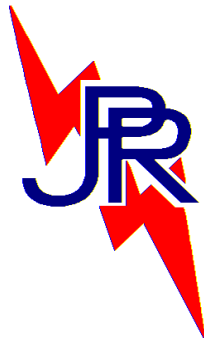


QUEENSLAND URBAN UTILITIES

EAGLE FARM WORKSHOPS MAIN SWITCHBOARD

ELECTRICAL SWITCHBOARD OPERATION AND MAINTENANCE MANUAL

Developed by:



**J & P RICHARDSON INDUSTRIES
CAMPBELL AVENUE
WACOL QLD 4076**

**ABN 23 001 952 325
ACN 001 952 325
Ph. (07) 3271 2911
Fax. (07) 3271 3623**

CONTENTS

- 1 INTRODUCTION
- 2 ELECTRICAL EQUIPMENT TECHNICAL INFORMATION
 - 2.1 CIRCUIT BREAKERS & CHASSIS
 - 2.2 TERMINALS & LINKS
- 3 SWITCHBOARD WORKS TEST RESULTS
- 4 “AS CONSTRUCTED” DRAWINGS
- 5 SERVICE AND MAINTENANCE

1 INTRODUCTION

These operating instructions cover the QUEENSLAND URBAN UTILITIES, Eagle Farm Workshops Main Switchboard electrical equipment supplied by J & P Richardson Industries Pty Ltd in 2012.

2 ELECTRICAL EQUIPMENT TECHNICAL INFORMATION

2.1 CIRCUIT BREAKERS & CHASSIS

2.2 TERMINALS & LINKS

2.1 CIRCUIT BREAKERS & CHASSIS

- TERASAKI – **XS800NJ 800 3P** 3P 800A Circuit Breaker
- TERASAKI – **T1HS80R5GM** Handle
- TERASAKI – **TKNNHPAA, TKNNHPKEYAA, 14997702**

- TERASAKI – **E250NJ332** 3P 32A Circuit Breaker
- TERASAKI – **E250NJ363** 3P 63A Circuit Breaker
- TERASAKI – **E250NJ3100** 3P 100A Circuit Breaker
- TERASAKI – **E250NJ3250** 3P 250A Circuit Breaker
- TERASAKI – **T2HS25R5GM** Handle
- TERASAKI – **T2CR253SG** Shroud
- TERASAKI – **T2CF253SSNBA** Shroud

- TERASAKI – **E400NJ3400** 3P 400A Circuit Breaker
- TERASAKI – **T2CR403SG** Shroud
- TERASAKI – **T2CF403SLNG** Shroud

- TERASAKI – **HC121203** Top Feed with White Phase 80mm Longer
1250A 30U Chassis Fitted with **1 x HCLN630** & **8 x HCL250** Tee Off's



TemBreak

The Ultimate Safety Breaker

OUR CUSTOMER CARE COMMITMENTS

Quality is Guaranteed

All products supplied from this catalogue carry a guarantee against defects in materials and workmanship for a period of 12 months from date of purchase as standard.

Quality is Accredited

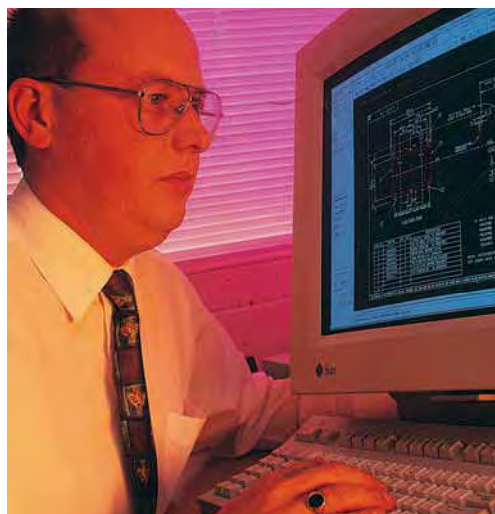
Terasaki has ISO 9001 accreditation for the manufacture, sale and distribution of all products featured in this catalogue.

Ordering is Easy

We have made ordering easy for you by colour coding the sections of this catalogue and including order codes. If you need help with ordering or selection, please call one of the telephone numbers shown below.

Technical Support is Free

We offer free technical support and application software to all customers. This could range from selecting a product for an unusual application through to carrying out a protection study. Please call one of the telephone numbers shown below.



CUSTOMER SERVICE CONTACT DETAILS

Italy:	+39 02 92278300	Australia and New Zealand:	+61 3 9429 2999
Spain & Latin America:	+34 93 8796050	Brazil:	+55 21 33019898
Sweden:	+46 8 55628230	Malaysia:	+60 3 55493820
Denmark:	+45 70 260057	Singapore:	+65 6425 4915
UK and all other countries in Europe, Middle East and Africa:	+44 141 9411940	China:	+86 20 8270 8556
		Japan and all other countries in Asia:	+81 6 67919323

Safety and protection are the prime purposes of Terasaki products. You care about safety and protection. The users of products you specify care about safety and protection.

We call TemBreak 2 the Ultimate Safety Breaker. Throughout this catalogue you will see our Safety+ mark. This is designed to draw your attention to safety features which exceed international standards.

Please read further to discover the benefits of TemBreak 2.



THE TEMBREAK 2 PRODUCT LINES

TEMBREAK 2

MOULDED CASE CIRCUIT BREAKERS

Rated current (I_n) from 20A to 1600A. Breaking
Capacity (I_{cu}) from 25kA to 200kA at 415V AC.



WELCOME TO TEMBREAK 2

TEMBREAK 2 MOULDED CASE CIRCUIT BREAKERS 16A TO 1600A

1. Welcome to TemBreak 2

Easy Selection Guide	5
10 Reasons to use TemBreak 2	7
Safety Plus	9
Exceeding Standards	11
Reducing Environmental Impact	12

2. Ratings and Specifications

3. Operating Characteristics

4. Application Data

5. Accessories

6. Installation

7. Dimensions



WELCOME TO TEMBREAK 2

EASY SELECTION GUIDE

The TemBreak 2 range of products includes:

- Moulded Case Circuit Breakers (MCCBs)
- Switch-Disconnectors in the same compact moulded case frame sizes as MCCBs
- A comprehensive range of accessories which are common to MCCBs and Switch-Disconnectors. All internal accessories are common to all frame sizes.



Key to Model and Type Designations

Model Denoted by

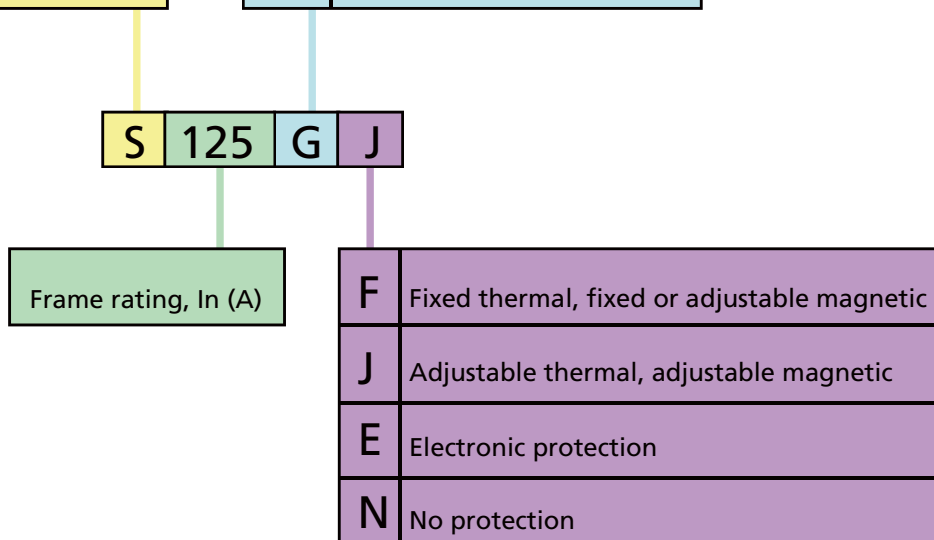


Type Denoted by








E	Economical
S	Standard
H	High
L	Limiting*

C,S	Low breaking capacity
N	Medium breaking capacity
G,R	High breaking capacity
P	Extra High breaking capacity



WELCOME TO TEMBREAK 2

EASY SELECTION GUIDE

Frame Rating (A)														
														
125			160/250			400/630			800/1000			1250/1600		
MCCBs														
Model	Type	I_{cu} (kA)	Model	Type	I_{cu} (kA)	Model	Type	I_{cu} (kA)	Model	Type	I_{cu} (kA)	Model	Type	I_{cu} (kA)
E125	NJ	25	E250	NJ	25	E400	NJ	25						
						E630	NE	36						
S125	NF	25	S160	NF	25	S400	CJ	36	S800	CJ	36	S1250	SE	50
S125	NJ	36	S160	NJ	36	S400	NJ	50	S800	NJ	50	S1250	NE	70
S125	GJ	65	S160	GJ	65	S400	NE	50	S800	NE	50	S1250	GE	85
			S250	NJ	36	S400	GJ	70	S800	RJ	70	S1600	SE	50
			S250	NE	36	S400	GE	70	S800	RE	70	S1600	NE	85
			S250	GJ	65	S400	PJ	85	S1000	SE	50			
			S250	GE	65	S400	PE	85	S1000	NE	70			
			S250	PE	70	S630	CE	50						
						S630	GE	70						
H125*	NJ	125	H160	NJ	125	H400	NE	125	H800	NE	125			
			H250	NJ	125									
			H250	NE	125									
L125*	NJ	200	L160	NJ	200	L400	NE	200	L800	NE	200			
			L250	NJ	200									
I_n (A)														
125 ↕ 16			250 ↑ 16			630 ↕ 250			1000 ↕ 630			1600 ↕ 1250		
Switch-Disconnectors														
Model	Type		Model	Type		Model	Type		Model	Type		Model	Type	
S125	NN		S160	NN		S400	NN		S800	NN		S1250	NN	
			S250	NN		S630	NN		S1000	NN		S1600	NN	

Note: All breaking capacities are r.m.s. symmetrical at 415V AC

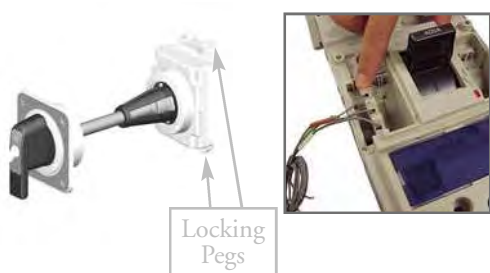
*250A Frame

The Ultimate Safety Breaker **TemBreak**

page 6

10 REASONS TO USE TEMBREAK 2

1. FIELD-INSTALLABLE ACCESSORIES

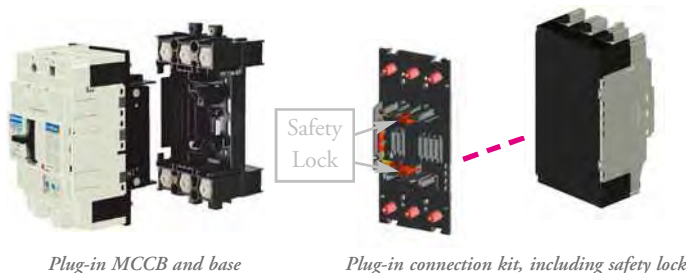


Accessories can be fitted by the switchboard builder or added by the end-user.

Handles and motor operators can be rapidly fitted using the locking pegs. It takes **less than 10 seconds** to secure a handle or motor to the MCCB – a great time saving compared to alternative products.

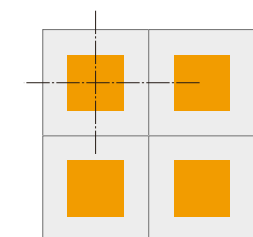
All accessories are endurance tested to the same level as the host MCCB.

2. SAFETY LOCK FOR PLUG-IN VERSIONS

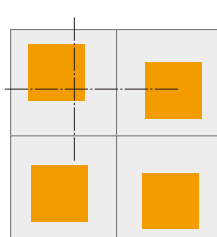


The plug-in MCCB is locked to the base when the toggle is ON. It cannot be removed unless the toggle is OFF or TRIPPED. The safety lock prevents a trip occurring as the MCCB is being removed from the base.

3. SYMMETRICAL DOOR CUTOUT PATTERNS



Using TemBreak 2 Operating Handles



Using other MCCB Operating Handles

Door cutout patterns for handles are symmetrical, even when breakers are mounted in opposite directions.

4. MODULAR SIZES



All current ratings up to 630A can be supplied in 2 sizes: the 250A and 630A sizes.



The compact 125A size offers the same features and performance but with reduced dimensions and cost.

5. ADVANCED L.C.D. DISPLAY, OCR



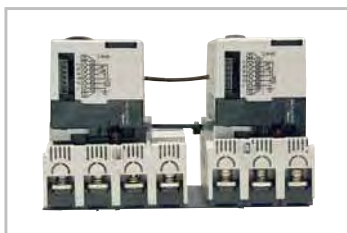
The XOW-1S OCR comes standard with the backlit LCD display. It can monitor and indicate phase currents, voltages, power, energy, power factor, harmonic currents, and more. Data communications via Modbus, an open network, are supported.

10 REASONS TO USE TEMBREAK 2

6. COMPACT CHANGEOVERS



Changeover Pair with Link Interlock and Motor Operators



Viewed from Below (250A frame)

The mechanical interlock is installed on the front of the MCCB, and is compatible with motor operators and handles. An automatic changeover system can be assembled very easily by a switchboard builder or end-user.

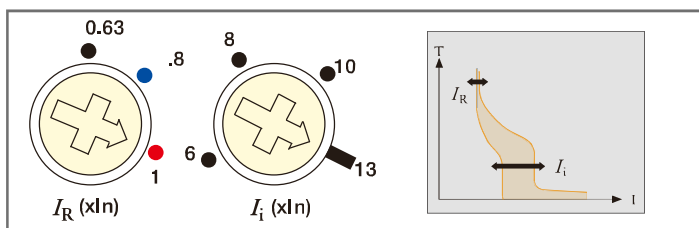
7. DIRECT OPENING



Under the heading “Measures to minimise the risk in the event of failure”, IEC 60204-1 Safety of Machinery-Electrical Equipment of Machinery includes the following recommendation:

“-the use of switching devices having positive (or direct) opening operation.”

8. UNSURPASSED FLEXIBILITY



Overload protection is adjustable between 63% and 100% of the rating.

Short-circuit protection is adjustable on all thermal magnetic models.

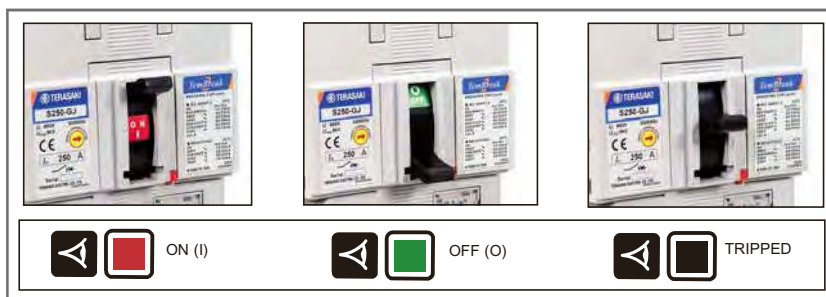
Short-circuit protection settings are suitable for motor starting on all models, including the compact 125A frame.

9. CUSTOMISED TRIPPING TIMES



If you require a characteristic which is not available as a preset on our electronic protection unit, send us the details and we will program a customised characteristic to suit your application. (Within certain limits - contact us for details).

10. VISUAL SAFETY



Coloured indicators display the ON or OFF status. The indicators are fully covered if the breaker trips, and black is the only visible colour.



WELCOME TO TEMBREAK 2

SAFETY PLUS

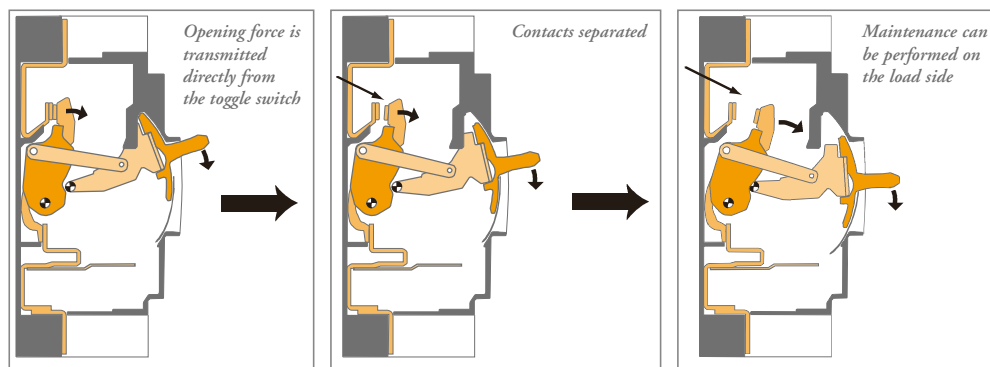
Terasaki have an innovative approach to product design. Our goal is to develop products which not only meet, but exceed recognised standards.

We use our knowledge of related applications to improve circuit breaker designs. For instance, when developing the Direct Opening Action, we applied ideas from a machinery safety standard to the design of the TemBreak 2 switching mechanism.

This proactive development policy confirms our reputation as Innovators in Protection Technology.



Machine Safety



TemBreak 2 MCCBs are marked with IEC symbol indicating Direct Opening Action. (→)

The robust mechanism ensures that the force you apply to the toggle is transmitted directly to the contacts.

Under the heading “Measures to minimise risk in the event of failure”, IEC 60204-1 Safety of Machinery - Electrical Equipment of Machines includes the following recommendation:

“ - the use of switching devices having positive (or direct) opening operation.”

TemBreak 2 MCCBs help you to comply with the world's most stringent safety standards. It is one of the safest switching devices for machinery.



WELCOME TO TEMBREAK 2

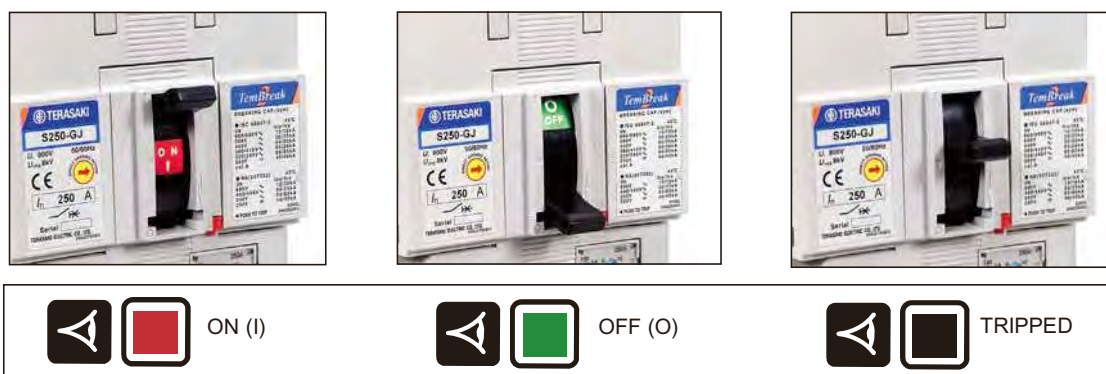
SAFETY PLUS

Visual Safety

You can easily see if a breaker is open, closed or tripped. **SAFETY+** coloured indicators boldly display the ON or OFF status. The indicators are fully covered if a breaker trips, and black is the only visible colour.

This is a *unique* safety feature. You can identify faulty circuits at a glance.

The toggle position always matches the position of the main contacts.



Touch Safety

The risk of touching live parts has been minimised by design.

These features reduce the risk of touching live parts:

There are no exposed metal screws on the front face

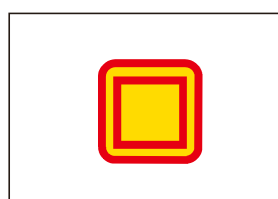
IP20 protection at the terminals

IP30 protection at the toggle

If the toggle is broken by accident or misuse, no live part is exposed

No live parts are exposed when fitting accessories

Double Insulation



WELCOME TO TEMBREAK 2

EXCEEDING STANDARDS

Safety Plus

TemBreak 2 MCCBs exceed the requirements of recognised standards.

International Compliance

The TemBreak 2 MCCB complies with the international standard IEC 60947-2

TemBreak 2 Switch Disconnectors comply with IEC 60947-3

Accessories comply with IEC 60947-5-1 or IEC 61058-1

The entire range conforms to the IEC general rules for switchgear, IEC 60947-1

TemBreak 2 MCCBs comply with JIS C 8201-2-1 Ann.1

The TemBreak 2 range complies with the EC Low Voltage Directive and all models are CE marked

TemBreak 2 MCCBs carry the IEC symbol indicating Direct Opening Action as defined by IEC 60947-5-1. IEC 60204-1, Safety of Machinery - Electrical Equipment of Machines recommends that switches used for machinery have Direct Opening Action to minimise risk in the event of failure



Independent Tests

TemBreak 2 circuit breakers have been tested at independent laboratories as well as in Terasaki's own laboratory in Osaka, Japan. Copies of independent test reports are available on request.

Marine Approvals

TemBreak 2 MCCBs are approved by the leading marine approval organisations.



WELCOME TO TEMBREAK 2

REDUCING ENVIRONMENTAL IMPACT

Longer Life Cycle

It makes good environmental sense to install a product with a long life expectancy. If you install a TemBreak 2 MCCB, you can expect it to stay in service for at least 30,000 mechanical operations (250A Frame). This is 22,000 more operations than recommended by IEC 60947-2, the international standard for circuit breakers.

If a system must be upgraded in future, we have made the following provisions for recycling:

- ① The modular design of TemBreak 2 allows component parts and accessories to be easily disassembled and separately disposed of. Moulded parts do not contain any embedded metal parts.
- ② Materials are clearly marked to allow future identification for easy recycling.



Uses Eco-friendly Materials

The following materials are used in most TemBreak 2 circuit breakers:

Thermoplastic resin not containing PBBs or PBDEs

Lead-free solder

Cadmium-free contacts

Lighter and Smaller

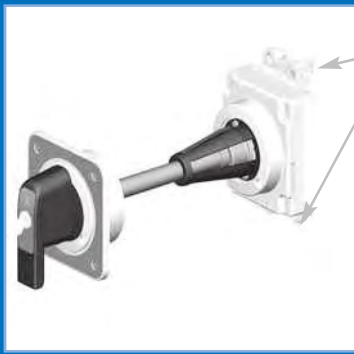
Components with low weight and volume make life easy for users, but high performance from smaller products also means less material used and less waste produced.

ISO 14001

Terasaki operate an Environmental Management System accredited to ISO 14001:1999. This requires us to monitor and measure the environmental performance of our activities, products and services in order to continually improve such performance.

Further information about this standard can be found on the internet at: www.tc207.org

FIELD-INSTALLABLE ACCESSORIES

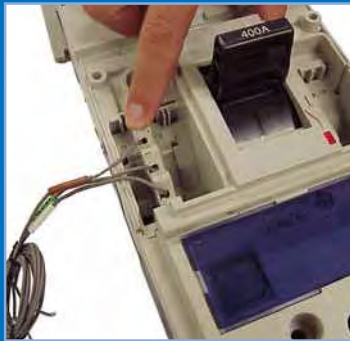


Locking
Pegs

Accessories can be fitted by the switchboard builder or added by the end-user. All internal accessories are common for TemBreak 2 MCCBs.

Handles and motor operators can be rapidly fitted using the locking pegs. It takes less than 10 seconds to secure a handle or motor to the MCCB – a great time saving compared to alternative products.

All accessories are endurance tested to the same level as the host MCCB.



RATINGS AND SPECIFICATIONS

TEMBREAK 2 MOULDED CASE CIRCUIT BREAKERS 16A TO 1600A

1. Welcome to TemBreak 2

2. Ratings and Specifications

MCCBs 15

Switch-Disconnectors 21

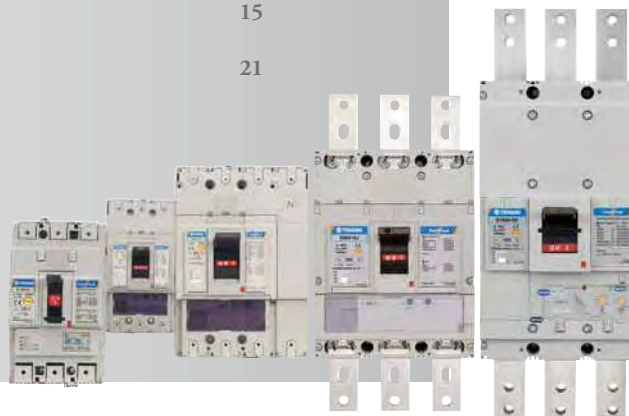
3. Operating Characteristics

4. Application Data

5. Accessories

6. Installation

7. Dimensions



RATINGS AND SPECIFICATIONS

MCCB ELECTRICAL CHARACTERISTICS TO IEC 60947-2, EN 60947-2, JIS C 8201-2-1 ANN.1, AS/NZS 3947-2, NEMA AB-1

Frame	Quantity	Unit	Condition	125	
Model				E125	S125
Number of Poles				3, 4	1
Type				NJ	NF
Nominal current ratings					
	I_n	(A)	45°C	20,32,50, 63,100,125	16,20,25, 32,40,50, 63, 80, 100,125
Electrical characteristics					
Rated operational voltage	U_c	(V)	AC 50/60 Hz DC	525 500	240 -
Rated insulation voltage	U_i	(V)		800	800
Rated impulse withstand voltage	U_{imp}	(kV)		8	8
Ultimate breaking capacity (IEC, JIS, AS/NZS)	I_{cu}	(kA)	690V AC	-	-
			525V AC	8	-
			440V AC	15	-
			400/415V AC	25	-
			220/240V AC	35	25
			250V DC	25	-
Service breaking capacity (IEC, JIS, AS/NZS)	I_{cs}	(kA)	690V AC	-	-
			525V AC	6	-
			440V AC	12	-
			400/415V AC	19	-
			220/240V AC	27	13
			250V DC	19	-
Rated breaking capacity (NEMA)		(kA)	480V AC 240VAC	8 35	- 25
Protection					
Adjustable thermal, adjustable magnetic				■	■
Fixed thermal, fixed magnetic					
Microprocessor					
Utilisation category				A	A
Installation					
Front connection (FC)				■	■
Extension bar (FB)					
Cable clamp (FW)					
Rear connection (RC)					-
Plug-in (PM)					-
Draw-out (DR)				-	-
DIN rail mounting (DA)					
Dimensions					
	h	(mm)		155	155
	w	(mm)	3 pole, (1 pole) 4 pole	90 120	(30)
	d	(mm)		68	68
Weight	W	(kg)	3 pole, (1 pole) 4 pole	1.1 1.4	(0.45)
Operation					
Direct Opening Action				■	■
Toggle operation				■	■
Door mounted (HS, HP) / Breaker mounted handle (HB)					-
Motor operation (MC)					-
Endurance	Electrical Mechanical	cycles cycles	440V AC	←	

RATINGS AND SPECIFICATIONS

SECTION 2

					160				
	S125	S125	H125	L125	S160	S160	S160	H160	L160
	3, 4 NJ	3,4 GJ	3, 4 NJ	3, 4 NJ	1 NF	3, 4 NJ	3, 4 GJ	3, 4 NJ	3, 4 NJ
	20,32,50, 63,100,125	20,32,50, 63,100,125	20,32,50, 63,100,125	20,32,50, 63,100,125	16,20,25,32, 40,50,63,80, 100,125,160	20,32,50,63, 100,125,160	50,63,100, 125,160	160	160
	690 600 800 8	690 600 800 8	690 600 800 8	690 600 800 8	415 125 800 8	690 600 800 8	690 600 800 8	690 600 800 8	690 600 800 8
	6 22 25 36 50 25	6 25 50 65 85 40	20 45 120 125 150 40	25 65 180 200 200 40	- - - - 25 -	7.5 (5*) 25 (18*) 25 (18*) 36 (30*) 65 (42*) 40 (30*)	7.5 25 50 65 85 40	20 45 120 125 150 40	25 65 180 200 200 40
	6 22 25 36/30 50 19	6 22 25 36/33 85 40	15 45 80 85 150 40	20 65 135 150 150 40	- - - - 19 -	7.5 (5*) 25 (18*) 25 (18*) 36 (25*) 65 (35*) 40 (25*)	7.5 25 25 36 85 40	15 45 80 85 150 40	20 65 135 150 150 40
	22 50	25 85	45 150	65 200	- 25	22 (18*) 65 (42*)	25 85	45 150	65 200
	■ A	■ A	■ A	■ A	■ A	■ A	■ A	■ A	■ A
	■ - 155 90 120 68 1.1 1.4	■ - 155 90 120 68 1.1 1.4	■ - 165 105 140 103 2.4 3.2	■ - 165 105 140 103 2.4 3.2	■ - 165 (35) - 68 (0.5)	■ - 165 105 140 68 1.5 1.9	■ - 165 105 140 68 1.5 1.9	■ - 165 105 140 103 2.5 3.3	■ - 165 105 140 103 2.5 3.3
	■ ■	■ ■	■ ■	■ ■	■ ■ - -	■ ■	■ ■	■ ■	■ ■
30,000 30,000					20,000 30,000			20,000 30,000	

*Applies only to 20A and 32A models

The Ultimate Safety Breaker

TemBreak page 16

RATINGS AND SPECIFICATIONS

MCCB ELECTRICAL CHARACTERISTICS TO IEC 60947-2, EN 60947-2, JIS C 8201-2-1 ANN.1, AS/NZS 3947-2, NEMA AB-1

Frame	Quantity	Unit	Condition	250				
Model				E250	S250	S250	S250	S250
Number of Poles				3, 4	3, 4	3, 4	3, 4	3, 4
Type				NJ	NJ	GJ	NE	GE
Nominal current ratings								
	I_n	(A)	45°C	20, 32, 50, 63, 100, 125, 160, 200, 250	160, 200, 250	160, 200, 250	40, 125, 160, 250	40, 125, 160, 250
Electrical characteristics								
Rated operational voltage	U_c	(V)	AC 50/60 Hz DC	525 500	690 600	690 600	690 -	690 -
Rated insulation voltage	U_i	(V)		800	800	800	800	800
Rated impulse withstand voltage	U_{imp}	(kV)		8	8	8	8	8
Ultimate breaking capacity (IEC, JIS, AS/NZS)	I_{cu}	(kA)	690V AC	-	7.5	7.5	7.5	7.5
			525V AC	10	25	25	25	25
			440V AC	15	25	50	25	50
			400/415V AC	25	36	65	36	65
			220/240V AC	35	65	85	65	85
			250V DC	25	40	40	-	-
Service breaking capacity (IEC, JIS, AS/NZS)	I_{cs}	(kA)	690V AC	-	7.5	7.5	7.5	7.5
			525V AC	7.5	25	25	25	25
			440V AC	12	25	25	25	25
			400/415V AC	19	36	36	36	36
			220/240V AC	27	65	85	65	85
			250V DC	19	40	40	-	-
Rated breaking capacity (NEMA)		(kA)	480V AC 240VAC	10 35	22 65	25 85	25 65	25 85
Rated short-time withstand current	I_{cw}	(kA)	0.3 Seconds	-	-	-	-	-
Protection								
Adjustable thermal, adjustable magnetic				■	■	■		
Fixed thermal, fixed magnetic							■	■
Microprocessor								
Utilisation category				A	A	A	A	A
Installation								
Front connection (FC)				■	■	■	■	■
Extension bar (FB)								
Cable clamp (FW)								
Rear connection (RC)								
Plug-in (PM)								
Draw-out (DR)				-	-	-	-	-
DIN rail mounting (DA)				-	-	-	-	-
Dimensions	h	(mm)	3 pole	165	165	165	165	165
	w	(mm)	4 pole	105	105	105	105	105
		(mm)		140	140	140	140	140
	d	(mm)		68	68	68	103	103
Weight	W	(kg)	3 pole	1.5	1.5	1.5	2.3	2.3
			4 pole	1.9	1.9	1.9	3.1	3.1
Operation								
Direct Opening Action				■	■	■	■	■
Toggle operation				■	■	■	■	■
Door mounted (HS, HP) / Breaker mounted handle (HB)								
Motor operation (MC)								
Endurance	Electrical Mechanical	cycles cycles	415V AC	←				

RATINGS AND SPECIFICATIONS

					400										630		
	S250	H250	H250	L250	E400	S400	S400	S400	S400	S400	S400	S400	H400	L400	E630	S630	S630
	3, 4 PE	3, 4 NJ	3, 4 NE	3, 4 NJ	3, 4 NJ	3, 4 CJ	3, 4 NJ	3, 4 NE	3, 4 GJ	3, 4 GE	3, 4 PJ	3, 4 PE	3, 4 NE	3, 4 NE	3, 4 NE	3, 4 CE	3, 4 GE
	40, 125, 160 250	160, 250**	40, 125, 160 250	160, 250**	250, 400	250, 400	250, 400	250, 400	250, 400	250, 400	250, 400	250, 400	250, 400	250, 400	630	630	630
	690 - 800 8	690 600 800 8	690 - 800 8	690 600 800 8	525 500 800 8	690 600 800 8	690 600 800 8	690 - 800 8	690 600 800 8	690 - 800 8	690 600 800 8	690 - 800 8	690 - 800 8	690 - 800 8	690* - 800 8	690* - 800 8	690* - 800 8
	20 35 50 70 125 -	20 45 120 125 150 40	20 45 120 125 150 -	25 65 180 200 200 40	- 15 22 25 35 25	15 22 30 36 50 40	20 30 45 50 85 40	20 30 45 50 85 -	20 30 65 70 100 40	20 30 65 70 100 -	20 30 80 85 100 40	20 30 80 85 100 -	35 45 120 125 150 -	50 65 180 200 200 -	10* 15 25 36 50 -	20* 30 45 50 85 -	20* 30 65 70 100 -
	15 35 50 70 125 -	15 45 80 85 150 40	15 45 80 85 150 -	20 65 135 150 150 40	- 15 22 25 35 19	15 22 30 36 50 40	15 30 45 50 85 40	15 30 45 50 85 -	15 30 50 50 85 40	15 30 50 50 85 -	15 30 80 85 85 40	15 30 80 85 85 -	35 45 80 85 150 -	50 65 135 150 150 -	10* 15 25 36 50 -	15* 30 45 50 85 -	15* 30 50 50 85 -
	35 125	45 150	45 150	65 200	15 35	22 50	25 85	25 85	30 100	30 100	30 100	30 100	45 150	65 200	15 50	25 85	30 100
	-	-	-	-	-	-	-	5	-	5	-	5	5	5	-	-	-
	■ A	■ A	■ A	■ A	■ A	■ A	■ A	■ B	■ A	■ B	■ A	■ B	■ B	■ B	■ A	■ A	■ A
	■ - - 165 105 140 103 2.5 3.3	■ † - 165 105 140 103 2.4 3.2	■ - - 165 105 140 103 2.5 3.3	■ † - 165 105 140 103 2.4 3.2	■ - - 260 140 185 103 4.2 5.6	■ - - 260 140 185 103 4.2 5.6	■ - - 260 140 185 103 4.2 5.6	■ - - 260 140 185 103 4.3 5.7	■ - - 260 140 185 103 4.2 5.6	■ - - 260 140 185 103 4.3 5.7	■ - - 260 40 185 103 4.2 5.6	■ - - 260 140 185 103 4.3 5.7	■ - - 260 140 185 140 7.1 9.4	■ - - 260 140 185 140 7.1 9.4	■ - - 260 140 185 103 5.0 6.5	■ - - 260 140 185 103 5.0 6.5	■ - - 260 140 185 103 5.0 6.5
	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■

10,000
30,0004,500
15,0004,500
15,000

*MCCB cannot be used in IT systems at this voltage.

**Max. rating 225A for Plug-in.

† Refer to Temperature Ratings, Section 6.

‡ Contact us for details.

SAFETY LOCK FOR PLUG-IN VERSIONS



Plug-in MCCB and base

The plug-in MCCB is locked to the base when the toggle is ON. It cannot be removed unless the toggle is OFF or TRIPPED. The safety lock prevents a trip occurring as the MCCB is being removed from the base.



Plug-in connection kit, including safety lock

2

OPERATING CHARACTERISTICS

TEMBREAK 2

MOULDED CASE CIRCUIT BREAKERS

16A TO 1600A

1.	Welcome to TemBreak 2	
2.	Ratings and Specifications	
3.	Operating Characteristics	
	Thermal Magnetic Protection	25
	Thermal Magnetic Time / Current Characteristics	28
	Electronic Protection	
	Standard type	36
	With LCD	47
	Electronic Time / Current Characteristics	
	Standard type	40
	With LCD	51
	Let-through Peak Current Characteristics	53
	Let-through Energy Characteristics	60
4.	Application Data	
5.	Accessories	
6.	Installation	
7.	Dimensions	



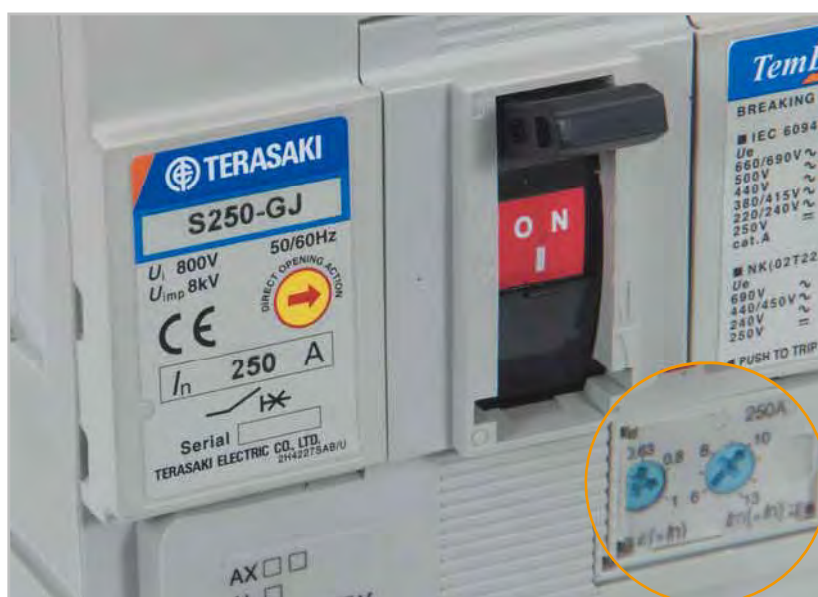
OPERATING CHARACTERISTICS

THERMAL MAGNETIC PROTECTION

TemBreak 2 MCCBs from 125A frame to 800A frame are available with thermal magnetic protection units.

Thermal Magnetic trip units are especially suited to the following applications:

Installations where harmonic distortion of current waveforms is likely.
They operate inherently on the root mean square (rms) heating effect of current.
DC circuits. Refer to Section 4, “The Application of MCCBs in DC Systems” for more information.



3 Pole MCCB with Adjustable Thermal and Adjustable Magnetic Characteristics



Single Pole MCCB with Fixed Characteristics

Models with Adjustable Thermal and Adjustable Magnetic Characteristics

All standard 3 pole and 4 pole TemBreak 2 thermal magnetic models have adjustable thermal and adjustable magnetic characteristics.

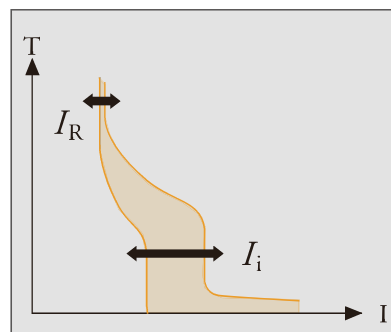
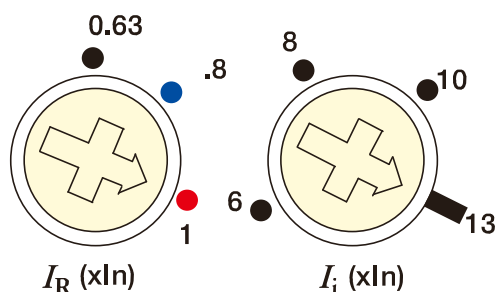
Traditionally, thermal magnetic MCCBs have had adjustable thermal with fixed magnetic characteristics. The fixed magnetic element can limit the application of the MCCB.

An adjustable magnetic characteristic allows short-circuit protection to be matched to the load and supply characteristics, for example motor inrush currents or generator short-circuit currents. Lowering the short-circuit tripping threshold can allow a higher earth-loop impedance in an installation and provide end-of-cable protection with the correct disconnection times.

OPERATING CHARACTERISTICS

THERMAL MAGNETIC PROTECTION

Adjustment Dials



1. I_R is the thermal element adjustment dial and is used to set the rated current to match the conductor rating.

I_R can be set between 0.63 and 1.0 times I_n .

2. I_i is the magnetic element adjustment dial and is used to set the short circuit tripping threshold to suit the application.

Models, Types, Rated Currents and Magnetic trip currents of Thermal Elements

Model	Type	Rated current I_n (A)	Magnetic trip current I_i (A)
S125	-NF	16, 20, 25, 32, 40, 50, 63, 80, 100	$13 \times I_n$
		125	$12.4 \times I_n$
E125	-NJ	20, 32, 50, 63, 100	$6 - 12 \times I_n$
		125	$6 - 10 \times I_n$
S125	-NJ	20, 32, 50, 63, 100	$6 - 12 \times I_n$
		125	$6 - 10 \times I_n$
S125	-GJ	20, 32, 50, 63, 100	$6 - 12 \times I_n$
		125	$6 - 10 \times I_n$
H125	-NJ	20, 32, 50, 63, 100, 125	$6 - 12 \times I_n$
L125	-NJ	20, 32, 50, 63, 100, 125	$6 - 12 \times I_n$
S160	-NF	16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160	$10 \times I_n$
		20, 32, 50, 63, 100, 125	$6 - 12 \times I_n$
S160	-NJ	160	$6 - 13 \times I_n$
		50, 63, 100, 125	$6 - 12 \times I_n$
S160	-GJ	160	$6 - 13 \times I_n$
		160	$6 - 13 \times I_n$
H160	-NJ	160	$6 - 13 \times I_n$
L160	-NJ	160	$6 - 13 \times I_n$
		20, 32, 50, 63, 100, 125	$6 - 12 \times I_n$
E250	-NJ	160, 200	$6 - 13 \times I_n$
		250	$6 - 10 \times I_n$
S250	-NJ	160, 200	$6 - 13 \times I_n$
		250	$6 - 10 \times I_n$
S250	-GJ	160, 200	$6 - 13 \times I_n$
		250	$6 - 10 \times I_n$
H250	-NJ	160	$6 - 13 \times I_n$
		250 (225A for Plug-in)	$6 - 10 \times I_n$
L250	-NJ	160	$6 - 13 \times I_n$
		250 (225A for Plug-in)	$6 - 10 \times I_n$
E400	-NJ	250, 400	$6 - 12 \times I_n$
S400	-CJ	250, 400	$6 - 12 \times I_n$
S400	-NJ	250, 400	$6 - 12 \times I_n$
S400	-GJ	250, 400	$6 - 12 \times I_n$
S800	-CJ	630, 800	$5 - 10 \times I_n$
S800	-NJ	630, 800	$5 - 10 \times I_n$
S800	-RJ	630, 800	$5 - 10 \times I_n$

OPERATING CHARACTERISTICS

THERMAL MAGNETIC PROTECTION

Single Pole MCCBs

Single pole models have fixed thermal and fixed magnetic characteristics.

Generator Protection

Generators may need specially modified protection characteristics, based on their short-circuit capability.

If a generator is capable of delivering short-circuit current greater than six times its full load current, a standard TemBreak 2 thermal magnetic MCCB may be used, with I_i set at less than the available short-circuit current. (Note that MCCBs, with fixed magnetic characteristics may not be suitable for this application.)

A thermal magnetic MCCB with low instantaneous protection may be used where the generator short-circuit current is less than six times its full load current. These are modified versions of the standard MCCB.

Four pole MCCBs with low instantaneous protection have protection on the neutral pole as standard. The magnetic characteristic of MCCBs with low instantaneous protection is fixed at the following values:

Model	Magnetic Trip Current
E125	$3 \times I_n$
S125	$3 \times I_n$
S160	$3 \times I_n$
E250	$3 \times I_n$
S250	$3 \times I_n$
E400	$3.5 \times I_n$
S400	$3.5 \times I_n$

Neutral Pole Protection

Neutral pole protection is available as an optional extra on four pole thermal magnetic MCCBs. The thermal and magnetic elements in the neutral pole are related to those in the phase poles as follows:

	Phase Trip Threshold	Neutral Trip Threshold
Thermal	I_r (adjustable)	I_N (adjustable) = I_n
Magnetic	I_i (adjustable)	I_i (adjustable)

Motor Protection

MCCBs feeding motors are often only required to provide protection from short-circuits. Overload protection is provided by a dedicated thermal or electronic overload relay. Tembreak 2 MCCBs without thermal protection elements are available for this application. Four pole MCCBs with magnetic trip only have protection on the neutral pole as standard.

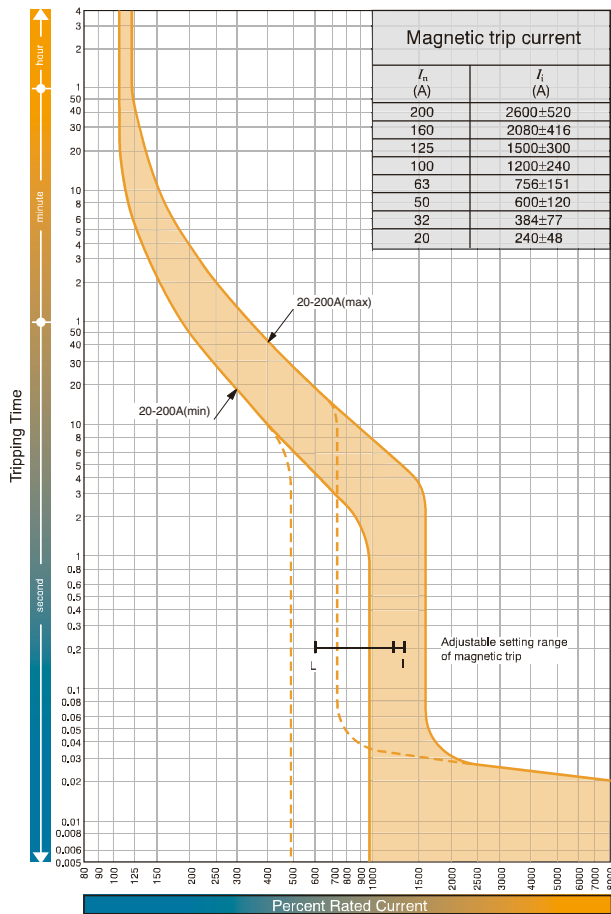
OPERATING CHARACTERISTICS

THERMAL MAGNETIC CHARACTERISTICS

160A and 250A Frames

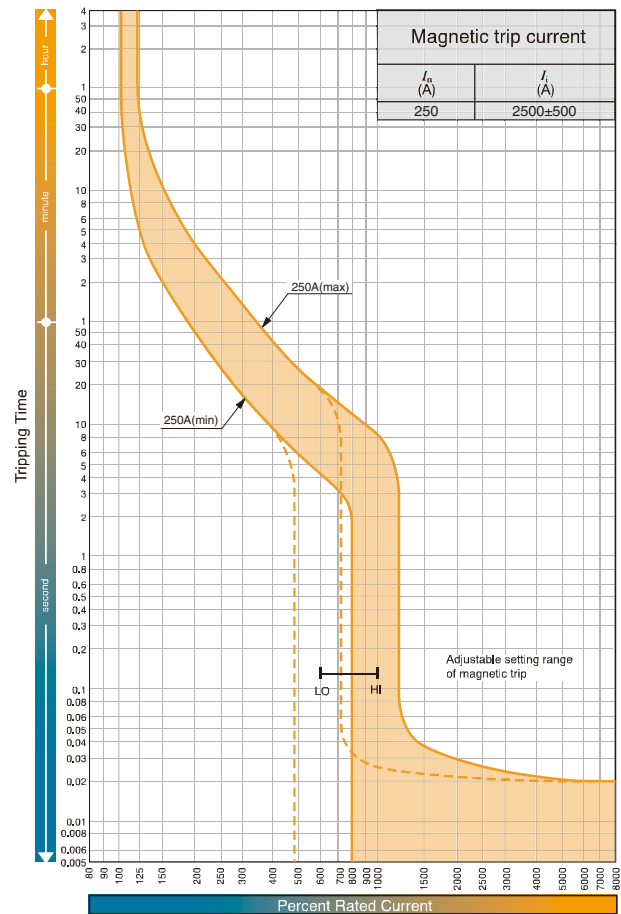
Time/current characteristic curves

S160-NJ, S160-GJ, **E250-NJ**, S250-NJ, S250-GJ



Time/current characteristic curves

E250-NJ, S250-NJ, S250-GJ



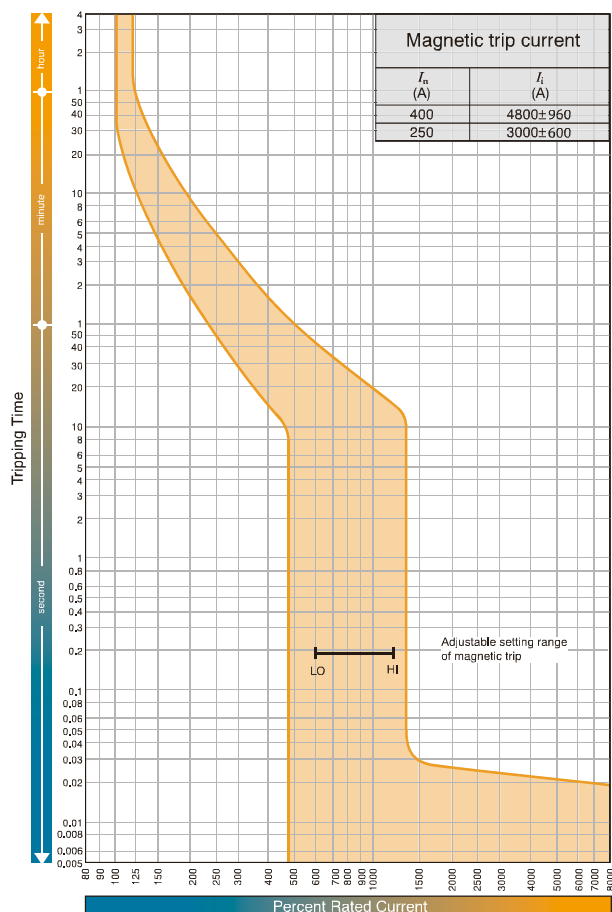
OPERATING CHARACTERISTICS

THERMAL MAGNETIC CHARACTERISTICS

400A Frame

Time/current characteristic curves

E400-NJ, S400-CJ, S400-NJ, S400-GJ, S400-PJ



OPERATING CHARACTERISTICS

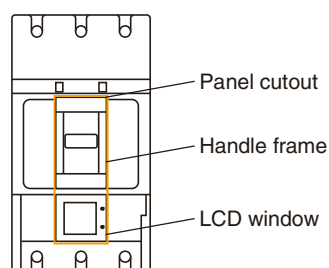
ELECTRONIC PROTECTION (WITH LCD)

Appearance



The TemBreak2 enhanced electronic breaker with integrated VT and CT monitors the current, voltage, instantaneous electrical power, integrated electrical energy and power factor of a circuit and displays their values on the LCD on the front of the breaker. This breaker using the Modbus protocol allows data such as measured values and event/fault logs to be transmitted to an external device.

- The LCD window provides the phase currents, line voltages (and their maximum values), power factor, electrical power and electrical energy. It can also provide the 1st to 19th harmonic currents for each phase.
- When a fault occurs, the cause of the fault and the fault current are indicated on the LCD. Data in memory is stored even if the power is lost. You can view event or fault logs after the power is restored.

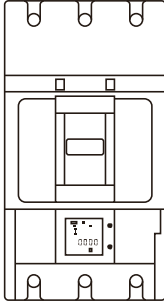
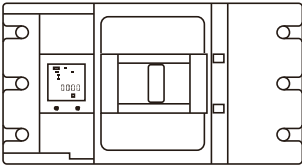
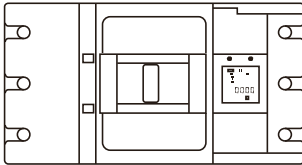


The LCD window is equal to the handle frame in width; the panel cutout can be made easily.

OPERATING CHARACTERISTICS

ELECTRONIC PROTECTION (WITH LCD)

- The breaker is available in three LCD orientations corresponding to the installation orientations of the breaker.

Vertical (move the handle up to ON) (Standard orientation)	Horizontal (move the handle right to ON)	Horizontal (move the handle left to ON)
		

If the breaker is installed in a horizontal orientation, please specify "Horizontal (move the handle right to ON)" or "Horizontal (move the handle left to ON)" when ordering. Otherwise the standard orientation "Vertical (move the handle up to ON)" will apply.

OCR Power Supply for Electronic Protection with LCD

The XOW OCR, protection relays, requires control power.

The OCR power supply is installed on the right side of the breaker as standard. This can also be installed separately to the breaker. Please specify when ordering.

Note ①: When the OCR power supply is installed on the right side of the breaker, the breaker cannot be equipped with a terminal block for connection to the shunt trip device and under voltage trip device.

• Specifications of OCR power supply

Control voltage Note ② (Rated voltage)	100 – 120 VAC or 200 – 240 VAC
Current consumption	2VA

Note ②: The permissible range of the control voltage is 85 to 110% of the rated voltage.
Please specify the rated voltage when ordering.

Dimensions of the OCR power supply can be found in Section 7.

OPERATING CHARACTERISTICS

ELECTRONIC PROTECTION (WITH LCD)

Available types

Type of OCR	Protective function				Alarm function	Display		
	Long time-delay trip Short time-delay trip Instantaneous trip	Ground fault trip	N-phase protection	Phase rotation protection	Pre-trip alarm	LCD window	LCD backlight	
	A	GF	NP	NS	PTA			
XOW-1L-A	●	—	—	—	—	●	—	
XOW-1L-AGN	●	●	●	—	—	●	—	
XOW-1L-AP	●	—	—	—	●	●	—	
XOW-1L-APGNS	●	●	●	●	●	●	—	
XOW-1L-APC	●	—	—	—	●	●	—	
XOW-1L-APGNSC	●	●	●	●	●	●	—	
XOW-1S-A	●	—	—	—	—	●	●	
XOW-1S-AGN	●	●	●	—	—	●	●	
XOW-1S-AP	●	—	—	—	●	●	●	
XOW-1S-APGNS	●	●	●	●	●	●	●	
XOW-1S-APCWH	●	—	—	—	●	●	●	
XOW-1S-APGNSCWH	●	●	●	●	●	●	●	

● : Standard equipment

○ : Optional

— : Not applicable

Measurement/event indication function specifications

Measurement/event (accuracy)		Modbus communication function ○ : Yes —: Non	Note
Load current (±1.5%)	Present value for each phase	○	Ground fault current and negative-phase current can be displayed depending on the specifications.
	Present max value	○	Among L1, L2, L3 phases, the phase having the highest current is subject to measurement and the value of the current is displayed.
Line voltage (±1.0%)	Present value of each line voltage	○	
	Present max value	○	
	Present phase voltage value for each phase	○	Applies to 4-pole breakers only.
Harmonic current (±2.5%)	Present value of 3rd, 5th, 7th, ...19th harmonic current for each phase	—	
Electrical power (±2.5%)	Present value	○	
	Demand value	○	
	Max demand value	○	
Electrical energy (±2.5%)	Electrical energy	○	
Power factor (±5%)	Present value	○	
Trip event log	Fault current (±1.5%)	○	
	Indication of cause	○	
Alarm event log	Cause of alarm, Indication of operated value	○	

Note: Electrical energy is stored every hour and the fault current and cause of fault are stored every time a fault occurs in a flash memory.

OPERATING CHARACTERISTICS

SECTION 3

	Measurement/event indication						Communication function	External indicator	Test function	Indication via output contact	Control power supply
	Current	Voltage, electrical power, electrical energy, power factor, demand electrical power	Electrical energy pulse	Harmonic current	Trip event log	Alarm event log					
			W	H			C	I		Y	
	●	—	—	—	●	●	—	—	●	—	Required
	●	—	—	—	●	●	—	—	●	—	Required
	●	—	—	—	●	●	—	—	●	●	Required
	●	—	—	—	●	●	—	—	●	●	Required
	●	—	—	—	●	●	●	—	●	●	Required
	●	—	—	—	●	●	●	—	●	●	Required
	●	●	—	—	●	●	—	—	●	—	Required
	●	●	—	—	●	●	—	—	●	—	Required
	●	●	—	—	●	●	—	—	●	●	Required
	●	●	—	—	●	●	—	—	●	●	Required
	●	●	●	●	●	●	●	○	●	●	Required
	●	●	●	●	●	●	●	○	●	●	Required

Network interface I/O specifications

Item	Modbus line
Communication protocol	RS-485
Communication mode	2-wire, half-duplex
Topology	Multi-drop bus
Transmission rate	19.2 kbps max
Transmission distance	1.2 km max (at 19.2 kbps)
Data format	Modbus-RTU
Max number of nodes	1–31

OPERATING CHARACTERISTICS

ELECTRONIC CHARACTERISTICS (WITH LCD)

Specifications of over-current release

Applicable MCCB type	CT rated primary current I_{CT}
S400-NE, S400-GE, S400-PE, H400-NE, L400-NE	250A 400A
E630-NE, S630-CE, S630-GE	630A
S800-NE, S800-RE, H800NE, L800-NE	630A 800A
S1000-SE, S1000-NE	1000A

Protective function		Symbol	Setting range
Rated current (A)		I_n	$[I_{CT}] \times (0.5-0.63-0.8-1.0)$
Long time-delay trip LT	Pick-up current (A)	I_R	$[I_n] \times (0.8-0.85-0.9-0.95-1.0)$ Non tripping at not more than $[I_R] \times 1.05$ Tripping at more than $[I_R] \times 1.05$ and not more than $[I_R] \times 1.2$
	Time-delay (s)	t_R	$(0.5-1.25-2.5-5-10-15-20-25-30)$ (sec) at 600% of $[I_R]$ ① Time-delay setting tolerance: $\pm 20\%$, +0.13s –0s
	COLD/HOT	—	COLD/HOT
Short time-delay trip ST	Pick-up current (A)	I_{sd}	$[I_n] \times (1-1.5-2-2.5-3-4-6-8-10-NON)$ ② Current setting tolerance: $\pm 15\%$
	Time-delay (s)	t_{sd}	I^2t OFF: $0.05-0.1-0.2-0.3s$ (Definite time characteristic) I^2t ON: $0.05-0.1-0.2-0.3s$ (Ramp characteristic at less than 1000% of $[I_n]$, Definite time characteristic at 1000% or more of $[I_n]$)
	I^2t ramp characteristic	—	OFF/ON
Instantaneous trip INST	Pick-up current (A)	I_i	$[I_n] \times (2-3-4-6-8-10-12-13-14-NON)$ ③④ Current setting tolerance: $\pm 20\%$
Ground fault trip GF	Pick-up current (A)	I_g	$[I_{CT}] \times (0.2-0.3-0.4-NON)$ Current setting tolerance: $\pm 20\%$
	Time-delay (s)	t_g	I^2t OFF: $0.1-0.2-0.3-0.4-0.8s$ (Definite time characteristic) Time-delay setting tolerance: +50ms –20ms I^2t ON: $0.1-0.2-0.3-0.4-0.8s$ (Ramp characteristic at less than 40% of $[I_{CT}]$, Definite time characteristic at 40% or more of $[I_{CT}]$) Time-delay setting tolerance: $\pm 15\%$, +50ms –20ms
	I^2t ramp characteristic	—	OFF/ON
	Mode	—	TRIP/OFF ⑤
N-phase protection NP	Pick-up current (A)	I_N	$[I_{CT}] \times (0.4-0.5-0.63-0.8-1.0-NON)$ Non tripping at not more than $[I_N] \times 1.05$ Tripping at more than $[I_N] \times 1.05$ and not more than $[I_N] \times 1.2$
	Time-delay (s)	t_N	Tripping at 600% of $[I_N]$ with LT time-delay $[t_R]$.
	COLD/HOT	—	COLD/HOT
Phase rotation protection NS	Pick-up current (A)	I_{NS}	$[I_n] \times (0.2-0.3-0.4-0.5-0.6-0.7-0.8-0.9-1.0)$ Current setting tolerance: $\pm 10\%$
	Time-delay (s)	t_{NS}	$(0.4-0.8-1.2-1.6-2.0-2.4-2.8-3.2-3.6-4.0)$ (sec) at 150% of $[I_{NS}]$ Time-delay setting tolerance: $\pm 20\%$, +0.13s –0s
	Mode	—	TRIP/OFF ⑤
Pre-trip alarm PTA	Pick-up current (A)	I_p	$[I_n] \times (0.7-0.8-0.9-1.0)$ Current setting tolerance: $\pm 10\%$
	Time-delay (s)	t_p	5-10-15-20-40-60-80-120-160-200s more than $[I_p]$ Time-delay setting tolerance: $\pm 10\%$, +0.1s –0s
	Mode	—	AL/OFF ⑤

Note ①: For E630, S630, S1000, (0.5-1.25-2.5-5-10-15-16)sec.

②: For E630, S630, S1000, $[I_n] \times (1-1.5-2-2.5-3-4-6-8-NON)$.

③: The max. pick-up current is set to 1300% $\times [I_{CT}]$ for S400, H400 and L400, 1000% $\times [I_{CT}]$ for E630, S630 and S1000, 1200% $\times [I_{CT}]$ for S800, H800 and L800.

④: When the short time delay trip function has been set to NON, the instantaneous trip function cannot be set to NON. When the instantaneous trip function has been set to NON, the short time delay trip function cannot be set to NON.

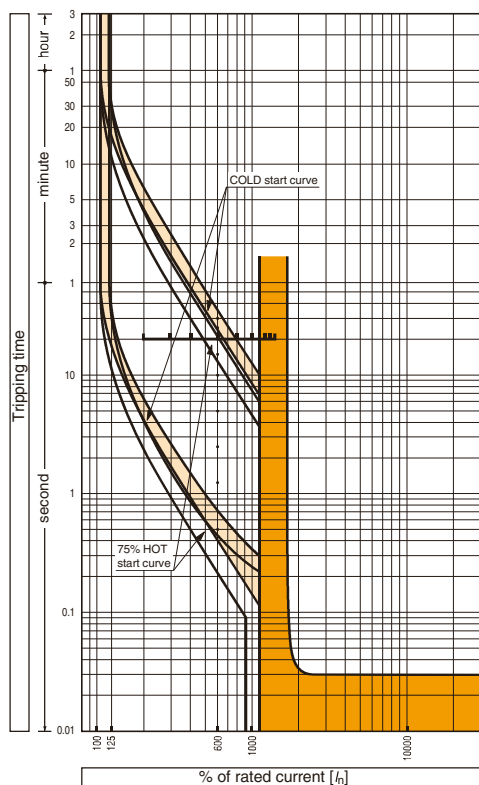
⑤: Selecting "OFF" disables protective functions.

Unless otherwise specified when ordering, the settings will default to those underlined in the table above.

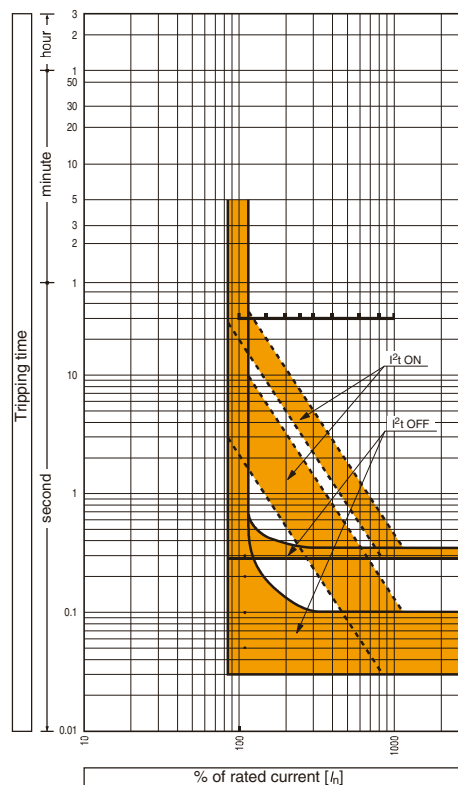
OPERATING CHARACTERISTICS

ELECTRONIC CHARACTERISTICS (WITH LCD)

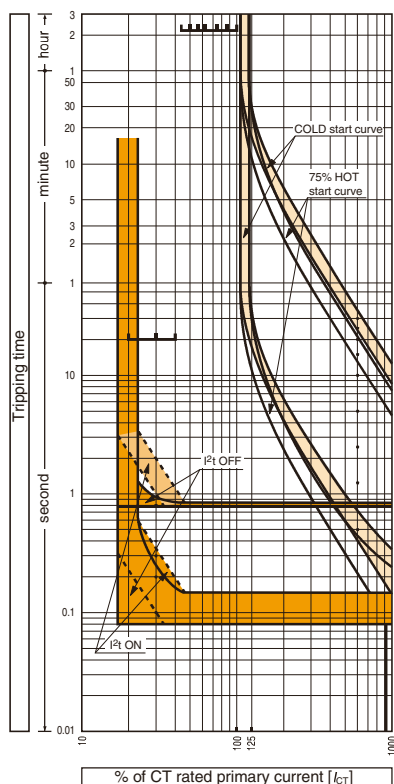
Long time-delay and instantaneous trip



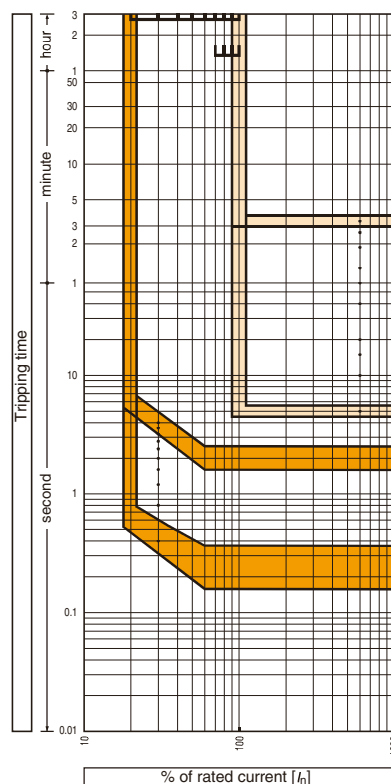
Short time-delay trip



N-phase protection and ground fault trip



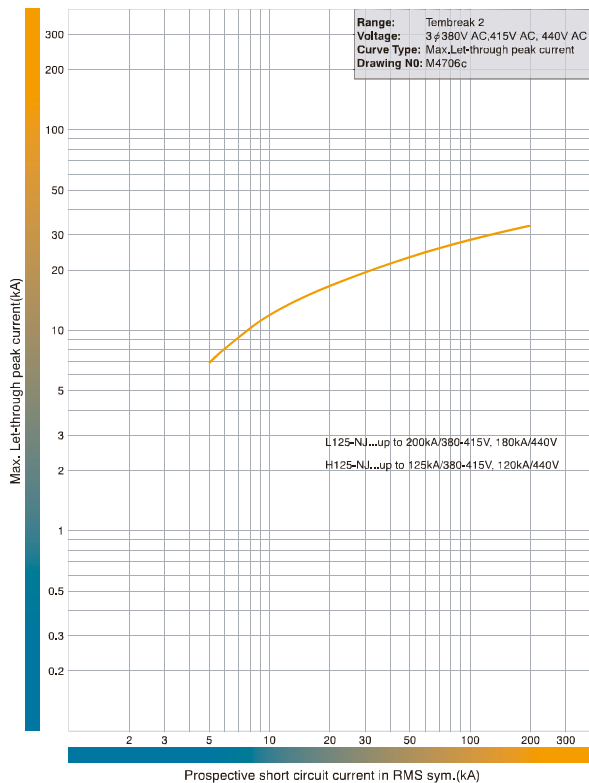
Phase rotation protection and pre-trip alarm



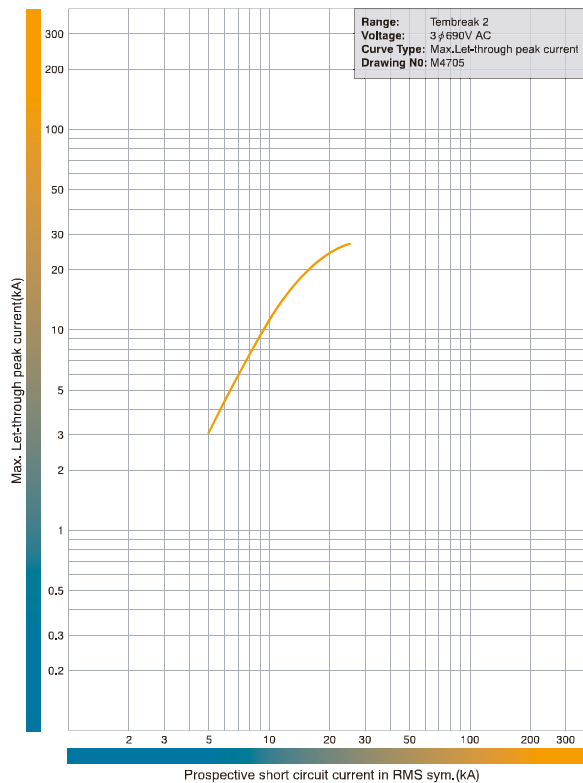
OPERATING CHARACTERISTICS

LET-THROUGH PEAK CURRENT CHARACTERISTICS

H125-NJ, L125-NJ. 440V AC.

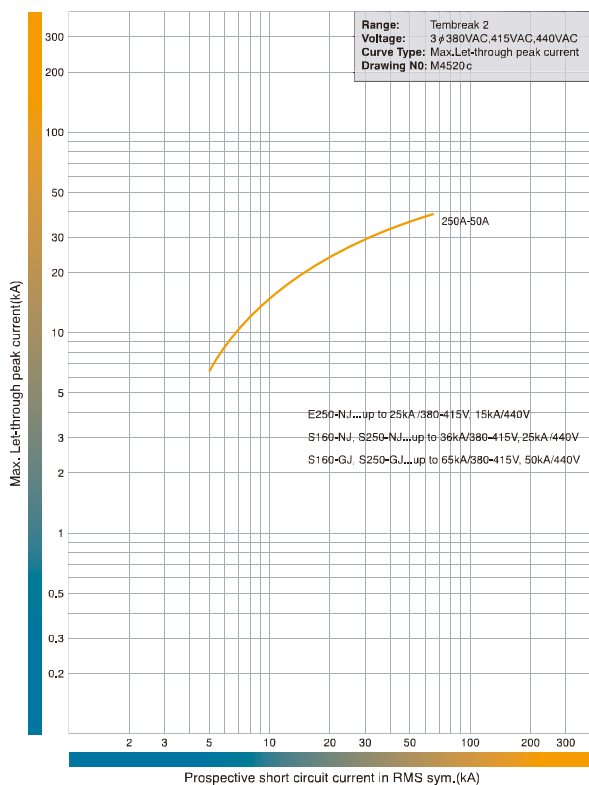


H125-NJ, L125-NJ. 690V AC.

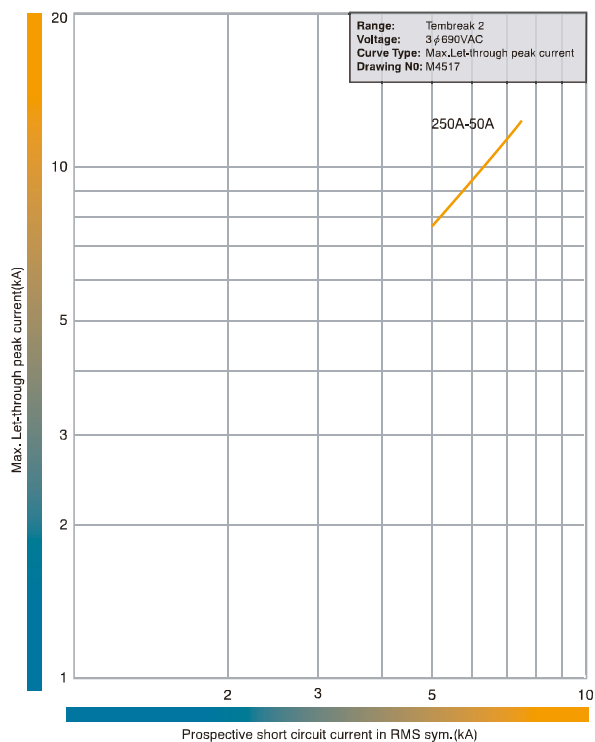


SECTION 3

S160-NJ, S160-GJ, E250-NJ, S250-NJ, S250-GJ. 440V AC.



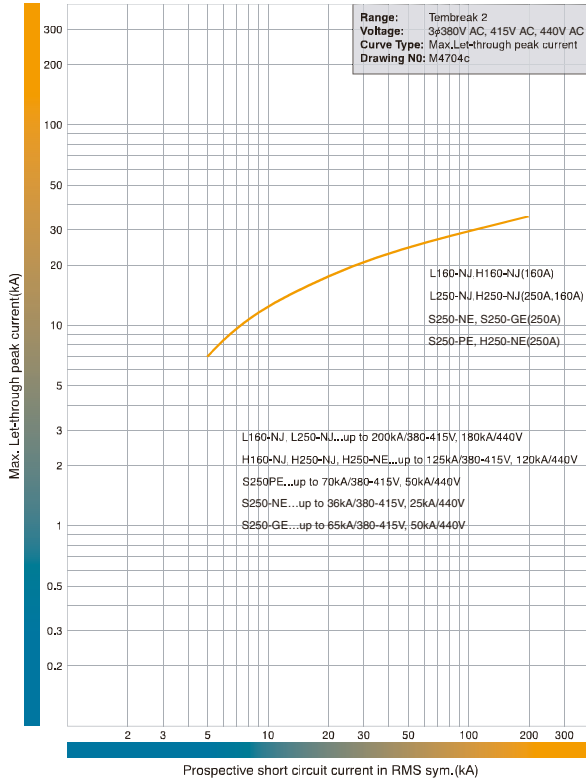
S160-NJ, S160-GJ, S250-NJ, S250-GJ. 690V AC.



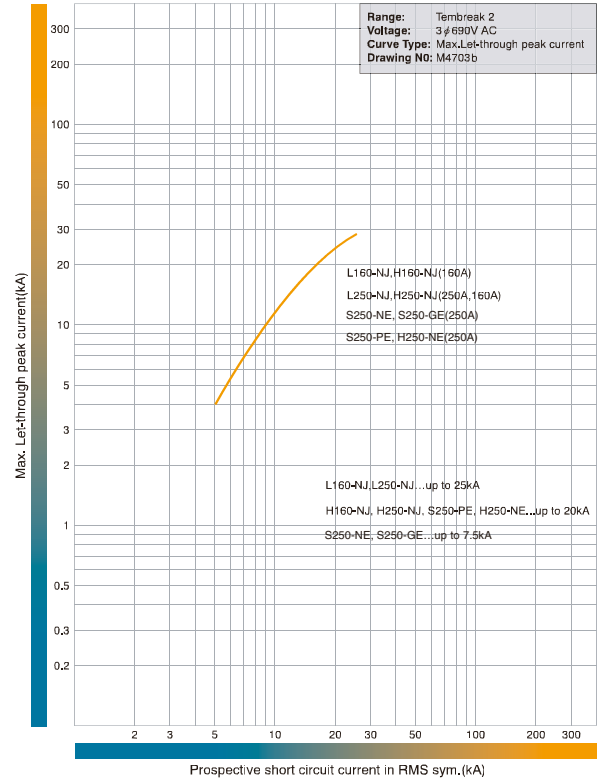
OPERATING CHARACTERISTICS

LET-THROUGH PEAK CURRENT CHARACTERISTICS

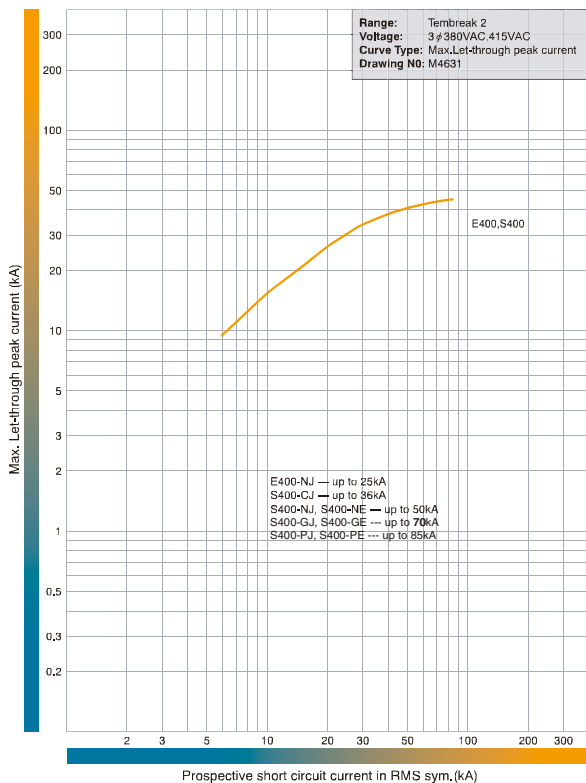
H160-NJ, L160-NJ, S250-NE, S250-GE, S250-PE,
H250-NJ, H250-NE, L250-NJ. 440V AC.



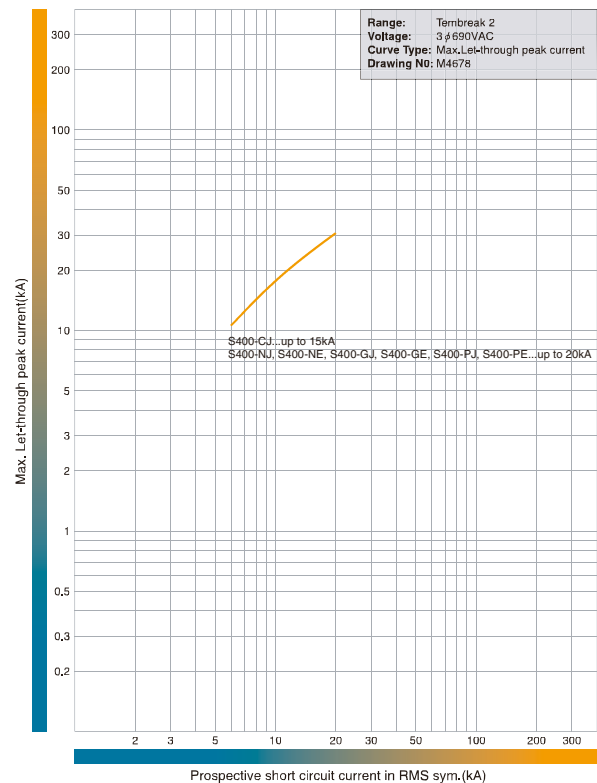
H160-NJ, L160-NJ, S250-NE, S250-GE, S250-PE,
H250-NJ, H250-NE, L250-NJ. 690V AC.



E400-NJ, S400-CJ, S400-NJ, S400-NE, S400-GJ,
S400-GE, S400-PJ, S400-PE. 415V AC.



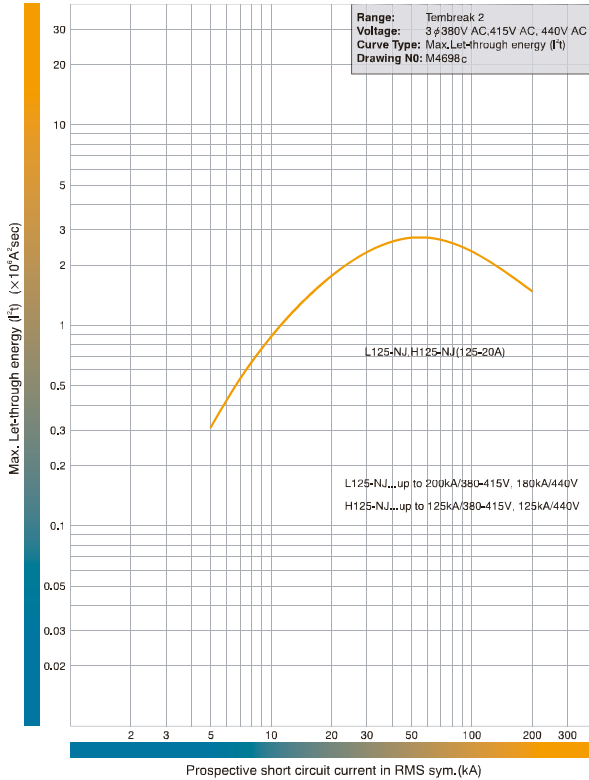
S400-CJ, S400-NJ, S400-NE, S400-GJ,
S400-GE, S400-PJ, S400-PE. 690V AC.



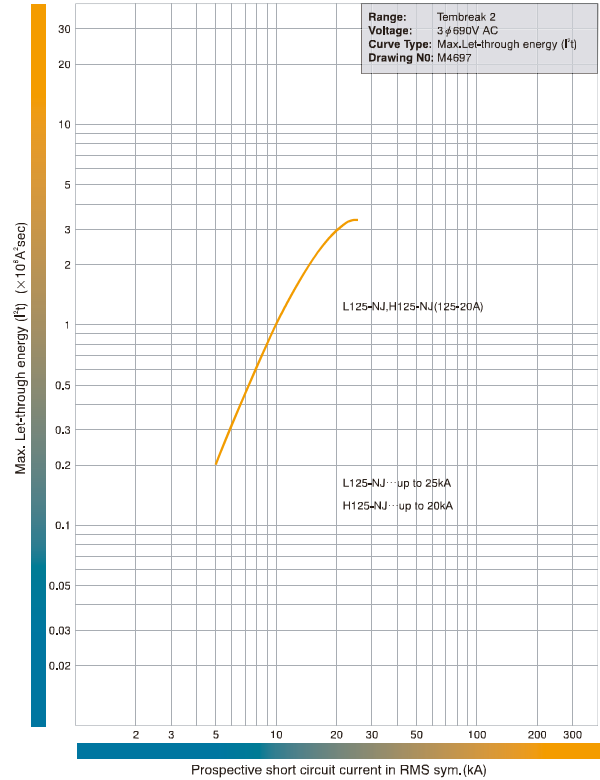
OPERATING CHARACTERISTICS

LET-THROUGH ENERGY CHARACTERISTICS

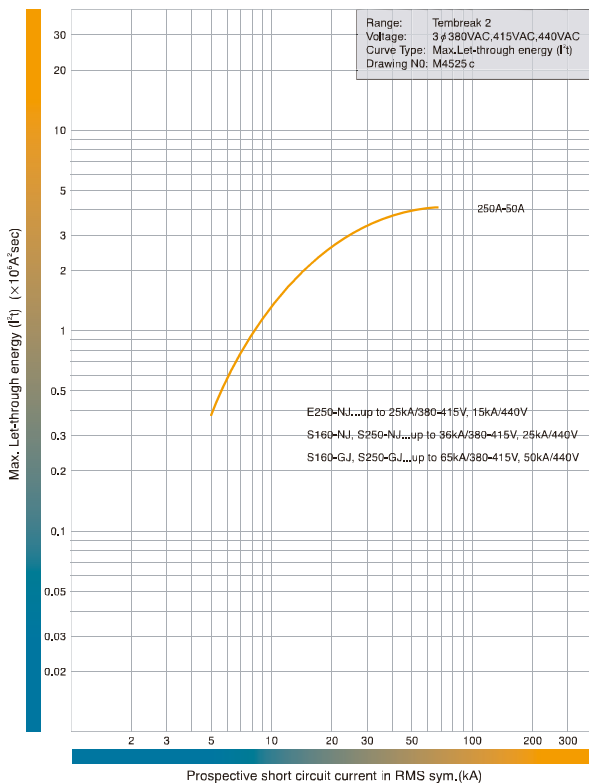
H125-NJ, L125-NJ. 440V AC.



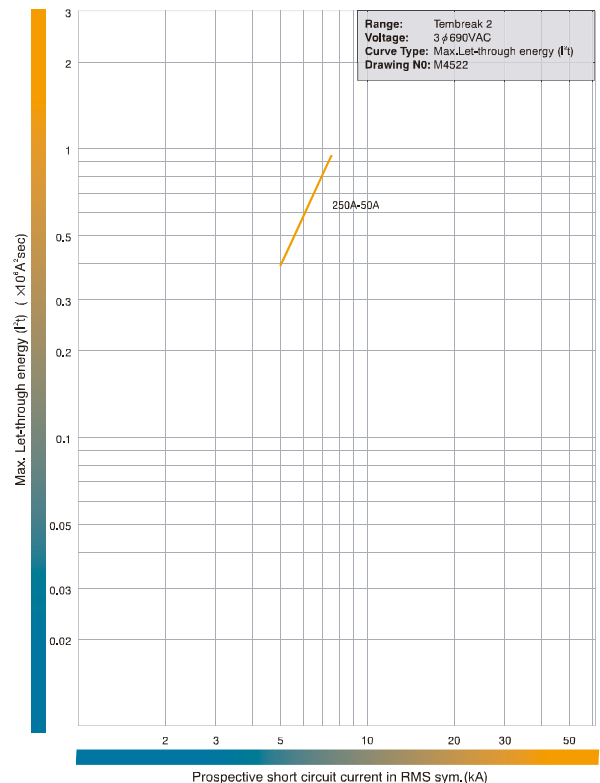
H125-NJ, L125-NJ. 690V AC.



S160-NJ, S160-GJ, E250-NJ, S250-NJ, S250-GJ. 440V AC.



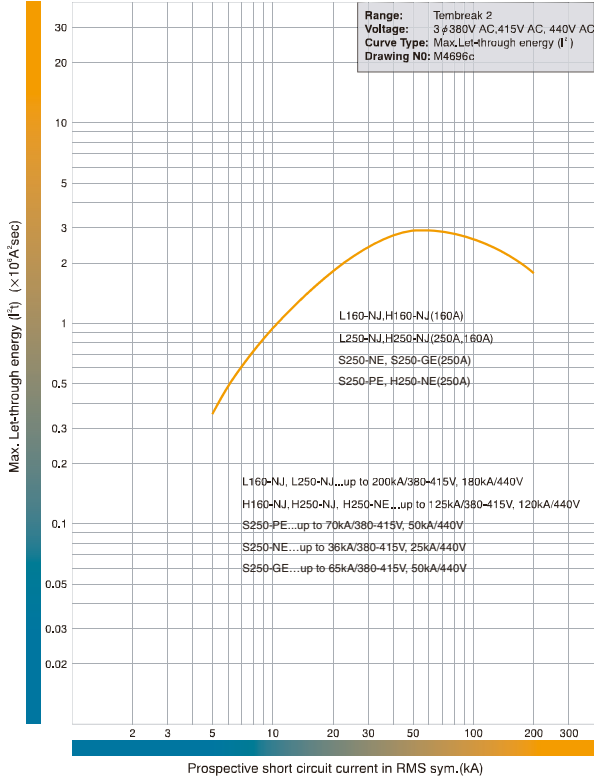
S160-NJ, S160-GJ, S250-NJ, S250-GJ. 690V AC.



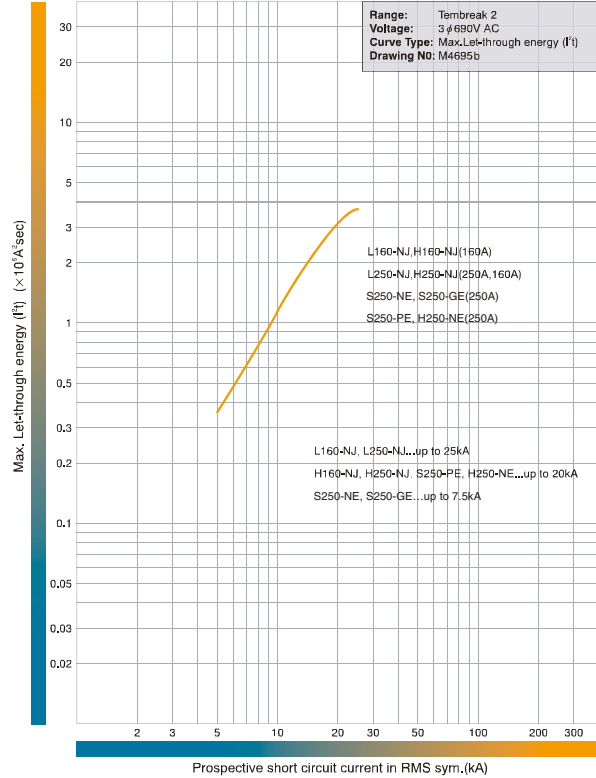
OPERATING CHARACTERISTICS

LET-THROUGH ENERGY CHARACTERISTICS

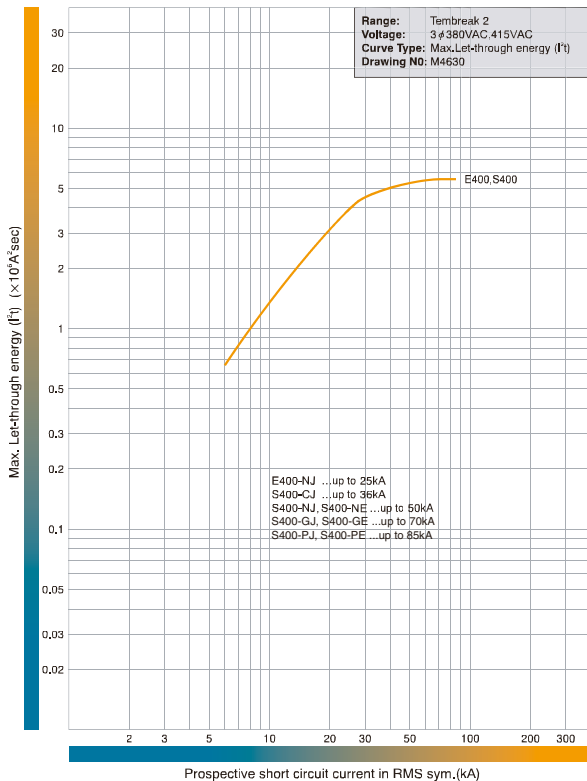
H160-NJ, L160-NJ, S250-NE, S250-GE, S250-PE,
H250-NE, H250-NJ, L250-NJ. 440V AC.



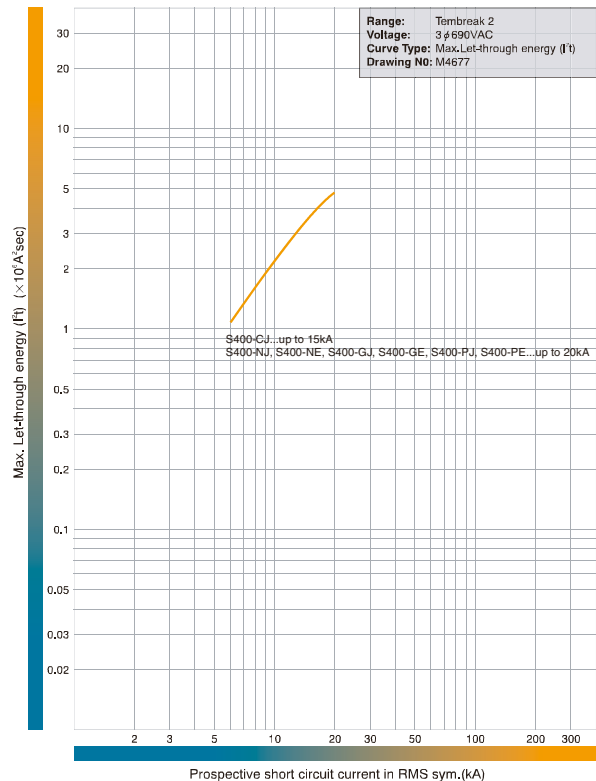
H160-NJ, L160-NJ, S250-NE, S250-GE, S250-PE,
H250-NE, H250-NJ, L250-NJ. 690V AC.



E400-NJ, S400-CJ, S400-NJ, S400-NE, S400-GJ,
S400-GE, S400-PJ, S400-PE. 415V AC.



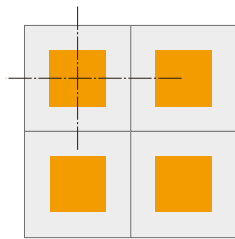
S400-CJ, S400-NJ, S400-NE, S400-GJ, S400-GE,
S400-PJ, S400-PE. 690V AC.



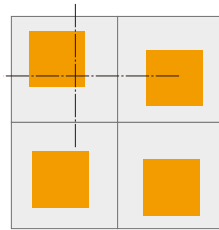
SYMMETRICAL DOOR CUTOUT PATTERNS



Door cutout patterns for handles are symmetrical, even when breakers are mounted in opposite directions.



Using TemBreak 2 Operating Handles



Using other MCCB Operating Handles

3

APPLICATION DATA

TEMBREAK 2
MOULDED CASE CIRCUIT BREAKERS
16A TO 1600A

- 1. Welcome to TemBreak 2
- 2. Ratings and Specifications
- 3. Operating Characteristics
- 4. Application Data
 - What is Discrimination? 69
 - How to Read the Discrimination Tables 70
 - Discrimination Tables 71
 - What is Cascading? 74
 - How to Read the Cascade Tables 75
 - Cascade Tables 76
- 5. Accessories
- 6. Installation
- 7. Dimensions

APPLICATION DATA

DISCRIMINATION

WHAT IS DISCRIMINATION?

Discrimination, also called selectivity, is the co-ordination of protective devices such that a fault is cleared by the protective device installed immediately upstream of the fault, and by that device alone.

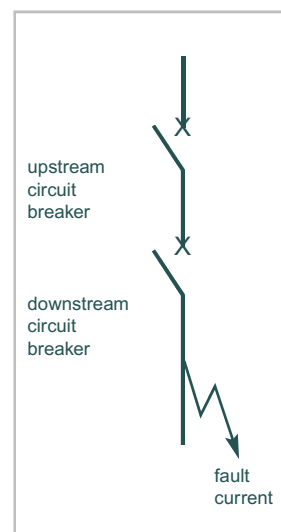
Total discrimination

Discrimination is said to be total if the downstream circuit breaker opens and the upstream circuit breaker remains closed. This ensures maximum availability of the system.

Partial discrimination

Discrimination is partial if the above condition is not fulfilled up to the prospective short-circuit current, but to a lesser value, termed the selectivity limit current (I_s).

Above this value both circuit breakers could open, resulting in loss of selectivity.



HOW TO READ THE DISCRIMINATION TABLES

Boxes containing the letter “T” indicate total discrimination between the relevant upstream and downstream circuit-breakers. Total discrimination applies for all fault levels up to the breaking capacity of the upstream or the downstream circuit breaker, whichever is the lesser.

For the other boxes, discrimination is either partial or there is no discrimination.

If discrimination is partial then the value of the selectivity limit current, I_s , is shown in the box.

Worked Examples

Q (1) A main switchboard requires a 1600A ACB feeding a 400A MCCB.
The fault level is 70kA. What combination of protective devices would provide total discrimination?

A (1) A TemPower2 ACB AR216S feeding a TemBreak2 S400-GJ would provide total discrimination up to 70kA. See page 71

Note: Discrimination would be total whether the TemPower 2 ACB had an integral or external protection relay because $I_{cw} (I_s) = I_{cs}$.
Most other ACBs have $I_{cw} (I_s) < I_{cs}$.

APPLICATION DATA

HOW TO READ THE DISCRIMINATION TABLES

Q (2) A Sub distribution board requires a 630A MCCB feeding a 250A MCCB.
The fault level is 65kA. What combination of protective devices would provide total discrimination?

A (2) Using a TemBreak 2 S630-GE MCCB feeding a TemBreak 2 S250-GJ would provide total discrimination up to 65kA. See page 73

Q (3) A final distribution board contains a 125A MCCB incomer feeding a 32A Type B MCB. Is discrimination between these devices possible?

A (3) A TemBreak 2 MCCB type S160-NJ/125A feeding a TD3 DIN type MCB would provide total discrimination. See page 72

Alternatively ANY OTHER MCB can be used provided it has energy limiting ability of class 3 in accordance with EN 60898.

APPLICATION DATA

DISCRIMINATION TABLES

Upstream: TemPower 2 ACB with or without Integral Protection Relay.

Downstream: TemBreak 2 MCCB.

			Upstream ACB																		
Frame			800A		1250A			1600A			2000A			2500A		3200A		4000A	5000A	6300A	
	Model		AR208S	AR212S	AR212H	AR216S	AR216H	AR316H	AR220S	AR220H	AR320H	AR325S	AR325H	AR332S	AR332H	AR440SB	AR650S	AR663S	AR663H		
		Breaking Capacity	65kA	65kA	80kA	65kA	80kA	100kA	65kA	80kA	100A	85kA	100kA	85kA	100kA	100kA	120kA	120kA	135kA		
Downstream MCCB	125A	E125NJ	25kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S125NJ	36kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S125GJ	65kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		H125NJ	125kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		L125NJ	200kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
	160A/ 250A	S160NJ	36kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S160GJ	65kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		E250NJ	25kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S250NJ	36kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S250GJ	65kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S250PE	70kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		H250NJ	125kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		L250NJ	200KA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
	400A/ 630A	E400NJ	25kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S400CJ	36kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S400NJ	50kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S400NE	50kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S400GJ	70kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S400GE	70kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S400PJ	85kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
		S400PE	85kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	
H400NJ		125kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
H400NE		125kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
E630NE		36kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
S630CE		50kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
S630GE	70kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
800A	S800-CJ	36kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	S800-NJ	50kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	S800-RJ	70kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	S800-NE	50kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	S800-RE	70kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	H800-NE	125kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	L800-NE	200kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
1000A	S1000-SE	50kA	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	S1000-NE	70kA	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
1250A	S1250-SE	50kA	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	S1250-NE	70kA	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	S1250-GE	100kA	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
1600A	S1600-SE	50kA	-	-	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
	S1600-NE	100kA	-	-	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T		

Notes: 1. All ACB's have I_n set at NON, MCR ON.

2. Assuming ACB time settings are greater than MCCB.

3. The above table is in accordance with IEC 60947-2, Annex A.

4. External relay can be used - Contact Terasaki for further details.

5. All values shown at 400V AC.

T= Total Selectivity

APPLICATION DATA

DISCRIMINATION TABLES

Upstream: TemBreak 2 MCCB (thermal-magnetic)

Downstream: MCB

Downstream MCB		Upstream MCCB																							
		S125NJ (36kA) E125NJ (25kA)							S160NJ (36kA)							S250NJ (36kA) E250NJ (25kA)								S400NJ	
		In	20A	32A	50A	63A	100A	125A	20A	32A	50A	63A	100A	125A	160A	20A	32A	50A	63A	100A	125A	160A	200A	250A	250A
6A	260	T	T	T	T	T	260	T	T	T	T	T	T	260	T	T	T	T	T	T	T	T	T	T	T
10A	260	420	T	T	T	T	260	420	T	T	T	T	T	260	420	T	T	T	T	T	T	T	T	T	T
16A	260	420	650	T	T	T	260	420	650	T	T	T	T	260	420	650	T	T	T	T	T	T	T	T	T
20A	260	420	650	1000	T	T	260	420	650	1000	T	T	T	260	420	650	1000	T	T	T	T	T	T	T	T
25A	260	420	650	1000	T	T	260	420	650	1000	T	T	T	260	420	650	1000	T	T	T	T	T	T	T	T
32A	260	420	650	1000	1500	T	260	420	650	1000	1500	T	T	260	420	650	1000	1500	T	T	T	T	T	T	T
40A	260	420	650	1000	1500	2000	260	420	650	1000	1500	2000	T	260	420	650	1000	1500	2000	T	T	T	T	T	T
50A	260	420	650	1000	1500	2000	260	420	650	1000	1500	2000	3000	260	420	650	1000	1500	2000	3000	T	T	T	T	T
63A	260	420	650	1000	1500	2000	260	420	650	1000	1500	2000	3000	260	420	650	1000	1500	2000	3000	2600	T	T	T	T

Notes: 1. MCBs can be of any manufacture provided they are Energy class three as defined in EN 60898.
 2. Table based on type B MCBs
 3. MCBs can be 6kA or 10kA at 400V

4. The above table is in accordance with IEC 60947-2, Annex A.
 5. All values shown at 400V AC.
 6. I_s expressed in A.

T= Total Selectivity

APPLICATION DATA

DISCRIMINATION TABLES

Upstream: TemBreak 2 MCCB (electronic).

Downstream: TemBreak 2 MCCB.

			Upstream MCCB																											
Frame	Model		250A				400A					630A			800A				1000A		1250A			1600A						
			S250-NE	S250-GE	S250-PE	H250-NE	S400-NE	S400-GE	S400-PE	H400-NE	L400-NE	E630-NE	S630-CE	S630-GE	S800-NE	S800-RE	H800-NE	L800-NE	S1000-SE	S1000-NE	S1250-SE	S1250-NE	S1250-GE	S1600-SE	S1600-NE					
			Breaking Capacity	36 kA	65 kA	70 kA	125 kA	50 kA	70 kA	85 kA	125 kA	200 kA	36 kA	50 kA	70 kA	50 kA	70 kA	125 kA	200 kA	50 kA	70 kA	50 kA	70 kA	100 kA	50 kA	100 kA				
50A	S50-NF	10kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T					
100A	E100-NF	10kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T					
125A	E125-NJ	25kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T					
	S125-NJ	36kA	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	S125-GJ	65kA	T	T	T	T	T	T	T	T	T	T	T	T	50	T	T	T	T	T	T	T	T	T						
	H125-NJ	125kA	T	T	T	T	T	T	T	T	T	T	T	T	50	T	T	T	T	T	T	70	T	85						
160A/ 250A	S160-NJ	36kA	-	-	-	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T					
	S160-GJ	65kA	-	-	-	-	T	T	T	T	T	T	T	36	36	T	T	T	50	T	T	T	T	T						
	H160-NJ	125kA	-	-	-	-	-	-	-	T	T	T	T	50	T	T	T	T	T	T	70	T	85							
	E250-NJ	25kA	-	-	-	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	S250-NJ	36kA	-	-	-	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	S250-GJ	65kA	-	-	-	-	T	T	T	T	T	T	T	36	36	T	T	T	50	T	T	T	T	T						
	S250-NE	36kA	-	-	-	-	-	-	-	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T						
	S250-GE	65kA	-	-	-	-	-	-	-	T	T	T	T	36	36	T	T	T	50	T	T	T	T	T						
	H250-NJ	125kA	-	-	-	-	-	-	-	T	T	T	T	50	T	T	T	T	T	T	70	T	85							
	S250-PE	70kA	-	-	-	-	-	-	-	T	T	T	T	36	36	T	T	T	50	T	T	70	T	T						
	H250-NE	125kA	-	-	-	-	-	-	-	T	T	T	T	36	36	T	T	T	50	T	T	70	T	85						
	400A/ 630A	E400-NJ	25kA	-	-	-	-	-	-	-	-	-	10	10	10	T	T	T	T	T	T	T	T	T	T					
S400-CJ		36kA	-	-	-	-	-	-	-	-	-	10	10	10	25	25	25	25	30	30	T	T	T	T						
S400-NJ		50kA	-	-	-	-	-	-	-	-	-	10	10	10	25	25	25	25	30	30	36	36	36	T						
S400-NE		50kA	-	-	-	-	-	-	-	-	-	10	10	10	25	25	25	25	30	30	36	36	36	T						
S400-GJ		70kA	-	-	-	-	-	-	-	-	-	10	10	10	25	25	25	25	30	30	36	36	36	50						
S400-GE		70kA	-	-	-	-	-	-	-	-	-	10	10	10	25	25	25	25	30	30	36	36	36	50						
S400-PJ		85kA	-	-	-	-	-	-	-	-	-	10	10	10	25	25	25	25	30	30	36	36	36	50						
S400-PE		85kA	-	-	-	-	-	-	-	-	-	10	10	10	25	25	25	25	30	30	36	36	36	50						
H400-NE		125kA	-	-	-	-	-	-	-	-	-	10	10	10	36	36	25	25	T	50	T	T	70	70						
E630-NE		36kA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	T	T	T						
S630-CE		50kA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36	36	36	T						
S630-GE		70kA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36	36	36	50						
800A	S800-CJ	36kA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20						
	S800-NJ	50kA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20						
	S800-RJ	70kA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20						
	S800-NE	50kA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20						
	S800-RE	70kA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20						

- Notes: 1. All pick-up current and time delay settings are to be set at maximum for upstream MCCBs.
 2. The above table is in accordance with IEC 60947-2, Annex A.
 3. All values shown at 400V AC.
 4. Is expressed in kA.

T = Total Selectivity

APPLICATION DATA

WHAT IS CASCADING?

Cascading is a technique where the current limiting capability of upstream circuit breakers is used to permit the installation of lower rated and therefore lower cost circuit breakers downstream.

The upstream TemBreak 2 circuit breaker acts as a resistance against short-circuit currents. With this assistance, downstream circuit breakers with breaking capacities lower than the prospective short-circuit at their point of installation can interrupt the reduced short-circuit current.

Since the current is limited downstream of the limiting circuit breaker, cascading applies to all switchgear in the downstream circuit. It is not restricted to two consecutive devices.

Cascading is recognised by the following standards related to electrical installations:

IEC 60364

BS 7671

AS/NZS 3000

The Advantages

Installation of a single limiting circuit-breaker results in considerable simplifications and savings for the entire downstream installation:

- Simplification of selection of devices using the cascading tables

- Savings on downstream devices. Cascading allows circuit-breakers with lower ratings to be used.

In addition the application of cascading will reduce both electrodynamic and thermal stress within the installation.

APPLICATION DATA

HOW TO READ THE CASCADE TABLES

The value shown in the table is the increased breaking capacity, expressed in kA, that can be achieved if the downstream MCCB is backed up by the appropriate upstream MCCB.

Worked Examples:

Q (1) A 36kA panelboard is required with a 400A incomer and 125A outgoing MCCBs. Can cascading be applied?

A (1) A cost effective solution would be to use an S400-CJ incomer rated at 36kA and E125-NJ MCCBs rated at 25kA downstream.

The upstream S400-CJ MCCB would back up the downstream E125-NJ to 36kA. If this was an 8 Way panelboard you have managed to save cost by installing eight 25kA MCCBs rather than eight 36kA MCCBs.

Q (2) If the same 8 way panelboard was to be used in an 80kA installation, what MCCBs could be used?

A (2) You could still use the E125-NJ provided it was backed up by an L400-NE. The Current limiting capacity of the 400A MCCB would back up the E125A from 25kA to 85kA.

APPLICATION DATA

CASCADE TABLES

Upstream: TemBreak 2 MCCB.

Downstream: Din type MCB.

		Upstream MCCB							
Downstream MCB	Model	E125NJ (25kA)	S125NJ (36kA)	S125GJ (65kA)	S160NJ (36kA)	S160GJ (65kA)	E250NJ (25kA)	S250NJ (36kA)	S250GJ (65kA)
	In	125A	125A	125A	160A	160A	250A	250A	250A
	TD3	14	14	14	12	12	12	12	12
	M06	14	14	14	12	12	12	12	12
	(6kA)	14	14	14	12	12	12	12	12
	10A	14	14	14	12	12	12	12	12
	16A	14	14	14	12	12	12	12	12
	20A	14	14	14	12	12	12	12	12
	25A	14	14	14	12	12	12	12	12
	32A	14	14	14	12	12	12	12	12
	40A	12	12	12	10	10	10	10	10
	50A	12	12	12	10	10	10	10	10
	63A	12	12	12	10	10	10	10	10

Notes: 1. All values shown at 400V AC.
2. Cascade fault level limit is expressed in kA.

		Upstream MCCB							
Downstream MCB	Model	E125NJ (25kA)	S125NJ (36kA)	S125GJ (65kA)	S160NJ (36kA)	S160GJ (65kA)	E250NJ (25kA)	S250NJ (36kA)	S250GJ (65kA)
	In	125A	125A	125A	160A	160A	250A	250A	250A
	TD3	25	30	30	25	25	25	25	25
	M10	25	30	30	25	25	25	25	25
	(10kA)	25	30	30	25	25	25	25	25
	10A	25	30	30	25	25	25	25	25
	16A	25	30	30	25	25	25	25	25
	20A	25	30	30	25	25	25	25	25
	25A	25	30	30	25	25	25	25	25
	32A	25	30	30	25	25	25	25	25
	40A	25	30	30	23	23	23	20	23
	50A	25	30	30	23	23	23	23	23
	63A	25	30	30	23	23	23	23	23

Notes: 1. All values shown at 400V AC.
2. Cascade fault level limit is expressed in kA.

APPLICATION DATA

CASCADE TABLES

Upstream: TemBreak 2 MCCB.

Downstream: TemBreak 2 MCCB.

		Upstream MCCB																
Frame			125A					160A/250A										
	Model		E125NJ	S125NJ	S125GJ	H125NJ	L125NJ	S160NJ	S160GJ	H160NJ	L160NJ	E250NJ	S250NJ	S250GJ	S250PE	H250NJ	H250NE	L250NJ
		Breaking Capacity	25kA	36kA	65kA	125kA	200kA	36kA	65kA	125kA	200kA	25kA	36kA	65kA	70kA	125kA	200kA	
Downstream MCCB	50A	S50NF E100NF	10kA 10kA	25 25	25 25	25 25	25 25	25 25	15 15	15 15	25 25	25 25	15 15	15 15	15 15	25 25	25 25	
	125A	E125NJ S125NJ S125GJ H125NJ	25kA 36kA 65kA 125kA	- - - -	36 - - -	50 65 - -	65 85 125 200	85 125 150 200	36 - - -	50 65 125 -	65 85 125 200	85 125 150 200	- - - -	36 - - -	50 65 70 -	50 65 70 -	65 85 125 -	85 125 150 200
	160A/ 250A	S160NJ S160GJ H160NJ E250NJ S250NJ S250GJ S250PE H250NJ	36kA 65kA 125kA 25kA 36kA 65kA 70kA 125kA	- - - - - - - -	- - - - - - - -	- - - - - - - -	- - - - - - - -	- - - - - - - -	- - - - - - - -	65 - - - - - - -	85 125 150 200 - - - -	125 150 200 - - - -	- - - - - - - -	- - - 36 - - - -	65 - - 50 65 - 70 -	65 70 50 65 70 -	85 125 - 65 85 125 -	125 150 200 85 125 150 200

Notes: 1. All values shown at 400V AC.
2. Cascade fault level limit is expressed in kA.

		Upstream MCCB																								
Frame			400A							630A			800A/1000A							1250A/1600A						
Downstream MCCB	Model		S400CJ	S400NJ S400NE	S400GJ S400GE	S400PJ S400PE	H400NE	L400NE	E630NE	S630CE	S630GE	S800CJ	S800NJ S800NE	S800RJ S800RE	H800NE	L800NE	S1000SE	S1000NE	S1250SE	S1250NE	S1250GE	S1600SE	S1600NE			
		Breaking Capacity	36kA	50kA	70kA	85kA	125kA	200kA	36kA	50kA	70kA	36kA	50kA	70kA	125kA	200kA	50kA	70kA	50kA	70kA	85kA	50kA	85kA			
	125A	E125NJ S125NJ S125GJ H125NJ	25kA 36kA 65kA 125kA	36 - - -	36 50 - -	50 65 70 -	50 65 85 -	65 85 125 -	85 125 150 200	36 - - -	36 50 - -	50 65 70 -	30 - - -	36 50 - -	36 50 70 -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -			
160A/ 250A	S160NJ	36kA	-	50	65	65	85	125	-	50	65	-	50	70	50	50	50	70	-	-	-	-	-			
	S160GJ	65kA	-	-	70	85	125	150	-	-	70	-	-	70	70	70	70	70	-	-	-	-	-			
	H160NJ	125kA	-	-	-	-	-	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	E250NJ	25kA	36	36	50	50	65	85	36	36	50	30	36	50	36	36	36	50	-	-	-	-	-			
	S250NJ	36kA	-	50	65	65	85	125	-	50	65	-	50	70	50	50	50	70	-	-	-	-	-			
	S250GJ	65kA	-	-	70	85	125	150	-	-	70	-	-	70	70	70	-	70	-	-	-	-	-			
	S250PE	70kA	-	-	-	-	125	150	-	-	-	-	-	-	85	85	-	-	-	-	-	-	-			
	H250NJ	125kA	-	-	-	-	-	200	-	-	-	-	-	-	-	150	-	-	-	-	-	-	-			
	400A	E400NJ	25kA	36	36	50	50	65	85	36	36	50	30	36	50	36	36	36	36	36	36	36	36	36		
	S400CJ	36kA	-	50	65	65	70	100	-	50	65	-	50	70	50	50	50	50	50	50	50	50	50			
	S400NJ	50kA	-	-	70	70	85	125	-	-	70	-	-	70	70	70	-	70	-	70	70	-	70			
	S400GJ	70kA	-	-	-	85	125	150	-	-	-	-	-	-	85	85	-	-	-	-	-	-	-			
	S400PJ	85kA	-	-	-	-	125	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Notes: 1. All values shown at 400V AC.
2. Cascade fault level limit is expressed in kA.

APPLICATION DATA

The Application of MCCBs in DC Systems

Terasaki's MCCBs provide an excellent range of protection for DC installations. We offer MCCBs of up to 1000A with DC overload protection and up to 2500A with DC short-circuit protection.

Protection Method

Current transformers require alternating current to generate magnetic flux thereby inducing current to flow in the secondary winding. Any device which relies on current transformers for measurement or detection of current is therefore unsuitable for protection of DC systems. Most electronic MCCBs fall into this category.

The most common method of detecting DC overloads is by the use of a thermal element. Short-circuit protection in DC circuits is provided by electromagnetic tripping elements.

Tripping Characteristics

The time-current characteristics of a thermal element, such as those published in Section 3, are unaffected by the frequency of current applied. They hold good for both AC and DC currents.

A magnetic element operates on the instantaneous value of the current waveform. This means that in practice in an AC circuit, it will operate at the peak value of the sinusoidal waveform. Tripping characteristics are published in AC root mean square (rms) Amperes (A). This means that the value of AC instantaneous current, I_p , which will operate the element is equal to the rms current multiplied by $\sqrt{2}$. Similarly, the value of DC instantaneous current which will operate the element is equal to the AC rms current multiplied by $\sqrt{2}$.

DC operating current of magnetic element = $\sqrt{2} \times$ AC rms operating current of magnetic element.

Time Constant

Time constants associated with DC circuits prevent the voltage of the circuit from reacting immediately when a load current is suddenly interrupted.

The time constant, τ , of a circuit indicates how quickly voltage across capacitors and current through inductors react to transient conditions.

The time constant of a capacitive circuit is the product of capacitance and resistance:

$$\tau = RC \text{ (s).}$$

The time constant of an inductive circuit is given by:

$$\tau = L/R \text{ (s).}$$

APPLICATION DATA

The Application of MCCBs in DC Systems

Time Constant

Transient voltages and currents, including those produced by switching, do not approximate their steady state values until 5 time constants have elapsed.

Fault currents occurring in circuits with high time constants are extremely difficult to interrupt due to the lagging voltage. All DC breaking capacities in this section are shown with the assumption that the time constant of the circuit is restricted to the values shown below.

Fault Level	τ
Near the rated current, I_n , of the circuit breaker	<2.0ms
<2.5 x I_n	<2.5ms
<10kA	<7ms
>10kA	<15ms

Breaking Capacity

The short-circuit ratings of MCCBs suitable for DC installations are shown in the table below. In some cases, two or more poles must be connected in series to achieve the given rating, this is also indicated in the table.

Please refer to catalogue I73E for further details.

DC Breaking Capacity, Icu (kA), Protection and Reference								
Voltage	250V DC	350V DC	500V DC		600V DC		Protection	
Poles in Series	2	3	3	4	3	4	Overload	Short Circuit
E125-NJ	25	–	–	–	–	–	Thermal, adjustable	Magnetic, adjustable
S125-ND	–	10	–	7.5	–	5	Thermal, adjustable	Magnetic, fixed
S125-GJ	40	–	–	–	–	–	Thermal, adjustable	Magnetic, adjustable
S160-ND	–	10	–	7.5	–	5	Thermal, adjustable	Magnetic, fixed
E250-NJ	25	–	–	–	–	–	Thermal, adjustable	Magnetic, adjustable
S250-ND	–	10	–	7.5	–	5	Thermal, adjustable	Magnetic, fixed
E400-NJ	25	–	–	–	–	–	Thermal, adjustable	Magnetic, adjustable
S400-CJ	–	–	–	–	–	–	Thermal, adjustable	Magnetic, adjustable
S400-ND	–	20	15	–	15	–	Thermal, adjustable	Magnetic, fixed
S800-CJ	50	–	–	–	–	–	Thermal, adjustable	Magnetic, adjustable
S800-ND	–	30	20	–	20	–	Thermal, adjustable	Magnetic, fixed
XS1000ND	50	30	20	20	20	20	Thermal, fixed	Magnetic, adjustable
XS1250ND	50	50	50	50	20	20	–	Magnetic, adjustable
XS1600ND	50	50	50	50	20	20	–	Magnetic, adjustable
XS2000ND	50	50	50	50	20	20	–	Magnetic, adjustable
XS2500ND	50	50	50	50	20	20	–	Magnetic, adjustable

ACCESSORIES

TEMBREAK 2
MOULDED CASE CIRCUIT BREAKERS
16A TO 1600A

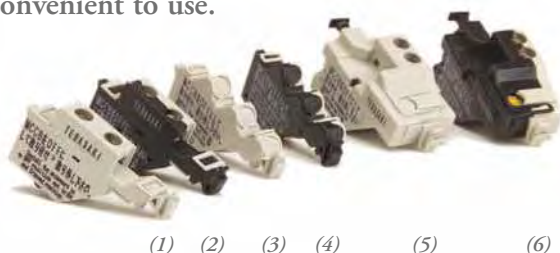
1.	Welcome to TemBreak 2	
2.	Ratings and Specifications	
3.	Operating Characteristics	
4.	Application Data	
5.	Accessories	
	Electrical Control (Internal Accessories)	81
	Termination of Control Wiring	86
	Electrical Control (Motorised Operation)	87
	Operating Handles & Locking Devices	92
	Insulation Accessories	95
	Dual Supply Changeover Systems	98
6.	Installation	
7.	Dimensions	



ACCESSORIES

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

Electrical control accessories for TemBreak 2 are designed with the installer in mind. Status and alarm contacts, remote tripping coils and undervoltage protection coils are of modular design and convenient to use.



- 1) Heavy-duty auxiliary switch
- 2) Heavy-duty alarm switch
- 3) General-purpose auxiliary switch
- 4) General-purpose alarm switch
- 5) Shunt trip
- 6) Undervoltage trip

Every accessory fits every MCCB and Switch-Disconnecter in the range.

All accessories are endurance tested to the same level as MCCBs.

TemBreak 2 internal accessories are easily field-installable.

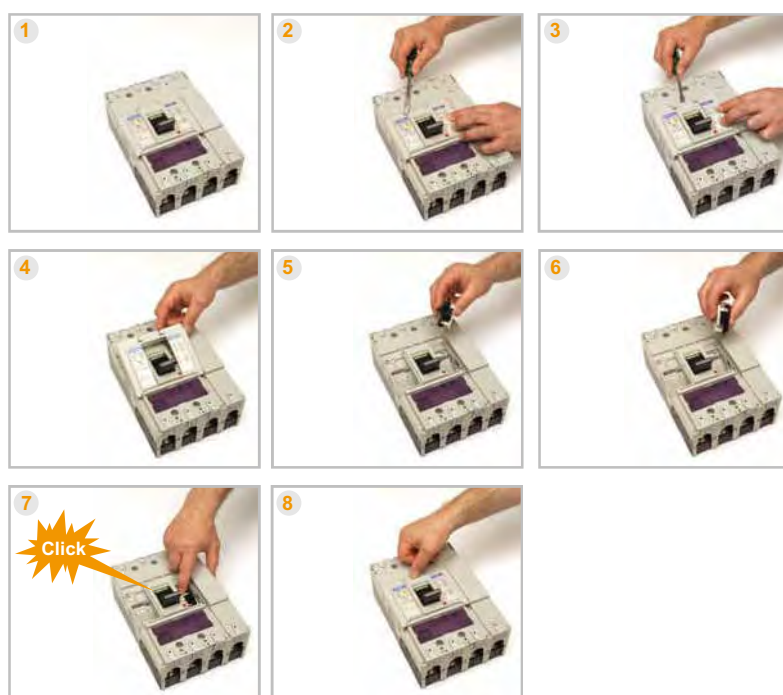
All accessories are individually packaged and are supplied with fitting instructions.

Control wiring is terminated on the accessory screw terminal. Alternatively a terminal block which clips to the side of the MCCB is available.



Installing Accessories in a 4 pole S400 model

The internal accessories can be easily installed in the field without special tools or product training.



Easy field-Installation of Accessories

Internal accessory can be simply plugged into position

No tools are required for this, except a screwdriver to lift the MCCB front cover clips.

Accessories fit with a firm click when installed correctly.

Colour coding of accessories helps identification and installation

ACCESSORIES

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

Valid Maximum Accessory Combinations

Frame size (A)	125	160 and 250	400 and 630	800 and 1000	1250 and 1600
E	E125	E250	E400 E630		
S	S125	S160 S250	S400 S630	S800 S1000	S1250 S1600
H		H125 H160 H250	H400	H800	
L		L125 L160 L250	L400	L800	
General Purpose Auxiliary Switch General Purpose Alarm Switch Shunt Trip					
General Purpose Auxiliary Switch General Purpose Alarm Switch Undervoltage Trip					
Heavy Duty Auxiliary Switch Heavy Duty Alarm Switch Shunt Trip					
Heavy Duty Auxiliary Switch Heavy Duty Alarm Switch Undervoltage Trip					

- Auxiliary Switch
- Alarm Switch
- Shunt Trip
- Undervoltage Trip

General purpose and heavy duty status indication switches cannot be mixed in the same MCCB.

It is not possible to install a shunt trip and an undervoltage trip in an MCCB as they occupy the same location. Undervoltage trips can provide remote tripping if necessary by wiring a normally closed contact or pushbutton in series with the protected supply.

Undervoltage trips with time delays require an external time delay controller which clips to the side of the MCCB.

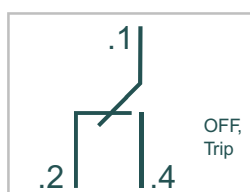
ACCESSORIES

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

Status Indication Switches



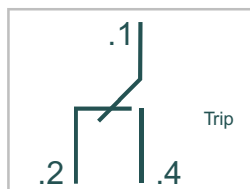
General Purpose Auxiliary Switch



Terminal Designations and Function of General Purpose Auxiliary Switch



General Purpose Alarm Switch



Terminal Designations and Function of General Purpose Alarm Switch

General Purpose Auxiliary Switch (AX)

An auxiliary switch electrically indicates the ON or OFF status of the MCCB. The general purpose type is a changeover switch with 3 terminals.

A microcurrent version is available for switching currents as low as 1mA.

Auxiliary switches are colour coded grey. The cable capacity of the terminals is 0.5 to 1.25mm².

The general purpose auxiliary switch meets the requirements of IEC 61058-1.

General Purpose Alarm Switch (AL)

An alarm switch electrically indicates the TRIP status of the MCCB. The general purpose type is a changeover switch with 3 terminals.

A microcurrent version is available for switching currents as low as 1mA.

Alarm switches are colour coded grey and black. The cable capacity of the terminals is 0.5 to 1.25mm².

The general purpose alarm switch meets the requirements of IEC 61058-1.

General purpose auxiliaries and alarm switch ratings						
Volts (V)	AC		Volts (V)	DC		Minimum Load
	Amperes (A)			Amperes (A)		
	Resistive Load	Inductive Load		Resistive Load	Inductive Load	
440	-	-	250	-	-	100mA at 15V DC.
240	3	2	125	0.4	0.05	
110	3	2	30	3	2	

Microcurrent versions		
Volts (V)	DC	
	Amperes (A)	
	Resistive Load	
30	0.1	
	1mA at 5V DC and 30V DC.	

ACCESSORIES

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

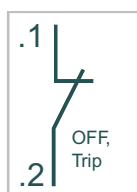
Status Indication Switches



Heavy Duty Auxiliary Switch



Terminal Designations and Function of Heavy Duty Auxiliary Switch, a contact



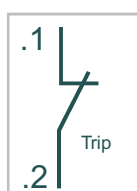
Terminal Designations and Function of Heavy Duty Auxiliary Switch, b contact



Heavy Duty Alarm Switch



Terminal Designations and Function of Heavy Duty Alarm Switch, a contact



Terminal Designations and Function of Heavy Duty Alarm Switch, b contact

Heavy Duty Auxiliary Switch (AX)

The heavy duty auxiliary switch has an impulse withstand voltage (Uimp) of 6kV and is suitable for isolating safety circuits. The auxiliary switch electrically indicates the ON or OFF status of the MCCB. The heavy duty type is a bridge switch with two terminals. It is available in either normally open or normally closed configurations.

Heavy duty auxiliary switches are colour coded grey. The cable capacity of the terminals is 1.25 to 2.5mm².

The heavy duty auxiliary switch meets the requirements of IEC 60947-5-1.

It has direct opening action, recommended by IEC 60204-1 Safety of Machinery - Electrical Equipment for Machines.



Heavy Duty Alarm Switch (AL)

The heavy duty alarm switch has an impulse withstand voltage (Uimp) of 6kV and is suitable for isolating control circuits. The alarm switch electrically indicates the TRIP status of the MCCB. The heavy duty type is a bridge switch with two terminals. It is available in either normally open or normally closed configurations.

Heavy duty auxiliary switches are colour coded grey and black. The cable capacity of the terminals is 1.25 to 2.5mm².

The heavy duty alarm switch meets the requirements of IEC 60947-5-1.

It has direct opening action, recommended by IEC 60204-1 Safety of Machinery - Electrical Equipment for Machines.



Ratings of Heavy Duty Auxiliary and Alarm Switches					
AC			DC		
Volts (V)	Amperes (A)		Volts (V)	Amperes (A)	
	Resistive Load	Inductive Load		Resistive Load	Inductive Load
500	1	1	-		
440	3	3	250	0.5	0.5
240	4	4	125	1	1
110	5	5	48	3	2.5
48	6	6	24	6	2.5

ACCESSORIES

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

Remote Tripping Devices

Shunt Trip (SHT)

A shunt trip allows an MCCB to be tripped remotely on the application of the rated coil voltage across the shunt trip terminals. TemBreak 2 shunt trips have **continuously rated coils** and are suitable for use in electrical interlocking applications.

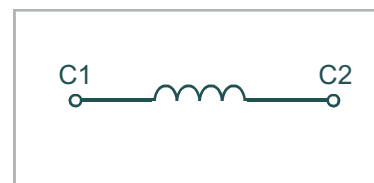
The MCCB contacts and toggle will move to the tripped position when the shunt trip is operated.

The permissible voltage range is 85% to 110% for AC or 75% to 125% for DC.

The cable capacity of the terminals is 0.5 to 1.25mm². Shunt trips are colour coded grey.



Shunt Trips



Terminal Designations of Shunt Trips

Ratings of Shunt Trips							
Rated Voltage	Voltage AC			Voltage DC			
	100-120	200-240	380-450	24	48	100-120	200-240
Excitation Current (A)	0.014	0.014	0.0065	0.03	0.03	0.011	0.011

Under Voltage Trip (UVT)

An undervoltage trip will trip the breaker automatically when the voltage applied to the terminals of the undervoltage coil drops to between 70% and 35% of its voltage rating. The undervoltage trip prevents the circuit breaker being closed unless a voltage corresponding to at least 85% of its voltage rating is applied across the terminals of the undervoltage coil.

The MCCB contacts and toggle will move to the tripped position when the under-voltage trip operates.

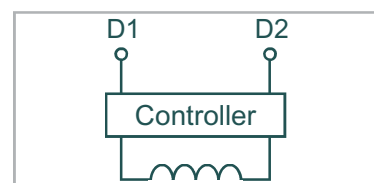
Undervoltage trips with AC operating voltages are available with 500ms time delays. Time-delay units are fitted to the outside of MCCBs.

The cable capacity of the terminals is 0.5 to 1.25mm². Undervoltage trips are colour coded grey and black.

A UVT controller is required for time delay UVT only.



Undervoltage Trips



Terminal Designations of Undervoltage Trips

Ratings of Undervoltage Trips									
MCCB Model	Rated Voltage	Power supply capacity (VA)						Excitation current (mA)	
		Voltage AC			Voltage DC			Voltage DC	
		100-120	200-240	380-450	24	100-120	200-240		
E125, S125, H125, L125, S160, H160, L160, E250, S250, H250, L250, E400, S400, H400, L400, E630, S630		1.4	2.8	2.3	23	10	10		
MCCB Model	Rated Voltage	Voltage AC						Voltage DC	
		100-110	115-120	200-220	230-240	380-415	440-450	24	100-120 200-240
S800, H800, L800, S1000, S1250, S1600		1.5	1.6	2.4	2.9	2.1	2.3	29	13 11

ACCESSORIES

TERMINATION OF CONTROL WIRING

Terminal blocks are for optional use with all types of internally mounted accessory.

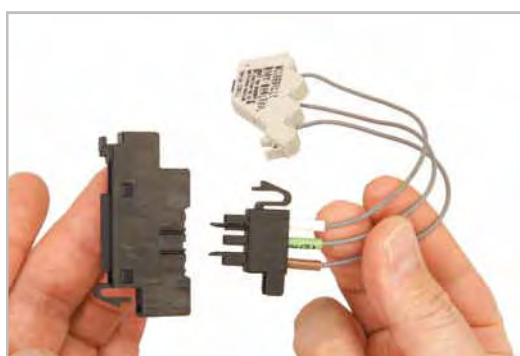


Terminal Block for Plug-in MCCBs

The terminal block for a plug-in MCCB consists of:

- a male section pre-fitted with 3 cables with which clips easily to the back of the MCCB
- a female section with 3 user terminals which clips easily into the plug-in base.

Up to 4 terminal blocks can be installed on a 125A, 160A or 250A frame MCCB.
Up to 5 terminal blocks can be installed on a 400A to 800A frame MCCB.



Terminal Block for Plug-in MCCBs

Terminal Block for Front-Connected and Rear-Connected MCCBs (TF)

A terminal block facilitates convenient and accessible control wiring to internally mounted accessories especially the accessories with lead wire.

It allows the use of control wiring cables with larger cross-sectional area than permitted by the internal accessories themselves.

This terminal block can be clipped to either side of the MCCB. If mounted on the left incoming wiring will be fed vertically up to the terminals. If mounted on the right, the incoming wiring will be fed vertically down to the terminals.

The maximum incoming cable size to the terminal block is 2.0mm². 11 terminals or 6 terminals can be specified. See page 153.

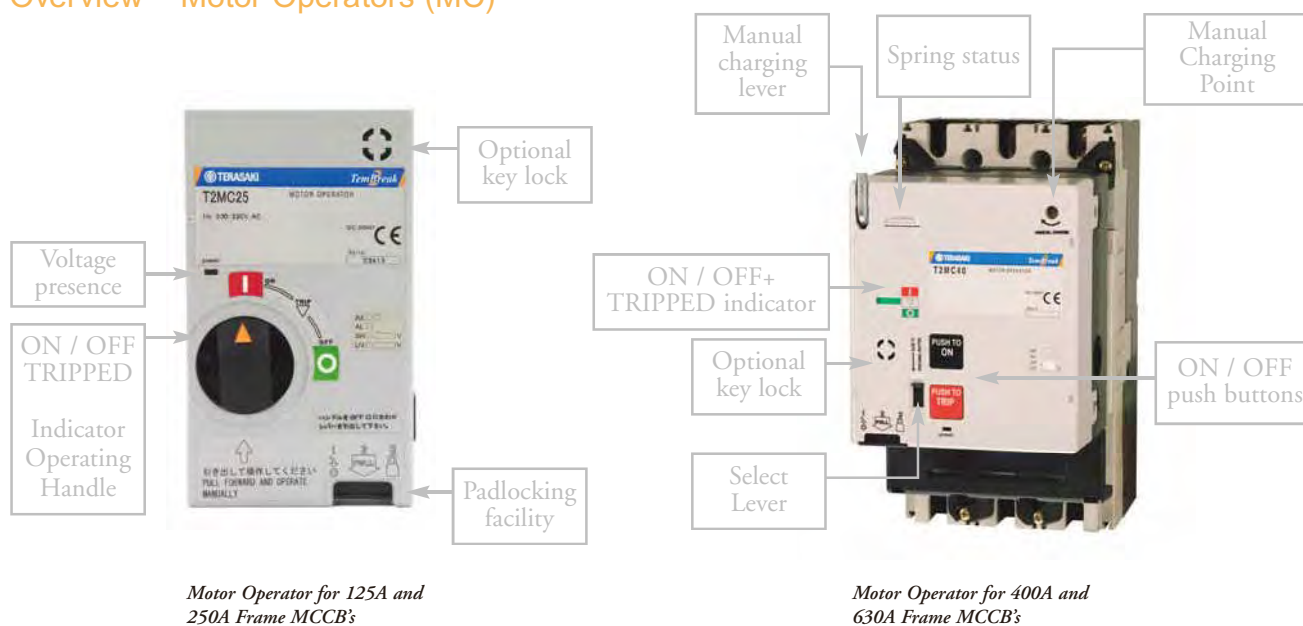


Terminal Block for Front-Connected and Rear-Connected MCCBs

ACCESSORIES

ELECTRICAL CONTROL USING MOTORISED OPERATION

Overview – Motor Operators (MC)



Motor operators provide the possibility of opening and closing an MCCB on application of electrical control signals. TemBreak 2 motor operators are extremely reliable, having been designed to endure the same switching duty as the host MCCB.

Easy field-installation.

Fast operation ($\leq 100\text{ms}$).

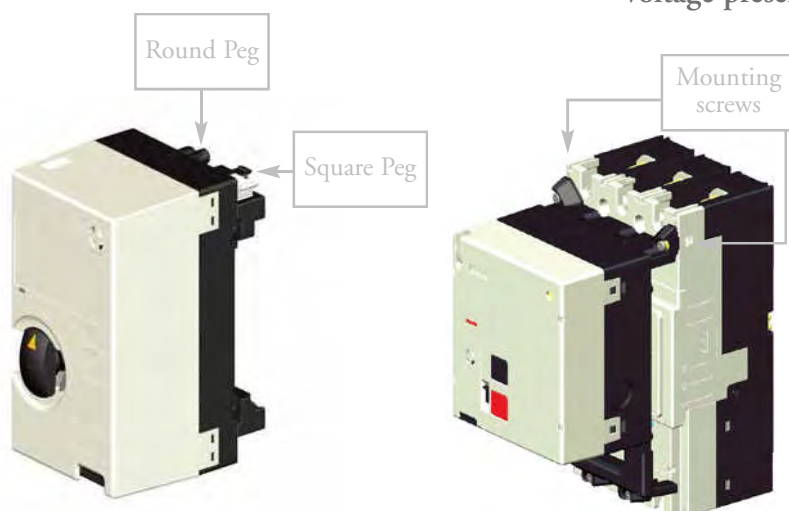
Positive contact indication.

Padlocking facility as standard (Maximum 3, hasp diameter 8mm).

Optional keylock.

Versions available with automatic reset function.

Voltage presence indication.



Motor Operator for 125A and 250A frame MCCB's

Motor Operator for 400A and 630A frame MCCB's

Motor operators for 125A and 250A frame are mounted on the front of the breaker. They can be rapidly fitted by locating the round pegs and square pegs on the motor into corresponding round and square holes on the breaker. It takes less than 10 seconds to secure the motor to the MCCB. Two levers securely lock the motor into position. No tools are needed to fit the motor operator.

400A frame to 1000A frame motor operators are held in place with mounting screws. They can be installed easily in the field.

ACCESSORIES

ELECTRICAL CONTROL USING MOTORISED OPERATION

Indication of ON, OFF or TRIPPED Status

The handle of 125A and 250A frame motor operators has dual functions:

1. Indication of ON, OFF or TRIPPED status as shown in the photographs below;
2. Manual operation when handle is pulled out. The supply to electrical control circuits inside the motor operator is cut when the handle is pulled out.



MCCB on



MCCB off



MCCB tripped



Motor operators for 400A to 1000A frame MCCBs incorporate a mechanical flag which indicates the ON, OFF and TRIPPED status of the MCCB. They can be manually charged using the lever provided.

Ratings and Specifications

Type of Motor Operators		T2MC12	T2MC25	T2MC40	T2MC80
Applicable MCCB		E125	E250	E400	S800, S1000
		S125	S160, S250	S400	H800
			H125, H160, H250	E630	L800
			L125, L160, L250	S630	
Rated operating voltage	100-110 V AC	■		■	■
	200-220 V AC	■		■	■
	230-240 V AC	■		■	■
	24 V DC	■		■	■
	48 V DC	■		■	■
	100-110 V DC	■		■	■
	200-220 V DC	■		NA	NA
Operating current/ Starting current Peak value (A)	100-110 V AC	4.5/8		ON ---/2.3 OFF, RESET 1.4/3.7	ON ---/2.2 OFF, RESET 1.7/3.5
	200-220 V AC	4/8		ON ---/2.3 OFF, RESET 1.1/3.5	ON ---/2.2 OFF, RESET 1.3/3.5
	230-240 V AC	3.5/7		ON ---/2.3 OFF, RESET 1.1/3.5	ON ---/2.2 OFF, RESET 1.3/3.5
	24 V DC	18/26		ON ---/7.2 OFF, RESET 3.9/8.1	ON ---/12 OFF, RESET 6.0/11.5
	48 V DC	12/18		ON ---/7.2 OFF/RESET 2.0/5.1	ON ---/7 OFF, RESET 3.2/6.5
	100-110 V DC	2.2/6		ON ---/2.4 OFF/RESET 1.2/3.8	ON ---/2.2 OFF, RESET 1.3/3.5
	200-220 V DC	2.2/5.5		—	—
Operating method		Direct drive		Spring charging	Spring charging
Operating time (s)	ON	0.1		0.1	0.1
	OFF	0.1		1.5	1.5
	RESET	0.1		1.5	1.5
Operating switch rating		100V, 0.1 A, Opening voltage 44V, current 4mA		100V, 0.1 A, Opening voltage 48V, current 1mA	
Power supply required		300 VA minimum		300VA minimum	300VA minimum
Dielectric properties (1 min)		1500 V AC (1000V AC for 24V DC and 48V DC motors)			
Weight		1.4 kg		3.5kg	3.5kg

■ = Available

Note: Operating times shown in the above table apply only when the rated operational voltage is supplied to the motor operator. The voltage supplied to the motor operator must be within the range of 85% and 110% of the rated operating voltage.

ACCESSORIES

ELECTRICAL CONTROL USING MOTORISED OPERATION

Motor Operator Control Circuits

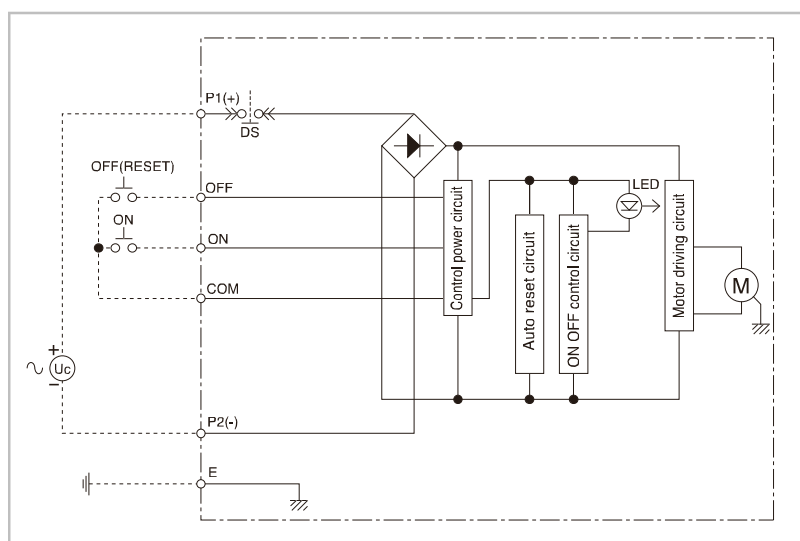


MCCB and Motor Operator Showing Control Wiring Socket

The Control circuits for Motor Operators are connected using a simple plug and socket system.



Control Wiring Plug



Control circuit for Motor Operators

Operation

The motor operator incorporates a self-hold circuit for the closing and opening signals. Therefore a momentary (over 50msec.) open or close signal will ensure a complete operation.

When the breaker trips, the breaker is reset by applying a signal to the OFF terminals of the motor.

When a UVT is used with a motor operator, design the control circuit so that the UVT is energised **before** a reset or close signal is sent to the motor operator. A 40ms time delay in the reset and close signals is sufficient to allow the UVT to energise.

When a shunt trip is used with a motor operator, design the control circuit so that the shunt trip is de-energised before a reset or close signal is sent to the motor operator.

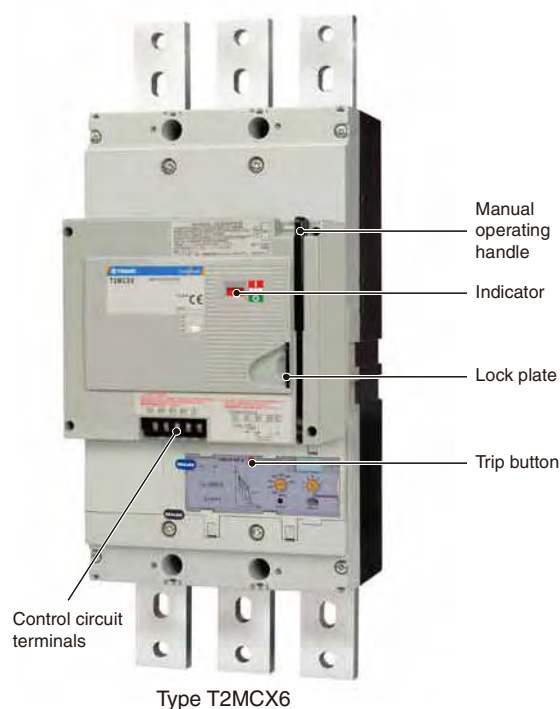
When a mechanical interlock is used with motor operators, design the control circuit to provide electrical interlocking between the motor operators. The electrical interlocking should prevent a close signal being sent to a motor operator unless the other motor operator and circuit breaker are in the OFF position.

Auto- reset

Two types of motor operator are available: motor operators without auto-reset and motor operators with auto-reset. The correct type of motor operator should be selected for the application. MCCB auxiliary and alarm switches do not have to be used in the control circuits for motor operators whether they have auto-reset or not, saving cost and space.

ACCESSORIES

ELECTRICAL CONTROL USING MOTORISED OPERATION



Positive contact indication

Colour coding indicates the true position of the contacts clearly: ON (red), OFF (green), TRIP (white).

Easy maintenance

Breaker mounting, removal, and even setting changes can be done without removing the motor operator.

Manual ON/OFF operation with one stroke

Fast closing operation

Closing in 60ms or less. The closing time remains constant over repeated operations.

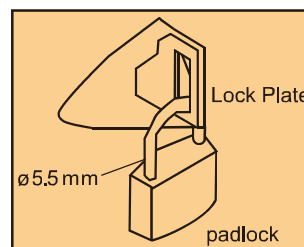
SECTION 5

Ratings and Specifications

Type of Motor Operators			T2MCX6
Applicable MCCB			S1250
			S1600
Rated Operating Voltage (V)	AC	100-115V 50/60Hz	■
		200-230V 50/60Hz	■
	DC	100-110V	■
		24V	■
Lock in “OFF” position (standard)			■
Manual Trip Button			*
Steady-state r.m.s. Amp/inrush Amp (A)	AC100-115V	ON①	~/3.1
		OFF, RESET①	1.8/6.0
	AC200-230V	ON②	~/1.2
		OFF, RESET②	1.0/3.2
	DC100-110V	ON③	~/0.8
		OFF, RESET③	1.1/4.2
	DC24V	ON	~/4.5
		OFF, RESET	4.0/12.0
Type of operation			Spring Charged
Operating Time(s)	ON (Maximum values)		0.06
	OFF, RESET④		3
Control Switch Ratings			250V, 5A
Power Source Capacity (VA)			300VA
Dielectric withstand voltage The value in brackets fot 24V DC			AC1500V (AC500V)
Weight (kg)			6.4

■ = Available

* Trip button on breaker to be used (accessible with motor fitted)



The breaker can be padlocked in the "OFF" position by pulling out the lock plate, and locking it with a padlock.

When the breaker is "ON", the lock plate cannot be pulled out.

Up to three locks can be used.
Padlocks not supplied.

NOTE

① : Maximum values at AC115V, 50Hz

② : Maximum values at AC230V, 50Hz

③ : Maximum values at DC110V

④ : Maximum values at the rated operating voltages

ACCESSORIES

ELECTRICAL CONTROL USING MOTORISED OPERATION

Motorised operation

ON CONTROL

When the ON switch is closed, the latch release coil (LRC) is excited and the closing spring is released. The breaker quickly closes and goes into ON status. When the closing spring is released, the limit switch (LS) is opened and the LRC is de-excited.

OFF CONTROL

When the off switch is closed, self-hold control relay (Y) is activated and motor (M) operates to charge the closing spring. The breaker changes to OFF status.

RESET CONTROL

When the breaker is in TRIP status, closing the OFF switch activates self-hold control relay (Y) and starts motor (M). Motor (M) charges the closing spring and resets the breaker.

Manual operation

ON, OFF (RESET)

The breaker can be opened (OFF or RESET) and closed (ON) alternately by pulling the operating lever down in one full stroke. ON/OFF operation of the breaker is possible without charging or releasing the closing spring.

Emergency Trip

Opening the breaker (OFF) using the motor operator takes up to 3 seconds. If a remote emergency OFF function is necessary, incorporate the shunt trip device (SHT) or the undervoltage trip device (UVT) into the breaker.

PRECAUTIONS REGARDING USAGE

- If using the UVT option, be sure to reset the UVT before closing the breaker.
- The motor operator must be supplied with voltage within the following range:
DC: 75-110% of rated voltage
AC: 85-110% of rated voltage
Operation at low voltage may burn out the motor.

Anti-pumping function

When the breaker is turned ON and the closing spring is released, self-hold control relay X is activate. Xa-contact is held closed, and Xb-contact is opened. While the ON switch is closed, latch release coil (LRC) will not be excited even if the OFF switch is closed or an automatic reset circuit is being used. Pumping is thus prevented.

Automatic charge/discharge function

If the breaker is closed manually (ON) while the power source is on, the handle switch (HS) induces automatic release of the closing spring. Likewise, if the breaker is opened manually (OFF), the springs are automatically charged. If the breaker is opened or closed while the power source is off, later when the power source is turned on, the closing spring will automatically be charged or discharged to match the ON/OFF status of the breaker. This automatic charge/discharge function is necessary to prepare the closing mechanism for the next ON/OFF operation. The sound of the charging or discharging of the spring should not be mistaken for a malfunction.

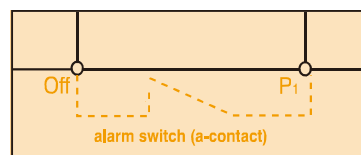
Automatic reset

An alarm switch (a-contact) fitted in the breaker, can be used to induce recharging of the closing spring and automatically reset the MCCB. Connect the automatic reset circuit as shown below.

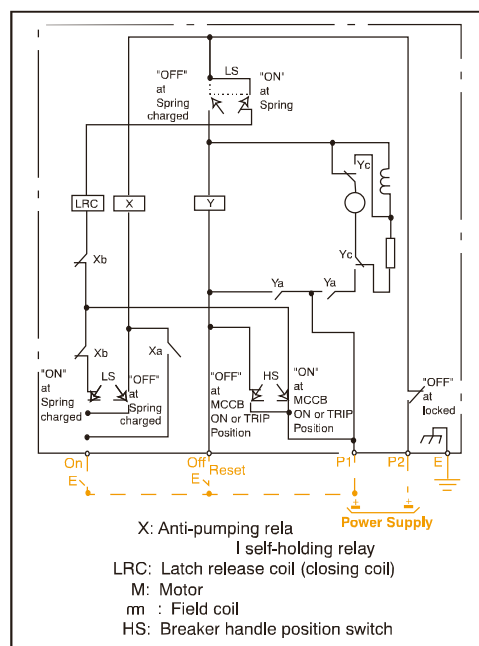
If the alarm switch is used, a pulse signal will be produced in the automatic reset circuit when the alarm is activated. Be sure to use a self-hold circuit to avoid possible problems caused by this pulse signal.

It is recommended that a time delay of approximately 3 minutes is introduced to the automatic reset circuit for thermal magnetic MCCB's. In the event of an overload trip this will prevent the motor operator repeatedly driving the MCCB between the tripped and reset positions while the thermal element is hot.

If an alarm signal is also required for external control, use a 2 alarm switch combination.



Control circuit AC and DC



Note: Customer wiring shown in orange

ACCESSORIES

OPERATING HANDLES & LOCKING DEVICES

TemBreak 2 external operating handles are extremely reliable, having been designed to endure the same switching duty as the host MCCB.

It is easy to fit the operating unit to the MCCBs up to 250A frame. Fitting involves three easy steps:

1. Align breaker toggle with operating mechanism
2. Push external operating handle into position (the handle's round pegs locate securely in the breaker's round holes and the external operating handle's* square pegs in the breaker's square holes).
3. Twist locking screws through 45 degrees.*

Safety Features

Door interlock mechanism with override facility included as standard

IP55 as standard (HS), IP54 as standard (HP), IP3X as standard (HB)

IP65 optional (HS, HP), IP5X optional (HB)

Locks OFF with up to 3 padlocks (8mm hasps)

Optional Key fitting facility is available for Castell FS1 (HS)

Contact us for the details of mounting dimension.

Optional keylock in OFF position (HP, HB)

Available Gray handle with Black base or Red handle with Yellow base (HS)

Available in black or red and yellow (HP, HB)

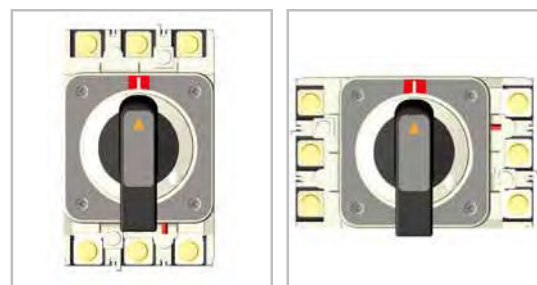
A trip test can be performed with the external operating handle fitted to the MCCB

Orientation

To switch the breaker from OFF to ON the external operating handle is rotated through 90 degrees in a clockwise direction.

The ON (I) and OFF (O) indication of the external operating handle can be re-oriented in steps of 90 degrees with respect to the operating mechanism. This allows the indication position to remain the same whether the breaker is mounted vertically (right side up or upside down) or horizontally (on its left side or on its right side).

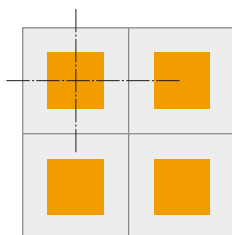
The hole cut-out dimensions for a panel or door will remain unchanged if the external operating handle is re-oriented. The external operating handle's axis of rotation is on the intersection of the centre lines of a 3P MCCB. This means that the positioning of the door cutouts is symmetrical for breakers mounted horizontally on either side of a vertical busbar system.



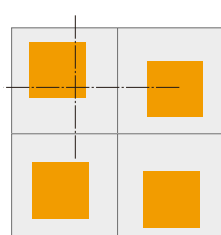
MCCB ON

MCCB ON

Cubicle Door Cutouts



Using TemBreak 2 Operating Handles



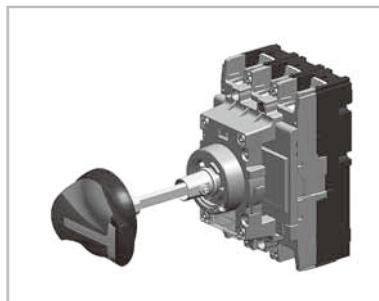
Using other MCCB Operating Handles

*external operating handles for 400A and 1600A Frame models are secured with four screws.

ACCESSORIES

OPERATING HANDLES & LOCKING DEVICES

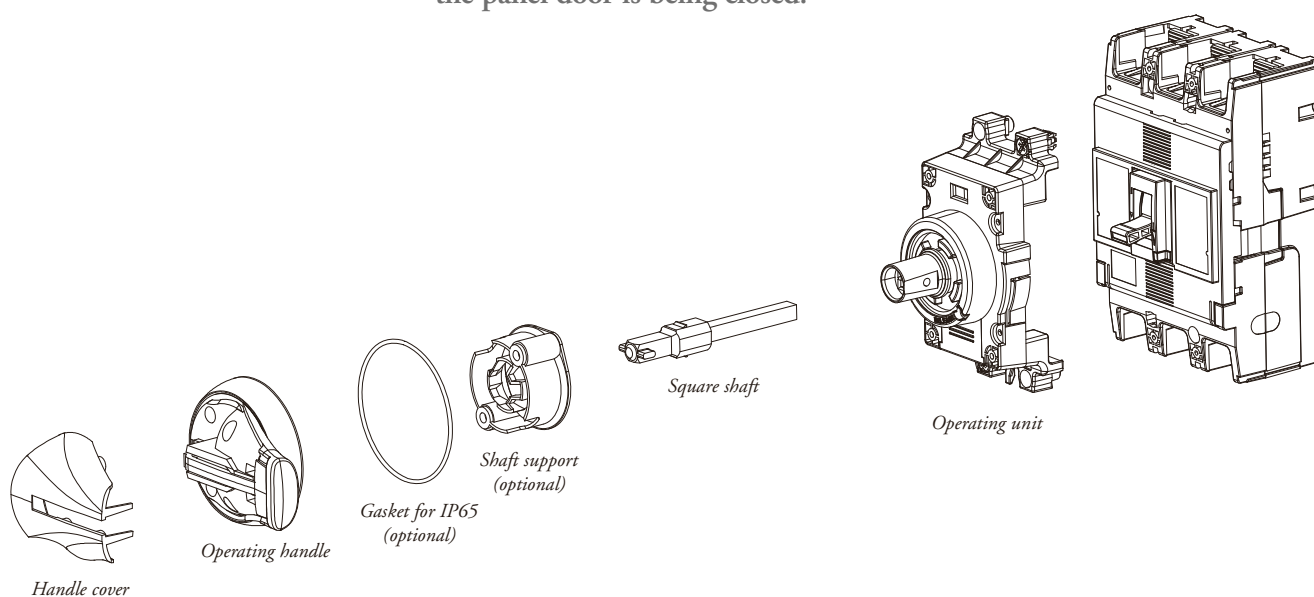
Door Mounted Handle (HS) standard type



The door mounted handles allow breakers installed in control centers or switchboards to be manually operated from outside and complies with IEC 60204-1.

It consists of an operating mechanism that is mounted on the breaker, an operating handle that is mounted on the door, and a shaft that transmits the turning force from the handle to the operating unit. The shaft can be cut to the required length.

The shaft support makes easy to insert to the operating handle when the panel door is being closed.



Door interlock mechanism

The external operating handle keeps the panel door locked when in the 'ON' position. There is OFF open type only.

OFF open type

The handle is turned to the OFF position to open the panel door.

Door interlock release button

The release button enables the panel door to be opened with the handle in the 'ON' position.

To release: push the release button on the side of the operating handle with a flat-bladed screwdriver.



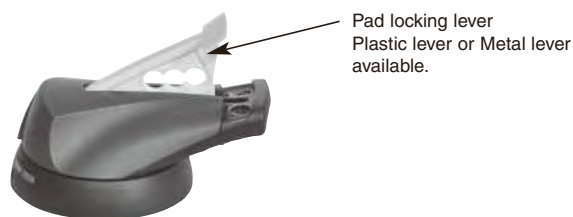
Toggle lock mechanism

Padlock (Standard)

This mechanism allows the breaker to be padlocked in the OFF position.

Padlocks are not supplied.

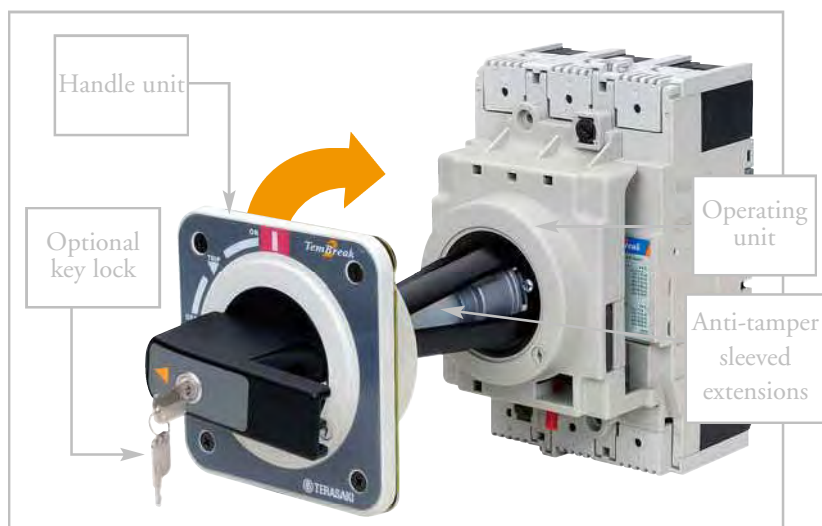
Up to three padlocks can be installed.



ACCESSORIES

OPERATING HANDLES & LOCKING DEVICES

Door Mounted Handle (HP) ordinal type



Door Mounted Handle with Optional Keylock

The door mounted handle is used to operate a circuit breaker mounted inside a cubicle from outside the door. It consists of an operating mechanism that is mounted on the breaker, an operating handle that is mounted on the door, and a shaft that transmits the turning force from the handle to the operating unit. The shaft can be cut to the required length.

Breaker Mounted Handle (HB)



Breaker Mounted Handle Padlocked in the OFF Position

This external operating handle is used to operate a circuit breaker mounted just behind a compartment door with the door closed. The operating unit and the handle itself are mounted directly onto the circuit breaker. The handle protrudes through a cutout in the door. A moulded door flange is supplied with the external operating handle which covers the cutout from the front.

Padlocking and keylocking is possible in the OFF position.

Locking Devices

Toggle locking devices allow MCCBs to be locked ON or OFF using up to three padlocks. Locking devices for 125A, 160A and 250A frame models accept padlocks with 5mm hasp diameter. Locking devices for 400A to 1600A frame models accept padlocks with 8mm hasp diameter.



S250 Locked OFF



S400 Locked OFF

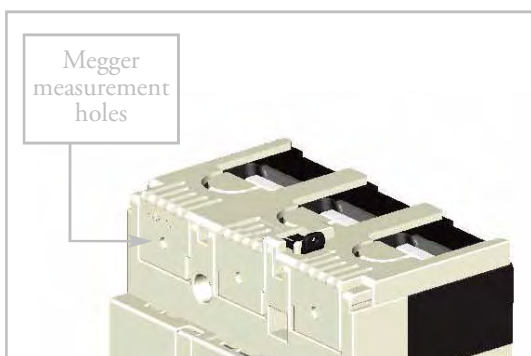
Fittings for Castell and Fortress locks are available. They are suitable for use on door mounted handles (HP) for MCCBs.

ACCESSORIES

INSULATION ACCESSORIES

Terminal Covers

Terminal covers are used to prevent direct contact with live MCCB terminations. They also provide additional insulation to reduce the possibility of a short circuit between phases or to earth when large conductors are used.



General features

Terminal covers for 125A to 630A frame models require no tools for installation

Terminal covers for 125A to 630A frame models have an IP20 ingress protection rating

Terminal covers are ordered individually. Two terminal covers are required to cover both the line and load terminals of an MCCB. Each cover can either be fitted to the top or bottom of the MCCB

Terminal covers have a megger measurement hole of 4mm diameter on each phase.



Terminal Cover Lock with Lead Seal

Options

A terminal cover for 125A to 630A frame models lock allows an anti-tampering seal to be added.

An earth barrier for 125A and 250A frame models can be added to terminal covers for front connection. The earth barrier provides insulation at the rear of the terminations.



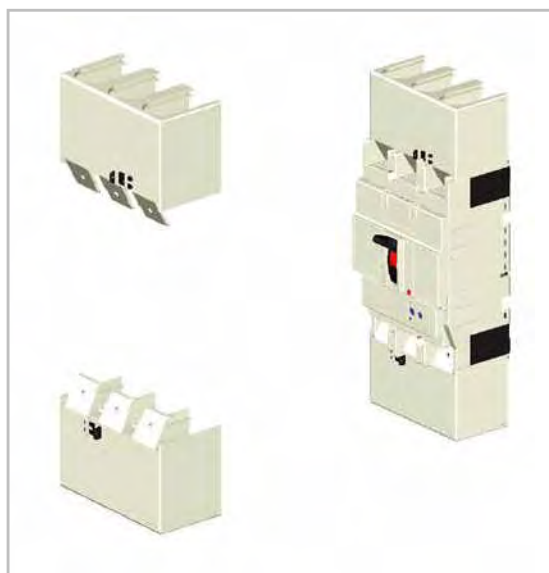
Earth Barrier Fitted to Rear of Terminal Cover

ACCESSORIES

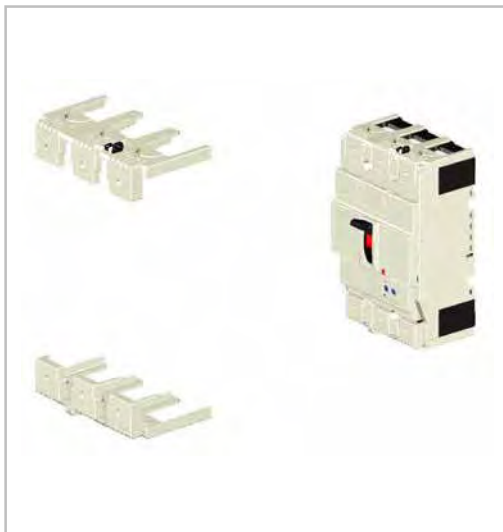
INSULATION ACCESSORIES

Terminal Covers for Front Connection (CF)

Terminal covers for front connection are suitable for covering the exposed live parts of conductors terminated on the MCCB.



Terminal Covers for Front Connection



Flush Terminal Covers

SECTION 5

Flush Terminal Covers (CS)

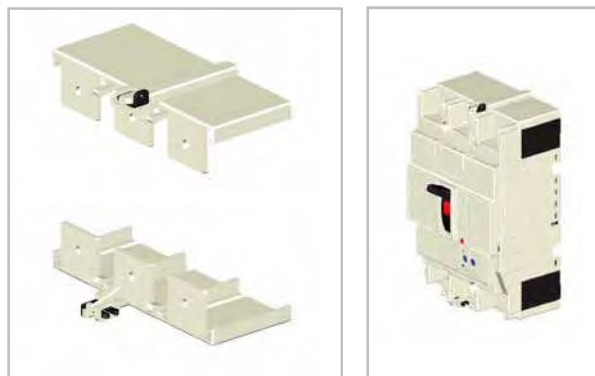
Flush terminal covers are available for 125A to 630A frame models and are useful for increasing the ingress protection rating at the terminals without increasing the overall length. They can be used with busbar and for direct entry of stranded cable (with cable clamp terminals (FW), refer to Section 6, Installation).

Flush terminal covers are identical to rear terminal covers for 400A and 630A frame models.

The user can remove a section of the rear terminal cover using a tool to allow entry of the conductor.

Terminal covers for Rear Connection (CR)

Terminal covers for rear connection are available for 125A to 1000A frame models and may be used on MCCBs fitted with rear connections (RC) or plug-in connections (PM). They prevent access to the terminals from the front and top.



Terminal Covers for Rear Connection

ACCESSORIES

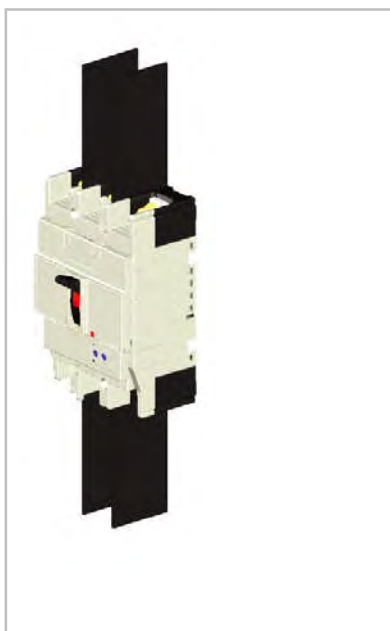
INSULATION ACCESSORIES

Interpole Barriers (BA)

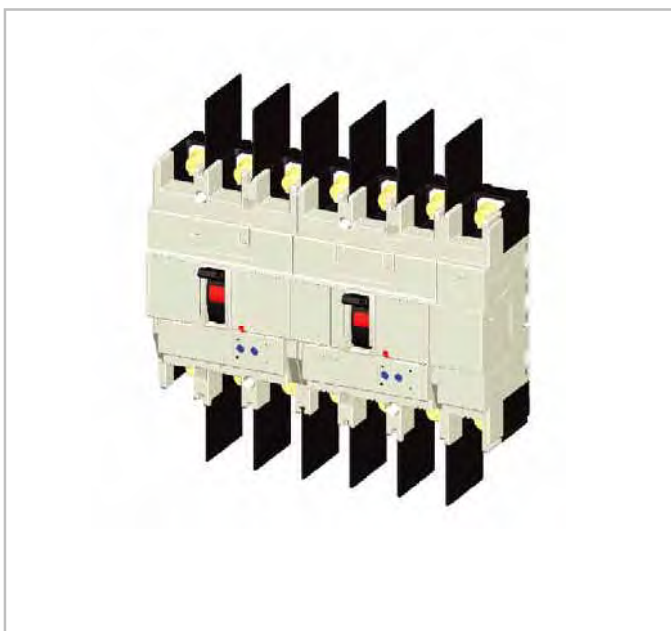
Interpole barriers provide maximum insulation between phases at the terminals of the MCCB. They cannot be fitted at the same time as any of the terminal covers.

Interpole barriers for use on one end of the MCCB are supplied as standard. Additional interpole barriers can be ordered individually. All interpole barriers can easily be fitted to either end of an MCCB.

MCCB moulds have been designed to accept an additional interpole barrier between two adjacent MCCBs.



MCCB Fitted with Interpole Barriers on Both Ends



Interpole Barriers between Adjacent MCCBs

DIMENSIONS

TEMBREAK 2

MOULDED CASE CIRCUIT BREAKERS 16A TO 1600A

1. Welcome to TemBreak 2
2. Ratings and Specifications
3. Operating Characteristics
4. Application Data
5. Accessories
6. Installation
7. **Dimensions**



S125-NE, S160-NF	115
E125-NJ, S125-NJ, S125-GJ, S125-NN	116
S160-NJ, S160-GJ, E250-NJ, S250-NJ, S250-GJ, S250-NN	118
H125-NJ, L125-NJ, H160-NJ, L160-NJ, S250-NE, S250-GE, S250-PE, H250-NJ, H250-NE, L250-NJ	120
E400-NJ, S400-CJ, S400-NJ, S400-GJ, S400-PJ, S400-NE, S400-GE, S400-PE, S400-NN	122
H400-NE, L400-NE	124
E630-NE, S630-CE, S630-GE, S630-NN	126
S800-CJ, S800-NJ, S800-RJ, S800-NE, S800-RE, S800-NN	128
H800-NE, L800-NE	130
S1000-SE, S1000-NE, S1000-NN	132
S1250-SE, S1250-NE, S1250-GE, S1250-NN	133
S1600-SE, S1600-NE, S1600-NN	135
Operating Handles	137
Terminal Covers	149
Interpole Barriers	152
Terminal Blocks for Front-Connected and Rear-Connected MCCBs	153
OCR Power Supply for Electronic Protection	
Standard type	155
With LCD	157
Slide Interlocks	158
Link Interlocks	163
Wire Interlocks	169
Position of Trip Button	176
External Neutral CT/Door Flanges	177

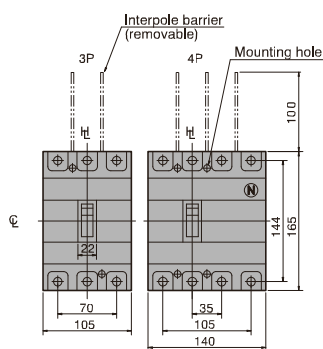
DIMENSIONS

S160-NJ, S160-GJ, E250-NJ, S250-NJ, S250-GJ, S250-NN

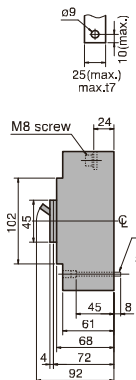
ASL: Arrangement Standard Line

HL: Handle Frame Centre Line

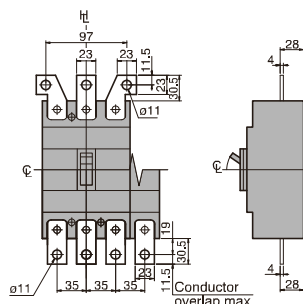
Front connected



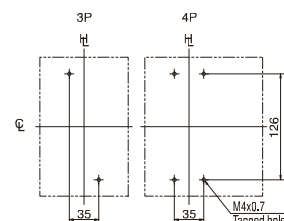
Preparation of conductor



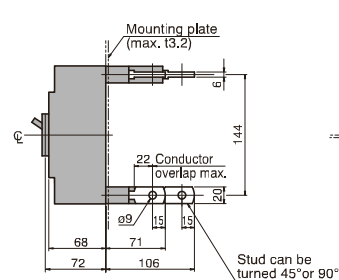
With extension bars (optional)



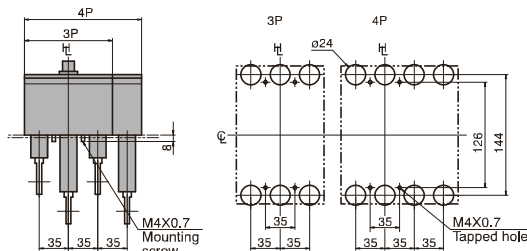
Drilling plan



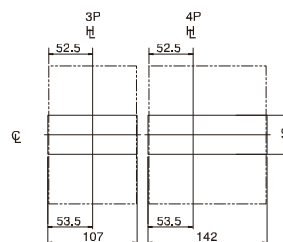
Rear connected



Drilling plan

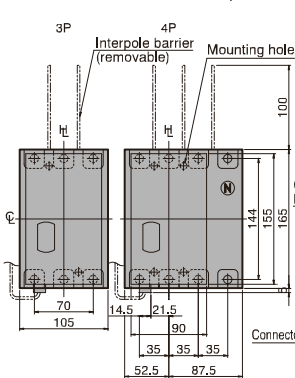


Panel cutout (Front view)



Panel cutout dimensions shown give an allowance of 1.0mm or more around the handle escutcheon.

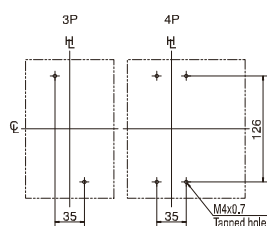
Front connected with Motor Operator



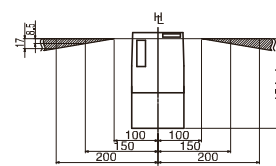
Preparation of conductor



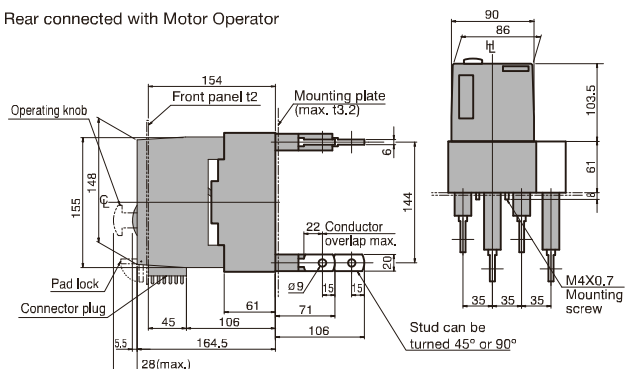
Drilling plan



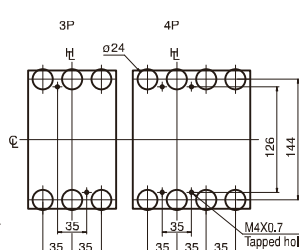
Panel hinge position (hatching area) bottom view



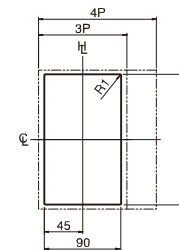
Rear connected with Motor Operator



Drilling plan

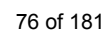


Panel cutout (Front view)



Panel cutout dimensions shown give an allowance of 1.5mm around the handle escutcheon.

Front connected



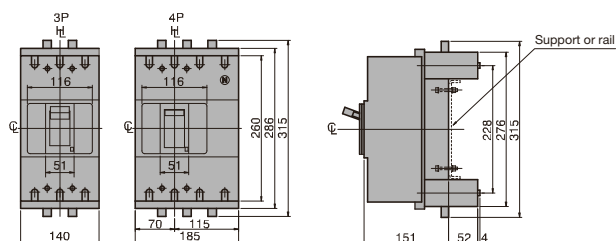
DIMENSIONS

E400-NJ, S400-CJ, S400-NJ, S400-NE, S400-GJ, S400-GE, S400-PJ, S400-PE, S400-NN Plug-in Versions

ASL: Arrangement Standard Line

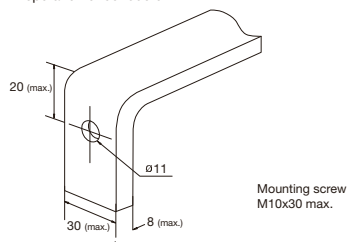
Ht: Handle Frame Centre Line

Outline Dimensions

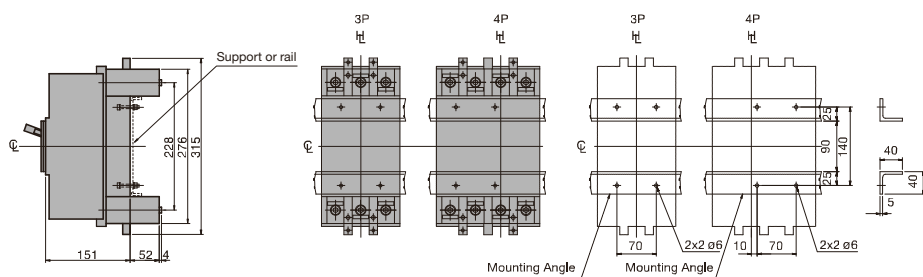


Termination of Busbar

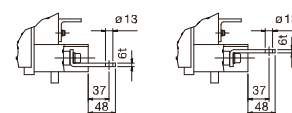
Preparation of conductor



Mounting on a support or rails (shown with optional connection bars oriented for rear access)

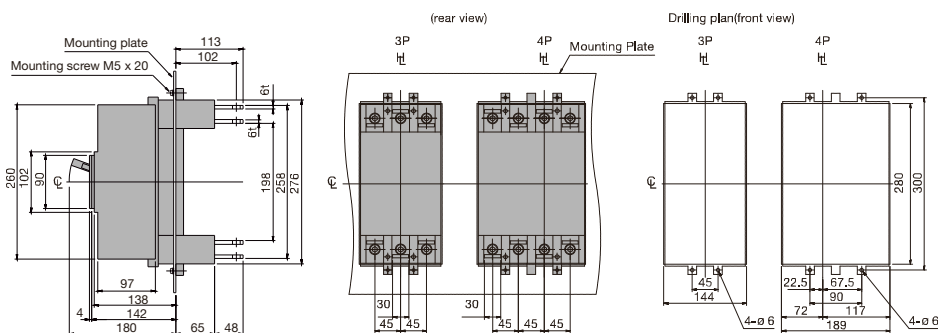


Detail of connecting part Oriented for rear access

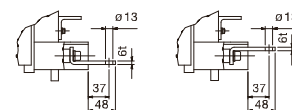


Terminal bars should be connected alternately on adjacent poles.

Mounting through the backplate (shown with optional connection bars oriented for rear access)

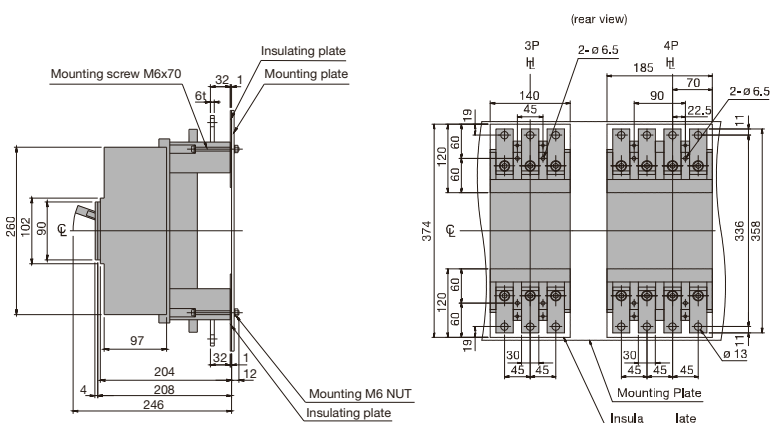


Detail of connecting part Oriented for rear access

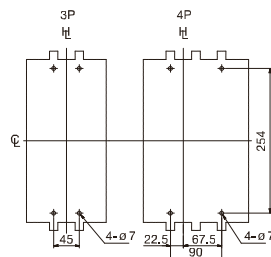


Terminal bars should be connected alternately on adjacent poles.

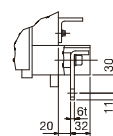
Mounting on the backplate (optional connection bars must be oriented for front access)



Drilling plan(front view)



Detail of connecting part Oriented for front access

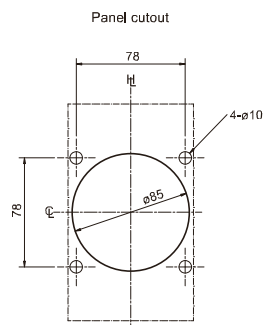
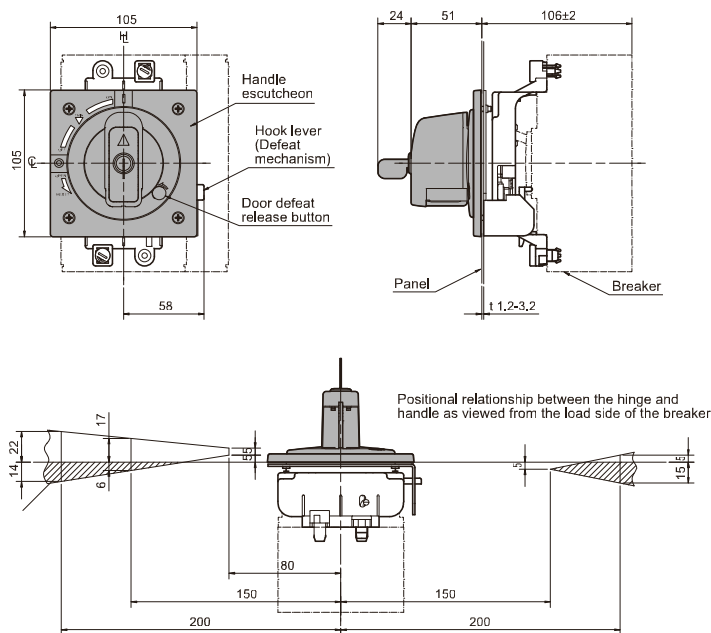


DIMENSIONS

Breaker Mounted Handle

Applicable MCCB

E125, S125



Applicable MCCB

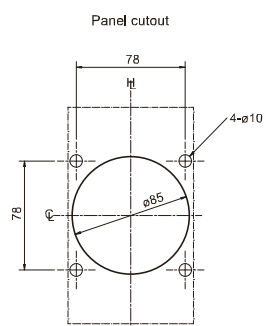
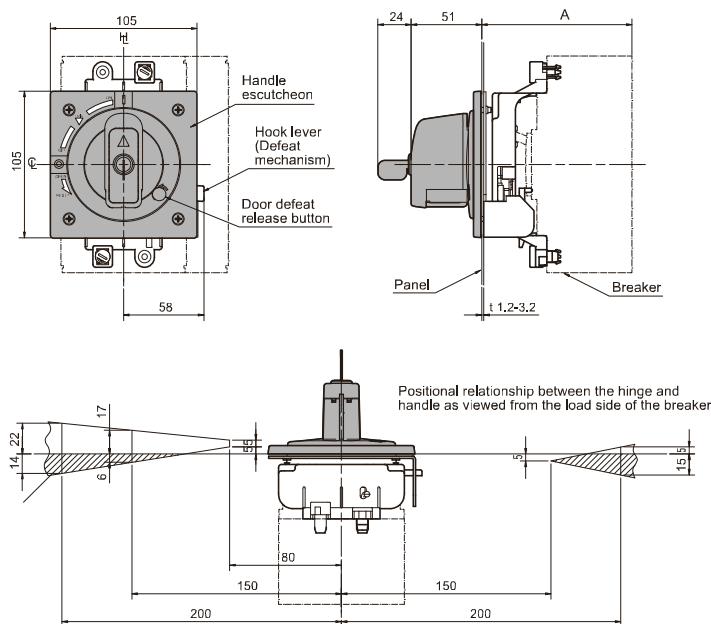
A

S160-NJ, E250-NJ,
S250-NJ, S250-GJ,
S250-NN

106±2

H125, L125, H160, L160,
S250-NE, S250-GE,
S250-PE, H250, L250

141±2



ASL: Arrangement Standard Line

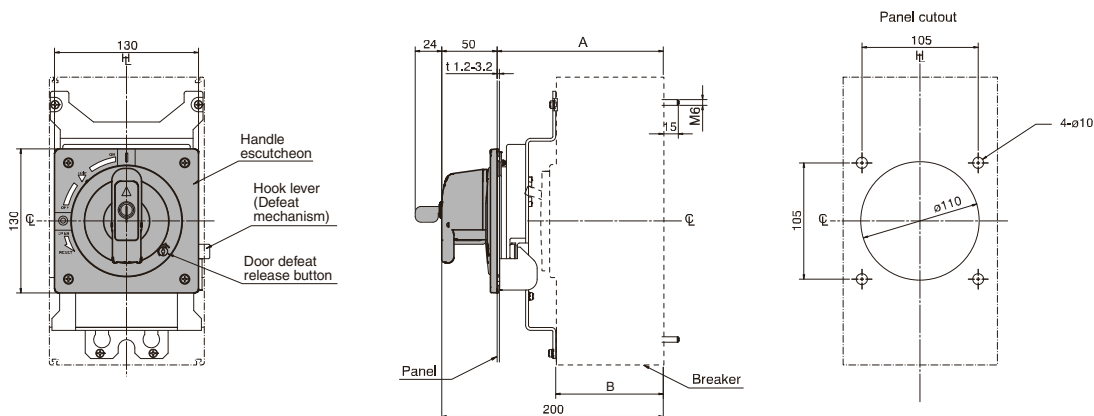
H: Handle Frame Centre Line

C: Handle Centre Line

DIMENSIONS

Breaker Mounted Handle

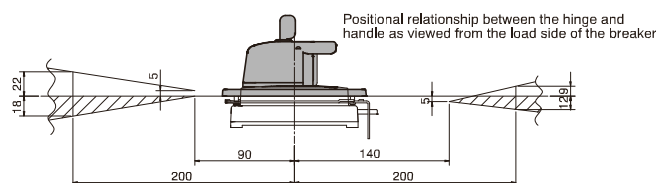
Applicable MCCB	A	B
E400 S400 E630 S630	150±2	97
H400 L400	187±2	134



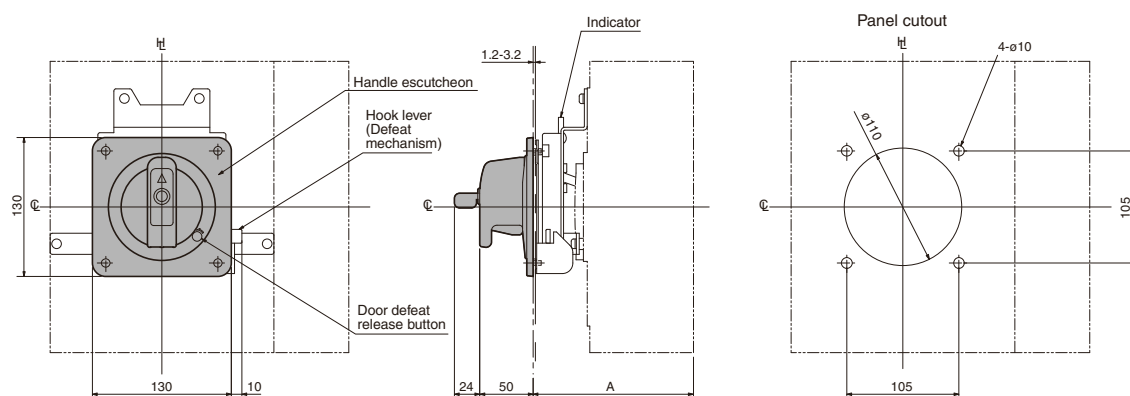
ASL: Arrangement Standard Line

H_L: Handle Frame Centre Line

CL: Handle Centre Line



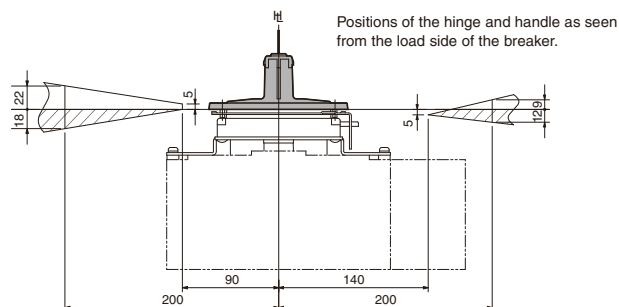
Applicable MCCB	A
S800 S1000	150±2
H800 L800	187±2



ASL: Arrangement Standard Line

H_L: Handle Frame Centre Line

CL: Handle Centre Line



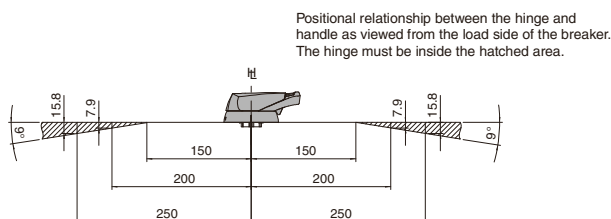
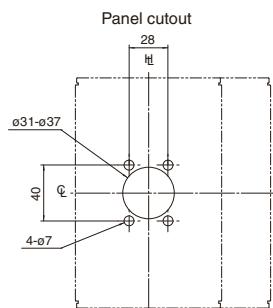
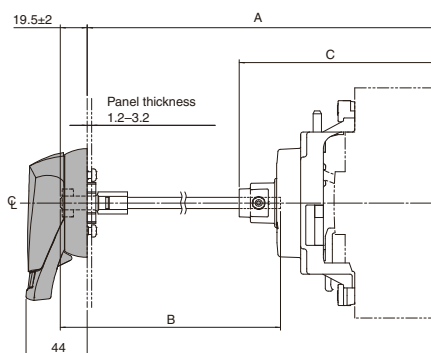
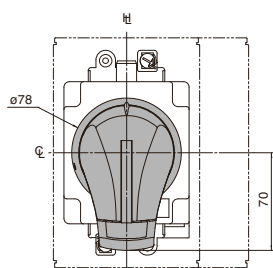
DIMENSIONS

Door Mounted Handle standard type

Applicable MCCB	A*1	B	C
S160-NJ, E250-NJ , S250-NJ, S250-GJ S250-NN	453 max.	358	144
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	488 max.	358	179

*1: Max. means the maximum length for A without cutting the shaft.
+ The shaft can be cut to the required length.

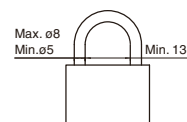
A: Distance from the panel surface to the breaker mounting surface
B: Length of the square shaft used



Positional relationship between the hinge and handle as viewed from the load side of the breaker.
The hinge must be inside the hatched area.

ASL: Arrangement Standard Line
H1: Handle Frame Centre Line
C: Handle Centre Line

Padlock dimensions (mm)



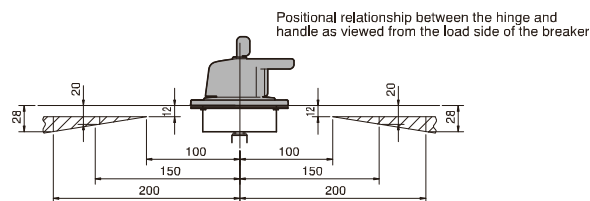
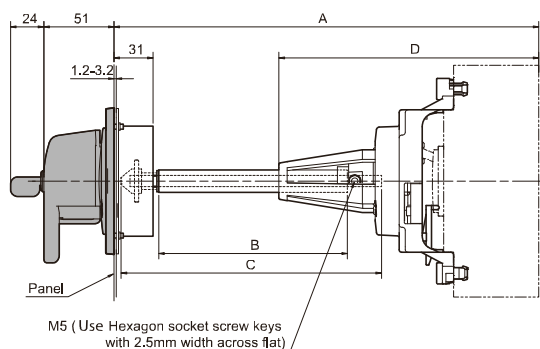
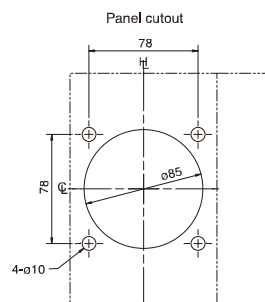
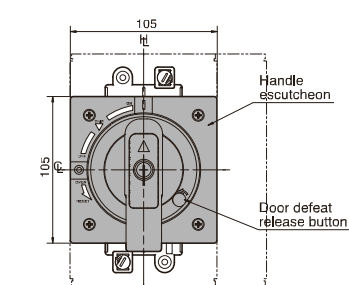
DIMENSIONS

Door Mounted Handle ordinal type

Applicable MCCB	A*1	B	C	D	Shaft support
S160-NJ, E250-NJ , S250-NJ, S250-GJ S250-NN	543 max.	370	421	186	With +
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	578 max.	370	421	221	With +

*1: Max. means the maximum length for A without cutting the shaft.

+ The shaft can be cut to the required length. If it is necessary to cut the shaft so short that it does not protrude beyond the shaft support, the shaft support may be removed.



ASL: Arrangement Standard Line

HL: Handle Frame Centre Line

CL: Handle Centre Line

Padlock dimensions (mm)



DIMENSIONS

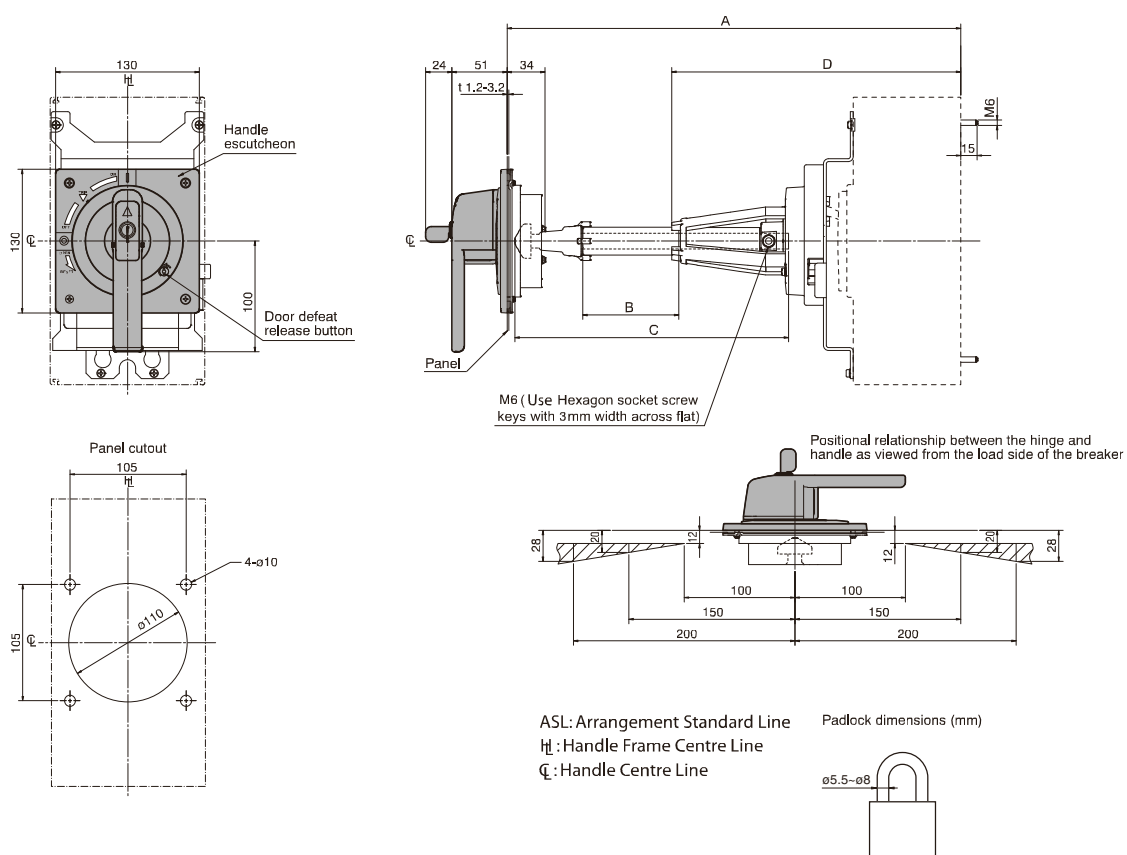
Door Mounted Handle ordinal type

Applicable MCCB	A*1	B	C	D	Shaft support
E400 E630	270 min.	12	107.5	—	Without
S400 S630	610 max.	280	447.5	261	With +
H400	307 min.	12	107.5	—	Without
L400	647 max.	280	447.5	298	With +

*1: Min. means the minimum length for A by cutting the shaft.

Max. means the maximum length for A without cutting the shaft.

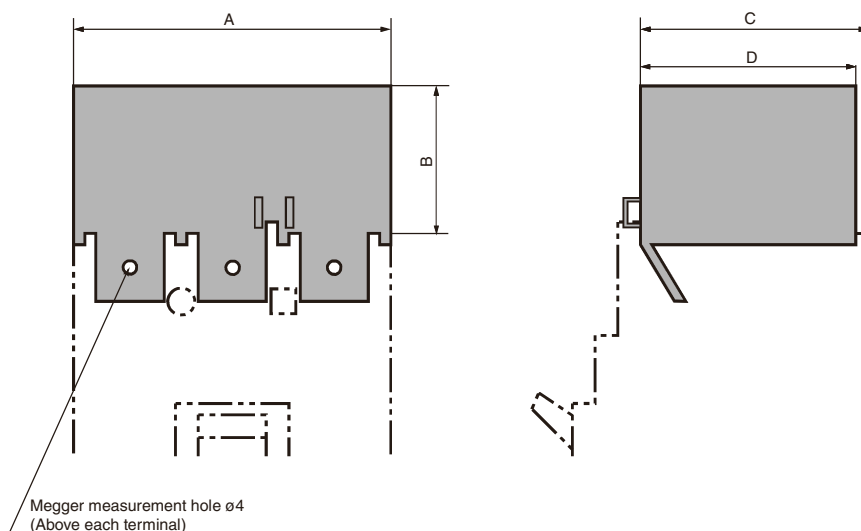
+ The shaft can be cut to the required length. If it is necessary to cut the shaft so short that it does not protrude beyond the shaft support, the shaft support may be removed.



DIMENSIONS

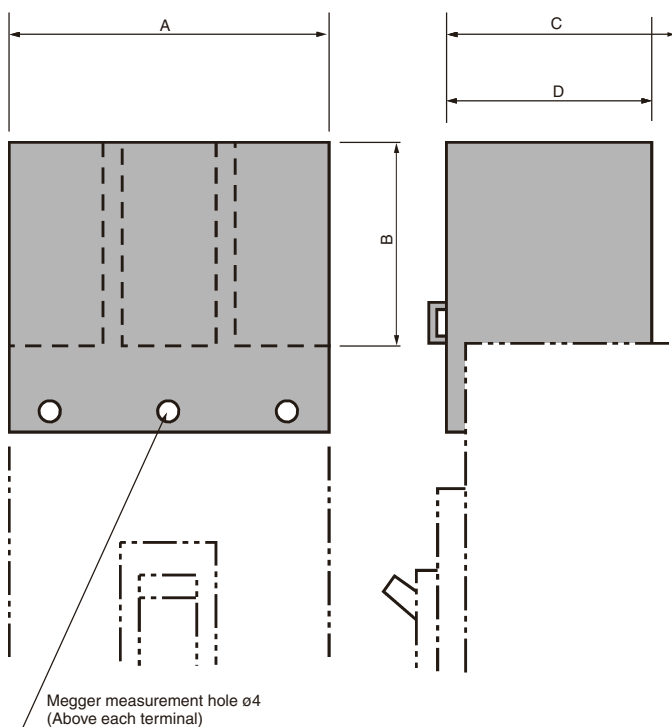
Terminal Covers

Terminal covers for Front connected MCCB's (CF)



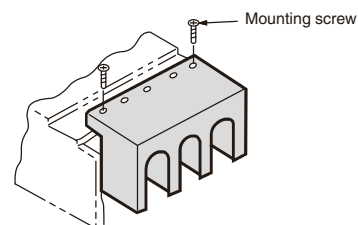
Plug-in mounted version

This version can be mounted simply by being plugged in the breaker body.



Screw-mounted version

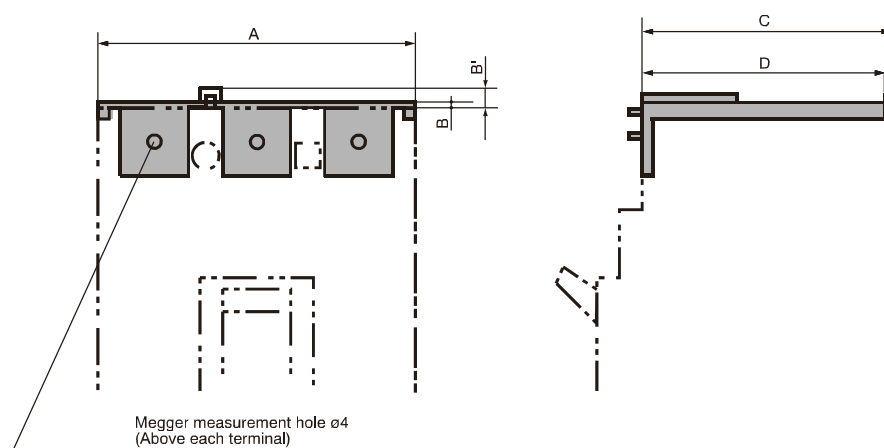
The terminal covers for 630 to 800AF are mounted to the breakers using tapping screws. The terminal cover for 1250AF is mounted to insert nuts of the breaker cover using screws. The insert nuts do not come standard with the breaker. Please be sure to state "with terminal cover (CF)" when ordering the breaker.



DIMENSIONS

Terminal Covers

Terminal covers for Cable clamp terminal type MCCB's (CS)



MCCB type	Connection	A			B			B'	C			D			Mounting version	
		1P	3P	4P	1P	3P	4P	3P, 4P	1P	3P	4P	1P	3P	4P	Plug-in mounted	Screw-mounted
E125,S125	Front conn.	30	90	120	40	40	40	o	48	48	48	46	46	46	○	—
	Cable clamp	30	90	120	2.5	2.5	2.5	6	62.5	61	61	60	59.5	59.5	○	—
S160-NJ, S160NN E250-NJ, S250-NJ, S250-GJ, S250-NN	Front conn. (1)	35	105	140	55	55	55	o	54	54	54	52	52	52	○	—
	Cable clamp	35	105	140	2.5	2.5	2.5	6	63	61	61	49.5	59.5	59.5	○	—
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE H250, L250	Front conn. (1)	o	105	140	o	55	55	o	o	89	89	o	87	87	○	—
	Cable clamp	o	105	140	o	2.5	2.5	4.5	o	96	96	o	59.5	59.5	○	—
E400, S400 E630, S630	Front conn. Wide type	o	180	240	o	110	114	o	o	97	98	o	96	98	○	—
	Front conn. Straight type	o	140	185	o	85	85	o	o	97	97	o	94.5	94.5	○	—
	Cable clamp	o	140	185	o	3	3	4.5	o	97	97	o	93	93	○	—
H400, L400	Front conn. Wide type	o	180	240	o	110	114	o	o	134	135	o	96	98	○	—
	Front conn. Straight type	o	140	185	o	85	85	o	o	134	134	o	94.5	94.5	○	—
	Cable clamp	—	140	185	o	3	3	4.5	o	134	134	o	93	93	○	—
S800, S1000	Front conn. (3)	—	215	285	—	130	130	—	—	99.5 (102)	99.5 (102)	—	99 (101.5)	99 (101.5)	—	○
H800, L800	Front conn. (2) (3)	—	215	285	—	130	130	—	—	99.5 (139)	99.5 (139)	—	99 (101.5)	99 (101.5)	—	○
S1250	Front conn. (3)	—	215	285	—	130	130	—	—	115	115	—	99 (102.5)	99 (102.5)	—	○

Notes:

(1) Not applicable when extension bars (FB) are fitted.

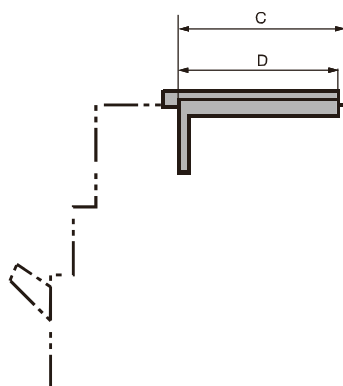
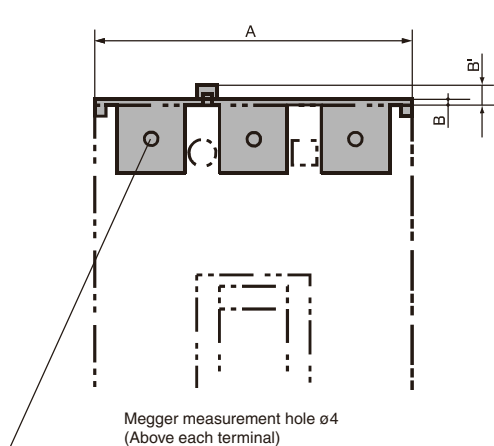
(2) There will be an approx. 40 mm gap between the bottom of the terminal cover and the breaker mounting surface.

(3) Values in parentheses indicate the distance to the head of terminal cover mounting screws.

DIMENSIONS

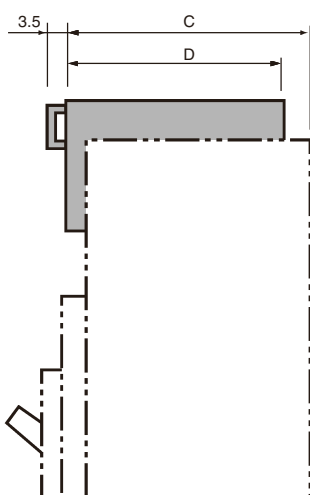
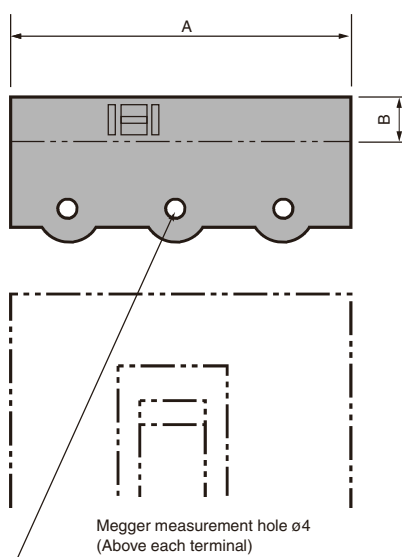
Terminal Covers

Terminal covers for Rear connected and Plug-in MCCB's (CR)



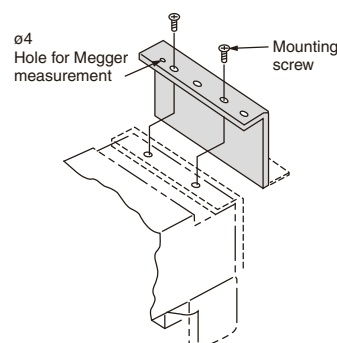
Plug-in mounted version

This version can be mounted simply by being plugged in the breaker body.



Screw-mounted version

The terminal covers for 630 to 800AF are mounted to the breakers using tapping screws.



MCCB type	A		B		B'	C		D		Mounting version	
	3 poles	4 poles	3 poles	4 poles		3 poles	4 poles	3 poles	4 poles	Plug-in mounted	Screw-mounted
E125, S125	90	120	2	2	6	41.5	41.5	40.5	40.5	○	—
S160, E250 , S250-NJ, S250-GJ, S250-NN	105	140	2	2	6	42.5	42.5	39.5	39.5	○	—
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	105	140	2	2	6	77.5	77.5	39.5	39.5	○	—
E400 , S400, E630, S630	140	185	3	3	5	97	97	93	93	○	—
H400, L400, (1)	140	185	3	3	5	134	134	93	93	○	—
S800, S1000 (2)	206	280	14	18	—	101 (103.5)	99 (101.5)	100.5 (103)	98 (100.5)	—	○
H800, L800 (2)	206	280	14	18	—	138 (140.5)	136 (138.5)	137.5 (140)	135 (137.5)	—	○

Notes:

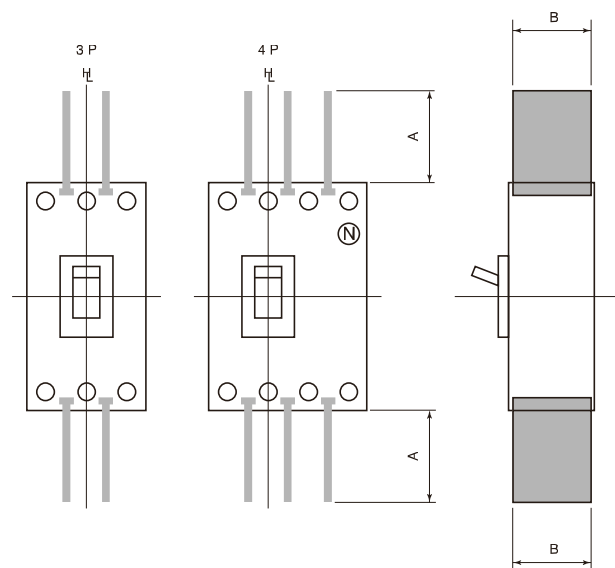
(1): There will be an approx. 40 mm gap between the bottom of the terminal cover and the breaker mounting surface.

(2): Values in parentheses indicate the distance to the head of terminal cover mounting screws.

DIMENSIONS

Interpole Barriers

Terminal Interpole Barriers (BA)



MCCB type	A	B
E125, S125	47	53
S160, E250, S250-NJ, S250-GJ, S250-NN	100	53
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	100	88
E400, S400, E630, S630	110	95
H400, L400	110	95
S800, H800, L800, S1000	110	95

ASL: Arrangement Standard Line

HL: Handle Frame Centre Line

CL: Handle Centre Line

DIMENSIONS

Terminal Blocks for Front-Connected and Rear-Connected MCCBs

11 terminals

Left terminal designations

Example

AXc1	AXc1
A 1	A 1
A	A
	Lb1
	ALa1
1	D1
C2	D2

With SHT

With UVT

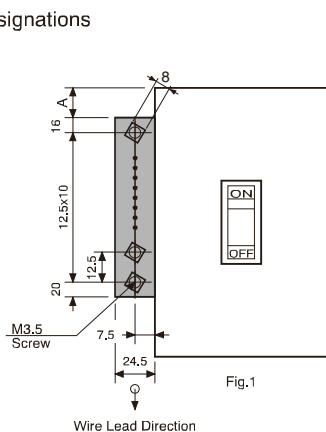


Fig.1

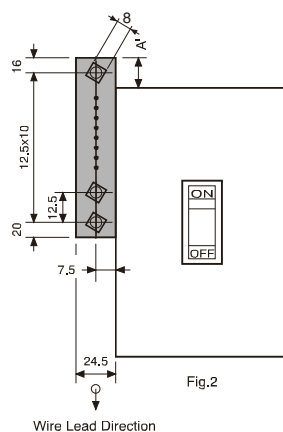
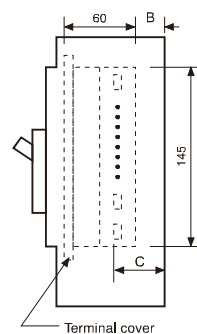


Fig.2



MCCB type	A	A'	B	C	Fig
E125, S125	—	3	0.5	40	2
S160, E250, S250-NJ, S250-GJ, S250-NN	2	—	0.5	40	1
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	2	—	35.5	75	1

Comments:

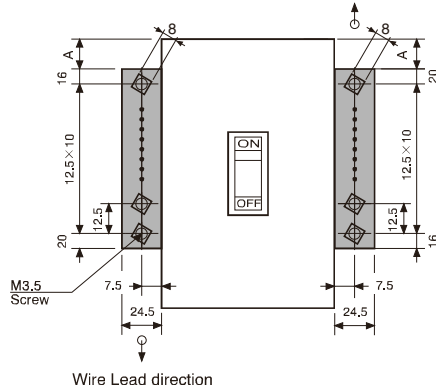
- The tightening torque for the M3.5 terminal screws is 0.9 to 1.2 N·m.
- Connection wire size is 2.5mm² (max).

11 terminals

Left terminal designations

Wire Lead direction

AXc1
AXb1
AXa1
AXc2
AXb2
AXa2
ALc1
ALb1
ALa1
AXc3
AXb3



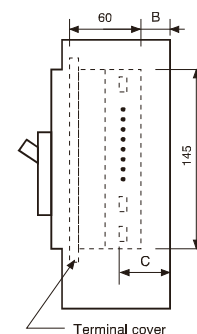
Wire Lead direction

Right terminal designations

PALc
PALa
k
/
C1
C2

With SHT

With UVT



MCCB type	A	B	C
E400, S400, E630, S630	39.5	30.5	70
H400, L400	39.5	67.5	107
S800, S1000	31	30.5	70
H800, L800	31	67.5	107

Comments:

- The tightening torque for the M3.5 terminal screws is 0.9 to 1.2 N·m.
- Connection wire size is 2.5mm² (max).
- When you specify Ground Fault Trip on electronic MCCBs with 3 poles the terminal block is automatically fitted to connect with the external neutral CT for 3 phases 4 wires system.

DIMENSIONS

Slide Interlocks

ASL : Arrangement Standard Line

HL : Handle Frame Centre Line

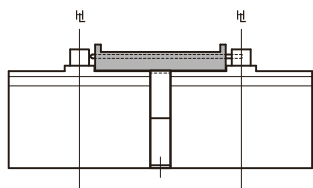
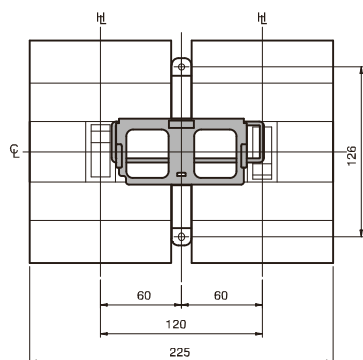
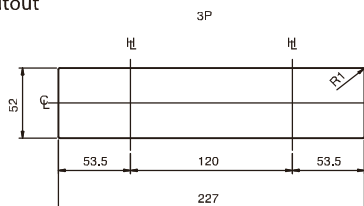
CL : Handle Centre Line

Mechanical Interlocks slide type (MS)

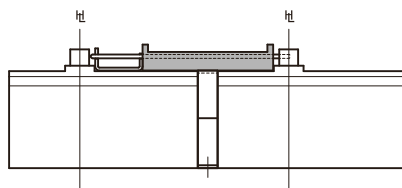
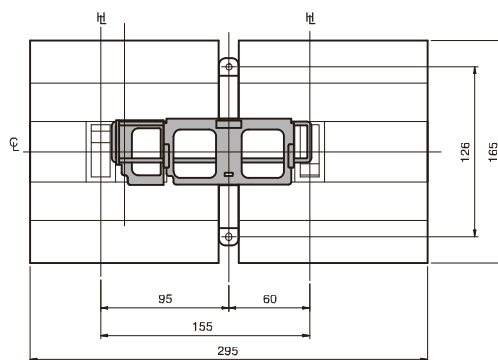
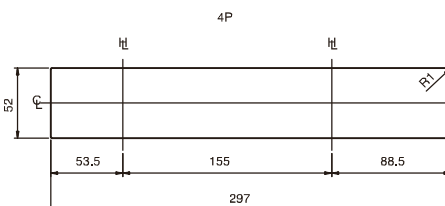
For 125A, 160A, 250A frame size

MCCB Type	Poles	Conn.	Parts No.	A
S160, E250, S250-NJ, S250GJ, S250-NN	3	FC, RC	T2MS253SF	91.7
	4	FC, RC	T2MS254SF	
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	3	FC, RC	T2MS253LF	126.7
	4	FC, RC	T2MS254LF	

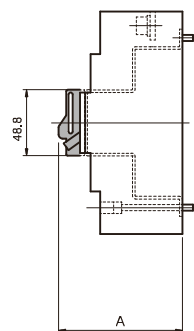
Panel Cutout
T2MS253SF/T2MS253LF



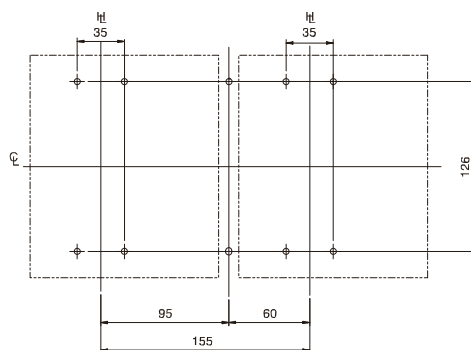
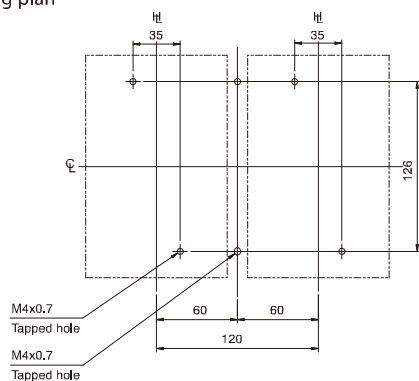
Panel Cutout
T2MS254SF/T2MS254LF



Panel cutout dimensions shown give an allowance of 1.0 mm around the handle escutcheon.



Drilling plan



DIMENSIONS

Slide Interlocks

ASL : Arrangement Standard Line

HL : Handle Frame Centre Line

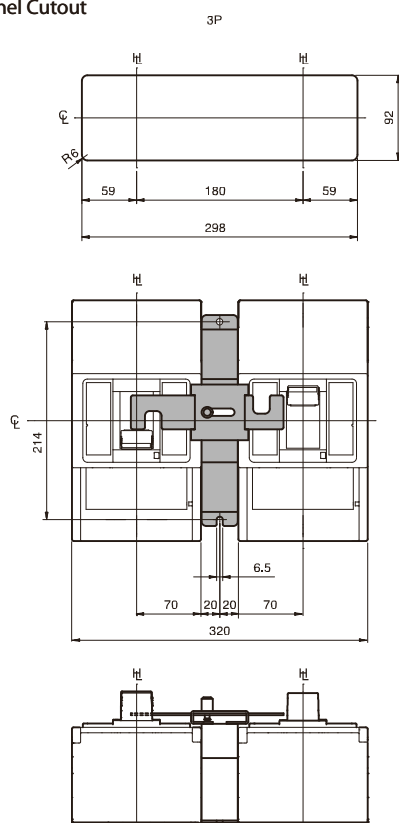
CL : Handle Centre Line

Mechanical Interlocks slide type (MS)

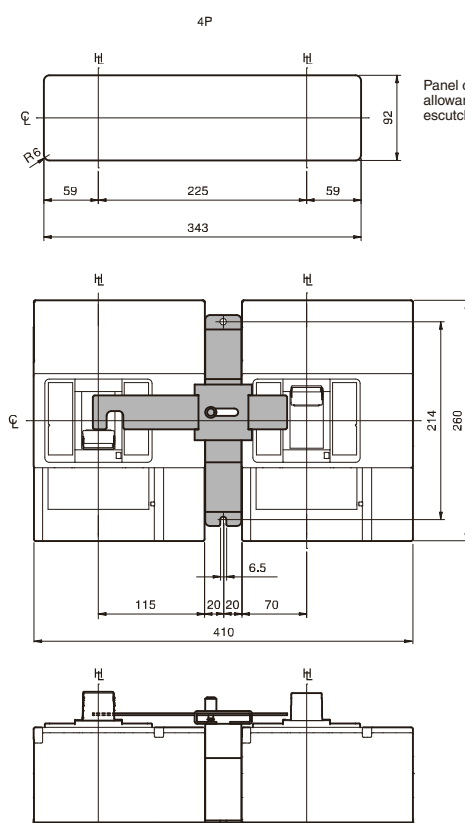
For 400A, 630A frame size

MCCB Type	Poles	Conn.	Parts No.	A
E400, S400, E630, S630	3	FC, RC	T2MS403SF	135.5
	4	FC, RC	T2MS404SF	
H400, L400	3	FC, RC	T2MS403LF	172.5
	4	FC, RC	T2MS404LF	

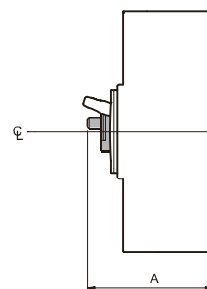
T2MS403SF/T2MS403LF
Panel Cutout



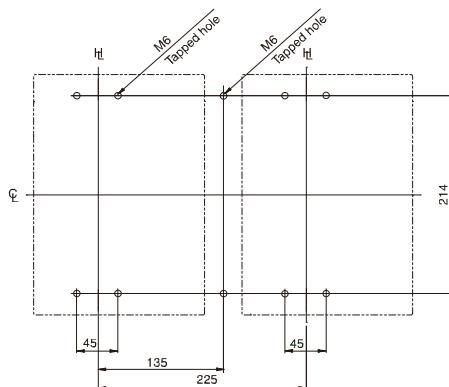
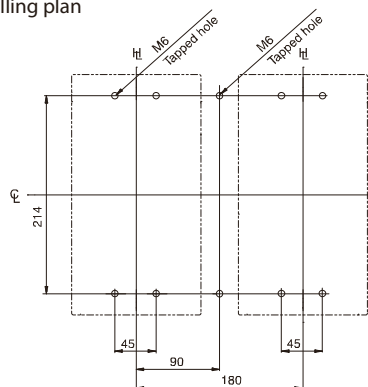
T2MS404SF/T2MS404LF
Panel Cutout



Panel cutout dimensions shown give an allowance of 1.0 mm around the handle escutcheon.



Drilling plan



DIMENSIONS

Link Interlocks

ASL : Arrangement Standard Line

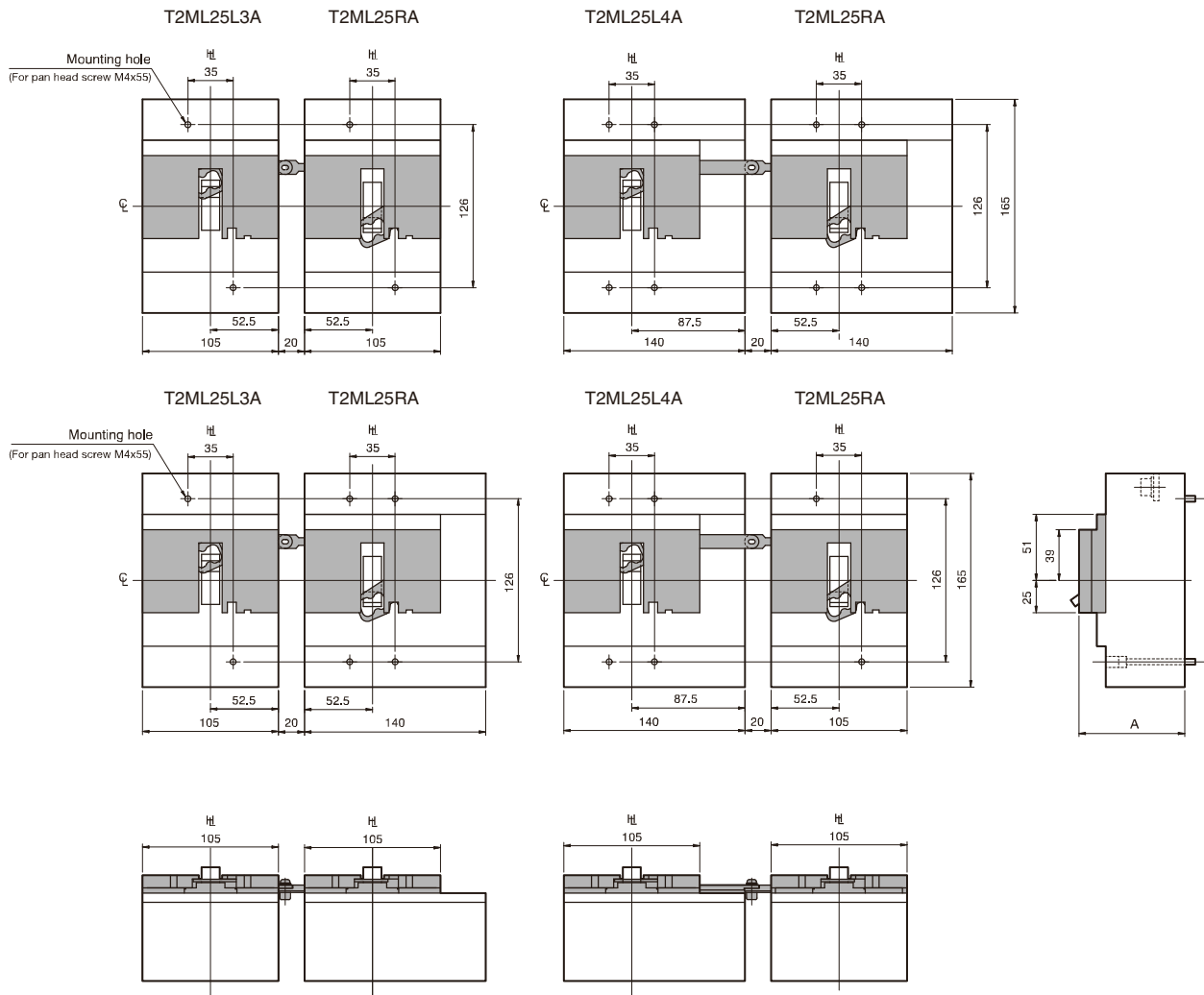
HL : Handle Frame Centre Line

CL : Handle Centre Line

Mechanical Interlocks link type (ML)

For 125A, 160A, 250A frame size

MCCB Type	Poles	Position	Parts No.	A
S160, E250, S250-NJ, S250-GJ, S250-NN	3	Right	T2ML25RA	81.7
	4		T2ML25L3A	
	3	Left	T2ML25L4A	
	4		T2ML25L4A	
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	3	Right	T2ML25RA	116.7
	4		T2ML25L3A	
	3	Left	T2ML25L3A	
	4		T2ML25L4A	



DIMENSIONS

Link Interlocks with motor operators

ASL : Arrangement Standard Line

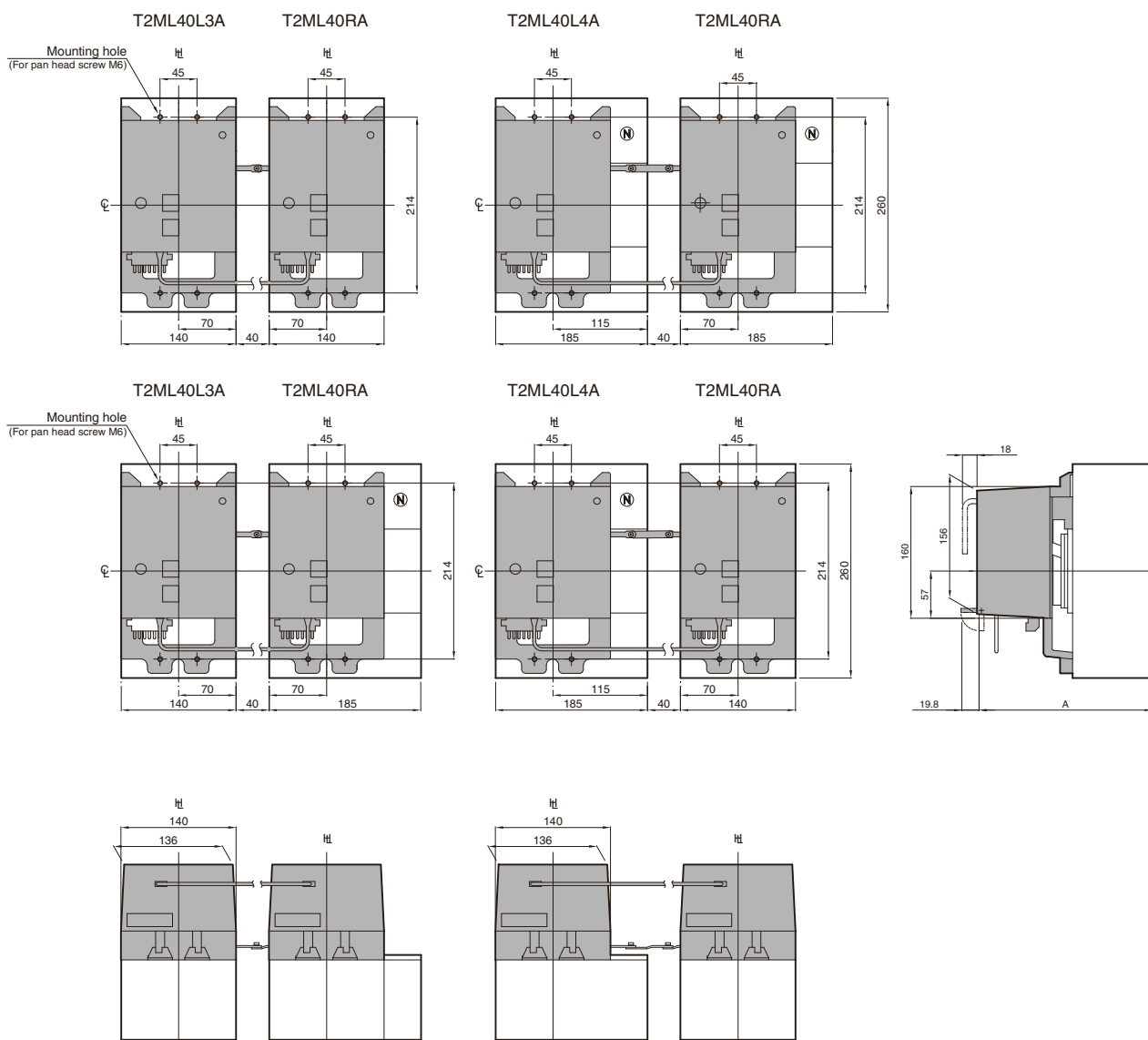
HL : Handle Frame Centre Line

CL : Handle Centre Line

Mechanical Interlocks link type (ML)

For 400A, 630A frame size

MCCB Type	Poles	Position	Parts No.	A
E400, S400 E630, S630	3	Right	T2ML40RA	213
	4		T2ML40L3A	
	3	Left	T2ML40L3A	
	4		T2ML40L4A	
H400, L400	3	Right	T2ML40RA	250
	4		T2ML40L3A	
	3	Left	T2ML40L3A	
	4		T2ML40L4A	



For 400A and 630A frame, the link mechanical interlocks can not be used without motor operators. Please specify also the motor operators when ordering. Furthermore, please request the additional labels for the breakers to TERA SAKI and put the labels on the side of the breakers.

DIMENSIONS

Link Interlocks with breaker mounted handles

ASL : Arrangement Standard Line

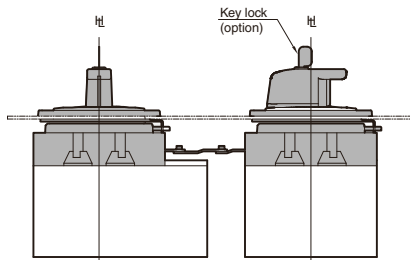
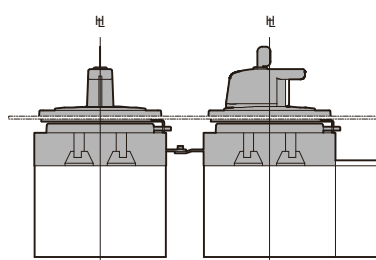
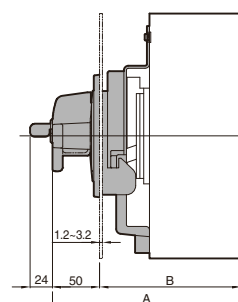
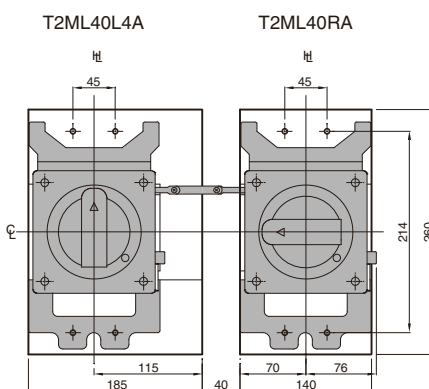
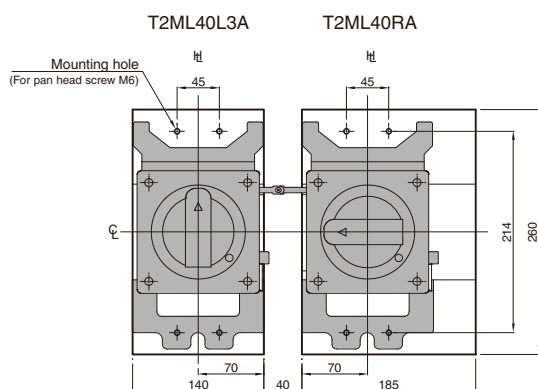
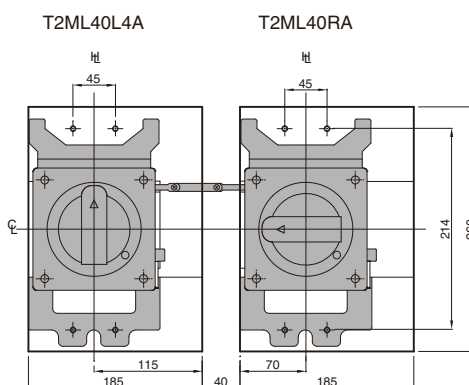
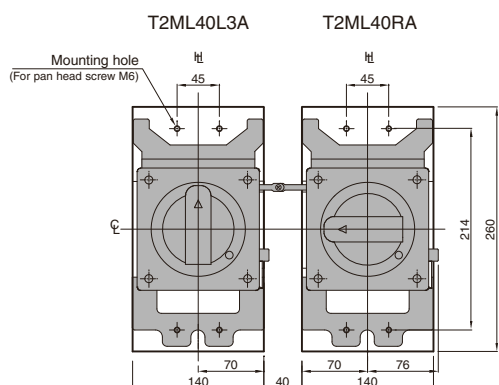
HL : Handle Frame Centre Line

CL : Handle Centre Line

Mechanical Interlocks link type (ML)

For 400A, 630A frame size

MCCB Type	Poles	Position	Parts No.	A	B
E400, S400 E630, S630	3	Right	T2ML40RA	200	150±2
	4		T2ML40L3A		
	3	Left	T2ML40L4A		
	4		T2ML40L3A		
H400, L400	3	Right	T2ML40RA	237	187±2
	4		T2ML40L3A		
	3	Left	T2ML40L4A		
	4		T2ML40L3A		



For 400A and 630A frame, the link mechanical interlocks can not be used without breaker mounted handles. Please specify also the breaker mounted handles when ordering. Furthermore, please request the additional labels for the breakers to TERA SAKI and put the labels on the side of the breakers.

SECTION 7

DIMENSIONS

Wire Interlocks with motor operators

ASL : Arrangement Standard Line

HL : Handle Frame Centre Line

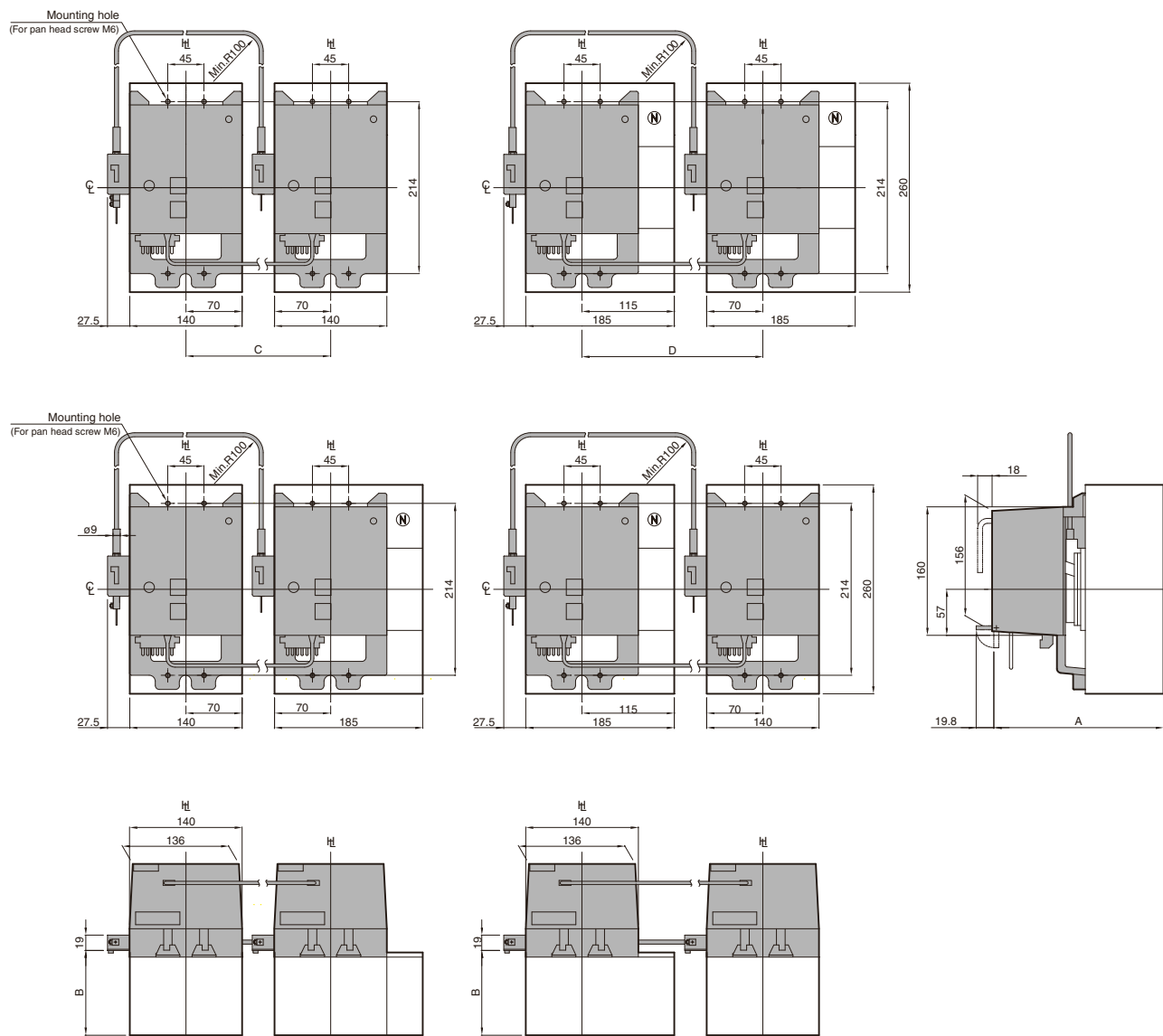
CL : Handle Centre Line

Mechanical Interlocks wire type (MW)

For 400A, 630A frame size

MCCB Type	Parts No.	A	B
E400, S400, E630, S630	T2MW40CA	213	105.4
H400, L400	T2MW40CA	250	142.4

Cable length	Parts No.	B	C
1.0m	T2MW00SA	180min. – 480max.	225min. – 480max.
1.5m	T2MW00LA	180min. – 930max.	225min. – 930max.



For 400A and 630A frame, the wire mechanical interlocks can not be used without motor operators. Please specify also the motor operators when ordering. Furthermore, please request the additional labels for the breakers to TERASAKI and put the labels on the side of the breakers.

DIMENSIONS

Wire Interlocks with breaker mounted handles

ASL : Arrangement Standard Line

HL : Handle Frame Centre Line

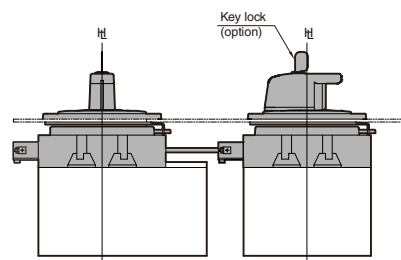
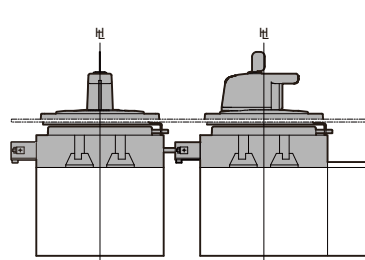
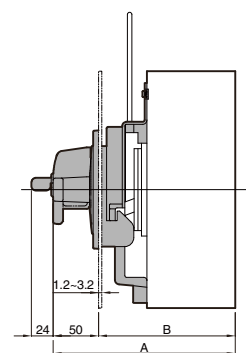
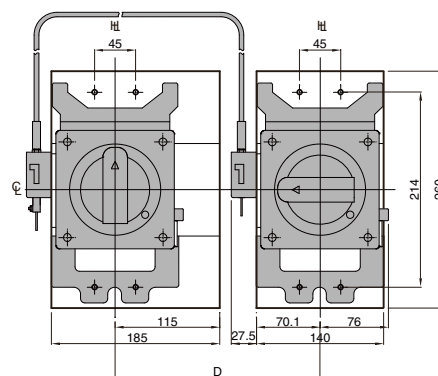
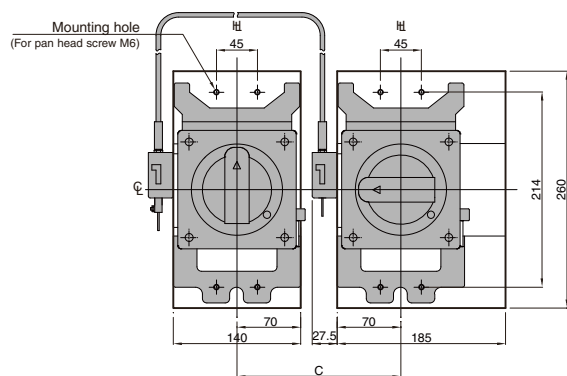
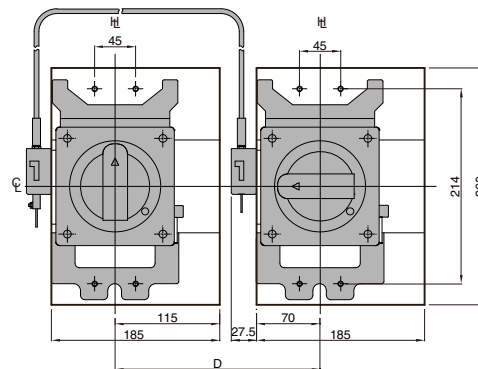
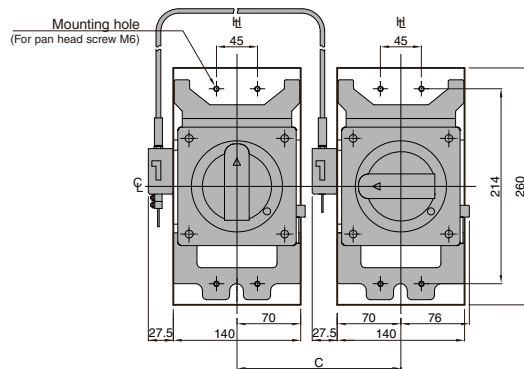
CL : Handle Centre Line

Mechanical Interlocks wire type (MW)

For 400A, 630A frame size

MCCB Type	Parts No.	A	B
E400, S400, E630, S630	T2MW40CA	200	150±2
H400, L400	T2MW40CA	237	187±2

Cable length	Parts No.	B	C
1.0m	T2MW00SA	180min. – 430max.	225min. – 430max.
1.5m	T2MW00LA	180min. – 930max.	225min. – 930max.



For 400A and 630A frame, the wire mechanical interlocks can not be used without breaker mounted handles. Please specify also the breaker mounted handles when ordering. Furthermore, please request the additional labels for the breakers to TERASAKI and put the labels on the side of the breakers.

DIMENSIONS

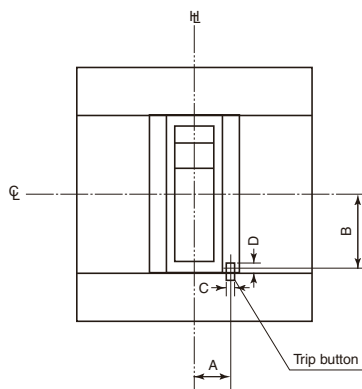
Position of Trip Button

Positions of Trip Button

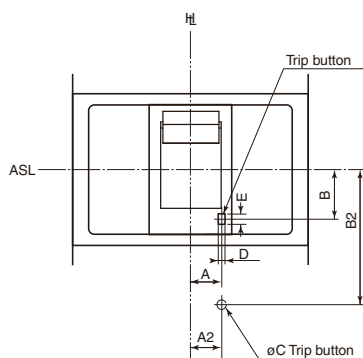
ASL : Arrangement Standard Line

HL : Handle Frame Centre Line

CL : Handle Centre Line



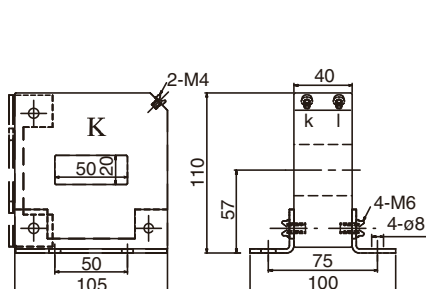
MCCB Type	Poles	A	B	C	D
E125, S125	3, 4	13.8	20.4	3.3	4.3
S160, E250, S250-NJ, S250-GJ, S250-NN,	3, 4	17.2	20.4	3.3	4.3
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	3, 4	17.2	20.4	3.3	4.3
E400, S400 H400, L400, E630, S630	3, 4	21.6	37.2	5.3	6.6
S800, S1000 H800, L800	3, 4	21.6	33	5.3	6.6



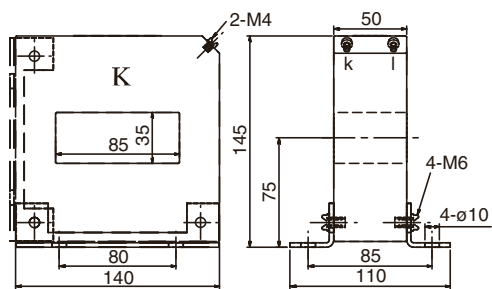
MCCB Type	Poles	A	B	A2	B2	C	D	E
S1250 S1600	3, 4	30	37.5	31	70.5	6	6	8

DIMENSIONS

External Neutral CT



Type of CT	Rated primary current (A)	Rated secondary current (mA)
T2GB40N04	400	100
T2GB40N06	630	100
T2GB40N08	800	100



Type of CT	Rated primary current (A)	Rated secondary current (mA)
T2GBX6N10	1000	100
T2GBX6N12	1250	100
T2GBX6N16	1600	100

Door Flanges

Door flanges are recommended to be used to cover the cutout of a switchboard panel.

Door Flange for toggle-operated MCCBs (mm)

MCCB Type	Parts No.	Fig.	A	B	C	D	E	F		G		H		K	d	t
								Min	Max	Min	Max	Min	Max			
E125, S125	T2DF25	1 ①	77.5	77.5	105	50	92	37	42	37	42	32	45	—	M3×0.5	2
H125, L125, H160, L160, S250-NE, S250-GE, S250-PE, H250, L250	T2DF25	1 ①	82.5	82.5	105	50	92	37	42	37	42	32	45	—	M3×0.5	2
S160, E250, S250-NJ, S250-GJ, S250-NN	T2DF25	1 ①	82.5	82.5	105	50	92	37	42	37	42	32	45	—	M3×0.5	2
E400, S400, E630, S630	T2DF40	2 ①	130	130	135	95	120	48	56	48	56	57	90	80	M3×0.5	2
H400, L400	T2DF40	2 ①	130	130	135	95	120	48	56	48	56	57	90	80	M3×0.5	2
S800, S1000	T2DF40	2 ②	132	141	135	95	120	48	56	48	56	57	90	80	M3×0.5	2
H800, L800	T2DF40	2 ②	132	141	135	95	120	48	56	48	56	57	90	80	M3×0.5	2
S1250	T2DFX6	2 ②	170	200	150	120	135	51	63.5	51	63.5	85	115	80	M3×0.5	2
S1600	T2DFX6	2 ②	170	200	150	120	135	51	63.5	51	63.5	85	115	80	M3×0.5	2

Notes:

① : \varnothing Handle centre line is applied.

② : ASL Arrangement standard line is applied.

Fig. 1

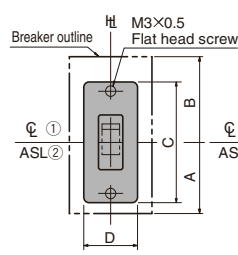
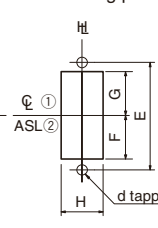
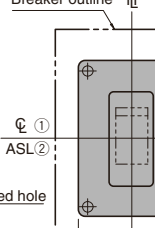


Fig. 2

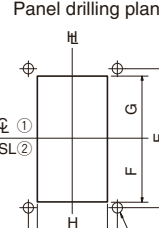
Panel drilling plan



Panel drilling plan



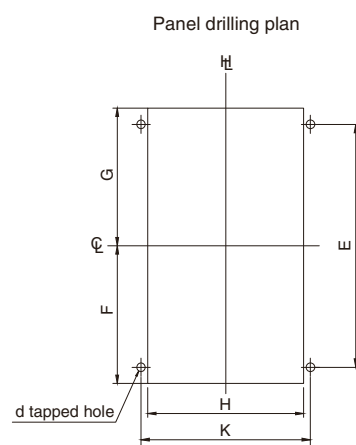
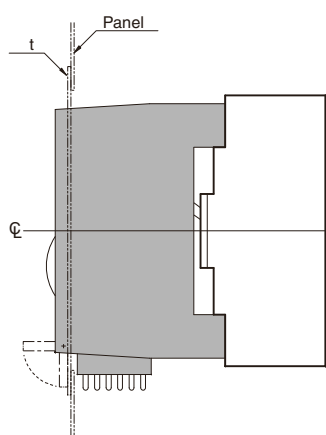
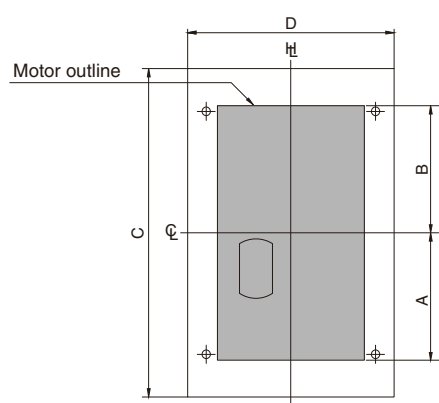
Panel drilling plan

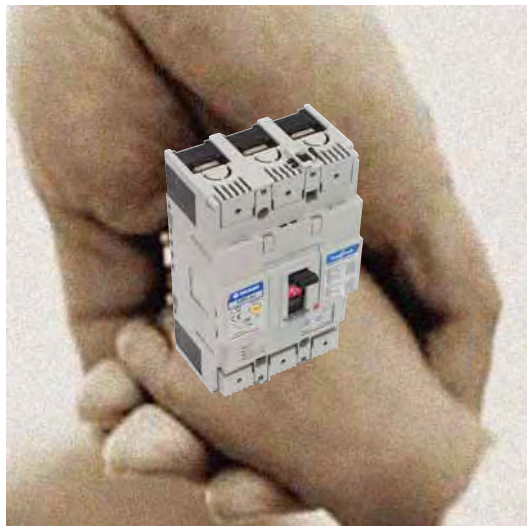


DIMENSIONS

Door Flange for motor-operated MCCBs (mm)

MCCB Type	Parts No.	A	B	C	D	E	F		G		H		K	d	t
							Min	Max	Min	Max	Min	Max			
E125 S125	T2DM25	77.5	77.5	200	130	151	80	90	80	90	94	98	106	4	3.5
H125, L125, H160, L160 S250-NE, S250-GE, S250-PE H250, L250	T2DM25	77.5	77.5	200	130	151	80	90	80	90	94	98	106	4	3.5
S160, E250, S250-NJ, S250-GJ, S250-NN	T2DM25	77.5	77.5	200	130	151	80	90	80	90	94	98	106	4	3.5
E400, S400 E630, S630	T2DM40	57	103	200	180	150	59	69	105	115	144	148	156	4	3.5
H400, L400	T2DM40	57	103	200	180	150	59	69	105	115	144	148	156	4	3.5
S800, S1000	T2DM40	58	102	200	180	150	60	70	104	114	144	148	156	4	3.5
H800, L800	T2DM40	58	102	200	180	150	60	70	104	114	144	148	156	4	3.5





TERASAKI ELECTRIC CO., LTD.

Head Office: 7-2-10 Hannancho, Abenoku
Osaka, Japan

Circuit Breaker Division: 7-2-10 Kamihigashi, Hiranoku Osaka, Japan

Telephone: 81-6-6791-9323
Fax: 81-6-6791-9274
Email: int-sales@terasaki.co.jp
<http://www.terasaki.co.jp/>

Ratings and specifications are subject to change without notice.

CAT REF. '11-I61E

TERASAKI ELECTRIC (EUROPE) LTD.

79 Beardmore Way, Clydebank Industrial Estate
Clydebank, Glasgow, G81 4HT, Scotland (UK)

Telephone: 44-141-941-1940
Fax: 44-141-952-9246
Email: marketing@terasaki.co.uk
<http://www.terasaki.com/>

TERASAKI ITALIA s.r.l.

Via Ambrosoli, 4A-20090 Rodano, Milano, Italy

Telephone: 39-02-92278300
Fax: 39-02-92278320
Email: terasaki@terasaki.it
<http://www.terasaki.it/>

TERASAKI ELECTRIC (EUROPE) LTD. BRANCH IN SPAIN

Cal Ros Dels Ocells 5-7, Granollers 08403,
Barcelona, Spain

Telephone: 34-93-879-60-50
Fax: 34-93-870-39-05
Email: terasaki@terasaki.es
<http://www.terasaki.es/>

TERASAKI SKANDINAVISKA AB

Box 2082 SE-128 22 Skarpnäk Sweden

Telephone: 46-8-556-282-30
Fax: 46-8-556-282-39
Email: info@terasaki.se
<http://www.terasaki.se/>

TERASAKI CIRCUIT BREAKERS (S) PTE. LTD.

9 Toh Guan Road East 03-01 Alliance Building
Singapore 608604

Telephone: 65-6425-4915
Fax: 65-6425-4351
Email: tecs@pacific.net.sg

TERASAKI ELECTRIC (M) SDN, BHD.

Lot 3, Jalan 16/13D, 40000 Shah Alam, Selangor Darul
Ehsan, Malaysia

Telephone: 60-3-5549-3820
Fax: 60-3-5549-3960
Email: terasaki@terasaki.com.my

TERASAKI DO BRASIL LTDA.

Rua Cordovil, 259-Parada De Lucas, 21250-450
Rio De Janeiro-R.J., Brazil

Telephone: 55-21-3301-9898
Fax: 55-21-3301-9861
Email: terasaki@terasaki.com.br
<http://www.terasaki.com.br>

TERASAKI ELECTRIC (CHINA) LTD.

72 Pacific Industrial Park, Xin Tang Zengcheng,
Guangzhou 511340, China

Telephone: 86-20-8270-8556
Fax: 86-20-8270-8586
Email: terasaki@public.guangzhou.gd.cn

TERASAKI ELECTRIC GROUP SHANGHAI REPRESENTATIVE OFFICE

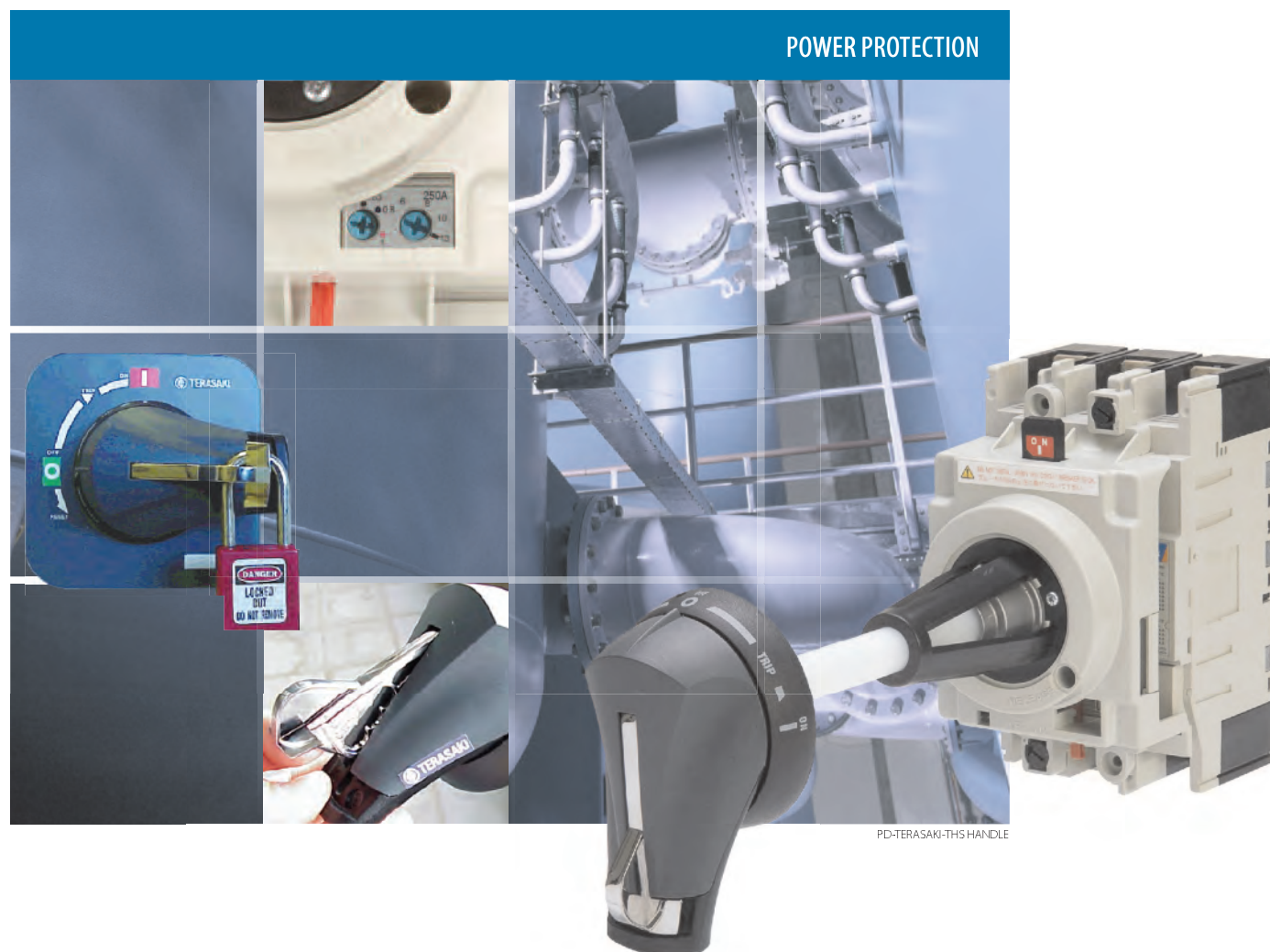
Room No. 1405-6, Tomson Commercial Building
710 Dong Fang Road, Pudong, Shanghai, 200122, China

Telephone: 86-21-58201611
Fax: 86-21-58201621
Email: terasaki@vip.163.com



T1HS / T2HS HANDLES

For Terasaki moulded case circuit breakers up to 1600 A.



- IP55 rated plastic handle
- Long variable depth shaft supplied standard
- Heavy duty metal locking lever standard
- Internal door interlocking components are all metal
- All handles mount in a 31-37 mm hole
- Short lever handles on MCCBs to 250 A, longer types 400 - 1600 A
- 105 mm² or 130 mm² escutcheon plates are optional
- Handles are padlockable in the OFF position as standard
- ON padlocking optional via on site handle modification
- Accepts up to three 4 - 8 mm locks or multi lock devices
- Door opens when handle is switched to OFF position
- Door will not open when handle is padlocked OFF
- Door defeat function standard
- Door defeat non functional when padlocked OFF
- Padlock option for handle mechanism mounted on MCCB
- All handle mechanisms allow MCCB dial setting viewing and access
- For IP 65 applications T1HP/T2HP handles are available
- ON indication flag on handle mechanism
- Prosafe trapped key interlock options



T1HS / T2HS Handles For Terasaki moulded case circuit breakers

Features

- IP 55 rated plastic handle
- Suitable for MCCBs 0.7 A to 1600 AF
- Long variable depth shaft supplied standard
- Heavy duty METAL locking lever standard
- Internal door interlocking components are metal
- All handles mount in a 31 - 37 mm hole
- Short lever handles on MCCBs to 250 A, longer types 400 - 1600 A (short handles optional for 400/630 A)
- 100 mm² escutcheon plates are optional
- Handles are padlockable in the OFF position as standard
- ON padlocking optional via on site handle modification
- Accepts up to three 4 - 8 mm locks or multi lock devices
- Door opens when handle is switched to OFF position
- Door will not open when handle is padlocked OFF
- Door defeat function standard
- Door defeat non functional when padlocked OFF
- Padlock option for handle mechanism mounted on MCCB
- All handle mechanisms allow MCCB dial setting viewing and access
- For IP 65 applications T1HP/T2HP handles are available



Field applications

- General and heavy duty applications
- Applications requiring padlocking
- Indoor and some outdoor areas



Metal lock lever
standard



Handle escutcheon plate
option



MCCB setting viewing
window

T1HS and T2HS Handle Catalogue Numbers to suit MCCBs TemBreak 2, 125 - 630 A and TemBreak 1, 0.7 – 1600 A

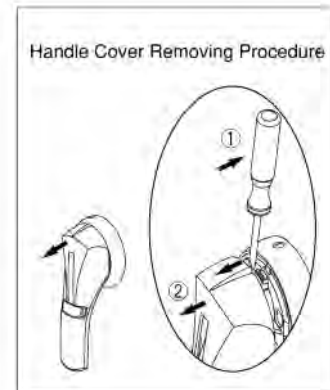
MCCB Ampere Frame	0.7 – 12A	125AF	250AF	400 / 630AF	630 / 800AF	1250 / 1600AF
Grey handle:	T1HS03R5GM	T2HS12R5GM	T2HS25R5GM	T2HS40R5GM	T1HS80R5GM	T1HSX6R5GM
Red/Yellow handle:	T1HS03R5RM	T2HS12R5RM	T2HS25R5RM	T2HS40R5RM	T1HS80R5RM	T1HSX6R5RM
MCCB Amp ratings:	XM30PB	E125NJ	S160NJ / GJ	E400NJ	XS / XH630	XS1250SE
		S125NJ	H / L160NJ	S400CJ / NJ	XV630PE	XV1250NE
15 A to 1600 A		S125GJ	E250NJ	S400NE	XS / SH800	XS1600SE
		ZS250GJ	S250NJ/GJ/PE	S400GJ	XV800PE	TL630NE
		H125NJ	H250NJ / NE	S400NE / GE		TL800NE
		L125NJ	L250NJ	E630NE		TL1250NE
			ZS125GJ	S630CE / GE		

T1HS Handle Catalogue Numbers to suit TemBreak 1 MCCBs, 125 - 400 A

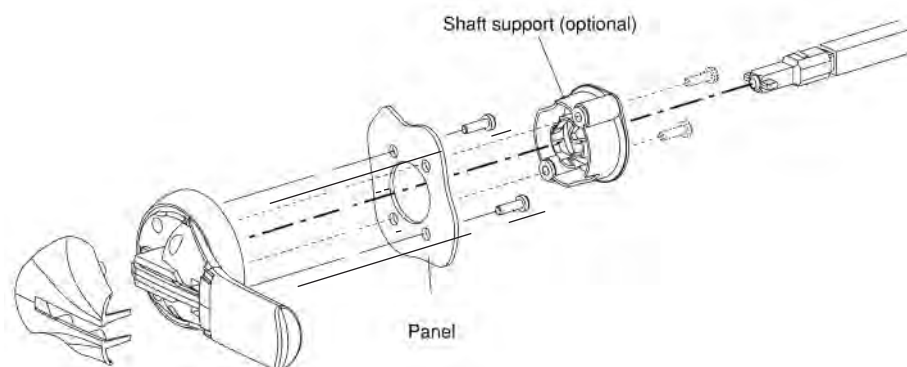
MCCB sizes	Grey handle:	T1HS12XR5GM	T1HS25XR5GM	T1HS40R5GM
15 A to 400 A		TL30NJ	XS250NJ	XS400NJ
		XS125NJ	XH250NJ	XH400SE
		XH125NJ		XV400NE
		TL100NJ		TL250NJ

Panel mount external operating handle Type T1HS/T2HS

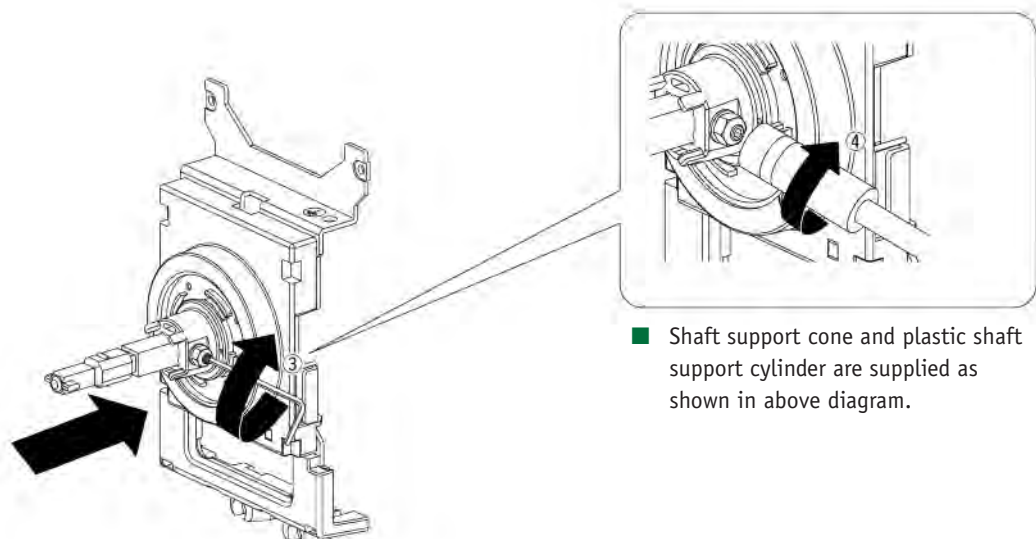
Handle type



Handle assembly



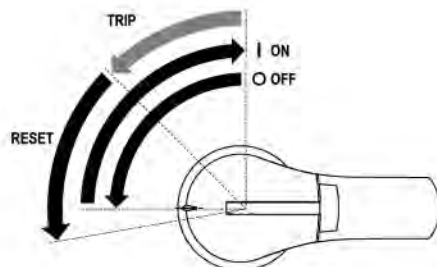
Shaft installation



Panel mount external operating handles

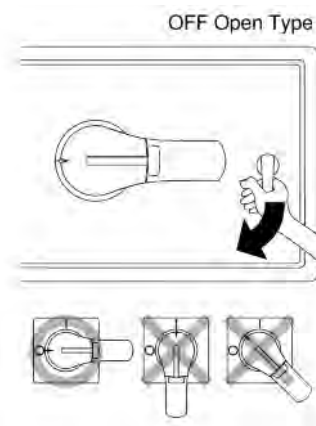
Type T1HS/T2HS

Handle operation



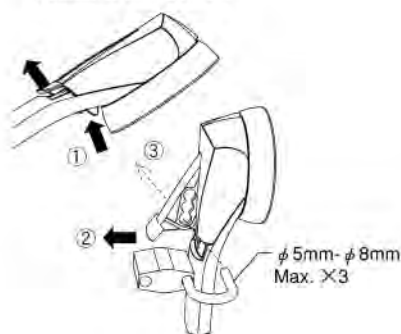
Notes: OFF position can be set at 9:00 o'clock or 12:00 o'clock orientation.

Panel opening procedure



Handle lock operation

• Padlock is not supplied.



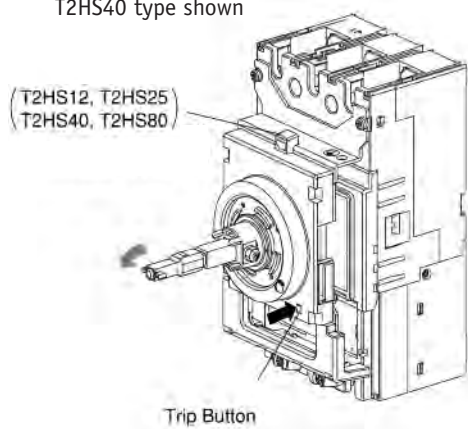
ON position locking

Modifying T1HS/T2HS handles to lock in the ON position

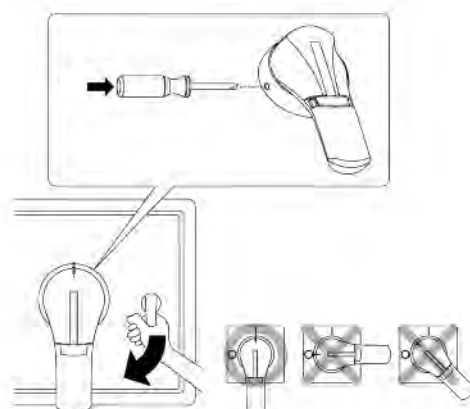
1. Unclip and remove the cover from the rear of the handle.
2. Locate and remove the knock-out tab in the rear of the handle to enable locking pin movement.
3. Check operation for ON locking.
4. Replace the clip on rear cover onto the rear of the handle.
5. The handle can now be installed. It will lock in both ON and OFF.

TRIP Operation with the panel open

T2HS40 type shown



Panel opening procedure by panel lock release

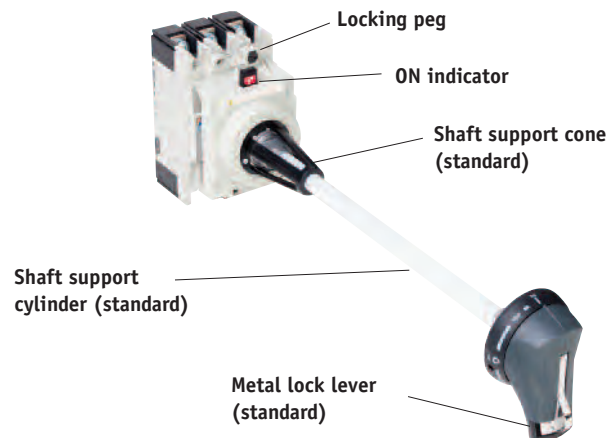


• This applies when the panel requires to be opened while the breaker is in the I (ON) position.

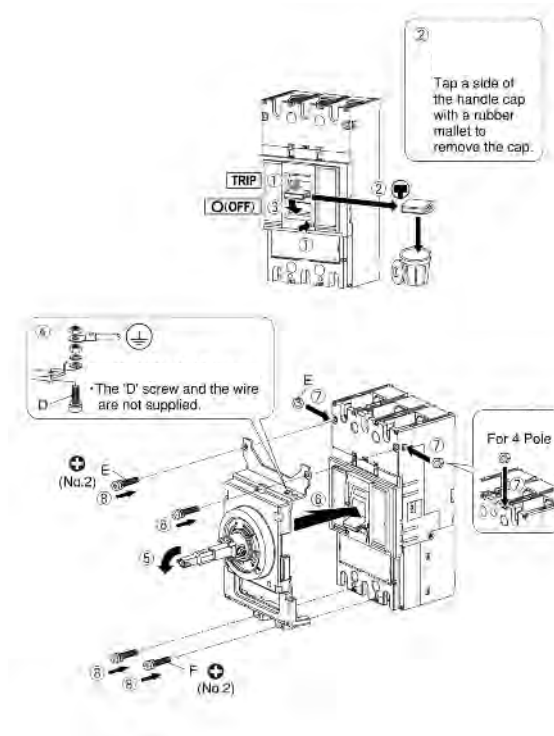
Panel mount external operating handles Type T1HS/T2HS

T2HS12, T2HS25

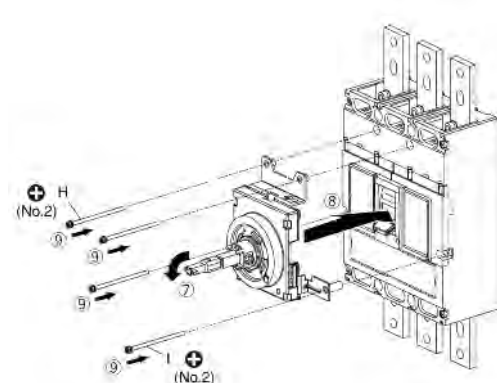
125/250 MCCB shown



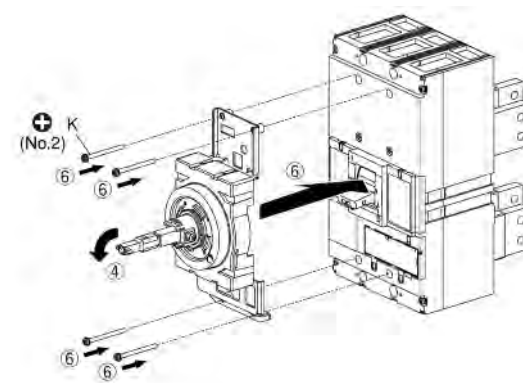
T2HS40



T1HS80



T1HSX6 / T1HSX6

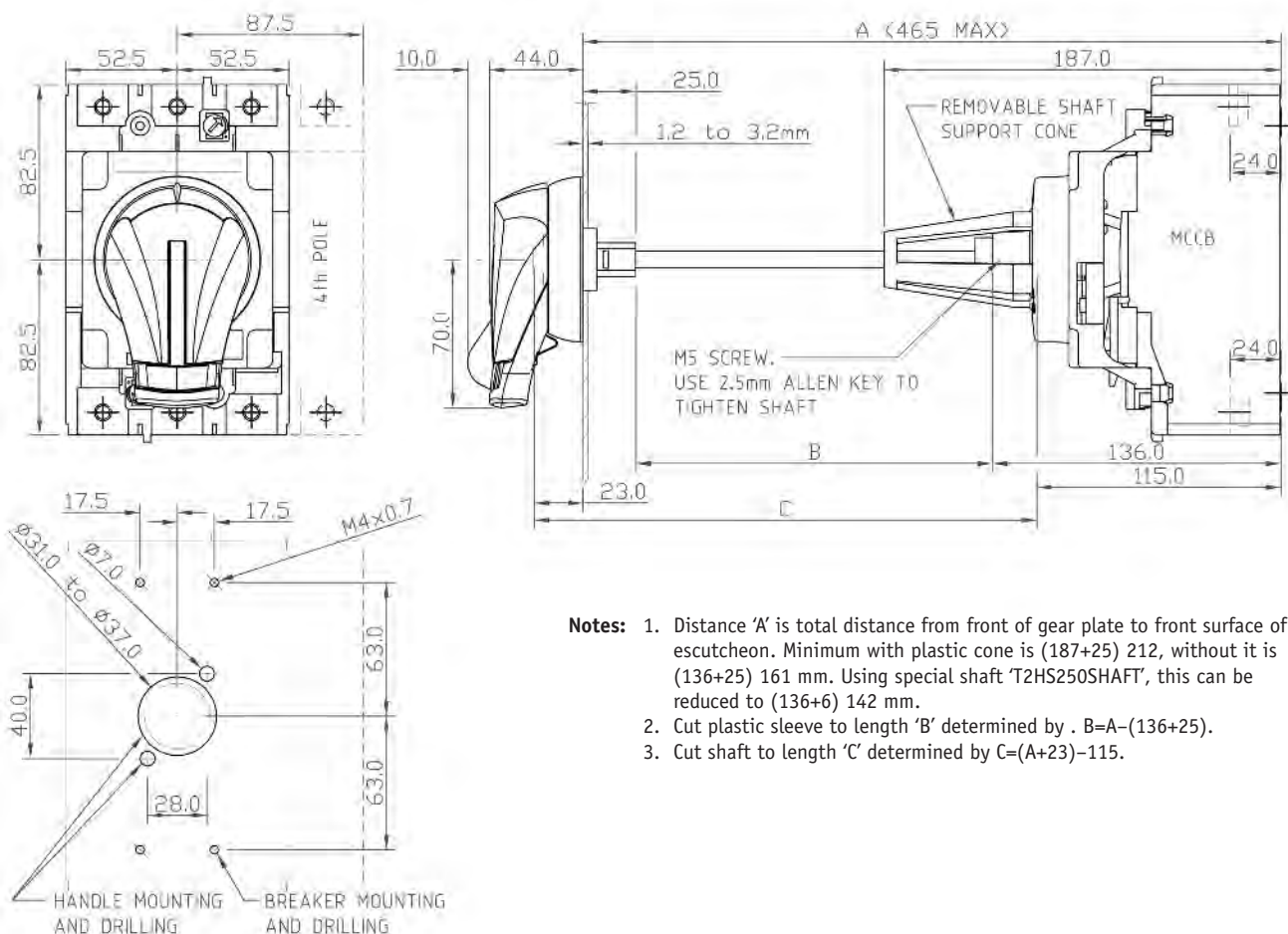


7

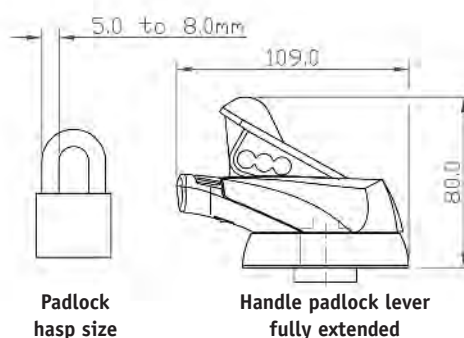
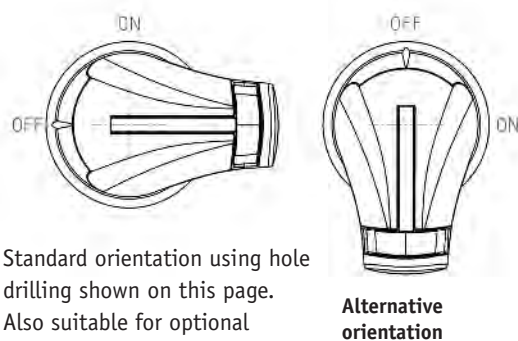
TemBreak 2 MCCB accessories

T1HS / T2HS Handle dimensions (mm)

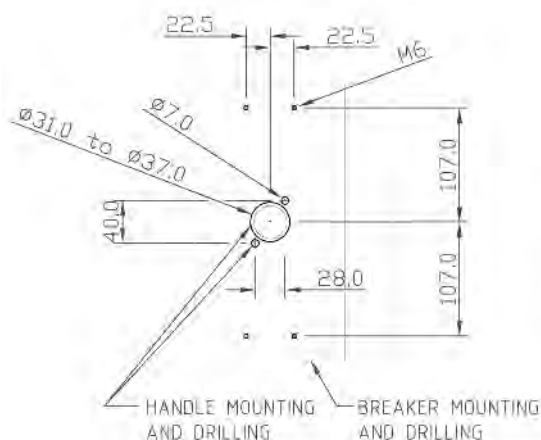
T2HS handle with S160NJ, S160GJ, **E250NJ**, S250NJ, S250GJ and ZS250GJ MCCB



Handle orientation options for OFF/ON

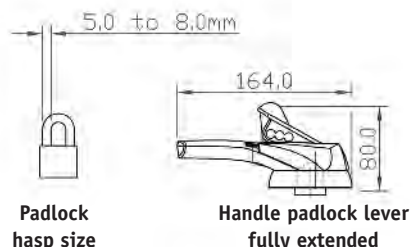


T2HS handle with E400NJ, S400CJ, S400NJ, S400NE, S400GJ, S400GE, E630NE, S630CE, S630GE MCCB



- Notes:**
1. Distance 'A' is total distance from front of gear plate to front surface of escutcheon. Minimum with plastic cone is $(264+7)$ 271, without it is $(182+25)$ 207 mm. Using special shaft 'T2HS400SHAFT', this can be reduced to $(182+6)$ 188 mm.
 2. Cut plastic sleeve to length 'B' determined by $B=A-(182+74+7)$.
 3. Cut shaft to length 'C' determined by $C=(A+23)-156$.

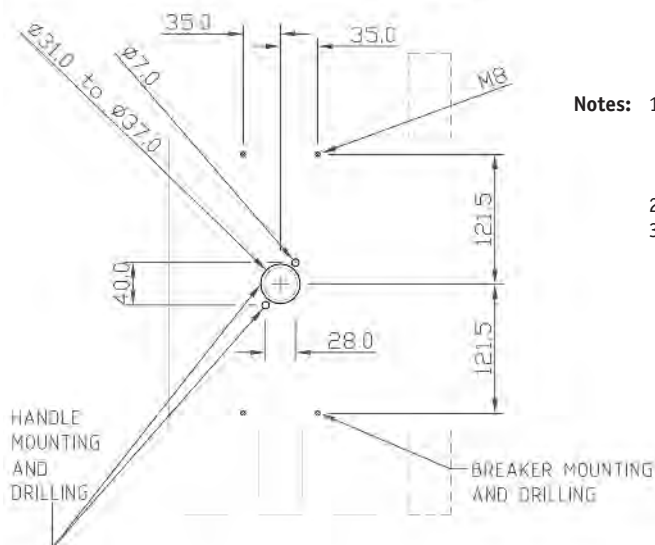
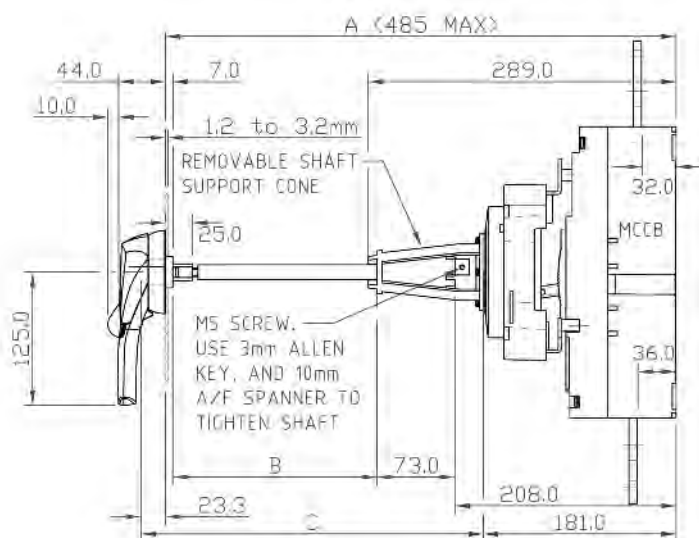
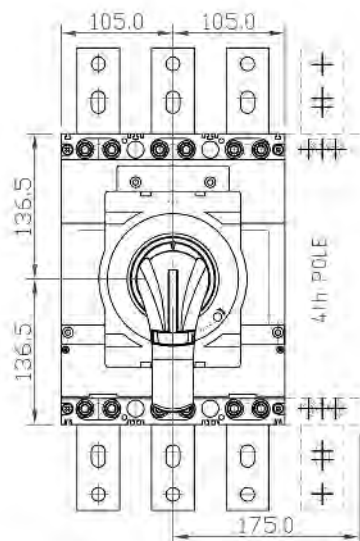
Standard orientation using hole drilling shown on this page.
Also suitable for optional T2HSESC100 escutcheon label (not shown)



TemBreak 2 MCCB accessories

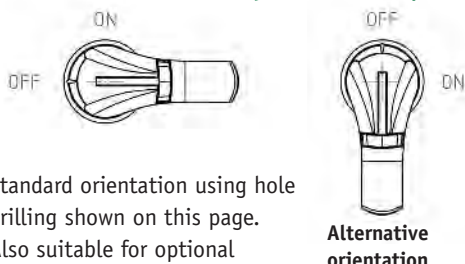
T1HS / T2HS Handle dimensions (mm)

T1HS handle with XS/XH 630 - 800, MCCBs



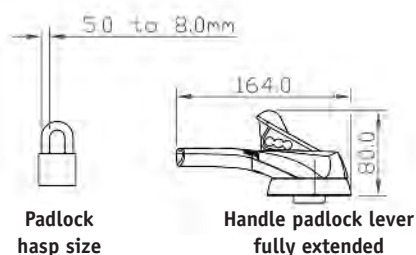
- Notes:**
- Distance 'A' is total distance from front of gear plate to front surface of escutcheon. Minimum with plastic cone is $(289+7)$ 296, without it is $(208+25)$ 233 mm. Using special shaft 'T2HS400SHAFT', this can be reduced to $(208+6)$ 214 mm.
 - Cut plastic sleeve to length 'B' determined by $B=A-(208+73+7)$.
 - Cut shaft to length 'C' determined by $C=(A+23)-181$.

Handle orientation options for OFF/ON



Standard orientation using hole drilling shown on this page.
Also suitable for optional T2HSESC100 escutcheon label (not shown)

Alternative orientation



Padlock hasp size

Handle padlock lever fully extended

TemBreak 2 MCCB accessories

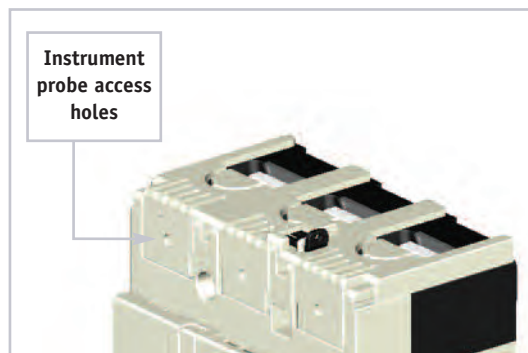
Insulation barriers, terminal covers

Terminal covers

Terminal covers are used to prevent direct contact with live circuit breaker terminations. They also provide additional insulation, to reduce the possibility of a short circuit between phases or to earth, when large conductors are used.

General features

- Terminal covers require no tools for installation
- All terminal covers have an IP 20 ingress protection rating
- Terminal covers are ordered individually. Two terminal covers are required to cover both the line and load terminals of an MCCB. Each cover can either be fitted to the top or bottom of the MCCB
- Terminal covers have an instrument probe access hole of 4 mm diameter on each phase.



Options

- A terminal cover lock allows an anti-tampering seal to be added.
- An earth barrier can be added to terminal covers for front connection, which provides insulation at the rear of the terminations.



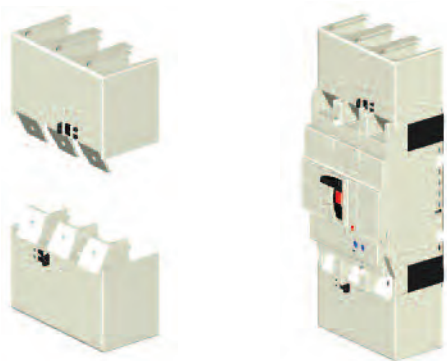
Terminal cover lock with lead seal



Earth barrier fitted to rear of terminal cover

TemBreak 2 MCCB accessories

Insulation barriers, terminal covers (cont)



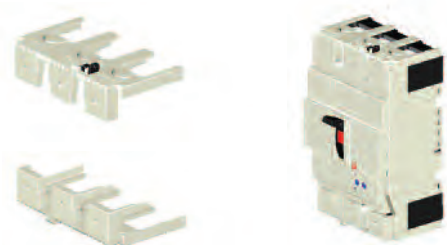
125 / 160 / 250 A covers

Terminal covers for front connection (T2 CF)

Terminal covers for front connection are designed to cover the exposed live parts of conductors terminated on the MCCB.

Terminal covers are clip-on, and require no tools. For the 125 A and 250 A MCCBs, 'short' covers and longer, standard covers, are available.

Rear insulation inserts are available for protection against earthing.

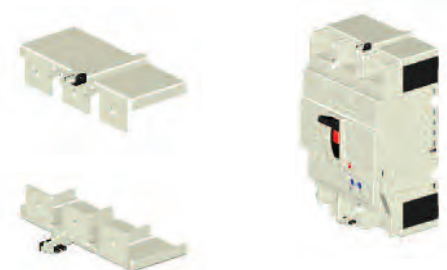


Flush terminal covers

Flush terminal covers (T2 CS)

Flush terminal covers are useful for increasing the ingress protection rating at the terminals, without increasing the overall length. They can be used with busbar and for direct entry of stranded cable (with solderless cable clamp terminals).

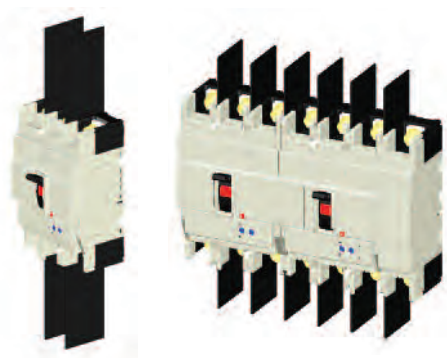
Flush terminal covers are identical to rear terminal covers for the 400 A and 630 A models. The user can remove a section of the rear terminal cover to allow entry of the conductor.



Terminal covers for rear connection

Terminal covers for rear connection (T2 CR)

Terminal covers for rear connection can be used on MCCBs fitted with rear connections (RP) or plug-in connections (PM). They prevent access to the terminals from the front and top.



MCCB Fitted with interpole barriers on both ends

Interpole barriers between adjacent MCCBs

Interpole barriers (T2 BA)

Interpole barriers provide maximum insulation between phases at the terminals of the MCCB. They cannot be fitted at the same time as any of the terminal covers. Interpole barriers for use on one end of the MCCB are supplied as standard. Additional interpole barriers can be ordered individually and can easily be fitted to either end of an MCCB.

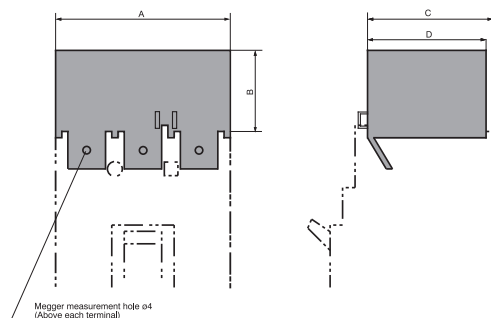
MCCB moulds have also been designed to accept an additional interpole barrier between two adjacent MCCBs.

TemBreak 2 MCCB accessories

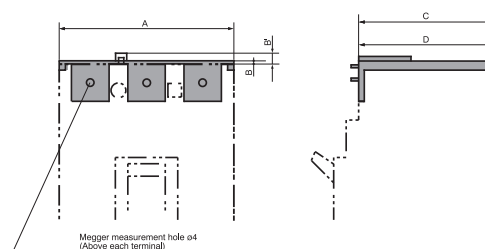
Terminal covers and interpole barriers

Dimensions (mm)

Terminal covers for front connected MCCBs (T2 CF)



Terminal covers for tunnel clamp terminal MCCBs (T2 CS)

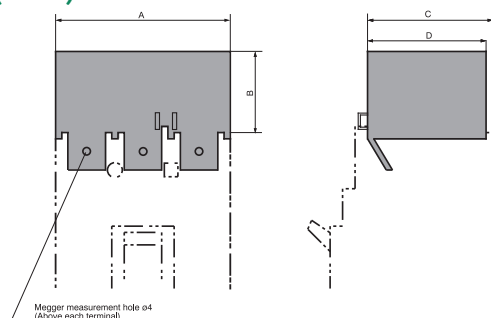


Dimensions (in mm)

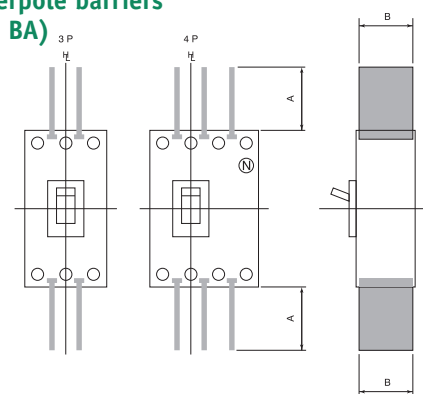
Breaker	Connection	A			B			B ¹		C			D		
		1P	3P	4P	1P	3P	4P	3P	4P	1P	3P	4P	1P	3P	4P
E125, S125, ZS125	Front (long)	30	90	120	40	40	40	—	—	48	48	48	46	46	46
	Front (short)	—	90	120	—	22	22	—	—	—	48	48	—	46	46
	Tunnel clamp	30	90	120	2.5	2.5	2.5	6	62.5	61	61	61	60	59.5	59.5
S160	Front ¹⁾ (long)	35	105	140	55	55	55	—	—	54	54	54	52	52	52
E250, S250 (except S250-PE)	Front (short) ¹⁾	—	105	140	—	30	30	—	—	—	54	54	—	52	52
ZS250	Tunnel clamp	35	105	140	2.5	2.5	2.5	6	63	61	61	61	49.5	59.5	59.5
H125, L125, H160, L160	Front ¹⁾	—	105	140	—	55	55	—	—	89	89	89	—	87	87
H250, L250, S250-PE	Tunnel clamp	—	105	140	—	2.5	2.5	4.5	—	96	96	96	—	59.5	59.5
E400, S400	Front (wide)	—	140	185	—	110	110	—	—	97	99	99	—	96	98
E630NE, S630CE, S630GE	Front (wide)	—	180	240	—	110	114	—	—	97	99	99	—	96	98
	Front (narrow) ¹⁾	—	140	185	—	80	85	—	—	134	134	134	—	93	93
H400, L400	Tunnel clamp	—	140	185	—	3	3	4.5	—	97	97	97	—	93	93
	Front (wide)	—	180	240	—	110	114	—	—	134	136	136	—	96	98
	Tunnel clamp	—	140	185	—	3	3	4.5	—	134	134	134	—	93	93

Note: ¹⁾ Not applicable when flat bars (FB) are fitted.

Terminal covers for rear connected and plug-in type MCCBs (T2 CR)



Interpole barriers (T2 BA)



Dimensions (in mm)

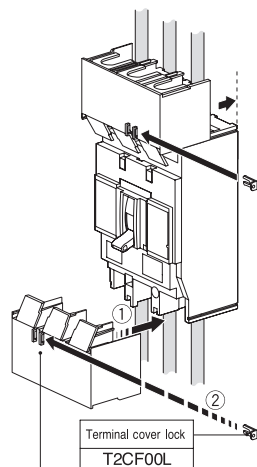
Dimensions (in mm)

Breaker	A		B	B ¹	C	D	Breaker	A		B
	3 pole	4 pole						3 pole	4 pole	
E125, S125, ZS125	90	120	2	6	41.5	40.5	E125, S125	47	53	
S160, ZS250	105	140	2	6	41.5	39.5	S160	100	53	
E250, S250 (except S250-PE)	105	140	2	6	77.5	39.5	E250, S250 (except S250-PE)	100	88	
H125, L125, H160, L160	105	140	2	6	77.5	39.5	H125, L125, H160, L160	100	88	
H250, L250, S250-PE	140	185	3	4.5	97	93	H250, L250, S250-PE	110	95	
E400, S400	140	185	3	4.5	97	93	E400, S400, E630, S630	110	95	
H400, L400	140	185	3	4.5	97	93	H400, L400	110	95	

TemBreak 2 MCCB accessories

TemBreak 2 Terminal cover fitting

Terminal cover mounting procedure 125-250 A

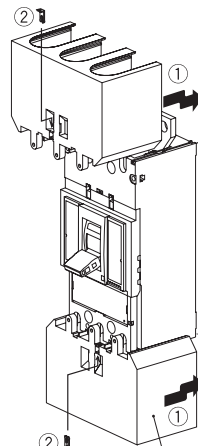


Connection	Terminal cover
Front connected (FC)	T2CF12*S (E/S125 AF)
	T2CF25*S (E/S250 AF)
	T2CF25*L (H/L)
Rear /Plug-in (RC/PM)	T2CR12*S (E/S125 AF)
	T2CR25*S (E/S250 AF, H/L)
Solderless terminal (FC)	T2CS12*S (E/S125 AF)
	T2CS25*S (E/S250 AF, H/L)

*: 2,3 or 4 (Poles)

- When removing, remove the items in reverse order of mounting.

Terminal cover mounting procedure 400-630 A



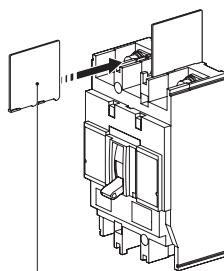
Connection	Terminal cover
FC (without Flat bar)	T2CF40* SL
FC (with Flat bar)	T2CF40* SW
RC / PM	T2CR40* S

*3 or 4 (Poles)

- When removing, remove the items in reverse order of mounting.

TemBreak 2 Interpole barriers 125-630 A

Interpole barrier mounting procedure 125-250 A

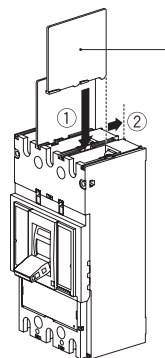


Interpole barrier
T2BA12S* (E/S125 AF)
T2BA25S* (E/S250 AF)
T2BA25L* (H/L)

*: 2,3 or 4 (Poles)

- When removing, remove the items in reverse order of mounting.

Interpole barrier mounting procedure 400-630 A



Interpole barrier
T2BA40* S

*3 or 4 (Poles)

TemBreak 1 MCCB technical data

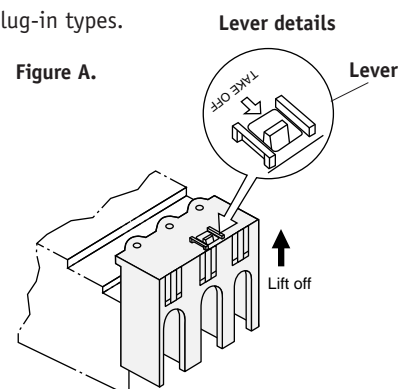
Terminal covers for front connected breakers

Terminal covers are designed to protect breaker terminals and other live parts from exposure.

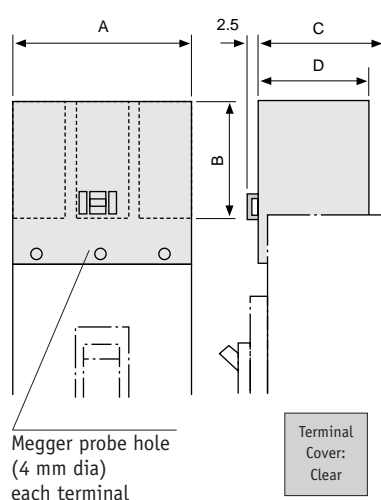
Terminal covers are available for front or rear connection and plug-in types.

Snap-on cover

XPR type. To remove; press lever in direction of 'TAKE OFF' position (Refer to figure A).



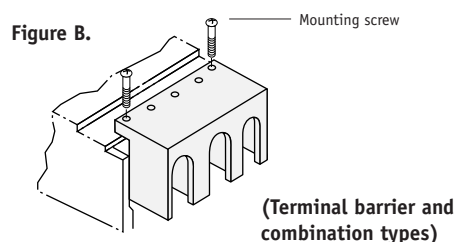
Front-connection application (TCF)



Screw-on cover

(Refer to figure B)

This cover screws directly onto insert nuts in the breaker cover however, insert nuts are not provided as standard on the breaker cover. Please specify if terminal cover (TCF) is to be used, when ordering the breaker.



7

Dimensions (in mm)

Frame (A)	Breaker	Cat. No.	No. of poles	A	B	C	D	Snap-on ¹⁾ cover	Cover ³⁾ screw size	Refer fig.
125	XS125	2H1407DAA	3	89	40	79	78	●	—	A
	XH125, TL30F	2H1408DAA	4	124	40	79	78	—	—	A
160/250	XS250	2H2135DAA	3	104	55	81	80	●	—	A
		2H1410DAA	4	144	70	81.4	80	—	—	A
	XH160PJ,	2H2136DAA	3	104	55	98	97	●	—	A
	XH250NJ	2H1412DAA	4	144	70	98.4	97	—	M3	A
250/400	XH250PJ,	2H1413DAB	3	180	110	99	96	—	M3	B
	XS400, XH400	2H1414DAB	4	240	110	99	96	—	M3	B
	XV400	2H1415DAB ²⁾	3	145	85	99	96.5	—	M3	B
		2H1416DAB ²⁾	4	190	85	99	96.5	—	M3	B
630/800	XS630, XH630,	2H1417DAB	3	215	130	99.5 ('ON' side)	99	—		B
	XS800, XH800,					105.5 ('OFF' side)			M3	
	XV630/800	2H1418DAB	4	285	130	99.5 ('ON' side)	99	—		B
1250	XS1250	2H1419DAB	3	215	130	115	99	—	M3	B
	XV1250	2H1420DAB	4	285	130	115	99	—		B

- Notes:**
- ¹⁾ ● 'yes' or 'available'
— 'no' or 'not available'.
 - ²⁾ without attached busbars.
 - ³⁾ For screw-on cover.

TemBreak 1 MCCB technical data

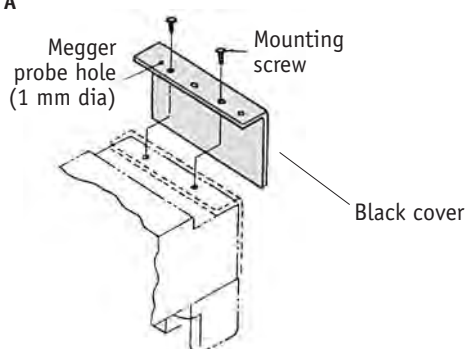
Terminal covers for rear-connect and plug-in breakers

Screw-on cover (TCR)

(Refer to figure A)

These covers screw directly onto insert nuts in the breaker cover however, insert nuts are not provided as standard on the breaker cover. Please specify if terminal cover (TCR) is to be used, when ordering the breaker.

Figure A



Dimensions (in mm)

Frame (A)	Breaker	Cat. No.	No of poles	A	B	C	D	Cover screw size ³⁾
125	XS125, XH125	UXPD0031A	3	89	2	79.5	78.5	M2.6
	TL30F	UXPD0032A	4	119	2	79.5	78.5	M2.6
225	XE225	2H1079CAA	3	105	2	58	55	M2.6
160/250	XS250	UXPD0027B	3	104	3	81.5	80.5	M2.6
		UXPD0028B	4	139	3	81.5	80.5	M2.6
	XH160PJ	UXPD0033B	3	104	3	78.5	97.5	M3
	XH250NJ	UXPD0034B	4	139	3	78.5	97.5	M3
250/400	XH250PJ	UXPD0011B	3	140	3	99	98	M3
	XS/XH/XV400	UXPD0012A	4	185	3	99	98	M3
630/800	XS/XH/XV630	UXPD0013B	3	210	3	99 ¹⁾	93	M3
						105 ²⁾		
	XS/XH/XV800	UXPD0014B	4	280	3	99 ¹⁾	93	M3
						105 ²⁾		

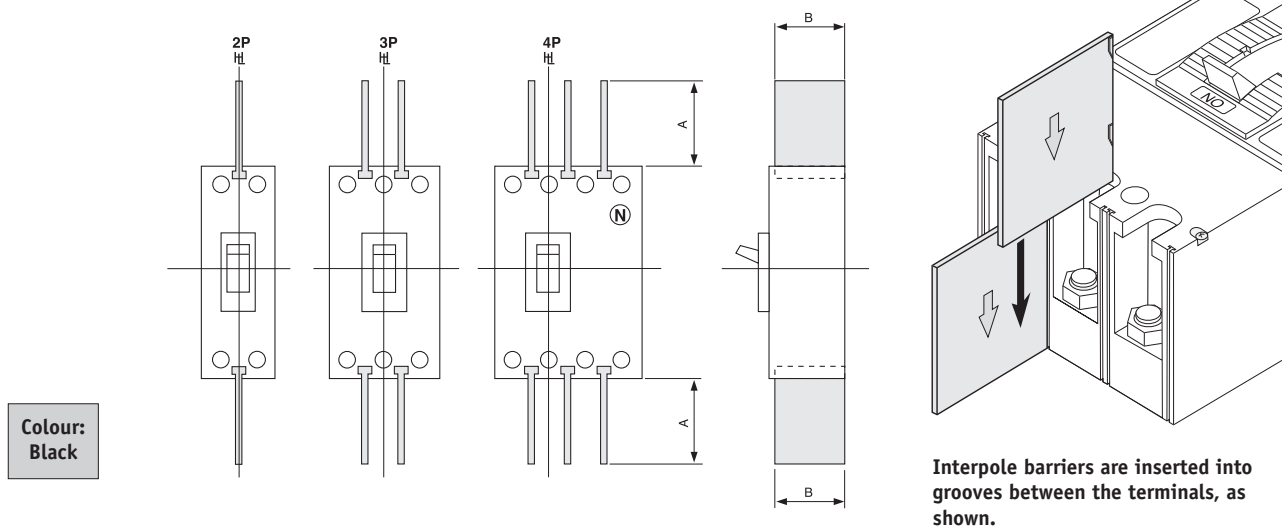
Notes: ¹⁾ ('ON' side).
²⁾ ('OFF' side).
³⁾ For screw-on cover.

TemBreak 1 MCCB technical data

Interpole/isolation barrier

Interpole barriers completely isolate terminals to prevent accidental short-circuiting between two or more terminals.

Interpole barriers are supplied for the lineside only, as standard, with all 125 A – 1600 A MCCBs.



Dimensions (in mm)

Frame (A)	Breaker	Barrier Cat. No.	A	B
125	XS125 ¹⁾	UXQH0002A	67	77
	XH125 ¹⁾			
160/225/250	XH160PJ	UXQH0002A	67	96
	XE225 ¹⁾			
	XS250 ¹⁾			
	XH250NJ ¹⁾			
250/400	XH250PJ	UXQH0004A	110	95
	XS400			
	XH400			
	XV400			
630	XS630	UXQH0004A	110	95
	XH630			
	XV630			
800	XS800	UXQH0004A	110	95
	XH800			
	XV800			
1250	XS1250	UXQH0004A	110	95
	XV1250			
1600	XS1600	UXQH0004A	110	95

Note: ¹⁾ The number of barriers are standard, as follows: 1 for 2 pole, 2 for 3 pole and 3 for 4 pole.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

TEMBREAK 2

MOULDED CASE CIRCUIT BREAKERS

16A TO 630A

- 1. Welcome to TemBreak 2
- 2. Ratings and Specifications
- 3. Operating Characteristics
- 4. Application Data
- 5. Accessories
- 6. Installation
- 7. Dimensions

TEMBREAK 2

MINI MOULDED CASE CIRCUIT BREAKERS

10A TO 100A

- 8. TemBreak 2 MINI Moulded Case Circuit Breakers

TEMBREAK

MOULDED CASE CIRCUIT BREAKERS

630A TO 1600A

9. TemBreak Moulded Case Circuit Breakers

• Easy Selection Guide	141
• Ratings and Specifications	143
• Operating Characteristics	147
• Electrical Control Using Internally Mounted Accessories	149
• Electrical Control Using Motor Operation	153
• Operating Handles	155
• Insulation Accessories	157
• Toggle Accessories	158
• Mechanical Interlocks	159
• Installation	160
• Dimensions	167

10. Order Codes



SECTION 9

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

EASY SELECTION GUIDE

The TemBreak range of products includes:

- Moulded Case Circuit Breakers
- Switch-Disconnectors
- A comprehensive range of accessories.

EXCEPTIONAL CURRENT LIMITING

Terasaki's ingenuity in current breaking is exemplified by the Fast Break Mechanism (FBM) of the TemBreak range.

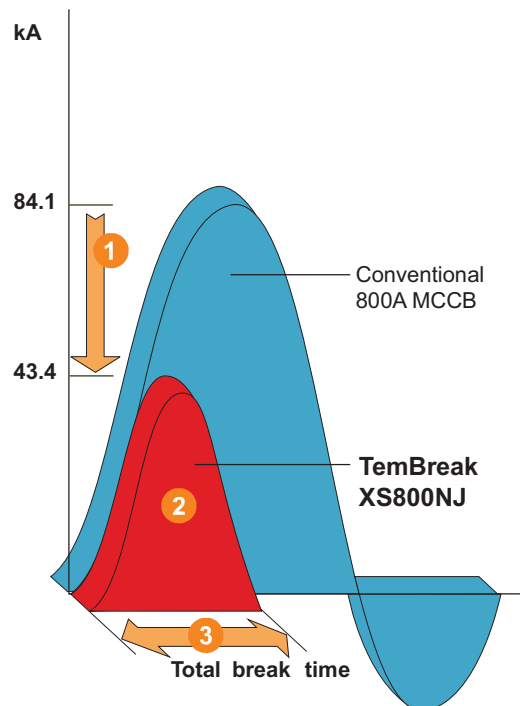
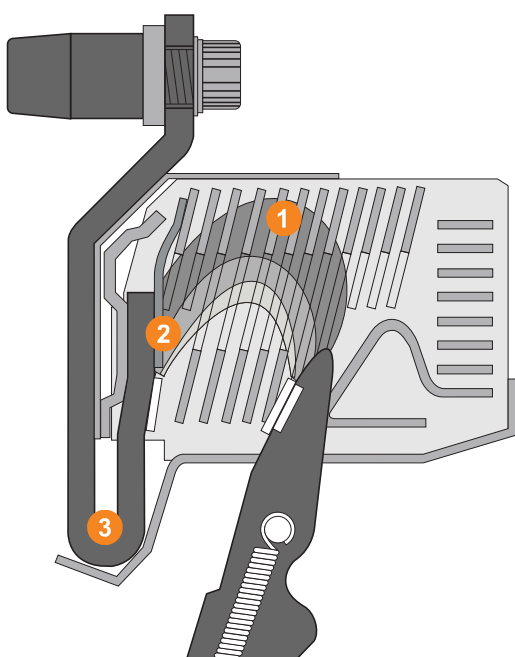
The quick breaking performance of TemBreak provides exceptional current limiting characteristics.



F.B.M - Fast Break Mechanism

Provides

Exceptional Current Limitation



- 1 Quick-break arc chutes
- 2 Dual repulsive contacts
- 3 U-shaped conductors

Provides

- 1 Reduced Peak let through minimises electrodynamic stress on conductors
- 2 Reduced i^2t energy let through minimises thermal stress on conductors
- 3 Reduced tripping time minimises damage after fault to both system and MCCB

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

RATINGS AND SPECIFICATIONS

TemBreak MCCB Electrical Characteristics to IEC 60947-2, EN 60947-2, JIS C 8201-2-1 Ann. 1, AS/NZS 3947-3, NEMA-AB1

Frame	Quantity	Unit	Condition	800	800	
Model				XS800NJ	XS800SE	
Number of Poles				3, 4	3, 4	
Nominal current ratings						
	I_n	(A)	50°C	630, 800	800	
Electrical characteristics						
Rated operational voltage	U_e	(V)	AC 50/60 Hz	690	690	
Rated insulation voltage	U_i	(V)	DC	250	-	
Rated impulse withstand voltage	U_{imp}	(kV)		690	690	
				8	8	
Ultimate breaking capacity (IEC, JIS, AS/NZS)	I_{cu}	(kA)	690V AC*	20	20	
			440V AC	50	50	
			415V AC	50	50	
			380/400V AC	65	50	
			220/240V AC	85	85	
			250V DC	50	-	
	Service breaking capacity (IEC, JIS, AS/NZS)	I_{cs}	(kA)	690V AC*	10	10
				440V AC	25	25
				415V AC	25	25
				380/400V AC	33	25
				220/240V AC	43	43
				250V DC	25	-
Rated short-time withstand current	I_{cw}	(kA _{rms}) (kA)	0.3 Seconds	-	10	
Rated breaking capacity (NEMA)			480V AC	50	50	
			240V AC	85	85	
Protection						
Adjustable thermal, adjustable magnetic				■		
Fixed hydraulic, fixed magnetic					■	
Microprocessor						
Utilisation category				A	B	
Installation						
Front connection (FC)				■	■	
Attached flat bar (FB)				•	•	
Solderless terminal (cable clamp)				•	•	
Rear connection (RC)				•	•	
Plug-in (PM)				•	•	
Draw-out (DR)				•	•	
DIN rail mounting (DA)				-	-	
Dimensions						
	h	(mm)		273	273	
	w	(mm)	3 pole	210	210	
			4 pole	280	280	
	d	(mm)		103	103	
Weight	w	(kg)	3 pole	9.4	9.7	
			4 pole	12.2	12.5	
Operation						
Toggle operation				■	■	
Variable depth/direct mount operating handle (HB/HP)				•	•	
Motor operator (MC)				•	•	

■ Standard • Optional - Not Available

*MCCBs cannot be used in IT earthed systems at this voltage.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

	800	800	800	1600	1250	1250	1600	1600	1600	
	XH800SE	XH800PJ	XH800PE	TL800NE	XS1250CE	XS1250SE	TL1250NE	XS1600CE	XS1600SE	>1600
	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	3, 4	Visit www.terasaki.com for details of MCCBs up to 2500A
	800	630, 800	630, 800	630, 800	1000, 1250	1000, 1250	1000, 1250	1600	1600	
	690 - 690 8	690 250 690 8	690 - 690 8	690 - 690 8	690 - 690 8	690 - 690 8	690 - 690 8	690 - 690 8	690 - 690 8	
	20 65 65 65	45 85 85 100	20 65 65 65	45 125 125 125	20 50 50 50	25 65 65 85	45 125 125 125	20 50 50 50	45 85 85 100	
	100 -	125 50	100 -	150 -	85 -	100 -	150 -	85 -	125 -	
	10 33 33 33	23 43 50 50	10 50 50 50	34 70 70 70	10 25 25 25	19 50 50 65	34 65 65 70/65	10 25 25 25	34 65 65 75	
	50 -	63 25	50 -	113 -	43 -	75 -	113 -	43 -	94 -	
	10 65 85	- 50 85	10 65 85	15 75 150	15 50 85	15 65 85	15 75 150	20 50 85	20 85 125	
	■ B	■ A	■ B	■ B	■ B	■ B	■ B	■ B	■ B	
	■ • • • • • -	■ • • • • • -	■ • • • • • -	- ■ - • • • -	- ■ - • • • -	- ■ - • • • -	- ■ - • • • -	- ■ - • • • -	- ■ - • • • -	
	273 210 280 103 9.7 12.5	273 210 280 103 9.4 12.2	273 210 280 103 9.7 12.5	370 210 280 140 25.8 33.5	370 210 280 120 22.0 28.0	370 210 280 120 22.0 28.0	370 210 280 140 26.0 33.7	370 210 280 140 27.0 35.0	370 210 280 140 27.0 35.0	
	■ • •	■ • •	■ • •	■ • •	■ • •	■ • •	■ • •	■ • •	■ • •	

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

RATINGS AND SPECIFICATIONS

TemBreak Switch-Disconnectors Electrical Characteristics to IEC 60947-3, EN 60947-3, AS/NZS 3947-3

Frame	Quantity	Unit	Condition	800	1250
Model				XS800NN	XS1250NN
Number of Poles				3, 4	3, 4
Nominal current ratings					
	I_n	(A)		800	1250
Electrical characteristics					
Rated operational voltage	U_c	(V)	AC 50/60 Hz DC	690 250	690 250
Rated insulation voltage	U_i	(V)		690	690
Rated impulse withstand voltage	U_{imp}	(kV)		8	8
Rated short-circuit making capacity	I_{cm}	(kA peak)		15	32
Rated short-time withstand current	I_{cw}	(kA rms)	0.3 Seconds AC	9.6 AC-23A	15 AC-23A
Utilisation category					
Installation					
Front connection (FC)				■	-
Attached flat bar (FB)				•	■
Solderless terminal (cable clamp)				•	-
Rear connection (RC)				•	•
Plug-in (PM)				•	•
Draw-out (DR)				•	•
DIN rail mounting (DA)				-	-
Dimensions					
h	(mm)			273	370
w	(mm)		3 pole	210	210
			4 pole	280	280
d	(mm)			103	120
Weight	(kg)		3 pole	9.4	20.4
			4 pole	12.2	26.4
Operation					
Toggle operation				■	■
Variable depth/direct mount operating handle (HB/HP)				•	•
Motor operator (MC)				•	•

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

	1600
	XS1600NN
	3, 4
	1600
	690 250 690 8
	45 20 AC-23A
	- ■ - • - • - 370 210 280 140 24.9 32.9
	■ • •

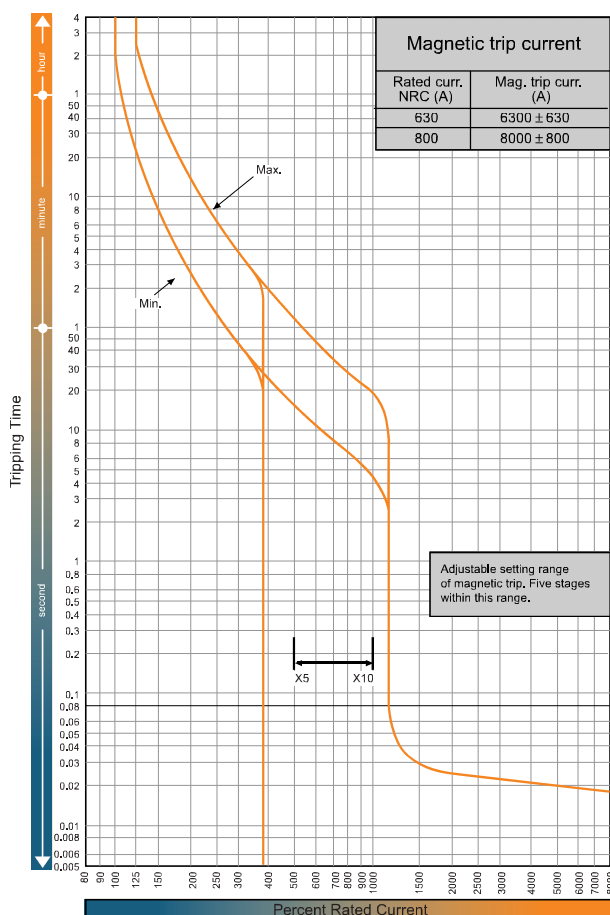
TEMBREAK MOULDED CASE CIRCUIT BREAKERS

OPERATING CHARACTERISTICS

800A Frame MCCBs

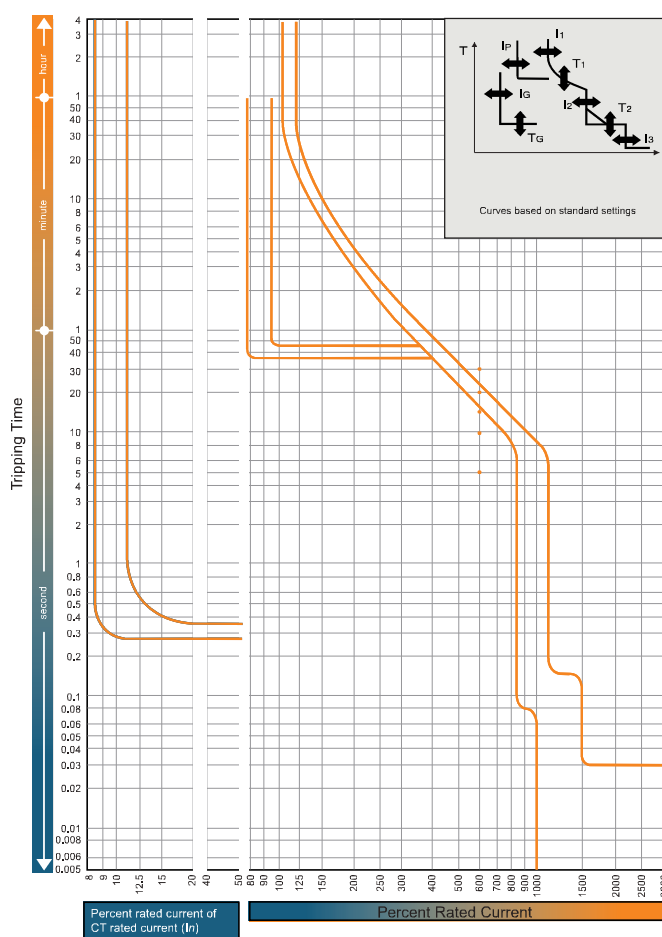
Time/current characteristic curves

XS800NJ, XH800PJ

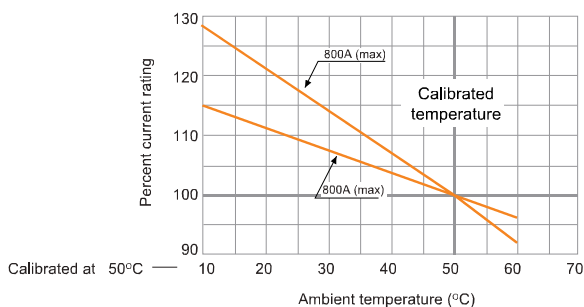


Time/current characteristic curves

XS800SE, XH800SE, XH800PE



Ambient compensating curves



Over current tripping characteristics

CT rated current (A) (I _n)	630, 800
Base current setting (A): (I ₀)	(I _n) x (0.63-0.8-1.0)
Long time-delay pick-up current (A): (I ₁)	(I ₀) x (0.8-0.85-0.9-0.95-1.0) Non-tripping at (I ₁) setting x 105% and below. Tripping at 125% & above.
Long time-delay time settings (S) (T ₁)	(5-10-15-20-30) at (I ₁) x 600% current. Setting tolerance ± 20%
Short time-delay pick-up current (A): (I ₂)	(I ₀) x (2-4-6-8-10) Setting tolerance ± 15%
Short time-delay time settings (S) (T ₂)	Opening time (0.1, 0.15, 0.2, 0.25, 0.3) in the definite time-delay. Total clearing time is + 50 mS and resettable time -20mS for the time-delay setting.
Instantaneous trip pick-up current (A) (I ₃)	Continuously adjustable from (I ₀) x (3 to 12) Setting tolerance ± 20%
* Pre-trip alarm pick-up current (A) (I _P)	(I ₁) x (0.7, 0.8, 0.9, 1.0) Setting tolerance ± 10%
* Pre-trip alarm time setting (S) (T _P)	40 fixed definite time-delay. Setting tolerance ± 10%
* Ground fault trip pick-up current (A): (I _G)	Continuously adjustable from (I _n) x (0.1 to 0.4) Setting tolerance ± 15%
* Ground fault trip time setting (S) (T _G)	Opening time (0.1-0.2-0.3-0.4-0.8) in the definite time-delay. Total clearing time is + 50mS and resettable time is - 20mS for the time-delay settings

Note: * Optional

Note: The underlined values will be applied as standard ratings unless otherwise specified when ordering.

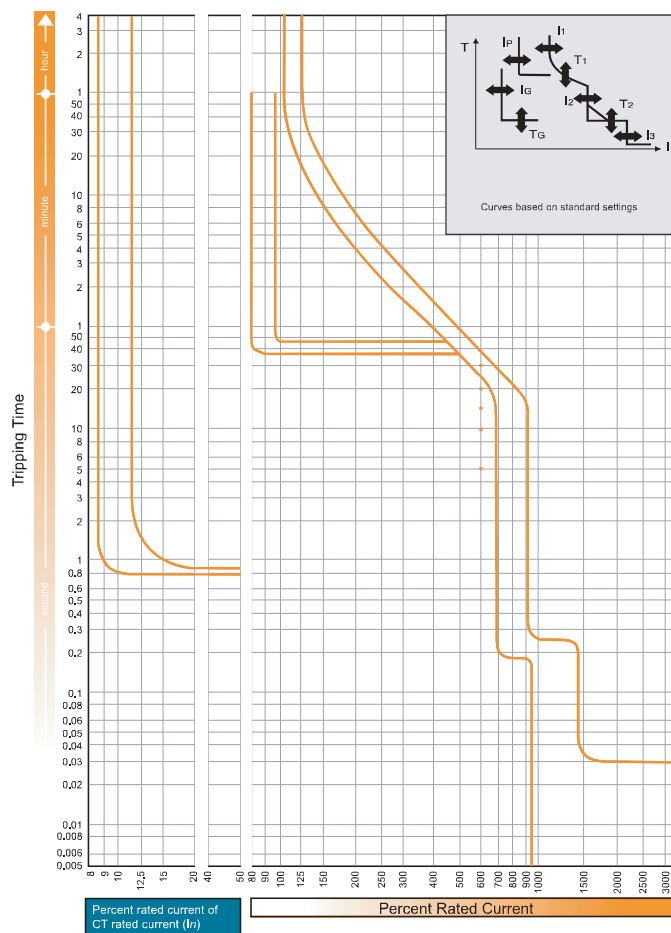
TEMBREAK MOULDED CASE CIRCUIT BREAKERS

OPERATING CHARACTERISTICS

1250A and 1600A Frame MCCBs

Time/current characteristic curves

TL800NE, XS1250CE, XS1250SE, TL1250NE, XS1600CE, XS1600SE



Over current tripping characteristics

CT rated current (A) (I_n)	630, 800, 1000, 1250, 1600, 2000, 2500
Base current setting (A): (I_0)	$(I_n) \times (0.63-0.8-1.0)$
Long time-delay pick-up current (A): (I_1)	$(I_0) \times (0.8-0.85-0.9-0.95-1.0)$ Non-tripping at (I_1) setting $\times 105\%$ and below. Tripping at 125% & above.
Long time-delay time settings (S) (T_1)	(5-10-15-20-30) at (I_1) $\times 600\%$ current. Setting tolerance $\pm 20\%$
Short time-delay pick-up current (A): (I_2)	$(I_0) \times (2-4-6-8-10)$ Setting tolerance $\pm 15\%$
Short time-delay time settings (S) (T_2)	Opening time (0.1, 0.15, 0.2, 0.25, 0.3) in the definite time-delay. Total clearing time is $+ 50$ mS and resettable time -20mS for the time-delay setting.
Instantaneous trip pick-up current (A) (I_3)	Continuously adjustable from $(I_0) \times (3$ to $12)$ Setting tolerance $\pm 20\%$
* Pre-trip alarm pick-up current (A) (I_P)	$(I_1) \times (0.7, 0.8, 0.9, 1.0)$ Setting tolerance $\pm 10\%$
* Pre-trip alarm time setting (S) (T_P)	40 fixed definite time-delay. Setting tolerance $\pm 10\%$
* Ground fault trip pick-up current (A): (I_G)	Continuously adjustable from $(I_n) \times (0.1$ to $0.4)$ Setting tolerance $\pm 15\%$
* Ground fault trip time setting (S): (T_G)	Opening time (0.1-0.2-0.3-0.4-0.8) in the definite time-delay. Total clearing time is $+ 50$ mS and resettable time is -20mS for the time-delay settings

Note: * Optional

Note: The underlined values will be applied as standard ratings unless otherwise specified when ordering.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

Shunt Trip (SHT)

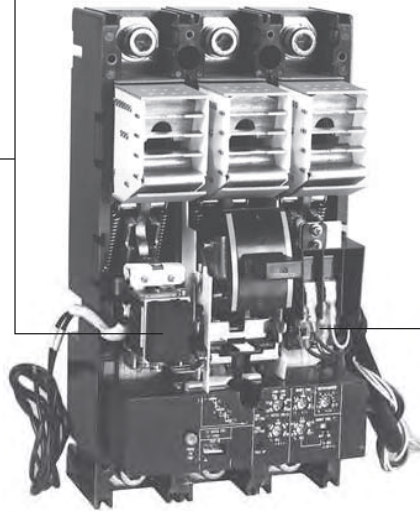
Remote tripping of the breaker

Undervoltage Trip (UVT)

Automatically trips the breaker when the circuit voltage falls below pre-set value. Remote tripping of the breaker is also possible.

Note: The UVT controller is installed externally, when provided with AC UVT. (Refer to Dimensions)

Note: The SHT and UVT cannot be mounted in the same breaker.



Auxiliary Switch (AX)

Electrically indicates On/Off status of the breaker.

Alarm Switch (AL)

Electrically indicates when the breaker is in the "Tripped" state.

Overview of Internally Mounted Accessories

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

Valid Combinations of Internally Mounted Accessories

Accessory Combinations

Breaker type

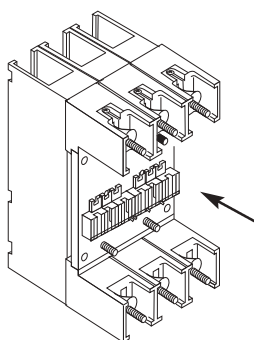
XS800NJ
XS800SE
XH800SE
XH800PJ
XH800PE
TL800NE
XS1250CE
XS1250SE
TL1250NE
XS1600CE
XS1600SE

Internally mounted accessories

AX, AXE	
AL, ALE	
SHT	
UVT	
AX	
AL	
AX	
SHT	
AX	
UVT	
AL	
SHT	
AL	
UVT	
AX	
AL	
SHT	
AX	
AL	
UVT	

Key:

AX	Auxiliary switch		AX
AL	Alarm switch		AL
SHT	Shunt trip		
UVT	Undervoltage trip		
	Handle		Left pole Right pole



Accessory Combinations for Plug-in MCCBs

Frame (A)		800-1250A Frame
Number of auxiliary terminals to be installed (maximum)		
SHT	LINE	
	LOAD	
UVT	LINE	
	LOAD	
1AB	LINE	
	LOAD	
2AB	LINE	
	LOAD	
3AB	LINE	
	LOAD	
SHT & 1AB	LINE	
	LOAD	
SHT & 2AB	LINE	
	LOAD	
SHT & 3AB	LINE	
	LOAD	
UVT & 1AB	LINE	
	LOAD	
UVT & 2AB	LINE	
	LOAD	
UVT & 3AB	LINE	
	LOAD	
ALT & 1AB	LINE	
	LOAD	
ALT & 2AB	LINE	
	LOAD	
UVT & ALT & 1AB	LINE	
	LOAD	
UVT & ALT & 2AB	LINE	
	LOAD	
SHT & ALT & 1AB	LINE	
	LOAD	
SHT & ALT & 2AB	LINE	
	LOAD	
ALT	LINE	
	LOAD	
SHT & ALT	LINE	
	LOAD	
UVT & ALT	LINE	
	LOAD	

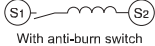
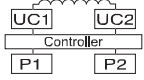

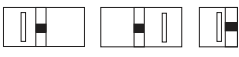


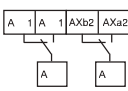

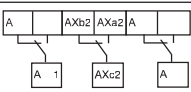

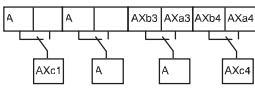

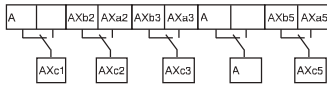

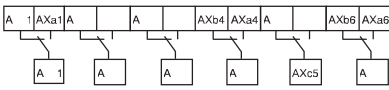


† : Alarm switch is an 'a' contact only
 Note 1 : DC UVT without controller will have terminals U₁ and U₂
 Note 2 : Due to restricted space, these terminals are common

The arrangements shown above represent the view on the arrow, that is, looking at the MCCB body from the rear.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

Connection Diagrams and Terminal Numbers

Shunt trip (SHT)	3, 4P Provided with anti-burn switch		
Undervoltage trip (UVT)	3, 4P AC rated voltage		
	DC rated voltage		
Auxiliary switch (AX)	3, 4P No. of mountings 1 unit		
	2 units		
	3 units		
	4 units		
	5 units		
	6 units		
Alarm switch (AL)	3, 4P		

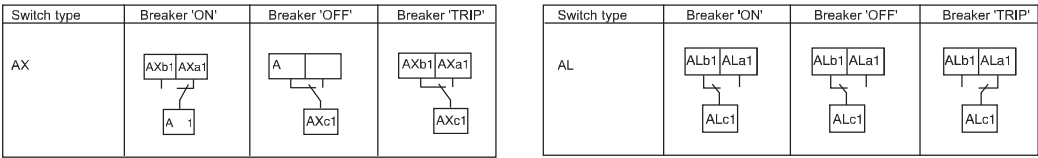
Ratings of Auxiliary Switches (AX) and Alarm Switches (AL)

AC	Voltage (V)	480	250	125
	Current (A)			
	Resistive load	3	5	5
	Lamp load	0.3	1.5	2
	Inductive load	2	5	5
DC	Voltage (V)	250	125	30
	Current (A)			
	Resistive load	0.3	0.6	5
	Lamp load	0.05	0.1	3
	Inductive load	0.3	0.6	4
	Motor load	0.05	0.1	3

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

ELECTRICAL CONTROL USING INTERNALLY MOUNTED ACCESSORIES

Operation of Auxiliary and Alarm Switches



Ratings of Shunt Trips

Rate voltage:	Exciting coil current [peak value (A)] Values at the highest voltage (60Hz f)					
	110-115VAC	200-480VAC	24VDC	48VDC	100-115VDC	200-2
	1.1	0.93	2.52	1.55	0.67	0.35

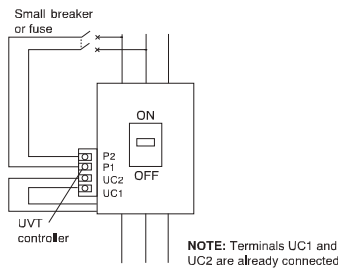
Note: AC rated, permissible operating voltage range is 85 to 110%. DC 75 to 125%.
Note: Special voltages available on request. Contact Terasaki for details.

Ratings of Undervoltage Trips

Rated voltage:	Power supply, VA (with UVT controller)			Exciting coil current (mA)	
	100-120VAC	200-240VAC	300-450VAC	24VDC	100-115VDC
	5VA	5VA	5VA	22.7	6.0

Note: Tripping voltage is 35-70% of the rated voltage. Resettable voltage is 85% or less, of the rated voltage.
Note: Special voltages available on request. Contact Terasaki for details

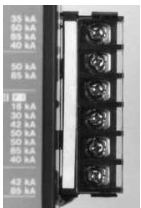
If the UVT is for AC use, an external controller will be installed. The controller is fitted to the left side of the breaker as standard. The controller may be installed separately if required (please specify location). Separate installation is necessary when mechanical interlocks are fitted. UVT controllers incorporating time delay units are also available (contact us for details). Refer to dimensions of terminal blocks for the mounting positions of UVT controllers.



Connection of UVT Controller

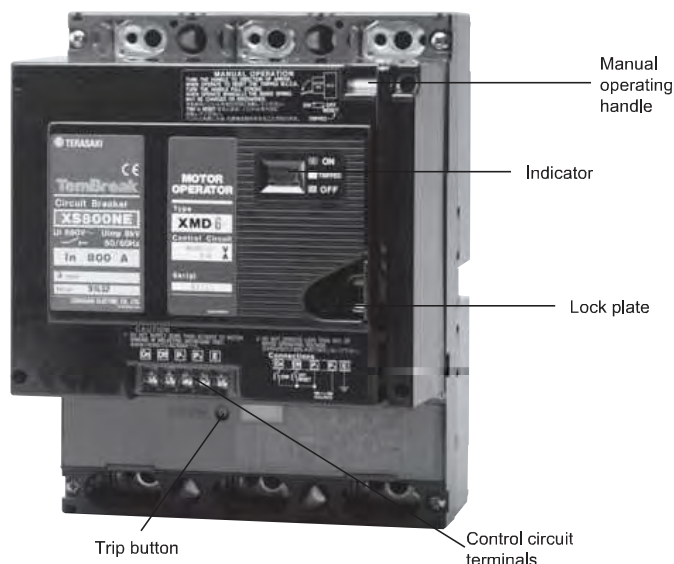
Termination of Control Wiring

Leads for internally mounted accessories can be connected to the terminal block. Each terminal block has six terminals. Terminal arrangements are standardised. Refer to dimensions for standard terminal arrangements.



TEMBREAK MOULDED CASE CIRCUIT BREAKERS

ELECTRICAL CONTROL USING MOTORISED OPERATION



Type XMD6, XMD9

Positive contact indication

Colour coding indicates the true position of the contacts clearly: ON (red), OFF (green), TRIP (white).

Easy maintenance

Breaker mounting, removal, and even setting changes can be done without removing the motor operator.

Manual ON/OFF operation with one stroke

Fast closing operation

Closing in 60ms or less. The closing time remains constant over repeated operations.

Ratings and Specifications

Type of Motor Operators

Applicable Breakers

Rated Operating Voltage (V) AC 100-115V 50/60Hz
200-230V 50/60Hz

DC 100-110V
24V

Lock in "OFF" position (standard)

Manual Trip Button

Steady-state r.m.s. AC100 ON ①
Amp/inrush Amp (A) -115V OFF, RESET ①
AC200 ON ②
-230V OFF, RESET ②
DC100 ON ③
-110V OFF, RESET ③
DC24V ON
OFF, RESET

Type of operation

Operating Time(s) ON (Maximum values)
OFF, RESET ④

Control Switch Ratings

Power Source Capacity (VA)

Dielectric withstand voltage

The value in brackets for 24V DC

Weight (kg)

XMD6

XS800NJ
XS800SE
XH800SE
XH800PJ
XH800PE

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XMD9

TL800NE
XS1250CE
XS1250NE
TL1250NE
XS1600CE
XS1600NE

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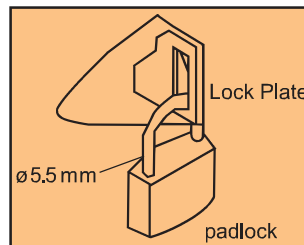
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The breaker can be padlocked in the "OFF" position by pulling out the lock plate, and locking it with a padlock.

When the breaker is "ON", the lock plate cannot be pulled out.

Up to three locks can be used.

Padlocks not supplied.

NOTE

* : Yes or available

① : Maximum values at AC115V, 50Hz

② : Maximum values at AC230V, 50Hz

③ : Maximum values at DC110V

④ : Maximum values at the rated operating voltages

* Trip button on breaker to be used (accessible with motor fitted)

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

ELECTRICAL CONTROL USING MOTORISED OPERATION

Motorised operation

ON CONTROL

When the ON switch is closed, the latch release coil (LRC) is excited and the closing spring is released. The breaker quickly closes and goes into ON status. When the closing spring is released, the limit switch (LS) is opened and the LRC is de-excited.

OFF CONTROL

When the off switch is closed, self-hold control relay (Y) is activated and motor (M) operates to charge the closing spring. The breaker changes to OFF status.

RESET CONTROL

When the breaker is in TRIP status, closing the OFF switch activates self-hold control relay (Y) and starts motor (M). Motor (M) charges the closing spring and resets the breaker.

Manual operation

ON, OFF (RESET)

The breaker can be opened (OFF or RESET) and closed (ON) alternately by pulling the operating lever down in one full stroke. ON/OFF operation of the breaker is possible without charging or releasing the closing spring.

Emergency Trip

Opening the breaker (OFF) using the motor operator takes up to 3 seconds. If a remote emergency OFF function is necessary, incorporate the shunt trip device (SHT) or the undervoltage trip device (UVT) into the breaker.

PRECAUTIONS REGARDING USAGE

- If using the UVT option, be sure to reset the UVT before closing the breaker.
- The motor operator must be supplied with voltage within the following range:
DC: 75-110% of rated voltage
AC: 85-110% of rated voltage
Operation at low voltage may burn out the motor.

Anti-pumping function

When the breaker is turned ON and the closing spring is released, self-hold control relay X is activate. Xa-contact is held closed, and Xb-contact is opened. While the ON switch is closed, latch release coil (LRC) will not be excited even if the OFF switch is closed or an automatic reset circuit is being used. Pumping is thus prevented.

Automatic charge/discharge function

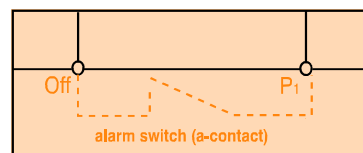
If the breaker is closed manually (ON) while the power source is on, the handle switch (HS) induces automatic release of the closing spring. Likewise, if the breaker is opened manually (OFF), the springs are automatically charged. If the breaker is opened or closed while the power source is off, later when the power source is turned on, the closing spring will automatically be charged or discharged to match the ON/OFF status of the breaker. This automatic charge/discharge function is necessary to prepare the closing mechanism for the next ON/OFF operation. The sound of the charging or discharging of the spring should not be mistaken for a malfunction.

Automatic reset

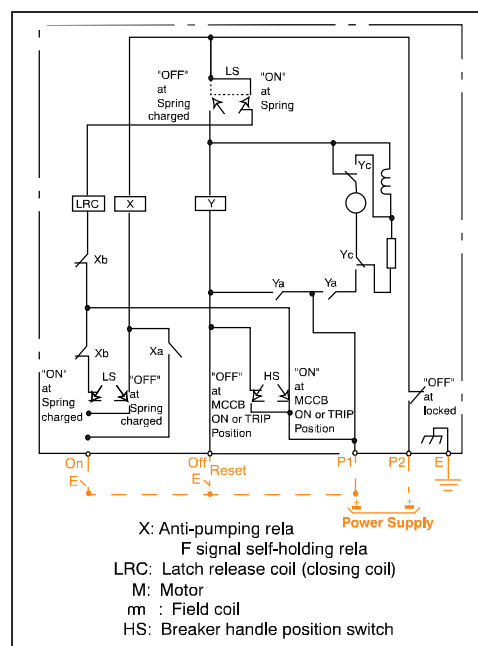
An alarm switch (a-contact) fitted in the breaker, can be used to induce recharging of the closing spring and automatically reset the MCCB. Connect the automatic reset circuit as shown below.

It is recommended that a time delay of approximately 3 minutes is introduced to the automatic reset circuit for thermal magnetic MCCB's. In the event of an overload trip this will prevent the motor operator repeatedly driving the MCCB between the tripped and reset positions while the thermal element is hot.

If an alarm signal is also required for external control, use a 2 alarm switch combination.



Control circuit AC and DC

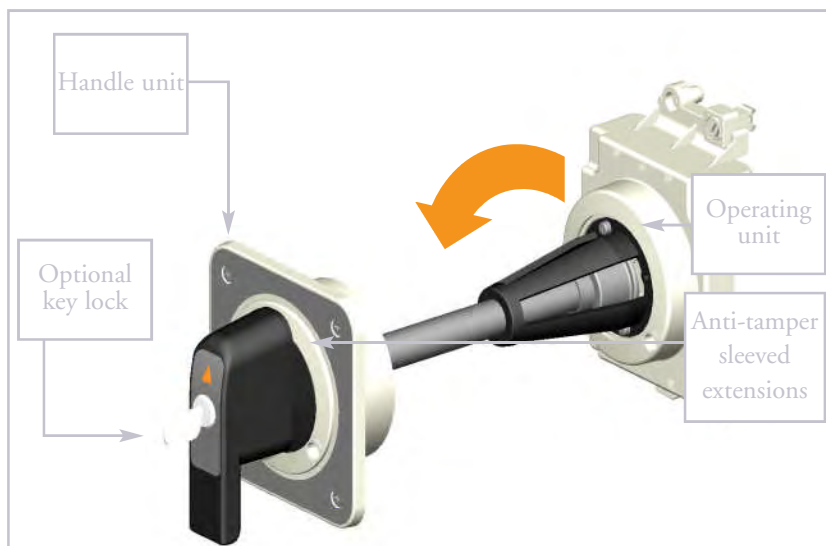


Note: Customer wiring shown in orange

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

OPERATING HANDLES

Door Mounted Handle



Door Mounted Handle with Optional Keylock

The door mounted operating handle is used to operate a circuit breaker mounted inside a cubicle from outside the door. It consists of an operating mechanism that is mounted on the breaker, an operating handle that is mounted on the door, and a shaft that transmits the turning force from the handle to the operating unit. The shaft can be cut to the required length.

The appearance and operation of this handle match those of the door mounted handle for Tembreak 2 MCCBs (details in Section 5).

This means that a switchboard containing a combination of TemBreak and TemBreak 2 MCCBs from this catalogue can be operated with handles which all look the same, and work the same way.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

OPERATING HANDLES

Breaker Mounted Handle (OHJ)

90° ON/OFF OPERATION.

The handle operation and ON/OFF indicator are the same irrespective of the breaker mounting direction, being vertical or horizontal. This also applies to the panel cut-out.

Double insulation structure

Provides an even higher degree of safety.

Panel lock mechanism

The panel door cannot be opened when the handle is in the ON or OFF position. The panel door can only be opened in the RESET position.

- Equipped with a lock (reverse interlock) mechanism which does not permit the breaker to be closed while the panel door is opened. The lock can be released.
- When the panel lock release is turned counterclockwise the panel door can be opened even when the handle is in the ON or OFF position.

Handle Lock Mechanism

The handle can be locked in the ON or OFF position. Upto 3 padlocks can be fitted (padlock not supplied).

Ordering code

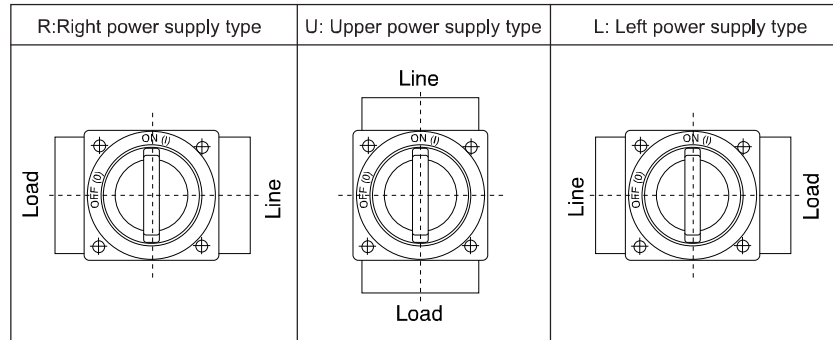
Please specify the correct type code when ordering

TFJXX -	U
Mounting Direction	
U	Upper power supply
L	Left hand power supply
R	Right hand power supply

Additional Options

Please specify at the time of ordering

	Standard	Option
Colour	Black	Yellow base Red handle
IP	3X	55

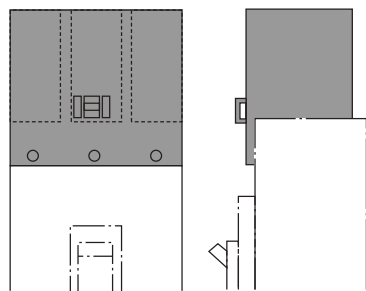


TEMBREAK MOULDED CASE CIRCUIT BREAKERS

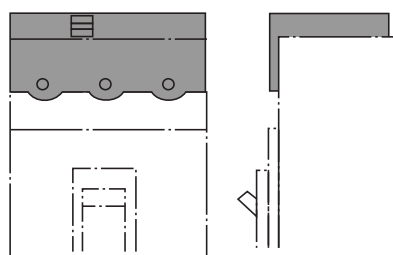
INSULATION ACCESSORIES

Terminal Covers

Terminal covers prevent exposure of terminals and other live parts.



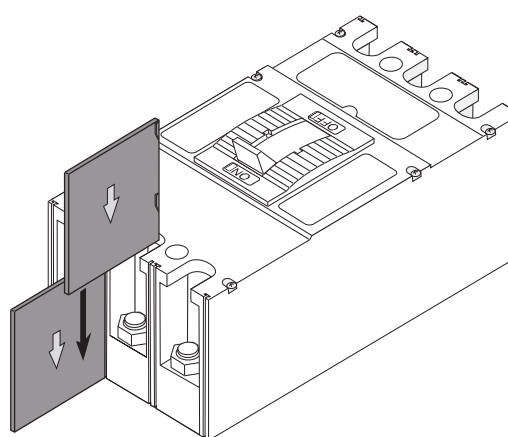
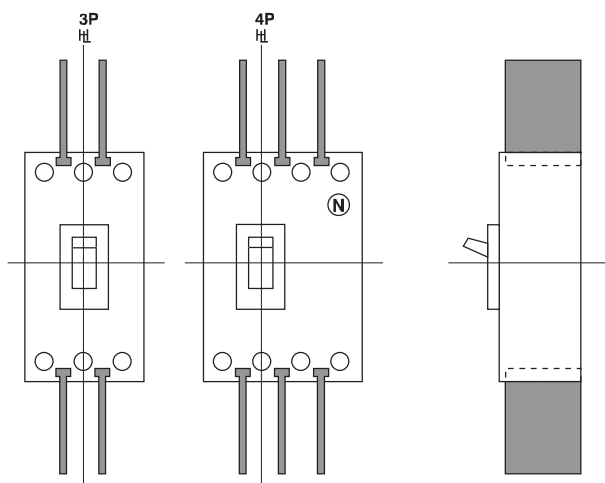
Terminal Covers for Front Connection.



Terminal Covers for Rear Connection and Plug-in.

Interpole Barriers

Interpole barriers provide maximum insulation between phases at the terminals of the MCCB. They can not be fitted at the same time as any of the terminal covers. Interpole barriers can easily be fitted to either end of an MCCB.



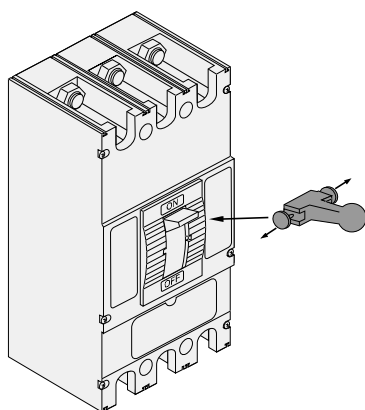
Interpole Barriers

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

TOGGLE ACCESSORIES

Toggle Extension

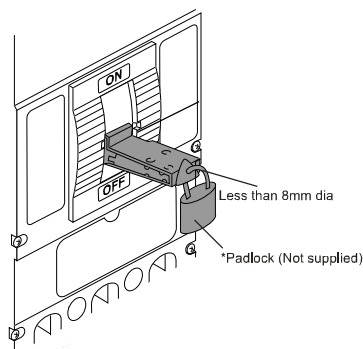
The toggle extension provides extra leverage for the operator when performing manual ON, OFF and RESET operations.



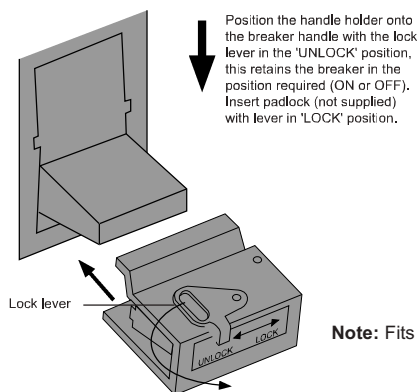
Toggle Extension

Toggle Lock

The toggle lock enables padlocking of the MCCB in either the ON or OFF position. Padlocks are not supplied.



Toggle Lock



Note: Fits up to three padlocks

Key Lock

MCCBs, including those fitted with door mounted handles and some motor operators can be supplied with Castell locking systems. Contact us for details.

Door Flange

A door flange provides a neat finish for the toggle cutout on the outside of the panel door.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

MECHANICAL INTERLOCKS

Rear Mechanical Interlocks

Rear interlocks consist of a mechanism mounted at the back of each MCCB of an adjacently mounted pair. The interlock inhibits the closure of one MCCB if the other is already in the ON position. MCCBs cannot be mounted directly to a flat plate, but are installed on a frame to ensure space for the interlock mechanism.

Two MCCBs or switch-disconnectors of the same frame size may be rear interlocked.

An operating handle or motor operator can be fitted to an MCCB with rear interlock.

Wire Mechanical Interlock

Wire interlocks consist of two mechanisms connected by a cable. The mechanisms are mounted on the back of two MCCBs located at a distance from each other which is limited by the length and bend radius of the cable. The mechanisms inhibit the closure of one MCCB if the other is already in the ON position. MCCBs cannot be mounted directly to a flat plate, but are installed on a frame to ensure space for the interlock mechanism.

Any two of the TemBreak MCCBs or switch disconnectors featured in this catalogue may be wire interlocked.

An operating handle or motor operator can be fitted to an MCCB with rear interlock.

TemTransfer Automatic Changeover Controller

TemBreak MCCBs can be configured to provide automatic supply changeover. They are compatible with the TemTransfer changeover controller. Refer to section 5 for details.

Front Mechanical Interlock

Front interlocks are manually operated toggle locking devices which can be installed between two adjacent MCCBs. Depending on the position of the interlock, one or other of the MCCBs is inhibited from being in the ON position.

Two MCCBs or switch-disconnectors of the same frame size may be front interlocked.

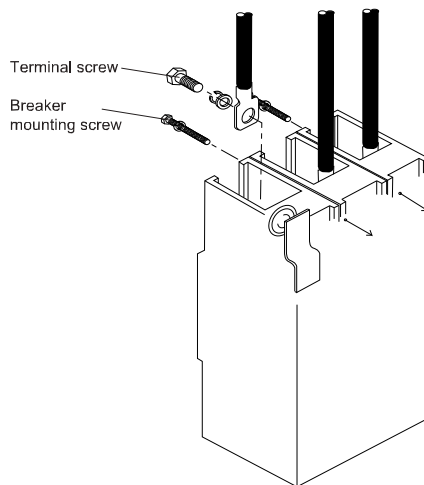
Operating handles and motor operators cannot be fitted to MCCBs with front mechanical interlocks.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

INSTALLATION

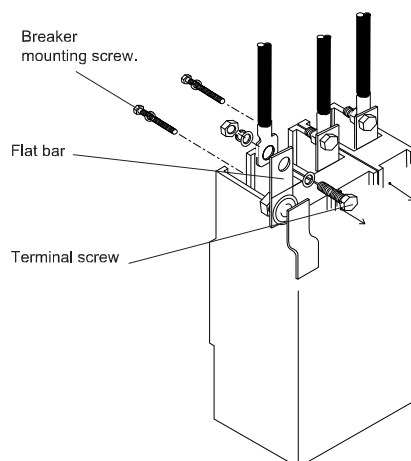
Connection of Busbars and Terminated Cables

This method is standard for 800A frame models. Solid conductors or cables terminated with compression terminals can be used.



Connection of Large Conductors and Multiple Conductors

Flat bars are terminal extensions which can be fitted to line or load side terminals and are used to connect large conductors and multiple conductors. Optional for 800A frame, standard for 1250A and 1600A frame models.



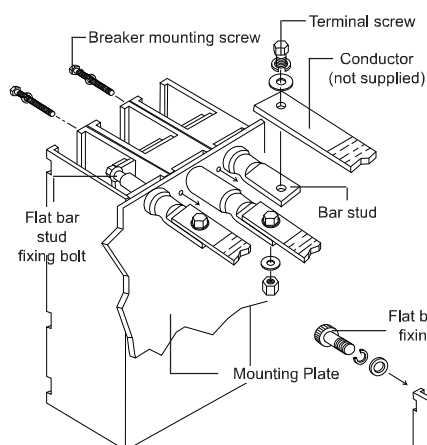
TEMBREAK MOULDED CASE CIRCUIT BREAKERS

INSTALLATION

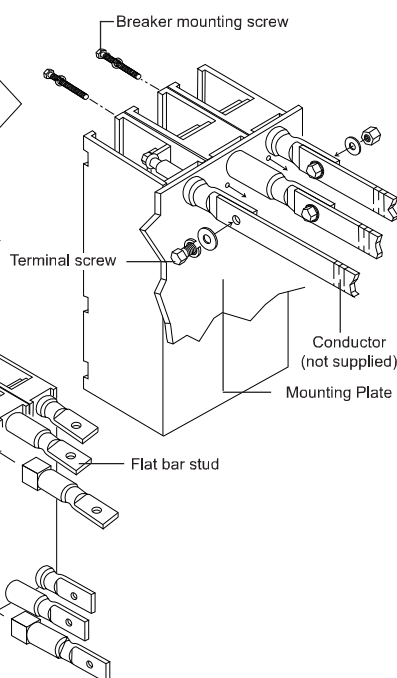
Termination in a Separate Compartment

Rear connections allow termination of conductors in a different switchboard compartment to the MCCB body. Optional.

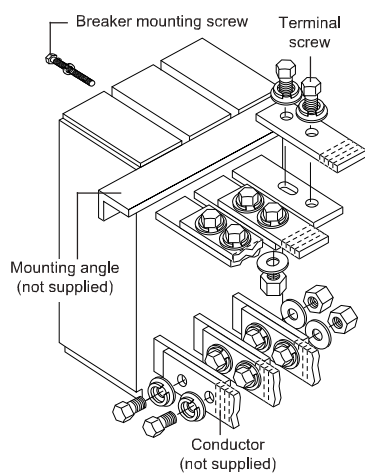
Horizontal (standard)



Vertical



Rear Connections for 800A Frame MCCBs

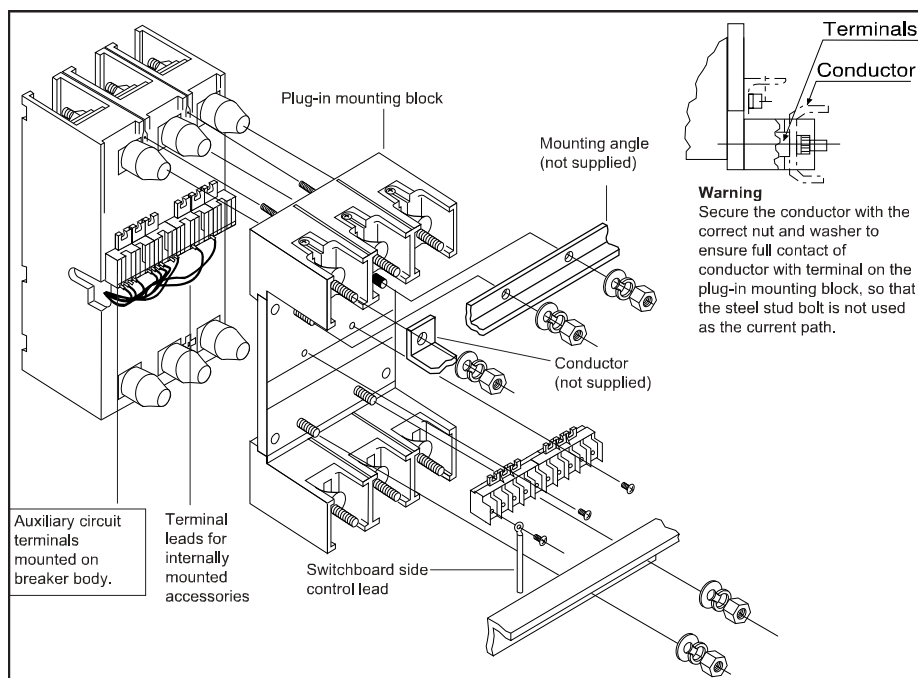


Rear Connections for 1250A and 1600A frame MCCBs

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

Plug-in Mounting

The plug-in mounting system allows fast replacement of the MCCB body without the need to disturb the terminations. Solid conductors or cables terminated with compression terminals can be used. Plug-in mounting is available for 800A and 1250A frame MCCBs.



IP20 Protection (Optional)

IP-20 degree of protection and safety trip are available for plug-in type breakers, for switchboard and distribution board use.

Safety Trip (standard)

(Trip first, plug-in mechanism)

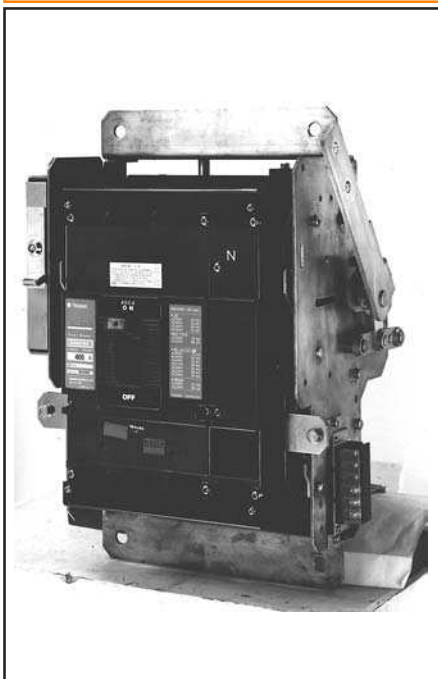
The breaker will trip automatically, if it is withdrawn while still in the 'ON' position. It is not possible to "plug-in" the breaker when it is in the 'ON' position.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

Drawout Mounting

Two types of drawout mounting system are used, depending on the frame size of the MCCB.

Two-position type



800A frame and 1250A frame

- The plug-in type breaker is housed in the draw-out cradle.
- The draw out cradle has two positions "Connected" and "Isolated".
- The auxiliary circuits are automatically connected or isolated by the auxiliary circuit terminals on the plug-in breaker. Manual connector type is available on request. When a motor operator is fitted, the circuits are manually connected (manual connector type).
- Safety Trip (first trip draw out mechanism). The breaker will trip automatically if it is drawn out while still in the "on" position.
- Position keylock in isolated position (optional) available on request.
- Position switch (1ab) in Connected position (optional) available on request.
- IP-20 degree of protection (Standard)

Three-position type



1600A frame

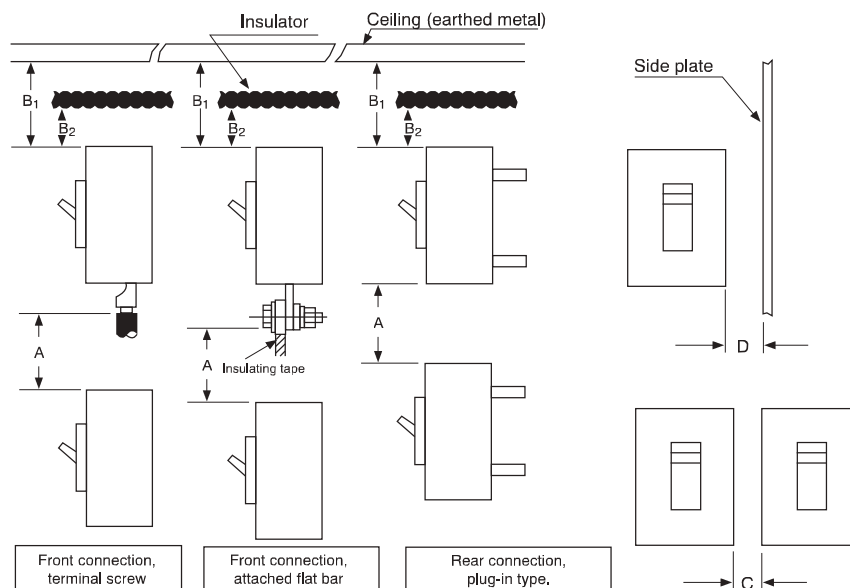
- The draw out cradle has three positions "Connected", "Test" and "Isolated".
- The auxiliary circuits are automatically connected and isolated by the disconnect contacts.
The auxiliary circuits are as follows:
Connected in "Connected" and "Test" positions and isolated in the "Isolated" position.
- Safety shutters are available (optional) which automatically cover the live parts on the cradle side in the isolated position.
- Safety trip (trip first, draw-out mechanism)
The breaker will trip automatically if it is drawn out while still in the "ON" position.

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

Insulation Distances

Attention

Exposed conductors must be insulated up to the breaker terminals. Interpole barriers or optional terminal covers are recommended. If optional terminal covers are used, insulate the exposed conductor until it overlaps the terminal cover.



- A : Distance (refer to Table 1) from lower breaker to open charging part of terminal on upper breaker (front connection) or the distance from lower breaker to upper breaker end (rear connection and plug-in type).
 B₁ : Distance from breaker end to ceiling (earthed metal)
 B₂ : Distance from breaker end to insulator
 C : Clearance between breakers
 D : Distance from breaker side to side plate (earthed metal)

This table is valid for 380/415V

Table 1

Series	Breaker	A	B ₁	B ₂	C	D
	XS800NJ, XS800SE, XH800SE, XH800PJ, XH800PE	120	70	40	0	30
	XS1250CE, XS1250SE	150	70	40	0	30
	TL800NE, XS1600CE, XS1600SE, TL1250NE	150	150	100	0	100

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

Standard Installation Environments and Special Treatments

Tembreak Circuit Breakers are designed and built to be used under standard operating conditions. Breakers required for conditions other than standard are available on request. Please specify when ordering.

Standard operating conditions are in accordance with IEC 60947-2

Operating ambient temperature - 5° C to 40° C

When a thermal magnetic breaker is used at a temperature exceeding its calibrated temperature of 40°c, 45°c or 50°c, the operating current should be reduced in accordance with ambient compensation curves, section 3. Please contact Terasaki for temperature performance details of microprocessor protected breakers.

Relative humidity 85% max

Altitude 2,000m max

Note:*Atmosphere should not contain dust, smoke, corrosive gases, inflammable gases, moisture or salt.

Special environment	Specification	Nameplate indication
Low Temperature Breaker	This is specially treated for storage and use at low temperature. The lowest limit is -40° C for storage and -20° C for use. The breaker is calibrated at 40° C or, 45° C for marine use and requires an appropriate adjustment of the specified characteristics. At low temperatures the environment must be free from rapid temperature changes that result in condensation forming or freezing of the breaker.	PROOFED FOR LOW TEMPERATURE Storage -40° C or higher Operation - 20° C or higher
Tropicalization (fungus moisture proof) Breaker	The dielectric strength and other electrical properties of insulating materials that are likely to deteriorate at high temperature and high humidity. The tropicalised breaker uses specially selected materials and special surface treatment for such conditions. Note: The maximum conditions for use are 60° C ambient and 95% relative humidity provided that there are no rapid changes in temperature likely to occur. Contact Terasaki for details.	TROPICALISATION Fungus moisture proof
Corrosive Resistant Breaker	The corrosive resistant breaker is specially surface treated for increased corrosion resistance. Note: If the breaker is to be used in an atmosphere that has an excess of corrosive gases or moisture and salt then the breaker must be housed in an air tight box, container or cabinet.	CORROSIVE RESISTANT

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

Power Consumption

Breaker	Rated current (A)	Internal resistance (DC mΩ) Value per pole		Power consumption (DC W) Value per pole	
		FC	Plug-in	FC	Plug-in
XS800NJ	800	0.07	0.11	44.8	70.4
XS800SE	400	0.07	0.11	11.2	17.6
XH800SE	450	0.07	0.11	14.2	22.3
XH800PJ	500	0.07	0.11	17.5	27.5
XH800PE	600	0.07	0.11	25.2	39.6
	700	0.07	0.11	34.3	53.9
	800	0.07	0.11	44.8	70.4
XS1250CE	600	0.04	0.053	14.4	19.1
XS1250SE	700	0.04	0.053	19.6	26.0
	800	0.04	0.053	25.6	33.9
	1000	0.04	0.053	40.0	53.0
	1250	0.04	0.053	57.6	76.3
XS1600CE	800	0.022	** 0.039	14.1	25.0
XS1600SE	900	0.022	** 0.039	17.8	31.6
TL800NE	1000	0.022	** 0.039	22.0	39.0
TL1250NE	1200	0.022	** 0.039	31.7	56.2
	1400	0.022	** 0.039	43.1	76.4
	1600	0.022	** 0.039	56.3	99.8

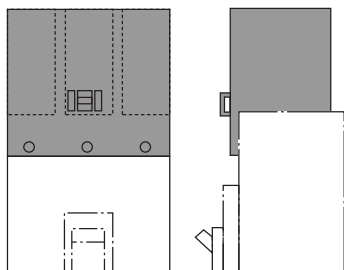
Note: * Value of rear connected type breaker. ** Value of draw-out type breaker.

Note: All values are intended as a guide only

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

DIMENSIONS

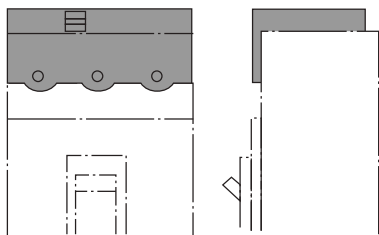
Terminal Covers for Front-Connections



Dimensions table (mm)

Frame (A)	Breaker	Pole	A	B	C	D
800	XS800NJ, XH800PJ XS800SE, XH800SE, XH800PE	3	215	130	99.5 ('ON' side)	99
		4	285		102.5 ('OFF' side)	
1250	XS1250SE, XS1250CE	3	215	130	115	99
		4	285			

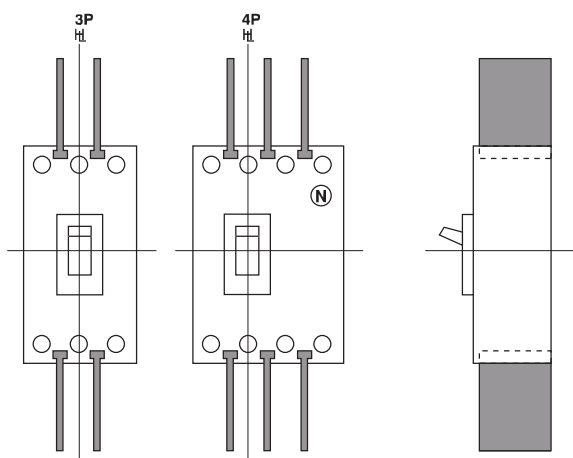
Terminal Covers for Rear Connections and Plug-in Connections



Dimensions table (mm)

Frame (A)	Breaker	Pole	A	B	C	D
800	XS800NJ, XH800PJ XS800SE, XH800SE, XH800PE	3	206	14	102 ('ON' side)	100,5
		4	280	18	102 ('OFF' side)	98

Interpole Barriers



Dimensions table (mm)

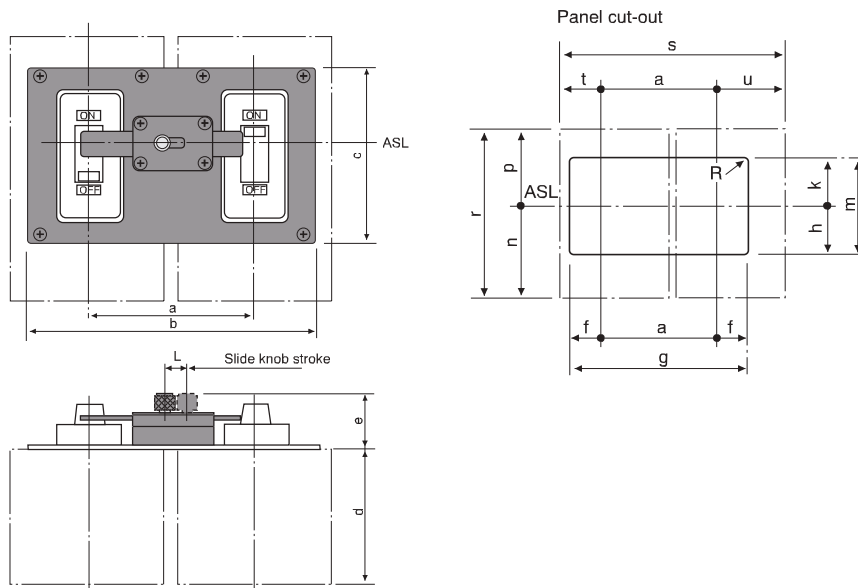
Frame (A)	Breaker	A	B
800	XS800NJ, XH800PJ, XS800SE, XH800SE, XH800PE, TL800NE	110	95
1250	XS1250SE, XS1250CE, TL1250NE	110	95
1600	XS1600CE, XS1600SE	110	95

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

DIMENSIONS

Front Mechanical Interlock

ASL: Arrangement Standard Line



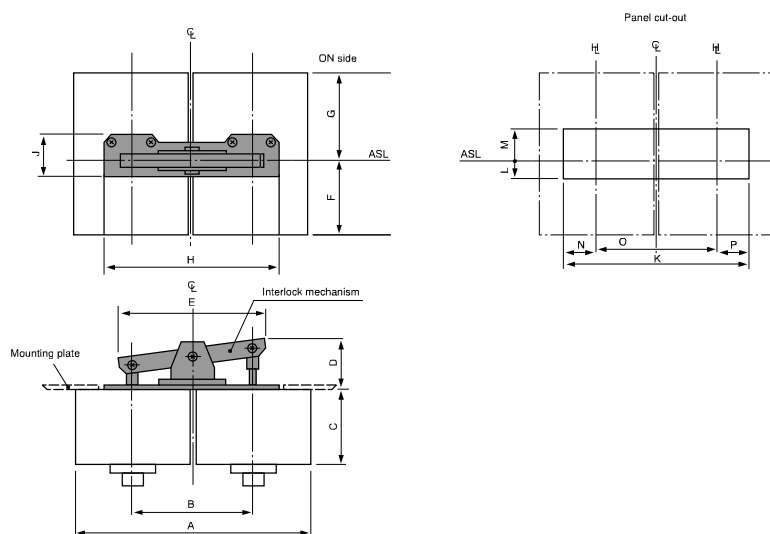
Dimensions table (mm)

Frame (A)	Breaker	Pole	a	b	c	d	e	f	g	h	k	m	n	p	r	s	t	u	L	R
800	XS800NJ	3	220	350	136	103	31.6	66.5	353	57.5	81.5	139	132	141	273	430	105	105	30	8.5
	XS800SE	4	290	420	136	103	31.6	66.5	423	57.5	81.5	139	132	141	273	570	105	175	30	
	XH800PJ																			
	XH800SE																			
	XH800PE																			
1250	XS1250SE	3	220	340	129	120	39.6	61.5	343	58	74	132	170	200	370	430	105	105	30	8.5
	XS1250CE	4	290	410	129	120	39.6	61.5	413	58	74	132	170	200	370	570	105	175	30	8.5
1600	XS1600SE	3	220	340	129	140	39.6	61.5	343	58	74	132	170	200	370	430	105	105	30	8.5
	TL800NE																			
	TL1250NE																			
	XS1600CE	4	290	410	129	140	39.6	61.5	413	58	74	132	170	200	370	570	105	175	30	8.5

Rear Mechanical Interlock

ASL: Arrangement Standard Line

H: Handle Frame Centre Line



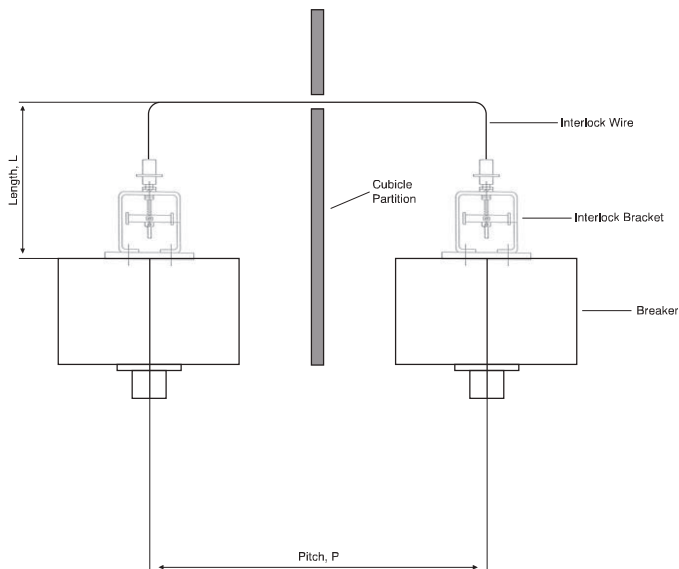
Dimensions table (mm)

Frame (A)	Breaker	Pole	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P
800	XS800NJ	3	430	220	103	74	250	132	141	430	83	440	41	52	110	220	110
	XS800SE	4	570	290	103	74	320	132	141	500	83	510	41	52	110	290	110
	XH800PJ																
	XH800SE																
	XH800PE																

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

DIMENSIONS

Wire Mechanical Interlock



Installation of wire mechanical interlock

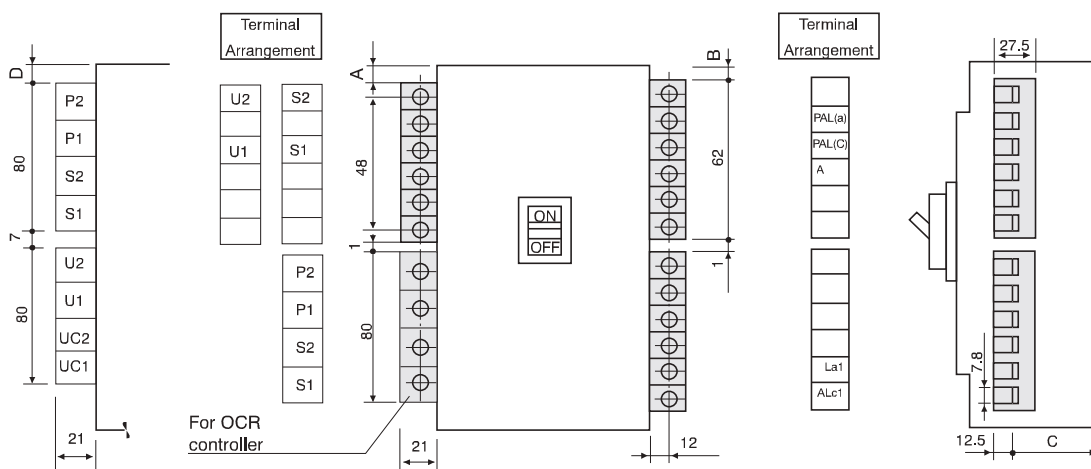
Wire Length (m)	Mounting Pitch, P (mm)	Hole Position Length, L (mm)	Wire Support Method
1.5	1000 ↓ 900 ↓ 750	550 ↓ 600 ↓ 700	Support 2 points at equal intervals
1.0	650 ↓ 500 ↓ 350 ↓ * (1) ↓ * (2)	450 ↓ 500 ↓ 530	Support at the centre

* (1): minimum of 60mm + cubicle partition thickness

* (2): minimum of arc base distance if vertical.

↓ : intermediate dimensions are acceptable.

Terminal Blocks



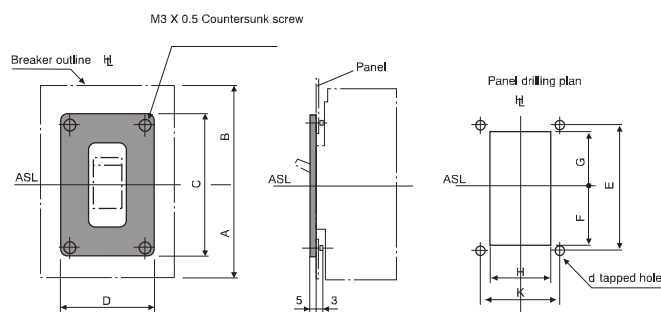
Dimensions table (mm)

Frame (A)	Breaker	A	B	C	D
800	XS800NJ	88	88	60	64
	XS800SE				
	XH800PJ				
	XH800SE				
	XH800PE				
1250	XS1250SE	51	51	72	51
	XS1250CE				
1600	XS1600CE	51	51	92	51
	XS1600SE				
	TL1250NE				
	TL800NE				

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

DIMENSIONS

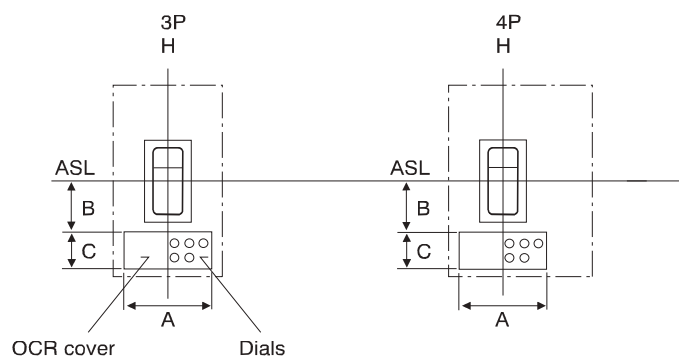
Door Flange



Dimensions table (mm)

Frame (A)	Breaker	A	B	C	D	E	F	G	H	K	d			
800	XS800NJ XS800SE XH800PJ XH800SE XH800PE	132	141	135	95	120	48	56	48	56	70	90	80	M3x0.5
1250	XS1250SE XS1250CE	170	200	150	120	135	51	63.5	51	63.5	85	115	80	M3x0.5
1600	XS1600SE XS1600CE TL800NE TL1250NE	170	200	150	120	135	51	63.5	51	63.5	85	115	80	M3x0.5

Panel Cutout for Adjustment Dials



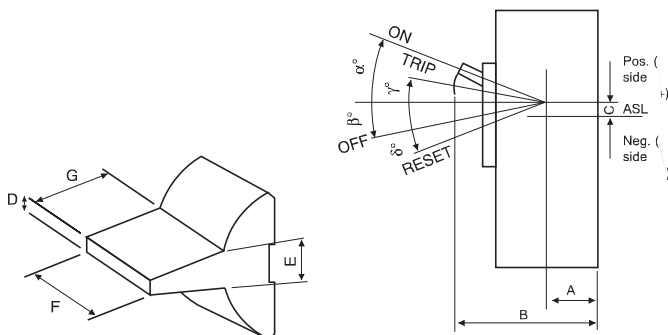
Dimension table (mm)

Frame size (A)	MCCB type	Dimensions		
		A	B	C
800	XS800NJ XS800SE XH800PJ XH800PE XH800SE	210	57	48.5
1250	XS1250CE XS1250SE	210	57.5	58
1600	XS1600CE XS1600SE TL800NE TL1250NE	210	57.5	58

TEMBREAK MOULDED CASE CIRCUIT BREAKERS

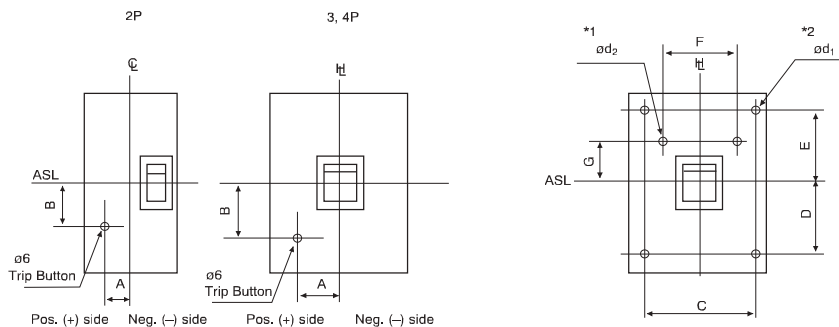
DIMENSIONS

Toggle Operation and Dimensions



Frame (A)	Breaker	Operation angles				Dimensions (mm)								Operation eff (kgf.)			
800	XS800NJ XS800SE XH800PJ XH800PE XH800SE	20	8.5	11	10.5	43.2	144	-6.8	11	12.5	40	33	12.3	15	24	100.8	
1250	XS1250CE XS1250SE	22	4	12	9	73.5	171.8	-2.8	11	12.5	40	30	16	30	35	98.3	
1600	XS1600CE XS1600SE TL800NE TL1250NE	22	4	12	9	93.5	191.8	-2.8	11	12.5	40	30	16	30	35	98.3	

Position of Trip Button and Externally Mounted Accessories



Frame (A)	Breaker	Poles	Trip button		Diameter					Lower hole			
			A	B	C	D	E	F	G	ød ₁	Depth	ød ₂	Depth
800	XS800NJ	3	+15	74	90	125.5	134.5	105	73	4.65	5.1	5.65	6
	XS800SE	4			160								
	XH800PJ												
	XH800PE												
	XH800SE												
1250	XS1250CE	3	0	72.5	100	155	185	—	—	4.65	5	—	—
	XS1250SE	4			170								
1600	XS1600CE	3	0	72.5	100	155	185	—	—	4.65	5	—	—
	XS1600SE	4			170								
	TL800NE												
	TL1250NE												

Moulded Case Circuit Breaker

Chassis systems



XB 800 12U chassis



MCCB chassis

Overview

MCCBs are often required to be mounted singly, in the case of a motor control centre, or in groups, as part of a larger power distribution system. To help assist with grouped MCCB power distribution requirements, NHP manufacture standardised busbar systems, simply called chassis. NHP stock a range of basic chassis which can be purchased "off the shelf", while more complex, or higher current chassis, are produced on a custom basis to suit a customer specification.

Common features

- A new mounting channel common to all chassis to make installation quicker & easier
- All chassis suitable for use up to 690 V AC

TemWay XA, XB, XC chassis

- 36 and 40 kA ratings on standard TemWay XA and XB chassis
- 50 and 65 kA ratings on TemWay XC chassis
- XC 1000 A chassis are stocked with 400 A and 250 A tee off combinations
- A range of TemWay 4 pole XA and XB chassis, suitable for earth leakage MCCBs

Heavy current "HC" chassis

- HC heavy current chassis for MCCBs, 20 - 1250 A
- HC heavy current chassis, compact single sided version, or double sided
- 11 box sizes – more economical sizing to suit applications. Saves cost
- Common configurations of HC chassis now stocked - fully assembled for quick delivery

Testing

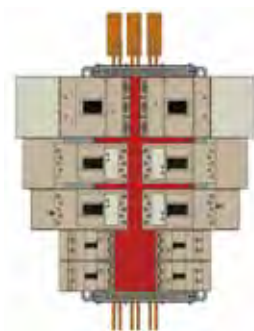
Both TemWay and HC Chassis have been unconditionally type tested (no MCCBs fitted) in Australia, at the short time ratings shown in the table below.

Chassis ratings

Chassis type	Description	Main bar rating (A)	Fault current level lcw Rating	MCCB frame size	MCCB Cat. No.
XA	Double sided	630, 800 A ¹⁾	36 kA for 1 second 40 kA for 0.5 second	125 AF	E/S/ZS125 12A – 125 A
XB	Double sided	800 A ¹⁾	36 kA for 1 second 40 kA for 0.5 second	250 AF	E/S/ZS250 NJ/ GJ 12 A–250 A
XBSS	Single sided Left or right sided	800 A ¹⁾	36 kA for 1 second 40 kA for 0.5 second	250 AF	E/S/ZS250 NJ/ GJ 12 A–250 A
PXB	Double sided	800 A	36 kA for 1 second 40 kA for 0.5 second	250 AF	S250PE, or a mix of 250 AF sizes
XC	Double sided	1000 A ¹⁾	50 kA for 1 second 65 kA for 0.5 second	250 AF, 400 A	E/S/ZS160-250 up to E/S400
HC	Double sided or Single sided left or right	1250 A, 1600 A, 2200 A	65 kA for 1 second	250 AF to 1250 AF	E/S160 up to XS1250SE

Notes: ¹⁾ XB Chassis main bars are rated at 800 A, and XC bars are rated 1000 A, while for XA chassis 800 A is an option. To comply with the new Australian New Zealand AS/NZS 3000 - 2007 standard regarding separation, XA, XB and XC chassis should be only used in switchboards having operational currents less than 800A. For chassis that includes integral separation and for utilisation currents equal to, and exceeding 800 A, a HC high current chassis must be used. HC Chassis will not accept TemBreak 1, 125 AF, 250 AF and 400 AF MCCBs.

HC High Current chassis for 250 AF to 1250 AF MCCBs



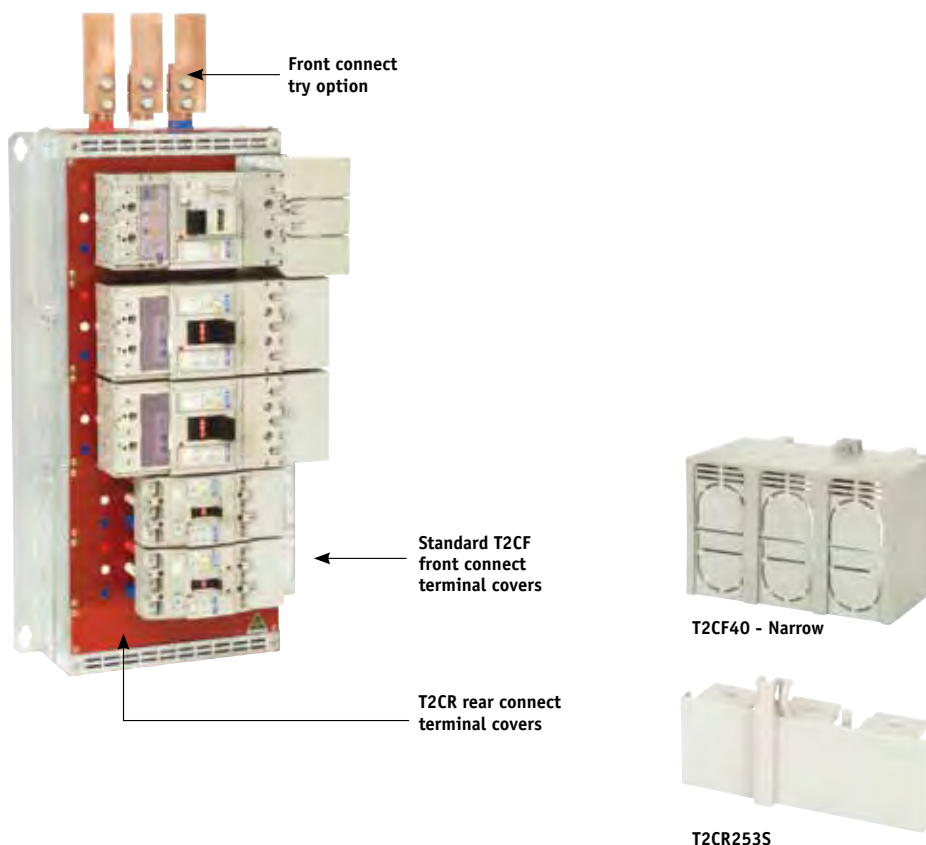
Features

- Double sided 3 pole MCCB chassis
- Compact single sided chassis 3 or 4 pole
- 1250 A, 1600 A or 2200 A rated main bars
- 11 enclosure sizes for more economical chassis sizing
- Front connect tags supplied as standard
- Complies with AS/NZS 3439, AS/NZS 3000 - 2007
- Form of separation 4bih. AS/NZS 3439.1 : 2000 (Annex ZF)
- Circuit breakers are reverse fed as standard
- 4th pole neutral bars 100 % rated
- Accepts MCCBs rated 12 A to 1250 A
- Ordering: choose from pre-assembled types, or custom assembly

Stocked assembled chassis selection - Suit MCCB amp frames shown below

Main bar rating	Chassis Size	800 A 6 units	630 A 5 units	400 A 4 units	250 A 3 units	Cat. No.
1600 A	DS	-	2 x 630	2 x 400	4 x 250	HCSTD1DS16153
1600 A	DS	-	4 x 630	-	8 x 250	HCSTD2DS16243
1600 A	SS left	-	1 x 630	1 x 400	2 x 250	HCSTD3SSL16153
1600 A	SS right	-	1 x 630	1 x 400	2 x 250	HCSTD4SSR16153
1600 A	SS left	-	1 x 630	1 x 400	4 x 250	HCSTD5SSL16213
1600 A	SS right	-	1 x 630	1 x 400	4 x 250	HCSTD6SSR16213
2200 A	SS left	1 x 800	1 x 630	1 x 400	3 x 250	HCSTD7SSL22243
2200 A	SS right	1 x 800	1 x 630	1 x 400	3 x 250	HCSTD8SSR22243

Example of a single side HC chassis with MCCBs and terminal covers fitted



HC High Current chassis

250 AF to 1250 AF MCCBs

Chassis box selection – for custom assembly

Chassis Size	Main bar rating (A)	Icw kA rating (1 sec)	MCCB unitspace (mm)	Overall height (mm) ¹⁾	Cat. No.
1			15 U	610	HC12153
2			18 U	718	HC12183
3			21 U	826	HC12213
4			24 U	934	HC12243
5	1250 A		27 U	1042	HC12273
6	(2 x 10	65	30 U	1150	HC12303
7	x 20 mm bars)		33 U	1258	HC12333
8			36 U	1366	HC12363
9			39 U	1474	HC12393
10			42 U	1582	HC12423
11			45 U	1690	HC12453
1			15 U	610	HC16153
2			18 U	718	HC16183
3			21 U	826	HC16213
4			24 U	934	HC16243
5	1600 A		27 U	1042	HC16273
6	(2 x 10	65	30 U	1150	HC16303
7	x 30 mm bars)		33 U	1258	HC16333
8			36 U	1366	HC16363
9			39 U	1474	HC16393
10			42 U	1582	HC16423
11			45 U	1690	HC16453
1			15 U	610	HC22153
2			18 U	718	HC22183
3			21 U	826	HC22213
4			24 U	934	HC22243
5	2200 A		27 U	1042	HC22273
6	(2 x 10	65	30 U	1150	HC22303
7	x 50 mm bars)		33 U	1258	HC22333
8			36 U	1366	HC22363
9			39 U	1474	HC22393
10			42 U	1582	HC22423
11			45 U	1690	HC22453

Notes: ¹⁾ Height excludes extended and attached busbar
 Overall chassis depth when MCCBs are fitted is 269 mm
 Dual feed optional.
 Refer next page for chassis Tee Off details
 Refer to the following pages for detailed dimensions
 Ordering form refer to page 6 - 27
 HC chassis not compatible with TemBreak 1, 125 A – 400 A MCCBs

HC High Current MCCB chassis MCCB

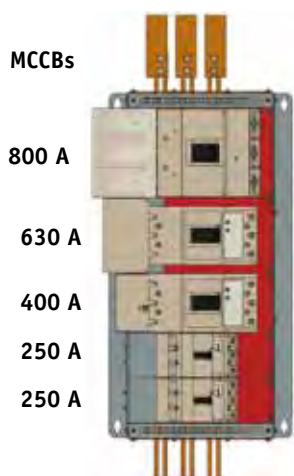
HC Chassis TEE OFF's

Frame	MCCB Amp Frame (A)	MCCB width	Single sided Cat. No. Right load	Single sided Cat. No. Left load	Double sided Cat. No.
S160 / 250	250	3 U	HCR250	HCL250	HCD250
H125 / S250PE	250	3 U	HCR250P	HCL250P	HCD250P
E/S400-630 Narrow	400-630	4 U	HCRN630	HCLN630	HCDN630
E/S400-630 Wide	400-630	5 U	HCRW630	HCLW630	HCDW630
XS/XH630/800	630-800	6 U	HCR800	HCL800	HCD800
XS1250 Right hand load	1250	6 U	HCR1250	-	HCR1250
XS1250 Left hand load	1250	6 U	-	HCL1250	HCL1250

Ordering

- 1) Add tee off's as required to the chassis enclosure to complete the chassis components list.
- 2) Note: If MCCBs below 32 A and a kA rating above 30 kA are required, use H125NJ320 and H125NJ332 with 250 A Tee Off catalogue number above.
- 3) 400 A MCCBs fitted with a same width narrow cover are 4 units in width.
- 4) 630 A MCCBs fitted with a 'wide' width cover are 5 units in width.
- 5) For ordering, use order from chassis catalogue or contact NHP.

Ordering example



Example: Single sided chassis	Chassis components	Quantity
Chassis box 1600 A, less tee offs	HC16183	1
800 A left load tee off set	HCL800	1
630 A left load tee off set	HCLW630	1
400 A left load tee off set	HCLN630	1
250 A left load tee off set	HCL250	1
250 A left load tee off set	HCL250	1

Testing:

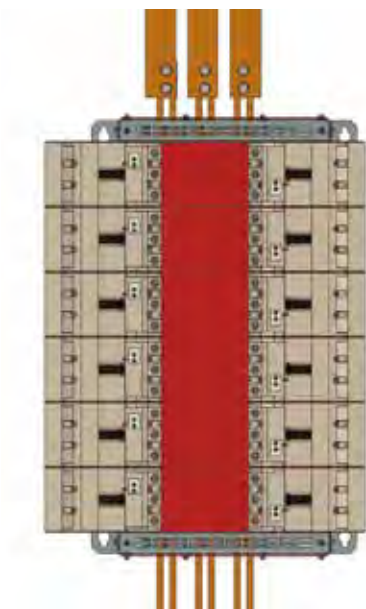
The HC chassis has been unconditionally type tested (no MCCBs fitted) in Australia, at a short time rating of 65 kA for 1 second.

Notes: Bottom or top extended main bars are optional.
For MCCB terminal cover selection use refer pages 6 - 9 and 6 - 10.

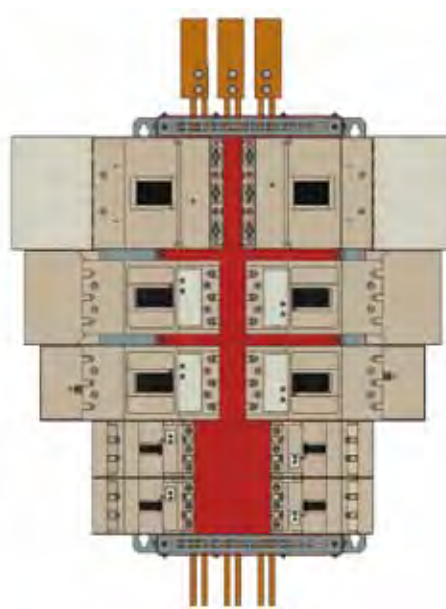
HC Chassis configuration types

Examples

HC Chassis with 250 A Frame MCCBs
Double sided, 3 pole, 1250 A main bars



HC Chassis with 250 A – 800 A MCCBs
Double sided, 3 pole, 2200 A main bars



400/630 A terminal covers

A 630 A MCCB using a T2CF403SWNG wide cover is 5 units of width (narrow cover optional)



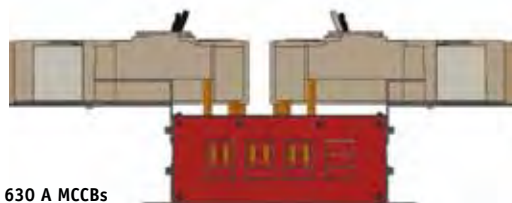
5 Units wide: MCCB + wide cover

A 400 A MCCB using a T2CF403SLNG narrow (same width as MCCB) cover is 4 units wide (wide cover optional)



4 Units wide: MCCB + narrow cover

HC Chassis MCCB mounting brackets
Metal extension brackets are attached to the side of HC chassis to cover rear of fitted MCCBs & terminal covers



400 A / 630 A MCCBs

HC High Current chassis order form

Customer _____ Deliver to _____ _____ Contact _____	Account No. _____ Order No. _____ Quantity _____ Price \$ _____ Required Delivery ____ / ____ / ____
---	---



TORQUE SETTINGS

MCCB LINE SIDE BOLTS		
250 AMPS	M6	7Nm
400 - 800 AMPS	M8	14Nm
1250 AMPS	M10	30Nm
MAIN BAR CONNECTIONS		
	M10	44Nm

CUSTOMER REFERENCE DRAWINGS FOR ALL MOUNTING, CUT OUT AND CONNECTION DETAILS

3 Pole Double Sided	MD-L002584
3 Pole Single Sided	MD-L002585
4 Pole Left Hand Single Sided	MD-L002586
4 Pole Right Hand Single Sided	MD-L002587

CHASSIS SPECIFICATIONS

POLES & TYPE		3 Pole	Double sided
		3 Pole	Single Sided Right Hand Load
		3 Pole	Single Sided Left Hand Load
		4 Pole	Single Sided Right Hand Load
		4 Pole	Single Sided Left Hand Load
ENTRY			Top Entry only
			Bottom Entry only
			Dual Feed
RATING 65 kA for 1 sec		1250 Amp	2-10 x 20 mm
		1600 Amp	2-10 x 30 mm
		2200 Amp	2-10 x 50 mm

3 POLE TEE OFFS - DOUBLE OR SINGLE SIDED

Qty	Units	Total	Type
x 3	=	250	S160-E250/S250
x 3	=	250P	H125/S250PE
x 4	=	400	E400/S400
x 5	=	630	* E630/S630
x 6	=	800	XS/XH630/800
x 6	=	1250	XS1250 (1per tee-off)
Total Units _____ Indicate load side <input type="checkbox"/> Left <input type="checkbox"/> Right			
* 18 mm gap each side of 630 amp MCCB			

4 POLE TEE OFFS - SINGLE SIDED ONLY

Qty	Units	Total	Type
x 4	=	250	S160./S250
x 4	=	250P	H125/S250PE
x 6	=	400	E400/S400
x 7	=	630	* E630/S630
x 8	=	800	XS/XH630/800
x 8	=	1250	XS1250
Total Units _____			
* 18 mm gap each side of 630 amp MCCB			

Note: ** 250P TEE OFFS SUIT H125 AND S250PE ONLY

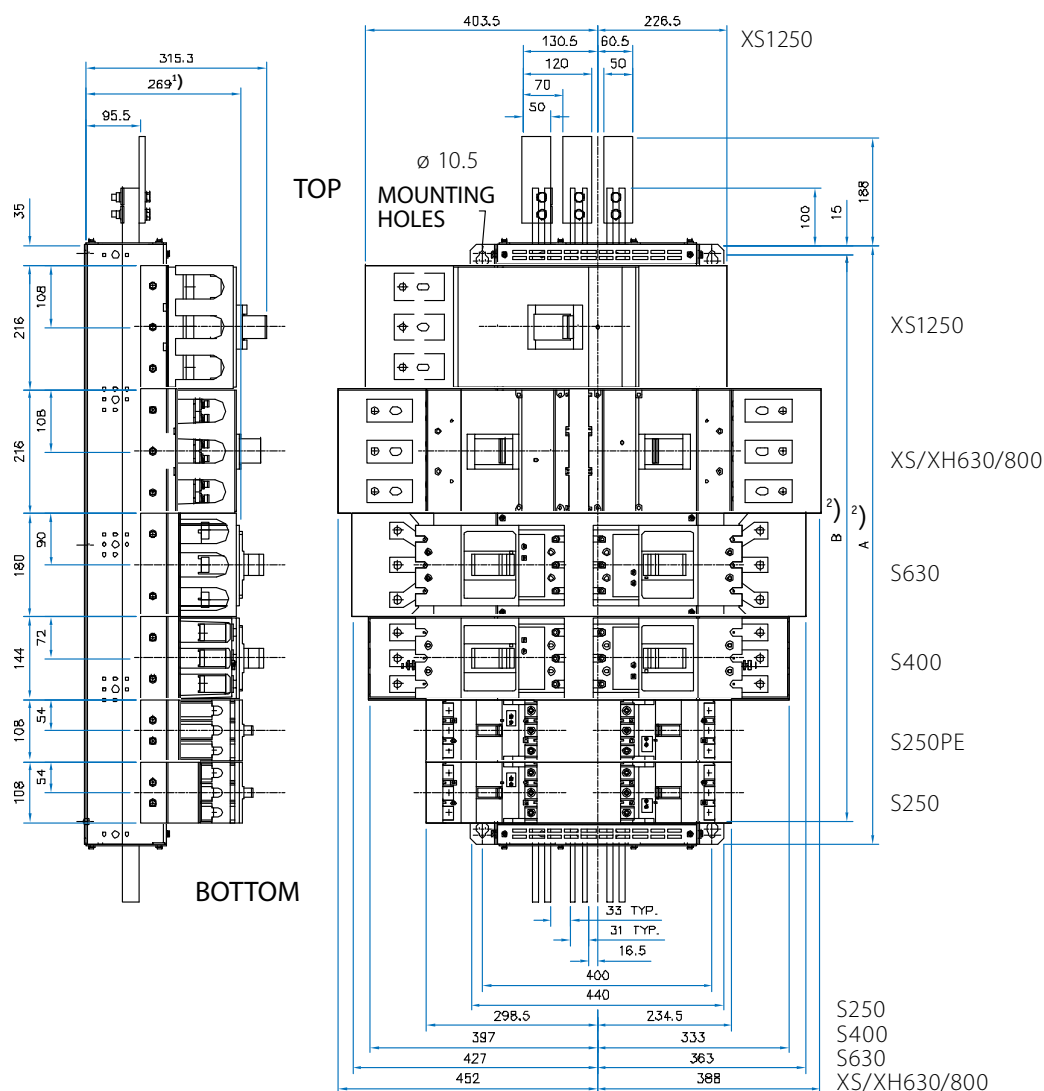
- Chassis are supplied crated and without MCCBs fitted
- All circuit breakers to be fitted reverse fed by customer
- Pan Width = 440 mm including mounting channel
- Depth = 269 mm from rear to escutcheon
- 1 Unit = 36 mm

Internal use only

NHP Branch	_____
NHP Contact	_____
Sales Order	_____
Works order	_____

6

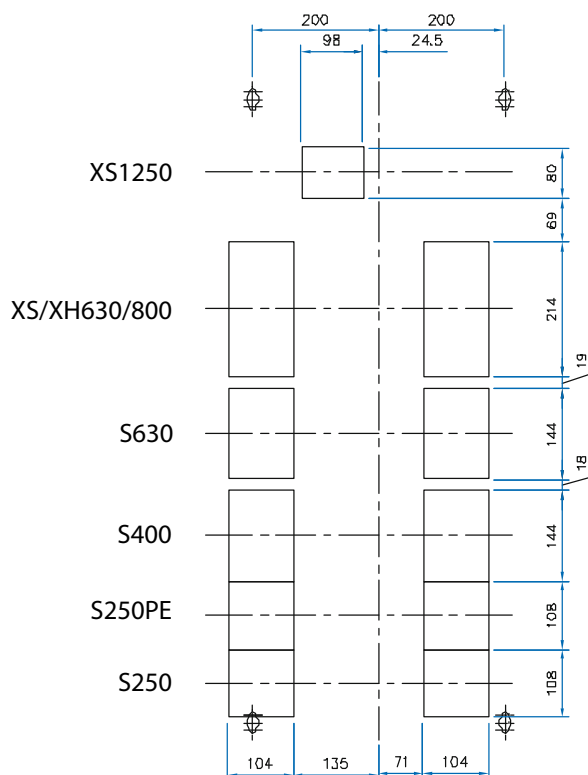
6



6 - 28

HC High Current chassis Double sided, 3 pole

Dimensions and panel cut-out detail



Chassis Dimension reference table

Chassis size	DIM A	DIM B
Size 1 - 15 Units	610	556
Size 2 - 18 Units	718	664
Size 3 - 21 Units	826	772
Size 4 - 24 Units	934	880
Size 5 - 27 Units	1042	988
Size 6 - 30 Units	1150	1096
Size 7 - 33 Units	1258	1204
Size 8 - 36 Units	1366	1312
Size 9 - 39 Units	1474	1420
Size 10 - 42 Units	1582	1528
Size 11 - 45 Units	1690	1636

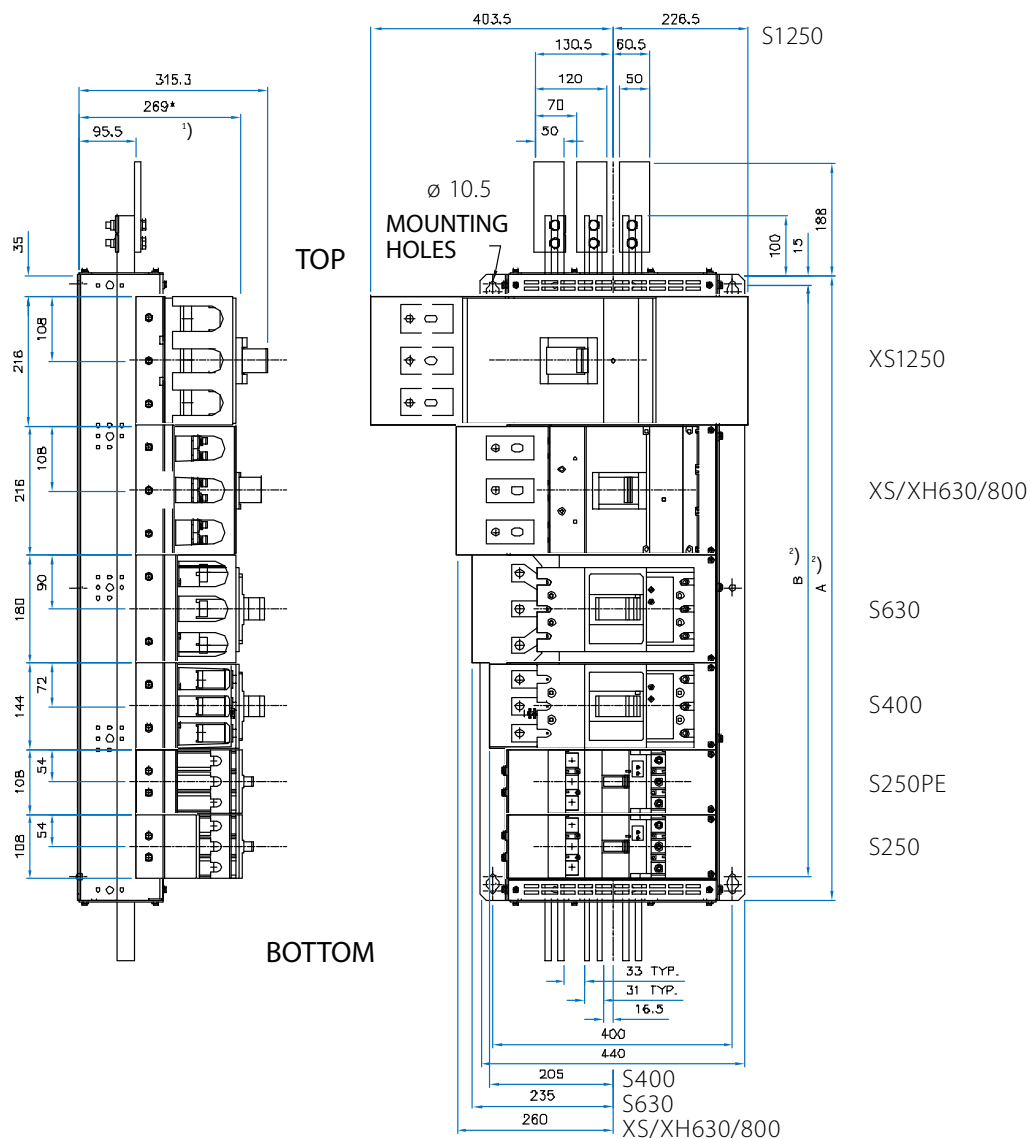
MCCB unit widths - 1 Unit = 36 mm

MCCB frame size	Units
S250	3
S250PE	3
S400	4
S630	5
XS/XH630/800	6
XS1250	6

Notes: Cut out dimensions are centered on the MCCB toggle

HC High Current chassis Single sided, 3 pole

Dimensions - LEFT hand load connection



Notes: ¹⁾ Escutcheon / door height: from the surface of the chassis mounting panel to the outside of the escutcheon or door surface.

²⁾ Refer next page for dimensions.

The chassis busbar supports allow for a full size neutral.

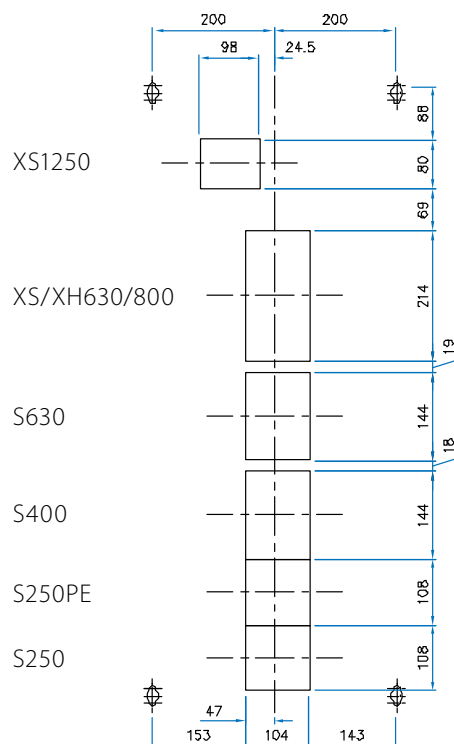
Form of construction to AS/NZS 3439.1: 2000: Up to 4 bph (requires terminal covers to be fitted and switchboard design to segregate the incoming connections and other busbars in the switchboard.)

1600 A chassis shown above. Options: 1250 A with 2 off 20 x 10 mm busbars per phase
1600 A with 2 off 30 x 10 mm busbars per phase
2200 A with 2 off 50 x 10 mm busbars per phase

A left sided chassis is shown above. For RIGHT sided versions the 1250 A MCCB will be the only breaker that changes location on the chassis. A RIGHT sided MCCB mounted layout will be mirror image of a left sided chassis for all MCCBs.

HC High Current chassis Single sided, 3 pole

Dimensions - LEFT hand load connection



Chassis Dimension reference table

Chassis size	DIM A	DIM B
Size 1 - 15 Units	610	556
Size 2 - 18 Units	718	664
Size 3 - 21 Units	826	772
Size 4 - 24 Units	934	880
Size 5 - 27 Units	1042	988
Size 6 - 30 Units	1150	1096
Size 7 - 33 Units	1258	1204
Size 8 - 36 Units	1366	1312
Size 9 - 39 Units	1474	1420
Size 10 - 42 Units	1582	1528
Size 11 - 45 Units	1690	1636

MCCB unit widths - 1 Unit = 36 mm

MCCB frame size	Units
S250	3
S250PE	3
S400	4
S630	5
XS/XH630/800	6
XS1250	6

Notes: A left sided chassis is shown above. For right handed single sided versions, cut out dimensions are mirrored on the chassis centerline.
 For RIGHT sided versions the 1250 A MCCB will be the only breaker that changes location on the chassis. A RIGHT sided 1250 A MCCB mounted layout will be mirror image of a left sided mounted MCCB.

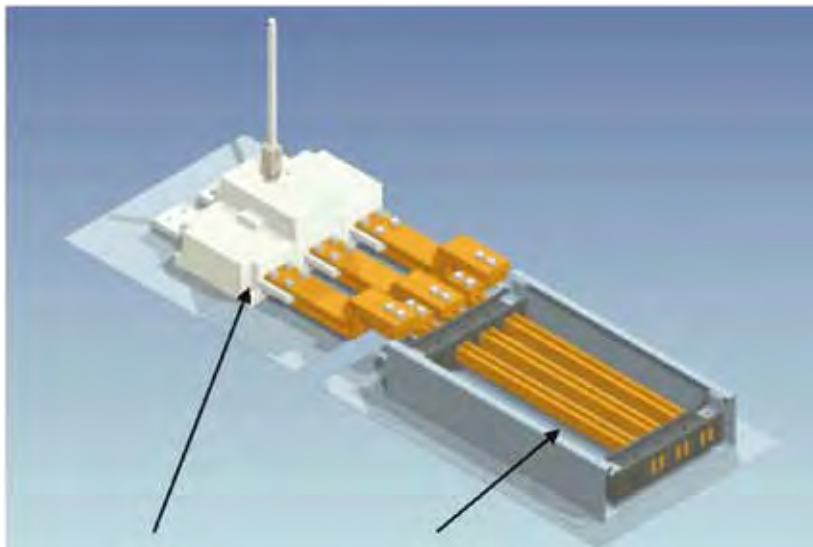
HC Chassis/load-break switch combination

One possible connection method for a HC High current chassis and a Socomec load-break switch

HC front connect tags are optional

Example - Connection method

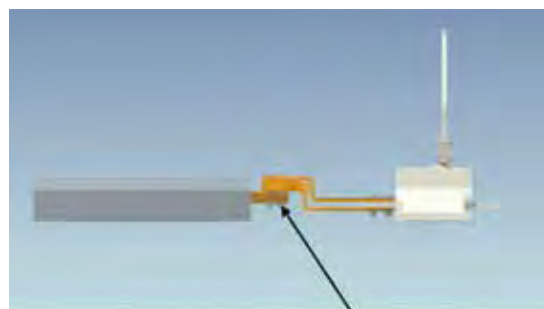
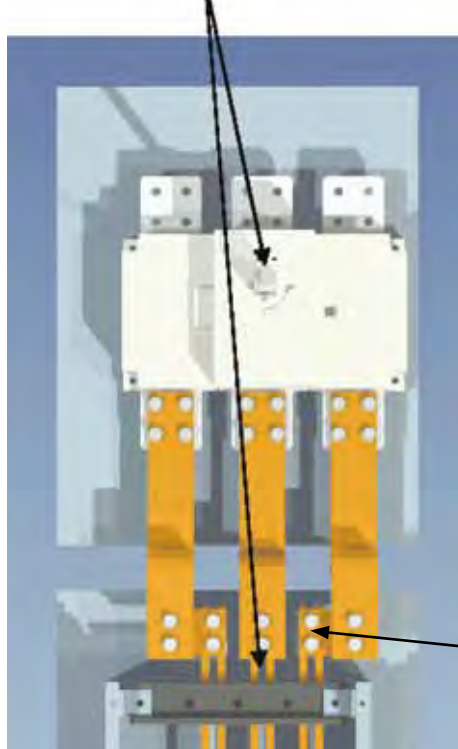
HC Chassis and Socomec 1600 A Load-break switch



Socomec 1600 A load-break switch

HC Chassis

Align centre of load-break switch with centre busbar of chassis



CUBIC captive nuts for fastening to chassis busbar (nuts supplied with chassis as standard) ¹⁾

Spacers fitted between connection tags and chassis busbars

Notes: ¹⁾ A connection 'Clamp, nut and bolt kit' is available, Catalogue Number: 08930044. The kit contains 4 x 60 mm x M10 hex head bolts, 4 clamp-nuts and 4 spring washers.

NHP Chassis testing

Temway and HC Chassis have been unconditionally type tested (no MCCBs fitted) in Australia.

Testing has been performed for:

- Temway XA, XB and XC chassis
- HC high current chassis

Test Report No. 1458/1

Date Issued: 15 October, 2007

Product: "Temway XB Double Sided 3P 42W" chassis

Clients rating: 415 V, 50 Hz
Rated short-time current (I_{sc}) = 40 kA, 0.5 s

Client: NHP Engineering Products Pty Ltd
104-106 William Angliss Drive
Laverton 3026
Australia

Nature of tests: Verification of short-circuit withstand strength of the main busbars, according to Clause 8.2.3.2.3 b) of AS/NZS 3439.1:2002

Result: The product withstood the tests, refer results herein.

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Test Report No. 1470

Date Issued: 12 August, 2008

Product: "1IC 27 Unit Chassis"

Clients rating: 415 V, 50 Hz
Rated short-time current (I_{sc}) = 65 kA, 1.0s

Client: NHP Engineering Products Pty Ltd
104-106 William Angliss Drive
Laverton Vic 3026
Australia

Nature of tests: Verification of short-circuit withstand strength of the main busbars, according to Clause 8.2.3.2.3 b) of AS/NZS 3439.1:2002

Result: The product withstood the tests, refer results herein.

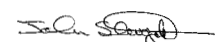
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Prepared by:



John Strugarek

NATA Approved Signatory:



Antony K. Milovae

Tested at:

ITACS High Power

ITACS Head Office & EMC
4-6 Second Street,
Bendigo, South Australia 5007
Postal PO Box 305
Bendigo, South Australia 5007
Telephone (08) 8346 8680
Facsimile (08) 8346 7072
Email: itacs@itsacslab.com

ITACS High Power
37 Sheehan Road,
Postal PO Box 5140
Hendallberg West DC
Victoria 3081
Telephone (03) 9458 3988
Facsimile (03) 9458 3172

ITACS HAE
PO Box 7212
Wilberforce NSW 2756
Telephone/Facsimile:
(02) 4576 3189

ITACS 190 Ltd
Approved Safety Building
Room 707, West 7th Building 101
Yorke Road & Glenelg West
F.R.C.
Telephone/Facsimile:
(073) 8238 3913



Prepared by:



John Strugarek

NATA Approved Signatory:



Antony K. Milovae

Tested at:

ITACS High Power

ITACS Head Office & EMC
4-6 Second Street,
Bendigo, South Australia 5007
Postal PO Box 305
Bendigo, South Australia 5007
Telephone (08) 8346 8680
Facsimile (08) 8346 7072
Email: itacs@itsacslab.com

ITACS High Power
37 Sheehan Road,
Postal PO Box 5140
Hendallberg West DC
Victoria 3081
Telephone (03) 9458 3988
Facsimile (03) 9458 3172

ITACS HAE
PO Box 7212
Wilberforce NSW 2756
Telephone/Facsimile:
(02) 4576 3189

ITACS 190 Ltd
Approved Safety Building
Room 707, West 7th Building 101
Yorke Road & Glenelg West
F.R.C.
Telephone/Facsimile:
(073) 8238 3913



Notes: Refer NHP for further information.

6

Load break switches

SIRCO

125 to 4000 A

Functions

References

Accessories

Enclosed load break switches

Characteristics

Dimensions

Accessories

Inter phase barriers



Use

Safety isolating separation between the terminals, essential for use at 690 VAC or in a polluted or dusty atmosphere. The terminal shrouds also provide phase separation for SIRCOs from 125 to 630 A.

References

Rating (A)	No. of poles	References
125 ... 160	3 P	2998 0033
125 ... 160	4 P	2998 0034
200 ... 250	3 P	2998 0023
200 ... 250	4 P	2998 0024
315 ... 630	3 P	2998 0013
315 ... 630	4 P	2998 0014
800 ... 3200	3/4 P	included

Handle key interlocking accessories

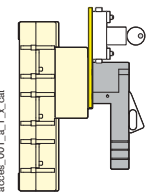


Fig. 1

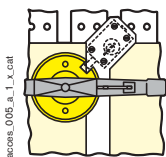


Fig. 2

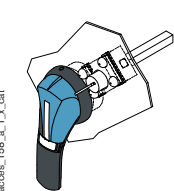


Fig. 3

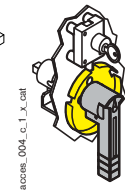


Fig. 4

Use

Locking in position 0 of the front operation handle:

- using a padlock (not supplied) and factory integrated into the handle. From 125 to 1800 A, the padlock on the external front operation handle also locks the door,
- using lock (not included): see diagrams opposite,
- using undervoltage coil: the SIRCO can only be closed if the coil is live.

For 6/8 pole, please consult us.

References

Locking using RONIS EL11AP lock (not included)

Rating (A)	No. of poles	Operation	Figure	References
125 ... 630	3/4 P	direct front	1	2699 6008 ⁽¹⁾
125 ... 1800	3/4 P	external front	3	1499 7701
800 ... 3200	3/4 P	direct front	2	2699 6027
2000 ... 4000	3/4 P	external front	4	2799 7002
4000	3/4 P	direct front	2	2699 7017

Locking using CASTELL lock (not included)

Rating (A)	No. of poles	Operation	Lock type	Figure	References
125 ... 1800	3/4 P	external front	FS	3	1499 7703
125 ... 1800	3/4 P	external front	K	3	1499 7702
2000 ... 4000	3/4 P	external front	K	2	2799 7003
125 ... 160	6/8 P	external front	K	2	4109 8507
250 ... 630	6/8 P	external front	K	2	2999 8707
800 ... 1600	6/8 P	external front	K	2	2799 7003

Locking using 230 VAC undervoltage coil (other voltages: please consult us)

Rating (A)	No. of poles	Operation	References
125 ... 630	3/4 P	external front	2699 9063 ⁽²⁾
800 ... 3200	3/4 P	direct front	2699 9315 ⁽²⁾

(1) Front operation handle included.

(2) The locking system is mounted directly on the device.

2.2 TERMINALS & LINKS

- JPR MANUFACTURED BUSBAR Earth Bar
- JPR MANUFACTURED BUSBAR Neutral Bar

3 SWITCHBOARD WORKS TEST RESULTS

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Form No. F1017/3



J. & P. RICHARDSON INDUSTRIES PTY LTD

114 Campbell Avenue, WACOL QLD 4076

Ph: (07) 3271 2911 - Fax: (07) 3271 3623

E-mail: jpr@jpr.com.au

SWITCHBOARD & SHEETMETAL INSPECTION REPORT

Customer Name: <u>QUU.</u>			Job No: <u>C54500</u>		
Item: <u>1 x EAGLE FARM WORKSHOP MAIN SWITCHBOARD.</u>			Drawing No: <u>E11-C54500/CO - C4</u>		
TASK	PRODUCT DETAIL	INSPECTED BY	DATE	PASS/ FAIL	CORRECTIVE ACTION REQUEST OR COMMENTS
Design	Documents	<u>D.M.C</u>	<u>25-1-12</u>	<u>P</u>	
Drafting	Documents	<u>D.M.C</u>	<u>25-1-12</u>	<u>P</u>	
Sheetmetal (Refer F1018 for details)	Switchboard	<u>D.C</u>	<u>27-2-12</u>	<u>P</u>	
	Doors	<u>D.C</u>	<u>27-2-12</u>	<u>P</u>	
	Cell/Panels				
Painting					
Process	Powder / Wet				
Min DFT (40 STD)					
Cure Test					
Colour Exterior		<u>W.H.J</u>	<u>28/02/12</u>		
Colour Internal					
Colour Panels					
Cubicle Erection					
Electrical Fitout (In accordance with drawings)	<u>I.S. VARY</u>				
Inspection & Test (Refer to F1019)		<u>A.VARY</u>	<u>8-5-12</u>	<u>PASS</u>	
		<u>J. Teege</u>	<u>02/5/12</u>	<u>PASS</u>	
Packing					

Comments:

all rep done! W.H.J 28/02/12

NOTE: - Manufacture is not to proceed to the next process until the item has passed inspection

Affix Status Here: -

Yellow

Awaiting Inspection

Green

Inspection & Test Passed

Red

Inspection & Test Failed, Awaiting Rectification

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E-mail: jpr@jpr.com.au

SWITCHBOARD / SHEETMETAL
INSPECTION CHECKLIST

CLIENT: <u>QUU</u>			JOB NO: <u>C54500</u>		
PRODUCT DESCRIPTION: <u>1x EAGLE FARM</u> <u>WORKSHOP MAIN SWITCH BOARD</u>			DRAWING & SCHEDULE NUMBERS <u>E11-C54500/CO-CL</u>		
CONSTRUCTION	QUALITY		COMPLIANCE WITH DRAWINGS		REMARKS OR ACTION
	GOOD	POOR	YES	NO	
1. Folds	/		/		
2. Welds	/		/		
3. Edges / File			/		
4. Gauge			/		
5. Material			/		
6. Ventilation Openings / Filter Bracket			/		N/A
7. Water Ingress Test			/		
8. Equipment Mounting Arrangement			/		
9. Doors Stiffened			/		
10. Escutcheons and Lexan Covers			/		
11. Cable Saddles					N/A
12. Grinding			/		
13. Door Stays Fitted			/		
14. Earth Studs			/		
15. Rubber Retainer					N/A
16. Drawing Holder			/		
17. Hat Sections			/		
18. Locking Bars Fitted			/		
19. External Crevice Welded and Ground			/		
20. Legend Cards			/		
21. General Conditions Satisfactory			/		
22. Cabinet Clean			/		
23. Job Name and Number Marked on Board and Panels			/		
24. Lap Top Tray			/		
25. Gland Plates Fitted			/		
26. Sunshields Fitted			/		

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E-mail: jpr@jpr.com.au

Form No. F1018/4

Page 2 of 2

SWITCHBOARD / SHEETMETAL
INSPECTION CHECKLIST

CONSTRUCTION	QUALITY		COMPLIANCE WITH DRAWINGS		REMARKS OR ACTION
	GOOD	POOR	YES	NO	
27. Mullion Welded to Divider	✓		✓		
28. Double Hinge Meter Panel Fitted					N/A
29. Plinth Fitted			✓		
30. Wall Mount Brackets					N/A
31. Light Switch Brackets					N/A
32. Cows					N/A
INSPECTED BY: D. CRANE		DATE: 27-2-12			

AFFIX STATUS HERE

Yellow
Green
Red

Awaiting Inspection
Inspected/Tested Passed
Inspected/Tested Awaiting Rectification



Customer Name: QUEENSLAND URBAN UTILITIES		
Project: EAGLE FARM WORKSHOP		
JPR Job No: M54500	Switchboard: MAIN SWITCHBOARD	
Constructed by: I. VARY	Tested by: J. SKIPPEN	Date: 1-5-12

Sketch:

The diagram shows a horizontal line representing a main power bus. Three vertical lines branch off downwards from this bus. The leftmost branch is labeled 'E' at the top and 'F' on the right side of a rectangular box labeled 'CHASSIS'. The middle branch is labeled 'B' at the top, followed by 'M', then 'H/S MAINS', and 'START' at the bottom. The rightmost branch is labeled 'C' at the top, followed by 'M/S GEN', and 'D' at the bottom. All labels are handwritten in capital letters.

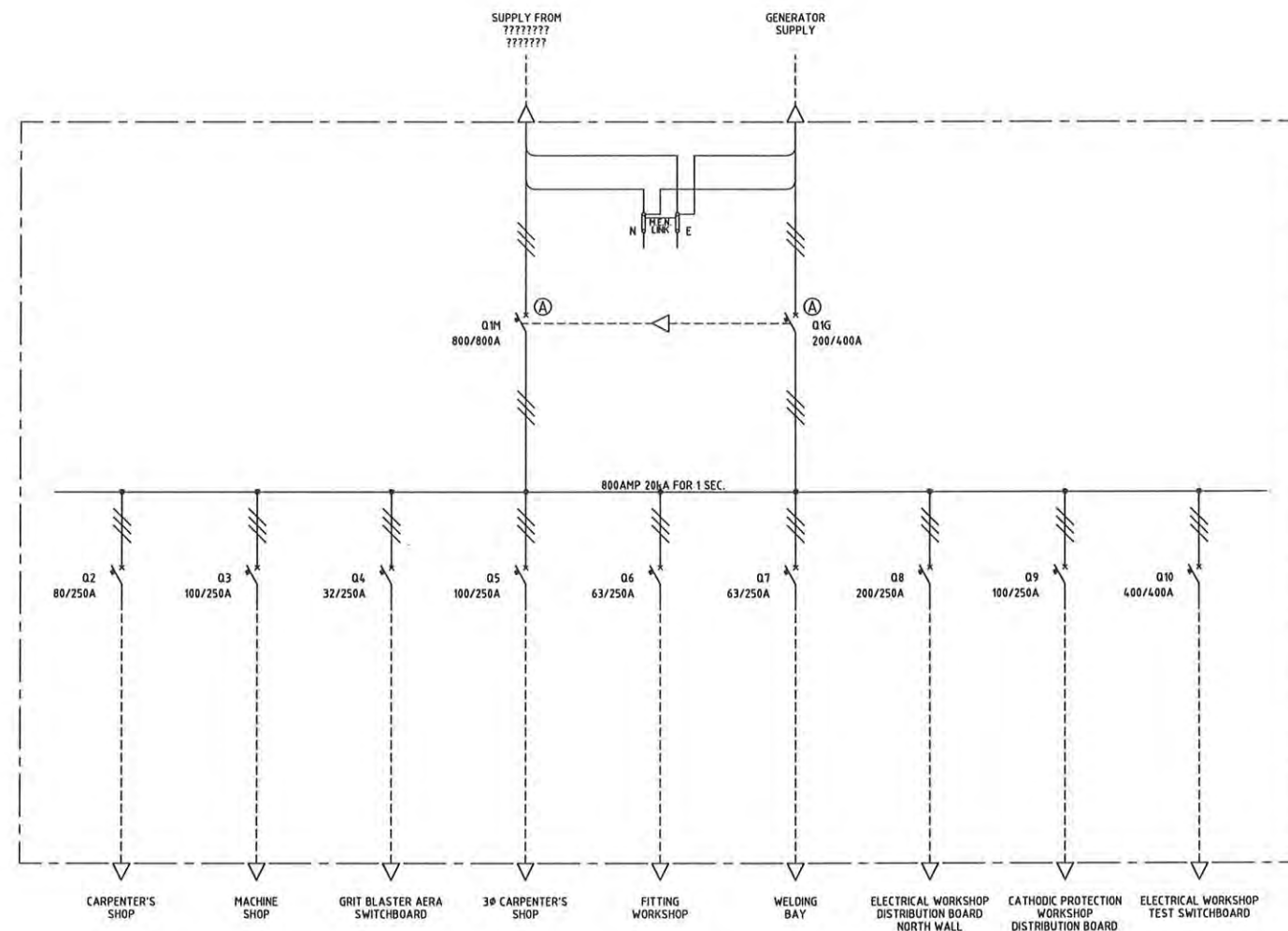
Comments:



E-mail: jpr@jpr.com.au

Comments: _____

4 “AS CONSTRUCTED” DRAWINGS



AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: *[Signature]* DATE: 26-02-13

NAME of SIGNATORY: DARREN MCKLAREN

RPEQ No. or LICENCE: 756

COMPANY NAME: J&P RICHARDSON INDUSTRIES

START DATE: 25-01-12 FINISH DATE: 24-04-12

J. & P. RICHARDSON
INDUSTRIES PTY LTD
ELECTRICAL CONTRACTORS AND ENGINEERS
A.B.N. 23 001 952 325
114 CAMPBELL AVE WACOL QLD 4076
PH. (07) 3271 2911
FAX. (07) 3271 3623
EMAIL: jpr@jpr.com.au

JPR Project No.: E12-C54500

NAME SIGNATURE DATE
QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

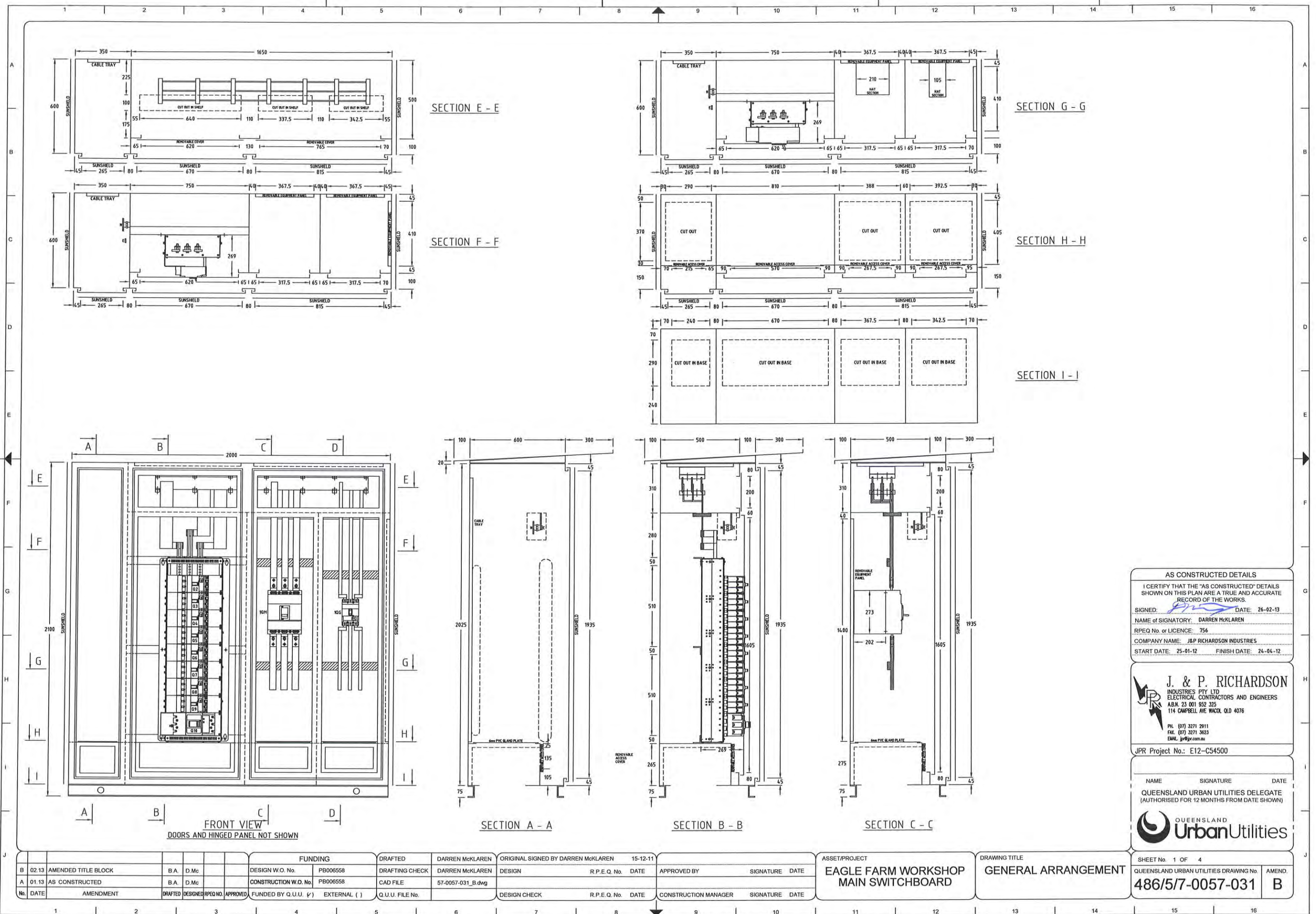
UrbanUtilities

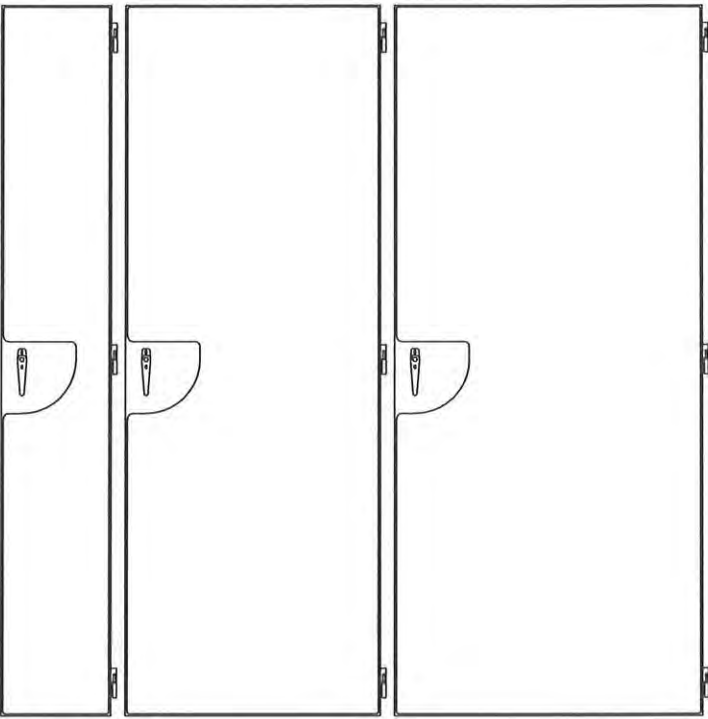
SHEET No. 0 OF 4

QUEENSLAND URBAN UTILITIES DRAWING No. AMEND.

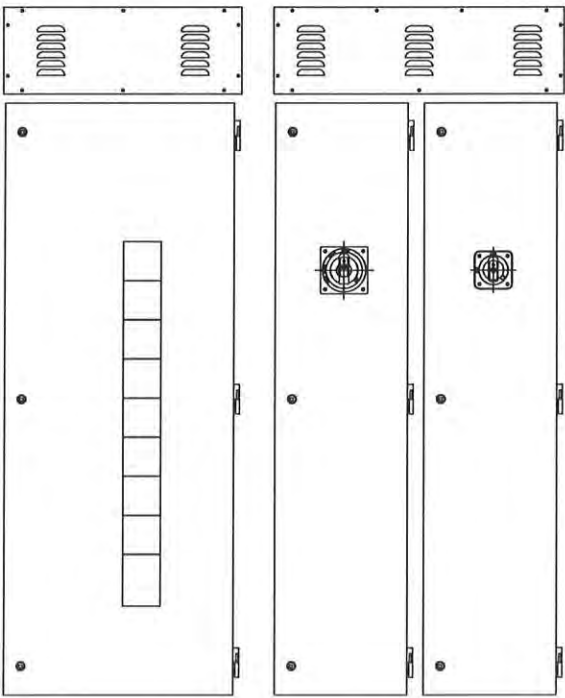
486/5/7-0057-030 B

FUNDING				DRAFTED		DARREN MCKLAREN		ORIGINAL SIGNED BY DARREN MCKLAREN		15-12-11		ASSET/PROJECT		DRAWING TITLE	
B	02.13	AMENDED TITLE BLOCK	B.A. D.Mc	DESIGN W.O. No.	PB006558	DRAFTING CHECK	DARREN MCKLAREN	DESIGN	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE	EAGLE FARM WORKSHOP MAIN SWITCHBOARD	
A	01.13	AS CONSTRUCTED	B.A. D.Mc	CONSTRUCTION W.O. No.	PB006558	CAD FILE	57-0057-030_B.dwg								
No.	DATE	AMENDMENT	DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. (✓)	EXTERNAL ()	Q.U.U. FILE No.		DESIGN CHECK	R.P.E.Q. No.	DATE	CONSTRUCTION MANAGER	SIGNATURE

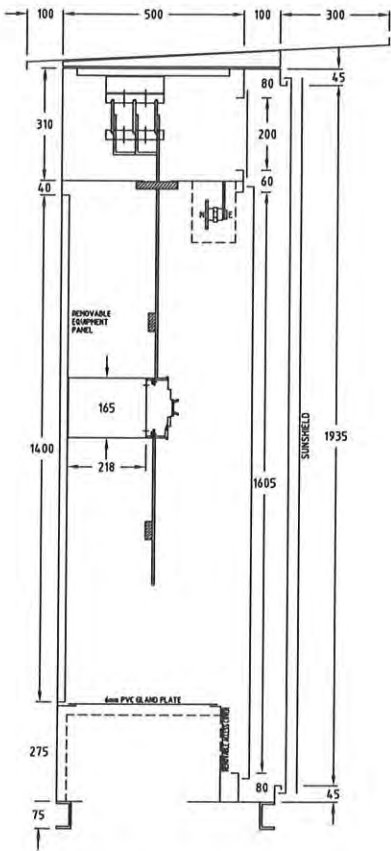




DOORS



HINGED PANELS AND REMOVABLE COVERS



SECTION D - D

					FUNDING		DRAFTED	DARREN MCKLAREN	ORIGINAL SIGNED BY DARREN MCKLAREN		15-12-11						
B	02.13	AMENDED TITLE BLOCK		B.A.	D.Mc		DESIGN W.O. No.	PB006558	DRAFTING CHECK	DARREN MCKLAREN	DESIGN	R.P.E.Q. No.	DATE	APPROVED BY	SIGNATURE	DATE	
A	01.13	AS CONSTRUCTED		B.A.	D.Mc		CONSTRUCTION W.O. No.	PB006558	CAD FILE	57-0057-032_B.dwg							
No.	DATE	AMENDMENT		DRAFTED	DESIGNED	RPEQ NO.	APPROVED	FUNDED BY Q.U.U. (✓)	EXTERNAL ()	Q.U.U. FILE No.		DESIGN CHECK	R.P.E.Q. No.	DATE	CONSTRUCTION MANAGER	SIGNATURE	DATE

ASSET/PROJECT	
EAGLE FARM WORKSHOP MAIN SWITCHBOARD	

DRAWING TITLE	
GENERAL ARRANGEMENT	

AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED: DATE: 26-02-13

NAME of SIGNATORY: DARREN MCKLAREN

RPEQ No. or LICENCE: 756

COMPANY NAME: J&P RICHARDSON INDUSTRIES

START DATE: 25-01-12 FINISH DATE: 24-04-12

J. & P. RICHARDSON
INDUSTRIES PTY LTD
ELECTRICAL CONTRACTORS AND ENGINEERS
A.B.N. 23 001 952 325
114 CAMPBELL AVE WACOL QLD 4076
PH. (07) 3271 2911
FAX. (07) 3271 3623
EMAIL: jpr@jpr.com.au

JPR Project No.: E12-C54500

NAME	SIGNATURE	DATE
QUEENSLAND URBAN UTILITIES DELEGATE (AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)		

SHEET No. 2 OF 4	AMEND.
486/5/7-0057-032	B

5 SERVICE AND MAINTENANCE

This product is designed to operate under specific environmental, supply and load conditions. Should these conditions change, consult a licenced electrician or electrical engineer before operating this product.

These procedures are to be performed only by a licenced electrician as they may expose live equipment.

The Switchgear and Controlgear Assembly is essentially maintenance free, however the following safety measures and routine maintenance is recommended.

- Where fitted, ensure cabinet vents and filters are clear and clean.
- During operation, ensure all doors and covers are secure and closed.
- All faults are to be investigated and repaired by an appropriately licenced electrician.
- All components to be operated in accordance with manufacturers data.
- The protective devices within switchboards are designed to operate in the event of a short circuit or overload condition. In the event of these devices operating under such conditions the device or devices must be inspected and tested by a suitably trained person to ascertain its condition prior to reconnecting the protective device to the supply.

Periodic checks should ensure

- The switchboard is clean and free of any contaminants, which could reduce the insulation properties of the switchboard.
- All entries are sealed to ensure no vermin can enter.
- There is no evidence of overheating, arcing or moisture.
- The earthing system is maintained and is adequate to allow correct operation of protective devices.
- Insulation resistance is maintained to appropriate levels.
- Check terminations for correct tension.
- Test operation of protective devices.
- Re-calibrate instrument loops as required.

Refer to AS-INSTALLED electrical drawings for details of protection equipment settings.

No special tools or equipment are required to perform routine maintenance.