Fairfield
Water Treatment Plant

Operation & Maintenance Manual
0200 Pre Treatment

0200 Pre Treatment
Operation Manual

Volume 3 of 5

4. Manufacturers Technical Data – Electrical – Main Switchboard

BRISBANE WATER

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A QUALITY COMPANY TO AS/ISO9001

FAIRFIELD WATER RECLAMATION PLANT
MAIN SWITCHBOARD

OPERATION &
MAINTENANCE MANUAL

JOB No A4215

HALMAC SERVICES IS A QUALITY COMPANY SERVING QUEENSLAND SINCE 1960
ELECTRICAL ENGINEERS & CONTRACTORS, DATA & COMMUNICATIONS, SERVICE AND MAINTENANCE, SWITCHBOARD MANUFACTURE, PLC, SCADA, TELEMETRY DESIGN & INSTALLATION
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FAIRFIELD WATER RECLAMATION PLANT MAIN SWITCHBOARD

OPERATION & MAINTENANCE MANUAL

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BRISBANE WATER

Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

FAIRFIELD WATER RECLAMATION PLANT

AIR CIRCUIT BREAKERS

1. MASTERPACT NT & NW CATALOGUE
2. MASTERPACT NW08-63 USER MANUAL
3. MICROLOGIC CONTROL UNITS USER MANUAL
4. MASTERPACT NW INSTALLATION MANUAL
5. SOURCE CHANGEOVER SYSTEM

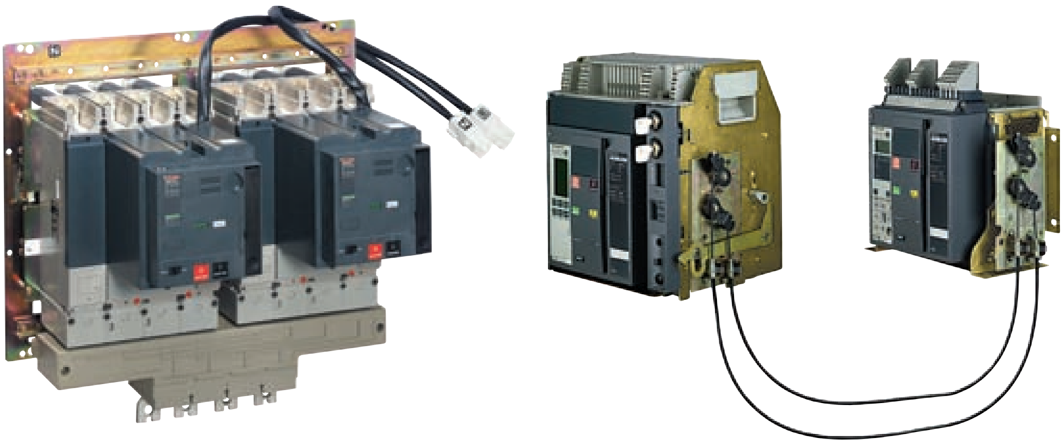
Low Voltage

Source changeover systems

Compact, Interpact and Masterpact

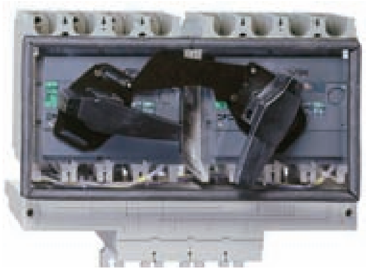
Catalogue

2008



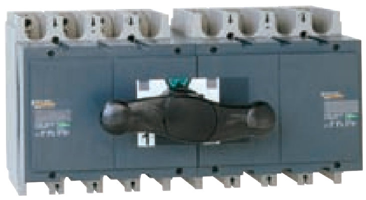
Schneider Electric

PB100839



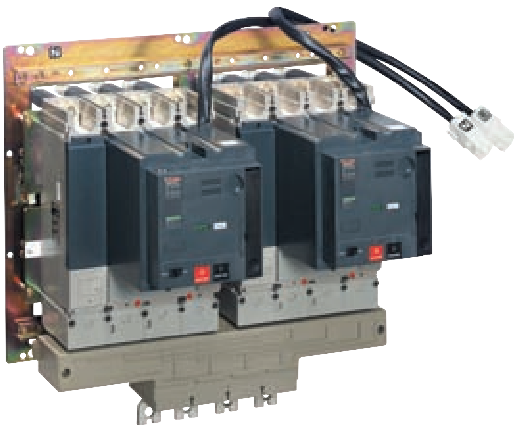
Interlocking of two Interpact switch-disconnectors via rotary handles.

PB100840



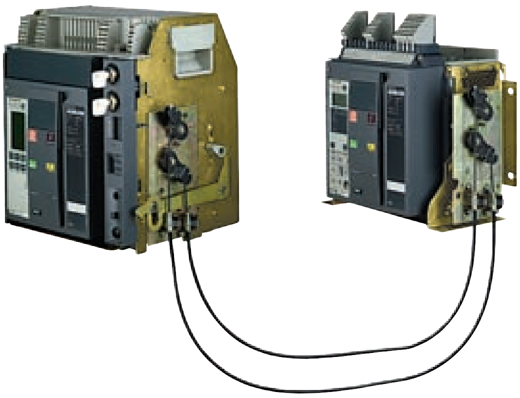
Complete source-changeover assembly with two Interpact switch-disconnectors.

PB100930-68



Interlocking of two Compact NS circuit breakers on a base plate.

PB100842



Interlocking of two Masterpact NT and NW circuit breakers using cables.

To ensure a continuous supply of electrical power, certain installations are connected to two sources:
- *a normal source N*
- *a replacement source R used to supply the installation when the normal source is unavailable.*

A source-changeover system switches the load between these two sources. It can be automated to manage transfers according to external conditions. A source-changeover system includes two or three circuit breakers or switch-disconnectors.

With Interpact INS, Compact NS and Masterpact NT and NW, new installation solutions are available to optimise the size of the switchboard and simplify installation.

General content

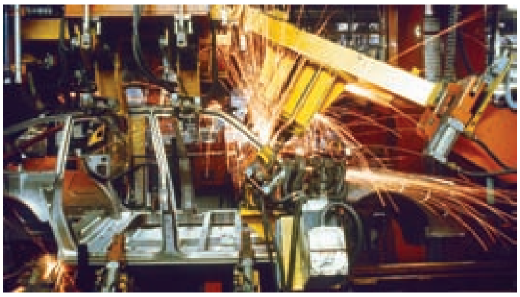
For maximum continuity of service ...

PB103937

PB103936

Commercial and service sector:
- *operating rooms in hospitals*
- *safety systems for tall buildings*
- *computer rooms (banks, insurance companies, etc.)*
- *lighting systems in shopping centres…*

PB103934



Industry:
- *assembly lines*
- *engine rooms on ships*
- *critical auxiliaries in thermal power stations…*

PB103935

Infrastructures:
- *port and railway installations*
- *runway lighting systems*
- *control systems on military sites…*

Manual source-changeover system

This is the most simple type. It is controlled manually by an operator and consequently the time required to switch from the normal to the replacement source can vary.
A manual source-changeover system is made up of two or three mechanically interlocked manually-operated circuit breakers or switch-disconnectors.

Remote-operated source-changeover system

This is the most commonly employed system for devices with high ratings (above 400 A). No human intervention is required. Transfer from the normal to the replacement source is controlled electrically.
A remote-controlled source-changeover system is made up of two or three circuit breakers or switch-disconnectors linked by an electrical interlocking system that may have different configurations. In addition, a mechanical interlocking system protects against electrical malfunctions or incorrect manual operations.

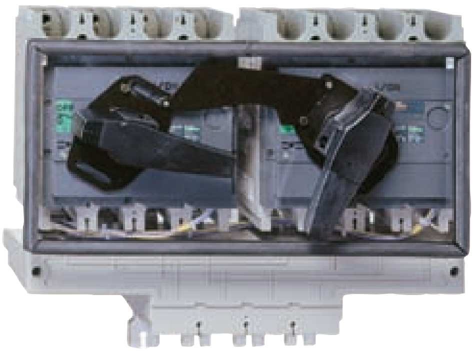
Automatic source-changeover systems

An automatic controller may be added to a remote-operated source-changeover system for automatic source control according to programmable operating modes. This solution ensures optimum energy management:
- transfer to a replacement source according to external requirements
- management of power sources
- regulation
- emergency source replacement, etc.

The automatic controller may be fitted with an option for communication with a supervisor.

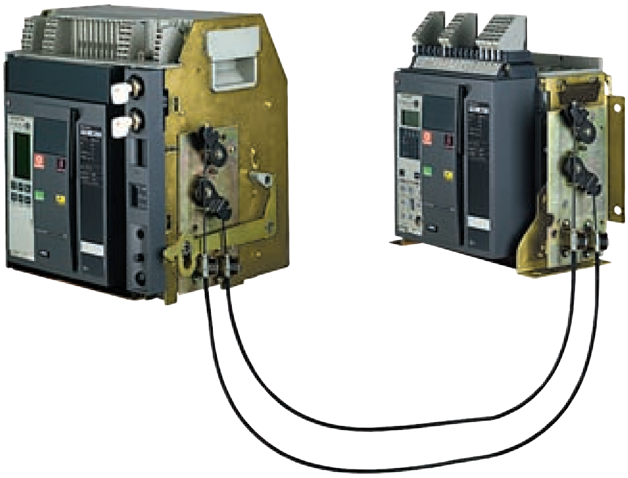
... in a wide range of applications

PB100839



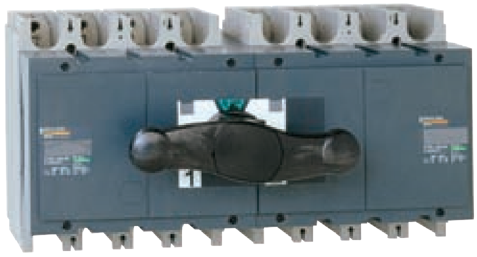
Interlocking of two Interpact switch-disconnectors via rotary handles.

PB100842



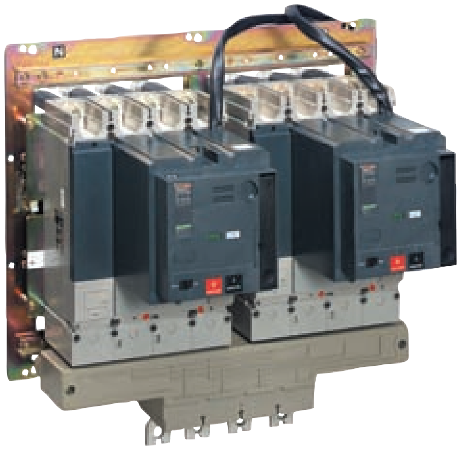
Interlocking of two Masterpact NT and NW circuit breakers using cables.

PB100840



Complete source-changeover assembly with two Interpact switch-disconnectors.

PB100957-62



Interlocking of two Compact NS circuit breakers on a base plate.

PB100849

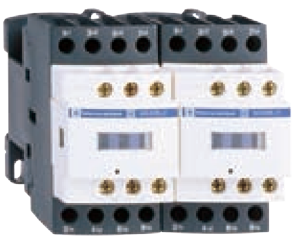
Interlocking of two Masterpact NT or NW circuit breakers using connecting rods.

PB100850

Interlocking of three Masterpact NW circuit breakers using cables.

Other source-changeover systems: Telemecanique products

PB100848



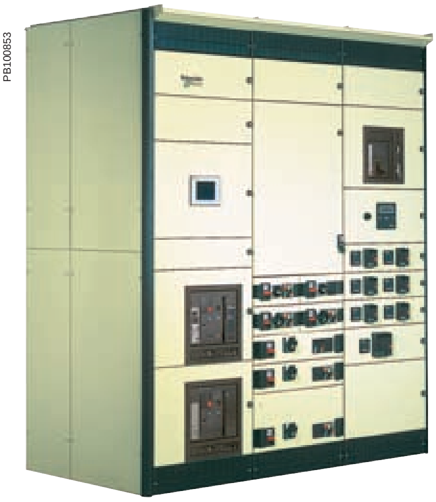
See LC2-D series.

PB100851

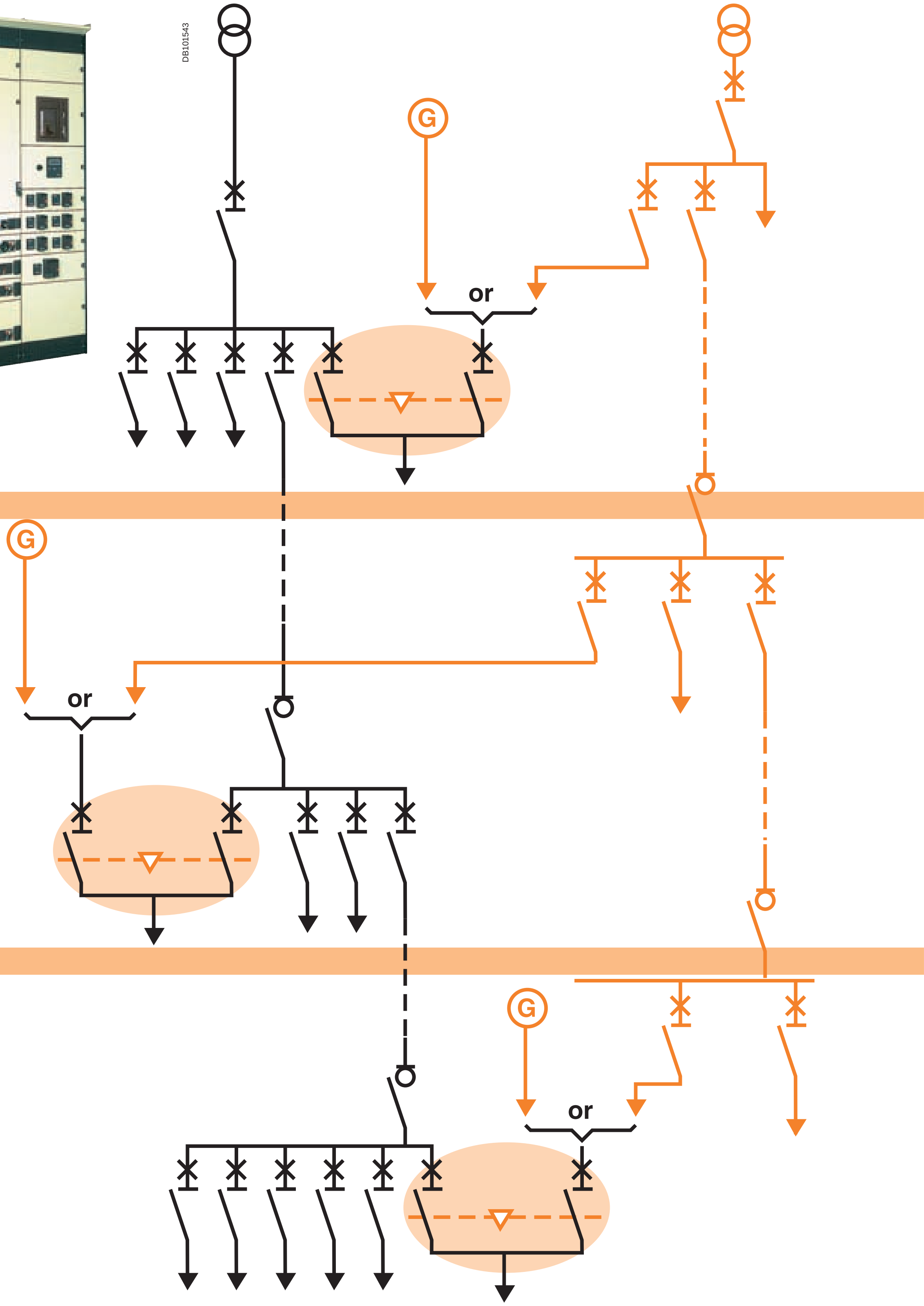
See LC2-F series.

For maximum continuity of service...

Incoming feeders and main LV switchboards



Currents
From 630 to 6300 A.



Power distribution

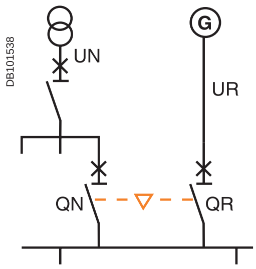
Currents
From 250 to 3200 A.

Loads

Currents
From 40 to 400 A.

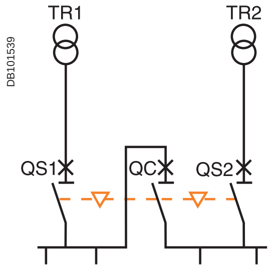
... in a wide range of applications

1 normal source
1 replacement source



QN	QR
0	0
1	0
0	1

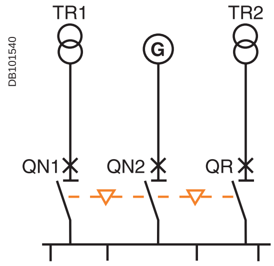
2 sources with coupler on busbars



QS1	QC	QS2
0	0	0
1	0	1
1	1	0
0	1	1
1	0	0 (1)
0	0	1 (1)

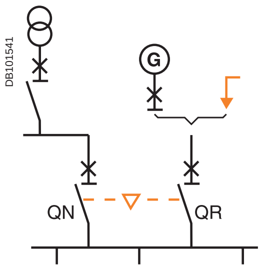
***(1)** possible by forcing operation.*

2 normal sources
1 replacement source



QN1	QN2	QR
0	0	0
1	1	0
0	0	1
1	0	0
0	1	0

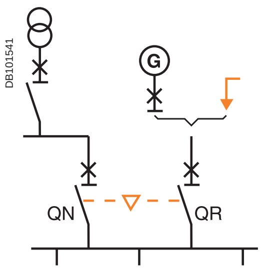
Generator or permanent source



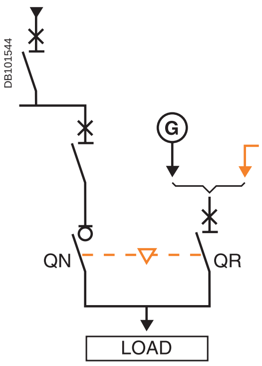
QN	QR
0	0
1	0
0	1

Typical applications:
- continuous production processes
- operating rooms
- computer rooms...

Generator or permanent source



Generator or permanent source



QN	QR
0	0
1	0
0	1

Typical applications:
- large electrical installations (e.g. airports)
- refrigeration units
- special electricity tariffs
- pumping stations...

TOOLS

schneider-electric.com

This international site allows you to access all the Schneider Electric products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- complete library: technical documents, catalogs, FAQs, brochures…
- selection guides from the e-catalog.
- product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, the list of country contacts…

The technical guide

These technical guides help you comply with installation standards and rules i.e.: the electrical installation guide, the protection guide, the switchboard implementation guide, the technical booklets and the co-ordination tables all form genuine reference tools for the design of high performance electrical installations.
For example, the LV protection co-ordination guide - discrimination and cascading - optimises choice of protection and connection devices while also increasing markedly continuity of supply in the installations.

Functions and characteristics

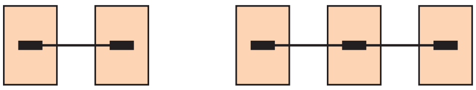
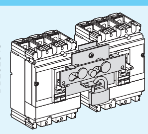
Overview of solutions

Manual source-changeover systems Interpact INS and Compact NS 40 A to 630 A

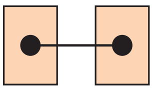
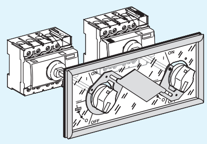
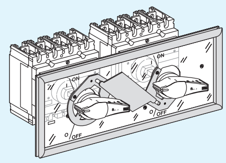
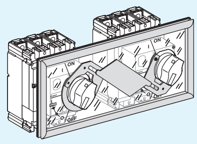
Range	Interpact		Compact
Models	INS40 to INS80 INS100 to INS160	INS250 to INS630 INV250 to INV630	NS100 to NS250 NS400 to NS630
Rating (A)	40 to 160	100 to 630	100 to 630
Type of device	Switch-disconnectors with extended handles	Switch-disconnectors	N/H/L circuit breakers NA switch-disconnectors

Manual source-changeover systems

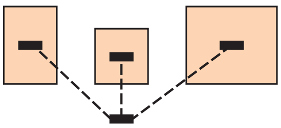
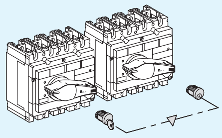
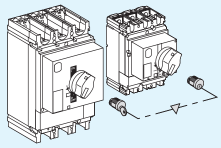
Interlocking via toggles

DB101768  *2 devices side-by-side* *3 devices side-by-side*			DB101545 

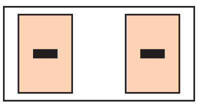
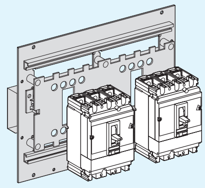
Interlocking via rotary handles

DB101769  *2 devices side-by-side*	DB101546 	DB101547 	DB101548 

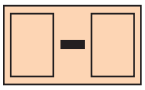
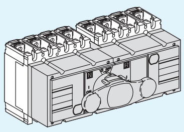
Interlocking via keylocks with captive keys

DB101770  *A number of different devices*		DB101549 	DB101550 

Interlocking on a base plate

DB101771  *2 devices side-by-side*			DB101551 

Complete source-changeover assemblies

DB101772  *2 devices side-by-side*		DB101552 	

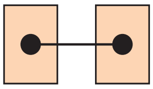
Overview of solutions

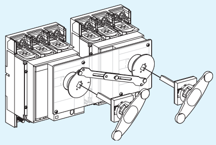
Manual source-changeover systems
Compact NS and Masterpact NT/NW
630 A to 6300 A

Range	Compact	Masterpact	
Models	NS630b to NS1600	NT06 to NT16	NW08 to NW63
Rating (A)	630 to 1600	630 to 1600	800 to 6300
Type of device	N/H/L circuit breakers NA switch-disconnectors	H1/L1 circuit breakers HA switch-disconnectors	N1/H1/H2/H3/L1 circuit breakers NA/HA/HF switch-disconnectors

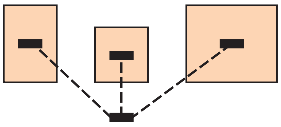
Manual source-changeover systems

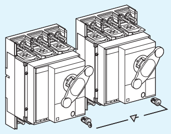
Interlocking via extended rotary handles

DB101769

2 devices side-by-side

DB101553


Interlocking via keylocks with captive keys

DB101770

A number of different devices

DB101554


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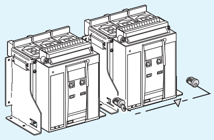

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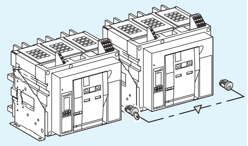
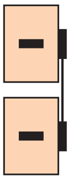
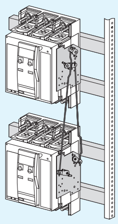
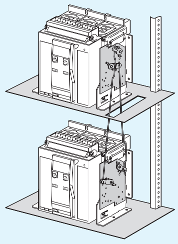


Mechanical interlocking using connecting rods

DB101773

2 devices one above the other

DB101557

(1)

DB101558


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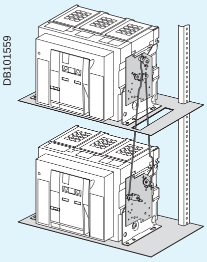
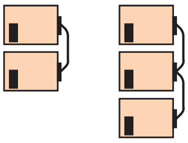
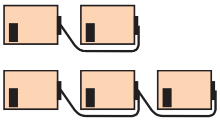
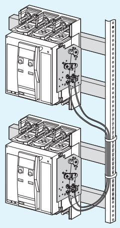
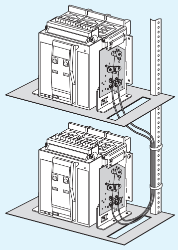


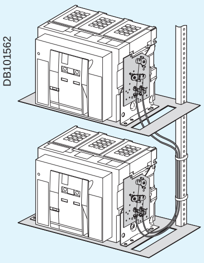
Mechanical interlocking using cables

DB101774

2 or 3 devices one above the other

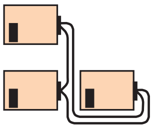
DB101775

2 or 3 devices side-by-side

DB101560

(1)
(2)

DB101561


DB101562


For this case and other cases, please consult us

DB101916


(1) Implemented with NS630b to NS1600 electrically-operated devices only.
(2) For source-changeover systems using cables, always respect the installation conditions specified on *page A-13**.*

Functions
and characteristics

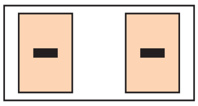
Overview of solutions

Remote-operated source-changeover systems Compact NS100/1600 100 A to 1600 A

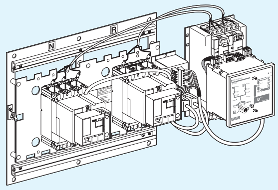
Range	Compact	
Models	NS100 to NS630	NS630b to NS1600
Rating (A)	100 to 630	630 to 1600
Type of device	N/H/L circuit breakers NA switch-disconnectors	N/H/L circuit breakers NA switch-disconnectors

Remote-operated source-changeover system

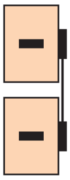
Mechanical interlocking on base plate + electrical interlocking



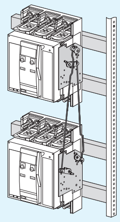
2 electrically-operated devices side-by-side combined with an electrical interlocking system



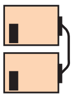
Mechanical interlocking using connecting rods + electrical interlocking



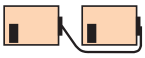
2 electrically-operated devices one above the other combined with an electrical interlocking system



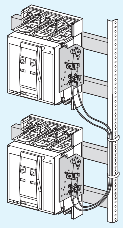
Mechanical interlocking using cables + electrical interlocking



2 electrically-operated devices one above the other combined with an electrical interlocking system



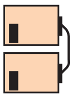
2 electrically-operated devices side-by-side combined with an electrical interlocking system

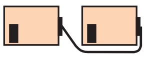


(2)

Automatic source-changeover systems

Remote-operated source-changeover system combined with an automatic-control system



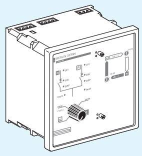


The automatic controller operates the devices depending on external parameters.

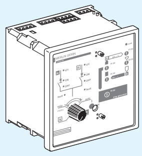
***BA**: Simple controller that manages the changeover function.*

***UA**: Controller that also manages engine generator sets.*

***UA150**: UA controller with a communication option.*



BA controller



UA and UA150 controller

(2) *For source-changeover systems using cables, always respect the installation conditions specified on* *page A-13*.

Overview of solutions

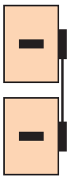
Remote-operated source-changeover systems Masterpact NT/NW 630 A to 6300 A

Range	Masterpact	
Models	NT06 to NT16	NW08 to NW63
Rating (A)	630 to 1600	800 to 6300
Type of device	H1/L1 circuit breakers HA switch-disconnectors	N1/H1/H2/H3/L1 circuit breakers NA/HA/HF switch-disconnectors

Remote-operated source-changeover system

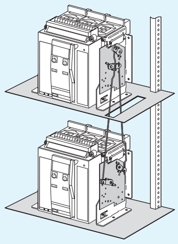
Mechanical interlocking using connecting rods + electrical interlocking

DB101773

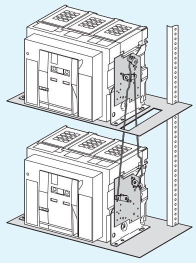


2 electrically-operated devices side-by-side combined with an electrical interlocking system

DB101558

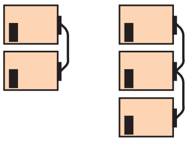


DB101559



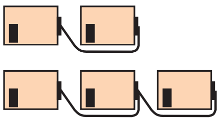
Mechanical interlocking using cables + electrical interlocking

DB101774



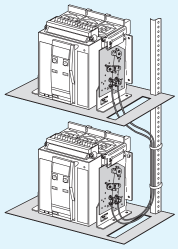
2 or 3 electrically-operated devices one above the other combined with an electrical interlocking system (1)

DB101775

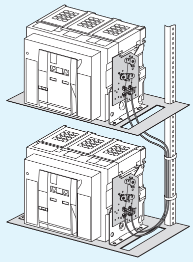


2 or 3 electrically-operated devices side-by-side combined with an electrical interlocking system (1)

DB101561



DB101562

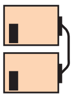


(2)

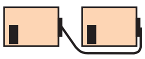
Automatic source-changeover systems

Remote-operated source-changeover system combined with an automatic-control system

DB101777



DB101776



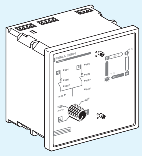
The automatic controller operates the devices depending on external parameters.

***BA**: Simple controller that manages the changeover function.*

***UA**: Controller that also manages engine generator sets.*

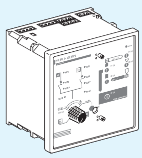
***UA150**: UA controller with a communication option.*

DB101564



BA controller

DB101565



UA and UA150 controller

(1) Three devices with Masterpact NW only.
(2) For source-changeover systems using cables, always respect the installation conditions specified on *page A-13*.
For other cases, please consult us.

Functions
and characteristics

Manual source-changeover systems

Possible combinations

A manual source-changeover system can be installed on two or three manually-operated and mechanically interlocked circuit breakers or switch-disconnectors. Interlocks prevent connection to both sources at the same time, even momentarily.

All possibilities for manual source-changeover systems

Type of device	Type of interlocking for two devices			
	Complete assembly	Keylock	Direct rotary handle	Extended rotary handle
Interpact switch-disconnectors				
INS40 to INS160				■
INS250-100 to INS630	■	■	■ 🔺	■ 🔺
INV100 to 630		■	■ 🔺	■ ▲ 🔺
INS/INV630b to 2500		■		

Legend:
▲ *Possible but visible break function disabled.*
🔺 *250 A and 630 A ratings can be mixed by using INS320/630 rotary handle interlocking system.*

Type of device	Type of interlocking for two devices					
	Toggle	Keylock	Direct rotary handle	Extended rotary handle	On base plate (toggle or direct extended rotary control)	On base plate (motor mechanism)
Compact fixed or withdrawable circuit breakers						
NS100 to 250	■ 🟧	■ 🟥 🟢	■ 🟧	■ 🟧	■ 🟥 🟦	■ 🟥 🟦
NS400 to NS630	■ 🟧	■ 🟥 🟢	■ 🟧	■ 🟧	■ 🟥 🟦	■ 🟥 🟦
NS100 to 630		■ 🟥 🟢	■ 🟧 🟠	■ 🟧 🟠	■ 🟥 🟦 🔴	■ 🟥 🟦 🔴
NS630b to 1600 with rotary handle		■ 🟥 🟢	■ 🟧	■ 🟧		

Legend:
🟧 *Fixed devices only.*
🟥 *Fixed or withdrawable devices.*
🟦 *Devices must be either both fixed or both withdrawable.*
🟠 *With NS400/630 rotary handle interlocking system.*
🔴 *Possible with NS400/630 base plate + NS100-250 adaptation kit.*
🟢 *Devices equipped with rotary handles.*

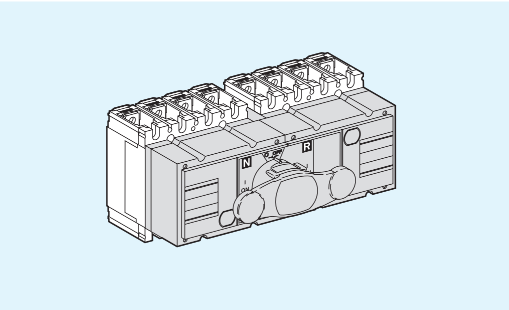
Type of device	Type of interlocking for either all fixed or all withdrawable devices					
	Keylock	Cable-type, 2 devices side-by-side	Cable-type, 3 devices side-by-side	Cable-type, 2 devices one above the other	Cable-type, 3 devices one above another	Rod-type, 3 devices one above another
Compact fixed or withdrawable circuit breakers or swith-disconnectors, with motor mechanism						
NS630b to 1600	■	■		■		■
Masterpact fixed or withdrawable circuit breakers or swith-disconnectors, manual operation or with motor mechanism						
NT06 to 16	■	■		■		■
NW08 to 63	■	■	■	■	■	■
NT06 to NW63	■	■		■		

Manual source-changeover systems

Possible combinations

All possibilities for manual source-changeover systems

DB101571



Complete source-changeover assembly for two Interpact INS switch-disconnectors.

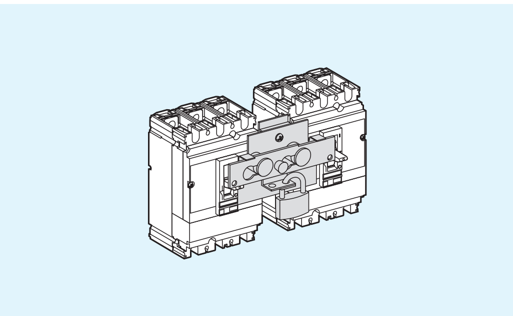
Complete source-changeover assembly for two switch-disconnectors

These assemblies provide an easy way to implement source changeover functions with:
■ a single 3-position rotary handle that controls the two switch-disconnectors (Normal source ON, OFF, Replacement source ON)
■ a smaller size, taking up less room in the switchboard.
A complete source changeover assembly can be ordered with a single catalogue number.

"Normal N"	"Replacement" R							
	INS250-100	INS250-160	INS200-200	INS250-250	INS320	INS400	INS500	INS630
INS250-100								
Ratings 100 A	■							
INS250-160								
Ratings 160 A		■						
INS200-200								
Ratings 200 A			■					
INS250-250								
Ratings 250 A				■				
INS320								
Ratings 320 A					■			
INS400								
Ratings 400 A						■		
INS500								
Ratings 500 A							■	
INS630								
Ratings 630 A								■

Possible combinations of "Normal" and "Replacement" source circuit breakers

DB101566



Interlocking of two toggle-controlled devices.

Interlocking of two or three toggle-controlled devices

Two devices can be interlocked using this system. Two identical interlocking systems can be used to interlock three devices installed side by side, in which case one device is in the ON position and the two others are in the OFF position. Devices must all have the same configuration, i.e. fixed, plug-in, withdrawable or drawout.
The system is locked using one or two padlocks (shackle diameter 5 to 8 mm).
Two interlocking system models are available for:
■ Compact NS100 to 250
■ Compact NS400 to 630.

"Normal N"	"Replacement" R				
	NS100	NS160	NS250	NS400	NS630
NS100					
Ratings 16... 100 A	■	■	■	■	■
NS160					
Ratings 80...160 A	■	■	■	■	■
NS250					
Ratings 125...250 A	■	■	■	■	■
NS400					
Ratings 150... 400 A	■	■	■	■	■
NS630					
Ratings 630 A	■	■	■	■	■

Functions
and characteristics

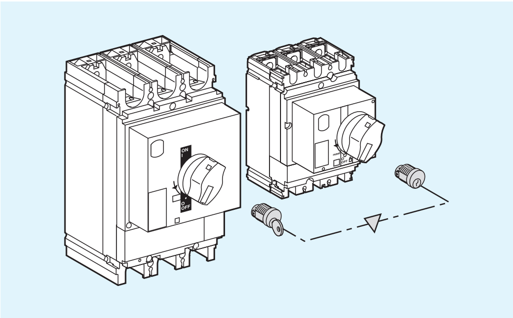
Manual source-changeover systems

Possible combinations

Combination of "Normal" and "Replacement" devices

All Interpact, Compact and Masterpact circuit breakers and switch-disconnectors from 100 to 6300 A with rotary handles or motor mechanisms can be interlocked.

DB101569



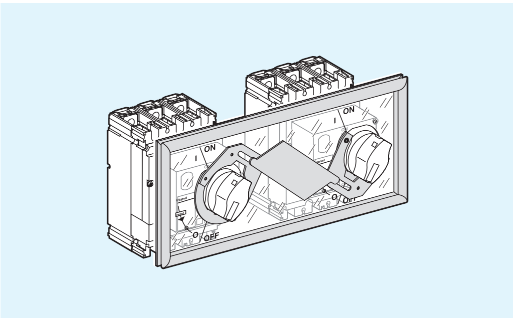
Keylock-type interlocking of two circuit breakers with rotary handles or motor mechanisms.

Interlocking of a number of devices using keylocks (captive keys)

Interlocking is based on two identical keylocks with a single key and a keylock adapter (different for each device). This solution enables interlocking between two devices that are physically distant or that have very different characteristics, for example between a low and a medium-voltage device, or between Compact NS circuit breakers and switch-disconnectors.
A system of wall-mounted captive key boxes makes possible a large number of combinations between many devices.

Possible combinations of "Normal" and "Replacement" source circuit breakers

DB101568



Interlocking of two Compact NS circuit breakers with rotary handles.

Interlocking of two devices with rotary handles

The direct or extended rotary handles are padlocked with the devices in the OFF position. The mechanism prevents simultaneous closing of the devices, but allows them to be opened.

"Normal N"	"Replacement" R				
Compact NS100/630 (1)	**NS100**	**NS160**	**NS250**	**NS400**	**NS630**
NS100					
Ratings 16... 100 A	■	■	■	□	□
NS160					
Ratings 80...160 A	■	■	■	□	□
NS250					
Ratings 125...250 A	■	■	■	□	□
NS400					
Ratings 160... 400 A	□	□	□	■	■
NS630					
Ratings 630 A	□	□	□	■	■

□ *250 A and 630 A ratings can be mixed by using NS400/630 rotary handle interlocking system.*

"Normal N"	"Replacement" R				
Compact NS630/1600 (1)	**NS630b**	**NS800**	**NS1000**	**NS1200**	**NS1600**
NS630b					
Ratings 250... 630 A	■	■	■	■	■
NS800					
Ratings 320... 800 A	■	■	■	■	■
NS1000					
Ratings 400... 1000 A	■	■	■	■	■
NS1200					
Ratings 480... 1200 A	■	■	■	■	■
NS1600					
Ratings 640... 1600 A	■	■	■	■	■

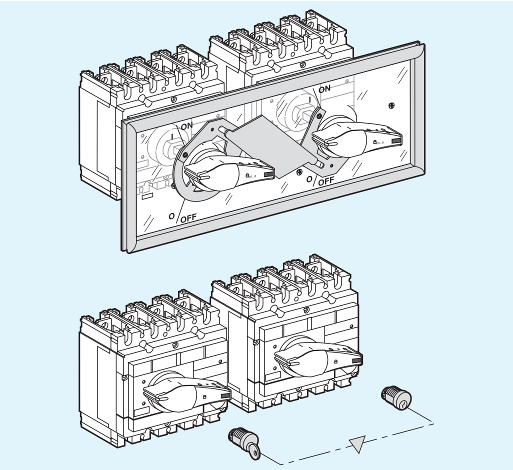
(1) When mixing NS100/250 and NS400/630 circuit breakers, use the NS400/630 interlocking system.

Manual source-changeover systems

Possible combinations

Possible combinations of "Normal" and "Replacement" source switch-disconnectors

DB107742



Interlocking of two Interpact switch-disconnectors with direct rotary handles.

Interlocking of two devices with rotary handles

The direct or extended rotary handles are padlocked with the devices in the OFF position. The mechanism prevents simultaneous closing of the devices, but allows them to be opened.

"Normal N"	"Replacement" R					
Interpact INS (1)	**INS40**	**INS63**	**INS80**	**INS100**	**INS125**	**INS160**
INS40						
Ratings 40 A	■	■	■	■	■	■
INS63						
Ratings 63 A	■	■	■	■	■	■
INS80						
Ratings 80 A	■	■	■	■	■	■
INS100						
Ratings 100 A	■	■	■	■	■	■
INS125						
Ratings 125 A	■	■	■	■	■	■
INS160						
Ratings 160 A	■	■	■	■	■	■

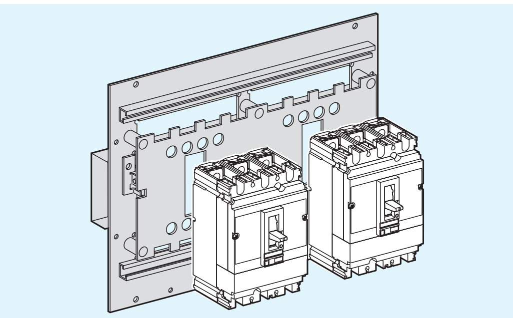
(1) With extended rotary handles only.
(2) Possible with INV, but visible-break function is significantly impaired.

"Normal N"	"Replacement" R							
Interpact INS /INV (2)	**INS250-100/ INV100**	**INS250-160/ INV160**	**INS250-200/ INV200**	**INS250-250/ INV250**	**INS320/ INV320**	**INS400/ INV400**	**INS500/ INV500**	**INS630/ INV630**
INS250-100/INV100								
Ratings 100 A	■	■	■	■	□	□	□	
INS250-160/INV160								
Ratings 160 A	■	■	■	■				
INS250-200/INV200								
Ratings 200 A	■	■	■	■				
INS250-250/INV250								
Ratings 250 A	■	■	■	■	□			□
INS320/INV320								
Ratings 320 A	□			□	■	■	■	■
INS400/INV400								
Ratings 400 A					■	■	■	■
INS500/INV500								
Ratings 500 A					■	■	■	■
INS630/INV630								
Ratings 630 A	□			□	■	■	■	■

□ 250 A and 630 A ratings can be mixed by using INS320/630 rotary handle interlocking system.

Possible combinations of Compact "Normal" and "Replacement" source circuit breakers

DB101570



Interlocking of two manually-operated Compact NS devices on a base plate.

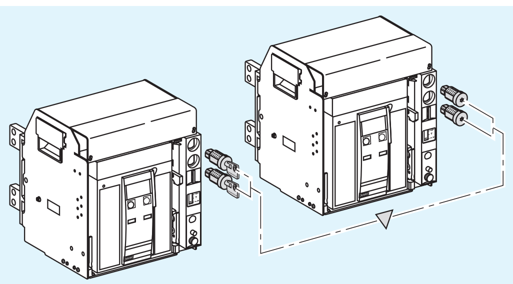
Interlocking of two devices on a base plate

A base plate is available for mechanical interlocking of two manually-operated Compact circuit breakers or switch-disconnectors.

"Normal N"	"Replacement" R				
	NS100	**NS160**	**NS250**	**NS400**	**NS630**
NS100					
Ratings 16... 100 A	■	■	■	■	■
NS160					
Ratings 80... 160 A	■	■	■	■	■
NS250					
Ratings 125... 250 A	■	■	■	■	■
NS400					
Ratings 150... 400 A	■	■	■	■	■
NS630					
Ratings 630 A	■	■	■	■	■

Combination of Masterpact devices

DB101903



Interlocking of a number of devices using keylocks (captive keys)

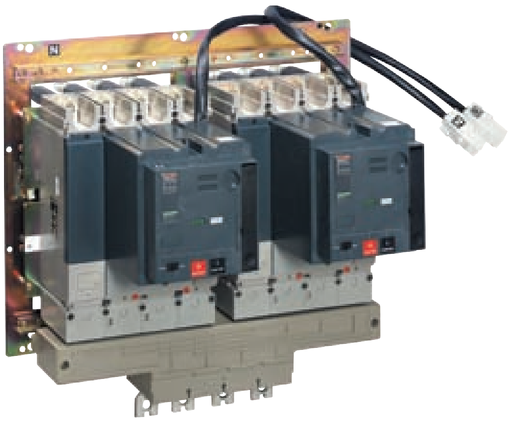
Interlocking uses two identical keylocks with a single key. This solution enables interlocking between two devices that are physically distant or that have significantly different characteristics.

Functions and characteristics

Remote-operated source-changeover systems
Mechanical interlocking

Electrical interlocking of two or three devices is used to create a remote-operated source-changeover system. A basic mechanical interlocking system enhances the reliability of system operation.

PB100930-67



Interlocking of two electrically-operated Compact NS circuit breakers using a base plate.

Interlocking of two Compact NS100 to 630 devices using a base plate

A base plate designed for two Compact circuit breakers can be installed horizontally or vertically on a mounting rail. Interlocking is carried out on the base plate by a mechanism located behind the breakers. Access to the circuit breaker controls and trip units is conserved. Circuit breakers must be fixed or plug-in versions, with or without earth-leakage protection or measurement modules. The base plate and the circuit breakers are supplied separately.

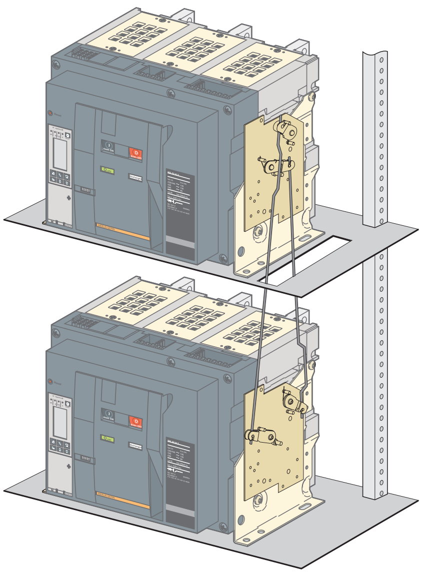
■ **base plate for Compact NS100 to 250 devices**
This base plate is intended for two Compact NS100 to 250 devices.

■ **base plate for Compact NS400 to 630 devices**
This base plate is intended for two Compact NS400 to 630 devices. It may also be used, without any modifications, to interlock a fixed Compact NS100 to 250 with a Compact NS400 or 630 device.
An adapter kit is required for plug-in versions of the Compact NS100 to 250 devices. Compact NS100 to 250 devices, in both fixed and plug-in versions, may be equipped with spreaders.

Possible combinations of "Normal" and "Replacement" Compact source circuit breakers

"Normal N"	"Replacement" R				
	NS100	NS160	NS250	NS400	NS630
NS100					
Ratings 12,5... 100 A	■	■	■	■	■
NS160					
Ratings 12,5...160 A	■	■	■	■	■
NS250					
Ratings 12,5...250 A	■	■	■	■	■
NS400					
Ratings 160... 400 A	■	■	■	■	■
NS630					
Ratings 250... 630 A	■	■	■	■	■

DB101572



Interlocking of two Masterpact NT or NW circuit breakers using connecting rods.

Interlocking of two Compact NS630b to 1600 or two Masterpact NT and NW devices using connecting rods

The two devices must be mounted one above the other (either 2 fixed or 2 withdrawable/drawout devices).
Combinations are possible between Compact NS630b to NS1600 devices and between Masterpact NT and Masterpact NW devices.

Installation
This function requires:

■ an adaptation fixture on the right side of each circuit breaker or switch-disconnector

■ a set of connecting rods with no-slip adjustments.

The adaptation fixtures, connecting rods and circuit breakers or switch-disconnectors are supplied separately, ready for assembly by the customer.
The maximum vertical distance between the fixing planes is 900 mm.

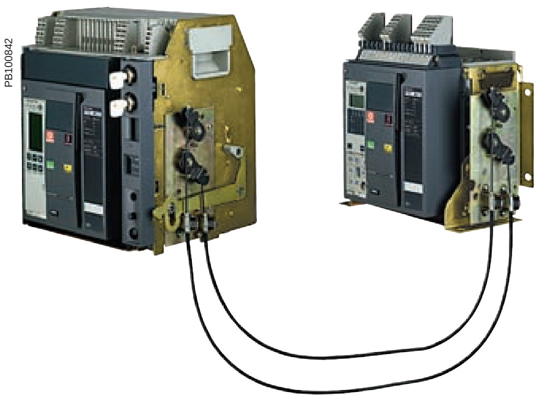
Possible combinations of "Normal" and "Replacement" source circuit breakers

"Normal N"	"Replacement" R			
	NS630b to NS1600	NT06 to NT16	NW08 to NW40	NW40b to NW63
NS630b to NS1600				
Ratings 250... 1600 A	■			
NT06 to NT16				
Ratings 250... 1600 A		■	■	■
NW08 to NW40				
Ratings 320... 4000 A		■	■	■
NW40b to NW63				
Ratings 4000... 6300 A		■	■	■

Functions and characteristics

Remote-operated source-changeover systems

Mechanical interlocking



Interlocking of two Masterpact circuit breakers using cables.

Interlocking of two Compact NS630b to 1600 or two Masterpact NT/NW or up to three Masterpact NW devices using cables

For cable interlocking, the circuit breakers may be mounted one above the other or side-by-side.
The interlocked devices may be fixed or drawout, three-pole or four-pole, and have different ratings and sizes.

Interlocking between two devices (Compact NS630b to 1600 or Masterpact NT and NW)

This function requires:

- an adaptation fixture on the right side of each device
- a set of cables with no-slip adjustments.

The maximum distance between the fixing planes (vertical or horizontal) is 2000 mm.

Interlocking between three devices (Masterpact NW only)

This function requires:

- a specific adaptation fixture for each type of interlocking, installed on the right side of each device
- two or three sets of cables with no-slip adjustments.

The maximum distance between the fixing planes (vertical or horizontal) is 1000 mm.

Installation

The adaptation fixtures, sets of cables and circuit breakers or switch-disconnectors are supplied separately, ready for assembly by the customer.

Installation conditions for cable interlocking systems:

- cable length: 2.5 m
- radius of curvature: 100 mm
- maximum number of curves: 3.

Possible combinations of "Normal" and "Replacement" source circuit breakers

"Normal N"	"Replacement" R			
	NS630b to NS1600	NT06 to NT16	NW08 to NW40	NW40b to NW63
NS630b to NS1600				
Ratings 250... 1600 A	■			
NT06 to NT16				
Ratings 250... 1600 A		■	■	■
NW08 to NW40				
Ratings 320... 4000 A		■	■	■
NW40b to NW63				
Ratings 4000... 6300 A		■	■	■

It is not possible to combine Compact NS630b to 1600 and Masterpact NT (or Masterpact NW) devices.
All combinations of two Masterpact NT and Masterpact NW devices are possible, whatever the rating or size of the devices.

Possible combinations of three device

"Normal N"	"Replacement" R			
	NS630b to NS1600	NT06 to NT16	NW08 to NW40	NW40b to NW63
NS630b to NS1600				
Ratings 250... 1600 A				
NT06 to NT16				
Ratings 250... 1600 A				
NW08 to NW40				
Ratings 320... 4000 A			■	■
NW40b to NW63				
Ratings 4000... 6300 A			■	■

Only Masterpact NW may be used for three-device combinations.

Types of mechanical interlocking and combinations

See page A-4 to page A-9.

Functions and characteristics

Remote-operated source-changeover systems

General characteristics

Range		Compact	
Types of devices		NS100 to NS250	NS400 to NS630
Types of circuit breakers		N / H / L	N / H / L
Switch-disconnector version		NA	NA
Mixing possibilities		all devices NS100 to NS250 N/H/L/NA fixed or plug-in	all devices NS100 to NS630 N/H/L/NA fixed or plug-in
Electrical characteristics			
Rating		15 to 250 A	15 to 630 A
Insulating voltage Ui (V AC)		750	750
Positive break indication		■	■
Number of poles (N and R devices must have the same number of poles)		3, 4	
Electrical durability		See page A-14	
Operating temperature		–25 °C to +70 °C (50 °C for 440 V - 60 Hz)	
Control characteristics			
Control voltage	AC	48 to 415 V - 50/60 Hz 440 V - 60 Hz	
	DC	24-250 V	
Maximum consumption	AC	500 VA	500 VA
	DC	500 W	500 W
Minimum switching time		800 ms	800 ms
Interlocking			
Mechanical (see page A-10)			
Electrical	by diagram (without IVE)	■	■
	with IVE unit	■	■
	auxiliary contacts used by circuit breaker	1 OF + 1 SDE	1 OF + 1 SDE
Protection and measurement			
Overload protection	long time	■	■
Short-circuit protection	short time	■	■
	instantaneous	■	■
Earth-fault protection			■
Zone selective interlocking (ZSI)			■
Earth-leakage protection	by Vigi module	■	■
	by control unit		
	by add-on Vigirex relay	■	■
Current measurements			
Voltage, frequency, power measurements, etc.			
Indication and control auxiliaries			
Available auxiliary indication contacts		OF + SD (+ SDV)	2 OF + SD (+ SDV)
Voltage releases	MX shunt	■	■
	MN undervoltage	■	■
Voltage presence indicator		■	■
Voltage transformer		■	■
Ammeter module		■	■
Insulation monitoring module		■	■
Source-changeover controller			
With permanent replacement source		■ BA controller	
With standby generator set		■ UA controller	
Remote communication via bus			
Device status indications		■	■
Device remote control			
Transmission of settings			
Indication and identification of protection status and alarms			
Transmission of measurements			
Installation and connection			
Fixed front connected			
Fixed rear connected		■ (long rear connections)	■ (long rear connections)
Withdrawable, plug-in or drawout		■ (plug-in on base)	■ (plug-in on base)
Installation and connection accessories			
Downstream coupling accessory		■	■
Bare-cable connectors		■	■
Terminal extensions		■	■
Terminal shields and inter-phase barriers			■
Locking	by padlock	■	■
	by keylock	■	■
Front panel escutcheons		■	■

Functions
and characteristics

Remote-operated source-changeover systems
General characteristics

	Masterpact	
NS630b to NS1600	NT06 to 16	NW08 to 63
N / H / L	N1 / H1 / H2 / H3 / L1	N1 / H1 / H2 / H3 / L1
NA	NA / HA / HF	NA / HA / HF
all devices	all mixing possibilities	all mixing possibilities
NS630b to 1600	(fixed, drawout or fixed + drawout)	(fixed, drawout or fixed + drawout)
N/H/L/NA	N1/H1/H2/H3/L1/NA/HA/HF	N1/H1/H2/H3/L1/NA/HA/HF
fixed or plug-in		
250 to 1600 A	600 to 1600 A	800 to 6300 A
750	1000	1000
	■	■
	3, 4	
See page A-14		
	–25 °C to +70 °C (50 °C for 440 V - 60 Hz)	
	48 to 415 V - 50/60 Hz	
	440 V - 60 Hz	
	24-250 V	
180 VA	180 VA	180 VA
180 W	180 W	180 W
800 ms	800 ms	800 ms
■	■	■
■	only with UA or BA	only with UA or BA
1 OF + 1 CE (+ SDE)	1 OF + 1 CE + 1 PF	1 OF + 1 CE + 1 PF
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
■	■	■
	■	■
2 OF + SD	2 OF + SD	2 OF + SD
■	■	■
■	■	■
	■	■
	■	■
	■	■
	■	■
	■ BA controller	
	■ UA controller	
■	■	■
■	■	■
■	■	■
■	■	■
■ (vertical or horizontal)	■ (vertical or horizontal)	■ (vertical or horizontal)
■ (drawout)	■ (drawout)	■ (drawout)
■		
■		
■	■	■
■	■	■
■	■	■

Functions and characteristics

Remote-operated source-changeover systems

Mechanical and electrical durability

Interpact INS switch-disconnectors

			INS250-100		INS250-160		INS250-200		INS250	
Number of poles			3, 4		3, 4		3, 4		3, 4	
Conventional thermal current (A)	Ith	At 60 °C	100		160		200		250	
Rated operational current (A)	Ie	**Electrical AC, 50/60 Hz**	**AC22A**	**AC23A**	**AC22A**	**AC23A**	**AC22A**	**AC23A**	**AC22A**	**AC23A**
		440-480 V	100	100	160	160	200	200	250	250
		660-690 V	100	100	160	160	200	200	250	250
Durability (category A) (O_N-C_R-O_R-C_N cycles)		Mechanical	15000		15000		15000		15000	
		Electrical AC, 50/60 Hz	**AC22A**	**AC23A**	**AC22A**	**AC23A**	**AC22A**	**AC23A**	**AC22A**	**AC23A**
		440-480 V	1500	1500	1500	1500	1500	1500	1500	1500
		660-690 V	1500	1500	1500	1500	1500	1500	1500	1500

			INS320		INS400		INS500		INS630	
Number of poles			3, 4		3, 4		3, 4		3, 4	
Conventional thermal current (A)	Ith	at 60 °C	320		400		500		630	
Rated operational current (A)	Ie	**Electrical AC, 50/60 Hz**	**AC22A**	**AC23A**	**AC22A**	**AC23A**	**AC22A**	**AC23A**	**AC22A**	**AC23A**
		440-480 V	320	320	400	400	500	500	630	630
		660-690 V	320	320	400	400	500	500	630	630
Durability (category A) (O_N-C_R-O_R-C_N cycles)		Mechanical	10000		10000		10000		10000	
		Electrical AC, 50/60 Hz	**AC22A**	**AC23A**	**AC22A**	**AC23A**	**AC22A**	**AC23A**	**AC22A**	**AC23A**
		440-480 V	1500	1500	1500	1500	1500	1500	1500	1500
		660-690 V	1500	1500	1500	1500	1500	1500	1500	1500

Compact NS100-NS1600

	NS100-250	NS400-630	NS630b-NS1600
Number of poles	3, 4	3, 4	3, 4
Rated current In (A)	100 to 250	400 to 630	630 to 1600
Mechanical durability (O_N-C_R-O_R-C_N cycles)	10000	8000	8000
Electrical durability at In (O_N-C_R-O_R-C_N cycles) for ≤ 440 V and 480 V NEMA (2)	10000	3000	2000
Electrical durability at In (O_N-C_R-O_R-C_N cycles) for U = 500 V to 690 V (2)	1500	1500	1500

Masterpact NT06-NT16/NW08-NW63 (1)

	NT06-NT10	NT12-NT16	NW08-NW16	NW20	NW25-NW40	NW50-NW63
Number of poles	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4
Rated current In (A)	630 to 1600	1250 to 1600	800 to 1600	2000	2500 to 4000	5000 to 6300
Mechanical durability (O_N-C_R-O_R-C_N cycles)	8000	8000	10000	10000	10000	5000
Electrical durability at In (O_N-C_R-O_R-C_N cycles) for ≤ 440 V and 480 V NEMA (2)	6000	6000 NT16: 3000	10000	8000	5000	1500
Electrical durability at In (O_N-C_R-O_R-C_N cycles) for U = 500 V to 690 V (2)	3000	2000 NT16: 1000	10000	6000	2500	1500

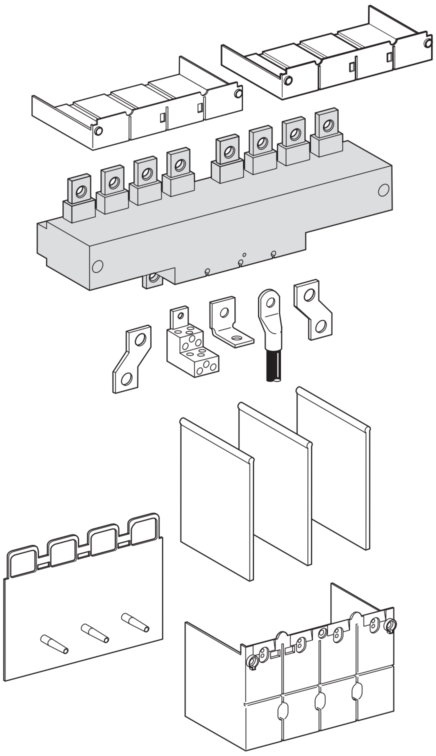
(1) Mechanical and electrical durability not applicable to Masterpact H3 and L versions.
(2) Electrical durability tests carried out with a power factor of 0.8 as per IEC 947-2.

Note:
ON: opening of Normal source
CR: closing of Replacement source
OR: opening of Replacement source
CN: closing of Normal source

Remote-operated

Connection and insulation accessories for Compact NS and INS ⩽ 630 A

DB101605



Downstream coupling accessory

This accessory simplifies connection to bars and cables with lugs.
It may be used to couple two circuit breakers (Compact NS100 to 630) or switch-disconnectors (Interpact INS/INV100 to 630) of the same size.
Pitch between outgoing terminals:

- Interpact INS250 and INV100 to 250: 35 mm
- Interpact INS/INV320 to 630: 52.5 mm
- Compact NS100 to 250: 35 mm
- Compact NS400 to 630: 52.5 mm.

For Compact NS circuit-breakers, the downstream coupling accessory can be used only with **fixed versions**.

Connection and insulation accessories

The coupling accessory can be fitted with the same connection and insulation accessories as the circuit breakers and switch-disconnectors.

Possible uses	Downstream coupling	
	Possible	Outgoing pitch (mm)
Manual source-changeover systems		
INS250 (100 to 250 A) with rotary handle	■	35
NS100/250 with rotary handle	■	35
NS100/250 on base plate with toggle control	■	35
INS400/630 (320 to 630 A) with rotary handle	■	52.5
NS400/630 with rotary handle	■	52.5
NS400/630 on base plate with toggle control	■	52.5
Complete source-changeover assembly		
INS250 (100 to 250 A)	■	35
INS400/630 (320 to 630 A)	■	52.5
Remote-operated source-changeover systems		
NS100/250	■	35
NS400/630	■	52.5

Remote-operated source-changeover systems

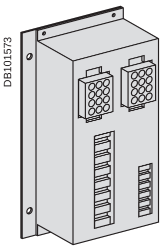
Electrical interlocking

Electrical interlocking is used with the mechanical interlocking system. It electrically interlocks the two circuit breakers and implements the time delays required for proper operation of the system.
An automatic controller may be added to take into account information from the distribution system.

Electrical interlocking is carried out by an electrical control device.
For Compact NS up to 630 A, electrical interlocking is implemented by the IVE unit integrating control circuits and an external terminal block. The integrated control circuits implement the time delays required for correct source transfer.
For Compact NS630b to 1600 and Masterpact, this function can be implemented in one of two ways:
■ using the IVE unit
■ by an electrician based on the diagrams presented in the “Electrical diagrams” part of this catalogue.

Characteristics of the IVE unit

■ external connection terminal block:
□ inputs: circuit breaker control signals
□ outputs: status of the SDE contacts on the “Normal” and “Replacement” source circuit breakers
■ 2 connectors for the two “Normal” and “Replacement” source circuit breakers:
□ inputs:
- status of the OF contacts on each circuit breaker (ON or OFF)
- status of the SDE contacts on the “Normal” and “Replacement” source circuit breakers
□ outputs: power supply for operating mechanisms
■ control voltage:
□ 24 to 250 V DC
□ 48 to 415 V 50/60 Hz - 440 V 60 Hz.
The IVE unit control voltage must be same as that of the circuit breaker operating mechanisms.



IVE unit.

Necessary equipment

For Compact NS100 to 630, each circuit breaker must be equipped with:
■ a motor mechanism
■ an OF contact
■ an SDE contact.
The components are supplied ready for assembly and the circuit breakers prewired. The prewiring must not be modified.

For Compact NS630b to 1600, each circuit breaker must be equipped with:
■ a motor mechanism
■ an available OF contact
■ a CE connected-position contact (carriage switch) on withdrawable circuit breakers
■ an SDE contact.

For Masterpact NT and NW, each circuit breaker must be equipped with:
■ a remote-operation system made up of:
□ MCH gear motor
□ MX or MN opening release
□ XF closing release
□ PF “ready to close” contact
■ an available OF contact
■ one to three CE connected-position contacts (carriage switches) on drawout circuit breakers (depending on the installation).

Functions
and characteristics

Remote-operated source-changeover systems

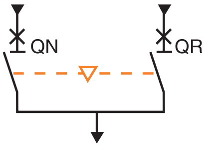
Standard configurations

Compact NS, Masterpact NT and NW

Types of mechanical interlocking | Possible combinations | Typical electrical diagrams | Diagram no.

2 devices

DB101574



QN	QR
0	0
1	0
0	1

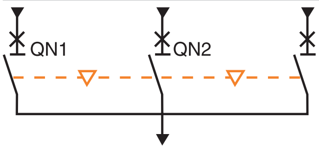
Typical electrical diagrams	Diagram no.
Compact NS100 to 630:	
■ electrical interlocking without emergency power off (EPO) auxiliaries:	51201177
□ with EPO by MN	51201178
□ with EPO by MX	51201179
Compact NS630b to 1600:	
■ electrical interlocking with lockout after fault:	
□ permanent replacement source (without IVE)	51201180
□ with EPO by MX (without IVE)	51201181
□ with EPO by MN (without IVE)	51201182
□ permanent replacement source (with IVE)	51201183
□ with EPO by MX (with IVE)	51201184
□ with EPO by MN (with IVE)	51201185
■ automatic control without lockout after fault:	
□ permanent replacement source (without IVE)	51201186
□ engine generator set (without IVE)	51201187
Masterpact NT and NW:	
■ electrical interlocking with lockout after fault:	
□ permanent replacement source (without IVE)	51201139
□ with EPO by MX (without IVE)	51201140
□ with EPO by MN (without IVE)	51201141
□ permanent replacement source (with IVE)	51201142
□ with EPO by MX (with IVE)	51201143
□ with EPO by MN (with IVE)	51201144
■ automatic control without lockout after fault:	
□ permanent replacement source (without IVE)	51156226
□ engine generator set (without IVE)	51156227
■ automatic control with lockout after fault:	
□ permanent replacement source (with IVE)	51156904
□ engine generator set (with IVE)	51156905
■ BA/UA controller (with IVE)	51156903

Masterpact NW only

Types of mechanical interlocking | Possible combinations | Typical electrical diagrams | Diagram no.

3 devices: 2 “Normal” sources and 1 “Replacement” source

DB101575

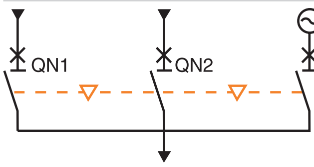


QN1	QN2	QR
0	0	0
1	1	0
0	0	1

Typical electrical diagrams	Diagram no.
■ electrical interlocking:	
□ without lockout after fault	51156906
□ with lockout after fault	51156907

3 devices: 2 “Normal” sources and 1 “Replacement” source with source selection

DB101576

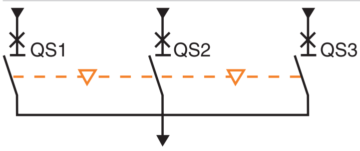


QN1	QN2	QR
0	0	0
1	0	0
0	0	1
1	1	0
0	1	0

Typical electrical diagrams	Diagram no.
■ automatic control with engine generator set:	
□ without lockout after fault (with MN)	51156908
□ with lockout after fault (with MN)	51156909

3 devices: 3 sources, only one device

DB101577

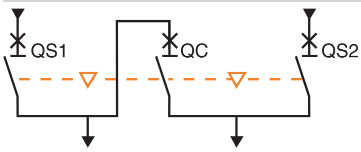


QS1	QS2	QS3
0	0	0
1	0	0
0	1	0
0	0	1

Typical electrical diagrams	Diagram no.
■ electrical interlocking:	
□ without lockout after fault	51156910
□ with lockout after fault	51156911

3 devices: 2 sources + 1 coupling

DB101578



QS1	QC	QS2	
0	0	0	
1	0	1	
1	1	0	
0	1	1	
1	0	0	(1)
0	0	1	(1)

(1) possible by forcing operation

Typical electrical diagrams	Diagram no.
■ electrical interlocking:	
□ without lockout after fault	51156912
□ with lockout after fault	51156913
■ automatic control with lockout after fault	51156914

“Lockout after fault” option. This option makes it necessary to manually reset the device following fault tripping.

Functions
and characteristics

Associated controllers

Controller selection

By combining a remote-operated source-changeover system with an integrated BA or UA automatic controller, it is possible to automatically control source transfer according to user-selected sequences.
These controllers can be used on source-changeover systems comprising 2 circuit breakers.
For source-changeover systems comprising 3 circuit breakers, the automatic control diagram must be prepared by the installer as a complement to to diagrams provided in the "electrical diagrams" section of this catalogue.

PB100855

BA controller.

PB100856

UA controller.

Controller		BA	UA
Compatible circuit breakers		All Compact NS and Masterpact circuit breakers	
4-position switch			
Automatic operation		■	■
Forced operation on "Normal" source		■	■
Forced operation on "Replacement" source		■	■
Stop (both "Normal" and "Replacement" sources off)		■	■
Automatic operation			
Monitoring of the "Normal" source and automatic transfer		■	■
Generator set startup control			■
Delayed shutdown (adjustable) of generator set			■
Load shedding and reconnection of non-priority circuits			■
Transfer to the "Replacement" source if one of the phases of the "Normal" phase is absent			■
Test			
By opening the P25M circuit breaker supplying the controller		■	
By pressing the test button on the front of the controller			■
Indications			
Circuit breaker status indication on the front of the controller: on, off, fault trip		■	■
Automatic mode indicating contact		■	■
Other functions			
Selection of type of "Normal" source (single-phase or three-phase) (1)			■
Voluntary transfer to "Replacement" source (e.g. energy management commands)		■	■
During peak-tariff periods (energy management commands) forced operation on "Normal" sourceif "Replacement" source not operational			■
Additional contact (not part of controller). Transfer to "Replacement" source only if contact is closed. (e.g. used to test the frequency of UR).		■	■
Setting of maximum startup time for the replacement source			■
Options			
Communication option			
Power supply			
Control voltages (2)	110 V	■	■
	220 to 240 V 50/60 Hz	■	■
	380 to 415 V 50/60 Hz and 440 V 60 Hz	■	■
Operating thresholds			
Undervoltage	0.35 Un ⩽ voltage ⩽ 0.7 Un	■	■
Phase failure	0.5 Un ⩽ voltage ⩽ 0.7 Un		■
Voltage presence	voltage ⩾ 0.85 Un	■	■
IP degree of protection (EN 60529) and IK degree of protection against external mechanical impacts (EN 50102)			
Front	IP40	■	■
Side	IP30	■	■
Connectors	IP20	■	■
Front	IK07	■	■
Characteristics of output contacts (dry, volt-free contacts)			
Rated thermal current (A)	8		
Minimum load	10 mA at 12 V		
Output contacts:			
Position of the Auto/Stop switch		■	■
Load shedding and reconnection order			■
Generator set start order.			■

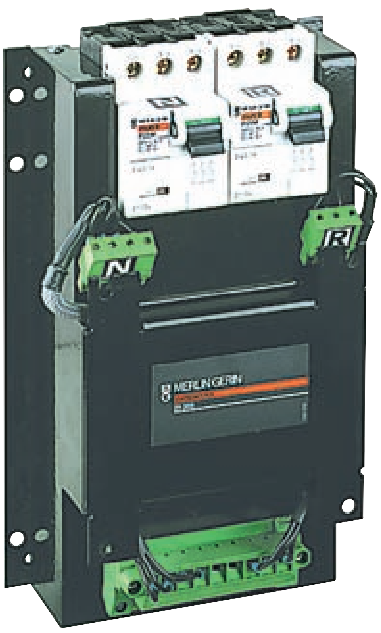
		AC				DC	
Utilisation category (IEC 947-5-1)		AC12	AC13	AC14	AC15	DC12	DC13
Operational current (A)	24 V	8	7	5	5	8	2
	48 V	8	7	5	5	2	-
	110 V	8	6	4	4	0.6	-
	220/240 V	8	6	4	3	-	-
	250 V	-	-	-	-	0.4	-
	380/415 V	5	-	-	-	-	-
	440 V	4	-	-	-	-	-
	660/690 V	-	-	-	-	-	-

(1) For example, 220 V single-phase or 220 V three-phase.
(2) The controller is powered by the ACP auxiliaries control plate. The same voltage must be used for the ACP plate, the IVE unit and the circuit-breaker operating mechanisms. If this voltage is the same as the source voltage, then the "Normal" and "Replacement" sources can be used directly for the power supply. If not, an isolation transformer must be used.

Associated controllers

Controller installation

PB100857



ACP auxiliaries control plate.

ACP auxiliaries control plate

The auxiliaries control plate provides in a single unit:

- protection for the BA or UA controller with two highly limiting P25M circuit breakers (infinite breaking capacity) for power drawn from the AC source
- control of circuit-breaker ON and OFF functions via two relay contactors
- connection of the circuit breakers to the BA or UA controller via a built-in terminal block.

Control voltages

- 110 V 50/60 Hz
- 220 to 240 V 50/60 Hz
- 380 to 415 V 50/60 Hz and 440 V 60 Hz.

The same voltage must be used for the ACP plate, the controller and the circuit-breaker operating mechanisms.

Installation

Connection between the ACP auxiliaries control plate and the IVE electrical-interlocking unit may use:

- wiring done by the installer
- prefabricated wiring (optional).

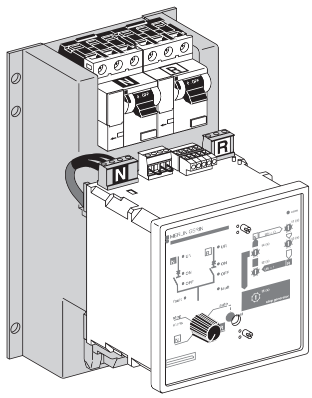
Installation of the BA and UA controllers

The BA and UA controllers may be installed in one of two manners:

- directly mounted on the ACP auxiliaries control plate
- mounted on the front panel of the switchboard.

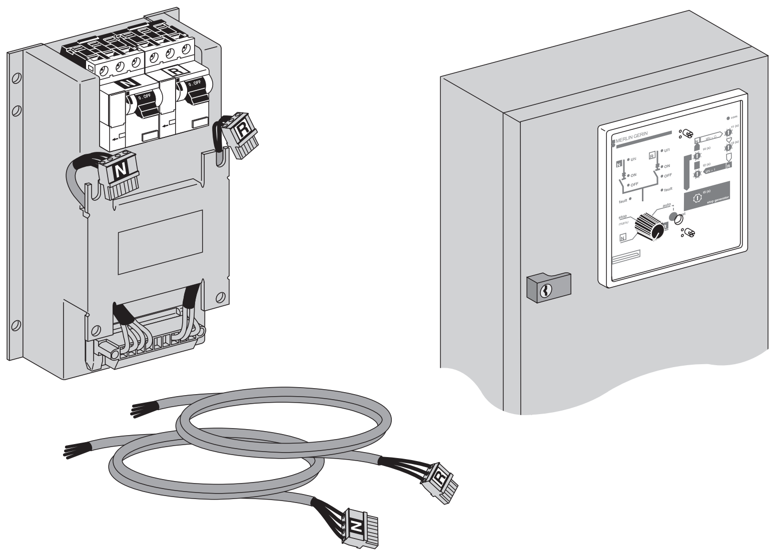
The length of the connection between the ACP plate and the controller must not exceed two metres. Wiring is done by the installer.

DB101579



Mounting on the ACP plate.

DB101580



Mounting on the front panel of the switchboard.

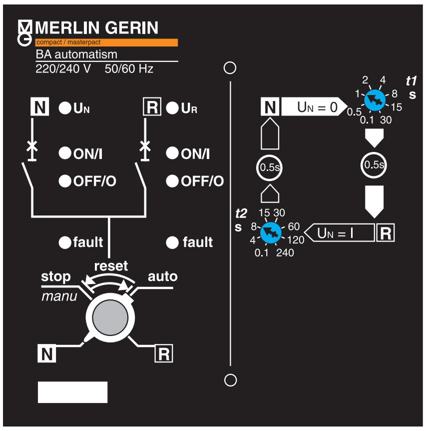
Associated controllers

BA controller

The BA controller is used to create simple source-changeover systems that switch from one source to another depending on the presence of voltage UN on the “Normal” source.
It is generally used to manage two permanent sources and can control Compact NS and Masterpact NT/NW circuit breakers and switch-disconnectors.

PB100858

DB101779



Front of the BA controller.

Operating modes

A four-position switch may be used to select:

- automatic operation
- forced operation on the “Normal” source
- forced operation on the “Replacement” source
- stop (both “Normal” and “Replacement” sources off).

Setting the time delays

Time delays are set on the front of the controller.
t1. delay between detection that the “Normal” source has failed and the transmission of the order to open the “Normal” source circuit breaker (adjustable from 0.1 to 30 seconds).
t2. delay between detection that the “Normal” source has returned and the transmission of the order to open the “Replacement” source circuit breaker (adjustable from 0.1 to 240 seconds).

Circuit breaker commands and status indications

The status of the circuit breakers is indicated on the front of the controller.

- ON, OFF, fault.

A built-in terminal block may be used to connect the following input/output signals:

- inputs:
  - voluntary order to transfer to source R (e.g. for special tariffs, etc.)
  - additional control contact (not part of the controller). Transfer to the “Replacement” source takes place only if the contact is closed (e.g. used to test the frequency of UR, etc.)
- outputs:

indication of operation in automatic or stop mode via changeover contacts.

Test

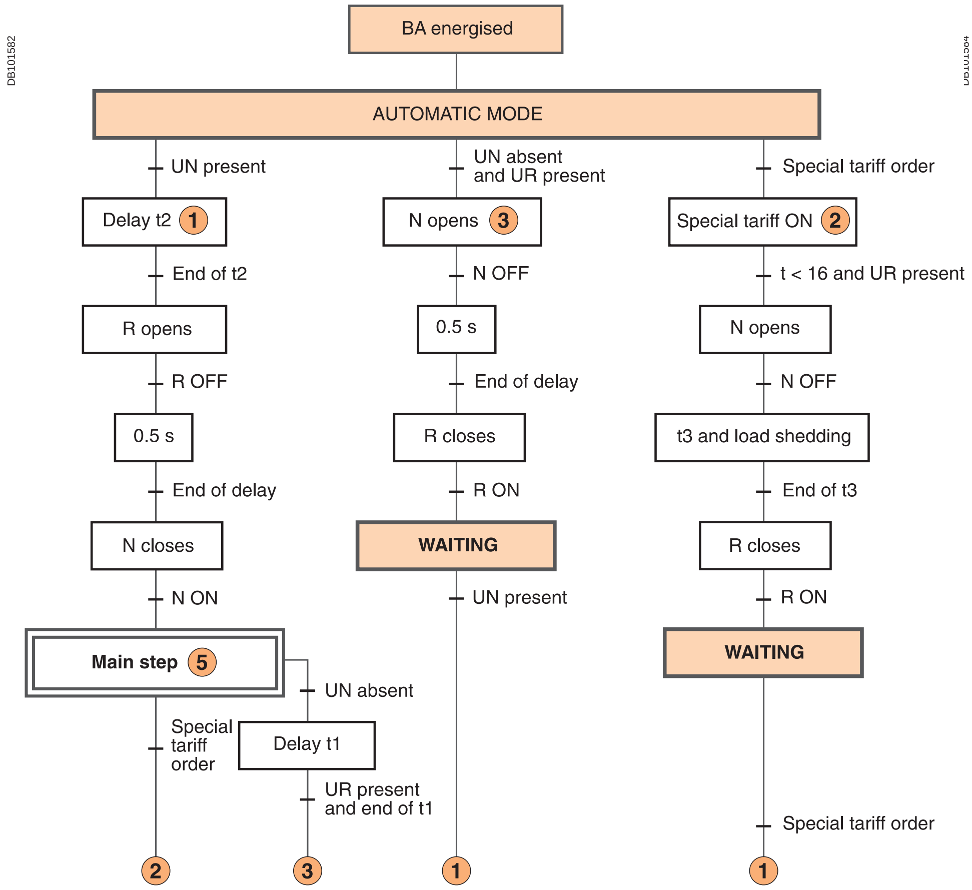
It is possible to test the operation of the BA controller by turning OFF (opening) the P25M circuit breaker for the “Normal” source and thus simulating a failure of voltage UN.

Functions and characteristics

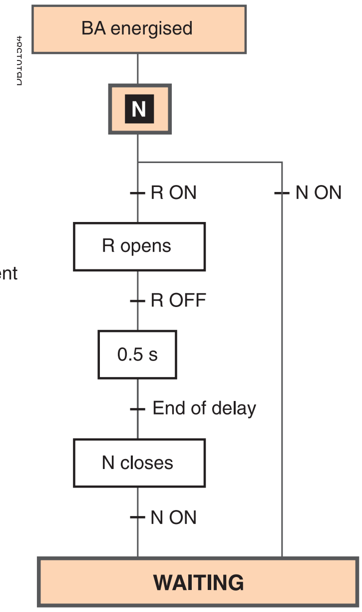
Associated controllers

BA controller operating sequences

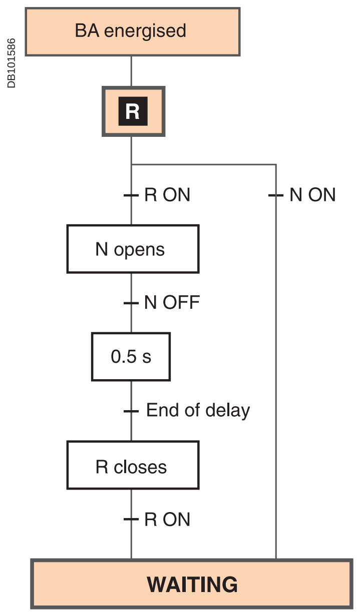
Switch set to Auto (automatic operation and special-tariff mode)



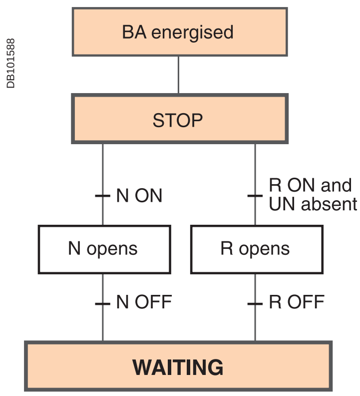
Switch set to the "N" position (forced operation on the "Normal" source)



Switch set to the "R" position (forced operation on the "Replacement" source)



Switch set to the "Stop" position



Key
UN : "Normal" source voltage
UR : "Replacement" source voltage
N : "Normal" source circuit breaker
R : "Replacement" source circuit breaker

1 *The number sends to the indicated step when the condition is true.*

WAITING The system exits this mode when the operating mode is modified or when an external event occurs (e.g. failure or return of UN).

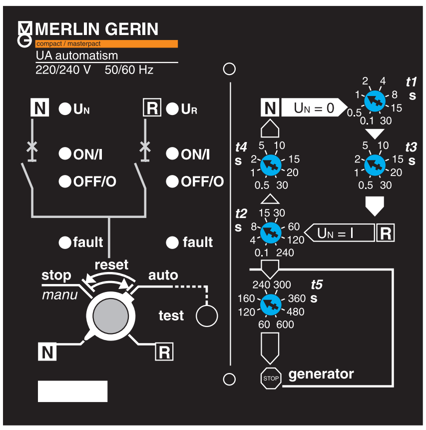
Associated controllers

UA controller

The UA controller is used to create a source-changeover system integrating the following automatic functions:
■ transfer from one source to another depending on the presence of voltage UN on the “Normal” source
■ startup of an engine generator set
■ shedding and reconnection of non-priority circuits
■ transfer to the “Replacement” source if one of the phases on the “Normal” source fails.
The UA controller can control Compact NS and Masterpact NT/NW devices.

PB100858

DB101778



Front of the UA controller.

Operating modes

A four-position switch may be used to select:
■ automatic operation
■ forced operation on the “Normal” source
■ forced operation on the “Replacement” source
■ stop (both “Normal” and “Replacement” sources off, then manual operation).

Setting the time delays

Time delays are set on the front of the controller.
t1. delay between detection that the “Normal” source has failed and the transmission of the order to open the “Normal” source circuit breaker (adjustable from 0.1 to 30 seconds).
t2. delay between detection that the “Normal” source has returned and the transmission of the order to open the “Replacement” source circuit breaker (adjustable from 0.1 to 240 seconds).
t3. delay following opening of QN with load shedding and before closing of QR (adjustable from 0.5 to 30 seconds).
t4. delay following opening of QR with load reconnection and before closing of QN (adjustable from 0.5 to 30 seconds).
t5. delay for confirmation that UN is present before shutting down the engine generator set (adjustable from 60 to 600 seconds).
t6. delay before startup of the engine generator set (120 or 180 seconds).

Commands and indications

Circuit breaker status indications on the front of the controller:
■ ON, OFF, fault.
A built-in terminal block may be used to connect the following input/output signals:
■ inputs:
□ voluntary order to transfer to source R (e.g. for special tariffs, etc.)
□ additional control contact (not part of the controller). Transfer to the “Replacement” source takes place only if the contact is closed (e.g. used to test the frequency of UR, etc.)
■ outputs:
□ control of an engine generator set (ON / OFF)
□ shedding of non-priority circuits
□ indication of operation in automatic mode via changeover contacts.

Distribution-system settings

Three switches are used to:
■ select the type of “Normal” source, whether single-phase or three-phase (e.g. 240 V single-phase or 240 V three-phase)
■ select whether to remain (or not) on the “Normal” source if the “Replacement” source is not operational during operation on special tariffs
■ select the maximum permissible startup time for the engine generator set during operation on special tariffs (120 or 180 seconds).

Test

A pushbutton on the front of the controller may be used to test transfer from the “Normal” source to the “Replacement” source, then the return to the “Normal” source. The test lasts approximately three minutes.

COM communications option

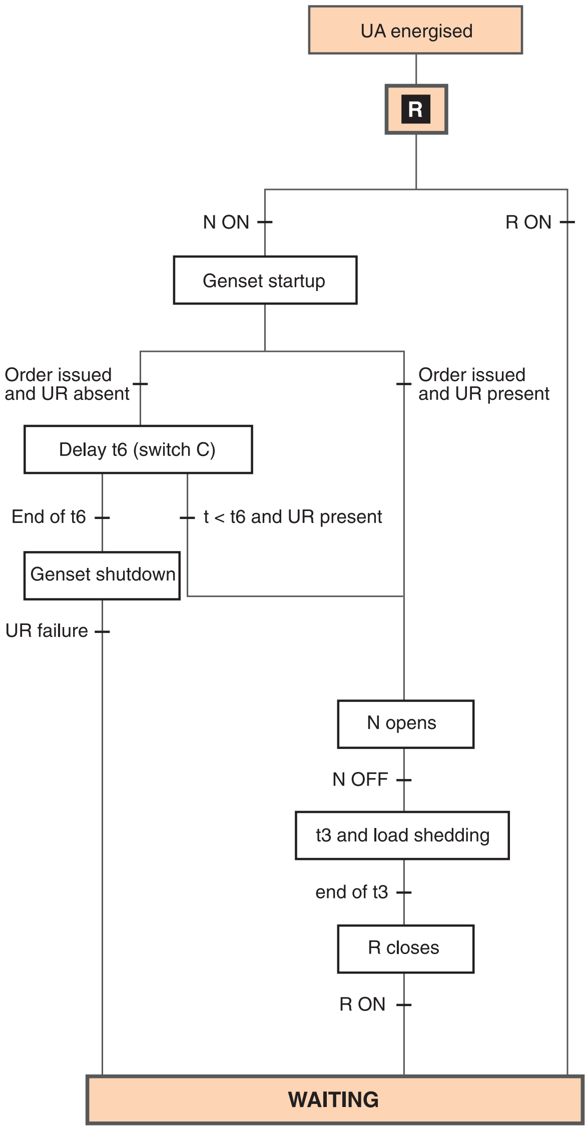
Using the internal bus protocol, this option may be used to remote the following information:
■ circuit breaker status (ON, OFF, fault trip)
■ presence of the “Normal” and “Replacement” voltages
■ presence of an order for forced operation (e.g. special tariffs)
■ settings and configuration information
■ status of non-priority circuits (loads shed or not)
■ position of the switch (stop, auto, forced operation on the “Normal” source, forced operation on the “Replacement” source).

Associated controllers

UA controller operating sequences

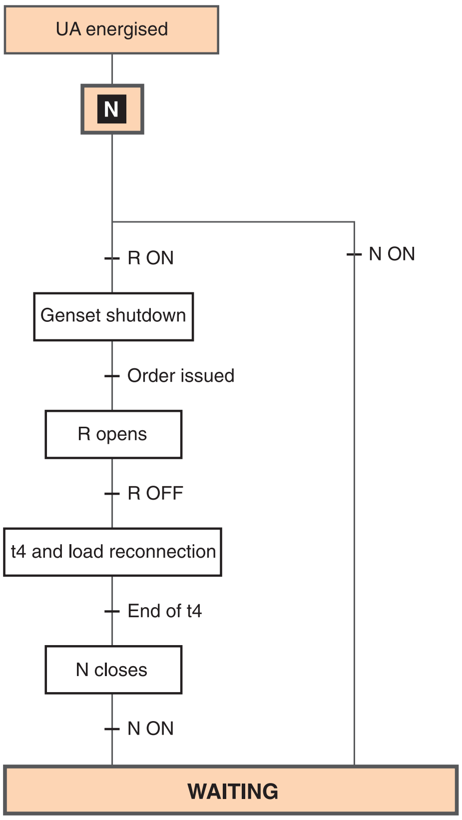
Switch set to the "R" position (forced operation on the "Replacement" source)

DB101590



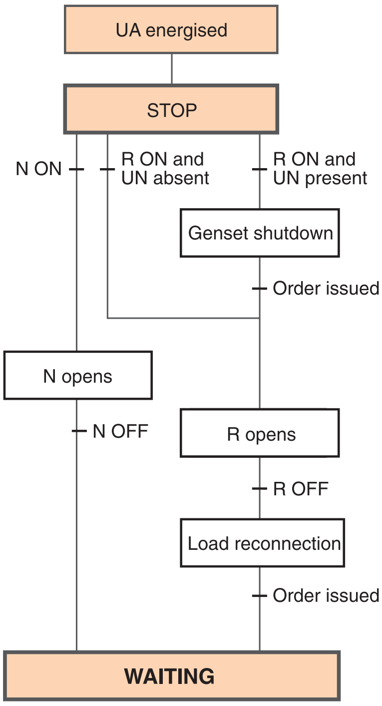
Switch set to the "N" position (forced operation on the "Normal" source)

DB101592



Switch set to the "Stop" position

DB101594



WAITING The system exits this mode when the operating mode is modified or when an external event occurs (e.g. failure or return of UN).

When the UA controller is not energised, the output for generator set startup is activated).

Key

UN : "Normal" source voltage
UR : "Replacement" source voltage
N : "Normal" source circuit breaker
R : "Replacement" source circuit breaker

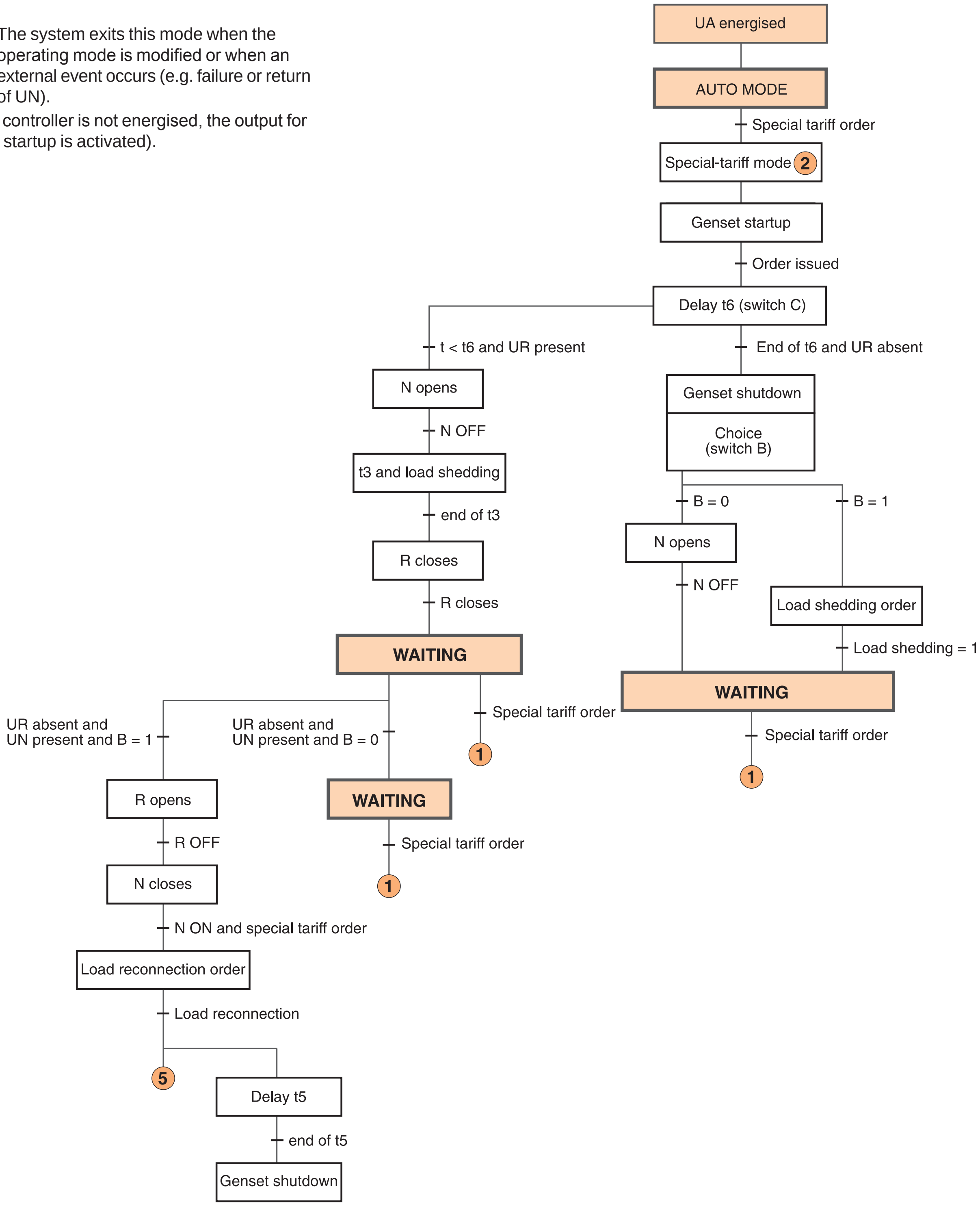
Functions
and characteristics

Associated controllers
UA controller
Operating sequences

Switch set to the "Auto" position (special-tariff mode)

DB117634

WAITING The system exits this mode when the operating mode is modified or when an external event occurs (e.g. failure or return of UN).
When the UA controller is not energised, the output for generator set startup is activated).



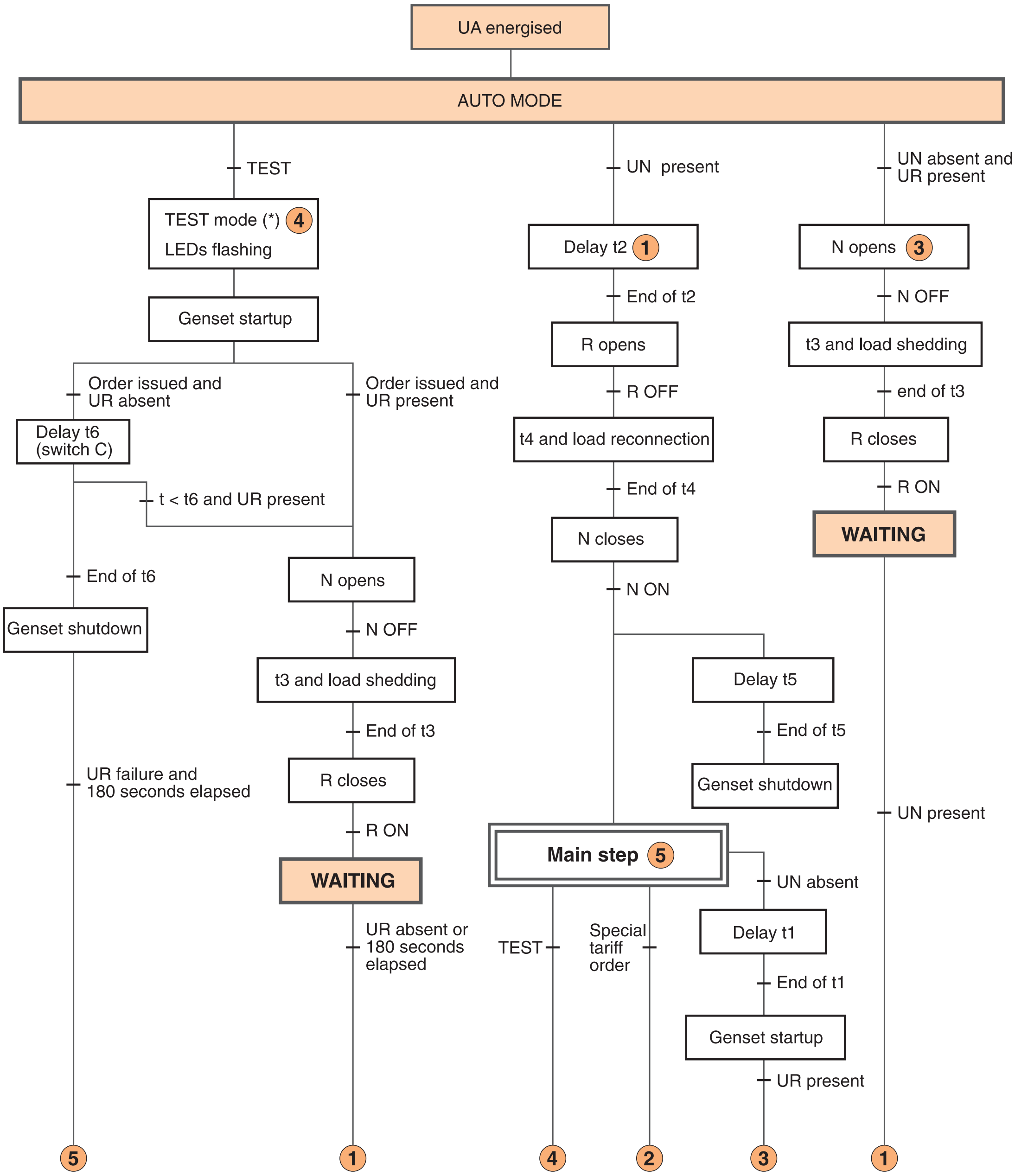
Key
UN : "Normal" source voltage
UR : "Replacement" source voltage
N : "Normal" source circuit breaker
R : "Replacement" source circuit breaker
B : Penalties accepted (N ON), i.e. B = 1

1 *The number sends to the indicated step when the condition is true.*

Associated controllers
UA controller
Operating sequences

Switch set to the "Auto" position (automatic operation and test mode).

DB101598



WAITING The system exits this mode when the operating mode is modified or when an external event occurs (e.g. failure or return of UN).

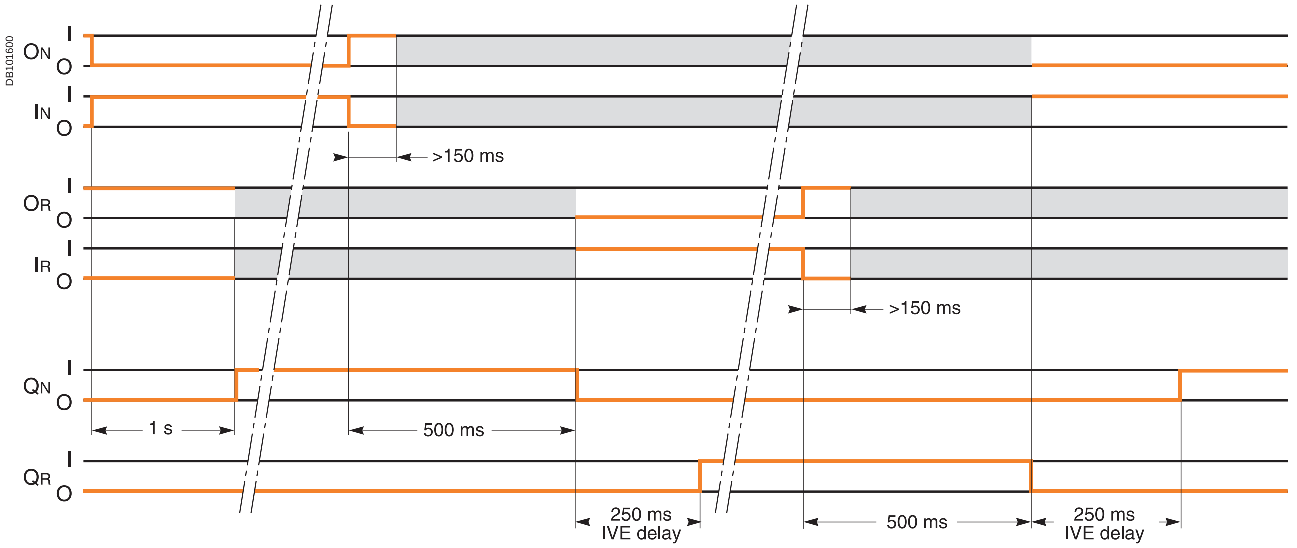
When the UA controller is not energised, the output for generator set startup is activated).

Key
UN : "Normal" source voltage
UR : "Replacement" source voltage
N : "Normal" source circuit breaker
R : "Replacement" source circuit breaker
B : Penalties accepted (N ON), i.e. B = 1
(*) The test lasts 180 seconds.

1 The number sends to the indicated step when the condition is true.

Operating sequences

IVE unit



Symbols

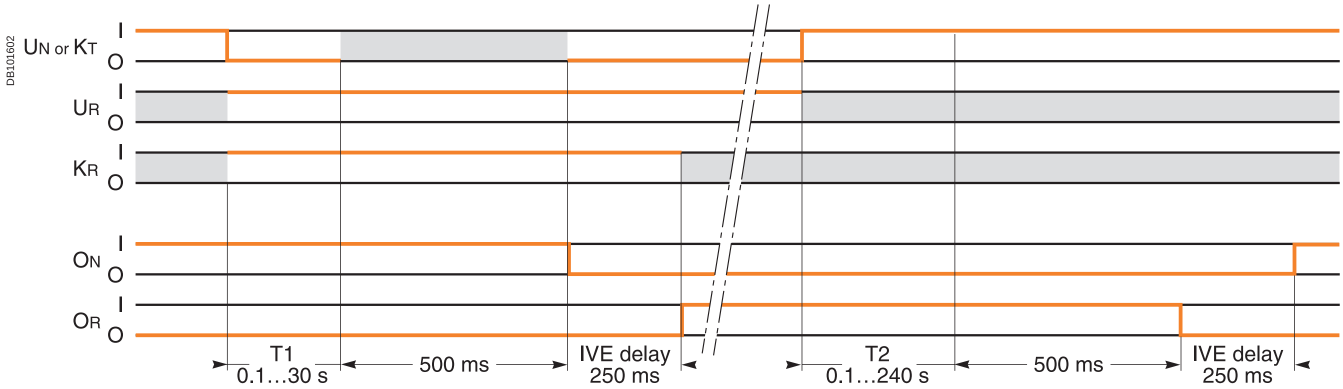
QN : "Normal" Compact C circuit breaker equipped for remote operation (motor mechanism)
QR : "Replacement" Compact C circuit breaker equipped for remote operation (motor mechanism)
ON : Circuit breaker QN opening order
OR : Circuit breaker QR opening order
IN : Circuit breaker QN closing order
IR : Circuit breaker QR closing order
L1 : Faulty "Normal" indication LED
L2 : Faulty "Replacement" indication LED

Key
O: OFF (circuit open)
I: ON (circuit closed
: either ON or OFF.

Note:
Following all trips (overload, short-circuit, earth-leakage fault, voluntary trip), a manual reset on the front of the motor mechanism is required.

Operating sequences

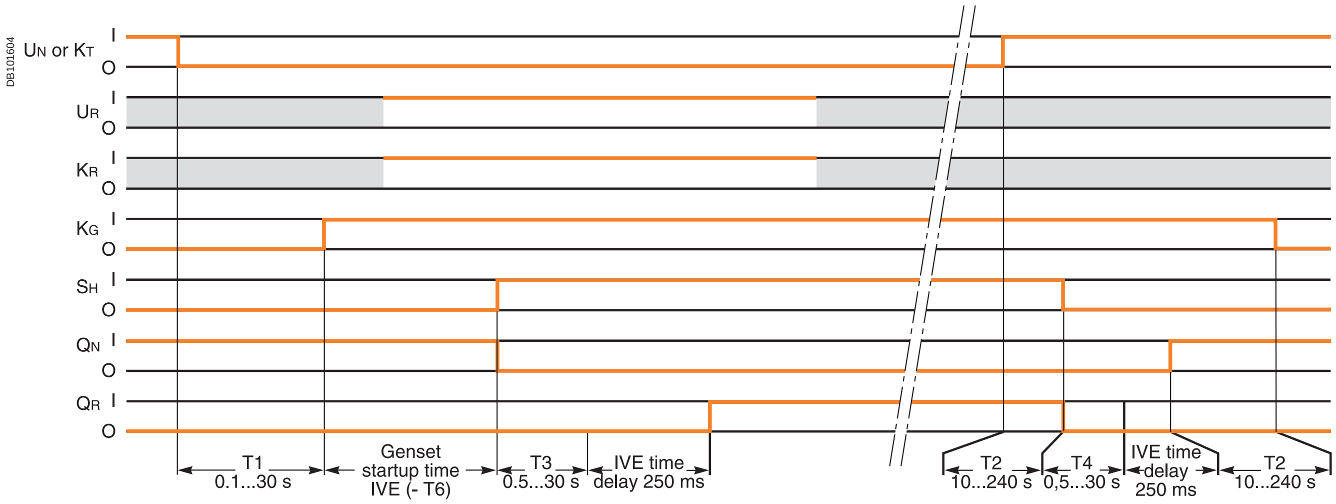
BA controller



Inputs
UN : "Normal" source voltage
UR : "Replacement" source voltage
KT : order for forced-operation on R
KR : additional check before transfer

Outputs
QN : "Normal" source circuit breaker
QR : "Replacement" source circuit breaker

UA controller



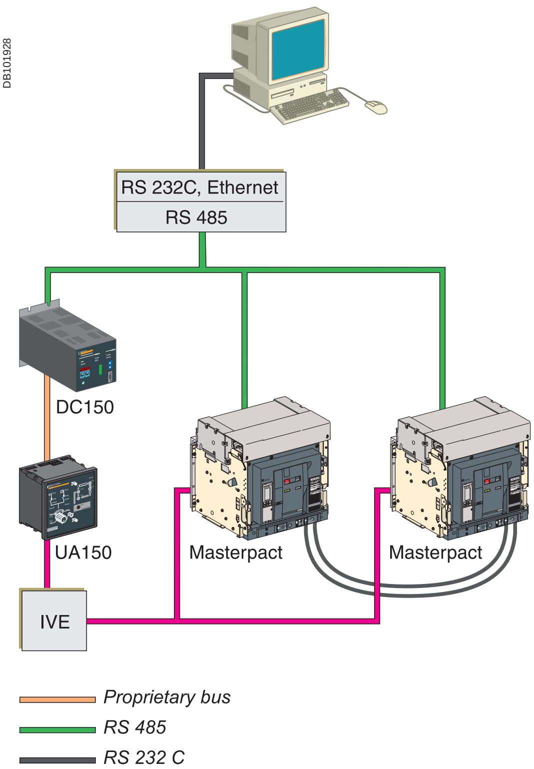
Inputs
UN : "Normal" source voltage
UR : "Replacement" source voltage
KT : order for forced-operation on R
KR : additional check before transfer

Outputs
KG : order to the genset
SH : load-shedding order
QN : "Normal" source circuit breaker
QR : "Replacement" source circuit breaker

Key
O: OFF (circuit open)
I: ON (circuit closed
: either ON or OFF.

Important
If UR is not ON when the transfer order is issued (KT or UN), the sequence is not carried out.
If KR status is not ON when the transfer order is issued (KT or UN), the transfer sequence is carried out later when KR status becomes I.

COM communications option



Communications option for Compact NS and Masterpact NT/NW

The COM communications option is compatible with all the source-changeover systems for Compact NS100 to 1600 and Masterpact NT/NW circuit breakers and switch-disconnectors.
It can be used to remote status information. It may not be used to operate the circuit breakers (only possible locally on the front of the UA150 controller).
Masterpact and Compact NS630b to 1600 circuit breakers and switch-disconnectors are compatible with the Modbus ECO COM option.
Depending on the trip units or control units used, the COM option may also be used to analyse distribution-system parameters required for the operating and maintenance assistance.

Circuit breaker communication

	Switch-disconnector	Circuit breaker
Compact NS100/1600 status indications		
ON / OFF	■	■
Fault trip		■
Connected / disconnected position	■	■
Masterpact NT/NW status indications		
ON / OFF	■	■
Fault trip		■
Connected / disconnected position	■	■

Operating and maintenance assistance

STR53UE trip unit for Compact NS400/630		
Current readings		
Phase and neutral rms currents		■
Current on the most heavily loaded phase		■
Alarm readings		
Overload		■
Tripping cause (overload, short-circuit, etc.)		■
Positions of setting dials		■

Operating and maintenance aids	Digipact			Modbus		
Measurement						
Current	A	P	H	A	P	H
Voltages, frequency, power, etc.		P	H		P	H
Power quality: fundamental, harmonics						H
Programming of demand metering					P	H
Fault readings						
Type of fault				A	P	H
Interrupted current					P	H
Waveform capture						
On faults						H
On demand or programmed						H
Histories and logs						
Trip history					P	H
Alarm history					P	H
Event logs					P	H
Indicators						
Counter operation	A	P	H	A	P	H
Contact wear					P	H
Maintenance register					P	H

Note:
see the description of the Micrologic control units for further details on protection and alarms, measurements, waveform capture, histories, logs and maintenance indicators.

COM communications option

Automatic source-changeover controller

	UA150
Status indications	
“Normal” source	
ON / OFF	■
Circuit breaker ON	■
Fault trip (SDE)	■
Voltage presence	■
“Replacement” source	
Circuit breaker ON	■
Fault trip (SDE)	■
Voltage presence	■
Status of R voltage contact	■
Controller	
Automatic mode	■
“Normal” mode	■
“Replacement” mode	■
Stop mode	■
Testing	■
“Replacement” engine generator set	
Genset failure	■
Genset OFF	■
Genset ON	■
Shedding of non-priority circuits	■
Reconnection of non-priority circuits	■
Settings	
Time delay t1 for validation of UN absence	■
Time delay t2 for validation of UN return	■
Time delay t3 for wait between opening of N and closing of R	■
Time delay t4 for wait between opening of R and closing of N	■
Time delay t5 for wait between return of UN and order for genset shutdown	■
Time delay t6 for wait before declaring genset failure	■
Penalties accepted to avoid special tariff transfer	■

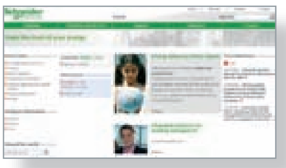
>TOOLS

schneider-electric.com

This international site allows you to access all the Schneider Electric products in just 2 clicks via comprehensive range data-sheets, with direct links to:

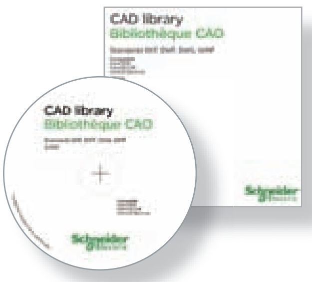
- complete library: technical documents, catalogs, FAQs, brochures…
- selection guides from the e-catalog.
- product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, the list of country contacts…



CAD software and tools

The CAD software and tools enhance productivity and safety. They help you create your installations by simplifying product choice through easy browsing in the Schneider Electric offers.
Last but not least, they optimise use of our products while also complying with standards and proper procedures.



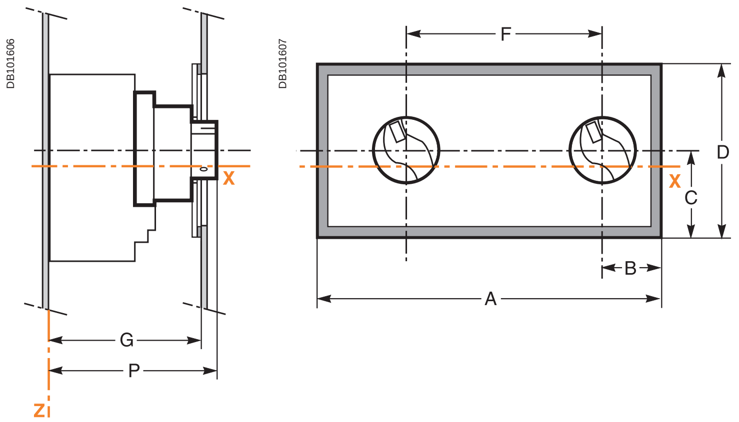
Dimensions

Manual source-changeover systems

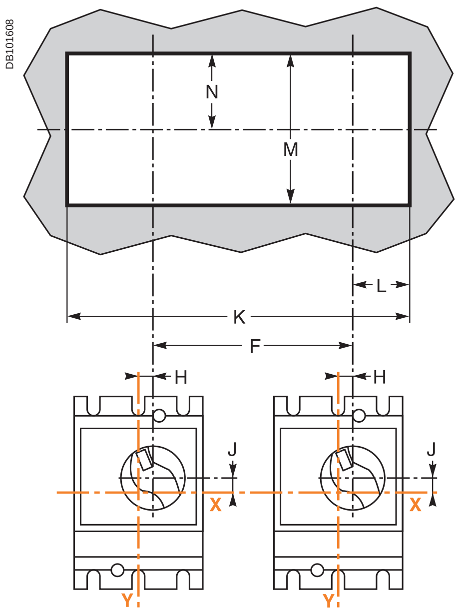
Interlocking of direct rotary handles

Compact NS100 to 1600

Dimensions



Front-panel cutout

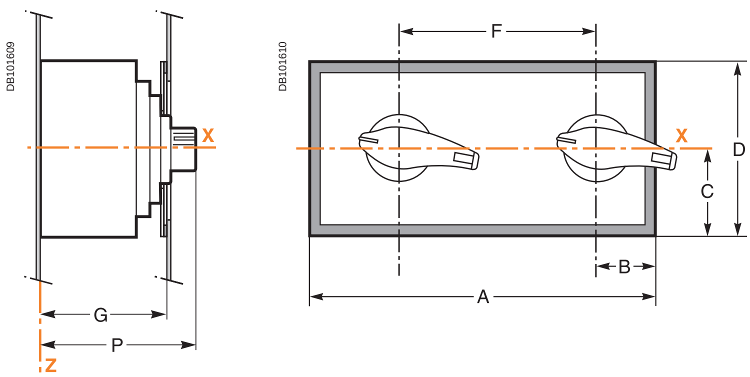


Dimensions (mm)

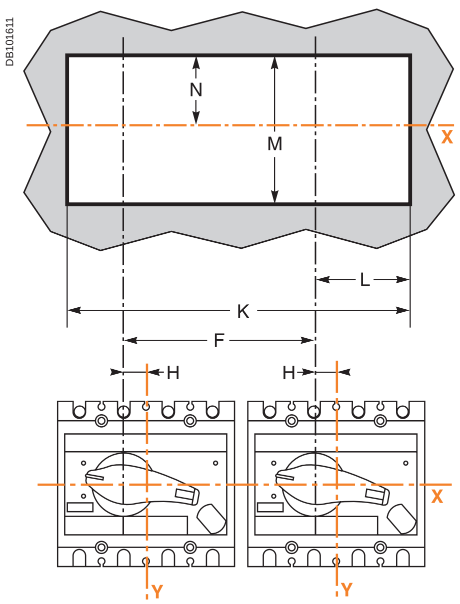
	A	B	C	D	F	G	H	J	K	L	M	N	P
NS100/160/250N/H/L	325	90	87.5	175	156	133	9.25	9	295	75.5	150	75	155
NS400/630N/H/L	416	115	100	200	210	157	5	24.6	386	100	175	74.5	179

Interpact INS/INV250 100 to 250 A / Interpact INS/INV320/400/500/630

Dimensions



Front-panel cutout



Dimensions (mm)

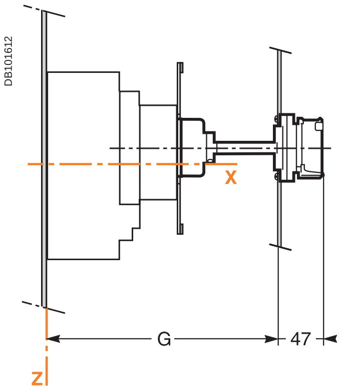
Type	A	B	C	D	F	G	H	K	L	M	N	P
INS/INV250 100/160/250 A	325	90	87.5	175	156	106	17.5	295	75.5	150	75	131
INS/INV320/400/500/630	416	115	100	200	210	130	22.5	386	100	175	74.5	160.4

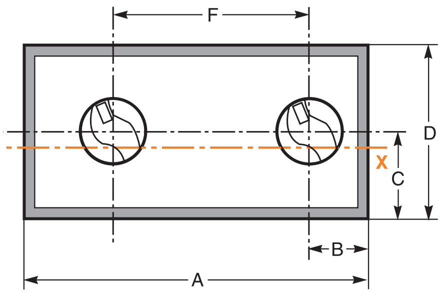
Note: X et Y are the symmetry planes for a 3-pole device.

Manual source-changeover systems
Interlocking of extended rotary handles

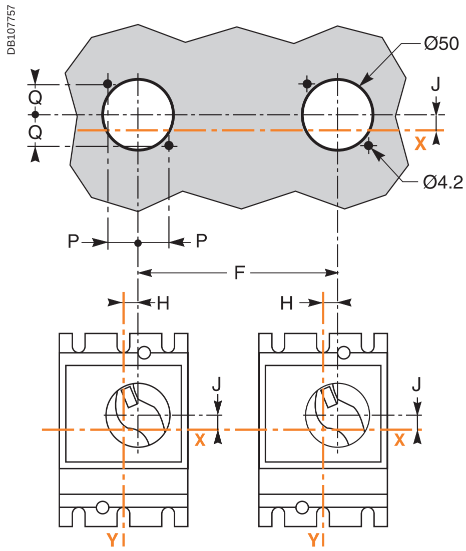
Compact NS100 to 630

Dimensions





Front-panel cutout

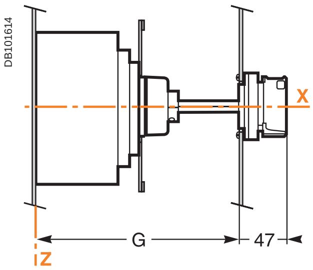


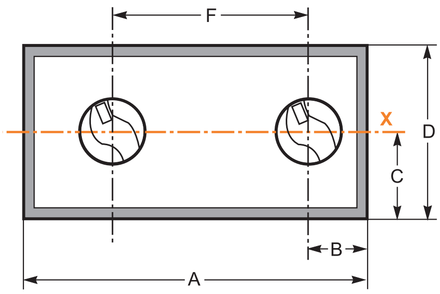
Dimensions (mm)

Type	A	B	C	D	F	G min	G max	H	J	P	Q
NS100/160/250N/H/L	325	90	87.5	175	156	185	600	9.25	9	25.5	25.5
NS400/630N/H/L	416	115	100	200	210	204	600	5	24.6	30.8	30.8

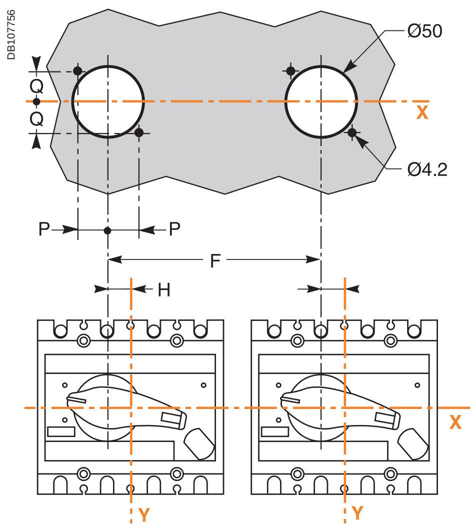
Interpact INS40/63/80/100/125/160 / Interpact INS/INV250 100 to 250 A / Interpact INS/INV320/400/500/630

Dimensions





Front-panel cutout



Dimensions (mm)

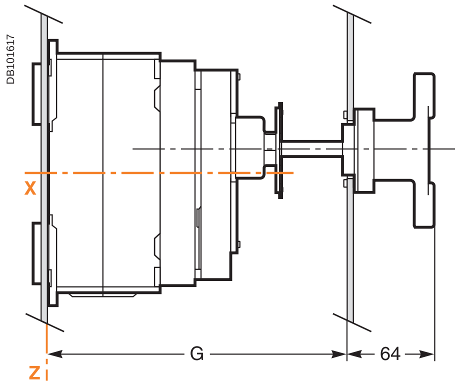
Type	A	B	C	D	F	G min	G max	H	P	Q
INS40/63/80	325	90	87.5	175	156	155	396	0	25.5	25.5
INS100/125/160	325	90	87.5	175	156	200	441	0	25.5	25.5
INS/INV250 100/160/250 A	325	90	87.5	175	156	185	600	17.5	25.5	25.5
INS320/400/500/630	416	115	100	200	210	204	600	22.5	30.8	30.8

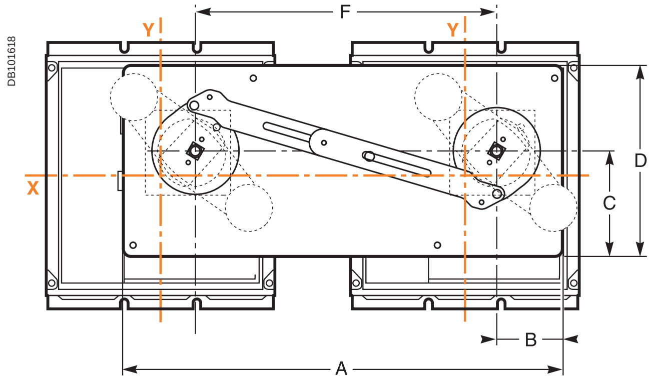
Manual source-changeover systems

Interlocking of extended rotary handles

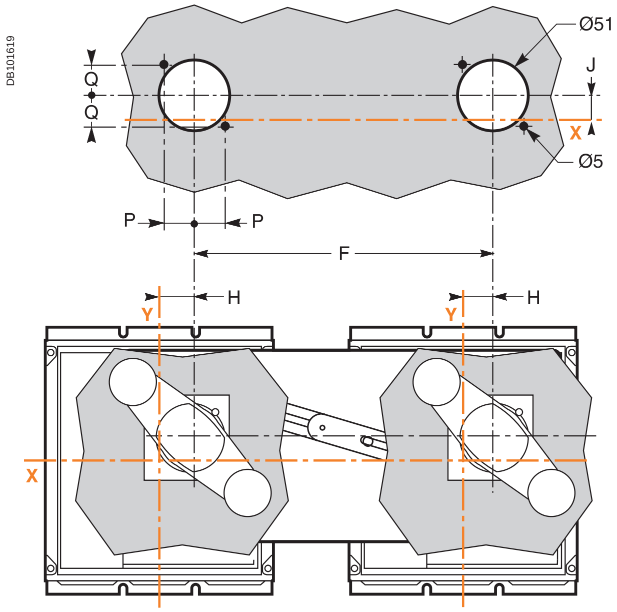
Compact NS630b to 1600

Dimensions





Front-panel cutout



Dimensions (mm)

Type	A	B	C	D	F	G min	G max	H	J	P	Q	R
NS630b/800/1000/1200/1600	411	63.5	98	175	280	218	605	25	24	25.5	25.5	64

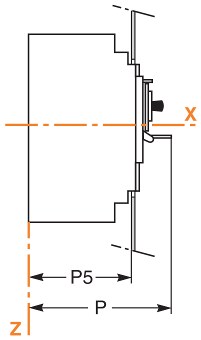
Manual source-changeover systems

Interlocking of toggles

Compact NS100 to 630

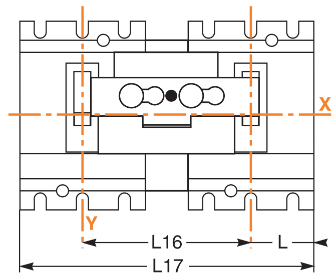
Dimensions

DB101620



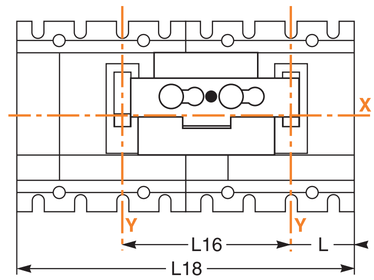
3 poles

DB101621



4 poles

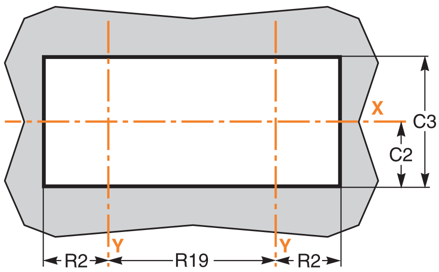
DB101622



Front-panel cutout

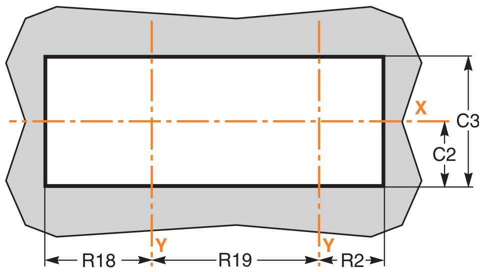
3 poles on left

DB101623



4 poles on left

DB101624



Dimensions (mm)

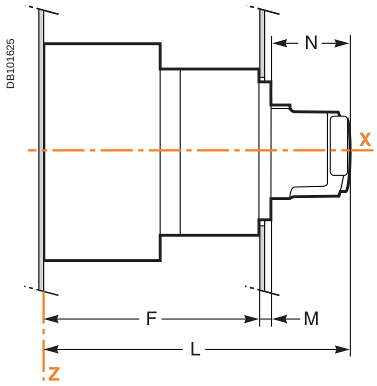
Type	C2	C3	L	L16	L17	L18	R2	R18	R19	P5	P
NS100/160/250N/H/L	54	108	52.5	140	245	280	54	89	140	83	115
NS400/630N/H/L	92.5	184	70	185	325	370	71.5	116.5	185	107	144

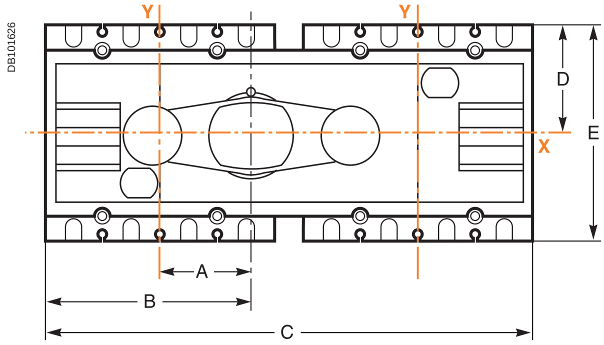
Manual source-changeover systems

Complete source-changeover assembly

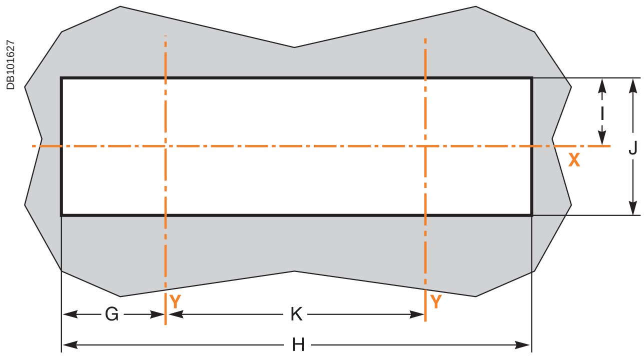
Assembly for INS250 100 to 250 A / Assembly for INS320/400/500/630

Dimensions





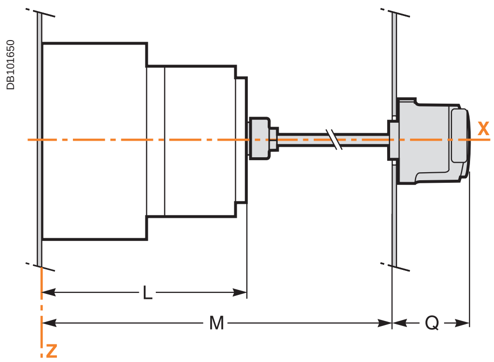
Front-panel cutout

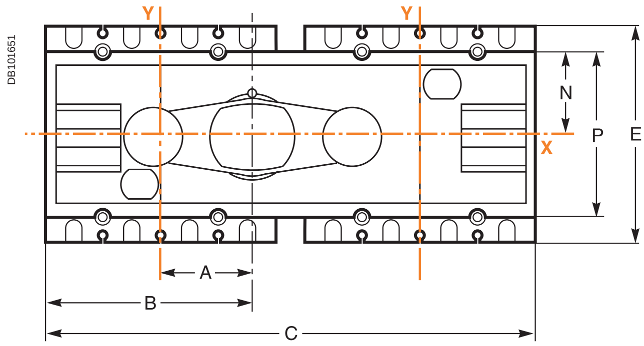


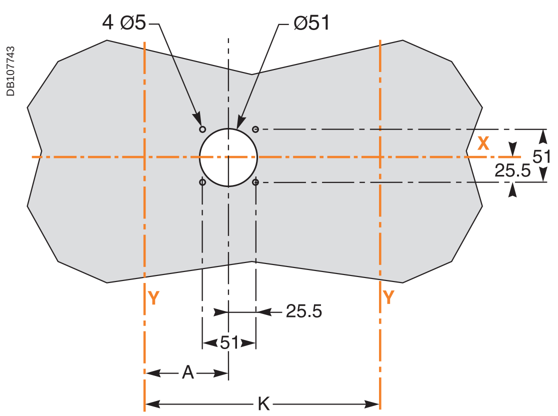
Dimensions (mm)

Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N
INS250	60.4	130.4	296	68	136	131	61.8	279.3	42	84	156	186.5	5.5	50
INS320/630	82.5	175	395	102.5	205	155	87	383.7	64	128	210	213	8	50

Dimensions of the complete source-changeover assembly with an extended handle







Dimensions (mm)

Type	A	B	C	E	K	L	M	N
INS250 INV100/250	60.4	130.4	295	136	156	138.5	631	50
INS320/630 INV320/630	82.5	175	395	205	210	162.5	658	75

Dimensions (mm)

Type	P	Mmax	Mmin	Q
INS250 INV100/250	100	567.5	195	64
INS320/630 INV320/630	150	593	220.5	64

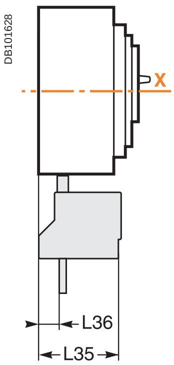
Note: Lines X and Y indicate the axes of symmetry of the switch-disconnector.
Reference plane Z corresponds to the back of the switch-disconnector.

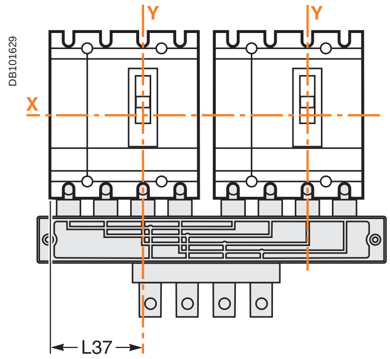
Manual source-changeover systems

Downstream coupling accessory

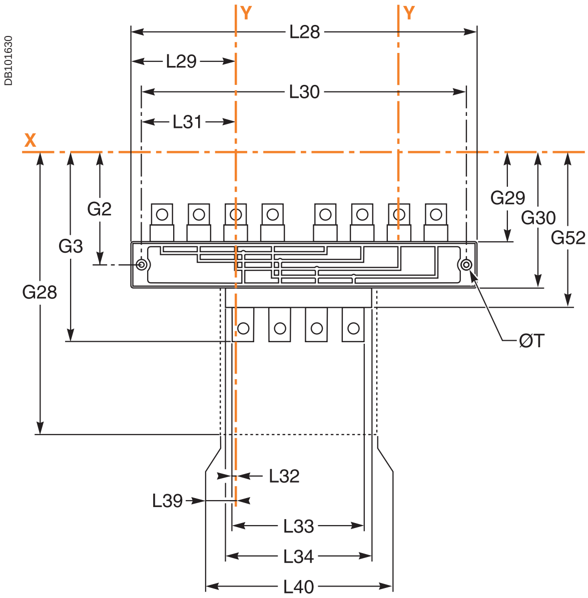
Compact NS100 to NS630 (only for Compact NS fixed devices)

Dimensions

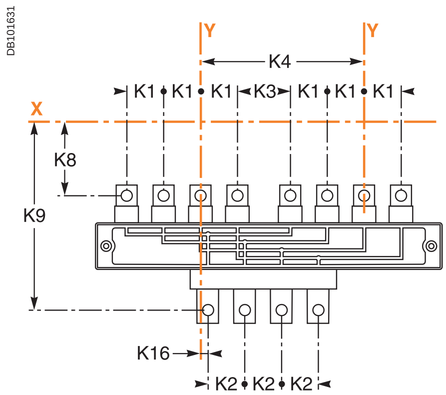




Dimensions



Connection



Dimensions (mm)

Type	G2	G3	G28	G29	G30	G52	K1	K2	K3	K4	K8	K9	K16
NS100/160/250	118	181.5	238	96	140	156	35	35	51	156	70	170	8
NS400/630	165.9	265.7	339.5	143.5	188.5	227.5	45	52.5	75	210	113.5	250.7	3.75

Dimensions (mm)

Type	L28	L29	L30	L31	L32	L33	L34	L35	L36	L37	L39	L40	ØT
NS100/160/250	320	99.5	300	89.5	1	123	139.5	74.5	19.5	87.5	9.5	140	6
NS400/630	420	127.5	400	117.5	11.2	187.5	-	96.5	26	115	22.5	210	6

***Note:** coupling accessory: only for changeover systems using fixed versions of Compact NS circuit breakers.*

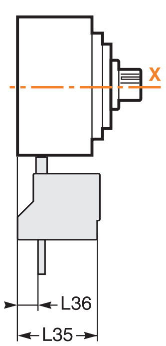
Manual source-changeover systems

Downstream coupling accessory

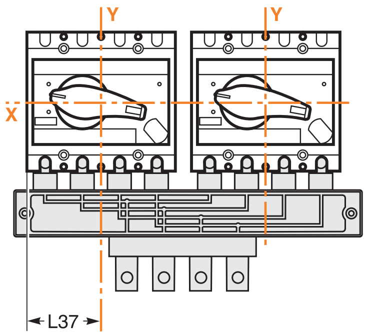
Interpact INS250 100 to 250 A / Interpact INS320/400/500/630

Dimensions

DB101632

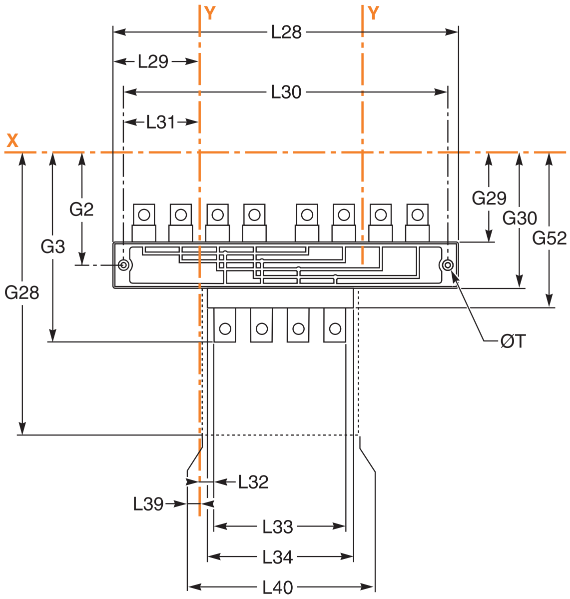


DB101633



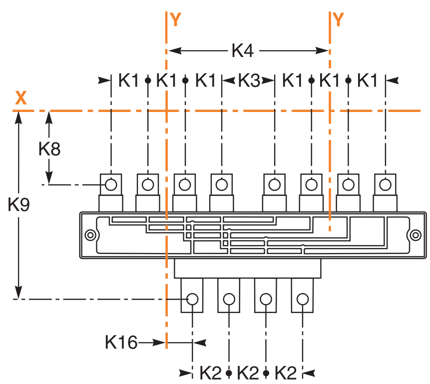
Dimensions

DB101901



Connection

DB101902



Dimensions (mm)

Type	G2	G3	G28	G29	G30	G52	K1	K2	K3	K4	K8	K9	K16
INS250-100/160/200/250	105.5	169	225.5	83.5	127.5	143.5	35	35	51	156	57.5	157.5	25.5
INS320/400/500/630	141	240.7	315	119	163.5	202.5	45	52.5	75	210	88.5	225.7	26.25

Dimensions (mm)

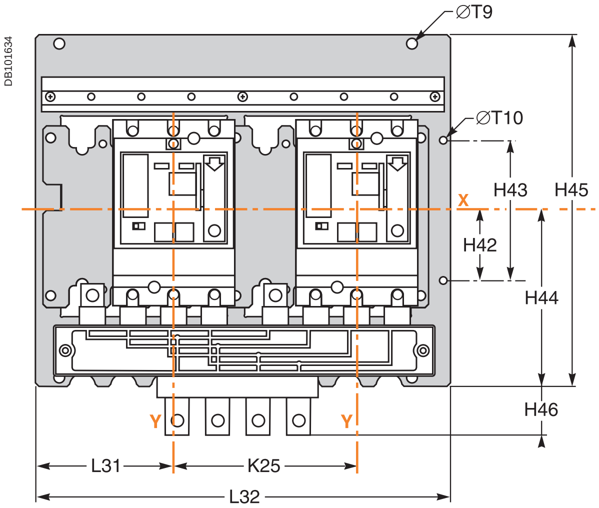
Type	L28	L29	L30	L31	L32	L33	L34	L35	L36	L37	L39	L40	ØT
INS250-100/160/200/250	320	82	300	72	16.5	123	139.5	74.5	21.5	70	8.5	140	6
INS320/400/500/630	420	105	400	95	11.2	187.5	-	98.5	26	92.5	0	210	6

Remote-operated source-changeover systems

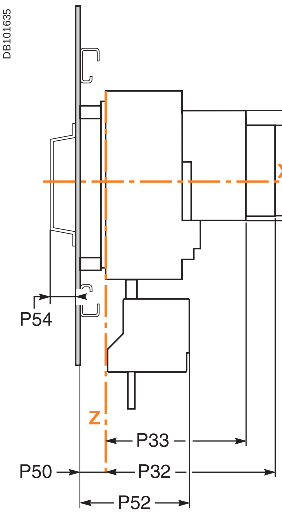
Interlocking on a base plate

Compact NS100 to 250

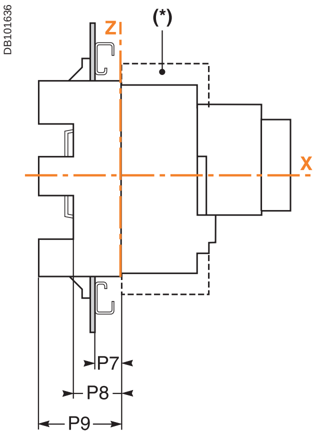
Dimensions, 3 or 4 poles



Fixed device

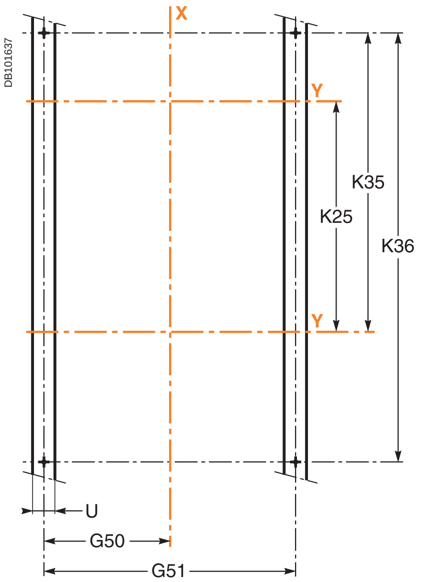


Withdrawable device

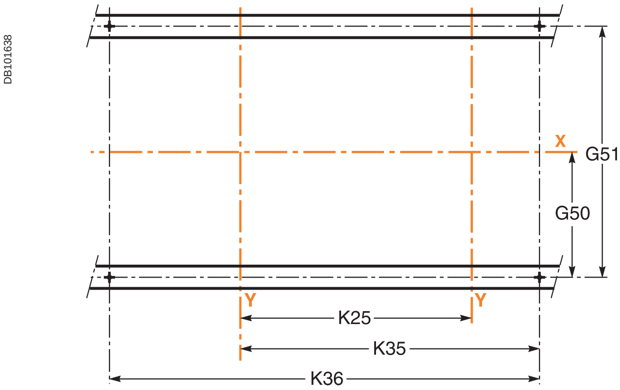


***(*)** Short terminal shields are mandatory.*

Vertical mounting



Horizontal mounting



Dimensions (mm)

Type	G50	G51	H20	H21	H22	H23	H42	H43	H44	H45	H46	K25	K35	K36
NS100/160/250N/H/L	137.5	285	62.5	97	45.5	73	60	120	144.5	300	37	156	210.5	300
NS400/630N/H/L	180	360	100	152	83	123	60	120	189	378	77	210	282.5	400

Dimensions (mm)

Type	L31	L32	P7	P8	P9	P32	P33	P50	P52	P54	ØT9	ØT10	U
NS100/160/250N/H/L	110.5	354	25	45	75	178	143	25	99.5	21	9	6	≤ 32
NS400/630N/H/L	150.5	466	25	45	100	250	215	25	123	21	9	6	≤ 32

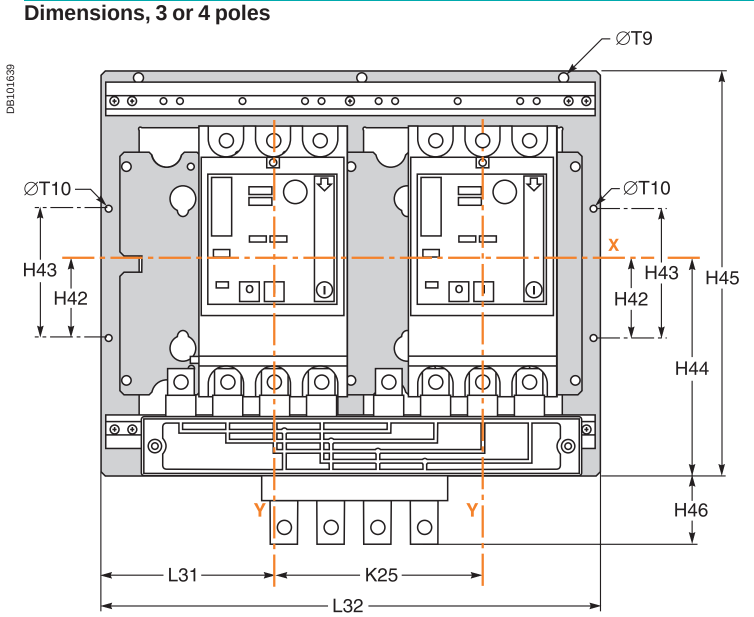
***Note:** coupling accessory: only for changeover systems using fixed versions of Compact NS circuit breakers.*

Remote-operated source-changeover systems

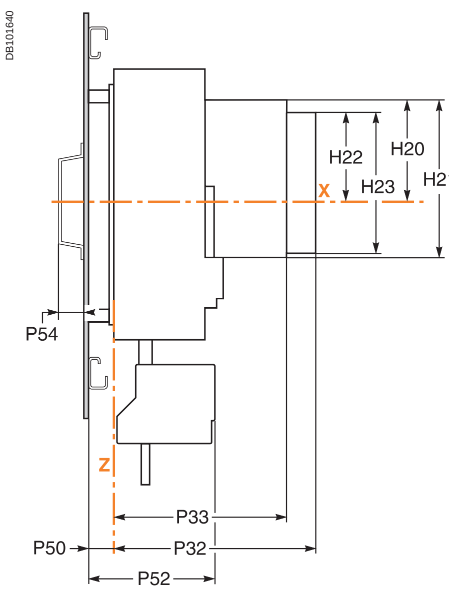
Interlocking on a base plate

Compact NS400 to 630

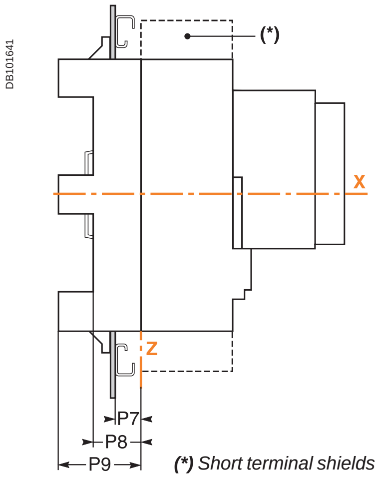
Dimensions, 3 or 4 poles



Fixed device



Withdrawable device

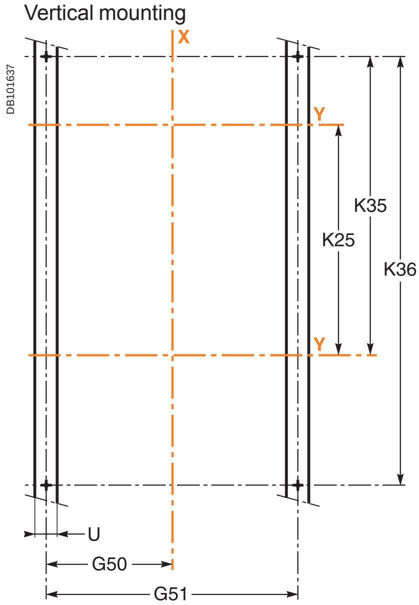


Note: *coupling accessory: only for changeover systems using fixed versions of Compact NS circuit breakers.*

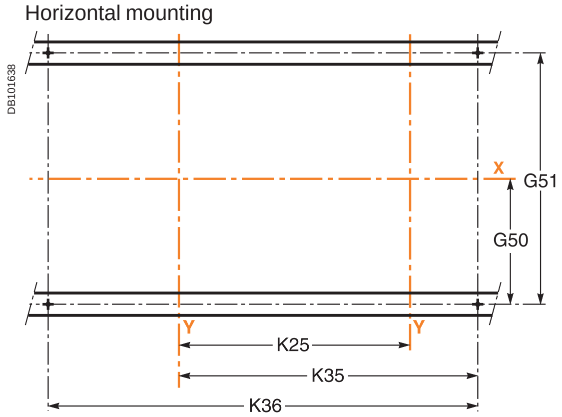
(*) *Short terminal shields are mandatory.*

Dimensions

Vertical mounting



Horizontal mounting



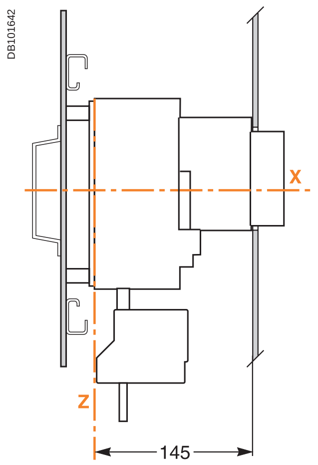
Note: *dimensions* *see p. B-9*.

Remote-operated source-changeover systems

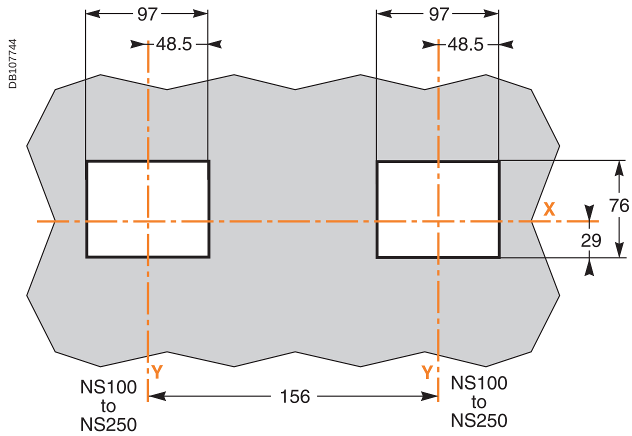
Interlocking on a base plate

"Normal" and "Replacement" source devices: NS100 to NS250

Dimensions

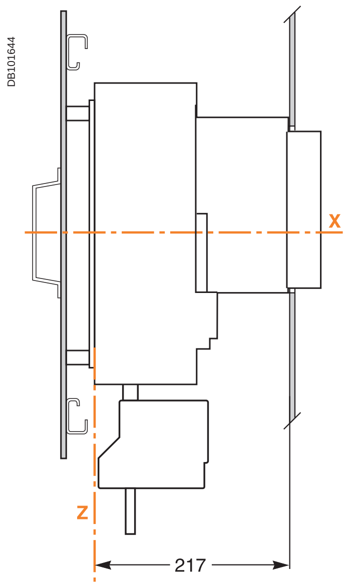


Front-panel cutout

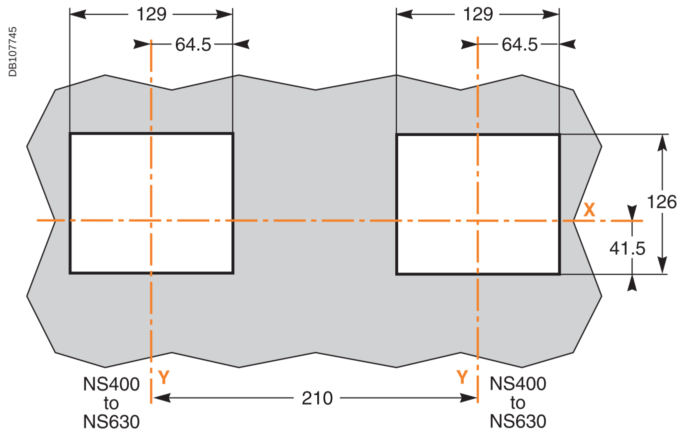


"Normal" and "Replacement" source devices: NS400 to NS630

Dimensions



Front-panel cutout



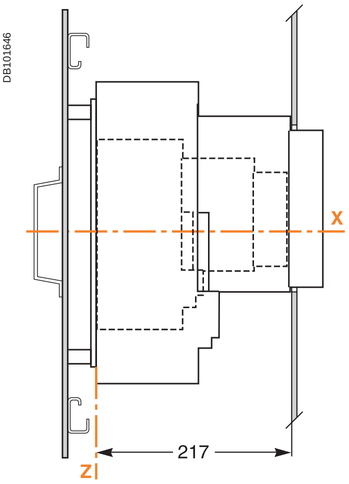
Note for Compact NS:
For dimensions with the accessories (IP40 escutcheons and Vigi escutcheon protection collars), see Catalogue Compact.

Remote-operated source-changeover systems

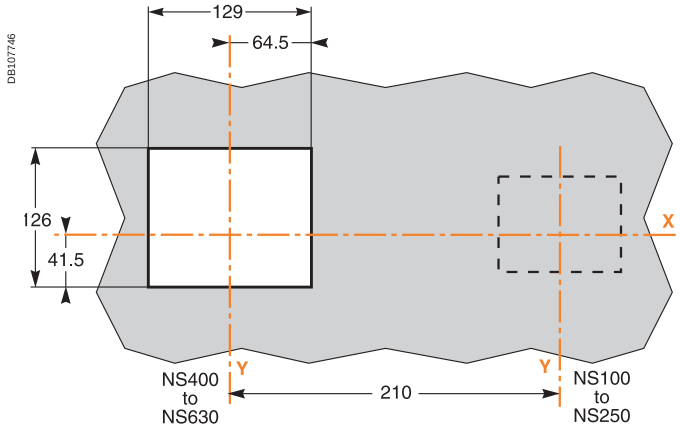
Interlocking on a base plate

NS400 to NS630 as the "Normal" device, NS100 to NS250 as the "Replacement" device

Dimensions



Front-panel cutout

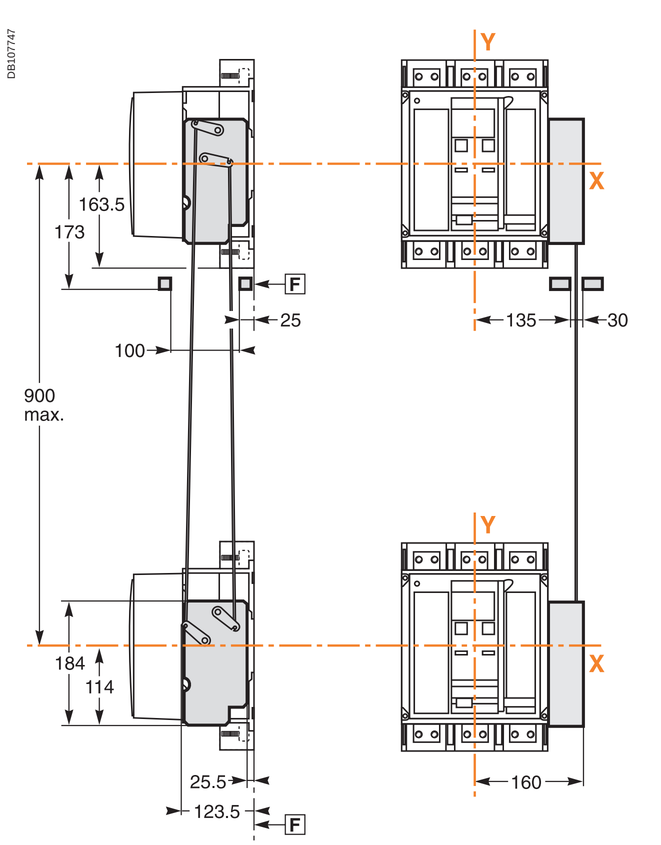


Remote-operated source-changeover systems

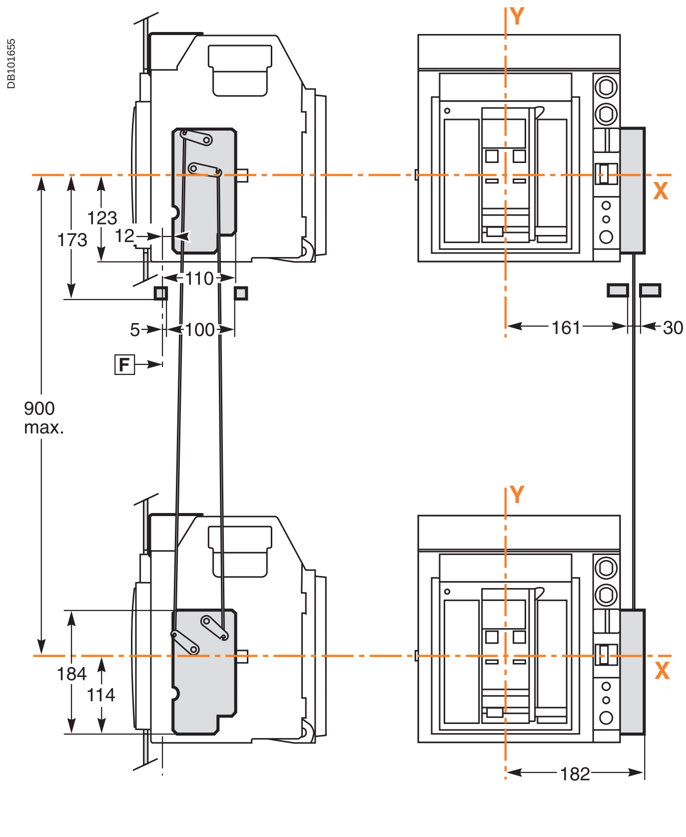
Interlocking using connecting rods

Two Compact NS630b to NS1600 devices one above the other

Fixed devices

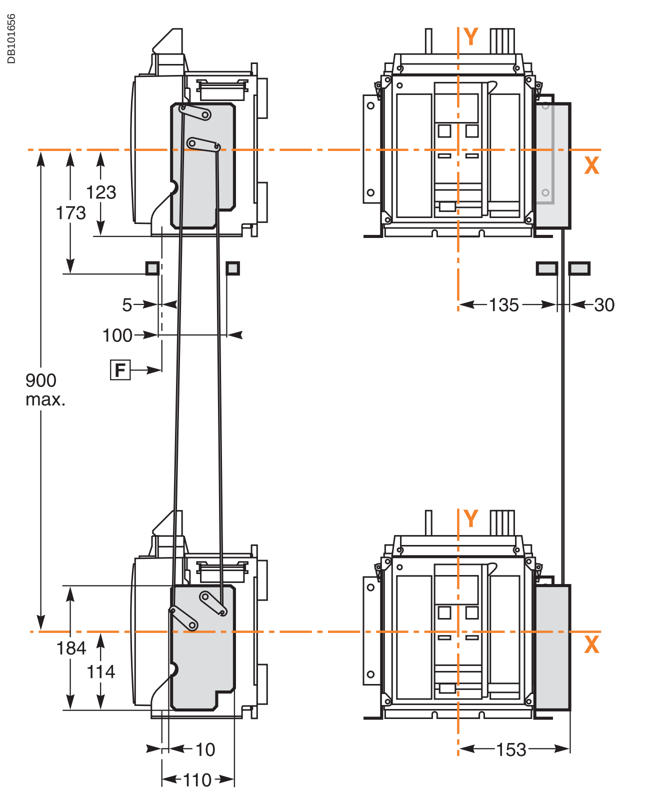


Withdrawable devices

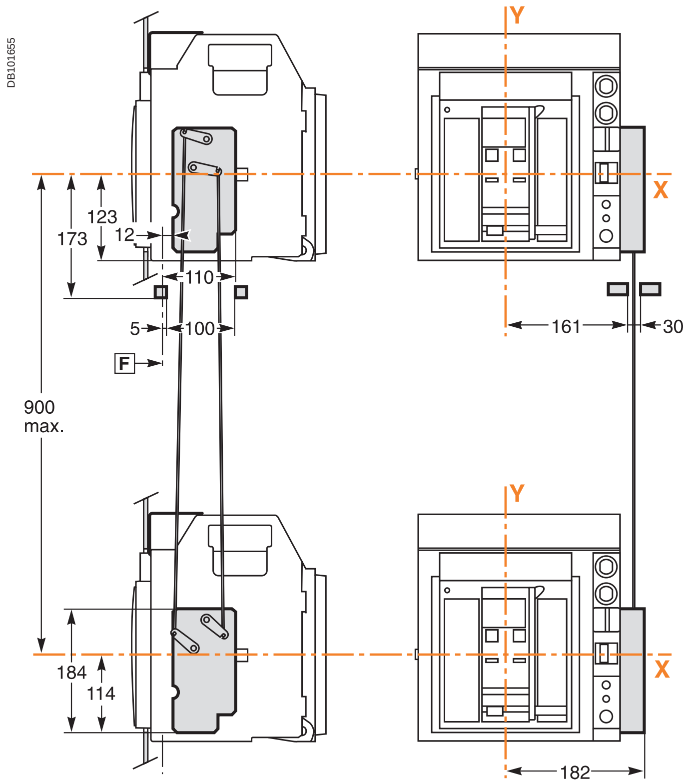


Two Masterpact NT devices one above the other

Fixed devices



Withdrawable devices

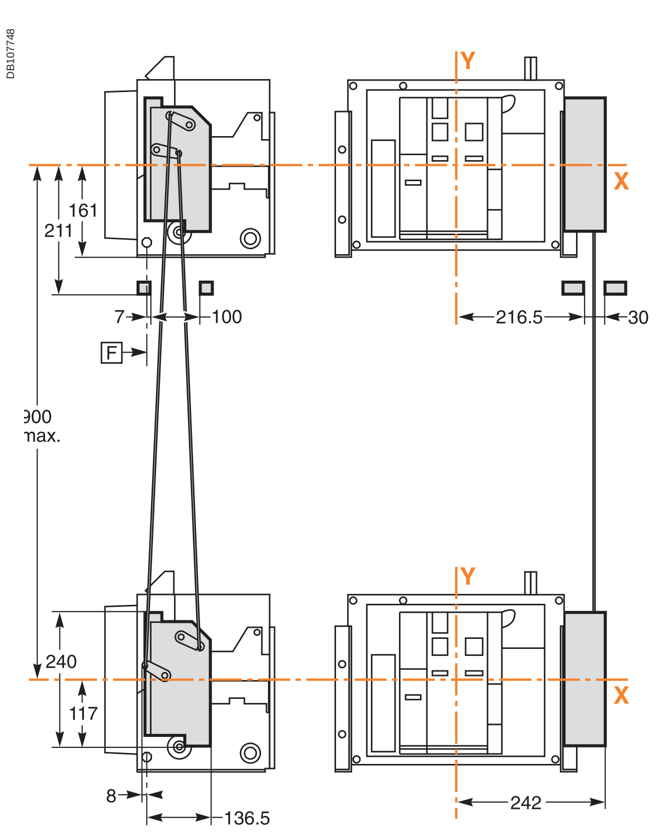


Remote-operated source-changeover systems

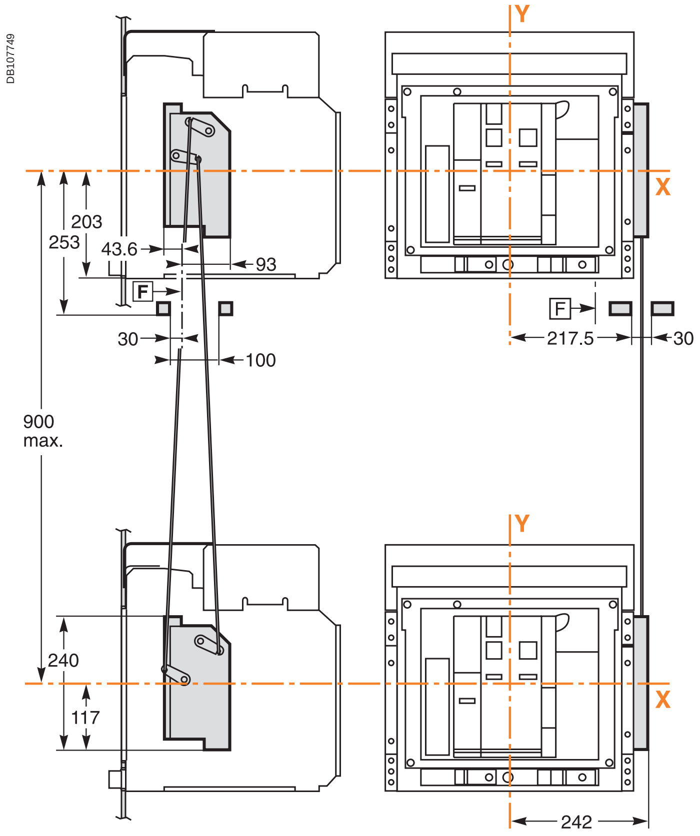
Interlocking using connecting rods

Two Masterpact NW devices one above the other

Fixed devices



Withdrawable devices

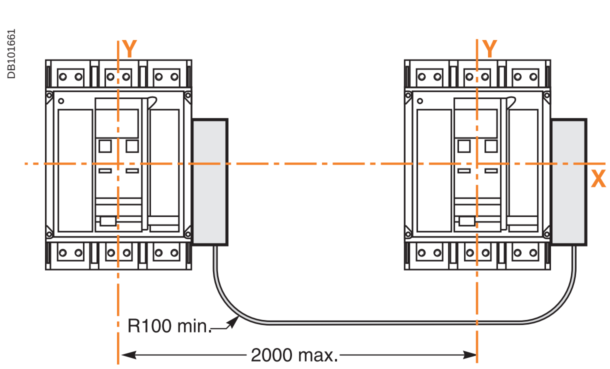


Remote-operated source-changeover systems

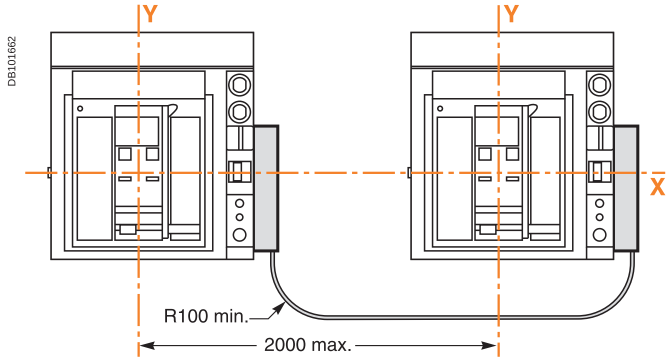
Interlocking using cables

Two Compact NS630b to NS1600 devices side-by-side

Fixed devices

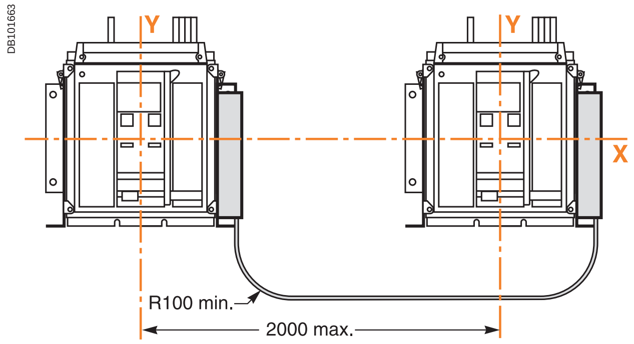


Withdrawable devices

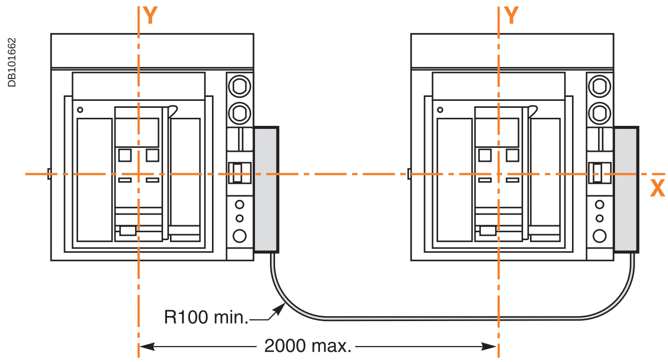


Two Masterpact NT devices side-by-side

Fixed devices

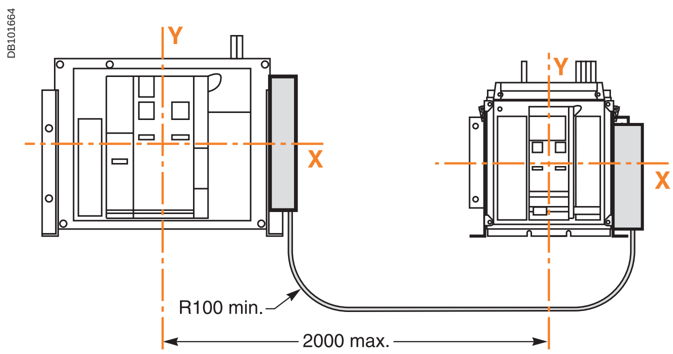


Drawout devices

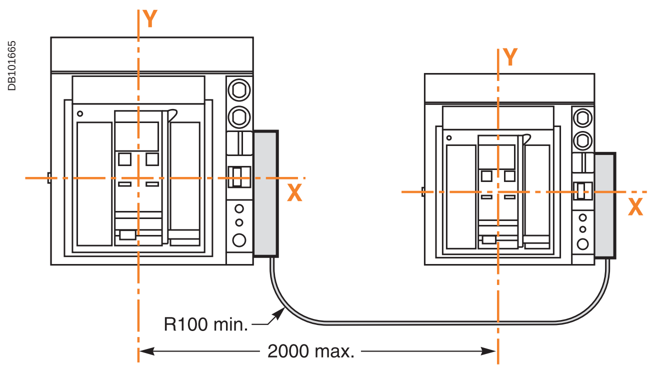


Combination of two Masterpact NT and NW devices side-by-side

Fixed devices



Drawout devices



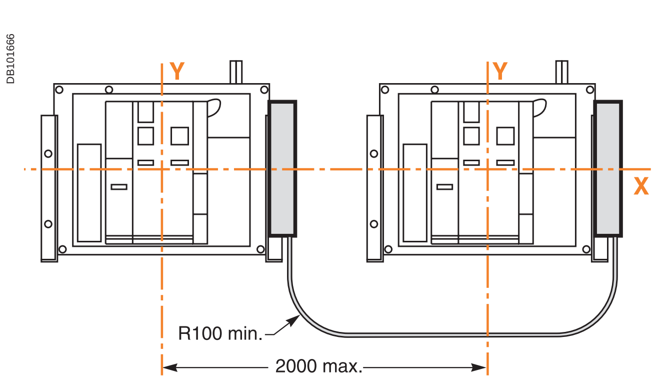
Dimensions

Remote-operated source-changeover systems

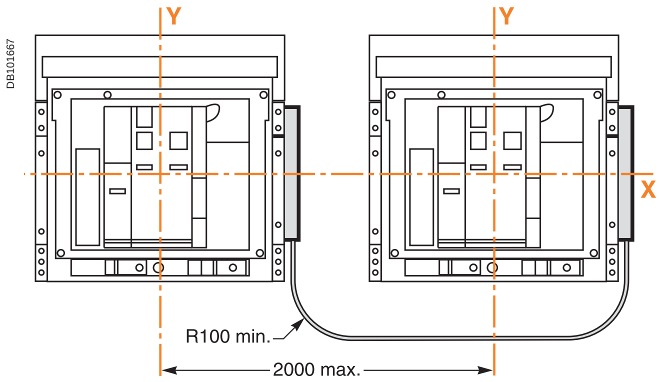
Interlocking using cables

Two Masterpact NW devices side-by-side

Fixed devices

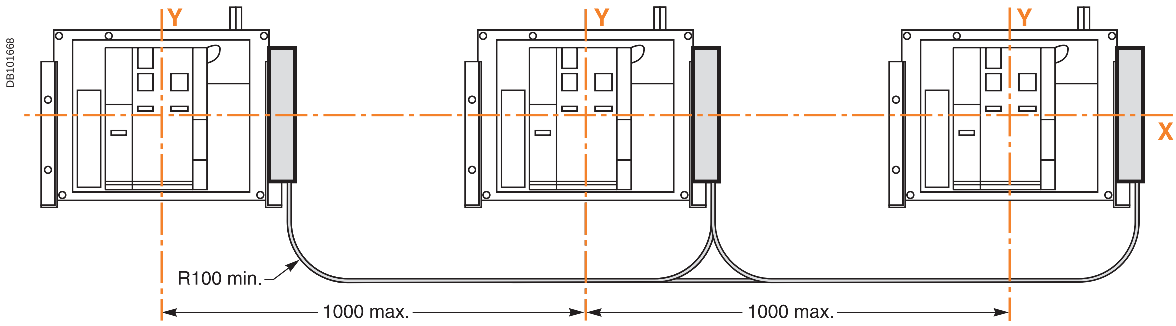


Drawout devices

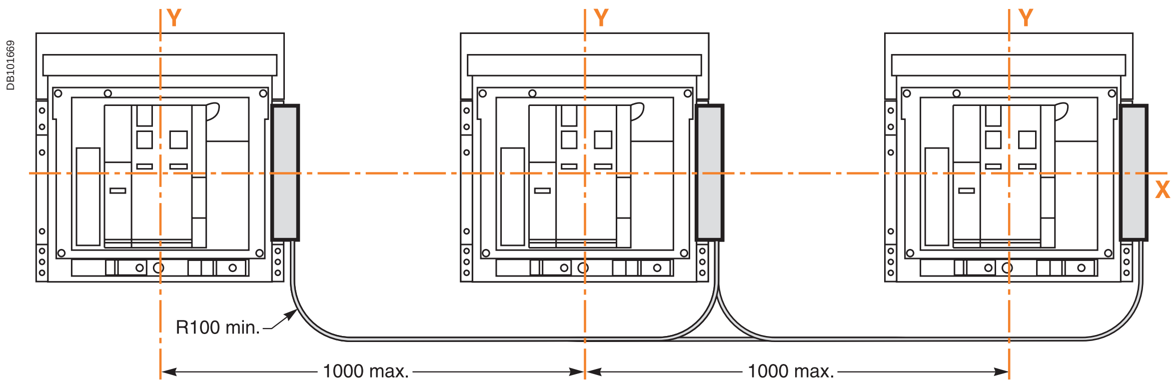


Three Masterpact NW devices side-by-side

Fixed devices



Drawout devices

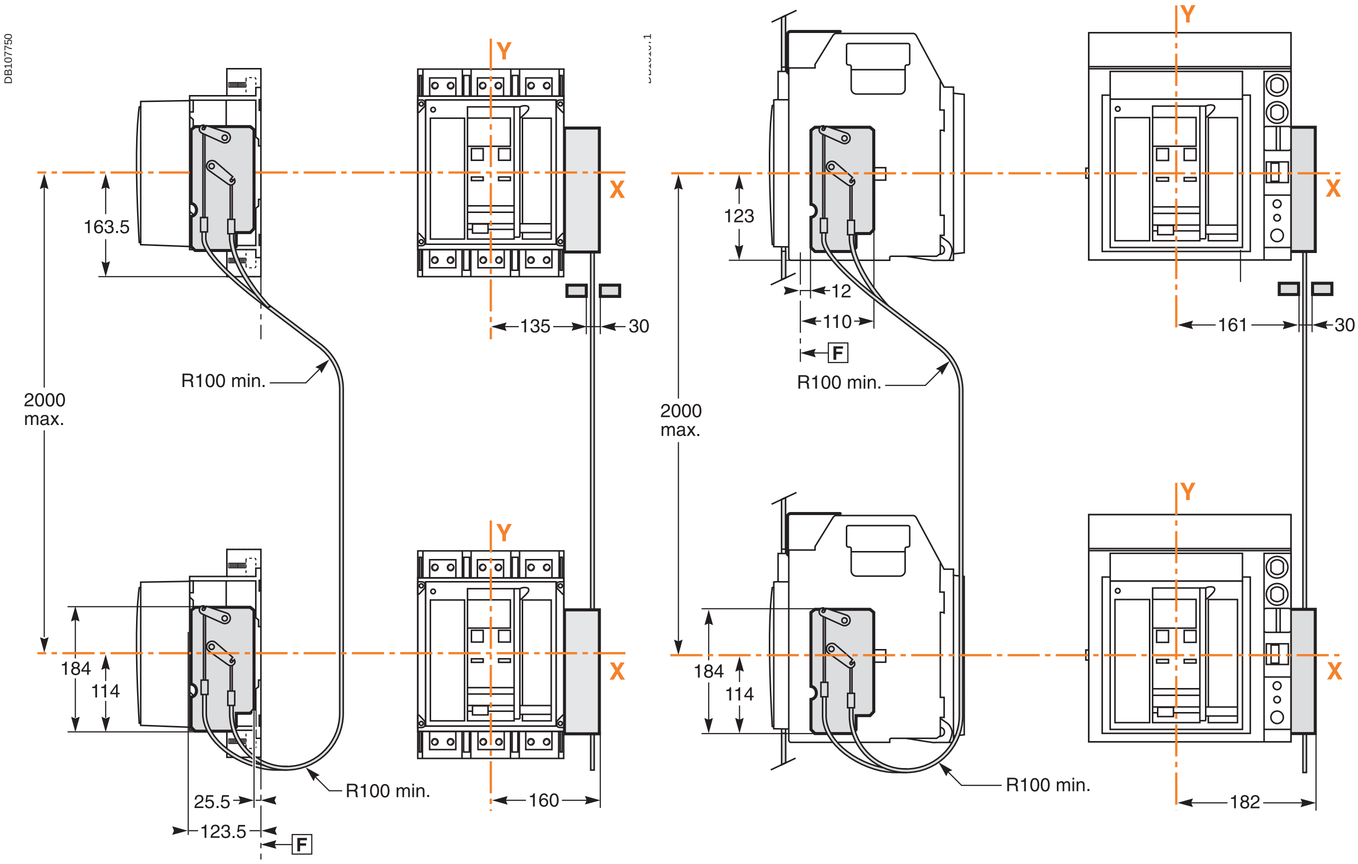


Remote-operated source-changeover systems

Interlocking using cables

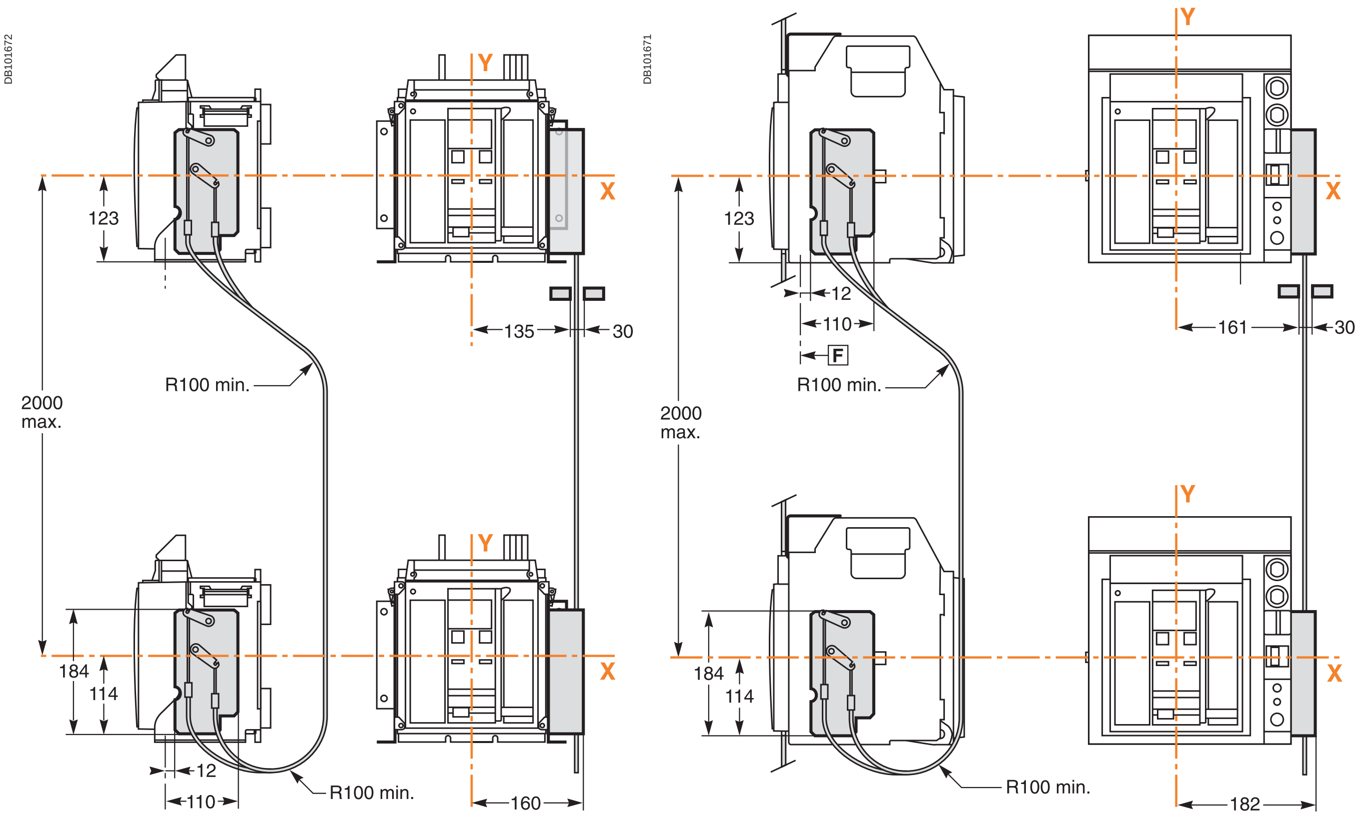
Two Compact NS630b to NS1600 devices one above the other

Fixed devices **Withdrawable devices**



Two Masterpact NT devices one above the other

Fixed devices **Drawout devices**



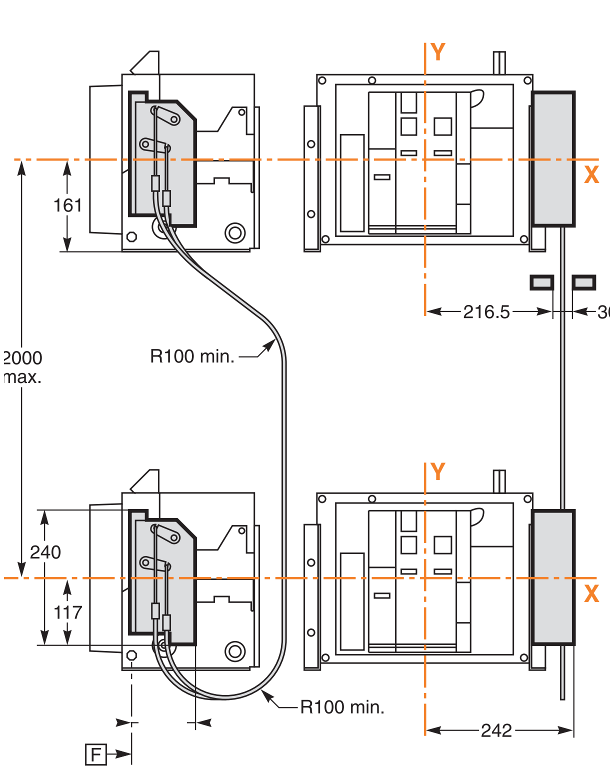
Dimensions

Remote-operated source-changeover systems

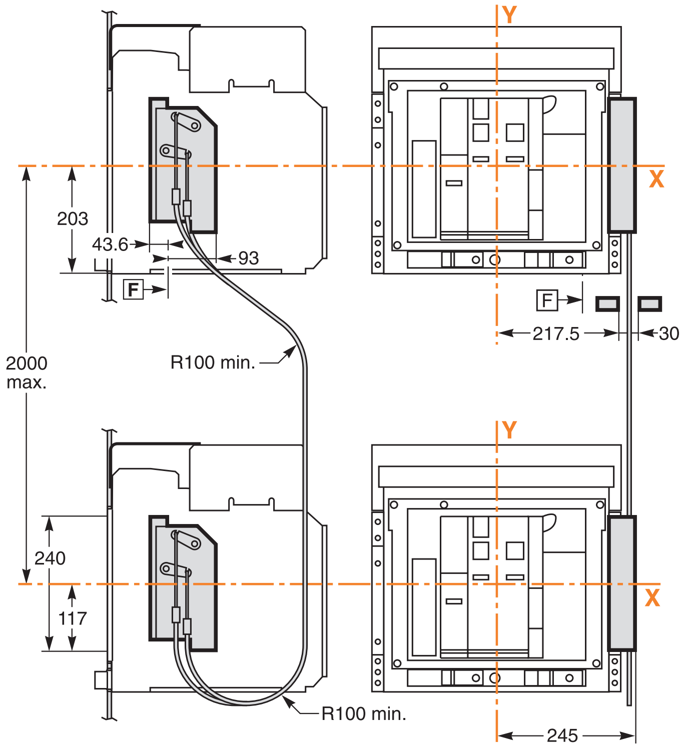
Interlocking using cables

Two Masterpact NW devices one above the other

Fixed devices

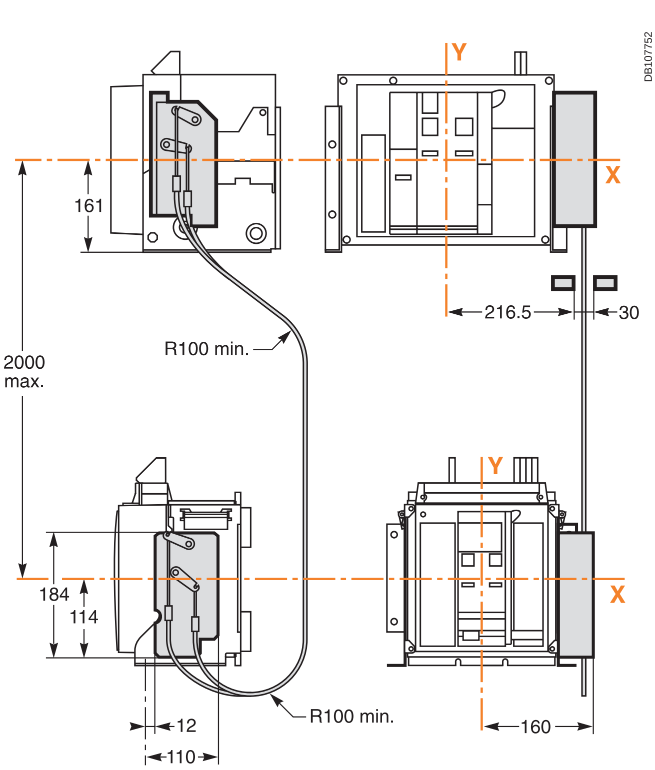


Drawout devices

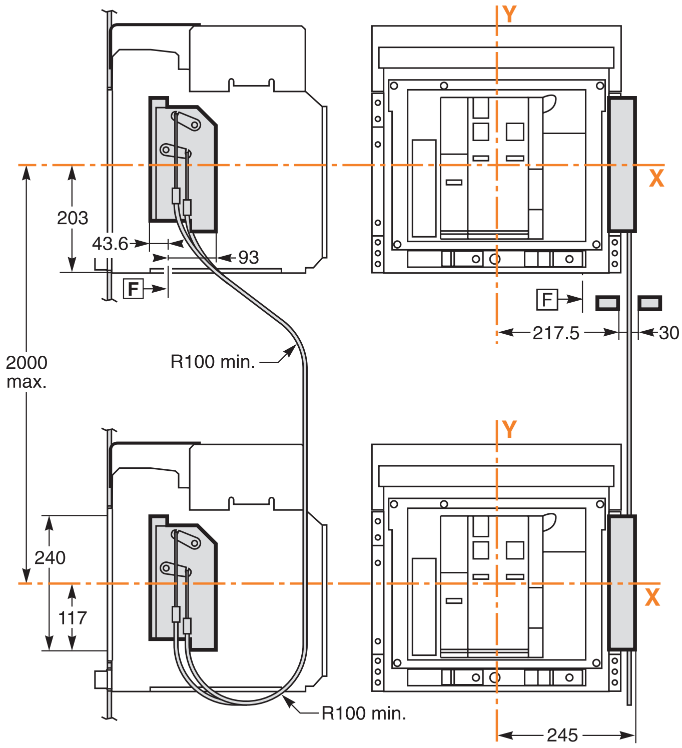


Two Masterpact NT and NW devices one above the other

Fixed devices



Drawout devices

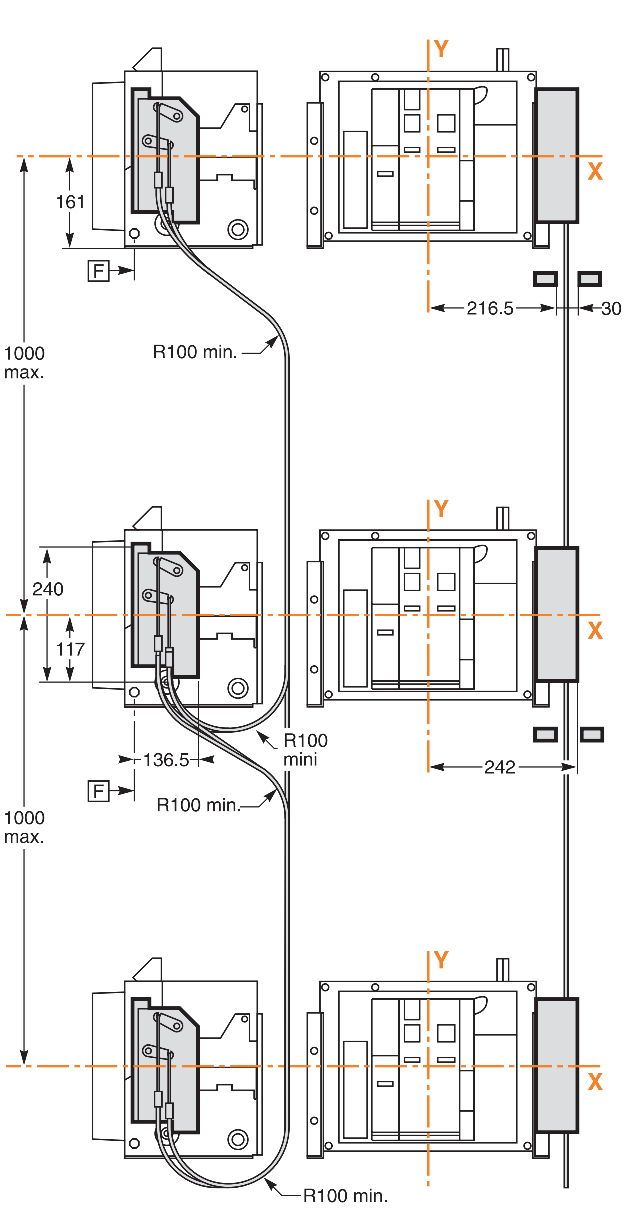


Remote-operated source-changeover systems

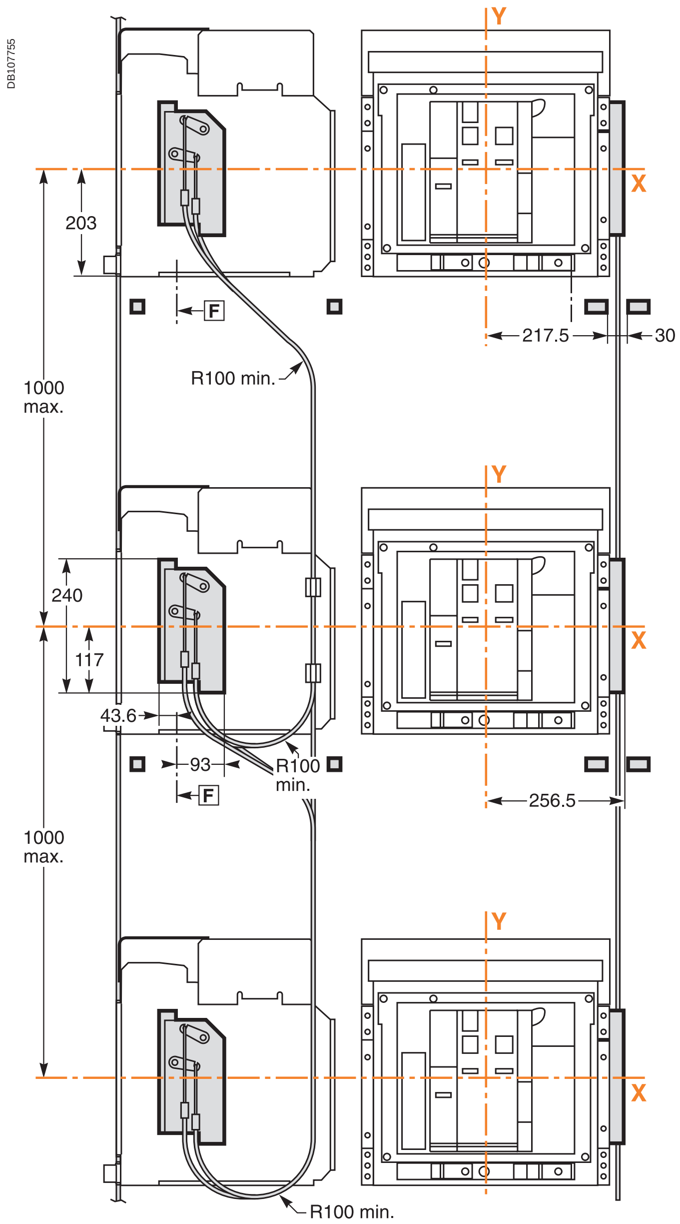
Interlocking using cables

Three Masterpact NW devices one above the other

Fixed devices



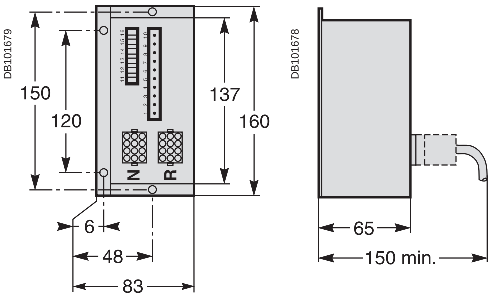
Drawout devices



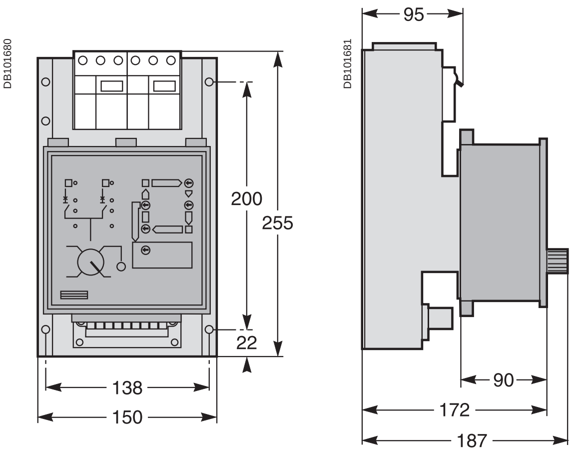
Remote-operated source-changeover systems

IVE electrical-interlocking unit
BA and UA automatic controllers

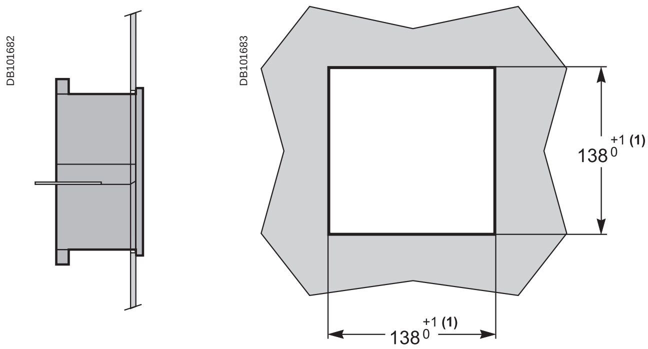
IVE electrical-interlocking unit



ACP auxiliaries control plate and BA/UA controller



Door cutout for BA/UA controllers



***(1)** Cutout according DIN 43700 standard.*

>TOOLS

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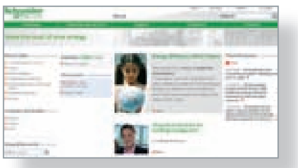
- complete library: technical documents, catalogs, FAQs, brochures…
- selection guides from the e-catalog.
- product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, the list of country contacts…



Training

Training allows you to acquire the Schneider Electric expertise (installation design, work with power on, etc.) for increased efficiency and a guarantee of improved customer service.
The training catalogue includes beginner's courses in electrical distribution, knowledge of MV and LV switchgear, operation and maintenance of installations, design of LV installations to give but a few examples.

Electrical diagrams

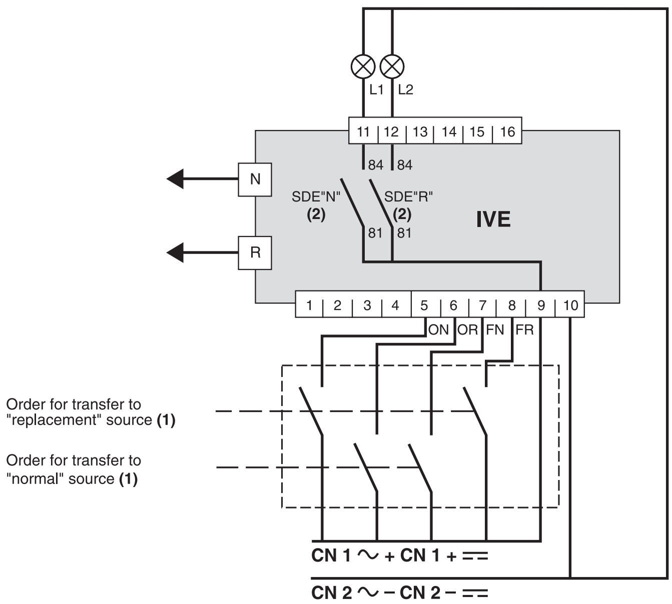
Remote-operated source-changeover systems

2 Compact NS100/1600 or Masterpact NT/NW devices

Electrical interlocking by the IVE unit

Recommended electrical control system

DB101689



(1) The "normal" and "replacement" source transfer orders must be interlocked electrically.
(2) Operating diagram: the SDE "fault-trip" signals are transmitted to the IVE unit. The SDE auxiliary contacts are mounted in the circuit breakers.

Legends
ON *"Normal" source opening order*
OR *"Replacement" source opening order*
FN *"Normal" source closing order*
FR *"Replacement" source closing order*
L1 *"Normal" source "fault-trip" signal*
L2 *"Replacement" source "fault-trip" signal*
N *"Normal" source auxiliary wiring connector*
R *"Replacement" source auxiliary wiring connector*

Note:
diagram shown with circuits de-energised, circuit breakers open and relays in normal position.

Electrical diagrams

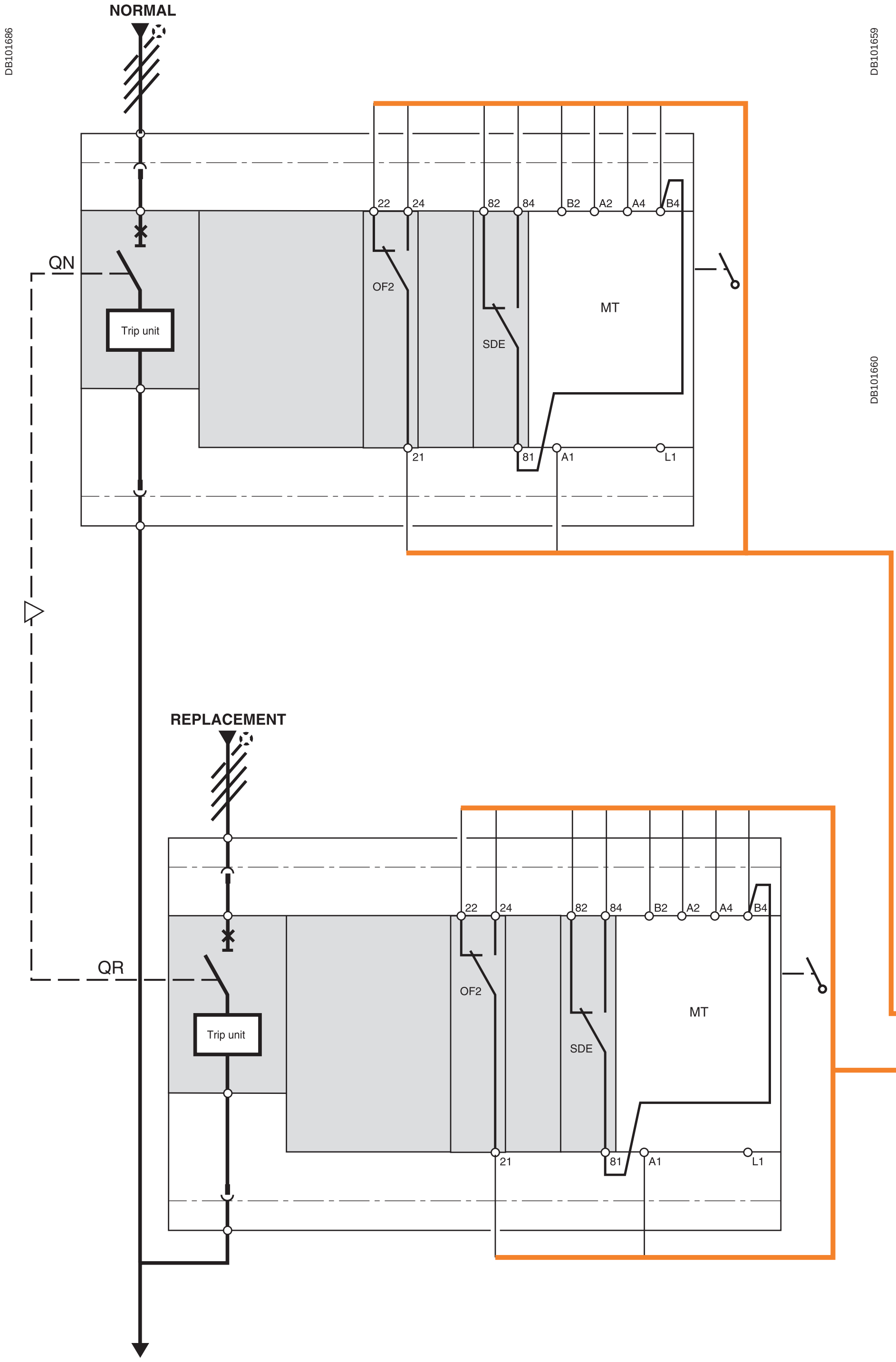
Remote-operated source-changeover systems

2 Compact NS100/630 devices

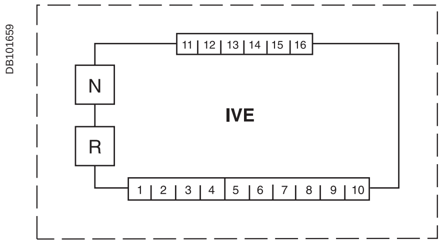
Diagram no. 51201177

Source-changeover system without automatic-control system

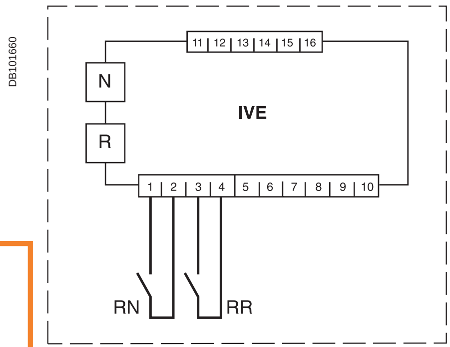
Without auxiliaries for emergency off



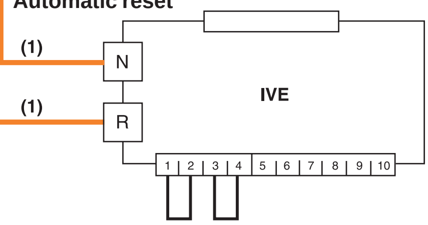
Local reset



Voluntary remote reset



Automatic reset



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, reverse the wires connected to terminals 82 and 84.**

(1) Prefabricated wiring: cannot be modified.

Legends
- ***QN*** *Normal" source Compact NS equipped with motor mechanism*
- ***QR*** *"Replacement" source Compact NS equipped with motor mechanism*
- ***SDE*** *"fault-trip" indication contact*
- ***IVE*** *electrical interlocking and terminal block unit*
- ***MT*** *motor mechanism*
- ***OF2*** *breaker ON/OFF indication contact*
- ***RN*** *reset order for breaker QN*
- ***RR*** *reset order for breaker QR*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
diagram shown with circuits de-energised, circuit breakers open and relays in normal position.

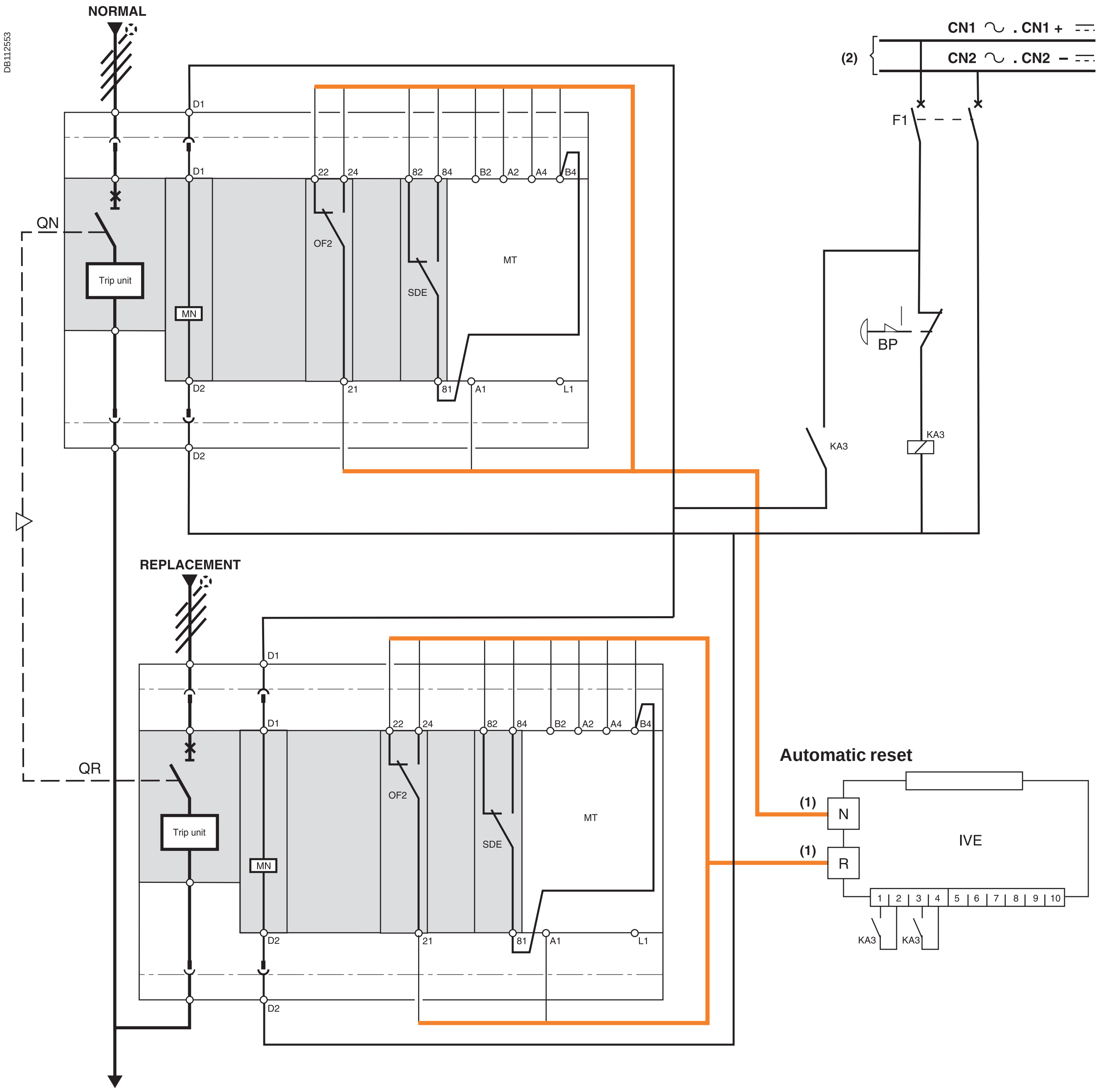
Remote-operated source-changeover systems

2 Compact NS100/630 devices

Diagram no. 51201178

Source-changeover system without automatic-control system

With emergency off by MN release and automatic reset



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, reverse the wires connected to terminals 82 and 84.**

(1) Prefabricated wiring supplied.
(2) Independent auxiliary source.

Legends

- ***QN*** *Normal" source Compact NS equipped with motor mechanism*
- ***QR*** *"Replacement" source Compact NS equipped with motor mechanism*
- ***MN*** *undervoltage release*
- ***OF2*** *breaker ON/OFF indication contact*
- ***SDE*** *"fault-trip" indication contact*
- ***MT*** *motor mechanism*
- ***IVE*** *electrical interlocking and terminal block unit*
- ***BP*** *emergency off button with latching*
- ***KA3*** *auxiliary relay*
- ***F1*** *auxiliary power supply circuit breaker*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuits de-energised, circuit breakers open and relays in normal position.

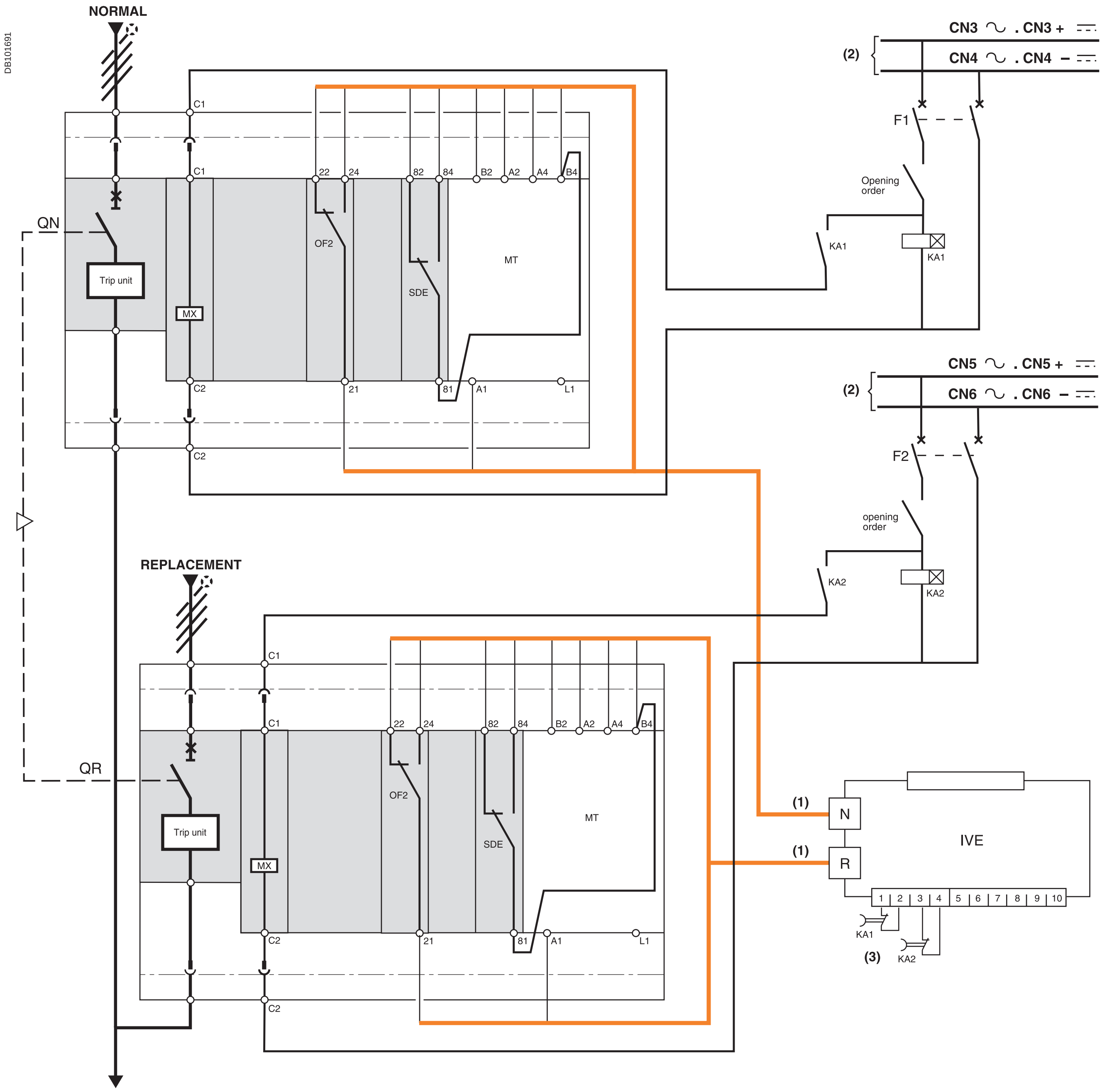
Remote-operated source-changeover systems

2 Compact NS100/630 devices

Diagram no. 51201179

Source-changeover system without automatic-control system

With emergency off by MX release and automatic reset



ATTENTION

The diagram shows the electrical wiring for circuit breakers.
When wiring the SDE with **switch-disconnectors, reverse the wires connected to terminals 82 and 84.**

(1) Prefabricated wiring supplied
(2) This source can be:
- *the source present in the case of voltage monitoring*
- *an independent source.*

In this case, the MX release must be protected.
(3) The reset orders must be delayed by 0.3 seconds.

Legends
QN *"Normal" source Compact NS equipped with motor mechanism*
QR *"Replacement" source Compact NS equipped with motor mechanism*
SDE *"fault-trip" indication contact*
OF2 *breaker ON/OFF indication contact*
MX *shunt release*
MT *motor mechanism*
IVE *electrical interlocking and terminal block unit*
KA1 *time-delayed auxiliary relays*
KA2 *time-delayed auxiliary relays*
F1 *auxiliary power supply circuit breaker*
F2 *auxiliary power supply circuit breaker*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

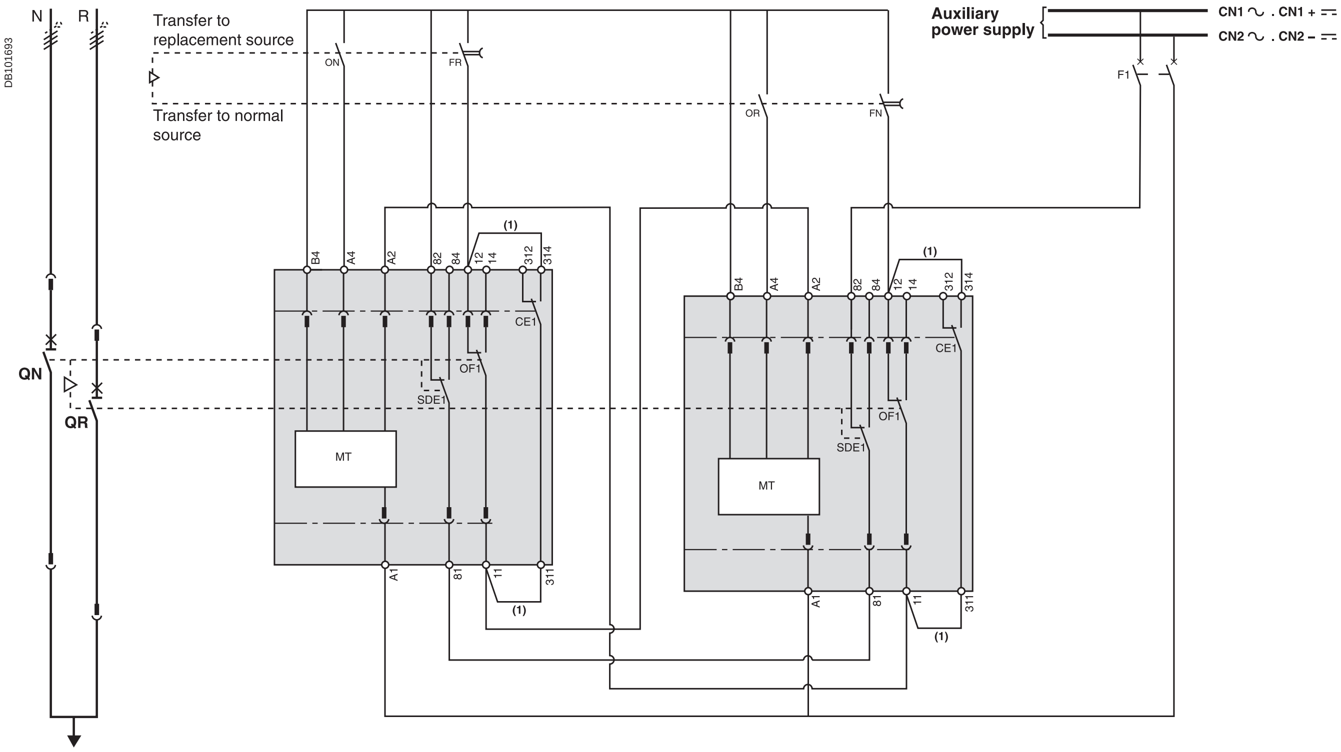
Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuits de-energised, circuit breakers open and relays in normal position.

Remote-operated source-changeover systems

2 Compact NS630b/1600 devices

Diagram no. 51201180

Electrical interlocking



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends
QN *"Normal" source Compact NS630b to 1600*
QR *"Replacement" source Compact NS NS630b to 1600*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
CE1 *"connected-position" indication contact (carriage switch)*
F1 *auxiliary power supply circuit breaker*
ON *"Normal" source opening order*
OR *"Replacement" source opening order*
FN *"Normal" source closing order (0.25 second delay)*
FR *"Replacement" source closing order (0.25 second delay)*
MT *Motor Mechanism*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

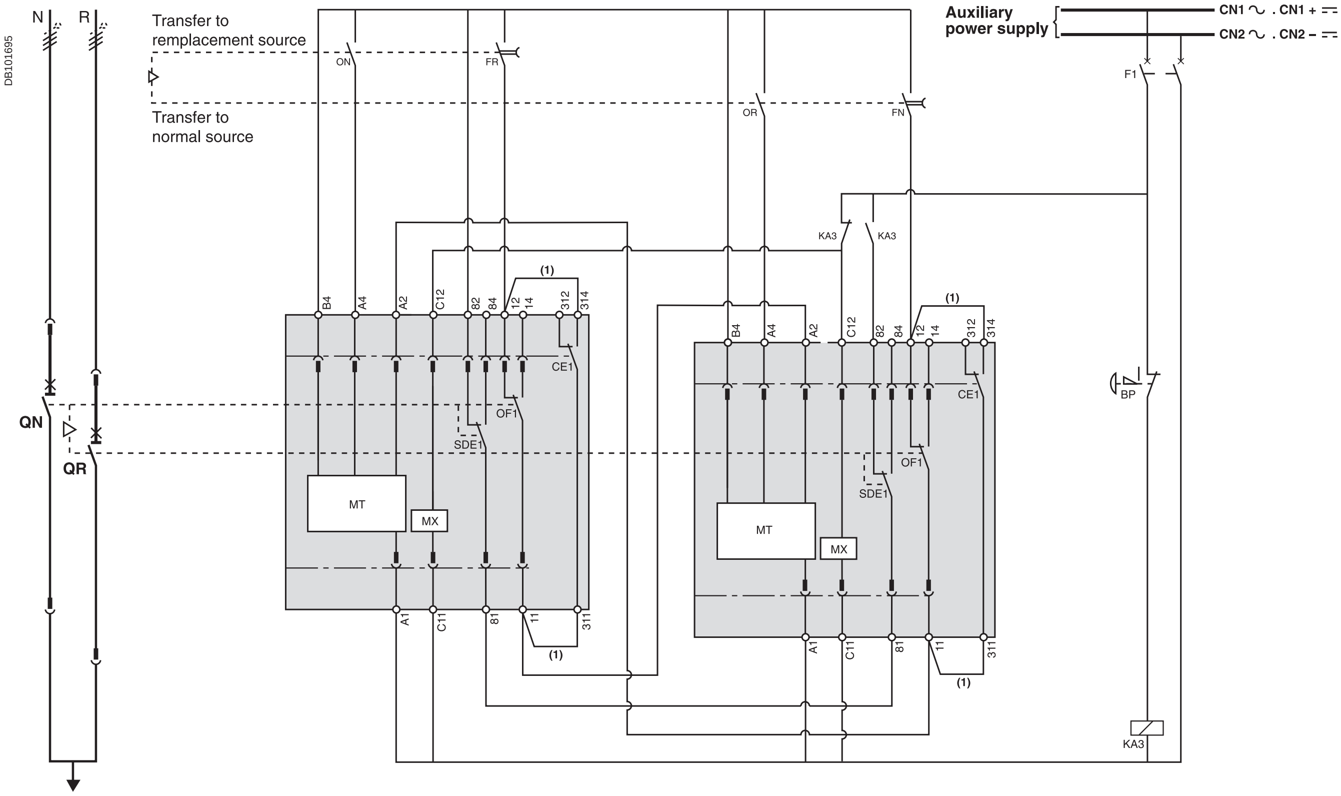
Electrical diagrams

Remote-operated source-changeover systems

2 Compact NS630b/1600 devices

Diagram no. 51201181

Electrical interlocking with emergency off by shunt release



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends
QN *"Normal" source Compact NS630b to 1600*
QR *"Replacement" source Compact NS NS630b to 1600*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
CE1 *"connected-position" indication contact (carriage switch)*
F1 *auxiliary power supply circuit breaker*
MX *shunt release*
BP *emergency off button with latching*
KA3 *auxiliary relay*
ON *"Normal" source opening order*
OR *"Replacement" source opening order*
FN *"Normal" source closing order (0.25 second delay)*
FR *"Replacement" source closing order (0.25 second delay)*
MT *Motor Mechanism*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

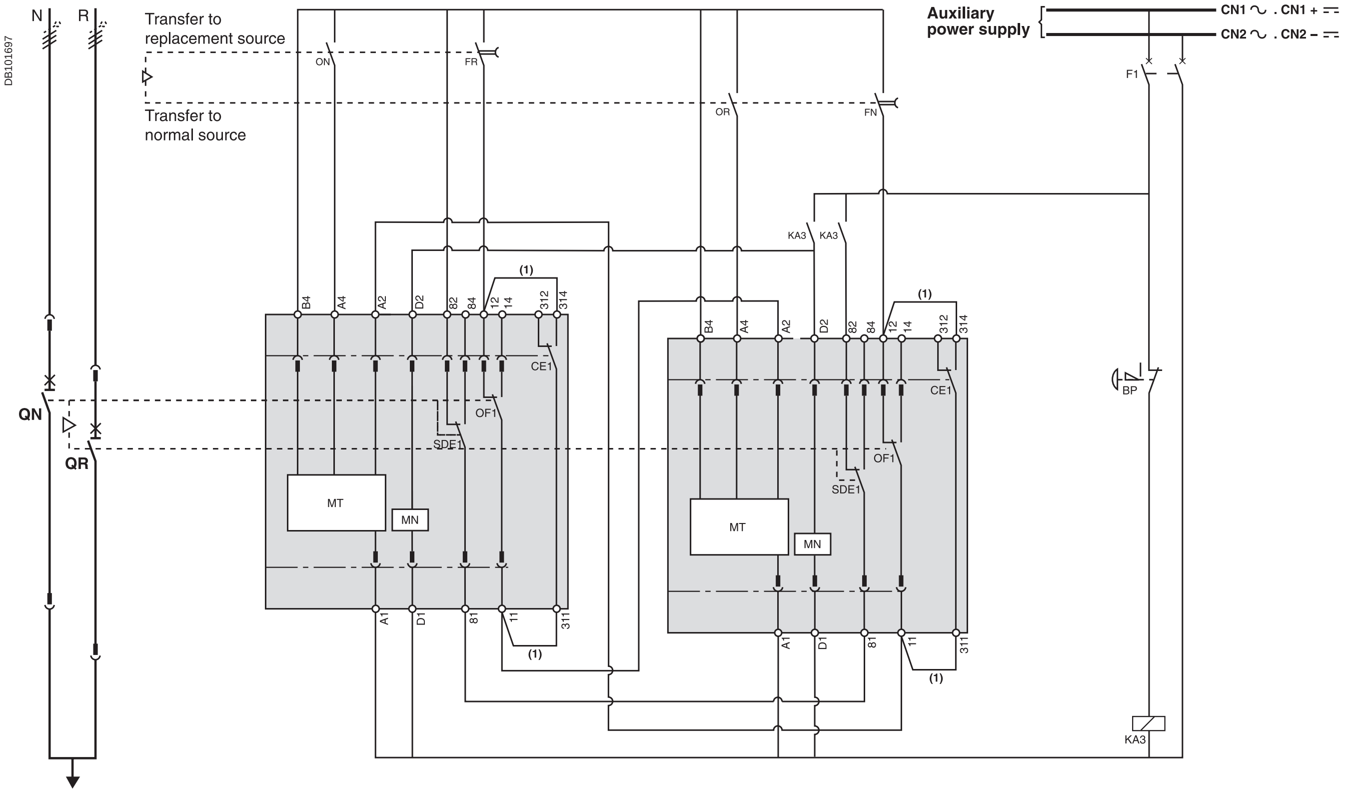
Electrical diagrams

Remote-operated source-changeover systems

2 Compact NS630b/1600 devices

Diagram no. 51201182

Electrical interlocking with emergency off by undervoltage



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends
QN *"Normal" source Compact NS630b to 1600*
QR *"Replacement" source Compact NS NS630b to 1600*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
CE1 *"connected-position" indication contact (carriage switch)*
F1 *auxiliary power supply circuit breaker*
MN *undervoltage release*
BP *emergency off button with latching*
KA3 *auxiliary relay*
ON *"Normal" source opening order*
OR *"Replacement" source opening order*
FN *"Normal" source closing order (0.25 second delay)*
FR *"Replacement" source closing order (0.25 second delay)*
MT *Motor Mechanism*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

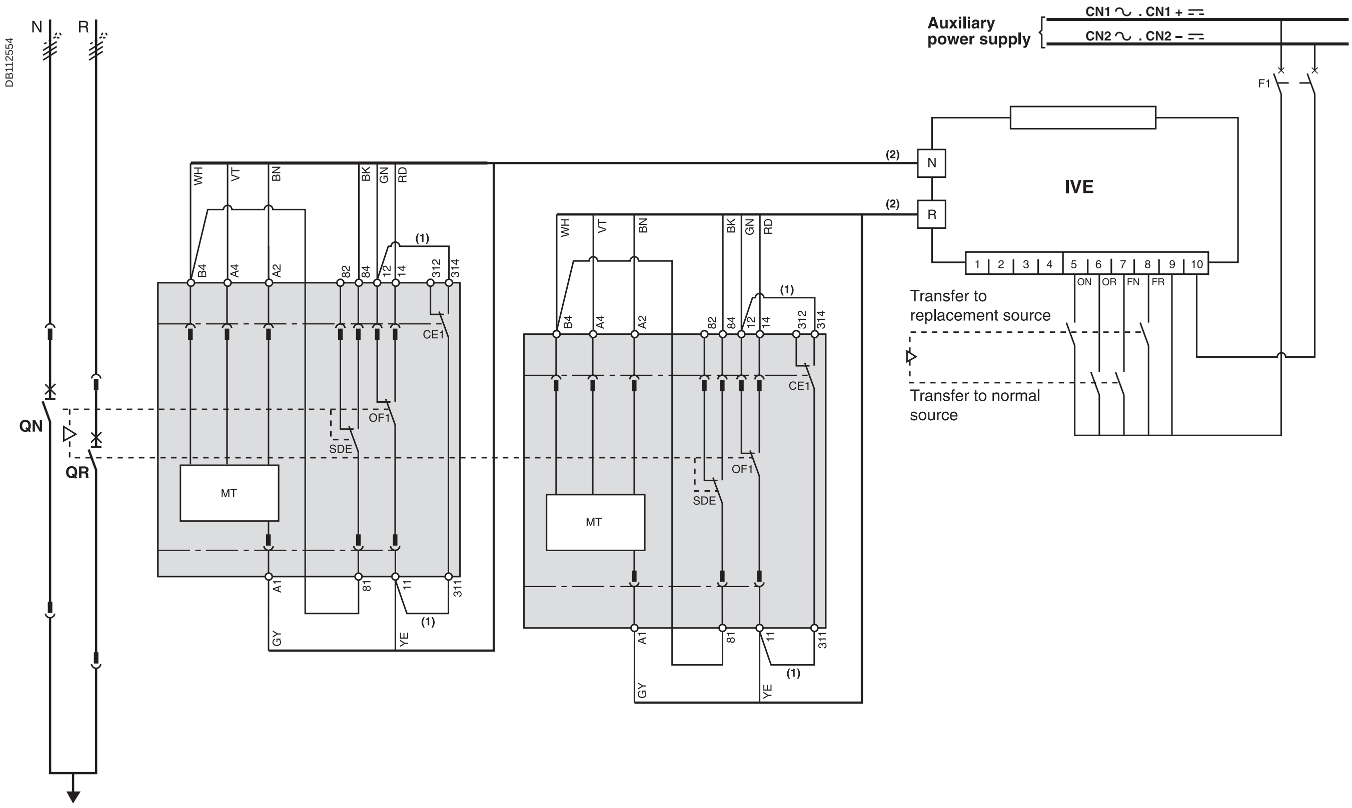
Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Compact NS630b/1600 devices

Diagram no. 51201183

Electrical interlocking by IVE



ATTENTION

The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired on fixed version.
(2) Prefabricated wiring supplied.

Legends
QN *"Normal" source Compact NS630b to 1600*
QR *"Replacement" source Compact NS NS630b to 1600*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
CE1 *"connected-position" indication contact (carriage switch)*
F1 *auxiliary power supply circuit breaker*
IVE *electrical interlocking and terminal block unit*
ON *"Normal" source opening order*
OR *"Replacement" source opening order*
FN *"Normal" source closing order (0.25 second delay)*
FR *"Replacement" source closing order (0.25 second delay)*
MT *Motor Mechanism*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

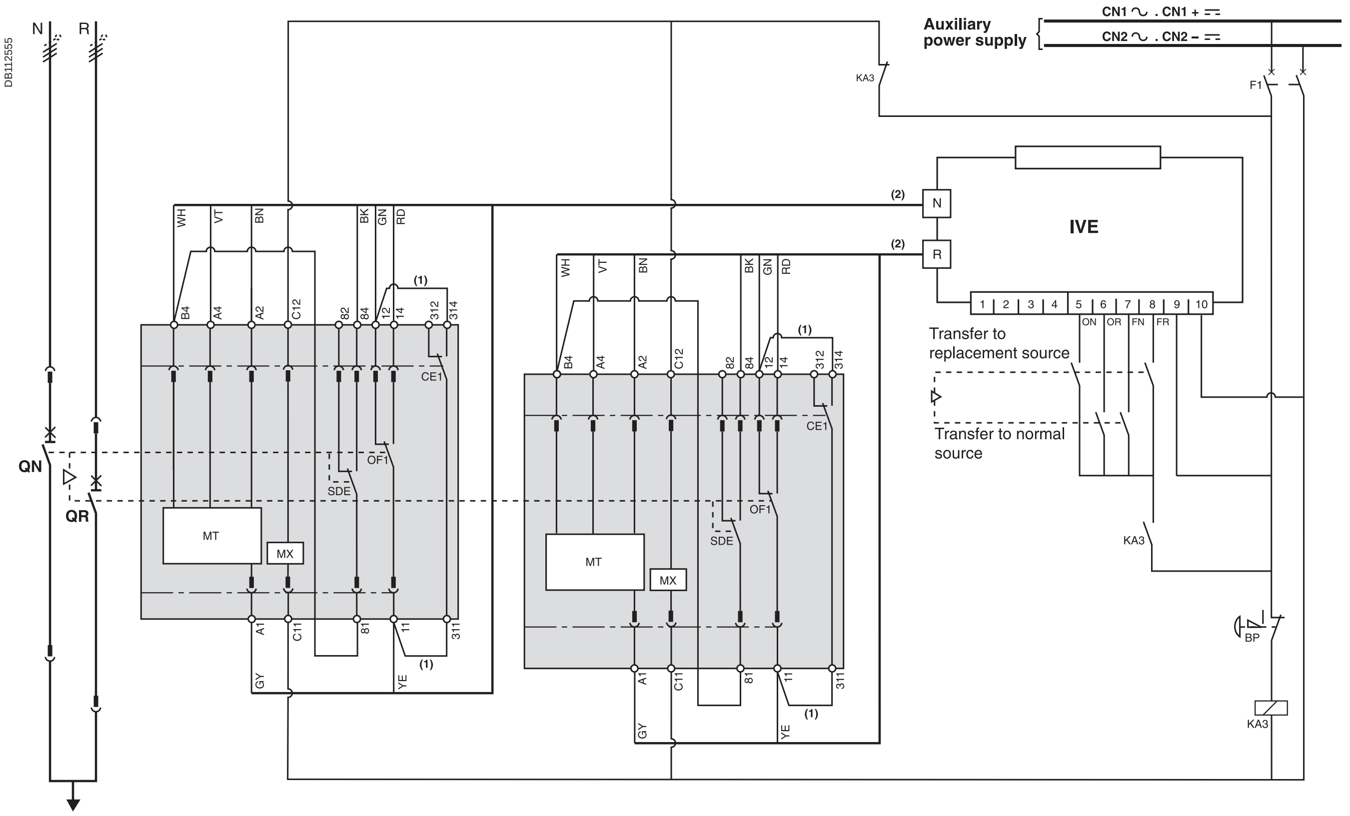
Electrical diagrams

Remote-operated source-changeover systems

2 Compact NS630b/1600 devices

Diagram no. 51201184

Electrical interlocking by IVE with emergency off by shunt release



ATTENTION

The diagram shows the electrical wiring for circuit breakers.
When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired on fixed version.
(2) Prefabricated wiring supplied.

Legends

QN	*"Normal" source Compact NS630b to 1600*
QR	*"Replacement" source Compact NS NS630b to 1600*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
CE1	*"connected-position" indication contact (carriage switch)*
F1	*auxiliary power supply circuit breaker*
IVE	*electrical interlocking and terminal block unit*
MX	*shunt release*
BP	*emergency off button with latching*
KA3	*auxiliary relay*
ON	*"Normal" source opening order*
OR	*"Replacement" source opening order*
FN	*"Normal" source closing order (0.25 second delay)*
FR	*"Replacement" source closing order (0.25 second delay)*
MT	*Motor Mechanism*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

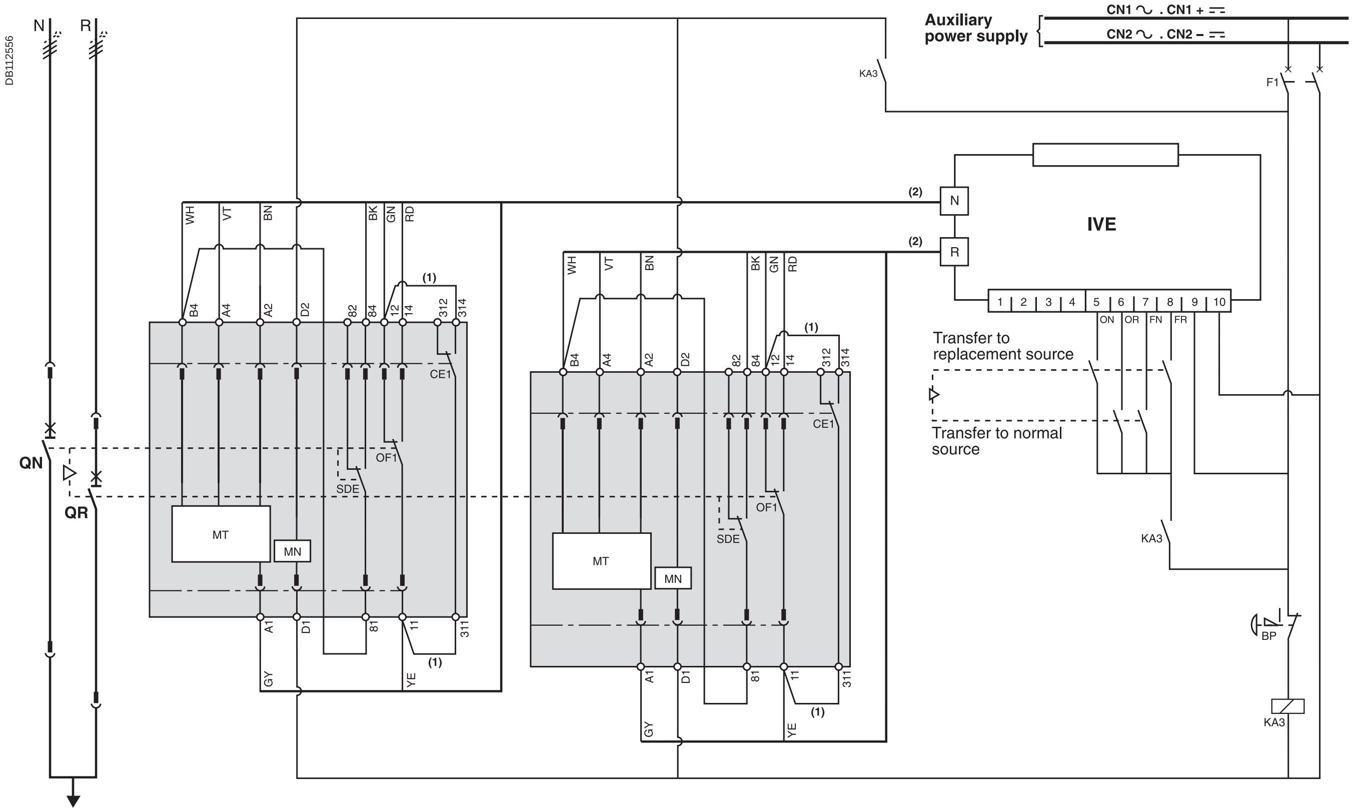
Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Compact NS630b/1600 devices

Diagram no. 51201185

Electrical interlocking by IVE with emergency off by undervoltage release



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired on fixed version.
(2) Prefabricated wiring supplied.

Legends

QN	*"Normal" source Compact NS630b to 1600*
QR	*"Replacement" source Compact NS NS630b to 1600*
MCH	*spring-charging motor*
MX	*standard opening release*
XF	*standard closing release*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
CE1	*"connected-position" indication contact (carriage switch)*
F1	*auxiliary power supply circuit breaker*
IVE	*electrical interlocking and terminal block unit*
MN	*undervoltage release*
BP	*emergency off button with latching*
KA3	*auxiliary relay*
ON	*"Normal" source opening order*
OR	*"Replacement" source opening order*
FN	*"Normal" source closing order (0.25 second delay)*
FR	*"Replacement" source closing order (0.25 second delay)*
MT	*Motor Mechanism*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

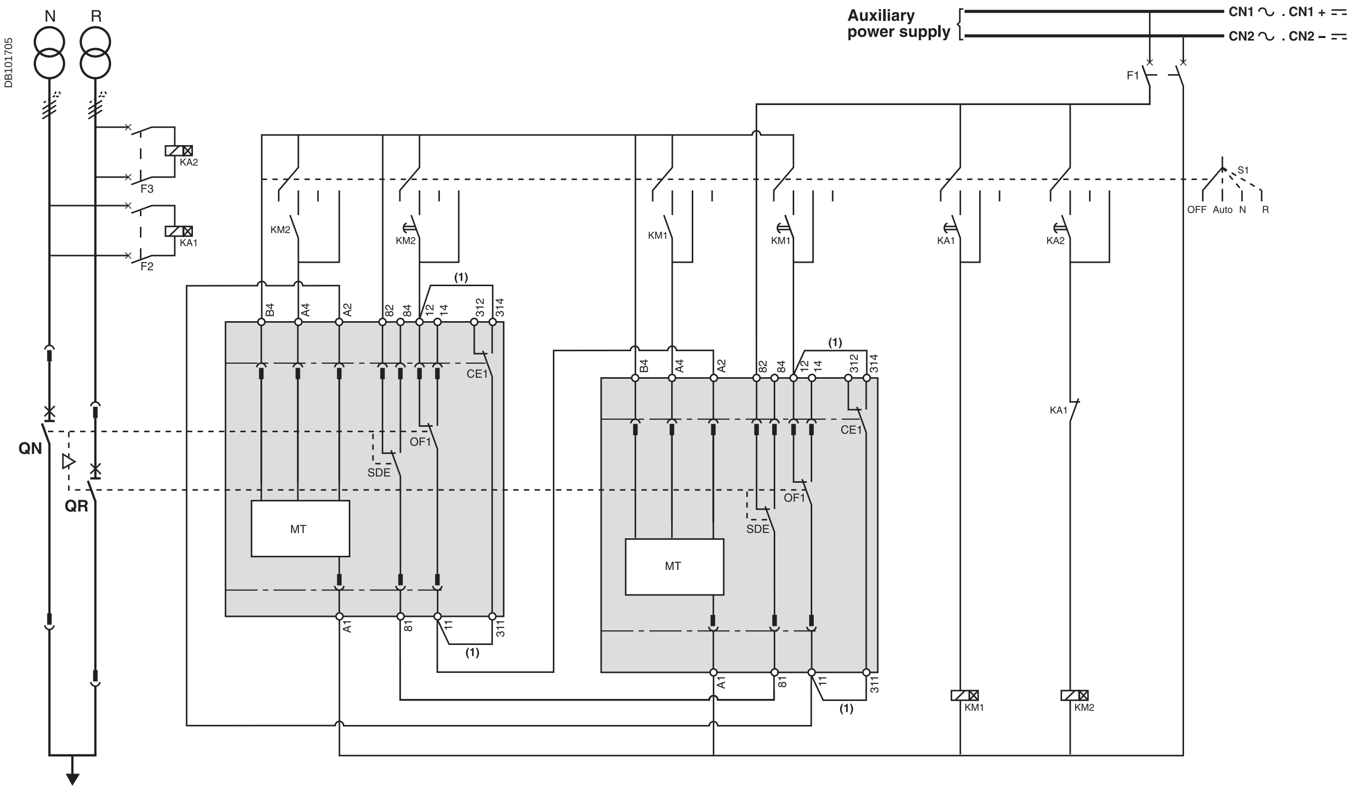
Electrical diagrams

Remote-operated source-changeover systems

2 Compact NS630b/1600 devices

Diagram no. 51201186

Automatic-control system without IVE for permanent replacement source



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends

QN	*Normal" source Compact NS630b to 1600*
QR	*"Replacement" source Compact NS NS630b to 1600*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
CE1	*"connected-position" indication contact (carriage switch)*
F1	*auxiliary power supply circuit breaker*
F2/F3	*circuit breaker (high breaking capacity)*
S1	*control switches*
KA1	*auxiliary relays - UN presence detection*
KA2	*auxiliary relays - UR presence detection*
KM1	*contactors with 0.25 second delay (for transfer to "Replacement" source)*
KM2	*contactors with 0.25 second delay (for transfer to "Normal" source)*
MT	*Motor Mechanism*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

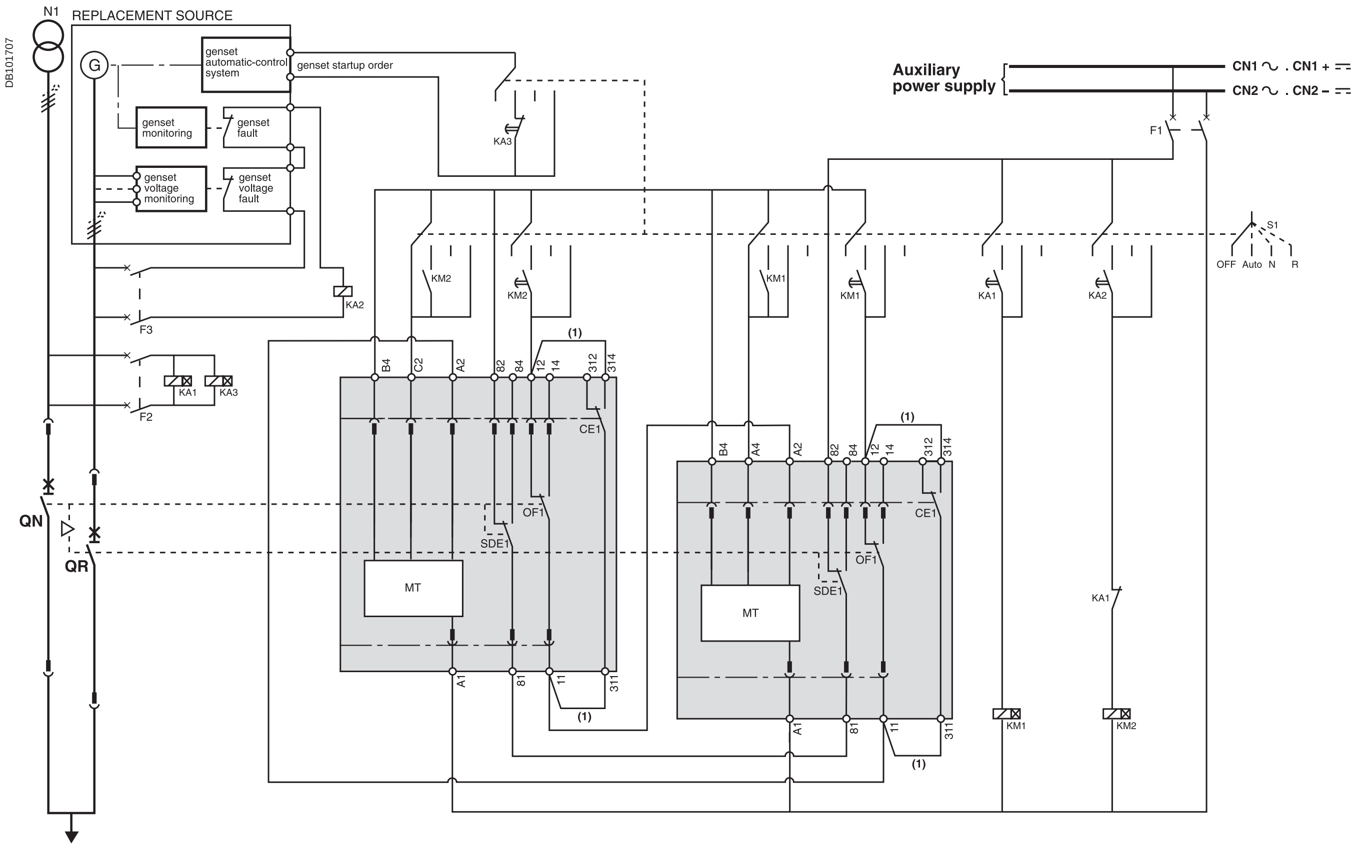
Electrical diagrams

Remote-operated source-changeover systems

2 Compact NS630b/1600 devices

Diagram no. 51201187

Automatic-control system for replacement source generator set



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends

- ***QN*** *"Normal" source Compact NS630b to 1600*
- ***QR*** *"Replacement" source Compact NS NS630b to 1600*
- ***OF...*** *breaker ON/OFF indication contact*
- ***SDE1*** *"fault-trip" indication contact*
- ***CE1*** *"connected-position" indication contact (carriage switch)*
- ***F1*** *auxiliary power supply circuit breaker*
- ***F2/F3*** *circuit breaker (high breaking capacity)*
- ***S1*** *control switches*
- ***KA1*** *auxiliary relays - UN presence detection*
- ***KA2*** *auxiliary relays - UR presence detection*
- ***KA3*** *auxiliary relays - generator set startup if UN absent*
- ***KM1*** *contactors with 0.25 second delay (for transfer to "Replacement" source)*
- ***KM2*** *contactors with 0.25 second delay (for transfer to "Normal" source)*
- ***MT*** *Motor Mechanism*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:

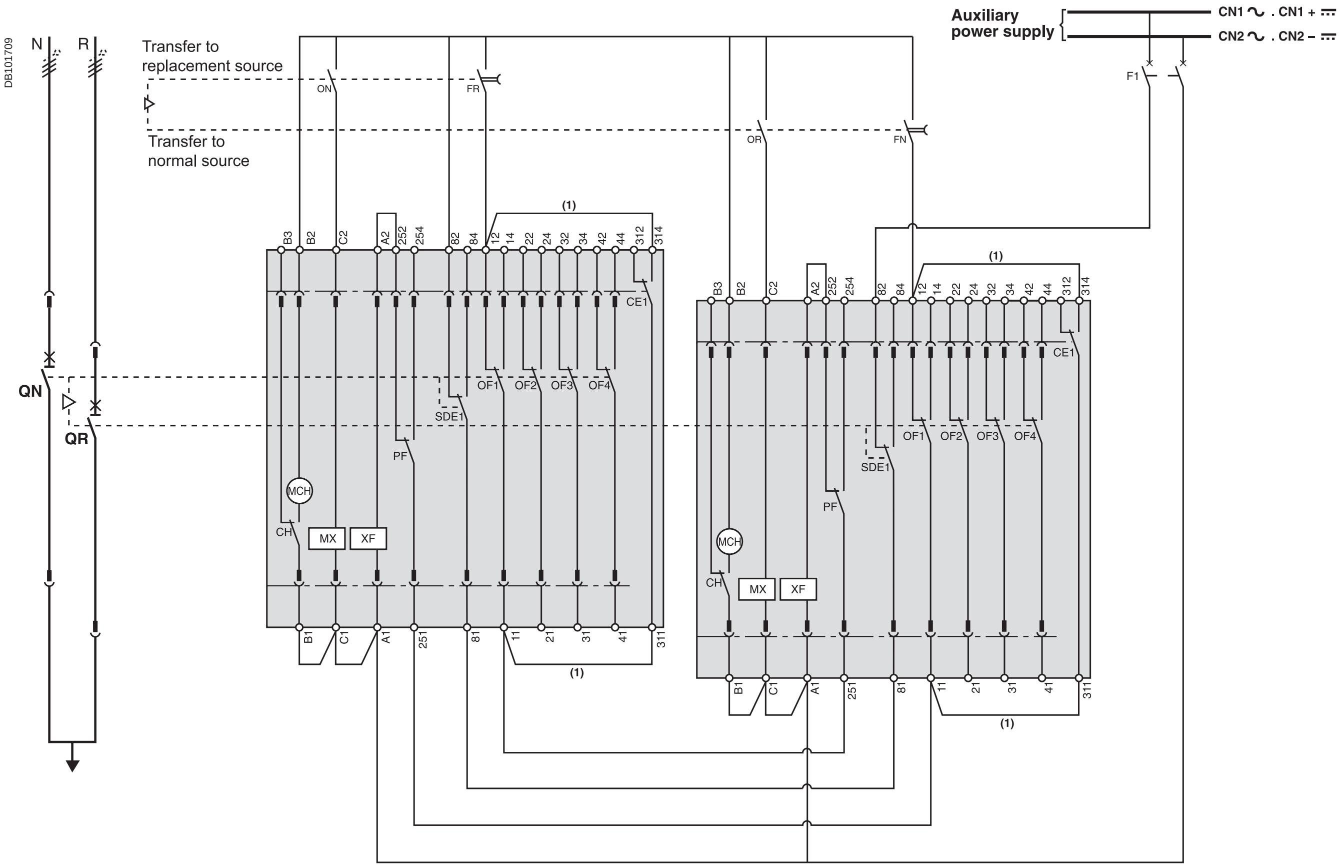
after a fault trip, the breaker must be reset manually by pressing its reset button.
Diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51201139

Electrical interlocking with lockout after a fault



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends

QN	*"Normal" source Masterpact NT or NW*
QR	*"Replacement" source Masterpact NT or NW*
MCH	*spring-charging motor*
MX	*standard opening voltage release*
XF	*standard closing voltage release*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
PF	*"ready-to-close" contact*
CE1	*"connected-position" indication contact (carriage switch)*
CH	*"springs charged" indication contact*
F1	*auxiliary power supply circuit breaker*
ON	*"Normal" source opening order*
OR	*"Replacement" source opening order*
FN	*"Normal" source closing order (0.25 second delay)*
FR	*"Replacement" source closing order (0.25 second delay)*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

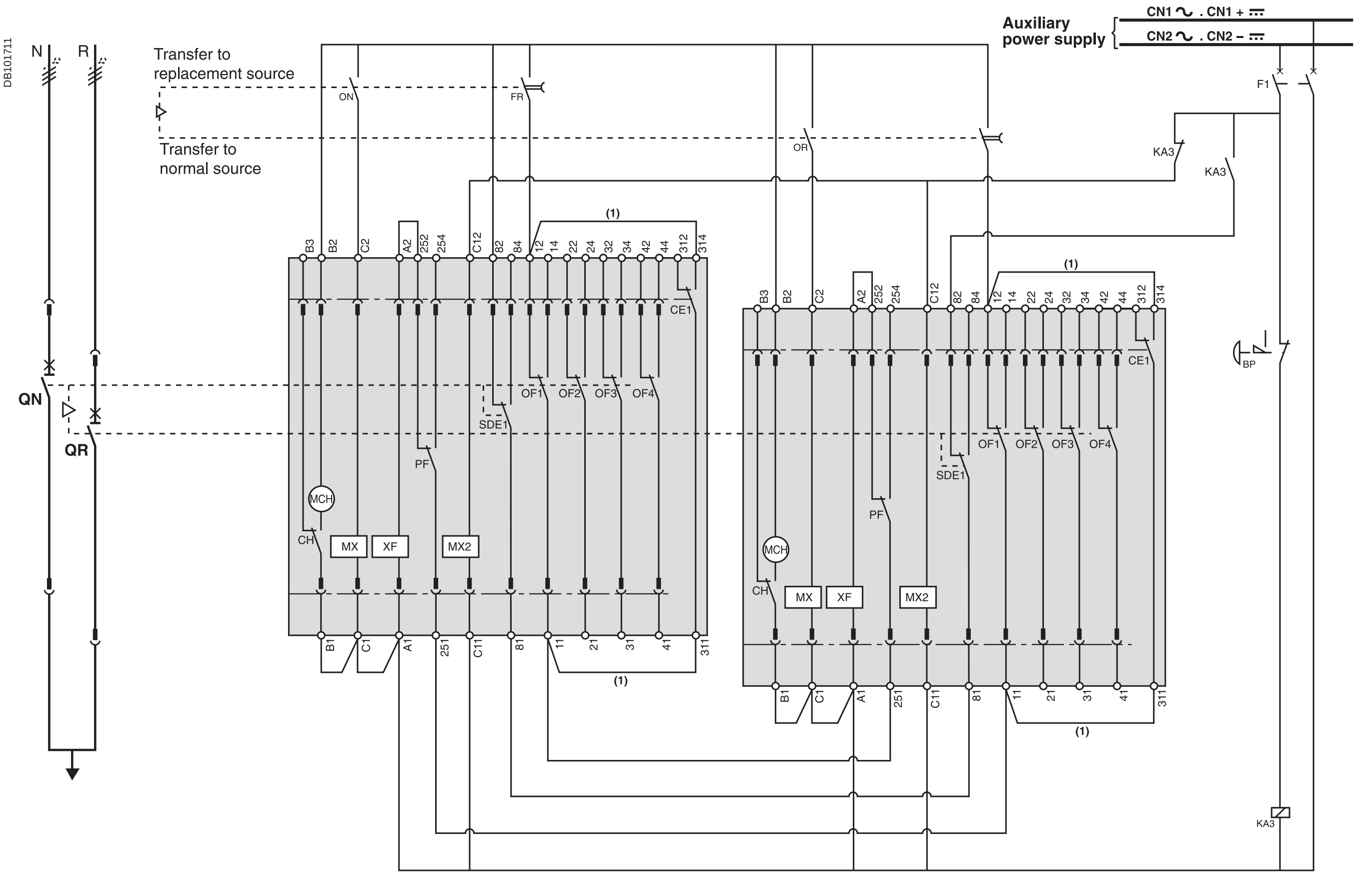
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51201140

Electrical interlocking with lockout after a fault and emergency off by shunt release



ATTENTION

The diagram shows the electrical wiring for circuit breakers.
When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends

KA3	*time delay for genset startup order to avoid starting the genset for transient UN disturbances*
QN	*"Normal" source Masterpact NT or NW*
QR	*"Replacement" source Masterpact NT or NW*
MCH	*spring-charging motor*
MX	*standard opening voltage release*
XF	*standard closing voltage release*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
PF	*"ready-to-close" contact*
CE1	*"connected-position" indication contact (carriage switch)*
CH	*"springs charged" indication contact*
F1	*auxiliary power supply circuit breaker*
MX2	*shunt release*
BP	*emergency off button with latching*
ON	*"Normal" source opening order*
OR	*"Replacement" source opening order*
FN	*"Normal" source closing order (0.25 second delay)*
FR	*"Replacement" source closing order (0.25 second delay)*
BP	*emergency off button with latching*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

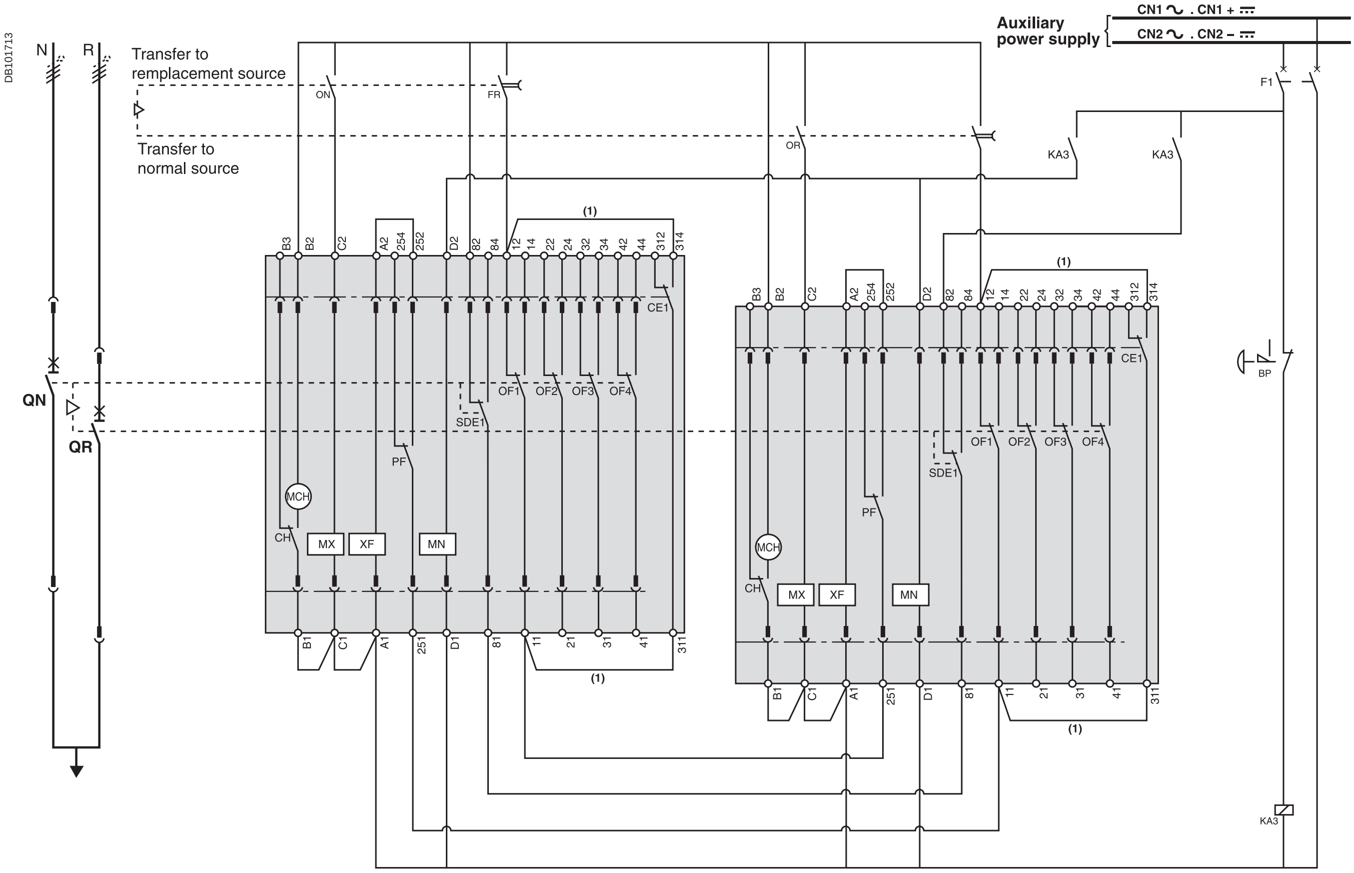
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51201141

Electrical interlocking with lockout after a fault and emergency off by undervoltage release



ATTENTION

The diagram shows the electrical wiring for circuit breakers.
When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends

QN *"Normal" source Masterpact NT or NW*
QR *"Replacement" source Masterpact NT or NW*
MCH *spring-charging motor*
MX *standard opening voltage release*
XF *standard closing voltage release*
MN *undervoltage release*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
PF *"ready-to-close" contact*
CE1 *"connected-position" indication contact (carriage switch)*
CH *"springs charged" indication contact*
F1 *auxiliary power supply circuit breaker*
BP *emergency off button with latching*
S1 *control switches*
KA3 *auxiliary relay*
ON *"Normal" source opening order*
OR *"Replacement" source opening order*
FN *"Normal" source closing order (0.25 second delay)*
FR *"Replacement" source closing order (0.25 second delay)*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

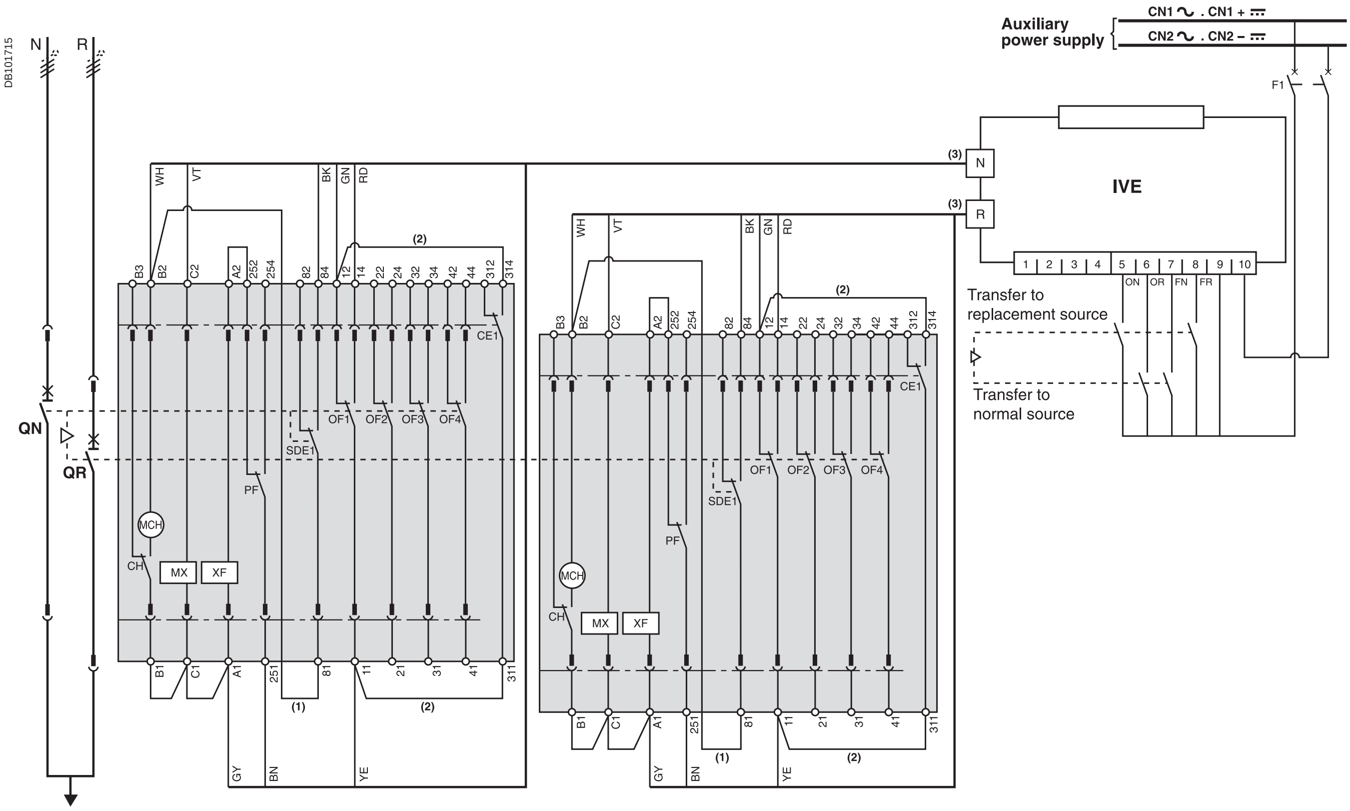
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51201142

Electrical interlocking by IVE with lockout after a fault



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired for the "without lockout after a fault" solution.
(2) Not to be wired on fixed version.
(3) Prefabricated wiring supplied.

Legends

QN	*"Normal" source Masterpact NT or NW*
QR	*"Replacement" source Masterpact NT or NW*
MCH	*spring-charging motor*
MX	*standard opening voltage release*
XF	*standard closing voltage release*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
PF	*"ready-to-close" contact*
CE1	*"connected-position" indication contact (carriage switch)*
CH	*"springs charged" indication contact*
IVE	*electrical interlocking and terminal block unit*
F1	*auxiliary power supply circuit breaker*
ON	*"Normal" source opening order*
OR	*"Replacement" source opening order*
FN	*"Normal" source closing order (0.25 second delay)*
FR	*"Replacement" source closing order (0.25 second delay)*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

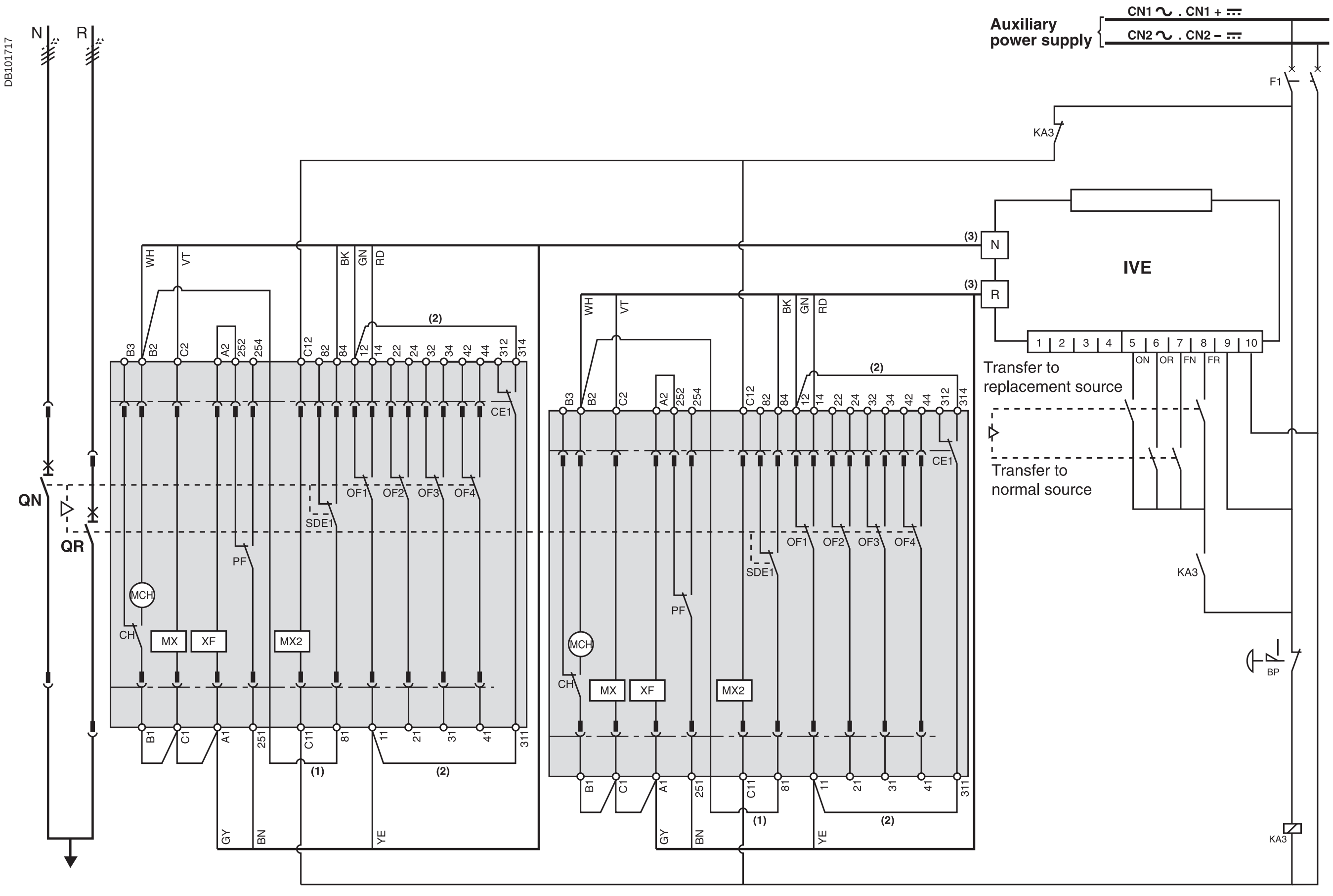
Electrical diagrams

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51201143

Electrical interlocking by IVE with lockout after a fault and emergency off by shunt release



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired for the "without lockout after a fault" solution.
(2) Not to be wired on fixed version.
(3) Prefabricated wiring supplied.

Legends

QN	*"Normal" source Masterpact NT or NW*
QR	*"Replacement" source Masterpact NT or NW*
MCH	*spring-charging motor*
MX	*standard opening voltage release*
XF	*standard closing voltage release*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
PF	*"ready-to-close" contact*
CE1	*"connected-position" indication contact (carriage switch)*
CH	*"springs charged" indication contact*
IVE	*electrical interlocking and terminal block unit*
F1	*auxiliary power supply circuit breaker*
BP	*emergency off button with latching*
KA3	*auxiliary relay*
ON	*"Normal" source opening order*
OR	*"Replacement" source opening order*
FN	*"Normal" source closing order (0.25 second delay)*
FR	*"Replacement" source closing order (0.25 second delay)*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

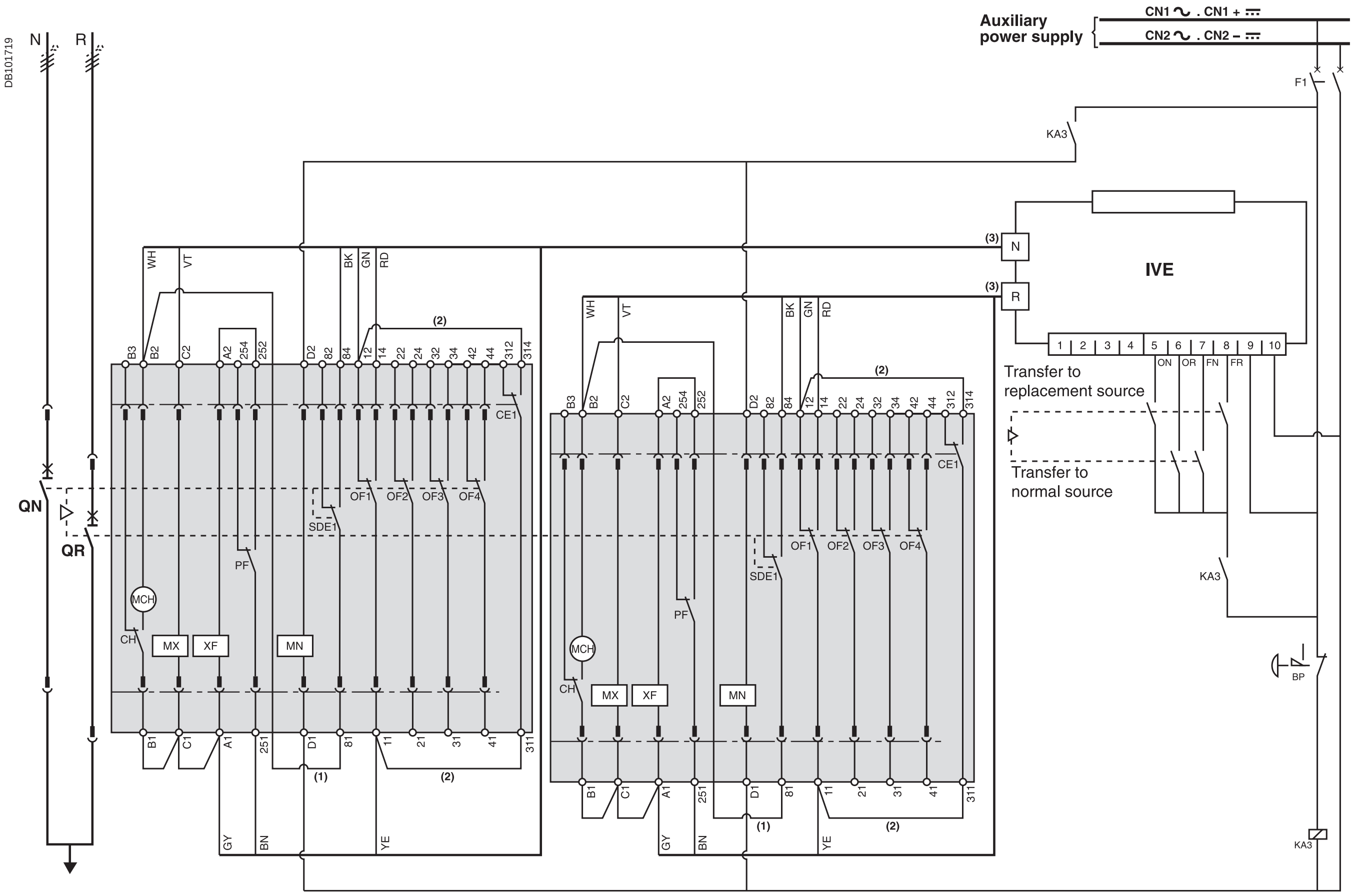
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51201144

Electrical interlocking by IVE with lockout after a fault and emergency off by undervoltage release



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired for the "without lockout after a fault" solution.
(2) Not to be wired on fixed version.
(3) Prefabricated wiring supplied.

Legends

QN	*"Normal" source Masterpact NT or NW*
QR	*"Replacement" source Masterpact NT or NW*
MCH	*spring-charging motor*
MX	*standard opening voltage release*
XF	*standard closing voltage release*
MN	*undervoltage release*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
PF	*"ready-to-close" contact*
CE1	*"connected-position" indication contact (carriage switch)*
CH	*"springs charged" indication contact*
IVE	*electrical interlocking and terminal block unit*
F1	*auxiliary power supply circuit breaker*
BP	*emergency off button with latching*
S1	*control switches*
KA3	*auxiliary relay*
ON	*"Normal" source opening order*
OR	*"Replacement" source opening order*
FN	*"Normal" source closing order (0.25 second delay)*
FR	*"Replacement" source closing order (0.25 second delay)*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

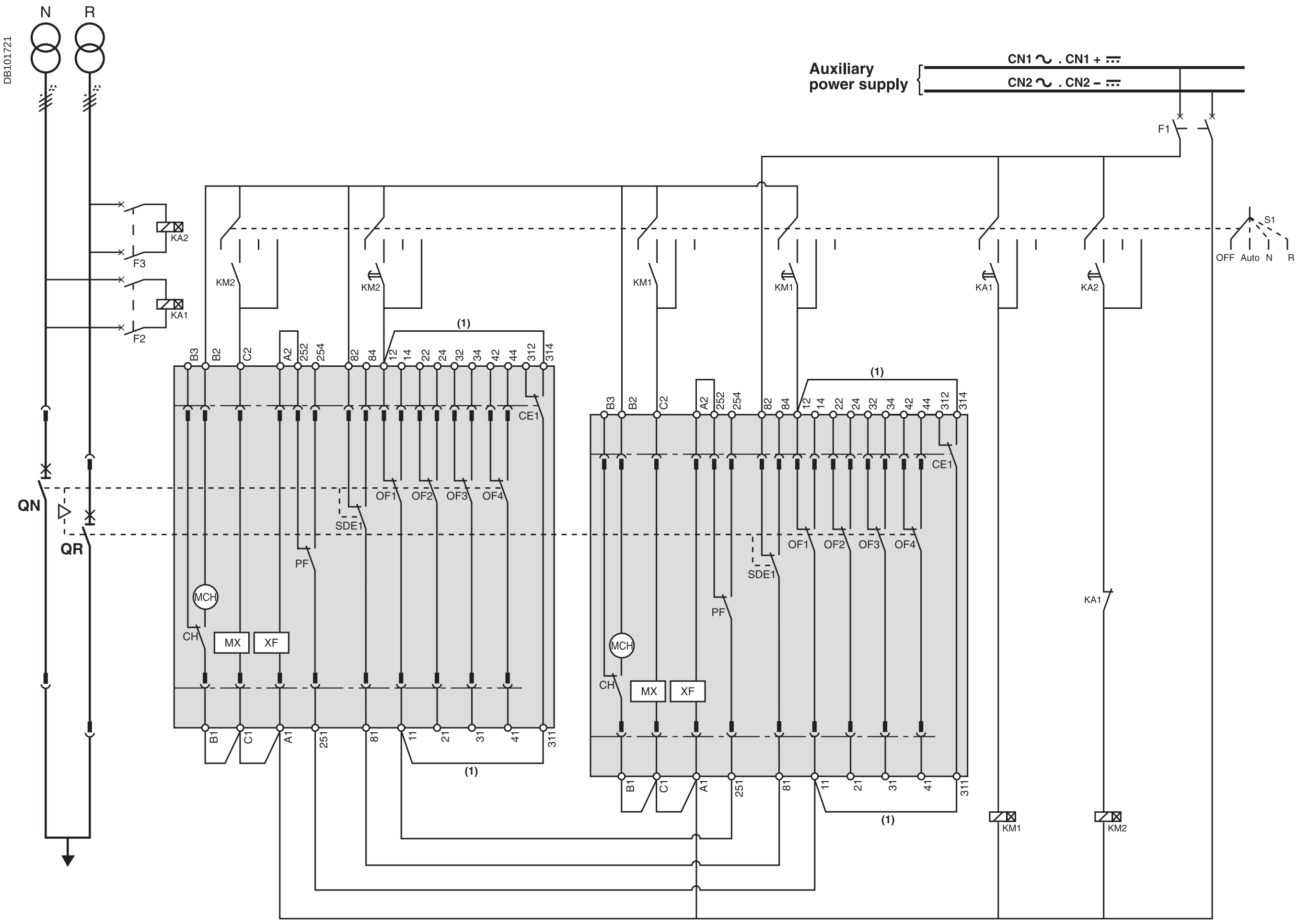
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51156226

Automatic-control system without IVE for permanent replacement source with lockout after a fault



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends
- ***QN*** *"Normal" source Masterpact NT or NW*
- ***QR*** *"Replacement" source Masterpact NT or NW*
- ***MCH*** *spring-charging motor*
- ***MX*** *standard opening voltage release*
- ***XF*** *standard closing voltage release*
- ***OF...*** *breaker ON/OFF indication contact*
- ***SDE1*** *"fault-trip" indication contact*
- ***PF*** *"ready-to-close" contact*
- ***CE1*** *"connected-position" indication contact (carriage switch)*
- ***CH*** *"springs charged" indication contact*
- ***F1*** *auxiliary power supply circuit breaker*
- ***F2/F3*** *circuit breaker (high breaking capacity)*
- ***S1*** *control switches*
- ***KA1*** *auxiliary relays - UN presence detection*
- ***KA2*** *auxiliary relays - UR presence detection*
- ***KM1*** *contactors with 0.25 second delay (for transfer to "Replacement" source)*
- ***KM2*** *contactors with 0.25 second delay (for transfer to "Normal" source)*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

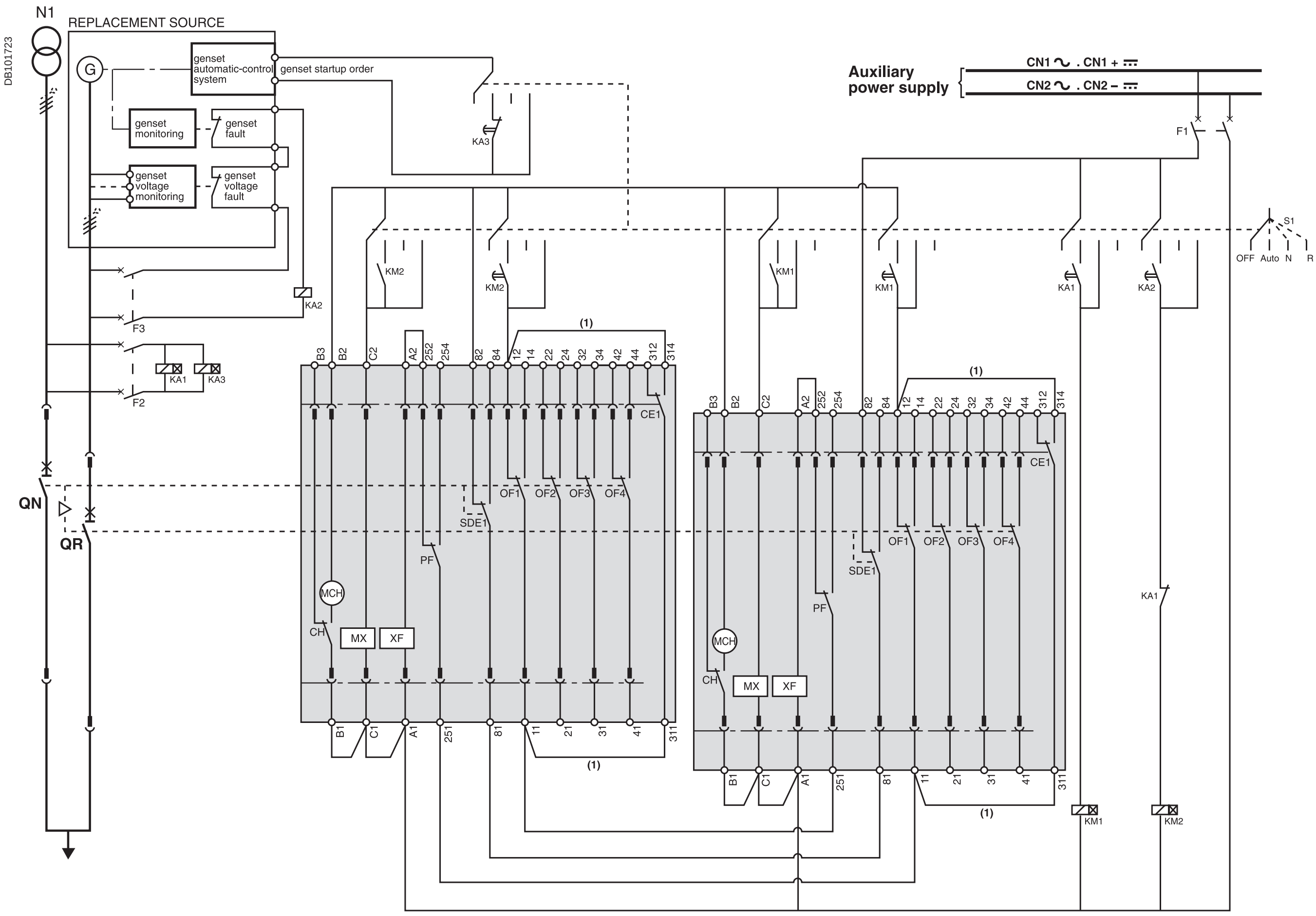
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51156227

Automatic-control system for replacement source generator set with lockout after a fault



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

(1) Not to be wired on fixed version.

Legends

QN	*"Normal" source Masterpact NT or NW*
QR	*"Replacement" source Masterpact NT or NW*
MCH	*spring-charging motor*
MX	*standard opening voltage release*
XF	*standard closing voltage release*
OF...	*breaker ON/OFF indication contact*
SDE1	*"fault-trip" indication contact*
PF	*"ready-to-close" contact*
CE1	*"connected-position" indication contact (carriage switch)*
CH	*"springs charged" indication contact*
F1	*auxiliary power supply circuit breaker*
F2/F3	*circuit breaker (high breaking capacity)*
S1	*control switches*
KA1	*auxiliary relays - UN presence detection*
KA2	*auxiliary relays - UR presence detection*
KA3	*auxiliary relays - generator set startup if UN absent*
KM1	*contactors with 0.25 second delay (for transfer to "Replacement" source)*
KM2	*contactors with 0.25 second delay (for transfer to "Normal" source)*

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

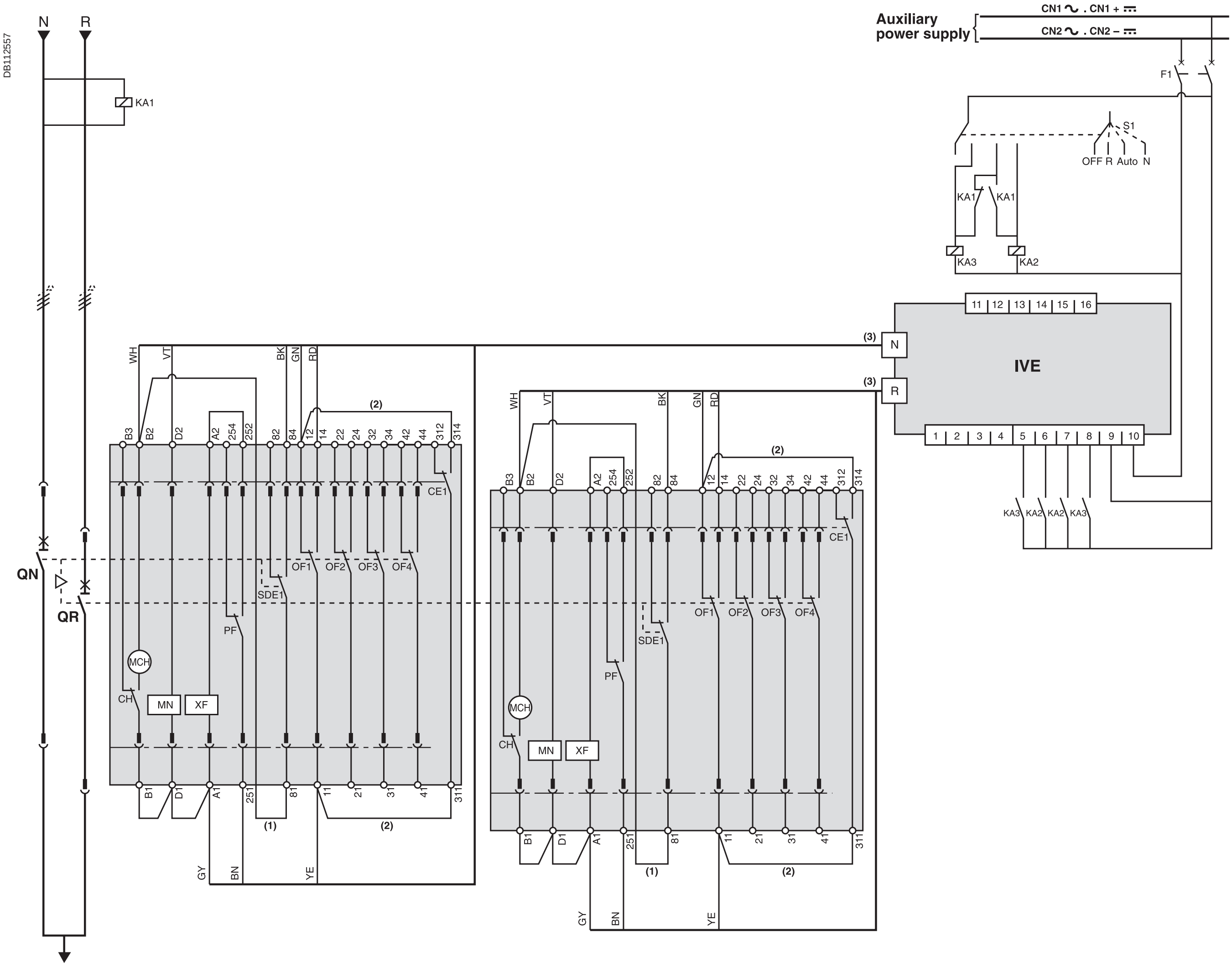
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51156904

Automatic-control system for permanent replacement source with lockout after a fault (with MN)



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired for the "without lockout after a fault" solution.
(2) Not to be wired on fixed version.
(3) Prefabricated wiring supplied.

Legends
QN *"Normal" source Masterpact NT or NW*
QR *"Replacement" source Masterpact NT or NW*
MCH *spring-charging motor*
XF *standard closing voltage release*
MN *undervoltage release*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
PF *"ready-to-close" contact*
CE1 *"connected-position" indication contact (carriage switch)*
CH *"springs charged" indication contact*
IVE *electrical interlocking and terminal block unit*
F1 *auxiliary power supply circuit breaker*
F2 *circuit breaker (high breaking capacity)*
S1 *control switches*
KA1 *auxiliary relays*
KA2 *auxiliary relays*
KA3 *auxiliary relays*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

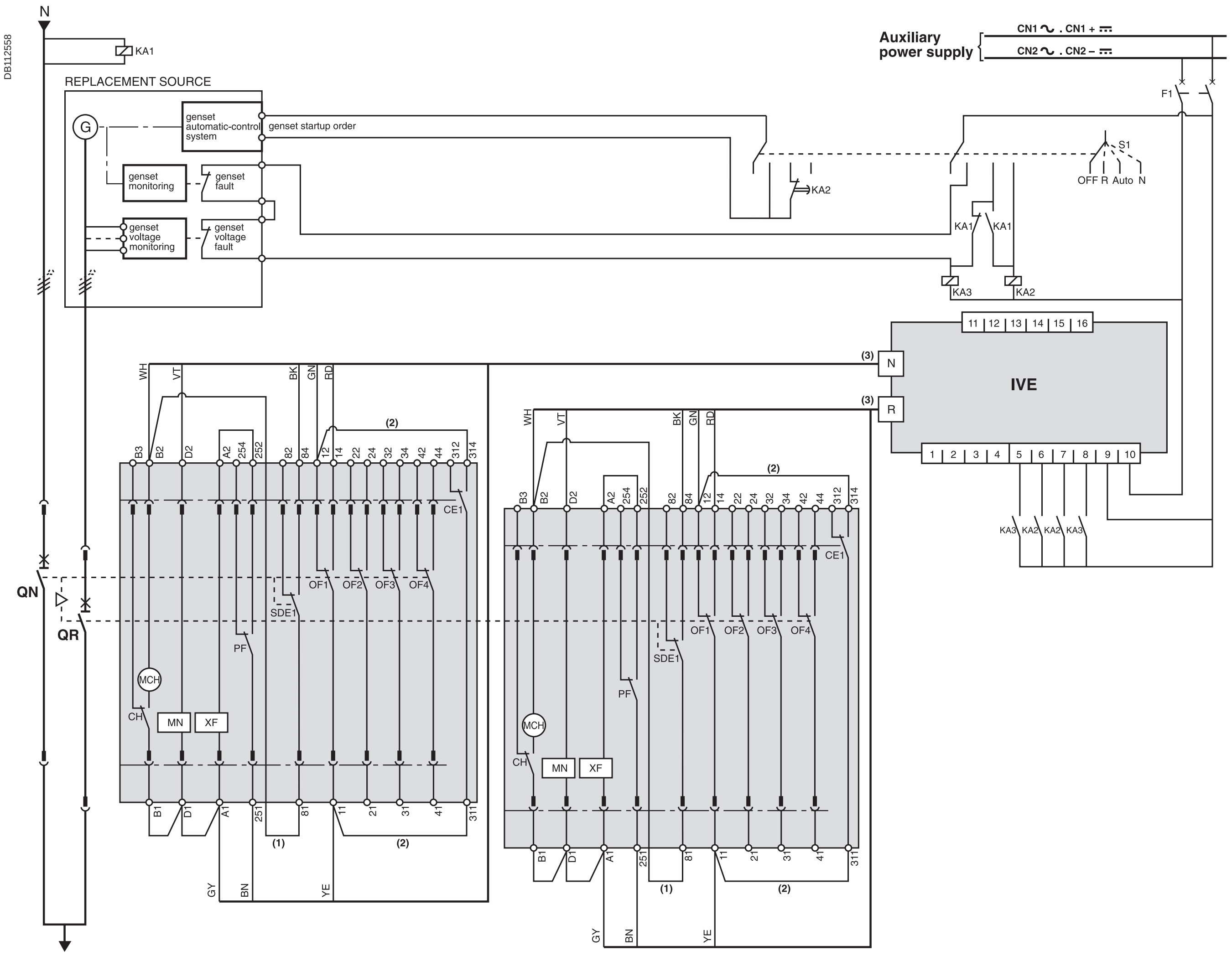
Electrical diagrams

Remote-operated source-changeover systems

2 Masterpact NT or NW devices

Diagram no. 51156905

Automatic-control system for replacement source generator set with lockout after a fault (with MN)



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired for the "without lockout after a fault" solution.
(2) Not to be wired on fixed version.
(3) Prefabricated wiring supplied.

Legends
QN *"Normal" source Masterpact NT or NW*
QR *"Replacement" source Masterpact NT or NW*
MCH *spring-charging motor*
XF *standard closing voltage release*
MN *undervoltage release*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
PF *"ready-to-close" contact*
CE1 *"connected-position" indication contact (carriage switch)*
CH *"springs charged" indication contact*
IVE *electrical interlocking and terminal block unit*
F1 *auxiliary power supply circuit breaker*
F2 *circuit breaker (high breaking capacity)*
S1 *control switches*
KA1 *auxiliary relay*
KA2 *time delay for genset startup order to avoid starting the genset for transient UN disturbances*
KA3 *auxiliary relay*

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

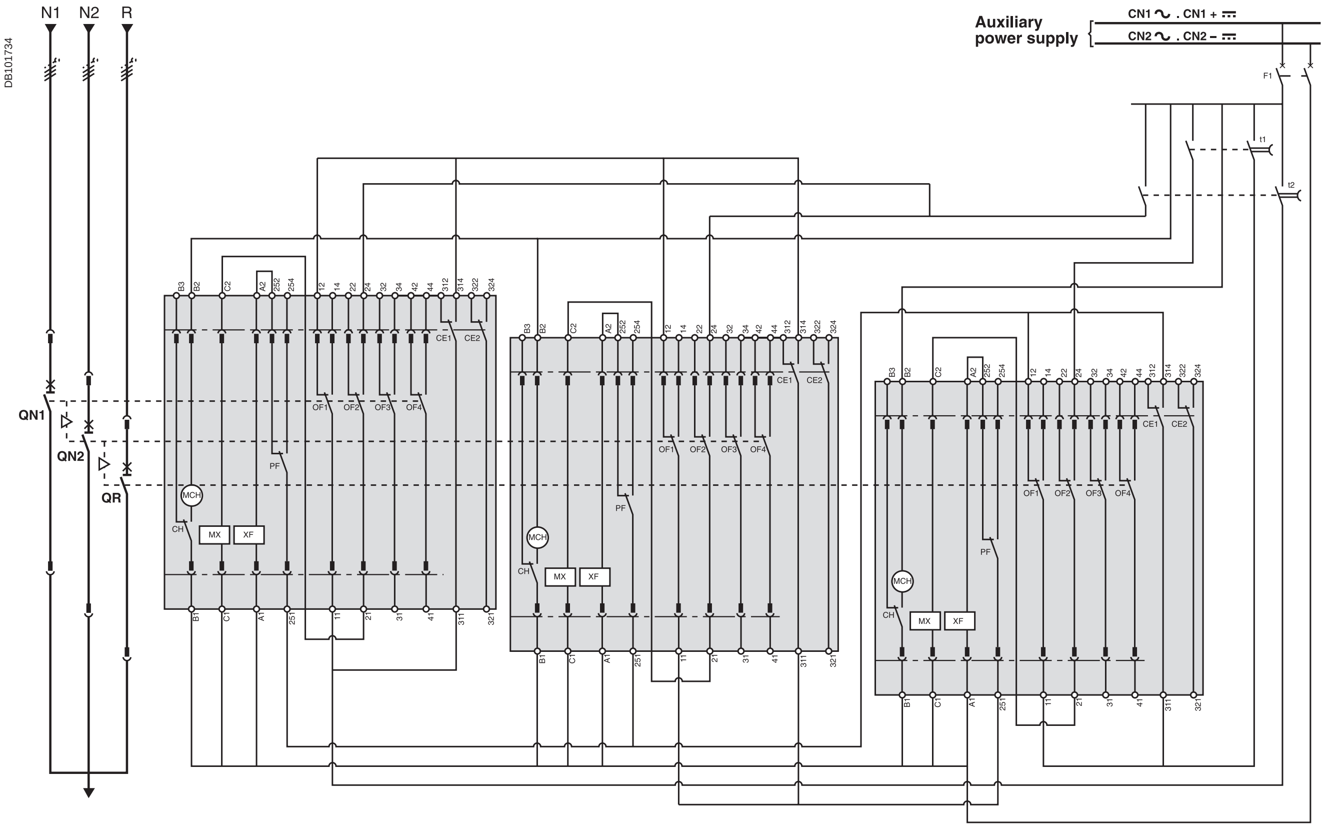
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156906

2 Normal sources and 1 Replacement source: electrical interlocking without lockout after a fault



Legends

- ***QN...*** *"Normal" source Masterpact NW*
- ***QR*** *"Replacement" source Masterpact NW*
- ***MCH*** *spring-charging motor*
- ***MX*** *standard opening voltage release*
- ***XF*** *standard closing voltage release*
- ***OF...*** *breaker ON/OFF indication contact*
- ***PF*** *"ready-to-close" contact*
- ***CE*** *"connected-position" indication contact (carriage switch)*
- ***CH*** *"springs charged" indication contact*
- ***F1*** *auxiliary power supply circuit breaker*
- ***t1*** *order for transfer from "R" to "N1 + N2"*
  (QN1 and QN2 closing time delay = 0.25 sec. minimum)
- ***t2*** *order for transfer from "N1 + N2"to "R"*
  (QR closing time delay = 0.25 sec. minimum)

States permitted by mechanical interlocking system

Normal 1	Normal 2	Replacement
0	0	0
1	1	0
0	0	1
1	0	0
0	1	0

Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

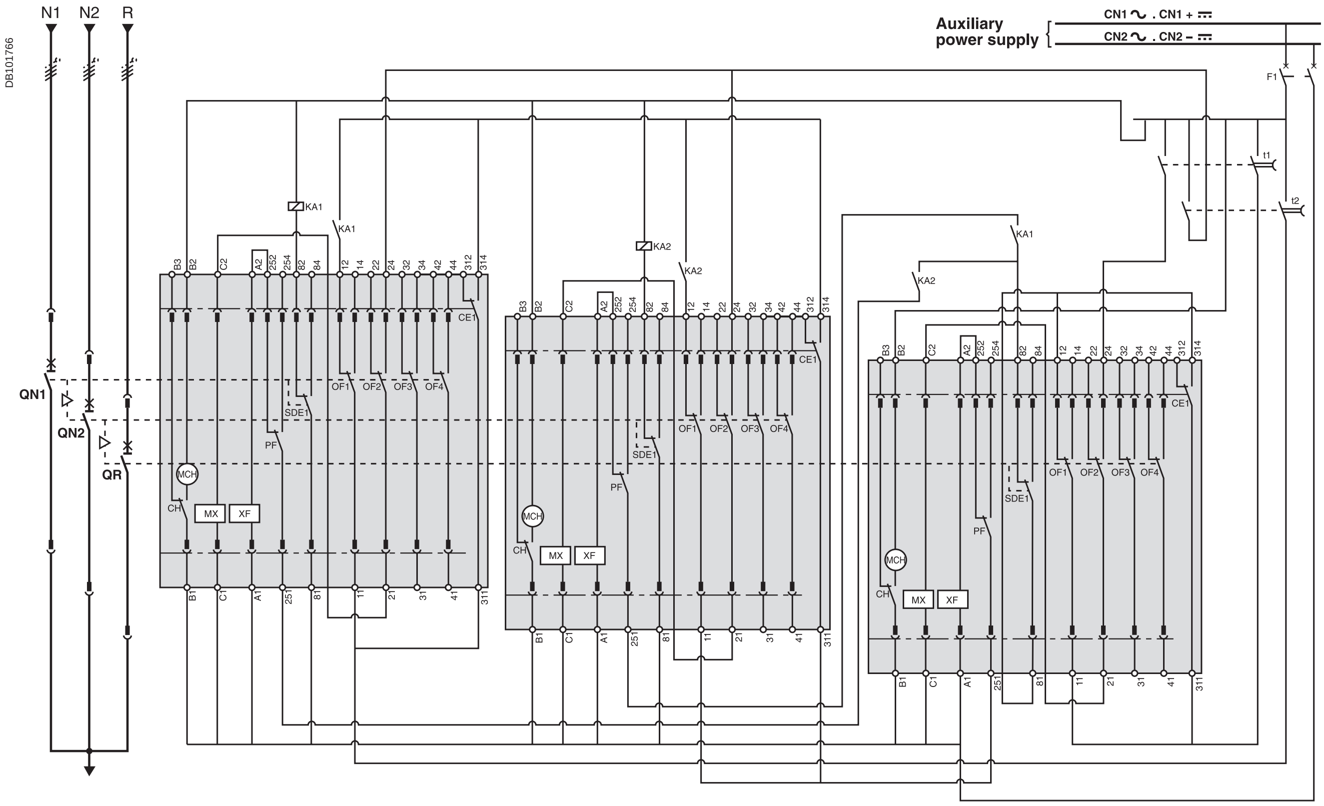
Electrical diagrams

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156907

2 Normal sources and 1 Replacement source: electrical interlocking with lockout after a fault



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

Legends
QN... *"Normal" source Masterpact NW*
QR *"Replacement" source Masterpact NW*
MCH *spring-charging motor*
MX *standard opening voltage release*
XF *standard closing voltage release*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
PF *"ready-to-close" contact*
CE1 *"connected-position" indication contact (carriage switch)*
CH *"springs charged" indication contact*
F1 *auxiliary power supply circuit breaker*
S1 *control switches*
S2 *source selection switches*
t1 *order for transfer from "R" to "N1 + N2"*
(QN1 and QN2 closing time delay = 0.25 sec. minimum)
t2 *order for transfer from "N1 + N2"to "R"*
(QR closing time delay = 0.25 sec. minimumm)

States permitted by mechanical interlocking system

Normal 1	Normal 2	Replacement
0	0	0
1	1	0
0	0	1
1	0	0
0	1	0

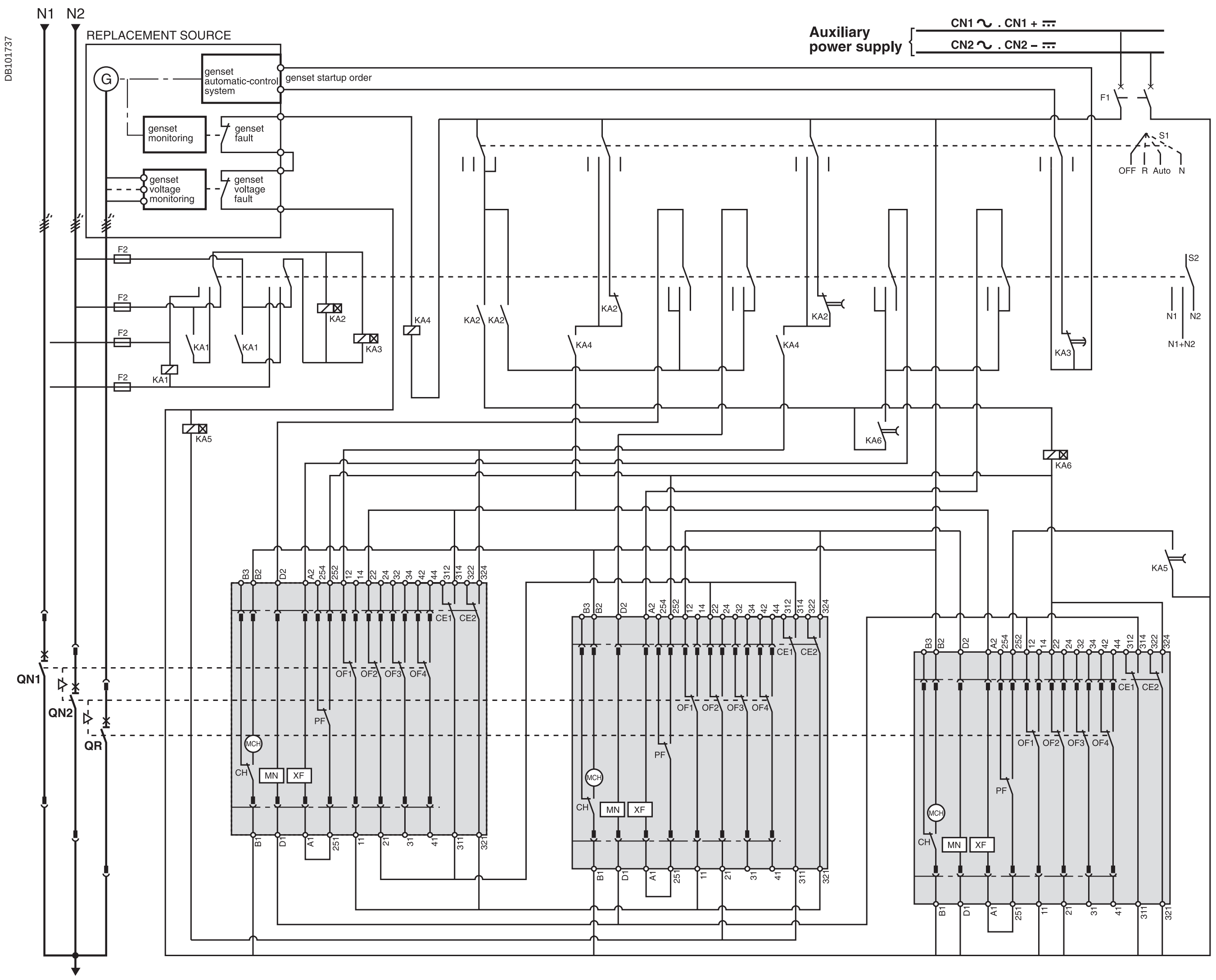
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156908

2 Normal sources and 1 Replacement source: automatic-control system for generator set without lockout after a fault (with MN)



Legends

QN... "Normal" source Masterpact NW
QR "Replacement" source Masterpact NW
MCH spring-charging motor
XF standard closing voltage release
MN undervoltage release
OF... breaker ON/OFF indication contact
PF "ready-to-close" contact
CE... "connected-position" indication contact (carriage switch)
CH "springs charged" indication contact
F1 auxiliary power supply circuit breaker
F2/F3 circuit breaker (high breaking capacity)
S1 control switches
S2 source selection switches
KA1 auxiliary relay
KA2 auxiliary relays with 10 to 180 sec. time delay
KA3 auxiliary relays with 0.1 to 30 sec. time delay
KA4 auxiliary relay
KA5 auxiliary relays with 0.25 sec. time delay
KA6 auxiliary relays with 0.25 sec. time delay

States permitted by mechanical interlocking system and with associated automatism

Normal 1	Normal 2	Replacement
0	0	0
1	1	0
0	0	1
1	0	0
0	1	0

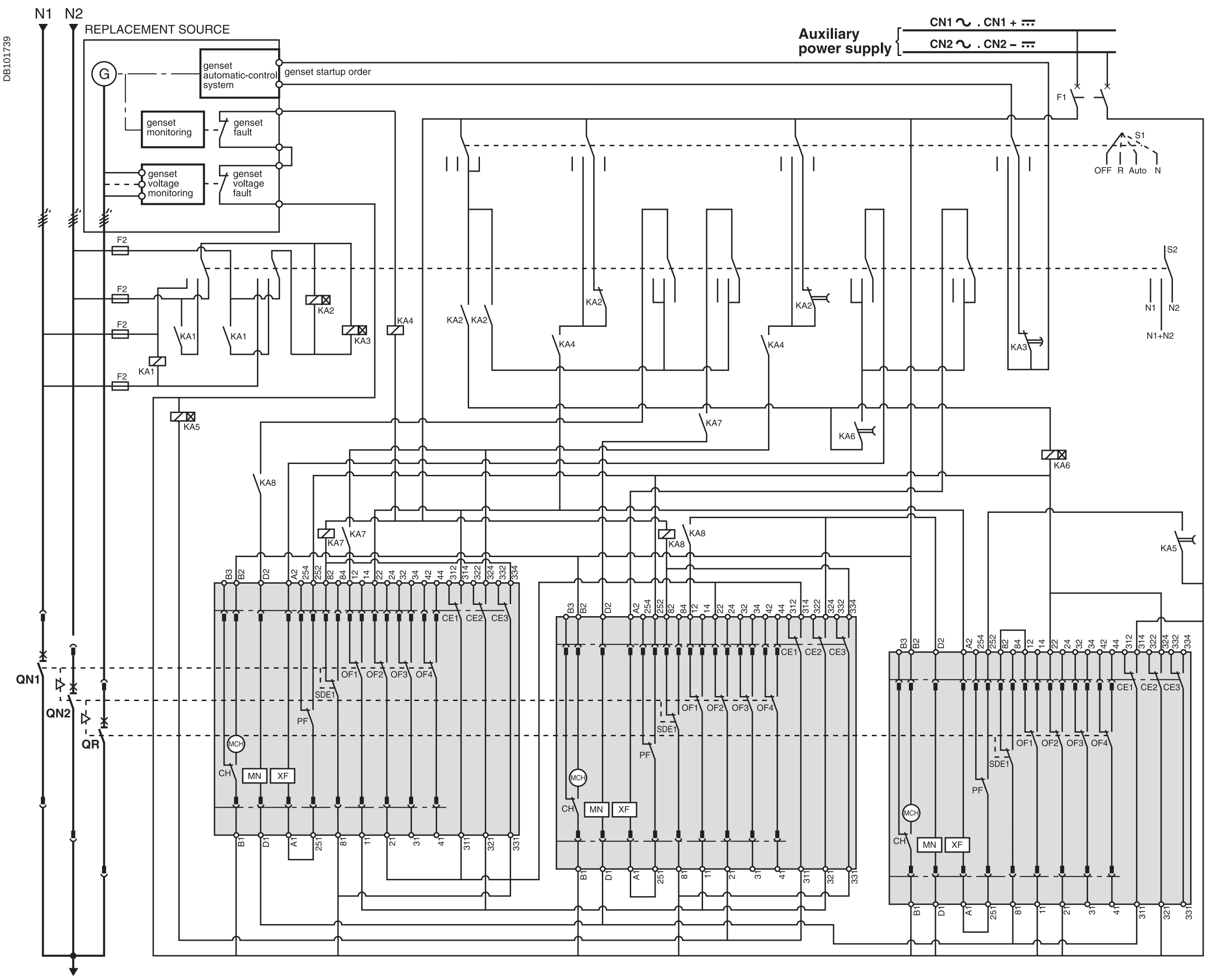
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156909

2 Normal sources and 1 Replacement source: automatic-control system for generator set with lockout after a fault (with MN)



ATTENTION

The diagram shows the electrical wiring for circuit breakers.
When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

Legends

QN... *"Normal" source Masterpact NW*
QR *"Replacement" source Masterpact NW*
MCH *spring-charging motor*
XF *standard closing voltage release*
MN *undervoltage release*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
PF *"ready-to-close" contact*
CE... *"connected-position" indication contact (carriage switch)*
CH *"springs charged" indication contact*
F1 *auxiliary power supply circuit breaker*
F2/F3 *circuit breaker (high breaking capacity)*
S1 *control switches*
S2 *source selection switches*
KA1 *auxiliary relay*
KA2 *auxiliary relays with 10 to 180 sec. time delay*
KA3 *auxiliary relays with 0.1 to 30 sec. time delay*
KA4 *auxiliary relay*
KA5 *auxiliary relays with 0.25 sec. time delay*
KA6 *auxiliary relays with 0.25 sec. time delay*
KA7 *auxiliary relay*
KA8 *auxiliary relay*

States permitted by mechanical interlocking system and with associated automatism

Normal 1	Normal 2	Replacement
0	0	0
1	1	0
0	0	1
1	0	0
0	1	0

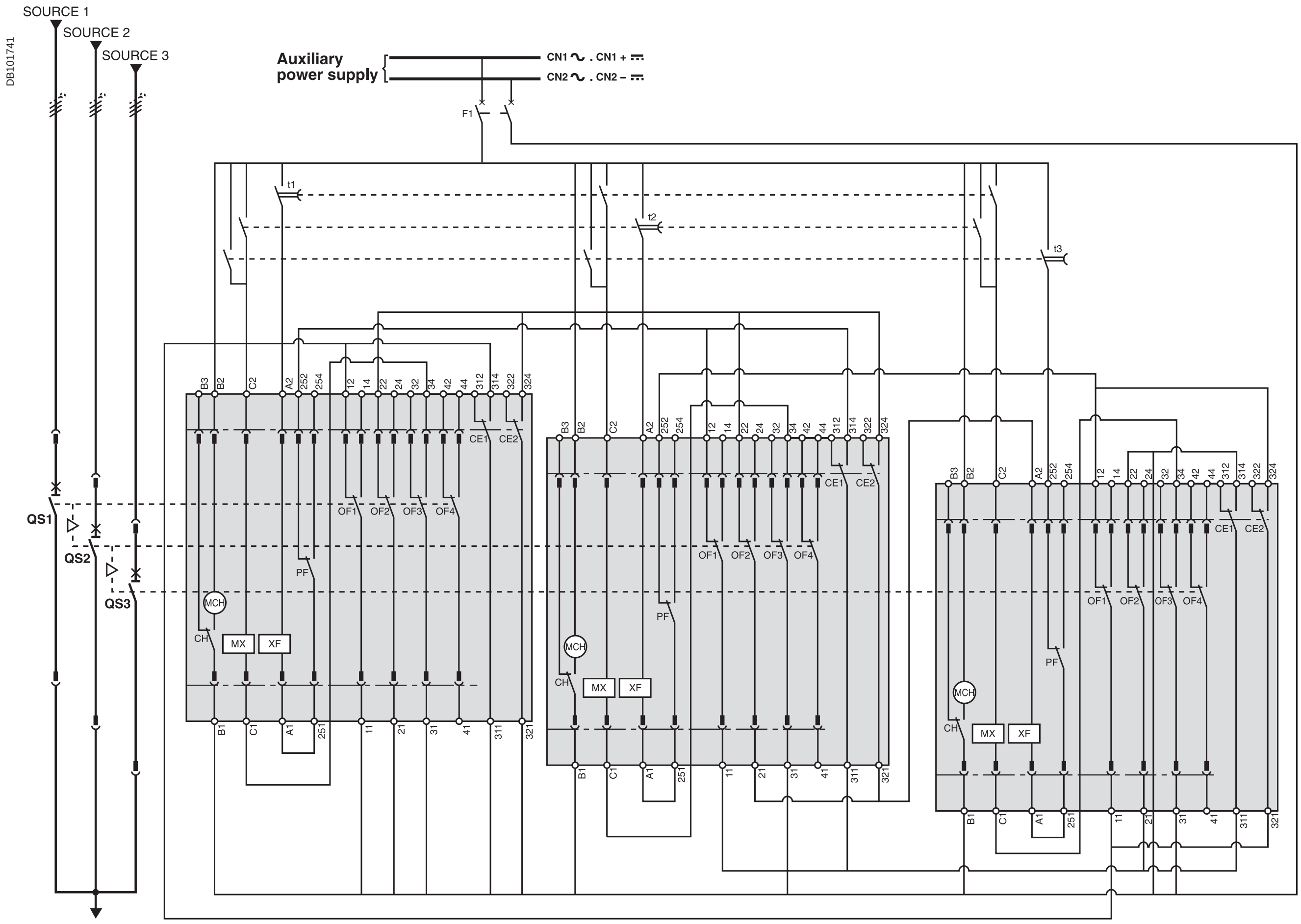
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156910

3 sources with only 1 device closed: electrical interlocking without lockout after a fault



Legends
- ***QS...*** *"Source" Masterpact NW*
- ***MCH*** *spring-charging motor*
- ***MX*** *standard opening voltage release*
- ***XF*** *standard closing voltage release*
- ***OF...*** *breaker ON/OFF indication contact*
- ***PF*** *"ready-to-close" contact*
- ***CE...*** *"connected-position" indication contact (carriage switch)*
- ***CH*** *"springs charged" indication contact*
- ***F1*** *auxiliary power supply circuit breaker*
- ***t1*** *order for transfer to "Source 1" (QS1 closing time delay = 0.25 sec. minimum)*
- ***t2*** *order for transfer to "Source 2" (QS2 closing time delay = 0.25 sec. minimum)*
- ***t3*** *order for transfer to "Source 3" (QS3 closing time delay = 0.25 sec. minimum)*

States permitted by mechanical interlocking system

Source 1	Source 2	Source 3
0	0	0
1	0	0
0	1	0
0	0	1

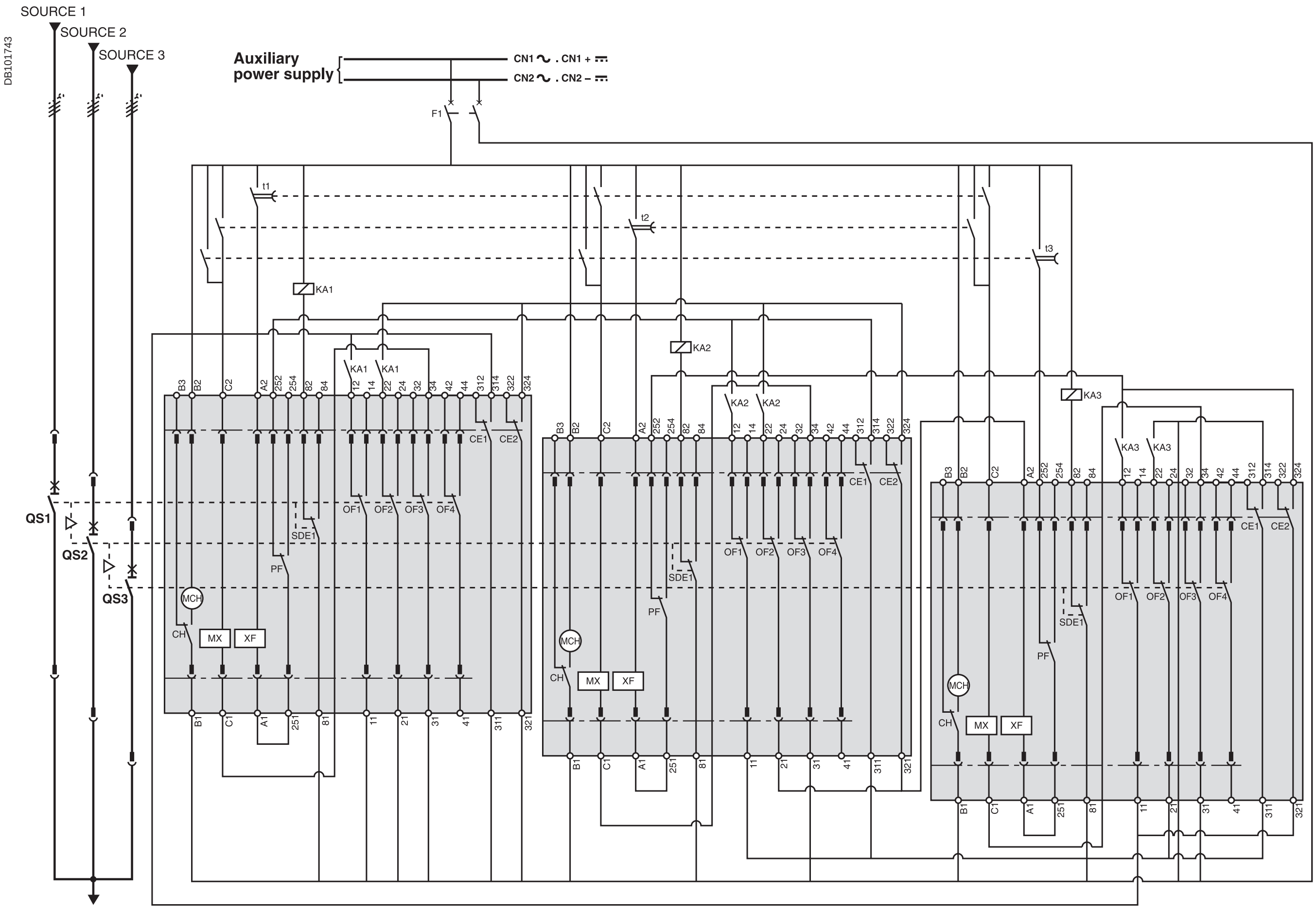
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156911

3 sources with only 1 device closed: electrical interlocking with lockout after a fault



ATTENTION
The diagram shows the electrical wiring for circuit breakers. When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

Legends

QS... *"Source" Masterpact NW*
MCH *spring-charging motor*
MX *standard opening voltage release*
XF *standard closing voltage release*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
PF *"ready-to-close" contact*
CE... *"connected-position" indication contact (carriage switch)*
CH *"springs charged" indication contact*
F1 *auxiliary power supply circuit breaker*
t1 *order for transfer to "Source 1" (QS1 closing time delay = 0.25 sec. minimum)*
t2 *order for transfer to "Source 2" (QS2 closing time delay = 0.25 sec. minimum)*
t3 *order for transfer to "Source 3" (QS3 closing time delay = 0.25 sec. minimum)*
KA1 *auxiliary relays*
KA2 *auxiliary relays*
KA3 *auxiliary relays*

States permitted by mechanical interlocking system

Source 1	Source 2	Source 3
0	0	0
1	0	0
0	1	0
0	0	1

Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

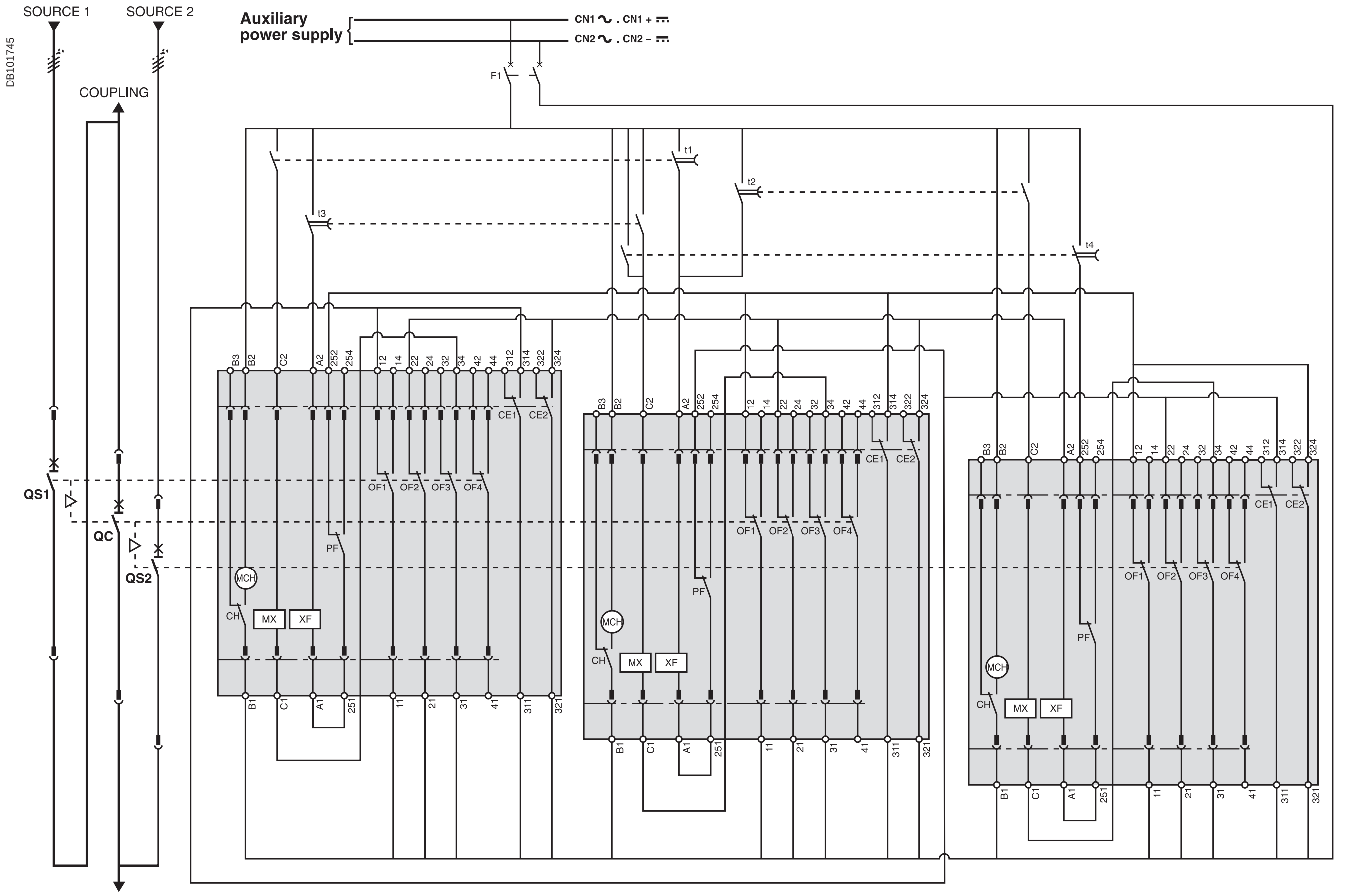
Electrical diagrams

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156912

2 sources and 1 coupling: electrical interlocking without lockout after a fault



Legends

QS...	*"Source" Masterpact NW*
QC	*"Coupling" Masterpact NW*
MCH	*spring-charging motor*
MX	*standard opening voltage release*
XF	*standard closing voltage release*
OF...	*breaker ON/OFF indication contact*
PF	*"ready-to-close" contact*
CE...	*"connected-position" indication contact (carriage switch)*
CH	*"springs charged" indication contact*
F1	*auxiliary power supply circuit breaker*
t1	*coupling order for "Source 1 failure" (QC closing time delay = 0.25 sec. minimum)*
t2	*coupling order for "Source 2 failure" (QC closing time delay = 0.25 sec. minimum)*
t3	*coupling order for "Source 1 restored" (QS1 closing time delay = 0.25 sec. minimum)*
t4	*coupling order for "Source 2 restored " (QS2 closing time delay = 0.25 sec. minimum)*

States permitted by mechanical interlocking system

Source 1	Source 2	Coupling
0	0	0
1	1	0
1	0	1
0	1	1
1	0	0
0	1	0
0	0	1

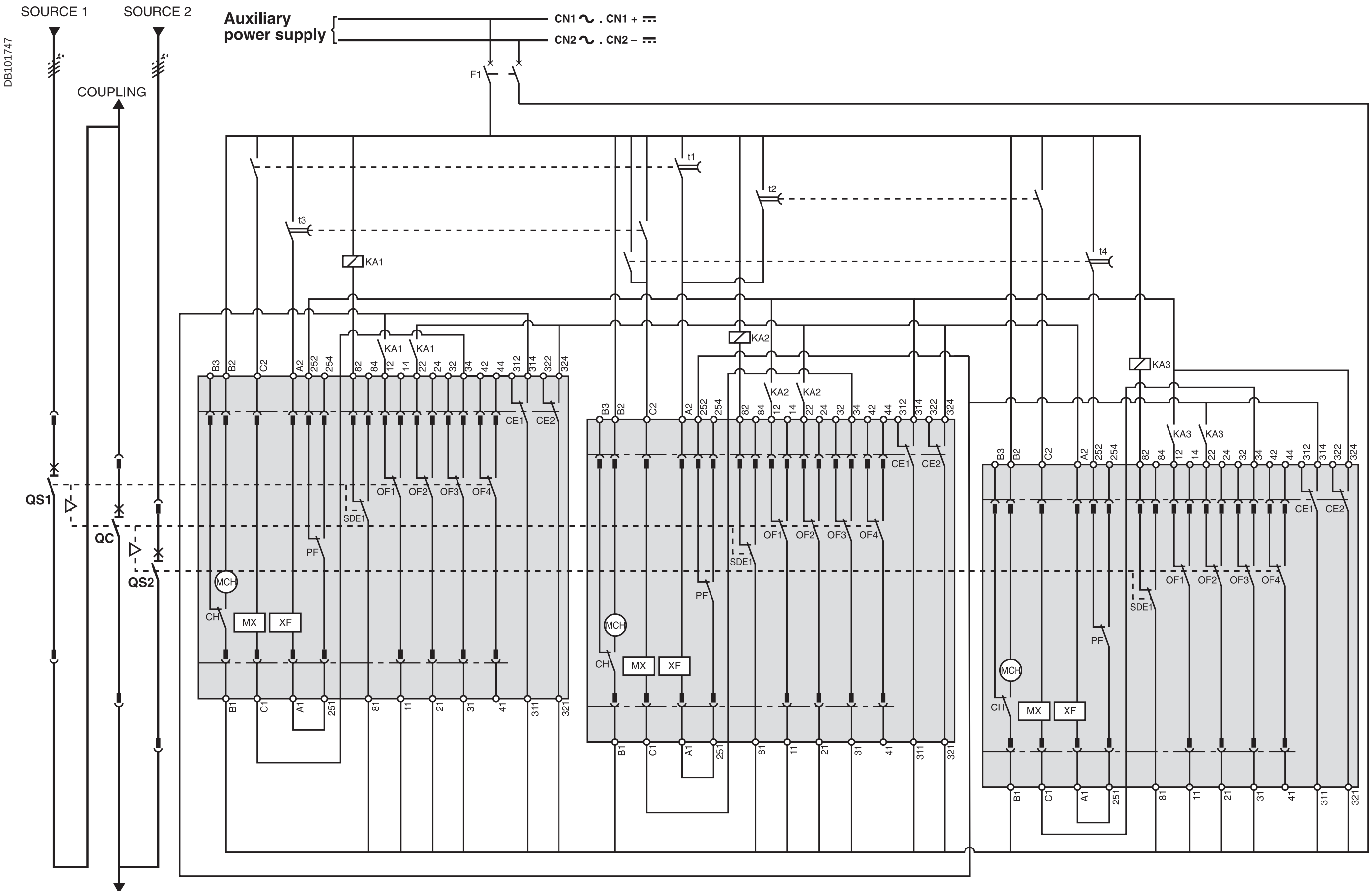
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156913

2 sources and 1 coupling: electrical interlocking with lockout after a fault



ATTENTION

The diagram shows the electrical wiring for circuit breakers.
When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

Legends

QS... *"Source" Masterpact NW*
QC *"Coupling" Masterpact NW*
MCH *spring-charging motor*
MX *standard opening voltage release*
XF *standard closing voltage release*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault-trip" indication contact*
PF *"ready-to-close" contact*
CE... *"connected-position" indication contact (carriage switch)*
CH *"springs charged" indication contact*
F1 *auxiliary power supply circuit breaker*
t1 *coupling order for "Source 1 failure" (QC closing time delay = 0.25 sec. minimum)*
t2 *coupling order for "Source 2 failure" (QC closing time delay = 0.25 sec. minimum)*
t3 *coupling order for "Source 1 restored" (QS1 closing time delay = 0.25 sec. minimum)*
t4 *coupling order for "Source 2 restored " (QS2 closing time delay = 0.25 sec. minimum)*
KA1 *auxiliary relays*
KA2 *auxiliary relays*
KA3 *auxiliary relays*

States permitted by mechanical interlocking system

Source 1	Source 2	Coupling
0	0	0
1	1	0
1	0	1
0	1	1
1	0	0
0	1	0
0	0	1

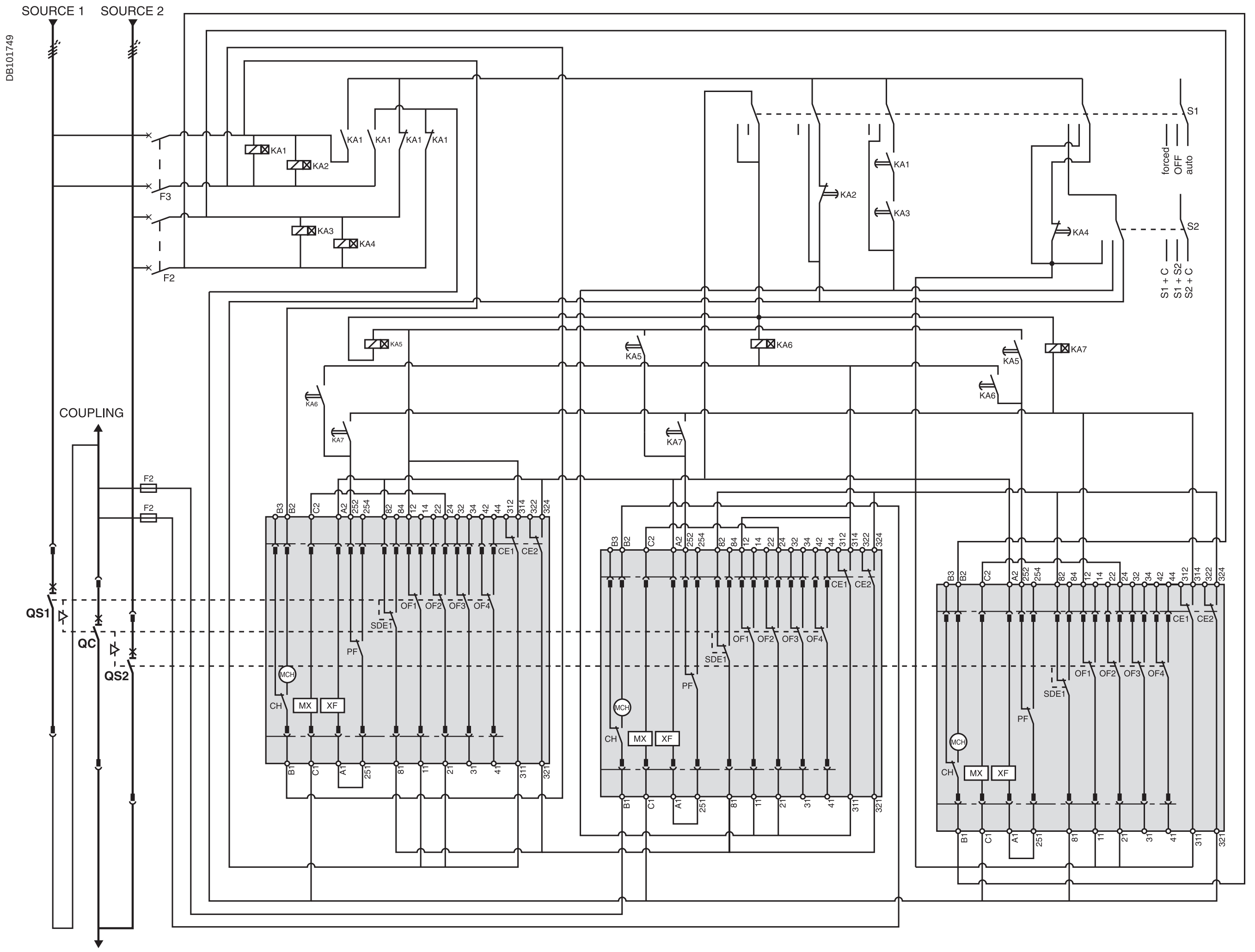
Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

Remote-operated source-changeover systems

3 Masterpact NW devices

Diagram no. 51156914

2 sources and 1 coupling: automatic-control system with lockout after a fault



ATTENTION

The diagram shows the electrical wiring for circuit breakers.
When wiring the SDE with **switch-disconnectors, connect the SDE to terminals 81 and 84.**

Legends

QS... *"Source" Masterpact NW*
QC *"Coupling" Masterpact NW*
MCH *spring-charging motor*
MX *standard opening voltage release*
XF *standard closing voltage release*
OF... *breaker ON/OFF indication contact*
SDE1 *"fault trip" indication contact*
PF *"ready-to-close" contact*
CE... *"connected-position" indication contact (carriage switch)*
CH *"springs charged" indication contact*
F1 *auxiliary power supply circuit breaker*
F2/F3 *circuit breaker (high breaking capacity)*
S1 *control switches*
S2 *source selection switches*
KA1 *auxiliary relays with 10 to 180 sec. time delay*
KA2 *auxiliary relays with 0.1 to 30 sec. time delay*
KA3 *auxiliary relays with 10 to 180 sec. time delay*
KA4 *auxiliary relays with 0.1 to 30 sec. time delay*
KA5 *auxiliary relays with 0.25 sec. time delay*
KA6 *auxiliary relays with 0.25 sec. time delay*
KA7 *auxiliary relays with 0.25 sec. time delay*

States permitted by mechanical interlocking system and with associated automation

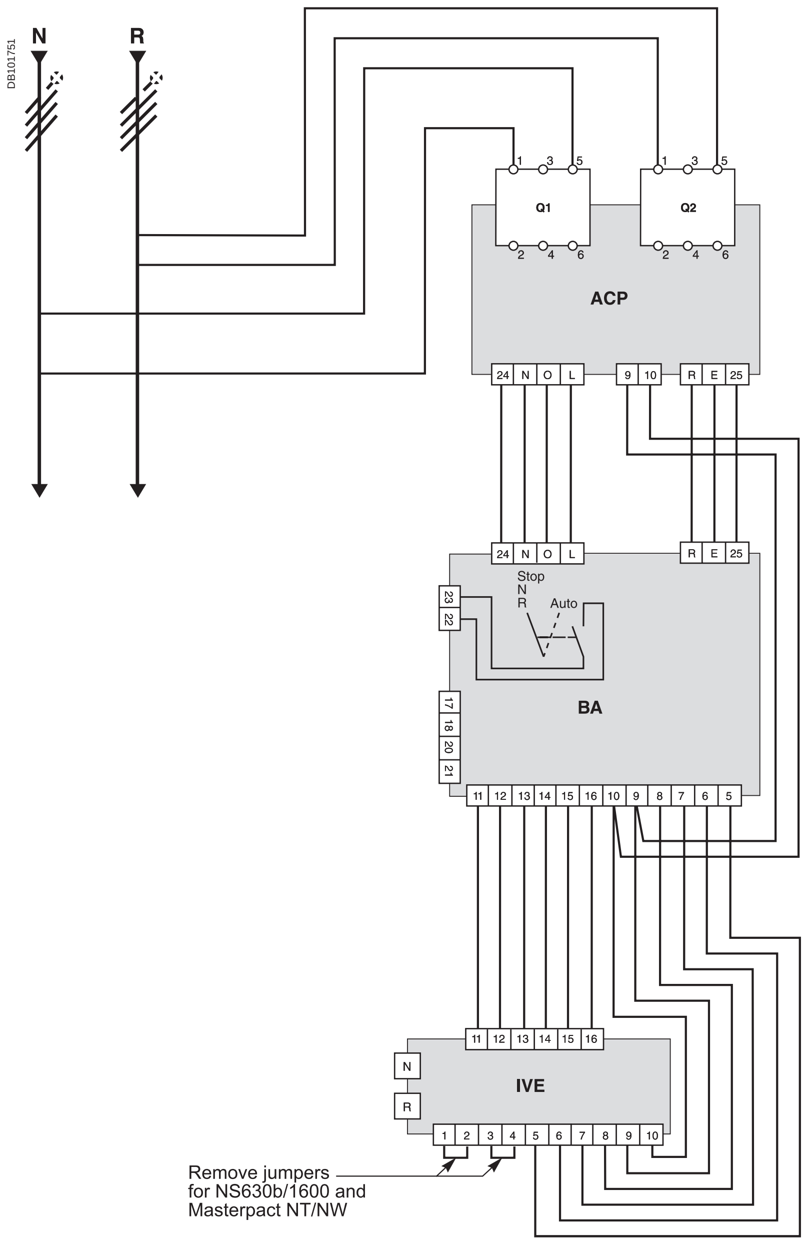
Source 1	Source 2	Coupling
0	0	0
1	1	0
1	0	1
0	1	1
1	0	0
0	1	0
0	0	1

Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.
Auxiliary power supply = supply voltage of auxiliary relays (KA...) = supply voltage of electrical auxiliaries (electrical operation, MCH, MX, MN...).

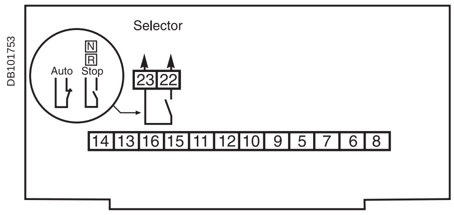
Source-changeover systems with automatic controllers

2 Compact NS100/1600 or Masterpact NT/NW devices

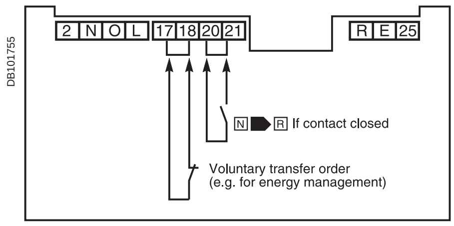
Source-changeover system with BA controller



Coupling



Transfer conditions



Terminals 20 and 21:
additional control contact (not part of controller).

Tests on "Normal" and "Replacement" source voltages
The single-phase check for UN and UR is implemented across terminals 1 and 5 of circuit breakers Q1 and Q2.

Legends

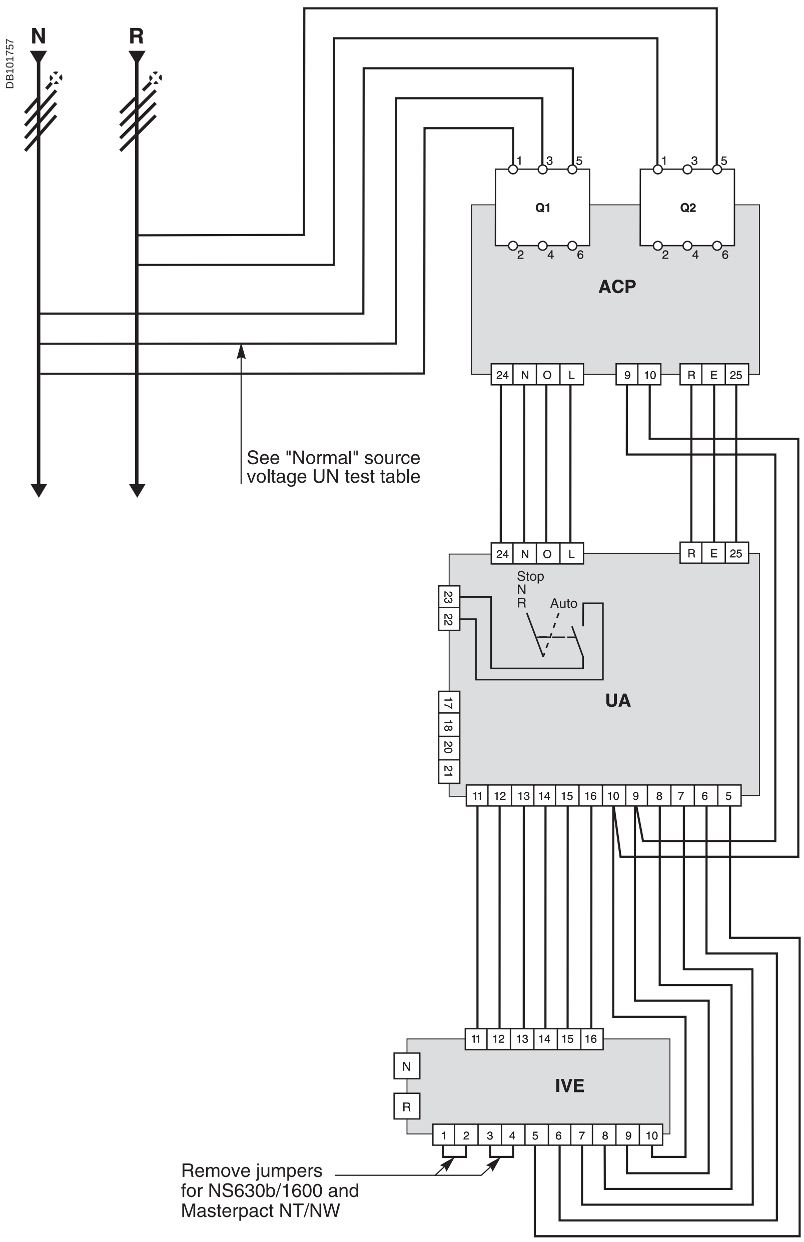
Q1	*circuit breaker supplying and protecting the automatic-control circuits for the "Normal" source*
Q2	*circuit breaker supplying and protecting the automatic-control circuits for the "Replacement" source*
ACP	*auxiliaries control plate*
BA	*automatic controller*
IVE	*electrical interlocking and terminal block unit*

Note:
diagram shown with circuits de-energised, circuit breakers open and relays in normal position.

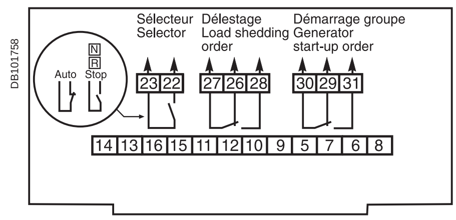
Source-changeover systems with automatic controllers

2 Compact NS100/1600 or Masterpact NT/NW devices

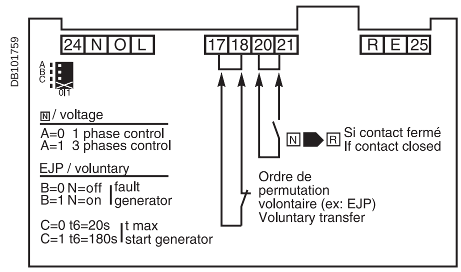
Source-changeover system with UA controller



Load shedding and genset management



Transfer conditions



Terminals 20 and 21:
additional control contact (not part of controller).

Tests on "Normal" and "Replacement" source voltages

"Normal" source voltage UN test

Ref. UA UA150	29472 29474	29472 29474	29473 29475
Supply voltage / Switch position	N / φ 220/240VAC 50/60Hz	φ / φ 220/240VAC 50/60Hz	φ / φ 380/415VAC 50/60Hz 440V - 60Hz
A = 0	N φ 1L1 3L2 5L3 Q1	φ φ 1L1 3L2 5L3 Q1	φ φ 1L1 3L2 5L3 Q1
A = 1		φ φ φ 1L1 3L2 5L3 Q1	φ φ φ 1L1 3L2 5L3 Q1

DB101761

"Replacement" source voltage UR test
The single-phase check for UR is implemented across terminals 1 and 5 of circuit breaker Q2.

Legends

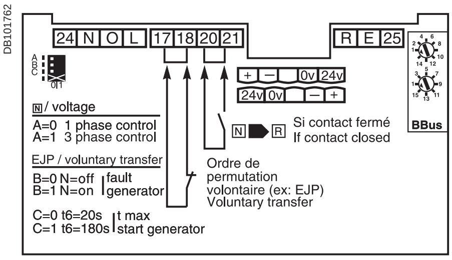
- ***Q1*** *circuit breaker supplying and protecting the automatic-control circuits for the "Normal" source*
- ***Q2*** *circuit breaker supplying and protecting the automatic-control circuits for the "Replacement" source*
- ***ACP*** *auxiliaries control plate*
- ***UA*** *automatic controller*
- ***IVE*** *electrical interlocking and terminal block unit*

Note:
diagram shown with circuits de-energised, circuit breakers open and relays in normal position.

Source-changeover systems with automatic controllers

2 Compact NS100/1600 or Masterpact NT/NW devices

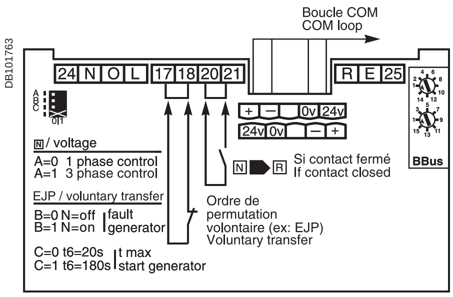
Controller settings



Tests on "Normal" source voltage
A = 0 single-phase test,
A = 1 three-phase test.

Voluntary transfert (e.g. for energy management)
■ action in the event of genset failure
B = 0 circuit breaker N opens,
B = 1 circuit breaker N remains closed.
■ maximum permissible genset startup time (T6)
C = 0 T = 120 s,
C = 1 T = 180 s.
After this time has elapsed, the genset is considered to have failed.

Using communication functions



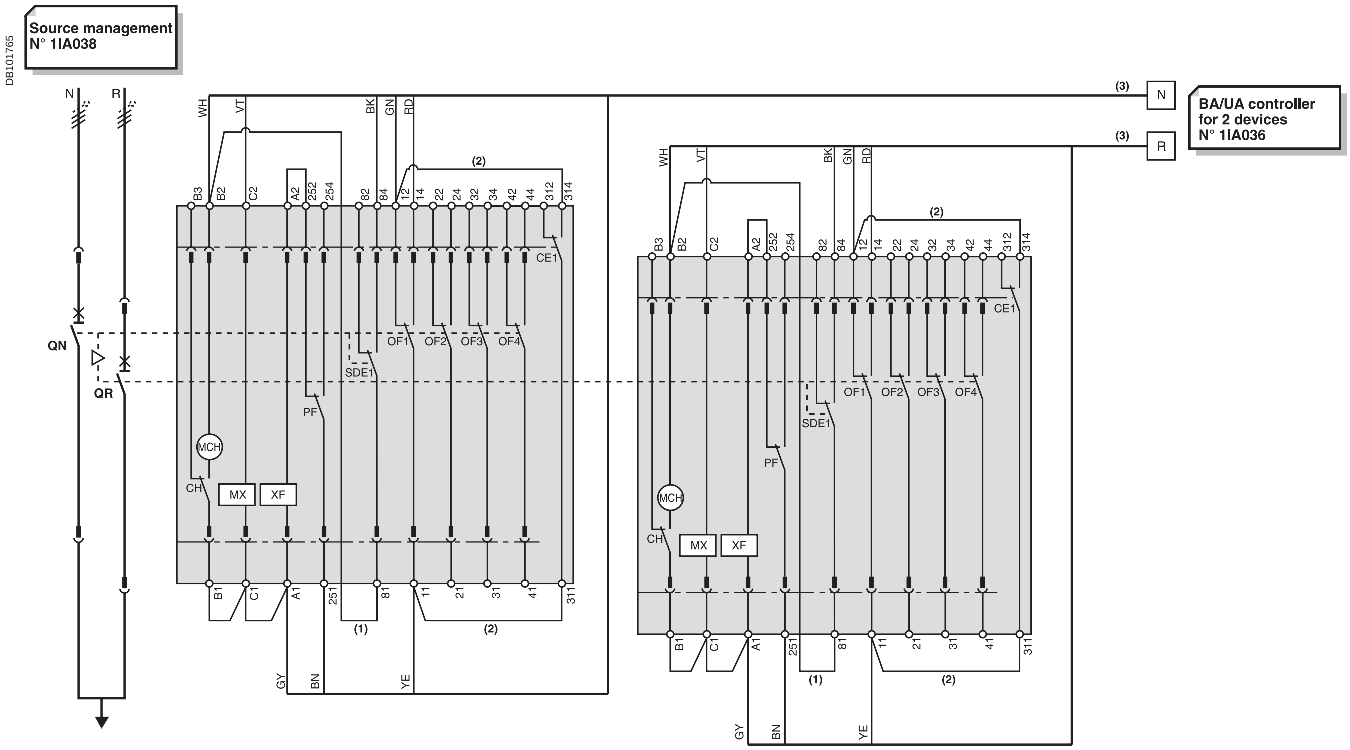
The address of the UA controller is set using the two BBus dials.

Source-changeover systems with automatic controllers

2 Masterpact NT or NW devices

Diagram no. 51156903

Electrical interlocking with lockout after a fault



ATTENTION

The diagram shows the electrical wiring for circuit breakers.
When wiring the SDE with **switch-disconnectors, connect wire BK to terminal 82.**

(1) Not to be wired for the "without lockout after a fault" solution.
(2) Not to be wired on fixed version.
(3) Prefabricated wiring supplied.

Legends

QN	"Normal" source Masterpact NT or NW
QR	"Replacement" source Masterpact NT or NW
MCH	spring-charging motor
MX	standard opening voltage release
XF	standard closing voltage release
OF...	breaker ON/OFF indication contact
SDE1	"fault-trip" indication contact
PF	"ready-to-close" contact
CE1	"connected-position" indication contact (carriage switch)
CH	"springs charged" indication contact
IVE	electrical interlocking and terminal block unit

Wiring colour codes

RD	GN	BK	VT	YE	GY	WH	BN
red	green	black	violet	yellow	grey	white	brown

States permitted by mechanical interlocking system

Normal	Replacement
0	0
1	0
0	1

Note:
diagram shown with circuit breakers in connected position, open, charged, and ready to close.

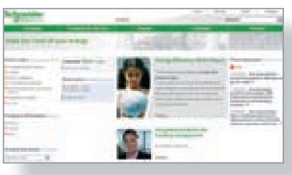
>TOOLS

schneider-electric.com

This international site allows you to access all the Schneider Electric products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- complete library: technical documents, catalogs, FAQs, brochures…
- selection guides from the e-catalog.
- product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, the list of country contacts…



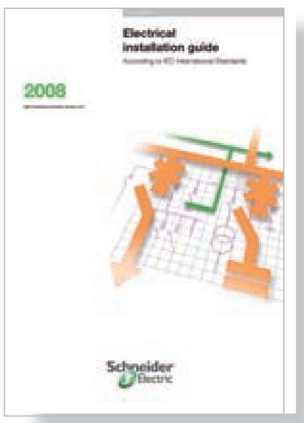
The electrical installation guide

According to IEC 60364
This guide, part of the Schneider Electric offer, is the essential tool to "guide" you any time in your business:

- design office, consultant
- contractor, panelbuilder
- teacher, trainer.

Comprehensive and concrete information on:

- all the new technical solutions
- all the components
- of an installation from a global point of view
- all the IEC standards modifications
- all the fundamental electrotechnical knowledge
- all the design stages, from medium to low voltage.



Catalogue numbers and order forms

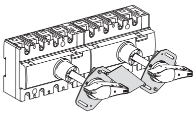
Source-changeover systems for 2 devices

Interpact INS40 to INS2500 and INV100 to INV2500

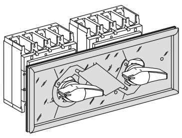
Manual source-changeover systems Interpact INS40 to INS630 and INV100 to INV630

Interlocking for rotary handle

DB107710



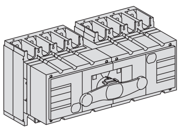
E89624



	3/4P
Mechanical device for INS40 to INS160 equipped with an extended rotary handle	28953
Mechanical device for INS250-100 to INS250/INV100 to INV250 equipped with a direct or extended rotary handle	31073
Mechanical device for INS/INV320 to INS/INV630 equipped with a direct or extended rotary handle	31074

Complete assembly source-changeover systems Interpact INS250 to INS630

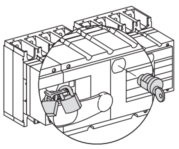
E89638



	3P	4P
With Interpact INS250-100A	31140	31141
With Interpact INS250-160A	31144	31145
With Interpact INS250-200A	31142	31143
With Interpact INS250	31146	31147
With Interpact INS320	31148	31149
With Interpact INS400	31150	31151
With Interpact INS500	31152	31153
With Interpact INS630	31154	31155

Locking for INS complete source changeover assembly

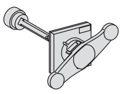
DB107711



Handle locking by 1 to 3 padlocks (in OFF position)		Built in
By keylock	Keylocking device	31097
	+ Ronis 1351B.500 keylock	41940
	or + Profalux KS5 B24 D4Z keylock	42888

Rotary handle

E89617

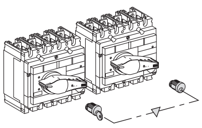


Extended front control for complete source changeover assembly	31055

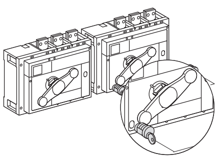
Manual source-changeover systems Interpact INS250 to INS2500 and INV250 to INV2500 by keylock

Interlocking

DB101549



E89626

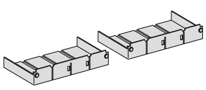


		3/4P
Locking device for Ronis/Profalux keylocks on INS250-100 to INS250/INV100 to INV250	2x	31087
Locking device for Ronis/Profalux keylocks on INS/INV320 to INS/INV630	2x	31088
Locking device for Ronis/Profalux keylocks on INS/INV630b to INS/INV2500	2x	31291
+ Ronis 1351B.500 keylock (2 keylocks / 1 key)		41950
or + Profalux KS5 B24 D4Z keylock (2 keylocks / 1 key)		42878

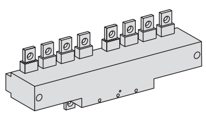
Connection accessories

Downstream coupling accessories

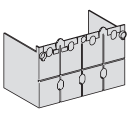
DB101062



E50998



DB101063

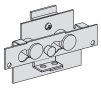


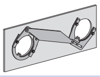
		3P	4P
Short terminal shields	INS250 (1 pair)	29322	29322
	INS320 to INS630 (1 pair)	32563	32563
"Normal" source / "replacement" source	INS250	29358	29359
	INS320 to INS630	32619	32620
Long terminal shields	INS250 (1 pair)	29324	29324
	INS320 to INS630 (1 pair)	32583	32583

Source-changeover systems for 2 devices (cont.)
Compact NS100 to NS630

Manual source changeover

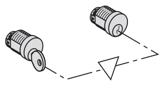
Mechanical interlocking

E21288


E18780


For toggle controlled circuit breakers	NS100...250	29354
	NS400...630	32614
For rotary handled circuit breakers	NS100...250	29369
	NS400...630	32621

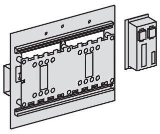
Key lock interlocking

E23851


For rotary handled or remote controlled circuit breakers		
2 locks, 1 key	Ronis 1351B.500	41950
	Profalux KS5 B24 D4Z	42878

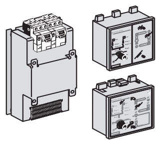
Remote controlled source changeover

Plate + IVE

E33419


Source "normal"/source "replacement" (identical voltages)			24 to 250 V DC		48 to 415 V AC 50/60 Hz 440 V 60 Hz
NS100...250/NS100...250					
Plate + IVE (1)			29351		29350
	Plate		29349		29349
	IVE		29356		29352
Auxiliary switches 2 OF + 2 SDE		4 x	29450	4 x	29450
Spare wiring system (device/IVE)			29365		29365
Back sockets option add:	Only long RC		(2)		(2)
Plug in base option add:	Plug in kit		(2)		(2)
NS400...630/NS100...630					
Plate + IVE (1)			32611		32610
	Plate		32609		32609
	IVE		29356		29352
Auxiliary switches 2 OF + 2 SDE		4 x	29450	4 x	29450
Spare wiring system (device/IVE)			29365		29365
Back sockets option add:	Only long RC		(2)		(2)
Plug in base option add:	Plug in kit		(2)		(2)
	Adaptator kit for NS100...250	1 x	32618	1 x	32618

Control unit option

E33420


		110/127 V AC 50/60 Hz	220/240 V AC 50/60 Hz	380/415 V AC 50/60 Hz 440 V 60 Hz
ACP + control unit BA (1)			29470	29471
	Plate ACP		29363	29364
	Control unit BA		29376	29377
ACP + control unit UA (1)		29448	29472	29473
	Plate ACP	29447	29363	29364
	Control unit UA	29446	29378	29380
ACP + control unit UA150 (1) (communication option)			29474	29475
	Plate ACP		29363	29364
	Control unit UA150		29379	29381

Wiring cable between BA/UA and ACP/IVE

	29368	29368

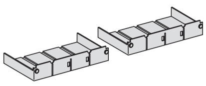
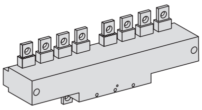
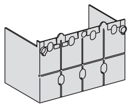
(1) The supply voltages BA/UA control unit, ACP plate, IVE and the remote control must be identical whatever the source changeover type.
(2) See products pages.

Source-changeover systems for 2 devices (cont.)

Compact NS100 to NS630 (cont.)

Connection accessories

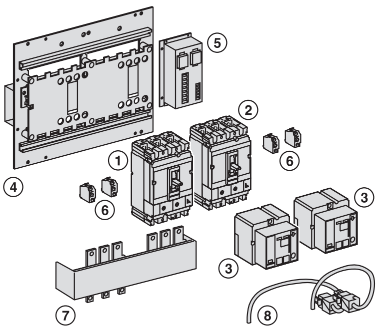
Downstream coupling accessories

				3P	4P
DB101062 	Short terminal shields (1 pair)	NS100...250/NS100...250		**29321**	**29322**
		NS400...630/NS400...630		**32562**	**32563**
E50998 	Source "normal"/source "replacement"	NS100...250/ NS100...250	250 A	**29358**	**29359**
		NS400...630/ NS400...630	630 A	**32619**	**32620**
DB101063 	Long terminal shields (1 pair)	NS100...250/NS100...250			**29324**
		NS400...630/NS400...630			**32565**

Typical composition of remote controlled source changeover

Remote controlled source changeover

E33422

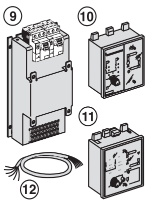


1 normal device N (1)
+ 1 replacement device R (2)
+ 2 remote controls (3)
+ 1 plate with interlocking (4) with IVE (5) and its wiring (8)
+ 2 plug-in kits (if plug-in version)
+ 1 adaptor kit for NS100...250 plug-in (if NS400...630 with NS100...250)
+ auxilary switches (6)
2 x (1 OF + 1 SDE) for Compact NS100...630
+ 1 downstream coupling accessory (7) for Compact NS100...630 (option)
+ long RC (if back connection)

IVE voltages and remote controls are identical.

Associated control unit

E33423



1 source changeover without associated control unit
+ 1 ACP (9) with BA control unit (10)
Or + 1 ACP (9) with UA control unit (11)
Or + 1 ACP (9) with UA150 control unit (11)
+ extension (12) for remote UA/BA connection on front of switchboard

IVE voltages + remote control + ACP + BA or UA are identical.

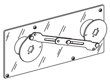
Source-changeover systems for 2 devices (cont.)

Compact NS630b to NS1600 circuit breakers and switch-disconnectors

Interlocking for source-changeover systems

Mechanical interlocking

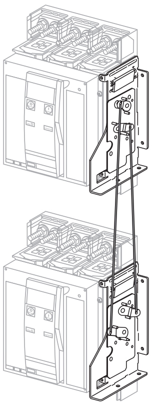
E70744



For 2 devices with extended rotary handles	33890

Interlocking using connecting rods for Compact electrically-operated devices

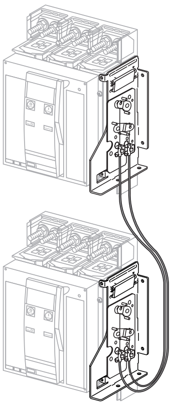
E72941



Complete assembly with 2 adaptation fixtures + rods	
2 Compact fixed devices	33910
2 Compact withdrawable devices	33913

Interlocking using cables for Compact electrically-operated devices

E72942



Complete assembly with 2 adaptation fixtures + cables	
2 Compact fixed devices	33911
2 Compact withdrawable devices	33914
1 Compact fixed + 1 Compact withdrawable device	33915

Catalogue numbers and order forms

Source-changeover systems for 2 devices (cont.)

Compact NS630b to NS1600 circuit breakers and switch-disconnectors (cont.)

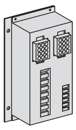
Associated controller

The automatic-control option includes:

- an IVE electrical-interlocking unit
- an ACP auxiliaries control plate
- a BA or UA controller, depending on the required functions
- a UA/BA adapter kit.

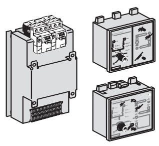
***Note:** the circuit breaker auxiliaries (MCH, MX, XF) and the automatic-control components (IVE, ACP, UA or BA) must have the same voltages.*

E88714



IVE electrical-interlocking unit	48/415 V AC 50/60 Hz 440 V 60 Hz
For 2 devices	**29352**
Wiring kit for connection of 2 fixed/withdrawable devices to the IVE unit	**54655**

E33420



Control unit option	110/127 V AC 50/60 Hz	220/240 V AC 50/60 Hz	380/415 V AC 50/60 Hz 440 V 60 Hz
ACP + control unit BA (1)		**29470**	**29471**
Plate ACP		**29363**	**29364**
Control unit BA		**29376**	**29377**
ACP + control unit UA (1)	**29448**	**29472**	**29473**
Plate ACP	**29447**	**29363**	**29364**
Control unit UA	**29446**	**29378**	**29380**
ACP + control unit UA150 (1) (communication option)		**29474**	**29475**
Plate ACP		**29363**	**29364**
Control unit UA150		**29379**	**29381**

(1) The supply voltages of the BA/UA controller, ACP plate, IVE unit and circuit breaker operating mechanism must be identical whatever the type of source-changeover system.

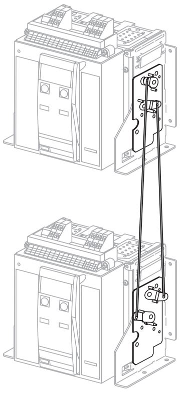
Source-changeover systems for 2 devices (cont.)

Masterpact NT circuit breakers and switch-disconnectors

interlocking for source-changeover systems

Interlocking using connecting rods

E47760



Complete assembly with 2 adaptation fixtures + rods	
2 Masterpact NT fixed devices	**33912**
2 Masterpact NT drawout devices	**33913**

Interlocking using cables (*)

Choose 2 adaptation fixtures (1 for each breaker + 1 set of cables)	
1 adaptation fixture for Masterpact NT fixed devices	**33200**
1 adaptation fixture for Masterpact NT drawout devices	**33201**
1 set of 2 cables	**33209**

(*) Can be used with any combination of NT or NW, fixed or drawout devices.

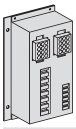
Associated controller

The automatic-control option includes:

- an IVE electrical-interlocking unit
- an ACP auxiliaries control plate
- a BA or UA controller, depending on the required functions
- a UA/BA adapter kit.

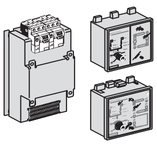
Note: *the circuit breaker auxiliaries (MCH, MX, XF) and the automatic-control components (IVE, ACP, UA or BA) must have the same voltages.*

E88714



IVE electrical-interlocking unit	48/415 V AC 50/60 Hz 440 V 60 Hz
for 2 devices	**29352**
wiring kit for connection of 2 fixed/drawout devices to the IVE unit	**54655**

E33420



Control unit option	110/127 V AC 50/60 Hz	220/240 V AC 50/60 Hz	380/415 V AC 50/60 Hz 440 V 60 Hz
ACP + control unit BA (1)		**29470**	**29471**
Plate ACP		**29363**	**29364**
Control unit BA		**29376**	**29377**
ACP + control unit UA (1)	**29448**	**29472**	**29473**
Plate ACP	**29447**	**29363**	**29364**
Control unit UA	**29446**	**29378**	**29380**
ACP + control unit UA150 (1) (communication option)		**29474**	**29475**
Plate ACP		**29363**	**29364**
Control unit UA150		**29379**	**29381**

(1) The supply voltages of the BA/UA controller, ACP plate, IVE unit and circuit breaker operating mechanism must be identical whatever the type of source-changeover system.

Catalogue numbers and order forms

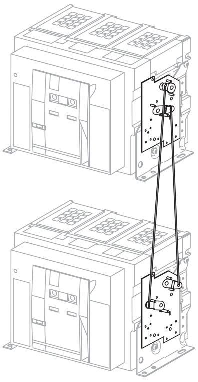
Source-changeover systems for 2 or 3 devices

Masterpact NW circuit breakers and switch-disconnectors

Interlocking for source-changeover systems for 2 devices

Interlocking of 2 devices using connecting rods

E47762



Complete assembly with 2 adaptation fixtures + rods	
2 Masterpact NW fixed devices	**48612**
2 Masterpact NW drawout devices	**48612**
Can be used with 1 NW fixed + 1 NW drawout.	

Interlocking of 2 devices using cables (*)

Choose 2 adaptation fixtures (1 for each breaker + 1 set of cables)	
1 adaptation fixture for Masterpact NW fixed devices	**47926**
1 adaptation fixture for Masterpact NW drawout devices	**47926**
1 set of 2 cables	**33209**

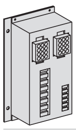
***(*)** Can be used with any combination of NT or NW, fixed or drawout devices.*

Associated controller for 2 devices

The automatic-control option includes:
- an IVE electrical-interlocking unit
- an ACP auxiliaries control plate
- a BA or UA controller, depending on the required functions
- a UA/BA adapter kit.

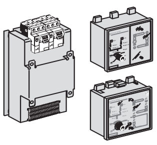
***Note:** the circuit breaker auxiliaries (MCH, MX, XF) and the automatic-control components (IVE, ACP, UA or BA) must have the same voltages.*

E88714



IVE electrical-interlocking unit	48/415 V AC 50/60 Hz 440 V 60 Hz
for 2 devices	**29352**
wiring kit for connection of 2 fixed/drawout devices to the IVE unit	**54655**

E33420



Control unit option	110/127 V AC 50/60 Hz	220/240 V AC 50/60 Hz	380/415 V AC 50/60 Hz 440 V 60 Hz
ACP + control unit BA [(1)]		**29470**	**29471**
Plate ACP		**29363**	**29364**
Control unit BA		**29376**	**29377**
ACP + control unit UA [(1)]	**29448**	**29472**	**29473**
Plate ACP	**29447**	**29363**	**29364**
Control unit UA	**29446**	**29378**	**29380**
ACP + control unit UA150 [(1)] (communication option)		**29474**	**29475**
Plate ACP		**29363**	**29364**
Control unit UA150		**29379**	**29381**

***(1)** The supply voltages of the BA/UA controller, ACP plate, IVE unit and circuit breaker operating mechanism must be identical whatever the type of source-changeover system.*

Interlocking for source-changeover systems for 3 devices

Interlocking of 3 devices using cables

Choose 3 adaptation fixtures (1 complete set with 3 adaptation fixtures + cables)	
3 sources, only 1 device closed, fixed or drawout devices	**48610**
2 sources, 1 coupling, fixed or drawout devices	**48609**
2 normal, 1 replacement source, fixed or drawout devices	**48608**

Source-changeover systems for 2 devices

Interpact INS40 to INS630 Switch-disconnectors

To indicate your choices, check the applicable square boxes ☐ and enter the appropriate information in the rectangles ▭.

Mechanical interlocking of two INS40 to INS630 devices				
Devices with front rotary handles, mounted side by side				
	Two devices with direct rotary handles			
	INS250	☐	INS320/400/500/630	☐
	Two devices with extended rotary handles			
	INS40/63/80	☐	INS100/125/160	☐
	INS250	☐	INS320/400/500/630	☐
Downstream coupling accessory	INS250	☐	INS320/400/500/630	☐
Long terminal shields	INS250	☐	INS320/400/500/630	☐
Complete source-changeover assembly				
	INS250-100 A	☐	INS250-160 A	☐
	INS250-200 A	☐	INS250-250 A	☐
	INS320	☐	INS400	☐
	INS500	☐	INS630	☐

Source-changeover systems for 2 devices

Interpact INS40 to INS630 Switch-disconnectors

To indicate your choices, check the applicable square boxes ☐ and enter the appropriate information in the rectangles ▭.
(one sheet per device, make copies if necessary)

Device identification:

Q 1 - NORMAL SOURCE ☐

Q 2 - REPLACEMENT SOURCE ☐

Switch-disconnector

Interpact type	**INS40/63/80**	▭
	INS100/125/160	▭
	INS250	▭
	INS320/400/500/630	▭
Rating	**A**	▭
Number of poles	**3 or 4**	▭

Connections

Front connection	Standard				
Rear connection	2 short	☐		2 long	☐
INS40/80 connectors	Distribution 3x16□ rigid/10□ flexible				☐
INS100/160 connectors	Snap-on ≤ 95□				☐
	Distribution 4x25□ rigid/16□ flexible				☐
INS250 connectors	Snap-on 1.5□ to 95□ (< 160 A)				☐
	Snap-on 10□ to 185□ (< 250 A)				☐
	Voltage tap connector for 185□ connector				☐
	Clips for connectors			Set of 10	☐
	Distribution 6x1.5□ to 35□ rigid with interphase barriers				☐
INS320/630 connectors	1 cable 35□ to 300□				☐
	2 cables 35□ to 240□				☐
	Voltage tap connector for 185□ connector				☐
Distribution blocks	"Distribloc"	125 A	☐	160 A	☐
	Multi-stage	125 A	☐	160 A	☐
	"Polybloc"	160 A	☐	250 A	☐
Rt-angle extension	Set of 3 or 4	250 A	☐	630 A	☐
Straight extension	INS250				☐
Edgewise ext.	INS630				☐
Spreader	INS250 (45 mm)				☐
	Front alignment base				☐
	INS320/630	52.5 mm	☐	70 mm	☐
	One-piece	INS250	☐	INS630	☐
CU cable lugs supplied with 2 or 3 inter-phase barriers	INS100/160	For 95□ cable			☐
	INS250	For 120□ cable			☐
		For 150□ cable			☐
		For 185□ cable			☐
	INS320/630	For 240□ cable			☐
		For 300□ cable			☐
AL cable lugs supplied with 2 or 3 inter-phase barriers	INS250	For 150□ cable			☐
		For 185□ cable			☐
	INS320/630	For 240□ cable			☐
		For 300□ cable			☐
Terminal shrouds	INS40/63/80	☐	INS100/125/160		☐
Terminal shields	INS40/63/80	☐	INS100/125/160		☐
	INS250	Short	☐	Long	☐
	INS320/630	Short	☐	Long	☐
	Long for 52.5 mm spreaders				☐
Interphase barriers	INS100/160			Set of 6	☐
	INS250			Set of 6	☐
	INS320/630			Set of 6	☐

Indication and measurements

4P ammeter module	For INS250	Rating	100 A	☐
			150 A	☐
			250 A	☐
	Adaptation kit required for direct handles			☐
	For INS320/630	Rating	400 A	☐
			600 A	☐
4P current-transformer module	For INS250	Rating	100 A	☐
			150 A	☐
			250 A	☐
	For INS320/630	Rating	400 A	☐
			600 A	☐
Auxiliary contact	For INS40/160	1OF/CAF/CAO	Standard	☐
			Low level	☐
	For INS250/630	1 OF/CAM	Standard	☐
			Low level	☐

Rotary handles

Extended front handles	INS40 to INS160	Black	☐	Red on yellow front	☐
	INS250	Black	☐	Red on yellow front	☐
	INS320 to INS630	Black	☐	Red on yellow front	☐
	For complete changeover assembly			INS250	☐
				INS320/630	☐

Locking of rotary handles

Padlocking	1 to 3 padlocks (in OFF position)			☐
Keylocking	Keylock adapter (keylock not included)			☐
	Keylocks Ronis 1351B.500	☐	Profalux KS5 B24 D4Z	☐

Installation accessories

Front-panel escutcheon	For switch-disconnectors	☐
	For ammeter module, IP40	☐

Catalogue numbers and order forms

Source-changeover systems for 2 devices

Compact NS100 to NS630 / Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes ☐ and enter the appropriate information in the rectangles ▭.

Diagram for two Compact NS devices		
Without automatic control, without emergency off auxiliaries	(no. 51201177)	☐
Without automatic control, with emergency off by MN	(no. 51201178)	☐
Without automatic control, with emergency off by MX	(no. 51201179)	☐

Mechanical interlocking of two NS100 to NS630 devices

(fixed, plug-in or withdrawable)

Manually operated devices, mounted side by side:

Two devices with toggles	☐
Two devices with rotary handles	☐

Mechanical and electrical interlocking of two NS100 to NS630 devices

(fixed or plug-in)

Electrically operated devices, mounted side by side:

Select 1 base plate + IVE, the 4 auxiliary contacts and the options / accessories

Base plate + IVE	Identical voltages:		48 to 415 V AC 50/60 Hz	
	24 to 250 V DC	☐	440/480 V AC 60 Hz	☐
	“Normal” NS100/250	☐	“Replacement” NS100/250	☐
	“Normal” NS400/630	☐	“Replacement” NS400/630	☐
	“Normal” NS400/630	☐	“Replacement” NS100/250	☐
	Adapter kit for NS400/630 with NS100/250 (plug-in)			☐
Auxiliary contacts	2 OF + 2 SDE (mandatory)		Quantity	4
Options	Long rear connections	☐	Plug-in base	☐
Downstream coupling accessory	3P	☐	NS100/250	☐
	4P	☐	NS400/630	☐
Prefabricated wiring	Between device and IVE		Quantity	▭

Automatic-control option

Power supply 220/240 V - 50/60 Hz:	ACP + BA controller	☐
	ACP + UA controller	☐
	ACP + UA150 controller	☐
Power supply 380/415 V - 50/60 Hz and 440 V - 60 Hz:	ACP + BA controller	☐
	ACP + UA controller	☐
	ACP + UA150 controller	☐

Source-changeover systems for 2 devices

Compact NS100 to NS630 / Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes ☐ and enter the appropriate information in the rectangles ☐.
(one sheet per device, make copies if necessary)
Device identification:

Q 1 - NORMAL SOURCE	☐
Q 2 - REPLACEMENT SOURCE	☐

Circuit breaker or switch-disconnector

Compact type	**NS100/160/250**			☐
	NS400/630			☐
Rating	**A**			☐
Circuit breaker	**N, H, L**			☐
Switch-disconnector	**NA**			☐
Number of poles	**2, 3 or 4**			☐
Number of poles tripped	**2d, 3d, 3dN/2 or 4d**			☐
Fixed device	Front connections	☐	Long rear conn.	☐
	Short rear conn.	☐	Mixed rear conn.	☐
Plug-in/withdr.	Plug-in	☐	Withdrawable	☐
Earth-leakage protection	**ME, MH, MB, MHM**			☐
	Voltage		**V**	☐
	4p **MB** option on 3p NS			☐

Thermal-magnetic or electronic trip unit

Thermal-mag.	**TMD rating (16 ... 250 A)**					☐
	TMG rating (16 ... 63 A)					☐
	MA rating (2.5 ... 220 A)					☐
Electronic	STR22	**SE** ☐	**GE** ☐		**ME**	☐
	STR23	**SE** ☐	**SV** ☐			
	STR53 (basic)		**UE F** ☐		**SV F**	☐
	STR53UE	**FT** ☐	**FI** ☐		**FTI**	☐
	ZSI wiring					
	Option **T** (rating 150…630 A)				**A**	☐
	STR43ME		**F** ☐		**FI**	☐
	Option **STDAM**	110/240 V AC/DC				☐
		24/48 V AC/24/72 V DC				☐
	COM wiring					☐
	Spare battery for STR43 and STR53					☐

Connections

Rear-connect. kit	Short	☐	Mixed	☐
Plug-in kit	Compact	☐	Vigicompact	☐
Withdrawable kit	Compact	☐	Vigicompact	☐

Long terminal-shield kit for plug-in or withdr. NS400/630						☐
Interphase-barrier kit for plug-in or withdr. NS400/630						☐
NS100/250 connectors	Snap-on 1.5▫ to 95▫ (< 160 A)					☐
	Snap-on 10▫ to 185▫ (< 250 A)					☐
	Distribution 6 x 1.5▫ to 35▫					☐
NS1400/630 connectors	1 cable 35▫ to 300▫					☐
	2 cables 35▫ to 240▫					☐
Right-angle terminal extensions						☐
Straight extensions	NS100/250					☐
Edgewise extensions	NS400/630					☐
Spreader	NS100/250 (one piece)	(45 mm)				☐
	NS400/630 (52.5 mm)	(70 mm)				☐
CU cable lugs	NS100/250	120▫ ☐	150▫ ☐		185▫	☐
	NS400/630	240▫ ☐	300▫ ☐			
AL cable lugs	NS100/250	150▫ ☐	185▫ ☐			
	NS400/630	240▫ ☐	300▫ ☐			
Voltage measurement input for connector	for lugs NS100/250 ≤ 185▫					☐
	for lugs NS400/630					☐
Terminal shields	NS100/250		Short ☐		Long	☐
	NS400/630		Short ☐		Long	☐
	Long for 52.5 mm spreaders					☐
Interphase barriers					Set of 6	☐
Insulation kit > 600 V	Without spreaders					☐
NS400/630	With 52.5 mm spreaders					☐
2 insulating screens:	NS100/250					☐
	NS400/630	52.5 pitch ☐			70 pitch	☐

Communication

Communicating OF, SD, SDE or SDV auxiliary contacts		☐
Connected/disconnected position indication contacts		☐
Motor mechanism + communicating OF, SD, SDE contacts	220-240 V 50/60 Hz	☐

Indication and measurements

Ammeter module	standard	3P	☐	4P	☐
	I max	3P	☐		
Current-transformer module		3P	☐	4P	☐
Insulation-monitoring module		3P	☐	4P	☐
Voltage-presence indicator					☐
Auxiliary contact	OF, SD, SDE or SDV	Standard	☐	Low level	☐
SDE adapter (TM or MA trip units)					☐

Remote operation

Electrical operation	Motor mechanism		AC ☐	DC ☐	V	☐
Voltage releases	Instantaneous	MX	AC ☐	DC ☐	V	☐
		MN	AC ☐	DC ☐	V	☐
	Delayed	MN	AC ☐	DC ☐	V	☐

Rotary handles

Direct	Black	☐	Red on yellow front	☐
	MCC conversion access.	☐	CNOMO conversion access.	☐
Extended	Black	☐	Red on yellow front	☐
	Telescopic handle for withdrawable device			☐
Indication auxiliary	1 early-break switch	☐	2 early-break switches	☐
	Wiring accessory for early-make switches			☐

Locking

Toggle (1 to 3 padlocks)	Removable	☐	Fixed	☐
Rotary handle	Keylock adapter (keylock not included)			☐
	Keylocks Ronis 1351B.500	☐	Profalux KS5 B24 D4Z	☐
Motor mechanism	Keylock adapter + Keylocks Ronis (special)		NS100/250	☐
	Keylock adapter (keylock not included)		NS400/630	☐
	Keylocks Ronis 1351B.500	☐	Profalux KS5 B24 D4Z	☐

Installation accessories

Front-panel escutcheon	Toggle			☐
	Rotary handle, motor mechanism, escutcheon collar; IP40			☐
	Vigi module or ammeter IP40	☐	Vigi module	☐
Toggle cover				☐
Sealing accessories				☐
DIN rail adapter NS100/250				☐

Plug-in / withdrawable configuration accessories

Auxiliary connections	1 automatic connector fixed part with 9 wires (for base)					☐
	1 auto. conn. moving part with 9 wires (for circuit breaker)					☐
	1 support for 3 automatic connector moving parts					☐
	9-wire manual auxiliary connector (fixed + moving)					☐
Plug-in base accessories	Long insulated terminals		Set of 3	☐	Set of 4	☐
	2 IP4 shutters for base					☐
Chassis accessories	Escutcheon collar		Toggle	☐	Vigi	☐
	Locking kit (keylock not included)					☐
	2 carriage switches (conn./disconnected position indication)					☐
Parts of plug-in	Plug-in base FC/RC	2P ☐	3P	☐	4P	☐
	Set of two power connections		Standard	☐	Vigi	☐
	Safety trip for advanced opening					☐
	For 3P/4P chassis				Moving part	☐
					Fixed part	☐

Source-changeover systems for 2 devices

Compact NS630b to NS1600 / Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes ☐ and enter the appropriate information in the rectangles ▭.

Diagram for two Compact NS devices			
Electrical interlocking with lockout after fault:			
Permanent replacement source (without IVE)		(no. 51201180)	☐
With emergency off by MX (without IVE)		(no. 51201181)	☐
With emergency off by MN (without IVE)		(no. 51201182)	☐
Permanent replacement source (with IVE)		(no. 51201183)	☐
With emergency off by MX (with IVE)		(no. 51201184)	☐
With emergency off by MN (with IVE)		(no. 51201185)	☐
Automatic control without lockout after fault:			
Permanent replacement source (without IVE)		(no. 51201186)	☐
Engine generator set (without IVE)		(no. 51201187)	☐
Interlocking using connecting rods between two NS630b to NS1600 devices			
Manually operated devices installed side-by-side:			
	For two fixed NS devices with extended rotary handles		☐
Electrically operated devices installed one above the other:			
Select a complete set including two adaptation fixtures and the connecting rods			
Complete set for:	2 fixed NS devices		☐
	2 withdrawable NS devices		☐
Interlocking using cables between two NS630b to NS1600 devices			
Electrically operated devices installed one above the other or side-by-side:			
Select a complete set including two adaptation fixtures and the cables			
Complete set for:	2 fixed NS devices		☐
	2 withdrawable NS devices		☐
	1 fixed NS device + 1 withdrawable NS device		☐
Electrical interlocking between two NS630b to NS1600 devices			
1 IVE unit 48/415 V - 50/60 Hz and 440 V - 60 Hz			☐
1 wiring kit for connection between 2 fixed / withdrawable devices to the IVE unit			☐
Automatic-control option			
Power supply 110 V - 50/60 Hz:		ACP + BA controller	☐
		ACP + UA controller	☐
		ACP + UA150 controller	☐
Power supply 220/240 V - 50/60 Hz:		ACP + BA controller	☐
		ACP + UA controller	☐
		ACP + UA150 controller	☐
Power supply 380/415 V - 50/60 Hz and 440 V - 60 Hz:		ACP + BA controller	☐
		ACP + UA controller	☐
		ACP + UA150 controller	☐

Source-changeover systems for 2 devices

Compact NS630b to NS1600 / Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes ☐ and enter the appropriate information in the rectangles ▭.
(one sheet per device, make copies if necessary)
Device identification:

Q 1 - NORMAL SOURCE		☐
Q 2 - REPLACEMENT SOURCE		☐

Circuit breaker or switch-disconnector

Compact type	**NS630b to NS1600**	▭
Rating	**A**	▭
Circuit breaker	**N, H, L**	▭
Switch-disconnector	**NA**	▭
Number of poles	**3 or 4**	▭
Device	Fixed	☐
	Withdr. chassis	☐
	Withdr. without chassis (moving part only)	☐
Chassis alone without connections		☐

Micrologic control unit

Basic protection	**2.0**	☐	**5.0**	☐				
A - ammeter	**2.0**	☐	**5.0**	☐	**6.0**	☐	**7.0**	☐
AD - external power-supply module							V	▭

TCE - external sensor (CT) for neutral protection		☐
Rectangular sensor	280 x 115 mm	☐
TCW - external sensor for SGR protection		☐
LR - long-time rating plug	Standard 0.4 to 1 Ir	☐
	Low setting 0.4 to 0.8 Ir	☐
	High setting 0.8 to 1 Ir	☐
	LT OFF	☐

Communication

COM module	Jbus/ Modbus	Manual operation	☐
		Electrical operation	☐
	Digipact	Manual operation	☐
		Electrical operation	☐
Modbus Eco COM module (for switchboard display units)			☐

Connections

Horizontal rear connections	Top	☐	Bottom	☐
Vertical rear connections	Top	☐	Bottom	☐
Front connections	Top	☐	Bottom	☐

4x240▫ bare cable connectors + shields	NS - FC fixed	☐
Long connection shields	NS - FC fixed	☐
Vertical-connection adapters	NS - FC fixed, withdr.	☐
Cable-lug adapters	NS - FC fixed, withdr.	☐
Arc chute screen	NS - FC fixed	☐
Interphase barriers	NS - FC fixed, withdr.	☐
Spreaders	NS - FC fixed, withdr.	☐
VO - safety shutters on chassis	NS - FC fixed	☐

Indication contacts

SD trip indication (maximum 1)					
	6 A-240 V AC	☐	Low level		☐
SDE fault-trip indication (maximum 1) (SDE integrated in electrically operated devices)					
	6 A-240 V AC	☐	Low level		☐
OF ON/OFF indication contacts (maximum 3)					
	6 A-240 V AC	qty ▭	Low level	qty	▭
Carriage switches (possible combinations: 3 CE, 2 CD, 1 CT)					
CE - "connected" position	6 A-240 V AC	qty ▭	Low level	qty	▭
CD - "disconnected" position	6 A-240 V AC	qty ▭	Low level	qty	▭
CT - "test" position	6 A-240 V AC	qty ▭	Low level	qty	▭
Auxiliary terminals for chassis alone			Jumpers (set of 10)		☐
	3-wire terminal (30 parts)	☐	6-wire terminal (10 parts)		☐

Remote operation

Electrical operation	Standard		☐	Communicating		☐
	Power supply	AC	☐	DC ☐	V	▭
Voltage releases	MX	AC	☐	DC ☐	V	▭
	MN	AC	☐	DC ☐	V	▭
	MN delay unit			Adjustable ☐	Non-adjustable	☐

Rotary handles for fixed and withdrawable device

Direct	Black	Red on yellow front	☐
		CNOMO conversion access.	☐
Extended	Black	Red on yellow front	☐
	Telescopic handle for withdrawable device		☐
Indication auxiliary	6 A-240 V AC	2 early-make switches	☐
		2 early-break switches	☐

Locking

Toggle (1 to 3 padlocks)	Removable system	☐	Fixed system		☐
Rotary handle using a keylock	OFF position	☐	ON and OFF positions		☐
	Ronis 1351B.500	☐	Profalux KS5 B24 D4Z		☐
	Keylock kit (without keylock)				☐
For electrically operated devices	**VBP** - ON/OFF pushbutton locking				☐
	OFF position locking:				
	VCPO - by padlocks				☐
	VSPO - by keylocks				
	Keylock kit (w/o keylock)		Profalux ☐	Ronis	☐
	1 keylock		Profalux ☐	Ronis	☐
	2 identical keylocks, 1 key		Profalux ☐	Ronis	☐
Chassis locking in "disconnected" position:					
VSPD - by keylocks	Keylock kit (w/o keylock)		Profalux ☐	Ronis	☐
			Kirk ☐	Castell	☐
	1 keylock		Profalux ☐	Ronis	☐
	2 identical keylocks, 1 key		Profalux ☐	Ronis	☐
	2 keylocks, different keys		Profalux ☐	Ronis	☐
	Optional connected/disconnected/test position locking				☐
VPEC - door interlock			On right-hand side of chassis		☐
			On left-hand side of chassis		☐
VPOC - racking interlock					☐
VDC - mismatch protection					☐

Accessories

CDM - mechanical operation counter				☐
CDP - escutcheon				☐
CP - transparent cover for escutcheon				☐
OP - blanking plate for escutcheon				☐
Mounting brackets for fixed NS			for mounting on horizontal plane	☐
Test kits	Mini test kit	☐	Portable test kit	☐

Source-changeover systems for 2 devices

Masterpact NT or NW / Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes ☐ and enter the appropriate information in the rectangles ▭.

Diagram for 2 Masterpact NT/NW devices

Electrical interlocking with lockout after fault:		
Permanent replacement source (without IVE)	(no. 51201139)	☐
With emergency off by MX (without IVE)	(no. 51201140)	☐
With emergency off by MN (without IVE)	(no. 51201141)	☐
Permanent replacement source (with IVE)	(no. 51201142)	☐
With emergency off by MX (with IVE)	(no. 51201143)	☐
With emergency off by MN (with IVE)	(no. 51201144)	☐
Automatic control without lockout after fault:		
Permanent replacement source (without IVE)	(no. 51156226)	☐
Engine generator set (without IVE)	(no. 51156227)	☐
Automatic control with lockout after fault:		
Permanent replacement source (with IVE)	(no. 51156904)	☐
Engine generator set (with IVE)	(no. 51156905)	☐
BA/UA controller (with IVE)	(no. 51156903)	☐

Interlocking using connecting rods (NT/NW devices one above the other)

Select a complete set including two adaptation fixtures and the connecting rods

Complete set for:	2 drawout NT devices	☐	2 fixed NT devices	☐
	2 drawout NW devices	☐	2 fixed NW devices	☐
	1 fixed NT device + 1 fixed NW devices			☐
	1 drawout NT device + 1 drawout NW device			☐

Interlocking using cables (NT/NW devices one above the other or side-by-side)

Select two adaptation fixtures (one for each device) and a set of two cables

Adaptation fixture for: (NT/NW fixed and drawout devices may be mixed)	1 fixed NT device	qty ▭
	1 drawout NT device	qty ▭
	1 fixed NW device	qty ▭
	1 drawout NW device	qty ▭
	1 set of 2 cables (for two devices)	☐

Electrical interlocking 2 appareils NT/NW

1 IVE unit 48/415 V - 50/60 Hz and 440 V - 60 Hz	☐
1 wiring kit for connection between 2 fixed / withdrawable devices to the IVE unit	☐

Automatic-control option

Power supply 220/240 V - 50/60 Hz:	ACP + BA controller	☐
	ACP + UA controller	☐
	ACP + UA150 controller	☐
Power supply 380/415 V - 50/60 Hz and 440 V - 60 Hz:	ACP + BA controller	☐
	ACP + UA controller	☐
	ACP + UA150 controller	☐

Source-changeover systems for 2 devices

Masterpact NT or NW / Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes and enter the appropriate information in the rectangles .
(one sheet per device, make copies if necessary)

Device identification:

Q 1 - NORMAL SOURCE

Q 2 - REPLACEMENT SOURCE

Circuit breaker or switch-disconnector

Masterpact type	**NT**	**NW**
Rating	**A**	
Sensor rating	**A**	
Circuit breaker	**N1, H1, H2, H3, L1**	
Switch-disconnector	**NA, HA, HF, ES, HA10 (NW)**	
Number of poles	**3 or 4**	
Option: neutral on right side		
Device	Fixed	
	Withdr. chassis	
	Withdr. without chassis (moving part only)	
Chassis alone without connections		

Micrologic control unit

A - ammeter	**2.0**	**5.0**	**6.0**	**7.0**
P - power meter		**5.0**	**6.0**	**7.0**
H - harmonic meter		**5.0**	**6.0**	**7.0**

AD - external power-supply module		V
TCE - external sensor (CT) for neutral protection		
Rectangular sensor for earth-leakage protection	NT (280 x 115 mm)	
	NW (470 x 160 mm)	
LR - long-time rating plug	Standard 0.4 to 1 Ir	
	Low setting 0.4 to 0.8 Ir	
	High setting 0.8 to 1 Ir	
	LT OFF	
PTE - external voltage measurement input (required for reverse supply)		
BAT - battery module		

Communication

Eco COM module (for switchboard display units)	Modbus	

Connections

Horizontal	Top	Bottom
Vertical	Top	Bottom
Front	Top	Bottom
Vertical-connection adapters	NT - FC fixed, draw.	
Cable-lug adapters	NT - FC fixed, draw.	
Arc chute screen	NT - FC fixed	
Interphase barriers	NT, NW fixed, draw.	
Spreaders	NT fixed, drawout	
Disconnectable front connection adapter	NW fixed	
Lugs for 240▫ or 300▫ cables	NT fixed, draw.	
VO - safety shutters on chassis	NT, NW	X
VIVC - shutter position indication and locking	NW	

Indication contacts

OF - ON/OFF indication contacts

Standard	4 OF 6 A-240 V AC (10 A-240 V AC and low-level for NW)		
Additional	1 block of 4 OF for NW	max. 2	qty

EF - combined "connected/closed" contacts

	1 EF 6 A-240 V AC for NW	max. 8	qty
	1 EF low-level for NW	max. 8	qty

SDE - "fault-trip" indication contact

Standard	1 SDE 6 A-240 V AC	
Additional	1 SDE 6 A-240 V AC	1 SDE Low level
Programmable contacts	2 M2C contacts	6 M6C contacts
Carriage switches	6 A-240 V AC	Low level
CE - "connected" position	max. 3 for NW / NT	qty
CD - "disconnected" position	max. 3 for NW, 2 for NT	qty
CT - "test" position	max. 3 for NW, 1 for NT	qty
AC - NW actuator for 6 CE - 3 CD - 0 CT additionnal carriage switches		qty

Remote operation

Remote ON/OFF	**MCH -** gear motor		V
	XF - closing voltage release		V
	MX - opening voltage release		V
	PF - "ready to close" contact	Low level	
		6 A-240 V AC	
	BPFE - electrical closing pushbutton		
	Res - electrical reset option		V
	RAR - automatic reset option		
Remote tripping	**MN -** undervoltage release		V
	R - delay unit (non-adjustable)		
	Rr - adjustable delay unit		
	2nd MX - shunt release		V

Locking

VBP - ON/OFF pushbutton locking (by transparent cover + padlocks)

OFF position locking:

VCPO - by padlocks			
VSPO - by keylocks	Keylock kit (w/o keylock)	Profalux	Ronis
		Kirk	Castell
	1 keylock	Profalux	Ronis
	2 identical keylocks, 1 key	Profalux	Ronis
	2 keylocks, different keys (NW)	Profalux	Ronis

Chassis locking in "disconnected" position:

VSPD - by keylocks	Keylock kit (w/o keylock)	Profalux	Ronis
		Kirk	Castell
	1 keylock	Profalux	Ronis
	2 identical keylocks, 1 key	Profalux	Ronis
	2 keylocks, different keys	Profalux	Ronis
	Optional connected/disconnected/test position locking		
VPEC - door interlock		On right-hand side of chassis	
		On left-hand side of chassis	

VPOC - racking interlock

IPA - cable-type door interlock

IBPO - racking interlock between crank and OFF pushbutton for NW

DAE - automatic spring discharge before breaker removal for NW

VDC - mismatch protection

Accessories

CDM - mechanical operation counter

CB - auxiliary terminal shield for chassis

CDP - escutcheon

CP - transparent cover for escutcheon

OP - blanking plate for escutcheon

Brackets for mounting NW fixed		on backplates
Test kits	Mini test kit	Portable test kit

Source-changeover systems for 3 devices

Masterpact NW / Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes ☐ and enter the appropriate information in the rectangles ▭.

Diagram for 3 Masterpact NW devices		
2 "Normal" sources + 1 "Replacement" source:		
Electrical interlocking without lockout after fault	(no. 51156906)	☐
Electrical interlocking with lockout after fault	(no. 51156907)	☐
2 "Normal" sources + 1 "Replacement" source with source selection:		
Automatic control w/ engine generator set w/o lockout after fault	(no. 51156908)	☐
Automatic control w/ engine generator set w/ lockout after fault	(no. 51156909)	☐
3 sources, only 1 device ON:		
Electrical interlocking without lockout after fault	(no. 51156910)	☐
Electrical interlocking with lockout after fault	(no. 51156911)	☐
2 "Normal" sources + 1 coupling:		
Electrical interlocking without lockout after fault	(no. 51156912)	☐
Electrical interlocking with lockout after fault	(no. 51156913)	☐
Automatic control with lockout after fault:	(no. 51156914)	☐

Interlocking using cables (NW devices one above the other or side-by-side)		
Select a complete set including three adaptation fixtures and the cables		
1 complete set for:	3 sources / 1 device ON, fixed or drawout	☐
	2 sources + 1 coupling, fixed or drawout	☐
	2 sources + 1 replacement source, fixed or drawout	☐

Source-changeover systems for 3 devices

Masterpact NW / Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes and enter the appropriate information in the rectangles.
(one sheet per device, make copies if necessary)

Device identification:

Q 1 - NORMAL SOURCE

Q 2 - REPLACEMENT SOURCE

Circuit breaker or switch-disconnector

Masterpact type		**NW**
Rating	**A**	
Sensor rating	**A**	
Circuit breaker	**N1, H1, H2, H3, L1**	
Switch-disconnector	**NA, HA, HF**	
Number of poles	**3 or 4**	
Option: neutral on right side		
Device	Fixed	
	Drawout with chassis	
	Drawout without chassis (moving part only)	
Chassis alone without connections		

Micrologic control unit

A - ammeter	**2.0**	**5.0**	**6.0**	**7.0**
P - power meter		**5.0**	**6.0**	**7.0**
H - harmonic meter		**5.0**	**6.0**	**7.0**

AD - external power-supply module		**V**
TCE - external sensor (CT) for neutral protection		
Rectangular sensor for earth-leakage protection	470 x 160 mm	
TCW - external sensor for SGR protection		
LR - long-time rating plug	Standard 0.4 to 1 Ir	
	Low setting 0.4 to 0.8 Ir	
	High setting 0.8 to 1 Ir	
	LT OFF	
PTE - external voltage measurement input (required for reverse supply)		
BAT - battery module		

Communication

Eco COM module (for switchboard display units)	Modbus	

Connections

Horizontal	Top	Bottom
Vertical	Top	Bottom
Front	Top	Bottom
Interphase barriers	Fixed, drawout	
Disconnectable front connection adapter	Fixed	
VO - safety shutters on chassis		X
VIVC - shutter position indication and locking		

Indication contacts

OF - ON/OFF indication contacts

Standard	4 OF 6 A-240 V AC (10 A-240 V AC and low-level)		
Additional	1 block of 4 OF	max. 2	qty

EF - combined "connected/closed" contacts

	1 EF 6 A-240 V AC	max. 8	qty
	1 EF low-level	max. 8	qty

SDE - "fault-trip" indication contact

Standard	1 SDE 6 A-240 V AC	
Additional	1 SDE 6 A-240 V AC	1 SDE Low level
Programmable contacts	2 M2C contacts	6 M6C contacts
Carriage switches	6 A-240 V AC	Low level
CE - "connected" position	max. 3	qty
CD - "disconnected" position	max. 3	qty
CT - "test" position	max. 3	qty
AC - NW actuator for 6 CE - 3 CD - 0 CT additionnal carriage switches		qty

Remote operation

Remote ON/OFF	**MCH** - gear motor		V
	XF - closing voltage release		V
	MX - opening voltage release		V
	PF - "ready to close" contact	Low level	
		6 A-240 V AC	
	BPFE - electrical closing pushbutton		
	Res - electrical reset option		V
	RAR - automatic reset option		
Remote tripping	**MN** - undervoltage release		V
	R - delay unit (non-adjustable)		
	Rr - adjustable delay unit		
	2eme MX - shunt release		V

Locking

VBP - ON/OFF pushbutton locking (by transparent cover + padlocks)

OFF position locking:

VCPO - by padlocks			
VSPO - by keylocks	Keylock kit (w/o keylock)	Profalux	Ronis
		Kirk	Castell
	1 keylock	Profalux	Ronis
	2 identical keylocks, 1 key	Profalux	Ronis
	2 keylocks, different keys (NW)	Profalux	Ronis

Chassis locking in "disconnected" position:

VSPD - by keylocks	Keylock kit (w/o keylock)	Profalux	Ronis
		Kirk	Castell
	1 keylock	Profalux	Ronis
	2 identical keylocks, 1 key	Profalux	Ronis
	2 keylocks, different keys	Profalux	Ronis
	Optional connected/disconnected/test position locking		
VPEC - door interlock		On right-hand side of chassis	
		On left-hand side of chassis	

VPOC - racking interlock

IPA - cable-type door interlock

IBPO - racking interlock between crank and OFF pushbutton for NW

DAE - automatic spring discharge before breaker removal for NW

VDC - mismatch protection

Accessories

CDM - mechanical operation counter

CB - auxiliary terminal shield for chassis

CDP - escutcheon

CP - transparent cover for escutcheon

OP - blanking plate for escutcheon

Brackets for mounting NW fixed		on backplates
Test kits	Mini test kit	Portable test kit

Notes

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89, boulevard Franklin Roosevelt
F - 92505 Rueil-Malmaison Cedex (France)
Tel : +33 (0)1 41 29 85 00

http://www.schneider-electric.com

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

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Low Voltage Products

Masterpact NW08-63 IEC

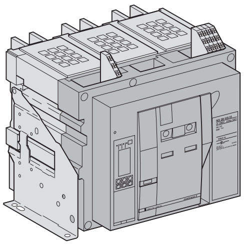
User manual

a brand of Schneider Electric

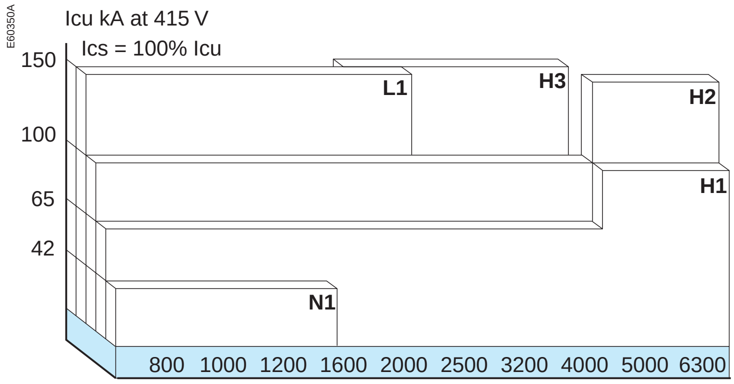
Merlin Gerin

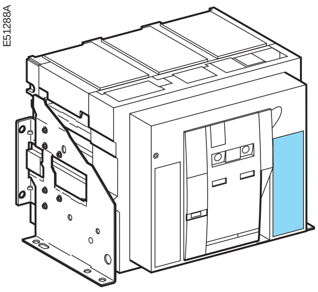
User manual for circuit breakers
Masterpact NW08-63 IEC

Discovering Masterpact

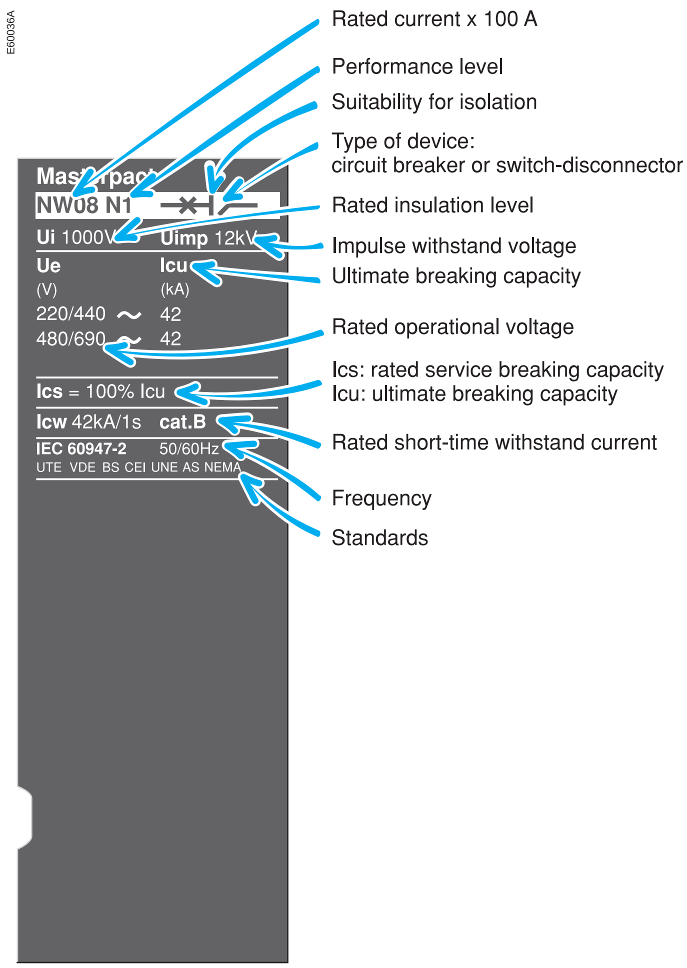


The Masterpact NW range of circuit breakers and switch-disconnectors offer current ratings from 800 A to 6300 A.
Five different performance levels are available:
- N1: standard with total discrimination
- H1: high performance with total discrimination
- H2: a compromise between current limiting and discrimination
- H3: high breaking capacity and discrimination, without current limiting
- L1: high level of current limiting, with some discrimination.





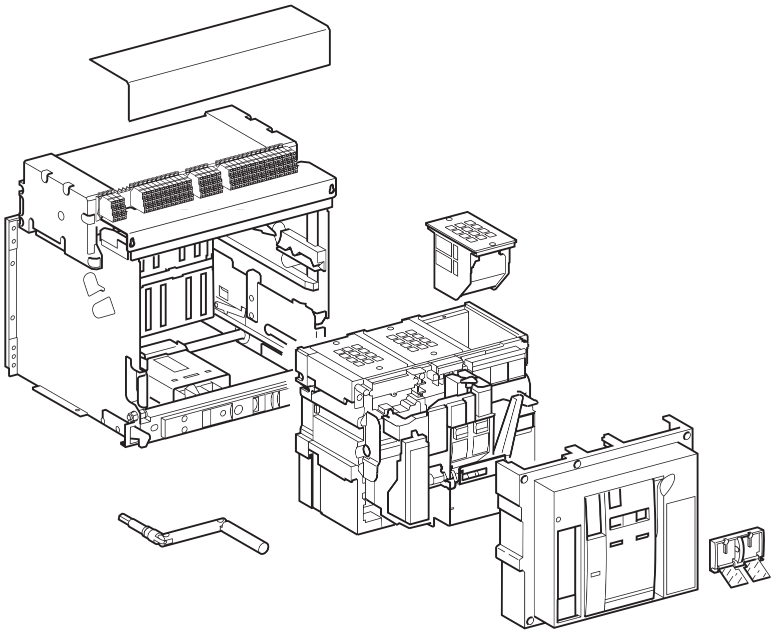
Rating plate



Masterpact circuit breakers are available in drawout and fixed versions.
The drawout version is mounted on a chassis and the fixed version is installed using fixing brackets

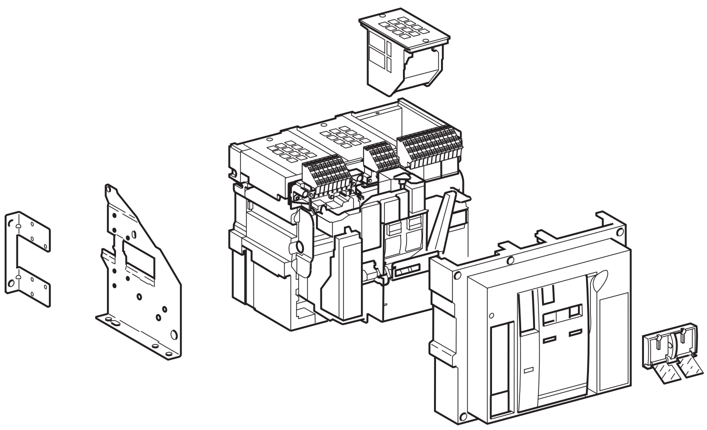
Drawout version

E51205C



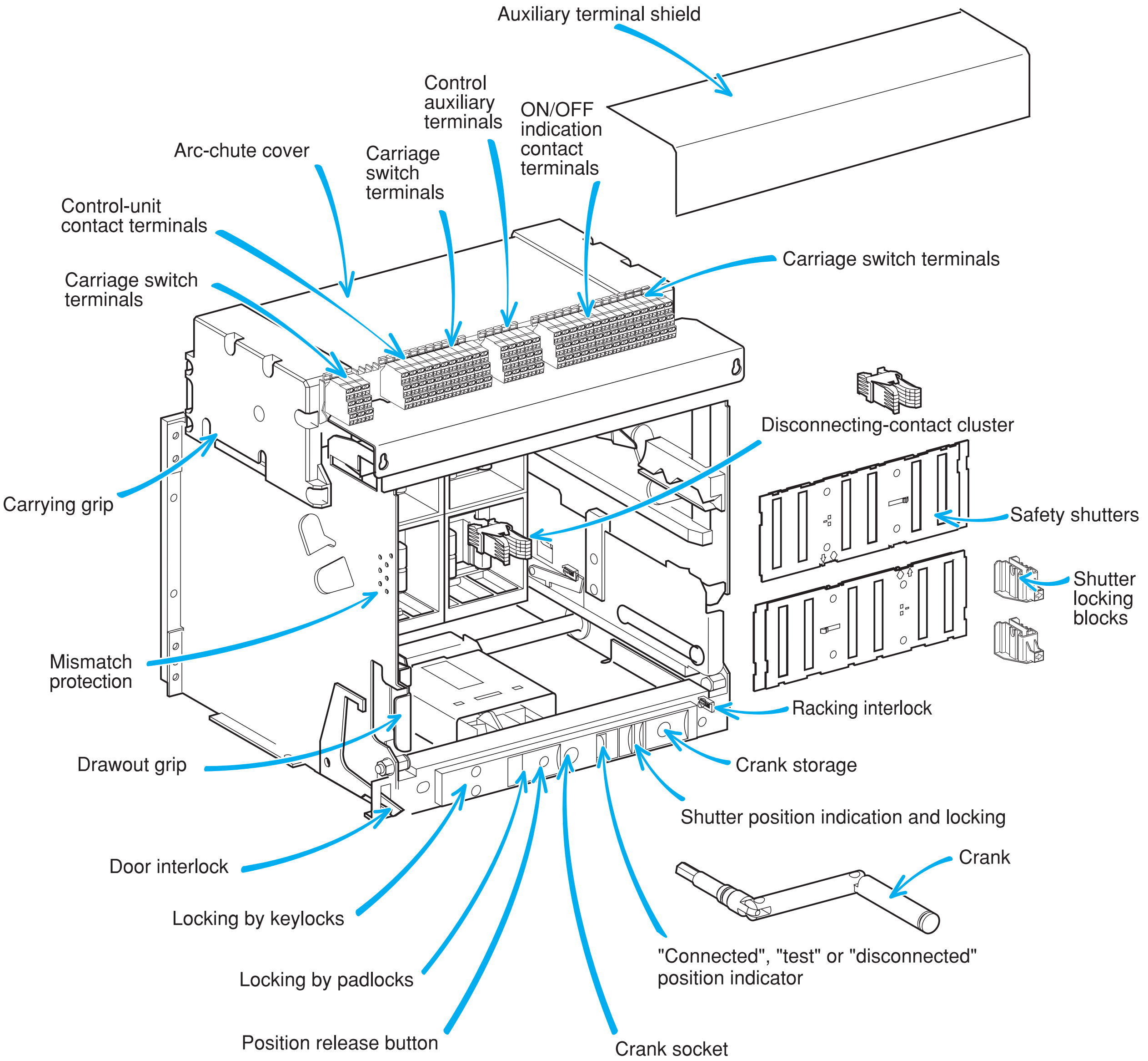
Fixed version

E51289C



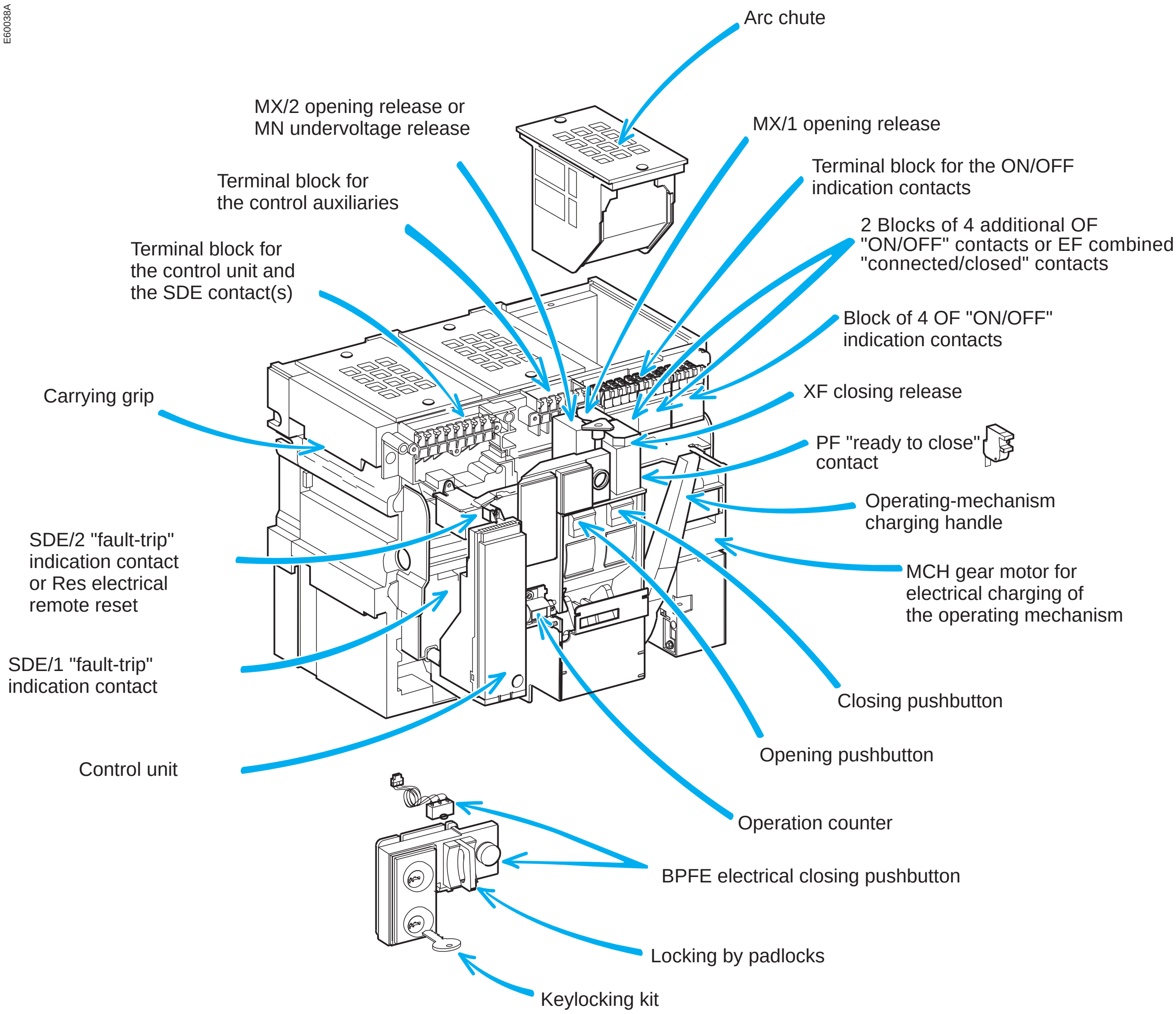
Chassis

E60037A

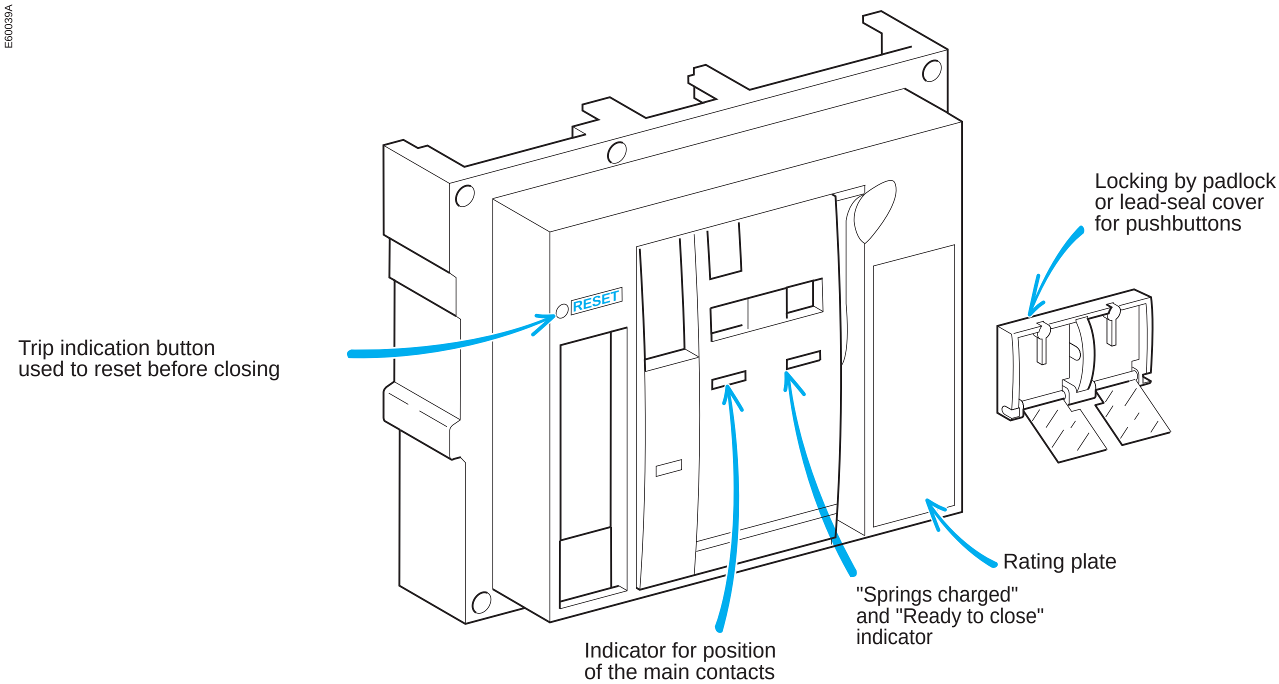


Discovering Masterpact

Circuit breaker / switch-disconnector

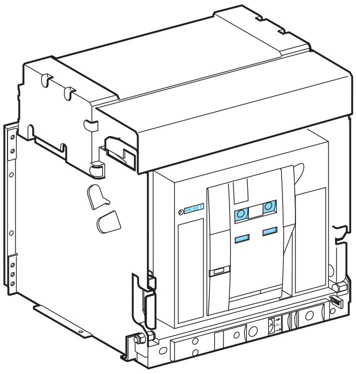


Front


E60039A
RESET
Trip indication button
used to reset before closing
Locking by padlock
or lead-seal cover
for pushbuttons
Rating plate
"Springs charged"
and "Ready to close"
indicator
Indicator for position
of the main contacts

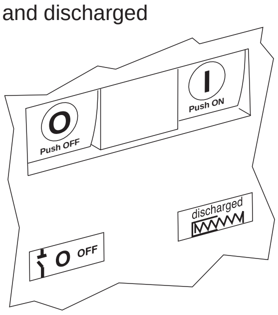
Understanding the controls and indications

E51320B



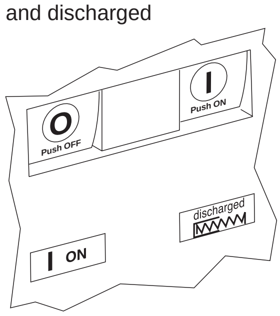
Circuit breaker open and discharged

E51207A



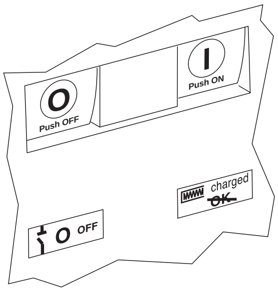
Circuit breaker closed and discharged

E51210A



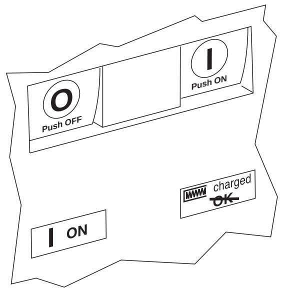
Circuit breaker open, charged and not "ready to close"

E51206A



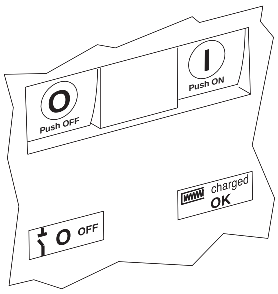
Circuit breaker closed, charged and not "ready to close"

E51211



Circuit breaker open, charged and "ready to close"

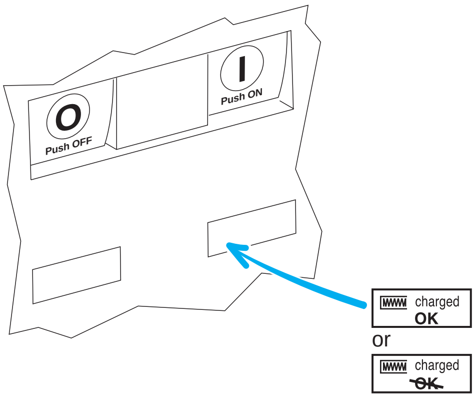
E51209A



Charging the circuit breaker

The charge status is indicated as follows.

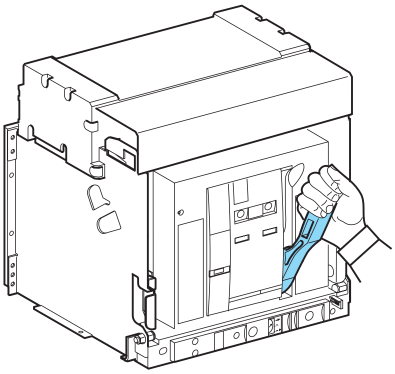
E60370A



The springs in the circuit breaker operating mechanism must be charged to store the energy required to close the main contacts. The springs may be charged manually using the charging handle or the optional MCH gear motor.

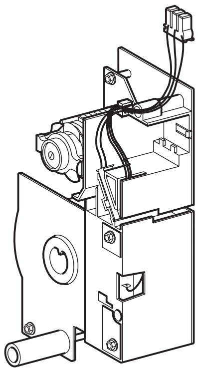
Manual charging:
Pull the handle down seven times until you hear a "clack".

E51213A



Automatic charging:
If the MCH gear motor is installed, the spring is automatically recharged after each closing.

E51290A



Closing the circuit breaker

Device "ready to close"

Device not "ready to close"

Closing conditions

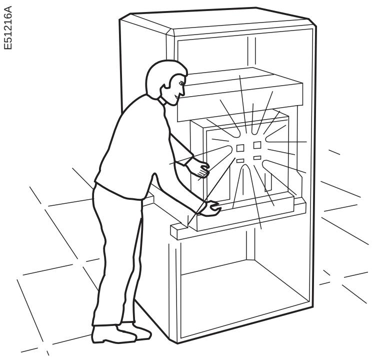
Closing (i.e. turning the circuit ON) is possible only if the circuit breaker is "ready to close".
The prerequisites are the following:

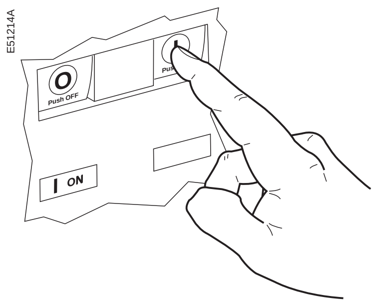
- device open (OFF)
- springs charged
- no opening order present.

If the circuit breaker is not "ready to close" when the order is given, stop the order and start again when the circuit breaker is "ready to close".

Closing the circuit breaker

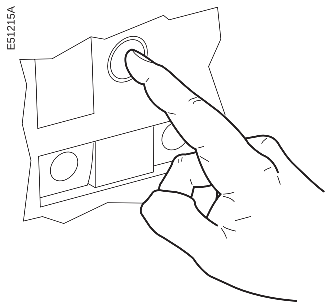
Locally (mechanical)
Press the mechanical ON pushbutton.



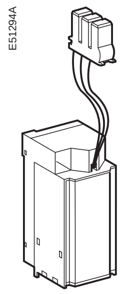


Locally (electrical)

BPFE

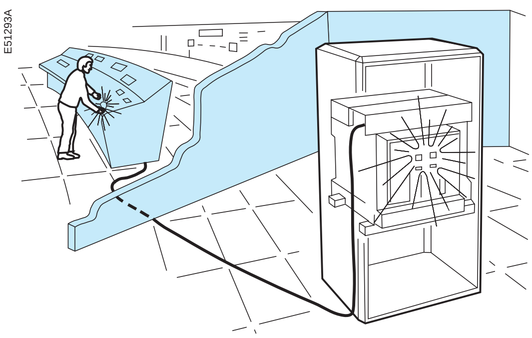


XF

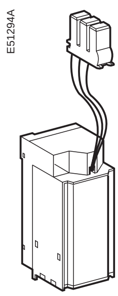


Press the electrical closing pushbutton. By adding an XF closing release, the circuit breaker can be closed remotely.

Remotely



XF



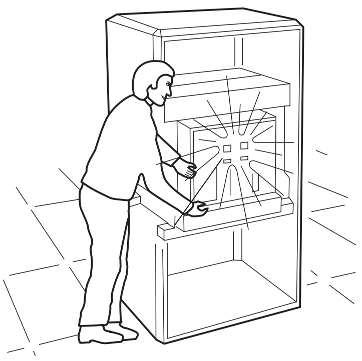
When connected to a remote control panel, the XF closing release (0.85 to 1.1 Un) can be used to close the circuit breaker remotely.

Enabling or disabling the anti-pumping function

The purpose of the mechanical anti-pumping function is to ensure that a circuit breaker receiving simultaneous opening and closing orders does not open and close indefinitely.
If there is a continuous closing order, after opening the circuit breaker remains open until the closing order is discontinued. A new closing order then closes the circuit breaker. This function can be disabled by wiring the closing release in series with the PF "ready to close" contact.

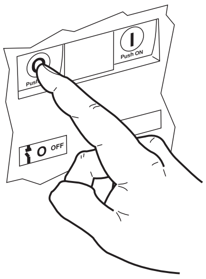
Opening the circuit breaker

E51216A

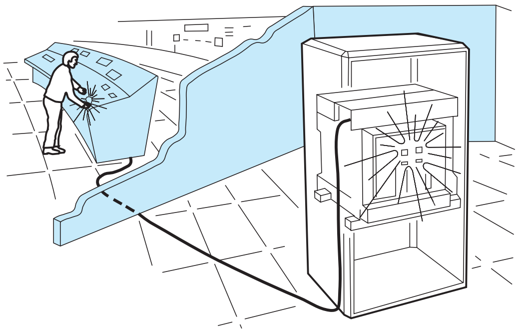


Locally
Press the OFF pushbutton.

E51217A



E51293A

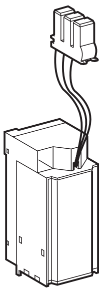


Remotely
Use one of the following solutions:
■ one or two MX opening releases (MX1 and MX2, 0.7 to 1.1 Un)
■ one MN undervoltage release (0.35 to 0.7 Un)
■ one MN undervoltage release (0.35 to 0.7 Un) with a delay unit (R or Rr).

When connected to a remote control panel, these releases can be used to open the circuit breaker remotely.

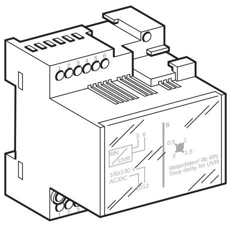
MX1, MX2, MN

E51294



Delay unit

E51296A

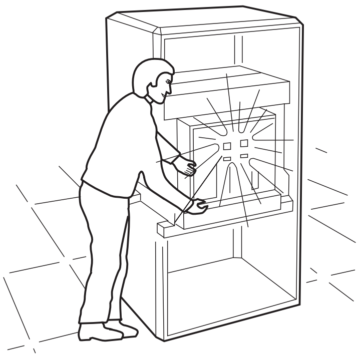


Resetting after a fault trip

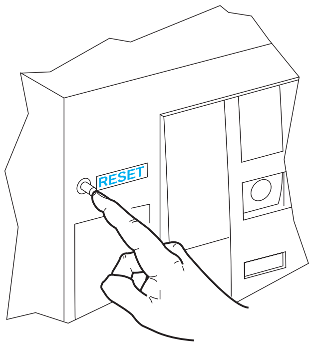
The circuit breaker signals a fault by:
- a mechanical indicator on the front panel
- one or two SDE "fault-trip" indication contacts (SDE/2 is optional).

Locally
If the circuit breaker is not equipped with the automatic reset option, reset it manually.

E51216A

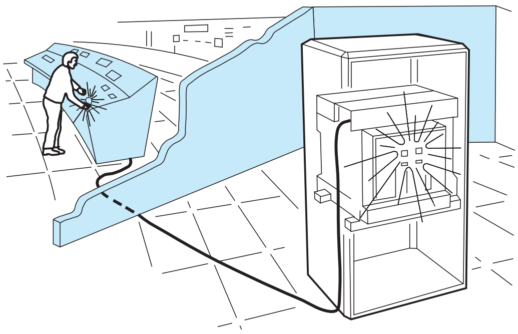


E51297B

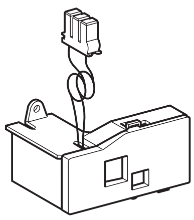


Remotely
Use the Res electrical remote reset option (not compatible with an SDE/2).

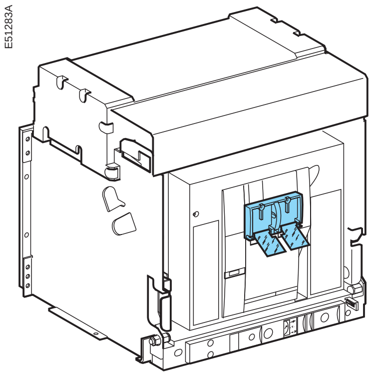
E51293A



E51298B

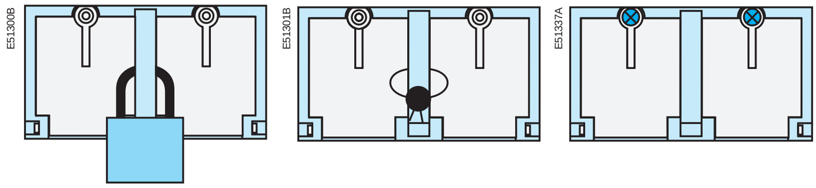


Locking the controls
Disabling circuit-breaker local closing and opening



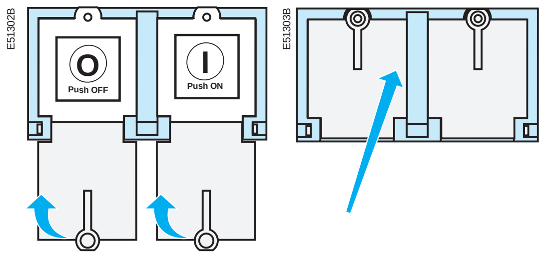
Pushbutton locking using a padlock (shackle diameter 5 to 8 mm), a lead seal or screws.

Padlock | Lead seal | Screws



Locking
Close the covers.

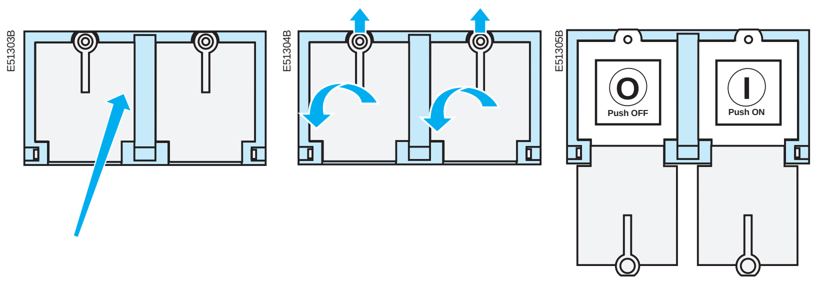
Insert the padlock shackle, lead seal or screws.



Unlocking
Remove the padlock, lead seal or screws.

Lift the covers and swing them down.

The pushbuttons are no longer locked.

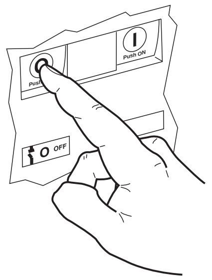


Locking the controls
Disabling local and remote closing

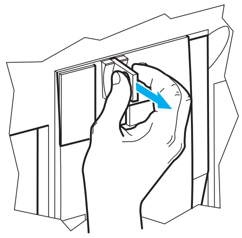
Combination of locking systems
To disable circuit-breaker closing using the pushbuttons or remotely, use as needed:
- a padlock
- one or two keylocks
- a combination of the two locking systems.

Install a padlock (maximum shackle diameter 5 to 8 mm)

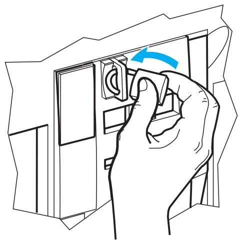
Locking
Open the circuit breaker.

E51217A


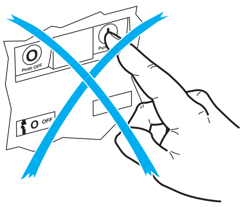
Pull out the tab.

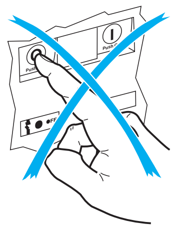
E51306A


Insert the padlock shackle.

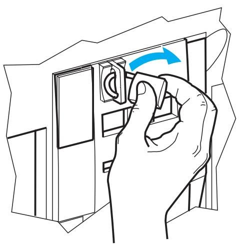
E51307A


Check
The controls are inoperative.

E51218A




Unlocking
Remove the padlock.

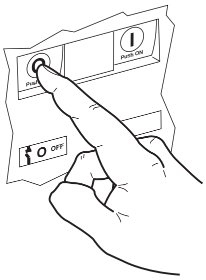
E51308A


Locking the controls with one or two keylocks

Locking

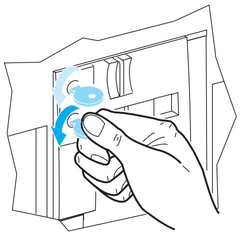
Open the circuit breaker.

E51217A



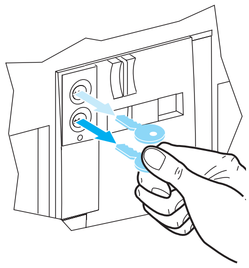
Turn the key(s).

E51310A



Remove the key(s).

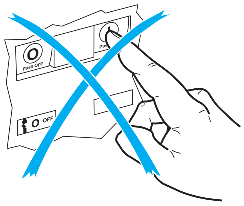
E51311A

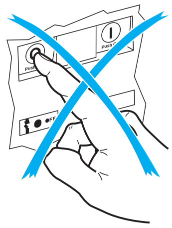


Check

The controls are inoperative.

E51218A

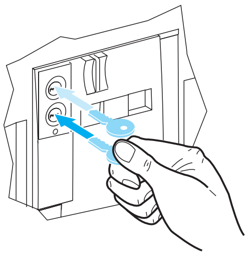




Unlocking

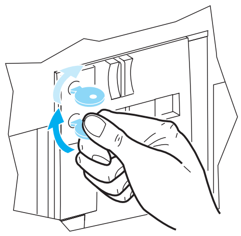
Insert the key(s).

E51312A



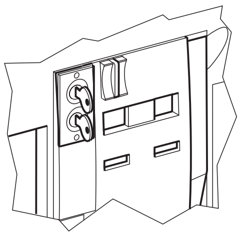
Turn the key(s).

E51313A



The key(s) cannot be removed.

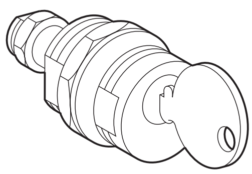
E51319A



Four types of keylocks are available.

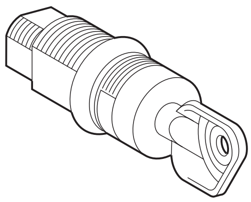
RONIS

E51270A



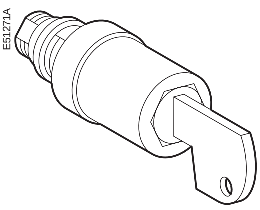
PROFALUX

E51269A



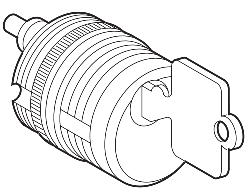
CASTELL

E51271A



KIRK

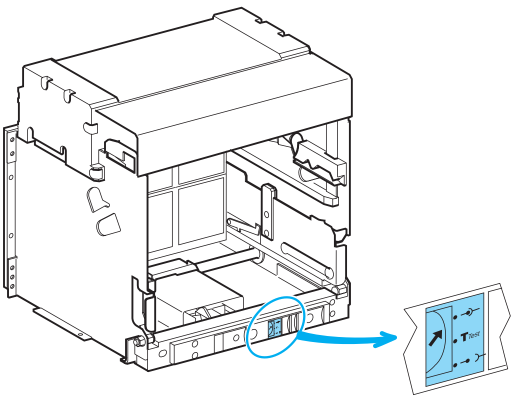
E51272A



Identifying the circuit breaker positions

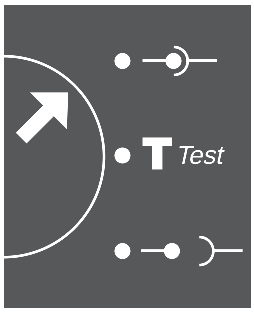
The indicator on the front signals the position of the circuit breaker in the chassis.

E51222A

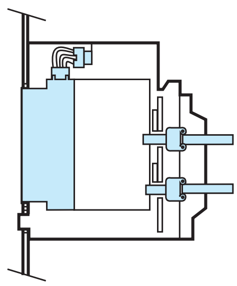


■ "connected" position

E51219A

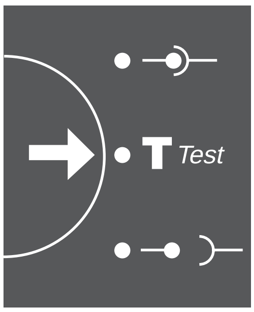


E51314A

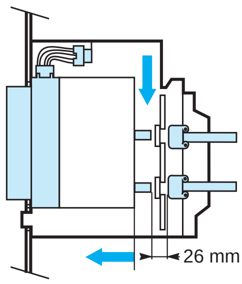


■ "test" position

E51220A

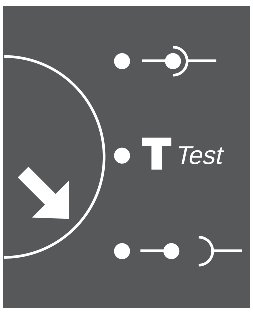


E51315A

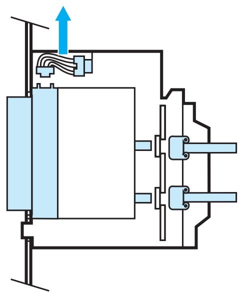


■ "disconnected" position

E51221A



E51316A



Racking

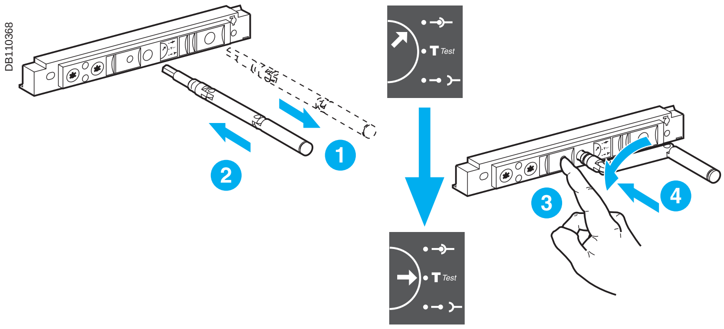
These operations require that all chassis-locking functions be disabled *(see page 21).*

Prerequisites

To connect and disconnect Masterpact, the crank must be used. The locking systems, padlocks and the racking interlock all inhibit use of the crank.

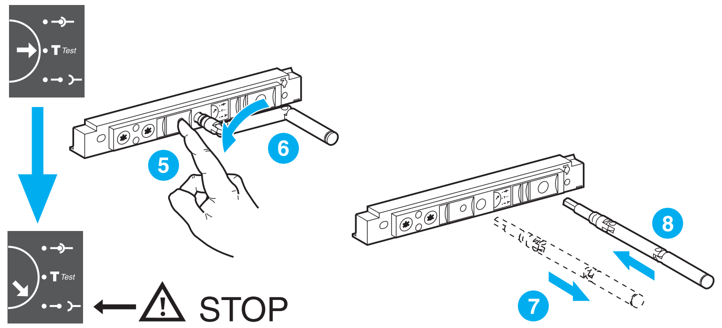
Withdrawing the circuit breaker from the "connected" to "test" position, then to "disconnected" position

The circuit breaker is in "connected" position.



The circuit breaker is in "test" position. Remove the crank or continue to "disconnected" position.

The circuit breaker is in "test" position.



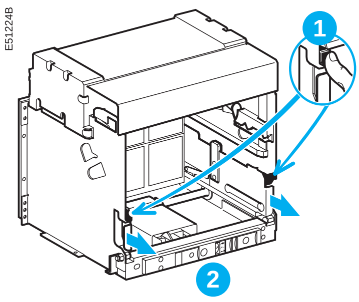
The circuit breaker is in "disconnected" position.

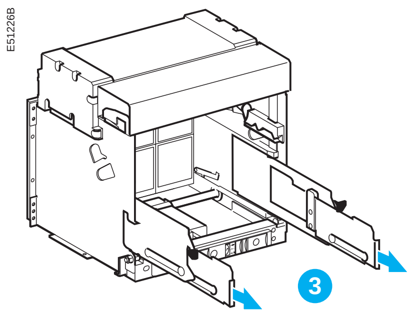
Caution. The right-hand rail cannot be removed if the crank has not been removed or if the circuit breaker is not fully disconnected.

Removing the rails

Press the release tabs and pull the rails out.

To put the rails back in, press the release tabs and push the rails in.





Using the Masterpact drawout chassis

Racking

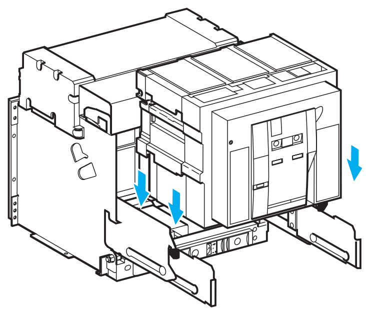
For complete information on Masterpact handling and mounting, see the installation manual(s).

Before mounting the circuit breaker, make sure it matches the chassis.

Inserting Masterpact

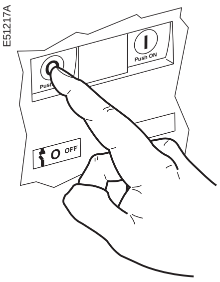
Position the circuit breaker on the rails.
Check that it rests on all four supports.

E51227A



Open the circuit breaker (in any case, it opens automatically during connection).

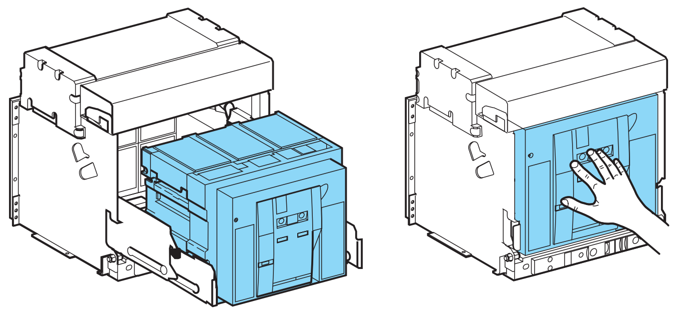
E51217A



Push the circuit breaker into the chassis, taking care not to push on the control unit.

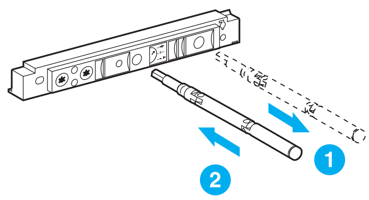
If you cannot insert the circuit breaker in the chassis, check that the mismatch protection on the chassis corresponds to that on the circuit breaker.

E51228B

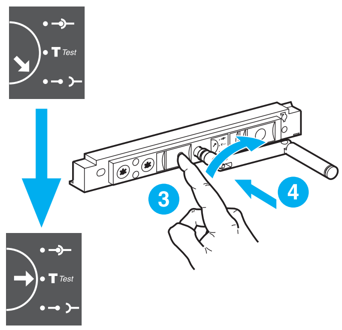


Racking the circuit breaker from the "disconnected" to "test" position, then to "connected" position

DB110369

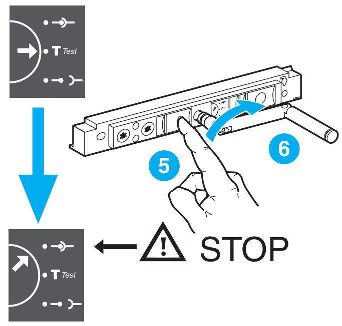


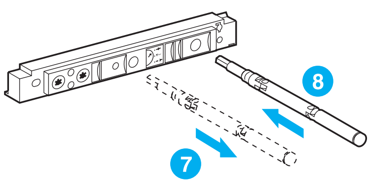
The device is in "disconnected" position



The device is in "test" position.
Remove the crank or continue to "connected" position.

The device is in "test" position.





The device is in "connected" position.

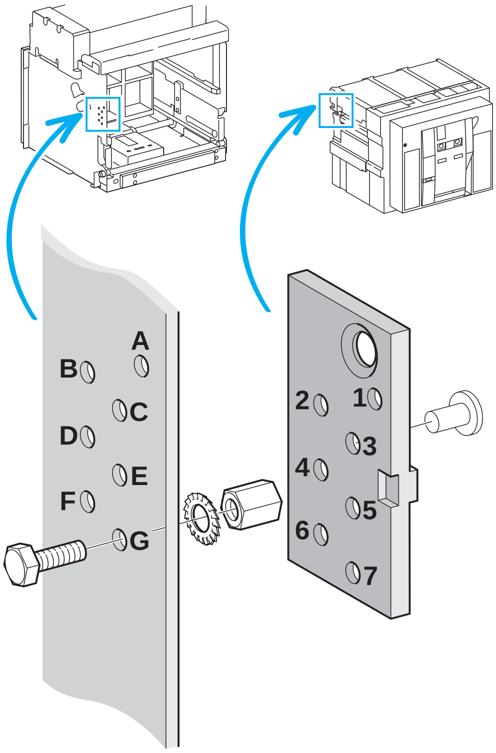
Matching a Masterpact circuit breaker with its chassis

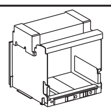
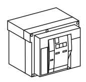
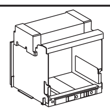
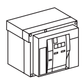
To set up a mismatch-prevention combination for the circuit breaker and the chassis, see the mismatch-prevention installation manual.

The mismatch protection ensures that a circuit breaker is installed only in a chassis with compatible characteristics.

The possible combinations are listed below.

E51317B



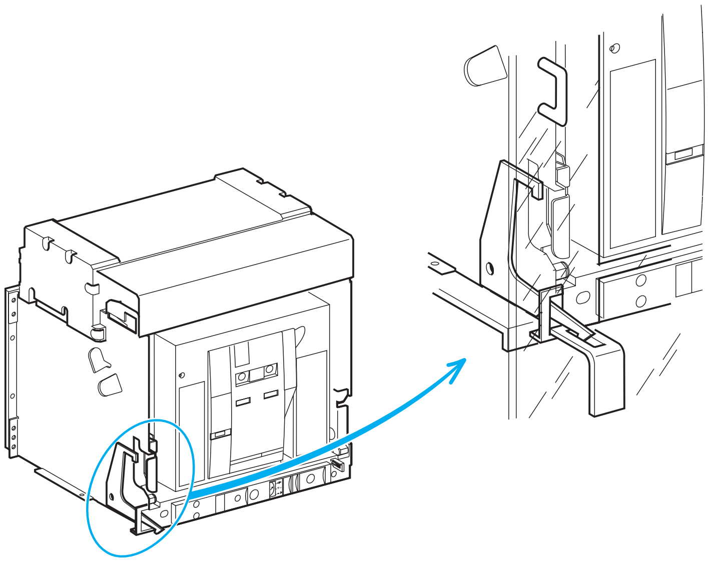
			
A B C D	5 6 7	B C D E	1 6 7
A B C E	4 6 7	B C D F	1 5 7
A B C F	4 5 7	B C D G	1 4 7
A B C G	4 5 6	B C E F	1 4 6
A B D E	3 6 7	B C E G	1 3 7
A B D F	3 5 7	B D E F	1 3 6
A B D G	3 5 6	B D E G	1 3 5
A B E F	3 4 7	B D F G	1 3 4
A B E G	3 4 6	C D E F	1 2 7
A B F G	3 4 5	C D E G	1 2 6
A C D E	2 6 7	C E F G	1 2 4
A C D F	2 5 7	D E F G	1 2 3
A C D G	2 5 6		
A C E F	2 4 7		
A C E G	2 4 6		
A C F G	2 4 5		
A D E F	2 3 7		
A D E G	2 3 6		
A D F G	2 3 5		
A E F G	2 3 4		

Using the Masterpact drawout chassis

Locking the switchboard door

The locking device is installed on the left or right-hand side of the chassis:
■ when the circuit breaker is in "connected" or "test" position, the latch is lowered and the door is locked
■ when the circuit breaker is in "disconnected" position, the latch is raised and the door is unlocked.

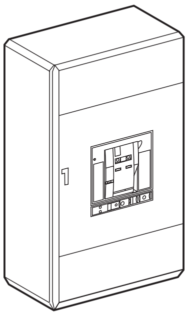
E51231B



Disabling door opening

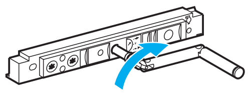
Close the door.

E51232A



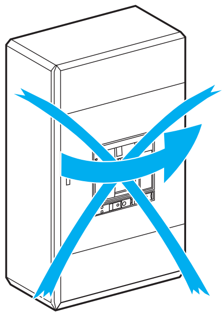
Put the Masterpact in "test" or "connected" position.

E51235A



The door is locked.

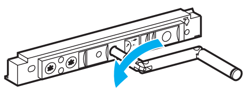
E51233A



Enabling door opening

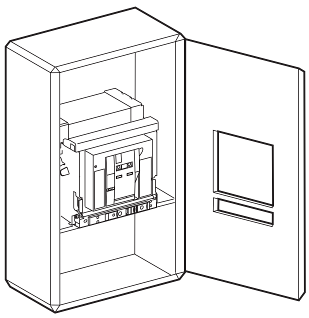
Put the Masterpact in "disconnected" position.

E51234A



The door is unlocked.

E51236A



Locking the circuit breaker in position

Padlocks and keylocks may be used together.

Combination of locking systems

To disable local or remote opening or closing of the circuit breaker, use as needed:

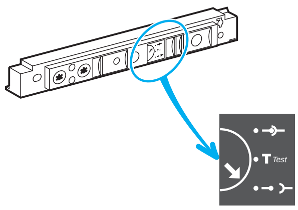
- one to three padlocks
- one or two keylocks
- a combination of the two locking systems.

Disabling connection when the circuit breaker is in "disconnected" position, using one to three padlocks (maximum shackle diameter 5 to 8 mm)

Locking

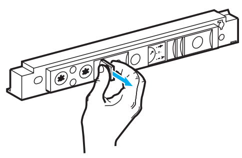
Circuit breaker in "disconnected" position.

E51237A



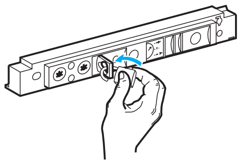
Pull out the tab.

E51238A



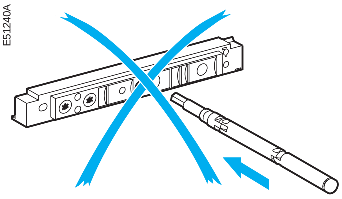
Insert the shackle (max. diameter 5 to 8 mm) of the padlock(s).

E51239A



The crank cannot be inserted.

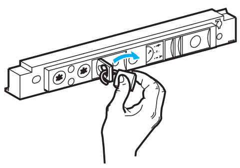
E51240A



Unlocking.

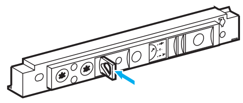
Remove the padlock(s).

E51241A



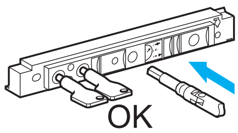
Release the tab.

E51242A



The crank can be inserted.

E51243B



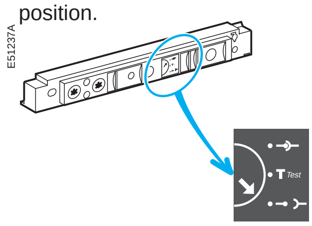
Locking the circuit breaker in position

Padlocks and keylocks may be used together.

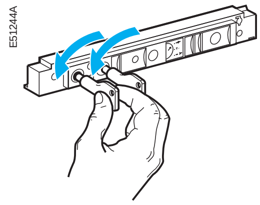
Disabling connection when the circuit breaker is in "disconnected" position, using one or two keylocks.

Locking

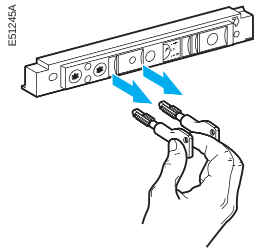
Circuit breaker in "disconnected" position.



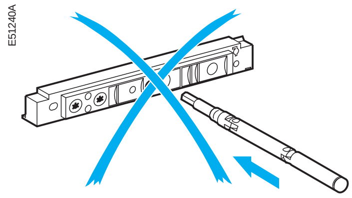
Turn the key(s).



Remove the key(s).

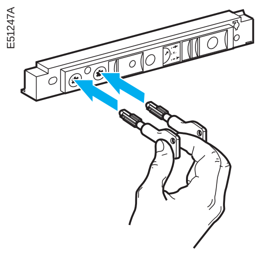


The crank cannot be inserted.

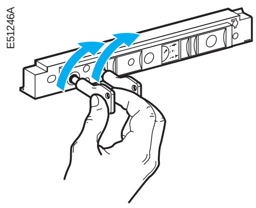


Unlocking

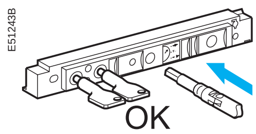
Insert the key(s).



Turn the key(s).

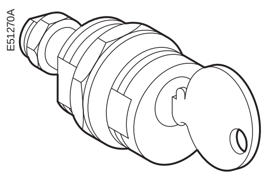


The crank can be inserted.

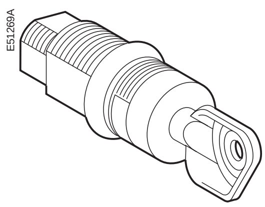


Four types of keylocks are available

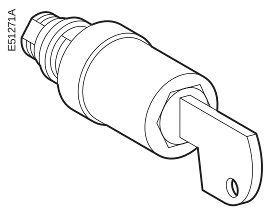
RONIS



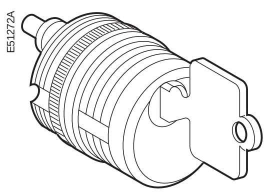
PROFALUX



CASTELL



KIRK

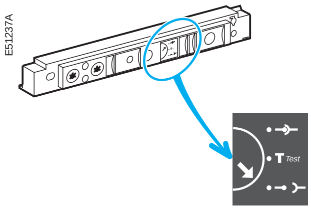


For this operation, the circuit breaker must be removed from the chassis.

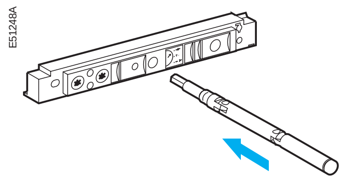
Disabling use of the crank in all positions

It is possible to modify the padlock and keylock locking function. Instead of locking only in "disconnected" position, it is possible to lock the circuit breaker in all positions.

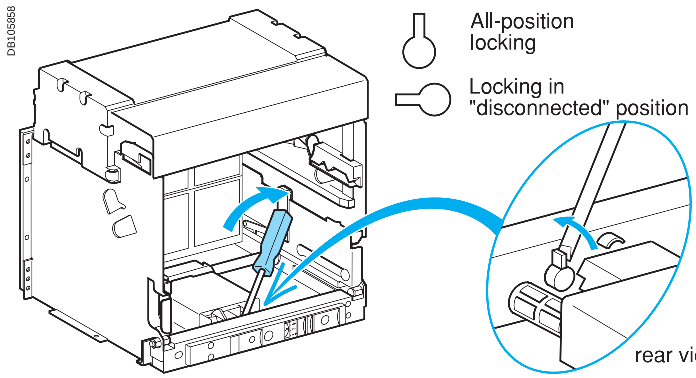
Set the circuit breaker to "disconnected" position. Remove the circuit breaker from the chassis.



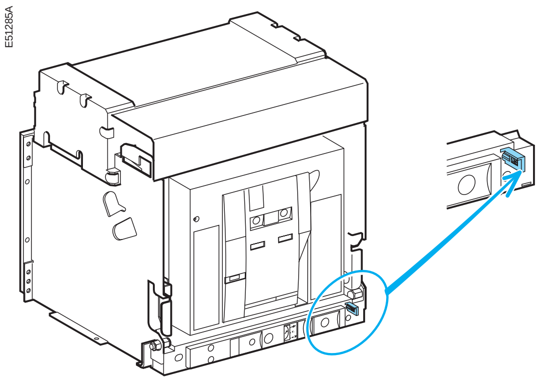
Insert the crank.



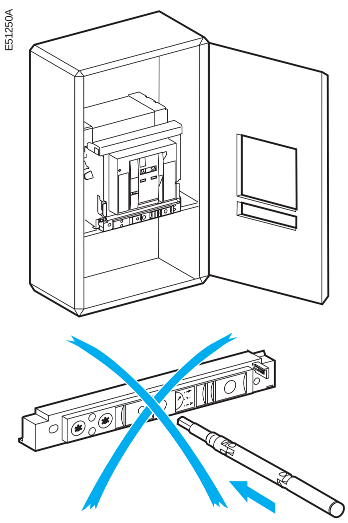
Turn the catch to the right. The circuit breaker can now be locked in all positions.



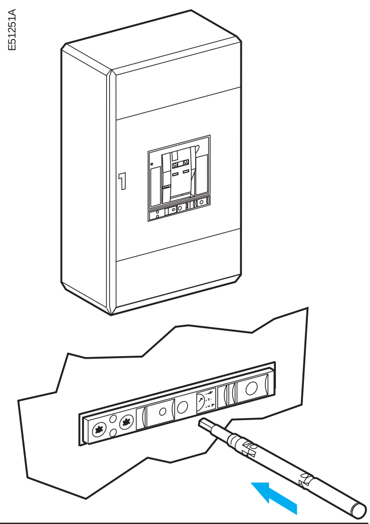
Locking the circuit breaker when the door is open



When the door is open, the crank cannot be inserted.



When the door is closed, the crank can be inserted.



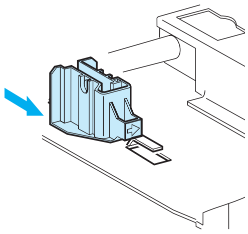
Using the Masterpact drawout chassis

Locking the safety shutters
Padlocking inside the chassis

Using the shutter locking blocks

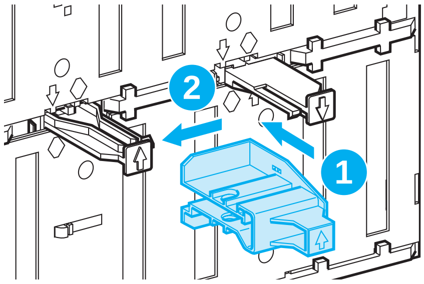
Remove the block(s) from their storage position.

E51338A



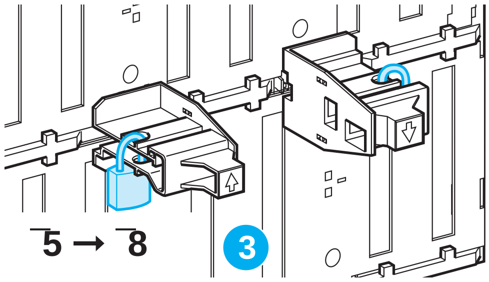
Position the block(s) on the guide(s).

E51339A



Lock the block(s) using a padlock.

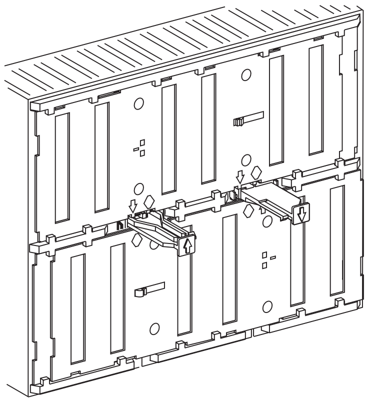
E51340A



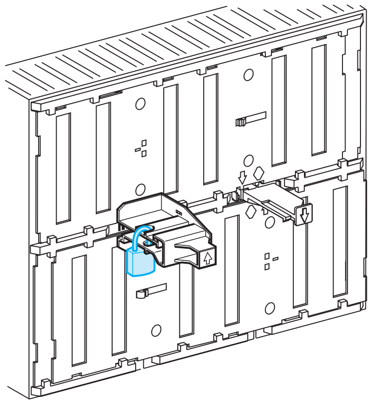
Four locking possibilities

Top and bottom shutters not locked.

E51341A

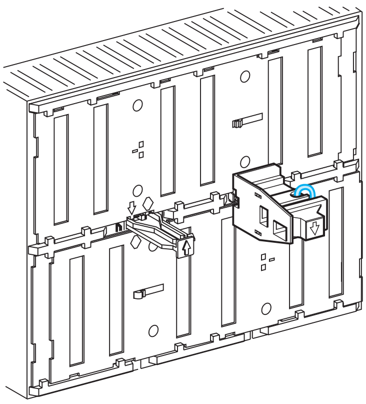


Top shutter locked, Bottom shutter not locked.

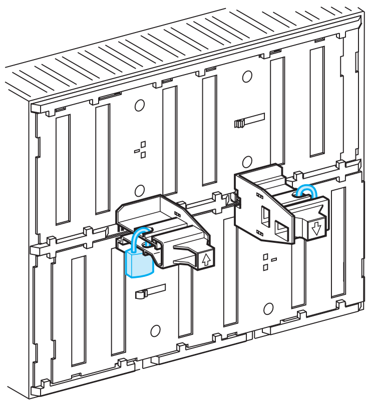


Top shutter not locked, Bottom shutter locked.

E51343A



Top and bottom shutters locked.

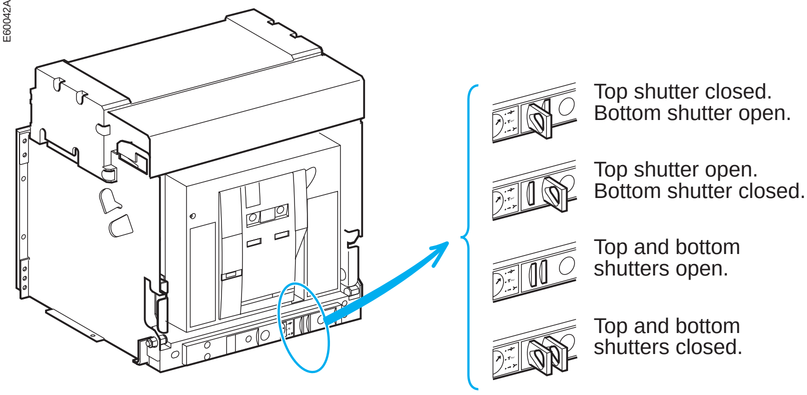


Padlocking or position indication on the front

This system offers two functions:

- *padlocking of the top or bottom shutters*
- *indication of the position of each shutter:*
  - *shutter open*
  - *shutter closed.*

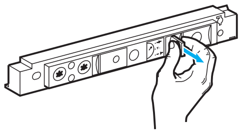
E60042A



Locking

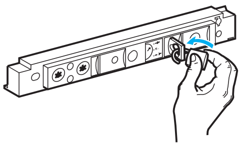
Pull out the left-hand tab to lock the top shutter.

E51252A



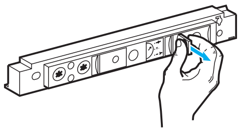
Insert a padlock (shackle 5 to 8 mm).

E51254A



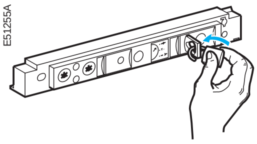
Pull out the right-hand tab to lock the bottom shutter.

E51253A



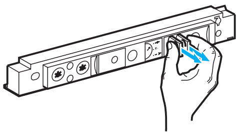
Insert a padlock (shackle 5 to 8 mm).

E51255A



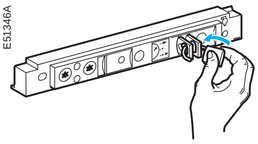
Pull out both tabs to lock both shutters.

E51345A



Insert a padlock (shackle 5 to 8 mm).

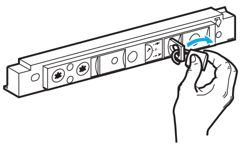
E51346A



Unlocking

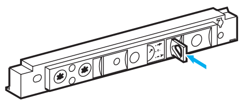
Remove the padlock.

E51256A



Release the tab(s).

E51257A



Identifying the electrical auxiliaries

Identification of the connection terminals

Layout of terminal blocks

E60352A

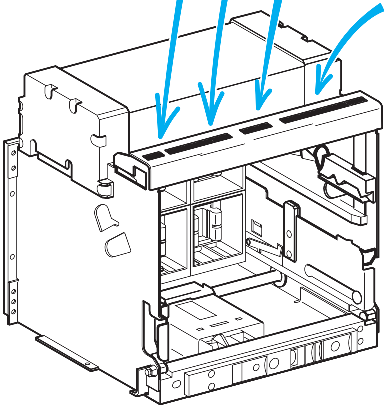
CD3	CD2	CD1
834	824	814
832	822	812
831	821	811

or

CE6	CE5	CE4
364	354	344
362	352	342
361	351	341

Com		UC1		UC2		UC3	UC4	M2C/M6C	SDE2/Res.	SDE1	CE3	CE2	CE1
E5	E6	Z5	M1	M2	M3	F2 +	V3	484/Q3	184/K2	84	334	324	314
E3	E4	Z3	Z4	T3	T4	VN	V2	474/Q2	182	82	332	322	312
E1	E2	Z1	Z2	T1	T2	F1 -	V1	471/Q1	181/K1	81	331	321	311

MN/MX2	MX1	XF	PF	MCH
D2/C12	C2	A2	254	B2
/C13	C3	A3	252	B3
D1/C11	C1	A1	251	B1

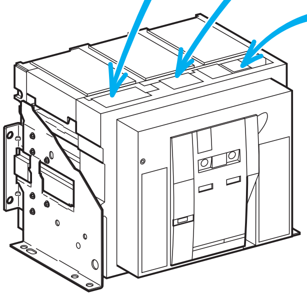


OF24	OF23	OF22	OF21	OF14	OF13	OF12	OF11	OF4	OF3	OF2	OF1	CT3	CT2	CT1
244	234	224	214	144	134	124	114	44	34	24	14	934	924	914
242	232	222	212	142	132	122	112	42	32	22	12	932	922	912
241	231	221	211	141	131	121	111	41	31	21	11	931	921	911
or	or	or	or	or	or	or	or					or		
EF24	EF23	EF22	EF21	EF14	EF13	EF12	EF11					CE9	CE8	CE7
248	238	228	218	148	138	128	118					394	384	374
246	236	226	216	146	136	126	116					392	382	372
245	235	225	215	145	135	125	115					391	381	371
												or		
												CD6	CD5	CD4
												864	854	844
												862	852	842
												861	851	841

Com		UC1		UC2		UC3	UC4	M2C/M6C	SDE2/Res.	SDE1
E5	E6	Z5	M1	M2	M3	F2 +	V3	484/Q3	184/K2	84
E3	E4	Z3	Z4	T3	T4	VN	V2	474/Q2	182	82
E1	E2	Z1	Z2	T1	T2	F1 -	V1	471/Q1	181/K1	81

MN/MX2	MX1	XF	PF	MCH
D2/C12	C2	A2	254	B2
/C13	C3	A3	252	B3
D1/C11	C1	A1	251	B1

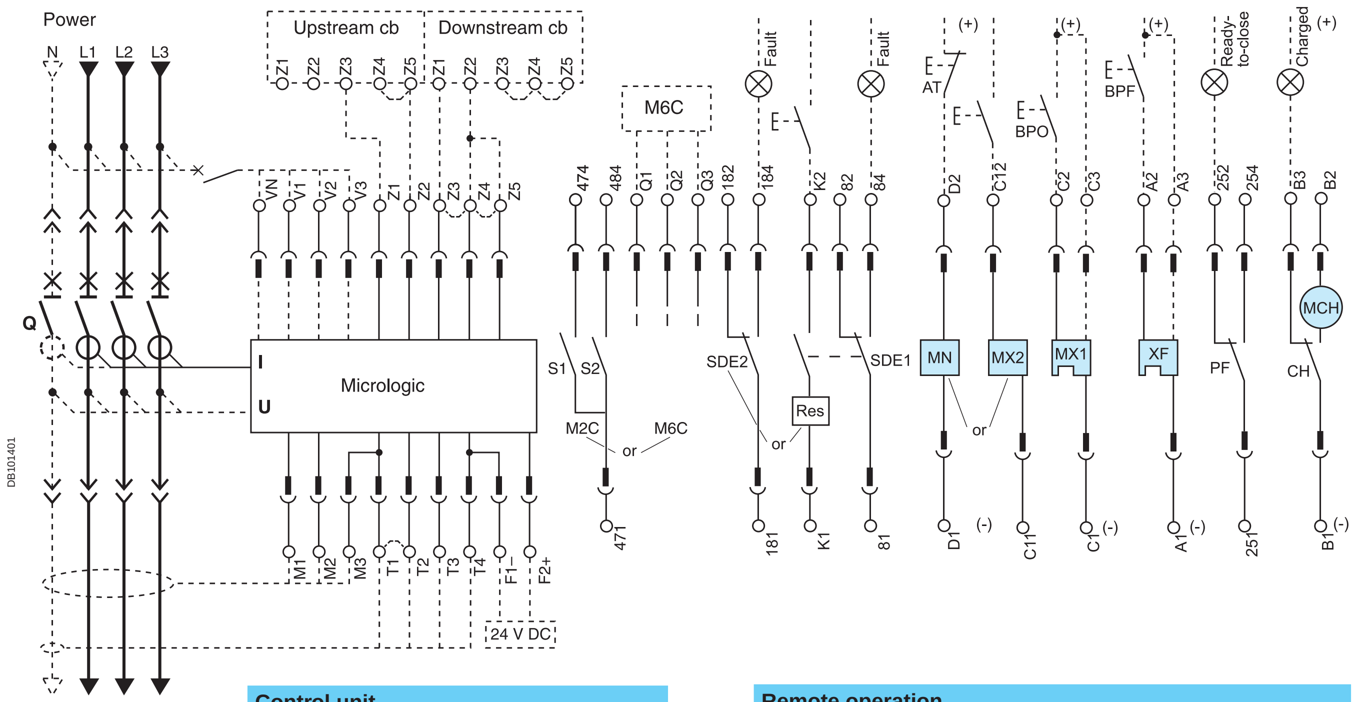
OF24	OF23	OF22	OF21	OF14	OF13	OF12	OF11	OF4	OF3	OF2	OF1
244	234	224	214	144	134	124	114	44	34	24	14
242	232	222	212	142	132	122	112	42	32	22	12
241	231	221	211	141	131	121	111	41	31	21	11



Electrical diagrams
Fixed and drawout devices

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

Power | **Control unit** | **Remote operation**



Control unit

Com		UC1		UC2		UC3	UC4	M2C / M6C
E5	E6	Z5	M1	M2	M3	F2+	V3	484 / Q3
E3	E4	Z3	Z4	T3	T4	VN	V2	474 / Q2
E1	E2	Z1	Z2	T1	T2	F1 –	V1	471 / Q1

Remote operation

SDE2 / Res	SDE1	MN / MX2	MX1	XF	PF	MCH
184 / K2	84	D2 / C12	C2	A2	254	B2
182	82		C3	A3	252	B3
181 / K1	81	D1 / C11	C1	A1	251	B1

A	P	H	Control unit
■	■	■	**Com**: E1-E6 communication
■	■	■	**UC1**: Z1-Z5 zone selective interlocking; Z1 = ZSI OUT SOURCE; Z2 = ZSI OUT; Z3 = ZSI IN SOURCE; Z4 = ZSI IN ST (short time); Z5 = ZSI IN GF (earth fault)
■	■	■	M1 = Vigi module input (Micrologic 7)
■	■	■	**UC2**: T1, T2, T3, T4 = external neutral;
■	■	■	M2, M3 = Vigi module input (Micrologic 7)
■	■	■	**UC3**: F2+, F1– external 24 V DC power supply
	■	■	VN external voltage connector
	■	■	**UC4**: V1, V2, V3 optional external voltage protector
	■	■	**M2C**: 2 programmable contacts (internal relay); ext. 24 V DC power supply required
			or
	■	■	**M6C**: 6 programmable contacts (external relay); 24 V DC power supply required

Remote operation

SDE2: Fault-trip indication contact
or
Res: Remote reset

SDE1: Fault-trip indication contact (supplied as standard)

MN: Undervoltage release
or
MX2: Shunt release

MX1: Shunt release (standard or communicating)

XF: Closing release (standard or communicating)

PF: "Ready to close" contact

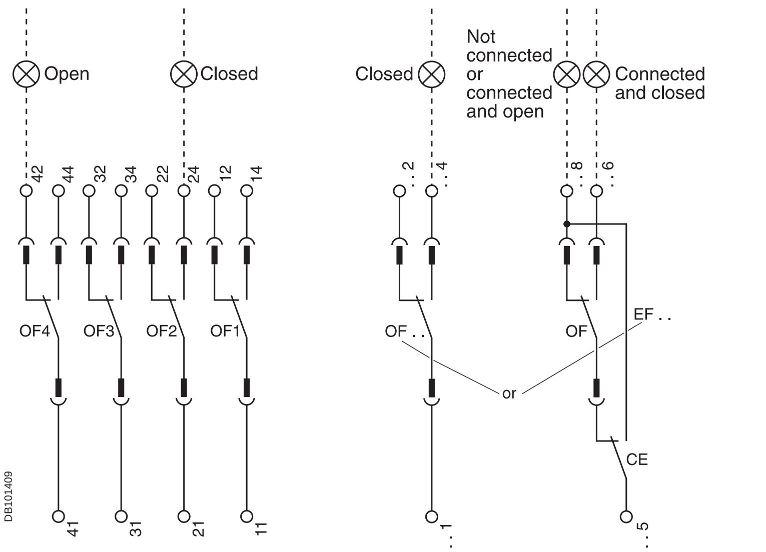
MCH: Gear motor.

Note:
When communicating MX or XF releases are used, the third wire (C3, A3) must be connected even if the communications module is not installed.

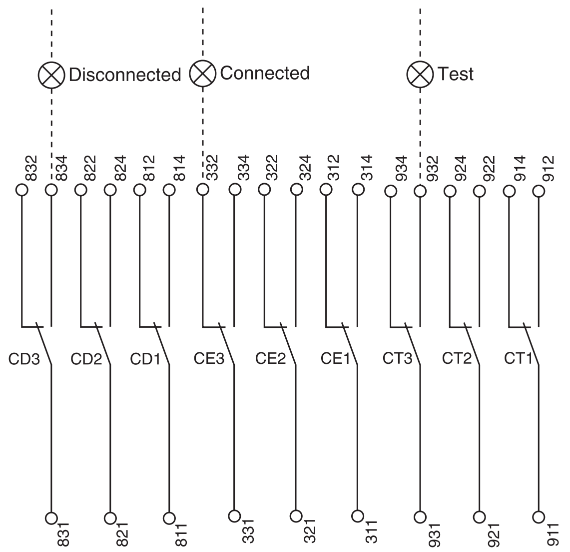
A *: Digital ammeter*
P *: A + power meter + programmable protection*
H *: P + harmonics*

Electrical diagrams

Indication contacts



Chassis contacts



Indication contacts

OF4	OF3	OF2	OF1	OF24	OF23	OF22	OF21	OF14	OF13	OF12	OF11
44	34	24	14	244	234	224	214	144	134	124	114
42	32	22	12	242	232	222	212	142	132	122	112
41	31	21	11	241	231	221	211	141	131	121	111
				or	or	or	or	or	or	or	or
				EF24	EF23	EF22	EF21	EF14	EF13	EF12	EF11
				248	238	228	218	148	138	128	118
				246	236	226	216	146	136	126	116
				245	235	225	215	145	135	125	115

Chassis contacts

CD3	CD2	CD1	CE3	CE2	CE1	CT3	CT2	CT1
834	824	814	334	324	314	934	924	914
832	822	812	332	322	312	932	922	912
831	821	811	331	321	311	931	921	911
	or						or	
CE6	CE5	CE4				CE9	CE8	CE7
364	354	344				394	384	374
362	352	342				392	382	372
361	351	341				391	381	371

Indication contacts

OF4: ON/OFF
OF3 indication
OF2 contacts
OF1

OF 24 or EF 24 — ON/OFF indication contacts
Combined "connected/closed" indication contacts

OF 23 or EF 23

OF 22 or EF 22

OF 21 or EF 21

OF 14 or EF 14

OF 13 or EF 13

OF12 or EF12

OF11 or EF11

Chassis contacts

CD3: Disconnected
CD2 -position
CD1 contacts

or

CE6: Connected
CE5 position
CE4 contacts

CE3: Connected
CE2 -position
CE1 contacts

CT3: Test-position
CT2 contacts
CT1 contacts

or

CE9: Connected
CE8 position
CE7 contacts

or

CD6: Disconnected
CD5 position
CD4 contacts

Key:

Drawout device only

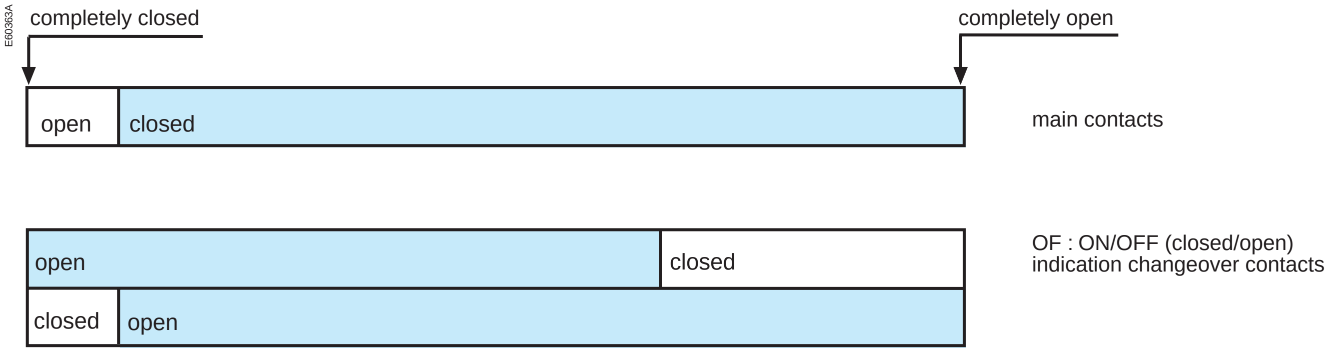
XXX *SDE1, OF1, OF2, OF3, OF4 supplied as standard*

Interconnected connections (only one wire per connection point)

Operation

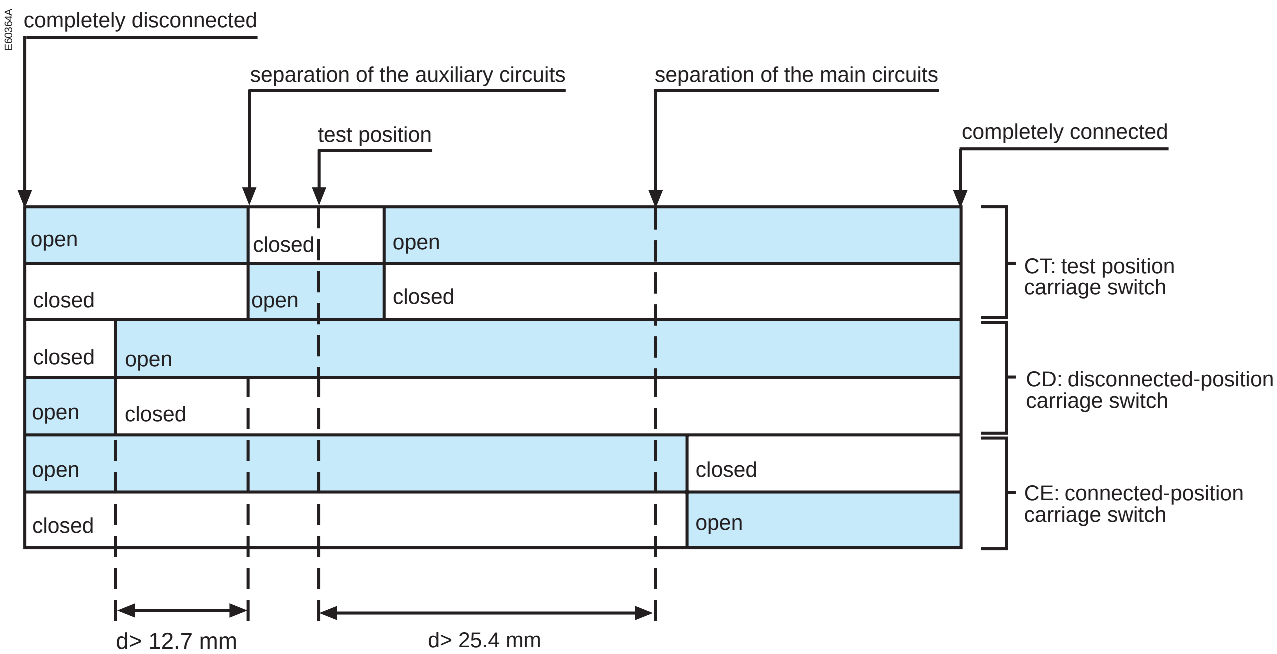
The ON/OFF indication contacts signal the status of the device main contacts.

Circuit breaker



The carriage switches indicate the "connected", "test" and "disconnected" positions.

Chassis



Discovering Masterpact's accessories

Micrologic control units

For more in-depth information, see the control-unit user manual

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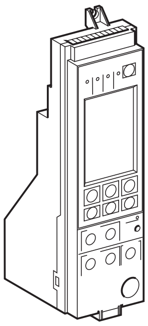

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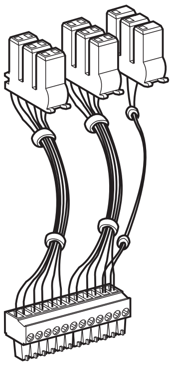

Micrologic control units

■ standard equipment, one per device
■ long-time rating plug and connection cables not included, see below:
Micrologic 2.0
Micrologic 5.0
Micrologic 2.0A
Micrologic 5.0A
Micrologic 6.0A
Micrologic 7.0A
Micrologic 5.0P
Micrologic 6.0P
Micrologic 7.0P
Micrologic 5.0P
Micrologic 6.0H
Micrologic 7.0H
■ connection cables:
□ for fixed device
□ for drawout device.

■ depending on the model, control units offer in addition:
□ fault indications
□ measurement of electrical parameters (current, voltage, power, etc.)
□ harmonic analysis
□ communication.

Long-time rating plugs

■ standard equipment, one per control unit.
□ 0.4 to 1 x Ir setting
□ 0.4 to 0.8 x Ir setting
□ 0.8 to 1 x Ir setting
□ Off (no long-time protection).

■ the plugs determine the setting range for the Long-time protection.

M2C and M6C programmable contacts

■ optional equipment, used with Micrologic P and H control units.
■ connection cables not included, see below:
□ 2 M2C contacts
□ 6 M6C contacts
■ connection cables:
□ for fixed device
□ for drawout device.

■ contacts can be programmed using the keypad on the control unit or via the COM option.
■ they indicate:
□ the type of fault
□ instantaneous or delayed threshold overruns.

■ M2C: 2 contacts (6 A-240 V)
■ M6C: 6 contacts (6A-240V).
■ permissible load on each of the M6C relay outputs:
□ 240 V AC:
5 A where p.f = 0.7
□ 380 V AC:
3 A where p.f = 0.7
□ 24 V DC:
8 A where L/R = 0
□ 48 V DC:
1.5 A where L/R = 0
□ 125 V DC:
0.4 A where L/R = 0
□ 250 V DC:
0.15 A where L/R = 0
■ M6C supply voltage: 24 V DC ± 5%
■ M6C maximum consumption: 100 mA

Indication contacts

ON/OFF indication contacts (OF)

■ standard equipment: 4 OF per device.

■ OF contacts indicate the position of main contacts
■ they trip when the minimum isolation distance between the main contacts is reached

■ 4 changeover contacts
■ rated current: 10 A
■ breaking capacity 50/60 Hz for AC power (AC12 as per 947-5-1):
□ 480 V: 10 A (rms)
□ 600 V: 6 A (rms)
■ breaking capacity for DC power (DC12 as per 947-5-1): 250 V: 3 A.

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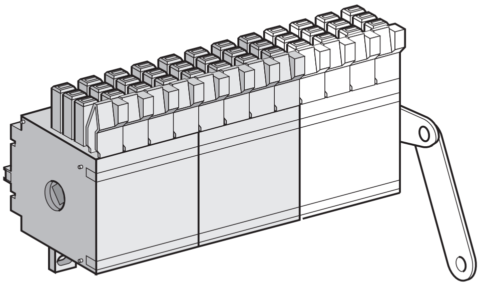

Additional ON/OFF indication contacts (OF)

■ optional equipment, two blocks of 4 OF contacts per device
■ connection cables not included, see below: one block of 4 OF contacts
■ connection cables:
□ for fixed device
□ for drawout device

■ OF contacts indicate the position of the main contacts
■ they trip when the minimum isolation distance between the main contacts is reached

■ changeover contacts
■ rated current: 10 A
■ breaking capacity 50/60 Hz for AC power (AC12 as per 947-5-1):
□ 480 V: 10 A (rms)
□ 600 V: 6 A (rms)
■ breaking capacity for DC power (DC12 as per 947-5-1): 250 V: 3 A.

Combined "connected/closed" contacts (EF)

■ optional equipment, 8 EF contacts per device
■ each contact is mounted in place of the connector of an additional OF contact
■ one EF contact

■ the contact combines the "device connected" and the "device closed" information to produce the "circuit closed" information

■ changeover contacts
■ rated current: 10 A
■ breaking capacity 50/60 Hz for AC power (AC12 as per 947-5-1):
□ 240 V: 10 A (rms)
□ 380 V: 10 A (rms)
□ 480 V: 10 A (rms)
□ 600 V: 6 A (rms)
■ breaking capacity for DC power (DC12 as per 947-5-1):
□ 48 V: 2.5 A
□ 130 V: 0.8 A
□ 250 V: 0.3 A.

"Fault-trip" indication contact (SDE/1)

■ standard equipment on circuit breakers, one SDE/1 contact per device
■ not available for switch-disconnector versions

■ the contact provides a remote indication of device opening due to an electrical fault

■ changeover contact
■ rated current: 10 A
■ breaking capacity 50/60 Hz for AC power (AC12 as per 947-5-1):
□ 240 V: 10 A (rms)
□ 380 V: 5 A (rms)
□ 480 V: 5 A (rms)
□ 600 V: 3 A (rms)
■ breaking capacity for DC power (DC12 as per 947-5-1):
□ 48 V: 3 A
□ 125 V: 0.3 A
□ 250 V: 0.15 A.

Discovering Masterpact's accessories

Indication contacts

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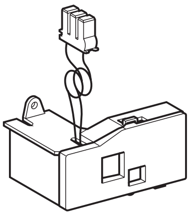


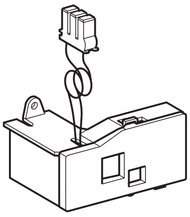
Additional "fault-trip" indication contact (SDE/2)

■ optional equipment for circuit breakers, one additional SDE/2 contact per device
■ not available for switch-disconnector versions
■ not compatible with the Res option
■ connection cables not included, see below:
one SDE/2 contact
■ connection cables:
□ for fixed device
□ for drawout device

■ the contact remotely indicates device opening due to an electrical fault

■ changeover contact
■ rated current: 10 A
■ breaking capacity 50/60 Hz for AC power (AC12 as per 947-5-1):
□ 240 V: 10 A (rms)
□ 380 V: 5 A (rms)
□ 480 V: 5 A (rms)
□ 600 V: 3 A (rms)
■ breaking capacity for DC power (DC12 as per 947-5-1):
□ 48 V: 3 A
□ 125 V: 0.3 A
□ 250 V: 0.15 A.

E51298B



Electrical reset after fault trip (Res)

■ optional equipment, one Res per device
■ not compatible with the SDE/2 option
■ connection cables not included, see below:
110/130 V AC
220/240 V AC
■ connection cables:
□ for fixed device
□ for drawout device

■ the contact remotely resets the device following tripping due to an electrical fault

"Springs charged" limit switch contact (CH)

■ standard equipment, one CH contact per device

■ the contact indicates the "charged" status of the operating mechanism (springs charged)

■ changeover contact
■ rated current: 10 A
■ breaking capacity 50/60 Hz for AC power (AC12 as per 947-5-1):
□ 240 V: 10 A (rms)
□ 380 V: 5 A (rms)
□ 480 V: 5 A (rms)
□ 600 V: 3 A (rms)
■ breaking capacity for DC power (DC12 as per 947-5-1):
□ 48 V: 3 A
□ 125 V: 0.3 A
□ 250 V: 0.25 A.

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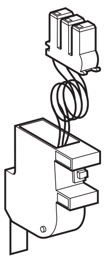

"Ready to close" contact (PF)

■ optional equipment, one PF contact per device
■ connection cables not included, see below:
one PF contact
■ connection cables:
□ for fixed device
□ for drawout device

■ the contact indicates that the device may be closed because all the following are valid:
□ circuit breaker is open
□ spring mechanism is charged
□ a maintained closing order is not present
□ a maintained opening order is not present

■ changeover contact
■ rated current: 10 A
■ breaking capacity 50/60 Hz for AC power (AC12 as per 947-5-1):
□ 240 V: 10 A (rms)
□ 380 V: 5 A (rms)
■ breaking capacity for DC power (DC12 as per 947-5-1):
□ 48 V: 3 A
□ 125 V: 0.3 A
□ 250 V: 0.15 A.

Auxiliaries for remote operation

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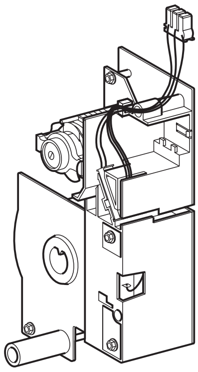

Gear motor (MCH)

- optional equipment, one MCH gear motor per device
- connection cables not included, see below:
100/130 V AC
200/240 V AC
277 V AC
380/415 V AC
400/440 V AC
480 V AC
24/30 V DC
48/60 V DC
100/125 V DC
200/250 V DC
- connection cables:
  - for fixed device
  - for drawout device
- the gear motor automatically charges and recharges the spring mechanism
- charging time: 4 seconds max.
- consumption:
  - 180 VA AC
  - 180 W DC
- inrush current: 2 to 3 In for 0.1 second
- operating rate: maximum 3 cycles per minute.

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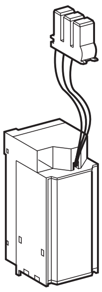
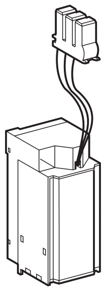


Opening releases MX/1 and MX/2, closing release XF

- optional equipment, 1 or 2 MX releases per device, 1 XF per device
- the function (MX or XF) is determined by where the coil is installed
- connection cables not included, see below:
  - standard version:
    - 12 V AC 50/60 Hz / DC
    - 24/30 V AC 50/60 Hz / DC
    - 48/60 V AC 50/60 Hz / DC
    - 100/130 V AC 50/60 Hz / DC
    - 200/250 V AC 50/60 Hz / DC
    - 277 V AC 50/60 Hz / DC
    - 380/480 V AC 50/60 Hz / DC.
  - communicating version (with COM option):
    - 12 V AC 50/60 Hz / DC
    - 24/30 V AC 50/60 Hz / DC
    - 48/60 V AC 50/60 Hz / DC
    - 100/130 V AC 50/60 Hz / DC
    - 200/250 V AC 50/60 Hz / DC
    - 240/277 V AC 50/60 Hz / DC
    - 380/480 V AC 50/60 Hz / DC
- connection cables:
  - for fixed device
  - for drawout device
- the MX release instantaneously opens the circuit breaker when energised
- the XF release instantaneously closes the circuit breaker when energised, if the device is "ready to close"
- device response time:
  - MX: 50 ms ± 10
  - XF: 70 ms +10 / -15
  > 3200 A: 80 ms ± 10
- operating threshold:
  - MX: 0.7 to 1.1 x Un
  - XF: 0.85 to 1.1 x Un
- the supply can be maintained
- consumption:
  - pick-up (80 ms): 200 VA
  - hold: 4.5 VA.

Auxiliairies for remote operation

E51294A



Instantaneous undervoltage releases (MN)

■ optional equipment, 1 MN per device
■ not compatible with the MX/2 opening release
■ connection cables not included, see below:
□ 24/30 V AC 50/60 Hz / DC
□ 48/60 V AC 50/60 Hz / DC
□ 100/130 V AC 50/60 Hz / DC
□ 200/250 V AC 50/60 Hz / DC
□ 380/480 V AC 50/60 Hz / DC
■ connection cables:
□ for fixed device
□ for drawout device

■ the MN release instantaneously opens the circuit breaker when its supply voltage drops

■ device response time: 90 ms ±5
■ operating threshold:
□ opening: 0.35 to 0.7 x Un
□ closing: 0.85 x Un
■ consumption:
□ pick-up (80 ms): 200 VA
□ hold: 4.5 VA

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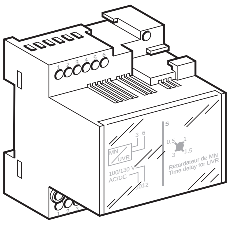


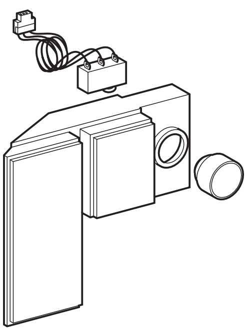
Delay unit for MN releases

■ optional equipment, 1 MN with delay unit per device.
■ delay-unit (must be ordered in addition to the MN):
□ 48/60 V AC 50/60 Hz / DC
□ 100/130 V AC 50/60 Hz / DC
□ 200/250 V AC 50/60 Hz / DC
□ 380/480 V AC 50/60 Hz / DC.

■ the unit delays operation of the MN release to eliminate circuit-breaker nuisance tripping during short voltage dips
■ the unit is wired in series with the MN and must be installed outside the circuit breaker

■ device response time: 0.5, 1, 1.5, 3 seconds
■ operating threshold:
□ opening: 0.35 to 0.7 x Un
□ closing: 0.85 x Un
■ consumption:
□ pick-up (80 ms): 200 VA
□ hold: 4.5 VA

E51333A



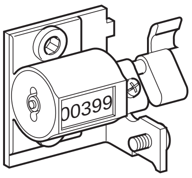
Electrical closing pushbutton (BPFE)

■ optional equipment, 1 BPFE per device
■ connection cables not included, see below:
■ connection cables:
□ for fixed device
□ for drawout device

■ located on the front face of the device, this pushbutton carries out electrical closing of the circuit breaker via the XF release, taking into account all the safety functions that are part of the control/monitoring system of the installation.

Device mechanical accessories

E46103A



Operation counter (CDM)

■ optional equipment, one CDM per device

■ the operation counter sums the number of operating cycles.

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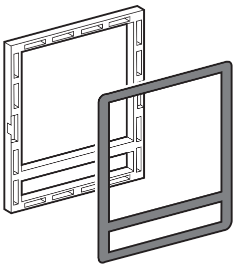
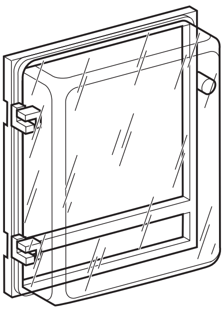


Escutcheon (CDP)

■ optional equipment, one CDP per device
□ for fixed device
□ for drawout device

■ the CDP increases the degree of protection to IP 40 and IK 07 (fixed and drawout devices).

E46118A



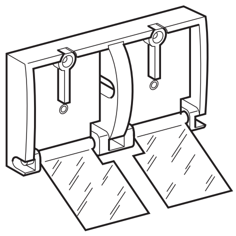
Transparent cover (CCP)

■ optional equipment, one CP per device equipped with a CDP (for fixed and drawout devices)

■ mounted with a CDP, the CP increases the degree of protection to IP 55 and IK 10 (fixed and drawout devices).

Device mechanical accessories

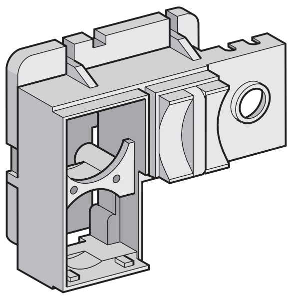
E46238A



Transparent cover for pushbutton locking using a padlock, lead seal or screws

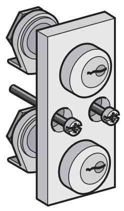
■ optional equipment, one locking cover per device
■ the transparent cover blocks access (together or separately) to the pushbuttons used to open and close the device
■ locking requires a padlock, a lead seal or two screws.

E46579A



Device locking in the OFF position using a padlock

■ optional equipment, one locking system per device
■ the unit inhibits local or remote closing of the device
■ up to three padlocks may be used for locking.

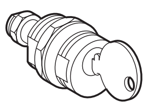


Device OFF position locking kit for keylocks

■ optional equipement, one locking kit per device
■ locks not included:
□ for Profalux or Ronis keylocks
□ for Castell keylocks
□ for Kirk keylocks
■ the kit inhibits local or remote closing of the device.

Ronis

E51286A



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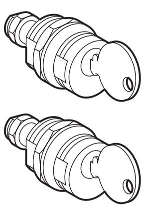

Profalux

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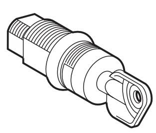

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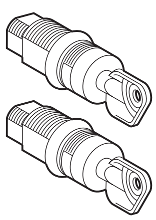


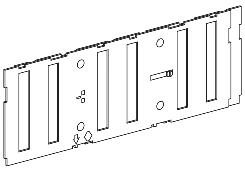
Keylocks required for the device locking kit

■ one or two keylocks per locking kit
□ Ronis:
1 keylock
2 keylocks.
□ Profalux:
1 keylock
2 keylocks.

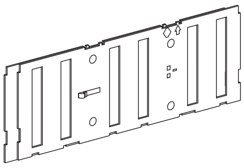
Chassis mechanical accessories

Top shutter closed

E51334A



Bottom shutter closed



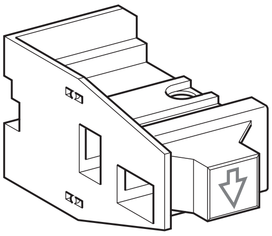
Safety shutters

■ optional equipment
■ set of shutters for top and bottom:
□ NW08/NW40
3 poles
4 poles
□ NW40b/NW63
3 poles
4 poles

■ mounted on the chassis, the safety shutters automatically block access to the disconnecting contact cluster when the device is in the "disconnected" or "test" positions.

■ IP20.

E46293A



Shutter locking blocks

■ optional equipment:
2 blocks for NW08 to NW40
4 blocks for NW40b to NW63

■ the block may be padlocked. It:
□ prevents connection of the device
□ locks the shutters in the closed position.

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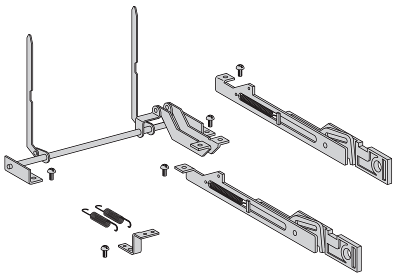

Shutter position indication and locking on front face

■ optional equipment
□ NW08/NW040
3 and 4 poles
□ NW40b/NW63
3 poles
4 poles

■ this option located on the front of the chassis:
□ indicates that the shutters are closed
□ can be used to independently or simultaneously padlock the two shutters (top and bottom).

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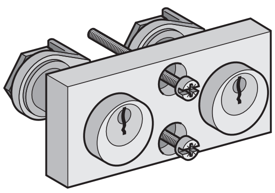


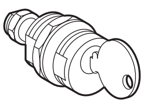
Circuit breaker locking in "disconnected" position

■ optional equipment, one locking system per device
□ for Profalux or Ronis keylocks
□ for Castell keylocks
□ for Kirk keylocks

■ mounted on the chassis and accessible with the door closed, this system locks the circuit breaker in "disconnected" position using one or two keylocks
■ the "disconnected" position locking system may be modified to lock the circuit breaker in all three positions.

Ronis

E51286A



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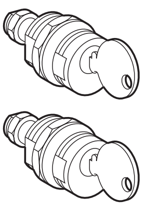

Profalux

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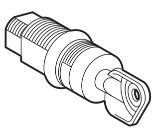

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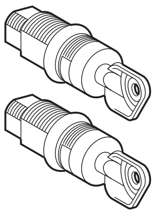

Keylocks required with the "disconnected" position locking system

■ one or two keylocks per locking system
□ Ronis:
1 keylock
2 keylocks
□ Profalux:
1 keylock
2 keylocks.

Chassis mechanical accessories

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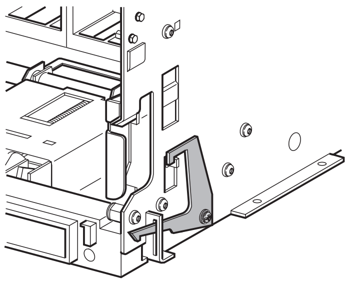

Door interlock

■ optional equipment, one door interlock per chassis

■ this device inhibits opening of the cubicle door when the circuit breaker is in "connected" or "test" position

■ it may be mounted on the left or right-hand side of the chassis.

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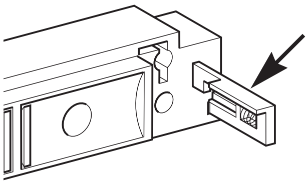


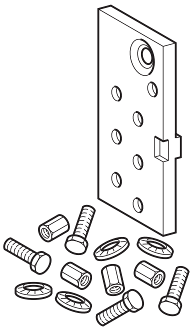
Racking interlock

■ optional equipment, one racking interlock per chassis

■ this device prevents insertion of the racking handle when the cubicle door is open

■ it is mounted on the right-hand side of the chassis

E46111A



Mismatch protection

■ optional equipment, one mismatch protection device per chassis

■ mismatch protection offers twenty different combinations that the user may select to ensure that only a compatible circuit breaker is mounted on a given chassis.

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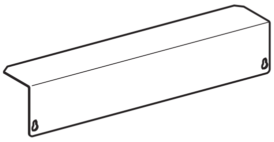
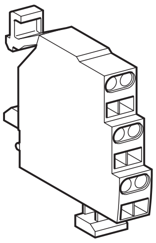


Auxiliary terminal shield (CB)

■ optional equipment, one CB shield per chassis
□ NW08/NW040
3 poles
4 poles
□ NW40b/NW63
3 poles
4 poles

■ the shield prevents access to the terminal block of the electrical auxiliaries.

E46095A



"Connected", "disconnected" and "test" position carriage switches (CE, CD, CT)

■ optional equipment, one to nine carriage switches
■ standard configuration, 0 to 3 CE, 0 to 3 CD, 0 to 3 CT
■ other configurations (by ordering additional actuators):
0 to 9 CE, 0 CD, 0 CT
0 to 6 CE, 0 to 3 CD, 0 CT
0 to 6 CE, 0 CD, 0 to 3 CT
■ connection cables not included, see below:
□ 1 carriage switch
□ 1 set of actuators for additional carriage switches
■ connection cables (per carriage switch)

■ the carriage switches indicate the three positions:
CE: connected position
CD: disconnected position (when the minimum isolation distance between the main contacts and the auxiliary contacts is reached)
CT: test position

■ changeover contact
■ rated current: 10 A
■ breaking capacity 50/60 Hz for AC power (AC12 as per 947-5-1):
240 V: 10 A (rms)
380 V: 5 A (rms)
■ breaking capacity for DC power (DC12 as per 947-5-1):
250 V: 0.3 A.

Inspecting and testing before use

Initial tests
Procedure

These operations must be carried out in particular before using a Masterpact device for the first time.

A general check of the circuit breaker takes only a few minutes and avoids any risk of mistakes due to errors or negligence.
A general check must be carried out:
■ prior to initial use
■ following an extended period during which the circuit breaker is not used.

A check must be carried out with the entire switchboard de-energised.
In switchboards with compartments, only those compartments that may be accessed by the operators must be de-energised.

Electrical tests

Insulation and dielectric-withstand tests must be carried out immediately after delivery of the switchboard. These tests are precisely defined by international standards and must be directed and carried out by a qualified expert.

Prior to running the tests, it is absolutely necessary to:
■ disconnect all the electrical auxiliaries of the circuit breaker (MCH, MX, XF, MN, Res electrical remote reset)
■ remove the long-time rating plug on the 7.0 A, 5.0 P, 6.0 P, 7.0 P, 5.0 H, 6.0 H, 7.0 H control units. Removal of the rating plug disconnects the voltage measurement input.

Switchboard inspection

Check that the circuit breakers are installed in a clean environment, free of any installation scrap or items
(tools, electrical wires, broken parts or shreds, metal objects, etc.).

Conformity with the installation diagram

Check that the devices conform with the installation diagram:
■ breaking capacities indicated on the rating plates
■ identification of the control unit (type, rating)
■ presence of any optional functions (remote ON/OFF with motor mechanism, auxiliaries, measurement and indication modules, etc.)
■ protection settings (long time, short time, instantaneous, earth fault)
■ identification of the protected circuit marked on the front of each circuit breaker.

Condition of connections and auxiliaries

Check device mounting in the switchboard and the tightness of power connections.
Check that all auxiliaries and accessories are correctly installed:
■ electrical auxiliaries
■ terminal blocks
■ connections of auxiliary circuits.

Operation

Check the mechanical operation of the circuit breakers:
■ opening of contacts
■ closing of contacts.

Check on the control unit

Check the control unit of each circuit breaker using the respective user manuals.

What to do when the circuit breaker trips

Note the fault

Faults are signalled locally and remotely by the indicators and auxiliary contacts installed on circuit breakers (depending on each configuration). See page 12 in this manual and the user manual of the control unit for information on the fault indications available with your circuit breaker.

Identify the cause of tripping

A circuit must never be reclosed (locally or remotely) before the cause of the fault has been identified and cleared.

A fault may have a number of causes.
- depending on the type of control unit, fault diagnostics are available. See the user manual for the control unit.
- depending on the type of fault and the criticality of the loads, a number of precautionary measures must be taken, in particular the insulation and dielectric tests on a part of or the entire installation. These checks and test must be directed and carried out by qualified personnel.

Inspect the circuit breaker following a short-circuit

- check the arc chutes (see page 43).
- check the contacts (see page 43).
- check the tightness of connections (see the device installation manual).
- check the disconnecting-contact clusters (see page 44).

Reset the circuit breaker

The circuit breaker can be reset locally or remotely.
See page 12 in this manual for information on how the circuit breaker can be reset.

Maintaining Masterpact performance

Recommended maintenance program

Recommended program for devices used under normal operating conditions:
Ambient temperature: -5° C / +60°C
Normal atmosphere

Periodic inspections required

Interval	Operations	Procedure
each year	■ open and close the device locally and remotely, successively using the various auxiliaries ■ test the operating sequences ■ test the control unit using the mini test kit	■ see pages 10 and 11 ■ see page 8 ■ see the user manual of the control unit
every two years or when the control-unit maintenance indicator reaches 100	■ check the arc chutes ■ check the main contacts ■ check the tightness of connections ■ check the disconnecting-contact clusters	■ see page 43 ■ see page 43 ■ see the device installation manual ■ see page 44

Parts requiring replacement, depending on the number of operating cycles

The following parts must be replaced periodically to lengthen the service life of the device (maximum number of operating cycles).

Part	Intervening entity	Description or procedure
arc chutes	■ user	■ see page 43.
main contacts	■ inspection: user ■ replacement: Schneider After Sales Support	■ see page 43.
MCH gear motor	■ user	■ see page 9.
mechanical interlocks	■ user	
connecting-rod springs	■ Schneider After Sales Support	
MX/MN/XF	■ user	■ see pages 10, 11.

Part replacement must be programmed on the basis of the data below, listing the service life of the various parts in numbers of O/C cycles at the rated current.

Number of O/C cycles at the rated current

Type of circuit breaker	Maximum service life	Service life of various parts			
		Arc chutes	Main contacts	Connecting-rod springs, MCH	MX/XF releases
NW08 to NW16 types N1/H1/H2	25000	10000	10000	12500	12500
NW08 to NW16 type L1	25000	3000	10000	12500	12500
NW20 types H1/H2	20000	440 V: 8000 690 V: 6000	440 V: 8000 690 V: 6000	10000	12500
NW20 to NW25 type H3	20000	2000	440 V: 8000 690 V: 6000	10000	12500
NW20 type L1	20000	3000	10000	10000	12500
NW25 to NW40 types H1/H2	20000	440 V: 5000 690 V: 2500	440 V: 5000 690 V: 2500	10000	12500
NW32 to NW40 type H3	20000	1250	440 V: 5000 690 V: 2500	10000	12500
NW40b to NW63 types H1/H2	10000	1500	1500	5000	12500

Maintenance operations

Before undertaking any maintenance work, de-energise the installation and fit locks or warnings in compliance with all applicable safety standards.

Arc chutes

■ remove the fixing screws:
■ types N1, H1 and H2 - NW 40: two screws
■ types H1 and H2 • NW 40b, type H3: three screws
■ type L1: four screws.

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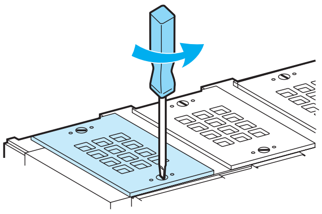

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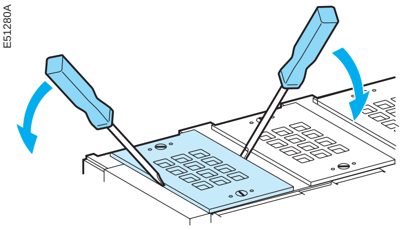

■ check the arc chutes:
■ chamber not cracked
■ separators not corroded.

If necessary, replace the arc chutes.

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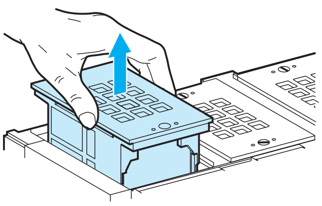

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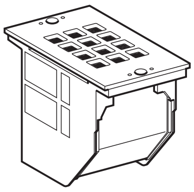

If the control unit has a maintenance indicator, there is no need to systematically check the contacts.

If the contacts are worn, have the concerned poles replaced by the Schneider service centre.

Wear of main contacts

■ remove the arc chutes
■ close the device and check the contacts

Type N1, H1, H2, H3 (- 4000 A)

Contacts OK

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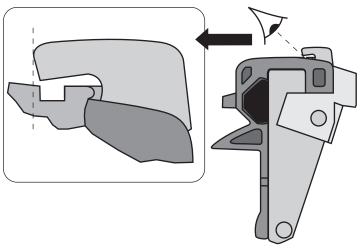

Contacts worn

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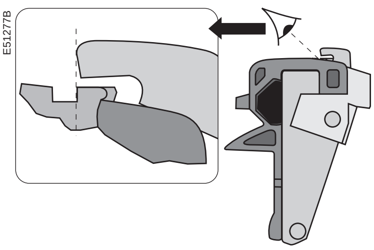

Type H1, H2 (• 4000b A), L1

Contacts OK

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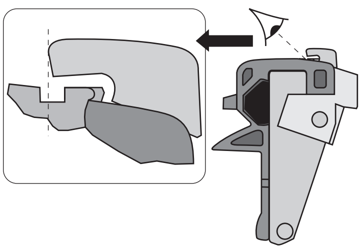
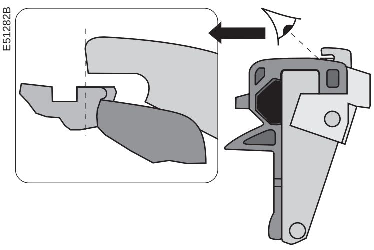


Contacts worn

E51282B



Maintaining Masterpact performance

Maintenance operations

Disconnecting-contact clusters

■ grease the contacts using the grease listed on page 45, supplied by Schneider Electric
■ check the contacts as follows:
■ open the circuit breaker
■ de-energise the busbars
■ disconnect the circuit breaker
■ remove the circuit breaker
■ check the contact fingers (no sign of copper should be visible)
Replace any worn clusters.
■ the position of the clusters must correspond to the table below.

E60360B

Rating Type	NW08	NW10 NW12	NW16	NW20	NW25	NW32	NW40	NW40b NW50	NW63
N1	layout n° 1 2 clusters/pole								
H1	layout n° 2 4 clusters/pole			layout n° 3 8 clusters/pole		layout n° 4 12 clusters/pole	layout n° 5 14 clusters/pole	layout n° 4 24 clusters/pole	
H2									
H3									
L1	layout n° 3 8 clusters/pole			layout n° 5 14 clusters/pole					
corrosion protection	layout 2' 4 "GOLDEN" clusters/pole		layout 3' 8 "GOLDEN" clusters/pole		layout 5 14 "GOLDEN" clusters/pole			layout 4 24 "GOLDEN" clusters/pole	

layout n° 1

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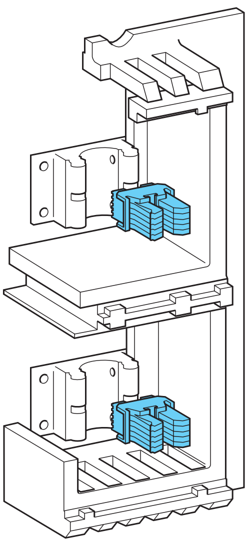
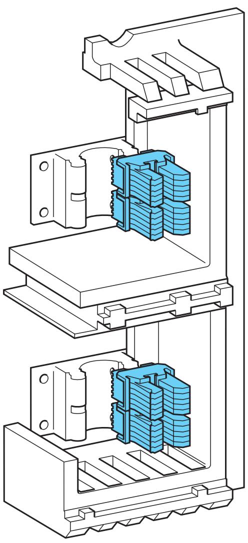


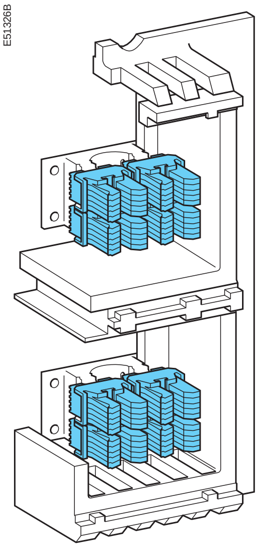
layout n° 2

E51325B



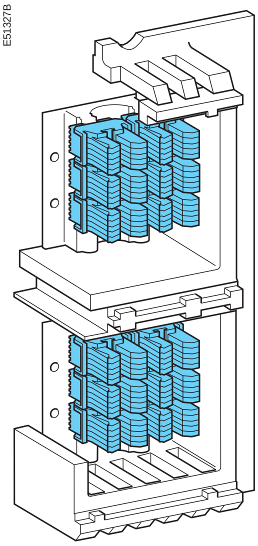
layout n° 3

E51326B



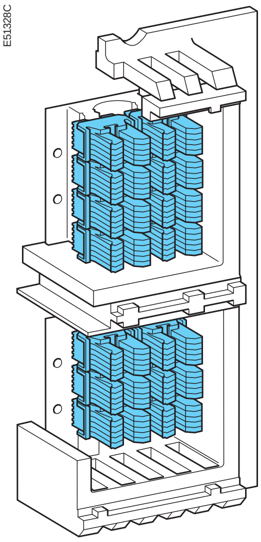
layout n° 4

E51327B



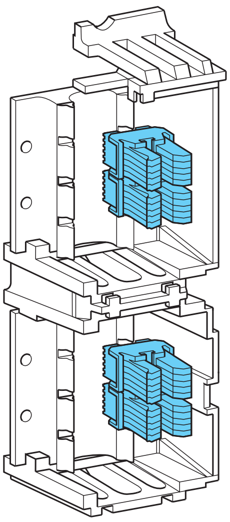
layout n° 5

E51328C



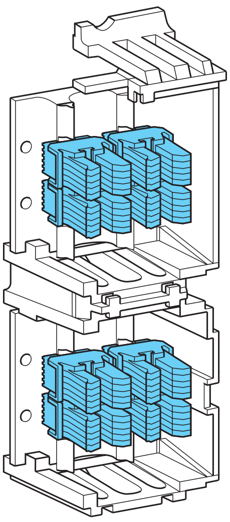
layout 2'

E71924A



layout 3'

E71925A



Ordering replacement parts

Electrical accessories

The electrical accessories that may require replacement are the following:
- MCH gear motor
- MX opening release(s)
- XF closing release
- MN undervoltage release.

See pages 33 and 34 in the "Auxiliaries for remote operation" section for their characteristics.

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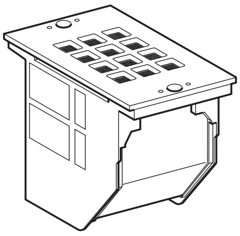

Arc chutes

- 1 arc chute:
- NW type N1
NW08 to NW40 types H1 and H2
- NW40b to NW63 types H1 and H2
NW type H3
- NW type L1.

- NW08 to NW40:
one chute per pole
NW40b to NW63:
two chutes per pole.

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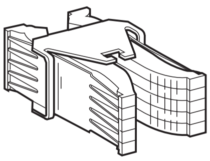

Disconnecting-contact clusters for standard NW

- 1 cluster

- number per circuit breaker, see table page 44.

Grease for disconnecting-contact clusters

- 1 can for standard NW.

- 1 can for NW with corrosion protection.

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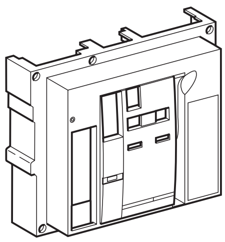

Front

- 1 front for 3- or 4-pole devices.

- 1 per device.

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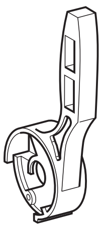

Charging handle

- 1 handle per device.

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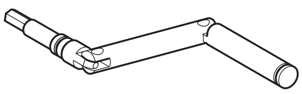

Crank

- 1 crank per device.

Troubleshooting and solutions

Problem	Probable causes	Solutions
circuit breaker cannot be closed locally or remotely	■ circuit breaker padlocked or keylocked in the "open" position	■ disable the locking fonction
	■ circuit breaker interlocked mechanically in a source changeover system	■ check the position of the other circuit breaker in the changeover system ■ modify the situation to release the interlock
	■ circuit breaker not completely connected	■ terminate racking in (connection) of the circuit breaker
	■ the reset button signalling a fault trip has not been reset	■ clear the fault ■ push the reset button on the front of the circuit breaker
	■ stored energy mechanism not charged	■ charge the mechanism manually ■ if it is equipped with a an MCH gear motor, check the supply of power to the motor. If the problem persists, replace the gear motor (MCH)
	■ MX opening shunt release permanently supplied with power	■ there is an opening order. Determine the origin of the order. The order must be cancelled before the circuit breaker can be closed
	■ MN undervoltage release not supplied with power	■ there is an opening order. Determine the origin of the order. ■ check the voltage and the supply circuit (U > 0.85 Un). If the problem persists, replace the release
	■ XF closing release continuously supplied with power, but circuit breaker not "ready to close" (XF not wired in series with PF contact)	■ cut the supply of power to the XF closing release, then send the closing order again via the XF, but only if the circuit breaker is "ready to close"
	■ permanent trip order in the presence of a Micrologic P or H control unit with minimum voltage and minimum frequency protection in Trip mode and the control unit powered	■ Disable these protection functions on the Micrologic P or H control unit
circuit breaker cannot be closed remotely but can be opened locally using the closing pushbutton	■ closing order not executed by the XF closing release	■ check the voltage and the supply circuit (0.85 - 1.1 Un). If the problem persists, replace the XF release
unexpected tripping without activation of the reset button signalling a fault trip	■ MN undervoltage release supply voltage too low	■ check the voltage and the supply circuit (U > 0.85 Un)
	■ load-shedding order sent to the MX opening release by another device	■ check the overall load on the distribution system ■ if necessary, modify the settings of devices in the installation
	■ unnecessary opening order from the MX opening release	■ determine the origin of the order
unexpected tripping with activation of the reset button signalling a fault trip	a fault is present : ■ overload ■ earth fault ■ short-circuit detected by the control unit	■ determine and clear the causes of the fault ■ check the condition of the circuit breaker before putting it back into service
instantaneous opening after each attempt to close the circuit breaker with activation of the reset button signalling a fault trip the	■ thermal memory	■ see the user manual of the control unit ■ press the reset button
	■ transient overcurrent when closing	■ modify the distribution system or control-unit settings ■ check the condition of the circuit breaker before putting it back into service ■ press the reset button
	■ closing on a short-circuit	■ clear the fault ■ check the condition of the circuit breaker before putting it back into service ■ press the reset button

Problem	Probable causes	Solutions
circuit breaker cannot be opened remotely, but can be opened locally	■ opening order not executed by the MX opening release	■ check the voltage and the supply circuit (0.7 - 1.1 Un). If the problem persists, replace the MX release
	■ opening order not executed by the MN undervoltage release	■ drop in voltage insufficient or residual voltage (> 0.35 Un) across the terminals of the undervoltage release. If the problem persists, replace the MN release
circuit breaker cannot be opened locally	■ operating mechanism malfunction or welded contacts	■ contact a Schneider service centre
circuit breaker cannot be reset locally but not remotely	■ insufficient supply voltage for the MCH gear motor	■ check the voltage and the supply circuit (0.7 - 1.1 Un). If the problem persists, replace the MCH release
nuisance tripping of the circuit breaker with activation of the reset button signalling a fault trip	■ reset button not pushed-in completely	■ push the reset button in completely
impossible to insert the crank in connected, test or disconnected position	■ a padlock or keylock is present on the chassis or a door interlock is present	■ disable the locking function
impossible to turn the crank	■ the reset button has not been pressed	■ press the reset button
circuit breaker cannot be removed from chassis	■ circuit breaker not in disconnected position	■ turn the crank until the circuit breaker is in disconnected position and the reset button out
	■ the rails are not completely out	■ pull the rails all the way out
circuit breaker cannot be connected (racked in)	■ chassis/circuit breaker mismatch protection	■ check that the chassis corresponds with the circuit breaker
	■ the safety shutters are locked	■ remove the lock(s)
	■ the disconnecting-contact clusters are incorrectly positioned	■ reposition the clusters
	■ chassis locked in disconnected position	■ disable the chassis locking function
	■ the reset button has not been pressed, preventing rotation of the crank	■ press the reset button
	■ the circuit breaker has not been sufficiently inserted in the chassis	■ insert the circuit breaker completely so that it is engaged in the racking mechanism
circuit breaker cannot be locked in disconnected position	■ the circuit breaker is not in the right position	■ check the circuit breaker position by making sure the resett button is out
	■ the cranck is still in the chassis	■ remove the crank and store it
circuit breaker cannot be locked in connected, test or disconnected position	■ check that locking in any position is enabled	■ contact a Schneider service centre
	■ the circuit breaker is not in the right position	■ check the circuit breaker position by making sure the rese button is out
	■ the cranck is still in the chassis	■ remove the crank and store it
the crank cannot be inserted to connect or disconnected the circuit breaker	■ the rails are not completely in	■ push the rails all the way in
the right-hand rail (chassis alone) or the circuit breaker cannot be drawn out	■ the crank is still in the chassis	■ remove the crank and store it

Checking Masterpact operating conditions

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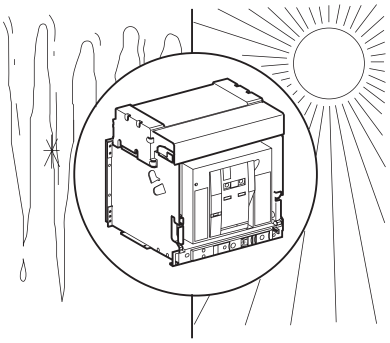

Ambient temperature

Masterpact NW devices can operate under the following temperature conditions:

■ the electrical and mechanical characteristics are stipulated for an ambient temperature of -5° C to +70° C

■ circuit-breaker closing is guaranteed down to -35° C

■ Masterpact NW (without the control unit) can be stored in an ambient temperature of -40° C to +85° C

■ the control unit can be stored in an ambient temperature of -25° C to +85° C.

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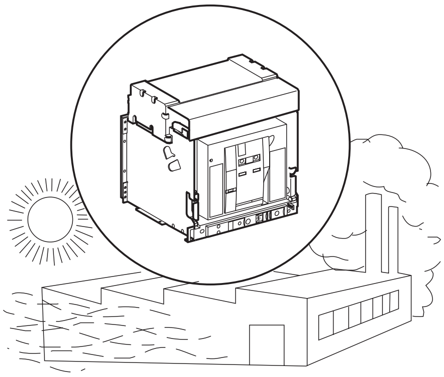

Extreme atmospheric conditions

Masterpact NW devices have successfully passed the tests defined by the following standards for extreme atmospheric conditions:

■ IEC 68-2-1: dry cold at -55° C

■ IEC 68-2-2: dry heat at +85° C

■ IEC 68-2-30: damp heat (temperature +55° C, relative humidity 95%)

■ IEC 68-2-52 level 2: salt mist.

Masterpact NW devices can operate in the industrial environments defined by standard IEC 947 (pollution degree up to 4).

It is nonetheless advised to check that the devices are installed in suitably cooled switchboards without excessive dust.

Masterpact NW devices with corrosion protection have successfully passed the tests defined by the following standards for extreme atmospheric conditions:

■ IEC 68-2-42: atmospheres containing sulphur dioxide (SO_2)

■ IEC 68-2-43: atmospheres containing hydrogen sulphide (H_2S).

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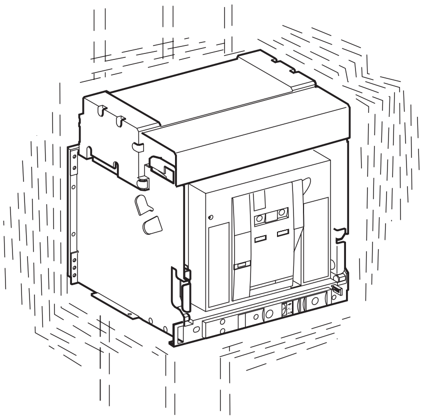


Vibrations

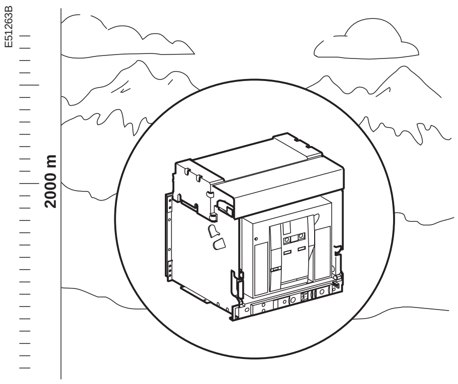
Masterpact NW devices resist electromagnetic or mechanical vibrations.

Tests are carried out in compliance with standard IEC 68-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):

■ 2 to 13.2 Hz: amplitude ±1 mm

■ 13.2 to 100 Hz: constant acceleration 0.7 g.

Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.

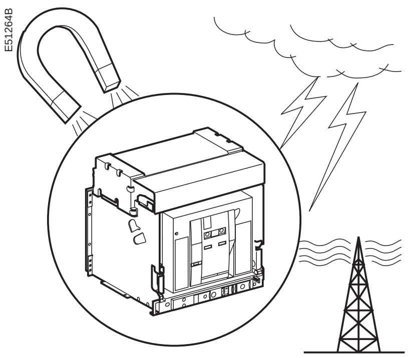


Altitude

Masterpact NW devices are designed for operation at altitudes under 2000 metres.

At altitudes higher than 2000 metres, the modifications in the ambient air (electrical resistance, cooling capacity) lower the following characteristics.

altitude (m)	2000	3000	4000	5000
dielectric resistance voltage (V)	3500	3150	2500	2100
average insulation level (V)	1000	900	700	600
maximum utilisation voltage (V)	690	590	520	460
average thermal current (A) at 40 °C	1 x In	0.99 x In	0.96 x In	0.94 x In



Electromagnetic disturbances

Masterpact NW devices are protected against:
■ overvoltages caused by devices that generate electromagnetic disturbances
■ overvoltages caused by an atmospheric disturbances or by a distribution-system outage (e.g. failure of a lighting system)
■ devices emitting radio waves (radios, walkie-talkies, radar, etc.)
■ electrostatic discharges produced by users.

Masterpact NW devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards:
■ IEC 947-2, appendix F
■ IEC 947-2, appendix B (trip units with earth-leakage function).

The above tests guarantee that:
■ no nuisance tripping occurs
■ tripping times are respected.

Cleaning

■ non-metallic parts:
never use solvent, soap or any other cleaning product. Clean with a dry cloth only
■ metal parts:
clean with a dry cloth whenever possible. If solvent, soap or any other cleaning product must be used, make sure that it does not come into contact with non-metallic parts.

Schneider Electric Industries SAS

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http://www.merlin-gerin.com

04443720AA-F1

Designed by: SEDOC
Photos: Schneider
Printed by:

11-2006

Masterpact NW Merlin Gerin

(F) Notice d'installation

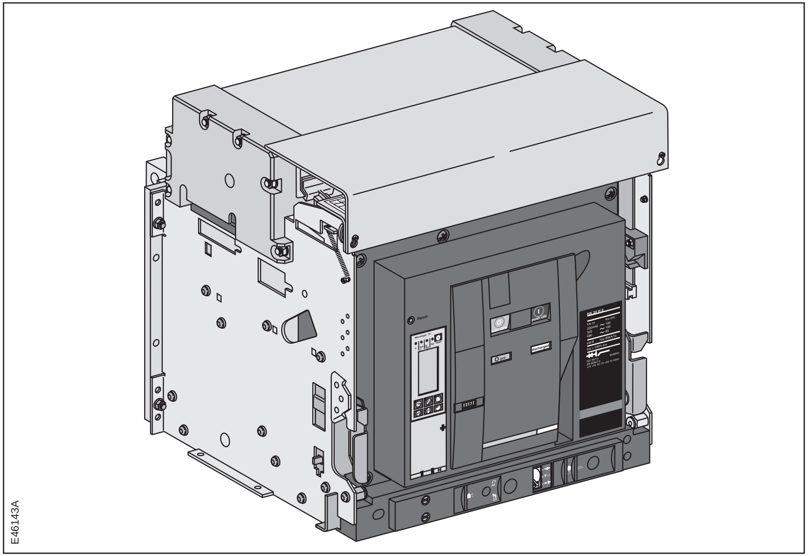
(EN) *Installation manual*

(DE) *Montageanleitung*

(IT) *Manuale d'installazione*

(ES) *Instrucciones de instalación*

Disjoncteur fixe et débrochable / *Fixed and drawout circuit breaker / Leistungsschalter in Festeinbau und Einschubtechnik / Interruttore fisso ed estraibile / Interruptor automático fijo y seccionable*



a brand of Schneider Electric

Merlin Gerin

Danger et avertissement / *Danger and warning / Vorsicht Lebensgefahr Norme di sicurezza e avvertenze / Instrucciones de seguridad*

Le montage de ces matériels ne peut être effectué que par des professionnels.
Le non respect des indications de la présente notice ne saurait engager la responsabilité du constructeur.

RISQUE D'ELECTROCUTION, DE BRULURES OU D'EXPLOSION

■ l'installation et l'entretien de cet appareil ne doivent être effectués que par des professionnels
■ coupez l'alimentation générale et auxiliaire de cet appareil avant toute intervention sur ou dans l'appareil
■ utilisez toujours un dispositif de détection de tension approprié pour confirmer l'absence de tension
■ replacez tous les dispositifs, les portes et les couvercles avant de mettre cet appareil sous tension.

Le non respect de ces consignes de sécurité exposerait l'intervenant et son entourage à des risques de dommages corporels graves susceptibles d'entraîner la mort.

This equipment should only be mounted by professionals. The manufacturer shall not be held responsible for any failure to comply with the instructions given in this manual.

RISK OF ELECTROCUTION, BURNS OR EXPLOSION

■ *the device should only be installed and serviced by professionals*
■ *switch off the general and auxiliary power supply to the device prior to any work on or in the device*
■ *always use an appropriate voltage detection device to confirm the absence of voltage*
■ *replace all interlocks, doors and covers before energising the device.*

Failure to take these precautions could expose intervener and people round to serious corporal injuries which could cause death.

*Diese Bauteile dürfen nur von qualifiziertem Personal montiert werden.
Bei Nichteinhaltung der Anweisungen der vorliegenden Anleitung kann der Hersteller auf keinen Fall haftbar gemacht werden.*

GEFAHR VON TÖDLICHEM ELEKTROSCHOCK, VERBRENNUNGEN UND EXPLOSION

■ *Installierung und Wartung dieses Gerätes dürfen nur von qualifiziertem Personal vorgenommen werden*
■ *Vor jeglichem Eingriff auf oder an dem Gerät muß die Stromversorgung des Geräts unterbrochen werden*
■ *Vor dem Eingriff ist mit einem geeigneten Spannungsmesser sicher zu stellen, daß keinerlei Spannung vorhanden ist*
■ *Bevor das Gerät erneut unter Spannung gesetzt wird, müssen sämtliche Vorrichtungen, Türen und Abdeckungen wieder angebracht sein.*

Falls diese Vorsichtsmaßnahmen nicht eingehalten werden, könnte dies zu schwere Verletzungen bis hin zum Tod führen.

*Il montaggio di questi materiali deve essere eseguito esclusivamente da personale competente.
In caso di mancato rispetto delle indicazioni fornite nel presente manuale, il costruttore non potrà essere ritenuto responsabile.*

RISCHIO DI ELETTROCUZIONE, DI USTIONI O DI ESPLOSIONE

■ *l'installazione e la manutenzione di questo apparecchio devono essere eseguite esclusivamente da personale competente*
■ *prima di qualsiasi intervento sull'apparecchio o al suo interno, interrompere l'alimentazione generale e ausiliare fornita all'impianto*
■ *verificare sempre l'assenza di tensione con uno strumento adeguato*
■ *prima di mettere questo apparecchio sotto tensione, riportatelo alle condizioni di sicurezza iniziali rimontando gli eventuali pezzi precedentemente tolti.*

Il mancato rispetto delle indicazioni sulla sicurezza riportate in questo documento, potrebbe causare gravi incidenti, tali da ferire o portare alla morte l'operatore.

*El montaje de estos materiales sólo puede ser realizado por profesionales.
El incumplimiento de las indicaciones dadas en estas instrucciones anula la responsabilidad del constructor.*

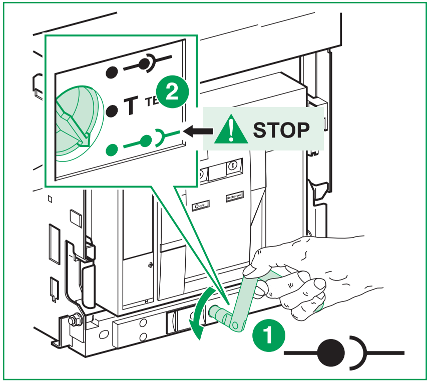
RIESGO DE ELECTROCUCION, DE QUEMADURAS O DE EXPLOSION

■ *la instalación y el mantenimiento de este aparato sólo deben ser realizados por profesionales*
■ *corte la alimentación general y auxiliar del aparato antes de cualquier intervención sobre o en el mismo*
■ *utilice siempre un dispositivo de detección de tensión apropiado para confirmar la falta de tensión*
■ *vuelva a colocar todos los dispositivos, las puertas y las tapas antes de poner este aparato bajo tensión.*

La falta de cumplimiento de estas precauciones puede exponer al usuario y a su entorno a riesgos de daños corporales graves susceptibles de producir la muerte .

Avant toute intervention sur l'appareil / *Before working on the device / Vor jeglichem Eingriff an dem Gerät / Prima di qualsiasi intervento sull'apparecchio / Antes de cualquier intervención sobre el aparato*

Disjoncteur débrochable / *Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable*



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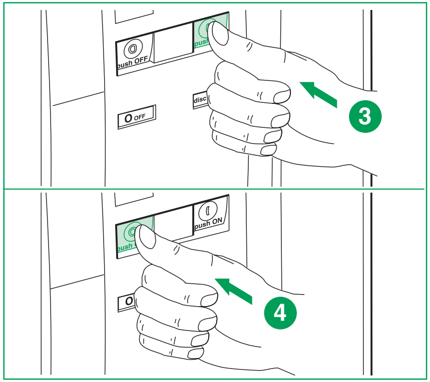

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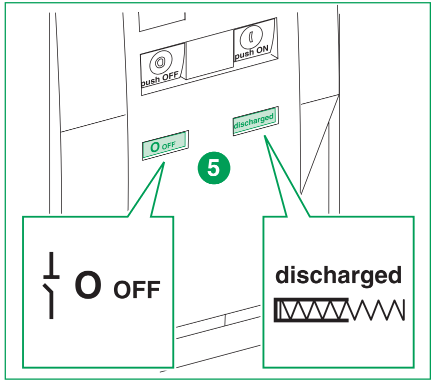
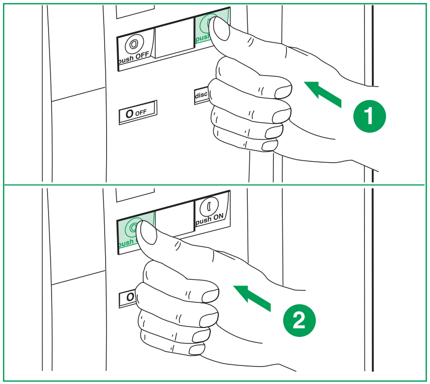


E46146A

Disjoncteur fixe / *Fixed circuit breaker / Leistungsschalter in Festeinbau / Interruttore fisso / Interruptor automático fijo*



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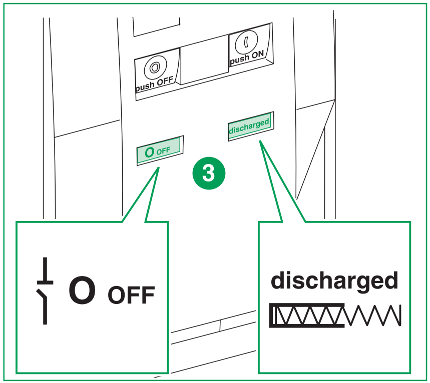
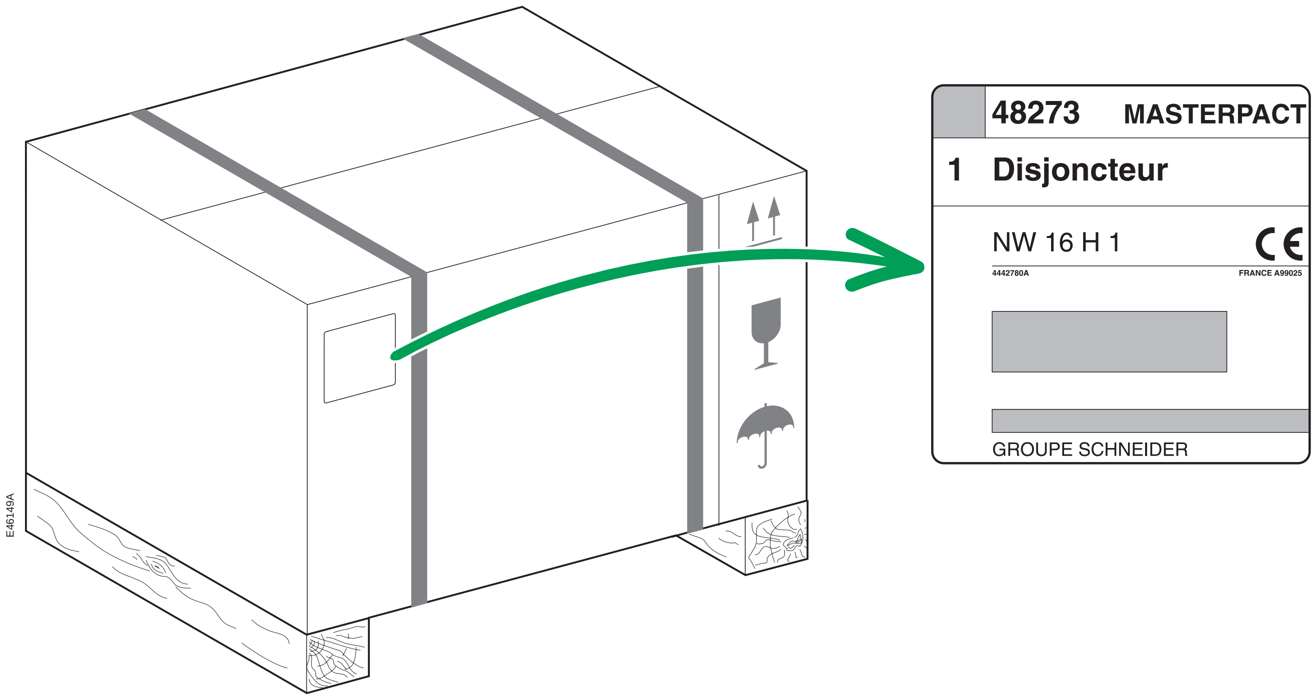


E46148A

Sommaire / *Contents / Inhalt / Sommario / Sumario*

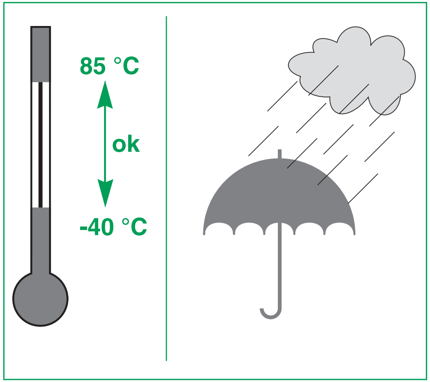
Sommaire / *Contents / Inhalt / Sommario / Sumario*

Identification emballage / *Package identification / Identifizierung der Verpackung / Identificazione dell'imballaggio / Identificación del embalaje*



Stockage / *Storage / Lagerung / Stoccaggio / Almacenamiento*

E46150A



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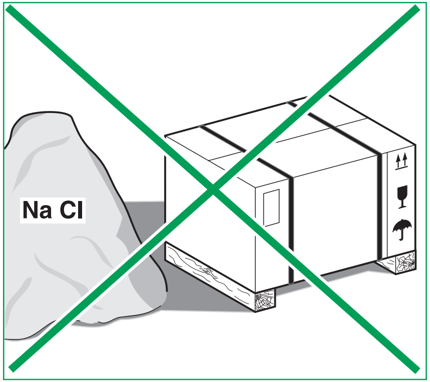

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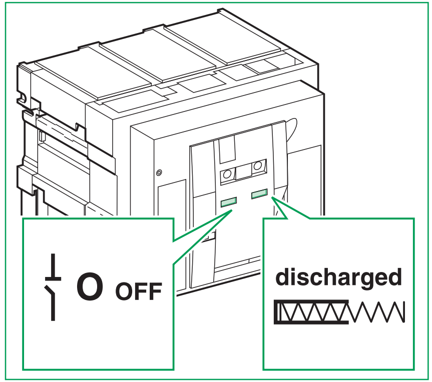

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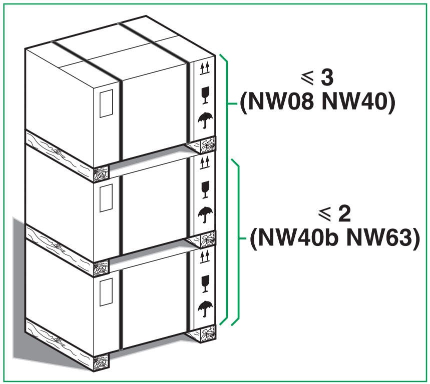

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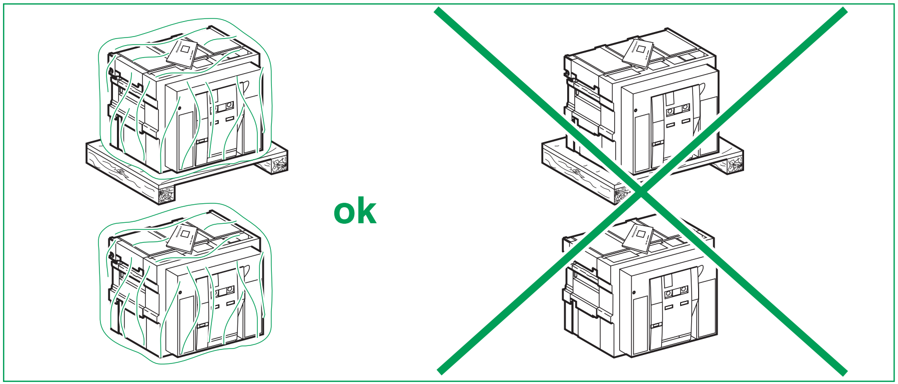


Outillage nécessaire / *Necessary tools / Benötigtes Werkzeuge / Utensili necessari / Herramientas necesarias*

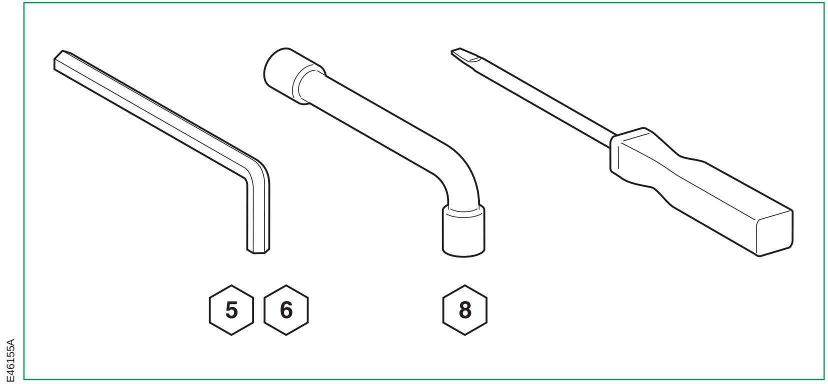
Clef 6 pans, clef à tube, tournevis (Pozidrive n°2, 3 ou plat).

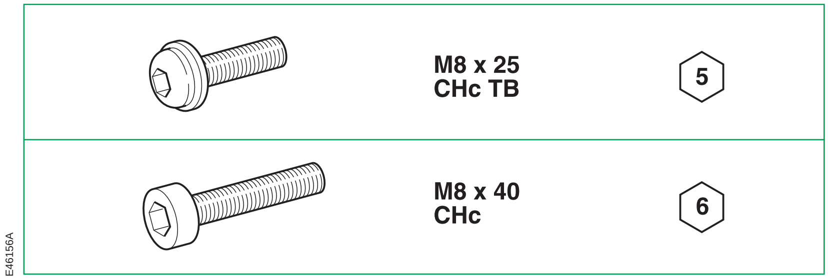
Hex key, angled socket wrench, screwdriver (Pozidrive n°2, 3 or slotted).

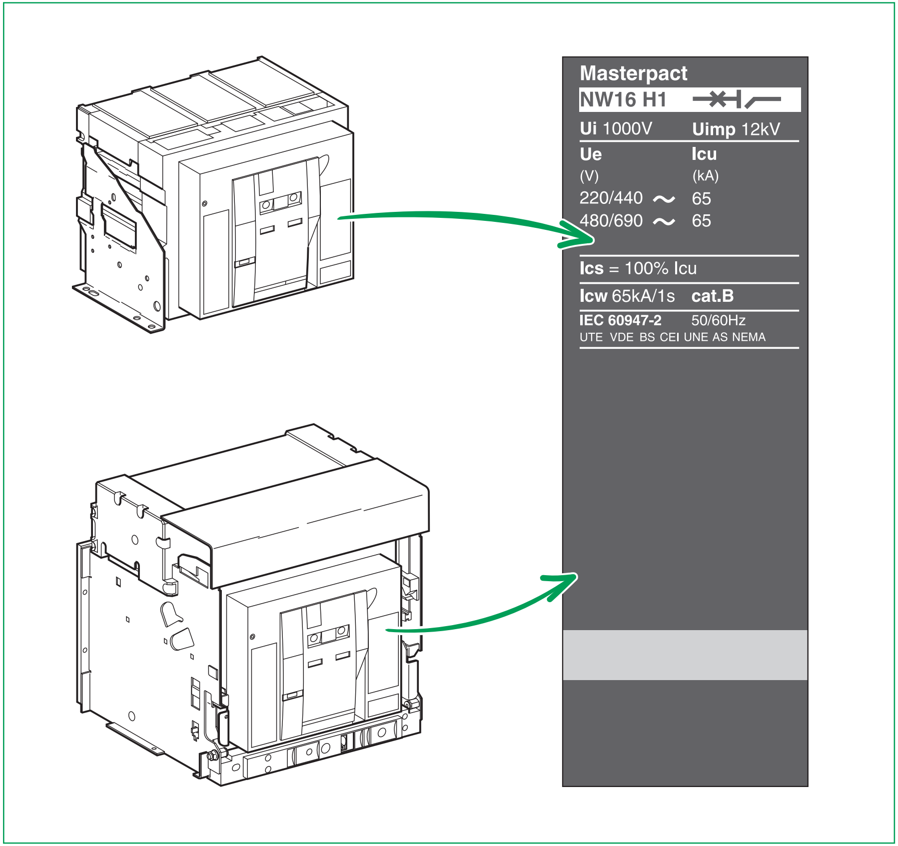
Sechskantschlüssel, Steckschlüssel, Schraubendreher (Pozidrive Nr. 2, 3 oder Schlitz).

Chiave per viti a brugola, chiave a tubo, cacciavite (Pozidrive n° 2, 3 o piatto).

Llave de allen, llave de tubo acodado, destornillador (Pozidrive n° 2, 3 o plano).

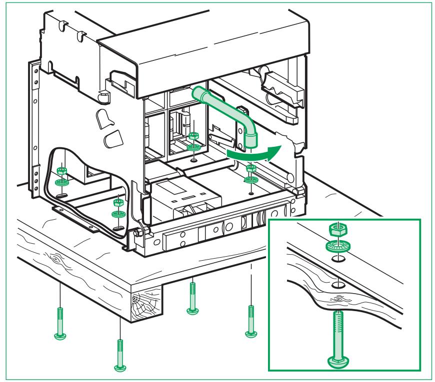






E46157A

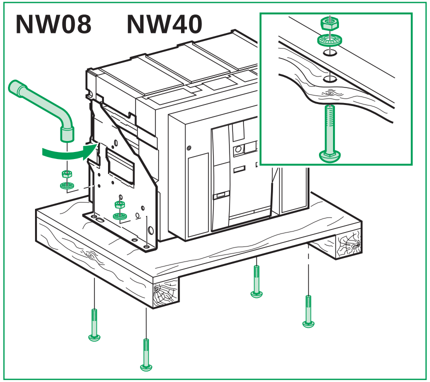
Châssis / ***Chassis / Chassis / Telaio / Chasis***



E46942A

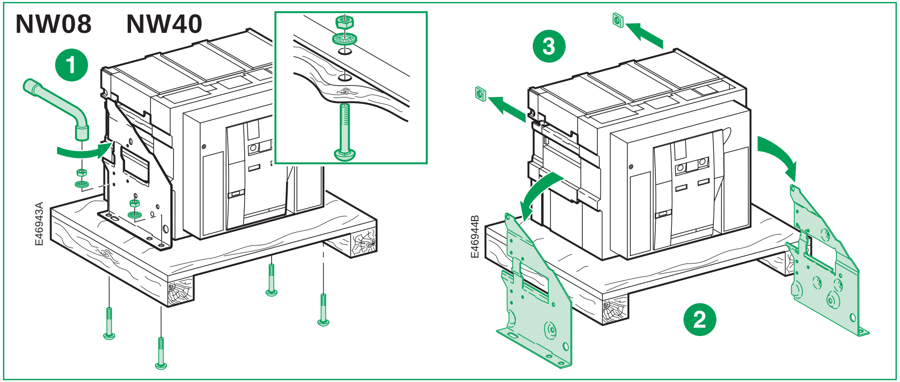
Déballage / *Unpacking / Auspacken / Apertura dell'imballaggio / Desembalaje*

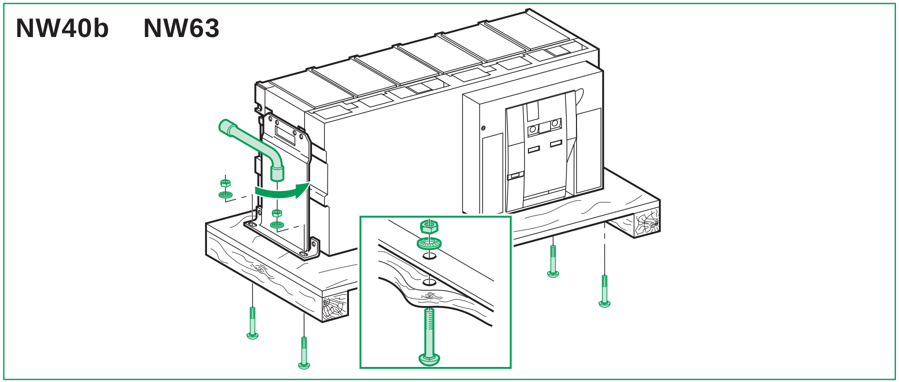
Disjoncteur fixe / *Fixed circuit breaker / Leistungsschalter in Festeinbau / Interruttore fisso / Interruptor automático fijo*



E46161A

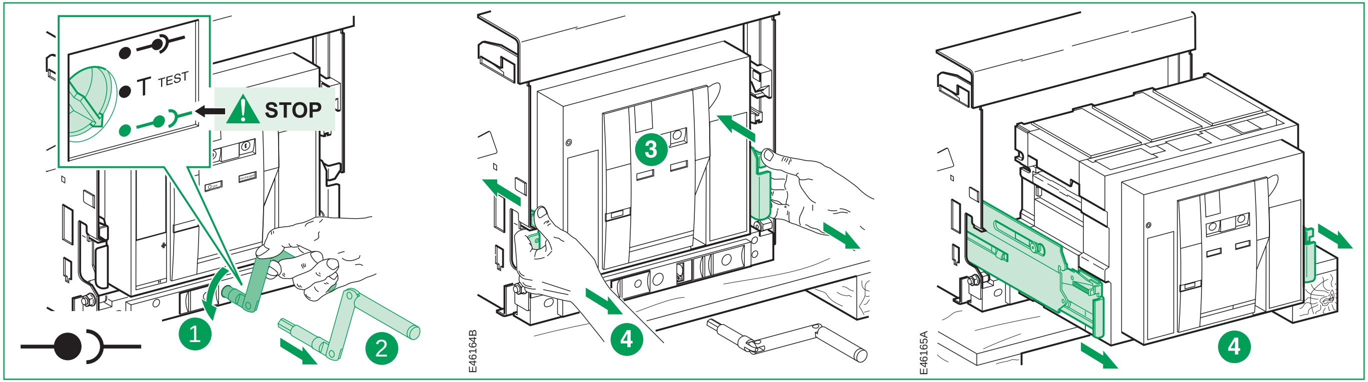
Disjoncteur débrochable sans châssis / *Drawout circuit breaker without chassis / Leistungsschalter in Einschubtechnik ohne Chassis / Interruttore estraibile senza telaio / Interruptor automático seccionable sin chasis*



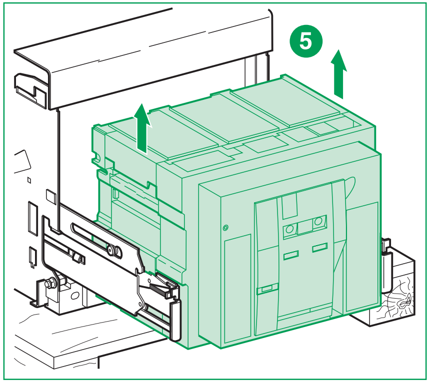


E47536A

Disjoncteur débrochable avec châssis / *Drawout circuit breaker with chassis / Leistungsschalter in Einschubtechnik mit Chassis / Interruttore estraibile con telaio / Interruptor automático seccionable con chasis*



DB111614 E46164B E46165A



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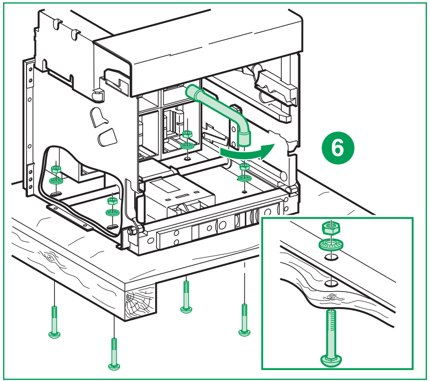
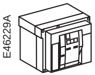
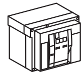
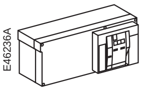
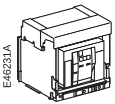
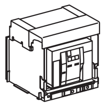
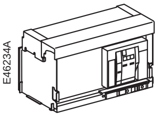
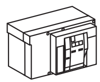
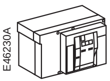
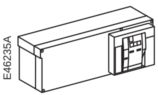
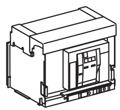
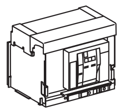
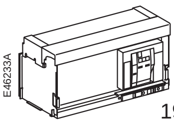


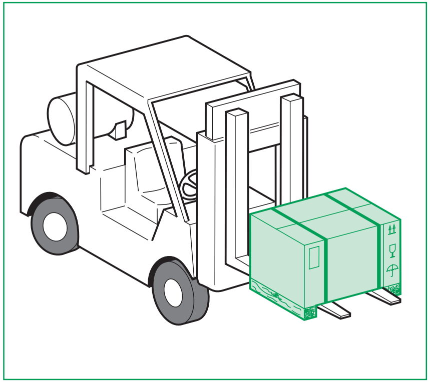
E46167A

Manutention / *Handling / Transport / Trasporto / Transporte*

E46168A

	NW08 NW40 N/H	NW08 NW20 L	NW40b NW63 H
3P	E46229A  42 kg	E46229A  43 kg	E46236A  88 kg
	E46231A  78 kg	E46231A  79 kg	E46234A  151 kg
4P	E46230A  52 kg	E46230A  53 kg	E46235A  114 kg
	E46232A  95 kg	E46232A  98 kg	E46233A  194 kg

Manutention / *Handling / Transport / Trasporto / Transporte*



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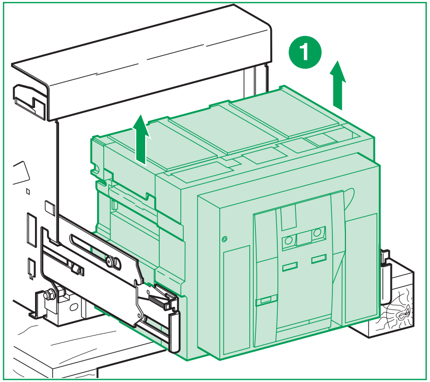

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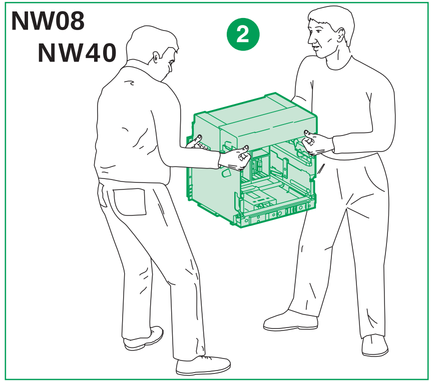

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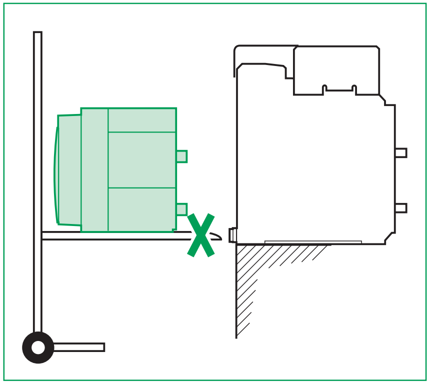

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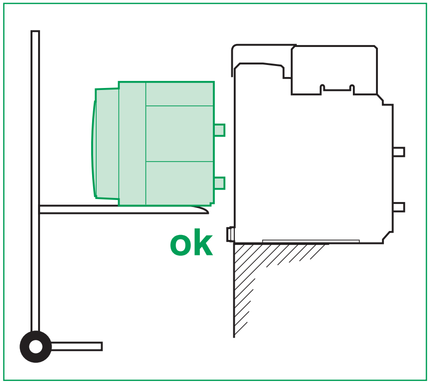
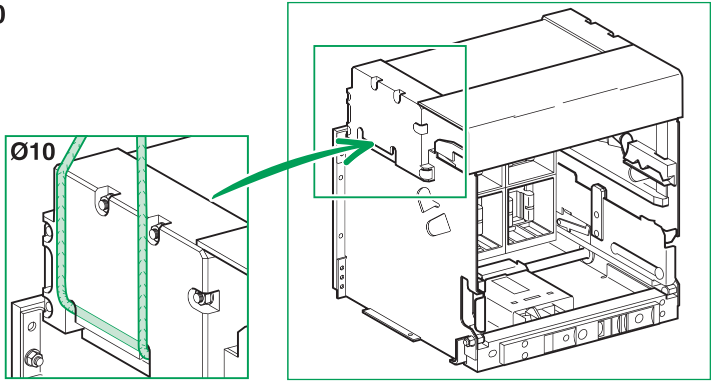


E46173A

NW08 → NW40

Châssis seul
Chassis only
Chassis einzeln
Solo telaio
Chasis solo



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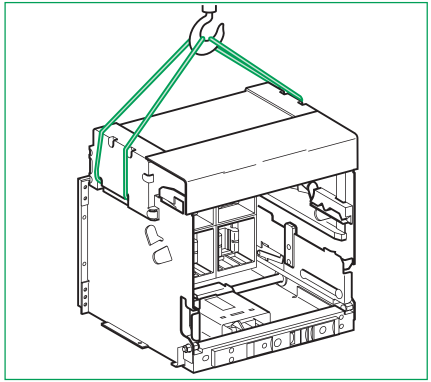
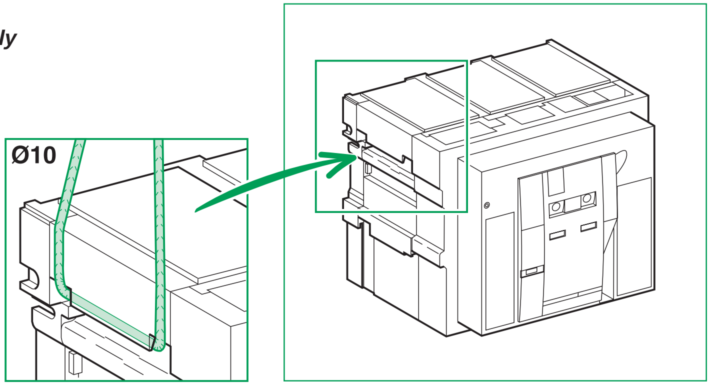


E46175A

Disjoncteur seul
Circuit breaker only
Leistungsschalter einzeln
Solo interruttore
Interruptor automático solo



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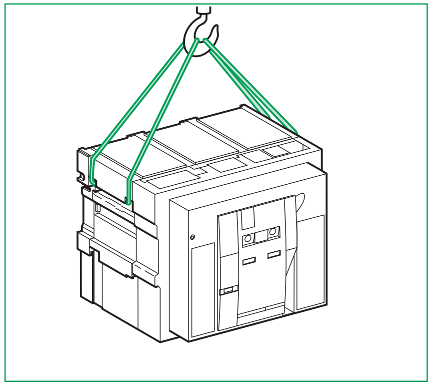
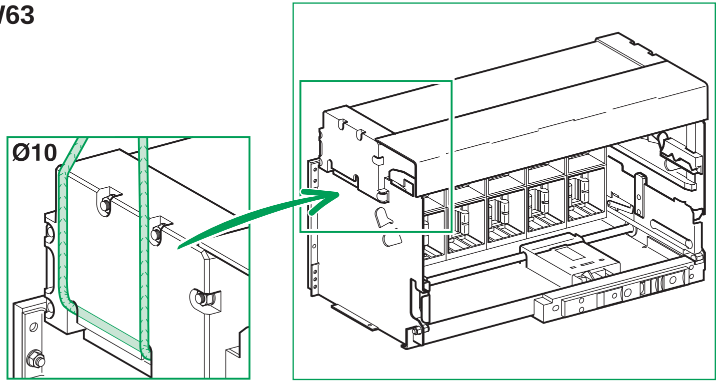


E46177A

NW40b → NW63

Châssis seul
Chassis only
Chassis einzeln
Solo telaio
Chasis solo



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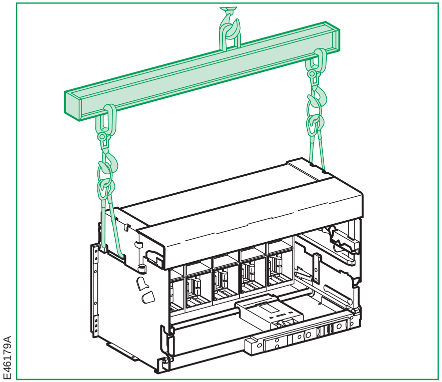

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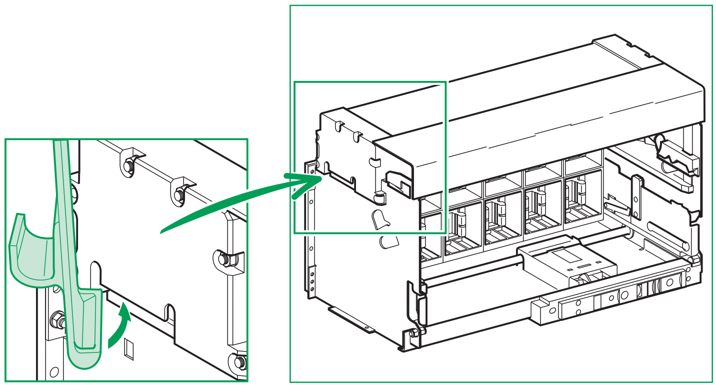
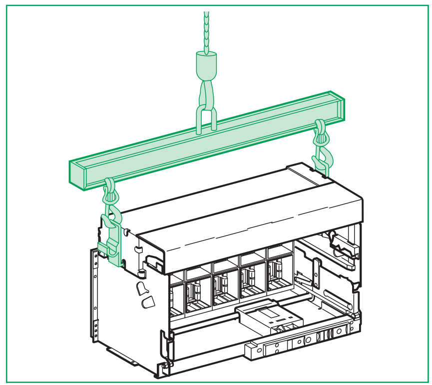


E46180A

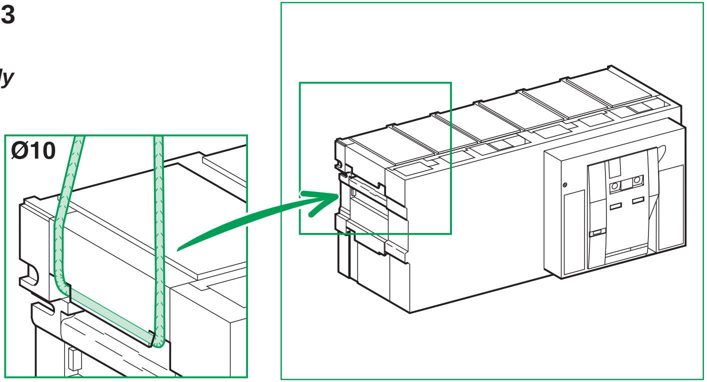


E46181A

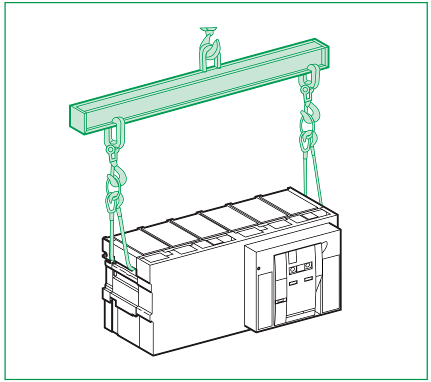
Manutention / *Handling / Transport / Trasporto / Transporte*

NW40b → NW63

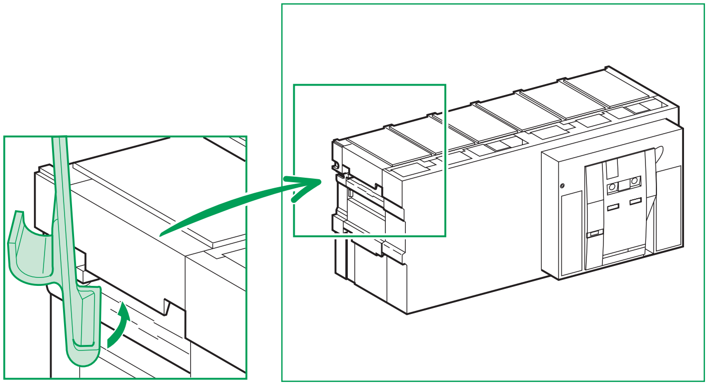
Disjoncteur seul
Circuit breaker only
Leistungsschalter einzeln
Solo interruttore
Interruptor automático solo



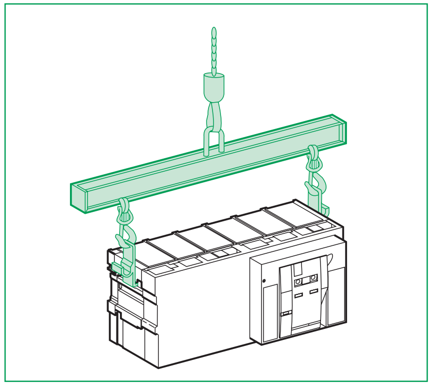
E46182A



E46183A



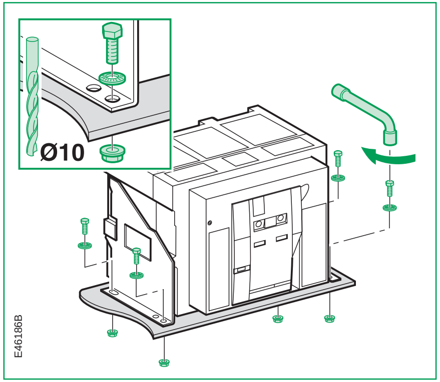
E46184A



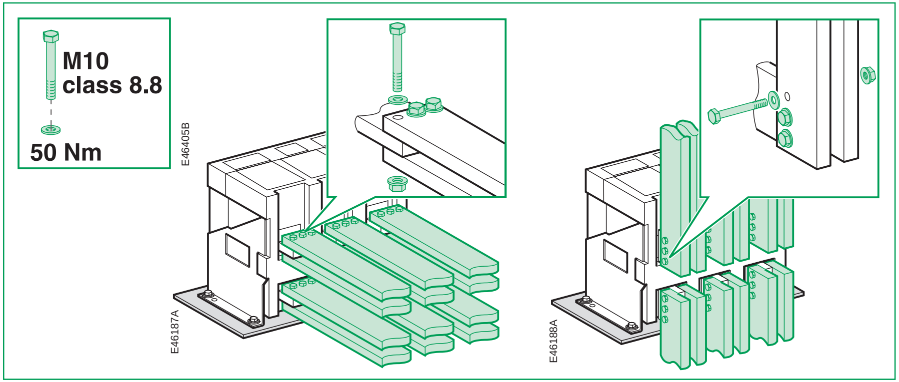
E46185A

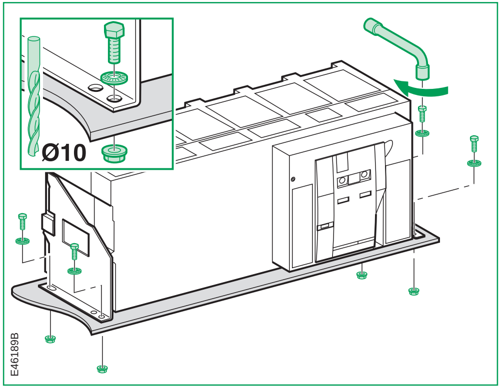
Installation / *Installation / Installation / Installazione / Instalación*

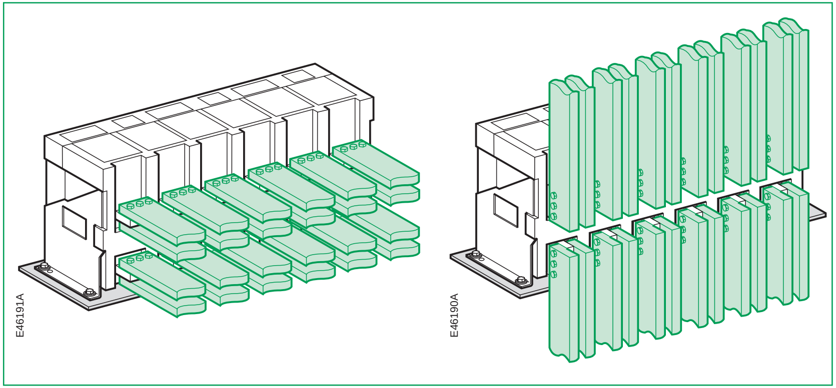
Fixation / *Fixing / Befestigung / Fissageo / Fijación*



Raccordement / *Connection / Anschluß / Collegamento / Conexión*



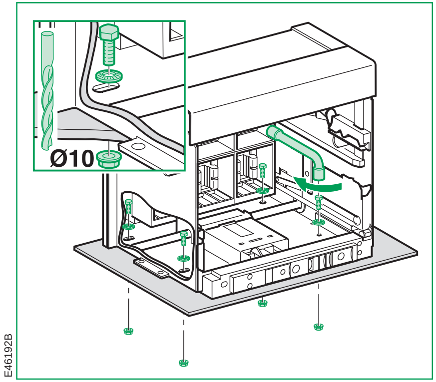


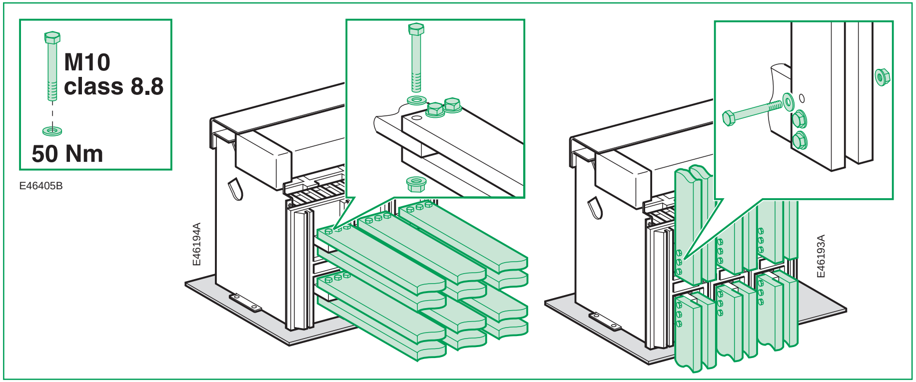


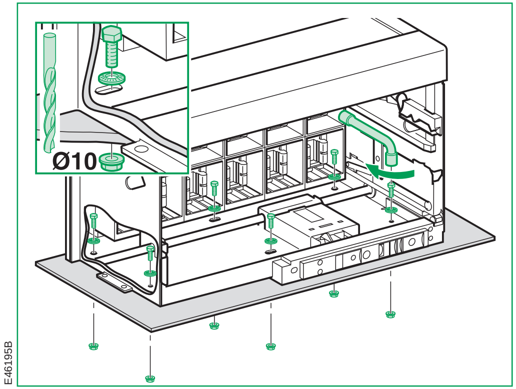
Installation / *Installation / Installation / Installazione / Instalación*

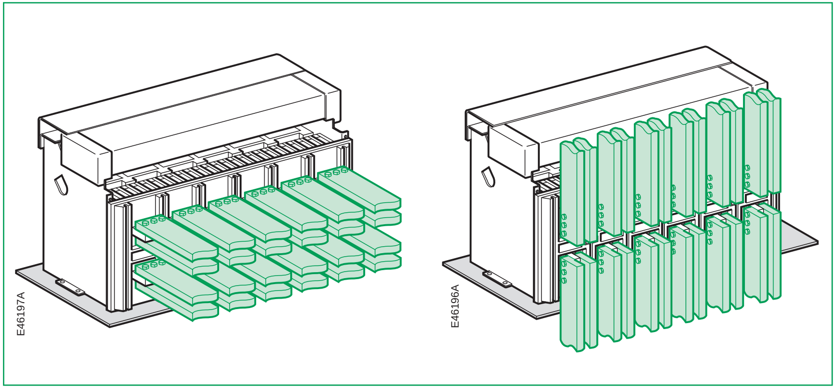
Fixation / *Fixing / Befestigung / Fissageo / Fijación*

Raccordement / Connection / Anschluß / Collegamento / Conexión

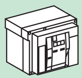
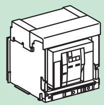


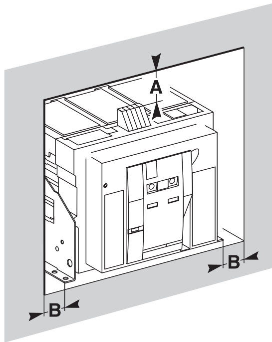




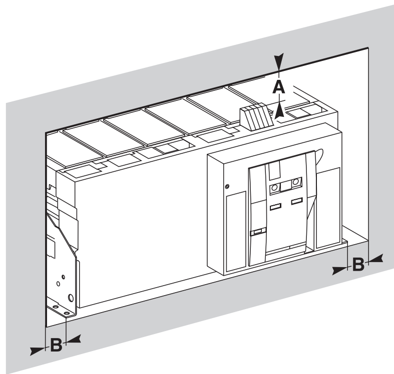


Périmétre de sécurité / *Safety perimeter / Sicherheitsabstände / Perimetri di sicurezza / Perímetro de seguridad*

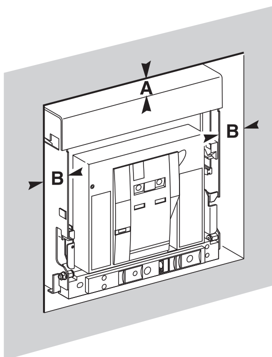
Pièces / *Parts* *Teile / Parti / Piezas* (mm)	 E46229A		 E46231A	
	A	**B**	**A**	**B**
Isolées / *insulated* *Isoliert / Isolanti* *Aisladas*	0	0	0	0
Métal. / *Metal.* *Leitfähig / Metalliche* *Metálicas*	0	0	0	0
Sous tension *Live* *Spannungführend* *In tensione* *Bajo tensión*	100	60	0	60



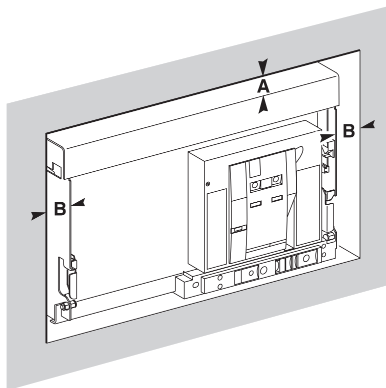
E46199B



E46201B



E46200A



E46202A

Raccordement puissance / *Power connections / Hauptstromanschluß / Collegamento dei circuiti principali / Conexión potencia*

Attention : ne pas confondre les connecteurs Cuivre (Cu) et Aluminium (Al).

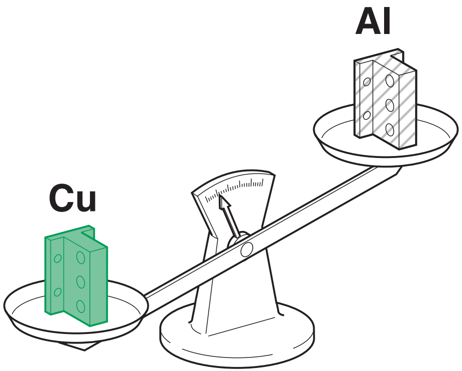
Caution: *Take care to distinguish between Copper (Cu) and Aluminium (Al) connectors*

Vorsicht: *Es muß darauf geachtet werden, daß die Anschlußteile aus Kupfer (Cu) und Aluminium (Al) nicht verwechselt werden.*

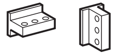
Attenzione: *non confondere i connettori di Rame (Cu) e di Alluminio (Al).*

Atención: *No confundir los conectores de Cobre (Cu) y de aluminio (Al)*

E46203B

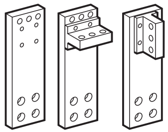


E46545



	800 A	1600 A	2000 A	2500 A 3200 A	4000 A	5000 A 6300 A
N1	Al	Al				
H1	Al	Al	Al	Cu	Cu	Cu
H2	Al	Al	Al	Cu	Cu	Cu
H3	Al	Al	Cu	Cu	Cu	
L1	Al	Al	Cu			

E46546B

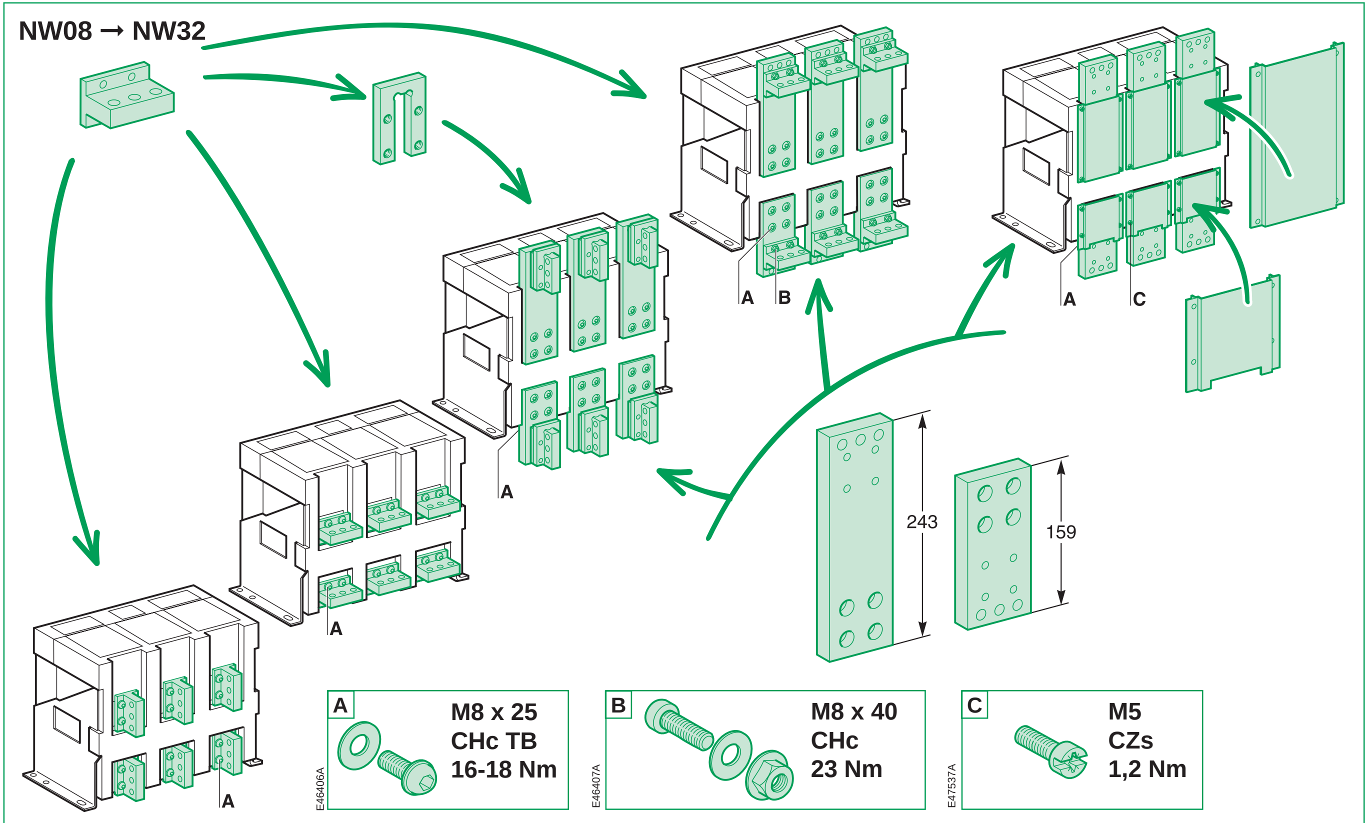


	800 A	1600 A	2000 A	2500 A 3200 A	4000 A	5000 A 6300 A
N1	Al	Al				
H1	Al	Al	Cu	Cu		
H2	Al	Al	Cu	Cu		
H3	Al	Al	Cu	Cu		
L1	Al	Al	Cu			

Cu   Al

Raccordement puissance / *Power connections / Hauptstromanschluß / Collegamento dei circuiti principali / Conexión potencia*

Disjoncteur fixe / *Fixed circuit breaker / Leistungsschalter in Festeinbau / Interruttore fisso / Interruptor automático fijo*

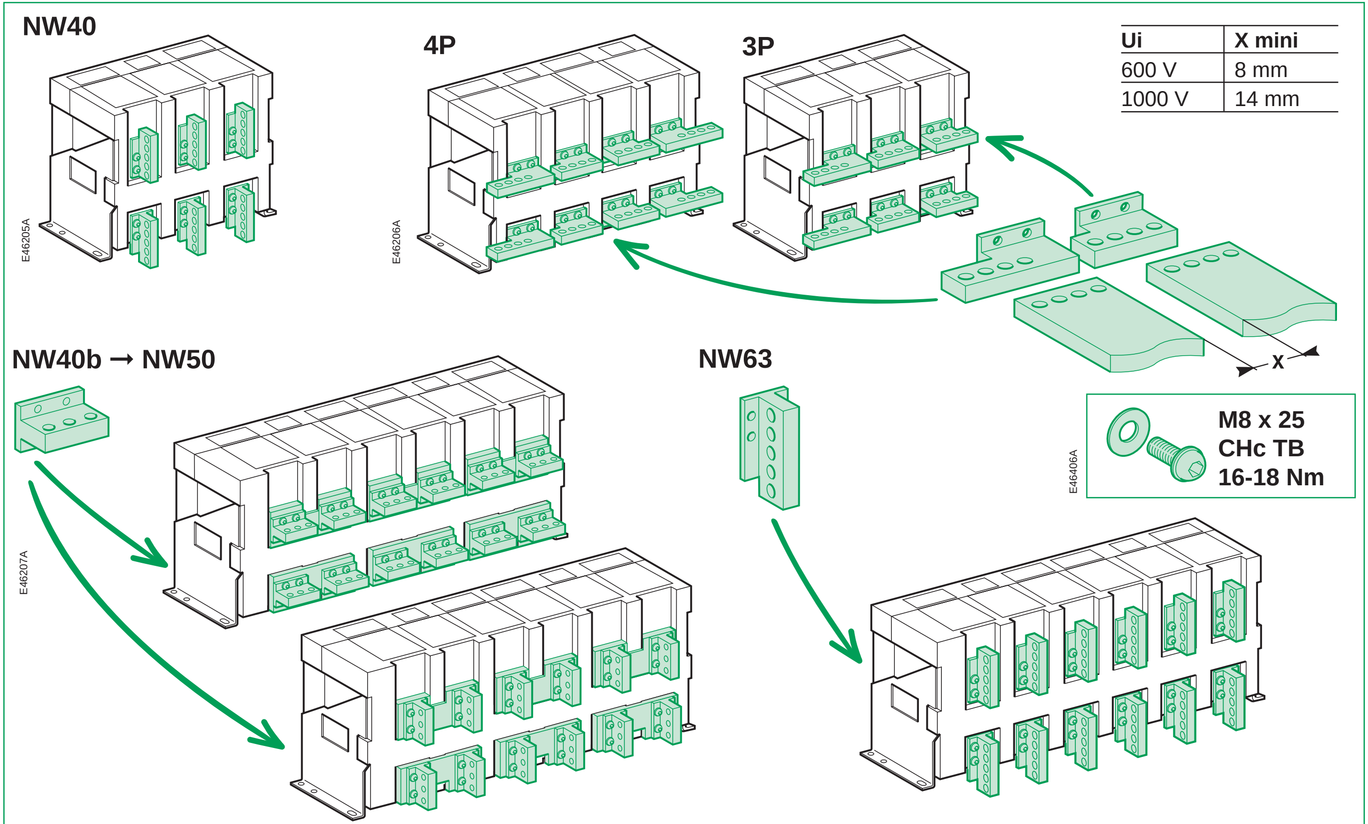


E46204B

Raccordement puissance / *Power connections / Hauptstromanschluß / Collegamento dei circuiti principali / Conexión potencia*

Disjoncteur fixe / *Fixed circuit breaker / Leistungsschalter in Festeinbau / Interruttore fisso / Interruptor automático fijo*

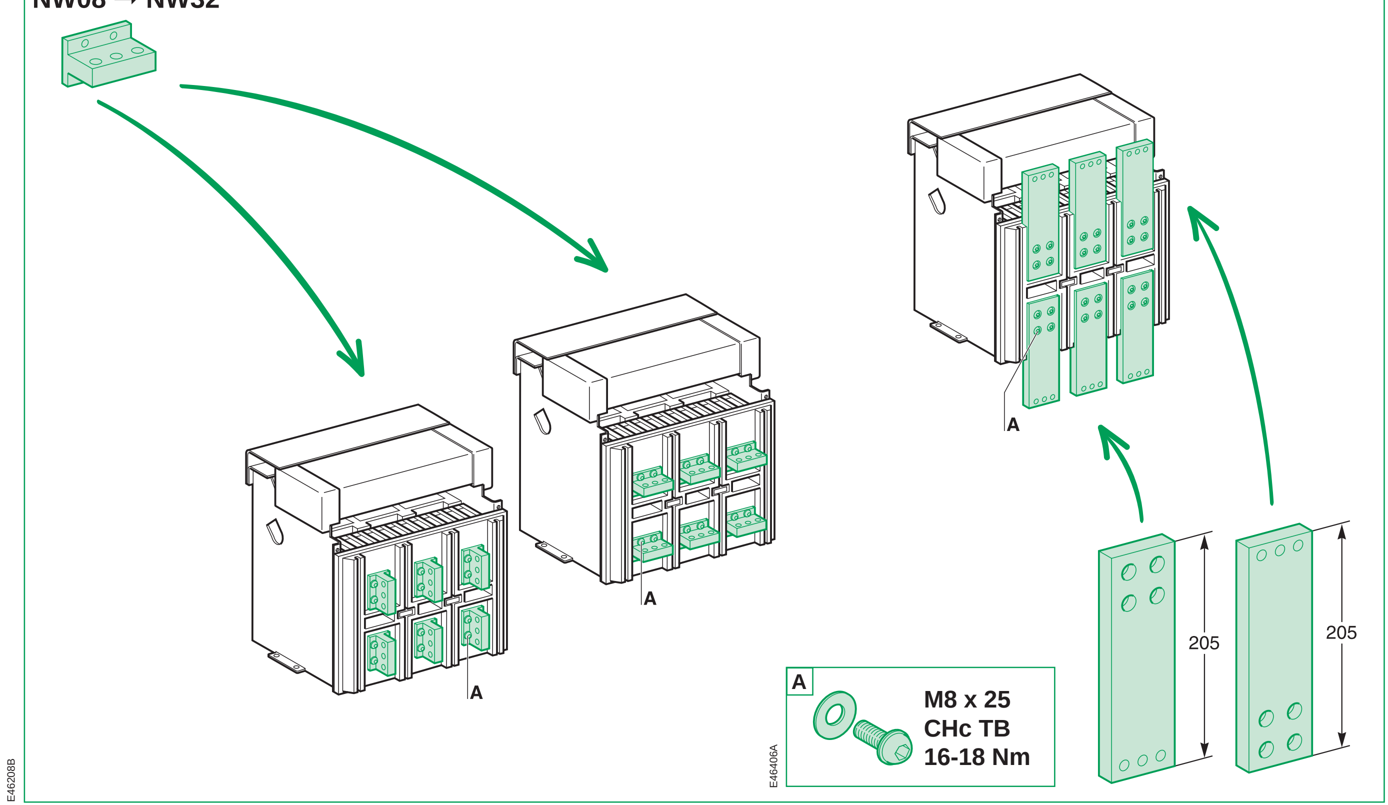
Ui	X mini
600 V	8 mm
1000 V	14 mm



Raccordement puissance / *Power connections / Hauptstromanschluß / Collegamento dei circuiti principali / Conexión potencia*

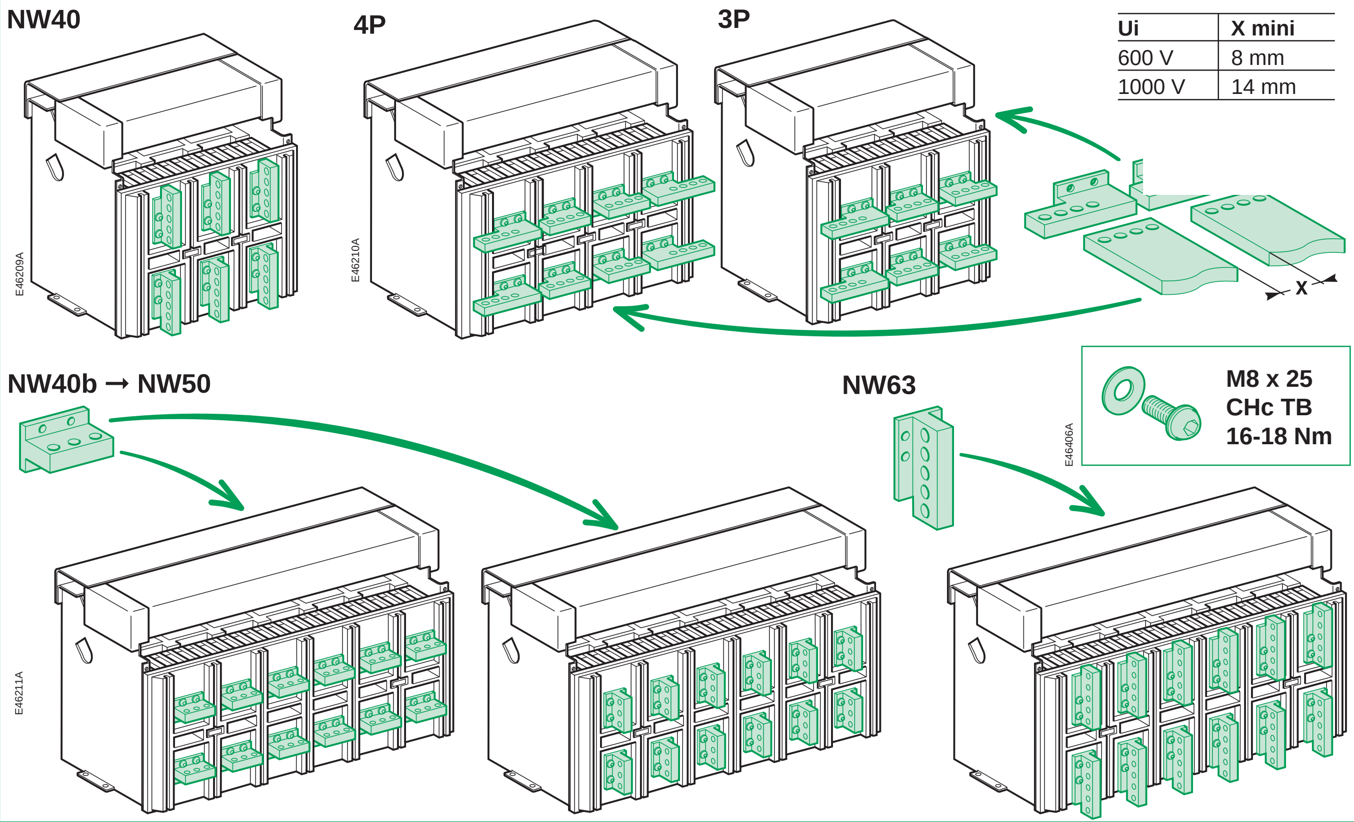
Disjoncteur débrochable / ***Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable***

NW08 → NW32



Raccordement puissance / *Power connections / Hauptstromanschluß / Collegamento dei circuiti principali / Conexión potencia*

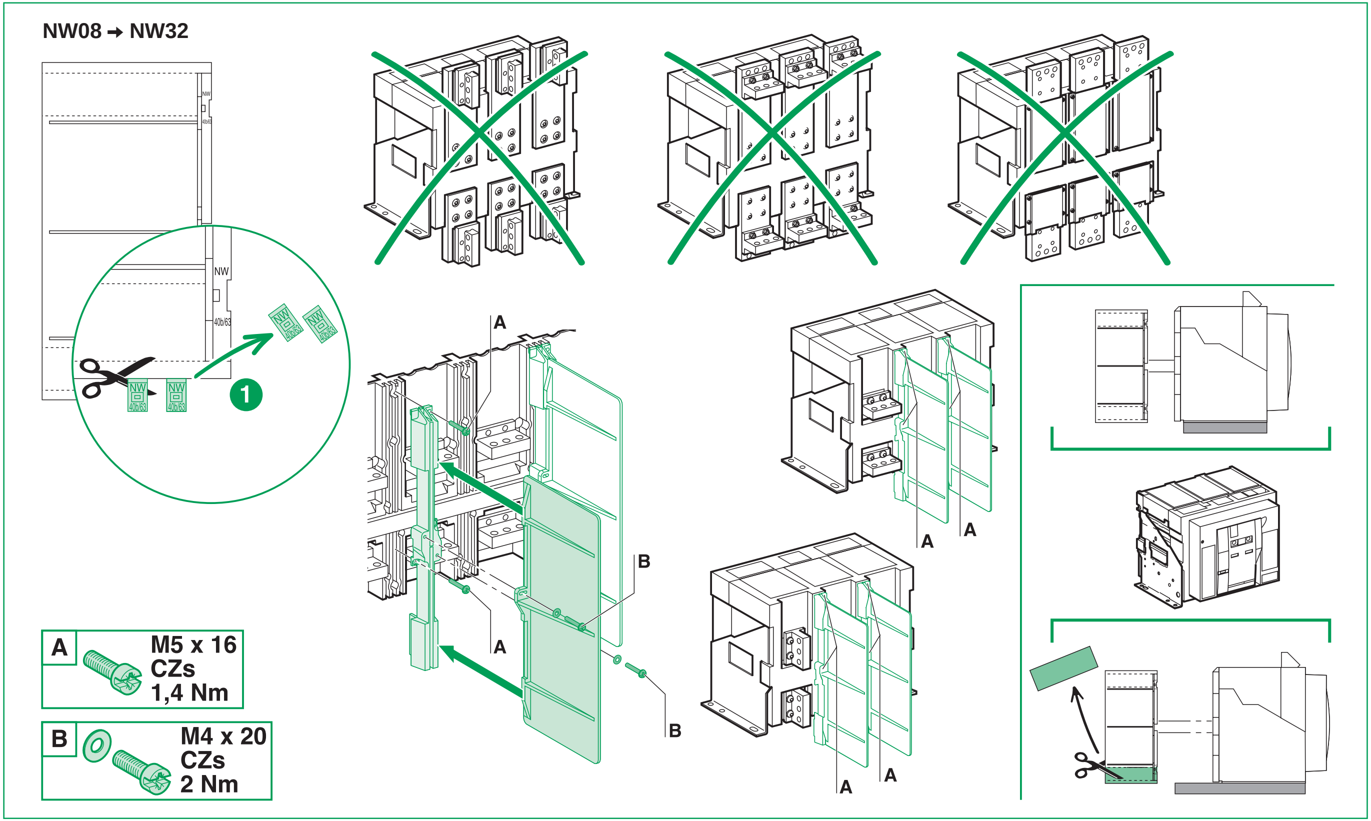
Disjoncteur débrochable / *Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable*



Ui	X mini
600 V	8 mm
1000 V	14 mm

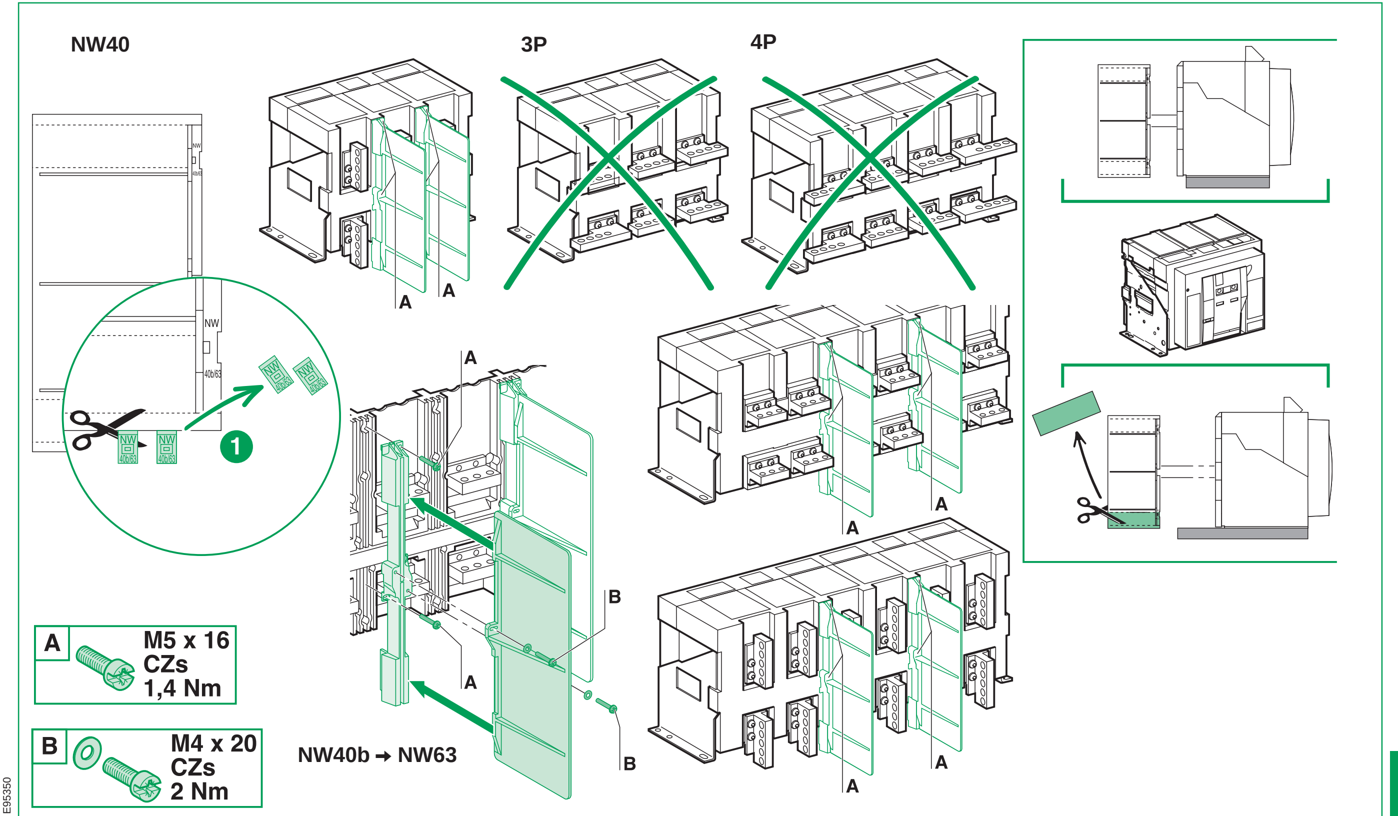
Séparateurs de phases / *Interphase insulating screen / Phasentrenner/ Separatori di fase / Separadores de fases*

Disjoncteur fixe / *Fixed circuit breaker / Leistungsschalter in Festeinbau / Interruttore fisso / Interruptor automático fijo*



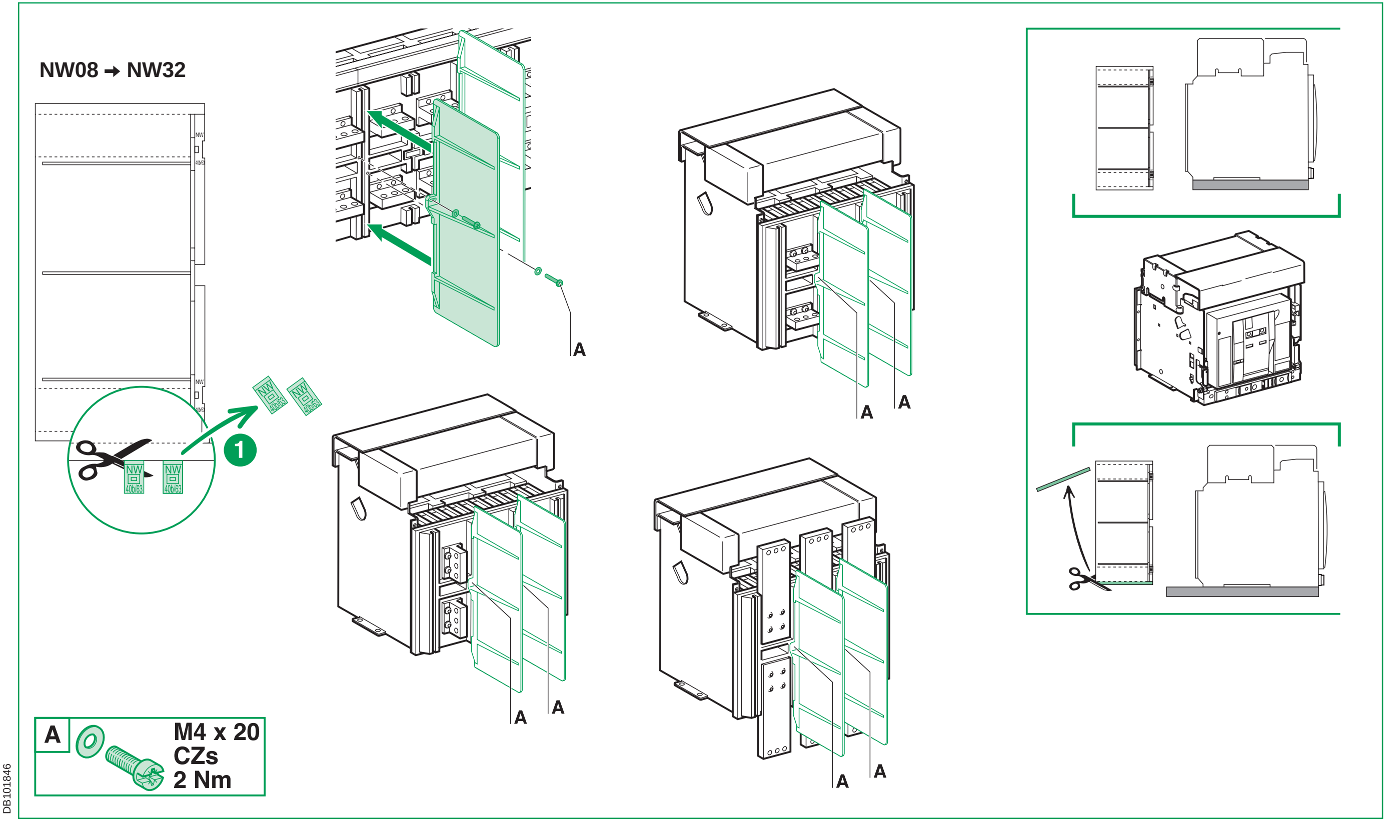
Séparateurs de phases / *Interphase insulating screen / Phasentrenner/ Separatori di fase / Separadores de fases*

Disjoncteur fixe / ***Fixed circuit breaker / Leistungsschalter in Festeinbau / Interruttore fisso / Interruptor automático fijo***



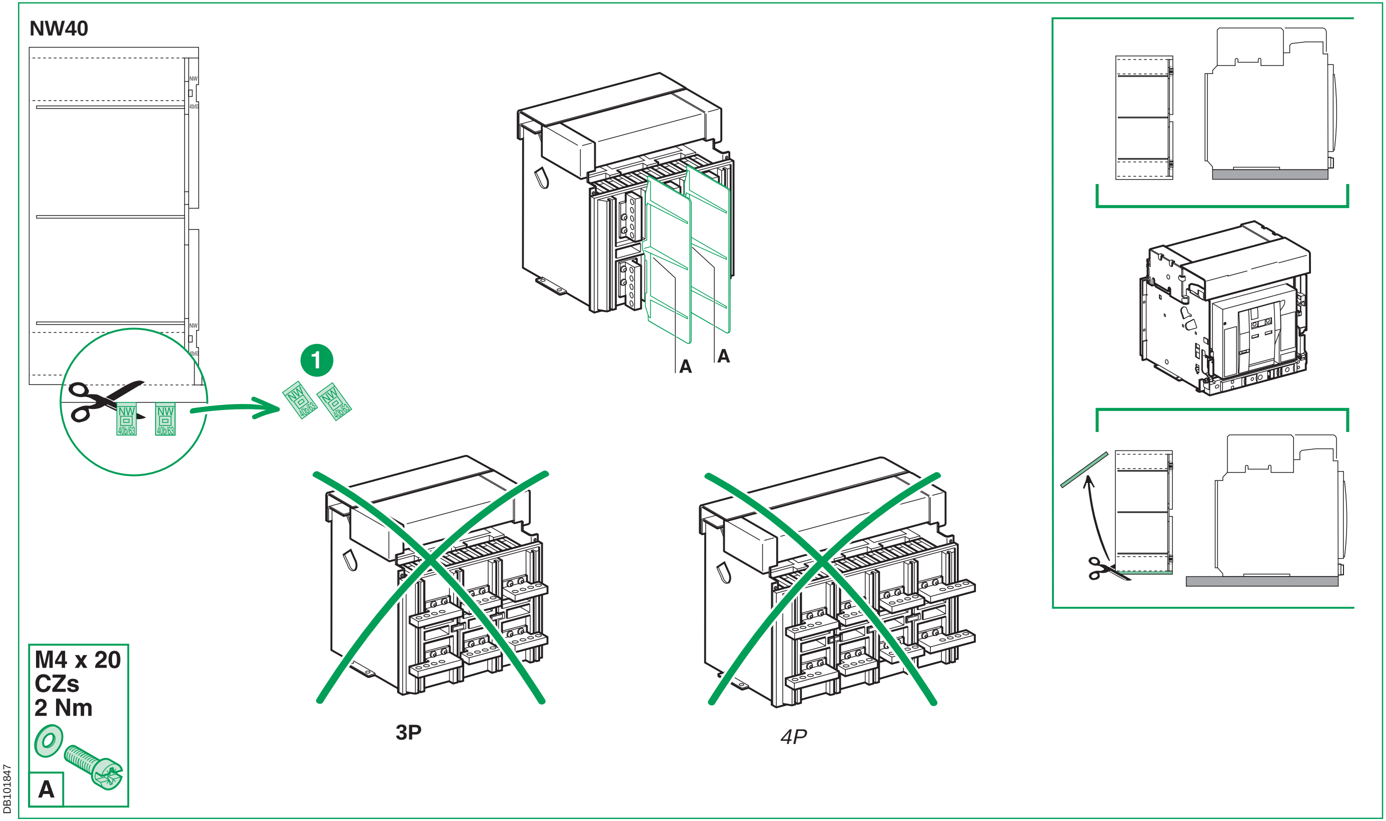
Séparateurs de phases / *Interphase insulating screen / Phasentrenner/ Separatori di fase / Separadores de fases*

Disjoncteur débrochable / *Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable*



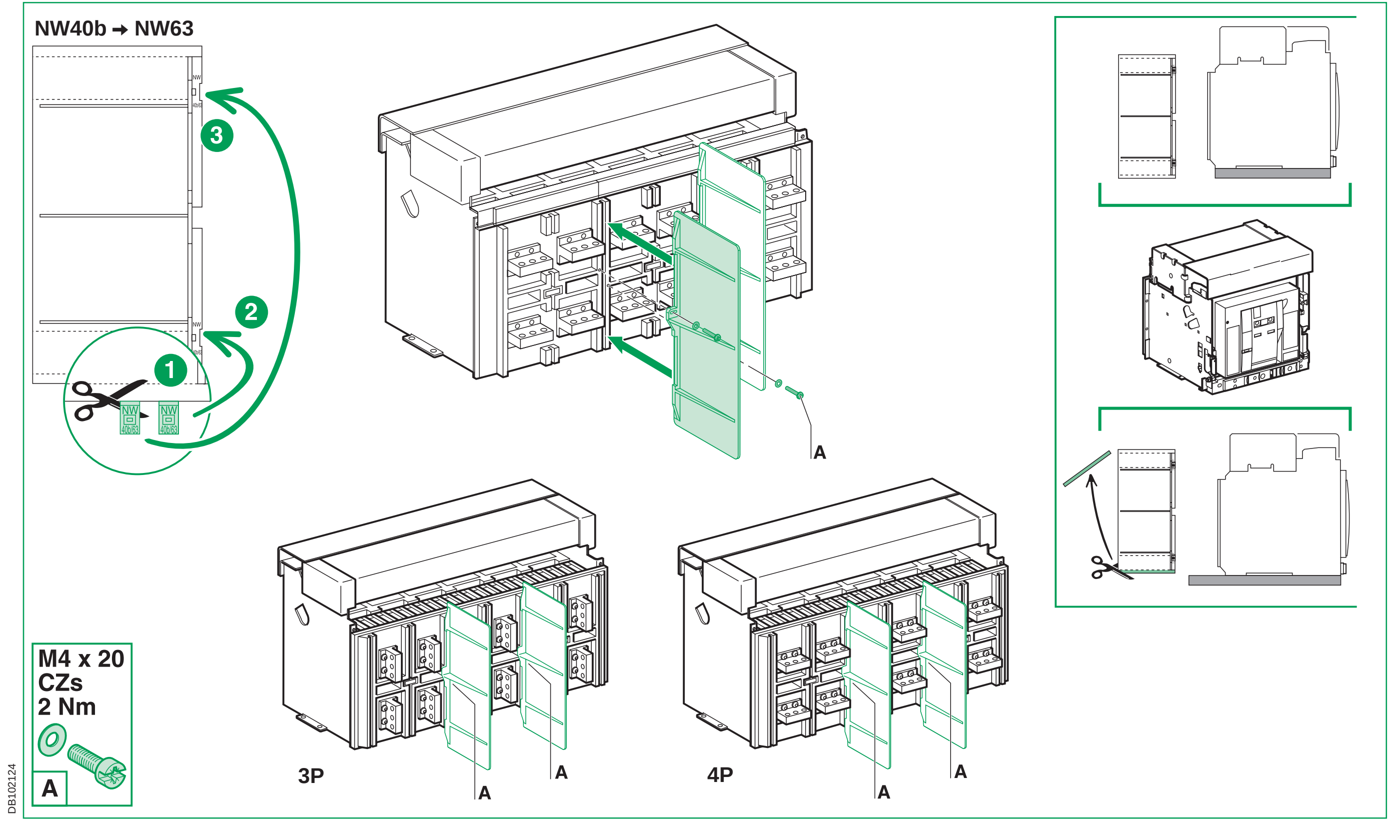
Séparateurs de phases / *Interphase insulating screen / Phasentrenner/ Separatori di fase / Separadores de fases*

Disjoncteur débrochable / *Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable*



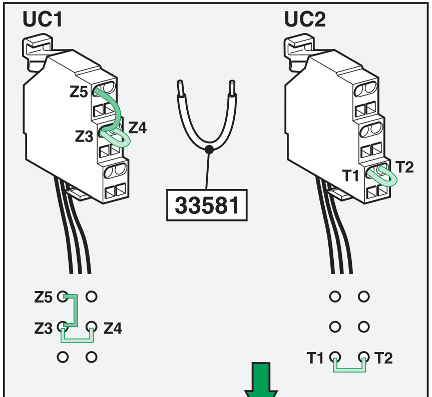
Séparateurs de phases / *Interphase insulating screen / Phasentrenner/ Separatori di fase / Separadores de fases*

Disjoncteur débrochable / ***Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable***

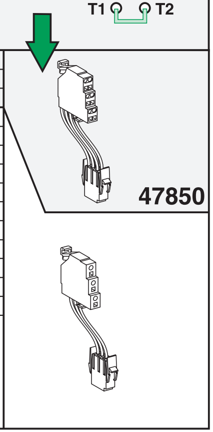


Raccordement auxiliaire / *Auxiliary connections / Zubehöranschluß / Collegamento degli ausiliari / Conexión auxiliar*

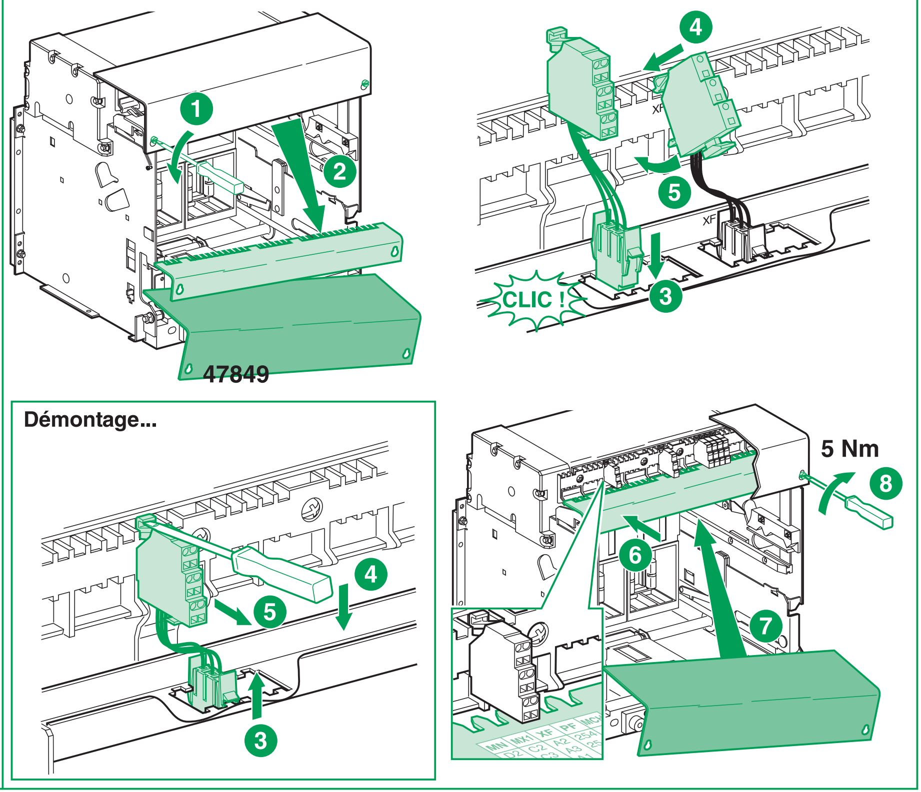
Châssis seul/chassis only/Chassis einzeln/ solo telaio/chassis solo



Micrologic	UC1	x 1
	UC2	x 1
COM		x 1
Micrologic	UC3	x 1
	UC4	x 1
M2C		x 1
M6C		x 1
SDE2/Res		x 1
SDE1		x 1
MN/MX2		x 1
MX1		x 1
XF		x 1
PF		x 1
MCH		x 1
OF1		x 1
OF24		x 1



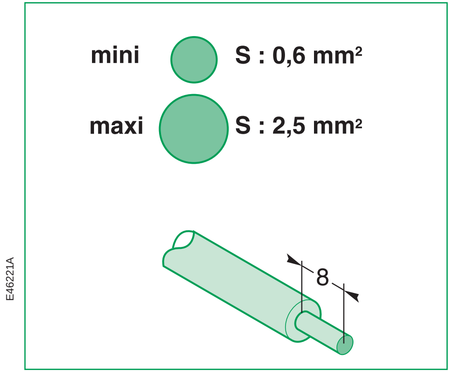
Montage/mantling/Montage/montaggio/montaje



E46217C

Raccordement auxiliaire / *Auxiliary connections / Zubehöranschluß / Collegamento degli ausiliari / Conexión auxiliar*

Section des fils
Cross-section of wires / Kabelquerschnitte / Sezione dei cavi / Sección de los hilos



Dénudez les fils
Remove insulation / Leitungen abisolieren / Spelare i cavi / Pele los hilos

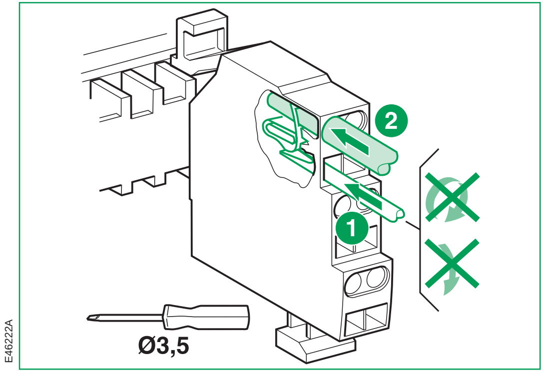


Schéma (page 24 et 25) représenté circuits hors tension, appareil ouvert, embroché, armé et les relais en position repos.

Diagram (page 24 and 25) shown with circuits deenergised, breaker open and in connected position, spring charged and relays in released position.

Schaltplan (Seite 24 und 25) in stromlosem Zustand, Schalter Aus, in Betriebstellung, Speicher gespannt und Relais in Ruhestellung Überstromauslösesystem.

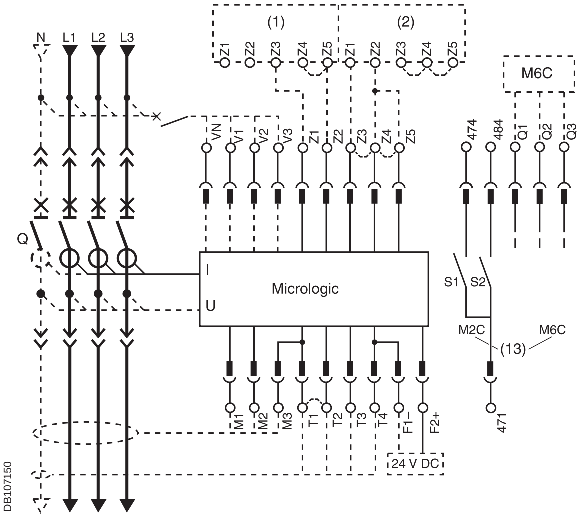
Lo schema (página 24 e 25) e rappresentato con circuiti fuori tensione, interruttore aperto, inserito, armato, con relè in posizione di riposo.

Esquema (página 24 e 25) representado circuito fuera de tensiòn, aparato abierto, conectado, armado, relé en posiciòn reposo.

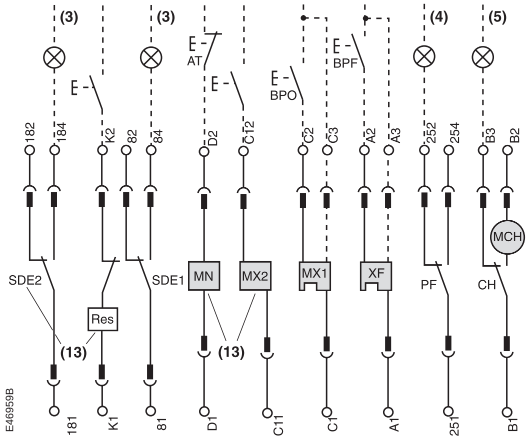
Raccordement auxiliaire / *Auxiliary connections / Zubehöranschluß / Collegamento degli ausiliari / Conexión auxiliar*

Disjoncteur fixe et débrochable / *Fixed and drawout circuit breaker / Leistungsschalter in Festeinbau und Einschubtechnik / Interruttore fisso ed estraibile / Interruptor automático fijo y seccionable*

Déclencheur / *Control unit / Überstromauslösesystem / Sganciatore elettronico / Unidad de control*



Commande à distance / *Remote control / Extern Ein- und Ausschalten / Comando a distanza / Mando a distancia*



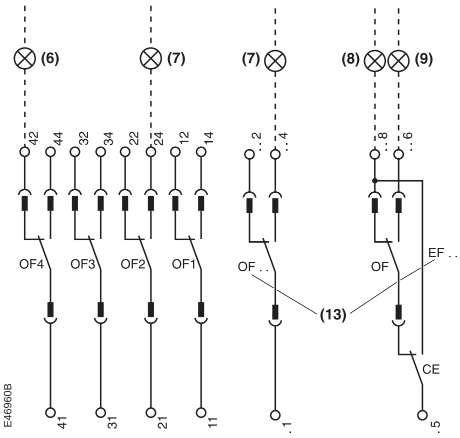
(1) Amont / *Upstream / Einspeiseseitig / Monte / Aguas arriba*
(2) Aval / *Downstream / Abgangsseitig / Valle / Aguas abajo*
(3) Défaut / *Fault / Fehler / Guasto / Defecto*
(4) Prêt à fermer / *Ready to close / Einschaltbereit / Pronto alla chiusura / Preparado para cerrar*
(5) Armé / *Spring charged / Gespannt / Armato / Armado*
(13) Ou / *Or / Oder / O / O*

Com	UC1	UC2	UC3	UC4	M2C / M6C
E5 E6	Z5 M1	M2 M3	F2+	V3	484 / Q3
E3 E4	Z3 Z4	T3 T4	VN	V2	474 / Q2
E1 E2	Z1 Z2	T1 T2	F1 –	V1	471 / Q1

SDE2 / Res	SDE1	MN / MX2	MX1	XF	PF	MCH
184 / K2	84	D2 / C12	C2	A2	254	B2
182 /	82	/ C13	C3	A3	252	B3
181 / K1	81	D1 / C11	C1	A1	251	B1

Raccordement auxiliaire / *Auxiliary connections / Zubehöranschluß / Collegamento degli ausiliari / Conexión auxiliar*

Contacts de signalisation / ***Auxiliary switches / Hilfskontakte / Contatti ausiliari / Contactos de señalización***



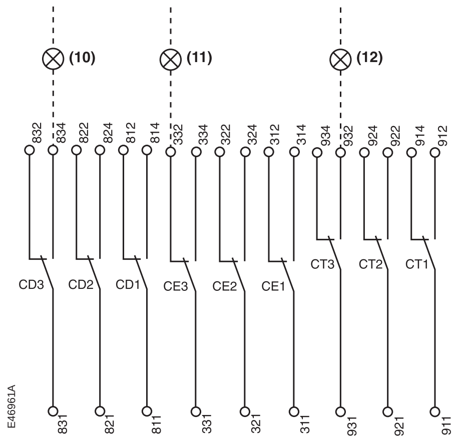
OF4	OF3	OF2	OF1
44	34	24	14
42	32	22	12
41	31	21	11

OF24	OF23	OF22	OF21	OF14	OF13	OF12	OF11
244	234	224	214	144	134	124	114
242	232	222	212	142	132	122	112
241	231	221	211	141	131	121	111

(13)

EF24	EF23	EF22	EF21	EF14	EF13	EF12	EF11
248	238	228	218	148	138	128	118
246	236	226	216	146	136	126	116
245	235	225	215	145	135	125	115

Contacts châssis / ***Chassis switches / Zubehör Einschubchassis / Ausiliari telaio / Contactos del chassis***



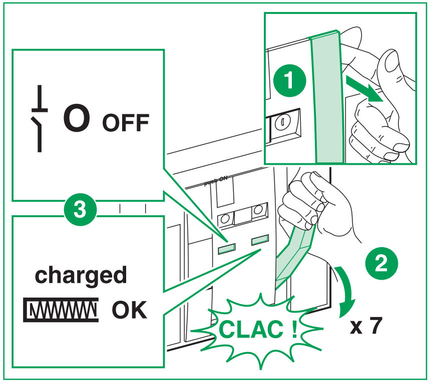
CD3	CD2	CD1	CE3	CE2	CE1	CT3	CT2	CT1
834	824	814	334	324	314	934	924	914
832	822	812	332	322	312	932	922	912
831	821	811	331	321	311	931	921	911

CE6	CE5	CE4
364	354	344
362	352	342
361	351	341

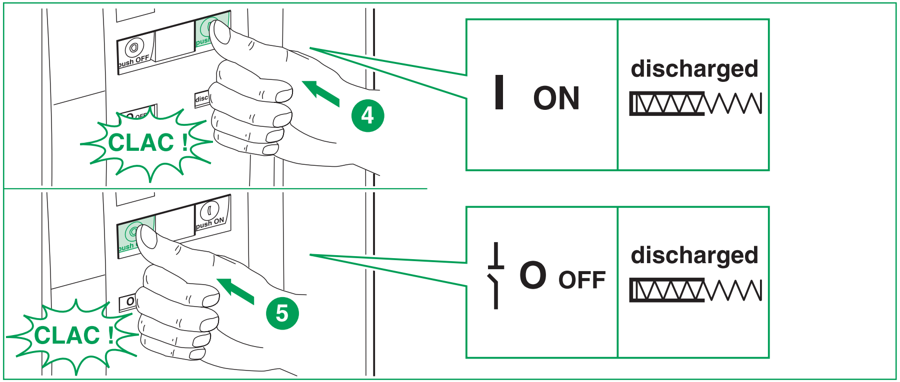
CE9	CE8	CE7
394	384	374
392	382	372
391	381	371

(6) Ouvert / *Open / Aus / Aperto / Abierto*
(7) Fermé / *Closed / Ein / Chiuso / Cerrado*
(8) Non embroché ou embroché ouvert / *Not connected or connected open / Nicht in Betriebsstellung oder in Betriebsstellung und aus / Non inserito o inserito aperto / No enchufado o enchufado abierto*
(9) Embroché fermé / *Connected closed / Betriebsstellung und ein / Inserito chiuso / Enchufado cerrado*
(10) Débroché / *Disconnected / Trennstellung / Estratto / Desenchufado*
(11) Embroché / *Connected / Betriebsstellung / Inserito / Enchufado*
(12) Position test / *Test position / Teststellung / Posizione prova / Posición de test*
(13) Ou / *Or / Oder / O / O*

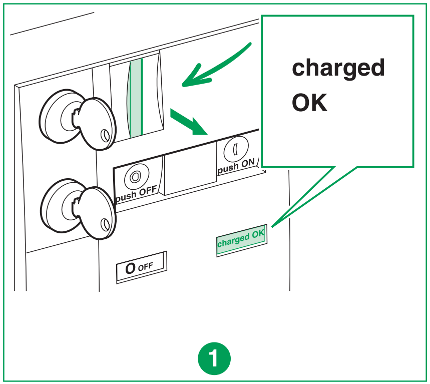
Principe de fonctionnement / *Operating principle / Funktionsweise / Principio di funzionamento / Principio de funcionamiento*



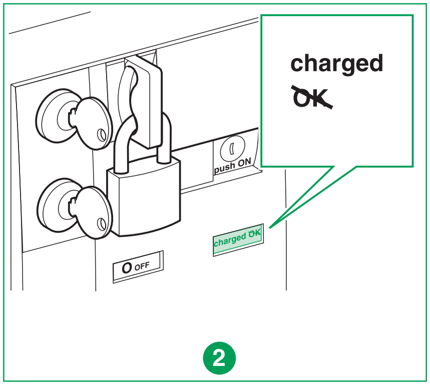
E46223A



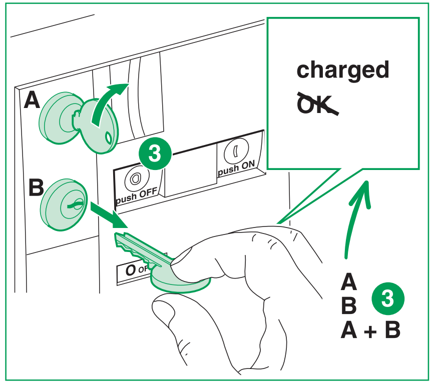
E46224A



E46226A



E46227A



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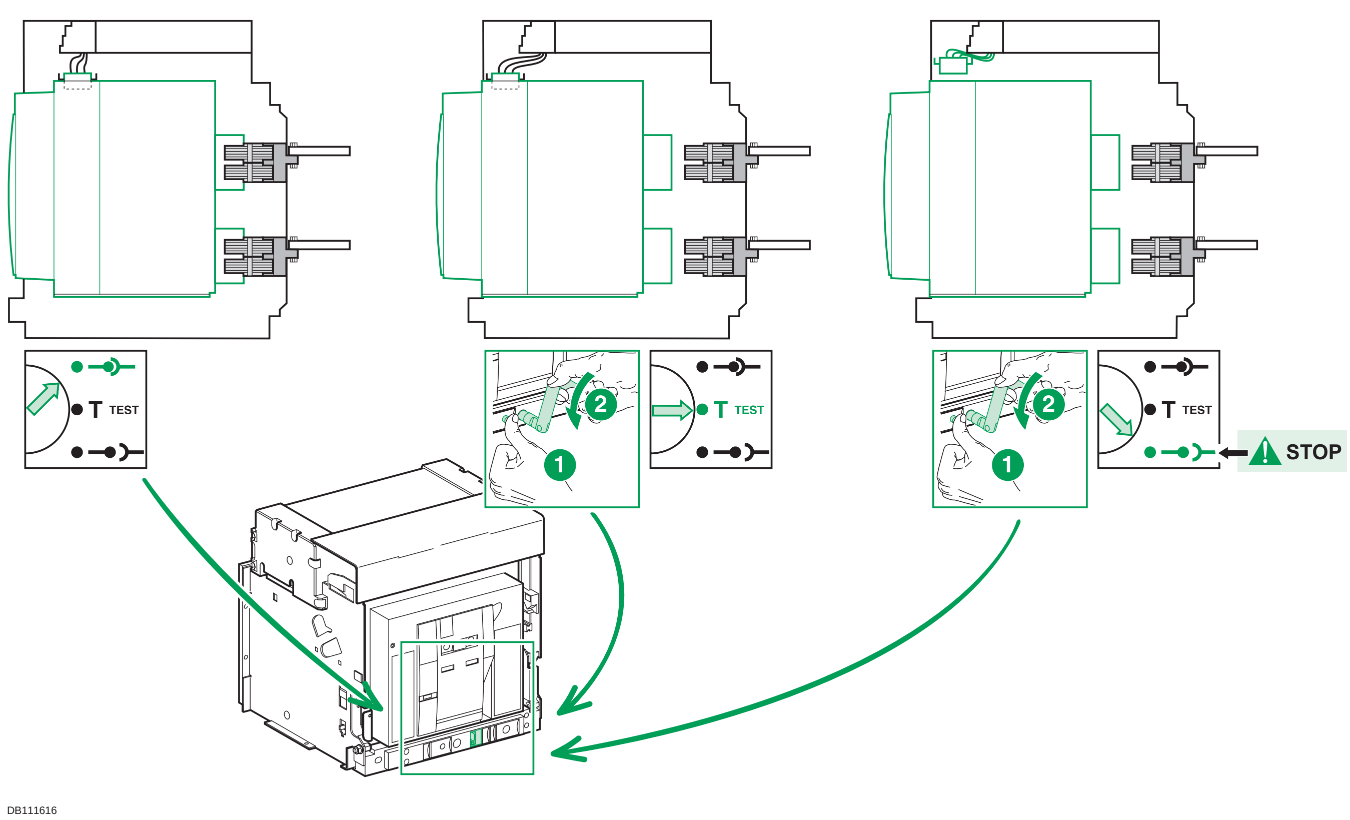
Principe de fonctionnement / *Operating principle / Funktionsweise / Principio di funzionamento / Principio de funcionamiento*



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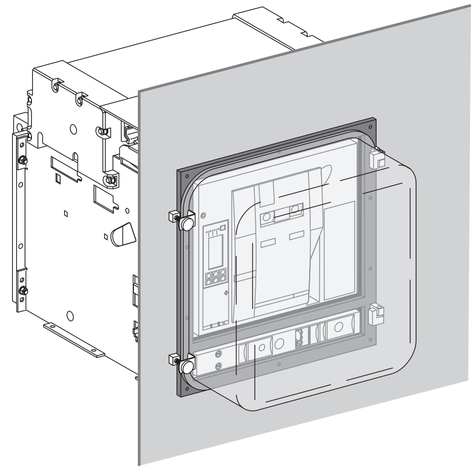
Masterpact NT/NW
Compact NS630b-1600

Capot transparent pour cadre de porte débrochable
Transparent cover for door escutcheon
Türdich tungsrahmen mit transparenter Abdeckung
Mostrina con calotta di protezione transparente
Marco de puerta con tapa transparente

F Notice d'installation
EN *Installation manual*
DE *Montageanleitung*
IT *Manuale d'installazione*
ES *Instrucciones de instalación*



E71231

Schneider Electric

Danger et avertissement / *Danger and warning / Vorsicht Lebensgefahr*
Norme di sicurezza e avvertenze / Instrucciones de seguridad

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Le non respect des indications de la présente notice ne saurait engager la responsabilité du constructeur.

RISQUE D'ELECTROCUTION, DE BRULURES OU D'EXPLOSION

■ l'installation et l'entretien de cet appareil ne doivent être effectués que par des professionnels
■ coupez l'alimentation générale de cet appareil avant toute intervention sur ou dans l'appareil
■ utilisez toujours un dispositif de détection de tension approprié pour confirmer l'absence de tension
■ replacez tous les dispositifs, les portes et les couvercles avant de mettre cet appareil sous tension.

Le non respect de ces consignes de sécurité exposerait l'intervenant et son entourage à des risques de dommages corporels graves susceptibles d'entraîner la mort.

This equipment should only be mounted by professionals. The manufacturer shall not be held responsible for any failure to comply with the instructions given in this manual.

RISK OF ELECTROCUTION, BURNS OR EXPLOSION

■ *the device should only be installed and serviced by professionals*
■ *switch off the general power supply to the device prior to any work on or in the device*
■ *always use an appropriate voltage detection device to confirm the absence of voltage*
■ *replace all interlocks, doors and covers before energising the device.*

Failure to take these precautions could expose intervener and people round to serious corporal injuries which could cause death.

*Diese Bauteile dürfen nur von qualifiziertem Personal montiert werden.
Bei Nichteinhaltung der Anweisungen der vorliegenden Anleitung kann der Hersteller auf keinen Fall haftbar gemacht werden.*

GEFAHR VON TÖDLICHEM ELEKTROSCHOCK, VERBRENNUNGEN UND EXPLOSION

■ *Installierung und Wartung dieses Gerätes dürfen nur von qualifiziertem Personal vorgenommen werden*
■ *Vor jeglichem Eingriff auf oder an dem Gerät muß die Stromversorgung des Geräts unterbrochen werden*
■ *Vor dem Eingriff ist mit einem geeigneten Spannungsmesser sicher zu stellen, daß keinerlei Spannung vorhanden ist*
■ *Bevor das Gerät erneut unter Spannung gesetzt wird, müssen sämtliche Vorrichtungen, Türen und Abdeckungen wieder angebracht sein.*

Falls diese Vorsichtsmaßnahmen nicht eingehalten werden, könnte dies zu schwere Verletzungen bis hin zum Tod führen.

*Il montaggio di questi materiali deve essere eseguito esclusivamente da personale competente.
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RISCHIO DI ELETTROCUZIONE, DI USTIONI O DI ESPLOSIONE

■ *l'installazione e la manutenzione di questo apparecchio devono essere eseguite esclusivamente da personale competente*
■ *prima di qualsiasi intervento sull'apparecchio o al suo interno, interrompere l'alimentazione generale fornita all'impianto*
■ *verificare sempre l'assenza di tensione con uno strumento adeguato*
■ *prima di mettere questo apparecchio sotto tensione, riportatelo alle condizioni di sicurezza iniziali rimontando gli eventuali pezzi precedentemente tolti.*

Il mancato rispetto delle indicazioni sulla sicurezza riportate in questo documento, potrebbe causare gravi incidenti, tali da ferire o portare alla morte l'operatore.

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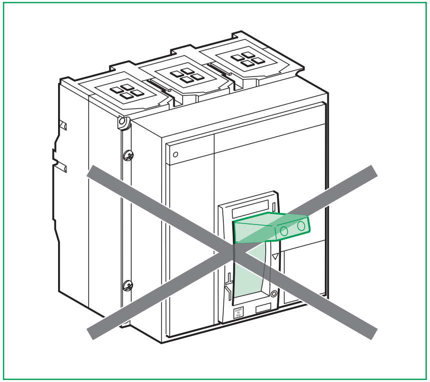
RIESGO DE ELECTROCUCION, DE QUEMADURAS O DE EXPLOSION

■ *la instalación y el mantenimiento de este aparato sólo deben ser realizados por profesionales*
■ *corte la alimentación general del aparato antes de cualquier intervención sobre o en el mismo*
■ *utilice siempre un dispositivo de detección de tensión apropiado para confirmar la falta de tensión*
■ *vuelva a colocar todos los dispositivos, las puertas y las tapas antes de poner este aparato bajo tensión.*

La falta de cumplimiento de estas precauciones puede exponer al usuario y a su entorno a riesgos de daños corporales graves susceptibles de producir la muerte .

Avant toute intervention sur l'appareil / *Before working on the device / Vor jeglichem Eingriff an dem Gerät / Prima di qualsiasi intervento sull'apparecchio / Antes de cualquier intervención sobre el aparato*

DB118056



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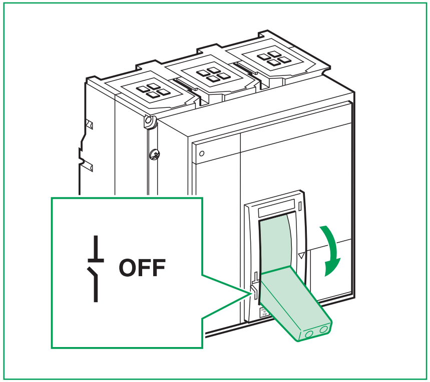

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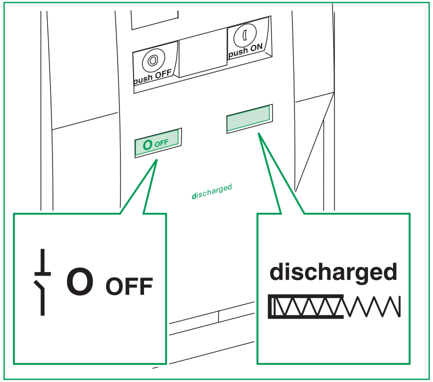


Outillage nécessaire / *Necessary tools / Benötigtes Werkzeuge / Utensili necessari / Herramientas necesarias*

Pince, tournevis (Pozidrive n°1, 2 ou plat), foret Ø 5,2.

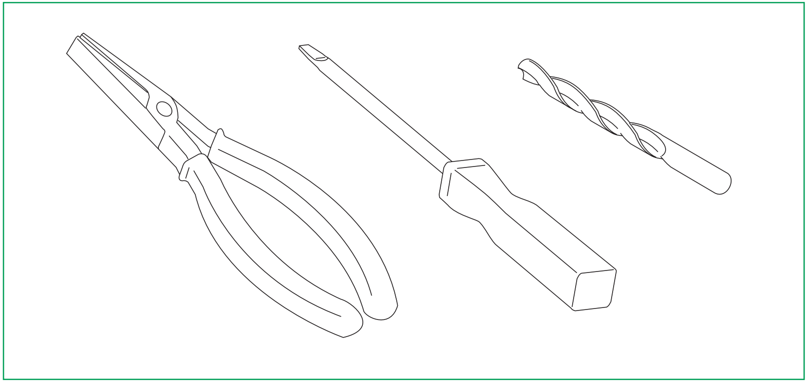
Plier, screwdriver (Pozidrive n°1, 2 or slotted), drill Ø 5.2/.

Zange, Schraubendreher (Pozidrive Nr. 1, 2 oder Schlitz), Bohrer Ø 5.2.

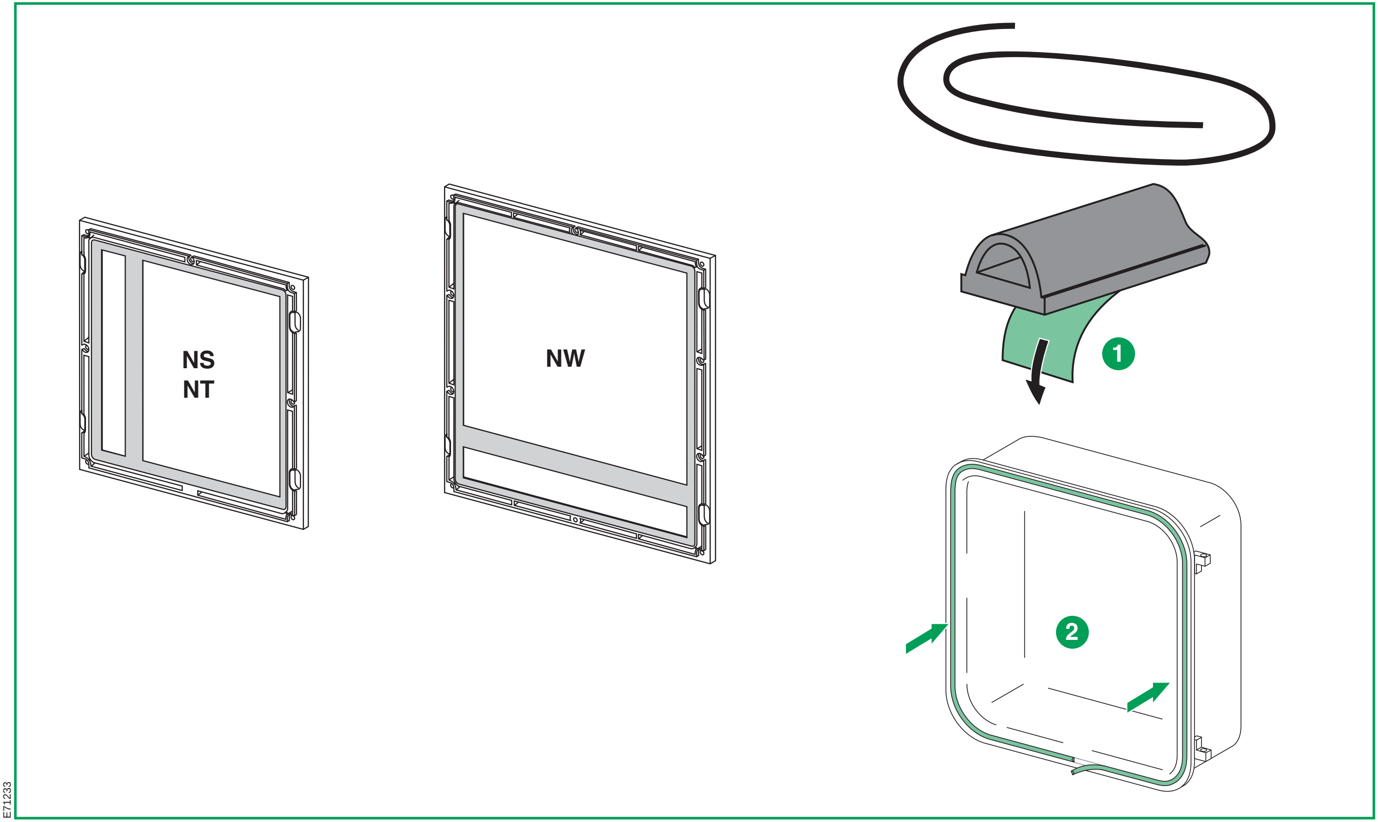
Pinza, cacciavite (Pozidrive n° 1, 2 o piatto), puntatrapano Ø 5.2.

Pinza, destornillador (Pozidrive n° 1, 2 o plano), broca Ø 5.2.

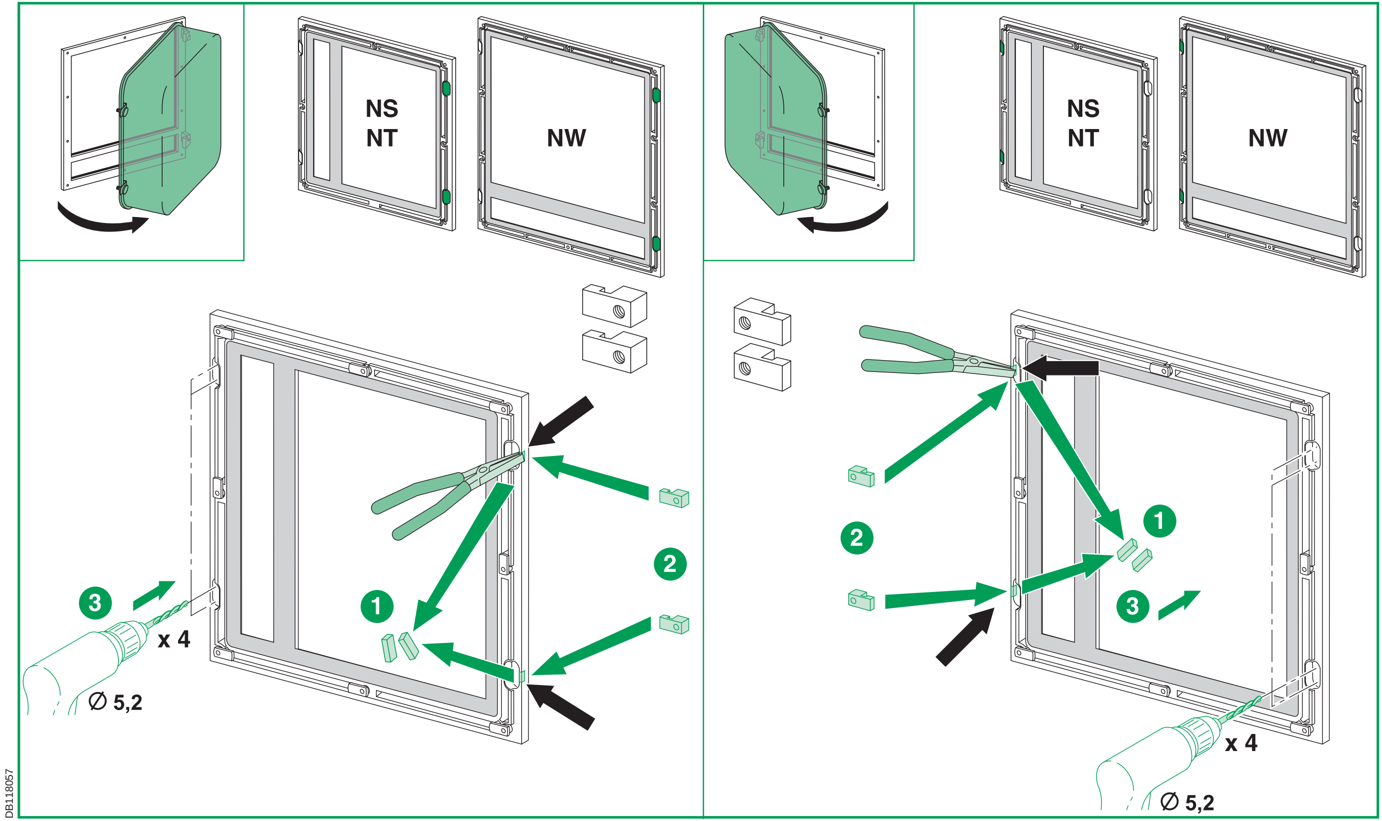
E71232A



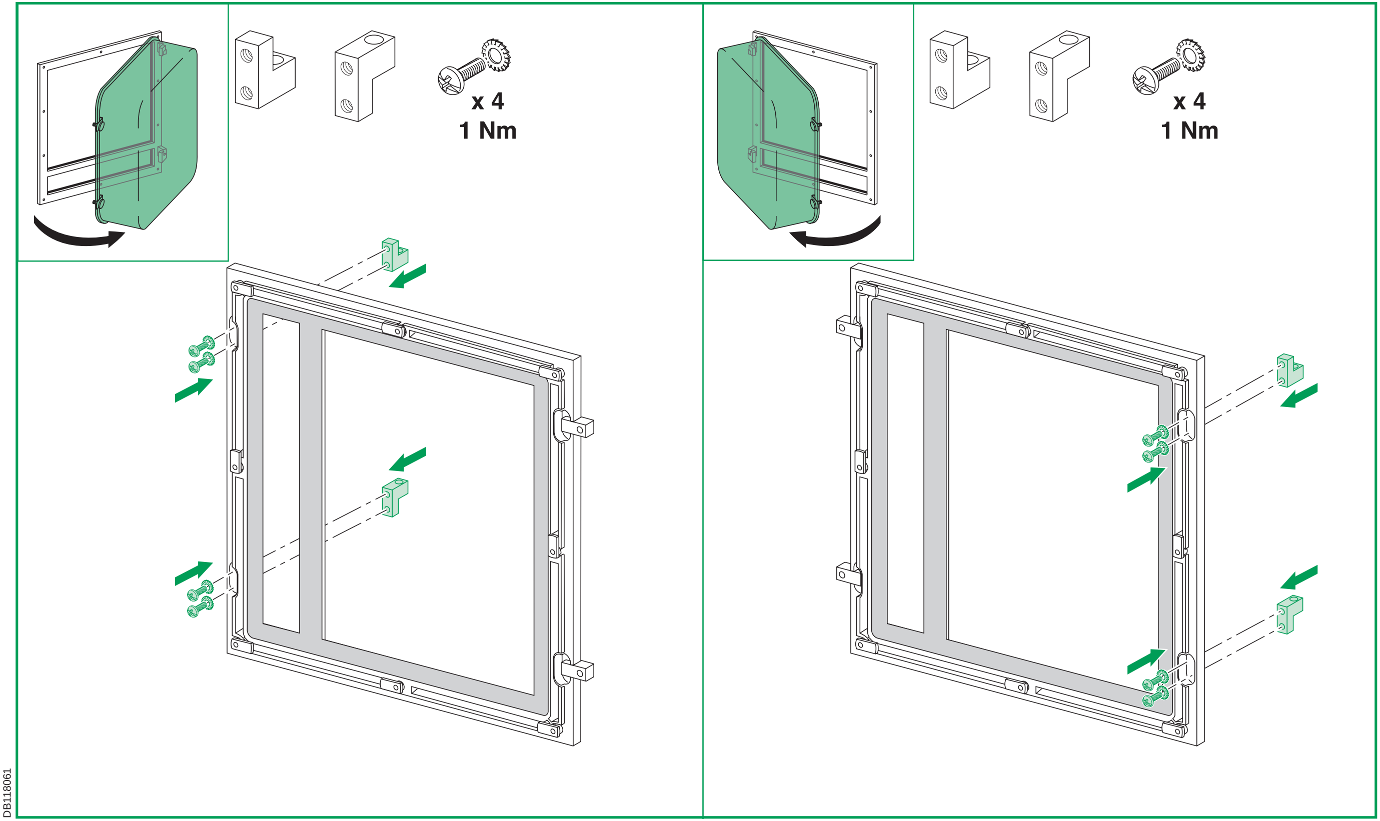
Installation / *Installation / Installation / Installazione / Instalación*



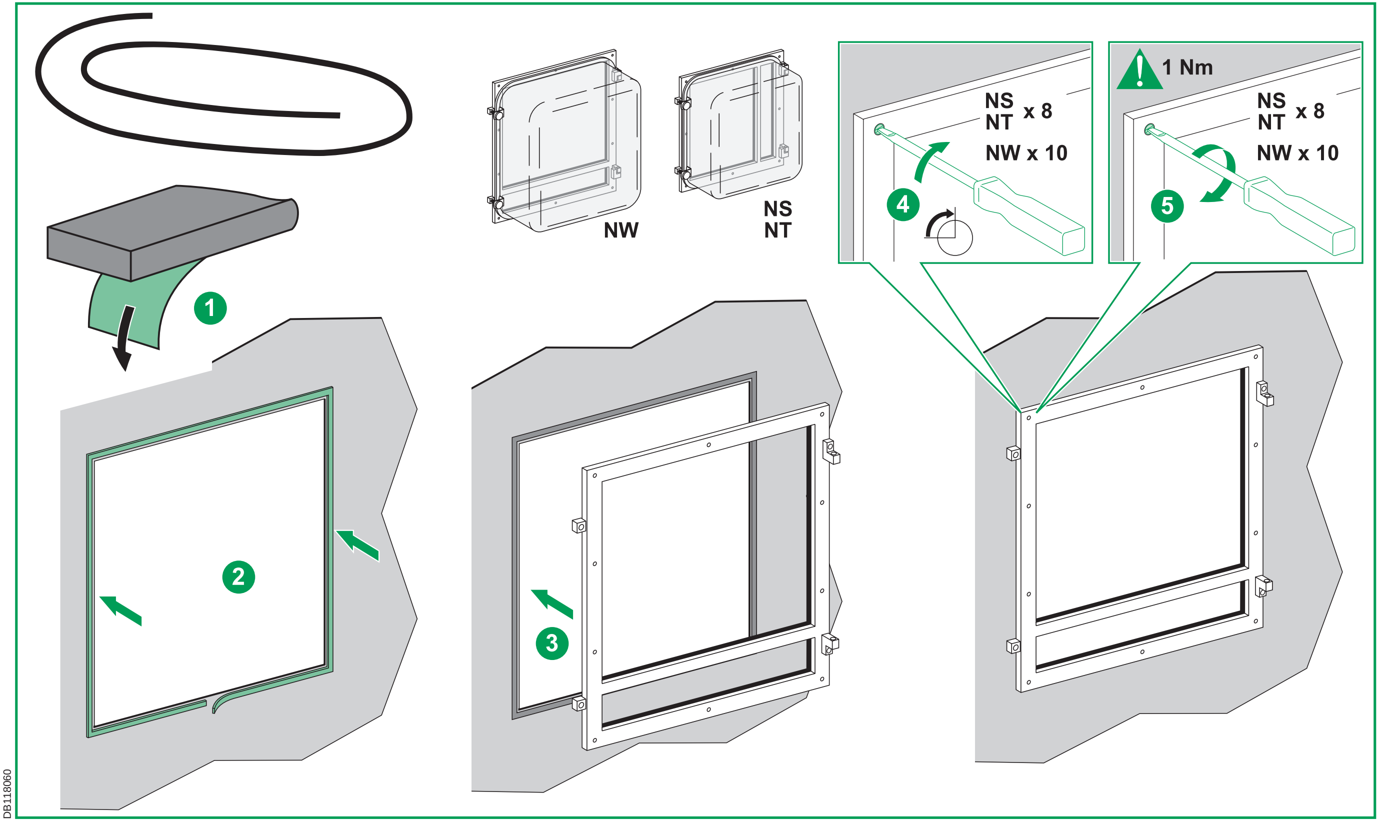
Installation / *Installation / Installation / Installazione / Instalación*



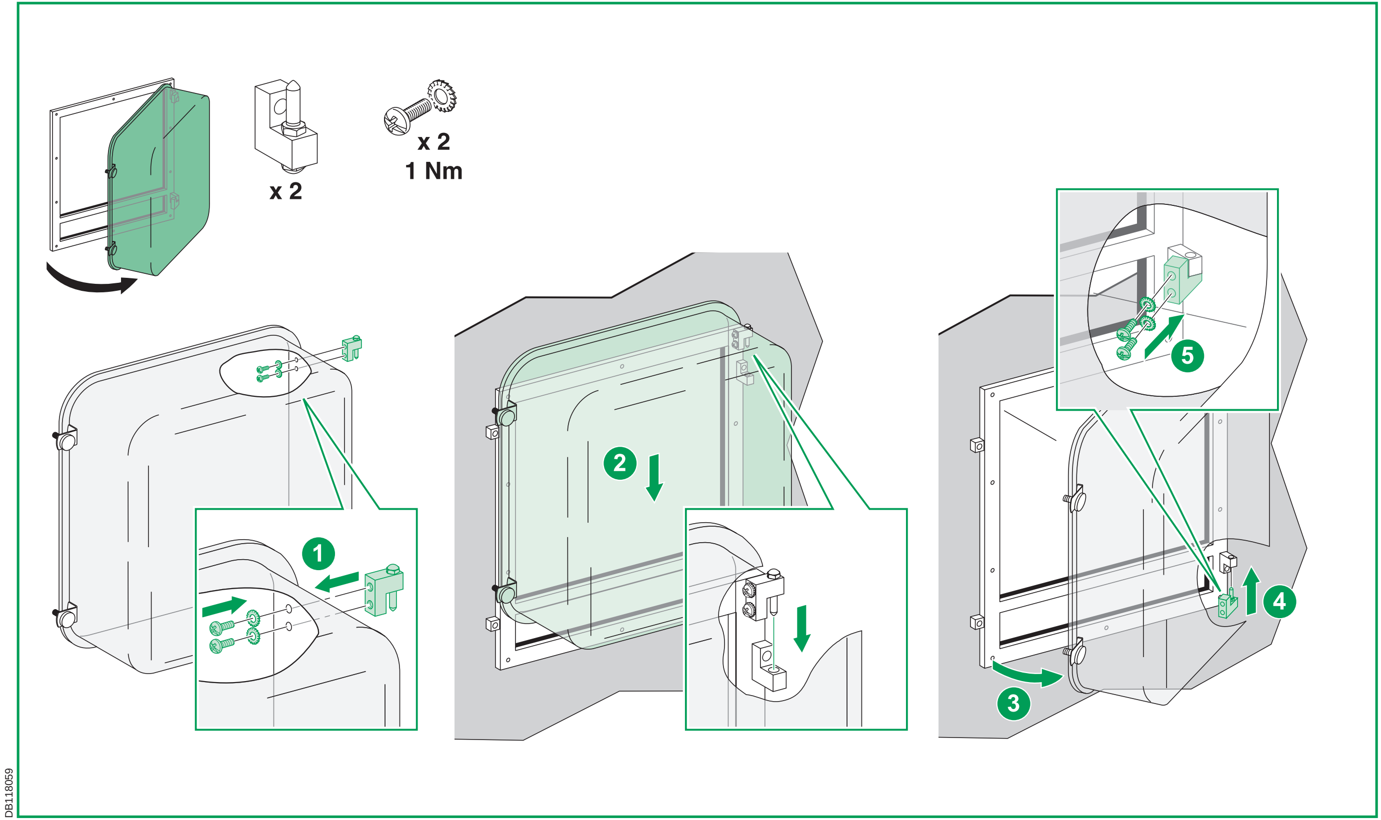
Installation / *Installation / Installation / Installazione / Instalación*



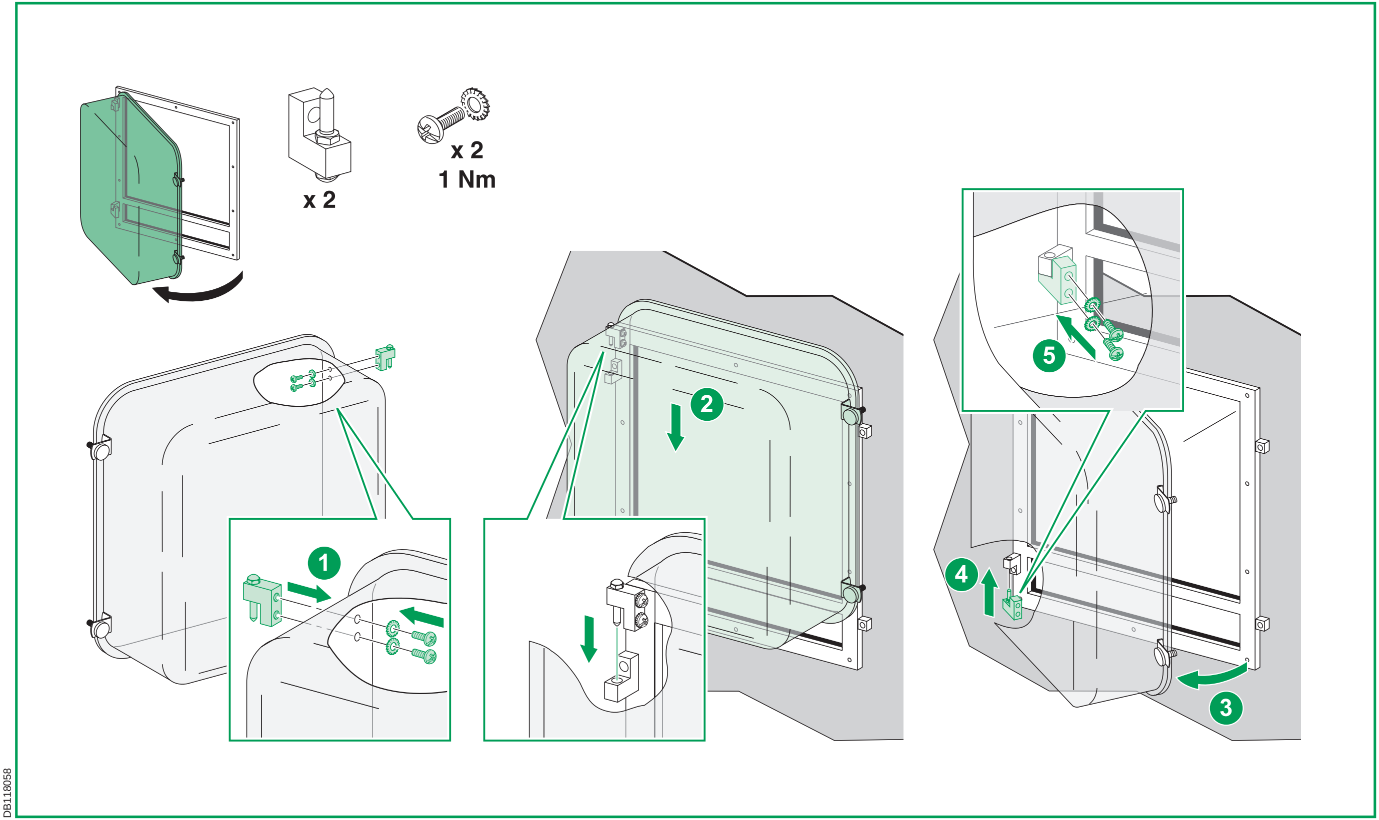
Installation / *Installation / Installation / Installazione / Instalación*



Installation / *Installation / Installation / Installazione / Instalación*



Installation / *Installation / Installation / Installazione / Instalación*



Notes / *Notes / Anmerkungen / Annotazioni / Notas*

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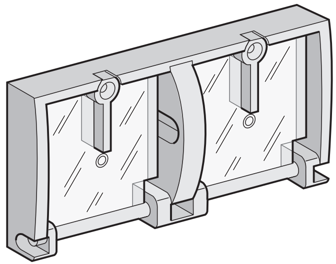
IT *Manuale d'installazione*

ES *Instrucciones de instalación*

Cadenassage des boutons poussoirs / *Pushbutton padlocking device / Abschliessbarkeit der Betätigungstaster / Blocco a lucchetto dei pulsanti / Enclavamiento de los botones-pulsadores*



E46726 A

Schneider Electric

Danger et avertissement / *Danger and warning / Vorsicht Lebensgefahr*
Norme di sicurezza e avvertenze / Instrucciones de seguridad

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■ Vor dem Eingriff ist mit einem geeigneten Spannungsmesser sicher zu stellen, daß keinerlei Spannung vorhanden ist
■ Bevor das Gerät erneut unter Spannung gesetzt wird, müssen sämtliche Vorrichtungen, Türen und Abdeckungen wieder angebracht sein.

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■ prima di qualsiasi intervento sull'apparecchio o al suo interno, interrompere l'alimentazione generale fornita all'impianto
■ verificare sempre l'assenza di tensione con uno strumento adeguato
■ prima di mettere questo apparecchio sotto tensione, riportatelo alle condizioni di sicurezza iniziali rimontando gli eventuali pezzi precedentemente tolti.

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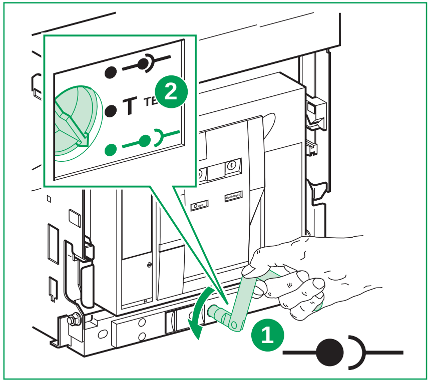
Avant toute intervention sur l'appareil / *Before working on the device / Vor jeglichem Eingriff an dem Gerät / Prima di qualsiasi intervento sull'apparecchio / Antes de cualquier intervención sobre el aparato*

Disjoncteur débrochable / *Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable*



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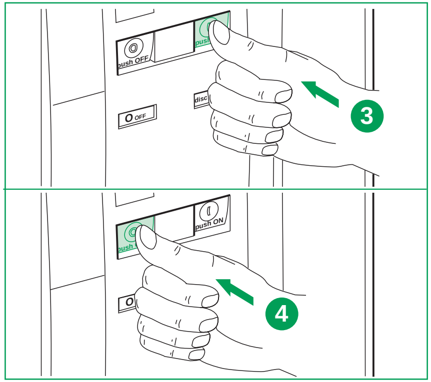

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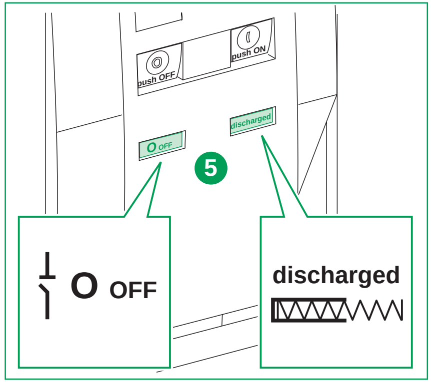
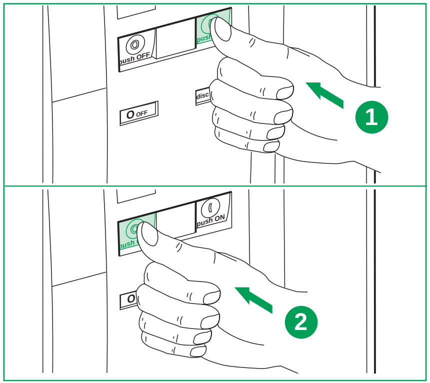


E46146A

Disjoncteur fixe / *Fixed circuit breaker / Leistungsschalter in Festeinbau / Interruttore fisso / Interruptor automático fijo*



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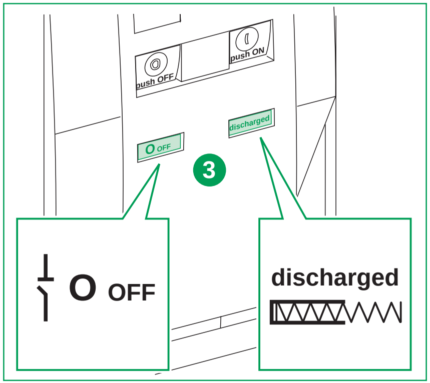


E46148A

Outillage nécessaire / *Necessary tools / Benötigtes Werkzeuge / Utensili necessari / Herramientas necesarias*

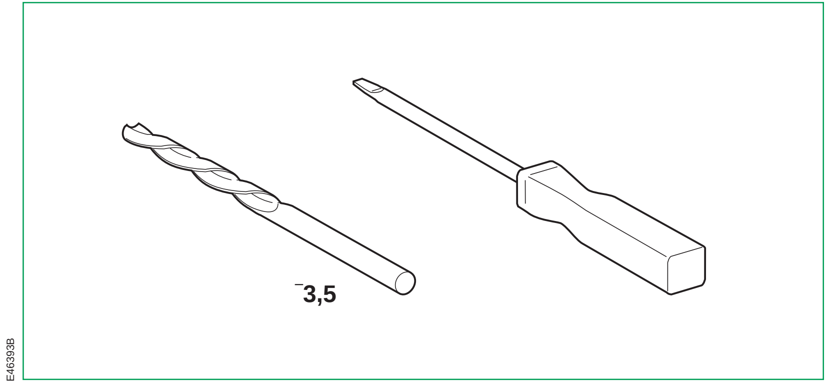
Tournevis (Pozidrive n°2, 3 ou plat).

Screwdriver (Pozidrive n°2, 3 or slotted).

Schraubendreher (Pozidrive Nr. 2, 3 oder Schlitz).

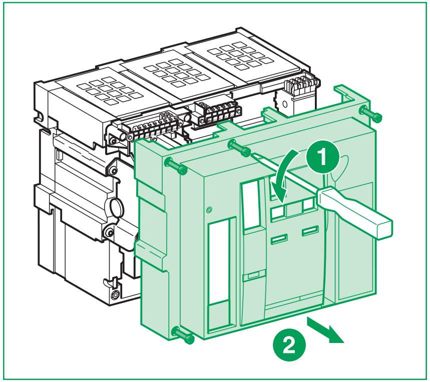
Cacciavite (Pozidrive n° 2, 3 o piatto).

Destornillador (Pozidrive n° 2, 3 o plano).



Installation / *Installation / Installation / Installazione / Instalación*

E46366A



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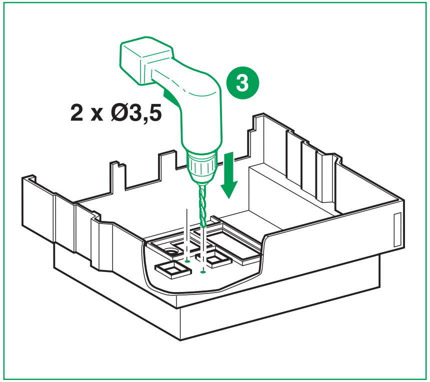

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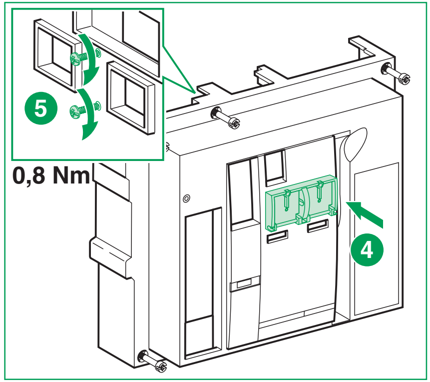

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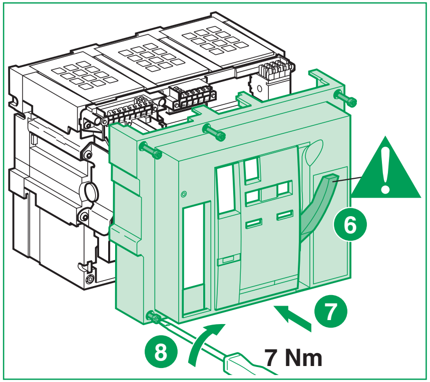

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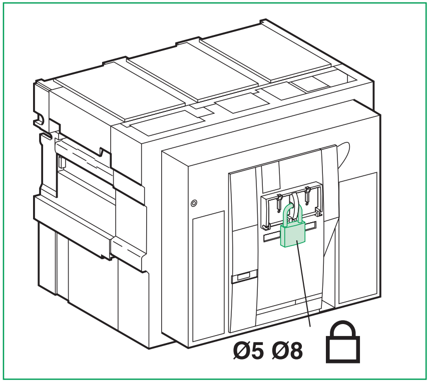

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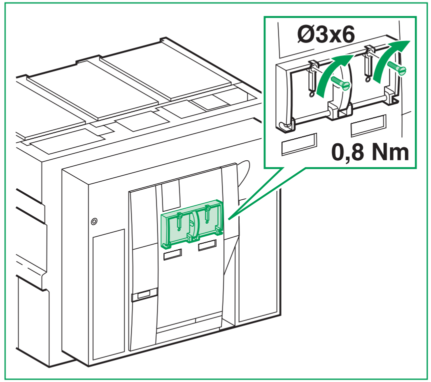

Notes / *Notes / Anmerkungen / Annotazioni / Notas*

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F Notice d'installation

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DE *Montageanleitung*

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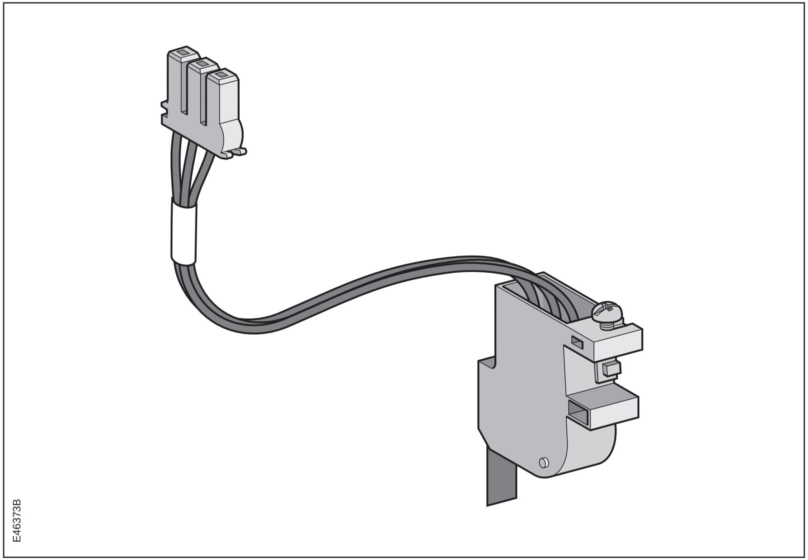
ES *Instrucciones de instalación*

Contact prêt à fermer / *Ready to close contact / Meldekontakt "Einschaltbereit" / Contatto pronto alla chiusura / Contacto preparado para cerrar*



Danger et avertissement / *Danger and warning / Vorsicht Lebensgefahr*
Norme di sicurezza e avvertenze / Instrucciones de seguridad

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RISCHIO DI ELETTROCUZIONE, DI USTIONI O DI ESPLOSIONE

c l'installazione e la manutenzione di questo apparecchio devono essere eseguite esclusivamente da personale competente

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c verificare sempre l'assenza di tensione con uno strumento adeguato

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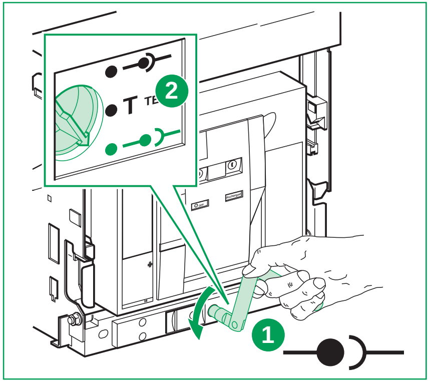
c utilice siempre un dispositivo de detección de tensión apropiado para confirmar la falta de tensión

c vuelva a colocar todos los dispositivos, las puertas y las tapas antes de poner este aparato bajo tensión.

La falta de cumplimiento de estas precauciones puede exponer al usuario y a su entorno a riesgos de daños corporales graves susceptibles de producir la muerte .

Avant toute intervention sur l'appareil / *Before working on the device / Vor jeglichem Eingriff an dem Gerät / Prima di qualsiasi intervento sull'apparecchio / Antes de cualquier intervención sobre el aparato*

Disjoncteur débrochable / *Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable*



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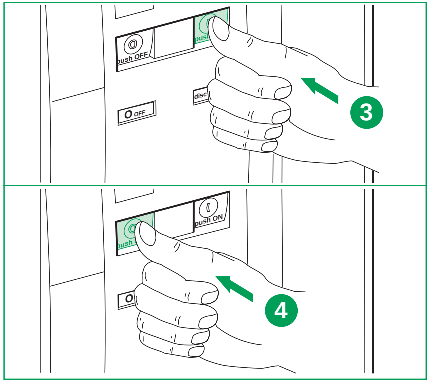

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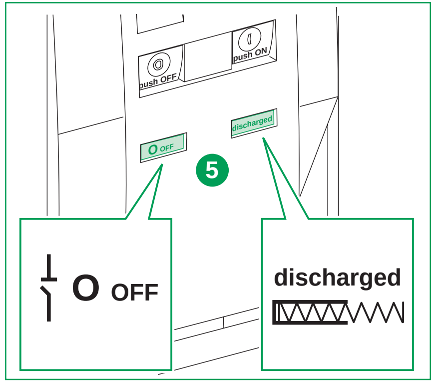

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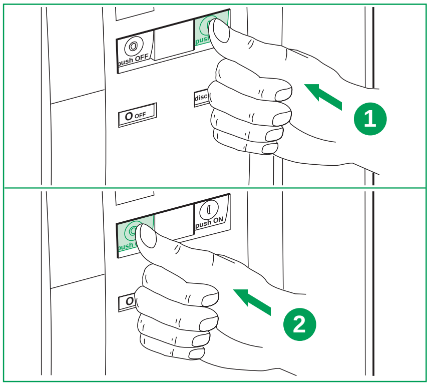

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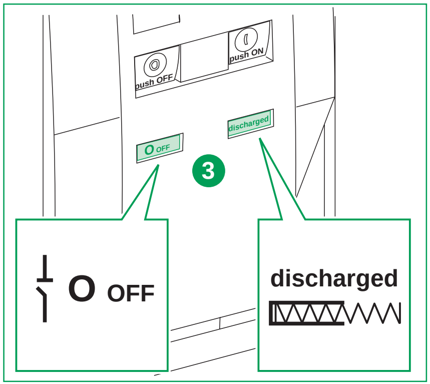


E46148A

Outillage nécessaire / *Necessary tools / Benötigtes Werkzeuge / Utensili necessari / Herramientas necesarias*

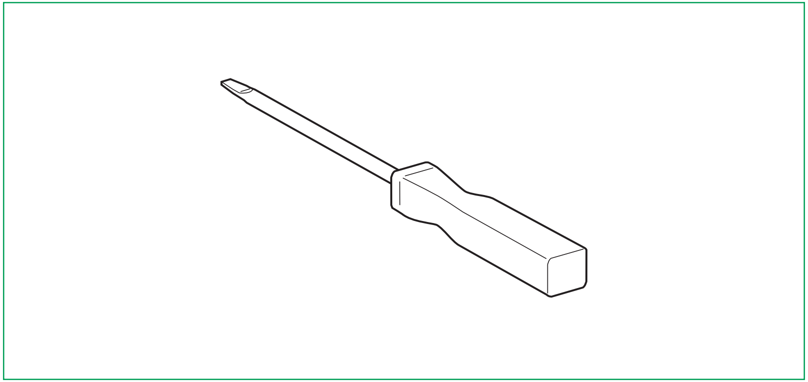
Tournevis (Pozidrive n°2, 3 ou plat).

Screwdriver (Pozidrive n°2, 3 or slotted).

Schraubendreher (Pozidrive Nr. 2, 3 oder Schlitz).

Cacciavite (Pozidrive n° 2, 3 o piatto).

Destornillador (Pozidrive n° 2, 3 o plano).



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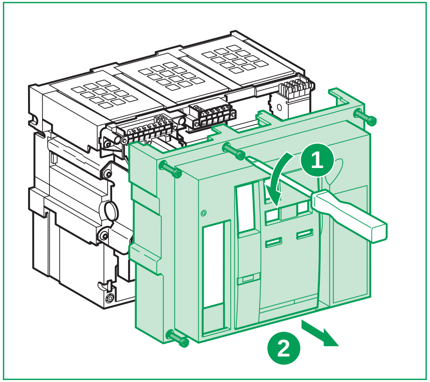
Installation / *Installation / Installation / Installazione / Instalación*



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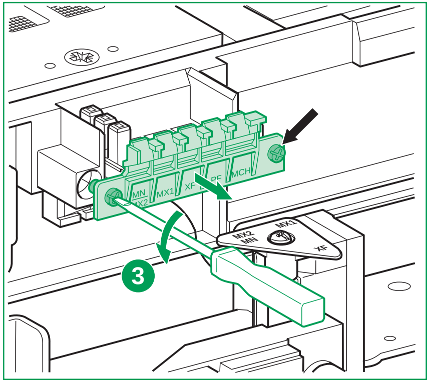

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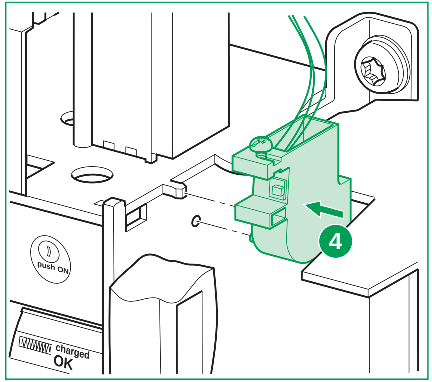

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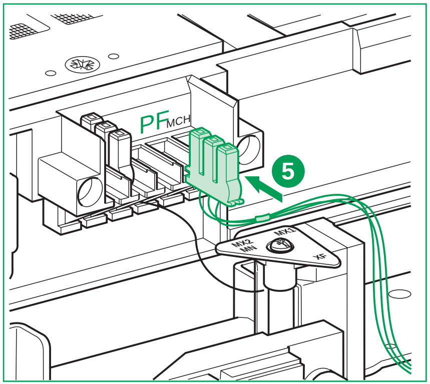

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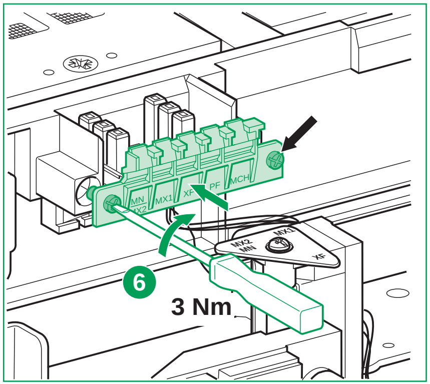

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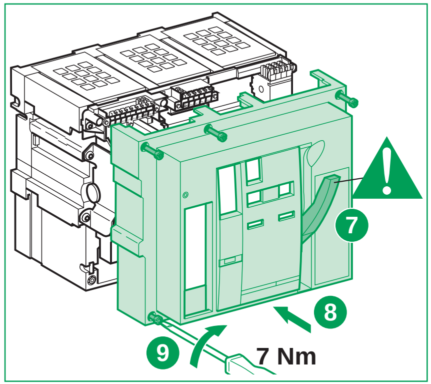

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Notes / *Notes / Anmerkungen / Annotazioni / Notas*

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F Notice d'installation

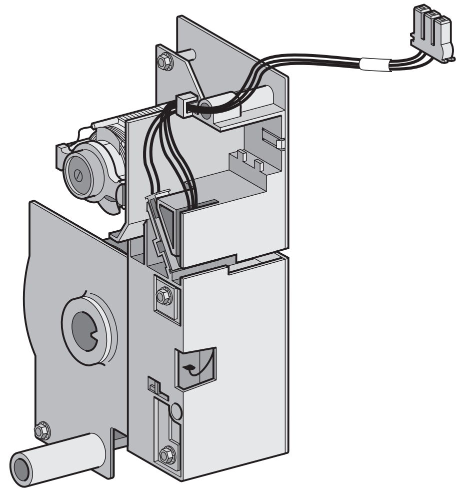
EN *Installation manual*

DE *Montageanleitung*

IT *Manuale d'installazione*

ES *Instrucciones de instalación*

Moto-réducteur MCH / *MCH gear motor / Motorantrieb MCH / Motoriduttore MCH / Motorreductor MCH*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Schneider Electric

Danger et avertissement / *Danger and warning / Vorsicht Lebensgefahr* *Norme di sicurezza e avvertenze / Instrucciones de seguridad*

Le montage des ces matériels ne peut être effectué que par des professionnels.
Le non respect des indications de la présente notice ne saurait engager la responsabilité du constructeur.

RISQUE D'ELECTROCUTION, DE BRULURES OU D'EXPLOSION

■ l'installation et l'entretien de cet appareil ne doivent être effectués que par des professionnels
■ coupez l'alimentation générale de cet appareil avant toute intervention sur ou dans l'appareil
■ utilisez toujours un dispositif de détection de tension approprié pour confirmer l'absence de tension
■ replacez tous les dispositifs, les portes et les couvercles avant de mettre cet appareil sous tension.

Le non respect de ces consignes de sécurité exposerait l'intervenant et son entourage à des risques de dommages corporels graves susceptibles d'entraîner la mort.

This equipment should only be mounted by professionals. The manufacturer shall not be held responsible for any failure to comply with the instructions given in this manual

RISK OF ELECTROCUTION, BURNS OR EXPLOSION

■ the device should only be installed and serviced by professionals
■ switch off the general power supply to the device prior to any work on or in the device
■ always use an appropriate voltage detection device to confirm the absence of voltage
■ replace all interlocks, doors and covers before energising the device.

Failure to take these precautions could expose intervener and people round to serious corporal injuries which could cause death.

Diese Bauteile dürfen nur von qualifiziertem Personal montiert werden.
Bei Nichteinhaltung der Anweisungen der vorliegenden Anleitung kann der Hersteller auf keinen Fall haftbar gemacht werden.

GEFAHR VON TÖDLICHEM ELEKTROSCHOCK, VERBRENNUNGEN UND EXPLOSION

■ Installierung und Wartung dieses Gerätes dürfen nur von qualifiziertem Personal vorgenommen werden
■ Vor jeglichem Eingriff auf oder an dem Gerät muß die Stromversorgung des Geräts unterbrochen werden
■ Vor dem Eingriff ist mit einem geeigneten Spannungsmesser sicher zu stellen, daß keinerlei Spannung vorhanden ist
■ Bevor das Gerät erneut unter Spannung gesetzt wird, müssen sämtliche Vorrichtungen, Türen und Abdeckungen wieder angebracht sein.

Falls diese Vorsichtsmaßnahmen nicht eingehalten werden, könnte dies zu schwere Verletzungen bis hin zum Tod führen.

Il montaggio di questi materiali deve essere eseguito esclusivamente da personale competente.
In caso di mancato rispetto delle indicazioni fornite nel presente manuale, il costruttore non potrà essere ritenuto responsabile.

RISCHIO DI ELETTROCUZIONE, DI USTIONI O DI ESPLOSIONE

■ l'installazione e la manutenzione di questo apparecchio devono essere eseguite esclusivamente da personale competente
■ prima di qualsiasi intervento sull'apparecchio o al suo interno, interrompere l'alimentazione generale fornita all'impianto
■ verificare sempre l'assenza di tensione con uno strumento adeguato
■ prima di mettere questo apparecchio sotto tensione, riportatelo alle condizioni di sicurezza iniziali rimontando gli eventuali pezzi precedentemente tolti.

Il mancato rispetto delle indicazioni sulla sicurezza riportate in questo documento, potrebbe causare gravi incidenti, tali da ferire o portare alla morte l'operatore.

El montaje de estos materiales sólo puede ser realizado por profesionales.
El incumplimiento de las indicaciones dadas en estas instrucciones anula la responsabilidad del constructor.

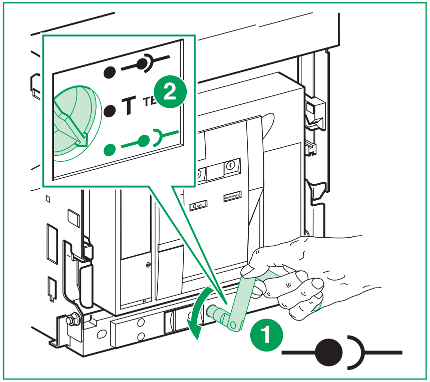
RIESGO DE ELECTROCUCION, DE QUEMADURAS O DE EXPLOSION

■ la instalación y el mantenimiento de este aparato sólo deben ser realizados por profesionales
■ corte la alimentación general del aparato antes de cualquier intervención sobre o en el mismo
■ utilice siempre un dispositivo de detección de tensión apropiado para confirmar la falta de tensión
■ vuelva a colocar todos los dispositivos, las puertas y las tapas antes de poner este aparato bajo tensión.

La falta de cumplimiento de estas precauciones puede exponer al usuario y a su entorno a riesgos de daños corporales graves susceptibles de producir la muerte .

Avant toute intervention sur l'appareil / *Before working on the device / Vor jeglichem Eingriff an dem Gerät / Prima di qualsiasi intervento sull'apparecchio / Antes de cualquier intervención sobre el aparato*

Disjoncteur débrochable / ***Drawout circuit breaker / Leistungsschalter in Einschubtechnik / Interruttore estraibile / Interruptor automático seccionable***



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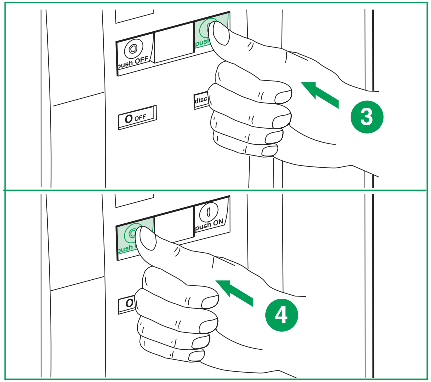

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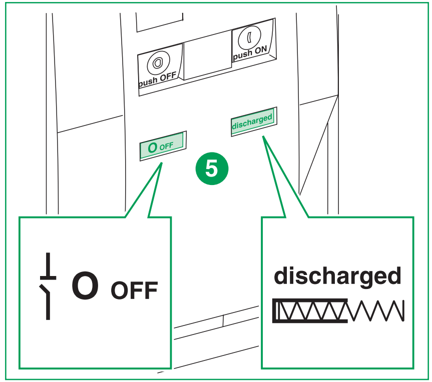

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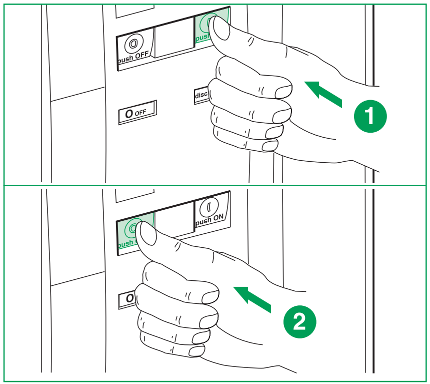
Disjoncteur fixe / ***Fixed circuit breaker / Leistungsschalter in Festeinbau / Interruttore fisso / Interruptor automático fijo***



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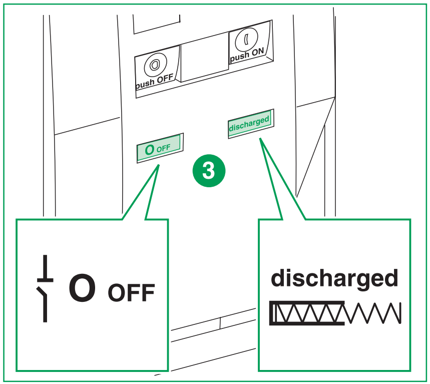


E46148A

Outillage nécessaire / *Necessary tools / Benötigtes Werkzeuge / Utensili necessari / Herramientas necesarias*

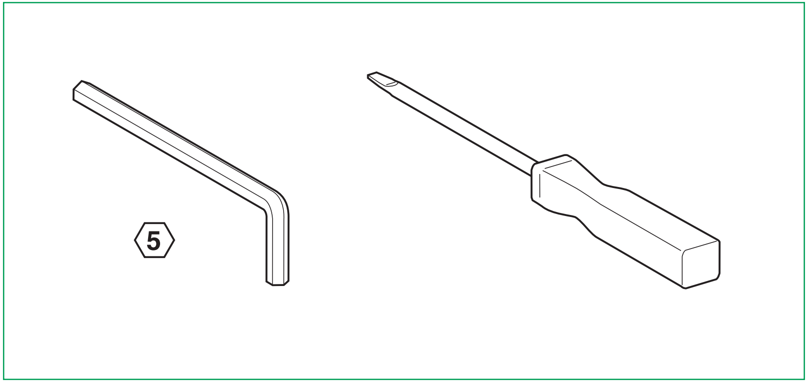
Clef 6 pans, tournevis (Pozidrive n°2, 3 ou plat).

Hex key, screwdriver (Pozidrive n°2, 3 or slotted).

Sechskantschlüssel, Schraubendreher (Pozidrive Nr. 2, 3 oder Schlitz).

Chiave per viti a brugola, cacciavite (Pozidrive n° 2, 3 o piatto).

Llave allen, destornillador (Pozidrive n° 2, 3 o plano).



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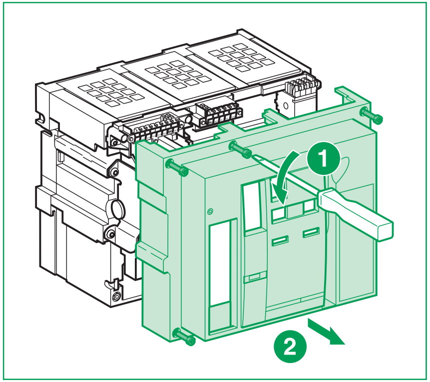
Installation NW standard / *Installation NW standard / Installation NW standard / Installazione NW standard / Instalación NW estándard*



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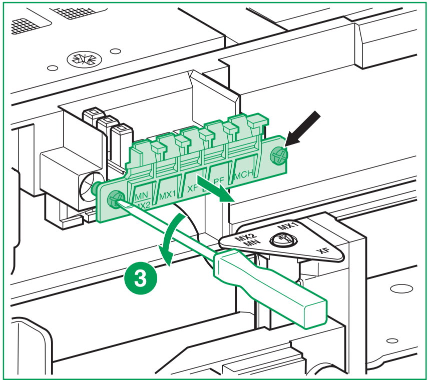

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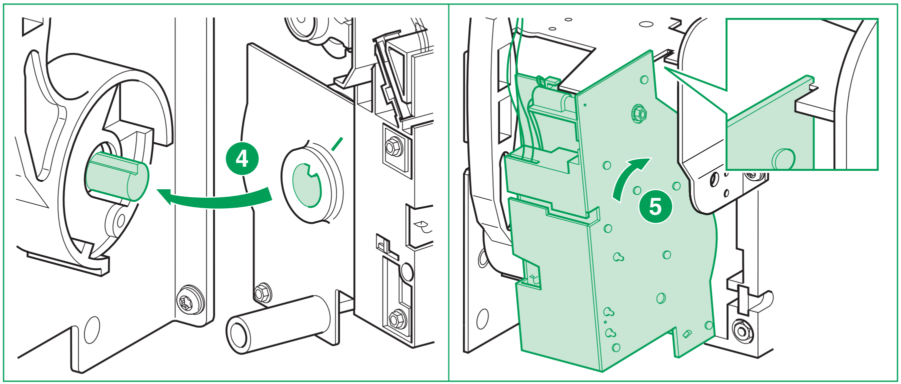

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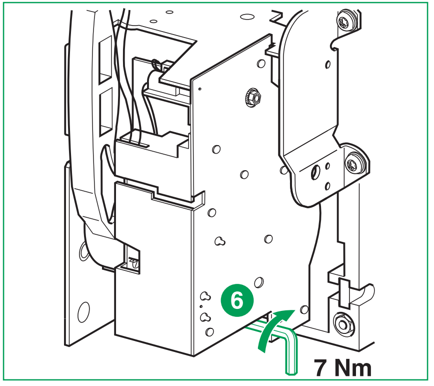

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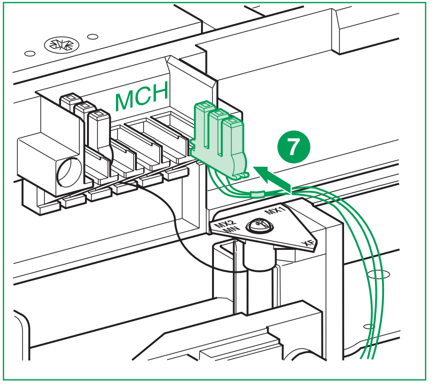

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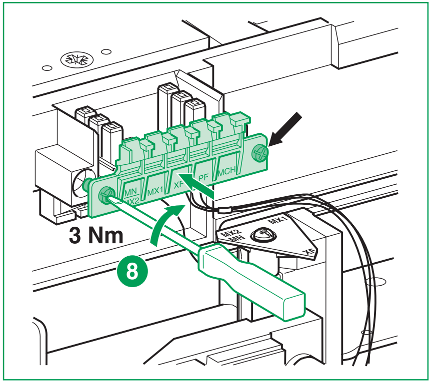

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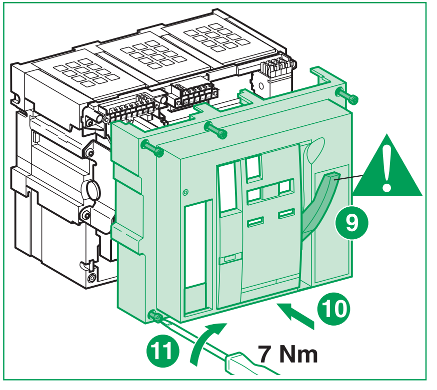

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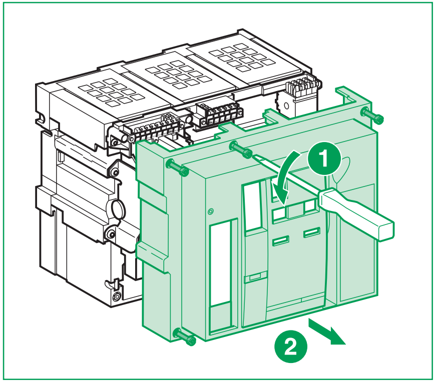

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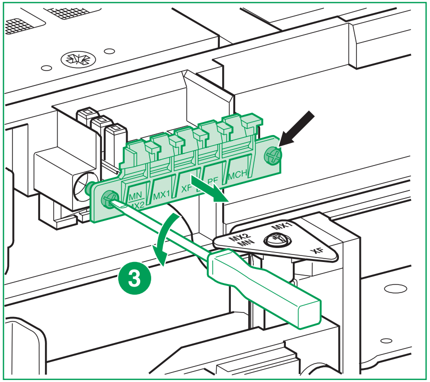

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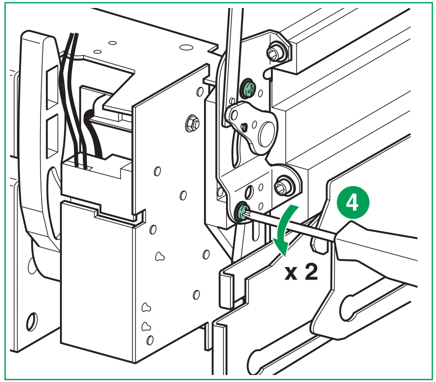

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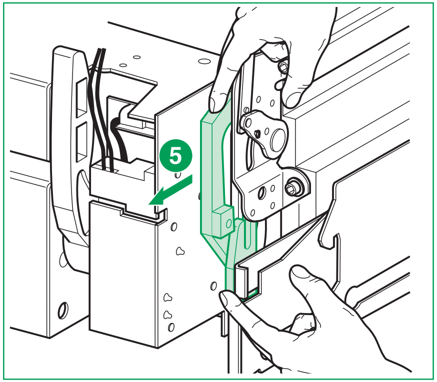

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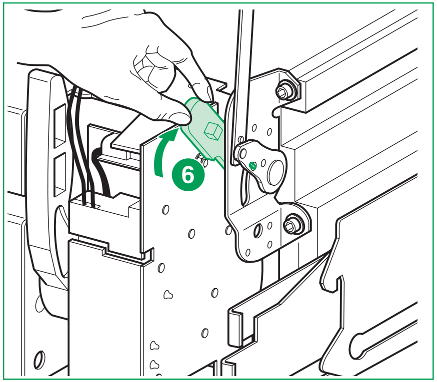

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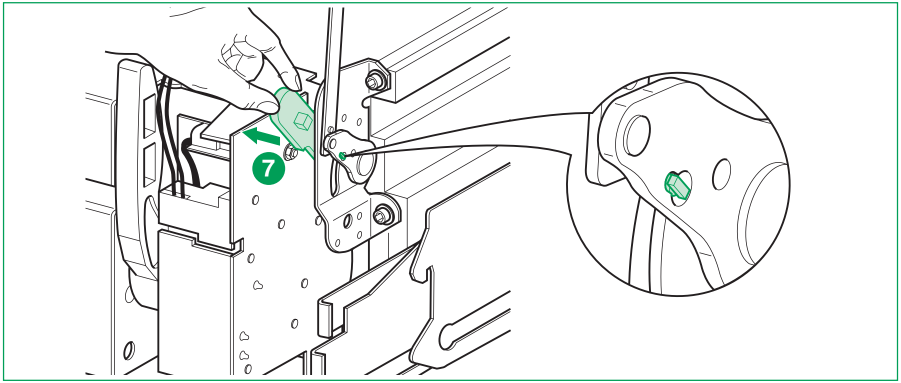

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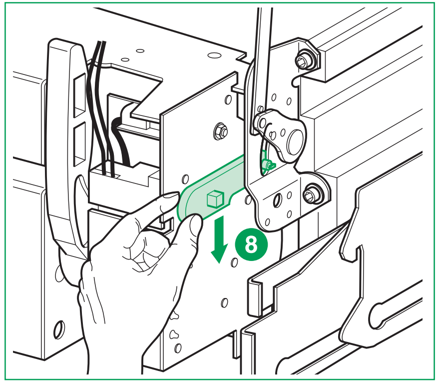

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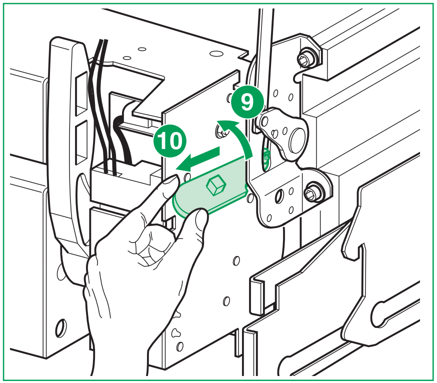

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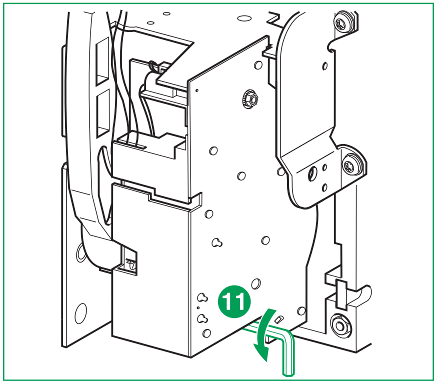

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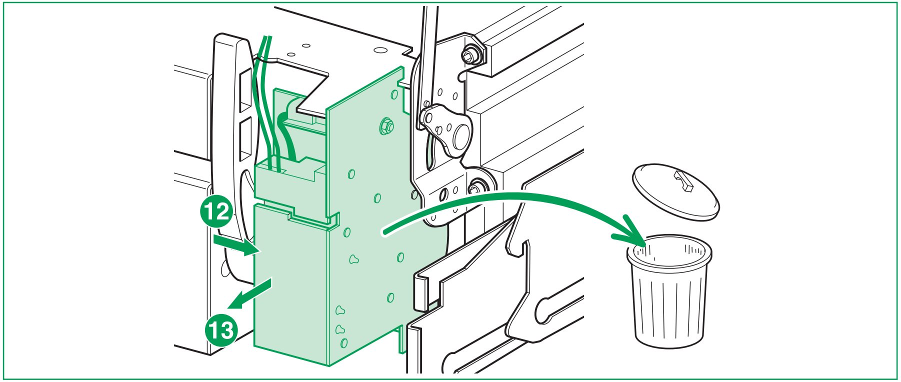

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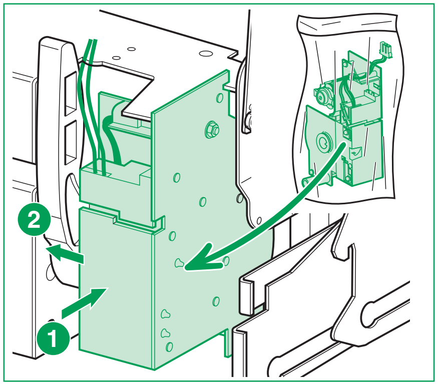

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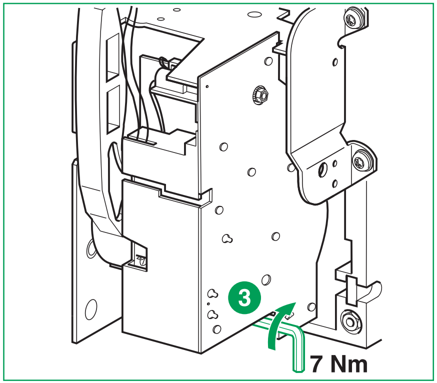

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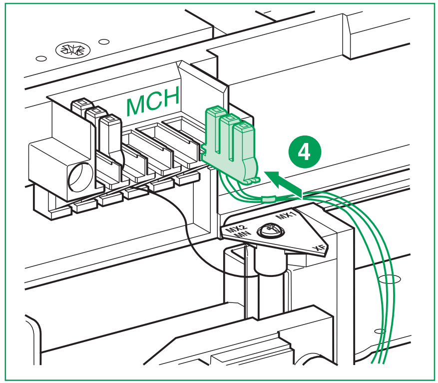

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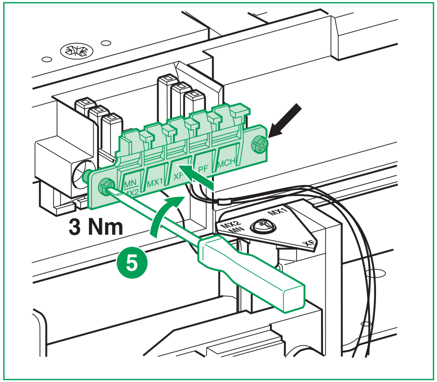

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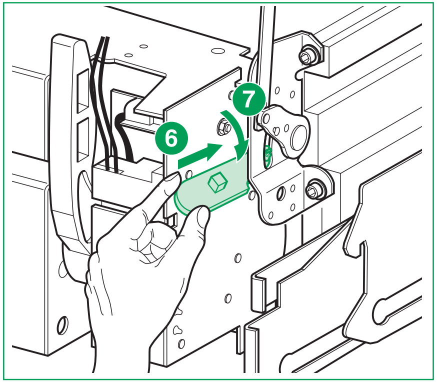

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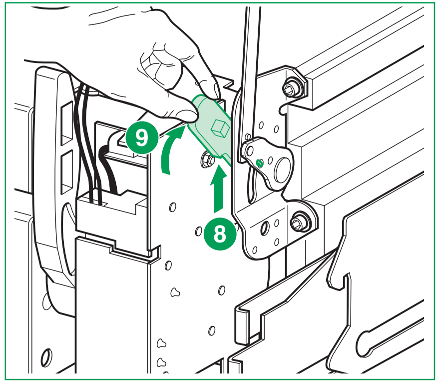

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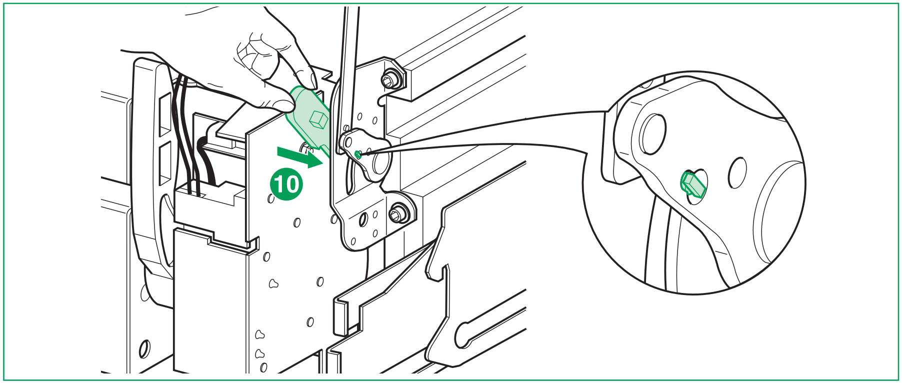

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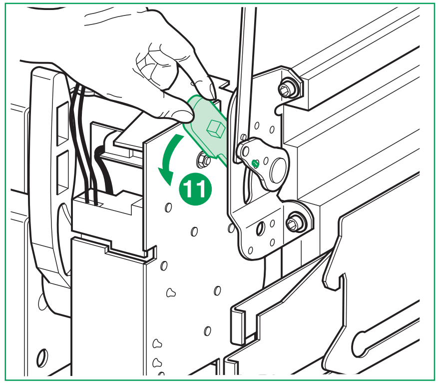

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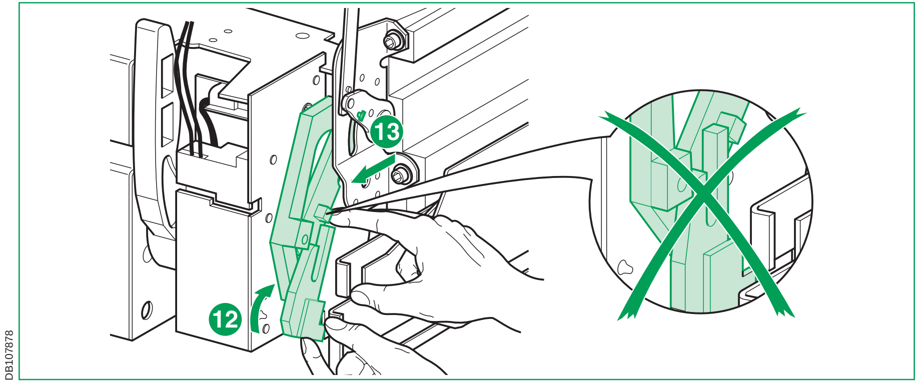

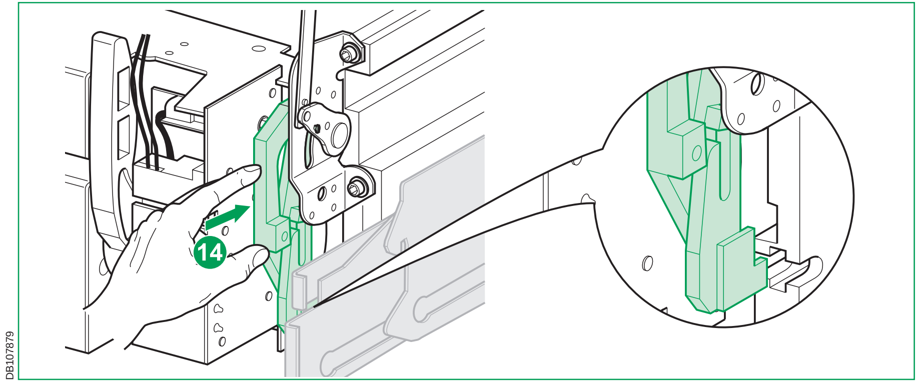

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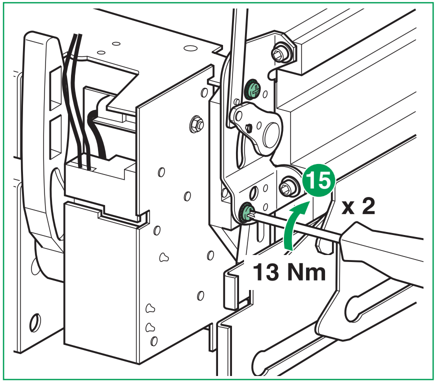

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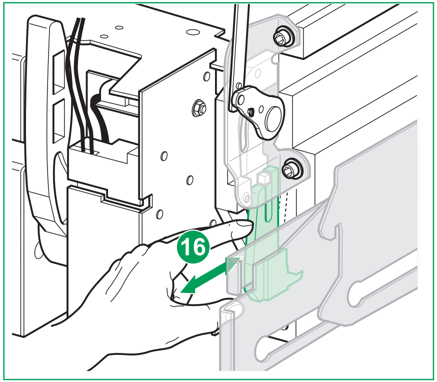

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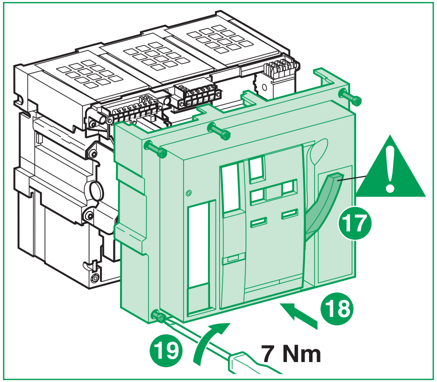

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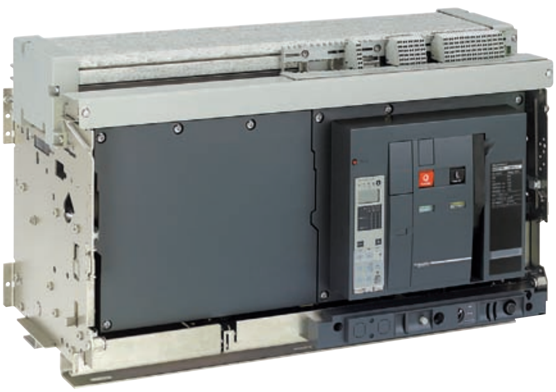
Catalogue
2009



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Masterpact NT and NW

The standard for power circuit breakers around the world.

Over the years, other major manufacturers have tried to keep up by developing products incorporating Masterpact's most innovative features, including the breaking principle, modular design and the use of composite materials.

In addition to the traditional features of power circuit breakers (withdrawability, discrimination and low maintenance), Masterpact NT and NW ranges offer built-in communications and metering functions, all in optimised frame sizes.

Masterpact NT and NW incorporate the latest technology to enhance both performance and safety. Easy to install, with user-friendly, intuitive operation and environment-friendly design, Masterpact NT and NW are, quite simply, circuit breakers of their time.

Covering all your applications

Masterpact meets the needs of all types of LV electrical distribution networks.

Building
> Hotels
> Hospitals
> Offices
> Retail

Data Centres and Networks

Industry
> Mining and minerals
> Automotive
> Food and beverage
> Chemical industry

Energy and Infrastructures
> Airports
> Oil and gas
> Water
> Electrical energy
> Navy

An answer to specific applications

> 1000 V for mining applications
> Direct current networks
> Corrosion protection
> Switch-disconnectors and earthing switches
> Automatic transfer switching equipment (ATSE) for emergency power systems
> High electrical endurance applications: Masterpact NT H2 is a high performance device offering high breaking capacity (Icu: 50 kA/480 V) and a high level of discrimination, all in a small volume.

Whenever high short circuit is involved

Masterpact UR is a low voltage ultra rapid opening circuit breaker. Its fault detection rate and its reaction speed mean that it will stop a short circuit from developing. As a result, this is the key component in very high power installations equipped with a number of power sources connected in parallel.

Masterpact UR truly comes into its own when short circuit currents can reach very high levels and when continuity of service is a must: offshore installations, cement plants, petrochemical industry. It is also especially suited to electrical installations on board merchant.

All standards
Masterpact is compliant with international standards IEC 60947-1 and 2, IEC 68230 for type 2 tropicalisation, UL489, ANSI, UL1066, CCC and GOST.

Two families and three frame sizes

The range of power circuit breakers includes two families:

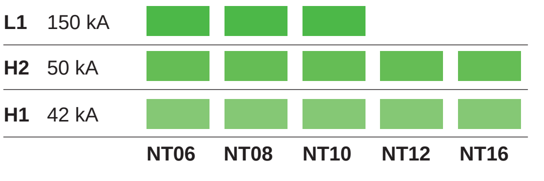
> Masterpact NT, the world's smallest true power circuit breaker, with ratings from 630 to 1600 A
> Masterpact NW, in two frame sizes, one from 800 to 4000 A and the other from 4000 A to 6300 A.

5 performance levels

> N1 - for standard applications with low short-circuit levels.
> H1 - for industrial sites with high short-circuit levels or installations with two parallel-connected transformers.
> H2 - high-performance for heavy industry where very high short-circuits can occur.
> H3 - for incoming devices supplying critical applications requiring both high performance and a high level of discrimination.
> L1 - for high current-limiting capability and a discrimination level (37 kA) as yet unequalled by any other circuit breaker of its type; intended for the protection of cable-type feeders or to raise the performance level of a switchboard when the transformer power rating is increased.

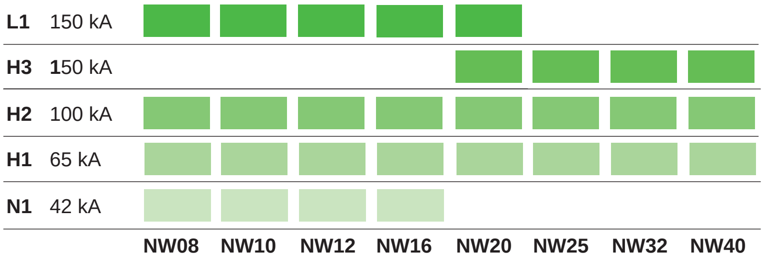
Masterpact NT

630 to 1600 A



Masterpact NW

800 to 4000 A



4000 to 6300 A

Optimised volumes and ease of installation

Aiming at standardising electrical switchboards at a time when installations are increasingly complex, Masterpact provides an unequalled simplicity, both concerning choice and installation.

The smallest circuit breaker in the world

Masterpact NT innovates by offering all the performance of a power circuit breaker in an extremely small volume. The 70 mm pole pitch means a three-pole draw out circuit breaker can be installed in a switchboard section 400 mm wide and 400 mm deep.

Maximum security

The arc chutes absorb the energy released during breaking, thus limiting the stresses exerted on the installation.
They filter and cool the gases produced, reducing effects perceptible from the outside.

Optimised volumes

Up to 4000 A, Masterpact NW circuit breakers are all the same size, the same as the old M08 to 32 range.
From 4000 A to 6300 A, there is just one size.

More than

60

patents are used to design Masterpact

Retrofit solutions

> Special connections terminals are available to replace a fixed or a drawout Masterpact M08 to 32 with a Masterpact NW, without modifying the busbars or the door cut-out.

> "Plug and Play" retrofit solution : this solution enables retrofitting of Masterpact M units with considerably reducing on-site intervention time and getting the performance of last generation device.

30 minutes and **2** easy operations

The retrofit solutions use a factory modified and adapted Masterpact NW which is installed in Masterpact M's original chassis.

Standardisation of the switchboard

With optimised sizes, the Masterpact NT and NW ranges simplify the design of switchboards and standardise the installation of devices:

> a single connection layout for Masterpact NT

> three connection layouts for Masterpact NW:

- one from 800 to 3200 A
- one for 4000 A
- one up to 6300 A

> horizontal or vertical rear connections can be modified on-site by turning the connectors 90° or they can even be replaced by front connection terminals

> identical connection terminals for the fixed or draw-out version for each rating (Masterpact NW)

> front connection requires little space because the connectors not increase the depth of the device.

Practical installation solutions

The Masterpact NW range further improves the installation solutions that have built the success of its predecessors:

> incoming connection to top or bottom terminals

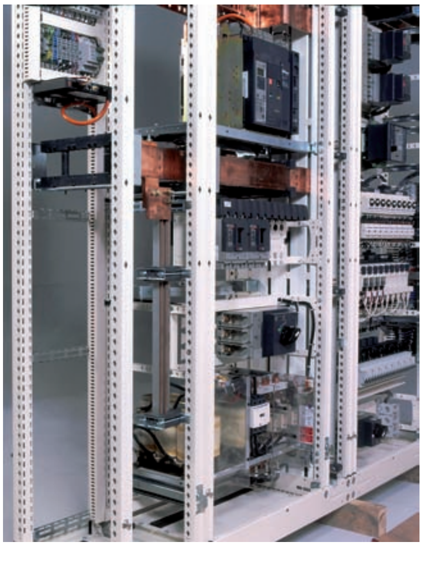
> no safety clearance required

> connection:

- horizontal or vertical rear connection
- front connection with minimum extra space
- mixed front and rear connections

> 115 mm pole pitch on all versions

> no derating up to 55 °C and 4000 A.



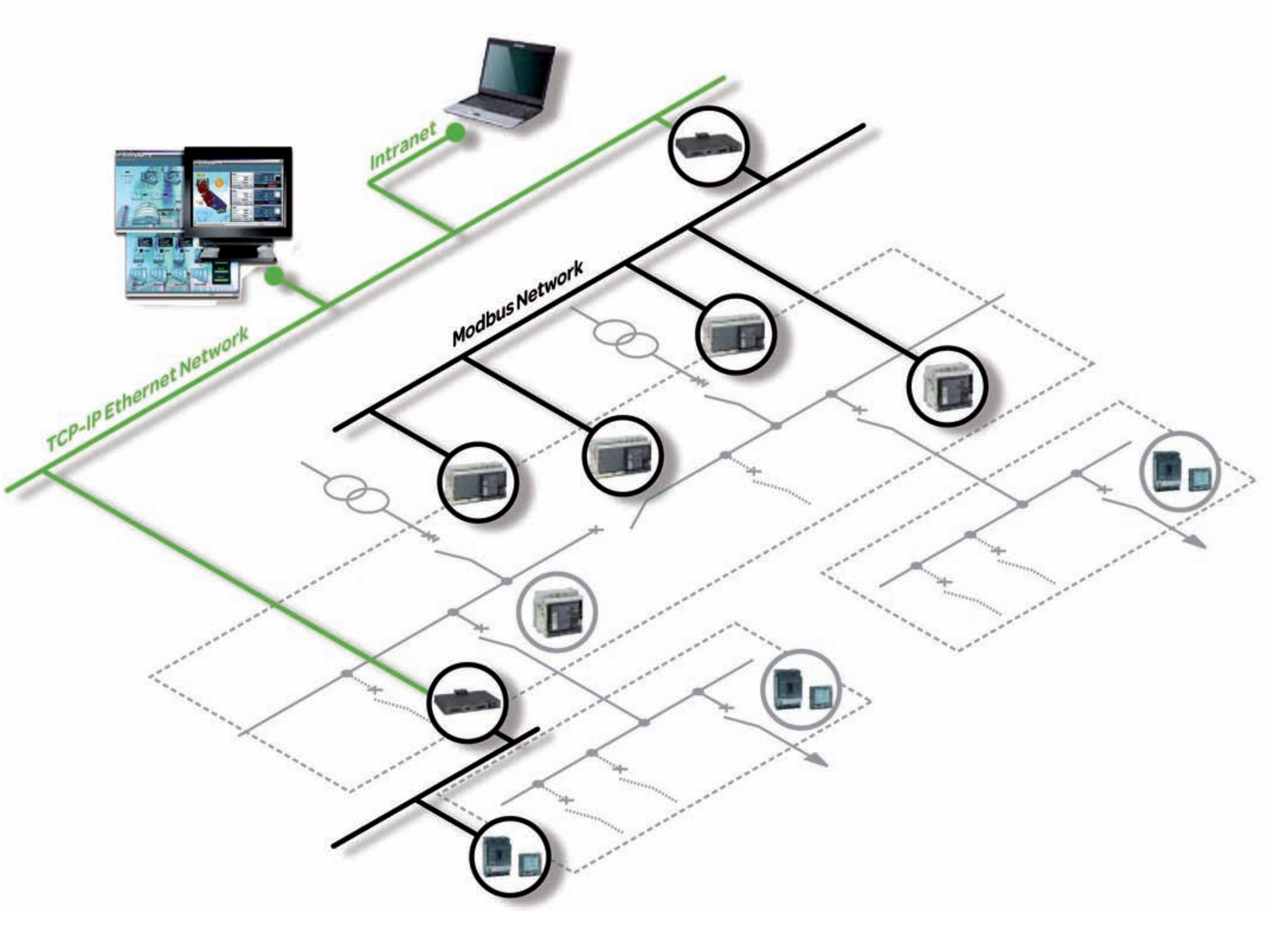
Compliance with environmental requirements

The materials used for Masterpact are not potentially dangerous to the environment and are marked to facilitate sorting for recycling.

Production facilities are non-polluting in compliance with the ISO 14001 standard.

Monitoring and protecting your low voltage network

Masterpact can be integrated in a general supervision system to optimise your electrical installation.



Intuitive use

Micrologic control units are equipped with a digital LCD display used in conjunction with simple navigation buttons. Users can directly access parameters and settings. Navigation between screens is intuitive and the immediate display of values greatly simplifies settings. Text is displayed in the desired language.

Ensuring safety at any time

All Masterpact circuit breakers are equipped with a Micrologic electronic control unit that offers all types of current and advanced protection, measurement and communication. Protection functions are separated from the measurement functions and are managed by an ASIC electronic component. This independence guarantees immunity from conducted or radiated disturbances and ensures the highest degree of reliability.

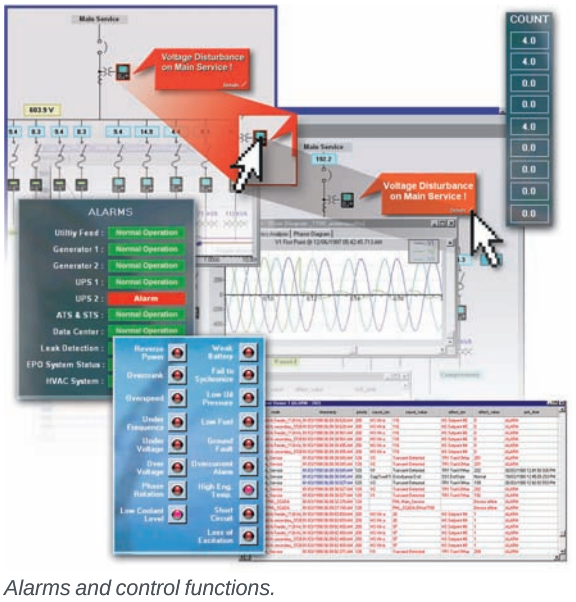
Maximising continuity of service

Because a LV power supply interruption is unacceptable especially in critical power applications, an automatic system is required for LV transfer switching. For your peace of mind, Masterpact enables automatic control and management of power sources in your low voltage distribution network guaranteeing the hi-reliability of your installation.

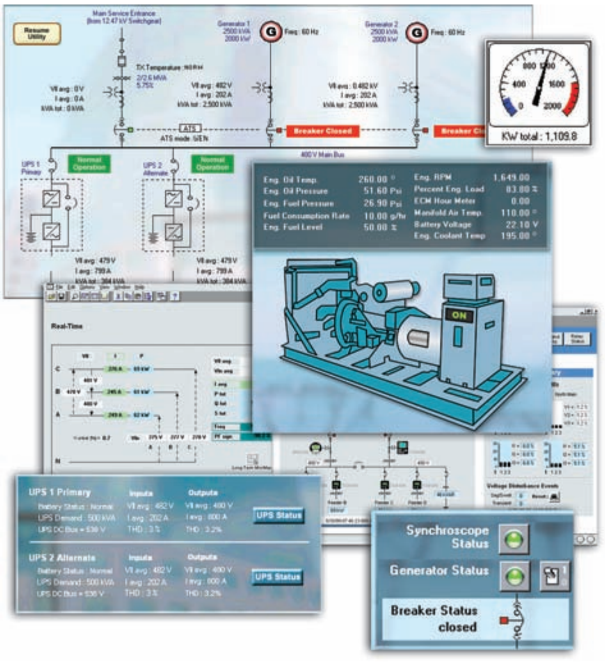
Optimising the management of your electrical installation

When equipped with a Micrologic type P, Masterpact can be integrated in a general supervision system to optimise installation operation and maintenance. Alarms may be programmed for remote indications. Used with PowerLogic ION Enterprise software, you can exploit the electrical data (current, voltage, frequency, power, and power quality) to optimise continuity of service and energy management:

> reduce energy and operations costs
> improve power quality, reliability and uptime
> optimise equipment use.



Alarms and control functions.



Real-time display of the data.

General contents

>TOOLS

schneider-electric.com

This international site allows you to access all the Schneider Electric products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- complete library: technical documents, catalogs, FAQs, brochures…
- selection guides from the e-catalog.
- product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, the list of country contacts…

The technical guide

These technical guides help you comply with installation standards and rules i.e.: the electrical installation guide, the protection guide, the switchboard implementation guide, the technical booklets and the co-ordination tables all form genuine reference tools for the design of high performance electrical installations.
For example, the LV protection co-ordination guide - discrimination and cascading - optimises choice of protection and connection devices while also increasing markedly continuity of supply in the installations.

Functions and characteristics

Functions and characteristics

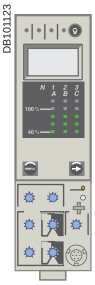
General overview
Detailed contents

This chapter describes all the functions offered by Masterpact NT and NW devices. The two product families have identical functions implemented using the same or different components depending on the case.

PB100762-60A

PB104347A55

DB101123



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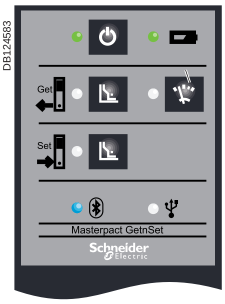

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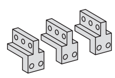

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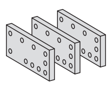

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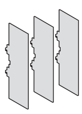

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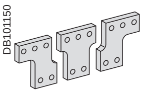
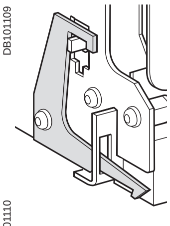


PB104348A55

Locking page A-35

■ pushbutton locking by padlockable transparent cover
■ OFF-position locking by padlock or keylock
■ chassis locking in disconnected position by keylock
■ chassis locking in connected, disconnected and test positions
■ door interlock (inhibits door opening with breaker in connected position)
■ racking interlock (inhibits racking with door open)
■ racking interlock between crank and OFF pushbutton
■ automatic spring discharge before breaker removal
■ mismatch protection.

DB101109



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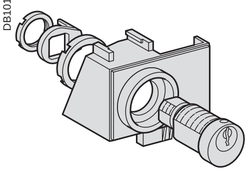

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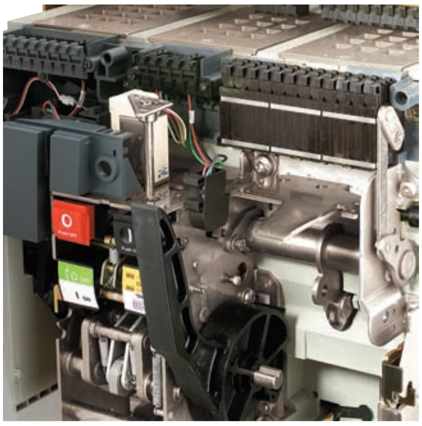
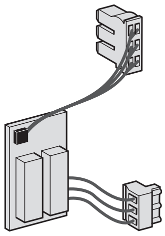


Indication contacts page A-37

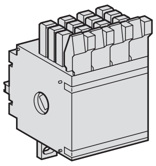
■ standard or low-level contacts:
□ ON/OFF indication (OF)
□ “fault trip” indication (SDE)
□ carriage switches for connected (CE) disconnected (CD) and test (CT) positions
■ programmable contacts:
□ 2 contacts (M2C)
□ 6 contacts (M6C).

DB101111



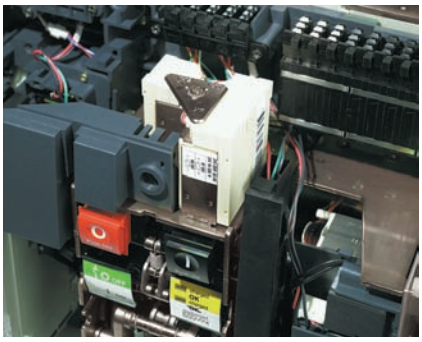
M2C contact.

DB101112



OF contact.

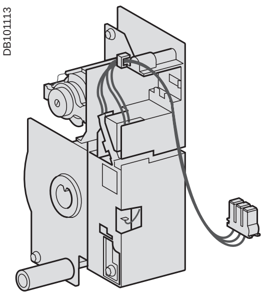
PB104349A55



Remote operation page A-39

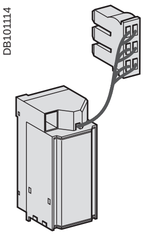
■ remote ON/OFF:
□ gear motor
□ XF closing or MX opening voltage releases
□ PF ready-to-close contact
options: RAR automatic or RES electrical remote reset
- BPFE electrical closing pushbutton
■ remote tripping function:
□ MN voltage release
- standard
- adjustable or non-adjustable delay
□ or second MX voltage release.

DB101113



Gear motor.

DB101114

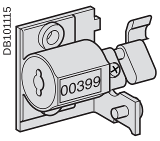


MX, XF and MN volage releases.

Accessories page A-43

■ auxiliary terminal shield
■ operation counter
■ escutcheon
■ transparent cover for escutcheon
■ escutcheon blanking plate.

DB101115



Circuit breakers and switch-disconnectors
NT06 to NT16 and NW08 to NW63

NT and NW selection criteria

	Masterpact NT			Masterpact NW	
	Standard applications			Standard applications	
	NT06, NT08, NT10, NT12, NT16		NT06, NT08, NT10	NW08...NW16	NW08...NW40
	H1	H2	L1	N1	H1
Type of application	Standard applications with low short-circuit currents	Applications with medium-level short-circuit currents	Limiting circuit breaker for protection of cable-type feeders or upgraded transformer ratings	Standard applications with low short-circuit currents	Circuit breaker for industrial sites with high short-circuit currents
Icu/Ics at 440 V	42 kA	50 kA	130 kA	42 kA	65 kA
Icu/Ics at 1000 V	-	-	-	-	-
Icu/Ics at 500 V DC L/R < 15 ms	-	-	-	-	-
Position of neutral	Left	Left	Left	Left	Left or right
Fixed	F	F	F	F	F
Drawout	D	D	D	D	D
Switch-disconnector version	Yes	No	No	Yes	Yes
Front connection	Yes	Yes	Yes	Yes	Yes up to 3200 A
Rear connection	Yes	Yes	Yes	Yes	Yes
Type of Micrologic control unit	A, P, H	A, P, H	A, P, H	A, P, H	A, P, H

Masterpact NT06 to NT16 installation characteristics

Circuit breaker		NT06, NT08, NT10			NT12, NT16	
Type		**H1**	**H2**	**L1**	**H1**	**H2**
Connection						
Drawout	FC	■	■	■	■	■
	RC	■	■	■	■	■
Fixed	FC	■	■	■	■	■
	RC	■	■	■	■	■
Dimensions (mm) H x W x D						
Drawout	3P	322 x 288 x 277				
	4P	322 x 358 x 277				
Fixed	3P	301 x 276 x 196				
	4P	301 x 346 x 196				
Weight (kg) (approximate)						
Drawout	3P/4P	30/39				
Fixed	3P/4P	14/18				

Masterpact NW08 to NW63 installation characteristics

Circuit breaker		NW08, NW10, NW12, NW16					NW20				
Type		**N1**	**H1**	**H2**	**L1**	**H10**	**H1**	**H2**	**H3**	**L1**	**H10**
Connection											
Drawout	FC	■	■	■	■	-	■	■	■	■	-
	RC	■	■	■	■	■	■	■	■	■	■
Fixed	FC	■	■	■	-	-	■	■	-	-	-
	RC	■	■	■	-	-	■	■	-	-	-
Dimensions (mm) H x W x D											
Drawout	3P	439 x 441 x 395									
	4P	439 x 556 x 395									
Fixed	3P	352 x 442 x 297									
	4P	352 x 537 x 297									
Weight (kg) (approximate)											
Drawout	3P/4P	90/120									
Fixed	3P/4P	60/80									

(1) Except 4000

				Special applications				
	H2	H3	L1	NW H10	NW H2 with corrosion protection	NW10...NW40 N DC	H DC	NW earthing switch
	High-performance circuit breaker for heavy industry with high short-circuit currents	Incoming device with very high performance for critical applications	Limiting circuit breaker for protection of cable-type feeders or upgraded transformer ratings	1000 V systems, e.g. mines and wind power	Environments with high sulphur contents	DC system	DC system	Installation earthing
	100 kA	150 kA	150 kA	-	100 kA	-	-	-
	-	-	-	50 kA	-	-	-	-
	-	-	-	-	-	35 kA	85 kA	-
	Left or right	Left	Left	Left	Left or right	-	-	-
	F	-	-	-	-	F	F	-
	D	D	D	D	D	D	D	D
	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
	Yes up to 3200 A	Yes up to 3200 A	Yes up to 3200 A	No	Yes up to 3200 A	No	No	Yes up to 3200 A
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	A, P, H	A, P, H	A, P, H	A, consult us for P and H	A, P, H	DC Micrologic	DC Micrologic	-

	NW25, NW32, NW40				NW40b, NW50,NW63	
	H1	H2	H3	H10	H1	H2
	■ (1)	■ (1)	■ (1)	-	-	-
	■	■	■	■	■	■
	■ (1)	■ (1)	-	-	-	-
	■	■	-	-	■	■
					479 x 786 x 395	
					479 x 1016 x 395	
					352 x 767 x 297	
					352 x 997 x 297	
					225/300	
					120/160	

Functions and characteristics

Circuit breakers and switch-disconnectors

NT06 to NT16

PB104378A48

Common characteristics

Number of poles		3/4
Rated insulation voltage (V)	**Ui**	1000
Impulse withstand voltage (kV)	**Uimp**	12
Rated operational voltage (V AC 50/60 Hz)	**Ue**	690
Suitability for isolation	IEC 60947-2	
Degree of pollution	IEC 60664-1	3

Basic sweatchgear

Circuit-breaker as per IEC 60947-2

Rated current (A)	**In**	at 40 °C/50 °C [1]
Rating of 4th pole (A)		
Sensor ratings (A)		
Type of circuit breaker		
Ultimate breaking capacity (kA rms) V AC 50/60 Hz	**Icu**	220/415 V 440 V 525 V 690 V
Rated service breaking capacity (kA rms)	**Ics**	% Icu
Utilisation category		
Rated short-time withstand current (kA rms) V AC 50/60 Hz	**Icw**	0.5 s 1 s 3 s
Integrated instantaneous protection (kA peak ±10 %)		
Rated making capacity (kA peak) V AC 50/60 Hz	**Icm**	220/415 V 440 V 525 V 690 V
Break time (ms) between tripping order and arc extinction		
Closing time (ms)		

Circuit-breaker as per NEMA AB1

Breaking capacity (kA) V AC 50/60 Hz		240 V 480 V 600 V

Switch-disconnector as per IEC 60947-3 and Annex A

Type of switch-disconnector		
Rated making capacity (kA peak) **AC23A/AC3 category** V AC 50/60 Hz	**Icm**	220 V 440 V 525/690 V
Rated short-time withstand current (kA rms) **AC23A/AC3 category** V AC 50/60 Hz	**Icw**	0.5 s 1 s 3 s
Ultimate breaking capacity Icu (kA rms) with an external protection relay Maximum time delay: 350 ms		690 V

Mechanical and electrical durability as per IEC 60947-2/3 at In/Ie

Service life C/O cycles x 1000	Mechanical	without maintenance		
Type of circuit breaker				
Rated current			**In (A)**	
C/O cycles x 1000 IEC 60947-2	Electrical	without maintenance		440 V [4] 690 V
Type of circuit breaker or switch-disconnector				
Rated operational current			**Ie (A)**	**AC23A**
C/O cycles x 1000 IEC 60947-3	Electrical	without maintenance		440 V [4] 690V
Type of circuit breaker or switch-disconnector				
Rated operational current			**Ie (A)**	**AC3** [5]
Motor power				380/415 V (kW) 440 V (kW)
C/O cycles x 1000 IEC 60947-3 Annex M/IEC 60947-4-1	Electrical	without maintenance		440 V [4] 690 V

(1) 50 °C: rear vertical connected. Refer to temperature derating tables for other connection types.
(2) See the current-limiting curves in the "additional characteristics" section.
(3) SELLIM system.
(4) Available for 480 V NEMA.
(5) Suitable for motor control (direct-on-line starting).

Sensor selection

Sensor rating (A)	250 [1]	400	630	800	1000	1250	1600
Ir threshold setting(A)	100 to 250	160 to 400	250 to 630	320 to 800	400 to 1000	500 to 1250	640 to 1600

(1) For circuit-breaker NT02, please consult us.

NT06			NT08			NT10			NT12		NT16	
630			800			1000			1250		1600	
630			800			1000			1250		1600	
400 to 630			400 to 800			400 to 1000			630 to 1250		800 to 1600	
H1	**H2**	**L1** [2]							**H1**	**H2**		
42	50	150							42	50		
42	50	130							42	50		
42	42	100							42	42		
42	42	25							42	42		
100 %									100 %			
B	B	A							B	B		
42	36	10							42	36		
42	36	-							42	36		
24	20	-							24	20		
-	90	10 x In [3]							-	90		
88	105	330							88	105		
88	105	286							88	105		
88	88	220							88	88		
88	88	52							88	88		
25	25	9							25	25		
< 50									< 50			
42	50	150							42	50		
42	50	100							42	50		
42	42	25							42	42		
HA									**HA**			
75									75			
75									75			
75									75			
36									36			
36									36			
20									20			
36									36			
12.5												
H1	**H2**	**L1**	**H1**	**H2**	**L1**	**H1**	**H2**	**L1**	**H1**	**H2**	**H1**	**H2**
630			**800**			**1000**			**1250**			
6	6	3	6	6	3	6	6	3	6	6	3	3
3	3	2	3	3	2	3	3	2	3	3	1	1
H1/H2/HA												
630			**800**			**1000**			**1250**		**1600**	
6			6			6			6		3	
3			3			3			3		1	
H1/H2/HA												
500			**630**			**800**			**1000**		**1000**	
≤ 250			250 to 335			335 to 450			450 to 560		450 to 560	
≤ 300			300 to 400			400 to 500			500 to 630		500 to 630	
6												
-												

Functions
and characteristics

Circuit breakers and switch-disconnectors
NW08 to NW63

PB104423A35

PB104433A65

Common characteristics

Number of poles		3/4
Rated insulation voltage (V)	**Ui**	1000/1250
Impulse withstand voltage (kV)	**Uimp**	12
Rated operational voltage (V AC 50/60 Hz)	**Ue**	690/1150
Suitability for isolation	IEC 60947-2	
Degree of pollution	IEC 60664-1	4 (1000 V) / 3 (1250 V)

Basic circuit-breaker

Circuit-breaker as per IEC 60947-2

Rated current (A)		at 40 °C / 50 °C (1)
Rating of 4th pole (A)		
Sensor ratings (A)		
Type of circuit breaker		
Ultimate breaking capacity (kA rms) V AC 50/60 Hz	**Icu**	220/415/440 V
		525 V
		690 V
		1150 V
Rated service breaking capacity (kA rms)	**Ics**	% Icu
Utilisation category		
Rated short-time withstand current (kA rms) V AC 50/60 Hz	**Icw**	1 s
		3 s
Integrated instantaneous protection (kA peak ±10 %)		
Rated making capacity (kA peak) V AC 50/60 Hz	**Icm**	220/415/440 V
		525 V
		690 V
		1150 V
Break time (ms) between tripping order and arc extinction		
Closing time (ms)		

Circuit-breaker as per NEMA AB1

Breaking capacity (kA) V AC 50/60 Hz		240/480 V
		600 V

Unprotected circuit-breaker

Tripping by shunt trip as per IEC 60947-2

Type of circuit breaker		
Ultimate breaking capacity (kA rms) V AC 50/60 Hz	**Icu**	220...690 V
Rated service breaking capacity (kA rms)	**Ics**	% Icu
Rated short-time withstand current (kA rms)	**Icw**	1 s
		3 s
Overload and short-circuit protection External protection relay: short-circuit protection, maximum delay: 350 ms (4)		
Rated making capacity (kA peak) V AC 50/60 Hz	**Icm**	220...690 V

Switch-disconnector as per IEC 60947-3 and Annex A

Type of switch-disconnector		
Rated making capacity (kA peak) **AC23A/AC3 category** V AC 50/60 Hz	**Icm**	220...690 V
		1150 V
Rated short-time withstand current (kA rms) **AC23A/AC3 category** V AC 50/60 Hz	**Icw**	1 s
		3 s

Earthing switch

Latching capacity (kA peak)		135	
Rating short time withstand (kA rms)	**Icw**	1 s	60 Hz
		3 s	50 Hz

Mechanical and electrical durability as per IEC 60947-2/3 at In/Ie

Service life	Mechanical	with maintenance		
C/O cycles x 1000		without maintenance		
Type of circuit breaker				
Rated current			**In (A)**	
C/O cycles x 1000	Electrical	without maintenance		440 V (5)
IEC 60947-2				690 V
				1150 V
Type of circuit breaker or switch-disconnector				
Rated operational current			**Ie (A)**	**AC23A**
C/O cycles x 1000	Electrical	without maintenance		440 V (5)
IEC 60947-3				690 V
Type of circuit breaker or switch-disconnector				
Rated operational current			**Ie (A)**	**AC3** (6)
Motor power				380/415 V (kW)
				440 V (5) (kW)
				690 V (kW)
C/O cycles x 1000	Electrical	without maintenance		440/690 V (5)
IEC 60947-3 Annex M/IEC 60947-4-1				

(1) 50 °C: rear vertical connected. Refer to temperature derating tables for other connection types.
(2) See the current-limiting curves in the "additional characteristics" section.
(3) Equipped with a trip unit with a making current of 90 kA peak.
(4) External protection must comply with permissible thermal constraints of the circuit breaker (please consult us). No fault-trip indication by the SDE or the reset button.
(5) Available for 480 V NEMA.
(6) Suitable for motor control (direct-on-line starting).

Sensor selection

Sensor rating (A)	250 (1)	400	630	800	1000	1250	1600	2000	2500	3200	4000	5000	6300
Ir threshold setting(A)	100 to 250	160 to 400	250 to 630	320 to 800	400 to 1000	500 to 1250	630 to 1600	800 to 2000	1000 to 2500	1250 to 3200	1600 to 4000	2000 to 5000	2500 to 6300

(1) For circuit-breaker NW02 , please consult us.

NW08	NW10	NW12	NW16		NW20					NW25	NW32	NW40		NW40b	NW50	NW63
800	1000	1250	1600		2000					2500	3200	4000		4000	5000	6300
800	1000	1250	1600		2000					2500	3200	4000		4000	5000	6300
400 to 800	400 to 1000	630 to 1250	800 to 1600		1000 to 2000					1250 to 2500	1600 to 3200	2000 to 4000		2000 to 4000	2500 to 5000	3200 to 6300
N1	**H1**	**H2**	**L1** (2)	**H10**	**H1**	**H2**	**H3**	**L1** (2)	**H10**	**H1**	**H2**	**H3**	**H10**	**H1**	**H2**	
42	65	100	150	-	65	100	150	150	-	65	100	150	-	100	150	
42	65	85	130	-	65	85	130	130	-	65	85	130	-	100	130	
42	65	85	100	-	65	85	100	100	-	65	85	100	-	100	100	
-	-	-	-	50	-	-	-	-	50	-	-	-	50	-	-	
100 %					100 %					100 %				100 %		
B					B					B				B		
42	65	85	30	50	65	85	65	30	50	65	85	65	50	100	100	
22	36	50	30	50	36	75	65	30	50	65	75	65	50	100	100	
-	-	190	80	-	-	190	150	80	-	-	190	150	-	-	270	
88	143	220	330	-	143	220	330	330	-	143	220	330	-	220	330	
88	143	187	286	-	143	187	286	286	-	143	187	286	-	220	286	
88	143	187	220	-	143	187	220	220	-	143	187	220	-	220	220	
-	-	-	-	105	-	-	-	-	105	-	-	-	105	-	-	
25	25	25	10	25	25	25	25	10	25	25	25	25	25	25	25	
< 70					< 70					< 70				< 80		
42	65	100	150	-	65	100	150	150	-	65	100	150	-	100	150	
42	65	85	100	-	65	85	100	100	-	65	85	100	-	100	100	
	HA	**HF** (3)			**HA**	**HF** (3)				**HA**	**HF** (3)			**HA**		
	50	85			50	85				55	85			85		
	100 %				100 %					100 %				100 %		
	50	85			50	85				55	85			85		
	36	50			36	75				55	75			85		
	-	-			-	-				-	-			-		
	105	187			105	187				121	187			187		

NW08/NW10/NW12				NW16			NW20			NW25/NW32/NW40			NW40b/NW50/NW63
NA	**HA**	**HF**	**HA10**	**HA**	**HF**	**HA10**	**HA**	**HF**	**HA10**	**HA**	**HF**	**HA10**	**HA**
88	105	187	-	105	187	-	105	187	-	121	187	-	187
-	-	-	105	-	-	105	-	-	105	-	-	105	-
42	50	85	50	50	85	50	50	85	50	55	85	50	85
-	36	50	50	36	50	50	36	75	50	55	75	50	85

25				20							10	
12.5				10							5	
N1/H1/H2	**L1**	**H10**		**H1/H2**	**H3**	**L1**	**H10**	**H1/H2**	**H3**	**H10**	**H1**	**H2**
800/1000/1250/1600				**2000**				**2500/3200/4000**			**4000b/5000/6300**	
10	3	-		8	2	3	-	5	1.25	-	1.5	1.5
10	3	-		6	2	3	-	2.5	1.25	-	1.5	1.5
-	-	0.5		-	-	-	0.5	-	-	0.5	-	-
H1/H2/HA/HF				**H1/H2/H3/HA/HF**				**H1/H2/H3/HA/HF**			**H1/H2/HA**	
800/1000/1250/1600				**2000**				**2500/3200/4000**			**4000b/5000/6300**	
10				8				5			1.5	
10				6				2.5			1.5	
H1/H2/HA/HF				**H1/H2/H3/HA/HF**								
800	**1000**	**1250**	**1600**	**2000**								
335 to 450	450 to 560	560 to 670	670 to 900	900 to 1150								
400 to 500	500 to 630	500 to 800	800 to 1000	1000 to 1300								
≤ 800	800 to 1000	1000 to 1250	1250 to 1600	1600 to 2000								
6												

Micrologic control units

Overview of functions

All Masterpact circuit breakers are equipped with a Micrologic control unit that can be changed on site. Control units are designed to protect Power circuits and loads. Alarms may be programmed for remote indications.
Measurements of current, voltage, frequency, power and power quality optimise continuity of service and energy management.

Dependability

Integration of protection functions in an ASIC electronic component used in all Micrologic control units guarantees a high degree of reliability and immunity to conducted or radiated disturbances.
On Micrologic A, P and H control units, advanced functions are managed by an independent microprocessor.

Accessories

Certain functions require the addition of Micrologic control unit accessories, described on page A-20.
The rules governing the various possible combinations can be found in the documentation accessible via the Products and services menu of the www.schneider-electric.com web site.

Micrologic name codes

2.0 A
X Y Z

X: type of protection
- 2 for basic protection
- 5 for selective protection
- 6 for selective + earth-fault protection
- 7 for selective + earth-leakage protection.

Y: control-unit generation
Identification of the control-unit generation.
"0" signifies the first generation.

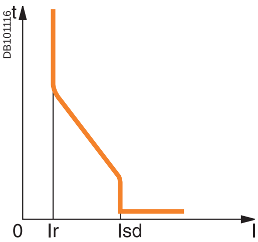
Z: type of measurement
- A for "ammeter"
- P for "power meter"
- H for "harmonic meter".

PB100772-32

Current protection

Micrologic 2: basic protection

DB101116



Protection:
long time
+ instantaneous

Micrologic 5: basic protection

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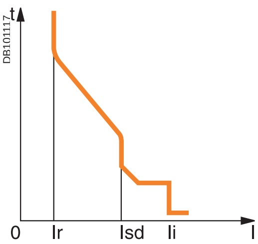
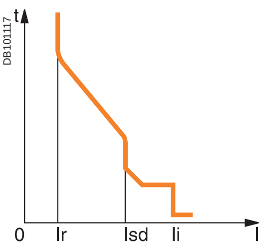


Protection:
long time
+ short time
+ instantaneous

Micrologic 6: selective + earth-fault protection

DB101117



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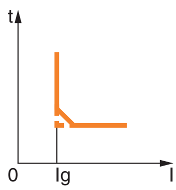

Protection:
long time
+ short time
+ instantaneous
+ earth fault

Micrologic 7: selective + earth-leakage protection

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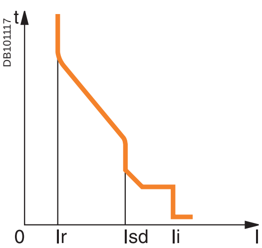

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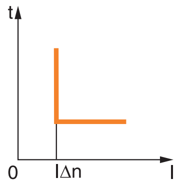


Protection:
long time
+ short time
+ instantaneous
+ earth leakage up to 3200A

Measurements and programmable protection

A: ammeter

- I_1, I_2, I_3, I_N, $I_{earth\text{-}fault}$, $I_{earth\text{-}leakage}$ and maximeter for these measurements
- fault indications
- settings in amperes and in seconds.

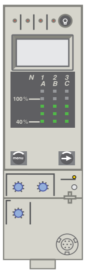
P: A + power meter + programmable protection

- measurements of V, A, W, VAR, VA, Wh, VARh, VAh, Hz, V_{peak}, A_{peak}, power factor and maximeters and minimeters
- IDMTL long-time protection, minimum and maximum voltage and frequency, voltage and current imbalance, phase sequence, reverse power
- load shedding and reconnection depending on power or current
- measurements of interrupted currents, differentiated fault indications, maintenance indications, event histories and time-stamping, etc.

H: P + harmonics

- power quality: fundamentals, distortion, amplitude and phase of harmonics up to the 31st order
- waveform capture after fault, alarm or on request
- enhanced alarm programming: thresholds and actions.

2.0 A

DB101120


5.0 A

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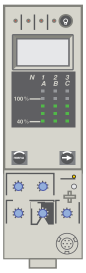


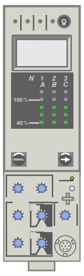
5.0 P

DB101122


5.0 H

DB101122


6.0 A

DB101123


6.0 P

DB101124


6.0 H

DB101124


7.0 A

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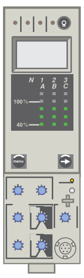

7.0 P

DB101124


7.0 H

DB101124


Functions
and characteristics

Micrologic control units

Micrologic A "ammeter"

Micrologic A control units protect power circuits. They also offer measurements, display, communication and current maximeters. Version 6 provides earth-fault protection, version 7 provides earth-leakage protection.

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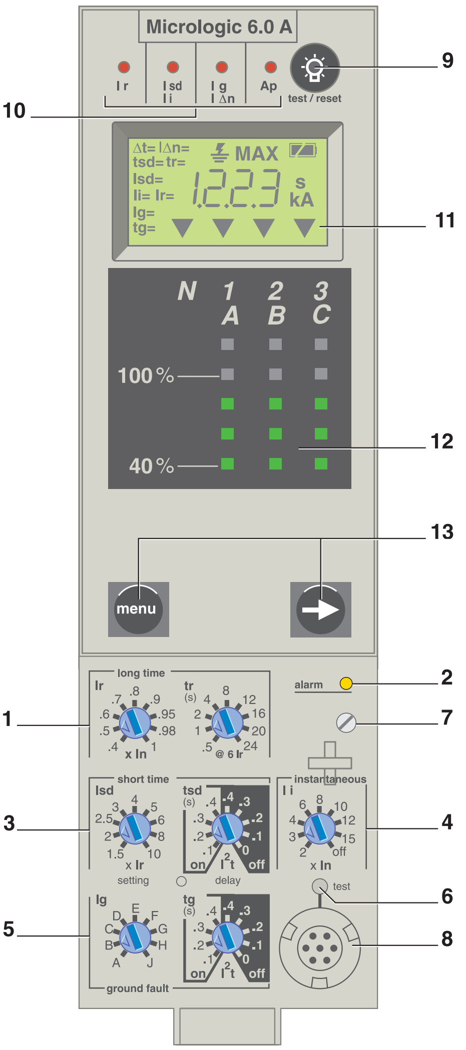


1 long-time threshold and tripping delay
2 overload alarm (LED) at 1,125 Ir
3 short-time pick-up and tripping delay
4 instantaneous pick-up
5 earth-leakage or earth-fault pick-up and tripping delay
6 earth-leakage or earth-fault test button
7 long-time rating plug screw
8 test connector
9 lamp test, reset and battery test
10 indication of tripping cause
11 digital display
12 three-phase bargraph and ammeter
13 navigation buttons

Note: Micrologic A control units come with a transparent lead-seal cover as standard.

"Ammeter" measurements

Micrologic A control units measure the true (rms) value of currents.
They provide continuous current measurements from 0.2 to 20 In and are accurate to within 1.5 % (including the sensors).
A digital LCD screen continuously displays the most heavily loaded phase (Imax) or displays the I_1, I_2, I_3, I_N, I_g, $I\Delta_n$, stored-current (maximeter) and setting values by successively pressing the navigation button.
The optional external power supply makes it possible to display currents < 20 % In.
Below 0.05 In, measurements are not significant. Between 0.05 and 0.2 In, accuracy is to within 0.5 % In + 1.5 % of the reading.

Communication option

In conjunction with the COM communication option, the control unit transmits the following:

- settings
- all "ammeter" measurements
- tripping causes
- maximeter readings.

Protection

Protection thresholds and delays are set using the adjustment dials.

Overload protection
True rms long-time protection.
Thermal memory: thermal image before and after tripping.
Setting accuracy may be enhanced by limiting the setting range using a different long-time rating plug.
Overload protection can be cancelled using a specific LT rating plug "Off".

Short-circuit protection
Short-time (rms) and instantaneous protection.
Selection of I^2t type (ON or OFF) for short-time delay.

Earth-fault protection
Residual or source ground return earth fault protection.
Selection of I^2t type (ON or OFF) for delay.

Residual earth-leakage protection (Vigi).
Operation without an external power supply.
⎍ Protected against nuisance tripping.
⏦ DC-component withstand class A up to 10 A.

Neutral protection
On three-pole circuit breakers, neutral protection is not possible.
On four-pole circuit breakers, neutral protection may be set using a three-position switch: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d).

Zone selective interlocking (ZSI)
A ZSI terminal block may be used to interconnect a number of control units to provide total discrimination for short-time and earth-fault protection, without a delay before tripping.

Overload alarm

A yellow alarm LED goes on when the current exceeds the long-time trip threshold.

Fault indications

LEDs indicate the type of fault:

- overload (long-time protection Ir)
- short-circuit (short-time Isd or instantaneous Ii protection)
- earth fault or earth leakage (Ig or IΔn)
- internal fault (Ap).

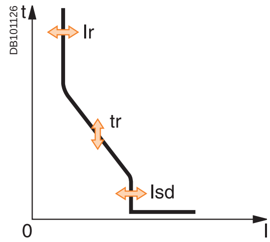
Battery power
The fault indication LEDs remain on until the test/reset button is pressed. Under normal operating conditions, the battery supplying the LEDs has a service life of approximately 10 years.

Test

A mini test kit or a portable test kit may be connected to the test connector on the front to check circuit-breaker operation. For Micrologic 6.0 A and 7.0 A control units, the operation of earth-fault or earth-leakage protection can be checked by pressing the test button located above the test connector.

Protection — Micrologic 2.0 A

Long time											
Current setting (A)			0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		**tr (s)**	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7(1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7(2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Instantaneous											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 80 ms								

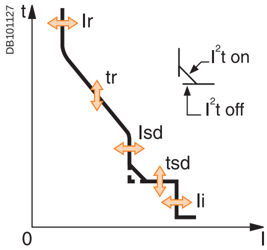


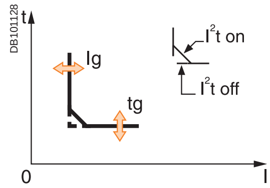
Ammeter — Micrologic 2.0 A

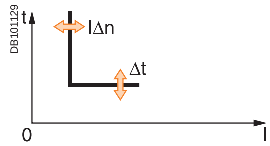
Continuous current measurements					
Display from 20 to 200 % of In	I1	I2	I3	IN	
Accuracy: 1.5 % (including sensors)	No auxiliary source (where I > 20 % In)				
Maximeters	I1 max	I2 max	I3 max	IN max	

Protection — Micrologic 5.0 / 6.0 / 7.0 A

Long time			**Micrologic 5.0 / 6.0 / 7.0 A**								
Current setting (A)	**Ir** = In x …		0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		**tr (s)**	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7(1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7(2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Short time											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time setting tsd (s)	Settings	I²t Off	0	0.1	0.2	0.3	0.4				
		I²t On	-	0.1	0.2	0.3	0.4				
Time delay (ms) at 10 x Ir	**tsd** (max resettable time)		20	80	140	230	350				
(I²t Off or I²t On)	**tsd** (max break time)		80	140	200	320	500				
Instantaneous											
Pick-up (A)	**Ii** = In x …		2	3	4	6	8	10	12	15	off
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 50 ms								
Earth fault			**Micrologic 6.0 A**								
Pick-up (A)	**Ig** = In x …		A	B	C	D	E	F	G	H	J
Accuracy: ±10 %	In ⩽ 400 A		0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	400 A < In < 1250 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	In ⩾ 1250 A		500	640	720	800	880	960	1040	1120	1200
Time setting tg (s)	Settings	I²t Off	0	0.1	0.2	0.3	0.4				
		I²t On	-	0.1	0.2	0.3	0.4				
Time delay (ms)	**tg** (max resettable time)		20	80	140	230	350				
at In or 1200 A (I²t Off or I²t On)	**tg** (max break time)		80	140	200	320	500				
Residual earth leakage (Vigi)			**Micrologic 7.0 A**								
Sensitivity (A)	**IΔn**		0.5	1	2	3	5	7	10	20	30
Accuracy: 0 to -20 %											
Time delay Δt (ms)	Settings		60	140	230	350	800				
	Δt (max resettable time)		60	140	230	350	800				
	Δt (max break time)		140	200	320	500	1000				







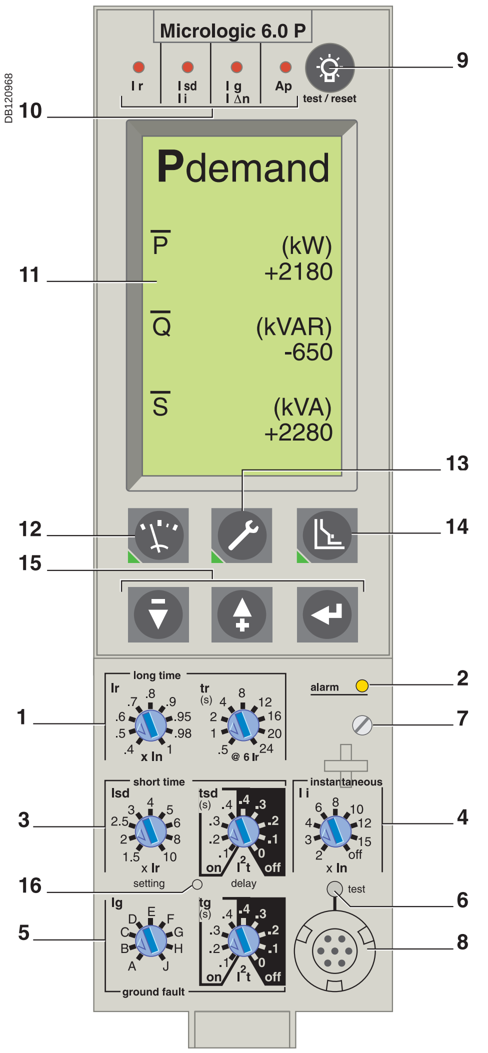
Ammeter — Micrologic 5.0 / 6.0 / 7.0 A

Continuous current measurements						
Display from 20 to 200 % of In	I1	I2	I3	IN	Ig	IΔn
Accuracy: 1.5 % (including sensors)	No auxiliary source (where I > 20 % In)					
Maximeters	I1 max	I2 max	I3 max	IN max	Ig max	IΔn max

Note: All current-based protection functions require no auxiliary source.
The test / reset button resets maximeters, clears the tripping indication and tests the battery.

Micrologic control units
Micrologic P "power"

Micrologic P control units include all the functions offered by Micrologic A.
In addition, they measure voltages and calculate power and energy values.
They also offer new protection functions based on currents, voltages, frequency and power reinforce load protection in real time.



1 Long-time current setting and tripping delay.
2 Overload signal (LED).
3 Short-time pick-up and tripping delay.
4 Instantaneous pick-up.
5 Earth-leakage or earth-fault pick-up and tripping delay.
6 Earth-leakage or earth-fault test button.
7 Long-time rating plug screw.
8 Test connector.
9 Lamp + battery test and indications reset.
10 Indication of tripping cause.
11 High-resolution screen.
12 Measurement display.
13 Maintenance indicators.
14 Protection settings.
15 Navigation buttons.
16 Hole for settings lockout pin on cover.

Note: *Micrologic P control units come with a non-transparent lead-seal cover as standard.*

Protection ....

Protection settings
The adjustable protection functions are identical to those of Micrologic A (overloads, short-circuits, earth-fault and earth-leakage protection).

Fine adjustment
Within the range determined by the adjustment dial, fine adjustment of thresholds (to within one ampere) and time delays (to within one second) is possible on the keypad or remotely using the COM option.

IDMTL (Inverse Definite Minimum Time lag) setting
Coordination with fuse-type or medium-voltage protection systems is optimised by adjusting the slope of the overload-protection curve. This setting also ensures better operation of this protection function with certain loads.

Neutral protection
On three-pole circuit breakers, neutral protection may be set using the keypad or remotely using the COM option, to one of four positions: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d) and neutral protection at 1,6 Ir (4P 3d + 1,6N). Neutral protection at 1,6 Ir is used when the neutral conductor is twice the size of the phase conductors (major load imbalance, high level of third order harmonics).
On four-pole circuit breakers, neutral protection may be set using a three-position switch or the keypad: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d). Neutral protection produces no effect if the long-time curve is set to one of the IDMTL protection settings.

Programmable alarms and other protection
Depending on the thresholds and time delays set using the keypad or remotely using the COM option, the Micrologic P control unit monitors currents and voltage, power, frequency and the phase sequence. Each threshold overrun is signalled remotely via the COM option. Each threshold overrun may be combined with tripping (protection) or an indication carried out by an optional M2C or M6C programmable contact (alarm), or both (protection and alarm).

Load shedding and reconnection
Load shedding and reconnection parameters may be set according to the power or the current flowing through the circuit breaker. Load shedding is carried out by a supervisor via the COM option or by an M2C or M6C programmable contact.

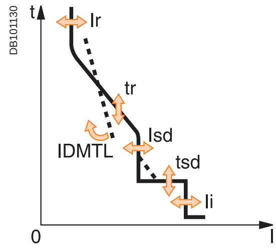
Indication option via programmable contacts
The M2C (two contacts) and M6C (six contacts) auxiliary contacts may be used to signal threshold overruns or status changes. They can be programmed using the keypad on the Micrologic P control unit or remotely using the COM option.

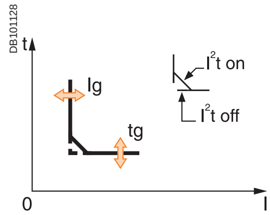
Communication option (COM)
The communication option may be used to:
- remotely read and set parameters for the protection functions
- transmit all the calculated indicators and measurements
- signal the causes of tripping and alarms
- consult the history files and the maintenance-indicator register.
- maximeter reset.

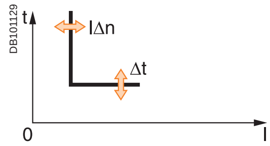
An event log and a maintenance register, stored in control-unit memory but not available locally, may be accessed in addition via the COM option.

Protection — Micrologic 5.0 / 6.0 / 7.0 P

Long time (rms)			**Micrologic 5.0 / 6.0 / 7.0 P**								
Current setting (A)	**Ir** = In x …		0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		**tr (s)**	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7 (1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7 (2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
IDMTL setting	Curve slope		SIT	VIT	EIT	HVFuse	DT				
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Short time (rms)											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time setting tsd (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms) at 10 Ir	**tsd** (max resettable time)		20	80	140	230	350				
(I^2t Off or I^2t On)	**tsd** (max break time)		80	140	200	320	500				
Instantaneous											
Pick-up (A)	**Ii** = In x …		2	3	4	6	8	10	12	15	off
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 50 ms								
Earth fault			**Micrologic 6.0 P**								
Pick-up (A)	**Ig** = In x …		A	B	C	D	E	F	G	H	J
Accuracy: ±10 %	In ≤ 400 A		0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	400 A < In < 1250 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	In ≥ 1250 A		500	640	720	800	880	960	1040	1120	1200
Time setting tg (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms)	**tg** (max resettable time)		20	80	140	230	350				
at In or 1200 A (I^2t Off or I^2t On)	**tg** (max break time)		80	140	200	320	500				
Residual earth leakage (Vigi)			**Micrologic 7.0 P**								
Sensitivity (A)	**IΔn**		0.5	1	2	3	5	7	10	20	30
Accuracy: 0 to -20 %											
Time delay Δt (ms)	Settings		60	140	230	350	800				
	Δt (max resettable time)		60	140	230	350	800				
	Δt (max break time)		140	200	320	500	1000				

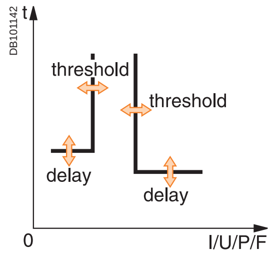






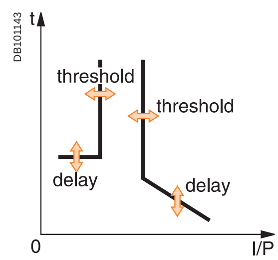
Alarms and other protection — Micrologic 5.0 / 6.0 / 7.0 P

Current		**Threshold**	**Delay**
Current unbalance	**Iunbalance**	0.05 to 0.6 Iaverage	1 to 40 s
Max. demand current	**Imax demand** : I1, I2, I3, IN,	0.2 In to In	15 to 1500 s
Earth fault alarm			
	I⏚	10 to 100 % In (3)	1 to 10 s
Voltage			
Voltage unbalance	**Uunbalance**	2 to 30 % x Uaverage	1 to 40 s
Minimum voltage	**Umin**	100 to Umax between phases	1.2 to 10 s
Maximum voltage (4)	**Umax**	Umin to 1200 between phases	1.2 to 10 s
Power			
Reverse power	**rP**	5 to 500 kW	0.2 to 20 s
Frequency			
Minimum frequency	**Fmin**	45 to Fmax	1.2 to 5 s
Maximum frequency	**Fmax**	Fmin to 440 Hz	1.2 to 5 s
Phase sequence			
Sequence (alarm)	**ΔØ**	Ø1/2/3 or Ø1/3/2	0.3 s



Load shedding and reconnection — Micrologic 5.0 / 6.0 / 7.0 P

Measured value		**Threshold**	**Delay**
Current	**I**	0.5 to 1 Ir per phases	20 % tr to 80 % tr
Power	**P**	200 kW to 10 MW	10 to 3600 s



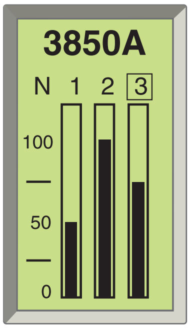
(3) In ≤ 400 A 30 %
400 A < In < 1250 A 20 %
In ≥ 1250 A 10 %
(4) For 690 V applications, a step-down transformer must be used if the voltage exceeds the nominal value of 690 V by more than 10 %.

Note: all current-based protection functions require no auxiliary source.
Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.

Micrologic control units

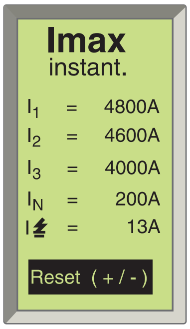
Micrologic P "power"

DB101133



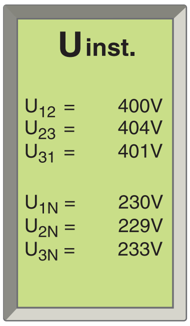
Default display.

DB101134



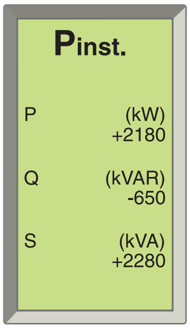
Display of a maximum current

DB101135



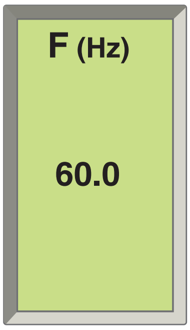
Display of a voltage.

DB117042



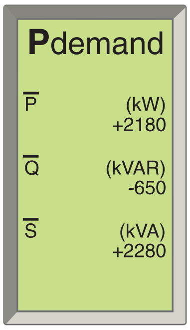
Display of a power.

DB101137



Display of a frequency.

DB101138



Display of a demand power.

DB124581A

Power View software.

Measurements

The Micrologic P control unit calculates in real time all the electrical values (V, A, W, VAR, VA, Wh, VARh, VAh, Hz), power factors and cosφ factors.
The Micrologic P control unit also calculates demand current and demand power over an adjustable time period. Each measurement is associated with a minimeter and a maximeter.
In the event of tripping on a fault, the interrupted current is stored. The optional external power supply makes it possible to display the value with the circuit breaker open or not supplied.

Instantaneous values

The value displayed on the screen is refreshed every second.
Minimum and maximum values of measurements are stored in memory (minimeters and maximeters).

Currents					
I rms	A	1	2	3	N
	A	E-fault		E-leakage	
I max rms	A	1	2	3	N
	A	E-fault		E-leakage	
Voltages					
U rms	V	12	23	31	
V rms	V	1N	2N	3N	
U average rms	V	(U12 + U23 + U31) / 3			
U unbalance	%				
Power, energy					
P active, Q reactive, S apparent	W, Var, VA	Totals			
E active, E reactive, E apparent	Wh, VARh, VAh	Totals consumed - supplied Totals consumed Totals supplied			
Power factor	PF	Total			
Frequencies					
F	Hz				

Demand metering

The demand is calculated over a fixed or sliding time window that may be programmed from 5 to 60 minutes. According to the contract signed with the power supplier, an indicator associated with a load shedding function makes it possible to avoid or minimise the costs of overrunning the subscribed power. Maximum demand values are systematically stored and time stamped (maximeter).

Currents					
I demand	A	1	2	3	N
	A	E-fault		E-leakage	
I max demand	A	1	2	3	N
	A	E-fault		E-leakage	
Power					
P, Q, S demand	W, Var, VA	Totals			
P, Q, S max demand	W, Var, VA	Totals			

Minimeters and maximeters

Only the current and power maximeters may be displayed on the screen.

Time-stamping

Time-stamping is activated as soon as time is set manually or by a supervisor.
No external power supply module is required (max. drift of 1 hour per year).

Reset

An individual reset, via the keypad or remotely, acts on alarms, minimum and maximum data, peak values, the counters and the indicators.

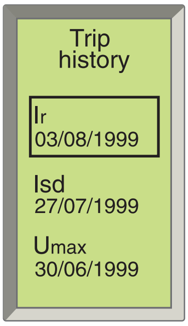
Additional measurements accessible with the COM option

Some measured or calculated values are only accessible with the COM communication option:
- $I_{peak} / \sqrt{2}$, $(I_1 + I_2 + I_3)/3$, $I_{unbalance}$
- load level in % Ir
- total power factor.

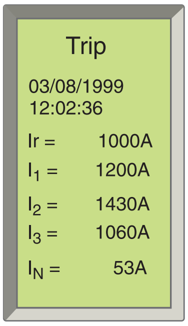
The maximeters and minimeters are available only via the COM option for use with a supervisor.

Additional info

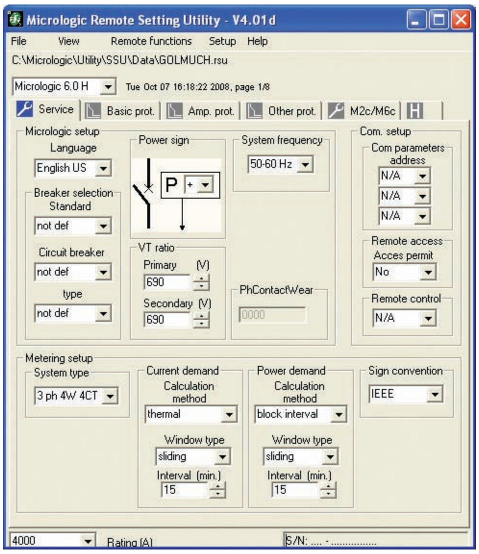
Accuracy of measurements (including sensors):
- *voltage (V) 0.5 %*
- *current (A) 1.5 %*
- *frequency (Hz) 0.1 %*
- *power (W) and energy (Wh) 2 %.*



Display of a tripping history.



Display after tripping.



RSU configuration screen for a Micrologic.

Histories and maintenance indicators

The last ten trips and alarms are recorded in two separate history files that may be displayed on the screen:

■ tripping history:
□ type of fault
□ date and time
□ values measured at the time of tripping (interrupted current, etc.)
■ alarm history:
□ type of alarm
□ date and time
□ values measured at the time of the alarm.

All the other events are recorded in a third history file which is only accessible through the communication network.

■ Event log history (only accessible through the communication network)
□ modifications to settings and parameters
□ counter resets
□ system faults:
□ fallback position
□ thermal self-protection
□ loss of time
□ overrun of wear indicators
□ test-kit connections
□ etc.

Note:
All the events are time stampled: time-stamping is activated as soon as time is set manually or by a supervisor. No external power supply module is required (max. drift of 1 hour per year).

Maintenance indicators (with COM option)

A number of maintenance indicators may be called up on the screen to better plan for device maintenance:

■ contact wear
■ operation counter:
□ cumulative total
□ total since last reset.

Additional maintenance indicators are also available through the COM network, and can be used as an aid in troubleshooting:

■ highest current measured
■ number of test-kit connections
■ number of trips in operating mode and in test mode.

Additional technical characteristics

Safety

Measurement functions are independent of the protection functions.
The high-accuracy measurement module operates independently of the protection module.

Simplicity and multi-language

Navigation from one display to another is intuitive. The six buttons on the keypad provide access to the menus and easy selection of values. When the setting cover is closed, the keypad may no longer be used to access the protection settings, but still provides access to the displays for measurements, histories, indicators, etc.
Micrologic is also multi-language, including the following languages: English, Spanish, Portuguese, Russian, Chinese, French, German...

Intelligent measurement

Measurement-calculation mode:

■ energies are calculated on the basis of the instantaneous power values, in two manners:
□ the traditional mode where only positive (consumed) energies are considered
□ the signed mode where the positive (consumed) and negative (supplied) energies are considered separately
■ measurement functions implement the new “zero blind time” concept which consists in continuously measuring signals at a high sampling rate. The traditional “blind window” used to process samples no longer exists. This method ensures accurate energy calculations even for highly variable loads (welding machines, robots, etc.).

Always powered

All current-based protection functions require no auxiliary source. Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.

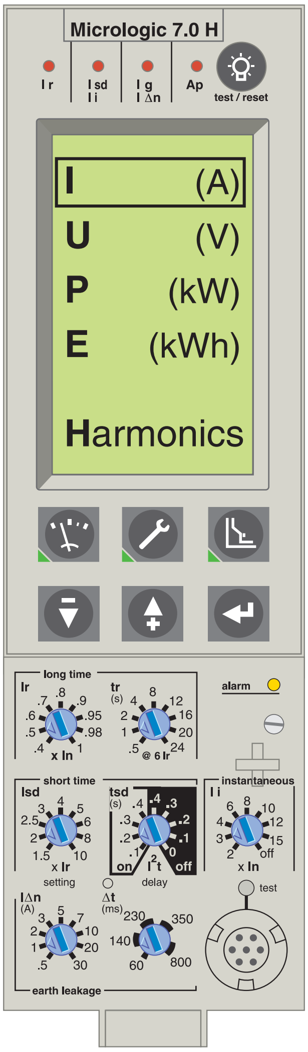
Stored information

The fine setting adjustments, the last 100 events and the maintenance register remain in the control-unit memory even when power is lost.

Micrologic control units
Micrologic H "harmonics"

Micrologic H control units include all the functions offered by Micrologic P. Integrating significantly enhanced calculation and memory functions, the Micrologic H control unit offers in-depth analysis of power quality and detailed event diagnostics. It is intended for operation with a supervisor.

DB117437



In addition to the Micrologic P functions, the Micrologic H control unit offers:
- in-depth analysis of power quality including calculation of harmonics and the fundamentals
- diagnostics aid and event analysis through waveform capture
- enhanced alarm programming to analyse and track down a disturbance on the AC power system.

Measurements ....

The Micrologic H control unit offers all the measurements carried out by Micrologic P, with in addition:
- phase by phase measurements of:
  - power, energy
  - power factors
- calculation of:
  - current and voltage total harmonic distortion (THD)
  - current, voltage and power fundamentals
  - current and voltage harmonics up to the 31st order.

Instantaneous values displayed on the screen

Currents					
I rms	A	1	2	3	N
	A	E-fault		E-leakage	
I max rms	A	1	2	3	N
	A	E-fault		E-leakage	
Voltages					
U rms	V	12	23	31	
V rms	V	1N	2N	3N	
U average rms	V	(U12 + U23 + U31) / 3			
U unbalance	%				
Power, energy					
P active, Q reactive, S apparent	W, Var, VA	Totals	1	2	3
E active, E reactive, E apparent	Wh, VARh, VAh	Totals consumed - supplied			
		Totals consumed			
		Totals supplied			
Power factor	PF	Total	1	2	3
Frequencies					
F	Hz				
Power-quality indicators					
Total fundamentals		U I P Q S			
THD	%	U I			
U and Iharmonics	Amplitude	3 5 7 9 11 13			

Harmonics 3, 5, 7, 9, 11 and 13, monitored by electrical utilities, are displayed on the screen.

Demand measurements
Similar to the Micrologic P control unit, the demand values are calculated over a fixed or sliding time window that may be set from 5 to 60 minutes.

Currents					
I demand	A	1	2	3	N
	A	E-fault		E-leakage	
I max demand	A	1	2	3	N
	A	E-fault		E-leakage	
Power					
P, Q, S demand	W, Var, VA	Totals			
P, Q, S max demand	W, Var, VA	Totals			

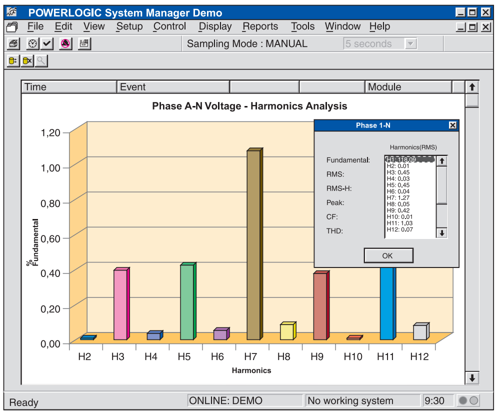
Maximeters
Only the current maximeters may be displayed on the screen.

Histories and maintenance indicators

These functions are identical to those of the Micrologic P.

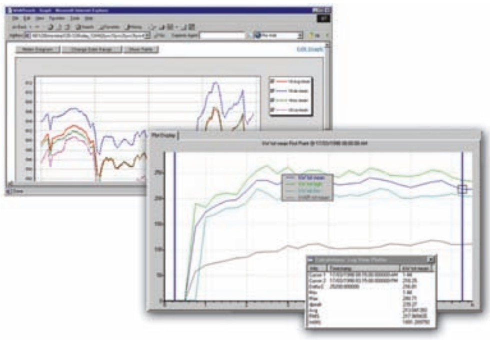
***Note:** Micrologic H control units come with a non-transparent lead-seal cover as standard.*

DB101521

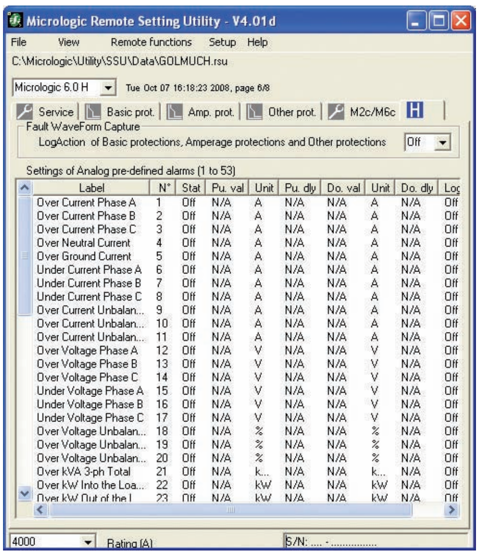


Display of harmonics up to 21th order.

DB120971A



DB120969A



Log.

With the communication option

Additional measurements, maximeters and minimeters

Certain measured or calculated values are only accessible with the COM communication option:

- I peak / $\sqrt{2}$ $(I_1 + I_2 + I_3)/3$, $I_{unbalance}$
- load level in % Ir
- power factor (total and per phase)
- voltage and current THD
- K factors of currents and average K factor
- crest factors of currents and voltages
- all the fundamentals per phase
- fundamental current and voltage phase displacement
- distortion power and distortion factor phase by phase
- amplitude and displacement of current and voltage harmonics 3 to 31.

The maximeters and minimeters are available only via the COM option for use with a supervisor.

Waveform capture

The Micrologic H control unit stores the last 4 cycles of each instantaneous current or voltage measurement. On request or automatically on programmed events, the control unit stores the waveforms. The waveforms may be displayed in the form of oscillograms by a supervisor via the COM option. Definition is 64 points per cycle.

Pre-defined analogue alarms (1 to 53)

Each alarm can be compared to user-set high and low thresholds. Overrun of a threshold generates an alarm. An alarm or combinations of alarms can be linked to programmable action such as selective recording of measurements in a log, waveform capture, etc.

Event log and maintenance registers

The Micrologic H offers the same event log and maintenance register functions as the Micrologic P. In addition, it produces a log of the minimums and maximums for each “real-time” value.

Additional technical characteristics

Safety

Measurement functions are independent of the protection functions.
The high-accuracy measurement module operates independently of the protection module.

Simplicity and multi-language

Navigation from one display to another is intuitive. The six buttons on the keypad provide access to the menus and easy selection of values. When the setting cover is closed, the keypad may no longer be used to access the protection settings, but still provides access to the displays for measurements, histories, indicators, etc.
Micrologic is also multi-language, including the following languages: English, Spanish, Portuguese, Russian, Chinese, French, German;;;

Intelligent measurement

Measurement-calculation mode:

- energies are calculated on the basis of the instantaneous power values, in two manners:
  - □ the traditional mode where only positive (consumed) energies are considered
  - □ the signed mode where the positive (consumed) and negative (supplied) energies are considered separately
- measurement functions implement the new “zero blind time” concept which consists in continuously measuring signals at a high sampling rate. The traditional “blind window” used to process samples no longer exists. This method ensures accurate energy calculations even for highly variable loads (welding machines, robots, etc.).

Always powered

All current-based protection functions require no auxiliary source. Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.

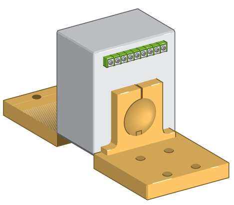
Stored information

The fine setting adjustments, the last 100 events and the maintenance register remain in the control-unit memory even when power is lost.

Micrologic control units

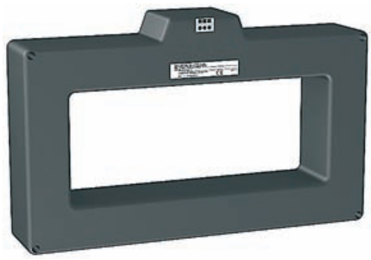
Accessories and test equipment

DB101524



External sensor (CT).

PB100834-48



Rectangular sensor.

06133779A

External sensor for source ground return protection.

PB100773-32

PB101026-32A

External sensors

External sensor for earth-fault and neutral protection
The sensors, used with the 3P circuit breakers, are installed on the neutral conductor for:
- neutral protection (with Micrologic P and H)
- residual type earth-fault protection (with Micrologic A, P and H)..

The rating of the sensor (CT) must be compatible with the rating of the circuit breaker:
- NT06 to NT16: TC 400/1600
- NW08 to NW20: TC 400/2000
- NW25 to NW40: TC 1000/4000
- NW40b to NW63: TC 4000/6300.

For oversized neutral protection the sensor rating must be compatible with the measurement range: 1.6 x IN (available up to NW 40 and NT 16).

Rectangular sensor for earth-leakage protection
The sensor is installed around the busbars (phases + neutral) to detect the zero-phase sequence current required for the earth-leakage protection. Rectangular sensors are available in two sizes.
Inside dimensions (mm)
- 280 x 115 up to 1600 A for Masterpact NT and NW
- 470 x 160 up to 3200 A for Masterpact NW.

External sensor for source ground return protection
The sensor is installed around the connection of the transformer neutral point to earth and connects to the Micrologic 6.0 control unit via an MDGF module to provide the source ground return (SGR) protection.

Voltage measurement inputs
Voltage measurement inputs are required for power measurements (Micrologic P or H) and for earth-leakage protection (Micrologic 7...).
As standard, the control unit is supplied by internal voltage measurement inputs placed downstream of the pole for voltages between 220 and 690 V AC. On request, it is possible to replace the internal voltage measurement inputs by an external voltage input (PTE option) which enables the control unit to draw power directly from the distribution system upstream of the circuit breaker. An 3 m cable with ferrite comes with this PTE option.

Long-time rating plug

Four interchangeable plugs may be used to limit the long-time threshold setting range for higher accuracy.
The time delay settings indicated on the plugs are for an overload of 6 Ir (for further details, see the characteristics on page A-13 and page A-15).

As standard, control units are equipped with the 0.4 to 1 plug.

Setting ranges										
Standard	Ir = In x…	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Low-setting option	Ir = In x…	0.4	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.8
High-setting option	Ir = In x…	0.80	0.82	0.85	0.88	0.90	0.92	0.95	0.98	1
Off plug		No long-time protection (Ir = In for Isd setting)								

Important: *long-time rating plugs must always be removed before carrying out insulation or dielectric withstand tests.*

External 24 V DC power-supply module

The external power-supply module makes it possible to use the display even if the circuit breaker is open or not supplied (for the exact conditions of use, see the "electrical diagrams" part of this catalogue).
This module powers both the control unit (100 mA) and the M2C and M6C programmable contacts (100 mA).
If the COM communication option is used, the communication bus requires its own 24 V DC power supply, independent with respect to that of the Micrologic control unit.
With the Micrologic A control unit, this module makes it possible to display currents of less than 20 % of In.
With the Micrologic P and H, it can be used to display fault currents after tripping.

Characteristics
- power supply:
  - □ 110/130, 200/240, 380/415 V AC (+10 % -15 %)
  - □ 24/30, 48/60, 100/125 V DC (+20 % -20 %)
- output voltage: 24 V DC ±5 %, 200 mA.
- ripple < 1 %
- dielectric withstand : 3.5 kV rms between input/output, for 1 minute
- overvoltage category: as per IEC 60947-1 cat. 4.

PB100771-24

Battery module

The battery module maintains display operation and communication with the supervisor if the power supply to the Micrologic control unit is interrupted. It is installed in series between the Micrologic control unit and the AD module.

Characteristics

- battery run-time: 4 hours (approximately)
- mounted on vertical backplate or symmetrical rail.

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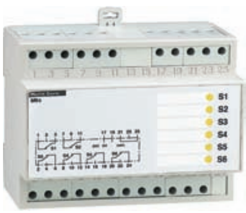
M2C.

PB100781-32



M6C.

M2C, M6C programmable contacts

These contacts are optional equipment for the Micrologic P and H control units.
They are described with the indication contacts for the circuit breakers.

Characteristics			M2C/M6C
Minimum load			100 mA/24 V
Breaking capacity (A) p.f.: 0.7	V AC	240	5
		380	3
	V DC	24	1.8
		48	1.5
		125	0.4
		250	0.15

M2C: 24 V DC power supplied by control unit (consumption 100 mA).
M6C: external 24 V DC power supply required (consumption 100 mA).

PB100775-32

Lead-seal cover.

Spare parts

Lead-seal covers

A lead-seal cover controls access to the adjustment dials.
When the cover is closed:

- it is impossible to modify settings using the keypad unless the settings lockout pin on the cover is removed
- the test connector remains accessible
- the test button for the earth-fault and earth-leakage protection function remains accessible.

Characteristics

- transparent cover for basic Micrologic and Micrologic A control units
- non-transparent cover for Micrologic P and H control units.

Spare battery

A battery supplies power to the LEDs identifying the tripping causes. Battery service life is approximately ten years.
A test button on the front of the control unit is used to check the battery condition.
The battery may be replaced on site when discharged.

PB100837-68

Portable test kit.

Test equipment

Hand-held test kit

The hand-held mini test kit may be used to:

- check operation of the control unit and the tripping and pole-opening system by sending a signal simulating a short-circuit
- supply power to the control units for settings via the keypad when the circuit-breaker is open (Micrologic P and H control units).

Power source: standard LR6-AA battery.

Full function test kit

The test kit can be used alone or with a supporting personal computer.
The test kit without PC may be used to check:

- the mechanical operation of the circuit breaker
- the electrical continuity of the connection between the circuit breaker and the control unit
- operation of the control unit:
  - display of settings
  - automatic and manual tests on protection functions
  - test on the zone-selective interlocking (ZSI) function
  - inhibition of the earth-fault protection
  - inhibition of the thermal memory.

The test kit with PC offers in addition:

- the test report (software available on request).

Portable data acquisition

Masterpact and GetnSet

GetnSet is a portable data acquisition and storage accessory that connects directly to the Micrologic control units of Masterpact circuit breakers to read important electrical installation operating data and Masterpact protection settings.
This information is stored in the GetnSet internal memory and can be transferred to a PC via USB or Bluetooth for monitoring and analysis.

Overview of Masterpact GetnSet functions

GetnSet[1] is a portable data acquisition and storage device that works like a USB drive, letting users manually transfer data to and from a Masterpact circuit breaker or PC.
GetnSet can download operating data from Masterpact and download or upload settings.
Downloadable operating data include measurements, the last 3 trip history records and contact wear status.
Accessible settings include protection thresholds, external relay assignment modes and pre-defined alarm configurations if applicable.

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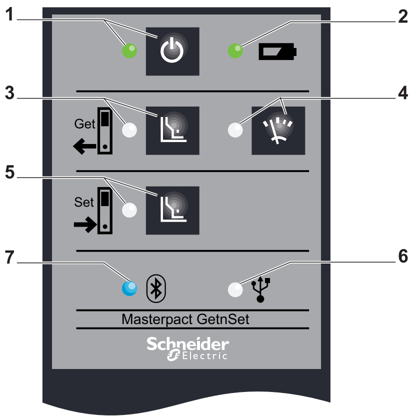

1 On/Off
2 batterie indicator
3 Download settings
4 Download operating parameters
5 Upload settings
6 USB indicator
7 Bluetooth indicator

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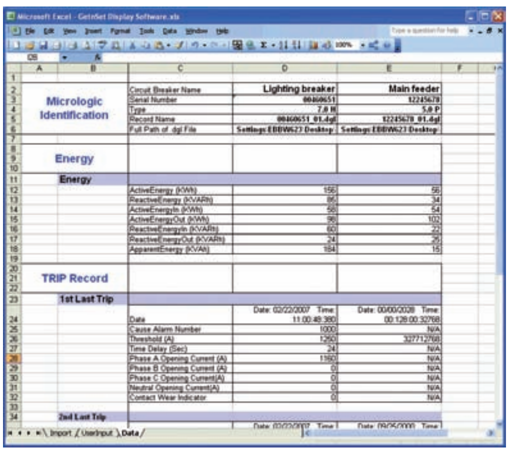

Operating data functions

Electrical installation information such as energy measurements and contact wear status is increasingly important to help reduce operating expenses and increase the availability of electrical power. Such data is often available from devices within the installation, but needs to be gathered and aggregated to allow analysis and determine effective improvement actions.
With GetnSet, this operating data can be easily read and stored as .dgl files in the internal memory. It can then be transferred to a PC via a USB or Bluetooth link and imported in an Excel spreadsheet.
The provided Excel spreadsheet can be used to display the operating data from several breakers in order to:

- analyse changes in parameters such as energy, power factor and contact wear
- compare the values of parameters between circuit breakers
- create graphics and reports using standard Excel tools

GetnSet data accessible in the Excel spreadsheet

Type of data	Micrologic		
Current	A	P	H
Energy, voltages, frequency, power, power factor		P	H
Power quality: fundamental, harmonics			H
Trip history		P	H
Contact wear		P	H

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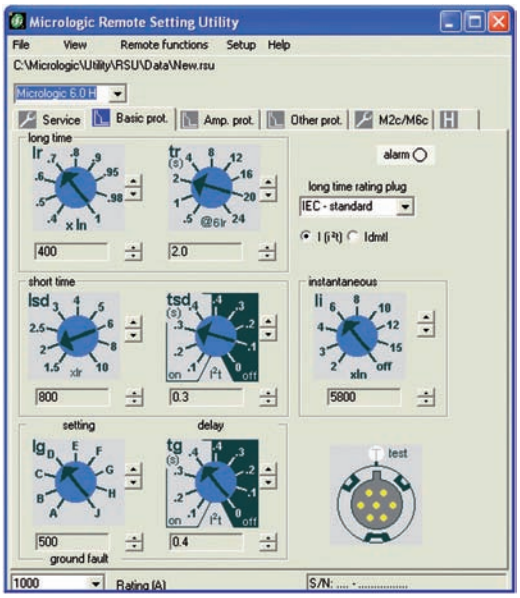

Protection setting functions

GetnSet can also be used to back up circuit breaker settings and restore them on the same device or, under certain conditions, copy them to any Masterpact circuit breaker equipped with the same type of Micrologic control unit. This concerns only advanced settings, as other parameters must be set manually using the dials on the Micrologic control unit.

■ When commissioning the installation, safeguard the configuration parameters of your electrical distribution system by creating a back-up of circuit breaker settings so that they can be restored at any time.

■ The settings read by GetnSet can be transferred to a PC and are compatible with RSU software (Remote Setting Utility). Protection configurations can also be created on a PC using this software, copied to GetnSet's internal memory and uploaded to a Masterpact circuit breaker with a compatible Micrologic trip unit and dial settings.

Operating procedure

The procedure includes several steps.

■ Plug GetnSet into the receptacle on the front of the Micrologic control unit of a Masterpact circuit breaker.

■ On the keypad, select the type of data (operating data or settings) and the transfer direction (download or upload). This operation can be done as many times as required for the entire set of Masterpact circuit breakers.

■ Downloaded data is transferred to the GetnSet internal memory and a file is created for each Masterpact device (either an .rsu file for settings or a.dgl file for operating data).

■ Data can be transferred between GetnSet and a PC via a USB or Bluetooth connection.

■ Operating data can be imported in an Excel spreadsheet and protection settings can be read with RSU (remote setting utility) software.

Features

■ Battery-powered to power a Micrologic control unit even if the breaker has been opened or tripped. This battery provides power for an average of 1 hour of use, enough for more than 100 download operations.

■ Can be used on Masterpact circuit breakers equipped or not equipped with a Modbus "device" communication module.

■ Portable, standalone accessory eliminating the need for a PC to connect to a Masterpact circuit breaker.

■ No driver or software required for GetnSet connection to a PC.

■ Can be used with many circuit breakers, one after the other.

■ Embedded memory sized to hold data from more than 5000 circuit breakers.

■ Supplied with its battery, a cable for connection to Micrologic trip units, a USB cable for connection to a PC and a battery charger.

Compatibility

■ Micrologic control units A, P, H

■ PC with USB port or Bluetooth link and Excel software

Technical characteristics

Charger power supply	100 – 240 V; ∿1A; 50 – 60 Hz
Charger power consumption	Max 100 W
Battery	3.3 V DC; 9mAh; Li-Ion
Operating temperature	-20 to +60 °C
GetnSet dimensions	95 x 60 x 35 mm

Communication

COM option in Masterpact

The COM option is required for integration of the circuit breaker or switch-disconnector in a supervision system.
Masterpact uses the Modbus communications protocol for full compatibility with the supervision management systems. An external gateway is available for communication on other networks:
- Ion Enterprise (power management system)
- Ethernet gateway (MPS100/EGX)
- Ethernet…
- Profibus.

Eco COM is limited to the transmission of metering data and does not allow the control of the circuit breaker.

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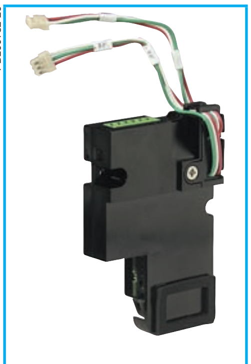

Modbus "device" communication module.

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Modbus "chassis" communication module.

For fixed devices, the COM option is made up of:
- a "device" communication module, installed behind the Micrologic control unit and supplied with its set of sensors (OF, SDE ,PF and CH micro-contacts) and its kit for connection to XF and MX1 communicating voltage releases.

For drawout devices, the COM option is made up of:
- a "device" communication module, installed behind the Micrologic control unit and supplied with its set of sensors (OF, SDE, PF and CH micro-contacts) and its kit for connection to XF and MX1 communicating voltage releases
- a "chassis" communication module supplied separately with its set of sensors (CE, CD and CT contacts).

Status indication by the COM option is independent of the device indication contacts. These contacts remain available for conventional uses.

Digipact or Modbus "Device" communication module
This module is independent of the control unit. It receives and transmits information on the communication network. An infra-red link transmits data between the control unit and the communication module.
Consumption: 30 mA, 24 V.

Digipact or Modbus "chassis" communication module
This module is independent of the control unit. With Modbus "chassis" communication module, this module makes it possible to address the chassis and to maintain the address when the circuit breaker is in the disconnected position.
Consumption: 30 mA, 24 V.

XF and MX1 communicating voltage releases
The XF and MX1 communicating voltage releases are equipped for connection to the "device" communication module.
The remote-tripping function (MX2 or MN) are independent of the communication option. They are not equipped for connection to the "device" communication module.

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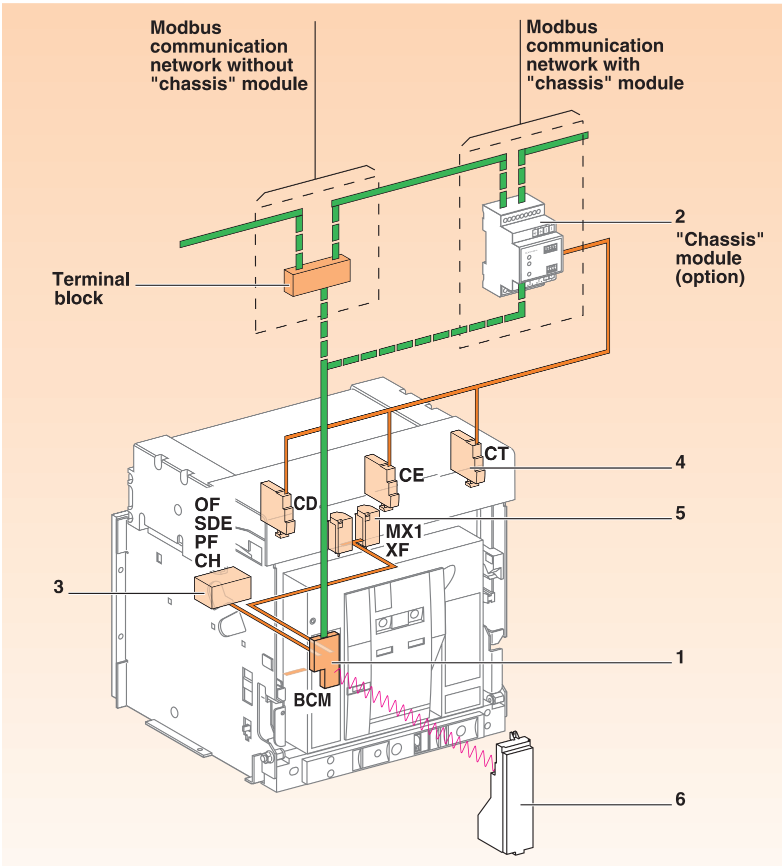

1 "Device" communication module.
2 "Chassis" communication module (option).
3 OF, SDE, PF and CH communicating "device" sensors.
4 CE, CD and CT communicating "chassis" sensors.
5 MX1 and XF communicating release.
6 Control unit.

: Hard wire.
: Communication bus.

Overview of functions

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The Masterpact circuit breakers and switch-disconnectors are compatible with the Digipact or Modbus COM option.

The COM option may be used to:
- identify the device
- indicate status conditions
- control the device.

Depending on the different types of Micrologic (A, P, H) control units, the COM option also offers:
- setting of the protection and alarms functions
- analysis of the AC-power parameters for operating-assistance and maintenance purposes.

	Switch-disconnector with communication bus Modbus	Circuit breaker with communication bus Modbus		
Device identification				
Address	■	A	P	H
Rating	-	A	P	H
Type of device	-		P	H
Type of control unit	-	A	P	H
Type of long-time rating plug	-	A	P	H
Status indications				
ON/OFF OF	■	A	P	H
Spring charged CH	■	A	P	H
Ready to close PF	(1)	A	P	H
Fault-trip SDE	■	A	P	H
Connected/disconnected/test position CE/CD/CT	■	A	P	H
Controls				
ON/OFF MX/XF	■	A	P	H
Spring charging	-			
Reset of the mechanical indicator	-			
Protections and alarms settings				
Reading of protections settings		A	P	H
Writing of fine settings in the range imposed by the adjustment dials			P	H
Reading/writing of alarms (load shedding and reconnect, M2C, etc.)			P	H
Reading/writing of custom alarms				H
Operating and maintenance aids				
Measurement				
Current		A	P	H
Voltages, frequency, power, etc.			P	H
Power quality: fundamental, harmonics				H
Programming of demand metering			P	H
Fault readings				
Type of fault		A	P	H
Interrupted current			P	H
Waveform capture				
On faults				H
On demand or programmed				H
Histories and logs				
Trip history			P	H
Alarm history			P	H
Event logs			P	H
Indicators				
Counter operation		A	P	H
Contact wear			P	H
Maintenance register			P	H

Note: see the description of the Micrologic control units for further details on protection and alarms, measurements, waveform capture, histories, logs and maintenance indicators.
(1) With modbus it is possible to monitor the PF status please see the instruction bulletin COMBT32AK at page 51/Register 661 documentation.
A: Micrologic with ammeter
P: Micrologic “Power”
H: Micrologic “Harmonics”

Communication

Masterpact in a communication network

Modbus

■ Modbus is the most widely used communication protocol in industrial networks.
■ Masterpact, Compact NSX, PowerLogic and Sepam products all operate with this protocol. A Modbus network is generally implemented on an LV or MV switchboard scale.

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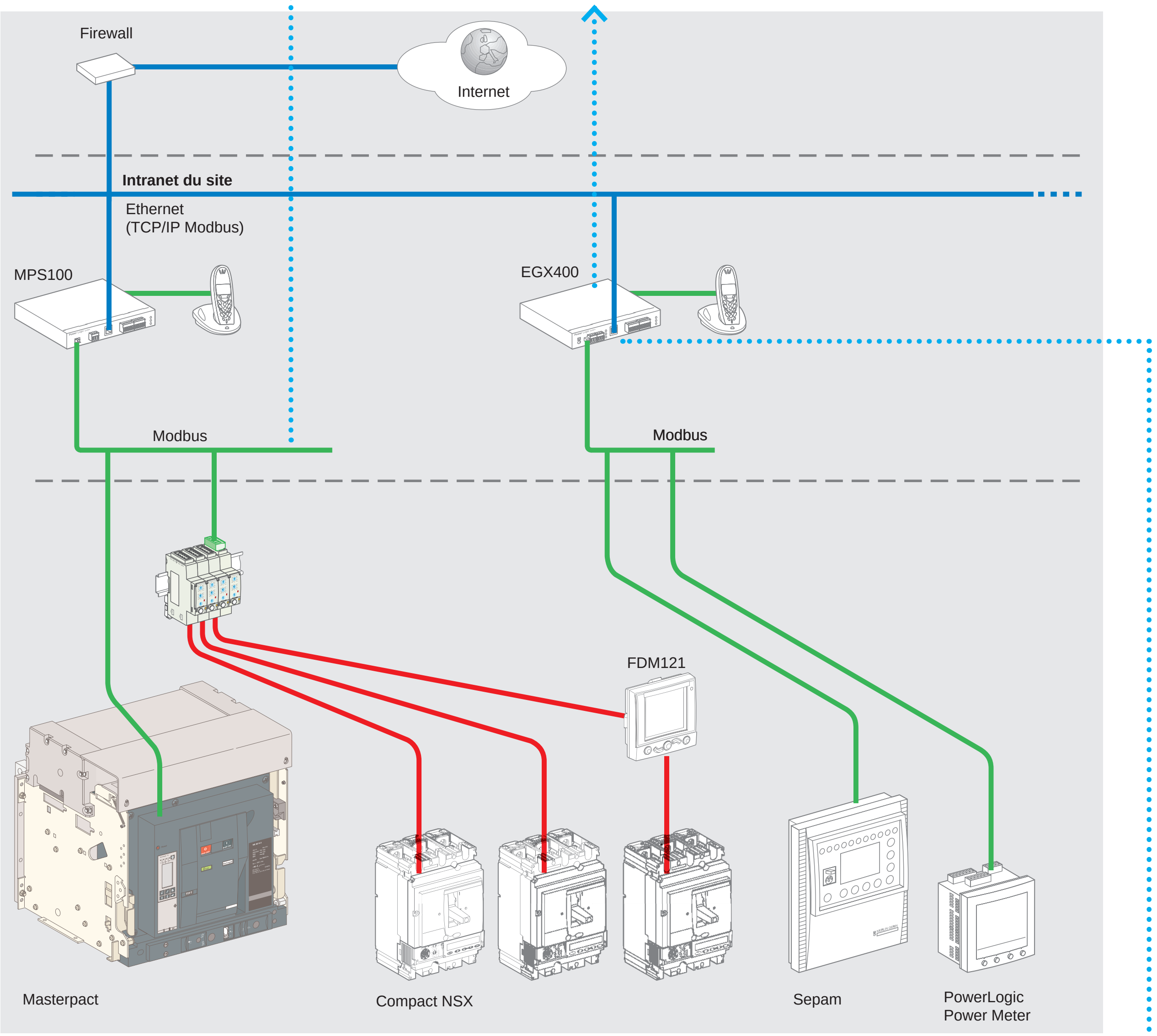

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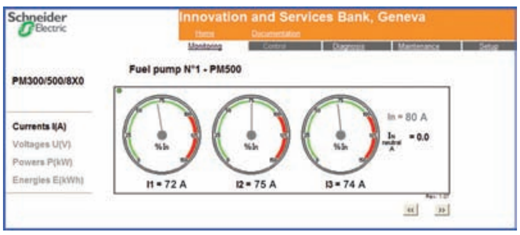

Web page.

Gateway

A Modbus TCP gateway can be used to connect the Modbus network to ethernet. The gateway has the two main functions:
■ access to the company intranet (Ethernet) by converting Modbus frames to the TCP/IP Modbus protocol,
■ optional web-page server for the information from the devices.
Examples include MPS100, EGX400 and EGX100.

MPS100

■ Plug and play device. It comes loaded with a web-page application for graphic display of currents and voltages and viewing of circuit-breaker status and power and energy values.
To use the application, simply declare the Modbus addresses of the connected slaves. Automatically recognised devices include all Masterpact and Compact NSX Micrologic trip units and the PM500/700/800 and PM9c power monitoring units.
■ Can be used for automatic alarm notification via a messaging server available on the site intranet or via mobile phones (e-mail converted into SMS).
■ Can be used for logging of data that can be automatically sent as e-mail attachments, e.g. a weekly consumption report.

Communication bus

Modbus bus

The Modbus RS485 system is an open bus on which communicating Modbus devices (Masterpact with Modbus COM, Power Meter, Sepam, Vigilohm, etc.) are installed. All types of PLCs and microcomputers may be connected to the bus.

Addresses

The Modbus parameters (address, baud rate, parity) are entered using the keypad on the Micrologic A, P or H. For a switch-disconnector, it is necessary to use the RSU (Remote Setting Utility) Micrologic utility.
The software layer of the Modbus protocol can manage up to 255 addresses (1 to 255).
The “device” communication module comprises three addresses linked to:
■ circuit-breaker manager
■ measurement manager
■ protection manager.
The “chassis” communication module comprises one address linked to the chassis manager.
The division of the system into four managers secures data exchange with the supervision system and the circuit-breaker actuators.
The manager addresses are automatically derived from the circuit-breaker address @xx entered via the Micrologic control unit (the default address is 47).

Logic addresses		
@xx	Circuit-breaker manager	(1 to 47)
@xx + 50	Chassis manager	(51 to 97)
@xx + 200	Measurement managers	(201 to 247)
@xx + 100	Protection manager	(101 to 147)

Number of devices

The maximum number of devices that may be connected to the Modbus bus depends on the type of device (Masterpact with Modbus COM, Power Meter, Sepam, Vigilohm, etc.), the baud rate (19200 is recommended), the volume of data exchanged and the desired response time. The RS485 physical layer offers up to 32 connection points on the bus (1 master, 31 slaves).
A fixed device requires only one connection point (communication module on the device).
A drawout device uses two connection points (communication modules on the device and on the chassis).
The number must never exceed 31 fixed devices or 15 drawout devices.

Length of bus

The maximum recommended length for the Modbus bus is 1200 meters.

Bus power source

A 24 V DC power supply is required (less than 20 % ripple, insulation class II).

Communication interface

The Modbus bus may be connected to the central processing device in any of three manners:
■ direct link to a PLC. The communication interface is not required if the PLC is equipped with a Modbus port
■ direct link to a computer. The Modbus (RS485) / Serial port (RS232) communication interface is required
■ connection to a TCP/IP (Ethernet) network. The Modbus (RS485) / TCP/IP (Ethernet) communication interface is required.

Devices

Circuit breakers equipped with Micrologic control units may be connected to either a Modbus communication bus. The information made available depends on the type of Micrologic control unit (A, P or H) and on the type of communication bus (Modbus).
Switch-disconnectors can be connected to the Modbus communication bus. The information made available is the status of the switch-disconnector.

Software

To make use of the information provided by the communicating devices, software with a Modbus driver must be used.

Micrologic utilities

This is a set of software that may be used with a PC to:
■ display the variables (I, U, P, E, etc.) with the RDU (Remote Display Utility)
■ read/write the settings with the RSU (Remote Setting Utility)
■ remotely control (ON / OFF) the device with the RCU (Remote Control Utility).
Micrologic utilities are available upon request

SMS (System Manager Software)

SMS is a software to monitor LV and/or MV electrical energy.
The SMS family includes a software range depending on the application and function, from single product monitoring to the management of a multiple building:
■ Power Meter and Circuit Monitor units
■ LV devices
■ Sepam units.

Functions
and characteristics

Communication

Masterpact and the MPS100 Micro Power Server

The MPS100 Micro Power Server:
- notifies maintenance staff when any preset alarm or trip is activated by the Micrologic trip unit, automatically sending an e-mail and/or SMS
- data logs are periodically forwarded by e-mail
- the e-mails are sent via an Ethernet local area network (LAN) or remotely via modem.

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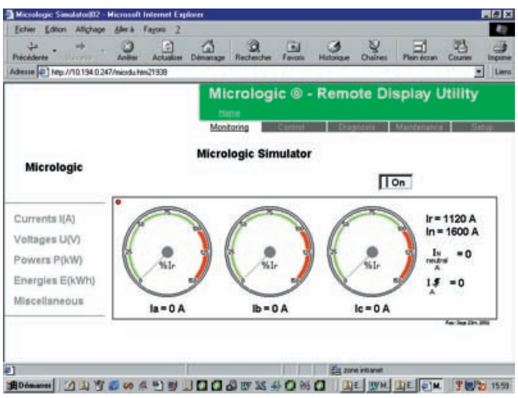
PB100804-60

MPS100 Micro Power Server.

PB100799-68

Main LV switchboard.

PB100877A-67



Monitoring of your main LV switchboard via embedded web pages in the MPS100 accessible with a standard web browser.

Micro Power Server makes data collection easy for monitoring Masterpact/Compact circuit breakers

Now, more than ever, there is a need to monitor electrical distribution systems in industrial and large commercial applications. The key to managing all equipment, maximising efficiencies, reducing costs and increasing up time is having the right tools.
Micro Power Server MPS100 is designed to withstand harsh electrical environments and provide a consistent flow of easy to interpret information.

Micro Power Server is designed for unattended operation within the main LV switchboard

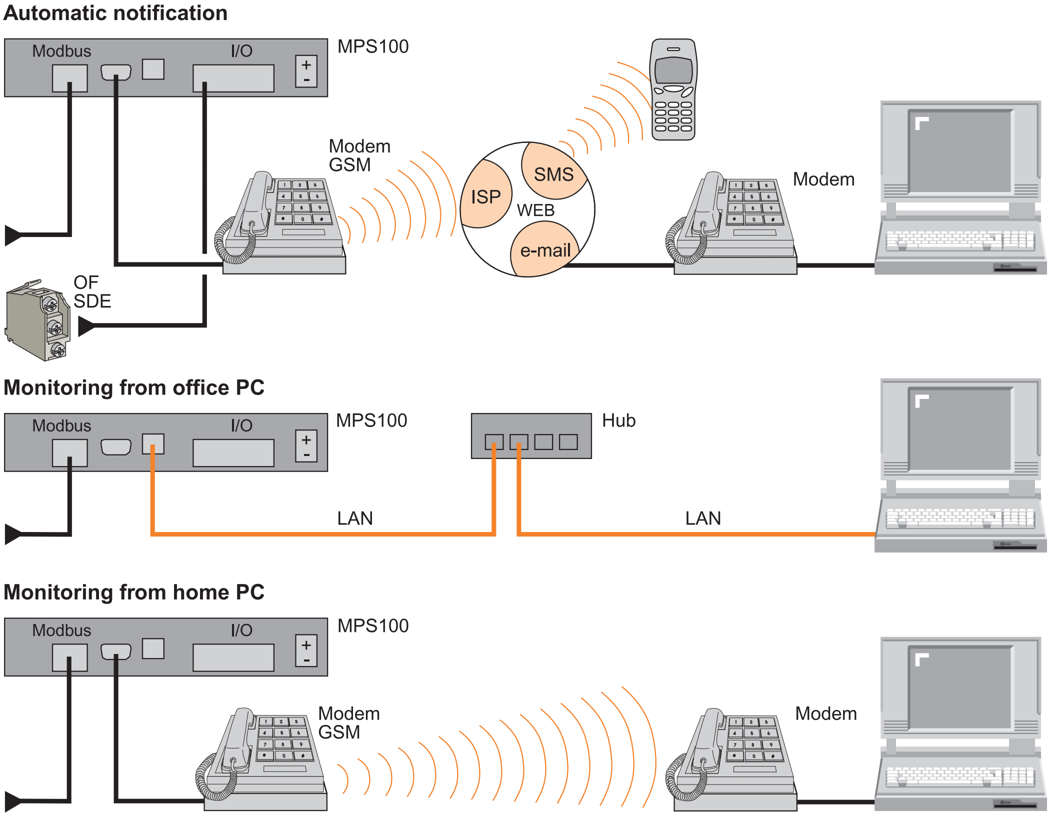
The MPS100 is a self-contained facility information server that serves as a stand-alone device for power system monitoring.
It is used to transfer power system information via a standard web browser over an Ethernet local area network (LAN) or via modem, making it possible to view power system information on a PC with an Ethernet connection.

In either capacity, the Micro Power Server functions as a web server for Micrologic trip unit and Power Meter supervision, automatically notifying (e-mail and/or SMS) maintenance staff when any preset alarm or trip is activated in the Micrologic trip unit.

Benefits

- view your main LV switchboard without installing software on your local PC, eliminating the need for a dedicated PC with specific software
- Micro Power Server allows centralised monitoring, so you no longer waste precious time walking around the facility to collect data
- view your main LV switchboard via a modem connection (GSM or switched network), avoiding the need for a LAN
- maintenance people are automatically notified at any time, wherever they are, so you do not have to stay in front of a monitor all day long
- data logs can be periodically forwarded by sending e-mails to the relevant people (maintenance, accounting, application service provider) automatically
- possibility to monitor/notify six external events (limit switches, auxiliary switches...)
- back-up of Micrologic trip unit settings in the memory of the MPS100, so you know where to retrieve it when necessary.

Typical architecture



It is possible to combine the different types of architecture.

Supported Modbus devices

- Micrologic trip units
- Power Meters (PM700, PM800...).

Maximum recommended connected devices is 10.

Micrologic trip unit.

Power Meter.

Features

- access to the power system via a standard PC web browser
- real-time data displayed with an intuitive and user friendly interface (dashboard)
- Ethernet Modbus TCP/IP connectivity directly to the LAN or via modem (Point to Point Protocol services)
- SMTP (Simple Mail Transfer Protocol) client (capacity to send e-mail)
- local logging of data such as energy, power, current…
- set-up and system configuration through MPS100 embedded HTML pages
- user interface translatable in any language, factory settings in English and French
- 6 inputs/2 outputs (no-volt contact)
- DHCP (Dynamic Host Configuration Protocol) client.

Short Message Service (SMS).

Technical characteristics

Power supply	24 V DC ±15 %, consumption = 250 mA
Operating temperature	0 to +50 °C
Rugged compact metal housing	35 x 218 x 115 mm (H x W x D)

Additional information available at: http://194.2.245.4/mkt/microser.nsf
User name: MPS, Password: MPS100

Communication
Communication wiring system

Wiring system
The wiring system is designed for low-voltage power switchboards. Installation requires no tools or special skills.
The prefabricated wiring ensures both data transmission (ModBus protocol) and 24 V DC power distribution for the communications modules on the Micrologic control units.

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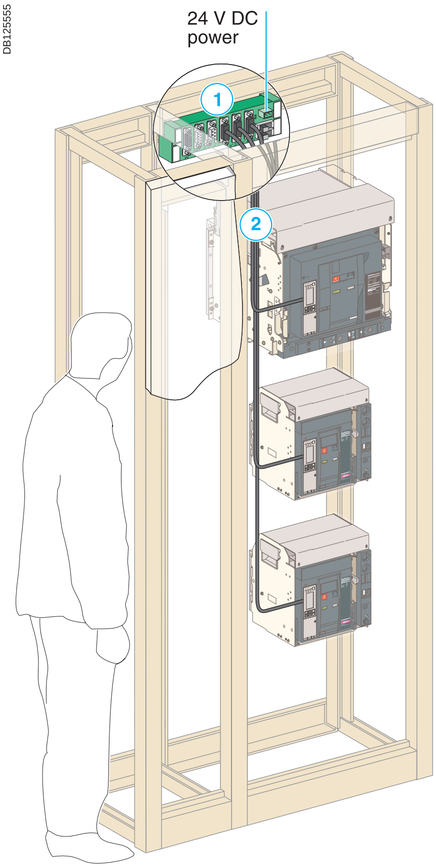

Masterpact circuit breakers equipped with Micrologic control units and the ModBus COM option.

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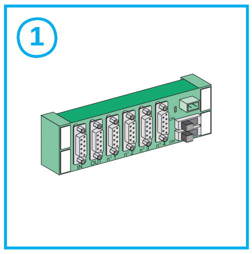
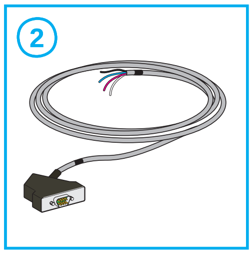


CJB 306 junction block.

DB101183



*CCP 303:
Connection cable between Masterpact or Compact and junction block.*

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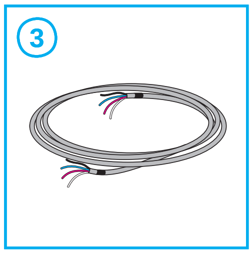

*CCR 301:
Roll of RS 485 cable
(2 RS 485 wires + 2 power supply wires).*

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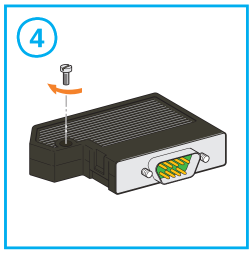

*CSD 309:
SubD 9-pin connector for colour-coded connection of wires to screw terminals.*

Maximum distance between module and circuit breaker: 1200 m.

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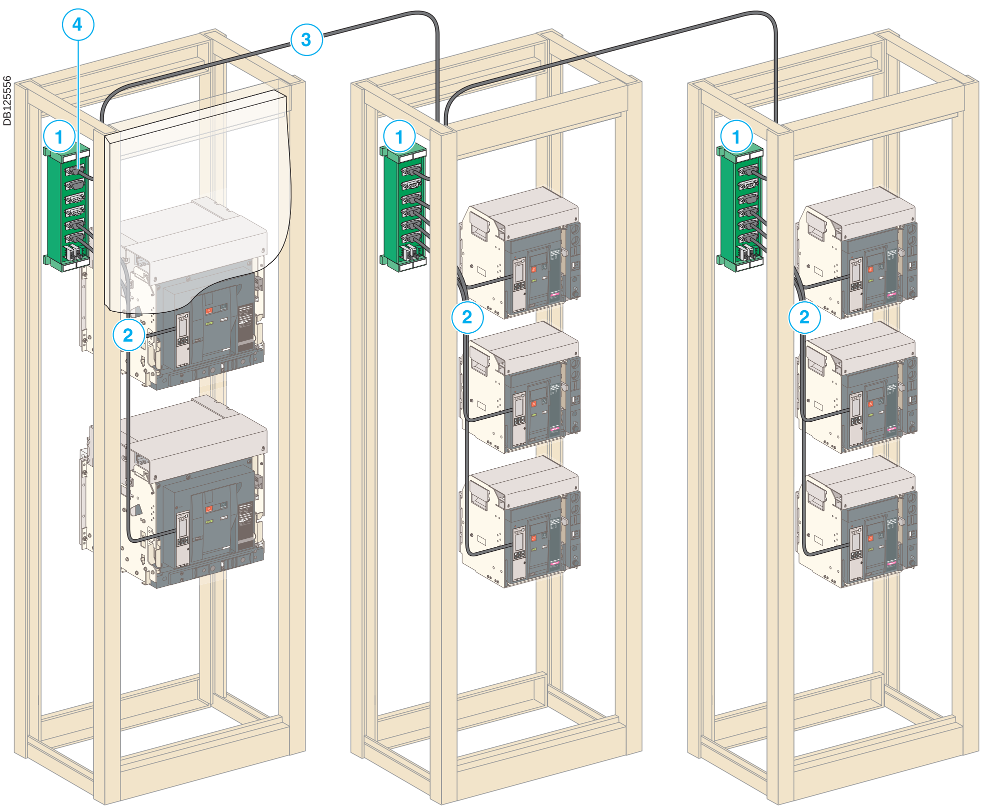

Masterpact circuit breakers equipped with Micrologic control units and the ModBus eco COM option.

Connections
Overview of solutions

Three types of connection are available:
- vertical or horizontal rear connection
- front connection
- mixed connection.

The solutions presented are similar in principle for all Masterpact NT and NW fixed and drawout devices.

Rear connection

Horizontal

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Vertical

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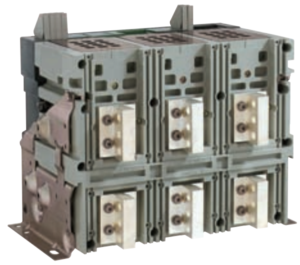
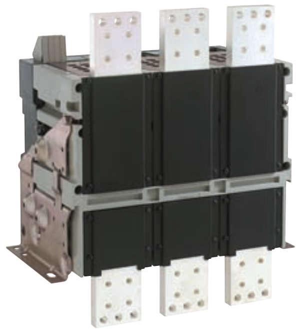


Simply turn a horizontal rear connector 90° to make it a vertical connector.
For the 6300 A circuit breaker, only vertical connection is available.

Front connection

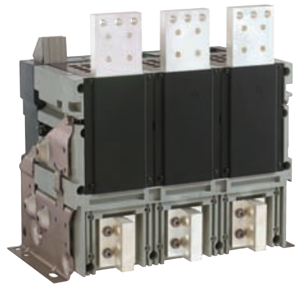
PB104356A40



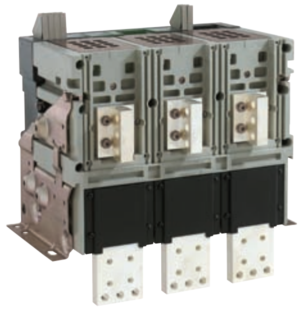
Front connection is available for NW fixed and drawout versions up to 3200 A.

Mixed connection

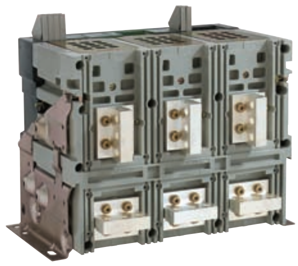
PB104357A40



PB104358A40



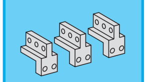
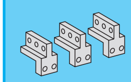
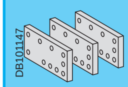
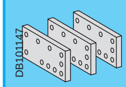
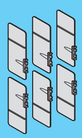
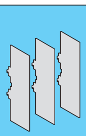
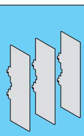
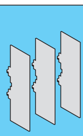
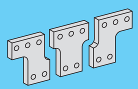
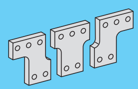
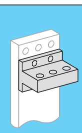
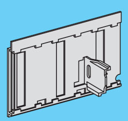
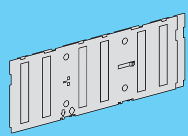
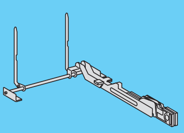
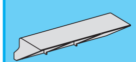
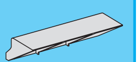
PB104359A40



Note: *Masterpact circuit breakers can be connected indifferently with bare-copper, tinned-copper and tinned-aluminium conductors, requiring no particular treatment.*

Connections

Accessories

Type of accessory	Masterpact NT06 to NT16				Masterpact NW08 to NW63			
	Fixed		Drawout		Fixed		Drawout	
	Front connection	Rear connection	Front connection	Rear connection	Front connection	Rear connection	Front connection	Rear connection
Vertical connection adapters								
Cable lug adapters								
Interphase barriers	 *(1)*			 *(1)*		 *(2)*		 *(2)*
Spreaders								
Disconnectable front-connection adapter								
Safety shutters with padlocking			 *standard*				 *standard*	
Shutter position indication and locking								
Arc chute screen	 *(3)*	 *(4)*						

(1) Mandatory for voltages > 500 V.
(2) Except for an NW40 equipped for horizontal rear connection, and for fixed NW40b-NW63.
(3) Mandatory for 1000 V and for fixed NT front-connection versions with vertical-connection adapters oriented towards the front.
(4) Mandatory for 1000 V.

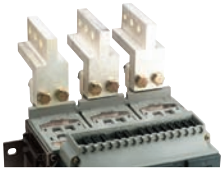
Masterpact M replacement kit

A set of connection parts is available to allow replacement of a Masterpact M08 to M32 circuit breaker by a Masterpact NW without modifying the busbars (please consult us).

Mounting on a switchboard backplate using special brackets

Masterpact NT and NW fixed front-connected circuit breakers can be installed on a backplate without any additional accessories.
Masterpact NW circuit breakers require a set of special brackets.

PB104360A30



Vertical-connection adapters (option)

Mounted on front-connected devices or chassis, the adapters facilitate connection to a set of vertical busbars.

PB104361A30

Cable-lug adapters (option)

Cable-lug adapters are used in conjunction with vertical-connection adapters.
They can be used to connect a number of cables fitted with lugs.
To ensure adequate mechanical strength, the connectors must be secured together via spacers (**catalogue number 07251**).

PB104350A30

Interphase barriers (option)

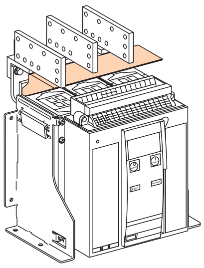
These barriers are flexible insulated partitions used to reinforce isolation of connection points in installations with busbars, whether insulated or not.
For Masterpact NT/NW devices, they are installed vertically between rear connection terminals. They are mandatory for NT devices at voltages > 500 V.

PB104362A30

Spreaders (option)

Mounted on the front or rear connectors, spreaders are used to increase the distance between bars in certain installation configurations.

DB117039



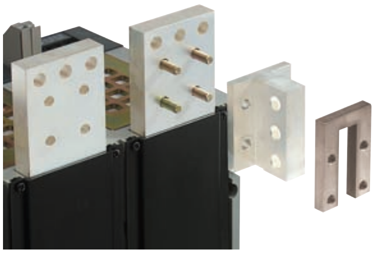
Arc chute screen (option)

For fixed Masterpact NT front-connection versions and with vertical-connection adapters oriented towards the front, an arc chute screen must be installed to respect safety clearances.

For Masterpact NT 1000 V, an arc chute screen must be installed to respect safety clearances.

Connections
Accessories

PB104363A350



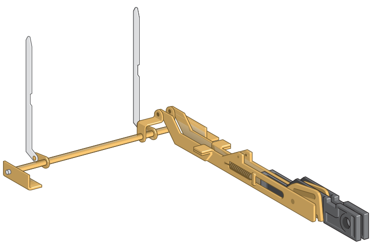
Disconnectable front-connection adapter (option)
Mounted on a fixed front-connected device, the adapter simplifies replacement of a fixed device by enabling fast disconnection from the front.

PB104364A50

Safety shutters (VO standard)
Mounted on the chassis, the safety shutters automatically block access to the disconnecting contact cluster when the device is in the disconnected or test positions (degree of protection IP 20) When the device is removed from its chassis, no live parts are accessible.
The shutter-locking system is made up of a moving block that can be padlocked (padlock not supplied). The block:
■ prevents connection of the device
■ locks the shutters in the closed position.

For Masterpact NW08 to NW63
A support at the back of the chassis is used to store the blocks when they are not used:
■ 2 blocks for NW08 to NW40
■ 4 blocks for NW40b to NW63.

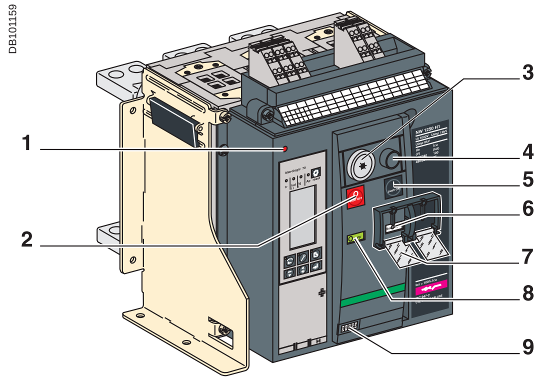
DB101158



Shutter position indication and locking on front face (VIVC, NW only)
This option located on the chassis front plate indicates that the shutters are closed. It is possible to independently or separately padlock the two shutters using one to three padlocks (not supplied).

Locking

On the device



1 *Reset button for mechanical trip indication.*
2 *OFF pushbutton.*
3 *OFF position lock.*
4 *Electrical closing pushbutton.*
5 *ON pushbutton.*
6 *Springs charged indication.*
7 *Pushbutton locking.*
8 *Contact position indication.*
9 *Operation counter.*

Access to pushbuttons protected by transparent cover.

Pushbutton locking using a padlock.

OFF position locking using a padlock.

OFF position locking using a keylock.

Pushbutton locking VBP

The transparent cover blocks access to the pushbuttons used to open and close the device.
It is possible to independently lock the opening button and the closing button.
The locking device is often combined with a remote operating mechanism.
The pushbuttons may be locked using either:
- three padlocks (not supplied)
- lead seal
- two screws.

Device locking in the OFF position VCPO by padlocks, VSPO by keylocks

The circuit breaker is locked in the OFF position by physically maintaining the opening pushbutton pressed down:
- using padlocks (one to three padlocks, not supplied)
- using keylocks (one or two different keylocks, supplied).

Keys may be removed only when locking is effective (Profalux or Ronis type locks).
The keylocks are available in any of the following configurations:
- one keylock
- one keylock mounted on the device + one identical keylock supplied separately for interlocking with another device
- two different key locks for double locking.

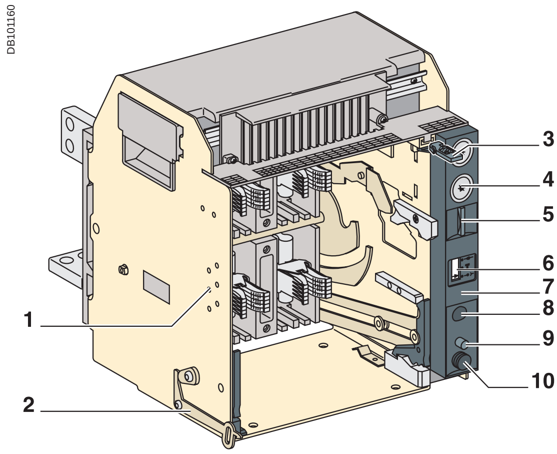
Profalux and Ronis keylocks are compatible with each other.
A locking kit (without locks) is available for installation of one or two keylocks (Ronis, Profalux, Kirk or Castell).

Accessory-compatibility
For Masterpact NT: 3 padlocks or 1 keylock
For Masterpact NW: 3 padlocks and/or 2 keylocks

Cable-type door interlock IPA

This option prevents door opening when the circuit breaker is closed and prevents circuit breaker closing when the door is open.
For this, a special plate associated with a lock and a cable is mounted on the right side of the circuit breaker.
With this interlock installed, the source changeover function cannot be implemented.

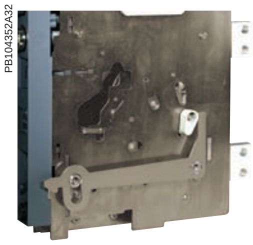
Locking
On the chassis



1 Mismatch protection.
2 Door interlock.
3 Racking interlock.
4 Keylock locking.
5 Padlock locking.
6 Position indicator.
7 Chassis front plate (accessible with cubicle door closed).
8 Racking-handle entry.
9 Reset button.
10 Racking-handle storage.

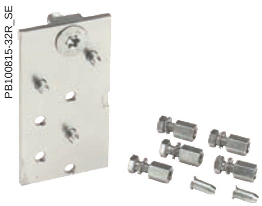
"Disconnected" position locking by padlocks.

"Disconnected" position locking by keylocks.



Door interlock.

Racking interlock.



Mismatch protection.

"Disconnected" position locking by padlocks (standard) or keylocks (VSPD option)
Mounted on the chassis and accessible with the door closed, these devices lock the circuit breaker in the "disconnected" position in two manners:
- using padlocks (standard), up to three padlocks (not supplied)
- using keylocks (optional), one or two different keylocks are available.

Profalux and Ronis keylocks are available in different options:
- one keylock
- two different keylocks for double locking
- one (or two) keylocks mounted on the device + one (or two) identical keylocks supplied separately for interlocking with another device.

A locking kit (without locks) is available for installation of one or two keylocks (Ronis, Profalux, Kirk or Castell).

"Connected", "disconnected" and "test" position locking
The "connected", "disconnected" and "test" positions are shown by an indicator andc are mechanically indexed. The exact position is obtained when the racking handle blocks. A release button is used to free it.
As standard, the circuit breaker can be locked only in "disconnected position". On request, the locking system may be modified to lock the circuit breaker in any of the three positions: "connected", "disconnected" or "test".

Door interlock catch VPEC
Mounted on the right or left-hand side of the chassis, this device inhibits opening of the cubicle door when the circuit breaker is in "connected" or "test" position. It the breaker is put in the "connected" position with the door open, the door may be closed without having to disconnect the circuit breaker.

Racking interlock VPOC
This device prevents insertion of the racking handle when the cubicle door is open.

Cable-type door interlock IPA
This option is identical for fixed and drawout versions.

Racking interlock between crank and OFF pushbutton IBPO (for NW only)
This option makes it necessary to press the OFF pushbutton in order to insert the racking handle and holds the device open until the handle is removed.

Automatic spring discharge before breaker removal DAE (for NW only)
This option discharges the springs before the breaker is removed from the chassis.

Mismatch protection VDC
Mismatch protection ensures that a circuit breaker is installed only in a chassis with compatible characteristics. It is made up of two parts (one on the chassis and one on the circuit breaker) offering twenty different combinations that the user may select.

Indication contacts

Indication contacts are available:
- in the standard version for relay applications
- in a low-level version for control of PLCs and electronic circuits.

M2C and M6C contacts may be programmed via the Micrologic P and H control units.

PB100806-32

ON/OFF indication contacts (OF) (microswitch type).

PB100807-20

ON/OFF indication contacts (OF) (rotary type).

PB100820-32

Additional "fault-trip" indication contacts (SDE).

PB100816-32

Combined contacts.

ON/OFF indication contacts OF

Two types of contacts indicate the ON or OFF position of the circuit breaker:
- microswitch type changeover contacts for Masterpact NT
- rotary type changeover contacts directly driven by the mechanism for Masterpact NW. These contacts trip when the minimum isolation distance between the main circuit-breaker contacts is reached.

OF				NT	NW
Supplied as standard				4	4
Maximum number				4	12
Breaking capacity (A)	Standard			Minimum load: 100 mA/24 V	
p.f.: 0.3		V AC	240/380	6	10/6 (1)
AC12/DC12			480	6	10/6 (1)
			690	6	6
		V DC	24/48	2.5	10/6 (1)
			125	0.5	10/6 (1)
			250	0.3	3
	Low-level			Minimum load: 2 mA/15 V	
		V AC	24/48	5	6
			240	5	6
			380	5	3
		V DC	24/48	5/2.5	6
			125	0.5	6
			250	0.3	3

(1) Standard contacts: 10 A; optional contacts: 6 A.

"Fault-trip" indication contacts SDE

Circuit-breaker tripping due to a fault is signalled by:
- a red mechanical fault indicator (reset)
- one changeover contact SDE.

Following tripping, the mechanical indicator must be reset before the circuit breaker may be closed. One SDE is supplied as standard. An optimal SDE may be added. This latter is incompatible with the electrical reset after fault-trip option (RES).

SDE				NT/NW
Supplied as standard				1
Maximum number				2
Breaking capacity (A)	Standard			Minimum load: 100 mA/24 V
p.f.: 0.3		V AC	240/380	5
AC12/DC12			480	5
			690	3
		V DC	24/48	3
			125	0.3
			250	0.15
	Low-level			Minimum load: 2 mA/15 V
		V AC	24/48	3
			240	3
			380	3
		V DC	24/48	3
			125	0.3
			250	0.15

Combined "connected/closed" contacts EF

The contact combines the "device connected" and the "device closed" information to produce the "circuit closed" information. Supplied as an option for Masterpact NW, it is mounted in place of the connector of an additional OF contact.

EF				NW
Maximum number				8
Breaking capacity (A)	Standard			Minimum load: 100 mA/24 V
p.f.: 0.3		V AC	240/380	6
AC12/DC12			480	6
			690	6
		V DC	24/48	2.5
			125	0.8
			250	0.3
	Low-level			Minimum load: 2 mA/15 V
		V AC	24/48	5
			240	5
			380	5
		V DC	24/48	2.5
			125	0.8
			250	0.3

Indication contacts

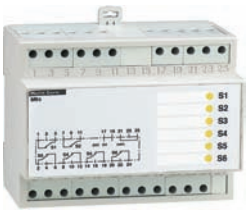
PB100817-32

CE, CD and CT "connected/disconnected/test" position carriage switches.

PB100778-52

M2C programmable contacts: circuit-breaker internal relay with two contacts.

PB100781-32



*M6C programmable contacts:
circuit-breaker external relay with six independent changeover contacts controlled from the circuit breaker via a three-wire connection. (maximum length is 10 meters).*

"Connected", "disconnected" and "test" position carriage switches

Three series of optional auxiliary contacts are available for the chassis:
■ changeover contacts to indicate the "connected" position CE
■ changeover contacts to indicate the "disconnected" position CD. This position is indicated when the required clearance for isolation of the power and auxiliary circuits is reached
■ changeover contacts to indicate the "test" position CT. In this position, the power circuits are disconnected and the auxiliary circuits are connected.

Additional actuators

A set of additional actuators may be installed on the chassis to change the functions of the carriage switches.

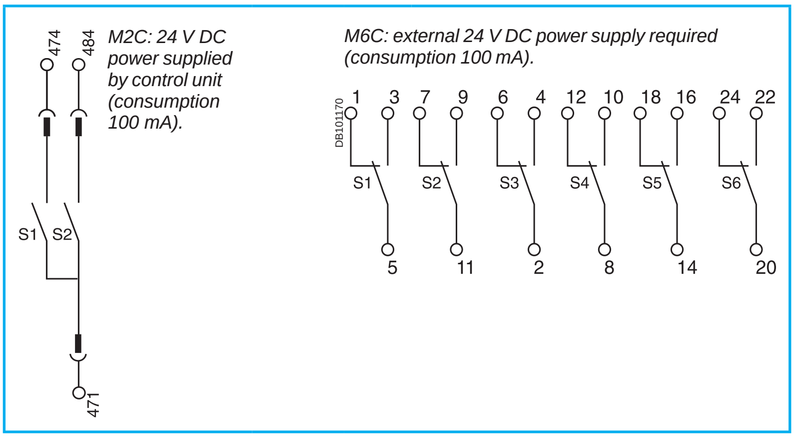
				NT	NW
Contacts				**CE/CD/CT**	**CE/CD/CT**
Maximum number	Standard			3 2 1	3 3 3
	with additional actuators				9 0 0
					6 3 0
					6 0 3
Breaking capacity (A) p.f.: 0.3 AC12/DC12	Standard			Minimum load: 100 mA/24 V	
		V AC	240	8	8
			380	8	8
			480	8	8
			690	6	6
		V DC	24/48	2.5	2.5
			125	0.8	0.8
			250	0.3	0.3
	Low-level			Minimum load: 2 mA/15 V	
		V AC	24/48	5	5
			240	5	5
			380	5	5
		V DC	24/48	2.5	2.5
			125	0.8	0.8
			250	0.3	0.3

M2C / M6C programmable contacts

These contacts, used with the Micrologic P and H control units, may be programmed via the control unit keypad or via a supervisory station with the COM communication option. They require an external power supply module.
They indicate:
■ the type of fault
■ instantaneous or delayed threshold overruns.
■ They may be programmed:
■ with instantaneous return to the initial state
■ without return to the initial state
■ with return to the initial state following a delay.

Characteristics			**M2C/M6C**
Minimum load			100 mA/24 V
Breaking capacity (A) p.f.: 0.7	V AC	240	5
		380	3
	V DC	24	1.8
		48	1.5
		125	0.4
		250	0.15

DB117038

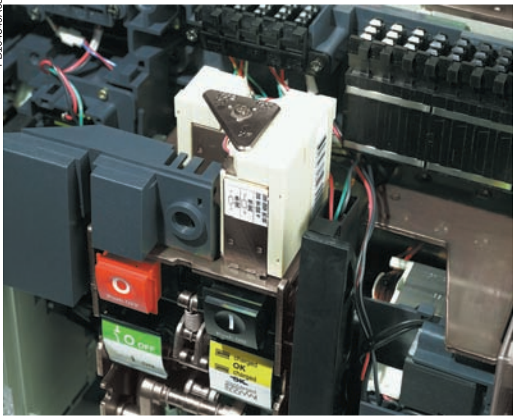


Remote operation

Remote ON / OFF

Two solutions are available for remote operation of Masterpact devices:
■ a point-to-point solution
■ a bus solution with the COM communication option.

PB104349A68



Note: an opening order always takes priority over a closing order.

If opening and closing orders occur simultaneously, the mechanism discharges without any movement of the main contacts. The circuit breaker remains in the open position (OFF).
In the event of maintained opening and closing orders, the standard mechanism provides an anti-pumping function by blocking the main contacts in open position.
Anti-pumping function. After fault tripping or intentional opening using the manual or electrical controls, the closing order must first be discontinued, then reactivated to close the circuit breaker.
When the automatic reset after fault trip (RAR) option is installed, to avoid pumping following a fault trip, the automatic control system must take into account the information supplied by the circuit breaker before issuing a new closing order or blocking the circuit breaker in the open position (information on the type of fault, e.g. overload, short-time fault, earth fault, earth leakage, short-circuit, etc.).

Note: MX communicating releases are of the impulse type only and cannot be used to lock a circuit breaker in OFF position. For locking in OFF position, use the remote tripping function (2nd MX or MN).
When MX or XF communicating releases are used, the third wire (C3, A3) must be connected even if the communication module is not installed. When the control voltage (C3-C1 or A3-A1) is applied to the MX or XF releases, it is necessary to wait 1.5 seconds before issuing an order. Consequently, it is advised to use standard MX or XF releases for applications such as source-changeover systems.

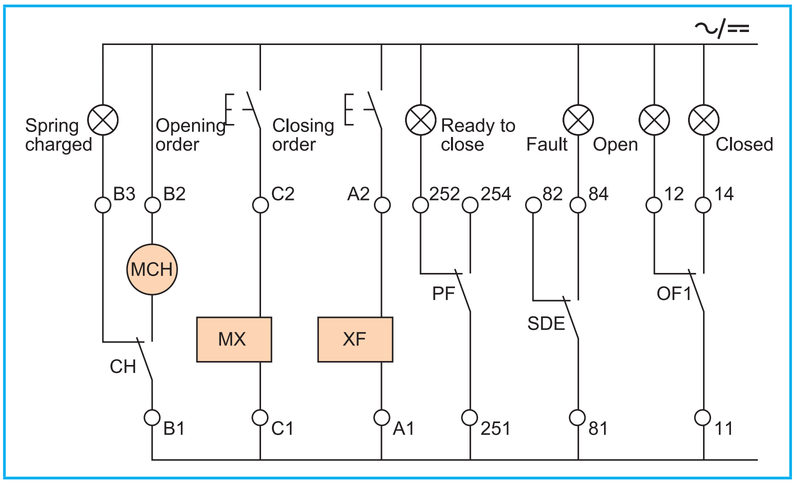
The remote ON / OFF function is used to remotely open and close the circuit breaker. It is made up of:
■ an electric motor MCH equipped with a "springs charged" limit switch contact CH
■ two voltage releases:
□ a closing release XF
□ an opening release MX.

Optionally, other functions may be added:
■ a "ready to close" contact PF
■ an electrical closing pushbutton BPFE
■ remote RES following a fault.

A remote-operation function is generally combined with:
■ device ON / OFF indication OF
■ "fault-trip" indication SDE.

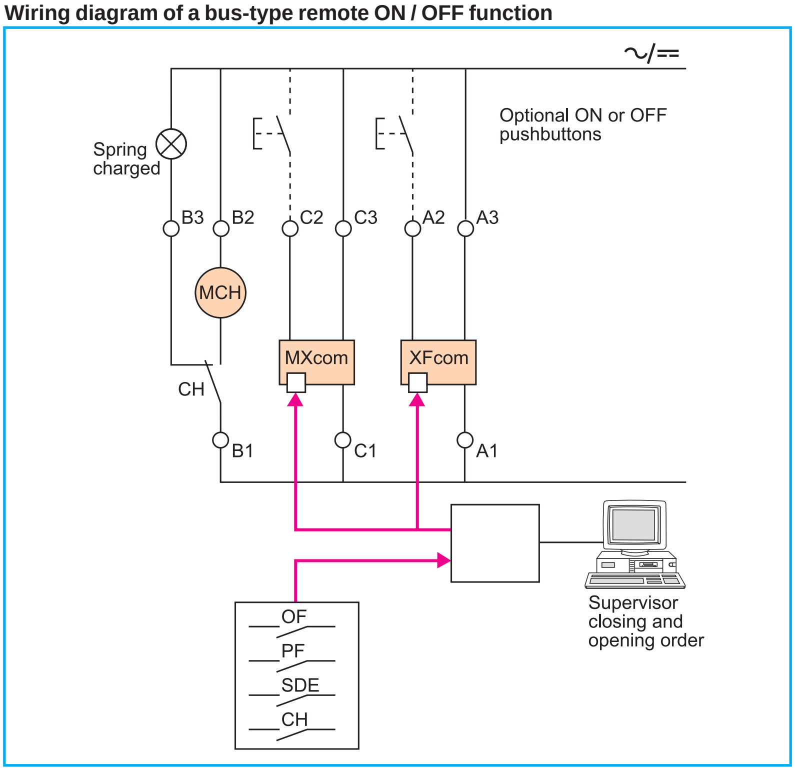
Wiring diagram of a point-to-point remote ON / OFF function

DB111783



Wiring diagram of a bus-type remote ON / OFF function

DB101165



Remote operation
Remote ON / OFF

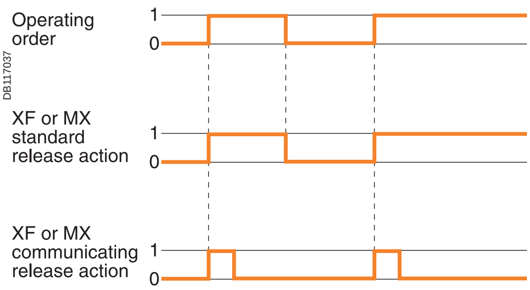
PB100797-23

Electric motor MCH for Masterpact NT.

PB100808-32

Electric motor MCH for Masterpact NW.

DB117037



PB100809-16

XF and MX voltage releases.

PB100818-16

"Ready to close" contacts PF.

Electric motor MCH

The electric motor automatically charges and recharges the spring mechanism when the circuit breaker is closed. Instantaneous reclosing of the breaker is thus possible following opening. The spring-mechanism charging handle is used only as a backup if auxiliary power is absent.
The electric motor MCH is equipped as standard with a limit switch contact CH that signals the "charged" position of the mechanism (springs charged).

Characteristics		
Power supply	V AC 50/60 Hz	48/60 - 100/130 - 200/240 - 277- 380/415 - 400/440 - 480
	V DC	24/30 - 48/60 - 100/125 - 200/250
Operating threshold		0.85 to 1.1 Un
Consumption (VA or W)		180
Motor overcurrent		2 to 3 In for 0.1 s
Charging time		maximum 3 s for Masterpact NT
		maximum 4 s for Masterpact NW
Operating frequency		maximum 3 cycles per minute
CH contact		10 A at 240 V

Voltage releases XF and MX

Their supply can be maintained or automatically disconnected.

Closing release XF

The XF release remotely closes the circuit breaker if the spring mechanism is charged.

Opening release MX

The MX release instantaneously opens the circuit breaker when energised. It locks the circuit breaker in OFF position if the order is maintained (except for MX "communicating" releases).

Note: whether the operating order is maintened or automatically disconnected (pulse-type), XF or MX "communicating" releases ("bus" solution with "COM" communication option) always have an impulse-type action (see diagram).

Characteristics		XF	MX
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 277 - 380/480	
	V DC	12 - 24/30 - 48/60 - 100/130 - 200/250	
Operating threshold		0.85 to 1.1 Un	0.7 to 1.1 Un
Consumption (VA or W)		Hold: 4.5 Pick-up: 200 (200 ms)	Hold: 4.5 Pick-up: 200 (200 ms)
Circuit-breaker response time at Un		55 ms ±10 (Masterpact NT)	50 ms ±10
		70 ms ±10 (NW ≤ 4000 A)	
		80 ms ±10 (NW > 4000 A)	

"Ready to close" contact PF

The "ready to close" position of the circuit breaker is indicated by a mechanical indicator and a PF changeover contact. This signal indicates that all the following are valid:

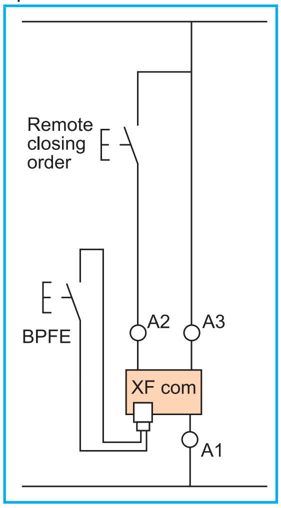
- the circuit breaker is in the OFF position
- the spring mechanism is charged
- a maintained opening order is not present:
  - MX energised
  - fault trip
  - remote tripping second MX or MN
  - device not completely racked in
  - device locked in OFF position
  - device interlocked with a second device.

Characteristics				NT/NW
Maximum number				1
Breaking capacity (A) p.f.: 0.3 AC12/DC12	Standard			Minimum load: 100 mA/24 V
		V AC	240/380	5
			480	5
			690	3
		V DC	24/48	3
			125	0.3
			250	0.15
	Low-level			Minimum load: 2 mA/15 V
		V AC	24/48	3
			240	3
			380	3
		V DC	24/48	3
			125	0.3
			250	0.15

Electrical closing pushbutton BPFE.

Electrical closing pushbutton BPFE

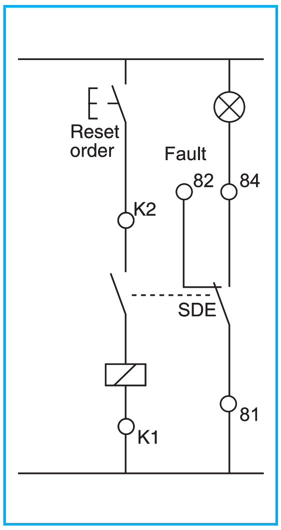
Located on the front panel, this pushbutton carries out electrical closing of the circuit breaker. It is generally associated with the transparent cover that protects access to the closing pushbutton.
Electrical closing via the BPFE pushbutton takes into account all the safety functions that are part of the control/monitoring system of the installation.
The BPFE connects to the closing release (XF com) in place of the COM module.
The COM module is incompatible with this option.
Different types of voltage exist and the XF electromagnet is compulsary if the BPFE option is selected.



Remote reset after fault trip

Electrical reset after fault trip RES

Following tripping, this function resets the “fault trip” indication contacts SDE and the mechanical indicator and enables circuit breaker closing.
Power supply: 110 / 130 V AC and 200 / 240 V AC.
The use of XF closing release is compulsory with this option.

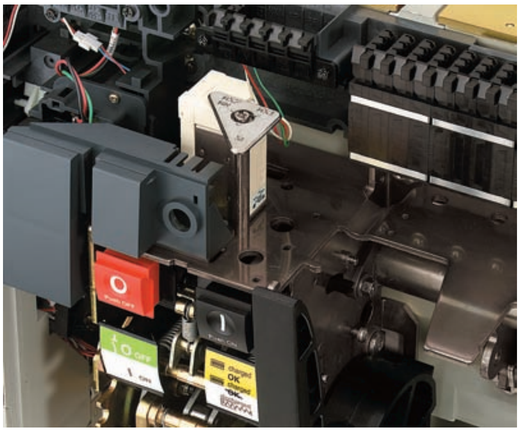


Automatic reset after fault trip RAR

Following tripping, a reset of the mechanical indicator (reset button) is no longer required to enable circuit-breaker closing. The mechanical (reset button) and electrical SDE indications remain in fault position until the reset button is pressed.
The use of XF closing release is compulsory with this option.

Remote operation
Remote tripping

PB104369A68



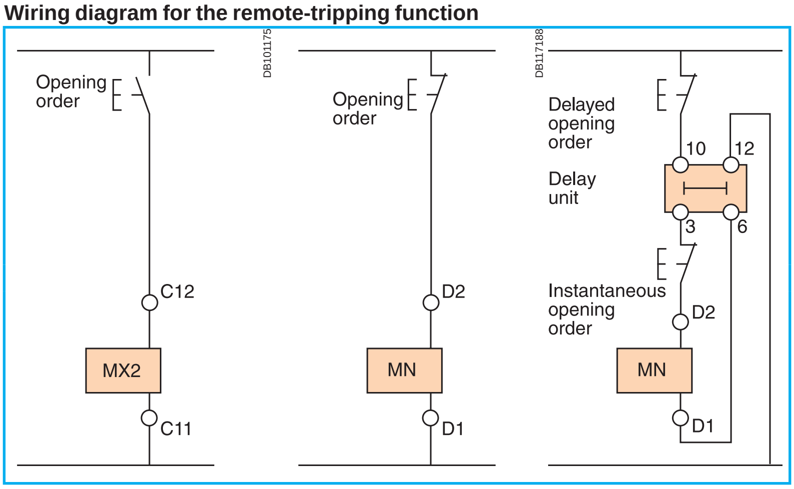
DB100809-16

MX or MN voltage release.

This function opens the circuit breaker via an electrical order. It is made up of:
- a shunt release second MX
- or an undervoltage release MN
- or a delayed undervoltage release MNR: MN + delay unit.

These releases (2nd MX or MN) cannot be operated by the communication bus.
The delay unit, installed outside the circuit breaker, may be disabled by an emergency OFF button to obtain instantaneous opening of the circuit breaker.

Wiring diagram for the remote-tripping function



Voltage releases second MX
When energised, the MX voltage release instantaneously opens the circuit breaker.
A continuous supply of power to the second MX locks the circuit breaker in the OFF position.

Characteristics			
Power supply	V AC 50/60Hz	24 - 48 - 100/130 - 200/250 - 277- 380/480	
	V DC	12 - 24/30 - 48/60 - 100/130 - 200/250	
Operating threshold		0.7 to 1.1 Un	
Permanent locking function		0.85 to 1.1 Un	
Consumption (VA or W)		Pick-up: 200 (80 ms)	Hold: 4.5
Circuit-breaker response time at Un		50 ms ±10	

Instantaneous voltage releases MN
The MN release instantaneously opens the circuit breaker when its supply voltage drops to a value between 35 % and 70 % of its rated voltage. If there is no supply on the release, it is impossible to close the circuit breaker, either manually or electrically. Any attempt to close the circuit breaker has no effect on the main contacts. Circuit-breaker closing is enabled again when the supply voltage of the release returns to 85 % of its rated value.

Characteristics			
Power supply	V AC 50/60 Hz V DC	24 - 48 - 100/130 - 200/250 - 380/480 24/30 - 48/60 - 100/130 - 200/250	
Operating threshold	Opening Closing	0.35 to 0.7 Un 0.85 Un	
Consumption (VA or W)		Pick-up: 200 (200 ms)	Hold: 4.5
MN consumption with delay unit (VA or W)		Pick-up: 200 (200 ms)	Hold: 4.5
Circuit-breaker response time at Un		40 ms ±5 for NT 90 ms ±5 for NW	

MN delay units
To eliminate circuit-breaker nuisance tripping during short voltage dips, operation of the MN release can be delayed. This function is achieved by adding an external delay unit in the MN voltage-release circuit. Two versions are available, adjustable and non-adjustable.

Characteristics		
Power supply	Non-adjustable	100/130 - 200/250
V AC 50-60 Hz /DC	Adjustable	48/60 - 100/130 - 200/250 - 380/480
Operating threshold	Opening Closing	0.35 to 0.7 Un 0.85 Un
Delay unit consumption	Pick-up: 200 (200 ms)	Hold: 4.5
Circuit-breaker response time at Un	Non-adjustable Adjustable	0.25 s 0.5 s - 0.9 s - 1.5 s - 3 s

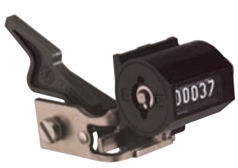
Accessories

PB104740

Auxiliary terminal shield CB

Optional equipment mounted on the chassis, the shield prevents access to the terminal block of the electrical auxiliaries.

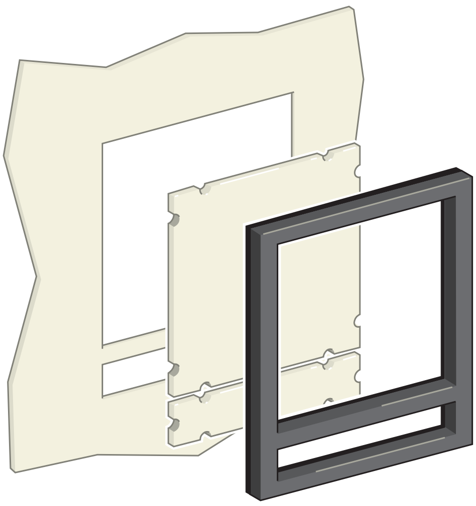
PB104382A32



Operation counter CDM

The operation counter sums the number of operating cycles and is visible on the front panel. It is compatible with manual and electrical control functions.
This option is compulsory for all the source-changeover systems.

DB101173



Escutcheon CDP with blanking plate.

Escutcheon CDP

Optional equipment mounted on the door of the cubicle, the escutcheon increases the degree of protection to IP 40 (circuit breaker installed free standing: IP30) .
It is available in fixed and drawout versions.

Blanking plate OP for escutcheon

Used with the escutcheon, this option closes off the door cut-out of a cubicle not yet equipped with a device. It may be used with the escutcheon for both fixed and drawout devices.

Transparent cover CCP for escutcheon

Optional equipment mounted on the escutcheon, the cover is hinged and secured by a screw. It increases the degree of protection to IP54, IK10. It adapts to drawout devices.

PB100776-42

Transparent cover CCP for escutcheon.

Source-changeover systems
Presentation

Manual source-changeover system
This is the most simple type. It is controlled manually by an operator and consequently the time required to switch from the normal to the replacement source can vary.
A manual source-changeover system is made up of two or three mechanically interlocked manually-operated circuit breakers or switch-disconnectors.

Remote-operated source-changeover system
This is the most commonly employed system for devices with high ratings (above 400 A). No human intervention is required. Transfer from the normal to the replacement source is controlled electrically.
A remote-controlled source-changeover system is made up of two or three circuit breakers or switch-disconnectors linked by an electrical interlocking system that may have different configurations. In addition, a mechanical interlocking system protects against electrical malfunctions or incorrect manual operations.

Automatic source-changeover systems
An automatic controller may be added to a remote-operated source-changeover system for automatic source control according to programmable operating modes.
This solution ensures optimum energy management:
- transfer to a replacement source according to external requirements
- management of power sources
- regulation
- emergency source replacement, etc.

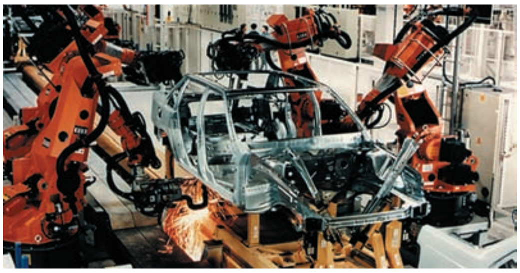
The automatic controller may be fitted with an option for communication with a supervisor.

Communication option
The communication option must not be used to control the opening or closing of source-changeover system circuit breakers. It should be used only to transmit measurement data or circuit-breaker status.
The eco COM option is perfectly suited to these equipments.

PB100843A


PB100844A


Tertiaire :
- *salles d'opérations des hôpitaux*
- *dispositifs de sécurité d'immeubles de grande hauteur*
- *salles d'ordinateurs (banques, assurances...)*
- *systèmes d'éclairage de centres commerciaux...*

PB100845A


Industry:
- *assembly lines*
- *engine rooms on ships*
- *critical auxiliaries in thermal power stations…*

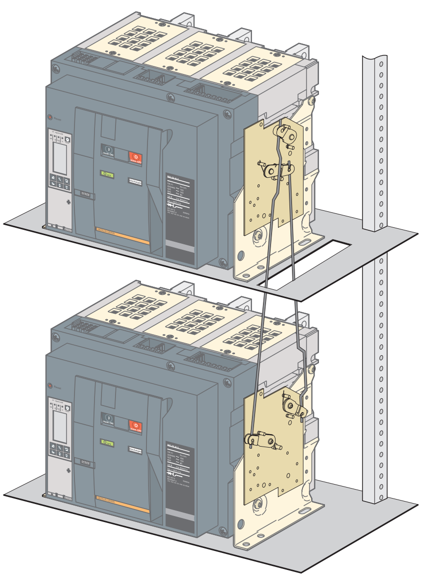
PB100846A


PB100847A


Infrastructures:
- *port and railway installations*
- *runway lighting systems*
- *control systems on military sites…*

Mechanical interlocking

DB101572



Interlocking of two Masterpact NT or NW circuit breakers using connecting rods.

Interlocking of two Compact NS630b to 1600 or two Masterpact NT and NW devices using connecting rods

The two devices must be mounted one above the other (either 2 fixed or 2 withdrawable/drawout devices).
Combinations are possible between Compact NS630b to NS1600 devices and between Masterpact NT and Masterpact NW devices.

Installation

This function requires:

■ an adaptation fixture on the right side of each circuit breaker or switch-disconnector

■ a set of connecting rods with no-slip adjustments.

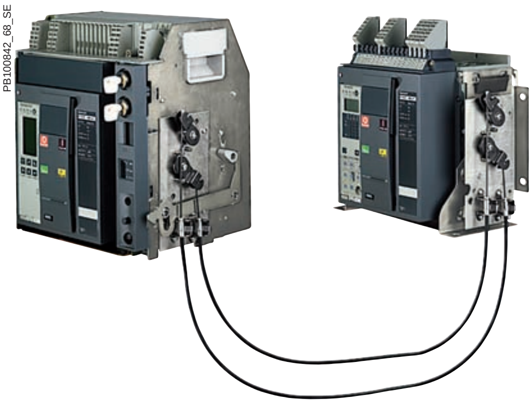
The adaptation fixtures, connecting rods and circuit breakers or switch-disconnectors are supplied separately, ready for assembly by the customer.
The maximum vertical distance between the fixing planes is 900 mm.

Possible combinations of "Normal" and "Replacement" source circuit breakers

"Normal N"	"Replacement" R			
	NS630b to NS1600	NT06 to NT16	NW08 to NW40	NW40b to NW63
NS630b to NS1600				
Ratings 250... 1600 A	■			
NT06 to NT16				
Ratings 250... 1600 A		■	■	■
NW08 to NW40				
Ratings 320... 4000 A		■	■	■
NW40b to NW63				
Ratings 4000... 6300 A		■	■	■

Source-changeover systems

Mechanical interlocking



Interlocking of two Masterpact circuit breakers using cable.

Interlocking of two Masterpact NT/NW or up to three Masterpact NW devices using cables

For cable interlocking, the circuit breakers may be mounted one above the other or side-by-side.
The interlocked devices may be fixed or drawout, three-pole or four-pole, and have different ratings and sizes.

Interlocking between two devices (Masterpact NT and NW)

This function requires:

- an adaptation fixture on the right side of each device
- a set of cables with no-slip adjustments
- the use of a mechanical operation counter CDM is compulsory.

The maximum distance between the fixing planes (vertical or horizontal) is 2000 mm.

Interlocking between three devices (Masterpact NW only)

This function requires:

- a specific adaptation fixture for each type of interlocking, installed on the right side of each device
- two or three sets of cables with no-slip adjustments
- the use of a mechanical operation counter CDM is compulsory.

The maximum distance between the fixing planes (vertical or horizontal) is 1000 mm.

Installation

The adaptation fixtures, sets of cables and circuit breakers or switch-disconnectors are supplied separately, ready for assembly by the customer.

Installation conditions for cable interlocking systems:

- cable length: 2.5 m
- radius of curvature: 100 mm
- maximum number of curves: 3.

Possible combinations of "Normal" and "Replacement" source circuit breakers

"Normal N"	"Replacement" R		
	NT06 to NT16	NW08 to NW40	NW40b to NW63
NT06 to NT16			
Ratings 250... 1600 A	■	■	■
NW08 to NW40			
Ratings 320... 4000 A	■	■	■
NW40b to NW63			
Ratings 4000... 6300 A	■	■	■

All combinations of two Masterpact NT and Masterpact NW devices are possible, whatever the rating or size of the devices.

Possible combinations of three device

	NT06 to NT16	NW08 to NW40	NW40b to NW63
NT06 to NT16			
Ratings 250... 1600 A			
NW08 to NW40			
Ratings 320... 4000 A		■	■
NW40b to NW63			
Ratings 4000... 6300 A		■	■

Only Masterpact NW may be used for three-device combinations.

Types of mechanical interlocking and combinations

See catalogue "Source changeover systems", réf. LVPED208007EN.

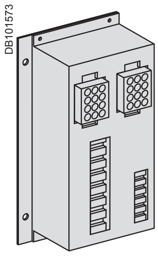
Electrical interlocking

Electrical interlocking is used with the mechanical interlocking system. It electrically interlocks the two circuit breakers and implements the time delays required for proper operation of the system.
An automatic controller may be added to take into account information from the distribution system.

Electrical interlocking is carried out by an electrical control device.
For Masterpact, this function can be implemented in one of two ways:
■ using the IVE unit
■ by an electrician based on the diagrams presented in the "Electrical diagrams" part of this catalogue.

Characteristics of the IVE unit

■ external connection terminal block:
□ inputs: circuit breaker control signals
□ outputs: status of the SDE contacts on the "Normal" and "Replacement" source circuit breakers
■ 2 connectors for the two "Normal" and "Replacement" source circuit breakers:
□ inputs:
- status of the OF contacts on each circuit breaker (ON or OFF)
- status of the SDE contacts on the "Normal" and "Replacement" source circuit breakers
□ outputs: power supply for operating mechanisms
■ control voltage:
□ 24 to 250 V DC
□ 48 to 415 V 50/60 Hz - 440 V 60 Hz.
The IVE unit control voltage must be same as that of the circuit breaker operating mechanisms.



IVE unit.

Necessary equipment

For Masterpact NT and NW, each circuit breaker must be equipped with:
■ a remote-operation system made up of:
□ MCH gear motor
□ MX or MN opening release
□ XF closing release
□ PF "ready to close" contact
□ CDM mechanical operation counter
■ an available OF contact
■ one to three CE connected-position contacts (carriage switches) on drawout circuit

Functions
and characteristics

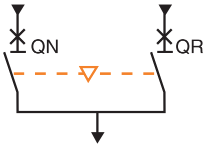
Source-changeover systems
Standard configuration

Compact NS, Masterpact NT and NW

Types of mechanical interlocking | **Possible combinations** | **Typical electrical diagrams** | **Diagram no.**

2 devices

DB101574



QN	QR
0	0
1	0
0	1

Masterpact NT and NW:

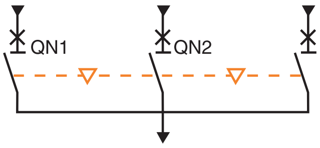
Typical electrical diagrams	Diagram no.
■ electrical interlocking with lockout after fault:	
□ permanent replacement source (without IVE)	**51201139**
□ with EPO by MX (without IVE)	**51201140**
□ with EPO by MN (without IVE)	**51201141**
□ permanent replacement source (with IVE)	**51201142**
□ with EPO by MX (with IVE)	**51201143**
□ with EPO by MN (with IVE)	**51201144**
■ automatic control without lockout after fault:	
□ permanent replacement source (without IVE)	**51156226**
□ engine generator set (without IVE)	**51156227**
■ automatic control with lockout after fault:	
□ permanent replacement source (with IVE)	**51156904**
□ engine generator set (with IVE)	**51156905**
■ BA/UA controller (with IVE)	**51156903**

Masterpact NW only

Types of mechanical interlocking | **Possible combinations** | **Typical electrical diagrams** | **Diagram no.**

3 devices: 2 "Normal" sources and 1 "Replacement" source

DB101575

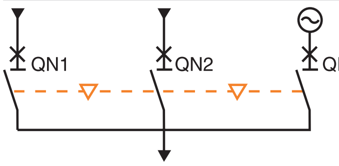


QN1	QN2	QR
0	0	0
1	1	0
0	0	1

Typical electrical diagrams	Diagram no.
■ electrical interlocking:	
□ without lockout after fault	**51156906**
□ with lockout after fault	**51156907**

3 devices: 2 "Normal" sources and 1 "Replacement" source with source selection

DB101576

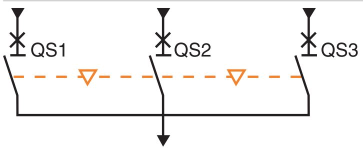


QN1	QN2	QR
0	0	0
1	0	0
0	0	1
1	1	0
0	1	0

Typical electrical diagrams	Diagram no.
■ automatic control with engine generator set:	
□ without lockout after fault (with MN)	**51156908**
□ with lockout after fault (with MN)	**51156909**

3 devices: 3 sources, only one device

DB101577

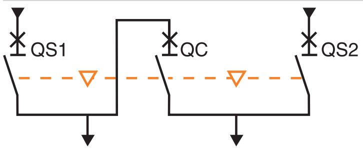


QS1	QS2	QS3
0	0	0
1	0	0
0	1	0
0	0	1

Typical electrical diagrams	Diagram no.
■ electrical interlocking:	
□ without lockout after fault	**51156910**
□ with lockout after fault	**51156911**

3 devices: 2 sources + 1 coupling

DB101578



QS1	QC	QS2	
0	0	0	
1	0	1	
1	1	0	
0	1	1	
1	0	0	(1)
0	0	1	(1)

(1) possible by forcing operation

Typical electrical diagrams	Diagram no.
■ electrical interlocking:	
□ without lockout after fault	**51156912**
□ with lockout after fault	**51156913**
■ automatic control with lockout after fault	**51156914**

"Lockout after fault" option. This option makes it necessary to manually reset the device following fault tripping.

Associated automatic controllers

By combining a remote-operated source-changeover system with an integrated BA or UA automatic controller, it is possible to automatically control source transfer according to user-selected sequences.
These controllers can be used on source-changeover systems comprising 2 circuit breakers.
For source-changeover systems comprising 3 circuit breakers, the automatic control diagram must be prepared by the installer as a complement to to diagrams provided in the "electrical diagrams" section of this catalogue.

PB100855_SE

BA controller.

PB100856_SE

UA controller.

Controller		**BA**	**UA**
Compatible circuit breakers		All Masterpact circuit breakers	
4-position switch			
Automatic operation		■	■
Forced operation on "Normal" source		■	■
Forced operation on "Replacement" source		■	■
Stop (both "Normal" and "Replacement" sources off)		■	■
Automatic operation			
Monitoring of the "Normal" source and automatic transfer		■	■
Generator set startup control			■
Delayed shutdown (adjustable) of generator set			■
Load shedding and reconnection of non-priority circuits			■
Transfer to the "Replacement" source if one of the phases of the "Normal" phase is absent			■
Test			
By opening the P25M circuit breaker supplying the controller		■	
By pressing the test button on the front of the controller			■
Indications			
Circuit breaker status indication on the front of the controller: on, off, fault trip		■	■
Automatic mode indicating contact		■	■
Other functions			
Selection of type of "Normal" source (single-phase or three-phase) (1)			■
Voluntary transfer to "Replacement" source (e.g. energy management commands)		■	■
During peak-tariff periods (energy management commands) forced operation on "Normal" sourceif "Replacement" source not operational			■
Additional contact (not part of controller). Transfer to "Replacement" source only if contact is closed. (e.g. used to test the frequency of UR).		■	■
Setting of maximum startup time for the replacement source			■
Options			
Communication option			
Power supply			
Control voltages (2)	110 V	■	■
	220 to 240 V 50/60 Hz	■	■
	380 to 415 V 50/60 Hz and 440 V 60 Hz	■	■
Operating thresholds			
Undervoltage	0.35 Un ⩽ voltage ⩽ 0.7 Un	■	■
Phase failure	0.5 Un ⩽ voltage ⩽ 0.7 Un		■
Voltage presence	voltage ⩾ 0.85 Un	■	■
IP degree of protection (EN 60529) and IK degree of protection against external mechanical impacts (EN 50102)			
Front	IP40	■	■
Side	IP30	■	■
Connectors	IP20	■	■
Front	IK07	■	■
Characteristics of output contacts (dry, volt-free contacts)			
Rated thermal current (A)	8		
Minimum load	10 mA at 12 V		
Output contacts:			
Position of the Auto/Stop switch		■	■
Load shedding and reconnection order			■
Generator set start order.			■

		AC				**DC**	
Utilisation category (IEC 947-5-1)		AC12	AC13	AC14	AC15	DC12	DC13
Operational current (A)	24 V	8	7	5	5	8	2
	48 V	8	7	5	5	2	-
	110 V	8	6	4	4	0.6	-
	220/240 V	8	6	4	3	-	-
	250 V	-	-	-	-	0.4	-
	380/415 V	5	-	-	-	-	-
	440 V	4	-	-	-	-	-
	660/690 V	-	-	-	-	-	-

(1) For example, 220 V single-phase or 220 V three-phase.
(2) The controller is powered by the ACP auxiliaries control plate. The same voltage must be used for the ACP plate, the IVE unit and the circuit-breaker operating mechanisms. If this voltage is the same as the source voltage, then the "Normal" and "Replacement" sources can be used directly for the power supply. If not, an isolation transformer must be used.

Masterpact NW with corrosion protection 800-4000 A

PB104383A50

Masterpact NW circuit breakers with corrosion protection are designed for use in industrial environments with high concentrations of sulphur compounds. Examples include paper mills, oil refineries, steel works and water treatment plants, all of which produce large quantities of sulphur dioxide (SO2) or hydrogen sulphate (H2S).
Under such conditions, silver-plated parts rapidly turn black due to the formation of silver sulphate (AgS) on the surface, an insulating material that can lead to abnormal temperature rise in electrical contacts. This phenomenon can have serious consequences on all equipment installed inside a switchboard.
Circuit breakers used in such environments generally require frequent maintenance and therefore a large number of replacement devices on the site. Furthermore, problems are often encountered even with intensive maintenance.
Masterpact NW circuit breakers with corrosion protection receive special surface treatment on all parts exposed to corrosion and critical with respect to electrical continuity. In this way, the availability of electrical power and operating safety are ensured without special maintenance for the following environmental condition classes as defined by standard IEC 721-3-3:
- 3C3 for H2S (concentrations from 2.1 to 7.1 x 10^{-6})
- 3C4 for SO2 (concentrations from 4.8 to 14.8 x 10^{-6}).

The Masterpact NW range of power circuit breakers with corrosion protection offers the following features:
- rated current from 800 A to 4000 A
- 3 and 4-pole models
- drawout circuit breaker
- operational voltage up to 690 V AC
- Ics breaking capacity of 100 kA at 220/415 V AC
- reverse feed possible
- stored-energy mechanism for instantaneous closing (source coupling).
- 3 types of RMS electronic protection
- adjustable long-time settings from 0.4 to 1 In, with fine adjustment via local keypad or remote supervisor
- electronic functions dedicated to energy management and power-quality analysis.

The Masterpact NW range complies with the main standards and certifications:
- IEC 60947-1 and 60947-2
- IEC 68230 (damp heat) and IEC 68252 severity level 2 (salt mist)
- IEC 60068-2-42 and IEC 60068-2-43 for corrosive environments:
  - SO2 : tested to IEC 60068-2-42 in a 3C4 environment as defined by IEC 60721-3-3
  - H2S: tested to IEC 60068-2-43 in a 3C3 environment as defined IEC 60721-3-3.

A complete range of electrical accessories and auxiliaries:
- motor mechanism (MCH)
- undervoltage release (MN, MNR)
- shunt trip unit (MX)
- closing release (XF)
- auxiliary contacts (OF)
- low-level indication contacts (SDE, PF, CD, CT, CE and EF)
- electrical closing button (BPFE)
- locking by padlocks and/or keylocks.
- source-changeover systems for 2 or 3 devices

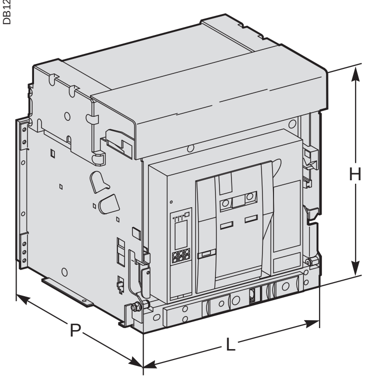
Maximum safety
The Masterpact NW range with corrosion protection offers the same safety features as the standard version:
- positive contact indication
- high impulse withstand voltage (12 kV)
- suitable for isolation in compliance with IEC 60947-2, as indicated by the disconnector symbol on the front face:
- Front face insulation class 2, allowing class 2 installations with breaker control from outside.

Characteristics according to IEC 60 947-2

				NW08H2	NW10H2	NW12H2	NW16H2	NW20H2	NW25H2	NW32H2	NW40bH2
Number of poles				3, 4							
Rated insulation voltage	**Ui** (V)			1000							
Rated operational voltage	**Ue** (V)			690							
Closing time (ms)				< 50							
Rated current	**In** (A)	Vertical connection	40 °C	800	1000	1250	1600	2000	2500	3200	4000
			45 °C	800	1000	1250	1600	2000	2500	3200	4000
			50 °C	800	1000	1250	1600	2000	2500	3200	4000
			55 °C	800	1000	1250	1550	1900	2500	3150	4000
			60 °C	800	1000	1250	1500	1800	2500	3000	4000
		Horizontal connection	40 °C	800	1000	1250	1600	2000	2500	-	4000
			45 °C	800	1000	1250	1550	1900	2500	-	4000
			50 °C	800	1000	1250	1500	1800	2500	-	4000
			55 °C	800	1000	1250	1450	1700	2400	-	4000
			60 °C	800	1000	1250	1400	1600	2300	-	3900
4th pole rating				800	1000	1250	1600	2000	2500	3200	4000
Rated utlimate breaking capacity	**Icu** (kA rms)	CA 50/60 Hz	220/440 V	100	100	100	100	100	100	100	100
			690 V	85	85	85	85	85	85	85	85
Rated service breaking capacity	**Ics** = Icu x...			100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Break time (ms)			Total maxi	25 to 30 with no intentional delay							

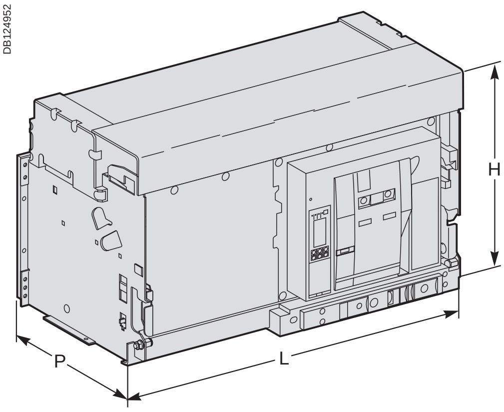
Dimensions and connection

DB124951



Masterpact NW08 to NW32 with corrosion protection.

DB124952



Masterpact NW40b with corrosion protection.

Drawout device	L (mm)		H (mm)	P (mm)
	3P	4P		
800 to 3200 A	441	556	439	395
4000 A	786	1016	479	395

Connection

■ Power circuits:
□ vertical rear connection
□ horizontal rear connection (except for 3200 A)
■ Auxiliaries connected to terminal block on circuit breaker front face.

Earthing switch Masterpact

The Masterpact Earthing Switch can be racked into any compatible Masterpact NW chassis in place of a Masterpact circuit breaker. It is used to interconnect and earth the phase and neutral conductors of an electrical installation to ensure the safety of personnel during servicing. It can be locked in earthed position.

PB104426A50

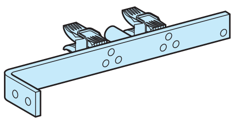
Main characteristics	
Rated insulation voltage	1000 V
Rated operational voltage	690 V
Rated current	800 to 4000 A
Latching capacity	135 kA peak
Rated short-time withstand current	60 kA/1s 50 kA/3s
Compatibility	Compatible with drawout NW08 to NW40 circuit breakers, types N1/H1/NA/HA, 3-pole and 4-pole rear connected versions
Remote indication	12 ON/OFF indication contacts that can be used according to the chassis auxiliary wiring

The Earthing Switch is compatible with Masterpact NW08 to NW40 type N1, H1, NA and HA circuit breakers in both 3-pole and 4-pole versions. It has two parts:
■ a chassis earthing kit for installation on the Masterpact NW chassis. Two different versions are available for 3-pole and 4-pole chassis.
■ the Earthing Switch itself, which is a specific Masterpact NW device that can be racked into any chassis equipped with an earthing kit, in place of the circuit breaker. Two versions are available (3-pole and 4-pole).

An earthing kit must be installed on the chassis of each circuit breaker protecting a circuit that may require earthing while work is being carried out. However, a single earthing switch is often sufficient for an entire installation if only one circuit is to be serviced at any given time.
The standard Earthing Switch comes with the short-circuit bar installed across the bottom (downstream) connections for earthing of the upstream portion of the circuit. The user can easily move the short-circuit bar to the top connections upstream if the downstream portion of the circuit needs to be earthed.

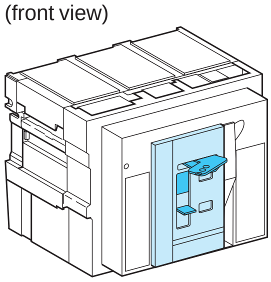
Earthing kit
(for chassis)

DB125557



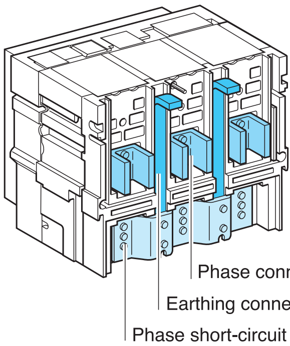
Earthing switch
(front view)

DB125558



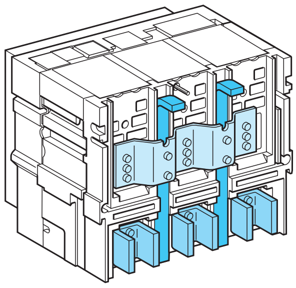
Earthing switch (rear view)

DB125559



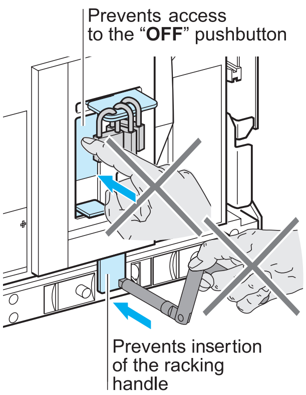
With short-circuit bar on the bottom connections.

DB125560



With short-circuit bar on the top connections.

DB125561



Locking in earthed position by 3 padlocks

The standard Earthing Switch can be locked in earthed position by one to three padlocks as long as the following conditions are satisfied:
■ the Earthing Switch must be in "connected" position in a chassis equipped with an earthing kit
■ the Earthing Switch must be in "ON" position.
Under these conditions, the installation is earthed.

When the Earthing Switch is locked in earthed position:
■ it cannot be moved to "disconnected" position (a shutter prevents insertion of the racking handle)
■ it cannot be turned "OFF" (a shutter prevents access to the "OFF" pushbutton).

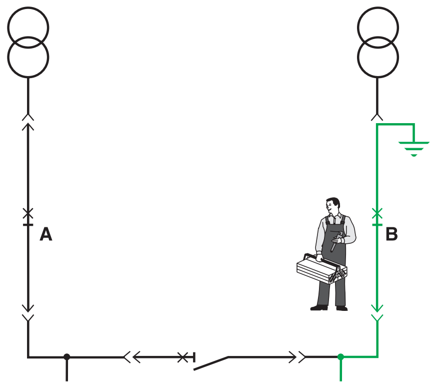
Typical applications

The earthing switch is used to protect maintenance personnel working on an installation against the risk of accidental connection of a parallel source or energisation by reverse power. Protection is provided by earthing the part of the installation that is to be worked on.

Application n°1

Earthing of one section of a coupled busbar arrangement

DB120865

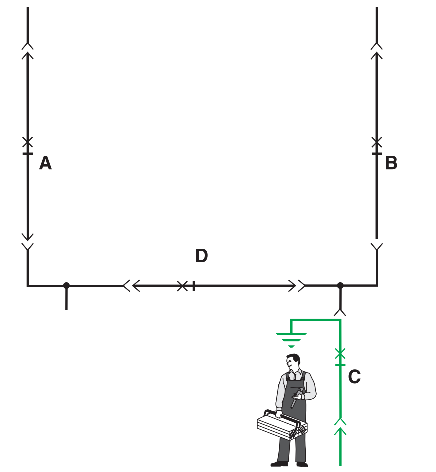


When working on section **B**, the bus coupler is normally open. To protect personnel in the event of accidental closing of this device, an earthing switch with the upstream terminals earthed is installed in place of the circuit breaker at **B**. In this way section **B** will remain at earth potential under all circumstances and the personnel can work in complete safety.

Application n°2

Earthing an outgoer

DB120866

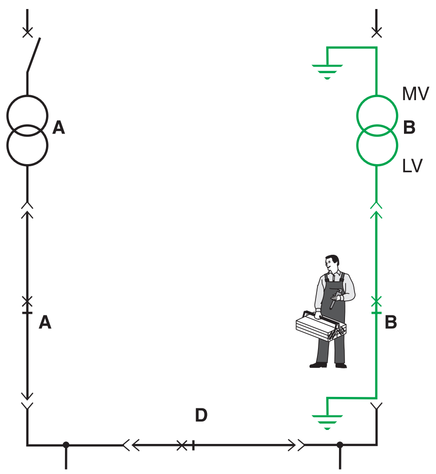


When working on outgoer **C**, installation of an earthing switch with the upstream terminals earthed (in place of the circuit breaker at **C**) ensures complete safety even if all the other devices on the installation are closed.

Application n°3

Earthing of an MV/LV transformer

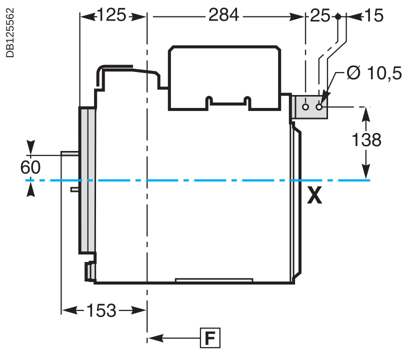
DB120867

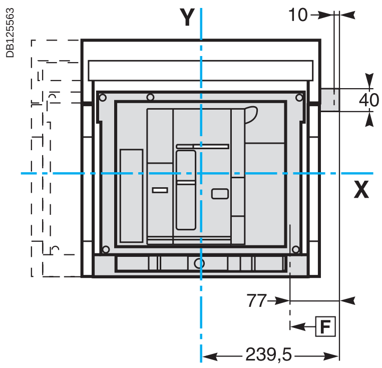


When working on an MV/LV transformer, upstream earthing is carried out by means of the usual medium voltage and high voltage procedures. Installation of an earthing switch with the downstream terminals earthed (in place of the circuit breaker at **B**) maintains the part of the installation between the upstream MV circuit breaker and the downstream LV circuit breaker at earth potential. In this way, the personnel can work in complete safety even if the rest of the installation is energised.

Earthing switch Masterpact

Dimensions and connection





TOOLS

schneider-electric.com

This international site allows you to access all the Schneider Electric products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- complete library: technical documents, catalogs, FAQs, brochures…
- selection guides from the e-catalog.
- product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, the list of country contacts…

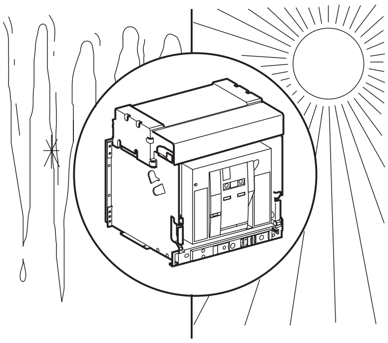
CAD software and tools

The CAD software and tools enhance productivity and safety. They help you create your installations by simplifying product choice through easy browsing in the Schneider Electric offers.
Last but not least, they optimise use of our products while also complying with standards and proper procedures.

Installation recommendations

Operating conditions

DB101422



Ambient temperature

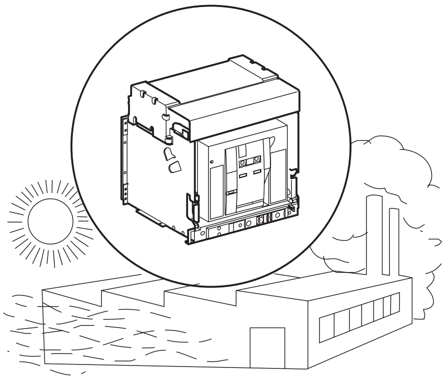
Masterpact devices can operate under the following temperature conditions:

- the electrical and mechanical characteristics are stipulated for an ambient temperature of -5 °C to +70 °C
- circuit-breaker closing is guaranteed down to -35 °C.

Storage conditions are as follows:

- -40 to +85 °C for a Masterpact device without its control unit
- -25 °C to +85 °C for the control unit.

DB101423



Extreme atmospheric conditions

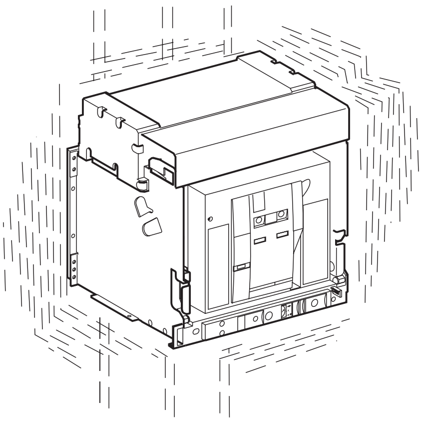
Masterpact devices have successfully passed the tests defined by the following standards for extreme atmospheric conditions:

- IEC 60068-2-1: dry cold at -55 °C
- IEC 60068-2-2: dry heat at +85 °C
- IEC 60068-2-30: damp heat (temperature +55 °C, relative humidity 95 %)
- IEC 60068-2-52 level 2: salt mist.

Masterpact devices can operate in the industrial environments defined by standard IEC 60947 (pollution degree up to 4).

It is nonetheless advised to check that the devices are installed in suitably cooled switchboards without excessive dust.

DB101424



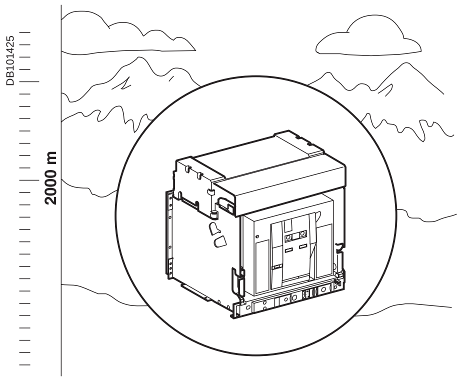
Vibrations

Masterpact devices are guaranteed against electromagnetic or mechanical vibrations.

Tests are carried out in compliance with standard IEC 60068-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):

- 2 to 13.2 Hz: amplitude ±1 mm
- 13.2 to 100 Hz: constant acceleration 0.7 g.

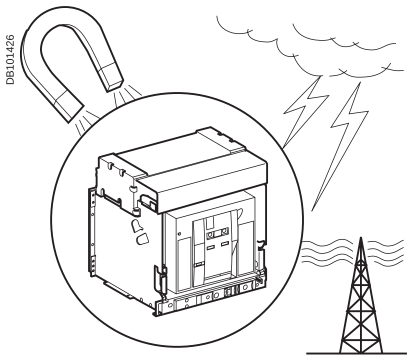
Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.



Altitude

At altitudes higher than 2000 metres, the modifications in the ambient air (electrical resistance, cooling capacity) lower the following characteristics as follows:

Altitude (m)	2000	3000	4000	5000
Dielectric resistance voltage (V)	3500	3150	2500	2100
Average insulation level (V)	1000	900	700	600
Maximum utilisation voltage (V)	690	590	520	460
Average thermal current (A) at 40 °C	1 x In	0.99 x In	0.96 x In	0.94 x In



Electromagnetic disturbances

Masterpact devices are protected against:
- ■ overvoltages caused by devices that generate electromagnetic disturbances
- ■ overvoltages caused by atmospheric disturbances or by a distribution-system outage (e.g. failure of a lighting system)
- ■ devices emitting radio waves (radios, walkie-talkies, radar, etc.)
- ■ electrostatic discharges produced by users.

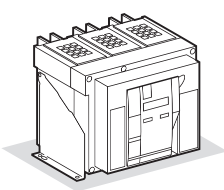
Masterpact devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards:
- ■ IEC 60947-2, appendix F
- ■ IEC 60947-2, appendix B (trip units with earth-leakage function).

The above tests guarantee that:
- ■ no nuisance tripping occurs
- ■ tripping times are respected.

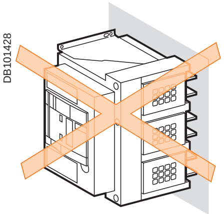
Installation in switchboard

Possible positions

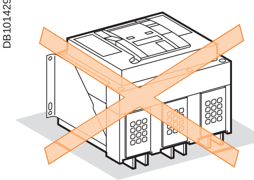
DB101427



DB101428



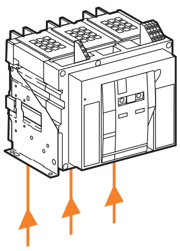
DB101429



Power supply

Masterpact devices can be supplied either from the top or from the bottom without reduction in performance, in order to facilitate connection when installed in a switchboard.

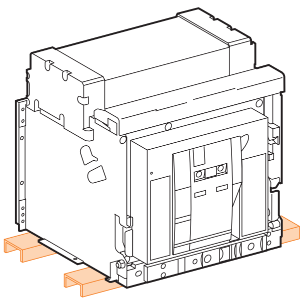
DB101430



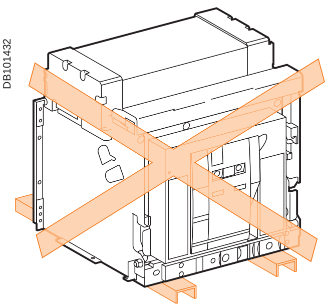
Mounting the circuit-breaker

It is important to distribute the weight of the device uniformily over a rigid mounting surface such as rails or a base plate.
This mounting plane should be perfectly flat (tolerance on support flatness: 2 mm).
This eliminates any risk of deformation which could interfere with correct operation of the circuit breaker.
Masterpact devices can also be mounted on a vertical plane using the special brackets.

DB101431

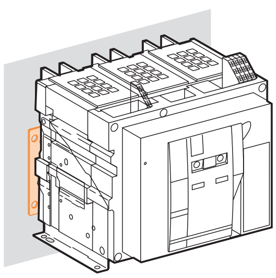


DB101432



Mounting on rails.

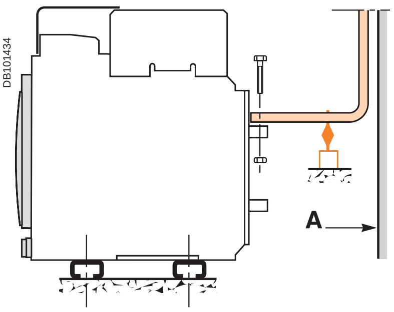
DB101433



Mounting with vertical brackets.

Partitions

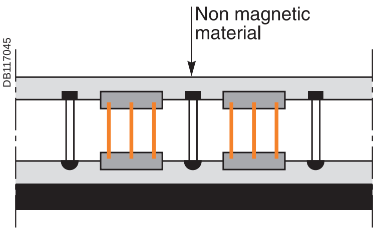
Sufficient openings must be provided in partitions to ensure good air circulation around the circuit breaker;
Any partition between upstream and downstream connections of the device must be made of non-magnetic material.
For high currents, of 2500 A and upwards, the metal supports or barriers in the immediate vicinity of a conductor must be made of non-magnetic material **A**.
Metal barriers through which a conductor passes must not form a magnetic loop.

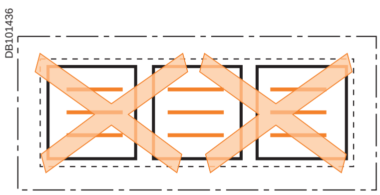


***A** : non magnetic material.*

Busbars (NT, NW)

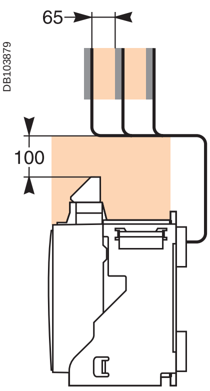
The mechanical connection must be exclude the possibility of formation of a magnetic loop around a conductor.





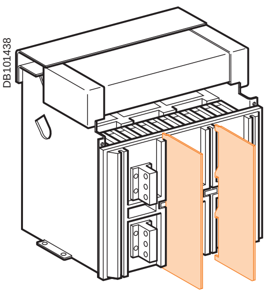
Busbars (NT)

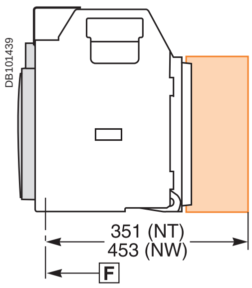
For live busbars installed immediately above the circuit breaker (respecting the 100 mm safety clearance), the distance between bars must be 65 mm minimum.
In a 1000 V system, the bars must be insulated.



Interphase barrier

If the insulation distance between phases is not sufficient (≤ 14 mm), it is advised to install phase barriers (taking into account the safety clearances).
Mandatory for a Masterpact NT > 500 V.

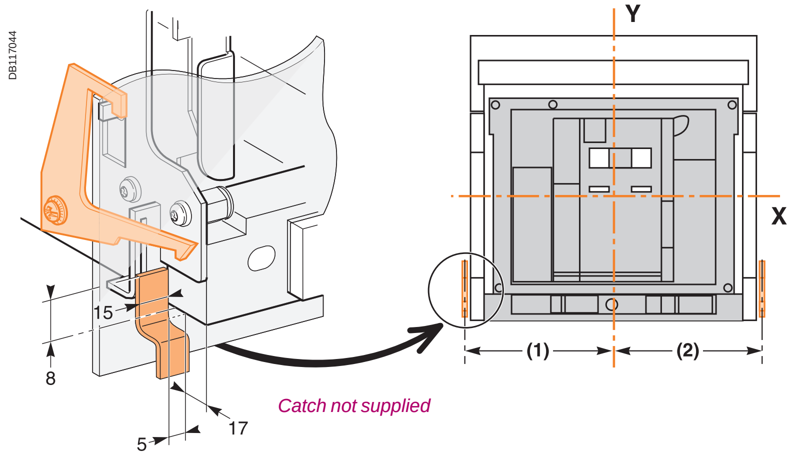




Door interlock catch

Door interlock VPEC

Mounted on the right or left-hand side of the chassis, this device inhibits opening of the cubicle door when the circuit breaker is in “connected” or “test” position.
It the breaker is put in the “connected” position with the door open, the door may be closed without having to disconnect the circuit breaker.

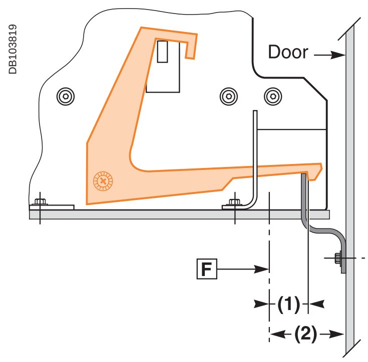


Dimensions (mm)

Type	(1)	(2)
NT08-16 (3P)	135	168
NT08-16 (4P)	205	168
NW08-40 (3P)	215	215
NW08-40 (4P)	330	215
NW40b-63 (3P)	660	215
NW40b-63 (4P)	775	215

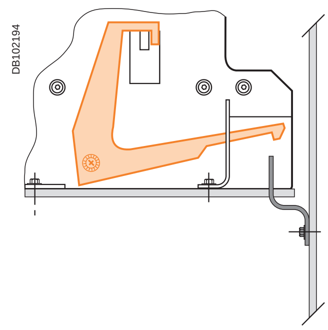
Breaker in “connected” or “test” position

Door cannot be opened



Breaker in “disconnected” position

Door can be opened

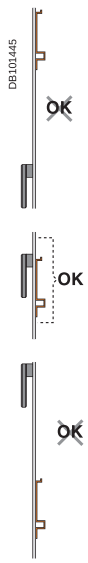


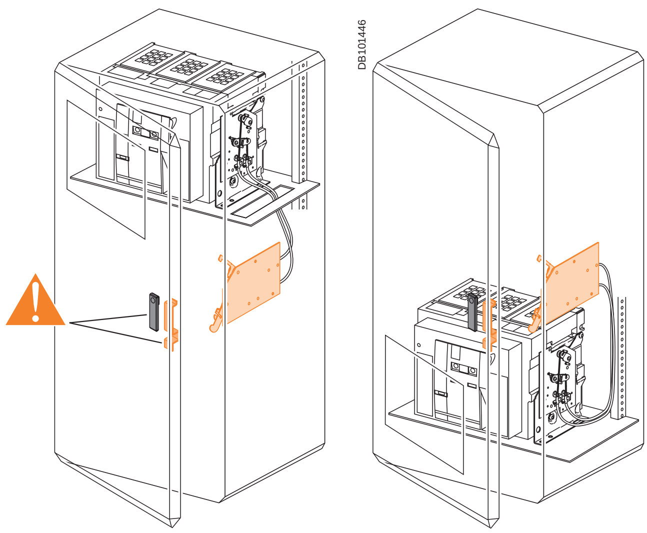
Dimensions (mm)

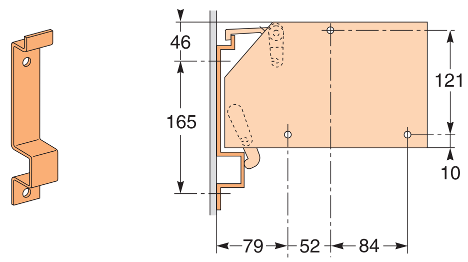
Type	(1)	(2)
NT	5	23
NW	83	103

Cable-type door interlock IPA

This option prevents door opening when the circuit breaker is closed and prevents circuit breaker closing when the door is open.
For this, a special plate associated with a lock and a cable is mounted on the right side of the circuit breaker.
With this interlock installed, the source changeover function cannot be implemented.







Note: *the door interlock can either be mounted on the right side or the left side of the breaker.*
F *: datum.*

Control wiring

Wiring of voltage releases

During pick-up, the power consumed is approximately 150 to 200 VA. For low control voltages (12, 24, 48 V), maximum cable lengths are imposed by the voltage and the cross-sectional area of cables.

Recommended maximum cable lengths (meter).

		12 V		24 V		48 V	
		2,5 mm²	1,5 mm²	2,5 mm²	1,5 mm²	2,5 mm²	1,5 mm²
MN	U source 100 %	–	–	58	35	280	165
	U source 85 %	–	–	16	10	75	45
MX-XF	U source 100 %	21	12	115	70	550	330
	U source 85 %	10	6	75	44	350	210

Note: *the indicated length is that of each of the two wires.*

24 V DC power-supply module

External 24 V DC power-supply module for Micrologic (F1-, F2+)

■ do not connect the positive terminal (F2+) to earth
■ the negative terminal (F1-) can be connected to earth, except in IT systems
■ a number of Micrologic control units and M6C modules can be connected to the same 24 V DC power supply (the consumption of a Micrologic control unit or an M6C module is approximately 100 mA)
■ do not connect any devices other than a Micrologic control unit or an M6C module
■ the maximum length for each conductor is ten metres. For greater distances, it is advised to twist the supply wires together
■ the 24 V DC supply wires must cross the power cables perpendicularly. If this is difficult, it is advised to twist the supply wires together
■ the technical characteristics of the external 24 V DC power-supply module for Micrologic control units are indicated on page A-20

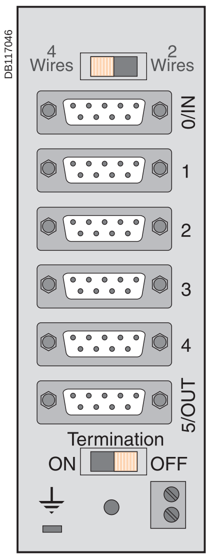
Communication bus

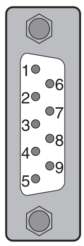
■ do not connect the positive terminal (E1) to earth
■ the negative terminal (E2) can be connected to earth
■ a number of "device" or "chassis" communication modules can be connected to the same 24 V DC power supply (the consumption of each module is approximately 30 mA)
■ the 24 V DC (E1, E2) power supply for the communication bus must be separate from the external 24 V DC power-supply module for Micrologic control units (F1-, F2+).

E1	E2	E3	E4	E5	E6
+	-	A/Tx^-	B/Tx^+	A'/Rx^-	B'/Rx^+

To create a two-wire Modbus communication bus, simply connect Tx^- with Rx^- and Tx^+ with Rx^+.
To connect a Modbus slave (Micrologic) to a Modbus master (PLC), connect:
the slave Tx^- to the master Rx^- the slave Rx^- to the master Tx^-
the slave Tx^+ to the master Rx^+ the slave Rx^+ to the master Tx^+.

RS485 Modbus Junction Block





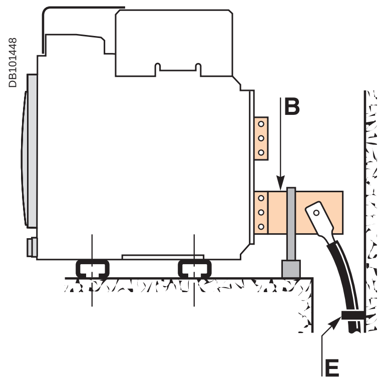
Pins	Signal	Color
1	0 V	Black
2	24 V	Red
3	NC	
4	B' / Rx^+	Blue
5	B / Tx^+	Yellow
6	0 V	Black
7	24 V	Red
8	A' / Rx^-	White
9	A / Tx^-	Brown

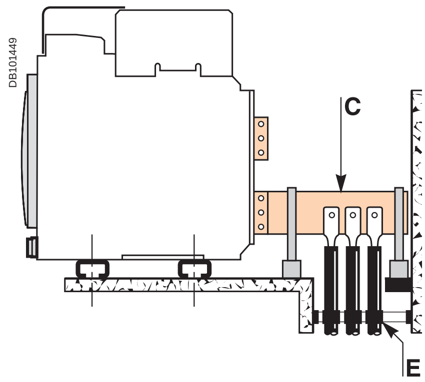
Wiring of ZSI: it is recommended to use twisted shielded cable. The shield must be connected to earth at both ends.

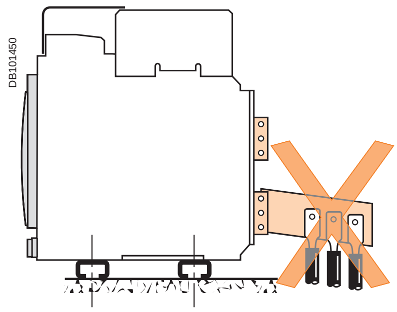
Power connection

Cables connections

If cables are used for the power connections, make sure that they do not apply excessive mechanical forces to the circuit breaker terminals.
For this, make the connections as follows:
■ extend the circuit breaker terminals using short bars designed and installed according to the recommendations for bar-type power connections:
□ for a single cable, use solution **B** opposite
□ for multiple cables, use solution **C** opposite
■ in all cases, follow the general rules for connections to busbars:
□ position the cable lugs before inserting the bolts
□ the cables should firmly secured to the framework **E**.

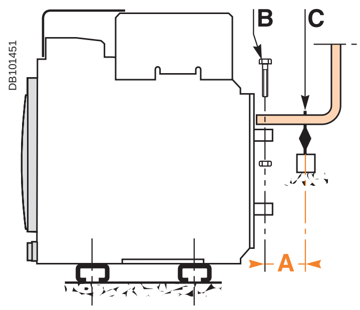


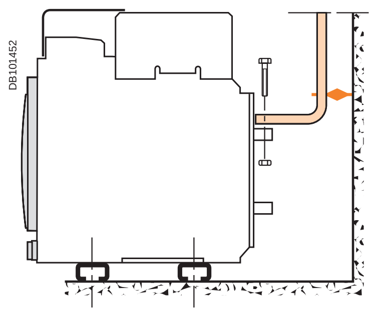


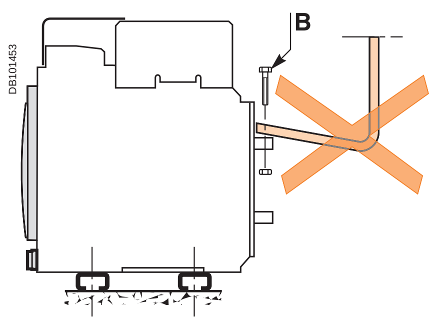


Busbars connections

The busbars should be suitably adjusted to ensure that the connection points are positioned on the terminals before the bolts are inserted **B**
The connections are held by the support which is solidly fixed to the framework of the switchboard, such that the circuit breaker terminals do not have to support its weight **C**. (This support should be placed close to the terminals).





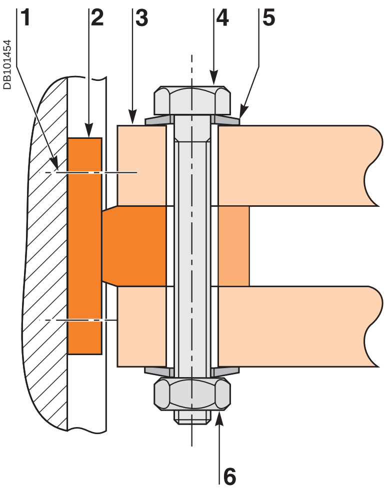


Electrodynamic stresses

The first busbar support or spacer shall be situated within a maximum distance from the connection point of the breaker (see table below). This distance must be respected so that the connection can withstand the electrodynamic stresses between phases in the event of a short circuit.

Maximum distance A between busbar to circuit breaker connection and the first busbar support or spacer with respect to the value of the prospective short-circuit current.

Isc (kA)	30	50	65	80	100	150
Distance A (mm)	350	300	250	150	150	150

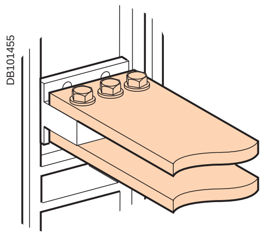


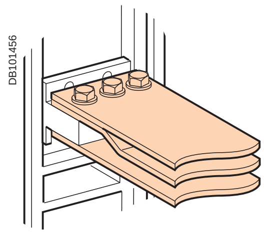
1 *Terminal screw factory-tightened to 16 Nm (NW), 13 Nm (NT).*
2 *Breaker terminal.*
3 *Busbar.*
4 *Bolt.*
5 *Washer.*
6 *Nut.*

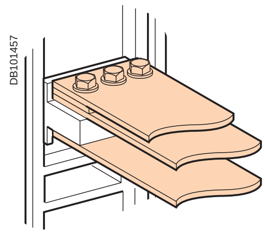
Clamping

Correct clamping of busbars depends amongst other things, on the tightening torques used for the nuts and bolts. Over-tightening may have the same consequences as under-tightening.
For connecting busbars (Cu ETP-NFA51-100) to the circuit breaker, the tightening torques to be used are shown in the table below.
These values are for use with copper busbars and steel nuts and bolts, class 8.8. The same torques can be used with AGS-T52 quality aluminium bars (French standard NFA 02-104 or American National Standard H-35-1).

Examples





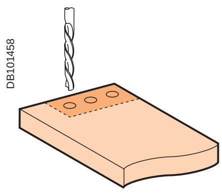


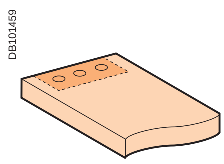
Tightening torques

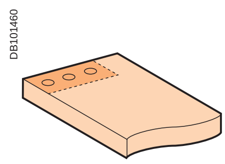
Ø (mm) Nominal	Ø (mm) Drilling	Tightening torques (Nm) with grower or flat washers	Tightening torques (Nm) with contact or corrugatec washers
10	11	37.5	50

Busbar drilling

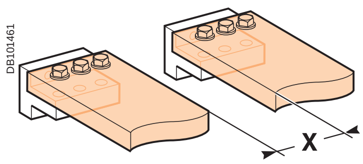
Examples







Isolation distance

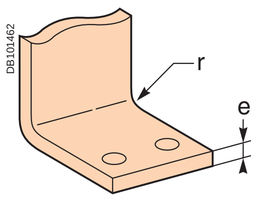


Dimensions (mm)

Ui	X min
600 V	8 mm
1000 V	14 mm

Busbar bending

When bending busbars maintain the radius indicated below(a smaller radius would cause cracks).



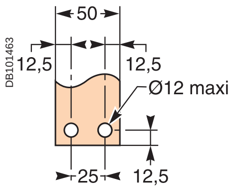
Dimensions (mm)

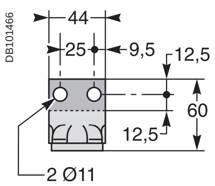
e	Radius of curvature r Min	Recommended
5	5	7.5
10	15	18 to 20

Recommended busbars drilling

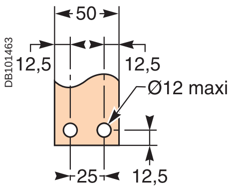
Masterpact NT06 to NT16

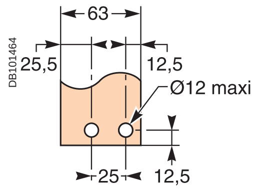
Rear connection

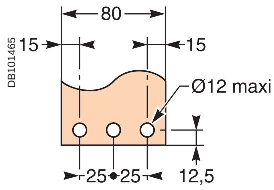




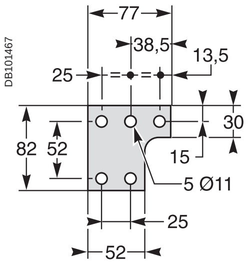
Rear connection with spreaders



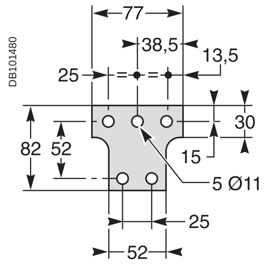




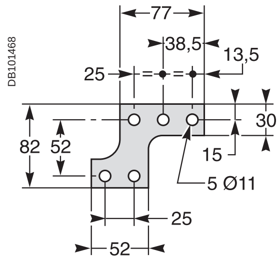
Middle left or middle right spreader for 4P



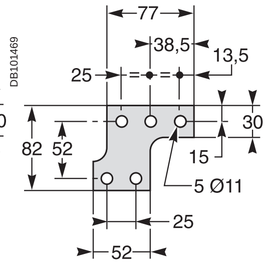
Middle spreader for 3P



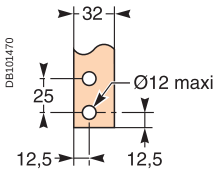
Left or right spreader for 4P

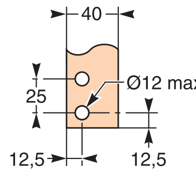


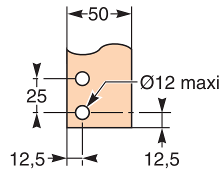
Left or right spreader for 3P

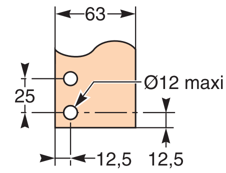


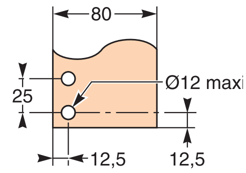
Vertical rear connection

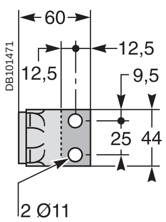




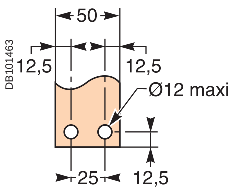




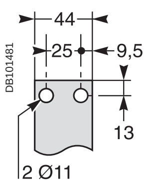




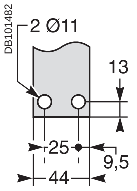
Front connection



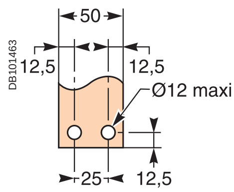
Top connection

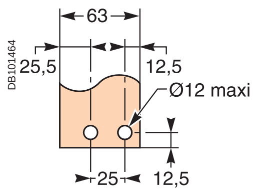


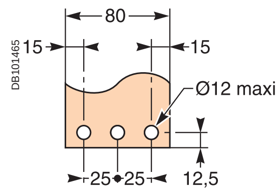
Bottom connection

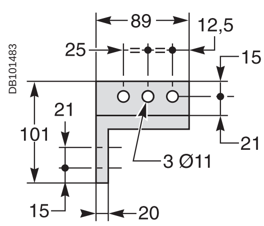


Front connection via vertical connection adapters



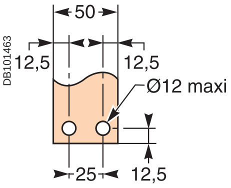


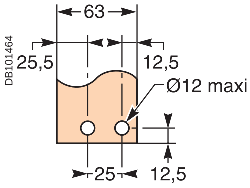


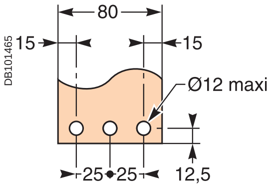


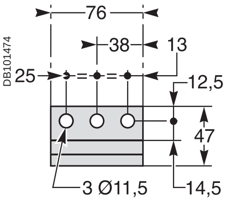
Masterpact NW08 to NW63

Horizontal rear connection NW08 to NW32

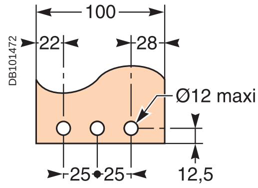


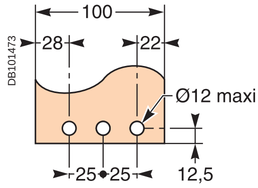


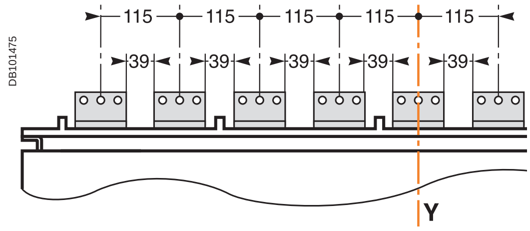




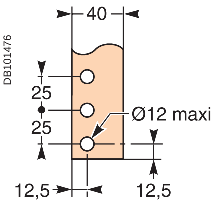
NW40b to NW50

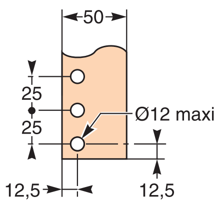


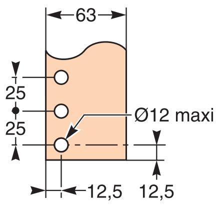


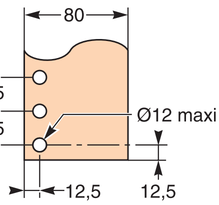


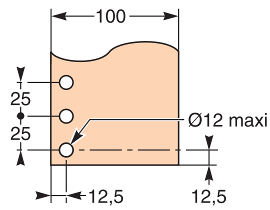
Vertical rear connection NW08 to NW32, NW40b to NW50

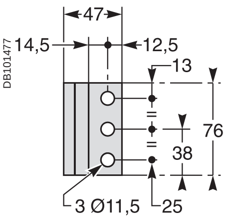




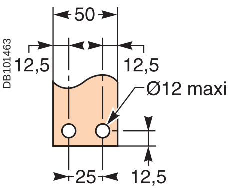


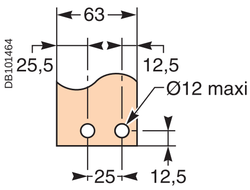


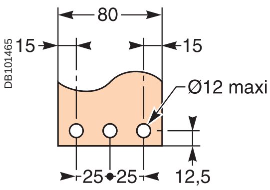




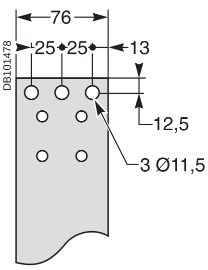
Front connection NW08 to NW32



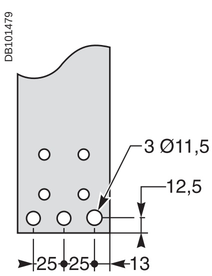




Top connection



Bottom connection

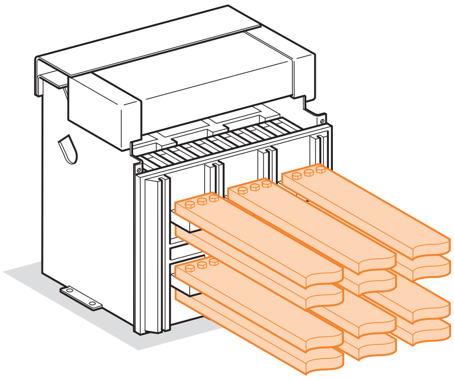


Busbar sizing

Basis of tables:
- maximum permissible busbars temperature: 100 °C
- Ti: temperature around the circuit breaker and its connection
- busbar material is unpainted copper.

Front or rear horizontal connection

DB101484



Masterpact	Maximum service current	Ti : 40 °C No. of 5 mm thick bars	Ti : 40 °C No. of 10 mm thick bars	Ti : 50 °C No. of 5 mm thick bars	Ti : 50 °C No. of 10 mm thick bars	Ti : 60 °C No. of 5 mm thick bars	Ti : 60 °C No. of 10 mm thick bars
NT06	400	2b.30 x 5	1b.30 x 10	2b.30 x 5	1b.30 x 10	2b.30 x 5	1b.30 x 10
NT06	630	2b.40 x 5	1b.40 x 10	2b.40 x 5	1b.40 x 10	2b.40 x 5	1b.40 x 10
NT08 ou NW08	800	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.63 x 10
NT10 ou NW10	1000	3b.50 x 5	1b.63 x 10	3b.50 x 5	2b.50 x 10	3b.63 x 5	2b.50 x 10
NT12 ou NW12	1250	3b.50 x 5	2b.40 x 10	3b.50 x 5	2b.50 x 10	3b.63 x 5	2b.50 x 10
		2b.80 x 5	2b.40 x 10	2b.80 x 5			
NT16 ou NW16	1400	3b.63 x 5	2b.40 x 10	3b.63 x 5	2b.50 x 10	3b.80 x 5	2b.63 x 10
NT16 ou NW16	1600	3b.80 x 5	2b.63 x 10	3b.80 x 5	2b.63 x 10	3b.80 x 5	3b.50 x 10
NW20	1800	3b.80 x 5	2b.63 x 10	3b.80 x 5	2b.63 x 10	3b.100 x 5	2b.80 x 10
NW20	2000	3b.100 x 5	2b.80 x 10	3b.100 x 5	2b.80 x 10	3b.100 x 5	3b.63 x 10
NW25	2200	4b.100 x 5	2b.80 x 10	4b.100 x 5	2b.80 x 10	4b.100 x 5	2b.100 x 10
NW25	2500	4b.100 x 5	2b.100 x 10	4b.100 x 5	2b.100 x 10	4b.100 x 5	3b.80 x 10
NW32	2800	4b.100 x 5	3b.80 x 10	4b.100 x 5	3b.80 x 10	5b.100 x 5	3b.100 x 10
NW32	3000	5b.100 x 5	3b.80 x 10	6b.100 x 5	3b.100 x 10	8b.100 x 5	4b.80 x 10
NW32	3200	6b.100 x 5	3b.100 x 10	8b.100 x 5	3b.100 x 10		4b.100 x 10
NW40	3800		4b.100 x 10		5b.100 x 10		5b.100 x 10
NW40	4000		5b.100 x 10		5b.100 x 10		6b.100 x 10
NW50	4500		6b.100 x 10		6b.100 x 10		7b.100 x 10
NW50	5000		7b.100 x 10		7b.100 x 10		

With Masterpact NT, it is recommanded to use 50 mm wideness bars (see “Recommended busbars drilling”).

Example

Conditions:
- drawout version
- horizontal busbars
- T_i: 50 °C
- service current: 1800 A.

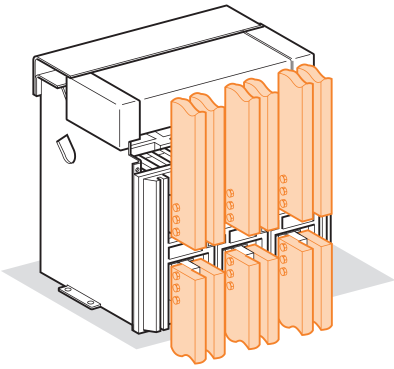
Solution:
For T_i = 50 °C, use an NW20 which can be connected with three 80 x 5 mm bars or two 63 x 10 mm bars.

***Note:** the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.*

Basis of tables:
- maximum permissible busbars temperature: 100 °C
- Ti: temperature around the circuit breaker and its connection
- busbar material is unpainted copper.

Rear vertical connection

DB101487



Masterpact	Maximum service current	Ti : 40 °C No. of 5 mm thick bars	Ti : 40 °C No. of 10 mm thick bars	Ti : 50 °C No. of 5 mm thick bars	Ti : 50 °C No. of 10 mm thick bars	Ti : 60 °C No. of 5 mm thick bars	Ti : 60 °C No. of 10 mm thick bars
NT06	400	2b.30 x 5	1b.30 x 10	2b.30 x 5	1b.30 x 10	2b.30 x 5	1b.30 x 10
NT06	630	2b.40 x 5	1b.40 x 10	2b.40 x 5	1b.40 x 10	2b.40 x 5	1b.40 x 10
NT08 ou NW08	800	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.50 x 10
NT10 ou NW10	1000	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.50 x 10	2b.63 x 5	1b.63 x 10
NT12 ou NW12	1250	2b.63 x 5	1b.63 x 10	3b.50 x 5	2b.40 x 10	3b.50 x 5	2b.40 x 10
NT16 ou NW16	1400	2b.80 x 5	1b.80 x 10	2b.80 x 5	2b.50 x 10	3b.63 x 5	2b.50 x 10
NT16 ou NW16	1600	3b.63 x 5	2b.50 x 10	3b.63 x 5	2b.50 x 10	3b.80 x 5	2b.63 x 10
NW20	1800	2b.100 x 5	1b.80 x 10	2b.100 x 5	2b.50 x 10	3b.80 x 5	2b.63 x 10
NW20	2000	3b.100 x 5	2b.63 x 10	3b.100 x 5	2b.63 x 10	3b.100 x 5	2b.80 x 10
NW25	2200	3b.100 x 5	2b.63 x 10	3b.100 x 5	2b.63 x 10	3b.100 x 5	2b.80 x 10
NW25	2500	4b.100 x 5	2b.80 x 10	4b.100 x 5	2b.80 x 10	4b.100 x 5	3b.80 x 10
NW32	2800	4b.100 x 5	2b.100 x 10	4b.100 x 5	2b.100 x 10	4b.100 x 5	3b.80 x 10
NW32	3000	5b.100 x 5	3b.80 x 10	6b.100 x 5	3b.100 x 10	5b.100 x 5	4b.80 x 10
NW32	3200	6b.100 x 5	3b.100 x 10	6b.100 x 5	3b.100 x 10		4b.100 x 10
NW40	3800		4b.100 x 10		4b.100 x 10		4b.100 x 10
NW40	4000		4b.100 x 10		4b.100 x 10		4b.100 x 10
NW50	4500		5b.100 x 10		5b.100 x 10		6b.100 x 10
NW50	5000		5b.100 x 10		6b.100 x 10		7b.100 x 10
NW63	5700		7b.100 x 10		7b.100 x 10		8b.100 x 10
NW63	6300		8b.100 x 10		8b.100 x 10		

Example

Conditions:
- drawout version
- vertical connections
- T_i: 40 °C
- service current: 1100 A.

Solution :
For T_i = 40 °C use an NT12 or NW12 which can be connected with two 63 x 5 mm bars or with one 63 x 10 mm bar.

***Note:** the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.*

Installation recommendations

Temperature derating Power dissipation and input / output resistance

Temperature derating

The table below indicates the maximum current rating, for each connection type, as a function of Ti around the circuit breaker and the busbars.
Circuit breakers with mixed connections have the same derating as horizontally connected breakers.
For Ti greater than 60 °C, consult us.
Ti: temperature around the circuit breaker and its connection.

Version	Drawout										Fixed									
Connection	Front or rear horizontal					Rear vertical					Front or rear horizontal					Rear vertical				
Temp. Ti	40	45	50	55	60	40	45	50	55	60	40	45	50	55	60	40	45	50	55	60
NT06 H1/H2/L1	630					630					630					630				
NT08 H1/H2/L1	800					800					800					800				
NT10 H1/H2/L1	1000					1000					1000					1000				
NT12 H1/H2	1250					1250					1250					1250				
NT16 H1/H2	1600		1520	1480	1430	1600			1560	1510	1600				1550	1600				
NW08 N/H/L	800					800					800					800				
NW10 N/H/L	1000					1000					1000					1000				
NW12 N/H/L	1250					1250					1250					1250				
NW16 N/H/L	1600					1600					1600					1600				
NW20 H1/H2/H3	2000			1980	1890	2000					2000				1920	2000				
NW20 L1	2000		1900	1850	1800	2000					–	–	–	–	–	–	–	–	–	–
NW25 H1/H2/H3	2500					2500					2500					2500				
NW32 H1/H2/H3	3200		3100	3000	2900	3200					3200					3200				
NW40 H1/H2/H3	4000		3900	3750	3650	4000				3850	4000			3900	3800	4000				
NW40b H1/H2	4000					4000					4000					4000				
NW50 H1/H2	5000					5000					5000					5000				
NW63 H1/H2	–	–	–	–	–	6300				6200	–	–	–	–	–	6300				

Power dissipation and input / output resistance

Total power dissipation is the value measured at I_N, 50/60 Hz, for a 3 pole or 4 pole breaker (values above the power $P = 3RI^2$).
The resistance between input / output is the value measured per pole (cold state).

Version	Drawout		Fixed	
	Power dissipation (Watts)	Input/output resistance (µohm)	Power dissipation (Watts)	Input/output resistance (µohm)
NT06 H1/H2/L1	55/115 (H1/L1)	38/72	30/45	26/39
NT08 H1/H2/L1	90/140 (H1/L1)	38/72	50/80	26/39
NT10 H1/H2/L1	150/230 (H1/L1)	38/72	80/110	26/39
NT12 H1/H2	250	36	130	26
NT16 H1/H2	460	36	220	26
NW08 N1	137	42	62	19
NW08 H/L	100	30	42	13
NW10 N1	220	42	100	19
NW10 H/L	150	30	70	13
NW12 N1	330	42	150	19
NW12 H/L	230	27	100	13
NW16 N1	480	37	220	19
NW16 H/L	390	27	170	13
NW20 H/L	470	27	250	13
NW25 H1/H2/H3	600	19	260	8
NW32 H1/H2/H3	670	13	420	8
NW40 H1/H2/H3	900	11	650	8
NW40b H1/H2	550	7	390	5
NW50 H1/H2	950	7	660	5
NW63 H1/H2	1200	7	1050	5

Derating in switchboards

Factors affecting switchboard design

The temperature around the circuit breaker and its connections:
This is used to define the type of circuit breaker to be used and its connection arrangement.

Vents at the top and bottom of the cubicles:
Vents considerably reduce the temperature inside the switchboard, but must be designed so as to respect the degree of protection provided by the enclosure.
For weatherproof heavy-duty cubicles, a forced ventilation system may be required.

The heat dissipated by the devices installed in the switchboard:
This is the heat dissipated by the circuit breakers under normal conditions (service current).

The size of the enclosure:
This determines the volume for cooling calculations.

Switchboard installation mode:
Free-standing, against a wall, etc.

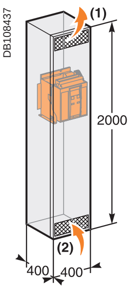
Horizontal partitions:
Partitions can obstruct air circulation within the enclosure.

Basis of tables

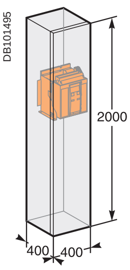
- switchboard dimensions
- number of circuit-breakers installed
- type of breaker connections
- drawout versions
- ambient temperature outside of the switchboard: T_a (IEC 60439-1).

Masterpact NT06-16 H1/H2/L1 (switchboard 2000 x 400 x 400) - area of outlet vents: 150 cm²

Type			NT06 H1/H2/L1		NT08 H1/H2/L1		NT10 H1/H2/L1		NT12 H1/H2		NT16 H1/H2	
Switchboard composition		4										
		3	■	■	■	■	■	■	■	■	■	■
		2										
		1										
Connection type			≡	|||	≡	|||	≡	|||	≡	|||	≡	|||
Busbar dimensions (mm)			2b. 40 x 5		2b. 50 x 5		3b. 63 x 5		3b. 63 x 5	3b. 50 x 5	3b. 80 x 5	3b. 63 x 5
Ventilated switchboard (➨ IP31)	T_a = 35 °C	4					H1/L1	H1/L1				
		3	630	630	800	800	1000/1000	1000/1000	1250	1250	1400	1520
		2										
		1										
	T_a = 45 °C	4										
		3	630	630	800	800	1000/950	1000/1000	1250	1250	1330	1440
		2										
		1										
	T_a = 55 °C	4										
		3	630	630	800	800	1000/890	1000/960	1200	1250	1250	1340
		2										
		1										
Non ventilated switchboard (➨ IP54)	T_a = 35 °C	4										
		3	630	630	800	800	1000/960	1000/1000	1250	1250	1330	1400
		2										
		1										
	T_a = 45 °C	4										
		3	630	630	800	800	1000/910	1000/980	1220	1250	1260	1330
		2										
		1										
	T_a = 55 °C	4										
		3	630	630	800	800	1000/860	1000/930	1150	1230	1200	1260
		2										
		1										



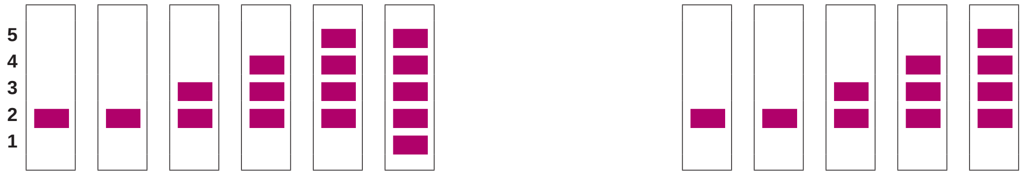
(1) *Area of outlet vents: 150 cm².*
(2) *Area of intlet vents: 150 cm².*



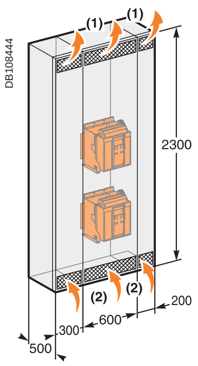
Note: *the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.*
The values indicated for the cross-sectional area of the vents should be considered as general indications only given that the thermal performance of a switchboard with natural ventilation depends on many parameters, e.g. shape, porosity and location of vents and air flow within the switchboard.

Derating in switchboards

Masterpact NT06-08 H1/H2/L1 (switchboard 2300 x 1100 x 500) - area of outlet vents: 300 cm²

Type	NT06 H1/H2/L1						NT08 H1/H2/L1				
Switchboard composition											
Connection type	≡	|||	|||	|||	|||	|||	≡	|||	|||	|||	|||
Busbar dimensions (mm)	2b. 40 x 5						2b. 50 x 5				

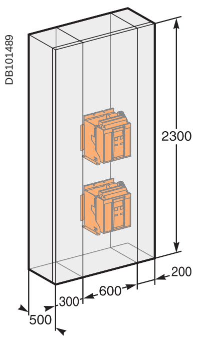
Ventilated switchboard (➨ IP31)



T_a	Position	NT06						NT08				
T_a = 35 °C	5					630	630					800
	4				630	630	630				800	800
	3			630	630	630	630			800	800	800
	2	630	630	630	630	630	630	800	800	800	800	800
	1						630					
T_a = 45 °C	5					630	630					800
	4				630	630	630				800	800
	3			630	630	630	630			800	800	800
	2	630	630	630	630	630	630	800	800	800	800	800
	1						630					
T_a = 55 °C	5					630	630					800
	4				630	630	630				800	800
	3			630	630	630	630			800	800	800
	2	630	630	630	630	630	630	800	800	800	800	800
	1						630					

(1) Area of outlet vents: 300 cm².
(2) Area of intlet vents: 300 cm².

Non ventilated switchboard (➨ IP54)

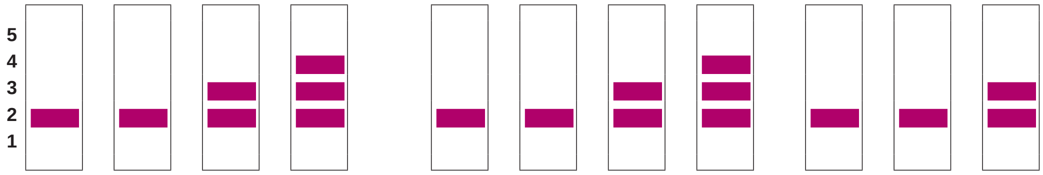


T_a	Position	NT06						NT08				
T_a = 35 °C	5					630	630					800
	4				630	630	630				800	800
	3			630	630	630	630			800	800	800
	2	630	630	630	630	630	630	800	800	800	800	800
	1						630					
T_a = 45 °C	5					630	630					800
	4				630	630	630				800	800
	3			630	630	630	630			800	800	800
	2	630	630	630	630	630	630	800	800	800	800	800
	1						630					
T_a = 55 °C	5					630	630					800
	4				630	630	630				800	800
	3			630	630	630	630			800	800	800
	2	630	630	630	630	630	630	800	800	800	800	800
	1						630					

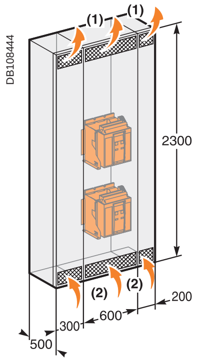
Note: the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.
The values indicated for the cross-sectional area of the vents should be considered as general indications only given that the thermal performance of a switchboard with natural ventilation depends on many parameters, e.g. shape, porosity and location of vents and air flow within the switchboard.

Masterpact NT10-16 H1/H2/L1 (switchboard 2300 x 1100 x 500) - area of outlet vents: 300 cm²

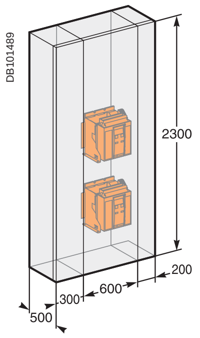
Switchboard composition



Type			NT10 H1/H2/L1				NT12 H1/H2				NT16 H1/H2		
Connection type			≡	|||	|||	|||	≡	|||	|||	|||	≡	|||	|||
Busbar dimensions (mm)			3b. 63 x 5	2b. 63 x 5			3b. 63 x 5	3b. 50 x 5			3b. 80 x 5	3b. 63 x 5	
Ventilated switchboard (➨ IP31)		5	H1/L1	H1/L1	H1/L1	H1/L1							
	T_a = 35 °C	4				1000/1000				1250			
		3			1000/1000	1000/1000			1250	1250			1500
		2	1000/1000	1000/1000	1000/1000	1000/1000	1250	1250	1250	1250	1460	1600	1550
		1											
	T_a = 45 °C	5											
		4				1000/1000				1250			
		3			1000/1000	1000/1000			1250	1250			1420
		2	1000/960	1000/1000	1000/1000	1000/1000	1250	1250	1250	1250	1400	1500	1480
		1											
	T_a = 55 °C	5											
		4				1000/920				1250			
		3			1000/950	1000/930			1250	1250			1330
		2	1000/900	1000/1000	1000/970	1000/950	1250	1250	1250	1250	1300	1400	1370
		1											
Non ventilated switchboard (➨ IP54)		5											
	T_a = 35 °C	4				1000/950				1250			
		3			1000/1000	1000/960			1250	1250			1370
		2	1000/1000	1000/1000	1000/1000	1000/970	1250	1250	1250	1250	1400	1500	1400
	T_a = 45 °C	5											
		4				1000/900				1180			
		3			1000/950	1000/910			1250	1190			1300
		2	1000/950	1000/1000	1000/960	1000/930	1250	1250	1250	1220	1350	1430	1320
	T_a = 55 °C	5											
		4				1000/850				1120			
		3			1000/900	1000/860			1200	1130			1210
		2	1000/880	1000/970	1000/910	1000/870	1210	1250	1210	1150	1250	1350	1250



(1) Area of outlet vents: 300 cm².
(2) Area of intlet vents: 300 cm².

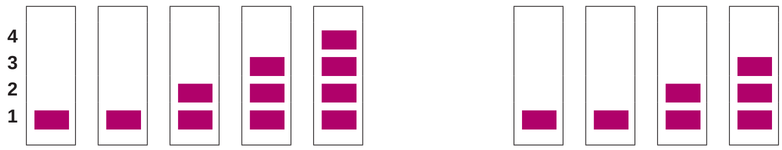


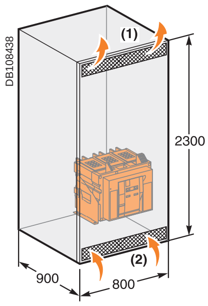
***Note:** the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.*
The values indicated for the cross-sectional area of the vents should be considered as general indications only given that the thermal performance of a switchboard with natural ventilation depends on many parameters, e.g. shape, porosity and location of vents and air flow within the switchboard.

Derating in switchboards

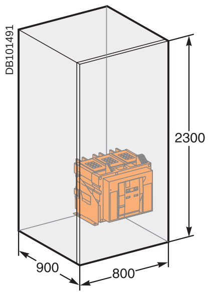
Masterpact NW08-10 N/H/L (switchboard 2300 x 800 x 900) **-** area of outlet vents: 350 cm²

Type			NW08 N/H/L					NW10 N/H/L			
Switchboard composition											
Connection type			≡	|||	|||	|||	|||	≡	|||	|||	|||
Busbar dimensions (mm)			2b. 50 x 5					3b. 63 x 5	2b. 63 x 5		
Ventilated switchboard (➨ IP31)	T_a = 35 °C	4					800				
		3				800	800				1000
		2			800	800	800			1000	1000
		1	800	800	800	800	800	1000	1000	1000	1000
	T_a = 45 °C	4					800				
		3				800	800				1000
		2			800	800	800			1000	1000
		1	800	800	800	800	800	1000	1000	1000	1000
	T_a = 55 °C	4					800				
		3				800	800				1000
		2			800	800	800			1000	1000
		1	800	800	800	800	800	1000	1000	1000	1000
Non ventilated switchboard (➨ IP54)	T_a = 35 °C	4					800				
		3				800	800				1000
		2			800	800	800			1000	1000
		1	800	800	800	800	800	1000	1000	1000	1000
	T_a = 45 °C	4					800				
		3				800	800				1000
		2			800	800	800			1000	1000
		1	800	800	800	800	800	1000	1000	1000	1000
	T_a = 55 °C	4					800				
		3				800	800				1000
		2			800	800	800			1000	1000
		1	800	800	800	800	800	1000	1000	1000	1000



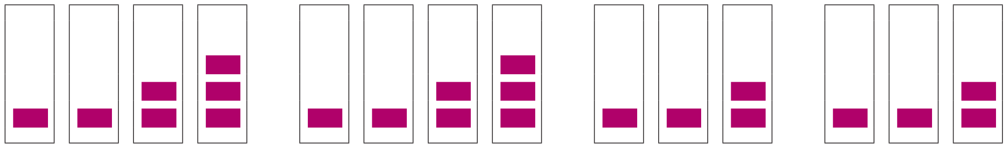


***(1)** Area of outlet vents: 350 cm².*
***(2)** Area of intlet vents: 350 cm².*

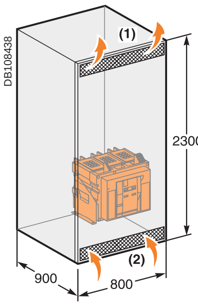


***Note:** the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.*
The values indicated for the cross-sectional area of the vents should be considered as general indications only given that the thermal performance of a switchboard with natural ventilation depends on many parameters, e.g. shape, porosity and location of vents and air flow within the switchboard.

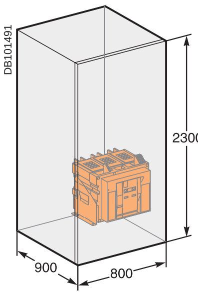
Masterpact NW12-16 N/H/L (switchboard 2300 x 800 x 900) - area of outlet vents: 350 cm²



Type			NW12 N1				NW12 H/L				NW16 N1			NW16 H/L		
Switchboard composition		4 3 2 1														
Connection type			≡	|||	|||	|||	≡	|||	|||	|||	≡	|||	|||	≡	|||	|||
Busbar dimensions (mm)			3b. 63 x 5	3b. 50 x 5			3b. 63 x 5	3b. 50 x 5			3b. 80 x 5	3b. 63 x 5		3b. 80 x 5	3b. 63 x 5	
Ventilated switchboard (➨ IP31)	Ta = 35 °C	4														
		3				1250				1250						
		2			1250	1250			1250	1250			1600			1600
		1	1250	1250	1250	1250	1250	1250	1250	1250	1550	1600	1600	1600	1600	1600
	Ta = 45 °C	4														
		3				1250				1250						
		2			1250	1250			1250	1250			1500			1600
		1	1250	1250	1250	1250	1250	1250	1250	1250	1470	1600	1600	1600	1600	1600
	Ta = 55 °C	4														
		3				1250				1250						
		2			1250	1250			1250	1250			1380			1470
		1	1250	1250	1250	1250	1250	1250	1250	1250	1380	1500	1500	1520	1600	1600
Non ventilated switchboard (➨ IP54)	Ta = 35 °C	4														
		3				1240				1250						
		2			1250	1250			1250	1250			1425			1600
		1	1250	1250	1250	1250	1250	1250	1250	1250	1440	1550	1550	1600	1600	1600
	Ta = 45 °C	4														
		3				1170				1250						
		2			1210	1210			1250	1250			1360			1500
		1	1200	1250	1250	1250	1250	1250	1250	1250	1360	1470	1470	1500	1600	1600
	Ta = 55 °C	4														
		3				1100				1250						
		2			1140	1170			1250	1250			1280			1400
		1	1130	1200	1200	1200	1250	1250	1250	1250	1280	1380	1380	1400	1520	1520



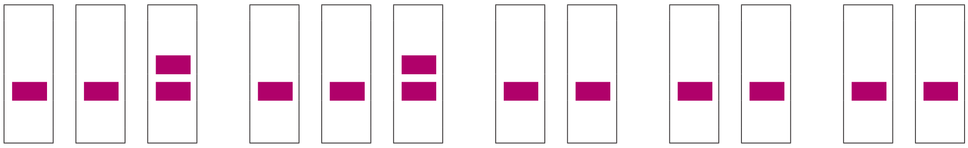
(1) Area of outlet vents: 350 cm².
(2) Area of intlet vents: 350 cm².

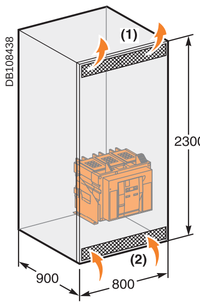


***Note:** the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.*
The values indicated for the cross-sectional area of the vents should be considered as general indications only given that the thermal performance of a switchboard with natural ventilation depends on many parameters, e.g. shape, porosity and location of vents and air flow within the switchboard.

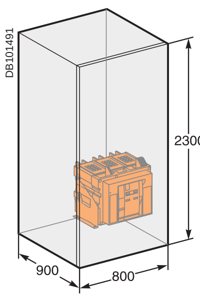
Derating in switchboards

Masterpact NW20-40 N/H/L (switchboard 2300 x 800 x 900) **-** area of outlet vents: 350 cm²

Type			NW20 H1/H2/H3			NW20 L1			NW25 H1/2/3		NW32 H1/2/3		NW40 H1/2/3	
Switchboard composition		4 / 3 / 2 / 1												
Connection type														
Busbar dimensions (mm)			3b. 100 x 5			3b. 100 x 5			4b. 100 x 5		3b. 100 x 10		4b. 100 x 10	
Ventilated switchboard (➨ IP31)	T$_a$ = 35 °C	4												
		3			2000			1830						
		2	2000	2000	2000	2000	2000	2000	2375	2500	3040	3200	3320	3700
		1												
	T$_a$ = 45 °C	4												
		3			2000			1750						
		2	2000	2000	2000	1810	1960	1920	2250	2380	2880	3100	3160	3500
		1												
	T$_a$ = 55 °C	4												
		3			2000			1640						
		2	2000	2000	2000	1700	1850	1800	2100	2250	2690	2900	2960	3280
		1												
Non ventilated switchboard (➨ IP54)	T$_a$ = 35 °C	4												
		3			2000			1750						
		2	2000	2000	2000	1800	1900	1890	2125	2275	2650	2850	3040	3320
		1												
	T$_a$ = 45 °C	4												
		3			1900			1660						
		2	1900	1960	1960	1680	1810	1800	2000	2150	2550	2700	2880	3120
		1												
	T$_a$ = 55 °C	4												
		3			1780			1550						
		2	1800	1920	1920	1590	1700	1700	1900	2020	2370	2530	2720	2960
		1												



(1) Area of outlet vents: 350 cm².
(2) Area of intlet vents: 350 cm².

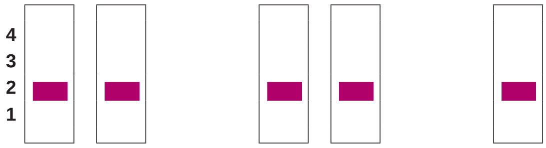


Note: *the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.*
The values indicated for the cross-sectional area of the vents should be considered as general indications only given that the thermal performance of a switchboard with natural ventilation depends on many parameters, e.g. shape, porosity and location of vents and air flow within the switchboard.

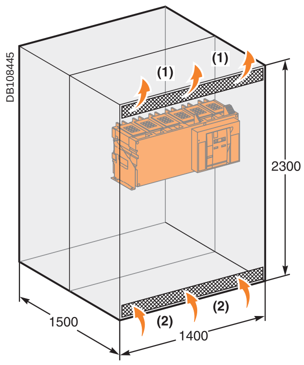
Masterpact NW40b-63 H1/H2 (switchboard 2300 x 1400 x 1500) **-** area of outlet vents: 500 cm²

Type			**NW40b H1/H2**		**NW50 H1/H2**		**NW63 H1/H2**
Switchboard composition							
Connection type			≡	|||	≡	|||	|||
Busbar dimensions (mm)			5b. 100 x 10		7b. 100 x 10		8b. 100 x 10
Ventilated switchboard (➨ IP31)		**4**					
		3					
	T_a = 35 °C	**2**	4000	4000	4700	5000	5850
		1					
		4					
		3					
	T_a = 45 °C	**2**	4000	4000	4450	4850	5670
		1					
		4					
		3					
	T_a = 55 °C	**2**	4000	4000	4200	4600	5350
		1					
Non ventilated switchboard (➨ IP54)		**4**					
		3					
	T_a = 35 °C	**2**	4000	4000	4350	4650	5290
		1					
		4					
		3					
	T_a = 45 °C	**2**	4000	4000	4100	4400	5040
		1					
		4					
		3					
	T_a = 55 °C	**2**	3840	3840	3850	4150	4730
		1					

Switchboard composition:

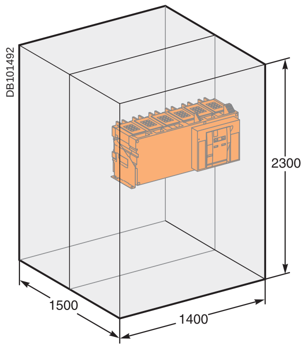


Ventilated switchboard (➨ IP31):



(1) *Area of outlet vents: 500 cm².*
(2) *Area of intlet vents: 500 cm².*

Non ventilated switchboard (➨ IP54):



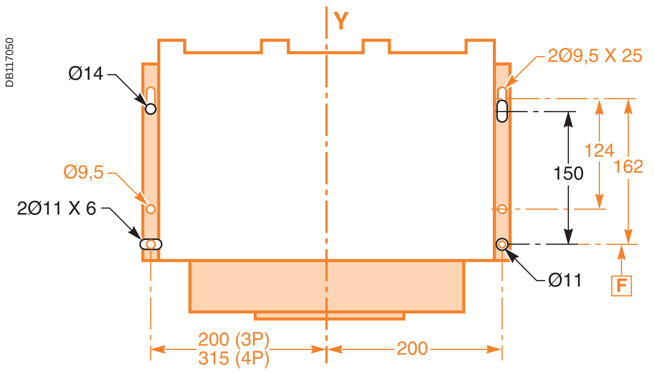
Note: *the values indicated in these tables have been extrapolated from test data and theoretical calculations. These tables are only intended as a guide and cannot replace industrial experience or a temperature rise test.*
The values indicated for the cross-sectional area of the vents should be considered as general indications only given that the thermal performance of a switchboard with natural ventilation depends on many parameters, e.g. shape, porosity and location of vents and air flow within the switchboard.

Substitution kit
Fixed / drawout devices 800 to 3200 A

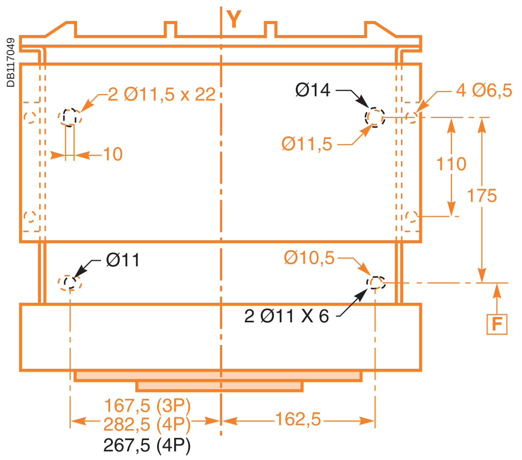
It is possible to replace a **Masterpact (M08 to M32)** with a new **Masterpact (NW08 to NW32)** with the same power rating.
Substitution is possible for the following types of circuit breakers:
- N1, H1, H2 for both fixed and drawout versions
- L1 for drawout versions up to 2000 A.

Mounting diagram

Fixed version



Drawout version



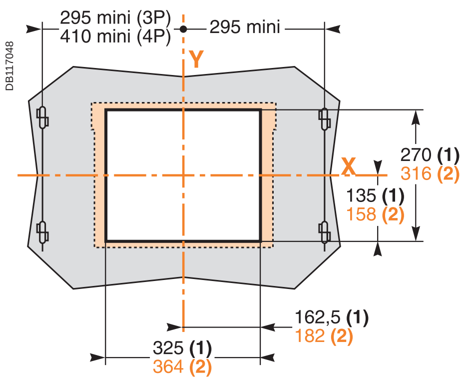
: *Masterpact NW*
: *Masterpact M*

Fixing points are identical for Masterpact (M08 to M32) and Masterpact (NW08 to NW32), except for the four-pole chassis.

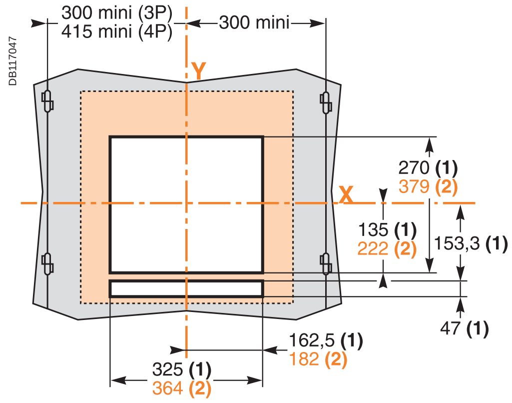
Door cut-out

- without an escutcheon, the cut-out is identical (270 x 325 mm)
- with the former escutcheon, the cut-out is identical (270 x 325 mm)
- with the new escutcheon, the cut-out is different.

Fixed version



Drawout version



Power connection

Select a set of retrofit connectors to replace the standard connectors and avoid any modifications to the busbars (see the retrofit section in “orders and quotations”).

Note:
(1) Without escutcheon.
(2) With escutcheon.

References X and Y represent the symmetry planes for three-pole devices.

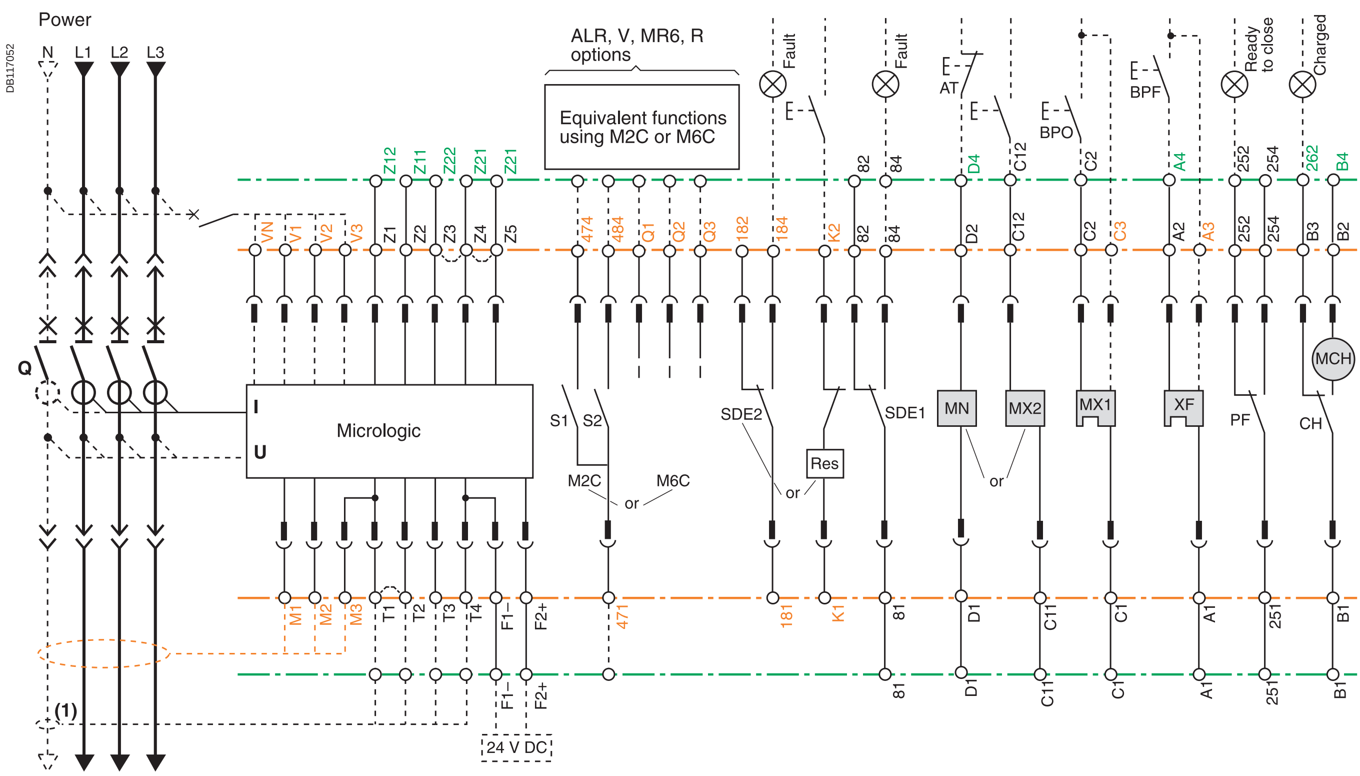
Electrical diagrams

Correspondences between Masterpact NW and Masterpact M terminal blocks.

Power

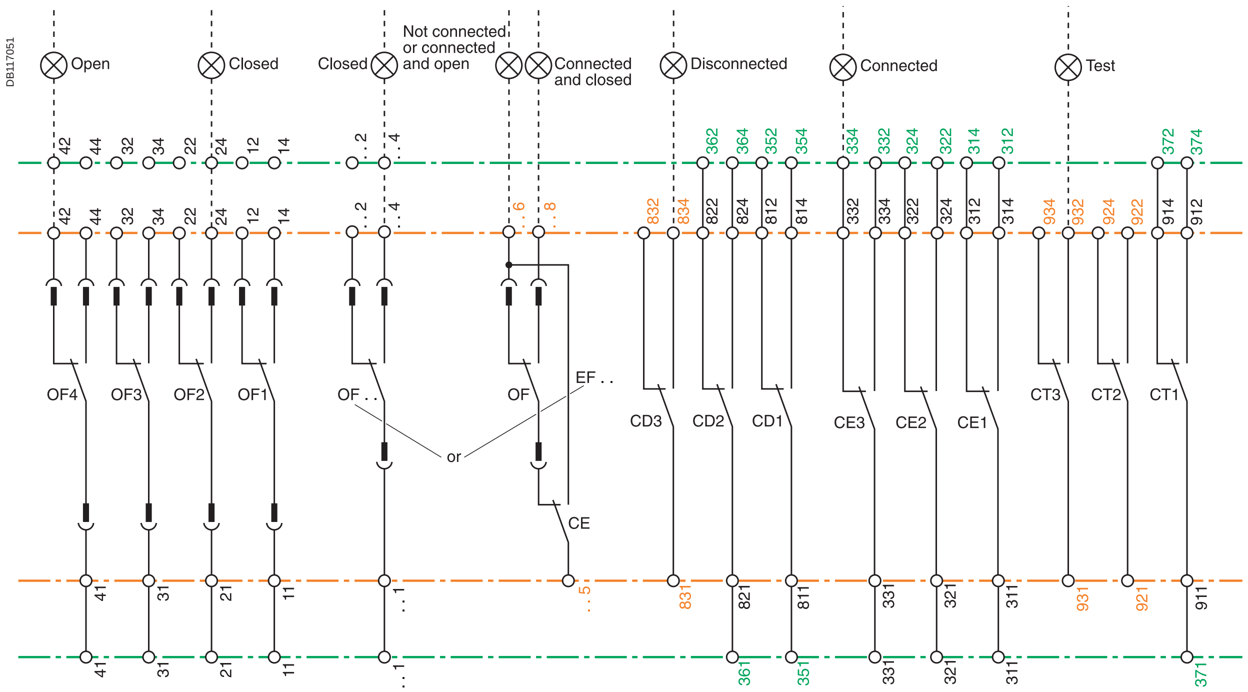
Control unit

Remote operation



Indication contacts

Chassis contacts



Identical to Masterpact M.

Different than Masterpact M.

New or additional functions.

(1) The current transformer for the external neutral must be replaced.

TOOLS

schneider-electric.com

This international site allows you to access all the Schneider Electric products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- complete library: technical documents, catalogs, FAQs, brochures…
- selection guides from the e-catalog.
- product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, the list of country contacts…

Training

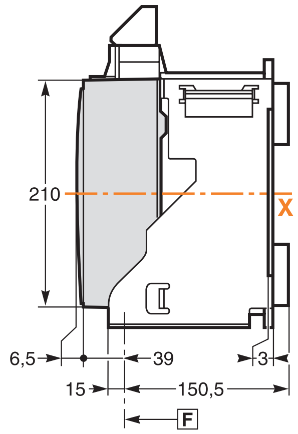
Training allows you to acquire the Schneider Electric expertise (installation design, work with power on, etc.) for increased efficiency and a guarantee of improved customer service.
The training catalogue includes beginner’s courses in electrical distribution, knowledge of MV and LV switchgear, operation and maintenance of installations, design of LV installations to give but a few examples.

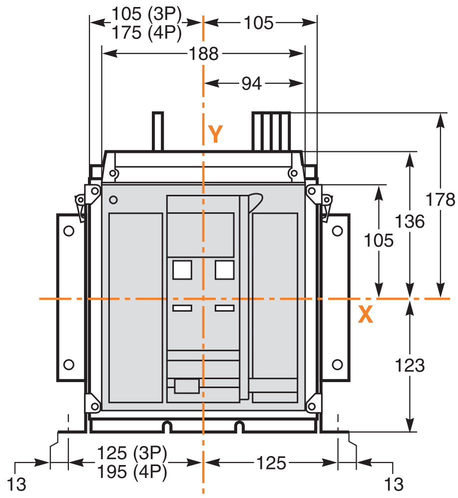
Dimensions and connection

NT06 to NT16 circuit breakers

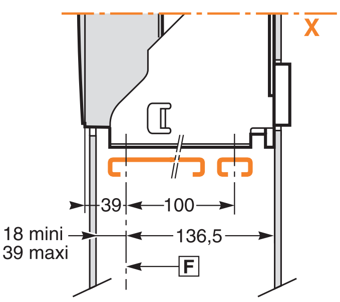
Fixed 3/4-poles device

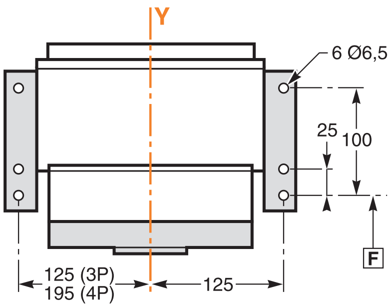
Dimensions



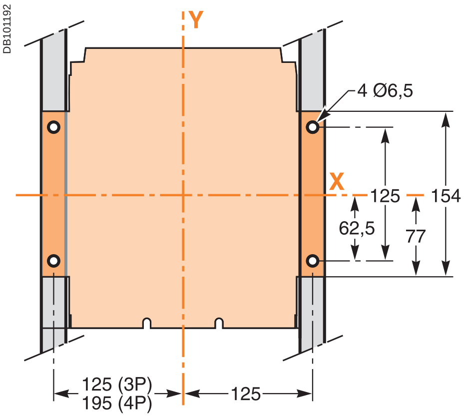


Bottom mounting (on base plate or rails)

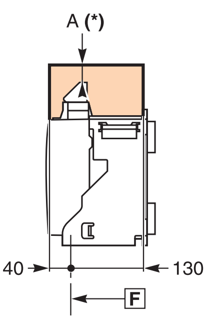


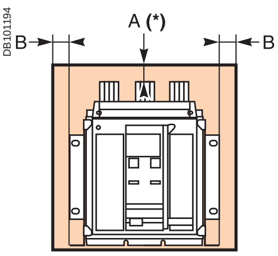


Rear mounting detail (on upright or backplate)

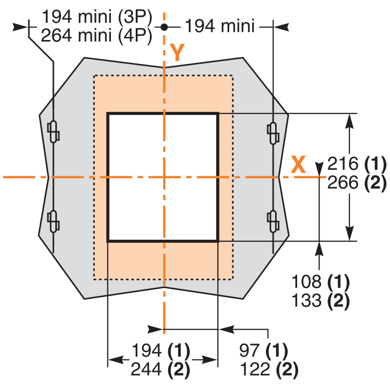


Safety clearances

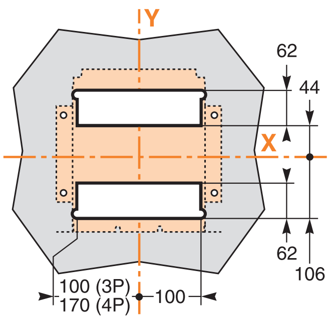




Door cutout



Rear panel cutout



For voltages < 690 V

	Parts		
	Insulated	Metal	Energised
A	0	0	100
B	0	0	60

For 1000 V

	Parts		
	Insulated	Metal	Energised
A	0	100	500 (3)
B	0	50	100 (3)

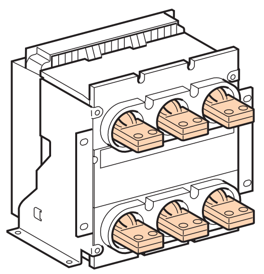
F: *datum.*

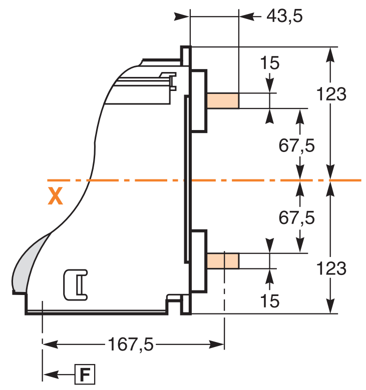
(1) Without escutcheon.
(2) With escutcheon.

(3) With a minimum distance between bars of 65 mm (A and B) if the bars are not insulated.
Note: X and Y are the symmetry planes for a 3-pole device.
A(*) An overhead clearance of 50 mm is required to remove the arc chutes.
An overhead clearance of 20 mm is required to remove the terminal block.

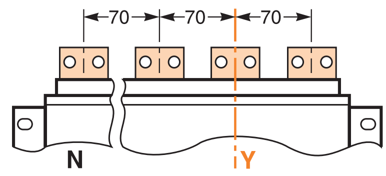
Connections

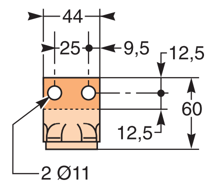
Horizontal rear connection



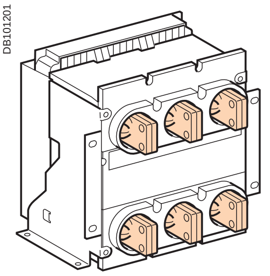


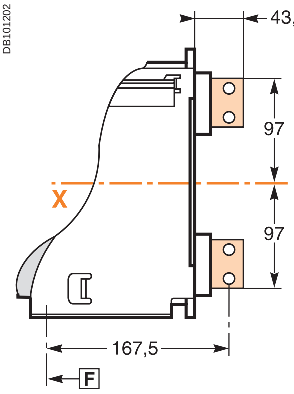
Detail



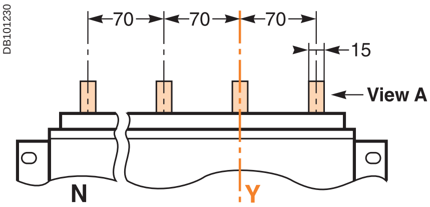


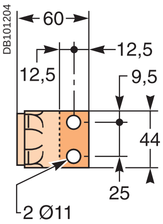
Vertical rear connection





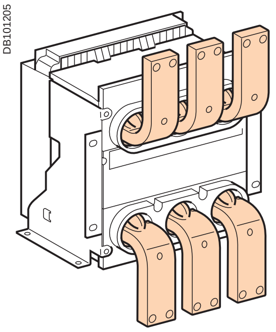
Detail

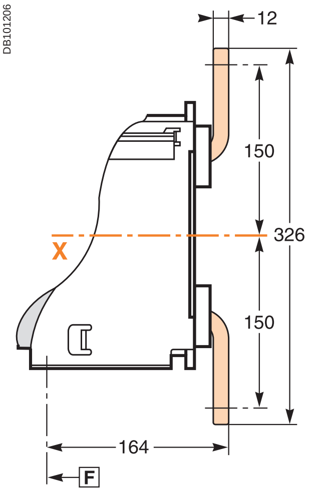




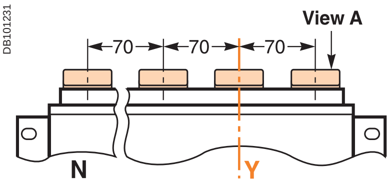
View A detail.

Front connection

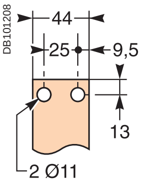




Detail

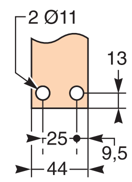


Top connection



View A detail.

Bottom connection



Note: *recommended connection screws:* ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

Dimensions
and connection

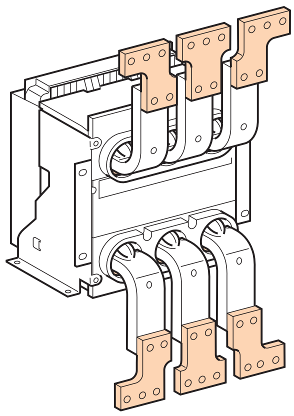
NT06 to NT16 circuit breakers

Fixed 3/4-poles device

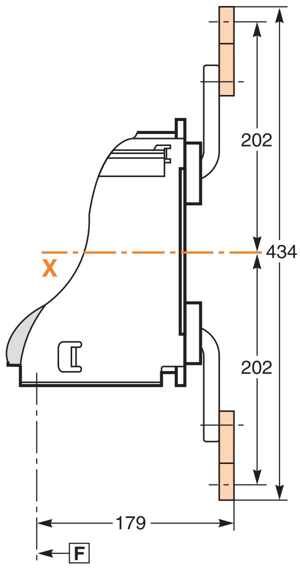
Connections

Front connection with spreaders

DB101210

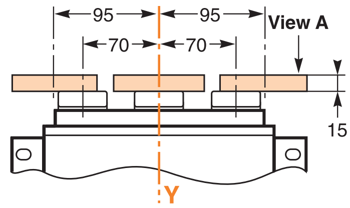


DB101211

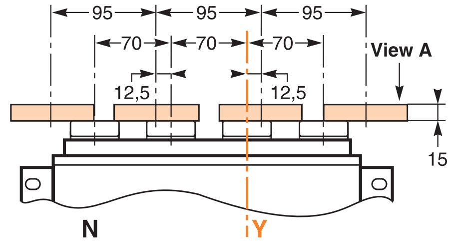


Detail

DB101527

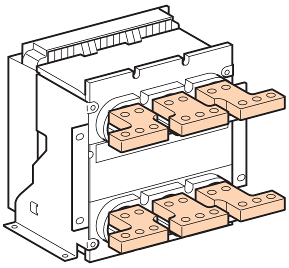


DB101528

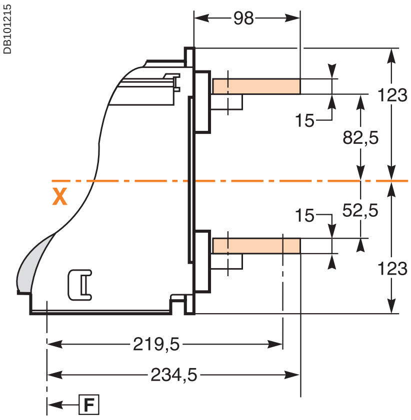


Rear connection with spreaders

DB101214

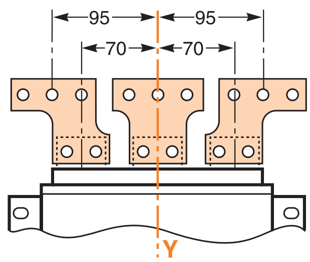


DB101215

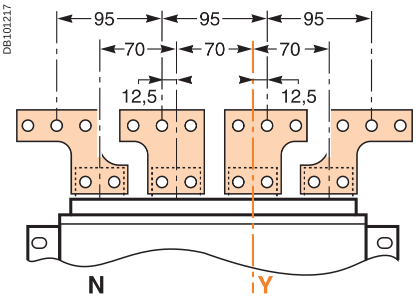


Detail

DB101216



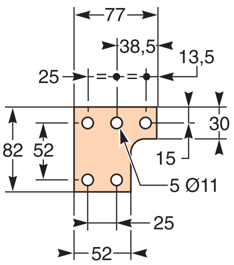
DB101217



Spreader detail

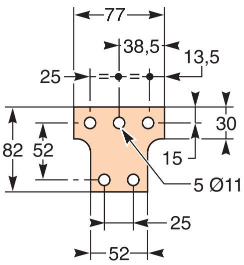
Middle left or middle right spreader for 4P.

DB101218



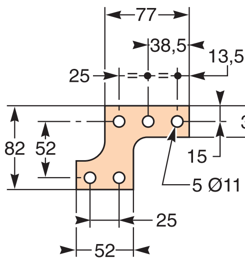
Middle spreader for 3P.

DB101219



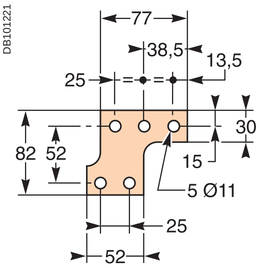
Left or right spreader for 4P.

DB101220



Left or right spreader for 3P.

DB101221



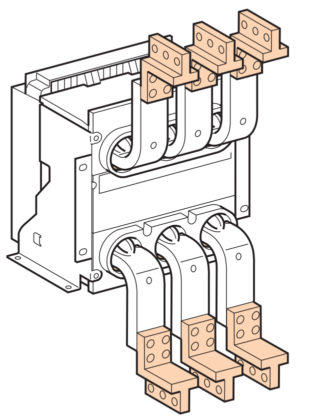
View A detail.

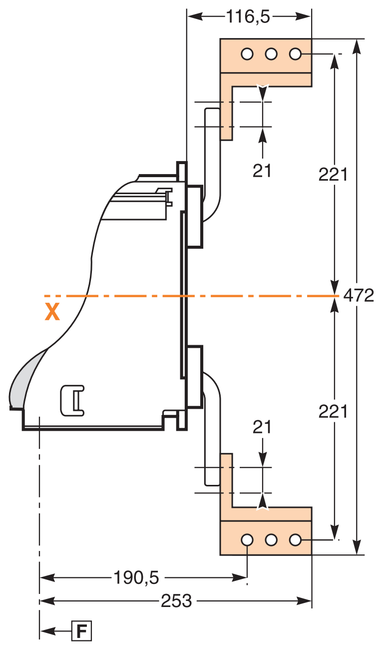
F *: datum.*

Note: X and Y are the symmetry planes for a 3-pole device.

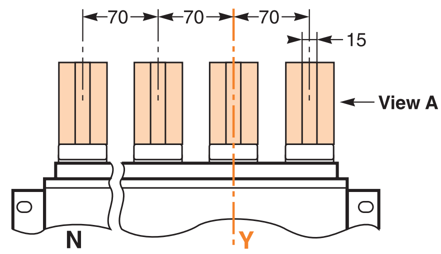
Connections

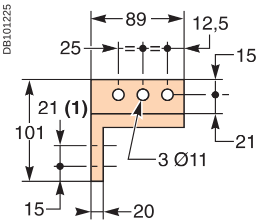
Front connection via vertical connection adapters





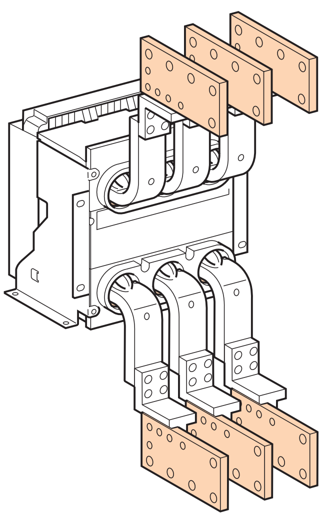
Detail

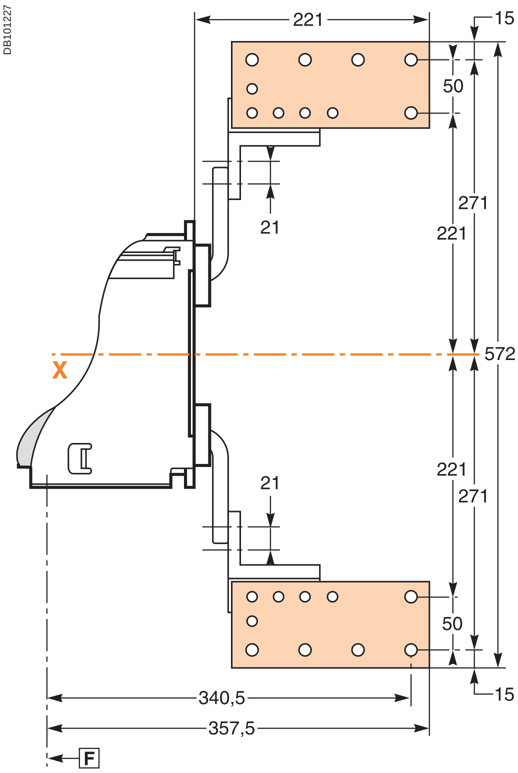




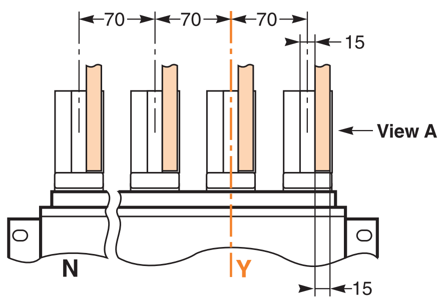
View A detail.

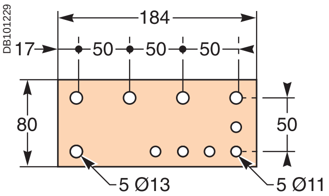
Front connection via vertical connection adapters fitted with cable-lug adapters





Detail





View A detail.

Note: *recommended connection screws:* ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

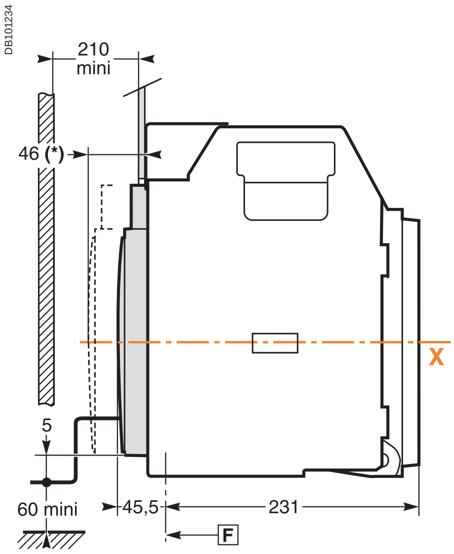
(1) *2 connection possibilities on vertical connection adapters (21 mm between centres).*

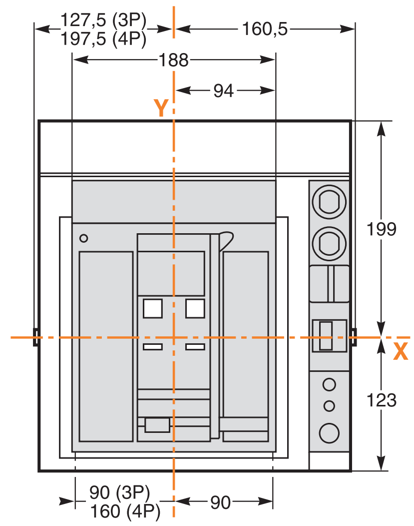
Dimensions and connection

NT06 to NT16 circuit breakers

Drawout 3/4-poles device

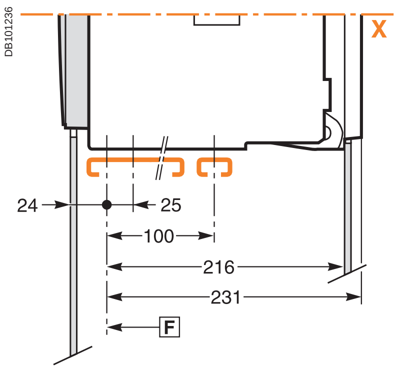
Dimensions

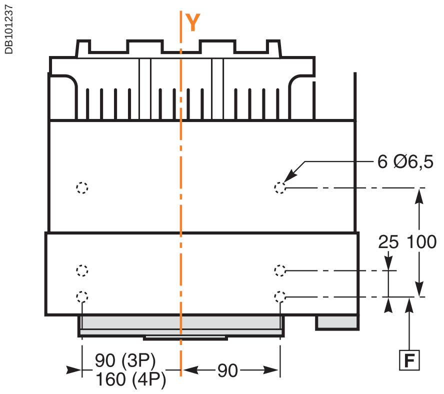




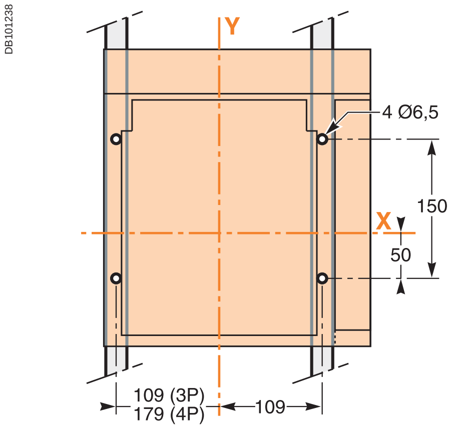
(*) Disconnected position.

Bottom mounting (on base plate or rails)

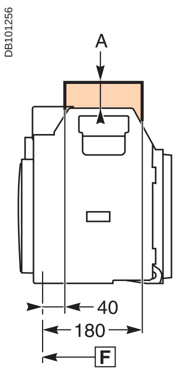


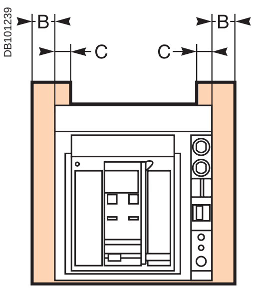


Rear mounting detail (on upright or backplate)

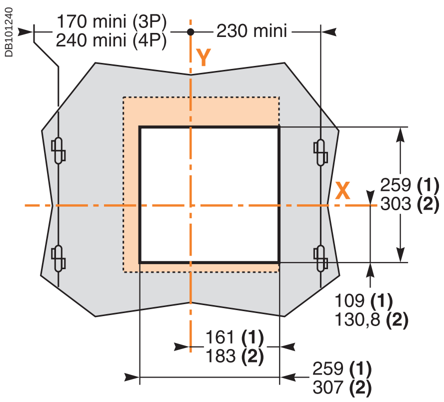


Safety clearances

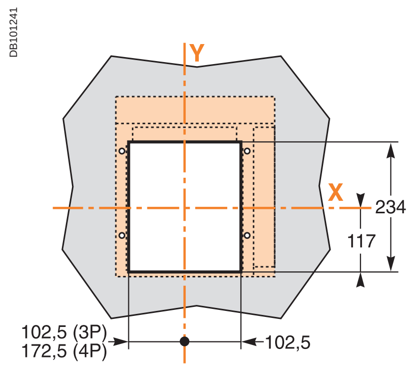




Door cutout



Rear panel cutout



For voltages < 690 V or equal to 1000 V.

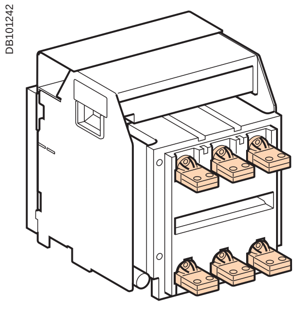
	Parts		
	Insulated	Metal	Energised
A	0	0	30
B	10	10	60
C	0	0	30

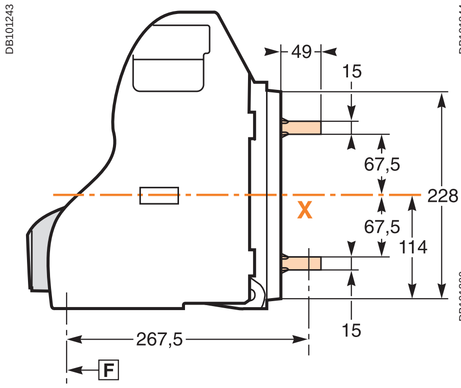
F : *datum.*

(1) Without escutcheon.
(2) With escutcheon.
Note: X and Y are the symmetry planes for a 3-pole device.

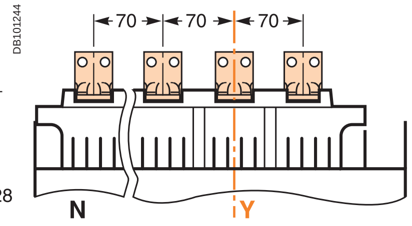
Connections

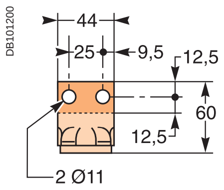
Horizontal rear connection



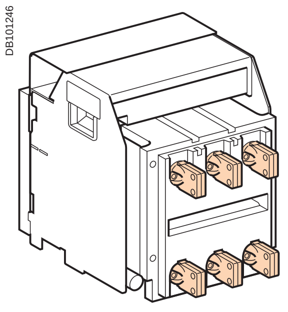


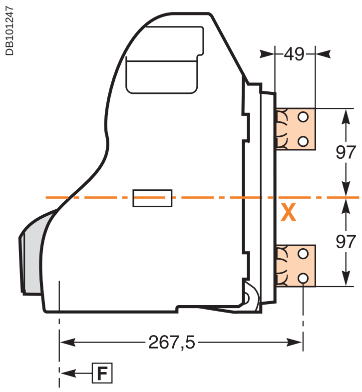
Detail



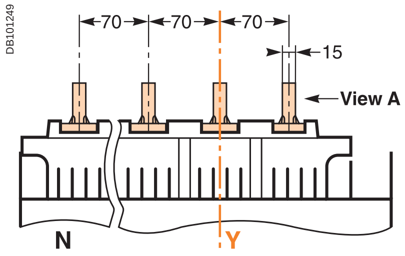


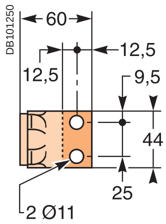
Vertical rear connection





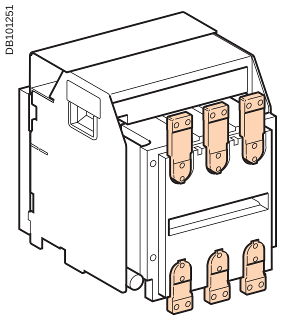
Detail

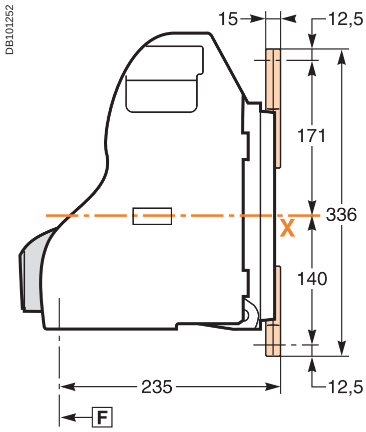




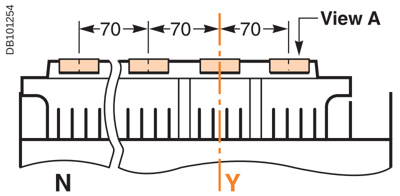
View A detail.

Front connection

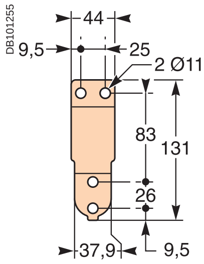




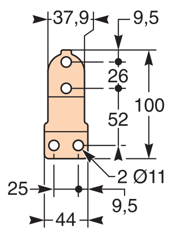
Detail



Top connection



Bottom connection



View A detail.

Note: *recommended connection screws:* ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

Dimensions
and connection

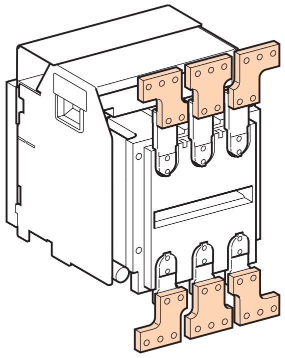
NT06 to NT16 circuit breakers

Drawout 3/4-poles device

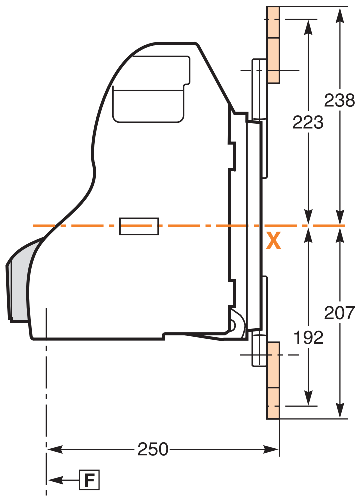
Connections

Front connection with spreaders

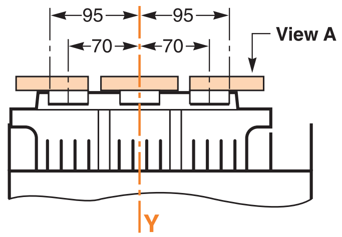
DB101257



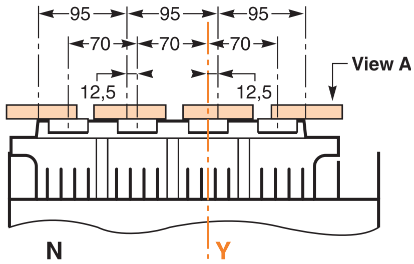
DB101258



DB101265



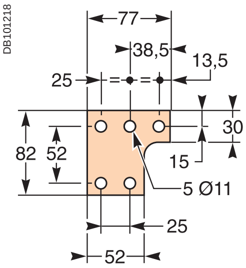
DB101266



Spreader detail

Middle left or middle right spreader for 4P.

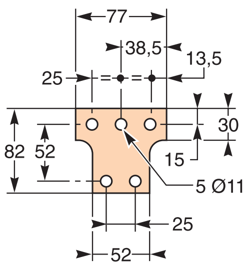
DB101218



View A detail.

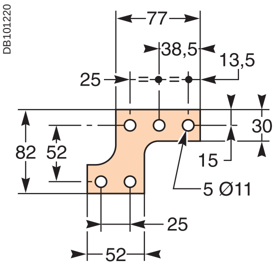
Middle spreader for 3P.

DB101219



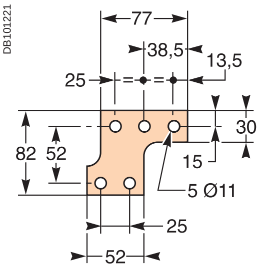
Left or right spreader for 4P.

DB101220



Left or right spreader for 3P.

DB101221



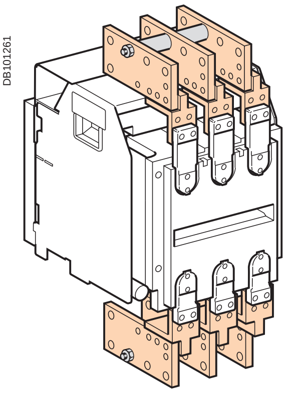
F : datum.

Note: X and Y are the symmetry planes for a 3-pole device.

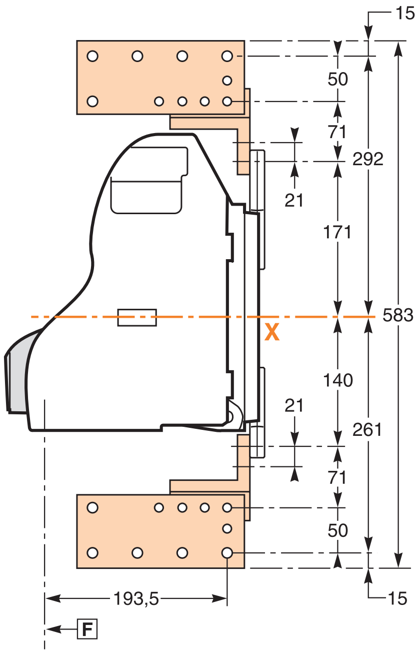
Connections

Front connection via vertical connection adapters fitted with cable-lug adapters

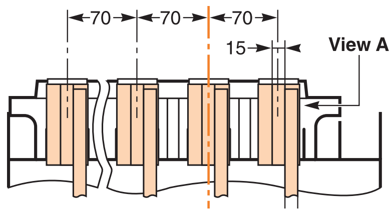
DB101261



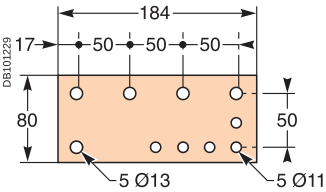
DB101262



DB101264



DB101229



View A detail.

Note: *recommended connection screws:* ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

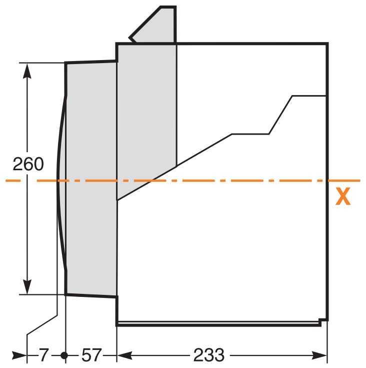
Dimensions and connection

NW08 to NW32 circuit breakers

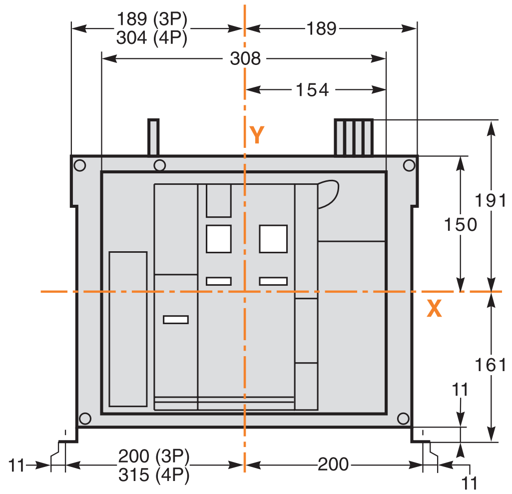
Fixed 3/4-poles device

Dimensions

DB101267

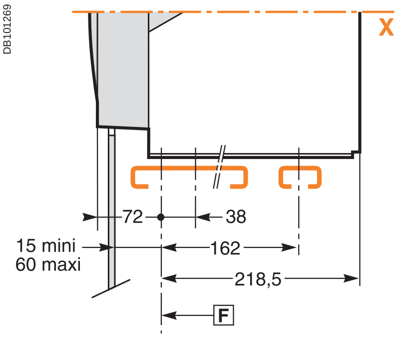


DB101268



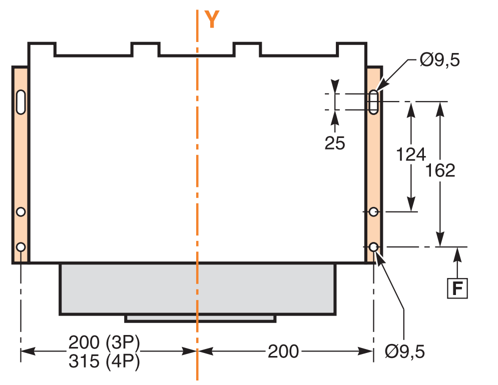
Mounting on base plate or rails

DB101269



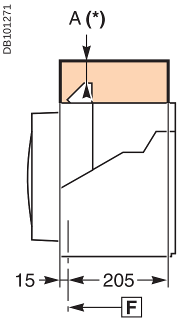
Mounting detail

DB101270

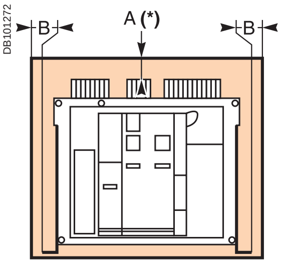


Safety clearances

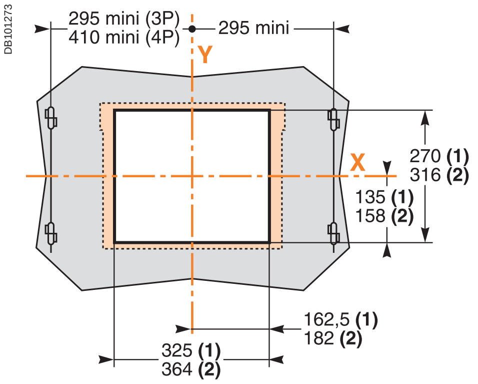
DB101271



DB101272



DB101273



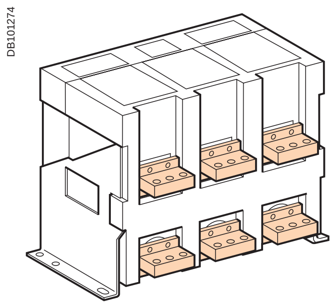
	Insulated parts	Metal parts	Energised parts
A	0	0	100
B	0	0	60

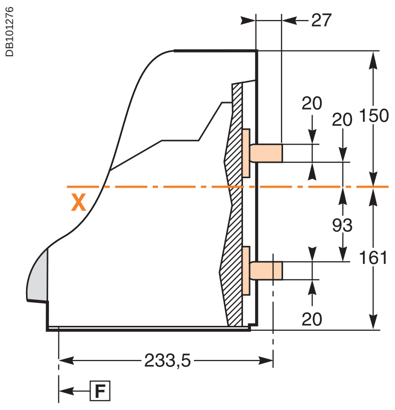
F : *datum.*

(1) Without escutcheon.
(2) With escutcheon.
Note: X and Y are the symmetry planes for a 3-pole device.
A(*) An overhead clearance of 50 mm is required to remove the arc chutes.
An overhead clearance of 20 mm is required to remove the terminal block.

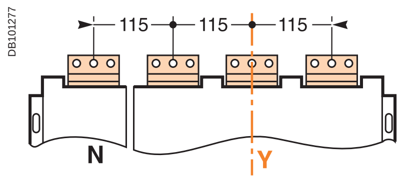
Connections

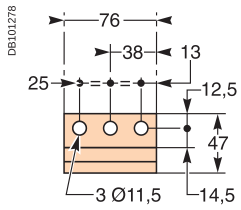
Horizontal rear connection



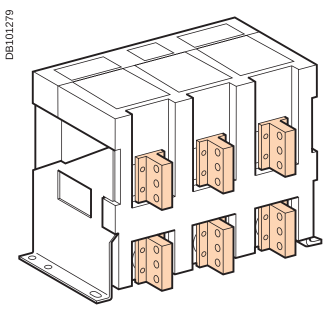


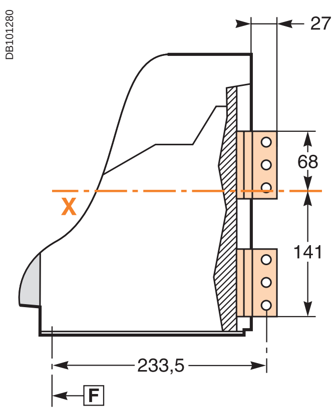
Detail



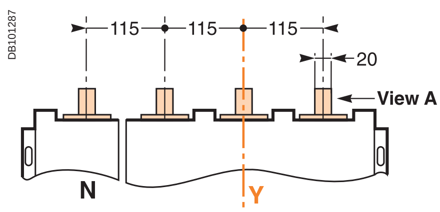


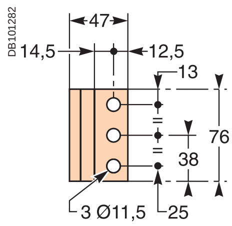
Vertical rear connection





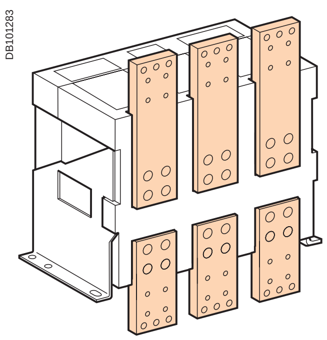
Detail

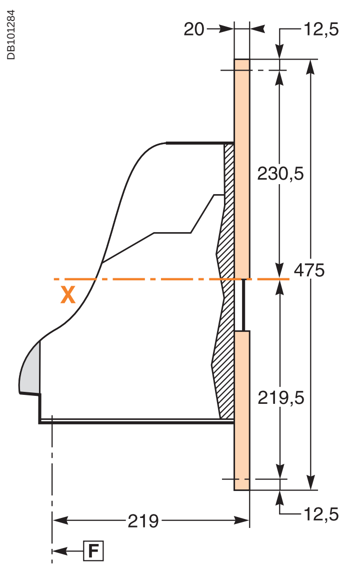




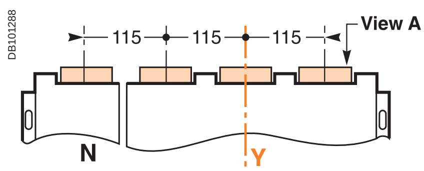
View A detail.

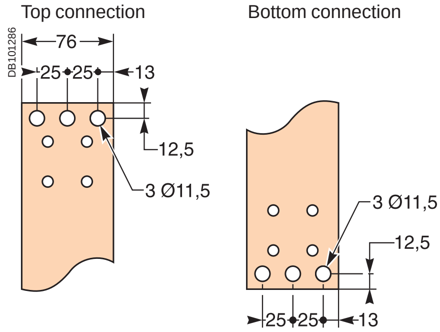
Front connection





Detail





View A detail.

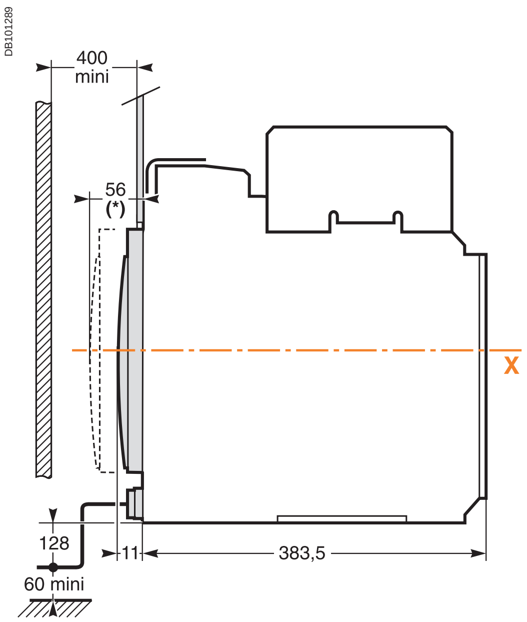
Note: *recommended connection screws:* ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

Dimensions and connection

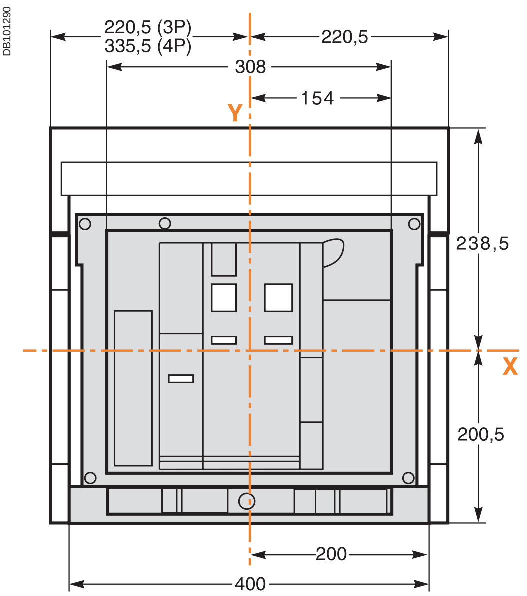
NW08 to NW32 circuit breakers

Drawout 3/4-poles device

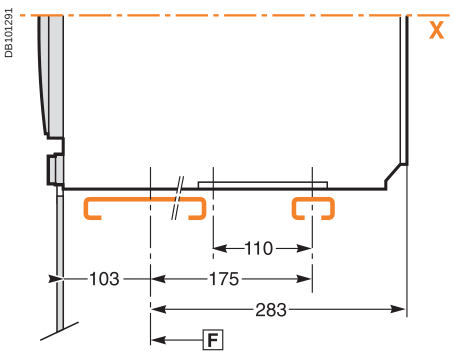
Dimensions



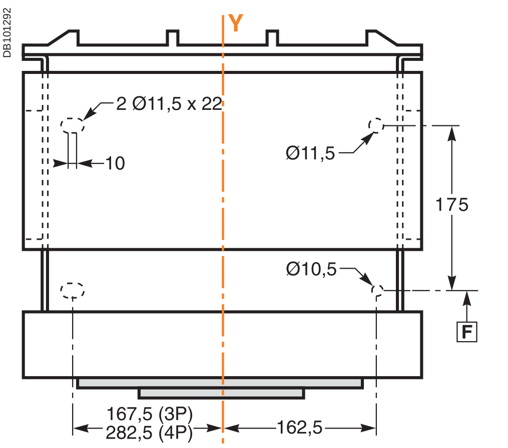
(*) Disconnected position.



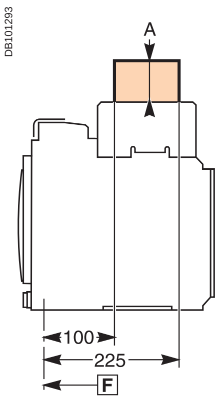
Mounting on base plate or rails

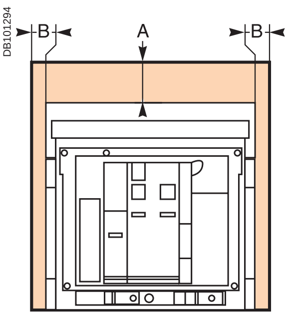


Mounting detail



Safety clearances

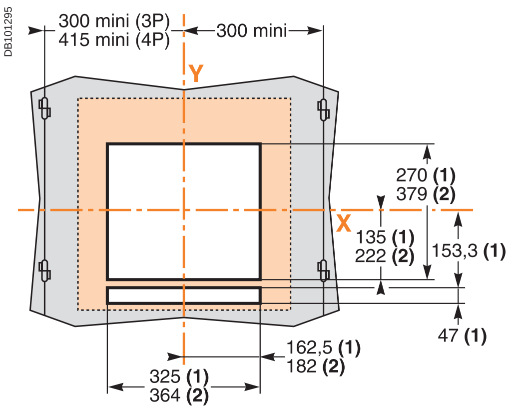




	Insulated parts	Metal parts	Energised parts
A	0	0	0
B	0	0	60

F : datum.

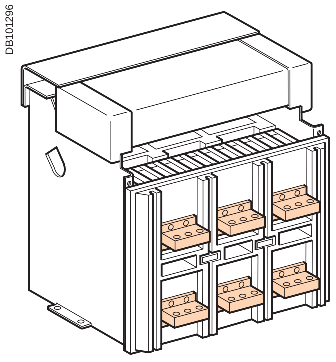
Door cutout

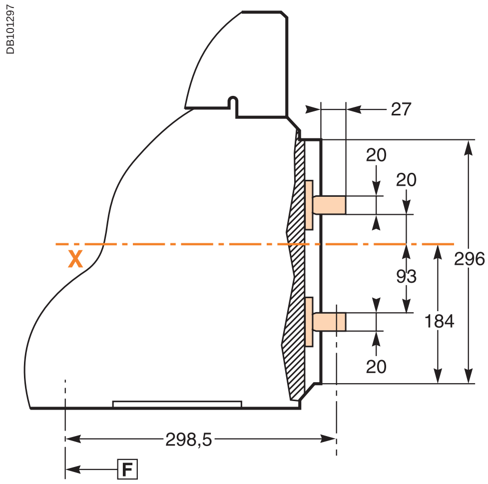


(1) Without escutcheon.
(2) With escutcheon.
Note: X and Y are the symmetry planes for a 3-pole device.

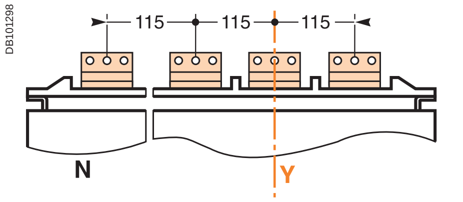
Connections

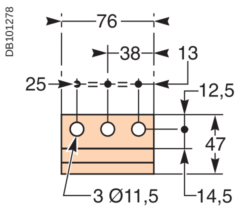
Horizontal rear connection



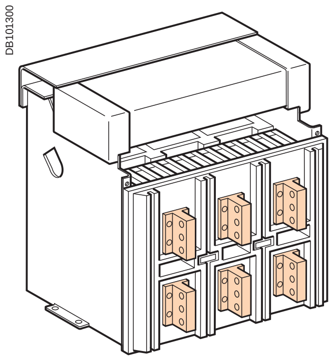


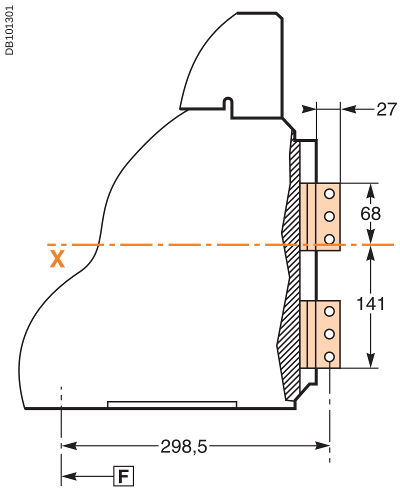
Detail



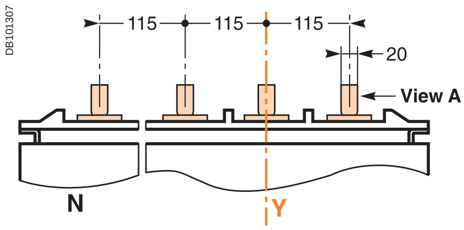


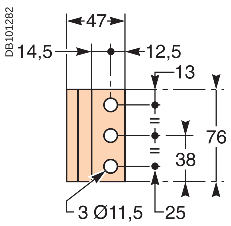
Vertical rear connection





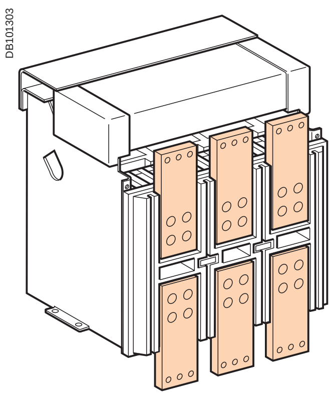
Detail

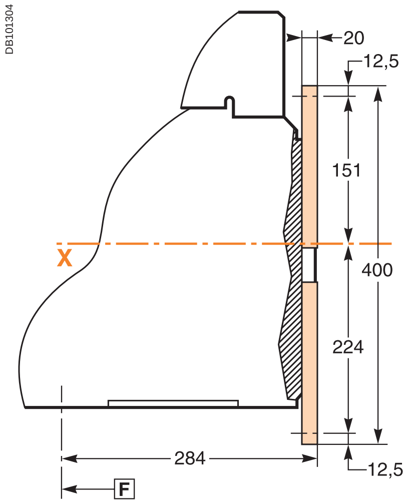




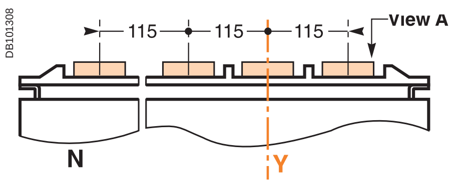
View A detail.

Front connection

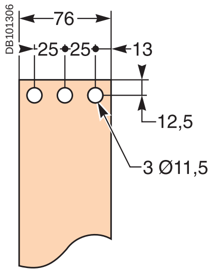




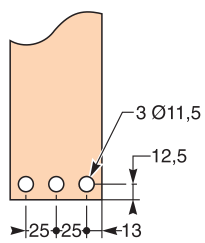
Detail



Top connection



Bottom connection



View A detail.

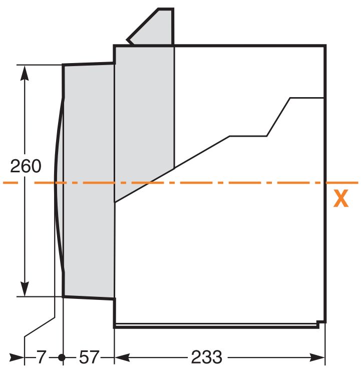
Note: *recommended connection screws:* ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

NW40 circuit breakers

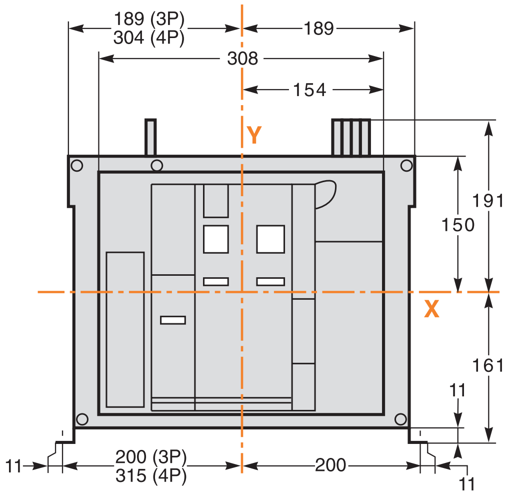
Fixed 3/4-poles device

Dimensions

DB101267

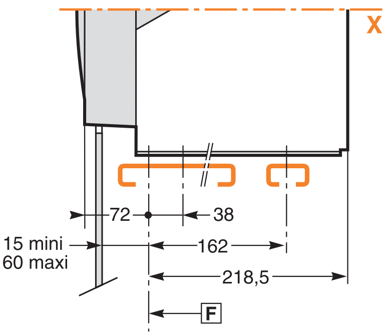


DB101268



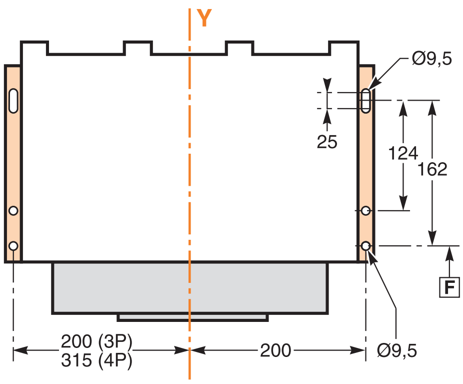
Mounting on base plate or rails

DB101269



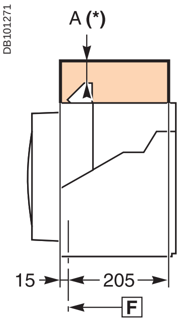
Mounting detail

DB101270

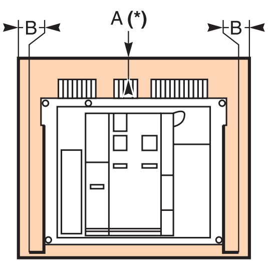


Safety clearances

DB101271

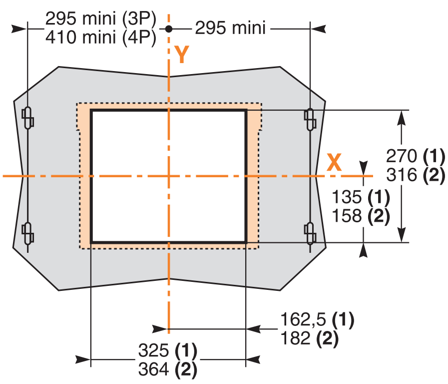


DB101272



Door cutout

DB101273



	Insulated parts	Metal parts	Energised parts
A	0	0	100
B	0	0	60

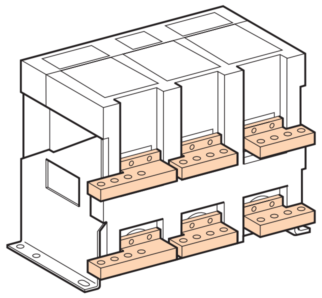
F : *datum.*

(1) Without escutcheon.
(2) With escutcheon.
Note: X and Y are the symmetry planes for a 3-pole device.
A(*) An overhead clearance of 110 mm is required to remove the arc chutes.
An overhead clearance of 20 mm is required to remove the terminal block.

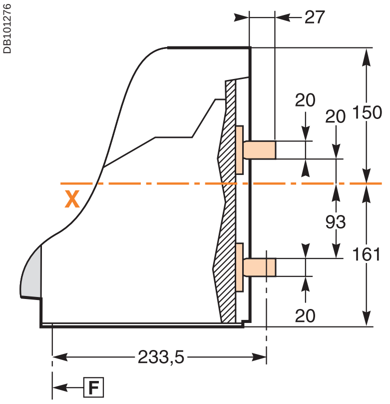
Connections

Horizontal rear connection

DB101309

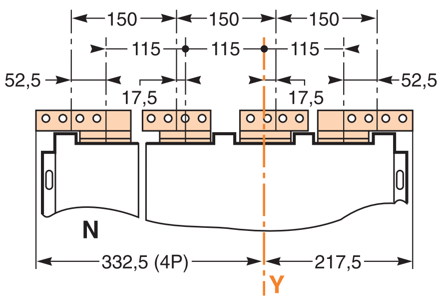


DB101276

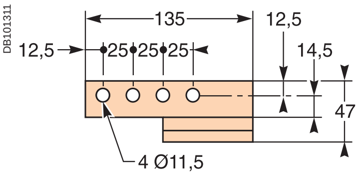


Detail

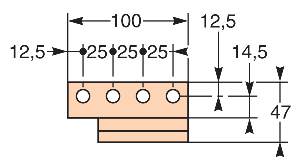
DB101310



DB101311

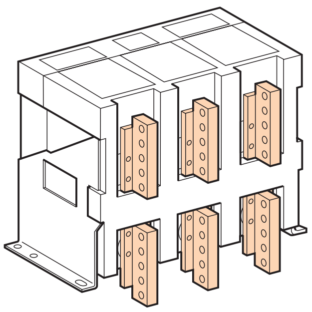


DB101315

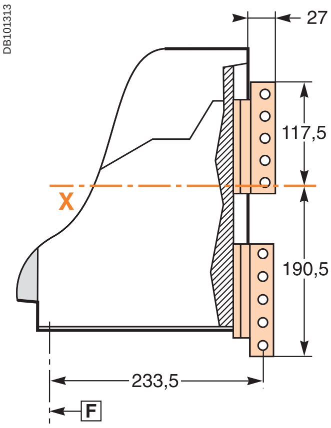


Vertical rear connection

DB101312

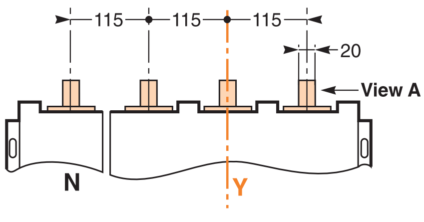


DB101313

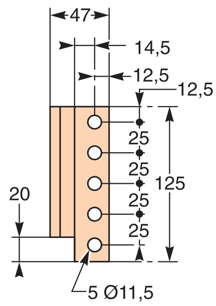


Detail

DB101287



DB101314



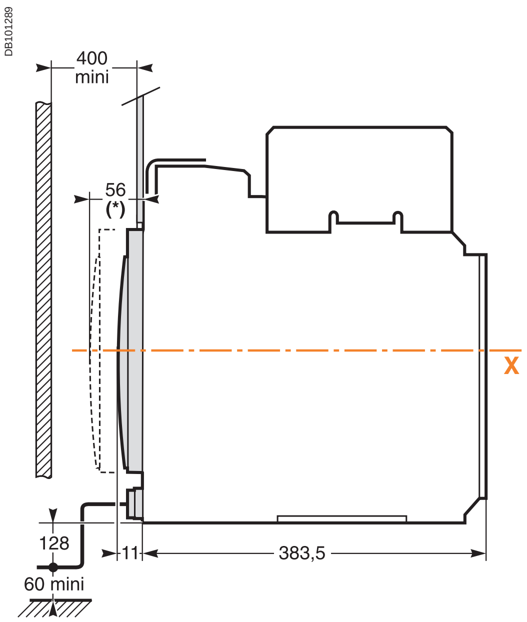
*Note: recommended connection screws: **M10** class 8.8.*
*Tightening torque: **50 Nm** with contact washer.*

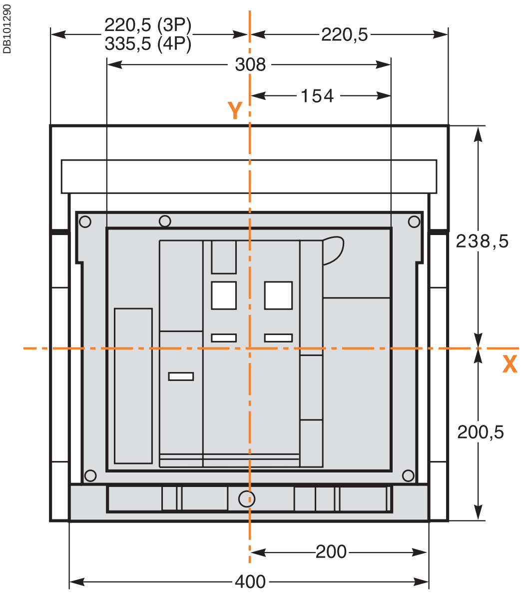
Dimensions
and connection

NW40 circuit breakers

Drawout 3/4-poles device

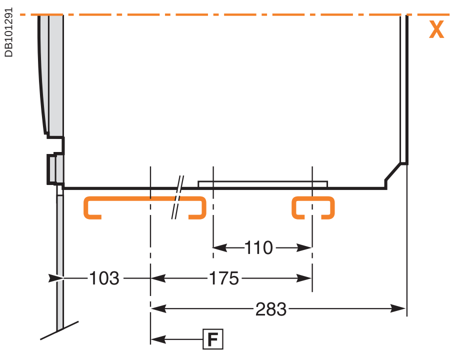
Dimensions



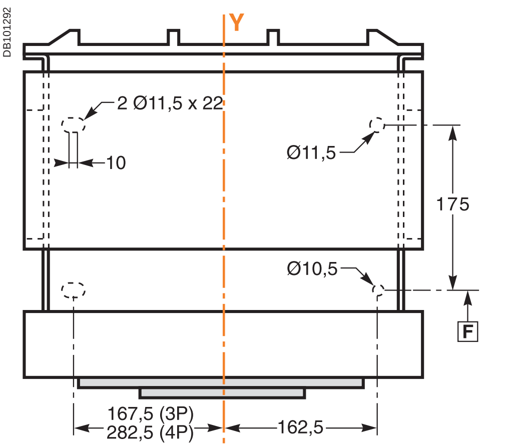


***(*)** Disconnected position.*

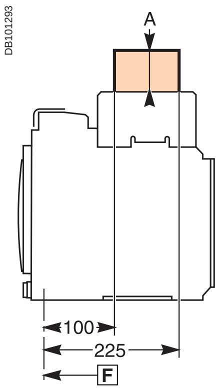
Mounting on base plate or rails

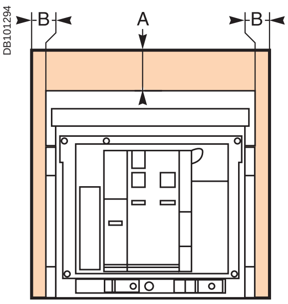


Mounting detail



Safety clearances

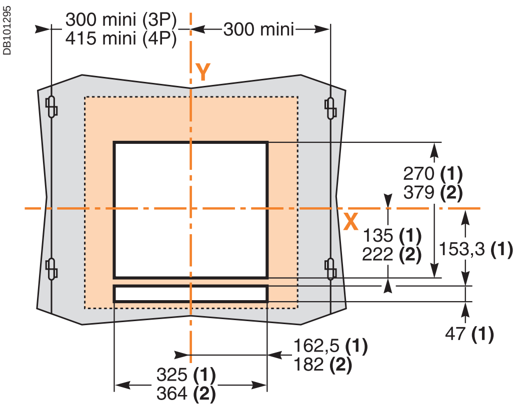




	Insulated parts	Metal parts	Energised parts
A	0	0	0
B	0	0	60

F : *datum.*

Door cutout

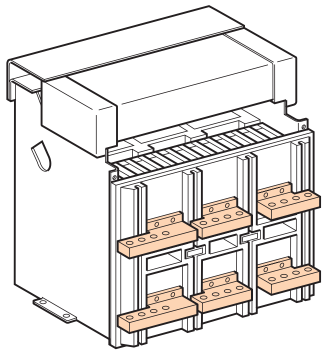


***(1)** Without escutcheon.*
***(2)** With escutcheon.*
***Note:** X and Y are the symmetry planes for a 3-pole device.*
The safety clearances take into account the space required to remove the arc chutes.

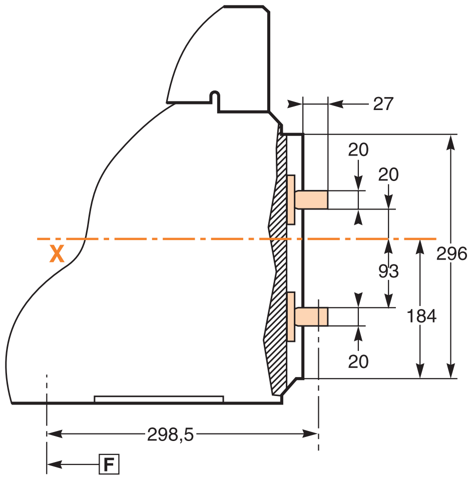
Connections

Horizontal rear connection

DB101316

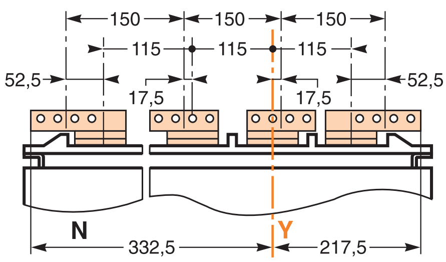


DB101297

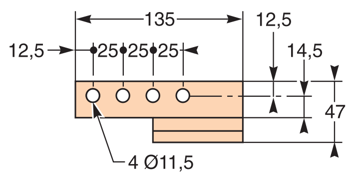


Detail

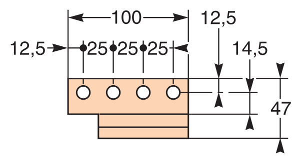
DB101317



DB101311

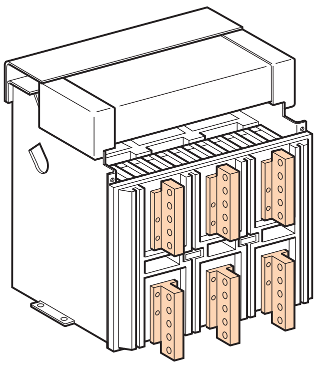


DB101315

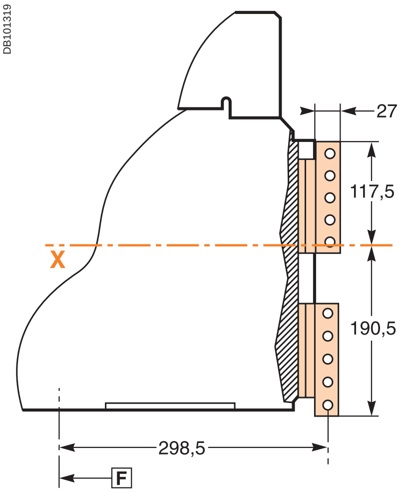


Vertical rear connection

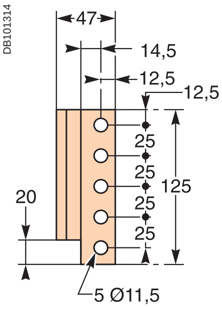
DB101318



DB101319



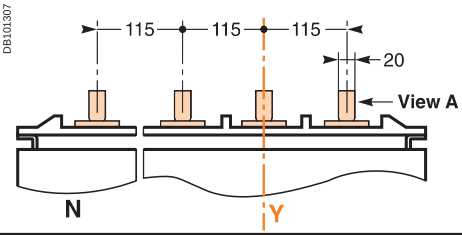
DB101314



View A detail.

Detail

DB101307



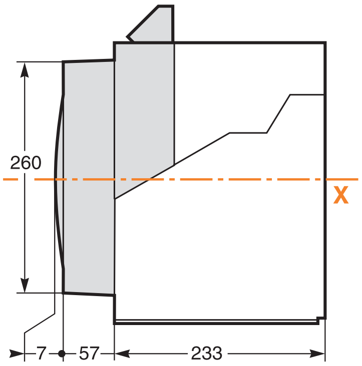
*Note: recommended connection screws: **M10** class 8.8.*
*Tightening torque: **50 Nm** with contact washer.*

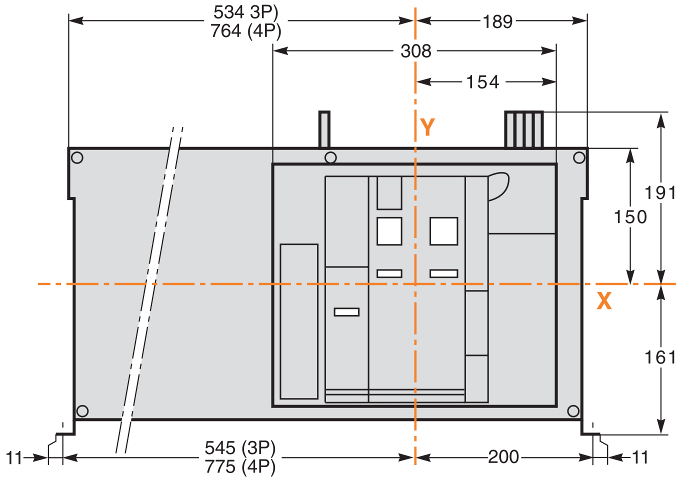
Dimensions and connection

NW40b to NW63 circuit breakers

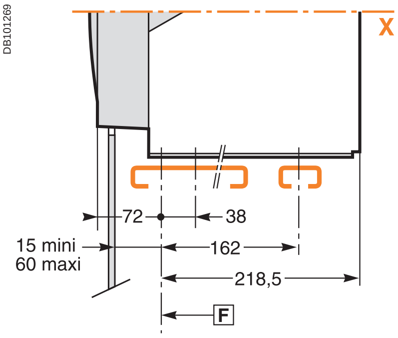
Fixed 3/4-poles device

Dimensions

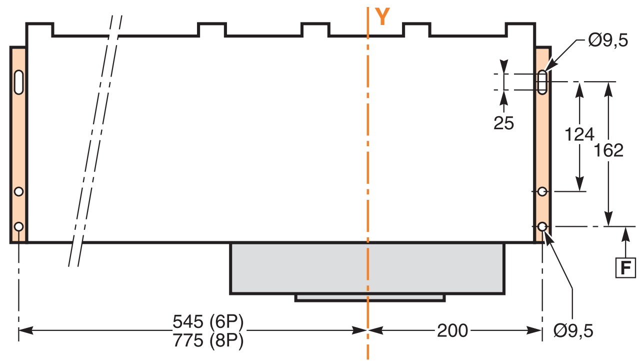




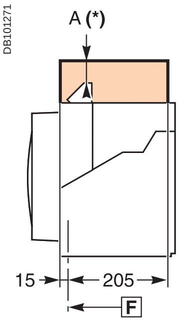
Mounting on base plate or rails

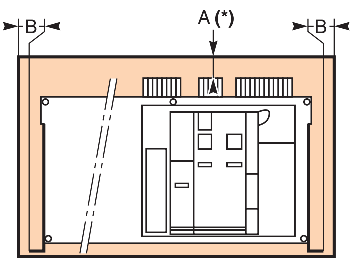


Mounting detail

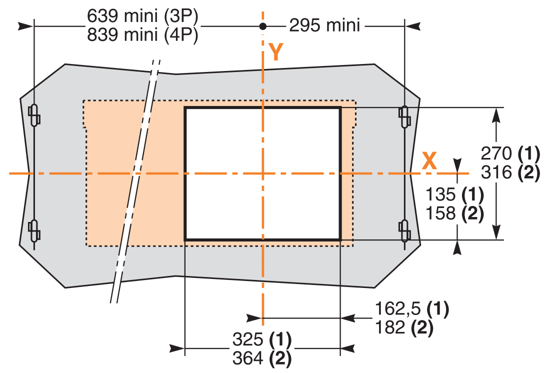


Safety clearances





Door cutout



	Insulated parts	Metal parts	Energised parts
A	0	0	100
B	0	0	60

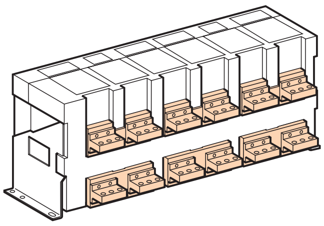
F : *datum.*

(1) Without escutcheon.
(2) With escutcheon.
Note: X and Y are the symmetry planes for a 3-pole device.
A(*) An overhead clearance of 110 mm is required to remove the arc chutes.
An overhead clearance of 20 mm is required to remove the terminal block.

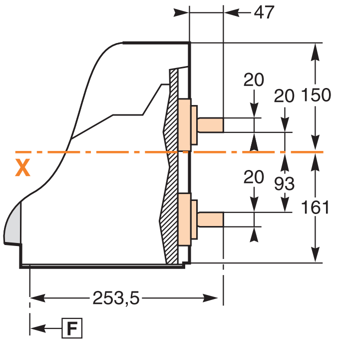
Connections

Horizontal rear connection (NW40b - NW50)

DB101332

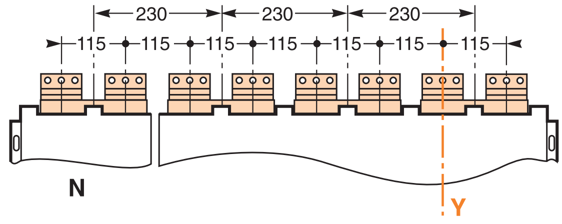


DB101324

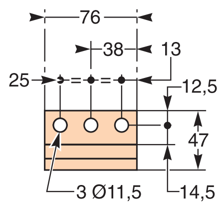


Detail

DB101325

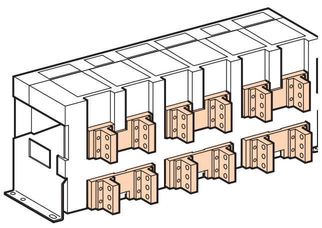


DB101278

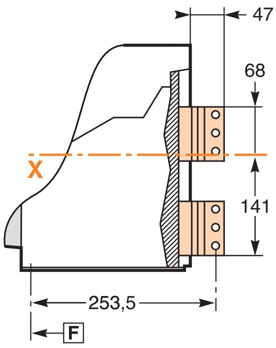


Vertical rear connection (NW40b - NW50)

DB101327

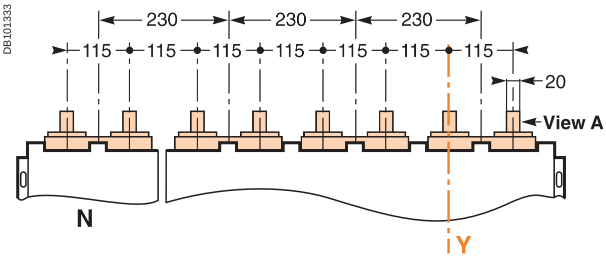


DB101328

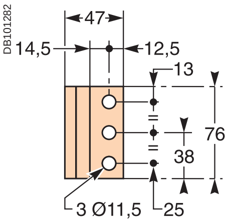


Detail

DB101333



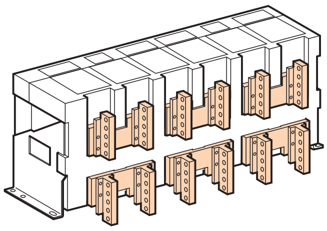
DB101282



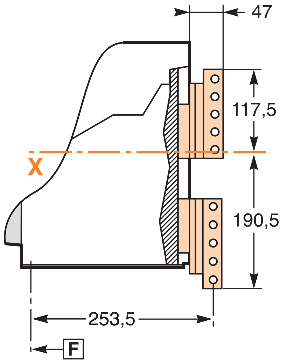
View A detail.

Vertical rear connection (NW63)

DB101330

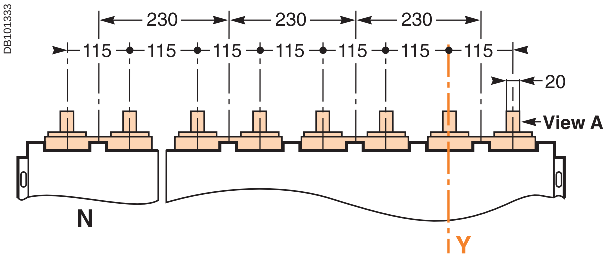


DB101331

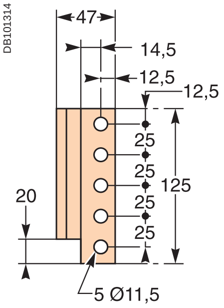


Detail

DB101333



DB101314



View A detail.

Note: *recommended connection screws:* ***M10*** *s/s class A4 80.*
Tightening torque: ***50 Nm*** *with contact washer.*

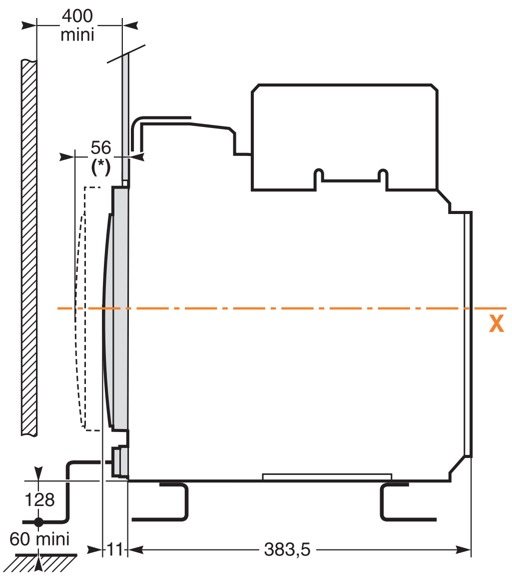
Dimensions and connection

NW40b to NW63 circuit breakers

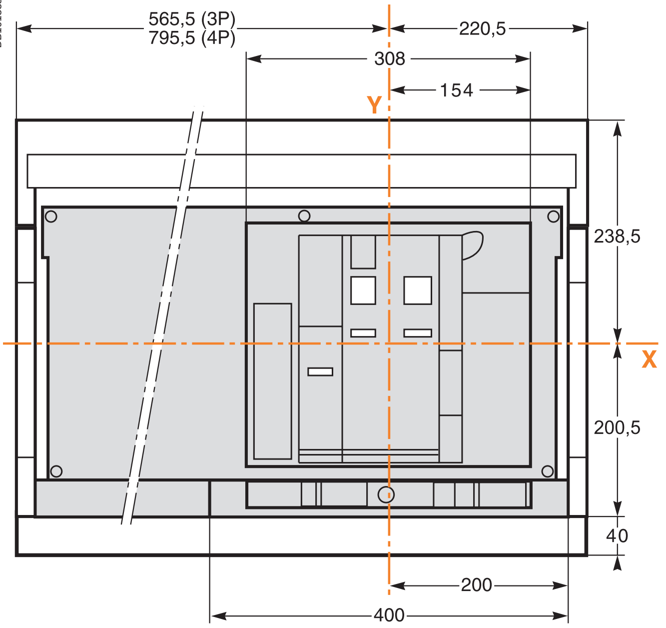
Drawout 3/4-poles device

Dimensions

DB101334



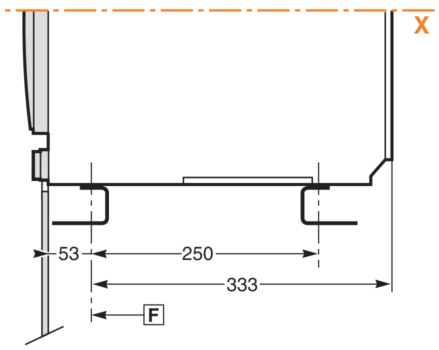
DB101335



(*) Disconnected position.

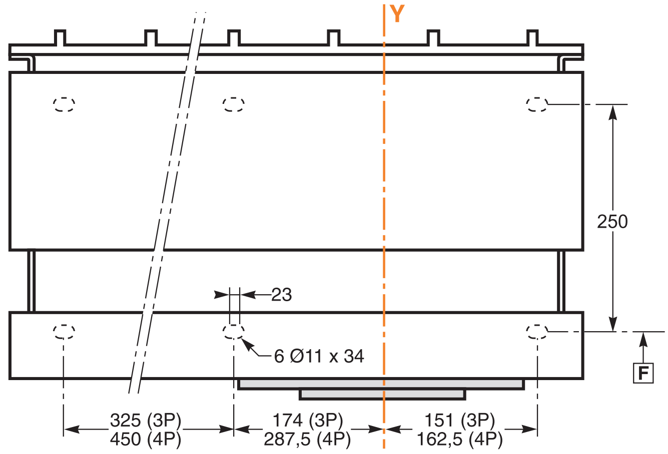
Mounting on base plate or rails

DB101336



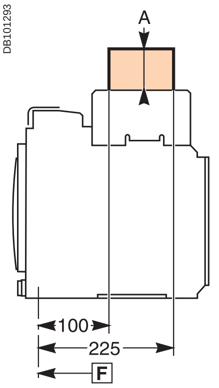
Mounting detail

DB101337

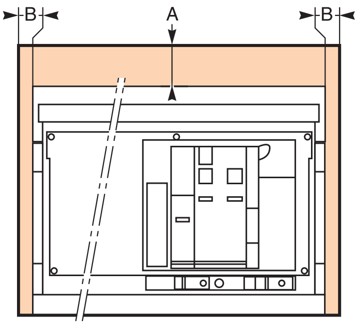


Safety clearances

DB101293

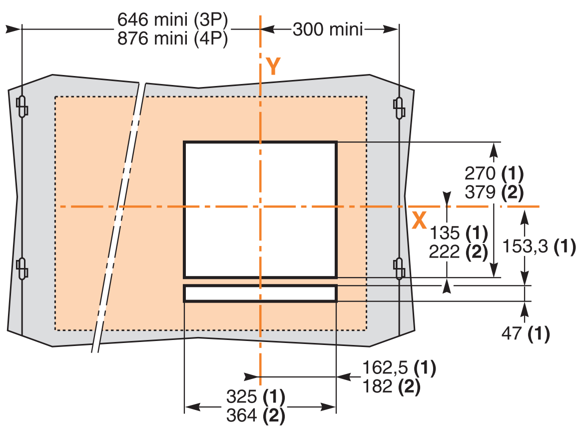


DB101338



Door cutout

DB101339



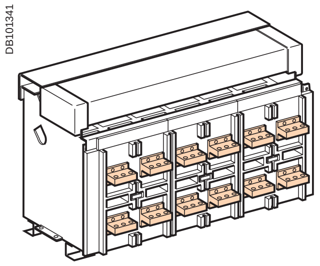
	Insulated parts	Metal parts	Energised parts
A	0	0	0
B	0	0	60

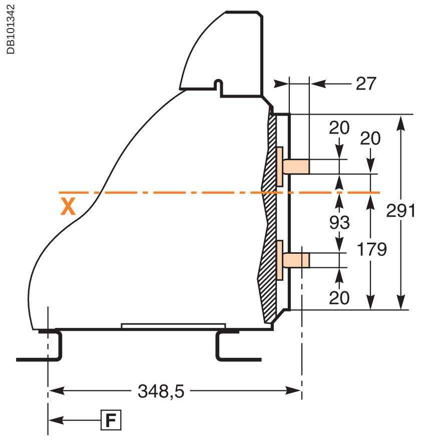
(1) Without escutcheon.
(2) With escutcheon.
Note: X and Y are the symmetry planes for a 3-pole device.

F : *datum.*

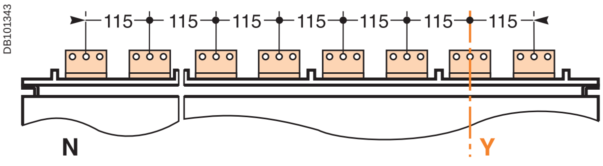
Connections

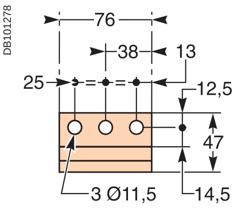
Horizontal rear connection (NW40b - NW50)



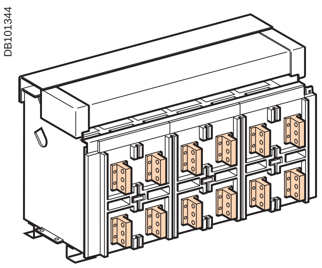


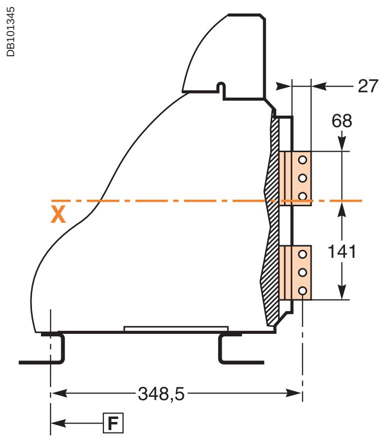
Detail



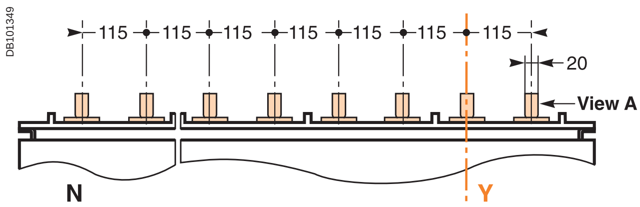


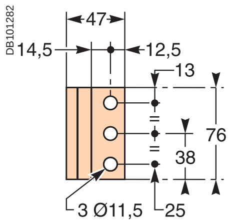
Vertical rear connection (NW40b - NW50)





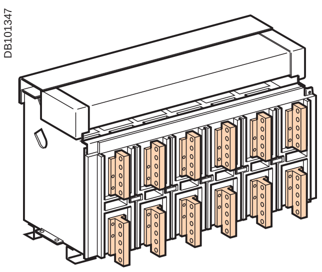
Detail

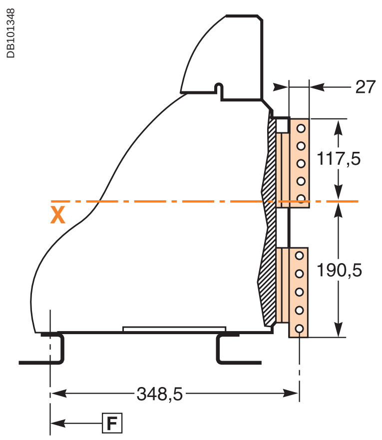




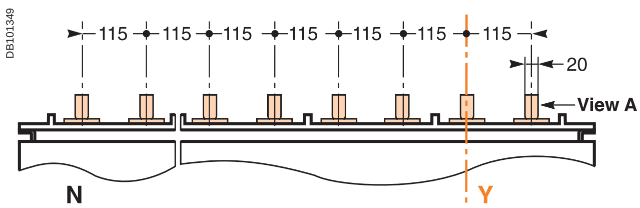
View A detail.

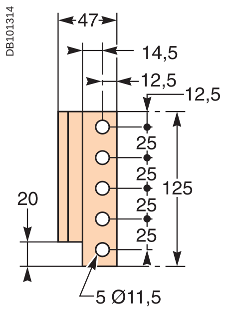
Vertical rear connection (NW63)





Detail





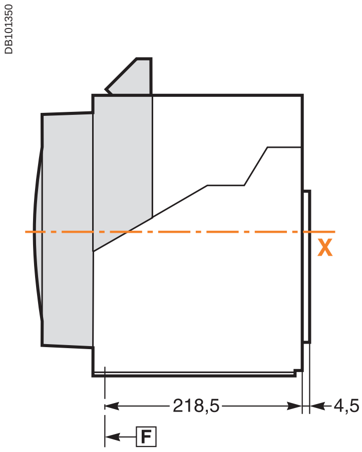
View A detail.

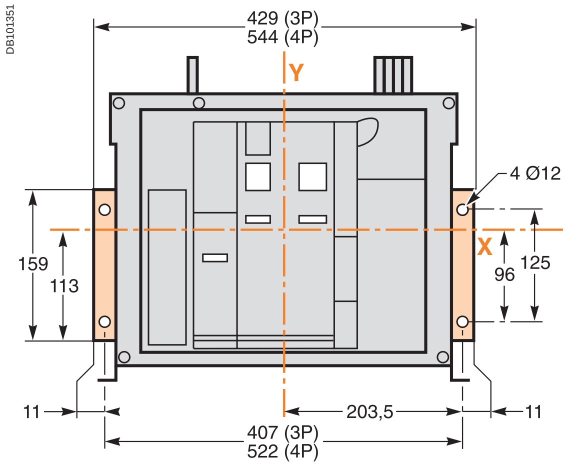
Note: *recommended connection screws:* ***M10*** *s/s class A4 80.*
Tightening torque: ***50 Nm*** *with contact washer.*

Dimensions
and connection

NT/NW accessories

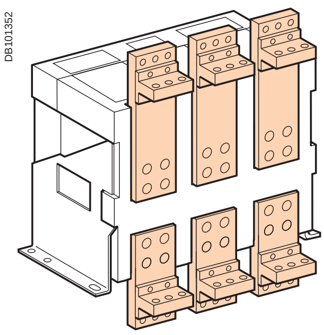
Mounting on backplate with special brackets (Masterpact NW08 to 32 fixed)

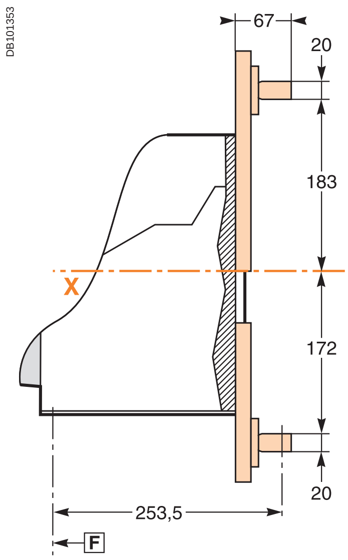




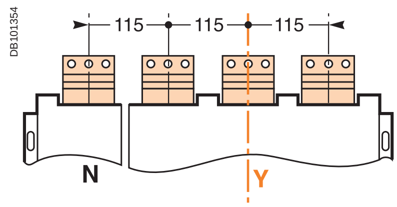
Disconnectable front-connection adapter (Masterpact NW08 to 32 fixed)

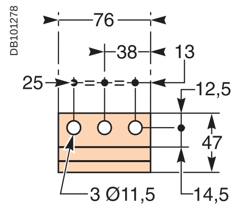
Horizontal rear connection





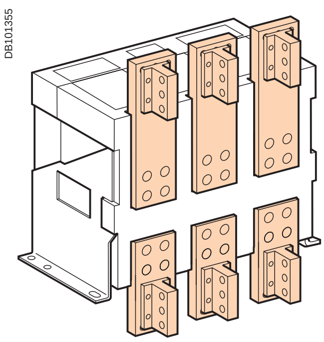
Detail

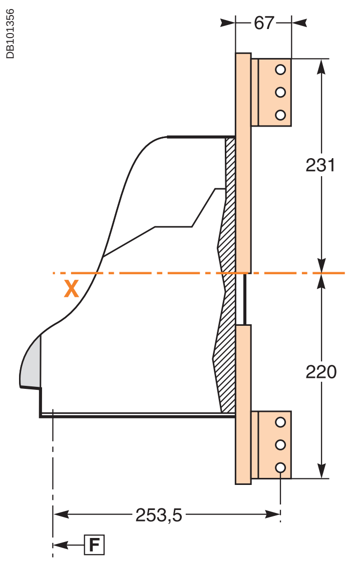




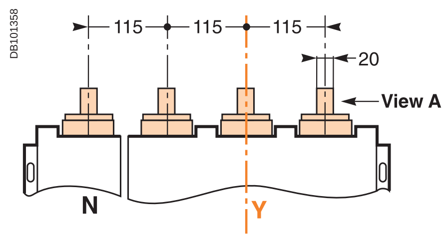
View A detail.

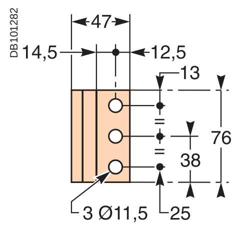
Vertical rear connection





Detail





View A detail.

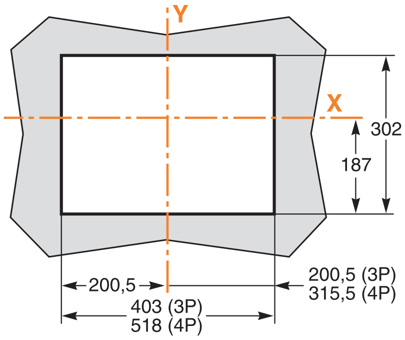
***Note:** recommended connection screws: **M10** class 8.8.*
*Tightening torque: **50 Nm** with contact washer.*

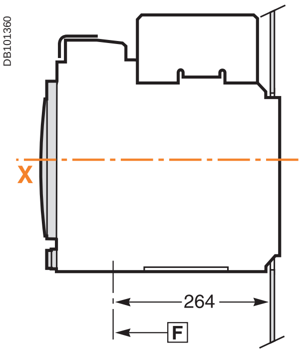
F *: datum.*

Rear panel cutout (drawout devices)

NW08 to NW40

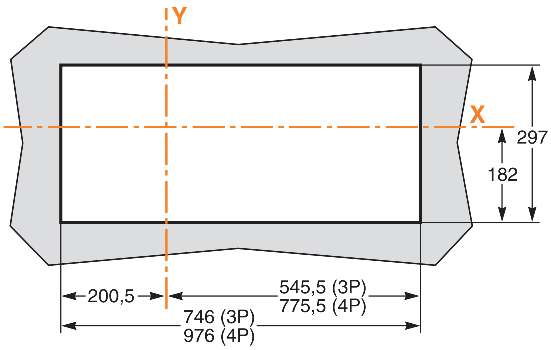
Rear view

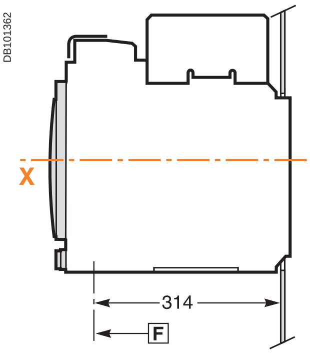




NW40b to NW63

Rear view

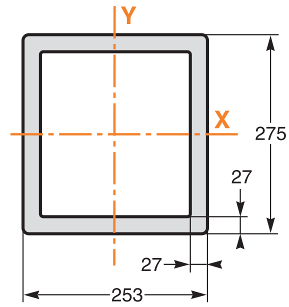




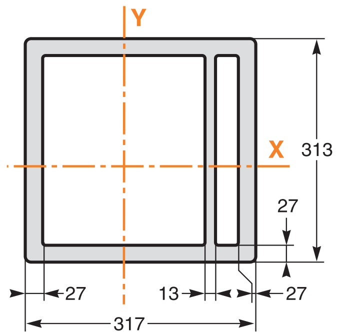
Escutcheon

Masterpact NT

Fixed device

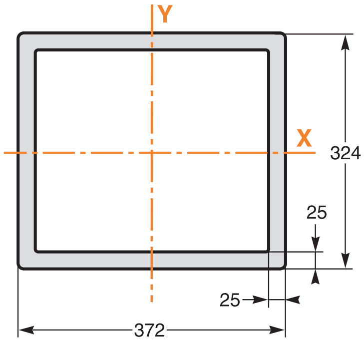


Drawout device

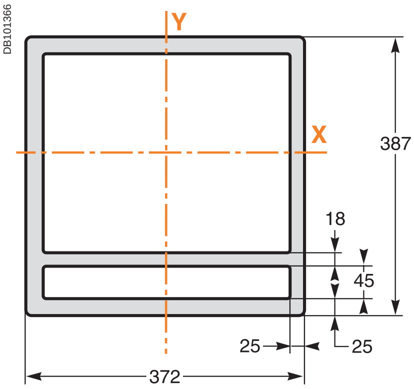


Masterpact NW

Fixed device



Drawout device

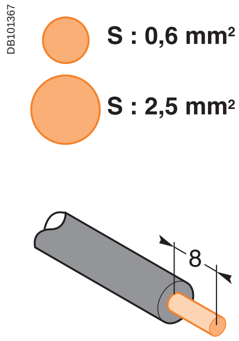


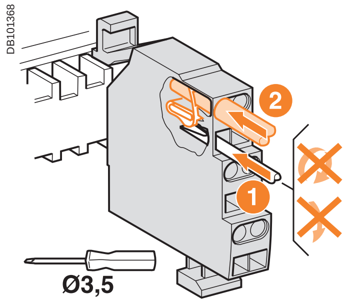
F : *datum.*

Dimensions
and connection

NT/NW external modules

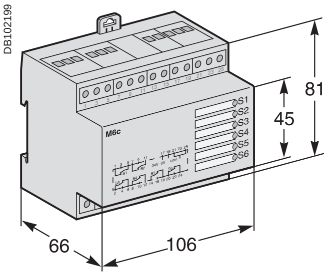
Connection of auxilary wiring to terminal block

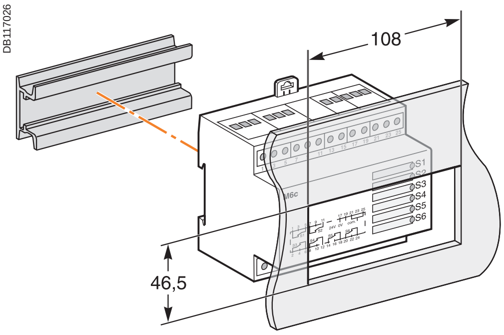




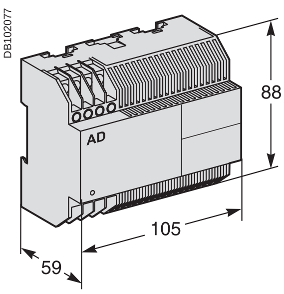
One conductor only per connection point.

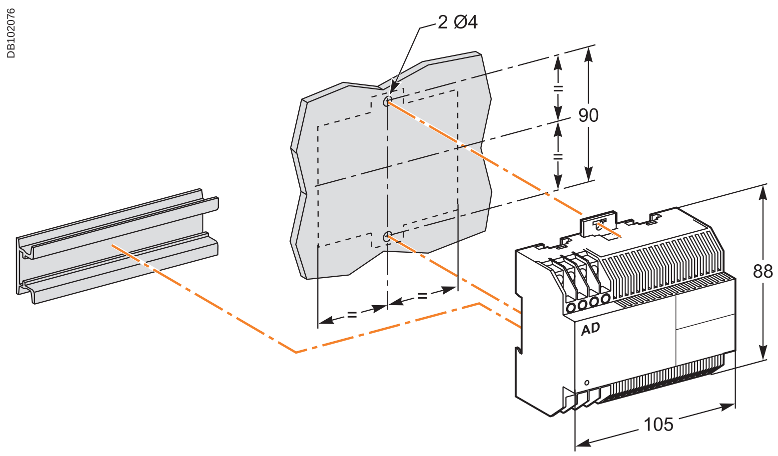
M6C relay module





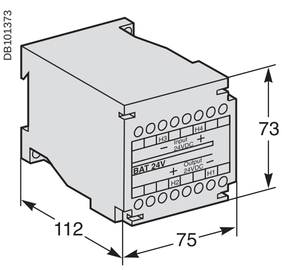
External power supply module (AD)

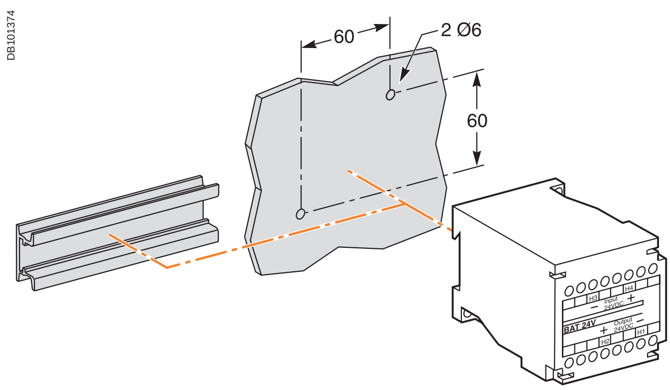




Battery module (BAT)

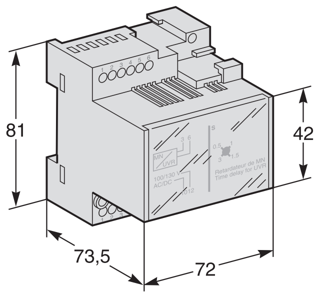
Mounting



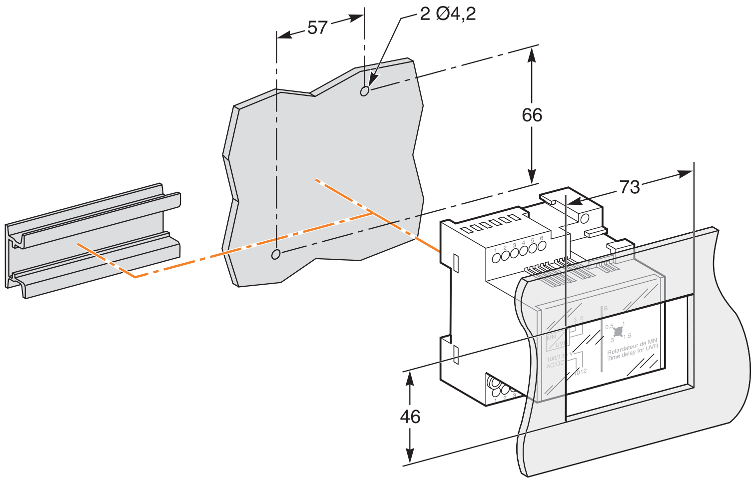


Delay unit for MN release

DB101375



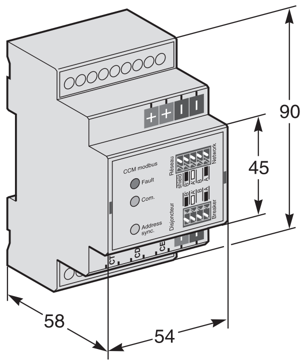
DB117025



"Chassis" communication module

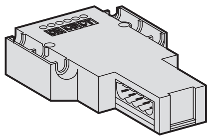
ModBUS

DB101377



BatiBUS

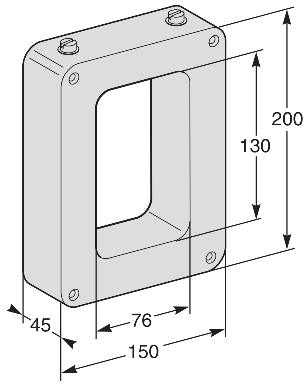
DB101378



External sensor for source ground return (SGR) protection

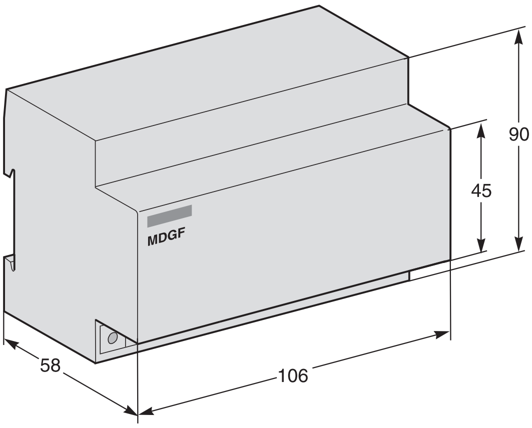
Sensor

DB101379



"MGDF summer" module

DB101380

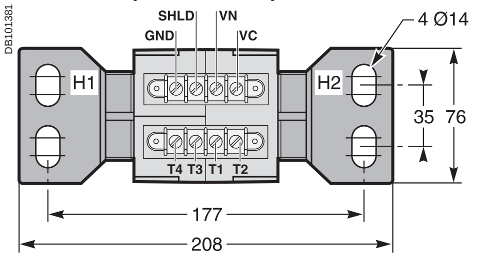


NT/NW external modules

External sensor for external neutral

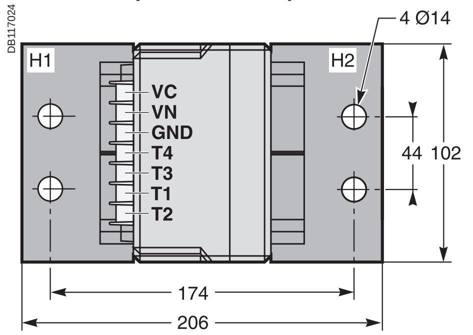
Dimensions

400/1600 A (NT06 to NT16)



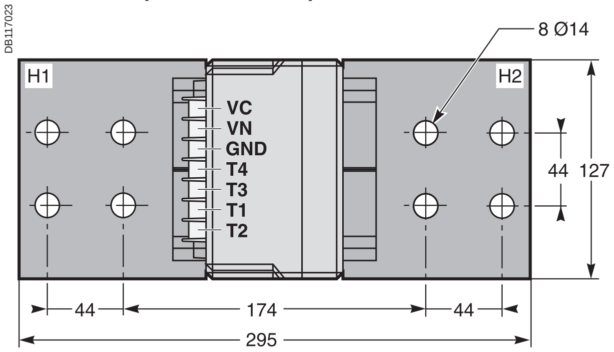
High: 137 mm.

400/2000 A (NW08 to NW20)



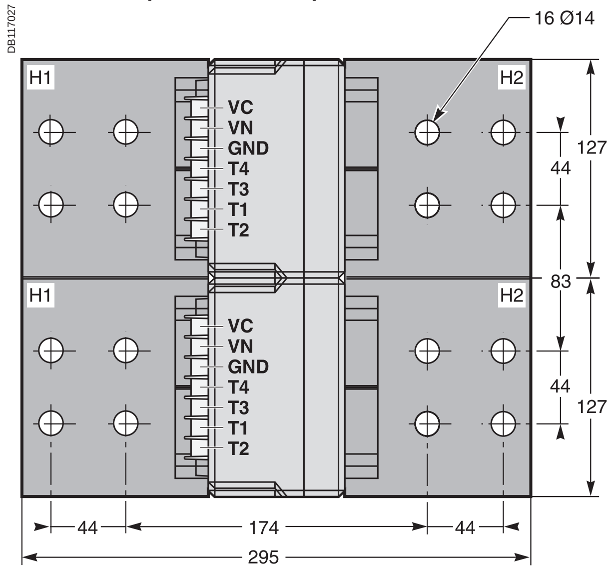
High: 162 mm.

1000/4000 A (NW025 to NW40)



High: 162 mm.

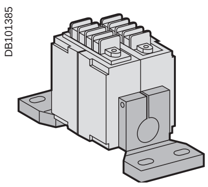
4000/6300 A (NW40b to NW63)



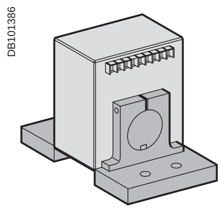
High: 168 mm.

Installation

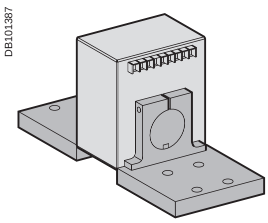
400/1600 A (NT06 to NT16)



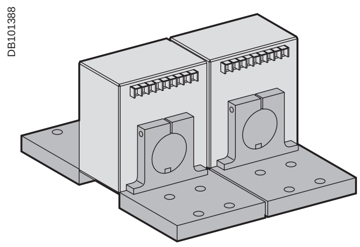
400/2000 A (NW08 to NW20)



1000/4000 A (NW025 to NW40)



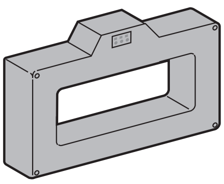
4000/6300 A (NW40b to NW63)



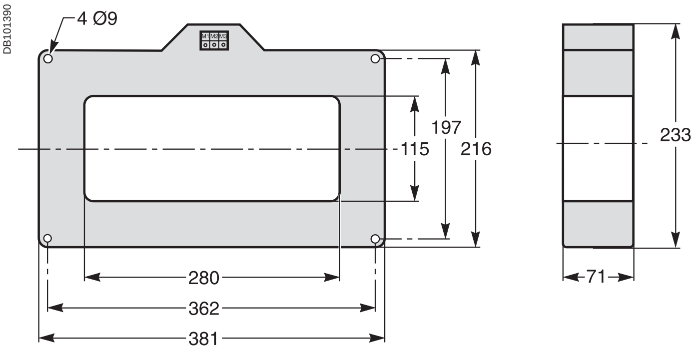
Rectangular sensor for earth leakage protection (Vigi)

280 x 115 mm window

DB101389

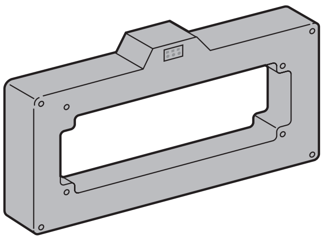


DB101390

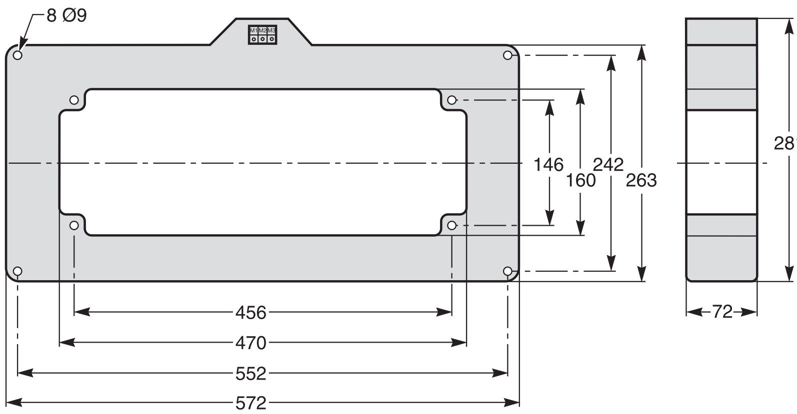


470 x 160 mm window

DB101391



DB101392



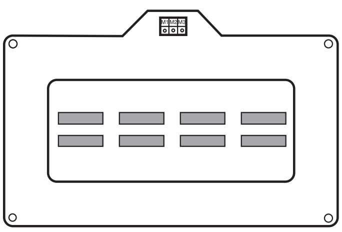
Busbars	I ⩽ 1600 A	I ⩽ 3200
Window (mm)	280 x 115	470 x 160
Weight (kg)	14	18

Busbars path

280 x 115 window

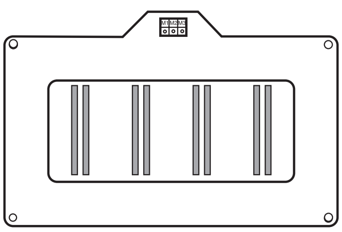
Busbars spaced 70 mm centre-to-centre

DB101393



2 bars 50 x 10.

DB101395

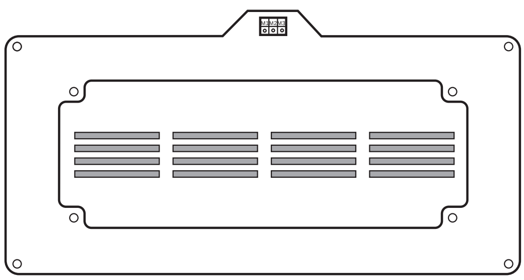


2 bars 100 x 5.

470 x 160 window

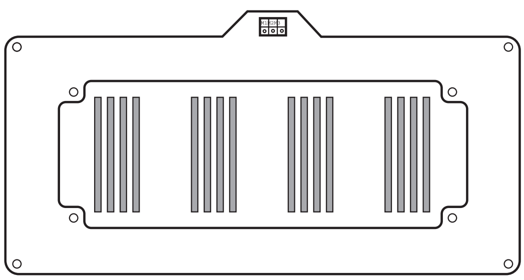
Busbars spaced 115 mm centre-to-centre

DB117029



4 bars 100 x 5.

DB117028



4 bars 125 x 5.

>TOOLS

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- complete library: technical documents, catalogs, FAQs, brochures…
- selection guides from the e-catalog.
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The electrical installation guide

According to IEC 60364
This guide, part of the Schneider Electric offer, is the essential tool to "guide" you any time in your business:
- design office, consultant
- contractor, panelbuilder
- teacher, trainer.

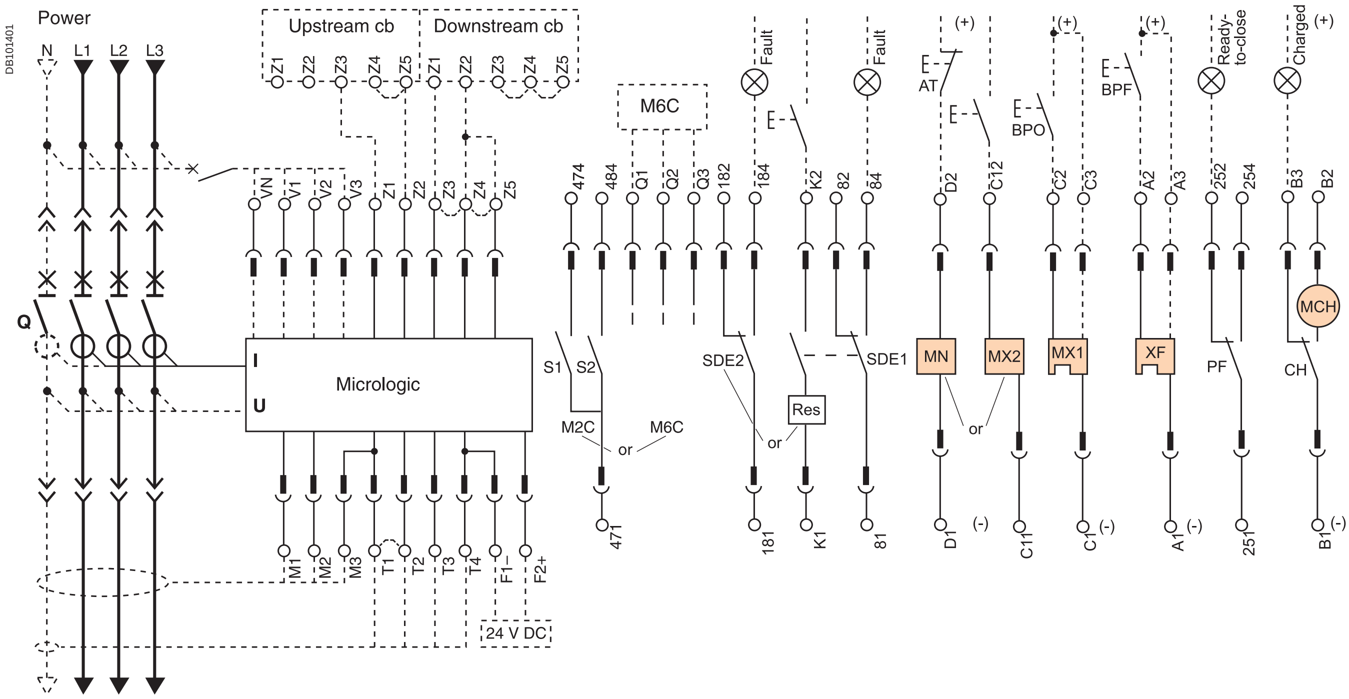
Comprehensive and concrete information on:
- all the new technical solutions
- all the components
- of an installation from a global point of view
- all the IEC standards modifications
- all the fundamental electrotechnical knowledge
- all the design stages, from medium to low voltage.

Electrical diagrams

Masterpact NT06 to NT16
Fixed and drawout devices

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

Power | **Control unit** | **Remote operation**



Terminal block marking	Control unit					Remote operation						
	Com	**UC1**	**UC2**	**UC3**	**UC4 / M2C / M6C**	**SDE2 / Res**	**SDE1**	**MN / MX2**	**MX1**	**XF**	**PF**	**MCH**
	E5 E6	Z5 M1	M2 M3	F2+	V3 / 484 / Q3	184 / K2	84	D2 / C12	C2	A2	254	B2
	E3 E4	Z3 Z4	T3 T4	VN	V2 / 474 / Q2	182	82		C3	A3	252	B3
	E1 E2	Z1 Z2	T1 T2	F1 –	V1 / 471 / Q1	181 / K1	81	D1 / C11	C1	A1	251	B1

A	P	H	Control unit
■	■	■	**Com :** E1-E6 communication
■	■	■	**UC1 :** Z1-Z5 zone selective interlocking Z1 = ZSI OUT SOURCE Z2 = ZSI OUT ; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault)
■	■	■	M1 = Vigi module input (Micrologic 7)
■	■	■	**UC2 :** T1, T2, T3, T4 = external neutral
■	■	■	M2, M3 = Vigi module input (Micrologic 7)
■	■	■	**UC3 :** F2+, F1– external 24 V DC power supply
	■	■	VN external voltage connector (must be connected to the neutral with a 3P circuit breaker)
	■	■	**UC4 :** External Voltage Connector (PTE option)
			or
	■	■	**M2C :** 2 programmable contacts (external relay) ext. 24 V DC power supply required.
			or
	■	■	**M6C :** 6 programmable contacts to be connected to the external module M6C) ext. 24 V DC power supply required.

Remote operation

SDE2 : fault-trip indication contact
or
Res : remote reset

SDE1 : fault-trip indication contact (supplied as standard)

MN : undervoltage release
or
MX2 : shunt release

MX1 : shunt release (standard or communicating)

XF : closing release (standard or communicating)

PF : ready-to-close contact

MCH : electric motor

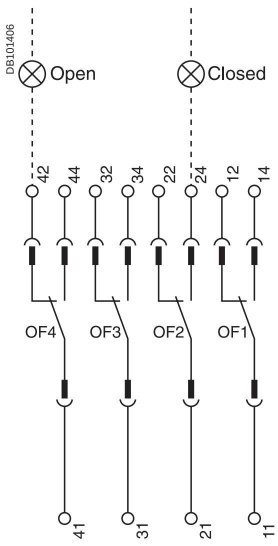
Note: *when communicating MX or XF releases are used, the third wire (C3,A3) must be connected even if the communication module is not installed.*

A *: digital ammeter.*
P *: A + power meter + additional protection.*
H *: P + harmonics.*

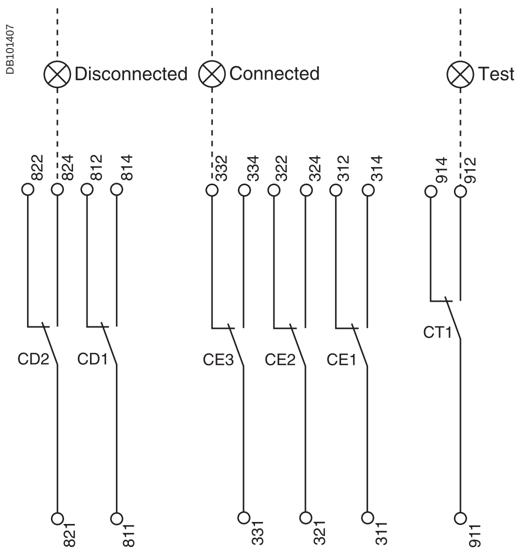
Masterpact NT06 to NT16

Fixed and drawout devices

Indication contacts



Chassis contacts



Indication contacts

OF4	OF3	OF2	OF1
44	34	24	14
42	32	22	12
41	31	21	11

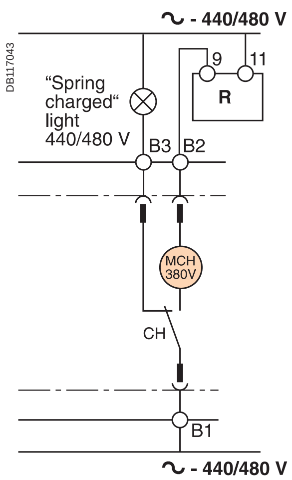
Chassis contacts

CD2	CD1	CE3	CE2	CE1	CT1
824	814	334	324	314	914
822	812	332	322	312	912
821	811	331	321	311	911

Indication contacts

OF4 / OF3 / OF2 / OF1 : ON/OFF indication contacts.

(*) Spring charging motor 440/480 V AC
(380 V motor + additional resistor).



Chassis contacts

CD2 : **CD1** disconnected position contacts

CE3 : **CE2** **CE1** connected position contacts

CT1 : test position contacts

Key:

drawout device only.

XXX *SDE1, OF1, OF2, OF3, OF4 supplied as standard.*

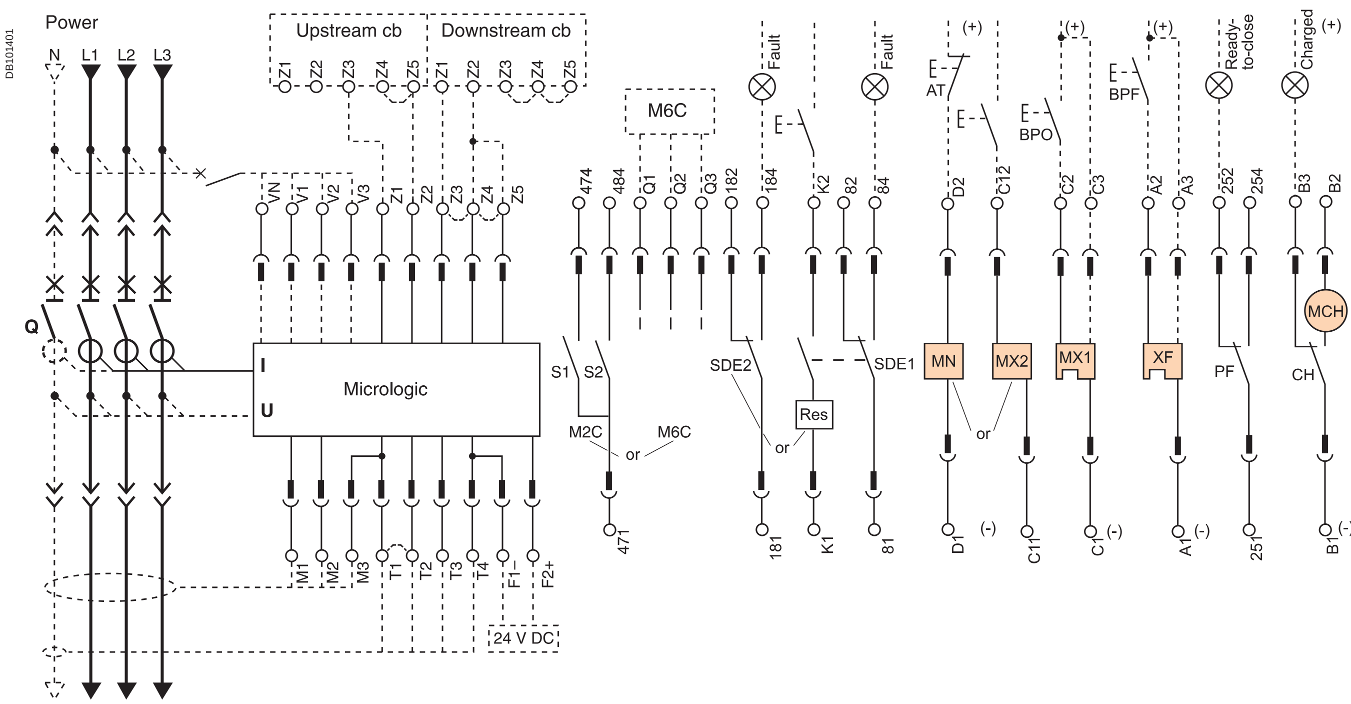
interconnected connections
(only one wire per connection point).

Masterpact NW08 to NW63

Fixed and drawout devices

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

Power	Control unit	Remote operation



Terminal block marking

Control unit					
Com	UC1	UC2	UC3	UC4	M2C / M6C
E5 E6	Z5 M1	M2 M3	F2+	V3	484 / Q3
E3 E4	Z3 Z4	T3 T4	VN	V2	474 / Q2
E1 E2	Z1 Z2	T1 T2	F1 –	V1	471 / Q1

Remote operation						
SDE2 / Res	SDE1	MN / MX2	MX1	XF	PF	MCH
184 / K2	84	D2 / C12	C2	A2	254	B2
182	82		C3	A3	252	B3
181 / K1	81	D1 / C11	C1	A1	251	B1

A	P	H	Control unit
■	■	■	**Com :** E1-E6 communication
■	■	■	**UC1 :** Z1-Z5 zone selective interlocking Z1 = ZSI OUT SOURCE Z2 = ZSI OUT ; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault)
■	■	■	M1 = Vigi module input (Micrologic 7)
■	■	■	**UC2 :** T1, T2, T3, T4 = external neutral
■	■	■	M2, M3 = Vigi module input (Micrologic 7)
■	■	■	**UC3 :** F2+, F1– external 24 V DC power supply
	■	■	VN external voltage connector (must be connected to the neutral with a 3P circuit breaker)
	■	■	**UC4 :** External Voltage Connector (PTE option)
	■	■	**M2C :** 2 programmable contacts (internal relay) ext. 24 V DC power supply required or
	■	■	**M6C :** 6 programmable contacts (to be connected to the external module M6C) ext. 24 V DC power supply required

Remote operation

SDE2 : fault-trip indication contact
or
Res : remote reset

SDE1 : fault-trip indication contact (supplied as standard)

MN : undervoltage release
or
MX2 : shunt release

MX1 : shunt release (standard or communicating)

XF : closing release (standard or communicating)

PF : ready-to-close contact

MCH : electric motor

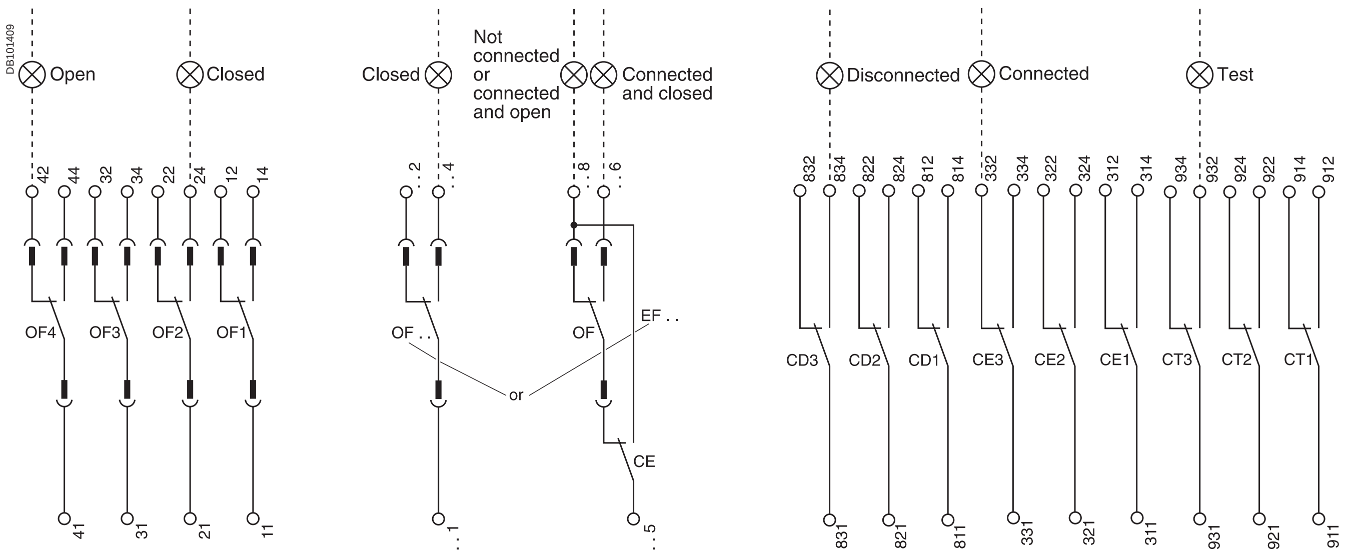
Note: *when communicating MX or XF releases are used, the third wire (C3,A3) must be connected even if the communication module is not installed.*

A *: digital ammeter.*
P *: A + power meter + additional protection.*
H *: P + harmonics.*

Masterpact NW08 to NW63

Fixed and drawout devices

Indication contacts	Chassis contacts



Indication contacts

OF4	OF3	OF2	OF1
44	34	24	14
42	32	22	12
41	31	21	11

244	234	224	214	144	134	124	114
242	232	222	212	142	132	122	112
241	231	221	211	141	131	121	111
or	or	or	or	or	or	or	or
248	238	228	218	148	138	128	118
246	236	226	216	146	136	126	116
245	235	225	215	145	135	125	115

Chassis contacts

CD3	CD2	CD1	CE3	CE2	CE1	CT3	CT2	CT1
834	824	814	334	324	314	934	924	914
832	822	812	332	322	312	932	922	912
831	821	811	331	321	311	931	921	911
or						or		
CE6	CE5	CE4				CE9	CE8	CE7
364	354	344				394	384	374
362	352	342				392	382	372
361	351	341				391	381	371

Indication contacts

OF4 : ON/OFF indication contacts
OF3
OF2
OF1

OF24 or EF24, **OF23 or EF23**, **OF22 or EF22**, **OF21 or EF21**, **OF14 or EF14**, **OF13 or EF13**, **OF12 or EF12**, **OF11 or EF11**: Combined "connected-deconnected" indication contacts

Chassis contacts

CD3, **CD2**, **CD1**: disconnected position contacts

or

CE6, **CE5**, **CE4**: connected position contacts

CE3, **CE2**, **CE1**: connected position contacts

CT3, **CT2**, **CT1**: test position contacts

or

CE9, **CE8**, **CE7**: connected position contacts

or

CD6, **CD5**, **CD4**: disconnected position contacts

Key:

drawout device only.

XXX *SDE1, OF1, OF2, OF3, OF4 supplied as standard.*

interconnected connections (only one wire per connection point).

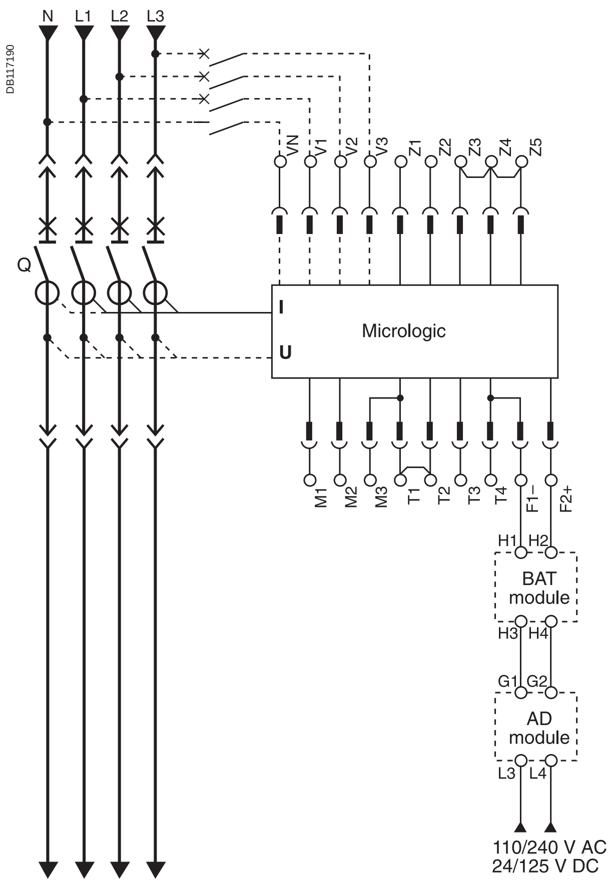
Masterpact NT and NW

Communications of the 24 V DC External power supply AD module

None of the control-unit protection functions require an auxiliary source. However, the 24 V DC external power-supply (AD module) is required for certain operating configurations as indicated in the table below.

Circuit breaker	**Closed**	**Open**	
Voltage measurement inputs	**Powered**	**Powered**	**Not powered**
M2C, M6C programmable contacts option	Yes	Yes	Yes
Protection function	No	No	No
Display function	No (1)	No (2)	Yes
Time-stamping function	No	No	Yes (3)
Circuit-breaker status indications and control via communications bus	No	No	No
Identification, settings, operation and maintenance aids via communications bus	No (1)	No (2)	Yes

(1) Except for Micrologic A control units (if current < 20 % In).
(2) Except for Micrologic A control units.
(3) Time setting is manual and can be carried out automatically by the supervisor via the communications bus.



Note: In case of using the 24 V DC external power supply (AD module), maximum cable length between 24 V DC (G1, G2) and the control unit (F1-, F2+) must not exceed 10 meters.

The BAT battery module, mounted in series upstream of the AD module, ensures an uninterrupted supply of power if the AD module power supply fails.

The voltage measurement inputs are standard equipment on the downstream connectors of the circuit breaker.

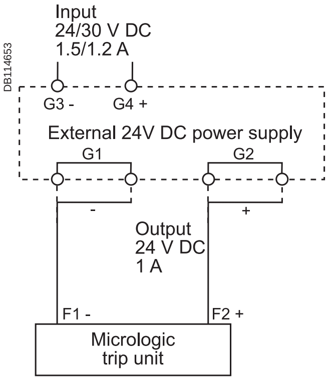
External connections are possible using the PTE external voltage measurement input option. With this option, the internal voltage measurement inputs are disconnected and terminals VN, V1, V2, V3 are connected only to the control unit (Micrologic P and H only). The PTE option is required for voltages less than 220 V and greater than 690 V (in which case a voltage transformer is compulsory). For three-pole devices, the system is supplied with terminal VN connected only to the control unit (Micrologic P and H).

When the PTE option is implemented, the voltage measurement input must be protected against short-circuits. Installed as close as possible to the busbars, this protection function is ensured by a P25M circuit breaker (1 A rating) with an auxiliary contact (cat. no. 21104 and 21117). This voltage measurement input is reserved exclusively for the control unit and must not ever be used to supply other circuits outside the switchboard.

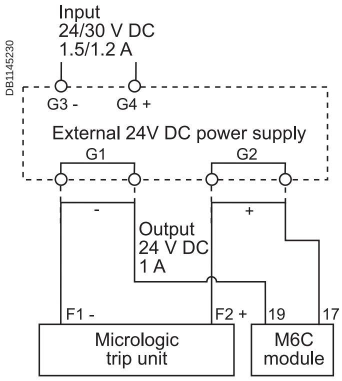
Masterpact NT and NW

Communications of the 24 V DC External power supply AD module

Wiring diagrams



Power supply wiring for Micrologic trip unit only.



Power supply wiring for Micrologic trip unit and M6C module.

Connection

The maximum length for each conductor supplying power to the trip unit or M6C module is 10 m.

Do not ground F2+, F1-, or power supply output:

■ the positive terminal (F2+) on the trip unit must not be connected to earth ground
■ the negative terminal (F1-) on the trip unit must not be connected to earth ground
■ the output terminals (- and +) of the 24 V DC power supply must not be grounded.

Reduce electromagnetic interference:

■ the input and output wires of the 24 V DC power supply must be physically separated as much as possible
■ if the 24 V DC power supply wires cross power cables, they must cross perpendicularly. If this is not physically possible, the power supply conductors must be twisted together
■ Power supply conductors must be cut to length. Do not loop excess conductor.

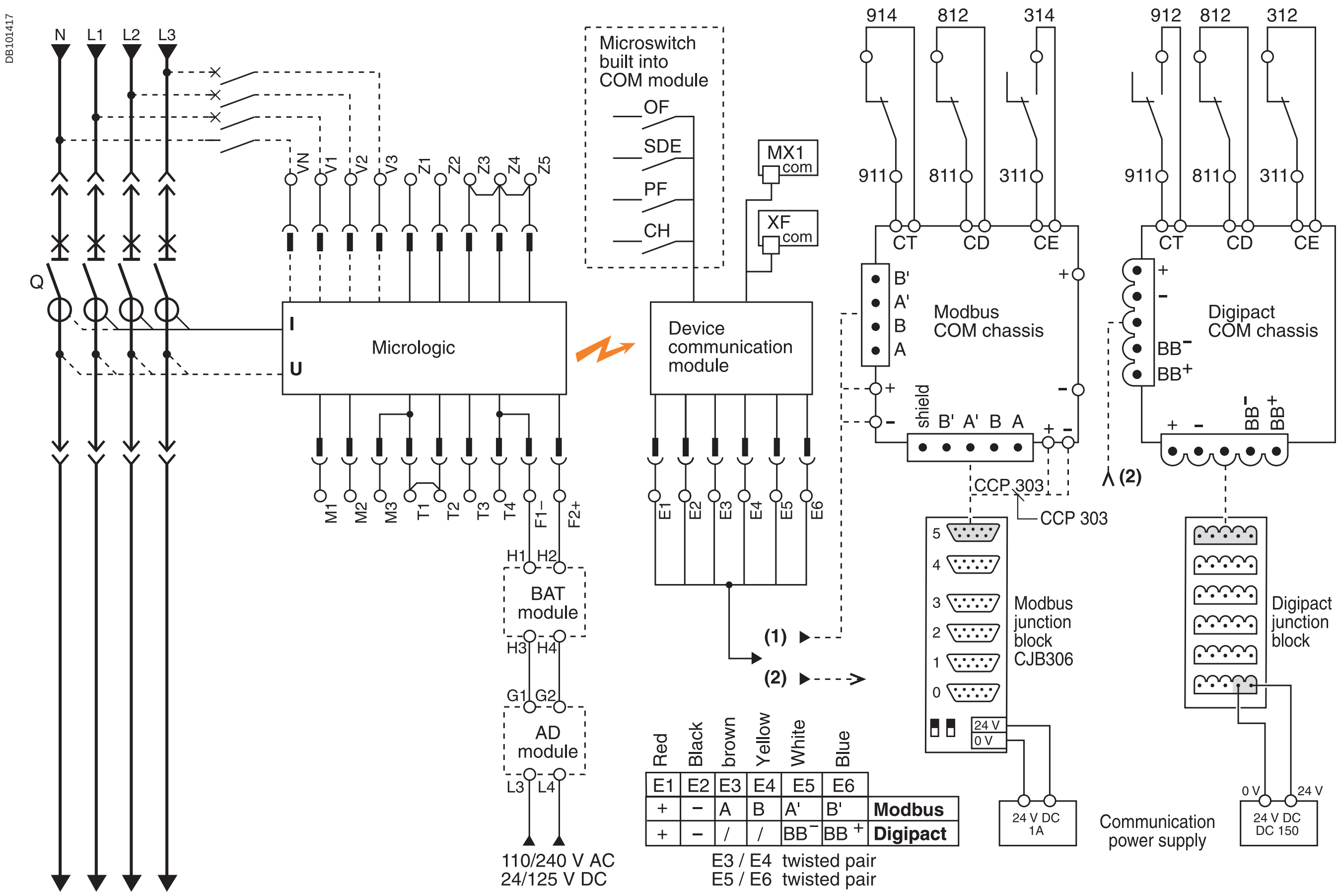
Use only one 24 V DC power supply for each Micrologic trip unit.
Connect external 24 V DC power supply only per the following wiring diagrams.

Masterpact NT and NW

Communications option 24 V DC external power supply

Example of connection of the communications option

The communications bus requires its own 24 V DC power source (E1, E2).
This source is not the same as the 24 V DC external power-supply module (F1-, F2+).



(1) Drawout device equipped with Modbus chassis COM.
(2) Drawout device equipped with Digipact chassis COM.

Masterpact NT and NW

Communications option 24 V DC external power supply

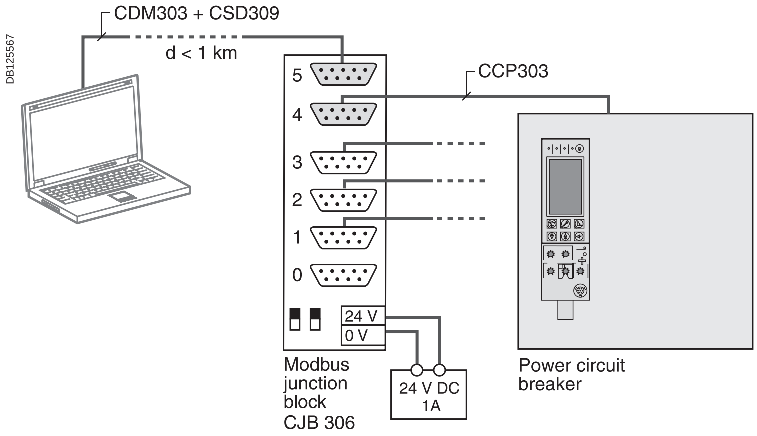
Examples using the COM communications option

Switchboard display unit

This architecture provides remote display of the variables managed by Micrologic control units equipped with the COM Modbus module.

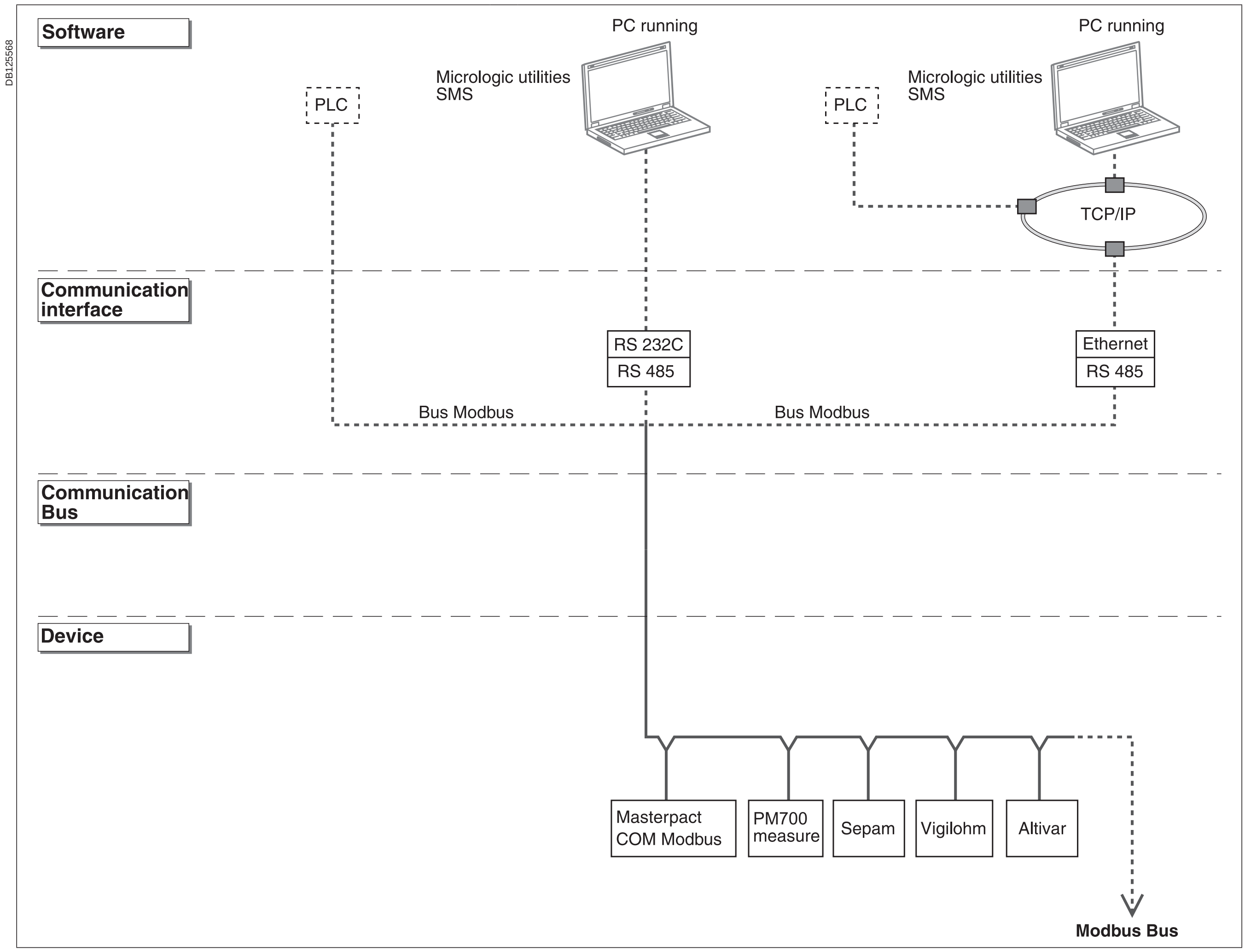
- I (Micrologic A)
- I, U, P, E (Micrologic P)
- I, U, P, E, THD (Micrologic H)

No programming is required.
For Micrologic A control unit (if current < 20 % In), it is recommended to use the 24 V DC external power supply (AD module).



Communicating switchboard

This configuration provides remote display and control of Masterpact equipped with the Modbus module.



Masterpact NT and NW

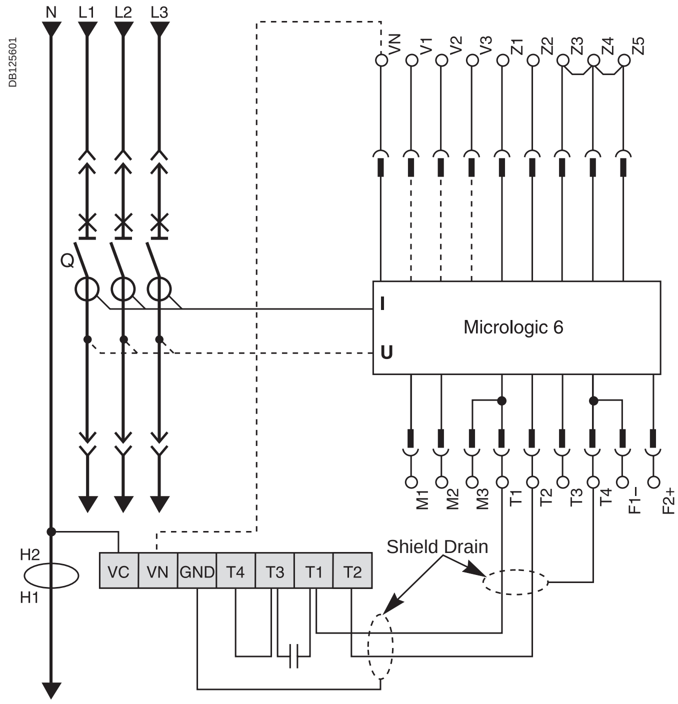
Earth-fault and earth-leakage protection
Neutral protection
Zone selective interlocking

External sensor (CT) for residual earth-fault protection

Connection of current-transformer secondary circuit for external neutral

Masterpact equipped with a Micrologic 6 A/P/H:
- shielded cable with 2 twisted pairs
- T1 twisted with T2
- maximum length 10 meters
- cable cross-sectional area 0.4 to 1.5 mm²
- recommended cable: Belden 9552 or equivalent.

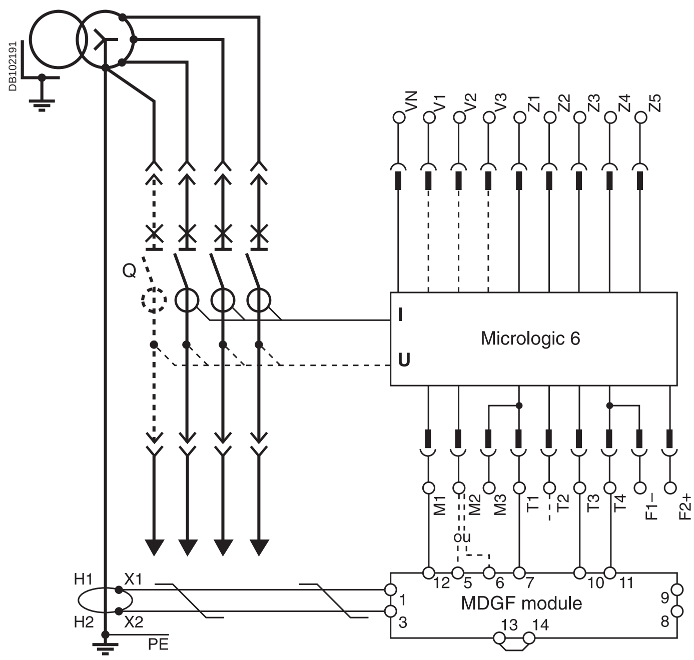
For proper wiring of neutral CT, refer to instruction Bulletin 48041-082-01 shipped with it.
Do not remove factory-installed jumper between T1 and T2 unless neutral CT is connected.
Do not install jumper between T3 and T4.
If supply is via the top, follow the shematics.
If supply is via the bottom, control wiring is identical; for the power wiring, H1 is connected to the source side, H2 to the load side.
For four-pole versions, for residual earth-fault protection, the current transformer for the external neutral is not necessary.
Connection for signal VN is required only for power measurements (3 Ø, 4 wires, 4CTs).



External transformer for source ground return (SGR) earth-fault protection

Connection of the secondary circuit

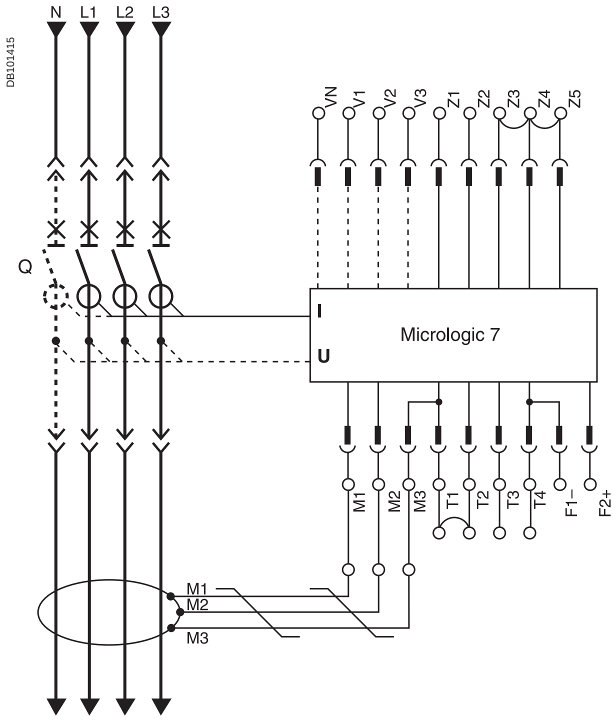
Masterpact equipped with a Micrologic 6 A/P/H:
- unshielded cable with 1 twisted pair
- maximum length 150 meters
- cable cross-sectional area 0.4 to 1.5 mm²
- terminals 5 and 6 may not be used at the same time
- use terminal 5 for NW08 to 40
- use terminal 6 for NW40b to 63
- recommended cable: Belden 9409 or equivalent.



Masterpact NT and NW
Earth-fault and earth-leakage protection
Neutral protection
Zone selective interlocking

Earth-leakage protection

Connection of the rectangular-sensor secondary circuit
Use the cable shipped with the rectangular sensor.



Neutral protection

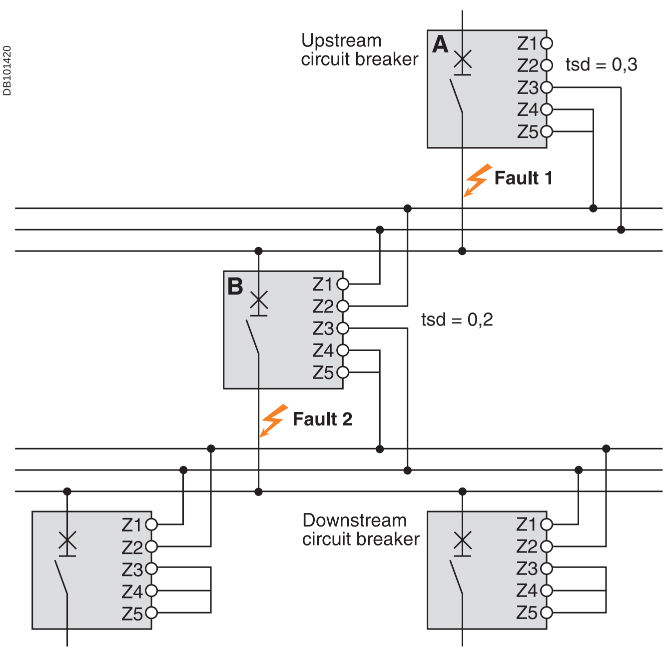
■ three pole circuit breaker:
□ neutral protection is impossible with Micrologic A
□ Masterpact equipped with Micrologic P or H
□ the current transformer for external neutral is necessary (the wiring diagram is identical to the one used for the residual earth-fault protection)
■ four pole circuit breaker:
□ Masterpact equipped with Micrologic A, P or H
□ the current transformer for external neutral is not necessary.

Zone selective interlocking

Zone-selective interlocking is used to reduce the electrodynamic forces exerted on the installation by shortening the time required to clear faults, while maintaining time discrimination between the various devices.
A pilot wire interconnects a number of circuit breakers equipped with Micrologic A/P/H control units, as illustrated in the diagram above.
The control unit detecting a fault sends a signal upstream and checks for a signal arriving from downstream. If there is a signal from downstream, the circuit breaker remains closed for the full duration of its tripping delay. If there is no signal from downstream, the circuit breaker opens immediately, regardless of the tripping-delay setting.

Fault 1.
Only circuit breaker A detects the fault. Because it receives no signal from downstream, it opens immediately, regardless of its tripping delay set to 0.3.

Fault 2.
Circuit breakers A and B detect the fault. Circuit breaker A receives a signal from B and remains closed for the full duration of its tripping delay set
to 0.3. Circuit breaker B does not receive a signal from downstream and opens immediately, in spite of its tripping delay set to 0.2.



Note: the maximum permissible distance between two devices is 3000 m. A downstream circuit breaker can “control” up to ten upstream circuit breakers.

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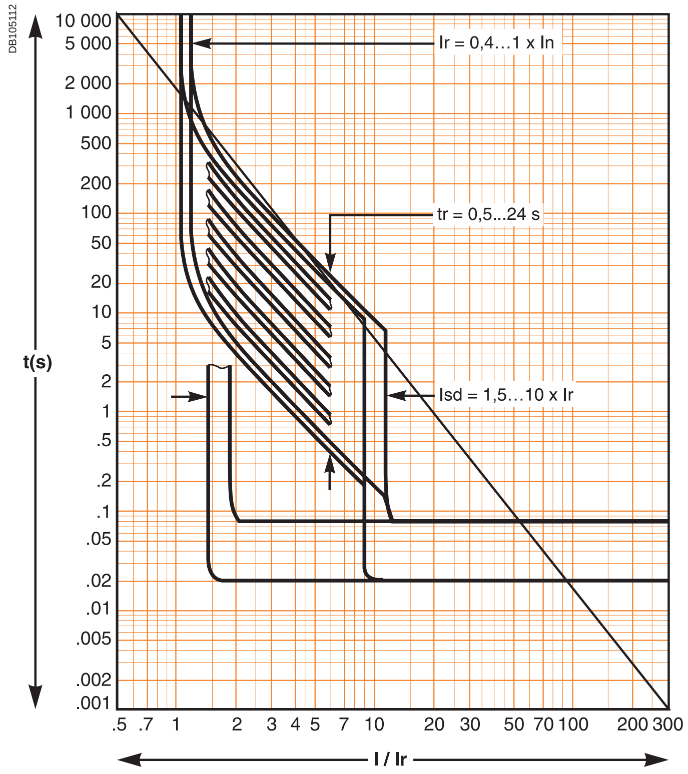
The technical guide

These technical guides help you comply with installation standards and rules i.e.: the electrical installation guide, the protection guide, the switchboard implementation guide, the technical booklets and the co-ordination tables all form genuine reference tools for the design of high performance electrical installations.
For example, the LV protection co-ordination guide - discrimination and cascading - optimises choice of protection and connection devices while also increasing markedly continuity of supply in the installations.

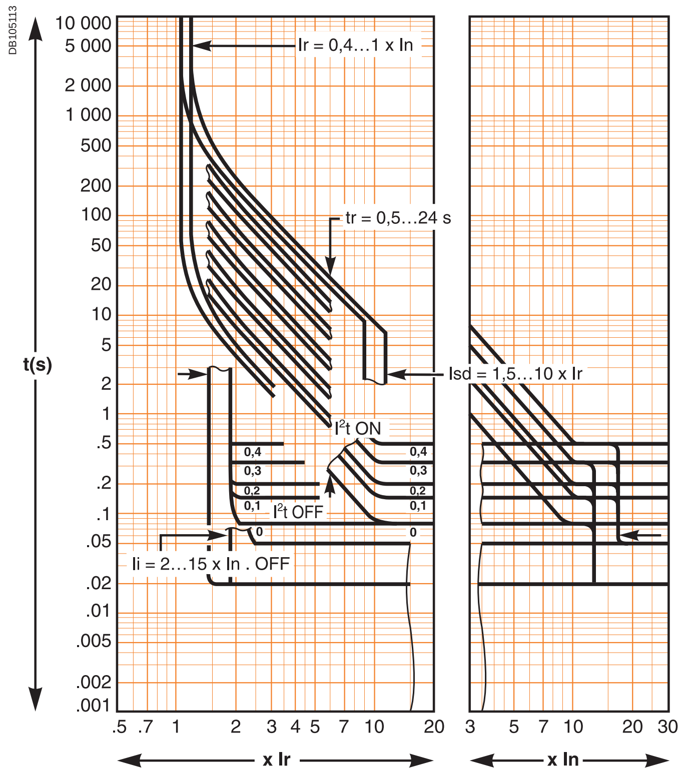
Additional characteristics

Tripping curves

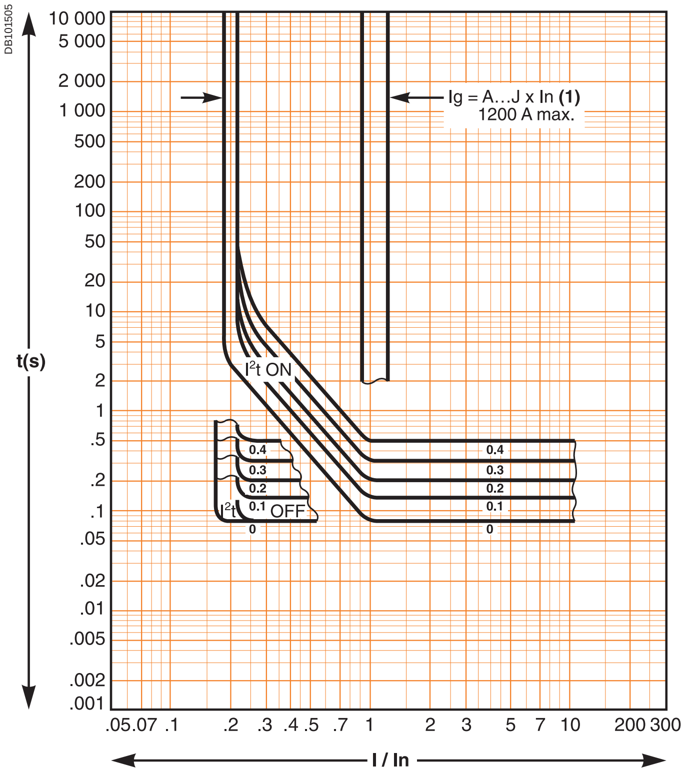
Micrologic 2.0



Micrologic 5.0, 6.0, 7.0



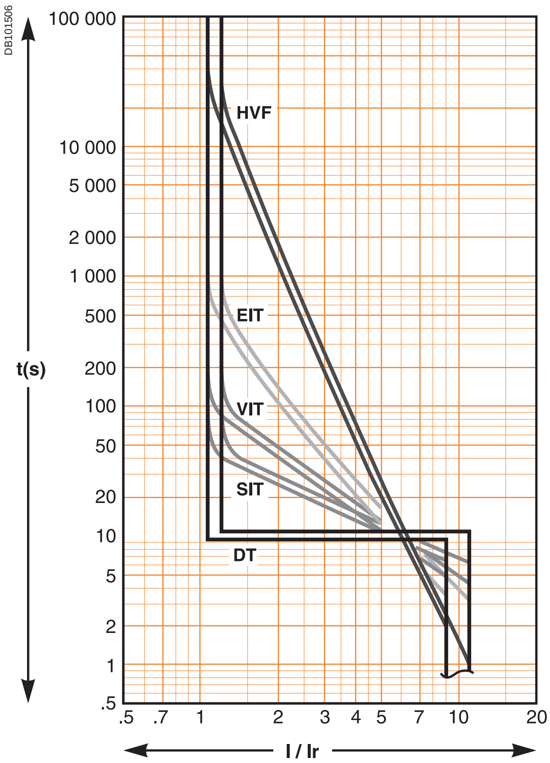
Earth fault protection (Micrologic 6.0)



(1)

Ig = In x...	A	B	C	D	E	F	G	H	I
Ig < 400 A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
400 A ≤ Ig ≤ 1200 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Ig > 1200 A	500	640	720	800	880	960	1040	1120	1200

IDMTL curve (Micrologic P and H)

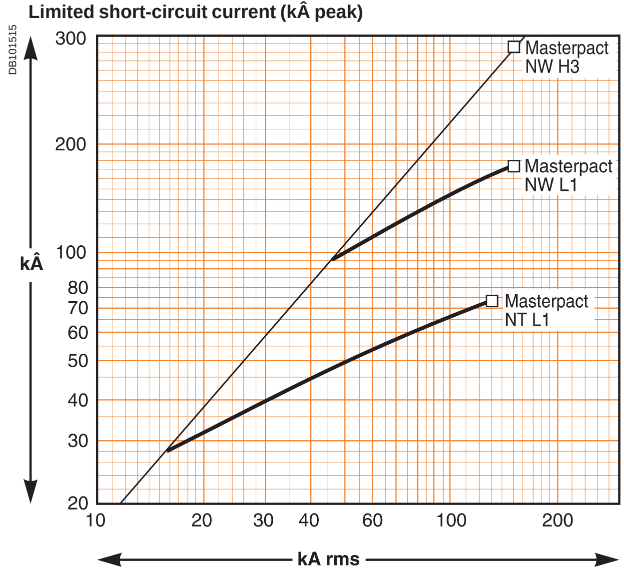


Limitation curves

Current limiting

Voltage 380/415/440 V AC

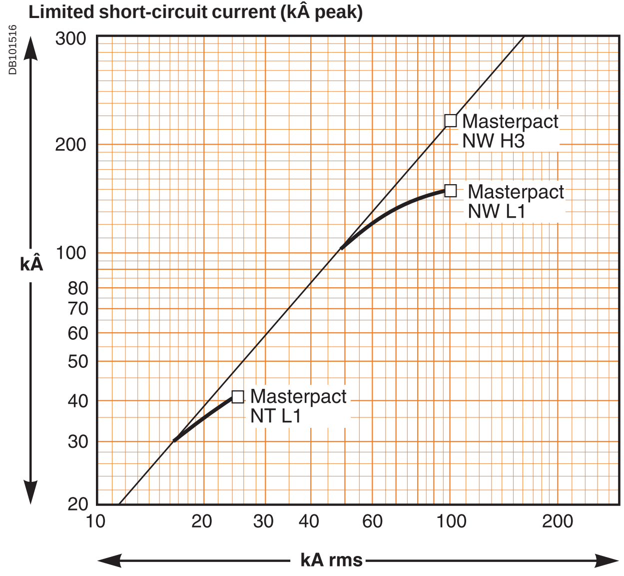
Limited short-circuit current (kÂ peak)



Rated short-circuit current (kA rms)

Voltage 660/690 V AC

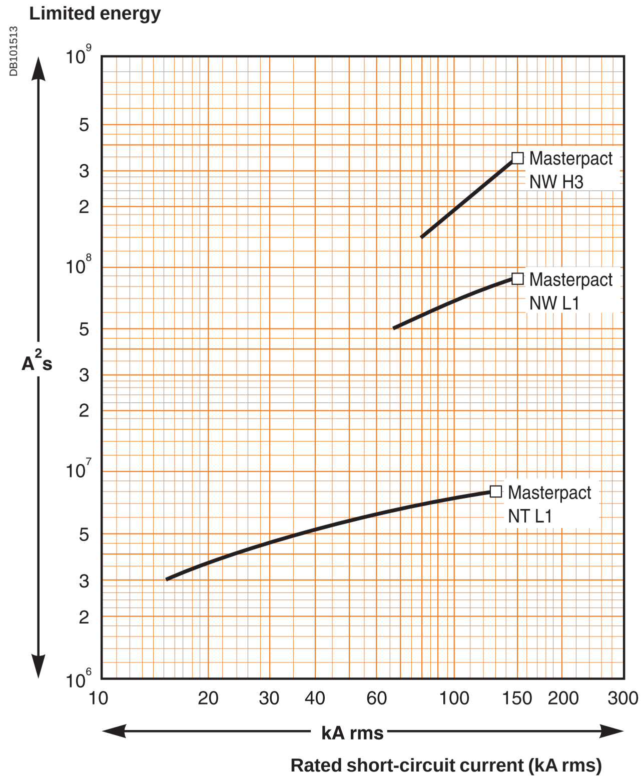
Limited short-circuit current (kÂ peak)



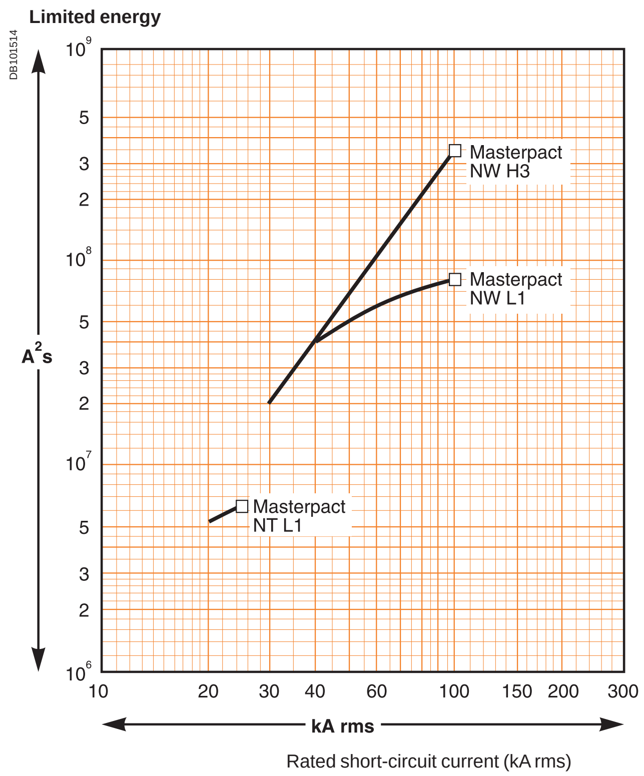
Rated short-circuit current (kA rms)

Energy limiting

Voltage 380/415/440 V AC



Voltage 660/690 V AC



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Last but not least, they optimise use of our products while also complying with standards and proper procedures.

Catalogue numbers, spare parts and order form

Retrofit solutions (*)

Connections for fixed devices

To replace a Masterpact M with a Masterpact NW, order a retrofit device (without connections) and select a set of connectors corresponding to the replaced device.
The Masterpact NW is installed in exactly the same place as the old Masterpact M device, without any modifications required on the switchboard.

Horizontal rear connection

Device to be replaced		Connection to be ordered		
Masterpact M08 to M12				
Type N1/NI				
		3P		**4P**
Top	3 x	**48951**	4 x	**48951**
Bottom	3 x	**48964**	4 x	**48964**
Type H1/H2/HI/HF				
Top	3 x	**48954**	4 x	**48954**
Bottom	3 x	**48965**	4 x	**48965**
Masterpact M16				
Type N1/NI/H1/H2/HI/HF				
Top	3 x	**48954**	4 x	**48954**
Bottom	3 x	**48965**	4 x	**48965**
Masterpact M20 and M25				
Type N1/NI/H1/H2/HI/HF				
Top	3 x	**48957**	4 x	**48957**
Bottom	3 x	**48958**	4 x	**48958**
Masterpact M32				
Type H1/H2/HI/HF				
Top	1 x	**48962**	1 x	**48960**
Bottom	1 x	**48961**	1 x	**48960**

(*) Please contact U2R (Retrofit Replacement Unit).

Connections for drawout devices

To replace a Masterpact M with a Masterpact NW, order a retrofit device (without connections) and select a set of connectors corresponding to the replaced device.
The Masterpact NW is installed in exactly the same place as the old Masterpact M device, without any modifications required on the switchboard.

Vertical rear connection

Device to be replaced		Connection to be ordered		
Masterpact M08 to M12				
Type N1/NI				
		3P		**4P**
Top	3 x	**48966**	4 x	**48966**
Bottom	3 x	**48966**	4 x	**48966**
Type H1/H2/HI/HF/L1				
Top	3 x	**48969**	4 x	**48969**
Bottom	3 x	**48969**	4 x	**48969**
Masterpact M16				
Type N1/NI/H1/H2/HI/HF/L1				
Top	3 x	**48969**	4 x	**48969**
Bottom	3 x	**48969**	4 x	**48969**
Masterpact M20 and M25				
Type N1/NI/H1/H2/HI/HF				
Top	3 x	**48970**	4 x	**48970**
Bottom	3 x	**48970**	4 x	**48970**
Masterpact M32				
Type H1/H2/HI/HF/M20/L1				
Top	1 x	**48974**	1 x	**48978**
Bottom	1 x	**48974**	1 x	**48978**

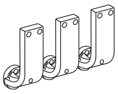
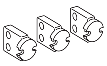
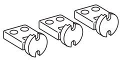
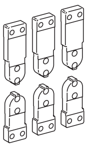
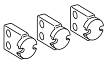
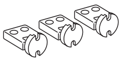
Horizontal rear connection

Device to be replaced		Connection to be ordered		
Masterpact M08 to M12				
Type N1/NI				
		3P		**4P**
Top	3 x	**48951**	4 x	**48951**
Bottom	3 x	**48964**	4 x	**48964**
Type H1/H2/HI/HF/L1				
Top	3 x	**48954**	4 x	**48954**
Bottom	3 x	**48965**	4 x	**48965**
Masterpact M16				
Type N1/NI/H1/H2/HI/HF/L1				
Top	3 x	**48954**	4 x	**48954**
Bottom	3 x	**48965**	4 x	**48965**
Masterpact M20 and M25				
Type N1/NI/H1/H2/HI/HF				
Top	3 x	**48957**	4 x	**48957**
Bottom	3 x	**48958**	4 x	**48958**
Masterpact M32 neutral on left-hand side				
Type H1/H2/HI/HF/M20/L1				
Top	1 x	**48973**	1 x	**48976**
Bottom	1 x	**48973**	1 x	**48977**
Masterpact M32 neutral on right-hand side				
Type H1/H2/HI/HF/M20/L1				
Top	1 x	**48973**	1 x	**48977**
Bottom	1 x	**48973**	1 x	**48976**

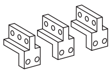
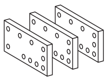
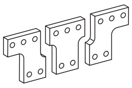
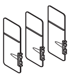
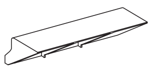
(*) Please contact U2R (Retrofit Replacement Unit).

Masterpact NT
Connection

Connection

			3P	4P
Fixed circuit breakers				
Front connection / Replacement kit (3 or 4 parts)				
E95534 	Top or bottom	250/630-1600 A	**47069**	**47070**
	Installation manual		**47102**	
Rear connection (vertical or horizontal mounting) / Replacement kit (3 or 4 parts)				
E46429  E46430 		250/630-1600 A	**33584**	**33585**
Vert. mounting. *Horiz. mounting.*	Installation manual		**47102**	
Drawout circuit breakers				
Front connection / Replacement kit (6 or 8 parts)				
E46440 	Top and bottom	250/630-1600 A	**33588**	**33589**
	Installation manual		**47102**	
Rear connection (vertical or horizontal mounting) / Replacement kit (3 or 4 parts)				
E46429  E46430 		250/630-1600 A	**33586**	**33587**
Vert. mounting. *Horiz. mounting.*	Installation manual		**47102**	

Connection accessories

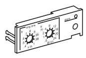
		3P	4P
Vertical connection adapters 250/630-1600 A / Replacement kit (3 or 4 parts)			
E46426 	For fixed and drawout front-connected circuit breakers	**33642**	**33643**
	Installation manual	**47102**	
Cable lug adapters 250/630-1600 A / Replacement kit (3 or 4 parts)			
E46427 	For fixed and drawout front-connected circuit breakers	**33644**	**33645**
	Installation manual	**47102**	
Spreaders / Replacement kit 250/630-1600 A (3 or 4 parts)			
E46431 	For fixed and drawout front and rear-connected circuit breakers	**33622**	**33623**
	Installation manual	**47102**	
Interphase barriers / Replacement kit (3 or 4 parts)			
E79151 	For fixed and drawout front and rear-connected circuit breakers	**33648**	**33648**
	For drawout rear-connected circuit breakers	**33768**	**33768**
	Installation manual	**47102**	
Arc chute screen (1 part)			
E74437 	For fixed front-connected circuit breakers	**47335**	**47336**
	Installation manual	**47102**	

Micrologic control unit, communication option

Replacement parts for Micrologic control units

Long-time rating plug (limits setting range for higher accuracy) / 1 part

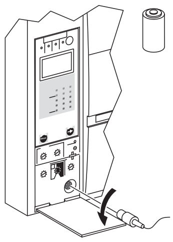
E46674



Standard	0.4 at 1 x Ir	**33542**
Low-setting option	0.4 at 0.8 x Ir	**33543**
High-setting option	0.8 at 1 x Ir	**33544**
Without long-time protection	off	**33545**

Battery + cover

E95540

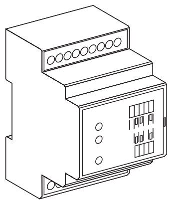


Battery (1 part)		**33593**
Cover (1 part)	For Micrologic A	**33592**
	For Micrologic P and H	**47067**

Communication option

Chassis

E95541

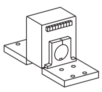


Modbus COM	**64915**
6 wires terminal drawout (1 part)	**33099**
6 wires terminal fixed (1 part)	**47075**
Installation manual	**33088**

External sensors

External sensor for earth-fault protection (TCE) / 1 part

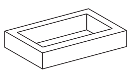
E46671



Sensor rating	400/1600 A	**33576**

Source ground return (SGR) earth-fault protection / 1 part

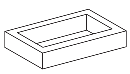
E46672



External sensor (SGR)	**33579**
MDGF summing module	**48891**

Rectangular sensor for earth-leakage protection + Vigi cable / 1 part

E46672



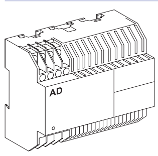
280 mm x 115 mm	**33573**

Vigi cable or external voltage cable / 1 part

Vigi cable or external voltage cable (1 part)	**47090**

External power supply module (AD) / 1 part

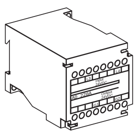
DB105360



24-30 V DC	**54440**
48-60 V DC	**54441**
100-125 V DC	**54442**
110-130 V AC	**54443**
200-240 V AC	**54444**
380-415 V AC	**54445**

Battery module (BAT) / 1 part

E47787



1 battery	24 V DC	**54446**

Test equipments / 1 part

E59554

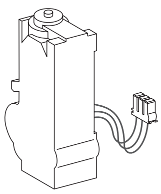
Hand held test kit (HHTK)	**33594**
Full function test kit (FFTK)	**33595**
Test report edition come from FFTK	**34559**
FFTK test cable 2 pin for STR trip unit	**34560**
FFTK test cable 7 pin for Micrologic trip unit	**33590**

Masterpact NT
Remote operation

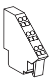
Remote operation

Gear motor

E95168

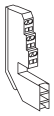


E95169



Fixed.

E95171

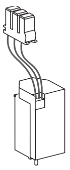


Drawout.

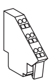
MCH (1 part)		
AC 50/60 Hz	48 V	**33186**
	100/130 V	**33176**
	200/240 V	**33177**
	277/415 V	**33179**
	440/480 V	**33179**
	+ resistor	**33193**
DC	24/30 V	**33185**
	48/60 V	**33186**
	100/125 V	**33187**
	200/250 V	**33188**
Terminal block (1 part)	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**33098**
Installation manual		**47103**

Closing and opening release (XF or MX)

E95170

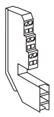


E95169



Fixed.

E95171

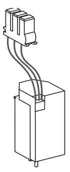


Drawout.

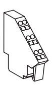
Standard coil (1 part)		
AC 50/60 Hz DC	12 V DC	**33658**
	24/30 V DC, 24 V AC	**33659**
	48/60 V DC, 48 V AC	**33660**
	100/130 V AC/DC	**33661**
	200/250 V AC/DC	**33662**
	277 V AC	**33663**
	380/480 V AC	**33664**
Communicating coil (1 part)		
AC 50/60 Hz DC	12 V DC	**33032**
	24/30 V DC, 24 V AC	**33033**
	48/60 V DC, 48 V AC	**33034**
	100/130 V AC/DC	**33035**
	200/250 V AC/DC	**33036**
	277 V AC	**33037**
	380/480 V AC	**33038**
Terminal block (1 part)	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**33098**
Installation manual		**47103**

Undervoltage release MN

E95170

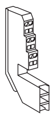


E95169



Fixed.

E95171

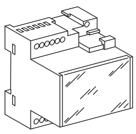


Drawout.

Undervoltage release (1 part)		
AC 50/60 Hz	24/30 V DC, 24 V AC	**33668**
DC	48/60 V DC, 48 V AC	**33669**
	100/130 V AC/DC	**33670**
	200/250 V AC/DC	**33671**
	380/480 V AC	**33673**
Terminal block (1 part)	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**33098**
Installation manual		**47103**

MN delay unit

E46694

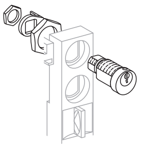


MN delay unit (1 part)			
		R (non-adjustable)	**Rr** (adjustable)
AC 50/60 Hz	48/60 V AC/DC		**33680**
DC	100/130 V AC/DC	**33684**	**33681**
	200/250 V AC/DC	**33685**	**33682**
	380/480 V AC/DC		**33683**
Installation manual			**47103**

Chassis locking and accessories

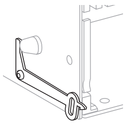
Chassis locking

"Disconnected" position locking / 1 part

E46685


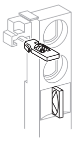
By padlocks		
	VCPO	Standard
By Profalux keylocks		
Profalux	1 lock with 1 key + adaptation kit	**64909**
	2 locks 1 keys + adaptation kit	**64910**
	2 locks 2 different keys + adaptation kit	**64911**
1 keylock Profalux (without adaptation kit):		
	identical key not identified combination	**33173**
	identical key identified 215470 combination	**33174**
	identical key identified 215471 combination	**33175**
By Ronis keylocks		
Ronis	1 lock with 1 key + adaptation kit	**64912**
	2 locks 1 keys + adaptation kit	**64913**
	2 locks 2 different keys + adaptation kit	**64914**
1 keylock Ronis (without adaptation kit):		
	identical key not identified combination	**33189**
	identical key identified EL24135 combination	**33190**
	identical key identified EL24153 combination	**33191**
	identical key identified EL24315 combination	**33192**
Adaptation kit (without keylock):	adaptation kit Profalux	**33769**
	adaptation kit Ronis	**33770**
	adaptation kit Castell	**33771**
	adaptation kit Kirk	**33772**
Installation manual		**47104**

Door interlock / 1 part

E46464


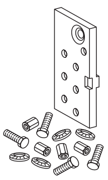
Right and left-hand side of chassis (VPECD or VPECG)	**33172**
Installation manual	**47104**

Racking interlock / 1 part

E46465


Racking interlock (VPOC)	**33788**
Installation manual	**47104**

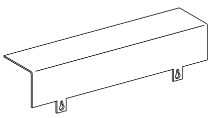
Breaker mismatch protection / 1 part

E46456


Breaker mismatch protection (VDC)	**33767**
Installation manual	**47104**

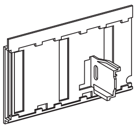
Chassis accessories

Auxiliary terminal shield (CB) / 1 part

E46698


Terminal shield	3P	**33763**
	4P	**33764**
Installation manual		**47104**

Safety shutters + locking / 1 part

E46699


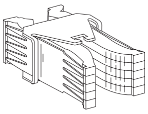
Safety shutters (VO)	3P	**33765**
	4P	**33766**
Installation manual		**47104**

Note: *the locking of safety shutters is integrated.*

Masterpact NT
Clusters

Clusters

E95538



1 disconnecting contact cluster for chassis (see table below) 1 part	**64906**

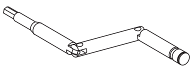
Table : number of clusters required for the different chassis models

Chassis rating (A)	Masterpact NT	
	3P	**4P**
250	12	18
630	12	18
800	12	18
1000	12	18
1250	12	18
1600	18	24

Note: *the minimum order is 6 parts.*

Racking handle / 1 part

E95561

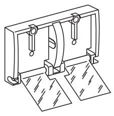


Racking handle	**47098**

Circuit breaker locking and accessories

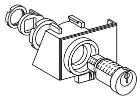
Circuit breaker locking

Pushbutton locking device / 1 part

E46666


By padlocks		**33897**
Installation manual		**47103**

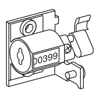
OFF position locking / 1 part

E46701


By padlocks + BPFE support		
		47514
By Profalux keylocks + BPFE support		
Profalux	1 lock with 1 key + adaptation kit	**64918**
	2 locks 1 keys + adaptation kit	**64919**
1 keylock Profalux (without adaptation kit):		
	identical key not identified combination	**33173**
	identical key identified 215470 combination	**33174**
	identical key identified 215471 combination	**33175**
By Ronis keylocks + BPFE support		
Ronis	1 lock with 1 key + adaptation kit	**64920**
	2 locks 1 keys + adaptation kit	**64921**
1 keylock Ronis (without adaptation kit):		
	identical key not identified combination	**33189**
	identical key identified EL24135 combination	**33190**
	identical key identified EL24153 combination	**33191**
	identical key identified EL24315 combination	**33192**
Adaptation kit (without keylock):	adaptation kit Profalux	**47515**
	adaptation kit Ronis	**47516**
	adaptation kit Kirk	**47517**
	adaptation kit Castell	**47518**
Installation manual		**47103**

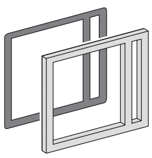
Other circuit breaker accessories

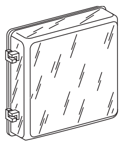
Mechanical operation counter / 1 part

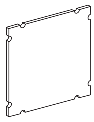
DB125617


Operation counter CDM	**33895**
Installation manual	**47103**

Escutcheon and accessories / 1 part

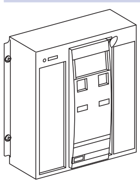
E46668

Escutcheon

E46669

Cover

E46670

Blanking plate

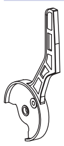
	Fixed	Drawout
Escutcheon	**33718**	**33857**
Transparent cover (IP54)		**33859**
Escutcheon blanking plate		**33858**
Installation manual		**47103**

Front cover (3P / 4P) / 1 part

E95558


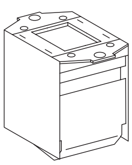
Front cover	**47094**
Installation manual	**47103**

Spring charging handle / 1 part

E95559


Spring charging handle	**47092**
Installation manual	**47103**

Arc chute for Masterpact NT / 1 part

E95560


		3P		4P
Type H1/H2	3 x	**47095**	4 x	**47095**
Type L1	3 x	**47096**	4 x	**47096**
Installation manual				**47103**

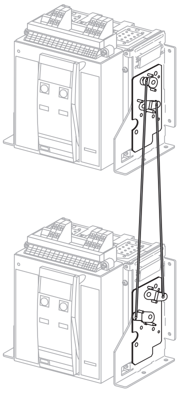
Masterpact NT

Mechanical interlocking for source changeover

Mechanical interlocking for source changeover

Interlocking using connecting rods

E47760



Complete assembly with 2 adaptation fixtures + rods	
2 Masterpact NT fixed devices	**33912**
2 Masterpact NT drawout devices	**33913**

Note: *the installation manual is enclosed.*

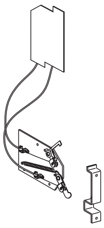
Interlocking using cables (1)

Choose 2 adaptation fixtures (1 for each breaker) + 1 set of cables	
1 adaptation fixture for Masterpact NT fixed devices	**33200**
1 adaptation fixture for Masterpact NT drawout devices	**33201**
1 set of 2 cables	**33209**

(1) *Can be used with any combination of NT or NW, fixed or drawout devices.*

Cable-type door interlock

E70742



1 complete assembly for Masterpact NT fixed devices	**33920**
1 complete assembly for Masterpact NT drawout devices	**33921**

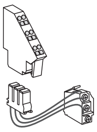
Note: *the installation manual is enclosed.*

Indication contacts

Indication contacts

ON/OFF indication contacts (OF) / 1 part

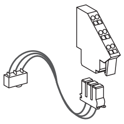
E46463



Changeover contacts (6 A - 240 V)		**47076**
1 low-level OF to replace 1 standard OF (4 max.)		**47077**
Wiring	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**33098**
Installation manual		**47103**

"Fault trip" indication contacts (SDE) / 1 part

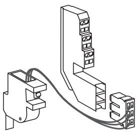
E47758



1 additional SDE (5 A - 240 V)		**47078**
1 additional low-level SDE		**47079**
Wiring	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**33098**
Installation manual		**47103**

"Ready to close" contact (1 max.) / 1 part

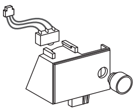
E46664



		PF
1 changeover contact (5 A - 240 V)		**47080**
1 low-level changeover contact		**47081**
Wiring	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**33098**
Installation manual		**47103**

Electrical closing pushbutton / 1 part

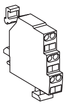
E46439



	BPFE
1 pushbutton	**64917**
Installation manual	**47103**

Carriage switches (connected / disconnected / test position) / 1 part

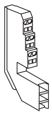
E46661



Changeover contacts (6 A - 240 V)	
1 connected position contact (3 max.)	**33170**
1 test position contact (1 max.)	**33170**
1 disconnected position contact (2 max.)	**33170**
And/or low-level changeover contacts	
1 connected position contact (3 max.)	**33171**
1 test position contact (1 max.)	**33171**
1 disconnected position contact (2 max.)	**33171**

Auxiliary terminals for chassis alone

E95171



3 wire terminal (1 part), terminal block (1 part)	**33098**
Jumpers (10 parts)	**47900**
Installation manual	**47104**

Masterpact NT
Instructions

Instructions		
Chassis accessories		47104
Circuit breaker accessories		47103
Fixed and drawout circuit breaker		47102
Micrologic user manual	20/50 (French)	33076
	20/50 (English)	33077
	2A/7A (French)	33079
	2A/7A (English)	33080
	5P/7P (French)	33082
	5P/7P (English)	33083
	5H/7H (French)	33085
	5H/7H (English)	33086
NT user manual	French	47106
	English	47107
Modbus communication notice for manual		33088

Portable data acquisition Communication bus accessories and Modbus

Portable data acquisition

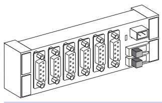
Masterpact GetnSet (*)

Masterpact GetnSet product with battery and accessories	**48789**
Spare battery for Masterpact GetnSet product	**48790**
Spare cable for Masterpact GetnSet product	**48791**

RS 485 Modbus pre-wired system

RS 485 Modbus junction block

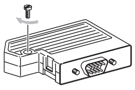
E67958



CJB306: 6 SubD 9 pins connectors junction block	**50963**

RS 485 Modbus connector

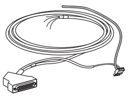
E67959



CSD309: 9 pins SubD with screw terminals	**50964**

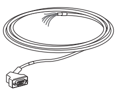
RS 485 Modbus cables

E67960



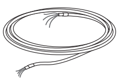
CDM303: display module pre-wired cable, 3 m length	**50960**

E79015



CCP303: Masterpact or Compact pre-wired cable (4 RS 485 wires + 2 power wires) 3 m length	**50961**

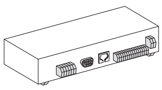
E67961



CCR301: RS 485 roll cable (2 RS 485 wires + 2 power wires) 60 m length	**50965**

Micro Power Server MPS100

DB101033



MPS100	**33507**

Converter

RS 485/RS 232 (ACE909) 12 V DC power supply included	**59648**	(2)
RS 485/RS 232	**TSX SCA72**	(1)
RS 485/Ethernet	**174 CEV 300-10**	
RS 485/Ethernet (SMS compatible)	**EGX 100/400**	(2)

(1) See catalogue Telemecanique.
(2) Consult PMC Department.
(*) Consult us.

Catalogue numbers: spare parts

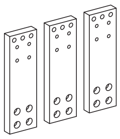
Masterpact NW

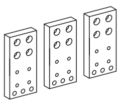
Connection

Connection

Fixed circuit breakers

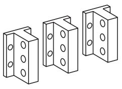
Front connection / Replacement kit (3 or 4 parts)

E95557


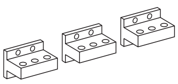
E95533


		3P	4P
800-1600 A	Top	47990	47991
2000/3200 A	Top	47992	47993
800-1600 A	Bottom	47932	47933
2000/3200 A	Bottom	47942	47943
Installation manual		47950	

Rear connection (vertical or horizontal mounting) / Replacement kit (3 or 4 parts)

E46445


Vertical mounting

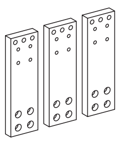
E46446


Horizontal mounting

		3P	4P
800-2000 A	Vertical	47964	47965
	Horizontal	47964	47965
2500/3200 A	Vertical	47966	47967
	Horizontal	47966	47967
4000 A	Vertical	47968	47969
	Horizontal	47970	47971
4000b/5000 A	Vertical	2x 47966	2x 47967
	Horizontal	2x 47966	2x 47967
6300 A	Vertical	2x 47968	2x 47969
Installation manual		47950	

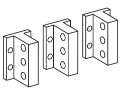
Drawout circuit breakers

Front connection / Replacement kit (3 or 4 parts)

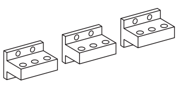
E46450


		3P	4P
800-1600 A	Top or bottom	47960	47961
2000/3200 A	Top or bottom	47962	47963
Installation manual		47950	

Rear connection (vertical or horizontal mounting) / Replacement kit (3 or 4 parts)

E46445


Vertical mounting

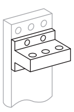
E46446


Horizontal mounting

		3P	4P
800-2000 A types N1/H1/H2	Vertical	47964	47965
800-1600 A types H3/L1	Horizontal	47964	47965
2500/3200 A types H1/H2	Vertical	47966	47967
2000/3200 A types H3/L1	Horizontal	47966	47967
4000 A	Vertical	47968	47969
	Horizontal	47970	47971
4000b/5000 A	Vertical	2x 47966	2x 47967
	Horizontal	2x 47966	2x 47967
6300 A	Vertical	2x 47968	2x 47969
Installation manual		47950	

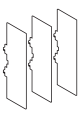
Connection accessories

Disconnectable front-connection adapter for fixed circuit breaker (3 or 4 parts)

E46889


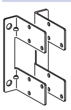
	3P	4P
1600 A	48464	48466
2000/3200 A	48465	48467
Installation manual	47950	

Interphase barriers / Replacement kit (3 parts)

E46428


	3P	4P
For fixed rear-connected circuit breaker	48599	48599
For drawout rear-connected circuit breaker	48600	48600
Installation manual	47950	

Additional support brackets for mounting on a backplate

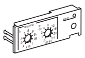
E47788


	3P	4P
For fixed rear-connected circuit breaker (2 parts)		47829

Micrologic control unit, communication option

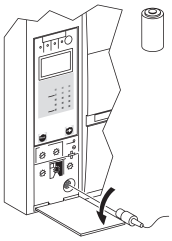
Replacement parts for Micrologic control units

Long-time rating plug (limits setting range for higher accuracy) / 1 part

E46674


Standard	0.4 at 1 x Ir	**33542**
Low-setting option	0.4 at 0.8 x Ir	**33543**
High-setting option	0.8 at 1 x Ir	**33544**
Without long-time protection	off	**33545**

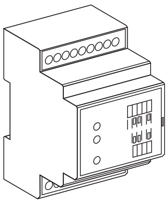
Battery + cover

E95540


Battery (1 part)		**33593**
Cover (1 part)	For Micrologic A	**33592**
	For Micrologic P and H	**47067**

Communication option

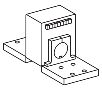
Chassis

E95541


Modbus COM	**64915**
6 wires terminal drawout (1 part)	**47850**
6 wires terminal fixed (1 part)	**47075**
Installation manual	**33088**

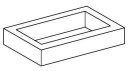
External sensors

External sensor for earth-fault protection (TCE) / 1 part

E46671


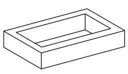
Sensor rating	400/2000 A	**34035**
	1000/4000 A	**34036**
	4000/6300 A	**48182**

Source ground return (SGR) earth-fault protection / 1 part

E46672


External sensor (SGR)	**33579**
MDGF summing module	**48891**

Rectangular sensor for earth-leakage protection + Vigi cable / 1 part (up to 3200 A)

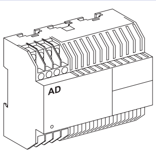
E46672


280 mm x 115 mm	**33573**
470 mm x 160 mm	**33574**

Vigi cable or external voltage cable / 1 part

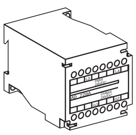
Vigi cable or external voltage cable	**47090**

External power supply module (AD) / 1 part

DB105360


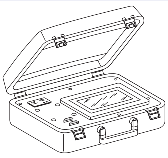
24-30 V DC	**54440**
48-60 V DC	**54441**
100-125 V DC	**54442**
110-130 V AC	**54443**
200-240 V AC	**54444**
380-415 V AC	**54445**

Battery module (BAT) / 1 part

E47787


1 battery	24 V DC	**54446**

Test equipments / 1 part

E59554


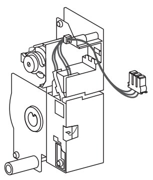
Hand held test kit (HHTK)	**33594**
Full function test kit (FFTK)	**33595**
Test report edition come from FFTK	**34559**
FFTK test cable 2 pin for STR trip unit	**34560**
FFTK test cable 7 pin for Micrologic trip unit	**33590**

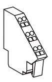
Catalogue numbers: spare parts

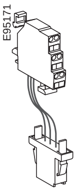
Masterpact NW
Remote operation

Remote operation

Gear motor

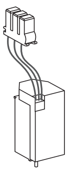
E95172


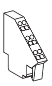
E95169

Fixed.

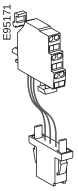
E95171

Drawout.

MCH (1 part)		
AC 50/60 Hz	48 V	**47889**
	100/130 V	**47893**
	200/240 V	**47894**
	250/277 V	**47895**
	380/415 V	**47896**
	440/480 V	**47897**
DC	24/30 V	**47888**
	48/60 V	**47889**
	100/125 V	**47890**
	200/250 V	**47891**
Terminal block (1 part)	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**47849**
Installation manual		**47951**

Closing and opening release (XF or MX)

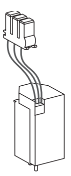
E95170


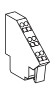
E95169

Fixed.

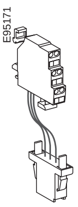
E95171

Drawout.

Standard coil (1 part)		
AC 50/60 Hz DC	12 V DC	**33658**
	24/30 V DC, 24 V AC	**33659**
	48/60 V DC, 48 V AC	**33660**
	100/130 V AC/DC	**33661**
	200/250 V AC/DC	**33662**
	277 V AC	**33663**
	380/480 V AC	**33664**
Communicating coil (1 part)		
AC 50/60 Hz DC	12 V DC	**33032**
	24/30 V DC, 24 V AC	**33033**
	48/60 V DC, 48 V AC	**33034**
	100/130 V AC/DC	**33035**
	200/250 V AC/DC	**33036**
	277 V AC	**33037**
	380/480 V AC	**33038**
Terminal block (1 part)	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**47849**
Installation manual		**47951**

Undervoltage release MN

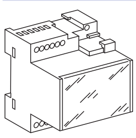
E95170


E95169

Fixed.

E95171

Drawout.

Undervoltage release (1 part)		
AC 50/60 Hz	24/30 V DC, 24 V AC	**33668**
DC	48/60 V DC, 48 V AC	**33669**
	100/130 V AC/DC	**33670**
	200/250 V AC/DC	**33671**
	380/480 V AC	**33673**
Terminal block (1 part)	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**47849**
Installation manual		**47951**

MN delay unit

E46694


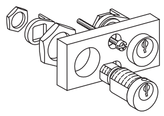
MN delay unit (1 part)			
		R (non-adjustable)	**Rr** (adjustable)
AC 50/60 Hz	48/60 V AC/DC		**33680**
DC	100/130 V AC/DC	**33684**	**33681**
	200/250 V AC/DC	**33685**	**33682**
	380/480 V AC/DC		**33683**
Installation manual			**47951**

Chassis locking and accessories

Chassis locking

"Disconnected" position locking / 1 part

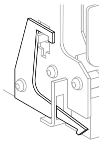
E46451



By padlocks		
	VCPO	Standard
By Profalux keylocks		
Profalux	1 lock with 1 key + adaptation kit	**64934**
	2 locks 1 keys + adaptation kit	**64935**
	2 locks 2 different keys + adaptation kit	**64936**
1 keylock Profalux (without adaptation kit):		
	identical key not identified combination	**33173**
	identical key identified 215470 combination	**33174**
	identical key identified 215471 combination	**33175**
By Ronis keylocks		
Ronis	1 lock with 1 key + adaptation kit	**64937**
	2 locks 1 keys + adaptation kit	**64938**
	2 locks 2 different keys + adaptation kit	**64939**
1 keylock Ronis (without adaptation kit):		
	identical key not identified combination	**33189**
	identical key identified EL24135 combination	**33190**
	identical key identified EL24153 combination	**33191**
	identical key identified EL24315 combination	**33192**
Adaptation kit (without keylock):	adaptation kit Profalux / Ronis	**48564**
	adaptation kit Kirk	**48565**
	adaptation kit Castell	**48566**
Installation manual		**47952**

Door interlock / 1 part

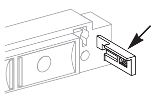
E46452



Right and left-hand side of chassis (VPECD or VPECG)	**47914**
Installation manual	**47952**

Racking interlock

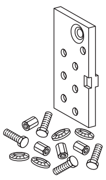
E46453



5 parts	**64940**
Installation manual	**47952**

Breaker mismatch protection / 1 part

E46456

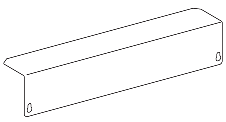


Breaker mismatch protection (VDC)	**33767**
Installation manual	**47952**

Chassis accessories

Auxiliary terminal shield (CB) / 1 part

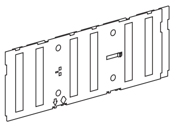
E46458



800/4000 A	3P	**64942**
	4P	**48596**
4000b/6300 A	3P	**48597**
	4P	**48598**
Installation manual		**47952**

Safety shutters + locking block / 1 part

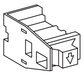
E46459



800/4000 A	3P	**48721**
	4P	**48723**
4000b/6300 A	3P	**48722**
	4P	**48724**
Installation manual		**47952**

Shutter locking block (for replacement) / 1 part

E46460



2 parts for 800/4000 A	**48591**
Installation manual	**47952**

Earthing kit for chassis

	3P	4P
Types for N1/H1/NA/HA		
	48433	**48434**

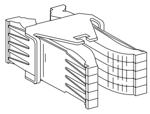
Note: *the installation manual is enclosed.*

Catalogue numbers:
spare parts

Masterpact NW
Clusters

Clusters

E95538



1 disconnecting contact cluster for chassis (see table below) (part 1) | **64906**

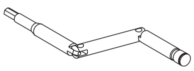
Table : number of clusters required for the different chassis models

Chassis rating (A)	Masterpact NW 3P				Masterpact NW 4P			
	N1	H1/H2	H3	L1	N1	H1/H2	H3	L1
250		12 (H1)						
630	6	12		24	8	16		32
800	6	12		24	8	16		32
1000	6	12		24	8	16		32
1250	6	12		24	8	16		32
1600	12	12		24	16	16		32
2000		24	24	42		32	32	56
2500		24	24			32	32	
3200		36	36			48	48	
4000		42	42			56	56	
4000b		72				96		
5000		72				96		
6300		72				96		

***Note:** the minimum order is 6 parts.*

Racking handle

E95561

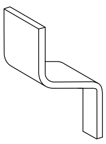


Racking handle | **47944**

DC rear connection

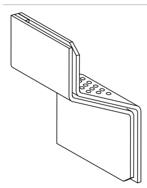
Serial connection kit

DB105109



For NW10/20 DC | **48642**

DB105110

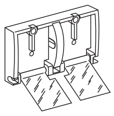


For NW40 DC | **48643**

Circuit breaker locking and accessories

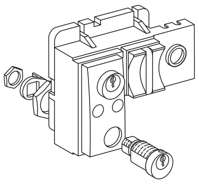
Circuit breaker locking

Pushbutton locking device / 1 part

E46666


By padlocks	**48536**
Installation manual	**47951**

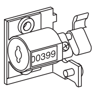
OFF position locking / 1 part

E46735


By padlocks		
		48539
By Profalux keylocks		
Profalux	1 lock with 1 key + adaptation kit	**64928**
	2 locks 1 keys + adaptation kit	**64929**
	2 locks 2 different keys + adaptation kit	**64930**
1 keylock Profalux (without adaptation kit):		
	identical key not identified combination	**33173**
	identical key identified 215470 combination	**33174**
	identical key identified 215471 combination	**33175**
By Ronis keylocks		
Ronis	1 lock with 1 key + adaptation kit	**64931**
	2 locks 1 keys + adaptation kit	**64932**
	2 locks 2 different keys + adaptation kit	**64933**
1 keylock Ronis (without adaptation kit):		
	identical key not identified combination	**33189**
	identical key identified EL24135 combination	**33190**
	identical key identified EL24153 combination	**33191**
	identical key identified EL24315 combination	**33192**
Adaptation kit (without keylock):	adaptation kit Profalux / Ronis	**64925**
	adaptation kit Kirk	**64927**
	adaptation kit Castell	**64926**
Installation manual		**47951**

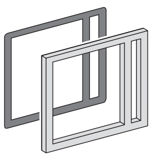
Other circuit breaker accessories

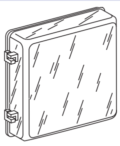
Mechanical operation counter / 1 part

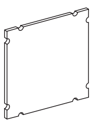
DB125617


Operation counter CDM	**48535**
Installation manual	**47951**

Escutcheon and accessories / 1 part

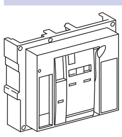
E46668

Escutcheon

E46669

Cover

E46670

Blanking plate

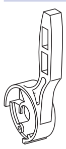
	Fixed	**Drawout**
Escutcheon	**48601**	**48603**
Transparent cover (IP 54)		**48604**
Escutcheon blanking plate	**48605**	**48605**
Installation manual		**47951**

Front cover (3P / 4P) / 1 part

E95535


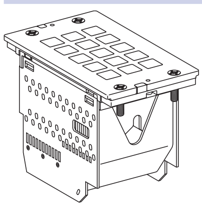
Front cover	**47939**
Installation manual	**47951**

Spring charging handle / 1 part

E95536


Spring charging handle	**47940**
Installation manual	**47951**

Arc chute for Masterpact NW / 1 part

E95537


		3P		**4P**
Type N1	3 x	**47935**	4 x	**47935**
Type H1/H2 (NW08 to NW40)	3 x	**47935**	4 x	**47935**
Type H1/H2 (NW40b to NW63)	6 x	**47936**	8 x	**47936**
Type H3	3 x	**47936**	4 x	**47936**
Type L1	3 x	**47937**	4 x	**47937**
Type NW DC	3 x	**47934**	4 x	**47934**
Installation manual				**47951**

Catalogue numbers: spare parts

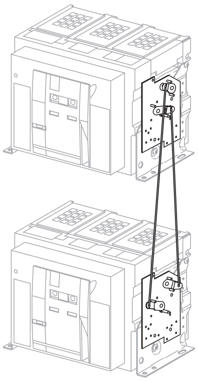
Masterpact NW

Mechanical interlocking for source changeover

Mechanical interlocking for source changeover

Interlocking of 2 devices using connecting rods

E47762



Complete assembly with 2 adaptation fixtures + rods	
2 Masterpact NW fixed devices	**48612**
2 Masterpact NW drawout devices	**48612**
Can be used with 1 NW fixed + 1 NW drawout.	
Note: *the installation manual is enclosed.*	

Interlocking of 2 devices using cables (1)

Choose 2 adaptation sets (1 for each device + 1 set of cables)	
1 adaptation fixture for Masterpact NW fixed devices	**47926**
1 adaptation fixture for Masterpact NW drawout devices	**47926**
1 set of 2 cables	**33209**

(1) Can be used with any combination of NT or NW, fixed or drawout devices.

Interlocking of 3 devices using cables

Choose 3 adaptation (inclusing 3 adaptation fixtures + cables)	
3 sources, only 1 device closed, fixed or drawout devices	**48610**
2 sources + 1 coupling, fixed or drawout devices	**48609**
2 normal + 1 replacement source, fixed or drawout devices	**48608**

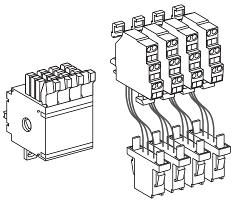
Cable-type door interlock

1 complete assembly for Masterpact NW fixed or drawout device	**48614**
Note: *the installation manual is enclosed.*	

Indication contacts

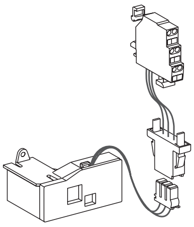
Indication contacts

ON/OFF indication contacts (OF) / 12 parts

E46689


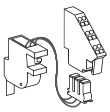
1 additional block of 4 contacts		**64922**
Wiring	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**47849**
Installation manual		**47951**

"Fault trip" indication contacts (SDE) / 1 part

E46691


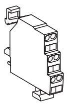
Changeover contact (SDE)	6 A - 240 V	**47915**
	Low-level	**47916**
Wiring	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**47849**
Installation manual		**47951**

"Ready to close" contact (1 max.) / 1 part

E46438


		PF
1 changeover contact (5 A - 240 V)		**47080**
1 low-level changeover contact		**47081**
Wiring	For fixed circuit breaker	**47074**
	For drawout circuit breaker	**47849**
Installation manual		**47951**

"Connected, disconnected, test position" indication contact (carriage switches) / 1 part

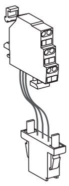
E46661


Changeover contacts	6 A - 240 V	**33170**
CE, CD, CT	Low-level	**33171**
Installation manual		**47952**

Set of additional actuaters for carriage switches / 1 set

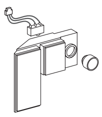
1 set		**48560**

Combined closed / connected contacts for use with 1 auxiliary contact / 1 part

E46690


1 contact (5 A - 240 V)		**48477**
or 1 low-level contact		**48478**
Installation manual		**47952**

Electrical closing pushbutton / 1 part

E46677


		BPFE
1 pushbutton		**48534**
Installation manual		**47951**

Auxiliary terminals for chassis alone

3 wire terminal (1 part)		**47849**
6 wire terminal (1 part)		**47850**
Jumpers (10 parts)		**47900**

Masterpact NW
Instructions

Instructions		
Chassis accessories		47952
Circuit breaker accessories		47951
Fixed and drawout circuit breaker		47950
User manual	NW AC (French)	47954
	NW AC (English)	47955
	NW DC (French)	64923
	NW DC (English)	64924
Micrologic user manual	20/50 (French)	33076
	20/50 (English)	33077
	2A/7A (French)	33079
	2A/7A (English)	33080
	5P/7P (French)	33082
	5P/7P (English)	33083
	5H/7H (French)	33085
	5H/7H (English)	33086
Modbus communication notice for manual		33088

Portable data acquisition Communication bus accessories and Modbus

Portable data acquisition

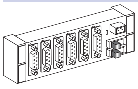
Masterpact GetnSet (*)

Masterpact GetnSet product with battery and accessories	**48789**
Spare battery for Masterpact GetnSet product	**48790**
Spare cable for Masterpact GetnSet product	**48791**

RS 485 Modbus pre-wired system

RS 485 Modbus junction block

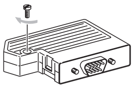
E67958



CJB306: 6 SubD 9 pins connectors junction block	**50963**

RS 485 Modbus connector

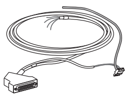
E67959



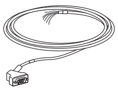
CSD309: 9 pins SubD with screw terminals	**50964**

RS 485 Modbus cables

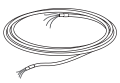
E67960



E79015



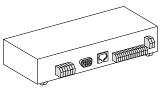
E67961



CDM303: display module pre-wired cable, 3 m length	**50960**
CCP303: Masterpact or Compact pre-wired cable (4 RS 485 wires + 2 power wires) 3 m length	**50961**
CCR301: RS 485 roll cable (2 RS 485 wires + 2 power wires) 60 m length	**50965**

Micro Power Server MPS100

DB101033



MPS100	**33507**

Converter

RS 485/RS 232 (ACE909) 12 V DC power supply included	**59648**	(2)
RS 485/RS 232	**TSX SCA72**	(1)
RS 485/Ethernet	**174 CEV 300-10**	
RS 485/Ethernet (SMS compatible)	**EGX 100/400**	(2)

(1) See catalogue Telemecanique.
(2) Consult PMC Department.
(*) Consult us.

Order form

Masterpact NT and NW

To indicate your choice, check the applicable square boxes ☐

and enter the appropriate information in the rectangles ▭

Circuit breaker or switch-disconnector — Quantity

Masterpact type	NT	☐	NW	☐
Rating	A			
Sensor rating	A			
Circuit breaker	N1, H1, H2, H3, L1			
Special circuit breaker	H2 anticorrosion, H10 (NW)			
Switch-disconnector	NA, HA, HF, ES, HA10 (NW)			
Number of poles	3 or 4			
Brand	Schneider Electric	☐	Square D	☐
Option: neutral on right side (NW)				☐
Type of equipment	Fixed			☐
	Drawout with chassis			☐
	Drawout without chassis (moving part only)			☐
	Chassis alone			☐
Earthing switch kit for chassis				☐

Micrologic control unit

A - ammeter	2.0 ☐	5.0 ☐	6.0 ☐	7.0 ☐
P - power meter		5.0 ☐	6.0 ☐	7.0 ☐
H - harmonic meter		5.0 ☐	6.0 ☐	7.0 ☐

LR - long-time rating plug	Standard 0.4 to 1 Ir	☐
	Low setting 0.4 to 0.8 Ir	☐
	High setting 0.8 to 1 Ir	☐
	LR OFF	☐
AD - external power-supply module	V	▭
BAT - battery module		☐
TCE - external sensor (CT) for neutral and residual earth-fault protection		☐
TCE - external sensor (CT) for over sized neutral (3P - Micrologic P / H) and residual earth-fault protection		☐
TCW - external sensor for SGR protection		☐
Rectangular sensor for earth-leakage protection	NT (280 x 115 mm)	☐
	NW (470 x 160 mm)	☐
PTE - external voltage connector		☐

Communication

COM module	JBus/ModBus	Device ☐	Chassis ☐	
Eco COM module	JBus/ModBus	Device ☐	Chassis (*)	
	(*) for drawout devices, please order 1 JBus/Modbus chassis COM module			

Connection

Horizontal	Top	☐	Bottom	☐
Vertical	Top	☐	Bottom	☐
Front	Top	☐	Bottom	☐
Vertical-connection adapters	NT - FC fixed, draw.			☐
Cable-lug adapters	NT - FC fixed, draw.			☐
Arc chute screen	NT - FC fixed			☐
Interphase barriers	NT, NW fixed, drawout			☐
Spreaders	NT fixed, drawout			☐
Disconnectable front connection adapter	NW fixed			☐
Lugs for 240□ or 300□ cables	NT fixed, drawout			▭

Micrologic control unit functions:
2.0 : basic protection (long time + inst.)
5.0 : selective protection (long time + short time + inst.)
6.0 : selective + earth-fault protection (long time + short time + inst. + earth-fault)
7.0 : selective + earth-leakage protection (long time + short time + inst. + earth-leakage)

Indication contacts

OF - ON/OFF indication contacts

Standard	4 OF 6 A-240 V AC (10 A-240 V AC and low-level for NW)		
Alternate	1 OF low-level for NT	Max. 4	qty ▭
Additional	1 block of 4 OF for NW	Max. 2	qty ▭

EF - combined "connected/closed" contacts

	1 EF 6 A-240 V AC for NW	Max. 8	qty ▭
	1 EF low-level for NW	Max. 8	qty ▭

SDE - "fault-trip" indication contact

Standard	1 SDE 6 A-240 V AC			
Additional	1 SDE 6 A-240 V AC	☐	1 SDE low level	☐
Programmable contacts	2 M2C contacts	☐	6 M6C contacts	☐
Carriage switches	Low level	☐	6 A-240 V AC	☐
CE - "connected" position	Max. 3 for NW/NT			qty ▭
CD - "disconnected" position	Max. 3 for NW - 2 for NT			qty ▭
CT - "test" position	Max. 3 for NW - 1 for NT			qty ▭
AC - NW actuator for 6 CE - 3 CD - 0 CT additional carriage switches				qty ▭

Remote operation

Remote ON/OFF	**MCH** - gear motor	V	▭
	XF - closing voltage release	V	▭
	MX - opening voltage release	V	▭
	PF - "ready to close" contact	Low level	☐
		6 A-240 V AC	☐
	BPFE - electrical closing pushbutton	V	▭
	RES - electrical reset option	V	▭
	RAR - automatic reset option		☐
Remote tripping	**MN** - undervoltage release	V	▭
	R - delay unit (non-adjustable)		☐
	Rr - adjustable delay unit		☐
	2nd **MX** - shunt release	V	▭

Locking

VBP - ON/OFF pushbutton locking (by transparent cover + padlocks) ☐

OFF position locking:

VCPO - by padlocks					☐
VSPO - by keylocks	Keyock kit (w/o keylock)	Profalux	☐	Ronis	☐
	1 keylock	Profalux	☐	Ronis	☐
	2 identical keylocks, 1 key	Profalux	☐	Ronis	☐
	2 keylocks, different keys (NW)	Profalux	☐	Ronis	☐

Chassis locking in "disconnected" position:

VSPD - by keylocks	Keyock kit (w/o keylock)	Profalux	☐	Ronis	☐
		Kirk	☐	Castell	☐
	1 keylock	Profalux	☐	Ronis	☐
	2 identical keylocks, 1 key	Profalux	☐	Ronis	☐
	2 keylocks, different keys	Profalux	☐	Ronis	☐
	Optional connected/disconnected/test position lock				☐
VPEC - door interlock		On right-hand side chassis			☐
		On left-hand side chassis			☐
VPOC - racking interlock					☐
IPA - cable-type door interlock					☐
VDC - mismatch protection					☐
VIVC - shutter position indication and locking for NW					☐
IBPO - racking interlock between crank and OFF pushbutton for NW					☐
DAE - automatic spring discharge before breaker removal for NW					☐

Accessories

VO - safety shutters on chassis for NT and NW				X
CDM - mechanical operation counter NT, NW				☐
CB - auxiliary terminal shield for chassis NT, NW				☐
CC - arc chute cover for fixed NT				☐
CDP - escutcheon NT, NW				☐
CP - transparent cover for escutcheon NT, NW				☐
OP - blanking plate for escutcheon NT, NW				☐
Brackets for mounting	NW fixed		On backplates	☐
Test kits	Mini test kit	☐	Portable test kit	☐

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As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

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Micrologic control units
2.0 A, 5.0 A, 6.0 A and 7.0 A
Low Voltage Products

User manual

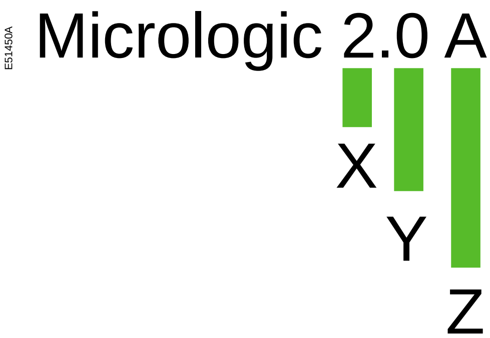
Merlin Gerin
Modicon
Square D
Telemecanique

Schneider Electric
We do more with electricity.

Micrologic control units
2.0 A, 5.0 A, 6.0 A and 7.0 A

Identifying your control unit
Designations

All Compact NS800-3200 and Masterpact NT and NW circuit breakers are equipped with a Micrologic control unit that can be changed on site. Control units are designed to protect power circuits and connected loads.

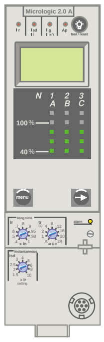


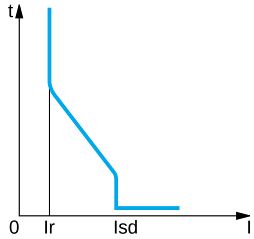
X: type of protection
- 2 for basic protection
- 5 for selective protection
- 6 for selective + ground-fault protection
- 7 for selective + earth-leakage protection

Y: version number
identification of the control-unit generation.
"0" signifies the first generation.

Z: type of measurement
- A for "ammeter"
- P for "power meter"
- H for "harmonic meter"
- no indication: no measurements

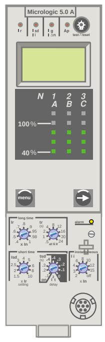
Micrologic 2.0 A: basic protection and ammeter

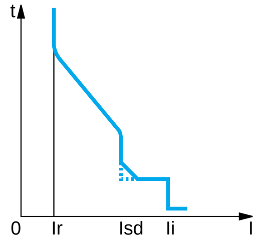




Long time + Instantaneous

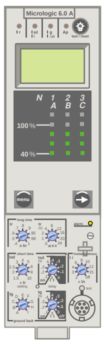
Micrologic 5.0 A: selective protection and ammeter

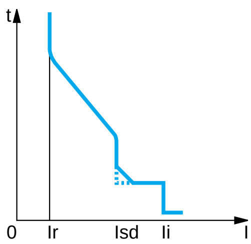




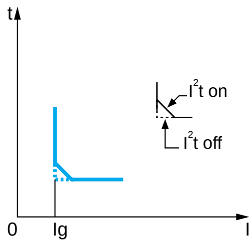
Long time + Short time + Instantaneous

Micrologic 6.0 A: selective + ground-fault protection and ammeter



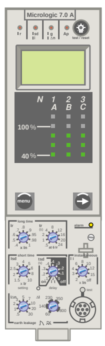


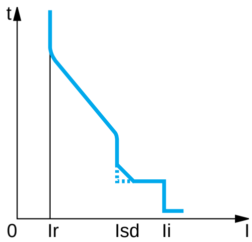
Long time + Short time + Instantaneous



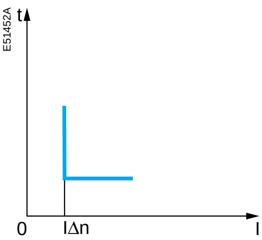
Ground-fault protection

Micrologic 7.0 A: selective + earth-leakage protection and ammeter





Long time + Short time + Instantaneous



Earth-leakage protection

Presentation

1 top fastener
2 bottom fastener
3 protective cover
4 cover opening point
5 lead-seal fixture for protective cover
6 long-time rating plug
7 screw for long-time rating plug
8 connection with circuit breaker
9 infrared link with communications interfaces
10 terminal block for external connections
11 housing for battery
12 digital display
13 three-phase bargraph and ammeter

Adjustment dials

14 long-time current setting Ir
15 long-time tripping delay tr
16 short-time pickup Isd
17 short-time tripping delay tsd
18 instantaneous pick-up Isd
19 instantaneous pick-up Ii
20 ground-fault pick-up Ig
21 ground-fault tripping delay tg
22 earth-leakage pick-up IΔn
23 earth-leakage tripping delay Δt

Indications

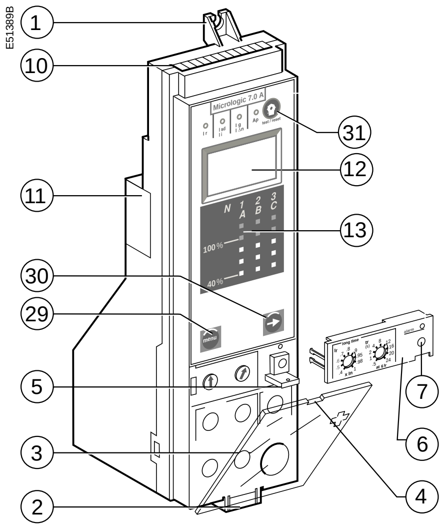
24 LED indicating long-time tripping
25 LED indicating short-time tripping
26 LED indicating ground-fault or earth-leakage tripping
27 LED indicating auto-protection tripping
28 LED indicating an overload

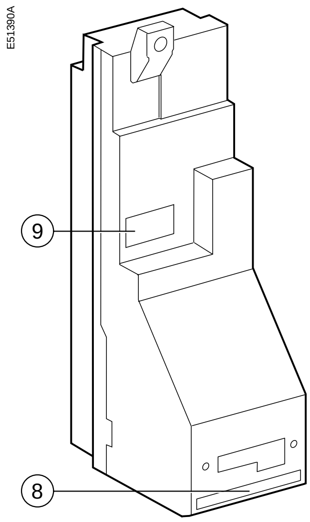
Navigation

29 navigation button to change menus
30 navigation button to view menu contents
31 button for fault-trip reset and battery test

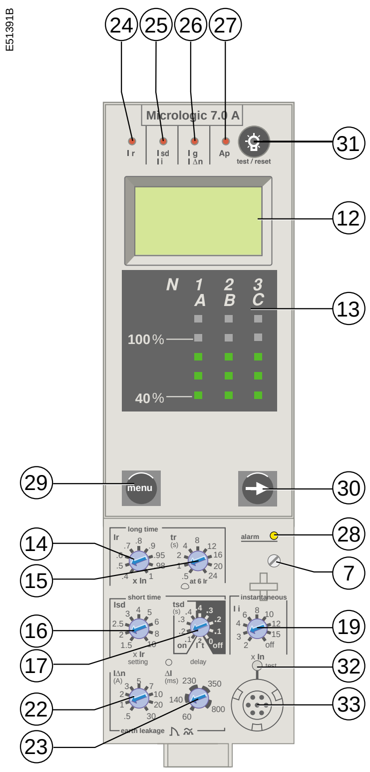
Test

32 test button for ground-fault and earth-leakage protection
33 test connector

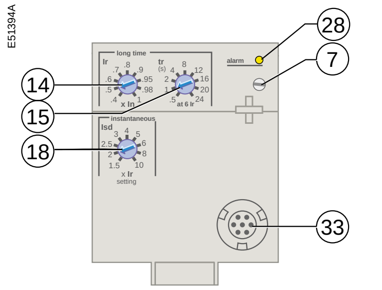




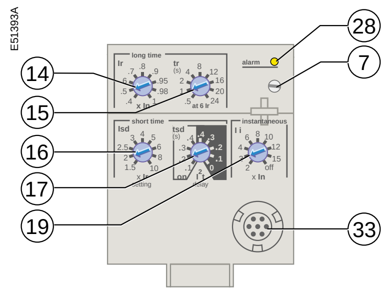
Micrologic 7.0 A



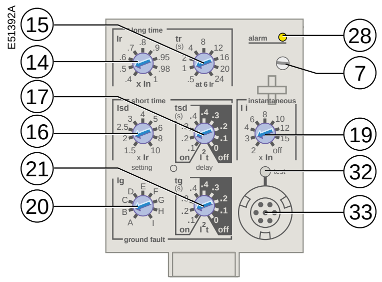
Micrologic 2.0 A



Micrologic 5.0 A



Micrologic 6.0 A

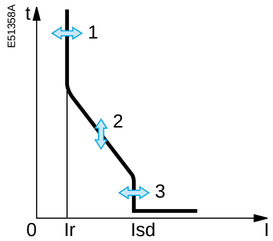


Overview of functions
Current protection

Protection settings

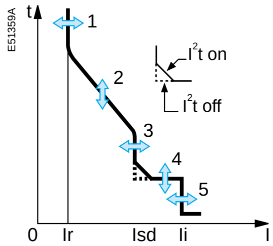
Depending on the type of installation, it is possible to set the tripping curve of your control unit using the parameters presented below.

Micrologic 2.0 A



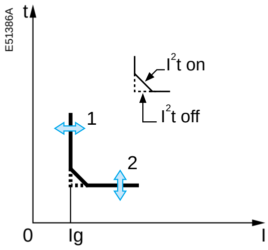
1. current setting Ir (long time)
2. tripping delay tr (long time) for 6 x Ir
3. pick-up Isd (instantaneous)

Micrologic 5.0 A, 6.0 A, 7.0 A



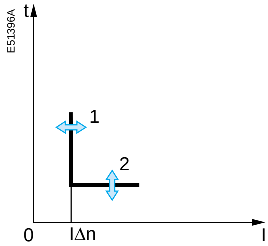
1. current setting Ir (long time)
2. tripping delay tr (long time) for 6 x Ir
3. pick-up Isd (short time)
4. tripping delay tsd (short time)
5. pick-up Ii (instantaneous)

Micrologic 6.0 A



1. pick-up Ig (ground fault)
2. tripping delay tg (ground fault)

Micrologic 7.0 A



1. pick-up IΔn (earth leakage)
2. tripping delay Δt (earth leakage)

Long-time protection

The long-time protection function protects cables (phases and neutral) against overloads. This function is based on true rms measurements.

Thermal memory

The thermal memory continuously accounts for the amount of heat in the cables, both before and after tripping, whatever the value of the current (presence of an overload or not). The thermal memory optimises the long-time protection function of the circuit breaker by taking into account the temperature rise in the cables. The thermal memory assumes a cable cooling time of approximately 15 minutes.

Long-time current setting Ir and standard tripping delay tr

Micrologic control unit		Accuracy	2.0 A, 5.0 A, 6.0 A and 7.0 A								
current setting tripping between 1.05 and 1.20 x Ir	Ir = In (*) x …		0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
			other ranges or disable by changing rating plug								
time delay (s)	tr at 1.5 x Ir	0 to -30%	12.5	25	50	100	200	300	400	500	600
	tr at 6 x Ir	0 to -20%	0.5	1	2	4	8	12	16	20	24
	tr at 7.2 x Ir	0 to -20%	0.34	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6

** In: circuit breaker rating*

Setting accuracy of the Ir setting may be enhanced by using a different long-time rating plug.
See the technical appendix "Changing the long-time rating plug".

For the characteristics and external wiring of the zone selective interlocking function, see the technical appendix on "Zone selective interlocking".

The portable test kit can be used to test the wiring between circuit breakers for the zone selective interlocking function.

Short-time protection

■ the short-time protection function protects the distribution system against impedant short-circuits
■ the short-time tripping delay can be used to ensure discrimination with a downstream circuit breaker
■ this function carries out true rms measurements.

■ the I^2t ON and I^2t OFF options enhance discrimination with downstream protection devices
■ use of I^2t curves with short-time protection:
□ I^2t OFF selected: the protection function implements a constant time curve;
□ I^2t ON selected: the protection function implements an I^2t inverse-time curve up to 10 Ir. Above 10 Ir, the time curve is constant.

■ zone selective interlocking (ZSI)
The short-time and ground-fault protection functions enable time discrimination by delaying the upstream devices to provide the downstream devices the time required to clear the fault. Zone selective interlocking can be used to obtain total discrimination between circuit breakers using external wiring.

Short-time pick-up Isd and tripping delay tsd

Micrologic control unit		2.0 A, 5.0 A, 6.0 A and 7.0 A								
pick-up	Isd = Ir x … accuracy ± 10 %	1.5	2	2.5	3	4	5	6	8	10
time delay	settings I^2t OFF	0	0.1	0.2	0.3	0.4				
(ms) at 10 Ir	I^2t ON		0.1	0.2	0.3	0.4				
I^2t ON or	tsd (max resettable time)	20	80	140	230	350				
I^2t OFF	tsd (max break time)	80	140	200	320	500				

Instantaneous protection

■ the instantaneous-protection function protects the distribution system against solid short-circuits. Contrary to the short-time protection function, the tripping delay for instantaneous protection is not adjustable.
The tripping order is sent to the circuit breaker as soon as current exceeds the set value, with a fixed time delay of 20 milliseconds.
■ this function carries out true rms measurements.

Instantaneous pick-up Isd

Micrologic control unit		2.0 A								
pick-up	Isd = Ir x … accuracy ± 10 %	1.5	2	2.5	3	4	5	6	8	10

Instantaneous pick-up Ii

Micrologic control unit		5.0 A, 6.0 A and 7.0 A								
pick-up	Ii = In (*) x … accuracy ± 10 %	2	3	4	6	8	10	12	15	OFF

** In: circuit-breaker rating*

Overview of functions
Current protection

Protection of the fourth pole on four-pole circuit breakers

Protection of the neutral conductor depends on the distribution system.
There are three possibilities.

Type of neutral	Description.
Neutral unprotected	The distribution system does not require protection of the neutral conductor.
Neutral protection at 0.5 In	The cross-sectional area of the neutral conductor is half that of the phase conductors. ■ the long-time current setting Ir for the neutral is equal to half the setting value ■ the short-time pick-up Isd for the neutral is equal to half the setting value ■ the instantaneous pick-up Isd (Micrologic 2.0 A) for the neutral is equal to half the setting value ■ the instantaneous pick-up Ii (Micrologic 5.0 A / 6.0 A / 7.0 A) for the neutral is equal to the setting value.
Neutral protection at In	The cross-sectional area of the neutral conductor is equal to that of the phase conductors. ■ the long-time current setting Ir for the neutral is equal to the setting value ■ the short-time pick-up Isd for the neutral is equal to the setting value ■ the instantaneous pick-ups Isd and Ii for the neutral are equal to the setting value.

Neutral protection for three-pole devices

Neutral protection is not available on three-pole devices.

Ground-fault protection on Micrologic 6.0 A

■ an ground fault in the protection conductors can provoke local temperature rise at the site of the fault or in the conductors.
The purpose of the ground-fault protection function is to eliminate this type of fault.
■ there are two types of ground-fault protection.

Type	Description
Residual	■ the function determines the zero-phase sequence current, i.e. the vectorial sum of the phase and neutral currents ■ it detects faults downstream of the circuit breaker.
Source Ground Return	■ using a special external sensor, this function directly measures the fault current returning to the transformer via the earth cable ■ it detects faults both upstream and downstream of the circuit breaker ■ the maximum distance between the sensor and the circuit breaker is ten metres.

■ ground-fault and neutral protection are independent and can therefore be combined.

Ground-fault pick-up Ig and tripping delay tg
The pick-up and tripping-delay values can be set independently and are identical for both the residual and "source ground return" ground-fault protection functions.

Micrologic control unit		6.0 A								
pick-up	Ig = In (*) x … accuracy ± 10 %	A	B	C	D	E	F	G	H	I
	In ≤ 400 A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	400 A < In ≤ 1200 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	In > 1200 A	500 A	640 A	720 A	800 A	880 A	960 A	1040 A	1120 A	1200 A
time delay (ms) at 10 In (*)	settings I^2t OFF	0	0.1	0.2	0.3	0.4				
	I^2t ON		0.1	0.2	0.3	0.4				
I^2t ON or	tg (max resettable time)	20	80	140	230	350				
I^2t OFF	tg (max break time)	80	140	200	320	500				

** In: circuit-breaker rating*

Current protection and alarms

Earth-leakage protection on Micrologic 7.0 A

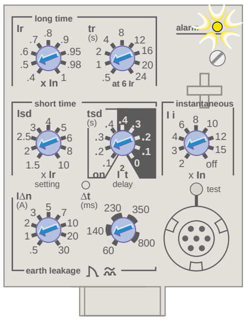
- the earth-leakage protection function primarily protects people against indirect contact because an earth-leakage current can provoke an increase in the potential of the exposed conductive parts. The earth-leakage pick-up value IΔn is displayed directly in amperes and the tripping delay follows a constant-time curve
- an external rectangular sensor is required for this function
- this function is inoperative if the long-time rating plug is not installed
- protected against nuisance tripping.
- DC-component withstand class A up to 10 A.

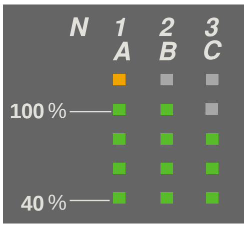
Pick-up value IΔn and tripping delay Δt

Micrologic control unit		7.0 A								
pick-up	IΔn accuracy 0 to - 20 %	0.5	1	2	3	5	7	10	20	30
time delay	settings									
(ms)	Δt (max resettable time)	60	140	230	350	800				
	Δt (max break time)	140	200	320	500	1000				

Overload LED

E51398B





This LED signals that the long-time current setting Ir has been overrun.

The auto-protection function (excessive temperature or short-circuit higher than circuit-breaker capacity) opens the circuit breaker and turns on the Ap LED.

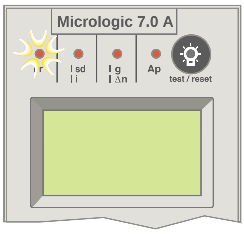
Caution.
If the circuit breaker remains closed and the Ap LED remains on, contact the Schneider after-sales support department.

Caution.
The battery maintains the fault indications. If there are no indications, check the battery.

Fault indications

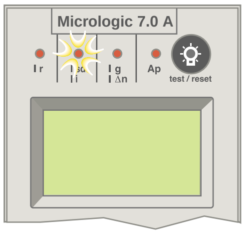
Signals tripping due to an overrun of the long-time current setting Ir.

E51399A



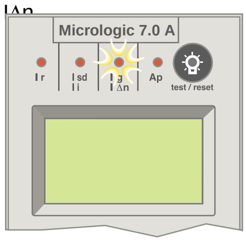
Signals tripping due to an overrun of the short-time pick-up Isd or the instantaneous pick-up Isd / Ii.

E51400A



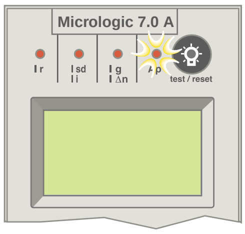
Signals tripping due to an overrun of the ground-fault pick-up Ig or the earth-leakage pick-up IΔn.

E51401A



Signals tripping due to the auto-protection function of the control unit.

E51402A

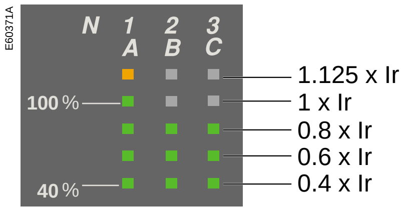


Discovering your control unit

Overview of functions
Ammeter measurements

If no information is displayed on the screen, see the technical appendix "Digital display".

■ all Micrologic control units measure the true rms value of currents
■ the most heavily loaded phase is continuously displayed on the digital screen
■ using the navigation buttons, it is possible to display successively the I1, I2, I3, neutral IN, Ig, IΔN and stored-current (maximeter) values
■ the percent load on each phase is displayed. A bargraph displays the currents measured on phases 1, 2 and 3 as a percentage of the long-time current setting Ir.



■ accuracy of the current measurements
Accuracy depends on both the value displayed (or transmitted) and the circuit-breaker rating, where:

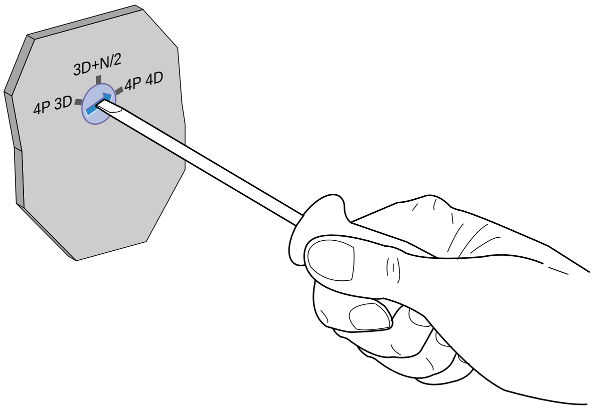
Accuracy = 0.5% In + 1.5% reading

Example
For a circuit breaker with a 4000 A rating and a current displayed on Micrologic of 49 A, the accuracy is:
0.5% x 4000 + 1.5% x 49 = ± 21 A

Selecting the type of neutral protection

On four-pole circuit breakers, it is possible to select the type of neutral protection for the fourth pole:
- neutral unprotected (4P 3D);
- neutral protection at 0.5 In (3D + N/2);
- neutral protection at In (4P 4D).

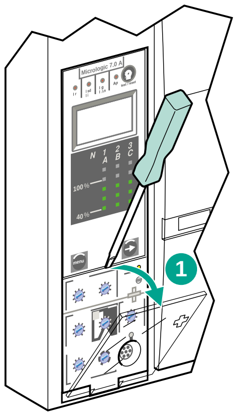
E51383A



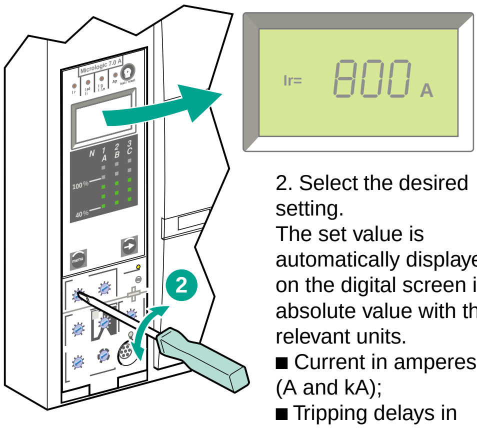
Setting procedure

1. Open the protective cover.

E51410A

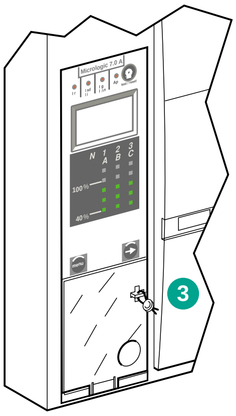


E51411A



2. Select the desired setting.
The set value is automatically displayed on the digital screen in absolute value with the relevant units.
■ Current in amperes (A and kA);
■ Tripping delays in seconds.

E51412A



3. If no information is displayed, see the technical appendix "Digital display". If no further action is taken, after a few seconds, the display returns to the main menu for current measurements.

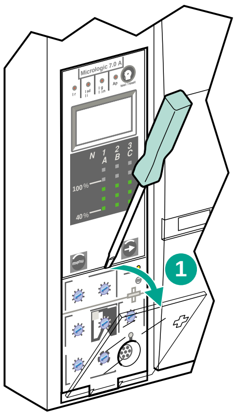
4. Close the protective cover and, if necessary, install a lead seal to protect the settings.

See the user manual for the portable test kit

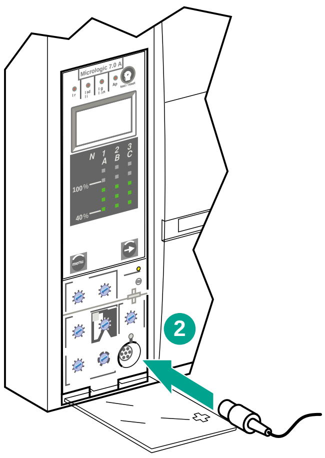
Using the portable test kit

To test the control unit, connect the portable test kit via the test connector.

E51410A



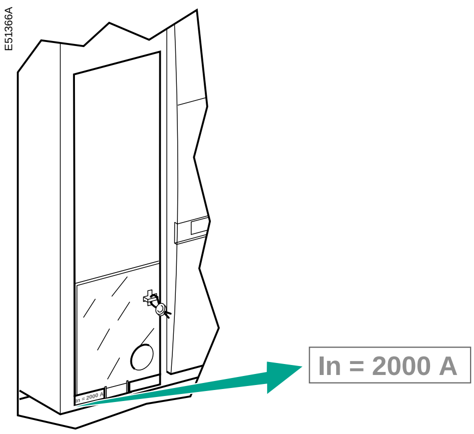
E51413A



Setting your control unit

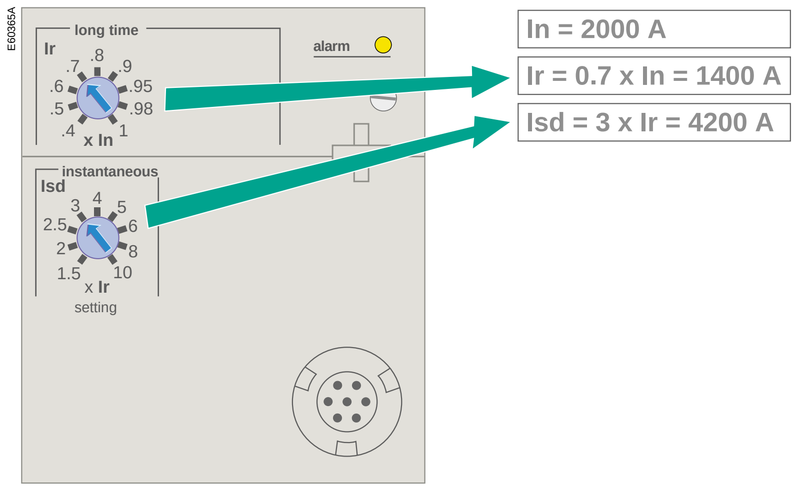
Setting the Micrologic 2.0 A control unit

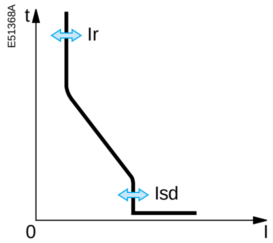
The rating of the circuit breaker in this example is 2000 A.



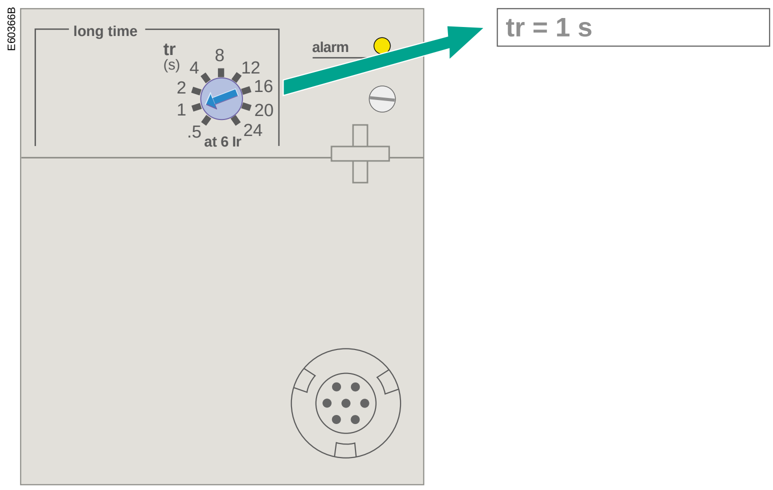
See pages 4 and 5 for information on the available settings

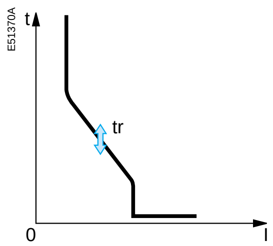
Set the threshold values





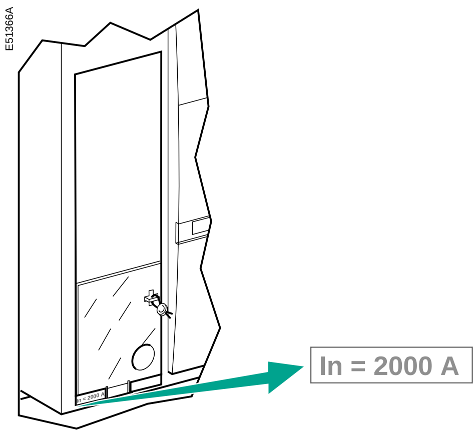
Set the tripping delay



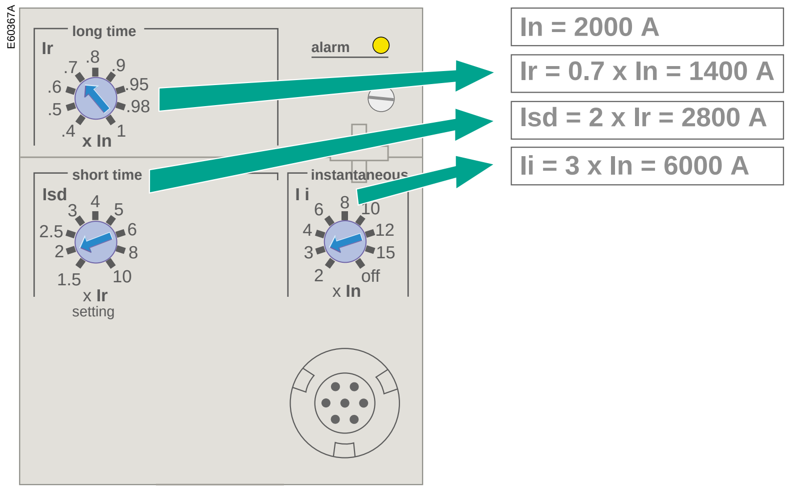


Setting the Micrologic 5.0 A control unit

The rating of the circuit breaker in this example is 2000 A.



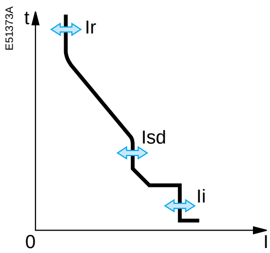
Set the threshold values



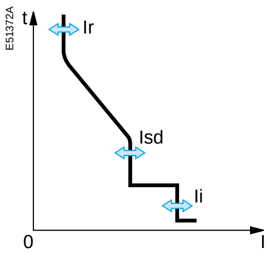
See pages 4 and 5 for information on the available settings

Thresholds

I^2t ON curve

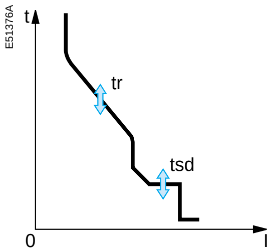


I^2t OFF curve

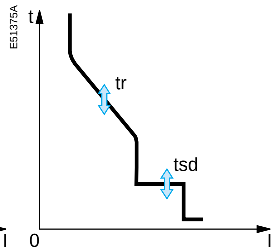


Tripping delays

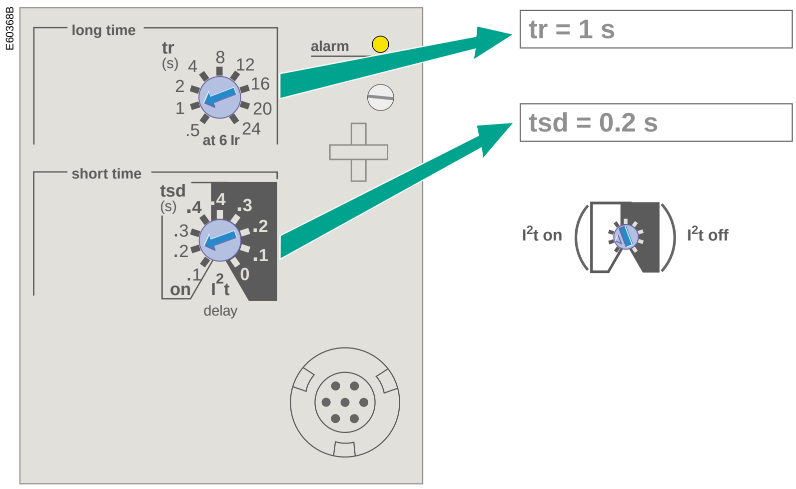
I^2t ON curve



I^2t OFF curve



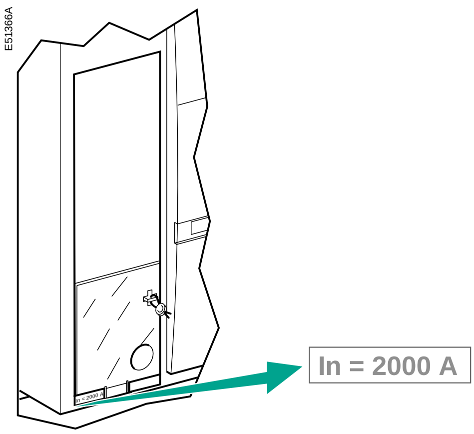
Set the tripping delay



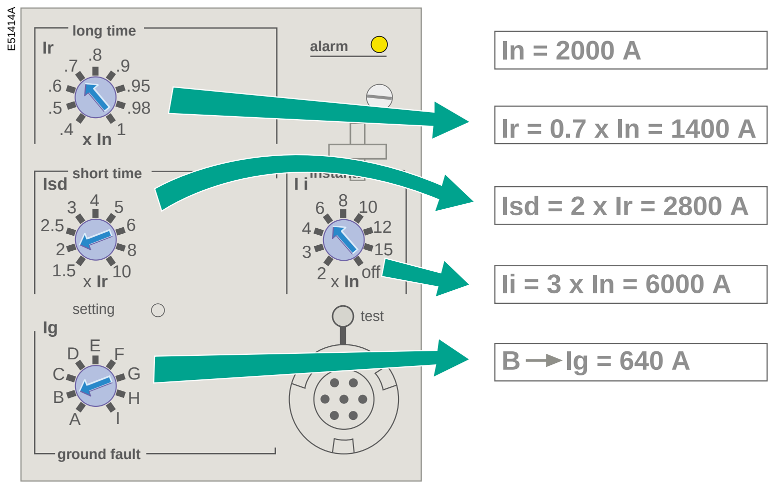
Setting your control unit

Setting the Micrologic 6.0 A control unit

The rating of the circuit breaker in this example is 2000 A.



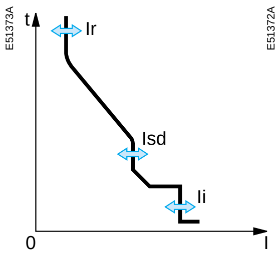
Set the threshold values

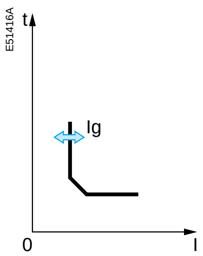


See pages 4 to 6 for information on the available settings.

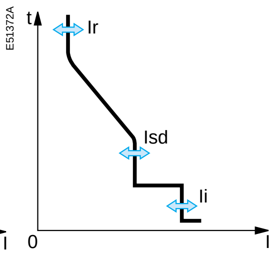
Thresholds

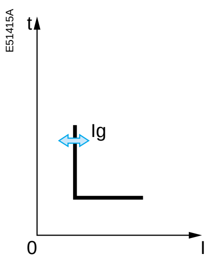
I^2t ON curve



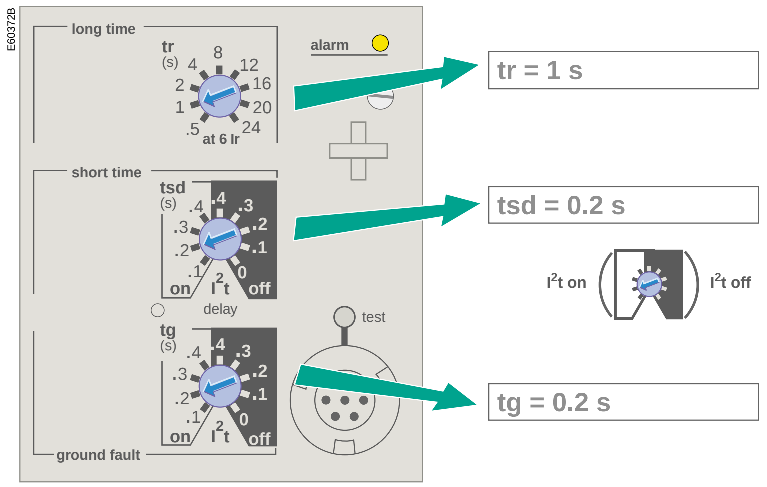


I^2t OFF curve



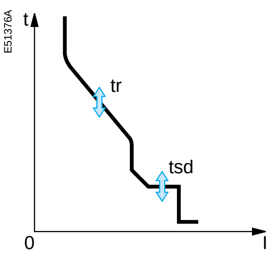


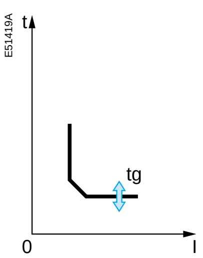
Set the tripping delay



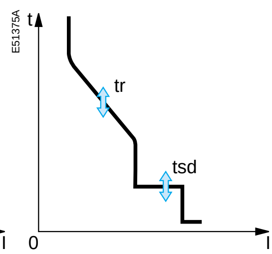
Tripping delays

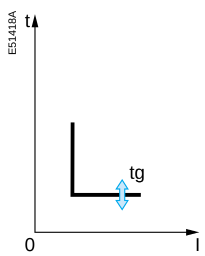
I^2t ON curve





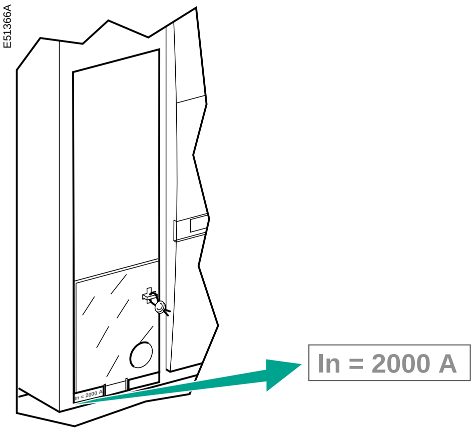
I^2t OFF curve





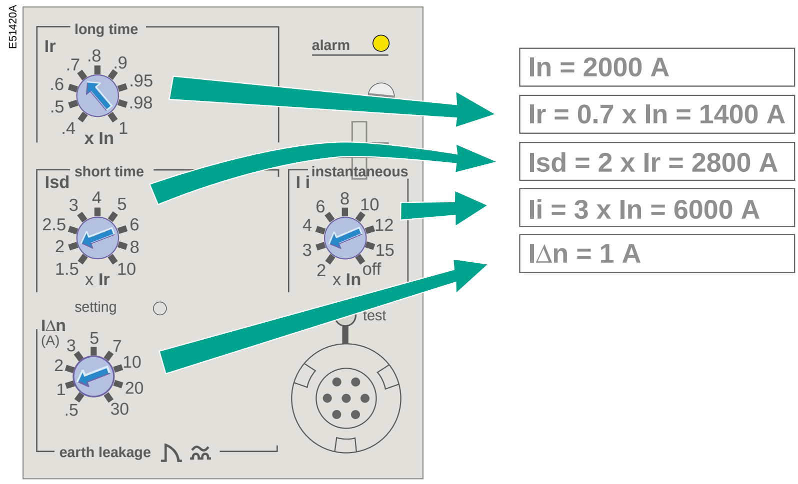
Setting the Micrologic 7.0 A control unit

The rating of the circuit breaker in this example is 2000 A.



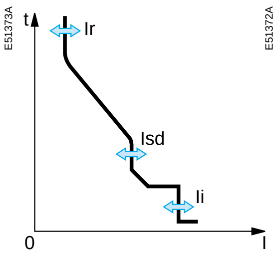
See pages 4 to 7 for information on the available settings.

Set the threshold values

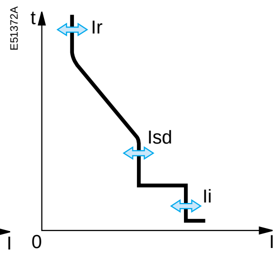


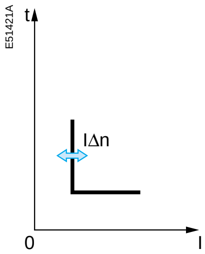
Thresholds

I^2t ON curve

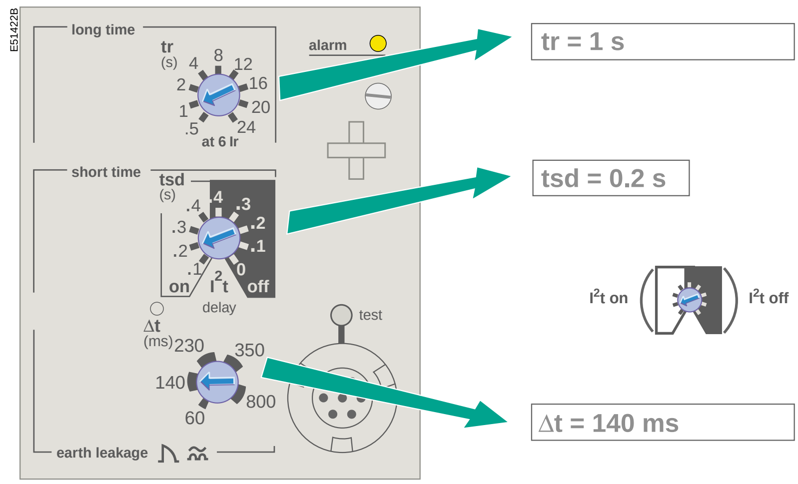


I^2t OFF curve



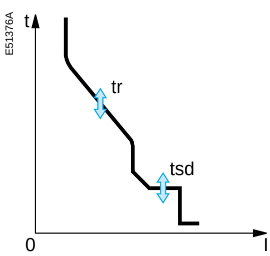


Set the tripping delay

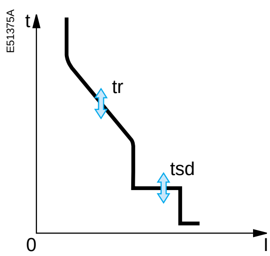


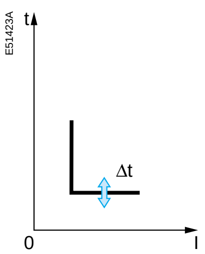
Tripping delays

I^2t ON curve



I^2t OFF curve





Fault and status indications

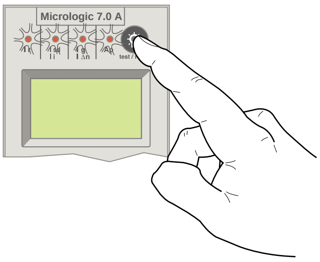
Resetting the fault indications and checking battery status

The procedure for closing the circuit breaker following a fault trip is presented in the circuit-breaker user manual.

Resetting the fault indications

■ determine why the circuit breaker tripped.
The fault indication is maintained until it is reset on the control unit.
□ press the fault-trip reset button.

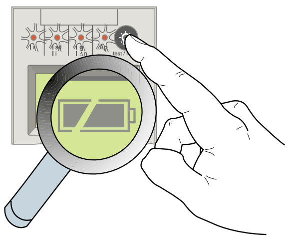
E51439A



□ check the parameter settings of the control unit.

Checking the battery

E51440A



Press the battery-test button (same as the fault-trip reset button) to display the battery status.

E51441A

Battery fully charged
Battery half charged
Change the battery

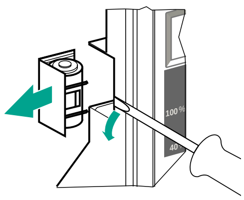
If no information is displayed, either:
■ no battery is installed in the control unit, or;
■ an auxiliary power supply is required.
See the technical appendix "Digital display".

If the battery needs to be changed, order a new battery with the Schneider catalogue number 33593.
- *lithium battery*
- *1.2 AA, 3.6 V, 850 mA/h*
- *SAFT LS3 SONNENSCHEIN TEL-S*
- *service life ten years.*

Changing the control-unit battery

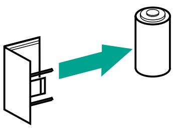
1. Remove the battery cover.

E51442A



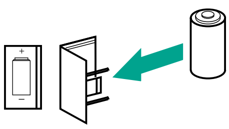
2. Remove the battery.

E51443A



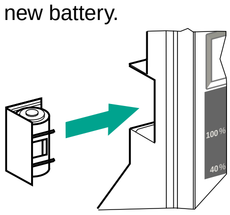
3. Insert a new battery. Check the polarity.

E51444A



4. Put the cover back in place. Press the battery-test button to check the new battery.

E51445A

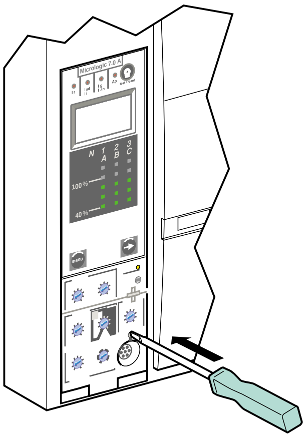


Testing the ground-fault and earth-leakage functions

Charge and close the circuit breaker.

Using a screwdriver, press the test button for ground-fault and earth-leakage protection. The circuit breaker should open.

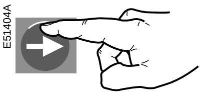
E51456B



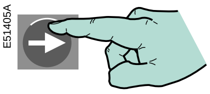
If the circuit breaker does not open, contact the Schneider after-sales support department.

Accessing the menus

Symbols used:



Briefly press a key.



Press and hold a key.

It is possible at any time to stop consulting a current measurement, a maximum current value recorded by the maximeter or the setting values. After a few seconds, the Micrologic control unit automatically returns to the main menu displaying the current value of the most heavily loaded phase.

The protection settings can be displayed directly on the digital display.

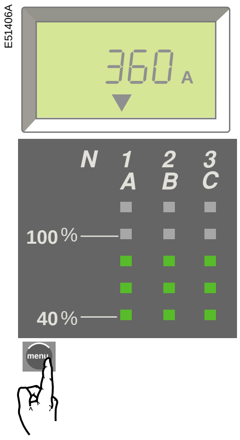
Three menus may be accessed on Micrologic control units, providing the following information:

■ phase current measurements I1, I2, I3, neutral IN, ground-fault current Ig on the Micrologic 6.0 A control unit and earth-leakage current IΔn on the Micrologic 7.0 A control unit;

■ maximeter current values for phases I1, I2, I3, neutral IN, the maximum ground-fault current Ig on the Micrologic 6.0 A control unit and the maximum earth-leakage current IΔn on the Micrologic 7.0 A control unit;

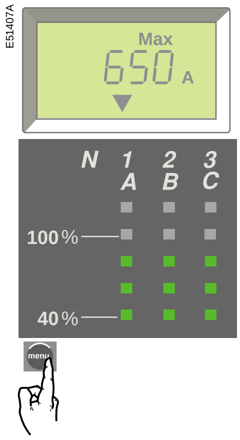
■ protection settings and tripping delays.

1. **Measurements**



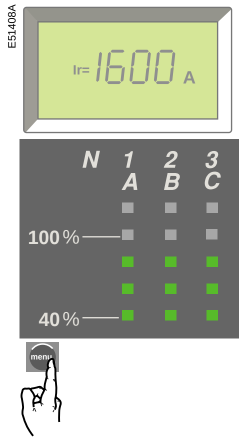
Press the "menu" button to access the maximum current values measured by the **maximeter**.

2. **Maximeter**



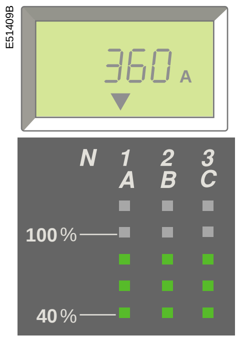
Press the "menu" button to access the protection **settings** and tripping delays.

3. **Settings**



Press the "menu" button to return to the current **measurements**.

4. The system returns to the main **"Measurements"** menu.

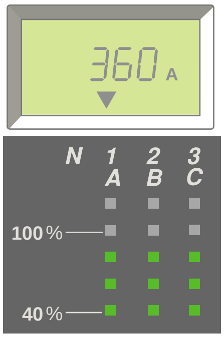


Measuring phase currents

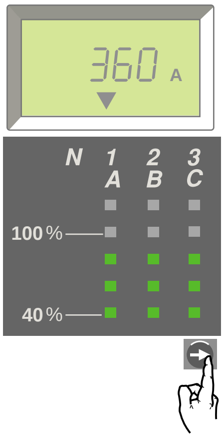
Current values may be read in the "Measurements" menu, which is also the main menu.

If no particular action is taken, the system displays the current value of the most heavily loaded phase.

"Measurements" menu
Phase 1 is the most heavily loaded.

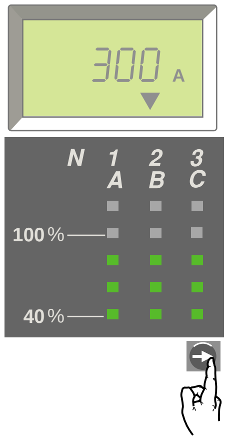
E51409B


Display of current I1.

E51425A


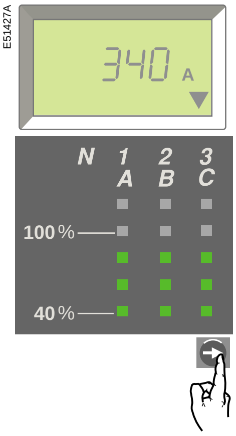
Press the "arrow" button to go on to current I2.

Display of current I2.

E51426A


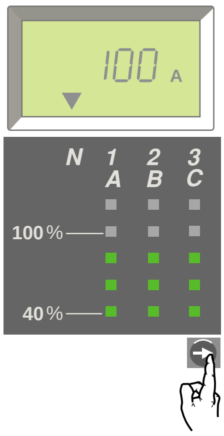
Press the "arrow" button to go on to current I3.

Display of current I3.

E51427A


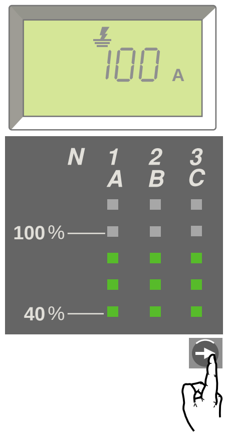
Press the "arrow" button to go on to current IN if the neutral is protected.

Display of current IN.

E51429A


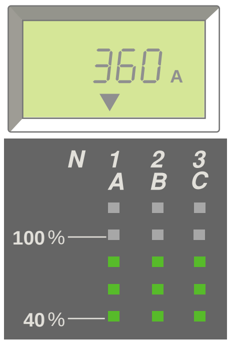
Press the "arrow" button to go on to the ground-fault current Ig or the earth-leakage current IΔn.

Display of current Ig (Micrologic 6.0 A) or current IΔn (Micrologic 7.0 A).

E51428A


Press the "arrow" button to return to current I1.

The system returns to the display of current I1.

E51409B


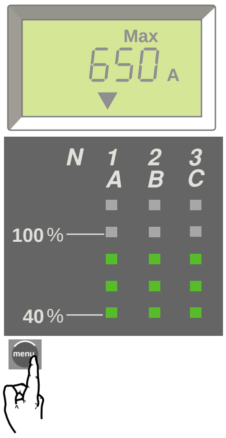
Displaying the maximum current values

Maximum current values may be read in the "Maximeter" menu.

If no particular action is taken, the system returns to the main menu.

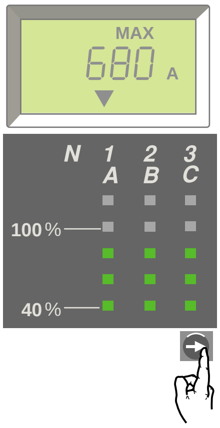
"Maximeter" menu.

E51407A



Display of the maximum I1 current.

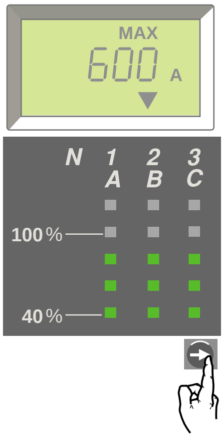
E51430A



Press the "arrow" button to go on to the maximum I2 current.

Display of the maximum I2 current.

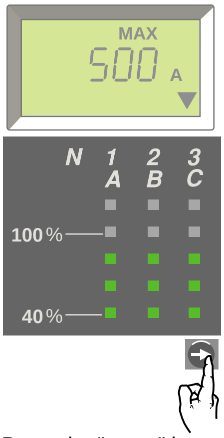
E51431A



Press the "arrow" button to go on to the maximum I3 current.

Display of the maximum I3 current.

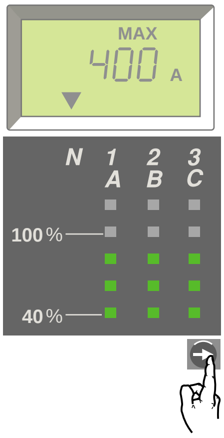
E51432A



Press the "arrow" button to go on to the maximum current IN if the neutral is protected.

Display of the maximum IN current.

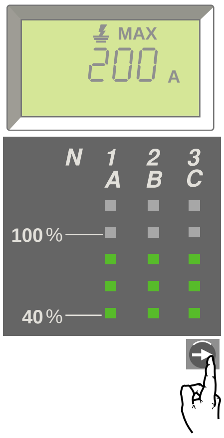
E51434A



Press the "arrow" button to go on to the maximum ground-fault current Ig (Micrologic 6.0 A) or the maximum earth-leakage current IΔn (Micrologic 7.0 A)

Display of the maximum Ig current or the maximum IΔn current.

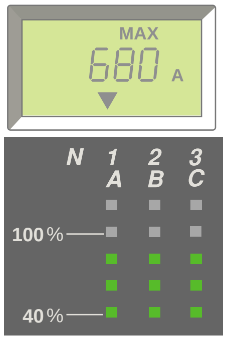
E51433A



Press the "arrow" button to return to the maximum I1 current.

The system returns to the display of the maximum I1 current.

E51435A

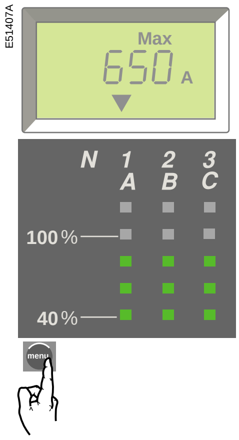


Resetting the maximum current values

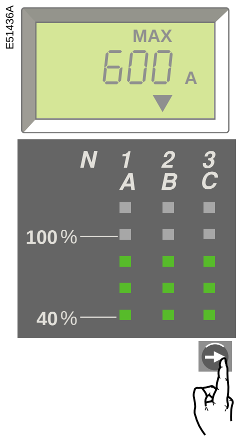
Maximum current values can be reset using the "Maximeter" menu.

If no particular action is taken, the system returns to the main menu.

"Maximeter" menu.

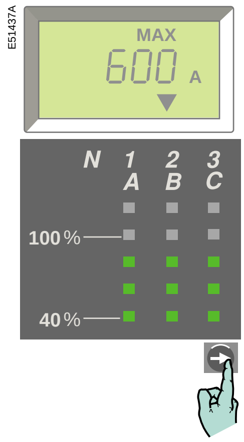


Select the maximum current value to be reset (e.g. I2 max.).



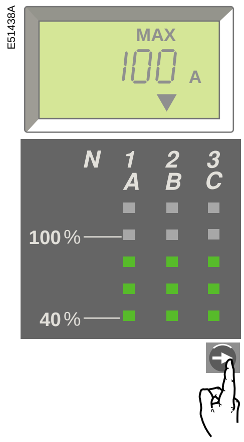
Press the "arrow" button as many times as required to select I2 max.

Reset.



Press and hold the "arrow" button down for three to four seconds. The current value flashes during the reset, then changes to the present value (the new maximum).

Select another value to reset or return to the main menu.



Press the "arrow" button as many times as required to select another maximum value to reset or return to the main menu.

Viewing the settings

Micrologic control unit
2.0 A 5.0 A 6.0 A 7.0 A

E60374B

Long-time current setting Ir

Select the "Settings" menu.
The Ir value is the first displayed.

Ir= 1400 A

Long-time tripping delay tr

Press the "arrow" button to go on to the tr value.

tr= 1 S

Short-time pick-up Isd

Press the "arrow" button to go on to the short-time Isd value.

Isd= 2800 A

Short-time tripping delay tsd

Press the "arrow" button to go on to the tsd value.

tsd= 0.200 S

Instantaneous pick-up Isd

Press the "arrow" button to go on to the instantaneous Isd value.

Or

Isd= OFF A

Instantaneous pick-up Ii

the instantaneous Ii value.

Ii= OFF A

Ground-fault pick-up Ig

Press the "arrow" button to go on to the Ig value.

Or

Ig= 40 A

Earth-leakage pick-up IΔn

the IΔn value.

IΔn= 131 A

Ground-fault tripping delay tg

Press the "arrow" button to go on to the tg value.

Or

tg= 0.200 S

Earth-leakage tripping delay Δt

the Δt value.

Δt= 0.100 S

Press the "arrow" button to return to the beginning of the menu.

Ir= 1400 A

Setting up the Modbus communications option

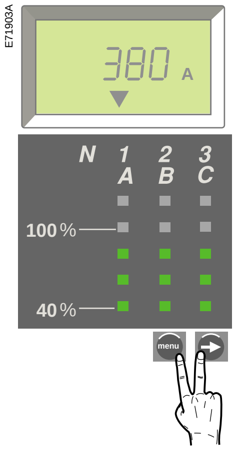
When a communications option is used, the communications parameters must be set. Note that the COM module should be set up only when installed. Modification of a parameter on a system already in operation may lead to communications faults.

The "Parameter" menu for the communications option displays the:

- *address of the communications module;*
- *baud rate;*
- *parity;*
- *language.*

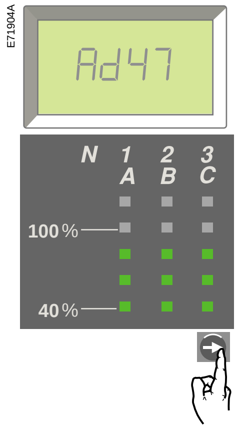
Briefly press the button to scroll through the parameter values.
Press the button somewhat longer to go on to the next parameter.
After selecting the language, press and hold the button to return to the "Metering" menu.

1. Metering menu

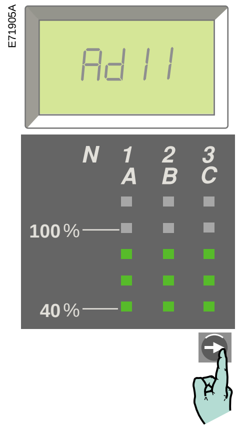


You are in the "Metering" menu. Simultaneously press the two buttons to access the parameter settings for the communications option.

2. Modbus address

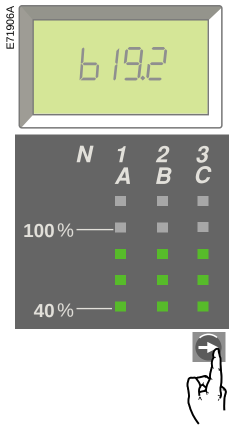


Set the Modbus address,

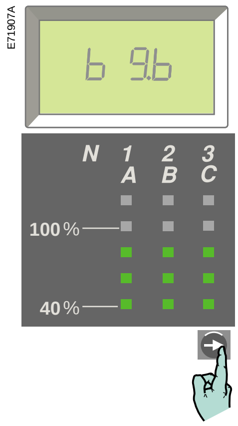


then go on to the next parameter.

3. Baud rate

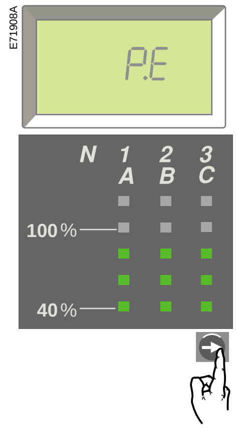


Set the baud rate,

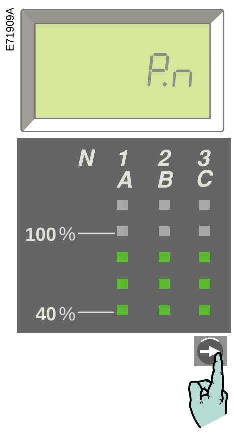


then go on to the next parameter.

4. Parity

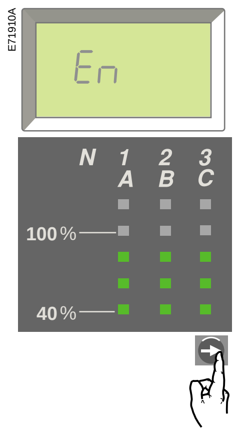


Set the parity.

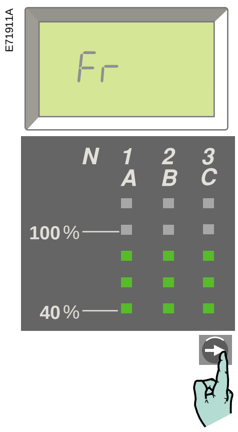


then go on to the next parameter.

5. Language



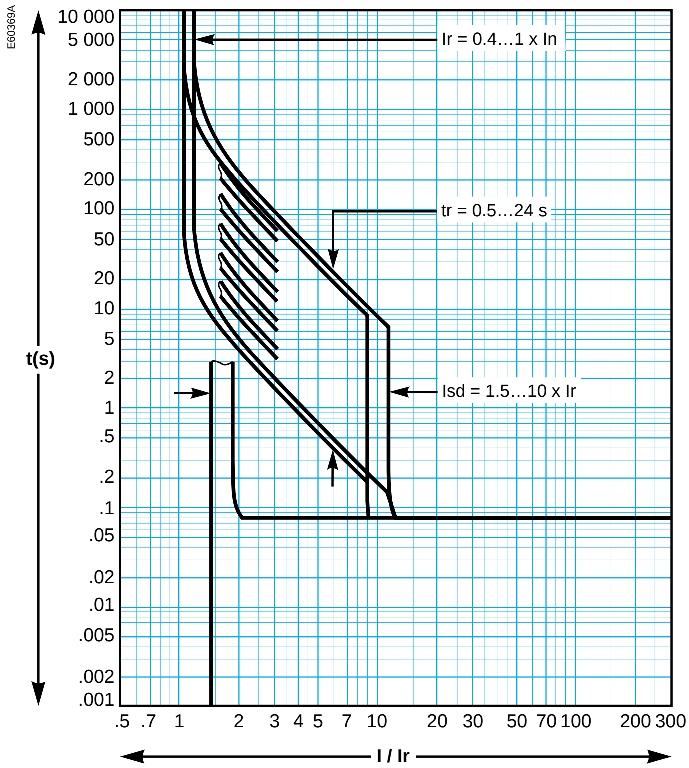
Set the language,



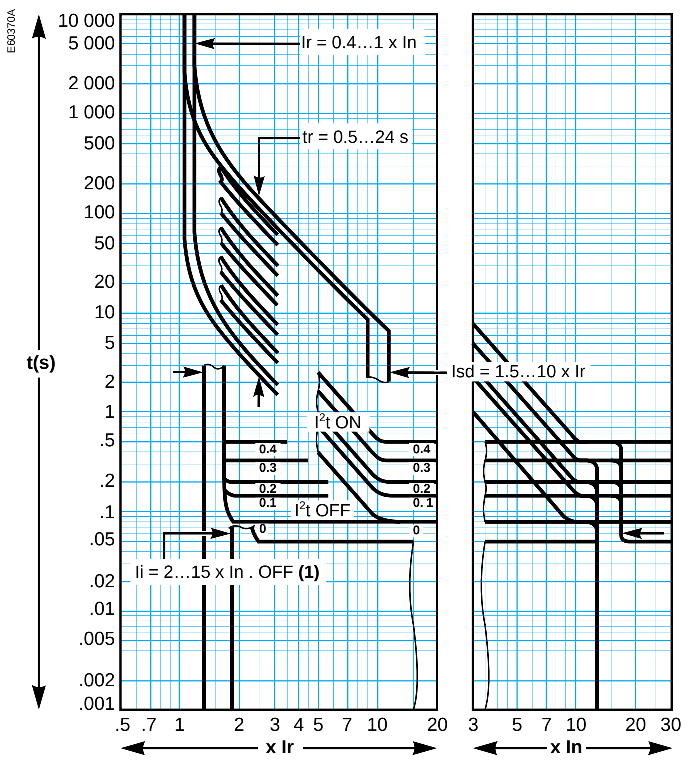
then return to the "Metering" menu.

Tripping curves

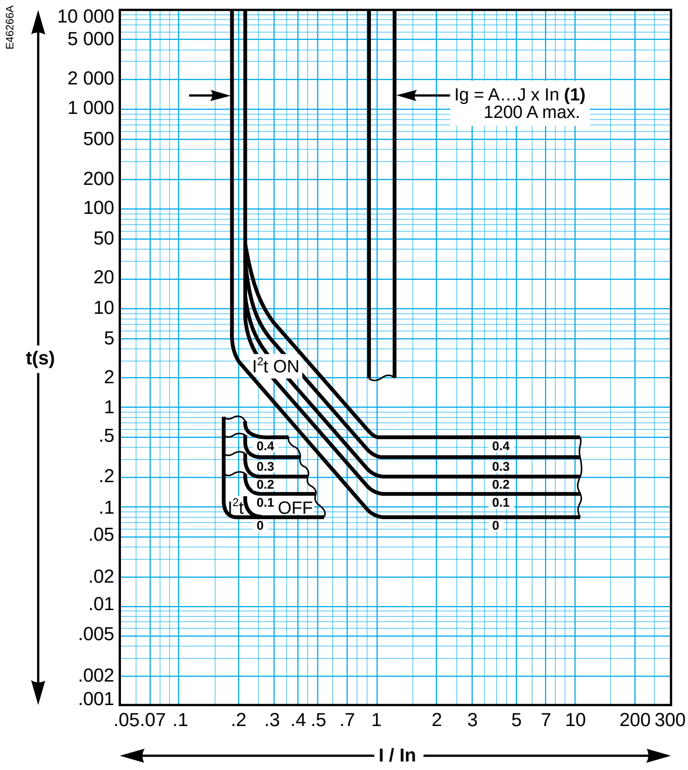
Long-time and instantaneous protection (Micrologic 2.0 A)



Long-time, short-time and instantaneous protection (Micrologic 5.0 A, 6.0 A and 7.0 A)



Ground-fault protection (Micrologic 6.0 A)



Changing the long-time rating plug

Select the long-time rating plug

A number of setting ranges for the long-time current setting are available on Micrologic A control units by changing the long-time rating plug.

The available rating plugs are listed below.

Part number	Setting range for the Ir value	
33542	standard	0.4 to 1 x Ir
33543	low setting	0.4 to 0.8 x Ir
33544	high setting	0.8 to 1 x Ir
33545	without long-time protection Ir = In for the Isd setting	

Caution.
Following any modifications to the long-time rating plug, all control-unit protection parameters must be checked.

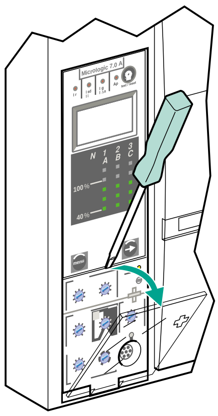
Change the long-time rating plug

Proceed in the following manner.

1. Open the circuit breaker.

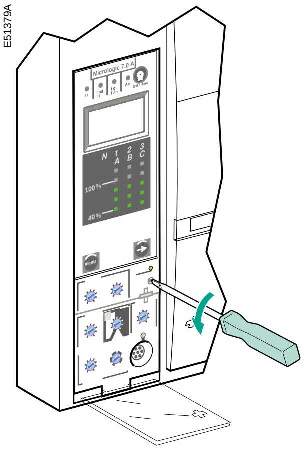
2. Open the protective cover of the control unit.

E51378A



3. Completely remove the long-time rating plug screw.

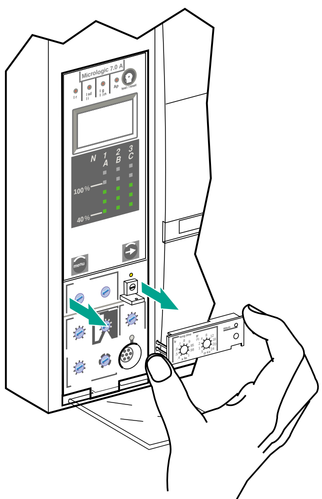
E51379A



Caution.
If no long-time rating plug is installed, the control unit continues to operate under the following downgraded conditions:
- *the long-time current setting Ir is 0.4;*
- *the long-time tripping delay tr corresponds to the value indicated by the adjustment dial;*
- *the earth-leakage protection function is disabled.*

4. Snap out the rating plug.

E51380A

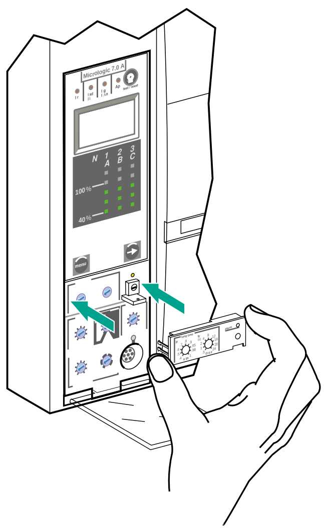


5. Clip in the new rating plug.

6. Refit the screw for the long-time rating plug.

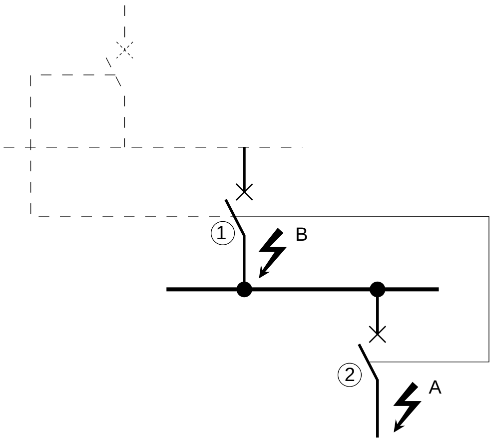
7. Check and/or modify the control-unit settings.

E51381A



Zone selective interlocking (ZSI)

E51397B



Operating principle

■ A fault occurs at point A.
Downstream device no. 2 clears the fault and sends a signal to upstream device no. 1, which maintains the short-time tripping delay tsd or the ground-fault tripping delay tg to which it is set.
■ A fault occurs at point B.
Upstream device no. 1 detects the fault. In the absence of a signal from a downstream device, the set time delay is not taken into account and the device trips according to the zero setting. If it is connected to a device further upstream, it sends a signal to that device, which delays tripping according to its tsd or tg setting.

Note :
On device no. 1, the tsd and tg tripping delays must not be set to zero because this would make discrimination impossible.

Connections between control units

A logic signal (0 or 5 volts) can be used for zone selective interlocking between the upstream and downstream circuit breakers.
■ Micrologic 5.0 A, 6.0 A, 7.0 A.
■ Micrologic 5.0 P, 6.0 P, 7.0 P.
■ Micrologic 5.0 H, 6.0 H, 7.0 H.
An interface is available for connection to previous generations of trip units.

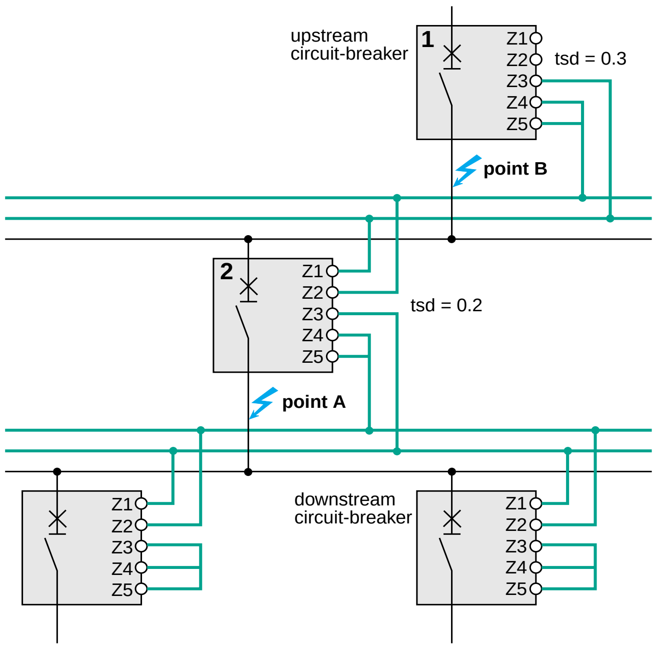
Caution.
If the protection function is not used on circuit breakers equipped for ZSI protection, a jumper must be installed to short terminals Z3, Z4 and Z5.
If the jumper is not installed, the short-time and ground-fault tripping delays are set to zero, whatever the position of the adjustment dial.

Wiring

■ maximum impedance: 2.7 Ω / 300 metres
■ capacity of connectors: 0.4 to 2.5 mm^2
■ wires: single or multicore
■ maximum length: 3000 metres
■ limits to device interconnection:
□ the common ZSI - OUT (Z1) and the output ZSI - OUT (Z2) can be connected to a maximum of 10 inputs;
□ a maximum of 100 devices may be connected to the common ZSI - IN (Z3) and to an input ZSI - IN CR (Z4) or GF (Z5).

Terminals Z1 to Z5 correspond to the identical indications on the circuit-breaker terminal blocks.

E71912A



Test

The portable test kit may be used to check the wiring and operation of the zone selective interlocking between a number of circuit breakers.

Digital display

For information on connecting an external power supply, see the electrical diagrams in the circuit-breaker user manual.

■ display of measurements operates without an external power supply.
The digital display goes off if the current drops below 0.2 x In (In = rated current).
An optional 24 V external power supply may be used to maintain the display of currents.

■ display back-lighting is disabled in the following situations:
□ current less than 1 x In on one phase;
□ current less than 0.4 x In on two phases;
□ current less than 0.2 x In on three phases.

■ the maximeter does not operate for currents under 0.2 x In.

The display back-lighting and the maximeter may be maintained, whatever the current, by adding a 24 V external power supply. Even if an external power supply is installed, the long-time, short-time, instantaneous and earth protection functions will not use it.

Thermal memory

Thermal memory

The thermal memory is the means to take into account temperature rise and cooling caused by changes in the flow of current in the conductors.

These changes may be caused by:
- ■ repetitive motor starting
- ■ loads fluctuating near the long-time protection settings
- ■ repeated circuit-breaker closing on a fault.

Control units with a thermal memory record the temperature rise caused by each overload, even very short ones. This information stored in the thermal memory reduces the tripping time.

Micrologic control units and thermal memory

All Micrologic control units are equipped as standard with a thermal memory
- ■ for all protection functions, prior to tripping, the temperature-rise and cooling time constants are equal and depend on the tr tripping delay:
  - □ if the tripping delay is short, the time constant is low
  - □ if the tripping delay is long, the time constant is high.

- ■ for long-time protection, following tripping, the cooling curve is simulated by the control unit. Closing of the circuit breaker prior to the end of the time constant (approximately 15 minutes) reduces the tripping time indicated in the tripping curves.

Short-time protection and intermittent faults

For the short-time protection function, intermittent currents that do no provoke tripping are stored in the Micrologic memory.
This information is equivalent to the long-time thermal memory and reduces the tripping delay for the short-time protection.
Following a trip, the short-time tsd tripping delay is reduced to the value of the minimum setting for 20 seconds.

Ground-fault protection and intermittent faults

The ground-fault protection implements the same function as the short-time protection.

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As standards, specifications and designs develop from time, always ask for confirmation of the information given in this publication.

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FAIRFIELD WATER RECLAMATION PLANT

MOULDED CASE CIRCUIT BREAKERS

1. COMPACT NSX CATALOGUE
2. COMPACT NS630b TO 1600 A USER MANUAL
3. COMPACT NS630b TO 1600 A ACCESSORIES

Low Voltage

Compact NSX

Moulded-case circuit breakers and switch-disconnectors
Measurement and communication
from 100 to 630 A

Catalogue
2009

Schneider Electric

Compact NSX

Next-generation circuit breakers

Today, next-generation Compact NSX circuit breakers provide an intelligent outlook and set the standards of tomorrow. A power monitoring unit enhances their invariably impeccable protective functions. For the first time, users can monitor both energy and power, offering new performance in a remarkably compact device.

Compactness, discrimination and modularity – all of the features which defined the success of the Compact NS generation of circuit breakers combined with new functions for safe, easy monitoring and management of installations.

The new range of Compact NSX circuit breakers stands out from the crowd, thanks to its electronic intelligence. Through direct access to in-depth information, and networking via open protocols, Compact NSX lets operators optimise the management of their electrical installations.

Far more than a circuit breaker, Compact NSX is a measurement and communication tool ready to meet energy-efficiency needs through optimised energy consumption, increased energy availability, and improved installation management.

Safety and performance

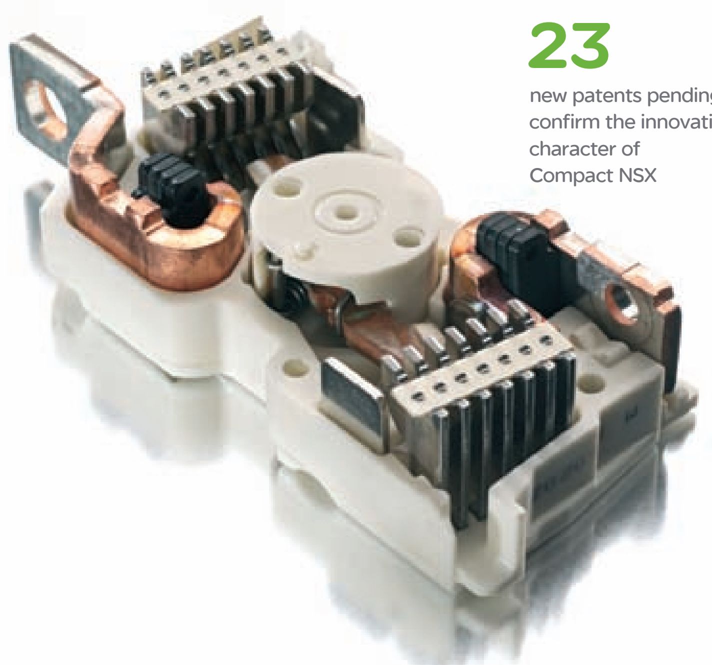
Compactness, discrimination and modularity – new Compact NSX circuit breakers incorporate advanced monitoring and communication functions, from 40 amps up, combined with impeccable protection.

Expert technology

A roto-active contact breaking principle provides each circuit breaker with very high breaking capacity in a very small device, remarkable fault current limitation performance, and endurance.

> Compact NSX benefits from a patented double roto-active contact breaking concept, together with a reflex tripping system for ultimate breaking.

> Exceptional fault current limitation guarantees robust, reliable protection and, above all, reduces the causes of component aging, thus extending service life for installations.



23
new patents pending confirm the innovative character of Compact NSX

New breaking capacities

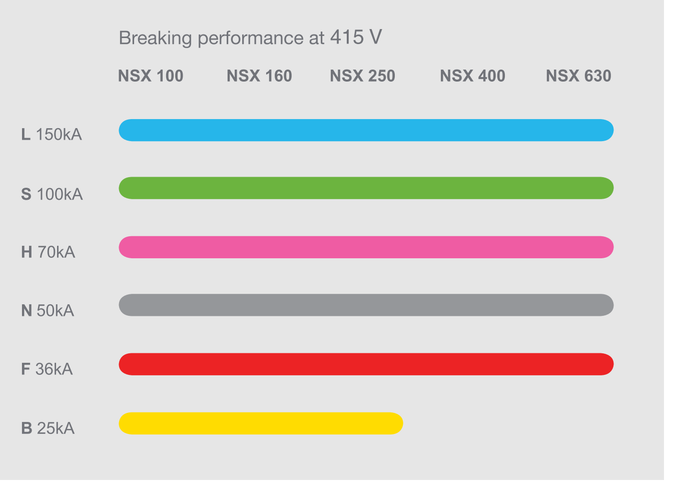
New performance levels for Compact NSX improve application targeting:

> 25 kA – standard low short-circuit level applications, e.g., for service businesses,

> 36-50 kA – standard applications (industrial plants, buildings and hospitals),

> 70-100 kA – high performance at controlled cost,

> 150 kA – demanding applications (maritime).



Enhanced protection for motors

Compact NSX meets the requirements of IEC 60947-4-1 standards for protection of motors:

> well adapted to motor-starting solutions up to 315 kW at 400 V, providing protection against short circuits, overloads, phase unbalance and loss,

> also enables set-up of additional protection systems for starting and braking with the motor running, reverse braking, jogging or reversing in complete safety,

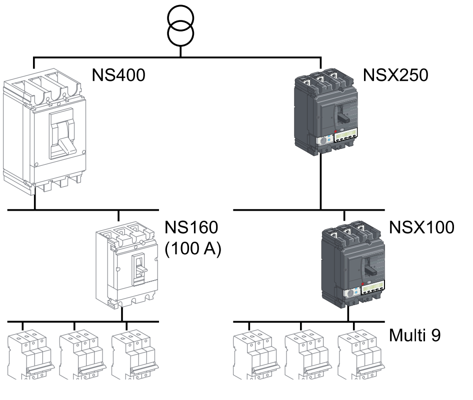
> add a Schneider Electric contactor; Compact NSX complies with the requirements of so-called type 2 coordination.

Reduced installation costs

Optimising installations allows for achieving up to 30 % savings:

> considerable savings at the time of installation, thanks to total discrimination with miniature circuit breakers,

> smaller devices, more economic switchboards mean best overall installation cost, without overcalibration.



The trip units are now true circuit breaker control systems.

With the integration of electronics, trip units have gained in **speed and accuracy.**

Greater reliability and better discrimination allows more refined settings, especially for time delays.

Monitoring and management

Compact NSX is a single device, which contains a monitoring unit to control energy consumption and power.

Integrated monitoring

> The new Compact NSX range incorporates Micrologic electronic trip units in the circuit breaker, offering both:

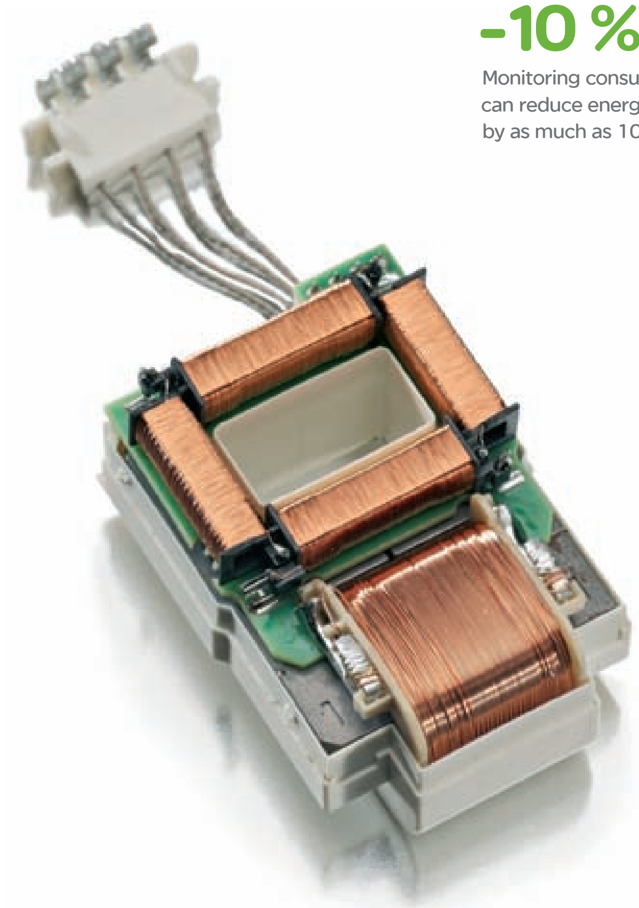
- an accurate power monitoring unit,
- a highly reliable protective device.

> A Micrologic electronic tripping device combines next-generation sensors:

- an "iron" sensor for the power supply to the electronics,
- an "air" sensor (Rogowski coils) for measurement, guaranteeing high accuracy.

> These electronic systems are designed to withstand high temperatures (105°C), ensuring reliability under severe operating conditions.

> The originality lies in how Compact NSX measures, processes and displays data, either directly on screen, on the switchboard front panel, or via a monitoring system.



-10 %

Monitoring consumption can reduce energy costs by as much as 10 %.

Accessibility of information...

To keep costs under control and ensure service continuity, relevant information must be available in real time:

> a kilowatt-hour meter helps optimise costs and their allocation,

> harmonic distortion rate shows the quality of electrical supply,

> alarm notification secures operational control and maintenance planning,

> event logs and tables, activated continuously, ensure the installed equipment base operates correctly, so energy efficiency is maximized.

...for power monitoring

> Together with power monitoring software (e.g., PowerLogic), the Compact NSX Modbus communication interface provides operators with a parameter set and tools that make system monitoring very easy.

> Operators have real-time data to control energy availability, to monitor power supply quality, to optimise consumption of different applications or zones, reducing load peaks and continuously supplying priority loads, and to draw up maintenance schedules.

> A software utility (RSU) allows protection and alarm configuration, in addition to testing communications with all installed devices.

Logiciel de supervision PowerLogic ION-E

ASIC

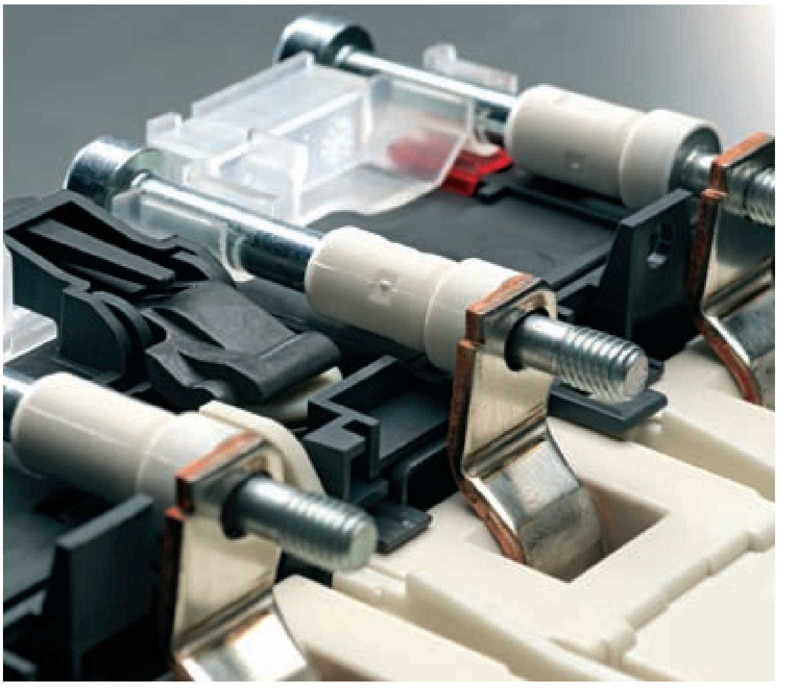
Measurement functions are controlled by an additional microprocessor.

Protection functions are electronically managed independently of measurement functions.

An ASIC (Application-Specific Integrated Circuit) is common to all trip units, which boosts immunity to conducted or radiated interference and increases reliability.

Simplicity

Compact NSX takes the principles of easy installation and use – which made its predecessor so successful – to a higher level.

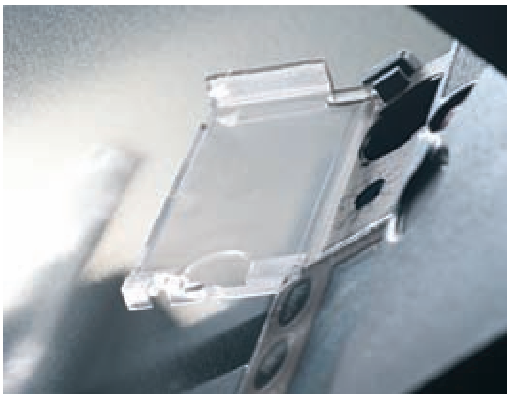


Simple in design

Compact NSX is mounted and wired reusing the same measurements as Compact NS.

Cut-outs are the same whatever the type of handle. Engineering drawings are the same, so installation and connection layouts can be used on new projects, simplifying extensions or retrofits, and reducing maintenance costs.

Integration in help software, for parameter settings and switchboard installation, further eases design.



Simple to install

> A Limited Torque Screw (LTS) system ensures proper installation of the tripping device, for added flexibility. It insures each screw is aligned correctly and tightened to the required torque. The LTS system thus avoids the need for a torque wrench.

> A transparent lead-sealable cover protects access to tripping device switches and prevents settings from being changed.

> The new electrical control adjustment also has a transparent lead- sealable cover to prevent it from being operated accidentally.

> Compact NSX has an optional functional terminal shield that offers excellent protection against direct contact (IP40 on all sides, IP20 at cable entry points) and easy installation.

> All Compact NSX devices can be equipped with a communication function via a pre-wired connection with a Modbus interface module. When the Modbus address is declared, the Compact NSX device is integrated into the network.

65 %

time savings in installation compared with a classic monitoring solution.

> There are four levels of functionalities:
- communication of device status: On/Off position, trip indication and fault-trip indication,
- communication of commands: open, close, and reset,
- communication of measurements: mainly I, U, f, P, E, and THD,
- communication of operating assistance data: settings, parameters, alarms, histograms and event tables, and maintenance indicators.

> The switchboard "plug & play" display unit connects to the trip unit without any special settings or configuration. A cable fitted with an RJ45 connector allows for easy integration with communications networking.

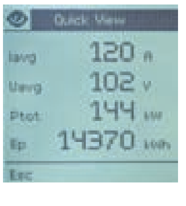
Simple to use

> Users customise time-stamped alarms for all parameters, assign them to indicator lights, choose display priorities, and configure time delay thresholds and modes.

> Event logs and tables are continuously-activated. Providing a wealth of information, they enable users to ensure that the installed equipment base operates correctly, to optimize settings, and to maximise energy efficiency.

> Local and remote displays offer easy access to operators and provide the main electrical values: I, U, V, f, energy, power, total harmonic distortion, etc. The user-friendly switchboard display unit with intuitive navigation is more comfortable to read, and offers quick access to information.

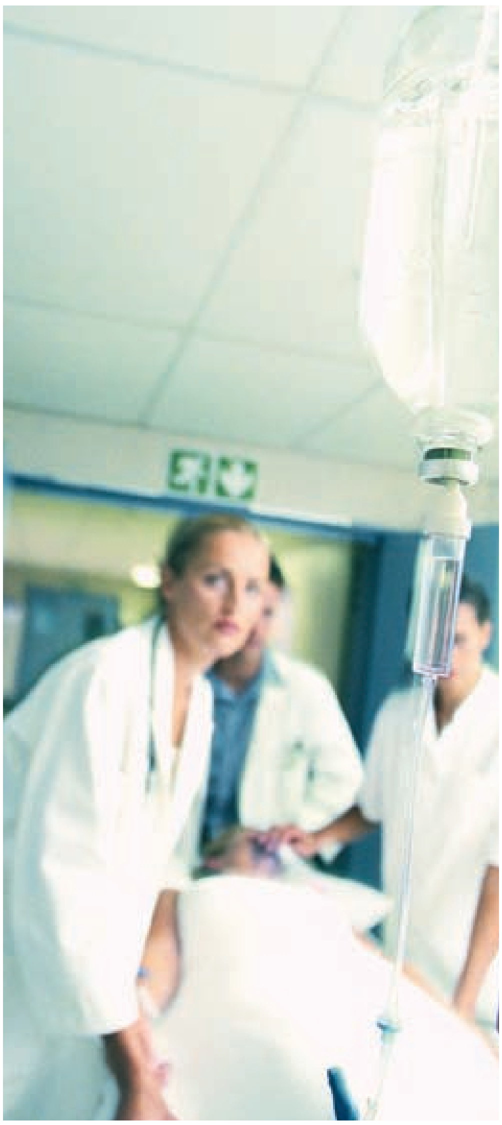
Performance, yet unimposing.
Compact NSX perfectly blends into its environment.



Attractively designed.
The front of Compact NSX circuit breakers has an attractive curved profile.
Measurements are easy to read on a backlit LCD display. Screen navigation is intuitive and settings are simplified by immediate readouts in amps.

Service continuity

Compact NSX makes discrimination its main advantage in minimising the impact of short circuits, ensuring service continuity for installations.



Total discrimination

Thanks to its 30 years of experience, Schneider Electric, with Compact NSX, offers perfect mastery of discrimination for ever more reliable service continuity. Compact NSX circuit breakers strongly limit fault currents, occurring as the result of short-circuits, which reduces installation downtime and avoids over-dimensioning cables.
When several circuit breakers are used in series, the downstream circuit breaker trips as close as possible to the fault, isolating only the circuit concerned. The upstream circuit breaker is not affected and allows the other circuits to remain operational.

100 %
service continuity

Direct access to maintenance indicators

Service continuity

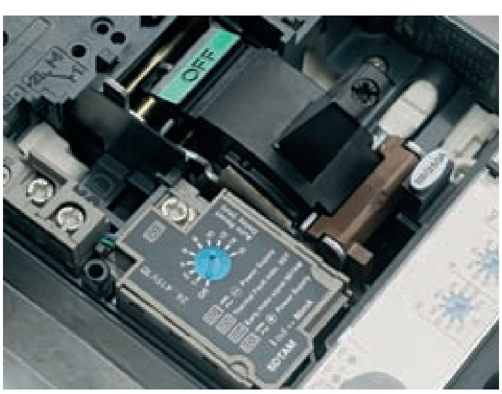
Adding an SDTAM module allows remote indication of motor overloads and actuation of a contactor, ensuring total service continuity:

> the SDTAM switches the contactor instead of tripping the circuit breaker,

> the module allows for machine restart directly from the contactor without having to operate circuit breakers.

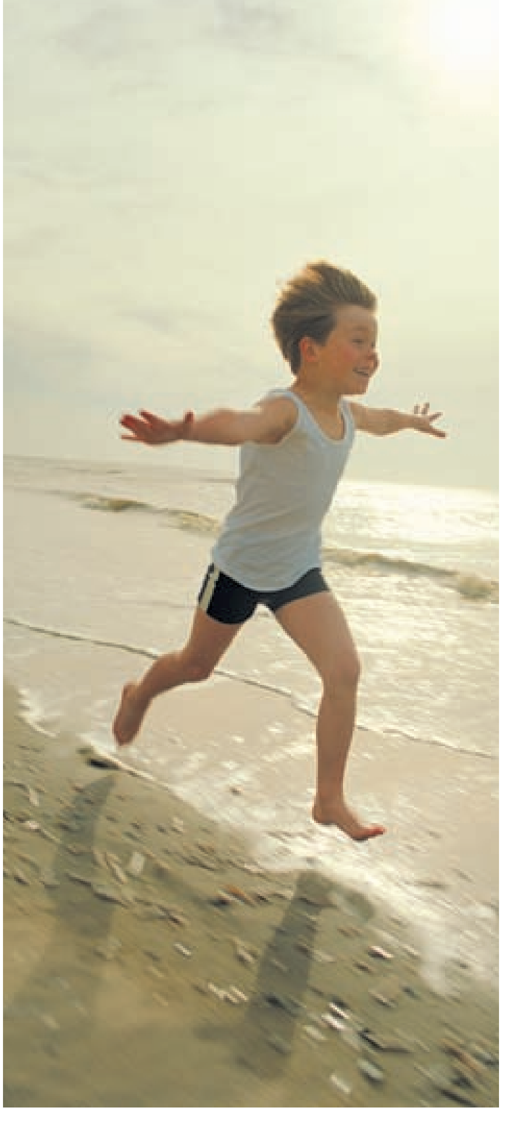
Preventive maintenance

Maintenance indicators provide information on the number of operations, level of wear on contacts and total load rates. This makes it far easier to monitor equipment ageing and optimise investments over time. Maintenance is now preventive, avoiding faults.



Schneider Electric expertise

Schneider Electric commits to reducing energy costs and CO_2 emissions for its customers. It offers products, solutions and services that integrate with all levels of the energy value chain. Compact NSX is part and parcel of the Schneider Electric energy efficiency approach.



Solutions for the future

With Compact NSX, Schneider Electric works through flexible solutions for commercial and industrial buildings, Schneider Electric commits to help customers gradually move towards an active approach to their energy efficiency. It helps get more return from investments and future design solutions.

Energy performance contracts

An energy performance contract offers innovative service to modernise technical installations.

The objective is dramatically to reduce energy costs, whilst improving comfort and safety, all in an environmentally-responsible way.

Environmentally responsible

Schneider Electric meets the expectations of its markets with products adapted to the practices of the 190 countries where it is present and strongly commits to respect the norms and directives of each of those countries.

- Compact NSX, like all the products in its LV ranges, is a product designed to comply with all European directives for the environment. It has also received international certifications and approval from independent agencies.
- In compliance with ISO 14001 standards, all of its factories are non-polluting.
- Designed for easy disassembly and recycling at end of life, Compact NSX complies with environmental directives RoHS* and WEEE**.

Up to **30 %**
savings in energy costs

4 steps

> Diagnosis
> Proposals
> Implementation
> Follow-up

* RoHS = Restriction of Hazardous Substances
** WEEE = Waste Electrical and Electronic Equipment

General contents

Protection, measurement and communication...

Functions and characteristics

Introduction
Overview of applications

Functions

Applications

Compact NSX100 to 630 offers high performance and a wide range of interchangeable trip units to protect most applications. Electronic versions provide highly accurate protection with wide setting ranges and can integrate measurement, metering and communication functions. They can be combined with the FDM121 switchboard display unit to provide all the functions of a Power Meter as well as operating assistance.

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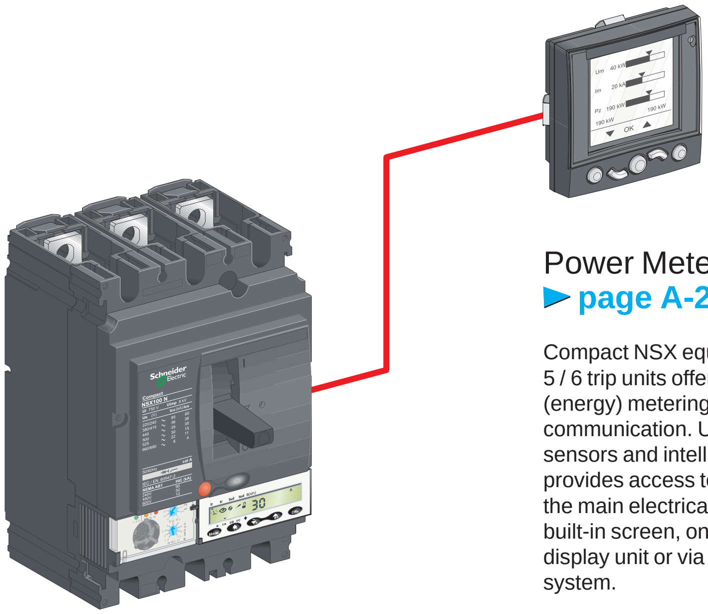

Power Meter
► page A-20

Compact NSX equipped with Micrologic 5 / 6 trip units offer type A (ammeter) or E (energy) metering functions as well as communication. Using Micrologic sensors and intelligence, Compact NSX provides access to measurements of all the main electrical parameters on the built-in screen, on a dedicated FDM121 display unit or via the communication system.

Operating assistance
► page A-22

Integration of measurement functions provides operators with operating assistance functions including alarms tripped by user-selected measurement values, time-stamped event tables and histories, and maintenance indicators.

Switchboard display unit
► page A-24

The main measurements can be read on the built-in screen of Micrologic 5 / 6 trip units.
They can also be displayed on the FDM121 switchboard display unit along with pop-up windows signalling the main alarms.

Communication
► page A-26

Compact NSX equipped with Micrologic 5 / 6 trip units provide communication capabilities. Simple RJ45 cords connect to a Modbus interface module.

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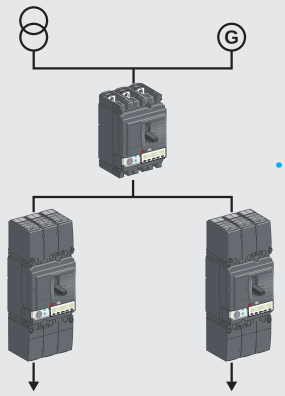

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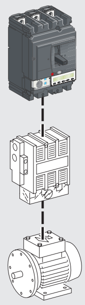

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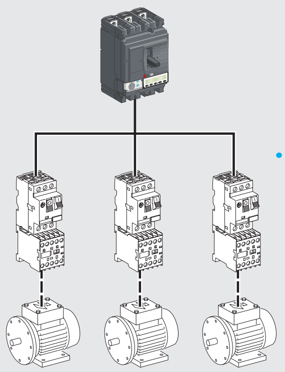

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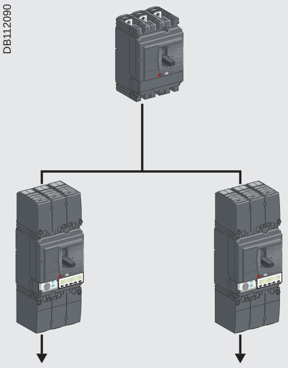

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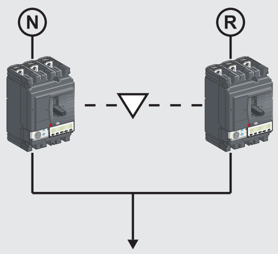

Protection of distribution systems (AC 220/690 V)

► page A-14

Compact NSX devices are equipped with MA or TM thermal-magnetic trip units or Micrologic 2 / 5 / 6 electronic trip units to provide protection against short-circuits and overloads for:

- distribution systems supplied by transformers
- distribution systems supplied by engine generator sets
- long cables in IT and TN systems.

They can be easily installed at all levels in distribution systems, from the main LV switchboard to the subdistribution boards and enclosures.
All Compact NSX devices can protect against insulation faults by adding a Vigi module or Vigirex relay.

Protection of motors (AC 220/690 V)

► page A-36

The Compact NSX range includes a number of versions to protect motor applications:

- basic short-circuit protection with MA magnetic trip units or the electronic Micrologic 1-M version, combined with an external relay to provide thermal protection
- protection against overloads, short-circuits and phase unbalance or loss with Micrologic 2-M trip units
- more complete protection against overloads and short-circuits with additional motor-specific protection (phase unbalance, locked rotor, underload and long start) with Micrologic 6 E-M trip units. These versions also offer communication, metering and operating assistance.

The exceptional limiting capacity of Compact NSX circuit breakers automatically provides type-2 coordination with the motor starter, in compliance with standard IEC 60947-4-1.

Protection of special applications

► page A-48

Special applications:
The Compact NSX range offers a number of versions for special protection applications:

- service connection to public distribution systems ► page A-48
- generators ► page A-50
- industrial control panels ► page A-52

with:

- □ compliance with international standards IEC 60947-2 and UL 508 / CSA 22-2 N14
- □ compliance with US standard UL 489
- □ installation in universal and functional enclosures.

- 16 Hz 2/3 systems ► page A-53
- 400 Hz systems ► page A-54

For all these applications, circuit breakers in the Compact NSX range offer positive contact indication and are suitable for isolation in accordance with standards IEC 60947-1 and 2.

Control and isolation using switch-disconnectors

► page A-56

A switch-disconnector version of Compact NSX circuit breakers is available for circuit control and isolation.
All add-on functions of Compact NSX circuit breakers may be combined with the basic switch-disconnector function, including:

- earth-leakage protection
- motor mechanism
- ammeter, etc.

For information on other switch-disconnector ranges, see the Interpact (offering positive contact indication and visible break) and Fupact (fusegear) catalogues.

Source changeover systems

► page A-60

To ensure a continuous supply of power, some electrical installations are connected to two power sources:

- a normal source
- a replacement source to supply the installation when the normal source is not available.

A mechanical and/or electrical interlocking system between two circuit breakers or switch-disconnectors avoids all risk of parallel connection of the sources during switching.

A source-changeover system can be:

- manual with mechanical device interlocking
- remote controlled with mechanical and/or electrical device interlocking
- automatic by adding a controller to manage switching from one source to the other on the basis of external parameters.

Introduction

General characteristics of the Compact NSX range

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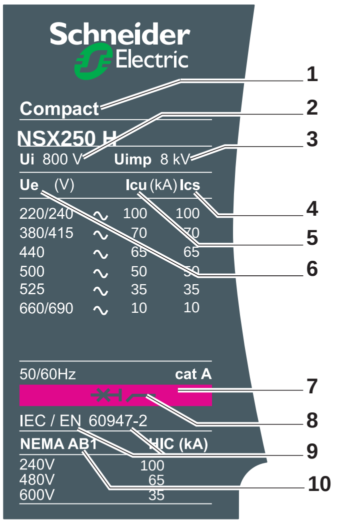

Standardised characteristics indicated on the rating plate:
1 Type of device: frame size and breaking capacity class
2 Ui: rated insulation voltage.
3 Uimp: rated impulse withstand voltage.
4 Ics: service breaking capacity.
5 Icu: ultimate breaking capacity for various values of the rated operational voltage Ue
6 Ue: operational voltage.
7 Colour label indicating the breaking capacity class.
8 Circuit breaker-disconnector symbol.
9 Reference standard.
10 Main standards with which the device complies.
***Note**: when the circuit breaker is equipped with an extended rotary handle, the door must be opened to access the rating plate.*

Compliance with standards

Compact NSX circuit breakers and auxiliaries comply with the following:
- international recommendations:
  - IEC 60947-1: general rules
  - IEC 60947-2: circuit breakers
  - IEC 60947-3: switch-disconnectors
  - IEC 60947-4: contactors and motor starters
  - IEC 60947-5.1 and following: control circuit devices and switching elements; automatic control components
- European (EN 60947-1 and EN 60947-2) and corresponding national standards:
  - France NF
  - Germany VDE
  - United Kingdom BS
  - Australia AS
  - Italy CEI
- the specifications of the marine classification companies (Veritas, Lloyd's Register of Shipping, Det Norske Veritas, etc.), standard NF C 79-130 and recommendations issued by the CNOMO organisation for the protection of machine tools.

For U.S. UL, Canadian CSA, Mexican NOM and Japanese JIS standards, please consult us.

Pollution degree

Compact NSX circuit breakers are certified for operation in pollution-degree III environments as defined by IEC standards 60947-1 and 60664-1 (industrial environments).

Climatic withstand

Compact NSX circuit breakers have successfully passed the tests defined by the following standards for extreme atmospheric conditions:
- IEC 60068-2-1: dry cold (-55 °C)
- IEC 60068-2-2: dry heat (+85 °C)
- IEC 60068-2-30: damp heat (95 % relative humidity at 55 °C)
- IEC 60068-2-52 severity level 2: salt mist.

Environment

Compact NSX respects the European environment directive EC/2002/95 concerning the restriction of hazardous substances (RoHS).
Product environment profiles (PEP) have been prepared, describing the environmental impact of every product throughout its life cycle, from production to the end of its service life.
All Compact NSX production sites have set up an environmental management system certified ISO 14001.
Each factory monitors the impact of its production processes. Every effort is made to prevent pollution and to reduce consumption of natural resources.

Ambient temperature

- Compact NSX circuit breakers may be used between -25 °C and +70 °C. For temperatures higher than 40°C (65°C for circuit breakers used to protect motor feeders), devices must be derated (pages B-8 and B-9).
- Circuit breakers should be put into service under normal ambient, operating-temperature conditions. Exceptionally, the circuit breaker may be put into service when the ambient temperature is between -35 °C and -25 °C.
- The permissible storage-temperature range for Compact NSX circuit breakers in the original packing is -50 °C [1] and +85 °C.

(1) -40 °C for Micrologic control units with an LCD screen.

Electromagnetic compatibility

Compact NSX devices are protected against:
- overvoltages caused by circuit switching (e.g. lighting circuits)
- overvoltages caused by atmospheric disturbances
- devices emitting radio waves such as mobile telephones, radios, walkie-talkies, radar, etc.
- electrostatic discharges produced by users.

Immunity levels for Compact NSX comply with the standards below.
- IEC/EN 60947-2: Low-voltage switchgear and controlgear, part 2: Circuit breakers:
  - Annex F: Immunity tests for circuit breakers with electronic protection
  - Annex B: Immunity tests for residual current protection
- IEC/EN 61000-4-2: Electrostatic-discharge immunity tests
- IEC/EN 61000-4-3: Radiated, radio-frequency, electromagnetic-field immunity tests
- IEC/EN 61000-4-4: Electrical fast transient/burst immunity tests
- IEC/EN 61000-4-5: Surge immunity tests
- IEC/EN 61000-4-6: Immunity tests for conducted disturbances induced by radio-frequency fields
- CISPR 11: Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.

Discrimination

Compact NSX reinforces the discrimination capabilities of the Compact NS range by applying the rapid calculation capacity of the Micrologic trip units.
Total discrimination is now possible between NSX100 and modular Multi 9 circuit breakers rated ≤ 63 A (see page A-8).

PB103578-53

Suitable for isolation with positive contact indication

All Compact NSX circuit breakers are suitable for isolation as defined in IEC standard 60947-2:
- The isolation position corresponds to the O (OFF) position.
- The operating handle cannot indicate the OFF position unless the contacts are effectively open.
- Padlocks may not be installed unless the contacts are open.

Installation of a rotary handle or a motor mechanism does not alter the reliability of the position-indication system.
The isolation function is certified by tests guaranteeing:
- the mechanical reliability of the position-indication system
- the absence of leakage currents
- overvoltage withstand capacity between upstream and downstream connections.

The tripped position does not insure isolation with positive contact indication.
Only the OFF position guarantees isolation.

DB112093

Installation in class II switchboards

All Compact NSX circuit breakers are class II front face devices. They may be installed through the door of class II switchboards (as per IEC standards 61140 and 60664-1) without downgrading switchboard insulation. Installation requires no special operations, even when the circuit breaker is equipped with a rotary handle or a motor mechanism.

Degree of protection

The following indications are in accordance with standards IEC 60529 (IP degree of protection) and IEC 62262 (IK protection against external mechanical impacts).

Bare circuit breaker with terminal shields
- With toggle: IP40, IK07.
- With standard direct rotary handle / VDE: IP40 IK07

Circuit breaker installed in a switchboard
- With toggle: IP40, IK07.
- With direct rotary handle:
  - standard / VDE: IP40, IK07
  - MCC: IP43 IK07
  - CNOMO: IP54 IK08
- With extended rotary handle: IP56 IK08
- With motor mechanism: IP40 IK07.

Introduction

Characteristics and performance of Compact NSX circuit breakers from 100 to 630 A

PB103354-40

Compact NSX100/160/250.

PB103279-44

Compact NSX400/630.

Common characteristics

Rated voltages			
Insulation voltage (V)	**Ui**		800
Impulse withstand voltage (kV)	**Uimp**		8
Operational voltage (V)	**Ue**	AC 50/60 Hz	690
Suitability for isolation		IEC/EN 60947-2	yes
Utilisation category			A
Pollution degree		IEC 60664-1	3

Circuit breakers

Breaking capacity levels

Electrical characteristics as per IEC 60947-2

Rated current (A)	**In**	40 °C		
Number of poles				
Breaking capacity (kA rms)				
	Icu	AC 50/60 Hz	220/240 V	
			380/415 V	
			440 V	
			500 V	
			525 V	
			660/690 V	
Service breaking capacity (kA rms)				
	Ics	AC 50/60 Hz	220/240 V	
			380/415 V	
			440 V	
			500 V	
			525 V	
			660/690 V	
Durability (C-O cycles)		Mechanical		
		Electrical	440 V	In/2
				In
			690 V	In/2
				In

Characteristics as per Nema AB1

Breaking capacity (kA rms)	AC 50/60 Hz	240 V
		480 V
		600 V

Characteristics as per UL 508

Breaking capacity (kA rms)	AC 50/60 Hz	240 V
		480 V
		600 V

Protection and measurements

Short-circuit protection	Magnetic only	
Overload / short-circuit protection	Thermal magnetic	
	Electronic	
		with neutral protection (Off-0.5-1-OSN) (1)
		with ground-fault protection
		with zone selective interlocking (ZSI) (2)
Display / I, U, f, P, E, THD measurements / interrupted-current measurement		
Options	Power Meter display on door	
	Operating assistance	
	Counters	
	Histories and alarms	
	Metering Com	
	Device status/control Com	
Earth-leakage protection	By Vigi module	
	By Vigirex relay	

Installation / connections

Dimensions and weights

Dimensions (mm) W x H x D	Fixed, front connections	2/3P
		4P
Weight (kg)	Fixed, front connections	2/3P
		4P

Connections

Connection terminals	Pitch	With/without spreaders
Large Cu or Al cables	Cross-section	mm²

(1) OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).
(2) ZSI: Zone Selective Interlocking using pilot wires.
(3) 2P circuit breaker in 3P case for B and F types, only with thermal-magnetic trip unit.

Common characteristics

Control			
	Manual	With toggle	■
		With direct or extended rotary handle	■
	Electrical	With remote control	■
Versions			
	Fixed		■
	Withdrawable	Plug-in base	■
		Chassis	■

NSX100						NSX160						NSX250						NSX400					NSX630				
B	F	N	H	S	L	B	F	N	H	S	L	B	F	N	H	S	L	F	N	H	S	L	F	N	H	S	L
100						160						250						400					630				
2 (3), 3, 4						2 (3), 3, 4						2 (3), 3, 4						3, 4					3, 4				
40	85	90	100	120	150	40	85	90	100	120	150	40	85	90	100	120	150	40	85	100	120	150	40	85	100	120	150
25	36	50	70	100	150	25	36	50	70	100	150	25	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150
20	35	50	65	90	130	20	35	50	65	90	130	20	35	50	65	90	130	30	42	65	90	130	30	42	65	90	130
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140 x 161 x 86						140 x 161 x 86						140 x 161 x 86						185 x 255 x 110					185 x 255 x 110				
2.05						2.2						2.4						6.05					6.2				
2.4						2.6						2.8						7.90					8.13				
35/45 mm						35/45 mm						35/45 mm						45/52.5 mm 45/70 mm					45/52.5 mm 45/70 mm				
300						300						300						4 x 240					4 x 240				

Introduction
Compact NSX trip units

With Micrologic electronic trip units, Compact NSX stands out from the crowd. Thanks to the new generation of sensors and its processing capability, protection is enhanced even further. It also provides measurements and operating information.

Thermal-magnetic or electronic trip unit?

Thermal-magnetic trip units protect against overcurrents and short-circuits using tried and true techniques. But today, installation optimisation and energy efficiency have become decisive factors and electronic trip units offering more advanced protection functions combined with measurements are better suited to these needs.
Micrologic electronic trip units combine reflex tripping and intelligent operation. Thanks to digital electronics, trip units have become faster as well as more accurate and reliable. Wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance. With this information, users can avoid or deal more effectively with disturbances and can play a more active role in system operation. They can manage the installation, anticipate on events and plan any necessary servicing.

Accurate measurements for complete protection

Compact NSX devices take advantage of the vast experience acquired since the launch of Masterpact NW circuit breakers equipped with Micrologic trip units.
From 40 amperes on up to the short-circuit currents, they offer excellent measurement accuracy. This is made possible by a new generation of current transformers combining "iron-core" sensors for self-powered electronics and "air-core" sensors (Rogowski toroids) for measurements.
The protection functions are managed by an ASIC component that is independent of the measurement functions. This independence ensures immunity to conducted and radiated disturbances and a high level of reliability.

Numerous security functions

Torque-limiting screws
The screws secure the trip unit to the circuit breaker. When the correct tightening torque is reached, the screw heads break off. Optimum tightening avoids any risk of temperature rise. A torque wrench is no longer required.

Easy and sure changing of trip units
All trip units are interchangeable, without wiring. A mechanical mismatch-protection system makes it impossible to mount a trip unit on a circuit breaker with a lower rating.

"Ready" LED for a continuous self-test
The LED on the front of the electronic trip units indicates the result of the self-test runs continuously on the measurement system and the tripping release. As long as the green LED is flashing, the links between the CTs, the processing electronics and the Mitop release are operational. The circuit breaker is ready to protect. No need for a test kit. A minimum current of 15 to 50 A, depending on the device, is required for this indication function.

A patented dual adjustment system for protection functions.
Available on Micrologic 5 / 6, the system consists of:
- an adjustment using dials sets the maximum value
- an adjustment, made via the keypad or remotly, fine-tunes the setting. This setting may not exceed the first one. It can be read directly on the Micrologic screen, to within one ampere and a fraction of a second.

Coordinated tripping systems

Compact NSX detects faults even faster and its tripping time is reduced. It protects the installation better and limits contact wear.

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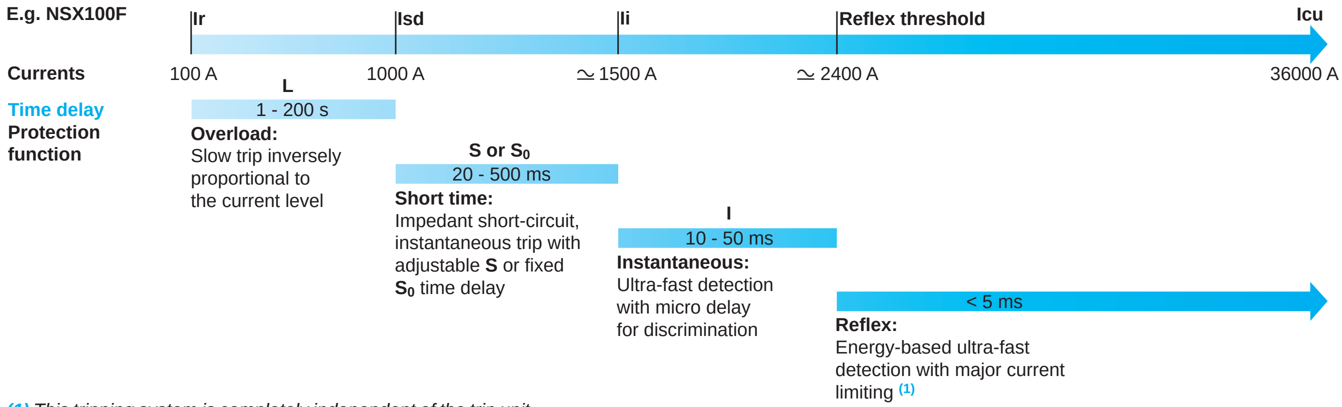
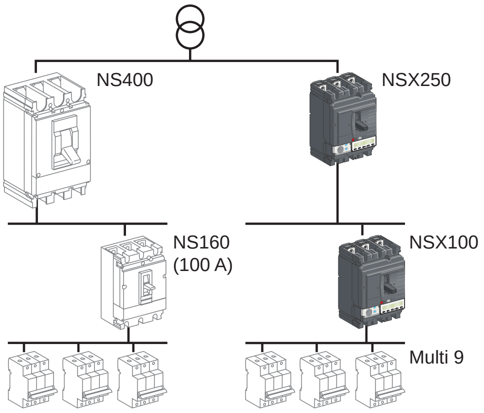


(1) This tripping system is completely independent of the trip unit.
Because it directly actuates the mechanism, it precedes the trip unit by a few milliseconds.

DB111354



Compact NSX100 with Micrologic for total discrimination with Multi 9 devices rated ≤ 40 A or a C60. *Better coordination between protection functions reduces the difference in ratings required for total discrimination.*

Unmatched discrimination

Discrimination

Compact NSX provides maximum continuity of service and savings through an unmatched level of discrimination:

- given the high accuracy of measurements, overload discrimination is ensured even between very close ratings
- for major faults, the fast processing of the Micrologic trip units means the upstream device can anticipate the reaction of the downstream device. The upstream breaker adjusts its tripping delay to provide discrimination
- for very high faults, the energy of the arc dissipated by the short-circuit in the downstream breaker causes reflex tripping. The current seen by the upstream device is significantly limited. The energy is not sufficient to cause tripping, so discrimination is maintained whatever the short-circuit current.

For total discrimination over the entire range of possible faults, from the long-time pick-up Ir to the ultimate short-circuit current Icu, a ratio of 2.5 must be maintained between the ratings of the upstream and downstream devices.
This ratio is required to ensure selective reflex tripping for high short-circuits.

Understanding the names of Micrologic electronic trip units

Protection

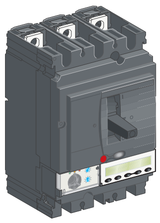
1: I
2: LS_0I
5: LSI
6: LSIG

I: Instantaneous
L: Long time
S_0: Short time (1) (fixed delay)
S: Short time
G: Ground fault

Frame

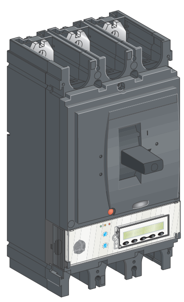
2: NSX100/160/250

DB112094



3: NSX400/630

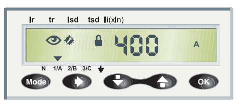
DB112120



Measurements

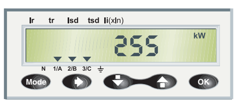
A: Ammeter

DB112155



E: Energy

DB112156



Applications

Distribution, otherwise
G: Generator
AB: Public distribution
M: Motors
Z: 16 Hz 2/3

Examples

	Protection	Frame	Measurements	Applications
Micrologic 1.3	Instantaneous only	400 or 630 A		Distribution
Micrologic 2.3	LS_0I	400 or 630 A		Distribution
Micrologic 5.2 A	LSI	100, 160 or 250 A	Ammeter	Distribution
Micrologic 6.3 E-M	LSIG	400 or 630 A	Energy	Motor

(1) LS_0I protection is standard on Micrologic 2. To ensure discrimination, it offers short-time protection S_0 with a non-adjustable delay and instantaneous protection.

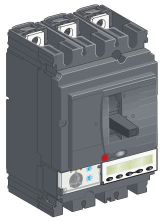
Introduction

Overview of trip units for Compact NSX

Compact NSX offers a range of trip units in interchangeable cases, whether they are magnetic, thermal-magnetic or electronic. Versions 5 and 6 of the electronic trip unit offer communication and metering. Using Micrologic sensors and intelligence, Compact NSX supplies all the information required to manage the electrical installation and optimise energy use.

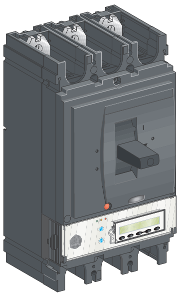
Compact NSX100/160/250

DB112094



Compact NSX400/630

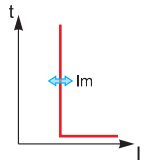
DB112120



Type of protection and applications

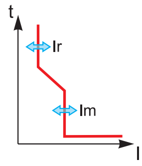
MA magnetic	TM-D thermal-magnetic

DB112028



■ Distribution and motors

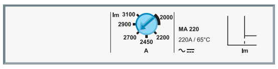
DB112029



■ Distribution
■ Generators

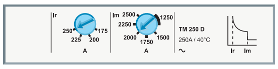
Circuit breakers and trip units

DB112022



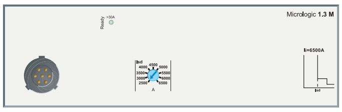
MA Distribution and motors

DB112023



TM-D Distribution
TM-G Generators

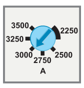
DB112092



1.3-M Distribution and motors

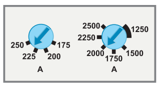
Settings and indications

DB112037



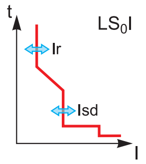
Adjustment and reading
Pick-up set in amps using dials
Non-adjustable time delay

DB112038

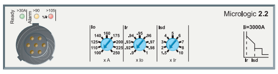


Adjustment and reading
Pick-up set in amps using dials
Non-adjustable time delay

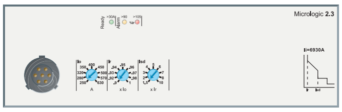
Micrologic 2 electronic



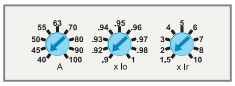
- Distribution
- Service connection (public distribution)
- Generators
- Motors (I only)
- Motors



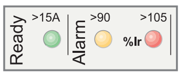
2.2 Distribution
2.2-AB Service connection (public distribution)
2.2-G Generators
2.2-M Motors



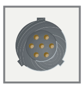
2.3 Distribution
2.3-AB Service connection (public distribution)
1.3-M Motors (I only)
2.3-M Motors



Adjustment and reading
Pick-up set in amps with fine adjustment using dials
Non-adjustable time delay



Front indications

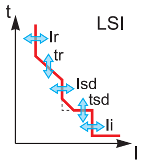


Test connector

Self test

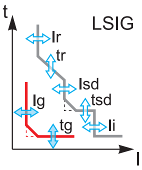
Micrologic 5 / 6 A or E electronic trip units

5 A or E



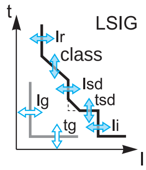
- Distribution and generators

6 A or E



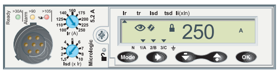
- Distribution and generators

6 E-M



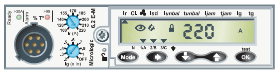
- Motors

A: *current metering functions*
E *:current and energy metering functions.*

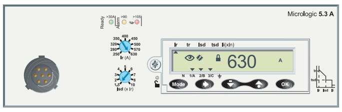


5.2 A Distribution and generators
5.2 E Distribution and generators
5.2 A-Z 16 Hz 2/3 networks

6.2 A Distribution and generators
6.2 E Distribution and generators

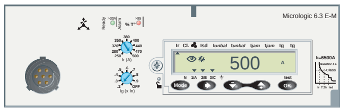


6.2 E-M Motors

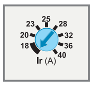


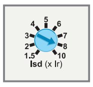
5.3 A Distribution and generators
5.3 E Distribution and generators
5.3 A-Z 16 Hz 2/3 networks

6.3 A Distribution and generators
6.3 E Distribution and generators

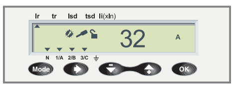


6.3 E-M Motors

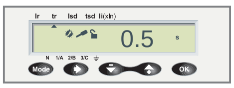




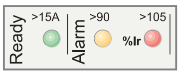
Adjustment and reading
Pick-up set in amps



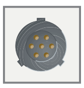
Fine adjustment via keypad



Adjustable time delays

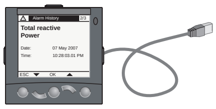


Front indications

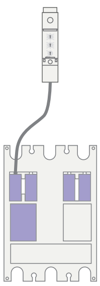


Test connector

Self test



Connection to switchboard display unit



Communication to Modbus

Introduction

Overview of trip units for Compact NSX

The capabilities of Micrologic 5 / 6 A and E trip units come into full play with the FDM121 switchboard display unit.
When the two are connected via a simple cord with RJ45 connectors, the combination offers full Power Meter capabilities and all the measurements required to monitor the electrical installation.

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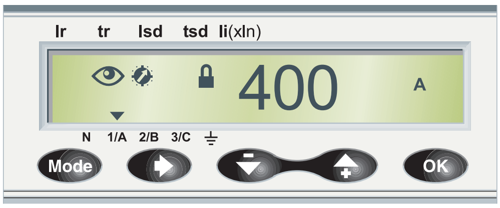
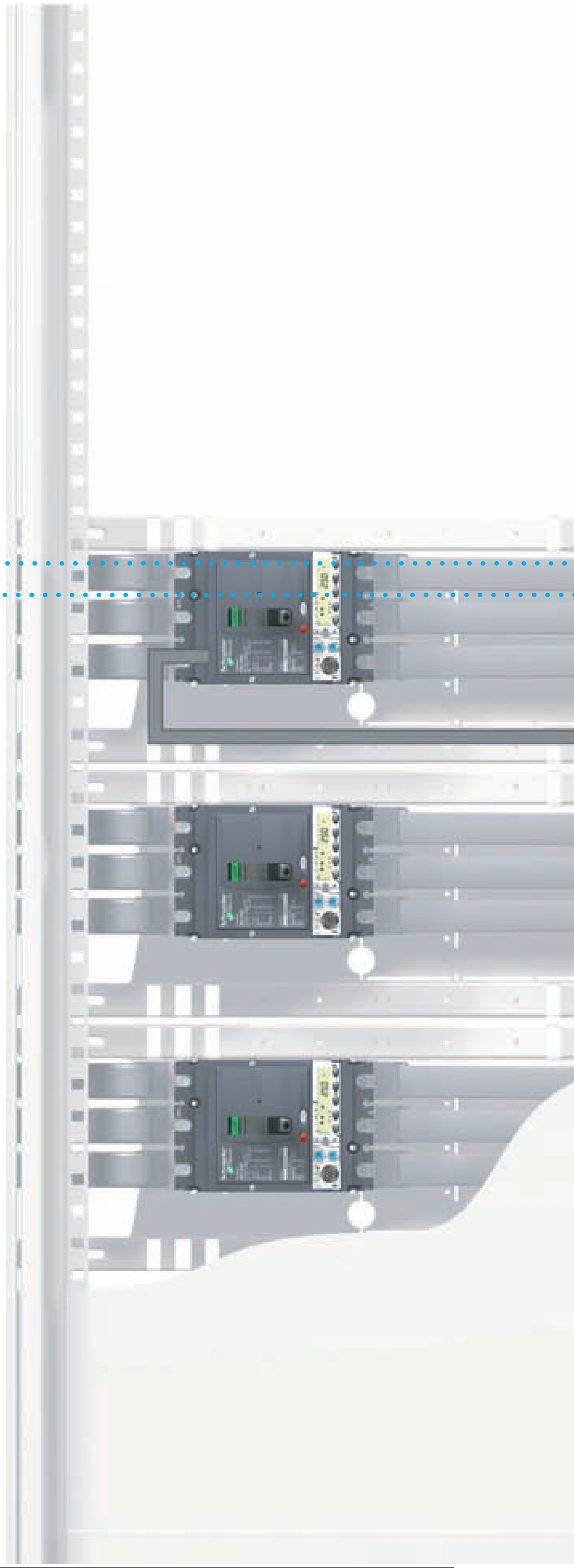
DB112044





Ammeter Micrologic (A)

I measurements

Current measurements

- Phase and neutral currents I1, I2, I3, IN
- Average current of the 3 phases Iavg
- Highest current of the three phases Imax
- Ground-fault current Ig (Micrologic 6.2 / 6.3 A)
- Maximeter/minimeter for I measurements

Operating and maintenance assistance

Indications, alarms and histories

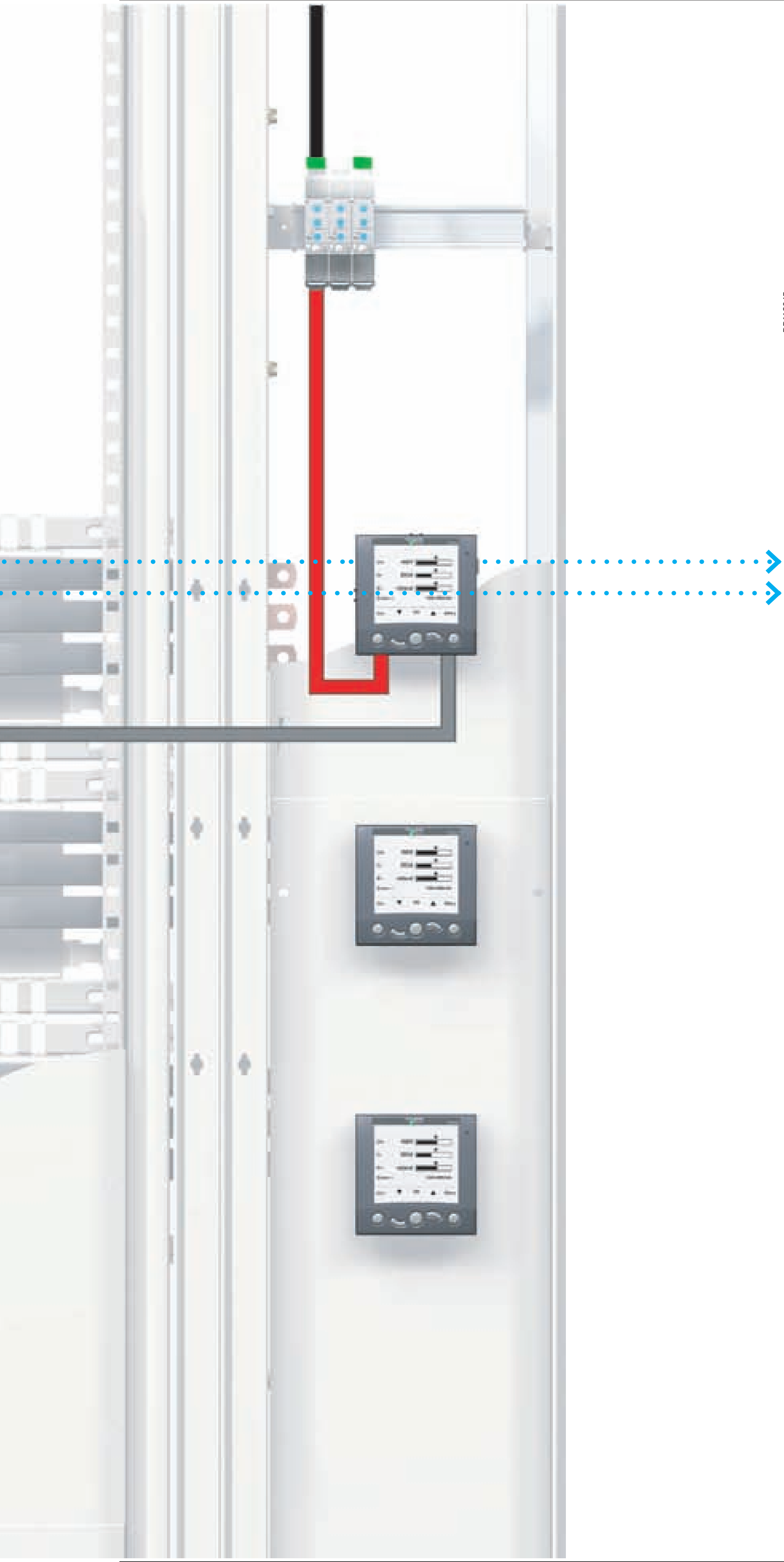
- Indication of fault types
- Alarms for high/low alarm thresholds linked to I measurements
- Trip, alarm and operating histories
- Time-stamped tables for settings and maximeters

Maintenance indicators

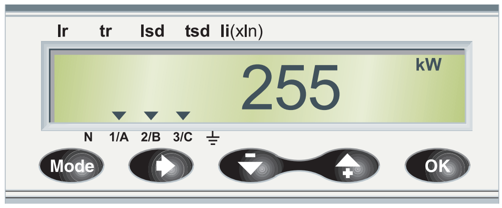
- Operation, trip and alarm counters
- Operating hours counter
- Contact wear
- Load profile and thermal image

Communication

- Modbus with add-on module



DB112045



Energy Micrologic (E)

I, U, f, P, E, THD measurements

Current measurements
- Phase and neutral currents I1, I2, I3, IN
- Average current of the 3 phases Iavg
- Highest current of the three phases Imax
- Ground-fault current Ig (Micrologic 6.2 / 6.3 A)
- Maximeter/minimeter for I measurements
- Current unbalance between phases

Voltage measurements
- Phase-to-phase (U) et phase-to-neutral (V) voltages
- Average voltages Uavg, Vavg
- Ph-Ph (U) and Ph-N (V) voltage unbalance

Frequency measurements
- Frequency (f)

Power-quality indicators
- Total harmonic distortion (THD) for current and voltage

Power measurements
- Active, reactive and apparent power, total and per phase
- Power factor and cos φ

Maximeters/minimeters
- For all I, U, f, P, E measurements

Demand current and power measurements
- Demand values, total and per phase
- Maximum demand

Energy metering
- Active, reactive and apparent energy, total and per phase

Operating and maintenance assistance

Indications, alarms and histories
- Indication of fault types
- Alarms for high/low thresholds linked to I, U, f, P, E measurements
- Trip, alarm and operating histories
- Time-stamped tables for settings and I, U, f, P, E maximeters

Maintenance indicators
- Operation, trip and alarm counters
- Operating hours counter
- Contact wear
- Load profile and thermal image

Communication
- Modbus with add-on module

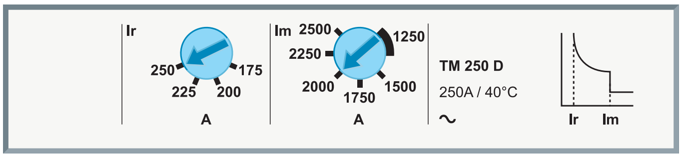
Protection of distribution systems

TM thermal-magnetic and MA magnetic trip units

TM thermal-magnetic and MA magnetic trip units can be used on Compact NSX100/160/250 circuit breakers with performance levels B/F/H/N/S/L.
TM trip units are available in 2 versions:
■ TM-D, for the protection of distribution cables
■ TM-G, with a low threshold, for the protection of generators or long cable lengths.
Vigi modules or Vigirex relays can be added to all the circuit breakers to provide external earth-leakage protection.

TM-D and TM-G thermal-magnetic trip units

DB112046



Circuit breakers equipped with thermal-magnetic trip units are used mainly in industrial and commercial electrical distribution applications:
■ TM-D, for protection of cables on distribution systems supplied by transformers
■ TM-G, with a low pick-up for generators (lower short-circuit currents than with transformers) and distribution systems with long cable lengths (fault currents limited by the impedance of the cable).

Protection

Thermal protection (Ir)
Thermal overload protection based on a bimetal strip providing an inverse time curve I^2t, corresponding to a temperature rise limit. Above this limit, the deformation of the strip trips the circuit breaker operating mechanism.
This protection operates according to:
■ **Ir** that can be adjusted in amps from 0.7 to 1 times the rating of the trip unit (16 A to 250 A), corresponding to settings from 11 to 250 A for the range of trip units
■ a non-adjustable time delay, defined to ensure protection of the cables.

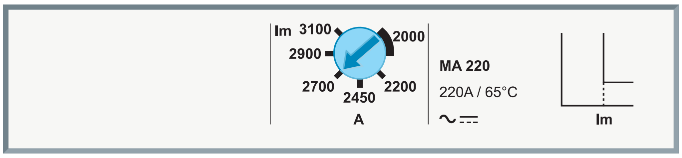
Magnetic protection (Im)
Short-circuit protection with a fixed or adjustable pick-up Im that initiates instantaneous tripping if exceeded.
■ TM-D: fixed pick-up, Im, for 16 to 160 A ratings and adjustable from 5 to 10 x In for 200 and 250 A ratings
■ fixed pick-up for 16 to 63 A ratings.

Protection against insulation faults
Two solutions are possible by adding:
■ a Vigi module acting directly on the trip unit of the circuit breaker
■ a Vigirex relay connected to an MN or MX voltage release.

Protection versions
■ 3-pole:
□ 3P 3D: 3-pole frame (3P) with detection on all 3 poles (3D)
□ 3P 2D: 3-pole frame (3P) with detection on 2 poles (2D).
■ 4-pole:
□ 4P 3D: 4-pole frame (4P) with detection on 3 poles (3D).
□ 4P 4D: 4-pole frame (4P) with detection on all 4 poles (same threshold for phases and neutral).

MA magnetic trip units

DB112047



In distribution applications, circuit breakers equipped with MA magnetic-only trip units are used for:
■ short-circuit protection of secondary windings of LV/LV transformers with overload protection on the primary side.
■ as an alternative to a switch-disconnector at the head of a switchboard in order to provide short-circuit protection.
Their main use is however for motor protection applications, in conjunction with a thermal relay and a contactor or motor starter (see "Motor protection", page A-36).

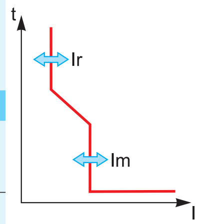
Protection

Magnetic protection (Im)
Short-circuit protection with an adjustable pick-up Im that initiates instantaneous tripping if exceeded.
■ **Im = In x ...** set in amps on an adjustment dial covering the range 6 to 14 x In for 2.5 to 100 A ratings or 9 to 14 In for 150 to 220 A ratings.

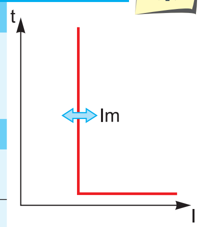
Protection versions
■ 3-pole (3P 3D): 3-pole frame (3P) with detection on all 3 poles (3D).
■ 4-pole (4P 3D): 4-pole frame (4P) with detection on 3 poles (3D).

***Note**: All the trip units have a transparent lead-sealable cover that protects access to the adjustment dials.*

Thermal-magnetic trip units		**TM16D to 250D**												**TM16G to 63G**			
Ratings (A)	**In at 40 °C** [1]	**16**	**25**	**32**	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**16**	**25**	**40**	**63**
Circuit breaker	Compact NSX100	■	■	■	■	■	■	■	■	-	-	-	-	■	■	■	■
	Compact NSX160	-	-	■	■	■	■	■	■	■	■	-	-	-	■	■	■
	Compact NSX250	-	-	-	-	-	■	■	■	■	■	■	■	-	-	■	■
Thermal protection																	
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir** = In x ...	adjustable in amps from 0.7 to 1 x In															
Time delay (s)	**tr**	non-adjustable												non-adjustable			
	tr at 1.5 x In	120 to 400												120 to 400			
	tr at 6 x Ir	15												-			
Magnetic protection																	
Pick-up (A)	**Im**	fixed										adjustable		fixed			
accuracy ±20 %	Compact NSX100	190	300	400	500	500	500	640	800					63	80	80	125
	Compact NSX160/250	190	300	400	500	500	500	640	800	1250	1250	5 to 10xIn		63	80	80	125
Time delay	**tm**	fixed															
Neutral protection																	
Unprotected neutral	4P 3D	no detection												no 4P3D version			
Fully protected neutral	4P 4D	1 x Ir												1 x Ir			



Magnetic trip units		**MA 2.5 to 220**							
Ratings (A)	**In at 65 °C**	**2.5**	**6.3**	**12.5**	**25**	**50**	**100**	**150**	**220**
Circuit breaker	Compact NSX100	■	■	■	■	■	■	-	-
	Compact NSX160	-	-	-	■	■	■	■	-
	Compact NSX250	-	-	-	-	-	■	■	■
Instantaneous magnetic protection									
Pick-up (A) accuracy ±20 %	**Im** = In x ...	adjustable in amps from 6 to 14 x In (9 settings)					adjustable in amps from 9 to 14 x In		
Time delay (ms)	**tm**	none							



(1) For temperatures greater than 40°C, the thermal protection characteristics are modified. See the temperature derating table.

Protection of distribution systems

Micrologic 2 and 1.3-M trip units

Micrologic 2 trip units can be used on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L.
They provide:
- ■ standard protection of distribution cables
- ■ indication of:
  - □ overloads (via LEDs)
  - □ overload tripping (via the SDx relay module).

Circuit breakers equipped with Micrologic 1.3-M trip units, without thermal protection, are used in certain applications to replace switch-disconnectors at the head of switchboards. Micrologic 1.3-M trip units are dedicated to Compact NSX400/630 A circuit breakers.

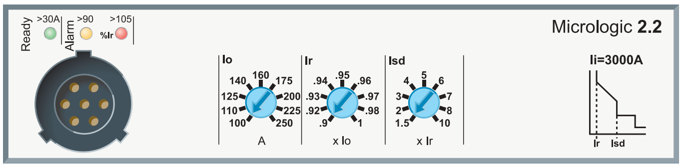
PB103377

SDx remote indication relay module with its terminal block.

***Note**: all the trip units have a transparent lead-sealable cover that protects access to the adjustment dials.*

Micrologic 2

DB112050



Circuit breakers equipped with Micrologic 2 trip units can be used to protect distribution systems supplied by transformers. For generators and long cables, Micrologic 2-G trip units offer better suited low pick-up solutions (see page A-50).

Protection

Settings are made using the adjustment dials with fine adjustment possibilities.

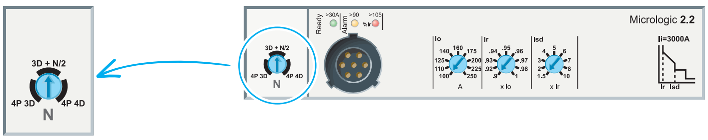
Overloads: Long time protection (Ir)
Inverse time protection against overloads with an adjustable current pick-up Ir set using a dial and a non-adjustable time delay tr.

Short-circuits: Short-time protection with fixed time delay (Isd)
Protection with an adjustable pick-up Isd. Tripping takes place after a very short delay used to allow discrimination with the downstream device.

Short-circuits: Non-adjustable instantaneous protection
Instantaneous short-circuit protection with a fixed pick-up.

Neutral protection
- ■ On 3-pole circuit breakers, neutral protection is not possible.
- ■ On four-pole circuit breakers, neutral protection may be set using a three-position switch:
  - □ 4P 3D: neutral unprotected
  - □ 4P 3D + N/2: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
  - □ 4P 4D: neutral fully protected at Ir.

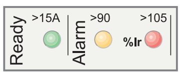
DB112051



Indications

Front indications
- ■ Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- ■ Orange overload pre-alarm LED: steady on when I > 90 % Ir
- ■ Red overload LED: steady on when I > 105 % Ir

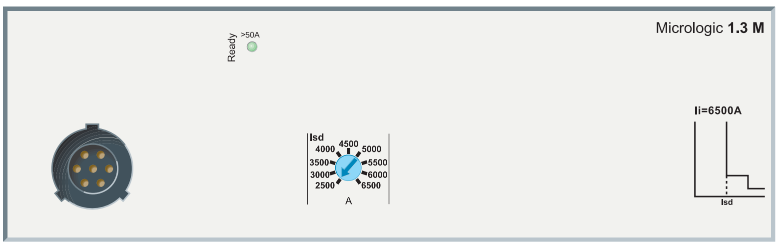
DB112019



Remote indications
An overload trip signal can be remoted by installing an SDx relay module inside the circuit breaker.
This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is reclosed. For description, see page A-81.

Micrologic 1.3-M for magnetic protection only

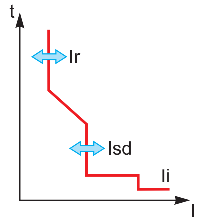
DB112106



Micrologic 1.3-M trip units provide magnetic protection only, using electronic technology. They are dedicated to 400/630 A 3-pole (3P 3D) circuit breakers or 4-pole circuit breakers with detection on 3 poles (4P, 3D) and are used in certain applications to replace switch-disconnectors at the head of switchboards. They are especially used in 3-pole versions for motor protection, see page A-40.

Micrologic 2

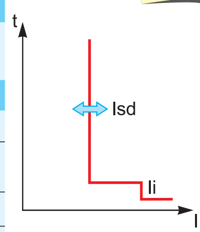
Ratings (A)	In at 40 °C (1)		40	100	160	250	400	630			
Circuit breaker	Compact NSX100		■	■	-	-	-	-			
	Compact NSX160		■	■	■	-	-	-			
	Compact NSX250		■	■	■	■	-	-			
	Compact NSX400		-	-	-	■	■	-			
	Compact NSX630		-	-	-	■	■	■			
L Long-time protection											
Pick-up (A)		Io	value depending on trip unit rating (In) and setting on dial								
tripping between 1.05 and 1.20 Ir	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160
	In = 250 A (NSX250)	Io =	100	110	125	140	160	175	200	225	250
	In = 250 A (NSX400)	Io =	70	100	125	140	160	175	200	225	250
	In = 400 A	Io =	160	180	200	230	250	280	320	360	400
	In = 630 A	Io =	250	280	320	350	400	450	500	570	630
	Ir = Io x ...		9 fine adjustment settings from 0.9 to 1 (0.9 - 0.92 - 0.93 - 0.94 - 0.95 - 0.96 - 0.97 - 0.98 - 1) for each value of Io								
Time delay (s) accuracy 0 to -20%	**tr**		non-adjustable								
		1.5 x Ir	400								
		6 x Ir	16								
		7.2 x Ir	11								
Thermal memory			20 minutes before and after tripping								
S_0 Short-time protection with fixed time delay											
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**		non-adjustable								
	Non-tripping time		20								
	Maximum break time		80								
I Instantaneous protection											
Pick-up (A) accuracy ±15 %	Ii non-adjustable		600	1500	2400	3000	4800	6900			
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								



(1) If the trip units are used in high-temperature environments, the Micrologic setting must take into account the thermal limitations of the circuit breaker. See the temperature derating table.

Micrologic 1.3-M

Ratings (A)	In at 65 °C	320	500
Circuit breaker	Compact NSX400	■	-
	Compact NSX630	■	■
S Short time protection			
Pick-up (A) accuracy ±15 %	**Isd**	adjustable directly in amps	
		9 settings: 1600, 1920, 2440, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500 A
Time delay (ms)	**tsd**	non-adjustable	
	Non-tripping time Maximum break time	20 60	
I Instantaneous protection			
Pick-up (A) accuracy ±15 %	**Ii** non-adjustable	4800	6500
	Non-tripping time Maximum break time	0 30 ms	



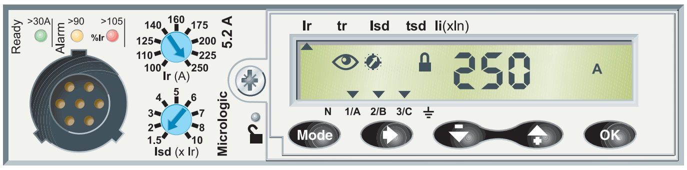
Functions
and characteristics

Protection of distribution systems

Micrologic 5 / 6 A or E trip units

Micrologic 5 / 6 A (Ammeter) or E (Energy) trip units can be used on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L. They all have a display unit.
They offer basic LSI protection (Micrologic 5) or LSI and ground-fault protection G (Micrologic 6).
They also offer measurement, alarm and communication functions.

DB112109



Protection

Settings can be adjusted in two ways, using the dials and/or the keypad.
The keypad can be used to make fine adjustments in 1 A steps below the maximum value defined by the setting on the dial. Access to setting modifications via the keypad is protected by a locking function displayed on the screen and controlled by a microswitch. The lock is activated automatically if the keypad is not used for 5 minutes. Access to the microswitch is protected by a transparent lead-sealable cover. With the cover closed, it is still possible to display the various settings and measurements using the keypad.

Overloads: Long time protection (Ir)
Inverse time protection against overloads with an adjustable current pick-up **Ir** set using a dial or the keypad for fine adjustments. The time delay **tr** is set using the keypad.

Short-circuits: Short-time protection (Isd)
Short-circuit protection with an adjustable pick-up **Isd** and adjustable time delay **tsd**, with the possibility of including a portion of an inverse time curve (I^2t On).

Short-circuits: Instantaneous protection (Ii)
Instantaneous protection with adjustable pick-up **Ii**.

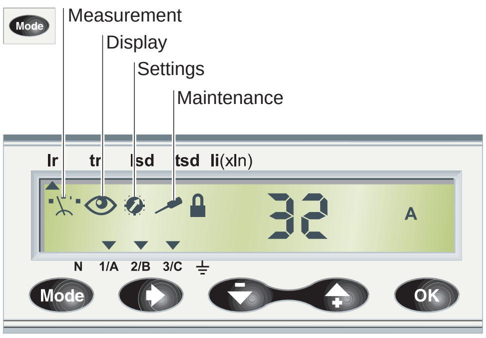
Additional ground fault protection (Ig) on Micrologic 6
Residual type ground-fault protection with an adjustable pick-up **Ig** (with Off position) and adjustable time delay **tg**. Possibility of including a portion of an inverse time curve (I^2t On).

Neutral protection
- On 4-pole circuit breakers, this protection can be set via the keypad:
  - Off: neutral unprotected
  - 0.5: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
  - 1.0: neutral fully protected at Ir
  - OSN: Oversized neutral protection at 1.6 times the value of the phase pick-up.

Used when there is a high level of 3rd order harmonics (or orders that are multiples of 3) that accumulate in the neutral and create a high current. In this case, the device must be limited to Ir = 0.63 x In for the maximum neutral protection setting of 1.6 x Ir.
- With 3-pole circuit breakers, the neutral can be protected by installing an external neutral sensor with the output (T1, T2) connected to the trip unit.

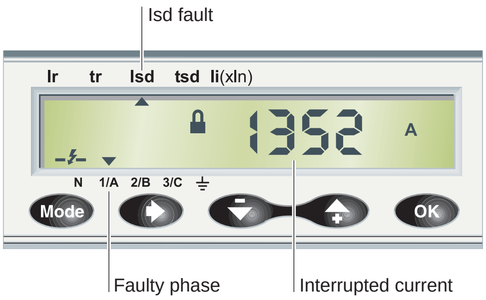
Zone selective interlocking (ZSI)
A ZSI terminal block may be used to interconnect a number of Micrologic control units to provide zone selective interlocking for short-time (Isd) and ground-fault (Ig) protection, without a time delay. For Compact NSX 100 to 250, the ZSI function is available only in relation to the upstream circuit breaker (ZSI out).

DB115566



Trip unit menus.

DB115567



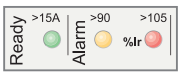
Display of interrupted current.

Display of type of fault

On a fault trip, the type of fault (Ir, Isd, Ii, Ig), the phase concerned and the interrupted current are displayed. An external power supply is required.

Indications

Front indications



- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- Orange overload pre-alarm LED: steady on when I > 90 % Ir
- Red overload LED: steady on when I > 105 % Ir

Remote indications
An SDx relay module installed inside the circuit breaker can be used to remote the following information:
- overload trip
- overload prealarm (Micrologic 5) or ground fault trip (Micrologic 6).

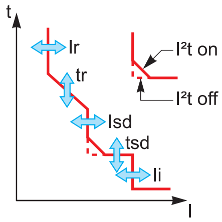
This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is closed.
These outputs can be reprogrammed to be assigned to other types of tripping or alarm. The module is described in detail in the section dealing with accessories.

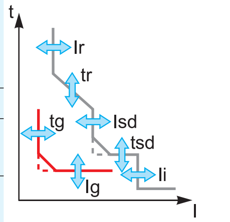
PB103377

SDx remote indication relay module with its terminal block.

Note: all the trip units have a transparent lead-sealable cover that protects access to the adjustment dials.

Protection	Micrologic 5 / 6 A or E trip units											
Ratings (A)	**In at 40 °C** (1)			**40** (2)	**100**	**160**	**250**	**400**	**630**			
Circuit breaker	Compact NSX100			■	■	-	-	-	-			
	Compact NSX160			■	■	■	-	-	-			
	Compact NSX250			■	■	■	■	-	-			
	Compact NSX400			-	-	-	-	■	-			
	Compact NSX630			-	-	-	-	■	■			
L Long-time protection												
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir** = ...	dial setting		value depending on trip unit rating (In) and setting on dial								
		In = 40 A	Io =	18	18	20	23	25	28	32	36	40
		In = 100 A	Io =	40	45	50	55	63	70	80	90	100
		In = 160 A	Io =	63	70	80	90	100	110	125	150	160
		In = 250 A	Io =	100	110	125	140	160	175	200	225	250
		In = 400 A	Io =	160	180	200	230	250	280	320	360	400
		In = 630 A	Io =	250	280	320	350	400	450	500	570	630
		keypad setting		Fine adjustment in 1 A steps below maximum value set on dial								
Time delay (s) accuracy 0 to -20 %	**tr** = ...	keypad setting		0.5	1	2	4	8	16			
			1.5 x Ir	15	25	50	100	200	400			
			6 x Ir	0.5	1	2	4	8	16			
			7.2 x Ir	0.35	0.7	1.4	2.8	5.5	11			
Thermal memory				20 minutes before and after tripping								
S Short-time protection with adjustable time delay												
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...	dial setting for Micrologic 5		1.5	2	3	4	5	6	7	8	10
				Fine adjustment in 0.5 x Ir steps using the keypad								
		keypad settings for micrologic 6		Adjustment in steps of 0.5 x In over the range 1.5 x In to: 15 x In (40 to 160 A), 12 x In (250 to 400 A) or 11 x In (630 A)								
Time delay (s)	**tsd** = ...	keypad setting	I^2Off	0	0.1	0.2	0.3	0.4				
			I^2On	-	0.1	0.2	0.3	0.4				
	Non-tripping time (ms)			20	80	140	230	350				
	Maximum break time (ms)			80	140	200	320	500				
I Instantaneous protection												
Pick-up (A) accuracy ±15 %	**Ii** = In x	keypad setting		Adjustment in steps of 0.5 x In over the range 1.5 x In to: 15 x In (40 to 160 A), 12 x In (250 to 400 A) or 11 x In (630 A)								
	Non-tripping time			10 ms								
	Maximum break time			50 ms for I > Ii								
G Ground-fault protection - for Micrologic 6 A or E												
Pick-up (A) accuracy ±10 %	**Ig** = In x	dial setting										
		In = 40 A		0.4	0.4	0.5	0.6	0.7	0.8	0.9	1	Off
		In > 40 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Off
				Fine adjustment in 0.05 A steps using the keypad								
Time delay (s)	**tg** = ...	keypad setting	I^2Off	0	0.1	0.2	0.3	0.4				
			I^2On	-	0.1	0.2	0.3	0.4				
	Non-tripping time (ms)			20	80	140	230	350				
	Maximum break time (ms)			80	140	200	320	500				
Test	Ig function			built-in								





(1) If the trip units are used in high-temperature environments, the Micrologic setting must take into account the thermal limitations of the circuit breaker. See the temperature derating table.
(2) For 40 A rating, the neutral N/2 adjustment is not possible.

Functions
and characteristics

Power Meter functions
Electronic Micrologic 5 / 6 A or E

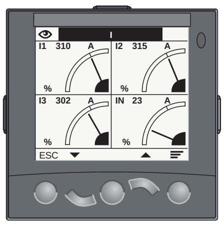
In addition to protection functions, Micrologic 5 / 6 trip units offer all the functions of Power Meter products as well as operating-assistance for the circuit breaker.
- display of settings
- measurement functions:
  - Ammeter (A)
  - Energy (E)
- alarms
- time-stamped histories and event tables
- maintenance indicator
- communication.

PB103365

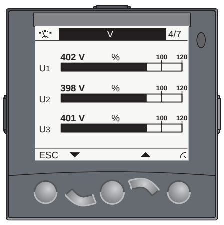

Micrologic built-in LCD display showing an energy measurement.

DB112211

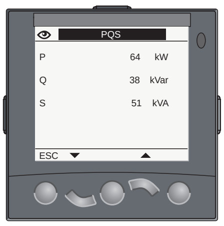

FDM121 display: navigation.

DB112131


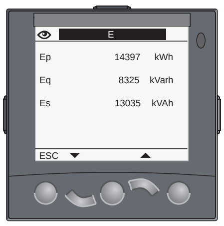
Current.

DB112132


Voltage.

DB112133


Power.

DB112134


Consumption.

Examples of measurement screens on the FDM121 display unit.

Micrologic A and E measurement functions are made possible by Micrologic intelligence and the accuracy of the sensors. They are handled by a microprocessor that operates independent of protection functions.

Display

Micrologic LCD
The user can display all the protection settings and the main measurements on the LCD screen of the trip unit.
- Micrologic A: instantaneous rms current measurements
- Micrologic E: voltage, frequency and power measurements and energy metering, in addition to the measurements offered by Micrologic A

To make the display available under all conditions and increase operating comfort, an external power supply is recommended for Micrologic A.
It is indispensable to:
- display faults and interrupted current measurements
- use all the functions of Micrologic E (e.g. metering of low power and energy values)
- ensure operation of the communication system.

The external power supply can be shared by several devices. For description, see page A-32.

FDM121 display unit
An FDM121 switchboard display unit can be connected to a Micrologic trip unit using a prefabricated cord to display all measurements on a screen. The result is a veritable 96 x 96 mm Power Meter.
In addition to the information displayed on the Micrologic LCD, the FDM121 screen shows demand, power quality and maximeter/minimeter values along with alarms, histories and maintenance indicators.
The FMD121 display unit requires a 24 V DC power supply. The Micrologic trip unit is supplied by the same power supply via the cord connecting it to the FDM121.

PC screen
When the Micrologic, with or without an FDM121 switchboard display unit, is connected to a communication network, all information can be accessed via a PC.

Measurements

Instantaneous rms measurements
The Micrologic A and E continuously display the RMS value of the highest current of the three phases and neutral (Imax). The navigation buttons can be used to scroll through the main measurements.
In the event of a fault trip, the current interrupted is memorised.
The Micrologic A measures phase, neutral, ground fault currents.
The Micrologic E offers voltage, frequency and power measurements in addition to the measurements provided by Micrologic A

Maximeters / minimeters
Every instantaneous measurement provided by Micrologic A or E can be associated with a maximeter/minimeter. The maximeters for the highest current of the 3 phases and neutral, the demand current and power can be reset via the trip unit keypad, the FDM121 display unit or the communication system.

Energy metering
The Micrologic E also measures the energy consumed since the last reset of the meter. The active energy meter can be reset via the keypad and the FDM121 display unit or the communication system.

Demand and maximum demand values
Micrologic E also calculates demand current and power values. These calculations can be made using a block or sliding interval that can be set from 5 to 60 minutes in steps of 1 minute. The window can be synchronised with a signal sent via the communication system. Whatever the calculation method, the calculated values can be recovered on a PC via Modbus communication.
Ordinary spreadsheet software can be used to provide trend curves and forecasts based on this data. They will provide a basis for load shedding and reconnection operations used to adjust consumption to the subscribed power.

Power quality
Micrologic E calculates power quality indicators taking into account the presence of harmonics up to the 15th order, including the total harmonic distortion (THD) of current and voltage.

Micrologic 5 / 6 integrated Power Meter functions			Type		Display	
			A	E	Micrologic LCD	FDM121 display
Display of protection settings						
Pick-ups (A) and delays	All settings can be displayed	Ir, tr, Isd, tsd, Ii, Ig, tg	■	■	■	
Measurements						
Instantaneous rms measurements						
Currents (A)	Phases and neutral	I1, I2, I3, IN	■	■	■	■
	Average of phases	Iavg = (I1 + I2 + I3) / 3	■	■	-	■
	Highest current of the 3 phases and neutral	Imax of I1, I2, I3, IN	■	■	■	■
	Ground fault (Micrologic 6)	% Ig (pick-up setting)	■	■	■	■
	Current unbalance between phases	% Iavg	-	■	-	■
Voltages (V)	Phase-to-phase	U12, U23, U31	-	■	■	■
	Phase-to-neutral	V1N, V2N, V3N	-	■	■	■
	Average of phase-to-phase voltages	Uavg = (U12 + U21 + U23) / 3	-	■	-	■
	Average of phase-to-neutral voltages	Vavg = (V1N + V2N + V3N) / 3	-	■	-	■
	Ph-Ph and Ph-N voltage unbalance	% Uavg and % Vavg	-	■	-	■
	Phase sequence	1-2-3, 1-3-2	-	■	■	■
Frequency (Hz)	Power system	f	-	■	-	■
Power	Active (kW)	P, total / per phase	-	■	■ / -	■
	Reactive (kVAR)	Q, total / per phase	-	■	■ / -	■
	Apparent (kVA)	S, total / per phase	-	■	■ / -	■
	Power factor and cos φ (fundamental)	PF and cos φ, total and per phase	-	■	-	■
Maximeters / minimeters						
	Associated with instantaneous rms measurements	Reset via Micrologic or FDM121 display unit	■	■	-	■
Energy metering						
Energy	Active (kW), reactive (kVARh), apparent (kVAh)	Total since last reset Absolute or signed mode (1)	-	■	■	■
Demand and maximum demand values						
Demand current (A)	Phases and neutral	Present value on the selected window	-	■	-	■
		Maximum demand since last reset	-	■	-	■
Demand power	Active (kWh), reactive (kVAR), apparent (kVA)	Present value on the selected window	-	■	-	■
		Maximum demand since last reset	-	■	-	■
Calculation window	Sliding, fixed or com-synchronised	Adjustable from 5 to 60 minutes in 1 minute steps	-	■	-	(2)
Power quality						
Total harmonic distortion (%)	Of voltage with respect to rms value	THDU,THDV of the Ph-Ph and Ph-N voltage	-	■	-	■
	Of current with respect to rms value	THDI of the phase current	-	■	-	■

(1) Absolute mode: E absolute = E out + E in; Signed mode: E signed = E out - E in.
(2) Available via the communication system only.

Additional technical characteristics

Measurement accuracy

Accuracies are those of the entire measurement system, including the sensors:

- *Current: Class 1 as per IEC 61557-12*
- *Voltage: 0.5 %*
- *Power and energy: Class 2 as per IEC 61557-12*
- *Frequency: 0.1 %.*

Operating-assistance functions

Micrologic 5 / 6 A or E trip units

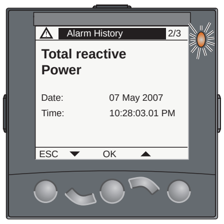
PB103365

Micrologic built-in LCD display.

DB112212

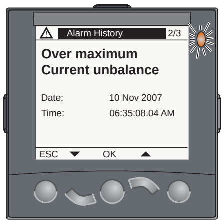
FDM121 display: navigation.

DB112127



Overpower alarm.

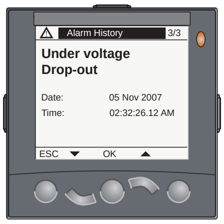
DB112128



Phase unbalance alarm.

DB112129

DB112130



Alarm pick-up and drop-out.

Examples of operating-assistance screens on the FDM121 display unit.

Personalised alarms with time-stamping

Alarm types

The user can assign an alarm to all Micrologic A or E measurements or events:

- up to 12 alarms can be used together:
  - two alarms are predefined and activated automatically:
    - Micrologic 5: overload (Ir)
    - Micrologic 6: overload (Ir) and ground fault (Ig)
  - thresholds, priorities and time delays can be set for ten other alarms.
- the same measurement can be used for different alarms to precisely monitor certain values, e.g. the frequency or the voltage
- alarms can also be assigned to various states: phase lead/lag, four quadrants, phase sequence
- selection of display priorities, with pop-up possibility
- alarm time-stamping.

Alarm settings

Alarms cannot be set via the keypad or the FDM121 display unit. They are set via communication with the PC. Set-up includes the threshold, priority, activation delay before display and deactivation delay. It is also possible to reprogram the standard assignment for the two SDx relay outputs to user-selected alarms.

Alarm reading

Remote alarm indications

- reading on FDM121 display unit or on PC via the communication system
- remote indications via SDx relay with two output contacts for alarms.

Histories and event tables

Micrologic A and E have histories and event tables that are always active.

Three types of time-stamped histories

- Tripping due to overruns of Ir, Isd, Ii, Ig: last 17 trips
- Alarms: last 10 alarms
- Operating events: last 10 events

Each history record is stored with:

- indications in clear text in a number of user-selectable languages
- time-stamping: date and time of event
- status: pick-up / drop-out

Two types of time-stamped event tables

- Protection settings
- Minimeters / maximeters

Display of alarms and tables

The time-stamped histories and event tables may be displayed on a PC via the communication system.

Embedded memory

Micrologic A and E have a non-volatile memory that saves all data on alarms, histories, event tables, counters and maintenance indicators even if power is lost.

Maintenance indicators

Micrologic A and E have indicators for, among others, the number of operating cycles, contact wear and operating times (operating hours counter) of the Compact NSX circuit breaker.

It is possible to assign an alarm to the operating cycle counter to plan maintenance.

The various indicators can be used together with the trip histories to analyse the level of stresses the device has been subjected to.

The information provided by the indicators cannot be displayed on the Micrologic LCD. It is displayed on the PC via the communication system.

Management of installed devices

Each circuit breaker equipped with a Micrologic 5 or 6 trip unit can be identified via the communication system:

- serial number
- firmware version
- hardware version
- device name assigned by the user.

This information together with the previously described indications provides a clear view of the state of the installed devices.

Micrologic 5 / 6 operating assistance functions			Type		Display	
			A	E	Micrologic LCD	FDM121 display
Operating assistance						
Personalised alarms						
Settings	Up to 10 alarms assigned to all A and E measurements		■	■	-	(2)
	Phase lead/lag, four quadrants, phase sequence, display priority selection		-	■	-	(2)
Display	Alarms and tripping		■	■	-	(2)
Remote indications	Activation of two dedicated contacts on SDx module		■	■	-	-
Time-stamped histories						
Trips (last 17)	Cause of tripping (time-stamping with ms)	Ir, Isd, Ii (Micrologic 5, 6)	■	■	-	(2)
		Ig (Micrologic 6)	■	■	-	(2)
Alarms (last 10)			■	■	-	(2)
Operating events (last 10)	Event types	Modification of protection setting by dial	-	■	-	(2)
		Opening of keypad lock	-	■	-	(2)
		Test via keypad	-	■	-	(2)
		Test via external tool	-	■	-	(2)
		Time setting (date and time)	-	■	-	(2)
		Reset for maximeter/minimeter and energy meter	■	■	■	■
Time stamping	Presentation	Date and time, text, status	■	■	-	(2)
Time-stamped event tables						
Protection settings	Setting modified (value displayed)	Ir tr Isd tsd Ii Ig tg	■	■	-	(2)
	Time-stamping	Date and time of modification	■	■	-	(2)
	Previous value	Value before modification	■	■	-	(2)
Min/Max	Values monitored	I1 I2 I3 IN	■	-	-	(2)
		I1 I2 I3 IN U12 U23 U31 f	-	■	-	(2)
	Time-stamping of each value	Date and time of min/max record	■	■	-	(2)
	Current min/max value	Min/max value	■	■	-	(2)
Maintenance indicators						
Counter	Mechanical cycles (1)	Assignable to an alarm	■	■	-	(2)
	Electrical cycles (1)	Assignable to an alarm	■	■	-	(2)
	Trips	One per type of trip	■	■	-	(2)
	Alarms	One for each type of alarm	■	■	-	(2)
	Hours	Total operating time (hours)	■	■	-	(2)
Indicator	Contact wear	%	■	■	-	(2)
Load profile	Hours at different load levels	% of hours in four current ranges: 0-49 % In, 50-79 % In, 80-89 % In and ≥ 90 % In	■	■	-	(2)

(1) The BSCM module (page A-27) is required for these functions.
(2) Available via the communication system only.

Additional technical characteristics

Contact wear

Each time Compact NSX opens, the Micrologic 5 / 6 trip unit measures the interrupted current and increments the contact-wear indicator as a function of the interrupted current, according to test results stored in memory. Breaking under normal load conditions results in a very slight increment. The indicator value may be read on the FDM121 display. It provides an estimation of contact wear calculated on the basis of the cumulative forces affecting the circuit breaker. When the indicator reaches 80%, it is advised to replace the circuit breaker to ensure the availability of the protected equipment.

Circuit breaker load profile

Micrologic 5 / 6 calculates the load profile of the circuit breaker protecting a load circuit. The profile indicates the percentage of the total operating time at four current levels (% of breaker In):

- *0 to 49 % In*
- *50 to 79 % In*
- *80 to 89 % In*
- *≥ 90 % In.*

This information can be used to optimise use of the protected equipment or to plan ahead for extensions.

Switchboard-display functions
Micrologic 5 / 6 A or E trip units

Micrologic measurement capabilities come into full play with the FDM121 switchboard display. It connects to Compact NSX via a simple cord and displays Micrologic information. The result is a true integrated unit combining a circuit breaker and a Power Meter. Additional operating assistance functions can also be displayed.

FDM121 switchboard display
The FDM121 is a switchboard display unit that can be integrated in the Compact NSX100 to 630 A system. It uses the sensors and processing capacity of the Micrologic trip unit. It is easy to use and requires no special software or settings. It is immediately operational when connected to the Compact NSX by a simple cord.
The FDM121 is a large display, but requires very little depth. The anti-glare graphic screen is backlit for very easy reading even under poor ambient lighting and at sharp angles.

Display of Micrologic measurements and alarms
The FDM121 is intended to display Micrologic 5 / 6 measurements, alarms and operating information. It cannot be used to modify the protection settings.
Measurements may be easily accessed via a menu.
All user-defined alarms are automatically displayed. The display mode depends on the priority level selected during alarm set-up:
■ high priority: a pop-up window displays the time-stamped description of the alarm and the orange LED flashes
■ medium priority: the orange "Alarm" LED goes steady on
■ low priority: no display on the screen.
All faults resulting in a trip automatically produce a high-priority alarm, without any special settings required.
In all cases, the alarm history is updated.
If power to the FDM121 fails, all information is stored in the Micrologic non-volatile memory. The data can be consulted via the communication system when power is restored.

Status indications and remote control
When the circuit breaker is equipped with the BSCM module (page A-27), the FDM121 display can also be used to view circuit breaker status conditions:
■ O/F: ON/OFF
■ SD: trip indication
■ SDE: Fault-trip indication (overload, short-circuit, ground fault)

PB103582

FDM121 display.

PB103807-32

Surface mount accessory.

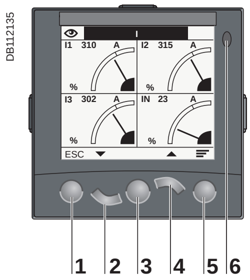
Main characteristics
■ 96 x 96 x 30 mm screen requiring 10 mm behind the door (or 20 mm when the 24 volt power supply connector is used).
■ White backlighting.
■ Wide viewing angle: vertical ±60°, horizontal ±30°.
■ High resolution: excellent reading of graphic symbols.
■ Alarm LED: flashing orange for alarm pick-up, steady orange after operator reset if alarm condition persists.
■ Operating temperature range -10 °C to +55 °C.
■ CE / UL marking.
■ 24 V DC power supply, with tolerances 24 V -20 % (19.2 V) to 24 V +10 % (26.4 V). When the FDM121 is connected to the communication network, the 24 V is supplied by the communication system wiring system.
■ Consumption 40 mA.

Mounting
The FDM121 is easily installed in a switchboard.
■ Standard door cut-out 92 x 92 mm.
■ Attached using clips.
To avoid a cut-out in the door, an accessory is available for surface mounting by drilling only two 22 mm diameter holes.
The FDM121 degree of protection is IP54 in front. IP54 is maintained after switchboard mounting by using the supplied gasket during installation.

PB103581-31

Connection with FDM121 display unit.

Connection
The FDM121 is equipped with:
■ a 24 V DC terminal block:
□ plug-in type with 2 wire inputs per point for easy daisy-chaining
□ power supply range of 24 V -20 % (19.2 V) to 24 V +10 % (26.4 V)
■ two RJ45 jacks.
The Micrologic connects to the internal communication terminal block on the Compact NSX via the pre-wired NSX cord. Connection to one of the RJ45 connectors on the FDM121 automatically establishes communication between the Micrologic and the FDM121 and supplies power to the Micrologic measurement functions.
When the second connector is not used, it must be fitted with a line terminator.



1 *Escape*
2 *Down*
3 *OK*
4 *Up*
5 *Context*
6 *Alarm LED*

Navigation

Five buttons are used for intuitive and fast navigation.
The "Context" button may be used to select the type of display (digital, bargraph, analogue).
The user can select the display language (Chinese, English, French, German, Italian, Portuguese, Spanish, etc.) Other languages can be downloaded.

Screens

Main menu

When powered up, the FDM121 screen automatically displays the ON/OFF status of the device.

- Quick view
- Metering
- Alarms
- Services.

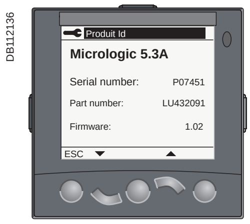
When not in use, the screen is not backlit. Backlighting can be activated by pressing one of the buttons. It goes off after 3 minutes.

Fast access to essential information

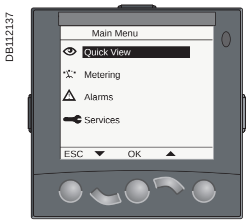
■ "Quick view" provides access to five screens that display a summary of essential operating information (I, U, f, P, E, THD, circuit breaker On / Off).

Access to detailed information

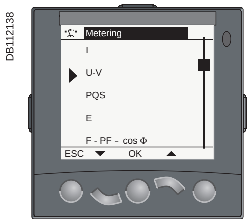
■ "Metering" can be used to display the measurement data (I, U-V, f, P, Q, S, E, THD, PF) with the corresponding min/max values.
■ Alarms displays active alarms and the alarm history.
■ Services provides access to the operation counters, energy and maximeter reset function, maintenance indicators, identification of modules connected to the internal bus and FDM121 internal settings (language, contrast, etc.)



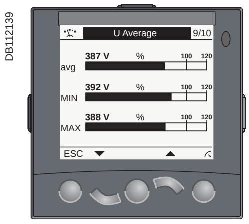
Product identification.



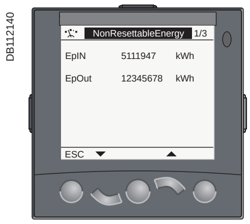
Quick view.



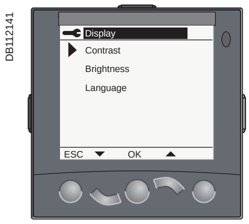
Metering: sub-menu.



Metering: U average.



Metering: meter.



Services.

Compact NSX communication
Communications modules

All Compact NSX devices can be equipped with the communication function via a prewired connection system and a Modbus network interface.
The interface can be connected directly or via the FDM121 switchboard display unit. Four functional levels can be combined to adapt to all supervision requirements.

Four functional levels
The Compact NSX can be integrated in a Modbus communication environment. Four functional levels can be used separately or combined.

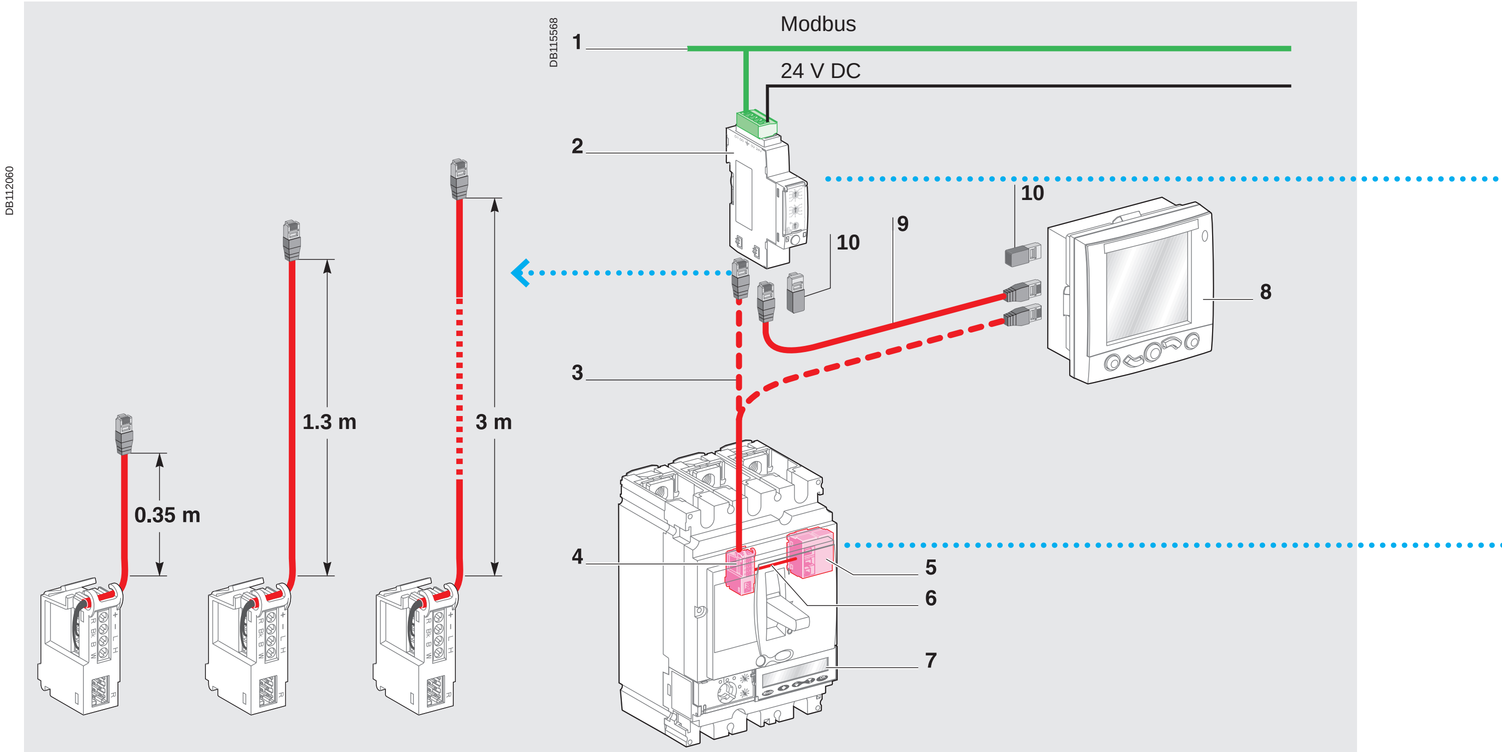
Communication of status indications
This level is compatible with all Compact NSX circuit breakers, whatever the trip unit, and with all switch-disconnectors. Using the BSCM module, the following information is accessible:
- ON/OFF position (O/F)
- trip indication (SD)
- fault-trip indication (SDE).

Communication of commands
Also available on all circuit breakers and switch-disconnectors, this level (communicating remote control) can be used to:
- open
- close
- reset.

Communication of measurements with Micrologic 5 / 6 A or E
This level provides access to all available information:
- instantaneous and demand values
- maximeters/minimeters
- energy metering
- demand current and power
- power quality.

Communication of operating assistance with Micrologic 5 / 6 A or E
- protection and alarm settings
- time-stamped histories and event tables
- maintenance indicators.

Communication components and connections



Connections
- *Compact NSX is connected to the Modbus interface or FDM121 display unit via the internal terminal block for the NSX cord equipped with an RJ45 connector.*
  - *cord available in three lengths: 0.35 m, 1.3 m and 3 m.*
  - *insulated 0.35 m version for installations > 480 V AC*
  - *lengths up to 10 m possible using extensions.*
- *The FDM121 display unit is connected to the Modbus interface by a communication cable with RJ45 connectors on both ends.*

1 Modbus network
2 Modbus interface
3 NSX cord
4 Internal terminal block for communication via NSX cord
5 BSCM module
6 Prefabricated wiring
7 Micrologic trip unit
8 FDM121 display
9 RJ45 cable
10 Line terminator (on unused connector if applicable)

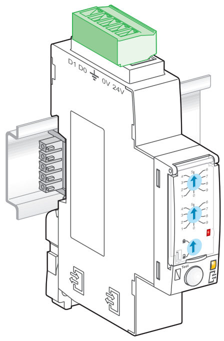
Modbus interface module

Functions

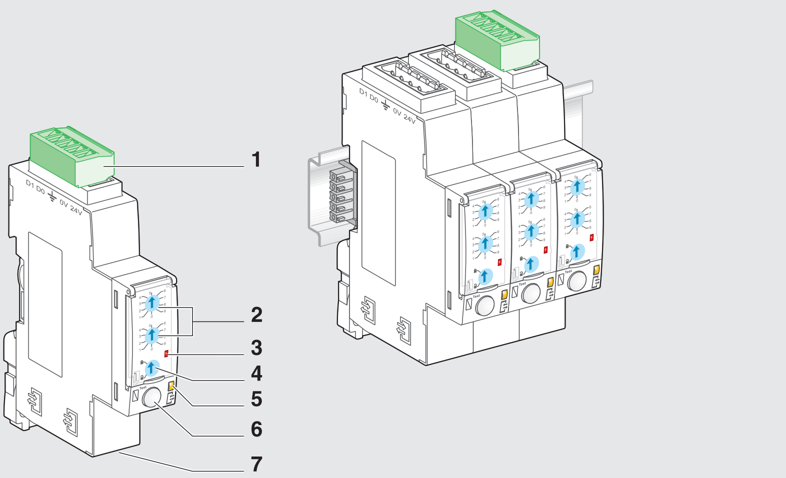
This module, required for connection to the network, contains the Modbus address (1 to 99) declared by the user via the two dials in front. It automatically adapts (baud rate, parity) to the Modbus network in which it is installed.
It is equipped with a lock-out switch to enable or disable operations involving writing to Micrologic, i.e. reset, counter reset, setting modifications, device opening and closing commands, etc.
There is a built-in test function to check the connections of the Modbus interface module with the Micrologic and FDM121 display unit.

Mounting

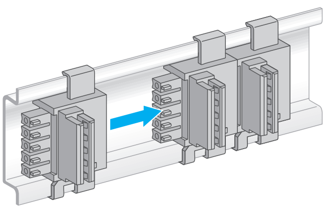
The module is mounted on a DIN rail. A number of modules may be clipped one next to the other.
For this, a stacking accessory is available for fast clip-connection of both the Modbus link and the 24 V DC supply.
The Modbus interface module supplies 24 V DC to the corresponding Micrologic, FDM121 display and BSCM module. Module consumption is 60 mA / 24 V DC.



Modbus interface module.



1 Five-point Modbus and 24 V DC connector
2 Two Modbus address dials (1 to 99)
3 Modbus traffic LED
4 Lock-out to disable writing to the NSX
5 Test LED
6 Test button
7 Two connectors for RJ45 cable



Mounting with stacking accessory.

BSCM module

Functions

The optional BSCM Breaker Status & Control Module is used to acquire device status indications and control the communicating remote-control function.
It includes a memory used to manage the maintenance indicators.

Status indications

Indication of device status:
O/F, SD and SDE.

Maintenance indicators

The BSCM module manages the following indicators:

- mechanical operation counter
- electrical operation counter
- history of status indications.

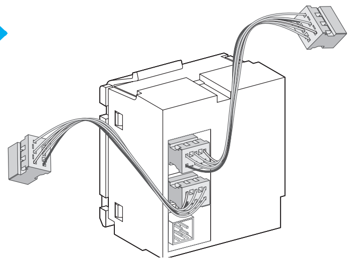
It is possible to assign an alarm to the operation counters.

Controls

The module can be used to carry out communicating remote control operations: (open, close and reset) in different modes (manual, auto).

Mounting

The BSCM module can be installed on all Compact NSX circuit breakers and switch-disconnectors. It simply clips into the auxiliary contact slots. It occupies the slots of one O/F contact and one SDE contact. The BSCM is supplied with 24 V DC power automatically via the NSX cord when the communication system is installed.



BSCM module.

Functions and characteristics

Compact NSX communication

Networks and software

Compact NSX uses the Modbus communication protocol, compatible with SMS PowerLogic supervision systems.
Two downloadable utilities facilitate implementation of communication functions.

Modbus

Modbus is the most widely used communication protocol in industrial networks. It operates in master-slave mode. The devices (slaves) communicate one after the other with a gateway (master).
Masterpact, Compact NSX, PowerLogic and Sepam products all operate with this protocol. A Modbus network is generally implemented on an LV or MV switchboard scale.
Depending on the data monitored and the desired refresh rate, a Modbus network connected to a gateway can serve 4 to 16 devices. For larger installations, a number of Modbus networks can be connected to an Ethernet network (TCP/IP/Modbus protocol) via their gateways.

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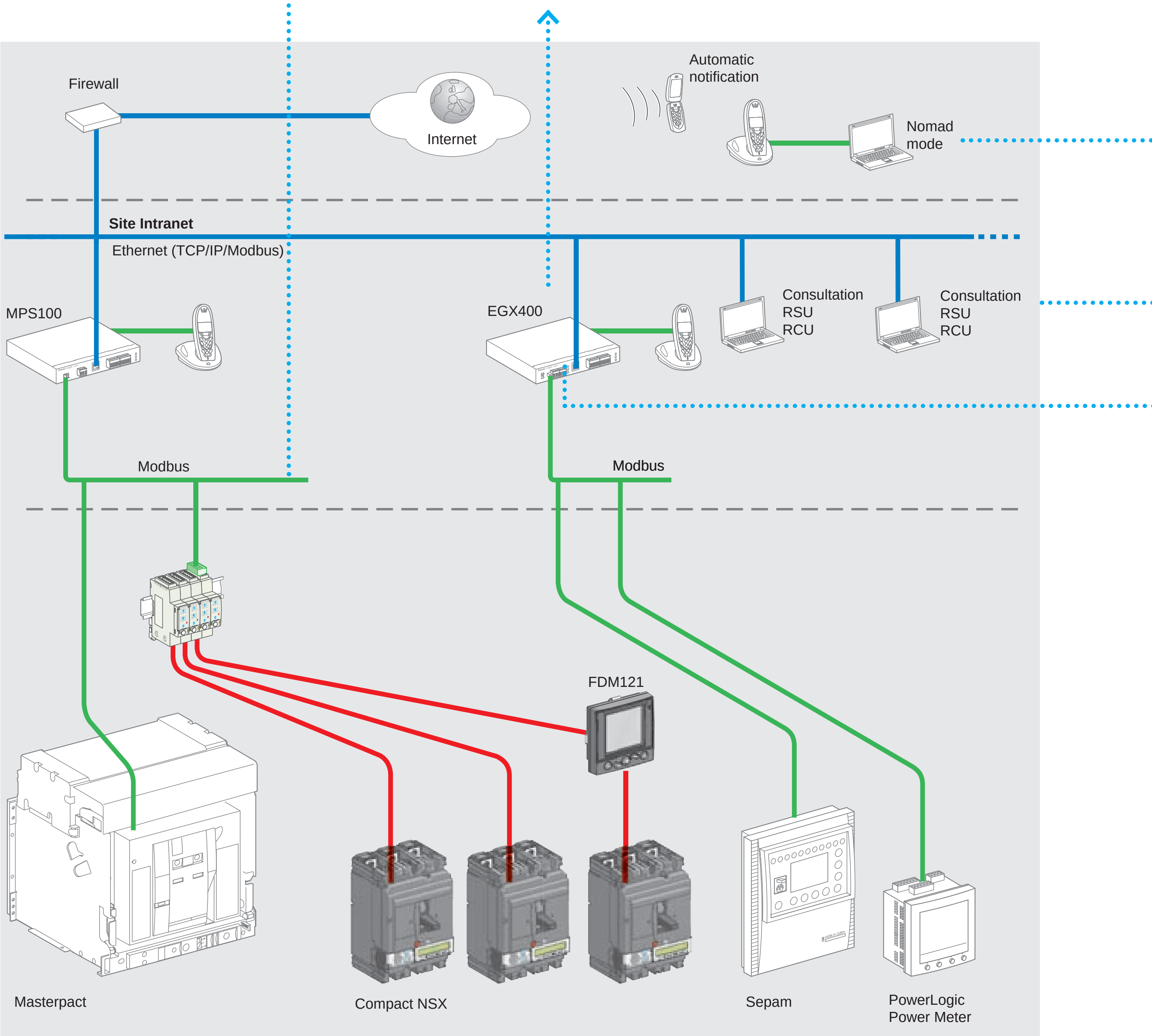
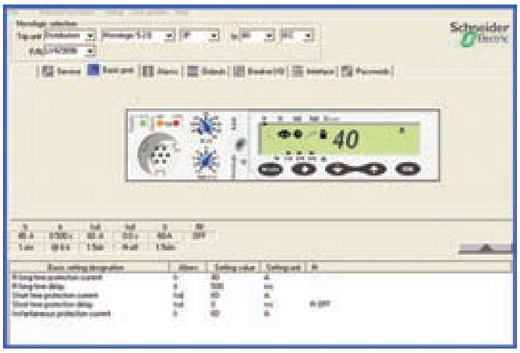


Micrologic utilities

■ Two utilities, RSU and RCU, presented on the next page, are available to assist in starting up a communicating installation. Intended for Compact NSX and Masterpact, the software can be downloaded from the Schneider Electric internet site.

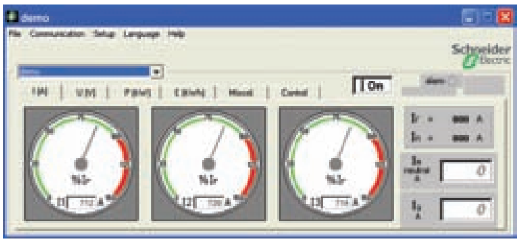
■ The "Live update" function enables immediate updating to obtain the most recent upgrades. These easy-to-use utilities include starting assistance and on-line help. They are compatible with Microsoft Windows 2000, XP and Vista.

DB112125



RSU configuration screen for a Micrologic 5.2.

DB112214



RCU mini-supervision screen for current measurements.

Gateway

The gateway has two functions:

■ access to the company intranet (Ethernet) by converting Modbus frames to the TCP/IP/Modbus protocol

■ optional web-page server for the information from the devices.

Examples include MPS100, EGX400 and EGX100.

MPS100

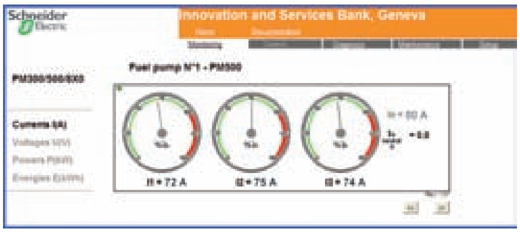
■ Plug and play device. It comes loaded with a web-page application for graphic display of currents and voltages and viewing of circuit-breaker status and power and energy values.

To use the application, simply declare the Modbus addresses of the connected slaves. Automatically recognised devices include all Masterpact and Compact NSX Micrologic trip units and the PM500/700/800 and PM9c power monitoring units.

■ Can be used for automatic alarm notification via a messaging server available on the site intranet or via mobile phones (e-mail converted into SMS).

■ Can be used for logging of data that can be automatically sent as e-mail attachments, e.g. a weekly consumption report.

DB112126



Web page.

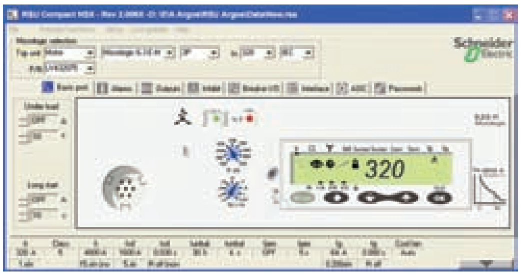
Functions
and characteristics

Compact NSX communication

RSU and RCU utilities

Two utilities, RSU and RCU, are available to assist in starting up a communicating installation.
They can be downloaded from the Schneider Electric internet site and include a "Live update" function that enables immediate updating.

DB118724



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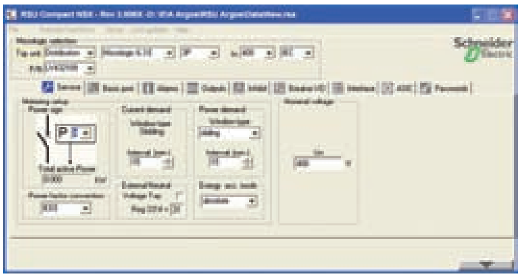

RSU: Micrologic Remote Setting Utility.

RSU (Remote Setting Utility)

This utility is used to set the protection functions and alarms for each Masterpact and Compact NSX device.
After connection to the network and entry of the circuit-breaker Modbus address, the software automatically detects the type of trip unit installed.
There are two possible operating modes.

Off-line with the software disconnected from the communication network

For each selected circuit breaker, the user can do the following.

Determine the protection settings
The settings are carried out on a screen that shows the front of the trip unit. The Micrologic setting dials, keypad and screen are simulated for easy use of all Micrologic setting functions.

Save and duplicate the protection settings
Each configuration created can be saved for subsequent device programming. It can also be duplicated and used as the basis for programming another circuit breaker.

On-line with the software connected to the network

Similarly, for each selected circuit breaker, the user can do the following.

Display the current settings
The software displays the trip unit and provides access to all settings.

View the corresponding protection curves
A graphic curve module in the software displays the protection curve corresponding to the settings. It is possible to lay a second curve over the first for discrimination studies.

Modify settings in a secure manner
■ There are different levels of security:
□ password: by default, it is the same for all devices, but can be differentiated for each device
□ locking of the Modbus interface module which must be unlocked before the corresponding device can be set remotely
□ maximum settings limited by the positions of the two dials on the trip unit.
These dials, set by the user, determine the maximum settings that can be made via the communication system.
■ Settings are modified by:
□ either direct, on-line setting of the protection settings on the screen
□ or by loading the settings prepared in off-line mode. This is possible only if the positions of the dials allow the new settings.
All manual settings made subsequently on the device have priority.

Program alarms
■ Up to 12 alarms can be linked to measurements or events.
■ two alarms are predefined and activated automatically:
□ Micrologic 5: overload (Ir)
□ Micrologic 6: overload (Ir) and ground fault (Ig)
■ thresholds, priorities and time delays can be set for 10 other alarms. They may be selected from a list of 91 alarms

Set the outputs of the SDx relays
This is required when the user wants to change the standard configuration and assign different signals to the 2 outputs of the SDx relay.

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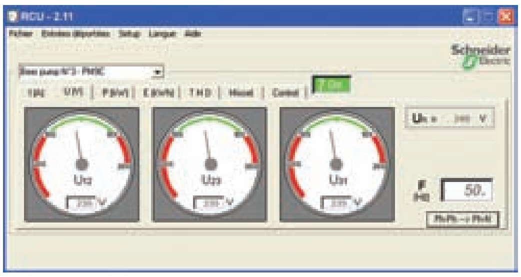


RCU: Remote Control Utility for communication tests.

RCU (Remote Control Utility)

The RCU utility can be used to test communication for all the devices connected to the Modbus network. It is designed for use with Compact NSX, Masterpact, Advantys OTB and Power Meter devices. It offers a number of functions.

Mini supervisor
■ Display of I, U, f, P, E and THD measurements for each device, via navigation
■ Display of ON/OFF status

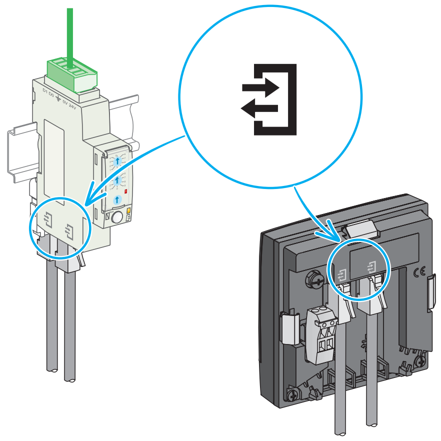
Open and close commands for each device
A common or individual password must first be entered.

When all functions have been tested, this utility is replaced by the supervision software selected for the installation.

Supervision software

Schneider Electric electrical installation supervision, management and expert system software integrates Compact NSX identification modules.

DB111370

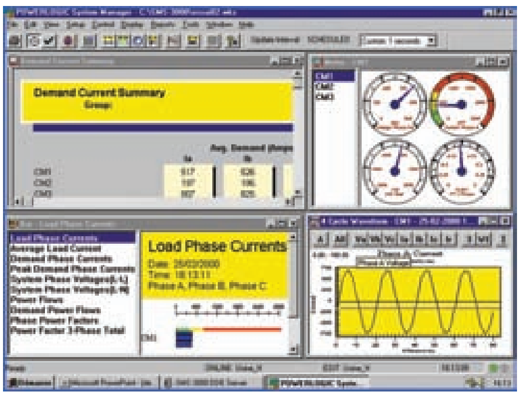


Connection symbol for Compact NSX compatible modules.

PE86106-62

PowerView software.

DB112145



SMS software screen.

Types of software

Masterpact and Compact NSX communication functions are designed to interface with software dedicated to electrical installations:
- switchboard supervision
- electrical installation supervision
- power system management: electrical engineering expert systems
- process control
- SCADA (Supervisory Control & Data Acquisition), EMS (Enterprise Management System) or BMS (Building Management System) type software.

Integration of Compact NSX

Compact NSX devices are integrated via Modbus interface modules connected via FDM121 display units or NSX cords.
For easy connection of the different modules, the prefabricated cables are identified by ULP (Universal Logic Plug) symbols. The connection points on compatible modules are marked in the same manner.

Schneider Electric solutions

Electrical switchboard supervision via MPS100 or EGX400 Web servers

A simple solution for customers who want to consult the main electrical parameters of switchboard devices without dedicated software.
Up to 16 switchboard devices are connected via Modbus interfaces to an MPS100 or EGX400 Ethernet gateway integrating the functions of a web page server. The embedded Web pages can be easily configured with just a few mouse clicks. The information they provide is updated in real time.
The Web pages can be consulted using a standard Web browser on a PC connected via Ethernet to the company Intranet or remotely via a modem. Automatic notification of alarms and threshold overruns is possible via e-mail or SMS (Short Message Service).

Electrical installation supervision via PowerView software

PowerLogic® PowerView software is ideally suited to the supervision needs of small system applications, monitoring up to 32 devices. Installed on a PC under Windows, it represents a cost-effective and easy-to-implement power-monitoring solution that offers:
- automatic detection of compatible devices
- real-time monitoring of data including power consumption
- a report generator with a number of pre-defined reports that can be exported to Excel
- cost allocation
- time-stamped data-logging possibilities
- Modbus serial and Modbus TCP/IP compatible communication.

SMS electrical engineering expert system software

PowerLogic® SMS is a family of web-enabled software products for high-end power-monitoring applications. It is designed for large power systems.
SMS products offer detailed analysis of electrical events, long-duration data logging and extensive, economical report-building capabilities (e.g. consumption monitoring and tariff management).
A wide variety of screens can be displayed in real time, including more than 50 tables, analogue meters, bargraphs, alarms logs with links to display waveforms and predefined reports on energy quality and service costs.

Other software

Compact NSX devices can forward their measurement and operating information to special software integrating the electrical installation and other technical facilities:
- SCADA process control software: Vijeo CITECT
- BMS Building Management System software: Vista.

Please consult us.

Accessories for Micrologic trip units

PB103843-18

External neutral current transformers.

PB103842-47

External neutral voltage tap (cat. no. LV434208).

PB103583-18

External 24 V DC power-supply module.

External neutral current transformer (ENCT)

The external transformer is a sensor required for a three-pole circuit breaker in a system with a distributed neutral to measure the neutral current in order to:

- protect the neutral conductor
- protect against insulation faults.

This current transformer can be connected to Micrologic 5 / 6 trip units. The transformer rating must be compatible with that of the circuit breaker.

Required current transformers for different circuit breaker models

Type of circuit breaker	Rating	Catalogue number
NSX100/160/250	25 – 100 A	**LV429521**
	150 – 250 A	**LV430563**
NSX400/630	400 – 630 A	**LV432575**

External neutral voltage tap (ENVT)

The neutral voltage transformer is required for Micrologic E power metering with a three-pole circuit breaker in a system with a distributed neutral. It is used to connect the neutral to the Micrologic trip unit to measure phase-to-neutral (Ph-N) voltages.

External 24 V DC power-supply module

Use

An external 24 V DC power supply is required for installations with communication, whatever the type of trip unit.

On installations without communication, it is available as an option for Micrologic 5/6 in order to make it possible to:

- modify settings when the circuit breaker is open
- display measurements when the current flowing through the circuit breaker is low (15 to 50 A depending on the rating)
- maintain the display of the cause of tripping and interrupted current.

Characteristics

A single external 24 V DC supply may be used for the entire switchboard.

The required characteristics are:

- output voltage: 24 V DC ±5 %
- ripple: ±1%.
- overvoltage category: OVC IV - as per IEC 60947-1

External 24 V DC power-supply modules with an output current of 1 A are available:

Available external power-supply modules			Cat. no.
Power supply	V DC (±5 %)	24/30	**54440**
		48/60	**54441**
		100/125	**54442**
	V AC (+10 %, -15 %)	110/130	**54443**
		200/240	**54444**
		380/415	**54445**
Output voltage		24 V DC (±5 %)	
Ripple		±1 %	
Overvoltage category (OVC)		OVC IV - as per IEC 60947-1	

An external 24 V DC power-supply module with an output current of 3 A is also available:

Available external power-supply modules			Cat. no.
Power supply	V DC	110/230	**ABL8RPS24030**
	V AC	110/240	
Output voltage		24 V DC (±5 %)	
Ripple		±1 %	
Overvoltage category (OVC)		OVC II	

Total consumption

To determine the required output current of the 24 V DC power supply, it is necessary to sum up the currents consumed by the different loads supplied:

Consumption of Compact NSX modules Module	Consumption (mA)
Micrologic 5/6	20
BSCM module	10
FDM121	40
Modbus communication interface	60
NSX cord U > 480 V AC	30

PB103790-20

Test battery (cat. no. LV434206).

PB103833-18

Battery module (cat. no. 54446).

PB103799-24

24 V DC power-supply terminal block (cat. no. LV434210).

PB103789-24

NSX cord U > 480 V (cat. no. LV434204).

PB103803-27

Maintenance case (cat. no. TRV00910).

PB103794-32

Configuration and maintenance module (cat. no. TRV00911).

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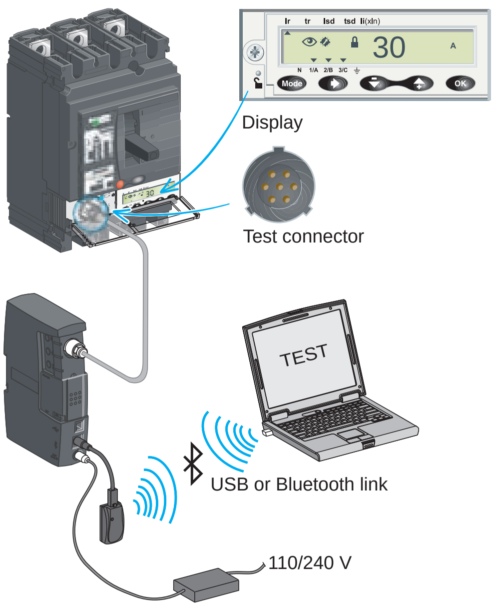

Using the configuration and maintenance module.

Test battery

This pocket battery connects to the Micrologic test connector. It powers up the Micrologic and the Ready LED. It supplies the screen and allows settings to be made via the keypad.

Battery module

The battery module is a back-up supply for the external power-supply module. The input/output voltages are 24 V DC and it can supply power for approximately three hours (100 mA).

24 V DC power-supply terminal block

The 24 V DC power-supply terminal block can be installed only on Micrologic 5/6 trip units. It is required to power the trip unit when the trip unit is not connected to an FDM121 display unit or to the communication system. When used, it excludes connection of an NSX cord.

NSX cord

■ For voltage U ≤ 480 V, available in 3 prefabricated lengths: 0.35 m, 1.3 m and 3 m.
■ For voltages U > 480 V, a special 1.3 m cord with an insulation accessory is required.
■ A set of cords with RJ45 connectors is available to adapt to different distances between devices.

Maintenance case

The case includes:
■ configuration and maintenance module
■ power supply (110...220 V AC / 50-60 Hz 24 V DC - 1 A)
■ special cable for connection to the trip-unit test connector
■ standard USB cable
■ standard RJ45 cable
■ user manual
■ optional Bluetooth link (to PC).

Configuration and maintenance module

Included in the maintenance kit, this module tests Micrologic operation and provides access to all parameters and settings. It connects to the Micrologic test connector and can operate in two modes.
■ Stand-alone mode to:
□ supply the Micrologic and check operation via the Ready LED
□ check mechanical operation of the circuit breaker (trip using pushbutton).
■ PC mode, connected to a PC via USB or Bluetooth link. This mode provides access to protection settings, alarm settings and readings of all indicators. Using the associated RSU software utility, it is possible to store, in a dedicated file for each device, all the data that can transferred to another device.
This mode also offers operating-test functions:
□ check on trip time delay (trip curve)
□ check on non-tripping time (discrimination)
□ check on ZSI (Zone Selective Interlocking) function
□ alarm simulation
□ display of setting curves
□ display of currents
□ printing of test reports.

Earth-leakage protection

Add-on protection against insulation faults using a Vigi module or Vigirex relay

There are two ways to add earth-leakage protection to any three or four-pole Compact NSX100 to 630 circuit breaker equipped with a magnetic, thermal-magnetic or Micrologic 2, 5 or 6 trip unit:
■ by adding a Vigi module to the circuit breaker to form a Vigicompact NSX
■ by using a Vigirex relay and separate toroids.

PB103579-21

Vigicompact NSX100 to 630.

044322

Earth-leakage relay.

051352

Separate toroids.

Circuit breaker with add-on Vigi module (Vigicompact NSX)

■ For general characteristics of circuit breakers, see pages A-6 and A-7.
■ Add-on Vigi modules. Earth-leakage protection is achieved by installing a Vigi module (characteristics and selection criteria on next page) directly on the circuit breaker terminals It directly actuates the trip unit (magnetic, thermal-magnetic or Micrologic).

Circuit breaker combined with a Vigirex relay

Compact NSX circuit breaker + Vigirex relay

Vigirex relays may be used to add external earth-leakage protection to Compact NSX circuit breakers. The circuit breakers must be equipped with an MN or MX voltage release. The Vigirex relays add special tripping thresholds and time delays for earth-leakage protection.
Vigirex relays are very useful when faced with major installation constraints (circuit breaker already installed and connected, limited space available, etc.).

Vigirex-relay characteristics
■ Sensitivity adjustable from 30 mA to 250 mA and 9 time-delay settings (0 to 4.5 seconds).
■ Closed toroids up to 630 A (30 to 300 mm in diameter), split toroids up to 250 A (46 to 110 mm in diameter) or rectangular sensors up to 630 A.
■ 50/60 Hz, 400 Hz distribution systems.

Options
■ Trip indication by a fail-safe contact
■ Pre-alarm contact and LED, etc.

Compliance with standards
■ IEC 60947-2, annex M
■ IEC/EN 60755: general requirements for residual-current operated protective devices
■ IEC/EN 61000-4-2 to 4-6: immunity tests
■ CISPR11: radio-frequency radiated and conducted emission tests
■ UL1053 and CSA22.2 No. 144 for RH10, RH21 and RH99 relays at supply voltages up to and including 220/240 V.

PB103579-21

Vigicompact NSX100 to 630 circuit breakers with earth-leakage protection

Addition of the Vigi module does not alter circuit-breaker characteristics:

- compliance with standards
- degree of protection, class II front-face insulation
- positive contact indication
- electrical characteristics
- trip-unit characteristics
- installation and connection modes
- indication, measurement and control auxiliaries
- installation and connection accessories.

Dimensions and weights		NSX100/160/250	NSX400/630
Dimensions	3 poles	105 x 236 x 86	135 x 355 x 110
W x H x D (mm)	4 poles	140 x 236 x 86	180 x 355 x 110
Weight (kg)	3 poles	2.5	8.8
	4 poles	3.2	10.8

Vigi earth-leakage protection modules

Compliance with standards

- IEC 60947-2, annex B.
- Decree dated 14 November 1988 (for France).
- IEC 60755, class A, immunity to DC components up to 6 mA
- operation down to -25 °C as per VDE 664.

Remote indications

Vigi modules may be equipped with an auxiliary contact (SDV) to remotely signal tripping due to an earth fault.

Use of 4-pole Vigi module with a 3-pole Compact NSX

In a 3-phase installation with an uninterrupted neutral, an accessory makes it possible to use a 4-pole Vigi module with connection of the neutral cable.

Power supply

Vigi modules are self-supplied internally by the distribution-system voltage and therefore do not require any external source. They continue to function even when supplied by only two phases.

PB103580-36

Vigi module selection

Type	Vigi ME	Vigi MH	Vigi MB
Number of poles	3, 4 (1)	3, 4 (1)	3, 4 (1)
NSX100	■	■	-
NXS160	■	■	-
NSX250	-	■	-
NSX400	-	-	■
NSX630	-	-	■
Protection characteristics			
Sensitivity	fixed	adjustable	adjustable
IΔn (A)	0.3	0.03 - 0.3 - 1 - 3 - 10	0.3 - 1 - 3 - 10 - 30
Time delay	fixed	adjustable	adjustable
Intentional delay (ms)	< 40	0 - 60 (2) - 150 (2) - 310 (2)	0 - 60 - 150 - 310
Max. break time (ms)	< 40	< 40 < 140 < 300 < 800	< 40 < 140 < 300 < 800
Rated voltage V AC 50/60 Hz	200...440	200... 440 - 440...550	200...440 - 440...550

(1) Vigi 3P modules may also be used on 3P circuit breakers used for two-phase protection.
(2) If the sensitivity is set to 30 mA, there is no time delay, whatever the time-delay setting.

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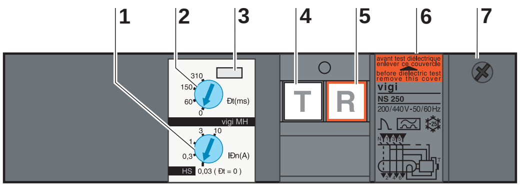

1 Sensitivity setting
2 Time-delay setting (for selective earth-leakage protection).
3 Lead-seal fixture for controlled access to settings.
4 Test button simulating an earth-fault for regular checks on the tripping function
5 Reset button (reset required after earth-fault tripping).
6 Rating plate
7 Housing for SDV auxiliary contact.

Plug-in devices

The Vigi module can be installed on a plug-in base. Special accessories are required (see catalogue number chapter).

Operating safety

The Vigi module is a user safety device. It must be tested at regular intervals (every 6 months) via test button.

Motor protection

General information on motor feeders

The parameters to be considered for motor-feeder protection depend on:
■ the application (type of machine driven, operating safety, frequency of operation, etc.)
■ the level of continuity of service required by the load or the application
■ the applicable standards for the protection of life and property.
The required electrical functions are:
■ isolation
■ switching, generally at high endurance levels
■ protection against overloads and short-circuits, adapted to the motor
■ additional special protection.
A motor feeder must comply with the requirements of standard IEC 60947-4-1 concerning contactors and their protection:
■ coordination of feeder components
■ thermal-relay trip classes
■ contactor utilisation categories
■ coordination of insulation.

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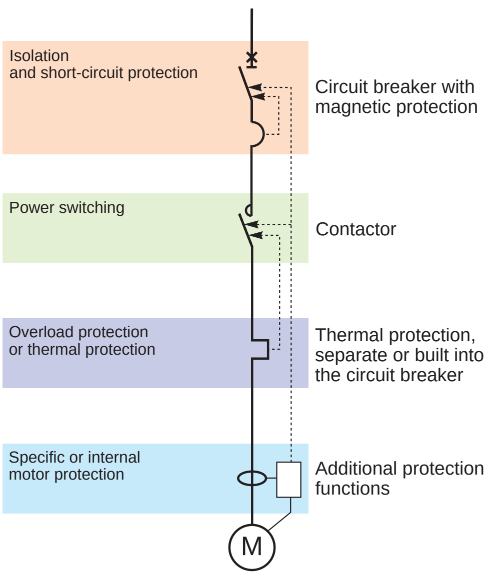

Switchgear functions in a motor feeder.

Motor-feeder function

A motor feeder comprises a set of devices for motor protection and control, as well as for protection of the feeder itself.

Isolation

The purpose is to isolate the live conductors from the upstream distribution system to enable work by maintenance personnel on the motor feeder at no risk. This function is provided by a motor circuit breaker offering positive contact indication and lockout/tagout possibilities.

Switching

The purpose is to control the motor (ON / OFF), either manually, automatically or remotely, taking into account overloads upon start-up and the long service life required. This function is provided by a contactor. When the coil of the contactor's electromagnet is energised, the contactor closes and establishes, through the poles, the circuit between the upstream supply and the motor, via the circuit breaker.

Basic protection

■ Short-circuit protection
Detection and breaking, as quickly as possible, of high short-circuit currents to avoid damage to the installation. This function is provided by a magnetic or thermal-magnetic circuit breaker.
■ Overload protection
Detection of overload currents and motor shutdown before temperature rise in the motor and conductors damages insulation. This function is provided by a thermal-magnetic circuit breaker or a separate thermal relay.

Overloads: I < 10 x In
They are caused by:
■ an electrical problem, related to an anomaly in the distribution system (e.g. phase failure, voltage outside tolerances, etc.)
■ a mechanical problem, related to a process malfunction (e.g. excessive torque) or damage to the motor (e.g. bearing vibrations).
These two causes will also result in excessively long starting times.
Impedant short-circuits: 10 x In < I < 50 x In
This type of short-circuit is generally due to deteriorated insulation of motor windings or damaged supply cables.
Short-circuits: I > 50 x In
This relatively rare type of fault may be caused by a connection error during maintenance.

■ Phase unbalance or phase loss protection
Phase unbalance or phase loss can cause temperature rise and braking torques that can lead to premature ageing of the motor. These effects are even greater during starting, therefore protection must be virtually immediate.

Additional electronic protection

■ Locked rotor
■ Under-load
■ Long starts and stalled rotor
■ Insulation faults.

Motor-feeder solutions

Standard IEC 60947 defines three types of device combinations for the protection of motor feeders.

Three devices
■ magnetic circuit breaker + contactor + thermal relay.

Two devices
■ thermal-magnetic circuit breaker + contactor.

One device
■ thermal-magnetic circuit breaker + contactor in an integrated solution (e.g. Tesys U).

Device coordination

The various components of a motor feeder must be coordinated. Standard IEC 60947-4-1 defines three types of coordination depending on the operating condition of the devices following a standardised short-circuit test.

Type-1 coordination

- No danger to life or property.
- The contactor and/or the thermal relay may be damaged.
- Repair and replacement of parts may be required prior to further service.

Type-2 coordination

- No danger to life or property.
- No damage or adjustments are allowed. The risk of contact welding is accepted as long as they can be easily separated.
- Isolation must be maintained after the incident, the motor feeder must be suitable for further use without repair or replacement of parts.
- A rapid inspection is sufficient before return to service.

Total coordination

- No damage and no risk of contact welding is allowed for the devices making up the motor feeder. The motor feeder must be suitable for further use without repair or replacement of parts.

This level is provided by integrated 1-device solutions such as Tesys U.

Contactor utilisation categories

For a given motor-feeder solution, the utilisation category determines the contactor withstand capacity in terms of frequency of operation and endurance. Selection, which depends on the operating conditions imposed by the application, may result in oversizing the contactor and circuit-breaker protection. Standard IEC 60947 defines the following contactor utilisation categories.

Contactor utilisation categories (AC current)

Contactor utilisation categories	Type of load	Control function	Typical applications
AC1	Non-inductive (cos φ ⩾ 0.8)	Energising	Heating, distribution
AC2	Slip-ring motor (cos φ ⩾ 0.65)	Starting Switching off motor during running Counter-current braking Inching	Wiring-drawing machine
AC3	Squirrel-cage motor (cos φ = 0.45 for ⩽ 100 A) (cos φ = 0.35 for > 100 A)	Starting Switching off motor during running	Compressors, elevators, pumps, mixers, escalators, fans, conveyer systems, air-conditioning
AC4		Starting Switching off motor during running Regenerative braking Plugging Inching	Printing machines, wire-drawing machines

Utilisation category AC3 - common coordination tables for circuit breakers and contactors

This category covers asynchronous squirrel-cage motors that are switched off during running, which is the most common situation (85 % of cases). The contactor makes the starting current and switches off the rated current at a voltage approximately one sixth of the nominal value. The current is interrupted without difficulty.

The circuit breaker-contactor coordination tables for Compact NSX are for use with contactors in the AC3 utilisation category, in which case they ensure type-2 coordination.

Utilisation category AC4 - possible oversizing

This category covers asynchronous squirrel-cage motors capable of operating under regenerative braking or inching (jogging) conditions

The contactor makes the starting current and can interrupt this current at a voltage that may be equal to that of the distribution system.

These difficult conditions make it necessary to oversize the contactor and, in general, the protective circuit breaker with respect to category AC3.

Motor protection

Motor-feeder characteristics and solutions

The trip class determines the trip curve of the thermal protection device (inverse-time curve) for a motor feeder.
Standard IEC 60947-4-1 defines trip classes 5, 10, 20 and 30.
These classes are the maximum durations, in seconds, for motor starting with a starting current of 7.2 Ir, where Ir is the thermal setting indicated on the motor rating plate.

Trip class of a thermal-protection device

The motor feeder includes thermal protection that may be built into the circuit breaker. The protection must have a trip class suited to motor starting. Depending on the application, the motor starting time varies from a few seconds (no-load start) to a few dozen seconds (high-inertia load).
Standard IEC 60947-4-1 defines the trip classes below as a function of current setting Ir for thermal protection.

Trip class of thermal relays as a function of their Ir setting

Class	1.05 I r (1)	1.2 Ir (1)	1.5 Ir (2)	7.2 I r(1)
5	t > 2 h	t < 2h	t < 2 mn	2 s < t ≤ 5 s
10	t > 2 h	t < 2h	t < 4 mn	4 s < t ≤ 10 s
20	t > 2 h	t < 2h	t < 8 mn	6 s < t ≤ 20 s
30	t > 2 h	t < 2h	t < 12 mn	9 s < t ≤ 30 s

(1) Time for a cold motor (motor off and cold).
(2) Time for warm motor (motor running under normal conditions).

Example: In class 20, the motor must have finished starting within 20 seconds (6 to 20 s) for a starting current of 7.2 Ir.

Currents of squirrel-cage motors at full rated load

Standardised values in kW

Rated operational power	Standardised values in kW currents Ie (A) for:			
	230 V	400 V	500 V	690 V
kW	A	A	A	A
0.06	0.35	0.32	0.16	0.12
0.09	0.52	0.3	0.24	0.17
0.12	0.7	0.44	0.32	0.23
0.18	1	0.6	0.48	0.35
0.25	1.5	0.85	0.68	0.49
0.37	1.9	1.1	0.88	0.64
0.55	2.6	1.5	1.2	0.87
0.75	3.3	1.9	1.5	1.1
1.1	4.7	2.7	2.2	1.6
1.5	6.3	3.6	2.9	2.1
2.2	8.5	4.9	3.9	2.8
3	11.3	6.5	5.2	3.8
4	15	8.5	6.8	4.9
5.5	20	11.5	9.2	6.7
7.5	27	15.5	12.4	8.9
11	38	22	17.6	12.8
15	51	29	23	17
18.5	61	35	28	21
22	72	41	33	24
30	96	55	44	32
37	115	66	53	39
45	140	80	64	47
55	169	97	78	57
75	230	132	106	77
90	278	160	128	93
110	340	195	156	113
132	400	230	184	134
160	487	280	224	162
200	609	350	280	203
250	748	430	344	250
315	940	540	432	313

Standardised values in HP

Rated operational power	Indicative values of the rated operational currents Ie (A) for						
	110 - 120 V	200 V	208 V	220 - 240 V	380 - 415 V	440 - 480 V	550 - 600 V
hp							
1/2	4.4	2.5	2.4	2.2	1.3	1.1	0.9
3/4	6.4	3.7	3.5	3.2	1.8	1.6	1.3
1	8.4	4.8	4.6	4.2	2.3	2.1	1.7
1 1/2	12	6.9	6.6	6	3.3	3	2.4
2	13.6	7.8	7.5	6.8	4.3	3.4	2.7
3	19.2	11	10.6	9.6	6.1	4.8	3.9
5	30.4	17.5	16.7	15.2	9.7	7.6	6.1
7 1/2	44	25.3	24.2	22	14	11	9
10	56	32.2	30.8	28	18	14	11
15	84	48.3	46.2	42	27	21	17
20	108	62.1	59.4	54	34	27	22
25	136	78.2	74.8	68	44	34	27
30	160	92	88	80	51	40	32
40	208	120	114	104	66	52	41
50	260	150	143	130	83	65	52
60	-	177	169	154	103	77	62
75	-	221	211	192	128	96	77
100	-	285	273	248	165	124	99
125	-	359	343	312	208	156	125
150	-	414	396	360	240	180	144
200	-	552	528	480	320	240	192
250	-	-	-	604	403	302	242
300	-	-	-	722	482	361	289

Note: 1 hp = 0.7457 kW.

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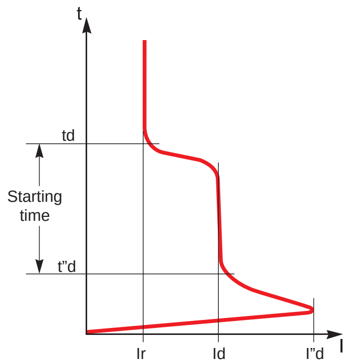


Typical motor-starting curve

Asynchronous-motor starting parameters

The main parameters of direct on-line starting of three-phase asynchronous motors (90 % of all applications) are listed below.

- **Ir**: rated current

This is the current drawn by the motor at full rated load (e.g. approximately 100 A rms for 55 kW at 400 V).

- **Id**: starting current

This is the current drawn by the motor during starting, on average 7.2 In for a duration td of 5 to 30 seconds depending on the application (e.g. 720 A rms for 10 seconds). These values determine the trip class and any additional "long-start" protection devices that may be needed.

- **I"d**: peak starting current

This is the subtransient current during the first two half-waves when the system is energised, on the average 14 In for 10 to 15 ms (e.g. 1840 A peak).

The protection settings must effectively protect the motor, notably via a suitable thermal-relay trip class, but let the peak starting current through.

Compact NSX motor-feeder solutions

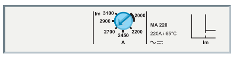
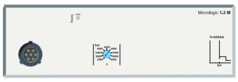
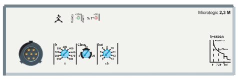
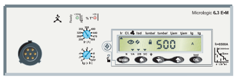
Compact NSX motor circuit breakers are designed for motor-feeder solutions using:
■ three devices, including an MA or 1.3-M magnetic-only trip unit
■ two devices including a TM-D or 2-M thermal-magnetic trip unit.
They are designed for use with contactors in the AC3 utilisation category (80 % of all cases) and they ensure type-2 coordination with the contactor.
For the AC4 utilisation category, the difficult conditions generally make it necessary to oversize the protection circuit breaker with respect to the AC3 category.

Compact NSX motor-protection range

Compact NSX trip units can be used to create motor-feeder solutions comprising two or three devices. The protection devices are designed for continuous duty at 65 °C.

Three-device solutions
■ 1 NSX circuit breaker with an MA or Micrologic 1.3-M trip unit
■ 1 contactor
■ 1 thermal relay.

Two-device solutions
■ 1 Compact NSX circuit breaker
□ with a Micrologic 2.2-M or 2.3-M electronic trip unit
□ with a Micrologic 6 E-M electronic trip unit. This version offers additional protection and Power Meter functions.
■ 1 contactor.

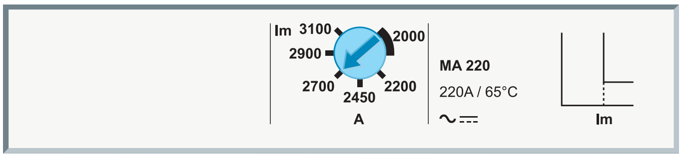
Type of motor protection		3 devices		2 devices	
Compact NSX circuit breaker		**NSX100/160/250**	**NSX400/630**	**NSX100 to 630**	
	Type-2 coordination with	Contactor + thermal relay		Contactor	
Trip unit	Type	**MA**	**Micrologic 1.3-M**	**Micrologic 2-M**	**Micrologic 6 E-M**
	Technology	Magnetic	Electronic	Electronic	Electronic
					
Thermal relay	Separate	■	■		
	Built-in, class 5			■	■
	10			■	■
	20			■	■
	30				■
Protection functions of Compact NSX circuit breaker					
Short-circuits		■	■	■	■
Overloads				■	■
Insulation faults	Ground-fault				■
Special motor functions	Phase unbalance			■	■
	Locked rotor				■
	Under-load				■
	Long start				■
Built-in Power Meter functions					
	I, U, energy				■
Operating assistance					
	Counters (cycles, trips, alarms, hours)				■
	Contact-wear indicator				■
	Load profile and thermal image				■

Motor protection
MA and Micrologic 1.3-M instantaneous trip units

MA magnetic trip units are used in **3-device motor-feeder solutions.** They can be mounted on all Compact NSX100/160/250 circuit breakers with performance levels B/F/H/N/S/L.
They provide short-circuit protection for motors up to 110 kW at 400 V.

MA magnetic trip units

DB112110



Circuit breakers with an MA trip unit are combined with a thermal relay and a contactor or a starter.

Protection

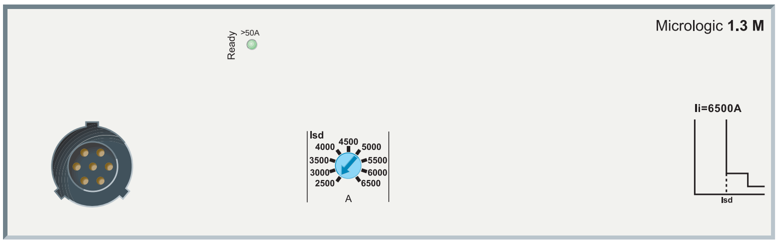
Magnetic protection (Im)
Short-circuit protection with an adjustable pick-up Im that initiates instantaneous tripping if exceeded.
■ **Im** = In x ... is set on an adjustment dial in multiples of the rating:
□ 6 to 14 x In (2.5 to 100 A ratings)
□ 9 to 14 x In (150 to 200 A ratings)

Protection version
■ 3-pole (3P 3D): 3-pole frame (3P) equipped with detection on all 3 poles (3D).

Micrologic 1.3-M trip units are used in **3-device motor-feeder solutions** on Compact NSX400/630 circuit breakers with performance levels B/F/H/N/S/L.
They provide short-circuit protection for motors up to 250 kW at 400 V.
They also provide the benefits of electronic technology:
■ accurate settings
■ tests
■ "Ready" LED.

Micrologic 1.3-M trip units

DB112106



Circuit breakers with a Micrologic 1.3-M trip unit are combined with a thermal relay and a contactor.

Protection

Settings are made using a dial.

Short-circuits: Short-time protection (Isd)
Protection with an adjustable pick-up Isd. There is a very short delay to let through motor starting currents.
■ Isd is set in amperes from 5 to 13 x In, as follows:
□ from 1600 to 4160 A for the 320 A rating.
□ from 2500 to 6500 A for the 500 A rating.

Short-circuits: Non-adjustable instantaneous protection (Ii)
Instantaneous protection with non-adjustable pick-up Ii.

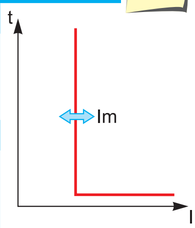
Protection version
■ 3-pole (3P 3D): 3-pole frame (3P) equipped with detection on all 3 poles (3D).

Indications

Front indications
■ Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.

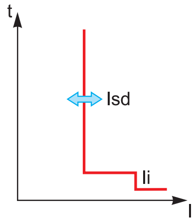
***Note**: all the trip units have a transparent lead-sealable cover that protects access to the adjustment dials.*

Magnetic trip units		MA 2.5 to 220							
Ratings (A)	**In at 65 °C (1)**	**2.5**	**6.3**	**12.5**	**25**	**50**	**100 (1)**	**150**	**220**
Circuit breaker	Compact NSX100	■	■	■	■	■	■	-	-
	Compact NSX160	-	-	-	■	■	■	■	-
	Compact NSX250	-	-	-	-	-	■	■	■
Instantaneous magnetic protection									
Pick-up (A) accuracy ±20 %	**Im** = In x ...	Adjustable from 6 to 14 x In (settings 6, 7, 8, 9, 10, 11, 12, 13, 14)						Adjustable from 9 to 14 x In (settings 9, 10, 11, 12, 13, 14)	
Time delay (ms)	tm	fixed							



(1) MA100 3P adjustable from 6 to 14 x In.
MA100 4P adjustable from 9 to 14 x In.

Micrologic 1.3-M			
Ratings (A)	**In at 65 °C (1)**	**320**	**500**
Circuit breaker	Compact NSX400	■	-
	Compact NSX630	■	■
S Short-time protection			
Pick-up (A) accuracy ±15 %	**Isd**	Adjustable directly in amps	
		9 settings: 1600, 1920, 2440, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500 A
Time delay (ms)	**tsd**	Non-adjustable	
	Non-tripping time Maximum break time	20 60	
I Instantaneous protection			
Pick-up (A) accuracy ±15 %	**Ii** non-adjustable	4800	6500
	Non-tripping time Maximum break time	0 30 ms	



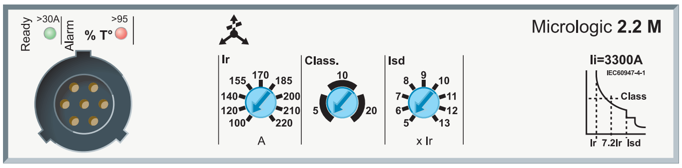
(1) Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account.

Motor protection

Micrologic 2-M electronic trip units

Micrologic 2-M trip units provide built-in thermal and magnetic protection. They are used in **2-device motor-feeder solutions** on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L.
They provide protection for motors up to 315 kW at 400 V against:
■ short-circuits
■ overloads with selection of a trip class (5, 10 or 20)
■ phase unbalance.

DB112111



Circuit breakers with a Micrologic 2.2 / 2.3-M trip unit include protection similar to an inverse-time thermal relay. They are combined with a contactor.

Protection

Settings are made using a dial.

Overloads (or thermal protection): Long-time protection and trip class (Ir)
Inverse-time thermal protection against overloads with adjustable pick-up Ir.
Settings are made in amperes. The tripping curve for the long-time protection, which indicates the time delay **tr** before tripping, is defined by the selected trip class.

Trip class (class)
The class is selected as a function of the normal motor starting time.
■ Class 5: starting time less than 5 s
■ Class 10: starting time less than 10 s
■ Class 20: starting time less than 20 s
For a given class, it is necessary to check that all motor-feeder components are sized to carry the 7.2 Ir starting current without excessive temperature rise during the time corresponding to the class.

Short-circuits: Short-time protection (Isd)
Protection with an adjustable pick-up **Isd**. There is a very short delay to let through motor starting currents.

Short-circuits: Non-adjustable instantaneous protection (Ii)
Instantaneous protection with non-adjustable pick-up **Ii**.

Phase unbalance or phase loss (Iunbal) ( )
This function opens the circuit breaker if a phase unbalance occurs:
■ that is greater than the 30% fixed pick-up **Iunbal**
■ following the non-adjustable time delay **tunbal** equal to:
□ 0.7 s during starting
□ 4 s during normal operation.
Phase loss is an extreme case of phase unbalance and leads to tripping under the same conditions.

Indications

Front indications
■ Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
■ Red alarm LED for motor operation: goes ON when the thermal image of the rotor and stator is greater than 95% of the permissible temperature rise.

Remote indications via SDTAM module
Compact NSX devices with a Micrologic 2 can be equipped with an SDTAM module dedicated to motor applications for:
■ a contact to indicate circuit-breaker overload
■ a contact to open the contactor. In the event of a phase unbalance or overload, this output is activated 400 ms before circuit-breaker tripping to open the contactor and avoid circuit breaker tripping.
This module takes the place of the MN/MX coils and an OF contact.

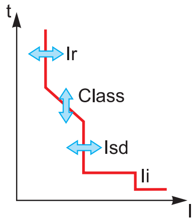
PB103376

SDTAM remote indication relay module with its terminal block.

***Note**: all the trip units have a transparent lead-sealable cover that protects access to the adjustment dials.*

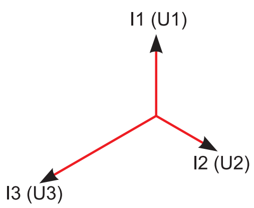
Micrologic 2.2 / 2.3-M

Ratings (A)	In at 65 °C (1)		25	50	100	150	220	320	500		
Circuit breaker	Compact NSX100		■	■	■	-	-	-	-		
	Compact NSX160		■	■	■	■	-	-	-		
	Compact NSX250		■	■	■	■	■	-	-		
	Compact NSX400		-	-	-	-	-	■	-		
	Compact NSX630		-	-	-	-	-	■	■		
L Overloads (or thermal protection): Long-time protection and trip class											
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir**		value depending on trip unit rating (In) and setting on dial								
	In = 25 A	Ir =	12	14	16	18	20	22	23	24	25
	In = 50 A	Ir =	25	30	32	36	40	42	45	47	50
	In = 100 A	Ir =	50	60	70	75	80	85	90	95	100
	In = 150 A	Ir =	70	80	90	100	110	120	130	140	150
	In = 220 A	Ir =	100	120	140	155	170	185	200	210	220
	In = 320 A	Ir =	160	180	200	220	240	260	280	300	320
	In = 500 A	Ir =	250	280	320	350	380	400	440	470	500
Trip class as per IEC 60947-4-1			5	10	20						
Time delay (s)	**tr**	1.5 x Ir	120	240	480	for warm motor					
depending on selected trip class		6 x Ir	6.5	13.5	26	for cold motor					
		7.2 x Ir	5	10	20	for cold motor					
Thermal memory			20 minutes before and after tripping								
Cooling fan			non-adjustable - motor self-cooled								
S_0 Short-circuits: Short-time protection with fixed time delay											
Pick-up (A) accuracy ±15 %	**Isd** = Ir x ...		5	6	7	8	9	10	11	12	13
Time delay (ms)	**tsd**		non-adjustable								
	Non-tripping time		20								
	Maximum break time		60								
I Short-circuits: Non-adjustable instantaneous protection											
Pick-up (A) accuracy ±15 %	Ii non-adjustable		425	750	1500	2250	3300	4800	6500		
Time delay (ms)	Non-tripping time		0								
	Maximum break time		30								
Phase unbalance or phase loss											
Pick-up (A) accuracy ±20 %	Iunbal in % average current (2)		> 30 %								
Time delay (s)	non-adjustable		0.7 s during starting 4 s during normal operation								



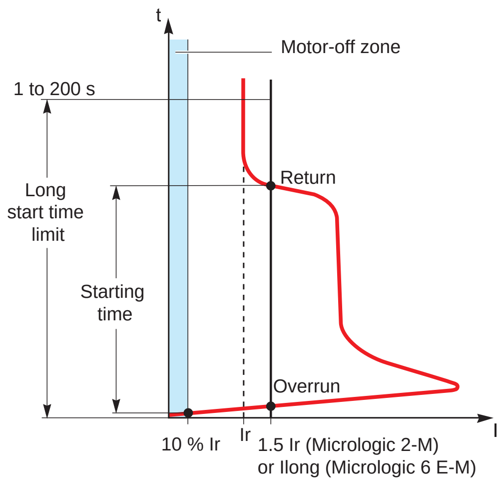
(1) Motor standards require operation at 65°C. Circuit-breaker ratings are derated to take this requirement into account.
(2) The unbalance measurement takes into account the most unbalanced phase with respect to the average current.

DB112114



Unbalance of phase currents and voltages

DB115573



Motor starting and long starts

Additional technical characteristics

Phase unbalance

An unbalance in three-phase systems occurs when the three voltages are not equal in amplitude and/or not displaced 120° with respect to each other. It is generally due to single-phase loads that are incorrectly distributed throughout the system and unbalance the voltages between the phases.

These unbalances create negative current components that cause braking torques and temperature rise in asynchronous machines, thus leading to premature ageing.

Phase loss

Phase loss is a special case of phase unbalance.

- *During normal operation, it produces the effects mentioned above and tripping must occur after four seconds.*
- *During starting, the absence of a phase may cause motor reversing, i.e. it is the load that determines the direction of rotation. This requires virtually immediate tripping (0.7 seconds).*

Starting time in compliance with the class (Micrologic 2-M)

For normal motor starting, Micrologic 2-M checks the conditions below with respect to the thermal-protection (long-time) pick-up Ir:

- *current > 10 % x Ir (motor-off limit)*
- *overrun of 1.5 x Ir threshold, then return below this threshold before the end of a 10 s time delay.*

If either of these conditions is not met, the thermal protection trips the device after a maximum time equal to that of the selected class.

Pick-up Ir must have been set to the current indicated on the motor rating plate.

Long starts (Micrologic 6 E-M)

When this function is not activated, the starting conditions are those indicated above.

When it is activated, this protection supplements thermal protection (class).

A long start causes tripping and is characterised by:

- *current > 10 % x Ir (motor-off limit) with:*
- *either overrun of the long-time pick-up (1 to 8 x Ir) without return below the pick-up before the end of the long-time time delay (1 to 200 s)*
- *or no overrun of the long-time pick-up (1 to 8 x Ir) before the end of the long-time time delay (1 to 200 s).*

Pick-up Ir must have been set to the current indicated on the motor rating plate.

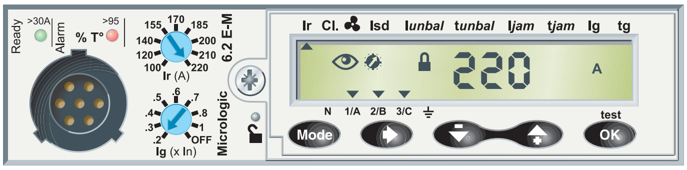
This protection should be coordinated with the selected class.

Motor protection

Micrologic 6 E-M electronic trip units

Micrologic 6.E-M is used in **2-device motor-feeder solutions.**
It provides the same protection as Micrologic 2-M:
■ short-circuits
■ overloads with selection of the same trip classes (5, 10 or 20), plus trip class 30 for starting of machines with high inertia.
In addition, it offers specific motor-protection functions that can be set via the keypad.

DB112116



Protection

The protection functions are identical to those of Micrologic 2-M and can be fine-adjusted via the keypad .
Access to setting modifications via the keypad is protected by a locking function that is controlled by a microswitch . The lock is activated automatically if the keypad is not used for 5 minutes. Access to the microswitch is protected by a transparent lead-sealable cover. It is possible to scroll through settings and measurements with the cover closed.

Overloads (or thermal), class and short-circuits
The long-time, short-time and instantaneous functions are identical to those of Micrologic 2-M.
In addition, there is trip class 30 for long-time protection and a setting for self-cooled or fan-cooled motors ( ).

Ground-fault protection (Ig)
Residual type ground-fault protection with an adjustable pick-up **Ig** (with Off position) and adjustable time delay **tg**.

Phase unbalance or phase loss (Iunbal)
This function opens the circuit breaker if a phase unbalance occurs:
■ that is greater than the **Iunbal** pick-up that can be fine-adjusted from 10 to 40 % (30 % by default)
■ following the **tunbal** time delay that is:
□ 0.7 s during starting
□ adjustable from 1 to 10 seconds (4 seconds by default) during normal operation.
Phase loss is an extreme case of phase unbalance and leads to tripping under the same conditions.

Locked rotor (Ijam)
This function detects locking of the motor shaft caused by the load.
During motor starting (see page A-43), the function is disabled.
During normal operation, it causes tripping:
■ above the **Ijam** pick-up that can be fine-adjusted from 1 to 8 x Ir
■ in conjunction with the **tjam** time delay that can be adjusted from 1 to 30 seconds.

Under-load (Iund)
This function detects motor no-load operation due to insufficient load (e.g. a drained pump). It detects phase undercurrent.
During motor starting (see page A-43), the function is always enabled.
During normal operation, it causes tripping:
■ below the **Iund** pick-up that can be fine-adjusted from 0.3 to 0.9 x Ir
■ in conjunction with the **tund** time delay that can be adjusted from 1 to 200 seconds.

Long starts (Ilong)
This protection supplements thermal protection (class).
It is used to better adjust protection to the starting parameters.
It detects abnormal motor starting, i.e. when the starting current remains too high or too low with respect to a pick-up value and a time delay.
It causes tripping:
■ in relation with a **Ilong** pick-up that can be fine-adjusted from 1 to 8 x Ir
■ in conjunction with the **tlong** time delay that can be adjusted from 1 to 200 seconds.
(see "long starts" page A-43)

PB103376

SDTAM remote indication relay module with its terminal block.

Display of type of fault

On a fault trip, the type of fault (Ir, Isd, Ii, Ig, Iunbal, Ijam), the phase concerned and the interrupted current are displayed.

Indications

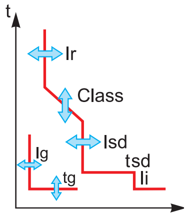
Front indications
■ Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
■ Red alarm LED for motor operation: goes ON when the thermal image of the rotor or stator is greater than 95% of the permissible temperature rise.

Remote indications via SDTAM or SDx module
See description on page A-42 for SDTAM and page A-81 for SDx.

***Note**: all the trip units have a transparent lead-sealable cover that protects access to the adjustment dials.*

Micrologic 6.2 / 6.3 E-M

Ratings (A)	In at 65 °C (1)	25	50	80	150	220	320	500
Circuit breaker	Compact NSX100	■	■	■	-	-	-	-
	Compact NSX160	■	■	■	■	-	-	-
	Compact NSX250	■	■	■	■	■	-	-
	Compact NSX400	-	-	-	-	-	■	-
	Compact NSX630	-	-	-	-	-	■	■



L Overloads: Long-time protection

Pick-up (A)	**Ir**	Dial setting		Value depending on trip-unit rating (In) and setting on dial								
Tripping between 1.05 and 1.20 Ir		In = 25 A	Ir =	12	14	16	18	20	22	23	24	25
		In = 50 A	Ir =	25	30	32	36	40	42	45	47	50
		In = 80 A	Ir =	35	42	47	52	57	60	65	72	80
		In = 150 A	Ir =	70	80	90	100	110	120	130	140	150
		In = 220 A	Ir =	100	120	140	155	170	185	200	210	220
		In = 320 A	Ir =	160	180	200	220	240	260	280	300	320
		In = 500 A	Ir =	250	280	320	350	380	400	440	470	500
		Keypad setting		Fine adjustments in 1 A steps below maximum value defined by dial setting								
Trip class as per IEC 60947-4-1				5	10	20	30					
Time delay (s)	**tr**		1.5 x Ir	120	240	480	720	for warm motor				
depending on selected trip class			6 x Ir	6.5	13.5	26	38	for cold motor				
			7.2 x Ir	5	10	20	30	for cold motor				
Thermal memory				20 minutes before and after tripping								
Cooling fan				Settings for self-cooled or fan-cooled motors								

S_0 Short-circuits: Short-time protection with fixed time delay

Pick-up (A) accuracy ±15 %	**Isd** = Ir x ...	5	6	7	8	9	10	11	12	13
		Fine adjustment In 0.5 x Ir steps using the keypad								
Time delay	**tsd**	non-adjustable								
	Non-tripping time	20 ms								
	Maximum break time	60 ms								

I Short-circuits: Non-adjustable instantaneous protection

Pick-up (A) accuracy ±15 %	**Ii** non-adjustable	425	750	1200	2250	3300	4800	6500
	Non-tripping time	0 ms						
	Maximum break time	30 ms						

G Ground faults

Pick-up (A) accuracy ±10 %	**Ig** = In x ...			Dial setting								
		In = 25 A	Ig =	0.6	0.6	0.6	0.6	0.7	0.8	0.9	1	Off
		In = 50 A	Ig =	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Off
		In > 50 A	Ig =	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Off
				fine adjustments in 0.05 x In steps								
Time delay (ms)	**tg**			0	0.1	0.2	0.3	0.4				
	Non-tripping time			20	80	140	230	350				
	Maximum break time			80	140	200	320	500				

Phase unbalance or phase loss

Pick-up (A) accuracy ±20 %	**Iunbal** = in % average current (2)	adjustable from 10 to 40 %, default setting = 30 % fine adjustments in 1 % steps using the keypad activated during motor starting
Time delay (s)	**tunbal**	0.7 s during starting 1 to 10 seconds during normal operation, default setting = 4 seconds fine adjustments in 1 s steps using the keypad

Locked rotor

Pick-up (A) accuracy ±10 %	**Ijam** = Ir x ...	1 x 8 Ir with Off position, default setting = Off fine adjustments in 0.1 x Ir steps using the keypad disabled during motor starting
Time delay (s)	**tjam** =	1 to 30 seconds fine adjustments in 1 s steps using the keypad, default setting = 5 s

Under-load (under-current)

Pick-up (A) accuracy ±10 %	**Iund** = Ir x ...	0.3 x 0.9 Ir with Off position, default setting = Off Fine adjustments in Ir x 0.01 steps using the RSU software activated during motor starting
Time delay (s)	**tund** =	1 to 200 seconds fine adjustments in 1 s steps using the RSU software, default setting = 10 s

Long starts

Pick-up (A) accuracy ±10 %	**Ilong** = Ir x ...	1 x 8 Ir with Off position, default setting = Off Fine adjustments in Ir x 0.1 steps using the RSU software activated during motor starting
Time delay (s)	**tlong** =	1 to 200 seconds fine adjustments in 1 s steps using the RSU software, default setting = 10 s

(1) Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account.
(2) The unbalance measurement takes into account the most unbalanced phase with respect to the average current.

Motor protection

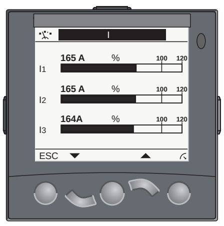
Micrologic 6 E-M electronic trip units (cont.)

Micrologic 6 E-M provides Power Meter functions with energy metering. With the FDM121 display unit, all metering data and operating indicators are available on the switchboard front panel. This version also displays the thermal image of the motor.

PB103365

Micrologic 6 E-M.

DB111404

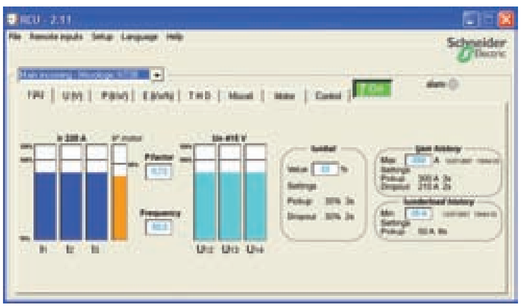


Current values.

DB111405

Thermal-image alarm.

DB118726



PC screen with motor thermal image and value monitoring.

Power Meter functions

The built-in Power Meter functions of the Micrologic 6 E-M are the same as those for the Micrologic 6-E presented in the section on distribution (see page A-20). When used exclusively in the three-phase version, neutral measurements are excluded.

Operating-assistance functions

The operating-assistance functions of the Micrologic 6 E-M are the same as those for the Micrologic 6-E presented in the section on distribution (see page A-22).

Special functions for motor feeders

Additional operating functions specifically for motor feeders are available.

Phase sequence

The order in which the phases L1, L2, L3 are connected determines the direction of motor rotation. If two phases are inverted, the direction is reversed.
Information on the direction of rotation is provided. It can be linked to an alarm to detect an inversion in the direction following servicing on the supply under de-energised conditions and disable restarting.

Thermal image of the rotor and stator

Micrologic 6 E-M offers a thermal-image function.
Taking into account the Ir setting and the class, an algorithm simulates rotor and stator temperature rise. It includes the slow temperature rise of the stator and its metal mass. Also included is the faster temperature rise of the copper rotor.
The thermal protection function trips the circuit breaker when the calculated thermal image reaches 100 % of the permissible temperature rise.
The communication indicates the thermal-image value as a percentage of the permissible temperature rise. One or more alarms may be assigned to selected thresholds. A red LED on the front signals when the value exceeds 95 %.
An SDx module with two outputs programmed for thermal-image values can be used to implement other alarm functions.

The additional technical characteristics are identical to those of Micrologic 6-E (see pages A-21 and A-23).

Micrologic 6 E-M integrated Power Meter and operating-assistance functions

			Display: Micrologic LCD	Display: FDM121 display
Measurements				
Instantaneous rms measurements				
Currents (A)	Phase currents and average value	I1, I2, I3 and Iavg = (I1 + I2 + I3) / 3	■	■
	Highest current of the 3 phases	Imax of I1, I2, I3	■	■
	Ground-fault protection	% Ig (pick-up setting)	■	■
	Current unbalance between phases	% Iavg	-	■
Voltages (V)	Phase-to-phase voltages and average value	U12, U23, U31 and Uavg = (U12 + U21 + U23) / 3	■	■
	Unbalance between phase-to-phase voltages	% Uavg	-	■
	Phase sequence	1-2-3, 1-3-2	■	-
Frequency (Hz)	Power system	F	■	■
Power	Active (kW), reactive (kVAR), apparent (kVA)	P, Q, S total and per phase	-	■
	Power factor and cos φ (fundamental)	PF, cos φ, total and per phase	-	■
Maximeters / minimeters	Associated with instantaneous rms measurements	Reset via Micrologic and the display unit	-	■
Energy metering				
Energy	Active (kWh), reactive (kVARh), apparent (kVAh)	Total since last reset	■	■
		Absolute or signed mode (1)	-	■
Demand and maximum demand values				
Demand current (A)	Phases	Present value on the selected window	-	(2)
		Maximum demand since last reset	-	(2)
Demand power	Active (kWh), reactive (kVARh), apparent (kVAh)	Present value on the selected window	-	(2)
		Maximum demand since last reset	-	(2)
Calculation window	Sliding, fixed or com-synchronised	Adjustable from 5 to 60 minutes in 1 minute steps	-	(2)
		Absolute or signed mode (1)	-	(2)
Power quality				
Total harmonic distortion (%)	Of voltage with respect to rms value	THDU,THDV of the Ph-Ph and Ph-N voltage	-	■
	Of current with respect to rms value	THDI of the phase current	-	■
Operating assistance				
Personalised alarms				
Settings	Up to 10 alarms can be assigned to all measurements and events		-	(2)
	as well as to phase lead/lag, four quadrants, phase sequence and thermal image		-	(2)
Time-stamped histories				
Trips	last 17	Ir, Isd, Ii, Ig, Iunbal, Ijam, Iund, Ilong	-	(2)
Alarms	last 10		-	(2)
Operating events	last 10 events and type:	Modification of protection setting by dial	-	(2)
		Opening of keypad lock	-	(2)
		Test via keypad	-	(2)
		Test via external tool	-	(2)
		Time setting (date and time)	-	(2)
		Reset for maximeter/minimeter and energy meter	■	(2)
Time stamping	Presentation	Date and time, text, status	-	(2)
Time-stamped event tables				
Protection settings	One of the following settings modified	Ir tr Isd tsd Ii Ig tg	-	(2)
	Time-stamping of modification	Date and time of modification	-	(2)
	Previous value	Value before modification	-	(2)
Min/Max	Value monitored	I1 I2 I3 U12 U23 U31 f	-	(2)
	Time-stamping of min/max value	Date and time of record	-	(2)
	Present min/max value	Min/max recorded for the value	-	(2)
Maintenance indicators				
Counter	Mechanical cycles (3)	Assignable to an alarm	-	(2)
	Electrical cycles (3)	Assignable to an alarm	-	(2)
	Trips	One per type of trip	-	(2)
	Alarms	One for each type of alarm	-	(2)
	Hours	Total operating time (hours)	-	(2)
Indicator	Contact wear	%	-	■
Load profile	Hours at different load levels	% of hours in four current ranges: 0-49 % In, 50-79 % In, 80-89 % In, ≥ 90 % In	-	(2)
Thermal image	Stator and rotor	% of permissible temperature rise	-	(2)

(1) Absolute mode: E absolute = E out + E in; Signed mode: E signed = E out - E in.
(2) Available via communication system.
(3) The BSCM module (page A-27) is required for these functions.

Functions
and characteristics

Special applications

Protection of public distribution systems with Micrologic 2-AB

Micrologic AB trip units are used in public distribution systems to limit the current supplied according to the consumer's contract. They are available in 100, 160, 240 and 400 A ratings and are supplied with a lead-seal device to protect the settings.

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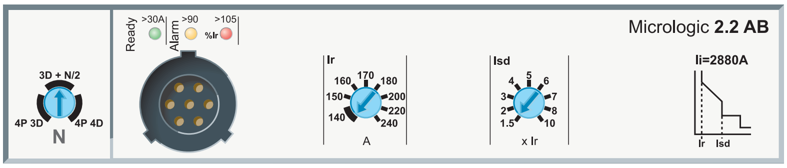


056650-33

INV switch-disconnector with visible break.

PB103266-35

Compact NSX with Micrologic 2-AB.

Compact NSX circuit breakers equipped with Micrologic AB trip units are installed as incoming devices for consumer installations connected to the public LV distribution system.
With respect to the utility, they have two functions.
■ Consumption is limited to the contractual power level. If the limit is exceeded, a fast thermal-protection function trips the device at the head of the consumer's installation without the utility having to intervene.
■ Total discrimination is ensured with the upstream fuses on the public distribution system in the event of a fault, overload or short-circuit in the consumer's installation, protecting the utility line.
In addition, they provide the consumer with:
■ protection for the installation as a whole, with the possibility of adding a Vigi earth-leakage protection module
■ the possibility of downstream discrimination.
This type of Compact NSX is often used in conjunction with an Interpact INV switch-disconnector located outside the consumer's building and providing the visible-break function.
This means the operator can directly see, through a transparent cover, the physical separation of the main contacts. The Interpact INV range is also suitable for isolation with positive contact indication.
This means utility operators can work on the service-connection unit after isolating it from the upstream line.

Protection

Settings are made using the adjustment dials with fine-adjustment possibilities and a lead-seal fixture.

Overloads: Long-time protection (Ir)
Inverse-time thermal protection against overloads with an adjustable current pick-up **Ir** and a very short, non-adjustable time delay **tr** (15 seconds for **1.5 x Ir**).

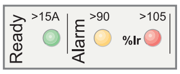
Short-circuits: Short-time protection (Isd) with fixed time delay
Short-circuit protection with an adjustable pick-up Isd. The short-time pick-up values are high enough to avoid nuisance tripping in the event of transient current spikes.

Short-circuits: Non-adjustable instantaneous protection
Instantaneous short-circuit protection with a fixed pick-up.

Neutral protection
Available on four-pole circuit breakers only. Neutral protection may be set using a three-position switch:
■ 4P 3D: neutral unprotected
■ 4P 3D + N/2: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
■ 4P 4D: neutral fully protected at Ir.

Indications

Front indications



■ Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
■ Orange overload pre-alarm LED: steady on when I > 90 % Ir
■ Red overload LED: steady on when I > 105 % Ir

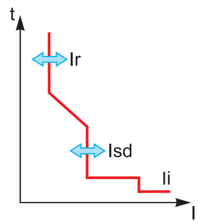
Remote indications
An SDx relay module installed inside the circuit breaker can be used to remote the overload-trip signal. This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is closed.
The module is described in detail in the section dealing with accessories page A-81.

PB103377

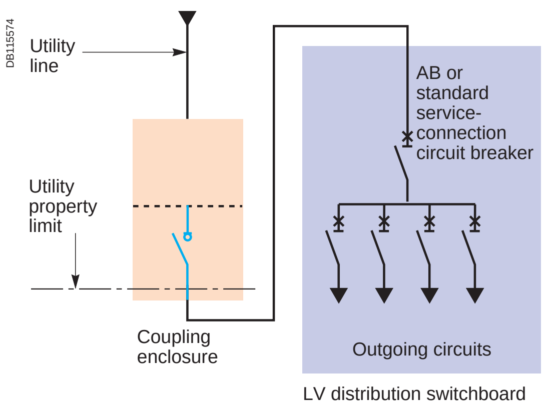
SDx remote indication relay module with its terminal block.

Micrologic 2.2 / 2.3-AB

Ratings (A)	In at 40°C (1)			100		160		240		400		
Circuit breaker	Compact NSX100			■		-		-		-		
	Compact NSX160			■		■		-		-		
	Compact NSX250			■		■		■		-		
	Compact NSX400			-		-		-		■		
	Compact NSX630			-		-		-		■		
L Long-time protection												
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir**			value depending on trip unit rating (In) and setting on dial								
		In = 100 A	Ir =	40	40	50	60	70	80	90	100	
		In = 160 A	Ir =	90	100	110	120	130	140	150	160	
		In = 240 A	Ir =	140	150	160	170	180	200	220	240	
		In = 400 A	Ir =	260	280	300	320	340	360	380	400	
Time delay (s)	**tr**			non-adjustable								
			1.5 Ir	15								
			6 Ir	0.5								
			7.2 Ir	0.35								
Thermal memory				20 minutes before and after tripping								
S_0 Short-time protection with fixed time delay												
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...			1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**			non-adjustable: 20								
	Non-tripping time			20								
	Maximum break time			80								
I Non-adjustable instantaneous protection												
Pick-up (A) accuracy ±15 %	**Ii** non-adjustable			1500		1600		2880		4800		
Time delay (ms)	Non-tripping time Maximum break time			10 50								



(1) If the trip units are used in high-temperature environments, the Micrologic setting must take into account the thermal limitations of the circuit breaker. See the temperature derating table.



Consumer connection diagram.

Technical details

Advantages of the AB trip unit

■ Controls the power drawn with respect to contractual power levels. If the contractual level is overrun, the circuit breaker opens and the consumer is not billed excess costs.

■ If a short-circuit occurs, the circuit breaker opens and the upstream HRC fuses on utility lines are not affected. No expensive utility servicing is billed to the consumer.

Special applications
Generator protection
with Micrologic 2.2-G

Micrologic G trip units are used for the protection of systems supplied by generators or comprising long cable lengths. They can be mounted on all Compact NSX100/160/250 circuit breakers.
With extensive setting possibilities, Micrologic 5 offers the same functions from 100 to 630 A.
A thermal-magnetic trip unit is also available for the NSX100 to 250 (see page A-15).

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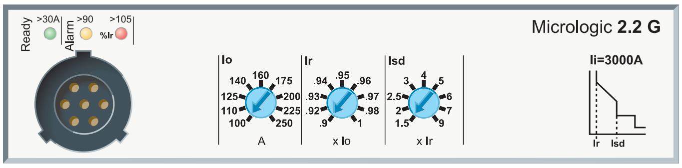


Circuit breakers equipped with Micrologic G trip units protect systems supplied by generators (lower short-circuit currents than with transformers) and distribution systems with long cable lengths (fault currents limited by the impedance of the cable).

Protection

Settings are made using the adjustment dials with fine adjustment possibilities.

Overloads: Long-time protection (Ir)
Inverse-time thermal protection against overloads with an adjustable current pick-up Ir and a very short, non-adjustable time delay **tr** (15 seconds for 1.5 x Ir).

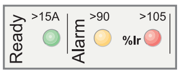
Short-circuits: Short-time protection (Isd) with fixed time delay
Short-circuit protection with an adjustable pick-up **Isd**, delayed 200 ms, in compliance with the requirements of marine classification companies.

Short-circuits: Non-adjustable instantaneous protection (Ii)
Instantaneous short-circuit protection with a fixed pick-up required for generator protection.

Neutral protection
■ On 3-pole circuit breakers, neutral protection is not possible.
■ On four-pole circuit breakers, neutral protection may be set using a three-position switch:
□ 4P 3D: neutral unprotected
□ 4P 3D + N/2: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
□ 4P 4D: neutral fully protected at Ir.

Indications

Front indications



■ Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
■ Orange overload pre-alarm LED: steady on when I > 90 % Ir
■ Red overload LED: steady on when I > 105 % Ir

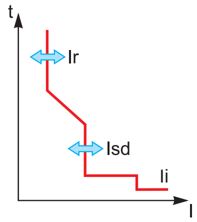
Remote indications
An SDx relay module installed inside the circuit breaker can be used to remote the overload-trip signal.
This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is closed.
The module is described in detail in the section dealing with accessories.

PB103377

SDx remote indication relay module with its terminal block.

Micrologic 2.2-G

Ratings (A)	In at 40°C (1)	40	100	160	250
Circuit breaker	Compact NSX100	■	■	-	-
	Compact NSX160	■	■	■	-
	Compact NSX250	■	■	■	■



L Long-time protection

Pick-up (A) tripping between 1.05 and 1.20 Ir		**Io**	value depending on trip unit rating (In) and setting on dial								
	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160
	In = 250 A (NSX250)	Io =	100	110	125	140	150	176	200	225	250
		Ir = Io x ...	9 fine-adjustment settings from 0.9 to 1 for each Io value								
Time delay (s) accuracy 0 to -20%	**tr**		non-adjustable								
		1.5 x Ir	15								
		6 x Ir	0.5								
		7.2 x Ir	0.35								
Thermal memory			20 minutes before and after tripping								

S_0 Short-time protection with fixed time delay

Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...	1.5	2	2.5	3	4	5	6	7	8	9
Time delay (ms)	**tsd**	non-adjustable									
	Non-tripping time	140									
	Maximum break time	200									

I Non-adjustable instantaneous protection

Pick-up (A) accuracy ±15 %	Ii non-adjustable	600	1500	2400	3000
	Non-tripping time Maximum break time	15 ms 50 ms			

(1) If the trip units are used in high-temperature environments, the Micrologic setting must take into account the thermal limitations of the circuit breaker. See the temperature derating table.

Special applications

Protection of industrial control panels

Compact NSX circuit breakers are also used in industrial control panels.
They serve as an incoming devices or can be combined with contactors to protect motor feeders:
■ compliance with worldwide standards including IEC 60947-2 and UL 508 / CSA 22-2 no. 14
■overload and short-circuit protection
■ isolation with positive contact indication, making it possible to service machines safely by isolating them from all power sources
■ installation in universal and functional type enclosures
■ NA switch-disconnector version.

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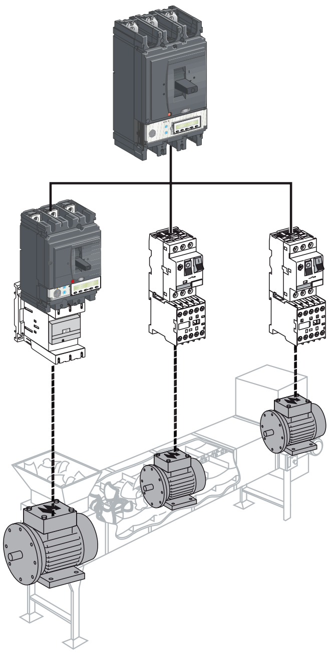

DB115234

Industrial control panels

Compact NSX circuit breakers equipped for public distribution or motor protection functions as described in the previous pages can be used in industrial control panels. The accessories for the Compact NSX range are suitable for the special needs of these switchboards.

Auxiliaries

All auxiliaries can be added to the circuit breaker by the user:
■ padlocking devices (in the OFF position)
■ rotary handle
■ status-indication auxiliary contacts (ON, OFF and tripped)
■ shunt (MX) or undervoltage (MN) releases
■ early-make or early-break contacts.

Rotary handle
Direct or extended versions for mounting up to 600 mm behind the front:
■ black front with black handle
■ yellow front with red handle (for machine tools or emergency off as per IEC 204 / VDE 0013).
All rotary handles can be padlocked in the OFF position. Optional door interlock, recommended for MCC panels (motor control centres).
When the device is equipped with an extended rotary handle, a control accessory mounted on the shaft makes it possible to operate the device with the door open. The device can be padlocked in the OFF position in compliance with UL508.

Early-make or early-break contacts
These contacts can be used respectively to supply an MN undervoltage release before the circuit breaker closes or to open the contactor control circuit before the circuit breaker opens.

Special functions
■ Indication of thermal overloads with the SDx module.
■ Early opening of the contactor for overload faults with the SDTAM module.
■ Links with PLCs via the communication system.
■ Measurement of all electrical parameters with Micrologic A and E.
■ Programmable alarms with Micrologic 5 and 6.

Installation in enclosures

Compact circuit breakers can be installed in a metal enclosure together with other devices (contactors, motor-protection circuit breakers, LEDs, etc.) (see page A-90).

Compliance with North American industrial control equipment standards

Compact NSX devices have received UL508 / CSA 22-2 no. 14 approval for industrial control equipment of the "Manual Motor Controller", "Across the Line Starter", "General Use" and "Disconnecting Means" types.
Type NA devices are switch-disconnectors that must always be protected upstream.

UL508 approval

Circuit breakers	Trip units	Approvals
Compact NSX100 to 630 F/N/H	TMD, Micrologic 2, 5 and 6	General Use Motor Disconnecting Means
	NA, MA, Micrologic 1.3 M, 2.2 M, 2.3 M, Micrologic 6.2 E-M and 6.3 E-M	Manual Motor Controller Across the Line Starter Motor Disconnecting Means

Table of 3-phase motor ratings in hp (1 hp = 0.7457 kW)

V AC ratings		115	230	460	575
TMD Micrologic 2, 5 and 6	**NA, MA Micrologic 1.3 M, 2.2 M, 2.3 M Micrologic 6.2 E-M and 6.3 E-M**				
25	25	3	7.5	15	20
50	50	7.5	15	30	40
100	100	15	30	75	100
160	150	25	50	100	150
250	220	40	75	150	200
400	320	-	125	250	300
550	500	-	150	350	500

The deratings indicated on pages B-8 and B-9 apply to TMD, Micrologic 2, 5 and 6 trip units, rated at 40 °C.

16 Hz 2/3 network protection
Micrologic 5 A-Z trip unit

Compact NSX circuit breakers may be used on 16 Hz 2/3 systems with special thermal-magnetic and electronic (Micrologic 5 A-Z) trip units.

16 Hz 2/3 networks

Single-phase distribution networks with a frequency of 16 Hz 2/3 are used for railroad applications in certain European countries.

Breaking capacity for 16 Hz 2/3 at 250/500 V

Compact NSX circuit breakers of the 3P 2D or the 3P 3D type protect 16 Hz 2/3 networks at 250 V or 500 V.
They can be equipped with either:
- a TM-D thermal-magnetic trip unit for Compact NSX100 to 250
- or an electronic Micrologic 5.2 A-Z trip unit for Compact NSX100 to 250 or a 5.3 A-Z for Compact NSX400/630.

The possible breaking-capacity performance levels are B, F, N and H as indicated below.

Breaking capacity Icu

Operating voltage		TMD and Micrologic 5 A-Z trip units			
	Performance	B	F	N	H
250 V / 500 V	Icu (kA)	25	36	50	70

Protection

TM-D thermal-magnetic trip units

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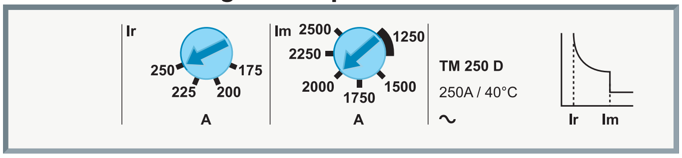

The 16 Hz 2/3 frequency does not modify the thermal settings with respect to those at 50 Hz (see page A-15). The magnetic pick-ups are modified as shown below.

Magnetic protection for Compact NSX 100/160/250 at 50 Hz and at 16 Hz 2/3

Rating (A) In at 40 °C		16	25	32	40	50	63	80	100	125	160	200 250
Pick-up (A) **Im** accur. ±20%		Fixed										Adjustable
NSX100	50Hz	190	300	400	500	500	500	640	800			
	16Hz 2/3	**170**	**270**	**360**	**450**	**450**	**450**	**580**	**720**			
NSX160/250	50Hz	190	300	400	500	500	500	640	800	1250	1250	5 to 10 In
	16 Hz 2/3	**170**	**270**	**360**	**450**	**450**	**450**	**580**	**720**	**1100**	**1100**	**4.5 to 9 In**

Micrologic 5 A-Z trip units

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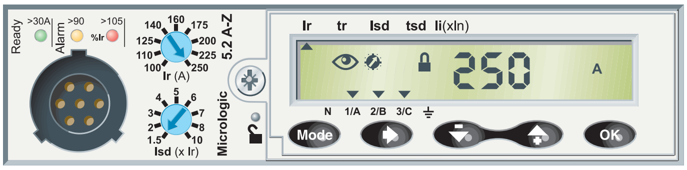

Micrologic 5.2 A-Z and 5.3 A-Z are dedicated to 16 Hz 2/3 networks.
They use a suitable sampling frequency. The protection settings are identical to those of Micrologic 5 A (see page A-19). They also offer a current-measurement function for this specific frequency.

Trip-unit selection

Rating	16	63	100	160	250	400	630
Compact							
NSX100		TM-D					
NSX160			TM-D				
NSX250				TM-D			
NSX100 to 250				Micrologic 5.2 A -Z			
NSX400/630						Micrologic 5.3 A-Z	

Wiring for NSX100 to 630 A

Phase and isolated neutral interrupted- 250 / 500 V		2 poles in series - Earthed neutral - 250 / 500 V	
B and F (3P 2D version)	N and H (3P 3D version)	B and F (3P 2D version)	N and H (3P 3D version)

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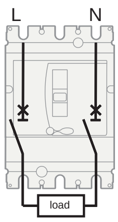

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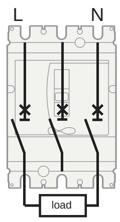
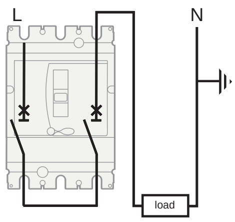
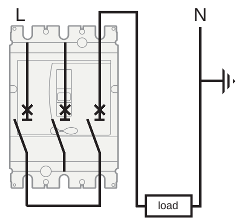


DB115577



DB115578



Remark. For an operating voltage > 250 V, the installation

Special applications

Protection of 400 Hz systems

Compact NSX circuit breakers may be used on 400 Hz systems.

400 Hz distribution systems

The main 400 Hz applications are in aeronautics and certain military ships. Modern aircraft have three-phase 115/200 V 400 Hz networks.

Impact on protective devices

Due to the higher frequency, circuit breakers are subjected to additional temperature rise for identical current levels, resulting from higher losses caused by Foucault currents and an increase in the skin effect (reduction in the useful CSA of conductors). To remain within the rated temperature-rise limits of devices, current derating is required.
The power levels of 400 Hz applications rarely exceed a few hundred kW with relatively low short-circuit currents, generally not exceeding four times the rated current.
The standard Compact NSX and Masterpact NT/NW ranges are suitable for 400 Hz applications if derating coefficients are applied to the protection settings. See the derating table below.

Breaking capacity of Compact NSX circuit breakers in 400 Hz, 440 V systems

Circuit breaker	Breaking capacity Icu
NSX100	10 kA
NSX160	10 kA
NSX250	10 kA
NSX400	10 kA
NSX630	10 kA

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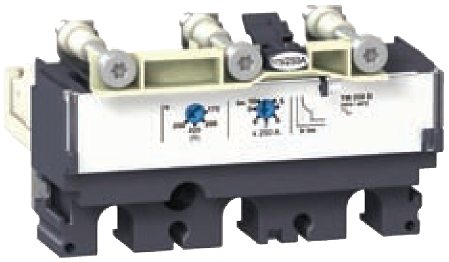


Micrologic TM-D trip unit.

Trip units equipped with thermal-magnetic protection

The 400 Hz current settings are obtained by multiplying the 50 Hz values by the following adaptation coefficient:

- K1 for thermal trip units
- K2 for magnetic trip units.

These coefficients are independent of the trip-unit setting.

Thermal trip units
The current settings are lower at 400 Hz than at 50 Hz (K1 < 1).

Magnetic trip units
The current settings are conversely higher at 400 Hz than at 50 Hz (K2 > 1).
Consequently, when the trip units are adjustable, they must be set to the minimum value.

Adaptation coefficients for thermal-magnetic trip units

Circuit breaker	Trip unit	In (A) 50Hz	Thermal at 40°C K1	400 Hz	Im (A) 50Hz	Magnetic K2	400 Hz
NSX100	TM16G	16	0.95	15	63	1.6	100
	TM25G	25	0.95	24	80	1.6	130
	TM40G	40	0.95	38	80	1.6	130
	TM63G	63	0.95	60	125	1.6	200
NSX100	TM16D	16	0.95	15	240	1.6	300
	TM25D	25	0.95	24	300	1.6	480
	TM40D	40	0.95	38	500	1.6	800
	TM63D	63	0.95	60	500	1.6	800
	TM80D	80	0.9	72	650	1.6	900
	TM100D	100	0.9	90	800	1.6	900
NSX250	TM100D	100	0.9	90	800	1.6	900
	TM160D	160	0.9	144	1250	1.6	2000
	TM200D	200	0.9	180	1000 to 2000	1.6	1600 to 3200
	TM250D	250	0.9	225	1250 to 2500	1.6	2000 to 4000

Example
NSX100 equipped with a TM16G with 50 Hz settings Ir = 16 A and Im = 63 A.
400 Hz settings Ir = 16 x 0.95 = 15 A and Im = 63 A x 1.6 = 100 A.

Protection of 400 Hz systems (cont.)

PB103363

Micrologic 5 E trip unit.

Protection (cont.)

Micrologic electronic trip units

Micrologic 2.2, 2.3 or 5.2, 5.3 with A or E measurement functions are suitable for 400 Hz. The use of electronics offers the advantage of greater operating stability when the frequency varies. However the units are still subject to temperature rise caused by the frequency.
The practical consequences are:

- limit settings: see the Ir derating table below
- the long-time, short-time and instantaneous pick-ups are not modified (see pages A-17 or A-19)
- the accuracy of the displayed measurements is 2 % (class II).

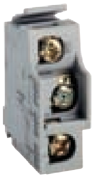
Thermal derating: maximum Ir setting

Circuit breaker	Maximum setting coefficient	Max. Ir setting at 400 Hz
NSX100	1	100
NSX250	0.9	225
NSX400	0.8	320
NSX630	0.8	500

Example

An NSX250N, equipped with a Micrologic 2.2, Ir = 250 A at 50 Hz, must be limited to use at Ir = 250 x 0.9 = 225 A.
Its short-time pick-up with fixed time delay is adjustable from 1.5 to 10 Ir (60 to 400 A).
The instantaneous pick-up remains at 3000 A.

DB125547



OF auxiliary contact.

DB125548

MX or MN voltage release.

OF auxiliary contacts in 400 Hz networks

Electrical characteristics of auxiliary contacts

Contacts		Standard		Low level	
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	CA12	CA15
Operational current (A)	24 V	6	6	5	3
	48 V	6	6	5	3
	110 V	6	5	5	2.5
	220/240 V	6	4	5	2
	380/415 V	6	2	5	1.5

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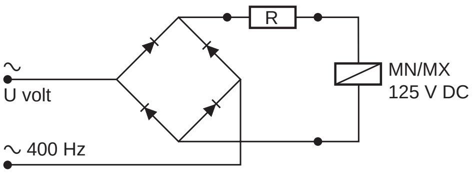


Wiring diagram.

MN and MX voltage releases for Compact NSX100/630 at 400 Hz and 440 V

For circuit breakers on 400 Hz systems, only 125 V DC MN or MX releases may be used. The release must be supplied by the 400 Hz system via a rectifier bridge (to be selected from the table below) and an additional resistor with characteristics depending on the system voltage.

U (V) 400 Hz	Rectifier	Additional resistor
220/240 V	Thomson 110 BHz or General Instrument W06 or Semikron SKB at 1.2/1.3	4.2 kΩ-5 W
380/420 V	Semikron SKB at 1.2/1.3	10.7 kΩ-10 W

Note: other models of rectifier bridges may be used if their characteristics are at least equivalent to those stated above.

PB103377

SDx remote indication relay module with its terminal block.

SDx indication contacts

The SDx module may be used in 400 Hz systems for voltages from 24 to 440 V.
An SDx relay module installed inside the circuit breaker can be used to remote the overload-trip signal.
This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is closed.
These outputs can be reprogrammed to be assigned to other types of tripping or alarm (see page A-81).

Switch-disconnectors

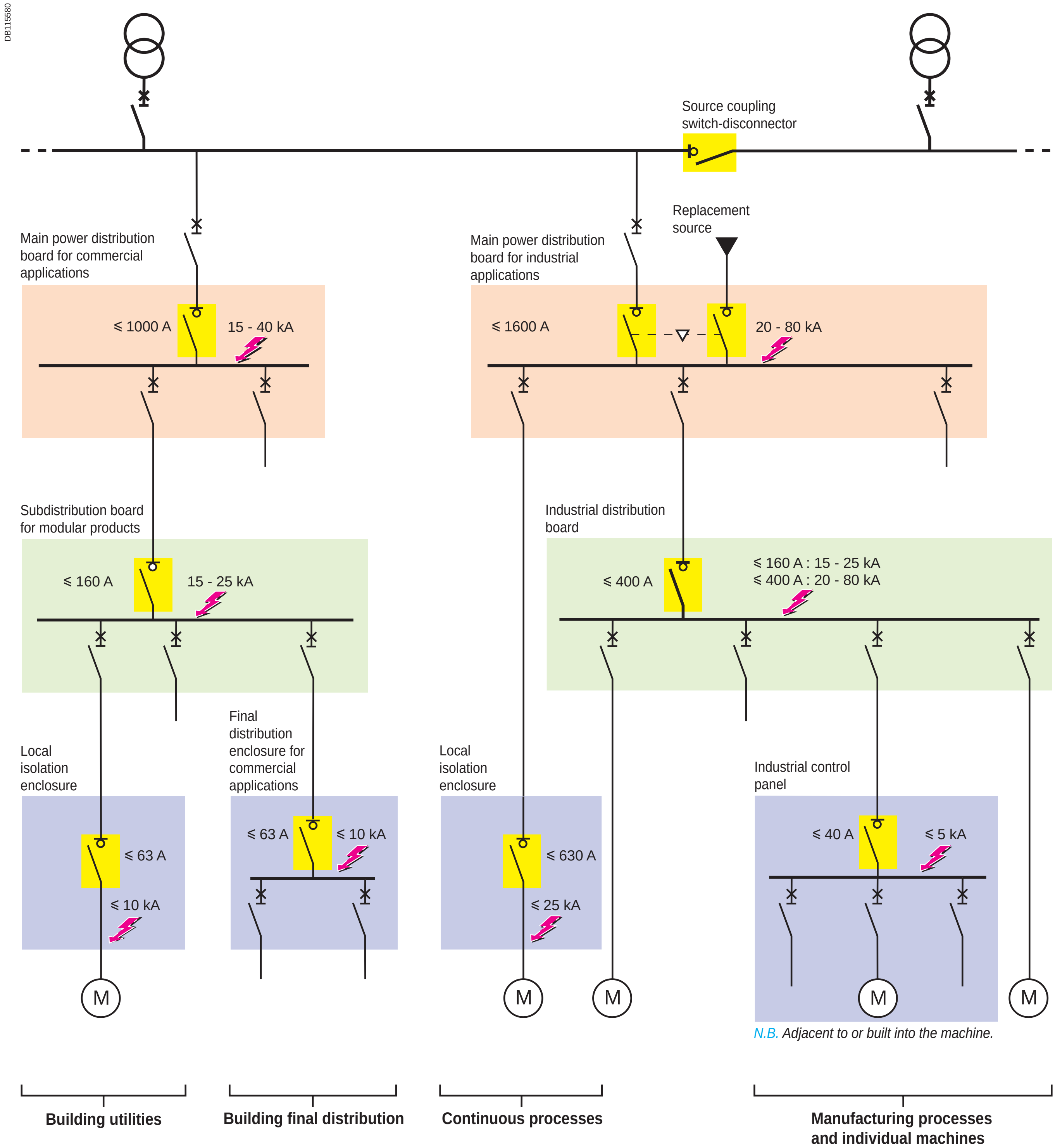
Overview of applications

A switch-disconnector is a control device that can be used to open and close a circuit under normal operating conditions.
It is suitable for isolation as indicated on the front by the symbol .

Position of switch-disconnectors

Compact NSX switch-disconnectors are used primarily for the following applications:

- busbar coupling and isolation
- isolation of industrial distribution boards and industrial control panels
- isolation of subdistribution boards for modular devices
- isolation of local enclosures
- isolation of final distribution enclosures for commercial applications
- industrial control panel switch-disconnectors.



Switch-disconnector functions

Compact NSX100 to 630 NA switch-disconnectors are available in fixed, plug-in and withdrawable versions. They use the same accessories and offer the same connection possibilities as the circuit-breaker versions. They may be interlocked with another Compact switch-disconnector or circuit breaker to form a source-changeover system.

PB103199-28

Compact NSX switch-disconnector.

PB103372-34

Compact NSX switch-disconnector equipped with a motor mechanism module.

PB103629-31

Compact NSX switch-disconnector equipped with a Vigi module.

Suitability for isolation with positive contact indication

Compact NSX switch-disconnectors are suitable for isolation as defined by standard IEC 60947-3. The corresponding conformity tests guarantee:

- the mechanical reliability of the position indication, i.e. the O (OFF) position indicated by the control device always reflects the open position of the contacts:
  - the required distance between contacts is provided
  - padlocks may not be installed unless the contacts are open
- the absence of leakage currents
- overvoltage withstand capacity between upstream and downstream connections.

Installation of a rotary handle or a motor mechanism does not alter the reliability of the position-indication system.

Emergency-off function

A Compact NSX NA is combined with an MN or MX release connected to an emergency-off button. In an emergency, an operator at a remote location can interrupt the circuit at rated load to isolate the entire switchboard and the downstream loads.

Motor mechanism

Compact NSX NA devices equipped with a motor mechanism module enable remote closing and opening. This function may be combined with the emergency-off function. In this case, the emergency off function is combined with a closing lock-out that must be intentionally reset (electrical diagram with closing lock-out).

Earth-leakage protection

A Vigi module may be added to a switch-disconnector to monitor all leakage currents in the outgoing circuits of the switchboard on which the switch-disconnector is installed. When the Vigi module detects an earth-leakage current, the switch-disconnector interrupts the load current. This function may be combined with the motor mechanism and the emergency-off function using an MN or MX release.

Switch-disconnector protection

The switch-disconnector can make and break its rated current. For an overload or a short-circuit, it must be protected by an upstream device, in compliance with installation standards.
The circuit-breaker/switch-disconnector coordination tables determine the required upstream circuit breaker. However, due to their high-set magnetic release, Compact NSX100 to 630 A switch-disconnectors are self-protected.

Switch-disconnector utilisation category

Depending on the rated operational current and the mechanical durability (A for frequent operation or B for infrequent operation), standard IEC 60947-3 defines the utilisation categories as shown in the table below. Compact NSX NA switch-disconnectors comply with utilisation categories AC22A or AC23A.

Utilisation category		Typical applications
Infrequent operation	**Frequent operation**	
AC-21A	AC-21B	Resistive loads including moderate overloads (cos φ = 0.95)
AC-22A	AC-22B	Mixed resistive and inductive loads including moderate overloads (cos φ = 0.65)
AC-23A	AC-23B	Motor loads or other highly inductive loads (cos φ = 0.45 or 0.35)

Functions and characteristics

Switch-disconnectors

Characteristics and performance of Compact NSX switch-disconnectors from 100 to 630 NA

Installation standards require upstream protection. However Compact NSX100 to 630 NA switch-disconnectors are self-protected by their high-set magnetic release.

PB103199-39

Compact NSX100 to 250 NA.

PB103271-45

Compact NSX400 to 630 NA.

Common characteristics

Rated voltages				
	Insulation voltage (V)	**Ui**		800
	Impulse withstand voltage (kV)	**Uimp**		8
	Operational voltage (V)	**Ue**	AC 50/60 Hz	690
Suitability for isolation			IEC/EN 60947-3	yes
Utilisation category		AC 22 A/AC 23 A - DC 22 A/DC 23 A		
Pollution degree			IEC 60664-1	3

Switch-disconnectors

Electrical characteristics as per IEC 60947-3 and EN 60947-3				
Conventional thermal current (A)	**Ith 60 °C**			
Number of poles				
Operational current (A) depending on the utilisation category	**Ie**	AC 50/60 Hz		
			220/240 V	
			380/415 V	
			440/480 V (2)	
			500/525 V	
			660/690 V	
		DC		
			250 V (1 pole)	
			500 poles (2 poles in series)	
			750 V (3 poles in series)	
Short-circuit making capacity (kA peak)	**Icm**	min. (switch-disconnector alone)		
		max. (protection by upstream circuit breaker)		
Rated short-time withstand current (A rms)	**Icw**	for	1 s	
			3 s	
			20 s	
Durability (C-O cycles)	mechanical			
	electrical	AC		
			440 V	In/2
				In
			690 V	In/2
				In
		DC	250 V (1 pole) and	In/2
			500 V (2 poles in series)	In
Positive contact indication				
Pollution degree				
Protection				
Add-on earth-leakage protection	By Vigi module			
	By Vigirex relay			
Additional indication and control auxiliaries				
Indication contacts				
Voltages releases	MX shunt release			
	MN undervoltage release			
Voltage-presence indicator				
Current-transformer module				
Ammeter module				
Insulation monitoring module				
Remote communication by bus				
Device-status indication				
Device remote operation				
Operation counter				
Installation / connections				
Dimensions (mm)	fixed, front connections		2/3P	
W x H x D			4P	
Weight (kg)	fixed, front connections		3P	
			4P	
Source-changeover systems (see chapter on Source-changeover systems)				
Manual source-changeover systems				
Remote-operated or automatic source-changeover systems				

(1) 2P in 3P case.
(2) Suitable for 480 V NEMA.

Common characteristics

Control			
	Manual	With toggle	■
		With direct or extended rotary handle	■
	Electrical	With remote control	■
Versions			
	Fixed		■
	Withdrawable	Plug-in base	■
		Chassis	■

	NSX100NA	NSX160NA	NSX250NA	NSX400NA	NSX630NA
	100	**160**	**250**	**400**	**630**
	2 (1), 3, 4	2 (1), 3, 4	2 (1), 3, 4	3, 4	3, 4
	AC22A / AC23A	**AC22A / AC23A**	**AC22A / AC23A**	**AC22A / AC23A**	**AC22A / AC23A**
	100	160	250	400	630
	100	160	250	400	630
	100	160	250	400	630
	100	160	250	400	630
	100	160	250	400	630
	DC22A / DC23A	**DC22A / DC23A**	**DC22A / DC23A**	**DC22A / DC23A**	**DC22A / DC23A**
	100	160	250	-	-
	100	160	250	-	-
	100	160	250	-	-
	2.6	3.6	4.9	7.1	8.5
	330	330	330	330	330
	1800	2500	3500	5000	6000
	1800	2500	3500	5000	6000
	690	960	1350	1930	2320
	50000	40000	20000	15000	15000
	AC22A / AC23A	**AC22A / AC23A**	**AC22A / AC23A**	**AC22A / AC23A**	**AC22A / AC23A**
	35000	30000	15000	10000	6000
	20000	15000	7500	5000	3000
	15000	10000	6000	5000	3000
	8000	5000	3000	2500	1500
	10000	10000	10000	-	-
	5000	5000	5000	-	-
	■	■	■	■	■
	3	3	3	3	3
	■			■	
	■			■	
	■			■	
	■			■	
	■			■	
	■			■	
	■			■	
	■			■	
	■			■	
	■			■	
	■			■	
	■			■	
	105 x 161 x 86			140 x 255 x 110	
	140 x 161 x 86			185 x 255 x 110	
	1.5 to 1.8			5.2	
	2.0 to 2.2			6.8	
	■			■	
	■			■	

Source-changeover systems
Presentation

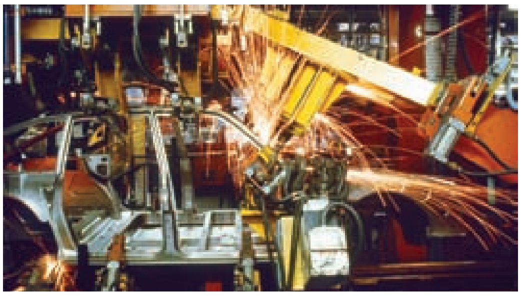
Some installations use two supply sources to counter the temporary loss of the main supply.
A source-changeover system is required to safely switch between the two sources.
The replacement source can be a generator set or another network.

PB103937

PB103936

Service sector:
- *hospital operating rooms*
- *safety systems for tall buildings*
- *computer rooms (banks, insurance companies, etc.)*
- *lighting systems in shopping centres, etc.*

PB103934



Industry:
- *assembly lines*
- *engine rooms on ships*
- *critical auxiliaries in thermal power stations, etc.*

PB103935

Infrastructures:
- *runway lighting systems*
- *port and railway installations*
- *control systems for military installations, etc.*

Manual source changeover
This is the most simple system. It is controlled manually by a maintenance technician and consequently the time required to switch from the normal source to the replacement source can vary.
A manual source-changeover system is made up of:
- two devices (circuit breakers or switch-disconnectors) controlled manually
- mechanical interlocking.

The interlock prevents connection to both sources at the same time, even momentarily.

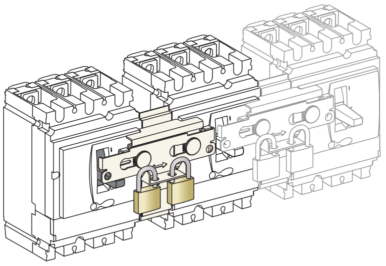
Remote-operated source-changeover systems
This is the most commonly employed system. No human invention is required. The transfer from the normal to the replacement source is controlled electrically.
A remote-operated source-changeover system is made up of two circuit breakers or switch-disconnectors equipped with motor mechanisms and:
- an electrical interlocking system implemented in a number of manners
- a mechanical interlocking system that protects against the consequences of an electrical malfunction and prevents incorrect manual operation.

Automatic source-changeover systems
An automatic controller may be added to the remote-operated source-changeover system for automatic source control according to programmable operating modes.
This solution ensures optimum energy management:
- switching to a replacement source depending on external requirements
- source management
- load shedding
- emergency source replacement, etc.

Manual source-changeover systems

Interlocking of two or three toggle-controlled devices

DB112198



Interlocking of two or three toggle-controlled devices.

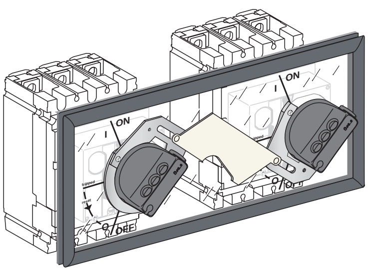
Interlocking system
Two devices can be interlocked using this system. Two identical interlocking systems can be used to interlock three devices installed side by side.
Authorised positions:
- one device closed (ON), the others open (OFF)
- all devices open (OFF).

The system is locked using one or two padlocks (shackle diameter 5 to 8 mm).
This system can be expanded to more than three devices.
There are two interlocking-system models:
- one for Compact NSX100 to 250
- one for Compact NSX400/630.

Combinations of Normal and Replacement devices
All toggle-controlled fixed or plug-in Compact NSX100 to 630 circuit breakers and switch-disconnectors of the same frame size can be interlocked. The devices must be either all fixed or all plug-in versions.

Interlocking of two devices with rotary handles

DB112194



Interlocking of two devices with rotary handles.

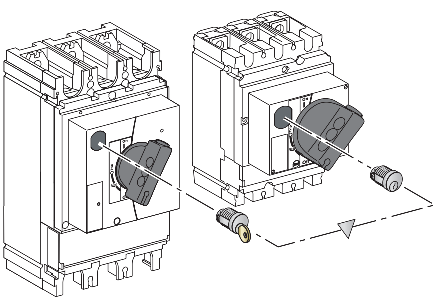
Interlocking system
Interlocking involves padlocking the rotary handles on two devices which may be either circuit breakers or switch-disconnectors.
Authorised positions:
- one device closed (ON), the other open (OFF)
- both devices open (OFF).

The system is locked using up to three padlocks (shackle diameter 5 to 8 mm).
There are two interlocking-system models:
- one for Compact NSX100 to 250
- one for Compact NS400/630.

Combinations of Normal and Replacement devices
All rotary-handle fixed or plug-in Compact NSX100 to 630 circuit breakers and switch-disconnectors of the same frame size can be interlocked. The devices must be either all fixed or all plug-in versions.

Interlocking of a number of devices using keylocks (captive keys)

DB112195



Interlocking with keylocks.

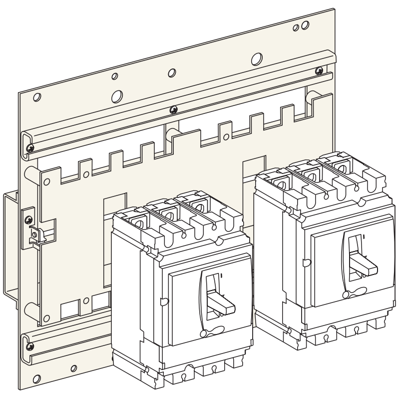
Interlocking using keylocks is very simple and makes it possible to interlock two or more devices that are physically distant or that have very different characteristics, for example medium-voltage and low-voltage devices or a Compact NSX100 to 630 circuit breaker and switch-disconnector.

Interlocking system
Each device is equipped with an identical keylock and the key is captive on the closed (ON) device. A single key is available for all devices. It is necessary to first open (OFF position) the device with the key before the key can be withdrawn and used to close another device.
A system of wall-mounted captive key boxes makes a large number of combinations possible between many devices.

Combinations of Normal and Replacement devices
All rotary-handle Compact NSX100 to 630 circuit breakers and switch-disconnectors can be interlocked between each other or with any other device equipped with the same type of keylock.

Interlocking of two devices on a base plate

DB112196



Interlocking on a base plate.

Interlocking system
A base plate designed for two Compact NSX devices can be installed horizontally or vertically on a mounting rail. Interlocking is carried out on the base plate by a mechanism located behind the devices. In this way, access to the device controls and trip units is not blocked.

Combinations of Normal and Replacement devices
All rotary-handle and toggle-controlled Compact NSX100 to 630 circuit breakers and switch-disconnectors can be interlocked. Devices must be either all fixed or all plug-in versions, with or without earth-leakage protection or measurement modules.
An adaptation kit is required to interlock:
- two plug-in devices
- a Compact NSX100-250 with an NSX400-630.

Connection to the downstream installation can be made easier using a coupling accessory (see next page).

Functions and characteristics

Source-changeover systems

Remote-operated and automatic source-changeover systems
Coupling accessory on base plate

PB103832-51

Remote-operated source-changeover system.

Remote-operated systems

It is made up of two devices with motor mechanisms, mounted on a base plate and combined with:

- an electrical interlocking unit
- optional mechanical interlocking system.

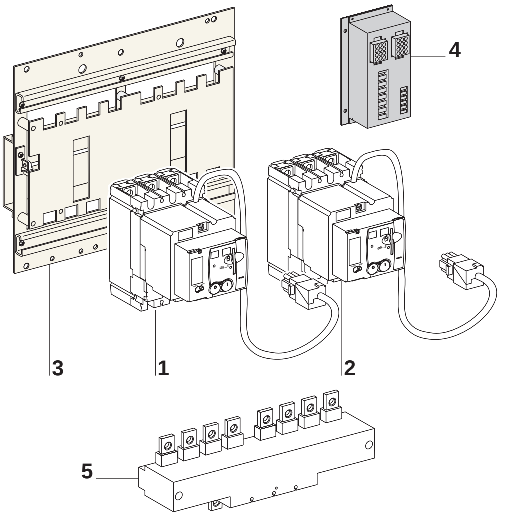
Electrical interlocking unit (IVE)

Interlocks two devices equipped with motor mechanisms and auxiliary contacts. The IVE unit is mandatory to ensure the necessary time-delays required for safe switching.

Mechanical interlocking system

The mechanical interlocking system is strongly recommended to limit the effects of design or wiring errors and to avoid manual switching errors.

DB112197



1 Circuit breaker QN equipped with a motor mechanism and auxiliary contacts, connected to the Normal source
2 Circuit breaker QR equipped with a motor mechanism and auxiliary contacts, connected to the Replacement source
3 Base plate with mechanical interlocking
4 Electrical interlocking unit IVE
5 Coupling accessory (downstream connection)

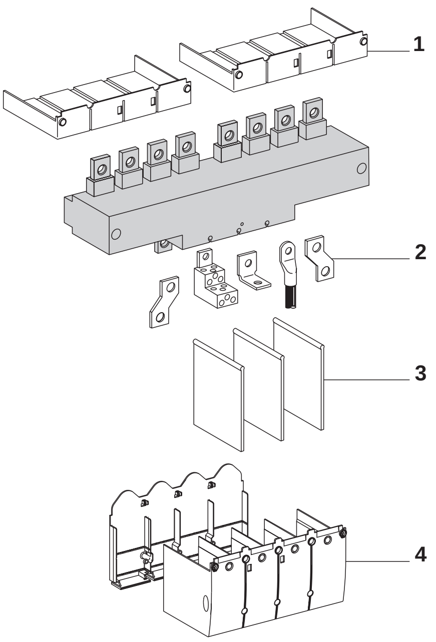
Automatic systems

An automatic controller can manage switching from one source to the other.
The controller can be:

- a device provided by the customer
- an integrated BA controller
- an integrated UA controller.

An integrated BA or UA automatic controller manages source transfer according to user-selected sequences that can include source priorities, start-up of a generator, return to the Normal source, etc. An ACP auxiliaries control plate facilitates installation of the BA and UA controllers. The plate includes two circuit breakers to protect the control circuits and two contactors to control the motor mechanisms of the devices.

DB112199



Standard device accessories may be used for the coupling accessory on the base plate.

Coupling accessory on base plate

This accessory may be used with a manual or remote-operated source-changeover system (with or without an automatic controller). It respects the mounting distance between the devices secured to the ACP plate and provides downstream coupling of the two sets of busbars. It is compatible with standard device accessories.
The short terminal shields of the device can be installed on the upstream connectors of the coupling accessory. Downstream, it is possible to use the connection accessories and the long or short terminal shields of the device.

1 Short terminal shields
2 Terminals
3 Interphase barriers
4 Long terminal shields

By combining a remote-operated source-changeover system with an integrated BA or UA automatic controller, it is possible to automatically control source transfer according to user-selected sequences.

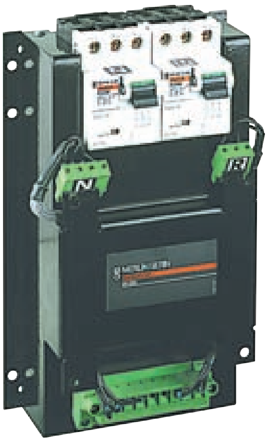
PB100855_SE-30

BA controller.

PB100856_SE-30

UA controller.

PB100857-35



Auxiliary control plate for a BA or UA controller.

Functions of the BA and UA controllers

Controller		**BA**	**UA**
Compatible circuit breakers		Compact NSX100 to 630 circuit breakers	
4-position switch			
Automatic operation		■	■
Forced operation on Normal source		■	■
Forced operation on Replacement source		■	■
Stop (both Normal and Replacement sources OFF)		■	■
Automatic operation			
Monitoring of the Normal source and automatic transfer from one source to the other		■	■
Engine generator set start-up control			■
Delayed shutdown (adjustable) of engine generator set			■
Load shedding and reconnection of non-priority loads			■
Transfer to Replacement source if one of the Normal source phases is absent			■
Test			
By opening the P25M circuit breaker upstream of the controller		■	■
By pressing the test button on the front of the controller			■
Indications			
Circuit-breaker status indication on the front of the controller: ON, OFF, fault trip		■	■
Automatic-mode indication contact		■	■
Other functions			
Selection of type of Normal source (single-phase or three-phase)			■
Voluntary transfer to Replacement source		■	■
Forced operation on Normal source if Replacement source is not operational			■
Additional test contact (not part of controller) Transfer to Replacement source only if contact closed (e.g. for a UR frequency check)		■	■
Setting of maximum start-up time for the Replacement-source			■
Power supply			
Control voltages [(1)]	220 to 240 V 50/60 Hz	■	■
	380 to 415 V 50/60 Hz	■	■
	440 V 60 Hz	■	■
Operating thresholds			
Undervoltage	0.35 Un ⩽ voltage ⩽ 0.7 Un	■	■
Phase failure	0.5 Un ⩽ voltage ⩽ 0.7 Un		■
Voltage presence	voltage ⩾ 0.85 Un	■	■

Characteristics of output contacts (dry, volt-free contacts)							
Rated thermal current (A)		8					
Minimum load		10 mA at 12 V					
		AC				**DC**	
Utilisation category (IEC 60947-5-1)		AC12	AC13	AC14	AC15	DC12	DC13
Operational current (A)	24 V	8	7	5	6	8	2
	48 V	8	7	5	5	2	-
	110 V	8	6	4	4	0.6	-
	220/240 V	8	6	4	3	-	-
	250 V	-	-	-	-	0.4	-
	380/415 V	5	-	-	-	-	-
	440 V	4	-	-	-	-	-
	660/690 V	-	-	-	-	-	-

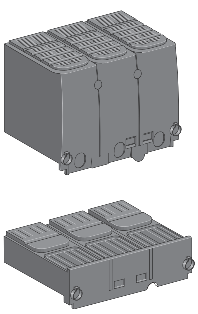
(1) The controller is powered by the ACP auxiliaries control plate. The same voltage must be used for the ACP plate, the IVE unit and the circuit-breaker operating mechanisms. If this voltage is the same as the source voltage, then the "Normal" and "Replacement" sources can be used directly for the power supply. If not, an isolation transformer must be used.

Accessories and auxiliaries

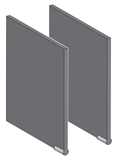
Overview of Compact NSX100 to 630 fixed version

Insulation accessories ▶ A-73

DB115581

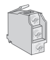


Sealable terminal shields

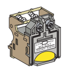


Interphase barriers

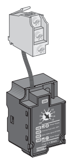
Electrical auxiliaries ▶ A-80



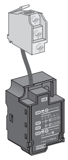
Indication contact



Voltage release

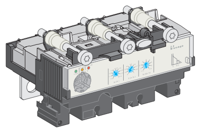


SDTAM module

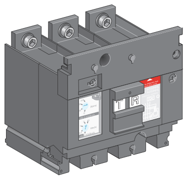


SDx module

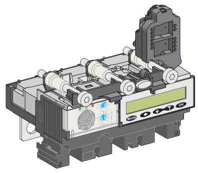
Protection and measurements ▶ A-86



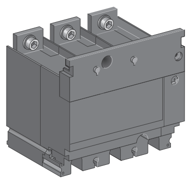
Micrologic 2 trip unit



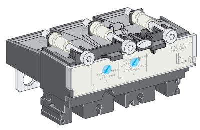
Vigi module



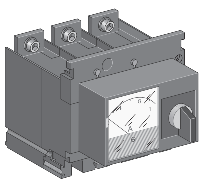
Micrologic 5 / 6 trip unit



Current-transformer module

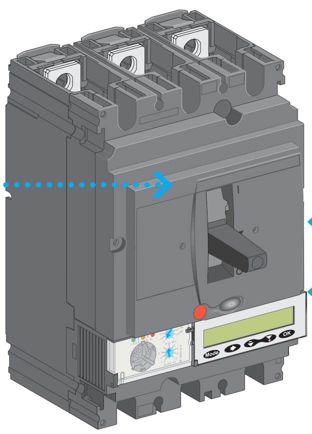


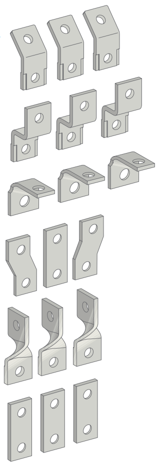
TM-D, TM-G trip unit



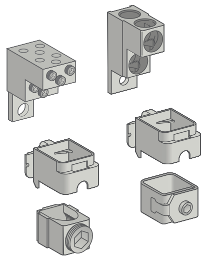
Ammeter module

Connection ► A-70

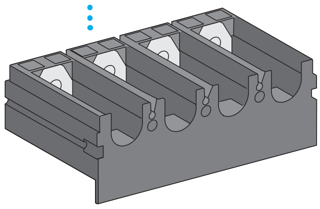




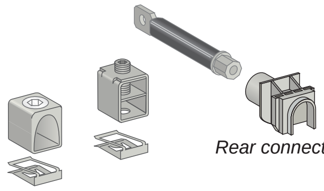
Terminal extensions



Cable connectors



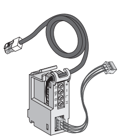
One-piece spreader



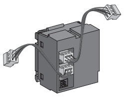
Cable connectors

Rear connectors

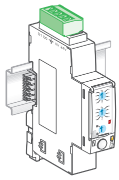
Communication and display ► A-26



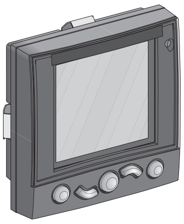
NSX cord



BSCM module

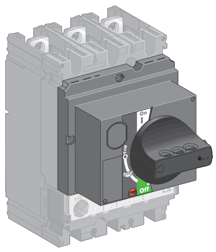


Modbus interface

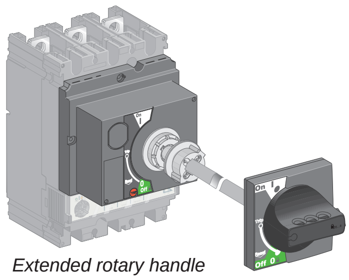


FDM121

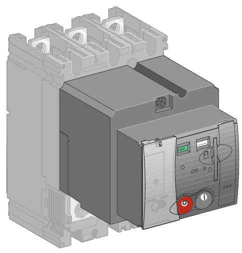
Control accessories ► A-82



Direct rotary handle



Extended rotary handle



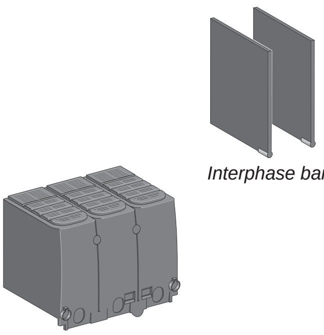
Motor mechanism

Accessories and auxiliaries

Overview of Compact NSX100 to 630 plug-in and withdrawable versions

Insulation accessories ▶ A-73

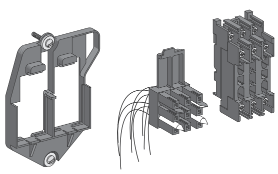
DB115888



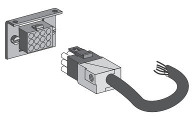
Interphase barriers

Sealable long terminal shields for plug-in base

Electrical accessories ▶ A-78

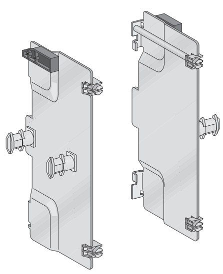


Automatic withdrawable auxiliary connector

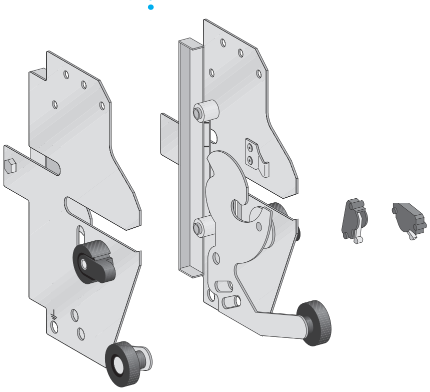


Manual auxiliary connector

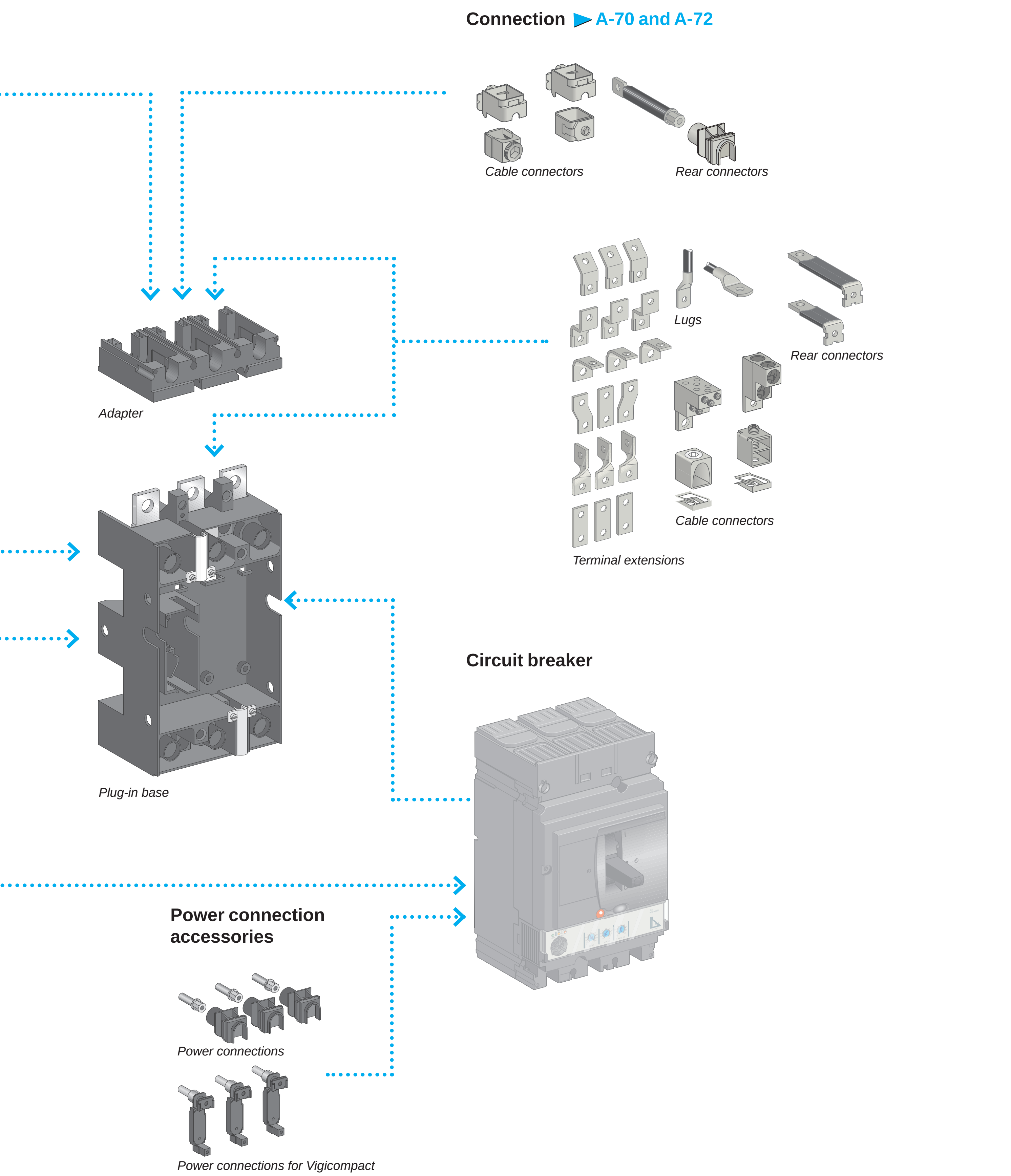
Mechanical accessories ▶ A-69



Circuit-breaker side plate



Chassis side plate

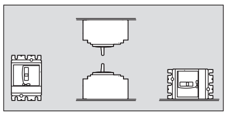

Connection ▶ A-70 and A-72
Cable connectors
Rear connectors
Lugs
Rear connectors
Cable connectors
Terminal extensions
Adapter
Plug-in base
Circuit breaker
Power connection accessories
Power connections
Power connections for Vigicompact

Accessories and auxiliaries

Device installation

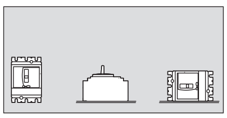
Compact NSX circuit breakers may be installed horizontally, vertically or flat on their back, without derating performance levels.
There are three installation versions:
■ fixed
■ plug-in (on a base)
■ withdrawable (on a chassis).
For the last two, components must be added (base, chassis) to the fixed version.
Many connection components are shared by the three versions.

Fixed Compact NSX250.



Installation positions.

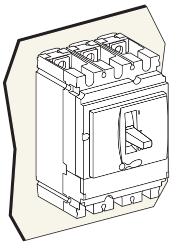
Plug-in Compact NSX250.



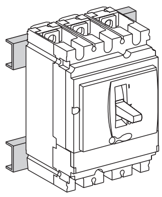
Installation positions.

Fixed circuit breakers

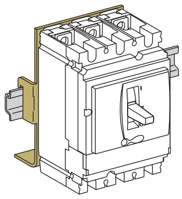
Fixed circuit breakers are designed for standard connection using bars or cables with lugs. Bare-cable connectors are available for connection to bare copper or aluminium cables.
For connection of large cables, a number of solutions with spreaders may be used for both cables with lugs or bare cables.



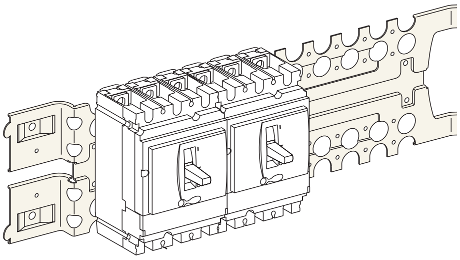
Mounting on a backplate.



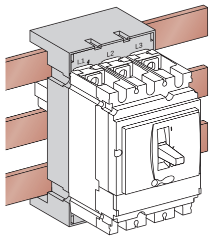
Mounting on rails.



Mounting on DIN rail (with adapter).



Mounting on a Prisma mounting plate.



Mounting on busbars with an adapter.

Plug-in circuit breakers

The plug-in version makes it possible to:
■ extract and/or rapidly replace the circuit breaker without having to touch the connections on the base
■ allow for the addition of future circuits by installing bases that will be equipped with a circuit breaker at a later date
■ isolate the power circuits when the device is mounted on or through a panel. It acts as a barrier for the connections of the plug-in base. Insulation is made complete by the mandatory short terminal shields on the device. The degrees of protection are:
□ circuit breaker plugged in = IP4
□ circuit breaker removed = IP2
□ circuit breaker removed, base equipped with shutters = IP4.

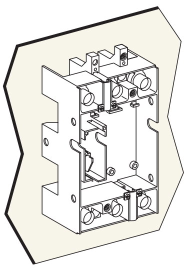
Parts of a plug-in configuration

A plug-in configuration is made by adding a "plug-in kit" to a fixed device.
To avoid connecting or disconnecting the power circuits under load conditions, a safety trip causes automatic tripping if the device is ON, before engaging or withdrawing it. The safety trip, supplied with the kit, must be installed on the device. If the device is disconnected, the safety trip does not operate. The device can be operated outside the switchboard.

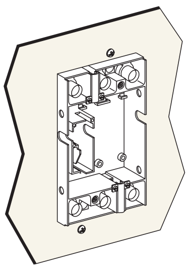
Accessories

Optional insulation accessories are available.
■ Terminal shields to protect against direct contact.
■ Interphase barriers to reinforce insulation between phases and protect against direct contact.

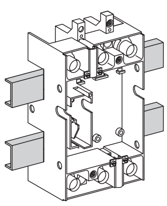
Mounting



Mounting on a backplate.



Mounting through a front panel.

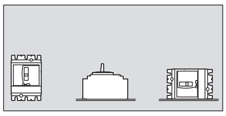


Mounting on rails.

PB103599-42

Withdrawable Compact NSX250.

DB112209



Installation positions.

Withdrawable circuit breakers

In addition to the advantages provided by the base, installation on a chassis facilitates handling. It offers three positions, with transfer from one to the other after mechanical unlocking:

- ■ connected: the power circuits are connected
- ■ disconnected: the power circuits are disconnected, the device can be operated to check auxiliary operation
- ■ removed: the device is free and can be removed from the chassis.

Parts of a withdrawable configuration

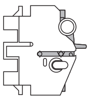
A withdrawable configuration requires two side plates installed on the base and two sides plates mounted on the circuit breaker. Similar to the plug-in version, a safety trip causes automatic tripping if the device is ON, before engaging or withdrawing it, and enables device operation in the disconnected position.

Accessories

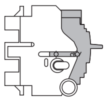
Accessories are the same as for the base, with in addition:

- ■ auxiliary contacts for installation on the fixed part, indicating the "connected" and "disconnected" positions
- ■ locking by 1 to 3 padlocks (shackle diameter 5 to 8 mm), to:
  - □ prevent insertion for connection
  - □ lock the circuit breaker in connected or disconnected position
- ■ toggle collar for circuit breakers with a toggle mounted through a front panel, intended to maintain the degree of protection whatever the position of the circuit breaker (supplied with a toggle extension)
- ■ telescopic shaft for extended rotary handles. The door can then be closed with the device in the connected and disconnected positions.

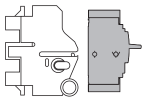
DB112210



Connected.

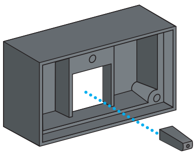


Disconnected.



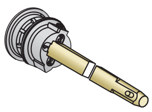
Removed.

DB111369



Protection collar for toggle and toggle extension to provide IP4 in the connected and disconnected positions.

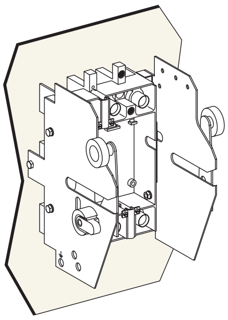
DB112219



Telescopic shaft.

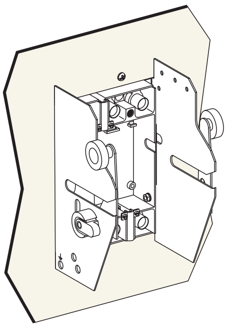
Mounting

DB112220



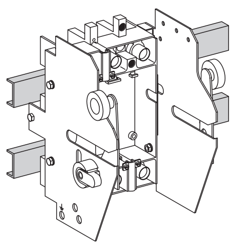
Mounting on a backplate.

DB112221



Mounting through a front panel.

DB112312



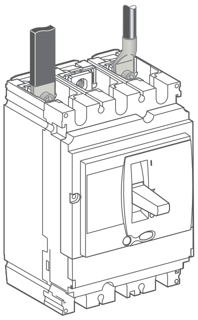
Mounting on rails.

Accessories and auxiliaries

Connection of fixed devices

Fixed circuit breakers are designed for standard front connection using bars or cables with lugs.
Cable connectors are available for bare cables. Rear connection is also possible.

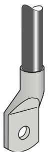
DB112168



DB112169

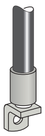
Insulated bar.

DB112170



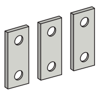
Small lug for copper cables.

DB112171



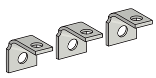
Small lug for Al cables.

DB112172



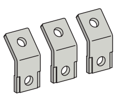
Straight terminal extensions.

DB112173



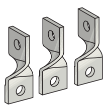
Right-angle terminal extensions.

DB112174



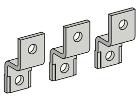
45° terminal extensions.

DB112175



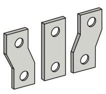
Edgewise terminal extensions.

DB112176



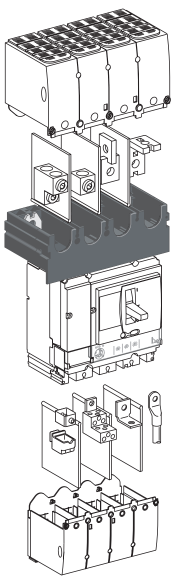
Double-L terminal extensions.

DB112177

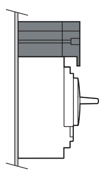


Spreaders.

DB118544

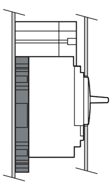


DB112179



Mounting at the back of a switchboard.

DB112180



Mounting behind the front panel with a raiser.

Front connection

Bars or cables with lugs

Standard terminals

Compact NSX100 to 630 come with terminals comprising snap-in nuts with screws:

- Compact NSX100: M6 nuts and screws. Compact NSX160/250: M8 nuts and screws
- Compact NSX400/630: M10 nuts and screws.

These terminals may be used for:

- direct connection of insulated bars or cables with lugs
- terminal extensions offering a wide range of connection possibilities.

Interphase barriers or terminal shields are recommended. They are mandatory for certain connection accessories (in which case the interphase barriers are provided).

Bars

When the switchboard configuration has not been tested, insulated bars are mandatory.

Maximum size of bars

Compact NSX circuit breaker		100/160/250	400/630
Without spreaders	pitch (mm)	35	45
	maximum bar size (mm)	20 x 2	32 x 6
With spreaders	pitch (mm)	45	52.5
	maximum bar size (mm)	32 x 2	40 x 6

Crimp lugs

There are two models, for aluminium and copper cables.
It is necessary to use narrow lugs, compatible with device connections. They must be used with interphase barriers or long terminal shields. The lugs are supplied with interphase barriers and may be used for the types of cables listed below.

Cable sizes for connection using lugs

Compact NSX circuit breaker		100/160/250	400/630
Copper cables	size (mm²)	120, 150, 185	240, 300
	crimping	hexagonal barrels or punching	
Aluminium cables	size (mm²)	120, 150, 185	240, 300
	crimping	hexagonal barrels	

Terminal extensions

Extensions with anti-rotation ribs can be attached to the standard terminals to provide numerous connection possibilities in little space:

- straight terminal extensions
- right-angle terminal extensions
- edgewise terminal extensions
- double-L extensions
- 45° extensions.

Spreaders

Spreaders may be used to increase the pitch:

- NSX100 to 250: the 35 mm pitch can be increased to 45 mm
- NSX400/630: the 45 mm pitch can be increased to 52 or 70 mm.

Bars, cable lugs or cable connectors can be attached to the ends.

One-piece spreader for NSX100 to 250

Connection of large cables may require an increase in the distance between the device terminals.
The one-piece spreader is the means to:

- increase the 35 mm pitch of the NSX100 to 250 circuit-breaker terminals to the 45 mm pitch of a NSX400/630 device
- use all the connection and insulation accessories available for the next largest frame size (lugs, connectors, spreaders, right-angle and edgewise terminal extensions, terminal shields and interphase barriers).

It may also be used for Interpact INS switch-disconnectors.
Equipped with a single-piece spreader, Compact NSX devices can be mounted:

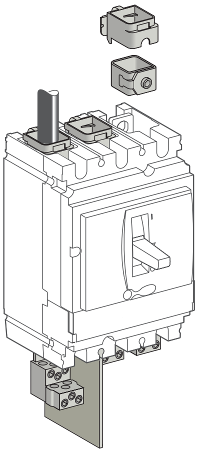
- at the back of a switchboard
- behind the front panel with a raiser.

The one-piece spreader is also the means to:

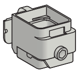
- align devices with different frame sizes in the switchboard
- use the same mounting plate, whatever the device.

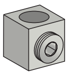
Pitch (mm) depending on the type of spreader

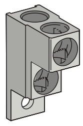
Compact NSX circuit breaker	NSX100 to 250	NSX100 to 630
Without spreaders	35	45
With spreaders	45	52.5 or 70
With one-piece spreader	45	-

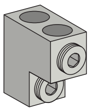


Bare cable.

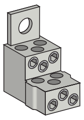




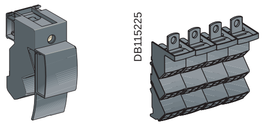




1-cable connector for NSX100 to 250 *NSX400/630.* *2-cable connector for NSX100 to 250* *NSX400/630.*



Distribution connector for NSX100 to 250.



Polybloc 100/160 A and 250 A distribution blocks.

Bare cables

For bare cables (without lugs), the prefabricated bare-cable connectors may be used for both copper and aluminium cables.

1-cable connectors for Compact NSX100 to 250
The connectors snap directly on to the device terminals or are secured by clips to right-angle and straight terminal extensions as well as spreaders.

1-cable connectors for Compact NSX400 to 630
The connectors are screwed directly to the device terminals.

2-cable connectors for Compact NSX100 to 250 and 400/630
The connectors are screwed to device terminals or right-angle terminal extensions.

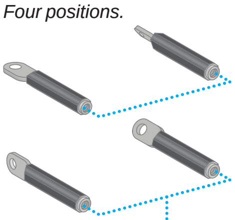
Distribution connectors for Compact NSX100 to 250
These connectors are screwed directly to device terminals. Interphase barriers are supplied with distribution connectors, but may be replaced by long terminal shields.
Each connector can receive six cables with cross-sectional areas ranging from 1.5 to 35 mm² each.

Polybloc distribution block for Compact NSX100 to 630
Polybloc connects directly to device terminals.
It is used to connect up to six or nine flexible or rigid cables with cross-sectional areas not exceeding 10 mm² or 16 mm², to each pole.
Connection is made to spring terminals without screws.

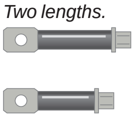
Maximum size of cables depending on the type of connector

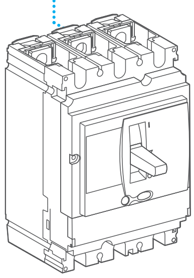
Compact NSX circuit breaker		100/160	250	400	630
Steel connectors	1.5 to 95 mm²	■			
Aluminium connectors	25 to 95 mm²	■	■		
	120 to 185 mm²	■	■		
	2 cables 50 to 120 mm²	■	■		
	2 cables 35 to 240 mm²			■	■
	35 to 300 mm²			■	■
Distribution connectors	6 cables 35 mm²	■	■		
Polybloc distribution blocks	6 or 9 cables 10/16 mm²	■	■		

Four positions.

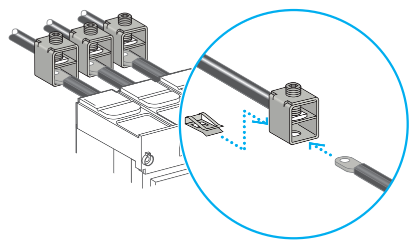


Two lengths.





Rear connection.



Connection of bare cables to NSX100 to 250.

Rear connection

Device mounting on a backplate with suitable holes enables rear connection.

Bars or cables with lugs

Rear connections for bars or cables with lugs are available in two lengths. Bars may be positioned flat, on edge or at 45° angles depending on how the rear connections are positioned.
The rear connections are simply fitted to the device connection terminals. All combinations of rear connection lengths and positions are possible on a given device.

Bare cables

For the connection of bare cables, the 1-cable connectors for Compact NSX100 to 250 may be secured to the rear connections using clips.

Accessories and auxiliaries

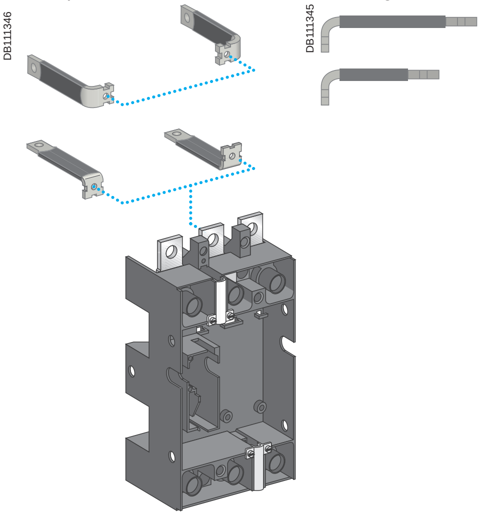
Connection of withdrawable and plug-in devices

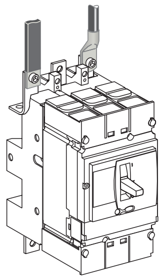
Connection is identical for both withdrawable and plug-in versions. The same accessories as for fixed devices may be used.

Bars or cables with lugs

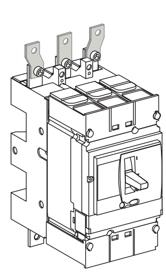
The plug-in base is equipped with terminals which, depending on their orientation, serve for front and rear connection.
For rear connection of a base mounted on a backplate, the terminals must be replaced by insulated, long right-angle terminal extensions.
For Compact NSX630 devices, connection most often requires the 52.5 or 70 mm pitch spreaders.

Four positions. *Two lengths.*

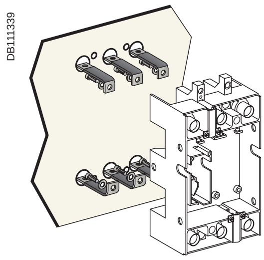




Front connection.



Front connection with spreaders.

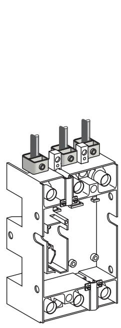


Rear connection of a base mounted on a backplate.

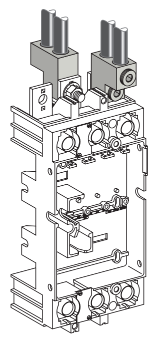
Connection accessories
All accessories for fixed devices (bars, lugs, terminal extensions and spreaders) may be used with the plug-in base (see pages A-70, A-71).

Bare cables

All terminals may be equipped with bare-cable connectors. See the "Connection of fixed devices" section.



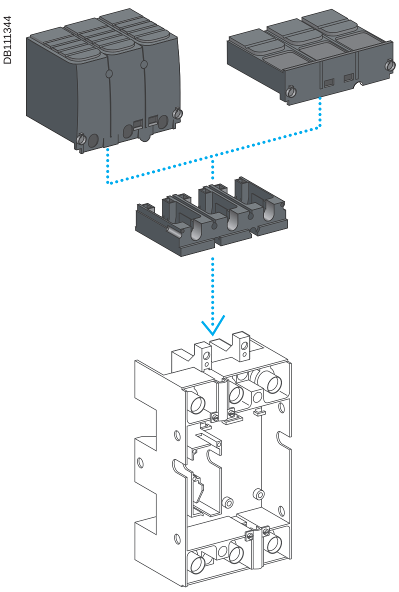
With a 100 to 250 A base.

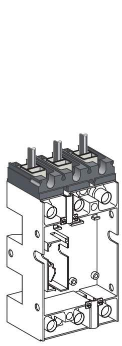


With a 400/630 A base.

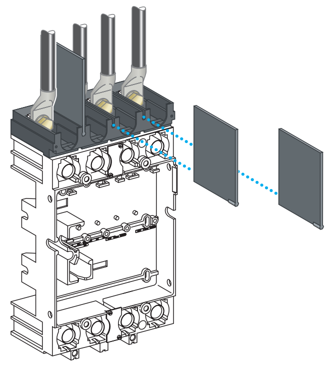
Adapter for plug-in base

The adapter is a plastic component for the 100 to 250 base and the 400/630 base that enables use of all the connection accessories of the fixed device.
It is required for interphase barriers and the long and short terminal shields.





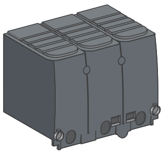
Adapter for 100 to 250 A - 3P base.
Connection with bars or cables with lugs.

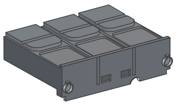


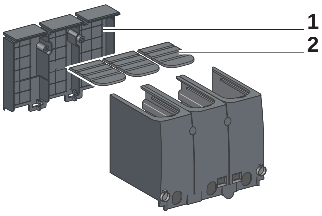
Adapter for 400/630 A - 4P base.
Connection with spreaders and interphase barriers.

Insulation of live parts

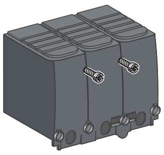
Terminal shields are identical for fixed and plug-in/withdrawable versions and cover all applications up to 1000 V.
They exist for the 100 to 250 A and 400/630 A ratings, in long and short versions.

DB111347

Long terminal shields.

DB111348

Short terminal shields.

DB111349


1 Partially cut removable squares.
2 Grids with break marks.

DB111355

Assembled with captive screws.

Terminal shields

Insulating accessories used for protection against direct contact with power circuits.
They provide IP40 degree of protection and IK07 mechanical impact protection.

Terminal-shield types

Compact NSX100 to 250 and NSX400/630 3P or 4P can be equipped with:
- short terminal shields
- long terminal shields.

All terminal shields have holes or knock-outs in front for voltage-presence indicators.

Short terminal shields

They are used with:
- plug-in and withdrawable versions in all connection configurations
- fixed versions with rear connection.

Long terminal shields

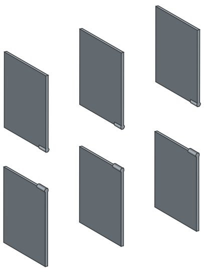
They are used for front connection with cables or insulated bars.
They comprise two parts assembled with captive screws, forming an IP40 cover.
- The top part is equipped with sliding grids with break marks for precise adaptation to cables or insulated bars.
- The rear part completely blocks off the connection zone. Partially cut squares can be removed to adapt to all types of connection for cables with lugs or copper bars.

Long terminal shields may be mounted upstream and downstream of:
- fixed devices
- the base of plug-in and withdrawable versions, thus completing the insulation provided by the mandatory short terminal shields on the device
- the one-piece spreader for NSX100 to 250
- the 52.5 mm spreaders for NSX400/630.

Terminal shields and pitch

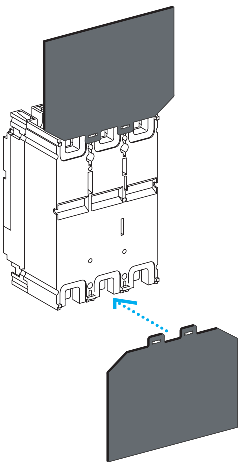
Combination possibilities are shown below.

Circuit breaker	NSX100/160/250	NSX400/630	
Short terminal shields			
Pitch (mm)	35	45	
Long terminal shields			
Pitch (mm)	35	45	52.5

DB111356

Interphase barriers.

Interphase barriers

Safety accessories for maximum insulation at the power-connection points:
- they clip easily onto the circuit breaker
- single version for fixed devices and adapters on plug-in bases
- not compatible with terminal shields
- the adapter for the plug-in base is required for mounting on plug-in and withdrawable versions.

DB111357

Rear insulating screens.

Rear insulating screens

Safety accessories providing insulation at the rear of the device.
Their use is mandatory for devices with spreaders, installed on backplates, when terminal shields are not used.
The available screen dimensions are shown below.

Circuit breaker		NSX100/160/250	NSX400/630
3P	W x H x thickness (mm)	140 x 105 x 1	203 x 175 x 1.5
4P	W x H x thickness (mm)	175 x 105 x 1	275 x 175 x 1.5

Accessories and auxiliaries
Selection of auxiliaries for Compact NSX100/160/250

Standard
All Compact NSX100/160/250 circuit breakers and switch-disconnectors have slots for the electrical auxiliaries listed below.

5 indication contacts (see page A-80)
- 2 ON/OFF (OF1 and OF2)
- 1 trip indication (SD)
- 1 fault-trip indication (SDE)
- 1 earth-fault indication (SDV), when the device is equipped with a Vigi module.

1 remote-tripping release (see page A-83)
- either 1 MN undervoltage release
- or 1 MX shunt release.

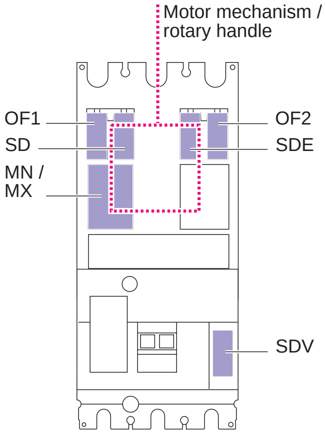
Remote indications
Circuit breakers equipped with Micrologic trip units may be equipped with a fault-trip indication to identify the type of fault by installing:

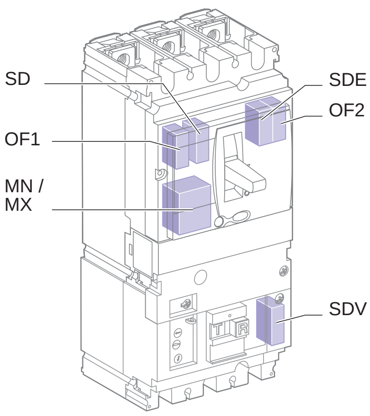
1 indication module with two outputs (see page A-81)
- either an SDx module with Micrologic 2.2 / 5.2 A or E / 6.2 A or E
- or an SDTAM module with Micrologic 2.2 M or 6-2 E-M (motor protection).

This module occupies the slots of one OF contact and an MN/MX release.

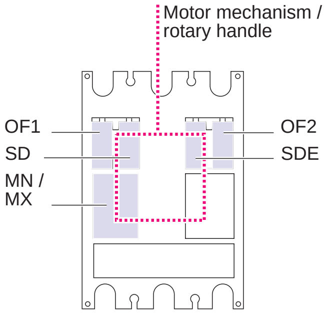
All these auxiliaries may be installed with a motor mechanism or a rotary handle.
The following table indicates auxiliary possibilities depending on the type of trip unit.

NA, TMD, TMG, MA
Standard



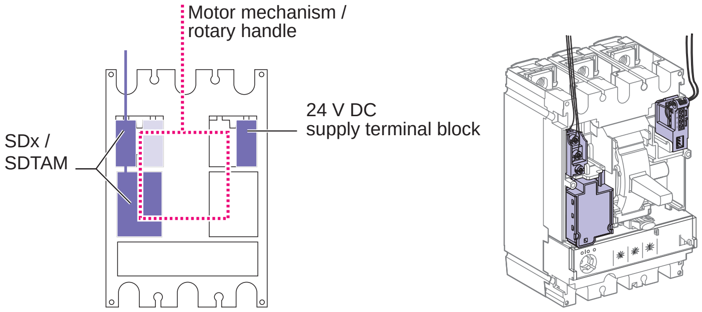


Micrologic 2 / 5 / 6
Standard



or

Remote indications via SDx or SDTAM



The SDx or SDTAM uses the OF1 and MN/MX slots.
External connection is made via a terminal block in the OF1 slot.
The 24 V DC supply provides for the Micrologic 5 / 6 display when the device is OFF or under low-load conditions.

Communication

Communication requires specific auxiliaries (see page A-26).

Communication of status indications

- 1 BSCM module.
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM.

Communication of status conditions is compatible with a standard motor mechanism and a rotary handle.

Communication of status indications and controls

This requires, in addition to the previous auxiliaries:

- 1 communicating motor mechanism connected to the BSCM.

Communication of measurements

Available on Micrologic 5 / 6, the system consists of:

- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the Micrologic.

Communication of measurements is compatible with a standard or communicating motor mechanism and a rotary handle.

Communication of status indications, controls and measurements

Available on Micrologic 5 / 6, the system consists of:

- 1 BSCM module
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM and the Micrologic
- 1 communicating motor mechanism connected to the BSCM.

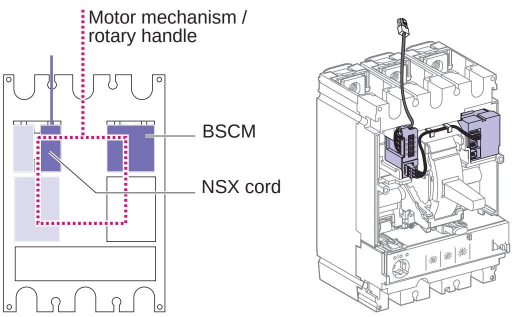
Installation of SDx or SDTAM is compatible with communication.

The following table indicates auxiliary possibilities depending on the type of trip unit.

NA, TMD, TMG, MA, Micrologic 2

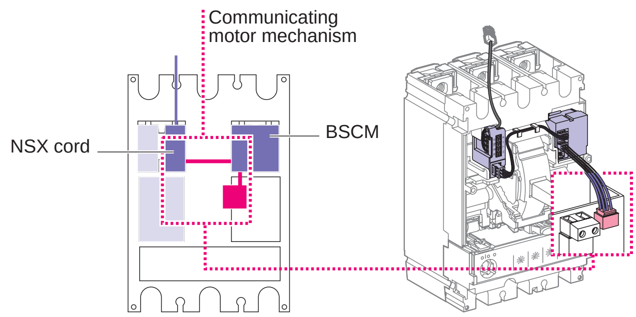
Communication of status indications	Communication of status indications and controls

DB115586



or

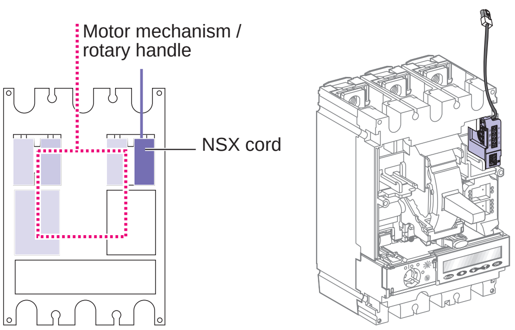
DB115587



Micrologic 5 / 6

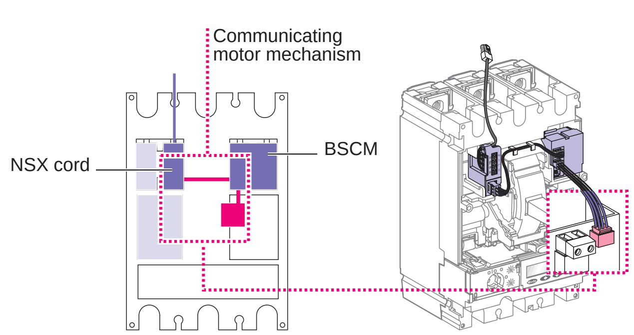
Communication of measurements with or without FDM121 display	Communication of status indications, controls and measurements with or without FDM121 display

DB115588



or

DB115589



Accessories and auxiliaries

Selection of auxiliaries for Compact NSX400/630

Standard

All Compact NSX400/630 circuit breakers and switch-disconnectors have slots for the electrical auxiliaries listed below.

7 indication contacts (see page A-80)

- 4 ON/OFF (OF1, OF2, OF3, OF4)
- 1 trip indication (SD)
- 1 fault-trip indication (SDE)
- 1 earth-fault indication (SDV), when the device is equipped with a Vigi module.

1 remote-tripping release (see page A-83)

- either 1 MN undervoltage release
- or 1 MX shunt release.

Remote indications

Circuit breakers equipped with Micrologic trip units may be equipped with a fault-trip indication to identify the type of fault by installing:

1 indication module with two outputs (see page A-81)

- either an SDx module with Micrologic 2.2 / 5.2 A or E / 6.2 A or E
- or an SDTAM module with Micrologic 2.2 M or 6-2 E-M (motor protection).

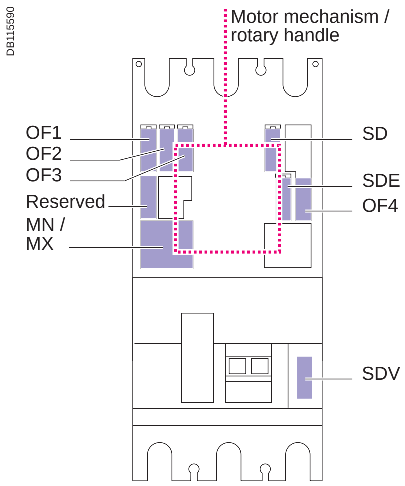
This module occupies the slots of an MN/MX release.

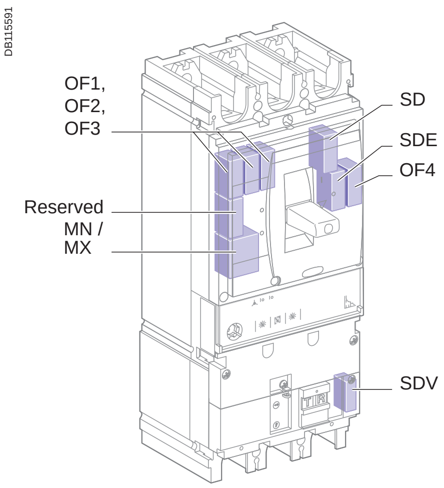
All these auxiliaries may be installed with a motor mechanism or a rotary handle.

The following table indicates auxiliary possibilities depending on the type of trip unit.

NA, Micrologic 1.3 M

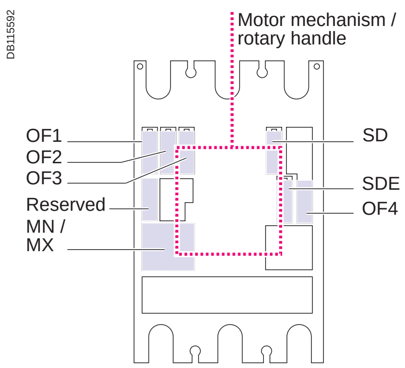
Standard



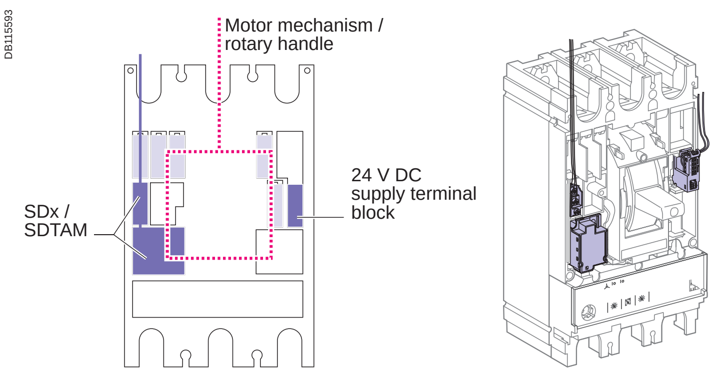


Micrologic 2 / 5 / 6

Standard



or



The SDx or SDTAM uses the reserved slot and the MN/MX slots.
External connection is made via a terminal block in the reserved slot.
The 24 V DC supply provides for the Micrologic 5 / 6 display when the device is OFF or under low-load conditions.

Communication

Communication requires specific auxiliaries (see page A-26).

Communication of status indications

■ 1 BSCM module
■ 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM.

Communication of status conditions is compatible with a standard motor mechanism and a rotary handle.

Communication of status indications and controls

This requires, in addition to the previous auxiliaries:
■ 1 communicating motor mechanism connected to the BSCM.

Communication of measurements

Available on Micrologic 5 / 6, the system consists of:
■ 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the Micrologic.

Communication of measurements is compatible with a standard or communicating motor mechanism and a rotary handle.

Communication of status indications, controls and measurements

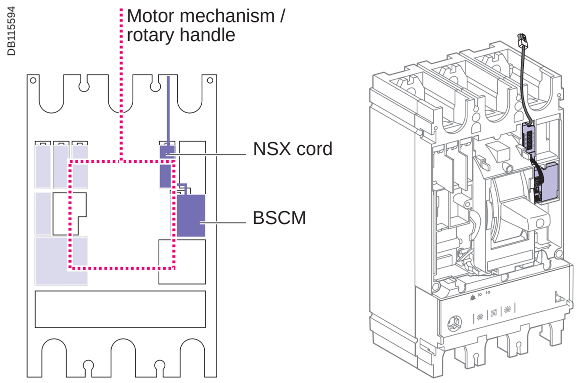
Available on Micrologic 5 / 6, the system consists of:
■ 1 BSCM module
■ 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM and the Micrologic
■ 1 communicating motor mechanism connected to the BSCM.

Installation of SDx or SDTAM is compatible with communication.

The following table indicates auxiliary possibilities depending on the type of trip unit.

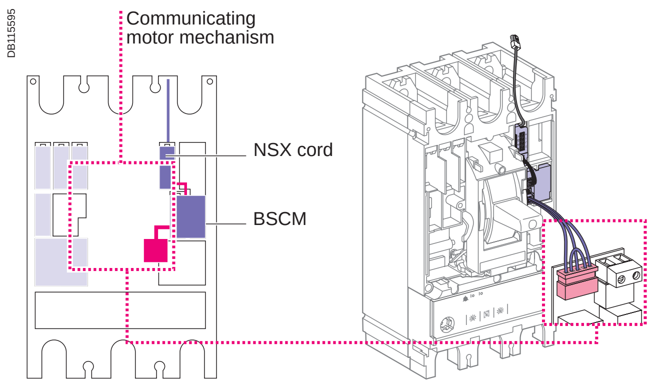
NA, Micrologic 1.3 M, Micrologic 2

Communication of status indications



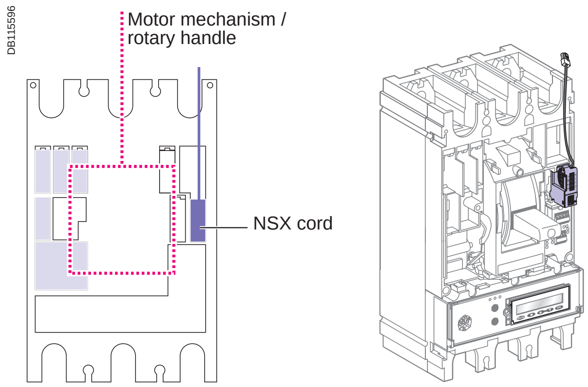
or

Communication of status indications and controls



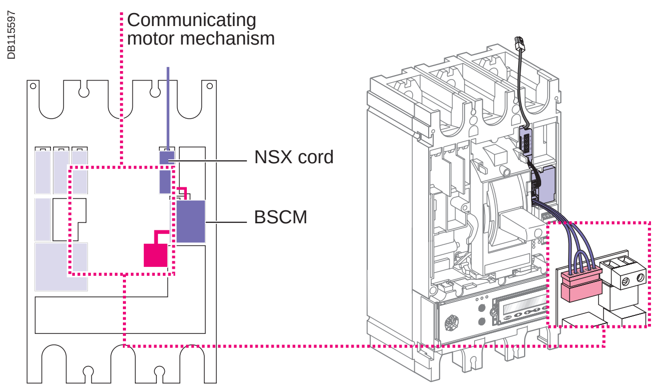
Micrologic 5 / 6

Communication of status indications

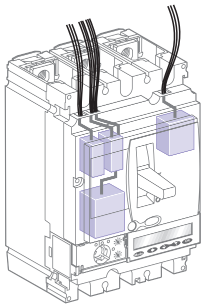


or

Communication of status indications, controls and measurements with or without FDM121 display

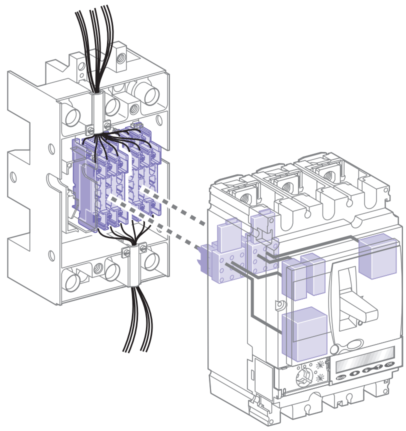


Accessories and auxiliaries
Connection of electrical auxiliaries



Fixed Compact NSX.

Fixed Compact NSX
Auxiliary circuits exit the device through a knock-out in the front cover.



Plug-in/withdrawable Compact NSX.

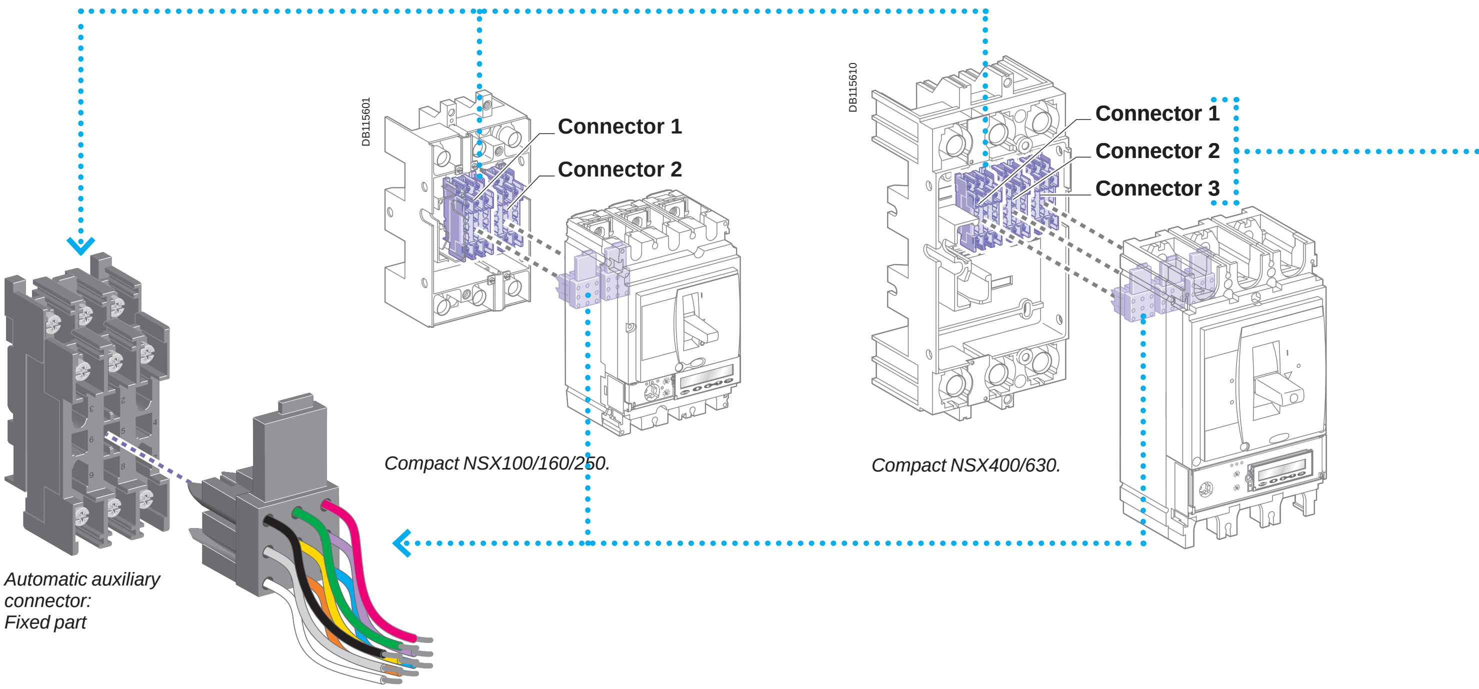
Withdrawable or plug-in Compact NSX

Automatic auxiliary connectors
Auxiliary circuits exit the circuit breaker via one to three automatic auxiliary connectors (nine wires each). These are made up of:

- a moving part, connected to the circuit breaker via a support (one support per circuit breaker)
- a fixed part, mounted on the plug-in base, equipped with connectors for bare cables up to 2.5 mm².

Micrologic trip unit options are also wired via the automatic auxiliary connectors.

Selection of automatic auxiliary connectors
Depending on the functions installed, one to three automatic auxiliary connectors are required.



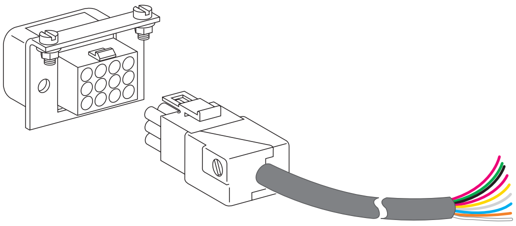
Automatic auxiliary connector: Fixed part

Moving part

Compact NSX100/160/250.

Compact NSX400/630.

DB111379



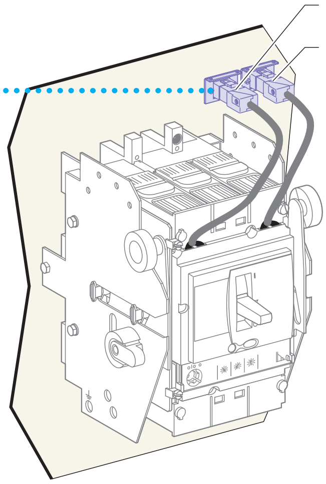
Nine-wire manual auxiliary connector.

Withdrawable Compact NSX

Manual auxiliary connectors

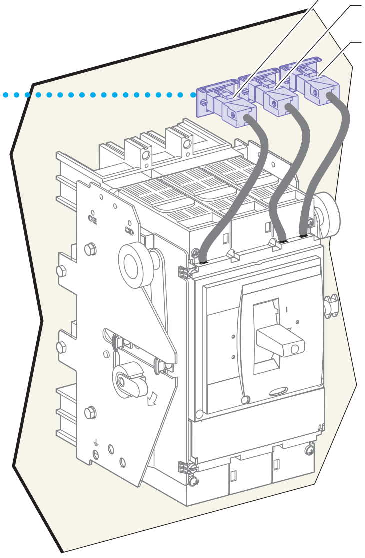
As an option to the automatic auxiliary connectors, withdrawable circuit breakers may be equipped with one to three plugs with nine wires each. In "disconnected" position, the auxiliaries remain connected.
They can then be tested by operating the device.

DB115602



Compact NSX100/160/250.

DB115611



Compact NSX400/630.

Each auxiliary is equipped with a terminal block with numbered terminals for connection of wires up to:
- 1.5 mm² for auxiliary contacts and voltage releases
- 2.5 mm² for the motor-mechanism module.

Circuit breaker	Connector 1	Connector 2	Connector 3
	OF1 MN/MX or SDx/ SDTAM SD	OF2/SDV / ZSI out (1) SDE NSX cord MT MTc 24 V DC	OF3 OF4 ZSI in ZSI out
NSX100/160/250	■	■	-
NSX400/630	■	■	■

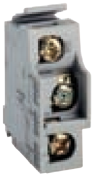
(1) Only for NSX100 to 250.
***MT**: motor mechanism.*
***MTc**: communicating motor mechanism.*

Accessories and auxiliaries

Indication contacts

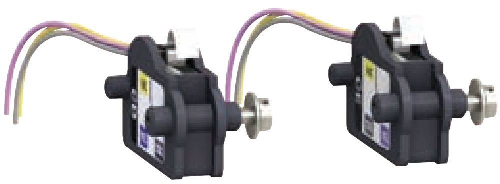
One contact model provides circuit-breaker status indications (OF - SD - SDE - SDV).
An early-make or early-break contact, in conjunction with a rotary handle, can be used to anticipate device opening or closing.
A CE / CD contact indicates that the chassis is connected / disconnected.

DB125549



Indication contacts.

PB103706



CE/CD carriage switches.

These common-point changeover contacts provide remote circuit-breaker status information.
They can be used for indications, electrical locking, relaying, etc.
They comply with the IEC 60947-5 international recommendation.

Functions

Breaker-status indications, during normal operation or after a fault
A single type of contact provides all the different indication functions:
■ OF (ON/OFF) indicates the position of the circuit breaker contacts
■ SD (trip indication) indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth fault (Vigi) or a ground fault (Micrologic 6)
□ operation of a voltage release
□ operation of the "push to trip" button
□ disconnection when the device is ON.
The SD contact returns to de-energised state when the circuit breaker is reset.
■ SDE (fault-trip indication) indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth fault (Vigi) or a ground fault (Micrologic 6).
The SD contact returns to de-energised state when the circuit breaker is reset.
■ SDV indicates that the circuit breaker has tripped due to an earth fault. It returns to de-energised state when the Vigi module is reset.
All the above auxiliary contacts are also available in "low-level" versions capable of switching very low loads (e.g. for the control of PLCs or electronic circuits).

Rotary-handle position contact for early-make or early-break functions
■ CAM (early-make or early-break function) contacts indicate the position of the rotary handle.
They are used in particular for advanced opening of safety trip devices (early break) or to energise a control device prior to circuit-breaker closing (early make).

Chassis-position contacts
■ CE/CD (connected/disconnected) contacts are microswitch-type carriage switches for withdrawable circuit breakers.

Installation

■ OF, SD, SDE and SDV functions: a single type of contact provides all these different indication functions, depending on where it is inserted in the device. The contacts clip into slots behind the front cover of the circuit breaker (or the Vigi module for the SDV function).
The SDE function on a Compact NSX100 - 250 A equipped with a magnetic, thermal-magnetic or Micrologic 2 trip unit requires the SDE actuator.
■ CAM function: the contact fits into the rotary-handle unit (direct or extended).
■ CE/CD function: the contacts clip into the fixed part of the chassis.

Electrical characteristics of auxiliary contacts

Contacts			Standard				Low level			
Types of contacts			**All**				**OF, SD, SDE, SDV**			
Rated thermal current (A)			6				5			
Minimum load			100 mA at 24 V DC				1 mA at 4 V DC			
Utilisation cat. (IEC 60947-5-1)			AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational current (A)	24 V	AC/DC	6	6	6	1	5	3	5	1
	48 V	AC/DC	6	6	2.5	0.2	5	3	2.5	0.2
	110 V	AC/DC	6	5	0.6	0.05	5	2.5	0.6	0.05
	220/240 V	AC	6	4	-	-	5	2	-	-
	250 V	DC	-	-	0.3	0.03	5	-	0.3	0.03
	380/440 V	AC	6	2	-	-	5	1.5	-	-
	480 V	AC	6	1.5	-	-	5	1	-	-
	660/690 V	AC	6	0.1	-	-	-	-	-	-

SDx and SDTAM modules for Micrologic

SDx and SDTAM are relay modules with two static outputs. They send different signals depending on the type of fault. They may not be used together.

PB103377-20

SDx relay module with its terminal block.

PB103376-20

SDTAM relay module with its terminal block.

SDx module

The SDx module remotes the trip or alarm conditions of Compact NSX circuit breakers equipped with electronic protection.
The SD2 output, available on all Micrologic trip units, corresponds to the overload-trip indication.
The SD4 output, available on Micrologic 5 / 6, is assigned to:
- overload pre-alarm (Micrologic 5)
- ground-fault trip indication (Micrologic 6).

These two outputs automatically reset when the device is closed (turned ON).
For Micrologic 5 / 6, the SD2 and SD4 outputs can be reprogrammed to be assigned to other types of tripping or alarm.

Output characteristics
It is possible to assign a function:
- latching with a time delay. Return to the initial state occurs at the end of the time delay
- permanent latching. In this case, return to the initial state takes place via the communication function.

Static outputs: 24 to 415 V AC / V DC; 80 mA max.

SDTAM module

The SDTAM module is specifically for the motor-protection Micrologic trip units 2.2 M, 2.3 M and 6.2 E-M, 6.3 E-M.
The SDTAM module, linked to the contactor controller, opens the contactor when an overload or other motor fault occurs, thus avoiding opening of the circuit breaker.

Micrologic 2 M
The SD4 output opens the contactor 400 ms before normal circuit-breaker opening in the following cases:
- overload (long-time protection for the trip class)
- phase unbalance or phase loss.

The SD2 output serves to memorise contactor opening by SDTAM.

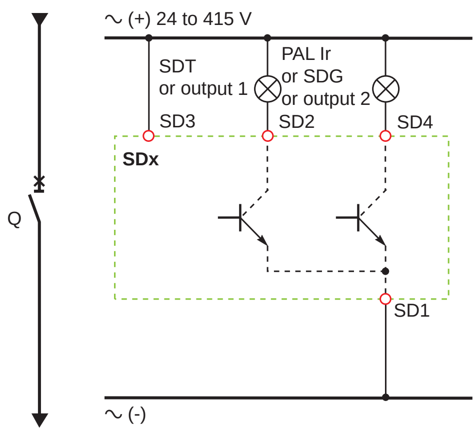
Micrologic 6 E-M
The SD4 output opens the contactor 400 ms before normal circuit-breaker opening in the following cases:
- overload (long-time protection for the trip class)
- phase unbalance or phase loss
- locked rotor
- underload (undercurrent protection)
- long start.

The SD2 output serves to memorise contactor opening by SDTAM.

Output characteristics
Output reset can be:
- manual by a pushbutton included in the wiring diagram
- automatic after an adjustable time delay (1 to 15 minutes) to take into account the motor-cooling time.

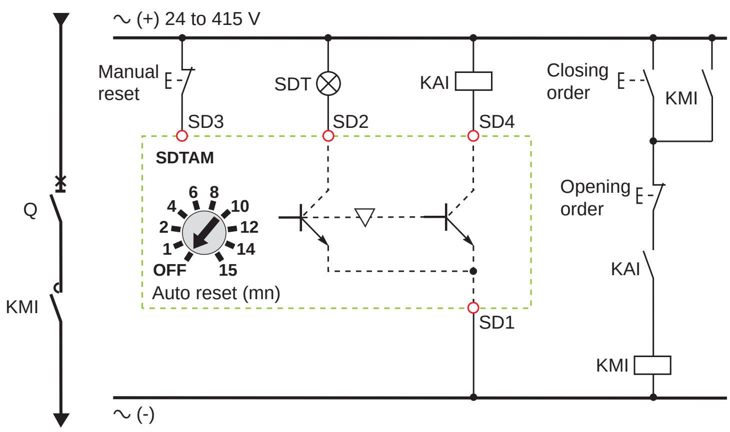
Static outputs: 24 to 415 V AC / V DC; 80 mA max.

DB115603



SDx wiring diagram.

DB115604



SDTAM wiring diagram with contactor control.

Accessories and auxiliaries

Motor mechanism

PB103372-30

Compact NSX250 with motor mechanism.

When equipped with a **motor-mechanism** module, Compact NSX circuit breakers feature very high mechanical endurance as well as easy and sure operation:
■ all circuit-breaker indications and information remain visible and accessible, including trip-unit settings and indications
■ suitability for isolation is maintained and padlocking remains possible
■ double insulation of the front face.
A specific motor mechanism is required for operation via the communication function. This **communicating motor mechanism** must be connected to the BSCM module to receive the opening and closing orders. Operation is identical to that of a standard motor mechanism.

Applications

■ Local motor-driven operation, centralised operation, automatic distribution control.
■ Normal/standby source changeover or switching to a replacement source to ensure availability or optimise energy costs.
■ Load shedding and reconnection.
■ Synchrocoupling.

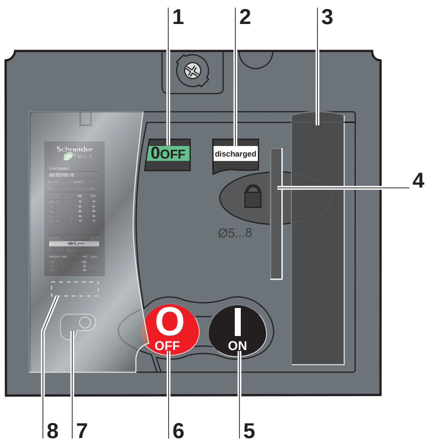
Operation

The type of operation is selected using the manual/auto mode selection switch (**7**).
A transparent, lead-seal cover controls access to the switch.

Automatic
When the switch is in the "auto" position, the ON/OFF (I/O) buttons and the charging lever on the mechanism are locked.
■ Circuit-breaker ON and OFF controlled by two impulse-type or maintained signals.
■ Automatic spring charging following voluntary tripping (by MN or MX), with standard wiring.
■ Mandatory manual reset following tripping due to an electrical fault.

Manual
When the switch is in the "manual" position, the ON/OFF (I/O) buttons may be used.
A microswitch linked to the manual position can remote the information.
■ Circuit-breaker ON and OFF controlled by 2 pushbuttons I/O.
■ Recharging of stored-energy system by pumping the lever 8 times.
■ Padlocking in OFF position.

DB111335



1 *Position indicator (positive contact indication)*
2 *Spring status indicator (charged, discharged)*
3 *Manual spring-charging lever*
4 *Keylock device (optional)*
Locking device (OFF position), using 1 to 3 padlocks, shackle diameter 5 to 8 mm, not supplied
5 *I (ON) pushbutton*
6 *O (OFF) pushbutton*
7 *Manual/auto mode selection switch. The position of this switch can be indicated remotely.*
8 *Operation counter (Compact NSX400/630)*

Installation and connections

All installation (fixed, plug-in/withdrawable) and connection possibilities are maintained.
Motor-mechanism module connections are made behind its front cover to integrated terminals, for cables up to 2.5 mm².

Optional accessories

■ Keylock for locking in OFF position.
■ Operations counter for the Compact NSX400/630, indicating the number of ON/OFF cycles. Must be installed on the front of the motor-mechanism module.

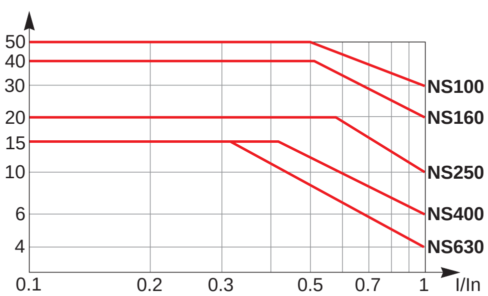
Characteristics

Motor mechanism			MT100 to MT630
Response time (ms)	opening		< 600
	closing		< 80
Operating frequency	cycles/minute max.		4
Control voltage (V)	DC		24/30 - 48/60 - 110/130 - 250
	AC 50/60 Hz		48 (50 Hz) - 110/130 - 220/240 - 380/440
Consumption (1)	DC (W)	opening	⩽ 500
		closing	⩽ 500
	AC (VA)	opening	⩽ 500
		closing	⩽ 500

(1) For NSX100 to NSX250, the inrush current is 2 In for 10 ms.

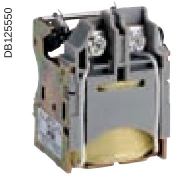
Electrical endurance

DB115690

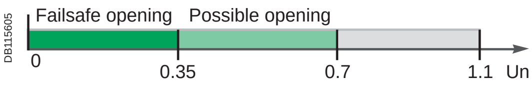


Circuit breaker + motor-mechanism module, in thousands of operations (IEC 60947 2), at 440 V.

Remote tripping



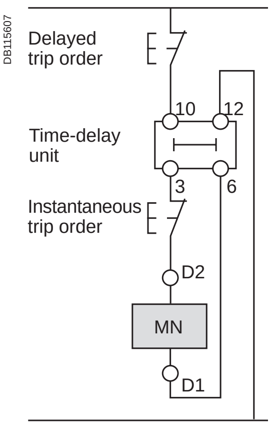
MX or MN voltage release.



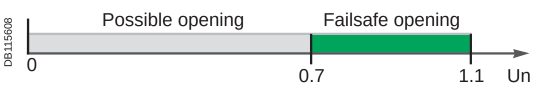
Opening conditions of the MN release.

Closing conditions of the MN release.

MN release with a time-delay unit.



Wiring diagram for emergency-off function with MN + time-delay unit.



Opening conditions of the MX release.

__Note__: circuit breaker opening using an MN or MX release must be reserved for safety functions. This type of tripping increases wear on the opening mechanism. Repeated use reduces the mechanical endurance of the circuit breaker by 50 %.

MX or MN voltage releases are used to trip the circuit breaker. They serve primarily for remote, emergency-off commands.
It is advised to test the system every six months.

MN undervoltage release

The MN release opens the circuit breaker when its supply voltage drops to a value below 35% of its rated voltage Un.
Undervoltage tripping, combined with an emergency-off button, provides fail-safe tripping. The MN release is continuously supplied, i.e. if supply is interrupted:
- either voluntarily, by the emergency-off button,
- or accidentally, through loss of power or faulty wiring,

the release provokes opening of the circuit breaker.

Opening conditions

Circuit-breaker tripping by an MN release meets the requirements of standard IEC 60947-2.
- Automatic opening of the circuit breaker is ensured when the continuous voltage supply to the release U ⩽ 0.35 x Un.
- If the supply voltage is between 0.35 and 0.7 Un, opening is possible, but not guaranteed. Above 0.7 Un, opening does not take place.

Closing conditions

If there is no supply to the MN release, it is impossible to close the circuit breaker, either manually or electrically. Closing is ensured when the voltage supply to the release U ⩾ 0.85 x Un. Below this threshold, closing is not guaranteed.

Characteristics

Power supply	V AC	50/60 Hz: 24 - 48 - 100/130 - 200/240
		50 Hz: 380/415 60 Hz: 208/277
	V DC	12 - 24 - 30 - 48 - 60 - 125 -250
Operating threshold	Opening	0.35 to 0.7 Un
	Closing	0.85 Un
Operating range		0.85 to 1.1 Un
Consumption (VA or W)		Pick-up: 30 - Hold: 5
Response time (ms)		50

Time-delay unit for an MN release

A time delay unit for the MN release eliminates the risk of nuisance tripping due to a transient voltage dip lasting ⩽ 200 ms. For shorter micro-outages, a system of capacitors provides temporary supply to the MN at U > 0.7 to ensure non tripping.
The correspondence between MN releases and time-delay units is shown below.

Power supply	Corresponding MN release
Unit with fixed delay 200 ms	
48 V AC	48 V DC
220 / 240 V AC	250 V DC
Unit with adjustable delay ⩽ 200 ms	
48 - 60 V AC/DC	48 V DC
100 - 130 V AC/DC	125 V DC
220 - 250 V AC/DC	250 V DC

MX shunt release

The MX release opens the circuit breaker via an impulse-type (⩾ 20 ms) or maintained order.

Opening conditions

When the MX release is supplied, it automatically opens the circuit breaker. Opening is ensured for a voltage U ⩾ 0.7 x Un.

Characteristics

Power supply	V AC	50/60 Hz: 24 - 48 - 100/130 - 200/240
		50 Hz: 380/415 60 Hz: 208/277
	V DC	12 - 24 - 30 - 48 - 60 - 125 -250
Operating range		0.7 to 1.1 Un
Consumption (VA or W)		Pick-up: 30
Response time (ms)		50

Circuit breaker control by MN or MX

When the circuit breaker has been tripped by an MN or MX release, it must be reset before it can be reclosed.
MN or MX tripping takes priority over manual closing.
In the presence of a standing trip order, closing of the contacts, even temporary, is not possible.
Connection using wires up to 1.5 mm² to integrated terminal blocks.

Functions
and characteristics

Accessories and auxiliaries

Rotary handles

There are two types of rotary handle:
- direct rotary handle
- extended rotary handle.

There are two models:
- standard with a black handle
- red handle and yellow front for machine-tool control.

PB103585-40

Compact NSX with a rotary handle.

PB103607-50

Compact NSX with an MCC rotary handle.

PB103608-50

Compact NSX with a CNOMO machine-tool rotary handle.

PB103586-50

Compact NSX with an extended rotary handle installed at the back of a switchboard, with the keylock option and key.

Direct rotary handle

Standard handle

Degree of protection IP40, IK07.
The direct rotary handle maintains:
- visibility of and access to trip-unit settings
- suitability for isolation
- indication of the three positions O (OFF), I (ON) and tripped
- access to the "push to trip" button.

Device locking
The rotary handle facilitates circuit-breaker locking.
- Padlocking:
  - standard situation, in the OFF position, using 1 to 3 padlocks, shackle diameter 5 to 8 mm, not supplied
  - with a simple modification, in the ON and OFF positions. Locking in the ON position does not prevent free circuit-breaker tripping if a fault occurs. In this case, the handle remains the ON position after the circuit breaker tripping. Unlocking is required to go to the tripped then the OFF position.
- Keylock (and padlock)

It is possible to install a Ronis or Profalux keylock (optional) on the base of the handle to obtain the same functions as with a padlock.

Early-make or early-break contacts (optional)
Early-make and/or early-break contacts may be used with the rotary handle. It is thus possible to:
- supply an MN undervoltage release before the circuit breaker closes
- open the contactor control circuit before the circuit breaker opens.

MCC switchboard control

Control of an MCC switchboard is achieved by adding a kit to the standard handle. In addition to the standard functions, the kit offers the characteristics listed below.

Higher degree of protection IP
Degree of protection IP43, IK07.
The IP is increased by a built-in gasket.

Door locking depending on device position
- The door cannot be opened if the circuit breaker is ON or in the tripped position.

For exceptional situations, door locking can be temporarily disabled with a tool to open the door when the circuit breaker is closed. This operation is not possible if the handle is locked by a padlock.
- Circuit-breaker closing is disabled if the door is open. This function can be deactivated.

Machine-tool control in compliance with CNOMO

Control of a machine-tool is achieved by adding a kit to the standard handle. In addition to the standard functions, the kit offers the characteristics listed below.

Enhanced waterproofness and mechanical protection
- Degree of protection IP54, IK08.
- Compliance with CNOMO E03.81.501N.

Extended rotary handle

Degree of protection IP56, IK08.
The extended rotary handle makes it possible to operate circuit breakers installed at the back of switchboards, from the switchboard front.
It maintains:
- visibility of and access to trip-unit settings
- suitability for isolation
- indication of the three positions O (OFF), I (ON) and tripped.

Mechanical door locking when device closed
A standard feature of the extended rotary handle is a locking function, built into the shaft, that disables door opening when the circuit breaker is in the ON or tripped positions.
Door locking can be temporarily disabled with a tool to open the door without opening the circuit breaker. This operation is not possible if the handle is locked by a padlock.

Voluntary disabling of mechanical door locking
A modification to the handle, that can be carried out on site, completely disables door locking, including when a padlock is installed on the handle. The modification is reversible.
When a number of extended rotary handles are installed on a door, this disabling function is the means to ensure door locking by a single device.

PB103618-56

Extended rotary handle (cont.)

Device and door padlocking

Padlocking locks the circuit-breaker handle and disables door opening:

■ standard situation, in the OFF position, using 1 to 3 padlocks, shackle diameter 5 to 8 mm, not supplied

■ with a simple modification, in the ON and OFF positions. Locking in the ON position does not prevent free circuit-breaker tripping if a fault occurs.

In this case, the handle remains in the ON position after the circuit breaker tripping. Unlocking is required to go to the tripped then the OFF position.

If the door controls were modified to voluntarily disable door locking, padlocking does not lock the door, but does disable handle operation of the device.

Device locking using a keylock inside the switchboard

It is possible to install a Ronis or Profalux keylock (optional) on the base of the rotary handle to lock the device in the OFF position or in either the ON or OFF positions.

Accessory for device operation with the door open

When the device is equipped with an extended rotary handle, a control accessory mounted on the shaft makes it possible to operate the device with the door open.

■ The device can be padlocked in the OFF position.

■ The accessory complies with UL508.

Early-make or early-break contacts (optional)

The extended rotary handle offers the same possibilities with early-make and/or early-break contacts as the standard rotary handle.

Parts of the extended rotary handles

■ A unit that replaces the front cover of the circuit breaker (secured by screws).

■ An assembly (handle and front plate) on the door that is always secured in the same position, whether the circuit breaker is installed vertically or horizontally.

■ An extension shaft that must be adjusted to the distance. The min/max distance between the back of circuit breaker and door is:

□ 185…600 mm for Compact NSX100 to 250

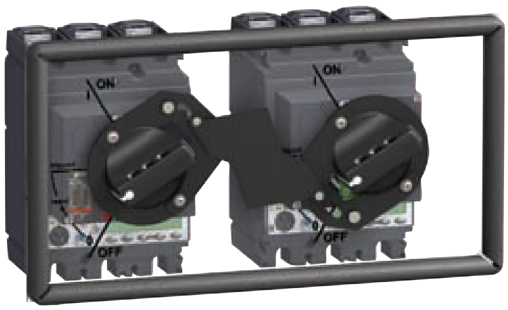
□ 209…600 mm for Compact NS400/630.

For withdrawable devices, the extended rotary handle is also available with a telescopic shaft to compensate for device disconnection. In this case, the min/max distances are:

□ 248…600 mm for Compact NSX100 to 250

□ 272...600 mm for Compact NS400/630.

PB103588-68



Manual source-changeover systems

An additional accessory interlocks two devices with rotary handles to create a source-changeover system. Closing of one device is possible only if the second is open.

This function is compatible with direct or extended rotary handles.

Up to three padlocks can be used to lock in the OFF or ON position.

Accessories and auxiliaries

Additional measurement and indication modules

PB103795-36

Voltage-presence indicator.

Voltage-presence indicator

The indicator detects and indicates that circuit breaker terminals are supplied with power.

Installation

- Mounted in the long or short terminal shields, via the knockouts.
- May be positioned upstream or downstream of the circuit breaker.
- Degree of protection IP40, IK04.
- Not compatible with the motor-mechanism module.

Electrical characteristics

Operates on all networks with voltages ranging from 220 to 550 V AC.

PB103600-32

Compact NSX with current-transformer module.

Current-transformer module

This module enables direct connection of a measurement device such as an ammeter or a power meter.

Installation

- The module is installed directly on the downstream circuit-breaker terminals.
- Degree of protection IP40, IK04.
- Class II insulation between front and the power circuits.
- Connection to 6 integrated connectors for cables up to 2.5 mm².

Electrical characteristics

- Current transformer with 5 A secondary winding.
- Class 3 for the following output-power consumptions:

Accuracy:

- □ 100 A rating: 1.6 VA
- □ 150 A rating: 3 VA
- □ 250 A rating: 5 VA
- □ 400/600 A rating: 8 VA.

Current-transformer module with voltage measurement outputs

This module enables direct connection of a digital measurement device such as a Power Meter PM700, PM800, etc. (not supplied).

Installation

- The module is installed directly on the downstream circuit-breaker terminals.
- Degree of protection IP40, IK04.
- Class II insulation between front and the power circuits.
- Built-in connectors for cables from 1.5 to 2.5 mm².

Electrical characteristics

- Rated operational voltage Ue: 530 V
- Frequencies of measured values: 50...60 Hz
- Three CTs with 5 A secondary windings for the rated primary current In:
- □ class 0.5 to 1 for rated power consumption values at the output:
  - 125 A, 150 A and 250 A ratings: class 1 for 1.1 VA
  - 400/600 A rating: class 0.5 for 2 VA
- □ Connection using a 2.5 mm2 cable up to 2.5 m long.
- Four voltage measurement outputs including protection with automatic reset.
- □ voltage measurement output impedance 3500 Ω ±25 %, maximum current 1 mA
- □ The voltage measurement outputs are intended only for measurements (1 mA max.) and may not be used to supply the display.

PB103601-32

Compact NSX with ammeter module.

Ammeter and Imax ammeter modules

Ammeter module

Measures and displays (dial-type ammeter) the current of each phase (selection of phases by 3-position switch in front).

Imax ammeter module

Measures and displays (dial-type ammeter) the maximum current flowing in the middle phase. The Imax value can be reset on the front.

Installation

- Identical for both types of ammeter module.
- The module is installed directly on the downstream circuit-breaker terminals.
- The ammeter clips into the module in any of four 90° positions, i.e. it can be installed of devices mounted both vertically and horizontally.
- Degree of protection IP40, IK04.
- Class II insulation between front and the power circuits.

Electrical characteristics

- Ammeter module: accuracy class 4.5
- Imax ammeter module: accuracy ±6 %
- Maximum currents are displayed only if they last ⩾ 15 minutes.

PB103602-32

Insulation monitoring module.

Insulation monitoring module

This module detects and indicates an insulation drop on a load circuit (TN-S or TT systems).
Operation is identical to that of a Vigi module, but without circuit-breaker tripping. Indication by a red LED in front.
An auxiliary contact may be installed for remote insulation-drop indications.
When insulation drops below a minimum, user-set threshold, the LED goes on and the auxiliary contact switches. The fault indication cannot be cancelled except by pressing the manual reset button.

Installation

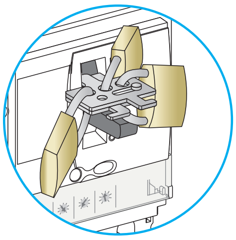
- The module is installed directly on the downstream circuit-breaker terminals.
- Degree of protection IP40, IK04.
- Double insulation of the front face.

Electrical characteristics

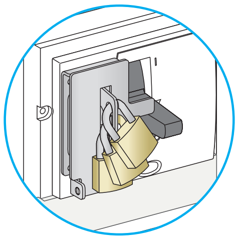
- Settings: 100 - 200 - 500 - 1000 mA
- Accuracy: -50 +0 %
- Time delay following insulation drop: 5 to 10 seconds
- AC-system voltage: 200 to 440 V AC.

Accessories and auxiliaries
Locks

DB111364

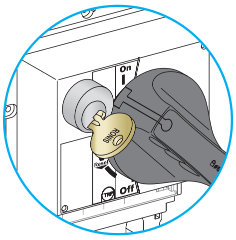


DB111365



Toggle locking using padlocks and an accessory:
Removable device — *Fixed device attached to the case.*

DB111363



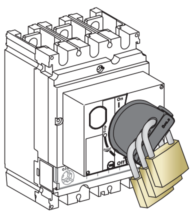
Rotary-handle locking using a keylock.

Locking in the OFF position guarantees isolation as per IEC 60947-2. Padlocking systems can receive up to three padlocks with shackle diameters ranging from 5 to 8 mm (padlocks not supplied). Certain locking systems require an additional accessory.

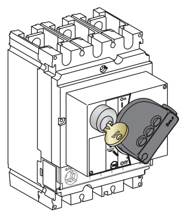
Control device		Function	Means	Required accessories
Toggle		Lock in OFF position	Padlock	Removable device
		Lock in OFF or ON position	Padlock	Fixed device
Direct rotary handle	Standard	Lock in ■ OFF position ■ OFF or ON position (1)	Padlock Keylock	- Locking device + keylock
	MCC	Lock in ■ OFF position ■ OFF or ON position (1)	Padlock	-
	CNOMO	Lock in ■ OFF position ■ OFF or ON position (1)	Padlock	-
Extended rotary handle		Lock in ■ OFF position ■ OFF or ON position (1) with door opening prevented (2)	Padlock	-
		Lock in OFF position	Padlock	UL508 control accessory
		■ OFF or ON position (1) inside the switchboard	Keylock	Locking device + keylock
Motor mechanism		Lock in OFF position remote operation disabled	Padlock Keylock	- Locking device + keylock
Withdrawable circuit breaker		Lock in ■ disconnected position	Padlock Keylock	- Locking device + keylock
		■ connected position	Keylock	Locking device + keylock

(1) Following a simple modification of the mechanism.
(2) Unless door locking has been voluntarily disabled.

DB111358

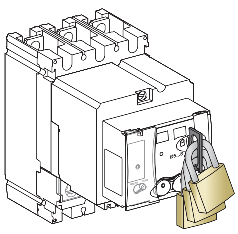


DB111359



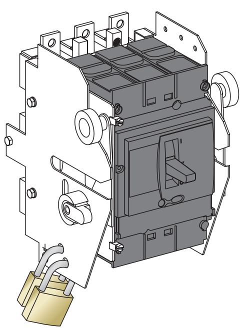
Rotary-handle locking using a padlock or a keylock.

DB111360



Motor-mechanism locking using a padlock or a keylock.

DB111362



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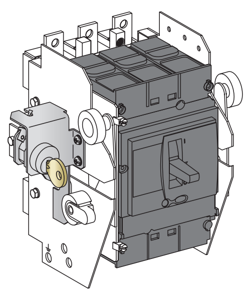
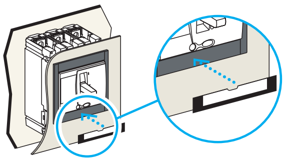


Chassis locking in the connected position.

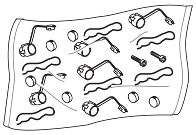
Sealing accessories

DB115224



Identification accessories.

DB115033



Sealing accessories.

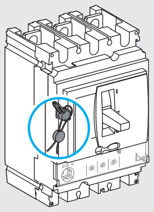
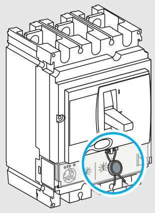
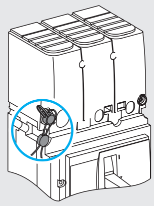
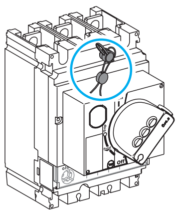
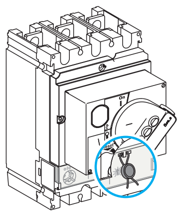
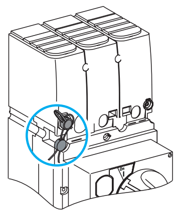
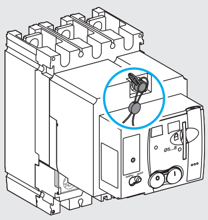
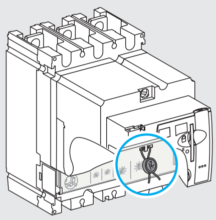
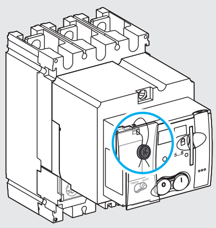
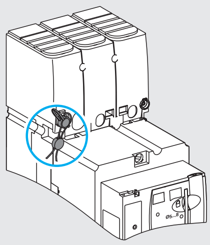
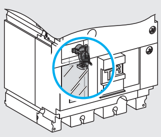
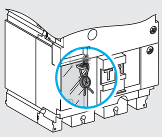
Outgoing-circuit identification

Compact NSX100 to 630 can be equipped with label holders supplied in sets of ten (cat. no. LV429226).
They are compatible with escutcheons.

Sealing accessories

Sealing accessories are available. Each bag of accessories contains all the parts required for the types of sealing indicated below.
A bag contains:
- 6 sealing accessories
- 6 lead seals
- 0.5 m of wire
- 2 screws.

Types of seals and corresponding functions

Toggle control	DB112300 	DB112301 		DB112303 
Rotary handle	DB112302 	DB112306 		DB112308 
Motor mechanism	DB112304 	DB112305 	DB112309 	DB112307 
Types of seals	**Front-cover fixing screw**	**Trip-unit transparent cover**	**Motor-mechanism transparent cover**	**Terminal-shield fixing screw**
Protected operations	■ front removal ■ access to auxiliaries ■ trip-unit removal.	■ modification of settings ■ access to test connector.	■ access to manual/auto mode selection switch: depending on its position, manual (1) or automatic operation is not possible. *(1) In this case, local operation is not possible.*	■ access to power connections (protection against direct contact).
Access to Vigi-module settings	DB112310 	DB112311 		
Types of seals	**Vigi-module fixing device**	**Protection cover for settings**		
Protected operations	■ removal of the Vigi module.	■ modification of settings.		

Functions and characteristics

Accessories and auxiliaries
Individual enclosures

PB103593-40

IP55 heavy-duty metal enclosure.

PB103592-40

IP55 heavy-duty insulating enclosure.

Individual enclosures are available for Compact/Vigicompact NSX devices with two, three or four poles.
All fixed, front connections are possible, except right-angle, 45°, double-L and edgewise terminal extensions.
All spreaders may be installed in the enclosures intended for Compact/Vigicompact NSX250 to 630 devices, except the 70 mm spreaders for NSX400/630.

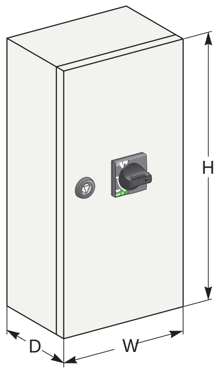
Two models of enclosures

- ■ IP55 heavy-duty metal individual enclosure, with:
  - □ metal enclosure
  - □ door with keylock and cut-out for rotary handle
  - □ extended rotary handle, IP56, IK08, black or red/yellow
  - □ device mounting plate
  - □ removable plate (without holes) for cable entry through bottom.
- ■ IP55 heavy-duty insulating individual enclosure, with:
  - □ polyester insulating enclosure
  - □ transparent cover, screwed, lead sealable, with cut-out for extended rotary handle
  - □ extended rotary handle, IP56, IK08, black or red/yellow
  - □ device mounting plate
  - □ 2 removable plates (without holes) for cable entry through bottom and/or top.

Dimensions (H x W x D in mm)

■ Metal enclosures:	
□ Compact NSX100/160	450 x 350 x 250
□ Compact NSX250 and Vigicompact NSX100 to 250	650 x 350 x 250
□ Compact NSX400	650 x 350 x 250
□ Compact NSX630 and Vigicompact NSX400/630	850 x 350 x 250
■ Insulating enclosures:	
□ Compact NSX100/160	360 x 270 x 235
□ Compact NSX250 and Vigicompact NSX100/160	540 x 270 x 235
□ Compact NSX400/630	720 x 360 x 235
□ Vigicompact NSX250/630	720 x 360 x 235

DB115609



Escutcheons and protection collars

Escutcheons are an optional feature mounted on the switchboard door. They increase the degree of protection to IP40, IK07. Protection collars maintain the degree of protection, whatever the position of the device (connected, disconnected).

PB103590-43

IP30 escutcheon.

PB103606-50

IP30 escutcheon with access to the trip unit.

IP30 or IP40 escutcheons for fixed devices

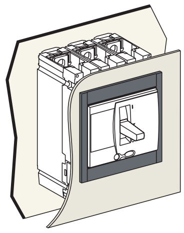
IP30

The three types are glued to the cut-out in the front door of the switchboard:
- ■ escutcheon for all control types (toggle, rotary handle or motor mechanism)
  - □ without access to the trip unit
  - □ with access to the trip unit
- ■ for Vigi modules, can be combined with the above.

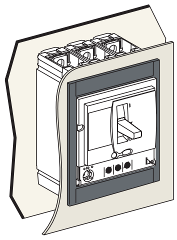
IP40

The four types, with a gasket, are screwed to the door cut-out:
- ■ three escutcheons identical to the previous, but IP40
- ■ a wide model for Vigi and ammeter modules that can be combined with the above.

DB112290

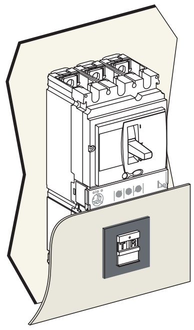


DB112291



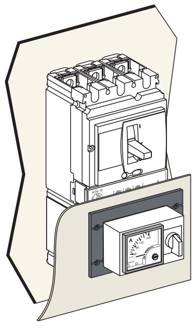
Escutcheon for toggle without and with access to the trip unit.

DB112292



Escutcheon for Vigi module.

DB112293



Wide escutcheon for ammeter.

Functions
and characteristics

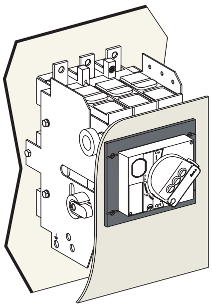
Accessories and auxiliaries
Escutcheons and protection collars

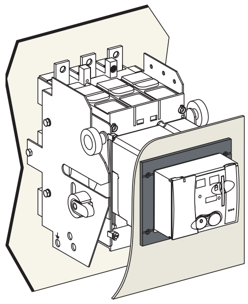
IP40 escutcheons for withdrawable devices

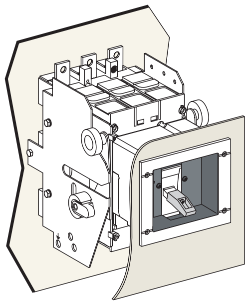
IP40 for withdrawable devices
The two types, with a gasket, are screwed to the door cut-out:
- ■ for rotary handle or motor mechanism: standard IP40 escutcheon
- ■ for toggle with extension: standard escutcheon + collar for withdrawal.

PB101777-36

Escutcheon with collar for toggle.

DB112294

Standard escutcheon with rotary handle.

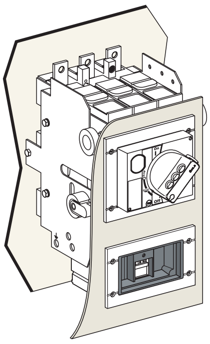
DB112295

Standard escutcheon for motor mechanism.

DB112296

Standard escutcheon with collar for withdrawal, for toggle.

PB103780-36

Escutcheon for Vigi module.

IP40 for Vigi module on withdrawable devices
The two types, with a gasket, are screwed to the door cut-out:
- ■ for rotary handle or motor mechanism: standard IP40 escutcheon
- ■ for toggle: standard escutcheon + collar for withdrawal.

DB112297

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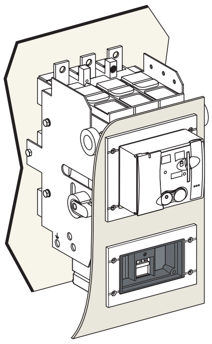
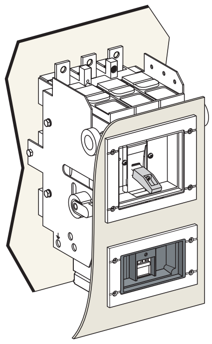
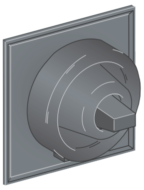

DB112299

Escutcheon for Vigi module, with escutcheons for the three types of control.

PB103775-40

Toggle cover.

IP43 toggle cover
Available only for devices with toggles. Fits over toggle and front cover of the device.
- ■ Mounted on the front of the circuit breaker.
- ■ Degree of protection IP43, IK07.

DB112218

Toggle cover.

PB103820-35

NS retrofit front cover.

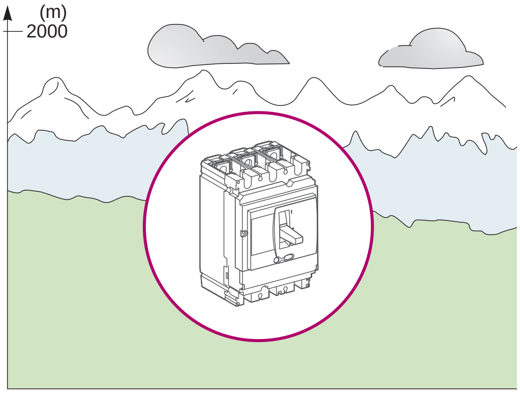
Retrofit front covers
These replacement front covers make it possible to install NSX devices in existing switchboards containing NS devices by installing the NS-type retrofit covers on the NSX devices.
- ■ NS100 to 250 cover.
- ■ NS400/630 cover.

Operating safety

Installation recommendations
Contents

Operating conditions

DB111389



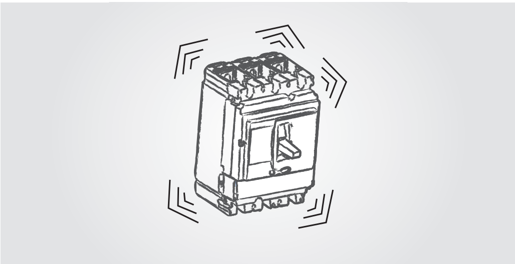
Altitude derating

Altitude does not significantly affect the characteristics of Compact NSX circuit breakers up to 2000 m. Above this altitude, it is necessary to take into account the decrease in the dielectric strength and cooling capacity of air.
The following table gives the corrections to be applied for altitudes above 2000 metres.
The breaking capacities remain unchanged.

Compact NSX100 to 630

Altitude (m)		2000	3000	4000	5000
Dielectric withstand voltage (V)		3000	2500	2100	1800
Insulation voltage (V)	Ui	800	700	600	500
Maximum operational voltage (V)	Ue	690	590	520	460
Average thermal current (A) at 40 °C	In x	1	0.96	0.93	0.9

DB111390

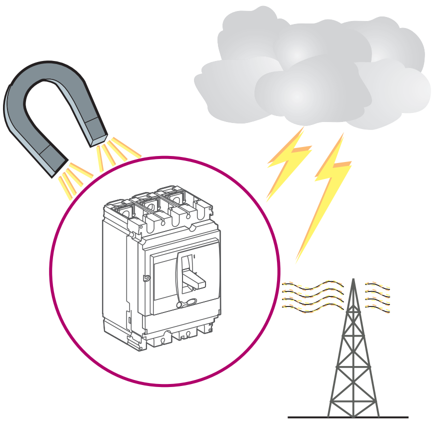


Vibrations

Compact NSX devices resist electromagnetic or mechanical vibrations.
Tests are carried out in compliance with standard IEC 60068-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):
- 2 to 13.2 Hz: amplitude ±1 mm
- 13.2 to 100 Hz: constant acceleration 0.7 g.

Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.

DB111391



Degree of protection

Compact NSX circuit breakers have been tested for degree of protection (IP) mechanical impact protection (IK). See page A-5.

Electromagnetic disturbances

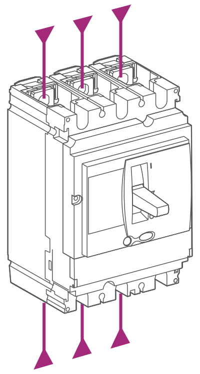
Compact NSX devices are protected against:
- overvoltages caused by circuit switching
- overvoltages caused by an atmospheric disturbances or by a distribution-system outage (e.g. failure of a lighting system)
- devices emitting radio waves (radios, walkie-talkies, radar, etc.)
- electrostatic discharges produced directly by users.

Compact NSX devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards. See page A-5.
These tests ensure that:
- no nuisance tripping occurs
- tripping times are respected.

Installation in switchboards

Power supply and weights

DB111383



Power supply from the top or bottom

Compact NSX circuit breakers can be supplied from either the top or the bottom, even when equipped with a Vigi earth-leakage protection module, without any reduction in performance. This capability facilitates connection when installed in a switchboard.
All connection and insulation accessories can be used on circuit breakers supplied either from the top or bottom.

Weight

The table below presents the weights (in kg) of the circuit breakers and the main accessories, which must be summed to obtain the total weight of complete configurations. The values are valid for all performance categories.

Type of device		Circuit breakers	Base	Chassis	Vigi module	Visu module	Motor mech.
NSX100	3P/2D	1.79	0.8	2.2	0.87	2	1.2
	3P/3D	2.05	0.8	2.2	0.87	2	1.2
	4P/4D	2.4	1.05	2.2	1.13	2.2	1.2
NSX160	3P/2D	1.85	0.8	2.2	0.87	2	1.2
	3P/3D	2.2	0.8	2.2	0.87	2	1.2
	4P/4D	2.58	1.05	2.2	1.13	2.2	1.2
NSX250	3P/2D	1.94	0.8	2.2	0.87	2	1.2
	3P/3D	2.4	0.8	2.2	0.87	2	1.2
	4P/4D	2.78	1.05	2.2	1.13	2.2	1.2
NSX400/630	3P/3D	6.19	2.4	2.2	2.8	4.6	2.8
	4P/4D	8.13	2.8	2.2	3	4.9	2.8

Installation in switchboards

Safety clearances and minimum distances

General rules

When installing a circuit breaker, minimum distances (safety clearances) must be maintained between the device and panels, bars and other protection devices installed nearby. These distances, which depend on the ultimate breaking capacity, are defined by tests carried out in accordance with standard IEC 60947-2.
If installation conformity is not checked by type tests, it is also necessary to:

- use insulated bars for circuit-breaker connections
- segregate the busbars using insulating screens.

For Compact NSX100 to 630 devices, terminal shields and interphase barriers are recommended and may be mandatory depending on the operating voltage of the device and type of installation (fixed, withdrawable, etc.).

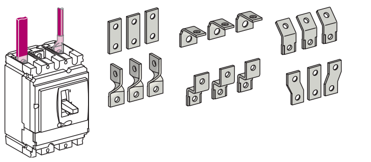
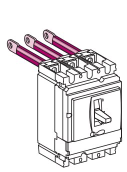
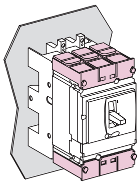
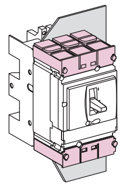
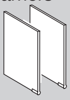
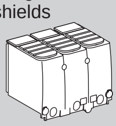
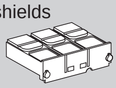
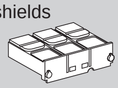
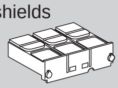
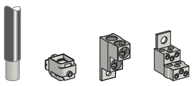
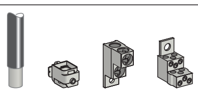
Power connections

The table below indicates the rules to be respected for Compact NSX100 to 630 devices to ensure insulation of live parts for the various types of connection.

- fixed devices with front connection (FC) or rear connection (RC)
- plug-in or withdrawable devices.

Connection accessories such as crimp lugs, bare-cable connectors, terminal extensions (straight, right-angle, double-L and 45°) and spreaders are supplied with interphase barriers.
Long terminal shields provide a degree of protection of IP40 (ingress) and IK07 (mechanical impact).

Compact NSX100 to 630: rules to be respected to ensure insulation of live parts

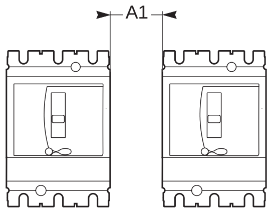
Type of connection		Fixed, front connection			Fixed, rear connection	Plug-in or withdrawable	
		 DB115055			 DB115056	On backplate  DB115057	Through panel  DB115058
Possible, recommended or mandatory accessories: With:		No insulating accessory	Interphase barriers  DB115059	Long terminal shields  DB115060	Short terminal shields  DB115061	Short terminal shields  DB115061	Short terminal shields  DB115061
operating voltage	**type of conductor**						
≤ 500 V	Insulated bars 	Possible	Possible	Possible	Recommended	Recommended	Mandatory
	Extension terminals Cables + crimp lugs 	No	Mandatory (supplied)	Possible (instead of ph. barriers)	Recommended	Recommended	Mandatory
	Bare cables + connectors 	Possible for NSX100 to 250 No	Possible for NSX100 to 250 Mandatory (supplied)	Possible for NSX100 to 250 Possible (instead of ph. barriers)	Recommended	Recommended	Mandatory
> 500 V	Insulated bars 	No	No	Mandatory	Mandatory	Mandatory	Mandatory
	Extension terminals Cables + crimp lugs 	No	No	Mandatory	Mandatory	Mandatory	Mandatory
	Bare cables + connectors 	No	No	Mandatory	Mandatory	Mandatory	Mandatory

Installation example

Safety clearance

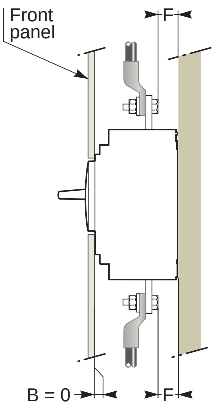
Minimum distance between two adjacent circuit breakers

DB115046



Minimum distance between circuit breaker and front or rear panels

DB115697

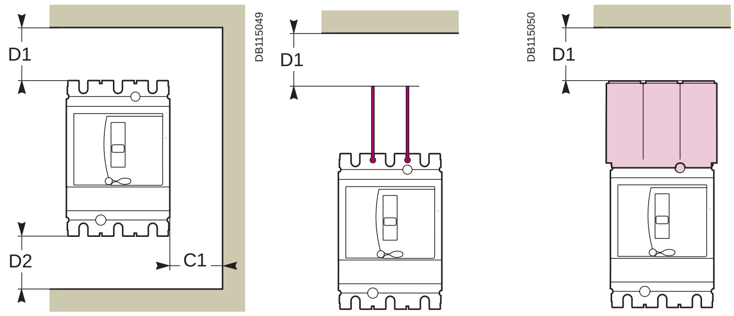


Bare or painted sheetmetal

Note: if F < 8 mm: an insulating screen or long terminal shield is mandatory *(see page A-73)*.

Minimum distance between circuit breaker and top, bottom or side panels

DB115048 DB115049 DB115050



Devices without accessories. *Devices with interphase barriers or long terminal shields.*

Minimum safety clearances for Compact NSX100 to 630

Operating voltage	Clearance (mm)						
	Between devices	Between device and sheetmetal					
		Painted sheet metal			Bare sheet metal		
	A1	C1	D1	D2	C1	D1	D2
U ≤ 440 V							
for devices equipped with:							
■ no accessories	0	0	30	30	5	40	40
■ interphase barriers	0	0	0	0	5	0	0
■ long terminal shields	0	0	0	0	0	0	0
440 V < U ≤ 600 V							
for devices equipped with:							
■ interphase barriers (1)	0	0	0	0	20	10	10
■ long terminal shields (2)	0	0	0	0	10	10	10
U > 600 V							
for devices equipped with:							
■ long terminal shields	0	10	50	50	20	100	100

(1) Only for NSX100 to 250.
(2) For all cases.

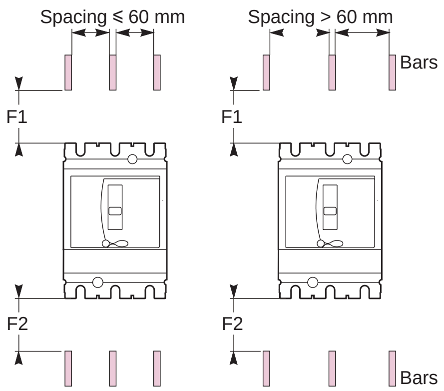
Clearances with respect to live bare busbars

Minimum clearances for Compact NSX100 to 630

Operating voltage	Clearances with respect to live bare busbars			
	spacing ≤ 60 mm		spacing > 60 mm	
	F1	F2	F1	F2
U < 440 V	350	350	80	80
440 V ≤ U ≤ 600 V	350	350	120	120
U > 600 V	prohibited: insulating screen required between device and busbars			

These clearances can be reduced for special installations as long as the configuration is checked by tests.

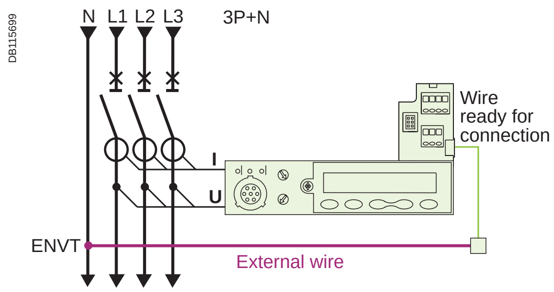
DB115698



Live busbars.

Installation recommendations

Control wiring



External neutral voltage tap (ENVT).

Remote tripping by MN or MX release

Power consumption is approximately:

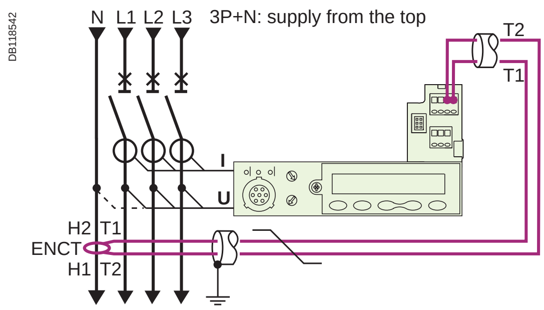
- 30 VA for pick-up of the MN and MX releases
- 300 VA to 500 VA for the motor mechanism.

The table below indicates the maximum permissible cable length for different supply voltages and cable cross-sectional areas.

Recommended maximum cable lengths (in metres)

Power supply voltage (V DC)		12 V		24 V		48 V	
Cable cross-section (mm²)		1.5	2.5	1.5	2.5	1.5	2.5
MN	U source 100 %	15	–	160	–	640	–
	U source 85 %	7	–	40	–	160	–
MX	U source 100 %	60	–	240	–	960	–
	U source 85 %	30	–	120	–	480	–
Motor mechanism	U source 100 %	–	–	10	16	65	110
	U source 85 %	–	–	2	4	17	28

Note: *the indicated length is that of each of the two wires.*



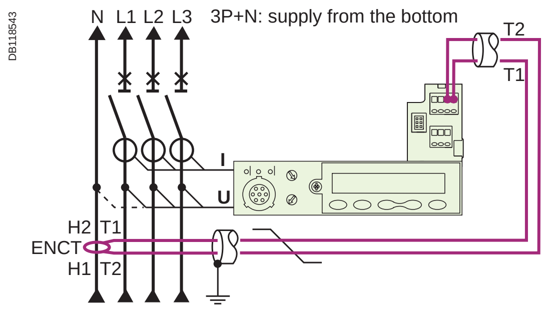
External neutral voltage tap (ENVT)

This connection is required for accurate power measurements on 3-pole circuit breakers equipped with Micrologic 5 / 6 E trip units in installations with a distributed neutral. It can be used to measure phase-neutral voltages and calculate power using the 3 wattmeter method.

Compact NSX 3-pole circuit breakers come with a wire installed on the device for the connection to the ENVT.

This wire is equipped with a connector for connection to an external wire with the following characteristics:

- cross-sectional area of 1 mm² to 2.5 mm²
- maximum length of 10 metres.



External neutral current transformer (ENCT).

External neutral current transformer (ENCT)

This connection is required to protect the neutral on 3-pole circuit breakers equipped with Micrologic 5 / 6 A or E trip units in installations with a distributed neutral. For Micrologic 6 A or E, it is required for type G ground-fault protection.

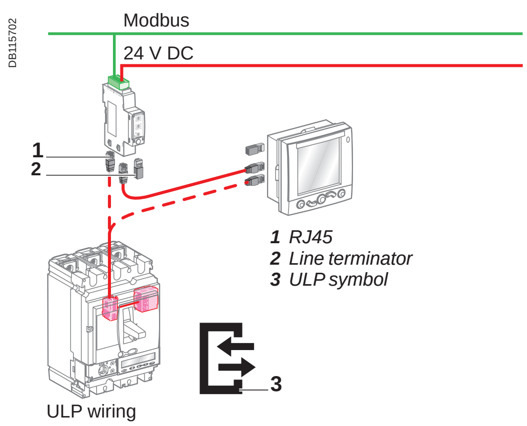
The ENCT is connected in the same way for fixed, plug-in or withdrawable devices:

- fixed devices are connected via terminals T1 and T2 of the internal terminal block.
- plug-in and withdrawable devices are not connected via the auxiliary terminals.

The wires must be connected/disconnected inside the device via terminals T1 and T2.

The ENCT must be connected to the Micrologic trip unit by a shielded twisted pair. The shielding should be connected to the switchboard earth only at the CT end, no more than 30 cm from the CT.

- the power connections of the CT to the neutral (H2 and H1) must be made in the same way for power supply from the top or the bottom (see figure). Make sure they are not reversed for devices with power supply from the bottom.
- cross-sectional area of 0.4 mm² to 1.5 mm²
- maximum length of 10 metres.



1 RJ45
2 Line terminator
3 ULP symbol

ULP connection system.

ULP connection system between Micrologic, FDM 121 switchboard display and Modbus interface

The ULP (Universal Logic Plug) wiring system used by Compact NSX for connections through to the Modbus network requires neither tools nor settings.

The prefabricated cords are sued for both data transfer and distribution of 24 V DC power. Connectors on each component are identified by ULP (Universal Logic Plug) symbols, ensuring total compatibility between each component.

Available cords

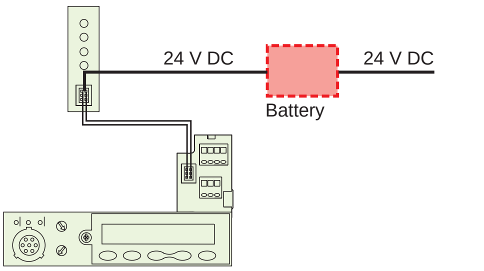
All connections are made with prefabricated cords:

- NSX cord for connection of the internal terminal block to the Modbus interface or the FDM 121 display via an RJ45 connector. The cord is available in three lengths, 0.35 m, 1.3 m and 3 m
- ULP cords with RJ45 connectors at each end for the other connections between components. The cord is available in six lengths, 0.3 m, 0.6 m, 1 m, 2 m, 3 m and 5 m. For greater distances, two cords can be interconnected using the RJ45 female/female accessory.

Maximum length of 10 m between 2 modules and 30 m in all.

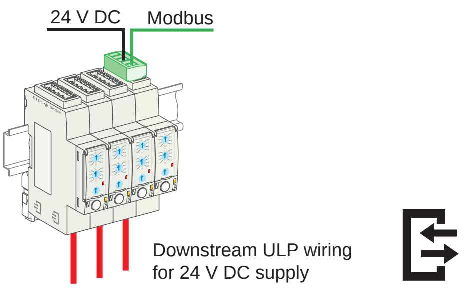
A line terminator must be fitted to all components with an unused RJ45 connector.

DB115703



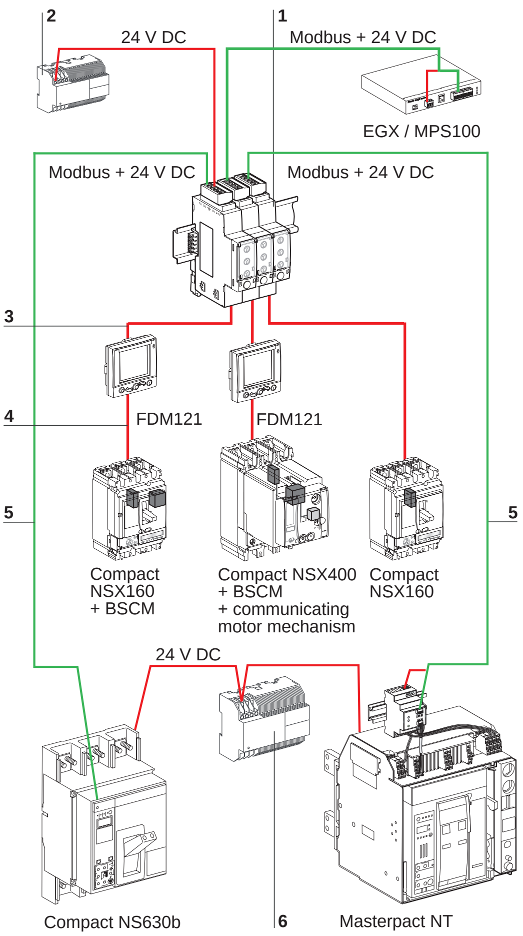
Power supply, without the Communication function, via the terminal block with a backup battery.

DB115704



Supply, with the Communication function, via the Modbus interface.

DB124600



1 Modbus interface module with connection accessory.
2 24 V DC power supply of Micrologic for Compact NSX and communication modules
3 ULP cord.
4 NSX cord.
5 Modbus cable + 24 V DC: ref. 50965 (Schneider Electric) recommended or ref. 7895A (Belden).
6 24 V DC power supply of Micrologic for Compact NS/ Masterpact.

24 V DC power-supply module

Use

An external 24 V DC power supply is required for installations with communication, whatever the type of trip unit.

On installations without communication, it is available as an option for Micrologic 5/6 to:

- modify settings when the circuit breaker is open (OFF position)
- display measurements when the current flowing through the circuit breaker is low
- maintain the display of the cause of tripping.

Characteristics

The external 24 V DC supply may be used for the entire switchboard.

The required characteristics are indicated in the table below.

Characteristics	
Output voltage	24 V DC -20 % to +10 %
Ripple	±1 %
Overvoltage category (OVC)	OVC IV - as per IEC 60947-1

Sizing

Sizing must take into account all supplied modules.

Module	Consumption (mA)
Micrologic 5 / 6	40
BSCM module	10
FDM 121	40
Modbus communication interface	60
NSX cord U > 480 V AC	30
SDx / SDTAM module	20

Wiring

Micrologic 5 or 6 not using the Communication function

The external 24 V DC supply is connected via the circuit breaker terminal block.

Use of a 24 V DC battery provides backup power for approximate 3 hours (100 mA) in the event of an interruption in the external supply.

Micrologic 5 or 6 using the Communication function

The external 24 V DC supply is connected via the Modbus interface using a five-pin connector, including two for the power supply. Stacking accessories (see page A-27) can be used to supply a number of interfaces by fast clip-on connection.

The 24 V DC power is distributed downstream by the ULP (Universal Logic Plug) communication cords with RJ45 connectors. This system ensures both data transfer and power distribution to the connected modules.

Recommendations for 24 V DC wiring

- Do not connect the positive terminal to earth.
- Do not connect the negative terminal to earth.
- The maximum length for each conductor (+/-) is ten metres.
- For connection distances greater than ten metres, the plus and minus conductors of the 24 V DC supply must be twisted to improve EMC.
- The 24 V DC conductors must cross the power cables perpendicularly. If this is difficult or impossible, the plus and minus conductors must be twisted.

Modbus

Each Compact NSX circuit breaker equipped with Micrologic 5/6 and an FDM 121 display is connected to the Modbus network via the Modbus interface module.

Connection of all the circuit breakers and other Modbus devices in the switchboard to a Modbus bus is made much easier by using a Modbus RJ45 junction block installed in the switchboard.

Recommendations for Modbus wiring

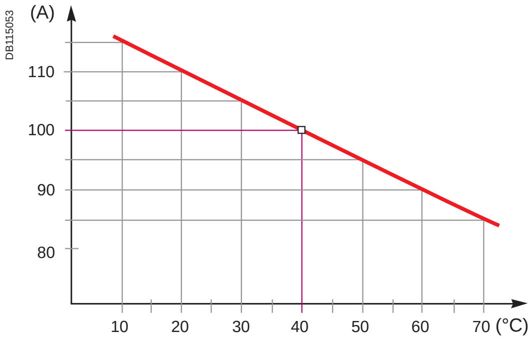
- The shielding may be earthed.
- The conductors must be twisted to improve immunity (EMC).
- The Modbus conductors must cross the power cables perpendicularly.

Installation recommendations

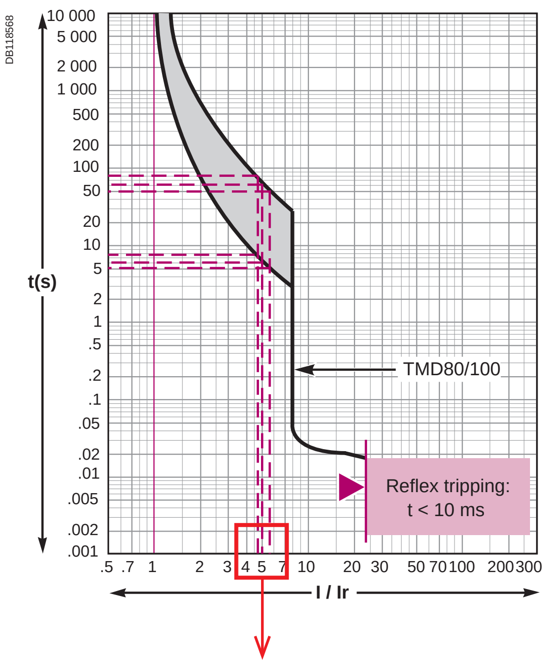
Temperature derating

Compact NSX100 to 250 equipped with thermal-magnetic trip units

When thermal-magnetic trip units are used at ambient temperatures other than 40 °C, the Ir pick-up is modified.



Temperature derating curve for Compact NSX100.



Example 1. Fault I = 500 A

I/Ir	4.5	5	5.5
T°C	20 °C	40 °C	60 °C
t min.	8 s	6 s	5 s
t max.	80 s	60 s	50 s

Thermal-protection curve with minimum and maximum values.

The overload protection is calibrated at 40 °C in the lab. This means that when the ambient temperature is less or greater than 40 °C, the Ir protection pick-up is slightly modified.
To obtain the tripping time for a given temperature:
- see the tripping curves for 40 °C (see pages E-2 and E-3)
- determine tripping times corresponding to the Ir value (thermal setting on the device), corrected for the ambient temperature as indicated in the tables below.

Settings of Compact NSX100 to 250 equipped with TM-D and TM-G trip units, as a function of the temperature

The table indicates the real Ir (A) value for a given rating and temperature.

Rat. (A)	Temperature (°C) 10	15	20	25	30	35	40	45	50	55	60	65	70
16	18.4	18.7	18	18	17	16.6	16	15.6	15.2	14.8	14.5	14	13.8
25	28.8	28	27.5	27	26.3	25.6	25	24.5	24	23.5	23	22	21
32	36.8	36	35.2	34.4	33.6	32.8	32	31.3	30.5	30	29.5	29	28.5
40	46	45	44	43	42	41	40	39	38	37	36	35	34
50	57.5	56	55	54	52.5	51	50	49	48	47	46	45	44
63	72	71	69	68	66	65	63	61.5	60	58	57	55	54
80	92	90	88	86	84	82	80	78	76	74	72	70	68
100	115	113	110	108	105	103	100	97.5	95	92.5	90	87.5	85
125	144	141	138	134	131	128	125	122	119	116	113	109	106
160	184	180	176	172	168	164	160	156	152	148	144	140	136
200	230	225	220	215	210	205	200	195	190	185	180	175	170
250	288	281	277	269	263	256	250	244	238	231	225	219	213

Example 1. What is the tripping time of a Compact NSX100 equipped with a TM100D trip unit set to 100 A, for an overload I = 500 A?
The overload I/Ir is calculated as a function of the temperature. Use the above values and the curve on page E-3 (shown on the left) to determine the corresponding time.
- At 40 °C, Ir = 100 A, I/Ir = 5 and the tripping time is between 6 and 60 seconds.
- At 20 °C, Ir = 110 A, I/Ir = 4.54 and the tripping time is between 8 and 80 seconds.
- At 60 °C, Ir = 90 A, I/Ir = 5.55 and the tripping time is between 5 and 50 seconds.

Example 2. What is the setting to obtain a real Ir of 210 A, taking into account the temperature, for a Compact NSX250 equipped with a TM250D trip unit?
The necessary dial setting, in amperes, is shown below.
- At 40 °C, Ir = (210/250) x 250 A = 210 A
- At 20 °C, Ir = (210/277) x 250 A = 189.5 A
- At 60 °C, Ir = (210/225) x 250 A = 233 A

Additional derating coefficient for an add-on module

The values indicated in the previous tables are valid for **fixed** circuit breakers equipped with one of the following modules:
- Vigi module
- insulation monitoring module
- ammeter module
- current-transformer module.

They also apply for **plug-in or withdrawable** circuit breakers equipped with:
- ammeter module
- current-transformer module.

However, for **plug-in or withdrawable** circuit breakers equipped with a Vigi module or an insulation monitoring module, the coefficient 0.84 must be applied.
The table below sums up the situation for add-on modules.

Type of device	Circuit breaker	TM-D trip-unit rating	Vigi or insulation monitoring module	Ammeter or current transformer module
Fixed	NSX100 to 250	16 to 100	1	1
	NSX160 to 250	125		
	NSX160 to 250	160		
	NSX250	200 to 250		
Plug-in or withdrawable	NSX100 to 250	16 to 100		
	NSX160 to 250	125		
	NSX160 to 250	160	0.84	
	NSX250	250		

Compact NSX equipped with electronic trip units

Electronic trip units are not affected by variations in temperature. If the trip units are used in high-temperature environments, the Micrologic setting must nevertheless take into account the temperature limits of the circuit breaker.

Changes in temperature do not affect measurements by electronic trip units.
- The built-in CT sensors with Rogowski toroids measure the current.
- The control electronics compare the value of the current to the settings defined for 40 °C.

Because temperature has no effect on the toroid measurements, the tripping thresholds do not need to be modified.
However, the temperature rise caused by the flow of current and the ambient temperature increase the temperature of the device. To avoid reaching the thermal withstand level of the equipment, it is necessary to limit the current flowing through the device, i.e. the maximum Ir setting as a function of the temperature.

Compact NSX100/160/250

The table below indicates the maximum long-time (LT) protection setting Ir (A) depending on the ambient temperature.

Type of device	Rating (A)	Temperature (°C)						
		40	45	50	55	60	65	70
NSX100/160								
Fixed, plug-in or withdr.	**40**	no derating						
	100	no derating						
NSX250								
Fixed, plug-in or withdrawable	**100**	no derating						
	160	no derating						
Fixed	**250**	250	250	250	245	237	230	225
Plug-in or withdr.	**250**	250	245	237	230	225	220	215

Compact NSX400 and 630

The table below indicates the maximum long-time (LT) protection setting Ir (A) depending on the ambient temperature.

Type of device	Rating (A)	Temperature (°C)						
		40	45	50	55	60	65	70
NSX400								
Fixed	**400**	400	400	400	390	380	370	360
Plug-in/withdr.	**400**	400	390	380	370	360	350	340
NSX630								
Fixed	**630**	630	615	600	585	570	550	535
Plug-in/withdr.	**630**	570	550	535	520	505	490	475

Example. A fixed Compact NSX400 equipped with a Micrologic can have a maximum Ir setting of:
- *400 A up to 50 °C*
- *380 A up to 60 °C.*

Additional derating coefficient for an add-on module

For **fixed** or **plug-in / withdrawable** circuit breakers, the addition of a:
- Vigi module
- insulation-monitoring module
- ammeter module
- current-transformer module

can modify the derating values. Apply the coefficients shown below.

Derating of a Compact NSX equipped with a Micrologic trip unit

<table>
<tr><th>Type of device</th><th>Circuit breaker</th><th>TM-D trip-unit rating</th><th>Vigi / Insulation monitoring module</th><th>Ammeter module / External sensor (CT)</th></tr>
<tr><td rowspan="3">Fixed</td><td>NSX100 to 250</td><td>40 to 100</td><td rowspan="5">1</td><td rowspan="10">1</td></tr>
<tr><td>NSX160 to 250</td><td>125</td></tr>
<tr><td>NSX250</td><td>250</td></tr>
<tr><td rowspan="3">Plug-in or withdrawable</td><td>NSX100 to 250</td><td>40 to 100</td></tr>
<tr><td>NSX160 to 250</td><td>160</td></tr>
<tr><td>NSX250</td><td>250</td><td>0.86</td></tr>
<tr><td rowspan="2">Fixed</td><td>NSX400</td><td>250 to 400</td><td>0.97</td></tr>
<tr><td>NSX630</td><td>250 to 630</td><td>0.90</td></tr>
<tr><td rowspan="2">Plug-in or withdrawable</td><td>NSX400</td><td>250 to 400</td><td>0.97</td></tr>
<tr><td>NSX630</td><td>250 to 630</td><td>0.90</td></tr>
</table>

***Note**: to provide the Visu function, Compact NSX circuit breakers, with or without a Vigi module, are combined with INV switch-disconnectors. Tripping values for the selected combination are indicated in the Interpact catalogue.*

Installation recommendations

Power loss/ Resistance

Compact NSX equipped with thermal-magnetic trip units

Compact NSX thermal power loss values are used to calculate total temperature rise in the switchboard in which the circuit breakers are installed.

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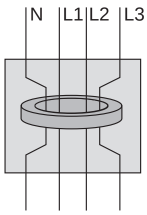


With a Vigi module, the deviation of the N and L3 bars required to pass through the toroid results in higher power losses compared to those of the L1 and L2 bars.

The values indicated in the tables below are typical values for a device at full rated load and 50/60 Hz.

Power loss per pole (P/pole) in Watts (W)

The value indicated is the power loss at I_N, 50/60 Hz, for a three-pole or four-pole circuit breaker. Measurement and calculation of power loss are carried out in compliance with the recommendations of Annex G of standard IEC 60947-2.

Resistance per pole (R/pole) in milliohms (mΩ)

The value of the resistance per pole is provided as a general indication for a new device.

The value of the contact resistance must be determined on the basis of the measured voltage drop, in accordance with the manufacturer's test procedure (ABT instruction document no. 1 - BEE - 02.2 -A).

***Note**: this measurement is not sufficient to determine the quality of the contacts, i.e. the capacity of the circuit breaker to carry its rated current.*

Additional power loss

Additional power loss is equal to the sum of the power dissipated by the following:

- Vigi module: note that the deviation of the N and L3 bars required to pass through the toroid results in higher power losses compared to those of the L1 and L2 bars (diagram opposite). When calculating total power loss, use L1, L2, L3 for a 3P device and N, L1, L2, L3 for a 4P device
- disconnecting contacts (plug-in and withdrawable devices)
- ammeter module
- transformer module.

Calculation of total power loss

Total power loss at full rated load and 50/60 Hz is equal to the sum of the device and additional power losses per pole multiplied by the number of poles (2, 3 or 4).

If a Vigi module is installed, it is necessary to differentiate between N and L3 on one hand and L1 and L2 on the other.

Compact NSX100 to 250 equipped with TM-D and TM-G trip units

Type of device		Fixed device		Additional power / pole				
3/4 poles	Rat. (A)	R/pole	P/pole	Vigi (N, L3)	Vigi (L1, L2)	Plug-in / withdr.	Ammeter module	Transfo. module
NSX100	**16**	11.42	2.92	0	0	0	0	0
	25	6.42	4.01	0	0	0.1	0	0
	32	3.94	4.03	0.06	0.03	0.15	0.1	0.1
	40	3.42	5.47	0.10	0.05	0.2	0.1	0.1
	50	1.64	4.11	0.15	0.08	0.3	0.1	0.1
	63	2.17	8.61	0.3	0.15	0.4	0.1	0.1
	80	1.37	8.77	0.4	0.2	0.6	0.1	0.1
	100	0.88	8.8	0.7	0.35	1	0.2	0.2
NSX160	**80**	1.26	8.06	0.4	0.2	0.6	0.1	0.1
	100	0.77	7.7	0.7	0.35	1	0.2	0.2
	125	0.69	10.78	1.1	0.55	1.6	0.3	0.3
	160	0.55	13.95	1.8	0.9	2.6	0.5	0.5
NSX250	**125**	0.61	9.45	1.1	0.55	1.6	0.3	0.3
	160	0.46	11.78	1.8	0.9	2.6	0.5	0.5
	200	0.39	15.4	2.8	1.4	4	0.8	0.8
	250	0.3	18.75	4.4	2.2	6.3	1.3	1.3

Compact NSX100 to 630 equipped with MA/1.3-M trip units

Type of device		Fixed device		Additional power / pole				
3 poles	Rat. (A)	R/pole	P/pole	Vigi (N, L3)	Vigi (L1, L2)	Plug-in / withdr.	Ammeter module	Transfo. module
NSX100	**2.5**	148.42	0.93	0	0	0	0	0
	6.3	99.02	3.93	0	0	0	0	0
	12.5	4.05	0.63	0	0	0	0	0
	25	1.66	1.04	0	0	0.1	0	0
	50	0.67	1.66	0.2	0.1	0.3	0.1	0.1
	100	0.52	5.2	0.7	0.35	1	0.2	0.2
NSX160	**150**	0.38	8.55	1.35	0.68	2.6	0.45	0.45
NSX250	**220**	0.3	14.52	2.9	1.45	4.89	0.97	0.97
NSX400	**320**	0.12	12.29	3.2	1.6	6.14	1.54	1.54
NSX630	**500**	0.1	25	13.99	7	15	3.75	3.75

Compact NSX equipped with electronic trip units

The values indicated in the table below are typical values for a device at full rated load and 50/60 Hz. The definitions and information are the same as that for circuit breakers equipped with thermal-magnetic trip units.

Compact NSX100 to 630 equipped with Micrologic trip units

Type of device		Fixed device		Additional power / pole				
3/4 poles	Rat. (A)	R/pole	P/pole	Vigi (N, L3)	Vigi (L1, L2)	Plug-in / withdr.	Ammeter module	Transfo. module
NSX100	40	0.84	1.34	0.1	0.05	0.2	0.1	0.1
	100	0.468	4.68	0.7	0.35	1	0.2	0.2
NSX160	40	0.73	1.17	0.4	0.2	0.6	0.1	0.1
	100	0.36	3.58	0.7	0.35	1	0.2	0.2
	160	0.36	9.16	1.8	0.9	2.6	0.5	0.5
NSX250	100	0.27	2.73	1.1	0.55	1.6	0.2	0.2
	250	0.28	17.56	4.4	2.2	6.3	1.3	1.3
NSX400	400	0.12	19.2	3.2	1.6	9.6	2.4	2.4
NSX630	630 (1)	0.1	39.69	6.5	3.25	19.49	5.95	5.95

(1) The power loss values for the Vigi modules and withdrawable circuit breakers are given for 570 A.

Easy installation

Dimensions and connection

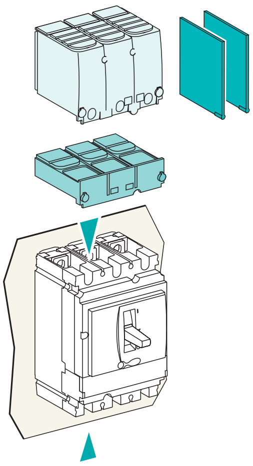
Contents

Dimensions and mounting

Compact NSX100 to 630 fixed version

Dimensions | 2/3P | 4P

DB112061



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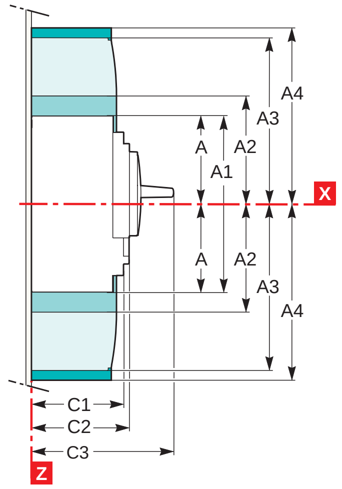

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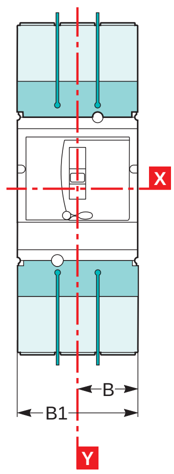

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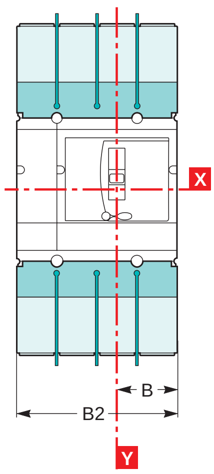


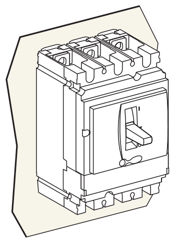
Interphase barriers.
Short terminal shields.

Long terminal shields (also available for NSX400/630 spreaders with 52.5 mm pitch: B1 = 157.5 mm, B2 = 210 mm).

Mounting | NSX100 to 250 | NSX400/630 | NSX100 to 630

On backplate | **2/3P** | **3P** | **4P**

DB112065



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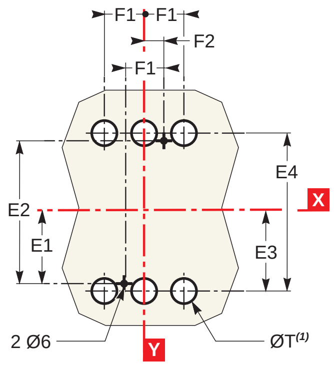

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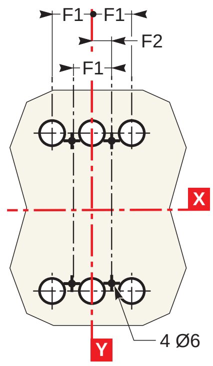

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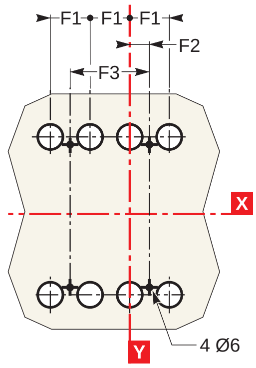
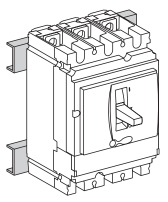


(1) *The ØT holes are required for rear connection only.*
For two-pole circuit breakers, the middle holes are not required.

On rails | **2/3P** | **3P** | **4P**

DB112068



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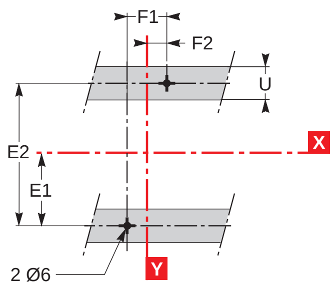

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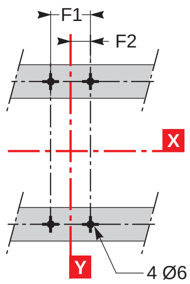

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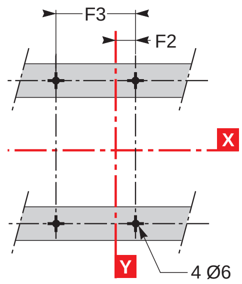

On DIN rail with adapter plate (NSX100 to 250)

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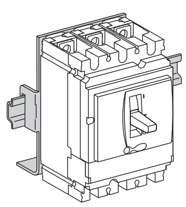

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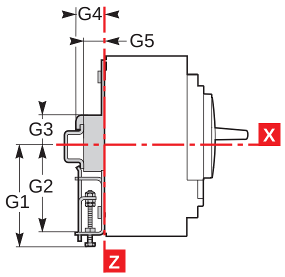
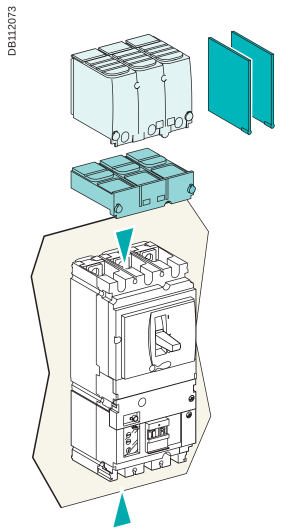


Vigicompact NSX100 to 630 fixed version

Dimensions | 3/4P | 3/4P

DB112073



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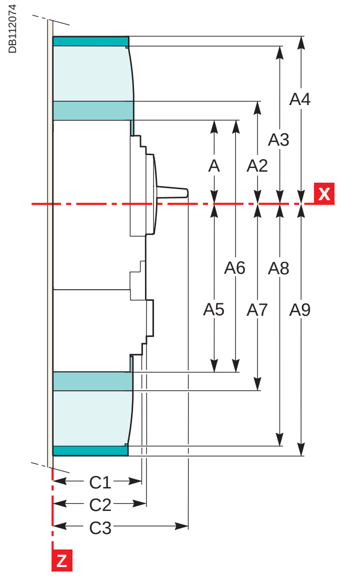

NSX100 to 250

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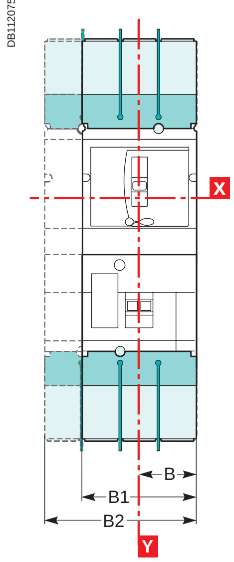
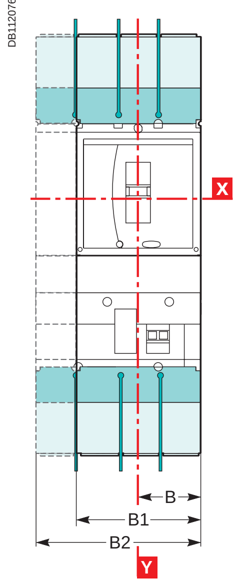


NSX400/630

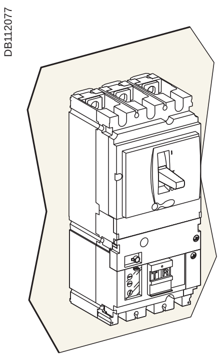
DB112076



Mounting | NSX100 to 250 | NSX400/630 | NSX100 to 630

On backplate | 3P | 3P | 4P

DB112077



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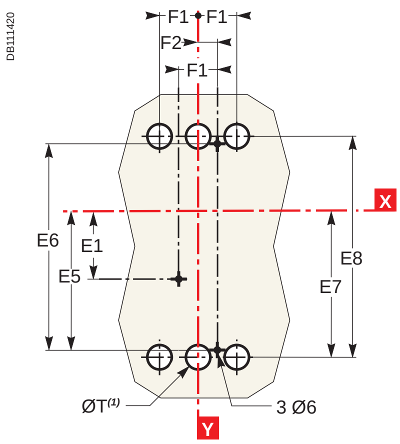

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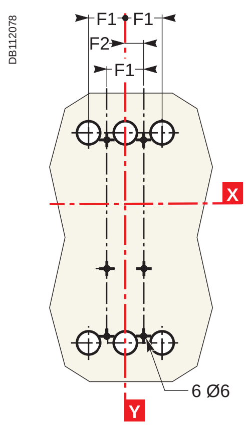

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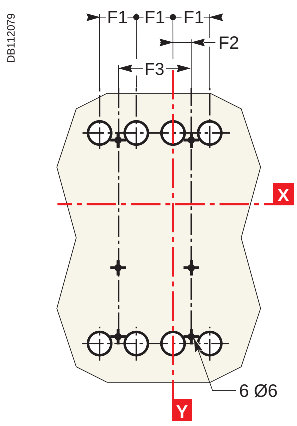
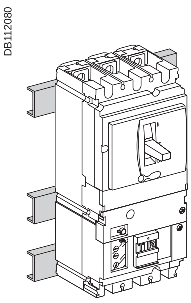


(1) The ØT holes are required for rear connection only.
For two-pole circuit breakers, the middle holes are not required.

On rails | 3P | 3P | 4P

DB112080



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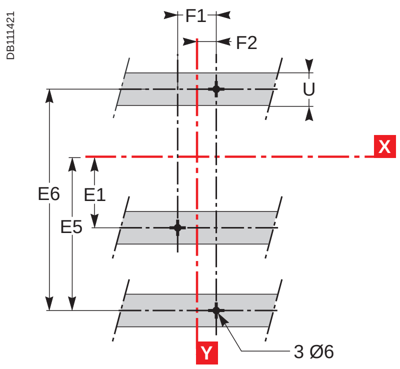

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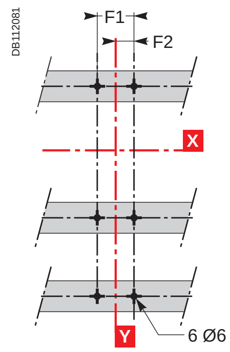

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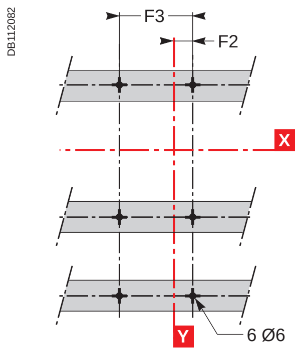


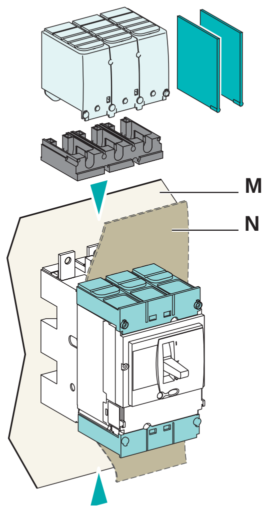
Type	A	A1	A2	A3	A4	A5	A6	A7	A8	A9	B	B1	B2	C1	C2	C3	E1
NSX100/160/250	80.5	161	94	145	178.5	155.5	236	169	220	253.5	52.5	105	140	81	86	126	62.5
NSX400/630	127.5	255	142.5	200	237	227.5	355	242.5	300	337	70	140	185	95.5	110	168	100
Type	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**F1**	**F2**	**F3**	**G1**	**G2**	**G3**	**G4**	**G5**	**ØT**	**U**
NSX100/160/250	125	70	140	137.5	200	145	215	35	17.5	70	95	75	13.5	23	17.5	24	≤ 32
NSX400/630	200	113.5	227	200	300	213.5	327	45	22.5	90	-	-	-	-	-	32	≤ 35

Dimensions and mounting

Compact NSX100 to 630 plug-in version

Dimensions	2/3P	4P

DB112640



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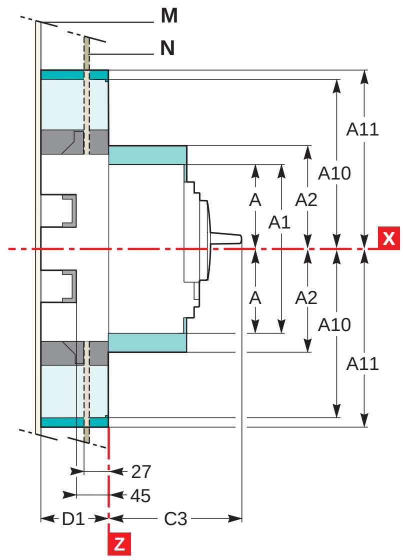

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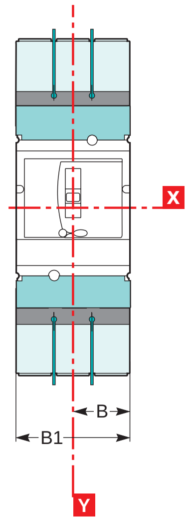

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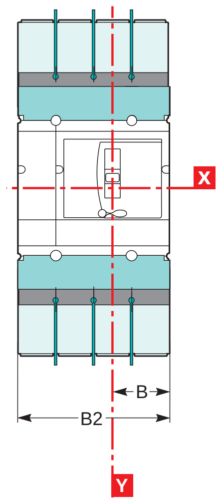


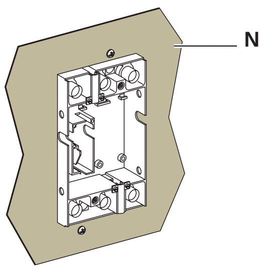
Interphase barriers for base.
Short terminal shields on circuit breaker.

Long terminal shields (also available for NSX400/630 spreaders with 52.5 mm pitch: B1 = 157.5 mm, B2 = 210 mm).
Adapter for base, required to mount long terminal shields or interphase barriers.

Mounting

Through front panel (N)	2/3P	3P	4P
	NSX100 to 250	NSX400/630	NSX100 to 630

DB112648



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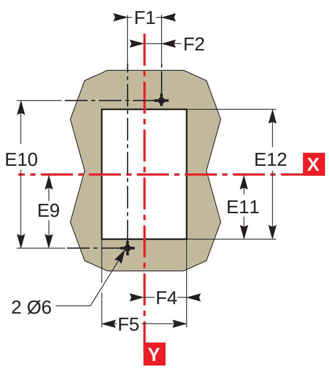

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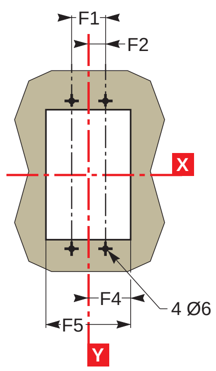

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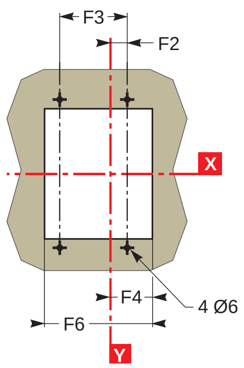
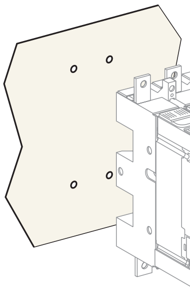
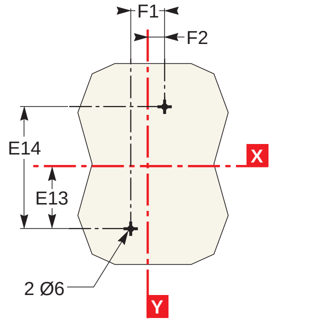
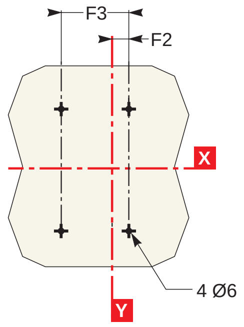


On backplate (M)	2/3P	4P

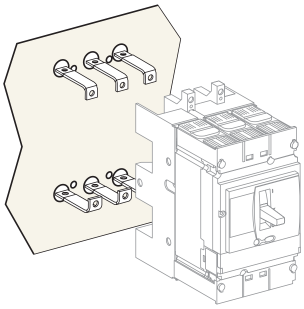
Front connection (an insulating screen is supplied with the base and must be fitted between the base and the backplate)

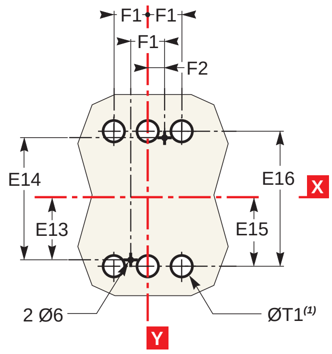


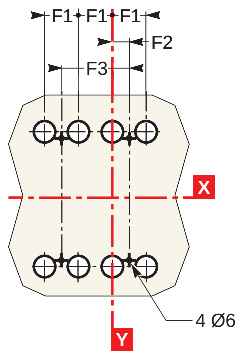




Connection by exterior-mounted rear connectors

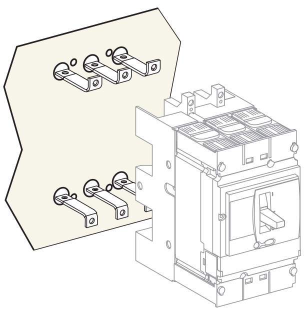


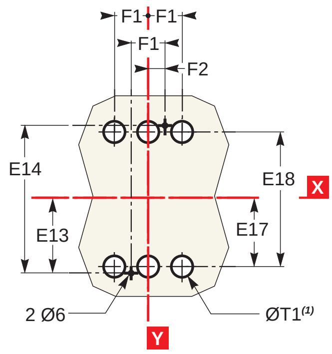


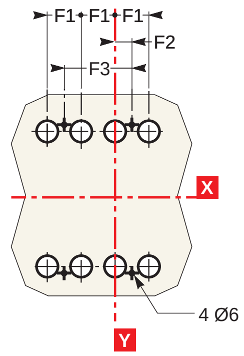


(1) The ØT1 holes are required for rear connection only (for two-pole circuit breakers, the middle holes are not required).

Connection by interior-mounted rear connectors

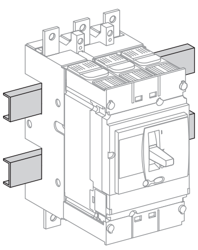


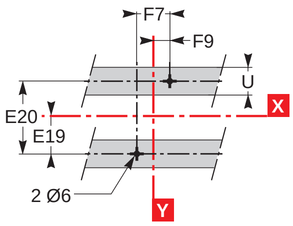


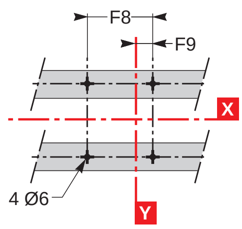


(1) The ØT1 holes are required for rear connection only (for two-pole circuit breakers, the middle holes are not required).

On rails	2/3P	4P







Type	A	A1	A2	A10	A11	B	B1	B2	C3	D1	E9	E10	E11	E12	E13	E14	E15
NSX100/160/250	80.5	161	94	175	210	52.5	105	140	126	75	95	190	87	174	77.5	155	79
NSX400/630	127.5	255	142.5	244	281	70	140	185	168	100	150	300	137	274	125	250	126

Type	E16	E17	E18	E19	E20	F1	F2	F3	F4	F5	F6	F7	F8	F9	ØT1	U
NSX100/160/250	158	61	122	37.5	75	35	17.5	70	54.5	109	144	70	105	35	24	≤ 32
NSX400/630	252	101	202	75	150	45	22.5	90	71.5	143	188	100	145	50	33	≤ 35

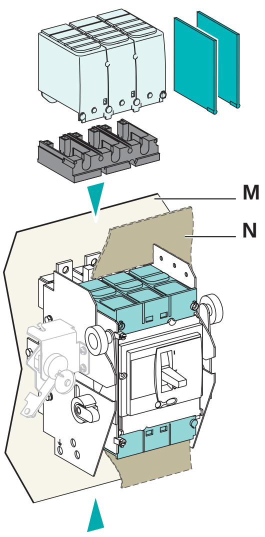
Dimensions and mounting

Compact NSX100 to 630 withdrawable version

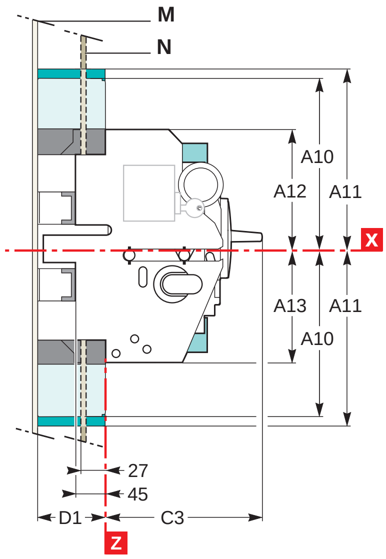
Dimensions

2/3P **4P**

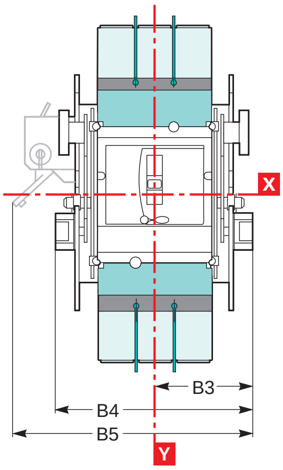
DB112644



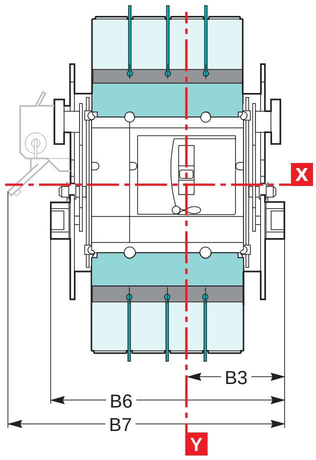
DB112645



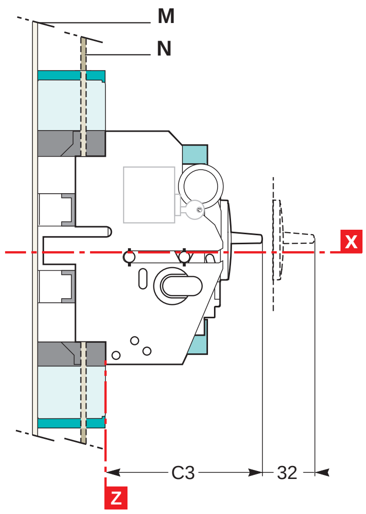
DB112646



DB112647



DB112681

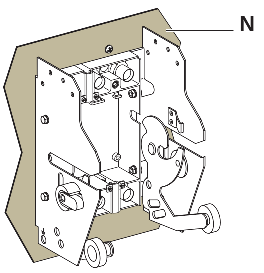


Interphase barriers for base.
Short terminal shields on circuit breaker.
Long terminal shields.
Adapter for base, required to mount long terminal shields or interphase barriers.

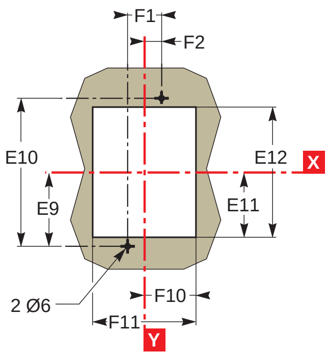
Mounting

Through front panel (N)	2/3P	3P	4P
	NSX100 to 250	NSX400/630	NSX100 to 630

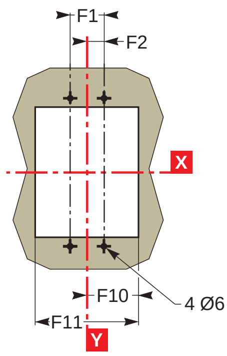
DB112651



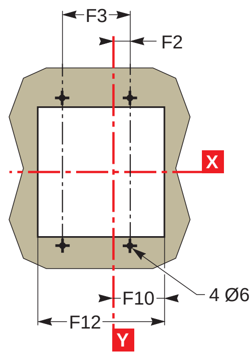
DB112652



DB115638



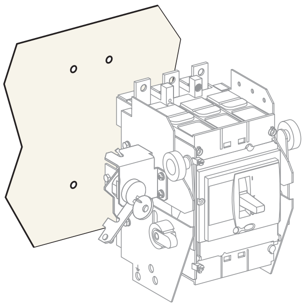
DB112653



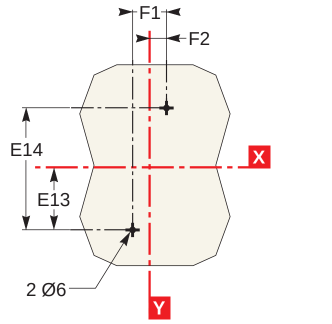
On backplate (M)	2/3P	4P

Front connection (an insulating screen is supplied with the base and must be fitted between the base and the backplate)

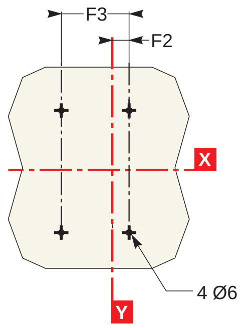
DB112682



DB112655

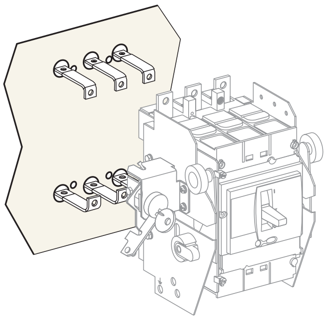


DB112656

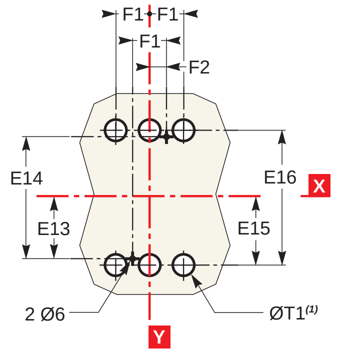


Connection by exterior-mounted rear connectors

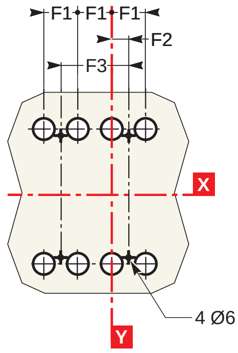
DB112683



DB112658



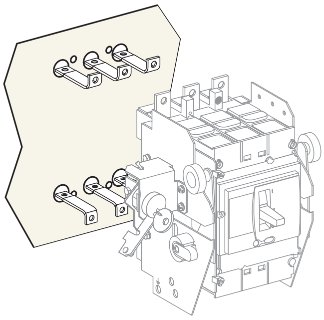
DB112659



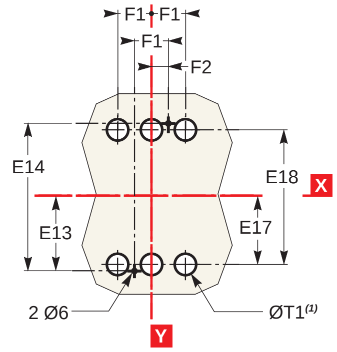
(1) The ØT1 holes are required for rear connection only (for two-pole circuit breakers, the middle holes are not required).

Connection by interior-mounted rear connectors

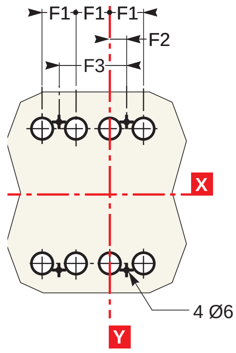
DB112684



DB112661



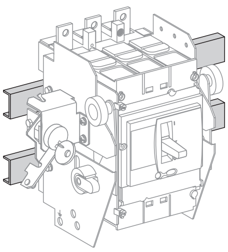
DB112662



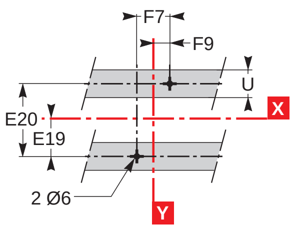
(1) The ØT1 holes are required for rear connection only (for two-pole circuit breakers, the middle holes are not required).

On rails	2/3P	4P

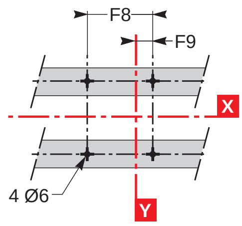
DB112685



DB112664



DB112665



Type	A10	A11	A12	A13	B3	B4	B5	B6	B7	C3	D1	E9	E10	E11	E12	E13	E14
NSX100/160/250	175	210	106.5	103.5	92.5	185	216	220	251	126	75	95	190	87	174	77.5	155
NSX400/630	244	281	140	140	110	220	250	265	295	168	100	150	300	137	274	125	250
Type	**E15**	**E16**	**E17**	**E18**	**E19**	**E20**	**F1**	**F2**	**F3**	**F7**	**F8**	**F9**	**F10**	**F11**	**F12**	**ØT1**	**U**
NSX100/160/250	79	158	61	122	37.5	75	35	17.5	70	70	105	35	74	148	183	24	≤ 32
NSX400/630	126	252	101	202	75	150	45	22.5	90	100	145	50	91.5	183	228	33	≤ 35

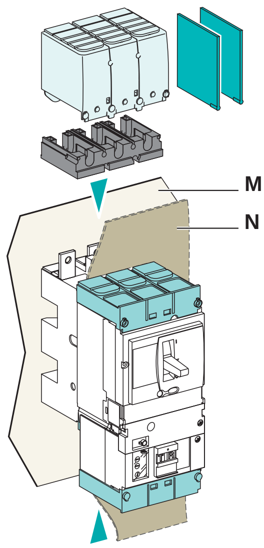
Dimensions and mounting

Vigicompact NSX100 to 630 plug-in and withdrawable versions

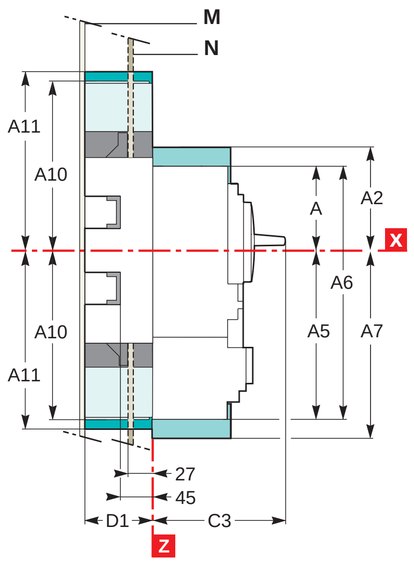
Dimensions - plug-in version

NSX100 to 250 — 3/4P | NSX400/630 — 3/4P

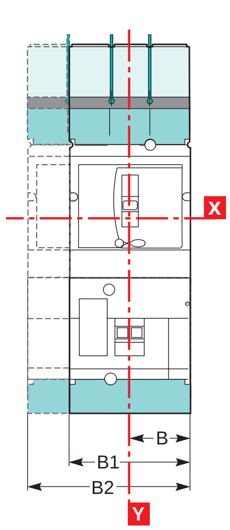
DB112666



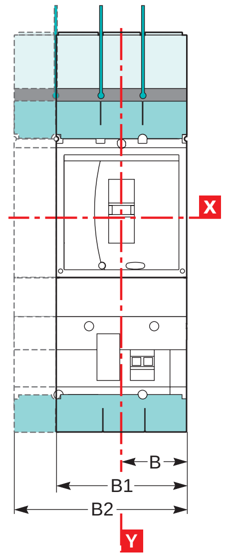
DB112667



DB112668



DB112669

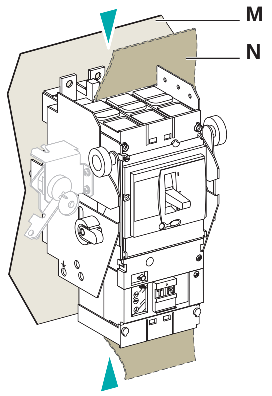


Interphase barriers for base.
Short terminal shields on circuit breaker.
Long terminal shields (also available for NSX400/630 spreaders with 52.5 mm pitch: B1 = 157.5 mm, B2 = 210 mm).
Adapter for base, required to mount long terminal shields or interphase barriers.

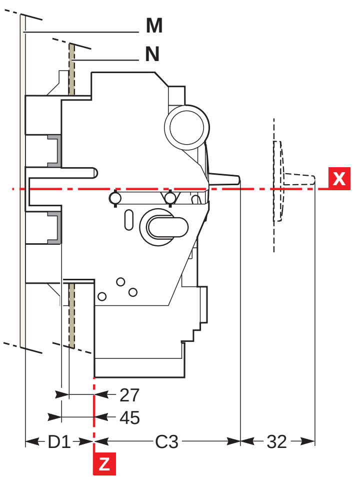
Dimensions - withdrawable version

NSX100 to 630 — 3P | 4P

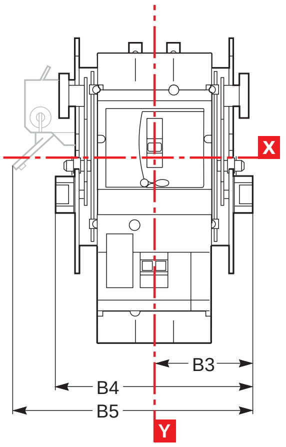
DB112670



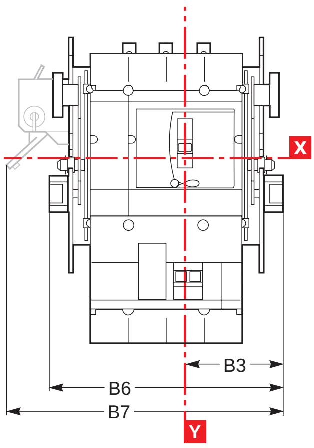
DB112671



DB112672



DB112673



Mounting

Through front panel (N)

See Compact NSX100 to 630 plug-in version, page C-4, or withdrawable version, page C-6

On backplate (M)

See Compact NSX100 to 630 plug-in version, page C-5, or withdrawable version, page C-7

On rails

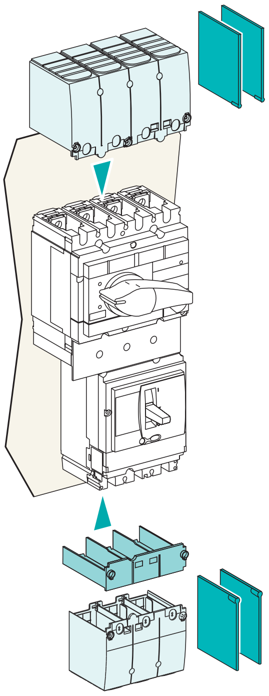
See Compact NSX100 to 630 plug-in version, page C-5, or withdrawable version, page C-7

Type	A	A2	A5	A6	A7	A10	A11	B	B1	B2	B3	B4	B5	B6	B7	C3	D1
NSX100/160/250	80.5	94	155.5	236	169	175	210	52.5	105	140	92.5	185	216	220	251	126	75
NSX400/630	127.5	142.5	227.5	355	242.5	244	281	70	140	185	110	220	250	265	295	168	100

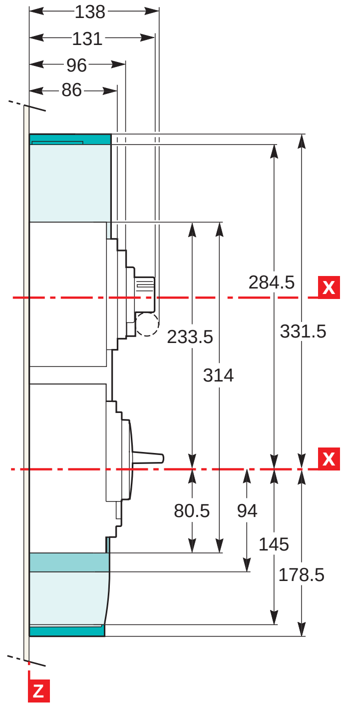
Visu function for Compact NSX100 to 250 fixed version

Dimensions - combination with Interpact INV100 to 250 — 3P — 4P

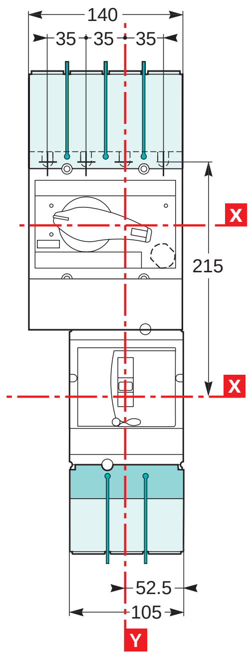
DB112674



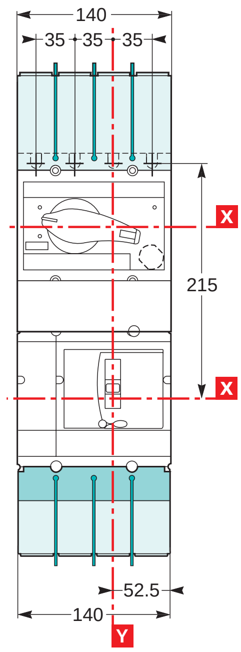
DB112675



DB112676



DB112677

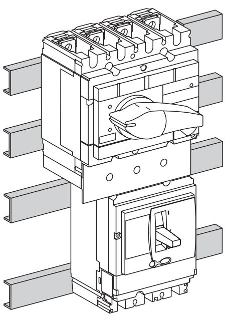


Interphase barriers.
Short terminal shields.
Long terminal shields.

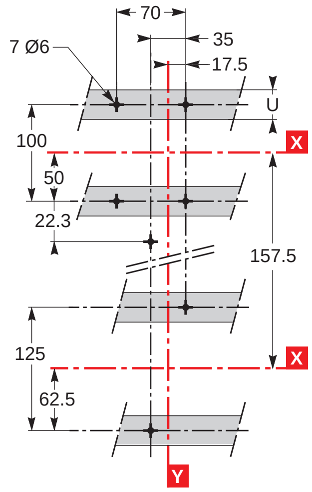
Mounting — 3P — 4P

On rails or backplate

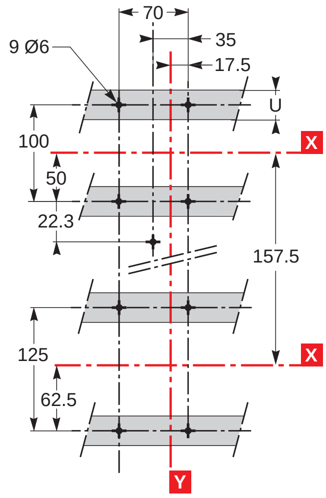
DB112678



DB112679



DB112680

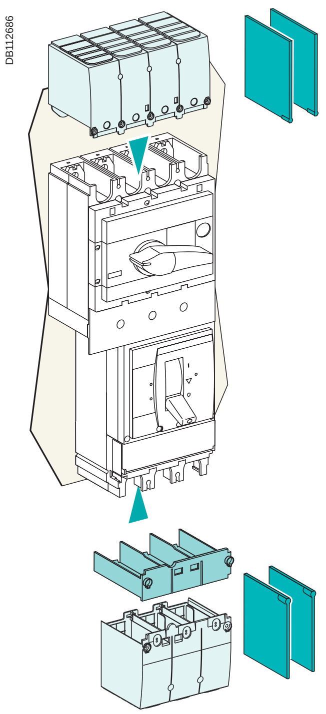


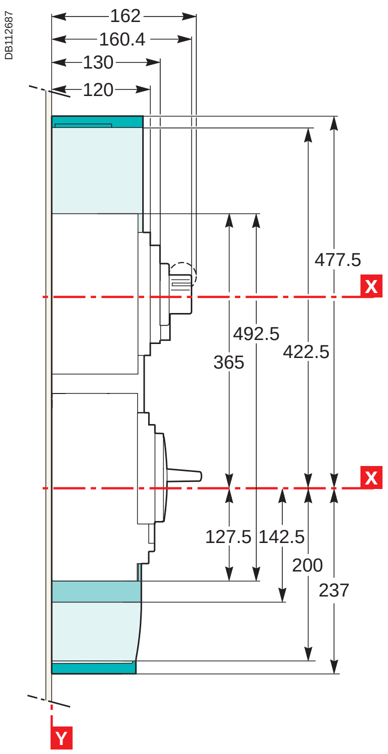
U ≤ 32

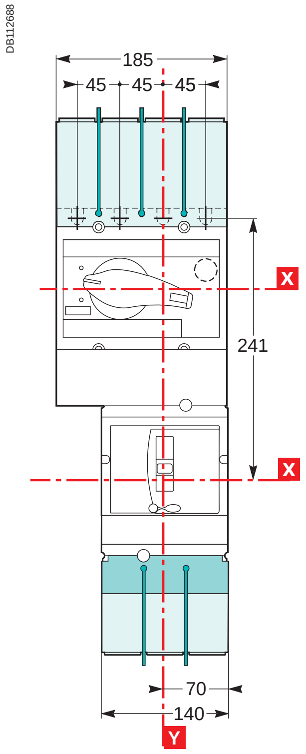
Dimensions and mounting

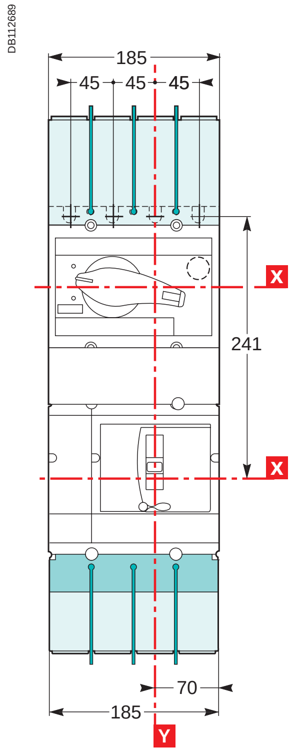
Visu function for Compact NSX400/630 fixed version

Dimensions - combination with Interpact INV400 to 630 3P 4P





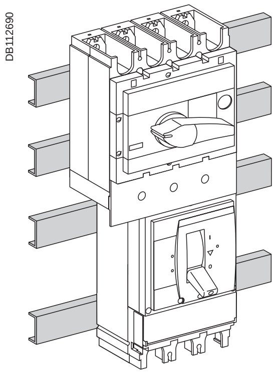


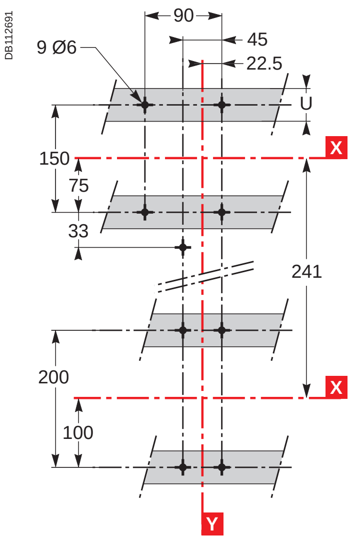


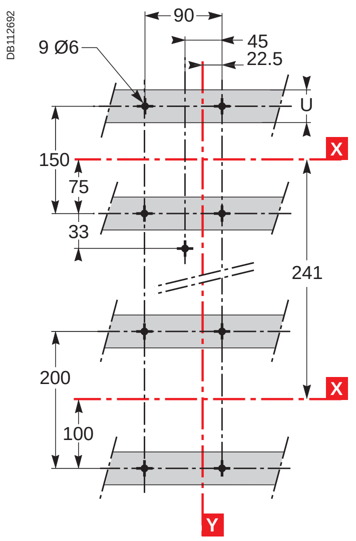
- Interphase barriers for base.
- Short terminal shields.
- Long terminal shields.

Mounting 3P 4P

On rails or backplate





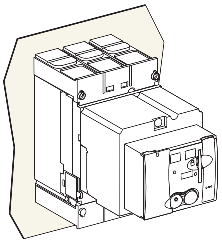


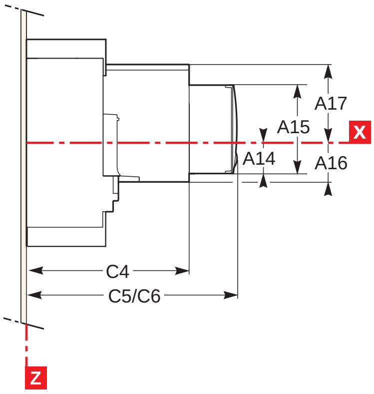
U ≤ 35

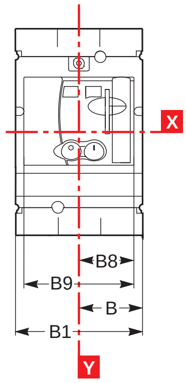
Motor mechanism module for Compact NSX100 to 630

Dimensions | 3P | 4P

Fixed circuit breaker

DB112693


DB112694


DB112695


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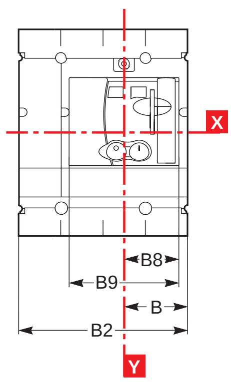
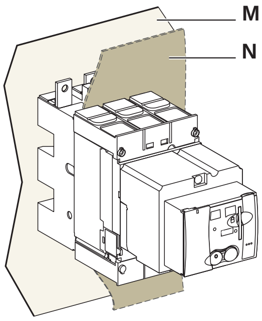
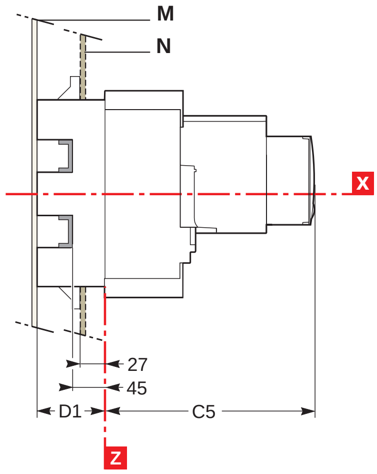


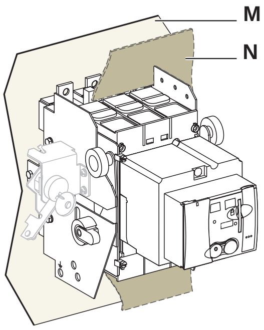
C5: without keylock
C6: with keylock

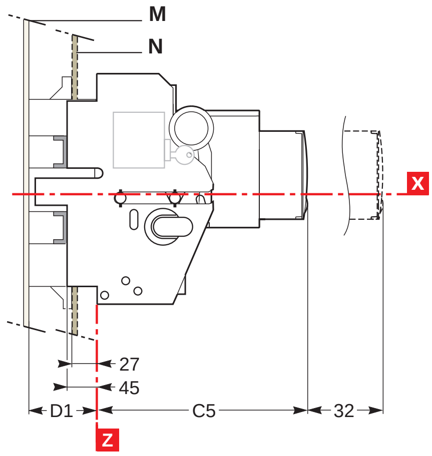
Plug-in circuit breaker

DB112697


DB112698


Withdrawable circuit breaker

DB112699


DB112700


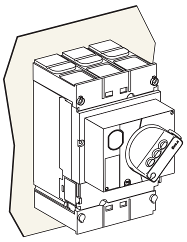
Type	A14	A15	A16	A17	B	B1	B2	B8	B9	C4	C5	C6	D1
NSX100/160/250	27.5	73	34.5	62.5	52.5	105	140	45.5	91	143	182	209.5	75
NSX400/630	40	123	52	100	70	140	185	61.5	123	215	256	258	100

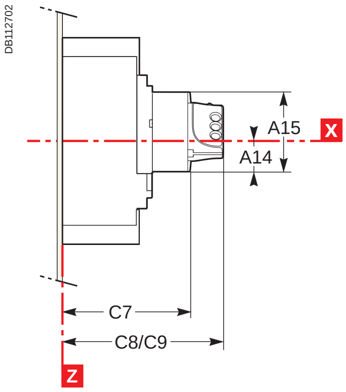
Dimensions and mounting

Direct rotary handle for Compact and Vigicompact NSX100 to 630

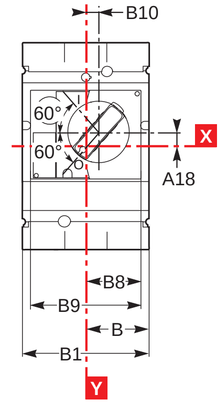
Dimensions	3P	4P

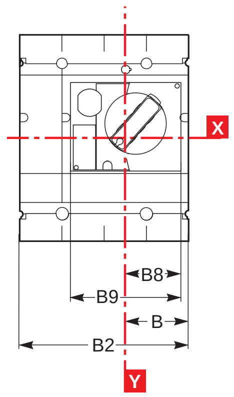
Fixed circuit breaker



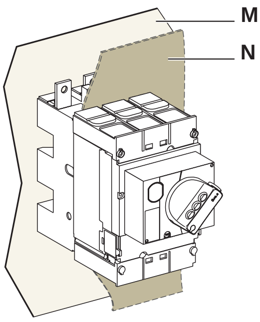


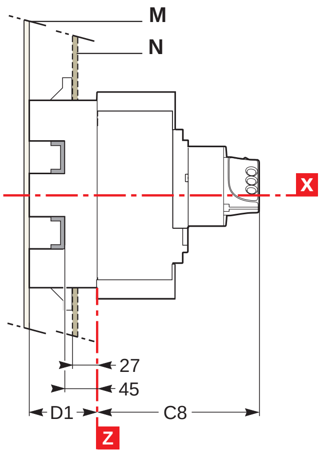
C8: without keylock
C9: with keylock



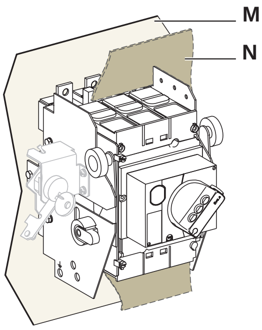


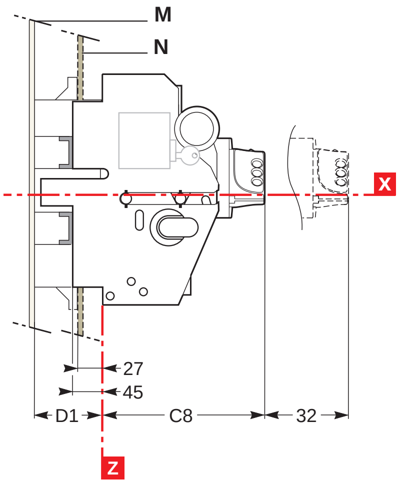
Plug-in circuit breaker





Withdrawable circuit breaker





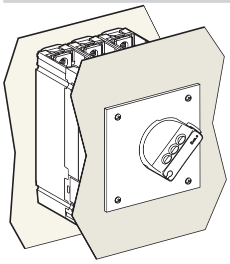
Type	A14	A15	A18	B	B1	B2	B8	B9	B10	C7	C8	C9	D1
NSX100/160/250	27.5	73	9	52.5	105	140	45.5	91	9.25	121	155	164	75
NSX400/630	40	123	24.6	70	140	185	61.5	123	5	145	179	188	100

MCC and CNOMO type direct rotary handles for Compact NSX100 to 630 fixed version

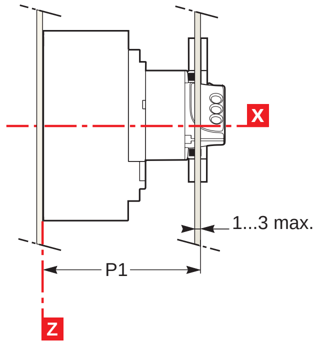
Dimensions

MCC type direct rotary handle

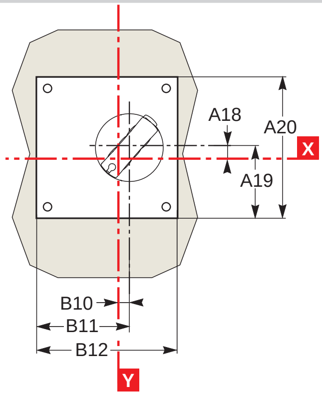
DB112712



DB112713

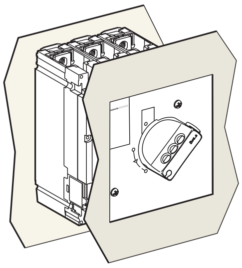


DB112714

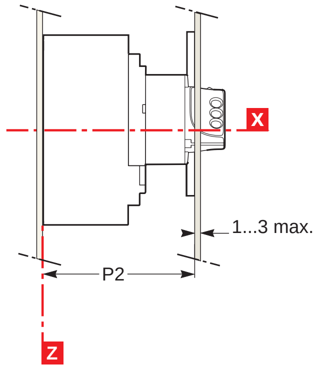


CNOMO type direct rotary handle

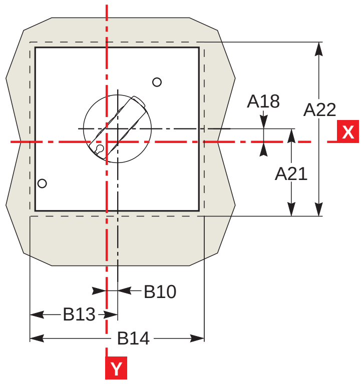
DB112 715



DB112716



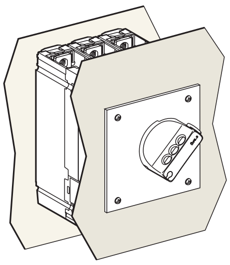
DB112717



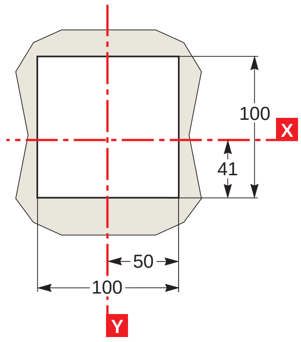
Front-panel cutout | NSX100 to 250 | NSX400/630

MCC type direct rotary handle

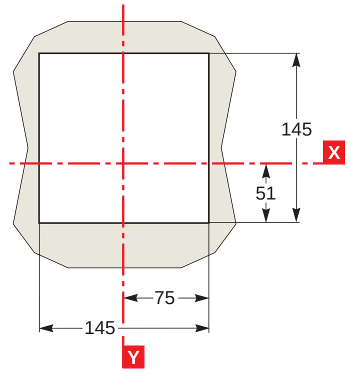
DB112712



DB111413

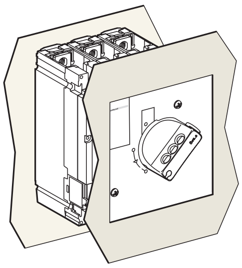


DB111414

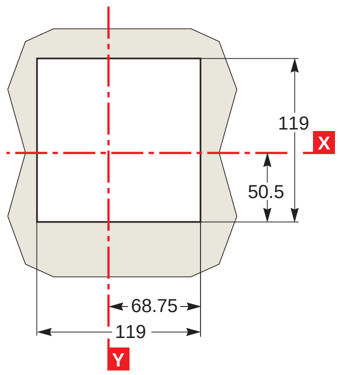


CNOMO type direct rotary handle

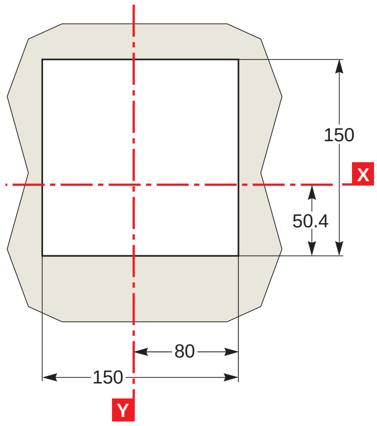
DB112 715



DB111415



DB111416



Type	A18	A19	A20	A21	A22	B10
NSX100/160/250	9	60	120	65	130	9.25
NSX400/630	24.6	83	160	82	164	5
Type	**B11**	**B12**	**B13**	**B14**	**P1**	**P2**
NSX100/160/250	69	120	65	130	125	135
NSX400/630	85	160	82	164	149	158

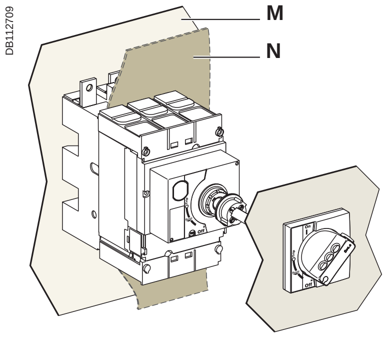
Dimensions and connection

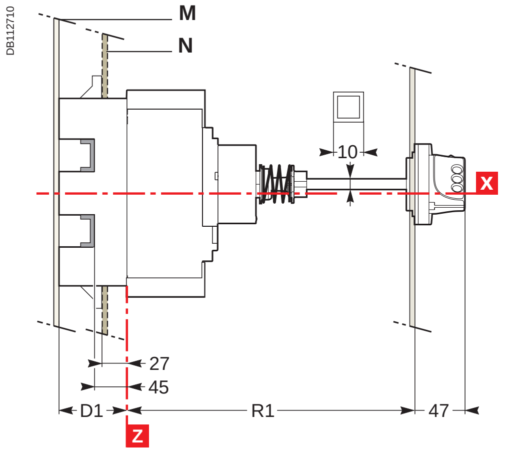
Dimensions and mounting

Extended rotary handle for Compact NSX100 to 630

Dimensions

Fixed and plug-in circuit breakers

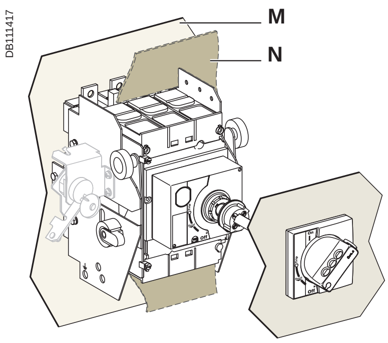


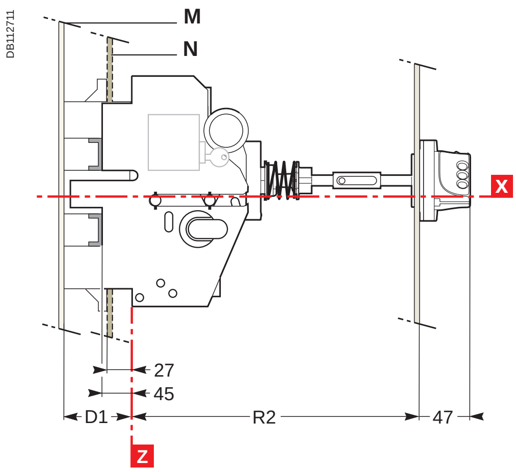


Cutout for shaft (mm)

Type	R1
NSX100/160/250	min. 171 max. 600
NSX400/630	min. 195 max. 600

Withdrawable circuit breaker

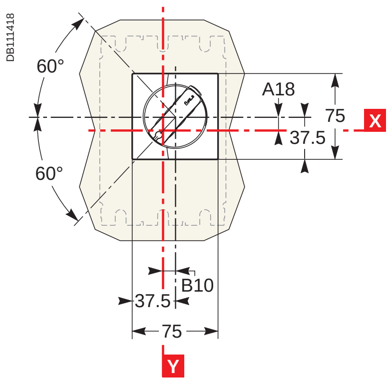


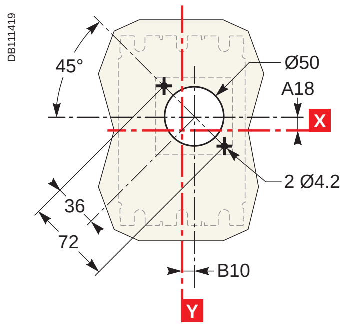


Cutout for shaft (mm)

Type	R2
NSX100/160/250	min. 248 max. 600
NSX400/630	min. 272 max. 600

Dimensions and front-panel cutout





Type	A18	B10	D1
NSX100/160/250	9	9.25	75
NSX400/630	24.6	5	100

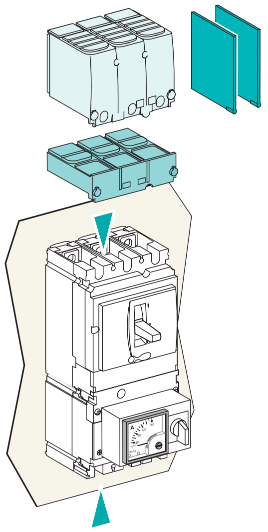
Dimensions and mounting

Indication and measurement modules for Compact NSX100 to 630 fixed version

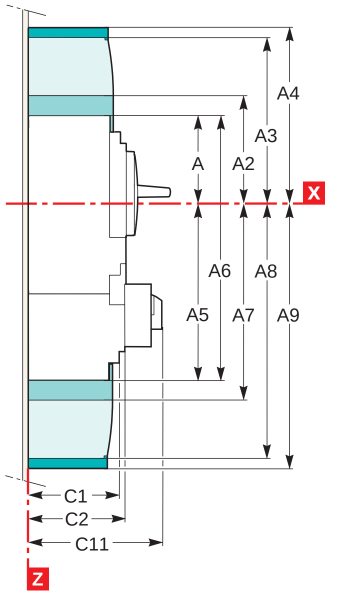
Dimensions

Circuit breaker with ammeter module

DB112718

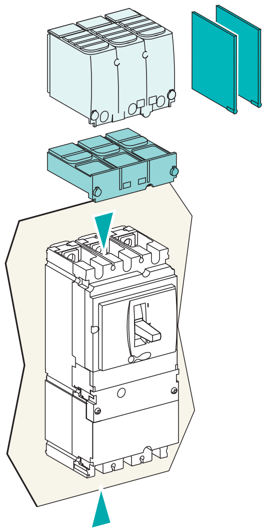


DB112719

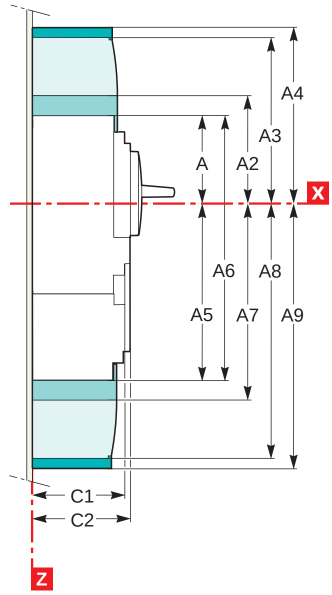


Circuit breaker with current-transformer module

DB112720



DB112721



Interphase barriers.
Short terminal shields.
Long terminal shields.

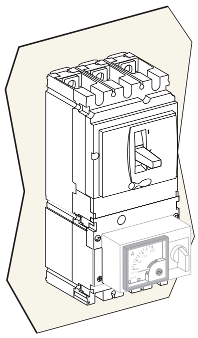
Mounting

NSX100 to 250	NSX400/630	NSX100 to 630

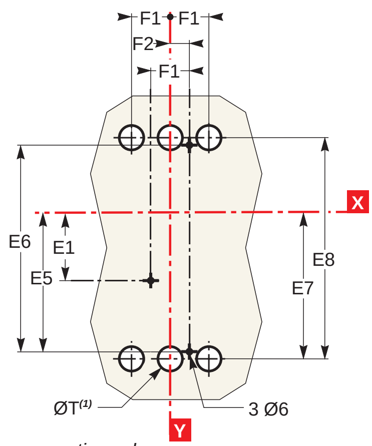
On backplate

2/3P	3P	4P

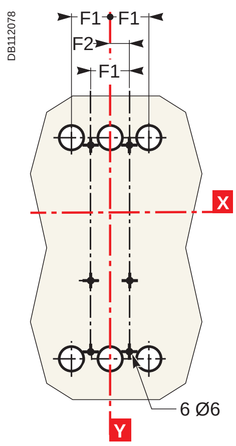
DB112722



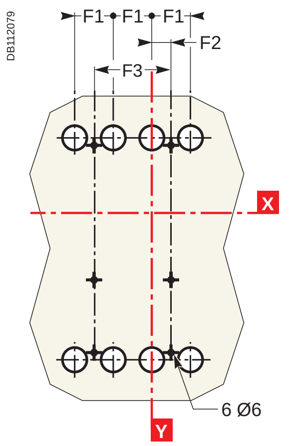
DB111420



DB112078



DB112079

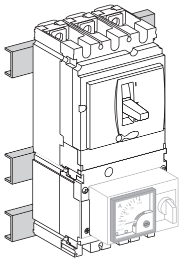


(1) The ØT holes are required for rear connection only.
For two-pole circuit breakers, the middle holes are not required.

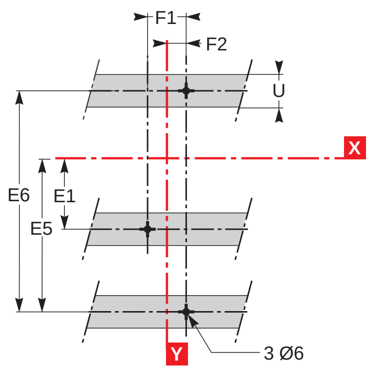
On rails

2/3P	3P	4P

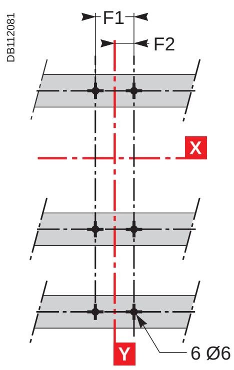
DB112723



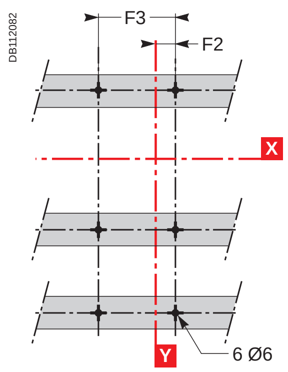
DB111421



DB112081



DB112082



Type	A	A2	A3	A4	A5	A6	A7	A8	A9	C1	C2	C11	E1	E5	E6	E7	E8
NSX100/160/250	80.5	94	145	178.5	155.5	236	169	220	253.5	81	86	137	62.5	137.5	200	145	215
NSX400/630	127.5	142.5	200	237	227.5	355	242.5	300	337	95.5	110	162	100	200	300	213.5	327

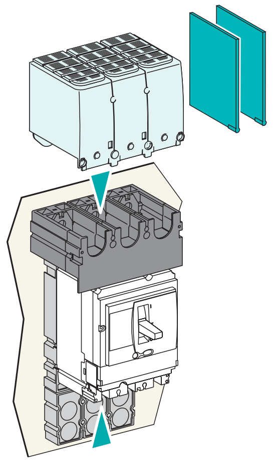
Type	F1	F2	F3	ØT	U
NSX100/160/250	35	17.5	70	24	≤ 32
NSX400/630	45	22.5	90	32	≤ 35

Dimensions and mounting

One-piece spreader for Compact NSX100 to 250 fixed version

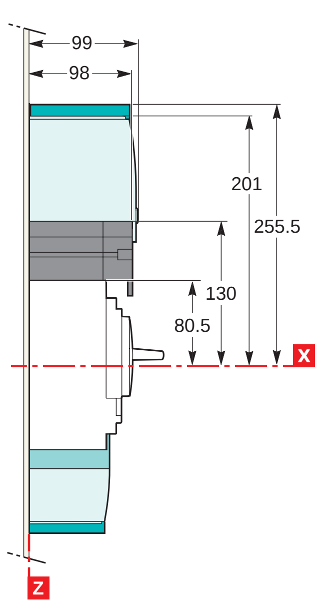
Dimensions

DB111422



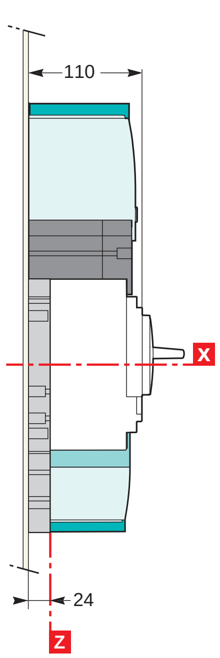
Rear alignment

DB111423

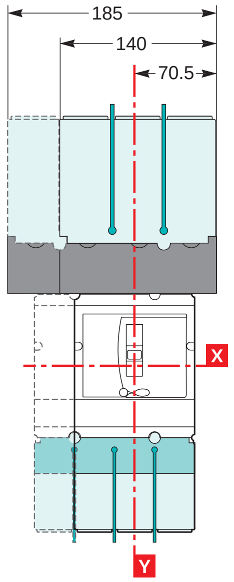


Front alignment

DB111424



DB111425

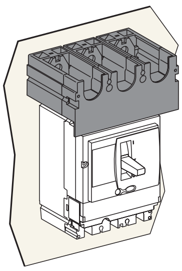


Interphase barriers.
Short terminal shields.
Long terminal shields.

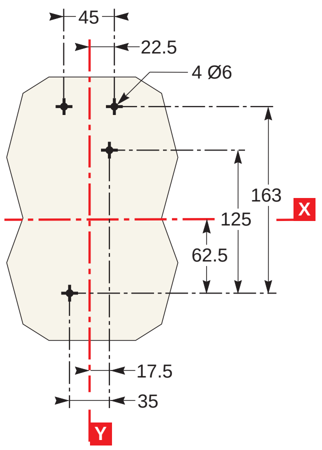
Mounting

Rear alignment | **2/3P** | **4P**

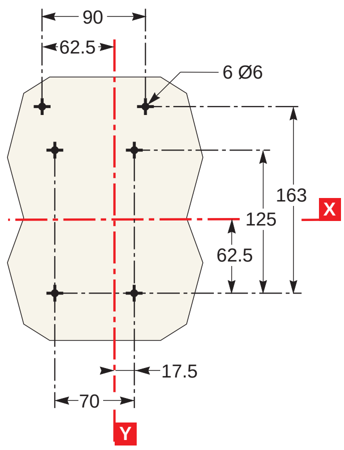
DB114985



DB114986

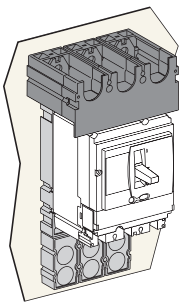


DB114987

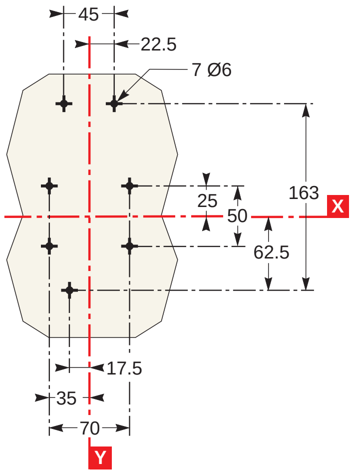


Front alignment | **2/3P** | **4P**

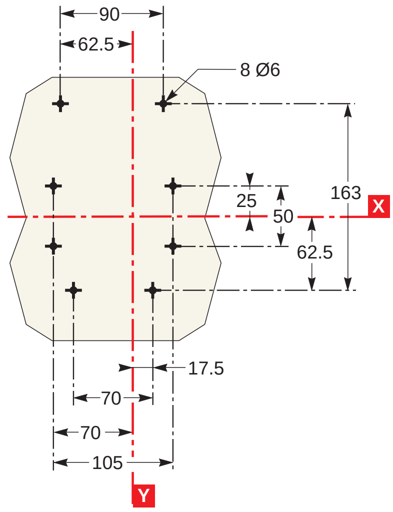
DB114988



DB114989



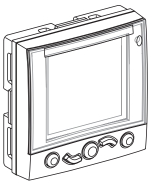
DB114990



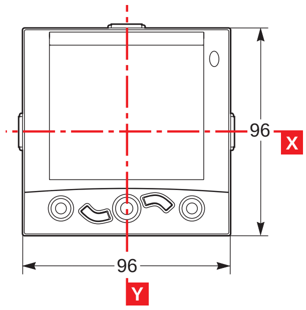
FDM121 switchboard display

Dimensions

DB114991



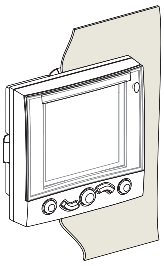
DB114992



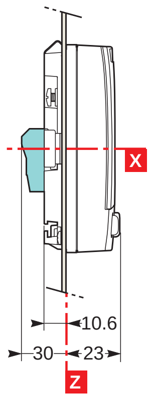
Mounting

Through panel

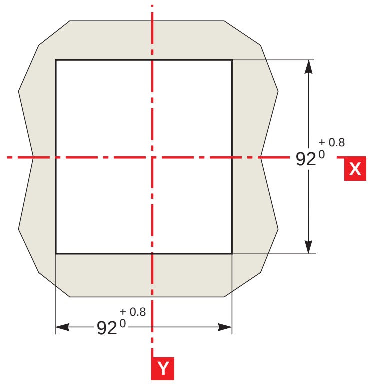
DB114993



DB114994

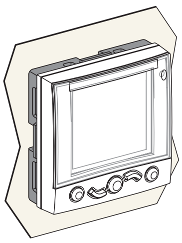


DB118545

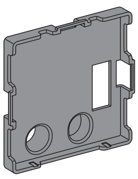


On panel

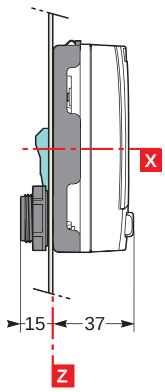
DB114996



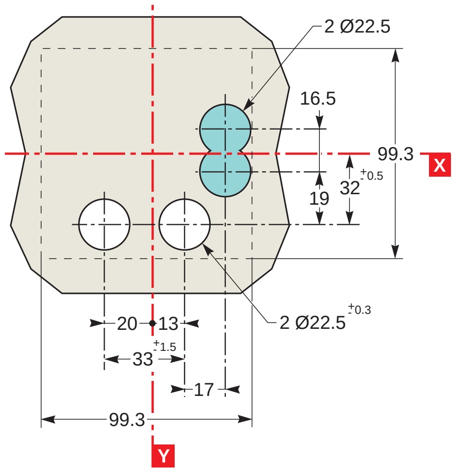
DB115270



DB115121



DB115122



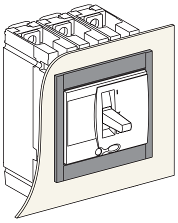
Connector (optional).

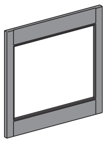
Front-panel accessories

Compact NSX100 to 630

IP30 front-panel escutcheons

For toggle, rotary handle or motor mechanism module

DB114997


DB114998


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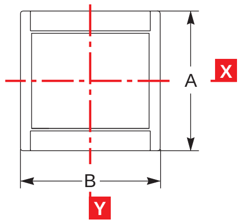

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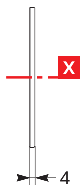
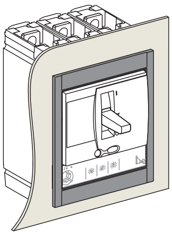


For toggle or rotary handle with access to trip unit

DB115001


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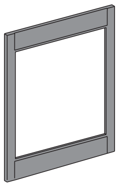

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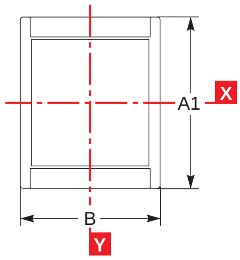
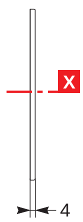
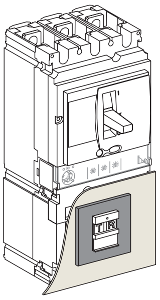
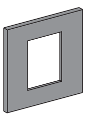
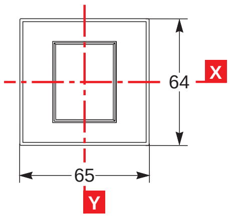


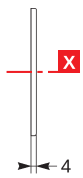
DB115004


For Vigicompact

DB115005


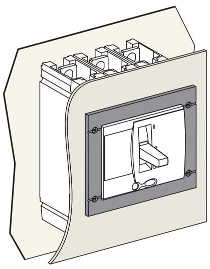
DB115006


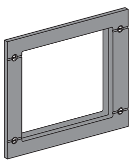
DB115007


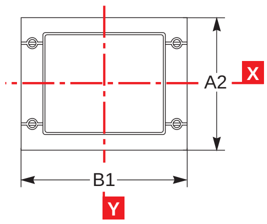
DB115008


IP40 front-panel escutcheons

For toggle, rotary handle or motor mechanism module and protection collar

DB115064


DB115010


DB115011


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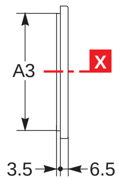
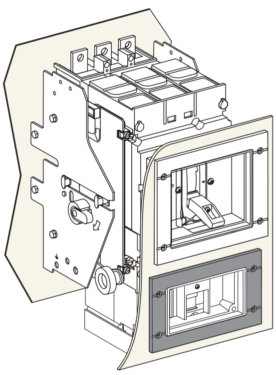
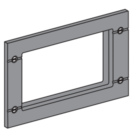
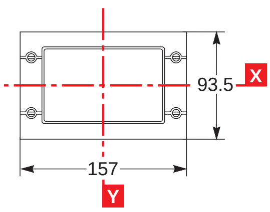
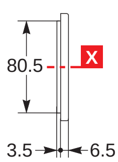


For Vigicompact with protection collar or ammeter module

DB115013


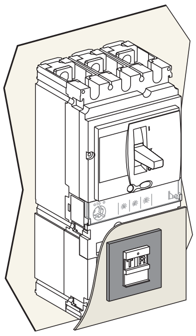
DB115014


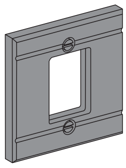
DB115015


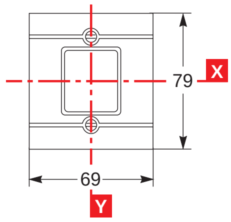
DB115016


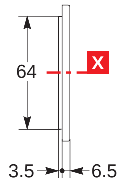
IP40 front-panel escutcheons (cont.)

For Vigicompact

DB115017


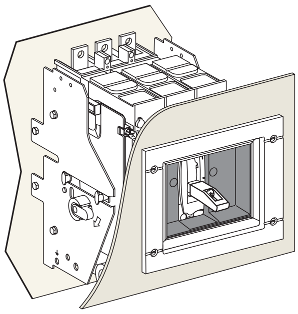
DB115018


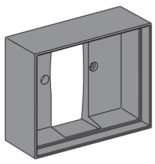
DB115019


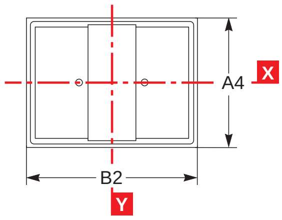
DB115020


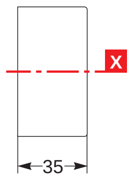
Protection collars for IP40 front-panel escutcheons

For toggle

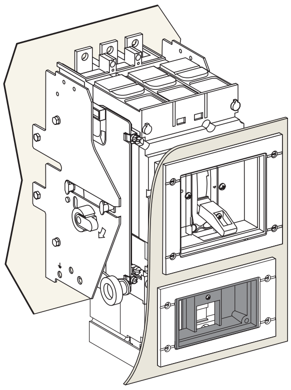
DB115021


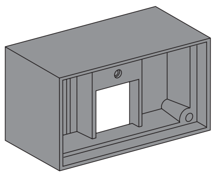
DB115022


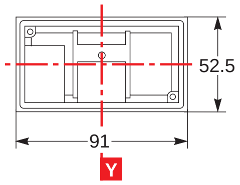
DB115023


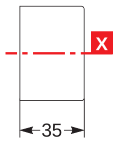
DB115024


For Vigicompact

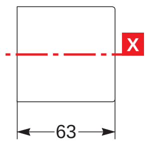
DB115025


DB115026


DB115027


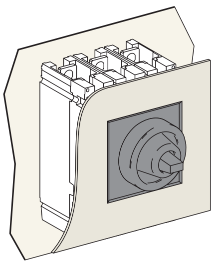
DB115028


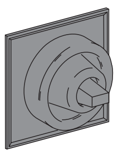
Circuit breaker with toggle or rotary handle.

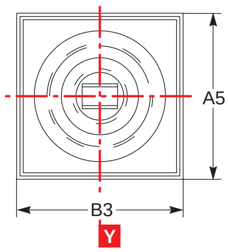
DB115029


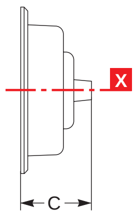
Circuit breaker with motor-mechanism module.

IP43 toggle cover

DB115030


DB115031


DB115032


DB115120


Type	A	A1	A2	A3	A4	A5	B	B1	B2	B3	C
NSX100/160/250	113	138	114	101	73	85	113	157	91	103	40
NSX400/630	163	211	164	151	122.5	138	163	189	122.5	138	60

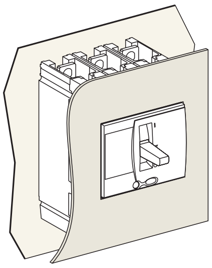
Front-panel cutouts

Compact NSX100 to 630 fixed version

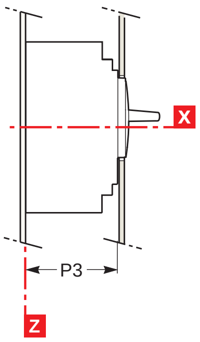
Bare sheet metal	NSX100 to 250	NSX400/630

For toggle

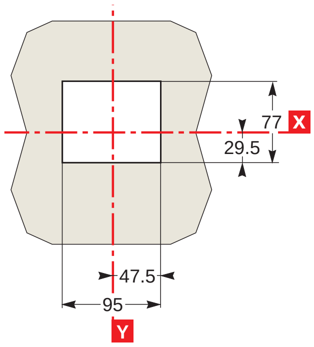
DB115035



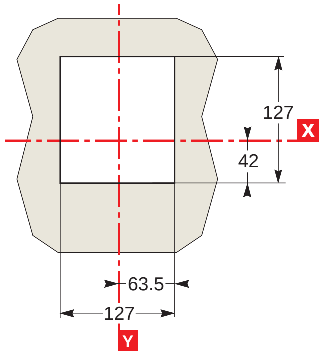
DB115037



DB115038

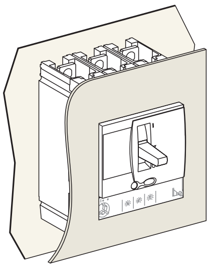


DB115039

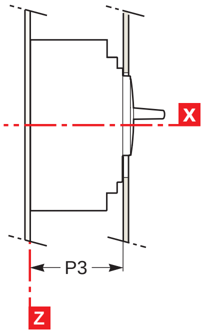


For toggle with access to trip unit

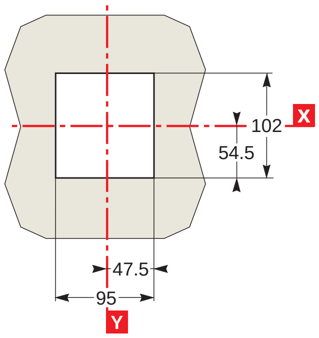
DB115040



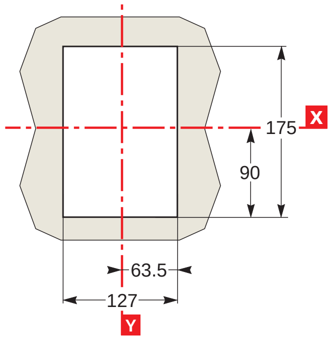
DB115041



DB115042



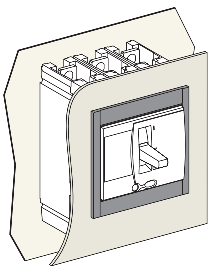
DB119816



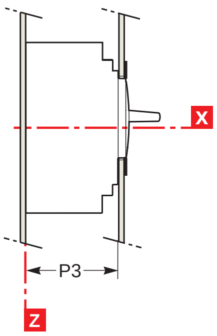
With IP30 front-panel escutcheon	NSX100 to 250	NSX400/630

For toggle

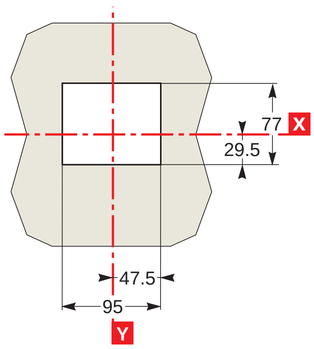
DB115044



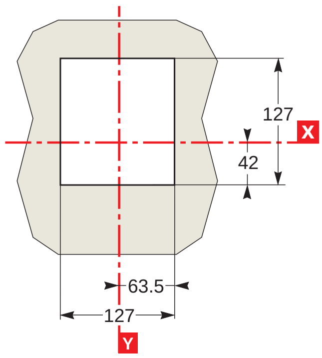
DB115045



DB115038

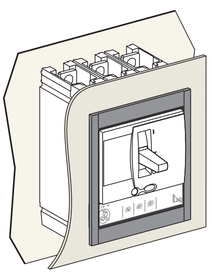


DB115039

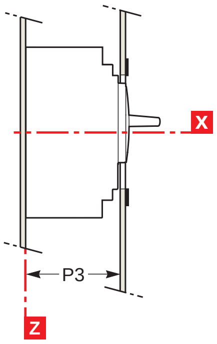


For toggle with access to trip unit

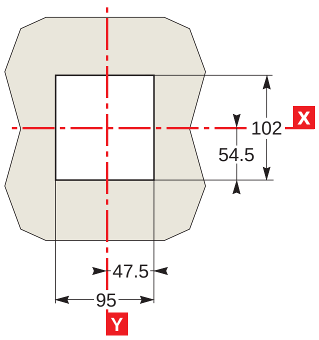
DB115062



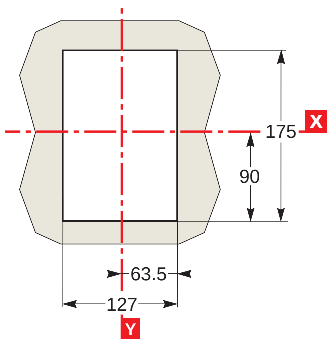
DB115063



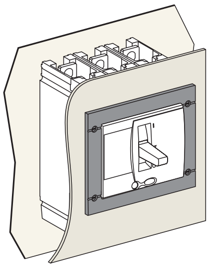
DB115042

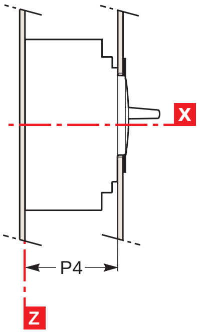


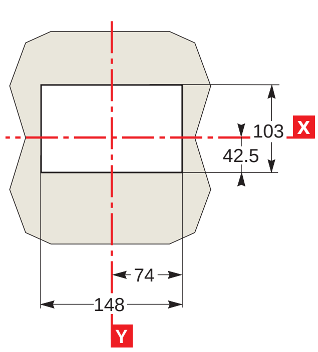
DB119816

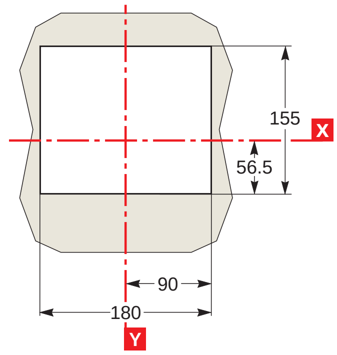


With IP40 front-panel escutcheon	NSX100 to 250	NSX400/630
For toggle		

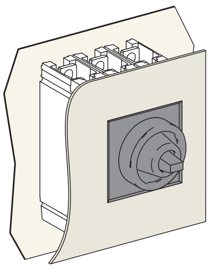
DB115064


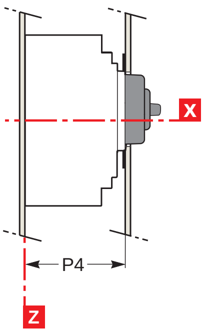
DB115065


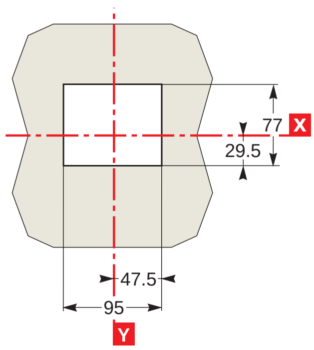
DB115066


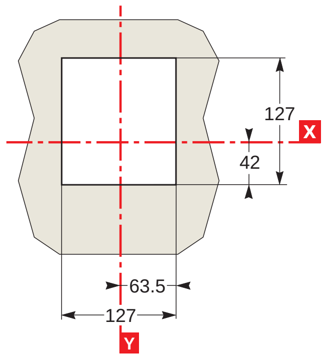
DB115067


With IP43 toggle cover	NSX100 to 250	NSX400/630
For toggle		

DB115068


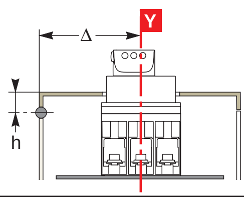
DB115123


DB115038


DB115039


Type	P3	P4
NSX100/160/250	88	89
NSX400/630	112	113

Note: door cutout dimensions are given for a device position in the enclosure where ∆ ⩾ 100 + (h x 5) with respect to the door hinge.

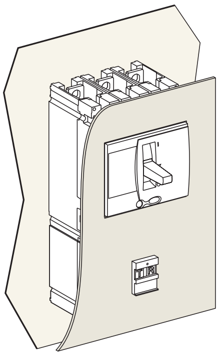
DB115439


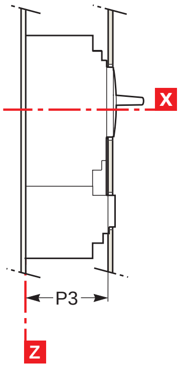
Front-panel cutouts

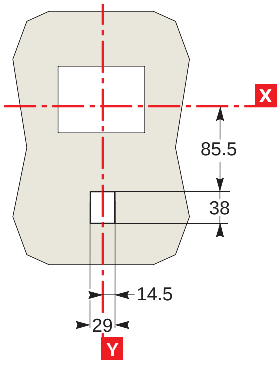
Vigicompact NSX100 to 630 fixed version

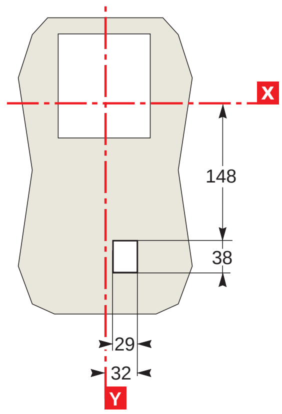
Bare sheet metal	NSX100 to 250	NSX400/630

For toggle

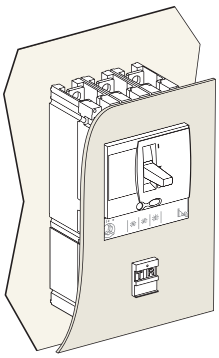
DB115072


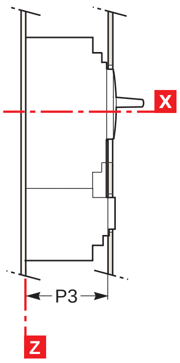
DB115073


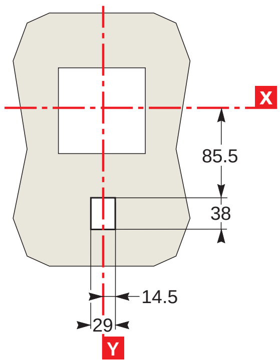
DB115074


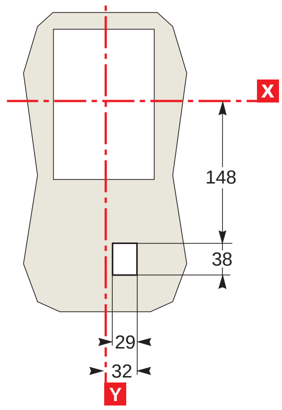
DB115075


For toggle with access to trip unit

DB115076


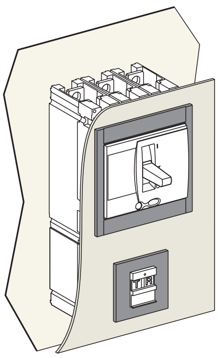
DB115077


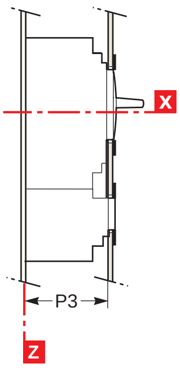
DB115078


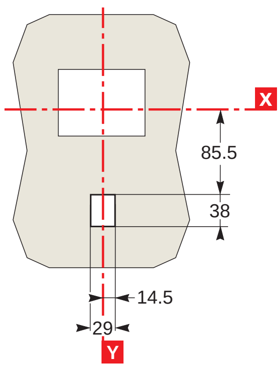
DB115079


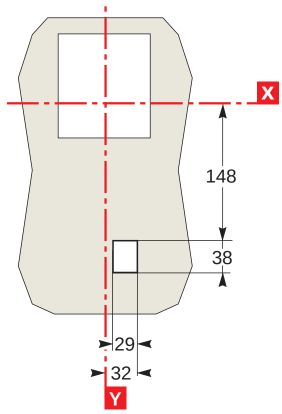
With IP30 front-panel escutcheon	NSX100 to 250	NSX400/630

For toggle

DB115080


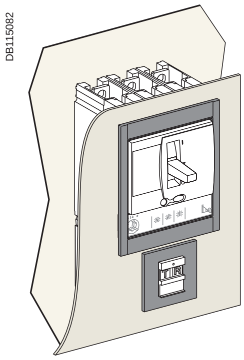
DB115081


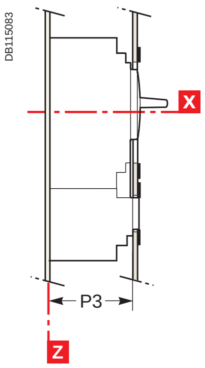
DB115074


DB115075


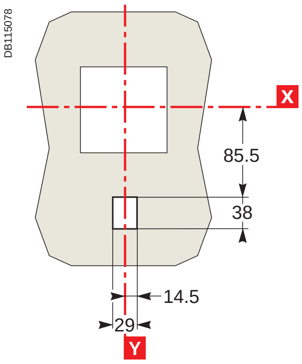
With IP30 front-panel escutcheon (cont.) — NSX100 to 250 — NSX400/630

For toggle with access to trip unit

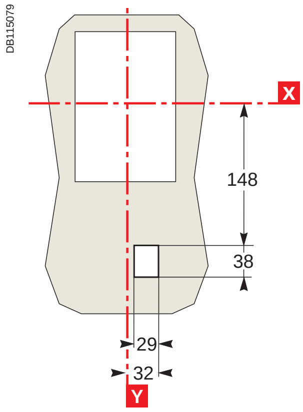




NSX100 to 250

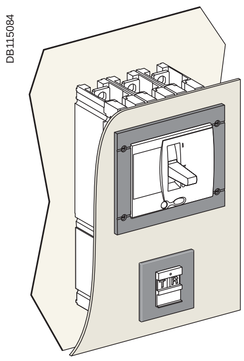


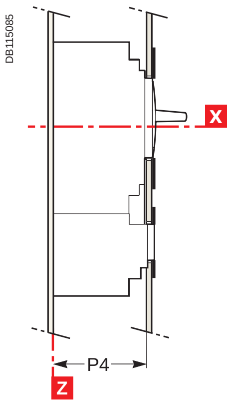
NSX400/630



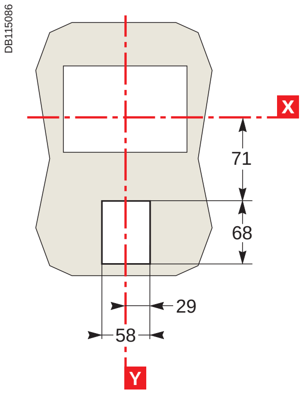
With IP40 front-panel escutcheon — NSX100 to 250 — NSX400/630

For toggle

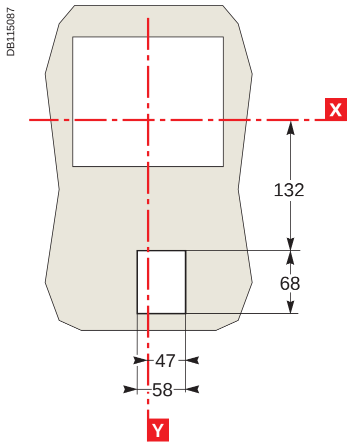




NSX100 to 250

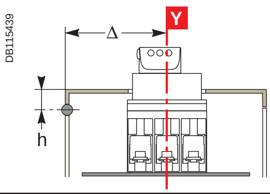


NSX400/630



Type	P3	P4
NSX100/160/250	88	89
NSX400/630	112	113

Note: door cutout dimensions are given for a device position in the enclosure where ∆ ≥ 100 + (h x 5) with respect to the door hinge.



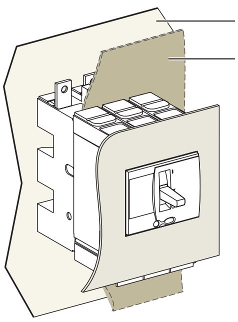
Dimensions and connection

Front-panel cutouts

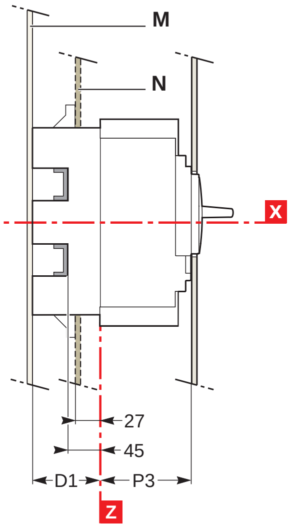
Compact NSX100 to 630 plug-in and withdrawable versions

Plug-in version

DB115088



DB115089



Bare sheet metal

See Compact NSX100 to 630 fixed version, page C-20

With IP30 front-panel escutcheon

See Compact NSX100 to 630 fixed version, page C-20

With IP40 front-panel escutcheon

See Compact NSX100 to 630 fixed version, page C-21

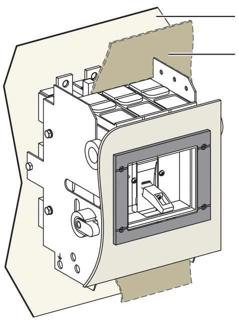
With toggle cover

See Compact NSX100 to 630 fixed version, page C-21

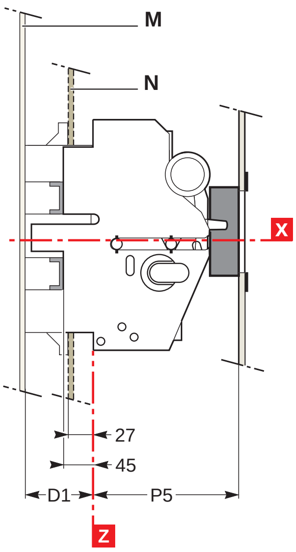
Withdrawable version | NSX100 to 250 | NSX400/630

With protection collar and IP40 front-panel escutcheon

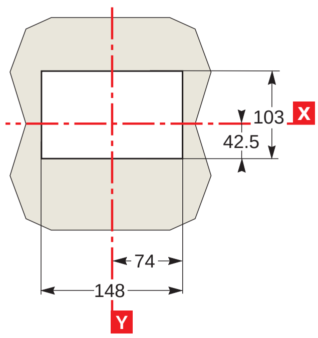
DB115090



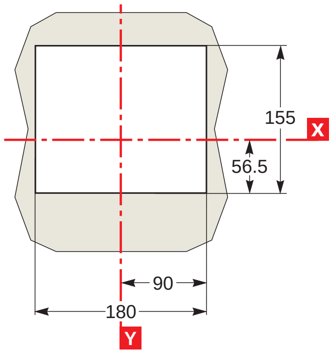
DB115091



DB115066



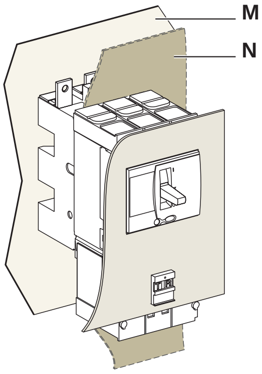
DB115067



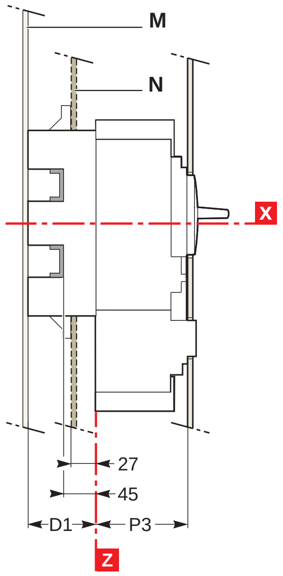
Vigicompact NSX100 to 630 plug-in and withdrawable versions

Plug-in version

DB115092



DB115094



Bare sheet metal

See Compact NSX100 to 630 fixed version, page C-22

With IP30 front-panel escutcheon

See Compact NSX100 to 630 fixed version, page C-22

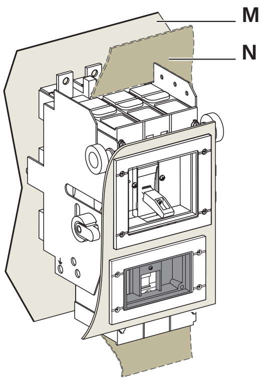
With IP40 front-panel escutcheon

See Compact NSX100 to 630 fixed version, page C-23

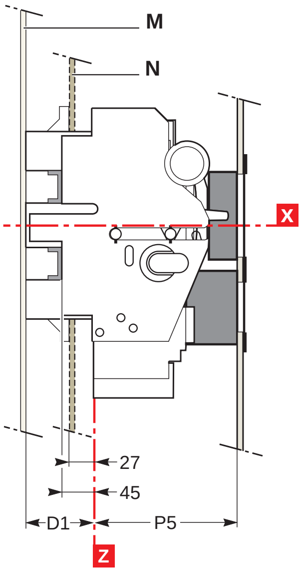
Withdrawable version | NSX100 to 250 | NSX400/630

With protection collar and IP40 front-panel escutcheon

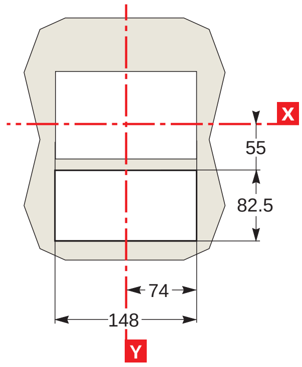
DB115095



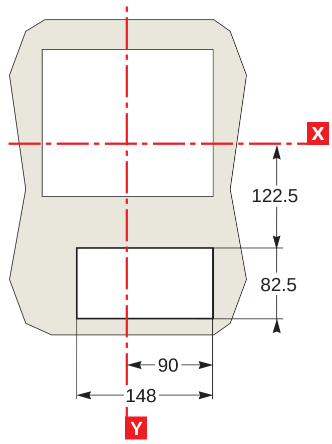
DB115096



DB115097



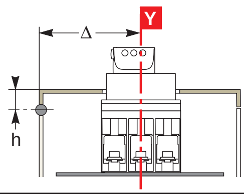
DB115098



Type	D1	P3	P5
NSX100/160/250	75	88	123
NSX400/630	100	112	147

Note: door cutout dimensions are given for a device position in the enclosure where Δ ⩾ 100 + (h x 5) with respect to the door hinge.

DB115439



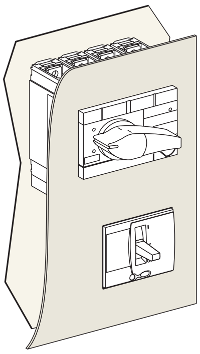
Front-panel cutouts

Visu function for Compact NSX100 to 630 fixed version

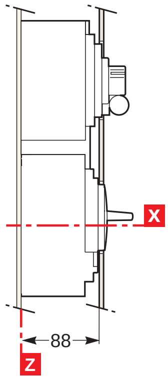
Compact NSX100 to 250 with Interpact INV100 to 250 Visu function

Bare sheet metal

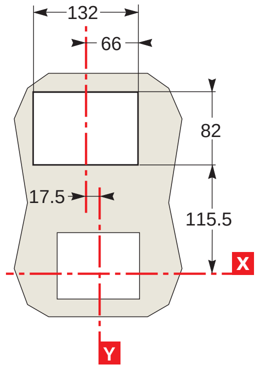
DB115099



DB115100

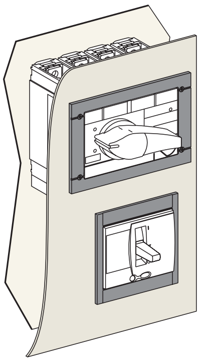


DB115101

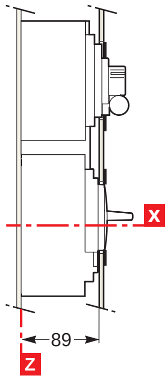


With IP40 front-panel escutcheon

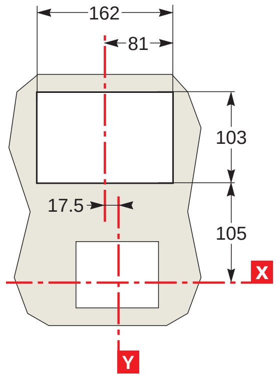
DB115102



DB115103



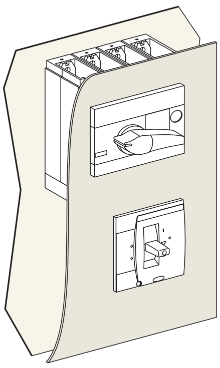
DB115440



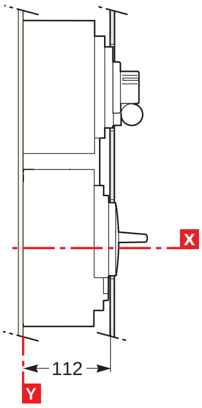
Compact NSX400/630 with Interpact INV400 to 630 Visu function

Bare sheet metal

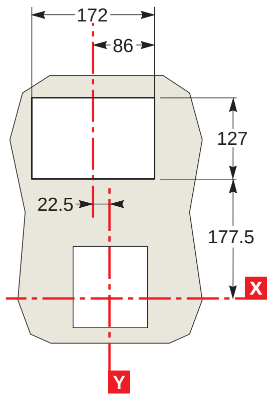
DB115104



DB115105

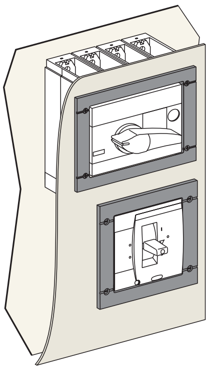


DB115106

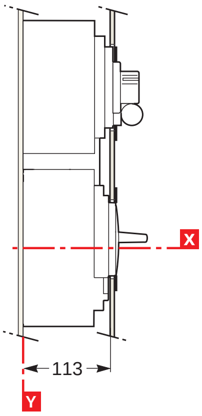


With IP40 front-panel escutcheon

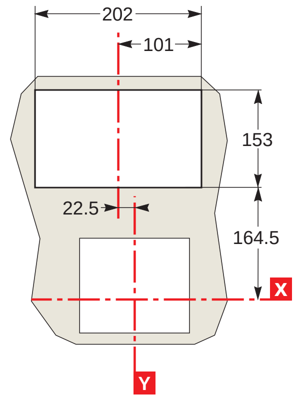
DB115107



DB115108



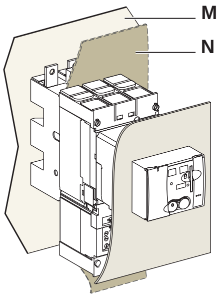
DB115441

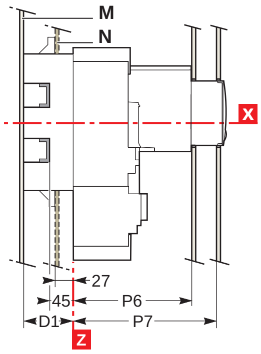


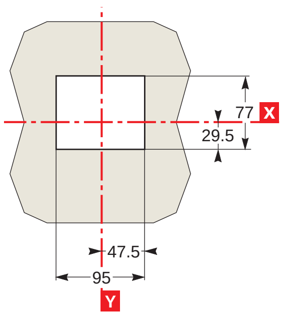
Motor mechanism module for Compact and Vigicompact NSX100 to 630

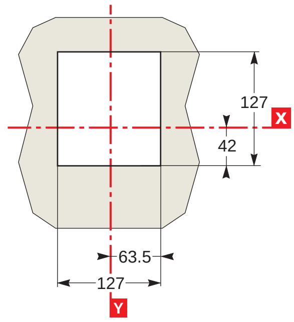
Bare sheet metal — NSX100 to 250 — NSX400/630

Fixed, plug-in or withdrawable circuit breaker

DB115109


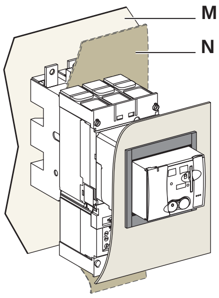
DB115110


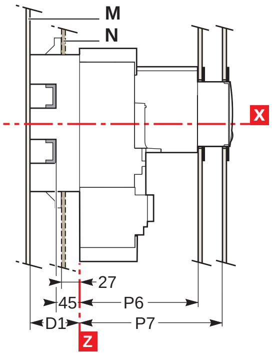
DB115038


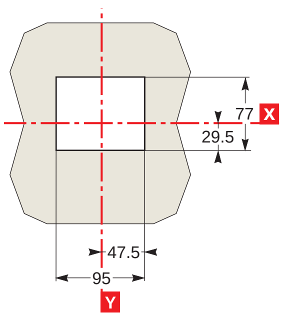
DB115069


With IP30 front-panel escutcheon — NSX100 to 250 — NSX400/630

Fixed, plug-in or withdrawable circuit breaker

DB115111


DB115112


DB115038


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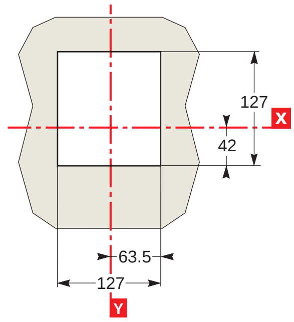
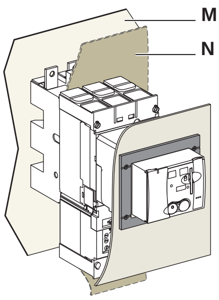
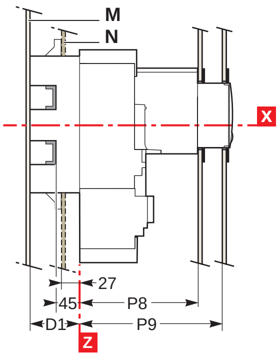
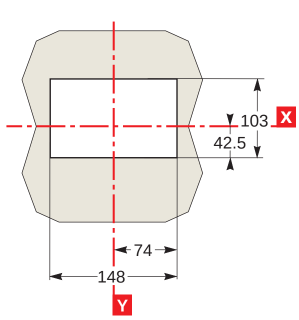


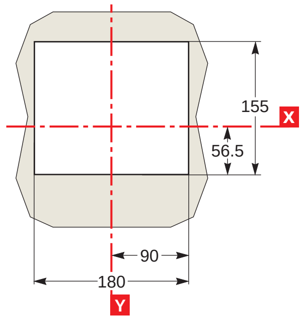
With IP40 front-panel escutcheon — NSX100 to 250 — NSX400/630

Fixed, plug-in or withdrawable circuit breaker without access to Vigi module

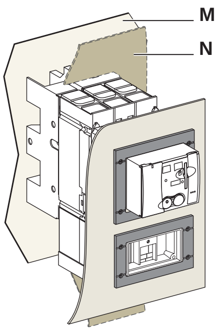
DB115113


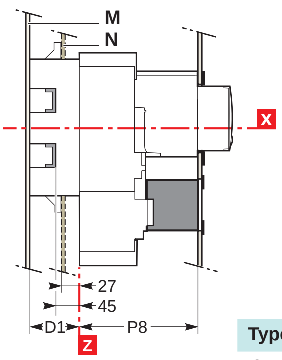
DB115114


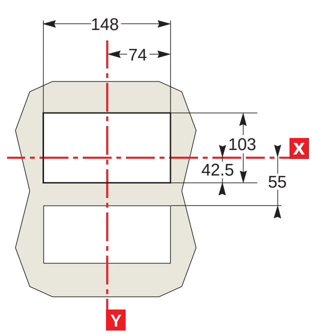
DB115066


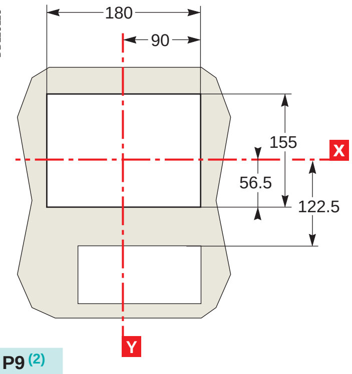
DB115067


Fixed or plug-in circuit breaker with access to Vigi module

DB115115


DB115116


DB115117


DB115118


Type	D1	P6 (1)	P7 (2)	P8 (1)	P9 (2)
NSX100/160/250	75	145	177	146	178
NSX400/630	100	217	249	218	250

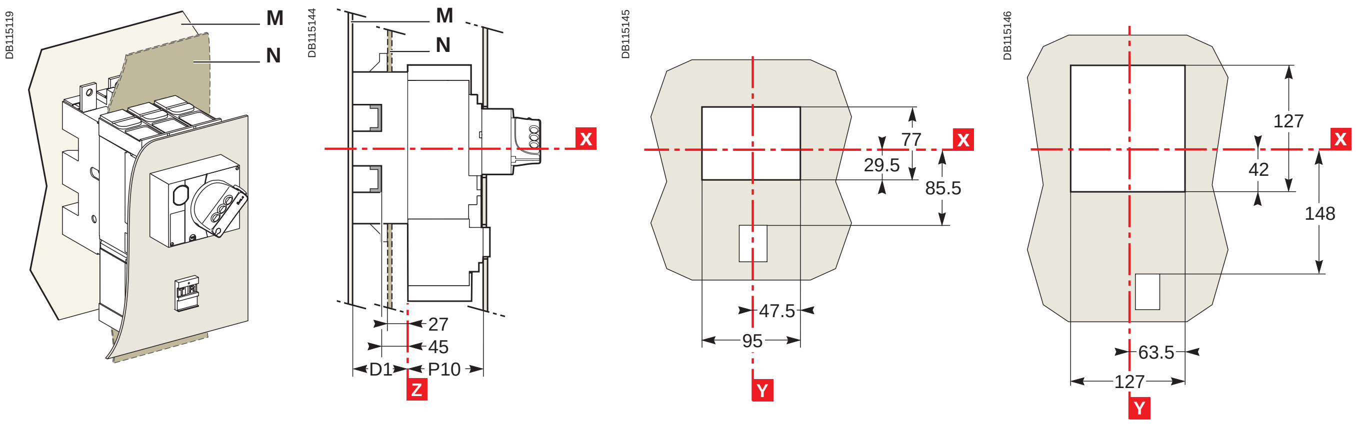
(1) Plug-in version.
(2) Withdrawable version.

Front-panel cutouts

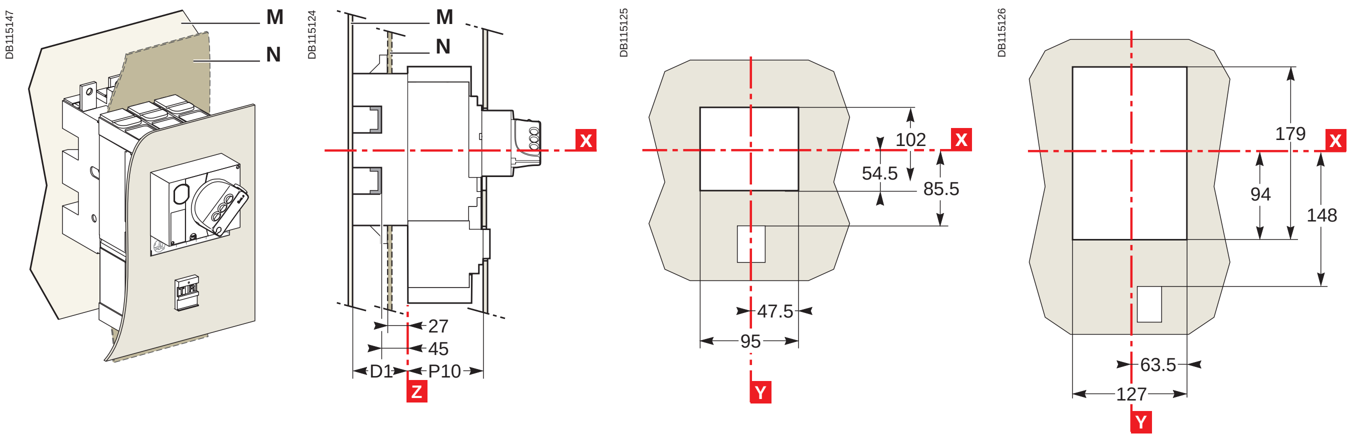
Direct rotary handle for Compact and Vigicompact NSX100 to 630

Fixed or plug-in circuit breakers	NSX100 to 250	NSX400/630

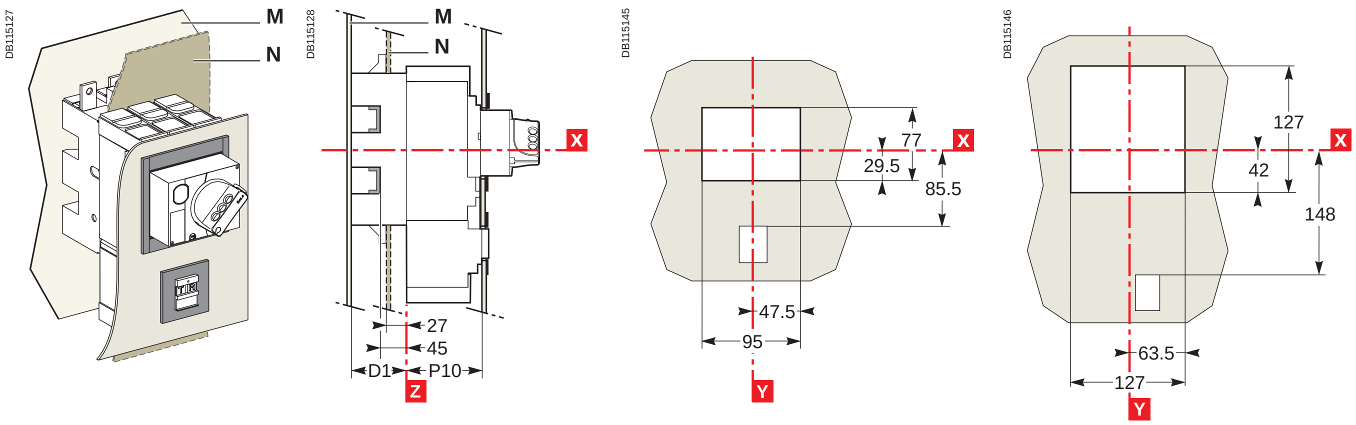
Bare sheet metal



Bare sheet metal with access to the trip unit

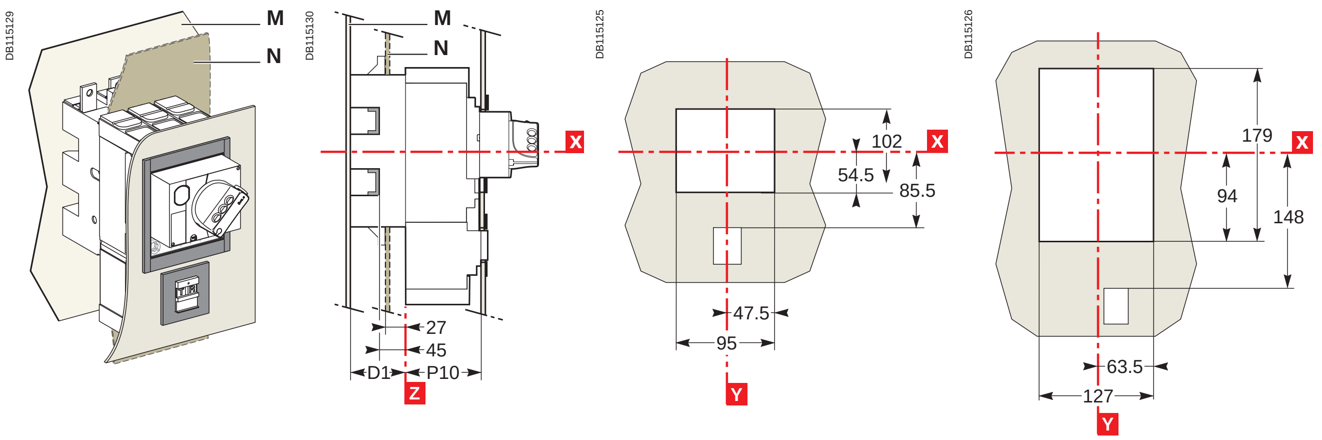


With IP30 front-panel escutcheon

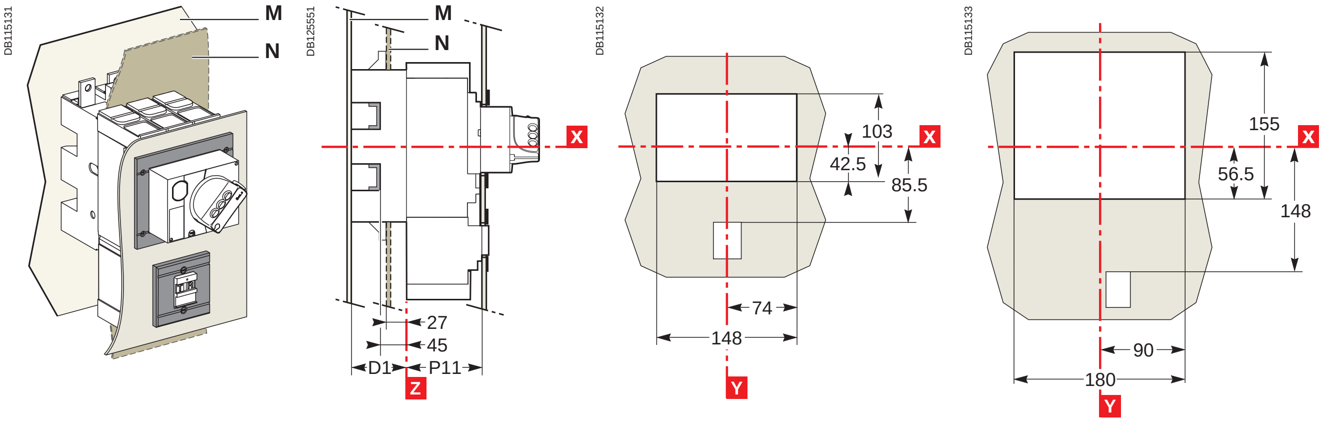


Fixed or plug-in circuit breakers (cont.) — NSX100 to 250 — NSX400/630

With IP30 front-panel escutcheon with access to the trip unit

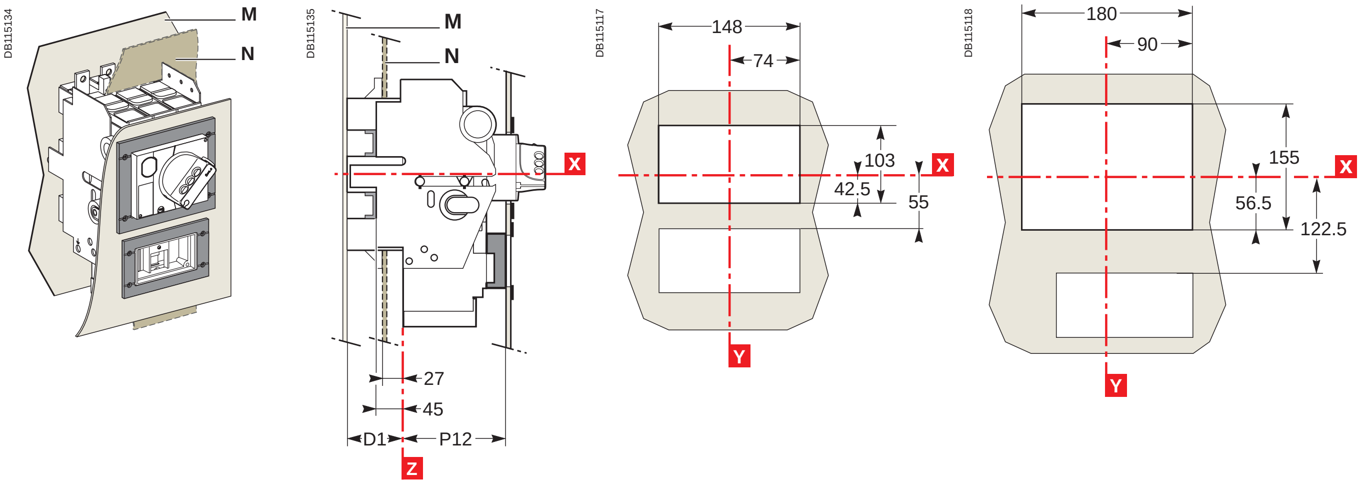


With IP40 front-panel escutcheon



Fixed or withdrawable circuit breakers — NSX100 to 250 — NSX400/630

With IP40 front-panel escutcheon



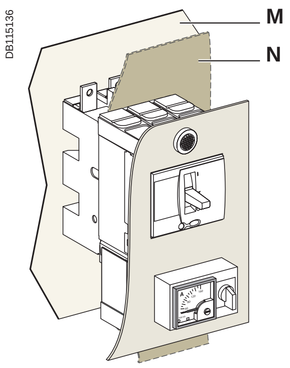
Type	D1	P10	P11	P12
NSX100/160/250	75	89	90	123
NSX400/630	100	112	113	147

Front-panel cutouts

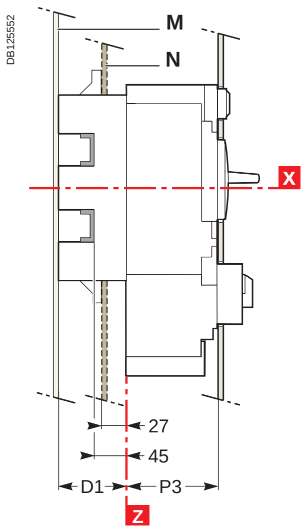
Indication and measurement modules for Compact NSX100 to 630

Fixed or plug-in circuit breakers with ammeter module and voltage-presence indicator

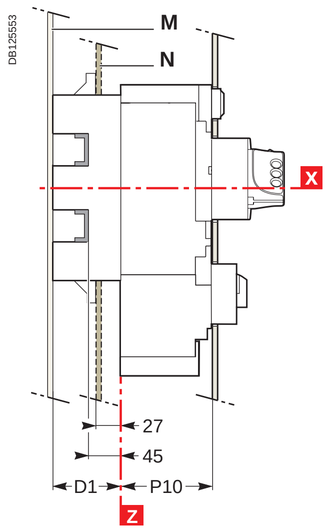
Bare sheet metal

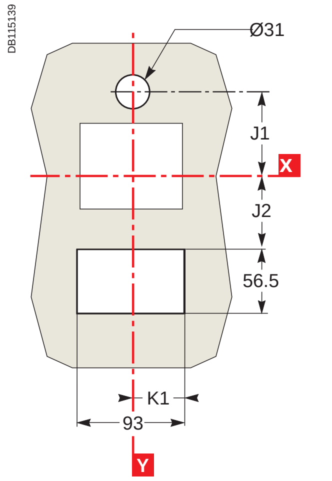


With toggle

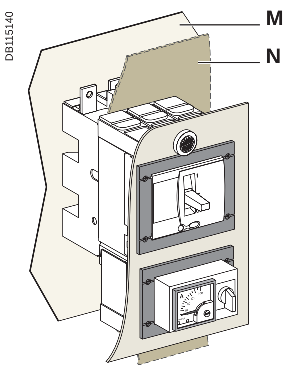


Rotary handle

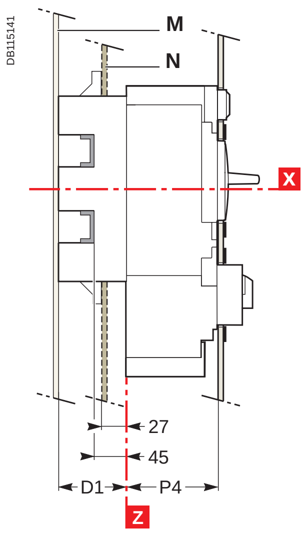




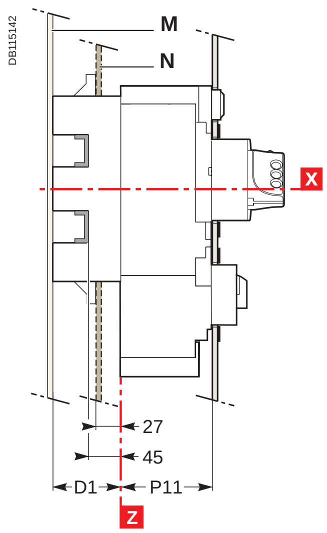
With IP40 front-panel escutcheon

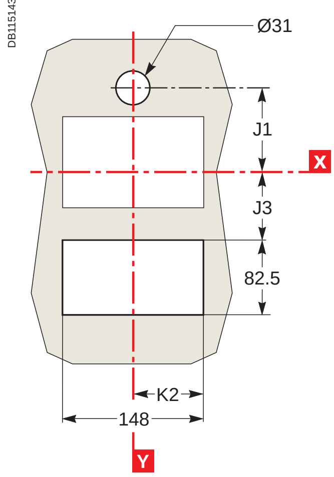


With toggle



Rotary handle





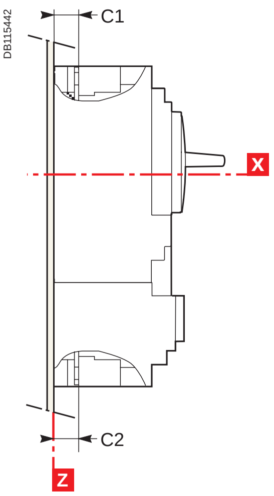
Type	D1	J1	J2	J3	K1	K2	P3	P4	P10	P11
NSX100/160/250	75	78.5	67.5	55	46.5	74	88	89	89	90
NSX400/630	100	122	129	122.5	64.5	90	112	113	112	113

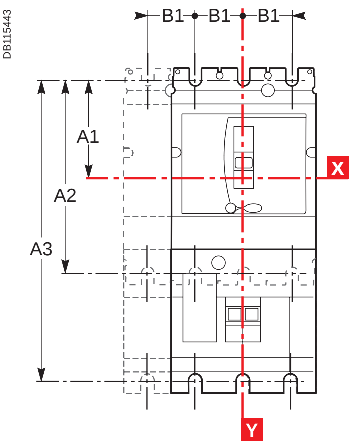
Dimensions and connection

Power connections

Compact and Vigicompact NSX100 to 630 fixed version

Connection locations

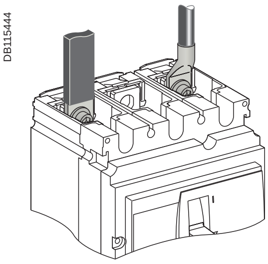




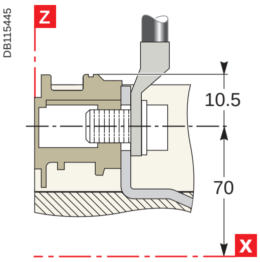
Type	A1	A2	B1	C1	C2
NSX100/160	70	140	35	19.5	19.5
NSX250	70	140	35	21.5	19.5
NSX400/630	113.5	227	45	26	26

Type	A1	A3	B1	C1	C2
NSX100/160 + Vigi	70	215	35	19.5	21.5
NSX250 + Vigi	70	215	35	21.5	21.5
NSX400/630 + Vigi	113.5	327	45	26	26

Front connection without accessories

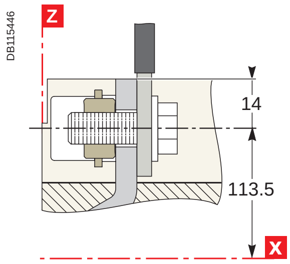


NSX100 to 250



Cables with lugs/bars

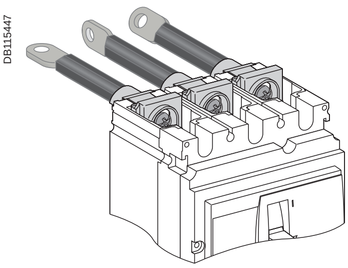
NSX400/630



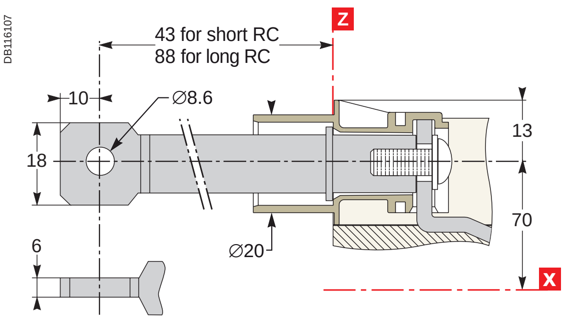
Bars/cables with lugs

Connection with accessories

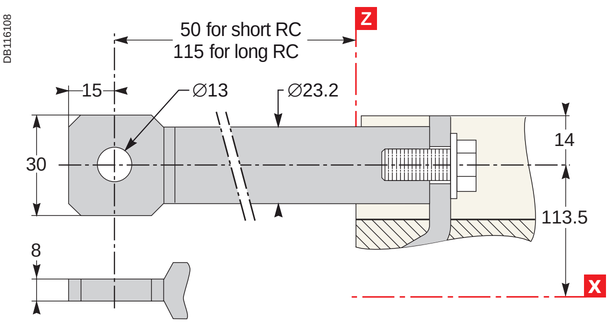
Long and short rear connectors



NSX100 to 250



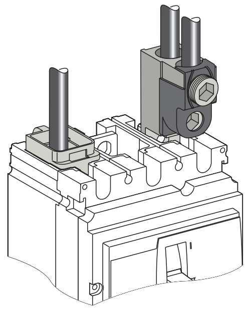
NSX400/630



Connection with accessories (cont.)

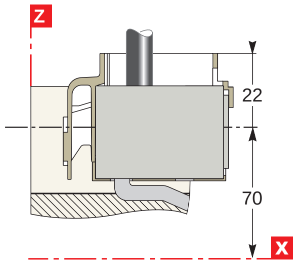
Bare-cable connectors

DB115450

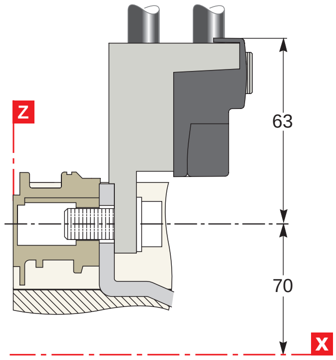


DB115451

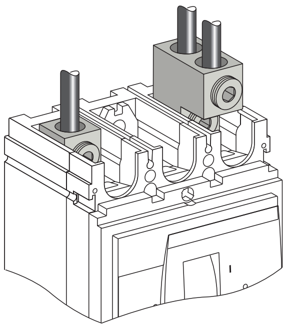
NSX100 to 250



DB115452

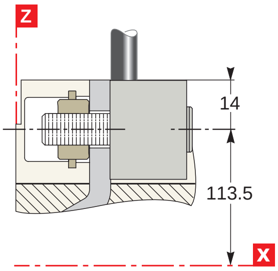


DB115453

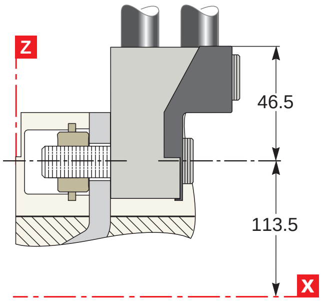


DB115454

NSX400/630

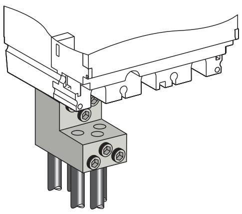


DB115455

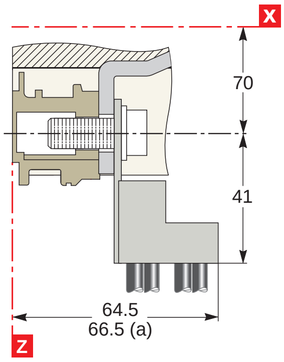


Distribution connectors (for NSX100 to 250 only)

DB115456



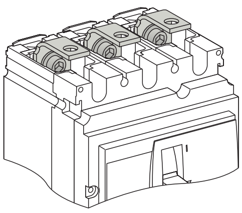
DB115457



(a) Vigi module or NSX250.

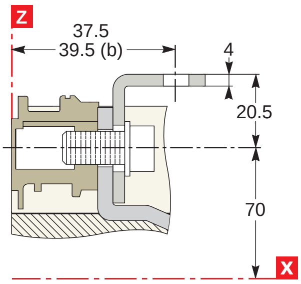
Right-angle terminal extensions (upstream only)

DB115458



DB115459

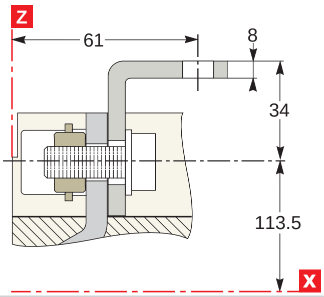
NSX100 to 250



(b) NSX250.

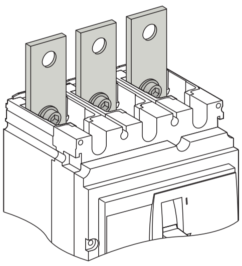
DB115460

NSX400/630

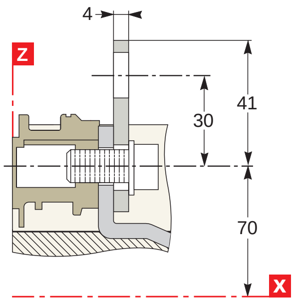


Straight terminal extensions (for NSX100 to 250 only)

DB115461



DB115462



Dimensions and connection

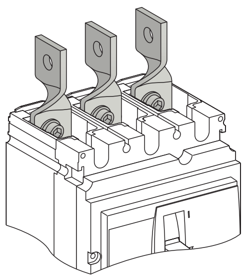
Power connections

Compact and Vigicompact NSX100 to 630 fixed version

Connection with accessories (cont.)

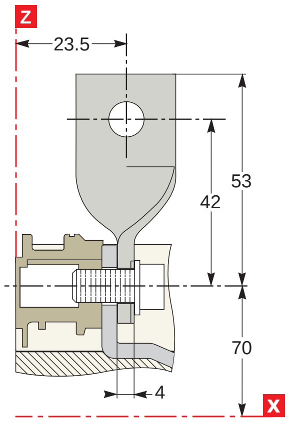
Edgewise terminal extensions

DB115463



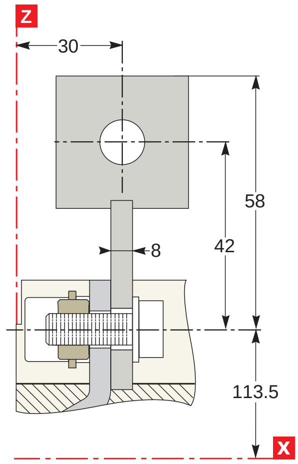
NSX100 to 250

DB115464



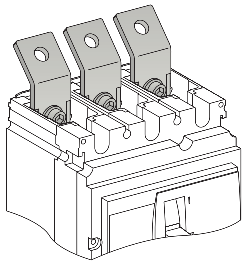
NSX400/630

DB115465



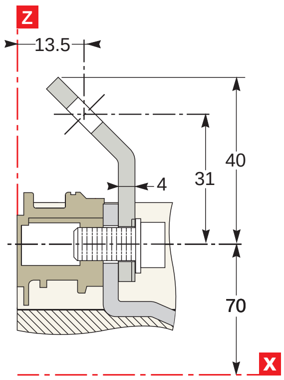
45° terminal extensions

DB115466



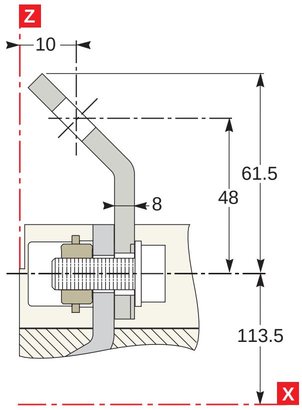
NSX100 to 250

DB115467



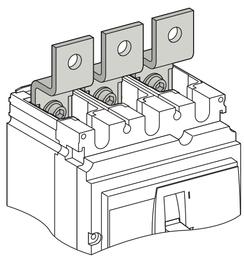
NSX400/630

DB115468



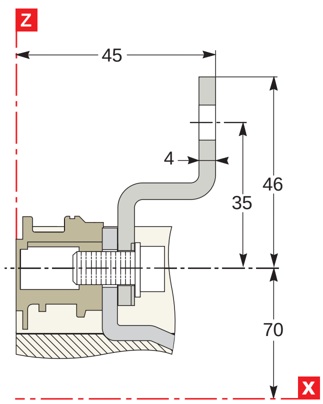
Double-L terminal extensions

DB115469



NSX100 to 250

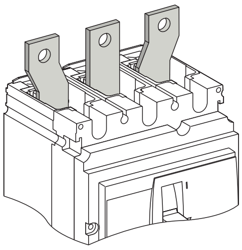
DB115470



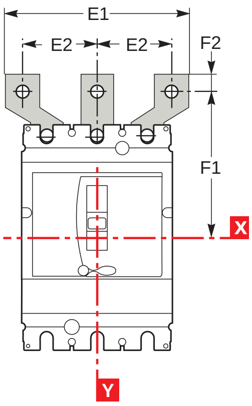
Connection with accessories (cont.)

Spreaders **3P** **4P**

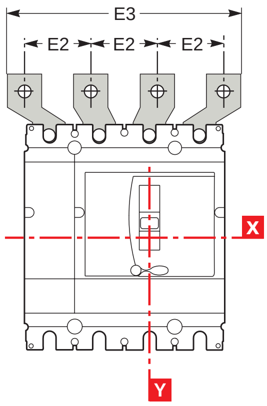
DB115471



DB115472

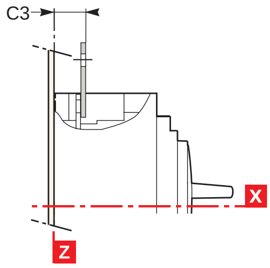


DB115473

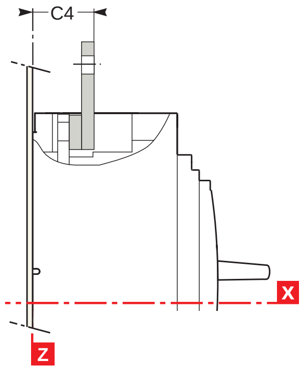


NSX100 to 250

DB115474



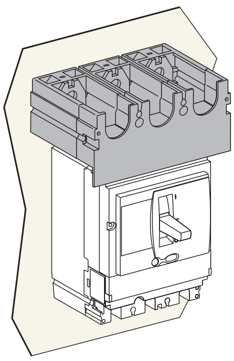
NSX400/630



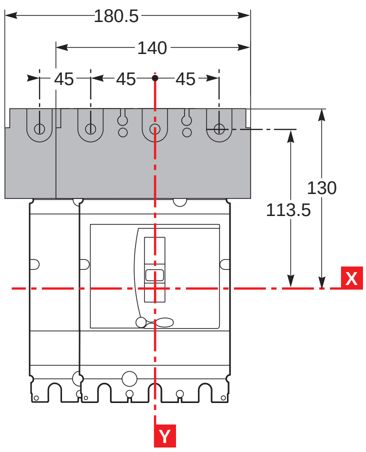
Type	C3	C4	E1	E2	E3	F1	F2
NSX100/160	23.5	-	114	45	159	100	11
NSX250	25.5	-	114	45	159	100	11
NSX400/630	-	44	135 170	52.5 70	187.5 240	152.5 166	15 15

One-piece spreader (for NSX100 to 250 only)

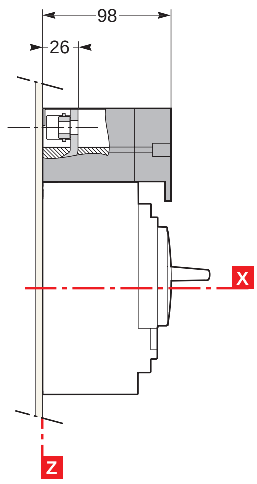
DB115475



DB115476



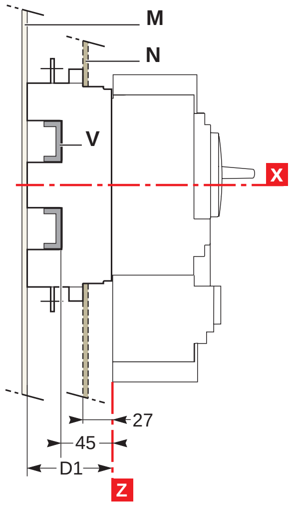
DB115477

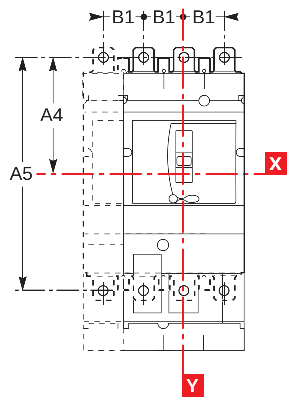


Power connections

Compact and Vigicompact NSX100 to 630 plug-in and withdrawable versions

Connection locations



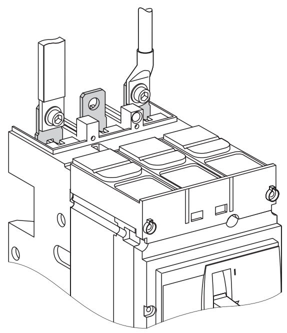


Type	A4	A5	B1	D1
NSX100 to 250	100	200	35	75
NSX400/630	156.5	313	45	100

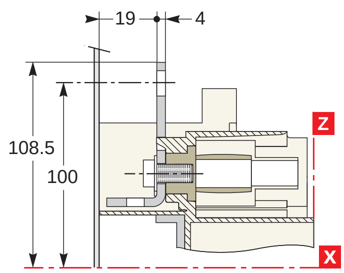
Note:
- *for mounting on a backplate, the insulating screen supplied with the plug-in base must be installed.*
- *for withdrawable versions, terminal shields are recommended.*

Connection without accessories

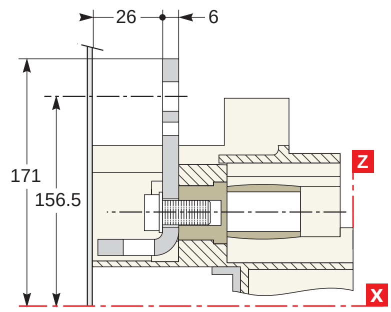
Front connection: mounting on backplate (M) or rails (V)



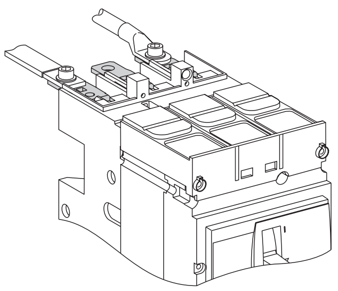
NSX100 to 250



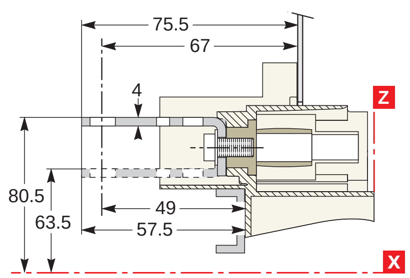
NSX400/630



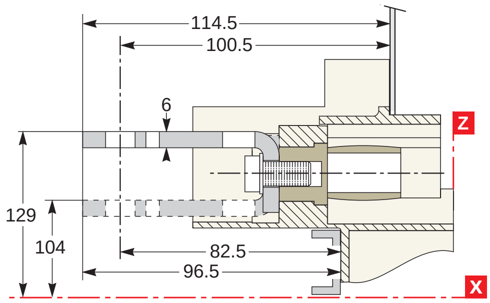
Rear connection: mounting through front panel (N) or on rails (V)

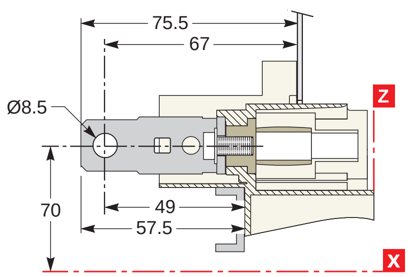


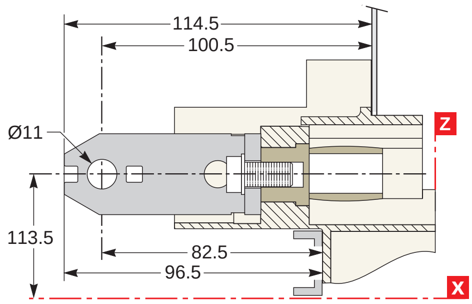
NSX100 to 250



NSX400/630



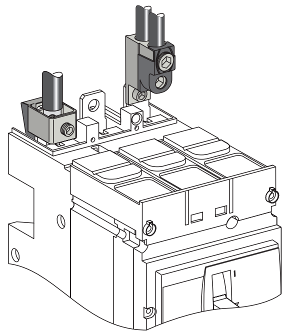




Connection with accessories

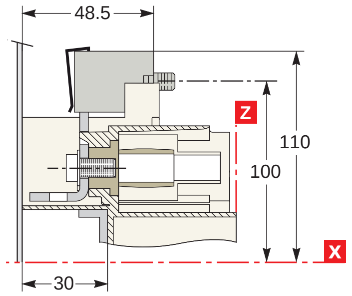
Bare-cable connectors: mounting on backplate (M) or rails (V)

DB115490

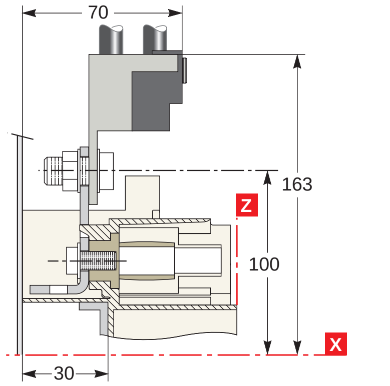


NSX100 to 250

DB115491

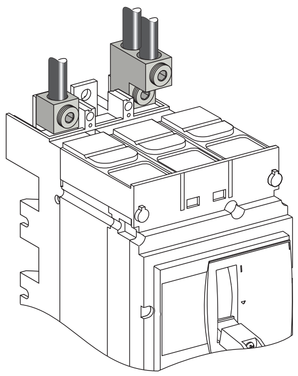


DB115492

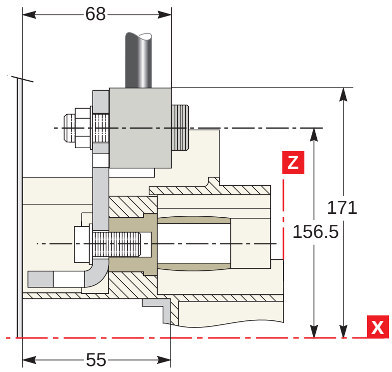


NSX400/630

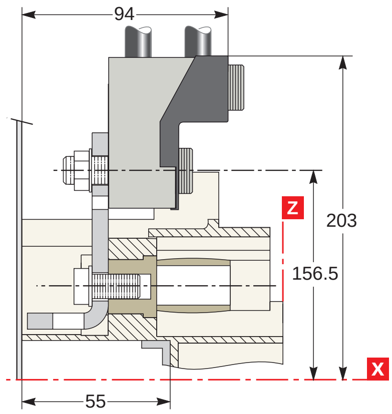
DB115493



DB115494

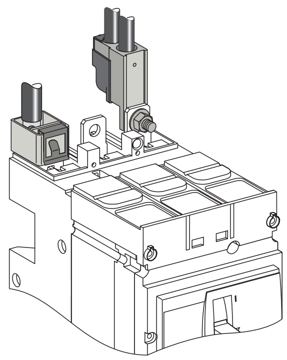


DB115495



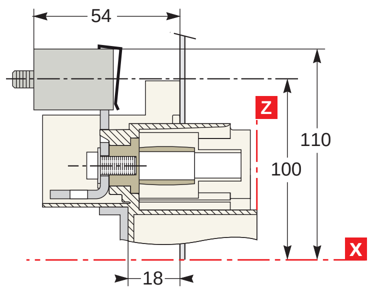
Bare-cable connectors: mounting through front panel (N) or on rails (V)

DB115496

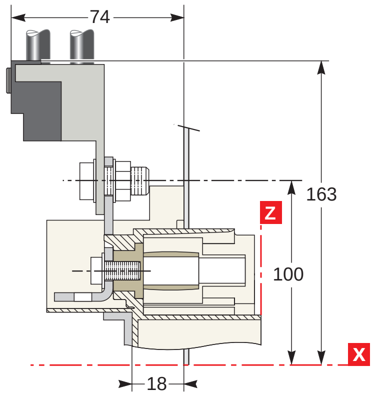


NSX100 to 250

DB115497

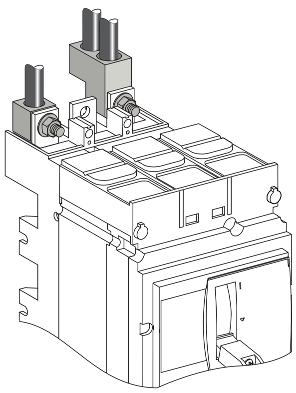


DB115498

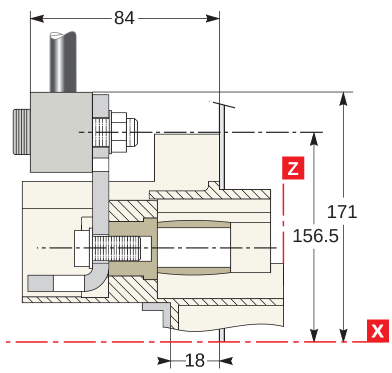


NSX400/630

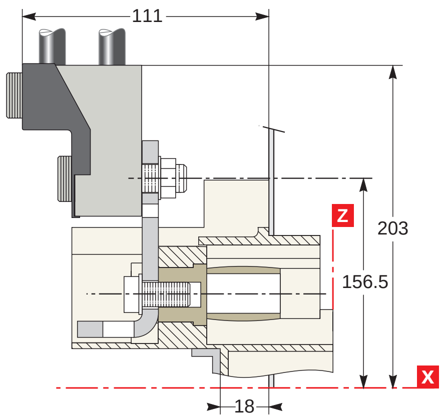
DB115499



DB115500



DB115501



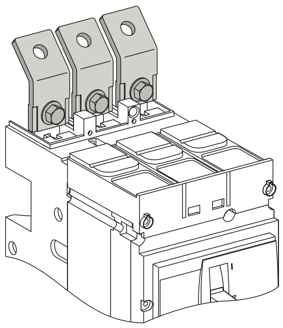
Power connections

Compact and Vigicompact NSX100 to 630 plug-in and withdrawable versions

Connection with accessories (cont.)

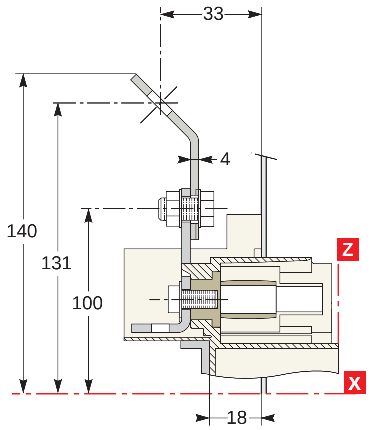
45° extensions: mounting through front panel (N) or on rails (V)

DB115506



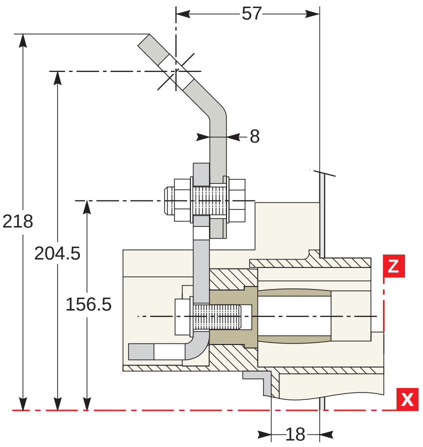
NSX100 to 250

DB115507



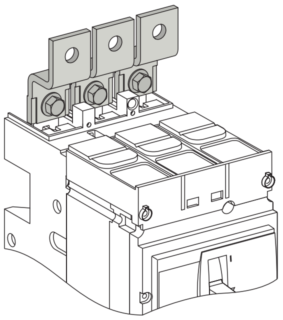
NSX400/630

DB115508



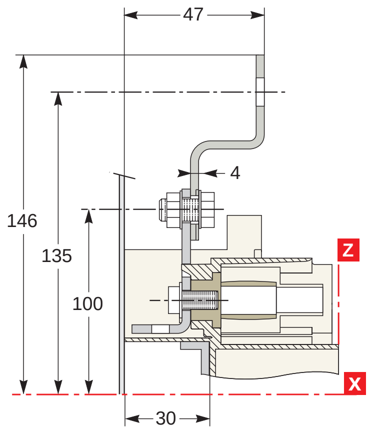
Double-L extensions: mounting on backplate (M) or rails (V)

DB115509



NSX100 to 250

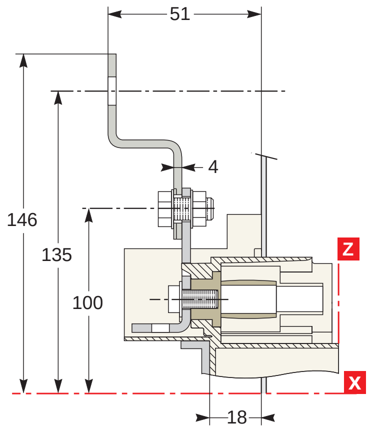
DB115510



Double-L extensions: mounting through front panel (N) or on rails (V)

NSX100 to 250

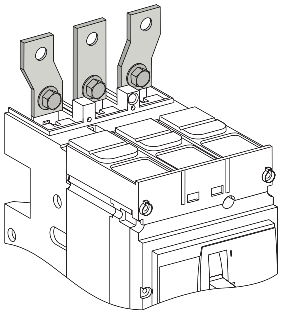
DB115505



Connection with accessories (cont.)

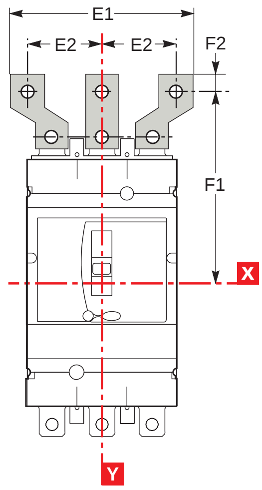
Spreaders: mounting on backplate (M) or rails (V)

DB115511



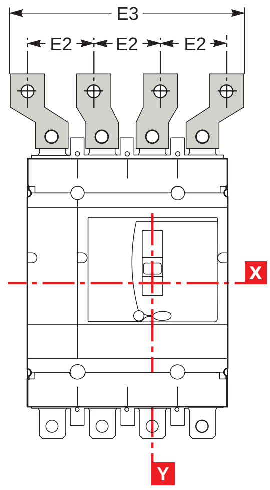
3P

DB115512



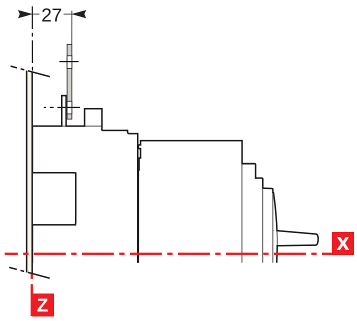
4P

DB115513

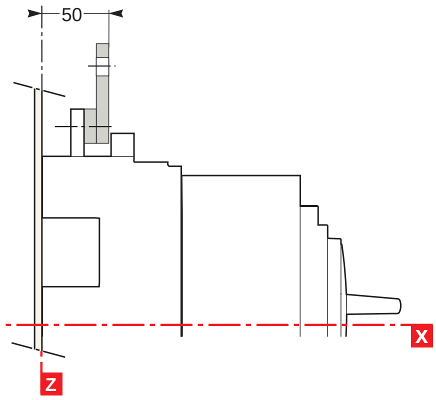


NSX100 to 250

DB115514



NSX400/630

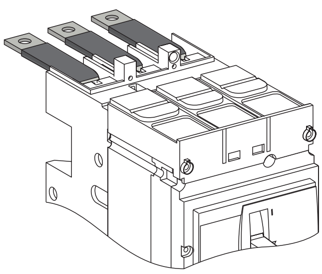


Type	E1	E2	E3	F1	F2
NSX100 to 250	114	45	159	130	11
NSX400/630	135 170	52.5 70	187.5 240	195.5 209	15 15

Long insulated rear connectors: mounting on backplate (M) or rails (V)

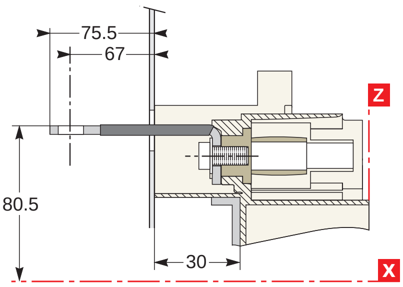
Exterior-mounted rear connectors

DB115515



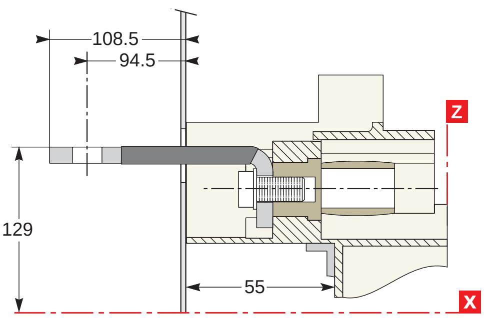
NSX100 to 250

DB115516



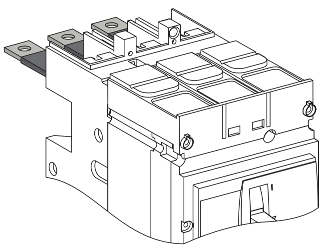
NSX400/630

DB115517



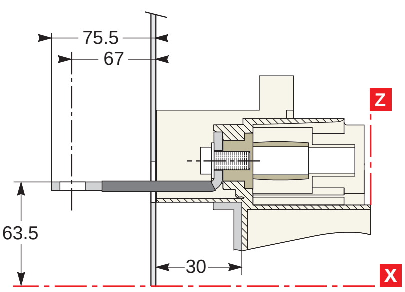
Interior-mounted rear connectors

DB115518



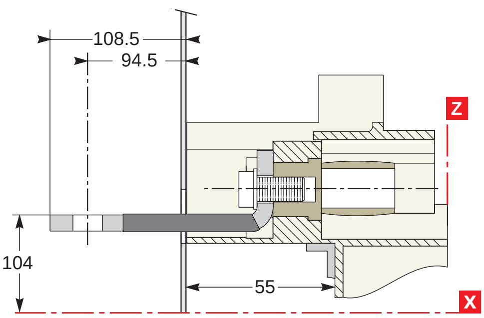
NSX100 to 250

DB115519



NSX400/630

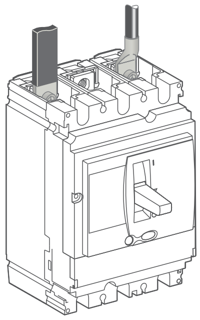
DB115520

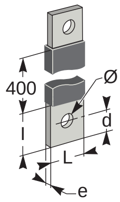


Long, insulated connectors are mandatory.

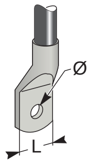
Power connections

Connection of insulated bars or cables with lugs to Compact and Vigicompact NSX100 to 630





Bar.



Lug.

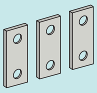
Direct connection to NSX100 to 630

Dimensions		NSX100	NSX160/250	NSX400/630
Bars	L (mm)	≤ 25	≤ 25	≤ 32
	l (mm)	d + 10	d + 10	d + 15
	d (mm)	≤ 10	≤ 10	≤ 15
	e (mm)	≤ 6	≤ 6	3 ≤ e ≤ 10
	Ø (mm)	6.5	8.5	10.5
Lugs	L (mm)	≤ 25	≤ 25	≤ 32
	Ø (mm)	6.5	8.5	10.5
Torque (Nm) (1)		10	15	50
Torque (Nm) (2)		5/5	5/5	20/11
Torque (Nm) (3)		8	8	20

(1) Tightening torque on the circuit breaker for lugs or bars.
(2) Tightening torque on fixed devices for rear connectors//tightening torque on plug-in or withdrawable devices for power connectors.
(3) Tightening torque on the plug-in base for terminal extensions.

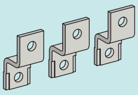
Accessories for NSX100 to 250

Straight terminal extensions



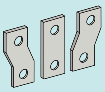
Tinned copper

Double-L terminal extensions



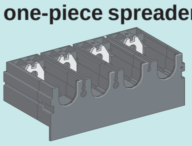
Tinned copper

Spreaders:
separate parts



Tinned copper

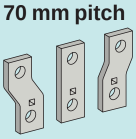
one-piece spreader



For U > 600 V, the mandatory insulation kit is not compatible with spreaders made up of separate parts. The one-piece spreader must be used.

Accessories for NSX400 and 630

Spreaders made up of separate parts for 52.5 and 70 mm pitch

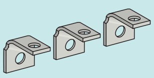


Tinned copper

For U > 600 V, use of the 52.5 mm pitch spreaders requires a specific insulation kit.
The 70 mm pitch spreaders may not be used.

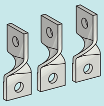
Accessories for NSX100 to 630

Right-angle terminal extensions



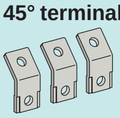
Tinned copper
To be mounted on upstream side.

Edgewise terminal extensions



Tinned copper

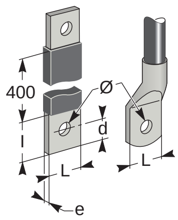
45° terminal extensions



Tinned copper

Connection with accessories to NSX100 to 250 (IEC 228)

Pole pitch	
Without spreaders	35 mm
With spreaders	45 mm



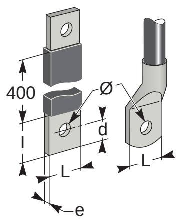
Dimensions		With spreaders or terminal extensions	
		NSX100	NSX160/250
Bars	L (mm)	≤ 25	≤ 25
	l (mm)	20 ≤ l ≤ 25	20 ≤ l ≤ 25
	d (mm)	≤ 10	≤ 10
	e (mm)	≤ 6	≤ 6
	Ø (mm)	6.5	8.5
Lugs	L (mm)	≤ 25	≤ 25
	Ø (mm)	6.5	8.5
Torque (Nm) (1)		10	15
Torque (Nm) (2)		5	5

(1) Tightening torque on the circuit breaker for spreaders or terminal extensions.
(2) Tightening torque on the plug-in base for spreaders or terminal extensions.

Spreaders and straight, right-angle, 45°, double-L and edgewise terminal extensions are supplied with flexible interphase barriers.

Connection with accessories to NSX400 and 630 (IEC 228)

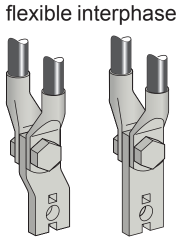
Pole pitch	
Without spreaders	45 mm
With spreaders	52.5 or 70 mm



Dimensions		With spreaders	With terminal extensions
Bars	L (mm)	≤ 40	≤ 32
	l (mm)	d + 15	30 ≤ l ≤ 34
	d (mm)	≤ 20	≤ 15
	e (mm)	3 ≤ e ≤ 10	3 ≤ e ≤ 10
	Ø (mm)	12.5	10.5
Lugs	L (mm)	≤ 40	≤ 32
	Ø (mm)	12.5	10.5
Torque (Nm) (1)		50	50
Torque (Nm) (2)		20	20

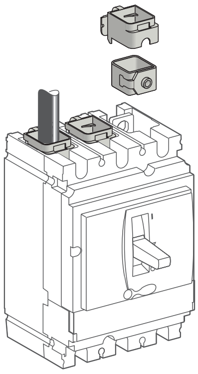
(1) Tightening torque on the circuit breaker for spreaders or terminal extensions.
(2) Tightening torque on the plug-in base for spreaders or terminal extensions.

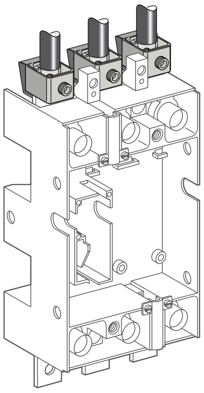
Spreaders and right-angle, 45° and edgewise terminal extensions are supplied with flexible interphase barriers.



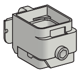
Mounting detail: 2 cables with lugs.

Connection of bare cables to Compact and Vigicompact NSX100 to 630

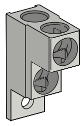
DB125659


DB115660


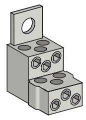
Connection for NSX100 to 250

DB112315


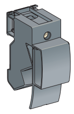
1-cable connector

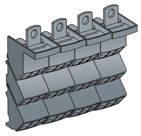
DB112317


2-cable connector

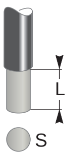
DB111327


Distribution connector

DB115661


DB115662


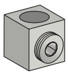
Polybloc distribution block

DB115663


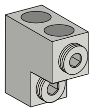
1-cable connector	Steel ≤ 160 A	Aluminium ≤ 250 A		
L (mm)	25	25		
S (mm²) Cu / Al	1.5 to 95 (1)	25 to 50	70 to 95	120 to 185 150 max. flex.
Torque (Nm)	12	20	26	26
2-cable connector				
L (mm)	25 or 50			
S (mm²) Cu / Al	2 x 50 to 2 x 120			
Torque (Nm)	22			
6-cable distribution connector (copper or aluminium)				
L (mm)	15 or 30			
S (mm²) Cu / Al	1.5 to 6 (1)	8 to 35		
Torque (Nm)	4	6		
Polybloc distribution block (6 or 9 cables)				
L (mm)	12	16		
S (mm²) Cu / Al	6 x 4 to 10	3 x 6 to 16		

(1) For flexible cables from 1.5 to 4 mm², connection with crimped or self-crimping ferrules.

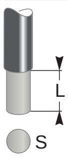
Connection to NSX400 and 630

DB112316


1-cable connector

DB111326


2-cable connector

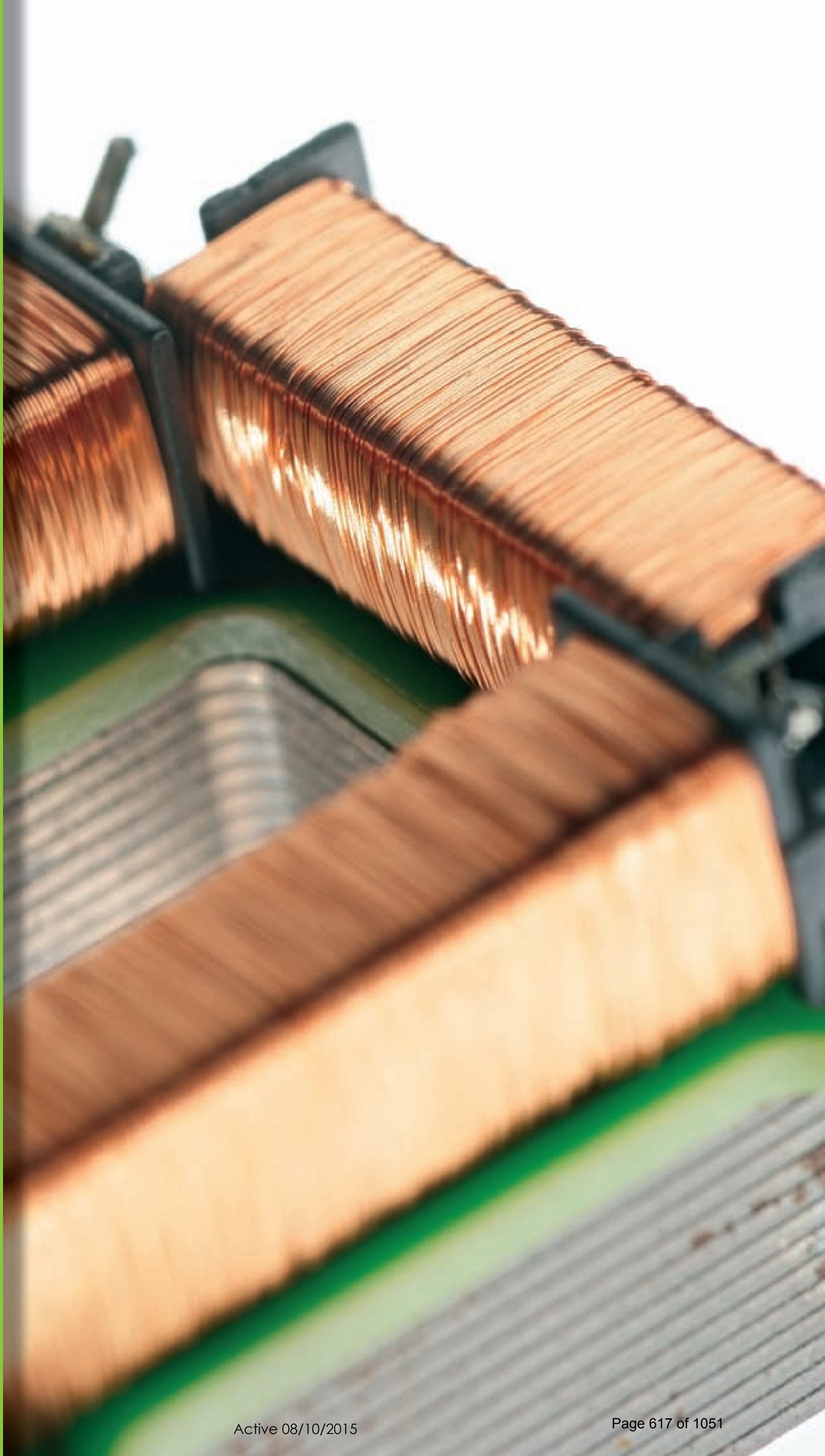
DB115663


	1-cable connector	2-cable connector
L (mm)	30	30 or 60
S (mm²) Cu / Al	35 to 300 rigid 240 max. flex.	2 x 35 to 2 x 240 rigid 240 max. flex.
Torque (Nm)	31	31

Conductor materials and electrodynamic stresses

Compact NSX circuit breakers can be connected indifferently with bare-copper, tinned-copper and tinned-aluminium conductors (flexible or rigid bars, cables).
In the event of a short-circuit, thermal and electrodynamic stresses will be exerted on the conductors. They must therefore be correctly sized and held in place by supports.
Electrical connection points on switchgear devices (switch-disconnectors, contactors, circuit breakers, etc.) should not be used for mechanical support.
Any partition between upstream and downstream connections of the device must be made of non-magnetic material.

Accumulated experience

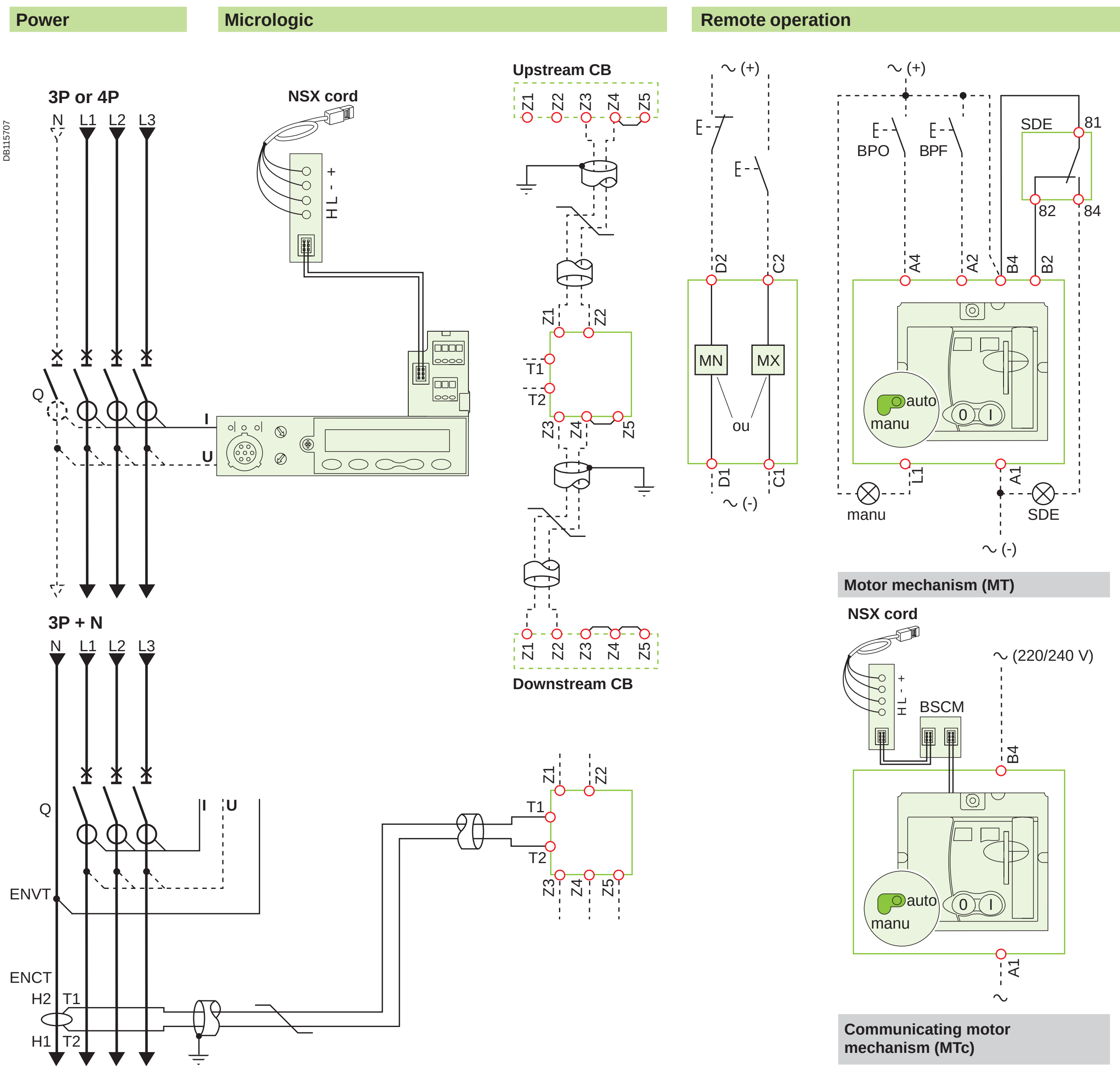


Wiring diagrams
Contents

Wiring diagrams

Compact NSX100 to 630

Fixed circuit breakers



Micrologic A or E

A/E	**Communication** H(WH), L(BL): data - (BK), + (RD): 24 V DC power supply
A/E	ZSI (Zone Selective Interlocking) Z1: ZSI OUT SOURCE Z2: ZSI OUT Z3: ZSI IN SOURCE Z4: ZSI IN ST (short time) Z5: ZSI IN GF (ground fault) *Note: Z3, Z4, Z5 for NSX400/630 only.*
A/E	ENCT: external neutral current transformer: - shielded cable with 1 twisted pair (T1, T2) - shielding earthed at one end only (CT end). Connection L = 30 cm max. - maximum length of 10 metres - cable size 0.4 to 1.5 mm² - recommended cable: Belden 8441 or equivalent.
E	ENVT: external neutral voltage tap for connection to the neutral via a 3P circuit breaker.

Remote operation

MN: undervoltage release

or

MX: shunt release

Motor mechanism (MT)

A4: opening order
A2: closing order
B4, A1: power supply to motor mechanism
L1: manual position (manu)
B2: SDE interlocking (mandatory for correct operation)

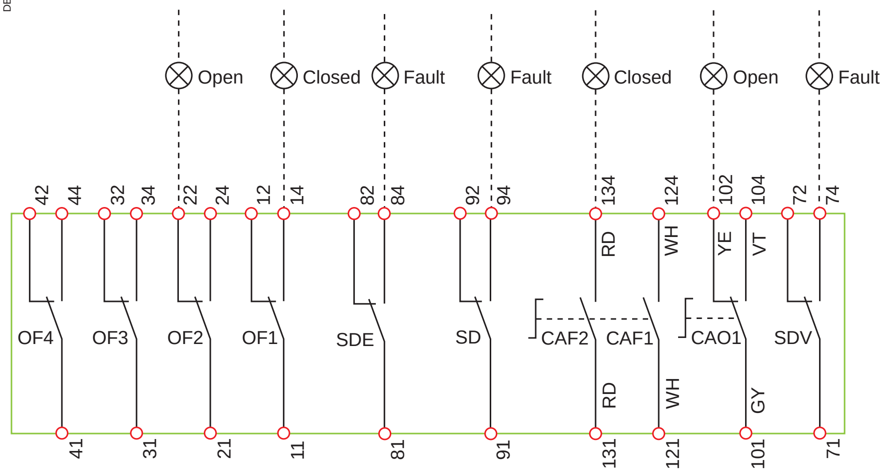
BPO: opening pushbutton
BPF: closing pushbutton

Communicating motor mechanism (MTc)

B4, A1: motor mechanism power supply
BSCM: breaker status and control module

Indication contacts

DB115708



The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

Terminals shown in red O must be connected by the customer.

Indication contacts

OF2 / OF1: device ON/OFF indication contacts

OF4 / OF3: device ON/OFF indication contacts (NSX400/630)

SDE: fault-trip indication contact (short-circuit, overload, ground fault, earth leakage)

SD: trip-indication contact

CAF2/CAF1: early-make contact (rotary handle only)

CAO1: early-break contact (rotary handle only)

SDV: earth leakage fault trip indication contact (add-on Vigi module)

Colour code for auxiliary wiring

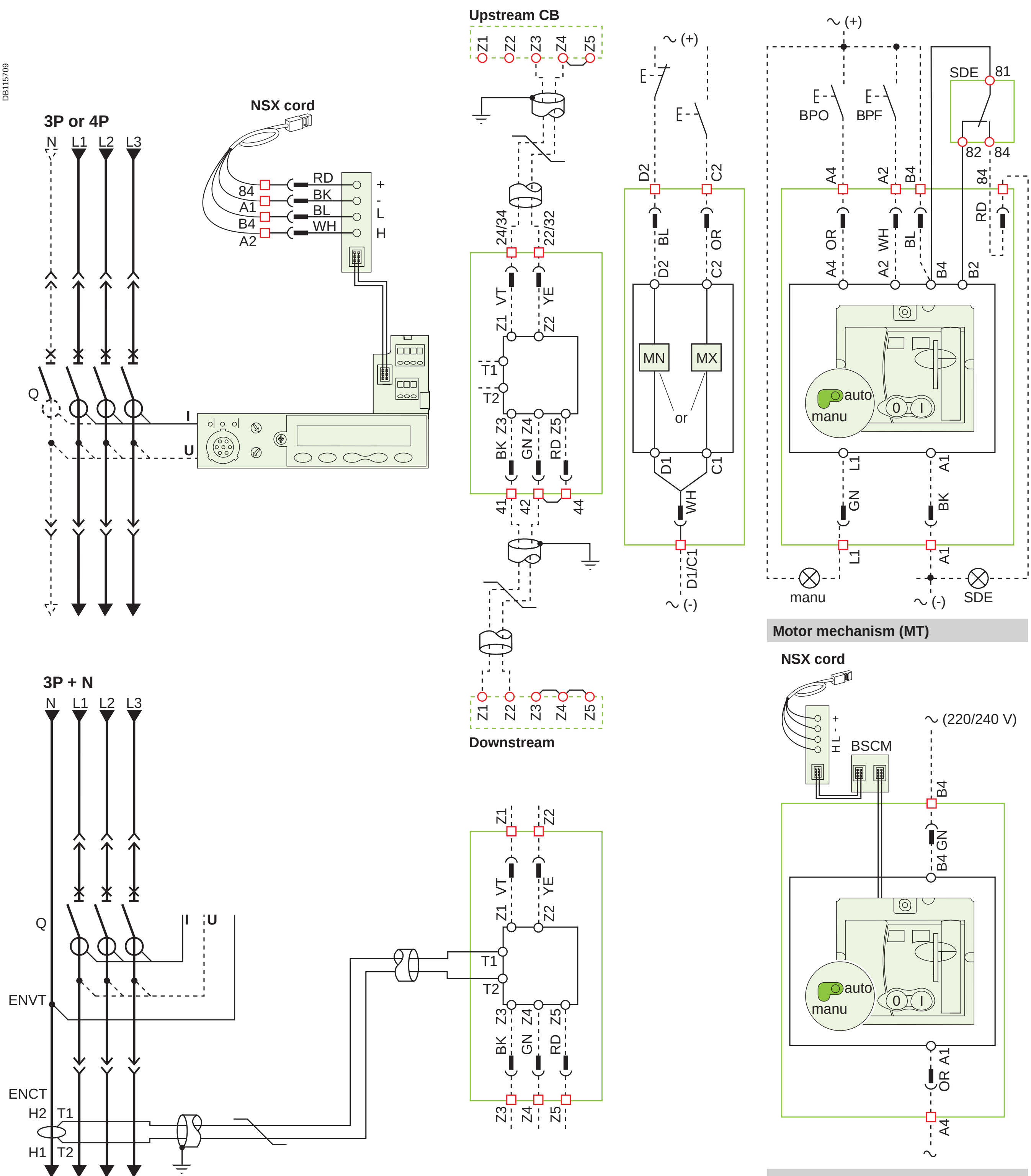
RD:	red	**VT:**	violet
WH:	white	**GY:**	grey
YE:	yellow	**OR:**	orange
BK:	black	**BL:**	blue
GN:	green		

Wiring diagrams

Compact NSX100 to 630

Plug-in / withdrawable circuit breakers

Power | **Micrologic** | **Remote operation**



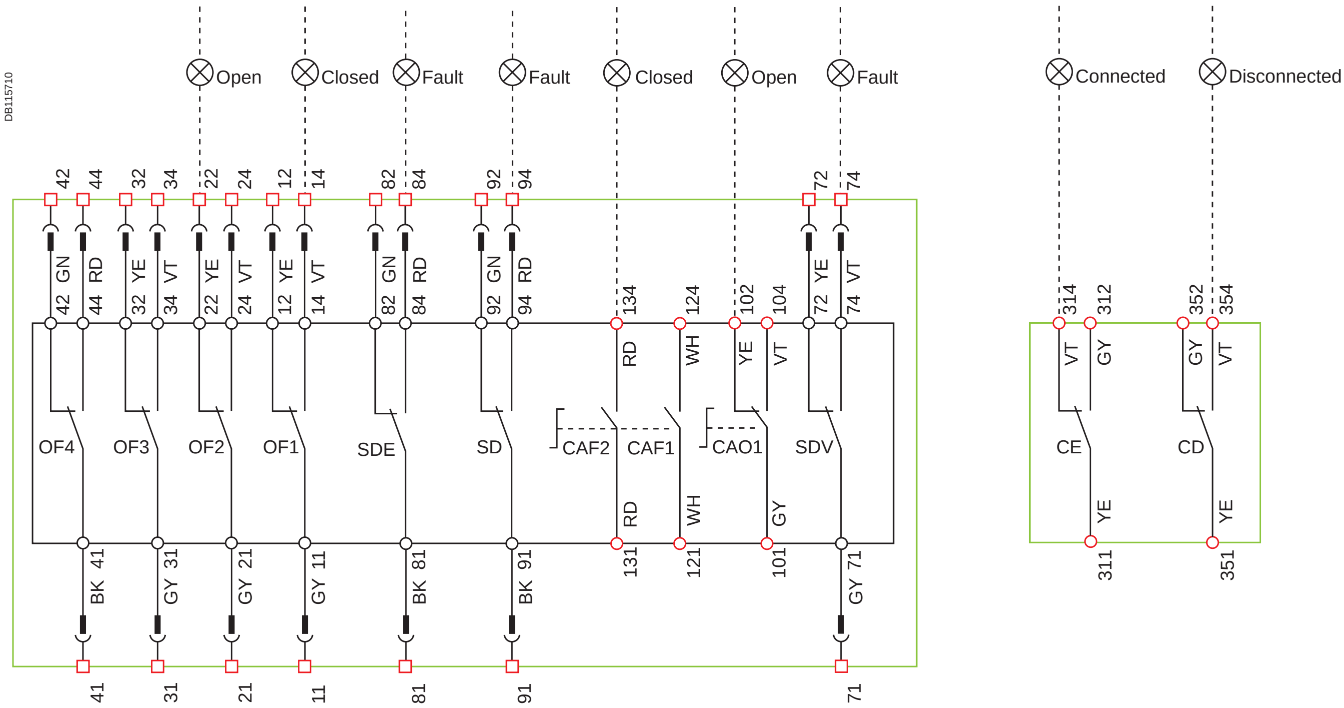
Motor mechanism (MT)

Communicating motor mechanism (MTc)

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

Indication contacts

Carriage switches



Micrologic A or E

A/E **Communication**
H(WH), L(BL): data
- (BK), + (RD): 24 V DC power supply

A/E ZSI (Zone Selective Interlocking)
Z1: ZSI OUT SOURCE
Z2: ZSI OUT
Z3: ZSI IN SOURCE
Z4: ZSI IN ST (short time)
Z5: ZSI IN GF (ground fault)
Note: Z3, Z4, Z5 for NSX400/630 only.

A/E ENCT: external neutral current transformer:
- shielded cable with 1 twisted pair (T1, T2)
- shielding earthed at one end only (CT end).
Connection L = 30 cm max.
- maximum length of 10 metres
- cable size 0.4 to 1.5 mm^2
- recommended cable: Belden 8441 or equivalent.

E ENVT: external neutral voltage tap for connection to the neutral via a 3P circuit breaker.

Colour code for auxiliary wiring

RD:	red	**VT:**	violet
WH:	white	**GY:**	grey
YE:	yellow	**OR:**	orange
BK:	black	**BL:**	blue
GN:	green		

Terminals shown in red □ / O must be connected by the customer.

Remote operation

MN: undervoltage release
or
MX: shunt release

Motor mechanism (MT)

A4: opening order
A2: closing order
B4, A1: motor mechanism power supply
L1: manual position (manu)
B2: SDE interlocking (mandatory for automatic or remote recharging)
BPO: opening pushbutton
BPF: closing pushbutton

Communicating motor mechanism (MTc)

B4, A1: motor mechanism power supply
BSCM: breaker status and control module

Indication contacts

OF2 / OF1: device ON/OFF indication contacts
OF4 / OF3: device ON/OFF indication contacts (NSX400/630)
SDE: fault-trip indication contact (short-circuit, overload, ground fault, earth leakage)
SD: trip-indication contact
CAF2/CAF1: early-make contact (rotary handle only)
CAO1: early-break contact (rotary handle only)
SDV: earth leakage fault trip indication contact (add-on Vigi module)

Compact NSX100 to 630

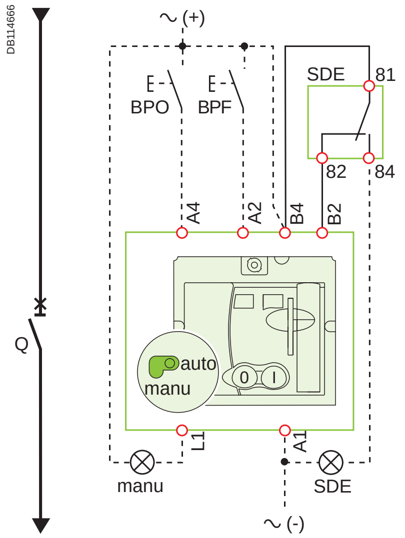
Motor mechanism

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

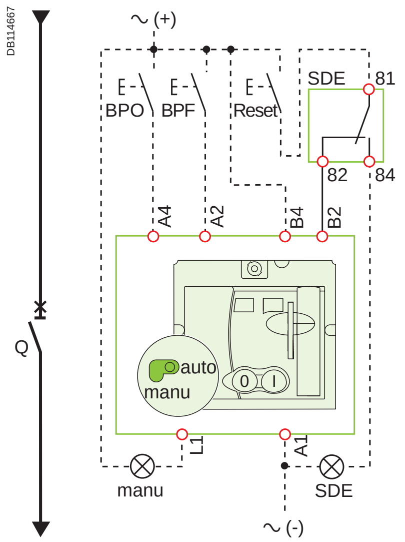
After tripping initiated by the "Push to trip" button or by the undervoltage (MN) release or the shunt (MX) release, device reset can be automatic, remote or manual.

Following tripping due to an electrical fault (with an SDE contact), reset must be carried out manually.

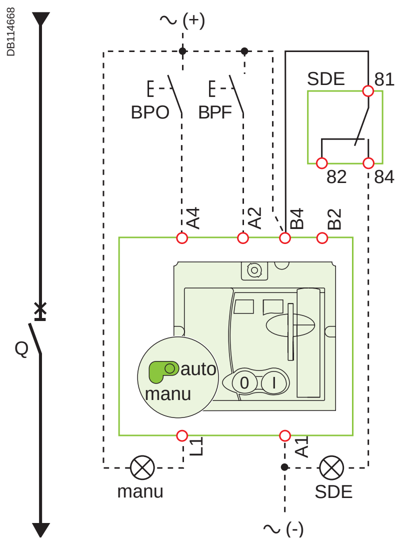
Motor mechanism (MT) with automatic reset



Motor mechanism (MT) with remote reset



Motor mechanism (MT) with manual reset

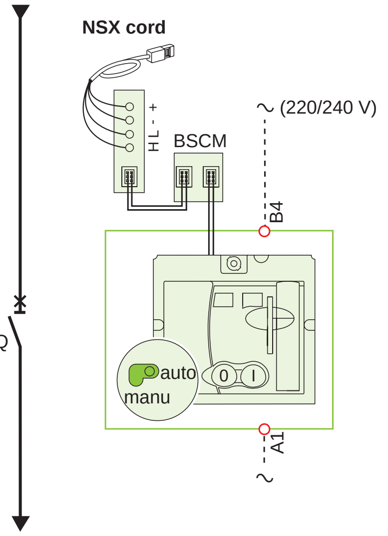


Symbols

Q:	circuit breaker
A4 :	opening order
A2:	closing order
B4, A1:	motor mechanism power supply
L1:	manual position (manu)
B2:	SDE interlocking (mandatory for correct operation)
BPO:	opening pushbutton
BPF:	closing pushbutton
SDE:	fault-trip indication contact (short-circuit, overload, ground fault, earth leakage)

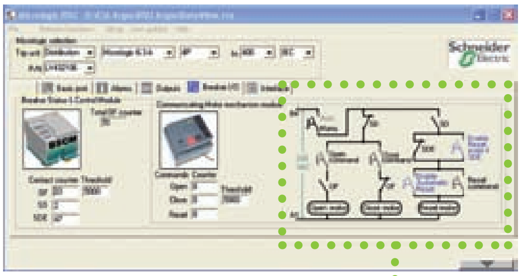
Communicating motor mechanism (MTc)

DB114669



Schematic representation of the communicating motor mechanism (MT).

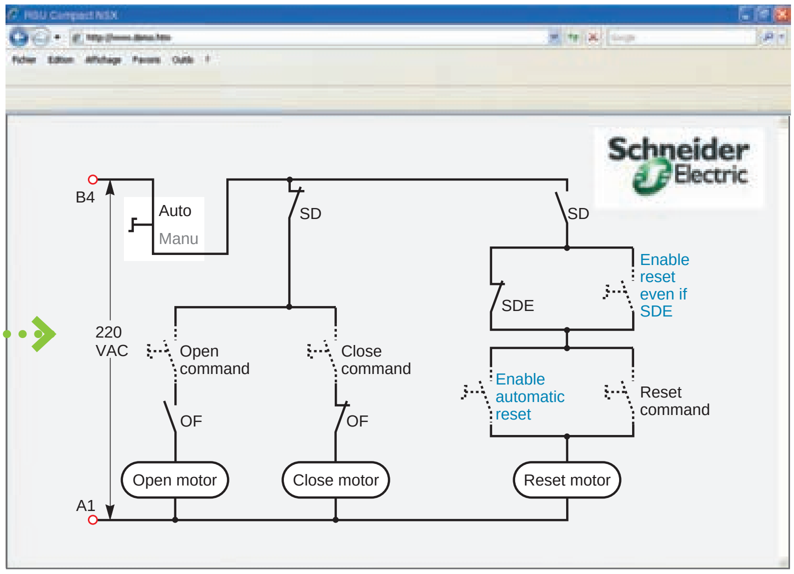
DB115436



RSU utility setup screen for the communicating motor mechanism.

RSU screen for the communicating motor mechanism (MTc)

DB114670



Single-line diagram of communicating motor mechanism

Opening, closing and reset orders are transmitted via the communication network. The "Enable automatic reset" and "Enable reset even if SDE" parameters must be set using the RSU software via the screen by clicking the blue text.

"**Auto/manu**" is a switch on the front of the motor mechanism.

Symbols

Q:	circuit breaker
B4, A1:	motor mechanism power supply
BSCM:	breaker status and control module

Terminals shown in red O must be connected by the customer.

Compact NSX100 to 630

SDx module with Micrologic

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

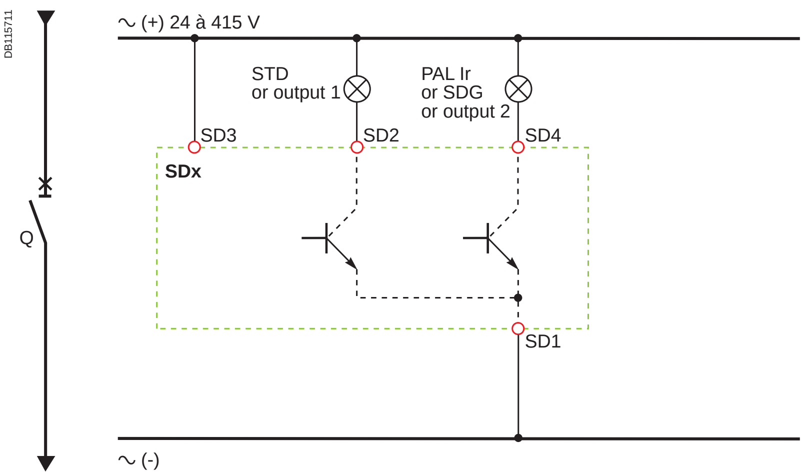
Symbols

SD1, SD3: SDx-module power supply
SD2: output 1 (80 mA max.)
SD4: output 2 (80 mA max.)

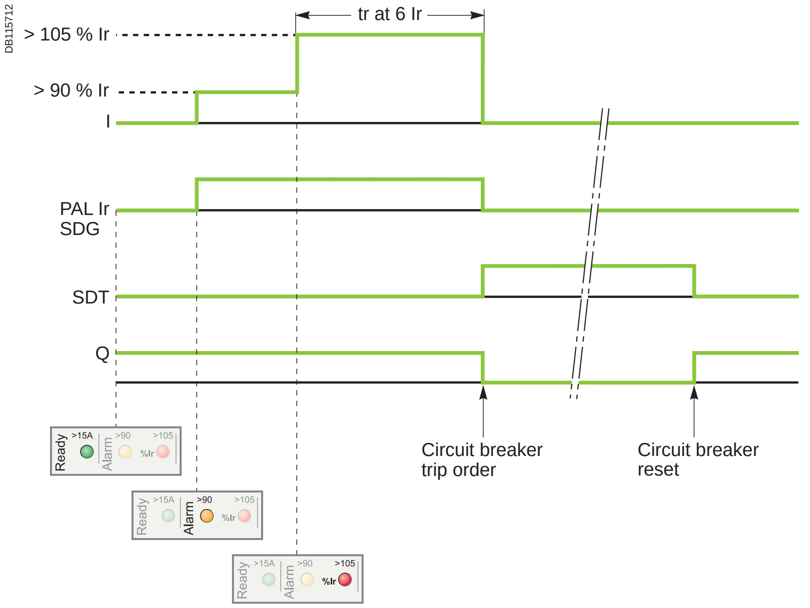
	SD2	SD4
Micrologic 2	SDT	-
Micrologic 5	SDT or output 1	PAL Ir or output 2
Micrologic 6	SDT or output 1	SDG or output 2

Terminals shown in red O must be connected by the customer.

Connection



Operation



I: *charge current*
PAL Ir: *thermal overload pre-alarm*
SDG: *ground-fault signal*
SDT: *thermal-fault signal*
Q: *circuit breaker*

SDTAM module with Micrologic M

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

Symbols

SD1, SD3: SDTAM-module power supply

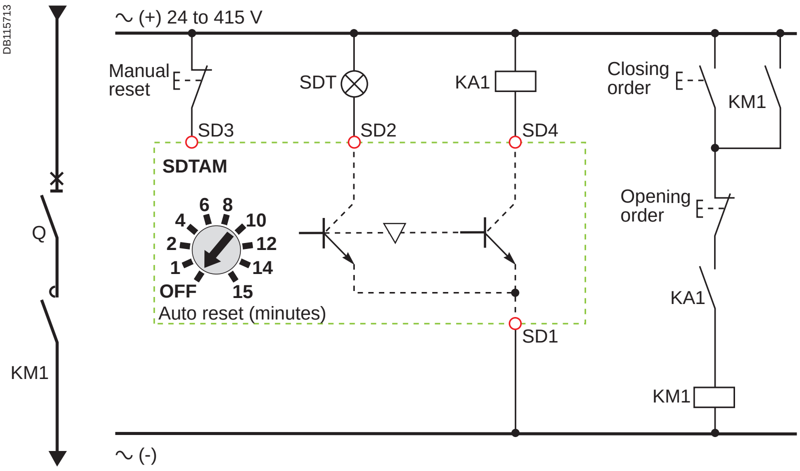
SD2: thermal-fault signal output (80 mA max.)

SD4: contactor-control output (80 mA max.)

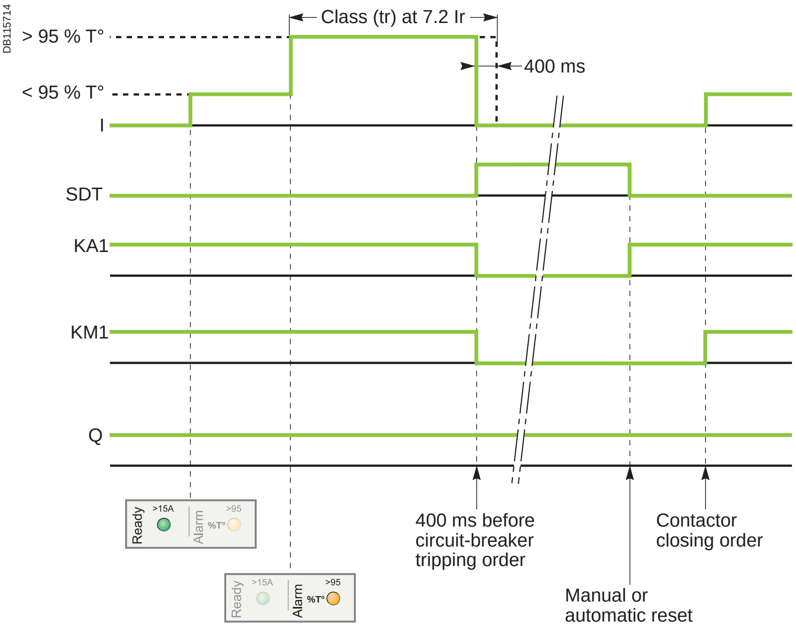
	SD2	SD4
Micrologic 2-M	SDT	KA1
Micrologic 6 E-M	SDT	KA1

Terminals shown in red O must be connected by the customer.

Connection



Operation



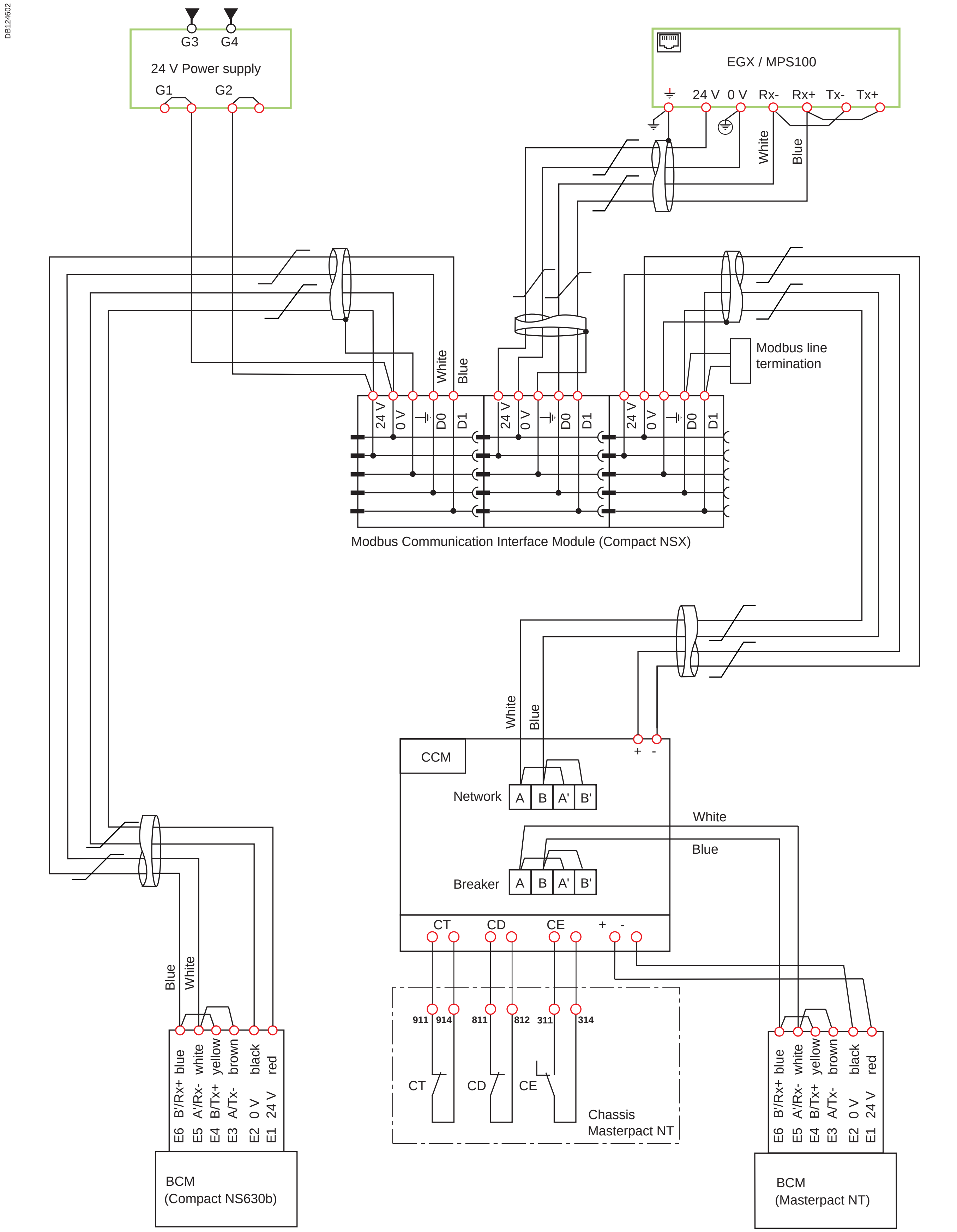
I: *charge current*
SDT: *thermal-fault signal*
KA1: *auxiliary relay (e.g. RBN or RTBT relay)*
KM1: *motor contactor*
Q: *circuit breaker*

Compact NSX100 to 630

Modbus module

Detailed connection of the circuit breakers on communication network Modbus.

Connection



Reinforced discrimination

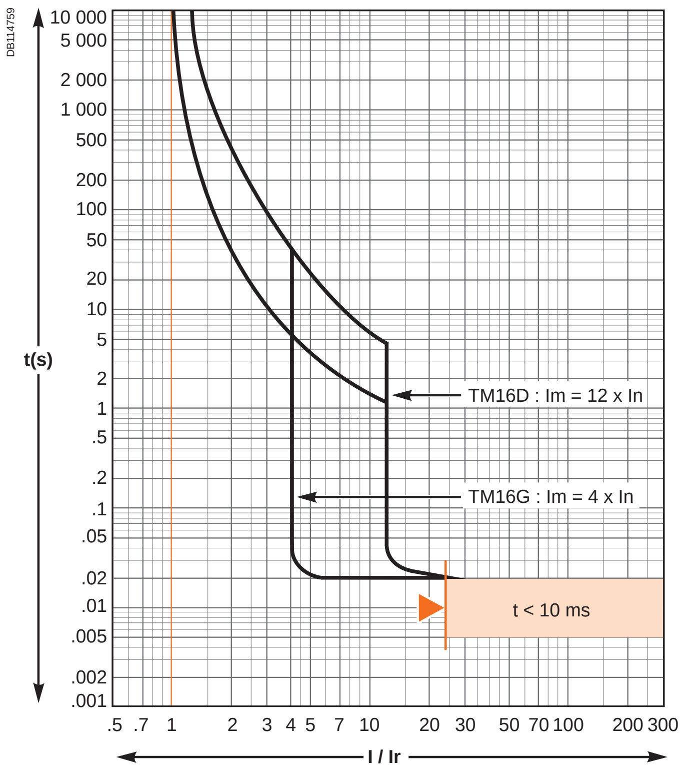
Additional characteristics

Contents

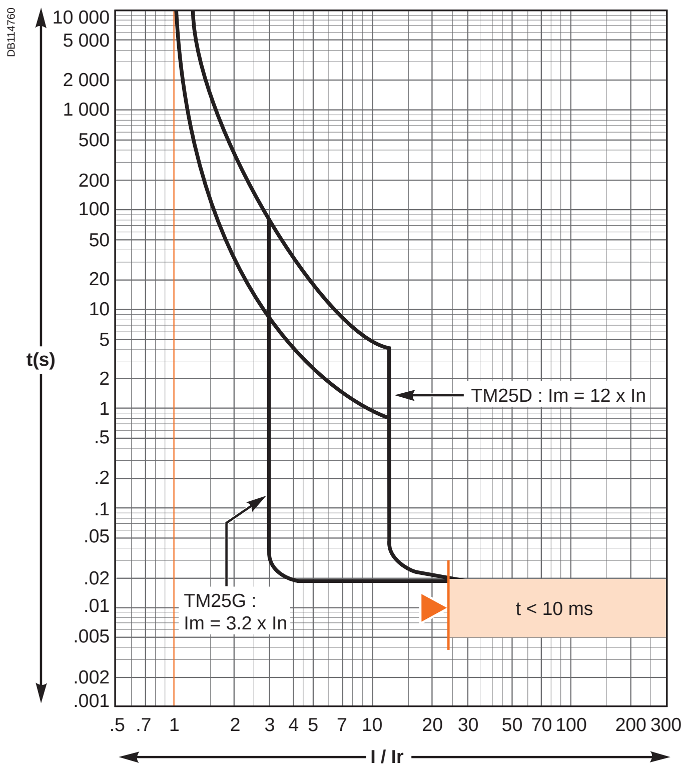
Tripping curves
Compact NSX100 to 250
Protection of distribution systems

TM magnetic trip units

TM16D / TM16G

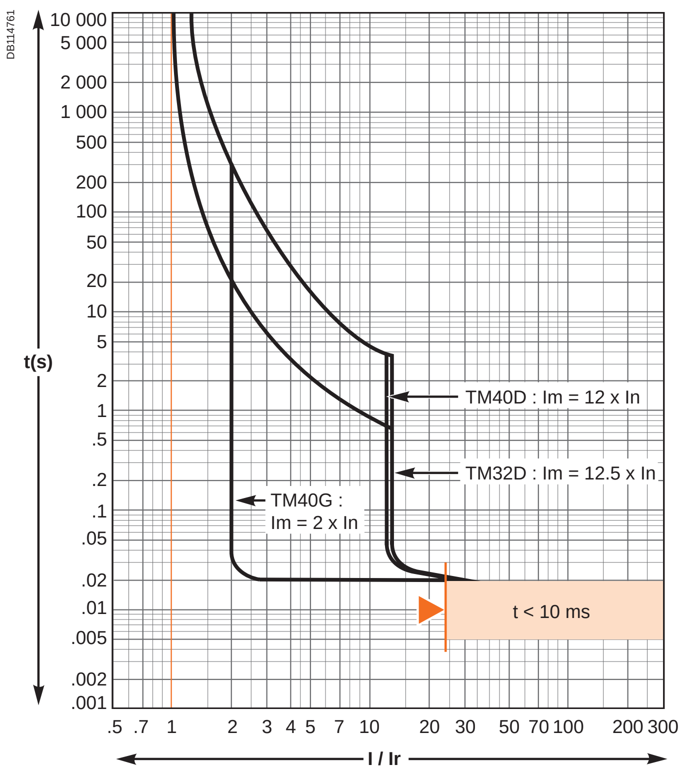


TM25D / TM25G

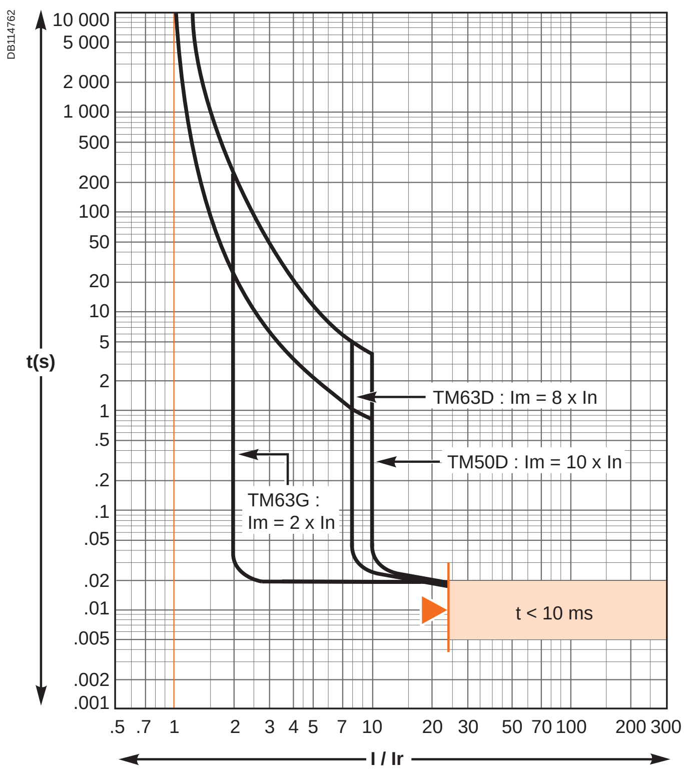


Reflex tripping.

TM32D / TM40D / TM40G



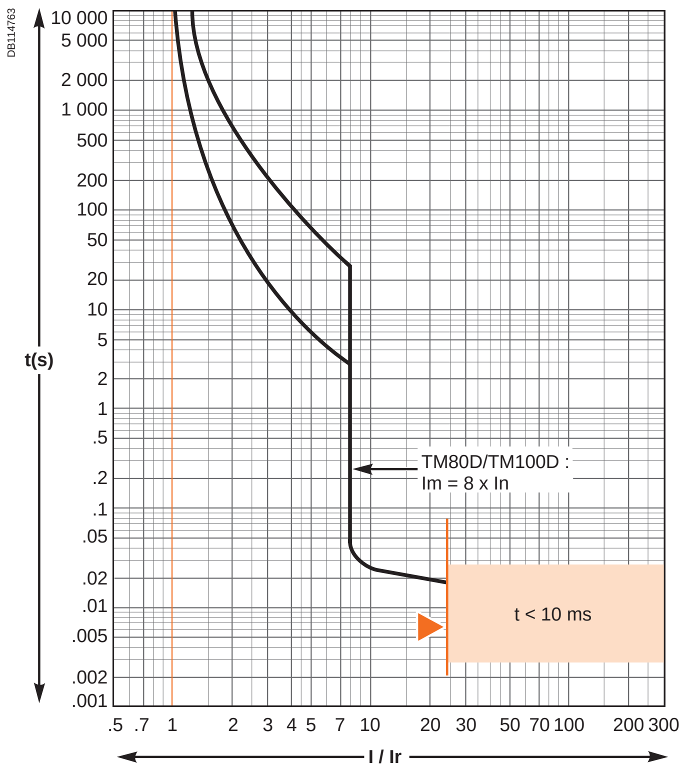
TM50D / TM63D / TM63G



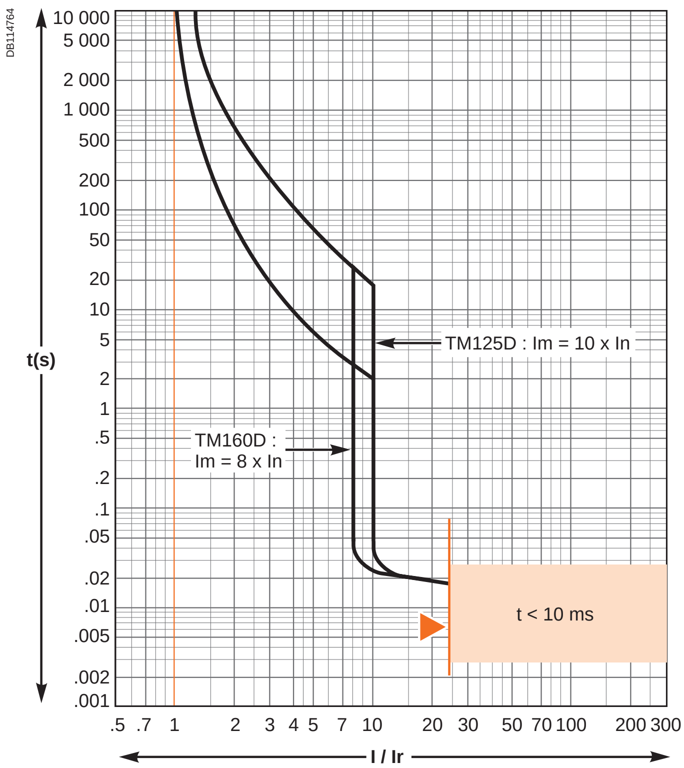
Reflex tripping.

TM magnetic trip units (cont.)

TM80D / TM100D

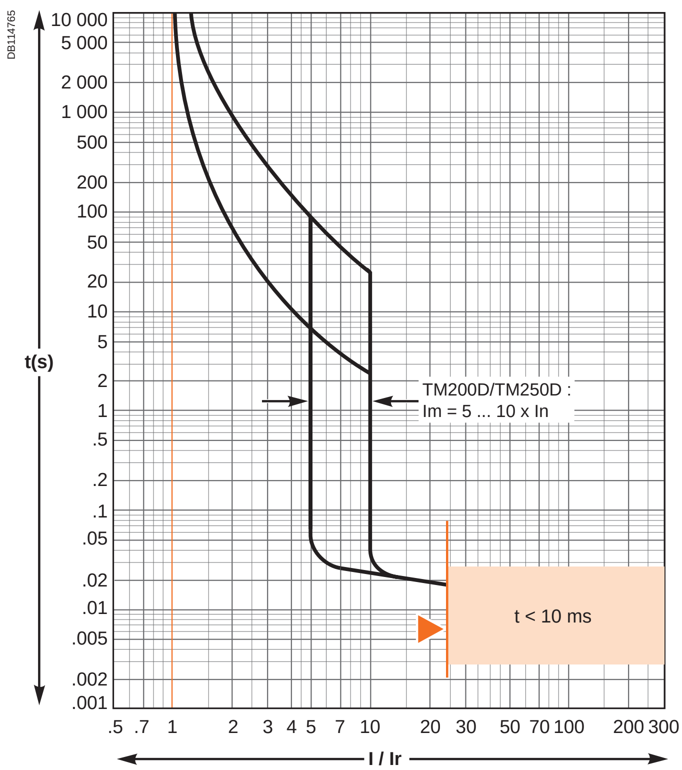


TM125D / TM160D



Reflex tripping.

TM200D / TM250D



Reflex tripping.

Additional characteristics

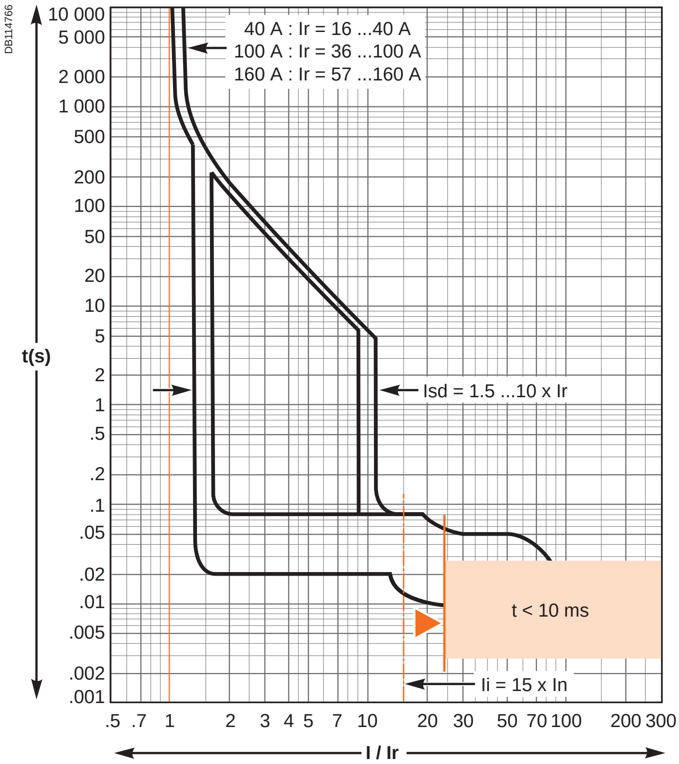
Tripping curves

Compact NSX100 to 250

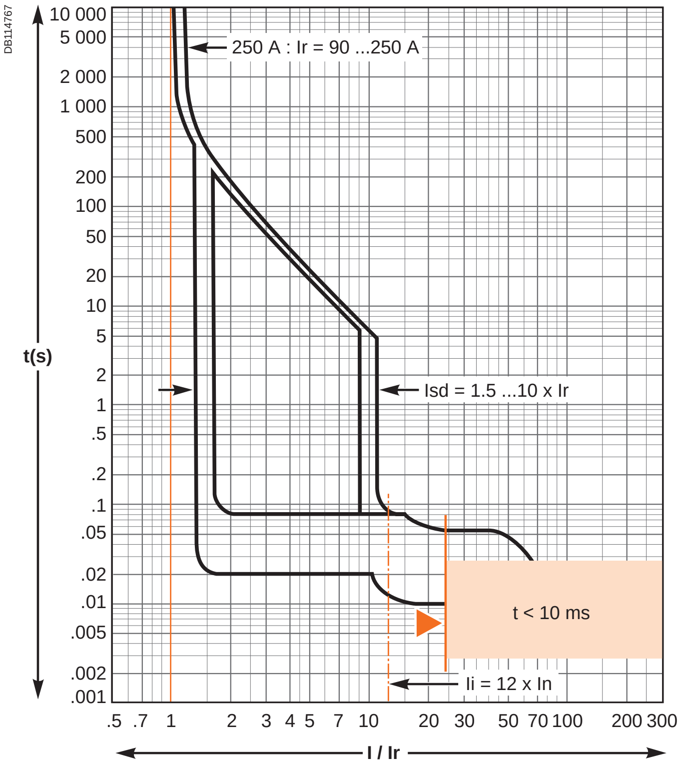
Protection of distribution systems (cont.)

Micrologic 2.2 and 2.2 G electronic trip units

Micrologic 2.2 - 40... 160 A

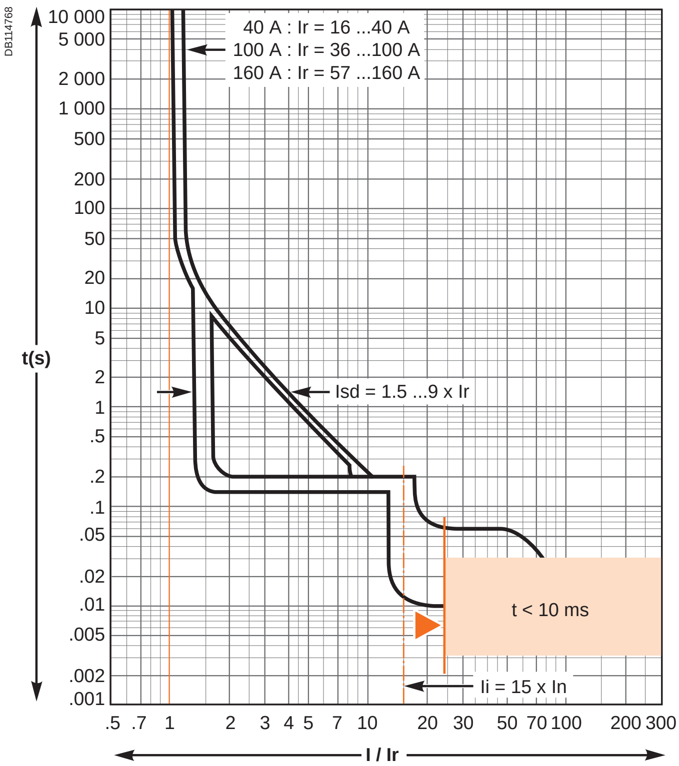


Micrologic 2.2 - 250 A

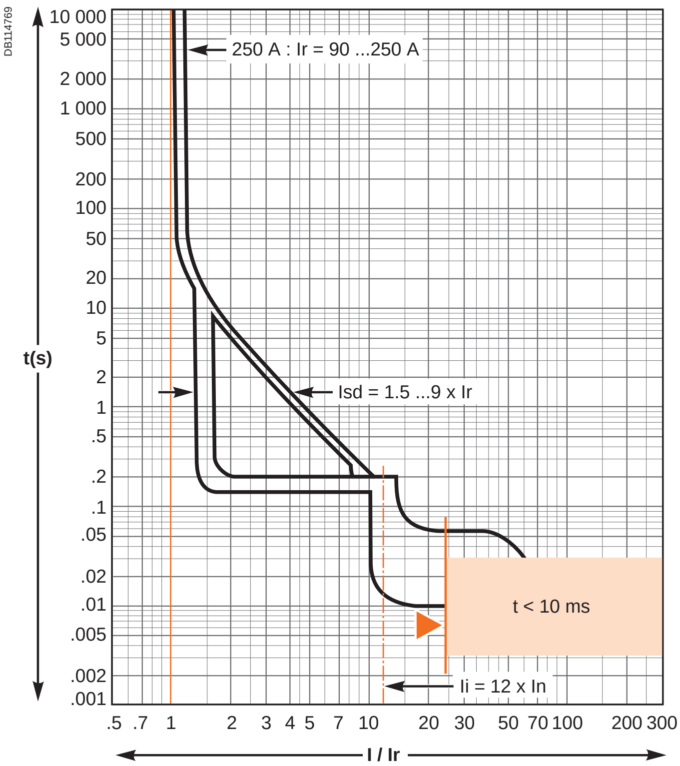


Reflex tripping.

Micrologic 2.2 G - 40... 160 A



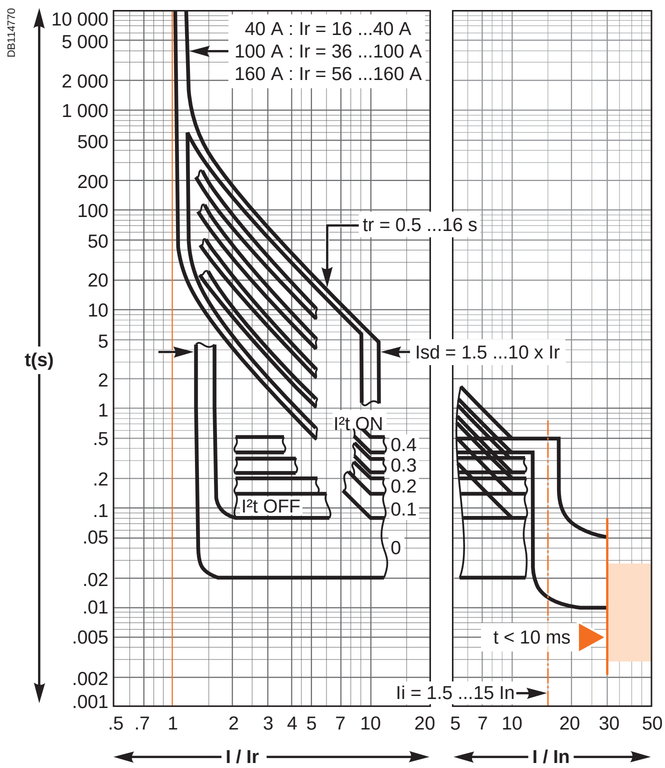
Micrologic 2.2 G - 250 A



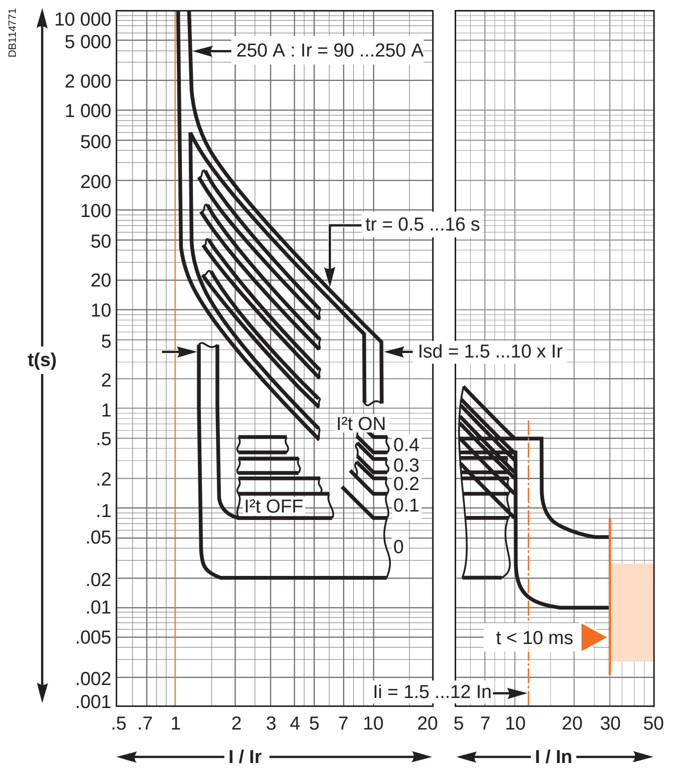
Reflex tripping.

Micrologic 5.2 and 6.2 A or E electronic trip units

Micrologic 5.2 and 6.2 A or E - 40... 160 A

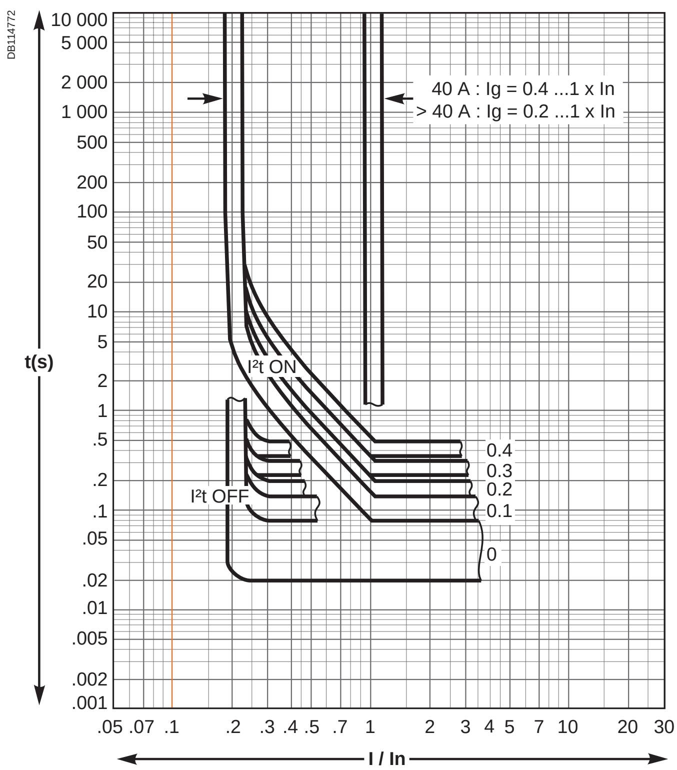


Micrologic 5.2 and 6.2 A or E - 250 A



Reflex tripping.

Micrologic 6.2 A or E (ground-fault protection)



Additional characteristics

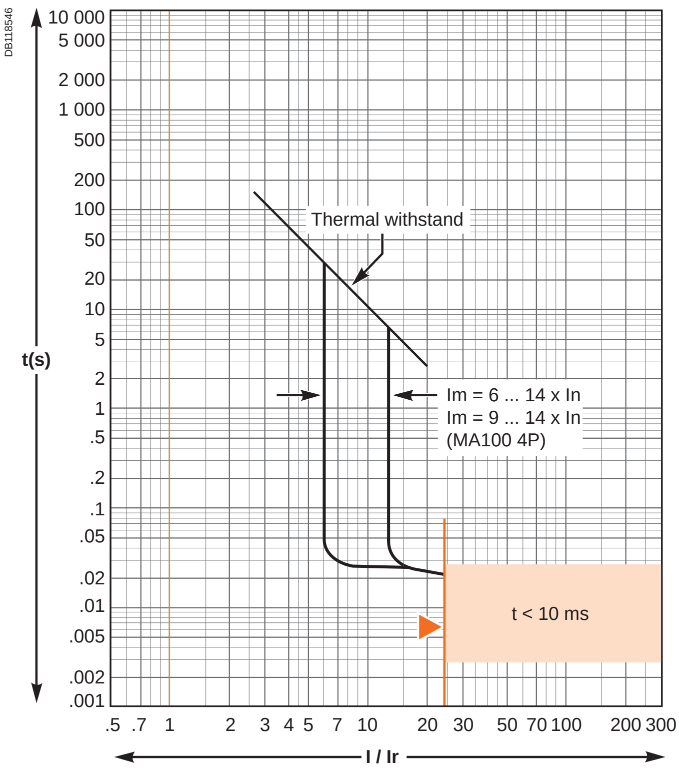
Tripping curves

Compact NSX100 to 250

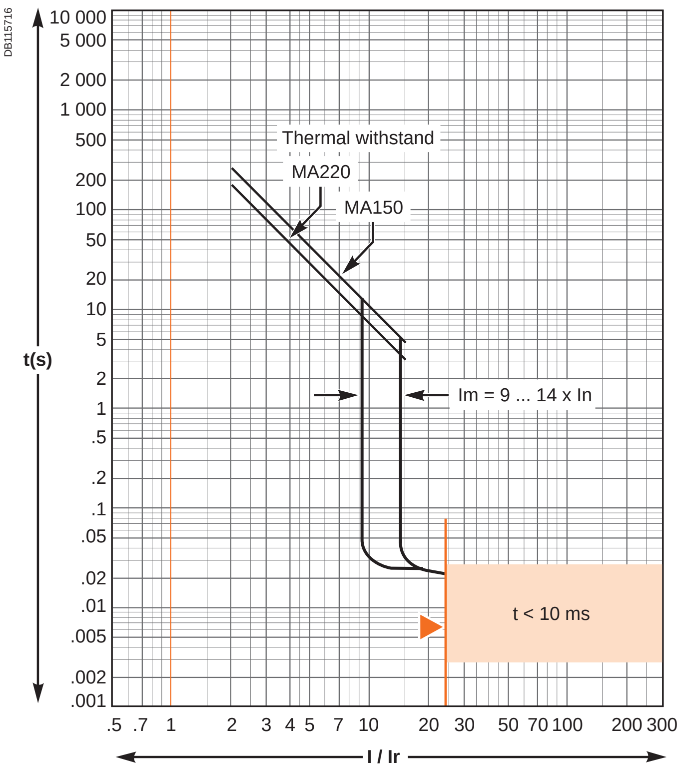
Motor protection

MA magnetic trip units

MA2.5... MA100



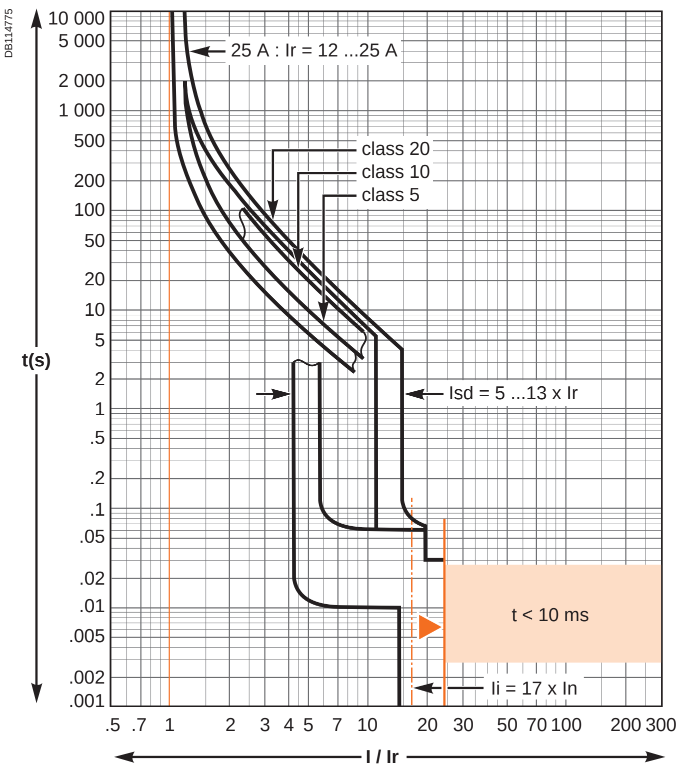
MA150 and MA220



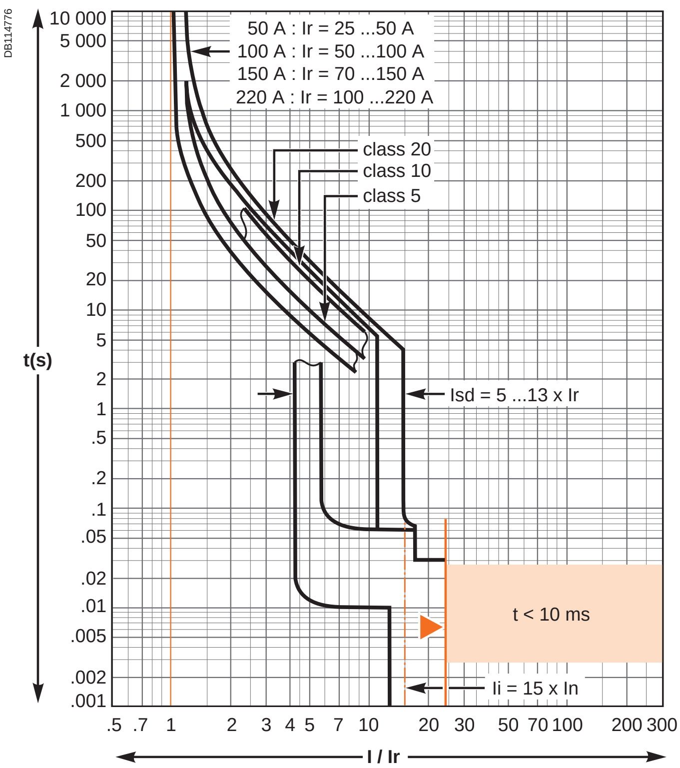
Reflex tripping.

Micrologic 2.2 M electronic trip units

Micrologic 2.2 M - 25 A



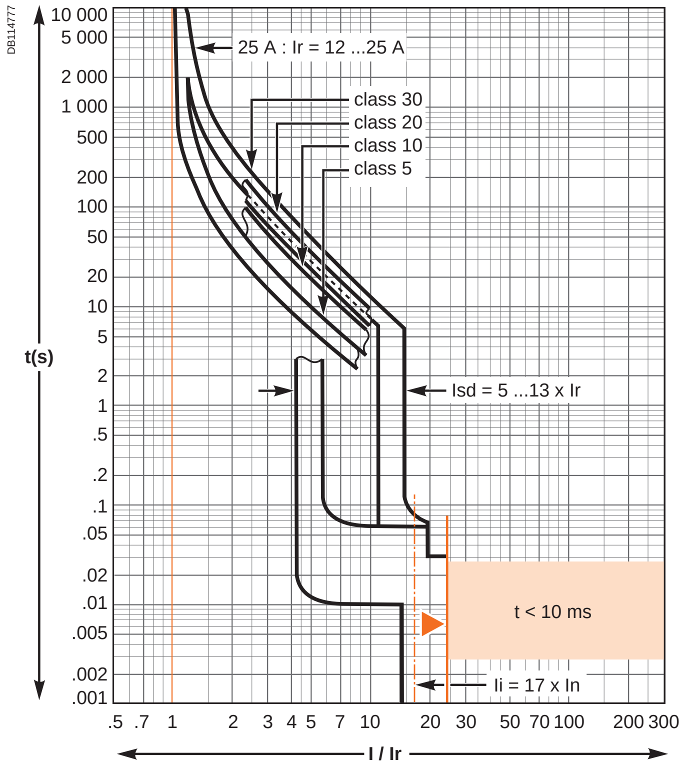
Micrologic 2.2 M - 50... 220 A



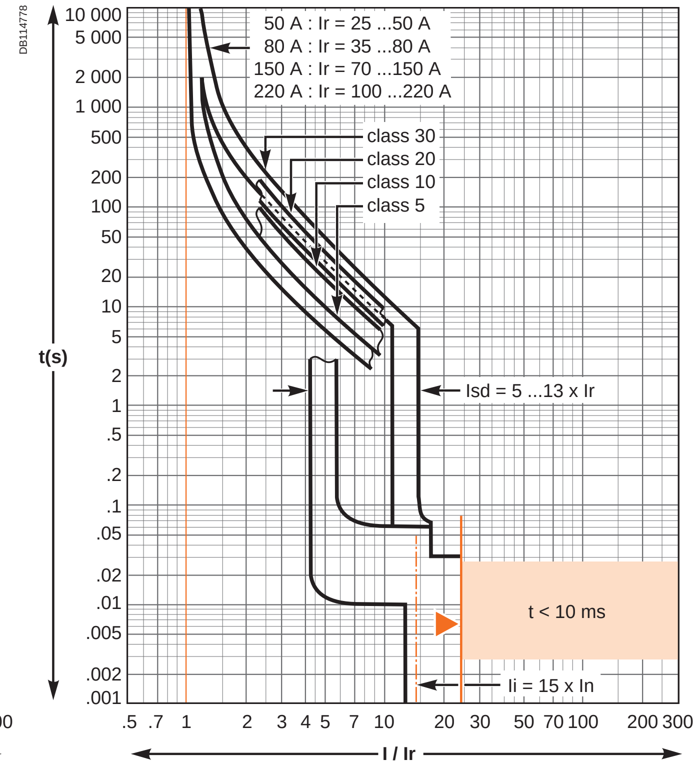
Reflex tripping.

Micrologic 6.2 E-M electronic trip units

Micrologic 6.2 E-M - 25 A

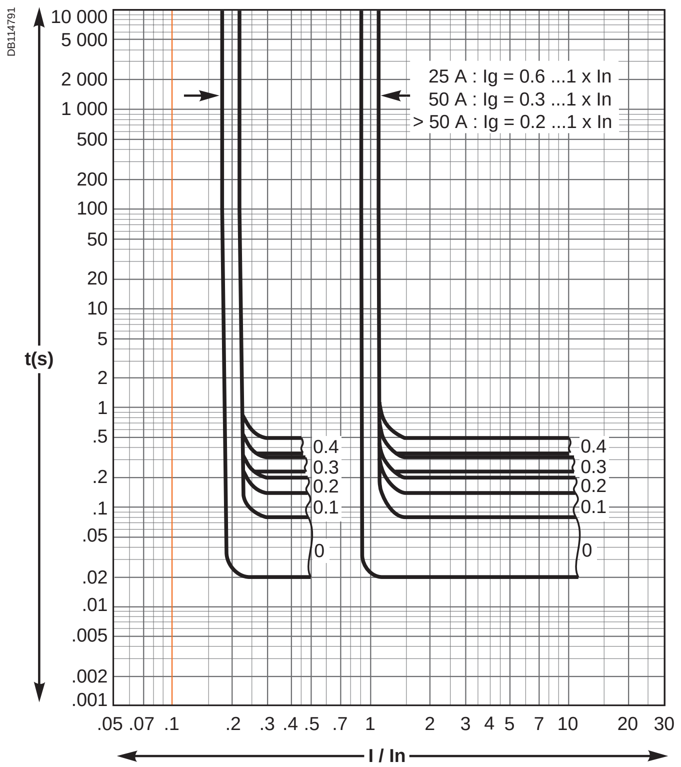


Micrologic 6.2 E-M - 50... 220 A



Reflex tripping.

Micrologic 6.2 E-M (ground-fault protection)



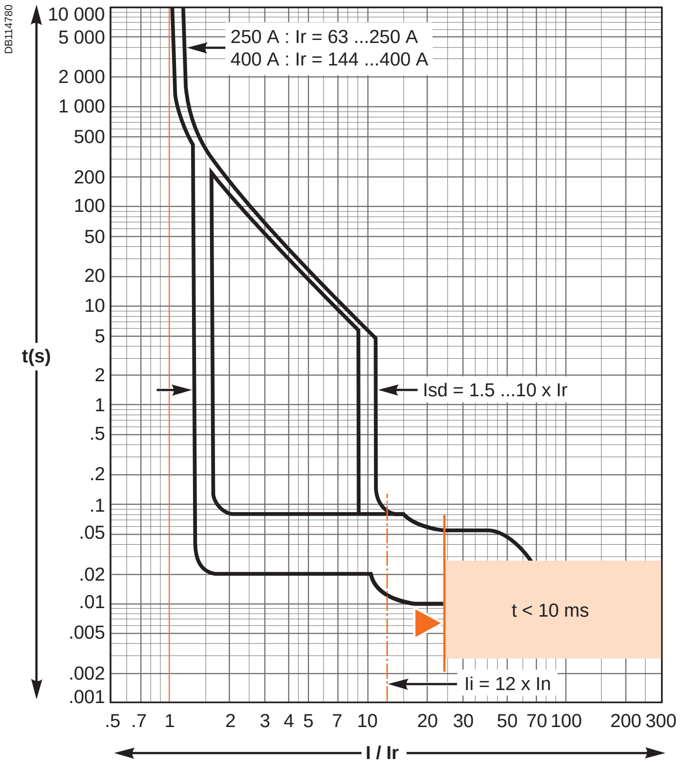
Tripping curves

Compact NSX400 to 630

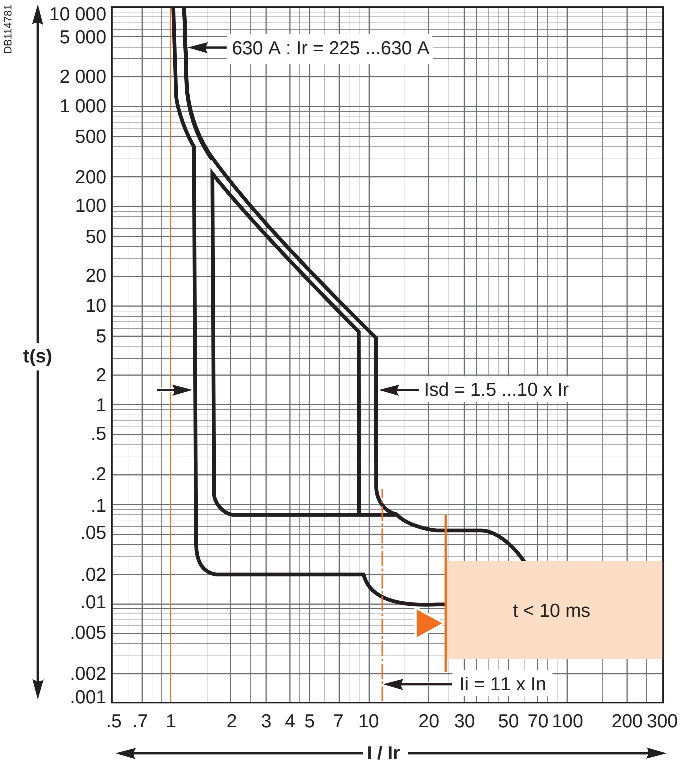
Protection of distribution systems

Micrologic 2.3, 5.3 and 6.3 A or E electronic trip units

Micrologic 2.3 - 250... 400 A

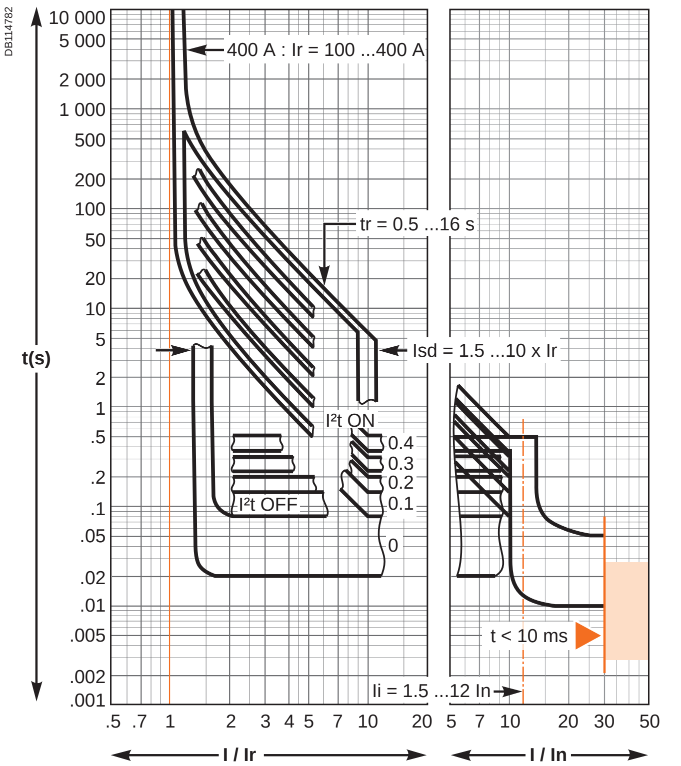


Micrologic 2.3 - 630 A

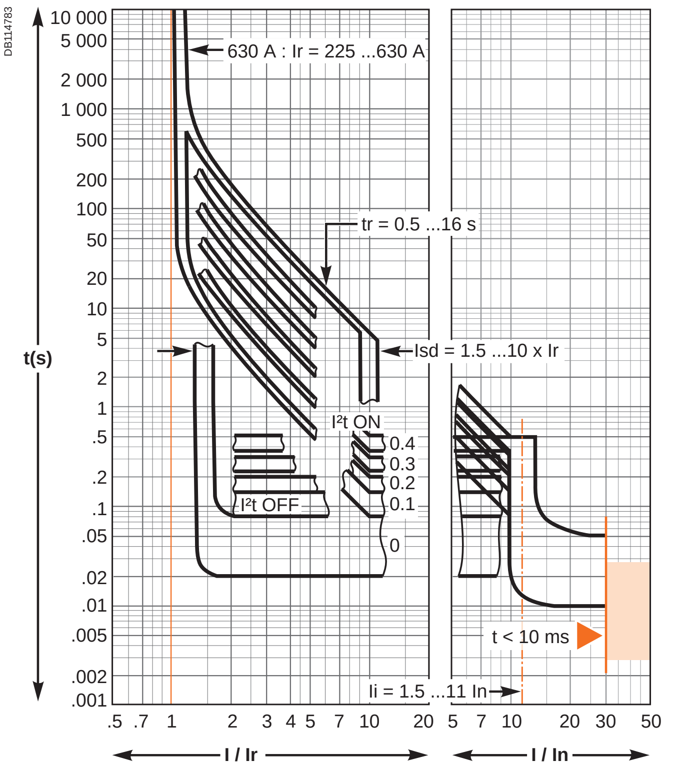


Reflex tripping.

Micrologic 5.3 and 6.3 A or E - 400 A



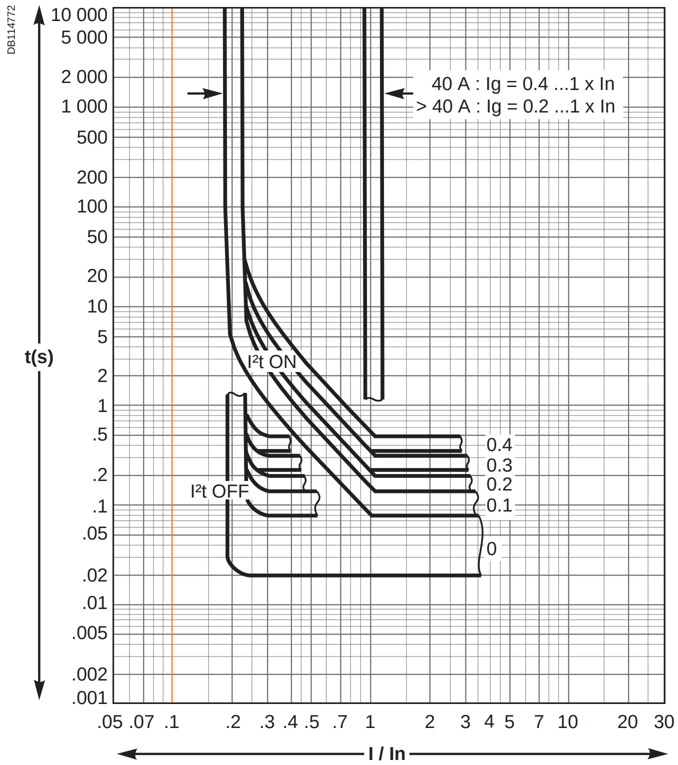
Micrologic 5.3 and 6.3 A or E - 630 A



Reflex tripping.

Micrologic 6.3 A or E electronic trip units (cont.)

Micrologic 6.3 A or E (ground-fault protection)



Additional characteristics

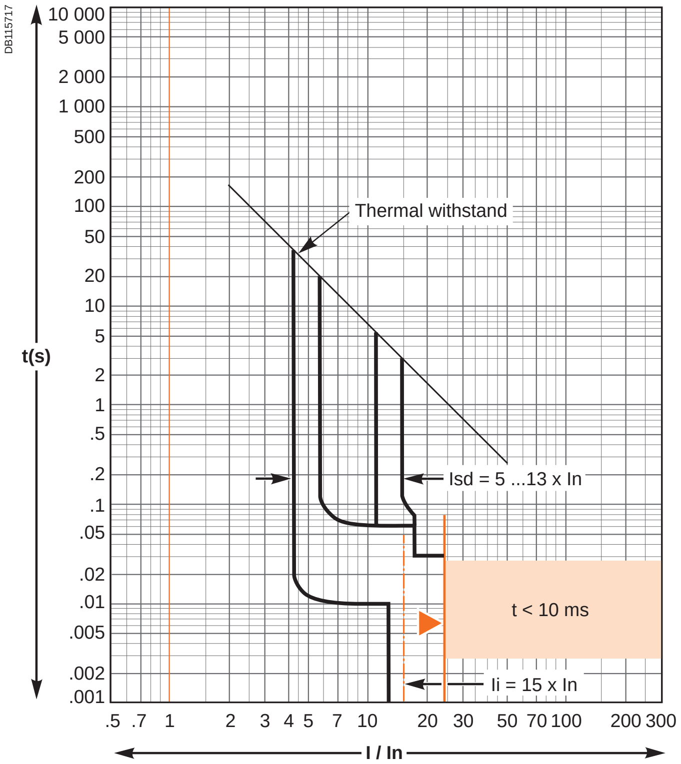
Tripping curves

Compact NSX400 to 630

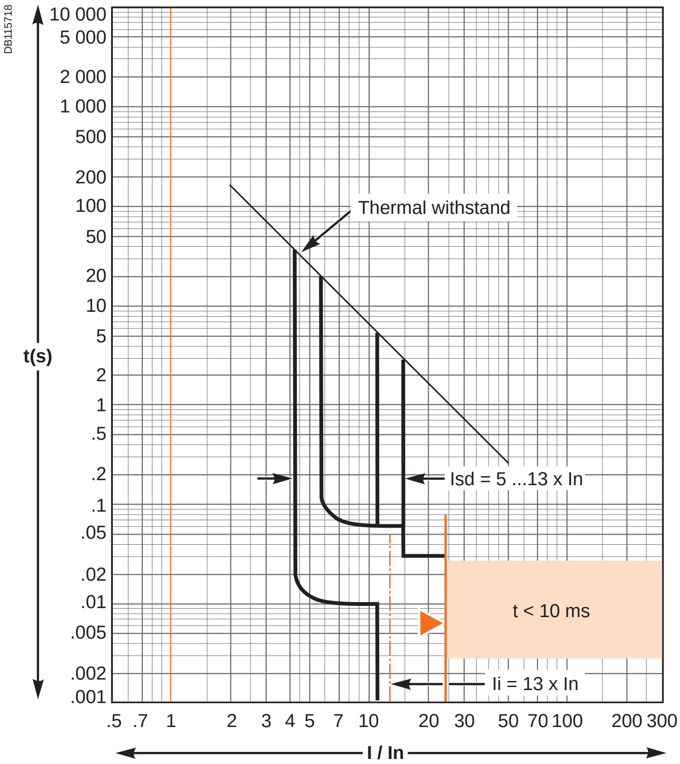
Motor protection

Micrologic 1.3 M and 2.3 M electronic trip units

Micrologic 1.3 M - 320 A

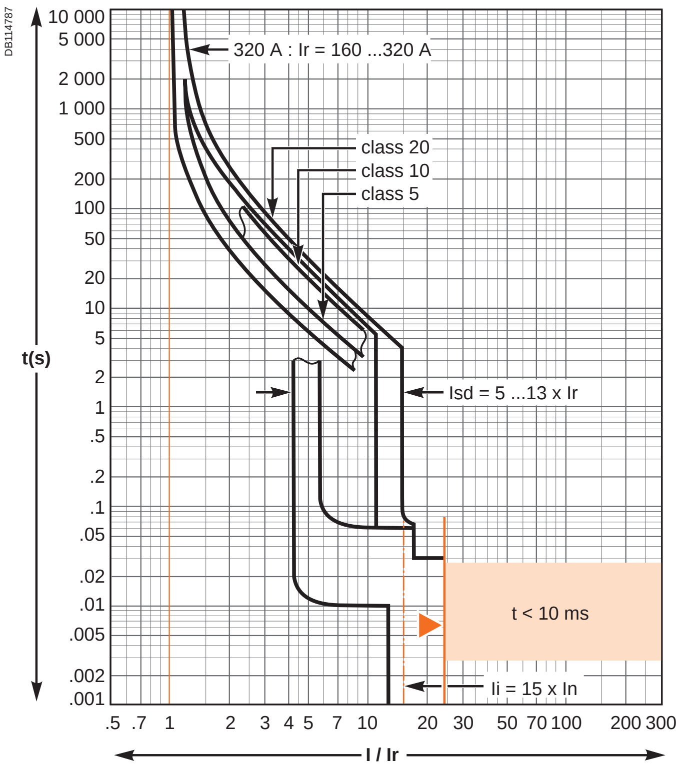


Micrologic 1.3 M - 500 A

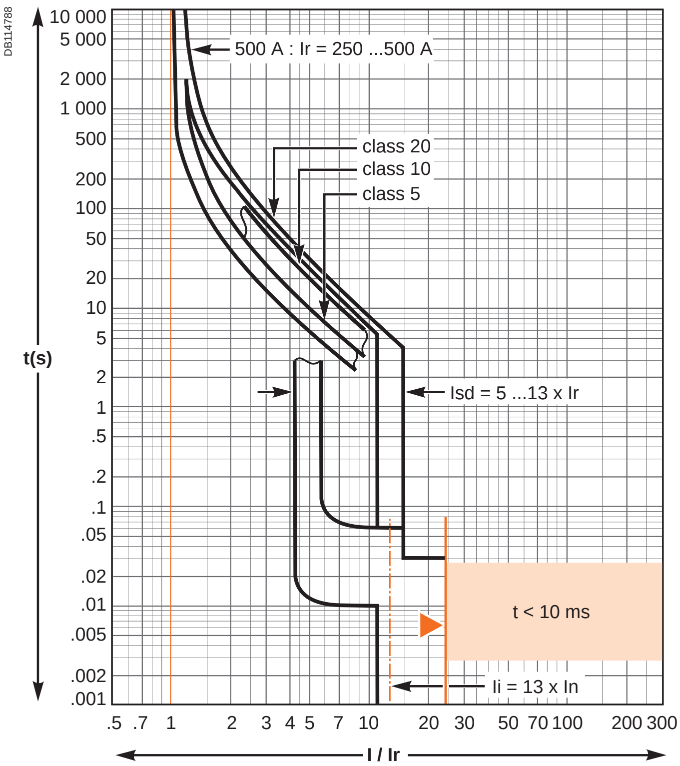


Reflex tripping.

Micrologic 2.3 M - 320 A



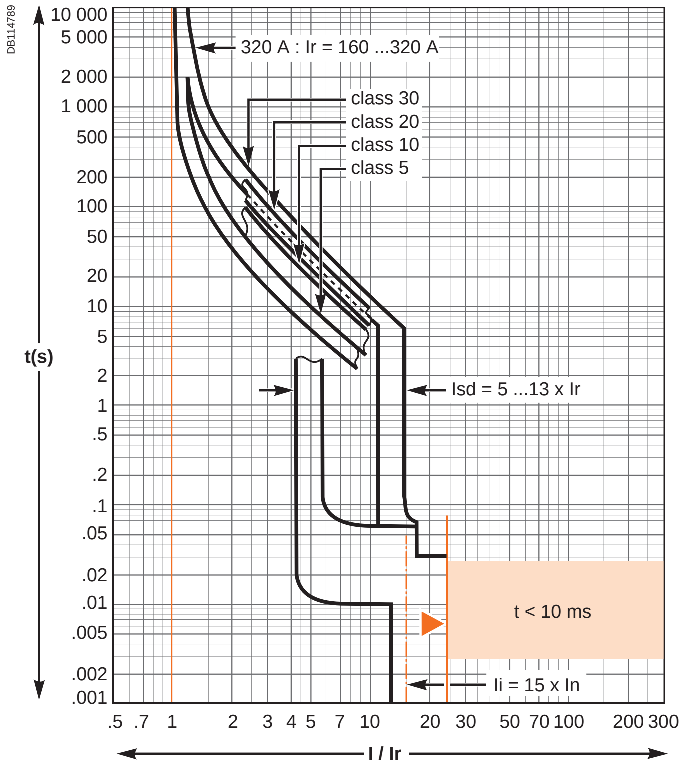
Micrologic 2.3 M - 500 A



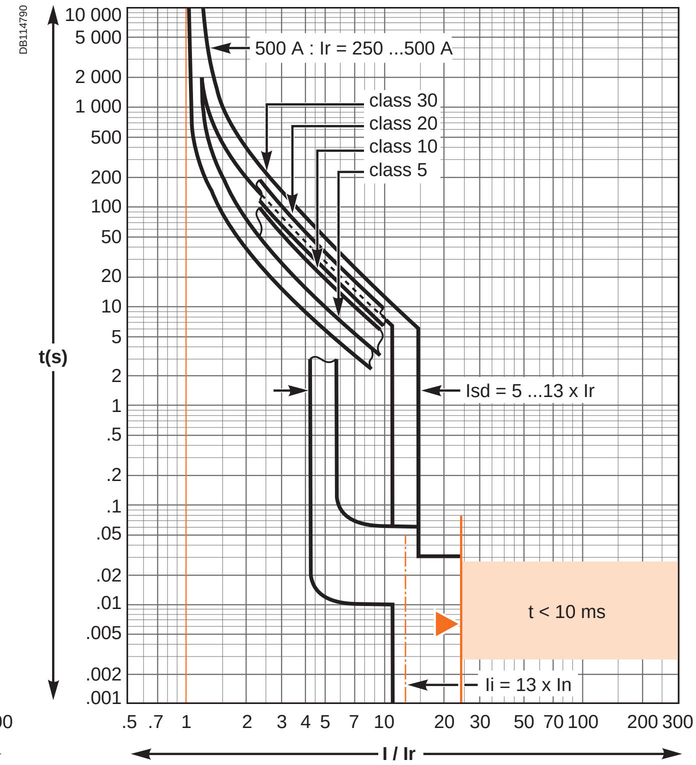
Reflex tripping.

Micrologic 6.3 E-M electronic trip units

Micrologic 6.3 E-M - 320 A

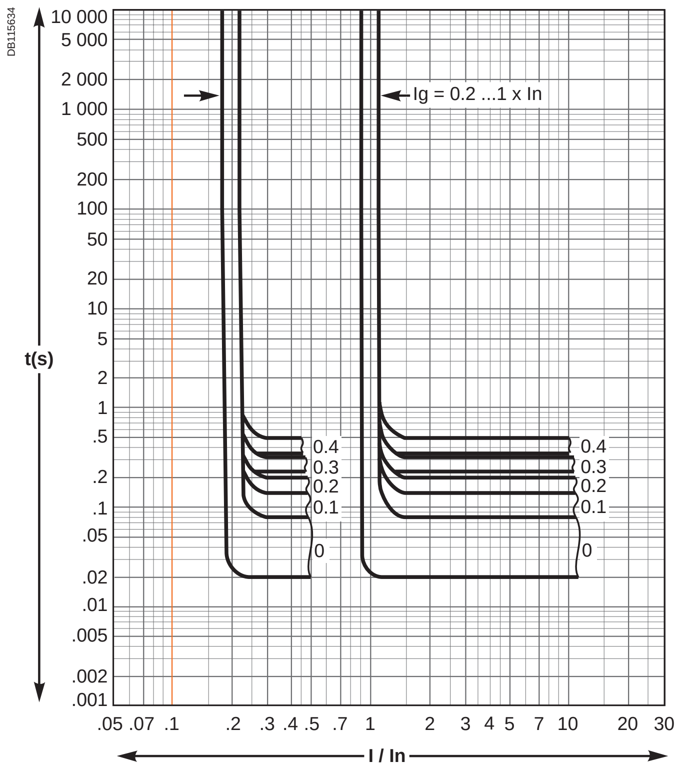


Micrologic 6.3 E-M - 500 A



Reflex tripping.

Micrologic 6.3 E-M (ground fault protection)



Tripping curves

Compact NSX100 to 630

Reflex tripping

Compact NSX100 to 630 devices incorporate the exclusive reflex-tripping system.
This system breaks very high fault currents.
The device is mechanically tripped via a "piston" actuated directly by the pressure produced in the breaking units by the short-circuit.
For high short-circuits, this system provides a faster break, thereby ensuring discrimination.
Reflex-tripping curves are exclusively a function of the circuit-breaker rating.

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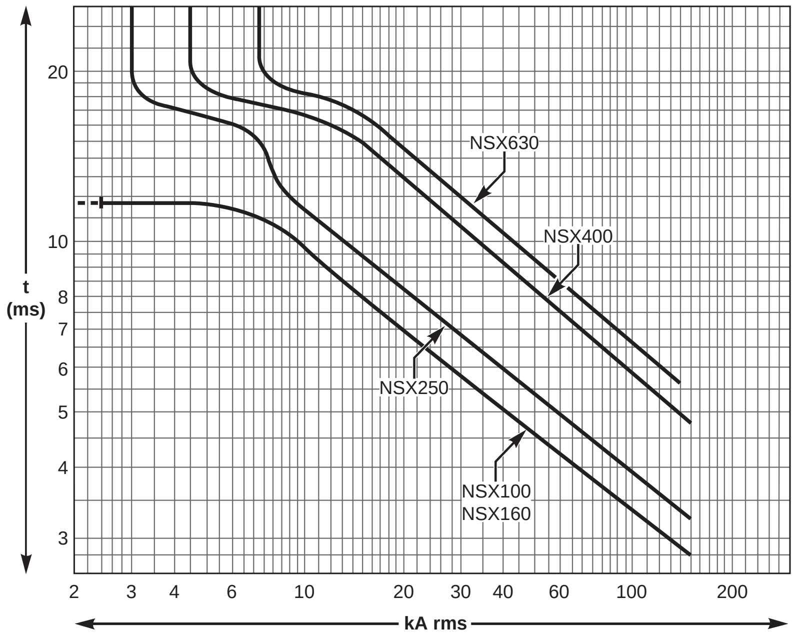
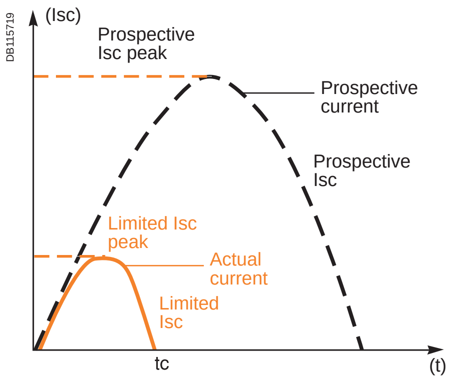


Current and energy limiting curves

The limiting capacity of a circuit breaker is its aptitude to let through a current, during a short-circuit, that is less than the prospective short-circuit current.



The exceptional limiting capacity of the Compact NSX range is due to the rotating double-break technique (very rapid natural repulsion of contacts and the appearance of two arc voltages in-series with a very steep wave front).

Ics = 100 % Icu

The exceptional limiting capacity of the Compact NSX range greatly reduces the forces created by fault currents in devices.
The result is a major increase in breaking performance.
In particular, the service breaking capacity Ics is equal to 100 % of Icu.
The Ics value, defined by IEC standard 60947-2, is guaranteed by tests comprising the following steps:

- break three times consecutively a fault current equal to 100% of Icu
- check that the device continues to function normally, that is:
  - it conducts the rated current without abnormal temperature rise
  - protection functions perform within the limits specified by the standard
  - suitability for isolation is not impaired.

Longer service life of electrical installations

Current-limiting circuit breakers greatly reduce the negative effects of short-circuits on installations.

Thermal effects
Less temperature rise in conductors, therefore longer service life for cables.

Mechanical effects
Reduced electrodynamic forces, therefore less risk of electrical contacts or busbars being deformed or broken.

Electromagnetic effects
Fewer disturbances for measuring devices located near electrical circuits.

Economy by means of cascading

Cascading is a technique directly derived from current limiting. Circuit breakers with breaking capacities less than the prospective short-circuit current may be installed downstream of a limiting circuit breaker. The breaking capacity is reinforced by the limiting capacity of the upstream device. It follows that substantial savings can be made on downstream equipment and enclosures.

Current and energy limiting curves

The limiting capacity of a circuit breaker is expressed by two curves which are a function of the prospective short-circuit current (the current which would flow if no protection devices were installed):

- the actual peak current (limited current)
- thermal stress (A^2s), i.e. the energy dissipated by the short-circuit in a conductor with a resistance of 1 Ω.

Example
What is the real value of a 150 kA rms prospective short-circuit (i.e. 330 kA peak) limited by an NSX250L upstream ?
The answer is 30 kA peak (curve page E-14).

Maximum permissible cable stresses

The table below indicates the maximum permissible thermal stresses for cables depending on their insulation, conductor (Cu or Al) and their cross-sectional area (CSA). CSA values are given in mm² and thermal stresses in A^2s.

CSA		1.5 mm²	2.5 mm²	4 mm²	6 mm²	10 mm²
PVC	Cu	$2.97x10^4$	$8.26x10^4$	$2.12x10^5$	$4.76x10^5$	$1.32x10^6$
	Al					$5.41x10^5$
PRC	Cu	$4.10x10^4$	$1.39x10^5$	$2.92x10^5$	$6.56x10^5$	$1.82x10^6$
	Al					$7.52x10^5$
CSA		**16 mm²**	**25 mm²**	**35 mm²**	**50 mm²**	
PVC	Cu	$3.4x10^6$	$8.26x10^6$	$1.62x10^7$	$3.31x10^7$	
	Al	$1.39x10^6$	$3.38x10^6$	$6.64x10^6$	$1.35x10^7$	
PRC	Cu	$4.69x10^6$	$1.39x10^7$	$2.23x10^7$	$4.56x10^7$	
	Al	$1.93x10^6$	$4.70x10^6$	$9.23x10^6$	$1.88x10^7$	

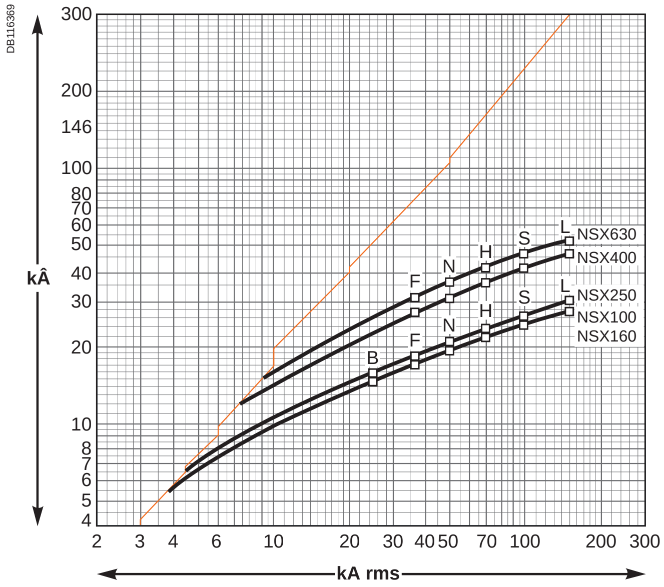
Example
Is a Cu/PVC cable with a CSA of 10 mm² adequately protected by an NSX160F?
The table above indicates that the permissible stress is $1.32x10^6$ A^2s.
All short-circuit currents at the point where an NSX160F (Icu = 35 kA) is installed are limited with a thermal stress less than $6x10^5$ A^2s (curve page E-14).
Cable protection is therefore ensured up to the limit of the breaking capacity of the circuit breaker.

Current and energy limiting curves

Current-limiting curves

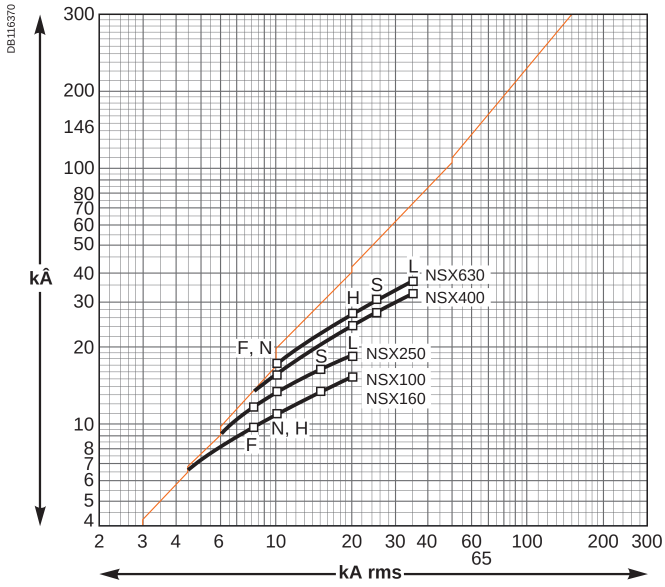
Voltage 400/440 V AC

Limited short-circuit current (kÂ peak)



Voltage 660/690 V AC

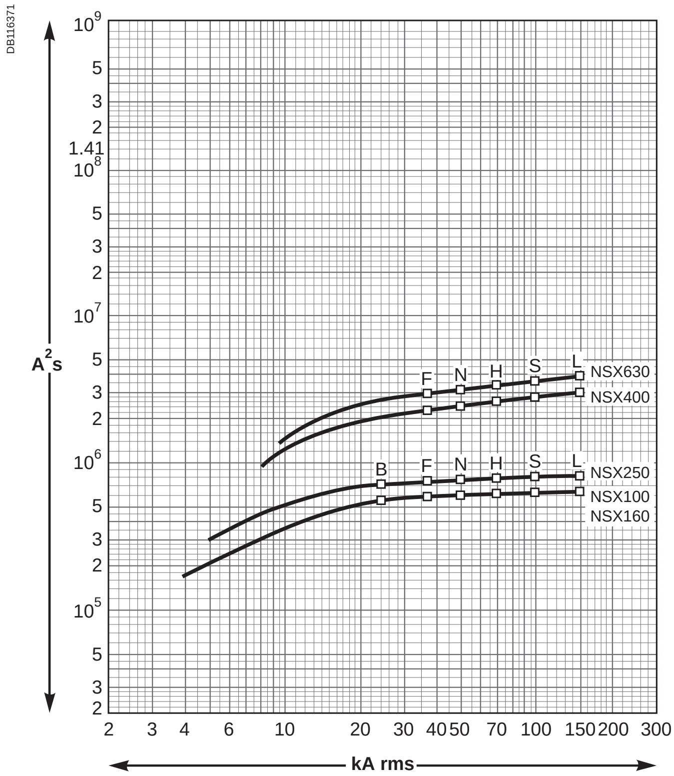
Limited short-circuit current (kÂ peak)



Energy-limiting curves

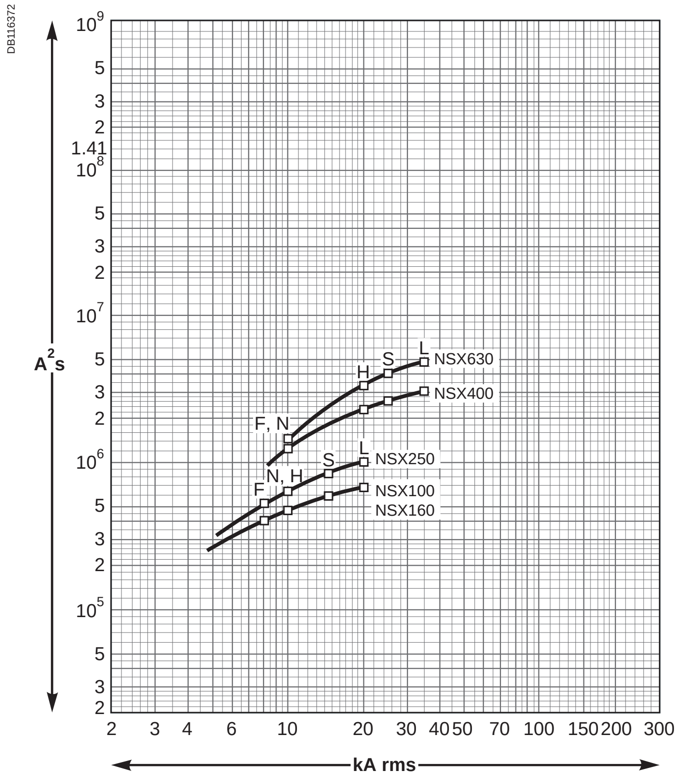
Voltage 400/440 V AC

Limited energy

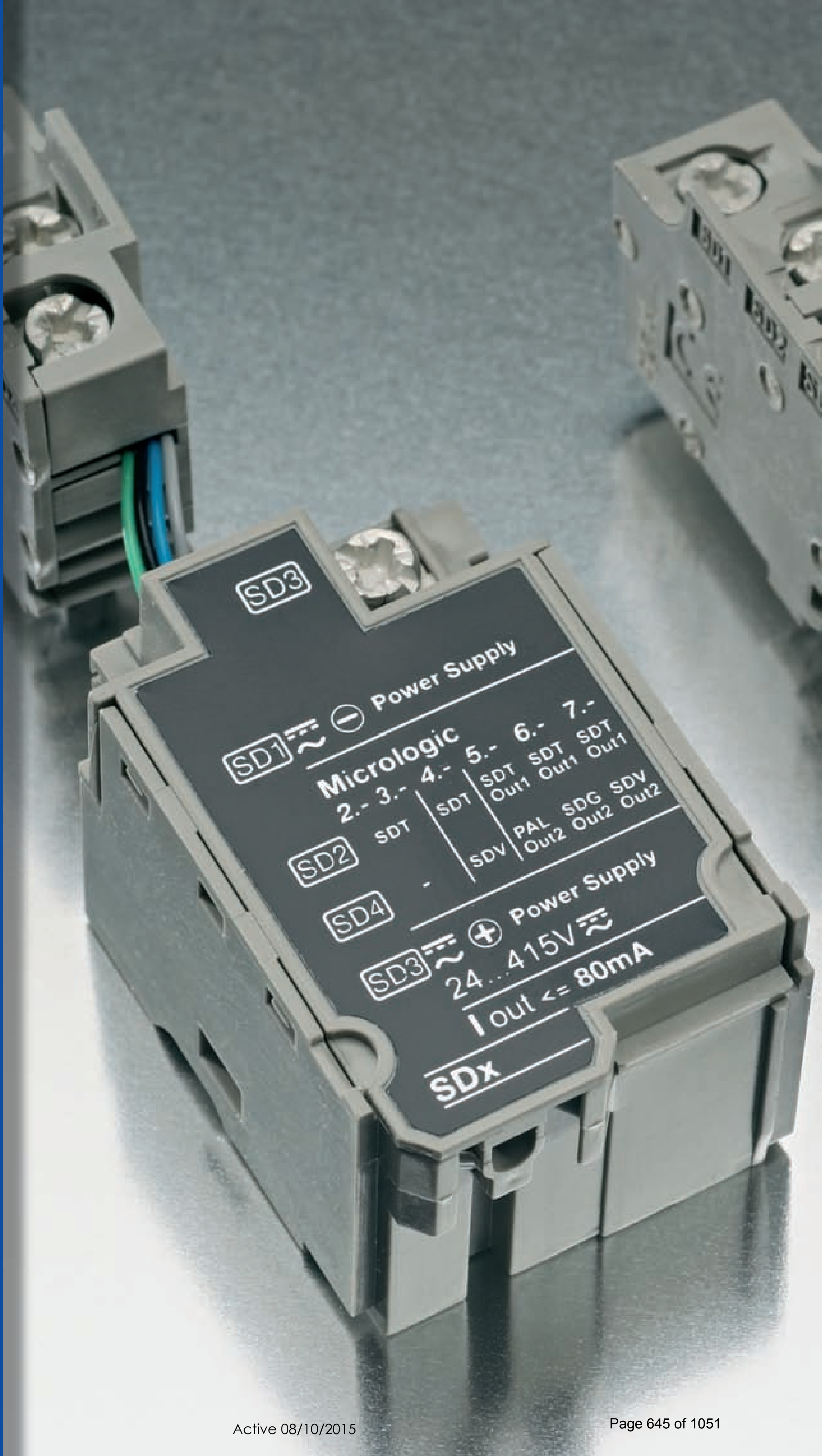


Voltage 660/690 V AC

Limited energy



Simplicity of catalogue numbers



Catalogue numbers
Contents

Compact NSX100 to 250

Contents

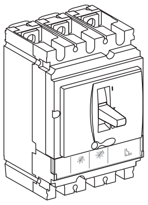
NSX100/160/250B: complete fixed/FC device

Compact NSX100/160/250B (25 kA 380/415 V)

Compact NSX100/160/250B

With thermal-magnetic trip unit TM-D

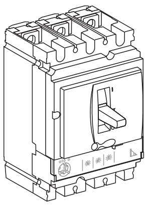
DB112222



Compact NSX100B (25 kA at 380/415 V)				
Rating	**3P** 2d	**3P** 3d	**4P** 3d	**4P** 4d
TM16D	**LV429547**	**LV429557**	**LV429567**	**LV429577**
TM25D	**LV429546**	**LV429556**	**LV429566**	**LV429576**
TM32D	**LV429545**	**LV429555**	**LV429565**	**LV429575**
TM40D	**LV429544**	**LV429554**	**LV429564**	**LV429574**
TM50D	**LV429543**	**LV429553**	**LV429563**	**LV429573**
TM63D	**LV429542**	**LV429552**	**LV429562**	**LV429572**
TM80D	**LV429541**	**LV429551**	**LV429561**	**LV429571**
TM100D	**LV429540**	**LV429550**	**LV429560**	**LV429570**
Compact NSX160B (25 kA at 380/415 V)				
Rating	**3P** 2d	**3P** 3d	**4P** 3d	**4P** 4d
TM80D	**LV430303**	**LV430313**	**LV430323**	**LV430333**
TM100D	**LV430302**	**LV430312**	**LV430322**	**LV430332**
TM125D	**LV430301**	**LV430311**	**LV430321**	**LV430331**
TM160D	**LV430300**	**LV430310**	**LV430320**	**LV430330**
Compact NSX250B (25 kA at 380/415 V)				
Rating	**3P** 2d	**3P** 3d	**4P** 3d	**4P** 4d
TM125D	**LV431103**	**LV431113**	**LV431123**	**LV431133**
TM160D	**LV431102**	**LV431112**	**LV431122**	**LV431132**
TM200D	**LV431101**	**LV431111**	**LV431121**	**LV431131**
TM250D	**LV431100**	**LV431110**	**LV431120**	**LV431130**

With electronic trip unit Micrologic 2.2 (LS$_o$I protection)

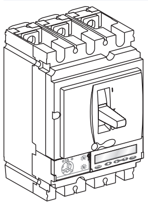
DB112223



Compact NSX100B (25 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
40	**LV429777**	**LV429787**
100	**LV429775**	**LV429785**
Compact NSX160B (25 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV430746**	**LV430751**
160	**LV430745**	**LV430750**
Compact NSX250B (25 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV431142**	**LV431152**
160	**LV431141**	**LV431151**
250	**LV431140**	**LV431150**

With electronic trip unit Micrologic 5.2 A (LSI protection, ammeter)

DB112224



Compact NSX100B (25 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
40	**LV429872**	**LV429877**
100	**LV429870**	**LV429875**
Compact NSX160B (25 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
100	**LV430871**	**LV430876**
160	**LV430870**	**LV430875**
Compact NSX250B (25 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
100	**LV431147**	**LV431157**
160	**LV431146**	**LV431156**
250	**LV431145**	**LV431155**

With electronic trip unit Micrologic 5.2 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

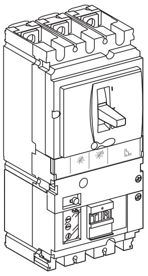
NSX100/160/250B: complete fixed/FC device

Vigicompact NSX100/160/250B (25 kA 380/415 V)

Vigicompact NSX100/160/250B

With thermal-magnetic trip unit TM-D

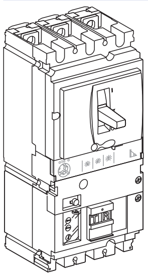
DB112243



Vigicompact NSX100B (25 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM16D	**LV429667**	**LV429707**	**LV429967**
TM25D	**LV429666**	**LV429706**	**LV429966**
TM32D	**LV429665**	**LV429705**	**LV429965**
TM40D	**LV429664**	**LV429704**	**LV429964**
TM50D	**LV429663**	**LV429703**	**LV429963**
TM63D	**LV429662**	**LV429702**	**LV429962**
TM80D	**LV429661**	**LV429701**	**LV429961**
TM100D	**LV429660**	**LV429700**	**LV429960**
Vigicompact NSX160B (25 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM80D	**LV430343**	**LV430353**	**LV430363**
TM100D	**LV430342**	**LV430352**	**LV430362**
TM125D	**LV430341**	**LV430351**	**LV430361**
TM160D	**LV430340**	**LV430350**	**LV430360**
Vigicompact NSX250B (25 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM125D	**LV431903**	**LV431913**	**LV431963**
TM160D	**LV431902**	**LV431912**	**LV431962**
TM200D	**LV431901**	**LV431911**	**LV431961**
TM250D	**LV431900**	**LV431910**	**LV431960**

With electronic trip unit Micrologic 2.2 (LS$_o$I protection)

DB115674



Vigicompact NSX100B (25 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
40	**LV429975**	**LV429985**
100	**LV429974**	**LV429984**
Vigicompact NSX160B (25 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
40	**LV430962**	**LV430997**
100	**LV430961**	**LV430996**
160	**LV430960**	**LV430995**
Vigicompact NSX250B (25 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV431977**	**LV431987**
160	**LV431976**	**LV431986**
250	**LV431975**	**LV431985**

With electronic trip unit Micrologic 5.2 A or 5.2 E (LSI protection, ammeter or energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

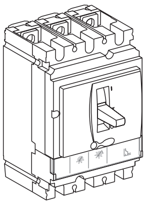
NSX100/160/250F: complete fixed/FC device

Compact NSX100/160/250F (36 kA 380/415 V)

Compact NSX100/160/250F

With thermal-magnetic trip unit TM-D

DB112222



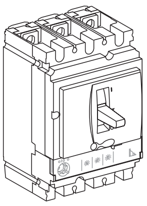
Compact NSX100F (36 kA at 380/415 V)				
Rating	**3P** 2d	**3P** 3d	**4P** 3d	**4P** 4d
TM16D	**LV429627**	**LV429637**	**LV429647**	**LV429657**
TM25D	**LV429626**	**LV429636**	**LV429646**	**LV429656**
TM32D	**LV429625**	**LV429635**	**LV429645**	**LV429655**
TM40D	**LV429624**	**LV429634**	**LV429644**	**LV429654**
TM50D	**LV429623**	**LV429633**	**LV429643**	**LV429653**
TM63D	**LV429622**	**LV429632**	**LV429642**	**LV429652**
TM80D	**LV429621**	**LV429631**	**LV429641**	**LV429651**
TM100D	**LV429620**	**LV429630**	**LV429640**	**LV429650**

Compact NSX160F (36 kA at 380/415 V)				
Rating	**3P** 2d	**3P** 3d	**4P** 3d	**4P** 4d
TM80D	**LV430623**	**LV430633**	**LV430643**	**LV430653**
TM100D	**LV430622**	**LV430632**	**LV430642**	**LV430652**
TM125D	**LV430621**	**LV430631**	**LV430641**	**LV430651**
TM160D	**LV430620**	**LV430630**	**LV430640**	**LV430650**

Compact NSX250F (36 kA at 380/415 V)				
Rating	**3P** 2d	**3P** 3d	**4P** 3d	**4P** 4d
TM125D	**LV431623**	**LV431633**	**LV431643**	**LV431653**
TM160D	**LV431622**	**LV431632**	**LV431642**	**LV431652**
TM200D	**LV431621**	**LV431631**	**LV431641**	**LV431651**
TM250D	**LV431620**	**LV431630**	**LV431640**	**LV431650**

With electronic trip unit Micrologic 2.2 (LS$_{o}$I protection)

DB112223



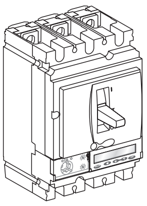
Compact NSX100F (36 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
40	**LV429772**	**LV429782**
100	**LV429770**	**LV429780**

Compact NSX160F (36 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV430771**	**LV430781**
160	**LV430770**	**LV430780**

Compact NSX250F (36 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV431772**	**LV431782**
160	**LV431771**	**LV431781**
250	**LV431770**	**LV431780**

With electronic trip unit Micrologic 5.2 A (LSI protection, ammeter)

DB112224



Compact NSX100F (36 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
40	**LV429882**	**LV429887**
100	**LV429880**	**LV429885**

Compact NSX160F (36 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
100	**LV430881**	**LV430886**
160	**LV430880**	**LV430885**

Compact NSX250F (36 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
100	**LV431862**	**LV431867**
160	**LV431861**	**LV431866**
250	**LV431860**	**LV431865**

With electronic trip unit Micrologic 5.2 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

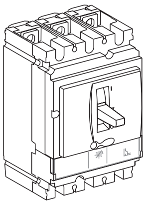
NSX100/160/250F: complete fixed/FC device (cont.)

Compact NSX100/160/250F (36 kA 380/415 V) (cont.)

Compact NSX100/160/250F

With magnetic trip unit MA

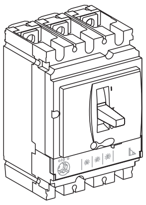
DB115664



Compact NSX100F (36 kA at 380/415 V)	
Rating	**3P** 3d
MA2.5	**LV429745**
MA6.3	**LV429744**
MA12.5	**LV429743**
MA25	**LV429742**
MA50	**LV429741**
MA100	**LV429740**
Compact NSX160F (36 kA at 380/415 V)	
Rating	**3P** 3d
MA100	**LV430831**
MA150	**LV430830**
Compact NSX250F (36 kA at 380/415 V)	
Rating	**3P** 3d
MA150	**LV431749**
MA220	**LV431748**

With electronic trip unit Micrologic 2.2-M (LS$_{o}$I motor protection)

DB112223



Compact NSX100F (36 kA at 380/415 V)	
Rating	**3P** 3d
25	**LV429828**
50	**LV429827**
100	**LV429825**
Compact NSX160F (36 kA at 380/415 V)	
Rating	**3P** 3d
100	**LV430986**
150	**LV430985**
Compact NSX250F (36 kA at 380/415 V)	
Rating	**3P** 3d
150	**LV431161**
220	**LV431160**

With electronic trip unit Micrologic 6.2 E-M (LSIG motor protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

Catalogue numbers

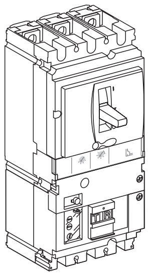
NSX100/160/250F: complete fixed/FC device (cont.)

Vigicompact NSX100/160/250F (36 kA 380/415 V)

Vigicompact NSX100/160/250F

With thermal-magnetic trip unit TM-D

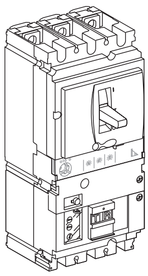
DB112243



Vigicompact NSX100F (36 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM16D	**LV429937**	**LV429947**	**LV429957**
TM25D	**LV429936**	**LV429946**	**LV429956**
TM32D	**LV429935**	**LV429945**	**LV429955**
TM40D	**LV429934**	**LV429944**	**LV429954**
TM50D	**LV429933**	**LV429943**	**LV429953**
TM63D	**LV429932**	**LV429942**	**LV429952**
TM80D	**LV429931**	**LV429941**	**LV429951**
TM100D	**LV429930**	**LV429940**	**LV429950**
Vigicompact NSX160F (36 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM80D	**LV430933**	**LV430943**	**LV430953**
TM100D	**LV430932**	**LV430942**	**LV430952**
TM125D	**LV430931**	**LV430941**	**LV430951**
TM160D	**LV430930**	**LV430940**	**LV430950**
Vigicompact NSX250F (36 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM125D	**LV431933**	**LV431943**	**LV431953**
TM160D	**LV431932**	**LV431942**	**LV431952**
TM200D	**LV431931**	**LV431941**	**LV431951**
TM250D	**LV431930**	**LV431940**	**LV431950**

With electronic trip unit Micrologic 2.2 (LS_0I protection)

DB115674



Vigicompact NSX100F (36 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
40	**LV429972**	**LV429982**
100	**LV429970**	**LV429980**
Vigicompact NSX160F (36 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
40	**LV430973**	**LV430983**
100	**LV430971**	**LV430981**
160	**LV430970**	**LV430980**
Vigicompact NSX250F (36 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV431972**	**LV431982**
160	**LV431971**	**LV431981**
250	**LV431970**	**LV431980**

With electronic trip unit Micrologic 5.2 A or 5.2 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

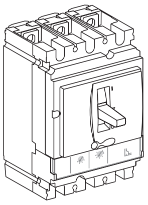
NSX100/160/250N: complete fixed/FC device

Compact NSX100/160/250N (50 kA 380/415 V)

Compact NSX100/160/250N

With thermal-magnetic trip unit TM-D

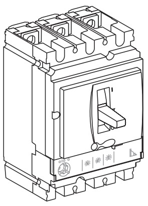
DB112222



Compact NSX100N (50 kA at 380/415 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM16D	**LV429847**	**LV429857**	**LV429867**
TM25D	**LV429846**	**LV429856**	**LV429866**
TM32D	**LV429845**	**LV429855**	**LV429865**
TM40D	**LV429844**	**LV429854**	**LV429864**
TM50D	**LV429843**	**LV429853**	**LV429863**
TM63D	**LV429842**	**LV429852**	**LV429862**
TM80D	**LV429841**	**LV429851**	**LV429861**
TM100D	**LV429840**	**LV429850**	**LV429860**
Compact NSX160N (50 kA at 380/415 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM80D	**LV430843**	**LV430853**	**LV430863**
TM100D	**LV430842**	**LV430852**	**LV430862**
TM125D	**LV430841**	**LV430851**	**LV430861**
TM160D	**LV430840**	**LV430850**	**LV430860**
Compact NSX250N (50 kA at 380/415 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM125D	**LV431833**	**LV431843**	**LV431853**
TM160D	**LV431832**	**LV431842**	**LV431852**
TM200D	**LV431831**	**LV431841**	**LV431851**
TM250D	**LV431830**	**LV431840**	**LV431850**

With electronic trip unit Micrologic 2.2 (LS$_o$I protection)

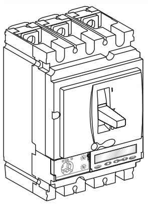
DB112223



Compact NSX100N (50 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
40	**LV429797**	**LV429807**
100	**LV429795**	**LV429805**
Compact NSX160N (50 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV430776**	**LV430786**
160	**LV430775**	**LV430785**
Compact NSX250N (50 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV431872**	**LV431877**
160	**LV431871**	**LV431876**
250	**LV431870**	**LV431875**

With electronic trip unit Micrologic 5.2 A (LSI protection, ammeter)

DB112224



Compact NSX100N (50 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, OSN
40	**LV429892**	**LV429897**
100	**LV429890**	**LV429895**
Compact NSX160N (50 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, OSN
100	**LV430891**	**LV430896**
160	**LV430890**	**LV430895**
Compact NSX250N (50 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, OSN
100	**LV431882**	**LV431887**
160	**LV431881**	**LV431886**
250	**LV431880**	**LV431885**

With electronic trip unit Micrologic 5.2 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

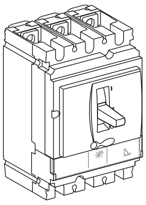
NSX100/160/250N: complete fixed/FC device (cont.)

Compact NSX100/160/250N (50 kA 380/415 V) (cont.)

Compact NSX100/160/250N

With magnetic trip unit MA

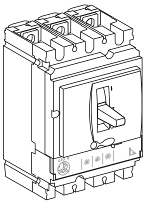
DB115664



Compact NSX100N (50 kA at 380/415 V)	
Rating	**3P** 3d
MA2.5	**LV429755**
MA6.3	**LV429754**
MA12.5	**LV429753**
MA25	**LV429752**
MA50	**LV429751**
MA100	**LV429750**
Compact NSX160N (50 kA at 380/415 V)	
Rating	**3P** 3d
MA100	**LV430833**
MA150	**LV430832**
Compact NSX250N (50 kA at 380/415 V)	
Rating	**3P** 3d
MA150	**LV431753**
MA220	**LV431752**

With electronic trip unit Micrologic 2.2-M (LS_0I motor protection)

DB112223



Compact NSX100N (50 kA at 380/415 V)	
Rating	**3P** 3d
25	**LV429833**
50	**LV429832**
100	**LV429830**
Compact NSX160N (50 kA at 380/415 V)	
Rating	**3P** 3d
100	**LV430989**
150	**LV430988**
Compact NSX250N (50 kA at 380/415 V)	
Rating	**3P** 3d
150	**LV431166**
220	**LV431165**

With electronic trip unit Micrologic 6.2 E-M (LSIG motor protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

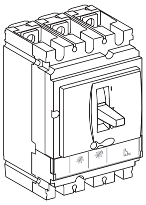
NSX100/160/250H: complete fixed/FC device

Compact NSX100/160/250H (70 kA 380/415 V)

Compact NSX100/160/250H

With thermal-magnetic trip unit TM-D

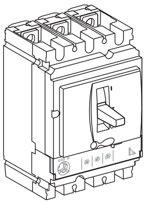
DB112222



Compact NSX100H (70 kA at 380/415 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM16D	**LV429677**	**LV429687**	**LV429697**
TM25D	**LV429676**	**LV429686**	**LV429696**
TM32D	**LV429675**	**LV429685**	**LV429695**
TM40D	**LV429674**	**LV429684**	**LV429694**
TM50D	**LV429673**	**LV429683**	**LV429693**
TM63D	**LV429672**	**LV429682**	**LV429692**
TM80D	**LV429671**	**LV429681**	**LV429691**
TM100D	**LV429670**	**LV429680**	**LV429690**
Compact NSX160H (70 kA at 380/415 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM80D	**LV430673**	**LV430683**	**LV430693**
TM100D	**LV430672**	**LV430682**	**LV430692**
TM125D	**LV430671**	**LV430681**	**LV430691**
TM160D	**LV430670**	**LV430680**	**LV430690**
Compact NSX250H (70 kA at 380/415 V)			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM125D	**LV431673**	**LV431683**	**LV431693**
TM160D	**LV431672**	**LV431682**	**LV431692**
TM200D	**LV431671**	**LV431681**	**LV431691**
TM250D	**LV431670**	**LV431680**	**LV431690**

With electronic trip unit Micrologic 2.2 (LS$_{o}$I protection)

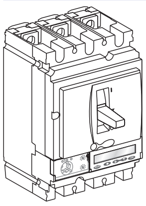
DB112223



Compact NSX100H (70 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
40	**LV429792**	**LV429802**
100	**LV429790**	**LV429800**
Compact NSX160H (70 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV430791**	**LV430801**
160	**LV430790**	**LV430800**
Compact NSX250H (70 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
100	**LV431792**	**LV431802**
160	**LV431791**	**LV431801**
250	**LV431790**	**LV431800**

With electronic trip unit Micrologic 5.2 A (LSI protection, ammeter)

DB112224



Compact NSX100H (70 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, OSN
40	**LV429794**	**LV429804**
100	**LV429793**	**LV429803**
Compact NSX160H (70 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, OSN
100	**LV430795**	**LV430805**
160	**LV430794**	**LV430804**
Compact NSX250H (70 kA at 380/415 V)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, OSN
100	**LV431797**	**LV431807**
160	**LV431796**	**LV431806**
250	**LV431795**	**LV431805**

With electronic trip unit Micrologic 5.2 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

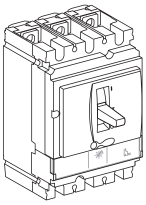
NSX100/160/250H: complete fixed/FC device (cont.)

Compact NSX100/160/250H (70 kA 380/415 V) (cont.)

Compact NSX100/160/250H

With magnetic trip unit MA

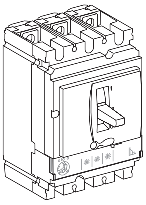
DB115664



Compact NSX100H (70 kA at 380/415 V)	
Rating	**3P** 3d
MA2.5	**LV429765**
MA6.3	**LV429764**
MA12.5	**LV429763**
MA25	**LV429762**
MA50	**LV429761**
MA100	**LV429760**
Compact NSX160H (70 kA at 380/415 V)	
Rating	**3P** 3d
MA100	**LV430835**
MA150	**LV430834**
Compact NSX250H (70 kA at 380/415 V)	
Rating	**3P** 3d
MA150	**LV431757**
MA220	**LV431756**

With electronic trip unit Micrologic 2.2-M (LS_oI motor protection)

DB112223



Compact NSX100H (70 kA at 380/415 V)	
Rating	**3P** 3d
25	**LV429838**
50	**LV429837**
100	**LV429835**
Compact NSX160H (70 kA at 380/415 V)	
Rating	**3P** 3d
100	**LV430992**
150	**LV430991**
Compact NSX250H (70 kA at 380/415 V)	
Rating	**3P** 3d
150	**LV431171**
220	**LV431170**

With electronic trip unit Micrologic 6.2 E-M (LSIG motor protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

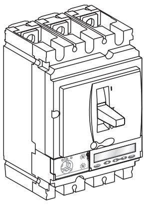
NSX100/160/250NA: complete fixed/FC device

Compact NSX100/160/250NA

Compact NSX100/160/250NA switch-disconnector

With NA switch-disconnector unit

DB112244



Compact NSX100NA			
Rating	**2P**	**3P**	**4P**
100	**LV429619**	**LV429629**	**LV429639**
Compact NSX160NA			
Rating	**2P**	**3P**	**4P**
160	**LV430619**	**LV430629**	**LV430639**
Compact NSX250NA			
Rating	**2P**	**3P**	**4P**
250	**LV431619**	**LV431629**	**LV431639**

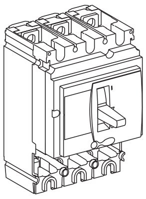
Catalogue numbers

NSX100/160/250B/F/N/H/S/L: fixed/FC device based on separate components

Compact and Vigicompact

Basic frame

DB112245

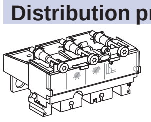


Compact NSX100	3P	4P
NSX100B (25 kA 380/415 V)	LV429014	LV429015
NSX100F (36 kA 380/415 V)	LV429003	LV429008
NSX100N (50 kA 380/415 V)	LV429006	LV429011
NSX100H (70 kA 380/415 V)	LV429004	LV429009
NSX100S (100 kA 380/415 V)	LV429018	LV429019
NSX100L (150 kA 380/415 V)	LV429005	LV429010
Compact NSX160	**3P**	**4P**
NSX160B (25 kA 380/415 V)	LV430390	LV430395
NSX160F (36 kA 380/415 V)	LV430403	LV430408
NSX160N (50 kA 380/415 V)	LV430406	LV430411
NSX160H (70 kA 380/415 V)	LV430404	LV430409
NSX160S (100 kA 380/415 V)	LV430391	LV430396
NSX160L (150 kA 380/415 V)	LV430405	LV430410
Compact NSX250	**3P**	**4P**
NSX250B (25 kA 380/415 V)	LV431390	LV431395
NSX250F (36 kA 380/415 V)	LV431403	LV431408
NSX250N (50 kA 380/415 V)	LV431406	LV431411
NSX250H (70 kA 380/415 V)	LV431404	LV431409
NSX250S (100 kA 380/415 V)	LV431391	LV431396
NSX250L (150 kA 380/415 V)	LV431405	LV431410

+ Trip unit

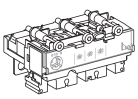
Distribution protection

DB112246



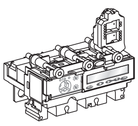
Thermal-magnetic TM-D			
Rating	**3P** 3d	**4P** 3d	**4P** 4d
TM16D	LV429037	LV429047	LV429057
TM25D	LV429036	LV429046	LV429056
TM32D	LV429035	LV429045	LV429055
TM40D	LV429034	LV429044	LV429054
TM50D	LV429033	LV429043	LV429053
TM63D	LV429032	LV429042	LV429052
TM80D	LV429031	LV429041	LV429051
TM100D	LV429030	LV429040	LV429050
TM125D	LV430431	LV430441	LV430451
TM160D (1)	LV430430	LV430440	LV430450
TM160D (2)	LV431432	LV431442	LV431452
TM200D	LV431431	LV431441	LV431451
TM250D	LV431430	LV431440	LV431450

DB112247



Micrologic 2.2 (LS$_o$I protection)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
Micrologic 2.2 40 A	LV429072	LV429082
Micrologic 2.2 100 A	LV429070	LV429080
Micrologic 2.2 160 A	LV430470	LV430480
Micrologic 2.2 250 A	LV431470	LV431480

DB112248



Micrologic 5.2 A (LSI protection, ammeter)		
Rating	3P 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
Micrologic 5.2 A 40 A	LV429091	LV429101
Micrologic 5.2 A 100 A	LV429090	LV429100
Micrologic 5.2 A 160 A	LV430490	LV430495
Micrologic 5.2 A 250 A	LV431490	LV431495
Micrologic 5.2 E (LSI protection, energy meter)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
Micrologic 5.2 E 40 A	LV429096	LV429106
Micrologic 5.2 E 100 A	LV429095	LV429105
Micrologic 5.2 E 160 A	LV430491	LV430496
Micrologic 5.2 E 250 A	LV431491	LV431496
Micrologic 6.2 A (LSIG protection, ammeter)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
Micrologic 6.2 A 40 A	LV429111	LV429136
Micrologic 6.2 A 100 A	LV429110	LV429135
Micrologic 6.2 A 160 A	LV430505	LV430515
Micrologic 6.2 A 250 A	LV431505	LV431515
Micrologic 6.2 E (LSIG protection, energy meter)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
Micrologic 6.2 E 40 A	LV429116	LV429141
Micrologic 6.2 E 100 A	LV429115	LV429140
Micrologic 6.2 E 160 A	LV430506	LV430516
Micrologic 6.2 E 250 A	LV431506	LV431516

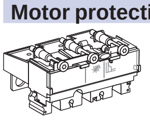
(1) For NSX160.
(2) For NSX250.

NSX100/160/250B/F/N/H/S/L: fixed/FC device based on separate components (cont.)

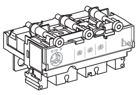
Compact and Vigicompact (cont.)

+ Trip unit (cont.)

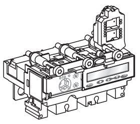
Motor protection

DB115666


Magnetic MA (I protection)		
Rating	**3P** 3d	**4P** 3d
MA2.5	**LV429125**	
MA6.3	**LV429124**	
MA12.5	**LV429123**	
MA25	**LV429122**	
MA50	**LV429121**	
MA100	**LV429120**	**LV429130**
MA150	**LV430500**	**LV430510**
MA220	**LV431500**	**LV431510**

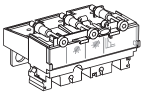
DB112247


Micrologic 2.2-M (LS_oI protection)	
Rating	**3P** 3d
Micrologic 2.2-M 25 A	**LV429174**
Micrologic 2.2-M 50 A	**LV429172**
Micrologic 2.2-M 100 A	**LV429170**
Micrologic 2.2-M 150 A	**LV430520**
Micrologic 2.2-M 220 A	**LV431520**

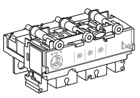
DB112248


Micrologic 6.2 E-M (LSIG protection, energy meter)	
Rating	**3P** 3d
Micrologic 6.2 E-M 25 A	**LV429184**
Micrologic 6.2 E-M 50 A	**LV429182**
Micrologic 6.2 E-M 80 A	**LV429180**
Micrologic 6.2 E-M 150 A	**LV430521**
Micrologic 6.2 E-M 220 A	**LV431521**

Generator protection

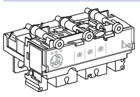
DB112246


Thermal-magnetic TM-G		
Rating	**3P** 3d	**4P** 4d
TM16G	**LV429155**	**LV429165**
TM25G	**LV429154**	**LV429164**
TM40G	**LV429153**	**LV429163**
TM63G	**LV429152**	**LV429162**

DB112247


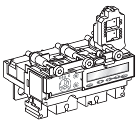
Micrologic 2.2 G (LS_oI protection)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
Micrologic 2.2-G 40 A	**LV429076**	**LV429086**
Micrologic 2.2-G 100 A	**LV429075**	**LV429085**
Micrologic 2.2-G 160 A	**LV430475**	**LV430485**
Micrologic 2.2-G 250 A	**LV431475**	**LV431485**

Protection of public distribution systems

DB112247


Micrologic 2.2 AB (LS_oI protection)		
Rating		**4P** 3d, 4d, 3d + N/2
Micrologic 2.2-AB 100 A		**LV434550**
Micrologic 2.2-AB 160 A		**LV434551**
Micrologic 2.2-AB 240 A		**LV434554**

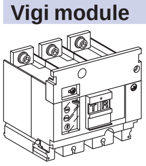
16 Hz 2/3 network protection

DB112248


Micrologic 5.2 A-Z (LSI protection, ammeter)	
Rating	**3P** 3d
Micrologic 5.2 A-Z 100 A	**LV429089**
Micrologic 5.2 A-Z 250 A	**LV431489**

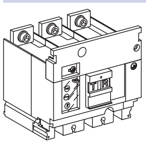
+ Vigi module or insulation monitoring module

Vigi module

DB112249


	3P	**4P**
ME type for NSX100/160 (200 to 440 V)	**LV429212**	**LV429213**
MH type for NSX100/160 (200 to 440 V)	**LV429210**	**LV429211**
MH type for NSX250 (200 to 440 V)	**LV431535**	**LV431536**
MH type for NSX100/160 (440 to 550 V)	**LV429215**	**LV429216**
MH type for NSX250 (440 to 550 V)	**LV431533**	**LV431534**
Connection for a 4P Vigi on a 3P breaker		**LV429214**

Insulation monitoring module

DB112249


	3P	**4P**
200 to 440 V AC	**LV429459**	**LV429460**
Connection for a 4P insulation monitoring module on a 3P breaker		**LV429214**

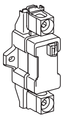
Trip unit accessories

Compact and Vigicompact NSX100/160/250

Trip unit accessories

External neutral CT for 3 pole breaker with Micrologic 5/6

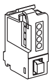
DB112733



25-100 A	**LV429521**
150-250 A	**LV430563**

24 V DC wiring accessory for Micrologic 5/6

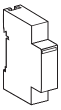
DB112730



24 V DC power supply connector	**LV434210**

ZSI wiring accessory for NS630b NW with NSX

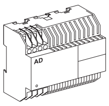
DB115665



ZSI module	**LV434212**

External power supply module (24 V DC - 1 A), class 4

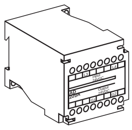
DB112736



24-30 V DC	**54440**
48-60 V DC	**54441**
100-125 V DC	**54442**
110-130 V AC	**54443**
200-240 V AC	**54444**
380-415 V AC	**54445**

Battery module

DB112729



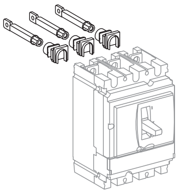
24 V DC battery module	**54446**

Installation and connection

Compact and Vigicompact NSX100/160/250

Fixed/RC device = fixed/FC device + rear connection kit

DB112251

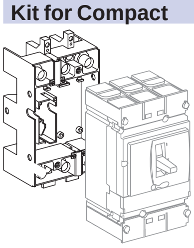


Short RC kit			
Kit 3P		3 x	**LV429235**
Kit 4P		4 x	**LV429235**
Mixed RC kit			
Kit 3P	Short RCs	2 x	**LV429235**
	Long RCs	1 x	**LV429236**
Kit 4P	Short RCs	2 x	**LV429235**
	Long RCs	2 x	**LV429236**

Plug-in version = fixed/FC device + plug-in kit

Kit for Compact

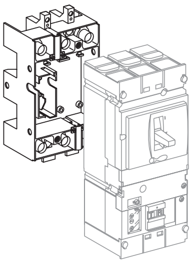
DB112252



	2P (3P)	**3P**	**4P**
Plug-in kit	**LV429288**	**LV429289**	**LV429290**
Comprising:			
Base	= 1 x LV429265	= 1 x LV429266	= 1 x LV429267
Power connections	+ 2 x LV429268	+ 3 x LV429268	+ 4 x LV429268
Short terminal shields	+ 2 x LV429515	+ 2 x LV429515	+ 2 x LV429516
Safety trip interlock	+ 1 x LV429270	+ 1 x LV429270	+ 1 x LV429270

Kit for Vigicompact

DB112253

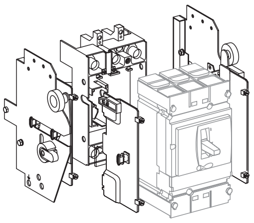


	3P	**4P**
Vigicompact plug-in kit	**LV429291**	**LV429292**
Comprising:		
Base	= 1 x LV429266	= 1 x LV429267
Power connections	+ 3 x LV429269	+ 4 x LV429269
Short terminal shields	+ 2 x LV429515	+ 2 x LV429516
Safety trip interlock	+ 1 x LV429270	+ 1 x LV429270

Withdrawable version = fixed/FC device + withdrawable kit

Kit for Compact

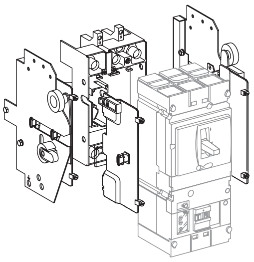
DB112731



	2P (3P)	**3P**	**4P**
	Kit for Compact	**Kit for Compact**	**Kit for Compact**
	=	=	=
Plug-in kit	1 x **LV429288**	1 x **LV429289**	1 x **LV429290**
	+	+	+
Chassis side plates for base	1 x **LV429282**	1 x **LV429282**	1 x **LV429282**
	+	+	+
Chassis side plates for breaker	1 x **LV429283**	1 x **LV429283**	1 x **LV429283**

Kit for Vigicompact

DB112732



	3P	**4P**
	Kit for Vigicompact	**Kit for Vigicompact**
	=	=
Plug-in kit	1 x **LV429291**	1 x **LV429292**
	+	+
Chassis side plates for base	1 x **LV429282**	1 x **LV429282**
	+	+
Chassis side plates for breaker	1 x **LV429283**	1 x **LV429283**

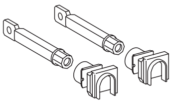
Catalogue numbers

Accessories

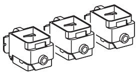
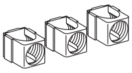
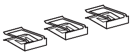
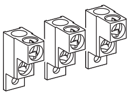
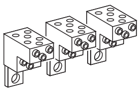
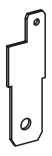
Compact and Vigicompact NSX100/160/250

Connection accessories (Cu or Al)

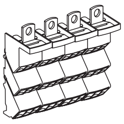
Rear connections

DB112225 	2 short			**LV429235**
	2 long			**LV429236**

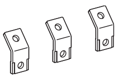
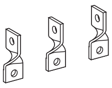
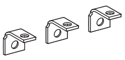
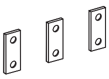
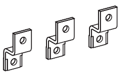
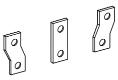
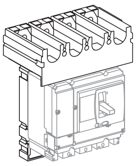
Bare cable connectors

DB112226 	Steel connectors	1 x (1.5 to 95 mm²) ; ≤ 160 A	Set of 3	**LV429242**
			Set of 4	**LV429243**
DB112225 	Aluminium connectors	1 x (25 to 95 mm²) ; ≤ 250 A	Set of 3	**LV429227**
			Set of 4	**LV429228**
		1 x (120 to 185 mm²) ; ≤ 250 A	Set of 3	**LV429259**
			Set of 4	**LV429260**
DB112726 	Clips for connectors		Set of 10	**LV429241**
DB112227 	Aluminium connectors for 2 cables (1)	2 x (50 to 120 mm²) ; ≤ 250 A	Set of 3	**LV429218**
			Set of 4	**LV429219**
DB112228 	Aluminium connectors (1) for 6 cables	6 x (1.5 to 35 mm²) ; ≤ 250 A	Set of 3	**LV429248**
			Set of 4	**LV429249**
DB112724 	6.35 mm voltage tap for steel or aluminium connectors		Set of 10	**LV429348**

"Polybloc" distribution block (for bare cable)

DB115613 	160 A (40 °C) 6 cables S ≤ 10 mm²	1P	**04031**
	250 A (40 °C) 9 cables S ≤ 10 mm²	3P	**04033**
		4P	**04034**

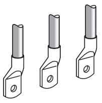
Terminal extensions

DB112230 	45° terminal extension (1)	Set of 3	**LV429223**
		Set of 4	**LV429224**
DB112231 	Edgewise terminal extensions (1)	Set of 3	**LV429308**
		Set of 4	**LV429309**
DB112232 	Right-angle terminal extensions (1)	Set of 3	**LV429261**
		Set of 4	**LV429262**
DB112233 	Straight terminal extensions (1)	Set of 3	**LV429263**
		Set of 4	**LV429264**
DB112234 	Double-L terminal extensions (1)	Set of 3	**LV429221**
		Set of 4	**LV429222**
DB112235 	Spreaders from 35 to 45 mm pitch (1)	3P	**LV431563**
		4P	**LV431564**
DB112236 	One-piece spreader from 35 to 45 mm pitch	3P	**LV431060**
		4P	**LV431061**
	Front alignment base (for one-piece spreader)	3P/4P	**LV431064**

(1) Supplied with 2 or 3 interphase barriers.

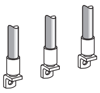
Accessories (cont.)
Compact and Vigicompact NSX100/160/250 (cont.)

Crimp lugs for copper cable (1)

DB112237


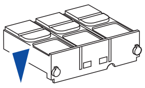
For cable 120 mm²	Set of 3	**LV429252**
	Set of 4	**LV429256**
For cable 150 mm²	Set of 3	**LV429253**
	Set of 4	**LV429257**
For cable 185 mm²	Set of 3	**LV429254**
	Set of 4	**LV429258**

Crimp lugs for aluminium cable (1)

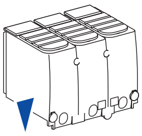
DB112238


For cable 150 mm²	Set of 3	**LV429504**
	Set of 4	**LV429505**
For cable 185 mm²	Set of 3	**LV429506**
	Set of 4	**LV429507**

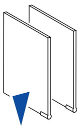
Insulation accessories

DB112239


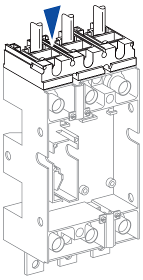
1 short terminal shield for breaker or plug-in base	3 P	**LV429515**
	4 P	**LV429516**

DB112240


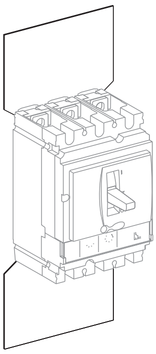
1 long terminal shield for breaker or plug-in base	3 P	**LV429517**
	4 P	**LV429518**

DB112241


Interphase barriers for breaker or plug-in base	Set of 6	**LV429329**

DB112734


Connection adapter for plug-in base	3P	**LV429306**
	4P	**LV429307**

DB112242


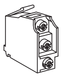
2 insulating screens for breaker (45 mm pitch)	3P	**LV429330**
	4P	**LV429331**

(1) Supplied with 2 or 3 interphase barriers.

Accessories (cont.)
Compact and Vigicompact NSX100/160/250 (cont.)

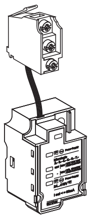
Electrical auxiliaries

Auxiliary contacts (changeover)

DB112254


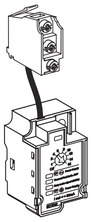
OF or SD or SDE or SDV	**29450**
OF or SD or SDE or SDV low level	**29452**
SDE adapter, mandatory for trip unit TM, MA or Micrologic 2	**LV429451**

SDx output module for Micrologic

DB112275


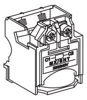
SDx module 24/415 V AC/DC	**LV429532**

SDTAM contactor tripping module (early-break thermal fault signal) for Micrologic 2.2-M/6.2 E-M

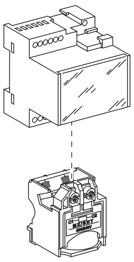
DB112276


SDTAM 24/415 V AC/DC overload fault indication	**LV429424**

Voltage releases

DB111454


	Voltage	MX	MN
AC	24 V 50/60 Hz	**LV429384**	**LV429404**
	48 V 50/60 Hz	**LV429385**	**LV429405**
	110-130 V 50/60 Hz	**LV429386**	**LV429406**
	220-240 V 50/60 Hz and 208-277 V 60 Hz	**LV429387**	**LV429407**
	380-415 V 50 Hz and 440-480 V 60 Hz	**LV429388**	**LV429408**
	525 V 50 Hz and 600 V 60 Hz	**LV429389**	**LV429409**
DC	12 V	**LV429382**	**LV429402**
	24 V	**LV429390**	**LV429410**
	30 V	**LV429391**	**LV429411**
	48 V	**LV429392**	**LV429412**
	60 V	**LV429383**	**LV429403**
	125 V	**LV429393**	**LV429413**
	250 V	**LV429394**	**LV429414**

DB115631


MN 48 V 50/60 Hz with fixed time delay		
Composed of:	MN 48 V DC	**LV429412**
	Delay unit 48 V 50/60 Hz	**LV429426**
MN 220-240 V 50/60 Hz with fixed time delay		
Composed of:	MN 250 V DC	**LV429414**
	Delay unit 220-240 V 50/60 Hz	**LV429427**
MN 48 V DC/AC 50/60 Hz with adjustable time delay		
Composed of:	MN 48 V DC	**LV429412**
	Delay unit 48 V 50/60 Hz	**33680**
MN110-130 V DC/AC 50/60 Hz with adjustable time delay		
Composed of:	MN 125 V DC	**LV429413**
	Delay unit 110-130 V 50/60 Hz	**33681**
MN 220-250 V 50/60 Hz with adjustable time delay		
Composed of:	MN 250 V DC	**LV429414**
	Delay unit 220-250 V 50/60 Hz	**33682**

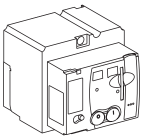
Accessories (cont.)

Compact and Vigicompact NSX100/160/250 (cont.)

Motor mechanism

Motor mechanism module supplied with SDE adapter

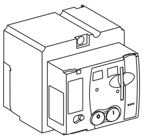
DB125554

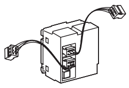


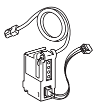
	Voltage	MT100/160	MT250
AC	48-60 V 50/60 Hz	LV429440	LV431548
	110-130 V 50/60 Hz	LV429433	LV431540
	220-240 V 50/60 Hz and 208-277 V 60 Hz	LV429434	LV431541
	380-415 V 50/60 Hz and 440-480 V 60 Hz	LV429435	LV431542
DC	24-30 V	LV429436	LV431543
	48-60 V	LV429437	LV431544
	110-130 V	LV429438	LV431545
	250 V	LV429439	LV431546

Communicating motor mechanism module supplied with SDE adapter

DB112265







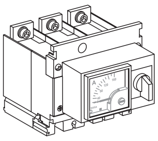
Motor mechanism module	MTc 100/160	220-240 V 50/60 Hz	LV429441
	MTc 250	220-240 V 50/60 Hz	LV431549
+			
Breaker and Status Communication Module	BSCM		LV434205
+			
NSX cord	Wire length L = 0.35 m		LV434200
	Wire length L = 1.3 m		LV434201
	Wire length L = 3 m		LV434202
	U > 480 V AC wire length L = 0.35 m		LV434204

Accessories (cont.)
Compact and Vigicompact NSX100/160/250 (cont.)

Indication and measurement modules

Ammeter module

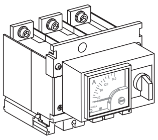
DB112256



Rating (A)	100	160	250
3P	**LV429455**	**LV430555**	**LV431565**
4P	**LV429456**	**LV430556**	**LV431566**

I max. ammeter module

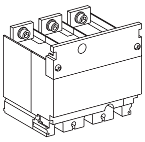
DB112256



Rating (A)	100	160	250
3P	**LV434849**	**LV434850**	**LV434851**

Current transformer module

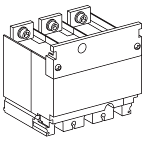
DB112257



Rating (A)	125	150	250
3P	**LV429457**	**LV430557**	**LV431567**
4P	**LV429458**	**LV430558**	**LV431568**

Current transformer module and voltage output

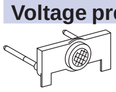
DB112257



Rating (A)	125	150	250
3P	**LV429461**	**LV430561**	**LV431569**
4P	**LV429462**	**LV430562**	**LV431570**

Voltage presence indicator

DB112258

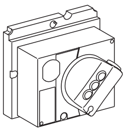


3P/4P	**LV429325**

Rotary handles

Direct rotary handle

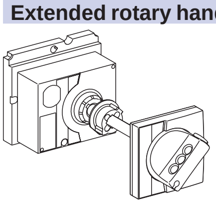
DB112259



With black handle	**LV429337**
With red handle on yellow front	**LV429339**
MCC conversion accessory	**LV429341**
CNOMO conversion accessory	**LV429342**

Extended rotary handle

DB112260



With black handle	**LV429338**
With red handle on yellow front	**LV429340**
With telescopic handle for withdrawable device	**LV429343**

Accessories for direct or extended rotary handle

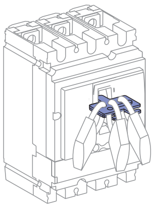
Indication auxiliary	1 early-break contact	**LV429345**
	2 early-make contacts	**LV429346**

Accessories (cont.)
Compact and Vigicompact NSX100/160/250 (cont.)

Locks

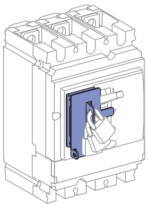
Toggle locking device for 1 to 3 padlocks

DB112261



By removable device		29370

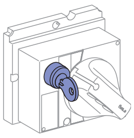
DB112262



By fixed device		LV429371

Locking of rotary handle

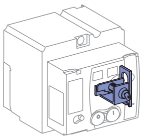
DB112263



Keylock adapter (keylock not included)		LV429344
Keylock (keylock adapter not included)	Ronis 1351B.500	41940
	Profalux KS5 B24 D4Z	42888

Locking of motor mechanism module

DB112264

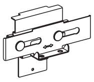


Keylock adapter + Ronis keylock (special)		LV429449

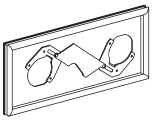
Accessories (cont.)
Compact and Vigicompact
NSX100/160/250 (cont.)

Interlocking

Mechanical interlocking for circuit breakers

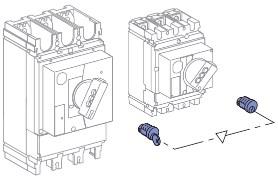
DB111486


With toggles	LV429354

DB111487


With rotary handles	LV429369

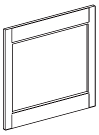
Interlocking with key (2 keylocks / 1 key) for rotary handles

DB112268


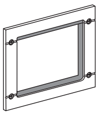
Keylock kit (keylock not included) (1)		LV429344
1 set of 2 keylocks	Ronis 1351B.500	41950
(1 key only, keylock kit not included)	Profalux KS5 B24 D4Z	42878

Installation accessories

Front-panel escutcheons

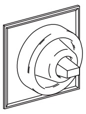
DB112269

IP30

IP30 escutcheon for all control types	LV429525
IP30 trip unit access escutcheon for toggle	LV429526
IP30 escutcheon for Vigi module	LV429527

DB112737

IP40

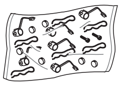
IP40 escutcheon for all control types	LV429317
IP40 escutcheon for Vigi module	LV429316
IP40 escutcheon for Vigi or ammeter module	LV429318

IP43 rubber toggle cover

DB112738


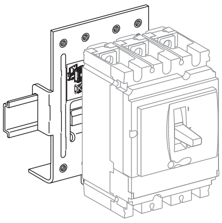
1 toggle cover	LV429319

Lead-sealing accessories

DB115615


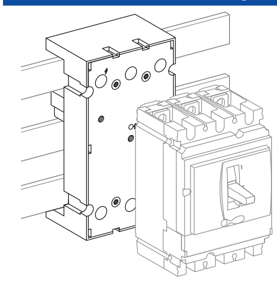
Bag of accessories	LV429375

Din rail adapter

DB112739


1 adapter	LV429305

60 mm busbar adapter

DB111428


3P 60 mm busbar adapter	29372

(1) For only 1 device.

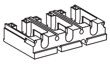
Catalogue numbers

Accessories (cont.)

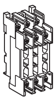
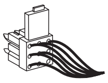
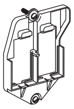
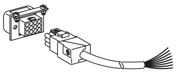
Compact and Vigicompact NSX100/160/250 (cont.)

Plug-in/withdrawable version accessories

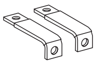
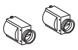
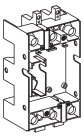
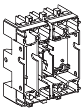
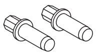
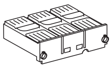
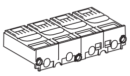
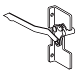
Insulation accessories

DB117159 	1 connection adapter for plug-in base	3P	**LV429306**
		4P	**LV429307**

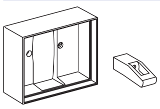
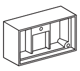
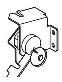
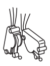
Auxiliary connections

DB117160 	1 9-wire fixed connector (for base)		**LV429273**
DB117161 	1 9-wire moving connector (for circuit breaker)		**LV429274**
DB117162 	1 support for 2 moving connectors		**LV429275**
DB115885 	9-wire manual auxiliary connector (fixed + moving)		**LV429272**

Plug-in base accessories

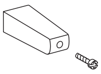
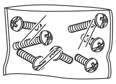
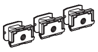
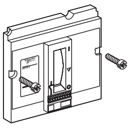
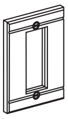
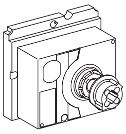
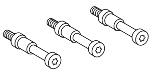
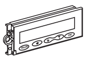
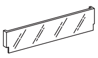
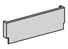
DB117164 	2 long insulated right angle terminal extensions	Set of 2	**LV429276**
DB117165 	2 IP40 shutters for base		**LV429271**
DB117166 	Base	2P	**LV429265**
		3P	**LV429266**
DB117167 	Base	4P	**LV429267**
DB117168 	2 power connections	2/3/4P	**LV429268**
DB117169 	1 short terminal shield	2/3P	**LV429515**
DB117170 	1 short terminal shield	4P	**LV429516**
DB117171 	1 safety trip interlock	2/3/4P	**LV429270**

Chassis accessories

DB117172 	Escutcheon collar	Toggle	**LV429284**
DB117173 	Escutcheon collar	Vigi module	**LV429285**
DB117163 	Locking kit (keylock not included)		**LV429286**
	Keylock (keylock adapter not included)	Ronis 1351B.500	**41940**
		Profalux KS5 B24 D4Z	**42888**
DB111426 	2 carriage switches (connected/disconnected position indication)		**LV429287**

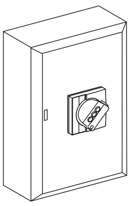
Accessories (cont.)
Compact and Vigicompact NSX100/160/250 (cont.)

Spare parts

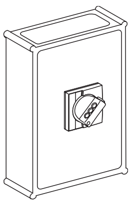
DB111430 	10 spare toggle extensions (NSX250)		**LV429313**
DB115620 	Bag of screws		**LV429312**
DB111431 	12 snap-in nuts (fixed/FC)	M6 for NSX100N/H/L	**LV429234**
		M8 for NSX160/250N/H/L	**LV430554**
DB111432 	NS retrofit escutcheon	Small cut-out	**LV429528**
DB111433 	IP40 toggle escutcheon	Compact NS type/small cut-out	**29315**
DB111438 	1 set of 10 identification labels		**LV429226**
DB111429 	1 base for extended rotary handle		**LV429502**
DB111434 	Torque limiting screws (set of 12)	3P/4P Compact NSX100-250	**LV429513**
DB111435 	LCD display for electronic trip unit	Micrologic 5	**LV429483**
		Micrologic 6	**LV429484**
		Micrologic 6 E-M	**LV429486**
DB111436 	5 transparent covers for trip unit	TM, MA, NA	**LV429481**
		Micrologic 2	**LV429481**
		Micrologic 5/6	**LV429478**
DB115886 	5 opaque covers for Micrologic 5/6		**LV429479**

Individual enclosures

IP55 steel enclosure

DB112270 	Compact NSX100/160 with black extended rotary handle	**LV431215**
	Compact NSX100/160 with red and yellow extended rotary handle	**LV431216**
	Compact NSX250 or Vigicompact NSX100-250 with black extended rotary handle	**LV431217**
	Compact NSX250 or Vigicompact NSX100-250 with red and yellow extended rotary handle	**LV431218**

IP55 insulating enclosure

DB112271 	Compact NXS100/160 with black extended rotary handle	**LV429465**
	Vigicompact NXS100/160 with black extended rotary handle	**LV429466**
	Compact NXS250 with black extended rotary handle	**LV431573**
	Vigicompact NXS250 with black extended rotary handle	**LV431574**

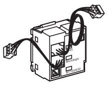
Visible break disconnect function

See catalogue dealing with "Interpact INV products (visible break)" and the associated accessories.
The visible break disconnection function is compatible with fixed front-connected/rear-connected Compact NSX devices.

Monitoring and control, test tools
Compact and Vigicompact
NSX100/160/250

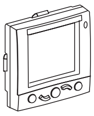
Monitoring and control (remote operation)

Circuit breaker accessories

DB111439


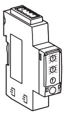
Breaker Status Control Module	BSCM (1)	**LV434205**

ULP display module (2)

DB111440


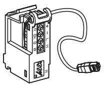
Switchboard front display module FDM121	**TRV00121**
FDM mounting accessory (diameter 22 mm)	**TRV00128**

ULP communication module

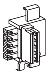
DB111441


Modbus interface	Modbus SL communication interface module	**TRV00210**

ULP wiring accessories

DB111442


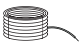
NSX cord L = 0.35 m	**LV434200**
NSX cord L = 1.3 m	**LV434201**
NSX cord L = 3 m	**LV434202**
NSX cord for U > 480 V AC L = 1.3 m	**LV434204**

DB115621


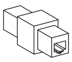
10 stacking connectors for communication interface modules	**TRV00217**

DB111443

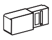

10 Modbus line terminators	**VW3A8306DRC**	(3)

DB115622


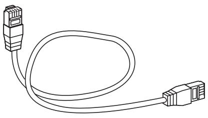
RS 485 roll cable (4 wires, length 60 m)	**50965**

DB115623


5 RJ45 connectors female/female	**TRV00870**

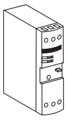
DB111444


10 ULP line terminators	**TRV00880**

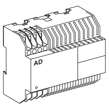
DB111445


10 RJ45/RJ45 male cord L = 0.3 m	**TRV00803**
10 RJ45/RJ45 male cord L = 0.6 m	**TRV00806**
5 RJ45/RJ45 male cord L = 1 m	**TRV00810**
5 RJ45/RJ45 male cord L = 2 m	**TRV00820**
5 RJ45/RJ45 male cord L = 3 m	**TRV00830**
1 RJ45/RJ45 male cord L = 5 m	**TRV00850**

Power supply modules

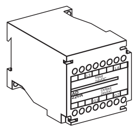
DB112278


External power supply module 100-240 V AC 110-230 V DC / 24 V DC-3 A class 2	**ABL8RPS24030**	(3)

DB112736


External power supply module 24 V DC-1 A OVC IV	
24-30 V DC	**54440**
48-60 V DC	**54441**
100-125 V AC	**54442**
110-130 V AC	**54443**
200-240 V AC	**54444**
380-415 V AC	**54445**

Battery module

DB112729


24 V DC battery module	**54446**

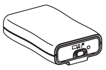
(1) SDE adapter mandatory for trip unit TM, MA or Micrologic 2 (LV429451).
(2) For measurement display with Micrologic A and E or status display with BSCM.
(3) See Telemecanique catalogue.

Monitoring and control, test tools (cont.)

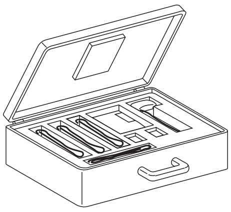
Compact and Vigicompact NSX100/160/250 (cont.)

Test tool, software, demo

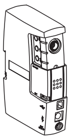
Test tool

DB111449


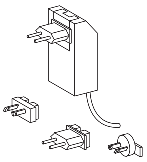
Pocket battery for Micrologic NSX100-630	**LV434206**	

DB111451


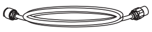
Maintenance case Comprising: - USB maintenance interface - Power supply - Micrologic cord - USB cord - RJ45/RJ45 male cord	**TRV00910**	

DB111450


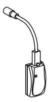
Spare USB maintenance interface	**TRV00911**	

DB111452


Spare power supply 110-240 V AC	**TRV00915**	

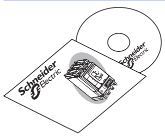
DB111453


Spare Micrologic cord for USB maintenance interface	**TRV00917**	

DB111448


Bluetooth/Modbus option for USB maintenance interface	**VW3A8114**	(1)

Software

DB117158


Configuration and setting software RSU	**LV4ST100**	(2)
Test software LTU	**LV4ST121**	(2)
Monitoring software RCU	**LV4SM100**	(2)

Demo tool

Demo case for Compact NSX	**LV434207**	

(1) See Telemecanique catalogue.
(2) Downloadable from http://schneider-electric.com.

Compact NSX400 to 630

Contents

Catalogue numbers

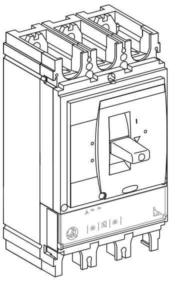
NSX400/630F: complete fixed/FC device

Compact NSX400/630F (36 kA 380/415 V)

Compact NSX400/630F

Electronic trip unit Micrologic 2.3 (LS$_o$I protection)

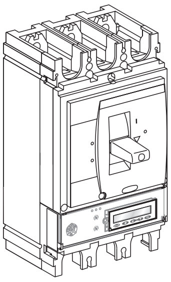
DB111455



		3P 3d	4P 3d, 4d, 3d + N/2
Compact NSX400F (36 kA at 380/415 V)	250 A	**LV432682**	**LV432683**
	400 A	**LV432676**	**LV432677**
Compact NSX630F (36 kA at 380/415 V)	630 A	**LV432876**	**LV432877**

Electronic trip unit Micrologic 5.3 A (LSI protection, ammeter)

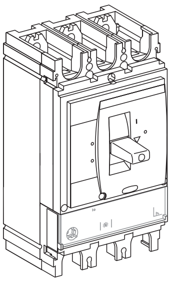
DB111456



		3P 3d	4P 3d, 4d, 3d + N/2, 3d + OSN
Compact NSX400F (36 kA at 380/415 V)	400 A	**LV432678**	**LV432679**
Compact NSX630F (36 kA at 380/415 V)	630 A	**LV432878**	**LV432879**

Electronic trip unit Micrologic 1.3-M (I motor protection)

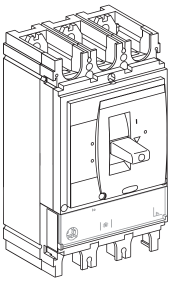
DB111457



		3P 3d
Compact NSX400F 1.3-M (36 kA at 380/415V)	320 A	**LV432748**
Compact NSX630F 1.3-M (36 kA at 380/415V)	500 A	**LV432948**

Electronic trip unit Micrologic 2.3-M (LS$_o$I motor protection)

DB111457



		3P 3d
Compact NSX400F 2.3-M (36 kA at 380/415V)	320 A	**LV432775**
Compact NSX630F 2.3-M (36 kA at 380/415V)	500 A	**LV432975**

With electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

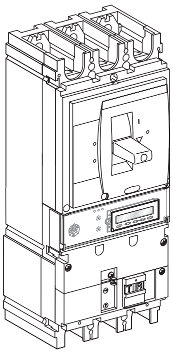
NSX400/630F: complete fixed/FC device

Vigicompact NSX400/630F (36 kA 380/415 V)

Vigicompact NSX400/630F

Electronic trip unit Micrologic 2.3 (LS$_o$I protection)

DB111458



		3P 3d	4P 3d, 4d, 3d + N/2
Vigicompact NSX400F (36 kA at 380/415 V)	400 A	LV432731	LV432732
Vigicompact NSX630F (36 kA at 380/415 V)	630 A	LV432931	LV432932

With electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

Catalogue numbers

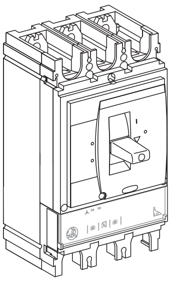
NSX400/630N: complete fixed/FC device

Compact NSX400/630N (50 kA 380/415 V)

Compact NSX400/630N

Electronic trip unit Micrologic 2.3 (LS_oI protection)

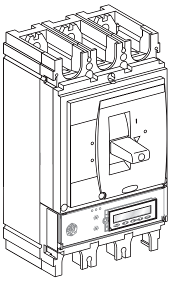
DB111455



		3P 3d	4P 3d, 4d, 3d + N/2
Compact NSX400N (50 kA at 380/415 V)	250 A	LV432707	LV432708
	400 A	LV432693	LV432694
Compact NSX630N (50 kA at 380/415 V)	630 A	LV432893	LV432894

Electronic trip unit Micrologic 5.3 A (LSI protection, ammeter)

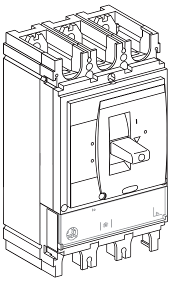
DB111456



		3P 3d	4P 3d, 4d, 3d + N/2, 3d + OSN
Compact NSX400N (50 kA at 380/415 V)	400 A	LV432699	LV432700
Compact NSX630N (50 kA at 380/415 V)	630 A	LV432899	LV432900

Electronic trip unit Micrologic 1.3-M A (I motor protection)

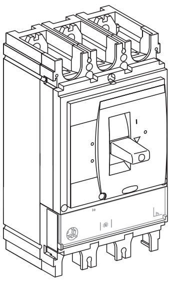
DB111457



		3P 3d
Compact NSX400N 1.3-M (50 kA at 380/415V)	320 A	LV432749
Compact NSX630N 1.3-M (50 kA at 380/415V)	500 A	LV432949

Electronic trip unit Micrologic 2.3-M (LS_oI motor protection)

DB111457



		3P 3d
Compact NSX400N 2.3-M (50 kA at 380/415V)	320 A	LV432776
Compact NSX630N 2.3-M (50 kA at 380/415V)	500 A	LV432976

With electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

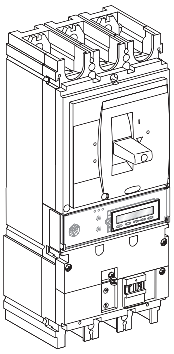
NSX400/630N: complete fixed/FC device

Vigicompact NSX400/630N (50 kA 380/415 V)

Vigicompact NSX400/630N

Electronic trip unit Micrologic 2.3 (LS$_o$I protection)

DB111458



		3P 3d	4P 3d, 4d, 3d + N/2
Vigicompact NSX400N (50 kA at 380/415 V)	400 A	**LV432733**	**LV432734**
Vigicompact NSX630N (50 kA at 380/415 V)	630 A	**LV432933**	**LV432934**

With electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

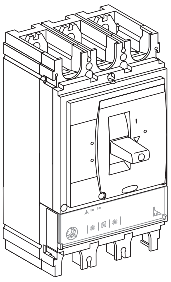
NSX400/630H: complete fixed/FC device

Compact NSX400/630H (70 kA 380/415 V)

Compact NSX400/630H

Electronic trip unit Micrologic 2.3 (LS$_o$I protection)

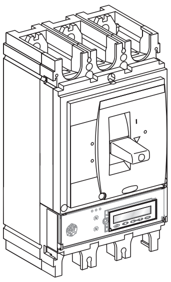
DB111455



		3P 3d	4P 3d, 4d, 3d + N/2
Compact NSX400H (70 kA at 380/415 V)	250 A	LV432709	LV432710
	400 A	LV432695	LV432696
Compact NSX630H (70 kA at 380/415 V)	630 A	LV432895	LV432896

Electronic trip unit Micrologic 5.3 A (LSI protection, ammeter)

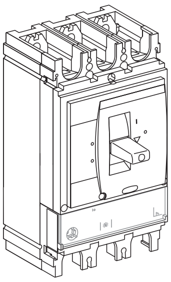
DB111456



		3P 3d	4P 3d, 4d, 3d + N/2, 3d + OSN
Compact NSX400H (70 kA at 380/415 V)	400 A	LV432701	LV432702
Compact NSX630H (70 kA at 380/415 V)	630 A	LV432901	LV432902

Electronic trip unit Micrologic 1.3-M (I motor protection)

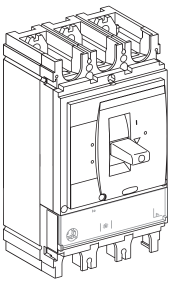
DB111457



		3P 3d
Compact NSX400H 1.3-M (70 kA at 380/415V)	320 A	LV432750
Compact NSX630H 1.3-M (70 kA at 380/415V)	500 A	LV432950

Electronic trip unit Micrologic 2.3-M (LS$_o$I motor protection)

DB111457



		3P 3d
Compact NSX400H 2.3-M (70 kA at 380/415V)	320 A	LV432777
Compact NSX630H 2.3-M (70 kA at 380/415V)	500 A	LV432977

With electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)

Only available as separate components.

With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)

Only available as separate components.

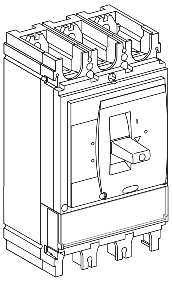
NSX400/630NA: complete fixed/FC device

Compact NSX400/630NA

Compact NSX400/630 0.3 NA switch-disconnector

With 0.3 NA switch-disconnector unit

DB111459



	3P	4P
Compact NSX400 0.3 NA	**LV432756**	**LV432757**
Compact NSX630 0.3 NA, 45 mm pitch	**LV432956**	**LV432957**

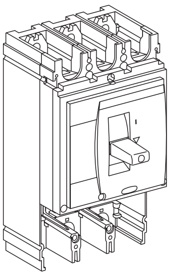
Catalogue numbers

NSX400/630F/N/H/S/L: fixed/ FC device based on separate components

Compact and Vigicompact

Basic frame

DB111460

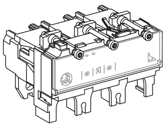


Compact NSX400		
	3P	**4P**
NSX400F (36 kA 380/415 V)	**LV432413**	**LV432415**
NSX400N (50 kA 380/415 V)	**LV432403**	**LV432408**
NSX400H (70 kA 380/415 V)	**LV432404**	**LV432409**
NSX400S (100 kA 380/415 V)	**LV432414**	**LV432416**
NSX400L (150 kA 380/415 V)	**LV432405**	**LV432410**
Compact NSX630		
	3P	**4P**
NSX630F (36 kA 380/415 V)	**LV432813**	**LV432815**
NSX630N (50 kA 380/415 V)	**LV432803**	**LV432808**
NSX630H (70 kA 380/415 V)	**LV432804**	**LV432809**
NSX630S (100 kA 380/415 V)	**LV432814**	**LV432816**
NSX630L (150 kA 380/415 V)	**LV432805**	**LV432810**

+ Trip unit

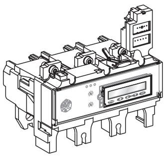
Distribution protection

DB111461



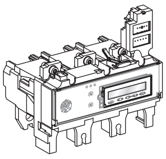
Micrologic 2.3 (LS$_{o}$I protection)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2
Micrologic 2.3 250 A	**LV432082**	**LV432086**
Micrologic 2.3 400 A	**LV432081**	**LV432085**
Micrologic 2.3 630 A	**LV432080**	**LV432084**

DB111462



Micrologic 5.3 A (LSI protection, ammeter)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
Micrologic 5.3 A 400 A	**LV432091**	**LV432094**
Micrologic 5.3 A 630 A	**LV432090**	**LV432093**
Micrologic 5.3 E (LSI protection, energy meter)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
Micrologic 5.3 E 400 A	**LV432097**	**LV432100**
Micrologic 5.3 E 630 A	**LV432096**	**LV432099**

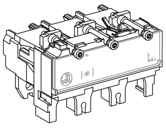
DB111462



Micrologic 6.3 A (LSIG protection, ammeter)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
Micrologic 6.3 A 400 A	**LV432103**	**LV432106**
Micrologic 6.3 A 630 A	**LV432102**	**LV432105**
Micrologic 6.3 E (LSIG protection, energy meter)		
Rating	**3P** 3d	**4P** 3d, 4d, 3d + N/2, 3d + OSN
Micrologic 6.3 E 400 A	**LV432109**	**LV432112**
Micrologic 6.3 E 630 A	**LV432108**	**LV432111**

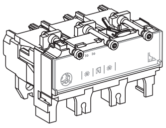
Motor protection

DB111463



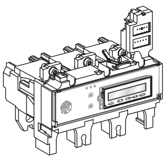
Micrologic 1.3-M (I protection)		
Rating	**3P** 3d	**4P** 3d
Micrologic 1.3-M 320 A	**LV432069**	**LV432078**
Micrologic 1.3-M 500 A	**LV432068**	**LV432077**

DB111461



Micrologic 2.3-M (LS$_{o}$I protection)	
Rating	**3P** 3d
Micrologic 2.3-M 320 A	**LV432072**
Micrologic 2.3-M 500 A	**LV432071**

DB111462



Micrologic 6.3 E-M (LSIG protection, energy meter)	
Rating	**3P** 3d
Micrologic 6.3 E-M 320 A	**LV432075**
Micrologic 6.3 E-M 500 A	**LV432074**

Protection of public distribution systems

Micrologic 2.3-AB (LS$_{o}$I protection)		
Rating		**4P** 3d, 4d, 3d + N/2
Micrologic 2.3 400 A		**LV434557**

16 Hz 2/3 network protection

Micrologic 5.3 A-Z (LSI protection, ammeter)	
Rating	**3P** 3d
Micrologic 5.3 A-Z 630 A	**LV432089**

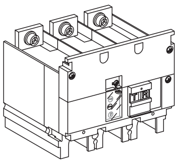
Trip unit accessories

Compact and Vigicompact NSX400/630

+ Vigi module or insulation monitoring module

Vigi module

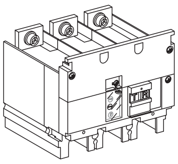
DB111464



		3P	4P
Type MB	200 to 440 V	LV432455	LV432456
	440 to 550 V	LV432453	LV432454
Connection for a 4P Vigi on a 3P breaker			LV432457

Insulation monitoring module

DB111464

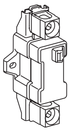


	3P	4P
200 to 440 V AC	LV432659	LV432660
Connection for a 4P insulation monitoring module on a 3P breaker		LV432457

Trip unit accessories

External neutral CT for 3 pole breaker with Micrologic 5/6

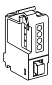
DB112277



400-630 A	LV432575

24 V DC wiring accessory for Micrologic 5/6

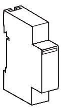
DB112730



24 V DC power supply connector	LV434210

ZSI accessory for NS630b-NW with NSX

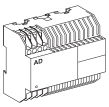
DB115665



ZSI module	LV434212

External power supply module (24 V DC - 1 A), class 4

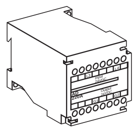
DB112736



24-30 V DC	54440
48-60 V DC	54441
100-125 V DC	54442
110-130 V AC	54443
200-240 V AC	54444
380-415 V AC	54445

Battery module

DB112729

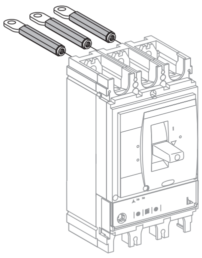


24 V DC battery module	54446

Installation and connection
Compact and Vigicompact NSX400/630

Fixed/RC device = fixed/FC device + rear connection kit

Mixed RC kit

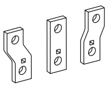
DB111465


Kit 3P	Short RCs	2 x	**LV432475**
	Long RCs	1 x	**LV432476**
Kit 4P	Short RCs	2 x	**LV432475**
	Long RCs	2 x	**LV432476**

Fixed/FC device with 52.5 mm or 70 mm pitch = fixed/FC device with 45 mm pitch + spreaders

The pitch of all Compact and Vigicompact NSX400/630 devices is 45 mm. Spreaders are available for fixed front, plug-in or withdrawable connection with pitch of 52.5 mm or 70 mm.

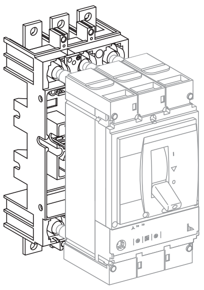
Upstream or downstream spreaders (1)

DB111466


52.5 mm	3P	**LV432490**
	4P	**LV432491**
70 mm	3P	**LV432492**
	4P	**LV432493**

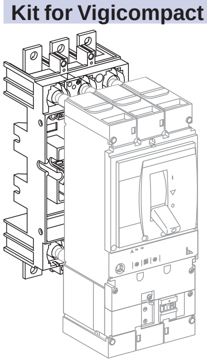
Plug-in version = fixed/FC device + plug-in kit

Kit for Compact

DB111467


	3P	4P
Plug-in kit	**LV432538**	**LV432539**
Comprising:		
Base	= 1 x LV432516	= 1 x LV432517
Power connections	+ 3 x LV432518	+ 4 x LV432518
Short terminal shields	+ 2 x LV432591	+ 2 x LV432592
Safety trip interlock	+ 1 x LV432520	+ 1 x LV432520

Kit for Vigicompact

DB111469


	3P	4P
Vigi plug-in kit	**LV432540**	**LV432541**
Comprising:		
Base	= 1 x LV432516	= 1 x LV432517
Power connections	+ 3 x LV432519	+ 4 x LV432519
Short terminal shields	+ 2 x LV432591	+ 2 x LV432592
Safety trip interlock	+ 1 x LV432520	+ 1 x LV432520

(1) Supplied with 2 or 3 interphase barriers.

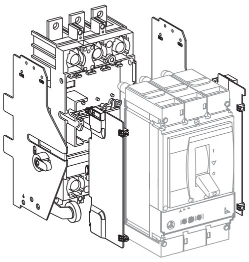
Installation and connection (cont.)

Compact and Vigicompact NSX400/630 (cont.)

Withdrawable version = fixed/FC device + withdrawable kit

Kit for Compact

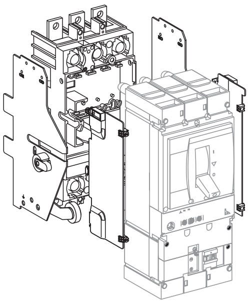
DB111468



	3P	4P
	Kit for Compact	Kit for Compact
	=	=
Plug-in kit:	1 x **LV432538**	1 x **LV432539**
	+	+
Chassis side plates for base	1 x **LV432532**	1 x **LV432532**
	+	+
Chassis side plates for breaker	1 x **LV432533**	1 x **LV432533**

Kit for Vigicompact

DB117174



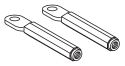
	3P	4P
	Kit for Vigicompact	Kit for Vigicompact
	=	=
Plug-in kit:	1 x **LV432540**	1 x **LV432541**
	+	+
Chassis side plates for base	1 x **LV432532**	1 x **LV432532**
	+	+
Chassis side plates for breaker	1 x **LV432533**	1 x **LV432533**

Accessories

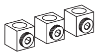
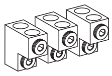
Compact and Vigicompact NSX400/630

Connection accessories (Cu or Al)

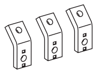
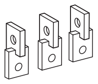
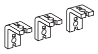
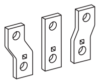
Rear connections

DB111471		2 short			LV432475
		2 long			LV432476

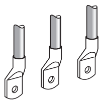
Bare cable connectors (1)

DB115624		Aluminium connectors	1 x (35 to 300 mm²)	Set of 3	LV432479
				Set of 4	LV432480
DB115625		Aluminium connectors for 2 cables	2 x (35 to 300 mm²)	Set of 3	LV432481
				Set of 4	LV432482
DB112724		6.35 mm voltage tap for steel or aluminium connectors		Set of 10	LV429348

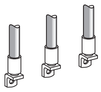
Terminal extensions (1)

DB115649		45° terminal extensions		Set of 3	LV432586
				Set of 4	LV432587
DB115650		Edgewise terminal extensions		Set of 3	LV432486
				Set of 4	LV432487
DB115651		Right-angle terminal extensions		Set of 3	LV432484
				Set of 4	LV432485
DB115652		Spreaders	52.5 mm	3P	LV432490
				4P	LV432491
			70 mm	3P	LV432492
				4P	LV432493

Crimp lugs for copper cable (1)

DB112237		For cable 240 mm²		Set of 3	LV432500
				Set of 4	LV432501
		For cable 300 mm²		Set of 3	LV432502
				Set of 4	LV432503
		Supplied with 2 or 3 interphase barriers			

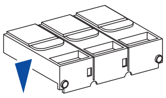
Crimp lugs for aluminium cable (1)

DB112238		For cable 240 mm²		Set of 3	LV432504
				Set of 4	LV432505
		For cable 300 mm²		Set of 3	LV432506
				Set of 4	LV432507
		Supplied with 2 or 3 interphase barriers			

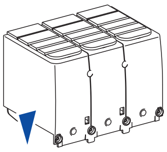
(1) Supplied with 2 or 3 interphase barriers.

Accessories (cont.)
Compact and Vigicompact NSX400/630 (cont.)

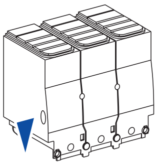
Insulation accessories

DB111472


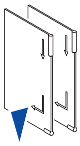
Short terminal shield, 45 mm (1 piece)	3 P	LV432591
	4 P	LV432592

DB111473


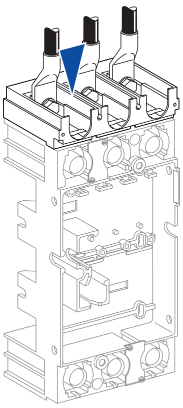
Long terminal shield, 45 mm (1 piece)	3 P	LV432593
	4 P	LV432594

DB115626


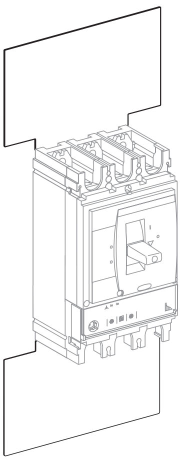
Long terminal shield for spreaders, 52.5 mm (1 piece) (supplied with insulating plate)	3 P	LV432595
	4 P	LV432596

DB115632


Interphase barriers	Set of 6	LV432570

DB115627


Connection adapter for plug-in base	3P	LV432584
	4P	LV432585

DB115628


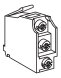
2 insulating screens (70 mm pitch)	3P	LV432578
	4P	LV432579

Accessories (cont.)
Compact and Vigicompact NSX400/630 (cont.)

Electrical auxiliaries

Auxiliary contacts (changeover)

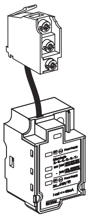
DB112254



OF or SD or SDE or SDV	29450
OF or SD or SDE or SDV low level	29452

SDx output module for Micrologic electronic trip unit

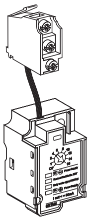
DB112275



SDx module 24/415 V AC/DC	LV429532

SDTAM contactor tripping module (early-break thermal fault signal) for Micrologic 2.3-M/6.3 E-M

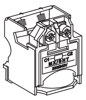
DB112276



SDTAM 24/415 V AC/DC overload fault indication	LV429424

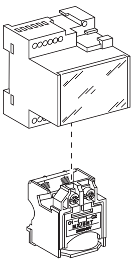
Voltage releases

DB111454



	Voltage	MX	MN
AC	24 V 50/60 Hz	LV429384	LV429404
	48 V 50/60 Hz	LV429385	LV429405
	110-130 V 50/60 Hz	LV429386	LV429406
	220-240 V 50/60 Hz and 208-277 V 60 Hz	LV429387	LV429407
	380-415 V 50 Hz and 440-480 V 60 Hz	LV429388	LV429408
	525 V 50 Hz and 600 V 60 Hz	LV429389	LV429409
DC	12 V	LV429382	LV429402
	24 V	LV429390	LV429410
	30 V	LV429391	LV429411
	48 V	LV429392	LV429412
	60 V	LV429383	LV429403
	125 V	LV429393	LV429413
	250 V	LV429394	LV429414

DB115631



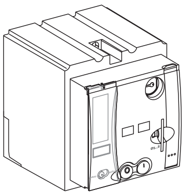
MN 48 V 50/60 Hz with fixed time delay		
Composed of:	MN 48 V DC	LV429412
	Delay unit 48 V 50/60 Hz	LV429426
MN 220-240 V 50/60 Hz with fixed time delay		
Composed of:	MN 250 V DC	LV429414
	Delay unit 220-240 V 50/60 Hz	LV429427
MN 48 V DC/AC 50/60 Hz with adjustable time delay		
Composed of:	MN 48 V DC	LV429412
	Delay unit 48 V 50/60 Hz	33680
MN110-130 V DC/AC 50/60 Hz with adjustable time delay		
Composed of:	MN 125 V DC	LV429413
	Delay unit 110-130 V 50/60 Hz	33681
MN 220-250 V 50/60 Hz with adjustable time delay		
Composed of:	MN 250 V DC	LV429414
	Delay unit 220-250 V 50/60 Hz	33682

Accessories (cont.)
Compact and Vigicompact
NSX400/630 (cont.)

Motor mechanism

Motor mechanism module

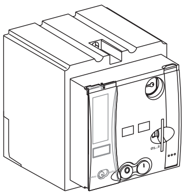
DB111475



	Voltage	MT400-630
AC	48-60 V 50/60 Hz	**LV432639**
	110-130 V 50/60 Hz	**LV432640**
	220-240 V 50/60 Hz and 208-277 V 60 Hz	**LV432641**
	380-415 V 50 Hz	**LV432642**
	440-480 V 60 Hz	**LV432647**
DC	24-30 V	**LV432643**
	48-60 V	**LV432644**
	110-130 V	**LV432645**
	250 V	**LV432646**
Operation counter		**LV432648**

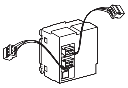
Communicating motor mechanism module

DB111476



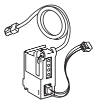
Motor mechanism module	MTc 400/630	220-240 V 50/60 Hz	**LV432652**

+



Breaker status Communication Module	BSCM	**LV434205**

+



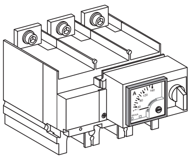
NSX cord	Wire length L = 0.35 m	**LV434200**
	Wire length L = 1.3 m	**LV434201**
	Wire length L = 3 m	**LV434202**
	U > 480 V AC wire length L = 0.35 m	**LV434204**

Accessories (cont.)
Compact and Vigicompact NSX400/630 (cont.)

Indication and measurement modules

Ammeter module

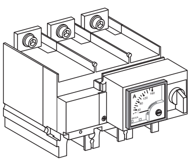
DB111477



Rating (A)	400	630
3P	**LV432655**	**LV432855**
4P	**LV432656**	**LV432856**

I max. ammeter module

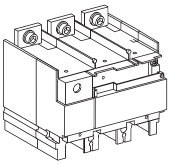
DB111477



Rating (A)	400	630
3P	**LV434852**	**LV434853**

Current transformer module

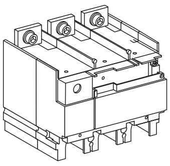
DB117179



Rating (A)	400	600
3P	**LV432657**	**LV432857**
4P	**LV432658**	**LV432858**

Current transformer module and voltage output

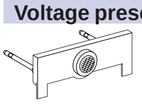
DB117179



Rating (A)	400	600
3P	**LV432653**	**LV432861**
4P	**LV432654**	**LV432862**

Voltage presence indicator

DB111479

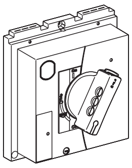


3P/4P	**LV432566**

Rotary handles

Direct rotary handle

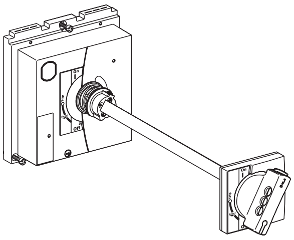
DB111480



With black handle	**LV432597**
With red handle on yellow front	**LV432599**
MCC conversion accessory	**LV432606**
CNOMO conversion accessory	**LV432602**

Extended rotary handle

DB111481



With black handle	**LV432598**
With red handle on yellow front	**LV432600**
With telescopic handle for withdrawable device	**LV432603**

Accessories for direct or extended rotary handle

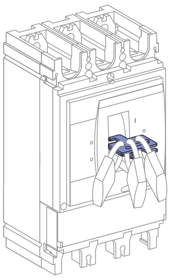
Indication auxiliary	1 early-break contact	**LV432605**
	2 early-make contacts	**LV429346**

Accessories (cont.)
Compact and Vigicompact NSX400/630 (cont.)

Locks

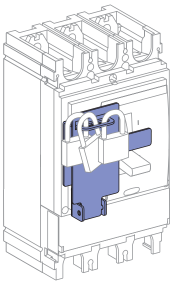
Toggle locking device for 1 to 3 padlocks

DB111483



By removable device		**29370**

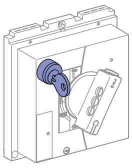
DB111482



By fixed device		**LV432631**

Locking of rotary handle

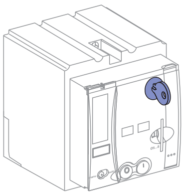
DB111484



Keylock adapter (keylock not included)		**LV432604**
Keylock (keylock adapter not included)	Ronis 1351B.500	**41940**
	Profalux KS5 B24 D4Z	**42888**

Locking of motor mechanism module

DB111485

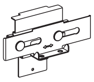


Keylock adapter (keylock not included)		**LV432649**
Keylock (keylock adapter not included)	Ronis 1351B.500	**41940**
	Profalux KS5 B24 D4Z	**42888**

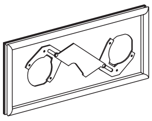
Accessories (cont.)
Compact and Vigicompact NSX400/630 (cont.)

Interlocking

Mechanical interlocking for circuit breakers

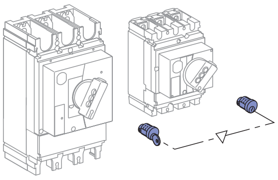
DB111486


With toggles	**LV432614**

DB111487


With rotary handles	**LV432621**

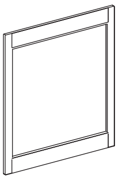
Interlocking with key (2 keylocks / 1 key) for rotary handles

DB112268


Keylock kit (keylock not included) (1)		**LV432604**
1 set of 2 keylocks	Ronis 1351B.500	**41950**
(1 key only, keylock kit not included)	Profalux KS5 B24 D4Z	**42878**

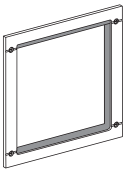
Installation accessories

Front-panel escutcheons

DB111488


IP30

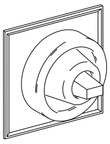
IP30 escutcheon for all control types	**LV432557**
IP30 trip unit access escutcheon for toggle	**LV432559**
IP30 escutcheon for Vigi module	**LV429527**

DB111489


IP40

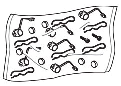
IP40 escutcheon for all control types	**LV432558**
IP40 escutcheon for Vigi module	**LV429316**
IP40 escutcheon for Vigi or ammeter module	**LV429318**

IP43 rubber toggle cover

DB111490


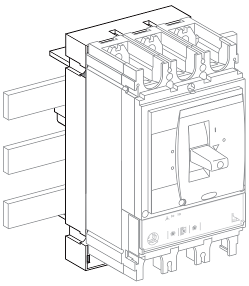
1 toggle cover	**LV432560**

Lead-sealing accessories

DB115615


Bag of accessories	**LV429375**

60 mm busbar adapter

DB111491


3P 60 mm busbar adapter	**32623**

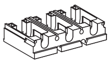
(1) *For only 1 device.*

Catalogue numbers

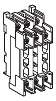
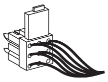
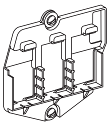
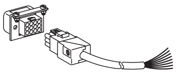
Accessories (cont.)
Compact and Vigicompact NSX400/630 (cont.)

Plug-in/withdrawable version accessories

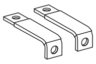
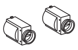
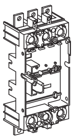
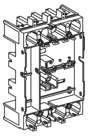
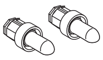
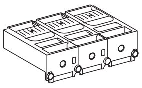
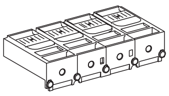
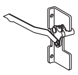
Insulation accessories

DB117159 	Connection adapter for plug-in base	3P	**LV432584**
		4P	**LV432585**

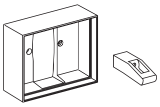
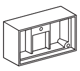
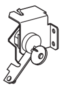
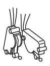
Auxiliary connections

DB117160 	1 9-wire fixed connector (for base)		**LV429273**
DB117161 	1 9-wire moving connector (for circuit breaker)		**LV432523**
DB116368 	1 support for 3 moving connectors		**LV432525**
DB115885 	9-wire manual auxiliary connector (fixed + moving)		**LV429272**

Plug-in base accessories

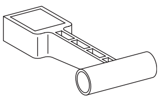
DB117164 	Long insulated right angle terminal extensions	Set of 2	**LV432526**
DB117165 	2 IP40 shutters for base		**LV432521**
DB117180 	Base	3P	**LV432516**
DB117181 	Base	4P	**LV432517**
DB117182 	Power connections	3/4P	**LV432518**
DB117183 	Short terminal shields	3P	**LV432591**
DB117184 	Short terminal shields	4P	**LV432592**
DB117171 	Safety trip interlock	3/4P	**LV432520**

Chassis accessories

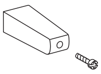
DB117172 	Escutcheon collar	Toggle	**LV432534**
DB117173 	Escutcheon collar	Vigi module	**LV429285**
DB117163 	Locking kit (keylock not included)		**LV429286**
	Keylock (keylock adapter not included)	Ronis 1351B.500	**41940**
		Profalux KS5 B24 D4Z	**42888**
DB111426 	2 carriage switches (connected/disconnected position indication)		**LV429287**

Accessories (cont.)
Compact and Vigicompact NSX400/630 (cont.)

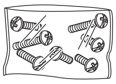
Spare parts

DB115633


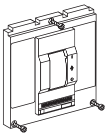
Additional toggle extension for NSX400/630			32595

DB111430


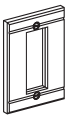
5 spare toggle extensions			LV432553

DB115620


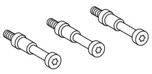
Bag of screws			LV432552

DB111493


Compact NS retrofit escutcheon	Small cut-out		LV432571

DB111433


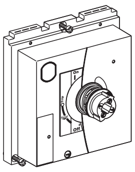
IP40 toggle escutcheon	Compact NS type/small cut-out		32556

DB111434


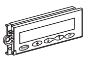
Torque limiting screws (set of 12)	3P/4P Compact NSX400-630		LV432513

DB111438

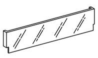

1 set of 10 identification labels			LV429226

DB111495


1 base for extended rotary handle			LV432498

DB111435


LCD display for electronic trip unit	Micrologic 5		LV429483
	Micrologic 6		LV429484
	Micrologic E-M		LV429486

DB111436


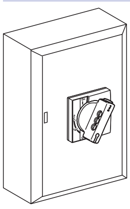
5 transparent covers for electronic trip unit	Micrologic 5/6		LV432459
	Micrologic 2		LV432461

DB115907


5 opaque covers for Micrologic 5/6			LV432460

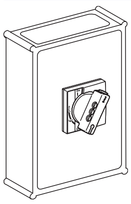
Individual enclosures

IP55 steel enclosure

DB111496


Compact NSX400 with black extended rotary handle	LV431219
Compact NSX400 with red and yellow extended rotary handle	LV431220
Compact NSX630 or Vigicompact NSX400/630 with black extended rotary handle	LV431221
Compact NSX630 or Vigicompact NSX400/630 with red and yellow extended rotary handle	LV431222

IP55 insulating enclosure

DB111497


Compact NSX400/630 with black extended rotary handle	LV432665
Vigicompact NSX400/630 with black extended rotary handle	LV432666

Visible break disconnect function

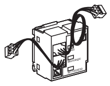
See catalogue dealing with "Interpact INV products (visible break)" and the associated accessories.
The visible break disconnection function is compatible with fixed front-connected/rear-connected Compact NSX devices.

Monitoring and control, test tools

Compact and Vigicompact NSX400/630

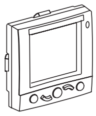
Monitoring and control (remote operation)

Circuit breaker accessories

DB111439


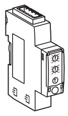
Breaker Status Control Module	BSCM	**LV434205**

ULP display module (1)

DB111440


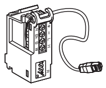
Switchboard front display module FDM121	**TRV00121**
FDM mounting accessory (diameter 22 mm)	**TRV00128**

ULP communication module

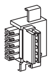
DB111441


Modbus interface	Modbus SL communication interface module	**TRV00210**

ULP wiring accessories

DB111442


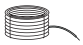
NSX cord L = 0.35 m	**LV434200**
NSX cord L = 1.3 m	**LV434201**
NSX cord L = 3 m	**LV434202**
NSX cord for U > 480 V AC L = 1.3 m	**LV434204**

DB115621


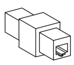
10 stacking connectors for communication interface modules	**TRV00217**

DB111443

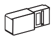

10 Modbus line terminators	**VW3A8306DRC** (2)

DB115622


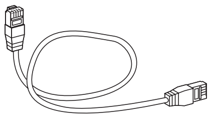
RS 485 roll cable (4 wires, length 60 m)	**50965**

DB115623


5 RJ45 connectors female/female	**TRV00870**

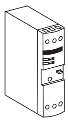
DB111444


10 ULP line terminators	**TRV00880**

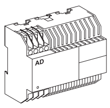
DB111445


10 RJ45/RJ45 male cord L = 0.3 m	**TRV00803**
10 RJ45/RJ45 male cord L = 0.6 m	**TRV00806**
5 RJ45/RJ45 male cord L = 1 m	**TRV00810**
5 RJ45/RJ45 male cord L = 2 m	**TRV00820**
5 RJ45/RJ45 male cord L = 3 m	**TRV00830**
1 RJ45/RJ45 male cord L = 5 m	**TRV00850**

Power supply modules

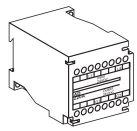
DB112278


External power supply module 100-240 V AC 110-230 V DC / 24 V DC-3 A class 2	**ABL8RPS24030** (2)

DB112736


External power supply module 24 V DC-1 A OVC IV	
24-30 V DC	**54440**
48-60 V DC	**54441**
100-125 V AC	**54442**
110-130 V AC	**54443**
200-240 V AC	**54444**
380-415 V AC	**54445**

Battery module

DB112729


24 V DC battery module	**54446**

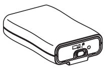
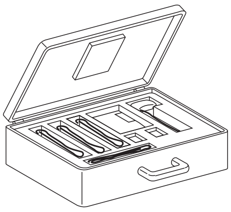
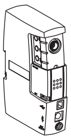
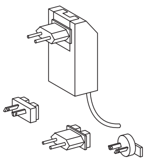
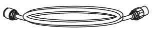
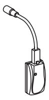
(1) For measurement display with Micrologic A and E or status display with BSCM.
(2) See Telemecanique catalogue.

Monitoring and control, test tools (cont.)

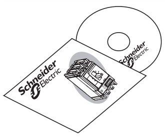
Compact and Vigicompact NSX400/630 (cont.)

Test tool, software, demo

Test tool

DB111449 	Pocket battery for Micrologic NSX100-630	**LV434206**	
DB111451 	Maintenance case Comprising: - USB maintenance interface - Power supply - Micrologic cord - USB cord - RJ45/RJ45 male cord	**TRV00910**	
DB111450 	Spare USB maintenance interface	**TRV00911**	
DB111452 	Spare power supply 110-240 V AC	**TRV00915**	
DB111453 	Spare Micrologic cord for USB maintenance interface	**TRV00917**	
DB111448 	Bluetooth/Modbus option for USB maintenance interface	**VW3A8114**	(1)

Software

DB117158 	Configuration and setting software RSU	**LV4ST100**	(2)
	Test software LTU	**LV4ST121**	(2)
	Monitoring software RCU	**LV4SM100**	(2)

Demo tool

	Demo case for Compact NSX	**LV434207**	

(1) See Telemecanique catalogue.
(2) Downloadable from http://schneider-electric.com.

COMPACT NSX

Instructions

User manual			
	Circuit breaker	(French)	**LV434100**
		(English)	**LV434101**
	Micrologic 5.6	(French)	**LV434103**
		(English)	**LV434104**
	Modbus	(French)	**LV434106**
		(English)	**LV434107**
	ULP	(French)	**TRV99100**
		(English)	**TRV99101**

Order form

Compact NSX100 to NSX630

Circuit breakers and switch-disconnectors

To indicate your choices, check the applicable square boxes or note the quantity

and enter the appropriate information in the rectangles

Circuit breaker or switch-disconnector

Compact type	**NSX100/160/250**	
	NSX400/630	
Rating	**A**	
Circuit breaker	**B, F, N, H, S, L**	
Switch-disconnector	**NA**	
Number of poles	**2, 3 or 4**	
Number of poles tripped	**2d, 3d or 4d**	
Fixed device		Front connections
Plug-in/withdr.	Plug-in	Withdrawable
Earth-leakage protection	**ME, MH, MB**	
Vigi module	Voltage V	
	4P option on 3P NSX	

Trip unit

Thermal-mag.	**TMD** rating (16 ... 250 A)	
	TMG rating (16 ... 63 A)	
	MA rating (2.5 ... 220 A)	
Electronic	**Micrologic 2.2**	**Micrologic 2.3**
	Micrologic 2.2-G	**Micrologic 2.3-AB**
	Micrologic 2.2-AB	**Micrologic 5.3 A**
	Micrologic 5.2 A	**Micrologic 5.3 E**
	Micrologic 5.2 E	**Micrologic 5.3 A-Z**
	Micrologic 5.2 A-Z	**Micrologic 6.3 A**
	Micrologic 6.2 A	**Micrologic 6.3 E**
	Micrologic 6.2 E	**Micrologic 1.3 M**
	Micrologic 2.2 M	**Micrologic 2.3 M**
	Micrologic 6.2 E-M	**Micrologic 6.3 E-M**
	SDTAM Module	
External neutral CT		
24 V DC power supply connector		
ZSI wiring accessory for NSX630b NW/NT		
External power supply module 24 V DC		
	24-30 V DC	48-60 V DC
	100-125 V AC	110-130 V AC
	200-240 V AC	380-415 V AC
Battery module		

Connection

Rear-connection kit	Short	Long	
	Mixed		
NSX100/250 connectors	Snap-on 1.5□ to 95□ (< 160 A)		
	Snap-on 25□ to 95□ (< 250 A)		
	Snap-on 120□ to 185□ (< 250 A)		
	Distribution 6 x 1.5□ to 35□		
	Aluminium 2 cables 50□ to 120□		
NSX400/630 connectors	1 cable 35□ to 300□		
	2 cables 35□ to 240□		
Right-angle terminal extensions			
Straight extensions	NSX100/250		
Edgewise extensions	45° terminal extension	Double-L terminal extensions	
Spreader	NSX100/250 (one piece)	(45 mm)	
	NSX400/630 (52.5 mm)	(70 mm)	
Cu cable lugs	NSX100/250 120□	150□	185□
	NSX400/630	240□	300□
Al cable lugs	NSX100/250	150□	185□
	NSX400/630	240□	300□
Voltage measurement	For lugs NSX100/250 ⩽ 185□		
Input for connector	For lugs NSX400/630		
Terminal shields	NSX100/250 Short	Long	
	NSX400/630 Short	Long	
	Long for 52.5 mm spreaders		
Interphase barriers	Set of 6		
2 insulating	NSX100/250		
screens:	NSX400/630	70 pitch	

Test tool

- Pocket battery for Micrologic
- Maintenance case
- USB maintenance interface
- Power supply 110-240 V AC
- Spare Micrologic cord

Indication and measurement

Ammeter module	standard	3P	4P
	I max	3P	
Current-transformer module		3P	4P
Current-transformer module + TCU		3P	4P
Insulation-monitoring module		3P	4P
Voltage-presence indicator			
Auxiliary contact	OF, SD, SDE or SDV	Standard	Low level
SDE adapter (TM, MA or Micrologic 2 trip units)			
SDX module			

Remote operation

Electrical operation	Motor mechanism		AC	DC	V
Voltage releases	Instantaneous	MX	AC	DC	V
		MN	AC	DC	V
	Fixed time delay	MN	AC	DC	V
	Adjust. time delay	MN	AC	DC	V

Rotary handles

Direct	Black	Red and yellow front
	MCC conversion access.	CNOMO conversion access.
Extended	Black	Red and yellow front
	Telescopic handle for withdrawable device	
Indication auxiliary	1 early-break switch	2 early-make switches

Locking

Toggle (1 to 3 padlocks)	Removable	Fixed
Rotary handle	Keylock adapter (keylock not included)	
	Keylocks Ronis 1351B.500	Profalux KS5 B24 D4Z
Motor mechanism	Keylock adapter + keylock Ronis (special)	NSX100/250
	Keylock adapter (keylock not included)	NSX400/630
	Keylocks Ronis 1351B.500	Profalux KS5 B24 D4Z

Interlocking

Mechanical	Toggle operated	Rotary Handle
By key (2 keylocks, 1 key)	Locking kit without locks	
for rotary handle	Keylocks Ronis 1351B.500	Profalux KS5 B24 D4Z

Installation accessories

- IP30 escutcheon for all types (toggle/rotary handle/motor mechanism)
- IP30 escutcheon (with access to toggle + trip unit)
- IP30 escutcheon for Vigi module
- IP40 escutcheon for all types (toggle/rotary handle/motor mechanism)
- IP40 escutcheon for Vigi module
- IP40 escutcheon for Vigi or ammeter module
- Toggle cover
- Sealing accessories
- DIN rail adapter NSX100/250
- 3P 60 mm busbar adapter

Plug-in / withdrawable configuration accessories

Auxiliary connections	1 automatic connector fixed part with 9 wires (for base)		
	1 automatic connector moving part with 9 wires (for circuit breaker)		
	1 support for 3 automatic connector moving parts	1 support for 2 automatic connector	
	9-wire manual auxiliary connector (fixed + moving)		
Plug-in base accessories	Long insulated terminals	Set of 2	
	2 IP4 shutters for base		
Chassis accessories	Escutcheon collar	Toggle	Vigi
	Locking kit (keylock not included)		
	2 carriage switches (conn./disconnected position indication)		
Parts or plug-in	Plug-in base FC/RC 2P	3P	4P
Withdrawable kits	Set of two power connections	Standard	Vigi
	Safety trip for advanced opening		
	For 3P/4P chassis	Moving part	
		Fixed part	
Adapter for plug-in base (for terminal shield or interphase barriers)			

Communication

	NSX Cord L = 0.35 m	NSX Cord L = 1.3 m
	NSX Cord U > 480 V AC L = 0.35 m	NSX Cord L = 3 m
BSCM		
Communicating motor mechanism 220-240V		
Switchboard front display module FDM121		
FDM mounting accessory		
Modbus interface		
Stacking accessory		
ULP line termination		
RJ45 connectors female/female	Wire length RJ45 L = 0.3 m	Wire length RJ45 L = 0.6 m
	Wire length RJ45 L = 1 m	Wire length RJ45 L = 2 m
	Wire length RJ45 L = 3 m	Wire length RJ45 L = 5 m

Glossary

Glossary

Contents

Glossary

For each major section (Accessories, Switchgear, etc.) and for each item (Adapter for plug-in base, Connection terminal, etc.), this glossary provides:
- the page number in the concerned catalogue
- the reference standard
- the standardised IEC symbol
- the definition.

Text in quotation marks is drawn from the standards.

Accessories

Adapter for plug-in base ▶ A-72
The adapter is a plastic component that can be installed upstream and/or downstream of the plug-in base and enables use of all the connection accessories of the fixed device.

Bare-cable connector ▶ A-71
Conducting part of the circuit breaker intended for connection to power circuits. On Compact NSX, it is an aluminium part that screws to the connection terminals of the circuit breaker. There are one or more holes (single or multiple cable connector) for the ends of bare cables.

Connection terminals ▶ A-70
Flat copper surface, linked to the conducting parts of the circuit breaker and to which power connections are made using bars, connectors or lugs.

One-piece spreader ▶ A-70
The spreader is a plastic component with copper connectors that can be installed upstream and/or downstream of a Compact NSX100 to 250 circuit breaker with a pole pitch of 35 mm. It increases the pitch of the circuit-breaker terminals to the 45 mm pitch of a NSX400/630 device to facilitate connection of large cables.

Spreaders ▶ A-70
Set of three (3P device) or four (4P) flat, conducting parts made of aluminium. They are screwed to the circuit-breaker terminals to increase the pitch between poles.

Circuit-breaker characteristics (IEC 60947-2)

Breaking capacity ▶ A-6
Value of prospective current that a switching device is capable of breaking at a stated voltage under prescribed conditions of use and behaviour. Reference is generally made to the ultimate breaking capacity (Icu) and the service breaking capacity (Ics).

Degree of protection (IP)
IEC 60529 ▶ A-5
Defines device protection against the penetration of solid objects and liquids, using two digits specified in standard IEC 60259. Each digit corresponds to a level of protection, where 0 indicates no protection.
- First digit (0 to 6): protection against penetration of solid foreign objects.
1 corresponds to protection against objects with a diameter > 50 mm, 6 corresponds to total protection against dust.
- Second digit (0 to 8): protection against penetration of liquids (water).
1 corresponds to protection against falling drops of water (condensation), 8 corresponds to continuous immersion.

The enclosure of Compact NSX circuit breakers provides a minimum of IP40 (protection against objects > 1 mm) and can reach IP56 (protection against dust and powerful water jets) depending on the installation conditions.

Degree of protection against external mechanical impacts (IK) ▶ A-6
Defines the aptitude of an object to resist mechanical impacts on all sides, indicated by a number from 0 to 10 (standard IEC 62262). Each number corresponds to the impact energy (in Joules) that the object can handle according to a standardised procedure.
0 corresponds to no protection, 1 to an impact energy of 0.14 Joules, 10 to an impact energy of 20 Joules. Compact NSX provide IK07 (2 Joules) and can provide IK08 (5 Joules) depending on the installation conditions.

Durability ▶ A-6
The term "durability" is used in the standards instead of "endurance" to express the expectancy of the number of operating cycles which can be performed by the equipment before repair or replacement of parts. The term "endurance" is used for specifically defined operational performance.

Electrical durability
IEC 60947-1 ▶ A-6
With respect to its resistance to electrical wear, equipment is characterised by the number of on-load operating cycles, corresponding to the service conditions given in the relevant product standard, which can be made without re replacement.

Frame size A-70

"A term designating a group of circuit breakers, the external physical dimensions of which are common to a range of current ratings. Frame size is expressed in amperes corresponding to the highest current rating of the group. Within a frame size, the width may vary according to the number of poles. This definition does not imply dimensional standardization."
Compact NSX has two frame sizes covering 100 to 250 A and 400 to 630 A.

Insulation class A-5

Defines the type of device insulation in terms of earthing and the corresponding safety for user, in one of three classes.
- Class I. The device is earthed. Any electrical faults, internal or external, or caused by the load, are cleared via the earthing circuit, thus ensuring user safety.
- Class II. The device is not connected to a protective conductor. User safety is ensured by reinforced insulation around the live parts (an insulating case and no contact with live parts, i.e. plastic buttons, moulded connections, etc.) or double insulation.
- Class III. The device may be connected only to SELV (safety extra-low voltage) circuits. The Compact NSX are class II devices (front) and may be installed through the door in class II switchboards (standards IEC 61140 and IEC 60664-1), without reducing insulation, even with a rotary handle or motor mechanism module.

Making capacity

Value of prospective making current that a switching device is capable of making at a stated voltage under prescribed conditions of use and behaviour. Reference is generally made to the short-circuit making capacity Icm.

Maximum break time A-17

Maximum time after which breaking is effective, i.e. the contacts separated and the current completely interrupted.

Mechanical durability A-6

With respect to its resistance to mechanical wear, equipment is characterised by the number of no-load operating cycles which can be effected before it becomes necessary to service or replace any mechanical parts.

Non-tripping time A-17

This is the minimum time during which the protective device does not operate in spite of pick-up overrun, if the duration of the overrun does not exceed the corresponding voluntary time delay.

Pollution degree
of environment conditions
IEC 60947-1
IEC 60664-1 A-6

"Conventional number based on the amount of conductive or hygroscopic dust, ionized gas or salt and on the relative humidity and its frequency of occurrence, resulting in hygroscopic absorption or condensation of moisture leading to reduction in dielectric strength and/or surface resistivity". Standard IEC 60947-1 distinguishes four pollution degrees.
- Degree 1. No pollution or only dry, non-conductive pollution occurs.
- Degree 2. Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation may be expected.
- Degree 3. Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation.
- Degree 4. The pollution generates persistent conductivity caused, for instance, by conductive dust or by rain or snow. Compact NSX meets degree 3, which corresponds to industrial applications.

Prospective short-circuit current E-13

Current that would flow through the poles if they remained fully closed during the short-circuit.

Rated current (In) A-6

This is the current that the device can carry continuously with the contacts closed and without abnormal temperature rise.

Rated impulse withstand voltage (Uimp) A-6

"The peak value of an impulse voltage of prescribed form and polarity which the equipment is capable of withstanding without failure under specified conditions of test and to which the values of the clearances are referred. The rated impulse withstand voltage of an equipment shall be equal to or higher than the values stated for the transient overvoltages occurring in the circuit in which the equipment is fitted".

Rated insulation voltage (Ui) A-6

"The rated insulation voltage of an equipment is the value of voltage to which dielectric tests and creepage distances are referred. In no case shall the maximum value of the rated operational voltage exceed that of the rated insulation voltage".

Rated operational current (Ie)

"A rated operational current of an equipment is stated by the manufacturer and takes into account the rated operational voltage, the rated frequency, the rated duty, the utilization category and the type of protective enclosure, if appropriate".

Rated operational voltage (Ue) A-6

"A value of voltage which, combined with a rated operational current, determines the application of the equipment and to which the relevant tests and the utilisation categories are referred. For multipole equipment, it is generally stated as the voltage between phases".
This is the maximum continuous voltage at which the equipment may be used.

Glossary

Rated short-time withstand current (Icw)

"Value of short-time withstand current, assigned to the equipment by the manufacturer, that the equipment can carry without damage, under the test conditions specified in the relevant product standard". Generally expressed in kA for 0.5, 1 or 3 seconds. This is an essential characteristic for air circuit breakers. It is not significant for moulded-case circuit breakers for which the design targets fast opening and high limiting capacity.

Service breaking capacity (Ics) ▶ A-6

Expressed as a percentage of Icu, it provides an indication on the robustness of the device under severe conditions. It is confirmed by a test with one opening and one closing/opening at Ics, followed by a check that the device operates correctly at its rated current, i.e. 50 cycles at In, where temperature rise remains within tolerances and the protection system suffers no damage.

Short-circuit making capacity (Icm) ▶ A-58

Value indicating the capacity of the device to make and carry a high current without repulsion of the contacts. It is expressed in kA peak.

Suitability for isolation ▶ A-5
(see also Positive contact indication, page G-5)

This capability means that the circuit breaker meets the conditions below.
- In the open position, it must withstand, without flashover between the upstream and downstream contacts, the impulse voltage specified by the standard as a function of the Uimp indicated on the device.
- It must indicate contact position by one or more of the following systems:
  - position of the operating handle
  - separate mechanical indicator
  - visible break of the moving contacts
- Leakage current between each pole, with the contacts open, at a test voltage of 1.1 x the rated operating voltage, must not exceed:
  - 0.5 mA per pole for new devices
  - 2 mA per pole for devices already subjected to normal switching operations
  - 6 mA, the maximum value that must never be exceeded.
- It must not be possible to install padlocks unless the contacts are open. Locking in the closed position is permissible for special applications. Compact NSX complies with this requirement by positive contact indication.

Suitable for isolation with positive contact indication ▶ A-5
(see also Suitability for isolation, page G2)

Suitability for isolation is defined here by the mechanical reliability of the position indicator of the operating mechanism, where:
- the isolation position corresponds to the O (OFF) position
- the operating handle cannot indicate the "OFF" position unless the contacts are effectively open.

The other conditions for isolation must all be fulfilled:
- locking in the open position is possible only if the contacts are effectively open
- leakage currents are below the standardised limits
- overvoltage impulse withstand between upstream and downstream connections.

Ultimate breaking capacity (Icu) ▶ A-6

Expressed in kA, it indicates the maximum breaking capacity of the circuit breaker. It is confirmed by a test with one opening and one closing/opening at Icu, followed by a check that the circuit is properly isolated. This test ensures user safety.

Communication

BSCM ▶ A-27
(Breaker status and control module)

The optional BSCM for Compact NSX is used to acquire device status indications and control the communicating remote-control function. It includes a memory used to manage the maintenance indicators. It serves as a converter between the analog outputs of the device indication contacts (O/F, SD, SDE) and the digital communicating functions.

Ethernet TCP/IP ▶ A-28
(Transmission Control Protocol / Internet Protocol)

Ethernet is a very common network protocol and complies with IEEE standard 802.3. Ethernet TCP/IP is the protocol that brings web functions to Ethernet networks. Most PCs have an Ethernet 10/100 card (10 or 100 Mbit/s) for connection to the internet. Data communicated from Compact NSX via Modbus are accessible on a PC via a TCP/IP-Modbus gateway such as MPS100 or EGX100.

Network

Set of communicating devices that are interconnected by communication lines in order to share data and resources.

Open protocol ▶ 3

A protocol for system communication, interconnection or data exchange for which technical specifications are public, i.e. there are no restrictions on access or implementation. An open protocol is the opposite of a proprietary protocol.

Protocol ▶ A-28

Standardised specification for dialog between digital components that exchange data. It is an operating mode based on the length and structure of binary words and it must be used by all the components exchanging data between themselves. Communication is not possible without using a protocol.

RJ45 connector ▶ A-26

Universal, 8-wire connector that is widely used in digital communication networks. The RJ45 connector is used to interconnect computer equipment (Ethernet, Modbus, etc.), telephones and audiovisual equipment.

RS485 Modbus ▶ A-28

Modbus is the most widely used communication protocol in industrial networks. It operates in master-slave mode. An RS485 multipoint link connects the master and slaves via a pair of wires offering throughputs of up to 38400 bits/second over distances up to 1200 m). The master cyclically polls the slaves which send back the requested information.
The Modbus protocol uses frames containing the address of the targeted slave, the function (read, write), the datum and the CRC (cyclical redundancy check).

SDTAM ▶ A-81

Relay module with two static outputs specifically for the motor-protection Micrologic trip units 1 M, 2 M and 6 E-M. An output, linked to the contactor controller, opens the contactor when an overload or other motor fault occurs, thus avoiding opening of the circuit breaker. The other output stores the opening event in memory.

SDx ▶ A-81

Relay module with two outputs that remotes the trip or alarm conditions of Compact NSX circuit breakers equipped with a Micrologic electronic trip unit.

Static output ▶ A-81

Output of a relay made up of a thyristor or triac electronic component. The low switching capability means that a power relay is required.
This is the case for the SDx and SDTAM outputs.

ULP (Universal Logic Plug) ▶ A-31

Connection system used by Compact NSX to communicate information to the Modbus interface via a simple RJ45 cable. Compatible modules are indicated by the symbol opposite.

Components

ASIC (Application Specific Integrated Circuit) ▶ A-8

Integrated circuit designed, built and intended for a specific application. It carries out repetitive sequences of instructions engraved in the silicon chip. For that reason, it is extremely reliable because it cannot be modified and is not affected by environment conditions.
Micrologic trip units use an ASIC for the protection functions. The ASIC cyclically polls the network status at a high frequency, using the values supplied by captors. Comparison with the settings forms the basis for orders to the electronic trip units.

Microprocessor ▶ A-8

A microprocessor is a more general purpose device than an ASIC. In Micrologic, a microprocessor is used for measurements and it can be programmed. It is not used for the main protection functions that are carried out by the ASIC.

Controls

Communicating motor mechanism ▶ A-82

For Compact NSX remote control via the communication system, a communicating motor mechanism is required. Except for the communication function, it is identical to the standard motor mechanism module and connects to and controlled by the BSCM module.

CNOMO machine-tool rotary handle ▶ A-84

Handle used for machine-tool control enclosures and providing IP54 and IK08.

Direct rotary handle ▶ A-84

This is an optional control handle for the circuit breaker. It has the same three positions I (ON), O (OFF) and TRIPPED as the toggle control. It provides IP40, IK07 and the possibility, due to its extended travel, of using early-make and early-break contacts. It maintains suitability for isolation and offers optional locking using a keylock or a padlock.

Emergency off ▶ A-83

In a circuit equipped with a circuit breaker, this function is carried out by an opening mechanism using an MN undervoltage release or an MX shunt release in conjunction with an emergency off button.

Extended rotary handle ▶ A-84

Rotary handle with an extended shaft to control devices installed at the rear of switchboards. It has the same characteristics as direct rotary handles. It offers multiple locking possibilities using a keylock, a padlock or a door interlock.

Failsafe remote tripping ▶ A-83

Remote tripping is carried out by an opening mechanism using an MN undervoltage release in conjunction with an emergency off button. If power is lost, the protection device opens the circuit breaker.

Glossary

Manual toggle control ▶ A-89
This is the standard control mechanism for the circuit breaker, with a toggle that can be flipped up or down. In a moulded-case circuit breaker (MCCB), there are three positions, I (ON), O (OFF) and TRIPPED. Once in the TRIPPED position, manual reset is required by switching to O (OFF position before reclosing.The TRIPPED position does not offer isolation with positive contact indication. This is guaranteed only by the O (OFF) position.

MCC rotary handle ▶ A-84
Handle used for motor control centres and providing IP43 and IK07.

Motor mechanism module ▶ A-82
The optional motor mechanism module is used to remotely open, close and recharge the circuit breaker.

Discrimination / Cascading

Cascading
Cascading implements the current-limiting capacity of a circuit breaker, making it possible to install downstream circuit breakers with lower performance levels.
The upstream circuit breaker reduces any high short-circuit currents. This makes it possible to install downstream circuit breakers with breaking capacities less than the prospective short-circuit current at their point of installation.
The main advantage of cascading is to reduce the overall cost of switchgear.
Because the current is limited throughout the circuit downstream of the limiting circuit breaker, cascading applies to all the devices located downstream.

Current discrimination
Discrimination based on the difference between the current-protection settings of the circuit breakers. The difference in settings between two successive circuit breakers in a circuit must be sufficient to allow the downstream breaker to clear the fault before the upstream breaker trips.

Discrimination ▶ A-8
Discrimination is ensured between upstream and downstream circuit breakers if, when a fault occurs, only the circuit breaker placed immediately upstream of the fault trips.
Discrimination is the key to ensuring the continuity of service of an installation.

Energy discrimination ▶ A-8
This function is specific to Compact NSX (see Reflex tripping on page G-7) and supplements the other types of discrimination.

Partial discrimination ▶ A-8
Discrimination is partial if the conditions for total discrimination are not met up to the ultimate short-circuit current Icu, but only up to a lesser value. This value is called the discrimination limit. If a fault exceeds the discrimination limit, both circuit breakers trip.

Time discrimination
Discrimination based on the difference between the time-delay settings of the circuit breakers. The upstream trip unit is delayed to provide the downstream breaker the time required to clear the fault.

Total discrimination ▶ A-8
Total discrimination is ensured between upstream and downstream circuit breakers if, for all fault values, from overloads up to solid short-circuits, only the downstream circuit breaker trips and the upstream circuit breaker remains closed.

Zone selective interlocking (ZSI) ▶ A-18
A number of circuit breakers with Micrologic electronic trip units are interconnected one after another by a pilot wire. In the event of a short-time or ground fault:
■ in the absence of information from downstream, the circuit breaker directly concerned by the fault (i.e. located just upstream of the fault) shifts to the shortest time delay and sends a signal upstream
■ the upstream device, on receiving the signal from the downstream device, maintains its normal time delay.
In this manner, the fault is cleared rapidly by the circuit breaker closest to the fault.

Environment

EMC (Electromagnetic compatibility) ▶ A-5
EMC is the capacity of a device not to disturb its environment during operation (emitted electromagnetic disturbances) and to operate in a disturbed environment (electromagnetic disturbances affecting the device). The standards define various classes for the types of disturbances. Micrologic trip units comply with annexes F and J in standard IEC IE60947-2.

Power loss
Pole resistance ▶ B-10
The flow of current through the circuit-breaker poles produces Joule-effect losses caused by the resistance of the poles.

Product environmental profile (PEP) ▶ A-4
LCA: Life-cycle assessment
ISO 14040

An assessment on the impact of the construction and use of a product on the environment, in compliance with standard ISO 14040, Environmental management, life-cycle assessment (LCA), principles and framework.
For Compact NSX, this assessment is carried out using the standardised EIME (Environmental Impact and Management Explorer) software, which makes possible comparisons between the products of different manufacturers.
It includes all stages, i.e. manufacture, distribution, use and end of life, with set usage assumptions:
- use over 20 years at a percent load of 80% for 14 hours per day and 20% for ten hours
- according to the European electrical-energy model.

It provides the information presented below.
- Materials making up the product: composition and proportions, with a check to make sure no substances forbidden by the RoHS directive are included.
- Manufacture: on Schneider Electric production sites that have set up an environmental management system certified ISO 14001.
- Distribution: packaging in compliance with the 94/62/EC packaging directive (optimised volumes and weights) and optimised distribution flows via local centres.
- Use: no aspects requiring special precautions for use. Power lost through Joule effect in Watts (W) must be < 0.02% of total power flowing through the circuit breaker. Based on the above assumptions, annual consumption from 95 to 200 kWh.
- End of life: products dismantled or crushed. For Compact NSX, 81% of materials can be recycled using standard recycling techniques. Less than 2% of total weight requires special recycling.

Product environmental profile (PEP) ▶ A-4
Environmental indicators

Environmental indicators are also frequently used for the PEP (sheet available on request for Compact NSX):
- Depletion of natural resources
- Depletion of energy
- Depletion of water
- Potential for atmospheric warming (greenhouse effect)
- Potential for stratospheric ozone depletion
- Creation of atmospheric ozone (ozone layer)
- Acidification of air (acid rain)
- Production of hazardous waste.

RoHS directive ▶ A-4
(Restriction of Hazardous substances)

European directive 2002/95/EC dated 27 January 2003 aimed at reducing or eliminating the use of hazardous substances. The manufacturer must attest to compliance, without third-party certification. Circuit breakers are not included in the list of concerned products, which are essentially consumer products.
That not withstanding, Schneider Electric decided to comply with the RoHS directive. Compact NSX products are designed in compliance with RoHS and do not contain (above the authorised levels) lead, mercury, cadmium, hexavalent chromium or flame retardants (polybrominated biphenyls PBB and polybrominated diphenyl ether PBDE).

Safety clearances ▶ A-4

When installing a circuit breaker, minimum distances (safety clearances) must be maintained between the device and panels, bars and other protection systems installed nearby. These distances, which depend on the ultimate breaking capacity, are defined by tests carried out in accordance with standard IEC 60947-2.

Temperature derating ▶ B-8

An ambient temperature varying significantly from 40°C can modify operation of magnetic or thermal-magnetic protection functions. It does not affect electronic trip units. However, when electronic trip units are used in high-temperature situations, it is necessary to check the settings to ensure that only the permissible current for the given ambient temperature is let through.

Vibration withstand ▶ B-2
IEC 60068-2-6

Circuit breakers are tested in compliance with standard IEC 60068-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):
- 2 to 13.2 Hz: amplitude of ±1 mm
- 13.2 to 100 Hz: constant acceleration of 0.7 g.

WEEE directive ▶ A-4
(Waste of Electrical and Electronic Equipment)

European directive on managing the waste of electrical and electronic equipment.
Circuit breakers are not included in the list of concerned products.
However, Compact NSX products respect the WEEE directive.

Harmonics

Glossary

Current harmonics ▶ A-20

Non-linear loads cause harmonic currents that flow in the 50 Hz (or 60 Hz) distribution system. Total harmonic current is the sum of sinusoidal AC currents for which the rms values can be measured and broken down into:
- the fundamental current at the 50/60 Hz frequency of the distribution system, with an rms value of IH_1
- harmonic currents with whole, odd multiples (3, 5, 7, etc.) of the 50/60 Hz frequency, called the third-order, fifth-order, etc. harmonics. For example, IH_3, the third-order harmonic at 150/180 Hz, IH_5, the fifth-order harmonic at 250/300 Hz, etc.

The presence of harmonics in the system must be monitored and limited because it results in temperature rise, currents in the neutral (caused by the third-order harmonics and multiples), malfunctions of sensitive electronic devices, etc.
Micrologic E trip units take into account harmonics up to order 15 in the THDI and THDU calculations.

Non-linear load

Systems producing harmonics are present in all industrial, commercial and residential sectors. Harmonics are caused by non-linear loads. A load is said to be non-linear when the current drawn does not have the same waveform as the supply voltage. Typically, loads using power electronics are non-linear.
Examples of non-linear loads include computers, rectifiers, variable-speed drives, arc furnaces and fluorescent lighting.

Total harmonic distortion of current (THDI) ▶ A-21

THDI characterises the distortion of the current wave by harmonics.
It indicates the quantity of harmonics in the resulting waveform. It is expressed in percent.
The higher the THDI, the more the current is distorted by harmonics.
THDI should remain below 10%. Above that level, there is said to be harmonic pollution that is considered severe when it rises above 50%.

Total harmonic distortion of voltage (THDU) ▶ A-21

THDU characterises the distortion of the voltage wave by harmonics.
It indicates the quantity of harmonics in the resulting waveform. It is expressed in percent.
The higher the THDU, the more the system voltage is distorted by harmonics. It is advised not to exceed 5% for low-voltage systems.

Voltage harmonics ▶ A-20

For each current harmonic IHk, there is a voltage harmonic UHk of the same order k, where the resulting voltage is the sum of the two waves.
The voltage wave is therefore distorted with respect to the standard sinusoidal wave.

Measurements

Contact wear ▶ A-23

Each time Compact NSX opens, the Micrologic 5 / 6 trip unit measures the interrupted current and increments the contact-wear indicator as a function of the interrupted current, according to test results stored in memory.

Current transformer with iron-core toroid ▶ 10

It is made up of a coil wound around an iron frame through which a power busbar runs. The current flowing in the bar, on passing through the sensor, induces a magnetic field that reverses for each half period. This variation in the field in turn creates an induced current in the coil. This current is proportional to the current flowing in the bar. It is sufficient to supply the measurement electronics.
The disadvantage of iron-core measurement current transformers (CT) is that they rapidly saturate for currents > 10 In.

Current transformer with Rogowski toroid or air-core CT ▶ 10

It is made up of a coil without an iron frame, through which a power busbar runs. The output voltage at the coil terminals is proportional to the current flowing through the bar. The result is a current transformer (CT) with a voltage output. The advantage is that it never saturates whatever the primary current and thus enables measurement of high currents. The output is however a very low current that is too low to supply the measurement electronics.
For Micrologic, Rogowski CTs measure the current and a second CT, with an iron core, provides the electrical supply.

Demand current, demand power and peak values ▶ A-21

Average of the instantaneous current or power values over an adjustable fixed or sliding time interval. The highest value observed over the time interval is the peak value. The time interval runs from the last reset.

Instantaneous current ▶ A-21

True rms value of the current measured by the current transformers over a sliding time interval. Available on Micrologic 5/6 A or E.

Instantaneous voltage	A-21	True rms value of the voltage measured by the voltage sensors over a sliding time interval. Available on Micrologic 5/6 A or E.
Maximeters/minimeters	A-20	Micrologic 5 and 6 A or E can record the minimum and maximum values of electrical parameters over set time periods.
Overvoltage category (OVC - Overvoltage category) IEC 60947-1. Annex H	A-32	Standard IEC 60664-1 stipulates that it is up to the user to select a measurement device with a sufficient overvoltage category, depending on the network voltage and the transient overvoltages likely to occur. Four overvoltage categories define the field of use for a device. ■ Cat. I. Devices supplied by a SELV isolating transformer or a battery. ■ Cat. II. Residential distribution, handheld or laboratory tools and devices connected to standardised 2P + earth electrical outlets (230 V). ■ Cat. III. Industrial distribution, fixed distribution circuits in buildings (main low voltage switchboards, rising mains, elevators, etc.). ■ Cat. IV. Utility substations, overhead lines, certain industrial equipment.
Percent load	A-23	Percentage of current flowing through the circuit breaker with respect to its rated current. Micrologic 6 E-M offers this information and can sum it over the total operating time to provide the load profile for the following ranges, 0 to 49%, 50 to 79%, 80 to 89% and ≥ 90%.
Phase sequence	A-23	The order in which the phases are connected (L1, L2, L3 or L1, L3, L2) determines the direction of rotation for three-phase asynchronous motors. Micrologic 6 E-M trip units provide this information.
Power and energy metering (consumption)	A-21	The digital electronics in Micrologic 5/6 E calculate the instantaneous power levels, apparent (S in kVA), active (P in kW) and (Q in kV), and integrate over a time interval to determine the corresponding energies (kVAh, kWh kvarh). Calculations are for each phase and for the total.
Time-stamped histories	A-23	Micrologic trip units store information on events (e.g. alarms and their cause) that are time-stamped to within a millisecond.

Protection

Ground-fault protection G (Ig)	A-19	Protection function specific to electronic circuit breakers, symbolised by G (Ground). This protection can calculate high-threshold residual earth-leakage currents (in the order of tens of Amperes) on the basis of phase-current measurements. Micrologic 5/6 offers this protection function with adjustable pick-up Ig and time delay.
Instantaneous protection I (Ii)	A-19	This protection supplements Isd. It provokes instantaneous opening of the device. The pick-up may be adjustable or fixed (built-in). This value is always lower than the contact-repulsion level.
Long-time protection L (Ir)	A-19	Protection function where the adjustable Ir pick-up determines a protection curve similar to the thermal-protection curve (inverse-time curve I^2t). The curve is generally determined on the basis of the Ir setting which corresponds to a theoretically infinite tripping time (asymptote) and of the point at 6 Ir at which the tripping time depends on the rating.
Magnetic protection (Im)	A-14	Short-circuit protection provided by magnetic trip units (see this term). The pick-up setting may be fixed or adjustable.
Neutral protection (IN)	A-16	The neutral is protected because all circuit-breaker poles are interrupted. The setting may be that used for the phases or specific to the neutral, i.e. reduced neutral (0.5 times the phase current) or OSN (oversized neutral) at 1.6 times the phase current. For OSN protection, the maximum device setting is limited to 0.63 In.
Residual-current earth-leakage protection (IΔn)	A-34	Protection provided by Vigi modules, in which the residual-current toroids directly detect low-threshold earth-leakage currents (in the order of tens of mA) caused by insulation faults.
Short-delay protection S (Isd)	A-19	Protection function specific to electronic circuit breakers, symbolised by S (Short delay or short time). This protection supplements thermal protection. The reaction time is very short, but has a slight time delay to enable discrimination with the upstream device. The short-delay pick-up Isd is adjustable from approximately 1.5 to 10 Ir.
Short-delay protection with fixed time delay So (Isd)	A-17	Short-delay protection, but with a fixed time delay. This function is available on Micrologic 2. It is symbolised by So. It ensures discrimination with downstream devices.

Glossary

Thermal protection (Ir) A-15

Overload protection provided by thermal trip units (see this term) using an inverse-time curve (I^2t).

Relays and auxiliary contacts

Auxiliary contact
IEC 60947-1

"Contact included in an auxiliary circuit and mechanically operated by the switching device".

Break contact A-84
IEC 60947-1

"Control or auxiliary contact which is open when the main contacts of the mechanical switching device are closed and closed when they are open".

Make contact A-84
IEC 60947-1

"Control or auxiliary contact which is closed when the main contacts of the mechanical switching device are closed and open when they are open".

Relay (electrical) A-18
IEC 60947-1

"Device designed to produce sudden, predetermined changes in one or more electrical output circuits when certain conditions are fulfilled in the electrical input circuits controlling the device".

Relay module with static output A-81

Output of a relay made up of a thyristor or triac electronic component. The low interrupting capacity means that a power relay is required. This is the case for the SDx and SDTAM outputs.

Switchgear

Circuit breaker A-6
IEC 60947-2

"Mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short circuit". Circuit breakers are the device of choice for protection against overloads and short-circuits. Circuit breakers may, as is the case for Compact NSX, be suitable for isolation.

Circuit-breaker utilisation category A-6
IEC 60947-2

The standard defines two utilisation categories, A and B, depending on breaker discrimination with upstream breakers under short-circuit conditions.
- Category A. Circuit breakers not specifically designed for discrimination applications.
- Category B. Circuit breakers specifically designed for discrimination, which requires a short time-delay (which may be adjustable) and a rated short-time withstand current in compliance with the standard.

Compact NSX100 to 630 circuit breakers are category A, however, by design, they provide discrimination with downstream devices (see the Complementary technical information guide).

Contactor A-36
IEC 60947-1

"Mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including operating overload conditions". A contactor is provided for frequent opening and closing of circuits under load or slight overload conditions. It must be combined and coordinated with a protective device against overloads and short-circuits, such as a circuit breaker.

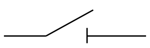
Contactor utilisation categories A-37
IEC 60947-4-1

The standard defines four utilisation categories, AC1, AC2, AC3 and AC4 depending on the load and the control functions provided by the contactor. The class depends on the current, voltage and power factor, as well as contactor withstand capacity in terms of frequency of operation and endurance.

Current-limiting circuit breaker A-36
IEC 60947-2

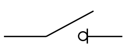
"A circuit-breaker with a break-time short enough to prevent the short-circuit current reaching its otherwise attainable peak value".

Disconnector
IEC 60947-3



"Mechanical switching device which, in the open position, complies with the requirements specified for the isolating function". A disconnector serves to isolate upstream and downstream circuits. It is used to open or close circuits under no-load conditions or with a negligible current level. It can carry the rated circuit current and, for a specified time, the short-circuit current.

Switch-disconnector A-56
IEC 60947-3



"Switch which, in the open position, satisfies the isolating requirements specified for a disconnector". A switch-disconnector serves for switching and isolation. The switch function breaks the circuit under load conditions and the disconnection function isolates the circuit. Protection is not provided. It may be capable of making short-circuit currents if it has the necessary making capacity, but it cannot break short-circuit currents. Compact NSX100 to 630 NA switch-disconnectors have a making capacity.

Switch-disconnector utilisation category
IEC 60947-3
▶ A-57
The standard defines six utilisation categories, AC-21A or B, AC-22 A or B, AC23 A or B. They depend on the rated operational current and the mechanical durability (A for frequent operation or B for infrequent operation). Compact NSX NA switch-disconnectors comply with utilisation categories AC22A or AC23A.

Three-phase asynchronous motors and their protection

Locked-rotor protection (Ijam)
▶ A-44
This function steps in when the motor shaft cannot or can no longer drive the load. The result is a high overcurrent.

Long-start protection (Ilong)
▶ A-44
An overly long start means the current drawn remains too high or too low for too long, with respect to the starting current. In all cases, the load cannot be driven and the start must be interrupted. The resulting temperature rise must be taken into account before restarting.

Phase-unbalance or phase- loss protection (Iunbal)
▶ A-43
This protection function steps in if the current values and/or the unbalance in the three phases supplying the motor exceeds tolerances. Currents should be equal and displacement should be one third of a period. Phase loss is a special case of phase unbalance.

Starting current
▶ A-38
Start-up of a three-phase, asynchronous motor is characterised by:
- a high inrush current, approximately 14 In for 10 to 15 ms
- a starting current, approximately 7.2 In for 5 to 30 seconds
- return to the rated current after the starting time.

Starting time
▶ A-38
Time after which the motor ceases to draw the starting current and falls back to the operating current Ir (⩽ In).

Thermal image of the rotor and stator
▶ A-44
The thermal image models the thermal behaviour of a motor rotor and stator, taking into account temperature rise caused by overloads or successive starts, and the cooling constants. For each motor power rating, the algorithm takes into account a theoretical amount of iron and copper which modifies the cooling constants.

Thermal protection
Protection against overcurrents following an inverse time curve I^2t = constant, which defines the maximum permissible temperature rise for the motor.
Tripping occurs after a time delay that decreases with increasing current.

Trip class
IEC 60947-4-1
▶ A-38
The trip class determines the trip curve of the thermal protection device for a motor feeder. The standard defines trip classes 5, 10, 20 and 30. These classes are the maximum durations, in seconds, for motor starting with a starting current of 7.2 Ir, where Ir is the thermal setting indicated on the motor rating plate.

Under-load protection (Iund)
▶ A-44
This function steps in when the driven load is too low. It detects a set minimum phase current which signals incorrect operation of the driven machine. In the example of a pump, under-load protection detects when the pump is no longer primed.

Trip units

Electronic trip unit (Micrologic)
▶ A-16
Trip unit that continuously measures the current flowing through each phase and the neutral if it exists. For Micrologic, the measurements are provided by built-in current sensors linked to an analog-digital converter with a high sampling frequency. The measurement values are continuously compared by the ASIC to the protection settings. If a setting is overrun, a Mitop release trips the circuit-breaker operating mechanism.
This type of trip unit offers much better pick-up and delay setting accuracy than thermal-magnetic trip units. It also provides a wider range of protection functions.

Magnetic release
▶ A-14
Release actuated by a coil or a lever. A major increase in the current (e.g. a short-circuit) produces in the coil or the lever a change in the magnetic field that moves a core. This trips the circuit breaker operating mechanism. Action is instantaneous. The pick-up setting may be adjustable.

Reflex tripping
▶ A-8
Compact NSX circuit breakers have a patented reflex-tripping system based on the energy of the arc and that is independent of the other protection functions. It operates extremely fast, before the other protection functions. It is an additional safety function that operates before the others in the event of a very high short-circuit.

Glossary

Release
IEC 60947-1

Device, mechanically connected to a mechanical switching device (e.g. a circuit breaker), which releases the holding means and permits the opening or the closing of the switching device. For circuit breakers, releases are often integrated in a trip unit.

Shunt release (MX) ▶ A-83

This type of release operates when supplied with current. The MX release provokes circuit-breaker opening when it receives a pulse-type or maintained command.

Thermal-magnetic trip unit ▶ A-14

Trip unit combining thermal protection for overloads and magnetic protection.

Thermal release ▶ A-14

Release in which a bimetal strip is heated by the Joule effect. Above a temperature-rise threshold that is a function of the current and its duration (I^2t curve = constant, which is representative of temperature rise in cables), the bimetal strip bends and releases the circuit-breaker opening mechanism. The pick-up setting may be adjustable.

Undervoltage release (MN) ▶ A-83

This type of release operates when the supply voltage drops below the set minimum.

Notes

Notes

Schneider Electric Industries SAS
35, rue Joseph Monier
CS 30323
F- 92506 Rueil Malmaison Cedex

RCS Nanterre 954 503 439
Capital social 896 313 776 €
www.schneider-electric.com

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

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LVPED208001EN
05-2009

Low Voltage Products

COMPACT NS630b to 1600 A

User manual

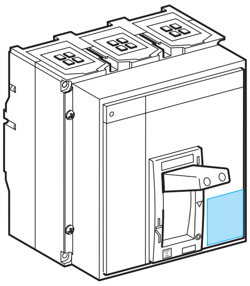
a brand of Schneider Electric

Merlin Gerin

User manual for circuit breakers
COMPACT NS630b to 1600 A

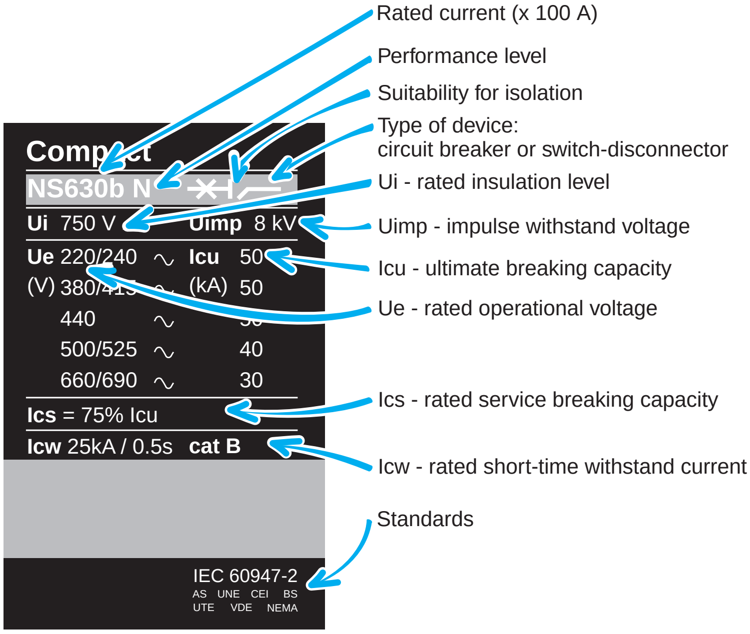
Discovering Compact

E60438A



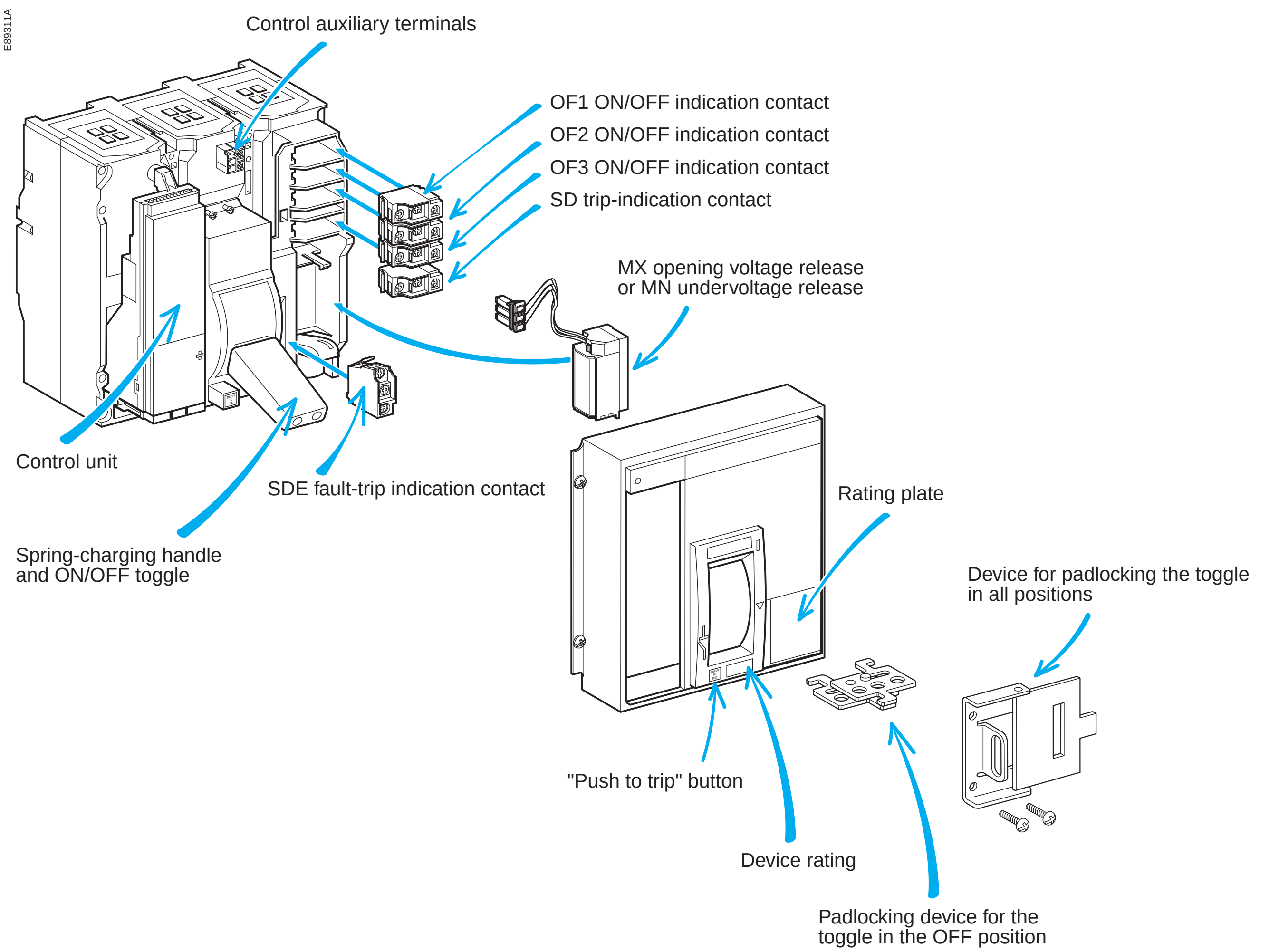
Rating plate

E89310A



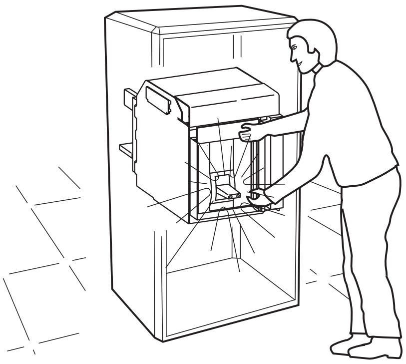
Manually operated Compact with a toggle

Components



Opening, closing, reset

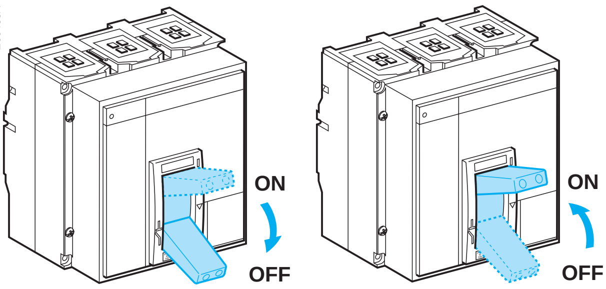
E60436A



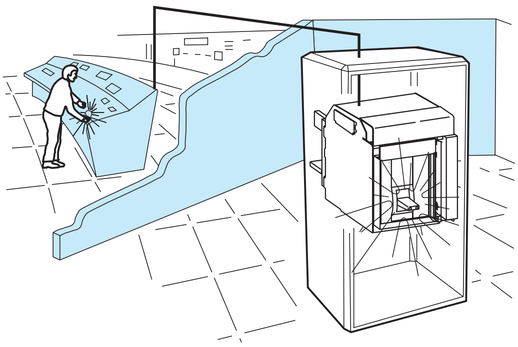
Local opening and closing

■ OFF: breaker open, ON: breaker closed.

E60435A



E60433A



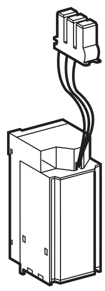
Remote opening

Use either:
■ an MX opening release
■ an MN undervoltage release
■ a delayed MN undervoltage release.

When connected to the control panel, these releases may be used to remotely open the device.

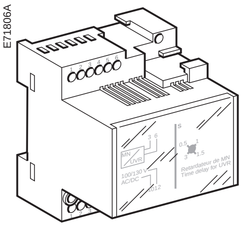
MX, MN

E71805A



Delay unit

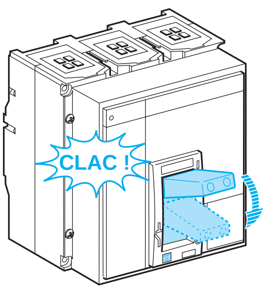
E71806A



Resetting the device following a trip

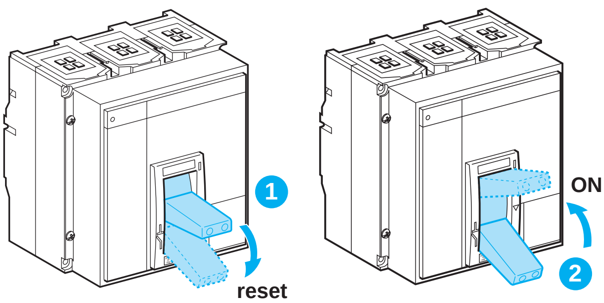
■ the device trips.

E60432A



■ reset the device, then close it again.

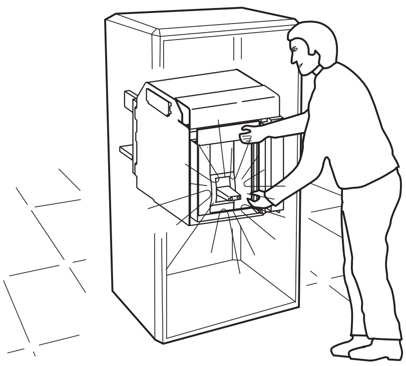
E60431A



Manually operated Compact with a toggle

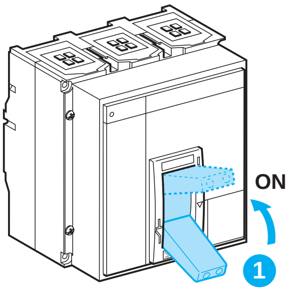
Testing the device

E60436A



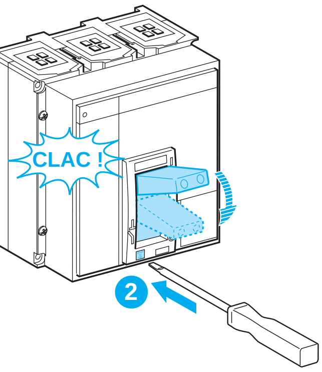
■ close the device.

E60429A



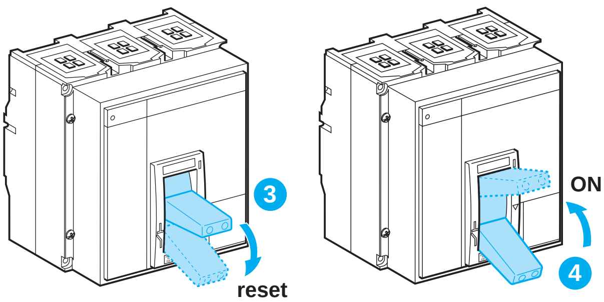
■ press the "Press to trip" button.

E60428A



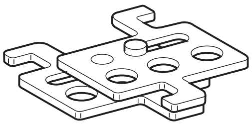
■ push the toggle down to reset the device, then back up close it again.

E60427A



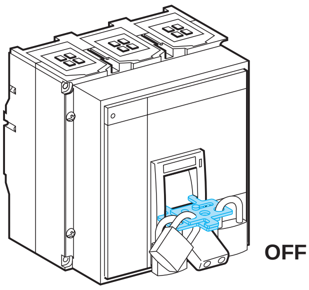
Locking the toggle

E60425A

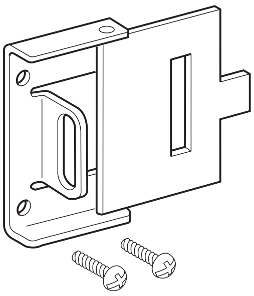


Locking the toggle in the OFF position using one to three padlocks (shackle diameter 5 to 8 mm)

E60424A

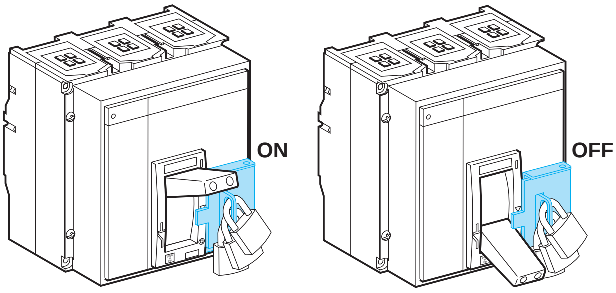


E60423A



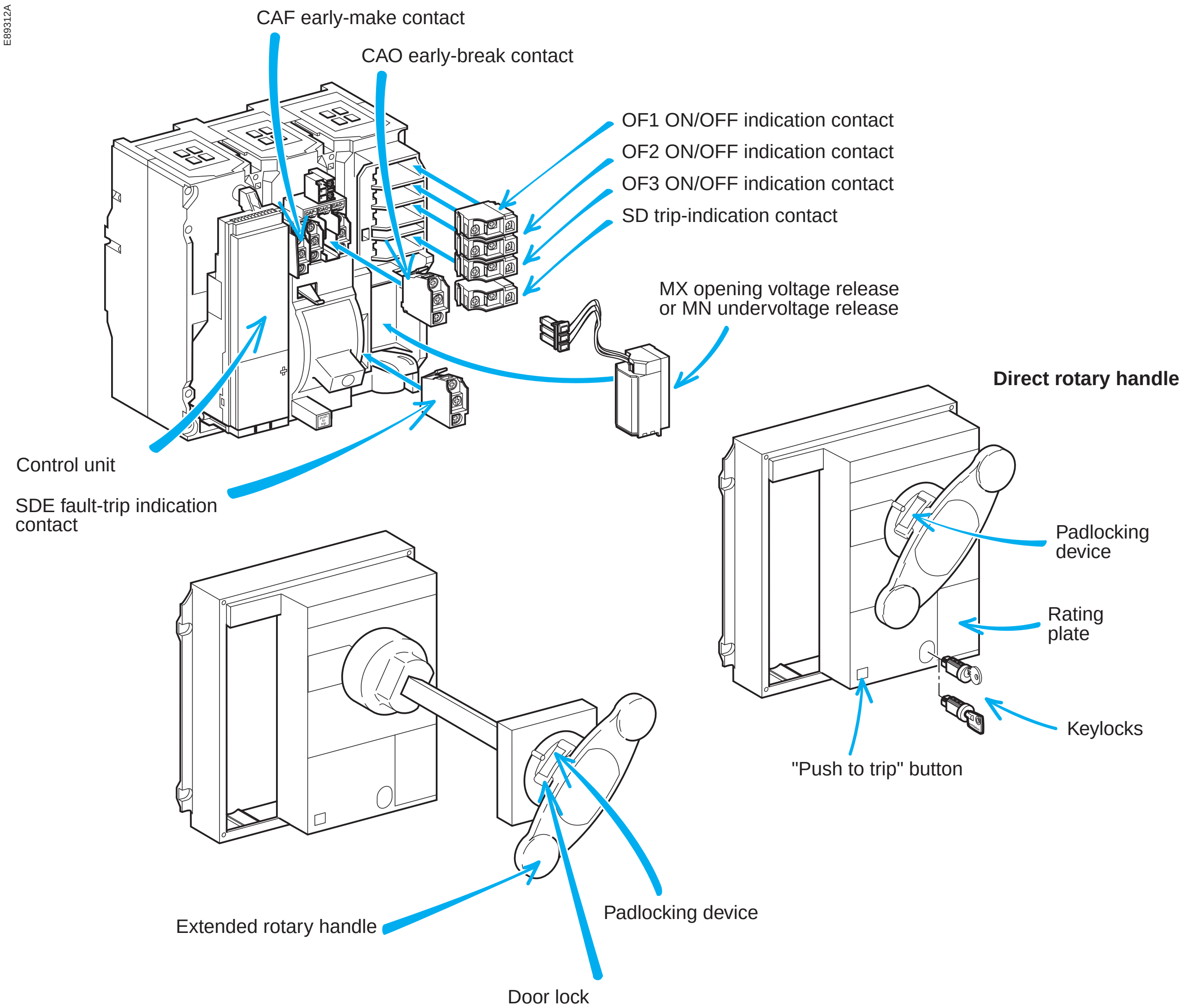
Locking the toggle in the ON or OFF position using one to three padlocks (shackle diameter 5 to 8 mm)

E60422A



Manually operated Compact with a rotary handle

Components

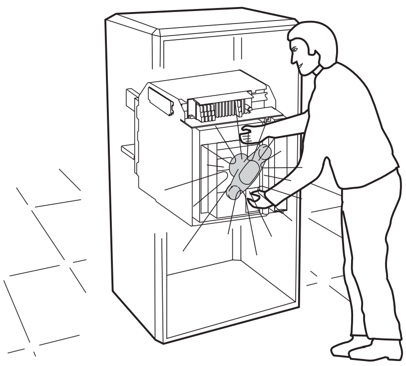


Direct rotary handle

Extended rotary handle

Opening, closing, reset

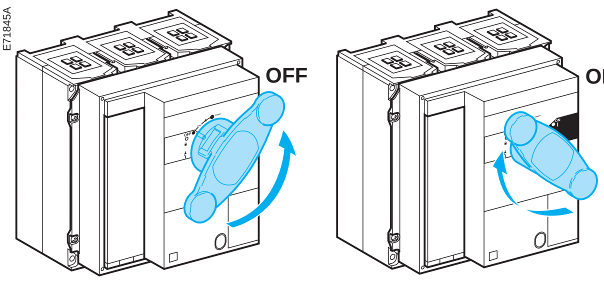
E71844A



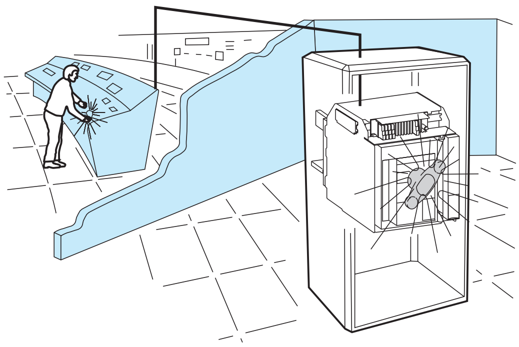
Local opening and closing

■ OFF: breaker open, ON: breaker closed.

E71845A



E71847A



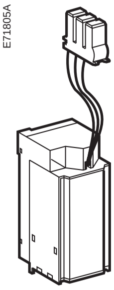
Remote opening

Use either:
■ an MX opening release
■ an MN undervoltage release
■ a delayed MN undervoltage release.

When connected to the control panel, these releases may be used to remotely open the device.

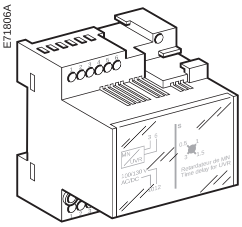
MX, MN

E71805A



Delay unit

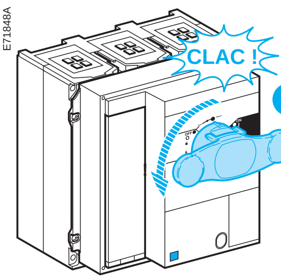
E71806A



Resetting the device following a trip

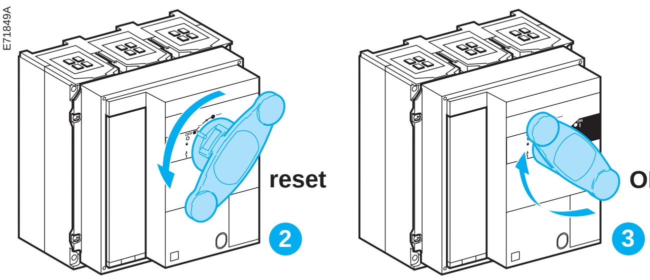
■ the device trips.

E71848A



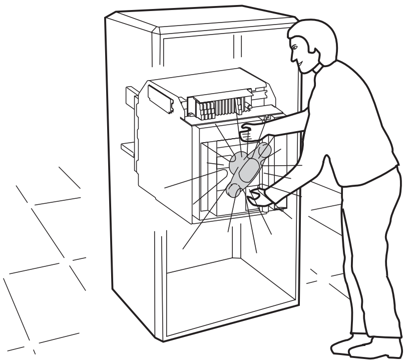
■ reset the device, then close it again.

E71849A



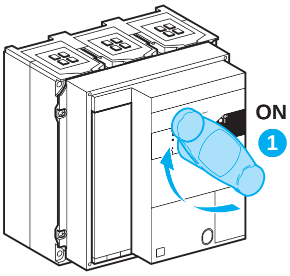
Testing the device

E71844A



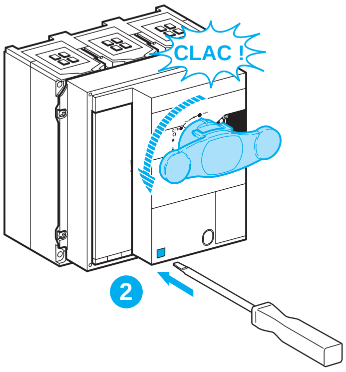
■ close the device.

E71852A



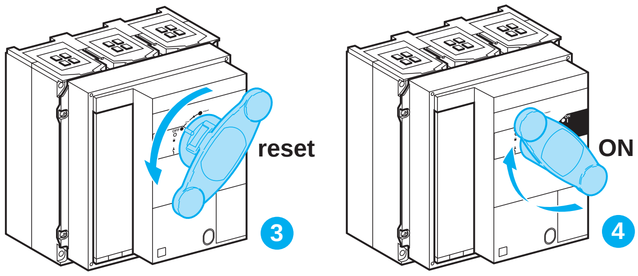
■ press the "Press to trip" button.

E71850A



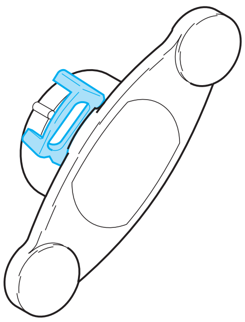
■ turn the handle to reset the device, then back to close it again.

E71851A



Locking the rotary handle

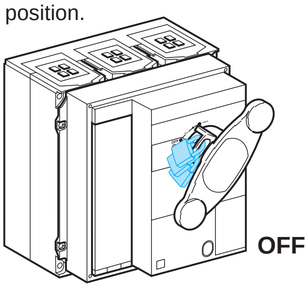
E71854A



Locking the direct or extended rotary handle in all positions using one to three padlocks (shackle diameter 5 to 8 mm)

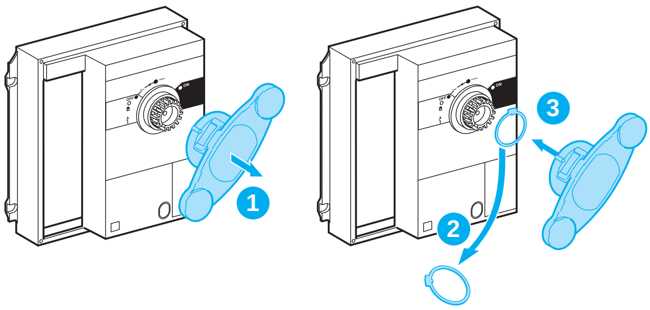
■ in the standard configuration, the device may be locked in the OFF position.

E71859A



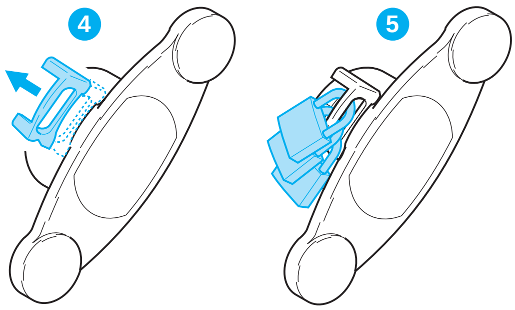
■ remove the ring as indicated below to enable locking in both the ON and OFF positions.

E71855A



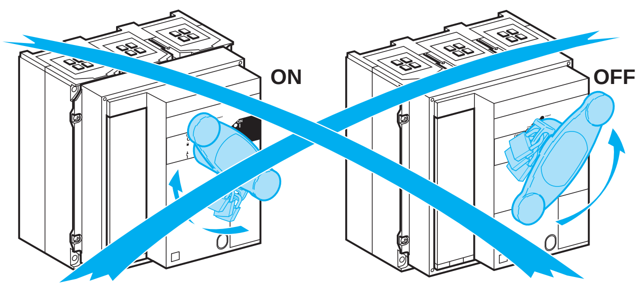
■ lock the handle.

E71857A



■ the controls are locked.

E71883A

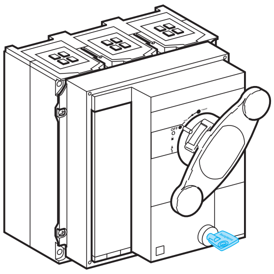


Note:
the rotary handle can equipped for locking by both padlocks and keylocks.

Manually operated Compact with a rotary handle

Locking the rotary handle

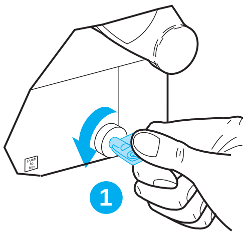
E71862A



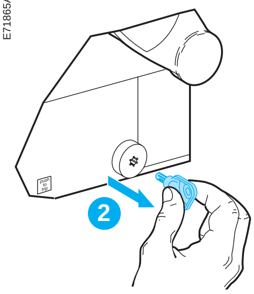
Locking the direct rotary handle in all positions using a keylock

■ lock.

E71863A

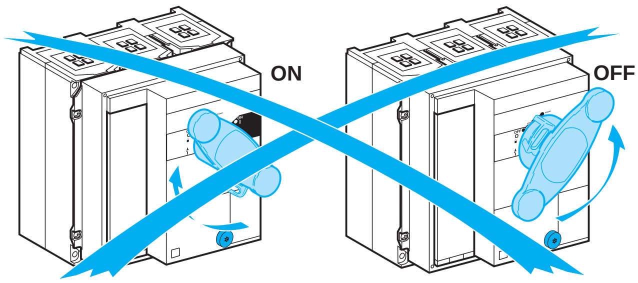


E71865A



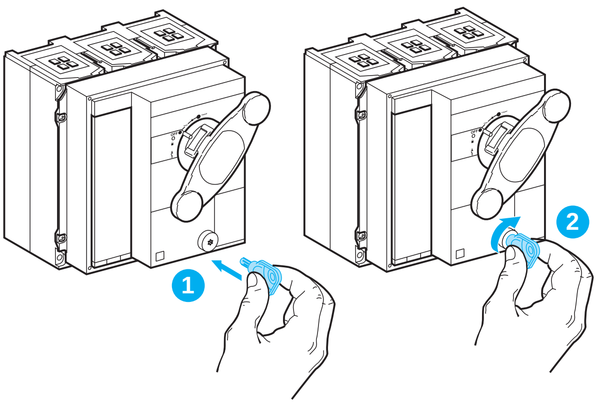
■ the controls are locked.

E71758A



■ unlock.

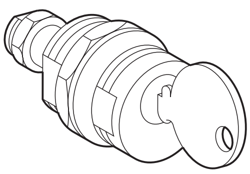
E71867A



Two types of keylocks are available

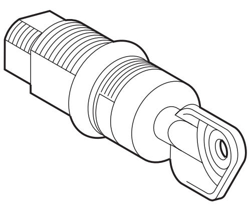
RONIS

E71810A



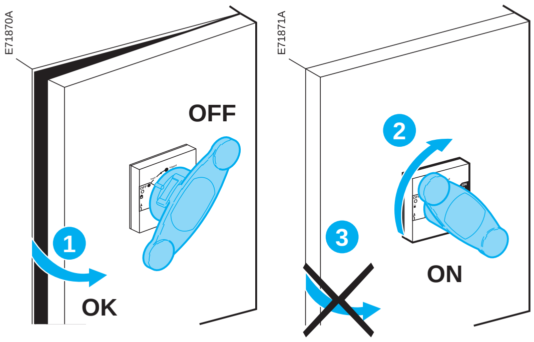
PROFALUX

E71811A

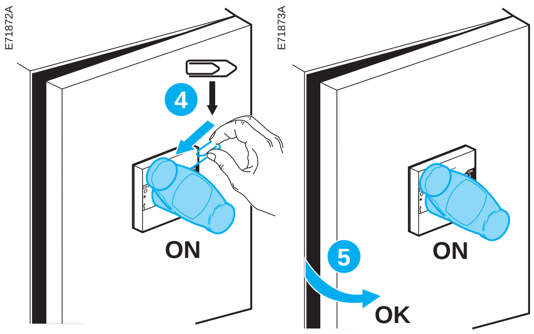


Door locking when the device is in the ON position, using the extended rotary handle

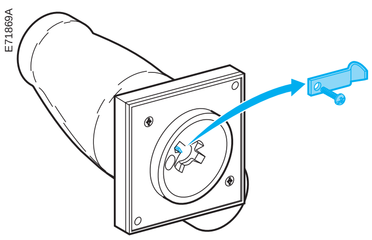
■ in the standard configuration, the door cannot be opened when the rotary handle is set to the ON position.



■ it is possible, however, to defeat the door lock.

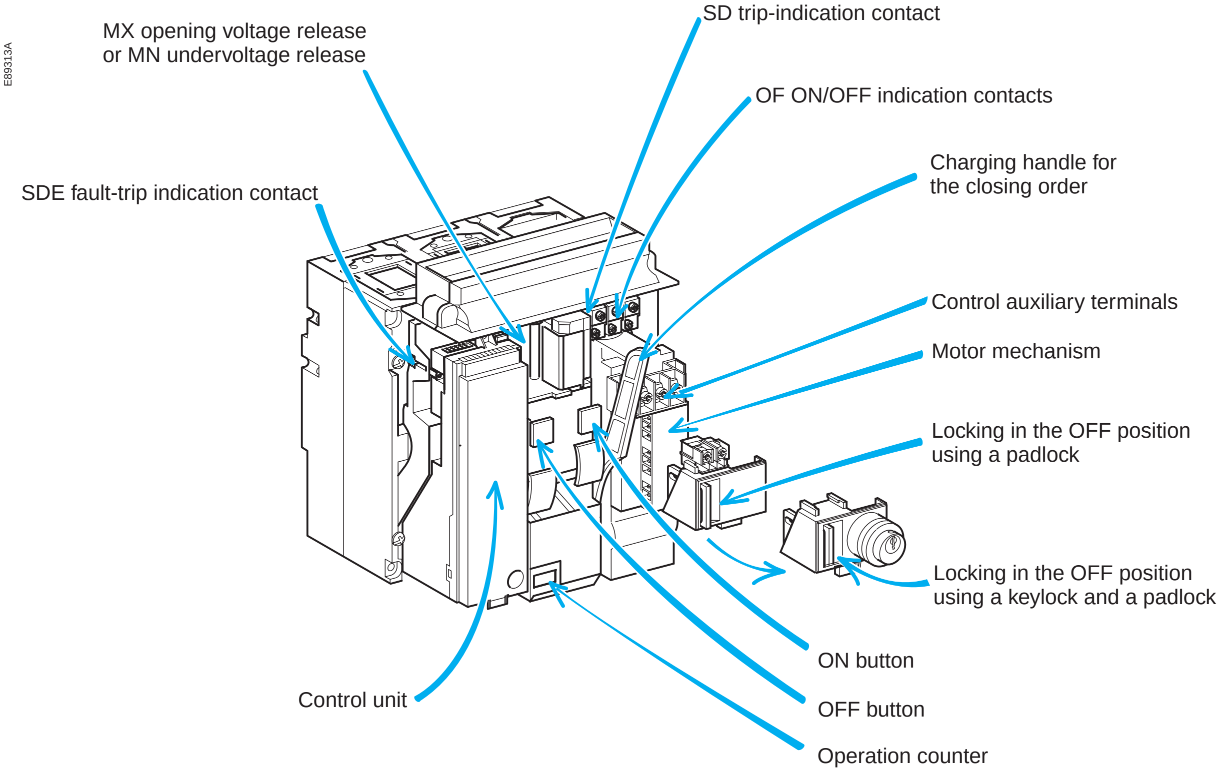


■ the door-lock function may be permanently disabled by removing the lock.

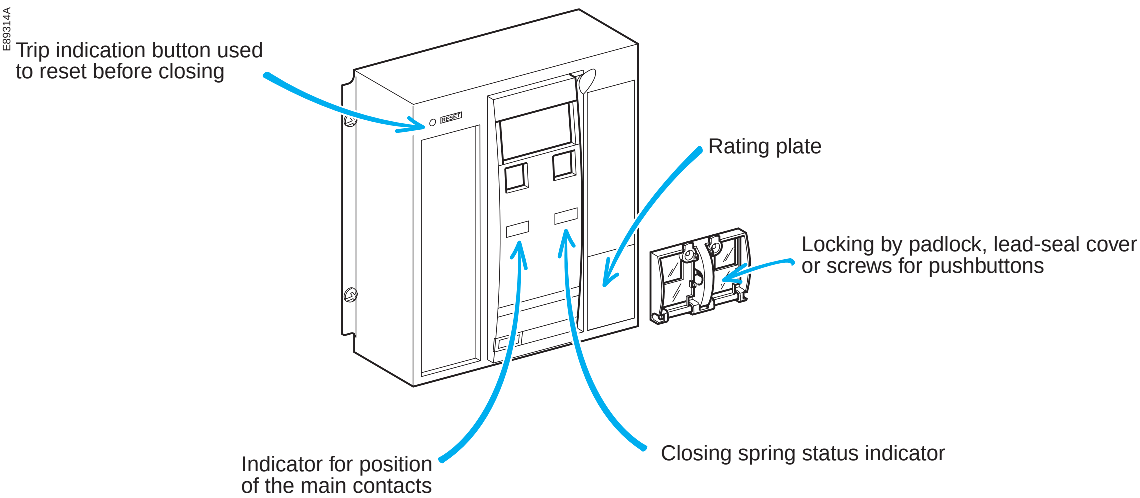


 Components

Fixed device

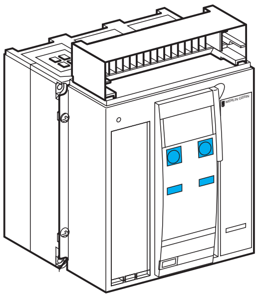


Front

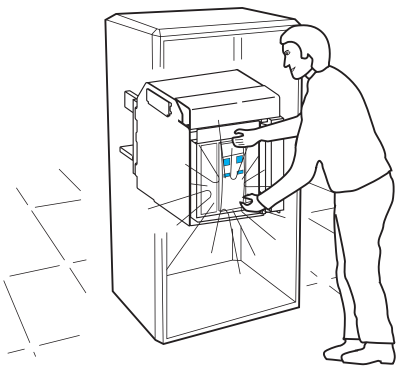


Opening, closing, reset

E71885A



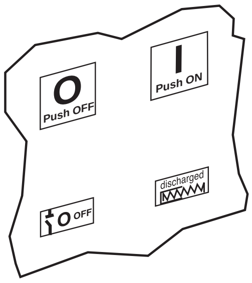
E71759A



Local opening and closing

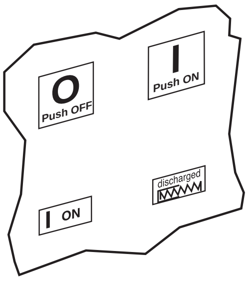
Device open (OFF), discharged

E60405A



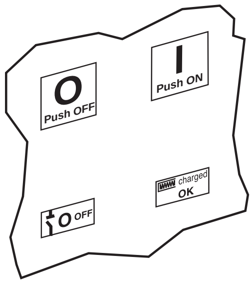
Device closed (ON), discharged

E60404A



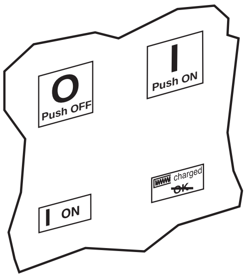
Device open (OFF), charged

E71877A



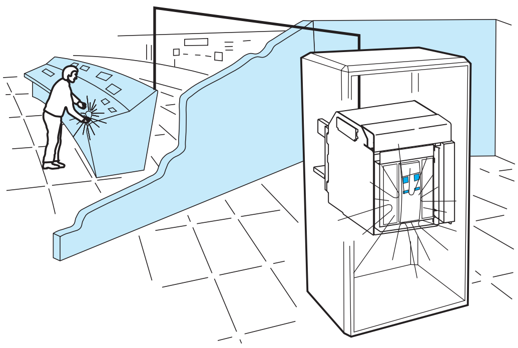
Device closed (ON), charged

E71876A



Remote operated Compact Opening, closing, reset

E71760A



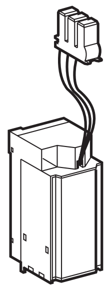
Remote opening

Use either:
- an MX opening release
- an MN undervoltage release
- a delayed MN undervoltage release
- a motor mechanism.

When connected to the control panel, these releases may be used to remotely open the device.

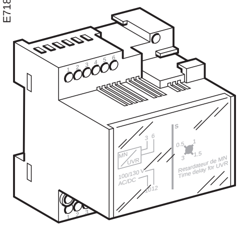
MX, MN

E71805A



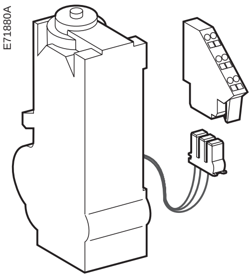
Delay unit

E71806A

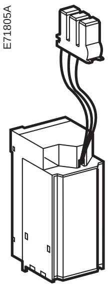


Motor mechanism

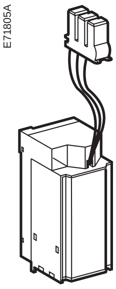
E71880A



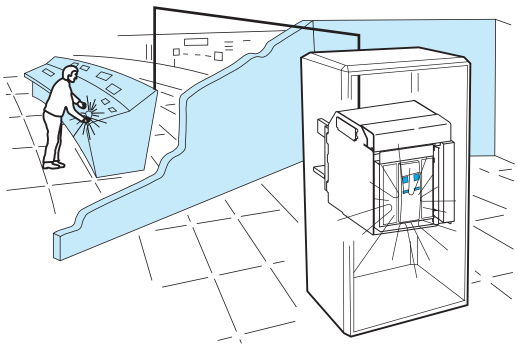
E71805A



E71805A



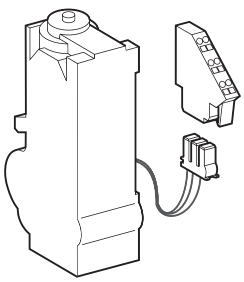
E71760A



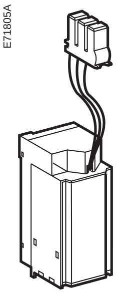
Remotely close

Motor mechanism

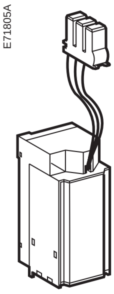
E71880A



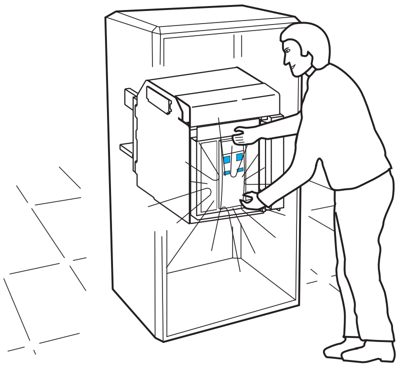
E71805A



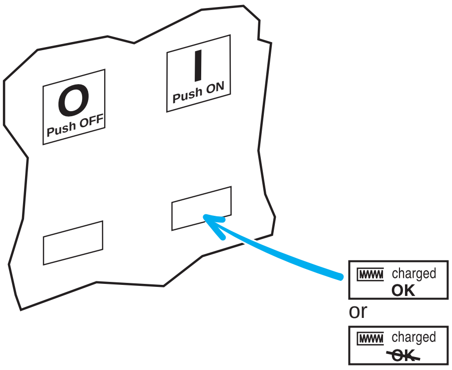
E71805A



E71759A



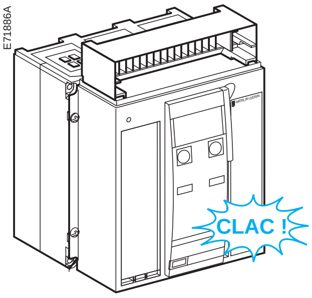
E71878A



Manually recharge the device following a trip

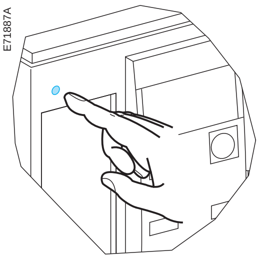
- the device trips.

E71886A

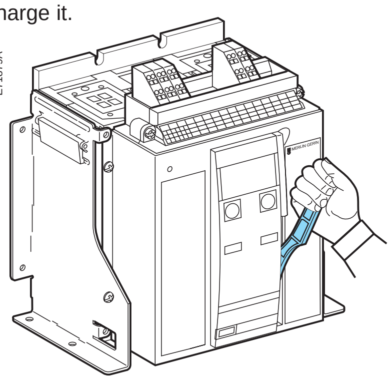


- reset the device, then recharge it.

E71887A

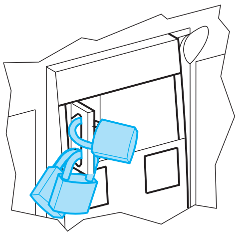


E71879A



Locking the controls
Disabling local or remote closing

E71888A

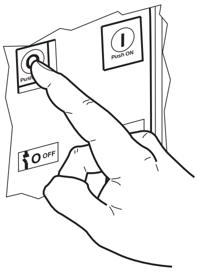


Locking the device using one to three padlocks (shackle diameter 5 to 8 mm)

■ lock.

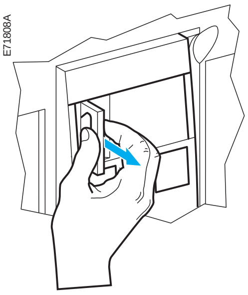
Open the device.

E71807A



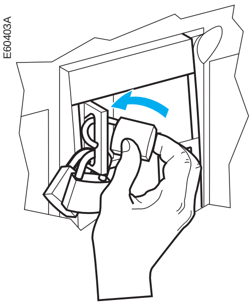
Pull out the tab.

E71808A



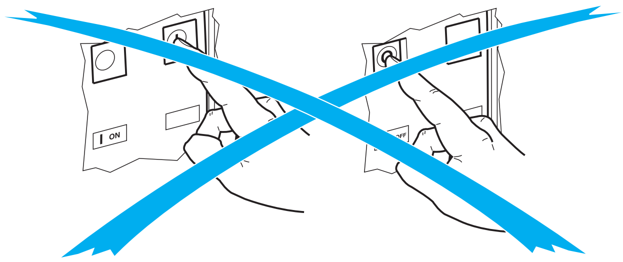
Install the padlock(s).

E60403A



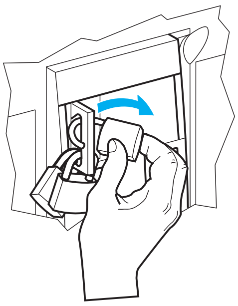
■ the controls are locked.

E71889A



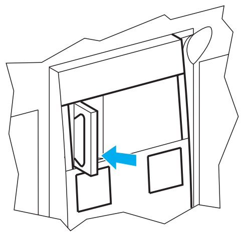
■ unlock.

E60402A



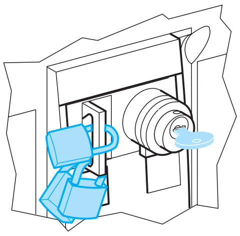
■ push in the tab.

E71761A



Note:
Padlocks and keylocks may be used together.

E71802A



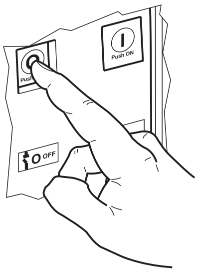
Padlocks and keylocks may be used together.
Locking using padlocks is identical to the system on the previous page.

Locking the device using a keylock and/or one to three padlocks (shackle diameter 5 to 8 mm)

■ keylocking.

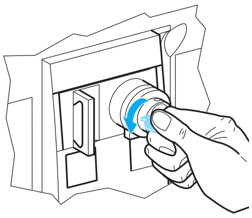
Open the device.

E71807A



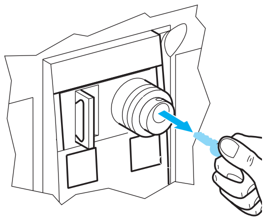
Turn the key.

E60401A



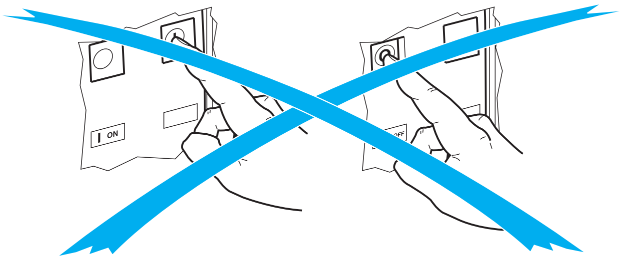
Remove the key.

E60400A



■ the controls are locked.

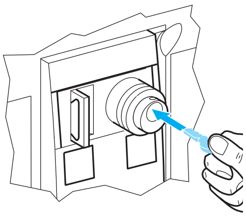
E71889A



■ unlock.

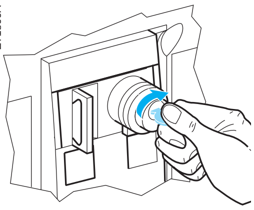
Insert the key.

E60399A



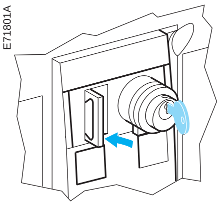
Turn the key.

E71800A



Push in the tab.

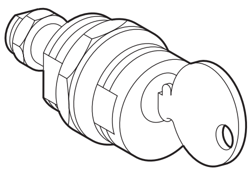
E71801A



Two types of keylocks are available

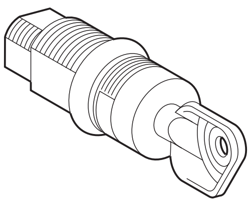
RONIS

E71810A

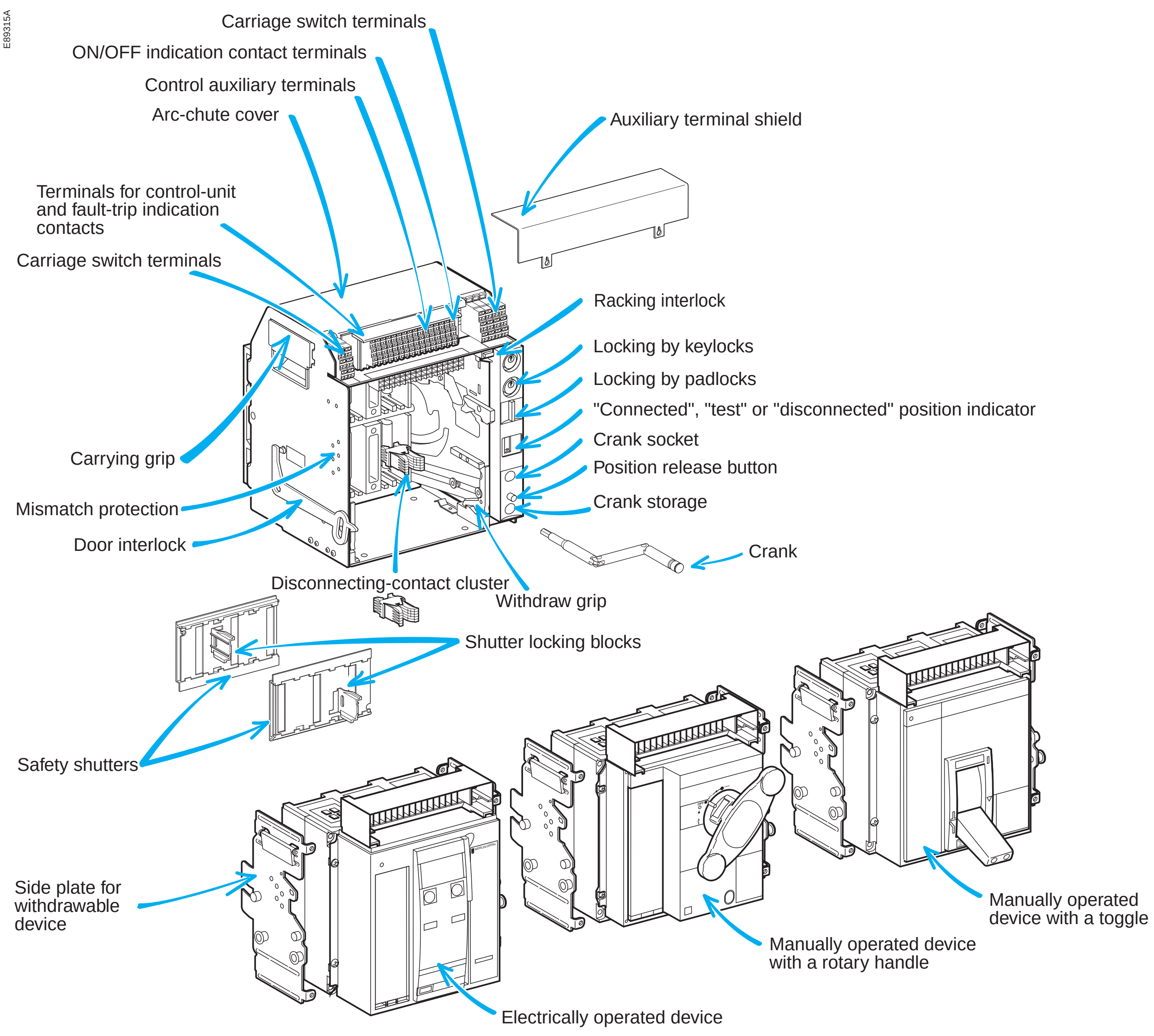


PROFALUX

E71811A



Components


E89315A
Carriage switch terminals
ON/OFF indication contact terminals
Control auxiliary terminals
Arc-chute cover
Auxiliary terminal shield
Terminals for control-unit and fault-trip indication contacts
Carriage switch terminals
Racking interlock
Locking by keylocks
Locking by padlocks
"Connected", "test" or "disconnected" position indicator
Crank socket
Position release button
Crank storage
Crank
Carrying grip
Mismatch protection
Door interlock
Disconnecting-contact cluster
Withdraw grip
Shutter locking blocks
Safety shutters
Side plate for withdrawable device
Manually operated device with a toggle
Manually operated device with a rotary handle
Electrically operated device

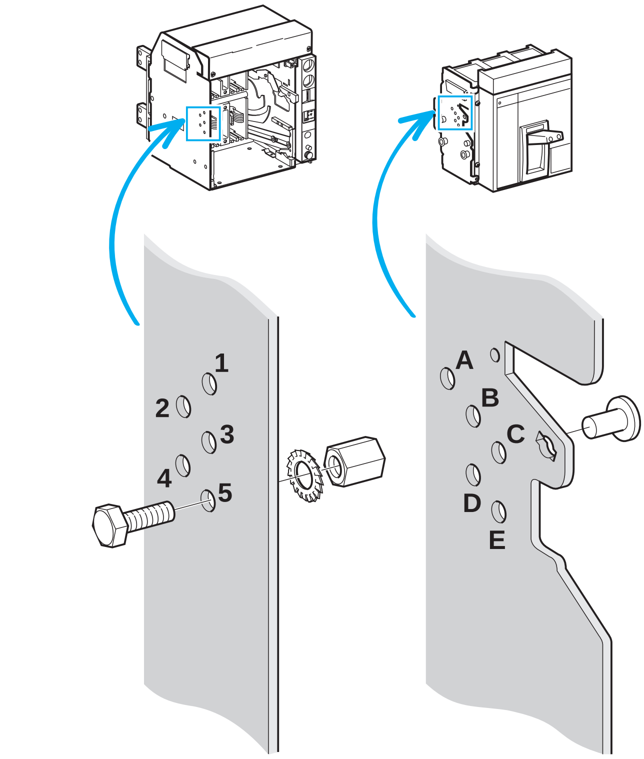
Matching a device with its chassis

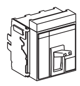
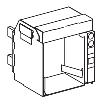
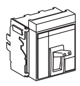
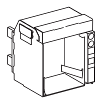
To set up a mismatch-prevention combination for the device and the chassis, see the mismatch-prevention installation manual.

The mismatch protection ensures that a device is installed only in a chassis with compatible characteristics.

The possible combinations are listed below.

E60408A



			
A B C	4 5	B C D	1 5
A B D	3 5	B C E	1 4
A B E	3 4	B C	1 4 5
A B	3 4 5	B D E	1 3
A C D	2 5	B D	1 3 5
A C E	2 4	B E	1 3 4
A C	2 4 5	C D E	1 2
A D E	2 3	C D	1 2 5
A D	2 3 5	C E	1 2 4
A E	2 3 4	D E	1 2 3

Racking

For complete information on Compact handling and mounting, see the installation manual(s).

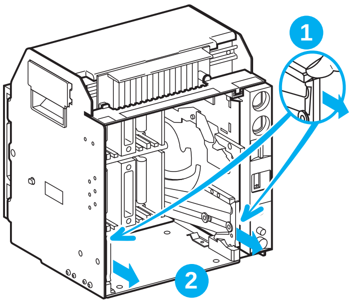
Before mounting Compact NS, make sure it matches the chassis.

Removing the rails

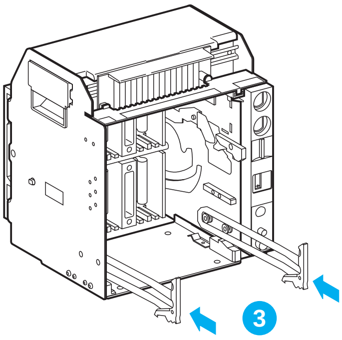
Press the release tabs and pull the rails out.

To put the rails back in, press the release tabs and push the rails in.

E71813A



E71814A

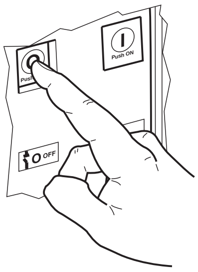


Inserting the device

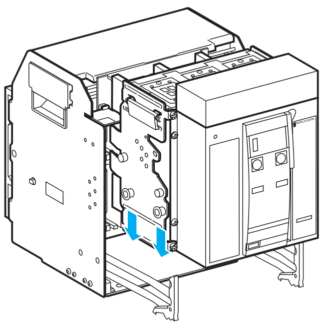
Open the circuit breaker (in any case, it opens automatically during connection).

Position the circuit breaker on the rails. Check that it rests on all four supports.

E71807A



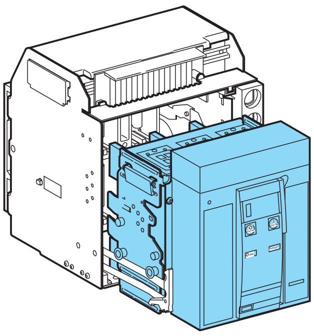
E60412A



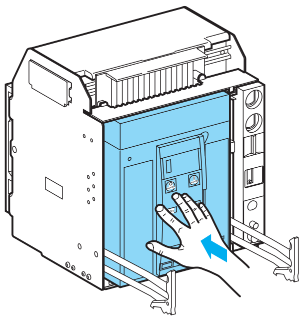
If you cannot insert the device in the chassis, check that the mismatch protection on the chassis corresponds to that on the device.

Push the device into the chassis, taking care not to push on the control unit.

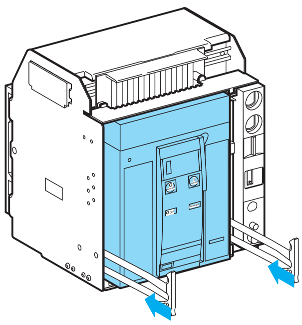
E60411A



E60410A



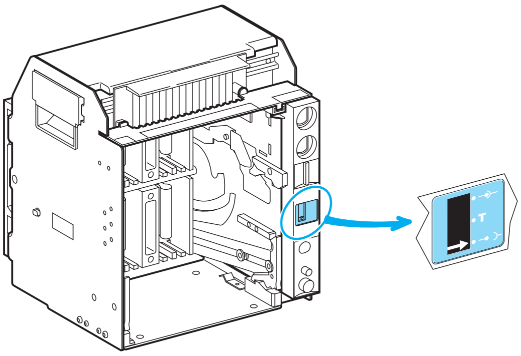
E60409A



Racking

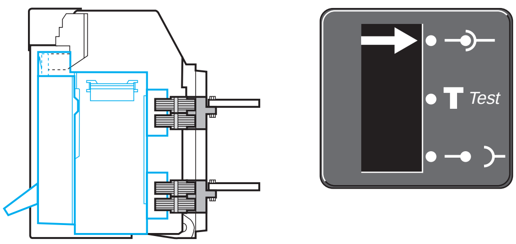
Prerequisites
To connect and disconnect the device, the crank must be used.
The locking systems, padlocks and the racking interlock all inhibit use of the crank.

E71815A



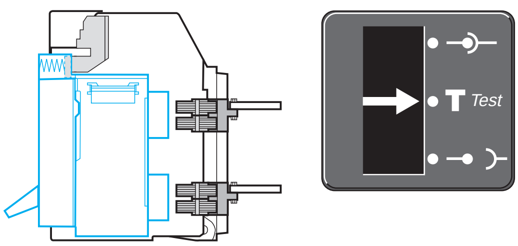
■"connected" position

E60413A



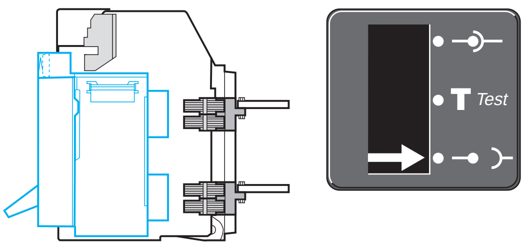
■"test" position

E60414A



■ "disconnected" position

E60415A

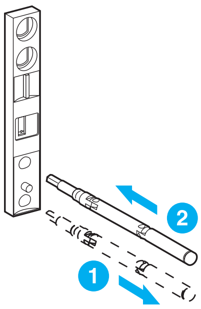


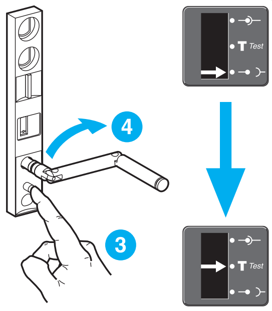
The indicator on the front signals the position of the circuit breaker in the chassis.

Racking the circuit breaker from the "disconnected" to "test" position, then to "connected" position

DB110366A

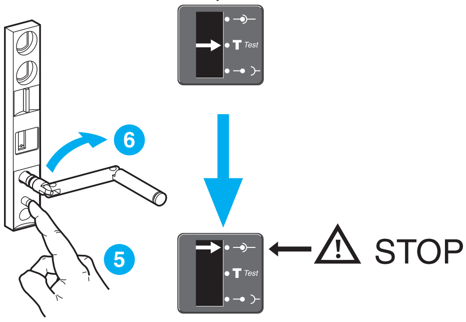
The device is in "disconnected" position.

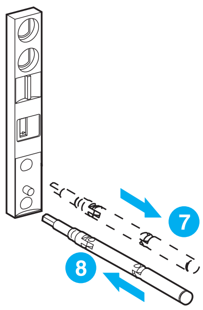




The device is in "test" position.
Remove the crank or continue to "connected" position.

The device is in "test" position.



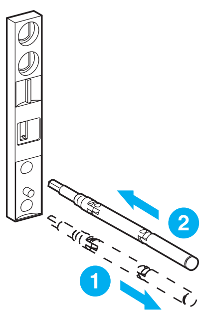


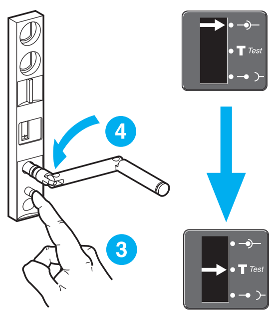
The device is in "connected" position.

Withdrawing the circuit breaker from the "connected" to "test" position, then to "disconnected" position

DB110365

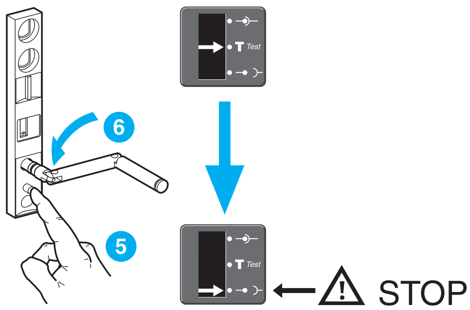
The circuit breaker is in "connected" position.

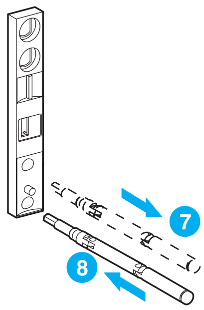




The circuit breaker is in "test" position.
Remove the crank or continue to "disconnected" position.

The circuit breaker is in "test" position.





The circuit breaker is in "disconnected" position.

Note:
These operations require that all chassis-locking functions be disabled (see page 24).

Compact chassis

Locking in the "disconnected" position
Using one to three padlocks

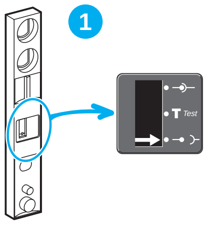
Combination of locking systems.
It is possible to lock the device on the chassis in the "disconnected" position using:
- *one to three padlocks*
- *one or two keylocks*
- *a combination of both.*

Locking

Use padlocks with a maximum shackle diameter of 5 to 8 millimetres.

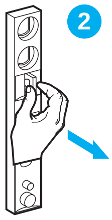
Device in "disconnected" position.

E71816A



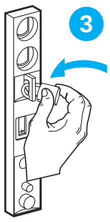
Pull out the tab.

E71817A



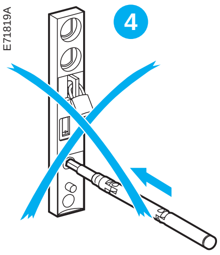
Insert the shackle (max. diameter 5 to 8 mm) of the padlock(s).

E71818A



The crank cannot be inserted.

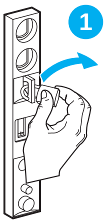
E71819A



Unlocking

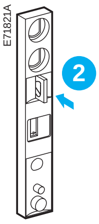
Remove the padlock(s).

E71820A



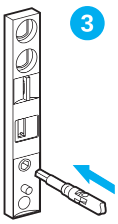
Release the tab.

E71821A



The crank can be inserted.

E71822A

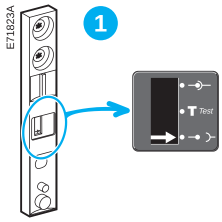


Note:
Padlocks and keylocks may be used together.
If specified when ordering the chassis, this locking function may be adapted to operate in all positions ("connected", "test" and "disconnected"), instead of in "disconnected" position alone.

Using one or two keylocks

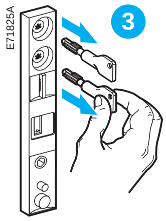
Locking

Device in "disconnected" position.

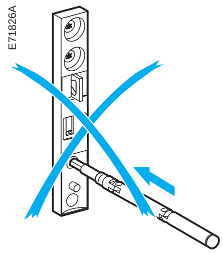


Turn the key(s).

Remove the key(s).

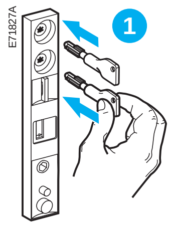


The crank cannot be inserted.



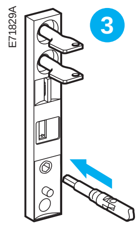
Unlocking

Insert the key(s).



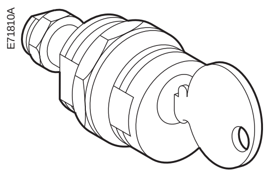
Turn the key(s).

The crank can be inserted.

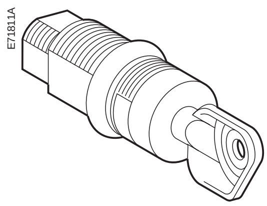


Three types of keylocks are available.

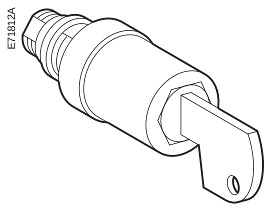
RONIS



PROFALUX



CASTELL



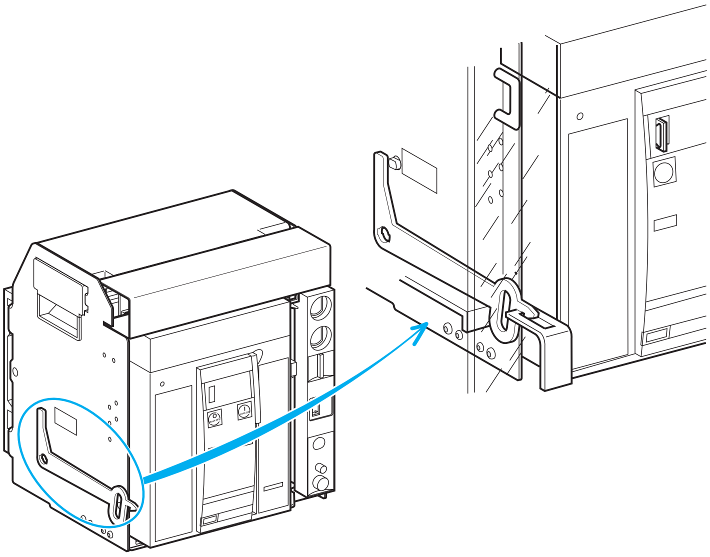
Locking the switchboard door

The locking device is installed on the left or right-hand side of the chassis.

■ when the device is in "connected" or "test" position, the latch is lowered and the door is locked.

■ when the device is in "disconnected" position, the latch is raised and the door is unlocked.

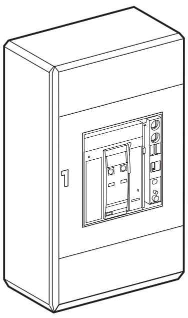
E71830A



Disabling door opening

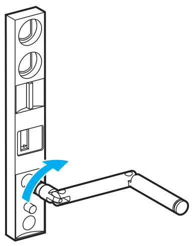
Close the door.

E71831A



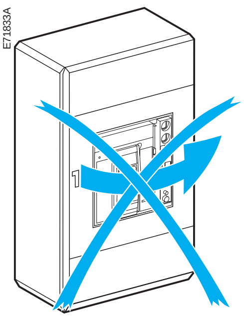
Turn the crank until the device is in "test" or "connected" position.

E71832A



The door is locked.

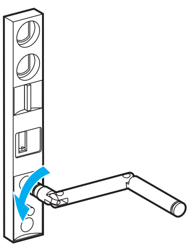
E71833A



Enabling door opening

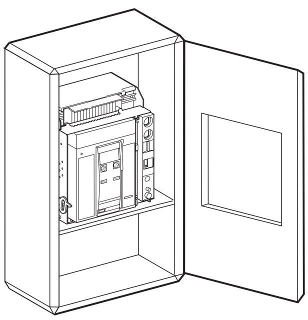
Turn the crank until the device is in "disconnected" position.

E71834A

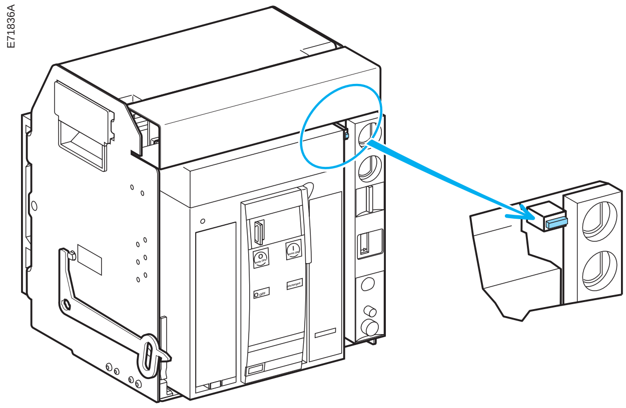


The door is unlocked.

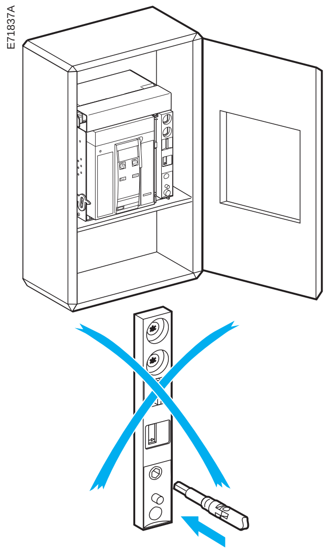
E71835A



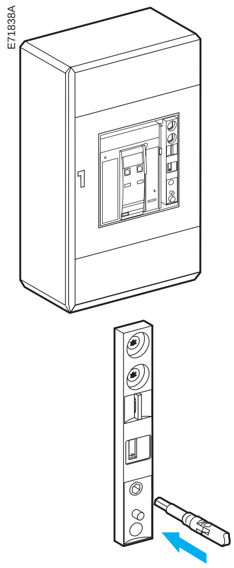
Locking the device when the door is open



When the door is open,
the crank cannot be inserted.



When the door is closed,
the crank can be inserted.

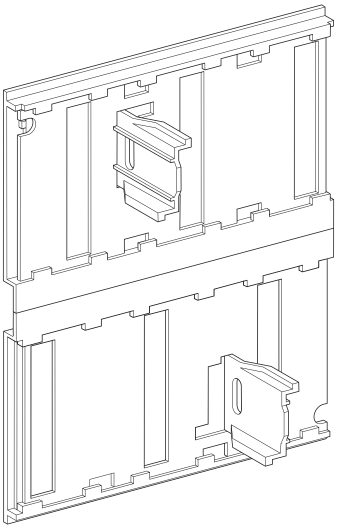


Locking the safety shutters

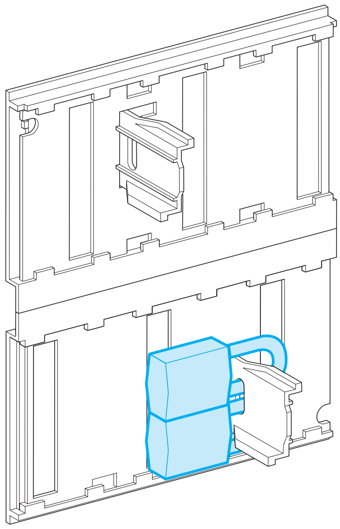
Four locking possibilities inside the chassis using one or two padlocks (maximum shackle diameter 5 to 8 mm) for each shutter

Top and bottom shutters not locked.

E71839A

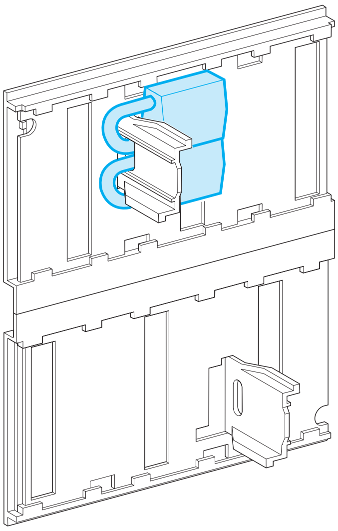


Top shutter not locked.
Bottom shutter locked.

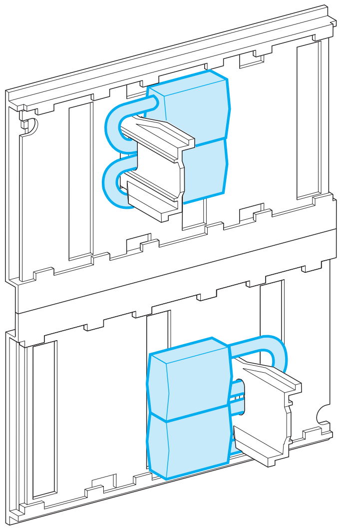


Top shutter locked.
Bottom shutter not locked.

E71840A



Top and bottom shutters locked.

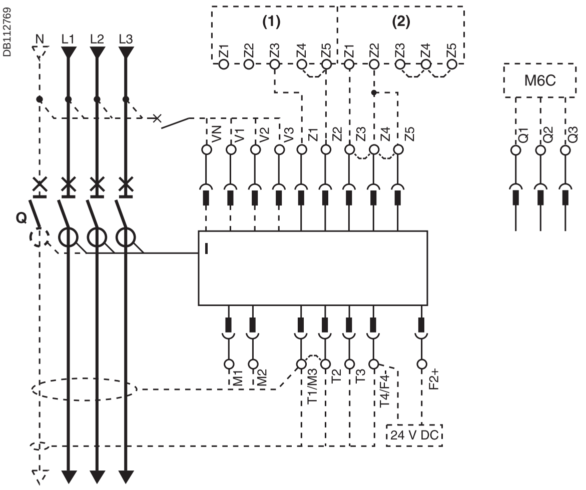


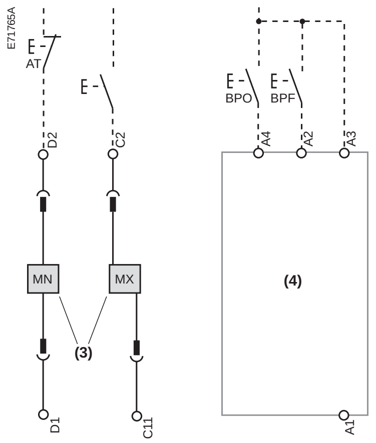
Electrical auxiliaries

Electrical diagrams
Fixed and withdrawable devices

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

Power | **Control unit** | **Remote operation**





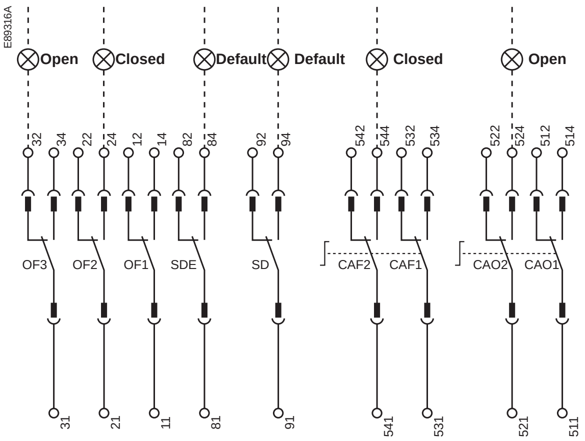
Control unit				
Com	**UC1**	**UC2**	**UC3**	**M6C**
E5 E6	Z5 M1	M2 M3	F2+	Q3
E3 E4	Z3 Z4	T3 T4	VN	Q2
E1 E2	Z1 Z2	T1 T2	F1–	Q1

Remote operation		
CAF2 / CAF1	**SDE**	**SD**
D2 / C12	A4	A2
		B4
D1 / C11		A1

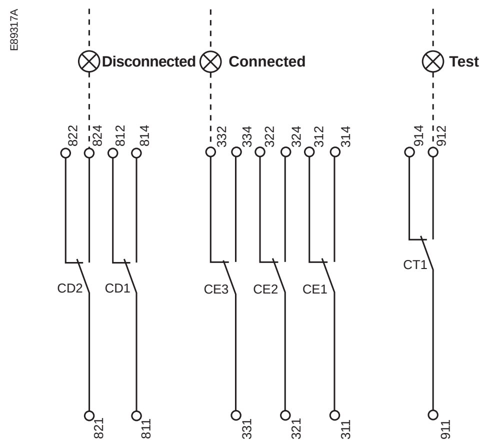
A	P	Control unit	Remote operation
■	■	**Com**: E1-E6 communication	**SDE** : Fault-trip indication contact (supplied as standard)
■	■	**UC1** : Z1-Z5 zone selective interlocking; Z1 = ZSI = ZSI OUT SOURCE Z2 = ZSI OUT; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (ground fault)	**SD** : Trip-indication contact (supplied as standard)
■	■	M1 = Vigi module input (Micrologic 7)	**MN** : Undervoltage release **or** **MX** : Shunt release (standard or communicating)
■	■	**UC2** : T1, T2, T3, T4 = external neutral;	
■	■	M2, M3 = Vigi module input (Micrologic 7)	
■	■	**UC3** : F2+, F1- external 24 V DC power supply	
	■	VN external voltage connector (must be connected to neutral with circuit breaker 3P)	
	■	**M6C** : 6 programmable contacts (must be connected to external relay M6C) ext. 24 V DC power supply required	

A: *Digital ammeter*
P: *A + power meter + programmable protection*

Indication contacts



Chassis contacts



Indication contacts

CAF1	CAF2	SDE	SD	CAO2	CAO1	OF3	OF2	OF1
544	534	84	94	544	514	34	24	14
542	532	82	92	522	512	32	22	12
542	531	81	91	521	511	31	21	11

Chassis contacts

CD2	CD1	CE3	CE2	CE1	CT1
824	814	334	324	314	914
822	812	332	322	312	912
821	811	331	321	311	911

Indication contacts

OF3 / OF2 / OF1: ON/OFF indication contacts

Chassis contacts

CD2: Disconnected-
CD1 position contacts

CE3: Connected-
CE2 position
CE1 contacts

CT1: Test-position contacts

Key:

Withdrawable device only

XXX *SDE1, OF1, OF2, OF3, OF4 supplied as standard*

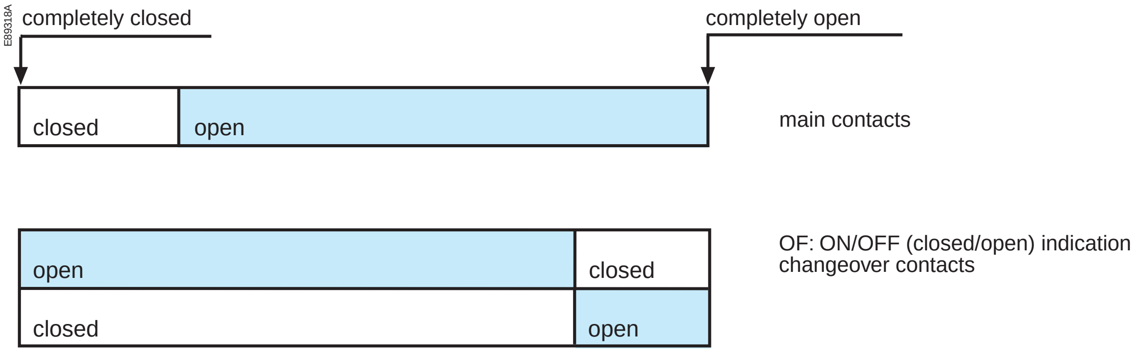
Interconnected connections (only one wire per connection point)

Electrical auxiliaries

Operation

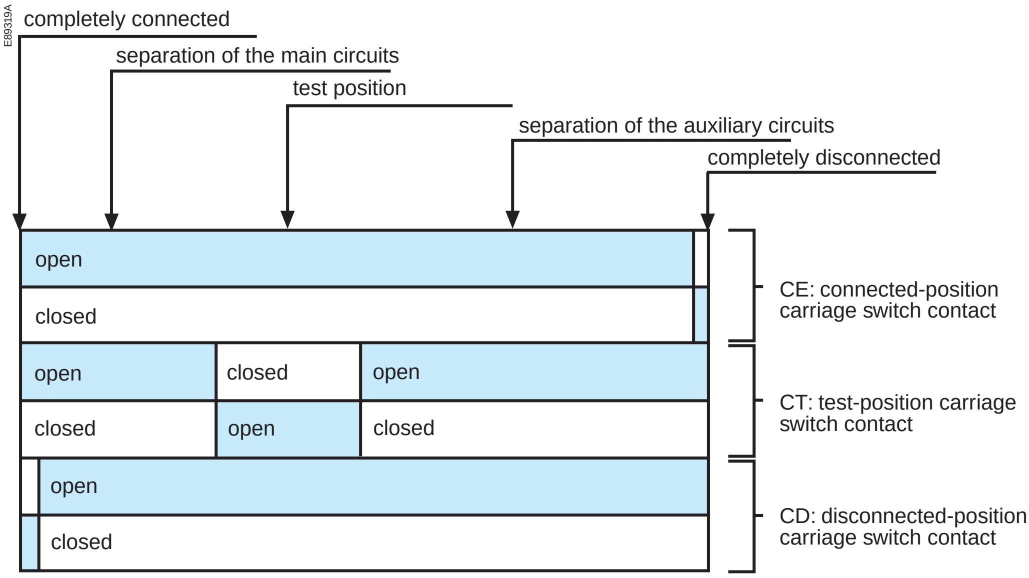
The ON/OFF indication contacts signal the status of the device main contacts.

Device



The carriage switches indicate the "connected", "test" and "disconnected" positions.

Chassis



Electrical characteristics of contacts and control auxiliaries

Device indication contacts

designation	type	standard, minimum current 100 mA 24 V			low level, minimum current 2 mA 15 V		
OF ON/OFF contact	3 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC V DC	240/380 480 690 24/48 125 250	6 A (rms) 6 A (rms) 6 A (rms) 2.5 A 0.5 A 0.3 A	V AC V DC	24/48 240 380 24/48 125 250	5 A (rms) 5 A (rms) 5 A (rms) 5 / 2.5 A 0.5 A 0.3 A
SD fault indication	1 changeover contact breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC V DC	240/380 480 690 24/48 125 250	6 A (rms) 6 A (rms) 6 A (rms) 2.5 A 0.5 A 0.3 A	V AC V DC	24/48 240 380 24/48 125 250	5 A (rms) 5 A (rms) 5 A (rms) 5 / 2.5 A 0.5 A 0.3 A
SDE fault-trip indication for device with motor mechanism	1 changeover contact breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC V DC	240/380 480 690 24/48 125 250	6 A (rms) 6 A (rms) 6 A (rms) 2.5 A 0.5 A 0.3 A	V AC V DC	24/48 240 380 24/48 125 250	5 A (rms) 5 A (rms) 5 A (rms) 5 / 2.5 A 0.5 A 0.3 A
CAO early-break switch for device with rotary handle	2 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC V DC	240/380 480 690 24/48 125 250	6 A (rms) 6 A (rms) 6 A (rms) 2.5 A 0.5 A 0.3 A	V AC V DC	24/48 240 380 24/48 125 250	5 A (rms) 5 A (rms) 5 A (rms) 5 / 2.5 A 0.5 A 0.3 A
CAF early-make switch for device with rotary handle	2 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC V DC	240/380 480 690 24/48 125 250	6 A (rms) 6 A (rms) 6 A (rms) 2.5 A 0.5 A 0.3 A	V AC V DC	24/48 240 380 24/48 125 250	5 A (rms) 5 A (rms) 5 A (rms) 5 / 2.5 A 0.5 A 0.3 A

Device control auxiliaries

designation	power supply	threshold	consumption	response time
MX opening release	V AC: 50/60 Hz: 24/48 - 100/130 - 200/250 - 277 - 380/480 V DC: 12 - 24/30 - 48/60 - 100/130 - 200/250	0.7 to 1.1 Un	pick-up: 200 VA or W (80 ms) hold: 4.5 VA or W	device at Un: 50 ms ± 10
MN undervoltage release	V AC: 50/60 Hz: 24/48 - 100/130 - 200/250 - 380/480 V DC: 24/30 - 48/60 - 100/130 - 200/250	open: 0.35 to 0.7 Un close: 0.85 Un	pick-up: 200 VA or W (80 ms) hold: 4.5 VA or W	device at Un: 40 ms ± 10
Delay unit for undervoltage release	V AC: 50/60 Hz V DC not adjustable: 100/130 - 200/250 V DC adjustable: 48/60 - 100/130 - 200/250 - 380/480	open: 0.35 to 0.7 Un close: 0.85 Un	200 VA	device at Un: not adjustable: 0.25 s adjustable: 0.5 - 0.9 - 1.5 - 3 s

Motor mechanism

designation	power supply	threshold	consumption and motor overcurrent	recharge time and operating rate
Motor mechanism	V AC: 50/60 Hz: 48/60 - 100/130 - 200/240 - 277 - 400/440 - 480 V DC: 24/30 - 48/60 - 100/125 - 200/250	0.85 to 1.1 Un	consumption: 180 VA or W overcurrent: 2 to 3 In for 0.1 s	3 seconds max. 3 cycles per minute

"Connected", "test" and "disconnected" position carriage switches

designation	type	standard, minimum current 100 mA 24 V			low level, minimum current 2 mA 15 V		
CE, CT, CD	3 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC V DC	240 380 480 690 24/48 125 250	8 A (rms) 8 A (rms) 8 A (rms) 6 A (rms) 2.5 A 0.8 A 0.3 A	V AC V DC	24/48 240 380 24/48 125 250	5 A (rms) 5 A (rms) 5 A (rms) 2.5 A 0.8 A 0.3 A

Electrical characteristics of contacts and control auxiliaries

Wiring of control auxiliaries

Under pick-up conditions, the level of consumption is approximately 150 to 200 VA. Consequently, for low supply voltages (12, 24, 48 V), cables must not exceed a maximum length determined by the supply voltage and the cross-section of the cables.

Indicative values for maximum cable lengths (in meters)

		12 V		24 V		48 V	
		2.5 mm^2	1.5 mm^2	2.5 mm^2	1.5 mm^2	2.5 mm^2	1.5 mm^2
MN	100% source voltage	—	—	58	36	280	165
	85% source voltage	—	—	16	10	75	45
MX-XF	100% source voltage	21	12	115	70	550	330
	85% source voltage	10	6	75	44	350	210

Note:
The indicated length is that for each of the two supply wires.

Start-up operations
Procedure

These operations must be carried out before using a device for the first time.

A general check of the device takes only a few minutes and avoids any risk of mistakes due to errors or negligence.
A general check must be carried out:
- prior to initial use
- following an extended period during which the device is not used.

A check must be carried out with the entire switchboard de-energised.
In switchboards with compartments, only those compartments that may be accessed by the operators must be de-energised.

Electrical tests

Insulation and dielectric-withstand tests must be carried out immediately after delivery of the switchboard. These tests are precisely defined by international standards and must be directed and carried out by a qualified expert.

Prior to running the tests, it is absolutely necessary to:
- disconnect all the electrical auxiliaries of the device (MCH, MX, MN)
- remove the long-time rating plug on the 7.0 A control units.

Removal of the rating plug disconnects the voltage measurement input.

Switchboard inspection

Check that the devices are installed in a clean environment, free of any installation scrap or items (tools, electrical wires, broken parts or shreds, metal objects, etc.).

Conformity with the installation diagram

Check that the devices conform with the installation diagram:
- breaking capacities indicated on the rating plates
- identification of the control unit (type, rating)
- presence of any optional functions (motor mechanism)
- protection settings (long time, short time, instantaneous, ground fault)
- identification of the protected circuit marked on the front of each device.

Condition of connections and auxiliaries

Check device mounting in the switchboard and the tightness of power connections.
Check that all auxiliaries and accessories are correctly installed:
- electrical auxiliaries
- terminal blocks
- connections of auxiliary circuits.

Operation

Check the mechanical operation of the devices:
- opening of contacts
- closing of contacts.

Check on the control unit

Check the control unit of each circuit breaker using the respective user manuals.

What to do when the circuit breaker trips?

Note the fault

Faults are signalled locally and remotely by the indicators and auxiliary contacts installed on devices (depending on each configuration). See page 32 in this manual and the user manual of the control unit for information on the fault indications available with your circuit breaker.

Identify the cause of tripping

A circuit must never be reclosed (locally or remotely) before the cause of the fault has been identified and cleared.

Depending on the type of fault and the criticality of the loads, a number of precautionary measures must be taken, in particular the insulation and dielectric tests on a part of or the entire installation. These checks and test must be directed and carried out by qualified personnel.

Inspect the circuit breaker following a short-circuit

- check the tightness of connections (see the device installation manual)
- check the disconnecting-contact clusters.

Reset the circuit breaker

The circuit breaker can be reset locally or remotely. See pages 5, 9 and 15 in this manual for information on how the device can be reset.

Compact operating conditions

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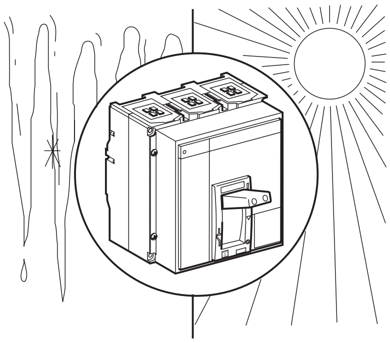
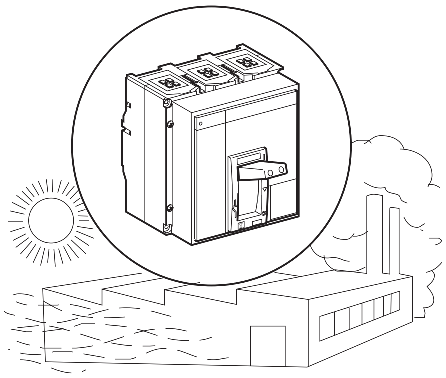


Ambient temperature

Compact devices can operate under the following temperature conditions:
- the electrical and mechanical characteristics are stipulated for an ambient temperature of -5° C to +70° C
- circuit-breaker closing is guaranteed down to -35° C
- Compact (without the control unit) can be stored in an ambient temperature of -40° C to +85° C
- the control unit can be stored in an ambient temperature of -25° C to +85° C.

E60417A



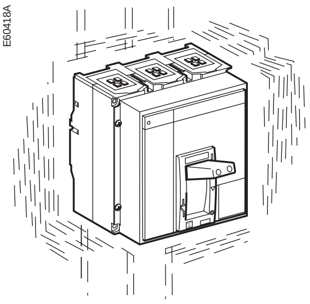
Extreme atmospheric conditions

Compact devices have successfully passed the tests defined by the following standards for extreme atmospheric conditions:
- IEC 68-2-1: dry cold at -55° C
- IEC 68-2-2: dry heat at +85° C
- IEC 68-2-30: damp heat (temperature +55° C, relative humidity 95%)
- IEC 68-2-52 level 2: salt mist.

Compact devices can operate in the industrial environments defined by standard IEC 947 (pollution degree up to 3).

It is nonetheless advised to check that the devices are installed in suitably cooled switchboards without excessive dust.

E60418A

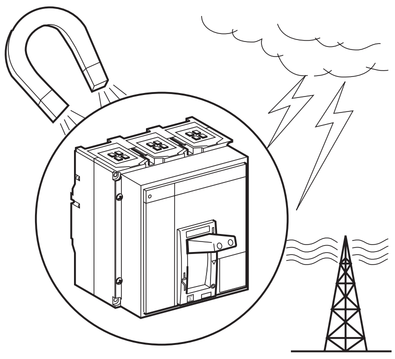


Vibrations

Compact devices resist electromagnetic or mechanical vibrations.
Tests are carried out in compliance with standard IEC 68-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):
- 2 to 13.2 Hz: amplitude ±1 mm
- 13.2 to 100 Hz: constant acceleration 0.7 g.

Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.

E60420A



Electromagnetic disturbances

Compact devices are protected against:
- ◻ overvoltages caused by devices that generate electromagnetic disturbances
- ◻ overvoltages caused by an atmospheric disturbance or by a distribution-system outage (e.g. failure of a lighting system)
- ◻ devices emitting radio waves (radios, walkie-talkies, radar, etc.)
- ◻ electrostatic discharges produced by users.

Compact devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards:
- ■ IEC 947-2, appendix F
- ■ IEC 947-2, appendix B (trip units with earth-leakage function).

The above tests guarantee that:
- ■ no nuisance tripping occurs
- ■ tripping times are respected.

Cleaning

◻ non-metallic parts:
never use solvent, soap or any other cleaning product. Clean with a dry cloth only
◻ metal parts:
clean with a dry cloth whenever possible. If solvent, soap or any other cleaning product must be used, make sure that it does not come into contact with non-metallic parts.

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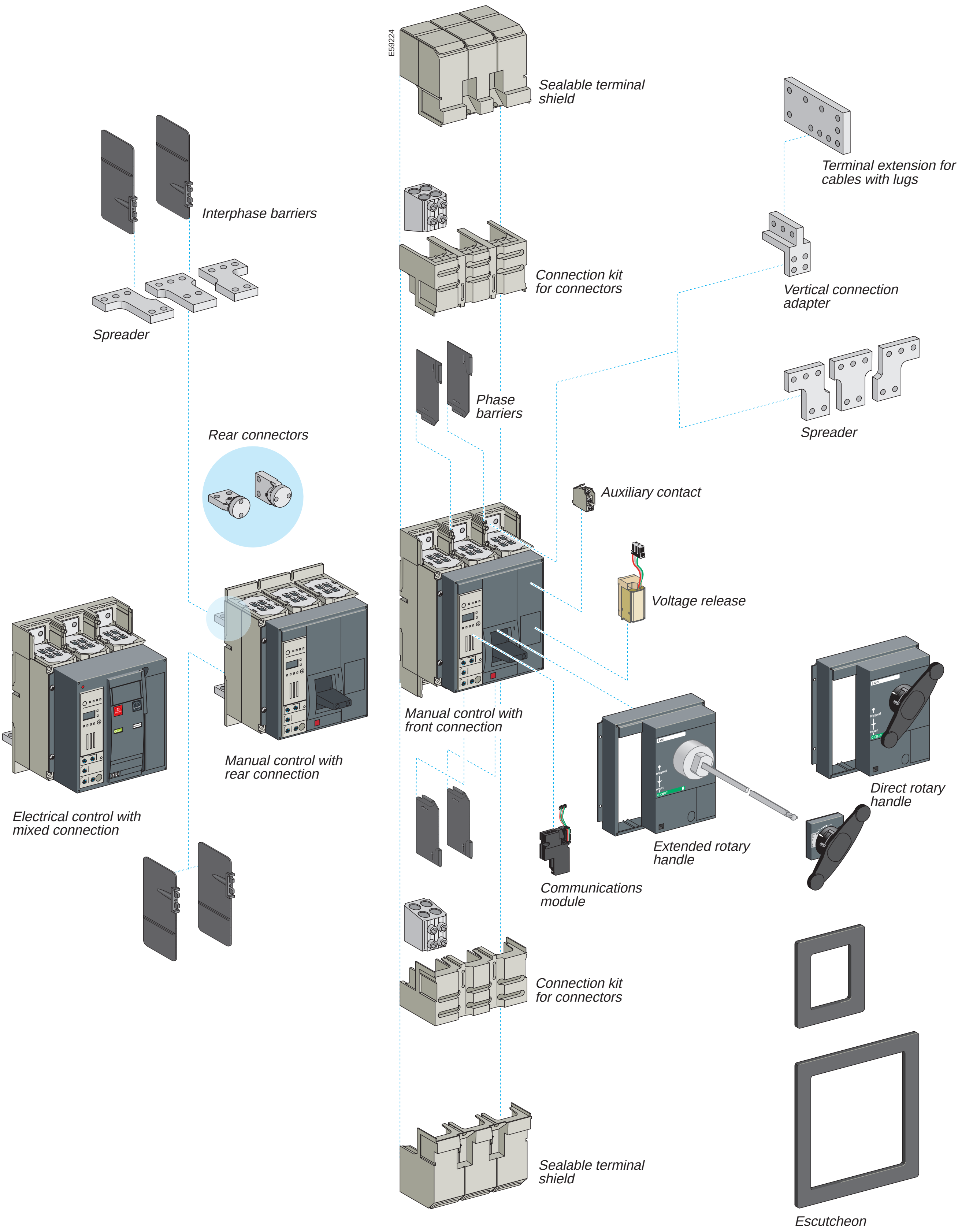
Designed by: SEDOC
Photos: Schneider
Printed by:

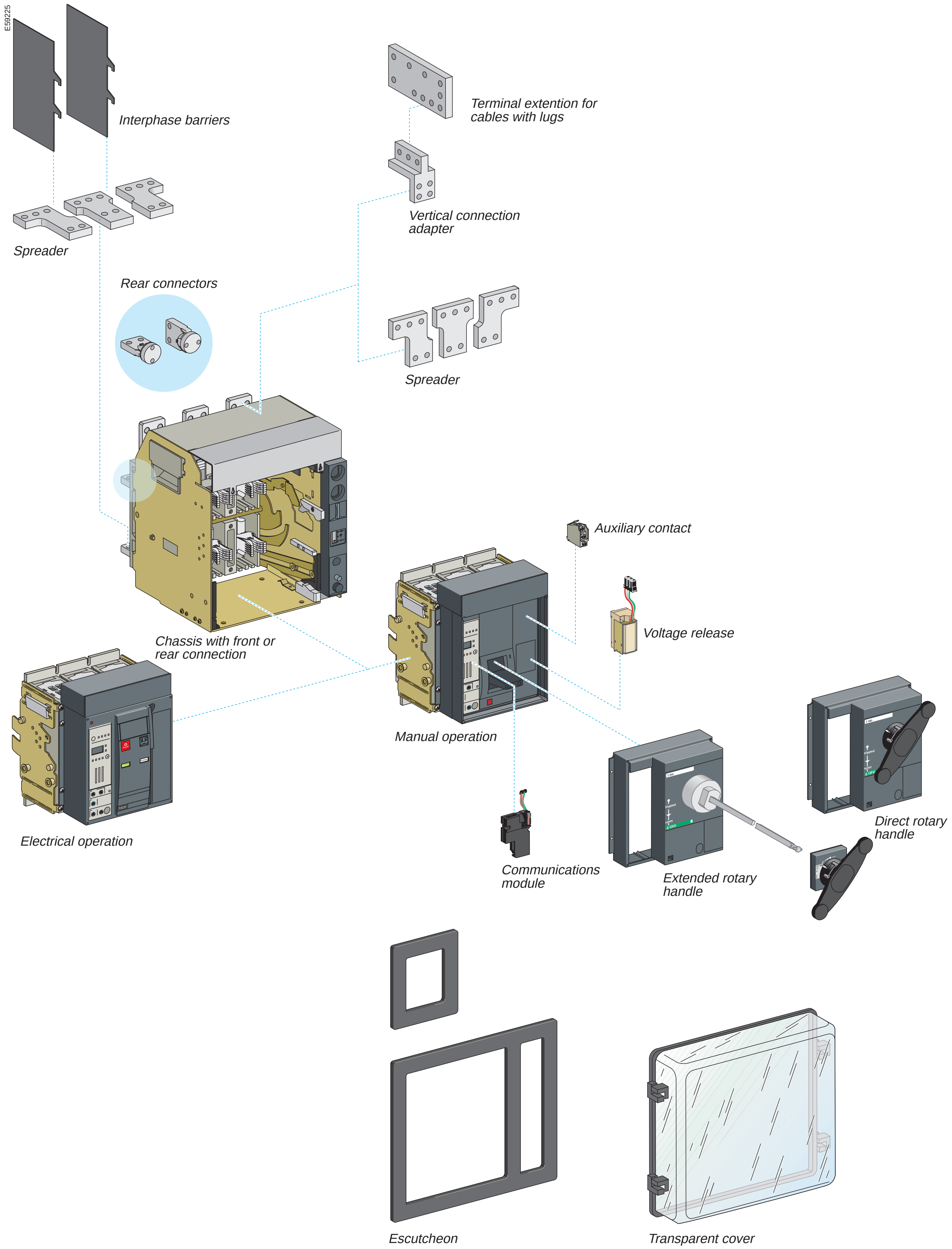
11-2006

Functions and characteristics

Electrical and mechanical accessories
Compact NS630b to 1600 (fixed version)



Compact NS630 to 1600 (withdrawable version)

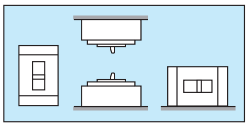


Functions and characteristics

Electrical and mechanical accessories
Compact NS630b to 1600

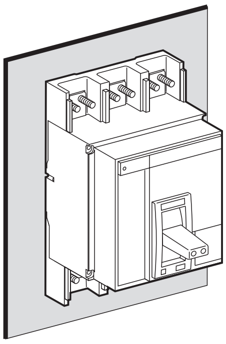
PB101206_39


Fixed Compact NS800H

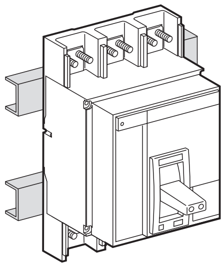
E59278


Installation

Fixed configuration
Compact NS630b to 1600 circuit breakers may be installed vertically, horizontally or flat on their back.

E59226A


Mounting on a backplate

E59227A


Mounting on rails

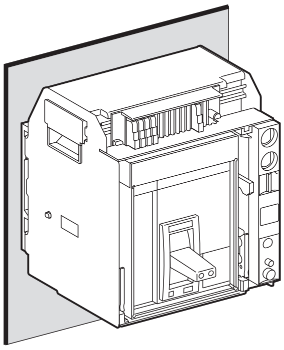
The withdrawable configuration makes it possible to:
- *extract and/or rapidly replace the circuit breaker without having to touch connections;*
- *allow for the addition of future circuits at a later date.*

E45176

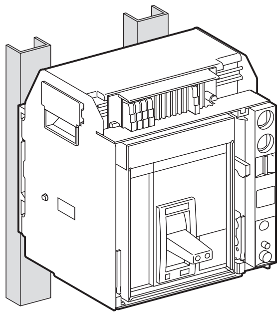

Withdrawable Compact NS800H

E59281A

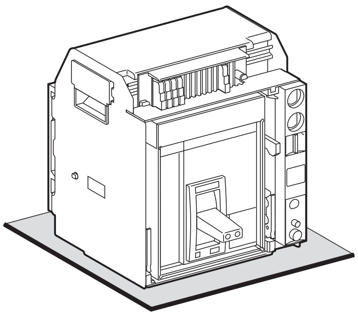

Withdrawable configuration
Compact NS630b to 1600 circuit breakers should be installed vertically only.

E59228A


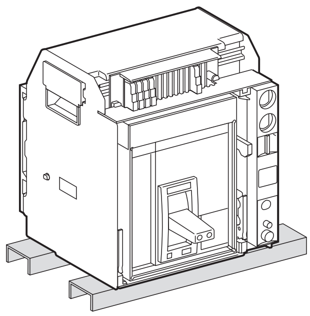
Mounting on a backplate

E59229A


Rear mounting on rails

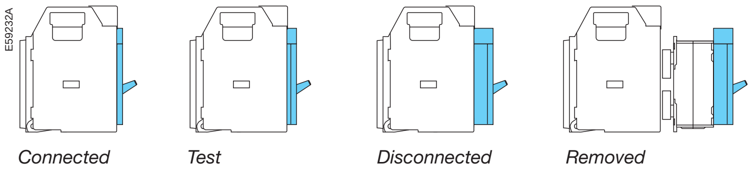
E59230


Device on mounting plate

E59231


Device on rails

The device may be in one of four positions on the chassis:
- *connected position. The power circuits and auxiliary contacts are all connected*
- *test position. The power circuits are disconnected. The auxiliary contacts are still connected and the device can be operated electrically*
- *disconnected position. The power circuits and auxiliary contacts are all disconnected, however the device is still mounted on the chassis. It can be operated manually (ON, OFF, "push to trip").*
- *removed position. All circuits are disconnected. The device simply rests on the chassis rails and can be removed.*



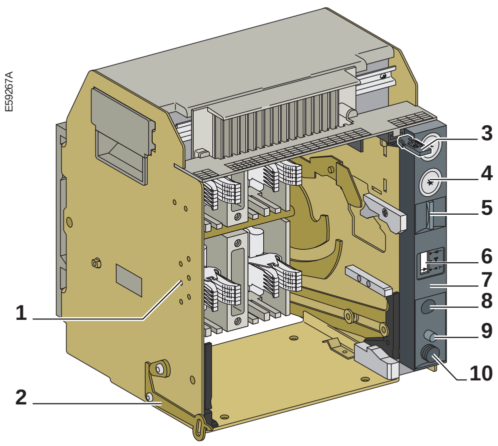
The multifunctional chassis for Compact NS630b to 1600 devices is particularly suited for incoming circuit breakers. Features include:
- device connection and disconnection through a door, using a crank that can be stored in the chassis
- three positions (connected, test and disconnected) that are indicated:
  - locally by a position indicator
  - remotely by carriage switches (3 for the connected position, 2 for the disconnected position and 1 for the test position)
- circuit-breaker ON/OFF commands through a switchboard front panel.

Locking

There are extensive locking possibilities:
- chassis locking in connected, disconnected and test positions using three padlocks and two keylocks, on the switchboard front panel
- door interlock (inhibits door opening with breaker in connected position)
- racking interlock (inhibits racking with door open)
- locking in each of the connected, disconnected and test positions during device connection or disconnection. Continuation to the next position requires pressing a release button to free the crank.

Other safety function

Mismatch protection ensures that a circuit breaker is installed only in a chassis with compatible characteristics.



1 mismatch protection
2 door interlock
3 racking interlock
4 keylock locking
5 padlock locking
6 position indicator
7 chassis front plate (accessible with cubicle door closed)
8 crank entry
9 reset button
10 crank storage

Functions and characteristics

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

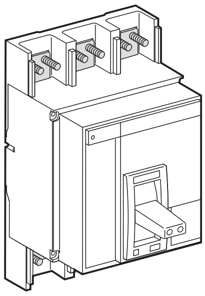
Compact NS630b to 1600 fixed and withdrawable devices can be connected using:

- *horizontal or vertical rear connections*
- *front connections*
- *mixed connections*
- *a combination of front and rear connections.*

Types of connection

Front connection

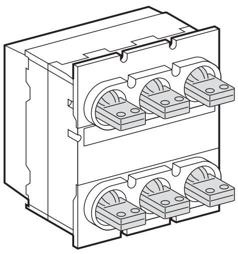
E59235



Rear connection

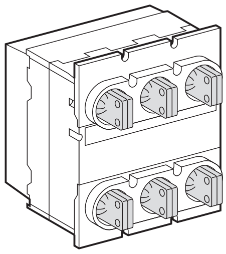
Horizontal

E59233A



Vertical

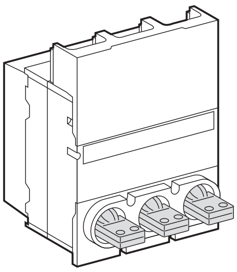
E59234A



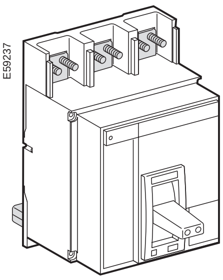
Simply turn a horizontal rear connector 90° to make it a vertical connector.

Combination of front and rear connections

E59236



E59237

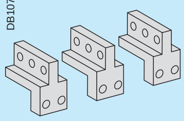
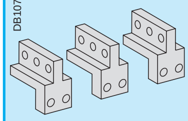
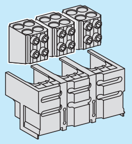
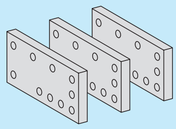
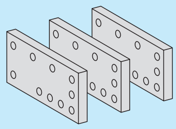
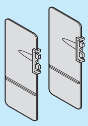
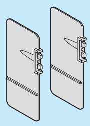
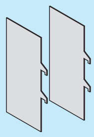
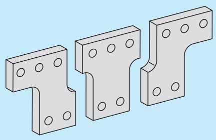
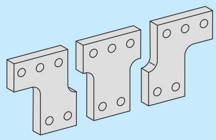
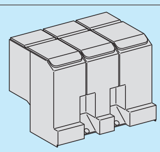
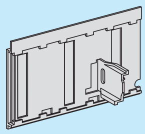
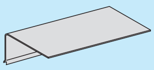


Note.
Compact circuit breakers can be connected indifferently with bare-copper, tinned-copper and tinned-aluminium conductors, requiring no particular treatment.

To ensure performance and isolation, depending on the type of circuit breaker (N, H, L, LB) and type of connection, certain isolation accessories are mandatory.

Connections

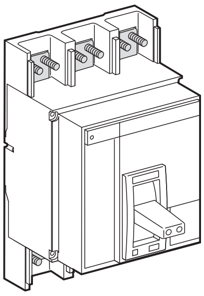
Accessories

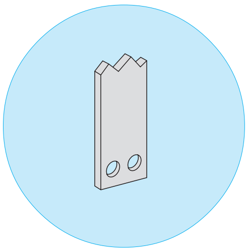
<table>
<tr><th rowspan="3">Type of accessories</th><th colspan="4">Compact NS630b to NS1600</th></tr>
<tr><th colspan="2">Fixed</th><th colspan="2">Withdrawable</th></tr>
<tr><th>Front connection (except LB)</th><th>Rear connection</th><th>Front connection</th><th>Rear connection</th></tr>
<tr><td>Vertical-connection adapters</td><td>DB107666 </td><td></td><td>DB107666 </td><td></td></tr>
<tr><td>Set of bare-cable connectors and terminal shields for ratings ⩽ 1250 A</td><td>DB107660  (except L)</td><td></td><td></td><td></td></tr>
<tr><td>Cable lug adapters</td><td colspan="2">DB107667 </td><td colspan="2">DB107667 </td></tr>
<tr><td>Interphase barriers</td><td>DB107661  (1) (2)</td><td>DB107661  (1)</td><td></td><td>DB107664  (1)</td></tr>
<tr><td>Spreaders</td><td colspan="2">DB107668 </td><td colspan="2">DB107668 </td></tr>
<tr><td>Connection shield</td><td>DB107662 </td><td></td><td></td><td></td></tr>
<tr><td>Safety shutters with locking by padlocks (IP20)</td><td></td><td></td><td colspan="2">DB107669  (standard)</td></tr>
<tr><td>Arc chute screen</td><td>DB107665  (1) (2)</td><td></td><td></td><td></td></tr>
</table>

***(1)** Mandatory for voltages ⩾ 500 V unless using the bare-cable connector + terminal shield kit.*
***(2)** Mandatory for fixed front-connected circuit breakers with vertical-connection adapters oriented towards the front.*

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

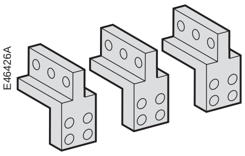
Front connection of fixed devices (except LB)

E59235


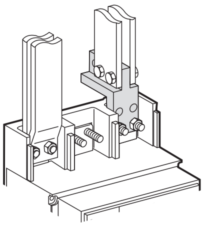
E54540


Bars

Fixed, front-connection Compact NS630b to 1600 devices are equipped with terminals comprising captive screws for direct connection of bars.
Other connection possibilities for bars include vertical-connection adapters for edgewise bars and spreaders to increase the pole pitch to 95 mm.
If the vertical connection adapters are front oriented, then it is mandatory to install the arc chute screen in order to comply with the safety clearances.

E46426A


Vertical-connection adapters

E59238A


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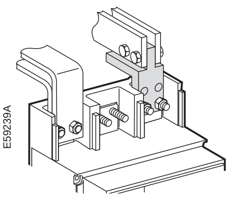

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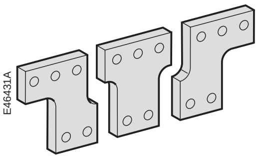
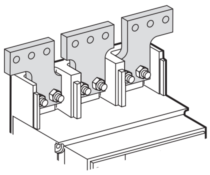
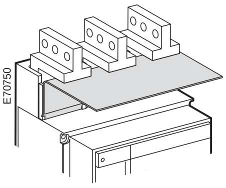


Spreaders.

E59240A


E70750


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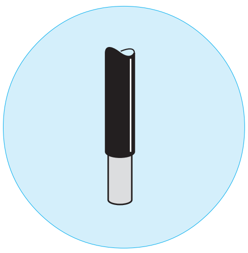
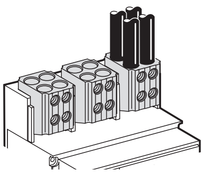


Bare cables (except L)

Special sets of connectors and terminal shields may be used to connect up to four 240 mm² copper or aluminium cables for each phase. Bare cable connection is possible for ratings up to and including 1250 A.

E59241A


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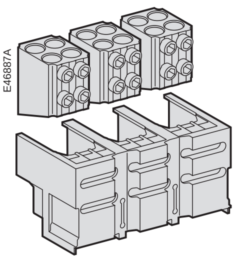
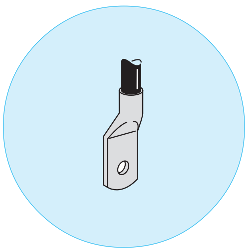


4-cable connectors

E54456


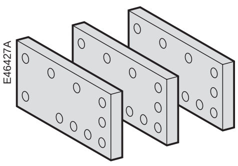
Cables with lugs

Cable lug adapters are combined with the vertical-connection adapters.

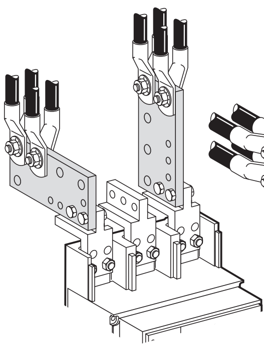
One to four cables with crimped lugs (≤ 300 mm²) may be connected.

To ensure stability, spacers must be positioned between the terminal extensions.

If the cable lug adapters are installed over the top of the arc chute chambers, then it is mandatory to install the arc chute screen in order to comply with the safety clearances.

E46427A


Cable lug adapters

E59242A


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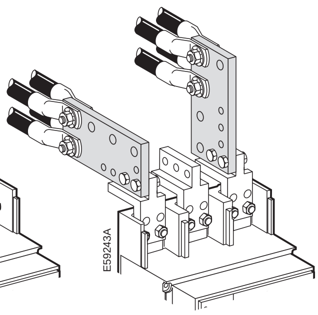

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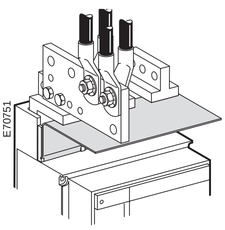
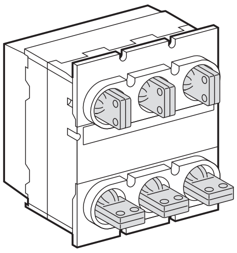
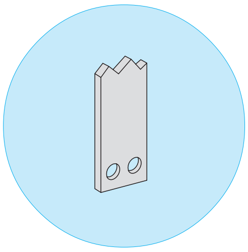


Rear connection of fixed devices

E59236



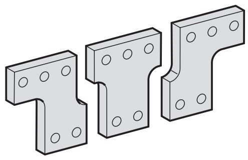
E54540



Bars

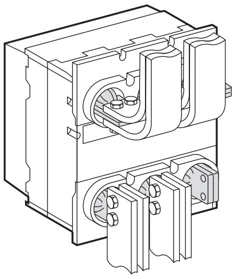
Fixed, rear-connection Compact NS630b to 1600 devices equipped with horizontal or vertical connectors may be directly connected to flat or edgewise bars, depending on the position of the connectors.
Spreaders are available to increase the pole pitch to 95 mm.

E46431A

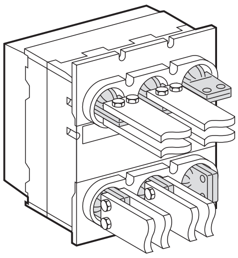


Spreaders.

E59257A



E59248A



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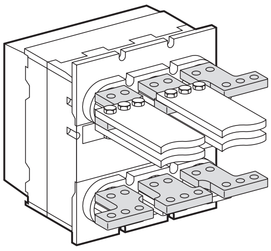
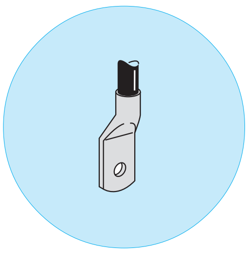


E54456

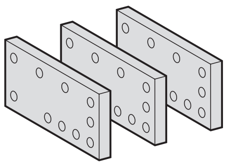


Cables with lugs

Cable lug adapters enable connection of one to four cables with crimped lugs (≤ 300 mm^2).

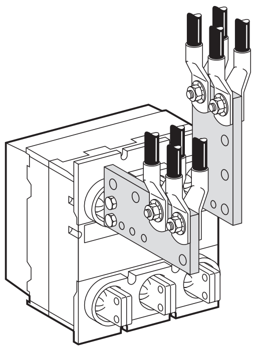
To ensure stability, spacers must be positioned between the terminal extensions.

E46427A



Cable lug adapters

E59249A



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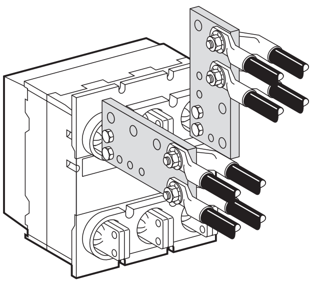
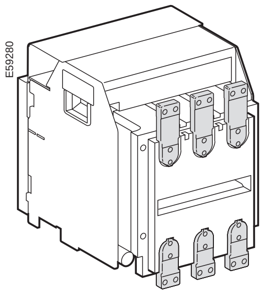
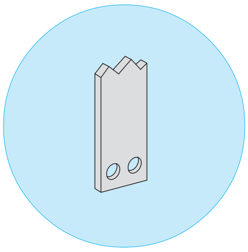


Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

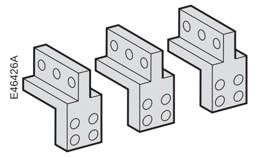
Front connection of withdrawable devices



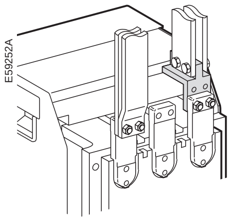


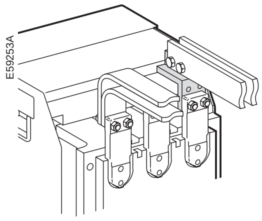
Bars

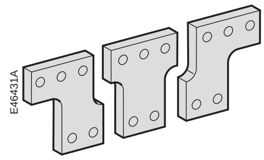
Withdrawable, front-connection Compact NS630b to 1600 devices are suitable for direct connection of bars. Other connection possibilities for bars include vertical-connection adapters for edgewise bars and spreaders to increase the pole pitch to 95 mm.



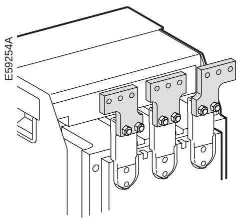
Vertical-connection adapters







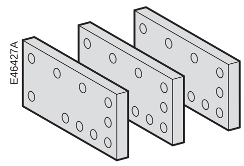
Spreaders



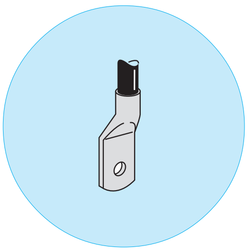
Cables with lugs

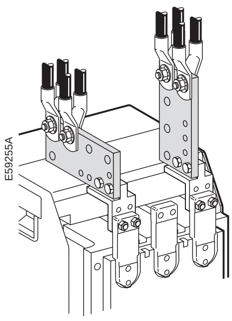
Cable lug adapters enable connection of one to four cables with crimped lugs (⩽ 300 mm²).

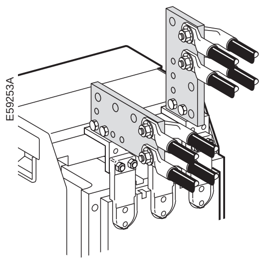
To ensure stability, spacers must be positioned between the terminal extensions.



Cable lug adapters

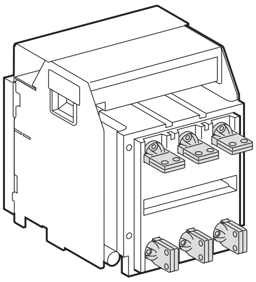




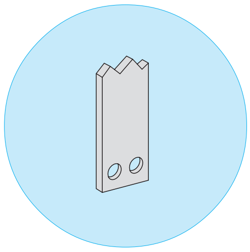


Rear connection of withdrawable devices

E59282A



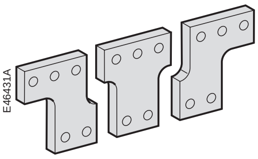
E54540



Bars

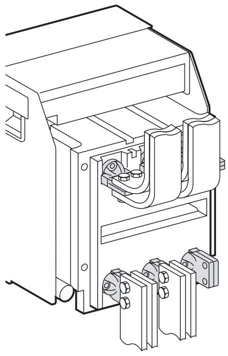
Withdrawable, rear-connection Compact NS630b to 1600 devices equipped with horizontal or vertical connectors may be directly connected to flat or edge-wise bars, depending on the position of the connectors. Spreaders are available to increase the pole pitch to 95 mm.

E46431A

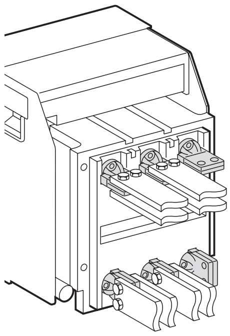


Spreaders

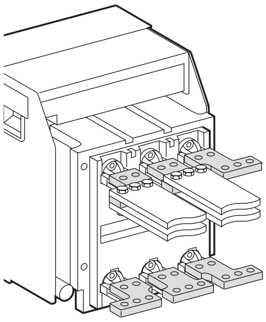
E59258A



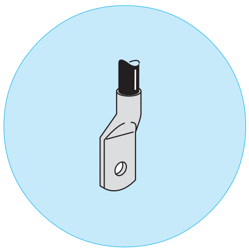
E59259A



E59260A



E54456

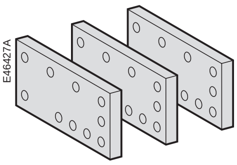


Cables with lugs

Cable lug adapters enable connection of one to four cables with crimped lugs (≤ 300 mm^2).

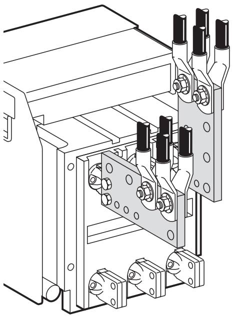
To ensure stability, spacers must be positioned between the terminal extensions.

E46427A

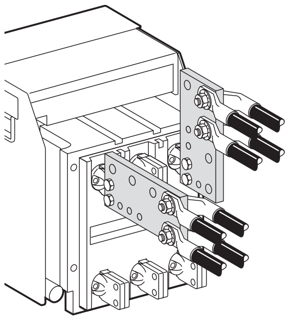


Cable lug adapters

E59261A



E59262A

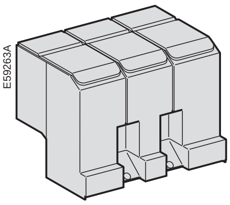


Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

Insulation of live parts

Connection shield

Mounted on fixed, front-connection devices, this shield insulates power-connection points, particularly when cables with lugs are used

E59263A

Connection shield

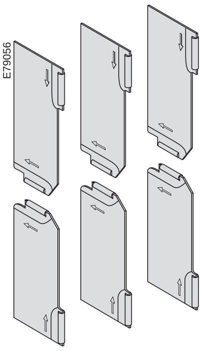
E45190

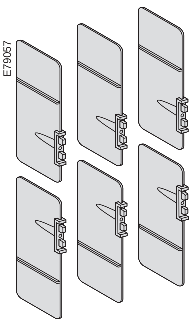
Compact NS equipped with connection shield

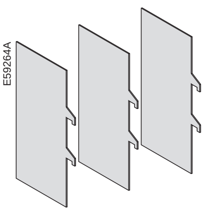
Interphase barriers

These barriers are flexible insulated partitions used to reinforce isolation of connection points in installations with busbars, whether insulated or not.
Barriers are installed vertically between front or rear connection terminals.

They are mandatory for voltages ⩾ 500 V for both fixed and withdrawable products and for L and LB types, whatever the voltage.

E79056

Interphase barriers for fixed device, front connection

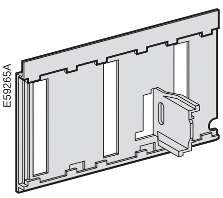
E79057

Interphase barriers for fixed device, rear connection

E59264A

Interphase barriers for withdrawable device, rear connection

Safety shutters

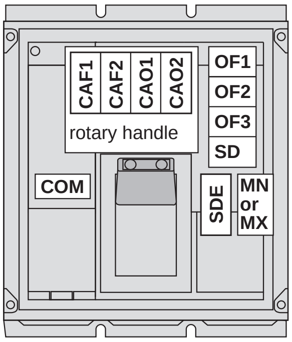
Mounted on the chassis, the safety shutters automatically block access to the disconnecting contact cluster when the device is in the disconnected or test positions (degree of protection IP20). When the device is removed from its chassis, no live parts are accessible.

The shutters can be padlocked (padlock not supplied) to:
■ prevent connection of the device
■ lock the shutters in the closed position.

E59265A

Safety shutters

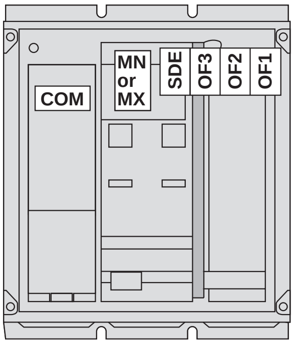
Connection of electrical auxiliaries

E59283A



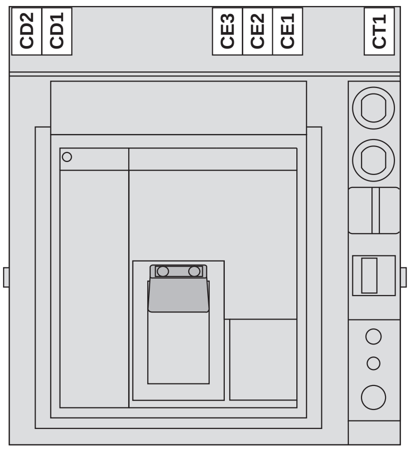
Manually operated device

E59284A



Electrically operated device

E59285A

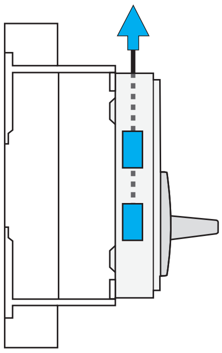


Withdrawable device

Fixed devices

Connections are made directly to the auxiliaries once the front has been removed. Wires exit the circuit breaker through a knock-out in the top.

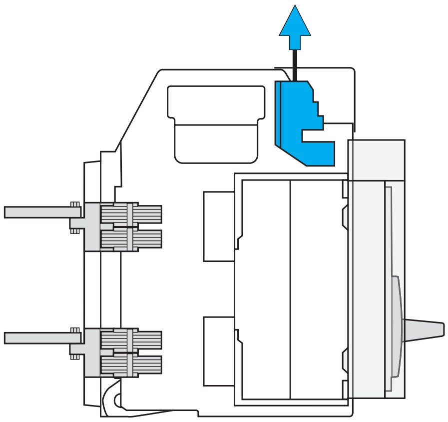
E59286A



Withdrawable devices

Auxiliary circuits are connected to terminal blocks located in the top part of the chassis.
The auxiliary terminal block is made up of a fixed and moving part. The two parts are in contact when the device is in the test and connected positions.

E59287A



Functions and characteristics

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

044314

OF, SD and SDE changeover contacts

All the auxiliary contacts opposite are also available in "low-level" versions capable of switching very low loads (e.g. for the control of PLCs or electronic circuits).

Indication contacts

Contacts installed in the device

Changeover contacts are used to remote circuit-breaker status information and can thus be used for indications, electrical locking, relaying, etc.
They comply with the IEC 60947-5 international recommendation.

Functions

■ OF (ON/OFF) - indicates the position of the main circuit breaker contacts
■ SD (trip indication) - indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth-leakage fault.
□ operation of a voltage release
□ operation of the "push to trip" button
□ disconnection when the device is ON.
Returns to de-energised state when the circuit breaker is reset.
■ SDE (fault indication) - indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth-leakage fault.
Returns to de-energised state when the circuit breaker is reset.
■ CAF / CAO (early-make or early-break function) - indicates the position of the rotary handle. Used in particular for advanced opening of safety trip devices (early break) or to energise a control device prior to circuit-breaker closing (early make).

Installation

■ OF, SD and SDE functions - a single type of contact provides all these different indication functions, depending on where it is inserted in the device. The contacts clip into slots behind the front cover of the circuit breaker
■ CAF / CAO function - the contact fits into the rotary-handle unit (direct or extended).

Electrical characteristics of the OF/SD/SDE/CAF/CAO auxiliary contacts

Contacts		Standard				Low level			
Rated thermal current (A)		6				5			
Minimum load		100 mA at 24 V				1 mA at 4 V DC			
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational current (A)	24 V	6	6	6	1	5	3	5	1
	48 V	6	6	2.5	0.2	5	3	2.5	0.2
	110 V	6	5	0.6	0.05	5	2.5	0.6	0.05
	220/240 V	6	4	-	-	5	2	-	-
	250 V	-	-	0.3	0.03	5	-	0.3	0.03
	380/440 V	6	2	-	-	5	1.5	-	-
	480 V	6	1.5	-	-	5	1	-	-
	660/690 V	6	0.1	-	-	-	-	-	-

056456

Carriage switches for connected (CE), disconnected (CD) and test (CT) positions

Connected, disconnected, test position carriage switches

A single type of changeover contact can be mounted optionally on the chassis to indicate, depending on the slot where it is installed:
■ the connected (CE) position
■ the disconnected (CD) position. This position is indicated when the required clearance for isolation of the power and auxiliary circuits is reached
■ the test (CT) position. In this position, the power circuits are disconnected and the auxiliary circuits are connected.

Installation

■ contacts for the connected (CE), disconnected (CD) and test (CT) positions clip into the upper front section of the chassis.

Electrical characteristics of the CE/CD/CT auxiliary contacts

Contacts		Standard				Low level			
Rated thermal current (A)		8				5			
Minimum load		100 mA at 24 V				2 mA at 15 V DC			
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational current (A)	24 V	8	6	2.5	1	5	3	5	1
	48 V	8	6	2.5	0.2	5	3	2.5	0.2
	110 V	8	5	0.8	0.05	5	2.5	0.8	0.05
	220/240 V	8	4	-	-	5	2	-	-
	250 V	-	-	0.3	0.03	5	-	0.3	0.03
	380/440 V	8	3	-	-	5	1.5	-	-
	660/690 V	6	0.1	-	-	-	-	-	-

E45159

Compact NS with a direct rotary handle

E45161

Compact NS with an extended rotary handle

Rotary handles

There are two types of rotary handle:
- direct rotary handle
- extended rotary handle.

There are two models:
- standard with a black handle
- VDE with a red handle and yellow front for machine-tool control.

Direct rotary handle

Degree of protection IP40, IK07.
The direct rotary handle maintains:
- visibility of and access to trip unit settings
- suitability for isolation
- indication of the three positions O (OFF), I (ON) and tripped
- access to the "push to trip" button
- circuit breaker locking capability in the OFF position by one to three padlocks, shackle diameter 5 to 8 mm (not supplied).

It replaces the circuit-breaker front cover.

Accessories transform the standard direct rotary handle for the following situations:
- motor control centre (MCC) switchboards:
  - door opening disabled when the circuit breaker is ON;
  - circuit-breaker closing is disabled if the door is open;
- a higher degree of protection (IP43, IK07)
- machine-tool control, complying with CNOMO E03.81.501, IP54, IK07.

Extended rotary handle

Degree of protection IP55, IK07.

This handle makes it possible to operate circuit breakers installed at the back of switchboards, from the switchboard front.

It maintains:
- suitability for isolation
- indication of the three positions O (OFF), I (ON) and tripped
- access to trip unit settings, when the switchboard door is open
- circuit breaker locking capability in the OFF position by one to three padlocks, shackle diameter 5 to 8 mm (not supplied).

The door cannot be opened if the circuit breaker is ON or locked.

The extended rotary handle is made up of:
- a unit that replaces the front cover of the circuit breaker (secured by screws)
- an assembly (handle and front plate) on the door that is always secured in the same position, whether the circuit breaker is installed vertically or horizontally
- an extension shaft that must be adjusted to the distance. The min/max distance between the back of circuit breaker and door is 218/605 mm.

Functions and characteristics

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

Manually operated circuit breakers may be equipped with an MX shunt release, an MN undervoltage release or a delayed undervoltage release (MN + delay unit). Electrically operated circuit breakers are equipped as standard with a remote-operating mechanism to remotely open or close the circuit breaker. An MX shunt release or an MN undervoltage release (instantaneous or delayed) may be added.

056421

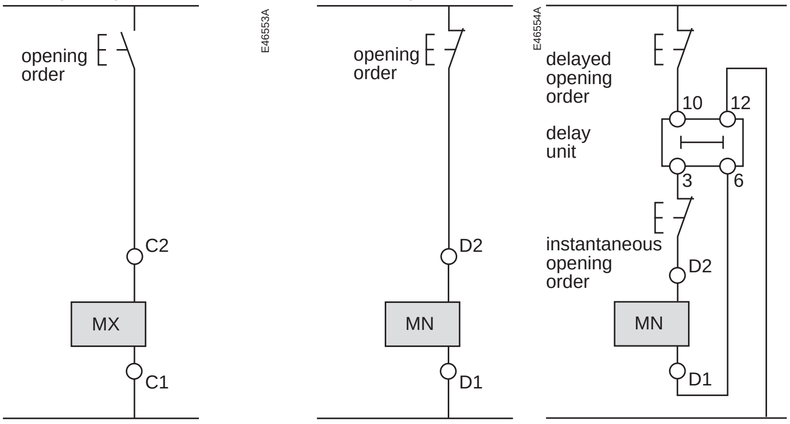
MX voltage release

Remote tripping

This function opens the circuit breaker via an electrical order. It is made up of:
■ a shunt release (2nd MX)
■ or an undervoltage release (MN)
■ or a delayed undervoltage release (MN + delay unit).
These releases (2nd MX or MN) cannot be operated by the communication bus.
The delay unit, installed outside the circuit breaker, may be disabled by an emergency OFF button to obtain instantaneous opening of the circuit breaker.

Wiring diagram for the remote-tripping function

E59433A E46553A E46554A



Voltage releases (2nd MX)

When energised, the 2nd MX voltage release instantaneously opens the circuit breaker. A continuous supply of power to the 2nd MX locks the circuit breaker in the OFF position.

Characteristics			
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 277 - 380/480	
	V DC	12 - 24/30 - 48/60 - 100/130 - 200/250	
Operating threshold		0.7 to 1.1 Un	
Permanent locking function		0.85 to 1.1 Un	
Consumption (VA or W)		pick-up: 200 (200 ms)	hold: 4.5
Circuit-breaker response time at Un		50 ms ±10	

Instantaneous voltage releases (MN)

The MN release instantaneously opens the circuit breaker when its supply voltage drops to a value between 35 % and 70 % of its rated voltage. If there is no supply on the release, it is impossible to close the circuit breaker, either manually or electrically. Any attempt to close the circuit breaker has no effect on the main contacts. Circuit-breaker closing is enabled again when the supply voltage of the release returns to 85 % of its rated value.

Characteristics			
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 380/480	
	V DC	24/30 - 48/60 - 100/130 - 200/250	
Operating threshold	opening	0.35 to 0.7 Un	
	closing	0.85 Un	
Consumption (VA or W)		pick-up: 200 (200 ms)	hold: 4.5
MN consumption with delay unit (VA or W)		pick-up: 400 (200 ms)	hold: 4.5
Circuit-breaker response time at Un		90 ms ±5	

MN delay units

To eliminate circuit-breaker nuisance tripping during short voltage dips, operation of the MN release can be delayed. This function is achieved by adding an external delay unit in the MN voltage-release circuit. Two versions are available, adjustable and non-adjustable.

Characteristics			
Power supply	non-adjustable	100/130 - 200/250	
V AC 50-60 Hz /DC	adjustable	48/60 - 100/130 - 200/250 - 380/480	
Operating threshold	opening	0.35 to 0.7 Un	
	closing	0.85 Un	
Consumption of delay unit alone (VA or W)	pick-up: 200 (200 ms)		hold: 4.5
Circuit-breaker response time at Un	non-adjustable	0.25 s	
	adjustable	0.5 s - 0.9 s - 1.5 s - 3 s	

Electrically operated circuit breakers are equipped as standard with a motor mechanism module.
Two solutions are available for electrical operation:
- *a point-to-point solution*
- *a bus solution with the COM communication option.*

Electrically operated Compact NS circuit breaker

Electrically operated circuit breaker

The motor mechanism module is used to remotely open and close the circuit breaker. It is made up of a spring-charging motor equipped with an opening release and a closing release.

An electrical operation function is generally combined with:
- device ON/OFF indication (OF)
- "fault-trip" indication (SDE).

Motor mechanism module		
Power supply	V AC 50/60 Hz	48/60 - 100/130 - 200/240 - 277- 380/415
	V DC	24/30 - 48/60 - 100/125 - 200/250
Operating threshold		0.85 to 1.1 Un
Consumption (VA or W)		180
Motor overcurrent		2 to 3 In for 0.1 second
Charging time		maximum 4 seconds
Operating frequency		maximum 3 cycles per minute

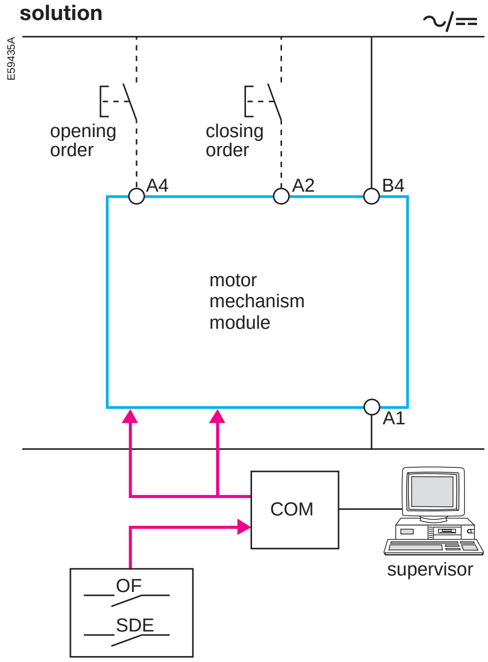
Electrical closing order

The release remotely closes the circuit breaker if the spring mechanism is charged. Release electrical characteristics are identical to those of an MX release (see above), the operating threshold is from 0.85 to 1.1 Un and the circuit-breaker response time at Un is 60 ms ±10.
The Compact NS electrical operation function can be used to implement a synchro-coupling system.

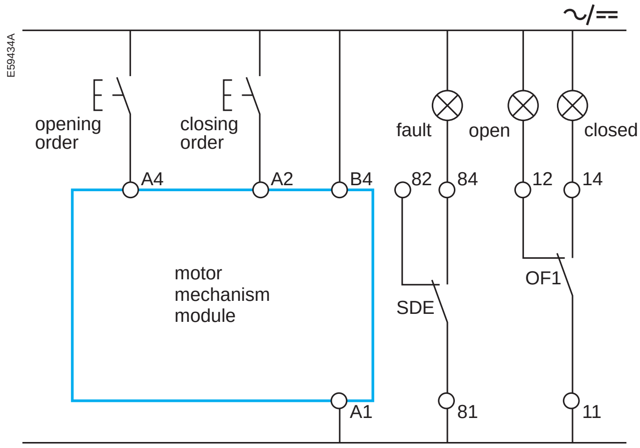
Electrical opening order

The release instantaneously opens the circuit breaker when energised. The supply can be impulse-type or maintained.
Release electrical characteristics are identical to those of an MX release (see above).

Wiring diagram of a bus-type electrical operation solution



Wiring diagram of a point-to-point electrical operation solution



In the event of simultaneous opening and closing orders, the mechanism discharges without any movement of the main contacts.

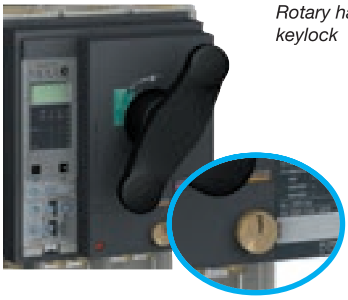
In the event of maintained opening and closing orders, the standard electrical operation solution provides an anti-pumping function by blocking the main contacts in open position.

Functions and characteristics

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

E45194

Toggle locked by removable padlocking device

E45159

Rotary handle locked by a keylock

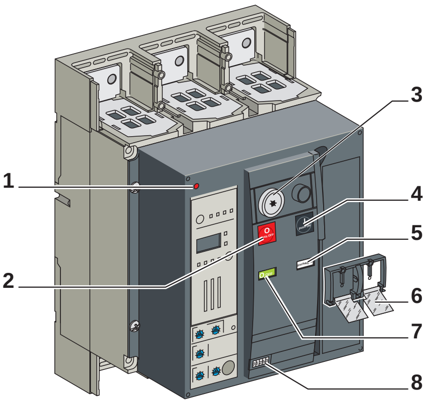
Locking on manually operated devices

Locking in the OFF position guarantees isolation as per IEC 60947-2.
Padlocking systems can receive up to three padlocks with shackle diameters ranging from 5 to 8 mm (padlocks not supplied).

Control device	Function	Means	Required accessories
Toggle	lock in OFF position	padlock	removable device
	lock in OFF or ON position	padlock	fixed device
Direct rotary handle	lock in	padlock	
	■ OFF position ■ OFF or ON position	keylock	locking device + keylock
CNOMO direct rotary handle	lock in	padlock	
	■ OFF position ■ OFF or ON position	keylock	locking device + keylock
Extended rotary handle	lock in OFF position,	padlock	
	door opening prevented	keylock	keylock

Locking in ON position does not prevent the device from tripping in the event of a fault or remote tripping order.

Locking on electrically operated devices

E59436A


1 reset of mechanical trip indicator
2 OFF pushbutton
3 OFF position locking
4 ON pushbutton
5 springs charged indication
6 pushbutton locking
7 contact position indication
8 operation counter

056447

Access to pushbuttons protected by transparent cover

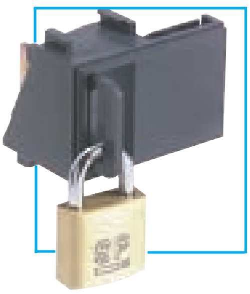
056446

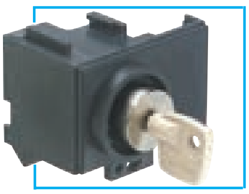
Pushbutton locking using a padlock

Pushbutton locking

The transparent cover blocks access to the pushbuttons used to open and close the device.
It is possible to independently lock the opening OFF button and the closing ON button.

The pushbuttons may be locked using either:
■ three padlocks (not supplied)
■ lead seal
■ two screws.

056448

OFF position locking using padlocks

056449

OFF position locking using a keylock and padlocks

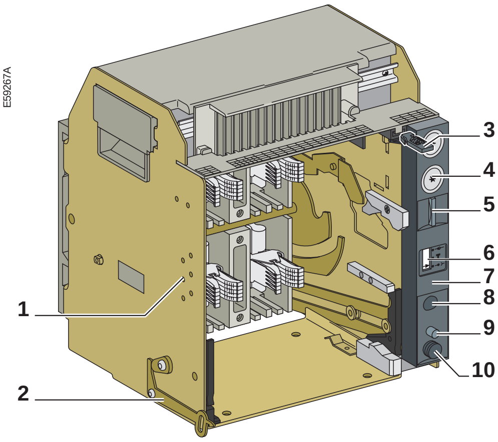
Device locking in the OFF position

The circuit breaker is locked in the OFF position by physically maintaining the opening pushbutton pressed down:
■ using padlocks in standard (one to three padlocks, not supplied)
■ using a keylock (supplied).

Keys may be removed only when locking is effective (Profalux or Ronis type locks).
The keylocks are available in any of the following configurations:
■ one keylock
■ one keylock mounted on the device + one identical keylock supplied separately for interlocking with another device.

A locking kit (without lock) is available for installation of a keylock (Ronis, Profalux, Kirk or Castell).

Chassis locking



1 mismatch protection
2 door interlock
3 racking interlock
4 keylock locking
5 padlock locking
6 position indicator
7 chassis front plate (accessible with cubicle door closed)
8 crank entry
9 reset button
10 crank storage

Disconnected position locking by padlocks

Disconnected position locking by keylocks

Disconnected position locking

Mounted on the chassis and accessible with the door closed, these devices lock the circuit breaker in the disconnected position in two manners:
- using padlocks (standard), up to three padlocks (not supplied)
- using keylocks (optional), one or two different keylocks are available.

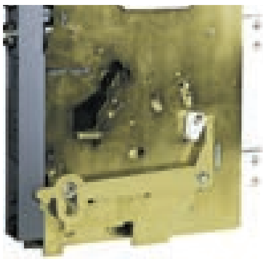
Profalux and Ronis keylocks are available in different options:
- one keylock
- one keylock mounted on the device + one identical keylock supplied separately, using the same key, for interlocking with another device
- one (or two) keylocks mounted on the device + one (or two) identical keylocks supplied separately, for interlocking with another device.

A locking kit (without locks) is available for installation of one or two keylocks (Ronis, Profalux, Kirk or Castell).

Connected, disconnected and test position locking

The connected, disconnected and test positions are shown by an indicator.
The racking crank blocks when the exact position is obtained.
A release button is used to free it.

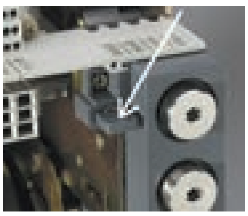
On request, the disconnected position locking system may be modified to lock the circuit breaker in any of the three positions, connected, disconnected and test.



Door interlock

Door interlock

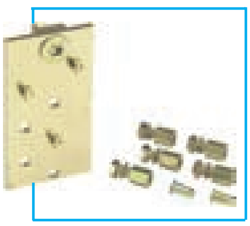
Mounted on the right or left-hand side of the chassis, this device inhibits opening of the cubicle door when the circuit breaker is in connected or test position. It the breaker is put in the connected position with the door open, the door may be closed without having to disconnect the circuit breaker.



Racking interlock

Racking interlock

This device prevents insertion of the crank when the cubicle door is open (device cannot be connected).



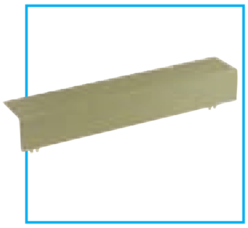
Mismatch protection

Mismatch protection

Mismatch protection ensures that a circuit breaker is installed only in a chassis with compatible characteristics. It is made up of two parts (one on the chassis and one on the circuit breaker) offering twenty different combinations that the user may select.

Functions and characteristics

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

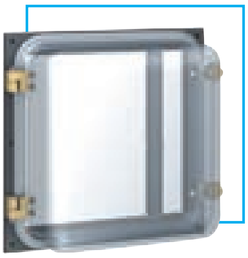
056463

Auxiliary terminal shield

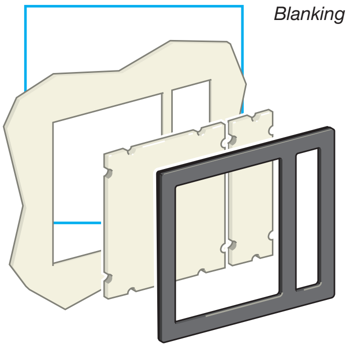
056464

Operation counter

E45184

Escutcheon

E45187

Transparent cover

E59987

Blanking plate

Other accessories

Auxiliary terminal shield (CB)
Optional equipment mounted on the chassis, the shield prevents access to the terminal block of the electrical auxiliaries.

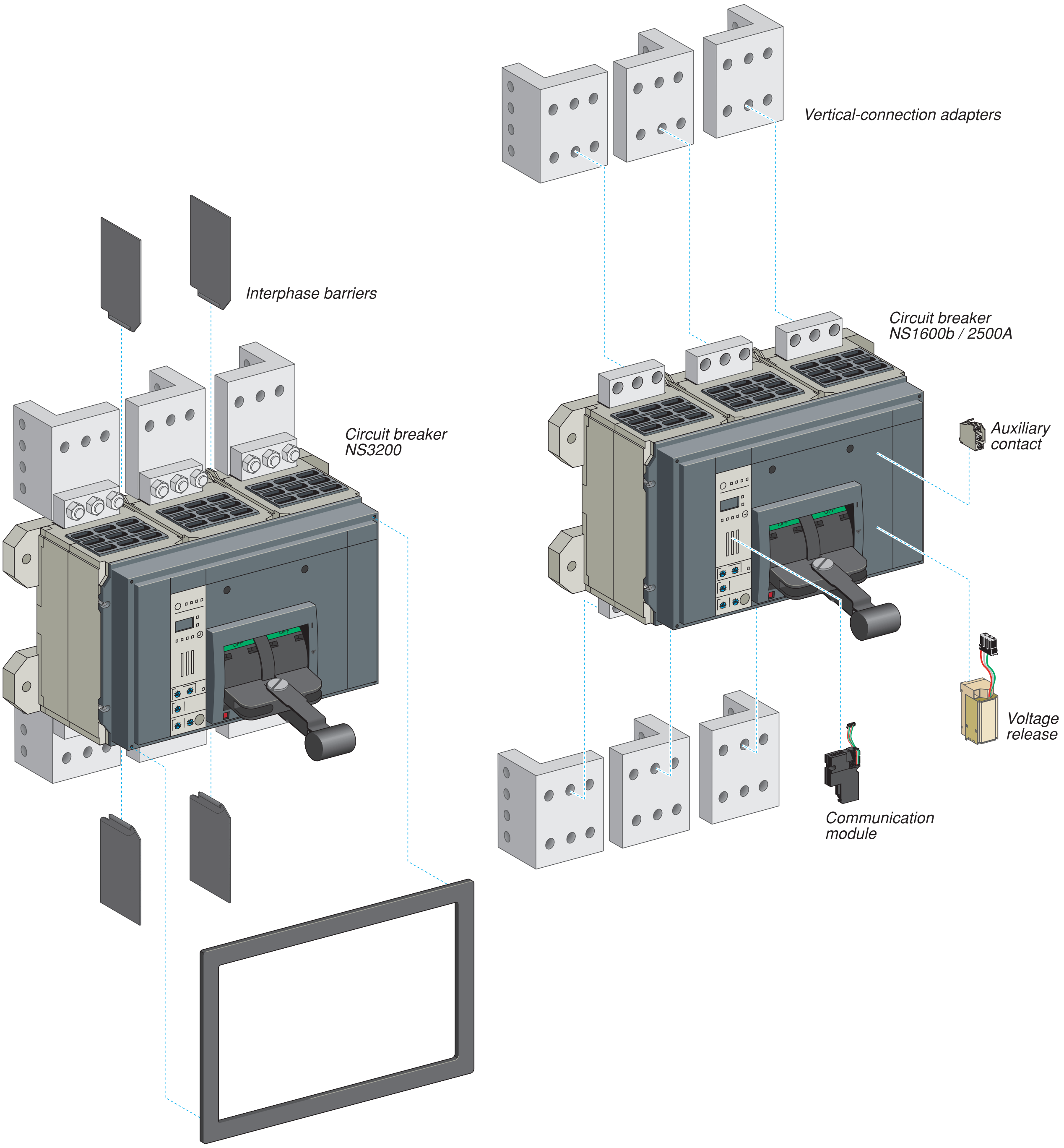
Operation counter (CDM)
The operation counter sums the number of operating cycles and is visible on the front panel. It is compatible with electrically operated devices.

Escutcheon (CDP)
Optional equipment mounted on the door of the cubicle, the escutcheon increases the degree of protection to IP40. It is available in fixed and withdrawable versions.

Transparent cover (CCP) for escutcheon
Optional equipment mounted on the escutcheon, the cover is hinged and secured by a screw. It increases the degree of protection to IP54 and the degree of protection against mechanical impacts to IK10. It may be used for withdrawable devices only.

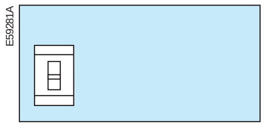
Blanking plate (OP) for escutcheon
Used with the escutcheon, this option closes off the door cutout of a cubicle not yet equipped with a device. It may be used with the escutcheon for both fixed and withdrawable devices.

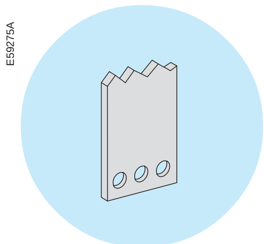
Electrical and mechanical accessories
Compact NS1600b to 3200 (fixed version)

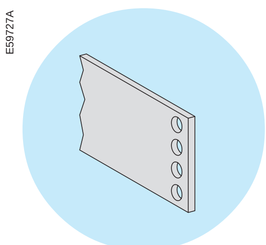


Electrical and mechanical accessories
Compact NS1600b to 3200 (cont.)

Fixed Compact NS

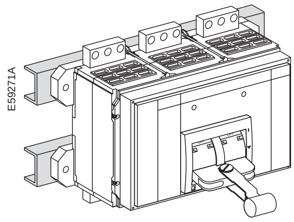






Installation

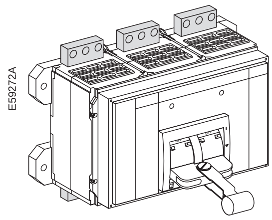
Fixed circuit breakers
Compact NS1600b to 3200 circuit breakers should be installed vertically only.



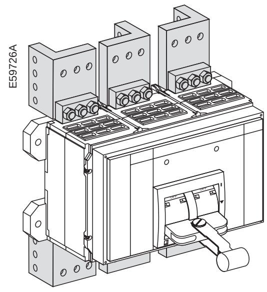
Mounting on rails

Connection

Front connection
NS1600 to 2500

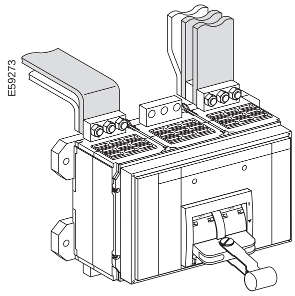


NS3200

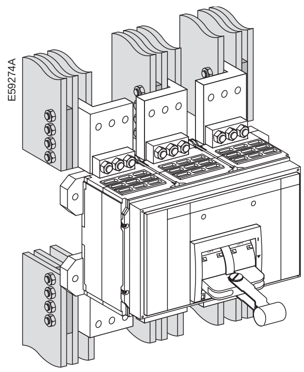


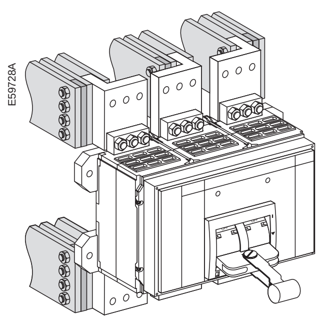
Bars
Bars may be directly connected to the terminals of Compact NS1600b to 3200 circuit breakers.

NS1600b to 2500



NS1600b to 2500 with connection for vertical-connection adapters or NS3200





044314

OF, SD and SDE changeover contacts

All the auxiliary contacts opposite are also available in "low-level" versions capable of switching very low loads (e.g. for the control of PLCs or electronic circuits).

Indication contacts

Contacts installed in the device

Changeover contacts are used to remote circuit-breaker status information and can thus be used for indications, electrical locking, relaying, etc.
They comply with the IEC 60947-5 international recommendation.

Functions

■ OF (ON/OFF) - indicates the position of the main circuit breaker contacts
■ SD (trip indication) - indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth-leakage fault
□ operation of a voltage release
□ operation of the "push to trip" button
Returns to de-energised state when the circuit breaker is reset.
■ SDE (fault indication) - indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth-leakage fault.
Returns to de-energised state when the circuit breaker is reset.

Installation

■ OF, SD and SDE functions - a single type of contact provides all these different indication functions, depending on the position where it is inserted in the device.
The contacts clip into slots behind the front cover of the circuit breaker.

Electrical characteristics of the OF/SD/SDE auxiliary contacts

Contacts		Standard				Low level			
Rated thermal current (A)		6				5			
Minimum load		100 mA at 24 V				1 mA at 4 V DC			
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational current (A)	24 V	6	6	6	1	5	3	5	1
	48 V	6	6	2.5	0.2	5	3	2.5	0.2
	110 V	6	5	0.6	0.05	5	2.5	0.6	0.05
	220/240 V	6	4	-	-	5	2	-	-
	250 V	-	-	0.3	0.03	5	-	0.3	0.03
	380/440 V	6	2	-	-	5	1.5	-	-
	480 V	6	1.5	-	-	5	1	-	-
	660/690 V	6	0.1	-	-	-	-	-	-

Electrical and mechanical accessories
Compact NS1600b to 3200 (cont.)

Compact NS1600b to 3200 circuit breakers may be equipped with an MX shunt release, an MN undervoltage release or a delayed undervoltage release (MN + delay unit).

056421

MX voltage release

Remote tripping

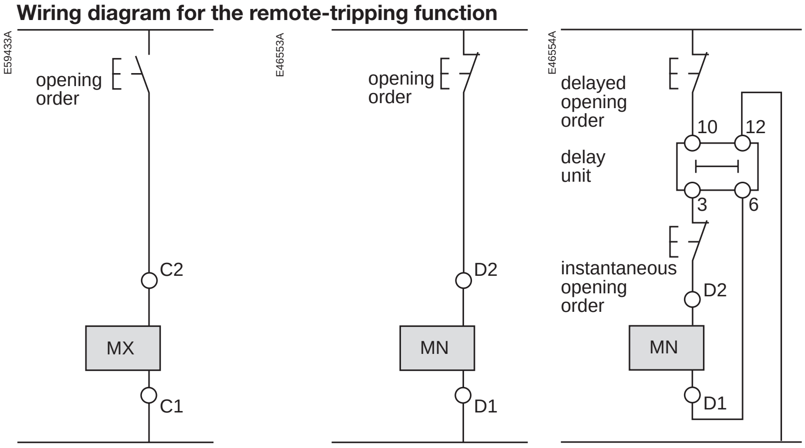
This function opens the circuit breaker via an electrical order. It is made up of:

- a shunt release (2nd MX)
- or an undervoltage release (MN)
- or a delayed undervoltage release (MN + delay unit).

These releases (2nd MX or MN) cannot be operated by the communication bus.

The delay unit, installed outside the circuit breaker, may be disabled by an emergency OFF button to obtain instantaneous opening of the circuit breaker.

Wiring diagram for the remote-tripping function



Voltage releases (2nd MX)

When energised, the 2nd MX voltage release instantaneously opens the circuit breaker. A continuous supply of power to the 2nd MX locks the circuit breaker in the OFF position.

Characteristics		
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 277 - 380/480
	V DC	12 - 24/30 - 48/60 - 100/130 - 200/250
Operating threshold		0.7 to 1.1 Un
Permanent locking function		0.85 to 1.1 Un
Consumption (VA or W)		pick-up: 200 (200 ms) hold: 4.5
Circuit-breaker response time at Un		50 ms ±10

Instantaneous voltage releases (MN)

The MN release instantaneously opens the circuit breaker when its supply voltage drops to a value between 35 % and 70 % of its rated voltage. If there is no supply on the release, it is impossible to close the circuit breaker, either manually or electrically. Any attempt to close the circuit breaker has no effect on the main contacts. Circuit-breaker closing is enabled again when the supply voltage of the release returns to 85 % of its rated value.

Characteristics			
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 380/480	
	V DC	24/30 - 48/60 - 100/130 - 200/250	
Operating threshold	opening	0.35 to 0.7 Un	
	closing	0.85 Un	
Consumption (VA or W)		pick-up: 200 (200 ms)	hold: 4.5
MN consumption with delay unit (VA or W)		pick-up: 400 (200 ms)	hold: 4.5
Circuit-breaker response time at Un		90 ms ±5	

MN delay units

To eliminate circuit-breaker nuisance tripping during short voltage dips, operation of the MN release can be delayed. This function is achieved by adding an external delay unit in the MN voltage-release circuit. Two versions are available, adjustable and non-adjustable.

Characteristics			
Power supply	non-adjustable	100/130 - 200/250	
V AC 50-60 Hz /DC	adjustable	48/60 - 100/130 - 200/250 - 380/480	
Operating threshold	opening	0.35 to 0.7 Un	
	closing	0.85 Un	
Consumption of delay unit alone (VA or W)	pick-up: 200 (200 ms)		hold: 4.5
Circuit-breaker response time at Un	non-adjustable	0.25 s	
	adjustable	0.5 s - 0.9 s - 1.5 s - 3 s	

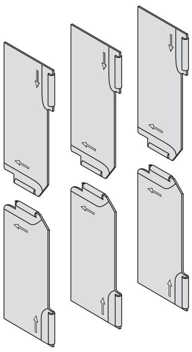
62191

Compact NS with toggle locked using a fixed device and padlocks

62190

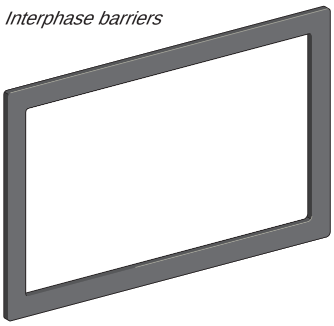
Compact NS with toggle locked using a removable device and padlocks

E79056



Interphase barriers

E94383



Escutcheon

Device locking

Locking in the OFF position guarantees isolation as per IEC 60947-2.
Padlocking systems can receive up to three padlocks with shackle diameters ranging from 5 to 8 mm (padlocks not supplied).

Control device	Function	Means	Required accessories
Toggle	lock in OFF position	padlock	removable device
	lock in OFF or ON position	padlock	fixed device

Interphase barriers

These barriers are flexible insulated partitions used to reinforce isolation of connection points in installations with busbars, whether insulated or not.

Barriers are installed vertically between front connection terminals.

Escutcheon (CDP)

Optional equipment mounted on the door of the cubicle, the escutcheon increases the degree of protection to IP40.

Test equipment

Compact NS100 to 630 test equipment for STR electronic trip units

047035

Mini test kit

052172

Portable test kit

Mini test kit

The mini test kit is a portable unit requiring no external power supply, used to check operation of the electronic trip unit and circuit-breaker tripping.
It connects to the test connector on the front of the circuit breaker.
Required power source: five 9 V alkaline batteries (not supplied).

Portable test kit

The portable test kit is used to check all aspects of the protection functions:
■ long time protection
■ short time protection
■ instantaneous protection
■ earth-fault protection.
Required power source: 110 or 220 V AC, 50/60 Hz.

Compact NS630b to 3200 test equipment for Micrologic control units

056466

Portable test kit

Mini test kit

The autonomous hand-held mini test kit may be used to:
■ check operation of the control unit and the tripping and pole-opening system by sending a signal simulating a short-circuit
■ supply power to the control units for settings via the keypad when the circuit-breaker is open (Micrologic P and H control units).
Required power source: standard LR6-AA battery.

Portable test kit

The portable test kit is may be used to check:
■ the mechanical operation of the circuit breaker
■ the electrical continuity of the connection between the circuit breaker and the control unit
■ operation of the control unit:
□ display of settings
□ operating tests on the ASIC electronic component
□ automatic and manual tests on protection functions
□ test on the zone-selective interlocking (ZSI) function
□ inhibition of the earth-fault protection
□ inhibition of the thermal memory.

Note
These test kits are identical for all Compact NS630b to 3200 circuit breakers and all Masterpact NT and NW circuit breakers.
Required power source: 110 or 220 V AC, 50/60 Hz.

Display modules

Perfectly integrated in the Compact and Masterpact ranges, Display modules are designed for use with Micrologic control units to provide instant and highly intuitive access to all the information provided by the circuit breakers, including device status, current, voltage and power values, etc.

057454

DMB300 display module: basic and harmonic measurements

E79078

DMC300 display module: measurements, harmonic analysis, diagnosis

Associated Micrologic control unit
A = Micrologic A
P = Micrologic P
H = Micrologic H

DMB300 and DMC300 display modules use the power and communications capabilities of the Micrologic control units to centralise the display of electrical values, status conditions and alarms of one or more Compact or Compact circuit breakers.

The mounting and cabling system for the display modules ensures fast, easy and reliable installation.

Start-up is immediate with no configuration or programming required.

Display modules are high-performance devices combining:
■ simple and easy-to-read dials
■ powerful and accurate digital processing.

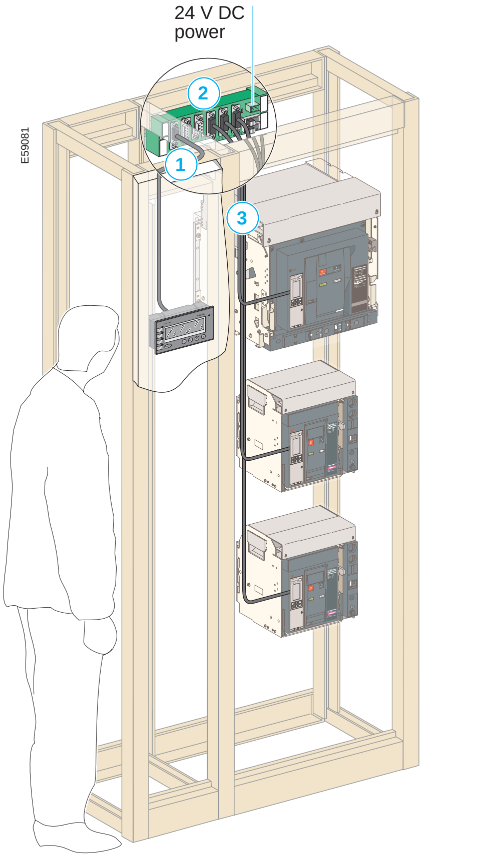
Their small size and extensive communications capabilities make for easy and flexible installation and operation.

Display modules	DMB300			DMC300		
Associated circuit breakers						
Type	Compact or Masterpact equipped with Micrologic control units					
Number	1 to 4			1 to 16		
Display						
Screen type	Black and white			Colour, touch screen		
Screen size	240 x 64 pixels			5“, 320 x 240 pixels		
Entry	5 buttons			Touch screen		
Information displayed						
Currents (per phase)						
Currents I1, I2, I3, IN	A	P	H	A	P	H
Maximum current	A	P	H	A	P	H
Earth-fault and earth-leakage currents	A	P	H	A	P	H
Demand current		P	H		P	H
Maximum demand current		P	H		P	H
Total harmonic distortion (THD)			H			H
Maximum total harmonic distortion			H			H
Amplitudes of individual harmonics						H
Voltages						
Phase-to-phase voltages (U_{1-2}, U_{2-3}, U_{3-1})		P	H		P	H
Minimum/maximum phase-to-phase voltages		P	H		P	H
Phase-to-neutral voltages (V_{1-N}, V_{2-N}, V_{3-N})		P	H		P	H
Minimum/maximum phase-to-neutral voltages		P	H			
Frequency		P	H		P	H
Voltage unbalance (% per phase)		P	H		P	H
Total harmonic distortion (% per phase)			H			H
Maximum total harmonic distortion (% per phase)			H			H
Amplitudes of individual harmonics			H			H
Power						
Active (P), reactive (Q) and apparent (S) power		P	H		P	H
Power factor and cos		P	H		P	H
Maximum power (P, Q, S)		P	H		P	H
Demand power (P, Q, S)		P	H		P	H
Maximum demand power (P, Q, S)		P	H		P	H
Metering						
Active, reactive and apparent energy		P	H		P	H
On-line help						
	On-line help is available for each type of information supplied by the module					
Circuit-breaker diagnostics						
Identification of control units	A	P	H	A	P	H
Reading of protections	A	P	H	A	P	H
Circuit-breaker status	A	P	H	A	P	H
Type of trip	A	P	H	A	P	H
Current alarms		P	H		P	H
Maintenance indicator					P	H
Installation diagnosis						
Indication of faulty devices				A	P	H
Fault log			A	P	H	
Installation and start-up						
Mounting	Mounted through door, without tools, using 6 spring-clips supplied with the mod.					
Connection	Prefabricated wiring systems					

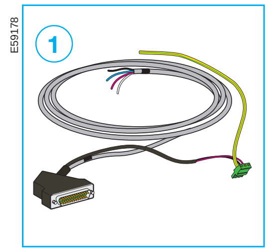
Display modules

Wiring system
The wiring system is designed for low-voltage power switchboards. Installation requires no tools or special skills.
The prefabricated wiring ensures both data transmission (Modbus protocol) and 24V DC power distribution for the display module and the communications modules on the Micrologic control units.

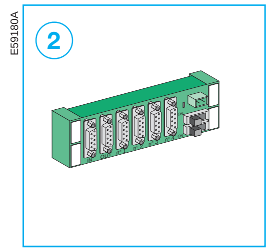
Connection of DMB300 display module



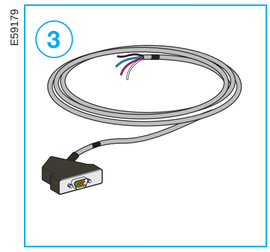
Compact circuit breakers equipped with Micrologic control units and the Modbus eco COM option



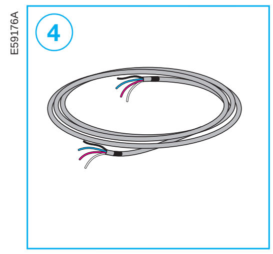
CDM 303:
Connection cable between display module and junction block



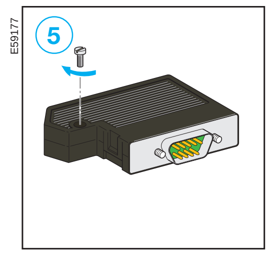
CJB 306 junction block



CCP 303:
Connection cable between Masterpact or Compact and junction block



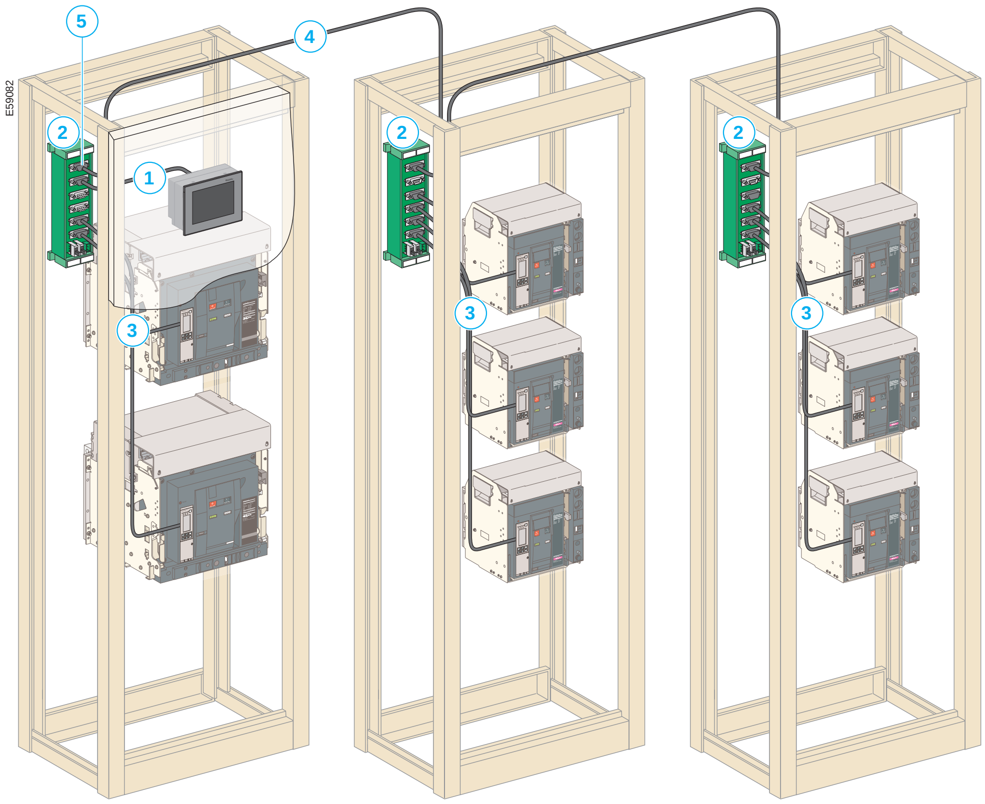
CCR 301:
Roll of RS 485 cable (2 RS 485 wires + 2 power supply wires)



CSD 309:
SubD 9-pin connector for colour-coded connection of wires to screw terminals

Connection of DMC300 display module

Maximum distance between module and circuit breaker: 1200 m



Compact circuit breakers equipped with Micrologic control units and the Modbus eco COM option

BRISBANE WATER

Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

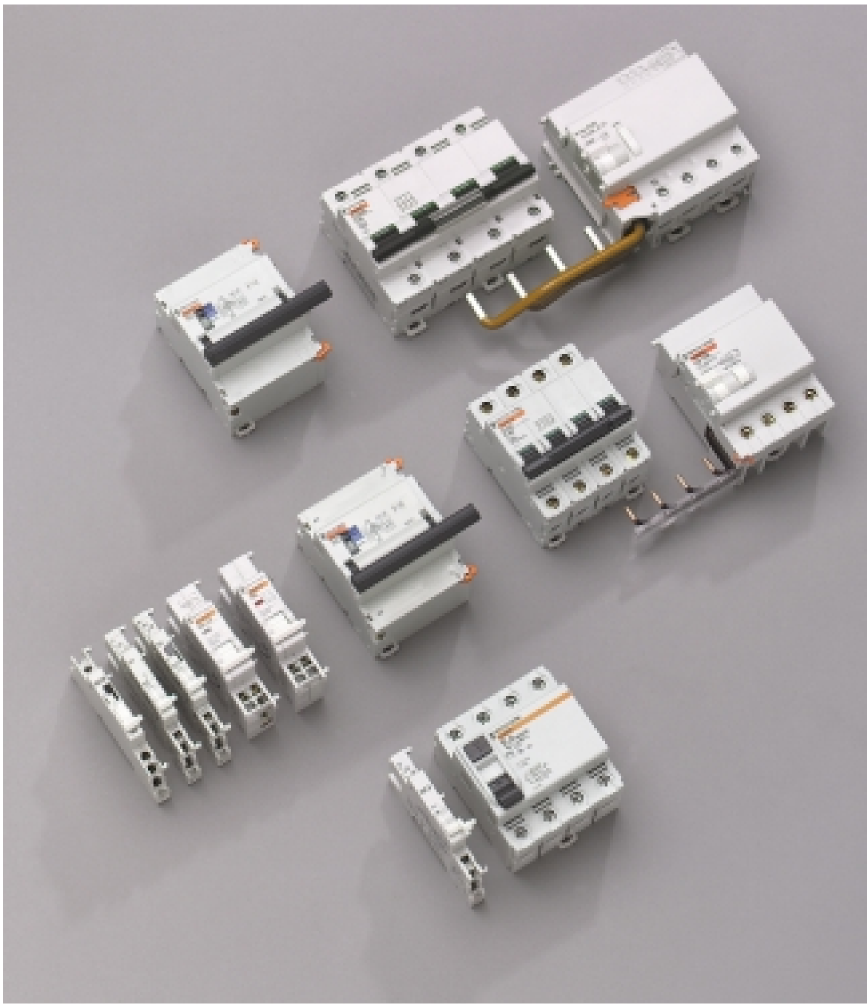
FAIRFIELD WATER RECLAMATION PLANT

MINIATURE CIRCUIT BREAKERS

1. MCB TECHNICAL DETAILS

2. RCBO TECHNICAL DETAILS

Merlin Gerin **Multi 9 System**
Protection
Miniature Circuit Breakers



Merlin Gerin
Modicon
Square D
Telemecanique

Schneider Electric

Get more with the world's Power & Control specialist

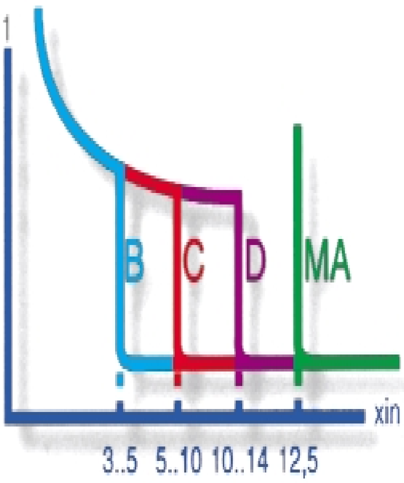
Protection

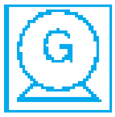
Merlin Gerin Multi 9 System
Miniature circuit breakers
Tripping curves
Markings & limitation capability

Trip Unit Variations

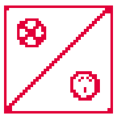
Circuit Protection

A choice of several curves
Whatever circuit has to be protected, a C60 or C120 circuit breaker provides the perfect solution with a suitable curve.

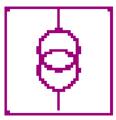




Curve B
tripping:
3 to 5 times the rated current (In);
protection of generators, persons, very long cables.



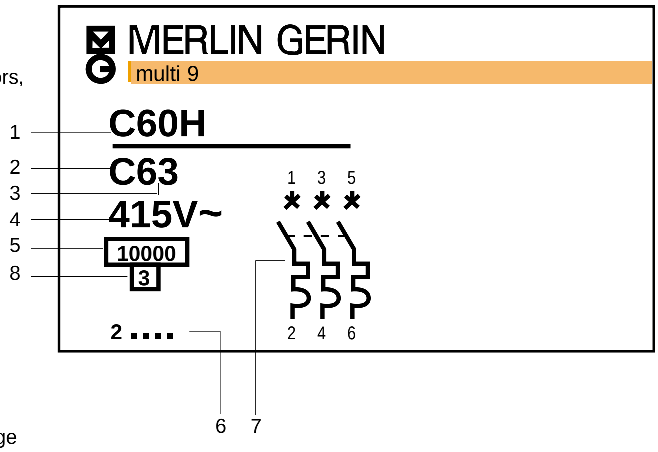
Curve C
tripping:
5 to 10 In;
protection of circuits, general applications.



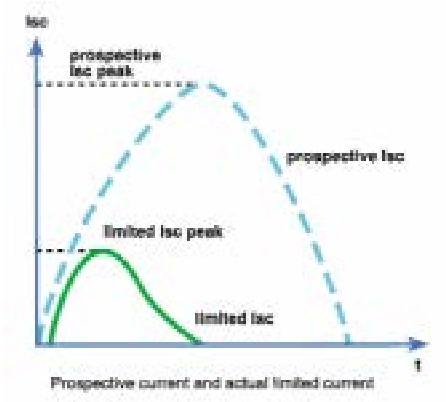
Curve D
tripping:
10 to 14 In;
protection of high surge circuits, welders, transformers, motors.

Curve MA
(magnetic only)
tripping: 12 In;
protection of motor starters (+ thermal protection when combined with contactor).

Circuit Breaker Marking



1. Circuit Breaker Model Number
2. Tripping Curve
3. Circuit Breaker Current Rating
4. Operating Voltage
5. Rated Breaking Capacity
6. Circuit Breaker Part Number
7. Electrical Diagram - No. of Poles
8. I^2t classification



Circuit Breaker Limitation Capability

The limitation capability of a circuit breaker is that characteristic whereby only a current less than the prospective fault current is allowed to flow under short-circuit conditions.

This is illustrated by limitation curves which give:

- The limited peak current in relation to the RMS value of the prospective short-circuit current (the short-circuit current being that current which would flow continuously in the absence of protection equipment).
- The limited current stress in relation to the RMS value of the prospective short-circuit current.
- Current limiting capability. The advanced design of the Multi-9 range provides current limitation with far better protection than conventional circuit breakers. For example, on a 6A rating with a prospective short circuit of 5000A, the current will be limited at 350A or 7%.

Installation of current limiting circuit breakers offers several advantages:

- **Better network protection**
  Current limiting circuit breakers considerably reduce the undesirable effects of short-circuit currents in an installation.
- **Reduced thermal effects**
  Cable heating is reduced, hence longer cable life.
- **Reduced mechanical effects**
  Electrodynamic forces reduced, thus electrical contacts are less likely to be deformed or broken.
- **Reduced electromagnetic effects**
  Measuring equipment situated near an electrical circuit less affected.

For supplementary technical information, consult AUS010306

protection

circuit-breakers up to 63 A

C60a circuit-breakers

4.5 kA, C curve
AS/NZS 4898

Approval No: N13634

functions

The circuit-breakers combine the following functions:
- protection of circuits against short-circuit currents,
- protection of circuits against overload currents,
- control,
- isolation,
- protection of persons against indirect contact.

- C60a circuit-breakers are used in the domestic sectors where single phase fault levels are less than or equal to 4.5kA.

description

technical data
C60a circuit-breakers

■ power circuit
□ voltage rating: 240 V AC
□ number of cycles (O-C): 10 000
□ foolproof terminal design
- moving barrier prevents incorrect cable insertion
- cable strand centering guides ensure correct cable positions and strand grouping
□ isolation with positive contact indication
□ bistable din clip, simplifies disassembly

■ environment
□ tropicalisation: treatment 2
(relative humidity: 95 % at 55 °C)
□ connection: tunnel terminals for the following cables:
- up to 25A : 25mm^2 stranded
- 32 to 63A : 35mm^2 stranded

C curve

utilisation
cables feeding conventional loads.

technical data

■ power circuit
□ tripping curves: the magnetic trip unit operates between 5 and 10 In
□ breaking capacity
- according to AS/NZS 4898 Icu ultimate breaking capacity (0-C0 cycle):

rating (A)	voltage (V)	breaking capacity Icu (A)
1...63	240	4500

catalogue numbers

11357

C curve C60a

type		rating (A)	catalogue number	width in mod. of 9 mm	quantity per box
1P		6	**11354**	2	12
		10	**11355**	2	12
		16	**11356**	2	12
		20	**11357**	2	12
		25	**11339**	2	12
		32	**11358**	2	12
		40	**11359**	2	12
		50	**11360**	2	12
		63	**11361**	2	12

protection

circuit-breakers up to 63 A

C60N circuit-breakers

6kA, C curve
AS/NZS 4898

Approval No: N13634

functions

The circuit-breakers combine the following functions:
- protection of circuits against short-circuit currents,
- protection of circuits against overload currents,
- control,
- isolation,
- protection of persons against indirect contact.

description

technical data common to C60N circuit breakers

■ power circuit
□ voltage rating: 240/415 V AC
- for 2P single phase 240/480V
□ I^2t classification: 3
□ number of cycles (O-C): 20 000
□ foolproof terminal design
- moving barrier prevents incorrect cable insertion
- cable strand centering guides ensure correct cable positions and strand grouping
□ isolation with positive contact indication
□ bistable din clip, simplifies disassembly

■ environment
□ tropicalisation: treatment 2
(relative humidity: 95 % at 55 °C)
□ connection: tunnel terminals for the following cables:
- up to 25A : 16mm^2 flexible with cable end
: 25mm^2 stranded
- 32 to 63A : 25mm^2 flexible with cable end
: 35mm^2 stranded

C curve

utilisation
cables feeding conventional loads.

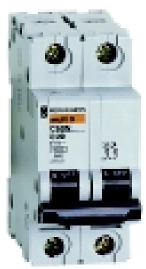
technical data

■ power circuit
□ tripping curves: the magnetic trip units operate between 5 and 10 In
□ breaking capacity according to AS/NZS 4898, Icu ultimate breaking capacity (O-CO cycle):

rating (A)	type	voltage (V)	breaking capacity Icu (A)
1...63	**1P**	240/415	6 000
	2P	415...480	6 000
	3P	415	6 000

catalogue numbers

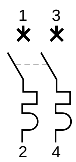
25804

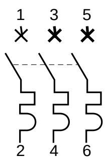


25818

25832

type		rating (A)	catalogue number
C curve C60N			
1P	Width in mod of 9mm - 2	1	**25797**
		2	**25798**
		4	**25800**
		6	**25801**
		10	**25802**
		16	**25803**
		20	**25804**
		25	**25805**
		32	**25806**
		40	**25807**
		50	**25808**
		63	**25809**
2P	Width in mod of 9mm - 4	1	**25811**
		2	**25812**
		4	**25814**
		6	**25815**
		10	**25816**
		16	**25817**
		20	**25818**
		25	**25819**
		32	**25820**
		40	**25821**
		50	**25822**
		63	**25823**
3P	Width in mod of 9mm - 6	1	**25825**
		2	**25826**
		4	**25828**
		6	**25829**
		10	**25830**
		16	**25831**
		20	**25832**
		25	**25833**
		32	**25834**
		40	**25835**
		50	**25836**
		63	**25837**





protection

circuit-breakers up to 63 A

C60H circuit-breakers

10kA, B, C and D curves
AS/NZS 4898

Approval No: N13634

functions

The circuit-breakers combine the following functions:
- protection of circuits against short-circuit currents,
- protection of circuits against overload currents,
- control,
- isolation,
- protection of persons against indirect contact.

description

technical data common to C60H circuit-breakers

■ power circuit
□ voltage rating: 240/415 V AC
□ breaking capacity
- according to AS/NZS 4898,
Icv ultimate breaking capacity (O-CO cycle):

rating (A)	type	voltage (V)	break. cap. Icu (A)
1…63	**1P, 2P**	240/415	10 000
	3P, 4P	415…480	10 000

□ I^2t classification: 3
□ foolproof terminal design
- moving barrier prevents incorrect cable insertion
- cable strand centering guides ensure correct cable positions and strand grouping
□ isolation with positive contact indication
□ bistable din clip, simplifies disassembly
□ isolation with positive contact indication: opening is indicated by a green strip on the device operating handle. This indicator shows opening of all the poles
□ number of cycles (O-C): 20 000

■ environment
□ tropicalisation: treatment 2
(relative humidity: 95 % at 55 °C)
□ connection: tunnel terminals for the following cables:
- up to 25A :16mm^2 flexible with cable end; 25mm^2 stranded
- 32 to 63A :25mm^2 flexible with cable end; 35mm^2 stranded

B curve

utilisation
when there are small inrush currents (generators, long cables).

technical data

■ power circuit
□ tripping curve:
the magnetic trip units operate between 3 and 5 In.

C curve

utilisation
cables feeding conventional loads.

technical data

■ power circuit
□ tripping curve:
the magnetic trip units operate between 5 and 10 In.

D curve

utilisation
loads with a high inrush current (motors, transformers).

technical data

■ power circuit
□ tripping curve:
the magnetic trip units operate between 10 and 14 In.

protection

circuit-breakers up to 63 A

C60H circuit-breakers

10kA, B, C and D curve
AS/NZS 4898

Approval No: N13634

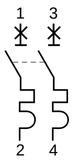
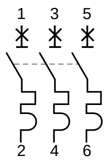
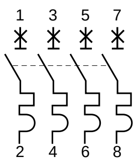
catalogue numbers


25845


25857


25871


25883

type	rating (A)	B Curve	C Curve	D Curve
C60H				
1P 	1	25839	25639	25695
	2	25840	25640	25696
	4	25841	25642	25698
	6	25842	25643	25699
	10	25843	25644	25700
	16	25844	25645	25701
	20	25845	25646	25702
	25	25846	25647	25703
Width in mod	32	25847	25648	25704
of 9mm - 2	40	25848	25649	25705
	50	25849	25651	25707
	63	25850	25652	25708
2P 	1	25852	25653	25709
	2	25853	25654	25710
	4	25854	25656	25712
	6	25855	25656	25713
	10	25856	25658	25714
	16	25857	25659	25715
	20	25858	25660	25716
	25	25859	25661	25717
	32	25860	25662	25718
	40	25861	25663	25719
Width in mod	50	25862	25665	25721
of 9mm - 4	63	25863	25666	25722
3P 	1	25865	25667	25723
	2	25866	25668	25724
	4	25867	25670	25726
	6	25868	25671	25727
	10	25869	25672	25728
	16	25870	25673	25729
	20	25871	25674	25730
	25	25872	25675	25731
	32	25873	25676	25732
	40	25874	25677	25733
Width in mod	50	25875	25679	25735
of 9mm - 6	63	25876	25680	25736
4P 	1	25878	25007	25211
	2	25879	25008	25212
	4	25880	25010	25214
	6	25881	25011	25215
	10	25882	25012	25216
	16	25883	25013	25217
	20	25884	25014	25218
	25	25885	25015	25219
	32	25886	25016	25220
	40	25887	25017	25221
Width in mod	50	25888	25018	25222
of 9mm - 8	63	25889	25019	25223

C120N circuit-breakers

10kA, B, C curves - AS/NZS 4898
10kA, D curve AS 3947-2

function

The circuit-breakers combine the following functions:
- protection of circuits against short circuit currents,
- protection of circuits against overload currents,
- control,
- isolation,
- protection of persons against indirect contact.

description

Technical data common to C120N circuit breakers

■ power circuit
□ current rating: 63 to 125 A
□ voltage rating 415 V AC
□ insulation voltage Ui: 500 V
□ impulse withstand voltage Uimp: 6 kV
□ breaking capacity:
- according to AS/NZS 4898 Icv ultimate breaking capacity (O-CO cycle)

type	voltage (V)	breaking cap. Icu (A)
1, 2, 3, 4P	240/415	10000

□ according to AS3947-2 Icu ultimate breaking capacity (O-CO cycle)

type	voltage (V)	breaking cap. Icu (kA)
1P	240	10
	415	3
2, 3, 4P	400…415	10

□ mechanical durability:
- 20000 cycles (O-C)
□ electrical durability:
- 63 A: 10000 cycles (O-C)
- 80…125 A: 5000 cycles (O-C)
□ I^2t classification: 3
□ isolation with positive contact indication: opening is indicated by a green strip on the device operating handle. This indicator shows opening of all the poles
□ foolproof terminal design
- moving barrier prevents incorrect cable insertion
- cable strand centering guides ensure correct cable positions and strand grouping
□ bistable din clip: simplifies disassembly
□ 63 to 125A: - up to 35mm^2 flexible with cable end
- up to 50mm^2 stranded

B curve

Approval No:Q00542

utilisation
when there are small inrush currents (generators, long cables).

technical data

■ power circuit
□ tripping curve:
the magnetic trip units operate between 3 and 5 In.

C curve

Approval No:Q00542

utilisation
cables feeding conventional loads.

technical data

■ power circuit
□ tripping curve:
the magnetic trip units operate between 5 and 10 In.

D curve - For industrial use only

utilisation
loads with a high inrush current (motors, transformers).

technical data

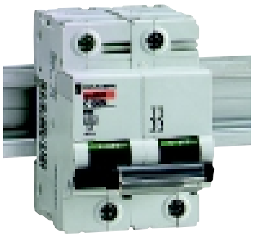
■ power circuit
□ tripping curve:
the magnetic trip units operate between 10 and 14 In.

C120N circuit-breakers

10kA, B, C curves - AS/NZS 4898
10kA, D curve AS 3947-2

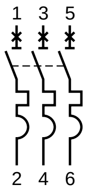
catalogue numbers

18340



18344

18349



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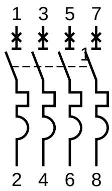


type	rating (A)	B Curve	C Curve	D Curve
B curve C120N				
1P	63	**18340**	**18356**	**18378**
	80	**18341**	**18357**	**18379**
	100	**18342**	**18358**	**18380**
	125	**18343**	**18359**	**18381**
Width in mod of 9mm - 3				
2P	63	**18344**	**18360**	**18382**
	80	**18345**	**18361**	**18383**
	100	**18346**	**18362**	**18384**
	125	**18347**	**18363**	**18385**
Width in mod of 9mm - 6				
3P	63	**18348**	**18364**	**18386**
	80	**18349**	**18365**	**18387**
	100	**18350**	**18367**	**18388**
	125	**18351**	**18369**	**18389**
Width in mod of 9mm - 9				
4P	63	**18352**	**18371**	**18390**
	80	**18353**	**18372**	**18391**
	100	**18354**	**18374**	**18392**
	25	**18355**	**18377**	**18393**
Width in mod of 9mm - 12				

C120H circuit-breakers

15kA, B, C curves - AS/NZS 4898
15kA, D curve AS 3947-2

function

The circuit-breakers combine the following functions:
- protection of circuits against short circuit currents,
- protection of circuits against overload currents,
- control,
- isolation,
- protection of persons against indirect contact.

description

Technical data common to C120N circuit breakers

■ power circuit
□ current rating: 10 to 125 A
□ voltage rating 415 V AC
□ insulation voltage Ui: 500 V
□ impulse withstand voltage Uimp: 6 kV
□ breaking capacity:
- according to AS/NZS 4898 Icu ultimate breaking capacity (O-CO cycle)

type	voltage (V)	breaking cap. Icu (A)
1, 2, 3, 4P	240/415	15000

□ according to AS3947-2 Icu ultimate breaking capacity (O-CO cycle)

type	voltage (V)	breaking cap. Icu (kA)
1P	240	15
	415	4.5
2, 3, 4P	400…415	15

□ mechanical durability:
- 20000 cycles (O-C)
□ electrical durability:
- 63 A: 10000 cycles (O-C)
- 80…125 A: 5000 cycles (O-C)
□ I^2t classification: 3
□ isolation with positive contact indication: opening is indicated by a green strip on the device operating handle. This indicator shows opening of all the poles
□ foolproof terminal design
- moving barrier prevents incorrect cable insertion
- cable strand centering guides ensure correct cable positions and strand grouping
□ bistable din clip: simplifies disassembly
□ 63 to 125A: - up to 35mm^2 flexible with cable end
- up to 50mm^2 stranded

B curve

Approval No:Q00542

utilisation
when there are small inrush currents (generators, long cables).

technical data

■ power circuit
□ tripping curve:
the magnetic trip units operate between 3 and 5 In.

C curve

Approval No:Q00542

utilisation
cables feeding conventional loads.

technical data

■ power circuit
□ tripping curve:
the magnetic trip units operate between 5 and 10 In.

D curve - For industrial use only

utilisation
loads with a high inrush current (motors, transformers).

technical data

■ power circuit
□ tripping curve:
the magnetic trip units operate between 10 and 14 In.

protection

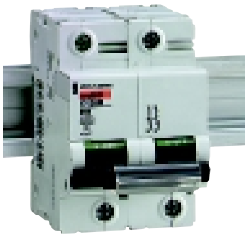
circuit-breakers up to 125 A

C120H circuit-breakers

15kA, B, C curves - AS/NZS 4898
15kA, D curve AS 3947-2

catalogue numbers

18394



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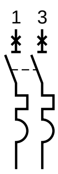

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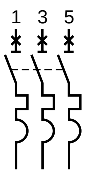

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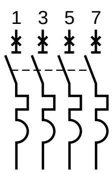


type	rating (A)	B Curve	C Curve	D Curve
C120H				
1P	10	18394	18438	18482
	16	18395	18439	18483
	20	18396	18440	18484
	25	18397	18441	18485
	32	18398	18442	18486
	40	18399	18443	18487
	50	18400	18444	18488
	63	18401	18445	18489
	80	18402	18446	18490
	100	18403	18447	18491
	125	18404	18448	18492
Width in mod of 9mm - 3				
2P	10	18405	18449	18493
	16	18406	18449	18494
	20	18407	18451	18495
	25	18408	18452	18496
	32	18409	18453	18497
	40	18410	18454	18498
	50	18411	18455	18499
	63	18412	18456	18500
	80	18413	18457	18501
	100	18414	18458	18502
	125	18415	18459	18503
Width in mod of 9mm - 6				
3P	10	18416	18460	18504
	16	18417	18461	18505
	20	18418	18462	18506
	25	18419	18463	18507
	32	18420	18464	18508
	40	18421	18465	18509
	50	18422	18466	18510
	63	18423	18466	18511
	80	18424	18468	18512
	100	18425	18469	18513
	125	18426	18470	18514
Width in mod of 9mm - 9				
4P	10	18427	18471	18515
	16	18428	18472	18516
	20	18429	18473	18517
	25	18430	18474	18518
	32	18431	18475	18519
	40	18432	18476	18520
	50	18433	18477	18521
	63	18434	18478	18522
	80	18435	18479	18523
	100	18436	18480	18524
	125	18437	18481	18525
Width in mod of 9mm - 12				

electrical auxiliaries
for C60 and C120 circuit-breakers

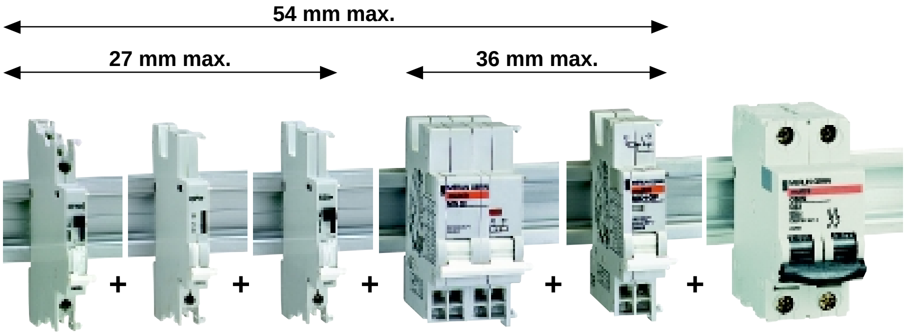
function

They allow remote tripping or indication of circuit-breakers, with or without a Vigi module.

description

- they are mounted on the left-hand side of the circuit-breaker within a width limit of 54 mm
- fixed using clips (without tools) on the left-hand side of the circuit-breaker
- compatible with Vigi modules (adaptable on the right-hand side)
- a maximum of 3 indication auxiliaries on the same circuit-breaker
- a maximum of 2 OF+SD/OF auxiliary switches on the same circuit-breaker
- a maximum of 2 MX+OF or MN tripping auxiliaries on the same circuit-breaker
- a maximum of 1 MN$\boxed{s}$ or MNx or MSU tripping auxiliary on the same circuit-breaker.

auxiliary combination



OF+SD/OF auxiliary contact | *OF auxiliary contact* | *SD fault indicating switch* | *MN$\boxed{s}$, MNx or MSU auxiliary* | *MX + OF or MN auxiliary* | *circuit-breaker*

electrical auxiliaries
for C60 and C120 circuit-breakers

tripping
Visualisation of tripping by means of the red indicator on front face.

MX + OF shunt trip
Remote tripping of a circuit-breaker:
■ equipped with an OF changeover switch:
- to indicate the circuit-breaker's position
- to carry out self-breaking allowing the control circuit to remain energized.

Undervoltage releases (MN, MN $\boxed{S}$)
Controls the tripping of a circuit-breaker when its supply voltage drops (threshold between 70 and 35 % of Un)
It allows for manual closing of the circuit-breaker if its voltage exceeds 85 % of the rated voltage

delayed MN $\boxed{S}$ release
0.2 second time-delay: prevents tripping due to brownouts or momentary voltage decreases.

MNx release for opening pushbutton
Completely unaffected by power supply circuit cuts, it is recommended for fail-safe emergency stopping. Replaces the MX "voluntary" release equipped with its NO/NC indicator lights.

MSU overvoltage
MSU voltage threshold release
Specially designed to monitor voltage between the neutral and phase(s) conductors, it cuts power supply by opening the circuit-breaker in event of an overvoltage. For overvoltages lasting for more than a few seconds.

technical data
Complance with standard: AS 3947-2

□ release consumption

type	voltage (V AC or DC)			power (W or VA)
MX+OF	415 V	AC	inrush	120
	220...240 V	AC	inrush	50
	110...130 V	AC	inrush	200
		DC	inrush	10
	48 V	AC	inrush	22
		DC	inrush	12
	24 V	AC	inrush	120
		DC	inrush	120
	12 V	AC	inrush	20
		DC	inrush	20
MN	220...240 V	AC	holding	4.1
	48 V	AC	holding	4.3
		DC	holding	2.0
MN $\boxed{S}$	220...240 V	AC	holding	4.1
MNx	230	AC	inrush	50
	400	AC	inrush	120
MSU	230	AC	inrush	50
	400	AC	inrush	120

remote indication

OF auxiliary switch
□ changeover switch that indicates the "open" or "closed" position of the circuit-breaker.
□ test button on the front face that allows for the indication circuit to be verified without operating the circuit-breaker

SD fault indicating switch
□ changeover switch that indicates the "fault trip" position of the circuit-breaker
□ visualisation of the fault (SD) by means of a mechanical indicator on front face.

OF+SD/OF selector switch
□ double changeover switch that indicates:
□ the "open" or "closed" position of the circuit-breaker (OF)
□ the "fault trip" position of the circuit-breaker (SD).
□ 2 circuits:
- upper: OF
- lower: SD or OF.
□ function is selected using rotary selector switch on the right-hand side
□ the selected function is indicated on the front face
□ visualisation of the fault (SD) by means of a red mechanical indicator on front face.

technical data
Complies with standard: AS 3947-2

□ rated current of auxiliary contacts

voltage (V AC or DC)		rated current (A)
415 V	AC	3
≤ 240 V	AC	6
130 V	DC	1
≤ 48 V	DC	2
≤ 24 V	DC	6

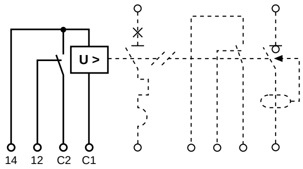
connection
■ using screw clamp terminals for 1 or 2 cables (max. 2.5 mm²)
■ visible markers near terminals.

electrical auxiliaries
for C60 and C120 circuit-breakers

references

type	control voltage (V AC)	control voltage (V DC)	catalogue number	width in mod. of 9 mm
MX + OF shunt release				
	220...415	110...130	**26946**	2
	48...130	48	**26947**	2
	24	24	**26948**	2
	12	12	**26949**	2

26946

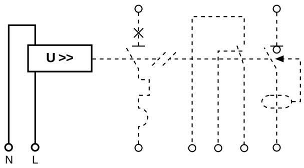


MSU overvoltage release

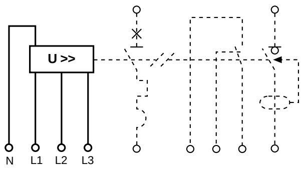
type	control voltage (V AC)	control voltage (V DC)	catalogue number	width in mod. of 9 mm
1P + N	220...240		**26979**	4
3P + N	380...415		**26980**	4

26979

1P + N



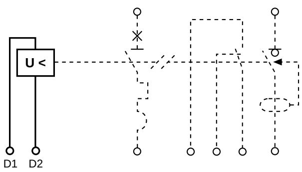
3P + N

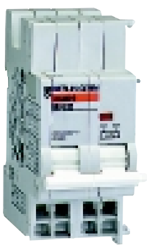


MN undervoltage release

type	control voltage (V AC)	control voltage (V DC)	catalogue number	width in mod. of 9 mm
instantaneous	220...240		**26960**	2
	48		**26961**	2
		48	**26962**	2
delayed 🅂	220...240		**26963**	4

instantaneous



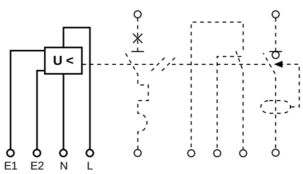


26963

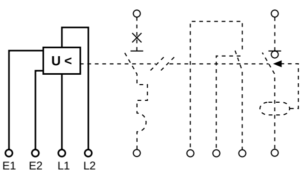
MNx release for opening pushbutton

type	control voltage (V AC)	control voltage (V DC)	catalogue number	width in mod. of 9 mm
Ph + N	220...240		**26969**	4
Ph to Ph	380...415		**26971**	4

Ph + N



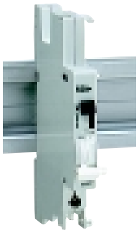
Ph to Ph



26969

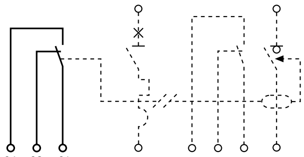
electrical auxiliaries
for C60 and C120 circuit-breakers

type	control voltage (V AC)	control voltage (V DC)	catalogue number	width in mod. of 9 mm
SD fault indicating switch			**26927**	1
OF auxiliary contact			**26924**	1
OF+SD/OF selector switch			**26929**	1



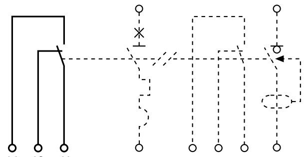
26927

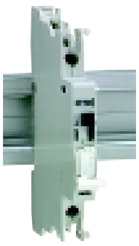
SD fault indicating switch



26924

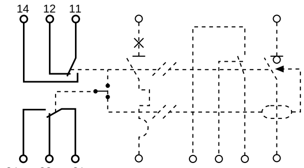
OF auxiliary contact





26929

OF+SD/OF selector switch



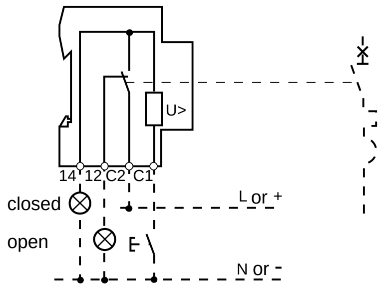
OF contact and SD switch, MX+OF, MN and MN$\boxed{\text{S}}$ releases
for C60 and C120 circuit-breakers

shunt release MX + OF

application

- remote opening by circuit-breaker tripping, of electrical lighting circuits, etc
- terminals 12 and 14 are used for indication of the circuit-breaker OF position, at a voltage identical to coil voltage
- indication on the front face of the tripped function, by a red mechanical indicator.

connection

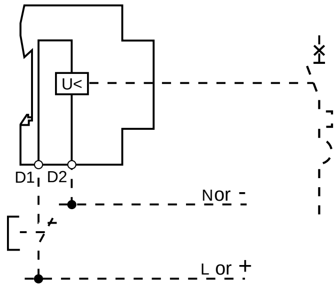


undervoltage release MN or MN$\boxed{\text{S}}$

application

- opening of electrical circuits by circuit-breaker tripping:
  - either by emergency stopping (mushroom head pushbutton)
  - or on mains failure
- impossibility of uncontrolled restart is particularly recommended in two cases cases, thus guaranteeing complete safety:
  - when the machine operator is confronted with a risk of untimely restart: circular saw, rotating machine, etc
  - when it is necessary to control restart of an installation further to a mains failure
- indication on the front face of the tripped function, by a red mechanical indicator
- the MN coil is accepted as an emergency stopping device by the installation standard. However it does not indicate the OFF position of a circuit-breaker.

connection



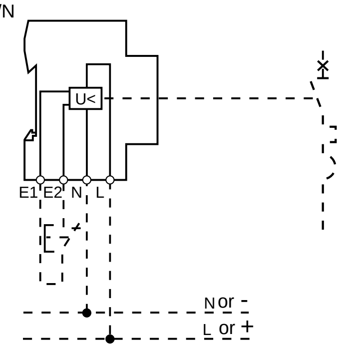
MNx release for emergency stopping on opening

application

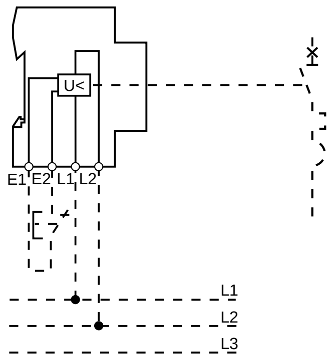
- remote opening of the circuit by circuit-breaker tripping on a voluntary order:
  - emergency stop pushbutton on opening (fail-safe)
  - completely unaffected by network fluctuations.

connection

Ph/N



Ph/Ph



OF contact and SD switch, MX+OF, MN and MNs releases
for C60 and C120 circuit-breakers

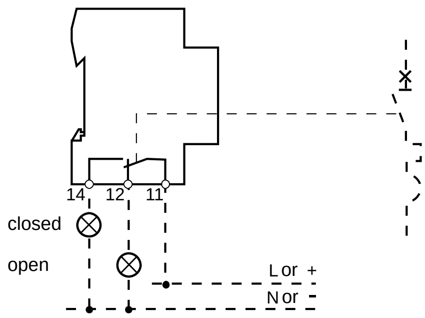
OF auxiliary contact

application

■ audible or visual indication of circuit-breaker "open" or "closed" contact status
□ this indication can be transferred to the front face of a cubicle or enclosure or centralised on a control desk
□ optional contact testing using the knob on the front face, with the circuit-breaker open.

circuit-breaker	OF contact position
open	11-12
closed	11-14
tripped	11-12

connection



SD fault indicating switch

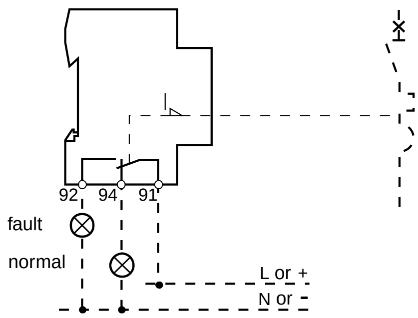
application

■ audible or visual indication of circuit-breaker tripped status: climatic room, lift, ventilation, etc

■ front face indication of contact status (red mechanical indicator) and of the "fault clearance" function
□ optional resetting of indication separately from the circuit-breaker
□ optional testing of contact on front face, with the circuit-breaker open.

circuit-breaker	OF contact position
open	91-94
closed	91-94
tripped	91-92

connection



OF + SD/OF changeover auxiliary switch

application

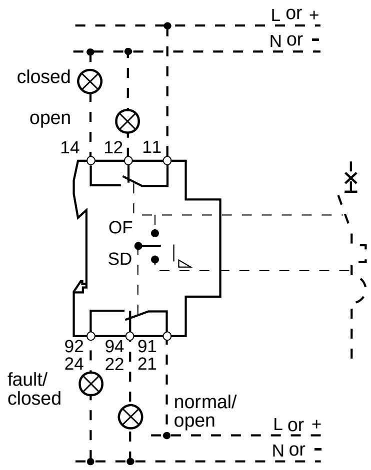
■ double changeover switch:
□ the top switch indicates the "open" or "closed" status of the circuit-breaker
□ the bottom switch indicates according to user choice:
- the "open" or "closed" status (OF)
- the "tripped" status (SD)

■ front face indication of the tripped status, by red mechanical indicator (regardless of lateral selector switch position)
□ optional testing of the bottom switch (SD changeover) on the front face, with the circuit-breaker open
□ optional resetting of indication separately from the circuit-breaker.

circuit-breaker	OF contact position	
open	11-12	21-22
closed	11-14	21-24
tripped	11-12	21-22

circuit-breaker	SD switch position
open	91-94
closed	91-94
tripped	91-92

connection



Vigi modules for C60 and C120 circuit-breakers

function

Common function
Adaptable toC60 & C120 circuit-breakers to 125 A - 2, 3, 4P, the Vigi up module ensures:
■ the protection of electrical installations against insulation faults
■ the protection of persons against indirect contact: medium sensitivities (300, 500mA)
■ additional protection of persons against direct contact: high sensitivity (30 mA)
The C60/C120 residual current device complies
with standard EN 61009: no heat derating of the circuit-breaker
It is equipped with a locating device that ensures the correct rating and number of poles
The technical data of circuit-breakers that are combined with Vigi modules remain unchanged and the circuit-breakers remain compatible with indication or control auxiliaries
AC class
Vigi module for which tripping is ensured by sinusoidal AC currents whether they are quickly applied or rise slowly

Instantaneous
It ensures instantaneous tripping (not time-delayed)
Selective S
Selective S Vigi modules allow for total vertical discrimination if:
■ upstream devices are s or delayed
■ downstream devices are instantaneous and their sensitivity is less than IDn/2 of the upstream device.

description

Technical data
■ the Vigi module incorporates the residual current relay and toroid in a case. Its earth leakage module is electro-mechanical.
It functions without an auxiliary power supply source and thus has a very wide operating range
■ protected against nuisance tripping due to transient overvoltages (lightning stroke, switchgear switching on the network, etc.)
■ breaking and making capacity upon short-circuit is equal to the breaking capacity of the circuit-breaker
■ instantaneous or selective s trip units
■ reinforced electromagnetic compatibility

■ remote tripping:
possible using an MX or MN release on circuit-breaker
■ connection by tunnel terminals in mod. of 9mm
■ fault indication by means of a red strip on the resetting handle
■ resetting the Vigi module, at user's convenience:
□ either using the circuit-breaker handle
□ or independently of the circuit-breaker.

■ AC class: 50/60Hz
■ Minimum operating threshold for test button
□ Vigi C60 : 100VAC
□ Vigi C120 : 176VAC
■ AS3190, AS/NZS61009 (IEC61009)
■ Connection by tunnel terminals
□ Vigi C60 : up to 35mm2 stranded cables
□ Vigi C120 : up to 50mm2 stranded cables
□ Copper or aluminium cables (using aluminium cable terminal).

type	Vigi C60	Vigi C120
2P	4	7
3P	7	10
4P	7	10

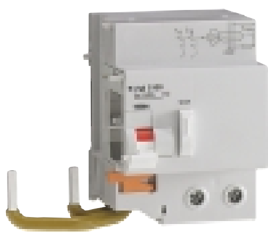
combination of earth leakage modules with circuit-breakers

C120 residual current device

=

C120 circuit breaker

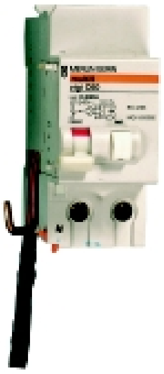
+



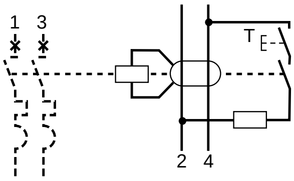
Vigi C120 module

Vigi modules for C60 and C120 circuit-breakers

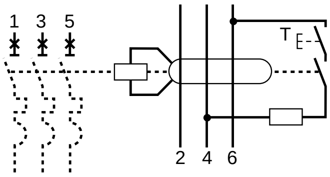
catalogue numbers



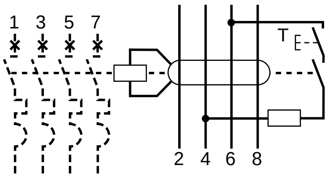
type	voltage (V)	sens. (mA)	catalogue number
Vigi C60 type AC (≤63A)			
2P	240…415	30 mA	26658
		300mA	26660



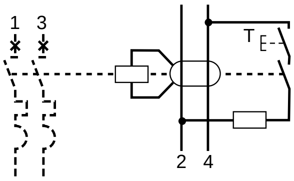
type	voltage (V)	sens. (mA)	catalogue number
3P	415	30 mA	26620
		300mA	26682



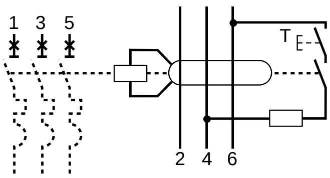
type	voltage (V)	sens. (mA)	catalogue number
4P	415	30 mA	26665
		300mA	26667



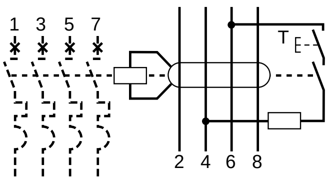
type	voltage (V)	sens. (mA)	catalogue number
Vigi C120 type AC (≤125A)			
2P	230…415	30	18563
		300	18564
		500	18565



type	voltage (V)	sens. (mA)	catalogue number
3P	230…415	30	18566
		300	18567
		500	18568



type	voltage (V)	sens. (mA)	catalogue number
4P	230…415	30	18569
		300	18570
		500	18571

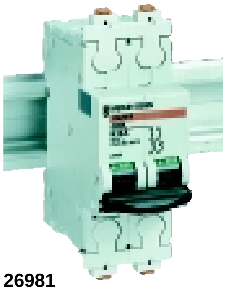


accessories
for C60 and C120 circuit-breakers

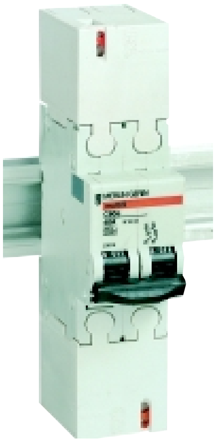
catalogue numbers

type	suitable for		catalogue number	quantity per box
padlocking facility	C60		**26970**	2
	C120		**27145**	4
	C60 circuit-breaker		**26981**	2
	Vigi C60		**26982**	10
	C120 circuit-breaker		**18527**	2
terminal shield	**C60**	1P	**26975**	
		2P	**26976**	
		3P	**26975 + 26976**	
		4P	**26978**	
terminal shield	**C120**	1P	**18526**	
		2P	**2 x 18526**	
		3P	**3 x 18526**	
		4P	**4 x 18526**	
insulated sub-terminal			**19091**	4
aluminium cable terminal			**27060**	1

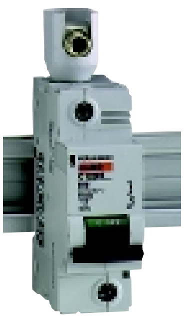
26970



26981



26976



27060

accessories
for C60 and C120 circuit breakers

type		catalogue number	quantity per box
screw connection		**27053**	8
rear connection terminal with 1P terminal shield		**18528**	2
inter-pole barrier		**27001**	10
spacer		**27062**	
marker strips		**27062**	
label holder C120		**27150**	10
replacement wire cover C60	2P	**26483**	5
	3P	**26484**	5
	4P	**26485**	5

18528

27062

marker strips

protection

circuit-breakers up to 40A

C32H-DC circuit-breakers

AS3947-2

functions

The C32H-DC circuit-breakers are designed for the protection and control of power circuits used in DC applications
(eg; security lighting, automation, telephone systems)

description

technical data common to C32H-DC circuit-breakers

■ power circuit
□ voltage rating:
single pole: 125V DC
two pole: 250V DC
□ current ratings: 1 to 40 A set at 40 °C
□ breaking capacity as in AS3947-2,
Icu ultimate breaking capacity
(O-CO operating cycle)

type	rating (A)	voltage (VDC)	breaking capacity Icu (kA)
1P	1 to 40 A	125	10
2P	1 to 40 A	125	20
		250	10

■ tripping curve: type C
the magnetic releases operate between 7 and 10 In.
□ number of operating cycles:
(O-C) 10,000 at L/R ≤ 0.015 sec
□ tropicalisation: treatment 2
(relative humidity 95% at 55°C)
□ connection: tunnel terminals for the following cables:
- 16mm² flexible with cable end
- 25mm² stranded

■ It is imperative to respect the polarity and function of the power supply.

catalogue numbers

20536

type	rating (A)	catalogue number	width in mod of 9 mm	quantity per box
C32H-DC single pole				
	1	**20531**	2	12
	2	**20532**	2	12
	3	**20533**	2	12
	6	**20534**	2	12
	10	**20535**	2	12
	16	**20536**	2	12
	20	**20537**	2	12
	25	**20538**	2	12
	32	**20539**	2	12
	40	**20540**	2	12
2P	1	**20541**	4	6
	2	**20542**	4	6
	3	**20543**	4	6
	6	**20544**	4	6
	10	**20545**	4	6
	16	**20546**	4	6
	20	**20547**	4	6
	25	**20548**	4	6
	32	**20549**	4	6
	40	**20550**	4	6

20550

protection

circuit breakers up to 40A

C32H-DC circuit-breakers for DC applications

selecting the circuit-breaker

The selection of a circuit-breaker most suitable for protection of a DC installation, depends mainly on the following criteria:

- the nominal current, which determines the rating of the equipment
- the type of network
- the nominal voltage, which determines the number of poles to be involved in breaking
- the maximum short-circuit current at the point of installation, which determines the breaking capacity

calculation of the short-circuit current (Isc) at the terminal of a battery

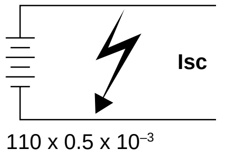
When a short-circuit occurs at its terminals, a battery discharges a current given by Ohm's law:

$$Isc = \frac{Vb}{Ri}$$

where Vb = the maximum discharge voltage (battery 100 % charged)
and Ri = the internal resistance equivalent to the sum of the cell resistances
(figure generally given by the manufacturer in terms of Ampere-hour capacity of the battery).

example
What is the short-circuit current at the terminals of standing battery with the following characteristics:

- capacity: 500 Ah
- maximum discharge voltage: 240 V (110 cells of 2.2 V)
- discharge current: 300 A
- internal resistance: 0.5 mΩ per cell



$Ri = 110 \times 0.5 \times 10^{-3}$

$$Isc = \frac{240}{55 \times 10^{-3}} = 4.4 \text{ kA}$$

As the above calculation shows, the short-circuit current is relatively weak.

Note: if the internal resistance is not known, the following aproximate formula can be used:
Isc = kC, where C is capacity of the battery expressed in Ampere-hours, and k is a coefficient close to 10 but in any case always lower than 20.

protection

circuit breakers up to 40A

C32H-DC circuit-breakers for DC applications

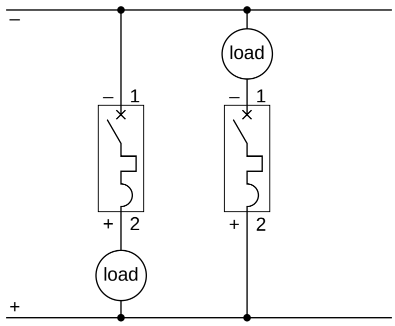
recommendations for use

The C32H-DC special DC circuit-breaker is designed for the control and protection of circuits up to 250 V DC with Isc ≤ 20 kA.
For higher voltages or short-circuit currents, refer to the previous pages.

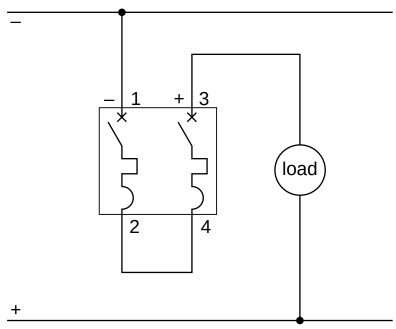
connection diagram

The circuit-breaker connection diagram to be used depends on the service voltage, the Isc of the installation and the position of the load:

C32H-DC 1 pole
- service voltage ≤ 125 V DC
- Isc ≤ 10 kA

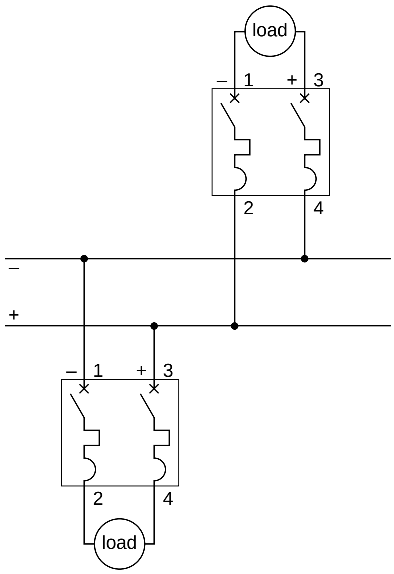


C32H-DC 2 poles
- service voltage ≤ 125 V DC
- Isc ≤ 20 kA



Note :
The C32H-DC is a polarized circuit-breaker, equipped with a permanent magnet for satisfactory breaking of the rated current. In accordance with the diagram to be used, always respect the + and - polarities indicated on the circuit-breaker.

C32H-DC 2 poles
- service voltage ≤ 250 V DC
- Isc ≤ 10 kA



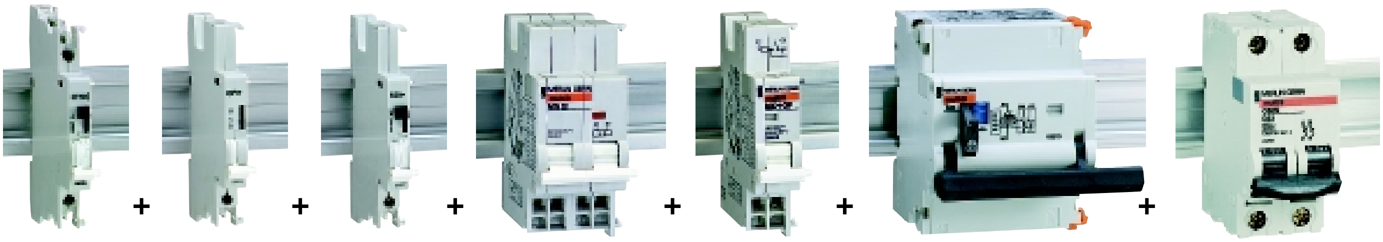
Tm motor mechanism
for C60N/H and C120N/H circuit breakers

function

Tm motor mechanism is used for:
■ the remote control of C60/C120 circuit-breakers (with or without a Vigi module) via a latched order,
■ circuit-breaker resetting after tripping.

Local control using the operating handle continues to be possible, as is adaptation of other circuit-breaker auxiliaries.

description



OF+SD/OF auxiliary switch | *OF auxiliary contact* | *SD fault indicating switch* | *MN$\boxed{S}$,MNx or MSU auxiliary* | *MX + OF or MN auxiliary* | *Tm remote control* | *circuit-breaker*

■ Tm modules are controlled by an electrical latched type order.

■ a disconnection selector switch placed on the front panel is used to:
□ neutralise the remote control
□ lock the remote controlled circuit-breaker in the "open" position (7 mm Ø padlock not supplied).

■ a mechanical indicator shows the "open" or "closed" status of the Tm remote control.

■ reclosing after a fault:
□ must be carried out in manual mode, locally after search and clearance of the fault
□ to impose manual and local resetting, an SD auxiliary switch (ref. 26927), cabled in series in the Tm module, prevents automatic and remote reclosing
□ remote reclosing is possible provided regulations are complied with: resetting takes place by opening the control circuit for more than 1.5 s.

■ auxiliaries in the C60/C120 range, adaptable to circuit-breakers using clips (without tools),
□ instantaneous or delayed undervoltage tripping: MN and MN$\boxed{S}$
□ instantaneous shunt tripping: MX+OF
□ fault trip indication: SD
□ indication of the circuit-breaker's “open” or “closed” position: OF.
■ other possible control modes:□ control by an impulse and/or latched order: ACTc
□ time-delayed: ACTt
□ by BatiBUS network: ATB1s.

technical data

■ control voltage (Uc):
230 V AC (-15 % +10 %)

■ frequency: 50…60 Hz

■ consumption:
□ inrush:
- TmC60: 28 VA
- TmC120: 35 VA
□ holding: 2 VA

■ insensitive to brownouts: ≤ 0.45 s

■ undervoltage behaviour:
□ > 0.45 s, mechanical opening of poles
□ reclosing 2 s after power is restored.

■ number of cylcles (O-C) at 40 °C:
□ Tm + C60: 20 000
□ Tm + C120 (≤ 63 A): 10 000
□ Tm + C120 (80…125 A): 5 000.

■ opening time by Tm: 0.5 s

■ closing time by Tm: 2 s

connection

■ using tunnel terminals:
□ 1 x 6 mm^2 cable
□ 2 x 1.5 mm^2 or 2.5 mm^2 cables.

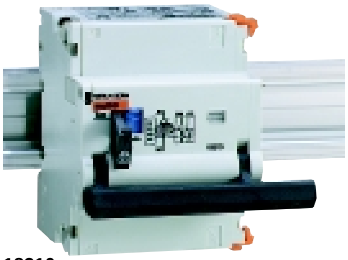
weight

■ 1-2P: 300 g

■ 3-4P: 310 g.

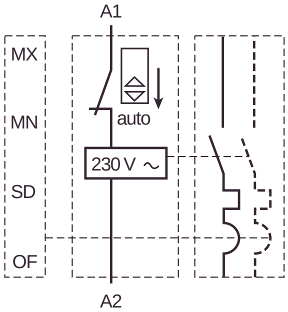
Tm motor mechanism
for C60N/H and C120N/H circuit breakers

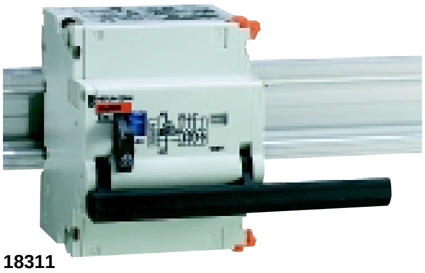
catalogue numbers



18310

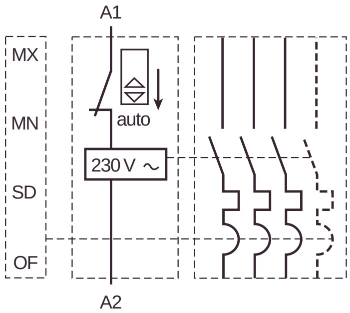
type	voltage (v AC)	catalogue number	width in mod. of 9 mm	quantity per box
C60 1-2P	230	**18310**	7	
C120 1-2P		**18312**	7	





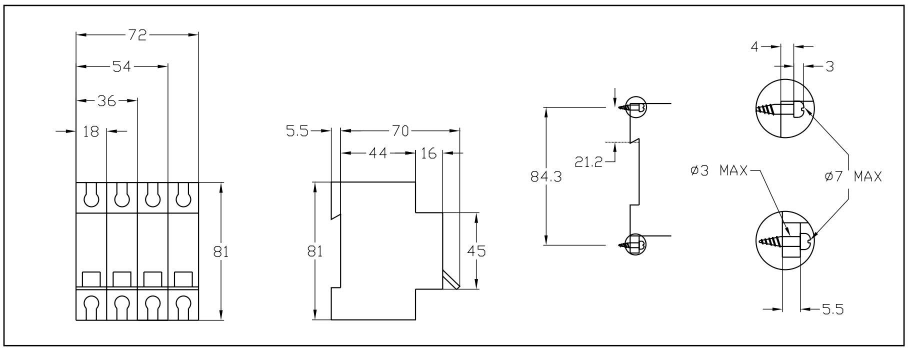
18311

type	voltage (v AC)	catalogue number	width in mod. of 9 mm	quantity per box
C60 3-4P	230	**18311**	7	
C120 3-4P		**18313**	7	

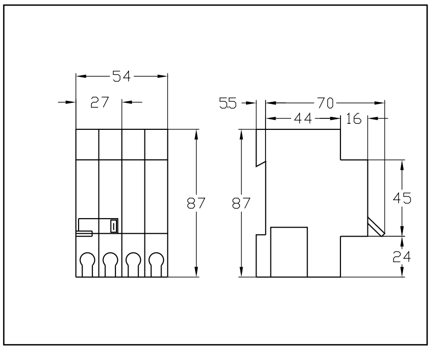


Dimensions

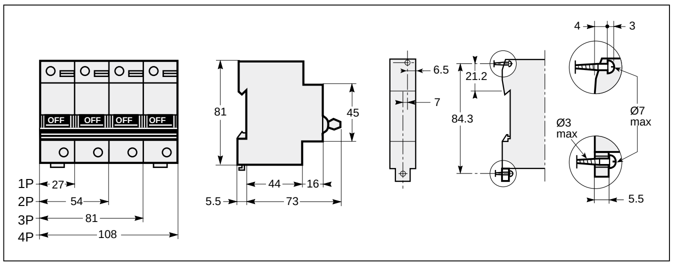
C60a/N/H circuit breakers



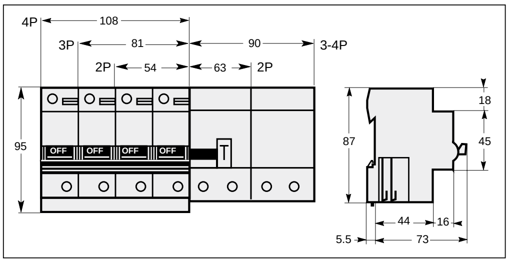
Vigi C60



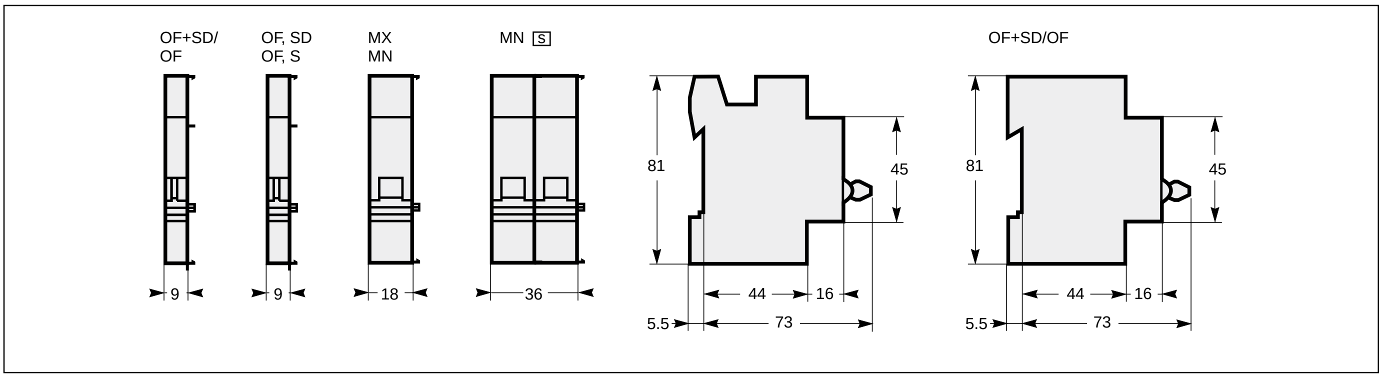
C120N/H circuit breakers



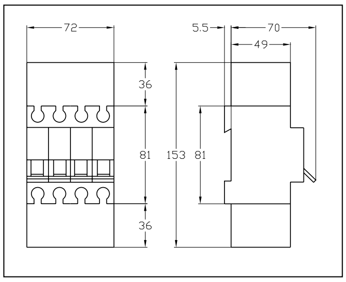
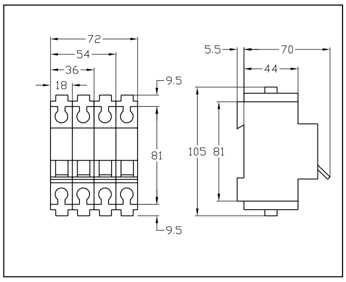
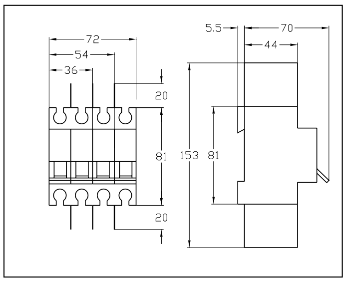
Vigi C120



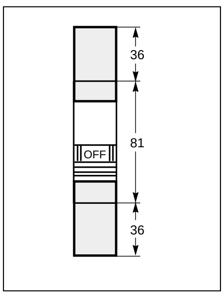
C60/C120 auxiliaries

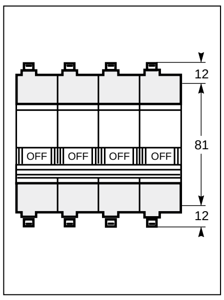


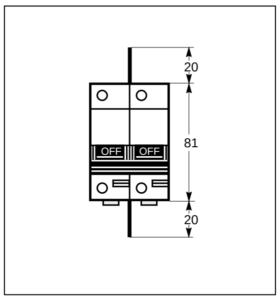
C60 accessories

C120 accessories

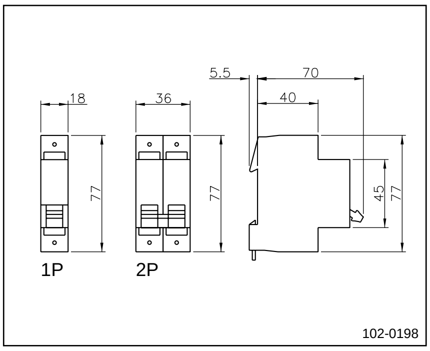




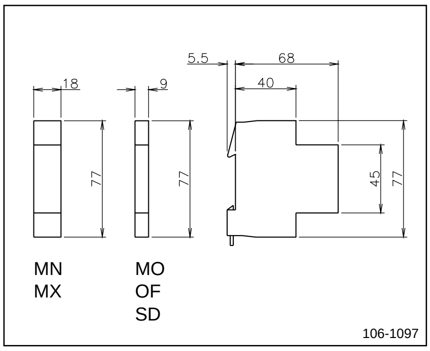


Dimensions

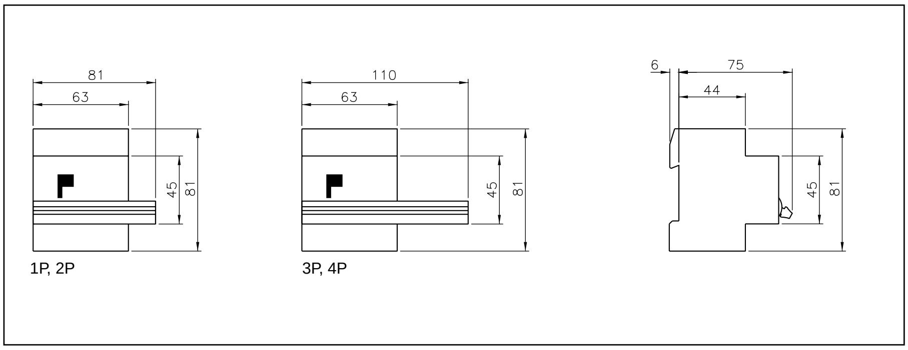
C32H-DC circuit breakers



C32H-DC auxiliaries



Tm C60/C120



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As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

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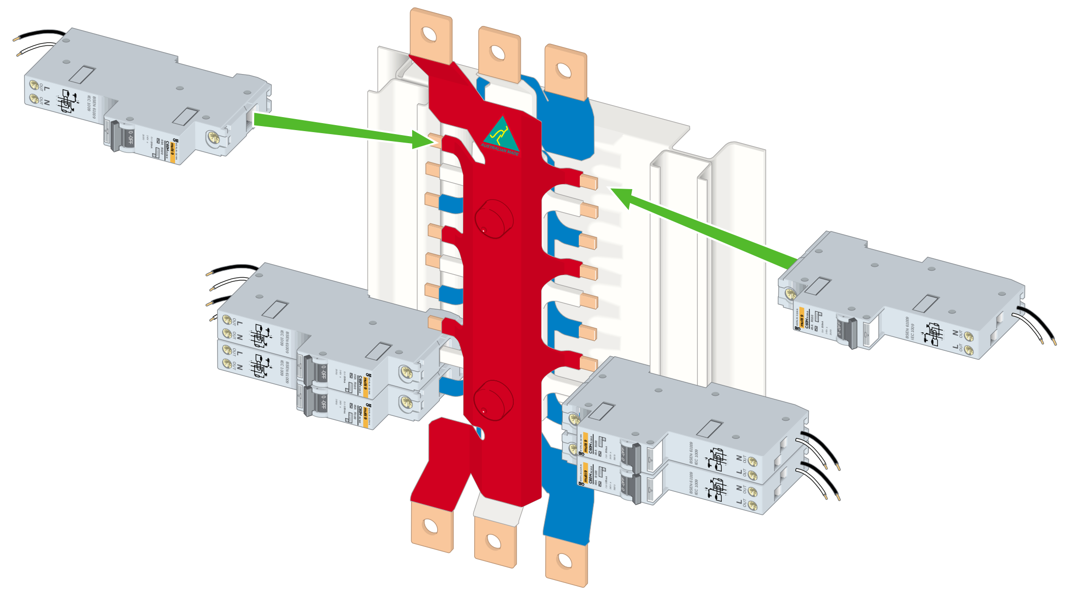
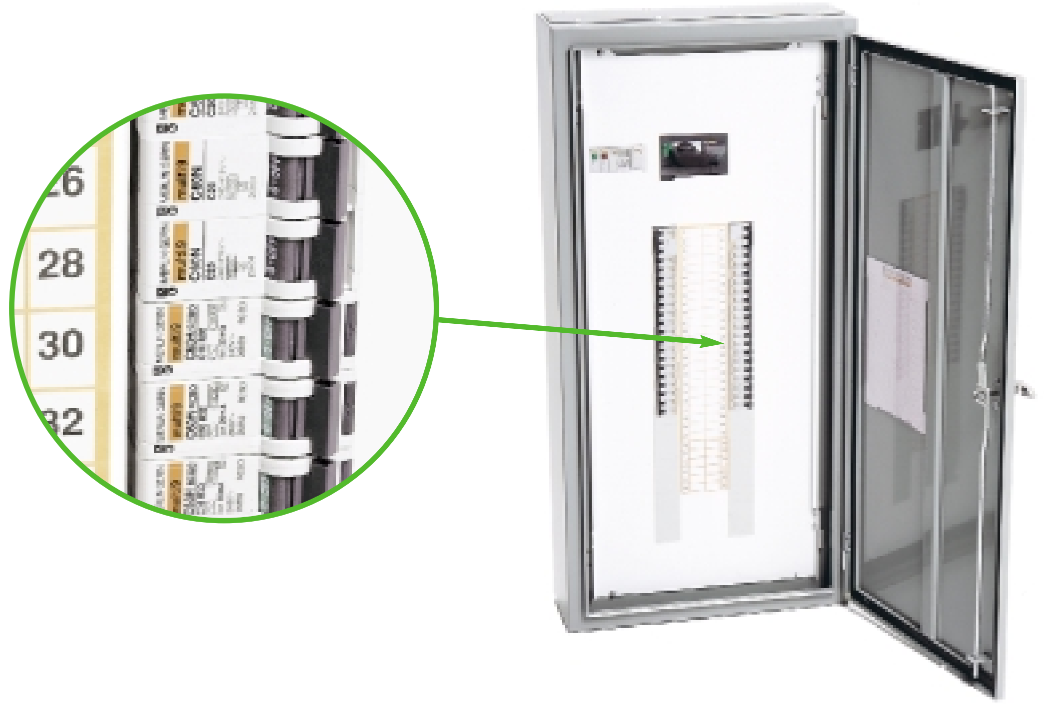
Photos: Schneider Electric
Printing: TBA

C60H Single Pole RCBO

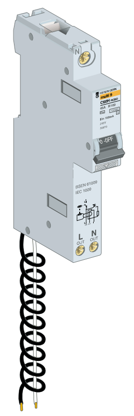
Whether you are trying to incorporate earth leakage protection into a main switchboard or a distribution board...



...you will save time & money with the C60H single pole RCBO

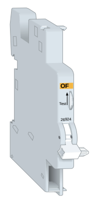


C60H Single Pole RCBO

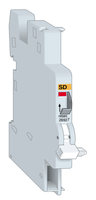


Single Pole RCBO - 10kA

Description	Sensitivity	Rating	Width in mod. of 9mm	Reference
C60H single pole	30mA type AC	10A	2	26858
RCBO		16A	2	26859
C curve		20A	2	26860
		32A	2	26861



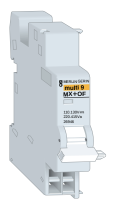
OF auxiliary switch



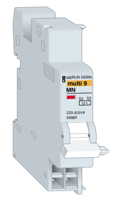
SD alarm switch

Clip on Auxiliaries

Description	Rated voltage	Width in mod. of 9mm	Reference
OF auxiliary switch		1	26924
SD alarm switch		1	26927
MX+OF shunt trip voltage release	240-415V AC 110-130V DC	2	26946
	48-130V AC 48VDC	2	26947
MN undervoltage release	220-240V AC	2	26960
	48V AC	2	26961
	48V DC	2	26962



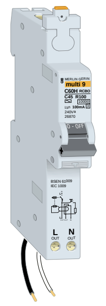
MX+OF shunt trip



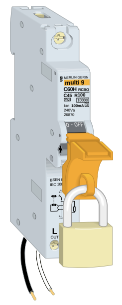
MN undervoltage release

Accessories

Description	Reference
Sealable, line side terminal screw shields	26981
Padlocking attachment	26970



Sealable terminal screw shields



Padlocking attachment

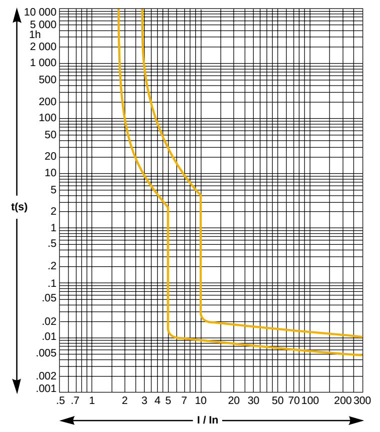
C60H Single Pole RCBO

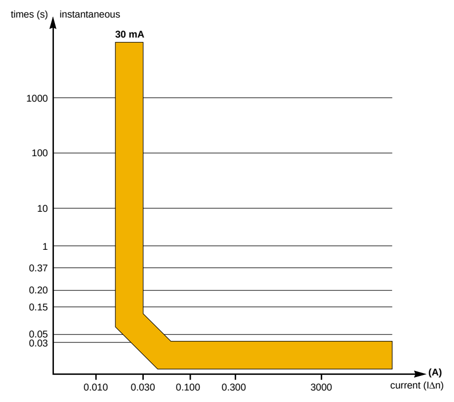
Technical Data

- Voltage rating: 110 - 240V AC
- Breaking capacity I_{cn} - 10kA
- Residual breaking capacity $I_{\Delta m}$ - 6kA
- Current ratings I_n - 10 ...32A
- Electrical endurance (O-C cycles): 20 000
- Tropicalisation: treatment 2 (relative humidity: 95% at 55˚C)
- Weight 240g
- Connection:
- L in: tunnel terminals 25mm^2 cables
  L & N out: tunnel terminals 16mm^2 cables
- Standards: IEC60898, AS/NZS4898, AS3190 Approval number N13634

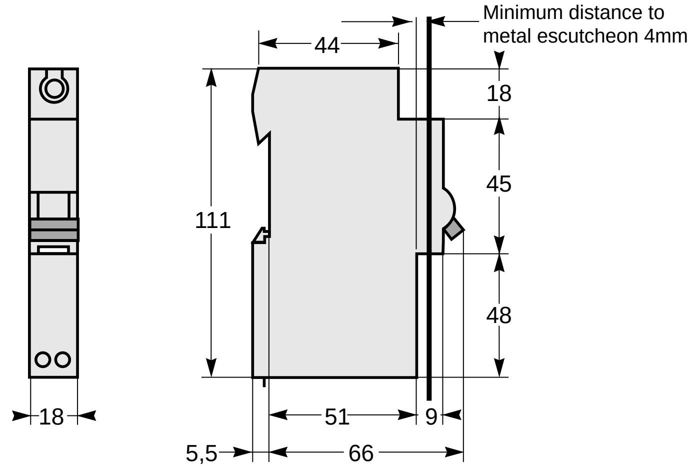
C Curve
tripping curve:
the magnetic trip operates between 5 and 10 In

Tripping Curves



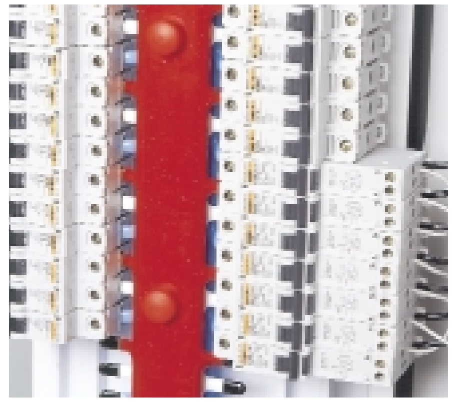


Dimensions



C60H Single Pole RCBO

Aesthetics & Convenience

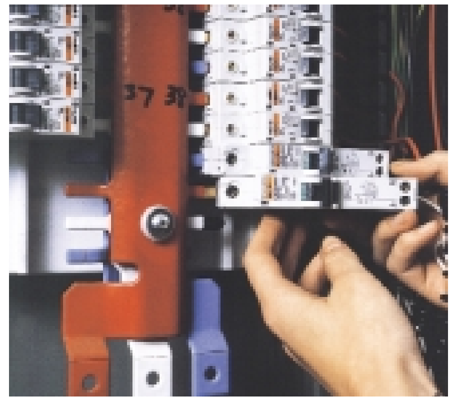


- Same profile as all other multi 9 devices
- Toggle position same as multi 9 MCB's
- Full range of auxiliaries & accessories
- Auxiliaries & accessories common to standard MCB's
- High stacking density = smaller chassis & distribution boards
- Tunnel terminals accept cables up to 16mm²

Performance & Safety

- High interrupting capacity - 10kA
- 100% compatible with multi 9 chassis & distribution boards
- Positive contact indication - suitable for isolation
- Loss of neutral protection - automatic tripping
- Padlockable with standard multi 9 lock dog
- Direction of toggle operation same as multi 9 MCB's & complies with AS3000:2000 clause 2.9.2.3

Reliability & Continuity of Service



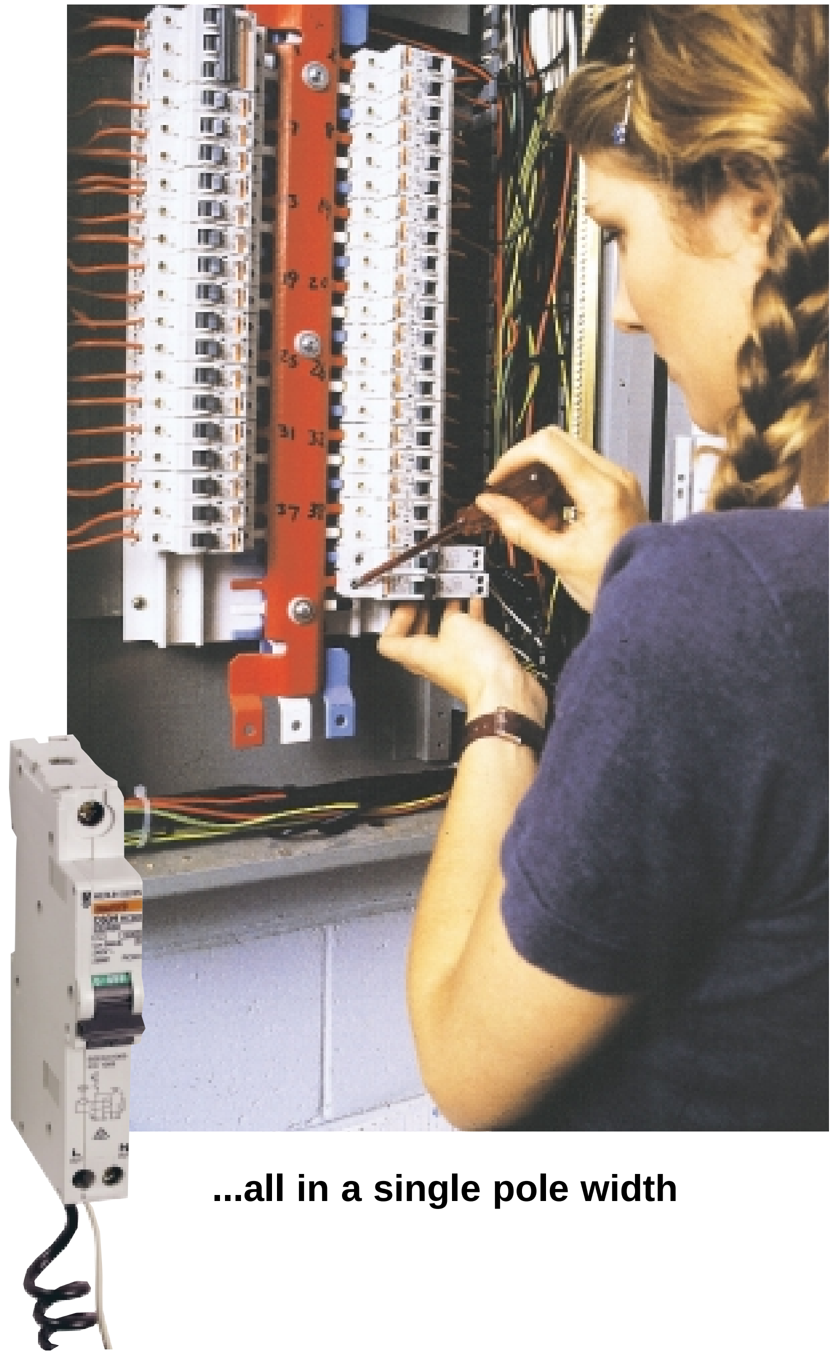
- Enhanced discrimination with Merlin Gerin NS range of MCCB's
- Back up to 50kA with BS & DIN fuses
- Retrofits multi 9 MCB's with no chassis tee off or escutcheon modifications
- Robust single case construction

Schneider Electric

Merlin Gerin
Modicon
Square D
Telemecanique

C60H Single Pole RCBO

Your favourite miniature circuit breaker now incorporates residual current protection...



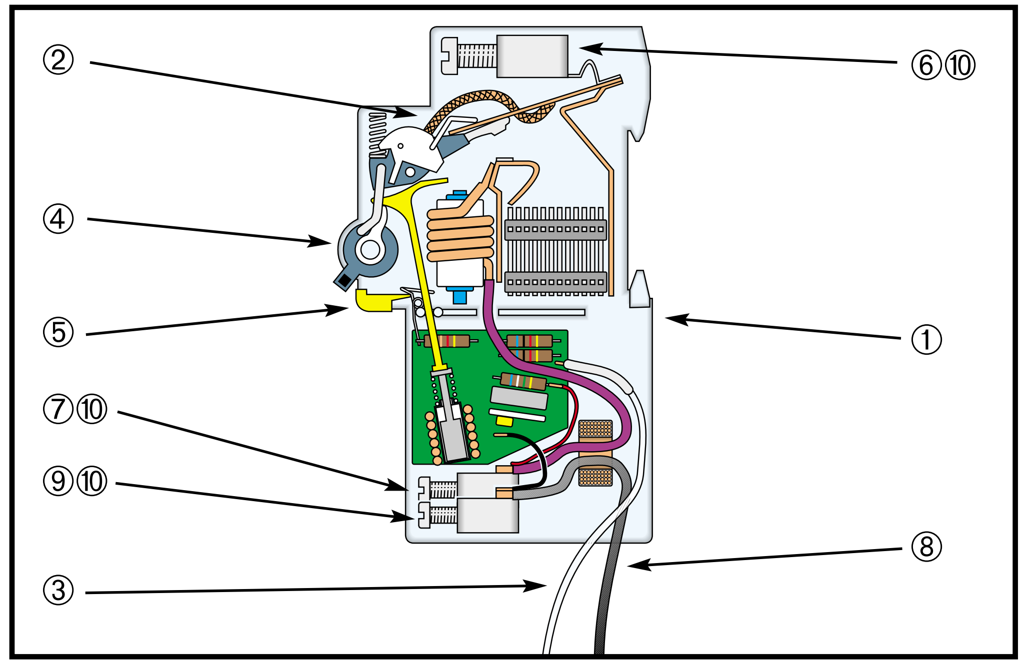
...all in a single pole width

Schneider Electric

C60H Single Pole RCBO

Product Design

① Single case construction - ensures product robustness
② Industry proven C60H MCB mechanism
③ Provision of functional earth ensures safe operation even with loss of neutral connection
④ Suitable for isolation - handle position always indicates contact position
⑤ Test trip button - conveniently positioned for periodic testing
⑥ Incoming line connection terminal
⑦ Outgoing line connection terminal
⑧ Incoming neutral connection
⑨ Outgoing neutral connection
⑩ Foolproof terminal design:
- moving barrier prevents incorrect cable insertion
- cable strand centring guides ensure correct cable positions & strand grouping



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A.C.N. 098 852 923
A.B.N. 40 741 712 113

FAIRFIELD WATER RECLAMATION PLANT

CONTACTORS

1. TESYS D CONTACTOR TECHNICAL DETAILS

Selection guide

TeSys contactors
TeSys d

Applications		All types of automation system					

Rated operational current	Ie max. AC-3 (Ue ⩽ 440 V)	9 A	12 A	18 A	25 A	32 A	38 A
	Ie AC-1 (θ ⩽ 60 °C)	20/25 A		25/32 A	25/40 A	50 A	
Rated operational voltage		690 V					
Number of poles		3 or 4	3 or 4	3 or 4	3 or 4	3	
Rated operational power in AC-3	220/240 V	2.2 kW	3 kW	4 kW	5.5 kW	7.5 kW	9 kW
	380/400 V	4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 kW
	415/440 V	4 kW	5.5 kW	9 kW	11 kW	15 kW	18.5 kW
	500 V	5.5 kW	7.5 kW	10 kW	15 kW	18.5 kW	18.5 kW
	660/690 V	5.5 kW	7.5 kW	10 kW	15 kW	18.5 kW	18.5 kW
	1000 V	–	–	–	–	–	–
Auxiliary contacts		1 N/C and 1 N/O instantaneous contacts incorporated in the contactors, with add-on blocks common to the whole range, comprising up to 4 N/C or N/O instantaneous, up to 1 N/O + 1 N/C time delay and up to 2 N/O or 2 N/C protected contacts and 2 screen continuity terminals					
Thermal overload relays manual-auto compatible	Class 10 A	0.10…10 A	0.10…13 A	0.10…18 A	0.10…32 A	0.10…38 A	0.10…38 A
	Class 20	2.5…10 A	2.5…13 A	2.5…18 A	2.5…32 A		
Suppressor modules (⎓ and low consumption contactors have built-in suppression as standard)	Varistor	●	●	●	●	●	●
	Diode	–	–	–	–	–	–
	RC circuit	●	●	●	●	●	●
	Bidirectional peak limiting diode	●	●	●	●	●	●
Interfaces	Relay	●	●	●	●	●	●
	Relay + override function	●	●	●	●	●	●
	Solid state	●	●	●	●	●	●
Contactor type references	∼ or ⎓ 3-pole	LC1 D09	LC1 D12	LC1 D18	LC1 D25	LC1 D32	LC1 D38
	∼ 4-pole	LC1 DT20/	LC1 DT25/	LC1 DT32/	LC1 DT40/	–	–
	⎓ 4-pole	LC1 D098	LC1 D128	LC1 D188	LC1 D258	–	–
Reversing contactor type references	∼ 3-pole	LC2 D09	LC2 D12	LC2 D18	LC2 D25	LC2 D32	LC2 D38
	⎓ 3-pole	LC2 D09	LC2 D12	LC2 D18	LC2 D25	LC2 D32	LC2 D38
	∼ 4-pole	LC2 DT20	LC2 DT25	LC2 DT32	LC2 DT40	–	–
	⎓ 4-pole	LC2 DT20	LC2 DT25	LC2 DT32	LC2 DT40	–	–
Pages	Contactors	5/58 to 5/61					
	Reversing contactors	5/62 to 5/65					

5

40 A		50 A	65 A		80 A		95 A	115 A		150 A
60 A		80 A			125 A			200 A		
1000 V on ∿ supply, 690 V on ⎓ supply										
3	4	3	3	4	3	4	3	3	4	3
11 kW		15 kW	18.5 kW		22 kW		25 kW	30 kW		40 kW
18.5 kW		22 kW	30 kW		37 kW		45 kW	55 kW		75 kW
22 kW		25/30 kW	37 kW		45 kW		45 kW	59 kW		80 kW
22 kW		30 kW	37 kW		55 kW		55 kW	75 kW		90 kW
30 kW		33 kW	37 kW		45 kW		45 kW	80 kW		100 kW
22 kW		30 kW	37 kW		45 kW		45 kW	75 kW		90 kW
1 N/C and 1 N/O instantaneous contacts incorporated in the contactors, with add-on blocks common to the whole range, comprising up to 4 N/C or N/O instantaneous, up to 1 N/O + 1 N/C time delay and up to 2 N/O or 2 N/C protected contacts and 2 screen continuity terminals										
17…50 A		17…70 A	17…80 A		17…104 A		17…104 A	60…150 A		60…150 A
17…40 A		17…65 A	17…70 A		17…80 A			60…150 A		60…150 A
•	•	•	•	•	•	•	•	•	•	–
•	•	•	•	•	•	•	•	–	–	–
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	–	–	–
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	–
LC1 D40		**LC1 D50**	**LC1 D65**		**LC1 D80**		**LC1 D95**	**LC1 D115**		**LC1 D150**
LC1 D40		–	**LC1 D65**		**LC1 D80**		–	**LC1 D115**		–
LP1 D40		–	**LP1 D65**		**LP1 D80**		–	**LC1 D115**		–
LC2 D40		**LC2 D50**	**LC2 D65**		**LC2 D80**		**LC2 D95**	**LC2 D115**		**LC2 D150**
–		–	–		–		–	–		–
LC2 D40		–	**LC2 D65**		**LC2 D80**		–	**LC2 D115**		–
–		–	–		–		–	–		–

5

Selection guide

TeSys contactors

TeSys d, low consumption

Applications		Automation systems		
				
Rated operational current	Ie max. AC-3 (Ue ≤ 440 V)	9 A	12 A	18 A
	Ie AC-1 (θ ≤ 60 °C)	20/25 A	20/25 A	25/32 A
Rated operational voltage		690 V		
Number of poles		3 or 4	3 or 4	3 or 4
Rated operational power in AC-3	220/240 V	2.2 kW	3 kW	4 kW
	380/400 V	4 kW	5.5 kW	7.5 kW
	415/440 V	4 kW	5.5 kW	9 kW
	500 V	5.5 kW	7.5 kW	10 kW
	660/690 V	5.5 kW	7.5 kW	10 kW
Coil consumption		2.4 W (100 mA - 24 V)		
Operating ranges		0.7…1.25 Uc		
Operating time at 20 °C and at Uc	Closing	70 ms		
	Opening	25 ms		
Auxiliary contact blocks		1 N/C and 1 N/O instantaneous contacts incorporated in the contactors, with add-on blocks common to the whole range, comprising up to 2 N/C or 2 N/O instantaneous standard contacts		
Interference suppression		Built-in suppression as standard, by bi-directional peak limiting diode		
Contactor type	3-pole	**LC1 D09**	**LC1 D12**	**LC1D18**
	4-pole	**LC1 DT20/D098**	**LC1 DT25/D128**	**LC1 DT32/D188**
Reversing contactor type	3-pole	**LC2 D09**	**LC2 D12**	**LC2 D18**
	4-pole	**LC2 DT20**	**LC2 DT25**	**LC2 DT32**
Pages	Contactors	5/58 to 5/61		
	Reversing contactors	5/62 to 5/65		

5

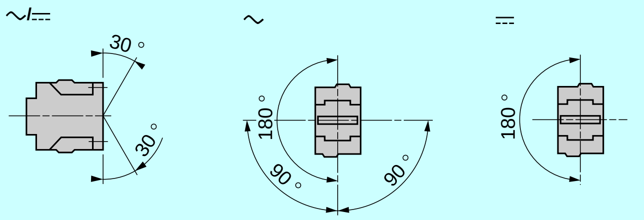
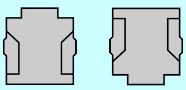


25 A	32 A	38 A
25/40 A	50 A	50 A
3 or 4	3	3
5.5 kW	7.5 kW	9 kW
11 kW	15 kW	18.5 kW
11 kW	15 kW	18.5 kW
15 kW	18.5 kW	18.5 kW
15 kW	18.5 kW	18.5 kW
2.4 W (100 mA - 24 V)		
0.7…1.25 Uc		
70 ms		
25 ms		
1 N/C and 1 N/O instantaneous contacts incorporated in the contactors, with add-on blocks common to the whole range, comprising up to 2 N/C or 2 N/O instantaneous standard contacts		
Built-in suppression as standard, by bi-directional peak limiting diode		
LC1 D25	**LC1 D32**	**LC1 D38**
LC1 DT40/D258		
LC2 D25	**LC2 D32**	**LC2 D38**
LC2 DT40		

5

Characteristics

TeSys contactors
TeSys d

Contactor type	LC1		D09…D18 DT20 and DT25	D25…D38 DT32 and DT40	D40	D50…D95	D115 and D150
Environment							
Rated insulation voltage (Ui)	Conforming to IEC 60947-4-1, overvoltage category III, degree of pollution: 3	V	690		1000		
	Conforming to UL, CSA	V	600				
Rated impulse withstand voltage (Uimp)	Conforming to IEC 60947	kV	6		8		
Conforming to standards			IEC 60947-1, 60947-4-1, NFC 63-110, VDE 0660, BS 5424, JEM 1038. EN 60947-1, EN 60947-4-1. GL, DNV, PTB, RINA				
Product certifications			UL, CSA Complies with SNCF, Sichere Trennung recommendations				
Separation insulation	Conforming to VDE 0106 part 101 and A1 (draft 2/89)	V	400				
Degree of protection *(1)* (front face only)	Conforming to VDE 0106 and IEC 60529						
	Power connection		Protection against direct finger contact IP 2X				
	Coil connection		Protection against direct finger contact IP 2X				
Protective treatment	Conforming to IEC 60068		"TH"				
Ambient air temperature around the device	Storage	°C	- 60…+ 80				
	Operation	°C	- 5…+ 60				
	Permissible	°C	- 40…+ 70, for operation at Uc				
Maximum operating altitude	Without derating	m	3000				
Operating positions *(2)*	Without derating in the following positions						
	Positions that are not permissible		For ⎓ contactors LC1 D09 to D38 				
Flame resistance	Conforming to UL 94		V1				
	Conforming to IEC 60695-2-1	°C	960				
Shock resistance *(3)* 1/2 sine wave = 11 ms	Contactor open		10 gn	8 gn	8 gn	8 gn	6 gn
	Contactor closed		15 gn	15 gn	10 gn	10 gn	15 gn
Vibration resistance *(3)* 5…300 Hz	Contactor open		2 gn				
	Contactor closed		4 gn	4 gn	4 gn	3 gn	4 gn

(1) Protection provided for the cabling c.s.a.'s indicated on the next page and for connection by cable.
(2) For other operating positions, please consult your Regional Sales Office.
(3) Without change of contact states, in the most unfavourable direction (coil energised at Ue).

Selection : pages 5/160 to 5/191 | References : pages 5/58 to 5/61 | Dimensions : pages 5/82 to 5/85 | Schemes : pages 5/86 and 5/87

Characteristics (continued)

TeSys contactors
TeSys d

Contactor type	LC1		D09 and D12 DT20 and DT25	D18 (3P)	D25 (3P)	D32	D38	D18 and D25 (4P) DT32 and DT40	D40	D50 and D65	D80 and D95	D115 and D150
Power circuit connections												
Connection by cable												
Tightening torque			Screw clamp terminals					Connector 2 inputs	Screw clamp terminals	Connector 1 input		Connector 2 inputs
Flexible cable without cable end	1 conductor	mm²	1…4	1.5…6	1.5…10	2.5…10		2.5…10	2.5…25	2.5…25	4…50	10…120
	2 conductors	mm²	1…4	1.5…6	1.5…6	2.5…10		2.5…10	2.5…16	2.5…16	4…25	10…120 + 10…50
Flexible cable with cable end	1 conductor	mm²	1…4	1…6	1…6	1…10		2.5…10	2.5…25	2.5…25	4…50	10…120
	2 conductors	mm²	1…2.5	1…4	1…4	1.5…6		2.5…10	2.5…10	2.5…10	4…16	10…120 + 10…50
Solid cable without cable end	1 conductor	mm²	1…4	1.5…6	1.5…6	1.5…10		2.5…16	2.5…25	2.5…25	4…50	10…120
	2 conductors	mm²	1…4	1.5…6	1.5…6	2.5…10		2.5…16	2.5…16	2.5…16	4…25	10…120 + 10…50
Screwdriver	Philips		N° 2	N° 2	N° 2	N° 2		N° 2	–	–	–	–
	Flat screwdriver Ø		Ø 6	Ø 6	Ø 6	Ø 6		Ø 6	Ø 6…Ø 8	Ø 6…Ø 8	Ø 6…Ø 8	–
Key for hexagonal headed screw			–	–	–	–		–	–	–	4	4
Tightening torque		N.m	1.7	1.7	2.5	2.5		1.8	5	5	9	12
Spring terminal connections *(1)*												
Flexible cable without cable end	1 conductor	mm²	2.5 (4: DT25)	4	4	4	–	10	–	–	–	
	2 conductors	mm²	2.5 (except DT25)	4	4	4	–	–	–	–	–	
Connection by bars or lugs												
Bar cross-section			–	–	–	–		–	–	–	3 x 16	5 x 25
Lug external Ø		mm	8	8	10	10		8 *(2)*	13	16	17	25
Ø of screw		mm	M3.5	M3.5	M4	M4		M3.5	M5	M6	M6	M8
Screwdriver	Philips		N° 2	N° 2	N° 2	N° 2		N° 2	N° 2	N° 3	–	–
	Flat screwdriver Ø		Ø 6	Ø 6	Ø 6	Ø 6		Ø 6	Ø 8	Ø 8	Ø 8	–
Key for hexagonal headed screw			–	–	–	–		–	–	–	10	13
Tightening torque		N.m	1.7	1.7	2.5	2.5		1.8	5	5	9	12
Control circuit connections												
Connection via cable (tightening via screw clamps)												
Flexible cable without cable end	1 conductor	mm²	1…4	1…4	1…4	1…4		1…4	1…4	1…4	1…4	1…2.5
	2 conductors	mm²	1…4	1…4	1…4	1…4		1…4	1…4	1…4	1…4	1…2.5
Flexible cable with cable end	1 conductor	mm²	1…4	1…4	1…4	1…4		1…4	1…2.5	1…2.5	1…2.5	1…2.5
	2 conductors	mm²	1…2.5	1…2.5	1…2.5	1…2.5		1…2.5	1…2.5	1…2.5	1…2.5	1…2.5
Solid cable without cable end	1 conductor	mm²	1…4	1…4	1…4	1…4		1…4	1…4	1…4	1…4	1…2.5
	2 conductors	mm²	1…4	1…4	1…4	1…4		1…4	1…4	1…4	1…4	1…2.5
Screwdriver	Philips		N° 2	N° 2	N° 2	N° 2		N° 2	N° 2	N° 2	N° 2	N° 2
	Flat screwdriver Ø		Ø 6	Ø 6	Ø 6	Ø 6		Ø 6	Ø 6	Ø 6	Ø 6	Ø 6
Tightening torque		N.m	1.7	1.7	1.7	1.7		1.7	1.2	1.2	1.2	1.2
Spring terminal connections *(1)*												
Flexible cable without cable end	1 conductor	mm²	2.5	2.5	2.5	2.5	–	2.5	–	–	–	–
	2 conductors	mm²	2.5	2.5	2.5	2.5	–	2.5	–	–	–	–
Connection by bars or lugs												
Lug external Ø		mm	8	8	8	8		8	8	8	8	8
Ø of screw		mm	M3.5	M3.5	M3.5	M3.5		M3.5	M3.5	M3.5	M3.5	M3.5
Screwdriver	Philips		N° 2	N° 2	N° 2	N° 2		N° 2	N° 2	N° 2	N° 2	N° 2
	Flat screwdriver Ø		Ø 6	Ø 6	Ø 6	Ø 6		Ø 6	Ø 6	Ø 6	Ø 6	Ø 6
Tightening torque		N.m	1.7	1.7	1.7	1.7		1.7	1.2	1.2	1.2	1.2

(1) If cable ends are used, choose the next size down (example: for 2.5 mm², use 1.5 mm²) and square crimp the cable ends using a special tool.
*(2) To connect cables with a c.s.a. > 4mm² and up to 10 mm², it is essential to use special connectors, sold in bags of 100 (reference: **LAD 96180**).*

5

Selection : pages 5/160 to 5/191
References : pages 5/58 to 5/61
Dimensions : pages 5/82 to 5/85
Schemes : pages 5/86 and 5/87

Characteristics *(continued)*

TeSys contactors
TeSys d

Contactor type	LC1		D09 (3P)	DT20 D098	D12 (3P)	DT25 D128	D18 (3P)	DT32 D188	D25 (3P)	DT40 D258
Pole characteristics										
Rated operational current (Ie) (Ue ⩽ 440 V)	In AC-3, θ ⩽ 60 °C	**A**	9		12		18		25	
	In AC-1, θ ⩽ 60 °C	**A**	25 *(1)*	20	25 *(1)*	25	32 *(1)*	32	40 *(1)*	40
Rated operational voltage (Ue)	Up to	**V**	690		690		690		690	
Frequency limits	Of the operating current	**Hz**	25…400		25…400		25…400		25…400	
Conventional thermal current (Ith)	θ ⩽ 60 °C	**A**	25 *(1)*	20	25 *(1)*	25	32 *(1)*	32	40 *(1)*	40
Rated making capacity (440 V)	Conforming to IEC 60947		250		250		300		450	
Rated breaking capacity (440 V)	Conforming to IEC 60947		250		250		300		450	
Permissible short time rating No current flowing for preceding 15 minutes with θ ⩽ 40 °C	For 1 s	**A**	210		210		240		380	
	For 10 s	**A**	105		105		145		240	
	For 1 min	**A**	61		61		84		120	
	For 10 min	**A**	30		30		40		50	
Protection by fuses against short-circuits (U ⩽ 690 V)	Without thermal overload relay, gG fuse, type 1	**A**	25		40		50		63	
	Without thermal overload relay, gG fuse, type 2	**A**	20		25		35		40	
	With thermal overload relay	**A**	See pages 6/16 and 6/17, for aM or gG fuse ratings corresponding to the associated thermal overload relay							
Average impedance per pole	At Ith and 50 Hz	**mΩ**	2.5		2.5		2.5		2	
Power dissipation per pole for the above operational currents	AC-3	**W**	0.20		0.36		0.8		1.25	
	AC-1	**W**	1.56		1.56		2.5		3.2	

Control circuit characteristics, a.c. supply

Rated control circuit voltage (Uc)		50/60 Hz	**V**	12…690
Control voltage limits	50 or 60 Hz coils	Operational		–
		Drop-out		–
	50/60 Hz coils	Operational		0.8…1.1 Uc on 50 Hz and 0.85…1.1 Uc on 60 Hz at 60 °C
		Drop-out		0.3…0.6 Uc at 60 °C
Average consumption at 20 °C and at Uc	∿ 50 Hz	Inrush 50 Hz coil	**VA**	–
		Inrush Cos φ		0.75
		Inrush 50/60 Hz coil	**VA**	70
		Sealed 50 Hz coil	**VA**	–
		Sealed Cos φ		0.3
		Sealed 50/60 Hz coil	**VA**	7
	∿ 60 Hz	Inrush 60 Hz coil	**VA**	–
		Inrush Cos φ		0.75
		Inrush 50/60 Hz coil	**VA**	70
		Sealed 60 Hz coil	**VA**	–
		Sealed Cos φ		0.3
		Sealed 50/60 Hz coil	**VA**	7.5
Heat dissipation	50/60 Hz		**W**	2…3
Operating time *(2)*		Closing "C"	**ms**	12…22
		Opening "O"	**ms**	4…19
Mechanical durability in millions of operating cycles		50 or 60 Hz coil		–
		50/60 Hz coil on 50 Hz		15
Maximum operating rate at ambient temperature ⩽ 60 °C		In operating cycles per hour		3600

(1) Versions with spring terminal connections:
*16 A for **LC1 D093** and **LC1 D123** (20 A possible with 2 x 2.5 mm² cables in parallel), 25 A for LC1 D183 to LC1 D323 (32 A possible for LC1 D183 connected with 2 x 4 mm2 cables in parallel; 40 A possible for LC1 D253 and LC1 D323 connected with 2 x 4 mm2 cables in parallel).*
(2) The closing time "C" is measured from the moment the coil supply is switched on to initial contact of the main poles. The opening time "O" is measured from the moment the coil supply is switched off to the moment the main poles separate.

Selection : pages 5/160 to 5/191
References : pages 5/58 to 5/61
Dimensions : pages 5/82 to 5/85
Schemes : pages 5/86 and 5/87

D32	D38	D40	D50	D65	D80	D95	D115	D150
32	38	40	50	65	80	95	115	150
50 *(1)*	50	60	80	80	125	125	200	200
690	690	1000	1000	1000	1000	1000	1000	1000
25…400	25…400	25…400	25…400	25…400	25…400	25…400	25…400	25…400
50	50	60	80	80	125	125	200	200
550	550	800	900	1000	1100	1100	1260	1660
550	550	800	900	1000	1100	1100	1100	1400
430	430	720	810	900	990	1100	1100	1400
260	310	320	400	520	640	800	950	1200
138	150	165	208	260	320	400	550	580
60	60	72	84	110	135	135	250	250
63	63	80	100	160	200	200	250	315
63	63	80	100	125	160	160	200	250
See pages 24514/2 and 24514/3, for aM or gG fuse ratings corresponding to the associated thermal overload relay								
2	2	1.5	1.5	1	0.8	0.8	0.6	0.6
2	3	2.4	3.7	4.2	5.1	7.2	7.9	13.5
5	5	5.4	9.6	6.4	12.5	12.5	24	24
12…690		24…660					24…500	
–		0.85…1.1 Uc at 55 °C					0.85…1.1 Uc at 55 °C	
–		0.3…0.6 Uc at 55 °C					0.3…0.5 Uc at 55 °C	
0.8…1.1 Uc on 50 Hz and 0.85…1.1 Uc on 60 Hz at 60 °C		0.8…1.1 Uc on 50 Hz and 0.85…1.1 Uc on 60 Hz at 55 °C					0.8…1.15 Uc on 50/60 Hz at 55 °C	
0.3…0.6 Uc at 60 °C		0.3…0.6 Uc at 55 °C					0.3…0.5 Uc at 55 °C	
–		200					300	–
0.75		0.75					0.8	0.9
70		245					280…350	280…350
–		20					22	–
0.3		0.3					0.3	0.9
7		26					2…18	2…18
–		220					300	–
0.75		0.75					0.8	0.9
70		245					280…350	280…350
–		22					22	–
0.3		0.3					0.3	0.9
7.5		26					2…18	2…18
2…3		6…10					3…8	3…4.5
12…22		20…26	20…26	20…26	20…35	20…35	20…50	20…35
4…19		8…12	8…12	8…12	6…20	6…20	6…20	40…75
–		16	16	16	10	10	8	–
15		6	6	6	4	4	8	8
3600		3600	3600	3600	3600	3600	2400	1200

5

Characteristics (continued)

TeSys contactors
TeSys d

Contactor type				LC1 D09…D38 LC1 DT20…DT40	LC1 or LP1 D40…D65	LC1 or LP1 D80 LC1 D95	LC1 D115 and LC1 D150
d.c. control circuit characteristics							
Rated control circuit voltage (Uc)	⎓		**V**	12…440	12…440		24…440
Rated insulation voltage	Conforming to IEC 60947-1		**V**	690			
	Conforming to UL, CSA		**V**	600			
Control voltage limits	Operational	Standard coil		0.7…1.25 Uc at 60 °C	0.85…1.1 Uc at 55 °C		0.75…1.2 Uc at 55 °C
		Wide range coil		–	0.75…1.2 Uc at 55 °C		–
	Drop-out			0.1…0.25 Uc at 60 °C	0.1…0.3 Uc at 55 °C		0.15…0.4 Uc at 55 °C
Average consumption at 20 °C and at Uc	⎓	Inrush	**W**	5.4	22	22	270 to 365
		Sealed	**W**	5.4	22	22	2.4…5.1
Average operating time at Uc *(1)*	Closing	"C"	**ms**	63 ± 15 %	85…110	95…130	20…35
	Opening	"O"	**ms**	20 ± 20 %	20…35	20…35	40…75
			Nota : *The arcing time depends on the circuit switched by the poles. For all normal 3-phase applications, the arcing time is less than 10 ms. The load is isolated from the supply after a time equal to the sum of the opening time and the arcing time.*				
Time constant L/R (L/R)			**ms**	28	65	75	25
Mechanical durability at Uc	In millions of operating cycles			30	20	20	8
Maximum operating rate at ambient temperature ⩽ 60 °C	In operating cycles per hour			3600	3600	3600	1200
Low consumption control circuit characteristics							
Rated insulation voltage	Conforming to IEC 60947-1		**V**	690	–		
	Conforming to UL, CSA		**V**	600	–		
Maximum voltage	Of the control circuit on ⎓			250	–		
Average consumption d.c. at 20 °C and at Uc	Wide range coil (0.7…1.25 Uc)	Inrush	**W**	2.4	–		
		Sealed	**W**	2.4	–		
Operating time *(1)* at Uc and at 20 °C	Closing	"C"	**ms**	77 ± 15 %	–		
	Opening	"O"	**ms**	25 ± 20%	–		
Voltage limits (θ ⩽ 60 °C) of the control circuit	Operational			0.7 to 1.25 Uc	–		
	Drop-out			0.1…0.3 Uc	–		
Time constant L/R (L/R)			**ms**	40	–		
Mechanical durability	In millions of operating cycles			30	–		
Maximum operating rate	At ambient temperature ⩽ 60 °C		**ops/h**	3600	–		

(1) The operating times depend on the type of contactor electromagnet and its control mode.
The closing time "C" is measured from the moment the coil supply is switched on to initial contact of the main poles.
The opening time "O" is measured from the moment the coil supply is switched off to the moment the main poles separate.

5

Selection : pages 5/160 to 5/191 | References : pages 5/58 to 5/61 | Dimensions : pages 5/82 to 5/85 | Schemes : pages 5/86 and 5/87

Characteristics (continued)

TeSys contactors
TeSys d

Characteristics of auxiliary contacts incorporated in the contactor

Mechanically linked contacts	Conforming to IEC60947-5-1			Each contactor has 2 N/O and N/C contacts mechanically linked on the same movable contact holder
Mirror contact	Conforming to IEC60947-4-1			The N/C contact on each contactor represents the state of the power contacts and can be connected to a PREVENTA safety module
Rated operational voltage (Ue)	Up to		**V**	690
Rated insulation voltage (Ui)	Conforming to IEC 60947-1		**V**	690
	Conforming to UL, CSA		**V**	600
Conventional thermal current (Ith)	For ambient temperature ⩽ 60 °C		**A**	10
Frequency of the operational current			**Hz**	25…400
Minimum switching capacity $\lambda = 10^{-8}$	U min		**V**	17
	I min		**mA**	5
Short-circuit protection	Conforming to IEC 60947-5-1			gG fuse: 10 A
Rated making capacity	Conforming to IEC 60947-5-1, I rms		**A**	∿: 140, ⎓: 250
Short-time rating	Permissible for	1 s	**A**	100
		500 ms	**A**	120
		100 ms	**A**	140
Insulation resistance			**MΩ**	> 10
Non-overlap time	Guaranteed between N/C and N/O contacts		**ms**	1.5 on energisation and on de-energisation

Operational power of contacts
conforming to IEC 60947-5-1

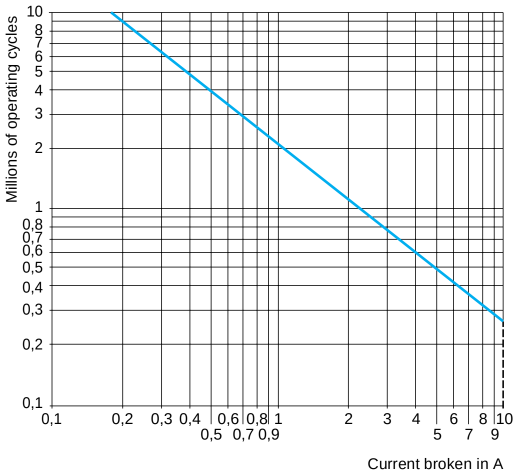
a.c. supply, categories AC-14 and AC-15
Electrical durability (valid for up to 3600 operating cycles/hour) on an inductive load such as the coil of an electromagnet: making current (cos φ 0.7) = 10 times the power broken (cos φ 0.4).

	V	**24**	**48**	**115**	**230**	**400**	**440**	**600**
1 million operating cycles	**VA**	60	120	280	560	960	1050	1440
3 million operating cycles	**VA**	16	32	80	160	280	300	420
10 million operating cycles	**VA**	4	8	20	40	70	80	100

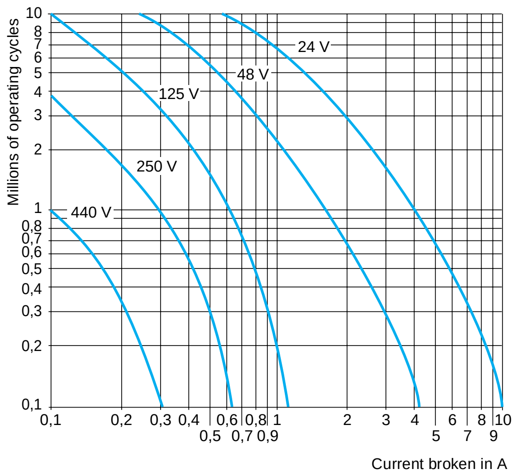
d.c. supply, category DC-13
Electrical durability (valid for up to 1200 operating cycles/hour) on an inductive load such as the coil of an electromagnet, without economy resistor, the time constant increasing with the load.

	V	**24**	**48**	**125**	**250**	**440**
1 million operating cycles	**W**	96	76	76	76	44
3 million operating cycles	**W**	48	38	38	32	–
10 million operating cycles	**W**	14	12	12	–	–

AC-15



DC-13



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Selection :
pages 5/160 to 5/191
References :
pages 5/58 to 5/61
Dimensions :
pages 5/82 to 5/85
Schemes :
pages 5/86 and 5/87

Characteristics

TeSys contactors

Auxiliary contact blocks without dust and damp protected contacts for TeSys d contactors

Contact block type			LAD N or LAD C	LAD T and LAD S	LAD R	LAD 8
Environment						
Conforming to standards			IEC 60947-5-1, NF C 63-140, VDE 0660, BS 4794, EN 60947-5-1			
Product certifications			UL, CSA			
Protective treatment	Conforming to IEC 60068		"TH"			
Degree of protection	Conforming to VDE 0106		Protection against direct finger contact IP 2X			
Ambient air temperature around the device	Storage	°C	- 60…+ 80			
	Operation	°C	- 5…+ 60			
	Permissible for operation at Uc	°C	- 40…+ 70			
Maximum operating altitude	Without derating	m	3000			
Connection by cable	Phillips N° 2 and Ø 6 mm Flexible or solid cable with or without cable end	mm^2	Min: 1 x 1, max: 2 x 2.5			
Spring terminal connections	Flexible or solid cable without cable end	mm^2	Max. 2 x 2.5			
Instantaneous and time delay contact characteristics						
Number of contacts			1, 2 or 4	2	2	2
Rated operational voltage (Ue)	Up to	V	690			
Rated insulation voltage (Ui)	Conforming to IEC 60947-5-1	V	690			
	Conforming to UL, CSA	V	600			
Conventional thermal current (Ith)	For ambient temperature ⩽ 60 °C	A	10			
Frequency of the operational current		Hz	25…400			
Minimum switching capacity	U min	V	17			
	I min	mA	5			
Short-circuit protection	Conforming to IEC 60947-5-1 and VDE 0660. gG fuse	A	10			
Rated making capacity	Conforming to IEC 60947-5-1, I rms	A	∿: 140 ; ⎓: 250			
Short-time rating	Permissible for 1 s	A	100			
	500 ms	A	120			
	100 ms	A	140			
Insulation resistance		MΩ	> 10			
Non-overlap time	Guaranteed between N/C and N/O contacts	ms	1.5 (on energisation and on de-energisation)			
Overlap time	Guaranteed between N/C and N/O contacts on **LAD C22**	ms	1.5	–	–	–
Time delay (LAD T, R and S contact blocks) Accuracy only valid for setting range indicated on the front face	Ambient air temperature for operation	°C	–	- 40…+ 70	- 40…+ 70	–
	Repeat accuracy		–	± 2 %	± 2 %	–
	Drift up to 0.5 million operating cycles		–	+ 15 %	+ 15 %	–
	Drift depending on ambient air temperature		–	0.25 % per °C	0.25 % per °C	–
Mechanical durability	In millions of operating cycles		30	5	5	30
Operational power of contacts			See page 5/54			

References : pages 5/69 and 5/70
Dimensions : pages 5/82 and 5/83
Schemes : pages 5/86 and 5/87

Characteristics (continued)

TeSys contactors
Auxiliary contact blocks with dust and damp protected contacts for TeSys d contactors

Contact block type			LA1 DX	LA1 DZ		LA1 DY
				Protected	Non protected	
Environment						
Conforming to standards			IEC 60947-5-1, VDE 0660			
Product certifications			UL, CSA			
Protective treatment	Conforming to IEC 60068		“TH”			
Degree of protection	Conforming to VDE 0106		Protection against direct finger contact IP 2X			
Ambient air temperature	Storage and operation	**°C**	- 25…+ 70			
Connection	Phillips N° 2 and Ø 6 mm Flexible or solid cable with or without cable end	**mm²**	Min: 1 x 1, max: 2 x 2.5			
Number of contacts			2	2	2	2
Contact characteristics						
Rated operational voltage (Ue)	Up to	**V**	50	50	690	24
Rated insulation voltage (Ui)	Conforming to IEC 60947-5-1	**V**	250	250	690	250
	Conforming to UL, CSA	**V**	–	–	600	–
Conventional thermal current (Ith)	For ambient temperature ⩽ 40 °C	**A**	–	–	10	–
Maximum operational current (Ie)		**mA**	500	500	–	50
Frequency of the operational current		**Hz**	–	–	25…400	–
Minimum switching capacity	U min	**V**	17	17	17	3
	I min	**mA**	4	4	5	0.3
Short-circuit protection	Conforming to IEC 609475-1 gG fuse	**A**	–	–	10	–
Rated making capacity	Conforming to IEC 60947 5-1, I rms	**A**	–	–	~: 140; ⎓: 250	–
Short-time rating	Permissible for 1 s	**A**	–	–	100	–
	500 ms	**A**	–	–	120	–
	100 ms	**A**	–	–	140	–
Insulation resistance		**MΩ**	> 10	> 10	> 10	> 10
Mechanical durability	In millions of operating cycles		5	5	30	5
Materials and technology used for dust and damp protected contacts			Silver - Single break	Silver - Single break	–	Gold - Single break with crossed bars

5

References : page 5/69
Dimensions : pages 5/82 and 5/83
Schemes : pages 5/86 and 5/87

Characteristics (continued)

TeSys contactors

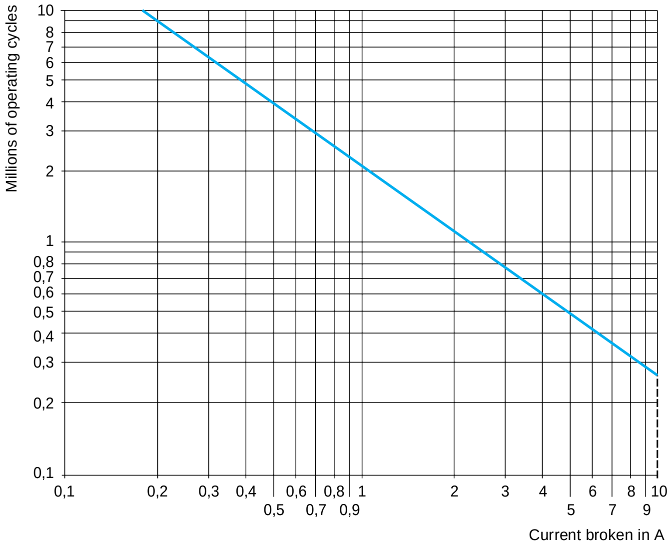
Auxiliary contact blocks with dust and damp protected contacts for TeSys d contactors

Rated operational power of contacts (conforming to IEC 60947-5-1)

a.c. supply, categories AC-14 and AC-15

Electrical durability (valid for up to 3600 operating cycles/hour) on an inductive load such as the coil of an electromagnet: making current (cos φ 0.7) = 10 times the power broken (cos φ 0.4).

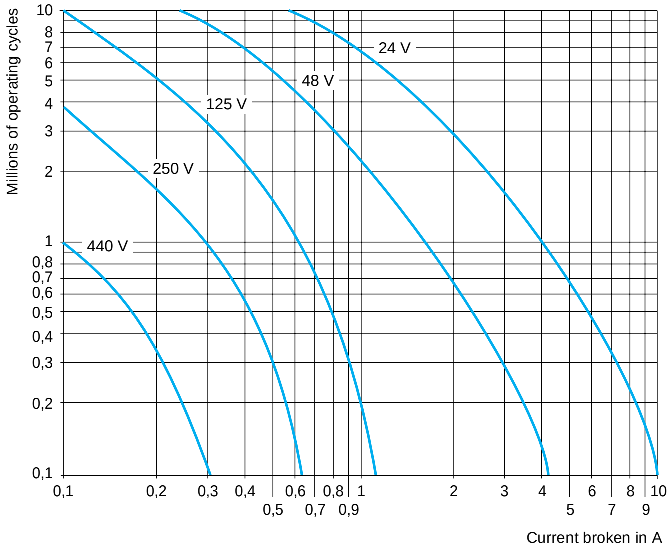
	V	24	48	115	230	400	440	600
1 million operating cycles	VA	60	120	280	560	960	1050	1440
3 million operating cycles	VA	16	32	80	160	280	300	420
10 million operating cycles	VA	4	8	20	40	70	80	100



d.c. supply, category DC 13

Electrical durability (valid for up to 1200 operating cycles/hour) on an inductive load such as the coil of an electromagnet, without economy resistor, the time constant increasing with the load.

	V	24	48	125	250	440
1 million operating cycles	W	120	90	75	68	61
3 million operating cycles	W	70	50	38	33	28
10 million operating cycles	W	25	18	14	12	10



References : pages 5/69 and 5/70
Dimensions : pages 5/82 and 5/83
Schemes : pages 5/86 and 5/87

Characteristics

TeSys contactors

Control modules, coil suppressor modules and mechanical latch blocks for TeSys d contactors

Environment

Conforming to standards			IEC 60947-5-1
Product certifications			UL, CSA
Protective treatment	Conforming to IEC 60068		"TH"
Degree of protection	Conforming to VDE 0106		Protection against direct finger contact IP 2X
Ambient air temperature around the device	Storage	**°C**	– 40…+ 80
	Operation	**°C**	– 25…+ 55
	Permissible for operation at Uc	**°C**	– 25…+ 70

Auto-Man-Stop control modules

Recommendation			The Auto - Man selector switch must only be operated with the Start - Stop ("O" "I") switch in position "O"
Rated insulation voltage	Conforming to IEC 60947-5-1	**V**	250
Rated operational voltage	Conforming to IEC 60947-5-1	**V**	250
Protection	Against electric shocks	**kV**	2
Built-in protection	Contactor coil suppression		By varistor
Indication	By integral LED		Illuminates when the contactor coil is energised
Electrical durability	In operating cycles		20 000

Suppressor modules

Module type			**LA4 DA, LAD 4RC**	**LA4 DB, LAD 4T**	**LA4 DC**	**LA4 DE, LAD 4V**
Type of protection			RC circuit	Bidirectional peak limiting diode	Diode	Varistor
Rated control circuit voltage (Uc)		**V**	~ 24…415	~ or ⎓ 24…72	⎓ 12…250	~ or ⎓ 24…250
Maximum peak voltage			3 Uc	2 Uc	Uc	2 Uc
Natural RC frequency	24/48 V	**Hz**	400	–	–	–
	50/127 V	**Hz**	200	–	–	–
	110/240 V	**Hz**	100	–	–	–
	380/415 V	**Hz**	150	–	–	–

Mechanical latch blocks *(1)*

Mechanical latch block type			**LA6 DK10**	**LAD 6K10**	**LA6 DK20**
For mounting on contactor			**LC1 D40…D65, LP1 D65**	**LC1 D09…D38, DT20…DT40**	**LC1 D80…D150 LP1 D80 and LC1 D115**
Product certifications			UL, CSA		UL, CSA
Rated insulation voltage	Conforming to IEC 60947-5-1	**V**	690		690
Rated control circuit voltage	~ 50/60 Hz and ⎓	**V**	24…415		24…415
Power required	For unlatching ~	**VA**	25		25
	⎓	**W**	30		30
Maximum operating rate	In operating cycles/ hour		1200		1200
On-load factor			10 %		10 %
Mechanical durability at Uc	In millions of operating cycles		0.5		0.5

*(1) Unlatching can be manually operated or electrically controlled (pulsed). The **LA6 DK** or **LAD 6K** latch coil and the **LC1 D** operating coil must not be energised simultaneously. The duration of the **LA6 DK** or **LAD 6K** and **LC1 D** control signals must be ⩾ 100 ms.*

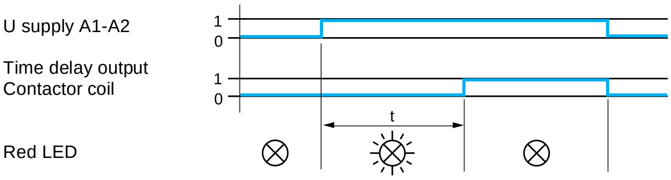
References : pages 5/70 à 5/73
Dimensions : pages 5/82 and 5/83
Schemes : pages 5/86 and 5/87

Characteristics

TeSys contactors
Electronic serial timer module for TeSys d contactors

Module type			**LA4 DT** (On-delay)
Environment			
Conforming to standards			IEC 60255-5
Product certifications			UL, CSA
Protective treatment	Conforming to IEC 60068		"TH"
Degree of protection	Conforming to VDE 0106		Protection against direct finger contact IP 2X
Ambient air temperature around the device	Storage	°C	– 40…+ 80
	Operation	°C	– 25…+ 55
	For operation at Uc	°C	– 25…+ 70
Rated insulation voltage (Ui)	Conforming to IEC 60947-1	V	250
Cabling	Phillips n° 2 and Ø 6 mm Flexible or solid conductor with or without cable end	mm²	Min: 1 x 1, max: 2 x 2.5
Control circuit characteristics			
Built-in protection	On input		By varistor
	Contactor coil suppression		By varistor
Rated control circuit voltage (Uc)		V	∼ or ⎓ 24…250
Permissible variation			0.8…1.1 Uc
Type of control			By mechanical contact only
Timing characteristics			
Timing ranges		s	0.1…2; 1.5…30; 25…500
Repeat accuracy	0…40 °C		± 3 % (10 ms minimum)
Reset time	During time delay period	ms	150
	After time delay period	ms	50
Immunity to microbreaks	During time delay period	ms	10
	After time delay period	ms	2
Minimum control pulse duration		ms	–
Indication of time delay	By LED		Illuminates during time delay period
Switching characteristics (solid state type)			
Maximum power dissipated		W	2
Leakage current		mA	< 5
Residual voltage		V	3.3
Overvoltage protection			3 kV; 0.5 joule
Electrical durability	In millions of operating cycles		30

Function diagram
LA4 DT "On-delay" electronic timers



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References : page 5/73
Dimensions : pages 5/82 and 5/83
Schemes : pages 5/86 and 5/87

TeSys contactors
Interface modules for TeSys d contactors

Environment

Conforming to standards			IEC 60255-5
Product certifications			UL, CSA
Protective treatment	Conforming to IEC 60068		"TH"
Degree of protection	Conforming to VDE 0106		Protection against direct finger contact IP 2X
Ambient air temperature around the device	Storage	**°C**	– 40…+ 80
	Operation	**°C**	– 25…+ 55
	Permissible for operation at Uc	**°C**	– 25…+ 70

Other characteristics

Module type				**LA4 DFBQ** With relay	**LA4 DFB** With relay	**LA4 DFE** With relay	**LA4 DLB** With relay + override	**LA4 DLE**	**LA4 DWB** Solid state
Rated insulation voltage	Conforming to IEC 60947-5-1		**V**	5	250				
Rated operational voltage	Conforming to IEC 60947-5-1		**V**	415	250				
Indication of input state			By integral LED which illuminates when the contactor coil is energised						
Input signals	Control voltage (E1-E2)		**V**	⎓ 24	⎓ 24	⎓ 48	⎓ 24	⎓ 48	⎓ 24
	Permissible variation		**V**	17…30	17…30	33…60	17…30	33…60	5…30
	Current consumption at 20 °C		**mA**	25	25	15	25	15	8.5 for 5 V 15 for 24 V
	State "0" guaranteed for	U	**V**	< 2.4	< 2.4	< 4.8	< 2.4	< 4.8	< 2.4
		I	**mA**	< 2	< 2	< 1.3	< 2	< 1.3	< 2
	State "1" guaranteed for	U	**V**	17	17	33	17	33	5
Built-in protection	Against reverse polarity			By diode					
	Of the input			By diode					
Electrical durability at 220 A/240 V	In millions of operating cycles			3	10	10	3	3	20
Maximum immunity to microbreaks			**ms**	4	4	4	4	4	1
Power dissipated	At 20 °C		**W**	0.6	0.6	0.6	0.6	0.6	0.4
Direct mounting without contactor	With coil	∼24…250 V		–	**LC1 D40…D150**				–
		∼ 100…250 V		–	–				**LC1 D40…D115**
		∼ 380…415 V		**LC1 D40…D150**	–				–
Mounting with cabling adapter LAD 4BB	With coil	∼24…250 V		–	**LC1 D09…D38, DT20…DT40**				**LC1 D09…D38, DT20…DT40**
		∼ 380…415 V		**LC1 D09…D38, DT20…DT40**	–				–
Total operating time at Uc (of the contactor)			The operating times depend on the type of contactor electromagnet and its control mode. The closing time "C" is measured from the moment the coil supply is switched on to initial contact of the main poles. The opening time "O" is measured from the moment the coil supply is switched off to the moment the main poles separate.						
				LC1 D09…D38, DT20…DT40		**LC1 D40…D65**		**LC1 D80 and D95**	
	With **LA4 DF, LA4 DL**	"C"	**ms**	20…30		28…34		28…43	
		"O"	**ms**	16…24		20…24		18…32	
Cabling	Phillips N° 2 and Ø 6 mm Flexible or solid cable with or without cable end		**mm²**	Min: 1 x 1; max: 2 x 2.5					

5

References :
page 5/73

Dimensions :
pages 5/82 and 5/83

Schemes :
pages 5/86 and 5/87

References

TeSys contactors

For motor control up to 75 kW at 400 V, in category AC-3

Control circuit: a.c., d.c. or low consumption

LC1 D09●●

LC1 D25●●

LC1 D95●●

LC1 D115●●

3-pole contactors for connection by screw clamp terminals or connectors

Standard power ratings of 3-phase motors 50-60 Hz in category AC-3 (θ ⩽ 60 °C)							Rated operational current in AC-3 440 V up to	Instantaneous auxiliary contacts (NO)	Instantaneous auxiliary contacts (NC)	Basic reference, to be completed by adding the voltage code *(2)* – Fixing *(1)*	Weight *(3)*
220 V 230 V	380 V 400 V	415 V	440 V	500 V	660 V 690 V	1000 V					
kW	kW	kW	kW	kW	kW		A				kg
2.2	4	4	4	5.5	5.5	–	**9**	1	1	**LC1 D09●●**	0.320
3	5.5	5.5	5.5	7.5	7.5	–	**12**	1	1	**LC1 D12●●**	0.325
4	7.5	9	9	10	10	–	**18**	1	1	**LC1 D18●●**	0.330
5.5	11	11	11	15	15	–	**25**	1	1	**LC1 D25●●**	0.370
7.5	15	15	15	18.5	18.5	–	**32**	1	1	**LC1 D32●●**	0.375
9	18.5	18.5	18.5	18.5	18.5	–	**38**	1	1	**LC1 D38●●**	0.380
11	18.5	22	22	22	30	22	**40**	1	1	**LC1 D40●●**	1.400
15	22	25	30	30	33	30	**50**	1	1	**LC1 D50●●**	1.400
18.5	30	37	37	37	37	37	**65**	1	1	**LC1 D65●●**	1.400
22	37	45	45	55	45	45	**80**	1	1	**LC1 D80●●**	1.590
25	45	45	45	55	45	45	**95**	1	1	**LC1 D95●●**	1.610
30	55	59	59	75	80	65	**115**	1	1	**LC1 D115●●**	2.500
40	75	80	80	90	100	75	**150**	1	1	**LC1 D150●●**	2.500

3-pole contactors for connection by lugs or bars

In the references selected above, insert a figure **6** before the voltage code.
Example: **LC1 D09●●** becomes **LC1 D096●●**.

Accessories

Auxiliary contact blocks and add-on modules: see pages 5/68 to 5/75.

(1) LC1 D09 to D38: clip-on mounting on 35 mm rail AM1 DP or screw fixing.
LC1 D40 to D95 ∼: clip-on mounting on 35 mm rail AM1 DP or 75 mm rail AM1 DL or screw fixing.
LC1 D40 to D95 ⎓: clip-on mounting on 75 mm rail AM1 DL or screw fixing.
LC1 D115 and D150: clip-on mounting on 2 x 35 mm rails AM1 DP or screw fixing.
(2) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office):

a.c. supply													
Volts	**24**	**42**	**48**	**110**	**115**	**220**	**230**	**240**	**380**	**400**	**415**	**440**	**500**
LC1 D09…D150 (D115 and D150 coils with integral suppression device fitted as standard))													
50/60 Hz	B7	D7	E7	F7	FE7	M7	P7	U7	Q7	V7	N7	R7	–
LC1 D40…D115													
50 Hz	B5	D5	E5	F5	FE5	M5	P5	U5	Q5	V5	N5	R5	S5
60 Hz	B6	–	E6	F6	–	M6	–	U6	Q6	–	–	R6	–
d.c. supply													
Volts	**12**	**24**	**36**	**48**	**60**	**72**	**110**	**125**	**220**	**250**	**440**		
LC1 D09…D38 (coils with integral suppression device fitted as standard)													
U 0.7…1.25 Uc	JD	BD	CD	ED	ND	SD	FD	GD	MD	UD	RD		
LC1 D40…D95													
U 0.85…1.1 Uc	JD	BD	CD	ED	ND	SD	FD	GD	MD	UD	RD		
U 0.75…1.2 Uc	JW	BW	CW	EW	–	SW	FW	–	MW	–	–		
LC1 D115 and D150 (coils with integral suppression device fitted as standard)													
U 0.75…1.2 Uc	–	BD	–	ED	ND	SD	FD	GD	MD	UD	RD		
Low consumption													
Volts ⎓	**5**	**12**	**20**	**24**	**48**	**110**	**220**	**250**					
LC1 D09...D38 (coils with integral suppression device fitted as standard)													
U 0.7…1.25 Uc	AL	JL	ZL	BL	EL	FL	ML	UL					

For other voltages between 5 and 690 V, see pages 5/76 to 5/81.
(3) The weights indicated are for contactors with a.c. control circuit. For d.c. or low consumption control circuit, add 0.160 kg for contactors LC1 D09 to D38, 0.785 kg for contactors LC1 D40 to D65 and 1 kg for contactors LC1 D80 and D95.

Selection : pages 5/160 to 5/191
Characteristics : pages 5/46 to 5/51
Dimensions : pages 5/82 to 5/85
Schemes : pages 5/86 and 5/87

References

TeSys contactors

For motor control up to 15 kW at 400 V, in category AC-3

Control circuit: a.c., d.c. or low consumption

LC1 D123●●

3-pole contactors for connection by spring terminals

Standard power ratings of 3-phase motors 50/60 Hz in category AC-3 (θ ⩽ 60 °C)						Rated operational current in AC-3 440 V up to	Instantaneous auxiliary contacts		Basic reference, to be completed by adding the voltage code *(2)* Fixing *(1)*	Weight *(3)*
220 V 230 V	380 V 400 V	415 V	440 V	500 V	660 V 690 V		N/O	N/C		
kW	kW	kW	kW	kW	kW	A				kg
2.2	4	4	4	5.5	5.5	**9**	1	1	**LC1 D093●●**	0.320
3	5.5	5.5	5.5	7.5	7.5	**12**	1	1	**LC1 D123●●**	0.325
4	7.5	9	9	10	10	**18**	1	1	**LC1 D183●●**	0.330
5.5	11	11	11	15	15	**25**	1	1	**LC1 D253●●**	0.370
7.5	15	15	15	18.5	18.5	**32** *(4)*	1	1	**LC1 D323●●**	0.375

3-pole contactors for connection by Faston connectors

These contactors are fitted with Faston connectors: 2 x 6.35 mm on the power poles and 1 x 6.35 mm on the coil and auxiliary terminals. It is possible to make 2 x 6.35 mm connections to the coil terminals by using a double Faston connector, reference: LA9 6180, to be ordered separately (sold in lots of 100).
For contactors LC1 D09 and LC1 D12 only, in the references selected above, replace the figure **3** before the voltage code with a figure **9**. Example: **LC1 D093●●** becomes **LC1 D099●●**.

Accessories

Auxiliary contact blocks and add-on modules: see pages 5/68 to 5/75.

(1) LC1 D09 to D32: clip-on mounting on 35 mm ⎍ rail AM1 DP or screw fixing.
(2) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office):

a.c. supply												
Volts	**24**	**42**	**48**	**110**	**115**	**220**	**230**	**240**	**380**	**400**	**415**	**440**
LC1 D09...D32												
50/60 Hz	B7	D7	E7	F7	FE7	M7	P7	U7	Q7	V7	N7	R7
d.c. supply												
Volts	**12**	**24**	**36**	**48**	**60**	**72**	**110**	**125**	**220**	**250**	**440**	
LC1 D09...D32 (coils with integral suppression device fitted as standard)												
U 0.7…1.25 Uc	JD	BD	CD	ED	ND	SD	FD	GD	MD	UD	RD	
Low consumption												
Volts ⎓	**5**	**12**	**20**	**24**	**48**	**110**	**220**	**250**				
LC1 D09...D32 (coils with integral suppression device fitted as standard)												
U 0.7…1.25 Uc	AL	JL	ZL	BL	EL	FL	ML	UL				

For other voltages between 5 and 690 V, see pages 5/76 to 5/81.
(3) The weights indicated are for contactors with a.c. control circuit. For d.c. or low consumption control circuit, add 0.160 kg for contactors LC1 D09 to D32.
(4) Must be wired with 2 x 4 mm² cables in parallel on the upstream side. On the downstream side, outgoing terminal block LAD 331 may be used (Quickfit technology, see page 1/219).

5

Selection : pages 5/160 to 5/191
Characteristics : pages 5/46 to 5/51
Dimensions : pages 5/82 to 5/85
Schemes : pages 5/86 and 5/87

References

TeSys contactors

For control in category AC-1, 25 to 200 A

Control circuit: a.c., d.c. or low consumption


810366

LC1 D12●●

3-pole contactors for connection by screw clamp terminals or connectors

Non inductive loads maximum current (θ ≤ 60 °C) utilisation category AC-1	Number of poles	Instantaneous auxiliary contacts			Basic reference, to be completed by adding the voltage code *(1)* Fixing *(2)*	Weight *(3)*
A						kg
25	3	1	1		**LC1 D09●●**	0.320
				or	**LC1 D12●●**	0.325
32	3	1	1		**LC1 D18●●**	0.330
40	3	1	1		**LC1 D25●●**	0.370
50	3	1	1		**LC1 D32●●**	0.375
				or	**LC1 D38●●**	0.380
60	3	1	1		**LC1 D40●●**	1.400
80	3	1	1		**LC1 D50●●**	1.400
				or	**LC1 D65●●** *(4)*	1.400
125	3	1	1		**LC1 D80●●**	1.590
				or	**LC1 D95●●** *(4)*	1.610
200	3	1	1		**LC1 D115●●**	2.500
				or	**LC1 D150●●** *(5)*	2.500

3-pole contactors for connection by lugs or bars

In the references selected above, insert a figure **6** before the voltage code.
Example: **LC1 D09●●** becomes **LC1 D096●●**.


810367

LC1 D123●●

3-pole contactors for connection by Faston connectors

These contactors are fitted with Faston connectors: 2 x 6.35 mm on the power poles and 1 x 6.35 mm on the coil terminals. It is possible to make 2 x 6.35 mm connections to the coil terminals by using a double Faston connector, reference: LAD 99635, to be ordered separately (sold in lots of 100).
For contactors LC1 D09 and LC1 D12 only, in the references selected above, insert a figure **9** before the voltage code.
Example: **LC1 D09●●** becomes **LC1 D099●●**.

3-pole contactors for connection by spring terminals

16	3	1	1		**LC1 D093●●** *(6)*	0.320
				or	**LC1 D123●●** *(6)*	0.325
25	3	1	1		**LC1 D183●●** *(5)*	0.335
				or	**LC1 D253●●** *(7)*	0.325
				or	**LC1 D323●●** *(7)*	0.325

Accessories

Auxiliary contact blocks and add-on modules: see pages 5/68 to 5/75.

(1) See note (1) page 5/61.
(2) LC1 D09 to D38 and LC1 DT20 to DT40: clip-on mounting on 35 mm rail AM1 DP or screw fixing.
LC1 D40 to D95 ∿: clip-on mounting on 35 mm rail AM1 DP or 75 mm rail AM1 DL or screw fixing.
LC1 or LP1 D40 to D95 ⎓: clip-on mounting on 75 mm rail AM1 DL or screw fixing.
LC1 D115 and D150: clip-on mounting on 2 x 35 mm rails AM1 DP or screw fixing.
(3) The weights indicated are for contactors with a.c. control circuit. For d.c. or low consumption control circuit, add 0.160 kg for contactors LC1 D09 to D38, 0.785 kg for contactors LC1 D40 to D65 and 1 kg for contactors LC1 D80 and D95.
(4) Selection according to the number of operating cycles, see AC-1 curve, page 5/164.
(5) 32 A with 2 x 4 mm² cables connected in parallel.
(6) 20 A with 2 x 2.5 mm² cables connected in parallel.
(7) 40 A with 2 x 4 mm² cables connected in parallel.

References

TeSys contactors
For control in category AC-1, 20 to 200 A
Control circuit: a.c., d.c. or low consumption

565131

LC1 DT20●●

4-pole contactors for connection by screw clamp terminals or connectors

Non inductive loads maximum current (θ ≤ 60 °C) utilisation category AC-1	Number of poles		Instantaneous auxiliary contacts			Basic reference, to be completed by adding the voltage code *(1)* Fixing *(2)*	Weight *(3)*
A							kg
20	4	–	1	1		**LC1 DT20●●**	0.365
	2	2	1	1		**LC1 D098●●**	0.365
25	4	–	1	1		**LC1 DT25●●**	0.365
	2	2	1	1		**LC1 D128●●**	0.365
32	4	–	1	1		**LC1 DT32●●**	0.425
	2	2	1	1		**LC1 D188●●**	0.425
40	4	–	1	1		**LC1 DT40●●**	0.425
	2	2	1	1		**LC1 D258●●**	0.425
60	4	–	–	–		**LC1 D40004●●**	1.440
					or	**LP1 D40004●●**	2.210
	2	2	–	–		**LC1 D40008●●**	1.440
					or	**LP1 D40008●●**	2.210
80	4	–	–	–		**LC1 D65004●●**	1.440
					or	**LP1 D65004●●**	2.210
	2	2	–	–		**LC1 D65008●●**	1.450
					or	**LP1 D65008●●**	2.220
125	4	–	–	–		**LC1 D80004●●**	1.760
					or	**LP1 D80004●●**	2.685
	2	2	–	–		**LC1 D80008●●**	1.840
					or	**LP1 D80008●●**	2.910
200	4	–	–	–		**LC1 D115004●●**	2.860

4-pole contactors for connection by lugs or bars

In the references selected above, insert a figure **6** before the voltage code (except LC1 D65●●● and LP1 D65●●●).
Example: **LC1 DT20●●** becomes **LC1 DT206●●**.

4-pole contactors for connection by spring terminals

20	4	–	1	1	**LC1 DT203**	0.380
	2	2	1	1	**LC1 D0983**	0.380
25	4	–	1	1	**LC1 DT253**	0.380
	2	2	1	1	**LC1 D1283**	0.380
32	4	–	1	1	**LC1 DT323**	0.425
	2	2	1	1	**LC1 D1883**	0.425
40	4	–	1	1	**LC1 DT403**	0.425
	2	2	1	1	**LC1 D2583**	0.425

Accessories

Auxiliary contact blocks and add-on modules: see pages 5/68 to 5/75.

(1) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office):

a.c. supply

Volts	**24**	**42**	**48**	**110**	**115**	**220**	**230**	**240**	**380**	**400**	**415**	**440**	**500**
LC1 D09...D150 and LC1 DT20...DT40 (coils with integral suppression device fitted as standard)													
50/60 Hz	B7	D7	E7	F7	FE7	M7	P7	U7	Q7	V7	N7	R7	–
LC1 D40...D115													
50 Hz	B5	D5	E5	F5	FE5	M5	P5	U5	Q5	V5	N5	R5	S5
60 Hz	B6	–	E6	F6	–	M6	–	U6	Q6	–	–	R6	–

d.c. supply

Volts	**12**	**24**	**36**	**48**	**60**	**72**	**110**	**125**	**220**	**250**	**440**
LC1 D09...D38 and LC1 DT20...DT40 (coils with integral suppression device fitted as standard)											
U 0.7…1.25 Uc	JD	BD	CD	ED	ND	SD	FD	GD	MD	UD	RD
LC1 or LP1 D40...D80											
U 0.85…1.1 Uc	JD	BD	CD	ED	ND	SD	FD	GD	MD	UD	RD
U 0.75…1.2 Uc	JW	BW	CW	EW	–	SW	FW	–	MW	–	–
LC1 D115 (coils with integral suppression device fitted as standard)											
U 0.75…1.2 Uc	–	BD	–	ED	ND	SD	FD	GD	MD	UD	RD

Low consumption

Volts ⎓	**5**	**12**	**20**	**24**	**48**	**110**	**220**	**250**
LC1 D09...D38 and LC1 DT20...DT40 (coils with integral suppression device fitted as standard)								
U 0.7…1.25 Uc	AL	JL	ZL	BL	EL	FL	ML	UL

For other voltages between 5 and 690 V, see pages 5/76 to 5/81.

(2) See note (2) page 5/60

*(3) The weights indicated are for contactors with a.c. control circuit. For d.c. or low consumption control circuit, add 0.165 kg and for contactors **LC1 D80**, 1 kg.*

5

References

TeSys contactors

Reversing contactors for motor control up to 75 kW at 400 V, in category AC-3

Horizontally mounted, pre-assembled

Control circuit: a.c., d.c. or low consumption

LC2 D12●●

LC2 D50●●

3-pole reversing contactors for connection by screw clamp terminals or connectors

Pre-wired power connections

Standard power ratings of 3-phase motors 50/60 Hz in category AC-3							Operational current in AC-3 (θ ≤ 60 °C) 440 V up to	Instantaneous auxiliary contacts per contactor		Contactors supplied with coils. Basic reference, to be completed by adding the voltage code *(2)*. Fixing *(1)*	Weight *(3)*
220 V 230 V	380 V 400 V	415 V	440 V	500 V	660 V 690 V	1000 V		N/O	N/C		
kW	kW	kW	kW	kW	kW	kW	A				kg
With mechanical interlock, without electrical interlocking											
2.2	4	4	4	5.5	5.5	–	**9**	1	1	**LC2 D09●●** *(4)*	0.687
3	5.5	5.5	5.5	7.5	7.5	–	**12**	1	1	**LC2 D12●●** *(4)*	0.697
4	7.5	9	9	10	10	–	**18**	1	1	**LC2 D18●●** *(4)*	0.707
5.5	11	11	11	15	15	–	**25**	1	1	**LC2 D25●●** *(4)*	0.787
7.5	15	15	15	18.5	18.5	–	**32**	1	1	**LC2 D32●●** *(4)*	0.797
9	18.5	18.5	18.5	18.5	18.5	–	**38**	1	1	**LC2 D38●●** *(4)*	0.807
11	18.5	22	22	22	30	–	**40**	1	1	**LC2 D40●●**	2.400
15	22	25	30	30	33	–	**50**	1	1	**LC2 D50●●**	2.400
18.5	30	37	37	37	37	–	**65**	1	1	**LC2 D65●●**	2.400
22	37	45	45	55	45	–	**80**	1	1	**LC2 D80●●**	3.200
25	45	45	45	55	45	–	**95**	1	1	**LC2 D95●●**	3.200
With mechanical interlock and electrical interlocking											
30	55	59	59	75	80	65	**115**	1	1	**LC2 D115●●**	6.350
40	75	80	80	90	100	75	**150**	1	1	**LC2 D150●●**	6.400

3-pole reversing contactors for connection by lugs or bars

For reversing contactors LC2 D09 to LC2 D38, LC2 D115 and LC2 D150, in the references selected above, insert a figure **6** before the voltage code. Example: **LC2 D09●●** becomes **LC2 D096●●**.

5

Accessories

Auxiliary contact blocks and add-on modules: see pages 5/68 to 5/75.

(1) LC2 D09 to D38: clip-on mounting on 35 mm rail AM1 DP or screw fixing.
LC2 D40 to D95: clip-on mounting on 35 mm rail AM1 DP or 75 mm rail AM1 DL or screw fixing.
LC2 D115 and D150: clip-on mounting on 2 x 35 mm rails AM1 DP or screw fixing.
(2) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office):

a.c. supply													
Volts	**24**	**42**	**48**	**110**	**115**	**220**	**230**	**240**	**380**	**400**	**415**	**440**	**500**
LC2 D09…D150 (D115 and D150 coils with integral suppression device fitted as standard))													
50/60 Hz	B7	D7	E7	F7	FE7	M7	P7	U7	Q7	V7	N7	R7	–
LC2-D40…D115													
50 Hz	B5	D5	E5	F5	FE5	M5	P5	U5	Q5	V5	N5	R5	S5
60 Hz	B6	–	E6	F6	–	M6	–	U6	Q6	–	–	R6	–

d.c. supply											
Volts	**12**	**24**	**36**	**48**	**60**	**72**	**110**	**125**	**220**	**250**	**440**
LC2 D09…D38 (coils with integral suppression device fitted as standard)											
U 0.7…1.25 Uc	JD	BD	CD	ED	ND	SD	FD	GD	MD	UD	RD

Low consumption								
Volts ⎓	**5**	**12**	**20**	**24**	**48**	**110**	**220**	**250**
LC2 D09...D38 (coils with integral suppression device fitted as standard)								
U 0.7…1.25 Uc	AL	JL	ZL	BL	EL	FL	ML	UL

For other voltages between 5 and 690 V, see pages 5/76 to 5/81.
*(3) The weights indicated are for contactors with a.c. control circuit. For d.c. or low consumption control circuit, add 0.330 kg (**LC2 D09**…**D38**).*
*(4) For reversing contactors with electrical interlocking pre-wired at the factory, add suffix **V** to the references selected above. Example: **LC2 D09P7** becomes **LC2 D09P7V**.*

References

TeSys contactors

Reversing contactors for motor control up to 15 kW at 400 V, in category AC-3

Horizontally mounted, pre-assembled

Control circuit: a.c., d.c. or low consumption

LC2 D123●●

3-pole reversing contactors for connection by spring terminals

Pre-wired power connections
Mechanical interlock, without electrical interlocking.

Standard power ratings of 3-phase motors 50/60 Hz in category AC-3						Operational current in AC-3 (θ ≤ 60 °C) 440 V up to	Instantaneous auxiliary contacts per contactor		Contactors supplied with coils: Basic reference, to be completed by adding the voltage code *(2)* — Fixing *(1)*	Weight *(3)*
220 V 230 V	380 V 400 V	415 V	440 V	500 V	660 V 690 V					
kW	kW	kW	kW	kW	kW	A				kg
2.2	4	4	4	5.5	5.5	**9**	1	1	**LC2 D093●●**	0.687
3	5.5	5.5	5.5	7.5	7.5	**12**	1	1	**LC2 D123●●**	0.697
4	7.5	9	9	10	10	**18**	1	1	**LC2 D183●●**	0.707
5.5	11	11	11	15	15	**25**	1	1	**LC2 D253●●**	0.787
7.5	15	15	15	18.5	18.5	**32**	1	1	**LC2 D323●●**	0.797

3-pole reversing contactors for connection by Faston connectors

All power connections are to be made by the customer.
These contactors are fitted with Faston connectors: 2 x 6.35 mm on the power poles and 1 x 6.35 mm on the coil terminals. It is possible to make 2 x 6.35 mm connections to the coil terminals by using a double Faston connector, reference: LAD 99635, to be ordered separately (sold in lots of 100).
For contactors LC2 D09 and LC2 D12 only, replace the digit **3** with a **9** in the references selected above.
Example: **LC2 D093●●** becomes **LC2 D099●●**.

Accessories

Auxiliary contact blocks and add-on modules: see pages 5/68 to 5/75.

(1) LC2 D09 to D32: clip-on mounting on 35 mm rail AM1 DP or screw fixing.
(2) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office).

a.c. supply

Volts	**24**	**42**	**48**	**110**	**115**	**220**	**230**	**240**	**380**	**400**	**415**	**440**
LC2 D09…D32												
50/60 Hz	B7	D7	E7	F7	FE7	M7	P7	U7	Q7	V7	N7	R7

d.c. supply

Volts	**12**	**24**	**36**	**48**	**60**	**72**	**110**	**125**	**220**	**250**	**440**
LC2 D09…D32 (coils with integral suppression device fitted as standard)											
U 0.7…1.25 Uc	JD	BD	CD	ED	ND	SD	FD	GD	MD	UD	RD

Low consumption

Volts ⎓	**5**	**12**	**20**	**24**	**48**	**110**	**220**	**250**
LC2 D09...D32 (coils with integral suppression device fitted as standard)								
U 0.7…1.25 Uc	AL	JL	ZL	BL	EL	FL	ML	UL

For other voltages between 5 and 690 V, see pages 5/76 to 5/81.
(3) The weights indicated are for reversing contactors with a.c. control circuit. For d.c. or low consumption control circuit, add 0.330 kg.

Selection : pages 5/160 to 5/191
Characteristics : pages 5/46 to 5/51
Dimensions, schemes : pages 5/88 and 5/89

TeSys contactors

Changeover contactor pairs
for control in category AC-1, 20 to 200 A, horizontally mounted, pre-assembled

Control circuit: a.c., d.c. or low consumption

510441

LC2 DT20●●

4-pole changeover contactor pairs for connection by screw clamp terminals or connectors

Pre-wired power connections

LC2 DT20 to LC2 DT40: mechanical interlock without electrical interlocking.
LC2 D40 to LC2 D80: order separately 2 auxiliary contact blocks LAD N●1 to obtain electrical interlocking between the 2 contactors (see page 5/69). For electrical interlocking incorporated in the mechanical interlock, please consult your Regional Sales Office.
LC2 D115: mechanical interlock with integral, pre-wired electrical interlocking.

Utilisation category AC-1 Non inductive loads Maximum rated operational current (θ ⩽ 60 °C)	Instantaneous auxiliary contacts per contactor (N/O)	Instantaneous auxiliary contacts per contactor (N/C)	Contactors supplied with coil: Basic reference, to be completed by adding the voltage code *(1)*; Fixing *(2)*	Weight
A				kg
20	1	1	**LC2 DT20●●**	0.730
25	1	1	**LC2 DT25●●**	0.730
32	1	1	**LC2 DT32●●**	0.850
40	1	1	**LC2 DT40●●**	0.850
60	–	–	**LC2 D40004●●**	3.200
80	–	–	**LC2 D65004●●**	3.200
125	–	–	**LC2 D80004●●**	3.200
200	–	–	**LC2 D115004●●**	7.400

4-pole changeover contactor pairs for connection by lugs or bars

20	1	1	**LC2 DT206●●**	0.730
25	1	1	**LC2 DT256●●**	0.730
32	1	1	**LC2 DT326●●**	0.850
40	1	1	**LC2 DT406●●**	0.850
60	–	–	**LC2 D400046**	2.400
80	–	–	**LC2 D650046●●**	3.200
125	–	–	**LC2 D800046●●**	3.200
200	–	–	**LC2 D1150046●●**	7.400

Accessories

Auxiliary contact blocks and add-on modules, see pages **5/68** to **5/75**.

(1) See note (1) on next page.
(2) LC2 DT20 to DT40: clip-on mounting on 35 mm rail AM1 DP or screw fixing.
LC2 D65 and D80: clip-on mounting on 35 mm rail AM1 DP or 75 mm rail AM1 DL or screw fixing.
LC2 D115: clip-on mounting on 2 x 35 mm rails AM1 DP or screw fixing.

References

TeSys contactors

Changeover contactor pairs for control in category AC-1, 20 A, horizontally mounted, pre-assembled

Control circuit: a.c., d.c. or low consumption

4-pole changeover contactor pairs for connection by spring terminals

Pre-wired power connections

Utilisation category AC-1 Non inductive loads Maximum rated operational current (θ ⩽ 60 °C)	Instantaneous auxiliary contacts per contactor		Contactors supplied with coil Basic reference, to be completed by adding the voltage code *(1)* Fixing *(2)*	Weight
A				**kg**
20	1	1	**LC2 DT203●●**	0.760

Accessories

Auxiliary contact blocks and add-on modules, see pages 5/68 to 5/75**.**

(1) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office).

a.c. supply													
Volts	**24**	**42**	**48**	**110**	**115**	**220**	**230**	**240**	**380**	**400**	**415**	**440**	**500**
LC2 DT20…DT40													
50/60 Hz	B7	D7	E7	F7	FE7	M7	P7	U7	Q7	V7	N7	R7	–
LC2 D65…D115													
50 Hz	B5	D5	E5	F5	FE5	M5	P5	U5	Q5	V5	N5	R5	S5
60 Hz	B6	–	E6	F6	–	M6	–	U6	Q6	–	–	R6	–
d.c. supply													
Volts	**12**	**24**	**36**	**48**	**60**	**72**	**110**	**125**	**220**	**250**	**440**		
LC2 DT20…DT40 (coils with integral suppression device fitted as standard)													
U 0.7…1.25 Uc	JD	BD	CD	ED	ND	SD	FD	GD	MD	UD	RD		
Low consumption													
Volts ⎓	**5**	**12**	**20**	**24**	**48**	**110**	**220**	**250**					
LC2 DT20...DT40 (coils with integral suppression device fitted as standard)													
U 0.7…1.25 Uc	AL	JL	ZL	BL	EL	FL	ML	UL					

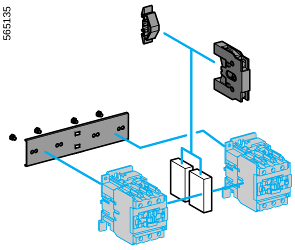
For other voltages between 5 and 690 V, see pages 5/76 to 5/81.

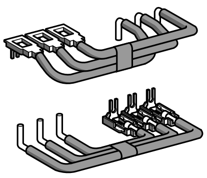
(2) Clip-on mounting on 35 mm ⊓ rail AM1 DP or screw fixing.

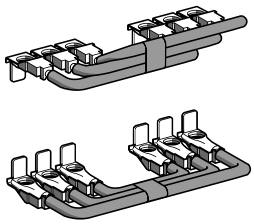
5

References

TeSys contactors
Component parts for assembling reversing contactors for motor control or low speed - high speed starters

565135

LA9 D4002

810374

LA9 D6569

810375

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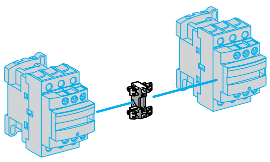
810373


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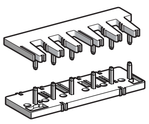

LAD 9R1

For 3-pole reversing contactors for motor control

Contactors with screw clamp terminals or connectors
Horizontally mounted, assembled by customer

Using 2 identical contactors *(1)*	Set of power connections Reference	Weight kg	Mechanical interlock Kit reference	Weight kg
Including mechanical interlock and an electrical interlocking kit for the contactors				
LC1 D09…D38	**LAD 9R1V** *(2)*	0.045	–	–
Including mechanical interlock with integral electrical interlocking				
LC1 D40…D65	**LA9 D6569**	0.290	**LA9 D4002**	0.170
LC1 D80 and D95 (~)	**LA9 D8069**	0.290	**LA9 D4002**	0.170
LC1 D80 and D95 (⎓)	**LA9 D8069**	0.490	**LA9 D8002**	0.170
LC1 D115 and D150	**LA9 D11569**	1.450	**LA9 D11502**	0.290
Including mechanical interlock without electrical interlocking				
LC1 D09…D38 with screw clamp terminals or connectors	**LAD 9R1** *(2)*	0.045	–	–
LC1 D09…D32 with spring terminal connections	*(3)*	–	–	–
LC1 D40…D65	**LA9 D6569**	0.290	**LA9 D50978**	0.170
LC1 D80 and D95 (~)	**LA9 D8069**	0.490	**LA9 D50978**	0.170
LC1 D80 and D95 (⎓)	**LA9 D8069**	0.490	**LA9 D80978**	0.170

For low speed - high speed starter

Description	For contactors with connections	Reference	Weight kg
Connection kit enabling reversing of low and high speed directions, using a reversing contactor and a 2N/O + 2N/C main pole contactor	Screw clamps or connectors	**LAD 9PVGV**	0.016
	Power connection module with spring terminal connections	**LAD 3PVGV**	0.034
	Outgoing terminal block with spring terminal connections	**LAD 3PVGV10**	0.034

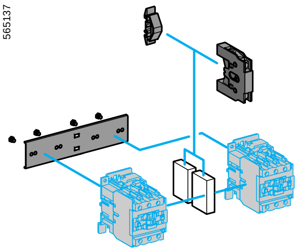
(1) To order the 2 contactors: see pages 5/58 and 5/59.
(2) Including mechanical interlock.
(3) To build a reversing contactor with spring terminal connections, the following components must be ordered:
*- 1 mechanical interlock **LAD 9V2**,*
- 1 upstream power connection kit and 1 downstream power connection kit.
*Upstream power connection kit **LAD 9V10**: installed in the Quickfit system with power connection module **LAD 34**.*
*(If module **LAD 34** is not used, replace **LAD 9V10** with **LAD 9V12**).*
*Downstream power connection kit **LAD 9V11**: installed in the Quickfit system with outgoing terminal block **LAD 331**.*
*(If module **LAD 331** is not used, replace **LAD 9V11** with **LAD 9V13**).*

Selection : pages 5/160 to 5/163
Characteristics : pages 5/46 to 5/51
Dimensions, schemes : pages 5/88 and 5/89

References

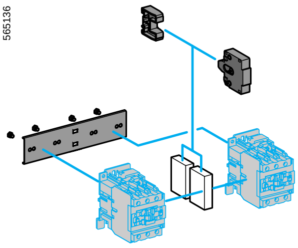
TeSys contactors
Component parts for assembling changeover contactor pairs for distribution

565137



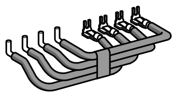
LA9 D4002

565136



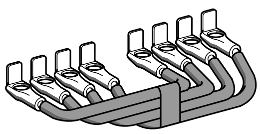
LA9 D50978

810379



LA9 D6570

810380



LA9 D8070

For 4-pole changeover contactor pairs (3-phase distribution + neutral)

Contactors with screw clamp terminals or connectors
Horizontally mounted, assembled by customer

Using 2 identical contactors *(1)*	Set of power connections Reference	Weight kg	Mechanical interlock Kit reference	Weight kg
Including mechanical interlock and an electrical interlocking kit for the contactors				
LC1 DT20…DT40	**LAD T9R1V** *(2)*	0.040	–	–
Including mechanical interlock with integral electrical interlocking				
LC1 D65004	**LA9 D6570**	0.150	**LA9 D4002**	0.170
LC1 D80004	**LA9 D8070**	0.280	**LA9 D4002**	0.170
LP1 D80004	**LA9 D8070**	0.280	**LA9 D8002**	0.170
LC1 D115004	**LA9 D11570**	1.100	**LA9 D11502**	0.280
Including mechanical interlock without electrical interlocking				
LC1 DT20…DT40 with screw clamp terminals or connectors	**LAD-T9R1** *(2)*	0.035	–	–
LC1 DT203…DT403 with spring terminal connections	*(3)*	–	–	–
LC1 or LP1 D65004	**LA9 D6570** *(4)*	0.150	**LA9 D50978**	0.155
LC1 D80004	**LA9 D8070** *(4)*	0.280	**LA9 D50978**	0.155
LP1 D80004	**LA9 D8070** *(4)*	0.280	**LA9 D80978**	0.180

For 3-pole changeover contactor pairs

Using 2 identical contactors *(1)*	Set of power connections Reference	Weight kg	Mechanical interlock Kit reference	Weight kg
Including mechanical interlock with integral electrical interlocking				
LC1 D115 and D150	**LA9 D11571**	0.960	**LA9 D11502**	0.280

(1) To order the 2 contactors: see pages 5/61 and 5/62.
(2) Including mechanical interlock.
(3) To build a changeover contactor pair with spring terminal connections, the following components must be ordered in addition to the 2 contactors:
*- 1 mechanical interlock **LAD 9V2**,*
*- 1 downstream power connection kit **LAD 9V9**.*
*(4) Order 2 contact blocks **LAD N●1** to build the electrical interlock, see page 5/69.*

5

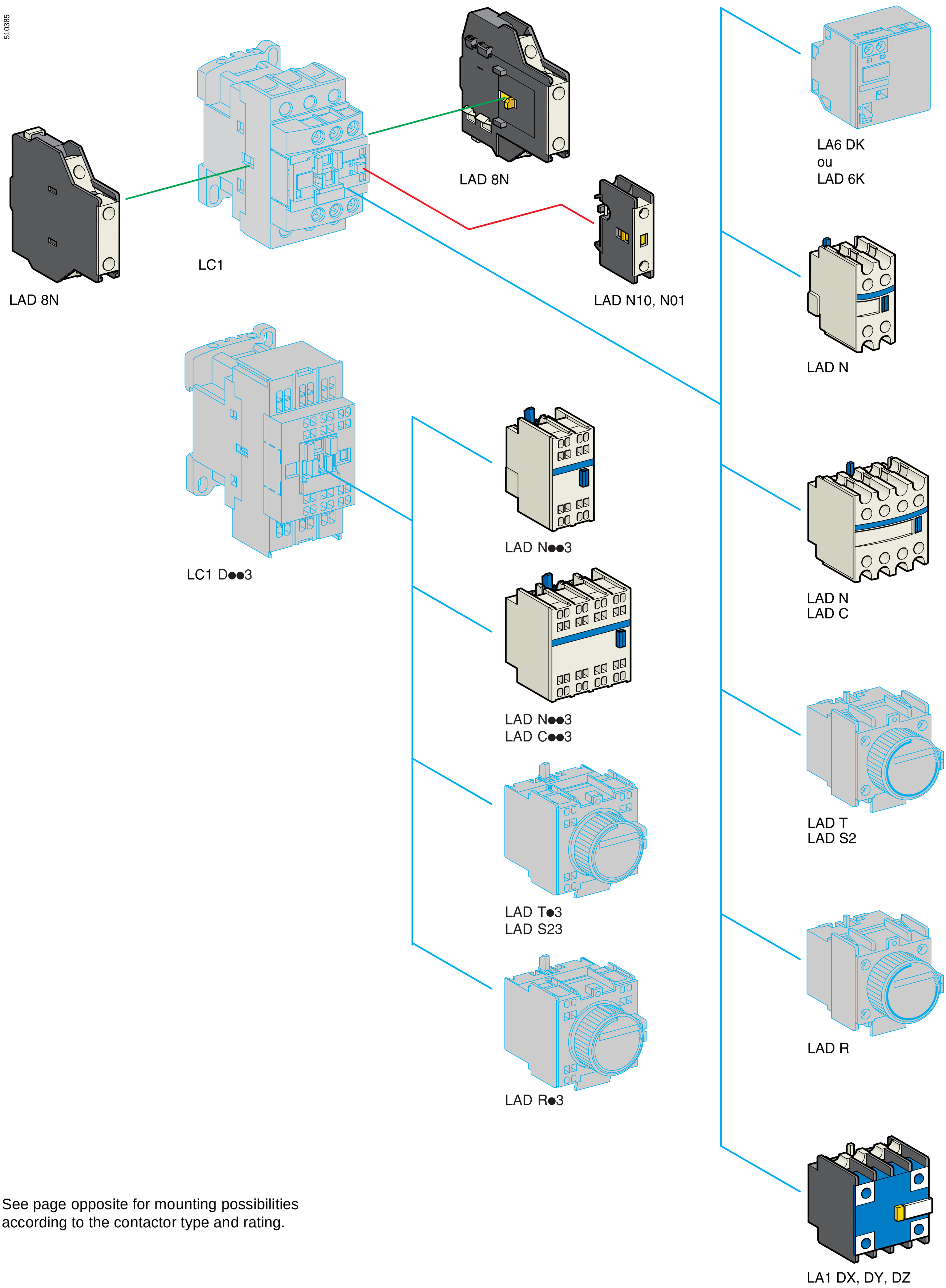
Selection :
pages 5/160 to 5/163
Characteristics :
pages 5/46 to 5/51
Dimensions, schemes :
pages 5/88 and 5/89

Presentation

TeSys contactors

TeSys d contactors and reversing contactors

Instantaneous auxiliary contact blocks



See page opposite for mounting possibilities according to the contactor type and rating.

References

TeSys contactors

TeSys d contactors and reversing contactors

Instantaneous auxiliary contact blocks

Instantaneous auxiliary contact blocks for connection by screw clamp terminals

For use in normal operating environments

In order to mount an LAD 8N on an LC1 D40 to D95, a set of shims must be ordered separately, see page 5/75

Clip-on mounting *(1)*	Number of contacts per block	Composition					Reference	Weight kg
Front	1	–	–	–	1	–	**LAD N10**	0.020
		–	–	–	–	1	**LAD N01**	0.020
	2	–	–	–	1	1	**LAD N11**	0.030
		–	–	–	2	–	**LAD N20**	0.030
		–	–	–	–	2	**LAD N02**	0.030
	4	–	–	–	2	2	**LAD N22**	0.050
		–	–	–	1	3	**LAD N13**	0.050
		–	–	–	4	–	**LAD N40**	0.050
		–	–	–	–	4	**LAD N04**	0.050
		–	–	–	3	1	**LAD N31**	0.050
	4 incl. 1 N/O & 1 N/C make before break	–	–	–	2	2	**LAD C22**	0.050
Side	2	–	–	–	1	1	**LAD 8N11**	0.030
		–	–	–	2	–	**LAD 8N20**	0.030
		–	–	–	–	2	**LAD 8N02**	0.030
For terminal referencing conforming to EN 50012								
Front, on 3P contactors and 4P contactors 20 to 60A	2	–	–	–	1	1	**LAD N11G**	0.030
	4	–	–	–	2	2	**LAD N22G**	0.050
Front, on 4P contactors 80 to 200A	2	–	–	–	1	1	**LAD N11P**	0.030
	4	–	–	–	2	2	**LAD N22P**	0.050
With dust and damp protected contacts, for use in particularly harsh industrial environments								
Front	2	–	2	–	–	–	**LA1 DX20**	0.040
		1	1	–	–	–	**LA1 DX11**	0.040
		2	–	–	–	–	**LA1 DX02**	0.040
		–	2	2	–	–	**LA1 DY20** *(2)*	0.040
	4	–	2	–	2	–	**LA1 DZ40**	0.050
		–	2	–	1	1	**LA1 DZ31**	0.060

Instantaneous auxiliary contact blocks for connection by lugs

This type of connection is not possible for blocks with 1 contact or blocks with dust and damp protected contacts. For all other instantaneous auxiliary contact blocks, add the figure 6 to the end of the references selected above. Example: **LAD N11** becomes **LAD N116**.

Instantaneous auxiliary contact blocks for connection by spring terminals

This type of connection is not possible for LAD 8, LAD N with 1 contact or blocks with dust and damp protected contacts. For all other contact blocks, add the figure **3** to the end of the references selected above. Example: **LAD N11** becomes **LAD N113**.

Instantaneous auxiliary contact blocks for connection by Faston connectors

This type of connection is not possible for LAD 8, LAD N with 1 contact or blocks with dust and damp protected contacts. For all other contact blocks, add the figure **9** to the end of the references selected above. Example: **LAD N11** becomes **LAD N119**.

(1) Maximum number of auxiliary contacts that can be fitted

Contactors			Instantaneous auxiliary contacts					Time delay
Type	Number of poles and size		Side mounted		Front mounted			Front mounted
					1 contact	2 contacts	4 contacts	
∼	3P	LC1 D09…D38	1 on LH side	**and**	–	1	or 1	or 1
		LC1 D40…D95 (50/60 Hz)	1 on each side	**or**	2	and 1	or 1	or 1
		LC1 D40…D95 (50 or 60 Hz)	1 on each side	**and**	2	and 1	or 1	or 1
		LC1 D115 and D150	1 on LH side	**and**	–	1	or 1	or 1
	4P	LC1 DT20…DT40	1 on LH side	**and**	–	1	or 1	or 1
		LC1 D40…D80	1 on each side	**or**	1	or 1	or 1	or 1
		LC1 D115	1 on each side	**and**	1	or 1	or 1	or 1
⎓	3P	LC1 D09…D38	–		–	1	or 1	or 1
		LC1 D40…D95	–		2	and 1	or 1	or 1
		LC1 D115 and D150	1 on LH side	**and**	–	1	or 1	or 1
	4P	LC1 DT20…DT40	–		–	1	or 1	or 1
		LC1 D40…D80	–		2	and 1	or 1	or 1
		LC1 D115	1 on each side		–	and 1	or 1	or 1
LC *(3)*	3P	LC1 D09…D38	–		–	1	–	–
	4P	LC1 DT20…DT40	–		–	1	–	–

(2) Device fitted with 4 earth screen continuity terminals.
(3) LC: low consumption.

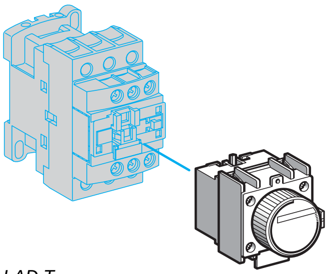
5

Characteristics : pages 5/52 to 5/54
Dimensions : pages 5/82 to 5/85
Schemes : pages 5/86 and 5/87

References

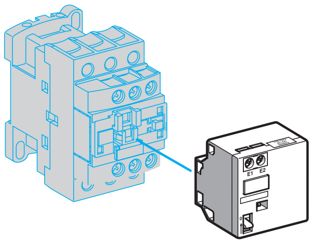
TeSys contactors
TeSys d contactors and reversing contactors
Time delay auxiliary contact blocks
Mechanical latch blocks

810438



LAD T

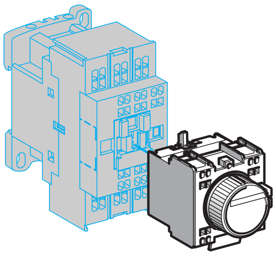
810439



LA6 DK

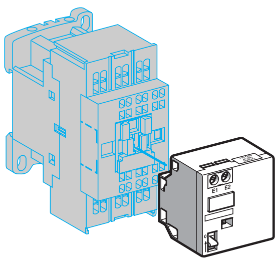
5

810441



LAD T●3

810440



LA6 DK

Time delay auxiliary contact blocks for connection by screw clamp terminals

Maximum number of auxiliary contact blocks that can be fitted per contactor, see page 5/69.
Sealing cover to be ordered separately, see page 5/75.
LAD T0 and LAD R0: with extended scale from 0.1 to 0.6 s.
LAD S2: with switching time of 40 ms ± 15 ms between opening of the N/C contact and closing of the N/O contact.

Clip-on mounting	Number of contacts per block	Time delay Type	Time delay Setting range	Reference	Weight kg
Front	1 N/O + 1 N/C	On-delay	0.1…3 s	**LAD T0**	0.060
			0.1…30 s	**LAD T2**	0.060
			10…180 s	**LAD T4**	0.060
			1…30 s	**LAD S2**	0.060
		Off-delay	0.1…3 s	**LAD R0**	0.060
			0.1…30 s	**LAD R2**	0.060
			10…180 s	**LAD R4**	0.060

Time delay auxiliary contact blocks for connection by lugs

Add the figure **6** to the end of the references selected above. Example: **LAD T0** becomes **LAD T06**.

Time delay auxiliary contact blocks for connection by spring terminals

Add the figure **3** to the end of the references selected above. Example: **LAD T0** becomes **LAD T03**.

Time delay auxiliary contact blocks for connection by Faston connectors

Add the figure **9** to the end of the references selected above. Example: **LAD T0** becomes **LAD T09**.

Mechanical latch blocks *(1)*

Clip-on mounting	Unlatching control	For use on contactor	Basic reference, to be completed by adding the voltage code *(2)*	Weight kg
Front	Manual or electric	LC1 D40…D65 (3 P ~ or ⎓) LC1 D40 and D65 (4 P ~) LP1 D40 and D65 (4 P ⎓)	**LA6 DK10●**	0.070
		LC1 D80…D150 (3 P ~) LC1 D80 and D115 (3 P ⎓) LC1 D80 (4 P ~) LC1 D80 & D115 (4 P ~) LP1 D80 & LC1 D115 (4 P ⎓)	**LA6 DK20●**	0.090
		LC1 D09…D38 (~ or ⎓) LC1 DT20…DT40 (~ or ⎓)	**LAD 6K10●**	0.070

(1) The mechanical latch block must not be powered up at the same time as the contactor. The duration of the control signal for the mechanical latch block and the contactor should be:
⩾ 100 ms for a contactor operating on an a.c. supply
⩾ 250 ms for a contactor operating on a d.c. supply
(2) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office):

Volts 50/60 Hz, ⎓	**24**	**32/36**	**42/48**	**60/72**	**100**	**110/127**	**220/240**	**256/277**	**380/415**
Code	B	C	E	EN	K	F	M	U	Q

Characteristics : pages 5/52 to 5/54
Dimensions : pages 5/82 to 5/85
Schemes : pages 5/86 and 5/87

References

TeSys contactors

TeSys d contactors and reversing contactors

Suppressor modules

RC circuits (Resistor-Capacitor)

- Effective protection for circuits highly sensitive to "high frequency" interference. For use only in cases where the voltage is virtually sinusoidal, i.e. less than 5% total harmonic distortion.
- Voltage limited to 3 Uc max. and oscillating frequency limited to 400 Hz max.
- Slight increase in drop-out time (1.2 to 2 times the normal time).

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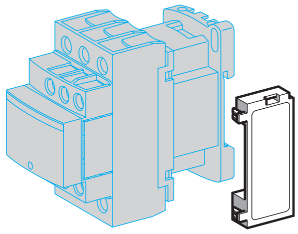


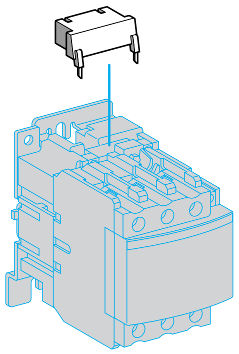
LAD 4●●

Mounting	For use with contactor *(1)*			Reference	Weight
	Rating	Type			
		V ~	V ⎓		kg
Clip-on *(3)*	D09…D38 (3P) DT20…DT40	24…48	–	**LAD 4RCE**	0.012
		50…127	–	**LAD 4RCG**	0.012
		110…240	–	**LAD 4RCU**	0.012
Screw mounting *(4)*	D40…D150 (3P) and D40…D115 (4P)	24…48	–	**LA4 DA2E**	0.018
		50…127	–	**LA4 DA2G**	0.018
		110…240	–	**LA4 DA2U**	0.018
		380…415	–	**LA4 DA2N**	0.018

Varistors (peak limiting)

- Protection provided by limiting the transient voltage to 2 Uc max.
- Maximum reduction of transient voltage peaks.
- Slight increase in drop-out time (1.1 to 1.5 times the normal time).

810443



LA4 D●●

Clip-on *(3)*	D09…D38 (3P) *(2)* DT20…DT40	24…48	–	**LAD 4VE**	0.012
		50…127	–	**LAD 4VG**	0.012
		110…250	–	**LAD 4VU**	0.012
Screw mounting *(4)*	D40…D115 (3P) and D40…D115 (4P)	24…48	–	**LA4 DE2E**	0.018
		50…127	–	**LA4 DE2G**	0.018
		110…250	–	**LA4 DE2U**	0.018
	D40…D95 (3P) and D40…D80 (4P)	–	24…48	**LA4 DE3E**	0.018
		–	50…127	**LA4 DE3G**	0.018
		–	110…250	**LA4 DE3U**	0.018

Flywheel diodes

- No overvoltage or oscillating frequency.
- Increase in drop-out time (6 to 10 times the normal time).
- Polarised component.

Clip-on *(5)*	D09…D38 (3P) DT20…DT40	–	24…250	**LAD 4DDL**	0.012
Screw mounting *(4)*	D40…D95 (3P) D40…D80 (4P)	–	24…250	**LA4 DC3U**	0.018

Bidirectional peak limiting diode

- Protection provided by limiting the transient voltage to 2 Uc max.
- Maximum reduction of transient voltage peaks.

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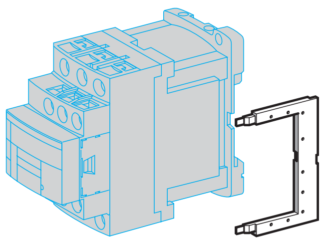


LAD 4DDL or LAD 4T●DL

Clip-on *(3) (5)*	D09…D38 (3P) *(2)* DT20…DT40	24	–	**LAD 4TB**	0.012
		–	24	**LAD 4TBDL**	0.012
		72	–	**LAD 4TS**	0.012
		–	72	**LAD 4TSDL**	0.012
		–	125	**LAD 4TGDL**	0.012
		–	250	**LAD 4TUDL**	0.012
		–	600	**LAD 4TXDL**	0.012
Screw mounting *(4)*	D40…D95 (3P) D40…D80 (4P)	24	–	**LA4 DB2B**	0.018
		72	–	**LA4 DB2S**	0.018
		–	24	**LA4 DB3B**	0.018
		–	72	**LA4 DB3S**	0.018

(1) For satisfactory protection, a suppressor module must be fitted across the coil of each contactor.
(2) From LC1 D09 to D38 and from LC1 DT20 to DT40, d.c. and low consumption 3-pole contactors are fitted with a built-in bidirectional peak limiting diode suppressor as standard. On contactors produced after 15th July 2004, this bidirectional peak limiting diode is removable and can therefore be replaced by the user. (See reference above). If a d.c. or low consumption contactor is used without suppression, the standard suppressor should be replaced with a blanking plug (reference LAD 9DL)
(3) Clipping-on makes the electrical connection. The overall size of the contactor remains unchanged.
(4) Mounting at the top of the contactor on coil terminals A1 and A2.
(5) In order to install these accessories, the existing suppression device must first be removed.

5

Characteristics :
pages 5/52 to 5/54

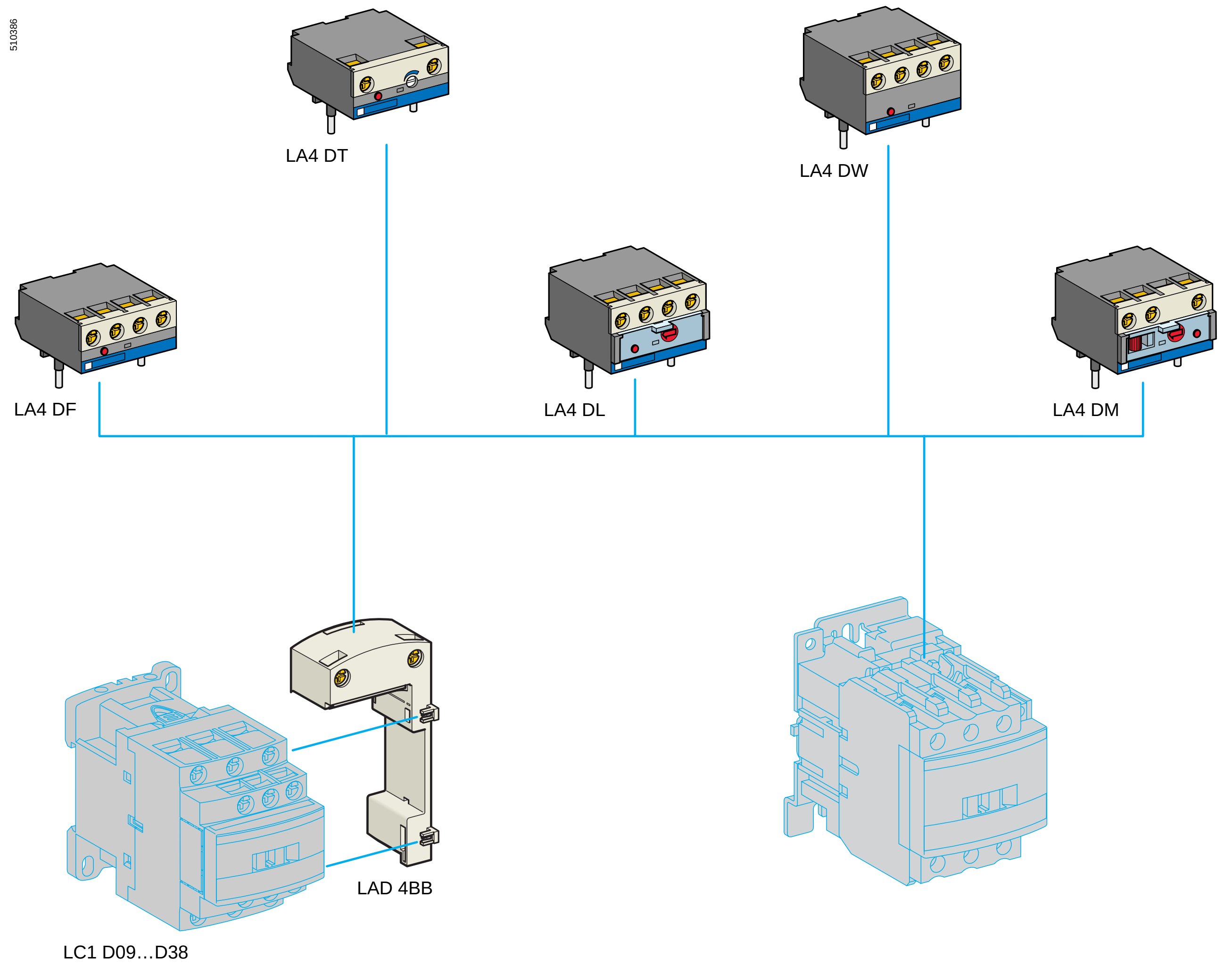
Dimensions :
pages 5/82 to 5/85

Schemes :
pages 5/86 and 5/87

Presentation

TeSys contactors

TeSys d contactors and reversing contactors



See page opposite for mounting possibilities according to contactor type and rating.

References

TeSys contactors

TeSys d contactors and reversing contactors

Accessories

Electronic serial timer modules *(1)*

- 3-pole contactors LC1 D09 to D38 and 4-pole contactors LC1 DT20 to DT40: mounted using adapter LAD 4BB, to be ordered separately, see page 5/75.
- 3-pole contactors LC1 D40 to D150 and 4-pole contactors LC1 D40 to D115: mounted directly across terminals A1 and A2 of contactor.

On-delay type

Operational voltage ∿		Time delay	Reference	Weight
24…250 V	**100…250 V**			**kg**
LC1 D09…D38 (3P) and DT20…DT40 (4P)	LC1 D40…D150 (3P)	0.1…2 s	**LA4 DT0U**	0.040
		1.5…30 s	**LA4 DT2U**	0.040
		25…500 s	**LA4 DT4U**	0.040

Interface modules

- 3-pole contactors LC1 D09 to D38 and 4-pole contactors LC1 DT20 to DT40: mounted using adapter LAD 4BB, to be ordered separately, see page 5/75.
- 3-pole contactors LC1 D40 to D150 and 4-pole contactors LC1 D40 to D115: mounted directly across terminals A1 and A2 of contactor.

Relay interface

Operational voltage ∿		Supply voltage E1-E2 (⎓)	Reference	Weight
24…250 V	**380…415 V**			**kg**
–	LC1 D09…D150 (3P) and DT20…DT40 (4P)	24 V	**LA4 DFBQ**	0.055
LC1 D09…D150 (3P) and DT20…DT40 (4P)	–	24 V	**LA4 DFB**	0.050
		48 V	**LA4 DFE**	0.050

Relay interface with "AUTO-I" manual override switch (output forced “ON”)

Operational voltage ∿		Supply voltage E1-E2 (⎓)	Reference	Weight
24…250 V	**100…250 V**			**kg**
LC1 D09…D150 (3P) and DT20…DT40 (4P)	–	24 V	**LA4 DLB**	0.045
		48 V	**LA4 DLE**	0.045
Solid state interface				
LC1 D09…D38 (3P) and DT20…DT40 (4P)	LC1 D40…D115 (3P)	24 V	**LA4 DWB**	0.045

Auto-Man-Stop control modules

For local override operation tests with 2-position “Auto-Man” switch and “O-I” switch

- 3-pole contactors LC1 D09 to D38 and 4-pole contactors LC1 DT20 to DT40: mounted using adapter LAD 4BB, to be ordered separately, see page 5/75.
- 3-pole contactors LC1 D40 to D150 and 4-pole contactors LC1 D40 to D115: mounted directly across terminals A1 and A2 of contactor.

Operational voltage ∿		Reference	Weight
24…100 V	**100…250 V**		**kg**
LC1 D09…D150 (3P) and DT20…DT40 (4P)	–	**LA4 DMK**	0.040
–	LC1 D40…D150 (3P)	**LA4 DMU**	0.040

(1) For 24 V operation, the contactor must be fitted with a 21 V coil (code Z). See pages 5/76 to 5/81

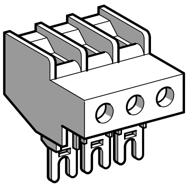
5

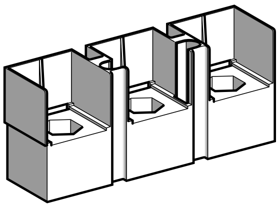
Characteristics : pages 5/55 to 5/57
Dimensions : pages 5/82 to 5/85
Schemes : pages 5/86 and 5/87

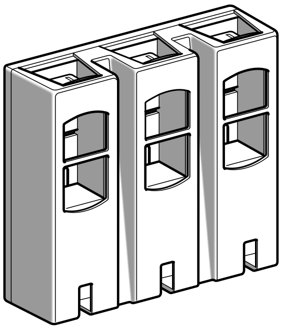
References

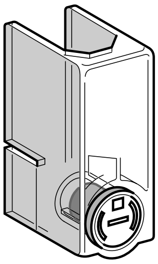
TeSys contactors

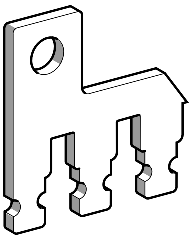
TeSys d contactors and reversing contactors
Accessories

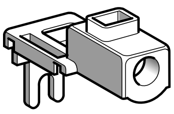

LA9 D3260


LA9 D11550●


LA9 D11560●


LA9 D11570●


LA9 D80962


LA9 D6567

Accessories for main pole and control connections

Description		For use with contactors LC1 ∼	For use with contactors LC1 ⎓	Sold in lots of	Unit reference	Weight kg
Connectors for cable, size (1 connector)	4-pole 10 mm²	DT20, DT25	DT20, DT25	1	**LA D92560**	0.030
	3-pole 25 mm²	D09…D38	D09…D38	1	**LA9 D3260**	0.040
Connectors for cable, size (2 connectors)	3-pole 120 mm²	D115, D150	D115, D150	1	**LA9 D115603**	0.560
	4-pole 120 mm²	D115	D115	1	**LA9 D115604**	0.740
Connectors for lug type terminals (2 connectors)	3-pole	D115, D150	D115, D150	1	**LA9 D115503**	0.300
	4-pole	D115	D115	1	**LA9 D115504**	0.360
Protective covers for connectors for lug type terminals	3-pole *(1)*	D115, D150	D115, D150	1	**LA9 D115703**	0.250
	4-pole *(1)*	D115, D150	D115, D150	1	**LA9 D115704**	0.300
Links for parallel connection of	2 poles	D09…D38	D09…D38	10	**LA9 D2561**	0.060
		DT20, DT25 (4P)	DT20, DT25 (4P)	10	**LA9 D1261**	0.012
		DT32, DT40 (4P)	DT32, DT40 (4P)	10	**LA D96061**	0.060
		D40…D65	D40…D65	2	**LA9 D40961**	0.021
		D80, D95	D80	2	**LA9 D80961**	0.060
	3 poles (star connection)	D09…D38	D09…D38	10	**LAD 9P3** *(2)*	0.005
		D80, D95	D80, D95	1	**LA9 D80962**	0.080
	4 poles	DT20, DT25	DT20, DT25	2	**LA9 D1263**	0.024
		D40…D65	D40…D65	2	**LA9 D40963**	0.070
		D80, D95	D80	2	**LA9 D80963**	0.100
Staggered coil connection		–	D40…D80	10	**LA9 D09966**	0.006
Control circuit take-off from main pole		D40…D65	D40…D65	10	**LA9 D6567**	0.010
		D80, D95	D80, D95	10	**LA9 D8067**	0.010
Spreaders for increasing the pole pitch to 45 mm		D115, D150	D115, D150	3	**GV7 AC03**	0.180

(1) For 3-pole contactors: 1 set of 6 covers, for 4-pole contactors: 1 set of 8 covers.
(2) Separate connecting bar for connecting 2 poles in parallel.

Dimensions :
pages 5/82 to 5/85

Schemes :
pages 5/86 and 5/87

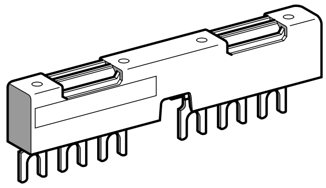
References

TeSys contactors

TeSys d contactors and reversing contactors

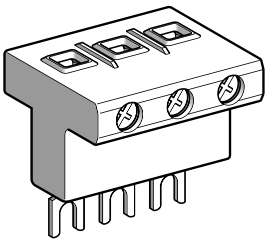
Accessories

810452



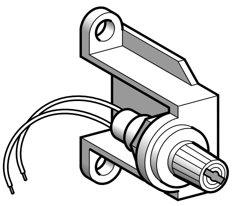
GV2 G245

810453



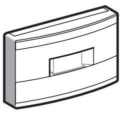
GV1 G09

810451



LA9 D941

810454



LAD 9ET●

563527

XBY 2U

Sets of contacts and arc chambers

Description	For contactor		Reference	Weight kg
Sets of contacts	3-pole	LC1 D115	**LA5 D1158031**	0.260
		LC1 D150	**LA5 D150803**	0.260
	4-pole	LC1 D115004	**LA5 D115804**	0.330
Arc chambers	3-pole	LC1 D115	**LA5 D11550**	0.395
		LC1 D150	**LA5 D15050**	0.395
	4-pole	LC1 D115004	**LA5 D115450**	0.470

Connection accessories

For adapting existing wiring to a new product	LC1 D09…D38 LC1 DT20…DT25	Without coil suppression		**LAD 4BB**	0.019
		With coil suppression	∿ 24…48 V	**LAD 4BBVE**	0.014
			∿ 50…127 V	**LAD 4BBVG**	0.014
			∿ 110…250 V	**LAD 4BBVU**	0.014
Set of 63 A busbars for parallelling of contactors	2 contactors LC1 D09…D18 or D25…D38			**GV2 G245**	0.036
	4 contactors LC1 D09…D18 or D25…D38			**GV2 G445**	0.077
Terminal block	For supply to one or more GV2 G busbar sets			**GV1 G09**	0.040

Protection accessories

Description	Application	Sold in lots of	Reference	Weight kg
Miniature circuit-breaker	5 x 20 with 4 A-250 V fuse	1	**LA9 D941**	0.025
Sealing cover	For LAD T, LAD R	1	**LA9 D901**	0.005
Safety cover preventing access to the moving contact carrier	LC1 D09…D38 and DT20…DT40	1	**LAD 9ET1**	0.026
	LC1 D40…D65	1	**LAD 9ET2**	0.012
	LC1 D80 and D95	1	**LAD 9ET3**	0.004
	LC1 D115 and D150	1	**LAD 9ET4**	0.004

Marking accessories

Description	Application	Sold in lots of	Unit reference	Weight kg
Sheet of 64 blank legends, self-adhesive, 8 x 33 mm (1)	Contactors (except 4P), LC1 D40…D115), LAD N (4 contacts), LA6 DK	10	**LAD 21**	0.020
Sheet of 112 blank legends, self-adhesive, 8 x 12mm *(1)*	LAD N (2 contacts), LAD T, LAD R, LRD	10	**LAD 22**	0.020
Sheet of 64 blank legends for marking using plotter or 8 x 33 mm engraver	Contactors (except 4P), LC1 D40…D115), LAD (4 contacts), LA6 DK	10	**LAD 23**	0.050
Sheet of 440 blank legends for marking using plotter or 8 x 12 mm engraver	All products	35	**LAD 24**	0.200
Marker holder, snap-in 8 x 22 mm	4-pole contactors, LC1 D40...D80, LA6 DK	100	**LA9 D92**	0.001
Marker holder, snap-in 8 x 18 mm	LC1 D09...38, LC1 DT20...40, LAD N (4 contacts), LAD T, LAD R	100	**LAD 90**	0.001
Bag of 300 blank legends self-adhesive, 7 x 21 mm	On holder LA9 D92	1	**LA9 D93**	0.001
"SIS Label" labelling software supplied on CD-Rom	Multi-language version: English, French, German, Italian, Spanish	1	**XBY 2U**	0.100

Mounting accessories

Mounting plate	For replacement of LC1 F115 or F150 by LC1 D115 or D150	1	**LA9 D730**	0.360
Set of shims	For fitting side mounting blocks LAD 8N on LC1 D40 to D95	1	**LA9 D511**	0.020

(1) These legends are for sticking onto the safety cover of the contactors or add-on block, if fitted.

5

TeSys contactors
a.c. coils
for 3 or 4-pole contactors LC1 D

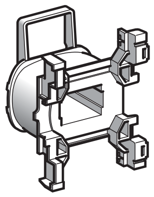
For contactors ∼ LC1 D09...D38 and LC1 DT20…DT40

Specifications

Average consumption at 20 °C:
- inrush (cos φ = 0.75) 70 VA,
- sealed (cos φ = 0.3) 50 Hz: 7 VA, 60 Hz: 7.5 VA

Operating range (θ ⩽ 60 °C): 50 Hz: 0.8…1.1 Uc, 60 Hz: 0.85…1.1 Uc.

810391



LXD 1●●

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Weight
V	**Ω**	**H**		**kg**
			50/60 Hz	
12	6.3	0.26	**LXD 1J7**	0.070
21 *(2)*	5.6	0.24	**LXD 1Z7**	0.070
24	6.19	0.26	**LXD 1B7**	0.070
32	12.3	0.48	**LXD 1C7**	0.070
36	–	–	**LXD 1CC7**	0.070
42	19.15	0.77	**LXD 1D7**	0.070
48	25	1	**LXD 1E7**	0.070
60	–	–	**LXD 1EE7**	0.070
100	–	–	**LXD 1K7**	0.070
110	130	5.5	**LXD 1F7**	0.070
115	–	–	**LXD 1FE7**	0.070
120	159	6.7	**LXD 1G7**	0.070
127	192.5	7.5	**LXD 1FC7**	0.070
200	–	–	**LXD 1L7**	0.070
208	417	16	**LXD 1LE7**	0.070
220	539	22	**LXD 1M7**	0.070
230	595	21	**LXD 1P7**	0.070
240	645	25	**LXD 1U7**	0.070
277	781	30	**LXD 1W7**	0.070
380	1580	60	**LXD 1Q7**	0.070
400	1810	64	**LXD 1V7**	0.070
415	1938	74	**LXD 1N7**	0.070
440	2242	79	**LXD 1R7**	0.070
480	2300	85	**LXD 1T7**	0.070
500	2499	–	**LXD 1S7**	0.070
575	3432	119	**LXD 1SC7**	0.070
600	3600	135	**LXD 1X7**	0.070
690	5600	190	**LXD 1Y7**	0.070

(1) The last 2 digits in the reference represent the voltage code.
(2) Voltage for special coils fitted in contactors with serial timer modules. with 24 V supply.

5

TeSys contactors
a.c. coils
for 3 or 4-pole contactors LC1 D

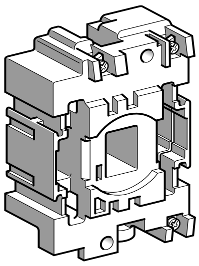
For 3 or 4-pole contactors LC1 D40, D50, D65, D80, D95

Specifications

Average consumption at 20 °C:
- inrush (cos φ = 0.75) 50 Hz: 200 VA, 60 Hz: 220 VA,
- sealed (cos φ = 0.3) 50 Hz: 20 VA, 60 Hz: 22 VA

Operating range (θ ≤ 55 °C): 0.85…1.1 Uc.

810394



LX1 D6●●

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Weight
V	Ω	H		Ω	H		kg
			50 Hz			**60 Hz**	
24	1.4	0.09	**LX1 D6B5**	1.05	0.06	**LX1 D6B6**	0.280
32	2.6	0.16	**LX1 D6C5**	–	–	–	0.280
42	4.4	0.27	**LX1 D6D5**	–	–	–	0.280
48	5.5	0.35	**LX1 D6E5**	4.2	0.23	**LX1 D6E6**	0.280
110	31	1.9	**LX1 D6F5**	22	1.2	**LX1 D6F6**	0.280
115	31	1.9	**LX1 D6FE5**	–	–	–	0.280
120	–	–	–	28	1.5	**LX1 D6G6**	0.280
127	41	2.4	**LX1 D6G5**	–	–	–	0.280
208	–	–	–	86	4.3	**LX1 D6L6**	0.280
220	–	–	–	98	4.8	**LX1 D6M6**	0.280
220/230	127	7.5	**LX1 D6M5**	–	–	–	0.280
230	133	8.1	**LX1 D6P5**	–	–	–	0.280
240	152	8.7	**LX1 D6U5**	120	5.7	**LX1 D6U6**	0.280
256	166	10	**LX1 D6W5**	–	–	–	0.280
277	–	–	–	157	8	**LX1 D6W6**	0.280
380	–	–	–	300	14	**LX1 D6Q6**	0.280
380/400	381	22	**LX1 D6Q5**	–	–	–	0.280
400	411	25	**LX1 D6V5**	–	–	–	0.280
415	463	26	**LX1 D6N5**	–	–	–	0.280
440	513	30	**LX1 D6R5**	392	19	**LX1 D6R6**	0.280
480	–	–	–	480	23	**LX1 D6T6**	0.280
500	668	38	**LX1 D6S5**	–	–	–	0.280
575	–	–	–	675	33	**LX1 D6S6**	0.280
600	–	–	–	775	36	**LX1 D6X6**	0.280
660	1220	67	**LX1 D6Y5**	–	–	–	0.280

Specifications

Average consumption at 20 °C:
- inrush (cos φ = 0.75) 50/60 Hz: 245 VA at 50 Hz,
- sealed (cos φ = 0.3) 50/60 Hz: 26 VA at 50 Hz,

Operating range (θ ≤ 55 °C): 0.85…1.1 Uc.

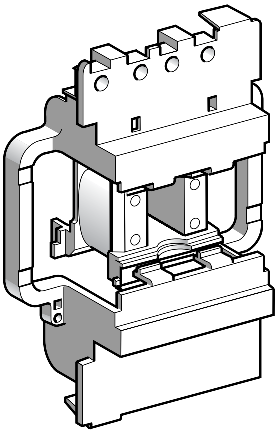
						50/60 Hz	
24	–	–	_	1.22	0.08	**LX1 D6B7**	0.280
42	–	–	–	3.5	0.25	**LX1 D6D7**	0.280
48	–	–	–	5	0.32	**LX1 D6E7**	0.280
110	–	–	–	26	1.7	**LX1 D6F7**	0.280
115	–	–	–	–	–	**LX1 D6FE7**	0.280
120	–	–	–	32	2	**LX1 D6G7**	0.280
220/230 *(2)*	–	–	–	102	6.7	**LX1 D6M7**	0.280
230	–	–	–	115	7.7	**LX1 D6P7**	0.280
230/240 *(3)*	–	–	–	131	8.3	**LX1 D6U7**	0.280
380/400 *(4)*	–	–	–	310	20	**LX1 D6Q7**	0.280
400	–	–	–	349	23	**LX1 D6V7**	0.280
415	–	–	–	390	24	**LX1 D6N7**	0.280
440	–	–	–	410	27	**LX1 D6R7**	0.280

(1) The last 2 digits in the reference represent the voltage code.
(2) For use on 230 V 50 Hz, apply a coefficient of 0.6 to the mechanical durability of the contactor, see pages 5/48 and 5/49. This coil can be used on 240 V at 60 Hz.
(3) This coil can be used on 220/240 V at 50 Hz and on 240 V only at 60 Hz.
(4) For use on 400 V 50 Hz, apply a coefficient of 0.6 to the mechanical durability of the contactor, see pages 5/48 and 5/49.

References *(continued)*

TeSys contactors
a.c. coils
for 3 or 4-pole contactors LC1 D

565140



LX1 D8●●

For 3 or 4-pole contactors LC1 D115

Specifications

Average consumption at 20 °C:
- inrush (cos φ = 0.8) 50 or 60 Hz: 300 VA,
- sealed (cos φ = 0.3) 50 or 60 Hz: 22 VA

Operating range (θ ⩽ 55 °C): 0.85…1.1 Uc.

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Weight
V	Ω	H		Ω	H		kg
			50 Hz			**60 Hz**	
24	1.24	0.09	**LX1 D8B5**	0.87	0.07	**LX1 D8B6**	0.260
32	2.14	0.17	**LX1 D8C5**	–	–	–	0.260
42	3.91	0.28	**LX1 D8D5**	–	–	–	0.260
48	4.51	0.36	**LX1 D8E5**	3.91	0.28	**LX1 D8E6**	0.260
110	26.53	2.00	**LX1 D8F5**	19.97	1.45	**LX1 D8F6**	0.260
115	26.53	2.00	**LX1 D8FE5**	–	–	–	0.260
120	–	–	–	24.02	1.70	**LX1 D8G6**	0.260
127	32.75	2.44	**LX1 D8FC5**	–	–	–	0.260
208	–	–	–	67.92	5.06	**LX1 D8L6**	0.260
220	104.77	7.65	**LX1 D8M5**	79.61	5.69	**LX1 D8M6**	0.260
230	104.77	8.29	**LX1 D8P5**	–	–	–	0.260
240	125.25	8.89	**LX1 D8U5**	97.04	6.75	**LX1 D8U6**	0.260
277	–	–	–	125.75	8.89	**LX1 D8W6**	0.260
380	338.51	22.26	**LX1 D8Q5**	243.07	17.04	**LX1 D8Q6**	0.260
400	368.43	25.55	**LX1 D8V5**	–	–	–	0.260
415	368.43	27.65	**LX1 D8N5**	–	–	–	0.260
440	441.56	30.34	**LX1 D8R5**	338.51	22.26	**LX1 D8R6**	0.260
480	–	–	–	368.43	25.55	**LX1 D8T6**	0.260
500	566.62	38.12	**LX1 D8S5**	–	–	–	0.260

For 3 or 4-pole contactors LC1 D115, LC1 D150

Specifications

Average consumption at 20 °C:
- inrush cos φ = 0.9 - 280 to 350 VA,
- sealed cos φ = 0.9 - 2 to 18 VA.

Operating range (θ ⩽ 55 °C): 0.8…1.15 Uc.
Coils with integral suppression device fitted as standard, class B.

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Weight
V	Ω	H		Ω	H		kg
						50/60 Hz	
24	–	–	–	147	3.03	**LX1 D8B7**	0.290
32	–	–	–	301	8.28	**LX1 D8C7**	0.290
42	–	–	–	498	13.32	**LX1 D8D7**	0.290
48	–	–	–	1061	24.19	**LX1 D8E7**	0.290
110	–	–	–	4377	109.69	**LX1 D8F7**	0.290
115	–	–	–	4377	109.69	**LX1 D8FE7**	0.290
120	–	–	–	4377	109.69	**LX1 D8G7**	0.290
127	–	–	–	6586	152.65	**LX1 D8FC7**	0.290
208	–	–	–	10 895	260.15	**LX1 D8LE7**	0.290
220	–	–	–	9895	210.72	**LX1 D8M7**	0.290
230	–	–	–	9895	210.72	**LX1 D8P7**	0.290
240	–	–	–	9895	210.72	**LX1 D8U7**	0.290
277	–	–	–	21 988	533.17	**LX1 D8UE7**	0.290
380	–	–	–	21 011	482.42	**LX1 D8Q7**	0.290
400	–	–	–	21 011	482.42	**LX1 D8V7**	0.290
415	–	–	–	21 011	482.42	**LX1 D8N7**	0.290
440	–	–	–	21 501	507.47	**LX1 D8R7**	0.290
480	–	–	–	32 249	938.41	**LX1 D8T7**	0.290
500	–	–	–	32 249	938.41	**LX1 D8S7**	0.290

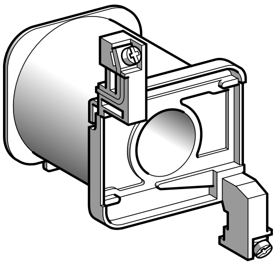
(1) The last 2 digits in the reference represent the voltage code.

References

TeSys contactors
d.c. coils
for 3 or 4-pole contactors

For 3-pole contactors LC1 D40…D65 or 4-pole contactors LP1 D40…D65

Specifications
Average consumption: 22 W.
Operating range: 0.85…1.1 Uc.

565142

LX4 D6●D

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference (1)	Weight
V	Ω	H		kg
12	7.1	0.44	**LX4 D6JD**	0.415
24	26.8	1.69	**LX4 D6BD**	0.415
36	58	3.55	**LX4 D6CD**	0.415
48	109	6.86	**LX4 D6ED**	0.415
60	173	10.9	**LX4 D6ND**	0.415
72	234	14.7	**LX4 D6SD**	0.415
110	560	35.28	**LX4 D6FD**	0.415
125	717	45.2	**LX4 D6GD**	0.415
220	2255	142	**LX4 D6MD**	0.415
250	2940	185	**LX4 D6UD**	0.415
440	9080	572	**LX4 D6RD**	0.415

For 3-pole contactors LC1 D80 or 4-pole contactors LP1 D80

Specifications
Average consumption: 22 W.
Operating range: 0.85…1.1 Uc.

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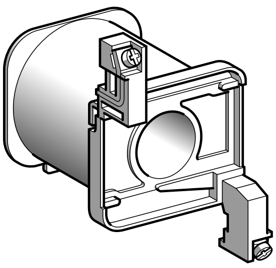

LX4 D7●D

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference (1)	Weight
V	Ω	H		kg
12	6.6	0.46	**LX4 D7JD**	0.680
24	27	1.89	**LX4 D7BD**	0.680
36	57	4	**LX4 D7CD**	0.680
48	107	7.5	**LX4 D7ED**	0.680
60	170	11.9	**LX4 D7ND**	0.680
72	230	16.1	**LX4 D7SD**	0.680
110	564	39.5	**LX4 D7FD**	0.680
125	718	50.3	**LX4 D7GD**	0.680
220	2215	155	**LX4 D7MD**	0.680
250	2850	200	**LX4 D7UD**	0.680
440	9195	640	**LX4 D7RD**	0.680

(1) The last 2 digits in the reference represent the voltage code.

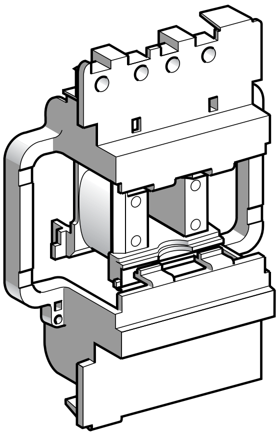
TeSys contactors
d.c. coils
for 3 or 4-pole contactors LC1 D

For contactors LC1 D115, D150

Specifications

Consumption: inrush 270 to 365 W, sealed 2.4 to 5.1 W.
Operating range: 0.7…1.2 Uc.
Coils with integral suppression device fitted as standard, class B.

565142



LX4 D8●D

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Weight
V	Ω	H		kg
24	147	3.03	**LX4 D8BD**	0.300
48	1061	24.19	**LX4 D8ED**	0.300
60	1673	38.44	**LX4 D8ND**	0.300
72	2500	56.27	**LX4 D8SD**	0.300
110	4377	109.69	**LX4 D8FD**	0.300
125	6586	152.65	**LX4 D8GD**	0.300
220	9895	210.72	**LX4 D8MD**	0.300
250	18 022	345.40	**LX4 D8UD**	0.300
440	21 501	684.66	**LX4 D8RD**	0.300

(1) The last 2 digits in the reference represent the voltage code.

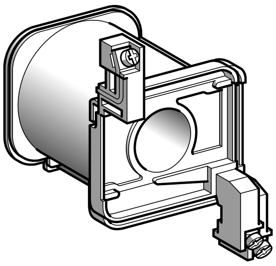
References

TeSys contactors
Wide range d.c. coils
(for specific applications)
for 3 or 4-pole contactors

For 3-pole contactors LC1 D40…D65 or 4-pole contactors LP1 D40…D65
Specifications

Average consumption: 22 W.
Operating range: 0.75…1.2 Uc.
Coils with "TH" treatment as standard.

565143



LX4 D6●W

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Weight
V	Ω	H		kg
12	6.8	0.45	**LX4 D6JW**	0.415
24	30	1.9	**LX4 D6BW**	0.415
36	53	3.5	**LX4 D6CW**	0.415
48	110	7.2	**LX4 D6EW**	0.415
72	215	14.2	**LX4 D6SW**	0.415
110	580	38.3	**LX4 D6FW**	0.415
220	2120	140	**LX4 D6MW**	0.415

For 3-pole contactors LC1 D80 or 4-pole contactors LP1 D80
Specifications

Average consumption: 23 W.
Operating range: 0.75 to 1.2 Uc
Coils with "TH" treatment as standard.

Control circuit voltage Uc	Average resistance at 20 °C ± 10 %	Inductance of closed circuit	Reference *(1)*	Weight
V	Ω	H		kg
12	6.2	0.49	**LX4 D7JW**	0.680
24	23.5	1.75	**LX4 D7BW**	0.680
36	51.9	4.18	**LX4 D7CW**	0.680
48	94.2	7	**LX4 D7EW**	0.680
72	204	15.7	**LX4 D7SW**	0.680
110	483	36	**LX4 D7FW**	0.680
220	1922	144	**LX4 D7MW**	0.680

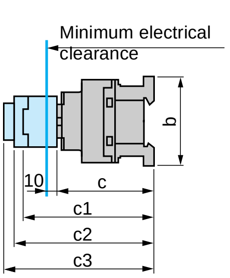
(1) The last 2 digits in the reference represent the voltage code.

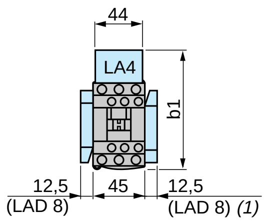
TeSys contactors

TeSys d contactors

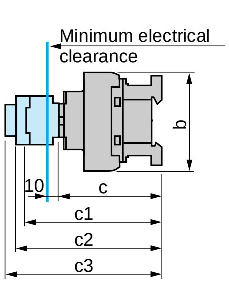
Control circuit: a.c.

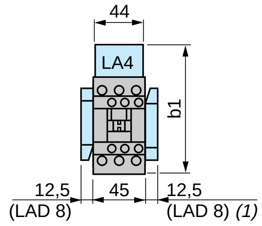
LC1 D09…D18 (3-pole)





LC1 D25…D38 (3-pole), **LC1 DT20…DT40** (4-pole)



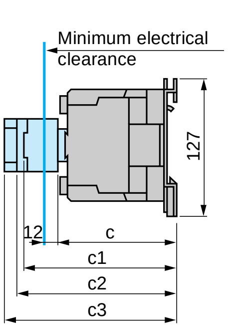


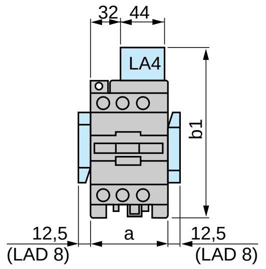
LC1		D09…D18	D093… D123	D099… D129	D25… D38	D183… D323	DT20 & DT25	DT203 & DT253	DT32 & DT40	DT323 & DT403
b	without add-on blocks	77	99	80	85	99	85	99	91	105
b1	with LAD 4BB	94	107	95.5	98	107	98	–	–	–
	with LA4 D●2	110 *(1)*	123 *(1)*	111.5 *(1)*	114 *(1)*	123 *(1)*	114	–	–	–
	with LA4 DF, DT	119 *(1)*	132 *(1)*	120.5 *(1)*	123 *(1)*	132 *(1)*	129	–	–	–
	with LA4 DW, DL	126 *(1)*	139 *(1)*	127.5 *(1)*	130 *(1)*	139 *(1)*	190	–	–	–
c	without cover or add-on blocks	84	84	84	90	90	90	90	97	97
	with cover, without add-on blocks	86	86	86	92	92	92	92	99	99
c1	with LAD N or C (2 or 4 contacts)	117	117	117	123	123	123	123	131	131
c2	with LA6 DK10, LAD 6K10	129	129	129	135	135	135	135	143	143
c3	with LAD T, R, S	137	137	137	143	143	143	143	151	151
	with LAD T, R, S and sealing cover	141	141	141	147	147	147	147	155	155

(1) Including LAD 4BB

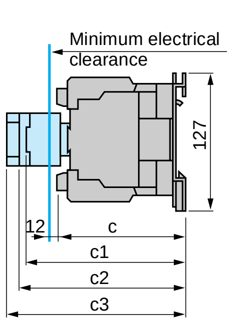
5

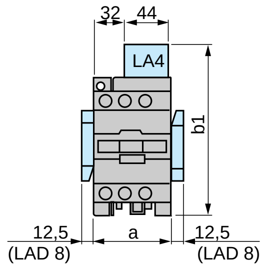
LC1 D40…D65 (3-pole), **LC1 D65004, D40008** & **D65008** (4-pole)





LC1 D80 & D95 (3-pole), **LC1 D80004** & **D80008** (4-pole)

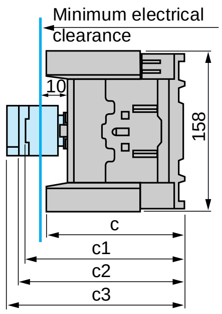


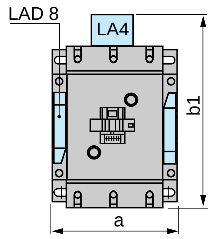


LC1		D40…D65	D40008	D80, D65004	D95, D65008	D80004	D80008
a		75	85	85	85	96	96
b1	with LA4 D●2	135	135	135	135	135	135
	with LA4 DB3	–	–	135	–	–	–
	with LA4 DF, DT	142	142	142	142	142	142
	with LA4 DM, DW, DL	150	150	150	150	150	150
c	without cover or add-on blocks	114	125	125	125	125	140
	with cover, without add-on blocks	119	–	130	130	–	–
c1	with LAD N (1 contact)	139	139	150	150	150	150
	with LAD N or C (2 or 4 contacts)	147	147	158	158	158	158
c2	with LA6 DK	159	159	170	170	170	170
c3	with LAD T, R, S	167	167	178	178	178	178
	with LAD T, R, S and sealing cover	171	171	182	182	182	182

LC1 D115 and D150 (3-pole), **LC1 D115004** (4-pole)

LC1		D115, D150	D115004	D115006	D150006	D1150046
a		120	150	120	120	155
b1	with LA4 DA2	174	174	174	174	174
	with LA4 DF, DT	185	185	185	185	185
	with LA4 DM, DL	188	188	188	188	188
	with LA4 DW	188	188	188	–	188
c	without cover or add-on blocks	132	132	115	115	115
	with cover, without add-on blocks	136	–	–	–	–
c1	with LAD N or C (2 or 4 contacts)	150	150	150	150	150
c2	with LA6 DK20	155	155	155	155	155
c3	with LAD T, R, S	168	168	168	168	168
	with LAD T, R, S and sealing cover	172	172	172	172	172



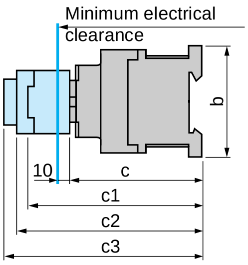


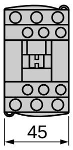
Selection : pages 5/160 to 5/191
Characteristics : pages 5/46 to 5/51
References : pages 5/58 to 5/61
Schemes : pages 5/86 and 5/87

Dimensions

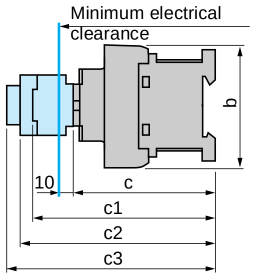
TeSys contactors
TeSys d contactors
Control circuit: d.c. or low consumption

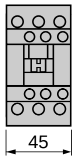
LC1 D09...D18 (3-pole)





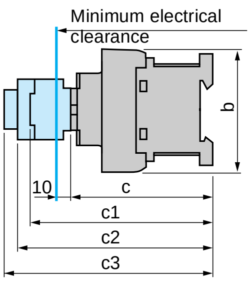
LC1 D25...D38 (3-pole)

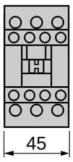




LC1		D09...D18	D093...D123	D099...D129	D25...D38	D183...D323
b		77	99	80	85	99
c	without cover or add-on blocks	93	93	93	99	99
	with cover, without add-on blocks	95	95	95	101	101
c1	with LAD N or C (2 or 4 contacts)	126	126	126	132	132
c2	with LA6 DK10	138	138	138	144	144
c3	with LAD T, R, S	146	146	146	152	152
	with LAD T, R, S and sealing cover	150	150	150	156	156

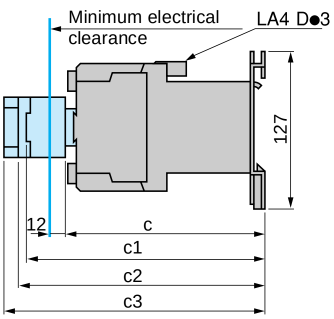
LC1 DT20 to DT40 (4-pole)

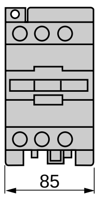




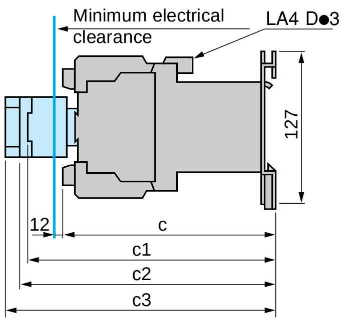
LC1		DT20 & DT25 D098 & D128	DT203 & DT253 D0983 & D1283	DT32 & DT40 D188...D258	DT323 & DT403 D1883 & D2583
b		85	99	91	105
c	with cover	99	99	107	107
c1	with LAD N or C (2 or 4 contacts)	123	123	131	131
c2	with LA6 DK10	135	135	143	143
c3	with LAD T, R, S	143	143	151	151
	with LAD T, R, S and sealing cover	147	147	155	155

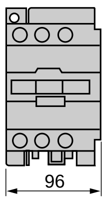
LC1 D40...D65 (3-pole)
LC1 D65004, LP1 D40008...D65008 (4-pole)





LC1 D80 & D95 (3-pole)
LP1 D80004, LP1 D80008 (4-pole)





		LC1 D40...D65	LP1 D65004	LP1 D40008 & D65008	LC1 D80 & D95	LP1 D80004	LP1 D80008
c	without cover or add-on blocks	171	171	182	181	181	196
	with cover, without add-on blocks	176	–	–	186	–	–
c1	with LAD N (1 contact)	196	196	196	204	204	204
	with LAD N or C (2 or 4 contacts)	202	202	202	210	210	210
c2	with LA6 DK10	213	213	213	221	221	221
c3	with LAD T, R, S	221	221	221	229	229	229
	with LAD T, R, S and sealing cover	225	225	225	233	233	233

LC1 D115●●● and **LC1 D150●●●** with ⎓ coil: see page 5/82

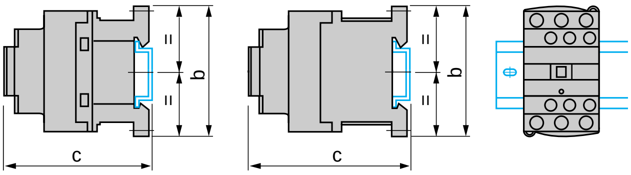
5

Selection :
pages 5/160 to 5/191
Characteristics :
pages 5/46 to 5/51
References :
pages 5/58 to 5/61
Schemes :
pages 5/86 and 5/87

TeSys contactors
TeSys d contactors

LC1 D09…D38, DT20…DT40

On mounting rail AM1 DP200, DR200 or AM1 DE200 (width 35 mm)

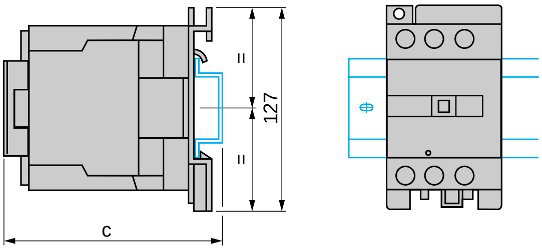


LC1	D09…D18	D25…D38	DT2 & DT25	DT32 & DT40
b	77	85	85	100
c (AM1 DP200 or DR200) *(1)*	88	94	94	109
c (AM1 DE200) *(1)*	96	102	102	117
Control circuit: d.c.				
b	77	85	94	109
c (AM1 DP200 or DR200) *(1)*	97	103	103	118
c (AM1 DE200) *(1)*	105	110	111	1236

(1) with safety cover.

LC1 D40…D95, LP1 D40…D80

On mounting rail AM1 DL200 or DL201 (width 75 mm)
On mounting rail AM1 ED●●● or AM1 DE200 (width 35 mm)



Control circuit: a.c.

LC1	D40…D65	D80 & D95
c (AM1 DL200) *(1)*	136	147
c (AM1 DL201) *(1)*	126	137
c (AM1 ED●●● or DE200) *(1)*	126	137

Control circuit: d.c.

LC1	D40…D65	D80 & D95
c (AM1 DL200) *(1)*	193	203
c (AM1 DL201) *(1)*	183	203

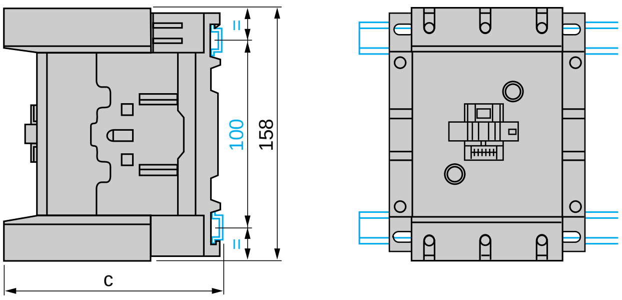
LP1	D40	D65	D80
c (AM1 DL200)	188	188	198
c (AM1 DL201)	178	178	198

(1) with safety cover.

5

LC1 D115, D150

On 2 mounting rails DZ5 MB on 120 mm centres

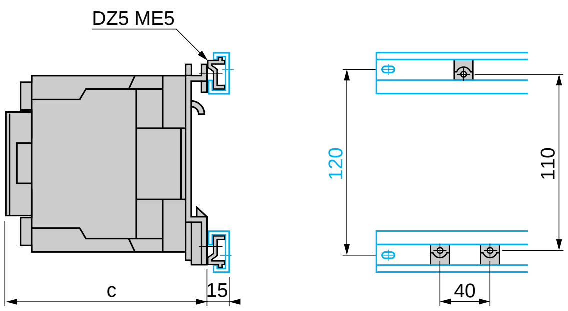


Control circuit: a.c. or d.c.

LC1	D115 & D150	D1156 & D1506
c (AM1 DP200 or DR200)	134.5	117.5
c (AM1 DE200 or ED●●●)	142.5	125.5

LC1 D40…D95, LP1 D40…D80

On 2 mounting rails DZ5 MB on 120 mm centres



Control circuit: a.c.

LC1	D40…D65	D80 & D95
c with cover	119	130

Control circuit: d.c.

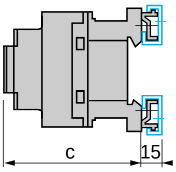
LC1	D40…D65	D80 & D95
c with cover	176	186

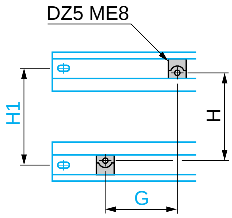
LP1	D40 & D65	D80
c	171	181

Mounting (continued)

TeSys contactors
TeSys d contactors

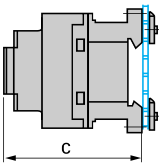
LC1 D09...D38 and LC1 DT20...DT40
On 2 mounting rails DZ5 MB

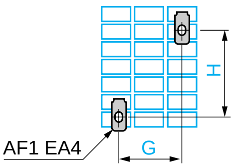




Control circuit:	a.c.		d.c.	
LC1	**D09...D18**	**D25...D38**	**D09...D18**	**D25...D38**
c with cover	86	92	95	101
G	35	35	35	35
H	60	60	70	70
H1	70	70	70	70
4-pole contactors				
LC1	**DT20 & DT25**	**DT32 & DT40**	**DT20 & DT25**	**DT32 & DT40**
c	92	100	101	109
G	35	35	35	35
H	60	60	70	70
H1	70	70	70	70

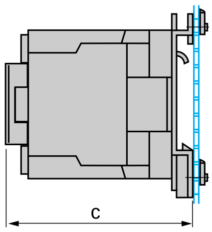
LC1 D09...D38 and LC1 DT20...DT40
On pre-slotted mounting plate AM1 PA, PB, PC

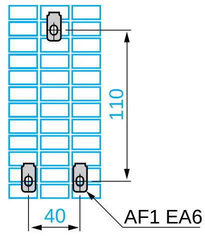




Control circuit:	a.c.		d.c.	
LC1	**D09...D18**	**D25...D38**	**D09...D18**	**D25...D38**
c with cover	86	92	95	101
G	35	35	35	35
H	60/70	60/70	70	70
LC1	**DT20 & DT25**	**DT32 & DT40**	**DT20 & DT25**	**DT32 & DT40**
c with cover	80	93	118	132
G	35	35	35	35
H	60	60	60	60

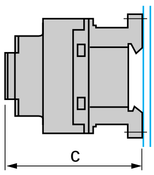
LC1 D40...D95, LP1 D40...D80
On pre-slotted mounting plate AM1 PA, PB, PC



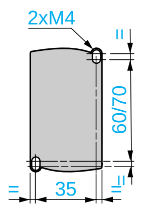


Control circuit:	a.c.		d.c.	
LC1	**D40...D65**	**D80 & D95**	**D40...D65**	**D80 & D95**
c with cover	119	130	176	186
LP1	–	–	**D40 & D65**	**D80**
c without cover	–	–	171	181

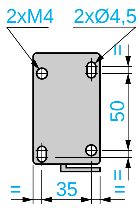
LC1 D09...D38
Panel mounted



AC

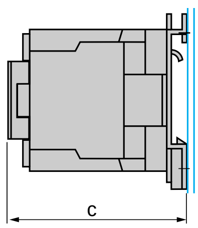


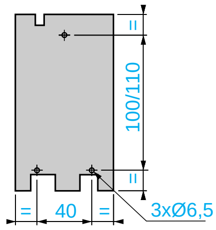
DC



Control circuit:	a.c.		d.c.	
LC1	**D09...D18**	**D25...D38**	**D09...D18**	**D25...D38**
c with cover	86	92	95	101
4-pole contactors				
LC1	**DT20 & DT25**	**DT32 & DT40**	**DT20 & DT25**	**DT32 & DT40**
c with cover	90	98	90	98

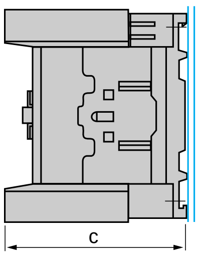
LC1 D40...D95, LP1 D40 D80
Panel mounted

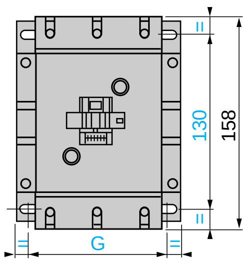




Control circuit:	a.c.		d.c.	
LC1	**D40...D65**	**D80 & D95**	**D4...D65**	**D80 & D95**
c with cover	119	130	176	186
LP1	–	–	**D40 & D65**	**D80**
c without cover	–	–	171	181

LC1 D115, D150
Panel mounted





LC1	**D115**	**D1156**	**D150**	**D1506**
c	132	115	132	115
G (3-pole)	96/110	96/110	96/110	96/110
G (4-pole)	130/144	130/144	–	–

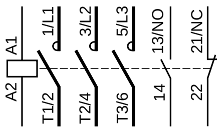
Selection :
pages 5/160 to 5/191
Characteristics :
pages 5/46 to 5/51
References :
pages 5/58 to 5/61
Schemes :
pages 5/86 and 5/87

TeSys contactors
TeSys d contactors

Contactors

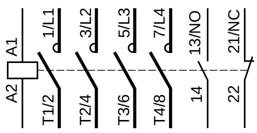
3-pole contactors (References: pages 5/58 to 5/61)

LC1 D09 to D150

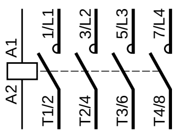


4-pole contactors (References: pages 5/60 and 5/61)

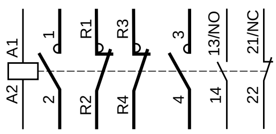
LC1 DT20 to DT40



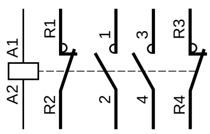
LC1 D115004



LC1 D098 to D258



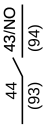
LC1 and LP1 D40008 to D80008



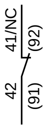
Front mounting add-on contact blocks

Instantaneous auxiliary contacts (References: page 5/69)

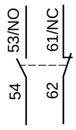
1 N/O LAD N10 *(1)*



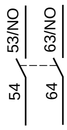
1 N/C LAD N01 *(1)*



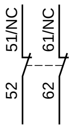
1 N/O + 1 N/C LAD N11



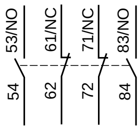
2 N/O LAD N20



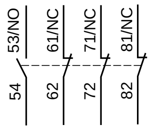
2 N/C LAD N02



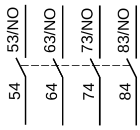
2 N/O + 2 N/C LAD N22



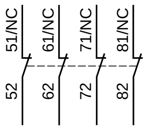
1 N/O + 3 N/C LAD N13



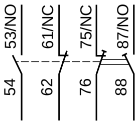
4 N/O LAD N40



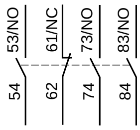
4 N/C LAD N04



2 N/O + 2 N/C including 1 N/O + 1 N/C make before break LAD C22

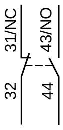


3 N/O + 1 N/C LAD N31

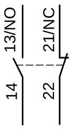


Instantaneous auxiliary contacts conforming to standard EN 50012 (References: page 5/69)

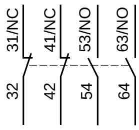
1 N/O + 1 N/C LAD N11G



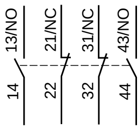
1 N/O + 1 N/C LAD N11P



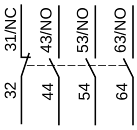
2 N/O + 2 N/C LAD N22G



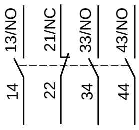
2 N/O + 2 N/C LAD N22P



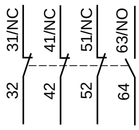
3 N/O + 1 N/C LAD N31G



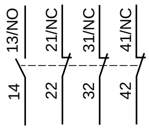
3 N/O + 1 N/C LADN31P



1 N/O + 3 N/C LAD N13G



1 N/O + 3 N/C LAD N13P



(1) Items in brackets are for blocks mounted on right-hand side of contactor.

Selection :
pages 5/160 to 5/191

Characteristics :
pages 5/46 to 5/51

References :
pages 5/58 to 5/73

Dimensions :
pages 5/82 to 5/85

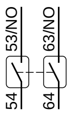
Schemes *(continued)*

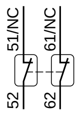
TeSys contactors
TeSys d contactors

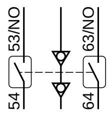
Front mounting add-on contact blocks

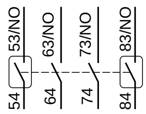
Dust and damp protected instantaneous auxiliary contacts (References: page 5/69)

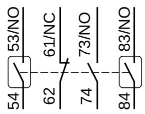
2 N/O (24-50 V) LA1 DX20	2 N/C (24-50 V) LA1 DX02	2 N/O (5-24 V) LA1 DY20	2 N/O protected (24-50 V) 2 N/O standard LA1 DZ40	2 N/O protected (24-50 V) + 1 N/O + 1 N/C standard LA1 DZ31





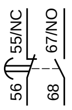


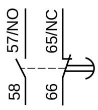


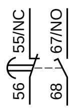


Time delay auxiliary contacts (References: page 5/70)

On-delay 1 N/O + 1 N/C LAD T	Off-delay 1 N/O + 1 N/C LAD R	On-delay 1 N/C + 1 N/O break before make LAD S

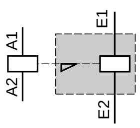






Mechanical latch blocks (References: page 5/70)

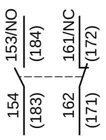
LAD 6K10 and LA6 DK20

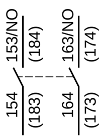


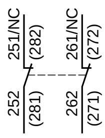
Side mounting add-on contact blocks

Instantaneous auxiliary contacts (References: page 5/69)

1 N/O + 1 N/C LAD 8N11 *(1)*	2 N/O LAD 8N20 *(1)*	2 N/C LAD 8N02 *(1)*



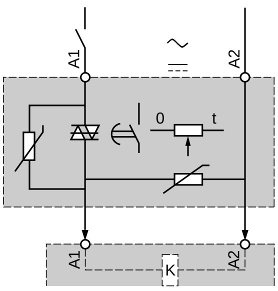




(1) Items in brackets are for blocks mounted on right-hand side of contactor.

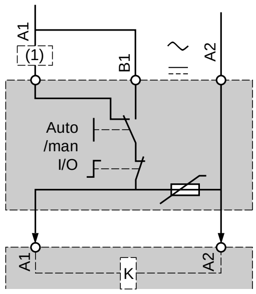
Electronic serial timer modules

On-delay LA4 DT●U



Auto-Man-Stop control modules

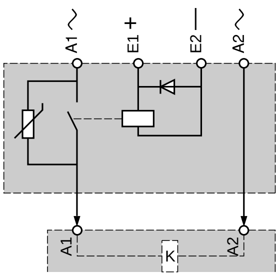
LA4 DM●

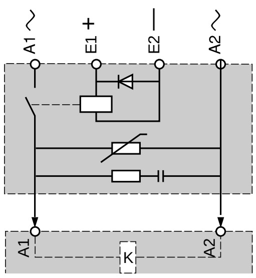


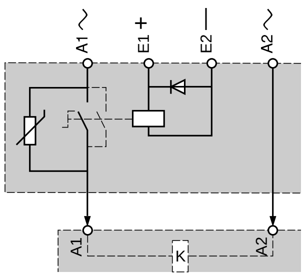
(1) PLC.

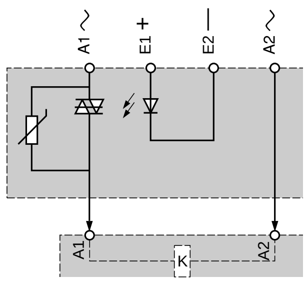
Interface modules

Relay interface		Relay with manual override	Solid state
LA4 DF●	LA4 DFBQ	LA4 DL●	LA4 DWB●









References: page 5/73.

Selection : pages 5/160 to 5/191
Characteristics : pages 5/46 to 5/51
References : pages 5/58 to 5/73
Dimensions : pages 5/82 to 5/85

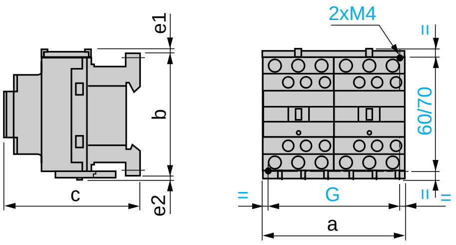
Dimensions

TeSys contactors

TeSys d reversing contactors

LC2 D09 to D38

2 x **LC1 D09 to D38**



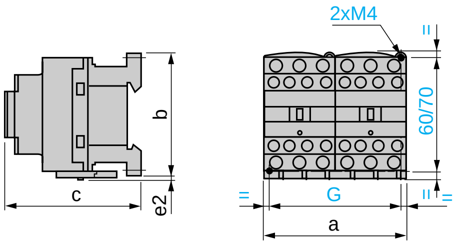
LC1 or 2 x **LC1**	**a**	**b**	**c** *(1)*	**e1**	**e2**	**G**
D09 to D18 ∼	90	77	86	4	1.5	**80**
D093 to D123 ∼	90	99	86	–	–	**80**
D09 to D18 ⎓	90	77	95	4	1.5	**80**
D093 to D123 ⎓	90	99	95	–	–	**80**
D25 to D38 ∼	90	85	92	9	5	**80**
D183 to D383 ∼	90	99	92	–	–	**80**
D25 to D32 ⎓	90	85	101	9	5	**80**
D183 to D383 ⎓	90	99	101	–	–	**80**

e1 and e2: including cabling.

(1) With safety cover, without add-on block.

LC2DT20 to DT40

2 x **LC1 DT20 to DT40**

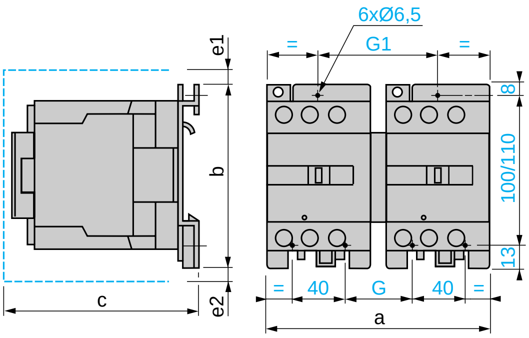


LC2 or 2 x **LC1**	**a**	**b**	**c**	**G**
DT20 and DT25	90	85	90	**80**
DT32 and DT40	90	91	98	**80**

c, e: including cabling.

LC2 D40 to D95

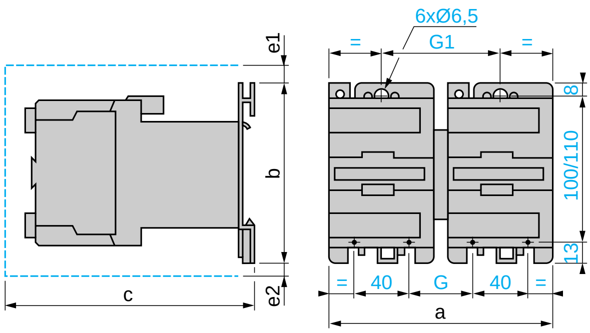
2 x **LC1 D40 to D95** ∼



LC2 or 2 x **LC1**	**a**	**b**	**c**	**e1**	**e2**	**G**	**G1**
D40 to D65 ∼	165	127	142	5	–	**50**	**90**
D65004 ∼	182	127	133	–	11	**57**	**97**
D80 and D95 ∼	182	127	158	13	–	**57**	**96**
D80004 ∼	207	127	158	–	20	**71**	**111**

c, e1 and e2: including cabling.

2 x **LC1 D40 to D95** ∼

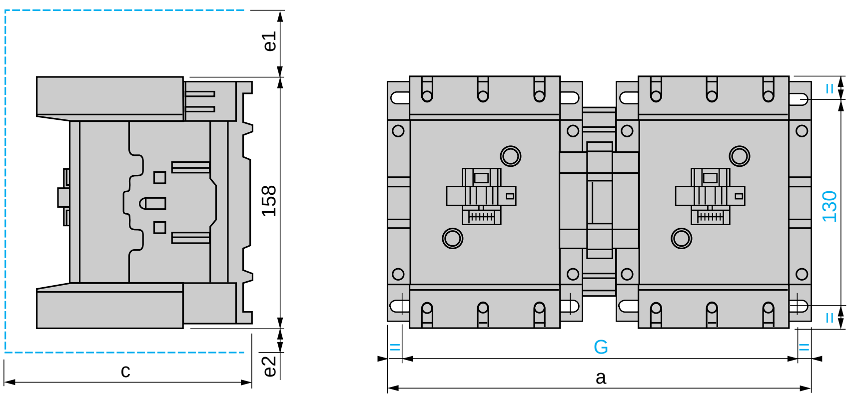


2 x **LC1**	**a**	**b**	**c**	**e1**	**e2**	**G**	**G1**
D40 to D65	182	127	190	5	11	**57**	**97**
D80 and D95	207	127	215	13	20	**96**	**111**

c, e1 and e2: including cabling.

LC2 D115 and D150

2 x **LC1 D115 and D150**



LC2 or 2 x **LC1**	**a**	**c**	**e1**	**e2**	**G**
D115 and D150	266	148	56	18	**242/256**
D115004	334	148	–	60	**310/324**

c, e1 and e2: including cabling.

Selection :
pages 5/160 to 5/191

Characteristics :
pages 5/46 to 5/51

References :
pages 5/58 to 5/67

Schemes :
page 5/89

Schemes

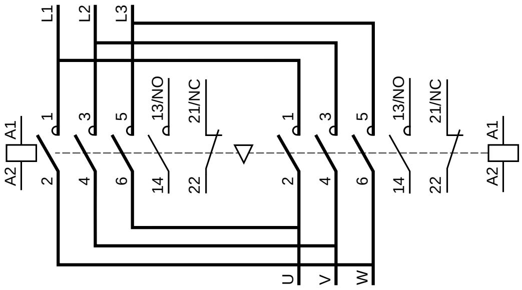
TeSys contactors

TeSys d reversing contactors

Reversing contactors for motor control

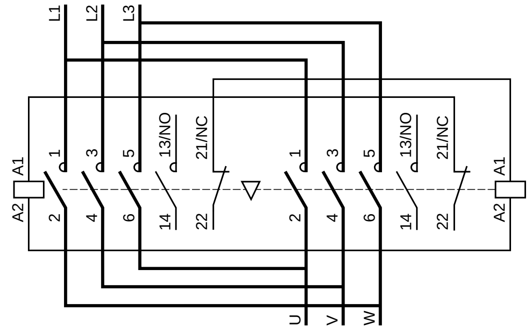
LC2 D09...D150

Horizontally mounted



LAD 9R1V

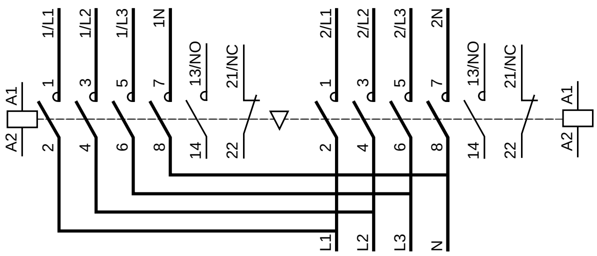
With integral electrical interlocking



Changeover contactor pairs

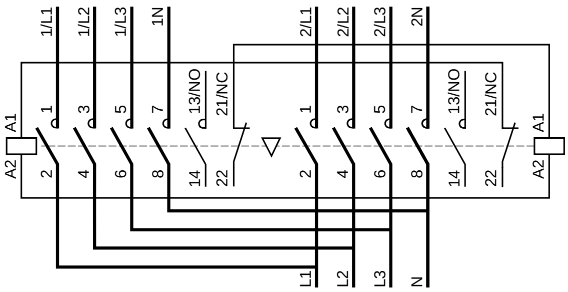
LC2 DT20...DT40

Horizontally mounted



LAD T9R1V

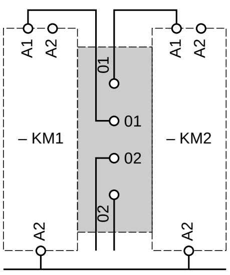
With integral electrical interlocking

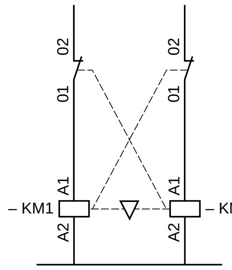


Electrical interlocking of reversing contactors fitted with:

Mechanical interlock with integral electrical contacts

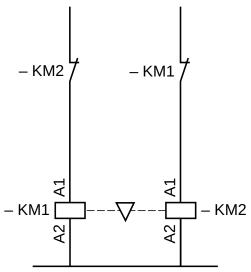
LA9 D●●●02



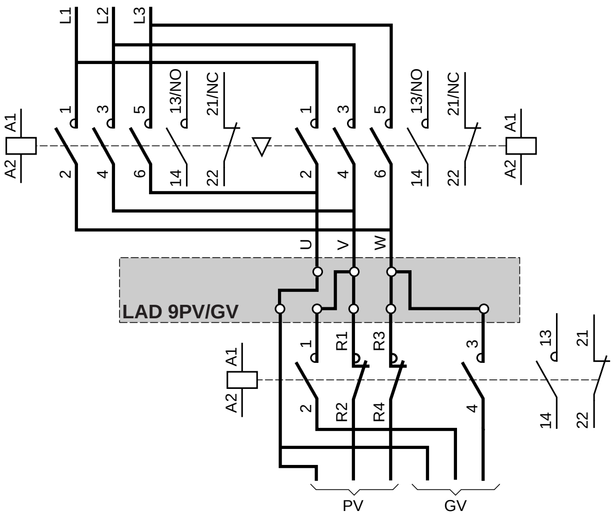


Mechanical interlock without integral electrical contacts

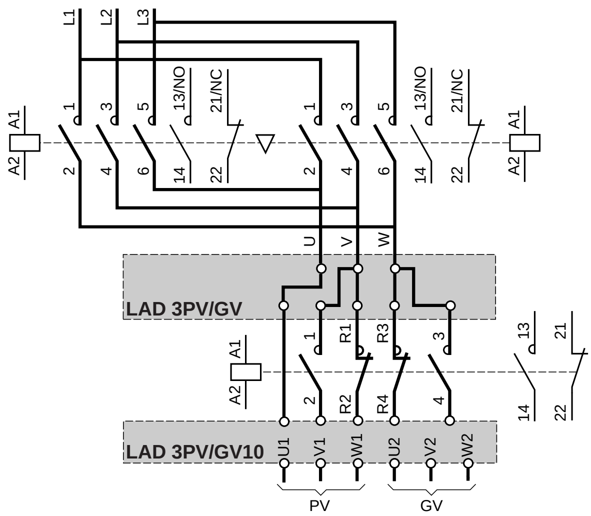
LA9 D●●●78, LAD 9R1



Low speed-High speed cabling kit, screw clamp terminals



Low speed-High speed cabling kit, spring terminals



Selection : pages 5/160 to 5/191
Characteristics : pages 5/46 to 5/51
References : pages 5/58 to 5/67
Dimensions : page 5/88

References

TeSys contactors

For switching 3-phase capacitor banks, used for power factor correction,

Direct connection without choke inductors

Special contactors

Special contactors **LC1 D●K** are designed for switching 3-phase, single or multiple-step capacitor banks; they conform to standards IEC 60070 and 60831, NFC 54-100, VDE 0560, UL and CSA.

Contactor applications

Specification

Contactors fitted with a block of early make poles and damping resistors, limiting the value of the current on closing to 60 In max.
This current limitation increases the life of all the components of the installation, in particular that of the fuses and capacitors.
The patented design of the add-on block (n° 90 119-20) ensures safety and long life of the installation.

Operating conditions

There is no need to use choke inductors for either single or multiple-step capacitor banks.
Short-circuit protection must be provided by gI type fuses rated at 1.7…2 In.

Maximum operational power

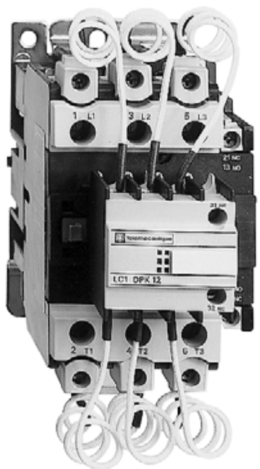
The power values given in the selection table below are for the following operating conditions:

Prospective peak current at switch-on	LC1 D●K		200 In
Maximum operating rate	LC1 DFK, DGK, DLK, DMK, DPK		240 operating cycles/hour
	LC1 DTK, DWK		100 operating cycles/hour
Electrical durability at nominal load	All contactor ratings	400 V	300 000 operating cycles
		690 V	200 000 operating cycles

811966

LC1 DFK11●●

811967



LC1 DPK12●●

5

Operational power at 50/60 Hz *(1)* θ ⩽ 55 °C *(2)* 220 V 240 V	400 V 440 V	660 V 690 V	Instantaneous auxiliary contacts		Tightening torque on cable end	Basic reference, to be completed by adding the voltage code *(3)*	Weight
kVAR	kVAR	kVAR	N/O	N/C	N.m		kg
6.7	12.5	18	1	1	1.2	**LC1 DFK11●●**	0.430
			–	2	1.2	**LC1 DFK02●●**	0.430
8.5	16.7	24	1	1	1.7	**LC1 DGK11●●**	0.450
			–	2	1.7	**LC1 DGK02●●**	0.450
10	20	30	1	1	1.9	**LC1 DLK11●●**	0.600
			–	2	1.9	**LC1 DLK02●●**	0.600
15	25	36	1	1	2.5	**LC1 DMK11●●**	0.630
			–	2	2.5	**LC1 DMK02●●**	0.630
20	33.3	48	1	2	5	**LC1 DPK12●●**	1.300
25	40	58	1	2	5	**LC1 DTK12●●**	1.300
40	60	92	1	2	9	**LC1 DWK12●●**	1.650

Switching of multiple-step capacitor banks (with equal or different power ratings)

The correct contactor for each step is selected from the above table, according to the power rating of the step to be switched.
Example: 50 kVAR 3-step capacitor bank. Temperature: 50 °C and U = 400 V or 440 V.
One 25 kVAR step: contactor LC1 DMK, one 15 kVAR step: contactor LC1 DGK, and one 10 kVAR step: contactor LC1 DFK.

(1) Operational power of the contactor according to the scheme on the page opposite.
(2) The average temperature over a 24-hour period, in accordance with standards IEC 60070 and 60831 is 45 °C.
(3) Standard control circuit voltages (for other voltages, please consult your Regional Sales Office):

Volts	24	42	48	110	115	220	230	240	380	400	415	440
50/60 Hz	B7	D7	E7	F7	FE7	M7	P7	U7	Q7	V7	N7	R7

For other voltages between 24 and 440 V, please consult your Regional Sales Office

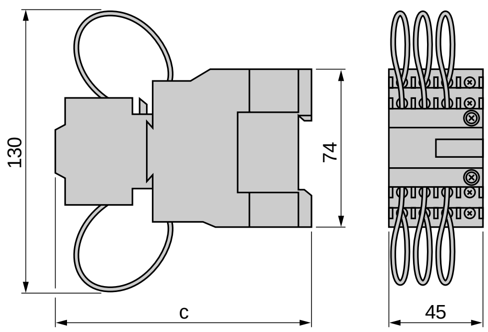
Dimensions, schemes :
page 5/91

Dimensions, schemes

TeSys contactors
For switching 3-phase capacitor banks, used for power factor correction

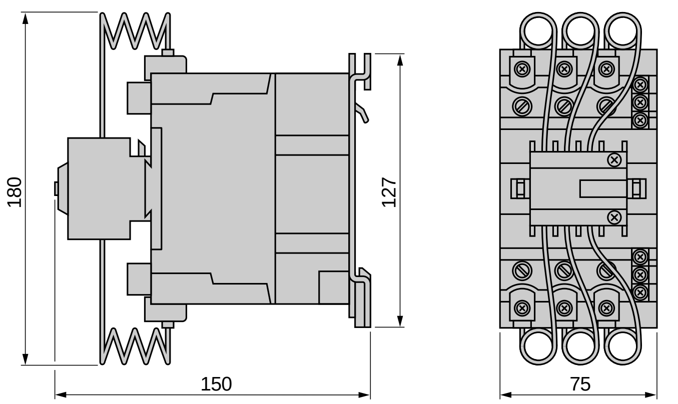
Dimensions

LC1 DFK, DGK



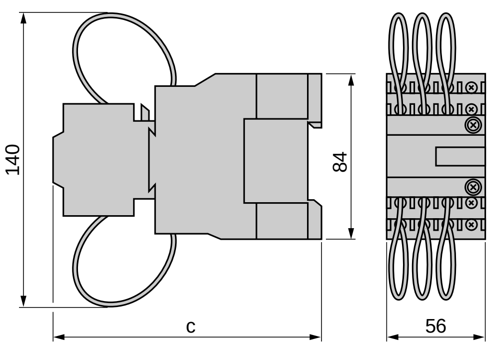
LC1	c	Type of fixing	
DFK	117	LC1 D12	See pages 5/84 and 5/85
DGK	122	LC1 D18	See pages 5/84 and 5/85

LC1 DPK, DTK



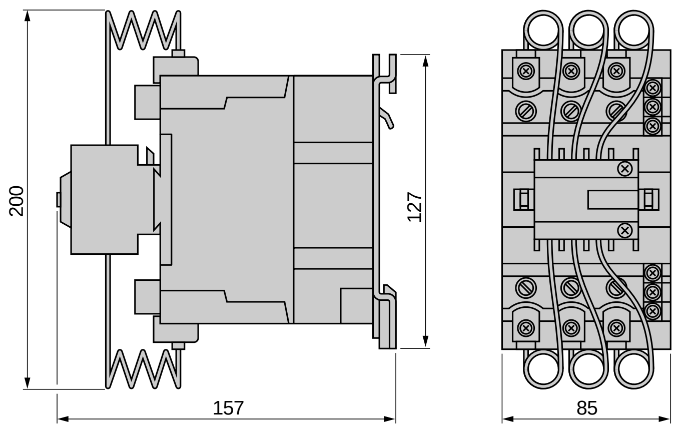
LC1	Type of fixing	
DPK	LC1 D40	See pages 5/84 and 5/85
DTK	LC1 D50	See pages 5/84 and 5/85

LC1 DLK, DMK



LC1	c	Type of fixing	
DLK	117	LC1 D25	See pages 5/84 and 5/85
DMK	122	LC1 D32	See pages 5/84 and 5/85

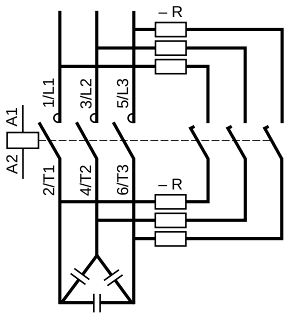
LC1 DWK



LC1	Type of fixing	
DWK	LC1 D80	See pages 5/84 and 5/85

Schemes

LC1 D●K



R = Pre-wired resistor connections.

Cabling (maximum permissible c.s.a.)

Contactor type LC1	DFK		DGK		DLK		DMK		DPK, DTK		DWK	
Number of conductors	1	2	1	2	1	2	1	2	1	2	1	2
Flexible cable with cable end (mm^2)	2.5	1.5	4	2.5	4	4	6	4	16	6	50	25
Solid cable with cable end (mm^2)	4	4	6	6	10	6	16	10	25	16	50	35

References :
page 5/90

BRISBANE WATER

Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

FAIRFIELD WATER RECLAMATION PLANT

CHASSIS

1. MSC CHASSIS TECHNICAL DETAILS

MSC Chassis

Suitable for C60, C120 , DPN & Vigi RCBO's

Multi 9 Merlin Gerin

MSC Chassis have been designed to provide direct connectivity to Merlin Gerin isolators & Compact NS circuit breakers.

Features

- Industrially proven & robust range.
- Flexible & easy to install.
- 12 to 108 pole chassis to suit MCB's up to 125A.
- Tough oven baked insulation.
- Easy identification with colour coded bar work.
- Cold formed single piece conductors ensuring no hot joints.

Options

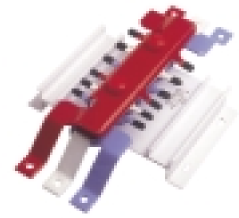
- Standard range of MSC18, MSC27, MSC18/27, MSC36 & MSC DC.
- Custom chassis built to your specifications.
- Choice of 250A or 400A current rating.

Technical Data

MSC current rating	250A	400A
Peak withstand	52.5kA	60.0kA
Short time withstand	25kA for 0.1 sec	30kA for 0.1 sec
Busbar thickness	2mm	2.5mm
Insulation voltage	690V	
Standards/Conformity	AS3439-1 & AS3439-3	

C325123

C125123



CH25123

Certificate of Conformity No. 6963

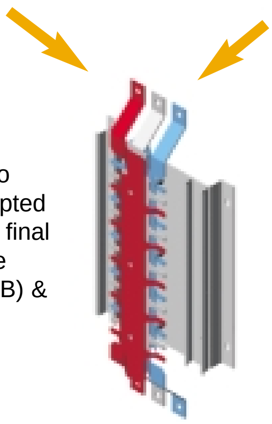
INS250-160
INS250

Isolator

NS250

MCCB

Uniquely designed to provide an uninterrupted connection between final distribution miniature circuit breakers (MCB) & upstream feeders...



Merlin Gerin
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Get more with the world's Power & Control specialist

MSC Chassis Range

MSC 18 – for C60 MCB

Description	Pole Capacity 18mm	Length (mm) L	Rating	Reference
3 phase	12	110	250A	**C325123**
	18	164	250A	**C325183**
	24	218	250A	**C325243**
	30	272	250A	**C325303**
	36	326	250A	**C325363**
	42	380	250A	**C325423**
	48	434	250A	**C325483**
	60	542	250A	**C325603**
	72	650	250A	**C325723**
	84	758	250A	**C325843**

MSC 27 – C120 MCB

Description	Pole Capacity 27mm	Length (mm) L	Rating	Reference
3 phase	12	164	250A	**C125123**
	18	245	250A	**C125183**
	24	326	250A	**C125243**
	30	407	250A	**C125303**
	36	488	250A	**C125363**
	42	569	250A	**C125423**
	48	650	250A	**C125483**
	60	812	250A	**C125603**
	72	974	250A	**C125723**

MSC 18/27 – for C60 or C120 MCB

Description	Pole Capacity 27mm	18mm	Total	Length (mm) L	Rating	Reference
3 phase	6	6	12	137	250A	**CH25123**
	6	12	18	191	250A	**CH25183**
	6	18	24	245	250A	**CH25243**
	6	24	30	299	250A	**CH25303**
	6	30	36	353	250A	**CH25363**
	12	30	42	434	250A	**CH25423**
	12	36	48	488	250A	**CH25483**
	12	48	60	596	250A	**CH25603**
	12	60	72	704	250A	**CH25723**

Notes:

- For 400A MSC rating, please add "4" to the end of the 250A chassis reference number.
- Busbars extend 94.5mm either end of pan, width is 215mm.
- For custom built chassis' (to meet with your specific requirements), please contact Schneider Help Centre on 1300 369 233.

MSC 18/4A – for C60

Description	Pole Capacity 18mm	Length (mm) L	Rating	Reference
3 phase & neutral (N.R.W.B)	8	74	250A	**C3250843**
	16	146	250A	**C3251643**
	24	218	250A	**C3252443**
	32	290	250A	**C3253243**
	40	362	250A	**C3254043**
	48	434	250A	**C3254843**
	56	506	250A	**C3255643**
	64	578	250A	**C3256443**
	72	650	250A	**C3257243**

MSC 18/4B – for C60

Description	Pole Capacity 18mm	Length (mm) L	Rating	Reference
3 phase & neutral (N.R.N.W.N.B)	16	146	250A	**C3251641**
	24	218	250A	**C3252441**
	32	290	250A	**C3253241**
	40	362	250A	**C3254041**
	48	434	250A	**C3254841**
	56	506	250A	**C3255641**
	64	578	250A	**C3256441**
	72	650	250A	**C3257241**

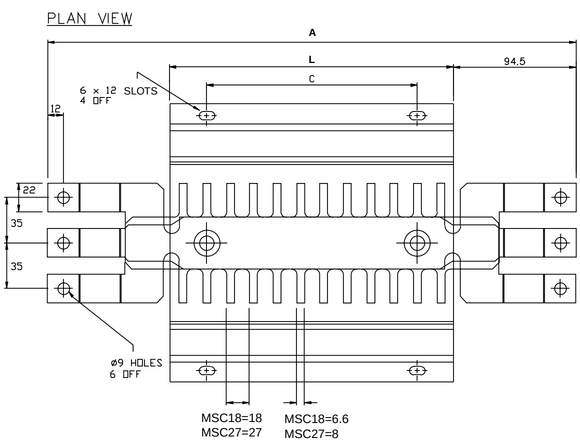
MSC 36 – for DPN. Vigi (Ph + N)

Description	Pole Capacity	Qty of DPN's	Length (mm) L	Rating	Reference
3 phase & neutral (N.R.N.W.N.B)	12	6	110	250A	**CD25124N**
	20	10	182	250A	**CD25204N**
	24	12	218	250A	**CD25244N**
	32	16	290	250A	**CD25324N**
	36	18	326	250A	**CD25364N**
	48	24	434	250A	**CD25484N**
	72	36	650	250A	**CD25724N**

MSC DC – for C60

Description	Pole Capacity 18mm	Length (mm) L	Rating	Reference
2-pole (Black/Red)	12	110	250A	**C3DC123**
	16	146	250A	**C3DC163**
	20	182	250A	**C3DC203**
	24	218	250A	**C3DC243**
	32	290	250A	**C3DC323**
	36	326	250A	**C3DC363**
	40	362	250A	**C3DC403**
	48	434	250A	**C3DC483**
	60	542	250A	**C3DC603**
	72	650	250A	**C3DC723**

Dimensions



DIMENSION DETAILS

CIRCUIT BREAKER TYPE	CATALOGUE No.	POLE SIZES	DIMENSIONS A	L	C	CURRENT RATING
NC100H NC100LS	C125123	12	353	164	108	250A
	C125183	18	434	245	189	
	C125243	24	515	326	270	
	C125303	30	614	407	351	
	C125363	36	677	488	432	
	C125423	42	758	569	513	
	C125483	48	839	650	594	
	C125603	60	1001	812	756	
	C125723	72	1163	974	918	

DIMENSION DETAILS

CIRCUIT BREAKER TYPE	CATALOGUE No.	POLE SIZES	DIMENSIONS A	L	C	CURRENT RATING
C60H, C60N	C325123	12	299	110	54	250A
	C325183	18	353	164	108	
	C325243	24	405	218	162	
	C325303	30	461	272	216	
	C325363	36	515	326	270	
	C325423	42	567	380	324	
	C325483	48	623	434	378	
	C325603	60	731	542	486	
	C325723	72	839	650	594	
	C325843	84	947	758	702	

DIMENSIONS THE SAME FOR 400A BARS (ADD SUFFIX 4 TO CAT#)

SCHNEIDER ELECTRIC HELP CENTRE
Tel: 1300 369 233
Fax: 1300 369 288
Email: help@schneider.com.au
www.schneider-electric.com.au

AUS01PL43-A

BRISBANE WATER

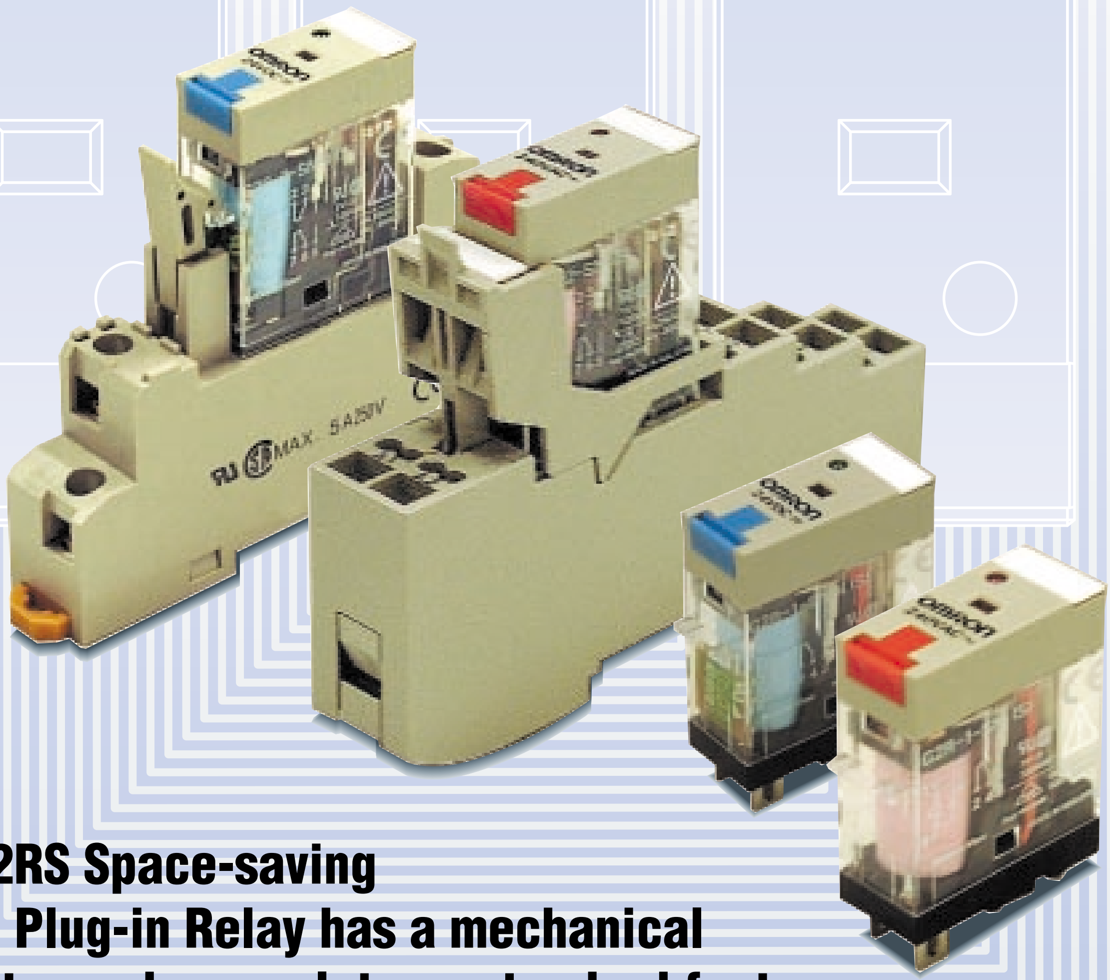
Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

FAIRFIELD WATER RECLAMATION PLANT

CONTROL RELAY

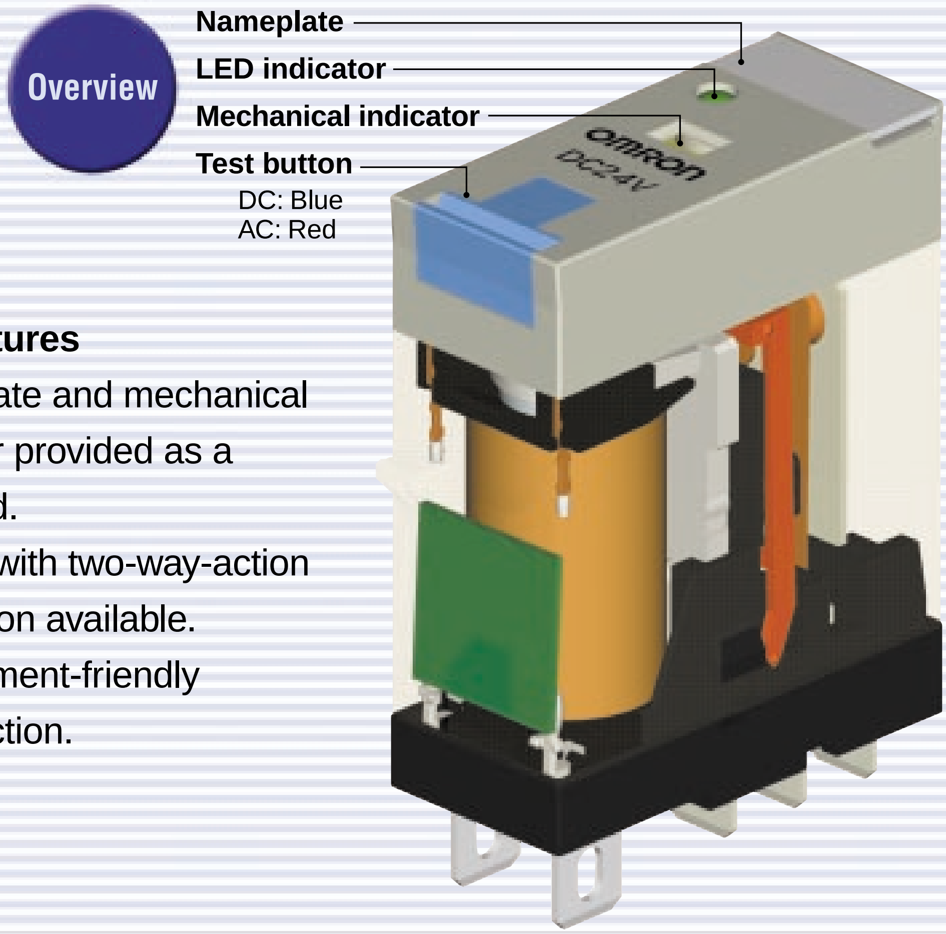
1. CONTROL RELAY TECHNICAL DETAILS

New G2RS Series



**The G2RS Space-saving
Power Plug-in Relay has a mechanical
indicator and nameplate as standard features.
A relay with a lockable test button is also available.**

Details on the New G2RS



New Features

- Nameplate and mechanical indicator provided as a standard.
- Models with two-way-action test button available.
- Environment-friendly construction.

Two-way-action test button

Pull down the test button to the first stop position, then press the yellow button with an insulated tool to operate the contact.

Pull down the test button to the second stop position. (The contact is now in the locked position.)

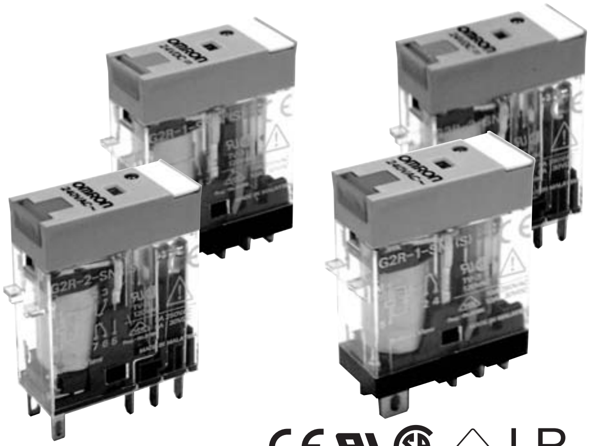
OMRON

General-purpose Relay

G2RS New Model

Slim and Space-saving Power Plug-in Relay

- Lockable test button models now available.
- Built-in mechanical operation indicator.
- Provided with nameplate.
- AC type is equipped with a coil-disconnection self-diagnostic function (LED type).
- High switching power (1-pole: 10 A).
- Environment-friendly (Cd, Pb free).
- Wide range of Sockets also available.



CE LR

Model Number Structure

■ Model Number Legend

G2R □ -□ □ □ - □ □ -□
1 2 3 4 5 6 7

1. **Relay Function**
   Blank: General-purpose
2. **Number of Poles**
   1: 1 pole
   2: 2 poles
3. **Contact Form**
   Blank: SPDT
4. **Contact Type**
   Blank: Single
5. **Terminals**
   S: Plug-in
6. **Classification**
   Blank: General-purpose
   N: LED indicator
   D: Diode
   ND: LED indicator and diode
   NI: LED indicator with test button
   NDI: LED indicator and diode with test button
7. **Rated Coil Voltage**

Ordering Information

■ List of Models

Classification		Enclosure rating	Coil ratings	Contact form	
				SPDT	DPDT
Plug-in terminal	General-purpose	Unsealed	AC/DC	G2R-1-S	G2R-2-S
	LED indicator			G2R-1-SN	G2R-2-SN
	LED indicator with test button			G2R-1-SNI	G2R-2-SNI
	Diode		DC	G2R-1-SD	G2R-2-SD
	LED indicator and diode			G2R-1-SND	G2R-2-SND
	LED indicator and diode with test button			G2R-1-SNDI	G2R-2-SNDI

Note: When ordering, add the rated coil voltage and "(S)" to the model number. Rated coil voltages are given in the coil ratings table.
Example: G2R-1-S 12 VDC (S) — New model
Rated coil voltage

OMRON

■ Accessories (Order Separately)

Connecting Sockets

Applicable Relay model	Track/surface-mounting Socket		Back-mounting Socket	
	Screwless clamp terminal	Screw terminal	Terminals	Model
1 pole G2R-1-S(N)(D)(ND)(NI)(NDI)	• P2RF-05S (See note.) + (P2CM-S (option))	• P2RF-05-E • P2RF-05	PCB terminals	P2R-05P, P2R-057P
			Solder terminals	P2R-05A
2 poles G2R-2-S(N)(D)(ND)(NI)(NDI)	• P2RF-08S (See note.) + (P2CM-S (option))	• P2RF-08-E • P2RF-08	PCB terminals	P2R-08P, P2R-087P
			Solder terminals	P2R-08A

Note: Use of the P2CM Clip & Release Lever is recommended to ensure stable mounting.

Accessories for Screwless Clamp Terminal Socket (Option)

Name	Model
Clip & Release Lever	P2CM-S
Nameplate	R99-11 Nameplate for MY
Socket Bridge	P2RM-SR (for AC), P2RM-SB (for DC)

Mounting Tracks

Applicable Socket	Description	Model
Track-connecting Socket	Mounting track	50 cm (ℓ) x 7.3 mm (t): PFP-50N 1 m (ℓ) x 7.3 mm (t): PFP-100N 1 m (ℓ) x 16 mm (t): PFP-100N2
	End plate	PFP-M
	Spacer	PFP-S
Back-connecting Socket	Mounting plate	P2R-P*

*Used to mount several P2R-05A and P2R-08A Connecting Sockets side by side.

Specifications

■ Coil Ratings

Rated voltage		Rated current*		Coil resistance*	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
		50 Hz	60 Hz		Armature OFF	Armature ON	% of rated voltage			
AC	24 V	43.5 mA	37.4 mA	253 Ω	0.81	1.55	80% max.	30% max.	110%	0.9 VA at 60 Hz
	110 V	9.5 mA	8.2 mA	5,566 Ω	13.33	26.83				
	120 V	8.6 mA	7.5 mA	7,286 Ω	16.13	32.46				
	230 V	4.4 mA	3.8 mA	27,172 Ω	72.68	143.90				
	240 V	3.7 mA	3.2 mA	30,360 Ω	90.58	182.34				

Rated voltage		Rated current*	Coil resistance*	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
				Armature OFF	Armature ON	% of rated voltage			
DC	6 V	87.0 mA	69 Ω	0.25	0.48	70% max.	15% min.	110%	0.53 W
	12 V	43.2 mA	278 Ω	0.98	2.35				
	24 V	21.6 mA	1,113 Ω	3.60	8.25				
	48 V	11.4 mA	4,220 Ω	15.2	29.82				

***** The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±10%.

■ Contact Ratings

Number of poles	1 pole		2 poles	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4; L/R = 7 ms)
Rated load	10 A at 250 VAC; 10 A at 30 VDC	7.5 A at 250 VAC; 5 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	2 A at 250 VAC; 3 A at 30 VDC
Rated carry current	10 A		5 A	
Max. switching voltage	440 VAC, 125 VDC		380 VAC, 125 VDC	
Max. switching current	10 A		5 A	
Max. switching power	2,500 VA, 300 W	1,875 VA, 150 W	1,250 VA, 150 W	500 VA, 90 W
Failure rate (reference value)	100 mA at 5 VDC		10 mA at 5 VDC	

Note: P level: λ_{60} = 0.1 x 10^{-6}/operation

■ Characteristics

Item	1 pole	2 poles
Contact resistance	100 mΩ max.	
Operate (set) time	15 ms max.	
Release (reset) time	AC: 10 ms max.; DC: 5 ms max. (w/built-in diode: 20 ms max.)	AC: 15 ms max.; DC: 10 ms max. (w/built-in diode: 20 ms max.)
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	5,000 VAC, 50/60 Hz for 1 min between coil and contacts*; 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity	5,000 VAC, 50/60 Hz for 1 min between coil and contacts*; 3,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2 when energized; 100 m/s^2 when not energized	
Endurance	Mechanical: AC coil: 10,000,000 operations min.; DC coil: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr under rated load) (DC coil type)	
Ambient temperature	Operating: –40°C to 70°C (with no icing or condensation)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 21 g	

Note: Values in the above table are the initial values.
*4,000 VAC, 50/60 Hz for 1 minute when the P2R-05A or P2R-08A Socket is mounted.

■ Approved Standards

UL 508 (File No. E41643)

Model	Contact form	Coil ratings	Contact ratings	Operations
G2R-1-S	SPDT	5 to 110 VDC 5 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3

IEC/VDE (EN61810)

Contact form	Coil ratings	Contact ratings	Operations
1 pole	6, 12, 24, 48 VDC 24, 110, 120, 230, 240 VAC	5 A, 440 VAC (cosϕ = 1.0) 10 A, 250 VAC (cosϕ = 1.0) 10 A, 30 VDC (0 ms)	100 x 10^3
2 poles	6, 12, 24, 48 VDC 24, 110, 120, 230, 240 VAC	5 A, 250 VAC (cosϕ =1.0) 5 A, 30 VDC (0 ms)	100 x 10^3

CSA 22.2 No.0, No.14 (File No. LR31928)

Model	Contact form	Coil ratings	Contact ratings	Operations
G2R-1-S	SPDT	5 to 110 VDC 5 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3

LR

Number of poles	Coil ratings	Contact ratings	Operations
1 pole	5 to 110 VDC 5 to 240 VDC	10 A, 250 VAC (general use) 7.5 A, 250 VAC (PF0.4) 10 A, 30 VDC (resistive) 5A, 30VDC (L/R=7ms)	100 x 10^3
2 poles	5 to 110 VDC 5 to 240 VDC	5 A, 250 VAC (general use) 2 A, 250 VAC (PF0.4) 5 A, 30 VDC (resistive) 3A, 30VDC (L/R=7ms)	100 x 10^3

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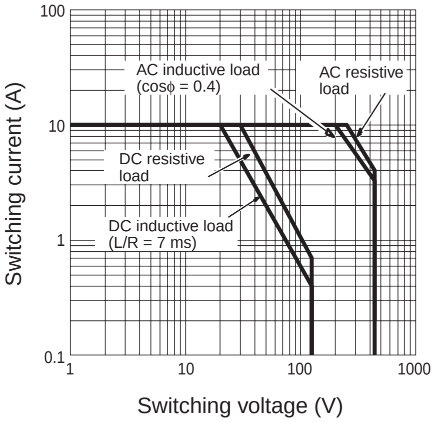
Engineering Data

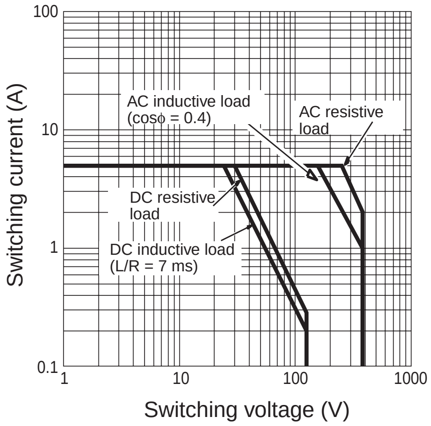
Maximum Switching Power

Plug-in Relays

G2R-1-S



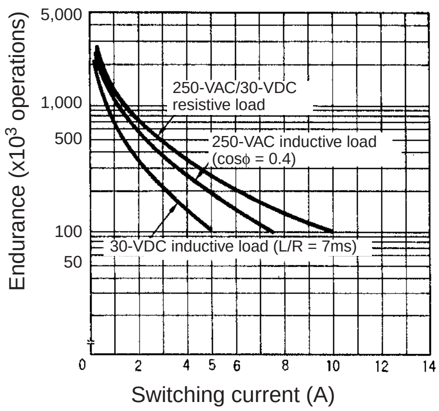
G2R-2-S



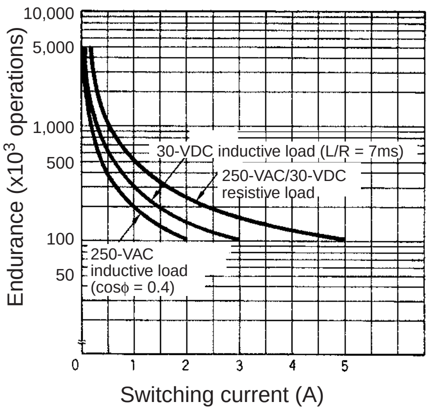
Endurance

Plug-in Relays

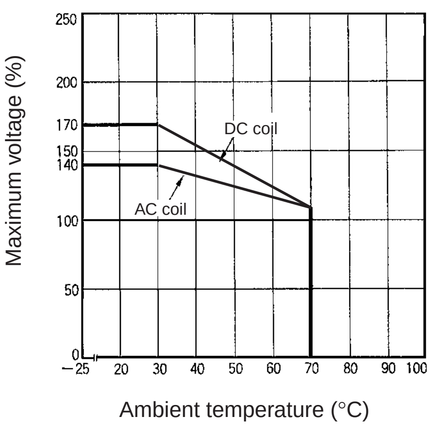
G2R-1-S



G2R-2-S



Ambient Temperature vs Maximum Coil Voltage



Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

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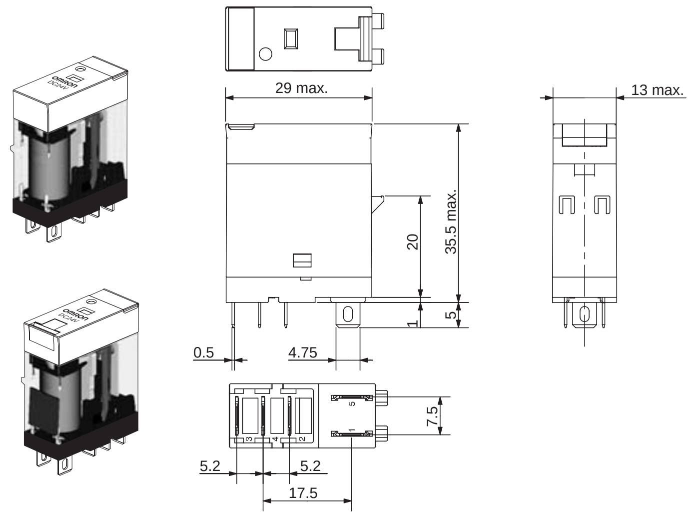
Dimensions

Note: All units are in millimeters unless otherwise indicated.

Relays with Plug-in Terminals

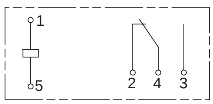
SPDT Relays

G2R-1-S, G2R-1-SN, G2R-1-SNI
G2R-1-SD, G2R-1-SND, G2R-1-SNDI

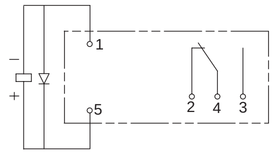


Terminal Arrangement/Internal Connections (Bottom View)

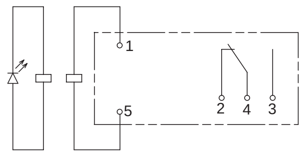
G2R-1-S



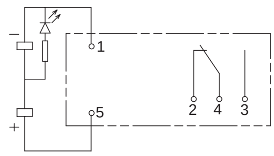
G2R-1-SD (DC)



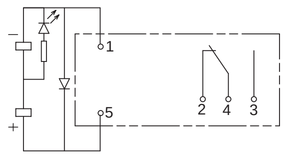
G2R-1-SN, G2R-1-SNI (AC)



G2R-1-SN, G2R-1-SNI (DC)

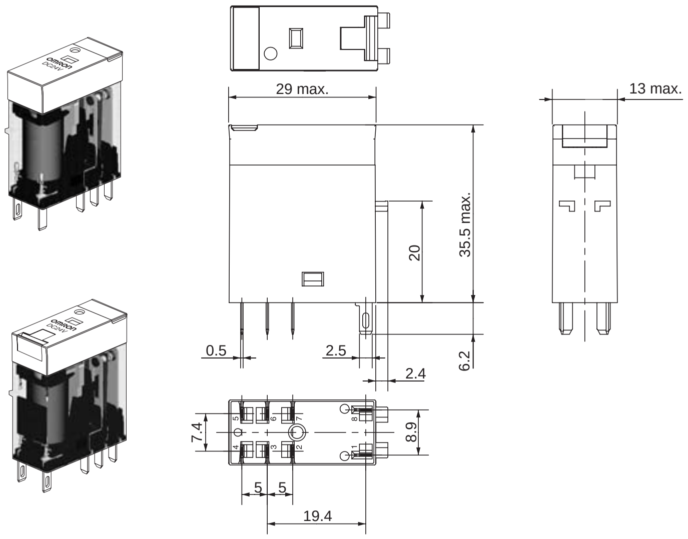


G2R-1-SND, G2R-1-SNDI (DC)



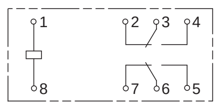
DPDT Relays

G2R-2-S, G2R-2-SN, G2R-2-SNI
G2R-2-SD, G2R-2-SND, G2R-2-SNDI

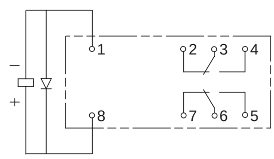


Terminal Arrangement/Internal Connections (Bottom View)

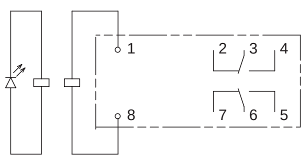
G2R-2-S



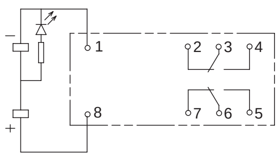
G2R-2-SD (DC)



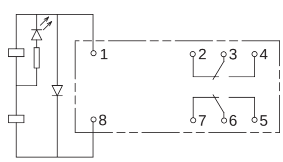
G2R-2-SN, G2R-2-SNI (AC)



G2R-2-SN, G2R-2-SNI (DC)



G2R-2-SND, G2R-2-SNDI (DC)



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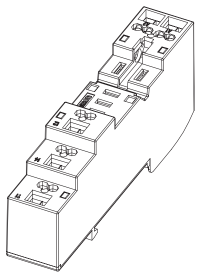
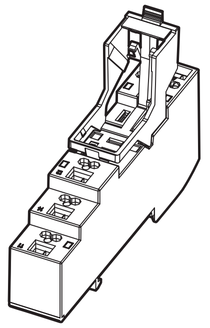
Track/Surface Mounting Sockets

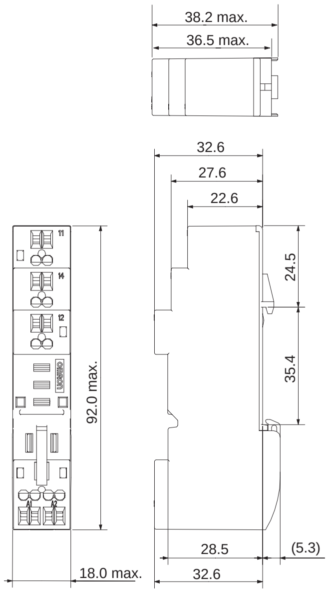
P2RF-05-S



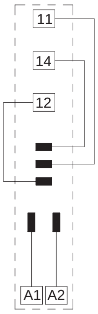
Standard model



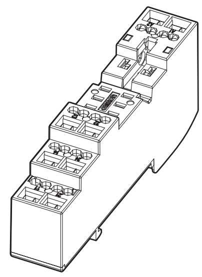
Option (with ejector and label attached)



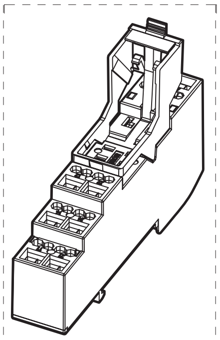
Terminal Arrangement (Top View)



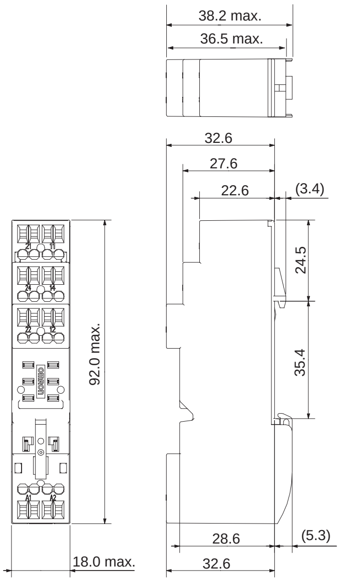
P2RF-08-S



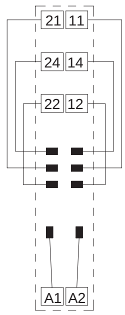
Standard model



Option (with ejector and label attached)

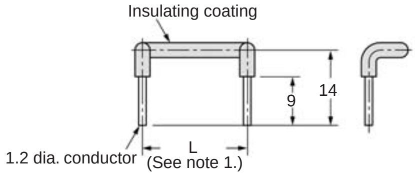


Terminal Arrangement (Top View)

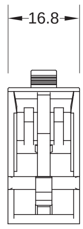


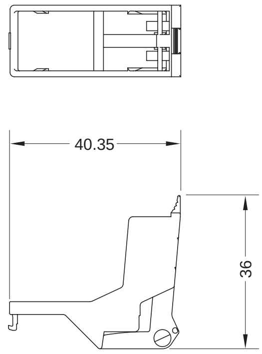
Accessories for P2RF-☐-S

Socket Bridge



Clip and Release Lever





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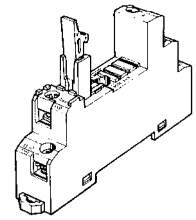
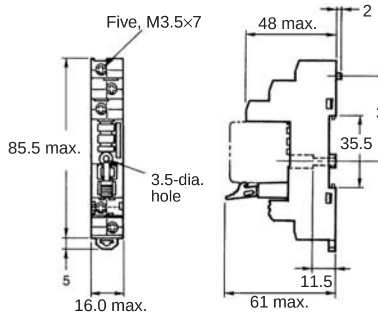
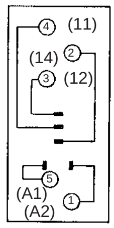
P2RF-05-E

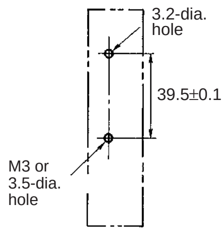




Terminal Arrangement (Top View)

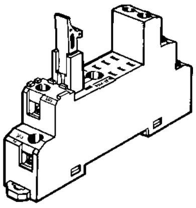


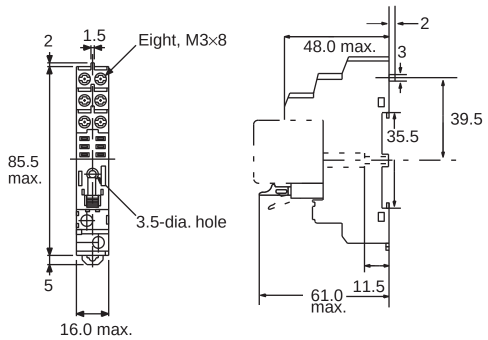
Mounting Holes (for Surface Mounting)



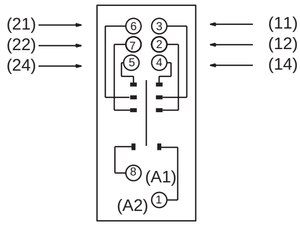
Note: Pin numbers in parentheses apply to DIN standard.

P2RF-08-E

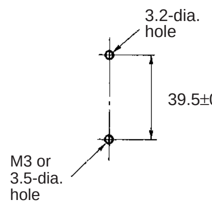




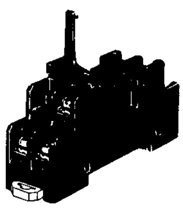
Terminal Arrangement (Top View)

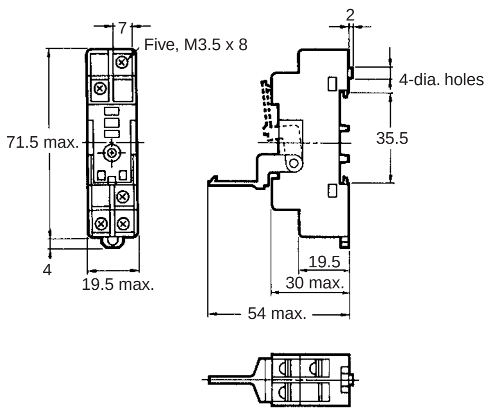


Mounting Holes (for Surface Mounting)

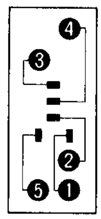


P2RF-05

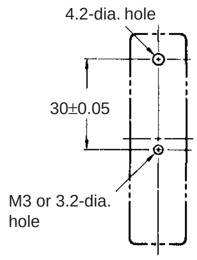




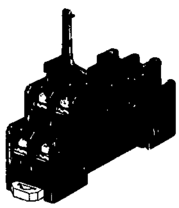
Terminal Arrangement (Top View)

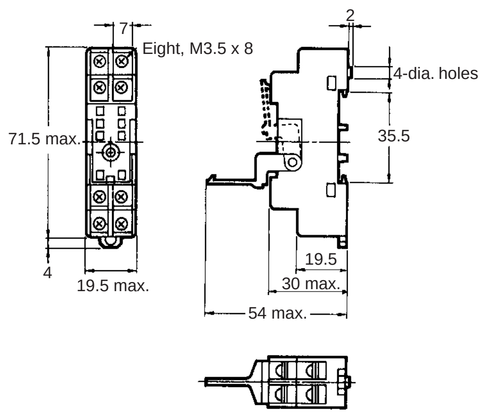


Mounting Holes (for Surface Mounting)

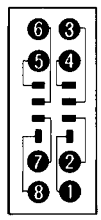


P2RF-08

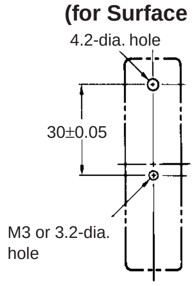




Terminal Arrangement (Top View)

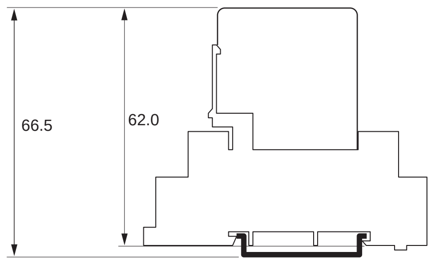


Mounting Holes (for Surface Mounting)

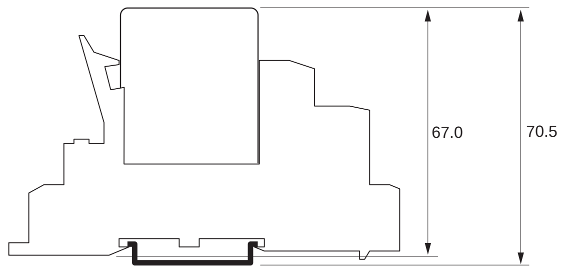


Mounting Height of Relay with Track/Surface Mounting Sockets

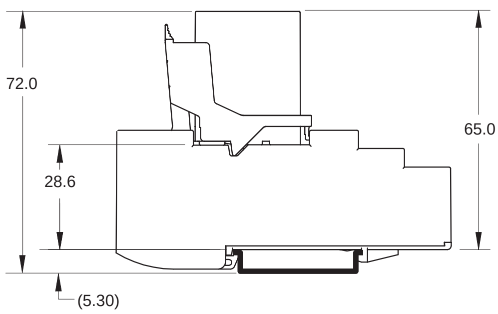
P2RF-□



P2RF-□-E

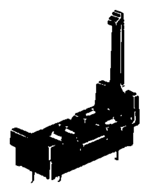


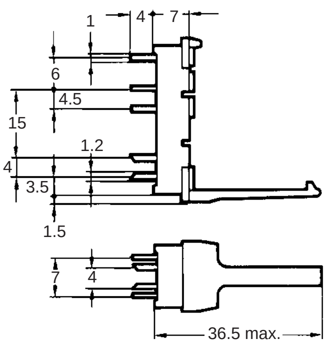
P2RF-□-S

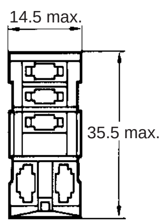


Back-connecting Sockets

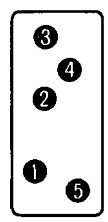
P2R-05P (1-pole)





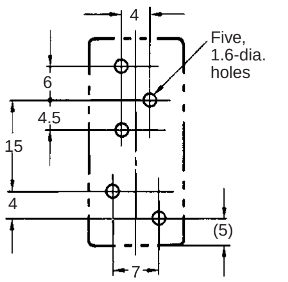


Terminal Arrangement (Bottom View)

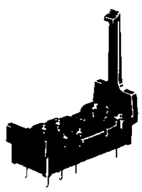


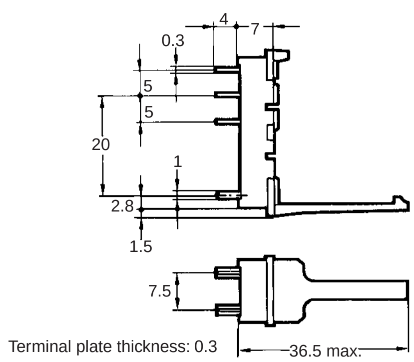
Mounting Holes

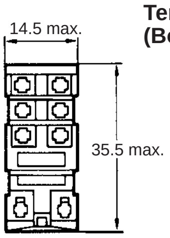
Tolerance: ±0.1



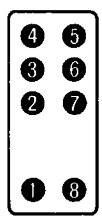
P2R-08P (2-pole)



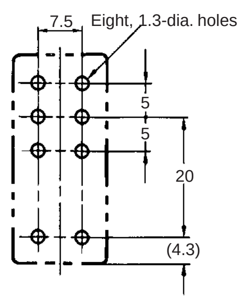




Terminal Arrangement (Bottom View)



Mounting Holes



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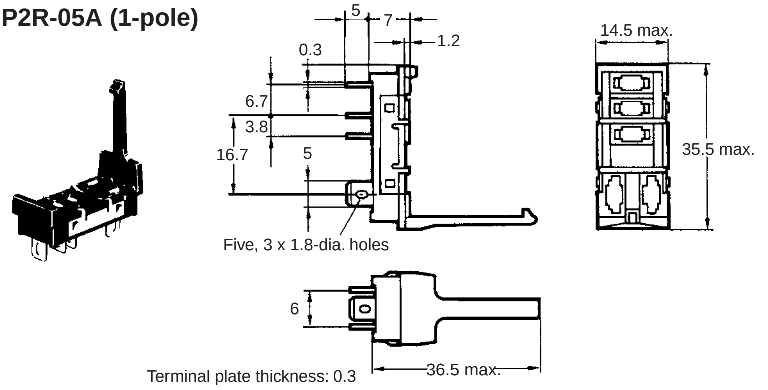
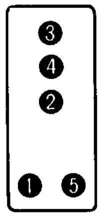
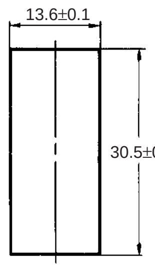
P2R-05A (1-pole)



Terminal Arrangement (Bottom View)

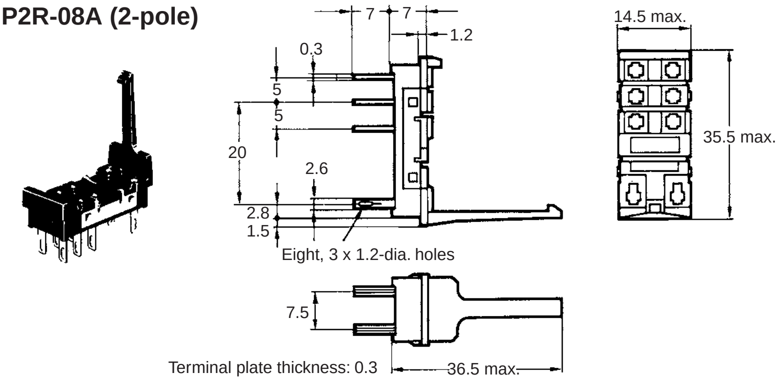


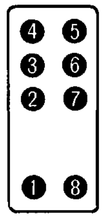
Panel Cutout



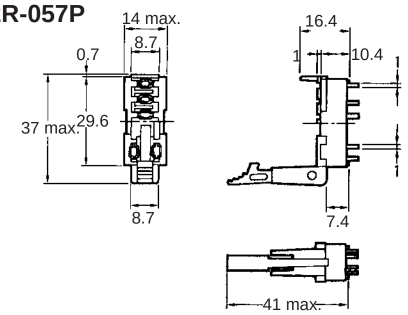
Recommended thickness of the panel is 1.6 to 2.0 mm

P2R-08A (2-pole)

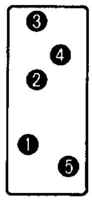




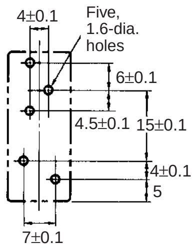
P2R-057P



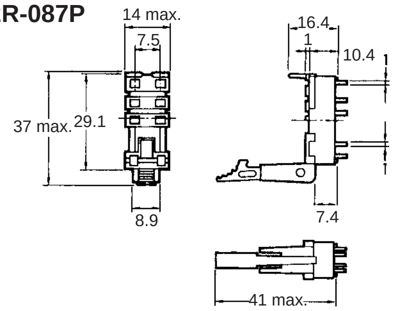
Terminal Arrangement (Bottom View)



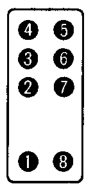
Mounting Holes



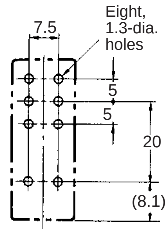
P2R-087P



Terminal Arrangement (Bottom View)

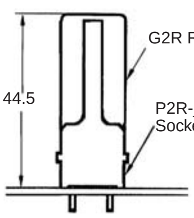


Mounting Holes

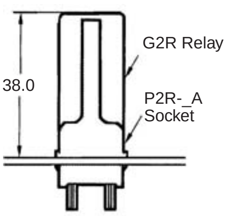


Mounting Height of Relay with Back-connecting Sockets

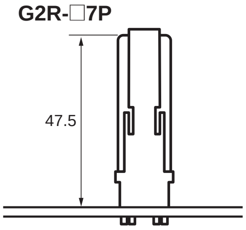
G2R-□P



G2R-□A



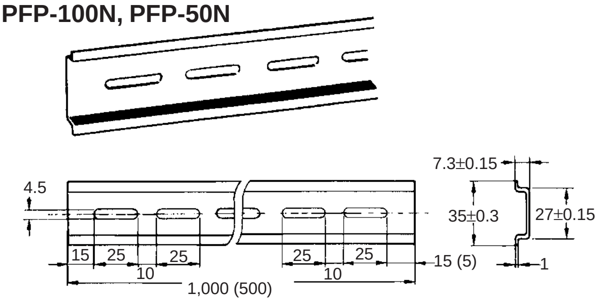
G2R-□7P



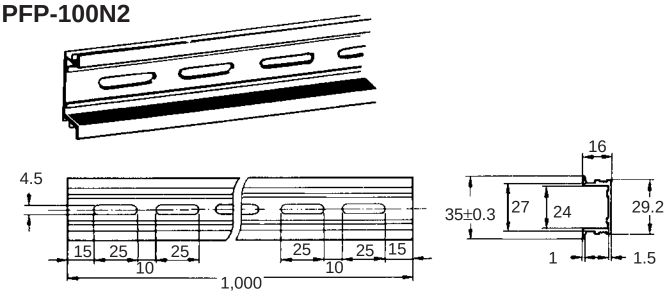
omron

Mounting Tracks

PFP-100N, PFP-50N



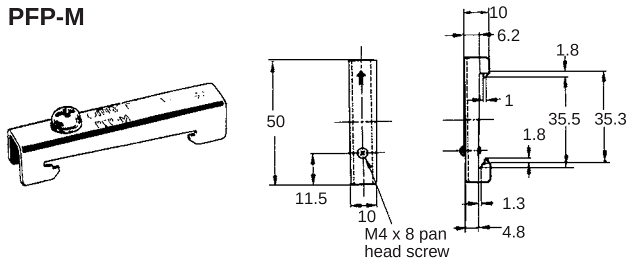
PFP-100N2



It is recommended to use a panel 1.6 to 2.0 mm thick.

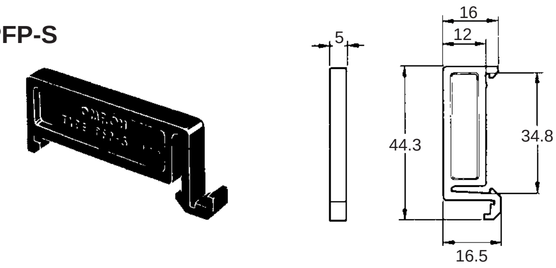
End Plate

PFP-M



Spacer

PFP-S



Precautions

⚠ Caution

Do not use the test button for any purpose other than testing. Be sure not to touch the test button accidentally as this will turn the contacts ON. Before using the test button, confirm that circuits, the load, and any other connected item will operate safely.

⚠ Caution

Check that the test button is released before turning ON relay circuits.

⚠ Caution

If the test button is pulled out too forcefully, it may bypass the momentary testing position and go straight into the locked position.

⚠ Caution

Use an insulated tool when you operate the test button.

Precautions for P2RF-□-S Connection

- Do not move the screwdriver up, down, or from side to side while it is inserted in the hole. Doing so may cause damage to internal components (e.g., deformation of the clamp spring or cracks in the housing) or cause deterioration of insulation.
- Do not insert the screwdriver at an angle. Doing so may break the side of the socket and result in a short-circuit.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J140-E1-01 **In the interest of product improvement, specifications are subject to change without notice.**

OMRON RELAY & DEVICES Corporation

GENERAL PURPOSE RELAY DIVISION
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Printed in Japan

BRISBANE WATER

Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

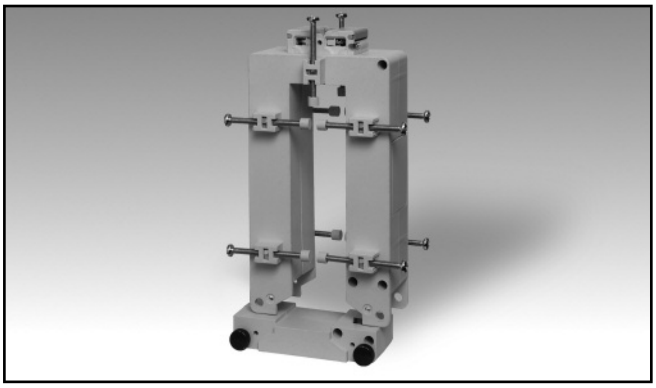
FAIRFIELD WATER RECLAMATION PLANT

CURRENT TRANSFORMERS

1. CURRENT TRANSFORMERS TECHNICAL DETAILS

Accessories
AC Split-Core Current Transformer
Type CTD-10S (max 50x126 mm)

CARLO GAVAZZI



- Bus-bar type split-core current transformer
- Class 1 accuracy
- Currents from 400 A to 4000 A
- Up to 10 Bus-bar isolated fixing screws
- Double screw terminals (up to 8-wire connections)
- Sealable terminal block covers
- Sealable fixing split-core screws

Product Description

Split-core current transformer with bus-bar mountng facility. Rated primary currents from 400 A to 4000 A.

Ordering Key CTD-10S 4000 5A XXX

Model
Primary current
Secondary current
Option

Type Selection

Primary current	Secondary current	Option
From 400A to 4000A (Refer to the Range Table)	**1A (on request)** **5A**	**XXX:** none **XTX:** tropicalization (on request)

Input Specifications

Operating frequency	48 to 62 Hz
Max. system voltage	0.72 kV
Rated insulation level	3 kV/1 min. @ 50 Hz
Insulation class	E (max 75°C)
Short-time current rating I_{th} I_{dyn}	Typical 100 I_n /1 s 2.5 I_{th} The short-time thermal current I_{th} is anyway limited by the cable/bus-bar size
Extended current rating	120%
Security factor (FS)	≤ 5 (Class: 1 and 3)

General Specifications

Standards	According to EN60044-1
Housing	ABS, self-extinguishing: UL 94 V-0
Mounting	Bus-bar mounting
Standard accessories	Two terminal block screws. Ten bus-bar fixing screws. Ten plastic caps for bus-bar fixing screws. Two sealable terminal block covers.
Special features	1 A secondary current, Tropicalization
Working temperature	-25°C to +60°C (-13°F to 140°F) (R.H. < 90% non condensing @ 40°C)
Storage temperature	-30°C to +70°C (-22°F to 158°F) (R.H. < 90% non condensing @ 40°C)
Approvals	CE
Connection Cable cross section area	Screw type From 1.5 to 6 mm^2 Min/Max screws tightening torque relevant to terminal block screws: From 1 to 2 Nm Max screws tightening torque relevant to the cable/bus-bar fixing screws: 0,3 Nm
Protection degree	IP00 (with sealable terminal covers) IP20 (with sealable terminal block covers + wire terminals)
Bus-bar size	Max. 51x125 mm
Weight	From 450 to 700 g

Output Specifications

Rated secondary current	5 A or 1 A

CTD-10S

CARLO GAVAZZI

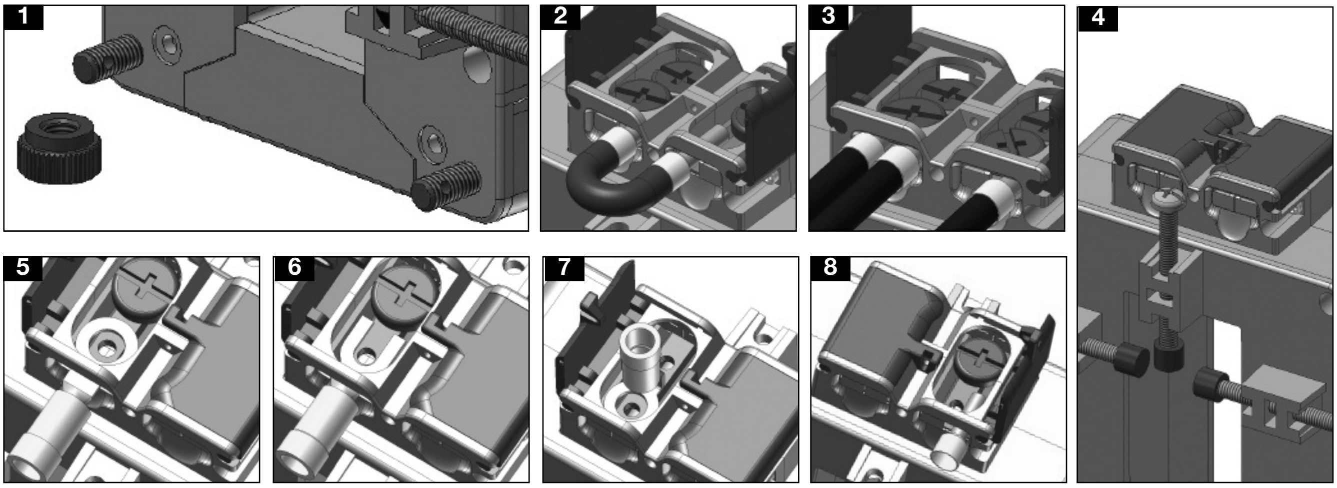
Range Table

Model CTD-10S from 400A to 1200A		
Primary Current	Burden (VA)	
A	CL 1	CL 3
400	1	7
500	3	10
600	5	12
700	8	15
750	10	15
800	10	15
1000	12	20
1200	15	25

Model CTD-10S from 1250A to 4000A		
Primary Current	Burden (VA)	
A	CL 1	CL 3
1250	15	25
1500	20	30
1600	20	30
2000	25	40
2500	30	50
3000	30	50
3200	30	50
4000	30	50

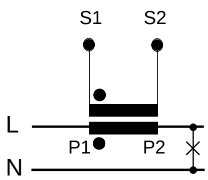
NOTE: the accuracy class is depending on the burden output. For the same rated primary current, the higher the burden the better the class.

Benefits

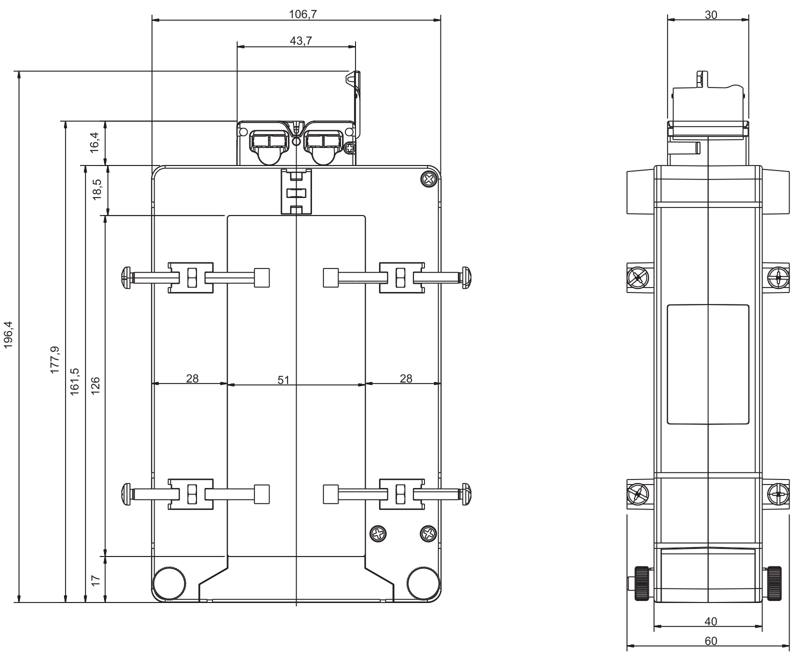


- Easy way to open and close the CT core by the dedicate seleable screws (see figure 1).
- Bridging of current transformer output without changing the connection of the secondary, so to avoid any output overvoltage during either the maintenance or the installation procedure (see figure 2).
- Easy output and earth connection (see fig. 3).
- Multiple screws provided with isolation cap screws to grant a strong and reliable fixing of the current transformer to the bus-bar (see figure 4).
- Screw terminals compatible with any kind of wire terminals and protection of screw terminals using specific sealable covers to assure always the best safety (see figure 5-6-7-8).

Wiring Diagram



Dimensions (mm)



Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

FAIRFIELD WATER RECLAMATION PLANT

FUSE & FUSE HOLDER

1. FUSE LINKS TECHNICAL DETAILS
2. FUSE HOLDER TECHNICAL DETAILS

NHP COMPACT FUSES

BS fuse holders

FUSES PROVIDE SUPERIOR SHORT CIRCUIT PROTECTION

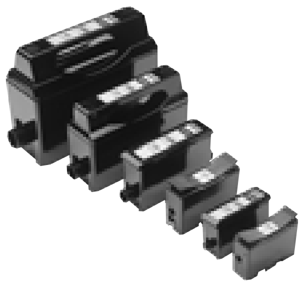
Refer Catalogue NF

SAVE PANEL SPACE SAVE $$$ WITH NEW COMPACT FUSE HOLDERS

UP TO 30% SMALLER

Compact fuse holders (Bolt-in)

- New compact size
- Front (FW) or stud/front (SFW) versions
- Smaller dimensions
- Saves panel space



Rating (A)	Fuse link to suit	Cat. No.
Front wired – bolt in		
32	NNIT	**NC32FW**
63	NTIA NTIS	**NC63FW**
100	NOS NTIA NTIS	**NC100FW**
200	NTIA 1) NTIS 1) NTFP NOS 1) NTCP	**NC200FW**
Back stud/front wired – bolt in		
32	NNIT	**NC32SFW**
63	NTIA NTIS	**NC63SFW**
100	NOS NTIA NTIS	**NC100SFW**
200	NTIA 1) NTIS 1) NTFP NOS 1) NTCP	**NC200SFW**

Note: **1)** Fuses can be fitted using adaptor 100M FLK.

Dimensions (mm)	H	W	D	Suggested Max. cable size
NC32_	87	27	50	10 mm²
NC63_	109	31	62	25 mm²
NC100_	118	35	72	50 mm²
NC200_	154	54	108	95 mm²

Standard fuse holders (Bolt-in)

- Ratings from 20 to 200 A
- Front (FW) or stud/front (SFW) versions
- Complies with BS88

N20FW

Rating (A)	Fuse link to suit	Cat. No.
Front wired – bolt in		
20	NNIT	**N20FW**
32	NTIA	**N32FW**
63	NTIA NTIS	**N63FW**
100	NTIA 1) NTIS 1) NOS 1) NTCP	**N100FW**
200	NTBC NTC NTF	**N200FW**
Back stud/front wired – bolt in		
20	NNIT	**N20SFW**
32	NTIA	**N32SFW**
63	NTIA NTIS	**N63SFW**
100	NTIA 1) NTIS 1) NOS 1) NTCP	**N100SFW**
200	NTBC NTC NTF	**N200SFW**

Dimensions (mm)	H	W	D	Suggested Max. cable size
N20_	87	27	50	10 mm²
N32_	109	31	62	10 mm²
N63_	118	35	72	50 mm²
N100_	154	54	108	70 mm²
N200_	193	70	149	150 mm²

Clip-in fuse holders - DIN rail mount

Fast, reliable fitting and removal of fuse links

NV20FW

NV32FW

NV63FW

Rating (A)	Fuse link to suit	Cat. No.
Front wired – clip-in – Black		
20	NSS	**NV20FW**
32	NSS	**NV32FW**
63	NES	**NV63FW**
Front wired – Clip-in – White		
32	NNS	**NV32FWW**
63	NES	**NV63FWW**

BS compact fuse links

- Complies with BS 88
- Reduced dimensions
- Low watts loss

Refer catalogue NF

FUSES PROVIDE SUPERIOR SHORT CIRCUIT PROTECTION

Clip-in offset tags

Rating (A)	BS 88 ref.	Overall length (mm)	Overall Dia. (mm)	Cat. No. [1])
2	F1	60	14	NNS 2
4				NNS 4
6				NNS 6
10				NNS 10
16				NNS 16
20				NNS 20
25				NNS 25
32				NNS 32
20M25				NNS 20M25
20M32				NNS 20M32
20	F2	68	17	NES 20
25				NES 25
32				NES 32
40				NES 40
50				NES 50
63				NES 63

NNS 2

NES 20

Bolted pattern offset tags

Rating (A)	BS 88 ref.	Fixing centres (mm)	Cat. No. [1])
2	A1	44.5	NNIT 2
4			NNIT 4
6			NNIT 6
10			NNIT 10
16			NNIT 16
20			NNIT 20
25			NNIT 25
32			NNIT 32
20M25			NNIT 20M25
20M32			NNIT 20M32
32M40			NNIT 32M40
32M50			NNIT 32M50
32M63			NNIT 32M63
2	A2	73	NTIA 2
4			NTIA 4
6			NTIA 6
10			NTIA 10
16			NTIA 16
20			NTIA 20
25			NTIA 25
32			NTIA 32
32M40			NTIA 32M40
32M50			NTIA 32M50
32M63			NTIA 32M63

NNIT 16

NTIA 16

Note: [1]) 'M' in catalogue No. denotes motor starting type.

DIN and BS fuse link selection chart

BS Fuses

Switch-fuses								Fuse type Cat. No. Prefix
800	630	400	315	250	200	160	125	
								NNS_
								NNIT_
						✔	✔	NTIA_
						✔	✔	NTIS_
						✔	✔	NOS_
						✔		NTCP_
								NTFP_
								NTSL00_
		✔	✔	✔	✔			NTBC_
		✔	✔	✔	✔			NTC_
		✔	✔	✔	✔			NTF_
		✔	✔	✔				NTKF_
								NTSL3_
		✔						NTMF_
✔	✔							NTM_
✔	✔							NTTM_
✔								NTLM_

Quick - Link fuse reference guide

NHP HRC fuse holders									Fuse type Cat. No. Prefix
NC (Bolt-in)						NV (Clip-in)			
315	200	100	63	32	20	63	32	20	
							✔	✔	NNS_
						✔			NES_
				✔	✔				NNIT_
	✔ 1)	✔	✔						NTIA_
	✔ 1)	✔	✔ 2)						NTIS_
	✔ 1)	✔							NOS_
	✔								NTCP_
	✔								NTFP_
✔									NTBC_
✔									NTC_
✔									NTF_
✔									NTKF_

DIN Fuses

Switch-fuses						Fuse type Cat. No. Prefix
800	630	400	250	160	125	
				✔	✔	N00_
			✔			N1_
		✔				N2_
✔	✔					N3_

Legend:
✔ Fuse links fit direct.
✔ 1) Fuses require 100MFLK adaptor, see page 11-107.
✔ 2) 'M' type (motor rated) NTIS not suitable for NC63_. Use NC100 fuse holder.

11

NHP COMPACT FUSES

Fuse-link terminology

NHP Compact fuses

HRC
High rupturing capacity (HRC) or High breaking capacity denotes the ability of a fuse-link to interrupt extremely high fault currents, usually up to 80kA.

Current limiting fuse-link
A fuse-link that limits the circuit current during it's operation to a value much lower than the peak value of the prospective current. In practice, the terms HRC and current limiting are synonymous.

Rated breaking capacity
The highest value of fault current that a fuse-link has been tested to interrupt eg. 80kA.

Rated voltage
The maximum system voltage that the fuse-link is designed to interrupt. Rated voltages may be in AC, DC, or both.

Current rating
The value of current that a fuse-link will carry continuously without deterioration under specified conditions.

Minimum fusing current
The minimum value of current that will cause melting of the fuse element.

Power dissipation
The power released in a fuse-link carrying rated current under a specified condition, usually expressed in watts.

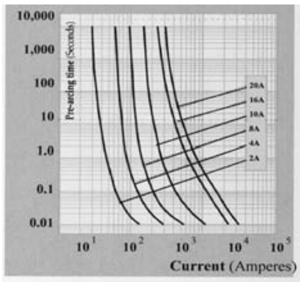
Time current characteristics (refer table 1)
A curve detailing the pre-arcing or operating time as a function of prospective current.

Let through characteristics (I^2t) (refer table 2)
A curve or chart showing values 'pre-arcing' and 'operating' let through energies as a function of prospective current, I^2t is proportional to energy in Amp^2 seconds.

Cut off characteristics (refer table 3)
A curve detailing the cut off current as a function of prospective current. Cut off current being the maximum instantaneous value of current let through by the fuse-link during operation.

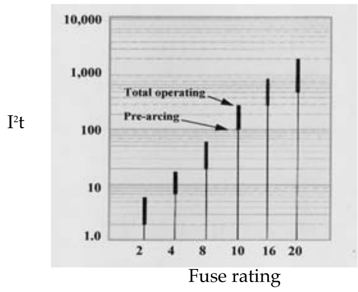
Discrimination (refer tables 4 and 5)
Discrimination is the ability of fuse-links to operate selectively and to disconnect only the parts of the circuit that are subject to faults. Discrimination can be checked by ensuring that the time current characteristics, including their tolerances, do not overlap at any point and that the total let through energy (I^2t) of the downstream (or minor) fuse-link does not exceed the pre-arcing energy (I^2t) of the upstream (or major) fuse-link at the applied system voltage. Discrimination is normally achieved with the ratio of 1.6 between upstream and downstream fuses.

Table 1



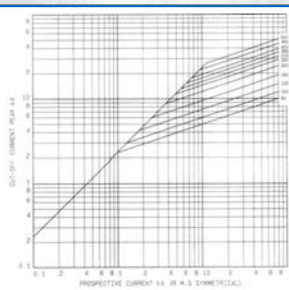
Typical time current curves

Table 2



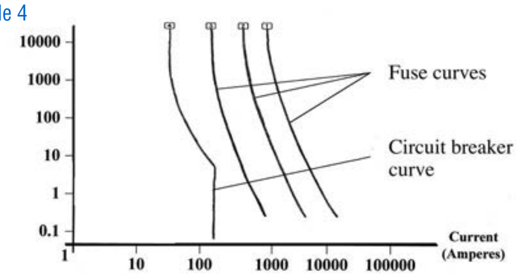
Operating and pre-arcing I^2t values

Table 3



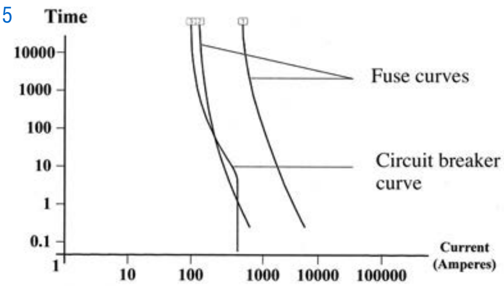
Cut off characteristics

Table 4



Discrimination achieved

Table 5



Discrimination *NOT* achieved

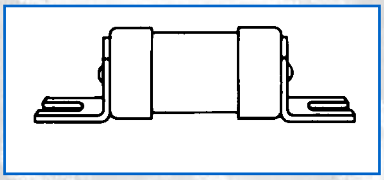
NHP COMPACT FUSES

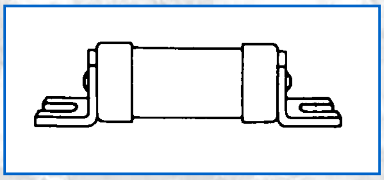
HRC cartridge fuse-links

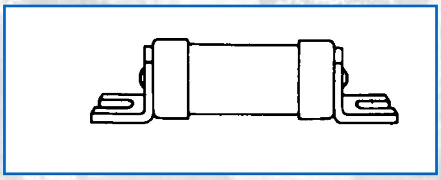
Dimensions

Dimensions (mm)

Fuse link type	A max. mm	B max. mm	D max. mm	E mm	F mm	G nom. mm	H mm	J mm
NNIT	36	14	55	11	0.8	44.5	4.8	-
NTIA } NTIS	56	21	86	9	1.2	73	5.5	7.5
NTIS(M)	58	26	90	13	1.6	73	5.5	-
NOS	58	27	90	13	1.6	73	5.5	-
NTCP	62	27	110	19	2.4	94	8.7	-
NTCP(M)	62	30	110	19	2.4	94	8.7	-
NTFP	77	30	110	19	2.4	94	8.7	10.3
NTFP(M)	77	40	110	19	2.4	94	8.7	10.3

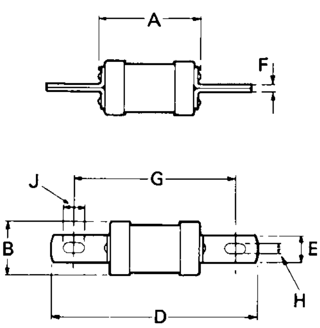


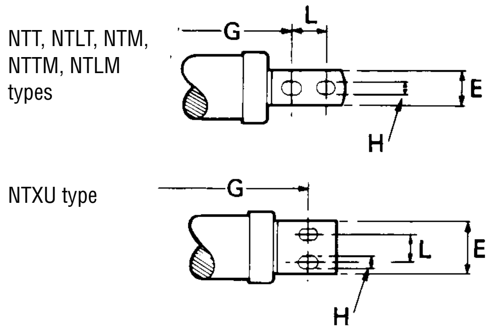




Dimensions (mm)

Fuse link type	A max. mm	B max. mm	D max. mm	E mm	F mm	G nom. mm	H mm	J mm	L mm
NTB	57	21	114	13	1.6	97	7.2	11	-
NTB...M...	57	26	116	13	1.6	97	7.2	11	-
NTBC	57	21	134	16	2.0	111	8.7	16	-
NTBC...M...	58	26	136	16	3.2	111	8.7	16	-
NTC	66	36	135	19	3.6	111	8.7	16	-
NTF	76	41	137	19	3.6	111	8.7	16	-
NTKF	76	51	137	26	4.0	111	8.7	16	-
NTMF	81	58	136	26	5.2	111	8.7	16	-
NTKM	76	51	158	26	4.0	133	8.7	16	-
NTM	81	58	210	26	5.2	133/184	10.3	16	25.4
NTTM	83	74	210	26	6.5	133/184	10.3	16	25.4
NTLM	84	82	210	26	10	133/184	10.3	16	25.4
NTT	83	74	267	38	6.5	165	10.3	16	32
NTLT	84	82	267	38	10	165	10.3	16	32
NTXU	83	100	198	63.5	9.5	149	14.3	19	32





NHP COMPACT FUSES

I^2t characteristics

BS fuses I^2t data

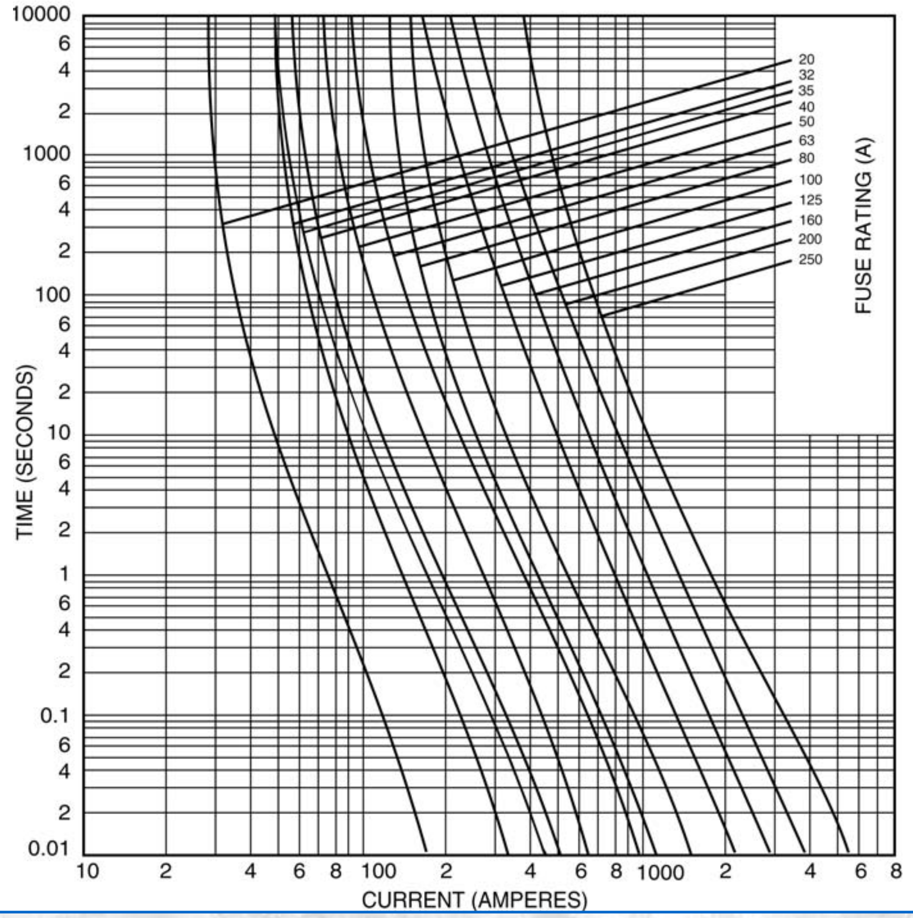
I^2t characteristics

Rating (amperes)	I^2t pre-arcing	I^2t total @ 240 volts	I^2t total @ 415 volts
2	2	2	4
4	10	15	21
6	34	52	74
10	188	289	408
16	92	211	412
20	155	355	690
20M25	574	1084	1809
20M32	574	1561	2605
25	826	1084	1809
32	826	1561	2605
35	1200	2400	4100
32M40	2482	4416	7019
32M50	3305	5879	9345
32M63	5875	10452	16612
40	2482	4416	7019
50	3305	5879	9345
63	5875	10452	16612
80 & 63M80	7800	15500	26000
100 & 63M100	14000	28000	46000
125 & 100M125	30000	51000	75500
160 & 100M160	58500	99000	145000
200 & 100M200	120000	205000	300000
250 & 200M250	210000	360000	530000
315 & 200M315	270000	460000	680000
355	365000	620000	915000
400 & 315M400	480000	820000	1200000
450	755000	1300000	1900000
500	1100000	1850000	2700000
560	1200000	2400000	4000000
630	1550000	3100000	5150000
710	1903565	2992861	4306813
800	3820349	6006505	8643534
1000	7000000	1500000	16000000
1250	12000000	20500000	30000000

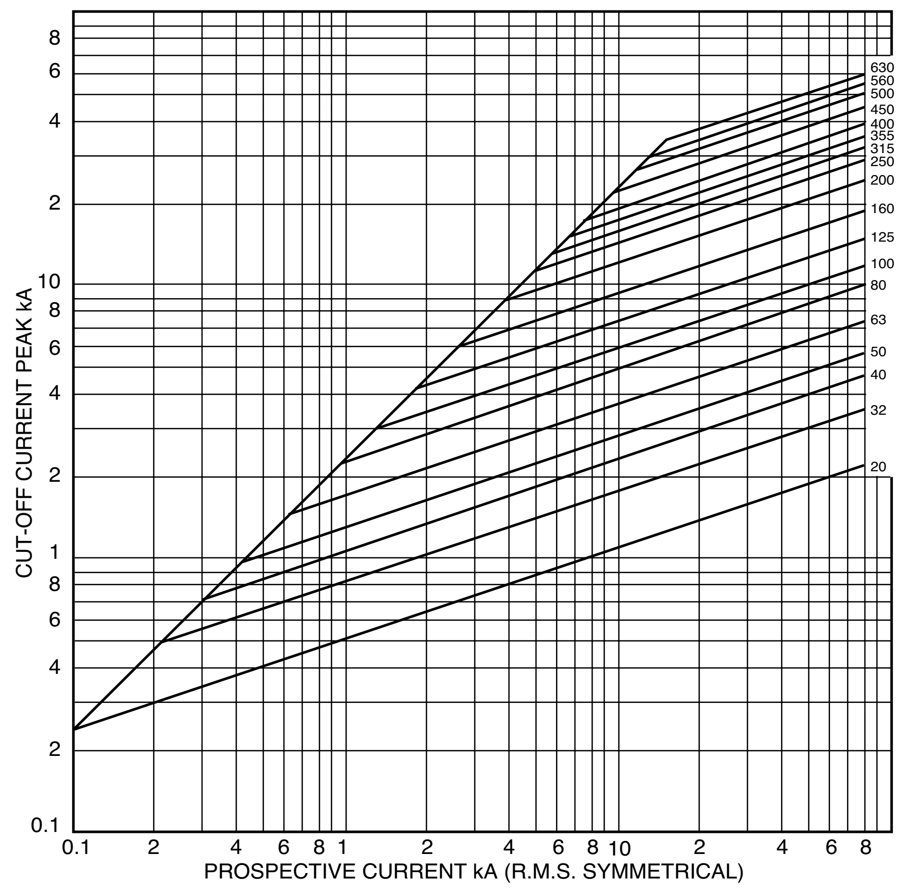
NHP COMPACT FUSES

Fuse curves

BS fuse curves



NHP Compact BS fuses from 20 to 250 amps



NHP Compact BS fuses cut-off current data from 20 to 630 amps

Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

FAIRFIELD WATER RECLAMATION PLANT

POWER METER

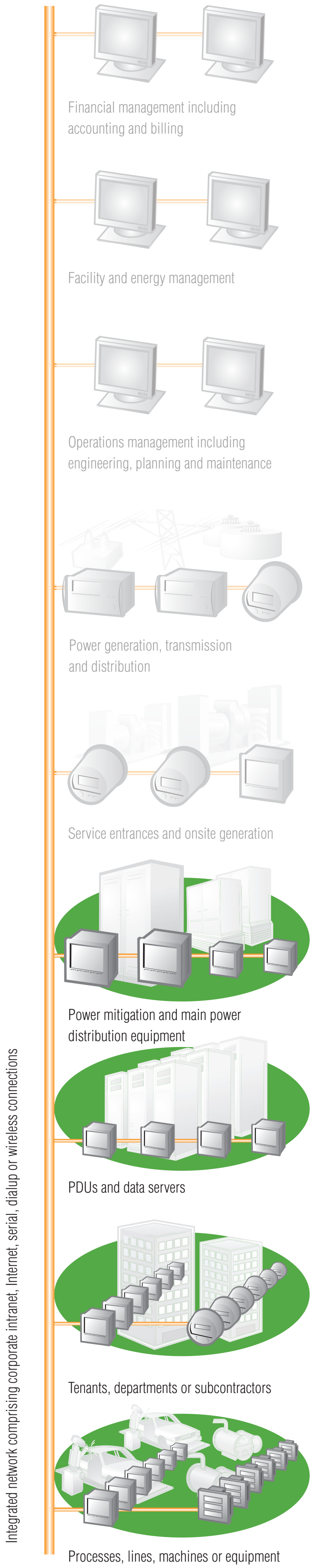
1. ION7300 POWER AND ENERGY METER TECHNICAL DETAILS

Gain energy insight and control with PowerLogic™

PowerLogic ION7300 series

power and energy meter

Schneider Electric



Typical uses within a PowerLogic power and energy management system

Features

Measurements

Bidirectional, absolute, and net energy measurements. Rolling block, predicted, and thermal demand. Individual and total harmonic distortion up to the 31st. Advanced logic and mathematical functions.

Internet-enabled communications

Two RS-485 ports, infrared data port standard. Optional built-in modem with ModemGate allows modem access for 31 other devices. Optional Ethernet port with EtherGate allows direct Ethernet-to-RS-485 data transfer to 31 other devices. Modbus RTU, Modbus TCP, DNP 3.0, and PROFIBUS DP. Call-back feature offers fast alarm response. WebMeter and MeterM@il® allow distribution of metered data and alarms over the Internet.

Interoperability

Communicate via multiple protocols to add to existing Modbus, DNP or ION Enterprise networks. Logs and real-time values are available via Modbus. These meters are supported by UTS MV-90® via serial and Ethernet.

On-board data logging

Scheduled or event-driven logging of up to 96 parameters. Sequence-of-events and min/max logging.

Setpoints for control and alarms

Use logical operators and setpoints to configure alarms, define basic control algorithms, and implement back-up protection. Setpoints can trigger data logging, digital outputs, pulse outputs, clearing and reset functions, call-back (ION7350).

Logic and math

Sophisticated logic and mathematical functions to perform on-board calculations on any measured value (ION7330, ION7350).

Inputs and outputs

Four digital inputs for status/counter functions. Four digital outputs for control/pulse functions. Optional analogue inputs and outputs.

Front panel display

Easy to read backlit LCD with adjustable contrast, supporting eight customisable data displays (scrolled automatically or manually) and basic setup.

PowerLogic ION7300 with remote modular display

PowerLogic ION7300 series

Schneider Electric PowerLogic ION7300 series meters offer unmatched value, functionality, and ease of use. Used in enterprise energy management applications such as feeder monitoring and sub-metering, PowerLogic ION7300 series meters interface with ION Enterprise software or other power management or automation systems to provide users with real-time information for monitoring and analysis.

The meter is available in three models, with incremental features sets and a variety of options. PowerLogic ION7300 meters are an ideal replacement for analogue meters, while also providing a multitude of power and energy measurements, analog and digital I/O, communication ports and industry-standard protocols. The ION7330 meter adds on-board data storage, emails of logged data, and an optional modem. The ION7350 meter is further augmented by more sophisticated power quality analysis, alarms and a call-back-on-alarm feature. Refer to the detailed descriptions within for a complete list of feature availability.

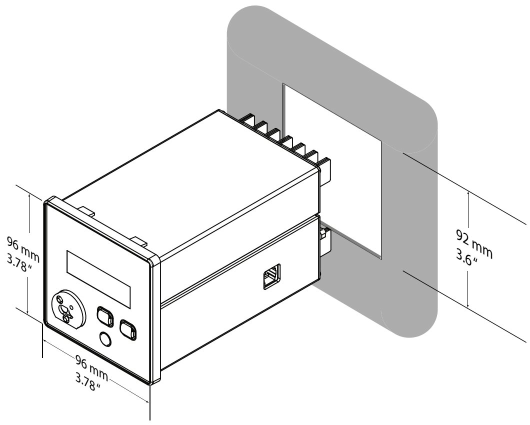
Applications

For infrastructure, industrials and buildings

- Energy efficiency and cost
  - Sub-bill tenants for energy costs
  - Allocate energy costs to departments or processes
  - Reduce peak demand surcharges
  - Reduce power factor penalties
- Power availability and reliability
  - Verify the reliable operation of equipment
  - Improve response to power quality-related problems
  - Leverage existing infrastructure capacity and avoid over-building
  - Support proactive maintenance to prolong asset life

For electric utilities

- Power availability and reliability
- Improve T&D network reliability
- Enhance substation automation
- Maximise the use of existing infrastructure
- Analyse and isolate the source of power quality problems



Installation

Standard PowerLogic ION7300 series meters with integrated display are designed to fit into DIN standard 92 X 92 mm (3.62 x 3.62 in.) cutout. Simply slide the mounting bars into the grooves on either side of the unit. The TRAN option provides a base unit without display that can be mounted either flush against any flat surface in whichever orientation is most convenient; attached to any standard DIN rail (requires optional DIN rail mount); or installed in a cutout (as the standard model). The remote modular display (RMD) can be mounted as the standard unit. A 1.8 m (6 ft.) cable is supplied.

4-wire Wye, Delta, 3-wire Wye, Direct Delta and single phase systems. 3 voltage and 3 current inputs. No PTs required on voltage inputs for Wye systems up to 347/600 V ac and Delta systems up to 600 V ac. All inputs pass ANSI/IEEE C37.90.1-1989 surge withstand and fast transient tests.

Input(s)	Specifications
Voltage inputs	
Inputs	U1, U2, U3, Uref
Rated inputs1	50 to 347 L-N (87 to 600 L-L) V ac rms (3-phase systems) 50 to 300 L-N (100 to 600 L-L) V ac rms (single-phase systems)
Overload	1500 V ac rms continuous
Input impedance	> 2 M Ω per phase (phase-vref)
Current inputs	
Inputs	I1, I2, I3
Rated inputs	10 A rms (+ 20% maximum, 300 V rms to ground)
Overload	20 A continuous
Dielectric withstand	500 A for one second (non-recurring)
Burden	0.0625 VA @ 10 Amps
Control power	
Operating range	Standard model: 95 to 240 V ac ±10% (47 - 440 Hz); DC: 120 to 310 V dc ±10% P24 option: 20 to 60 V dc ±10%
Current transformers	
Compatibility	5 A nominal, 10 A full-scale secondaries.
Primary CT rating	Equal to current rating of the power feed protection device.2
Secondary CT burden capacity	> 3 VA

1 Accuracy may be affected if the voltage on V1 falls below 50.
2 If the peak anticipated load is considerably less than the rated system capacity, you can improve accuracy and resolution by selecting a lower rated CT.

PowerLogic ION7350

Front panel

Easy to read backlit LCD with adjustable contrast. LCD supports local data display and basic setup. Remote display option to 1.8 m (6 ft) from base unit. Eight data display screens (kWh net, kWh swd / mx, Volts, Amps, Power, Frequency, V-THD, I-THD) can be customised through the communications port to show chosen parameters, and scrolled manually or automatically. The front panel can display up to nine digits of resolution for numeric values. Four display formats are available: 4 parameter, to single-parameter large character displays. Customer-designed parameter labels are programmable via PowerLogic ION Enterprise software.

Example meter display formats.

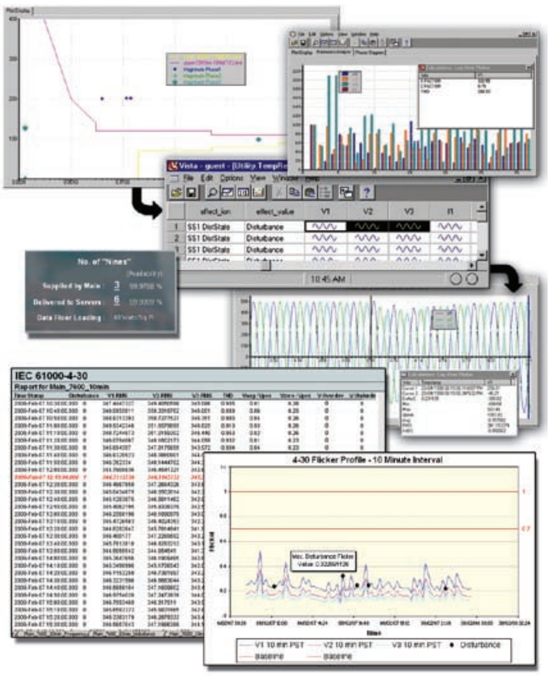
Power and energy measurements

Fully bi-directional, 4-quadrant, revenue-accurate or revenue-certified energy metering. They can replace discrete energy meters, demand meters and pulse initiators, and perform a wide range of other metering and instrumentation functions.

Supports thermal demand and sliding window (rolling block) demand. Factory-configured to calculate average current demand and kW, kvar and kVA demand. User-configureable time intervals for demand calculations and sensitivity settings.

Measurement specifications[1] (at 50.0 Hz and 60.0 Hz at 25° C / 77° F)	Accuracy 1 (%rdg + %fs[2])
Voltage	0.25% + 0.05%
Current	0.25% + 0.05%
Power, real (kW)	0.5% reading
Energy, real (kWh)	0.5% reading[3]
Power, apparent (kVA)	0.5% + 0.1%
Energy, apparent (kVAh)	1.0% reading
Power, reactive (kvar) > 5 % FS	1.5% reading
Energy, reactive (kvarh)	1.5% reading
Power factor (at unity PF)	1.5% reading
Frequency U1,U2,U3 (42-69 Hz): per phase, total	±0.01 Hz

Display resolution meets or exceeds accuracy.
1 50 V ac to 347 V ac + 25 %
2 % full scale voltage and current. Accuracy specifications comply with IEC 60687 Class 0.5 and ANSI 12.20 Class 0.5 at 25°C (77°F)
3 Register bounds 0 to ± 3.3x107 (kW) and 0 to ± 1038 (kWh)



Example from PowerLogic ION Enterprise software showing continuous, wide-area monitoring, data capture and reporting for power quality and reliability conditions.

Power quality

Use meter data to help uncover the sources of harmonics and voltage sags/swells. Analyse problems and avoid repeat interruptions.

- Harmonics (all models): individual harmonics, even, odd, total up to 15th (31st on ION7350). Total harmonic distortion: 1% Full Scale. I4 derivation. 1% reading + 0.2% unbalanced. K Factor: 5.0 % Full Scale.
- Sag/swells (ION7350 only): monitors applicable phase voltages for temporary undervoltages and overvoltages (i.e. CBEMA Type 2 and Type 3 disturbances). Voltage waveforms for sags and swells; report on each disturbance magnitude and duration.
- Sampling rate (all models): Up to 32 samples per cycle (64 on ION7350).
- Waveform (digital fault) recording (ION7350 only): Simultaneous event capture on all channels, up to 48 cycles each. Resolution: 64 samples per cycle; maximum number of cycles for contiguous waveform capture: 6,900 (16 samples/cycle x 48 cycles). depth of 3, the interval is triggered on demand.

.

Example log configurations

Waveform recording settings

Meter	Event	Data	Channel	Samples/ channel	Cycles	Record	Days
7330	500	A	-	-	-	-	29
	500	B	-	-	-	-	118
	500	C	-	-	-	-	96
	500	D	-	-	-	-	383
7350	500	A	6	32	12	3	28
	500	B	6	32	12	3	111
	500	C	6	16	48	3	26
	500	D	6	64	16	3	331

A 16 parameters recorded every 15 minutes
B 16 parameters recorded hourly
C 4 parameters recorded every 15 minutes
D 4 parameters recorded every hour

Data and event logging (ION7330, ION7350)

Ships with a comprehensive data-logging configuration. Data is prioritised and stored onboard in nonvolatile memory to eliminate data gaps in the event of outages or server downtime. Retrieved data is stored in an ODBC-compliant database when using ION Enterprise. Logs various power system data such as energy and demand, or the average power system quantity used over a period of time (Historic Mean Log). Standard memory capacity for both meters is 304 kilobytes. Default logging depth is set for 930 records.

- Historic log: record any combination of measurements at scheduled intervals by setpoints or logic conditions. Configure for up to 30 days of recording capacity at 15 minute intervals. Default depth of 930, interval of 900 seconds (15 minutes).
- Min/Max log: on any parameter, over any time interval (e.g. daily, monthly). Easily record other values coinciding with the new minimum or maximum. Defaults: min and max for all basic power parameters.
- Report Generator log (EgyDmd Log): Default depth and interval.
- Sag/Swell log (ION7350 only): Detect sags, swells on any voltage channel and record instantaneous values and waveforms. Depth of 100; interval triggered on demand.
- Event log: Depth of 50; nterval triggered on demand.

Time of use (TOU)

2-year internal calendar with up to 15 daily tariff profiles. Programmable triggers.Separate energy and demand accumulators.

Event priorities and alarming

Configurable event priorities allow you to define alarm conditions. Sequence-of-events time-stamped to ±10ms accuracy. Time-stamped record of all configuration changes, setpoint and min/max events.

Inputs and outputs

All meter models: four digital outputs, one infrared data port, one configurable LED output. Four digital status inputs standard on ION7330 and ION7350 meters. Optional analogue I/O ports can be used to monitor flow rates, RPM, fluid levels, oil pressures and transformer temperatures. Output real-time power to an RTU or perform equipment control operations.

Type	Input / output	Specifications
Solid state relays	4 Form A digital outputs: D1-D4[1]	Maximum voltage: 30 V dc; maximum current: 80 mA; isolation: optical; continuous or pulse signals
Digital Self-excited (internal 30 V dc supply)	4 inputs (option): S1 - S4	Self-excited (internal 30 VDC supply). Min pulse width: 25 ms. Max. transition rate: 40 transitions per second (20 Hz).
Analogue (option)[1]	4 inputs: AI 1 to AI 4	Accuracy ±0.3% of full-scale; update rate 1 Hz; max. common mode voltage 30 V. 0-20 mA (scalable to 4-20 mA) option: input impedance 25 Ω, maximum source impedance 500 Ω. 0-1 mA option: input impedance 475 Ω, maximum source impedance 10 kΩ.
	4 outputs: A1 to A4	Accuracy ±0.3% of full-scale; channel to channel isolation: none. Max. common mode voltage: 30 V. 0-20 mA (scalable to 4-20 mA) option: max. load drive capability 500 Ω. 0-1 mA option: max. load drive capability 10 kΩ.

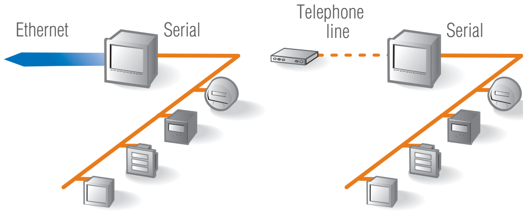
1 Analogue I/O is not available with RMD or Ethernet options.

EtherGate and ModemGate

The meters can provide gateway functionality depending on communication options.

EtherGate: provides access from an Ethernet network using Modbus TCP protocol to devices connected to the meter's serial ports.

ModemGate: provides access from the telephone network to devices connected to the meter's serial ports.



Internet connectivity

XML: to integrate with custom reporting, spreadsheet, database, and other applications.

WebMeter: an on-board web server, provides access to real-time values and PQ data through any web-enabled device and even supports basic meter configuration tasks.

MeterM@il: automatically emails user-configured, high-priority alarm notifications or scheduled system-status update messages to anyone, anywhere within the facility or around the world.

Communications

Multiple communication ports that operate simultaneously allow the meters to be used as part of a power and energy management system and to interface with other automation systems. Upload waveforms, alarms, billing data, and more to software for viewing and analysis.

Port	Specifications
RS-485 ports	ION7300 has a single RS-485 port. ION7330 and ION7350 meters can have two RS-485 ports. Supports DNP 3.0
Infrared data port	Front panel optical port. Compatible with an ANSI Type 2 magnetic optical communications coupler. Data rates up to 19,200 bps.
Ethernet port (optional)	Optional 10Base-T port for direct access to metering information via Ethernet LAN/WAN. EtherGate (data transfer between Ethernet and RS-485).[1]
PROFIBUS port (optional ION7300 only)	PROFIBUS DP standard protocol support via sub-D 9 pin female connector.
Internal modem (ION7330, ION7350)	Data rates from 300 bps to 33,600 bps. RJ-11 connector, ModemGate (data transfer between modem and RS-485).[2] Compatible with power monitoring software that supports Modbus RTU, ION or DNP 3.0. The ION7350 meter is offered with a call-back feature for quick alarm response.

1 The meter COM2 port functions as a dedicated EtherGate port (RS-485 Master) on ION7330 and ION7350 meters with the Ethernet option
2 The meter COM1 port functions as a dedicated ModemGate port (RS-485 Master) on ION7330 and ION7350 meters with the internal modem option

Software integration

PowerLogic ION7330 and ION7350 can communicate via multiple protocols to extend existing Modbus, DNP or ION Enterprise networks. Logs and real-time values are available via Modbus. Meters supported by UTS MV-90® via serial and Ethernet. Integrate within PowerLogic facility-level or enterprise-wide power and energy management systems. Real-time data and data logs stored onboard can be automatically retrieved on a scheduled basis for analysis at the system level. Compatible with PowerLogic ION Enterprise and PowerLogic ION Setup.

Special features

Flash-based firmware allows upgrades via communications without removing the meter from the site. Simply download the latest firmware from www.powerlogic.com.

General specifications

Description	Specifications
Accuracy	IEC 60687 class 0.5S; ANSI C12.16; ANSI class 10, (5 A nominal, 10 A max); OFGEM approved (UK)
Safety/construction	IEC 1010-1; CE marked; UL: Certified to UL 3111; CAN/CSA C22.2 No.1010-1
Electromagnetic compatibility	EN 55014-1:1993; EN 61000-4-4; EN 60687:1993 for immunity to electromagnetic HF fields; EN 60687:1993 for immunity to electrostatic discharges. Analog I/O: each analog I/O pin passes IEC 61000-4-4 (4 kVp-p @ 2.5 kHz for 1 min).
Surge withstand	All inputs pass ANSI/IEEE C37.90-1989 surge withstand and fast transient tests
Environmental conditions	Operation: -20° C to +60° C (-4° F to +140° F) ambient air; Storage: -30° C to +85° C (-22° F to +185° F) Humidity: 5 % to 95 % non-condensing; FCC: Part15, FCC Rules for Class A Digital Device (emissions)

Features and options	ION7300	ION7330	ION7350
Metering			
Power, energy and demand	■	■	■
Power quality			
Dip/swell monitoring			■
Harmonics: individual, even, odd, up to	15th	15th	31st
Sampling rate, maximum samples per cycle	32	32	64
Logging and recording			
Standard memory		300 kB	300 kB
Min/max logging for any parameter	■	■	■
Historical logs, maximum # of channels		32	96
Waveform logs, maximum # of cycles			48
Timestamp resolution in seconds		0.001	0.001
Communications and I/O			
RS-485 ports	1	2	2
Ethernet/infrared optical ports	1/ 1	1/ 1	1/ 1
Internal modem		1	1
PROFIBUS DP port	1		
DNP 3.0 through serial, modem, and i/r ports		■	■
Modbus RTU slave on serial, modem, and i/r ports	■	■	■
Modbus TCP through Ethernet port	■	■	■
EtherGate data transfer between Ethernet & RS-485		■	■
ModemGate data transfer between internal modem & RS-485		■	■
MeterM@il, logged data alarms via email[1]		■	■
WebMeter, onboard web server	■	■	■
Analog inputs/analog outputs	4/4	4/4	4/4
Digital status inputs/counter		4	4
Digital relay outputs	4	4	4
Setpoints, alarming, and control			
Setpoints, number/minimum response time		1 sec	1 sec
Math, logic, trig, log, linearisation formulas		■	■
Single & multi-condition alarms		■	■
Call-out on alarms			■
Other metering functions			
MV-90 on serial, Ethernet ports		■	■
Multi-year scheduling: hourly activity profiles		■	■

1 ION7330 and ION7350 models only

2007 FROST & SULLIVAN
North American Frost & Sullivan Award for Product Innovation

The 2007 award recognizes Schneider Electric for its technological advancements and wide product range in the field of power quality (PQ) and energy management solutions. In total, this is the fourth award that Schneider Electric and [recently acquired] Power Measurement have received from Frost & Sullivan in recognition of achievements in this arena.
Prithvi Raj, Frost & Sullivan research analyst

c UL us LISTED DIGITAL POWER METER 20SJ

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Please contact your local sales representative for ordering information.

Visit www.powerlogic.com for more information on other PowerLogic products, applications and system solutions.

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BRISBANE WATER

Halmac Services (Qld) Pty. Ltd.
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FAIRFIELD WATER RECLAMATION PLANT

PHASE FAILURE RELAY

1. PHASE FAILURE RELAY TECHNICAL DETAILS

250 Series DIN-rail and Wall Mounted Relays

Phase Balance

The 250 series phase balance protector module provides continuous surveillance of a three-phase, three- or four-wire system and monitors the correct phase rotation or sequence of three-phase supply systems. The module protects against phase loss, reversal or sequence, phase unbalance and system under-voltage.

Operation

Rotating machines are particularly vulnerable to incorrect phase sequence. Three-phase motors can rotate in the wrong direction, potentially leading to physical damage or the risk of injury to personnel, yet voltage and current readings may appear normal. If one phase is lost because of a blown fuse, electric motors can continue to operate (single-phasing) which can result in severe electrical or mechanical damage. This relay has the added advantage that it will detect the phantom or regenerated phase that can be caused by a single-phase failure on some equipment or when running motors at low load levels.

An unbalanced supply voltage can lead to temperature rises in motors. An unbalanced voltage as little as 10% can increase operating temperature to 150% of normal. For permanent installations, this relay should be used to monitor the incoming supply, protecting all equipment against incorrect connection at initial installation or after maintenance work. Rotating machines that cannot tolerate reverse rotation or pose significant risk to personnel under this condition should be individually protected with this relay. The possibility of incorrect supply connection is much more likely in portable equipment or marine applications.

The protector continuously monitors the three-phase supply. With the correct phase sequence applied and all three voltages balanced within the required limits, the front panel LED will illuminate and the output relay will be energised. An incorrect sequence, missing phase, out of balance or under-voltage condition will de-energise the relay and the LED will be extinguished.

The set point control allows adjustment of the voltage matching between 5% and 15%. The time delay function operates only for the voltage unbalance condition. The delay can be used to prevent nuisance tripping due to short term unbalance situations. Incorrect phase rotation, a missing phase or an under-voltage condition trip the relay immediately.

Product Codes

Relay	Protection	ANSI no.	Cat. no.
3-phase 3- or 4-wire	Phase loss and unbalance 5-15%	47	252-PSF
3-phase 3- or 4-wire	Phase loss, unbalance and under-voltage 5-15%	47/27	252-PSG

Please specify system voltage, frequency and required options at time of ordering.

Features

- Three-phase, three or four-wire
- Adjustable set point
- Adjustable time delay
- Internal differential
- LED trip indication
- Double-pole relay contacts
- Automatic reset

Benefits

- Monitoring of correct phase rotation
- Protects against phantom or regenerated phase voltage
- Protection against phase loss, reversal or sequence
- Under-voltage and unbalanced voltage monitoring
- Prevents reverse rotation of motor driven equipment
- Ensures correct engine rotation
- Protects portable electrical equipment
- Nuisance tripping avoidance

Applications

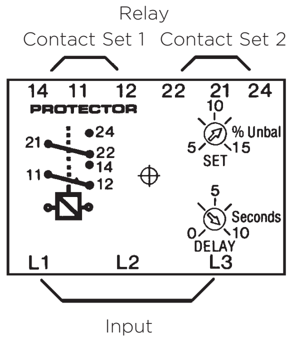
- Marine panels
- Switchgear
- Distribution systems
- Generator sets
- Control panels
- Process control
- Motor protection
- Transformers
- Overload protection

Specification – Phase Balance

Nominal voltage	110V, 120V, 208V, 220V, 230V, 240V, 277V, 380V, 400V, 415V, 440V or 480V
System frequency	50 or 60Hz
Voltage burden	3VA approx.
Overload	1.2 x rating continuously, 1.5 x rating for 10 x seconds
Set point repeatability	>0.5% of full span
Under-voltage set point	Pre-set at 15% of nominal voltage. Other values 10 to 30% to order (model 252-PSG only)
Trip level adjustment	Phase unbalance adjustable 5 to 15%
Time delay	10 seconds as standard. Up to 30 seconds available
Auxiliary voltage burden	4VA (max)
Output relay	2-pole change over
Relay contact rating	AC: 240V 5A, non inductive DC: 24V 5A resistive
Relay mechanical life	0.2 million operations at rated loads
Relay reset	Automatic
Operating temperature	0°C to +60°C (0°C to +40°C for UL models)
Storage temperature	–20°C to +70°C
Temperature co-efficient	0.05% per °C
Interference immunity	Electrical stress surge withstand and non-function to ANSI/IEEE C37 90a
Enclosure style	DIN-rail with wall mounting facility
Material	Flame retardant polycarbonate/ABS
Enclosure integrity	IP50
Model 252 dimensions	55mm (2.2") wide x 70mm (2.8") high x 112mm (4.4") deep
Weight	0.4Kg approx.

Connections

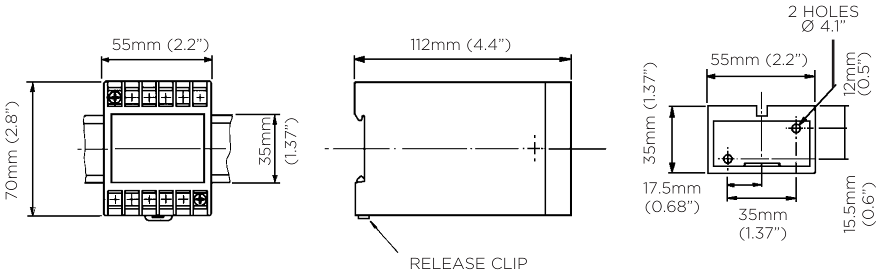
252-PSF
252-PSG



Note: Neutral connection not required.

Dimensions

Model 252



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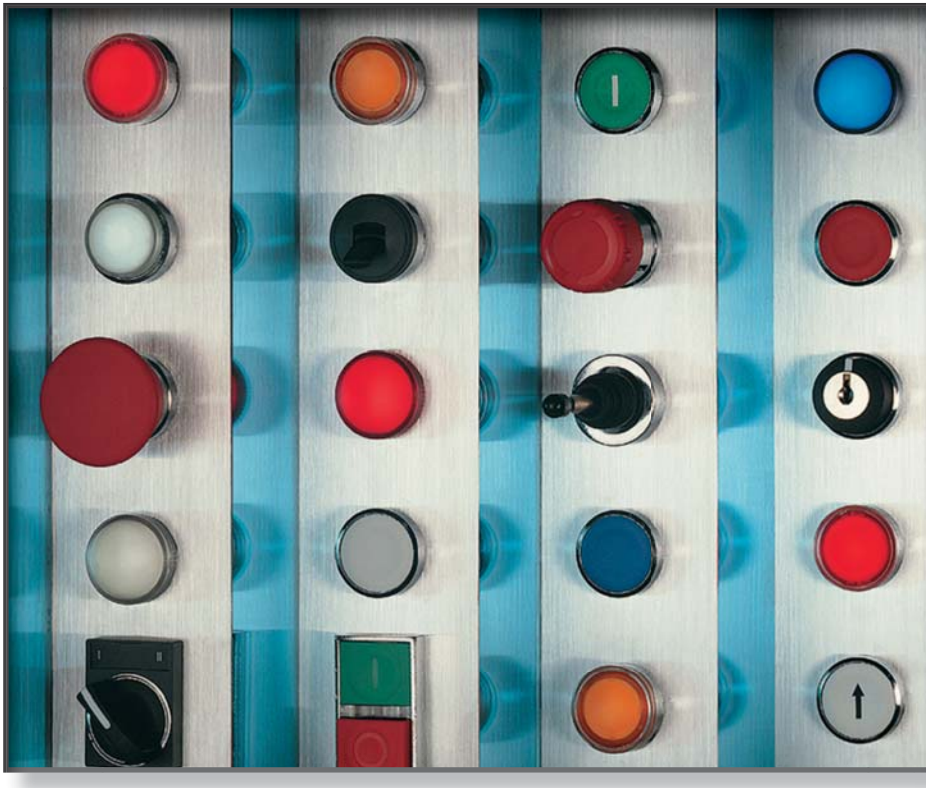
FAIRFIELD WATER RECLAMATION PLANT

PUSHBUTTON & INDICATORS

1. PUSHBUTTON & INDICATORS TECHNICAL DETAILS

The *easy* selection guide:

for Australia's top selling push button range



Schneider Electric

Australia's top selling push button range

Australia's top selling push buttons, pilot lights and selector switches gives a full array of quality interface solutions for all aspects of electrical control.

The Telemecanique Harmony range offers a wide variety of products used in domestic, commercial and industrial applications. The Harmony Range is the smart and easy choice for your control and signalling requirements.

The extensive range provides unrivalled performance through demonstrated reliability in all types of environments. Indoor or outdoor, corrosive or harsh, these products consistently provide efficient operation under any condition.

Gain from the benefits of using the Harmony range of products - easy and time-saving installation, reinforced protection and high performance.

Built to last

The extreme robustness of Harmony ranges ensures functional efficiency and reduced maintenance.

Compliant with strict international standards, the Harmony range of products are tested and guaranteed for safety, reliability and resistance to mechanical shock and vibration.

30% brighter

With LED high-intensity and true colours, Harmony push buttons, pilot lights and selector switches stand out with quality that is clearly visible.

Unequalled brightness and vivid displays enable the operator to know the exact status of a machine or installation.

Easy to select

This new selection guide makes choosing the right product simpler and easier.

Showcasing the wide range of options, features and applications of the Harmony range, it enables you to quickly select products with ease.

Telemecanique

Schneider Electric

Designed to help you make the right choice

With this guide, selecting the best solution is *easy*

This guide has been designed to help you make the right choice for push buttons, selector switches and pilot lights.

Once you have selected the style of product required, simply follow the two steps.

It's that easy.

METAL RANGES

PLASTIC RANGES

STEP 1

SELECT THE BODY:

- Pre-assembled body kits
- Custom body kits
- Optional / Additional accessories
  (contact blocks, boots)

STEP 2

SELECT THE HEAD:

- Push buttons
- Selector / Key Switches
- Pilot Lights

Metal Body with no illumination

STEP 1

Select a **Pre-assembled** body kit, then **additional accessories** if required

PRE-ASSEMBLED BODY KITS

Each kit includes:

- Metal collar
- Contact block

METAL COLLAR + CONTACT BLOCK

DESCRIPTION	TYPE OF CONTACT	REF.
METAL COLLAR + CONTACT BLOCK	1N/O	ZB4BZ101
	1N/C	ZB4BZ102
	2N/O	ZB4BZ103
	2N/C	ZB4BZ104
	1N/O + 1N/C	ZB4BZ105

You can add more contact blocks to Pre-assembled Body Kits

Need more functionality?

No problem: simply add more contact blocks to suit your requirement.

ADDITIONAL CONTACT BLOCKS (OPTIONAL)

DESCRIPTION	CONTACT RATING	TYPE OF CONTACT	REF.
SINGLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	1N/O	ZBE101
		1N/C	ZBE102
DOUBLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	2N/O	ZBE203
		2N/C	ZBE204
		1N/O + 1N/C	ZBE205
SPECIAL CONTACT BLOCK *(for low power switching)*	0.1A 24VDC	1N/O	ZBE1016
		1N/C	ZBE1026

Need extra PROTECTION?

ADDITIONAL PUSH BUTTON BOOTS (OPTIONAL)

DESCRIPTION	FOR USE WITH PUSH BUTTON TYPE *(WITH CIRCULAR HEAD)*	REF.
CLEAR SINGLE BOOTS	FLUSH	ZBPA
	PROJECTING	ZBP0
	FLUSH OR PROJECTING IN FOOD INDUSTRY APPLICATION	ZBP0A

Extend the life of your push buttons by protecting from excess grime, wear and tear that these devices will be subject to.

METAL

STEP 2

Now select either a **Push Button**, **Selector/Key Switch** or **Emergency Stop** Head

PUSH BUTTONS

- Spring Return
- Available in Marked and Unmarked

PUSH BUTTON SPRING RETURN - MARKED

TYPE	MARKING TEXT	REF.
FLUSH	I	ZB4BA331
	START	ZB4BA333
	ON	ZB4BA341
	O	ZB4BA432
	STOP	ZB4BA434
	OFF	ZB4BA435
	↑	ZB4BA334
	↑	ZB4BA335
PROJECTING	O	ZB4BL432
	STOP	ZB4BL434
	OFF	ZB4BL435
DOUBLE HEADED	I / O	ZB4BL9434

PUSH BUTTON SPRING RETURN - UNMARKED

COLOUR	FLUSH	PROJECTING	BOOTED (COLOURED)	RECESSED	MUSHROOM Ø40mm
White	ZB4BA1	ZB4BL1	ZB4BP1S	ZB4BA16	-
Black	ZB4BA2	ZB4BL2	ZB4BP2S	ZB4BA26	ZB4BC2
Green	ZB4BA3	ZB4BL3	ZB4BP3S	ZB4BA36	ZB4BC3
Red	ZB4BA4	ZB4BL4	ZB4BP4S	ZB4BA46	ZB4BC4
Yellow	ZB4BA5	ZB4BL5	ZB4BP5S	ZB4BA56	ZB4BC5
Blue	ZB4BA6	ZB4BL6	ZB4BP6S	ZB4BA66	ZB4BC6

OR

SELECTOR & KEY SWITCHES

- Selector Switches *(available in Standard and Long handle)*
- Key Switches

SELECTOR / KEY SWITCHES

NUMBER & TYPE OF POSITION	2 - STAY PUT	2 - SPRING RETURN FROM RIGHT TO LEFT	3 - STAY PUT	3 - SPRING RETURN TO CENTRE	3 - SPRING RETURN FROM LEFT TO CENTRE	3 - SPRING RETURN FROM RIGHT TO CENTRE
Selector Switch *STD HANDLE*	ZB4BD2	ZB4BD4	ZB4BD3	ZB4BD5	ZB4BD7	ZB4BD8
Selector Switch *LONG HANDLE*	ZB4BJ2	ZB4BJ4	ZB4BJ3	ZB4BJ5	ZB4BJ7	ZB4BJ8
Key Switch *(n°455)* key withdrawal position.	ZB4BG2 ZB4BG4	ZB4BG6	ZB4BG0 ZB4BG3 ZB4BG5 ZB4BG9	ZB4BG7	ZB4BG1	ZB4BG8 ZB4BG08

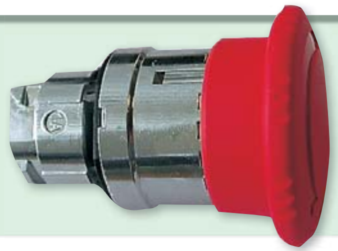
OR

EMERGENCY STOP PUSH BUTTON

- Available in RED ONLY

EMERGENCY STOP PUSH BUTTON

DIAMETER	TURN TO RELEASE	PUSH-PULL	KEY RELEASE
30mm	ZB4BS44	-	-
40mm	ZB4BS54	ZB4BT4	ZB4BS14
40mm (Trigger Action)	ZB4BS844	-	ZB4BS944
60mm	ZB4BS64	ZB4BX4	ZB4BS24



Metal Body with LED Illumination

STEP 1

Select a **Pre-assembled** Body Kit or **Customise** your own Body Kit

PRE-ASSEMBLED BODY KITS

Each kit includes:

- Metal collar
- LED light source
- Contact block

Need more functionality?

No problem: simply add more contact blocks to suit your requirement.

METAL COLLAR + LED LIGHT SOURCE + CONTACT BLOCK

DESCRIPTION	SUPPLY VOLTAGE	COLOUR	1N/O	1N/C	1N/O + 1N/C
METAL COLLAR + CONTACT BLOCK + LED LIGHT SOURCE	*24VAC/DC*	White	ZB4BW0B11	-	ZB4BW0B15
		Green	ZB4BW0B31	-	ZB4BW0B35
		Red	ZB4BW0B41	ZB4BW0B42	ZB4BW0B45
		Orange	ZB4BW0B51	-	ZB4BW0B55
		Blue	ZB4BW0B61	-	ZB4BW0B65
	48..120VAC	White	ZB4BW0G11	-	ZB4BW0G15
		Green	ZB4BW0G31	-	ZB4BW0G35
		Red	ZB4BW0G41	ZB4BW0G42	ZB4BW0G45
		Orange	ZB4BW0G51	-	ZB4BW0G55
		Blue	ZB4BW0G61	-	ZB4BW0G65
	230..240VAC	White	ZB4BW0M11	-	ZB4BW0M15
		Green	ZB4BW0M31	-	ZB4BW0M35
		Red	ZB4BW0M41	ZB4BW0M42	ZB4BW0M45
		Orange	ZB4BW0M51	-	ZB4BW0M55
		Blue	ZB4BW0M61	-	ZB4BW0M65

You can add more contact blocks to Pre-assembled Body Kits

OR

CUSTOM BODY KITS

Select the components you need to suit your specification:

- Greater flexibility

METAL COLLAR

FOR USE WITH	REF.
ELECTRICAL BLOCKS (Contact or Light)	ZB4BZ009

+

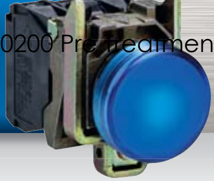
LED LIGHT SOURCES

SUPPLY	12V AC/DC	24V AC/DC	24-120V AC/DC	48-120V AC	230-240V AC
White	ZBVJ1	ZBVB1	ZBVBG1	ZBVG1	ZBVM1
Green	ZBVJ3	ZBVB3	ZBVBG3	ZBVG3	ZBVM3
Red	ZBVJ4	ZBVB4	ZBVBG4	ZBVG4	ZBVM4
Orange	ZBVJ5	ZBVB5	ZBVBG5	ZBVG5	ZBVM5
Blue	ZBVJ6	ZBVB6	ZBVBG6	ZBVG6	ZBVM6

+

CONTACT BLOCKS

DESC.	CONTACT RATING	TYPE OF CONTACT	REF.
SINGLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	1N/O	ZBE101
		1N/C	ZBE102
DOUBLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	2N/O	ZBE203
		2N/C	ZBE204
		1N/O + 1N/C	ZBE205
SPECIAL CONTACT BLOCK (for low power switching)	0.1A 24VDC	1N/O	ZBE1016
		1N/C	ZBE1026



METAL+LED

STEP 2

Now select either a **Push Button**, **Selector Switch** or **Pilot Light** Head

PUSH BUTTONS

Available in:

- Spring Return
- Latching

OR

SELECTOR SWITCHES

- Standard handle

OR

PILOT LIGHTS

PUSH BUTTON - SPRING RETURN

COLOUR	FLUSH	PROJECTING	MUSHROOM Ø40mm
White	ZB4BW313	ZB4BW113	ZB4BW413
Green	ZB4BW333	ZB4BW133	ZB4BW433
Red	ZB4BW343	ZB4BW143	ZB4BW443
Orange	ZB4BW353	ZB4BW153	ZB4BW453
Blue	ZB4BW363	ZB4BW163	ZB4BW463

PUSH BUTTON - LATCHING

FLUSH	PROJECTING	E-STOP Ø40 MUSHROOM PUSH-PULL
ZB4BH013	ZB4BH13	-
ZB4BH033	ZB4BH33	-
ZB4BH043	ZB4BH43	ZB4BW643
ZB4BH053	ZB4BH53	-
ZB4BH063	ZB4BH63	-

SELECTOR SWITCHES

NUMBER & TYPE OF POSITION	2 - STAY PUT	2 - SPRING RETURN FROM RIGHT TO LEFT	3 - STAY PUT	3 - SPRING RETURN TO CENTRE	3 - SPRING RETURN FROM LEFT TO CENTRE	3 - SPRING RETURN FROM RIGHT TO CENTRE
White	ZB4BK1213	ZB4BK1413	ZB4BK1313	ZB4BK1513	ZB4BK1713	ZB4BK1813
Green	ZB4BK1233	ZB4BK1433	ZB4BK1333	ZB4BK1533	ZB4BK1733	ZB4BK1833
Red	ZB4BK1243	ZB4BK1443	ZB4BK1343	ZB4BK1543	ZB4BK1743	ZB4BK1843
Orange	ZB4BK1253	ZB4BK1453	ZB4BK1353	ZB4BK1553	ZB4BK1753	ZB4BK1853
Blue	ZB4BK1263	ZB4BK1463	ZB4BK1363	ZB4BK1563	ZB4BK1763	ZB4BK1863

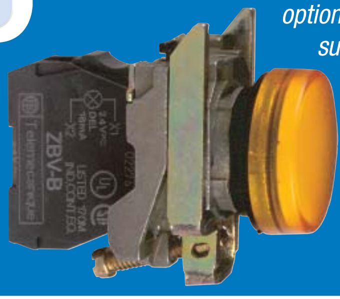
PILOT LIGHT - HEAD ONLY

COLOUR	REF.
White	ZB4BV013
Green	ZB4BV033
Red	ZB4BV043
Orange	ZB4BV053
Blue	ZB4BV063

OR A SINGLE STEP

for a complete pilot light selection...

*We've even got a range of fully-assembled pilot lights. Includes the **metal collar** + **LED light source** + **pilot light head**: just add an optional contact block to suit your requirement.*



CLEAR SINGLE BOOTS (OPTIONAL)

(For use with circular head push button)

TYPE OF HEAD	REF.
FLUSH	ZBPA
PROJECTING	ZBP0
FLUSH OR PROJECTING IN FOOD INDUSTRY APPLICATION	ZBP0A

FULLY ASSEMBLED PILOT LIGHT:
METAL COLLAR + LED LIGHT SOURCE + HEAD

LENS COLOUR	24V AC/DC	48..120V AC	230..240V AC
White	XB4BVB1	XB4BVG1	XB4BVM1
Green	XB4BVB3	XB4BVG3	XB4BVM3
Red	XB4BVB4	XB4BVG4	XB4BVM4
Yellow/Orange	XB4BVB5	XB4BVG5	XB4BVM5
Blue	XB4BVB6	XB4BVG6	XB4BVM6

Metal Body with BA9 Bulb Illuminati

STEP 1

Select a **Push Button** Body Kit
or **Pilot Light** Body Kit

PUSH BUTTON BODY KITS

- DC supply
- AC supply via Integral Transformer

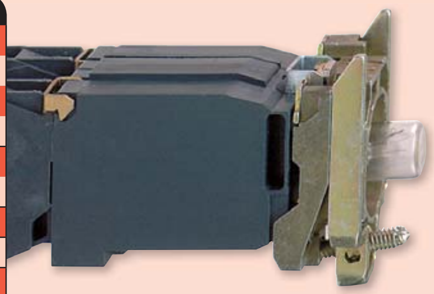
OR

PILOT LIGHT BODY KITS

- DC supply
- AC supply via Integral Transformer

PUSH BUTTON BODIES

LIGHT SOURCE	SUPPLY VOLTAGE	TYPE OF CONTACT	REF.
DC SUPPLY (Bulb **NOT** Included)	≤ 250V	1N/O	ZB4BW061
		1N/C	ZB4BW062
		2N/O	ZB4BW063
		1N/O + 1N/C	ZB4BW065
AC SUPPLY, VIA INTEGRAL TRANSFORMER 1.2VA, 6V SEC (Bulb Included)	~ 110..120V 50/60HZ	1N/O	ZB4BW031
		1N/O + 1N/C	ZB4BW035
	~ 230V 50Hz	1N/O	ZB4BW041
	~ 220..240V 60Hz	1N/O + 1N/C	ZB4BW045
	~ 400v 50Hz	1N/O	ZB4BW051
		1N/O + 1N/C	ZB4BW055



PILOT LIGHT BODIES

LIGHT SOURCE	SUPPLY VOLTAGE	REF.
DC SUPPLY (Bulb **NOT** Included)	≤ 250V	ZB4BV6
AC SUPPLY, VIA INTEGRAL TRANSFORMER 1.2VA, 6V SEC (Bulb Included)	~ 110..120V 50/60HZ	ZB4BV3
	~ 230..240 50/60Hz	ZB4BV4
	~ 400V 50Hz	ZB4BV5
	~ 440..480V 60Hz	ZB4BV8

You can add more contact blocks to Pre-assembled Body Kits

ADDITIONAL CONTACT BLOCKS

DESCRIPTION	CONTACT RATING	TYPE OF CONTACT	REF.
SINGLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	1N/O	ZBE101
		1N/C	ZBE102
DOUBLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	2N/O	ZBE203
		2N/C	ZBE204
		1N/O + 1N/C	ZBE205
SPECIAL CONTACT BLOCK (for low power switching)	0.1A 24VDC	1N/O	ZBE1016
		1N/C	ZBE1026

CLEAR SINGLE BOOTS (OPTIONAL)

(For use with circular head push button)

TYPE OF HEAD	REF.
FLUSH	ZBPA
PROJECTING	ZBP0
FLUSH OR PROJECTING IN FOOD INDUSTRY APPLICATION	ZBP0A

Need more functionality or protection accessories?
No problem: simply add contact block or boot to suits your requirement.

STEP 2

Now select either a Push Button or Pilot Light Head

PUSH BUTTONS

- Illuminated for BA9s Bulb

PUSH BUTTON - SPRING RETURN

COLOUR	FLUSH	PROJECTING
White	ZB4BW31	ZB4BW11
Green	ZB4BW33	ZB4BW13
Red	ZB4BW34	ZB4BW14
Orange	ZB4BW35	ZB4BW15
Blue	ZB4BW36	ZB4BW16

OR

PILOT LIGHTS

- Illuminated for BA9s Bulb

PILOT LIGHT

COLOUR	REF.
White	ZB4BV01
Green	ZB4BV03
Red	ZB4BV04
Orange	ZB4BV05
Blue	ZB4BV06

BA9 BULB

- Incandescent
- 2.4W max.

BA9 BULB SELECTION

SUPPLY VOLTAGE	REF.
6V AC/DC	DL1CB006
12V AC/DC	DL1CE012
24V AC/DC	DL1CE024
48V AC/DC	DL1CE048
130V AC/DC	DL1CE130

BA9 BULB

Required for DC supply body kits.

If you have selected the direct supply option for either the push button or pilot light body kits, select a BA9 incandescent bulb supply voltage that best suited for the job.

Plastic Body with no illumination

STEP 1

Select a **Pre-assembled** body kit, then **additional accessories** if required

PRE-ASSEMBLED BODY KITS

Each kit includes:

- Plastic collar
- Contact block

Need more functionality?

No problem: simply add more contact blocks to suit your requirement.

PLASTIC COLLAR + CONTACT BLOCK

DESCRIPTION	TYPE OF CONTACT	REF.
PLASTIC COLLAR + CONTACT BLOCK	1N/O	ZB5BZ101
	1N/C	ZB5BZ102
	2N/O	ZB5BZ103
	2N/C	ZB5BZ104
	1N/O + 1N/C	ZB5BZ105

You can add more contact blocks to Pre-assembled Body Kits

ADDITIONAL CONTACT BLOCKS (OPTIONAL)

DESCRIPTION	CONTACT RATING	TYPE OF CONTACT	REF.
SINGLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	1N/O	ZBE101
		1N/C	ZBE102
DOUBLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	2N/O	ZBE203
		2N/C	ZBE204
		1N/O + 1N/C	ZBE205
SPECIAL CONTACT BLOCK (for low power switching)	0.1A 24VDC	1N/O	ZBE1016
		1N/C	ZBE1026

CLEAR SINGLE BOOTS (OPTIONAL)

(For use with circular head push button)

TYPE OF HEAD	REF.
FLUSH	ZBPA
PROJECTING	ZBP0
FLUSH OR PROJECTING IN FOOD INDUSTRY APPLICATION	ZBP0A

OR A SINGLE STEP

for complete push button and selector switch selection...

COMPLETE PUSH BUTTON OR SELECTOR SWITCH

COLOUR	FLUSH PUSH BUTTON	SELECTOR SWITCH
Black	MXB5AA21	-
Green	MXB5AA31	-
Red	MXB5AA42	-
Blue	MXB5AA61	-
STAY PUT, 2-POS	-	MXB5AD21
STAY PUT, 3-POS	-	MXB5AD33

Flush push button:
Head (spring return, unmarked) + Plastic Collar + Contact Block

Selector Switch:
Head (2 position, stay put, standard handle) + Plastic Collar + Contact Block

PLASTIC

STEP 2

Now select either a Push Button, Selector/Key Switch or Emergency Stop Head

PUSH BUTTONS

- Spring Return
- Available in Marked and Unmarked

OR

SELECTOR, KEY & TOGGLE SWITCHES

- Selector Switches *(available in Standard and Long handle)*
- Key Switches
- Toggle Switches

OR

MUSHROOM HEAD PUSH BUTTON

- Available in RED ONLY
- Latching Head

PUSH BUTTON SPRING RETURN - MARKED

TYPE	MARKING TEXT	REF.
FLUSH	START	ZB5AA333
	STOP	ZB5AA434
	UP	ZB5AA343
	DOWN	ZB5AA344
	↑	ZB5AA334
	↑	ZB5AA335
DOUBLE HEADED	↑	ZB5AL9434
	O	

PUSH BUTTON SPRING RETURN - UNMARKED

COLOUR	FLUSH	PROJECTING	MUSHROOM Ø40mm	BOOTED (COLOURED)	DOUBLE HEADED
White	ZB5AA1	ZB5AL1	-	ZB5AP1S	-
Black	ZB5AA2	ZB5AL2	ZB5AC2	ZB5AP2S	-
Green	ZB5AA3	ZB5AL3	ZB5AC3	ZB5AP3S	ZB5AL9434
Red	ZB5AA4	ZB5AL4	ZB5AC4	ZB5AP4S	ZB5AL9434
Yellow	ZB5AA5	ZB5AL5	ZB5AC5	ZB5AP5S	-
Blue	ZB5AA6	ZB5AL6	ZB5AC6	ZB5AP6S	-

SELECTOR / KEY SWITCHES /TOGGLE SWITCHES

NUMBER & TYPE OF POSITION	2 - STAY PUT	2 - SPRING RETURN FROM RIGHT TO LEFT	3 - STAY PUT	3 - SPRING RETURN TO CENTRE	3 - SPRING RETURN FROM LEFT TO CENTRE	3 - SPRING RETURN FROM RIGHT TO CENTRE
Selector Switch *STD HANDLE*	ZB5AD2	ZB5AD4	ZB5AD3	ZB5AD5	ZB5AD7	ZB5AD8
Selector Switch *LONG HANDLE*	ZB5AJ2	ZB5AJ4	ZB5AJ3	ZB5AJ5	ZB5AJ7	ZB5AJ8
Key Switch *(n°455) key withdrawal position.*	ZB5AG2 ZB5AG4	ZB5AG6	ZB5AG0 ZB5AG3	ZB5AG7	ZB5AG1	ZB5AG8 ZB5AG08
Toggle Switch *BLK LEVER*	ZB5AD28	ZB5AD48	-	-	-	-

MUSHROOM HEAD FOR LATCHING PUSH BUTTON

DIAMETER	TURN TO RELEASE	PUSH-PULL	KEY RELEASE
30mm	ZB5AS44	-	-
40mm	ZB5AS54	ZB5AT4	ZB5AS14
40mm *(Trigger Action)*	ZB5AS844	-	ZB5AS944
60mm	ZB5AS64	ZB5AX4	ZB5AS24

Plastic Body with LED Illumination

STEP 1

Select a **Pre-assembled** Body Kit or **Customise** your own Body Kit

PRE-ASSEMBLED BODY KITS

Each kit includes:

- Plastic collar
- LED light source
- Contact block

Need more functionality?

No problem: simply add more contact blocks to suit your requirement.

PLASTIC COLLAR + LED LIGHT SOURCE + CONTACT BLOCK

DESCRIPTION	SUPPLY VOLTAGE	COLOUR	1N/O	1N/C
PLASTIC COLLAR + CONTACT BLOCK + LED LIGHT SOURCE	*24VAC/DC*	White	ZB5ZW0B11	-
		Green	ZB5AW0B31	-
		Red	-	ZB5AW0B42
		Orange	ZB5AW0B51	-
		Blue	ZB5AW0B61	-
	48..120VAC	White	ZB5AW0G11	-
		Green	ZB5AW0G31	
		Red	-	ZB5AW0G42
		Orange	ZB5AW0G51	-
		Blue	ZB5AW0G61	-
	230..240VAC	White	ZB5AW0M11	-
		Green	ZB5AW0M31	-
		Red	-	ZB5AW0M42
		Orange	ZB5AW0M51	-
		Blue	ZB5AW0M61	-

You can add more contact blocks to Pre-assembled Body Kits

OR

CUSTOM BODY KITS

Select the components you need to suit your specification:

- Greater flexibility

PLASTIC COLLAR

FOR USE WITH	REF.
ELECTRICAL BLOCKS *(Contact or Light)*	ZB5AZ009

+

LED LIGHT SOURCES

SUPPLY	12V AC/DC	24V AC/DC	24-120V AC/DC	48-120V AC	230-240V AC
White	ZBVJ1	ZBVB1	ZBVBG1	ZBVG1	ZBVM1
Green	ZBVJ3	ZBVB3	ZBVBG3	ZBVG3	ZBVM3
Red	ZBVJ4	ZBVB4	ZBVBG4	ZBVG4	ZBVM4
Orange	ZBVJ5	ZBVG5	ZBVBG5	ZBVG5	ZBVM5
Blue	ZBVJ6	ZBVB6	ZBVBG6	ZBVG6	ZBVM6

+

CONTACT BLOCKS

DESC.	CONTACT RATING	TYPE OF CONTACT	REF.
SINGLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	1N/O	ZBE101
		1N/C	ZBE102
DOUBLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	2N/O	ZBE203
		2N/C	ZBE204
		1N/O + 1N/C	ZBE205
SPECIAL CONTACT BLOCK (for low power switching)	0.1A 24VDC	1N/O	ZBE1016
		1N/C	ZBE1026

PLASTIC+LED

STEP 2

Now select either a Push Button, Selector Switch or Pilot Light Head

PUSH BUTTONS

Available in:

- Spring Return
- Latching

OR

SELECTOR SWITCHES

- Standard handle

OR

PILOT LIGHTS

PUSH BUTTON - SPRING RETURN

COLOUR	FLUSH	PROJECTING
White	ZB5AW313	ZB5AW113
Green	ZB5AW333	ZB5AW133
Red	ZB5AW343	ZB5AW143
Orange	ZB5AW353	ZB5AW153
Blue	ZB5AW363	ZB5AW163

PUSH BUTTON - LATCHING

FLUSH	PROJECTING	MUSHROOM Ø40mm (TURN TO RELEASE)
ZB5AH013	ZB5AH13	ZB5AW713
ZB5AH033	ZB5AH33	ZB5AW733
ZB5AH043	ZB5AH43	ZB5AW743
ZB5AH053	ZB5AH53	ZB5AW753
ZB5AH063	ZB5AH63	ZB5AW763

SELECTOR SWITCHES

NUMBER & TYPE OF POSITION	2 - STAY PUT	2 - SPRING RETURN FROM RIGHT TO LEFT	3 - STAY PUT	3 - SPRING RETURN TO CENTRE	3 - SPRING RETURN FROM LEFT TO CENTRE	3 - SPRING RETURN FROM RIGHT TO CENTRE
White	ZB5AK1213	ZB5AK1413	ZB5AK1313	ZB5AK1513	ZB5AK1713	ZB5AK1813
Green	ZB5AK1233	ZB5AK1433	ZB5AK1333	ZB5AK1533	ZB5AK1733	ZB5AK1833
Red	ZB5AK1243	ZB5AK1443	ZB5AK1343	ZB5AK1543	ZB5AK1743	ZB5AK1843
Orange	ZB5AK1253	ZB5AK1453	ZB5AK1353	ZB5AK1553	ZB5AK1753	ZB5AK1853
Blue	ZB5AK1263	ZB5AK1463	ZB5AK1363	ZB5AK1563	ZB5AK1763	ZB5AK1863

PILOT LIGHT - HEAD ONLY

COLOUR	REF.
White	ZB5AV013
Green	ZB5AV033
Red	ZB5AV043
Orange	ZB5AV053
Blue	ZB5AV063

CLEAR SINGLE BOOTS (OPTIONAL)

(For use with circular head push button)

TYPE OF HEAD	REF.
FLUSH	ZBPA
PROJECTING	ZBP0
FLUSH OR PROJECTING IN FOOD INDUSTRY APPLICATION	ZBP0A

FULLY ASSEMBLED PILOT LIGHT: PLASTIC COLLAR + LED LIGHT SOURCE + HEAD

LENS COLOUR	24V AC/DC	48..120V AC	230..240V AC
White	XB5AVB1	XB5AVG1	XB5AVM1
Green	XB5AVB3	XB5AVG3	XB5AVM3
Red	XB5AVB4	XB5AVG4	XB5AVM4
Yellow/Orange	XB5AVB5	XB5AVG5	XB5AVM5
Blue	XB5AVB6	XB5AVG6	XB5AVM6

OR A SINGLE STEP

for a complete pilot light selection...

We've even got a range of fully-assembled pilot lights. Includes the ***plastic collar*** *+* ***LED light source*** *+* ***pilot light head****: just add an optional contact block to suit your requirement.*

Plastic Body with BA9 Bulb Illuminat

STEP 1

Select a **Push Button** Body Kit or **Pilot Light** Body Kit

PUSH BUTTON BODY KITS

- DC supply
- AC supply via Integral Transformer

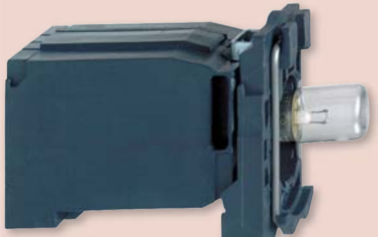
OR

PILOT LIGHT BODY KITS

- DC supply
- AC supply via Integral Transformer

PUSH BUTTON BODIES

LIGHT SOURCE	SUPPLY VOLTAGE	TYPE OF CONTACT	REF.
DC SUPPLY (BULB **NOT** INCLUDED)	≤ 250V	1N/O	ZB5AW061
		1N/C	ZB5AW062
		2N/O	ZB5AW063
		1N/O + 1N/C	ZB5AW065
AC SUPPLY, VIA INTEGRAL TRANSFORMER 1.2VA, 6V SEC (BULB INCLUDED)	~ 110..120V 50/60HZ	1N/O	ZB5AW031
		1N/O + 1N/C	ZB5AW035
	~ 230V 50Hz	1N/O	ZB5AW041
	~ 220..240V 60Hz	1N/O + 1N/C	ZB5AW045
	~ 400v 50Hz	1N/O	ZB5AW051
		1N/O + 1N/C	ZB5AW055



PILOT LIGHT BODIES

LIGHT SOURCE	SUPPLY VOLTAGE	REF.
DC SUPPLY (BULB **NOT** INCLUDED)	≤ 250V	ZB5AV6
AC SUPPLY, VIA INTEGRAL TRANSFORMER 1.2VA, 6V SEC (BULB INCLUDED)	~ 110..120V 50/60HZ	ZB5AV3
	~ 230..240 50/60Hz	ZB5AV4
	~ 400V 50Hz	ZB5AV5
	~ 440..480V 60Hz	ZB5AV8

You can add more contact blocks to Pre-assembled Body Kits

ADDITIONAL CONTACT BLOCKS

DESCRIPTION	CONTACT RATING	TYPE OF CONTACT	REF.
SINGLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	1N/O	ZBE101
		1N/C	ZBE102
DOUBLE CONTACT BLOCK	3A 250VAC, 0.55A 125VDC	2N/O	ZBE203
		2N/C	ZBE204
		1N/O + 1N/C	ZBE205
SPECIAL CONTACT BLOCK (for low power switching)	0.1A 24VDC	1N/O	ZBE1016
		1N/C	ZBE1026

CLEAR SINGLE BOOTS (OPTIONAL)

(For use with circular head push button)

TYPE OF HEAD	REF.
FLUSH	ZBPA
PROJECTING	ZBP0
FLUSH OR PROJECTING IN FOOD INDUSTRY APPLICATION	ZBP0A

Need more functionality or protection accessories?

No problem: simply add contact block or boots to suits your requirement.

STEP 2

Now select either a Push Button, or Pilot Light Head

PUSH BUTTONS

- Spring Return

PUSH BUTTON - SPRING RETURN

COLOUR	FLUSH	PROJECTING
White	ZB5AW31	ZB5AW11
Green	ZB5AW33	ZB5AW13
Red	ZB5AW34	ZB5AW14
Orange	ZB5AW35	ZB5AW15
Blue	ZB5AW36	ZB5AW16

OR

PILOT LIGHTS

- Illuminated for BA9s Bulb

PILOT LIGHT

COLOUR	REF.
White	ZB5AV01
Green	ZB5AV03
Red	ZB5AV04
Orange	ZB5AV05
Blue	ZB5AV06

BA9 BULB

- Incandescent
- 2.4W max.

BA9 BULB SELECTION

SUPPLY VOLTAGE	REF.
6V AC/DC	DL1CB006
12V AC/DC	DL1CE012
24V AC/DC	DL1CE024
48V AC/DC	DL1CE048
130V AC/DC	DL1CE130

BA9 BULB

Required for DC supply body kits.

If you have selected the direct supply option for either the push button or pilot light body kits, select a BA9 incandescent bulb supply voltage that best suited for the job.

Customer Service
Tel: 1300 369 233
Fax: 1300 369 288
Email: help@au.schneider-electric.com

www.schneider-electric.com.au

Schneider Electric (Australia) Pty Limited

Head Office

Postal Address:
Locked Bag 5500
Baulkham Hills
Business Centre
NSW 2153 Australia

MKTED2080319AU

Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

FAIRFIELD WATER RECLAMATION PLANT

SELECTOR SWITCH

1. SELECTOR SWITCH TECHNICAL DETAILS

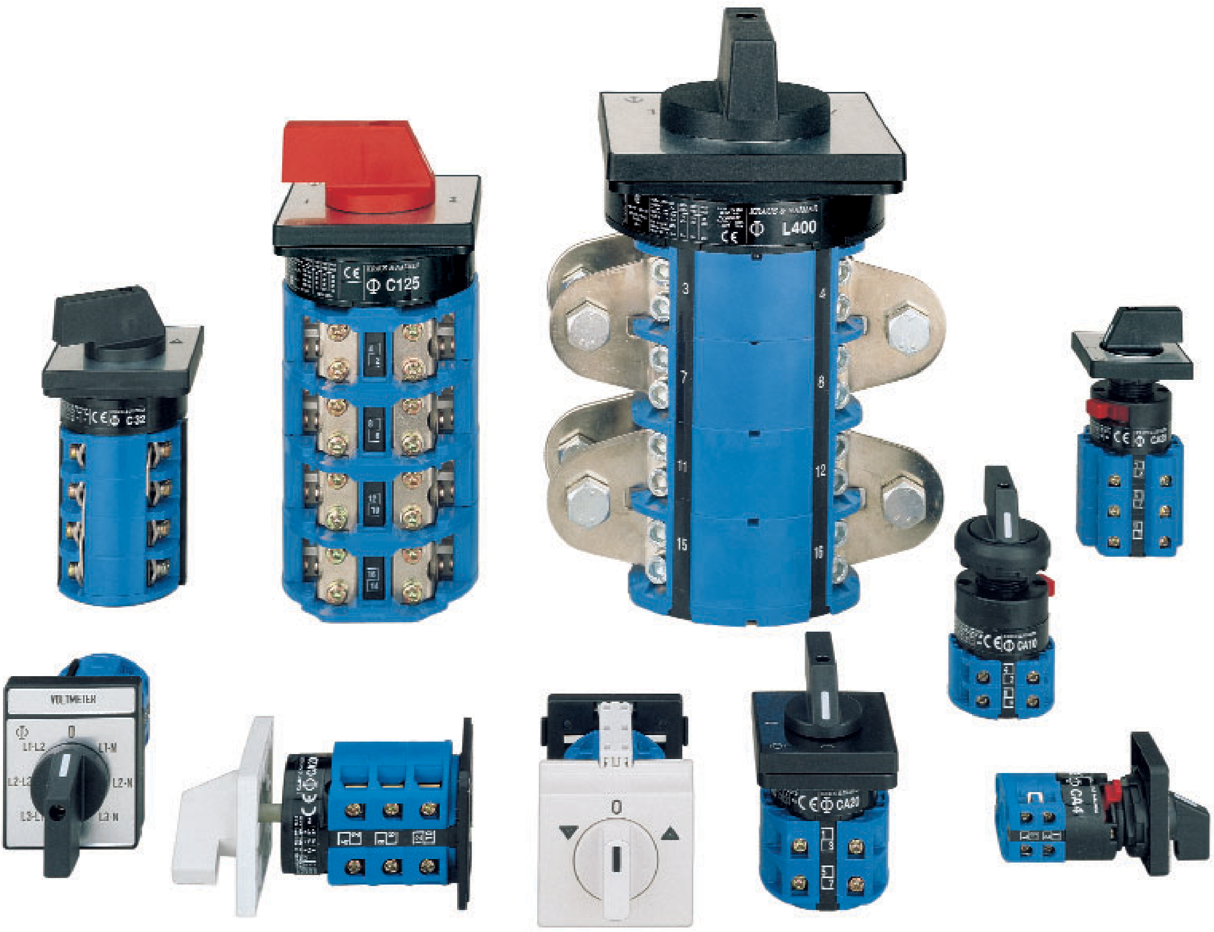
KRAUS & NAIMER
BLUE LINE SWITCHGEAR

www.krausnaimer.com

SINCE 1907

Catalog 100

CL Switches 10 A-20 A
C, CA, CAD Switches 10 A-315 A
L Switches 350 A-2400 A



KRAUS & NAIMER

The development of the Blue Line rotary switch, contactor and motor starter product ranges is based on more than seventy-five years experience by Kraus & Naimer in the design and manufacture of electrical switchgear. Kraus & Naimer pioneered the introduction of the cam operated rotary switch and continues to be recognized as the world leader in that product field.

BLUE LINE

Blue Line products are protected by numerous patents throughout the industrial world. They are built to national and international standards and designed to withstand adverse temperatures and climates.

Blue Line products are accepted and universally recognized for their quality and workmanship. They are supported by a worldwide sales and service organization.

The Kraus & Naimer Registered Trademark

WORLDWIDE SYMBOL FOR QUALITY SWITCHGEAR

Disconnectors and Main Switches acc. to IEC 60947-3 see Catalog 500

Contents

Page

Construction Data

The load switches of the C, CA, CAD and CL-series offer a solution for most cam switch applications. Different contact designs, contact materials and terminals allow for their use as control switches, instrumentation switches and motor control switches, as well as in electronic circuitry and in aggressive environments according to IEC 60947-3 and VDE 0660 part 107.

The stage is the basis for all switches and can be supplied with a maximum of 2 contacts. The terminals are accessible from the side. CA and CAD switches are supplied with open terminals to facilitate wiring and are protected against accidental finger contact according to EN 50274, VDE 0660 part 514 and BGV A2. Captive plus-minus terminal screws and integrated screwdriver guides also reduce wiring.

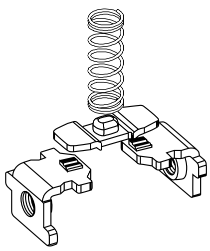
The switches of the new CL-series are supplied with IDC terminals (**I**nsulation **D**isplacement **C**onnection) instead of the conventional screw type terminals. The stripping or preparation of the insulation is no longer required. Eliminate errors due to i.e., stripped end of the conductor too long or too short, incorrect sleeves used, sleeves crimped incorrectly or wrong crimping tool is used, terminal screws not tightened properly etc. The CL switches reduce installation time by 60 %-70 % compared to the screw type terminals. This translates to significant cost savings. For connecting 2 conductors to a terminal an additional screw terminal with plus-minus screw is available.

If a positive manual operation or a higher DC rating is required, many of these switches can be fitted with a snap action latching mechanism - suffix „S“ - to the switch type.

The cam-operated switches L350-L2000 are continuous current rated for off-load switching. They may be used to switch resistive or low inductive loads.

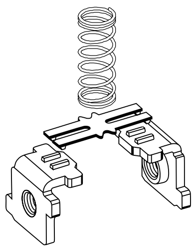
Special Contact Systems

CA4/CA4-1



High contact reliability by multiple cross-point contacts, electronic compatible, CA4 with 1 μ and CA4-1 with 35 μ gold plating.

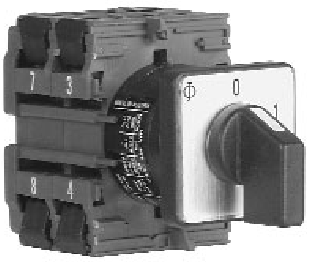
CAD11/CAD12



H-bridge with „cross-wire“ contact system, high contact reliability also at lower voltages. CAD11 with gold-plated contacts, CAD12 with silver contact.

Type	Size	Possible Switching Angles	Max. No. of Stages
CA4, CA4-1	S00	30°, 45°, 60°, 90°	9
CL4	S00	30°, 45°, 60°, 90°	8
CA10-CA25	S0	30°, 45°, 60°, 90°	12
CA10S-CA25S	S0	60°	on request
CAD11, CAD12	S0	30°, 45°, 60°, 90°	12
CL10	S0	30°, 45°, 60°, 90°	10
CA10B-CA25B	S1	30°, 45°, 60°, 90°	12
C26, C32, C42	S1	20°, 30°, 45°, 60°, 90°	12
C26S, C32S, C42S	S1	60°	on request
C43, C80, C125	S2	20°, 30°, 45°, 60°, 90°	12
C315	S3	20°, 30°, 45°, 60°, 90°	12
L350/51, L630/31, L1000/01, L1250/51	S2	30°, 45°, 60°, 90°	12
L400, L600, L800, L1200, L1600, L2000	S3	30°, 45°, 60°, 90°	12

CL Switches



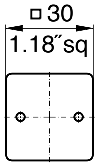
CA and CAD Switches

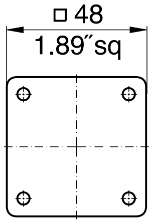
C Switches

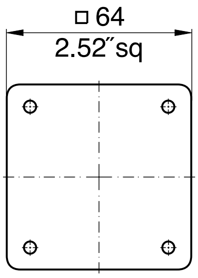
L Switches

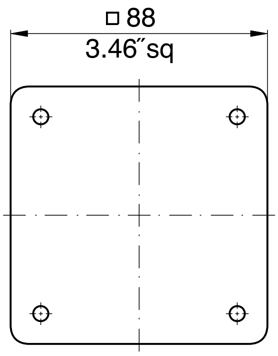
Above illustrates the standard terminal positions.

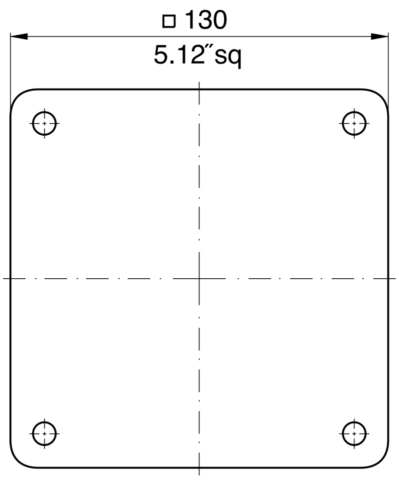
Nominal Ratings

S00


S0


S1


S2


S3


Switch Size	Type	According to IEC 60947-3/VDE 0660 part 107 Insulation Voltage[1] U_i V	Thermal Current I_u/I_{th} A	Motor Rating 3 x 380 V-440 V AC-23 kW	AC-3 kW
S00	**CA4**	440	10	3	2,2
	CA4-1	440	10	3	2,2
	CL4	440	10	3	2,2
S0	**CA10**	690	20	7,5	5,5
	CA11	690	20	7,5	5,5
	CA20	690	25	11	7,5
	CA25	690	32	15	11
	CAD11	600	6	-	-
	CAD12	600	6	-	-
	CL10	690	20	7,5	5,5
S1	**CA10B**	690	20	7,5	5,5
	CA11B	690	20	7,5	5,5
	CA20B	690	25	11	7,5
	CA25B	690	32	15	11
	C26	690	32	15	11
	C32	690	50	22	15
	C42	690	63	30	18,5
S2	**C43**	690	63	30	18,5
	C80	690	115	45	30
	C125	690	150	75	37
	L350	690	350	90	37
	L351	690	350	90	37
	L630	690	630[2]	90	37
	L631	690	630[2]	90	37
	L1000	690	1000[2]	90	37
	L1001	690	1000[2]	90	37
	L1250	690	1250[2]	90	37
	L1251	690	1250[2]	90	37
S3	**C315**	690	315	132	55
	C316[3]	1000	315	132	55
	L400	690	500	132	55
	L600	690	800[2]	132	55
	L800	690	1100[2]	132	55
	L1200	690	1450[2]	132	55
	L1600	690	1900[2]	132	55
	L2000	690	2400[2]	132	55

For further technical details, refer to pages 40-43.
To furnish with gold contacts and quick connects see page 4.

[1]Valid for lines with grounded common neutral termination, overvoltage category III, pollution degree 3. Values for other supply systems on request. [2]Ambient temperature 35 °C max. [3]Additional switch functions on request.

How to order

Disconnectors and Main Switches according to IEC 60947-3 see Catalog 500

Three types of data (shown below) are required for ordering Blue Line cam-operated switches. Code numbers for ordering are shown in this catalog.

1. Type of Switch

The type of switch required may be easily selected by referring to the table on page 3 which shows the thermal current, power rating and dimensions of each switch. For further technical details, refer to pages 40-43. Variations of contacts and terminals are shown below.

2. Switch Function

The code numbers for standard switches shown on pages 6-28 indicate the switch function, escutcheon plate, handle and any optional extras.

Additional coding to modify type and color of handle and escutcheon plate is explained below.

3. Type of Mounting

Types of mounting are shown on pages 29-35. Catalog **101** describes enclosures and optional extras.

Specify the mounting code to indicate required mounting.

CA10	A202-600	VE

Type of Switch

Extending the switch type coding the following combinations will define:

Amendment	Definition	For switch types
-1	with gold contacts[1]	CA10, CA11, CA10B, CA11B
-4	with quick connects	CA4
B	S0 switches with latching mechanism size S1	CA10, CA11, CA20, CA25, CAD12
C	S1 switches with latching mechanism size S2	C26, C32
L	with lockout-relay w/o manual release for std. sw.	CA10, C26, C32, C42
M	with lockout-relay with manual release for std. sw.	C26, C32, C42
X	with power failure release	CA10, CA11, CA20, CA25, CAD12, C26, C32, C42
Y	with power failure release and trip-free release	CA10, CA11, CA20
S	with snap action	CA10, CA11, CA20, CA25, C26, C32, C42 with 60° switching
R	with spring return latching mechanism	CA10

Example: Coding for switch type **CA10** with gold contacts is **CA10-1**.

Modification of Switches

The part number for switch function and options may be modified in cases where items are required other than standard. The modification may involve the escutcheon plate inscription, color combination of escutcheon plate and handle, type of escutcheon plate and handle or the optional extra.

Switch Size	Escutcheon Plate Frame	Handle	Escutcheon Plate Backing	Escutcheon Plate Lettering	Dash Number
S0, S1, S2, S3	electro-gray	electro-gray	brushed alu	black	-100
S0, S1, S2, S3	electro-gray	electro-gray	black	mat silver	-500
S00, S0, S1, S2, S3	black	black	brushed alu	black	-600
S00, S0, S1, S2, S3	black	black	black	mat silver	-700

[1]Technical data on request.

How to order

Modification of Switches

Color combinations of escutcheon plate and handle

The standard switch consists of a transparent escutcheon plate with brushed aluminum backing and black inscription. The escutcheon plate frame is black as well as the handle. Page 4 shows further color combinations of escutcheon plate and handle which are available. The appropriate dash number must be substituted in the switch function coding to specify other color combinations as required.

Example: The complete coding for switch type CA10 with a 3 pole ON/OFF switch function, electro-gray handle and electro-gray escutcheon plate frame with brushed aluminum backing and black inscription which reads 0-1 is as follows: **CA10 A202-100 E**.

The following is a list of special programs for escutcheon plate and handle combinations. They may be obtained by specifying any one of the following two (2) digit dash numbers as a part of the overall dash number. It is still necessary to prefix these two digit numbers with the first digit which represents the color combination desired.

Special programs for escutcheon plate and handle combinations

-000 = without escutcheon plate, without handle
- .01 = without escutcheon plate
- .02 = without handle
- .03 = with square escutcheon plate without lettering
- .04 = with rectangular escutcheon plate without lettering
- .05 = with square escutcheon plate without lettering and without handle
- .06 = with rectangular escutcheon plate without lettering and without handle
- .07 = standard escutcheon plate, without lettering on rectangular section
- .08 = with F-handle
- .09 = with P-handle
- .10 = escutcheon plate with frame and fixation ring only (if using switches with single hole mounting: **- .16**)
- .11 = without escutcheon plate, but with handle bearing plate
- .12 = with yellow escutcheon plate backing and red handle
- .14 = with B-handle
- .16 = escutcheon plate with frame and fixation ring only, if using switches with single hole mounting
- .17 = standard escutcheon plate and rectangular add-on escutcheon plate, if using switches with single hole mounting FT2

Example: The complete coding for switch type CA10 with a 3 pole ON/OFF switch function with electro-gray escutcheon plate frame, square escutcheon plate without lettering, brushed aluminum plate backing and electro-gray handle reads as follows: **CA10 A202-103 E**.

Handles, Escutcheon Plates and Optional Extras

The handles for standard switches shown on pages 6-28 are suitable for mounting units with four hole mounting. Alternative types of handles available are illustrated on pages 29-35.
When a handle, escutcheon plate or optional extra is required but not covered by the dash number, the code number for the selected component should be entered separately. A comprehensive range of available standard escutcheon plates is illustrated on pages 36 and 37. Non-standard or special escutcheon plate engravings are available at extra cost.
The large number of optional extras and enclosures is covered in Catalog **101**.

Switch Size

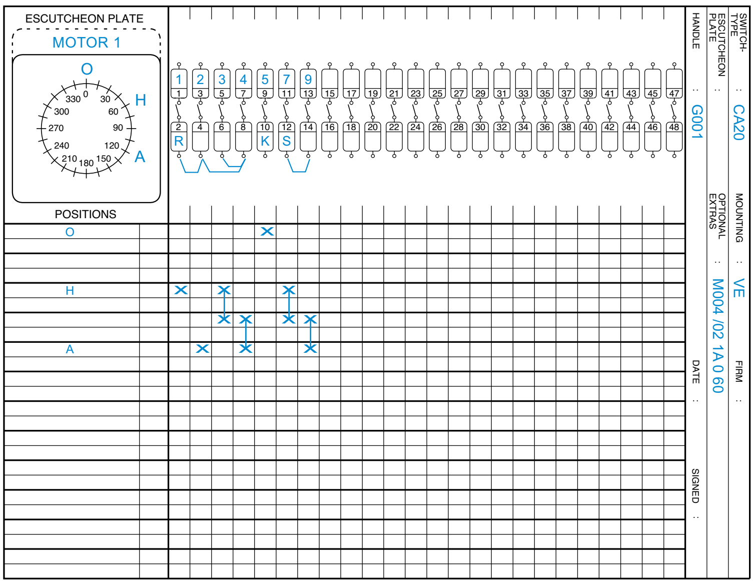
Blue Line switches are available in sizes S00, S0, S1, S2 and S3. These size codes indicate the dimensions of the mounting, the escutcheon plate and the handle, as well as the size of optional devices and enclosures.
Page 3 lists these sizes and the various switch types they include.

Ordering of Special Switches and Escutcheon Plates

When ordering special switches and escutcheon plates it is advisable to use our order form, as illustrated. The customer's requirements are shown in blue as an example.

For technical reasons, it may not be possible to follow the sequence of contacts requested by the customer. The final contact development which is sent with every switch will show the customer's original terminal markings.

Order forms are available on request.

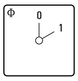
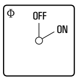
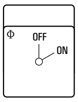
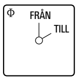
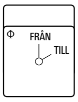
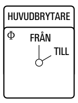
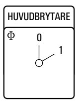


Switch Function and Configuration

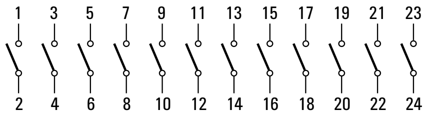
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- CA25B	C26- C315	Code	Stages	Connection Diagram

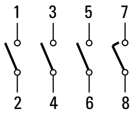
ON/OFF Switches with 60° Switching

Function	Escutch. Plate	CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- CA25B	C26- C315	Code	Stages
1 pole						A200-600	1
2 pole						A201-600	1
3 pole						A202-600	2
3 pole with red handle						A202-626	2
3 pole with V850 padlock attachment						A202-627	2
4 pole						A203-600	2
4 pole 1 pole preclose 6°[1]						A653-600	2
5 pole						A341-600	3
6 pole						A342-600	3
7 pole						A343-600	4
8 pole						A344-600	4
8 pole 2 pole preclose 6°[1]						A654-600	4
9 pole						A345-600	5
10 pole						A346-600	5
11 pole						A347-600	6
12 pole						A348-600	6
1 pole						A200-620	1
2 pole						A201-620	1
3 pole						A202-620	2
4 pole						A203-620	2
4 pole 1 pole preclose 6°[1]						A653-620	2
5 pole						A341-620	3
6 pole						A342-620	3
7 pole						A343-620	4
8 pole						A344-620	4
8 pole 2 pole preclose 6°[1]						A654-620	4
9 pole						A345-620	5
10 pole						A346-620	5
11 pole						A347-620	6
12 pole						A348-620	6
1 pole						A200-621	1
2 pole						A201-621	1
3 pole						A202-621	2
4 pole						A203-621	2
4 pole 1 pole preclose 6°[1]						A653-621	2
5 pole						A341-621	3
6 pole						A342-621	3
1 pole						A200-622	1
2 pole						A201-622	1
3 pole						A202-622	2
4 pole						A203-622	2
4 pole 1 pole preclose 6°[1]						A653-622	2
5 pole						A341-622	3
6 pole						A342-622	3
1 pole						A200-623	1
2 pole						A201-623	1
3 pole						A202-623	2
4 pole						A203-623	2
4 pole 1 pole preclose 6°[1]						A653-623	2
5 pole						A341-623	3
6 pole						A342-623	3
1 pole						A200-624	1
2 pole						A201-624	1
3 pole						A202-624	2
4 pole						A203-624	2
4 pole 1 pole preclose 6°[1]						A653-624	2
5 pole						A341-624	3
6 pole						A342-624	3
1 pole						A200-625	1
2 pole						A201-625	1
3 pole						A202-625	2
4 pole						A203-625	2
4 pole 1 pole preclose 6°[1]						A653-625	2
5 pole						A341-625	3
6 pole						A342-625	3

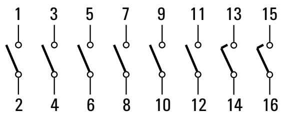
Connection Diagram:



1-12 pole



4 pole 1 pole preclose 6°



8 pole 2 pole preclose 6°

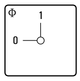
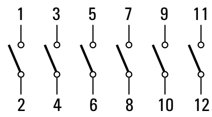
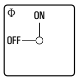
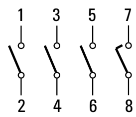
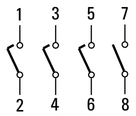
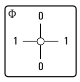
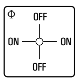
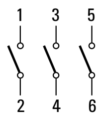
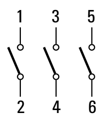
[1] for use in a three phase four-wire system with switched neutral

Switch Function and Configuration

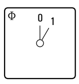
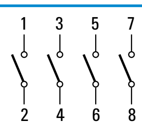
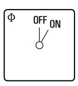
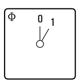
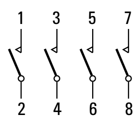
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	Type/Handle CAD.. CA10- CA25 CL10	Type/Handle CA10B- CA25B	Type/Handle C26- C315	Code	Stages	Connection Diagram

ON/OFF Switches with 90° Switching

1 pole contacts 2 pole preclose 30° 3 pole 4 pole 4 pole 1 pole preclose 60° 4 pole 3 pole preclose 30° 5 pole contacts 6 pole preclose 30°						A290-600 A291-600 A292-600 A324-600 A293-600 A327-600 A325-600 A326-600	1 1 2 2 2 2 3 3	 1, 2, 3, 4, 5 and 6 pole
1 pole contacts 2 pole preclose 30° 3 pole 4 pole 4 pole 1 pole preclose 60° 4 pole 3 pole preclose 30° 5 pole contacts 6 pole preclose 30°						A290-620 A291-620 A292-620 A324-620 A293-620 A327-620 A325-620 A326-620	1 1 2 2 2 2 3 3	 4 pole 1 pole preclose 60°  4 pole 3 pole preclose 30°
3 pole 360° rotation	 					A208-600 A208-620	2 2	
3 pole for foot operation					 C26- C42	A386-600	2	

ON/OFF Switches with 30° Switching

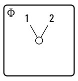
1 pole 2 pole 3 pole 4 pole						A100-600 A101-600 A102-600 A103-600	1 1 2 2	 1-4 pole
1 pole with spring return 2 pole with spring return 3 pole with spring return 4 pole with spring return 1 pole with spring return 2 pole with spring return 3 pole with spring return 4 pole with spring return	 		 [1] [1]			A204-600 A205-600 A206-600 A207-600 A204-620 A205-620 A206-620 A207-620	1 1 2 2 1 1 2 2	 1-4 pole

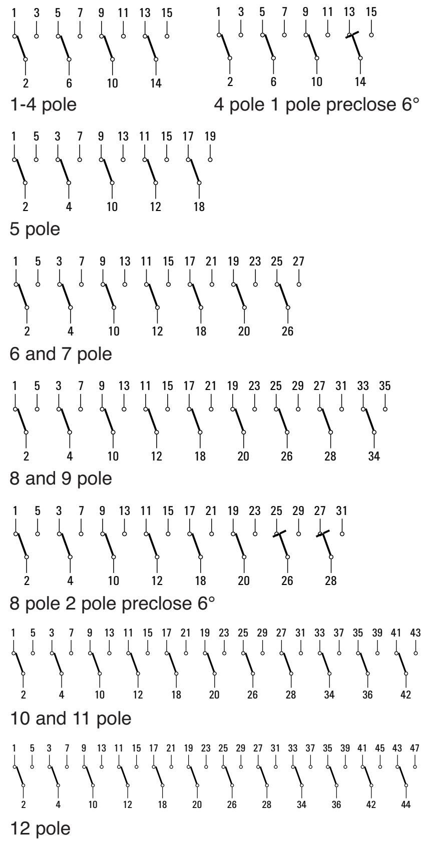
[1] not available for switch type CA25

Switch Function and Configuration

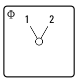
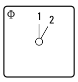
C, CA, CAD, CL Switches

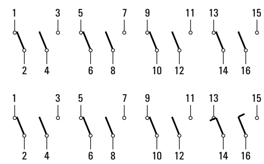
Double-throw Switches without „OFF“ 60° Switching

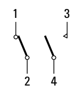
Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	Type/Handle CAD.. CA10- CA25 CL10	Type/Handle CA10B- CA25B	Type/Handle C26- C315	Code	Stages	Connection Diagram
1 pole						A220-600	1	see diagrams below
2 pole						A221-600	2	
3 pole						A222-600	3	
4 pole						A223-600	4	
4 pole 1 pole preclose 6°[3]						A673-600	4	
5 pole						A369-600	5	
6 pole						A370-600	6	
7 pole						A371-600	7	
8 pole						A372-600	8	
8 pole 2 pole preclose 6°[3]						A972-600	8	
9 pole		[2]				A373-600	9	
10 pole		–				A374-600	10	
11 pole		–	[4]			A375-600	11	
12 pole		–	[4]			A376-600	12	



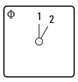
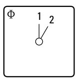
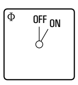
Double-throw Switches without „OFF“ with electrically isolated contacts

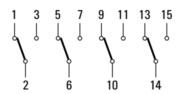
Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	Type/Handle CAD.. CA10- CA25 CL10	Type/Handle CA10B- CA25B	Type/Handle C26- C315	Code	Stages	Connection Diagram
1 pole						A720-600	1	1-4 pole
2 pole						A721-600	2	
3 pole						A722-600	3	
4 pole						A723-600	4	
4 pole 1 pole preclose 6°[3]						A973-600	4	4 pole 1 pole preclose 6°
1 pole with spring return						A795-600	1	1 pole with spring return

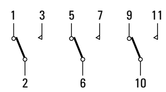




Double-throw Switches without „OFF“ 30° Switching

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	Type/Handle CAD.. CA10- CA25 CL10	Type/Handle CA10B- CA25B	Type/Handle C26- C315	Code	Stages	Connection Diagram
1 pole		–		–	–	A120-600	1	1-4 pole
2 pole		–		–	–	A121-600	2	
3 pole		–		–	–	A122-600	3	
4 pole		–		–	–	A123-600	4	
1 pole with spring return						A295-600	1	1-3 pole
2 pole with spring return						A296-600	2	
3 pole with spring return			[1]			A297-600	3	
1 pole with spring return						A295-620	1	
2 pole with spring return						A296-620	2	
3 pole with spring return			[1]			A297-620	3	

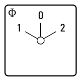
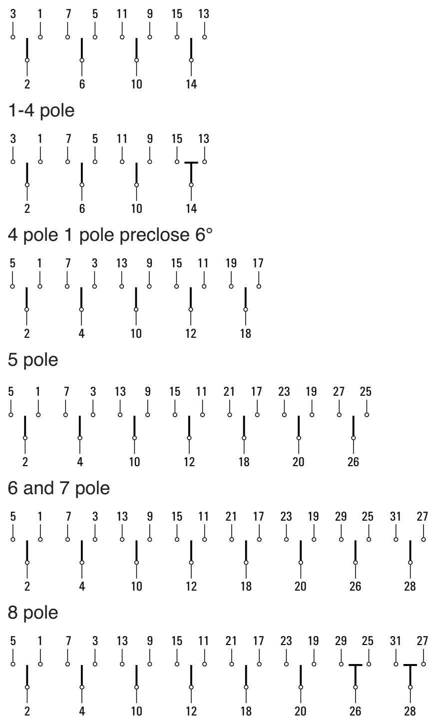
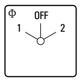
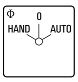
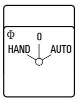
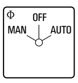
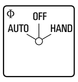
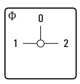
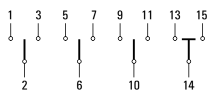
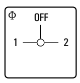
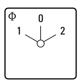
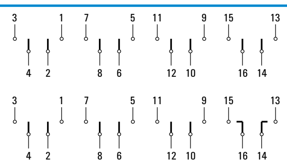
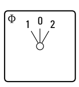
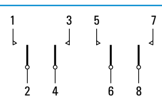




[1]not available for switch type CA25 [2]not available for switch type CL4 [3]for use in a three phase four-wire system with switched neutral
[4]not available for switch type CL10

Switch Function and Configuration

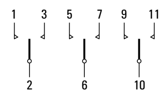
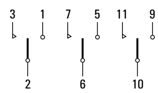
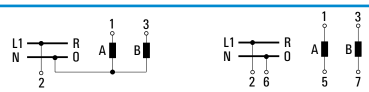
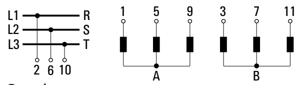
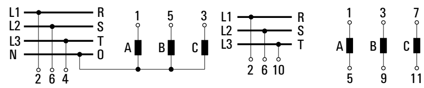
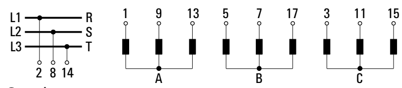
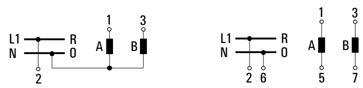
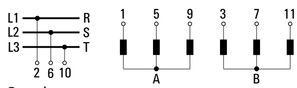
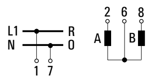
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- C43	C80- C315	Code	Stages	Connection Diagram
Double-throw Switches with Center „OFF“ 60° Switching								
1 pole 2 pole 3 pole 4 pole 4 pole 1 pole preclose 6°[3] 5 pole 6 pole 7 pole 8 pole 8 pole 2 pole preclose 6°[3]						A210-600 A211-600 A212-600 A213-600 A913-600 A361-600 A362-600 A363-600 A364-600 A664-600	1 2 3 4 4 5 6 7 8 8	 1-4 pole 4 pole 1 pole preclose 6° 5 pole 6 and 7 pole 8 pole 8 pole 2 pole preclose 6°
1 pole 2 pole 3 pole 4 pole 4 pole 1 pole preclose 6°[3] 5 pole 6 pole 7 pole 8 pole 8 pole 2 pole preclose 6°[3]						A210-620 A211-620 A212-620 A213-620 A913-620 A361-620 A362-620 A363-620 A364-620 A664-620	1 2 3 4 4 5 6 7 8 8	
1 pole 2 pole 3 pole						A210-621 A211-621 A212-621	1 2 3	
1 pole 2 pole 3 pole						A210-622 A211-622 A212-622	1 2 3	
1 pole 2 pole 3 pole						A210-623 A211-623 A212-623	1 2 3	
1 pole 2 pole 3 pole 4 pole 4 pole 1 pole preclose 6°[3]						A210-624 A211-624 A212-624 A213-624 A913-624	1 2 3 4 4	
Double-throw Switches with Center „OFF“ 90° Switching								
1 pole 2 pole 3 pole 4 pole 1 pole preclose 60°					 [1] [1]	A218-600 A219-600 A299-600 A294-600	1 2 3 4	 1-4 pole
1 pole 2 pole 3 pole 4 pole 1 pole preclose 60°					 [1] [1]	A218-620 A219-620 A299-620 A294-620	1 2 3 4	
Double-throw Switches with Center „OFF“ and electrically isolated contacts								
1 pole 2 pole 3 pole 4 pole 4 pole 1 pole preclose 6°[3]						A710-600 A711-600 A712-600 A713-600 A963-600	1 2 3 4 4	 1-4 pole 4 pole 1 pole preclose 6°
1 pole with spring return 2 pole to center					[2]	A714-600 A715-600	1 2	 1 and 2 pole

[1]switch type C315 with handle [2]not available for switch type C315 [3]for use in a three phase four-wire system with switched neutral

Switch Function and Configuration

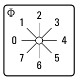
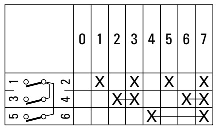
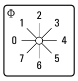
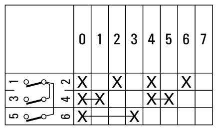
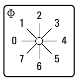
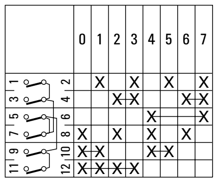
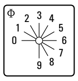
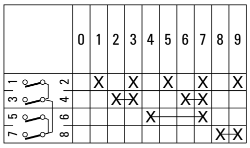
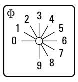
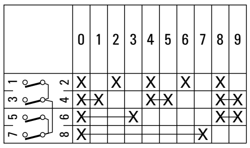
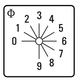
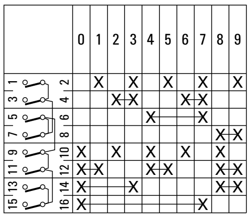
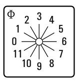
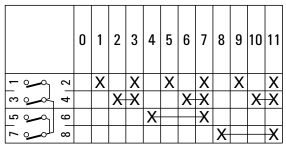
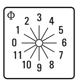
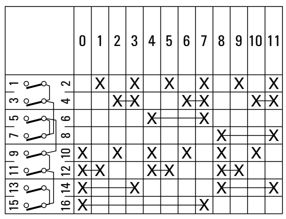
C, CA, CAD, CL Switches

Function		Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- CA25B	C26- C315	Code	Stages	Connection Diagram
Double-throw Switches with Spring Return to Center									
1 pole 2 pole 3 pole	with spring return to center	1 0 2		 [1]		[2] [3] [4]	A214-600 A215-600 A216-600	1 2 3	 1-3 pole
1 pole 2 pole 3 pole		1 OFF 2		 [1]		[2] [3] [4]	A214-620 A215-620 A216-620	1 2 3	
1 pole 2 pole 3 pole	with spring return from left to center	PROV 0 DRIFT		 [1]			A320-600 A321-600 A322-600	1 2 3	 1-3 pole
1 pole 2 pole 3 pole		1 0 2		 [1]			A320-621 A321-621 A322-621	1 2 3	
General Application Switches									
1 pole 2 pole 3 pole	2 Gang Switching sequence: 0, A, A+B	0 1 2					A310-600 A312-600 A314-600	1 2 3	 1 pole 2 pole
1 pole 2 pole 3 pole		OFF 1 2					A310-620 A312-620 A314-620	1 2 3	 3 pole
1 pole 2 pole 3 pole	3 Gang Switching sequence: 0, A, A+B, A+B+C	0 1 2 3					A311-600 A313-600 A315-600	2 3 5	 1 pole 2 pole
1 pole 2 pole 3 pole		OFF 1 2 3					A311-620 A313-620 A315-620	2 3 5	 3 pole
1 pole 2 pole 3 pole	2 Gang Series switching Switching sequence: 0, A, B, A+B	0 1 2 3					A330-600 A331-600 A332-600	1 2 3	 1 pole 2 pole
1 pole 2 pole 3 pole		OFF 1 2 3					A330-620 A331-620 A332-620	1 2 3	 3 pole
2 pole	2 Gang Series-parallel Switching Switching sequence: 0, A+B series, A, A+B parallel	0 1 2 3					A339-600	2	
		OFF 1 2 3					A339-620	2	

[1]not available for switch type CA25 [2]not available for switch type C315 [3]available only up to switch type C43 [4]available only for switch type C43

Switch Function and Configuration

C, CA, CAD, CL Switches

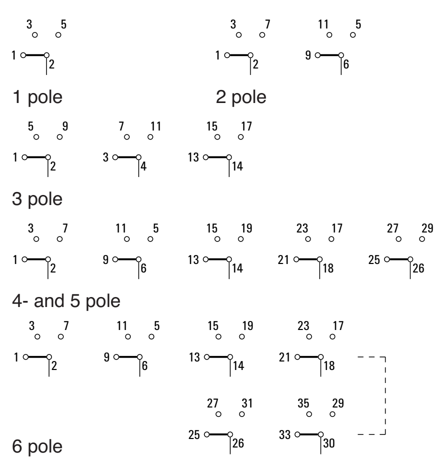
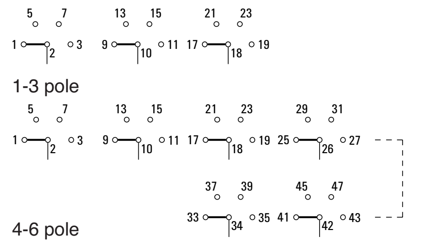
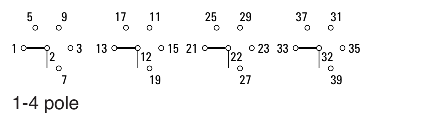
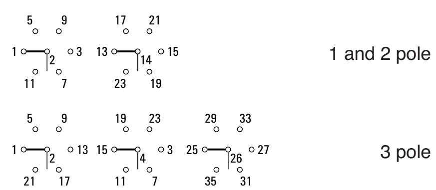
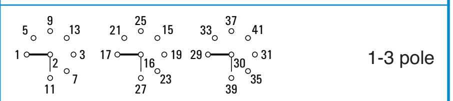
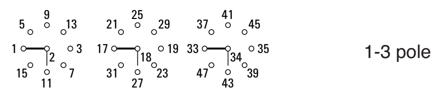
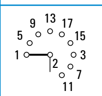
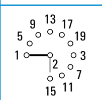
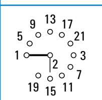
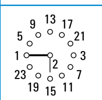
Function	Escutch. Plate	Type/Handle				Code	Stages	Connection Diagram
		CA4 CA4-1 CL4	CA10 CAD11 CAD12 CL10	CA10B- CA25B	C26- C315			
Coding Switches/Binary Code								
0 - 7 360° rotation						A540-600	2	
0 - 7 complement 360° rotation						A541-600	2	
0 - 7 + complement 360° rotation						A542-600	3	
0 - 9						A550-600	2	
0 - 9 complement						A551-600	2	
0 - 9 + complement						A552-600	4	
0 - 11 360° rotation						A543-600	2	
0 - 11 + complement 360° rotation						A545-600	4	

Switch Function and Configuration

C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- C43	C80- C315	Code	Stages	Connection Diagram

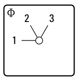
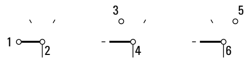
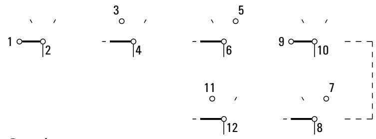
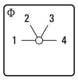
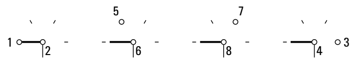
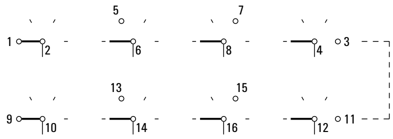
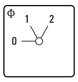
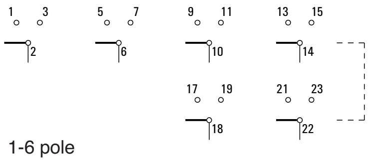
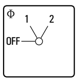
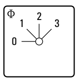
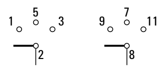
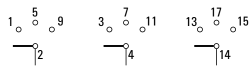
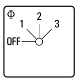
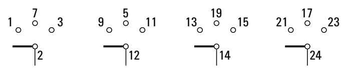
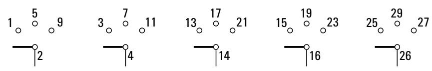
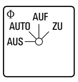
Multi-step Switches without „OFF“

Function	Escutch. Plate	CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- C43	C80- C315	Code	Stages	Connection Diagram
1 pole 3 Step 2 pole 3 pole 4 pole 5 pole 6 pole						A230-600 A250-600 A270-600 A476-600 A484-600 A489-600	2 3 5 6 8 9	 1 pole 2 pole 3 pole 4- and 5 pole 6 pole
1 pole 4 Step 2 pole 3 pole 4 pole 5 pole 6 pole						A231-600 A251-600 A271-600 A477-600 A485-600 A490-600	2 4 6 8 10 12	 1-3 pole 4-6 pole
1 pole 5 Step 2 pole 3 pole 4 pole						A232-600 A252-600 A272-600 A478-600	3 5 8 10	 1-4 pole
1 pole 6 Step 2 pole 3 pole						A233-600 A253-600 A273-600	3 6 9	 1 and 2 pole 3 pole
1 pole 7 Step 2 pole 3 pole						A234-600 A254-600 A274-600	4 7 11	 1-3 pole
1 pole 8 Step 2 pole 3 pole						A235-600 A255-600 A275-600	4 8 12	 1-3 pole
1 pole 9 Step						A236-600	5	
1 pole 10 Step						A237-600	5	
1 pole 11 Step						A238-600	6	
1 pole 12 Step 1 pole 360° rotation						A239-600 A639-600	6 6	

[1]switch type C315 with handle [2]not available for switch type CL4 [3]not available for switch type CA11B [4]not available for switch type CL10

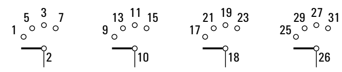
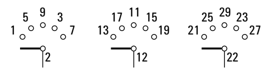
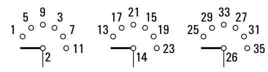
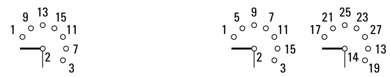
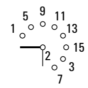
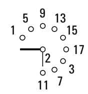
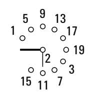
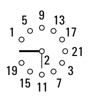
Switch Function and Configuration

C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- C43	C80- C315	Code	Stages	Connection Diagram
Multi-step Switches without „OFF“ with electrically isolated contacts								
1 pole 3 Step						A730-600	2	 1 pole
2 pole						A750-600	3	 2 pole
1 pole 4 Step						A731-600	2	 1 pole
2 pole						A751-600	4	 2 pole
Multi-step Switches with „OFF“								
1 pole 2 Step						A240-600	1	 1-6 pole
2 pole						A260-600	2	
3 pole						A280-600	3	
4 pole						A480-600	4	
5 pole						A486-600	5	
6 pole						A491-600	6	
1 pole						A240-620	1	
2 pole						A260-620	2	
3 pole						A280-620	3	
4 pole						A480-620	4	
5 pole						A486-620	5	
6 pole						A491-620	6	
1 pole 3 Step						A241-600	2	 1 and 2 pole
2 pole						A261-600	3	
3 pole						A281-600	5	 3 pole
4 pole						A481-600	6	
5 pole						A487-600	8	
1 pole						A241-620	2	 4 pole
2 pole						A261-620	3	
3 pole						A281-620	5	
4 pole						A481-620	6	 5 pole
5 pole						A487-620	8	
1 pole						A241-621	2	
2 pole						A261-621	3	

Switch Function and Configuration

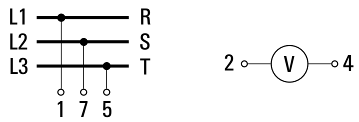
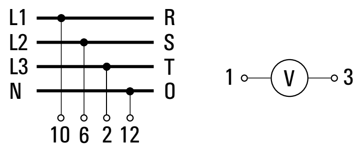
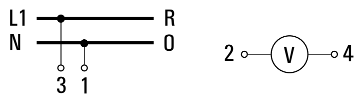
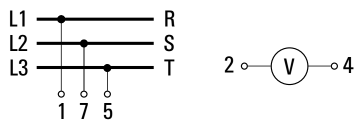
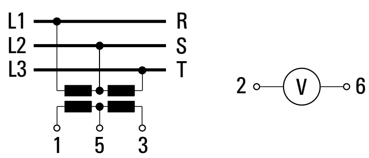
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle: CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- C43	C80- C315	Code	Stages	Connection Diagram
Multi-step Switches with „OFF“								
1 pole 4 Step						A242-600	2	
2 pole						A262-600	4	
3 pole						A282-600	6	
4 pole						A482-600	8	
1 pole						A242-620	2	1-4 pole
2 pole						A262-620	4	
3 pole						A282-620	6	
4 pole						A482-620	8	
1 pole 5 Step						A243-600	3	
2 pole						A263-600	5	
3 pole						A283-600	8	
1 pole						A243-620	3	1-3 pole
2 pole						A263-620	5	
3 pole						A283-620	8	
1 pole 6 Step						A244-600	3	
2 pole						A264-600	6	
3 pole		[1]				A284-600	9	
1 pole						A244-620	3	1-3 pole
2 pole						A264-620	6	
3 pole		[1]				A284-620	9	
1 pole 7 Step						A245-600	4	
2 pole						A265-600	7	
1 pole						A245-620	4	1 pole 2 pole
2 pole						A265-620	7	
1 pole 8 Step						A246-600	4	
1 pole						A246-620	4	
1 pole 9 Step						A247-600	5	
1 pole						A247-620	5	
1 pole 10 Step						A248-600	5	
1 pole						A248-620	5	
1 pole 11 Step						A249-600	6	
1 pole 360° rotation						A649-600	6	
1 pole						A249-620	6	
1 pole 360° rotation						A649-620	6	

[1]not available for switch type CL4

Switch Function and Configuration

C, CA, CAD, CL Switches

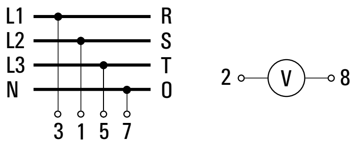
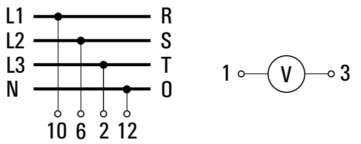
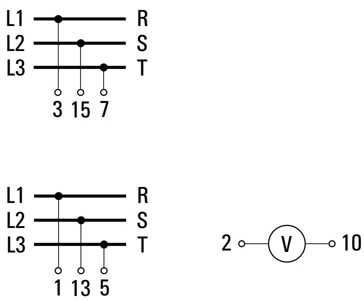
Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CA10- CA25	CAD.. CL10	CA10B- CA25B	Code	Stages	Connection Diagram
Voltmeter Switches without „OFF“								
3 phase 3 wire	RS ST TR					A023-600	2	
	L1-L2 L2-L3 L3-L1					A023-620	2	
3 phase 3 wire 3 phase to phase and phase to neutral	ST RS RO TR SO TO					A025-600	3	
	L1-L2 L2-L3 L1-N L3-L1 L2-N L3-N					A025-620	3	
Voltmeter Switches with „OFF“								
2 pole 360° rotation	VOLTMETER OFF ON ON OFF					A002-600	1	
3 phase 3 wire	RS ST TR 0					A004-600	2	
	L2L3 L1L2 L3L1 OFF					A004-620	2	
	VOLTMETER L2L3 L1L2 L3L1 OFF					A004-621	2	
	RY YB BR OFF					A004-622	2	
	VOLTMETER YB RY BR OFF					A004-623	2	
	L2-L3 L1-L2 L3-L1 0					A004-624	2	
	VOLTMETER 1-2 2-3 3-1 OFF					A011-600	2	

Switch Function and Configuration

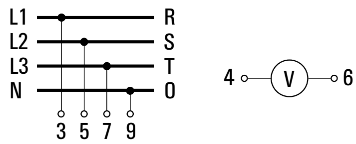
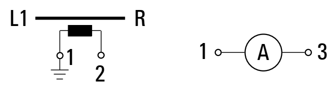
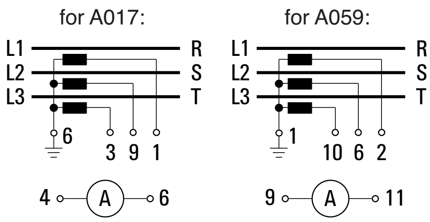
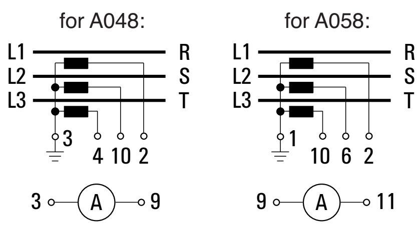
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CA10- CA25	CAD.. CL10	CA10B- CA25B	Code	Stages	Connection Diagram

Voltmeter Switches with „OFF“

Function	Escutch. Plate	CA4 CA4-1 CL4	CA10- CA25	CAD.. CL10	CA10B- CA25B	Code	Stages	Connection Diagram
3 phase to neutral	Φ SO RO TO 0					A005-600	2	
	Φ L2-N L1-N L3-N OFF					A005-620	2	
	VOLTMETER Φ L2-N L1-N L3-N OFF					A005-621	2	
	VOLTMETER Φ YN RN BN OFF					A005-622	2	
	Φ L2-N L1-N L3-N 0					A005-623	2	
3 phase to phase and 3 phase to neutral	Φ 0 RS RO ST SO TR TO					A007-600	3	
	Φ OFF L1L2 L1-N L2L3 L2-N L3L1 L3-N LL LN					A007-620	3	
	VOLTMETER Φ OFF L1L2 L1-N L2L3 L2-N L3L1 L3-N LL LN					A007-621	3	
	Φ OFF RY RN YB YN BR BN					A007-622	3	
	VOLTMETER Φ OFF RY RN YB YN BR BN					A007-623	3	
	Φ 0 L1-L2 L1-N L2-L3 L2-N L3-L1 L3-N					A007-624	3	
2 separate 3 phase with center „OFF“	Φ 0 RS RS ST ST TR TR					A008-600	4	
	Φ OFF L1L2 L1L2 L2L3 L2L3 L3L1 L3L1 1 2					A008-620	4	
	VOLTMETER Φ OFF L1L2 L1L2 L2L3 L2L3 L3L1 L3L1 1 2					A008-621	4	
	Φ 0 L1-L2 L1-L2 L2-L3 L2-L3 L3-L1 L3-L1					A008-622	4	

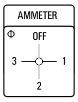
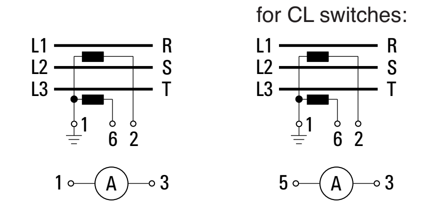
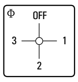
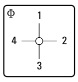
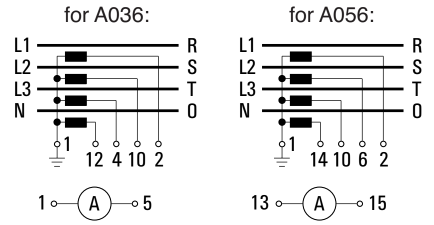
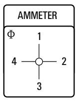
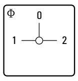
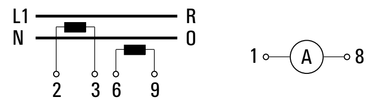
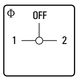
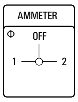
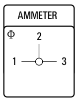
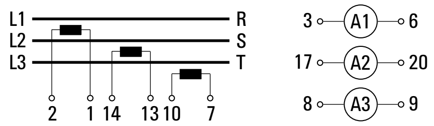
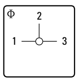
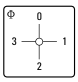
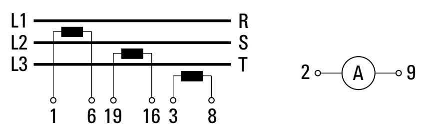
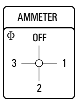
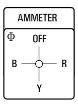
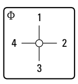
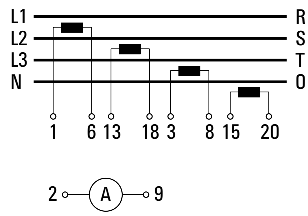
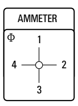
Switch Function and Configuration — C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- C32	C43- C125	Code	Stages	Connection Diagram
Voltmeter Switches with „OFF“								
3 phase and 1 phase to neutral				[1]		A010-600	3	
				[1]		A010-620	3	
	VOLTMETER			[1]		A010-621	3	
				[1]		A010-622	3	
Ammeter Switches								
Single pole with one current transformer		[2]	[2]			A046-600	1	
		[2]	[2]			A046-620	1	
	AMMETER	[2]	[2]			A046-621	1	
Single pole with 3 current transformers without „OFF“	AMMETER	[2]	[2]			A017-600	3	
		CL4	CL10			A059-600		
		[2]	[2]			A017-620	3	
		CL4	CL10			A059-620		
Single pole with 3 current transformers with „OFF“ 360° rotation		[2]	[2]			A048-600	3	
		CL4	CL10			A058-600		
		[2]	[2]			A048-620	3	
		CL4	CL10			A058-620		
		[2]	[2]			A048-621	3	
		CL4	CA10 CL10			A058-621		
	AMMETER	[2]	[2]			A048-622	3	
		CL4	CL10			A058-622		
	AMMETER	[2]	[2]			A048-623	3	
		CL4	CL10			A058-623		

[1]available only up to switch type CA25B [2]not available for switch types CL4 and CL10

Switch Function and Configuration

C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- C42	C43- C125	Code	Stages	Connection Diagram
Ammeter Switches								
Single pole with 2 current transformers (3 readings)						A021-600	2	
						A021-620	2	
Single pole with 4 current transformers		[1]	[1]			A036-600	4	
		CL4	CL10			A056-600		
		[1]	[1]			A036-620	4	
		CL4	CL10			A056-620		
2 pole 2 current transformers						A037-600	3	
						A037-620	3	
						A037-621	3	
2 pole 3 current transformers						A019-600	5	
						A019-620	5	
		[1]	[1]			A038-600	5	
		[1]	[1]			A038-620	5	
		[1]	[1]			A038-621	5	
2 pole 4 current transformers		[1]	[1]			A039-600	6	
		[1]	[1]			A039-620	6	

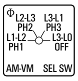
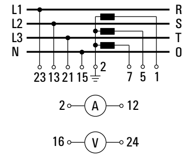
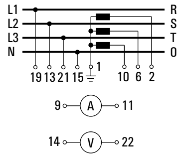
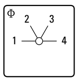
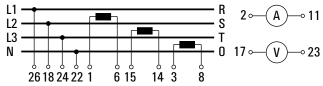
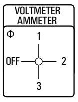
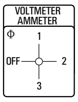
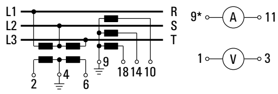
[1]not available for switch types CL4 and CL10

Switch Function and Configuration

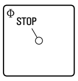
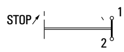
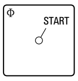
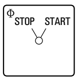
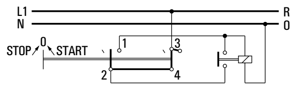
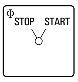
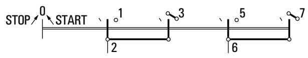
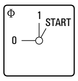
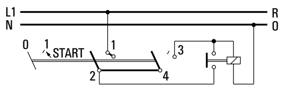
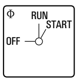
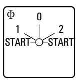
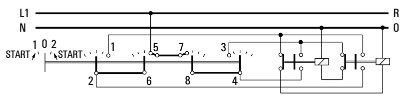
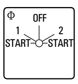
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- CA25B	C26- C43	Code	Stages	Connection Diagram

Volt-ammeter Switches

Function	Escutch. Plate	CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- CA25B	C26- C43	Code	Stages	Connection Diagram
3 phase - phase to phase 3 current		[1] CL4	[1] CL10			A027-600 A057-600	6	for A027:  for A057: 
		[1]	[1]			A028-600	7	
3 phase voltage 3 phase current 4 wire						A033-600	5	 for CL switches: *19 instead of 11
3 phase voltage 3 phase current 3 wire						A035-600	5	 for CL switches: *17 instead of 9

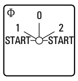
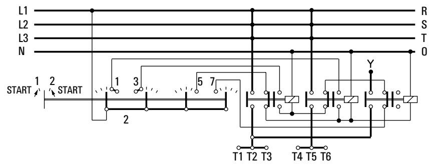
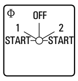
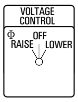
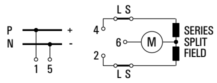
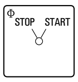
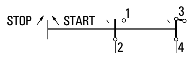
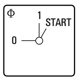
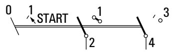
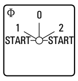
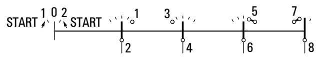
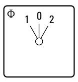
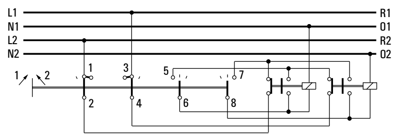
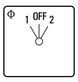
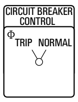
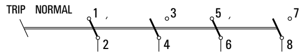
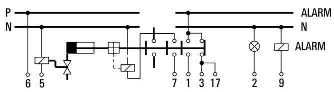
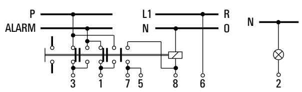
Control Switches

Function	Escutch. Plate	CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- CA25B	C26- C43	Code	Stages	Connection Diagram
Stop switch						A174-600	1	
Start switch						A175-600	1	
Stop start switch single pole						A176-600	1	
Stop start switch 2 pole						A183-600	2	
Stop start switch with spring return from start to run						A178-600	1	
						A178-620	1	
Stop start switch with spring return to run for 2 units						A177-600	2	
						A177-620	2	

[1] not available for switch types CL4 and CL10

Switch Function and Configuration

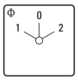
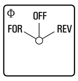
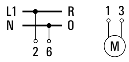
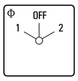
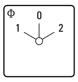
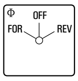
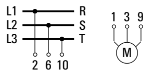
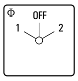
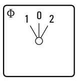
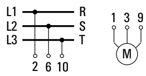
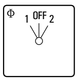
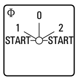
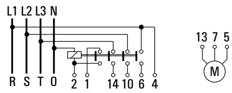
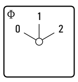
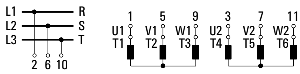
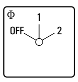
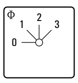
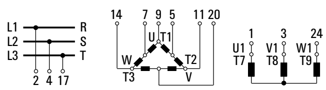
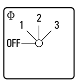
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- CA25B	C26 C32	Code	Stages	Connection Diagram
Control Switches								
Stop start switch with spring return to run with contactor interlock contactors for 2 units						A182-600	2	
						A182-620	2	
Motor voltage control switch						A150-600	2	
Control Switches with electrically isolated contacts								
Stop start switch single pole						A789-600	1	
Stop start switch with spring return to 1						A791-600	1	
Stop start switch with spring return to run for 2 units						A790-600	2	
Contactor control with spring return to „OFF“						A179-600	2	
						A179-620	2	
Circuit breaker control						A537-600	2	
Control and Alarm Switches[1]								
With slip clutch and without indicator device			[2]	[2]		A190-600	5[3]	
Without indicator device			[2]			A192-600	2	

[1]Advise the indicator device, described in Catalog 101, page 7. [2]not available for switch types CL10, CA25 and CA25B [3]incl. slip clutch

Switch Function and Configuration

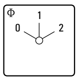
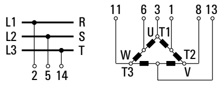
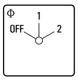
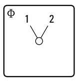
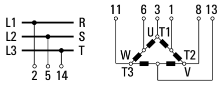
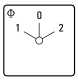
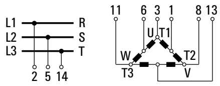
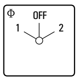
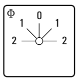
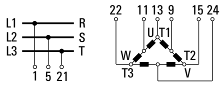
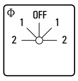
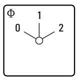
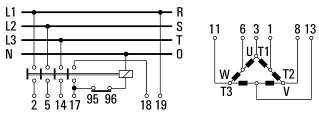
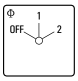
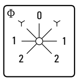
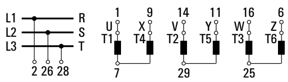
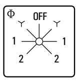
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA..B C26- C43	C80- C315	Code	Stages	Connection Diagram
Motor Reversing Switches								
2 pole						A400-600	2	
						A400-620	2	
						A400-621	2	
3 pole						A401-600	3	
						A401-620	3	
						A401-621	3	
3 pole with spring return to „OFF“			[1]	[2]		A228-600	3	
			[1]	[2]		A228-620	3	
3 pole for use with reversing contactors				[3]		A402-600	4	
Motor Control Switches								
2 speed 2 winding 0-A-BY or Δ						A451-600	3	
						A451-620	3	
3 speed 2 winding 0-AΔ-BY-AYY						A457-600	6	
						A457-620	6	

[1]not available for switch type CA25 [2]not available for switch types C26 and C32 [3]not available for switch types C42 and C43

Switch Function and Configuration

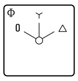
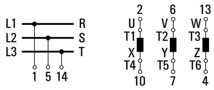
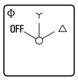
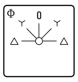
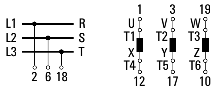
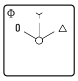
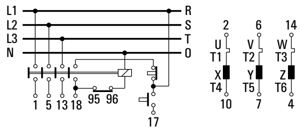
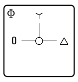
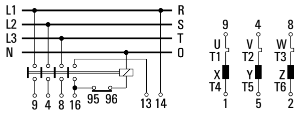
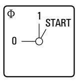
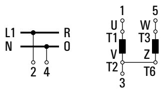
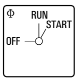
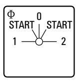
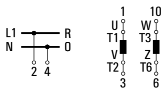
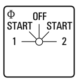
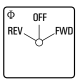
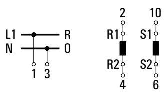
C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA10B- CA25B	C26- C315	Code	Stages	Connection Diagram
Motor Control Switches								
2 speed single winding		✓	✓	✓	✓	A440-600	4	
		✓	✓	✓	✓	A440-620	4	
2 speed single winding without „OFF“		✓	✓	✓	✓	A466-600	4	
2 speed single winding with center „OFF“		✓	✓	✓	✓	A441-600	4	
		✓	✓	✓	✓	A441-620	4	
2 speed single winding reversing		✓	✓	✓	✓	A442-600	6	
		✓	✓	✓	✓	A442-620	6	
2 speed single winding for use with contactors		✓	✓	✓	✓	A444-600	5	
		✓	✓	✓	✓	A444-620	5	
2 speed reversing for 2 way operation with slip clutch for „OFF“ load use			✓[2]	✓	✓	A468-600	10[1]	
			✓[2]	✓	✓	A468-620	10[1]	

[1]incl. slip clutch [2]not available for switch type CL10

Switch Function and Configuration

C, CA, CAD, CL Switches

Function	Escutch. Plate	Type/Handle CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10	CA..B C26- C43	C80- C315	Code	Stages	Connection Diagram
Star-delta Switches								
OFF-star-delta						A410-600	4	
						A410-620	4	
Reversing						A413-600	5	
With auxiliary contact closed in „OFF“ position						A416-600	5	
For use with reversing contactors		[1]	[1]			A419-600	4	
Start and Run Switches								
Split-phase start						A425-600	2	 Split-phase Start FLD
						A425-620	2	
Split-phase start reversing			[2]			A426-600	3	 Split-phase Start FLD
			[2]			A426-620	3	
Split-phase reversing auto cutout of start field winding						A622-600	3	 Split-phase Start FLD

[1]not available for switch types CL4 and CL10 [2]not available for switch type CA25

Switch Function and Configuration

L Switches

Function/Type	Escutch. Plate	Handle	Code	Stages	Double Latching	Connection Diagram
						L350 L630 L1000 L1250 / L351 L631 L1001 L1251

ON/OFF Switches with 60° Switching

Function/Type		Escutch. Plate	Code	Stages	Double Latching	Connection Diagram	
1 pole	L350/L351	0 1	A200-600	1		1 3 5 7 / 2 4 6 8	1-4 pole
2 pole			A201-600	2			
3 pole			A202-600	3			
4 pole			A203-600	4			
1 pole		OFF ON	A200-620	1			
2 pole			A201-620	2			
3 pole			A202-620	3			
4 pole			A203-620	4			
1 pole	L400	0 1	A200-600	2		1 3 9 11 / 2 4 10 12	1-4 pole
2 pole			A201-600	2			
3 pole			A202-600	4			
4 pole			A203-600	4			
3 pole	with lugs suitable for protective cover	0 1	A302-600	3		3 5 11 / 2 8 10	A302
1 pole		OFF ON	A200-620	2			
2 pole			A201-620	2			
3 pole			A202-620	4			
4 pole			A203-620	4			
1 pole	L600	0 1	A200-600	3		9 3 21 15 / 2 12 14 24	1-4 pole
2 pole			A201-600	3			
3 pole			A202-600	6			
4 pole			A203-600	6			
1 pole	L630/L631	0 1	A200-600	2		9 3 21 15 / 2 12 14 24	1-4 pole
2 pole			A201-600	4			
3 pole			A202-600	6	●		
4 pole			A203-600	8	●		
1 pole	L800	0 1	A200-600	2		1 9 17 25 / 8 16 24 32	1-4 pole
2 pole			A201-600	4			
3 pole			A202-600	6			
4 pole			A203-600	8			
1 pole	L1000/L1001	0 1	A200-600	3		1 3 5 7 / 2 4 6 8	1-4 pole
2 pole			A201-600	6	●		
3 pole			A202-600	9	●		
4 pole			A203-600	12	●		
1 pole	L1200	0 1	A200-600	3		1 13 25 / 12 24 36	1-3 pole
2 pole			A201-600	6			
3 pole			A202-600	9			
1 pole	L1250/L1251	0 1	A200-600	4		1 3 5 / 2 4 6	1-3 pole
2 pole			A201-600	8	●		
3 pole			A202-600	12	●		
1 pole	L1600	0 1	A200-600	4		1 17 33 / 16 32 48	1-3 pole
2 pole			A201-600	8			
3 pole			A202-600	12			
1 pole	L2000	0 1	A200-600	5		1 21 / 20 40	1 and 2 pole
2 pole			A201-600	10	●		

● Additional length for switches size S2 for mounting E/EF = 27 mm
Additional length for switches size S3 for mounting E/EF = 31,5 mm and mounting ER/VE = 20,1 mm

Switch Function and Configuration

L Switches

ON/OFF Switches with 90° Switching

Function/Type		Escutch. Plate	Handle	Code	Stages	Double Latching	Connection Diagram (L350, L630, L1000, L1250 / L351, L631, L1001, L1251)
1 pole	L350/L351			A290-600	1		1 3 5 / 2 4 6 — 1-3 pole
2 pole				A291-600	2		
3 pole				A292-600	3		
4 pole	1 pole preclose 60°			A293-600	4		
1 pole	L400			A290-600	2		1 3 9 / 2 4 10 — 1-3 pole; 1 3 9 11 / 2 4 10 12 — 4 pole
2 pole				A291-600	2		
3 pole				A292-600	4		
4 pole	1 pole preclose 60°			A293-600	4		
3 pole	with lugs suitable for protective cover			A307-600	3		1 7 9 / 4 6 12 — A307
3 pole	360° rotation			A208-600	4		
1 pole	L600			A290-600	3		9 3 21 / 2 12 14 — 1-3 pole; 9 3 21 15 / 2 12 14 24 — 4 pole
2 pole				A291-600	3		
3 pole				A292-600	6	●	
4 pole	1 pole preclose 60°			A293-600	6	●	
1 pole	L630/L631			A290-600	2		1 3 5 / 2 4 6 — 1-3 pole; 1 3 5 7 / 2 4 6 8 — 4 pole
2 pole				A291-600	4		
3 pole				A292-600	6	●	
4 pole	1 pole preclose 60°			A293-600	8	●	
1 pole	L800			A290-600	2		1 9 17 / 8 16 24 — 1-3 pole; 1 9 17 25 / 8 16 24 32 — 4 pole
2 pole				A291-600	4	●	
3 pole				A292-600	6	●	
4 pole	1 pole preclose 60°			A293-600	8	●	
1 pole	L1000/L1001			A290-600	3		1 3 5 / 2 4 6 — 1-3 pole; 1 3 5 7 / 2 4 6 8 — 4 pole
2 pole				A291-600	6	●	
3 pole				A292-600	9	●	
4 pole	1 pole preclose 60°			A293-600	12	●	
1 pole	L1200			A290-600	3	●	1 13 25 / 12 24 36 — 1-3 pole
2 pole				A291-600	6	●	
3 pole				A292-600	9	●	
1 pole	L1250/L1251			A290-600	4		1 3 5 / 2 4 6 — 1-3 pole
2 pole				A291-600	8	●	
3 pole				A292-600	12	●	

● Additional length for switches size S2 for mounting E/EF = 27 mm
Additional length for switches size S3 for mounting E/EF = 31,5 mm and mounting ER/VE = 20,1 mm

Switch Function and Configuration

L Switches

Function/Type		Escutch. Plate	Handle	Code	Stages	Double Latching	Connection Diagram
							L350 L630 L1000 L1250 / L351 L631 L1001 L1251
ON/OFF Switches with 90° Switching							
1 pole 2 pole 3 pole	L1600			A290-600 A291-600 A292-600	4 8 12	● ● ●	1-3 pole
1 pole 2 pole	L2000			A290-600 A291-600	5 10	● ●	1- and 2 pole
Double-throw Switches without „OFF“ 60° Switching							
1 pole 2 pole 3 pole 4 pole	L350/L351			A220-600 A221-600 A222-600 A223-600	2 4 6 8		1-4 pole
1 pole 2 pole 3 pole 4 pole	L400			A220-600 A221-600 A222-600 A223-600	2 4 6 8		1-4 pole
1 pole 2 pole 3 pole 4 pole	L600			A220-600 A221-600 A222-600 A223-600	3 6 9 12	 ● ●	1-4 pole
1 pole 2 pole 3 pole	L630/L631			A220-600 A221-600 A222-600	4 8 12	 ●	1-3 pole
1 pole 2 pole 3 pole	L800			A220-600 A221-600 A222-600	4 8 12	 ●	1-3 pole
1 pole 2 pole	L1000/L1001			A220-600 A221-600	6 12	 ●	1 and 2 pole
1 pole	L1200			A220-600	6		
1 pole	L1250/L1251			A220-600	8		
1 pole	L1600			A220-600	8		
1 pole	L2000			A220-600	10		

● Additional length for switches size S2 for mounting E/EF = 27 mm
Additional length for switches size S3 for mounting E/EF = 31,5 mm and mounting ER/VE = 20,1 mm

Switch Function and Configuration

L Switches

Function/Type		Escutch. Plate	Handle	Code	Stages	Double Latching	Connection Diagram	L350 L630 L1000 L1250	L351 L631 L1001 L1251

Double-throw Switches with Center „OFF“

Function/Type		Escutch. Plate	Handle	Code	Stages	Double Latching	Connection Diagram
1 pole 2 pole 3 pole 4 pole	L350/L351			A210-600 A211-600 A212-600 A213-600	2 4 6 8		2 1 5 4 8 7 11 10 / 3 6 9 12 — 1-4 pole
1 pole 2 pole 3 pole 4 pole	L400			A210-600 A211-600 A212-600 A213-600	2 4 6 8		3 1 11 9 19 17 27 25 / 2 10 18 26 — 1-4 pole
1 pole 2 pole 3 pole 4 pole	L600			A210-600 A211-600 A212-600 A213-600	3 6 9 12	 ● ●	3 9 15 21 27 33 39 45 / 2 14 26 38 — 1-4 pole
1 pole 2 pole 3 pole	L630/L631			A210-600 A211-600 A212-600	4 8 12	 ●	2 1 5 4 8 7 / 3 6 9 — 1-3 pole
1 pole 2 pole 3 pole	L800			A210-600 A211-600 A212-600	4 8 12	 ●	9 1 25 17 41 33 / 16 32 48 — 1-3 pole
1 pole 2 pole	L1000/L1001			A210-600 A211-600	6 12	 ●	2 1 5 4 / 3 6 — 1 and 2 pole
1 pole	L1200			A210-600	6		13 1 / 24
1 pole	L1250/L1251			A210-600	8		2 1 / 3
1 pole	L1600			A210-600	8		17 1 / 32
1 pole	L2000			A210-600	10		29 1 / 18

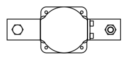
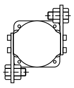
Multi-step Switches single pole without „OFF“

Function/Type		Escutch. Plate	Handle	Code	Stages	Double Latching	Connection Diagram
3 Step	L350/L351			A230-600	4		2 3 / 1 4
3 Step	L400			A230-600	4		3 9 / 1 2
4 Step	L350/L351			A231-600	4		2 3 / 1 5 4
4 Step	L400			A231-600	4		9 11 / 1 2 3
5 Step	L350/L351			A232-600	6		2 3 / 1 6 4 / 5

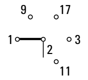
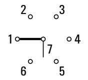
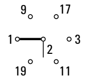
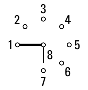
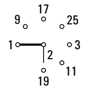
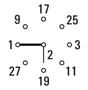
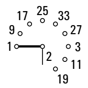
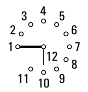
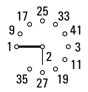
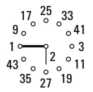
● Additional length for switches size S2 for mounting E/EF = 27 mm
Additional length for switches size S3 for mounting E/EF = 31,5 mm and mounting ER/VE = 20,1 mm

Switch Function and Configuration

L Switches

Function/Type		Escutch. Plate	Handle	Code	Stages	Double Latching	Connection Diagram	L350 L630 L1000 L1250  L351 L631 L1001 L1251 

Multi-step Switches single pole without „OFF“

Function/Type		Escutch. Plate	Handle	Code	Stages	Double Latching	Connection Diagram
5 Step	L400			A232-600	6		
6 Step	L350/L351			A233-600	6		
6 Step	L400			A233-600	6		
7 Step	L350/L351			A234-600	8		
7 Step	L400			A234-600	8		
8 Step	L350/L351			A235-600	8		
8 Step	L400			A235-600	8		
9 Step	L350/L351			A236-600	10		
9 Step	L400			A236-600	10		
10 Step	L350/L351			A237-600	10		
10 Step	L400			A237-600	10		
11 Step	L350/L351			A238-600	12		
11 Step	L400			A238-600	12		
12 Step	L350/L351			A239-600	12		
12 Step	L400			A239-600	12		

Mounting

CA4, CA4-1 and CL4 Switches

	Two Hole Panel Mounting or Mosaic Mounting	Terminals rotated 90°	**Code**	CA4 CA4-1 CL4
	Panel mounting			
	Two hole panel mounting	●	E E-V	● ●
	Panel mounting with shaft seal Protection IP 65			
	Two hole panel mounting	●	EF EF-V	● ●
	Panel mounting with round shaft for combining with commercial radio knobs			
	Two hole panel mounting Shaft diam. 6 mm/.24 inch		E9	●
	Two hole panel mounting Shaft diam. 6.35 mm/.25 inch		E91	●
	Mosaic mounting			
	For Siemens-Mosaic 30 mm grid depth		E92	●
	For Subklew-, Kreutzenbeck-, Symo-Mosaic 28 mm 25 mm 25 mm grid depth		E93	●
	For Mauell-Mosaic 30 mm grid depth		E94	●

Mounting

C, CA, CAD, CL, L Switches

Two or Four Hole Panel Mounting		Terminals rotated 90°	**Code**	CAD.. CA10-CA25 CL10	CA10B-C42	C43-C125 L350-L1251 Size S2	C315 L400-L2000 Size S3
	Panel mounting						
	Four hole panel mounting		E	●	●	●	●
		●	E-V	●	●		
	Four hole panel mounting Protection IP 65		EF	●	●	●	●
		●	EF-V	●	●		
	Two hole panel mounting Protection IP 65		E22	●			
		●	E22-V	●			
	Panel mounting using larger escutcheon plate and handle and with heavy duty latching						
	Four hole panel mounting		EG	●	C26-C42	C80-C125	
	Four hole panel mounting Protection IP 65		EGF	●	C26-C42	C80-C125	
	Panel and base mounting						
	Four hole mounting		ER	CAD.. CA10-CA25	●	●	●
	Four hole mounting Protection IP 65		ERF	CAD.. CA10-CA25	●	●	●

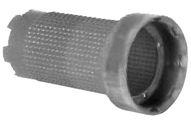
Mounting

C, CA, CAD, CL Switches

Two or Four Hole Panel Mounting		Code	CAD.. CA10- CA25 CL10	CA10B CA11B CA20B CA25B C26	C32 C42	C43
	Panel mounting with heavy duty latching and metal shaft					
	Four screw panel mounting Mounting plate, escutcheon plate and handle of size S0	KN2	●			
	Four screw panel mounting Mounting plate, escutcheon plate and handle of size S1	KN1	●	●	●	
	Four screw panel mounting Mounting plate, escutcheon plate and handle of size S1 and 6 mm square metal shaft	KD1	●	●	●	
	Panel mounting with protective cover					
	Four screw panel mounting Protection front IP 40 rear IP 30 for CA and CAD IP 42 for C26-C43	EC	CAD.. CA10- CA25	●	●	●
	Four screw panel mounting with additional shaft seal Protection front IP 65 rear IP 30 for CA and CAD IP 42 for C26-C43	ED	CAD.. CA10- CA25	●	●	●
	Four screw panel mounting Protection front IP 40 rear IP 42	EC1		●		
	Four screw panel mounting with additional shaft seal Protection front IP 65 rear IP 42	ED1		●		
	Two screw panel mounting Protection front IP 65 rear IP 42	ED22	CAD.. CA10- CA25			

Mounting

C, CA, CAD, CL Switches

Single Hole Mounting		Terminals rotated 90°	Code	CA4 CA4-1 CL4	CAD.. CA10- CA25 CL10
	With locking nut and shaft seal, protection IP 65			mm	mm
	Without escutcheon plate		FS1	16/22	
		●	FS1-V	16/22	
			FT1		22
		●	FT1-V		22
			FT3		22/30
		●	FT3-V		22/30
	With square escutcheon plate		FS2	16/22	
		●	FS2-V	16/22	
			FT2		22
		●	FT2-V		22
			FT4		22/30
		●	FT4-V		22/30
	With rectangular escutcheon plate		FS4	16/22	
		●	FS4-V	16/22	
	With size S1 escutcheon plate and heavy duty latching		FH3		22
		●	FH3-V		22
	Mounting key for locking nut		S00 T170 09		

Mounting

C, CA, CAD, L Switches

Base Mounting	Terminals rotated 90°	Code	CAD.. CA10- CA25 CL10	CA10B- C42	C43- L2000
Base mounting					
 Base mounting - four hole		VE	CAD.. CA10- CA25	●	●
	●	VE-V		●	
For four hole base mounting and with integrated simplified door clutch, protection IP 65		VF	CAD.. CA10- CA25		
	●	VF-V			
 For two hole base mounting		VE22	●		
	●	VE22V	CAD.. CA10- CA25		
For two hole base mounting and with integrated simplified door clutch, protection IP 65		VF22	●		
	●	VF22V	CAD.. CA10- CA25		
 Snap-on base mounting for track EN 50022		VE1	●	●	

Mounting

C, CA, CAD, L Switches

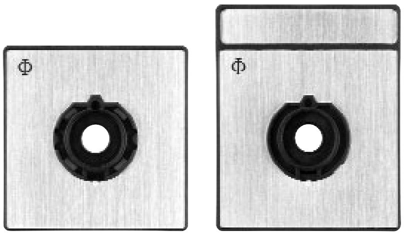
Base Mounting		Code	CA4 CA4-1	CAD.. CA10- CA25 CL10
	Base mounting			
	Snap-on base mounting for track EN 50022 with escutcheon plate for 45 mm standard knock-out.	VE2		●
	Snap-on base mounting for track EN 50022. Both the escutcheon plate for 45 mm standard knock-out and the handle are adjustable in height.	VE21	●	CAD.. CA10- CA25
	Snap-on base mounting for track EN 50022 with circular escutcheon plate for 46 mm knock-out.	VE3		●
	Base mounting - four hole - for circular escutcheon plate with 46 mm knock-out.	VE4		CAD.. CA10- CA25

Mounting

C, CA, CAD Switches

	Mounting Plates for Plaster Depth Boxes acc. to DIN 49070 and ÖNORM E6508	Code	CAD.. CA10- CA25
	Plaster depth trim	UE1	●
	With light	UE2	●
	With facility for light addition	UE3	●
	Plaster depth trim	UE4	●
	With light	UE5	●
	With facility for light addition	UE6	●
	For multiple boxes	UE7	●

Escutcheon Plates

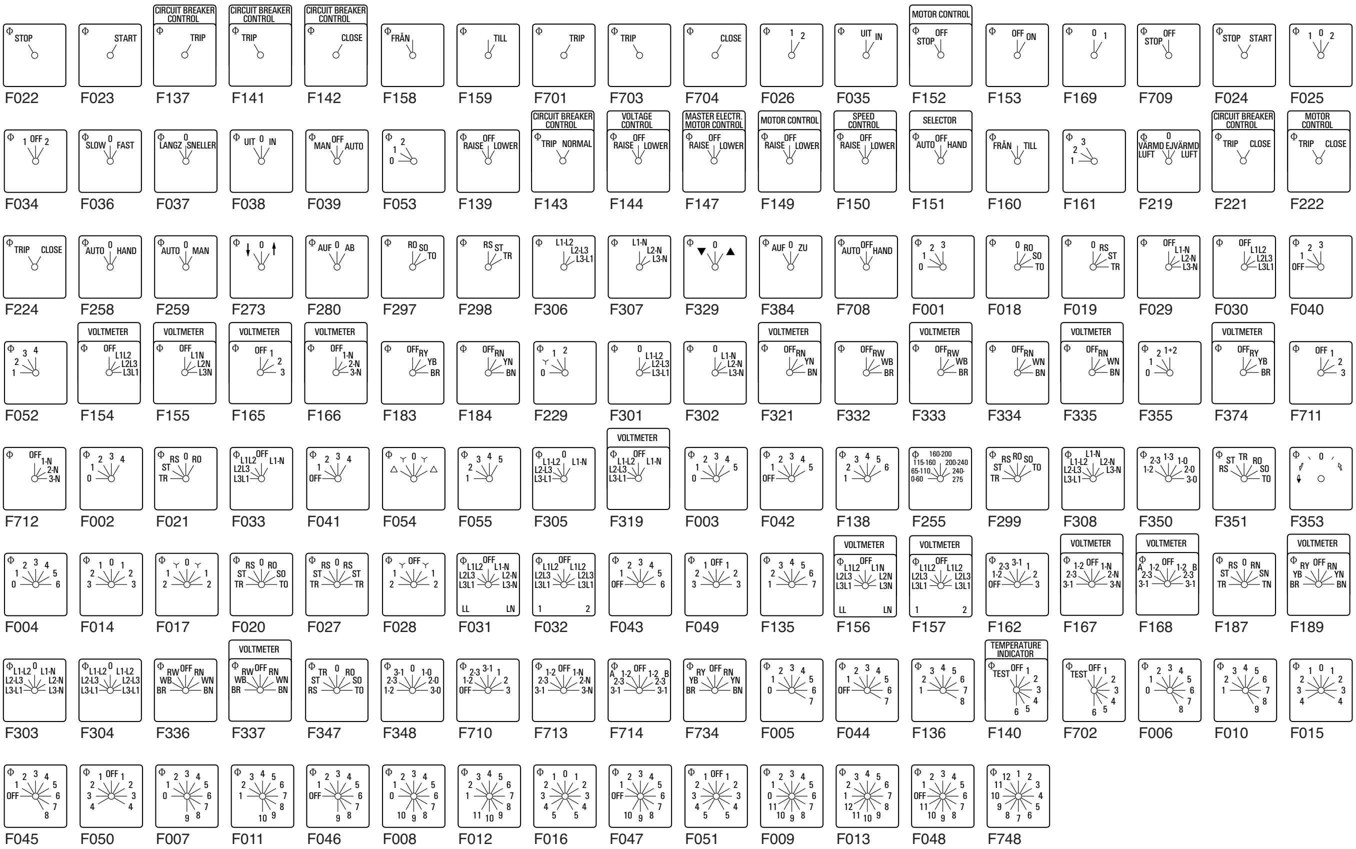


Square and rectangular escutcheon plates are available for each size of switch. The escutcheon plate consists of a frame and a faceplate having the switch positions which is than embossed with hot-foil backing. The escutcheon plate frame is an essential part of the switch and serves as a bearing surface for the handle. If the switch is to be mounted without an escutcheon plate we would recommend for size S1, S2 and S3 the handle bearing plate T100-04.

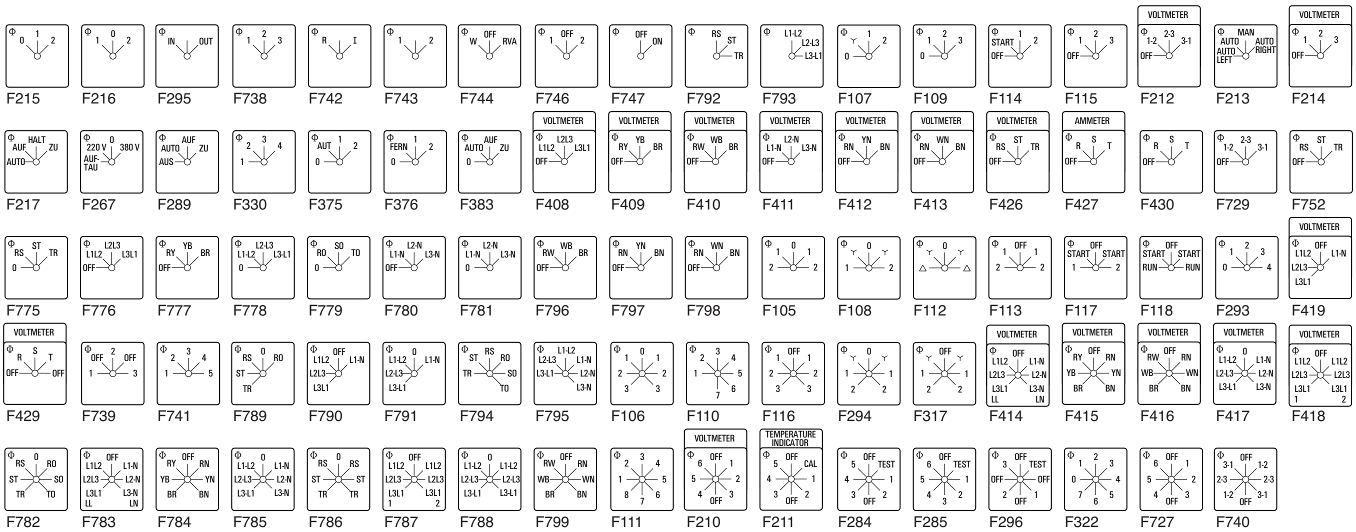
Standard Letterings Available

(Over 500 standard letterings, special letterings upon request.)

30° switching

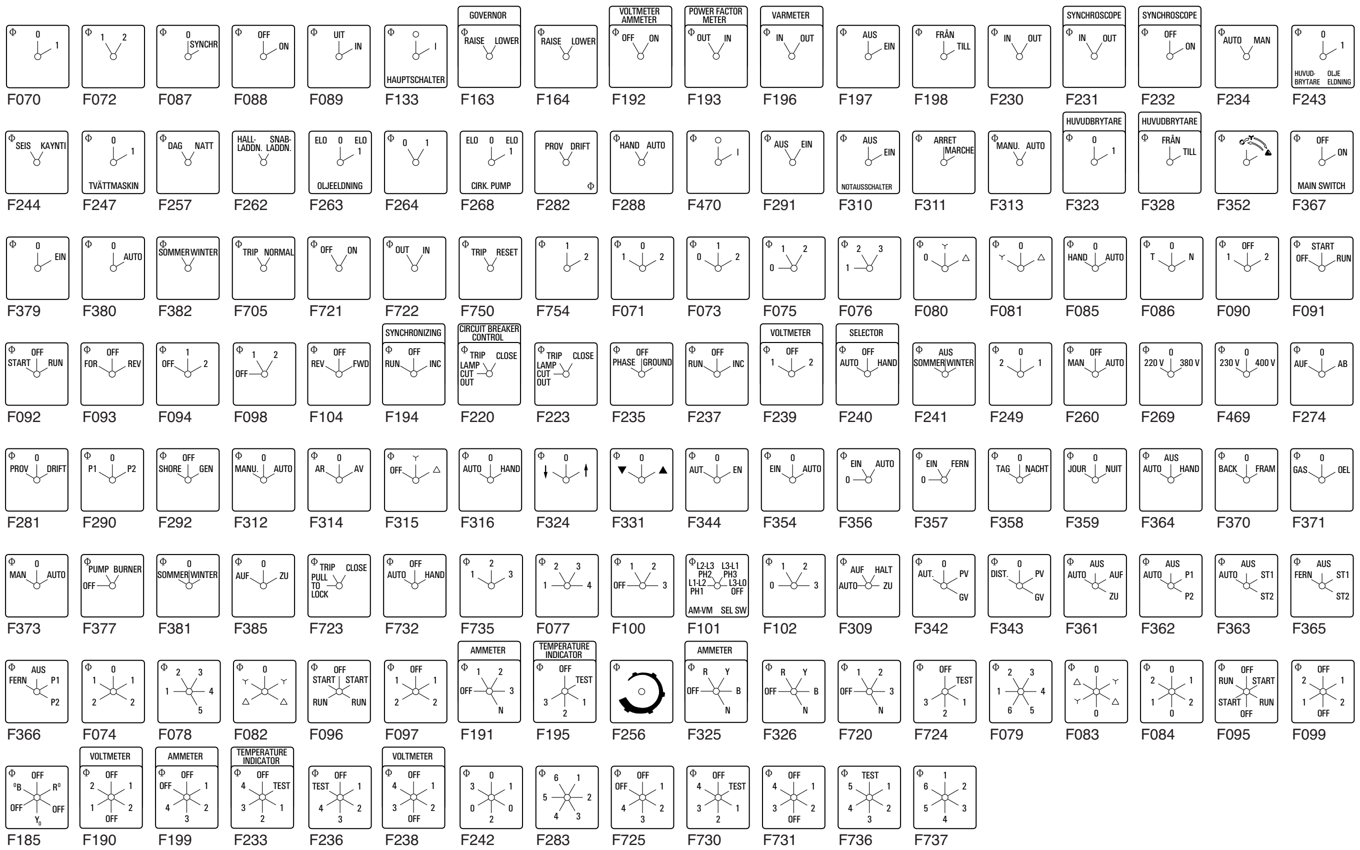


45° switching

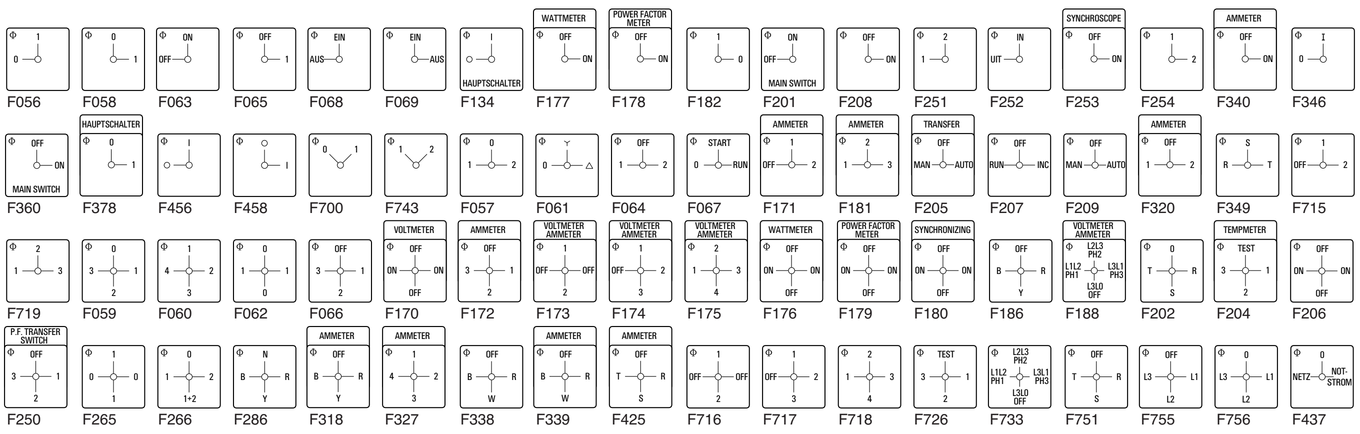


Escutcheon Plates

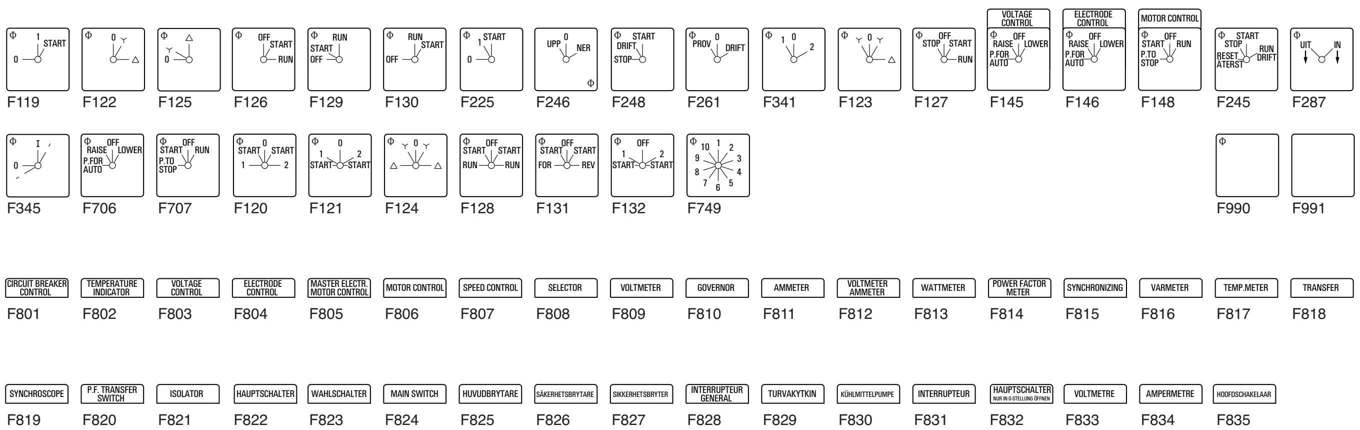
60° switching



90° switching

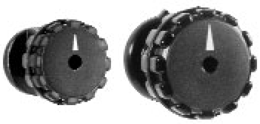


Miscellaneous



37

Handles

Type	Color	Code	Size S00	S0	S1	S2	S3
R-Handle 	black red white electro-gray	G001 G002 G003 G007	–	●	●	●	●
F-Handle 	black red white electro-gray	G221 G222 G223 G227	●	●	●	●	–
S-Handle  S0 S1	black red white electro-gray	G301 G302 G303 G307	–	●	●	–	–
P-Handle  S0 S1-S3	black red white electro-gray	G211 G212 G213 G217	–	●	●	●	●
Handwheel 	black	G971	–	–	–	–	●
Capstan Handle 	black	G931	–	–	–	–	●
I-Handle  S00 S0-S3	black red white electro-gray	G251 G252 G253 G257	●	●	●	●	●
B-Handle 	black red white electro-gray	G521 G522 G523 G527	–	●	●	–	–
L-Handle 	black red white electro-gray	G501 G502 G503 G507	–	–	●	–	–
K-Handle 	black red white electro-gray	G411 G412 G413 G417	–	–	●	●	●
O-Handle 	black red white electro-gray	G321 G322 G323 G327	–	–	●	–	–

International Standards and Approvals

Country	Authority	Mark or Standard	CAD11/12 CA4 CA4-1	CA10 CA11 CA20	CA10B CA11B CA20B	CA25 CA25B	C26 C32 C42	C43 C80 C125	L350/1 L630/1 L1000/1	L1250/1 C315 C316	L400 L600 L800	L1200 L1600 L2000
USA	Underwriters Laboratories Inc.	[1]							● ● ●	● ● ●	 ● ●	● + +
		[2] [3]	● ● ●	● ● ●	● ● ●	 ● ●	● ● ●	● ● ●			●	
Canada	UL investigated acc. to CSA	[6]	+ ● ●	● ● ●	● ● ●	 ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●
		[1]							● ● ●	● ● ●	 ● ●	●
		[2] [3]	● ● ●	● ● ●	● ● ●	 ● ●	● ● ●	● ● ●			●	
Switzerland	Schweizerischer Elektrotechnischer Verein		+ + +	+ + +	+ + +	 + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +
Denmark	Danmarks Elektriske Materiellkontrol		+ + +	+ + +	+ + +	 + +	+ + +	+ + *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*
Norway	Norges Elektriske Materiellkontroll		+ + +	+ + +	+ + +	 + +	+ + +	+ + *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*
Sweden	Svenska Elektriska Materielkontroll-anstalten		+ + +	+ + +	+ + +	 + +	+ *+* *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*
Finland	Sähkötar-kastuskeskus		+ + +	+ + +	+ + +	 + +	+ + +	+ + *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*
Austria	Österreichischer Verband für Elektrotechnik		+ + +	+ + +	+ + +	 + +	+ + +	+ + *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*	*+* *+* *+*
Federal Republic of Germany	Verband Deutscher Elektrotechniker	VDE 0660[4]	+ + +	+ + +	+ + +	 + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +
Great Britain	British Standards Institution	BS EN 60947[4]	+ + +	+ + +	+ + +	 + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +
International Electrical Commission (IEC) Recommendation		IEC 60947[5]	+ + +	+ + +	+ + +	 + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +
China	China Quality Certification Centre	[7] GB14048.3	●	● ●	● ●							
Russian Federation	GOST	[7] CH01	● ● ●	● ● ●	● ● ●	 ● ●	● ● ●	● ● ●	+ + +	+ ● ●	+ + +	+ + +
Germanischer Lloyd			+ + +	+ + +	+ + +	 + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +
Lloyds Register of Shipping			+ + +	+ + +	+ + +	 + +	+ + +	+ + +	+ + +	+ + +	+ + +	+ + +

● Switch approved   + Switch conforms to requirements   *+* No approval required

[1] Approved under the "Component Program" (UL-Recognized Industrial Component). File No. E35541, Category Control No. NLRV2 (U.S.) resp. NLRV8 (Canada).
[2] Approved under the "Listing Program". File No. E35541, Category Control No. NLRV (U.S.) resp. NLRV7 (Canada).
[3] Switch types CAD11/CAD12 approved under the "Listing Program". File No. E60262, Category Control No. NRNT (U.S.) resp. NRNT7 (Canada).
[4] It is not required for Industrial Switchgear to bear a symbol but must conform to requirements. By stating the specific standard no. on the product the manufacturer declares that all requirements of the product standard are met.
[5] IEC does not operate an approval scheme.
[6] File No. 13002, Class No. 3211-05 resp. 4652-04.
[7] If this approval is required, please request when ordering.

Technical Data

C, CA, CL Switches

Selection Data

			CA4 CA4-1	CL4	CA10 CA10B	CL10	CA11 CA11B	CA20 CA20B	CA25 CA25B	C26	C32	C42 C43	C80	C125	C315/C316
Rated Insulation Voltage U_i	IEC 60947-3, EN 60947-3[1]														
	VDE 0660 part 107[1]	V	440	440	690	690	690	690	690	690	690	690	690	690	690/1000
	SEV[4]	V	380	380	660	690	660	660	690	660	660	660	660	660	660
	UL/Canada	V	300	–	300	–	600	600	300	600	600	600	600	600	600
	CEE/NEMKO	V	400/380	–	380	–	400	400	–	400	400	400	400	–	–
Rated Impulse Withstand Voltage U_{imp}		kV	4	4	6	6	6	6	6	6	6	6	6	6	6/8
Rated Thermal Current I_u/I_{th}	IEC 60947-3, EN 60947-3														
	VDE 0660 part 107	A	10	10	20	20	20	25	32	32	50	63	115	150	315
	SEV[4] 380 V	A	10	10	16	16	16	25	32	32	40	63	100	160	315
	660 V	A	–	–	12	12	12	25	32	32	40	63	–	–	315
	UL/Canada	A	10	–	20	–	20	30	30	40	50	65	100	150	240
Rated Operational Current I_e															
AC-21A Switching of resistive loads, including moderate overloads	IEC 60947-3, EN 60947-3 VDE 0660 part 107	A	10	10	20	20	20	25	32	32	40	63	100	150	315
AC-1 Resistive or low inductive loads	SEV[4] 380 V	A	10	10	16	16	16	25	32	32	40	63	100	160	315
	660 V	A	–	–	12	12	12	20	32	32	40	63	–	–	315
AC-22A Switching of combined resistive or low inductive loads including moderate overloads	IEC 60947-3, EN 60947-3														
	VDE 0660 220 V-500 V	A	10	10	20	20	20	25	32	32	40	63	100	150	315
	part 107 660 V-690 V	A	–	–	20	20	20	25	32	32	40	63	100	125	125
AC-15 Switching of control devices, contactors, valves etc.	IEC 60947-3, EN 60947-3														
	VDE 0660 220 V-240 V	A	2,5	2,5	5	5	5	8	12	14	16	–	–	–	–
	part 107 380 V-440 V	A	1,5	1,5	4	4	4	5	6	6	7	–	–	–	–
Pilot Duty	UL/Canada[4] Heavy	VAC	300	–	300	–	600	600	300	600	600	600	–	–	–
Ampere Rating Resistive or low inductive loads	UL/Canada[4]	A	10	–	20	–	20	30	30	40	50	65	100	150	240
Resistive load/motor load	CEE	A	4/2	–	10/6	–	10/6	16/10	–	25/10	32/10	40/10	63/10	–	–
	NEMKO	A	6/4[2]	–	10/6	–	–	20/10	–	–	–	–	–	–	–
Short Circuit Protection															
Max. fuse size	(gL-characteristic)	A	10	10	25	25	25	35	35	50	63	80	125	200	315
Rated short-time withstand current	(1s-current)	A	60	90	140	140	140	280	480	350	800	1000	1300	2000	4200

DC Switching Capacity — **Rated Operational Current I_e**

No. of series contacts	1	2	3	4	5	6	8		CA4 CA4-1	CL4	CA10 CA10B	CL10	CA11 CA11B	CA20 CA20B	CA25 CA25B	C26S	C32S	C42S	C80	C125	C315[3] C316[3]
	Voltage V																				
Resistive loads T ≤ 1 ms	24	48	70	95	120	145	190	A	10	10	20	20	20	25	32	–	50	–	115	–	315
	48	95	140	190	240	290	350		6	6	12	12	12	20	25	32	40	63	100	150	250
	60	120	180	240	300	360	450		2,5	2,5	4,5	4,5	4,5	7,5	10	23	27	30	–	–	–
	110	220	330	440	550	660	–		0,7	0,7	1	1	1	1,5	2	6,5	–	–	–	–	–
	220	440	660	–	–	–	–		0,3	0,3	0,4	0,4	0,4	0,5	0,6	1,2	–	–	–	–	–
	440	660	–	–	–	–	–		0,2	0,2	0,27	0,27	0,27	0,3	0,3	0,4	–	–	–	–	–
Inductive loads T = 50 ms	24	48	70	95	120	145	190	A	6	6	12	12	12	20	25	32	40	63	100	150	250
	30	60	90	120	150	180	240		3	3	5	5	5	9	12	25	30	55	33	50	70
	48	95	140	190	240	290	350		1	1	2	2	2	3	3	16	20	–	–	–	–
	60	120	180	240	300	360	450		0,7	0,7	1	1	1	1,5	1,5	11	15	–	–	–	–
	110	220	330	440	550	660	–		0,3	0,3	0,4	0,4	0,4	0,5	0,5	3,2	3,5	–	–	–	–

Ambient Temperature of Stages[5]	open at 100 % I_u/I_{th}	55 °C during 24 hours with peaks up to 60 °C
	enclosed at 100 % I_{the}	35 °C during 24 hours with peaks up to 40 °C

[1]Valid for lines with grounded common neutral termination, overvoltage category III, pollution degree 3. Values for other supply systems on request. [2]Valid for CA4 only.
[3]DC switching capacity applies to ON/OFF switches. Switching capacity for other configurations on request. [4]International Standards and Approvals, refer to page 39.
[5]For electromagnetic optional extras see additional data in Catalog 101.

Technical Data

C, CA, CL Switches

Selection Data					CA4 CA4-1	CL4	CA10 CA10B	CL10	CA11 CA11B	CA20 CA20B	CA25 CA25B	C26	C32	C42 C43	C80	C125	C315 C316
Rated Utilization Category		IEC 60947-3, EN 60947-3 VDE 0660 part 107															
AC-2	Slip ring motor starting,	3 phase	220 V-240 V		2,5	2,5	4	4	4	5,5	7,5	8	10	18,5	30	37	55
	reversing and plugging,	3 pole	380 V-440 V	kW	4,5	4,5	7,5	7,5	7,5	11	15	15	18,5	30	45	55	90
	star-delta starting		500 V		–	–	10	10	10	15	18,5	18,5	22	40	55	75	110
	CA4-C32		660 V-690 V		–	–	10	10	10	13	15	15	22	37	55	55	55
AC-3	Direct-on-line starting,	3 phase	220 V-240 V		1,5	1,5	3	3	3	4	5,5	5,5	7,5	11	15	22	37
	star-delta starting	3 pole	380 V-440 V	kW	2,2	2,2	5,5	5,5	5,5	7,5	11	11	15	18,5	30	37	55
	C42-C315		500 V		–	–	5,5	5,5	5,5	7,5	11	11	15	18,5	30	37	55
			660 V-690 V		–	–	5,5	5,5	5,5	7,5	11	11	15	18,5	30	37	37
		1 phase	110 V		0,3	0,3	0,6	0,6	0,6	1,5	2,2	2,2	2,5	3	3,7	5,5	11
		2 pole	220 V-240 V	kW	0,55	0,55	2,2	2,2	2,2	3	4	4	5,5	6	7,5	11	22
			380 V-440 V		0,75	0,75	3	3	3	3,7	5,5	5,5	7,5	11	13	18,5	30
AC-4	Direct-on-line starting,	3 phase	220 V-240 V		0,37	0,37	0,55	0,55	0,55	1,5	2,5	2,7	3,7	5,5	6	10	15
	reversing, plugging and	3 pole	380 V-440 V	kW	0,55	0,55	1,5	1,5	1,5	3	5,5	5,5	6	7,5	11	15	25
	inching		500 V		–	–	1,5	1,5	1,5	3	5,5	5,5	6	7,5	11	15	25
			660 V-690 V		–	–	1,5	1,5	1,5	3	5,5	5,5	6	7,5	11	15	22
		1 phase	110 V		0,15	0,15	0,3	0,3	0,3	0,45	0,75	0,75	1,1	1,2	1,5	2,2	4
		2 pole	220 V-240 V	kW	0,25	0,25	0,75	0,75	0,75	1,1	1,5	1,5	2,2	2,4	3	4	7,5
			380 V-440 V		0,5	0,5	1,5	1,5	1,5	2,2	3	3	3,7	4	5,5	7,5	11
AC-23A	Frequent switching of	3 phase	220 V-240 V		1,8	1,8	3,7	3,7	3,7	5,5	7,5	7,5	11	15	30	37	75
	motors or other high	3 pole	380 V-440 V	kW	3	3	7,5	7,5	7,5	11	15	15	22	30	45	75	132
	inductive loads		500 V		–	–	7,5	7,5	7,5	11	15	15	30	45	55	90	132
			660 V-690 V		–	–	7,5	7,5	7,5	11	15	15	22	55	65	65	37
		1 phase	110 V		0,37	0,37	0,75	0,75	0,75	1,5	2,2	2,2	2,5	4	5,5	11	18,5
		2 pole	220 V-240 V	kW	0,75	0,75	2,5	2,5	2,5	3	4	4	5,5	10	15	22	37
			380 V-440 V		1,1	1,1	3,7	3,7	3,7	5,5	7,5	7,5	11	18,5	22	37	55
Ratings		UL/Canada															
	Standard motor load		120 V		0,75	–	1,5	–	1,5	3	5	5	7,5	7,5	10	15	30
	DOL-Rating	3 phase	240 V	HP	1	–	3	–	3	7,5	10	10	15	15	20	25	75
	(similar AC-3)	3 pole	480 V		–	–	–	–	5	10	–	20	25	25	30	40	75
			600 V		–	–	–	–	5	10	–	25	30	30	40	50	60
			120 V		0,33	–	0,5	–	0,5	1,5	2	2	3	3	5	7,5	15
		1 phase	240 V		0,75	–	1	–	1	3	5	5	7,5	7,5	10	15	40
		2 pole	277 V	HP	0,75	–	2	–	2	3	5	5	7,5	7,5	10	15	40
			480 V		–	–	–	–	2	5	–	10	15	15	20	25	50
			600 V		–	–	–	–	2	5	–	15	20	20	25	30	50
	Heavy motor load		120 V		–	–	0,5	–	0,5	1	2	2	3	5	7,5	10	15
	Reversing-Rating	3 phase	240 V	HP	–	–	1	–	1	2	3	3	5	7,5	15	20	30
	(similar AC-4)	3 pole	440 V-600 V		–	–	–	–	3	5	–	10	15	20	25	30	40
			120 V		–	–	0,17	–	0,17	0,33	1,5	1,5	1,5	2	3	5	7,5
		1 phase	240 V	HP	–	–	0,5	–	0,5	0,75	3	3	3	5	7,5	10	15
		2 pole	277 V		–	–	0,6	–	0,6	1	3	3	3	5	7,5	10	15
Max. Permissible Wire Gage - Use copper wire only					2x	1x[2]	2x	1x[2]	2x	2x	2x	2x	2x	2x			
	Single-core or stranded wire			mm^2	1,5	0,5-1,5	2,5	0,5-2,5	2,5	4	6	6	10	16	35	70	185[1]
				AWG	14	–	12	–	12	10	8	8	8	6	2	2/0	MCM 350
					2x	1x[2]	2x	1x[2]	2x	2x	2x	2x	2x	2x			
	Flexible wire			mm^2	1,5	0,5-1,5	2,5	0,5-2,5	2,5	4	4	6	6	10	25	50	150[1]
	(sleeving in accordance with DIN 46228)				(–)	(–)	(2,5)	(–)	(2,5)	(2,5)	(4)	(4)	(6)	(10)	(25)	(50)	
	Flexible AWG wires (without sleeve)			AWG	16	–	14	–	14	12	10	10	8	6	3	1/0	MCM 300

[1]Cable lug must accept M12 screw. [2]The insulation material of the conductor has to be PVC (typical wire codes are H05V-K0,5 ... H07V-K1,5 or H05V-U0,5 ... H07V-U1,5 etc.). Other materials on request. Connected conductors, which have to be disconnected and re-connected again must be cut in order to ensure a proper electrical connection and to prevent a complete cut-off of the wire insulation. The permissible ambient temperature range when connecting the wires is 5-40 °C.

Technical Data

L Switches

Selection Data			L350 L351	L400	L600	L630 L631	L800	L1000 L1001	L1200	L1250 L1251	L1600	L2000
Rated Insulation Voltage U_i	IEC 60947-3, EN 60947-3[1]											
	VDE 0660 part 107[1]	V	690	690	690	690	690	690	690	690	690	690
	UL/Canada[2]	V	600	600	600	600	600	600	600	600	600	600
Rated Impulse Withstand Voltage U_{imp}		kV	6	6	6	6	6	6	6	6	6	6
Rated Thermal Current I_u/I_{th}	IEC 60947-3, EN 60947-3 VDE 0660 part 107											
Ambient temp. +35 °C during 24 hours with peaks up to +40 °C		A	350	500	800	630	1100	1000	1450	1250	1900	2400
Ambient temp. +55 °C during 24 hours with peaks up to +60 °C		A	350	500	750	600	950	920	1300	1100	1700	2000
	UL/Canada[2]	A	350	400	630	630	800	1000	1200	1250	1600	2000
Rated Operational Current I_e												
AC-20A No-load operation	IEC 60947-3, EN 60947-3 VDE 0660 part 107 690 V	A	350	500	800	630	1100	1000	1450	1250	1900	2400
Occasional switching under load cos φ 0,8 (AC-20B)	3 phase, 3 pole 220 V-440 V	A	350	500	800	500	1000	630	1200	630	1200	1200
	and 500 V	A	350	450	500	450	630	500	800	500	800	800
	1 phase, 2 pole 660 V-690 V	A	315	350	400	360	400	400	400	400	400	400
AC-21B Switching of resistive loads, including moderate overloads	3 phase, 3 pole 220 V-440 V	A	250	450	500	350	630	400	800	400	800	800
	and 500 V	A	250	400	450	315	500	350	630	350	630	630
	1 phase, 2 pole 660 V-690 V	A	200	300	350	250	350	300	350	300	350	350
Interrupting Rating	UL/Canada[2] 600 V	A	200	300	300	200	300	200	300	200	200	200
	CSA 600 V	A	200	200	200	200	200	200	200	200	200	200
Rated Utilization Category	IEC 60947-3, EN 60947-3 VDE 0660 part 107											
AC-23B Occasional switching of motors or other high inductive loads	3 phase 220 V-240 V	kW	45	75	75	45	75	45	75	45	75	75
	3 pole 380 V-440 V	kW	90	132	132	90	132	90	132	90	132	132
	500 V	kW	110	132	132	110	132	110	132	110	132	132
	660 V-690 V	kW	65	65	65	65	65	65	65	65	65	65
Short Circuit Protection												
Max. fuse size	(aR-characteristic)	A	400	500	800	630	1250	1000	2x800	1250	2x1000	2x1250
Rated short-time withstand current	(1s-current)	A					on request					
Terminals						Cable lug or copper bus						
	for connection screw		M12	M12	M16	M16	M16	M16	M16	M16	2xM16	4xM16
	length	mm	20	30	40	30	40	40	40	50	50	50
Ambient Temperature of Stages[3]			55 °C during 24 hours with peaks up to 60 °C, permissible load see Rated Thermal Current.									

[1]Valid for lines with grounded common neutral termination, overvoltage category III, pollution degree 3. Values for other supply systems on request.
[2]International Standards and Approvals, refer to page 39. [3]For electromagnetic optional extras see additional data in Catalog 101.

Technical Data

CAD Switches

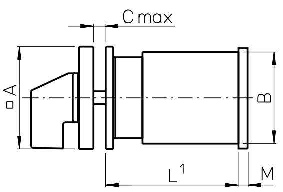
Selection Data				CAD11	CAD12
Rated Insulation Voltage U_i	IEC 60947-3, EN 60947-3[1]				
	VDE 0660 part 107		V	600	600
	SEV[2]		V	600	600
	UL/Canada		V	300	300
	min. voltage		V	1[5]	6
Rated Impulse Withstand Voltage U_{imp}				on request	
Rated Thermal Current I_u/I_{th}	IEC 60947-3, EN 60947-3				
	VDE 0660 part 107		A	6	6
	SEV[2]		A	5	5
	UL/Canada		A	6	6
Rated Operational Current I_e	IEC 60947-3, EN 60947-3				
	VDE 0660 part 107				
AC-21A Switching of resistive loads, including moderate overloads	UL/Canada[3]	1 V/6 V	A	6/3	–/6
		12 V/24 V	A	2/1	5/5
		48 V/110 V	A	0,8/0,4	4/3
		220 V/400 V	A	0,2/0,13	2/1,3
		440 V/500 V	A	0,1/0,08	1/0,8
		600 V	A	0,05	0,5
AC-1 Resistive or low inductive loads	SEV[2]	1 V/6 V	A	5/3	–/5
		12 V/24 V	A	2/1	5/5
		48 V/110 V	A	0,8/0,4	4/3
		220 V/380 V	A	0,2/0,13	2/1,3
		440 V/500 V	A	0,1/0,08	1/0,8
		600 V	A	0,05	0,5
Short Circuit Protection					
Max. fuse size		(gL-characteristic)	A	6	6
Rated short-time withstand current		(1s-current)	A	35	50
DC Switching Capacity	IEC 60947-3, EN 60947-3				
	VDE 0660 part 107				
DC-1 Resistive load T = 1 ms	SEV[2]	1 V/6 V	A	4/2,5	–/4
	UL/Canada[3]	12 V/24 V	A	1,5/0,8	3/2,2
		48 V/60 V	A	0,3/0,27	1,2/1
		110 V/220 V	A	0,2/0,1	0,6/0,3
		240 V/500 V	A	0,08/0,03	0,25/0,1
		600 V	A	0,02	0,1
Max. Permissible Wire Gage - Use copper wire only					
Single-core or stranded wire			mm²	2x 2,5	2x 2,5
			AWG	12	12
Flexible wire (sleeving in accordance with DIN 46228)			mm²	2x 2,5 (2,5)	2x 2,5 (2,5)
			AWG	14	14
Ambient Temperature of Stages[4]		open at 100 % I_u/I_{th}		55 °C during 24 hours with peaks up to 60 °C	
		enclosed at 100 % I_{the}		35 °C during 24 hours with peaks up to 40 °C	

[1]Valid for lines with grounded common neutral termination, overvoltage category III, pollution degree 3. Values for other supply systems on request.
[2]International Standards and Approvals, refer to page 39. [3]Max. 300 V. [4]For electromagnetic optional extras see additional data in Catalog 101.
[5]Values for lower voltages on request.

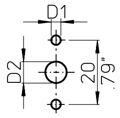
Dimensions

mm
inch

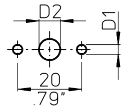
Two or Four Hole Panel Mounting



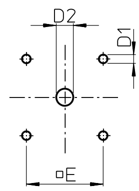
E
for CA4, CA4-1
E-V
for CL4



E-V
for CA4, CA4-1
E
for CL4

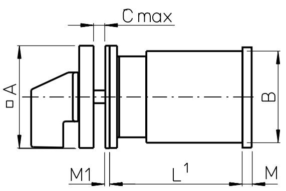


E
E-V
ER

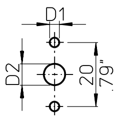


	CA4 CA4-1	CL4	CA10 CA11 CAD11 CAD12	CL10	CA20	CA25[3]	CA10B CA11B CA20B	CA25B	C26	C32	C42[3]	C43	C80	C125	L switches Size S2	C315 L switches Size S3
A	30 1.18	30 1.18	48 1.89	48 1.89	48 1.89	48 (64) 1.89 (2.52)	64 2.52	64 2.52	64 2.52	64 2.52	64 (88) 2.52 (3.46)	88 3.46	88 3.46	88 3.46	88 3.46	130 5.12
B	29,5 1.16	35x46 1.38x1.81	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81	56 2.20	56 2.20	58 2.28	60 2.36	66 2.60	84 3.30	84 3.30	88 3.46	88 3.46	126 4.96
C	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	5,5 .22	5,5 .22	5,5 .22	5,5 .22	7 .28
D1	3,2 .13	3,2 .13	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 (6) .20 (.24)	6 .24	6 .24	6 .24	6 .24	7 .28
D2	8-11 .31-.43	8-11 .31-.43	8-15 .31-.59	8-15 .31-.59	8-15 .31-.59	8-15 .31-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	13-17 .51-.67	13-17 .51-.67	13-17 .51-.67	13-17 .51-.67	15,5-20 .61-.79
E	- -	- -	36 1.42	36 1.42	36 1.42	36 (48) 1.42 (1.89)	48 1.89	48 1.89	48 1.89	48 1.89	48 (68) 1.89 (2.68)	68 2.68	68 2.68	68 2.68	68 2.68	104 4.09
M[2]	- -	- -	4,5 .18	- -	4,5 .18	5,5 .22	5 .20	5,5 .22	7,5 .30	7,5 .30	7,5 .30	7,5 .30	9,4 .37	9,4 .37	27,5 1.08	11,9 .47

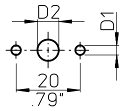
[2]M, additional length for mounting ER only
[3]Dimensions in ( ) for ER mounting plate only



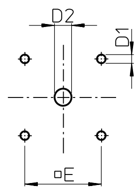
EF
for CA4, CA4-1
EF-V
for CL4



EF-V
for CA4, CA4-1
EF
for CL4



EF
EF-V
ERF



	CA4 CA4-1	CL4	CA10 CA11 CAD11 CAD12	CL10	CA20	CA25[3]	CA10B CA11B CA20B	CA25B	C26	C32	C42[3]	C43	C80	C125	L switches Size S2	C315 L switches Size S3
A	30 1.18	30 1.18	48 1.89	48 1.89	48 1.89	48 (64) 1.89 (2.52)	64 2.52	64 2.52	64 2.52	64 2.52	64 (88) 2.52 (3.46)	88 3.46	88 3.46	88 3.46	88 3.46	130 5.12
B	29,5 1.16	35x46 1.38x1.81	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81	56 2.20	56 2.20	58 2.28	60 2.36	66 2.60	84 3.30	84 3.30	88 3.46	88 3.46	126 4.96
C	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	5,5 .22	5,5 .22	5,5 .22	5,5 .22	7 .28
D1	3,2 .13	3,2 .13	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 (6) .20 (.24)	6 .24	6 .24	6 .24	6 .24	7 .28
D2	8-11 .31-.43	8-11 .31-.43	15-19 .59-.75	15-19 .59-.75	15-19 .59-.75	15-19 .59-.75	19-22 .75-.87	19-22 .75-.87	19-22 .75-.87	19-22 .75-.87	19-22 .75-.87	26-30 1.02-1.18	26-30 1.02-1.18	26-30 1.02-1.18	26-30 1.02-1.18	22-25 .87-.98
E	- -	- -	36 1.42	36 1.42	36 1.42	36 (48) 1.42 (1.89)	48 1.89	48 1.89	48 1.89	48 1.89	48 (68) 1.89 (2.68)	68 2.68	68 2.68	68 2.68	68 2.68	104 4.09
M[2]	- -	- -	4,5 .18	- -	4,5 .18	5,5 .22	5 .20	5,5 .22	7,5 .30	7,5 .30	7,5 .30	7,5 .30	9,4 .37	9,4 .37	27,5 1.08	11,9 .47
M1	1 .04	1 .04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

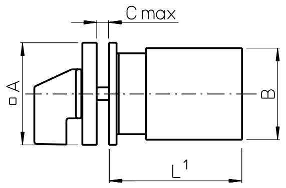
[2]M, additional length for mounting ERF only
[3]Dimensions in ( ) for ERF mounting plate only

[1]see page 51

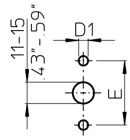
Dimensions

mm
inch

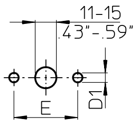
Two or Four Hole Panel Mounting



E22

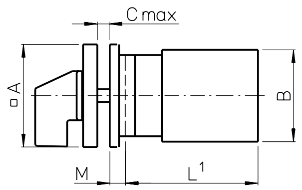


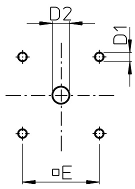
E22-V



	CA10 CA11 CAD11 CAD12	CL10	CA20	CA25
A	48 1.89	48 1.89	48 1.89	48 1.89
B	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81
C	4 .16	4 .16	4 .16	4 .16
D1	5 .20	5 .20	5 .20	5 .20
E	30 1.17	30 1.17	30 1.17	30 1.17

EG
EGF





		CA10 CA11 CAD11 CAD12	CL10	CA20	CA25	C26	C32	C42	C80	C125 L switches Size S2
	A	64 2.52	64 2.52	64 2.52	64 2.52	88 3.46	88 3.46	88 3.46	130 5.12	130 5.12
	B	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81	58 2.28	60 2.36	66 2.60	84 3.30	88 3.46
	C	4 .16	4 .16	4 .16	4 .16	5,5 .22	5,5 .22	5,5 .22	7 .28	7 .28
	D1	5 .20	5 .20	5 .20	5 .20	6 .24	6 .24	6 .24	7 .28	7 .28
EG	**D2**	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	13-17 .51-.67	13-17 .51-.67	13-17 .51-.67	15,5-20 .61-.79	15,5-20 .61-.79
EGF	**D2**	19-22 .75-.87	19-22 .75-.87	19-22 .75-.87	19-22 .75-.87	26-30 1.02-1.18	26-30 1.02-1.18	26-30 1.02-1.18	22-25 .87-.98	22-25 .87-.98
	E	48 1.89	48 1.89	48 1.89	48 1.89	68 2.68	68 2.68	68 2.68	104 4.09	104 4.09
EG	**M**	6,7 .26	6,7 .26	6,7 .26	6,7 .26	0,5 .02	0,5 .02	0,5 .02	2 .08	2 .08
EGF	**M**	6,7 .26	6,7 .26	6,7 .26	6,7 .26	0,5 .02	0,5 .02	0,5 .02	2 .08	2 .08

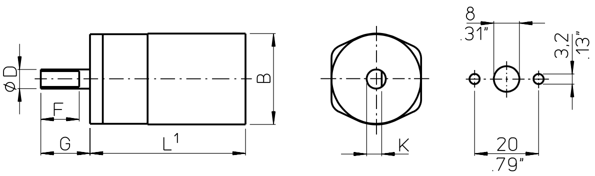
[1]see page 51

Dimensions

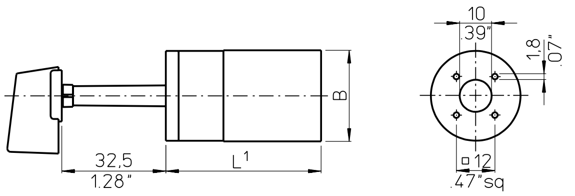
mm
inch

Four Hole Panel Mounting or Mosaic Mounting

E9
E91

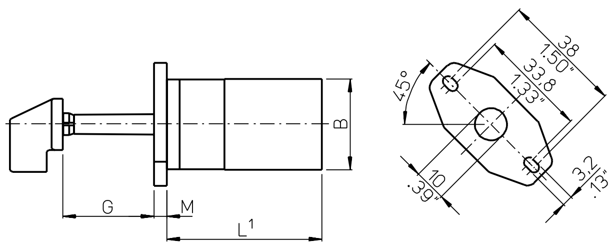


E92



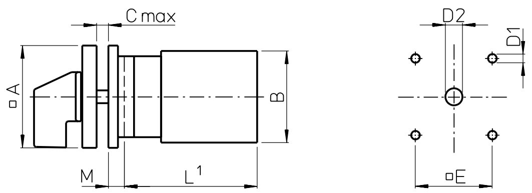
	CA4 CA4-1	CL4
B	29,5 1.16	35x46 1.38x1.81

E93
E94



CA4 CA4-1 CL4	E9	E91	E92	E93	E94
D	6 .24	6,35 .25	- -	- -	- -
F	12 .47	12,8 .50	- -	- -	- -
G	15,4 .61	17,4 .69	32,5 1.28	28,5 1.12	32,5 1.28
K	4,7 .19	5,5 .22	- -	- -	- -
M	- -	- -	- -	4 .16	- -

KN1
KD1
KN2



KN2	CA10 CA11 CAD11 CAD12	CL10	CA20	CA25
A	48 1.89	48 1.89	48 1.89	48 1.89
B	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81
C	4 .16	4 .16	4 .16	4 .16
D1	5 .20	5 .20	5 .20	5 .20
D2	8-15 .31-.59	8-15 .31-.59	8-15 .31-.59	8-15 .31-.59
E	36 1.42	36 1.42	36 1.42	36 1.42
M	5,2 .20	5,2 .20	5,2 .20	5,2 .20

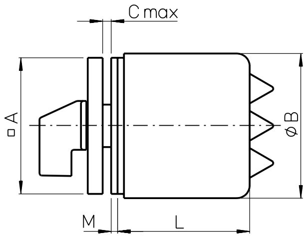
KN1 KD1	CA10 CA11 CAD11 CAD12	CL10	CA20	CA25	CA10B CA11B CA20B	CA25B	C26	C32	C42
A	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52
B	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81	56 2.20	56 2.20	58 2.28	60 2.36	66 2.60
C	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16
D1	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20
D2	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59
E	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89
M	4,7 .19	4,7 .19	4,7 .19	4,7 .19	7 .28	7 .28	7 .28	7 .28	7 .28

[1] see page 51

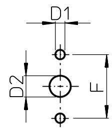
Dimensions

mm
inch

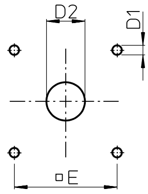
Two or Four Hole Panel Mounting



ED22



EC
ED
EC1
ED1

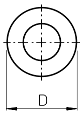


		CA10 CAD11 CAD12		CA11		CA20		CA25		CA10B		CA11B		CA20B CA25B		C26		C32	C42	C43
		EC ED	**ED22**	**EC ED**	**ED22**	**EC ED**	**ED22**	**EC ED**	**ED22**	**EC ED**	**EC1 ED1**	**EC ED**	**EC1 ED1**	**EC ED**	**EC1 ED1**	**EC ED**	**EC1 ED1**	**EC ED**	**EC ED**	**EC ED**
	A	48 1.89	48 1.89	48 1.89	48 1.89	64 2.52	48 1.89	64 2.52	48 1.89	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52	88 3.46	88 3.46	88 3.46
	B	50 1.97	74 2.91	50 1.97	74 2.91	68 2.68	74 2.91	68 2.68	74 2.91	88 3.46	74 2.91	88 3.46	74 2.91	88 3.46	74 2.91	88 3.46	74 2.91	108 4.25	108 4.25	108 4.25
EC/EC1	**C**	4 .16	- -	4 .16	- -	4 .16	- -	4 .16	- -	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16
ED/ED1/ ED22	**C**	2 .08	4 .16	2 .08	4 .16	2 .08	4 .16	2 .08	4 .16	2 .08	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	4 .16	7,5 .30	7,5 .30	7,5 .30
	D1	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	6 .24	6 .24	6 .24
EC/EC1	**D2**	8-15 .31-.59	- -	8-15 .31-.59	- -	8-15 .31-.59	- -	8-15 .31-.59	- -	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	13-15 .51-.59	13-15 .51-.59	13-15 .51-.59
ED/ED1/ ED22	**D2**	18-22 .71-.87	11-15 .43-.59	18-22 .71-.87	11-15 .43-.59	18-22 .71-.87	11-15 .43-.59	18-22 .71-.87	11-15 .43-.59	22-25 .87-.98	19-22 .75-.87	22-25 .87-.98	19-22 .75-.87	22-25 .87-.98	19-22 .75-.87	22-25 .87-.98	19-22 .75-.87	28-33 1.1-1.3	28-33 1.1-1.3	28-33 1.1-1.3
	E	36 1.42	- -	36 1.42	- -	48 1.89	- -	48 1.89	- -	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89	68 2.68	68 2.68	68 2.68
	F	- -	30 1.17	- -	30 1.17	- -	30 1.17	- -	30 1.17	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
ED/ED22	**M**	2 .08	1,5 .06	2 .08	1,5 .06	2 .08	1,5 .06	2 .08	1,5 .06	2 .08	- -	2 .08	- -	2 .08	- -	2,2 .09	- -	2,2 .09	2,2 .09	2,2 .09
Stages L	**1**	53,5 2.10	74,3 2.93	53,5 2.10	74,3 2.93	- -	74,3 2.93	- -	74,3 2.93	- -	73,7 2.90	- -	73,7 2.90	- -	73,7 2.90	- -	73,7 2.90	101 3.98	101 3.98	101 3.98
	2	53,5 2.10	74,3 2.93	53,5 2.10	74,3 2.93	- -	74,3 2.93	- -	74,3 2.93	- -	73,7 2.90	- -	73,7 2.90	- -	73,7 2.90	- -	73,7 2.90	101 3.98	101 3.98	101 3.98
	3	67,5 2.66	74,3 2.93	67,5 2.66	94,3 3.71	- -	74,3 2.93	- -	94,3 3.71	- -	73,7 2.90	- -	93,7 3.69	- -	93,7 3.69	- -	93,7 3.69	101 3.98	139 5.47	139 5.47
	4	67,5 2.66	74,3 2.93	81,5 3.21	94,3 3.71	- -	94,3 3.71	- -	94,3 3.71	- -	93,7 3.69	- -	93,7 3.69	- -	93,7 3.69	- -	93,7 3.69	139 5.47	139 5.47	139 5.47
	5	81,5 3.21	94,3 3.71	- -	- -	103 4.06	- -	103 4.06	- -	- -	93,7 3.69	103 4.06	- -	103 4.06	- -	114,5 4.50	- -	139 5.47	177 6.97	177 6.97
	6	81,5 3.21	94,3 3.71	- -	- -	- -	- -	- -	- -	103 4.06	- -	127 5	- -	127 5	- -	127 5	- -	177 6.97	215 8.46	215 8.46
	7	- -	- -	- -	- -	- -	- -	- -	- -	127 5	- -	139,5 5.47	- -	139,5 5.47	- -	139,5 5.47	- -	177 6.97	215 8.46	215 8.46
	8	- -	- -	- -	- -	- -	- -	- -	- -	127 5	- -	152 5.98	- -	152 5.98	- -	152 5.98	- -	215 8.46	253 9.96	253 9.96
	9	- -	- -	- -	- -	- -	- -	- -	- -	139,5 5.47	- -	164,5 6.48	- -	164,5 6.48	- -	164,5 6.48	- -	215 8.46	253 9.96	253 9.96
	10	- -	- -	- -	- -	- -	- -	- -	- -	152 5.98	- -	177 6.97	- -	177 6.97	- -	177 6.97	- -	253 9.96	- -	291 11.46
	11	- -	- -	- -	- -	- -	- -	- -	- -	152 5.98	- -	- -	- -	- -	- -	- -	- -	253 9.96	- -	291 11.46
	12	- -	- -	- -	- -	- -	- -	- -	- -	164,5 6.48	- -	- -	- -	- -	- -	- -	- -	253 9.96	- -	329 12.95

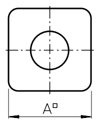
Dimensions
mm
inch

Single Hole Mounting or Base Mounting

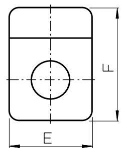
FS1... FT1... FT3...

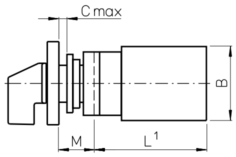


FH3... FS2... FT2... FT4...

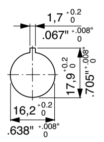


FS4...

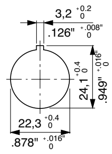




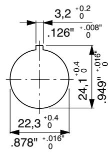
FS1... FS2... FS4...

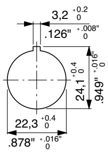


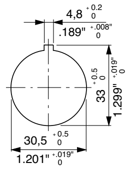
FH3... FT1... FT2...



FT3... FT4...

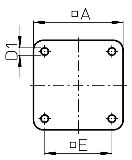


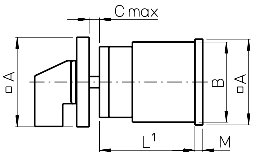


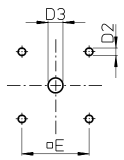


		CA4 CA4-1	CL4	CA10 CA11 CAD11 CAD12	CL10	CA20	CA25
A/E		30 1.18	30 1.18	48 1.89	48 1.89	48 1.89	48 1.89
	FH3...	- -	- -	64 2.52	64 2.52	64 2.52	64 2.52
B		28 1.10	35x46 1.38x1.81	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81
C		5 .20	5 .20	6 .24	6 .24	6 .24	6 .24
D		29,5 1.16	29,5 1.16	39 1.54	39 1.54	39 1.54	39 1.54
F		39 1.54	39 1.54	- -	- -	- -	- -
M		12,5 .49	12,5 .49	18,2 .72	18,2 .72	18,2 .72	18,2 .72
	FH3...	- -	- -	25,2 .99	25,2 .99	25,2 .99	25,2 .99

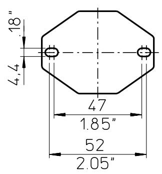
VE VE-V

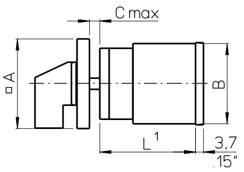


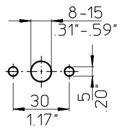




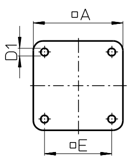
VE22 VE22V

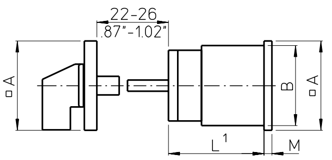


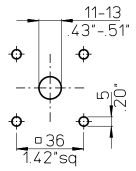




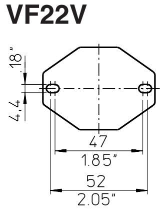
VF VF-V

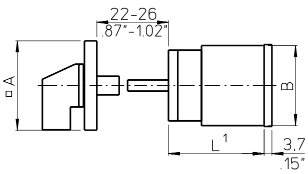


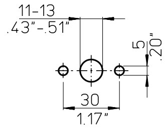




VF22 VF22V







	CA10 CA11 CAD11 CAD12	CL10	CA20	CA25[2]	CA10B CA11B CA20B	CA25B	C26	C32	C42[2]	C43	C80	C125	L switches Size S2	C315 L switches Size S3
A	48 1.89	48 1.89	48 1.89	48 (64) 1.89 (2.52)	64 2.52	64 2.52	64 2.52	64 2.52	64 (88) 2.52 (3.46)	88 3.46	88 3.46	88 3.46	88 3.46	128 5.04
B	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81	56 2.20	56 2.20	58 2.28	60 2.36	66 2.60	84 3.30	84 3.30	88 3.46	88 3.46	126 4.96
C	10,5 .41	10,5 .41	10,5 .41	10,5 .41	13,5 .53	13,5 .53	13,5 .53	13,5 .53	13,5 .53	16 .63	16 .63	16 .63	16 .63	19,3 .76
D1	4,1 .16	- -	4,1 .16	4,1 .16	4,1 .16	4,1 .16	4,1 .16	4,1 .16	5,4 .21	5,4 .21	5,4 .21	5,4 .21	5,4 .21	7 .28
D2	5 .20	- -	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	6 .24	6 .24	6 .24	6 .24	7 .28
D3	8-15 .31-.59	- -	8-15 .31-.59	8-15 .31-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	13-17 .51-.67	13-17 .51-.67	13-17 .51-.67	13-17 .51-.67	15,5-20 .61-.79
E	36 1.42	- -	36 1.42	36 (48) 1.42 (1.89)	48 1.89	48 1.89	48 1.89	48 1.89	48 (68) 1.89 (2.68)	68 2.68	68 2.68	68 2.68	68 2.68	104 4.09
M	2,2 .09	- -	2,2 .09	3,2 .13	2,5 .10	2,5 .10	5 .20	5 .20	5 .20	7 .28	8,9 .35	8,9 .35	27 1.06	11,4 .45

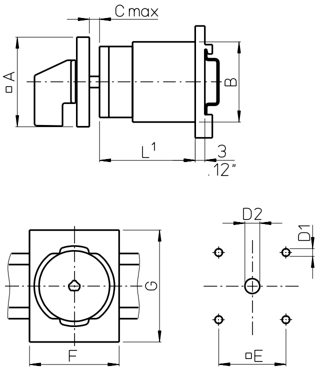
[2]Dimensions in ( ) for revertive mounting plate

[1]see page 51

Dimensions
mm
inch

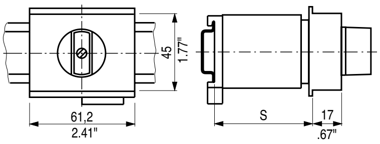
Base Mounting

VE1

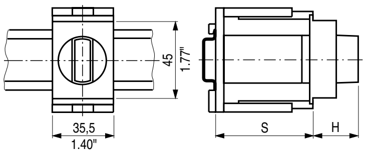


	CA10 CA11 CAD11 CAD12	CL10	CA20	CA25	CA10B CA11B CA20B	CA25B	C26	C32	C42
A	48 1.89	48 1.89	48 1.89	48 1.89	64 2.52	64 2.52	64 2.52	64 2.52	64 2.52
B	43 1.69	50x56 1.97x2.20	45 1.77	46 1.81	56 2.20	56 2.20	58 2.28	60 2.36	66 2.60
C	10,5 .41	10,5 .41	10,5 .41	10,5 .41	13,5 .53	13,5 .53	13,5 .53	13,5 .53	13,5 .53
D1	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20	5 .20
D2	8-15 .31-.59	8-15 .31-.59	8-15 .31-.59	8-15 .31-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59	10-15 .39-.59
E	36 1.42	36 1.42	36 1.42	36 1.42	48 1.89	48 1.89	48 1.89	48 1.89	48 1.89
F	48 1.89	48 1.89	48 1.89	48 1.89	70 2.76	70 2.76	70 2.76	70 2.76	70 2.76
G	60 2.36	60 2.36	60 2.36	60 2.36	60 2.36	60 2.36	60 2.36	60 2.36	60 2.36

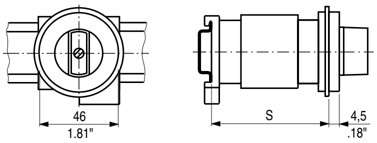
VE2



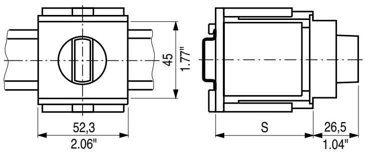
VE21 (for CA4 and CA4-1)



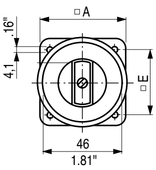
VE3

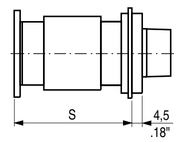


VE21 (for CA10-CA25)



VE4





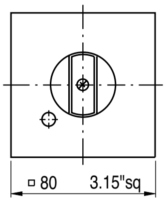
	VE2 CA10 CAD11 CAD12	 CA11 CA20 CL10	 CA25	VE3 CA10 CAD11 CAD12	 CA11 CA20 CA25 CL10	VE4 CA10 CAD11 CAD12	 CA11 CA20	 CA25	$S_{min.}$	H	VE21 CA4 CA4-1	 CA10 CAD11 CAD12	 CA11	 CA20	 CA25
	Max. no. of stages			Max. no. of stages		Max. no. of stages					No. of stages				
S = 46 1.81	3	1	-	1	1	1	2	-	44 1.73	21 .83	1/2	1/2	1/2	1/2	1
S = 50 1.97	3	1	1	2	1	2	2	1	46 1.81	26,5 1.04	3	3	-	-	2
S = 61 2.40	4	2	2	3	2	3	3	2	54 2.13	26,5 1.04	4	-	-	-	-
S = 67 2.64	5	2	2	3	2	3	3	2	56 2.20	- -	-	-	3	3	-
S = 69 2.70	5	3[2]	3	4	3	4	4	3	60 2.36	- -	-	-	-	-	3
									62 2.44	26,5 1.04	5	-	-	-	-
									66 2.60	- -	-	4/5	-	-	-
									68 2.68	- -	-	-	4	-	-
									70 2.76	26,5 1.04	6	-	-	4	-
									74 2.91	- -	-	6	-	-	4

[1] see page 51 [2] not available for switch type CA20

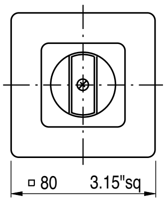
Dimensions
mm
inch

Wall Mounting, Escutcheon Plates and Additional Length

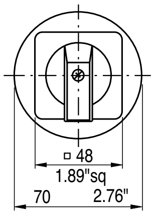
UE1
UE2
UE3



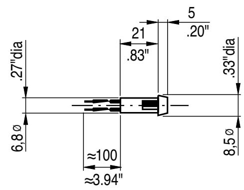
UE4
UE5
UE6



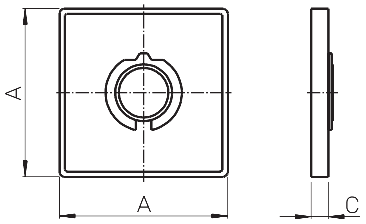
UE7



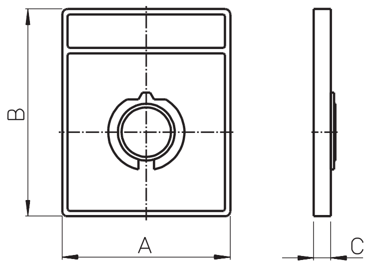
Lamp



Escutcheon plates for mounting E, EF, ER, ERF, EG, EGF, KN1, KD1, KN2, EC, EC1, ED, ED1, VE, VE1, VF



Size	A	C
S00	30 1.18	5,5 .22
S0	48 1.89	6,3 .25
S1	64 2.52	7,4 .29
S2	88 3.46	8,5 .33
S3	130 5.12	11,5 .45

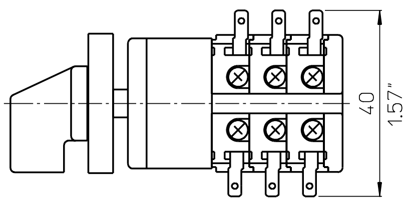


Size	A	B	C
S00	30 1.18	39 1.54	5,5 .22
S0	48 1.89	59 2.32	6,7 .26
S1	64 2.52	78 3.07	7,4 .29

Additional length for amendment (page 4)

	CA10 CA11 CAD11 CAD12	CA20 CA25	C26	C32	C42
Latching mechanism size S1	5,4 .21	5,4 .21	- -	- -	- -
Latching mechanism size S2	- -	- -	9,2 .36	9,2 .36	- -
Snap action	14,3 .56	14,3 .56	12,2 .48	12,2 .48	12,2 .48

Quick connects for switches CA4-4

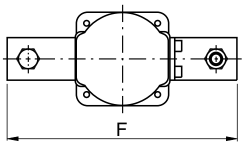


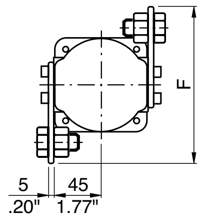
Dimensions

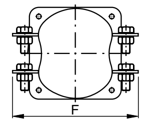
mm
inch

Additional Length

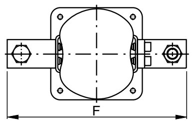
Terminal lugs for switches C315, C316 and L switches



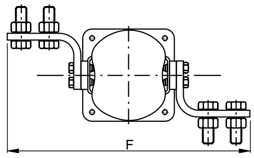




C315
C316
L400
L600



L800
L1200
L1600



L2000

	L350	L630	L1000	L1250	L351	L631	L1001	L1251	C315 C316	L400	L600	L800 L1200	L1600 L2000
F	190 7.48	220 8.66	230 9.06	240 9.45	138 5.43	148 5.83	148 5.83	148 5.83	150 5.91	180 7.09	208 8.19	256 10.08	326 12.83

Length L

Stages	CA4 CA4-1	CL4	CA10 CAD11 CAD12	CL10	CA11	CA20	CA25	CA10B	CA11B	CA20B	CA25B	C26	C32	C42	C43	C80	C125 L switches Size S2	C315 L switches Size S3
1	30 1.18	34 1.34	33,5 1.32	37,2 1.46	36,7 1.44	37,7 1.48	39 1.51	38,9 1.53	42,1 1.66	43,1 1.70	44,4 1.75	42 1.65	46,8 1.84	50,8 2.00	59 2.32	61,5 2.42	67,5 2.66	78,6 3.09
2	38 1.50	46 1.81	43 1.69	49,9 1.96	49,4 1.94	50,4 1.98	53 2.09	48,4 1.91	54,8 2.16	55,8 2.20	58,4 2.30	54,7 2.15	64,3 2.51	72,3 2.85	80,5 3.17	88,0 3.46	100 3.94	117,2 4.61
3	46 1.81	58 2.28	52,5 2.07	62,6 2.46	62,1 2.44	63,1 2.48	67 2.64	57,9 2.28	67,5 2.66	68,5 2.70	72,4 2.85	67,4 2.65	81,8 3.22	93,8 3.69	102 4.02	114,5 4.51	132,5 5.22	155,8 6.13
4	54 2.13	70 2.76	62 2.44	75,3 2.96	74,8 2.94	75,8 2.98	81 3.19	67,4 2.65	80,2 3.16	81,2 3.20	86,4 3.40	80,1 3.15	99,3 3.91	115,3 4.54	123,5 4.86	141 5.55	165 6.50	194,4 7.65
5	62 2.44	82 3.23	71,5 2.81	88 3.46	87,5 3.44	88,5 3.48	95 3.74	76,9 3.03	92,9 3.66	93,9 3.70	100,4 3.95	92,8 3.65	116,8 4.60	136,8 5.39	145 5.71	167,5 6.59	197,5 7.78	233 9.17
6	70 2.76	94 3.70	81 3.19	100,7 3.96	100,2 3.94	101,2 3.98	109 4.29	86,4 3.40	105,6 4.16	106,6 4.20	114,4 4.50	105,5 4.15	134,3 5.29	158,3 6.23	166,5 6.56	194 7.64	230 9.06	271,6 10.69
7	78 3.07	106 4.17	90,5 3.56	113,4 4.46	112,9 4.44	113,9 4.48	123 4.84	95,9 3.78	118,3 4.66	119,3 4.70	128,4 5.05	118,2 4.65	151,8 5.98	179,8 7.08	188 7.40	220,5 8.68	262,5 10.33	310,2 12.21
8	86 3.39	118 4.65	100 3.94	126,1 4.96	125,6 4.94	126,6 4.98	137 5.39	105,4 4.15	131 5.16	132 5.20	142,4 5.60	130,9 5.15	169,3 6.67	201,3 7.93	209,5 8.25	247 9.72	295 11.61	348,8 13.73
9	94 3.70	- -	109,5 4.31	138,8 5.46	138,3 5.44	139,3 5.48	151 5.94	114,9 4.52	143,7 5.66	144,7 5.70	156,4 6.15	143,6 5.65	186,8 7.36	222,8 8.77	231 9.09	273,5 10.77	327,5 12.89	387,4 15.25
10	- -	- -	119 4.68	151,5 5.96	151 5.94	152 5.98	165 6.50	124,4 4.90	156,4 6.16	157,4 6.20	170,4 6.70	156,3 6.15	204,3 8.04	244,3 9.62	252,2 9.54	300 11.81	360 14.17	426 16.77
11	- -	- -	128,5 5.06	- -	163,7 6.44	164,7 6.48	179 7.05	133,9 5.27	169,1 6.66	170,1 6.70	184,4 7.25	169 6.65	221,8 8.73	265,8 10.46	274 10.79	326,5 12.85	392,5 15.45	464,6 18.29
12	- -	- -	138 5.43	- -	176,4 6.94	177,4 6.98	193 7.60	143,4 5.65	181,8 7.16	182,8 7.20	198,4 7.80	181,7 7.15	239,3 9.42	287,3 11.31	295,5 11.63	353 13.90	425 16.73	503,2 19.81

The Range of "Blue Line" Switchgear

Technical literature covering the following products is available on request.

	Catalog Number
Main Switches and Main Switches with Emergency Function 16 A-315 A **Maintenance Switches 20 A-315 A** **Switch Disconnectors 20 A-315 A** According to IEC 60947-3, EN 60947-3, VDE 0660 part 107, IEC 60204, EN 60204 and VDE 0113	**500**
CL Switches 10 A-20 A **C, CA and CAD Switches 10 A-315 A and L Switches 350 A-2400 A** C, CA and CAD switches are designed for universal application. They are recommended for instrument, isolator, double-throw and motor control. L switches are designed for load and off-load applications. They are used to switch resistive or low inductive loads.	**100**
Optional Extras and Enclosures The complete product line, a large number of optional extras is available, including door interlocks, push-pull devices, cylinder and padlock attachments, control and indicator devices, AC motor drives, as well as enclosures, both insulated and metal.	**101**
A and AD Switches 6 A-25 A A and AD switches have 4 contacts in each switching stage. These switches provide an extensive range of switch functions and require a minimum mounting depth. Up to 36 switching positions are possible, with availability of 48 contacts per 12 stage switch column.	**110**
CG, CH and CHR Switches 10 A-25 A Ultra compact CG, CH and CHR switches are ideally suited for control and instrumentation applications. Switch terminals are "finger-proof" and conveniently accessible for wiring and are delivered open. All CG4 switches offer specially designed gold plated contacts or H-bridges with "cross-wire" contact systems, which facilitates their use in electronic circuitry and chemically aggressive environments.	**120**
DH, DHR, DK and DKR Switches 6 A-16 A DH, DHR, DK and DKR switches incorporate unique corrosion resistant contacts that permit operation on system voltage as low as 1 V. They have fully enclosed and protected contacts which can be operated either by rotary and/or lateral handle movement. D switches are used in calibration and semiconductor circuits. They are also used for relay and contactor control.	**130**
X Switches 80 A-630 A X switches can be applied for load, tap and gang switching duties. They incorporate 6 contacts in each switching stage. Their compact design provides a minimum length dimension for mounting purposes.	**140**
KG Switches 20 A-315 A and KH and KHR Switches 16 A-80 A KG, KH and KHR switches are excellent circuit interruptors. They have high through fault and fault making capacities and are especially designed for use as isolators and safety switches for machine tools, distribution panels and switchboards. KG ON/OFF switches offer unusually high dimensioned air and creepage distances between terminals which are designed for time saving "straight-line" wiring. ON/OFF switches are available with up to 8 poles and double-throw switches are available with up to 4 poles.	**150**
Contactors 16 A-115 A and Motor Starters 1,1 kW-55 kW These include control relays, motor contactors, two and four pole output contactors, heating contactors, thermal overload relays.	**200**
Push Buttons and Pilot Lights, 22,5 mm Ø A complete range of state-of-the-art push buttons and pilot lights represent an ideal combination of functional security and economical efficiency in a modular design.	**302**

We reserve the right to make technical and dimensional changes without prior notice.

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SURGE DIVERTERS

1. SURGE DIVERTER TECHNICAL DETAILS

2. SURGE DIVERTER INSTALLATION INSTRUCTION

CRITEC®

Surge and Transient Protection

Featuring CRITEC® Surge Protection Devices

ERICO®

Introduction

ERICO

Lightning strikes and the dangerous surges and transients induced by lightning, as well as surges caused by motor switching and power supply regulation problems, represent a direct threat to people, building facilities, electrical and electronic equipment.

ERICO recognises that no single technology can protect a facility from the damaging effects of lightning and induced transients, which can severely damage or destroy electronic systems. An integrated approach is required to provide effective direct strike protection and grounding, in combination with effective surge protection, so that valuable assets, data and personnel remain secure and safe.

In order to provide the optimum level of protection, ERICO has developed a Six Point Plan of Protection™, incorporating direct strike protection and grounding and surge protection for incoming power and data lines. This protection plan, combined with engineering and manufacturing excellence established over the last century, has helped position ERICO as a global supplier of premium performance protection products.

Introduction

By following the Six Point Plan of Protection™, ERICO consultants are able to recommend the most effective solutions to individual lightning, grounding and surge problems while retaining an integrated protection philosophy. The products and concepts outlined in this catalogue relate to points 5 & 6 of the ERICO Six Point Protection Plan.

Point 5 of the Six Point Plan advocates a coordinated approach of distributed protection, where the first stage of defence is the installation of primary protection devices at the mains supply service entrance, followed by secondary protection at distribution branch panels or, where necessary, at point-of-use applications.

Point 6 recognises the need to provide effective surge clamping on cables supplying telecommunications, signal and data management equipment and has resulted in the development of equipment protectors which display a range of transient and operating performance characteristics, designed specifically for the protection of this type of equipment.

The ERICO Six Point Plan of Protection™

1. *Capture the lightning strike to a known and preferred attachment point.*
2. *Safely convey this energy to ground.*
3. *Dissipate the energy into a low impedance grounding system.*
4. *Bond all ground points together to eliminate ground loops and create an equipotential plane.*
5. *Protect incoming AC power feeders.*
6. *Protect low voltage data/telecommunication circuits.*

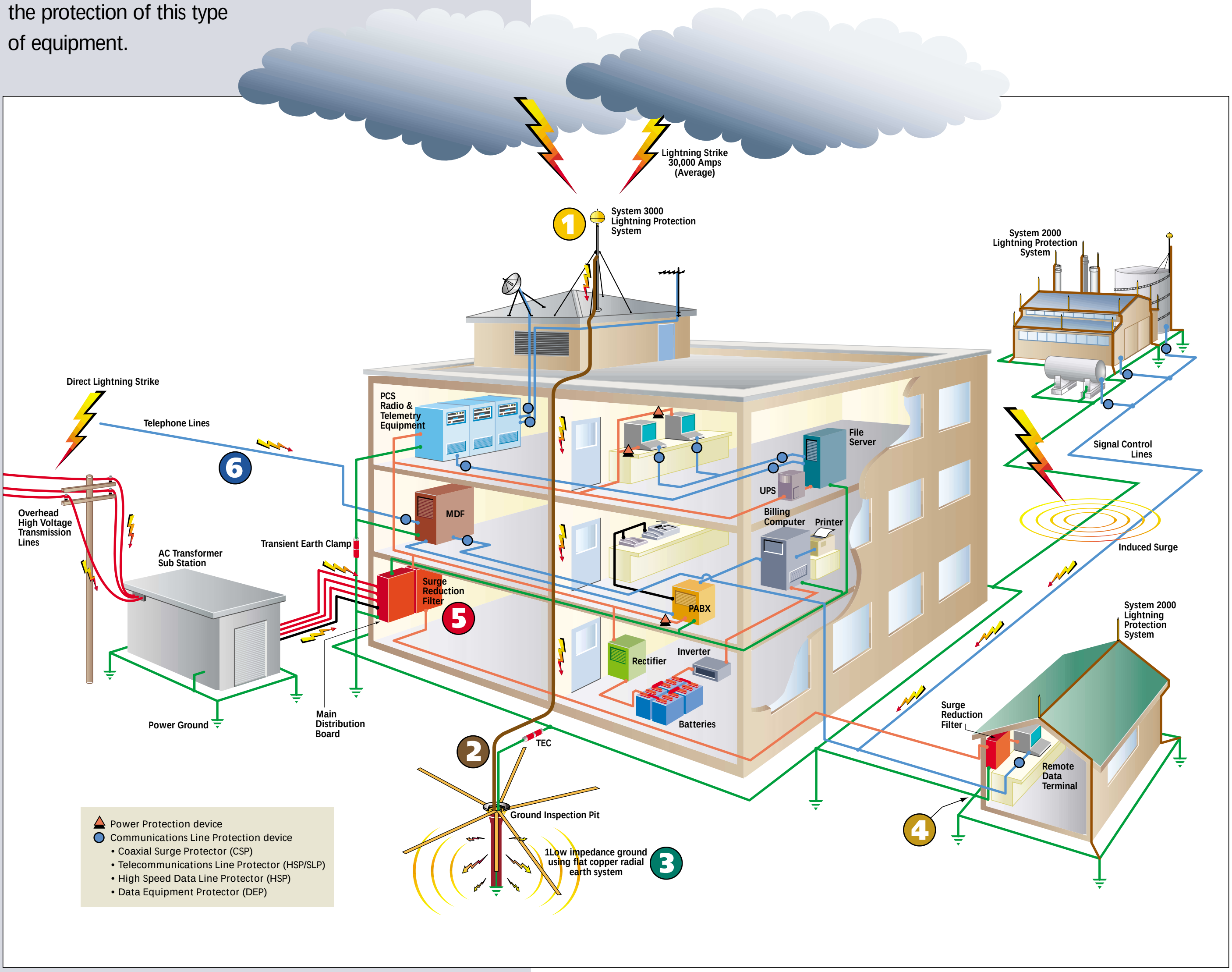


Figure 1. The Six Point Plan applied to a facility with point 5 showing primary and secondary stage protection for incoming AC power. Point 6 shows protection on telecommunication and data lines.

The need for protection

Critical Factors

Critical factors need to be considered when determining the need for facility protection. Many factors can be determined by answering the following questions:

- What is the risk to personnel?
- What is the risk of equipment damage?
- What are the consequences of equipment failure?
- Is the equipment associated with an essential service?
- How will equipment failure effect overall facility operation and revenue generation?
- What are the legal implications of providing inadequate protection?

The statistical nature of lightning and the broad spectrum of energy delivered by a lightning flash, problems created by various power generation and distribution systems, and the continued trend to more sensitive and specialised electronics, requires careful selection of available technologies if adequate protection is to be provided.

What are the costs of inadequate protection?

The costs that can result from inadequate protection are many and varied. The type of equipment within a facility will have a direct impact on the damage that can occur. Robust 240V equipment such as lighting and air-conditioning systems are able to withstand impulses in the region of 1000 to 1500 Vpk (L-N) and are not as sensitive to the rapid rate-of-rise exhibited by the pre-clamped surge waveform as are electronics. These systems are often not critical to the continuing operation of the site and therefore usually do not require the premium level of protection that is essential for more sensitive equipment.

However significant damage can occur, even to the more robust systems, as a result of lightning induced surges resulting within a radius of several kilometres, or from switching induced surges, particularly where long distribution lines are prevalent.

Costs can range from degradation of electrical or electronic systems to data loss, equipment destruction and also to injury of personnel. Some of these costs can appear relatively minor but the loss of an essential service or revenues associated with a facility or plant shut down can be enormous.

Damage to vital equipment caused by destructive surges and transients.

According to the Insurance Information Institute, NY, (NY Press Release 11 August 1989): Lightning and over-voltage transients cause damage to property, electrical, electronic and communications equipment estimated to be more than US$1.2 billion dollars per year in the US alone. This represents approximately 5% of all insurance claims in the US. Costs in more lightning prone regions of the world are even greater.

According to Holle, et al., Journal of Applied Met, Vol 35, No.8, August 1996: Insurance claims to lightning and over-voltage damage amount to US$332 million annually in the US, but many parties remain uninsured against this form of property damage. On average this represents one claim for every 57 lightning strikes in the US.

Sources of Transients and Surges

Although it is the most spectacular form of externally generated transients, lightning is only one source of over-voltage events. Other sources include the switching of power circuits and operation of electrical equipment by neighbouring industries, the operation of power factor correction devices, the switching and clearing of faults on transmission lines and utility substations. It is important to note that lightning does not need to directly strike a power line for such damage to occur; a strike several hundred metres away can induce large damaging transients, even to underground cables.

It is estimated that 70 to 85% of all transients are generated internally within one's own facility by the switching on and off of electrical loads such as lights, heating systems, motors and the operation of laser printers and photocopiers, etc.

Modern industry is highly reliant on electronic equipment and automation to increase productivity and safety. The economic benefits of such devices are well accepted. Computers are commonplace and microprocessor-based Programmable Logic Controllers (PLCs) are used in most manufacturing facilities. Microprocessors can also be found embedded in many industrial machines, security & fire alarms, time clocks and inventory tracking tools. Given the wide range of transient sources and the potential cost of disruption, the initial installed cost of surge protection can readily be justified for any facility.

As a guide, the cost of protection should be approximately 10% of the cost of the facility's economic risk.

What is the risk of occurrence of transients and surges?

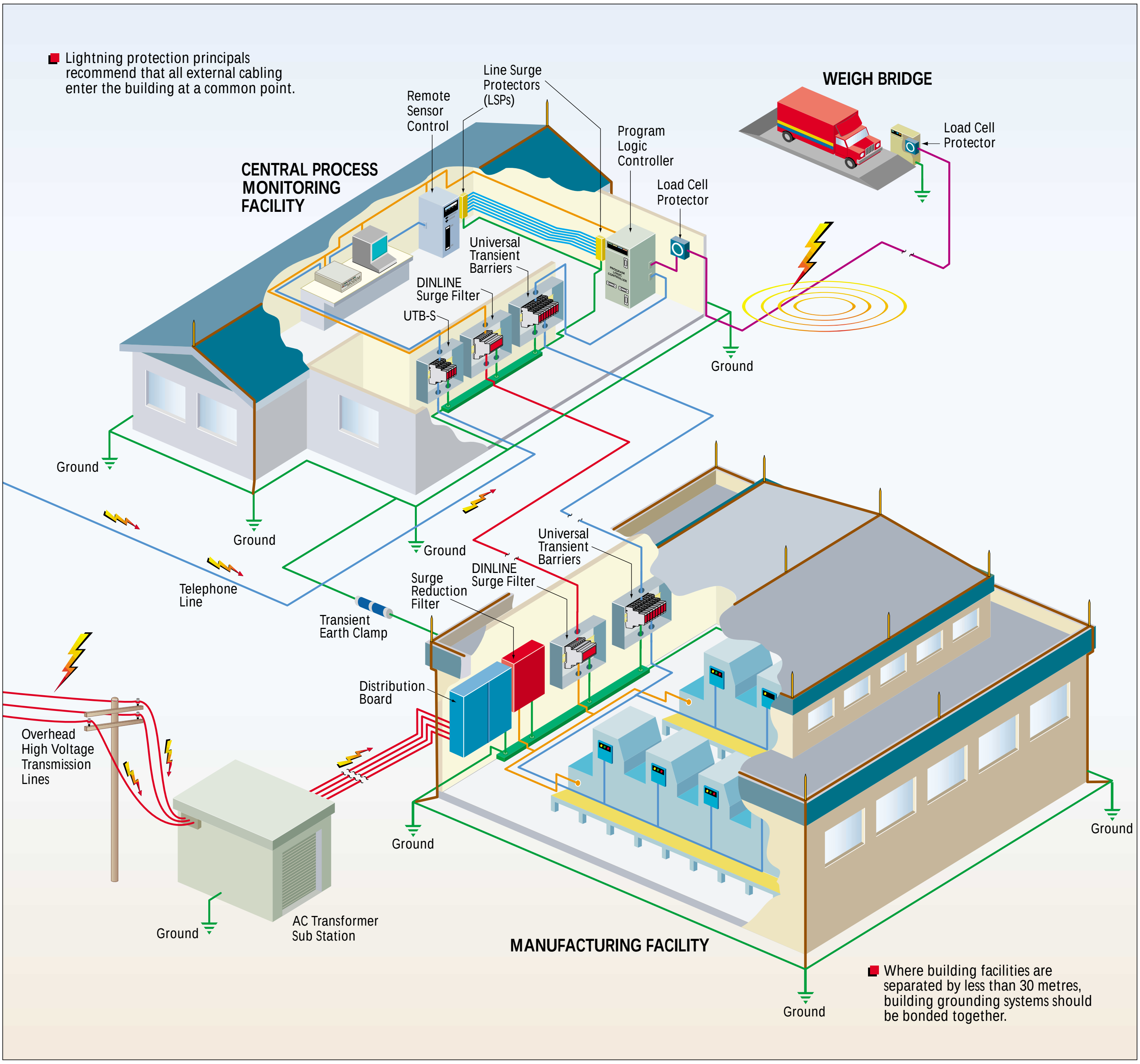
The risk of damage to an individual site will vary depending on a range of factors including the incidence of lightning activity, topography of the site, the source of power distribution and the distances that incoming power and communications lines travel. The incidence of switching loads, both external to and from within a facility, as well as switching of power correction devices will also affect risk factors of a particular location.

The need for co-ordinated protection

Reliable protection of structures, industrial and commercial operations and personnel, demands a systematic and comprehensive approach to minimising the threats caused by transient over-voltages. Grounding, bonding, lightning protection and surge protection all need to be considered for comprehensive facility electrical protection. Each of these are interdependent disciplines that need a holistic design approach to ensure the facility is not left with a vulnerable "blind spot". The investment in surge protection devices can be wasted if "blind spots" exist. For example, installing a surge protection device on the power supply to a programmable logic controller is of little value if the I/O lines are not also protected. In addition, an air terminal on the facility may capture the lightning energy but without a dependable ground system, this energy cannot be safely dissipated. Equally, even the most expensive Surge Protection Devices (SPDs) are poor performers if a low impedance electrical ground is not provided. These interdependent disciplines are best applied when looking at a total facility rather than an individual piece of equipment or portion of the facility.

It is for these reasons that the ERICO Six Point Plan was developed. The plan prompts the customer into considering a coordinated approach to lightning protection, surge and transient protection and grounding, an approach that embraces all aspects of potential damage, from the more obvious direct strike to the more subtle mechanisms of differential earth potential rises and voltage induction at service entry points.

Figure 2. The Six Point Plan applied to a manufacturing facility. Surge and transient protection principles applied to a total facility rather than individual pieces of equipment.



Understanding surge protection

How transients enter your facility

Transients can be coupled onto communication and power circuits in a variety of ways. Figure 3 shows three coupling methods onto a power circuit, using lightning as an example source:

- Galvanic coupling is a direct electrical connection.
- Magnetic coupling occurs when the magnetic field of a current carrying conductor induces a current onto an adjacent conductor. This is one reason why burying power cables is not considered adequate protection.
- Capacitive coupling is where the transient voltage is coupled due to the inherent capacitance between two circuits.

Nearby power circuits can be a source for magnetic and capacitive coupled transients onto communication circuits, particularly when run together on cable trays or raceways.

One of the reasons that lightning poses such a threat is because it can couple significant amounts of energy onto adjacent conductors using any one of these methods. For example, a lightning discharge several hundred metres from a power transmission line, railroad track or pipeline can magnetically and capacitively couple sufficient energy to disrupt operations and destroy information or equipment.

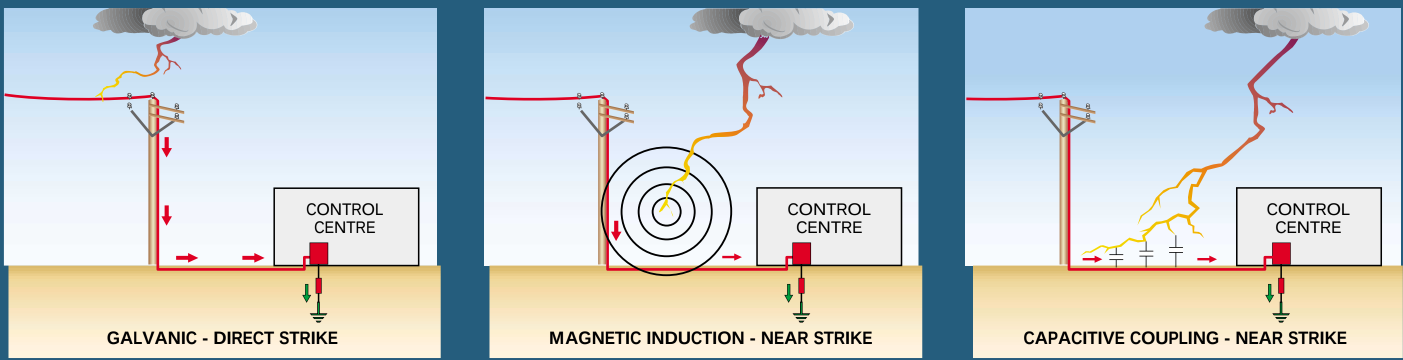


Figure 3. Three methods in which transients from lightning can be coupled onto power circuits.

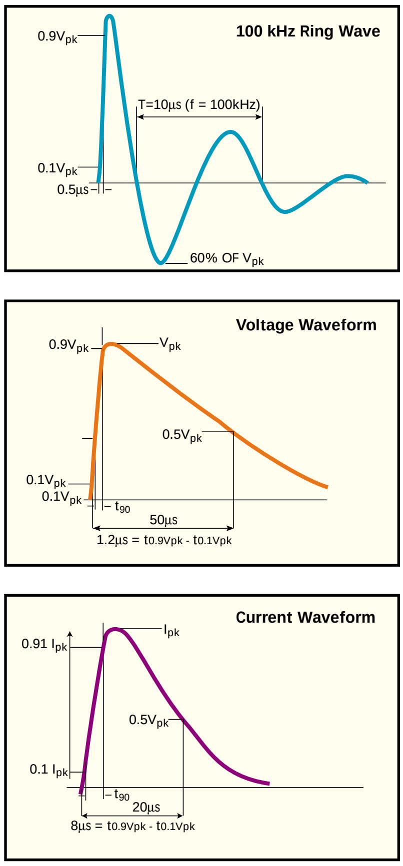
How SPD's are tested and what we use to test SPD's

Due to the random nature of most disturbances and the variable characteristics of the transmission media, transients exhibit wide waveform variations. However, field and laboratory measurements, confirmed by theoretical calculations, have lead to the selection of a small number of waveshapes that are representative of the majority of transients encountered in practice. To assist in the evaluation of the danger posed by transients, standards such as ANSI/IEEE C62.41 define typical location categories and corresponding waveforms as detailed in Figure 4.

- CCITT K17, (has now been replaced by ITU-TSS, International Telegraphic Union-Telecommunications Standards Sector) 10/700µs unidirectional impulse for the energy absorption specification of telephone protection equipment. This waveform is most representative of the long tail impulse characteristic of higher capacitance telephone lines.
- IEC, 10/350µs current impulse for service entrance power SPDs. This waveshape is thought to better represent the effects of a direct, galvanically coupled, lightning discharge.
- 5/50ns EFT burst - used to measure immunity of equipment from electromagnetic interference.
- 10/1000µs - sometimes used as a measure to test a SPDs energy handling ability.

These waveshapes define the short-circuit current characteristic of the generator (effectively the generators' internal impedance). It is also common to define the open circuit voltage characteristic of the generator. For example, for an IEEE C62.41 Category B test, this is 6kV 1.2/50µs. The 8/20µs waveform is perhaps the most commonly quoted waveform. Put simply, it is the short-circuit current from a generator with a 1.2/50µs open-circuit voltage. The 8/20µs specifies that the current rises from 10% to 90% of peak in 8µs and then decays to 50% of its peak in 20µs (taken from the initial rise point, not the peak).

Figure 4. Typical Test Waveforms.



Understanding surge protection

What surge ratings are recommended for various locations?

Two issues need to be considered when determining the surge ratings of an SPD for a specific location:

- What is the largest surge impulse the site is likely to require protection against?
- Will this rating provide sufficient operational life under the more frequent smaller impulses?

A number of sources provide information on the statistical distribution of the current discharge of the direct lightning strike. Figure 5, shows that direct strike lightning discharges above 100kA are likely to occur less than 5% of the time.

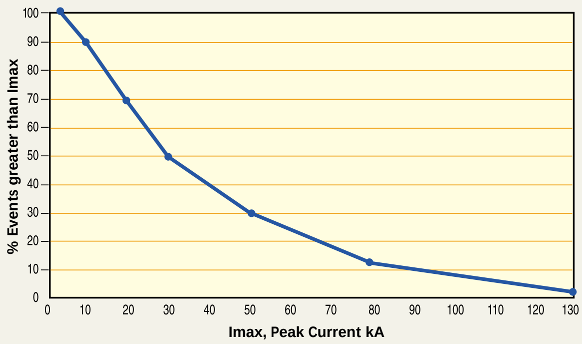


Figure 5. Probability distribution of direct strike current.

Most discharges do not strike the power line directly. Discharges are usually magnetically or capacitively coupled to the power line and, even with a direct strike, the energy will split in either direction and be attenuated by the distribution class arresters. This means that only a small fraction of the initial energy actually enters the facility in question.

ANSI/IEEE standard C62.41 has classified the service entrance environment as Cat B/Cat C (see Figure 6). Under this classification, the highest expected energy level is 10kA 8/20µs. IEEE argues its case by pointing to many years of data collected on observed failure rates of equipment and impulse insulation of the supply system. Put simply, electrical insulation of equipment prior to the service entrance will not allow enough voltage to develop to source currents in the magnitude of hundreds of thousands of amps.

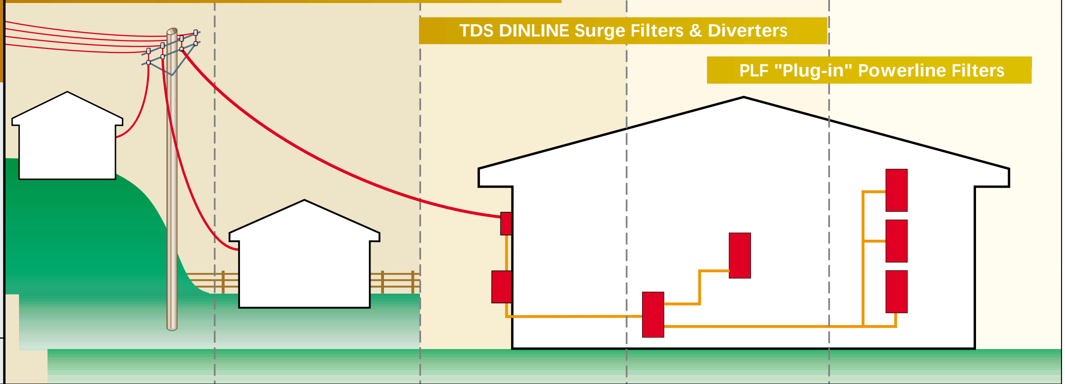
Recent work within the IEEE by respected scientists and academics has seen the Cat C reclassified to levels nearer a maximum single shot rating of 100kA 8/20µs. It is important to note this 100kA rating includes its own safety overhead, thus higher surge ratings are not required. A study that classifies the electrical environment of the primary service entrance to a facility can be found in a 10-year independent study completed during the 1970s. The purpose of this long duration study was to better understand the frequency and magnitude of surges which a typical building might experience in a location of average isokeraunic level, in order to better protect the computer main frame installations.

This again confirms the observation that large surges (>70kA) are rare, but multiple smaller surges are common. ERICO recommends a single shot rating of 100kA 8/20µs as providing a sufficient, cost effective level of protection for most exposed locations. SPDs rated to this level will provide a typical service life in excess of 15 years. This assertion is supported by the satisfactory field performance of many thousands of SPDs in some of the most lightning prone areas in the world. For an explanation of the different format of recommendations of IEEE (stated above) and IEC surge protection standards, please refer to page 9.

Figure 6. Recommended Surge Ratings

RECOMMENDED SURGE RATINGS Imax (8/20µs)

LOCATION CATEGORY				CAT C	CAT B	CAT A
		POINT-OF-ENTRY HIGHLY EXPOSED OR CRITICALLY IMPORTANT SITES	POINT-OF-ENTRY EXPOSED OR RURAL SITES	POINT-OF-ENTRY INNER CITY SITES	SUB CIRCUITS OR NEAR TO POINT-OF-ENTRY	DISTRIBUTED CIRCUITS, POWER OUTLETS, CIRCUITS REMOTE FROM POINT-OF-ENTRY
PRODUCT SERIES		TSG / TDS MOVTEC - TSG Surge Reduction Filters				
				TDS DINLINE Surge Filters & Diverters		
						PLF "Plug-in" Powerline Filters
EXPOSURE Ng = strikes/ km^2/year.	Ng					
HIGH	>2	100kA	70kA	40kA	20kA	10kA
MED.	0.5-2	65kA	40kA	20kA	20kA	5kA
LOW	<0.5	65kA	40kA	15kA	5kA	2kA



Understanding surge protection

What are clamping voltages, suppressed voltage ratings and let-throughs?

All these terms relate to a measure of the SPDs' ability to protect the downstream equipment by limiting the transient voltage of an applied impulse. No SPD can clamp the transient voltage to zero. Some small amount of residual voltage is let-through to the protected equipment. A good SPD will limit this let-through voltage to a level that can be tolerated by the equipment being protected. For example, it is not unusual for transients to exceed several thousand volts while most 240V electronic equipment can not withstand a voltage peak greater than 600V. Provided that the SPD can clamp the incident transient to less than the tolerance threshold of the equipment, adequate protection is provided.

Actual equipment withstand voltages vary, but as a guide for electronic equipment transient voltages, twice the nominal peak supply voltage can cause operational problems. Since the let-through voltage of an SPD is proportional to the magnitude of the applied surge, it is important, when considering the relative performance of different devices, to know what test amplitude in kA, and what waveshape (i.e. 8/20µs) was used to measure the let-through voltage.

In UL 1449, Underwriters Laboratories defines the term "Suppressed Voltage Rating" (SVR) as the transient voltage reaching the protected equipment (rounded up to the nearest given value in Table 1), under a test condition of 6kV 1.2/50µs, 500A 8/20µs. The 500A level was selected by UL as the lowest common denominator to allow even the cheapest lowest surge-rated SPDs to be tested. However, as most manufacturers use 275V nominal MOVs (for 240V nominal SPDs) most SVRs will be similar at this 500A 8/20µs level. Larger performance differences will be noted at higher surge ratings.

The IEEE C62.41 defines the electrical environment of the service entrance to a facility as being a Category C exposure. This means that transients of up to 10kA 8/20µs with voltages of up to 20kV can be expected. Under such conditions, two SPDs with similar SVR results under UL 1449 may exhibit significantly different let-through voltages.

UL1449 attempts to make these products comparable by providing SVR levels into which various devices can be categorised. As an example, an SPD with a let-through of 830V will be considered to have an SVR of 900V. This allows comparison of devices falling between 800V and 900V. These categories extend to 6000V in increments of 100V for smaller capacity devices, through 300 and 500V increments and up to 1000V increments for larger capacity devices.

UL Suppressed Voltage Ratings								
330	400	500	600	700	800	900	1000	1200
1500	1800	2000	2500	3000	4000	5000	6000	

Table 1. UL suppressed voltage ratings.

The term Clamping Voltage is defined by different standards to refer to the voltage at which an SPD limits a defined transient voltage/current amplitude and wave-shape. More correctly, it is intended to define the "knee" of the VI characteristic for a MOV at which the onset of conduction occurs and is generally measured at the 1mA point i.e. the voltage across the MOV when 1mA is being conducted.

For Example :	A Critec DSD 140-2S (refer to page 24) has the following performance ratings.	
	Clamp Voltage	275Vrms
	UL SVR Rating (500A, 6kV)	600V
	Cat B Let-through (3kA,6kV)	675V
	Cat C Let-through (20kA, 6kV)	940V
Compared to	A Critec DSD 180-2S (refer to page 24) has the following performance ratings.	
	Clamp Voltage	275Vrms
	UL SVR Rating (500A, 6kV)	600V
	Cat B let-through (3kA, 6kV)	630V
	Cat C let-through (20kA, 6kV	790V

As it can be shown, if you were comparing these two products using the SVR or Cat B let-through voltage ratings alone they would appear relatively similar in performance. However, when comparing the two products at a higher rating the differences in performance becomes clearer.

It is recommended to compare the performance of SPDs under surge magnitudes similar to that experienced in their application.

Damage to Airport runway lighting transformer caused by a lightning induced power surge.

Understanding surge protection

Shunt versus Series Protection and the benefits of filtering

A single port SPD is a device installed in parallel with the equipment to be protected and serves to simply clamp the peak of the transient voltage. The performance of this clamping depends upon technology used (e.g. MOVs, silicon, spark gaps, etc.) circuit and construction designs. The main limitation of the parallel diverter is that prior to the activation of the device, little is done to modify the leading edge of the incident surge.

Two port SPD devices contain a series inductance and typically, parallel capacitance. Such devices with a low-pass series filter, provide superior performance and are well suited to the protection of electronic equipment including computers, rectifier systems, to all types of electronic systems. A well-designed two port SPD will provide attenuation to, not only the higher frequency RFI/EMI (Radio Frequency Interference/Electro-Magnetic Interference), but critically to 5 to 50kHz band (the main fundamental frequency range of most lightning induced interference). Figure 7, indicates the typical lightning frequency bandwidth, comparing filters designed for RFI/EMI filtering to those required for effective protection against lightning induced surges.

The benefits of filtering

Lightning or switching transients are characterised by an impulse of very fast rise time. It is not uncommon to experience 10kA/µs rise times in current and much the same in voltage. Electronic equipment is sensitive not only to the absolute magnitude of the voltage, but also to the rate-of-rise of this impulse.

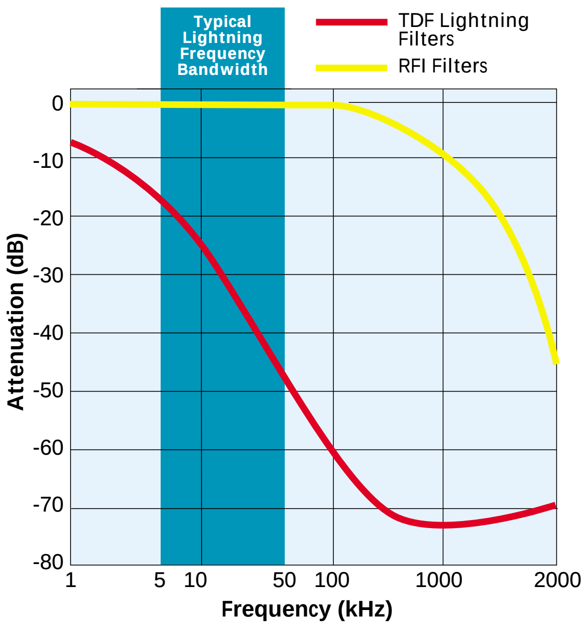


Figure 7. Typical lightning frequency bandwidth.

Much of the damage occurring in sensitive electronic circuits, which use power semiconductor components such as MOSFETs, thyristors and IGBTs, is the result of these steep changes in dv/dt and di/dt rather than simply the peak voltage.

Such fast changes can cause these components to switch at the wrong point in their conduction cycle and self-destruct. Protection of sensitive electronic circuits requires more than simply limiting the voltage of the transient. It is also extremely important to slow down the inherently fast rates of voltage and current rise, or in effect, to condition the waveshape of the incident surge. The inclusion of a "low pass filter" is well suited to such a role. As its name implies, such a device will pass low frequencies, such as the 50/60Hz mains voltage, with little attenuation, while it will attenuate and slow down the higher frequency components of a fast transient event. These products efficiently reduce the dv/dt of the surge from a nominal 10,000V/µs to less than 100V/µs, a one hundred-fold improvement.

These filters offer two benefits:

1) They further reduce the transient voltage reaching the equipment.

2) Most importantly they alter the rate-of-rise of the leading edge of the impulse. The residual leading edge spike from a standard SPD, although it may only be 500V in amplitude, can cripple electronics due to its extremely high rate of voltage rise of 3,000-12,000V/µs. The series surge filter reduces this rate-of-rise to less than 100V/µs. This slower change in voltage is better withstood by electronic equipment using switched mode power supplies. The filter also attenuates small signal RFI/EMI noise problems.

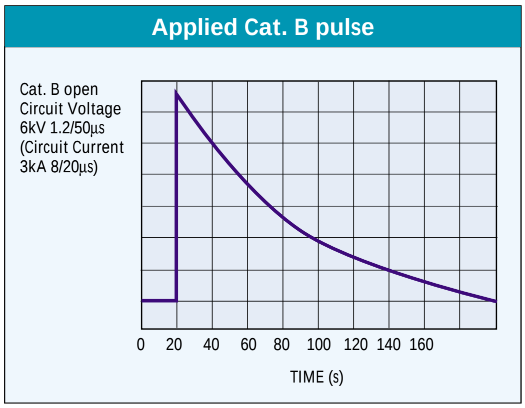
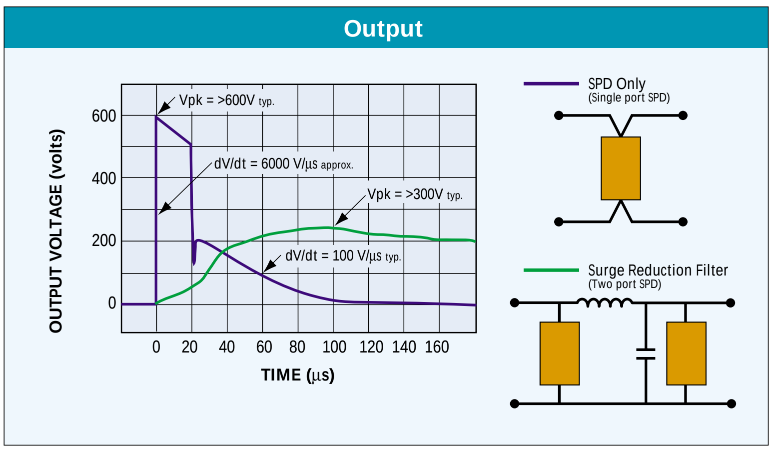


Figure 8. Improved reduction in dv/dt of Surge Filter



What to look for when selecting surge protection products

Recommended Surge Ratings - A Comparison between IEC and IEEE Recommendations

Competition between SPD manufacturers has seen ever-increasing surge ratings being offered to the market, to the point where surges of this magnitude are unlikely to ever occur in nature. A number of sources provide information on the statistical distribution of the current discharge of the direct lightning strike. Many studies have shown that peak lightning discharges above 100kA are likely to occur less than 5% of the time. Combined with the fact that most discharges do not strike the power line directly but are magnetically or capacitively coupled to it, and that even under a direct lightning discharge the energy will split in either direction and be attenuated by the distribution arresters and line losses, it is not difficult to determine that a smaller fraction of the initial lightning energy typically enters the facility in question.

ANSI/IEEE standard C62.41 has classified the "point-of-entry" environment as CatB/C. Under this classification the highest expected energy level is 10kA 8/20µs (For further detailed information refer to page 6). In contrast, the IEC61312 and DIN VDE 0675 defines some differing guidelines. IEC 61000-5-6 and IEC 61312-1 describe protection zone concepts. This is similar in nature to the ANSI/IEEE C62.41 concept of Category A, B & C locations.

A "Zone" is where the lightning electromagnetic environment can be defined/controlled. The zones are characterised by significant changes of electromagnetic conditions at these boundaries. These will typically be building boundaries, or the point where protection is installed.

- LPZ OA — Zone subject to direct strikes
- LPZ OB — Zone not subjected to direct strikes, but un-attenuated electromagnetic fields may occur.
- LPZ 1 — Zone not subjected to direct strikes and where currents in this zone are reduced compared to Zone OB
- LPZ 2... — If further reductions in current from LPZ 1 are achieved/required further zones can be created.

Actual surge ratings required in each of these zones is not exactly defined and is largely determine by some site-specific details . However, to assist with this the VDE0675 Part 6 standard defines the minimum class of product that can be applied to each of these Zones as shown below :

Class A : Arrester for use in Low-Voltage overhead lines

Class B : Arrester for Lightning Current protection (must be at least 100kA 8/80µs or 10As charge, two times). Zones OB to 1 (Main distribution Boards, Sub-Boards)

Class C : Arrester for Overvoltage protection (must have a nominal surge rating of at least 5kA 8/20µs) Zones 1 to 2 (mainly sub-boards or low exposure main boards)

Class D : Arrester for mobile use on socket-outlets (must have a nominal surge rating of at least 1.5kA 8/20µs)

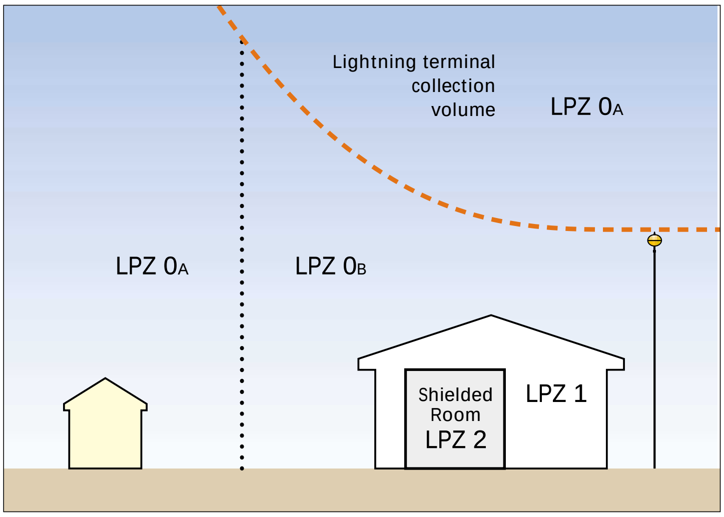


Figure 9. Protection zones defined by specific product application.

As it can be shown, protection equipment for power supply systems are classified as follows, according to its task. →

- Lightning Current Arrester
- Overvoltage Arrester

Lightning current arresters must be capable of conducting lightning currents or major components of them without being destroyed. Over-voltage arresters are only used for limiting overvoltages at relatively smaller surge currents. The different "protection zones" assume the division of the initial lightning current, from zone 0 to higher zones. For zone 0, it is required for the user to select the lightning protection class, from I - IV : (i.e. these refer to max energy within a direct lightning strike).

Protection Level	Current Magnitude	% Exceeded
Level I	200kA (10/350µs)	~ 0.2%
Level II	150kA (10/350µs)	~ 1.5%
Level III - IV	100kA (10/350µs)	~ 3%

The above levels can be selected based on the statistical level of protection required. A lightning current of 200kA (10/350µs) can be expected for the Protection Level I. This lightning current is divided as follows in the most exposed sites :

50% (100kA, 10/350µs) discharges via the ground system.
50% (100kA, 10/350µs) flows into the supply systems connected to it. (i.e. power supply system, IT communications system, metal pipes, etc.)

In the worst case, the power supply system is present only with two conductors (L;PEN), then this is loaded with 50% of the lightning current, or 50kA (10/350µs) per conductor.

In summary, if the IEC and DIN VDE standard were selected, the highest surge current expected at Zone O, with Protection Level I, for single phase two conductor is 50kA (10/350µs) or 25kA (10/350µs) for three phase 4-wire systems. In contrast, the lowest required surge current expected at Zone O, with Protection Level III-IV, for single phase two conductor is 25kA (10/350µs) or 12.5kA (10/350µs) for three phase 4-wire systems.

ERICO products are designed for IEC, IEEE and other related surge protection zonal and category defined standards. It is a matter of selecting the product with the required surge rating for the exposure application. Please refer to the “Surge rated to meet” selection criteria on the product pages.

How to select surge protection for AC powered equipment

Knowing where to install surge protection can be difficult. The balance must be found between installing SPDs on every distribution board and installing insufficient protection, thereby leaving the facility vulnerable to damage.

The following 3 steps provide guidelines to optimising your investment in protection without paying for over-coverage:

1) The first line of defence is to install an adequate surge protection device at the primary service entrance to the facility. This unit is normally the largest surge rated device, as it may be subjected to the injection of direct lightning currents. Typically a rating of 100kA (8/20µs) is required. The choice of whether to use shunt or series protection at this location is dependent on the ratio of the current rating of robust electrical equipment, such as lights and motors to the total rating of sensitive electronic equipment on the facility. If the latter rating is smaller or some distance from the service entrance, it may be more economical to install shunt only protection at this location. This primary shunt protection alone is often adequate to protect such robust equipment.

2) If shunt protection is chosen for the service entrance, a second line of defence using series filtering is required for sensitive electronic equipment to further reduce the let-through and rate of voltage rise to this equipment. Generally, this is applied at selected branch distribution boards. This line of defence also serves to protect branch circuit equipment from transients generated internally within the facility. Approximately 70 to 85% of all transients are generated within one's own facility.

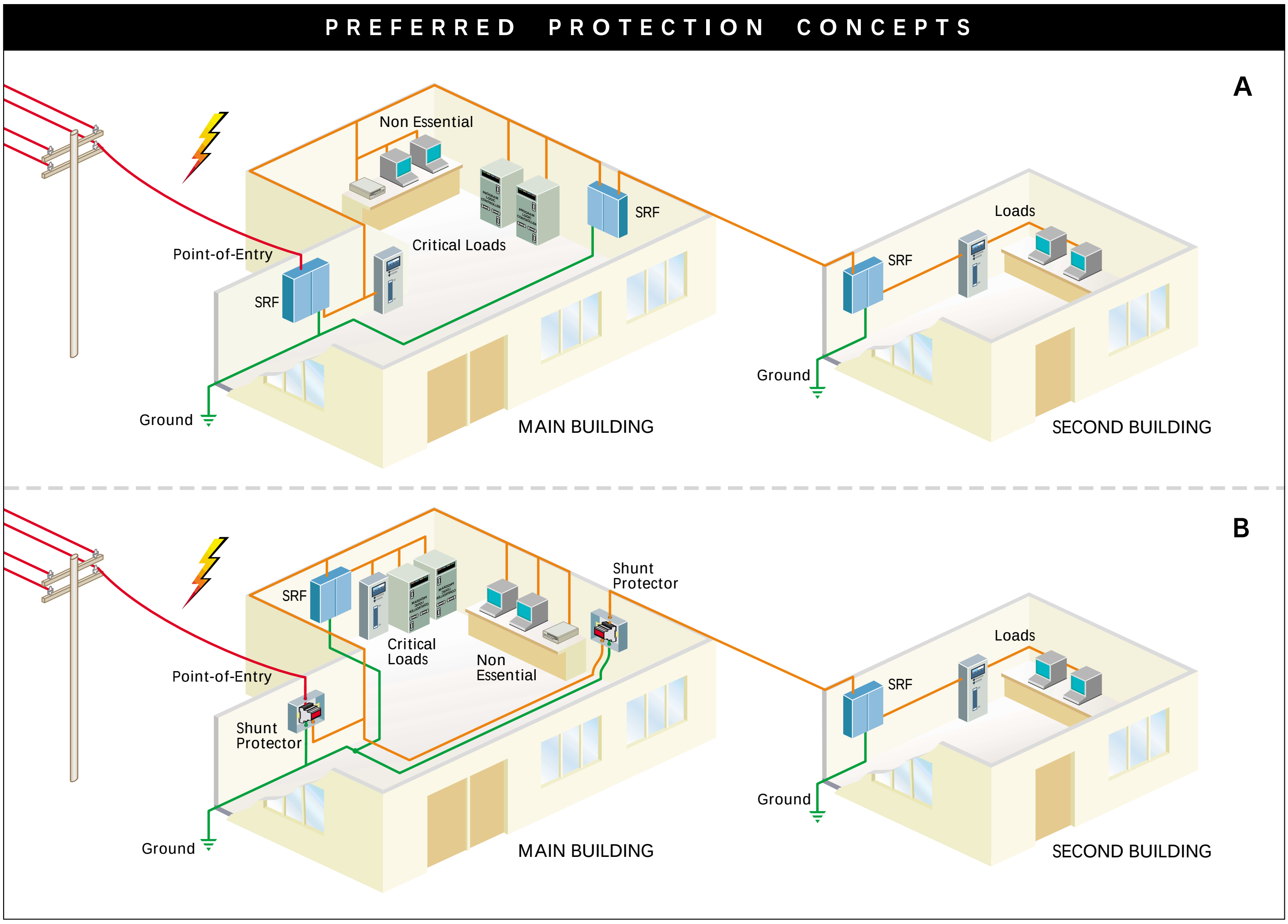
3) For large or "spread-out" facilities it is required to consider protection for sensitive electronic equipment at the nearest upstream distribution panel. If the nearest distribution panel is greater than 30m away, or located in an adjacent building, the protection must be installed closer to the equipment requiring protection. This is termed "point-of-use" protection.

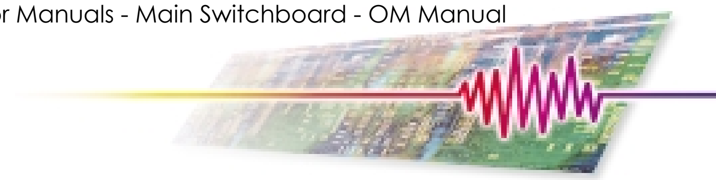
Substantial confusion can occur when attempting to compare different products. There are a number of issues that need to be considered in attempting such an exercise:

1. What is the surge rating ? Are the stated ratings theoretical or tested ?

   Not all manufacturers have surge generators capable of testing at high surge levels. It is not uncommon to find products on the market, which claim a 80kA 8/20µs surge rating, but use internal fuses or circuit board tracks that rupture at approximately 20kA 8/20µs.

Figure 10. Surge protection installation for facilities and buildings - preferred concepts.





How to select surge protection for AC powered equipment

ERICO recommends that you request test results from manufacturers verifying claimed maximum surge ratings to determine the required surge rating for your application, refer to pages 6 & 9 for advice.

2. Are the stated surge ratings using the same current / voltage waveshape ?

   For example, a 10kA 8/20µs impulse has approximately the same Joule energy rating as a 2kA 10/350µs impulse.

3. Will the SPD limit the surge voltage to a level which is acceptable for the equipment I wish to protect ?

   Not all SPD's perform the same, and as a result different products are required depending upon the robustness of and the exposure of the equipment to be protected.

   For example, it would be of little value to compare the let-through voltage of products using a Category B 3kA 8/20µs test if the product were to be installed in an exposed location. The use of a Category C 20kA 8/20µs test or higher would be more suitable in this case.

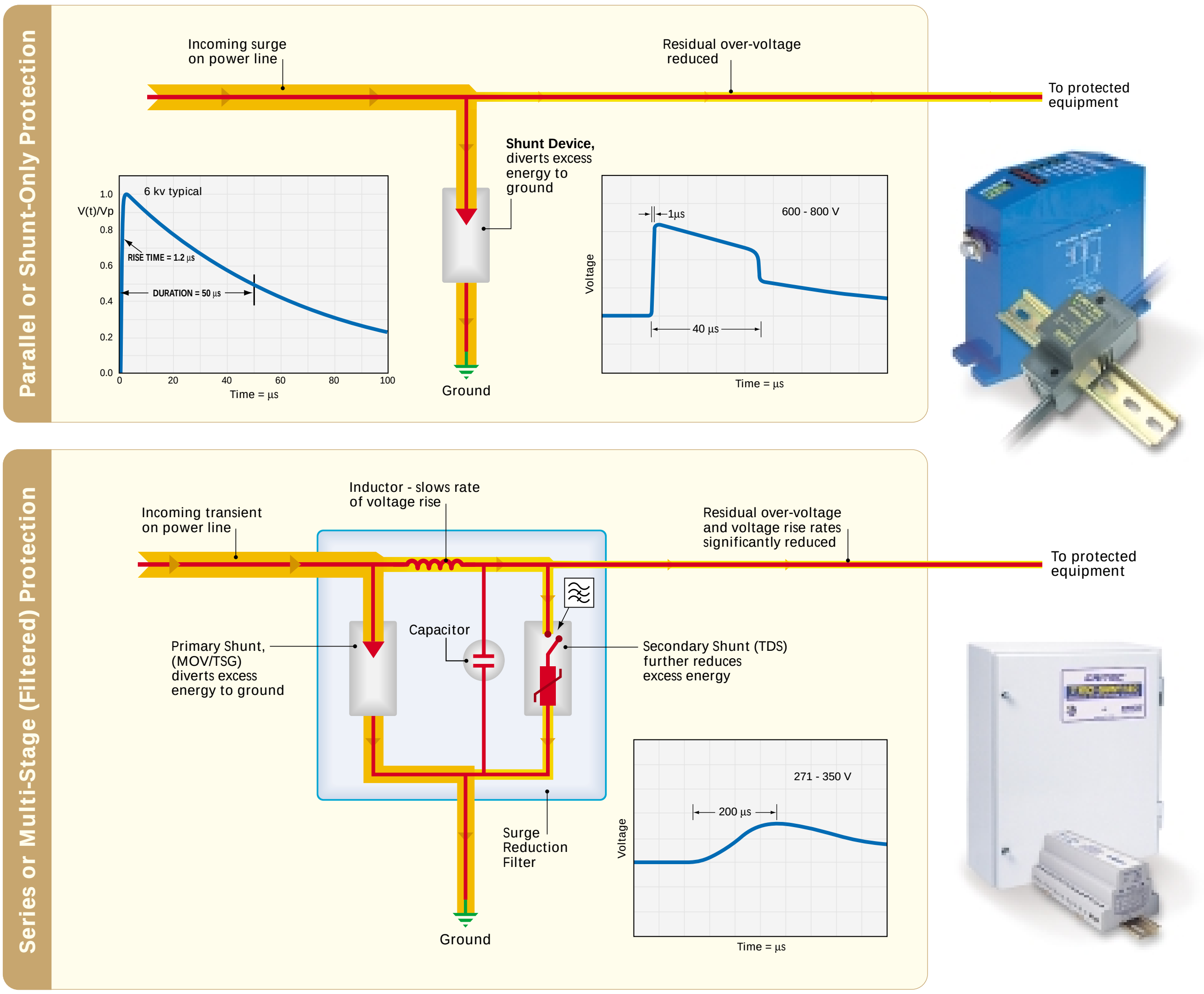
   As referred to in certain standards, it is recommended to limit the let-through voltage to electronic equipment to less than 150% of the mains peak voltage. (ie 510Vpeak for a typical 240Vrms system). It is strongly recommended for sensitive electronic equipment to consider both the rate of voltage rise (dv/dt) and the let-through voltage that results from a typical surge.

   Figure 10 provides a comparison of the let-through voltage for shunt versus series product. Effective series connected SPDs, as shown, should reduce the dv/dt of the surge for a nominal 10,000V/µs to less than 100V/µs, a one hundred-fold improvement.

4. Is the Maximum Continuous Operating Voltage (MCOV) of the SPD important ?

   Recently released standards on Surge Protective Devices (IEC61643-1, UL1449 Ed2) highlight concerns about the safety of traditional technologies under sustained over-voltage conditions which can arise from poor regulation of the distribution system or from a number of other causes. The US-based UL1449 standard has specified that SPDs (operating on Wye circuits) with a nominal operating voltage of 240Vrms must be tested to sustain over-voltages of 415Vrms without the device overheating or becoming a fire risk. An SPD with UL 1449 approval will ensure safe failure due to abnormal over-voltages, while a SPD with UL 1449 approval and TD technology will ensure safe, reliable operation during and after abnormal over-voltages.

Figure 11. Shunt versus Series protection for power applications.



How to select surge protection for data, signalling and control circuits

Knowing where to install surge protection can be difficult. To ensure cost-effective protection is provided for data, signalling and control circuits, two issues need to be considered:

- Where should the SPDs be installed?
- What type of SPD is appropriate for each circuit type and location?

Where should the SPD(s) be installed?

Communications devices are at risk from transients being induced onto the interconnecting signal lines. The use of surge protection barriers, installed at either end of the lines, provides cost effective protection. Communication or signal lines that enter or exit the building pose the highest risk. In such circumstances, protection devices should be installed at the point-of-entry or at the equipment termination itself. Internal wiring which extends more than 10 to 15m should also be protected. Twisting or shielding of cables provides a level of protection, however this should not be regarded as sufficient for the sensitive interfaces that characterise today's communication devices.

How to select an SPD for a given location

Five parameters must be considered to ensure that surge protection devices for use on data, signalling or control circuits are effective and do not adversely affect operation of the circuit.

1) SPDs are designed to clamp the excess transient voltage to safe levels sustainable by the equipment, yet should not interfere with the normal signalling voltages. As a guide, the SPD clamping voltage should be selected to be approximately 20% higher than peak working voltage of the circuit.

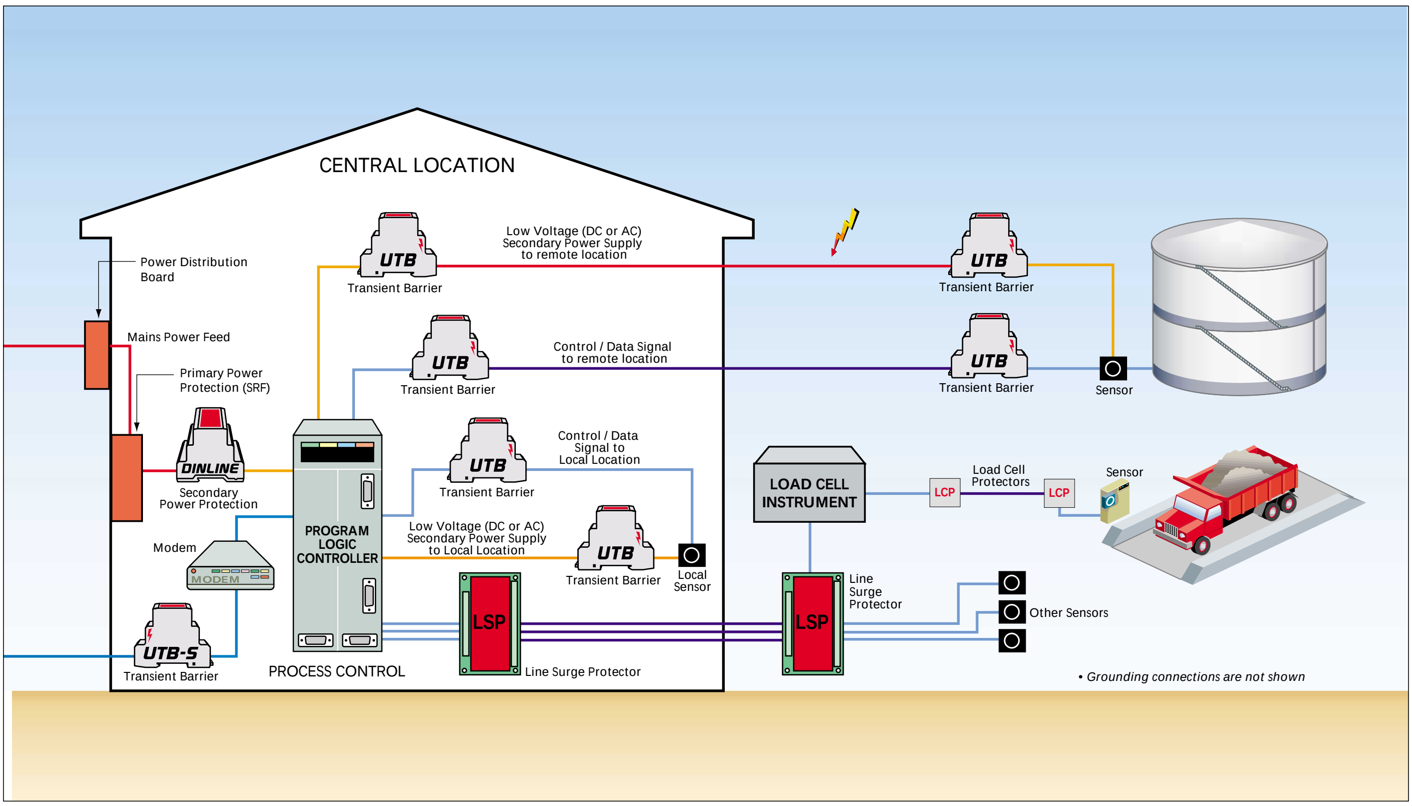
2) The line current rating of the SPD should be sufficient to handle the maximum expected signalling current.

3) The SPD bandwidth should be sufficient to allow correct operation of the system without adverse attenuation. This ensures that the attenuation of the SPD at the nominal operating frequency of the system does not exceed the stated limit. For most SPDs, frequency attenuation data or a maximum recommended baud rate is generally specified.

4) The connection termination, mounting method, number of lines to be protected and other physical aspects must be considered.

5) The SPD surge rating should be appropriate for the intended location. For circuits internal to the building, surge ratings of 1-5kA are generally sufficient. For the protection of circuits that connect to exposed lines entering or exiting the facility, 10-20kA is recommended. Alternatively a protocol or standard may be specified that defines the above parameters. As an example, the CRITEC DEP-RS232/9/9 is designed to protect circuits meeting the V.24 EIA-232 specifications. As items 1-3 are defined by the Standard the DEP-RS232/9/9 will work on any circuit employing the RS-233 signal protocol.

Figure 12. Installed protection on all incoming telecommunications and data signal lines.



ERICO differentiating technologies

To meet the fundamental requirements of performance, longer service life and greater safety under real world conditions, ERICO has developed a range of technologies covering all aspects of the Six Point Plan of protection. In the field of surge protection, several technologies play a critical role.

Traditional Technologies

Conventional SPD technologies utilise metal oxide varistors (MOVs) and/or silicon avalanche diodes (SADs) to clamp or limit transient events. However, these devices are susceptible to sustained 50/60Hz mains over-voltage conditions, which often occur during faults to the utility system. Such occurrences present a significant safety hazard when the suppression device attempts to clamp the peak of each half cycle on the mains over-voltage. This condition can cause the device to rapidly accumulate heat and in turn fail, with the possibility of creating a fire hazard.

Transient Discriminating™ (TD)™ Technology

Transient Discriminating™ (TD) Technology represents a quantum leap in surge protection and adds a level of "intelligence" to the SPD, enabling it to discriminate between sustained abnormal over-voltage conditions and true transient or surge events. Not only does this ensure safe operation under practical application, but it also prolongs the life of the protector.

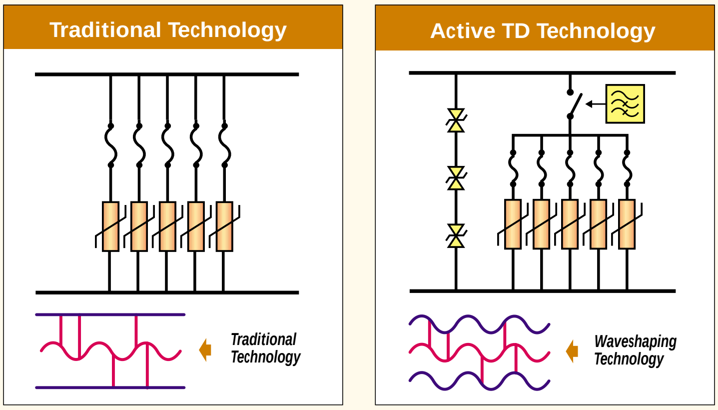


Figure 13. Diagram shows the wave form and spike differences between traditional technology and Active TD Technology.

The secret to ERICO's Transient Discriminating Technology is its active frequency discrimination circuit. This patented device can discriminate between a temporary over-voltage (TOV) condition and a very fast transient, which is associated with lightning or switching-induced surges. When the transient frequencies are detected, the patented circuitry within the TD™ device activates, allowing the robust protection to limit the incoming transient. The frequency discriminating circuit ensures that the SPD device is immune to the effects of a sustained 50/60Hz TOV. This allows the device to keep operating, providing safe and reliable transient protection to sensitive electronic equipment; even after an abnormal over-voltage condition has occurred.

Meeting & Exceeding UL Standards

The CRITEC® range of surge protection devices that employ TD™ Technology have been specifically designed to meet and exceed the safety requirements of UL 1449 Edition 2. To meet the abnormal over-voltage testing of UL 1449 Edition 2, many manufacturers of SPD devices have incorporated fuse or thermal disconnect devices, which permanently disconnect all protection from the circuit during an over-voltage event. By comparison, Transient Discriminating Technology allows the SPD to experience an abnormal over-voltage up to twice its nominal operating voltage and still remain operational. TD technology is especially recommended for any site where sustained over-voltages are known to occur, and where failure of traditional SPD technologies cannot be tolerated.

The UL 1449 testing standard addresses the safety of an SPD under temporary and abnormal over-voltage conditions, but does not specifically mandate a design that will give a reliable, long length of service in the real world. Specifically, UL 1449 tests that the TVSS remains operational at 10% above nominal supply voltage, allowing SPD manufacturers to design products that permanently disconnect just above that level. Most reputable manufacturer's designs allow for up to a 25% over-voltage, while ERICO's TD™ Technology gives even greater overhead.

TD Technology - Features & Benefits:

- Long life by eliminating SPD failure under TOV conditions.
- Fully compliant with UL 1449, Edition 2.
- Extended Maximum Continuous Operating Voltage makes this technology ideal where the integrity of the utility power cannot be guaranteed.
- No reliance on permanent over-voltage disconnects means continued protection even after abnormal over-voltage events.
- High surge capacity with low suppressed voltage ratings.

ERICO differentiating technologies

Triggered Spark Gap (TSG) Technology

ERICO continues to seek new and more efficient means by which to provide over-voltage protection and has recently developed an enhanced triggered spark gap to provide high-energy surge diversion. The spark gap was recognised as having the potential to provide effective surge suppression and meet the emerging requirements of various recognised standards, having the ability to clamp a surge to low levels while diverting currents of more than 100kA. This represents extremely efficient energy absorption capability when compared to other technologies.

One of the criticisms of traditional spark gap technology has been the high initiating voltage required to form the arc, typically as much as three to four thousand volts. Clearly this is inappropriate for sensitive AC supply where surges of several hundred volts can be lethal to equipment. ERICO has addressed this problem by incorporating a triggering device, which senses the arrival of a transient and initiates a spark to ionise the region surrounding the spark gap electrodes. This enables the spark gap to operate on significantly lower transient voltages.

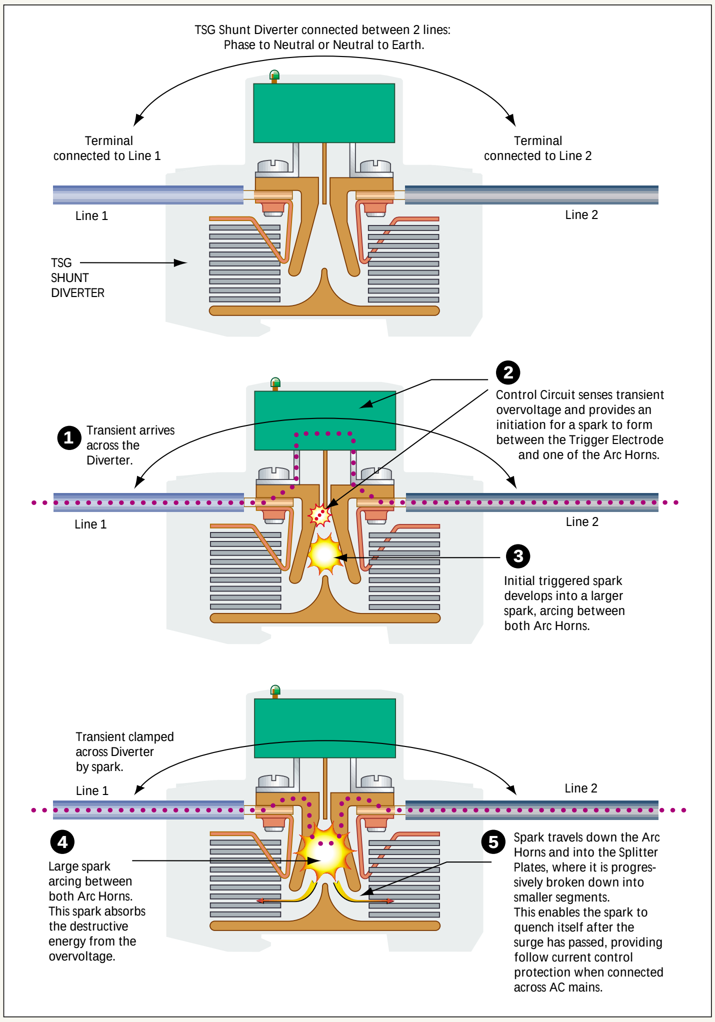


Figure 14. Activation of the Triggered Spark Gap Diverter.

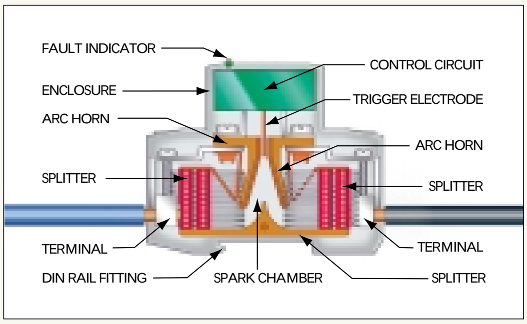


Figure 15. Internal components of TSG Shunt Diverter

A second major criticism of traditional spark gaps has been their follow current performance. Spark gaps have a low clamping voltage and can clamp a surge below the peak of the AC mains voltage, meaning in effect that the clamp will remain in place until the next zero crossing of the AC voltage. Such clamping of the fault current capacity of the AC mains is potentially damaging to the device. To overcome this problem, ERICO has incorporated a method of increasing the voltage of the spark gap once the surge has passed, allowing the voltage to rise to the peak of the AC mains and extinguish the arc. This feature is effective even on AC supplies with higher prospective fault current capacities and has the added benefit of preventing upstream fuses or circuit breakers from activating.

The TSG is a parallel device, which is not load dependent and will therefore operate only under transient conditions. It is an ideal point-of-entry device, providing primary protection for robust loads such as electrical motors, air conditioning and lighting systems, greatly reducing the amount of transient energy entering the facility. This allows downstream products such as ERICO's Surge Reduction Filters (SRFs) to provide optimum fine level protection to equipment within a facility.

A plasma shield has been incorporated into this product to prevent the spark gap from venting outside its enclosure. This allows it to be mounted close to the back plane and means that there is no requirement to physically isolate adjacent devices. The TSG has provided a flexibility to the range of SPDs, which was not previously possible. Not only can it be used as a high performance, stand-alone surge diverter, but it has also been incorporated into the premium CRITEC Surge Reduction Filter range, allowing this range of products to provide levels of performance previously unattainable.

ERICO differentiating technologies

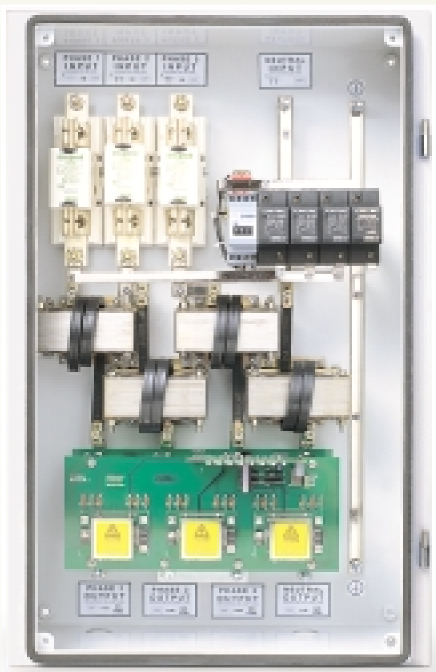
Surge Reduction Filter Technology

Recent advances in diverter design have seen the development and incorporation of Transient Discriminating™ (TD) and Triggered Spark Gap (TSG) technologies into SPDs. These devices employ traditional components, including Metal Oxide Varistors (MOV's), and enhanced performance spark gaps that have been engineered to exhibit different performance characteristics. As a result of this, they have different applications as stand alone products.

New concepts for surge reduction filters

ERICO strives to employ the most suitable technology for each application across its range of SPDs, including high performance Surge Reduction Filters (SRFs). The new CRITEC SRF is the most recent development in SRF technology. It brings together for the first time, TD™ and TSG technologies, with the additional benefits of series filtering.

Because of the considerable technological advance achieved with the TSG, ERICO is using it as the primary shunt diverter within the new SRF, exploiting the performance benefits offered by spark gap diverters.



Internal configuration showing the combined technologies of the CRITEC three phase Surge Reduction Filter.

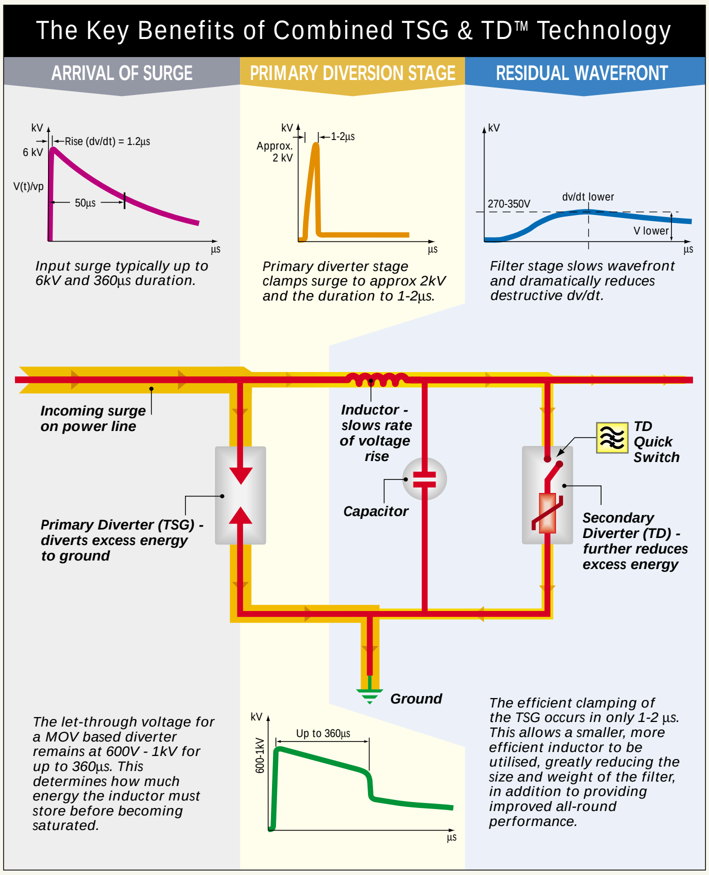


Figure 16. Diagram illustrates the complete filtering effect of combined technologies.

Fundamental breakthrough in filter design

Incorporating TSG Technology into a surge reduction filter has allowed a fundamental breakthrough in the overall design of the filter. Ferrous-cored inductors, which are much smaller than non-saturating air-cored inductors required in MOV based surge reduction filters, have been used in the CRITEC TSG-SRF.

The use of ferrous-cored inductors is possible because the let-through voltage from a TSG remains high for only a few microseconds (µs). In comparison, the let-through voltage from a MOV based device remains between 600V and 1000V for the duration of the surge. This time can range from 30ms to 400ms and above for longer tail pulses and determines how much energy the inductor has to store before reaching saturation and becoming ineffective.

This advantage becomes more significant on longer pulses. To incorporate ferrous-cored inductors into a MOV based filter would significantly reduce the filter performance on longer tailed pulses. This loss of performance does not arise in TSG based filters.

What benefits flow from this technology?

The combination of TSG and TD™ Technology provides the benefits of high surge capability, low let-through voltage and considerably reduced dv/dt. This applies to both surge performance and over-voltage withstand from short and long duration high-energy surges.

Glossary of Terms

Aggregate (Surge) Rating - Sum of the surge current rating of all modes within an SPD, excluding any fuse-limiting effects. This figure is used primarily as an indicator of the total life, which the SPD can be expected to provide and should not be confused with the maximum single shot surge rating that the device may be capable of withstanding.

Capacitive Coupling - Normally unwanted interference between two nearby conductors due to the strength of the electric field surrounding the source conductor. This is a common cause of noise being coupled from a noisy power circuit to a low voltage data circuit.

Clamping Voltage - This term is loosely used in the industry to refer to the voltage at which an SPD limits an applied surge impulse. More correctly, for MOV devices the clamping voltage is the point at which the SPD will start to draw current and is generally regarded as the knee of the VI curve at which 1mA DC current flows.

Common Mode Voltage - A voltage between two or more conductors and ground. This is normally an interference or transient voltage between two lines such as Line and Neutral to Ground. Sometimes referred to as the longitudinal mode.

Common Mode

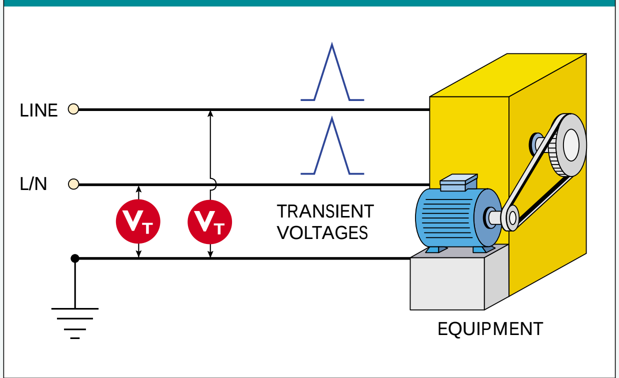


Figure 17. Common Mode Voltage.

Coupling - Interaction between circuits, during which energy is transmitted from one circuit to the other. May be coupled galvanically (directly), magnetically or capacitively.

Electromagnetic Compatibility (EMC) - EMC is the ability of a device to function satisfactorily in its intended electromagnetic environment without producing interference, which may affect other nearby devices.

Energy Rating (in Joules) - Given by some SPD manufacturers to indicate the maximum amount of transient energy that the suppressor can dissipate. Commonly specified for 10/1000μs waveforms. This rating is of little practical value as it is dependent upon three variables: voltage, current and time. Hence an improved current rating will increase the energy rating, but an improved (lower) let-through voltage will lower the energy rating.

Therefore, it is unwise to compare energy ratings between two different devices.

Follow-Current - Where a "Voltage Clamping" SPD after "firing", clamps below the AC supply voltage and causes line current to flow. Follow-current is normally very large for spark gap (crow bar) type devices. It is for this reason that gas arresters are not used for AC power protection applications. "Voltage Limiting" devices such as MOVs and Silicon Avalanche Diode-based devices do not cause follow-currents.

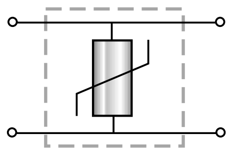
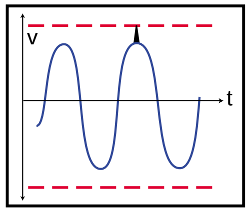
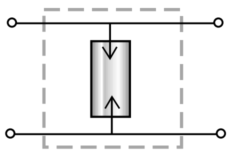
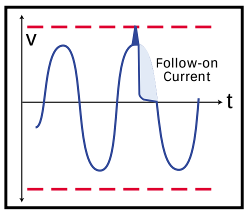
Type	Typical Response
Voltage Limiting type SPD 	
Voltage Limiting type SPD 	

Figure 18. Follow Current.

Frequency (Noise) Attenuation (dB) - The small signal attenuation for a filter in decibels. This attenuation varies with applied frequency, so it is best given as a graph of frequency versus attenuation. However it is commonly specified at a single point (either at 100kHz, or the frequency at which attenuation equals -3dB). The Decibel scale is non-linear and a large negative number indicates greater attenuation (each increment of -20dB increases voltage attenuation by a factor of 10 times, i.e. 40db = x100, 60dB = x1000). Test signals used are normally in the order of 10V, so attenuation results are an indication of response to noise signals rather than larger surge performance.

Impulse Withstand Voltage - The peak value of the

Glossary of terms

highest impulse voltage with a defined waveshape and polarity, which will not lead to a flashover or failure of the device under test (DUT) in the given test conditions.

Lead Length - The length of parallel "T" connected SPD leads from the SPD terminals to the circuit to be protected. This lead length, and size, shape and loop area, adversely increases the let-through voltage reaching the protected equipment. A Kelvin connection is recommended, where possible, to avoid this.

Leakage Current - The miniscule current flowing through

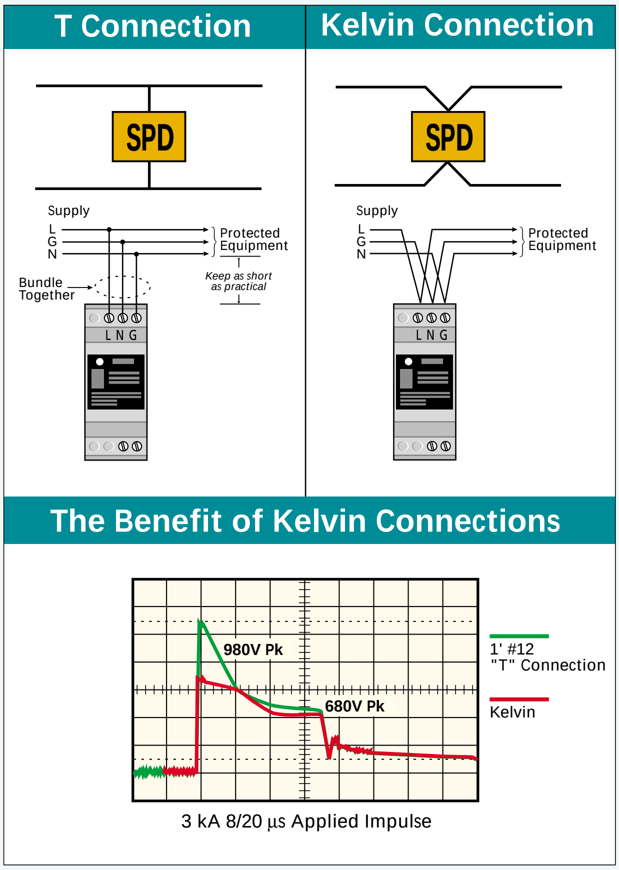


Figure 19. The benefits of a Kelvin connection.

insulators and electronic components that are in a non-conductive state, or between two points that are insulated between each other. A rising leakage current can be a warning of an impending insulation or component failure.

Let-through Voltage - The voltage appearing on the equipment side of an SPD when an impulse voltage or current of a defined waveshape and amplitude is applied to the SPD. This is a measure of the SPDs' ability to clamp a transient voltage. As let-through voltage depends on the amplitude and waveshape of the applied current, test conditions must be stipulated with the result. Some SPD results will alter depending on whether or not the test was conducted with nominal mains voltage present. This should be stated. (Refer to Suppressed Voltage Rating).

Listing - Statement of independent laboratory testing of safety or performance.

Location Categories - ANSI C62.41 defines areas of a typical installation, assigning these location categories with typical maximum expected transient voltages, currents and waveshapes.

Magnetic (or Inductive) Coupling - Formed by the magnetic field surrounding a conductor with a changing current flowing through it. When another conductor cuts the magnetic flux lines, a voltage is developed on that conductor. The greater the rate of change of the flux lines, the greater the voltage developed. This is the main source of lightning impulses on power circuits.

Maximum Continuous Operating Voltage (MCOV) – The maximum RMS voltage that can be applied continuously to an SPD without inhibiting its correct operation.

Modes (of Protection) - This refers to the way the SPD is connected to the circuit. Each mode is where a dedicated direct SPD element is connected. Note that an SPD may have multiple internal elements allowing one SPD to protect multiple modes, e.g. L-N, L-G and N-G. An SPD that protects only L1-N and L2-N cannot be claimed as also having an L1-L2 protection mode as no direct element is provided. Note that not all modes require protection. A 3Ph 4W+G power system has 10 possible modes but can be adequately protected with a 4 mode SPD.

MOV (Metal Oxide Varistor) - Commonly used at the clamping device in SPDs. The MOV is a bipolar non-linear resistor with a symmetrical voltage or current characteristic curve whose resistance value decreases as the voltage increases.

Nominal Voltage - The normal operating voltage at which the equipment is intended to operate. Generally the actual voltage is expected to be within +/- 10% of this under normal conditions.

Normal Mode Voltage - The voltage interference between

Glossary of Terms

two conductors of a circuit (Line to Line). Also referred to as Differential Mode or Transverse Mode.

Residual Voltage - Another term for let-through voltage. Some standards, however, define residual voltage as being measured when testing is conducted with nominal or MCOV voltage applied. This is optional with let-through results.

Response Time - Most commonly thought to be the time it takes an SPD to respond to a transient, although the actual definition as given in standards is the overshoot time of an SPD. Response time is misleading as to the true performance of an SPD.

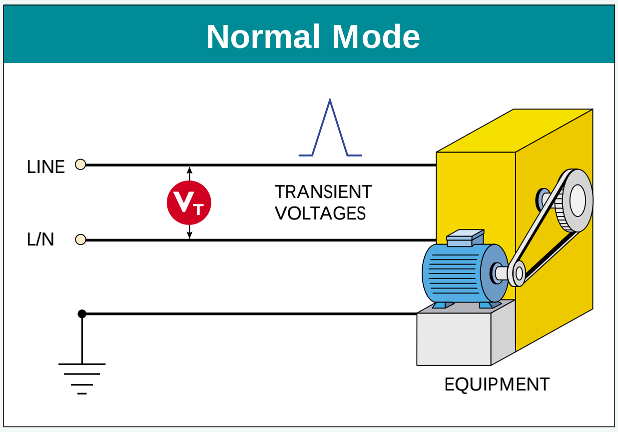


Figure 20. Normal Mode Voltage.

Sparkover-voltage - The voltage at which a spark gap SPD becomes conductive. Normally specified with a voltage increasing at 1kV/s.

Stage (of protection) - Describes the configuration of circuit elements of an SPD where multiple technologies may be used to provide protection.

Suppressed Voltage Rating - A term defined within UL 1449, to measure the let-through voltage with a 6kV 1.2/50µs, 500A 8/20µs impulse. The voltage is then rounded up to the next value on a list of preferred values.

Surge Current Rating - Maximum current withstand of an SPD for a single current impulse waveform of defined waveshape (with MCOV voltage applied).

The clamping voltage after this test should not differ by more than 10% of the value prior to the test. Most commonly, surge ratings are quoted for an 8/20µs current waveform, but 10/350µs and 10/700µs are others used.

Surge Filter - An in-line filter specifically designed to reduce the rate of voltage rise (dv/dt) of the pre-clamped waveform. Requires some series impedance between input and output terminals. This type of product is highly recommended for the protection of sensitive electronic equipment.

Surge Protection Device (SPD) - Internationally accepted term for surge diverters. Also referred to by UL as Transient Voltage Surge Suppressors (TVSSs). Note "Surge arresters" is a term normally reserved for devices intended for operation on medium voltage systems (>1kV), or prior to the main service entrance disconnect. Reduction of dv/dt is not normally provided by low cost EMI/RFI noise filters.

Temporary Over-Voltages (TOV) - An over-voltage occuring on the power system of relatively long duration, typically between 0.05s and 10s.

Transient Voltage Surge Suppressor (TVSS) - A term commonly used in the USA for Surge Protection Devices.

A Guide to common voltage distribution systems

Varying power distribution systems are currently in use throughout the world. The following guide identifies the more commonly used systems and lists the appropriate CRITEC products that are compatible with those systems.

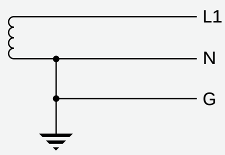
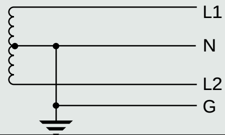
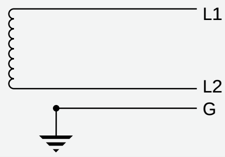
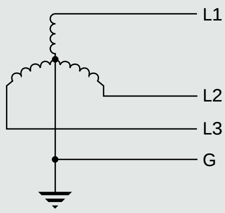
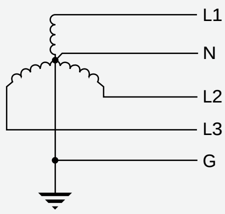
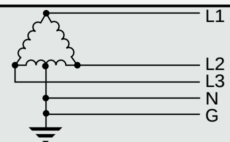
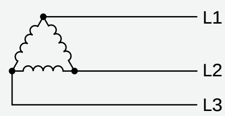
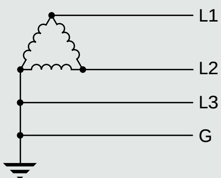
Distribution System	Source Configuration	Supply Voltages		ERICO SPD			
				Shunt			Series Surge Reduction Filter
				Type	Qty*	Mode	
Single Phase 1Ph, 2W+G M.E.N System		220-240V	220-240V L-N, L-G	MOVTEC, DINLINE, DSD, TDS, TDX	1 to 2	L-N, L-G	TSG-SRF140, TDF-240V TSG-SRF163, TSG-SRF1125 TSG-SRF - 120V version TDF-120V version
				TSG	1	N-G	
		110-120V	110-120V L-N, L-G	MOVTEC, DINLINE , DSD, TDS, TDX	1 to 2	L-N, L-G	
				TSG	1	N-G	
Single Phase 1Ph, 3W + G (Edison system)		120/240	240V L1-L2, 120V L1-N, L2-N	MOVTEC, DINLINE DSD, TDS, TDX	1 to 3	L-L, L-N N-G	TDF63 120/240, TDF125 120/240 - Special Models (Inquire for Assistance)
				TSG	1	N-G	
Single Phase 1Ph, 2W+G Non-M.E.N		220-240V	220-240 V L-L	MOVTEC, DINLINE DSD, TDS, TSG, TDX	1	L-L	TDF-3A-240, TDF-10-240, TDF-20A-240
			110-120 V L-G	TSG1130-2S-NE	2	L-G	TDF63 220, TDF125 220 - Special models 63A-125A (Inquire for Assistance)
Three Phase 3Ph Y, 3W+G No-Neutral		400-440	400-440V L-L	MOVTEC 480V Version TDX	3	L-L	Special Application - Inquire for Assistance
			230-254 L-G	MOVTEC, DINLINE, DSD, TDS, TSG,	3	L-G	
		200-240	200-240V L-L	MOVTEC, DINLINE, DSD, TDS, TSG, TDX	3	L-L	
			115-138V L-G	MOVTEC, DINLINE, DSD, TDS, TSG,	3	L-G	
Three Phase 3Ph Y, 4W+G Neutral		380-440	380-440 L-L	MOVTEC, DINLINE, DSD, TDS, TSG,	3	L-N	TSG-SRF 3Ph 40A-2000A
			220-254 L-N	MOVTEC, DINLINE, DSD, TDS, TSG,	1	N-G L-N, N-G	
				TDS-MPM-277, TDX	1	Protection Module	
		208-230	208-230 L-L	MOVTEC, DINLINE, DSD, TDS, TSG,	3	L-N	TSG-SRF 3Ph 40A-2000A - 120V version
			120-130 L-N	MOVTEC, DINLINE DSD, TDS, TSG,	1	N-G L-N, N-G	
				TDS-MPM-120, TDX	1	Protection Module	
Three Phase 3Ph Delta, 4W+G Delta High Leg		240	240V L-L	MOVTEC, DINLINE DSD, TDS, TSG, TDX	Up to 8	L-L, L-N, L-G	Special Application - Inquire for Assistance
			(208V L1-N & G!) 120V L2-N, 120V L3-N	TSG, TDS, DSD, TDX MOVTEC, DINLINE	1	N-G	
Three Phase 3Ph Delta, 3W Delta Ungrounded		480V	480V L-L	MOVTEC 480V version TDX	3 3	L-L, L-G	Special Application - Inquire for Assistance
		240V	240V L-L	MOVTEC, DINLINE DSD,TDS,TSG,TDX	3	L-L	
Three Phase 3Ph Delta, 3W+G Delta Grounded corner		480V	480V L-L	MOVTEC 480V version TDX	3 1	L-L L-L, L-G	Special Application - Inquire for Assistance
			488V L-G		3	L-G	
		240V	240V L-L	MOVTEC, DINLINE	3	L-L	
		240V	240V L1 & L2-G	DSD,TDS,TSG,TDX TSG1130-2S	3	L-G	

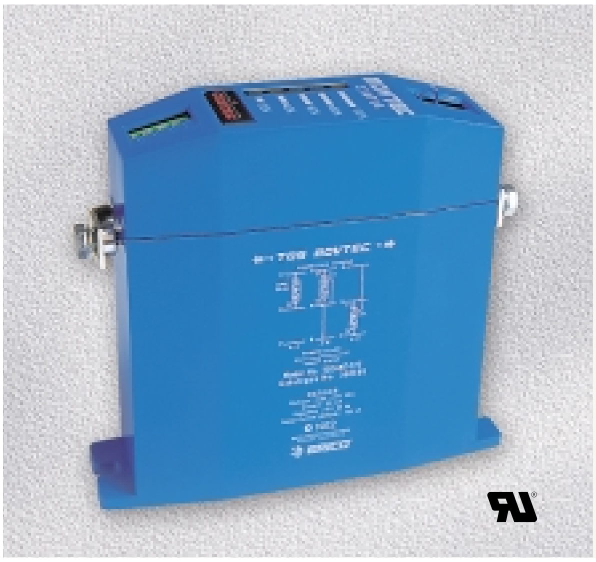
Table 2. Product applications for different power systems.

Refer to separate documentation for detailed advice on protection modes and connection details.

Notes * Qty. will depend upon distance from N-G connection and modes to be protected. For exposed sites, N-G protection may be better fitted with Spark Gap, rather than MOV based device.

AC Power Devices

TD™ MOVTEC™



FEATURES

- TD™ Technology for superior life and robust protection against abnormal over-voltage events
- UL 1449 Edition 2 Recognised
- Primary protection for extremely high exposure sites and point-of-entry protection applications
- Multipulse capability
- Available in single and three mode protection
- Small foot print for more effective use of real estate
- 5 segment electronic status indication ideal for poorly illuminated locations with fail safe voltage-free alarm contacts
- Lug terminals for connection of large cables

TD™ MT

The TD-MOVTEC family of surge suppressor modules offers economical and reliable protection from power transients in even the most strenuous applications.

Transient Discriminating™ (TD) Technology introduces a quantum leap in transient suppression technology, providing a new level of safety and reliability while retaining optimum protection critical for sensitive electronic equipment. TD™ Technology is essential for any site where abnormal over-voltages can occur or where the possible catastrophic failure of traditional technologies cannot be tolerated.

A patented electronic circuit continuously monitors the health of the internal MOVs and displays this status on a 5-segment LED bar graph. Alarm contacts are provided which may be used to shut down the system or activate an external warning if the internal surge material is below optimum condition.

ORDERING INFORMATION

Item Number	Description
TDS MT 120	1 MODE, 110-150V, 100kA, 5 LED Status
TDS MT 277	1 MODE, 220-277V, 100kA, 5 LED Status
TDS MTU 120	3 MODE, 110-150V, 100kA, 5 LED Status
TDS MTU 277	3 MODE, 220-277V, 100kA, 5 LED Status
TDSMT 480	1 MODE, 347-480V, 80kA, 5 LED Status

SPECIFICATIONS

Operation	TDS-MTx-120	TDS-MTx-277	TDS-MT-480
Nominal Line Voltage:	100-120 Vrms	220-277 Vrms	480 Vrms
Frequency:	50 / 60 Hz	50 / 60 Hz	50/60 Hz / DC
Leakage Current:	<2 mA	<2 mA	<2 mA
MCOV (Ph-N, Ph-E, N-E):	240 Vrms	480 Vrms	508 Vrms
Max Surge Rating:			
8/20µs	100kA	100kA	80kA
10/350µs	20kA	20kA	12kA
note: TDS-MTU-xxx 3 mode units 40+40+20kA 8/20µs			
Energy Rating:	4800J	4800J	5120J
Aggregate Surge Material 8/20µs:	160kA	200kA	160kA
Let-through Voltages @ 3kA 8/20µs:	< 480V	< 750V	< 1050V
Let-through Voltages @ 20kA 8/20µs:	< 760V	< 980V	< 1300V
Surge Rated to Meet:	ANSI/IEEE C62.41-1991 Cat A, B, C Zone 0 and 1, Class B		

Alarms and Indicators

Status Indication:	Five Segment LED Bar Graph Voltage free (4kV isolation) contact 10A @ 250VAC NC Fail Safe, change state at <80%

Physicals

Temperature and Humidity:	-35˚C to +55˚C, 0-90%
Terminals:	M6 Lug, 16mm² cable
Dimensions (WxDxH):	45 x 140 x 150 mm
Weight:	600g
Listing:	UL Recognized Component AS3260, IEC950, C-Tick
Warranty:	5 years

MOVTEC AND TDS-MOVTEC SURGE DIVERTERS

INSTALLATION INSTRUCTIONS

Includes MPM Movtec Protection Module Instructions

ERICO®

www.erico.com

Handbook No: HB-HBCR-111

ISSUE: 3 April 2003

INSIDE FRONT COVER

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CONTENTS

I. WARNINGS

- Prior to installation ensure that the Movtec is of the correct voltage and frequency, and is the type recommended for the local power distribution, and for the equipment being protected.
- Hazardous voltages may exist internally to the units. The units should be installed (and replaced) only by qualified personnel in accordance with all relevant Electricity Safety Standards.
- Do not power MPMs and three phase connected Movtecs (Ph-N) without the upstream neutral connected. Failure to do so may damage the Movtecs and/or the load.
- Where the MPMs/Movtecs are connected to an earth, this must be a low impedance earth (<10 Ω) for correct operation.
- X1-X4 connections may be at phase voltages dependant upon connection method.
- If connecting to the Movtec alarm outputs do not exceed the maximum permissible ratings as damage may occur.
- Movtecs must be installed in an enclosure or panel, ensure this does not cause their environmental ratings to be exceeded.
- Do not "Megger" or "Flash Test" circuits with Movtecs installed.
- The DINLINE Surge Counter (DSC) should not be used in voltage sensing mode with TDS-Movtecs. Voltage sensing mode is not compatible with TDS-Movtecs.
- All instructions must be followed to ensure correct and safe operation.
- Diagrams are illustrative only, and should not be relied on in isolation.

2. INTRODUCTION

Movtecs are designed to protect mains powered equipment from the damaging effects of lightning and transients. They are ideal for point-of-entry shunt protection applications where robustness and high surge ratings are required.

The Movtec family is designed to suit many distribution systems including TN-C, TN-S, TN-C-S and TT. They can be selected for use with distribution systems with nominal voltages of 110/120V, 220/240V and 277Vrms at frequencies of 50/60 Hz.

The TDS Technology (Transient Discriminating Suppressor) units are specifically designed for distribution systems that may feature poor voltage regulation where the actual supply voltage may exceed the nominal ratings for extended periods.

This Installation Manual details the preferred procedure for the installation of the family of Critec Movtec™ Surge Diverters.

The Critec Movtec family includes:

- Critec Movtec, Single Mode, enhanced MOV technology units eg. (MT275V-135K-A)
- Critec TDS-Movtec, Single Mode, TDS technology unit featuring high over-voltage withstand for added robustness (TDS-MT-277)
- Critec TDS-Movtec, Three Mode, TDS technology unit featuring high over-voltage withstand for added robustness (TDS-MTU)

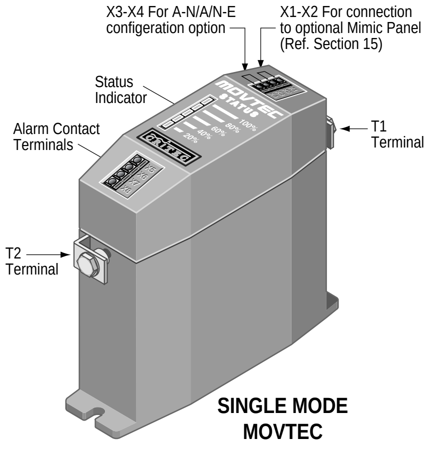
TDS-Movtec units are coloured blue for easy identification, while enhanced MOV technology units are coloured red.

In this manual, reference to " Movtec" also includes "TDS-Movtec".

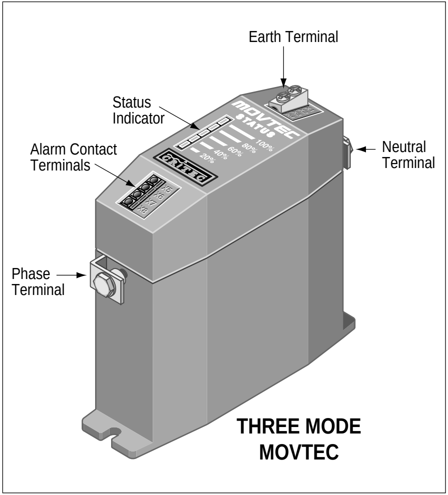
This manual also details the installation of the MPM (Movtec Protection Module). The MPM is a supplied enclosure with three Movtecs and a high energy neutral to earth protection device for three phase protection. The MPM is often used where Movtecs can not be fitted in an existing switchboard and must be mounted externally. Therefore the Movtec installation instructions are also applicable to the MPM. Section 11 gives details which are specific to the MPM.

Two standard MPMs are available:

- Critec TDS-MPM, Single Mode, TDS Technology unit (uses 3 x TDS-MT-277)
- Critec MPM-275V, Single Mode, Enhanced MOV Technology unit (uses 3 x MT275V-135K-A)



SINGLE MODE MOVTEC

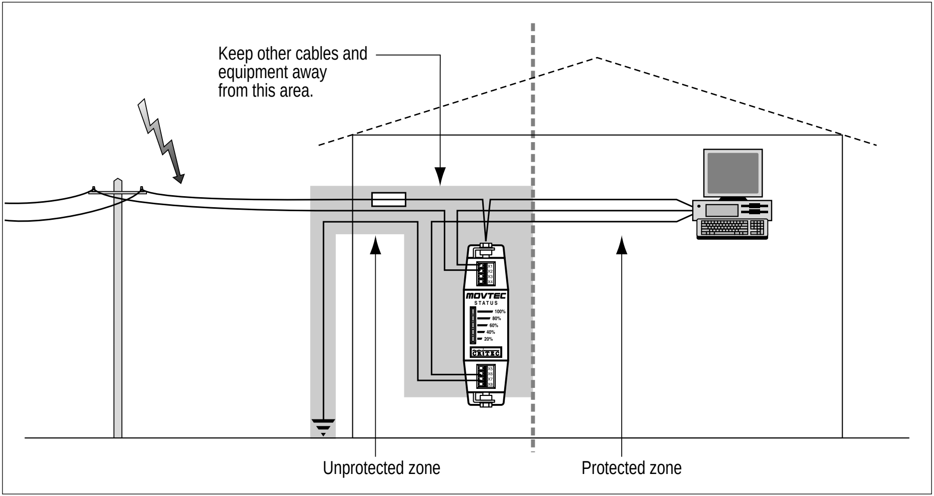


THREE MODE MOVTEC

3. PROTECTION CONCEPTS

To optimise effectiveness of installed protection a concept of "Unprotected" and "Protected" wiring should be followed.Wiring from the transient source to the Movtec should be considered "Unprotected" and kept remote from all other wiring (approximately 300mm) where possible. Wiring on the equipment side of the Movtec should be considered "Protected".

The separation of "Protected" from "Unprotected" wiring is recommended in order to minimise the risk of transients conducted on "Unprotected" wiring cross coupling on to "Protected" circuits, thus compromising the level of protection available from the Movtec.


Keep other cables and equipment away from this area.
MOVTEC
STATUS
100%
80%
60%
40%
20%
CRITEC
X1
X2
X3
X4
X5
X6
X7
X8
Unprotected zone
Protected zone

4. MOUNTING & CAUTIONS

The performance of surge diverters can be dramatically affected by the method of connection (refer section 7). Where possible select a mounting method that allows the Movtec to be connected in the "Preferred Connection Method".

Failure of a Movtec under severe AC over-voltage, such as 11kV on 240V mains, can result in the generation of significant heat. Consideration should be given to ensure that Movtecs are not installed in close proximity to combustible materials.

Units must be installed in an enclosure or panel to provide the appropriate degree of electrical and environmental protection.

Only use enclosures that:

- Do not cause the Movtec temperature to exceed 60 deg C
- Provide adequate electrical and safety protection
- Prevent the ingress of moisture and water
- Allow Movtec Status Indication to be inspected

5 VOLTAGE RATINGS

The TDS (Transient Discriminating Suppressor) technology has been specifically developed to cater for abnormal over-voltage conditions that may occur on sites with poor voltage regulation, or due to wiring or distribution faults. The TDS units feature an extremely high over-voltage withstand to eliminate heat build up that can occur with standard technologies when the protection devices start to clamp on the peak of each abnormal mains cycle.

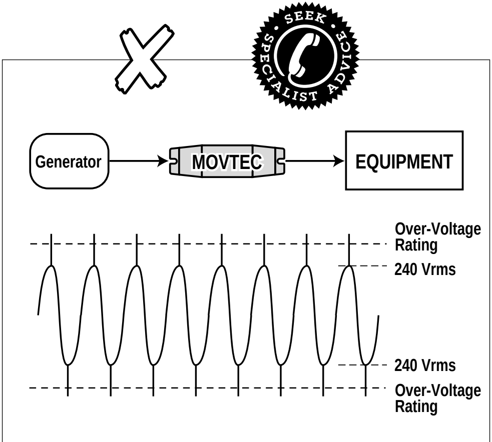
Traditional MOV technology (eg MT-275V/ 135K/A) is not suitable in applications where sustained over-voltage conditions can be experienced.

Examples of poorly regulated voltage environments include:

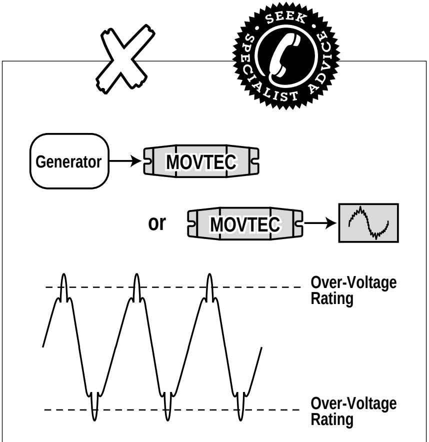
- Smaller power generation supplies
- Sites with large earth currents
- Variable motor speed control circuits
- High harmonic voltage environments (non-linear loads)

The TDS range of Movtecs with a higher over-voltage withstand may be able to be used in these environments following advice.

Transient protection devices are usually rated to protect against non-repetitive pulses from such sources as direct or induced lightning strikes. They are not designed to provide protection against repeated cyclic anomalies. Nor are they designed to provide protection



Avoid repetitive voltages in excess of rating



Avoid high harmonic voltages

against *sustained over-voltage conditions where the supply voltage exceeds the protection equipment's nominal rating for an extended period of time*, ie continuous over-voltages from poorly regulated generators or distribution systems.

Smaller power generation equipment (particularly capacitive excitation induction generators) does not generally conform to the same standards of voltage regulation that are in place for mains power reticulation. A large number of smaller and/or cheaper generators have a voltage waveform that is "loosely" 240Vrms (often poorly regulated), but more importantly, often contains significant higher order harmonics. These generators may exhibit a peak voltage on each half cycle far in excess of the normal 340V. The problem is usually worse when the generator is lightly loaded.

Whilst electrical equipment may tolerate this over-voltage for a period of time, the clamping elements in the power protection devices will begin to conduct on the peak of each 50Hz cycle, as their voltage threshold is reached (typically 400V peak for a traditional 275V diverter). This will cause slow degradation and ultimate failure of the clamping device (time dependent upon how poor the waveform is).

Harmonic voltages may also be present in distribution systems that do not feature generators. This is normally where non-linear loads are used, such as UPSs, rectifiers, switch mode power supplies and motor speed controls. The high harmonic voltages in certain applications may have peak voltages in excess of the protective clamping voltage causing problems as described above. Seek the manufacturer's advice before installing any product into a circuit which features a total harmonic voltage ratio above 5%.

Model	Nominal Voltage	†Maximum Permissible Abnormal Over-Voltage
TDS-MT-277	220-277V	480V
TDS-MTU	220-277V	480V
MT275V-135K-A	220-240V	275V

Ensure that the correct voltage rating unit is installed. Exceeding the nominal rating while transient events occur may affect product life.

† *Note: Other voltage rating Movtecs are available. Refer to Movtec table for actual ratings.*

6. PROTECTION MODES

Movtecs are available in Three Mode and Single Mode configurations. This refers to how the internal protection is arranged and applied to the circuit to be protected.

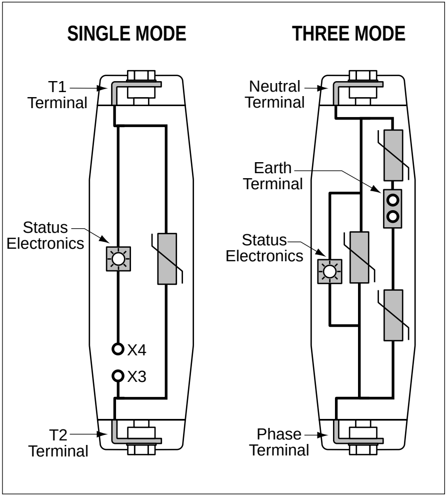
Three Mode units provide protection between the Phase-Neutral*, Phase-Earth* and Neutral-Earth circuit within one Movtec.

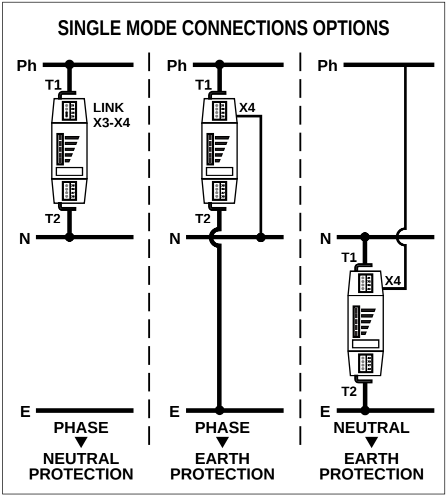
Single Mode units provide protection between two conductors connected to the terminals marked T1 and T2. These units can be connected to provide protection from Phase-Neutral* or Phase-Earth* or Neutral-Earth. To allow the status indication and alarm circuitry to operate, a neutral connection is required for Phase-Earth* configured units, and a Phase* connection is required for

Neutral-Earth configured units. Connection details for single mode units are detailed on page 15. Warning - this connection link can be at mains potential.

* Note. Some users may be used to the terminology “Active” or “Line”, in place of “Phase”. For consistency “Phase” is used throughout this documentation.

Model	Modes
TDS-MTU	Three Mode
TDS-MT-277	Single Mode
MT275V-135K-A	Single Mode



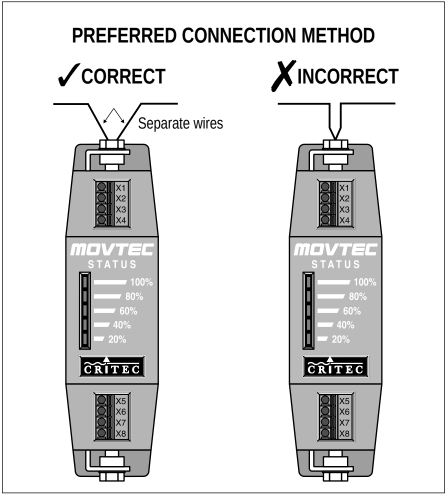


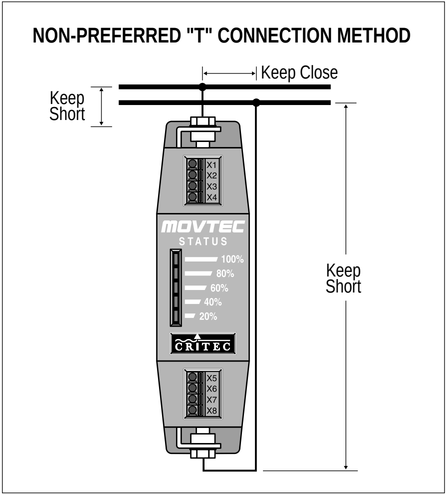
7. CONNECTION METHOD

To optimise transient performance, attempt to connect the Movtecs in the "Preferred" fashion as depicted on pages 16 and 17. This is recommended for cable sizes between 6mm² and 16mm². Take care not to run the protected and unprotected wire parallel or in close proximity.

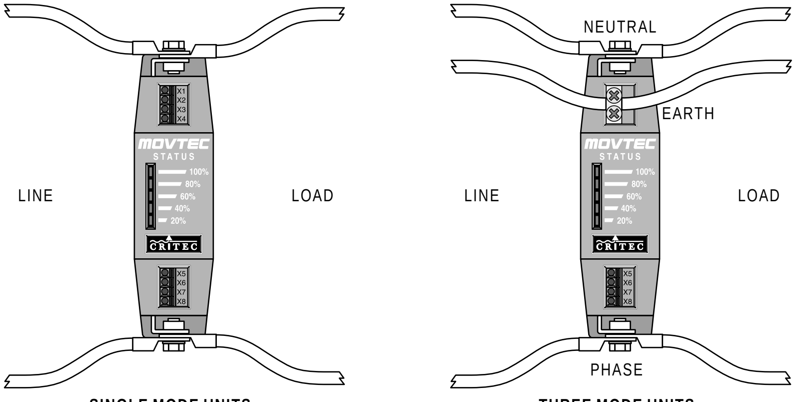
Where this is not possible due to layout or conductor size, use the "Non-preferred" "T" connection method as depicted on pages 16 to 18. With this connection method, the "T" lead should be between 6mm² and 16mm². The connection should be as short as practicable (less than 100mm).

Cable sizes less than 6mm² should not be used without specialist advice.


PREFERRED CONNECTION METHOD
✓CORRECT
✗INCORRECT
Separate wires
X1
X2
X3
X4
MOVTEC
STATUS
100%
80%
60%
40%
20%
CRITEC
X5
X6
X7
X8

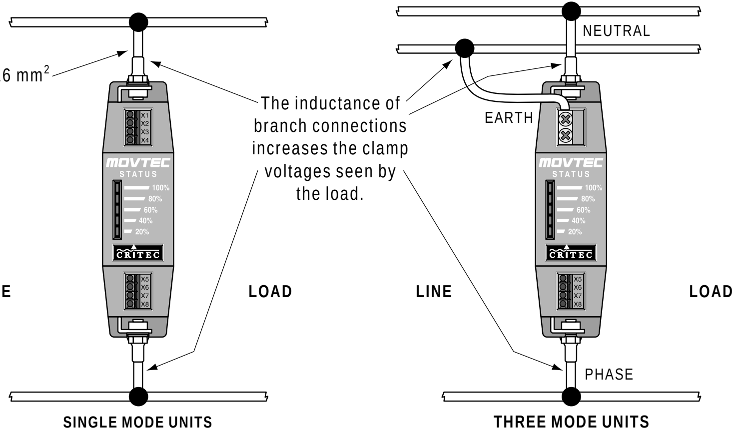

NON-PREFERRED "T" CONNECTION METHOD
Keep Close
Keep Short
Keep Short
MOVTEC
STATUS
CRITEC

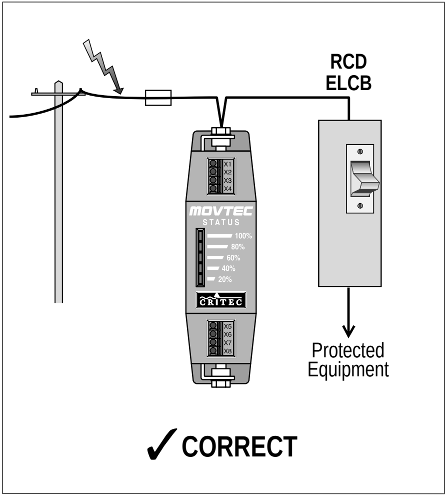
PREFERRED CONNECTION METHOD EXAMPLES

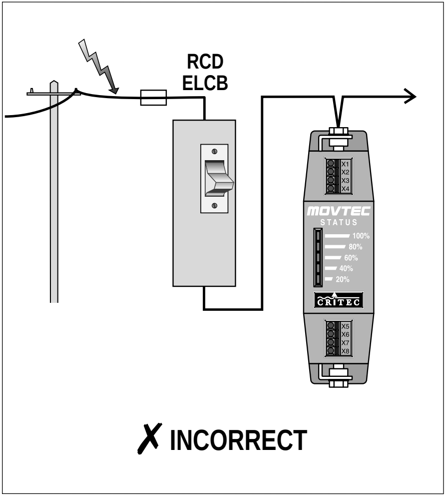


SINGLE MODE UNITS **THREE MODE UNITS**

NON-PREFERRED "T" CONNECTION METHOD EXAMPLES




RCD
ELCB
X1
X2
X3
X4
MOVTEC
STATUS
100%
80%
60%
40%
20%
CRITEC
X5
X6
X7
X8
Protected
Equipment
✓ CORRECT


RCD
ELCB
X1
X2
X3
X4
MOVTEC
STATUS
100%
80%
60%
40%
20%
CRITEC
X5
X6
X7
X8
✗ INCORRECT

8. RCD, ELCB

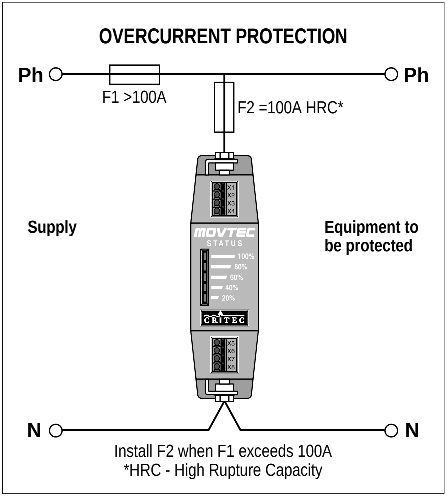
Where RCDs/ELCBs (Residual Current Devices / Earth Leakage Circuit Breakers) are fitted the Movtecs should be installed in the circuit prior to these devices (ie upstream). Where this can not be avoided and RCDs/ ELCBs are installed upstream, nuisance tripping of the RCD/ELCB may occur during transient activity.

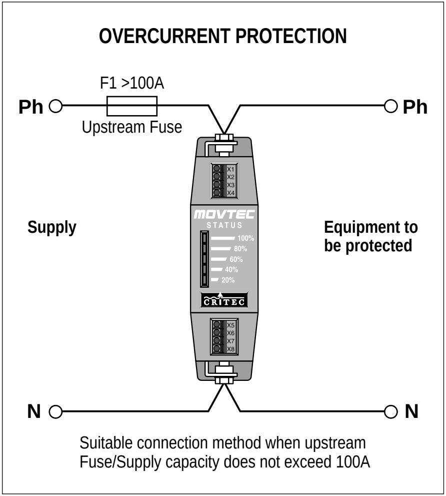
Contact your local ERICO agent for advice if upstream RCDs/ELCBs can not be avoided.

9. ISOLATION AND FUSING

Overcurrent and short circuit protection must be provided to protect the Movtec and associated wiring if a fault develops. The overcurrent protection should be installed in such a manner to also provide a means of isolating the Movtec module from the mains supply. This is an important safety consideration and is required in the event that any future maintenance or testing is needed.

The Movtec uses disconnection devices to isolate internal segments that have reached the end of their service life. In order for this disconnection to occur correctly, Movtecs should be only used on circuits with fuse or circuit breaker ratings of 32A or greater. (Nuisance operation of the overcurrent protection may occur during transient activity on smaller capacity circuits.)


OVERCURRENT PROTECTION
Ph
Ph
F1 >100A
F2 =100A HRC*
X1
X2
X3
X4
MOVTEC
STATUS
100%
80%
60%
40%
20%
CRITEC
X5
X6
X7
X8
Supply
Equipment to be protected
N
N
Install F2 when F1 exceeds 100A
*HRC - High Rupture Capacity


OVERCURRENT PROTECTION
F1 >100A
Ph
Ph
Upstream Fuse
X1
X2
X3
X4
MOVTEC
STATUS
100%
80%
60%
40%
20%
CRITEC
X5
X6
X7
X8
Supply
Equipment to be protected
N
N
Suitable connection method when upstream Fuse/Supply capacity does not exceed 100A

On circuits with a capacity of greater than 100A, the Movtecs should be installed in series with a 100A HRC fuse being placed prior to the Movtec, as detailed in the diagram on page 21. This will require the Movtec to be installed in a similar manner to the non-preferred "T" connection method. Care must be taken to keep "T" connections as short and straight as possible. Note that this fuse may rupture under surge events exceeding 60kA, thereby disconnecting the protection circuit. Under such conditions it is important that suitable monitoring of the alarm contact should be carried out to detect this possible occurrence.

10. STATUS INDICATION AND ALARMS

A characteristic of **all** transient and surge protection devices is that they degrade in proportion to the magnitude and number of incident surges to which they have been subjected. Status indication should be periodically monitored to determine if replacement is required.

Each Movtec features 5 protection segments. The status for each of these sectors is provided by way of a 5 segment LED bar graph. If any sector is damaged due to excess surge activity, a LED will extinguish. The LEDs extinguish in a sequential order (100% LED out first, 80% LED out next etc.) irrespective of which sector has sustained damage.

When mains voltage is applied to the fully functional Movtec, the alarm contacts will be **closed**. Should the surge handling capacity fall to below the alarm threshold, these contacts will **open**. The contacts are “fail-safe” in that, if power to the unit fails, the contacts will also revert to the open condition.

For Single Mode units (TDS-MT-277 and MT275V-135K-A)

- The voltage free alarm contacts are activated (opened) as soon as the primary protection status displays 60% or less and indicates that the Movtec unit should be replaced.

For Three Mode units (TDS-MTU)

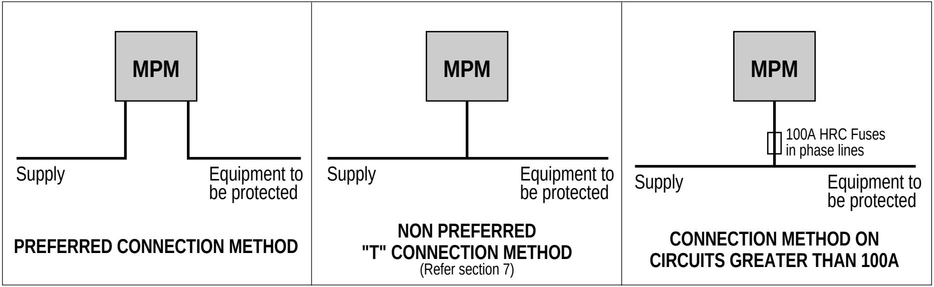
- The voltage-free alarm contacts are activated (opened) as soon as the protection status displays 80% or less. This indicates that damage has been sustained to the protection of one of the three modes and that the TDS-Movtec unit should be replaced.

MOVTEC MODEL	TERMINALS	ALARM OPERATES WHEN
TDS-MT-277	X5 & X7	MOVTEC displayed capacity =< 60%
MT275V-135K-A	X5 & X7	MOVTEC displayed capacity = <60%
TDS-MTU	X5 & X7	MOVTEC displayed capacity = <80%
Contact Rating Contact connection	250Vac, 10A resistive, 1A inductive Multi-stranded wire with CSA not greater than $1.5mm^2$	

Where multiple Movtecs are used, such as in three phase distribution systems the alarm contacts may simply be connected in series to provide a common alarm output connection.

11. MPM, MOVTEC PROTECTION MODULE

The MPM utilises a high energy Neutral to Earth spark gap to provide robust protection against earth potential rise problems. Care is required to ensure co-ordination of this device if any other voltage limiting device is connected either upstream or downstream in the Neutral to Earth circuit. **Contact your local agent for further information if other N-E protection devices are installed and co-ordination may be affected.**



INSTALLATION PROCEDURE FOR MPM

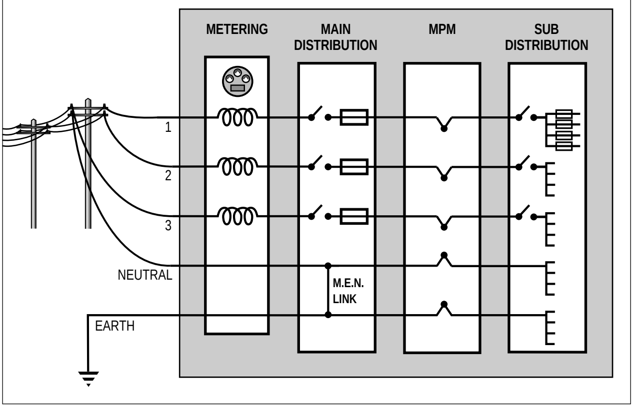
1. Remove the cover from the MPM.
2. Select the MPM mounting position to ensure optimum electrical connection method (refer Section 7) and in accordance with all given instructions.
3. Position and mark the mounting position of the MPM on the wall.
4. Depending on the mounting surface, prepare suitable anchoring holes for the marked position.
5. Snap the mounting spacers, supplied, into the rear of the back of the MPM as shown in Figure 1. *(see inside back cover P31)*
6. Mount the unit to the wall. To ensure the IP33 rating is preserved, the MPM should be mounted to the wall using the spacers provided and one of the fixing methods as shown in Figure 1. *(see inside back cover P31)*
7. Prepare the appropriate cable glands. It is recommended that a nylon cable gland (typically rated at IP66) be used.
8. Install wiring, taking care to support cabling directly connecting to the MPM unit, and tighten all terminals.
9. Check that the MPM is installed in accordance with all instructions, and relevant electrical safety codes.
10. Replace MPM cover, then apply power.
11. Correct operation of the MPM unit is established by checking that all 5 LED's on each MOVTEC bar graph are lit, and that power is correctly being supplied to the load(s).

INSTALLATION ARRANGEMENT FOR AUSTRALIAN MEN SYSTEMS

Under Australian Standards classification, MPMs are considered a piece of equipment to be connected to the mains supply. The MPMs are not intended for use as, nor are they, a ‘switch board’, ‘distribution board’ or other equipment. As MPMs are classified as ‘electrical equipment’ (ie: a product), AS 3000 Wiring Regulations apply to the installation and operation of the units.

In the multiple earth neutral (MEN) distribution system, the MPM equipment should be installed as close as possible after the MEN point and after both the main disconnect switch/ overcurrent protector and any metering equipment.

TYPICAL CONNECTION DETAIL FOR MPM POINT-OF-ENTRY INSTALLATION IN MEN DISTRIBUTION SYSTEM



12. MAINTENANCE & TESTING

Before removing any unit from service ensure that power to the device is isolated. Replacement of any Movtec units should only be undertaken in accordance with all relevant Electricity and Safety Standards by suitably qualified personnel.

Movtecs should be inspected periodically, and also following any periods of lightning or transient activity. Check the status indicators and replace if in the "Alarm" condition as detailed in Section 10 -STATUS INDICATION.

For high transient exposure sites or those of a critical operational nature, it is recommended that the alarm outputs be monitored to provide an additional warning of reduced capacity (refer Section 10).

Movtecs are designed for optimum performance under severe transient activity. To provide this performance, electronic components in the Movtec are encased in a patented proprietary, shock and thermal absorbant compound. **Units cannot be serviced, they must be replaced.**

Do not attempt to open or tamper with the units in any way as this may compromise performance and will void warranty.

Do not "Megger" or perform other types of electrical tests that apply voltages greater than the nominal operating voltage of the Movtec. The Movtec will attempt to limit these voltages thereby affecting the test result. Where these tests must be performed, remove the Movtec from circuit first.

13. EXTENDED WARRANTY

This product has a limited warranty to be free from defects in materials and workmanship for a period of five (5) years from the date of dispatch from the Manufacturer. The Purchaser acknowledges that lightning is a natural event with statistical variation in behaviour and energy levels which may exceed product ratings, and 100 % protection is not offered and cannot be provided for. Therefore the Manufacturer's liability is limited to the repair or replacement of the product (at the Manufacturer's sole option) which in its judgement has not been abused, misused, interfered with by any person not authorised by the Manufacturer, or exposed to energy or transient levels exceeding the Manufacturer's specifications for the product. The product must be installed and earthed (where applicable) in strict accordance with the Manufacturer's specifications and all relevant national Electricity and Safety Standards. The Manufacturer and the Purchaser mutually acknowledge that the product, by its nature, may be subject to degradation as a consequence of the number and severity of surges and transients that it experiences in normal use, and that this warranty excludes such gradual or sudden degradation. This warranty does not indemnify the Purchaser of the product for any consequential claim for damages or loss of operations or service or profits. Customers should contact their nearest manufacturer's agent to obtain a Product Repair Authorisation Number prior to making any claim under this warranty. This is only a summary of the warranty given by the Manufacturer. The full text of the warranty is set out in the Manufacturer's Conditions of Quotation and Sale. The above limited warranty is additional to rights which arise in respect of the sale of industrial and technical products and services to knowledgable buyers under the Australian Trade Practices Act 1974 as amended.

14. SIX POINT PLAN

Critec Movtec surge diverters form an important part of the much larger ERICO lightning, surge and transient protection philosophy (ERICO Lightning Technologies "Six Point Plan"). The level of protection and the degree of attention dedicated to each of the six points will require careful consideration for each site. The degree of protection required is determined by the individual site location/exposure with the aid of risk management principals.

For further advice on your protection needs please contact your local representative.

15. USE OF MIMIC PANELS

Movtecs are used in the Proline range of Surge Reduction Filters where superior protection is required for critical or sensitive electronic equipment. Some models of SRF use an electronic mimic panel to display in the front door the status of the internal Movtecs. The X1-X4 terminals on the Movtec are used for this purpose. If this Movtec is to be used with a mimic panel (possibly as a replacement for an existing Movtec in a SRF) please ensure compatibility as below.

Movtec & Mimic Compatibility			
Movtec Version	**Mimic Version**		
	TDS-Mimic #300732 EA-SRFP-117 EA-117	Hybrid Mimic #300731 EA-SRFP-115 EA-115	Discrete Mimic #300730 EA-SRFP-104 EA-104
TDS-MT-277	Yes	Note 1	No
MT-275V/135K/A #300867	Yes	Yes	Note 2
MT-275V/135K/A #300865/300866	Yes	Yes	Yes
Note 1	Mimic will operate for supply voltages up to 275Vrms		
Note 2	Request Product Update 44 for further details		

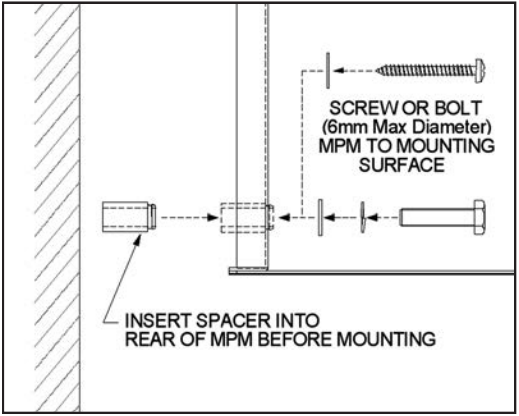
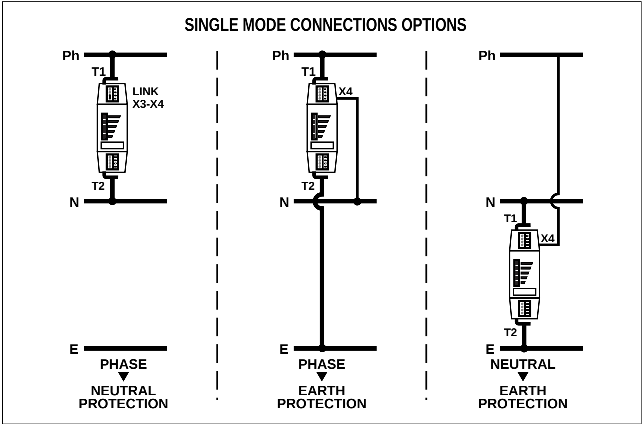


Figure 1. MPM mounting spacers.


SINGLE MODE CONNECTIONS OPTIONS
Ph
T1
LINK
X3-X4
T2
N
E
PHASE
NEUTRAL
PROTECTION
Ph
T1
X4
T2
N
E
PHASE
EARTH
PROTECTION
Ph
N
T1
X4
T2
E
NEUTRAL
EARTH
PROTECTION

Halmac Services (Qld) Pty. Ltd.
A.C.N. 098 852 923
A.B.N. 40 741 712 113

FAIRFIELD WATER RECLAMATION PLANT

TEST SHEET

1. MAIN SWITCHBOARD TEST SHEET

Halmac Services (Qld) Pty Ltd

DESIGN & INSPECTION ROUTE SCHEDULE

CUSTOMER:Tenix Alliance	PROJECT NAME:Fairfield WRP	PROJECT OFFICER:D.J.
JOB NO:A4215	SWITCHBOARD NAME: MSB	DRAWING NO: 4215-01

IS THIS SWITCHBOARD IDENTICAL, OR SIMILAR, TO A PREVIOUS DESIGN? (DELETE AS APPLICABLE) IF "NO" COMPLETE SWITCHBOARD DESIGN REVIEW. IF "YES" PROVIDE PREVIOUS DRAWING NO. REFERENCE ....

(TICK APPLICABLE SECTION BELOW: YES / NO / N/A (Not Applicable)

DESCRIPTION	INSPECTION/TEST			INSP.	DATE
	YES	NO	N/A		
SHEET METALWORK - UNPAINTED	X			DJ.	2/3
SHEET METALWORK - PAINTED	X			DAJ/DJ	2/3
FRONT LAYOUT AS PER DWG	X			DAJ/DJ	2/3
DITTO - SHARP EDGES REMOVED	X			DAJ	2/3
WIRING BUILDING WIRE		X		DJ.	
FLEX	X			DAJ	2/3
CRIMP LUGS	X			DAJ	2/3
BUSBARS AFTER MANUFACTURE	X			DAJ	24/3
BUSBARS - AFTER ASSEMBLY	X			DAJ	24/3
FITTING OUT - BEFORE WIRING	X			DAJ	2/3
FITTING OUT - AFTER WIRING	X			DAJ	24/3
NAME PLATES - BEFORE FITTING	X			DAJ	2/3
NAME PLATES - AFTER FITTING	X			DAJ	24/3
MEGGER &/OR H.V. TEST	X			DJ.	24/3
FUSES/C-B'S - CORRECT SIZE	X			DJ	24/3
WIRE & TERMINALS NUMBERED	X			DAJ	24/3
CONTROL & POWER CONN. TIGHT	X			DJ	31/5
POINT TO POINT TEST	X			DJ.	31/5
FUNCTIONAL TEST	X			DJ.	31/5
COMPLETE S/BOARD TESTING	X			DJ.	31/5
PLC/PROGRAMMING		X		DJ.	N/A.
FULL DOCUMENTATION IN DWG POCKET	X			DJ.	31/5
CORRECT DRAWING IN BOARD		X		DJ.	2/3
PACKING		X		DJ.	2/3.

IF BUSBARS ARE APPLICABLE COMPLETE DETAIL BELOW	
• Sizing as per approved shop drawings	Yes
• Accessible terminations and fixings	Yes
• Adequate supports and spacing	Yes
• Bolts correct type and torque tension	Yes
• Compartment segregation	Yes
• Phase-Phase & Phase-Earth Clearance	Yes

INSULATION TEST

1. Megger between phases, phase to N/L phases to earth, with MEN link removed. Note details below in Table "Megger 1"
2. Megger N/L to earth with MEN link removed.
3. Apply 2.5kV for (1) min., phase to phase, phase to NL, and 3-phases to earth.
4. Remove HI VOLT tester and repeat Item (1). Note details below in Table "Megger 2".

HV TEST Set Details: Hi Phony

"MEGGER" Detail: KYORITSU Serial No. 1180891

"HI POT" TEST VOLTAGE: 2.5 kV Duration 1 mins

"MEGGER" TEST VOLTAGE: 500 Volts D.C.

INSTRUMENT CALIBRATION: O.K.

TEST	MEGGER 1	"HI POT"	MEGGER 2
Red-White	>100 M Ohm	1 mA	>100 M Ohm
White-Blue	>100 M Ohm	1 mA	>100 M Ohm
Red-Blue	>100 M Ohm	1 mA	>100 M Ohm
Red-Neutral	>100 M Ohm	1 mA	>100 M Ohm
White-Neutral	>100 M Ohm	1 mA	>100 M Ohm
Blue-Neutral	>100 M Ohm	1 mA	>100 M Ohm
R.W.B.-Earth	>50 M Ohm	1 mA	>50 M Ohm

REQUEST FOR RELEASE

'As Built' Dwgs-Completed	X				
Test Reports - O.K.	X				
Delivery Docket - Completed	X				
Packaging - Completed		X			

I certify that the electrical switchboard has been tested in accordance with the prescribed procedure and is suitable for connection to supply.

Certificate of Competency No : C16507

Signature of Electrical Mechanic : [signature]

WIRE COLOURS	240V ACTIVE: RED	240V NEUTRAL: BLACK
ELV-AC ACTIVE: ORANGE	ELV-AC COMMON:	ELV DEVICES: SALMON
ELV-DC POSITIVE:	ELV-DC NEGATIVE: VIOLET	TELEMETRY:GREY

NOTES: WIRING SIZES ARE CONTROL 1.0mm & 0.5mm. Power 2.5mm. DOOR EARTHING 4mm

Inspected by: DAVE JACKSON of HALMAC. DATE: 31/3/10.

Accepted by: MARLON PRITCHARD of TENIX DATE: 31/3/10

Release Authorized by: DALE JACKSON of HALMAC DATE: 15/4/10

HS ITP 001 Rev 01 March 09

TEST RESULTS

Description of Test	Results
Meggar test	as per DIRS.
Ducter test -	as per DOCTOR Test Report.
Hi Pot test.	as per DIRS.
Point to Point	as per clean drawings highlighted.
TEST C/O CIRCUIT.	
Function test C/B'S.	

Tested By (Print Name): ______________________

Signed: ______________________ Date: ______________________

Customer Witness: ______________________ Date: ______________________

Halmac Services (Qld) Pty Ltd

DUCTOR TEST REPORT

PROJECT DESIGNATION: FAIRFIELD WWR	
SWITCHBOARD DESIGNATION: MSB	
JOB NO: A4215	DRAWING NO: 4215
DUCTOR TEST OF BUSBAR JOINTS:	DATE: 15/3/10
TIER NO.	TIER NO.

Joint 1

	μΩ	Injection A	V
R	2	199.8	0.4 mV
W	1.7	199.5	0.3 mV
B	1.3	200.5	0.3 mV
N			

Joint 7

	μΩ	Injection A	V
R	0.9	199.8	0.2 mV
W	0.5	199.5	0.1 mV
B	~~0.4~~ 1.2	199.4	0.3 mV
N			

Joint 2

	μΩ	Injection A	V
R	0.9	199.6	0.2 mV
W	0.8	198.8	0.2 mV
B	1.4	200.1	0.2 mV
N			

Joint 8

	μΩ	Injection A	V
R	1.0	199.4	0.3 mV
W	0.9	199.4	0.1 mV
B	0.4	199.7	0.1 mV
N			

Joint 3

	μΩ	Injection A	V
R	0.9	199.5	0.2 mV
W	0.6	199.4	0.1 mV
B	1.2	199.5	0.3 mV
N			

Joint 9

	μΩ	Injection A	V
R	1.8	199.0	0.3 mV
W	2.0	199.7	0.4 mV
B	3.0	199.0	0.6 mV
N			

Joint 4

	μΩ	Injection A	V
R	1.4	199.9	0.3 mV
W	1.3	199.0	0.3 mV
B	1.6	198.9	0.3 mV
N			

Joint 10

	μΩ	Injection A	V
R	1.8	199.3	0.3 mV
W	1.2	199.6	0.3 mV
B	2.2	199.3	0.5 mV
N			

Joint 5

	μΩ	Injection A	V
R	2.0	199.3	0.4 V
W	1.5	199.5	0.3 mV
B	1.9	199.5	0.4 mV
N			

Joint 11

	μΩ	Injection A	V
R	1.9	198.9	0.4 mV
W	1.2	199.1	0.3 mV
B	1.4	199.4	0.5 mV
N			

Joint 6

	μΩ	Injection A	V
R	1.5	199.5	0.3 mV
W	1.4	199.2	0.2 mV
B	1.1	198.8	0.2 mV
N			

Joint 12

	μΩ	Injection A	V
R	2.0	199.5	0.4 mV
W	1.1	199.6	0.1 mV
B	2.1	199.3	0.3 mV
N			

TESTED BY (Print Name): DAVE JACKSON	WITNESSED BY (Print Name): Dylan Jeffs
SIGNED: [signature] 16/3/10	SIGNED: [signature] 16/3/10

Halmac Services (Qld) Pty Ltd

DUCTOR TEST REPORT

PROJECT DESIGNATION: FAIRFIELD WWTP	
SWITCHBOARD DESIGNATION: MAIN SWITCHBOARD	
JOB NO: A4215	DRAWING NO: 4215
DUCTOR TEST OF BUSBAR JOINTS:	DATE: 15/3/10
TIER NO.	TIER NO.

Joint ~~1~~ 13 — Injection

	µΩ	A	V
R	1.4	199.4	0.3 m
W	0.8	199.9	0.1 m
B	0.5	199.2	0.1 m
N			

Joint ~~2~~ 14 — Injection

	µΩ	A	V
R	2.0	199.1	0.5 m
W	1.8	199.4	0.4 m
B	2.6	199.6	0.5 m
N			

Joint ~~3~~ 15 — Injection

	µΩ	A	V
R	0.3	199.7	0.1 m
W	1.2	199.8	0.3 m
B	0.6	198.8	0.2 m
N			

Joint ~~4~~ 16 — Injection

	µΩ	A	V
R			
W			
B			
N	2.0	199.5	0.2 m

Joint ~~5~~ 17 — Injection

	µΩ	A	V
R			
W			
B			
N	2.0	199.8	0.3 m

Joint 6 — Injection

	µΩ	A	V
R			
W			
B			
N			

Joint 7 — Injection

	µΩ	A	V
R			
W			
B			
N			

Joint 8 — Injection

	µΩ	A	V
R			
W			
B			
N			

Joint 9 — Injection

	µΩ	A	V
R			
W			
B			
N			

Joint 10 — Injection

	µΩ	A	V
R			
W			
B			
N			

Joint 11 — Injection

	µΩ	A	V
R			
W			
B			
N			

Joint 12 — Injection

	µΩ	A	V
R			
W			
B			
N			

TESTED BY (Print Name): DAVE JACKSON

SIGNED: [signature]

WITNESSED BY (Print Name): Dylan Jeffs

SIGNED: [signature] 16/3/10

QAF Pb 10.04-2

TR techrentals

CERTIFICATE OF CALIBRATION CONFORMANCE

Certificate Number : 17515
Reference : 409851
Model : MEG,DLRO200
Asset Number : 125915
Description : Megger 200A Micro-Ohmmeter DLRO200

Date Calibrated: 30/11/2009
Technician : Nick Sawyer
Serial No. : 081108/1547
Calibration valid for: 365 days.

The Performance of the above listed equipment has been verified for measurement accuracy to the manufacturers relevant published specification, in accordance with our Quality Assurance Procedures, using the appropriate calibrated equipment, traceable to nationally recognized standards.

SOURCE ASSET 83824 MET,100A REPORT 364779 DUE 28/08/2010
SOURCE ASSET 93810 MET,300A REPORT 364780 DUE 28/08/2010
SOURCE ASSET 93811 MET,50A REPORT 372619 DUE 29/01/2011

FOR Service Manager
30/11/2009

QSF 326-1/B

JAS-ANZ
Australian Sites

Offices throughout Australia, New Zealand, Malaysia
TR Pty Ltd (Box 1185) 6 Joseph Street Blackburn North 3130 VIC Australia
Freecall 180 632 652 P 03 9896 3000 F 03 9896 3099
www.trcorporation.com
ABN 99 005 499 721

TR0147

G. Non-Conformances and Unauthorised Modifications

✓ G.1	Label on ACP Control missing – Normal / Test.
✓ G.2	Earth & Neutral bar unaccessable.
G.3	Warning 415 label needs fitting Getting made
G.4	Move Surge diverter from Neutral to Earth. ~~Parallel MEN~~?
✓ G.5	Shroud terminals on Surge Diverter
✓ G.6	No hole to get into the CT Cabinet.
G.7	Masterpacts required shrouding as discussed
G.8	labels to terminals in Cable Zone. Getting made.
G.9	Bring Generator Start (3 terminals) out to PLC Connections
G.10	Bring change over CB's closed Signal to PLC terminals.

G.11. change descriptive labels to description & tag id. – Getting made.
✓ G.12. Shield power meter Terminals

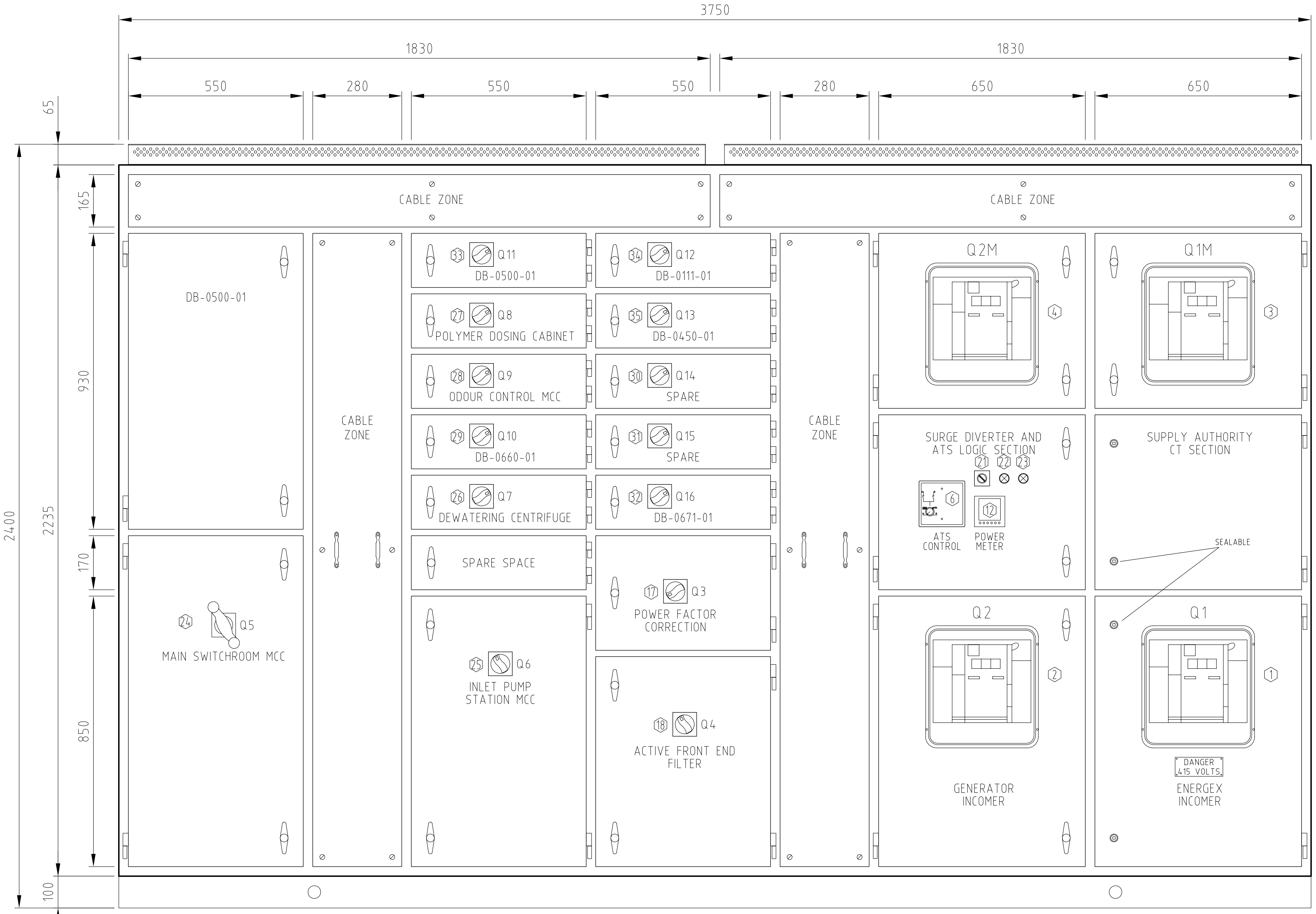
Contractor's Tester Signature .... Date 31/3/10.

Queensland Urban Utilities Electrical Inspector .... Date 31/3/10

✓ G.13. Deburr Neutral bar end.

Fairfield Water Reclamation Plant
Main Switchboard Drawing Register

Halmac Drawing No.	Brisbane Water Drawing No.	Description	Date	Revision
4215-01		Main Switchboard General Arrangement Part 1	30.10.09	D
4215-02		Main Switchboard General Arrangement Part 2	05.11.09	D
4215-03		Main Switchboard General Arrangement Part 3	05.11.09	D
4215-04		Main Switchboard General Arrangement Part 4	05.11.09	C
4215-05		Main Switchboard Part List	05.11.09	D



OPERATING PARAMETERS

SEGREGATION	FORM 4 TO AS 3439.1
PROTECTION	IP54 SPLASH PROOF TO AS 1939.
FAULT LEVEL (1sec)	30kA rms
PEAK WITHSTAND S.C.	69kA peak
RATED VOLTAGE	415VAC
RATED CURRENT	1600A
RATED INSULATION VOLTAGE	500V Ui
RATED FREQUENCY	50 Hz
AMBIENT TEMP.	45 Deg. C
TEMPERATURE RISE	30 Deg. C
EARTHING SYSTEM	M.E.N.
DIVERSITY FACTOR	1 (Unity)
AUX. CIRCUIT VOLTAGE	240 VAC
MEASURE OF PROTECTION	DOOR INTERLOCKS, TERMINATION BARRIERS IP20
SERVICE CONDITIONS	INDOORS.
WEIGHT (APPROX)	1200kg

CONSTRUCTION DETAILS

CONSTRUCTION	MACHINE FORMED AND WELDED. FRONT CONNECTED, FLOOR MOUNTED. ALL JOINTS TO BE CONTINUOUSLY WELDED.
MATERIAL	2.0mm ZINCANNEAL SHEET STEEL CUBICLES AND DOORS. 2.0mm ZINCANNEAL SHEET STEEL GEAR TRAYS.
DOORS	FITTED WITH CHROME PLATED BRASS PINTLE HINGES. CHROME PLATED T-HANDLES KEYED 92268. CHROME PLATED 1/4 TURN COIN LOCKS WITH ENERGEX SEALABILITY WHERE SHOWN.
DOOR SEALS	NEOPRENE RUBBER AROUND EACH DOOR. NEOPRENE RUBBER TO BE RETAINED IN CHANNEL.
ESCUTCHEON	FITTED WITH CHROME PLATED BRASS PINTLE HINGES. CHROME PLATED 1/4 TURN COIN LOCKS
PLINTH	BOLT ON 100x40x5mm MILD STEEL CHANNEL WITH 14mm DIA HOLES IN LOWER FRONT & REAR FLANGES AS SHOWN. UPPER FLANGES TO BE NOTCHED TO CLEAR 32mm ACCESS HOLES. FITTED WITH 50mm TUBES FOR LIFTING. HOT DIP GALVANISED AFTER FABRICATION.
CABLE ENTRIES	BOTTOM ONLY AS SHOWN.
GLANDPLATES	6mm ALUMINIUM WITH 6mm EARTH STUD. 25mm NEOPRENE GASKET GLUED TO GLANDPLATE.
FASTENERS	ZINC PLATED MILD STEEL NUTS & BOLTS.
BUSBARS	ROUNDED-EDGE HDHC TINNED COPPER TO AS 3439. PHASE COLOURED HEAT SHRINK AT 300mm INTERVALS.
BUSBAR JOINTS	M10 HIGH TENSILE BOLTS & BELVILLE WASHERS.
BUSBAR SUPPORTS	MOULDED THERMOSET POLYESTER RESIN GLASS FILLED SUPPORTS
FINISH	ELECTROSTATIC POWDER COAT BAKED ENAMEL
EXTERNAL COLOUR INTERNAL COLOUR EQUIPMENT PANELS ESCUTCHEONS	X15 ORANGE TO AS 2700. X15 ORANGE TO AS 2700. N14 WHITE TO AS 2700. N14 WHITE TO AS 2700.
WIRING	POWER- PVC INSULATED V90 MINIMUM 2.5mm sq FLEX TO AS 3147. PHASE COLOURED CONTROL- PVC INSULATED V90HT FLEX TO AS 3147. 240V ACTIVE RED 240V NEUTRAL BLACK 24VDC +ve SUPPLY ORANGE 24VDC -ve SUPPLY VIOLET 24VDC +ve GENERAL GREY 24VDC -ve GENERAL GREY INTRINSICALLY SAFE LIGHT BLUE ELECTRODES SALMON MARKERS- LEGRAND LOGICAB BLACK TEXT ON WHITE.
LABELS	MATERIAL- ENGRAVED GRAVOPLY. FIXING _ M3 x 6 STAINLESS STEEL PANHEADS. COLOUR- W/B/W UNLESS NOTED.

MAIN BUSBAR LOCATION	TOP		TOP	TOP		TOP	TOP
MAIN BUSBAR RATING / SIZE	1876A @ 30deg Rise - 2 x 100 x 10 Cu.		1876A @ 30deg Rise - 2 x 100 x 10 Cu.	1876A @ 30deg Rise - 2 x 100 x 10 Cu.		1876A @ 30deg Rise - 2 x 100 x 10 Cu.	1876A @ 30deg Rise - 2 x 100 x 10 Cu.
MAIN NEUTRAL RATING / SIZE	1876A @ 30deg Rise - 2 x 100 x 10 Cu.		1876A @ 30deg Rise - 2 x 100 x 10 Cu.	1876A @ 30deg Rise - 2 x 100 x 10 Cu.		1876A @ 30deg Rise - 2 x 100 x 10 Cu.	1876A @ 30deg Rise - 2 x 100 x 10 Cu.
MAIN EARTH RATING / SIZE	485A @ 30deg Rise - 40 x 10 Cu.		485A @ 30deg Rise - 40 x 10 Cu.	485A @ 30deg Rise - 40 x 10 Cu.		485A @ 30deg Rise - 40 x 10 Cu.	485A @ 30deg Rise - 40 x 10 Cu.
DROPPER ASSEMBLY RATING / SIZE	1218A @ 30deg Rise - 2 x 63 x 10 Cu.		1042A @ 30deg Rise - 100 x 10 Cu.	1042A @ 30deg Rise - 100 x 10 Cu.		1876A @ 30deg Rise - 2 x 100 x 10 Cu.	1876A @ 30deg Rise - 2 x 100 x 10 Cu.
INCOMING COPPER RATING / SIZE							
INCOMING CABLE SIZE	TBA		TBA	TBA		TBA	3 x 300mm/Ph 3 x 300mm/N 3 x 120mm/E
CABLE ZONE RISER NEUTRAL SIZE		2 x 40 x 10 Cu.			2 x 40 x 10 Cu.		
CABLE ZONE RISER EARTH SIZE		40 x 10 Cu.			40 x 10 Cu.		
BREAKER RATING						1000A	1600A
MAKE AND MODEL						Schneider Electric / NW10 N1 Fixed	Schneider Electric / NW16 N1 Fixed
TRIP UNIT MODEL						Micrologic 2.0A	Micrologic 2.0A
TRIP UNIT SETTING						TBA	TBA
BREAKER RATING						1000A	1600A
MAKE AND MODEL						Schneider Electric / NW10 N1 Fixed	Schneider Electric / NW16 N1 Fixed
TRIP UNIT MODEL						Micrologic 6.0A	Micrologic 6.0A
TRIP UNIT SETTING						TBA	TBA
TERMINATION DETAILS	Direct to MCCB		Direct to MCCB	Direct to MCCB		On to Copper Tags on ACB	On to Copper Tags on ACB

Brisbane Water

SHEET No.

BRISBANE WATER DRAWING No. | AMEND.

REV.	DATE	REVISION DESCRIPTION.	DWG.	APP.
D	17.06.10	AS BUILT	UM	DJ
C	13.11.09	MAINS INCOMER AND GENERATOR INCOMER TIERS SWAPPED.	DNC	DPS
B	11.11.09	CHANGES AS PER F. ABUELAWN COMMENTS.	DNC	DPS
A	30.10.09	ISSUED FOR APPROVAL	DNC	JCS

CLIENT:
TENIX

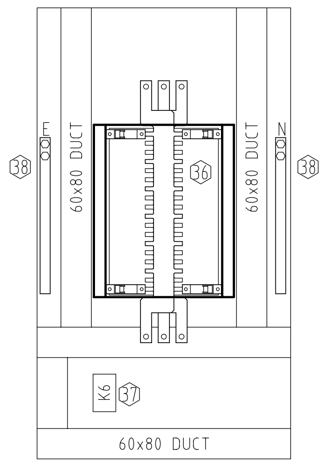
A.C.N 098 852 923 A.B.N 40 741 712 113
Halmac Services(Qld)Pty.Ltd.
30 Palmer Place Murarrie, Qld. 4172
Telephone : (07) 3249 9500 Fax :(07) 3249 9599
Email : info@halmacservicesqld.com.au
A QUALITY COMPANY TO AS/ISO9001

Scale: 1:7.5
Contract No. A4215
Plotted:
☒ CONTROLLED COPY
☐ UNCONTROLLED COPY (NOT SUBJECT TO AUTOMATIC UPDATE)

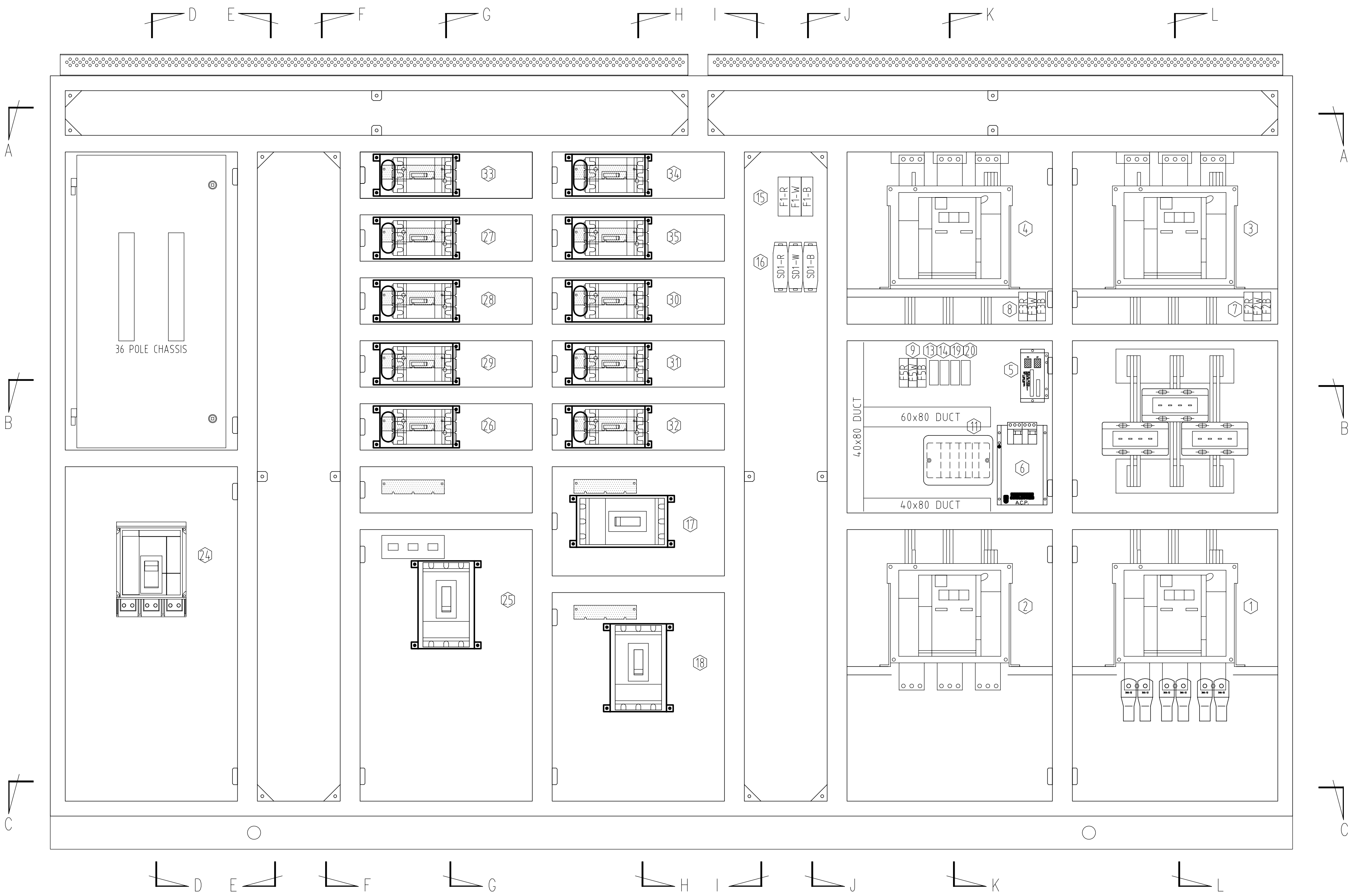
Date: 30.10.09
Drawn: DNC
Designed: JCS
Checked: JCS
Approved:

TITLE :
FAIRFIELD WRP UPGRADE
MAIN SWITCHBOARD
GENERAL ARRANGEMENT
PART 1
FRONT VIEW

DRAWING No.
4215-01
SHEET SIZE : A1
REV. D



BEHIND ADJACENT ESCUTCHEON



REV.	DATE.	REVISION DESCRIPTION.	DWG.	APP.
D	17.06.10	AS BUILT	UM	DJ
C	13.11.09	MAINS INCOMER AND GENERATOR INCOMER TIERS SWAPPED.	DNC	DPS
B	10.11.09	CHANGES AS PER F. ABUELAUN COMMENTS.	DNC	DPS
A	5.11.09	ISSUED FOR APPROVAL	DNC	JCS

CLIENT: TENIX

Halmac Services(Qld)Pty.Ltd.
A.C.N 098 852 923 A.B.N 40 741 712 113
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Telephone : (07) 3249 9500 Fax :(07) 3249 9599
Email : info@halmacservicesqld.com.au
A QUALITY COMPANY TO AS/ISO9001

Scale: 1:7.5
Contract No. A4215
Plotted:
☒ CONTROLLED COPY
☐ UNCONTROLLED COPY (NOT SUBJECT TO AUTOMATIC UPDATE)

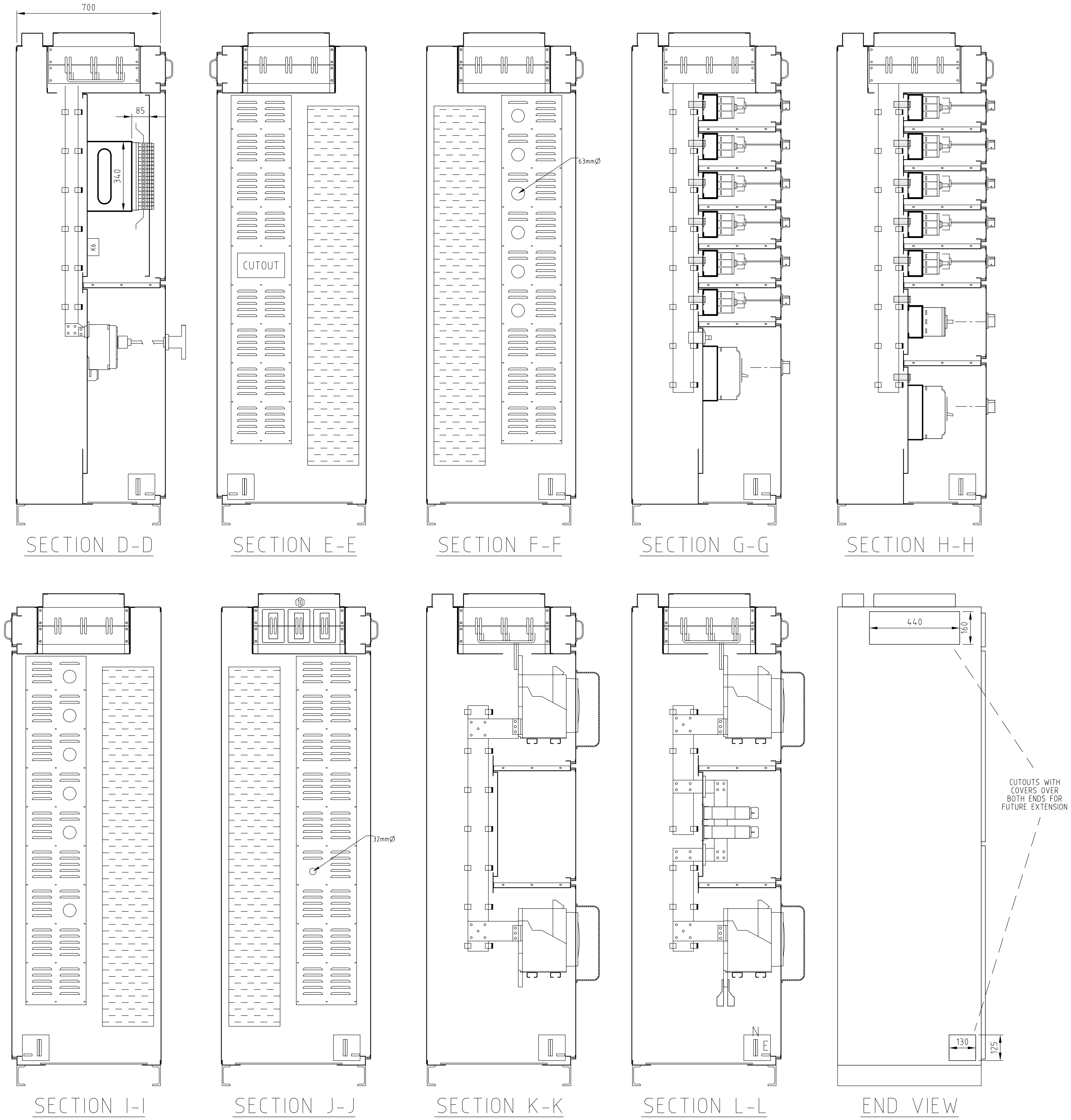
Date: 5.11.09
Drawn: DNC
Designed: JCS
Checked: JCS
Approved:

TITLE :
FAIRFIELD WRP UPGRADE
MAIN SWITCHBOARD
GENERAL ARRANGEMENT
PART 2
FRONT VIEW - DOORS REMOVED

Brisbane Water

SHEET No.
BRISBANE WATER DRAWING No.
AMEND.

DRAWING No. 4215-02
SHEET SIZE : A1
REV. D



Brisbane Water

SHEET No.

BRISBANE WATER DRAWING No.	AMEND.

REV.	DATE.	REVISION DESCRIPTION.	DWG.	APP.
D	17.06.10	AS BUILT	UM	DJ
C	13.11.09	SECTION K-K AND SECTION L-L INTERCHANGED.	DNC	DPS
B	10.11.09	CHANGES AS PER F.ABELUAWN COMMENTS.	DNC	DPS
A	5.11.09	ISSUED FOR APPROVAL	DNC	JCS

CLIENT: TENIX

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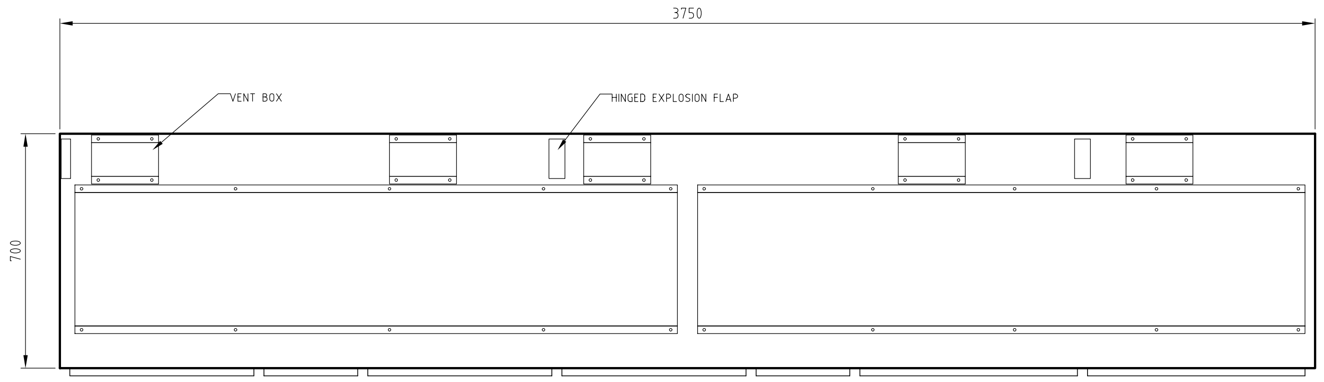
Telephone : (07) 3249 9500 Fax :(07) 3249 9599
Email : info@halmacservicesqld.com.au
A QUALITY COMPANY TO AS/ISO9001

Scale: NTS	Date: 5.11.09
Contract No. A4215	Drawn: DNC
Plotted:	Designed: JCS
☒ CONTROLLED COPY	Checked: JCS
☐ UNCONTROLLED COPY (NOT SUBJECT TO AUTOMATIC UPDATE)	Approved:

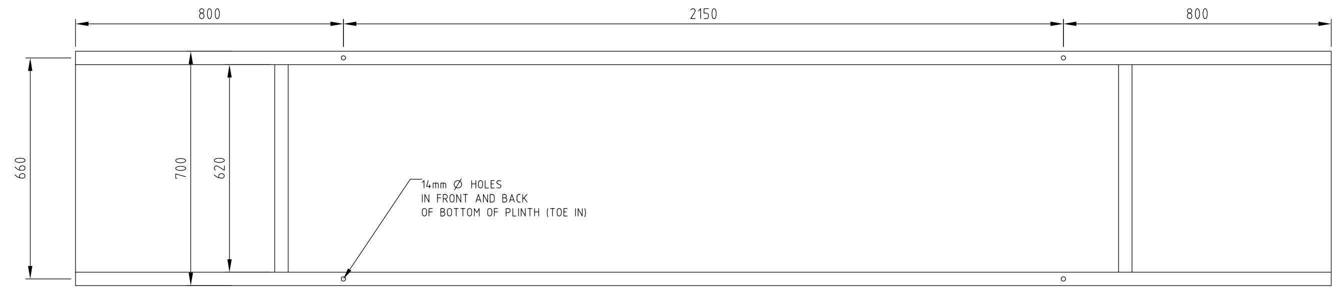
TITLE :
FAIRFIELD WRP UPGRADE
MAIN SWITCHBOARD
GENERAL ARRANGEMENT
PART 3
VERTICAL SECTION VIEWS

DRAWING No. 4215-03

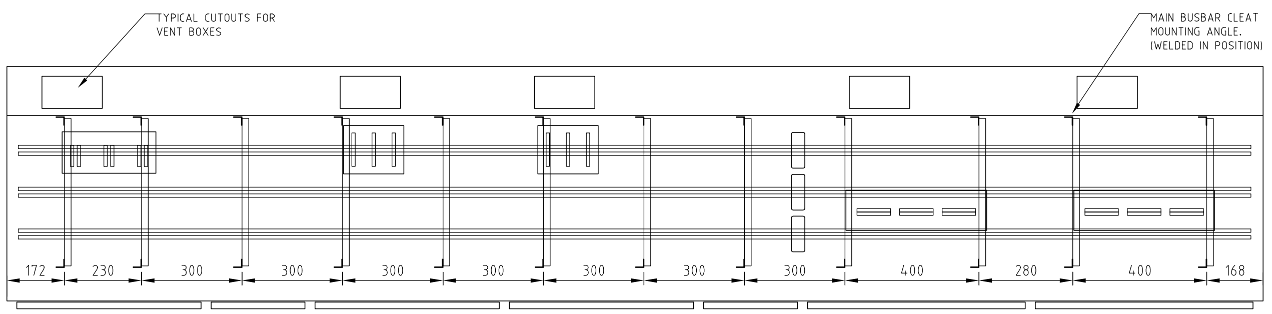
SHEET SIZE : A1 REV. D



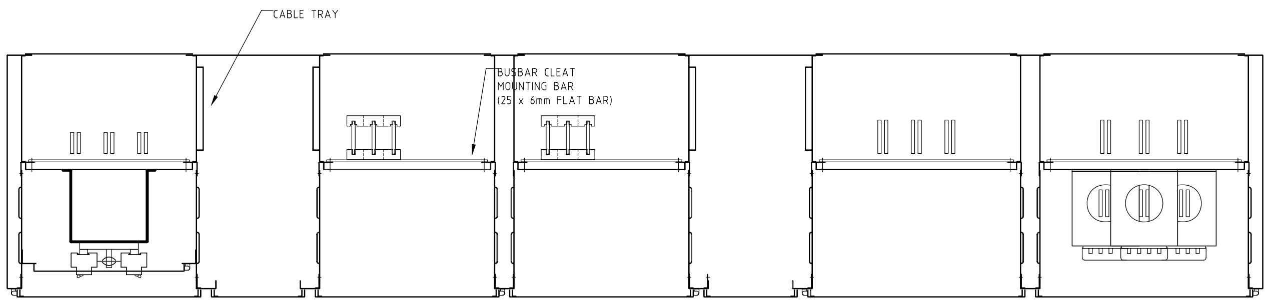
PLAN VIEW



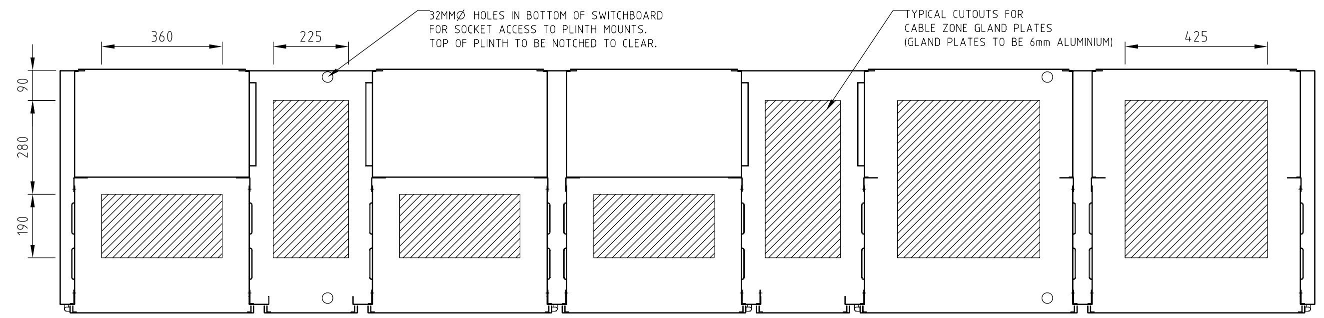
PLINTH FOOTPRINT



SECTION A-A



SECTION B-B



SECTION C-C

Brisbane Water

SHEET No.

BRISBANE WATER DRAWING No.	AMEND.

REV.	DATE	REVISION DESCRIPTION.	DWG.	APP.
C	17.06.10	AS BUILT	UM	DJ
B	13.11.09	CHANGES AS PER F. ABLELAWN COMMENTS.	DNC	DPS
A	11.11.09	ISSUED FOR APPROVAL.	DNC	DPS

CLIENT: TENIX

A.C.N 098 852 923 A.B.N 40 741 712 113
Halmac Services(Qld)Pty.Ltd.
30 Palmer Place Murarrie, Qld. 4172
Telephone : (07) 3249 9500 Fax :(07) 3249 9599
Email : info@halmacservicesqld.com.au
A QUALITY COMPANY TO AS/ISO9001

Scale: NTS
Contract No. A4215
Plotted:
☒ CONTROLLED COPY
☐ UNCONTROLLED COPY (NOT SUBJECT TO AUTOMATIC UPDATE)

Date: 5.11.09
Drawn: DNC
Designed: JCS
Checked: JCS
Approved:

TITLE : FAIRFIELD WRP UPGRADE
MAIN SWITCHBOARD
GENERAL ARRANGEMENT
PART 4
HORIZONTAL SECTION VIEWS

DRAWING No. 4215-04
SHEET SIZE : A1
REV. C

PARTS LIST

I.D. No.	Reference	Part No.	DESCRIPTION	Qty.	Supplier
1	Q1	48042	NW 16 H1 3P Basic Frame Fixed	1	Schneider Electric
2	Q2	48014	NW 10 H1 3P Basic Frame Fixed	1	Schneider Electric
1,2	Q1,Q2	47286	Micrologic 6.0 A	2	Schneider Electric
1	Q1	48536	Pushbutton Padlocking Device	1	Schneider Electric
1,2	Q1,Q2	48603	Door Frame	2	Schneider Electric
1,2	Q1,Q2	48604	Door Frame Transparent Cover	2	Schneider Electric
3	Q1M	48042	NW 16 H1 3P Basic Frame Fixed	1	Schneider Electric
4	Q2M	48014	NW 10 H1 3P Basic Frame Fixed	1	Schneider Electric
3,4	Q1M,Q2M	47280	Micrologic 2.0 A	2	Schneider Electric
3,4	Q1M,Q2M	48603	Door Frame	2	Schneider Electric
3,4	Q1M,Q2M	48604	Door Frame Transparent Cover	2	Schneider Electric
3,4	Q1M,Q2M	48212	MCH 200/240 VAC Motor Drive	2	Schneider Electric
3,4	Q1M,Q2M	47353	XF 200/250 VAC/VDC Closing Release	2	Schneider Electric
3,4	Q1M,Q2M	47363	MX 200/250 VAC Shunt Trip	2	Schneider Electric
3,4	Q1M,Q2M	47342	1 Ready to Close Auxilliary	2	Schneider Electric
3,4	Q1M,Q2M	47926	Cable Interlock Plate	2	Schneider Electric
3,4	Q1M,Q2M	33209	Set of 2 Interlock Cables	1	Schneider Electric
3,4	Q1M,Q2M	29352	48/415VAC Electric Interlock Box	1	Schneider Electric
5	Q1M,Q2M	54655	IVE Wiring Kit	1	Schneider Electric
6	Q1M,Q2M	29472	ACP PLATE + UA LOGIC 240V AC	1	Schneider Electric
7,8,9	F2,F3,F5	NV20FW	20A Fuse Holder	9	NHP
7,8,9	F2,F3,F5	NNS6	6A Fuse	9	NHP
10	Power Meter	CTD10S16005A	1600/5 Current Tranformer	3	NHP
11	Power Meter	KWHTB01	Test Block	1	IPD
12	Power Meter	ION 7300	Power Meter	1	Schneider Electric
13,14	PFR1,PFR2	252-PSGW	Phase Failure Relay	2	Crompton Instruments
15	F1	NV63FW	63A Fuse Holder	3	NHP
15	F1	NES63	63A Fuse	3	NHP
16	SD1	TDSMT277	1P 100kA Movtech Surge Diverter	3	Energy Corrections Options
17,18	Q3,4	LV432676	3P3D Micrologic 2.3 400A NSX400F Compact C/B	2	Schneider Electric
17,18	Q3,4	LV432591	3P Terminal Shield	4	Schneider Electric
17,18	Q3,4	LV432598	Extended Standard Rotary Handle	2	Schneider Electric
19,20	Q1MR,Q2MR	G2R-1-SNAC240	Relay 240VAC	2	Omron
19,20	Q1MR,Q2MR	P2RF-05-E	Relay Base	2	Omron
21	S2	CA10 A220-600 FT2	Generator Test Switch	1	Kraus & Naimer
22,23	H11,H21	ZB5AW313	Press to Test Pilot Light (White)	2	Schneider Electric
22,23	H11,H21	ZB5AW0M11	Switch Body inc. LED for above	2	Schneider Electric
22,23	H11,H21	ZBE102	N/C Contact Block for above	2	Schneider Electric
24	Q5	33564 / 33875	NS1250N 3P 5.0 C/W Extended Handle	1	Schneider Electric
24	Q5	33628	3P Terminal Shield	2	Schneider Electric
25	Q6	LV432876	3P3D Micrologic 2.3 630A NSX630N; Compact circuit breaker	1	Schneider Electric
25	Q6	LV432591	3P Terminal Shield	2	Schneider Electric
25	Q6	LV432598	Extended Standard Rotary Handle	1	Schneider Electric
26	Q7	LV431831	3P3D TM200D NSX250N Compact Circuit Breaker	1	Schneider Electric
27,28	Q8,9	LV429843	3P3D TM50D NSX100N Compact Circuit Breaker	2	Schneider Electric
29,30,31,32	Q10,14,15,16	LV431830	3P3D TM250D NSX250N Compact Circuit Breaker	4	Schneider Electric
33,34,35	Q11,12,13	LV430831	3P3D TM125D NSX160N Compact Circuit Breaker	3	Schneider Electric
26-35	Q7-16	LV429517	3P Terminal Shield	20	Schneider Electric
26-35	Q7-16	LV429338	Extended Standard Rotary Handle NSX100-250	10	Schneider Electric
36	DB-0500-01	C325363	36 way 3P 250A Chassis	1	Schneider Electric
-	Q11-2,3,4	25834	6kA 3 pole 32A Circuit Breaker	3	Schneider Electric
-	Q11-5,6,7	25833	6kA 3 pole 25A Circuit Breaker	4	Schneider Electric
-	Q11-8	25831	6kA 3 pole 16A Circuit Breaker	1	Schneider Electric
-	Q11-9,10,11	25803	6kA 1 pole 16A Circuit Breaker	3	Schneider Electric
-	Q11-12,13	26892	10Ka 1 Pole 25A RCD Circuit Breaker	2	Schneider Electric
-	Q11-14	26858	10Ka 1 Pole 10A RCD Circuit Breaker	1	Schneider Electric
-	Q11-15	25798	6kA MCB 1 pole 2A Circuit Breaker	1	Schneider Electric
37	K6	LC1D098U7	4 pole contactor 2N/O 2 N/C	1	Schneider Electric
38	E/N	ENB36	36 Hole Earth/Neutral Bar	2	Schneider Electric

Brisbane Water

SHEET No.

BRISBANE WATER DRAWING No. | AMEND.

REV.	DATE.	REVISION DESCRIPTION.	DWG.	APP.
D	17.06.10	AS BUILT	UM	DJ
C	13.11.09	PFR1,PFR2 CHANGED TO CROMPTON, Q2M CHANGED TO 1000A.	DNC	DPS
B	11.11.09	CHANGES AS PER F. ABEULAWN COMMENTS.	DNC	DPS
A	5.11.09	ISSUED FOR APPROVAL	DNC	JCS

CLIENT: TENIX

A.C.N 098 852 923 A.B.N 40 741 712 113
Halmac Services(Qld)Pty.Ltd.
30 Palmer Place Murarrie, Qld. 4172
Telephone : (07) 3249 9500 Fax :(07) 3249 9599
Email : info@halmacservicesqld.com.au
A QUALITY COMPANY TO AS/ISO9001

Scale: NTS
Contract No. A4215
Plotted:
☒ CONTROLLED COPY
☐ UNCONTROLLED COPY (NOT SUBJECT TO AUTOMATIC UPDATE)

Date: 5.11.09
Drawn: DNC
Designed: JCS
Checked: JCS
Approved:

TITLE : FAIRFIELD WRP UPGRADE
MAIN SWITCHBOARD
PARTS LIST

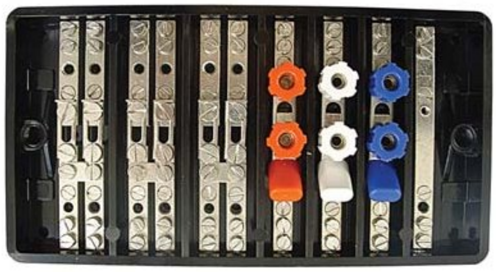
DRAWING No. 4215-05

SHEET SIZE : A1 | REV. D

METERING TEST BLOCK

Features:
- Multi-point sealing
- Captive sealing screws
- Terminals align with standard Cable Holes
- IP20 enclosure with cover fitted
- Dimensions 148mm x 207mm x 58mm (H x W x D) Screw projection 13mm

H



W

Description	Part No.	
Metering Test Block (supplied with loose Link)	KWHTB01	
Metering Test Block (supplied with Z-shape Link fitted)	KWHTB02