



# POWER ELECTRIC Switchboards PTY LTD

ACN 052 204 118

Manufacturers of Engineered Switchboards for Mining Industrial and Commercial Projects

P.O. Box 6176, Fairfield Gardens, Brisbane, Queensland, 4103, Australia  
Telephone (07) 274 3922 Facsimile (07) 274 3929

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## MAINTENANCE MANUAL



BRISBANE CITY COUNCIL

FIG TREE POCKET ROAD  
CONVENTIONAL ABOVE GROUND  
SEWERAGE PUMPING STATION

PROJECT CODE: SFLK5/73

ORDER NUMBER: P20535EF

S E C T I O N        1

**MAINTENANCE INSTRUCTIONS**

**TEST REPORTS**

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**EQUIPMENT CATALOGUES**

S E C T I O N        3

**M.C.C. DRAWINGS**

## PREVENTATIVE MAINTENANCE INSTRUCTIONS

### 1. MAINS CONNECTIONS:

The mains must be checked annually to ensure:

- All bolted connections are tight, dust and corrosion free;
- All fixings and cable supports etc. are positive.

### 2. MOTOR CONTROL CENTRE

The M.C.C must be checked annually. Firstly, remove all access panels and clean all accumulated dust out of the enclosure, and then check:

- All bolted connections;
- All incoming and outgoing terminations;
- Operations of all C.F.S units, isolators, contactors, controls etc..
- All instruments and instrument connections;
- All labelling and schedules are in place and up to date;
- Main earth connections and continuity;
- Load Balance;
- All fixings are tight and in place;
- Paintwork for blemishes and for any signs of corrosion;
- All hinges, locks, keys, handles, etc. to ensure that they are secure and function properly;
- All gaskets create a good seal;
- Automatic operation of control circuits.

### 3. Cleaning of Equipment

The equipment should be cleaned with a soft, dry paint brush, feather duster or equivalent, according to the circumstances and if possible with a jet of clean, dry air taking care to avoid damage to the components.

If it should happen that a component such as a relay is not working properly owing to dirt on its moving parts, its immediate replacement by a spare is to be recommended. In the case of grommets, connectors, contactors, etc., cleaning of the contact area can be done in place, using a cloth moistened with a solvent such as benzine or trichorethylene plus a dab of vaseline. All due care should be taken to de-energize the circuits associated with the location being serviced.

### Visual Inspection

Visual inspection should be quite frequent. To verify the perfect functioning of the signalling system is to guarantee the immediate indication of any abnormal occurrence in the equipment or its components.



# POWER ELECTRIC

## Switchboards PTY LTD

ACN. 052 204 118

Manufacturers of Engineered Switchboards for Mining, Industrial and Commercial Projects

FINAL CHECKING PROCEDURE FOR ALL SWITCHBOARDS

SWITCHBOARD TITLE: FIG TREE POCKET SP-45 .....

JOB NUMBER: 410 .....

✓
✓
✓
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✓
✓
✓
✓
✓

1. Check Switchboard has been built as per the approved drawing. (KA Rating, IP Rating, Form of Segregation.)
2. Check all Control Functions.
3. Check all Connections.
4. Check all Clearance's.
5. Check hinges, locks, keys, handles etc, to ensure that they are secure and function properly.
6. Check operations of all CFS units, Circuit Breakers, Isolators, Contactors etc.
7. Check Main Earth connections and continuity.
8. Check that all neutrals are accessible.
9. Check that all labeling and schedules are in place (Neutral Numbers).
10. Check general condition of Switchboard (Paintwork etc).
11. Check Switchboard has been cleaned out.
12. Meger Switchboard.

COMMENTS: \_\_\_\_\_

CIRCUIT	RESULT 1000V MEGGER	AFTER H.V. TEST 1000V MEGGER
R-E	2000 M-OHM	2000 M-OHM
W-E	2000 M-OHM	2000 M-OHM
B-E	2000 M-OHM	2000 M-OHM
R-W	2000 M-OHM	2000 M-OHM
R-B	2000 M-OHM	2000 M-OHM
W-B	2000 M-OHM	2000 M-OHM
NEUT-E	2000 M-OHM	2000 M-OHM

CHECKED BY:

CIRCUIT	DURATION	APPLIED VOLTAGE	LEAKAGE TO EARTH
R+W - B+E	1 MIN	2500V	.5MA
W+B - R+E	1 MIN	2500V	.5MA
N-E	1 MIN	2500V	.4MA



Catalogue  
P20A  
July 1994

# TemBreak

## *Total Protection, Complete Control*



**NHP** ELECTRICAL ENGINEERING PRODUCTS PTY LTD



# • TemBreak

## **Total Protection, Complete Control**

TemBreak incorporates a series of microprocessor based MCCBs that represents a major evolution in low-voltage distribution systems. They were engineered to meet the requirements of the fast developing information-oriented society. Each model is designed to serve a key point in the system. Providing refined characteristics, incorporating true r.m.s. detection and ensuring the reliability necessary for the efficient functioning of the system.

### **TemBreak's features are designed to match the needs of the 90's**

- Meets Worldwide Users Requirements
- Electronic Type TemBreak
- Achieves a Higher Degree of Protection Co-ordination
- Adjustable Rated Current
- World Wide Standards
- Operation Unaffected by Harmonics
- Adjustable Long and Short Time-delay Trips
- Expanded Protective Functions
- Improved Breaking Performance
- Spacesaving
- Fast Break Mechanism
- Advanced Breaking Technology
- Highest Degree of Protection

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# Fast Break Mechanism (FBM)

## EXCEPTIONAL CURRENT LIMITING QUICK-BREAKING PERFORMANCE

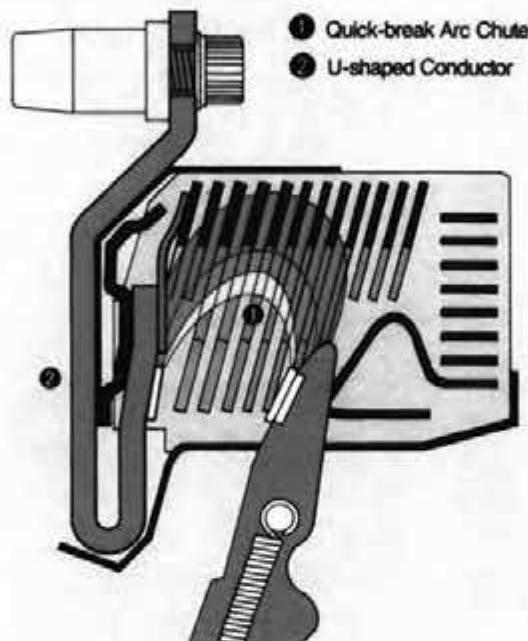
TERASAKI's ingenuity on current breaking is reflected in the new Fast Break Mechanism (FBM) of the TemBreak series. Achieving high-speed, highly-efficient breaking. Its outstanding features include: U-shaped conductors, Dual Repulsive Contacts and Quick-break Arc Chutes (To quickly quench and extinguish ionized arcing gases). The Current Limiting, Quick-Breaking Performance of TemBreak provides exceptional current-limiting characteristics that have not been possible with existing moulded case circuit breakers. The current-limiting characteristics of TemBreak products, up to 800A frame, are outstanding.

## HIGH SPEED, HIGHLY-EFFICIENT BREAKING ACHIEVED!!

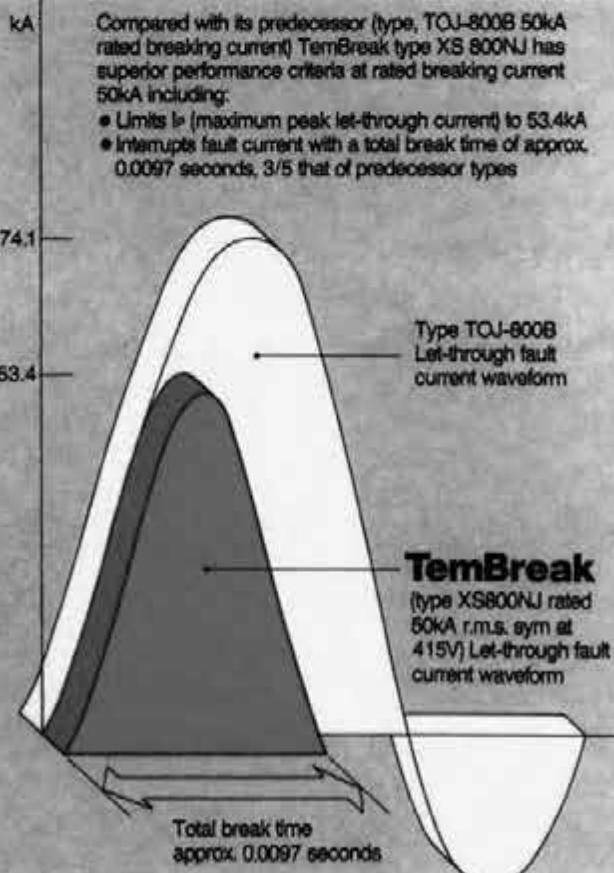
### U-shaped Conductors

### Dual Repulsive Contacts

### Quick-break Arc Chutes

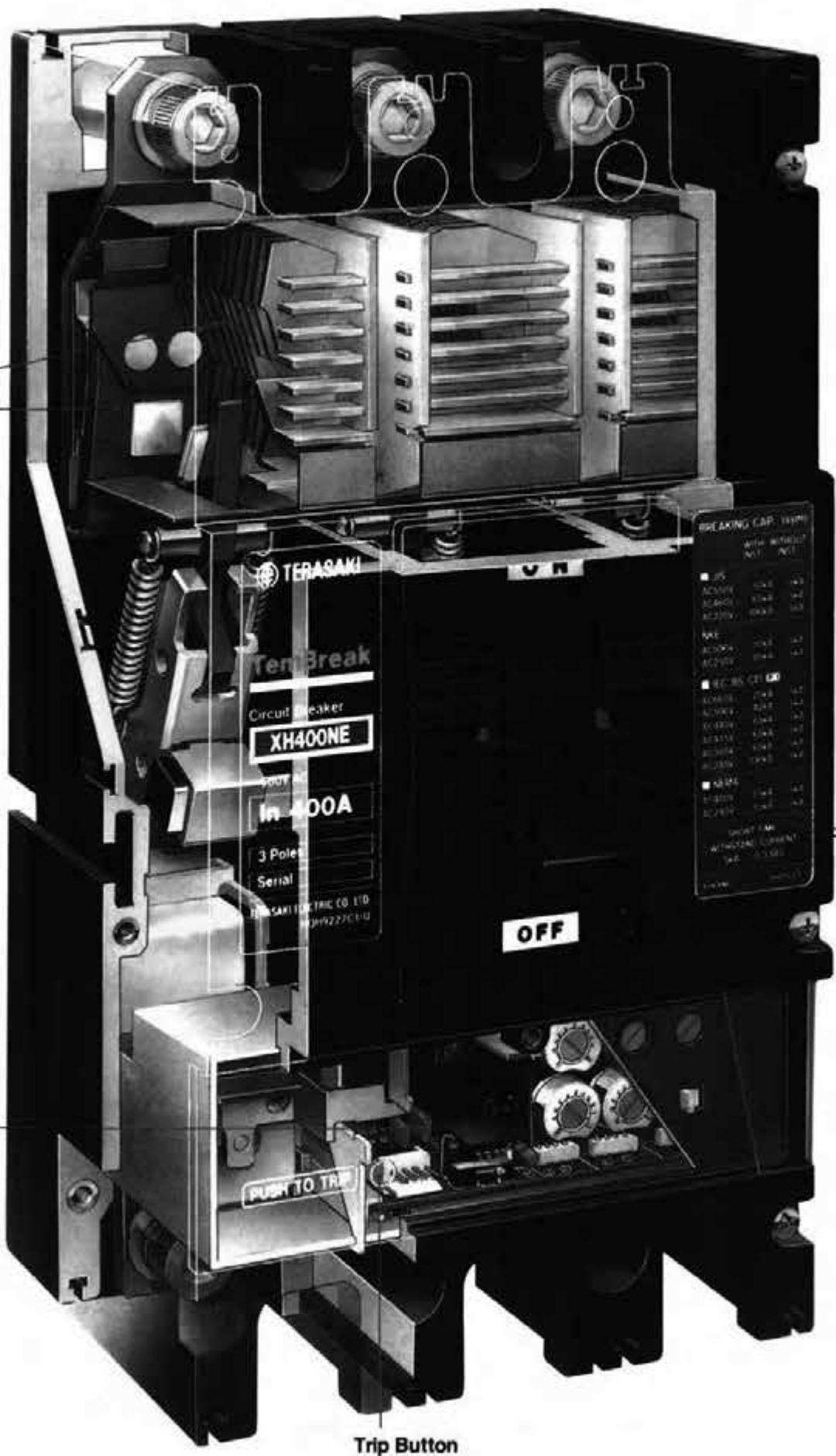


## REMARKABLE CURRENT — LIMITING FEATURE



## MULTI-PROTECTIVE FUNCTIONS!! By 8-Bit CPU

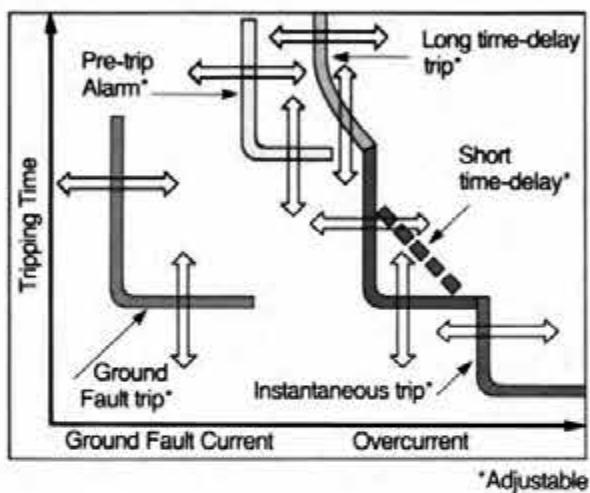
Terasaki's 28 years of achievements in the field of electronic technology is "second to none". In particular, its microcomputer application engineering has a "first class record" of supplying computer systems, of high, cost-performance to a variety of industrial plants over the past 10 years.



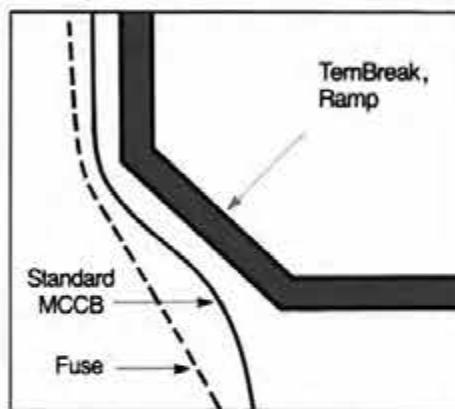
XH400NE

# TemBreak contains advanced technology for precise protection co-ordination, anticipating the requirements of commercial buildings and automated factories.

## Multiple Protective Functions Incorporating A Wide Range of Pick-Up Current and Time-delay Settings



**Protective Characteristics Are Readily Co-ordinated With Those of Thermal-Magnetic MCCBs and Fuses. (The adjustable short time-delay trip has a ramp in its characteristic curve)**



## TemBreak Meets All Major Standards

### Based Standards

- IEC PUB 157-1 Part 1/International Electrotechnical Commission
- AS 2184/Australian Standard
- BS 4752 Part 1/British Standard
- VDE 0660/Verband Deutscher Elektrotechniker
- CEI 17.5/Comitato Electrotecnico Italiano
- NEMA AB-1/National Electrical Manufacturers Association
- JIS C8 370/Japanese Industrial Standards

## TemBreak's Adjustable Rated Current Type (Meets IEC Standards) And Is Available In A Wide Range For Plant Applications

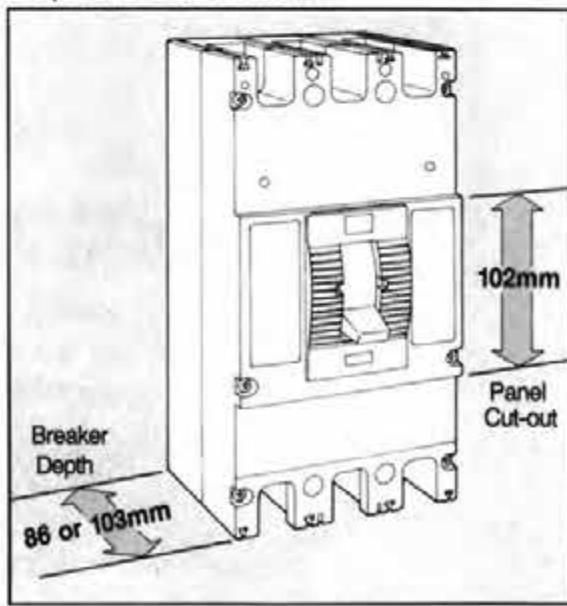
## Plug in Mounting Blocks, for Switchboard Use

Note: The degree of protection provided by the mounting blocks for plug-in type TemBreak breakers (for Switchboard use) is IP-20, as defined in IEC Pub, 529.

## Unified Dimensions Simplifies Distribution Board Design

TemBreak includes frame sizes up to 800A which are the most frequently used in distribution boards. Unified dimensions include:

Two depth sizes and one panel cut-out height  
\*Depth of XS100NS is 68mm



# Precise Protection Co-ordination

## TemBreak, Electronic Type

### TemBreak Profile (Electronic type)

Each electronic type TemBreak product is fitted with an electronic protective device using an 8-bit microprocessor, to provide full protective functions necessary for upgrading low-voltage distribution systems and for achieving the highest reliability in operation.

### Operation Unaffected By Harmonics

Semiconductor controlled power equipment in a distribution system can be a source of harmonic currents, which can cause malfunctioning in other equipment within the system.

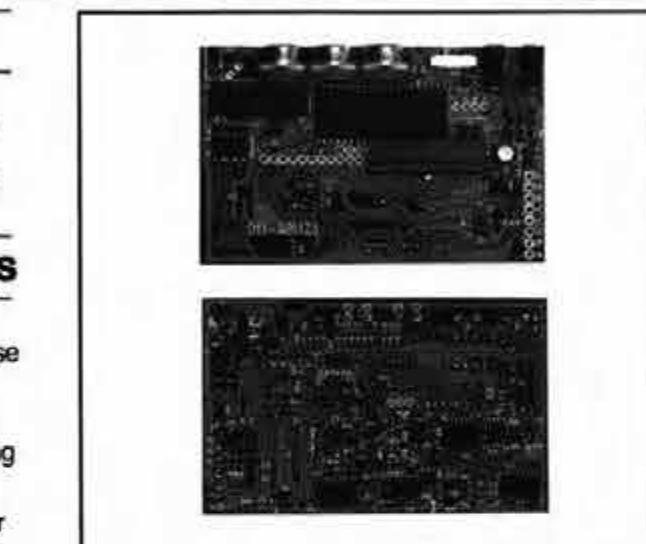
The TemBreak's electronic protective device is designed to detect, true r.m.s. value of the load current. Therefore, remaining unaffected by harmonics.

TemBreak's electronic protective device consists of a number of flat-package ICs, which are compactly mounted, using high-density double-surface mounting, the most advanced surface mount technology.

### Protective Characteristics of TemBreak (Electronic type)

The protective characteristics include:

An adjustable long time-delay (For general industrial plants and for generator protection). An adjustable short time-delay trip (for co-ordination with existing solid-state trip and thermal magnetic trip breakers or fuses). An adjustable instantaneous

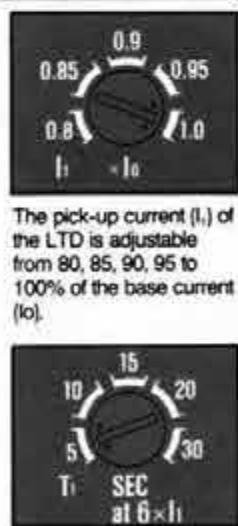
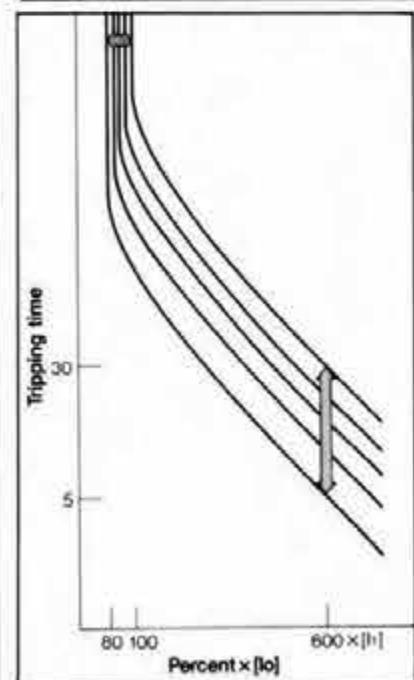


trip, an adjustable ground fault trip and an adjustable pre-trip alarm.

NOTE: The ground fault trip and pre-trip alarm can not be used simultaneously in a single breaker.

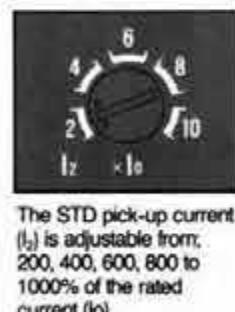
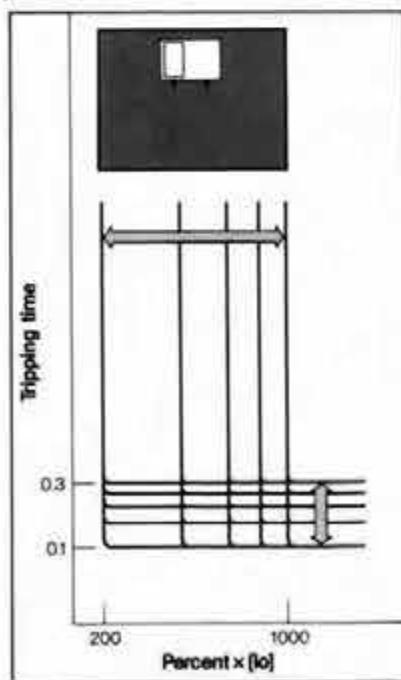
### Adjustable long time-delay trip (LTD)

For general industrial applications



The pick-up current ( $I_1$ ) of the LTD is adjustable from 80, 85, 90, 95 to 100% of the base current ( $I_0$ ).

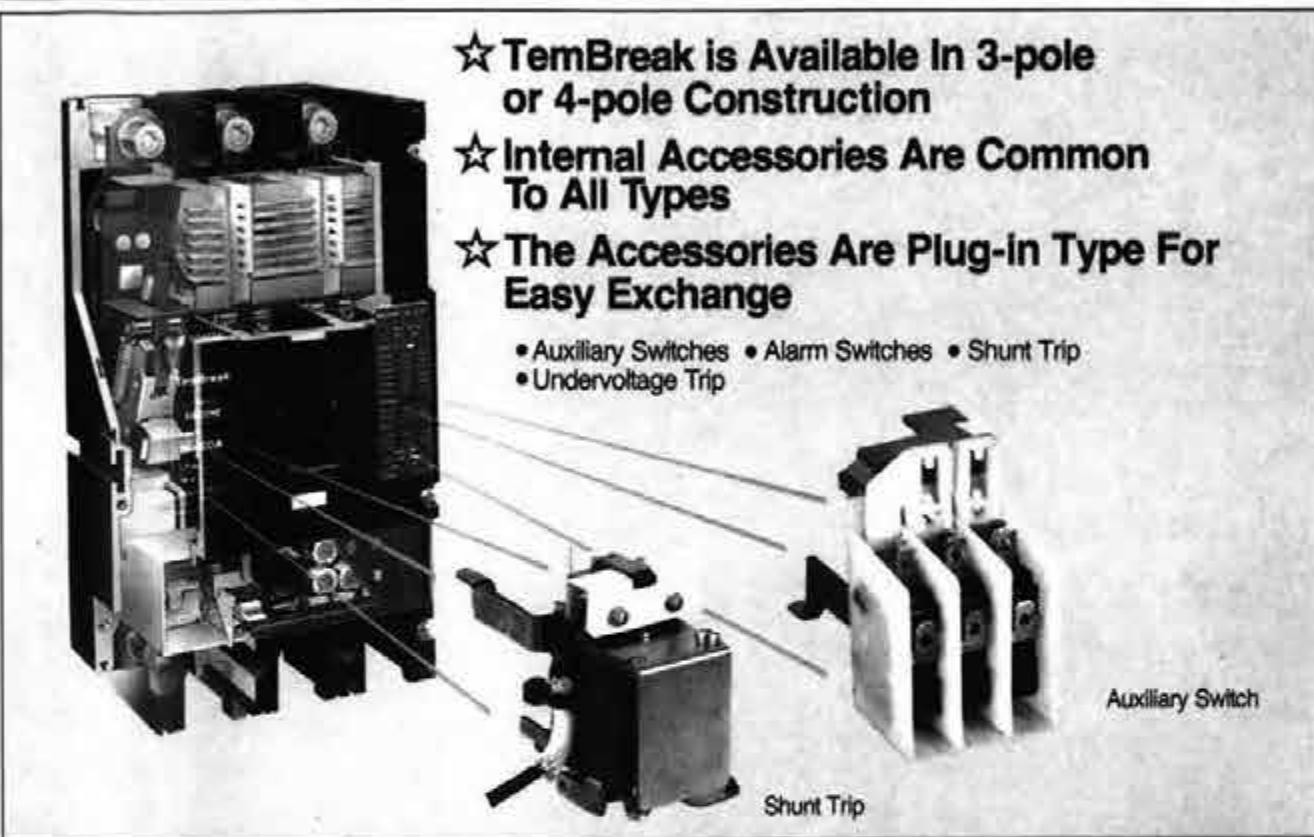
The LTD time delay at 600% of the rated current ( $I_1$ ) is adjustable from; 5, 10, 15, 20 to 30 secs



The STD pick-up current ( $I_1$ ) is adjustable from; 200, 400, 600, 800 to 1000% of the rated current ( $I_0$ ).



The STD has a definite time-delay characteristic. This opening time is adjustable from; 100, 150, 200, 250 to 300 ms



★ TemBreak is Available In 3-pole or 4-pole Construction

★ Internal Accessories Are Common To All Types

★ The Accessories Are Plug-in Type For Easy Exchange

- Auxiliary Switches
- Alarm Switches
- Shunt Trip
- Undervoltage Trip



Auxiliary Switch

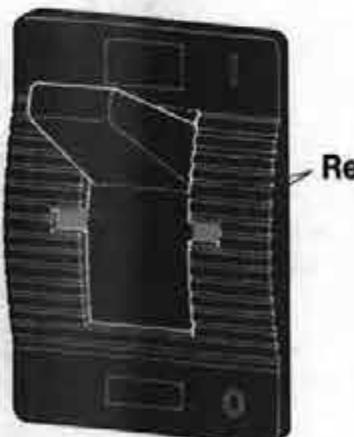


Shunt Trip

### Contact Status Indication

International symbols are used (colour coded) for status indication; I(ON) Red, TRIP, White, O(OFF) Green.

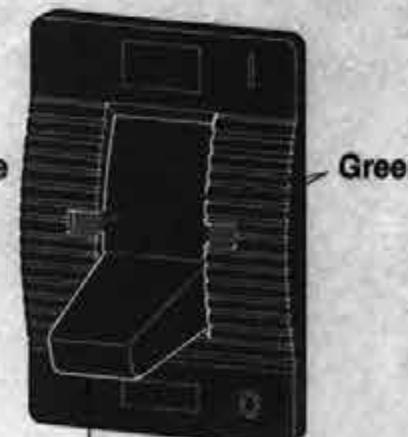
I(ON)



TRIP



O(OFF)



Handle

### "Reliable Indication Mechanism," for Safety

The operating handle indicates the O (OFF) position ONLY when the required isolating distance, between

the fixed and moving contact is achieved  
(No extra indication is necessary)

# TemBreak

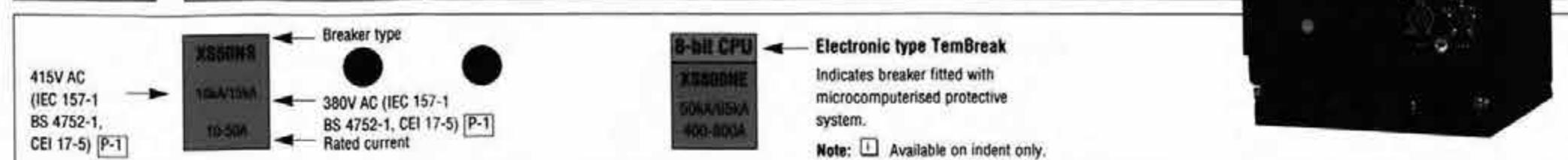


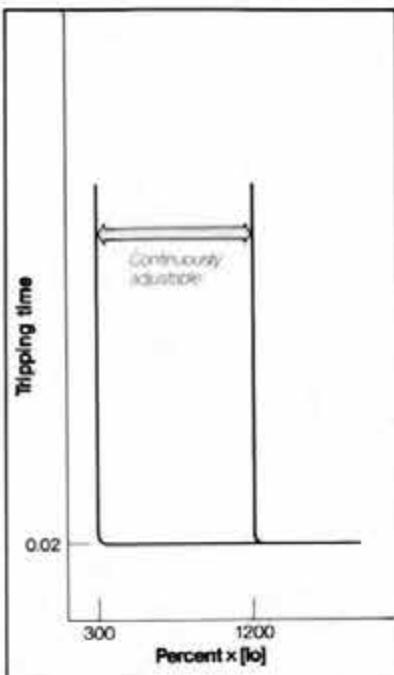
## **TemBreak series**

38 types

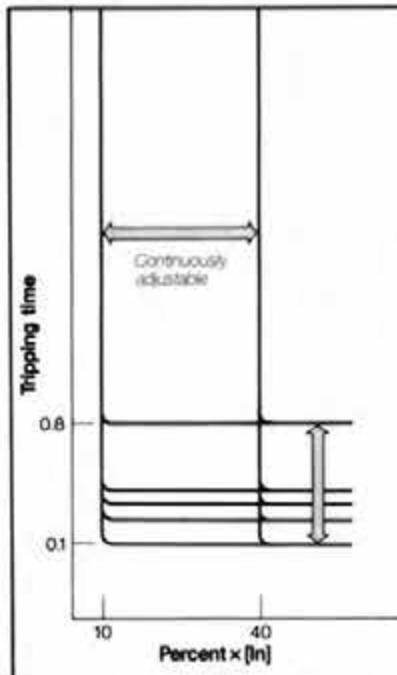


XV mining  
1100/1200V  
series



**Adjustable instantaneous trip (INST)**

The INST pick-up current ( $I_o$ ) is continuously adjustable from 300% to 1200% of the rated current ( $I_o$ )

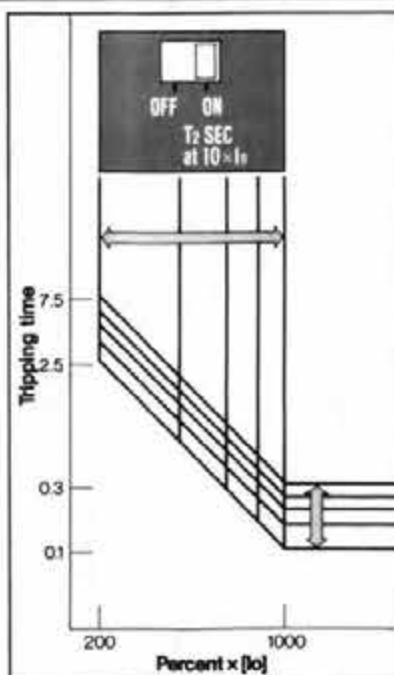
**Adjustable ground fault trip (GFT)**

The GFT pick-up current ( $I_o$ ) is continuously adjustable from 10% to 40% of the rated current ( $I_o$ )



The GFT has a definite time-delay characteristic, its opening time is adjustable from; 100, 200, 300, 400 to 800ms

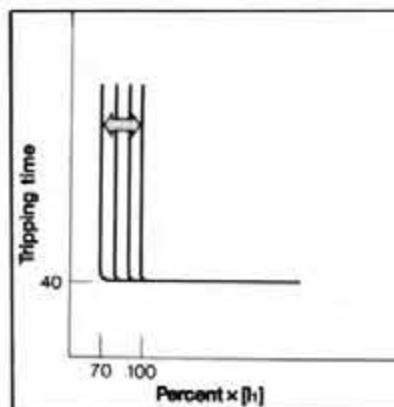
For co-ordination with thermal-magnetic trip breakers or fuses.



The STD pick-up current ( $I_o$ ) is adjustable from 200, 400, 600, 800 to 1000% of the rated current ( $I_o$ )



The STD has a time current characteristic of  $IT = \text{constant}$  (ramp characteristic) for optimum co-ordination with conventional thermal-magnetic type moulded case circuit

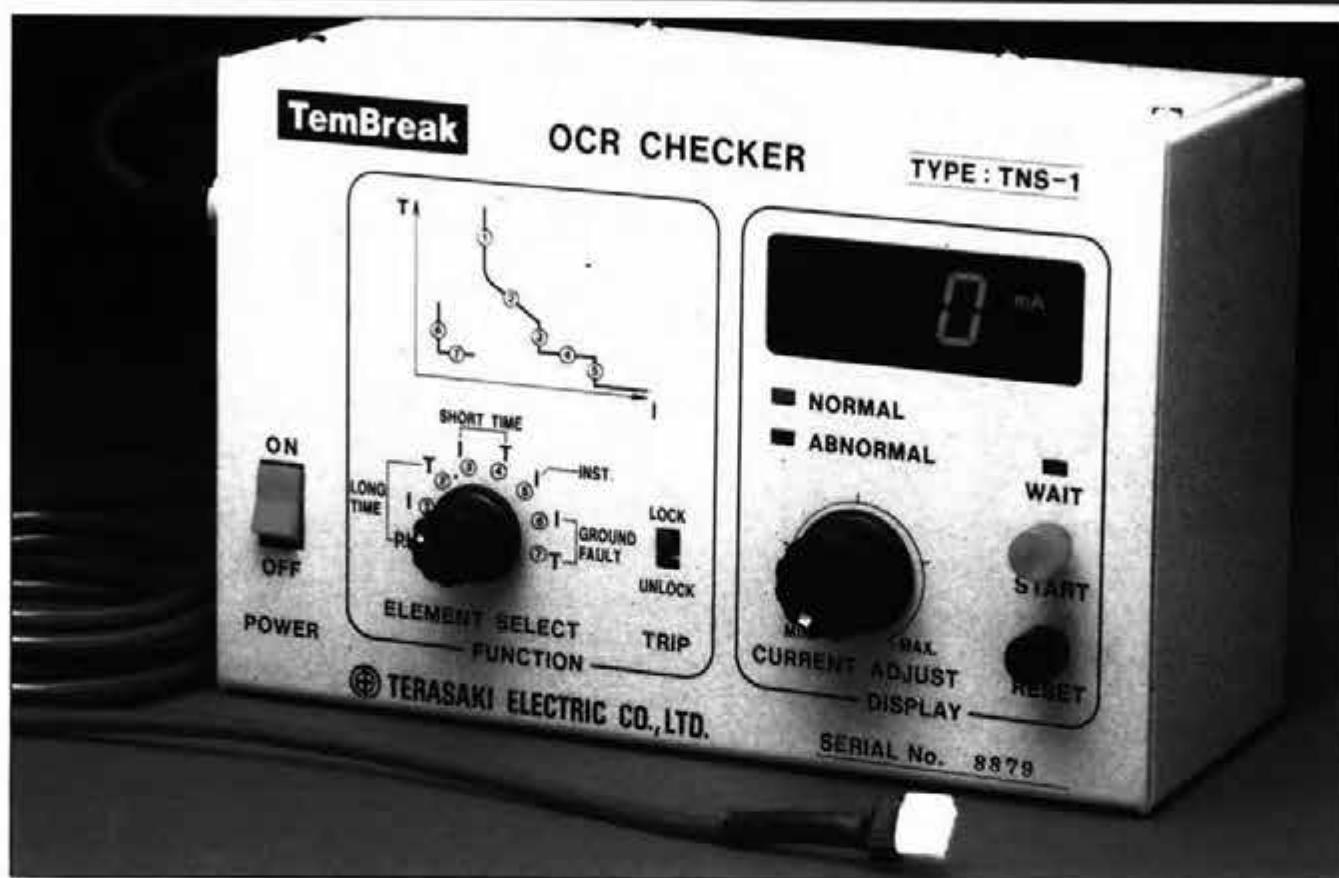
**Adjustable pre-trip alarm (PTA)**

The PTA pick-up current ( $I_o$ ) is adjustable from 70, 80, 90 to 100% of the rated current ( $I_o$ ). The time-delay is 40 seconds fixed. (A separate power source is required)

breakers or fuses. It has a definite time-delay characteristic at current levels above 1000% of the rated current ( $I_o$ )

# TemBreak

## OCR Checker (Portable)



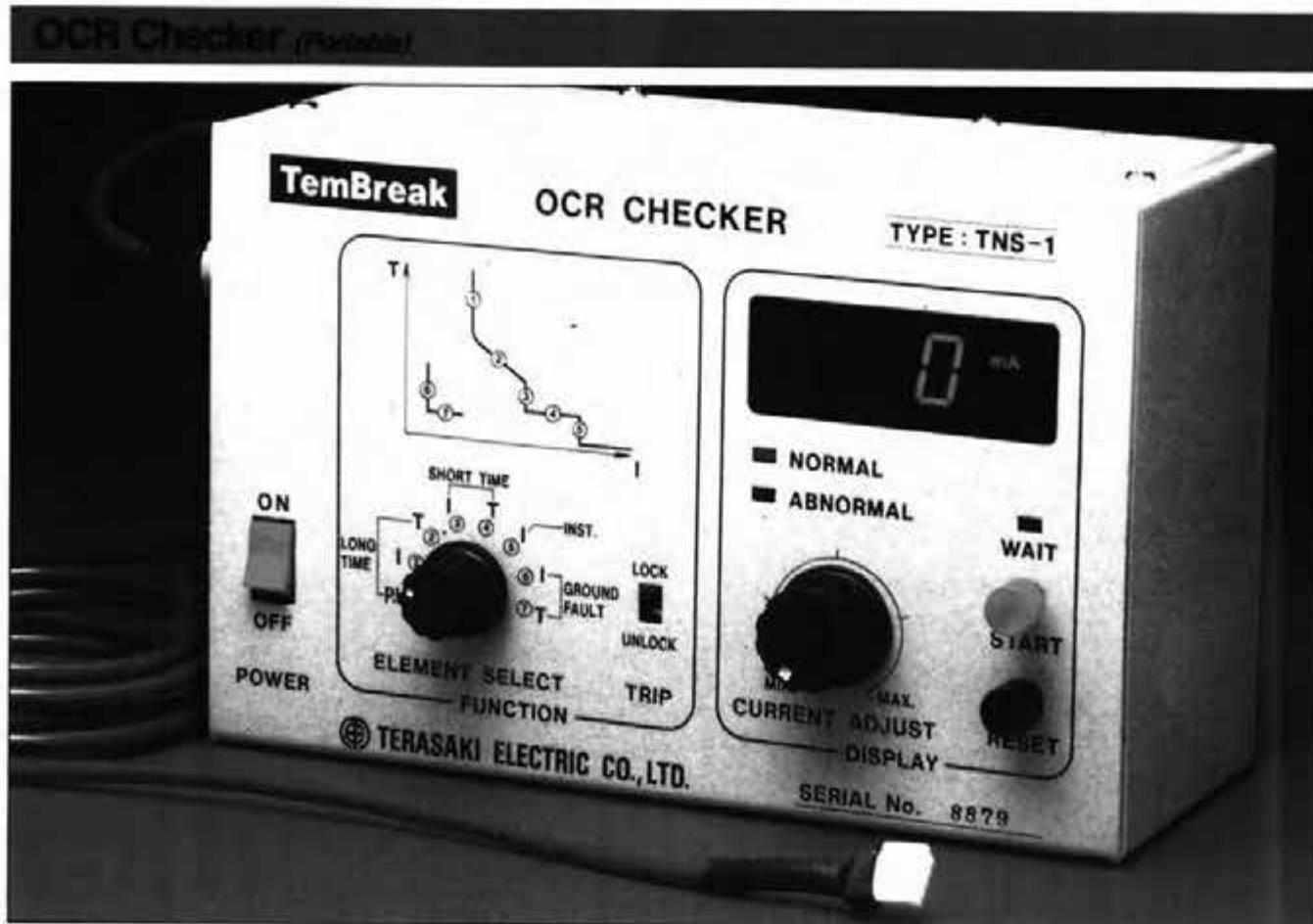
TemBreak OCR checker, type TNS-1, is an easy-to-use instrument for field testing the trip functions of the electronic type TemBreak circuit breakers.

It checks the pick-up current and tripping time values of the functions (LTD, STD, INST and GFT)

The values are indicated digitally on a 3-digit LED display

Power Source 100-110VAC or 220-240VAC,  
single phase, 50/60Hz 30VA  
Dimensions: 200mm(W) x 84mm (H) x 130mm (D)

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Power Source 100-110VAC or 220-240VAC,  
single phase, 50/60Hz 30VA  
Dimensions: 200mm(W) x 84mm (H) x 130mm (D)

## Electronic, 8-Bit CPU adjustment face



Type: XS1600NE

### Pick-up LED

LED turns on when LTD function picks-up.

Note: If PTA is fitted, this LED flickers when PTA functions pick-up (separate control power required)

### Trip Indicators (Optional)

One of the LEDs is lit to indicate which trip function tripped the breaker LTD, STD/INST or GFT (separate control power required)

## TemBreak (Thermal-magnetic trip type)

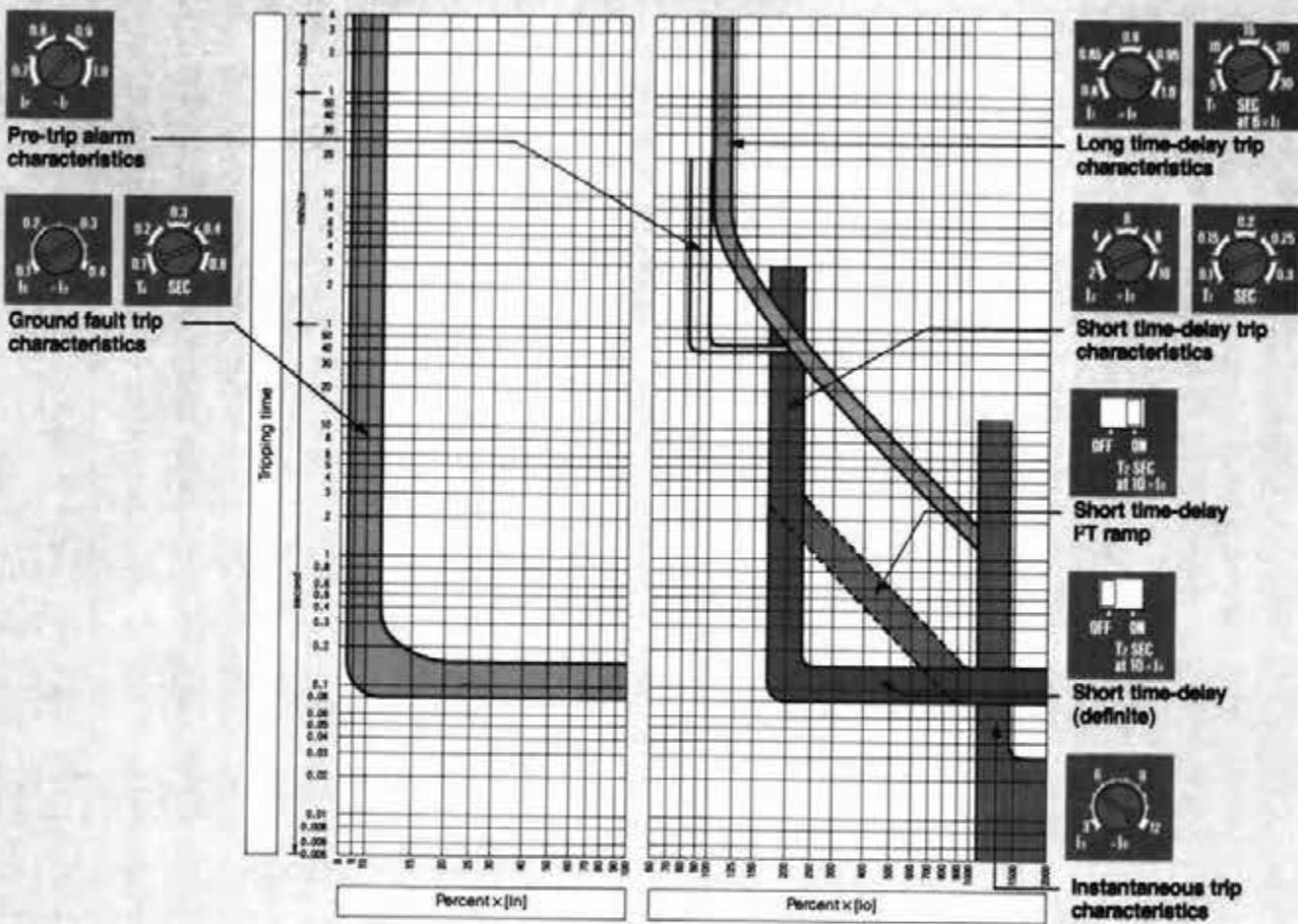
The rated current is continuously adjustable from 63% to 100% of the nominal rated current. The scale is marked at three positions; 63%, 80% and 100%



# Precise Protection Co-ordination

## TemBreak, Electronic Type

### Overcurrent tripping characteristics (Example)

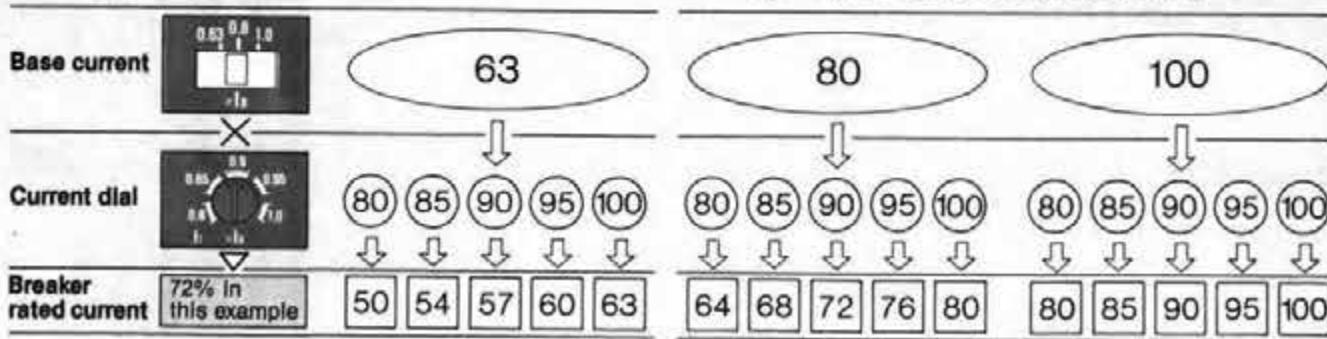


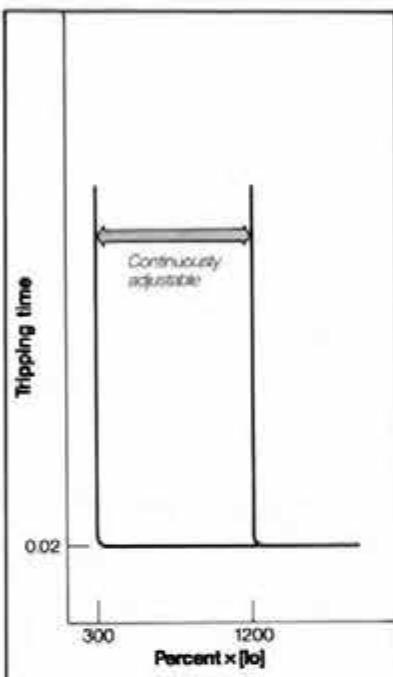
### Adjustable Rated Current

#### TemBreak (Electronic type)

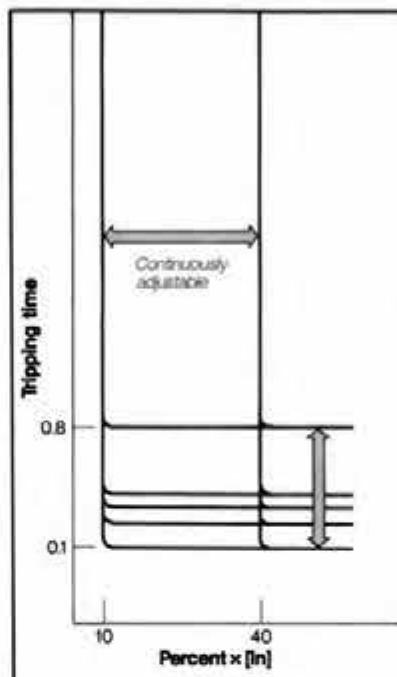
The rated current of the electronic type TemBreak is adjustable in 15 steps from 50% to 100% of the nominal rated current, using the base current ( $I_o$ ) select switch and the rated current ( $I_r$ ) setting dial.

The rated current of a single breaker is adjustable in 15 steps from 50% to 100%. This is one of the essential features for precise protection co-ordination and for upgrading low-voltage distribution systems.



**Adjustable instantaneous trip (INST)**

The INST pick-up current ( $I_s$ ) is continuously adjustable from 300% to 1200% of the rated current ( $I_o$ ).

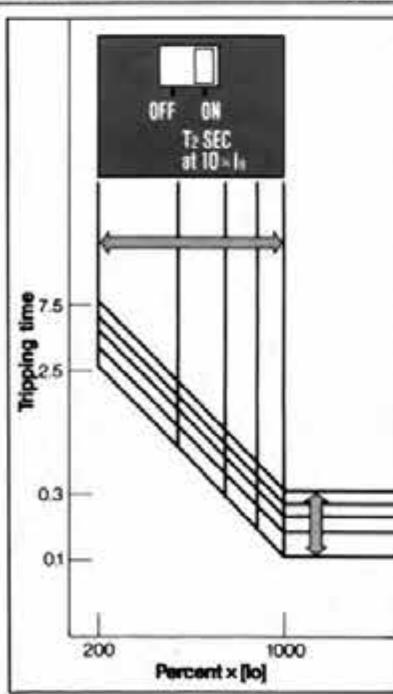
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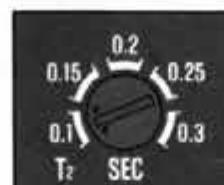


The GFT has a definite time-delay characteristic, its opening time is adjustable from; 100, 200, 300, 400 to 800ms

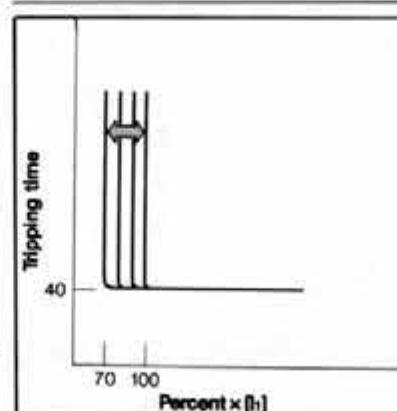
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breakers or fuses. It has a definite time-delay characteristic at current levels above 1000% of the rated current ( $I_o$ )



**NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD**

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**DARWIN:**

J. Blackwood & Son Ltd., Mataram Street, Winnellie, N.T. 0820  
Telephone: (089) 84 4255 Fax: (089) 84 3945

**NHP**

Proudly Australian

## Miniature circuit breakers and Residual current devices

### DIN rail mounting system

- Loadcentres
- Panelboards
- Chassis
- Accessories

selection  
guide

**NHP**

ELECTRICAL ENGINEERING PRODUCTS PTY LTD

A.C.N. 004 304 812

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## General features

### Advantages of the Din-T series miniature circuit breakers

- Short-circuit breaking capacity of 6, 9, 10 and 14 kA at 415V AC.
- Increased rating to 50 kA when backed up with a 200A HRC fuse, (9 kA, 10kA & 14 kA only.) (Max. back-up fuse of 125 amp to 50 kA for 6 kA MCBs).
- Rated current range from 0.5A up to 125A.
- Silver graphite (AgC) contacts.
- Input connection by lifting terminal with capacity of up to 35 mm<sup>2</sup> giving fast and practical connection.
- Output terminals offer finger and hand protection with a capacity of up to 25 mm<sup>2</sup>.
- A new design of snap fixing with two stop locations, for normal DIN rail mounting.
- Approval number V87382 - 11/1987.
- Complies to AS 3111 and AS 2184.

### Brief description

The Din-T series miniature circuit breakers have inverse time delayed thermal and instantaneous magnetic trips, and are suitable for mounting in distribution boards or in switchgear panels and consumer units.

### Operation

Protection against overheating of electrical conductors, against excess currents due to overload and short circuit or earth fault.

### Application

In switching, control, distribution and measurement systems for domestic, commercial and industrial installations.

### Tripping characteristic

Characteristics are as required by Australian standards (following IEC type 'U'), for cable and equipment protection in commercial and industrial applications. See technical data page.

### Handle

Sealable and padlockable with quick-make and quick-break type mechanism. The Handle is sealable in ON and OFF position. Due to the free tripping mechanism, the MCB contacts open through overload or short circuit even when the handle is sealed in the ON position on all types.

### Input terminal

Box type terminal with lifting screw for copper and aluminium conductors: max. capacity 1 x 35mm<sup>2</sup> or 2 x 16mm<sup>2</sup>. When unscrewing the screw, the head lifts; however, on pushing the screw head, the box terminal opens. This system enables the MCBs to be linked with a non-insulated wire or a connection strip very easily. The MCB is delivered with a half open box terminal and a lifted screw head. A protection cap is fixed onto the MCB in order to obtain IP20 protection against finger contact. (Standard for 9 and 14kA only)

### Output terminal

Box type terminal with captive terminal screw for copper and aluminium conductors: max. 1 x 25mm<sup>2</sup> or 2 x 10 mm<sup>2</sup>. The box terminals are always delivered in the open position. Output terminals are always supplied with IP20 protection against direct finger contact by means of an insulating cover.

### Arc chamber

Contains arc extinction plates, de-ionising type, designed to break up and dissipate the arc which is generated during interruption of all types of fault.

### Electromagnet

Operating the plunger which opens the contacts instantaneously.

### Arc magnetic blowout system

Short-circuit currents do not flow through the bimetal but are directed by the blowout magnet, in such a way that the arc is transferred to a special arc runner, therefore taking the bimetal out of the circuit which ensures the trip characteristics remain unchanged.

- The combination of the electromagnet (with a plunger rapidly opening the contacts), the blowout magnet and the arc chamber, results in an extremely high short circuit breaking capacity, and very low let through energy.

### Snap-on clip for DIN rail mounting

This special flexible system gives ease of mounting and positioning of the MCB on DIN rail.

## NHP TERASAKI Din-T series 6, 9, 10 and 14kA

NHP Terasaki offers an unparalleled choice of DIN rail mounted miniature circuit breakers (MCBs).

This comprehensive selection is based on the 6<sup>1</sup>, 9, 10 and 14kA series and the accessories which convert the ranges into a flexible system for protection, control, switching and monitoring. These are high performance devices using the latest developments in the technology of circuit protection and capable of dealing with the most difficult problems involving high short circuit

currents and selectivity with feeder or back-up protection.

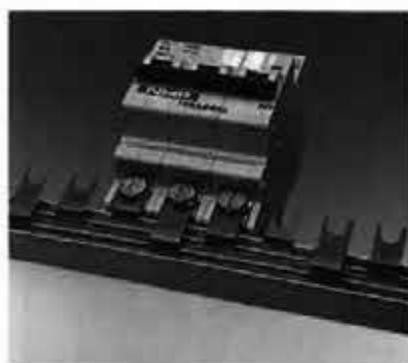
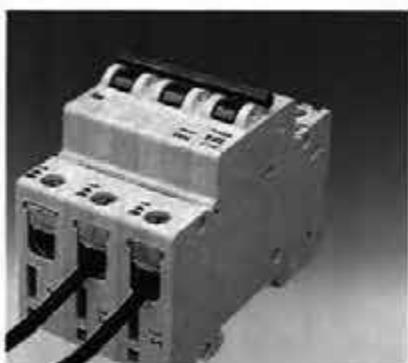
The MCBs are designed for and certified to many international and national specifications including IEC, CEE, NBN, VDE, BS, AS in particular AS3111 and AS 2184.

A truly international range of high performance devices from a group with an international reputation for high quality and technical innovation.

Note<sup>1</sup>) Some accessories not available for use with 6kA MCBs refer pages 20 & 21 for details.



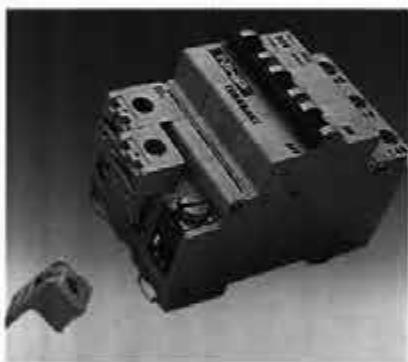
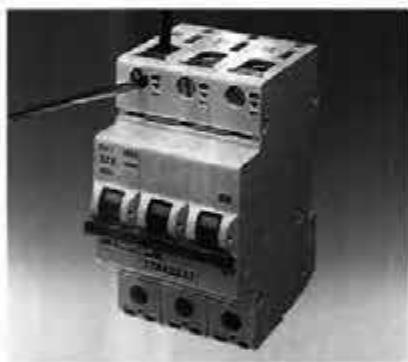
## Some of the advantages



### **Input terminal**

The newly developed input box terminal which is designed as a "lift terminal" is suitable for busbar as well as conductor connection. It is delivered already opened so that loosening of the terminal screws is not necessary. The screw heads are held in the upper position so that busbars can be located directly and without any problems. However it is first necessary to remove the standard IP20 protection cap. For the connection of single or multiple-wire conductors

the terminal box is moved down by pressing the screw head and is opened approximately 5mm. This means conductors up to 10mm<sup>2</sup> can be inserted without further opening. For thicker conductors up to maximum 1 x 35mm<sup>2</sup> or 2 x 16mm<sup>2</sup> the terminal box needs only to be unscrewed a little. In the same way a combined connection of busbar and feeding line is possible without additional terminals.

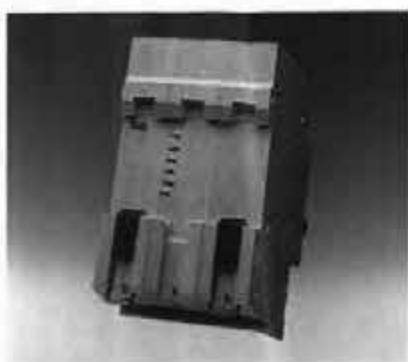


### **Output terminal**

The output terminal is designed as a box terminal with captive terminal screw and is finger and hand safe. The terminal already opened in the delivery state receives multiple-wire conductors with cross sections of up to 1 x 25mm<sup>2</sup> or 2 x 10mm<sup>2</sup>.

### **Protection cap**

Simple snap-on cap for the "lift terminal" can be fixed on to the MCB in order to obtain the IP20 protection against finger contact. For the Australian market these are supplied as standard.



### **Sealing**

In both switching positions the handles can be protected against manual switching by means of sealing. Interruption in case of faults is guaranteed by means of a trip free mechanism.

### **Snap-on fixing**

The newly developed snap-on fixing has an additional stop location which permits slight movement and alignment of the MCB during assembly on the rail. A further advantage is the easy changing of the MCB in this stop location as the spring device is disengaged when it is taken off the sectional rail.

For fixing of the MCB on the sectional rail the spring device is engaged by simply pressing the projecting spring clip.

## New products in the DIN rail mounting system



**Din-Modula loadcentres** are flexible, easy to install, cost effective and high quality.

These loadcentres are suitable for installation in domestic, commercial and light industrial areas such as office building and the food industry.

The Din-Modula-150 has an IP40 rating and is available in 36, 54 and 72 pole.

Din-Modula

weatherproof has an

IP55-6 rating. They are available in 12, 24 and 36 pole. All loadcentres are fitted with earth and neutral bars. Accessories such as locks and busbars are available refer to page 17.



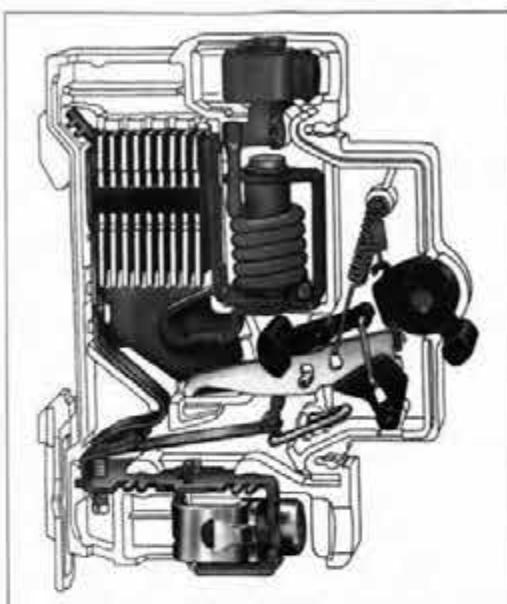
**Din-T 10** is the 80, 100 and 125 amp DIN type miniature circuit breaker. Din-T 10 has a short circuit rating of 10kA and has been tested to IEC 947-2. These circuit breakers can be fitted to ND250 chassis on request refer page 9 for further details. Technical details are found in the rear of this catalogue.

**Din-Surge diverters** are becoming an essential part of every electrical installation. The protection they offer against voltage spikes is essential to modern day electronic and electrical equipment. Voltage spikes can be caused by various conditions in the electrical network. Examples are grid switching, lightning strikes and when a car collides with a power pole. Refer to page 24.



# Din-T series 6 kA MCBs

6 kA interrupting capacity to AS3111



The 6000 series offers unparalleled choice of DIN rail mounted miniature circuit breakers. This high performance device uses all the latest developments and technology of circuit breaker protection and is capable of dealing with the most difficult problems. These include high short circuit currents and selectivity with a feeder, or back-up protection. The Din-T6 series is designed and certified to many international and national specifications, including AS3111. Truly an international range of high performance miniature circuit breakers.

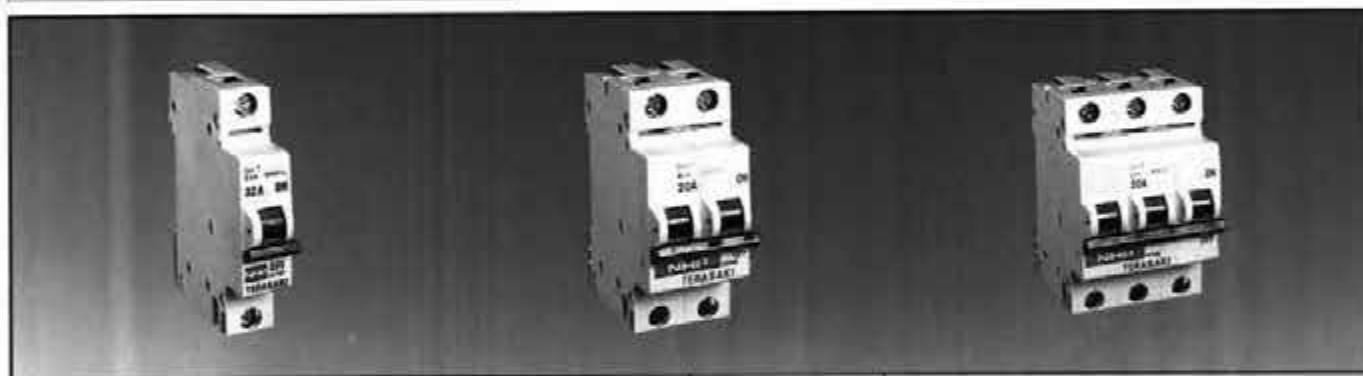
#### Mounting:

Suitable for quick mounting (snap-on) symmetric DIN rail.

#### Ratings:

Rated voltages from 240/415 volts AC. Rated currents from 2 amps to 40 amps. Available in 1 pole, 2 pole and 3 pole.

The Din-T6 series is of the highest quality and, as standard with the entire Din-T system, finger protected to IP20.



Amps	Cat. No.	Amps	Cat. No.
<b>Single pole 6kA</b>		<b>Single pole 6kA</b>	
2	Din-T 6 102	20	Din-T 6 120
4	Din-T 6 104	25	Din-T 6 125
6	Din-T 6 106	32	Din-T 6 132
10	Din-T 6 110	40	Din-T 6 140
16	Din-T 6 116	50	Din-T 9 150
		63	Din-T 9 163
<b>Double pole 6kA</b>		<b>Double pole 6kA</b>	
2	Din-T 6 202	20	Din-T 6 220
4	Din-T 6 204	25	Din-T 6 225
6	Din-T 6 206	32	Din-T 6 232
10	Din-T 6 210	40	Din-T 6 240
16	Din-T 6 216	50	Din-T 9 250
		63	Din-T 9 263
<b>Triple pole 6kA</b>		<b>Triple pole 6kA</b>	
2	Din-T 6 302	20	Din-T 6 320
4	Din-T 6 304	25	Din-T 6 325
6	Din-T 6 306	32	Din-T 6 332
10	Din-T 6 310	40	Din-T 6 340
16	Din-T 6 316	50	Din-T 9 350
		63	Din-T 9 363

Note: Din-T series 6kA suitable for mounting side attached accessories AUX and ALT. Not suitable for mounting SHT. Din-Safe-M6 refer NHP.

**Din-T series 9 kA MCBs****9 kA Interrupting capacity to AS3111**

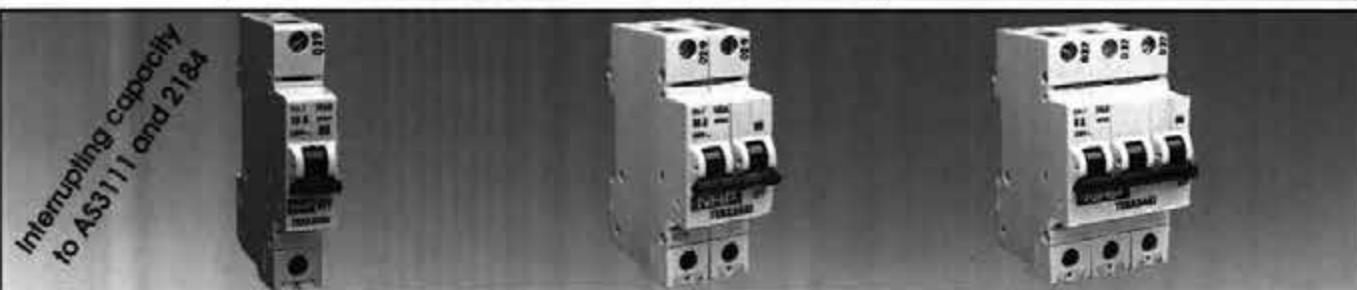
Amps	Cat. No.	Amps	Cat. No.
Single pole 9kA		Double pole 9kA	
0.5	Din-T 9 105	0.5	Din-T 9 205
1	Din-T 9 101	1	Din-T 9 201
2	Din-T 9 102	2	Din-T 9 202
3	Din-T 9 103 □	3	Din-T 9 203 □
4	Din-T 9 104	4	Din-T 9 204
6	Din-T 9 106	6	Din-T 9 206
10	Din-T 9 110	10	Din-T 9 210
16	Din-T 9 116	16	Din-T 9 216
20	Din-T 9 120	20	Din-T 9 220
25	Din-T 9 125	25	Din-T 9 225
32	Din-T 9 132	32	Din-T 9 232
40	Din-T 9 140	40	Din-T 9 240
50	Din-T 9 150	50	Din-T 9 250
63	Din-T 9 163	63	Din-T 9 263
Triple pole 9kA		Four pole 9kA	
0.5	Din-T 9 305		
1	Din-T 9 301		
2	Din-T 9 302		
3	Din-T 9 303 □		
4	Din-T 9 304		
6	Din-T 9 306	6	Din-T 9 406
10	Din-T 9 310	10	Din-T 9 410
16	Din-T 9 316	16	Din-T 9 416
20	Din-T 9 320	20	Din-T 9 420
25	Din-T 9 325	25	Din-T 9 425
32	Din-T 9 332	32	Din-T 9 432
40	Din-T 9 340	40	Din-T 9 440
50	Din-T 9 350	50	Din-T 9 450
63	Din-T 9 363	63	Din-T 9 463

□ Available on indent only.

IP20 finger protection cover standard on Input terminal.  
Refer page 31 for dimensions.

**Din-T series 10 & 14kA MCBs**

Amps	Cat. No.	Amps	Cat. No.
<b>Single pole 10kA</b>		<b>Double pole 10kA</b>	
80	Din-T 10 180	80	Din-T 10 280
100	Din-T 10 1100	100	Din-T 10 2100
125	Din-T 10 1125	125	Din-T 10 2125
<b>Triple pole 10kA</b>		<b>Four pole 10kA</b>	
80	Din-T 10 380	80	Din-T 10 480
100	Din-T 10 3100	100	Din-T 10 4100
125	Din-T 10 3125	125	Din-T 10 4125



Amps	Cat. No.	Amps	Cat. No.
<b>Single pole 14kA</b>		<b>Double pole 14kA</b>	
6	Din-T 14 106	6	Din-T 14 206
10	Din-T 14 110	10	Din-T 14 210
16	Din-T 14 116	16	Din-T 14 216
20	Din-T 14 120	20	Din-T 14 220
25	Din-T 14 125	25	Din-T 14 225
32	Din-T 14 132	32	Din-T 14 232
40	Din-T 14 140	40	Din-T 14 240
50	Din-T 14 150	50	Din-T 14 250
63	Din-T 14 163	63	Din-T 14 263
<b>Triple pole 14kA</b>		<b>Four pole 14kA</b>	
6	Din-T 14 306	6	Din-T 14 406
10	Din-T 14 310	10	Din-T 14 410
16	Din-T 14 316	16	Din-T 14 416
20	Din-T 14 320	20	Din-T 14 420
25	Din-T 14 325	25	Din-T 14 425
32	Din-T 14 332	32	Din-T 14 432
40	Din-T 14 340	40	Din-T 14 440
50	Din-T 14 350	50	Din-T 14 450
63	Din-T 14 363	63	Din-T 14 463

Available on indent only

IP20 finger protection cover standard on input terminal.

3 pole + N available on indent only.  
Refer page 31 for dimensions.

# Din-Safe safety switches

## Residual current devices (RCDs)

Refer catalogue RCD

Safety switches are electrical safety devices that provide protection against earth faults. Overcurrent devices such as fuses and miniature circuit breakers do not protect human beings from electrocution, they only protect equipment against faults of higher magnitude. Because residual current (or earth leakage) flows at such a low level an overcurrent device may take minutes to

### Din-Safe features

- Current ratings 40, 63, 80Amp
- 2 and 4 Pole 50/60 Hz
- 2 pole for single phase protection 240 volt
- 4 pole for multi circuit or three phase protection 415/240 volt
- Complies to AS 3190 - 1990
- Certificate of suitability C/S N11649
- Din-Safe safety switches are suitable for surface mounting on 35 mm DIN rail

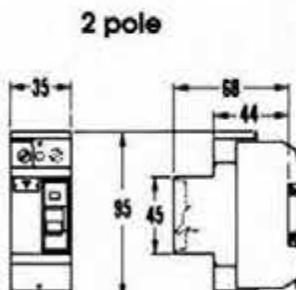
operate or it may not operate at all. By using a safety switch, dangerous earth leakage currents are prevented from flowing, hence protection from electrocution, equipment damage and fire is greatly enhanced.



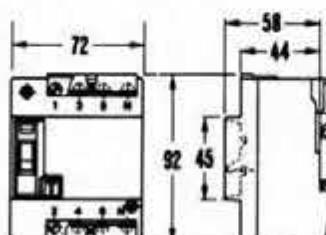
Cat. No.	Poles	Amp rating	Trip Voltage	Phase	sensitivity
Din-Safe 2-40-30	2	40	240	1+N	30 mA
Din-Safe 2-40-100 <small>□</small>	2	40	240	1+N	100 mA
Din-Safe 2-63-30	2	63	240	1+N	30 mA
Din-Safe 2-63-100	2	63	240	1+N	100 mA
Din-Safe 2-80-30	2	80	240	1+N	30 mA
Din-Safe 2-80-100	2	80	240	1+N	100 mA
Din-Safe 4-40-30	4	40	415	3+N	30 mA
Din-Safe 4-63-30	4	63	415	3+N	30 mA
Din-Safe 4-63-100 <small>□</small>	4	63	415	3+N	100 mA
Din-Safe 4-80-100	4	80	415	3+N	100 mA

□ Available on indent only

Dimensions (mm)

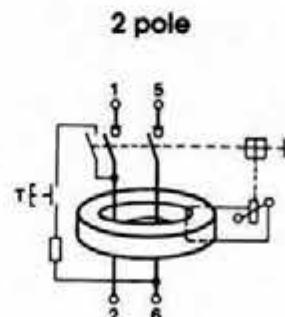


2 pole

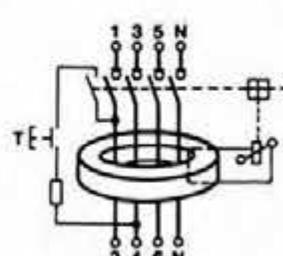


4 pole

Connection diagrams



2 pole



4 pole

# Din-Safe-M modules with MCB combination units

## Residual current devices (RCDs)

Refer catalogue RCD



### Safety switch modules and circuit breaker combinations offer the following functions:

- protection against overloads
- protection against short-circuit faults
- protection against earth-leakage faults thus protecting against:
  - (a) indirect contact
  - (b) direct contact
  - (c) fire
  - (d) earthing through corrosion

- Residual current sensitivity:  
30 mA and 100 mA  
300 mA or 500 mA available on request.
- Tripping characteristics:  

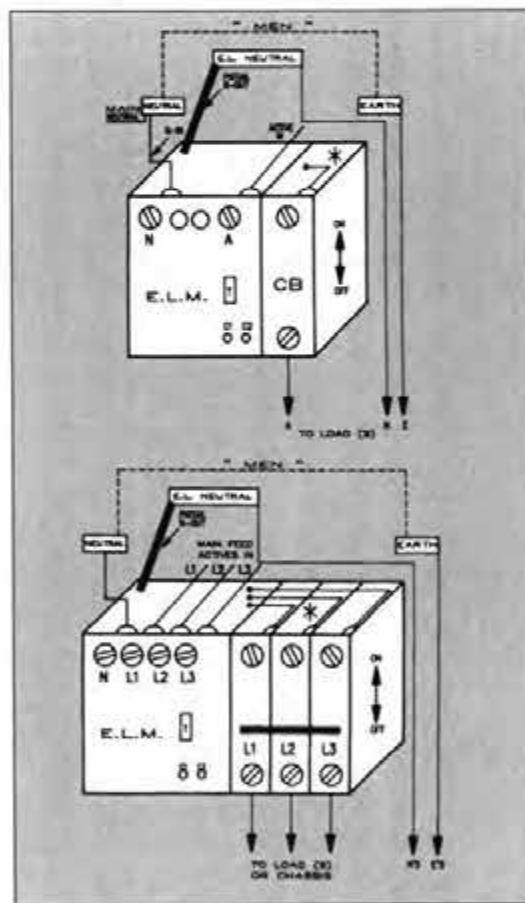
$0.5I_{\Delta n}$	no tripping
$I_{\Delta n}$	$t \leq 0.2s$
$5I_{\Delta n}$	$t \leq 0.03s$

The tripping time depends upon the point in the cycle at which the earth leakage fault occurs.

### Remote tripping

All Din-Safe-M modules have remote tripping facilities. Terminals marked C1 and C2 when connected through a switch, pushbutton or auxiliary contact, allow tripping from a remote location.

- Din-Safe-M module is an earth leakage relay only and needs to be used with a circuit breaker attached. Connection from Din-Safe-M module to circuit breaker is by copper links.
- If pigtail and N are reversed, breaker will trip as soon as load is energised.
- Din-Safe-M module space requirement with MCB. Single pole & neutral - 3 modules (54 mm). Triple pole & neutral 32 amp - 5 modules (90 mm). Triple pole & neutral 63 amp - 6 modules (108 mm).
- Check unit operation with test button provided on Din-Safe-M module.
- Reset Din-Safe-M module before switching circuit breaker on.**
- If unit is feeding motor do not connect pigtail.
- To enable test function to operate neutral is required on incoming neutral terminal.



Connection diagram

### Function checking

The MCB/Din-Safe-M module must be connected with the load at the incoming side of MCB. After connection the MCB/Din-Safe-M module should be tested before use by switching the Din-Safe-M module ON and then the MCB.

When the test knob T is pressed, both handles should trip.

### Operation

The MCB/Din-Safe-M modules are two handles, each handle indicates the cause of trip.

- If an overload or short-circuit fault occurs the handle of the MCB only moves to the trip position.
- If an earth leakage fault occurs, both handles trip.
- The trip free mechanism of the MCB/Din-Safe-M module ensures the tripping of the contacts even if both handles are held in their ON position.

# Din-Safe-M modules with MCB combination units

## Residual current devices (RCDs)

### Din-Safe-M modules (clip on) to suit Din-T 9 + 14kA MCBs

Sensitivity	Poles	Modules	Cat. No.
30 mA	1P+N	3	Din-Safe - M 1-32/30mA
		3	Din-Safe - M 1-63/30mA
	3P+N	5	Din-Safe - M 3-32/30mA
		6	Din-Safe - M 3-63/30mA
100mA	1P+N	3	Din-Safe - M 1-32/100mA
		3	Din-Safe - M 1-63/100mA
	3P+N	5	Din-Safe - M 3-32/100mA
		6	Din-Safe - M 3-63/100mA
300mA	1P+N	3	Din-Safe - M 1-32/300mA
		3	Din-Safe - M 1-63/300mA
	3P+N	5	Din-Safe - M 3-32/300mA
		6	Din-Safe - M 3-63/300mA

Note \*): For 2 pole application use.

In the above part No's 32 and 63 refers to the max MCB size the module can be fitted to.  
In both 1P + N and 3P + N types the Neutral is conducted by a "pigtail" cable.  
Add 9 kA or 14 kA circuit breaker to above for complete unit.



### Din-Safe-M6 Modules (clip-on) to suit Din-T6 MCBs

Sensitivity	Poles	Modules	Cat. No.
30 mA	1P+N	2	Din-Safe - M6 1-32/30mA
	3P+N	2	Din-Safe - M6 3-32/30mA
100mA	1P+N	2	Din-Safe - M6 1-32/100mA
	3P+N	2	Din-Safe - M6 3-32/100mA
300mA	1P+N	2	Din-Safe - M6 1-32/300mA
	3P+N	2	Din-Safe - M6 3-32/300mA

Note : For 40, 50 and 63A requirements use Din-T 9 plus Din-Safe-M.

# Din-Safe protection in action

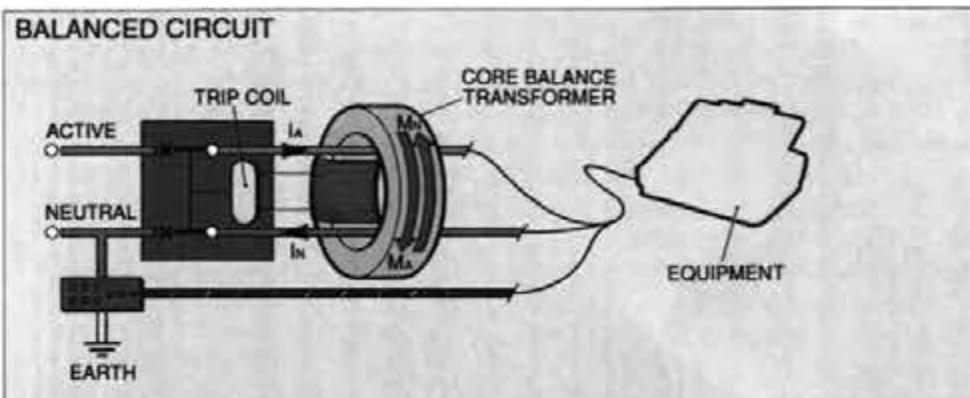
## Residual current devices (RCDs)

### Safe condition

- No residual current
- Single phase
- 240V connection
- Magnetic field is balanced and is zero
- No output from secondary winding to signal trip circuit

$I_A = I_N$

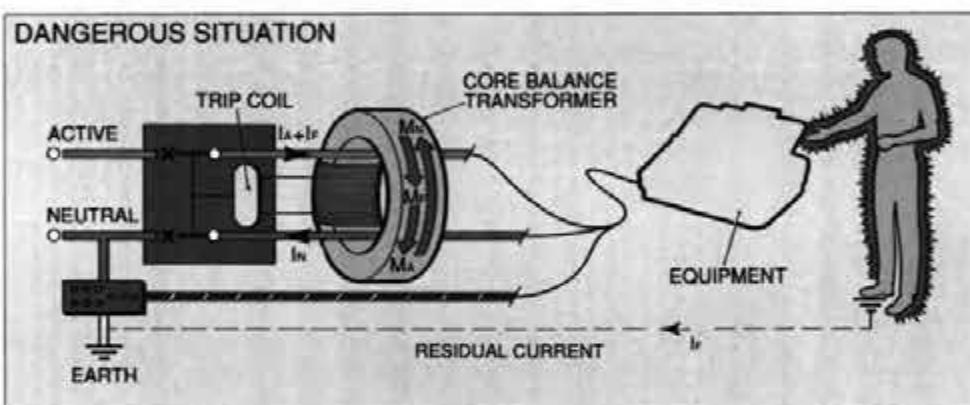
$M_A = M_N$



### Unsafe condition

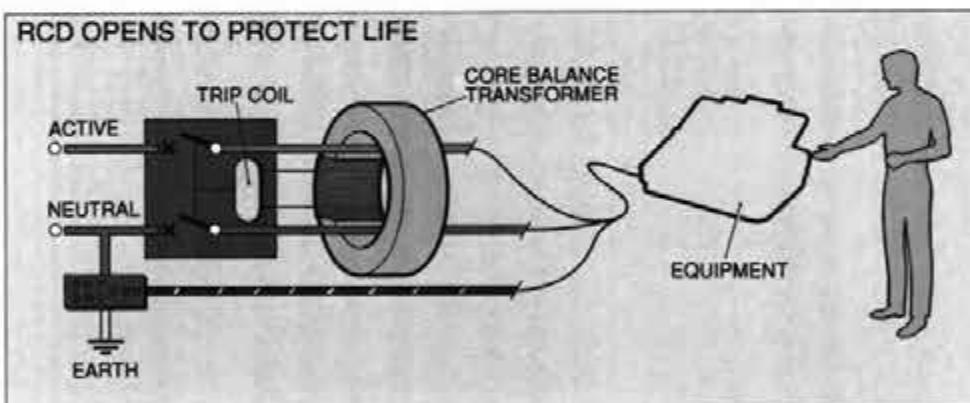
- Residual current is flowing
- Resultant magnetic field produces current in secondary winding
- Trip coil is energised

$I_A + I_F$  is greater than  $I_N$   
 $M_A + M_F$  is greater than  $M_N$



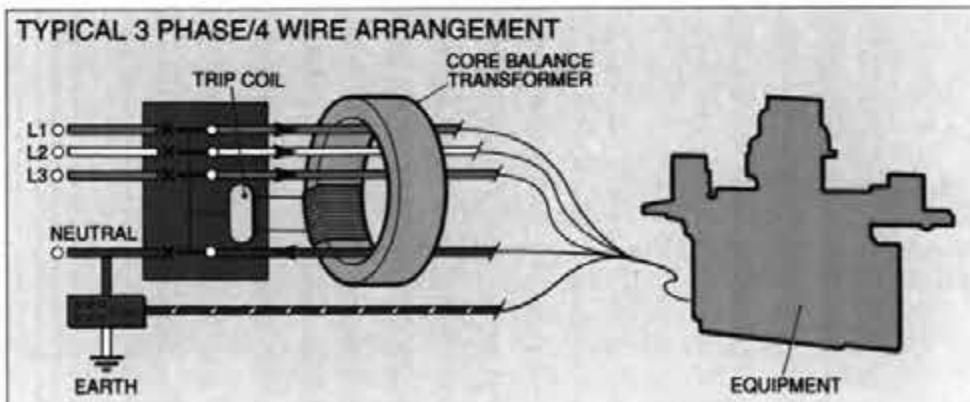
### Trip circuit activated

- Safety switch opens
- Electrocution is avoided



### 3 phase 415 volt connection

- Principal of operation is the same as single phase



# Din-Safe protection in action

## Residual current devices (RCDs)

### How Din-Safe provides the protection solution

Both the speed with which the RCD responds, and its tripping sensitivity to a dangerous level of residual current, are critical specifications. This is because the severity of an electric shock is directly related to (a) the duration of the contact with a live appliance, and (b) the current's path through the body. The closer this path is to the heart, the worse the result.

Din-Safe RCDs operate on the electromagnetic principle of a balanced circuit. Through a toroidal transformer, the RCD continually monitors the magnetic field of the active conductor and the magnetic field of the neutral conductor as current passes through the protected circuit.

Under the normal conditions of a balanced circuit, these magnetic fields are equal. But under abnormal conditions, such as when a fault causes current to flow from the active conductor to earth,

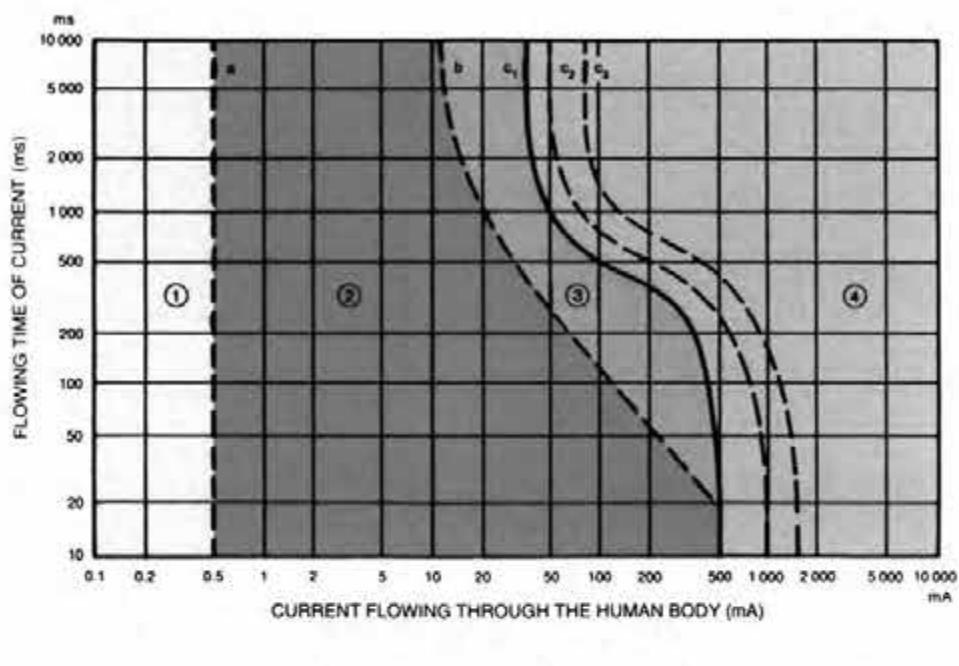
the residual current will increase the magnetic field of the active conductor.

The Din-Safe RCD detects the unbalanced circuit through the toroidal transformer and automatically cuts off the electricity supply to the protected circuit.

In terms of saving life and protecting equipment, that's why Din-Safe RCDs are regarded as the protection solution.

### Fast operation

Din-Safe RCDs operate well within the safe operating time preventing any dangerous physical consequences. The table below shows the four zones of physiological effects on the human body when subjected to increasing residual current with increasing flowing time of that current. Therefore fast operation time as well as sensitivity of the RCD is significant in preventing injury.



TIME/CURRENT ZONE OF ALTERNATE CURRENT EFFECTS ON PEOPLE (15 TO 100Hz)

### Zones of physiological effects

**Zone 1:** Normally no effect or consequences.

**Zone 2:** Normally no dangerous physical consequences.

**Zone 3:** Normally no organic damage. Possibility of muscle contraction, breathing difficulties and perturbation of heart beat including auricular fibrillation with temporary lack of cardiac pulsation without ventricular fibrillation. This increases with the current rating and time of exposure.

**Zone 4:** In addition to Zone 3 effects, probable ventricular fibrillation increasing to 5% (C1) up to 50% (C2) and above (C3) increasing with current rating and time of exposure which can stop breathing function and heart beat and cause severe burns.

# Metal panelboards Type NDB

Designed for commercial and industrial installations, NDB panelboards are complete with type tested busbar systems (to 18 kA) neutral and earth bars, identification label and circuit schedule card.

The steel escutcheon is cut out to suit breakers and is punched to accept IPA studs. All Terasaki NDB panelboards have concealed hinges and are made from 1.6 mm zinc annealed steel. NDB

panel boards are generously sized to provide cabling room and will accept contactors up to Sprecher + Schuh size CA3-72N.

Standard colour is N42 storm grey per AS 2700-1985 (other colours to special order). Busbar ratings: 18-78 poles 250A, 300A available to special order. Type tests to AS 1136: 250A bar 18 kA 0.3 sec. 300A bar 20 kA 1.0 sec. Neutral bar tested: 10 kA - 1 sec.

Modular box size	Pole capacity	Surface mounting standard with door Cat. No. 1)	Box height (mm)
0	18	NDB18SDR	500
1	24	NDB24SDR	610
1	30	NDB30SDR	610
2	36	NDB36SDR	685
3	42	NDB42SDR	835
3	48	NDB48SDR	835
3	54	NDB54SDR	835
4	60	NDB60SDR	1060
4	72	NDB72SDR	1060
4	78	NDB78SDR	1060

Note: 1) Space available in top of box for accessories inc. contactors, main switches and time clocks.

## Dimensions

**Height** - shown for box only.

**Width** - 485 mm for all sizes.

**Depth** - 125 mm for all sizes.

**Lockable door** - add 23 mm to depth.

## Doors

Doors R.H.S. hinged as standard and fitted with a lockable lifting latch. Readily converted to L.H.S. hinging.

## Optional accessories and extras:

1. Flush additional kit supplied loose. Order as 1 x NDB-18SDR and 1 x SPBFK size X.
2. Dustproof doors for all sizes. Insert P after D in catalogue number, example: NDB 18SDPR. At extra charge.
3. If door is not required, **delete DR** from catalogue number.
4. For left hand hinged door, **replace R with L**.
5. Special colours. White interior. Additional charge applies.
6. I.P.A. identity studs supplied loose. Additional charge applies.
7. Split tariff chassis. Additional charge applies.
8. Accessory mounting plates - for main switches, contactors, time clocks or earth leakage relays available on request.
9. Standard main switch is non-auto.
10. 300 amp busbar. Specify by description.
11. P.V.C. duct. Additional charge applies.
12. N.S.W. P.W.D. 'E1 type Lock'. Available on request.
13. Pole Fillers.
14. Fitting of circuit breakers on request. Additional charge applies.

## Main switches for NDB series

160A Din-T 160A M/S kit

225A Din-T 225A M/S kit

**Note:** Field fittable. Additional charge for factory fitting. Other main switch sizes available on request.



# Insulated loadcentres Type Din-Modula 150

The NHP range of Din-Modula 150 consumer units have design features previously unavailable in consumer unit construction. With a wide range available from 36, 54 and 72 module space, the Din-Modula 150 is the most versatile consumer unit currently on the market. The Din-Modula 150 was designed

with ease of wiring in mind, as the name suggests, the distance between the DIN rail is an ample 150mm allowing for greater space in making connections to the MCBs. The aesthetic qualities of the Din-Modula 150 consumer units are so pleasing they are ideally suitable for domestic, commercial and industrial applications.

## Technical data

Material - Self extinguishing halogen free polystyrene

Colour of Enclosures: grey Base, light grey Cover

IP rating: IP40

Flush mount available

## Accessories supplied

- Hinged door. Can be left or right hinged. (left hand hinged is standard).
- Full DIN rail
- Earth and neutral bars with split neutral
- Pole fillers
- Circuit identification labels

## Accessories

- Door lock complete with two (2) keys.
- A range of 1, 2 & 3 phase insulated busbar combs and connection lugs. See page 15 and 21.

Cat. No.	No. of modules	No. of rows	Consumer unit dimensions (mm)		
			Height	Width	Depth
DM15036	36	2	450	355	142
DM15054	54	3	600	355	142
DM15072	72	4	750	355	142



## Din-Modula weatherproof enclosures

The Din-Modula weatherproof consumer unit maintains the modern styling and attractive appearance but offers a higher protection rating of IP55-6. The Din-Modula weatherproof was designed with maximum flexibility in mind. Using the connection set, two or more enclosures can be joined together - maintaining the IP55-6 protection rating. A further feature of flexibility is that of the adjustable height DIN rail. Din-Modula weatherproof was designed for use with the Din-T6, 9 and 14kA MCB range in wet area applications, out of direct sunlight. Split neutral and earth bars are provided. A range of accessories including three phase insulated busbar combs and terminal lugs are available for applications up to 100 amp.



## Technical data

Maximum load: 100 amp

Max. operating volt.: 415V

Material: impact resistant  
polystyrene base  
polycarbonate door

Degree of protection: IPP 55-6  
Colour: Grey base / clear door

## Accessories

- Circuit identification labels.
- Split neutral and earth bars
- Clear hinged door - left or right side
- Weatherproof sealing caps for mounting screws.
- Polefillers
- Connection set for joining enclosures together at extra cost.
- Locking device
- Connection set



Cat. No.	No. of rows	No. of modules	Neutral bar	Earth bar
DMWP12	1	12	8/4	8
DMWP24	2	24	18/6	18
DMWP36	3	36	24/12	18

Notes: Neutral and earth bars rated at 90 amps.

Neutral bar indicated as eg. 8/4 split.

## Dimensions (mm)

Cat. No.	H	W	D
DMWP12	250	285	138
DMWP24	375	285	138
DMWP36	500	285	138

# Insulated loadcentres Type ILC

## ILC range

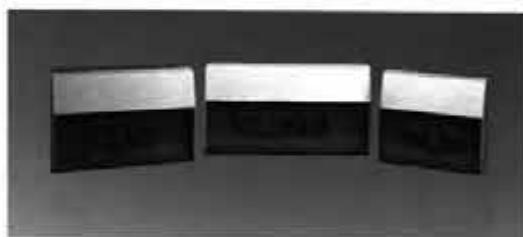
The NHP ILC consumer unit range offers a number of options suitable for most applications.

They are designed for indoor use and accept any of the modular Din-T 6 kA MCB range, as well as Din-Safe safety switches, Din-Safe-M modules, time switches, main switches and contactors.

The moulded plastic ILC range is available in 5 different sizes, 4, 8, 10, 14 and 18 way.

### Technical data

Maximum load 100amp. Maximum operating voltage 415 VAC.  
 Material : Self extinguishing halogen free polystyrene.  
 Degree of protection: ILC 4 & 8 IP44  
 ILC 10, 14 & 18 IP40  
 Colour: grey base, clear door.



Cat. No.	No. of mods	Neutral bars	
		Protected	Unprotected
ILC 4S 1)	4	-	-
ILC 8S 1)	8	-	-
ILC10SSN	10	4	9
ILC14SSN	14	8	9
ILC18SSN	18	12	9

Note: 1) Enclosure without earth & neutral bars  
 Order earth and neutral bars separately



## Accessories supplied

- Single phase comb type busbar
- Full DIN rail
- Circuit identification label
- Hinged lid
- Earth and neutral bars. (Neutral bars can be split for Din-Safe module installation on 10, 14, and 18 way enclosures.)

## Dimensions (mm)

	ILC 4S	ILC 8S	ILC 10S	ILC14S	ILC 18S
Height	175	175	208	208	208
Width	90	170	218	292	370
Depth	100	120	108	108	108

## Main switch

DIN-mount	Amps	Cat. No.
Single pole	63A	DTMS631
Single pole	63A	DTMS633
Triple pole	80A	DTMS801
Single pole	100A	DTMS1001
Triple pole	100A	DTMS1003

## Additional accessories available

- Three phase comb busbar (refer below)
- Flush surround kit. All screws and wall brackets supplied to mount unit semi-flush in brick and brick-veneer walls

## Flush Mount Kit

Dimensions (mm)	ILC10	ILC14	ILC18
Cavity height	212	212	212
Cavity width	223	298	212
Cavity depth	67	67	67
Flange height	264	264	264
Flange width	274	349	426
Flange depth	6	6	6

## Three phase link bars

### Accessories

- ICL 12
- ICL 15
- ICL 18
- ICL 21
- ICL 57
- ICL end cap



Note: Two and four pole link bars available - refer NHP.  
 Current carrying capacity 120Amp

# Din-Safe-R Core balance earth leakage relays

Din-Safe-R relays are for the protection of electrical distribution systems and equipment. The relays must be used in conjunction with a current transformer as listed below.

## Technical data

- Control voltage: 110, 240V and 415V 50/60Hz (440V to order)
- Tripping current  $I_{\Delta n}$ : Adjustable 30milli Amps to 10 amp
- Time delay: Adjustable 0.025milli seconds to 2.5 seconds
- Output: Changeover contact 250V 4 amps ( $\cos\phi=0.4$ ) with normally de-energised relay
- Indication: Supply healthy - green LED  
Relay tripped - red LED
- Reset: Remote or local by pushbutton
- Test: Tests all functions including CT wiring
- Power consumption: <10VA at 240V AC
- Operating temperature: -5°C to +40°C
- For 400Hz applications refer NHP
- Din-Safe-R relays are designed and manufactured according to IEC publication 755

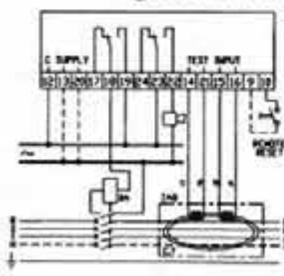


Relay type	Features
Din-Safe -R4RD Cat. No. DSR4RD	DIN rail mounting Adjustable time 0.025 to 2.5sec Adjustable trip current 0.025 to 10amp
Din-Safe -R72 Cat. No. DSR72	Panel mounting 72mm Adjustable time 0.025 to 2.5 sec Adjustable trip current 0.025 to 10amp
Din-Safe -R961P Cat. No. DSR961P	Panel mounting 96mm Adjustable time 0.025 to 2.5 sec Adjustable trip current 0.025 to 10 amp Alarm preset at 50% of trip current
Din-Safe -R96D Cat. No. DSR96D	Panel mounting 96mm Adjustable time 0.025 to 2.5 sec. Adjustable trip current 0.025 to 10amps Digital indication of residual current

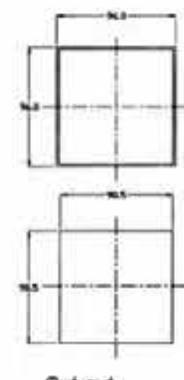
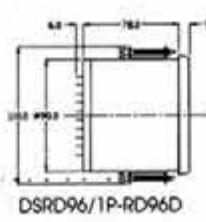
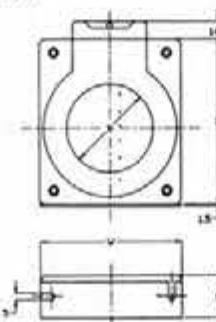
Din-Safe-R CTs are to be used with Din-Safe-R relays. Care should be taken to select a size closest to the diameter of the cables in order to maintain maximum accuracy.

Cat. No.	Max. $I_{\Delta n}$	Max. In (A)	Internal diameter	Overall dimensions H	W	D
DSR35CT	0.03	200	35	115	92	34
DSR70CT	0.03	400	70	148	115	34
DSR105C	0.1	800	105	191	159	34
DSR140C	0.2	1200	140	234	200	34
DSR210C	0.3	1800	210	325	290	44

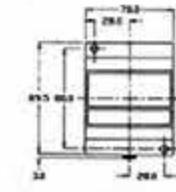
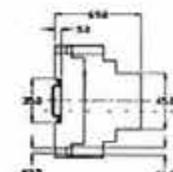
Overall dimensions and general wiring diagrams



Note: DSR4RD has one changeover (17,18,19) and one normally open (23,22) contacts only.



Cut-out



Din-Safe R4RD

# Metal loadcentres Type NLC

## Suitable for commercial and industrial installations

Each loadcentre is supplied with earth bar and neutral link. (Standard numbers and labels).

Surface and flush mounting available with and without drop down lockable door as standard. Colours: N42 Storm Grey. Special colours available on application at extra cost.

Pole cap	Surface mount Cat. No.	Flush escutcheon Cat. No.	Door ') Cat. No.
8	NLC8S	NLC8FE	LD6/8
12	NLC12S	NLC12FE	LD9/12
15	NLC15S	NLC15FE	LD12/15
18	NLC18S	NLC18FE	LD15/18
21	NLC21S	NLC21FE	LD18/21

Note: ') Door is lockable as standard. Lock and lock bracket optional extra.

## Dimensions (mm)

Poles	Height	Width	Depth
8	205	250	192
12	205	325	267
15	205	400	342
18	205	475	417
21	205	550	492

- Add 23 mm to dimension D for door.
- Add 50 mm to dimension H and W for flush cover.



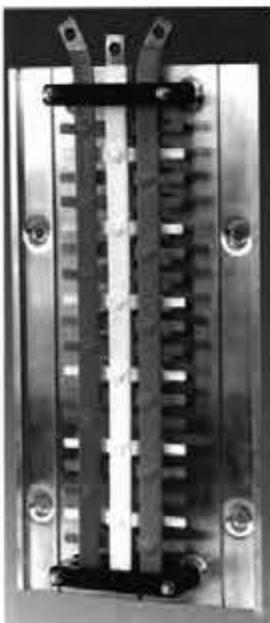
- Link bars and circuit designation label provided as standard.
- Door supplied loose. Order as per 1 x NLC 12S and 1 x LD 9/12.
- Flush escutcheons supplied loose. Order as per following example: 1 x NLC 12S and 1 x NLC 12FE.
- Flush escutcheons and door can be supplied fitted. Fitting charge applies. Please specify when ordering.

## Accessories and extras:

Spare pole fillers (set of 4). Traffolite labels and numbers. Special paint colours.

3 phase insulated link bars available - Type ICL refer page 15.

Split neutral available - refer NHP.



## Three phase panel assembly

The 3 phase distribution chassis has been designed for distribution networks where substantial prospective fault levels exist and where good engineering practices need to be rigidly observed.

Suitable for any combination of single pole (1P + N) or three pole (3P+ N) earth leakage modules which can be fitted within the boards.

## Technical data

- Current rating 250A, 300A available on request.
- Voltage rating 440 VAC
- Type tested for 18 kA 0.1 second without back-up protection

# Electrical accessories

Electrical accessories are supplied as a kit for simple fitting to MCBs.

**Shunt trip** **SHT**

For remote electrical tripping of MCB.

**Auxiliary switch** **H**

Electrically indicates MCB status, ON or OFF.

**Alarm switch** **S**

Electrically indicates tripped state of MCB.

## Combination of auxiliary and alarm switches

**Front indications with (H) and/or (S)**

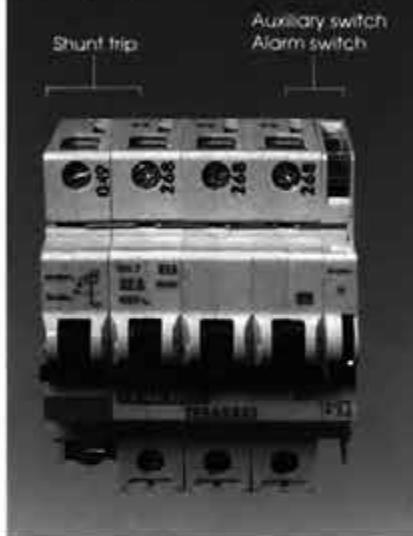
- H : Auxiliary switch, 1c
- S H : Alarm switch, 1c
- S H : Auxiliary switch, 2c
- H H : Auxiliary switch, 1c  
Alarm switch, 1c

Connecting diagram printed



Auxiliary switch (H) 1c Din-T H	Alarm switch (S) 1c Din-T S	Auxiliary switch (HH) 2c Din-T H/S	Auxiliary switch (SH) each 1c Din-T H+H/S Din-T 10H+H/S

**Front indications with (SHT)**



Position of auxiliary and alarm switch	MCB ON	MCB OFF	MCB TRIPPED

## Auxiliary contacts for MCBs

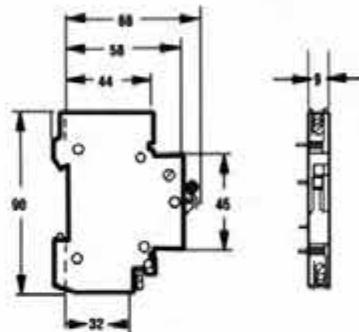
When coupling an auxiliary element to the side of an MCB both handles must be in identical position.

Bring the MCB and auxiliary function side by side carefully. Fix together by means of the two spring clips provided. When opening the spring clip again, the auxiliary element can be removed.

**Attention:** Always open spring on MCB side.

### Maximum contact ratings

Volts	AC-11	DC-11
240V AC	5amp	-
415V AC	3amp	-
24V DC	-	4 amp
48V DC	-	2 amp
60V DC	-	1 amp
110V DC	-	0.7 amp
220V DC	-	0.5 amp



### Shunt trip for MCBs

#### Shunt trip for remote tripping of Din-T MCBs

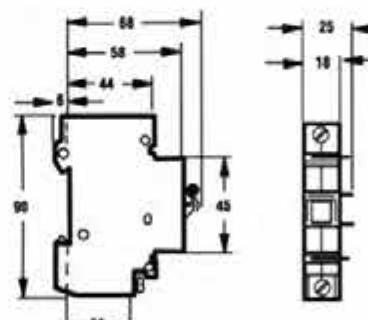
The shunt module makes it possible to remotely switch off the MCB to which it is coupled by energising the terminals of the module. An inbuilt contact in series with the coil prevents burnout damage if the voltage remains.

#### Characteristics

- Simply coupled to the left side of the MCB series 9kA & 14kA only
- Modular width of 18 mm
- Material of shells is thermosetting, self extinguishing and tropicalised.

#### Applications

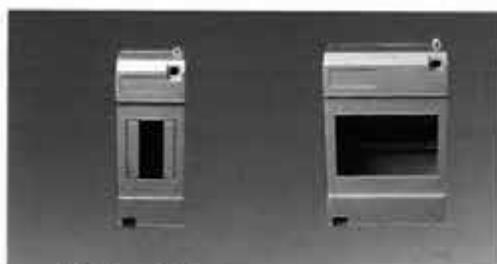
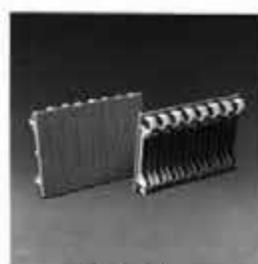
- Emergency stop
- Isolation of industrial socket outlets



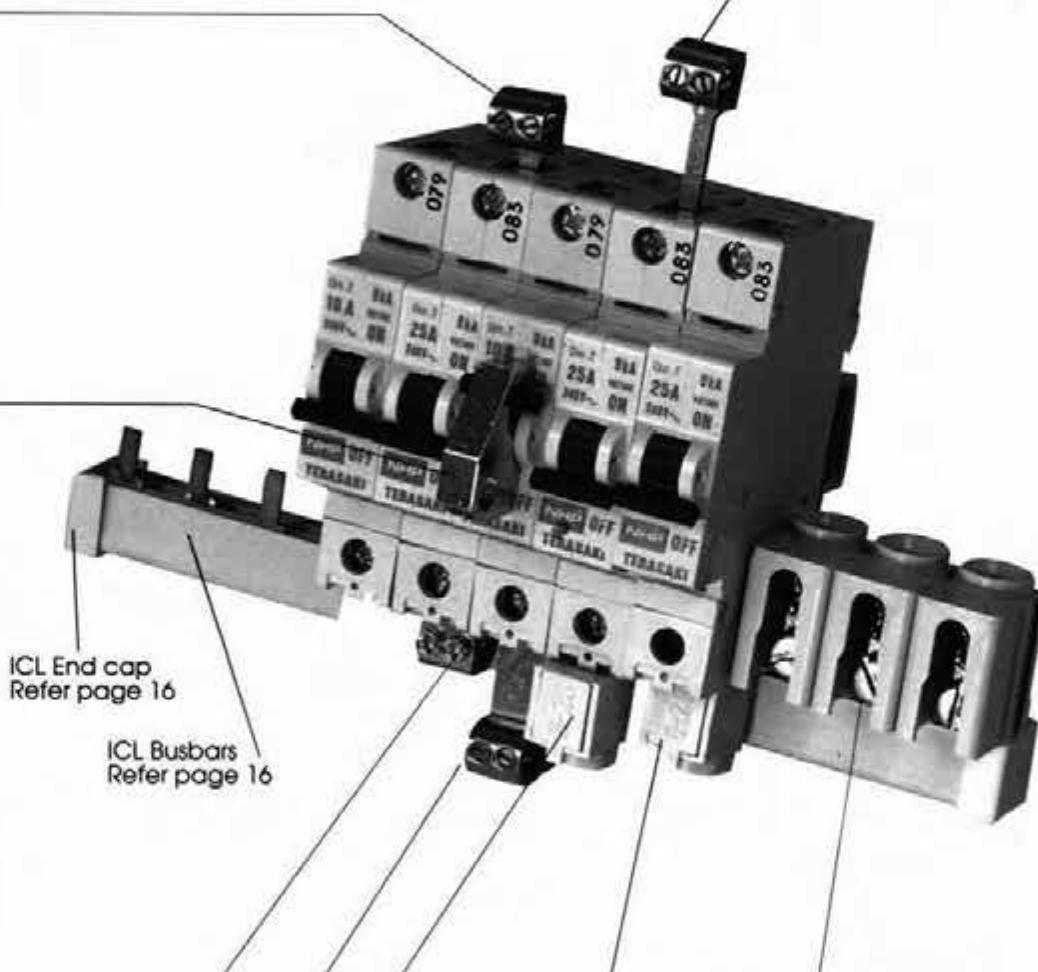
Cat. No.	Rated voltage	Closing current	Operating time	Coil impedance
Din - T SHT 110-415V AC	110 to 415V~ 110 to 125V~	at 110V—0.3A 240V—0.6A 415V—1A	10 mS 3 mS 2 mS	ca. 29 Ohm
Din - T SHT 24-48V DC	24 to 48V— 24 to 60V~	at 24V—1A 48V—2A	10 mS 4 mS	ca. 24 Ohm

Note: Not available for 6kA and 10kA MCBs.

# Accessories for Din-T circuit breakers

2 pole cover  
4 pole coverPole filler  
(strip of 4)T-off cap  
(strip of 3)Lateral pin terminal  
35mm<sup>2</sup> (long type)Lateral pin terminal  
35mm<sup>2</sup> (short type)

Din-T lock dog

Lateral spade terminal  
25mm<sup>2</sup> (short type)Lateral spade terminal  
35mm<sup>2</sup> (extra long type)Axial pin terminal  
25mm<sup>2</sup>Axial spade terminal  
25mm<sup>2</sup> (insulated)

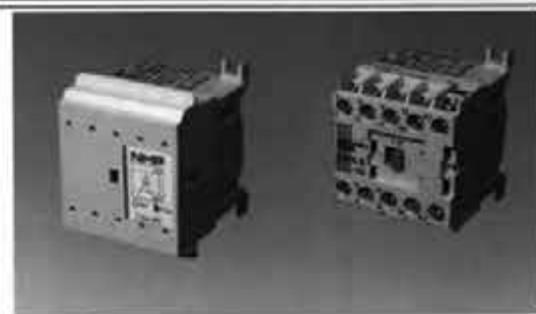
**Note:**  
Catalogue  
search  
code DTT...

# Sprecher + Schuh contactors

## Sprecher + Schuh CA 4 contactors

### Features

- Ideally suited for heating, lighting, hot water and storage heating applications.
- DIN rail mounting.
- Contactors can be mechanically interlocked
- Large range of snap on accessories<sup>1)</sup>.
- Protection cover allows mounting adjacent to DIN circuit breakers utilising a 2.5 module width.
- Conforms to AS 1202 and IEC 158 with world wide approvals.



Cat No. <sup>2)</sup>	Maximum current rating (amps) at 415 volt			CA 4-9-10 <sup>3)</sup>			CA 4-9-M4D <sup>4)</sup> <sup>5)</sup>	
	1	2	3	1	2	3	1	4
Poles in parallel <sup>6)</sup>	1	2	3	1	2	3	1	4
<b>Heating loads AC1</b>								
Amps per phase 40°C	20	34	50	20	34	50	20	64
Amps per phase 60°C	16	27	40	16	27	40	16	51
<b>Lighting loads</b>								
Tungsten per phase	4	-	-	7	-	-	7	-
Fluorescent 40°C	18	30	45	18	30	45	18	57
Fluorescent 60°C	14	24	35	14	24	35	14	45
<b>Motor loads</b>								
Amps 415 volt AC 3	4.8		8.2		8.2			
kW 60°C	2.2		4.0		4.0			

Accessories	
Description	Cat. No.
Bridging link 2 pole	CB4-2
Bridging link 3 pole	CB4-3
Bridging link 4 pole	CB4-4
Protection cover	CA 4-PC

Notes: <sup>1)</sup> For further information refer to Part A catalogue.  
<sup>2)</sup> Supplied with 1 N/O auxiliary contact.  
<sup>3)</sup> For 1 N/C auxiliary contact, specify 01 instead of 10 when ordering.  
<sup>4)</sup> M40 denotes 4 pole contactor.  
<sup>5)</sup> Single pole contactor using bridging links.

## Din-T contactors

Din-T contactors are electro-magnetically operated load-break devices with 1 stable position.

### General features

- Rated current In: 20A, 40A, 63A.
- Rated voltage Un: 240/415V, 50Hz.
- Coil voltage: 24V, 240V - 50 Hz.
- DIN rail mounting.

### Technical data

- Manufactured in accordance with the following standards: NBN C63-158-1, IEC-158-1, NF C63-110, CEE 14, VDE 0660, BS 775 pt. 1.
- If two contacts are connected in parallel the maximum AC 1 rating of that arrangement is 0.8 x 21 the ie 1.6 times the AC 1 rating of one contact.
- To ensure current thermal distribution, when a number of contactors are mounted together, a half module spacer should be inserted between each group of 3.
- Internal loss: 2W
- Operating limits of coil between - 15% and + 10% of nominal coil voltage.

	Max. operating loads (kW)		
	20A 2P	40A 2P	63A 4P
<b>AC 1 - resistive</b>			
240V single phase	4	8.5	13.5
415 three phase	-	25	40
<b>Lighting filament lamps</b>			
240V fluorescent	1.5	4	5.5
- compensated	3	6.1	8.4
- uncompensated	2.2	3.2	4.4
<b>AC 3 - motors</b>			
Single phase + capacitor	1.1	-	-
415V three phase	-	7.5	15
<b>Power required</b>			
on closing (VA)	8	50	50
when closed (VA)	4	7	7
Closing time at Un (ms)	11	12	12
Opening time at Un (ms)	11	6	6

Characteristic of the load switching		
	20A	40A
Rated voltage	415V	415V
Maximum connection	2 x 4 mm <sup>2</sup>	1 x 16 mm <sup>2</sup>
Mechanical life (ops)	1,000,000	1,000,000
Electrical life AC 1 (ops)	70,000	50,000
Electrical life AC 3 (ops)	800,000	120,000

Cat. No.	No. of poles	No. of modules	Coil voltage
DC 202024	2	1	24V
DC 202240	2	1	240V
DC 402240	2	3	240V
DC 403240 <sup>1)</sup>	3	3	240V
DC 634240	4	3	240V

Note: <sup>1)</sup> Available on indent only

# Pulsar - impulse switch

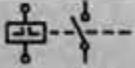
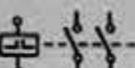
## Impulse switches 16A

For DIN rail mounting - depth 68 mm, 1 module width

Din-T 511: Impulse switch complete with normally open contact (1 N/O)

Din-T 512: Impulse switch complete with two normally open contacts (2 N/O)

Din-T 711: Impulse switch complete with one changeover contact (1N/C)

Cat. No.	In	Poles	Mods	Coil voltages AC	DC	Diagram
Din-T 511	16A	1	1	240V	110V	
Din-T 512	16A	2	1	240V	110V	



**Notes:** Special voltage models available on indent.

Voltages 12, 24, 48 AC, 6, 12, 24 DC.

Available on indent only.

## Din-T pilot light & Din-T pushbuttons

Modular style pushbutton with illuminated indication circuit and pilot lights.

Lenses in red, green or orange ordered separately.

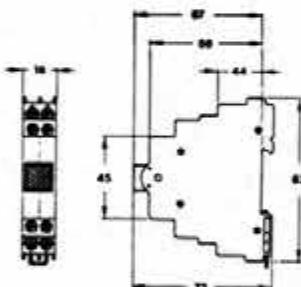
Pushbutton contact rating 16 amp.



Description	Cat. No.
Pilot light	DTPL
Lens red	DTLRD
Lens green	DTLGR
Lens orange	DTLOR
Lens clear	DTLCL
Lamp 240V	DTLP240
Lamp 24V	DTLP24
Pushbutton (ILL)	DTPB771
Pushbutton	DTPB691

**Notes:** Illuminated pushbutton 240V only.

Dimensions (mm)



## Surge diverters

Surge diverters offer affordable protection against over-voltage spikes. Using a zinc oxide varistor with a high discharge capacity the modular design permits compact installation features. The varistor module can easily be replaced without interrupting the mains supply. A signal contact to remote indicate the 'healthy' and 'tripped' status of the varistor is available.



Technical data	Cat. No.	
	DTSD 230	DTSD 500
Rated voltage	230-250V	500V
Maximum operational voltage AC	275V	550V
Maximum operational voltage DC	350V	745V
Rated impulse current: Isn	15kA	15kA
Maximum impulse current: Is max.	40kA	40kA
Residual voltage: Ur	≤1.3kV	≤2.5kV
Response time: t <sub>a</sub>	25ns	25ns
Cable connection size	4-25mm <sup>2</sup>	4-25mm <sup>2</sup>
Maximum fuse back-up:	100A	100A
Temperature range	-40°C to +60°C	
Standard	IEC99-1	
Auxiliary module 250V 2A (optional)	1 C/O	1 C/O
Cable connection (auxiliary models)	1.5mm <sup>2</sup> max	1.5mm <sup>2</sup> max

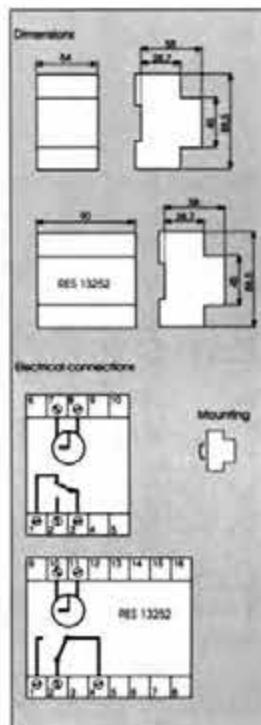
# Flash time switches

## Micromat

Day or week and combined day/week cycle time switches for DIN rail mounting.

### Characteristics

Movement	Quartz
Supply - voltage	240V~
- frequency	50-60Hz
- consumption	0.5VA
Contacts	1 changeover
Resistive load	16A/250V~ (AC 1)
Degree of protection	IP20
Operating temperature	from -10°C to +45°C
Terminals	1-4mm <sup>2</sup>
Programming steps	- day dial 15 minute - week dial 2 hour
Minimum interval	- day dial 15 minute - week dial 2 hour
Accuracy (switching)	- day dial 1 minute 30 seconds - week dial 10 minute
Manual override	yes
Battery reserve	72 hours



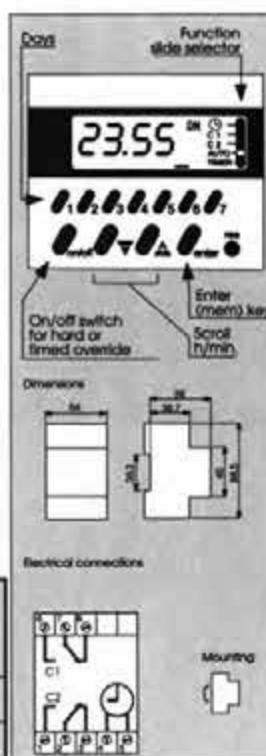
Cycle	Reserve	Programming interval	Minimum interval between 2 actions	Rating	Contact	Cat. No.
24 hr. ec.	-	15 minute	15 minute	16A	— =	QSR 13003
24 hr.	-	15 minute	15 minute	16A	— =	QSR 13001
24 hr.	72 hour	15 minute	15 minute	16A	— =	RES 13002
7 days	72 hour	2 hr	2 hr	16A	— =	RES 13702
24hr.+7 days	72 hour	15 min. + 2 hr.	15 minute + 2 hr.	16A	— =	RES 13252

## Monotron 200

Electronic weekly cycle time switch in 1 or 2 channel versions for DIN rail mounting.

### Characteristics

Supply	
- voltage	240V~
- frequency	50-60Hz
- consumption	1VA
Contacts	1 or 2 changeover
Resistive load	16A/250V~ (AC 1)
Degree of protection	IP20
Operating temperature	from -10°C to +50°C
Terminals	1-4mm <sup>2</sup>
Programming steps	1 minute
Minimum interval	1 minute
Operating precision	1 second/24 hour
Timed override	1 hour to 27 days
Battery reserve	10 years (programme)
Programming capacity	10 on & 10 off per day or 140 per week by grouping commands.



Cycle	Reserve	Programming interval	Minimum interval between 2 actions	Rating	Contact	Cat. No.
7d/1chan	72 hr.	1 minute	1 minute	16A	— =	RES 23701
7d/2chan	72 hr.	1 minute	1 minute	16A	— = — =	RES 23702

## Modular switches

### General features

Din-Modular switches have the same profile as Din-T MCB. These switches have double break contacts and comply to IEC408 with regard to isolating duty. The switch housing self extinguishing material has very high mechanical strength and allows operation in 50°C ambient with a 95% relative humidity.



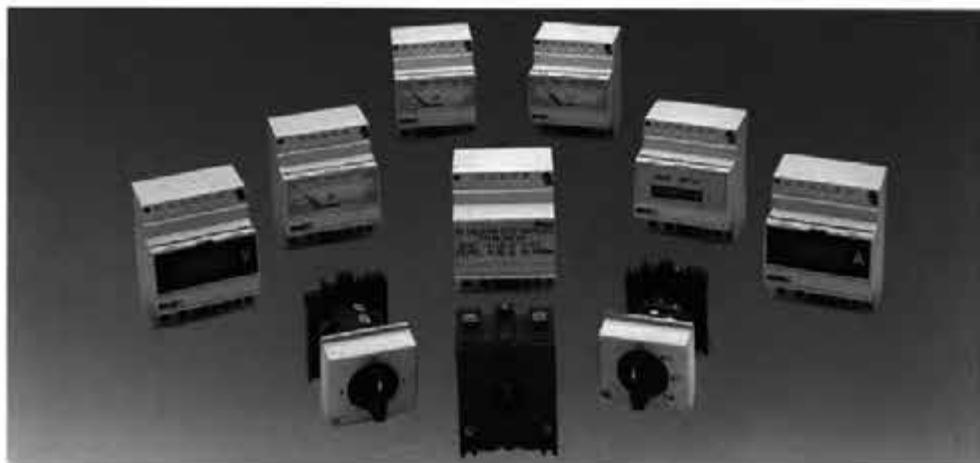
### Modular switches

Cat. No.	In	Poles	Modules
<b>Without off-position</b>			
Din-T C0321	32A	1	1
Din-T C0322	32A	2	2
<b>With off-position</b>			
Din-T C0321/0	32A	1	1
Din-T C0322/0	32A	2	2

## RAIL DIN instruments

IME RAIL DIN Instruments are an exciting new concept in instrumentation which gives a choice of conventional analogue, or digital display, in a DIN rail mounted housing. The IME concept of RAIL DIN equipment occupies four DIN modules (e.g. same space as four Din-T 1 pole circuit breakers), and offers an economical

and convenient system for applications such as metering in starters and distribution centres. The RAIL DIN equipment is simple to install and has an inherent IP52 degree of casing protection.



# RAIL DIN instruments

## RAIL DIN analogue meters AC and DC

- Accuracy class 1.5
- Working voltage 600V
- Test voltage 2kV
- Self extinguishing housing

### RAIL DIN analogue meters (AC)

Range	Cat. No.
<b>Direct connect ammeters D4E-AAC - 2 times overscale</b>	
0-1A	D4E-AAC 1A
0-2.5A	D4E-AAC 2.5A
0-5A	D4E-AAC 5A
0-10A	D4E-AAC 10A
0-15A	D4E-AAC 15A
0-20A	D4E-AAC 20A
0-25A	D4E-AAC 25A
0-30A	D4E-AAC 30A
0-40A	D4E-AAC 40A
0-50A	D4E-AAC 50A
0-60A	D4E-AAC 60A
<b>CT operated ammeters D4E-ACT</b>	
5A 5 times overscale	D4E-ACT 5A 5X <sup>1)</sup>
5A 2 times overscale	D4E-ACT 5A 2X <sup>1)</sup>
1A 5 times overscale	D4E-ACT 1A 5X <sup>1)</sup>
1A 2 times overscale	D4E-ACT 1A 2X <sup>1)</sup>
<b>Direct connect voltmeters D4E-VAC</b>	
0-50V	D4E-VAC 50V
0-150V	D4E-VAC 150V
0-300V	D4E-VAC 300V
0-500V	D4E-VAC 500V
<b>VT operated voltmeters D4E-VVT</b>	
For use with 110V VT	D4E-VVT 110V
<b>Frequency meter D4FI</b>	
Range 45-55Hz 240V	D4FI

**Note:** Standard scales - C.T. operated meters comprise of the following scale ranges and their decade multiples - 10/20A, 12/24A, 15/30A, 20/40A, 25/50A, 30/60A, 40/80A, 50/100A, 60/120A, 75/150A, 80/160A.  
<sup>1)</sup> Include range scale to suit chosen transformer ratio.  
 eg. A 2 times overscale ammeter operating from a 800/5A CT will have a Cat. No. D4E-ACT 5A 2X 800A.



### Overload withstand

Ammeters: 10 x rated current for 1 sec.  
 1.2 x rated current indefinitely  
 Voltmeters: 2 x rated voltage for 1 sec.  
 1.2 x rated voltage indefinitely

### RAIL DIN analogue meters (DC)

Range	Cat. No.
<b>Direct connect ammeters D4M-ADC</b>	
0-1mA to 0-8mA	D4M-ADC M1 <sup>1)</sup>
0-10mA to 0-800mA	D4M-ADC M2 <sup>1)</sup>
1, 5, 10, 15, 25, 40A	D4M-ADC <sup>1)</sup>
<b>Shunt connected ammeters D4M-ADC</b>	
0-10A to 0-1000A 50mV	D4M-ADC 5 <sup>1)</sup>
0-20A to 0-1000A 75mV	D4M-ADC 7 <sup>1)</sup>
<b>Direct connect DC voltmeters D4M-VDC</b>	
0-0.5V to 0-600V	D4M-VDC V <sup>1)</sup>
<b>Direct connect AC (rectified) voltmeters D4M-VAC</b>	
0-10V to 0-600V	D4M-VAC V <sup>1)</sup>

**Notes:** Standard scales - Moving coil meters comprise the following scale ranges and their decade multiples - 0 - 10, 12, 15, 20, 25, 30, 40, 50, 60, 75, 80  
<sup>1)</sup> Please include range required at the end of the Cat. No. eg. A 0-150V DC voltmeter in a RAIL DIN housing will have a Cat. No. D4M-VDC V/150.  
<sup>1)</sup> Price does not include a shunt (shunt ordered separately).

### Non standard caption

For meter scale requiring non standard captions, please add the suffix 'S' to the Cat. No. followed by the range required.  
 eg. A 0-10mA ammeter in a RAIL DIN housing, scaled 0-500 RPM will have Cat. No. D4M-ADC M2 S / input 0-10mA scale 0-500RPM.

# RAIL DIN instruments

## Digital ammeters

### Overload withstand

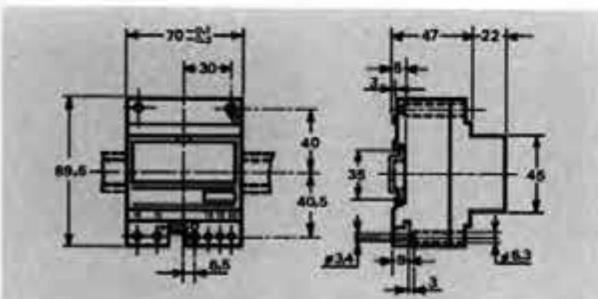
2 x In constant  
10 x In for 5 seconds

## RAIL DIN digital meters

Range	Connection	Max. display	Cat. No.
AC voltmeter DG3-4VAC			
0-100V	Direct	99.9V	DG3-4VAC 100V
0-600V	Direct	600V	DG3-4VAC 600V
0-1000V	VT	999V	<input checked="" type="checkbox"/> DG3-4VAC 1000/100V
AC ammeter DG3-4AAC			
0-1A <sup>1)</sup>	CT	999A	DG3-4ACT 1A
0-5A <sup>1)</sup>	CT	999A	DG3-4ACT 5A
0-10A	Direct	9.99A	DG3-4AAC 10A
0-20A	Direct	20.0A	DG3-4AAC 20A
DC voltmeter DG3-4VDC			
0-100V	Direct	99.9V	DG3-4VDC 100V
0-600V	Direct	600V	DG3-4VDC 600V
DC ammeter DG3-4ADC			
0-50mV <sup>1)</sup>	Shunt <sup>2)</sup>	999A	DG3-4ADC 50mV
0-75mV <sup>1)</sup>	Shunt <sup>2)</sup>	999A	<input checked="" type="checkbox"/> DG3-4ADC 75mV
Frequency meter DG3-4FI			
40-80Hz	Direct	40-80Hz	DG3-4FI 80
200-800Hz	Direct	200-800Hz	DG3-4FI 800
Temperature meter DG3-4 Pt2			
-10 to +100°C	PT 100 <sup>1)</sup>	-9.9 to 99.9°C	DG3-4Pt2 100
-20 to +400°C	PT 100 <sup>1)</sup>	-20 to 400°C	DG3-4Pt2 400

**Notes:** All digital meters require auxiliary supply.

- <sup>1)</sup> The instrument can be used for 10 ranges which may be selected to suit the current transformer or shunt value in use.
- Range selections are made by switches located under the front cover of the instrument (refer to page 33).
- <sup>2)</sup> Price does not include shunt (shunt ordered separately).
- PT 100 thermistor not supplied.
- Available on indent only.

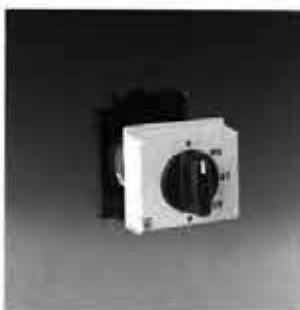


## RAIL DIN supplementary types

Range	Cat. No.
Hour run meter D4.0	
5 digital + 2 decimal 110V	D4.0 - 110
5 digital + 2 decimal 240V	D4.0 - 240
Phase fail/rotation indicator D4S-E	
100-415V	D4S-E

## RAIL DIN metering switches

Range	Cat. No.
Ammeter switch D4A	
For use with CTs only	D4A
Voltmeter switch D4V	
3 position phase-phase	D4V-3
7 position phase/phase phase/neutral	D4V-7



### How to set the range

1. Remove the front as shown on figure A.
2. The instrument is calibrated to display 99.9 (1st switch on position 'x1', then switch on position 99.9 - figure B).
3. Move the switch from position '0' to the desired range (15.0, 25.0 or 40.0 or 60.0 or 99.9). All other switches must be placed on '0'.
4. With the first switch on position 'x10', the display is multiplied by 10. (e.g. switch on position 'x10' and on 99.9, instrument set to read 999).
5. Connect the instrument through CT or shunt having the primary range equal to the set range.
6. The full scale (SPAN) and beginning scale (0) calibrations are already made by the manufacturer and therefore it is not necessary to adjust any potentiometers.

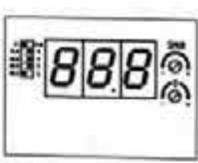
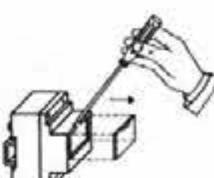
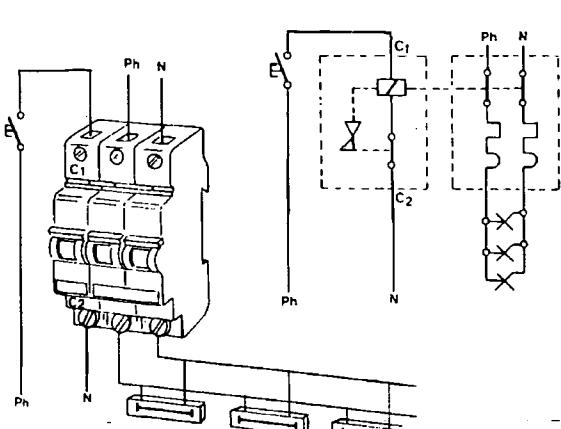


Figure B

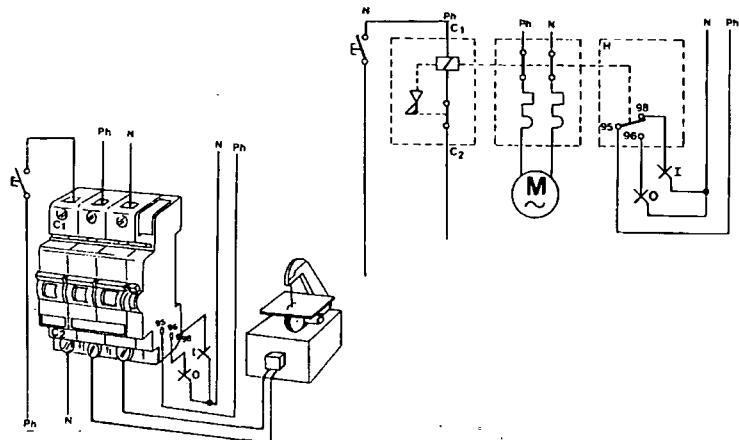
# Shunt trip for MCBs

## Connection schematics

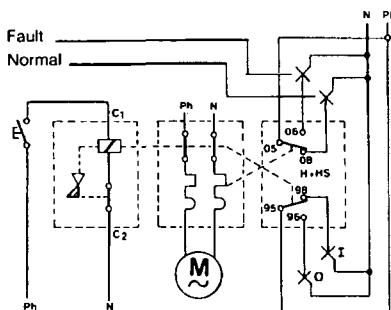
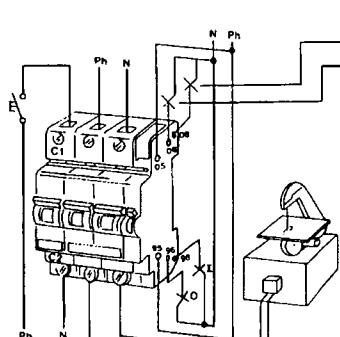
Shunt trip + MCB



Shunt trip + MCB + auxiliary contact H

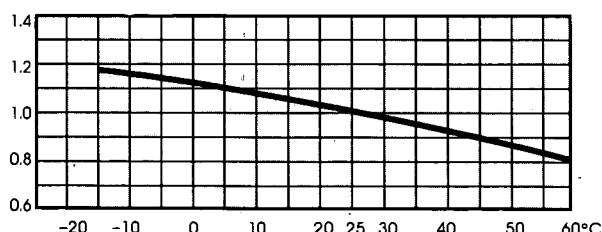


Shunt trip + MCB + auxiliary contact H-H/S

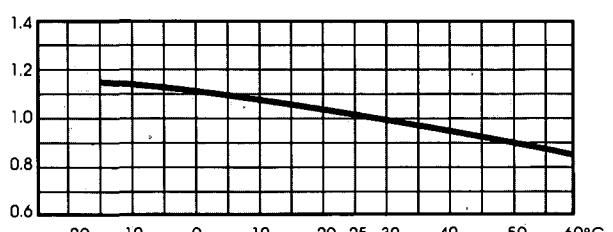


## Temperature compensation

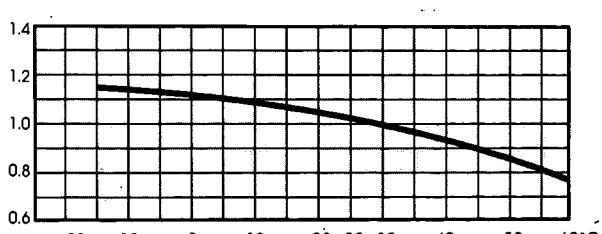
Temperature derating chart 6-32 amp  
K = correction factor



Temperature derating chart 0.5-4 amp  
K = correction factor



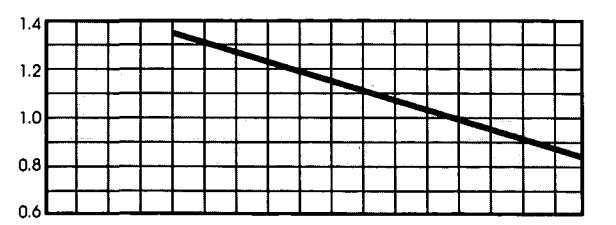
Temperature derating chart 40-63 amp  
K = correction factor



## Din-T 10

### Influence of Ambient Temperature

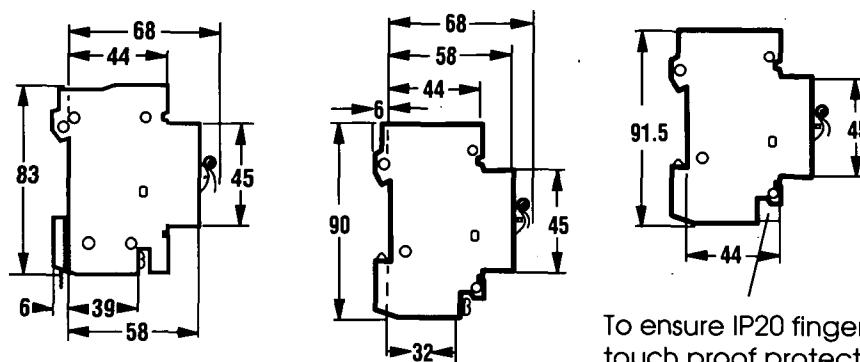
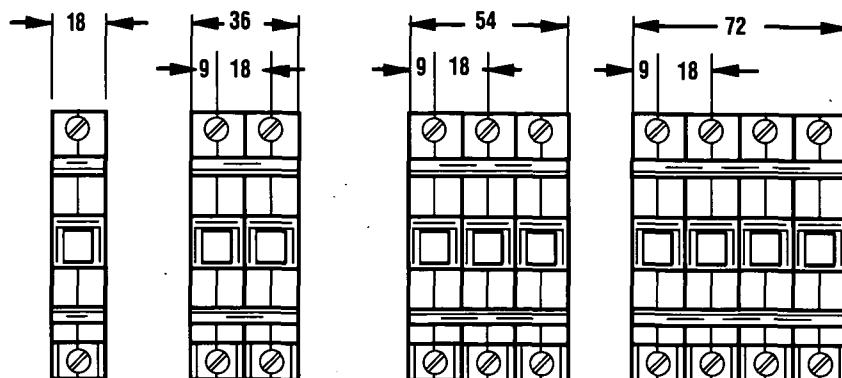
The normal thermal setting of the MCB's are done at an ambient temperature of 40°C. A variation of the ambient results in that the MCB will react at either a lower or higher continuous current.



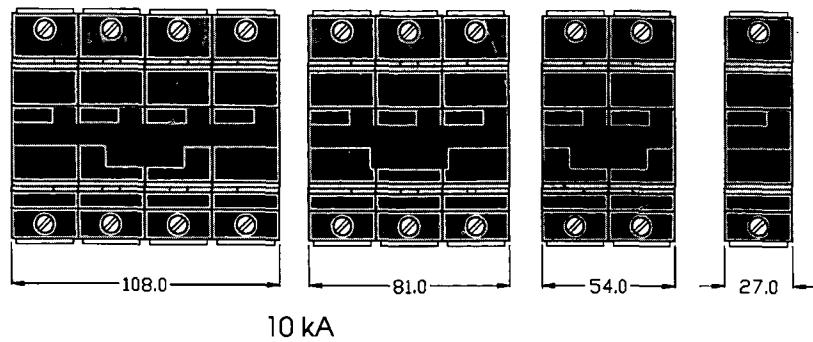
# Din-T series 6kA, 9 kA, 14kA & 10kA

## Dimensions

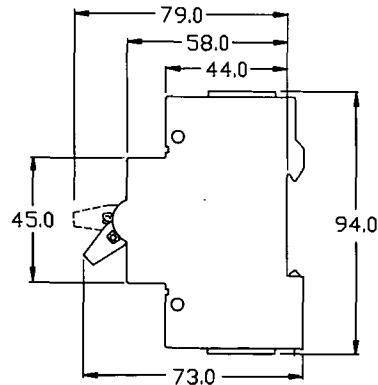
Width remains constant with all ranges



To ensure IP20 finger touch proof protection this cap is supplied as standard



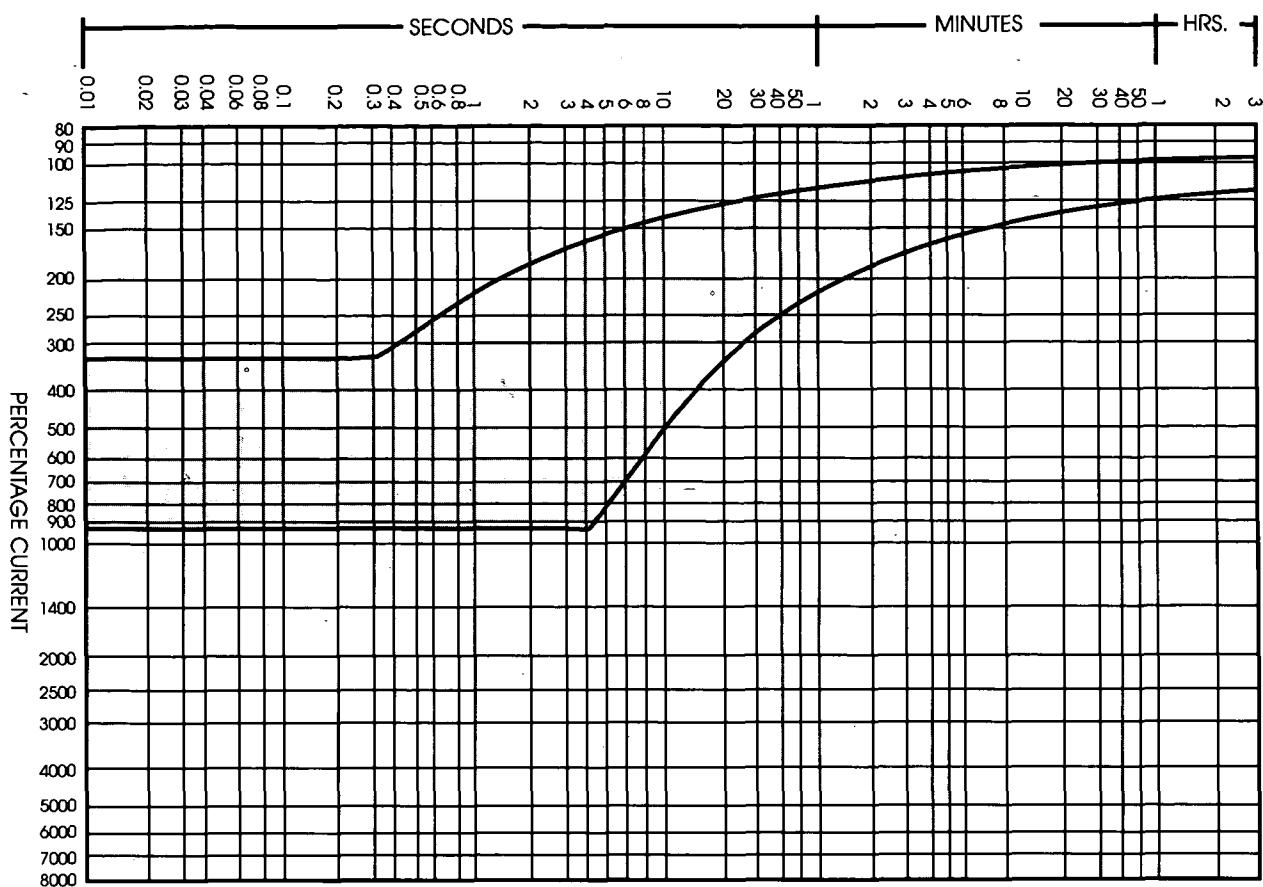
10 kA



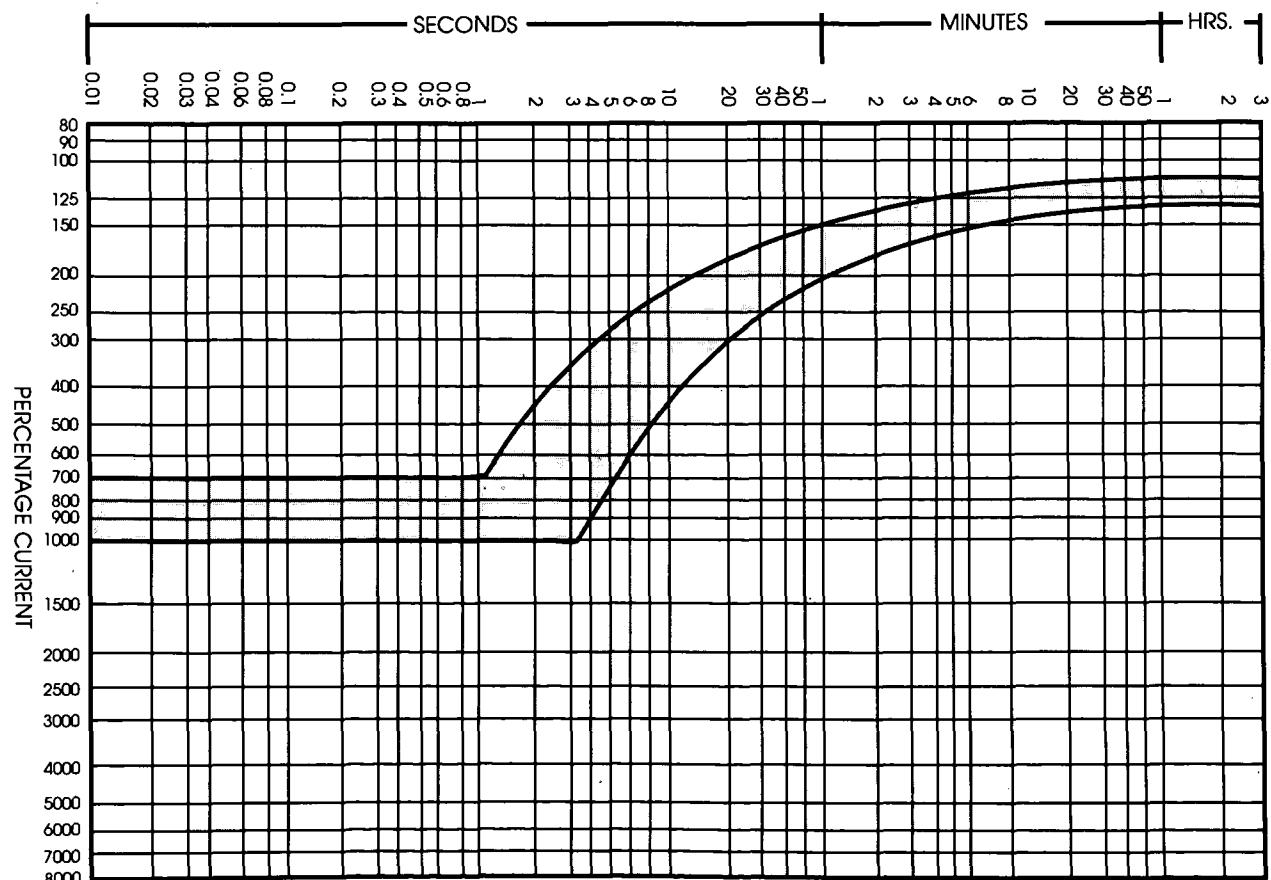
Dimensions (mm)

# Din-T time current curves

6kA

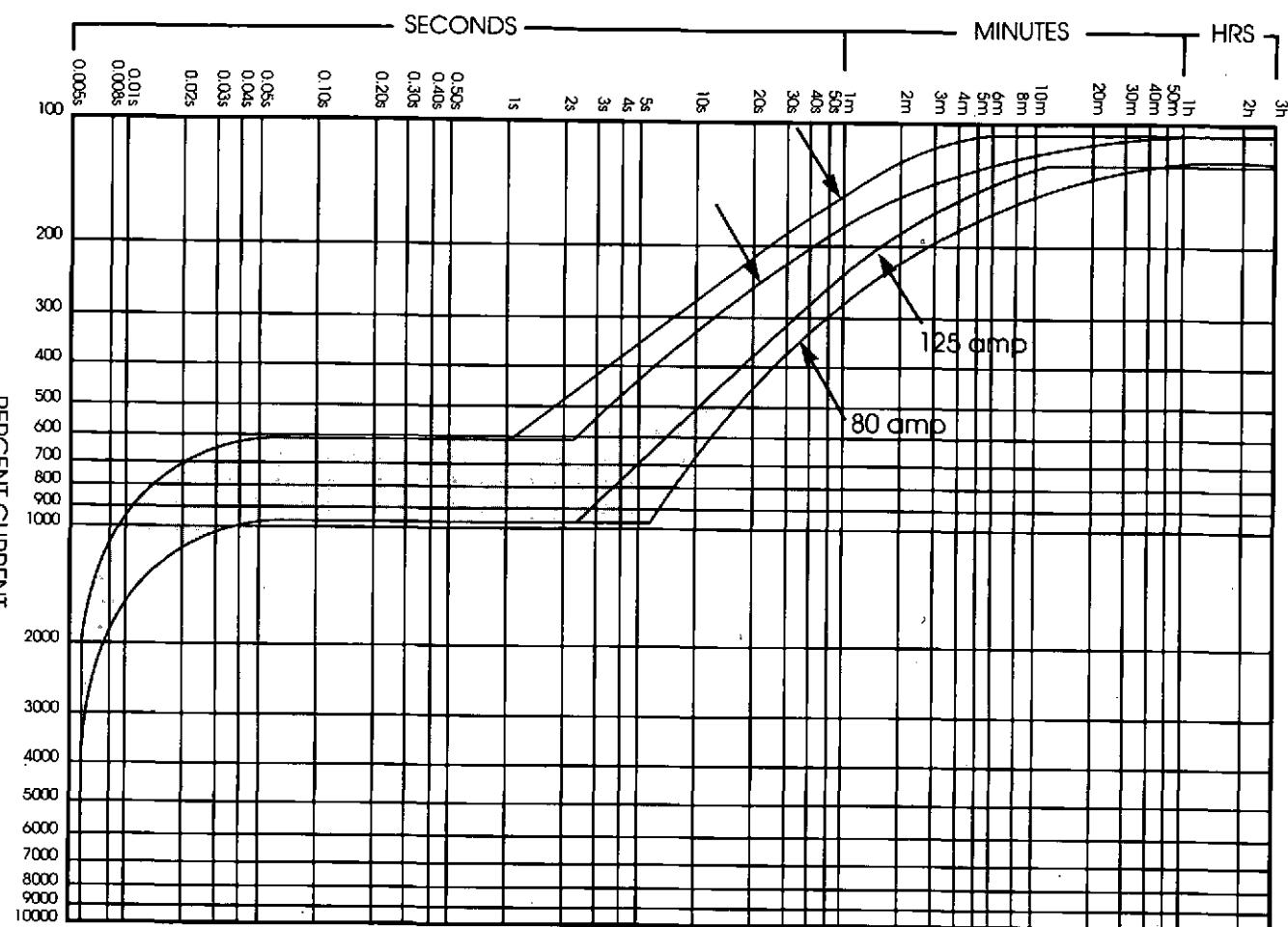


9kA &amp; 14kA



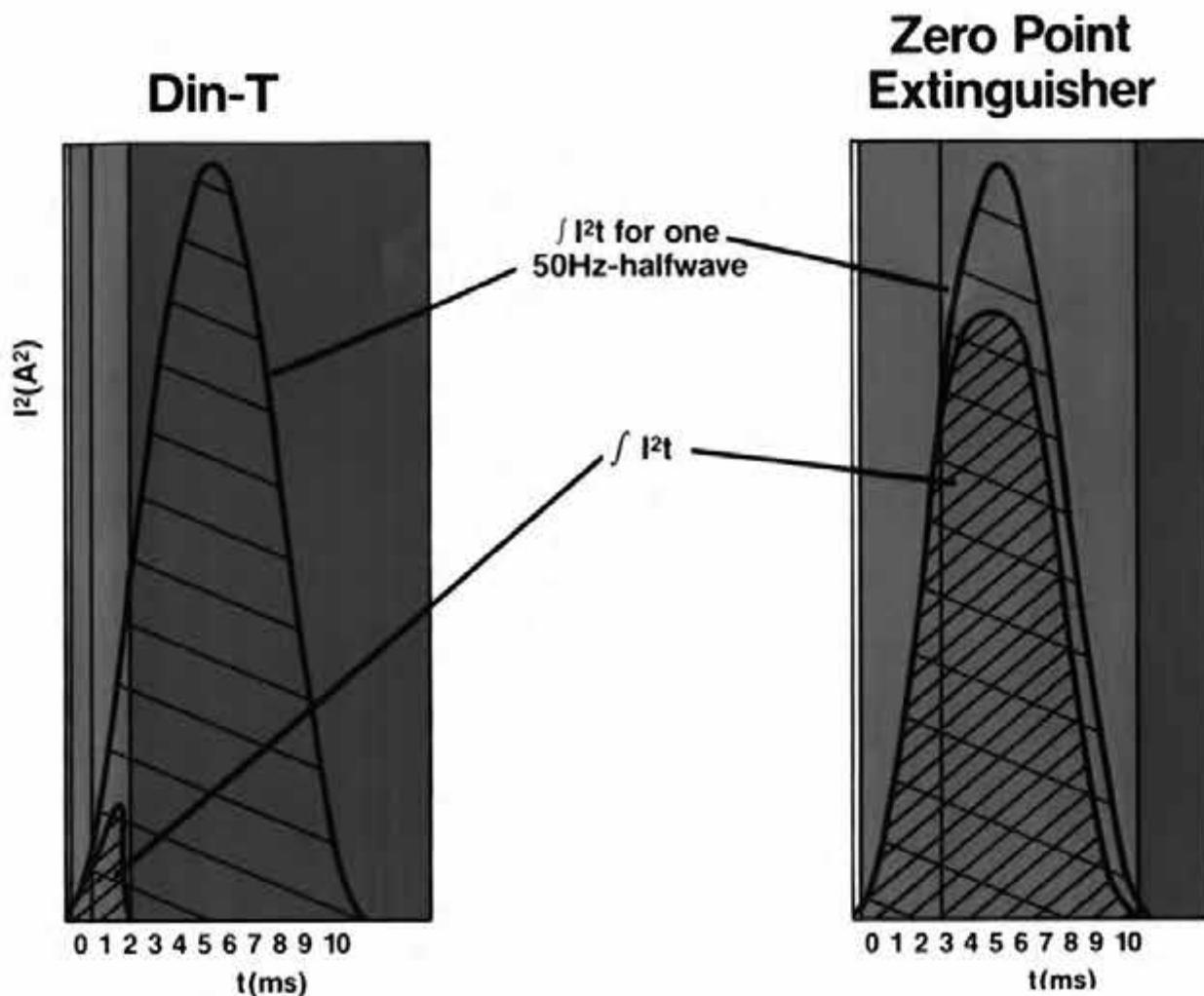
# Din-T time current curves

**10kA**



## Din-T I<sup>2</sup>t let-through

---



### Comparison of current capabilities between Din-T MCBs and Nema style MCBs.

Above graph indicates 3 stages of arc formation, to arc extinction and I<sup>2</sup>t let-through values.

1. Instantaneous trip time (yellow stage) indicates fault current levels just prior to magnetic trip mechanism response. (7-10 In).
2. Magnetic response time (red stage) from time of magnetic trip operation to time of arc being formed.  
Din-T 1 ms Nema style 3 ms.
3. Arc extinction time (orange stage) from arc formation to complete arc extinction.  
Din-T 2 ms Nema style 10 ms.

Because total operating time of Din-T is much faster than Nema style MCB, the level of let-through energy in MCB is dramatically reduced as can be compared between cross hatched sections above.

# Motor starting selection

**Table 415 volt 3 phase D.O.L. starting**

Motor rating

KW.	H.P.	MAX.FLC AMPS	Din-T	SAFE-T	XS125CJ XS125NJ XH125NJ	XE250NS XS250NJ XH250NJ	XS400CJ XS400NJ XS400NE XH400NE
0.12	0.17	0.95	4				
0.18	0.25	1.5	4				
0.25	0.33	1.7	4				
0.37	0.5	1.05	4				
0.55	0.75	1.44	4				
0.75	1	1.76	6				
1.1	1.5	2.6	10				
1.5	2	3.4	16				
2.2	3	4.7	16				
3	4	6.4	20				
3.75	5	8.1	25				
5.5	7.5	10.7	32				
7.5	10	14.3	40	40	32		
11	15	20.2	63	63	50		
15	20	26.7	63	80			
18.5	25	35	80 <sup>1)</sup>	100	75		
22	30	40	100 <sup>1)</sup>	100	100		
25	35	47	125 <sup>1)</sup>		125		
30	40	55	125 <sup>1)</sup>		125		
37	50	66				125	
45	60	79				160	
55	75	95					
75	100	128				225	
90	125	155				250	
110	150	188				250	
132	180	224					300
160	220	266					350
200	270	335					400

Note: The above table is based on holding 125% continuously and 600% for 10 seconds. For average 3-phase 4 pole 415 volt AC motors  
 1) 80,100 and 125A are type Din-T10

**Table 415 volt 3 phase assisted start**

Motor rating

K.W.	H.P.	MAX.FLC AMPS	Din-T	SAFE-T	XS125CJ XS125NJ XH125NJ	XE250NS XS250NJ XH250NJ	XS400CJ XS400NJ XS400NE XH400NE
0.37	0.5	1.05	4				
0.55	0.75	1.44	4				
0.75	1	1.76	4				
1.1	1.5	2.6	6				
1.5	2	3.4	10				
2.2	3	4.7	10				
3	4	6.4	16				
4	5.5	8.1	20				
5.5	7.5	10.7	25				
7.5	10	14.3	32				
11	15	20.2	50				
15	20	26.7	63	63			
18.5	25	35	80 <sup>1)</sup>	63			
22	30	40	80 <sup>1)</sup>	80			
25	35	47	80 <sup>1)</sup>	100	75		
30	40	55	80 <sup>1)</sup>	100	85		
37	50	66	100 <sup>1)</sup>		125		
45	60	79	125 <sup>1)</sup>		125		
55	75	95				125	
75	100	128				175	
90	125	155				200	
110	150	188				250	
132	180	224					300
160	220	266					350

Note: The above table is based on holding 125% continuously and 350% for 20 seconds. For average 3-phase 4 pole motors  
 1) 80,100 and 125A are type Din-T10

# Motor starting selection and Cascade co-ordination chart

**Table 415 volt 3 phase D.O. L. starting for fire pump**

**Motor rating**

kW.	H.P.	MAX.FLC AMPS	Din-T	SAFE-T	XS125CJ XS125NJ XH125NJ	XE250NS XS250NJ XH250NJ	XS400CJ XS400NJ XS400NE XH400NE
0.37	0.5	1.05	4				
0.55	0.75	1.44	6				
0.75	1	1.9	10				
1.1	1.5	2.5	10				
1.5	2	3.45	16				
2.2	3	4.7	16				
3	4	6.2	20				
4	5.5	8.1	25				
5.5	7.5	10.9	40				
7.5	10	14.8	50	50	32		
11	15	20.5	80 (1)	63	50		
15	20	28	80 (1)	80	63		
18.5	25	34.5	100 (1)	100	100		
22	30	40	125 (1)		125		
25	35	47	125 (1)		125		
30	40	55				125	
37	50	66				150	
45	60	79				175	
55	75	95				225	
75	100	128					300
90	125	155					350
110	150	188					
132	180	224					
160	220	266					

**Note:** The above table is based on holding 125% continuously and 600% for between 20 and 50 seconds. For average 3-phase 415 volt AC  
(1)80, 100 and 125A are type Din-T10

## Din-T Cascade co-ordination chart

Rated breaking capacity kA	Back-up breaker	XS125CJ XS125NJ XH125NJ XS250NJ XH250NJ XS400CJ XS400NE XS400NJ						
		XS125CJ	XS125NJ	XH125NJ	XS250NJ	XH250NJ	XS400CJ	XS400NE XS400NJ
Load-side breaker		18	30	50	35	50	35	50
Din-T6 2-40 amp	6	18	25	25	25	25	-	-
Din-T9 0.5-25 amp	9	18	30	50	35	50	35	50
Din-T9 32-63 amp	9	18	25	25	25	25	25	25
Din-T14 0.5-25 amp	14	18	30	50	35	50	35	50
Din-T14 32-63 amp	14	18	25	25	25	25	25	25
Din-T10 80-125 amp	10	18	25	25	15	15	10	10

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**NHP**

*Proudly Australian*

**sprecher+schuh**

*The Ultimate in  
Motor Control*

Represented in Australia by

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**1000V CONTACTORS**

Publication  
**SSC**  
July 1993

**sprecher+schuh**

*The Ultimate in  
Motor Control*

**New Release**  
CA6 contactors now  
with Electronically  
Controlled Mechanism  
"ECM".

# 1000 volt contactors type CA 6

## The New Generation

### One size- Four ratings

The CA 6 contactors are now available in four ratings up to 90kw, 1000 volts, all having the same outside mounting dimensions.

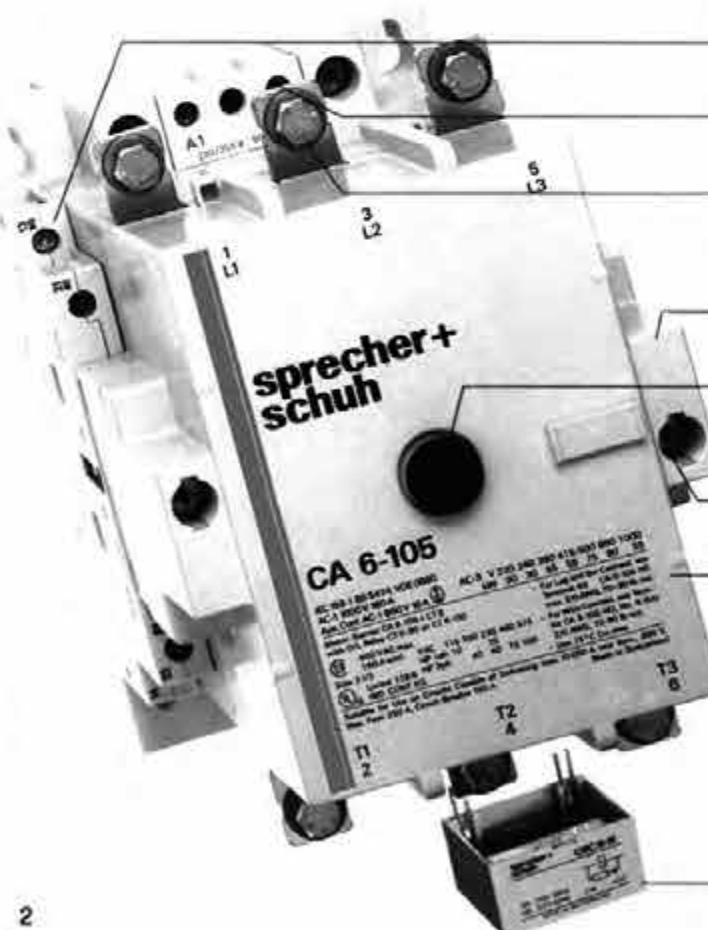
All accessories such as auxiliary contacts, mechanical interlocks and mounting plates are common to the range. This allows standard panel designs to be used for motors in this range and simplifies planning and assembly.

### The ideal starter

The CEF 1 Electronic Motor Protection Relay mounts directly onto the CA 6 providing precise setting of the motor current. It can be used directly for 1000 volt motors. With this compact combination, the ideal starter can be assembled.

### A new generation is born

Innovative design of the CA 6 ensures that the contactors conform to the latest IEC 947 Standards whilst offering the latest in electronic coil control. The use of environmentally friendly materials and optimum safety features make this range the "new generation" of contactors.



### Optimum safety

The CA 6 contactors help provide complete protection for personnel, plant and the best possible safety against human error. For example, the arc quenching chambers cannot be removed whilst the contactor is energised. In addition it cannot be switched on, if they are not fitted. Also it is impossible to manually operate a contactor by means of the switch position indicator.

The unintentional starting of motors is therefore not possible.

- The entirely closed quenching chambers do not have blow holes and therefore protect effectively against escaping hot gases.

- The higher insulation level of the magnetic system increases the availability of machines and plant.

- Clip-on terminal covers and insulated leads guard against inadvertent contact with conducting parts.

- Interlocked auxiliary switches preclude the risk of unwanted operation (tests being prepared).

- All plastics are free of cadmium and asbestos.

### Up to 1000 volts

Through the use of modern materials, CA 6 contactors satisfy all the regulations applicable today for operation in systems with a rated voltage of 1000 V.

**Easy to install and service**

The CA 6 contactors have been designed with the user in mind. The keyhole shaped mounting holes in the base and the screw terminal lugs simplify installation and wiring.

The condition of the contact can be easily checked and they can be easily replaced if necessary.

No loose parts are involved in replacing the coil. Everything is accessible from the front and therefore, space does not have to be allowed for at the sides.

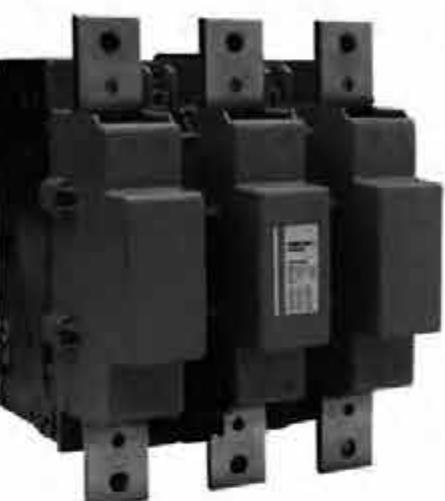
### Environmentally friendly materials

Only environmentally compatible materials are used in the construction of CA 6 contactors.

All plastics are free of cadmium and asbestos.

# 1000 volt contactors type CA 5

## Ordering Information



### Contactors CA 5, 3 and 4 pole - 1000 V

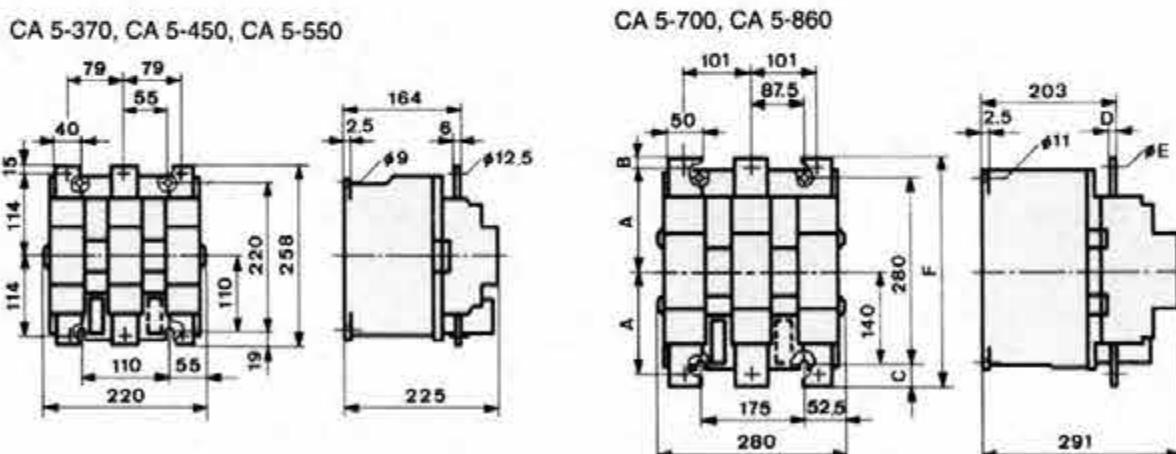
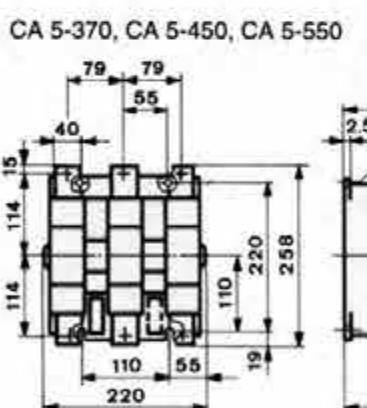
Rated thermal current $I_{th}$	3-phase motors at 1000 V AC-3	Auxiliary contacts <sup>1)</sup>	Order No. type
[A]	[kW]	Contactor type N.O. N.C.	
500	185	CA 5-370	2 2 CA 5-370...V..-22
600	280	CA 5-450	2 2 CA 5-450...V..-22
645	355	CA 5-550	2 2 CA 5-550...V..-22
760	500	CA 5-700	2 2 CA 5-700...V..-22
930	550	CA 5-860	2 2 CA 5-860...V..-22
		Additional auxiliary contact to suit all CA 5 contactors	2 2 CA 5-EF 22

### 4th pole

4th pole AC-1 [A]	4th Pole Cat No	Supplied factory fitted to contactor	CA 5....V..-
		left hand side	-L
		right hand side	-R
500	CA 5-NP500/5	CA 5-450 CA 5-550	-500 -500
500	CA 5-NP500/6	CA 5-700 CA 5-860	-500 -500
900	CA 5-NP900/6	CA 5-700 CA 5-860	-900 -900

<sup>1)</sup> The closing of the N/O contact is adjustable.

### Dimensions[mm]



Contactor type A	B	C	D	E	F
CA 5-700	138.5	15	13.5	5	307
CA 5-860	162.5	18	40.5	8	361

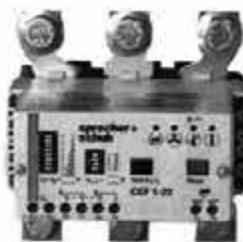
# 1000 volt contactors type CA 5

## CA 5 High current contactors

**The complete system for demanding applications**



CA 5 - 450 280kW, 1000 volts



CA 5 - 550 355kW, 1000 volts with CEF 1-22 Motor Protection Relay



High current contactor CA 5-860 rated at 550kW, 1000 volts

**The new generation of high current contactors type CA5, offers notable advantages and improvements: a modern system for exacting requirements is thus available for your application**

### Compact and low weight

Contactors having compact dimensions save expensive switchboard space and hence costs. In this regard, the CA 5 contactor range sets new standards. As the contactor weight has been reduced considerably it permits not only a simpler (and less costly) switchboard construction, but also provides for far easier assembly and fitting.

### Modular system arrangement

The CA 5 range includes five 1000 volt contactors providing a natural extension of the CA 6 range to cover motor sizes up to 550 kW at 1000 volts. With only two modular frame sizes, switchboard design and planning is simplified.

A choice of separately mounted CT, CEF or CET Electronic Motor Protection Relays complete the motor starter combination of CA 5 contactors.

### 1000 V operating voltage

Particularly in the mining industry, but also in other heavy industrial segments, there is a tendency to set the distribution voltage level to 1000 V. Design improvements on the CA 5-370...CA 5-860 contactors now permit their use in networks having operating voltage levels of up to 1000 V.

### Extensive accessory range

This new high current contactor system is available with a wide range of accessories including the following items:

- 2 and 4 pole auxiliary contact blocks.
- Add-on main 4th poles for neutral switching.
- Mechanical interlocks for reversing starters.
- Add-on mechanical latches for maintained and impulse contact controls.
- Choice of Electronic Motor Protection Relays CEF or CET.

### Rugged and reliable

A massive steel framework supporting the magnet system ensures high stability under all conditions. Low-wear materials for bearings and sliding surfaces as well as generously dimensioned magnet pole faces result in an above average mechanical life with a minimum of maintenance.

# 1000 volt contactors type CA 6

## Electronic Motor Protection Relay CEF 1

The CEF 1 Electronic Motor Protection Relay is the ideal partner for the CA 6 range of contactors. It is available with or without thermistor protection and one current range covers all motor currents up to 180 amps at 1000 volts.

### Double thermal protection system

Alongside current sensing thermal overload protection, thermistor over-temperature protection detects the actual winding temperature.

### Safe starting for all types of motors

The adjustable tripping time ensures excellent protection with both heavy duty and high speed starting.

### Improved motor utilization

The precise digital setting of the rated current permits full motor utilization without neglecting safety.

### Rapid single phasing protection

In the event of loss of a phase the CEF 1 trips immediately, regardless of load.

### Selective indication for clarity

Red LED'S for each protection function assist the rapid identification of faults.

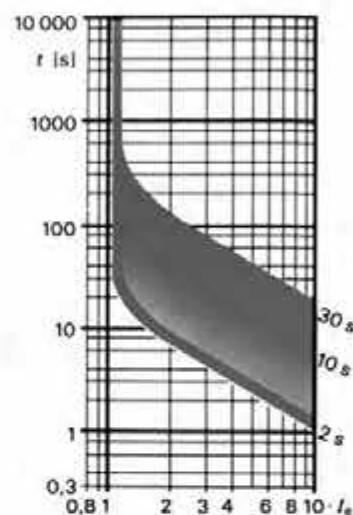
### Overload pre-warning

Should the motor current reach an admissible level, a LED flashes.

### Thermal overload CT 6

A choice of standard thermal overloads type CT 6 are also available.

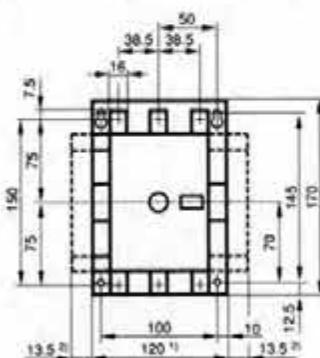
Refer page 10 for further details.



*The time/current characteristic curves for the shortest, normal and longest tripping time.*

### Dimensions [mm]

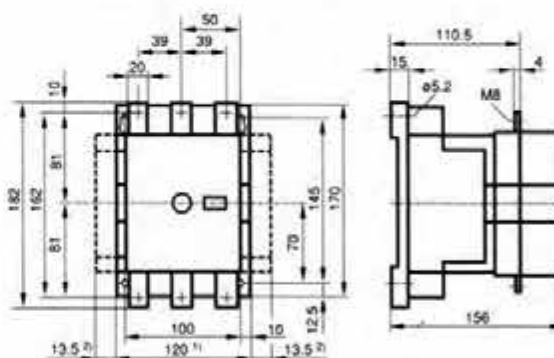
Contactor CA 6-85/CA 6-105



- With 1 or 2 auxiliary contact blocks

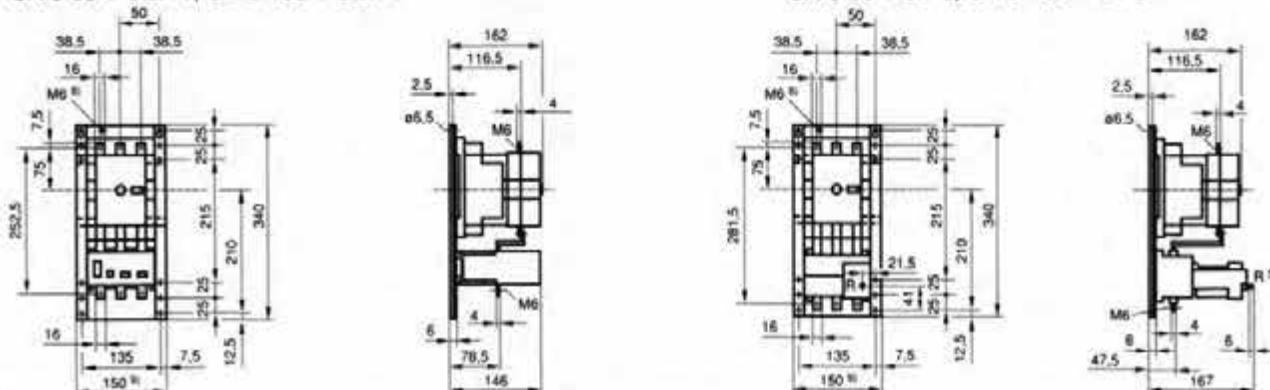
CA 6-85 + CEF 1, CA 6-105 + CEF 1

Contactor CA 6-140-E/CA 6-170-E



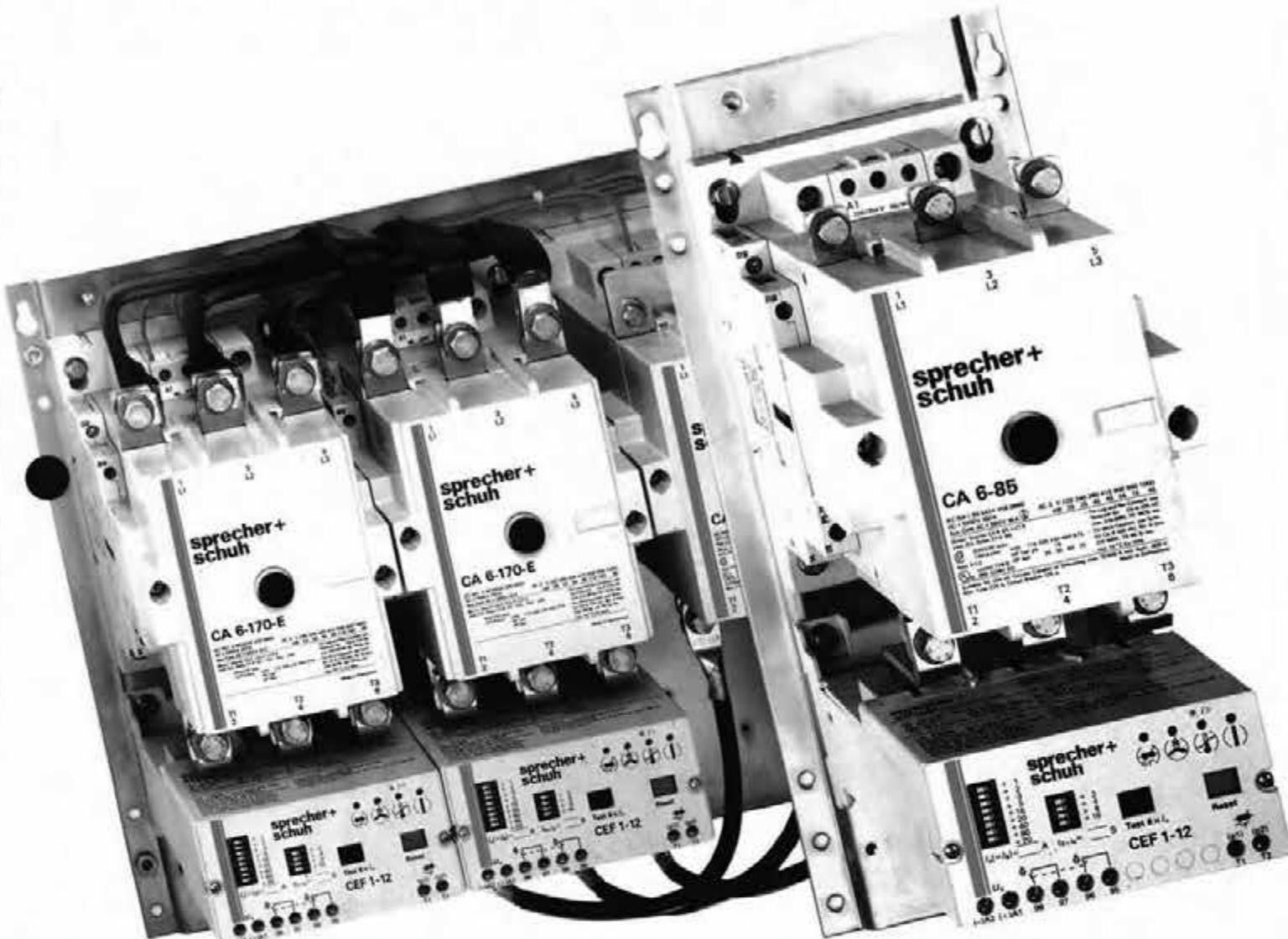
- For 3rd and 4th auxiliary contact blocks + 13.5mm each

CA 6-85 + CT 6, CA 6-105 + CT 6



# 1000 volt contactors type CA 6

With Electronically Controlled Mechanism "ECM"



## Electronically Controlled Mechanism "ECM"

In-built electronic coil control and a specially designed mechanism provides unique benefits for the user.



*Extremely low pick-up and hold-in coil consumption, compared with conventional contactors.*

## Improved performance

- Precisely defined pick-up and drop out voltages. No contact chattering is possible.
- Smooth operation in the whole voltage range minimises any tendency to contact bounce. This improves contact life even under adverse conditions.
- Low pick-up and hold-in consumption. Reduces power consumption and keeps temperature rise to a minimum.
- Brief supply voltage dips caused by heavy motor starting currents are automatically bridged for secure motor starting.
- Wide voltage range coils are suitable for both 50 and 60 Hz operation.
- Built-in over voltage protection and suppression circuits eliminate interference from the coil.

## Versatile



*Only 2 sets of flexible flat conductors are needed to wire all contactors up to 90kW, which makes wiring up starters a quick and simple job. Matching terminal lugs enable CEF 1 Electronic Motor Protection Relays to be mounted directly onto the contactors.*

# 1000 volt contactors type CA 5

## Safety and ease of use through an innovative design



### CA 5 Shock-free contact system

The operating planes of the CA 5 contactor magnet system and the contacts, are opposed to each other by 90 degrees.

This results in a bounce-free contact system, increasing the mechanical and electrical life, and raising the contact reliability.

### Add-on 4th pole

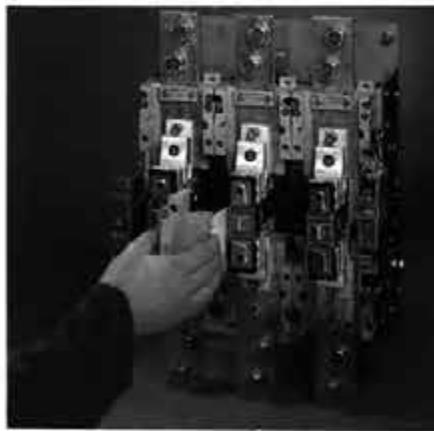
With many applications, the neutral also needs to be switched. For this reason the CA 5 contactors can be fitted with a 4th pole on either the left or right hand side of the contactor. The 4th pole is available as an accessory component for subsequent on-site fitting.

### Additional auxiliary contacts

The CA 5 contactors can be equipped with a maximum of 4 make and 4 break (4n/o and 4n/c) auxiliary contacts. Furthermore with the CA 5-370..CA 5-860 contactors, the closing time of the auxiliary contacts can be adjusted to meet individual control requirements.

### Easy inspection

After removal of the arcing chambers, the main contacts are presented for easy inspection and/or replacement. Coil exchange is also straight forward and simple - a screwdriver is all that is required. All inspection and maintenance work can be carried out from the front - no extra space at the sides needs to be allowed for this.



*Simple main contact inspection and easy coil exchange.*

Your requirements for a cost effective and reliable system are optimised through the advanced technical concept of the CA 5 high current contactors

### Improved magnet system

Low pull-in and holding coil consumption requirements of the magnet system reduce power consumption to a minimum.

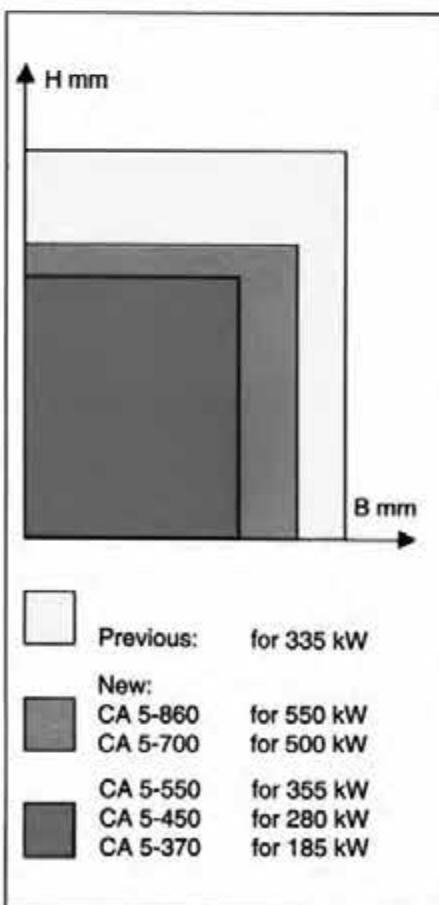
Three different drop out times can be chosen from the CA 5-370.. CA 5-860 contactors :

- Delayed (500...1000 ms)
- Normal (150...200 ms)
- Accelerated (20...55 ms)

Delayed drop-out is of particular advantage in supply networks having wide voltage fluctuations or where brief supply voltage interruptions are anticipated, thus avoiding a nuisance opening of the contacts.

### Maximum saving of space

In spite of the high switching capacity the new CA 5-370..CA 5-860 contactors have up to 40% less mounting space requirement with respect to comparable contactor types. Installations having CA5 contactors are more compact and need less space.

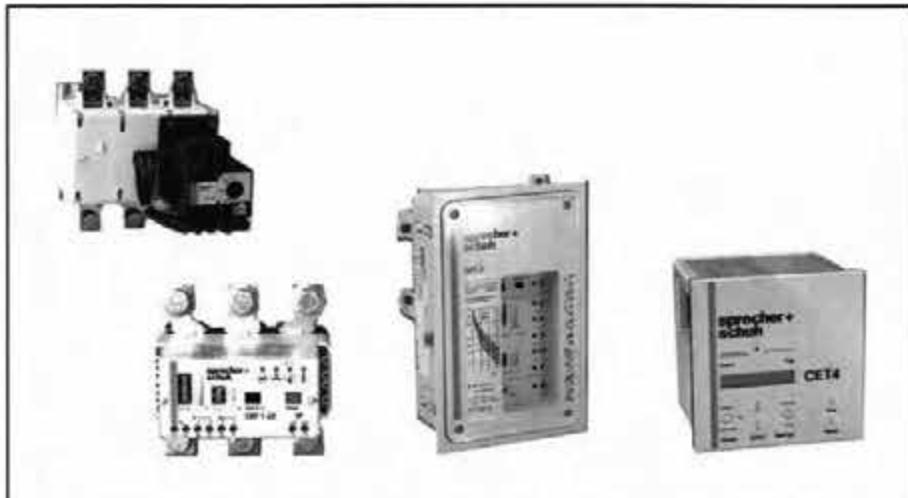


# 1000 volt contactors type CA 5

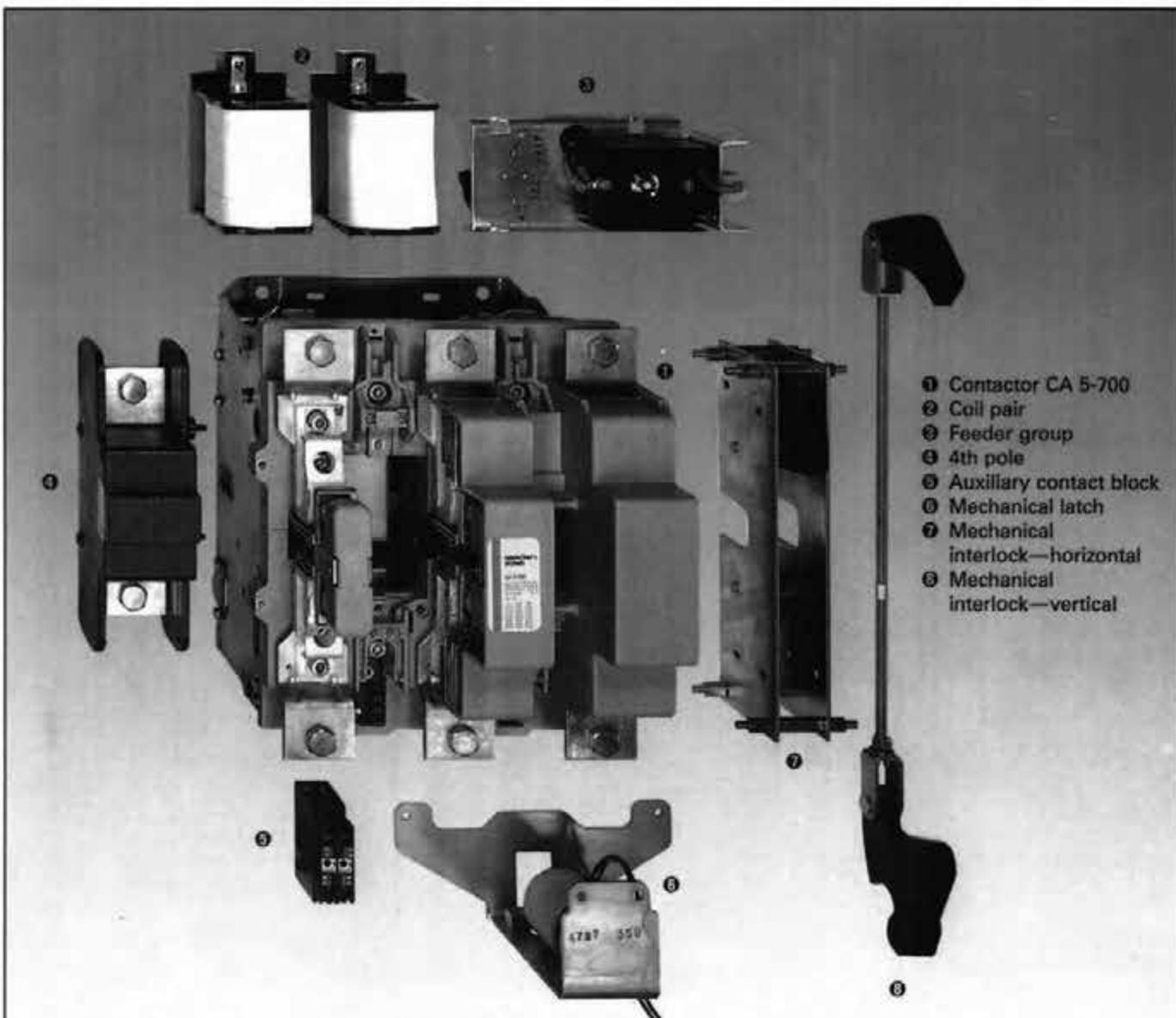
## A choice of motor protection

The ideal motor protection device is available from Sprecher + Schuh for every motor application.

- CTA 6 Thermal Overload Relays for normal starting and operating conditions.
- CEF 1 Electronic Motor Protection Relay for heavy duty starting and thermistor protection.
- CET 3 Electronic Motor Protection Units for heavy-duty starting, intermittent operating conditions and optimum motor utilization.
- RT 3 Thermistor Protection Relay for fluctuating loads and blocked cooling.
- The latest CET 4 for ultimate protection and control.



All motor protection requirements can be met with these protection devices.  
From left to right: CTA 6, CEF 1, CET 3, CET 4.



The wide range of components, using the CA 5-700 contactor as an example.

# 1000 volt contactors type CA 6

## Selection Table

Contactors		CA 6-85	CA 6-105	CA 6-140-E	CA 6-170-E
Rated insulation voltage $U_i$	V		1000 Volts		
Ambient temperature, open	°C		-25/+60°		
Rated frequency	Hz		50/60		
Operating voltage $U_o$	V	415 1000	415 1000	415 1000	415 1000
<b>Switching of ohmic loads</b>					
AC-1') open	A	160	160	250	250
Rated thermal current $I_{th}$	kW	115	180	180	400
AC-2') Slip ring	A	120	120	210	210
AC-3') Squirrel cage	kW	86	150	150	340
OFF during running					
AC-4') Squirrel cage, For 25,000 plug braking operations	A kW	90 50	33 45	140 81	55 75
inchng, for 200,000 jogging operations	A kW	46 25	19 30	70 40	30 40
Star-delta starting <sup>3)</sup>	A kW	155 90	55 75	200 110	68 135
<b>Switching of 3-phase capacitors</b>					
single capacitors <sup>4)</sup> open	(40°) kVar	65	-	77	-
enclosed	(55°) kVar	55	-	65	-
battery capacitors <sup>4)</sup> open	(40°) kVar	-	-	-	-
enclosed	(55°) kVar	-	-	-	-
<b>Switching capacity (to IEC 158)</b>					
Opening	A				
Closing	A	1350	-	1500	-
<b>Magnet system (coil)</b>					
Pull-in voltage	Alternating and direct voltage	n.U <sub>s</sub>	0.85-1.1	0.85-1.1	0.75-1.15
Drop-out voltage	Alternating voltage	n.U <sub>s</sub>	0.35-0.55	0.35-0.55	0.35-0.55
Performance	Direct voltage	n.U <sub>s</sub>	0.2-0.45	0.2-0.45	0.2-0.45
Alternating current: pull-in holding	VA	650 (375) <sup>1)</sup>	650 (375) <sup>1)</sup>	250 <sup>1)</sup>	250 <sup>1)</sup>
Direct current: holding	VA	50 (25)	50 (25)	15	15
<b>Auxiliary contact</b>					
$I_a$ (AC-1)	A			16	
AC-11, 240V	A			5.5	
DC-11, 24V	A			5	
<b>Life</b>					
Electrical	MIL. OPS			1	
Mechanical	MIL. OPS			10	
<b>Electronic Motor Protection Relay</b>		CEF 1-11/12	CEF 1-11/12	CEF 1-11/12	CEF 1-11/12
Setting range <sup>5)</sup>	CEF 1-11/12/22	A		0.5-180 A	
	CET 3 <sup>6)</sup>	A		0.5-180 A (select CWE)	
	CET 4 <sup>6)</sup>	A		0.5-180 A (select CWE)	
<b>Thermal Overload Relays</b>		CT 6-90	CT 6-110	CT 6-150	CT 6-200
Setting range	Direct-on-line	A	70-90	85-110	105-150
	Star-delta starting	A	121-155	147-190	181-260
Fitted to contactor			CA6-85...CA6-170	CA6-85...CA 6-170	CA 6-85...CA6-170
Separate Mounting			CTA 6-90	CTA 6-110	CTA 6-150
					CTA 6-200

<sup>1)</sup> Non or lightly inductive loads.<sup>2)</sup> Ambient temperature next to contactor (within enclosure).<sup>3)</sup> Rated operating current and performance for 50/60 Hz to IEC up to 55°C ambient temp.

AC-3 values valid for occasional inching operation.

<sup>4)</sup> Refer catalogue 2212 (CA 5), 2208 K2 (CA 6) or Part "A" Price List Catalogue.

# 1000 volt contactors type CA 5

CA 5-370	CA 5-450	CA 5-550	CA 5-700	CA 5-860			
1000	1000	1000	1000	1000			
-25/+55	-25/+55	-25/+55	-25/+55	-25/+55			
50/60	50/60	50/60	50/60	50/60			
415 1000	415 1000	415 1000	415 1000	415 1000			
500 500	600 600	760 760	900 900	1100 1100			
360 820	410 985	520 1250	615 1480	750 1800			
420 420	510 510	645 645	760 760	930 930			
300 725	345 835	440 1060	520 1250	635 1525			
370 140	450 200	550 250	700 340	860 380			
190 185	255 280	315 355	400 500	500 550			
230 85	280 120	350 230	420 280	510 350			
140 120	165 175	200 335	250 400	300 500			
95 40	115 55	140 95	180 120	210 145			
55 55	65 80	80 130	105 170	120 205			
640 240	780 290	950 420	1200 580	1450 650			
370 340	465 420	570 600	700 800	840 850			
180 200	220 280	350 900	430 1050	500 1200			
165 175	200 250	300 700	360 900	450 1000			
155 175	185 250	350 900	430 1050	500 1200			
135 155	160 220	300 700	360 900	450 1000			
2950 1200	3600 1700	4500 2000	5600 3500	6900 3800			
3700 3700	4500 4500	5500 5000	7000 6300	8600 6800			
0.85..1.1	0.85...1.1	0.85...1.1	0.85...1.1	0.85...1.1			
0.35...0.7	0.35...0.7	0.35...0.7	0.35...0.7	0.35...0.7			
0.1..0.25	0.1...0.25	0.1...0.25	0.1...0.25	0.1...0.25			
800...950	800...950	800...900	1350...1600	1350...1600			
9...11	9...11	9...11	21...25	21...25			
700...850	700...850	700...850	1300...1550	1300...1550			
8...10	8...10	8...10	18...22	18...22			
16	16	16	16	16			
4.5	4.5	4.5	4.5	4.5			
-	-	-	-	-			
0.6	0.6	0.6	0.6	0.6			
5	5	5	5	5			
CEF 1-11/12	CEF 1-22	CEF 1-11/1200	CEF 1-22	CEF 1-11/1200	CEF 1-22	CEF 1-11/1200	CEF 1-22
0.5-180	160-400	300-1200 <sup>a)</sup>	160-400	300-1200 <sup>a)</sup>	160-400	300-1200 <sup>a)</sup>	160-400
0.5..407		0.5-678		0.5-678		0.5-678	
0.5..700 <sup>b)</sup>		0.5-700 <sup>b)</sup>		0.5-700 <sup>b)</sup>		0.5-700 <sup>b)</sup>	
CTA 1-500 <sup>c)</sup>							
320-500	320-500	320-500	320-500	320-500	320-500	320-500	320-500
545-866	545-866	545-866	545-866	545-866	545-866	545-866	545-866
)	)	)	)	)	)	)	)
CTA 6-90..CTA 6-150	CTA 6-200						

<sup>a)</sup> CTA 1-500 is separate mounting, 415 volt only.  
Use of CTA 6 for 1000 volts permissible.

<sup>b)</sup> CEF 1-11 or CEF 1-12 available with external CT's  
- refer Part "A" Price List Catalogue.

<sup>c)</sup> Select appropriate CEF from Cat. 2253 or Part "A" Price List Catalogue.

<sup>a)</sup> Refer catalogue 2253 for CET 3 details.

<sup>b)</sup> CET-4 release late 1993.

<sup>c)</sup> Preliminary data.

<sup>d)</sup> Data for coil with "ECM" ( ) available late 1993 for CA 6-85, CA 6-105.

# 1000 volt contactors type CA 6

## Ordering information



CA6-105



CA6-170-E

CA6-P...



CEF1-12



CT6...

### Contactors CA6<sup>1)</sup>

With 3 main contacts and 1 aux. contact block 13-14/21-22

Rated 3-phase  
thermal motors  
current /h at 1000 V  
enclosed AC-3

		Contactor			
[A]	(kW)	type	N.O.	N.C.	Order No.
120	45	CA 6-85	1	1	CA 6-85...V..-11
120	55	CA 6-105	1	1	CA 6-105...V..-11
210	75	CA 6-140-E	1	1	CA 6-140-E...V..-11
210	90	CA 6-170-E	1	1	CA 6-170-E...V-11

### Aux. contact blocks CA 6-P

For fitting left	1 n/o	
	1 n/c	CA 6-P1-11
	1 n/o	
	1 n/c	CA 6-P3-11
For fitting left	1 n/o	
	1 n/c	CA 6-P2-11
	1 n/o	
	1 n/c	CA 6-P4-11
	1 n/o	
	1 n/c (Latebreak)	CA 6-P2-L11

### Mechanical Interlock CM 6

For contactors CA 6-85 and CA 6-105

CA 6-CM 6

### Electronic Motor Protection Relay CEF 1<sup>2)</sup>

For surface mounting with current sensing, evaluation electronics, output relay.

3 protection functions	0.5-180A	CEF 1-11...V..
5 protection functions	0.5-180A	CEF 1-12...V..
5 protection functions	160-400A	CEF 1-22...V
3 protection functions C/W CT's	300-1200A	CEF 1-11/1200P...V
5 protection functions C/W CT's	300-1200A	CEF 1-12/1200P...V

### Thermal Overload Relay CT 6

For fitting to contactor CA 6

Type	Setting range for direct- on-line [A]	for YΔ starting [A]	
CT 6-90	70...90	121...155	CT 6-90
CT 6-110	85...110	147...190	CT 6-110
CT 6-150	105...150	181...260	CT 6-150
CT 6-200	140...200	240...347	CT 6-200
For separate mounting			
CTA 6-90	70...90	121...155	CTA 6-90
CTA 6-110	85...110	147...190	CTA 6-110
CTA 6-150	105...150	181...260	CTA 6-150
CTA 6-200	140...200	240...347	CTA 6-200

<sup>1)</sup> For pricing details refer catalogue Part "A"  
(Full range of accessories available).

<sup>2)</sup> For pricing details refer catalogue Part "A"  
For technical details refer Catalogue 2252.

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#### Agents

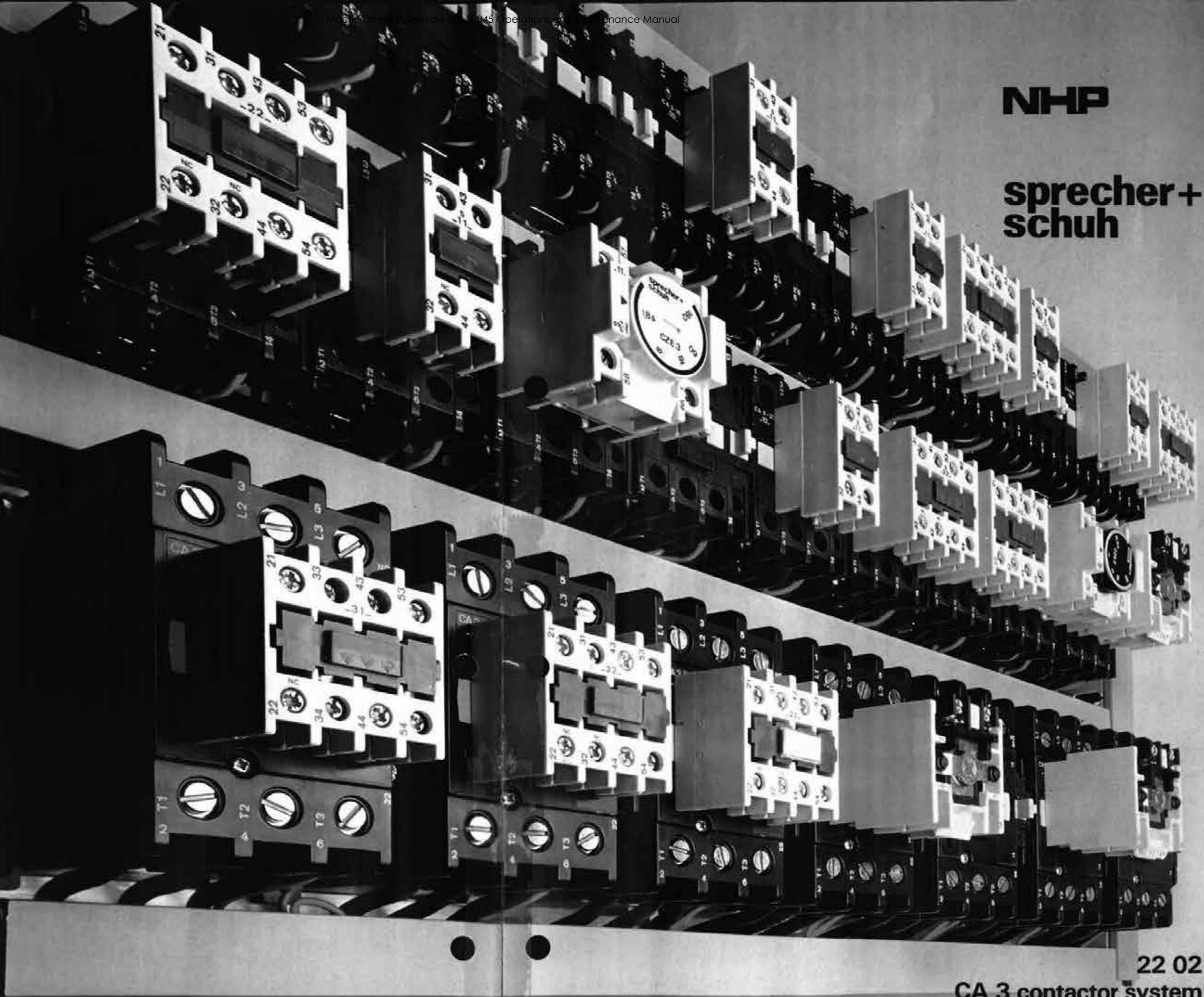
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 Winnellie NT 5789  
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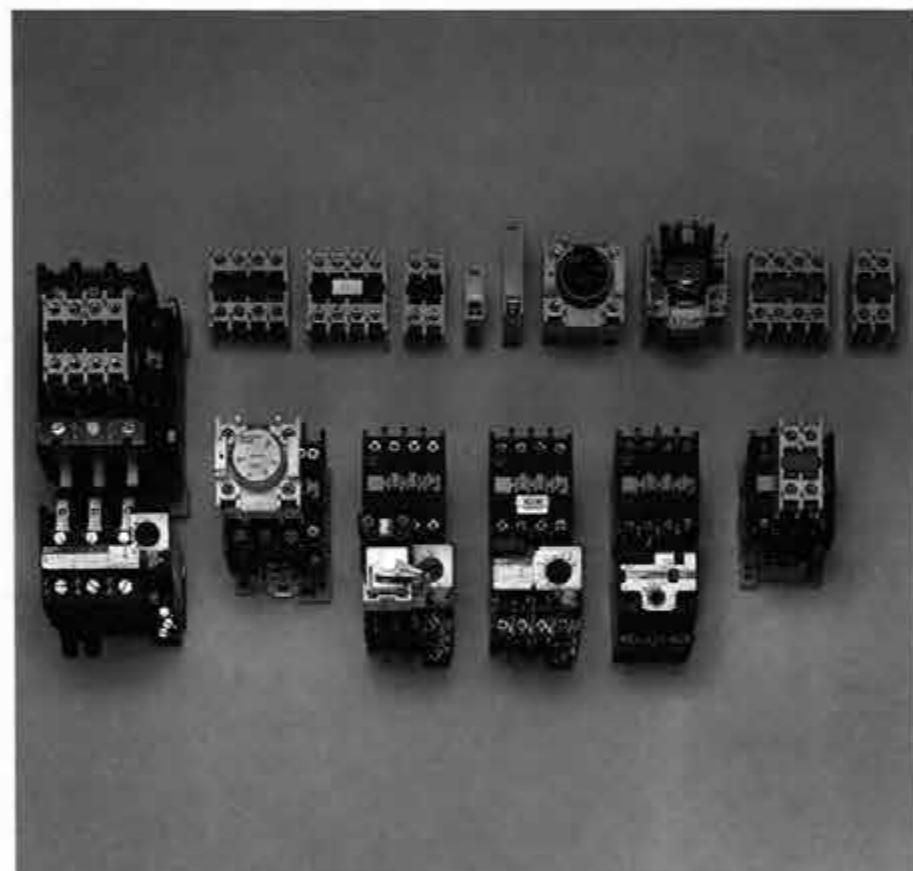
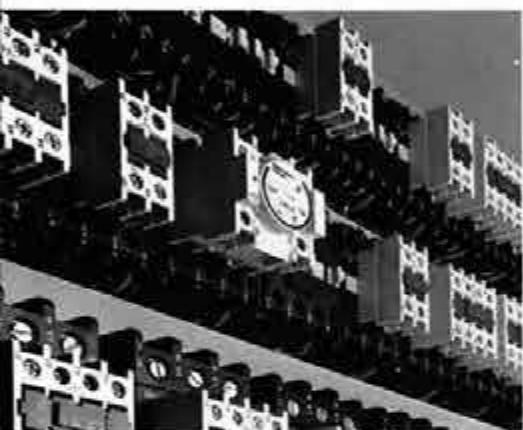
**CA 3 contactor system**

## A powerful contactor system with decisive advantages

CA 3 is well-engineered contactor system in which modules for small and large ratings are integrated. There are 9 power contactors in only 3 different sizes covering a range from 4...37 kW.

The matching thermal overload relays in only 2 sizes are designed to provide protection from 0.1...72.5 A.

These components together with a universal range of accessories provides more performance in less space.



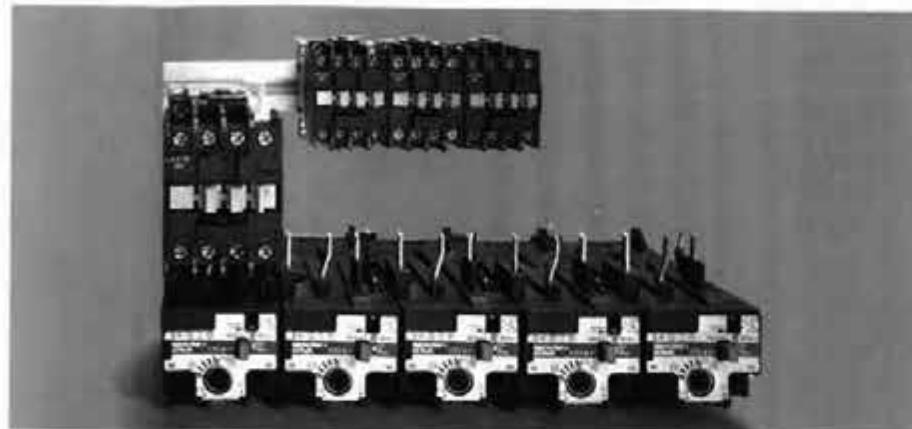
### User compatible

The clearly visible switching status of the contactors, auxiliary contacts and thermal overload relays simplify installation supervision.

Three options are available for equipment inscription purposes.

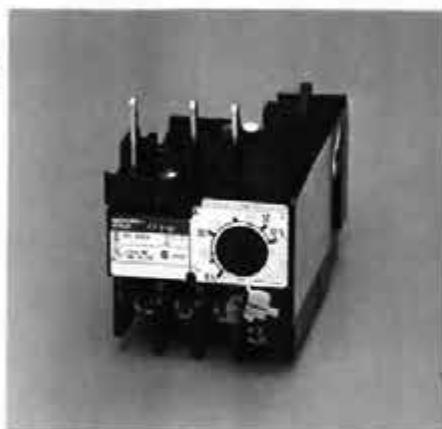
Clear connection designations and code number according to European standards (EN) as well as an integrated snap-on device for EN 50 022-35 top hat rails permit worldwide use.

CA 3 solves all control problems with very few components.



## Compact

With a spacing of 45 mm, the compact thermal overload relay CT 3 K exactly matches the contactors CA 3-9... CA 3-16 and permit the space-saving assembly of switching cabinets and combinations.



## Convenient

The easily readable current scales of the thermal overload relays allow simple, accurate adjustment for both direct and star-delta starting. A complex limiting current calibration procedure for each individual item of equipment enables outstanding tripping accuracy to be achieved.

## Operationally reliable

Independent of position, high vibration and shock-resistance, positively guided contacts and phase failure protection guarantee safety and reliability.

## Completely modular

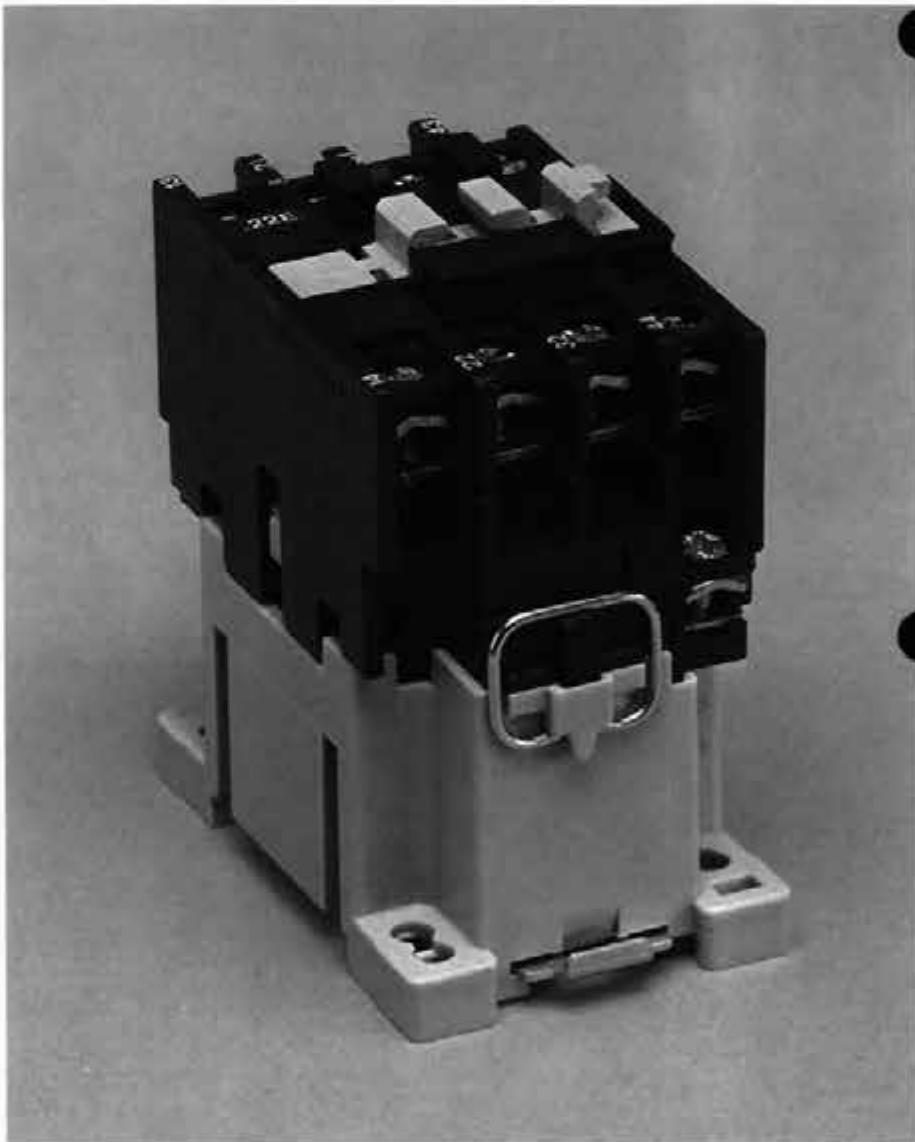
The comprehensive selection of modules and standard boxes permit the construction of any combination of contactors and miniature control systems, i.e. the items are available:

- Connection keys for screwless, efficient subassembly
- Attachable interlock to mechanically inhibit the simultaneous switching of 2 contactors
- Single enclosure for cost-effective starter construction
- Protective elements for limiting voltage surges when the contactors are switched off.

Contactor type	CA 3-9	3-12	3-16	3-23	3-30	3-37-N	3-43-N	3-60-N	3-72-N
AC-1, open	[A]	25	25	25	45	45	63	63	90
For switching motors AC-2, AC-3, AC-4 at [kW] 380/415 V	4	6,5	7,5	11	15	18,5	22	30	37

## Versatile contactor system for rapid assembly and effortless upgrading

A series of useful items considerably simplify the assembly of the CA 3 contactor system. During commissioning or during subsequent expansion of the installation, the modular system accommodates numerous modifications without the need for structural alterations.



The compact and easily assembled elements of the CA 3 system save time and space.

### Safe to handle

A terminal cover protects against inadvertent contact while acting as a screwdriver guide (safe for back of hand and fingers according to VBG 4).

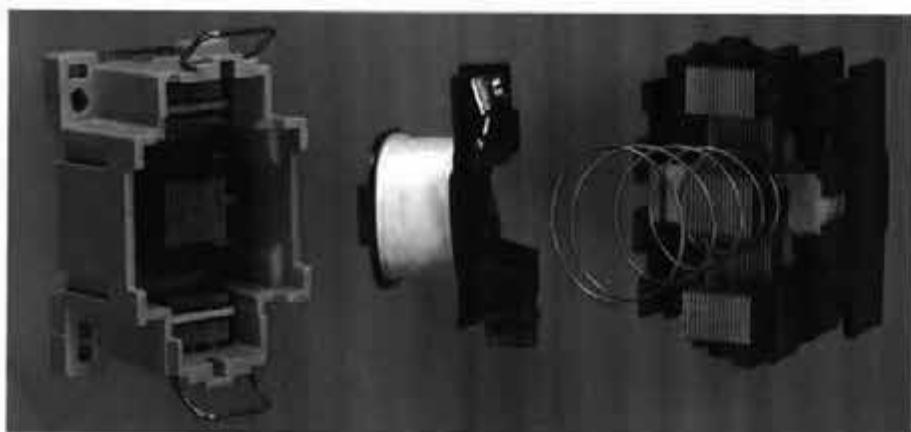
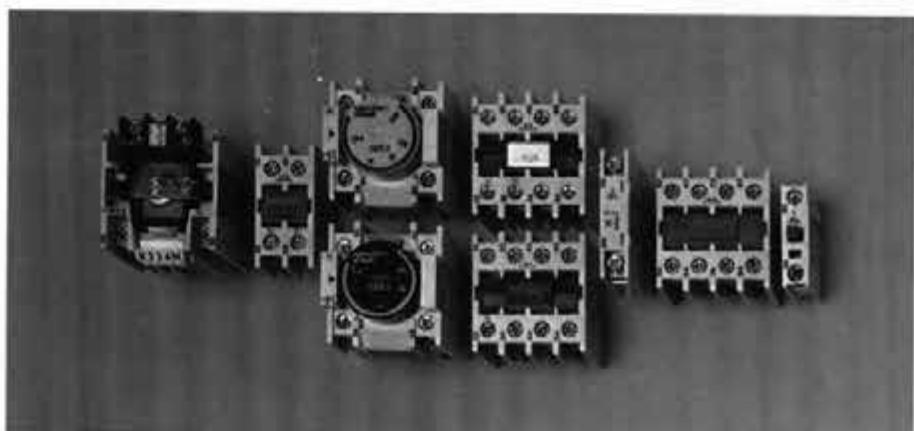
### Time saving

All contactors and thermal overload relays are supplied with opened terminals. Thus, an operation is saved for every screw and valuable time is saved. Captive screws ( $\pm$ /pozidriv) for all types of manual and powered screwdrivers.



### User-friendly

Simplified inventory management through versatility and snap-on elements. A standard version of which can be used for all types from 4...37 kW.



### Exclusive

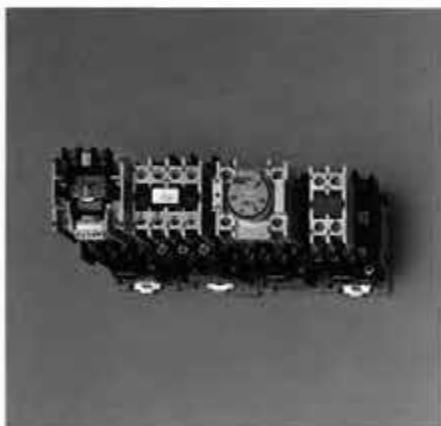
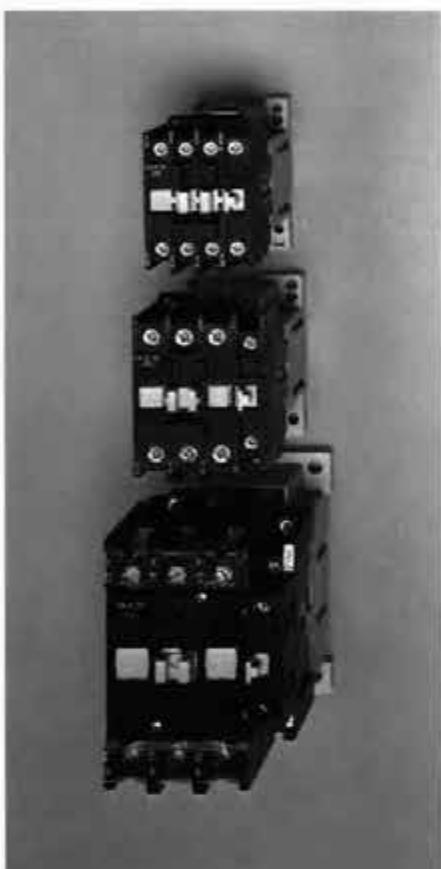
Simple, rapid exchanging of coils even on mounted and wired contactors. Trouble-free coil changing is also possible for reset solenoids and latches (no loose small components).



### Versatile

The programmable reset button of the CT 3 thermal overload relay permits any one of 3 reset options to be chosen: test, manual and automatic modes. The uniformly attachable magnetic remote reset up to 660 V and the shortenable reset rod permit flexibility in the solution of special reset problems.

## Well-engineered contactor system for simple planning



### Well-engineered

CA 3 simplifies design thanks to the unified and universally applicable system.

Time-saving design aids simplify design work. The following items are available:

- Base plate or appliance drawings, scale 1:1
- Templates, scale 1:10
- Adhesive films for efficient circuit diagram preparation.

Simple planning with the CA 3 contactor system that can be used all over the world. The standard version corresponds to the European-international and to the special North American codes. The auxiliary circuits are also approved for up to 660 V according to IEC and to 600 V according to CSA and UL. CA 3 components function perfectly under any climatic conditions. As well as under unfavorable environmental and operating conditions. For example, the thermal overload relays are compensated from  $-25^{\circ}\text{C}...+70^{\circ}\text{C}$ .

### Uniformity

Simple job planning thanks to uniform site grid for:

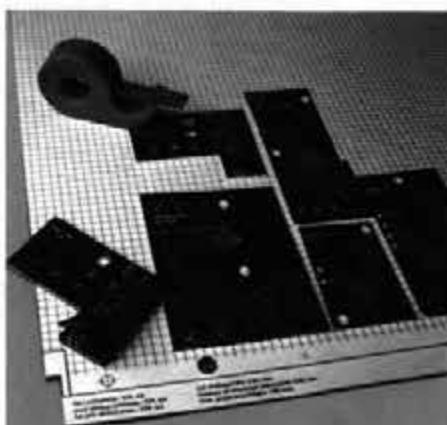
- Auxiliary contactors and contactors up to 7.5 kW
- Contactors between 18.5...37 kW DC and AC controlled.

### Space saving

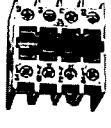
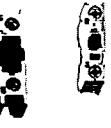
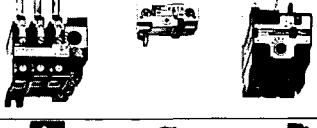
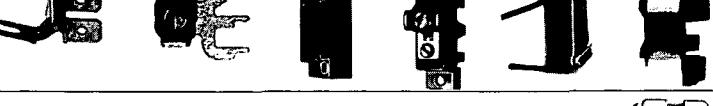
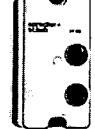
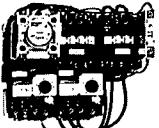
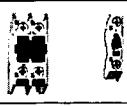
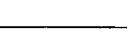
No extra space required for all function alternatives:

- Auxiliary contacts with 1...4 poles
- Timing element (time delay relay)
- Mechanical latch (latched contactor)
- DC operation

Therefore, the CA 3 offers more for performance in less space.



## Table of contents

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## Selection Table

### Contactor

### CS 3 Control Relay



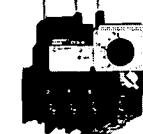
### CA 3-9



		V	220	240	380	415	500	660		220	240	380	415	500	660
$I_{th}^{(1)}$ AC-1 <sup>2)</sup>	open	A	20	20	20	20	20	20		25	25	25	25	25	25
		kW	7,6	8,3	13	14,5	17,5	23		9,5	10,5	16,5	18	21,5	28,5
$I_{th}$ enclosed		A	16	16	16	16	16	16		16	16	16	16	16	16
		kW	6	6,7	10,5	11,5	14	18		6	6,7	10,5	11,5	14	18
<b>Switching of 3-phase motors</b>															
AC-2	Slip-ring motors <sup>4)</sup>	A	12	11	9	8,2	7	5,2		12	11	9	8,2	7	5,2
		kW	3	3	4	4	4	4		3	3	4	4	4	4
AC-3	Squirrel-cage motors <sup>4)</sup> off during running	HP	4	4	5,5	5,5	5,5	5,5		4	4	5,5	5,5	5,5	5,5
		kW	3	3	4	4	4	4		3	3	4	4	4	4
AC-4	Squirrel-cage motors <sup>4)</sup> plugging	A	12	11	9	8,2	7	5,2		12	11	9	8,2	7	5,2
	inching	kW	3	3	4	4	4	4		3	3	4	4	4	4
Star-delta starting <sup>4)</sup>		HP	4	4	5,5	5,5	5,5	5,5		4	4	5,5	5,5	5,5	5,5
		A								15	14	16	14	12	9
		kW								4	4	7,5	7,5	7,5	7,5
		HP								5,5	5,5	10	10	10	10
<b>Switching of 3-phase capacitor banks</b>															
Single capacitors <sup>19)</sup> , open		kVar								6,7	7,3	11,5	12,5	15	20
		kVar								4,3	4,7	7,5	8	10	12,5
Variable capac. <sup>20)</sup> , open		kVar								5	5	5	5	5	5
		kVar								4,3	4,7	5	5	5	5
Back-up fuse (without th. overl. rel.) <sup>13)</sup>		A	20							25					
Aux. contacts	Switching <sup>16)</sup>	A	5,5	5	3	2,5	1,6	1		5,5	5	3	2,5	1,6	1
	AC-11	A	(12)	(10)	(5)	(4)	(2,5)	(1,25)		(12)	(10)	(5)	(4)	(2,5)	(1,25)
of Block, $I_{th}$ open		A	16	(20)						16	(20)				
		A	12	(16)						12	(16)				
Contactor	Back-up fuse	A <sup>14)</sup>	12	(~20)	(~16)					12	(~20)	(~16)			
	No. of. aux. contacts		4...8							1...5					
<b>UL Approval (USA), CSA (Canada)<sup>34)</sup></b>															
Size		00								00					
	Continuous current rating	open A	20							25					
	current rating	enclosed A	18							24					
	Voltage	AC V <sup>15)</sup>	600							200	230	460	575		
Motor load (with and without thermal overload relay)		HP	-							2	2	5	7,5		
Coil burden	pick-up VA (W)	VA (W)	59 (46)							59 (46)					
	Alternat. current holding	VA (W)	7,2 (2,2)							7,2 (2,2)					
Direct current	pick-up W	W	7,4							7,4					
	holding W	W	7,4							7,4					
Switching delay	closing ms		10...20 (CS 3 C: 20...60)							10...20 (CA 3-9 C: 20...60)					
	opening ms		8...18 (CS 3 C: 12...25)							8...18 (CA 3-9 C: 12...25)					
Life	Mech	Mill. Ops.	15 (CS 3 C: 30)							15 (CA 3-9 C: 30)					
	Contactor contacts	AC-11	Mill. Ops.	3 (220 V, 2 A)											
Main contacts	AC-3	Mill. Ops.	1,2 (380/415 V)							1,2 (380/415 V)					
	Aux. contact blocks	AC-11	Mill. Ops.	3 (220 V, 2 A)						3 (220 V, 2 A)					

### Thermal Overload Relay

### CT3 K-12 CT 3-12



Setting range direct-on-line	see page 47
Setting range star-delta	see page 47
Thermal overload relay for fitting to contactor	CT 3 K-12 CA 3-9
Back-up fuse, max. rated current coordination type «C» <sup>13)</sup>	CT 3-12 CA 3-16
Thermal overload relay for separate mounting	(Back-up fuse as for fitting to contactor, see page 47, 49) CTA 3-12

<sup>1)</sup> $I_{th}$ in accordance with IEC, AS, BS, SEV. Corresponds to the continuous current rating $I_{th2}$ according to VDE.	<sup>4)</sup> Rated current and power for 50-60 Hz in accordance with IEC, AS, BS; SEV, VDE. Same data as AC-3 if only occasional inching (plugging) (AC-4).	Low voltage and HRC fuses in compliance with IEC 269-2 and -3, gl, g II: VDE 0636/2 and /3, gl; SEV 1010 T; SEV 1018, T2; SEV 1066 gl, e.g., Sprecher + Schuh types SM and SN 2, GEC English Electric types T and GTF..., Siemens type 3 NA 1, Slow acting screw type (DT) fuse.
<sup>2)</sup> Rated power according to IEC, AS, BS, DEMKO, NEMKO, SEMKO, Finland, SEV, VDE for 3-phase non-inductive loads 50-60 Hz.		
<sup>3)</sup> "Open" values refer to 40°C ambient temperature, "enclosed" values 60°C.	<sup>13)</sup> Co-ordination type «C» in compliance with IEC 292-1 A: short circuit protection, slight contact welding possible, no other damage.	

**Contactor****CA 3-12****CA 3-16**

<b>Operating voltage</b>	V	220	240	380	415	500	660	220	240	380	415	500	660
$I_{th}^1)$ open	A	25	25	25	25	25	25	25	25	25	25	25	25
<b>AC-1<sup>2)</sup></b>	kW	9,5	10,5	16,5	18	21,5	28,5	9,5	10,5	16,5	18	21,5	28,5
enclosed	A	16	16	16	16	16	16	16	16	16	16	16	16
	kW	6	6,7	10,5	11,5	14	18	6	6,7	10,5	11,5	14	18
<b>Switching of 3-phase motors</b>													
<b>AC-2</b> Slip-ring motors <sup>4)</sup>	A	15	14	12	11	9	7	16	16	16	14	12	9
<b>AC-3</b> Squirrel-cage motors <sup>4)</sup>	kW	4	4	5,5	5,5	5,5	5,5	4,5	4,8	7,5	7,5	7,5	7,5
off during running	HP	5,5	5,5	7,5	7,5	7,5	7,5	6	6,5	10	10	10	10
<b>AC-4</b> Squirrel-cage motors <sup>4)</sup>	A	15	14	12	11	9	7	16	16	16	14	12	9
plugging	kW	4	4	5,5	5,5	5,5	5,5	4,5	4,8	7,5	7,5	7,5	7,5
inching	HP	5,5	5,5	7,5	7,5	7,5	7,5	6	6,5	10	10	10	10
<b>Star-delta starting</b>	A	21	19	21	21	16	12	28 <sup>31)</sup>	25 <sup>31)</sup>	28 <sup>31)</sup>	28 <sup>31)</sup>	20 <sup>31)</sup>	15
	kW	5,5	5,5	10	11	10	10	7,5	7,5	14	15	13	13
	HP	7,5	7,5	13,5	15	13,5	13,5	10	10	19	20	17,5	17,5
<b>Switching of 3-phase capacitor banks</b>													
Single capacitors <sup>19)</sup> , open	kVar	6,7	7,3	11,5	12,5	15	20	6,7	7,3	11,5	12,5	15	20
Single capacitors <sup>19)</sup> , encl.	kVar	4,3	4,7	7,5	8	10	12,5	4,3	4,7	7,5	8	10	12,5
Variable capac. <sup>20)</sup> , open	kVar	6,7	7,3	7,5	7,5	7,5	7,5	6,7	7,3	7,5	7,5	7,5	7,5
Variable capac. <sup>20)</sup> , encl.	kVar	4,3	4,7	7,5	7,5	7,5	7,5	4,3	4,7	7,5	7,5	7,5	7,5
Back-up fuse (without th. overl. rel.) <sup>19)</sup>	A	25						35					
Aux. contacts	A	5,5	5	3	2,5	1,6	1	5,5	5	3	2,5	1,6	1
of Block, in () of	AC-11	A	(12)	(10)	(5)	(4)	(2,5)	(1,25)	(12)	(10)	(5)	(4)	(2,5)
<i>I<sub>th</sub></i> open	A	16	(20)					16	(20)				
<i>I<sub>th</sub></i> enclosed	A	12	(16)					12	(16)				
<b>Contactor</b>	Back-up fuse	A <sup>14)</sup>	12	(~20; ~16)				12	(~20; ~16)				
No. of aux. contacts			1...5					1...5					
<b>UL Approval (USA), CSA (Canada)<sup>34)</sup></b>													
Size		00+						0+					
Continuous current rating	open	A	25					25					
	enclosed	A	24					24					
Voltage	AC V <sup>15)</sup>	200	230	460	575			200	230	460	575		
Motor load (with and without thermal overload relay)	HP	3	3	7,5	10			5	5	10	15		
Coil burden	pick-up	VA (W)	59 (46)					59 (46)					
Alternat. current	holding	VA (W)	7,2 (2,2)					7,2 (2,2)					
Direct current	pick-up	W	7,4					7,4					
	holding	W	7,4					7,4					
Switching delay	closing	ms	10...20 (CA 3-12 C: 20...60)					10...20 (CA 3-16 C: 20...60)					
	opening	ms	8...18 (CA 3-12 C: 12...25)					8...18 (CA 3-16 C: 12...25)					
Life	Mech	Mill. Ops.	15 (CA 3-12 C: 30)					15 (CA 3-16 C: 30)					
Main contacts	AC-3	Mill. Ops.	1,2 (380/415 V)					1,2 (380/415 V)					
Aux. contact blocks	AC-11	Mill. Ops.	3 (220 V, 2 A)					3 (220 V, 2 A)					

**Thermal Overload Relay****CT3K-12 CT3-12**

Setting range direct-on-line	9...12,5 A	8,5...12,5 A	12,5...17,5 A	12,5...17,5 A
Setting range star-delta	15,6...21,6 A	14,7...21,7 A	21,6...30,3 A	20,8...30,3 A
Thermal overload relay for fitting to contactor	CT 3 K-12	CT 3-12	CT 3 K-17	CT 3-17
Back-up fuse, max. rated current coordination type «C» <sup>13)</sup>	CA 3-9	CA 3-12	CA 3-16	CA 3-16...30
Thermal overload relay for separate mounting	25 A	25 A	35 A	40 A <sup>32)</sup>

<sup>14)</sup> Short circuit protection without contact welding according to IEC 337-1 B, one rated current setting higher permissible for fast-acting screw fuses (D).

<sup>15)</sup> Rated motor voltages. The corresponding mains network voltages are 220...240, 440...480, 550...600 V.

<sup>16)</sup> Control of AC electro-magnets.

<sup>17)</sup> Connecting single capacitors or capacitors as a basic load to the mains.

<sup>20)</sup> Parallel switching to capacitors already connected (resulting inductance in the supply line to each condenser stage min. 6 µH).

<sup>31)</sup> Dependent on cross-section of supply line, contactor may need to be fitted with larger main current terminals.

<sup>32)</sup> Max. 35 A. In accordance with SEMKO, DEMKO, NEMKO, Finland.

<sup>34)</sup> Also Lloyds Register of Shipping.

## Selection Table

### Contactor

CA 3-23



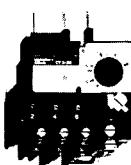
CA 3-30



Operating voltage	V	220	240	380	415	500	660	220	240	380	415	500	660
$I_{th}^{(1)}$ open	A	45	45	45	45	45	45	45	45	45	45	45	45
AC-1 <sup>(2)</sup>	kW	17	19	30	32	39	51	17	19	30	32	39	51
enclosed	A	30	30	30	30	30	30	30	30	30	30	30	30
	kW	11,5	12,5	20	21,5	26	34	11,5	12,5	20	21,5	26	34
<b>Switching of 3-phase motors</b>													
AC-2 Slip-ring motors <sup>(4)</sup>	A	23	22	23	21	23	17	28	25	30	28	28	21
AC-3 Squirrel-cage motors <sup>(4)</sup>	kW	6,3	6,3	11	11	15	15	7,5	7,5	15	15	18,5	18,5
off during running	HP	8,5	8,5	15	15	20	20	10	10	20	20	25	25
AC-4 Squirrel-cage motors <sup>(4)</sup>	A	23	22	23	21	17	13	28	25	30	28	23	17
plugging	kW	6,3	6,3	11	11	11	11	7,5	7,5	15	15	15	15
inchng	HP	8,5	8,5	15	15	15	15	10	10	20	20	20	20
Star-delta starting <sup>(4)</sup>	A	39 <sup>(3)</sup>	36 <sup>(3)</sup>	37 <sup>(3)</sup>	37 <sup>(3)</sup>	38 <sup>(3)</sup>	29 <sup>(3)</sup>	45 <sup>(3)</sup>	48 <sup>(3)</sup>	50 <sup>(3)</sup>	46 <sup>(3)</sup>	45 <sup>(3)</sup>	34 <sup>(3)</sup>
	kW	11	11	18,5	20	25	25	13	15	25	25	30	30
	HP	15	15	25	27	34	34	17,5	20	34	34	40	40
<b>Switching of 3-phase capacitor banks</b>													
Single capacitors <sup>(19)</sup> , open	kVar	12	13	20	22,5	27	36	12	13	20	22,5	27	36
Single capacitors <sup>(19)</sup> , encl.	kVar	8	9	13,5	15	18	25	8	9	13,5	15	18	25
Variable capac. <sup>(20)</sup> , open	kVar	12	13	15	15	15	15	12	13	15	15	15	15
Variable capac. <sup>(20)</sup> , encl.	kVar	8	9	13,5	15	15	15	8	9	13,5	15	15	15
Back-up fuse (without th. overl. rel.) <sup>(19)</sup>	A	50						50					
Aux. contacts	Switching <sup>(16)</sup>	A	5,5	5	3	2,5	1,6	1	5,5	5	3	2,5	1,6
of Block,	AC-11	A	(12)	(10)	(5)	(4)	(2,5)	(1,25)	(12)	(10)	(5)	(4)	(2,5)
in () of	$I_{th}$ open	A	16	(20)					16	(20)			
Contactor	$I_{th}$ enclosed	A	12	(16)					12	(16)			
No. of. aux. contacts	Back-up fuse	A <sup>(14)</sup>	12	(25)					12	(25)			
<b>UL Approval (USA), CSA (Canada)<sup>(34)</sup></b>													
Size		1						1½					
Continuous current rating	open	A	40					40					
	enclosed	A	36					36					
Voltage	AC V <sup>(15)</sup>	200	230	460	575			200	230	460	575		
Motor load (with and without thermal overload relay)	HP	7,5	7,5	15	20			10	10	20	25		
Coil burden	pick-up	VA (W)	90 (65)					90 (65)					
Alternat. current	holding	VA (W)	8,6 (2,5)					8,6 (2,5)					
Direct current	pick-up	W	150					150					
	holding	W	3,8					3,8					
Switching delay	closing	ms	10...20					10...20					
	opening	ms	8...18					8...18					
Life	Mech	Mill. Ops.	10					10					
Main contacts	AC-3	Mill. Ops.	1,2 (380/415 V)					1,2 (380/415 V)					
Aux. contact blocks	AC-11	Mill. Ops.	3 (220 V, 2 A)					3 (220 V, 2 A)					

### Thermal Overload Relay

CT 3-23



CT 3-32



Setting range direct-on-line	16...23 A	23...32 A <sup>(35)</sup>
Setting range star-delta	27,7...39,8 A	39,8...55,5 A
Thermal overload relay for fitting to contactor	CT 3-23	CT 3-32
CA 3-23	CA 3-30	CA 3-30
Back-up fuse, max. rated current coordination type «c» <sup>(13)</sup>	50 A	50 A <sup>(33)</sup>
Thermal overload relay for separate mounting	CTA 3-23	CTA 3-32

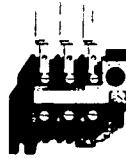
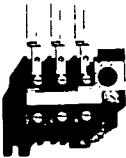
- <sup>1)</sup>  $I_{th}$  in accordance with IEC, AS, BS, SEV. Corresponds to the continuous current rating  $I_{th2}$  according to VDE.
- <sup>2)</sup> Rated power according to IEC, AS, BS, DEMKO, NEMKO, SEMKO, Finland, SEV, VDE for 3-phase non-inductive loads 50-60 Hz.
- <sup>3)</sup> "Open" values refer to 40°C ambient temperature, "enclosed" values 60°C.

- <sup>4)</sup> Rated current and power for 50-60 Hz in accordance with IEC, AS, BS, SEV, VDE. Same data as AC-3 if only occasional inching (plugging) (AC-4).
- <sup>13)</sup> Co-ordination type «c» in compliance with IEC 292-1 A; short circuit protection, slight contact welding possible, no other damage.

- <sup>13)</sup> Low voltage and HRC fuses in compliance with IEC 269-2 and -3, gl, g II: VDE 0636/2 and /3, gl; SEV 1010 T; SEV 1018, T2; SEV 1066 gl, e.g., Sprecher + Schuh types SM and SN 2, GEC English Electric types T and GTF..., Siemens type 3 NA 1, Slow acting screw type (DT) fuse.

**Contactor****CA 3-37-N****CA 3-43-N**

<b>Operating voltage</b>	V	220	240	380	415	500	660	220	240	380	415	500	660
$I_{th}^{(1)}$ open	A	63	63	63	63	63	63	63	63	63	63	63	63
<b>AC-1<sup>(2)</sup></b>	kW	24	26	41	45	55	72	24	26	41	45	55	72
enclosed	A	45	45	45	45	45	45	45	45	45	45	45	45
	kW	17	18,5	30	32	39	51	17	18,5	30	32	39	51
<b>Switching of 3-phase motors</b>													
<b>AC-2</b> Slip-ring motors <sup>(4)</sup>	A	39	36	37	37	33	30	45	42	43	40	43	34
<b>AC-3</b> Squirrel-cage motors <sup>(4)</sup> off during running	kW	--	--	11	11	18,5	20	22	26	12,5	13	22	30
	HP	15	15	25	27	30	35	17	17,5	30	30	40	40
<b>AC-4</b> Squirrel-cage motors <sup>(4)</sup> plugging inching	A	39	36	37	37	33	30	45	42	43	40	43	34
	kW	11	11	18,5	20	22	26	12,5	13	22	22	30	30
	HP	15	15	25	27	30	35	17	17,5	30	30	40	40
<b>Star-delta starting</b>	A	64	63	65	66	55	45	75	70	72	72	72	55
	kW	18,5	20	33	37	37	40	22	22	37	40	50	50
	HP	25	27	44	50	50	55	30	30	50	55	67	67
<b>Switching of 3-phase capacitor banks</b>													
Single capacitors <sup>(19)</sup> , open	kVar	17	18	29	32	38	50	17	18	29	32	38	50
Single capacitors <sup>(19)</sup> , encl.	kVar	12	12,5	20	22	26	35	12	12,5	20	22	26	35
Variable capac. <sup>(20)</sup> , open	kVar	17	18	22	22	22	22	17	18	22	22	22	22
Variable capac. <sup>(20)</sup> , encl.	kVar	12	12,5	20	22	22	22	12	12,5	20	22	22	22
Back-up fuse (without th. overv. rel.) <sup>(13)</sup>	A	80						100					
<b>Aux. contacts</b>	Switching <sup>(16)</sup>	A	5,5	5	3	2,5	1,6	1	5,5	5	3	2,5	1,6
of Block,	AC-11	A	(12)	(10)	(5)	(4)	(2,5)	(1,25)	(12)	(10)	(5)	(4)	(2,5)
in () of	$I_{th}$ open	A	16	(20)					16	(20)			
<b>Contactor</b>	$I_{th}$ enclosed	A	12	(16)					12	(16)			
	Back-up fuse	A <sup>(14)</sup>	12	(25)					12	(25)			
No. of. aux. contacts			2	...	7				2	...	7		
<b>UL Approval (USA), CSA (Canada)<sup>(34)</sup></b>													
Size			1 P						2				
Continuous current rating	open	A	50						50				
	enclosed	A	45						45				
<b>Voltage</b>	AC V <sup>(5)</sup>		200	230	460	575			200	230	460	575	
Motor load (with and without thermal overload relay)	HP		10	10	25	30			10	15	30	40	
<b>Coil burden</b>	pick-up	VA (W)	190 (103)						190 (103)				
Alternat. current	holding	VA (W)	17	(4,9)					17	(4,9)			
Direct current	pick-up	W	350						350				
	holding	W	5,5						5,5				
<b>Switching delay</b>	closing	ms	12	...	22				12	...	22		
	opening	ms	8	...	18				8	...	18		
<b>Life</b>	Mech	Mill. Ops.	10						10				
Main contacts	AC-3	Mill. Ops.	1 (380/415 V)						1 (380/415 V)				
Aux. contact blocks	AC-11	Mill. Ops.	3 (220 V, 2 A)						3 (220 V, 2 A)				

**Thermal Overload Relay****CT 3-42****CT 3-42**

Setting range direct-on-line	25...32 A		32...42 A
Setting range star-delta	43,3...55,5 A		55,5...72,5 A
<b>Thermal overload relay</b>	CT 3-42		CT 3-42
for fitting to contactor	CA 3-37-N, 3-43-N, 3-60-N, 3-72-N		CA 3-37-N, 3-43-N, 3-60-N, 3-72-N
<b>Back-up fuse, max. rated current coordination type «cn»<sup>(13)</sup></b>	80 A	80 A	100 A
Thermal overload relay for separate mounting	CTA 3-42		CTA 3-42

<sup>(14)</sup> Short circuit protection without contact welding according to IEC 337-1 B, one rated current setting higher permissible for fast-acting screw fuses (D).

<sup>(15)</sup> Rated motor voltages. The corresponding mains network voltages are 220...240, 440...480, 550...600 V.

<sup>(16)</sup> Control of AC electro-magnets.

<sup>(18)</sup> Connecting single capacitors or capacitors as a basic load to the mains.

<sup>(20)</sup> Parallel switching to capacitors already connected (resulting inductance in the supply line to each condenser stage min. 6  $\mu$ H).

<sup>(31)</sup> Dependent on cross-section of supply line, contactor may need to be fitted with larger main current terminals.

<sup>(32)</sup> Max. 35 A. In accordance with SEMKO, DEMKO, NEMKO, Finland.

<sup>(34)</sup> Also Lloyds Register of Shipping.

## Selection Table

### Contactor



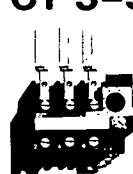
CA 3-60-N



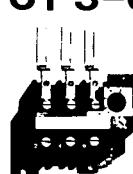
CA 3-72-N

	V	220	240	380	415	500	660		220	240	380	415	500	660	
$I_{th}^{(1)}$ open	A	90	90	90	90	90	90		90	90	90	90	90	90	
AC-1 <sup>(2)</sup>	kW	34	37	59	65	78	10		34	37	59	65	78	103	
enclosed	A	75	75	75	75	75	75		75	75	75	75	75	75	
	kW	29	31	50	54	65	85		29	31	50	54	65	85	
<b>Switching of 3-phase motors</b>															
AC-2 Slip-ring motors <sup>(4)</sup>	A	64	59	59	60	49	37		69	70	72	66	55	42	
AC-3 Squirrel-cage motors <sup>(4)</sup>	kW	18,5	18,5	30	33	33	33		20	22	37	37	37	37	
off during running	HP	25	25	40	44	44	44		27	30	50	50	50	50	
AC-4 Squirrel-cage motors <sup>(4)</sup>	A	64	59	59	60	49	37		69	70	72	66	55	42	
plugging	kW	18,5	18,5	30	33	33	33		20	22	37	37	37	37	
inching	HP	25	25	40	44	44	44		27	30	50	50	50	50	
Star-delta starting <sup>(4)</sup>	A	107	105	105	100	80	60		125	125	120	110	92	70	
	kW	31,5	33	55	55	55	55		37	40	63	63	63	63	
	HP	42	44	75	75	75	75		50	55	85	85	85	85	
<b>Switching of 3-phase capacitor banks</b>															
Single capacitors <sup>(19)</sup> , open	kVar	24	26	41	45	55	72		24	26	41	45	55	72	
Single capacitors <sup>(19)</sup> , encl.	kVar	20	22	35	38	45	60		20	22	35	38	45	60	
Variable capac. <sup>(20)</sup> , open	kVar	24	26	40	40	40	40		24	26	40	40	40	40	
Variable capac. <sup>(20)</sup> , encl.	kVar	20	22	35	38	40	40		20	22	35	38	40	40	
Back-up fuse (without th. overl. rel.) <sup>(13)</sup>	A	125							125						
Aux. contacts	Switching <sup>(6)</sup>	5,5	5	3	2,5	1,6	1		5,5	5	3	2,5	1,6	1	
of Block, in () of Contactor	AC-11	A	(12)	(10)	(5)	(4)	(2,5)	(1,25)	(12)	(10)	(5)	(4)	(2,5)	(1,25)	
$I_{th}$ open	A	16(20)							16(20)						
enclosed	A	12(16)							12(16)						
Back-up fuse	A <sup>(14)</sup>	12(25)							12(25)						
No. of aux. contacts		2...7							2...7						
<b>UL Approval (USA), CSA (Canada)<sup>(34)</sup></b>															
Size		2 1/2							2 3/4						
Continuous current rating	open enclosed	A A	80						80						
Voltage	AC V <sup>(15)</sup>	200	230	460	575				200	230	460	575			
Motor load (with and without thermal overload relay)	HP (HP, 3 ph)	15	20	40	50				20	20	50	60			
Coil burden	pick-up	VA (W)	190 (103)						190 (103)						
Alternat. current	holding	VA (W)	17 (4,9)						17 (4,9)						
Direct current	pick-up	W	350						350						
	holding	W	5,5						5,5						
Switching delay	closing	ms	12...22						12...22						
	opening	ms	8...18						8...18						
Life	Mech	Mill. Ops.	10						10						
Main contacts	AC-3	Mill. Ops.	1 (380/415 V)						1 (380/415 V)						
Aux. contact blocks	AC-11	Mill. Ops.	5,5 (220 V, 2 A)						5,5 (220 V, 2 A)						

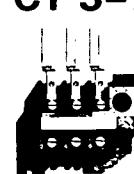
### Thermal Overload Relay



CT 3-52



CT 3-63



CT 3-72

Setting range direct-on-line	40...52 A	52...63 A	58...72,5 A
Setting range star-delta	70...90 A	90...110 A	100...125 A
Thermal overload relay for fitting to contactor	CT 3-52	CT 3-63	CT 3-72
	CA 3-60-N, CA 3-72-N	CA 3-60-N, CA 3-72-N	CA 3-60-N, CA 3-72-N
Back-up fuse, max. rated current coordination type «C» <sup>(13)</sup>	125 A	125 A	125 A
Thermal overload relay for separate mounting	CTA 3-52	CTA 3-63	CTA 3-72

## Order Number Arrangement Connections

**Example:** Starter CA 3 + CT 3

**Contactor**

**Main Contact System** Alternating current

**Enclosure:** without control, without reset button  
with reset button  
with impulse contact control and reset button  
with maintained contact control and reset button

IP 65 instead of IP 42  
with neutral link

**Design Range**

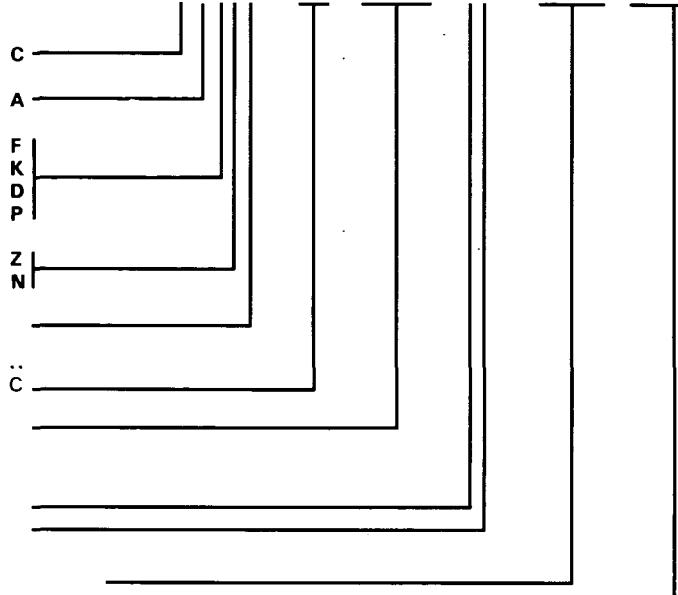
**Contactor Reference** Size  
with DC operation

**Control Voltage and frequency..V..**  
or with DC ..VDC

**Auxiliary Contacts<sup>1)</sup>** (Contactor and auxiliary contact block)  
total no. of n/o contacts  
total no. of n/c contacts

**Thermal Overload Relay** (fitted onto contactor, range 3) + CT 3  
max. setting value      /..A

**CA..3 - 12 - ...V.. - 10 + CT 3 / 0,16 A**



**Example:** Star-Delta Starter CAY 3 + CT 3

**Contactor**

**Main Contact System** Alternating current

**Operating Function:** Star-delta  
Reversing  
Two stage Dahlander  
Two stage separate winding  
Heating

**Mechanical Interlock**  
**Mechanical Latch**  
**Design Range**

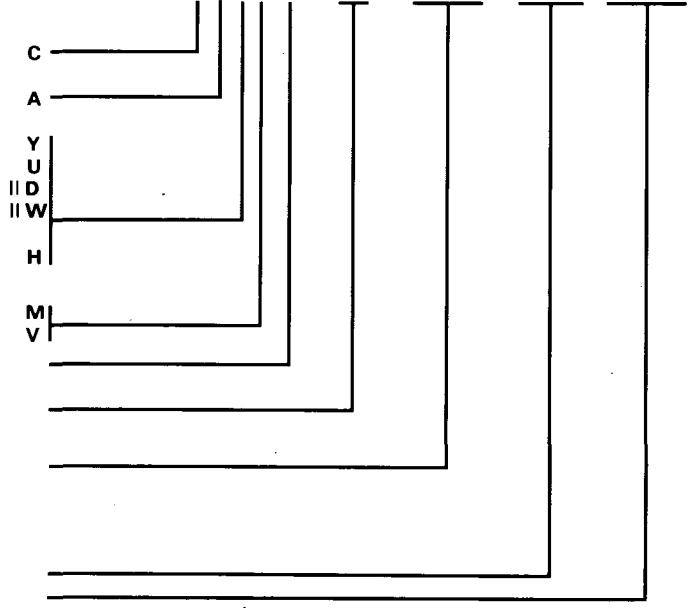
**Contactor Reference**

**Control Voltage and frequency..V..**  
or with DC ..VDC

**Thermal Overload Relay**  
(fitted onto appropriate contactor)  
range 3  
max. setting value

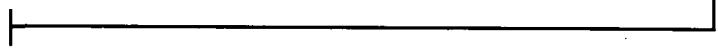
+ CT 3  
/..A

**CAY..3 - 12 - ...V.. + CT 3 / 4,3 A + KOP**



**Timing Element:**

KOP 151-A3-30S      1.5...30 s + KOP  
Timing element block CZE 3, 0.3...30 s + CZE



<sup>1)</sup> Only given with contactors. With starters and contactor combinations, the auxiliary contacts (as well as any spare auxiliary contacts)

necessary for internal switching are included in the ordering number without reference. With some contactor combinations, the

method of control is determined with the auxiliary contact reference marking and any supplementary lettering (e.g., 11 D).

**Connections**

Cross sectional area in mm<sup>2</sup> of round wire connectors, wire with cable-end shoes is correspondingly less.

Contactors CA	3-9 (C)	3-12 (C)	3-16 (C)	3-23	3-30	3-37-N...3-72-N
Control Relay CS 3 (C)						
Main contacts	2 x 4		2 x 4	1 x 10 + 1 x 6	1 x 10 + 1 x 6	1 x 50 + 1 x 10
Auxiliary contacts	2 x 4		2 x 4	2 x 4	2 x 4	2 x 4
Coil connections	2 x 4		2 x 4	2 x 4	2 x 4	2 x 4
Thermal Overload Relays CT	3-12		3-17	3-23	3-32	3-42...3-72
Input (CTA)	3 K-12		3 K-17			
Output	1 x 6		1 x 6	1 x 10	1 x 10	1 x 50 + 1 x 10
Auxiliary control circuit	2 x 4		2 x 4	1 x 10	1 x 10	1 x 50 + 1 x 10
	2 x 2,5		2 x 2,5	2 x 2,5	2 x 2,5	2 x 2,5

Arrangement  
Order No.  
Index No.

## Control Relay CS 3

Control Relay CS 3 complete<sup>1)</sup>

Preferred Arrangement to

EN 50 011

Diagram

Arrange-  
ment

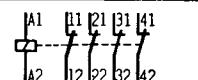
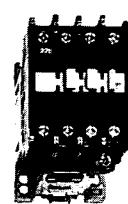
EN  
ref.

No. of No.  
con-  
tacts

Order No.

Index No.

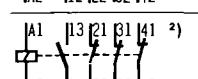
Weight [g]  
1 off



04 E

CS 3...V..-04 E

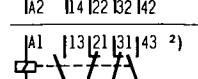
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13 E

CS 3...V..-13 E

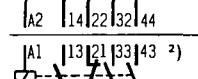
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22 E

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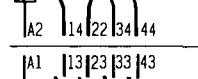
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31 E

CS 3...V..-31 E

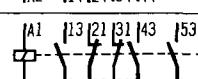
004



40 E

CS 3...V..-40 E

005

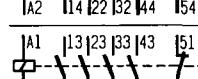


22 E+11

33 Y

CS 3...V..-33 Y

006  
340

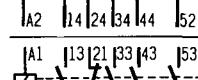


40 E+02

42 E

CS 3...V..-42 E

007

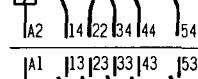


31 E+11

42 Y

CS 3...V..-42 Y

008

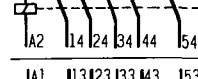


40 E+11

51 E

CS 3...V..-51 E

009

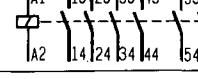


40 E+20

60 E

CS 3...V..-60 E

010



40 E+04

44 E

CS 3...V..-44 E

011  
360

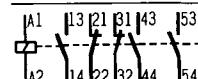


22 E+22

44 Y

CS 3...V..-44 Y

012

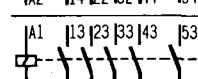


40 E+13

53 E

CS 3...V..-53 E

013

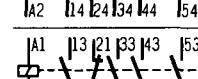


31 E+22

53 Y

CS 3...V..-53 Y

014

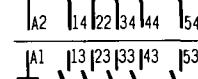


40 E+22

62 E

CS 3...V..-62 E

015

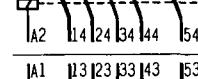


40 E+31

71 E

CS 3...V..-71 E

016



40 E+40

80 E

CS 3...V..-80 E

017

Order no. supplement

For AC control (see page 40)

For DC control CS 3 C (see page 18)

For control relays in enclosures (see page 23)

For auxiliary contactors with clamped-type terminals (see page 23)

...V..

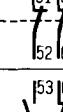
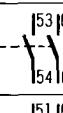
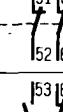
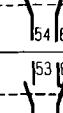
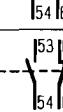
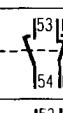
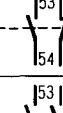
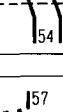
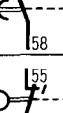
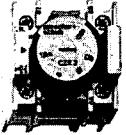
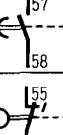
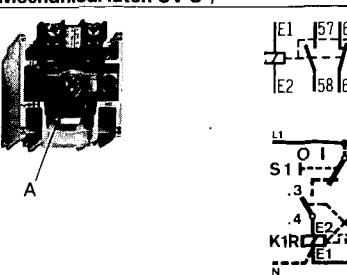
...VDC

# Auxiliary Contact for CS 3

## Timing Element CZ 3

### Mechanical Latch CV 3

**Arrangement**  
**Order No.**  
**Index No.**

Auxiliary Contact Blocks for Control Relay CS 3 <sup>1)</sup>	No. of con- tacts	No. 1 1 1 1	Order No.	Index No.	Weight [g] 1 off
	Auxiliary contact block 02 2	- 2 --	CS 3-P- 02	001	30
	Auxiliary contact block 11 2	1 1 --	CS 3-P- 11	002	
	Auxiliary contact block 20 2	2 - --	CS 3-P- 20	003	
	Auxiliary contact block 04 4	- 4 --	CS 3-P- 04	004	50
	Auxiliary contact block 13 4	1 3 --	CS 3-P- 13	005	
	Auxiliary contact block 22 4	2 2 --	CS 3-P- 22	006	
	Auxiliary contact block L 22 4	1 1 1 1	CS 3-P- L 22	007	
	Auxiliary contact block LL 22 4	-- 2 2	CS 3-P- LL 22	008	
	Auxiliary contact block 31 4	3 1 --	CS 3-P- 31	009	
	Auxiliary contact block 40 4	4 - --	CS 3-P- 40	010	
<b>Timing element CZ 3</b>					
	Timing element CZE 3 delay on energization setting range	0.3... 30 s 1.8...180 s	CZE 3-30 s CZE 3-180 s	011 012	70
	Timing element CZA 3 delay on de-energization setting range	0.3... 30 s 1.8...180 s	CZA 3-30 s CZA 3-180 s	013 014	70
<b>Mechanical latch CV 3<sup>4)</sup></b>					
	Mechanical latch CV 3-...VAC-11 fitted onto contactor (including connections) supplied separately		C..3-...V.. + CV 3-...V..-11 <sup>3)</sup> <u>CV 3-...V..-11<sup>3)</sup></u>	015 016	+ 125 125

<sup>4)</sup> Not suitable for continuous operation.  
See page 6 for technical details.  
During assembly and disassembly of the latch, the magnet armature A must be depressed.

Accessories see pages 22...23

#### Possible combinations of contactors and auxiliary contact blocks

All auxiliary contact blocks as listed on page 15 and 17 can be attached to the control relays CS 3 and 17 as well as the contactors CA 3-9...CA 3-72-N.

All combinations may be used if the (partly) overlapping terminal markings is of no importance, or

if the terminals are to be renumbered. A functional security is ensured with all mounting variants.

<sup>1)</sup> 1-pole and 2-pole auxiliary contact blocks can be fitted on together. 1-pole and 4-pole auxiliary contact blocks or 1-pole and timing element with CA 3-23...CA 3-72-N can be fitted on together.

<sup>2)</sup> Forcibly actuated n/o and n/c contacts with respect to each other.

<sup>3)</sup> Control voltages, see page 40.

# Contactors CA 3

## Starters CA 3+CT 3

Arrangement  
Order No.  
Index No.

### Contactor CA 3-9..CA 3-72-N

3 Main contacts

Auxiliary contact: 1 n/o

Diagram



**Contactor CA 3-9-M, CA 3-16-M**  
4 Main contacts



**Starter CA 3-9+CT 3 K..CA 3-16+CT 3 K**  
Contactor with thermal overload relay CT 3 K  
3 main contacts



**Starter CA 3-9+CT 3..CA 3-72-N+CT 3**  
Contactor with thermal overload relay fitted  
3 main contacts



Dimensions see page 19

Order No. supplement

For AC control, see page 40

For DC control:

CA 3-9 C..CA 3-16 C see page 18

CA 3-23..CA 3-72-N see page 40

<sup>6)</sup> Not permissible to CSA, UL, DEMKO and Finland

Thermal rated current  $I_{th}$   
motors at 380/415 V  
enclosed [A] AC-3 [kW]

EN ref. number  
Contactor  
Order No.

No. of aux. contacts  
Thermal overload relay [A]  
Index No.

Weight  
[g]  
1 off

Auxiliary contact: 1 n/o					
16	4	10	CA..3- 9- ...V..-10		001 310
16	5,5	10	CA..3-12- ...V..-10		002
16	7,5	10	CA..3-16- ...V..-10		003 315
30	11	10	CA..3-23- ...V..-10		004 440
30	15	10	CA..3-30- ...V..-10		005
Auxiliary contact: 1 n/c					
16	4	01	CA..3- 9- ...V..-01		006 310
16	5,5	01	CA..3-12- ...V..-01		007
16	7,5	01	CA..3-16- ...V..-01		008 315
30	11	01	CA..3-23- ...V..-01		009 440
30	15	01	CA..3-30- ...V..-01		010
Auxiliary contact: 1 n/o+1 n/c					
45	18,5	11	CA..3-37-N-...V..-11		011 990
45	22	11	CA..3-43-N-...V..-11		012
75	30	11	CA..3-60-N-...V..-11		013 1050
75	37	11	CA..3-72-N-...V..-11		014

Thermal rated current  $I_{th}$   
motors at 380/415 V  
enclosed [A] AC-3 [kW]

3-phase  
motors at  
380/415 V Thermal overload relay

AC-3 [kW]	Range [A]				
0,02	0,1 ...0,15 <sup>6)</sup>	10	CA..3- 9- ...V..-10+CT 3 K/0,15	015	460
0,04	0,15...0,23 <sup>6)</sup>	10	CA..3- 9- ...V..-10+CT 3 K/0,23	016	
0,06	0,23...0,35 <sup>6)</sup>	10	CA..3- 9- ...V..-10+CT 3 K/0,35	017	
0,09	0,12 0,35...0,55	10	CA..3- 9- ...V..-10+CT 3 K/0,55	018	
0,18	0,55...0,80	10	CA..3- 9- ...V..-10+CT 3 K/0,80	019	
0,25	0,37 0,80...1,2	10	CA..3- 9- ...V..-10+CT 3 K/1,2	020	
0,55	1,2 ...1,8	10	CA..3- 9- ...V..-10+CT 3 K/1,8	021	
0,75	1,8 ...2,7	10	CA..3- 9- ...V..-10+CT 3 K/2,7	022	
1,1	1,5 2,7 ...4	10	CA..3- 9- ...V..-10+CT 3 K/4	023	
2,2	4 ...6	10	CA..3- 9- ...V..-10+CT 3 K/6	024	
3	4 6 ...9	10	CA..3- 9- ...V..-10+CT 3 K/9	025	
5,5	9 ...12,5	10	CA..3-12- ...V..-10+CT 3 K/12,5	026	
7,5	12,5 ...17,5	10	CA..3-16- ...V..-10+CT 3 K/17,5	027	

Switching of  
3-phase motors at  
380/415 V Thermal overload relay

AC-3 [kW]	Range [A]				
0,02	0,1 ...0,16 <sup>6)</sup>	10	CA..3- 9- ...V..-10+CT 3/0,16	028	460
0,04	0,16...0,24 <sup>6)</sup>	10	CA..3- 9- ...V..-10+CT 3/0,24	029	
0,06	0,24...0,38 <sup>6)</sup>	10	CA..3- 9- ...V..-10+CT 3/0,38	030	
0,09	0,12 0,38...0,62	10	CA..3- 9- ...V..-10+CT 3/0,62	031	
0,18	0,25 0,62...1	10	CA..3- 9- ...V..-10+CT 3/1	032	
0,37	0,55 1 ...1,6	10	CA..3- 9- ...V..-10+CT 3/1,6	033	
0,75	1,6 ...2,5	10	CA..3- 9- ...V..-10+CT 3/2,5	034	
1,1	1,5 2,5 ...4	10	CA..3- 9- ...V..-10+CT 3/4	035	
2,2	3,8 ...6	10	CA..3- 9- ...V..-10+CT 3/6	036	
3	4 6 ...9,5	10	CA..3- 9- ...V..-10+CT 3/9,5	037	
5,5	8,5 ...12,5	10	CA..3-12- ...V..-10+CT 3/12,5	038	
7,5	12 ...17,5	10	CA..3-16- ...V..-10+CT 3/17,5	039	490
11	16 ...23	10	CA..3-23- ...V..-10+CT 3/23	040	620
15	23 ...32	10	CA..3-30- ...V..-10+CT 3/32	041	
18,5	32 ...42	11	CA..3-37-N-...V..-11+CT 3/42	042	1390
22	32 ...42	11	CA..3-43-N-...V..-11+CT 3/42	043	
26	40 ...52	11	CA..3-60-N-...V..-11+CT 3/52	044	1450
30	52 ...63	11	CA..3-60-N-...V..-11+CT 3/63	045	
33	37 58 ...72,5	11	CA..3-72-N-...V..-11+CT 3/72,5	046	

Dimensions see page 19

Order No. supplement

For AC control, see page 40

For DC control:

CA 3-9 C..CA 3-16 C see page 18

CA 3-23..CA 3-72-N see page 40

6) Not permissible to CSA, UL, DEMKO and Finland

7) For UL/CSA with thermal overload relay

CT 3-63 see page 20.

Arrangement  
Order No.  
Index No.

## Auxiliary Contact for CA 3

Auxiliary contact block <sup>1)</sup> for contactors CA 3	Diagram	En ref. contac-aux. contact tor block		No. of auxiliary contacts	Index No.	Weight [g] 1 off
		1	1			
		Auxiliary contact block O1				
		fitted onto CA 3-...-10	10 + 01	CA.. 3-...-V..-11	001(+)	+ 20
		supplied separately	01	CA 3-P-01	002	20
		Auxiliary contact block H 10				
		also for marking contact				
		fitted onto CA 3-...-10	10 +H10	CA.. 3-...-V..-H20	003(+)	+ 20
		supplied separately	H10	CA 3-P-H10	004	20
		Auxiliary contact block Z 01 (delayed)				
		fitted onto CA 3-...-01	01 +Z01	CA.. 3-...-V..-Z02	005(+)	+ 25
		fitted onto CA 3-...-10	10 +Z01	CA.. 3-...-V..-Z11	006(+)	
		fitted onto CA 3-...-11	11 +Z01	CA.. 3-...-V..-Z12	007(+)	
		supplied separately	Z01	CA 3-P-Z01	008	25
		Auxiliary contact block Z 10 (delayed)				
		fitted onto CA 3-...-10	10 +Z10	CA.. 3-...-V..-Z20	009(+)	+ 25
		fitted onto CA 3-...-11	11 +Z10	CA.. 3-...-V..-Z21	010(+)	
		supplied separately	Z10	CA 3-P-Z10	011	25
		Auxiliary contact block L 01 (late break)				
		fitted onto CA 3-...-01	01 +L01	CA.. 3-...-V..-L02	012(+)	+ 20
		fitted onto CA 3-...-10	10 +L01	CA.. 3-...-V..-L11	013(+)	
		fitted onto CA 3-...-11	11 +L01	CA.. 3-...-V..-L12	014(+)	
		supplied separately	L01	CA 3-P-L01	015	20
		Auxiliary contact block S 01				
		fitted onto CA 3-...-01	01 +S01	CA.. 3-...-V..-S02	016(+)	+ 20
		fitted onto CA 3-...-11	11 +S01	CA.. 3-...-V..-S12	017(+)	
		supplied separately	S01	CA 3-P-S01	018	20
		Auxiliary contact block S 10				
		fitted onto CA 3-...-01	01 +S10	CA.. 3-...-V..-S11	019(+)	+ 20
		fitted onto CA 3-...-11	11 +S10	CA.. 3-...-V..-S21	020(+)	
		supplied separately	S10	CA 3-P-S10	021	20
		Auxiliary contact block O2				
		fitted onto CA 3-...-10	10 + 02	CA.. 3-...-V..-12	022(+)	+ 30
		supplied separately	02	CA 3-P-02	023	30
		Auxiliary contact block 11				
		fitted onto CA 3-...-10	10 + 11	CA.. 3-...-V..-21	024(+)	+ 30
		supplied separately	11	CA 3-P-11	025	30
		Auxiliary contact block S 11				
		fitted onto CA 3-...-01	01 +S11	CA.. 3-...-V..-S12	026(+)	+ 30
		fitted onto CA 3-...-11	11 +S11	CA.. 3-...-V..-S22	027(+)	
		supplied separately	S11	CA 3-P-S11	028	30
		Auxiliary contact block 22				
		fitted onto CA 3-...-10	10 + 22	CA.. 3-...-V..-32	029(+)	+ 50
		supplied separately	22	CA 3-P-22	030	50
		Auxiliary contact block 31				
		fitted onto CA 3-...-10	10 + 31	CA.. 3-...-V..-41	031(+)	+ 50
		supplied separately	31	CA 3-P-31	032	50
		Auxiliary contact block S 22				
		fitted onto CA 3-...-01	01 +S22	CA.. 3-...-V..-S23	033(+)	+ 50
		fitted onto CA 3-...-11	11 +S22	CA.. 3-...-V..-S33	034(+)	
		supplied separately	S22	CA 3-P-S22	035	50
		Auxiliary contact block S 31				
		fitted onto CA 3-...-01	01 +S31	CA.. 3-...-V..-S32	036(+)	+ 50
		fitted onto CA 3-...-11	11 +S31	CA.. 3-...-V..-S42	037(+)	
		supplied separately	S31	CA 3-P-S31	038	50

Timing element CZ 3 see page 15

Mechanical latch CV see page 15

Accessories see page 22...23

<sup>1)</sup> 1-pole and 2-pole auxiliary contact blocks can be fitted on together. 1-pole and 4-pole auxiliary contact blocks or 1-pole and timing element with CA 3-23...CA 3-72-N can be fitted on together.

<sup>2)</sup> Forcibly actuated n/o and n/c contacts with respect to each other.

Arrangement  
Order No.  
Index No.

## DC-Control

### Control Relay CS 3 C complete with DC control to EN 50 011

Diagram	EN Ref.	No. of contacts	Number	Order No.	Control voltage	Index No.	Weight [g]
	04 E	4	0 4	CS 3 C-04 E-...VDC		001	570 on request
	13 E	4	1 3	CS 3 C-13 E-...VDC		002	570 on request
	22 E	4	2 2	CS 3 C-22 E-...VDC		003	570
	31 E	4	3 1	CS 3 C-31 E-...VDC		004	
	40 E	4	4 0	CS 3 C-40 E-...VDC		005	

Possible EN arrangements:  
33 Y, 42 E, 42 Y, 44 E, 44 Y, 53 E, 51 E,  
53 Y, 60 E, 62 E, 71 E, 80 E

Auxiliary contact blocks Same as for control relay CS 3 with AC control (see pages 14 and 15)

### Contactors CA 3-9 C...CA 3-16 C complete with DC control, 1 n/o auxiliary contact

Diagram	Thermal Current [A]	Three-Phase Motors [kW] 380/415 V	EN Ref.	Control voltage	Auxiliary contactor	Index No.	Weight [g]
	9	4	10	CA 3- 9 C	-...VDC-10	006	570
	12	5,5	10	CA 3-12 C	-...VDC-10	007	
	16	7,5	10	CA 3-16 C	-...VDC-10	008	
	9	4	10	CA 3- 9 C	-...VDC-01	009	570
	12	5,5	10	CA 3-12 C	-...VDC-01	010	

### Contactors CA 3-9 C-M, CA 3-16 C-M complete with DC control 4 main contacts

Diagram	Thermal Current [A]	Three-Phase Motors [kW] 380/415 V	Control voltage	Index No.	Weight [g]
	16	4	CA 3- 9 C-M40-...VDC	018	310
	16	7,5	CA 3-16 C-M40-...VDC	019	570

### Starter CA 3-9 C+CT 3 (K)...CA 3-16 C+CT 3 (K)<sup>8</sup> with DC control (see page 19)

Diagram	Switching of 3-phase motors	Thermal overload relay type setting range [A]	Auxiliary Control contact	Thermal voltage contactor	Thermal overload [A]
	see page 20	CT 3 K	CA 3- 9 C	-...VDC-10 + CT 3 K/...	012
		CT 3	CA 3- 9 C	-...VDC-10 + CT 3/...	013
	5,5	CT 3 K 9 ... 12,5	CA 3-12 C	-...VDC-10 + CT 3 K/12,5	014
		CT 3 8,5 ... 12,5	CA 3-12 C	-...VDC-10 + CT 3/12,5	015
	7,5	CT 3 K 12,5 ... 17,5	CA 3-16 C	-...VDC-10 + CT 3 K/17,5	016
		CT 3 12 ... 17,5	CA 3-16 C	-...VDC-10 + CT 3/17,5	017

Starter CA 3-23+ CT 3...CA 3-72-N+CT 3 see page 16

Diagrams see page 19

Order No. supplement for DC control voltages, see page 40

...VDC

For contactors with CV 3 latch, see page 40

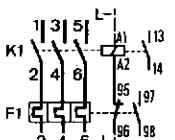
Dimensions see page 19

## Diagrams Dimensions

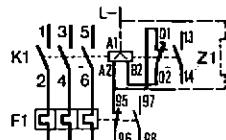
## **Direct current control**

With direct current control, there is a basic difference between

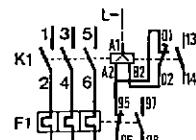
- actual direct current magnets and modified alternating current magnets.
  - Actual direct current magnets are symbolized by their high permissible frequency of operation and long life. They are thus specially suited for control relay functions.
  - Actual direct current magnet systems are available for the smaller types (CS 3 C, CA 3-9 C...CA 3-16 C). These have the same base area and fixing dimensions as their alternating current counterparts.



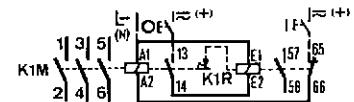
DC control  
CA 3-9 C + CT 3..  
CA 3-16 C + CT 3



**DC control**  
CA 3-23 + CT 3...  
CA 3-30 + CT 3  
**Z1 = Voltage limiting element**



**DC control**  
CA 3-37-N + CT 3...  
CA 3-72-N + CT 3  
**Voltage limiting element built in**



with CV 3 latch  
CS 3 + CV 3  
CA 3-9 + CV 3...  
CA 3-72-N + CV 3

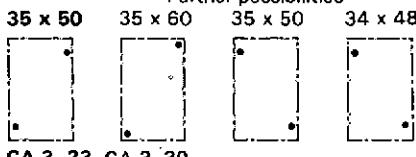
## Drilling plan

Two of the fixing holes conform to the preferred vertical distance between holes of 50 mm complying with EN 50 002/EN 50 003. The horizontal distance between fixing holes on the CS 3 control relay and the CA 3-9...CA 3-16 contactors conforms with the widely used measurement of 35 mm. Further holes permit the use of other frequently used drilling plans.

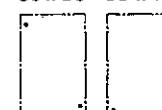
CS 3, CA 3-9...CA 3-16

### **CA 3-10**

### **Further possibilities**

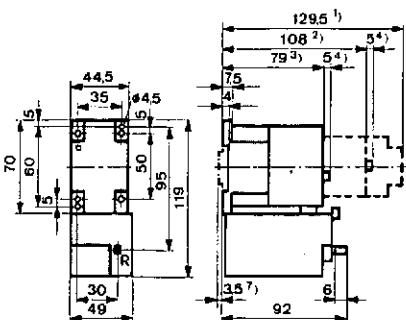


**CA 3-37-N...CA 3-72-N**

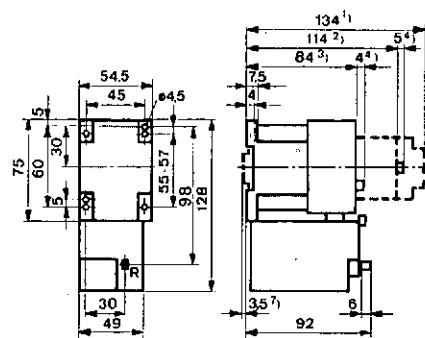
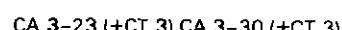


### Dimensions (mm)

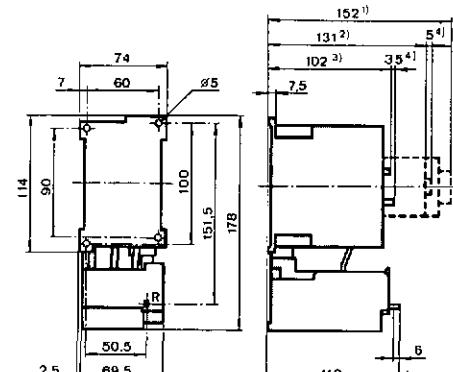
Dimensions (mm) CA 3-9 (+GT 3) CA 3-16 (+GT 3)



zu CS 3 C, CA 3-9 C., CA 3-16 C



CA 3-9 (+ CT 3 K)...CA 3-16 (+ CT 3 K)



- With timing element CZ 3 or CV 3 latch, or time delayed aux. contact.
  - With aux. contact block.
  - Basic device without added elements.
  - With marking tag carrier.
  - Reset pushbutton, 2.3 mm travel = reset.
  - Reset buttons: 3.5 mm away = reset, 6 mm away = test.
  - Possibility of mounting CTA onto mounting rail EN 50 022-35.
  - With auxiliary contact CT 3K-P-10

Arrangement  
Order No.  
Index-Nr.

## Thermal Overload Relays CT 3 K, CT 3

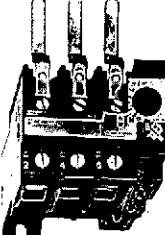
Thermal overload relay CT 3 K for fitting onto contactor CA 3 with 1 n/c (95-96)

Diagram	Type	Setting range for direct-on-line starting [A]	Setting range for star-delta contactor combinations [A]	For fitting onto contactor CA...	Order No.	Index No.	Weight [g] 1 off
	CT 3 K-12	0,1 ... 0,15 0,15...0,23 0,23...0,35 0,35...0,55 0,55...0,80 0,80...1,20 1,20...1,80 1,80...2,70 2,70...4 4 ... 6 6 ... 9 9 ... 12,50	0,17...0,26 0,26...0,40 0,40...0,61 0,61...0,95 0,95...1,40 1,40...2,10 2,10...3,10 3,10...4,70 4,70...6,90 6,90...10,40 10,4...15,60 15,6...21,60	3-9 3-16	CT 3 K-12-0,15 CT 3 K-12-0,23 CT 3 K-12-0,35 CT 3 K-12-0,55 CT 3 K-12-0,80 CT 3 K-12-1,20 CT 3 K-12-1,80 CT 3 K-12-2,70 CT 3 K-12-4 CT 3 K-12-6 CT 3 K-12-9 CT 3 K-12-12,50	001 002 003 004 005 006 007 008 009 010 011 012	130
	CT 3 K-17	12,5 ... 17,50	21,6...30,30	3-16	CT 3 K-17-17,50	013	

Auxiliary contact block CT 3 K-P-10 fitted onto Thermal overload relay CT 3 K with 1 n/o 97-98 (signalling contact)

	Auxiliary contact block CT 3 K-P-10	CT 3 K-P-10	014	15
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Thermal overload relay CT 3 for fitting onto contactor CA 3 with electrically separated tripping and signalling contacts

Diagram	Type	Setting range for direct-on-line starting [A]	Setting range for star-delta contactor combinations [A]	For fitted onto contactor CA...	Order No.	Index No.	Weight [g]
	CT 3-12	0,1 ... 0,16 0,15...0,24 0,24...0,38 0,38...0,62 0,62...1 1 ... 1,6 1,6 ... 2,5 2,5 ... 4 3,8 ... 6 6 ... 9,5 8,5 ... 12,5	0,17...0,28 0,26...0,42 0,42...0,66 0,66...1,07 1,07...1,7 1,7 ... 2,8 2,8 ... 4,3 4,3 ... 6,9 6,6 ... 10,4 10,4...16,5 14,7...21,7	3-9... 3-16	CT 3-12-0,16 CT 3-12-0,24 CT 3-12-0,38 CT 3-12-0,62 CT 3-12-1 CT 3-12-1,6 CT 3-12-2,5 CT 3-12-4 CT 3-12-6 CT 3-12-9,5 CT 3-12-12,5	015 016 017 018 019 020 021 022 023 024 025	155
	CT 3-17	12 ... 17,5	20,8...30,3	3-16... 3-30	CT 3-17-17,5	026	
	CT 3-23	16 ... 23	27,7...39,8	3-23 and 3-30	CT 3-23-23	027	180
	CT 3-32	23 ... 32	39,8...55,5	3-30	CT 3-32-32	028	
	CT 3-42	25 ... 32	43,3...55,5	3-37-N... 3-72-N	CT 3-42-32	029	380
		32 ... 42	55,5...72,5	3-37-N... 3-72-N	CT 3-42-42	030	
	CT 3-52	40 ... 52	70 ... 90	3-60-N	CT 3-52-52	031	
	CT 3-63	52 ... 63	90 ... 110	3-72-N	CT 3-63-63	032	
	CT 3-72 <sup>2)</sup>	58 ... 72,5	100 ... 125	3-72-N	CT 3-72-72,5	033	

Dimensions see page 21

<sup>2)</sup> Not permissible to CSA, UL.

**Arrangement  
Order No.  
Index No.  
Dimensions**

## **Thermal Overload Relays CTA 3 K, CTA 3**

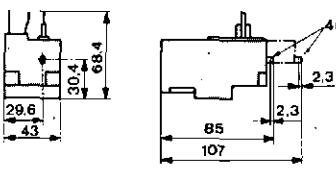
#### Thermal overload relay CTA 3 K with socket for separate mounting

Diagram	Type	Setting range direct-on-line starting [A]	For star-delta contactor combinations [A]	Order No. [A]	Index No.	Weight (g) 1 off
F1	CTA 3 K-12	0,1 ... 0,15	0,17...0,26	CTA 3 K-12-0,15	022	175
		0,15 ... 0,23	0,26...0,40	CTA 3 K-12-0,23	023	
		0,23 ... 0,35	0,40...0,61	CTA 3 K-12-0,35	024	
		0,35 ... 0,55	0,61...0,95	CTA 3 K-12-0,55	025	
		0,55 ... 0,80	0,95...1,40	CTA 3 K-12-0,80	026	
		0,80 ... 1,20	1,40...2,10	CTA 3 K-12-1,20	027	
		1,20 ... 1,80	2,10...3,10	CTA 3 K-12-1,80	028	
		1,80 ... 2,70	3,10...4,70	CTA 3 K-12-2,70	029	
		2,70 ... 4	4,70...6,90	CTA 3 K-12-4	030	
		4 ... 6	6,90...10,40	CTA 3 K-12-6	031	
		6 ... 9	10,4...15,60	CTA 3 K-12-9	032	
		9 ... 12,50	15,6...21,60	CTA 3 K-12-12,50	033	
	CTA 3 K-17	12,5 ... 17,50	21,6...30,30	CTA 3 K-17-17,50	034	

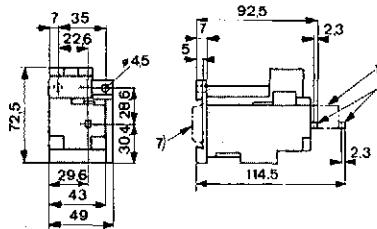
#### **Thermal overload relay CTA 3 with socket for separate mounting**

### **Dimensions [mm]**

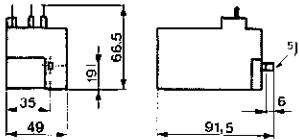
### **CT 3 K-12 and CT 3 K-17**



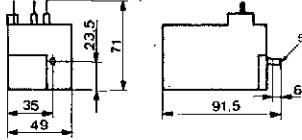
CTA 3 K-12 and CTA 3 K-17



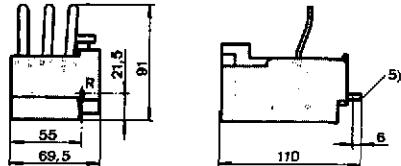
CT 3-12 and CT 3-17



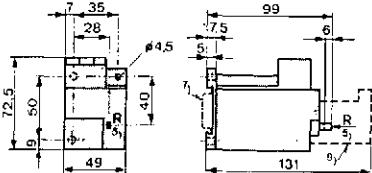
CT 3-23 and CT 3-32



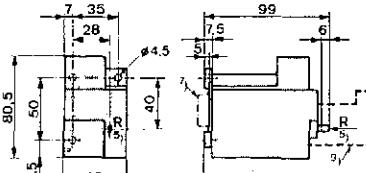
CT 3-42,.. CT 3-72



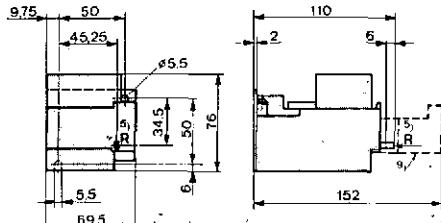
CTA 3-12 and CTA 3-17



CTA 3-23 and CTA 3-32



CTA 3-42...CTA 3-72



<sup>1)</sup> Not permissible to CSA, UL, DEMKO and Finland.

<sup>2)</sup> Not permissible to CSA, UL.

**4) Reset pushbutton, 2.3 mm travel = reset.**

5) Reset buttons: 3.5 mm away = reset, 6 mm away = test.

7) Possibility of mounting CTA onto mounting rail EN 50 022-35.

18) With reset Magnet CMR 3.

10) With auxiliary contact CT 3 K-P-10.

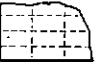
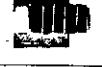
## Accessories, Enclosures

Accessories		Order No.	Index No.	Weight [g]	
	<b>Coils for alternating current see page 40 for normal control voltages</b>				
	to CS 3, CA 3-9, CA 3-12, CA 3-16	22.122.304-...V..	001	60	
	to CA 3-23, CA 3-30	22.601.304-...V..	002	65	
	to CA 3-37-N...CA 3-72-N	22.701.323-...V..	003	120	
	for reset magnet CMR 3	25.943.321-...V..	005	40	
	for latch CV 3	25.943.321-...V..	006		
	<b>for alternating current, special control voltages</b>				
	to CS 3, CA 3-9, CA 3-12, CA 3-16	22.122.304-...V..	007	60	
	to CA 3-23, CA 3-30	22.601.304-...V..	008	65	
	to CA 3-37-N...CA 3-72-N	22.701.323-...V..	009	120	
	for reset magnet CMR 3	25.943.321-...V..	011	40	
	for latch CV 3	25.943.321-...V..	012		
	<b>for direct current, normal control voltages see page 40</b>				
	to CS 3 C, CA 3-9 C, CA 3-12 C, CA 3-16 C	22.501.304-...VDC	013	200	
	to CA 3-23, CA 3-30	22.601.305-...VDC	014	66	
	to CA 3-37-N...CA 3-72-N	22.701.324-...VDC	015	110	
	for reset magnet CMR 3	25.943.321-...VDC	018	40	
	for latch CV 3	25.943.321-...VDC	018		
	<b>for direct current, special control voltages</b>				
	to CS 3 C, CA 3-9 C, CA 3-12 C, 3-16 C	22.501.304-...VDC	019	200	
	to CA 3-23, CA 3-30	22.601.305-...VDC	020	66	
	to CA 3-37-N...CA 3-72-N	22.701.324-...VDC	021	110	
	for reset magnet CMR 3	25.943.321-...VDC	023	40	
	for latch CV 3	25.943.321-...VDC	024		
	<b>Protection links snap-on attachment to con. CA 3-9...CA 3-72-N</b>				
	for contact wiring protection				
	<b>RC link CRC 3</b> DC 24...240 V	25.946.111-04	025	20	
	For limitation of over voltages (surge voltages) with coil disconnection (see page 50)				
	<b>RC link CRC 3</b>				
	24 V... 48 V 50/60 Hz	25.946.111-01	026	20	
	110 V...280 V 50/60 Hz	25.946.111-02	027		
	380 V...480 V 50/60 Hz	25.946.111-03	028		
	<b>Diode link CRD 3</b> DC 12...250 V	25.946.112-01	029		
	<b>Varistor link CRV 3</b> DC 24 V	25.946.113-01	030		
	DC 36... 48 V	25.946.113-02	031		
	DC 110...150 V	25.946.113-03	032		
	DC 220...250 V	25.946.113-04	033		
	<b>Reset magnet CMR 3-1</b>	25.947.105-...V..	034	78	
	for thermal overload relays CT 3-12...CT 3-32				
	<b>Reset magnet CMR 3-2</b>	25.947.103-...V..	035	80	
	for thermal overload relays CT 3-42...CT 3-72				
	Order No. supplement for control voltages, see page 40	...V..			
	Only operate with early make/late break contact in series				
	<b>Reset rod</b>				
	for extending reset button:				
	on thermal overload CT 3-12...32	300 mm long	25.947.102-01	036	20
	relays	500 mm long	25.947.102-02	037	30
	on thermal overload CT 3-42...72-N	300 mm long	25.947.102-03	038	20
	relays	500 mm long	25.947.102-04	039	30
	The reset rod can be easily shortened				
	<b>Mechanical interlock CM 3</b>				
	For contactors CA 3-12...CA 3-72-N	22.143.101-01	040	20	
	<b>Neutral link 10 mm<sup>2</sup></b>				
	with insulated part for sliding onto contactor	25.945.105-01	041	20	
	<b>Neutral link 16 mm<sup>2</sup></b>				
	with insulated part for sliding onto contactor	25.945.105-02	042	28	
	<b>Neutral link 10 mm<sup>2</sup></b>				
	without insulated part for mounting in enclosures KS 3-2	25.945.201-01	043	16	
	<b>Neutral link 6 mm<sup>2</sup></b>				
	Pluggable onto enclosure base plate KS 3-1	22.141.203-03	044	7	
	or onto earthing (grounding) bracket				
	<b>Earthing (grounding) bracket</b>				
	for fitting onto perforated plates	22.141.202-01	045	14	
	<b>Main current terminals CA 3-P-K..</b>				
	10 mm <sup>2</sup> 1-pole for CA 3- 9...CA 3-16 contactors	25.945.101-01	046	7	
	25 mm <sup>2</sup> 1-pole for CA 3-23 and CA 3-30 contactors	25.945.102-01	047	17	
	<b>Dovetail Joint 6 and 16 mm</b>				
	for the connection of contactors to contactor combinations for mean distance between centres of 50 or 60 mm	25.944.201-03	048	2	
	<b>Protection cover</b>				
	for main contact to CA 3-37-N...CA 3-72-N	22.701.209-01	049		

# Accessories

## Enclosures

Arrangement  
Order No.  
Index No.

Accessories	Order No.	Index No.	Weight [g]
	<b>Double spade connector 2 x 6.3 x 0.8</b> <b>Single spade connector 1 x 6.3 x 0.8</b> for fitting to the main contacts, auxiliary contacts and coil connections can also be used as a soldering terminal	<b>22.115.249-01</b> <b>25.945.207-01</b>	(100 pces) 001 1.5 (100 pces) 002 1
	<b>Connecting bridge</b> for the parallel connection of the 3 main terminals (e.g., for the operation as a single-phase contactor) For contactors CA 3-12 and CA 3-16 For contactors CA 3-23 and CA 3-30	<b>22.141.209-01</b> <b>22.601.209-01</b>	003 15 004 30
	<b>Upper part of contactor with contacts</b> to CA 3-23-10 CA 3-23-01 CA 3-30-10 CA 3-30-01 CA 3-37-N-11 CA 3-43-N-11 CA 3-60-N-11 CA 3-72-N-11	<b>22.601.231-02</b> <b>22.601.233-02</b> <b>22.601.232-02</b> <b>22.601.234-02</b> <b>22.701.214-01</b> <b>22.701.215-01</b> <b>22.701.216-01</b> <b>22.701.217-01</b>	005 140 006 007 008 009 480 010 011 012
	<b>Label sheet</b> with 105 self-adhesive paper labels	<b>22.145.223-01</b>	016 -
	<b>Marking tag sheet</b> perforated, with 160 paper tags	<b>22.145.203-01</b>	017 -
	<b>Transparent cover</b> (in packets of 100) for paper tags	<b>22.145.202-01</b>	018 -
	<b>Tag carrier</b> (in packets of 100) for marking with clip-on tags (see catalogue 19 00)	<b>22.145.201-01</b>	019 1
	<b>Enclosure KS 3-1</b> (for CA 3+CT 3) Protection class from grey plastic with earthing (grounding) terminal (DIN 40050)		
	Without push buttons IP 42	<b>KS 3-1 F</b>	020 280
	IP 65	<b>KS 3-1 FZ</b>	021
	With reset buttons IP 42	<b>KS 3-1 K</b>	022 290
	IP 65	<b>KS 3-1 KZ</b>	023 300
	With START-STOP-buttons IP 42	<b>KS 3-1 D</b>	024 290
	STOP-button also reset button IP 65	<b>KS 3-1 DZ</b>	025
	With maintained contact control IP 42	<b>KS 3-1 P</b>	026 300
	IP 65	<b>KS 3-1 PZ</b>	027
	<b>Enclosure KS 3-2</b> Protection class from grey plastic with earthing (grounding) terminal (DIN 40 050)		
	Without push buttons IP 65	<b>KS 3-2 FZ</b>	028 500
	With reset buttons IP 65	<b>KS 3-2 KZ</b>	029 520
	With START-STOP-buttons STOP-button also reset button IP 65	<b>KS 3-2 DZ</b>	030
	With maintained contact control IP 65	<b>KS 3-2 PZ</b>	031
<b>Dimensions to enclosures KS 3-1, enclosures KS 3-2 see page 24, 25</b>			

### Spade connectors

Order No. see Accessories

All devices and accessories with terminals up to 2 x 4 mm<sup>2</sup> can be fitted with removable spade connectors

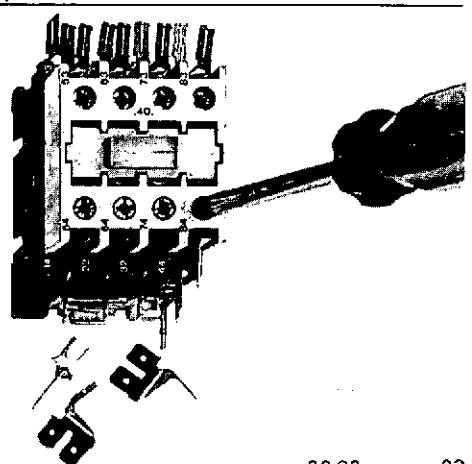
**Control relay CS 3, CS 3 C**  
(Main- and auxiliary contacts, coil connections)

**Contactor CA 3-9...CA 3-16, CA 3-9 C...**  
**CA 3-16 C**  
(Main- and auxiliary contactors and coil connections)

**Thermal overload relay CT 3-12 and CT 3-17**  
(Main- and auxiliary contacts)

**Auxiliary contact blocks CS 3-P and CA 3-P**  
**Timing elements CZ 3**  
**Mechanical latch CV 3**

**Contactor CA 3-23...CA 3-72-N**  
Auxiliary contacts and coil connections



Arrangement  
Order No.  
Index No.  
Diagrams, Dimensions

## Compact Starter CA 3 K

### Compact Starter CA-3 K

Contactor CA 3 K + thermal overload relay CT 3 K

for impulse contact control  
in enclosure KS 3-1 K  
with earthing (grounding) terminal  
and recessed pushbuttons



Rated thermal current $I_{th}$	Three-phase motors at 380/415 V current	Thermal rated current $I_{th}$	Order No.	Control voltage [V]	Thermal overload relay [A]	Weight [g]
						Index No. 1 off
with O pushbutton (OFF/reset) IP 42						
16	4	9	CAK ..3- 9...V..+GT 3 K..		001	775
16	5,5	12	CAK ..3-12...V..+GT 3 K..		002	
16	7,5	16	CAK ..3-16...V..+GT 3 K..		003	
with O pushbutton (OFF/reset) IP 65						
16	4	9	CAKZ ..3- 9...V..+GT 3 K..		004	785
16	5,5	12	CAKZ ..3-12...V..+GT 3 K..		005	
16	7,5	16	CAKZ ..3-16...V..+GT 3 K..		006	

### Compact Starter CA-3 K

Contactor CA 3 + thermal overload relay CT 3 K

for impulse contact control in enclosure KS 3-1 K/D  
with earthing (grounding) terminal  
and recessed pushbuttons



Impulse contact control with START-STOP-buttons IP 42						
16	4	9	CAAD ..3- 9...V..+GT 3 K..		007	795
16	5,5	12	CAAD ..3-12...V..+GT 3 K..		008	
16	7,5	16	CAAD ..3-16...V..+GT 3 K..		009	
Impulse contact control with START-STOP-buttons IP 65						
16	4	9	CAADZ ..3- 9...V..+GT 3 K..		010	807
16	5,5	12	CAADZ ..3-12...V..+GT 3 K..		011	
16	7,5	16	CAADZ ..3-16...V..+GT 3 K..		012	

### Order No. supplement

For recessed START and raised STOP pushbutton

..SR

013

For additional neutral link

..N

014

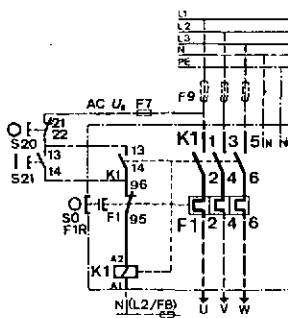
For thermal overload relay setting range (see page 47)

l<sub>oo</sub>

### Diagrams

#### CAK 3 + CT 3 K

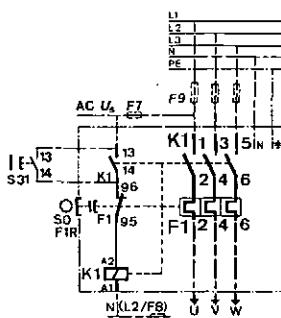
impulse contact control  
remote ON/OFF



- remote ON pushbutton S21
- remote OFF pushbutton S20
- local OFF pushbutton doubles as relay reset pushbutton SO/F1R

#### CAK 3 + CT 3 K

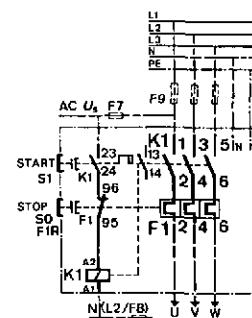
impulse contact control  
remote ON, local OFF



- remote ON pushbutton S31
- local OFF pushbutton doubles as relay reset pushbutton SO/F1R

#### CAD 3 + CT 3 K

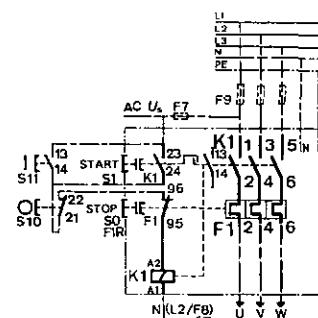
impulse contact control  
local ON/OFF



- local ON pushbutton S1
- local OFF pushbutton doubles as relay reset pushbutton SO/F1R

#### CAD 3 + CT 3 K

impulse contact control local,  
with additional remote ON/OFF



- remote ON pushbutton S11
- remote OFF pushbutton S10
- local ON pushbutton S1
- local OFF pushbutton doubles as relay reset pushbutton SO/F1R

Dimensions see page 25

**Arrangement**  
**Order No.**  
**Index No.**  
**Dimensiones**

## Starters in Enclosures

### Starters CA 3 + CT 3

3 main cont.  
in enclosure KS 3-1  
with earthing (grounding) terminal  
and recessed pushbuttons



Rated thermal current $I_{th}$	Three-phase motors at 380/415 V encapsula. [A] AC-3 [kW]	Order No.	Control voltage	Thermal overload relay [A]	Weight [g]
				Index No.	1 off
without buttons					
IP 42					
16	4	CAF ..3- 9...V.. + CT 3/..		001	790
16	5,5	CAF ..3-12...V.. + CT 3/..		002	
16	7,5	CAF ..3-16...V.. + CT 3/..		003	795
without buttons					
IP 65					
16	4	CAFZ..3- 9...V.. + CT 3/..		004	790
16	5,5	CAFZ..3-12...V.. + CT 3/..		005	
16	7,5	CAFZ..3-16...V.. + CT 3/..		006	795
with reset button (blue)					
IP 65					
16	4	CAKZ..3- 9...V.. + CT 3/..		007	800
16	5,5	CAKZ..3-12...V.. + CT 3/..		008	
16	7,5	CAKZ..3-16...V.. + CT 3/..		009	805
with START-STOP-buttons (with maintained contact control)					
IP 65					
16	4	CAPZ..3- 9...V.. + CT 3/..		010	820
16	5,5	CAPZ..3-12...V.. + CT 3/..		011	
16	7,5	CAPZ..3-16...V.. + CT 3/..		012	825
<b>Order No. supplement</b>					
For recessed START and raised STOP pushbutton		..SR		013	
For additional neutral link		..N		014	
For thermal overload relay setting range (see page 49)		/..			

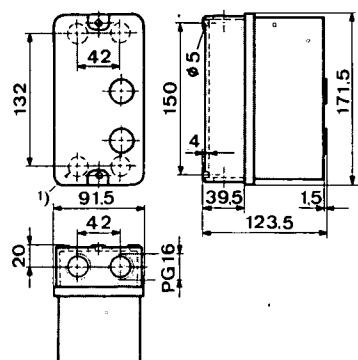
### Starters CA 3 + CT 3 3 main cont. in enclosure KS 3-2 with earthing (grounding) terminal and recessed pushbuttons



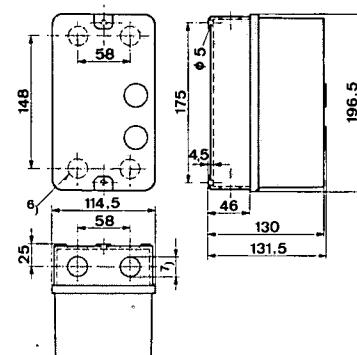
without buttons					
IP 65					
30	11	CAFZ..3-23...V.. + CT 3/..		015	940
30	15	CAFZ..3-30...V.. + CT 3/..		016	
with rest buttons (blue)					
IP 65					
30	11	CAKZ..3-23...V.. + CT 3/..		017	960
30	15	CAKZ..3-30...V.. + CT 3/..		018	
with START-STOP-buttons (with maintained contact control)					
IP 65					
30	11	CAPZ..3-23...V.. + CT 3/..		019	970
30	15	CAPZ..3-30...V.. + CT 3/..		020	
with START-STOP-buttons (with impulse contact control)					
IP 65					
30	11	CADZ..3-23...V.. + CT 3/..		021	970
30	15	CADZ..3-30...V.. + CT 3/..		022	
<b>Order No. supplement</b>					
For recessed START and raised STOP pushbutton		..SR		023	
For additional neutral link		..N		024	
For thermal overload relay setting range (see page 49)		/..			

### Dimensions [mm]

#### Single enclosure KS 3-1 and KS 3-1 K/D



#### Single enclosure KS 3-2



<sup>1)</sup> 4 20 mm dia. knockouts.

<sup>2)</sup> 4 23/29 mm dia. knockouts.

Arrangement  
Order No.  
Index No.  
Dimensions

## Reversing Contactors CAU (M) 3

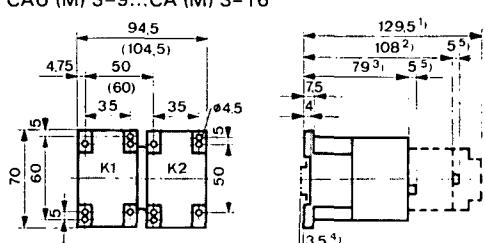
### Reversing contactor CAU 3

Contactor combination from 2 contactors with main and control connections, and electrical interlock

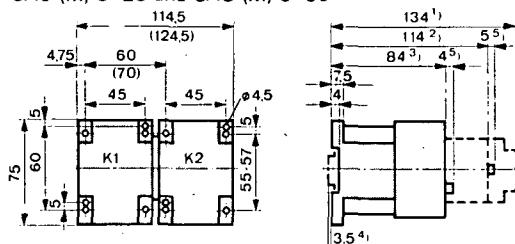
Arrangement Contactors Type	Switching of 3-phase motors at 380/415 V AC-3 [kW]	Order No.	Control voltage	Method control (aux. contact)	Weight {g} 1 off
				Index No.	
<b>For maintained contact control</b>					
CA 3- 9	4	CAU..3- 9-	...V..-01 P	001	710
CA 3-12	5,5	CAU..3-12-	...V..-01 P	002	
CA 3-16	7,5	CAU..3-16-	...V..-01 P	003	720
CA 3-23	11	CAU..3-23-	...V..-01 P	004	1050
CA 3-30	15	CAU..3-30-	...V..-01 P	005	
Free auxiliary contacts: each one 1 n/o (13-14)					
CA 3-37-N	18,5	CAU..3-37-N-	...V..-11 P	006	2000
CA 3-43-N	22	CAU..3-43-N-	...V..-11 P	007	
CA 3-60-N	30	CAU..3-60-N-	...V..-11 P	008	2050
CA 3-72-N	37	CAU..3-72-N-	...V..-11 P	009	
<b>For impulse contact control</b>					
CA 3- 9	4	CAU..3- 9-	...V..-11 D	010	760
CA 3-12	5,5	CAU..3-12-	...V..-11 D	011	
CA 3-16	7,5	CAU..3-16-	...V..-11 D	012	770
CA 3-23	11	CAU..3-23-	...V..-11 D	013	1075
CA 3-30	15	CAU..3-30-	...V..-11 D	014	
CA 3-37-N	18,5	CAU..3-37-N-	...V..-11 D	015	2030
CA 3-43-N	22	CAU..3-43-N-	...V..-11 D	016	
CA 3-60-N	30	CAU..3-60-N-	...V..-11 D	017	2070
CA 3-72-N	37	CAU..3-72-N-	...V..-11 D	018	
<b>For maintained contact control with momentary changeover with electrical interlock delayed</b>					
Free auxiliary contacts per contactor 1 n/o (13-14)					
CA 3- 9	4	CAU..3- 9-	...V..-Z 11 P	019	760
CA 3-12	5,5	CAU..3-12-	...V..-Z 11 P	020	
CA 3-16	7,5	CAU..3-16-	...V..-Z 11 P	021	770
CA 3-23	11	CAU..3-23-	...V..-Z 11 P	022	1075
CA 3-30	15	CAU..3-30-	...V..-Z 11 P	023	
Free auxiliary contacts: each one 1 n/o + 1 n/c					
CA 3-37-N	18,5	CAU..3-37-N-	...V..-Z 12 P	024	1100
CA 3-43-N	22	CAU..3-43-N-	...V..-Z 12 P	025	
CA 3-60-N	30	CAU..3-60-N-	...V..-Z 12 P	026	2050
CA 3-72-N	37	CAU..3-72-N-	...V..-Z 12 P	027	
<b>Order number supplement</b>					
For mechanical interlock		CAU..3-..			
For AC control, see page 40		M		028 (+)	+20
For DC control:	CA 3-9 C...CA 3-16 C see page 18		...V..		
	CA 3-23...CA 3-72-N see page 40		...VDC		
<b>Additional auxiliary contacts see page 38</b>					

### Dimensions {mm}

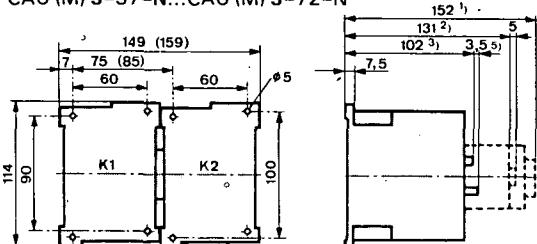
CAU (M) 3-9...CAU (M) 3-16



CAU (M) 3-23 and CAU (M) 3-30



CAU (M) 3-37-N...CAU (M) 3-72-N



Dimensions in () with mechanical interlock

1) Time delayed auxiliary contact.

2) With auxiliary contact block.

3) Basic device without added elements.

4) Fixing possibility onto mounting rail

EN 50 022-35 for CA 3-9...CA 3-30.

5) With marking tag carrier.

Arrangement  
Order No.  
Index No.  
Dimensions

## Reversing Starters CAU (M) 3 + CT 3

with Fitted Thermal Overload Relay  
Electrical (and Mechanical) Interlock

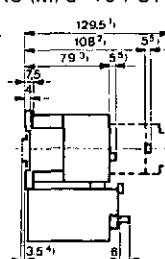
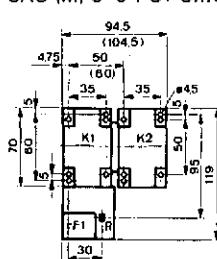
### Reversing starter CAU 3 + CT 3

Contactor combination from 2 contactors, 1 thermal overload relay  
with main and control connections  
and electrical interlock

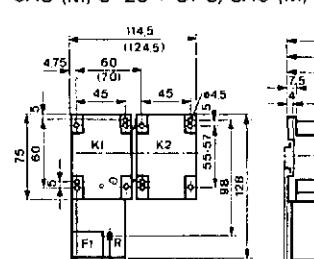
Arrangement Contactors Type	Switching of motors at 380/415 V AC-3 (kW)	Thermal overload relay Type	Setting range [A]	Order No.	Control voltage	Method of control (aux. con.)	Thermal overload relay [A]	Index No.	Weight [g] 1 off
<b>For maintained contact control</b>									
CA 3- 9	4	CT 3 K 6	...9 <sup>a</sup> )	CAU..3- 9-	...V..-01	P+CT 3 K/9	001	860	
		CT 3	6 ...9,5 <sup>a</sup> )	CAU..3- 9-	...V..-01	P+CT 3/9,5	002		
CA 3-12	5,5	CT 3 K 9	...12,5	CAU..3-12-	...V..-01	P+CT 3 K/12,5	003		
		CT 3	8,5 ...12,5	CAU..3-12-	...V..-01	P+CT 3/12,5	004		
CA 3-16	7,5	CT 3 K 12,5...17,5		CAU..3-16-	...V..-01	P+CT 3 K/17,5	005		
		CT 3	12 ...17,5	CAU..3-16-	...V..-01	P+CT 3/17,5	006		
CA 3-23	11	CT 3	16 ...23	CAU..3-23-	...V..-01	P+CT 3/23	007	1130	
CA 3-30	15	CT 3	23 ...32	CAU..3-30-	...V..-01	P+CT 3/32	008		
Free auxiliary contacts per contactor 1 n/o (13-14)									
CA 3-37-N	18,5	CT 3	32 ...42 <sup>a</sup> )	CAU..3-37-N-...V..-11	P+CT 3/42	009	2400		
CA 3-43-N	22	CT 3	32 ...42 <sup>a</sup> )	CAU..3-43-N-...V..-11	P+CT 3/42	010			
CA 3-60-N	30	CT 3	40 ...52 <sup>a</sup> )	CAU..3-60-N-...V..-11	P+CT 3/52	011	2450		
CA 3-72-N	37	CT 3	58 ...72,5 <sup>a</sup> ) <sup>7)</sup>	CAU..3-72-N-...V..-11	P+CT 3/72,5	012			
<b>For impulse contact control</b>									
CA 3- 9	4	CT 3 K 6	...9 <sup>a</sup> )	CAU..3- 9-	...V..-11	D+CT 3 K/9	013	860	
		CT 3	6 ...9,5 <sup>a</sup> )	CAU..3- 9-	...V..-11	D+CT 3/9,5	014		
CA 3-12	5,5	CT 3 K 9	...12,5	CAU..3-12-	...V..-11	D+CT 3 K/12,5	015	910	
		CT 3	8,5 ...12,5	CAU..3-12-	...V..-11	D+CT 3/12,5	016		
CA 3-16	7,5	CT 3 K 12,5...17,5		CAU..3-16-	...V..-11	D+CT 3 K/17,5	017	920	
		CT 3	12 ...17,5	CAU..3-16-	...V..-11	D+CT 3/17,5	018		
CA 3-23	11	CT 3	16 ...23	CAU..3-23-	...V..-11	D+CT 3/23	019	1170	
CA 3-30	15	CT 3	23 ...32	CAU..3-30-	...V..-11	D+CT 3/32	020		
CA 3-37-N	18,5	CT 3	32 ...42 <sup>a</sup> )	CAU..3-37-N-...V..-11	D+CT 3/42	021	2430		
CA 3-43-N	22	CT 3	32 ...42 <sup>a</sup> )	CAU..3-43-N-...V..-11	D+CT 3/42	022			
CA 3-60-N	30	CT 3	40 ...52 <sup>a</sup> )	CAU..3-60-N-...V..-11	D+CT 3/52	023	2470		
CA 3-72-N	37	CT 3	58 ...72,5 <sup>a</sup> ) <sup>7)</sup>	CAU..3-72-N-...V..-11	D+CT 3/72,5	024			
<b>For maintained contact control with momentary changeover with electrical interlock delayed</b>									
Free auxiliary contacts per contactor 1 n/o (13-14)									
CA 3- 9	4	CT 3 K 6	...9 <sup>a</sup> )	CAU..3- 9-	...V..-Z 11	+CT 3 K/9	025	860	
		CT 3	6 ...9,5 <sup>a</sup> )	CAU..3- 9-	...V..-Z 11	+CT 3/9,5	026		
CA 3-12	5,5	CT 3 K 9	...12,5	CAU..3-12-	...V..-Z 11	+CT 3 K/12,5	027	910	
		CT 3	8,5 ...12,5	CAU..3-12-	...V..-Z 11	+CT 3/12,5	028		
CA 3-16	7,5	CT 3 K 12,5...17,5		CAU..3-16-	...V..-Z 11	+CT 3 K/17,5	029	920	
		CT 3	12 ...17,5	CAU..3-16-	...V..-Z 11	+CT 3/17,5	030		
CA 3-23	11	CT 3	16 ...23	CAU..3-23-	...V..-Z 11	+CT 3/23	031	1170	
CA 3-30	15	CT 3	23 ...32	CAU..3-30-	...V..-Z 11	+CT 3/32	032		
Free auxiliary contacts per contactor 1 n/o + 1 n/c									
CA 3-37-N	18,5	CT 3	32 ...42 <sup>a</sup> )	CAU..3-37-N-...V..-Z 12	+CT 3/42	033	2450		
CA 3-43-N	22	CT 3	32 ...42 <sup>a</sup> )	CAU..3-43-N-...V..-Z 12	+CT 3/42	034			
CA 3-60-N	30	CT 3	40 ...52 <sup>a</sup> )	CAU..3-60-N-...V..-Z 12	+CT 3/52	035	2500		
CA 3-72-N	37	CT 3	58 ...72,5 <sup>a</sup> ) <sup>7)</sup>	CAU..3-72-N-...V..-Z 12	+CT 3/72,5	036			
<b>Order No. addition</b>									
For mechanical interlock									
M									
For AC control, see page 40									
...V..									
For DC control:									
CA 3-9 C...CA 3-16 C see page 18									
...VDC									
CA 3-23...CA 3-72-N see page 40									
...VDC									
<b>Additional auxiliary contacts see page 38</b>									

### Dimensions (mm)

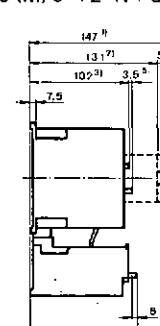
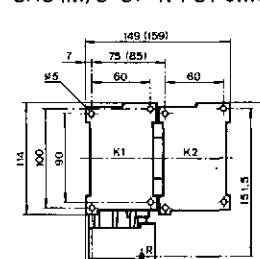
CAU (M) 3-9 + CT 3...CAU (M) 3-16 + CT 3



CAU (M) 3-23 + CT 3, CAU (M) 3-30 + CT 3



CAU (M)



Dimensions in () with mechanical interlock

<sup>1)</sup> Time delayed auxiliary contact.  
<sup>2)</sup> With auxiliary contact block.  
<sup>3)</sup> Basic device without added elements.

<sup>4)</sup> Fixing possibility onto mounting rail  
EN 50 022-35 for CA 3-12...CA 3-30  
EN 50 022-35.

<sup>5)</sup> With marking tag carrier.  
<sup>6)</sup> Further setting ranges (see page 20).  
<sup>7)</sup> For UL/CSA with thermal overload relay CT 3-63 (see page 20).

## Two-Step Contactors CA II W 3

(without Thermal Overload Relays)

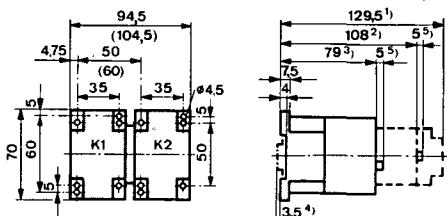
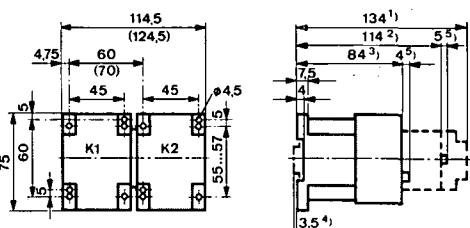
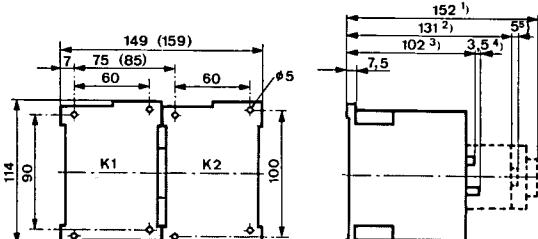
Arrangement  
Order No.  
Index No.  
Dimensions

**Two-step contactor CA II W 3**For motors with 2 separate windings<sup>1)</sup>  
2 speeds, 1 direction of rotation.

Arrangement Contactors Type	Switching of 3-phase motors at 380/415 V AC-3 [kW]	Order No.	Control voltage	Method of control	Weight [g] 1 off
<b>For maintained contact control</b>					
CA 3- 9	4	CA II W..3- 9- ...V..-01 P		001	620
CA 3-12	5,5	CA II W..3-12- ...V..-01 P		002	
CA 3-16	7,5	CA II W..3-16- ...V..-01 P		003	
CA 3-23	11	CA II W..3-23- ...V..-01 P		004	880
CA 3-30	15	CA II W..3-30- ...V..-01 P		005	
Spare contacts: 1 n/o per contactor					
CA 3-37-N	18,5	CA II W..3-37-N-...V..-11 P		006	1980
CA 3-43-N	22	CA II W..3-43-N-...V..-11 P		007	
CA 3-60-N	30	CA II W..3-60-N-...V..-11 P		008	2100
CA 3-72-N	37	CA II W..3-72-N-...V..-11 P		009	
<b>For impulse contact control</b>					
CA 3- 9	4	CA II W..3- 9- ...V..-11 D		010	660
CA 3-12	5,5	CA II W..3-12- ...V..-11 D		011	
CA 3-16	7,5	CA II W..3-16- ...V..-11 D		012	
CA 3-23	11	CA II W..3-23- ...V..-11 D		013	920
CA 3-30	15	CA II W..3-30- ...V..-11 D		014	
CA 3-37-N	18,5	CA II W..3-37-N-...V..-11 D		015	2030
CA 3-43-N	22	CA II W..3-43-N-...V..-11 D		016	
CA 3-60-N	30	CA II W..3-60-N-...V..-11 D		017	2150
CA 3-72-N	37	CA II W..3-72-N-...V..-11 D		018	

**Order No. supplement**

For mechanical interlock between stage 1 and network contactor	CA II W..3-	M	019 (+)	+ 20
For AC control, see page 40		...V..		
For DC control:	CA 3-9 C...CA 3-16 C see page 18	...VDC		
	CA 3-23...CA 3-72-N see page 40	...VDC		

**Additional auxiliary contacts see page 38****Dimensions [mm]****CA II W (M) 3-9...CA II W (M) 3-16****CA II W (M) 3-23, CA II W (M) 3-30****CA II W (M) 3-37-N...CA II W (M) 3-72-N**

Dimensions in () with mechanical interlock

<sup>1)</sup> Time delayed auxiliary contact.<sup>2)</sup> With auxiliary contact block.<sup>3)</sup> Basic device without added elements.<sup>4)</sup> Fixing possibility onto mounting rail  
EN 50-022-35 for CA 3-9...3-30<sup>5)</sup> With marking tag carrier.<sup>11)</sup> 2 rotational speeds with similar torques, 1 direction of rotation. On request: Dahlander connection Y/YY, 2 speeds, higher speed with higher torque (ventilator and pump drivers).

Arrangement  
Order No.  
Index No.  
Dimensions

## Two-Step Starter CA II W 3 + CT 3 + CT 3 (with 2 fitted Thermal Overload Relays)

**Two-step starter CA II W 3 + CT 3 + CT 3**  
For motors with 2 separate windings  
2 speeds, 1 direction of rotation.

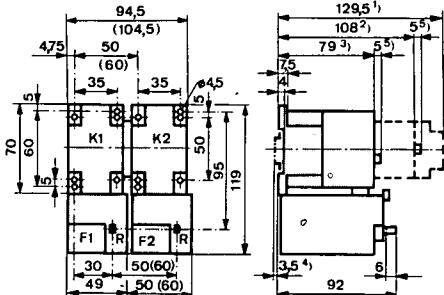
Contactor combinations consisting of 2 contactors, 2 thermal overload relays with main and control wiring and electrical interlock.

Arrange- ment Contactors Type	Switching of 3-phase motors at 380/415 V 2 thermal overload relays AC-3 [kW] Type setting range [A] Order No.	Control voltage Method of control	Thermal overload relay F 1 [A] F 2 [A]	Index No.	Weight [g] 1 off
<b>For maintained contact control</b>					
CA 3- 9 4	CT 3 K 6 ...9°) CT 3 6 ...9,5°)	CA II W..3- 9- ...V..-01 P+CT 3 K/9 CA II W..3- 9- ...V..-01 P+CT 3/9,5	+ CT 3 K/9 + CT 3/9,5	001 002	930
CA 3-12 5,5	CT 3 K 9 ...12,5 CT 3 8,5 ...12,5	CA II W..3-12- ...V..-01 P+CT 3 K/12,5 CA II W..3-12- ...V..-01 P+CT 3/12,5	+ CT 3 K/12,5 + CT 3/12,5	003 004	
CA 3-16 7,5	CT 3 K 12,5...17,5 CT 3 12 ...17,5	CA II W..3-16- ...V..-01 P+CT 3 K/17,5 CA II W..3-16- ...V..-01 P+CT 3/17,5	+ CT 3 K/17,5 + CT 3/17,5	005 006	
CA 3-23 11	CT 3 16 ...23	CA II W..3-23- ...V..-01 P+CT 3/23	+ CT 3/23	007	1240
CA 3-30 15	CT 3 23 ...32	CA II W..3-30- ...V..-01 P+CT 3/32	+ CT 3/32	008	
Spare contacts: 1 n/o per contactor					
CA 3-37-N 18,5	CT 3 32 ...42°)	CA II W..3-37-N-...V..-11 P+CT 3/42	+ CT 3/42	009	2780
CA 3-43-N 22	CT 3 32 ...42°)	CA II W..3-43-N-...V..-11 P+CT 3/42	+ CT 3/42	010	
CA 3-60-N 30	CT 3 40 ...52°)	CA II W..3-60-N-...V..-11 P+CT 3/52	+ CT 3/52	011	2900
CA 3-72-N 37	CT 3 58 ...72,5°)	CA II W..3-72-N-...V..-11 P+CT 3/72,5	+ CT 3/72,5	012	
<b>For impulse contact control</b>					
CA 3- 9 4	CT 3 K 6 ...9°) CT 3 6 ...9,5°)	CA II W..3- 9- ...V..-11 D+CT 3 K/9 CA II W..3- 9- ...V..-11 D+CT 3/9,5	+ CT 3 K/9 + CT 3/9,5	013 014	950
CA 3-12 5,5	CT 3 K 9 ...12,5 CT 3 8,5 ...12,5	CA II W..3-12- ...V..-11 D+CT 3 K/12,5 CA II W..3-12- ...V..-11 D+CT 3/12,5	+ CT 3 K/12,5 + CT 3/12,5	015 016	
CA 3-16 7,5	CT 3 K 12,5...17,5 CT 3 12 ...17,5	CA II W..3-16- ...V..-11 D+CT 3 K/17,5 CA II W..3-16- ...V..-11 D+CT 3/17,5	+ CT 3 K/17,5 + CT 3/17,5	017 018	
CA 3-23 11	CT 3 16 ...23	CA II W..3-23- ...V..-11 D+CT 3/23	+ CT 3/23	019	1260
CA 3-30 15	CT 3 23 ...32	CA II W..3-30- ...V..-11 D+CT 3/32	+ CT 3/32	020	
CA 3-37-N 18,5	CT 3 32 ...42°)	CA II W..3-37-N-...V..-11 D+CT 3/42	+ CT 3/42	021	2780
CA 3-43-N 22	CT 3 32 ...42°)	CA II W..3-43-N-...V..-11 D+CT 3/42	+ CT 3/42	022	
CA 3-60-N 30	CT 3 40 ...52°)	CA II W..3-60-N-...V..-11 D+CT 3/52	+ CT 3/52	023	2900
CA 3-72-N 37	CT 3 58 ...72,5°)	CA II W..3-72-N-...V..-11 D+CT 3/72,5	+ CT 3/72,5	024	
<b>Order No. supplement</b>					
For mechanical interlock between stage 1 and network contactor					
For AC control, see page 40					
For DC control: CA 3- 9 C...CA 3-16 C see page 18					
CA 3-23...CA 3-72-N see page 40					

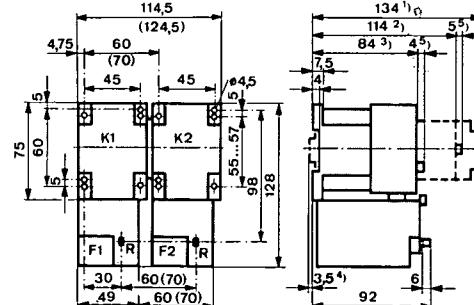
**Additional auxiliary contacts see page 38**

**Dimensions [mm]**

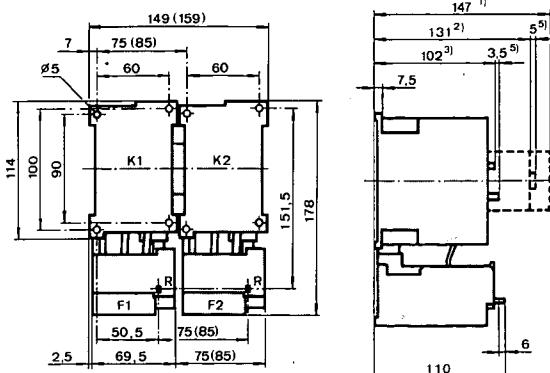
CA II W (M) 3-9 + CT 3 + CT 3...CA II W (M) 3-16 + CT 3 + CT 3



CA II W (M) 3-23 + CT 3 + CT 3, CA II W (M) 3-30 + CT 3 + CT 3



CA II W (M) 3-37-N + CT 3 + CT 3...CA II W (M) 3-72-N + CT 3 + CT 3



Dimensions in () with mechanical interlock

<sup>1)</sup> Time delayed auxiliary contact.

<sup>2)</sup> With auxiliary contact block.

<sup>3)</sup> Basic device without added elements.

<sup>4)</sup> Fixing possibility onto mounting rail

EN 50 022-35 for CA 3-9...CA 3-30.

<sup>5)</sup> With marking tag carrier.

<sup>6)</sup> Further setting ranges (see page 20).

<sup>7)</sup> For UL/CSA with thermal overload relay

CT 3-63 (see page 20).

## Two-Step Starters

### CA II D 3 + CT 3 + CT 3

for Continuance Contact Control

Arrangement  
Order No.  
Index No.  
Dimensions

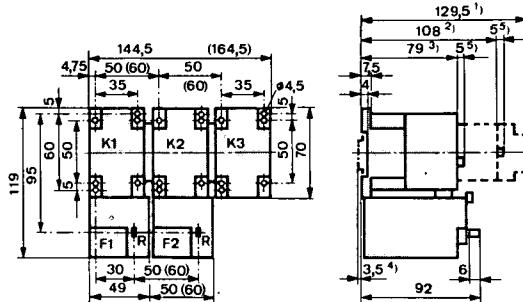
**Two-step starters CA II D 3 + CT 3 + CT 3**  
complete (for pole changing Dahlander connected motors  $\Delta/YY^{11}$ ). Contactor combination consists of 3 contactors, 2 thermal overload relays

main and control wiring, electrical interlock and neutral link.

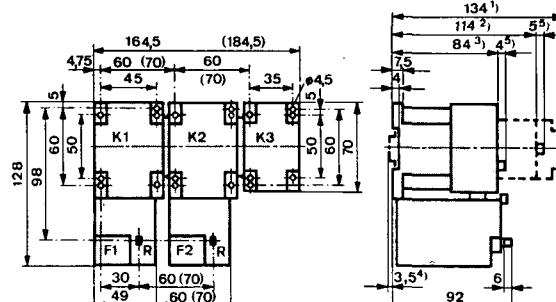
Arrange- ment	Switching of 3-phase motors at	Control voltage	Method of control	Thermal overload relay	Index No.	Weight [g]
Contactors	380/415 V 2 thermal overload relays			F 1 [A] F 2 [A]		
K 1 and K 2	AC-3 [kW] Type setting range [A]	Order No.				
CA 3- 9	4 CT 3 K 6 ...9 <sup>6)</sup>	CA II D..3- 9- ...V..-01 P+CT 3 K/9	+ CT 3 K/9	001	1470	
	CT 3 6 ...9,5 <sup>6)</sup>	CA II D..3- 9- ...V..-01 P+CT 3/9,5	+ CT 3/9,5	002		
CA 3-12	5,5 CT 3 K 9 ...12,5	CA II D..3-12- ...V..-01 P+CT 3 K/12,5	+ CT 3 K/12,5	003		
	CT 3 8,5 ...12,5	CA II D..3-12- ...V..-01 P+CT 3/12,5	+ CT 3/12,5	004		
CA 3-16	7,5 CT 3 K 12,5...17,5	CA II D..3-16- ...V..-01 P+CT 3 K/17,5	+ CT 3 K/17,5	005		
	CT 3 12 ...17,5	CA II D..3-16- ...V..-01 P+CT 3/17,5	+ CT 3/17,5	006		
CA 3-23	11 CT 3 16 ...23	CA II D..3-23- ...V..-01 P+CT 3/23	+ CT 3/23	007	1695	
CA 3-30	15 CT 3 23 ...32	CA II D..3-30- ...V..-01 P+CT 3/32	+ CT 3/32	008		
Spare auxiliary contacts on K 1, 1 n/c (21-22) on K 3 1 n/o (13-14)						
CA 3-37-N	18,5 CT 3 32 ...42 <sup>6)</sup>	CA II D..3-37-N-...V..-11 P+CT 3/42	+ CT 3/32	009	2780	
CA 3-43-N	22 CT 3 32 ...42 <sup>6)</sup>	CA II D..3-43-N-...V..-11 P+CT 3/42	+ CT 3/42	010		
CA 3-60-N	30 CT 3 40 ...52 <sup>6)</sup>	CA II D..3-60-N-...V..-11 P+CT 3/52	+ CT 3/52	011	2900	
CA 3-72-N	37 CT 3 58 ...72,5 <sup>12)</sup>	CA II D..3-72-N-...V..-11 P+CT 3/72,5	+ CT 3/72,5	012		
<b>Additional auxiliary contacts see page 38</b>						
<b>Order No. supplement</b>						
For mechanical interlock between stage 1 and network contactor						
For AC control, see page 40						
For DC control: CA 3-9 C...CA 3-16 C see page 18 CA 3-23...CA 3-72-N see page 40						

#### Dimensions [mm]

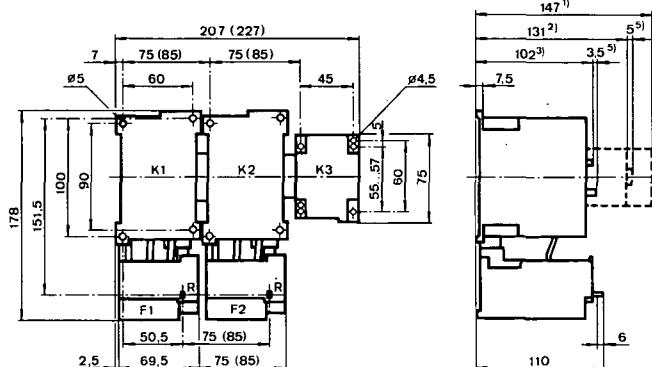
CA II D 3-9 + CT 3 + CT 3...CA II D 3-16 + CT 3 + CT 3



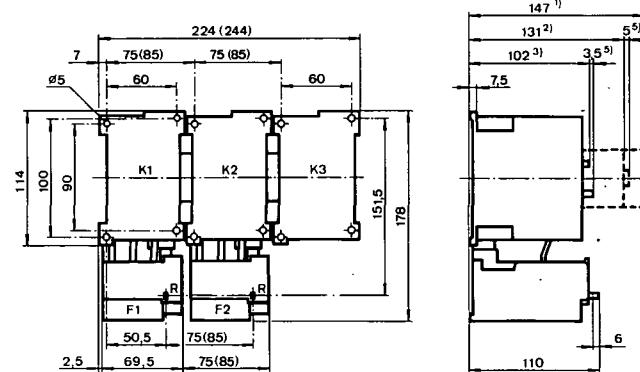
CA II D 3-23 + CT 3 + CT 3, CA II D 3-30 + CT 3 + CT 3



CA II D 3-37-N + CT 3 + CT 3...CA II D 3-60-N + CT 3 + CT 3



CA II D 3-72-N + CT 3 + CT 3



Dimensions in () with mechanical interlock

- <sup>1)</sup> With timing element CZE, with latch mechanism, with short time delay auxiliary contact.
- <sup>2)</sup> With auxiliary contact block.
- <sup>3)</sup> Basic device without added elements.
- <sup>4)</sup> Fixing possibility onto mounting rail EN 50 022-35 for CA 3-9...CA 3-30.

<sup>5)</sup> With marking tag carrier.

<sup>6)</sup> Further setting ranges, see page 20.

<sup>11)</sup> 2 rotational speeds with similar torques, 1 direction of rotation. On request: Dahlander connection YY/YY, 2 speeds, higher speed

with higher torque (ventilator and pump drivers).

<sup>12)</sup> See page 20 for UL/CSA with CT 3-63 thermal overload relay.

**Arrangement  
Order No.  
Index No.  
Dimensions**

## Two-Step Starters **CA II D 3 + CT 3 + CT 3** for Impulse Contact Control

**Two-step starters CA II D 3 + CT 3 + CT 3**  
complete (for pole changing Dahlander connected  
motors  $\Delta$  /YY"). Contactor combination consist-

ing of 3 contactors, 2 thermal overload relays  
main and control wiring, electrical interlock and  
neutral link.

Arrange- ment Contactors K 1 and K 2	Switching of 3-phase motors at AC [kW]-3 Type	Setting range [A]	Order No.	Control voltage	Method of control	Thermal overload relay F 1 [A] F 2 [A]	Index No.	Weight [g]
								1 off
CA 3- 9	4	CT 3 K 6 ... 9	CA II D..3- 9-	...V..-11 D + CT 3 K/9	+ CT 3 K/9	001	1520	
		CT 3 6 ... 9,5	CA II D..3- 9-	...V..-11 D + CT 3/9,5	+ CT 3/9,5	002		
CA 3-12	5,5	CT 3 K 9 ... 12,5	CA II D..3-12-	...V..-11 D + CT 3 K/12,5	+ CT 3 K/12,5	003		
		CT 3 8,5 ... 12,5	CA II D..3-12-	...V..-11 D + CT 3/12,5	+ CT 3/12,5	004		
CA 3-16	7,5	CT 3 K 12,5 ... 17,5	CA II D..3-16-	...V..-11 D + CT 3 K/17,5	+ CT 3 K/17,5	005		
		CT 3 12 ... 17,5	CA II D..3-16-	...V..-11 D + CT 3/17,5	+ CT 3/17,5	006		
CA 3-23	11	CT 3 16 ... 23	CA II D..3-23-	...V..-11 D + CT 3/23	+ CT 3/23	007	1695	
CA 3-30	15	CT 3 23 ... 32	CA II D..3-30-	...V..-11 D + CT 3/32	+ CT 3/32	008		
Spare auxiliary contacts on K 1, n/c (21-22), on K 3 1 n/o (13-14)								
CA 3-37-N	18,5	CT 3 32 ... 42	CA II D..3-37-N-...V..-11 D + CT 3/42	+ CT 3/42	009	2780		
CA 3-43-N	22	CT 3 32 ... 42	CA II D..3-43-N-...V..-11 D + CT 3/42	+ CT 3/42	010			
CA 3-60-N	30	CT 3 40 ... 52	CA II D..3-60-N-...V..-11 D + CT 3/52	+ CT 3/52	011	2900		
CA 3-72-N	37	CT 3 58 ... 72,5 <sup>1)</sup>	CA II D..3-72-N-...V..-11 D + CT 3/72,5	+ CT 3/72,5	012			

Additional auxiliary contacts see page 38

**Order No. supplement**

For mechanical interlock between stage 1 and network contactor

**CA II D..3-...**

**M**

**013(+)+20**

For AC control, see page 40

**...V..**

For DC control CA 3-9 C...CA 3-16 C see page 18

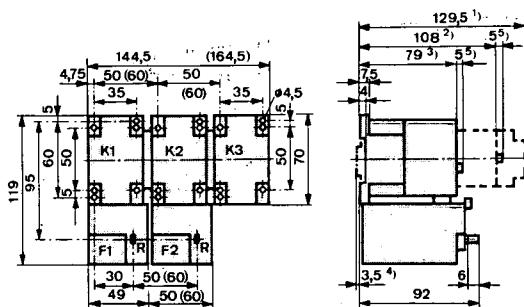
**...VDC**

CA 3-23...CA 3-72-N see page 40

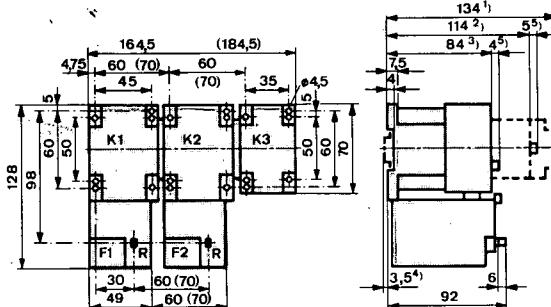
**...VDC**

### Dimensions [mm]

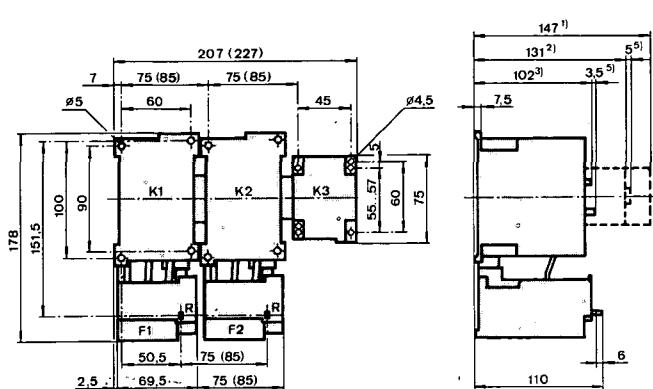
**CA II D 3-9 + CT 3 + CT 3...CA II D 3-16 + CT 3 + CT 3**



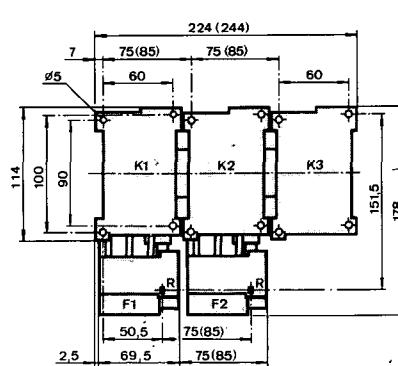
**CA II D 3-23 + CT 3 + CT 3, CA II D 3-30 + CT 3 + CT 3**



**CA II D 3-37-N + CT 3 + CT 3...CA II D 3-60-N + CT 3 + CT 3**



**CA II D 3-72-N + CT 3 + CT 3**



Dimensions in () with mechanical interlock

- <sup>1)</sup> With timing element CZE, with latch mechanism, with short time delay auxiliary contact.
- <sup>2)</sup> With auxiliary contact block.
- <sup>3)</sup> Basic device without added elements.
- <sup>4)</sup> Fixing possibility onto mounting rail  
EN 50 022-35 for CA 3-9...CA 3-30.

<sup>5)</sup> With marking tag carrier.

<sup>6)</sup> Further setting ranges, see page 20.

<sup>11)</sup> 2 rotational speeds with similar torques,  
1 direction of rotation. On request: Dahlander  
connection Y/YY, 2 speeds, higher speed

with higher torque (ventilator and pump  
drivers).

<sup>12)</sup> See page 20 for UL/CSA with CT 3-63 ther-  
mal overload relay.

# Star-Delta Starter

## CAY 3 + CT 3

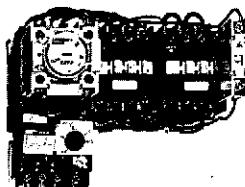
with Timing Element CZE 3

Arrangement  
Order No.  
Index No.  
Dimensions

**Star-delta starter CAY 3 + CT 3**

With timing element CZE 3, 0.3...sec.

Contactor combination from 3 contactors,

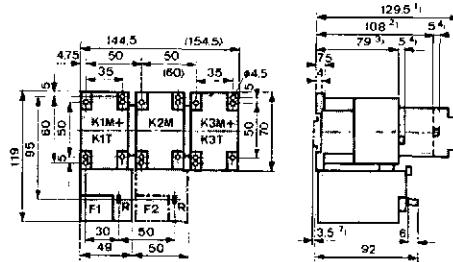


1 thermal overload relay with main and control wiring.

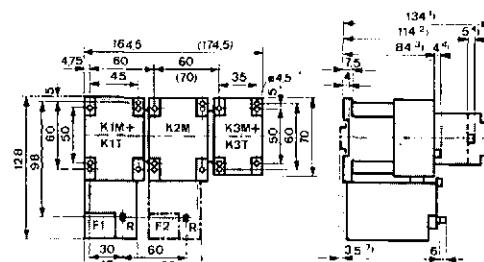
Rated power of motor at 380/415 V AC-3 [kW]	Thermal overload relay Type	setting range [A] F1	Order No.	Control voltage	Thermal overload relay F1 [A]	Timing element	Index No.	Weight [g] 1 off
1 spare aux. contact on contactor K 3M: 1 n/o (13-14) with maintained contact control, 1 additional n/o contact (13-14) on contactor K 1M								
1,5	CT 3 K	3,1 ... 4,7 <sup>1)</sup>	CAY..3- 9- ...V..- + CT 3 K/4,7 + CZE		001		1285	
	CT 3	2,8 ... 4,3 <sup>1)</sup>	CAY..3- 9- ...V..- + CT 3/4,3 + CZE		002			
2,2	CT 3 K	4,7 ... 6,9	CAY..3- 9- ...V..- + CT 3 K/6,9 + CZE		003			
	CT 3	4,3 ... 6,9	CAY..3- 9- ...V..- + CT 3/6,9 + CZE		004			
3 4	CT 3 K	6,9 ... 10,4	CAY..3- 9- ...V..- + CT 3 K/10,4 + CZE		005			
	CT 3	6,6 ... 10,4	CAY..3- 9- ...V..- + CT 3/10,4 + CZE		006			
5,5 7,5	CT 3 K	10,4...15,6	CAY..3- 9- ...V..- + CT 3 K/15,6 + CZE		007			
	CT 3	10,4...16,5	CAY..3- 9- ...V..- + CT 3/16,5 + CZE		008			
10	CT 3 K	15,6...21,6	CAY..3-12- ...V..- + CT 3 K/21,6 + CZE		009			
	CT 3	14,7...21,7	CAY..3-12- ...V..- + CT 3/21,7 + CZE		010			
11 14	CT 3 K	21,6...30,3	CAY..3-16- ...V..- + CT 3 K/30,3 + CZE		011			
	CT 3	20,8...30,3	CAY..3-16- ...V..- + CT 3/30,3 + CZE		012			
15 18,5	CT 3	27,7...39,8	CAY..3-23- ...V..- + CT 3/39,8 + CZE		013	1685		
22 25	CT 3	39,8...55,5	CAY..3-30- ...V..- + CT 3/55,5 + CZE		014			
Spare contacts: on K 1 n/c (21-22) on K 2 1 n/o (13-14) on K 3 1 n/o (13-14), 1 n/c (21-22) with maintained contact control, 1 spare auxiliary contact 1 n/o (13-14) on contactor K 1M								
25	CT 3	43,3...55,5	CAY..3-37-N...V..- + CT 3/55,5 + CZE		015	3580		
30	CT 3	55,5...72,5	CAY..3-37-N...V..- + CT 3/72,5 + CZE		016			
37	CT 3	55,5...72,5	CAY..3-43-N...V..- + CT 3/72,5 + CZE		017			
45	CT 3	70 ... 90	CAY..3-60-N...V..- + CT 3/90 + CZE		018	3650		
50 55	CT 3	90 ... 110	CAY..3-60-N...V..- + CT 3/110 + CZE		019			
63	CT 3	100 ... 125	CAY..3-72-N...V..- + CT 3/125 + CZE		021			
Additional auxiliary contacts see page 38								
Order No. supplement								
For mechanical interlock between star 1 and delta contactor								
For AC control, see page 40								
For DC control: CA 3-9 C...CA 3-16 C see page 18 CA 3-23...CA 3-72-N see page 40								

**Dimensions [mm]**

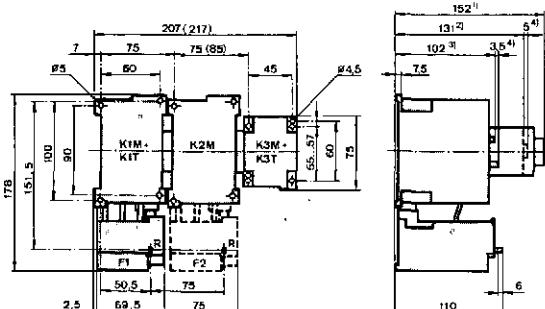
CAY 3-9 + CT 3 + (CT 3)...CAY 3-16 + CT 3 + (CT 3)



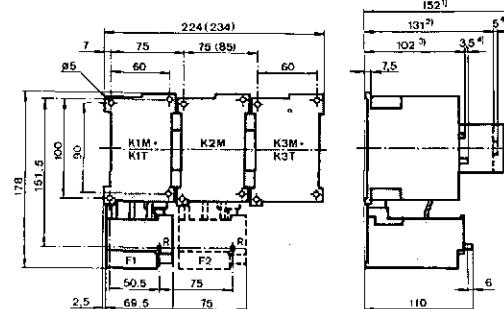
CAY 3-23 + CT 3 (+ CT 3), CAY 3-30 + CT 3 (+ CT 3)



CAY 3-37-N + CT 3 + (CT 3), CAY 3-43-N + CT 3 (CT 3)



CAY 3-60-N + CT 3 (+ CT 3), CAY 3-72-N + CT 3 (+ CT 3)



Dimensions in () with mechanical interlock

1) With timing element CZE.

2) With auxiliary contact block.

3) Basic device without added elements.

4) With marking tag carrier.

5) Reset buttons: 3.5 mm away = reset, 6 mm away = test.

7) Fixing possibility onto mounting rail  
EN 50 022-35 for CA 3-9...CA 3-30.

11) Further setting ranges, see page 20.

12) See page 20 for UL/CSA with CT 3-63 thermal overload relay.

Arrangement  
Order No.  
Index No.

## Star-Delta Starter CAY 3 + CT 3 + CT 3 with Timing Element CZE 3

**Star-delta starter CAY 3 + CT 3 + CT 3**  
with timing element CZE 3, 0.3...30 sec.

Contactor combination from 3 contactors, 2 thermal overload relays with main and control connections. For reduced cross-sectional area of the supply line to motor and for heavy duty starting, dependent on the setting of the thermal overload relays.

**Thermal overload relay setting with CAY 3 + CT 3 + CT 3**

Red. cross-sectional area: Thermal overload relays F1 and F2 set to motor current. Heavy duty starting: Thermal overload relay F1 set to motor current. Thermal overload relay F2 should not trip with normal motor run-up.

	Cross-sec- tional area [kW]	Heavy duty [kW]	Type	Thermal overload relay setting range [A] F1      F2	Order No.	Control voltage	Thermal overload relay F1 [A]      F2 [A]	Timing element	Index No.	Weight [g] 1 off
<b>1 spare auxiliary contact on contactor K 3M: 1 n/o (13-14) with maintained contact control, 1 additional n/o contact (13-14) on contactor K 1M</b>										
1,5	1,1	CT 3 K	3,1 ... 4,7	3,1 ... 4,7 <sup>1)</sup>	CAY..3- 9- ...V..+ CT 3 K/4,7 + CT 3 K/4,7 + CZE				001	1450
		CT 3	2,8 ... 4,3	2,8 ... 4,3 <sup>1)</sup>	CAY..3- 9- ...V..+ CT 3/4,3 + CT 3/4,3 + CZE				002	
-	1,5	CT 3 K	4,7 ... 6,9	3,1 ... 4,7	CAY..3- 9- ...V..+ CT 3 K/6,9 + CT 3 K/4,7 + CZE				003	
		CT 3	4,3 ... 6,9	2,8 ... 4,3	CAY..3- 9- ...V..+ CT 3/6,9 + CT 3/4,3 + CZE				004	
2,2	2,2	CT 3 K	4,7 ... 6,9	4,7 ... 6,9	CAY..3- 9- ...V..+ CT 3 K/6,9 + CT 3 K/6,9 + CZE				005	
		CT 3	4,3 ... 6,9	4,3 ... 6,9	CAY..3- 9- ...V..+ CT 3/6,9 + CT 3/6,9 + CZE				006	
3	4	3	CT 3 K	6,9 ... 10,4	CAY..3- 9- ...V..+ CT 3 K/10,4 + CT 3 K/10,4 + CZE				007	
		CT 3	6,6 ... 10,4	6,6 ... 10,4	CAY..3- 9- ...V..+ CT 3/10,4 + CT 3/10,4 + CZE				008	
-	4	CT 3 K	10,4...15,6	6,9 ... 10,4	CAY..3- 9- ...V..+ CT 3 K/15,6 + CT 3 K/10,4 + CZE				009	
		CT 3	10,4 ... 16,5	6,6 ... 10,4	CAY..3- 9- ...V..+ CT 3/16,5 + CT 3/10,4 + CZE				010	
5,5	7,5	5,5	CT 3 K	10,4...15,6	10,4 ... 15,6	CAY..3- 9- ...V..+ CT 3 K/15,6 + CT 3 K/15,6 + CZE			011	
		CT 3	10,4 ... 16,5	10,4 ... 16,5	CAY..3- 9- ...V..+ CT 3/16,5 + CT 3/16,5 + CZE				012	
-	7,5	CT 3 K	15,6 ... 21,6	10,4 ... 15,6	CAY..3- 9- ...V..+ CT 3 K/21,6 + CT 3 K/15,6 + CZE				013	
		CT 3	14,7 ... 21,7	10,4 ... 16,5	CAY..3- 9- ...V..+ CT 3/21,6 + CT 3/16,5 + CZE				014	
10	-	CT 3 K	15,6 ... 21,6	15,6 ... 21,6	CAY..3-12- ...V..+ CT 3 K/21,6 + CT 3 K/21,6 + CZE				015	
		CT 3	14,7 ... 21,7	14,7 ... 21,7	CAY..3-12- ...V..+ CT 3/21,7 + CT 3/21,7 + CZE				016	
11	11	CT 3 K	21,6 ... 30,3	21,6 ... 30,3	CAY..3-16- ...V..+ CT 3 K/30,3 + CT 3 K/30,3 + CZE				017	
		CT 3	20,8 ... 30,3	20,8 ... 30,3	CAY..3-16- ...V..+ CT 3/30,3 + CT 3/30,3 + CZE				018	
15	18,5	15	CT 3	27,7 ... 39,8	27,7 ... 39,8	CAY..3-23- ...V..+ CT 3/39,8 + CT 3/39,8 + CZE			019	1740
-	18,5	CT 3	39,8 ... 55,5	27,7 ... 39,8	CAY..3-30- ...V..+ CT 3/55,5 + CT 3/39,8 + CZE				020	
22	25	22	CT 3	39,8 ... 55,5	39,8 ... 55,5	CAY..3-30- ...V..+ CT 3/55,5 + CT 3/55,5 + CZE			021	
<b>Spare contacts: on K 1 1 n/c (21-22), on K 2 1 n/o (13-14) on K 3 1 n/o (13-14), 1 n/c (21-22) with maintained contact control, 1 additional n/o contact (13-14) on contactor K 1M</b>										
30	30	CT 3	55,5 ... 72,5	55,5 ... 72,5	CAY..3-37-N-...V..+ CT 3/72,5 + CT 3/72,5 + CZE			022	3990	
37	-	CT 3	55,5 ... 72,5	55,5 ... 72,5	CAY..3-43-N-...V..+ CT 3/72,5 + CT 3/72,5 + CZE			023		
-	37	CT 3	70 ... 90	55,5 ... 72,5	CAY..3-43-N-...V..+ CT 3/90 + CT 3/72,5 + CZE			024		
45	-	CT 3	70 ... 90	70 ... 90	CAY..3-60-N-...V..+ CT 3/90 + CT 3/90 + CZE			025	4170	
-	45	CT 3	100 ... 110	70 ... 90	CAY..3-60-N-...V..+ CT 3/110 + CT 3/90 + CZE			026		
55	-	CT 3	90 ... 110	90 ... 110	CAY..3-60-N-...V..+ CT 3/110 + CT 3/110 + CZE			027		
-	55	CT 3	100 ... 125	90 ... 110	CAY..3-60-N-...V..+ CT 3/125 + CT 3/110 + CZE			028		
63	-	CT 3	100 ... 125	100 ... 125 <sup>2)</sup>	CAY..3-72-N-...V..+ CT 3/125 + CT 3/125 + CZE			029		
<b>Order No. supplement</b>										
<b>CAY..3-..</b>										
<b>For mechanical interlock between star 1 and delta contactor</b>										
<b>M</b>										
<b>For AC control, see page 40</b>										
<b>...V..</b>										
<b>For DC control:</b>										
<b>CA 3-9 C...CA 3-16 C see page 18</b>										
<b>...VDC</b>										
<b>CA 3-23...CA 3-72-N see page 40</b>										
<b>...VDC</b>										

**Additional auxiliary contacts see page 38**

**Dimensions see page 32**

<sup>1)</sup> See page 16 for other setting ranges.

<sup>2)</sup> For UL/CSA with thermal overload relay CT 3-63 (see page 20).

# Star-Delta Starter

## CAY 3 + CT 3 + (CT 3)

with Timing Relay

Arrangement  
Order No.  
Index No.  
Dimensions

### Star-delta starter CAY 3 + CT 3

Contactor combination from 3 contactors, 1 thermal overload relay with main and control wiring with timing relay KOP 1.5...30 s ( $U_s$  max.  $U_s$  max. AC 440 V).

Rated power of motor at 380/415 V AC-3 [kW]	Thermal overload relay Type	setting range [A] F1	Order No.	Control voltage F1 [A]	Thermal overload relay	Index No.	Weight [g] 1 off
with maintained contact control, 1 spare auxiliary contact 1 n/o (13-14) on contactor K 1M							
1,5	CT 3 K	3,1 ... 4,7 <sup>1)</sup>	CAY..3- 9-	...V..- + CT 3 K/4,7 + KOP		001	1475
	CT 3	2,8 ... 4,3 <sup>11)</sup>	CAY..3- 9-	...V..- + CT 3/4,3 + KOP		002	
2,2	CT 3 K	4,7 ... 6,9	CAY..3- 9-	...V..- + CT 3 K/6,9 + KOP		003	
	CT 3	4,3 ... 6,9	CAY..3- 9-	...V..- + CT 3/6,9 + KOP		004	
3 4	CT 3 K	6,9 ... 10,4	CAY..3- 9-	...V..- + CT 3 K/10,4 + KOP		005	
	CT 3	6,6 ... 10,4	CAY..3- 9-	...V..- + CT 3/10,4 + KOP		006	
5,5 7,5	CT 3 K	10,4 ... 15,6	CAY..3- 9-	...V..- + CT 3 K/15,6 + KOP		007	
	CT 3	10,4 ... 16,5	CAY..3- 9-	...V..- + CT 3/16,5 + KOP		008	
10	CT 3 K	15,6 ... 21,6	CAY..3-12-	...V..- + CT 3 K/21,6 + KOP		009	
	CT 3	14,7 ... 21,7	CAY..3-12-	...V..- + CT 3/21,7 + KOP		010	
11 14	CT 3 K	21,6 ... 30,3	CAY..3-16-	...V..- + CT 3 K/30,3 + KOP		011	
	CT 3	20,8 ... 30,3	CAY..3-16-	...V..- + CT 3/30,3 + KOP		012	
15 18,5	CT 3	27,7 ... 39,8	CAY..3-23-	...V..- + CT 3/39,8 + KOP		013	1695
22 25	CT 3	39,8 ... 55,5	CAY..3-30-	...V..- + CT 3/55,5 + KOP		014	
Spare contacts: on K 1 1 n/c (21-22) on K 2 1 n/o (13-14) on K 3 1 n/o (13-14), 1 n/o (21-22) with maintained contact control, 1 additional n/o contact (13-14) on contactor K 1M							
25	CT 3	43,3 ... 55,5	CAY..3-37-N-...V..- + CT 3/55,5 + KOP		015	3690	
30	CT 3	55,5 ... 72,5	CAY..3-37-N-...V..- + CT 3/72,5 + KOP		016		
37	CT 3	55,5 ... 72,5	CAY..3-43-N-...V..- + CT 3/72,5 + KOP		017		
45	CT 3	70 ... 90	CAY..3-60-N-...V..- + CT 3/90 + KOP		018	3870	
50 55	CT 3	90 ... 110	CAY..3-60-N-...V..- + CT 3/110 + KOP		019		
63	CT 3	100 ... 125 <sup>12)</sup>	CAY..3-72-N-...V..- + CT 3/125 + KOP		021		

### Order No. supplement

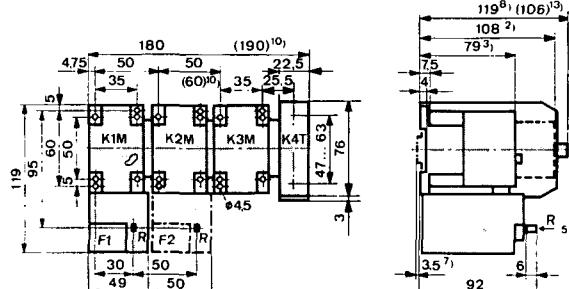
For mechanical interlock between star 1 and delta contactor	M	022(+)+20
For AC control, see page 40	...V..	
For DC control:	...VDC	
CA 3-9 C...CA 3-16 C see page 18	...VDC	+ KOP 3 MIN
CA 3-23...CA 3-72-N see page 40	...VDC	

For timing relay KOP 0,15...3 min. ( $U_s$  max. AC 440 V)

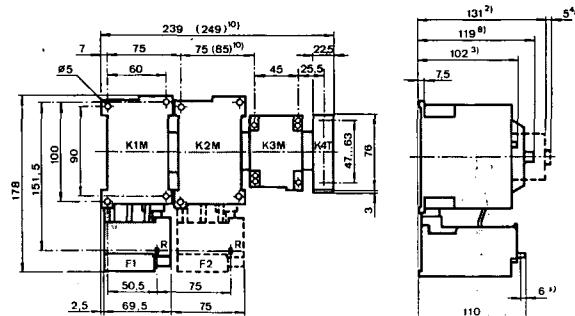
Additional auxiliary contacts see page 38

### Dimensions [mm] with timing relay

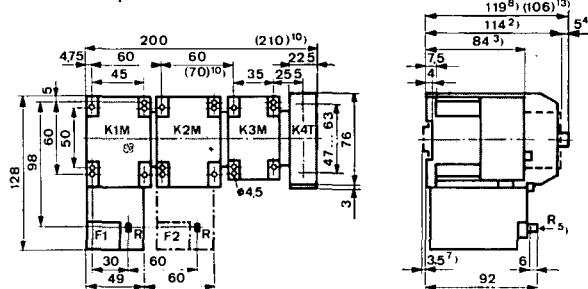
CAY 3-9 + CT 3 (+ CT 3)...CAY 3-16 + CT 3 (+ CT 3)



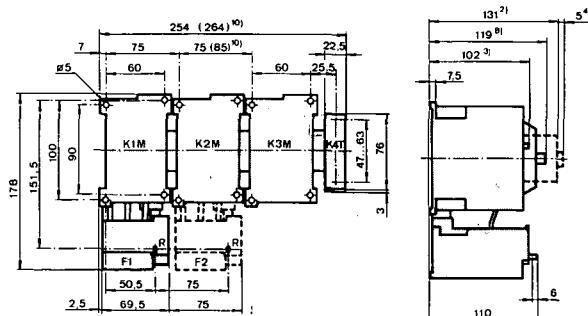
CAY 3-37-N + CT 3 + (CT 3) CAY 3-43-N + CT 3 (CT 3)



CAY 3-23 + CT 3 (+ CT 3), CAY 3-30 + CT 3 (+ CT 3)



CAY 3-60-N + CT 3 (+ CT 3), CAY 3-72-N + CT 3 (+ CT 3)



Dimensions in () with mechanical interlock

<sup>1)</sup> With auxiliary contact block.

<sup>2)</sup> Basic device without added elements.

<sup>3)</sup> With marking tag carrier.

<sup>4)</sup> Reset buttons: 3.5 mm away = reset, 6 mm away = test.

34 22 02

<sup>5)</sup> Fixing possibility onto mounting rail

EN 50 022-35 for CA 3-9...CA 3-30.

<sup>6)</sup> With timing relay KOP and dovetail adapter.

<sup>7)</sup> Dimensions in () with mechanical interlock

<sup>11)</sup> Further setting ranges, see page 20.

<sup>12)</sup> See page 20 for UL/CSA with CT 3-63 thermal overload relay.

<sup>13)</sup> With timing relay KOP onto mounting rail.

Arrangement  
Order No.  
Index No.

# Star-Delta Starter

## CAY 3 + CT 3 + CT 3

with Timing Relay

**Star-delta starter CAY 3 + CT 3 + CT 3**

Contactor combination from 3 contactors, 2 thermal overload relays. With main and control wiring for reduced motor conductor cross section with timing relay KOP, 1.5...30 sec. ( $U_s$  max. AC 440 V)

**Overload relay settings with CAY 3 + CT 3 + CT 3**

Red cross-sect. area: thermal overload relay F1 and F2 set to motor current. Heavy duty-starting: Thermal overload relay F1 set to motor current. Thermal overload relay F2 should not trip with normal motor run-up.

Cross-section area starting [kW]	Heavy duty starting [kW]	Thermal overload relays		Control voltage	Thermal overload relays F1 [A]	Thermal overload relays F2 [A]	Timing relay	Weight Index [g]
		Type	setting range [A] F1 F2					
Spare contact on contactor K 3M: 1 n/o (13-14) with maintained contact control, 1 additional n/o contact (13-14) on contactor K 1M								
1,5	1,1	CT 3 K	3,1 ... 4,7    3,1 ... 4,7 <sup>1)</sup>	[CAY..3- 9- ...V.- + CT 3 K/4,7 + CT 3 K/4,7 + KOP]				001    1630
		CT 3	2,8 ... 4,3    2,8 ... 4,3 <sup>1)</sup>	[CAY..3- 9- ...V.- + CT 3/4,3 + CT 3/4,3 + KOP]				002
	- 1,5	CT 3 K	4,7 ... 6,9    3,1 ... 4,7	[CAY..3- 9- ...V.- + CT 3 K/6,9 + CT 3 K/4,7 + KOP]				003
		CT 3	4,3 ... 6,9    2,8 ... 4,3	[CAY..3- 9- ...V.- + CT 3/6,9 + CT 3/4,3 + KOP]				004
2,2	2,2	CT 3 K	4,7 ... 6,9    4,7 ... 6,9	[CAY..3- 9- ...V.- + CT 3 K/6,9 + CT 3 K/6,9 + KOP]				005
		CT 3	4,3 ... 6,9    4,3 ... 6,9	[CAY..3- 9- ...V.- + CT 3/6,9 + CT 3/6,9 + KOP]				006
3	4	CT 3 K	6,9 ... 10,4    6,9 ... 10,4	[CAY..3- 9- ...V.- + CT 3 K/10,4 + CT 3 K/10,4 + KOP]				007
		CT 3	6,6 ... 10,4    6,6 ... 10,4	[CAY..3- 9- ...V.- + CT 3/10,4 + CT 3/10,4 + KOP]				008
	- 4	CT 3 K	10,4...15,6    6,9 ... 10,4	[CAY..3- 9- ...V.- + CT 3 K/15,6 + CT 3 K/10,4 + KOP]				009
		CT 3	10,4...16,5    6,6 ... 10,4	[CAY..3- 9- ...V.- + CT 3/16,5 + CT 3/10,4 + KOP]				010
5,5	7,5	CT 3 K	10,4...15,6    10,4...15,6	[CAY..3- 9- ...V.- + CT 3 K/15,6 + CT 3 K/15,6 + KOP]				011
		CT 3	10,4...16,5    10,4...16,5	[CAY..3- 9- ...V.- + CT 3/16,5 + CT 3/16,5 + KOP]				012
	- 7,5	CT 3 K	15,6...21,6    10,4...15,6	[CAY..3- 9- ...V.- + CT 3 K/21,6 + CT 3 K/15,6 + KOP]				013
		CT 3	14,7...21,7    10,4...16,5	[CAY..3- 9- ...V.- + CT 3/21,7 + CT 3/16,5 + KOP]				014
10	-	CT 3 K	15,6...21,6    15,6...21,6	[CAY..3- 12- ...V.- + CT 3 K/21,6 + CT 3 K/21,6 + KOP]				015
		CT 3	14,7...21,7    14,7...21,7	[CAY..3- 12- ...V.- + CT 3/21,7 + CT 3/21,7 + KOP]				016
11	11	CT 3 K	21,6...30,3    21,6...30,3	[CAY..3- 16- ...V.- + CT 3 K/30,3 + CT 3 K/30,3 + KOP]				017
		CT 3	20,8...30,3    20,8...30,3	[CAY..3- 16- ...V.- + CT 3/30,3 + CT 3/30,3 + KOP]				018    1850
15	18,5	CT 3	27,7...39,8    27,7...39,8	[CAY..3- 23- ...V.- + CT 3/39,8 + CT 3/39,8 + KOP]				019
	- 18,5	CT 3	39,8...55,5    27,7...39,8	[CAY..3- 30- ...V.- + CT 3/55,5 + CT 3/39,8 + KOP]				020
22	25	CT 3	39,8...55,5    39,8...55,5	[CAY..3- 30- ...V.- + CT 3/55,5 + CT 3/55,5 + KOP]				021
Spare contacts: on K 1 1 n/c (21-22) on K 2 1 n/o (13-14) on K 3 1 n/o (13-14), 1 n/c (21-22) with maintained contact control, 1 additional n/o contact (13-14) on contactor K 1M								
30	30	CT 3	55,5...72,5    55,5...72,5	[CAY..3-37-N-...V.- + CT 3/72,5 + CT 3/72,5 + KOP]				022    4090
37	-	CT 3	55,5...72,5    55,5...72,5	[CAY..3-43-N-...V.- + CT 3/72,5 + CT 3/72,5 + KOP]				023
-	37	CT 3	70 ... 90	[CAY..3-43-N-...V.- + CT 3/90 + CT 3/72,5 + KOP]				024
45	-	CT 3	70 ... 90    70 ... 90	[CAY..3-60-N-...V.- + CT 3/90 + CT 3/90 + KOP]				025    4270
-	45	CT 3	90 ... 110    70 ... 90	[CAY..3-60-N-...V.- + CT 3/110 + CT 3/90 + KOP]				026
55	-	CT 3	90 ... 110    90 ... 110	[CAY..3-60-N-...V.- + CT 3/110 + CT 3/110 + KOP]				027
-	55	CT 3	100 ... 125    90 ... 110	[CAY..3-60-N-...V.- + CT 3/125 + CT 3/110 + KOP]				028
63	-	CT 3	100 ... 125    100 ... 125 <sup>2)</sup>	[CAY..3-72-N-...V.- + CT 3/125 + CT 3/125 + KOP]				029
Order No. supplement								
For mechanical interlock between star 1 and delta contactor								
For AC control, see page 40								
For DC control:								
CA 3-9 C...CA 3-16 C see page 18								
CA 3-23...CA 3-72-N see page 40								
For timing relay KOP 0,15...3 min. ( $U_s$ max. AC 440 V)								
+ KOP 3 MIN    031								

**Additional auxiliary contacts** see page 38

**Dimensions** see page 34

<sup>1)</sup> See page 20 for other setting ranges.

<sup>2)</sup> For UL/CSA with thermal overload relay CT 3-63 (see page 20).

Arrangement  
Order No.  
Index No.  
Dimensions

## 1-Phase Active Power Contactors CAH

**1-phase active power contactors CAH** complete contactor CA 3 with 2 connection bridges for connecting the 3 main current paths in parallel.

Arrangement Contactors Type	$I_{th}$ and $I_e$ AC-1 up to 600 V [A] open      enclosed	Max. rated current of back-up fuse [A]	EN ref. contactor	Order No.	Control voltage Auxiliary contact	Index No.	Weight [g] 1 off
<b>Auxiliary contact: 1 n/o (13-14)</b>							
CA 3-9	50      40	50	10	CAH 3- 9...V...-10		001	335
CA 3-12	50      40	50	10	CAH 3-12...V...-10		002	
CA 3-16	50      40	50	10	CAH 3-16...V...-10		003	350
CA 3-23	80      75	80	10	CAH 3-23...V...-10		004	500
CA 3-30	80      75	80	10	CAH 3-30...V...-10		005	
<b>Auxiliary contact: 1 n/c (21-22)</b>							
CA 3-9	50      40	50	01	CAH 3- 9...V...-01		006	335
CA 3-12	50      40	50	01	CAH 3-12...V...-01		007	
CA 3-16	50      40	50	01	CAH 3-16...V...-01		008	350
CA 3-23	80      75	80	01	CAH 3-23...V...-01		009	500
CA 3-30	80      75	80	01	CAH 3-30...V...-01		010	
<b>Additional auxiliary contacts CA 3-P...see page 17</b>							

### Order No. supplement

For AC control, see page 40

...V..

For DC control:

CA 3-9 C...CA 3-16 C see page 18

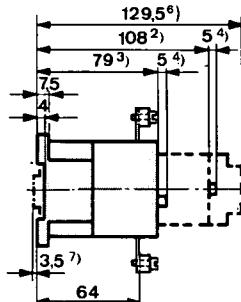
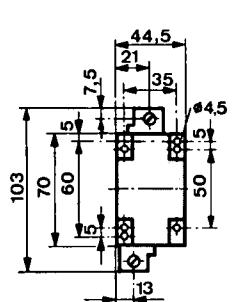
...VDC

CA 3-23...CA 3-72 see page 40

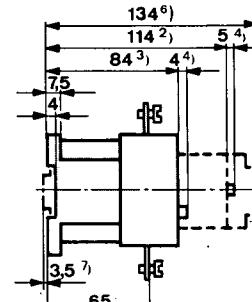
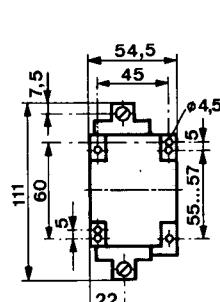
...VDC

### Dimensions (mm)

CAH 3-9...CAH 3-16



CAH 3-23 and CAH 3-30



<sup>2)</sup> With auxiliary contact block.

<sup>3)</sup> Basic device without added elements.

<sup>4)</sup> With marking tag carrier.

<sup>5)</sup> With time delayed auxiliary contact.

<sup>7)</sup> Fixing possibility onto mounting rail

EN 50 022-35 for CA 3-9...CA 3-30.

**Arrangement  
Order No.  
Index No.  
Dimensions**

## 3-Phase Active Power Contactors CAYH

### 3-phase active power contactors CAYH

complete (for heating in star-delta circuits)

Contactor combination consisting of 3 contactors, main and control wiring, electrical interlock and neutral link.

<b>For maintained contact control</b>	<b>Arrangement Contactors K1 and K2 Type</b>	<i>I<sub>th</sub></i> and <i>I<sub>e</sub></i> AC-1 in Delta-Connection up to 660 V [A]		<b>Max. rated current of back-up fuse [A]</b>	<b>Order No.</b>	<b>Index No.</b>	<b>Weight (g) 1 off</b>
		<b>open</b>	<b>enclosed</b>				
<b>Spare auxiliary contacts: on contactor K 1, 1 n/o (21-22)</b>							
CA 3-9	25	25	25	CAYH 3- 9- ...V..	001	1050	
CA 3-12	25	25	25	CAYH 3-12- ...V..	002		
CA 3-16	35	28	35	CAYH 3-16- ...V..	003	1100	
CA 3-23	50	50	50	CAYH 3-23- ...V..	004	1200	
CA 3-30	50	50	50	CAYH 3-30- ...V..	005		
<b>Spare auxiliary contacts: on contactor K 1, 1 n/o (21-22) 1 n/c (13-14)</b>							
CA 3-37-N	80	78	80	CAYH 3-37-N-...V..	006	3070	
CA 3-43-N	100	78	100	CAYH 3-43-N-...V..	007		
CA 3-60-N	125	125	125	CAYH 3-60-N-...V..	008	3350	
CA 3-72-N	125	125	125	CAYH 3-72-N-...V..	009		

### Order No. supplement

For AC control, see page 40

...V..

For DC control: CA 3-9 C...CA 3-16 C see page 18

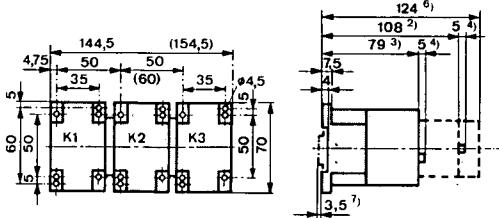
...VDC

CA 3-23...CA 3-72-N see page 40

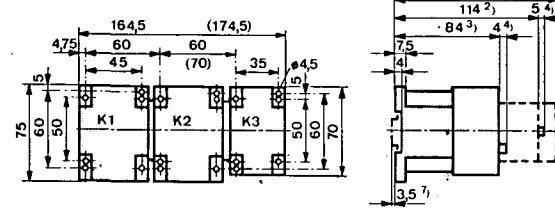
...VDC

### Dimensions [mm]

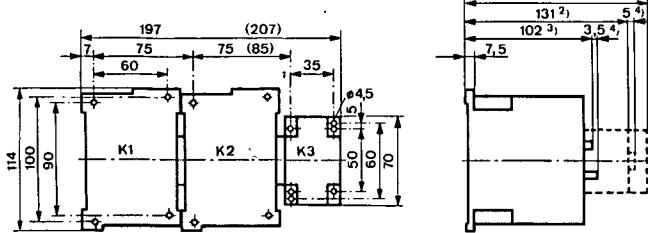
CAYH 3-9...CAYH 3-16



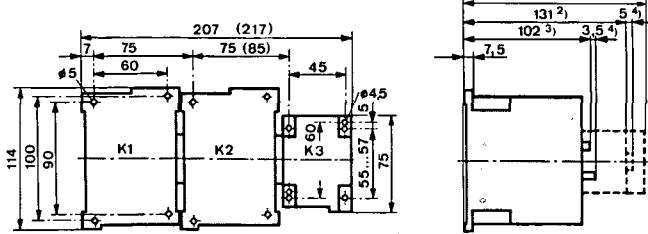
CAYH 3-23 and CAYH 3-30



CAYH 3-37-N and CAYH 3-43-N



CAYH 3-60-N and CAYH 3-72-N



Dimensions in () with mechanical interlock

<sup>2)</sup> With auxiliary contact block.

<sup>3)</sup> Basic device without added elements.

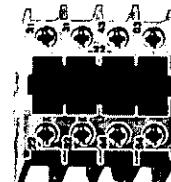
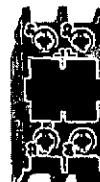
<sup>4)</sup> With marking tag carrier.

<sup>5)</sup> With time delayed auxiliary contact.

<sup>7)</sup> Fixing possibility onto mounting rail

EN 50 022-35 for CA 3-9...CA 3-30.

## Additional Auxiliary Contacts for Contactor Combinations



### Additional auxiliary contacts

Order No.	Index	Weight [g]
	No.	1 off

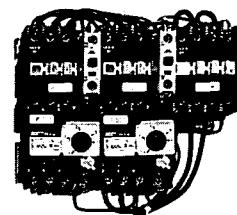
<b>Reversing contactor CAU 3</b>	
<b>Reversing starter CAU 3 + CT 3</b>	
<b>For maintained contact control</b>	
on contactor K 1 or K 2	
with CAU 3-9...CAU 3-72-N	
1 n/o (23-24)	CA3-P-H10
1 n/c (31-32)	CA3-P-S11
2 n/c (31-32, 41-42)	CA3-P-S22
	001   + 25
	002   + 30
	003   + 50

<b>For impulse contact control</b>	
on contactor K 1 or K 2	
with CAU 3-9...CAU 3-72-N	
1 n/c (31-32)	1 n/o (43-44)
with CAU 3-32...CAU 3-72-N	
2 n/c (31-32, 41-42)	2 n/o (53-54, 63-64)
CA3-P-S11	004   + 30
CA3-P-S22	005   + 50

<b>For maintained contact control</b>	
with momentary changeover	
on contactor K 1 or K 2	
with CAU 3-9...CAU 3-72-N	
1 n/c (21-22)	1 n/o (33-34)
with CAU 3-23...CAU 3-72-N	
2 n/c (21-22, 31-32)	2 n/o (43-44, 53-54)
CA3-P-11	006   + 30
CA3-P-22	007   + 50

<b>Two-step contactor CA II W 3</b>	
<b>Two-step starter CA II W 3 + CT 3 + CT 3</b>	
<b>For maintained contact control</b>	
on contactor K 1 or K 2	
with CA II W 3-9...CA II W 3-72-N	
1 n/o (23-24)	CA3-P-H10
1 n/c (31-32)	CA3-P-S11
2 n/c (31-32, 41-42)	CA3-P-S22
CA3-P-H10	008   + 25
CA3-P-S11	009   + 30
CA3-P-S22	010   + 50
<b>For impulse contact control</b>	
on contactor K 1 or K 2	
with CA II W 3-9...CA II W 3-72-N	
1 n/o (23-24)	CA3-P-H10
1 n/c (31-32)	CA3-P-S11
2 n/c (31-32, 41-42)	CA3-P-S22
CA3-P-H10	011   + 25
CA3-P-S11	012   + 30
CA3-P-S22	013   + 50

<b>Two-step starter CA II D 3 + CT 3 + CT 3</b>	
<b>For maintained contact control</b>	
on contactor K 1	
with CA II D 3-9...CA II D 3-30	
1 n/c (21-22)	CA3-P-01
1 n/o (23-24)	CA3-P-H10
2 n/c (21-22, 31-32)	CA3-P-02
1 n/c (21-22)	CA3-P-11
2 n/c (21-22, 31-32)	CA3-P-22
1 n/c (21-22)	CA3-P-31
with CA II D 3-37-N...CA II D 3-72-N	
1 n/c (31-32)	CA3-P-01
1 n/o (33-34)	CA3-P-S10
1 n/c (31-32)	CA3-P-11
2 n/c (31-32, 41-42)	CA3-P-22
1 n/c (31-32)	CA3-P-31
with CA II D 3-9...CA II D 3-72-N	
1 n/c (31-32)	CA3-P-S01
1 n/o (33-34)	CA3-P-S10
1 n/c (31-32)	CA3-P-S11
2 n/c (31-32, 41-42)	CA3-P-S22
1 n/c (31-32)	CA3-P-S31
on contactor K 2 and/or contactor K 3	
with CA II D 3-9...CA II D 3-72-N	
1 n/c (31-32)	CA3-P-S01
1 n/o (33-34)	CA3-P-S10
1 n/c (31-32)	CA3-P-S11
2 n/c (31-32, 41-42)	CA3-P-S22
1 n/c (31-32)	CA3-P-S31
with CA II D 3-9...CA II D 3-72-N	
1 n/c (31-32)	CA3-P-S01
1 n/o (33-34)	CA3-P-S10
1 n/c (31-32)	CA3-P-S11
2 n/c (31-32, 41-42)	CA3-P-S22
1 n/c (31-32)	CA3-P-S31
with CA II D 3-9...CA II D 3-72-N	
1 n/c (31-32)	CA3-P-S01
1 n/o (33-34)	CA3-P-S10
1 n/c (31-32)	CA3-P-S11
2 n/c (31-32, 41-42)	CA3-P-S22
1 n/c (31-32)	CA3-P-S31

Order No.  
Index No.**Additional auxiliary contacts****Two-step starter CA II D 3 + CT 3 + CT 3****For impulse contact control**

on contactor K 1

with CA II D 3-9...CA II D 3-16

2 n/c (21-22, 31-32)

1 n/c (31-32) 1 n/o (43-44)

with CA II D 3-23...CA II D 3-30

1 n/c (21-22)

2 n/c (21-22, 31-32)

1 n/c (31-32) 1 n/o (43-44)

2 n/c (31-32, 41-42) 2 n/o (53-54, 63-64)

1 n/c (31-32) 3 n/o (43-44, 53-54, 63-64)

with CA II D 3-37-N...CA II D 3-72-N

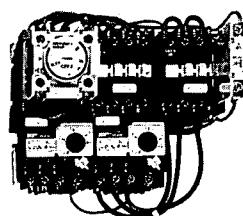
1 n/c (31-32) 1 n/o (43-44)

2 n/c (31-32, 41-42) 2 n/o (53-54, 63-64)

1 n/c (31-32) 3 n/o (43-44, 53-54, 63-64)

Order No. Index No. Weight  
[g] 1 off

<b>CA 3-P-02</b>	<b>001</b>	+ 30
<b>CA 3-P-S11</b>	<b>002</b>	
<b>CA 3-P-01</b>	<b>003</b>	+ .25
<b>CA 3-P-02</b>	<b>004</b>	+ 30
<b>CA 3-P-S11</b>	<b>005</b>	
<b>CA 3-P-S22</b>	<b>006</b>	+ 50
<b>CA 3-P-S31</b>	<b>007</b>	
<b>CA 3-P-S11</b>	<b>008</b>	+ 30
<b>CA 3-P-S22</b>	<b>009</b>	+ 50
<b>CA 3-P-S31</b>	<b>010</b>	
<b>CA 3-P-S11</b>	<b>011</b>	+ 30
<b>CA 3-P-S11</b>	<b>012</b>	
<b>CA 3-P-S22</b>	<b>013</b>	+ 50
<b>CA 3-P-S31</b>	<b>014</b>	

**Star-delta starter CAY 3 + CT 3****Star-delta starter CAY 3 + CT 3 + CT 3****With timing element CZE 3**

on contactor K 1M

with CAY 3-23...CAY 3-72-N

1 n/o (23-24)

CA 3-P-H10 015 + 25

on contactor K 2M

with CAY 3-9...CAY 3-72-N

1 n/c (31-32) 1 n/o (43-44)

CA 3-P-S11 016 + 30

2 n/c (31-32, 41-42) 2 n/o (53-54, 63-64)

CA 3-P-S22 017 + 50

on contactor K 3M

with CAY 3-9...CAY 3-30

1 n/o (21-22) 1 n/c (33-34)

CA 3-P-11 018 + 30

with CAY 3-9...CAY 3-72-N

1 n/c (31-32) 1 n/o (43-44)

CA 3-P-S11 019 + 30

2 n/c (31-32, 41-42) 2 n/o (53-54, 63-64)

CA 3-P-S22 020 + 50

1 n/c (31-32) 3 n/o (43-44, 53-54, 63-64)

CA 3-P-S31 021 + 30

**With time delay relay KOP**

on contactor K 1M

with CAY 3-9...CAY 3-30

1 n/c (21-22)

CA 3-P-01 022 + 25

1 n/o (23-24)

CA 3-P-H10 023 + 25

2 n/c (21-22, 31-32)

CA 3-P-02 024 + 30

1 n/c (31-32) 1 n/o (43-44)

CA 3-P-11 025 + 30

2 n/c (31-32, 41-42) 2 n/o (53-54, 63-64)

CA 3-P-22 026 + 50

with CAY 3-37-N...CAY 3-72-N

1 n/o (23-24)

CA 3-P-H10 027 + 25

1 n/c (31-32) 1 n/o (43-44)

CA 3-P-11 028 + 30

2 n/c (31-32, 41-42) 2 n/o (53-54, 63-64)

CA 3-P-S22 029 + 50

1 n/c (31-32) 3 n/o (43-44, 53-54, 63-64)

CA 3-P-S31 030 + 30

on contactor K 2M and/or contactor K 3M

with CAY 3-9...CAY 3-30

1 n/o (23-24)

CA 3-P-H10 031 + 25

1 n/c (31-32) 1 n/o (43-44)

CA 3-P-S11 032 + 30

2 n/c (31-32, 41-42) 2 n/o (53-54, 63-64)

CA 3-P-S22 033 + 50

with CAY 3-37-N...CAY 3-72-N

1 n/o (23-24)

CA 3-P-H10 034 + 25

1 n/c (31-32) 1 n/o (43-44)

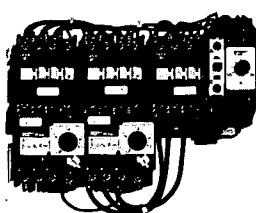
CA 3-P-11 035 + 30

2 n/c (31-32, 41-42) 2 n/o (53-54, 63-64)

CA 3-P-S22 036 + 50

1 n/c (31-32) 3 n/o (43-44, 53-54, 63-64)

CA 3-P-S31 037 + 30



# Control Voltage

Alternating and Direct Current Control

Arrangement  
Order No.  
Index No.

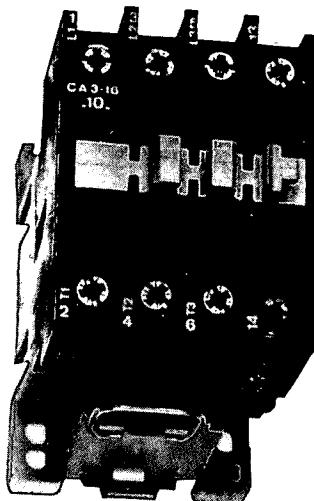
Arrangement	Order No.	Index No.
<b>Order No. addition for AC control</b>	CA..3...V..	
Possible control voltages: Min. 12 V, 50 Hz/ 14 V, 60 Hz Max. 550 V, 50 Hz/630 V, 60 Hz		
<b>Normal control voltages</b>		
CS 3, CA 3-9...CA 3-72-N      24 V, 50 Hz/ 28 V, 60 Hz 32 V, 50 Hz/ 37 V, 60 Hz 110 V, 50 Hz/127 V, 60 Hz 240 V, 50 Hz/277 V, 60 Hz 415 V, 50 Hz/480 V, 60 Hz 440 V, 50 Hz/508 V, 60 Hz		
for CS 3, CS 3-9, CA 3-12, CA 3-16      ...V.. CA 3-23, CA 3-30      ...V.. CA 3-37-N, CA 3-43-N      ...V.. CA 3-60-N, CA 3-72-N      ...V.. Reset magnet CMR 3 (without*)      ...V.. Latch CV 3 (without*)      ...V..		-
<b>Special control voltages</b>		
for Contactors CS 3, CA 3-.. Reset magnet CMR 3 Latch CV 3 Indicate rated control voltage at 50 Hz or rated control voltage at 60 Hz	...V.. ...V.. ...V.. ...V 50 ...V 60	001 (+) 002 (+) 003 (+)
<b>Order No. addition for DC control</b>		
Possible control voltages: Min. DC 12 V Max. DC 250 V		
<b>Normal control voltages</b>		
CS 3 C, CA 3-9 C...CA 3-72-N      DC 12 V      DC 11... 14 V DC 24 V      DC 22... 28 V DC 48 V      DC 44... 55 V DC 110 V     DC 110...140 V DC 220 V     DC 220...280 V		
for CS 3 C, CA 3-9 C, CA 3-12 C, CA 3-16 C (with DC magnet system see page 18)	...VDC	-
for CA 3-23, CA 3-30 up to DC 110 V (incl. auxiliary contact L01 and connections) > DC 110 V (incl. Varistor) <sup>2)</sup>	...VDC ...VDC	004 (+) 005 (+)
for CA 3-37-N...CA 3-72-N <sup>1)</sup> (coil with integral Diode, incl. auxiliary contact L01 and connections)	...VDC	006 (+)
for Reset magnet CMR 3 (without*)	...VDC	-
for Latch CV 3 (without*)	...VDC	-
<b>Special control voltages</b>		
for CS 3 C, CA 3-9 C, CA 3-12 C, CA 3-16 C (with DC magnet system see page 18)	...VDC	008 (+)
for CA 3-23, CA 3-30 up to DC 110 V (incl. auxiliary contact L01 and connections) > DC 110 V (incl. Varistor) <sup>2)</sup>	...VDC ...VDC	009 (+) 010 (+)
for CA 3-43-N...CA 3-72-N <sup>1)</sup> (coil with integral Diode, incl. auxiliary contact L01 and connections)	...VDC	011 (+)
for Reset magnet CMR 3	...VDC	013 (+)
for Latch CV 3	...VDC	014 (+)
<b>Contactors with Latch CV 3 for DC control</b>		
CS 3, CA 3-9...CA 3-72-N are to be ordered with AC operating mechanism and AC coil (same voltage 50 Hz.) e.g. contactor equipped with CV 3; closing control voltage DC 220 V; contactor CA 3-12-220 V 50		

<sup>1)</sup> 1 auxiliary contact used.<sup>2)</sup> Necessary for coil protection, also limitation  
of overvoltages (spikes) when switching off.

## Technical Information

**Reliable operation**

- In any desired position
- Operationally reliable under vibration and shock conditions, suitable for use in vehicles and ships.
- Unaffected by climate, encapsulated standard design under tropical conditions.
- Unaffected by pollution, suitably encapsulated.
- On and off switching operation in one movement (tumbler charac.).
- High in-rush current permissible due to bounce-free contact system and high contact pressure.
- High permissible operating frequency.


**Rated insulation voltage  $U_i$  according to:**

IEC, AS, BS, ASE, VDE 0660	V	660
UL, NEMA, CSA, EEMAC	V	600

**Test voltage, 1 minute**

Test voltage, 1 minute	V	3000
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**Max. supply voltage**

Max. supply voltage	$n \cdot U_s$	1.1
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**Min. pull-up voltage**

Min. pull-up voltage	CS 3 (8 n/o...4 n/o 4 n/c)	
	CA 3-9...CA 3-16	

**AC and DC voltage**

AC and DC voltage	$n \cdot U_s$	0.8
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**Remaining contactors**

Remaining contactors	$n \cdot U_s$	0.85
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**AC and DC voltage**

AC and DC voltage	$n \cdot U_s$	0.85
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**Dropout voltage**

Dropout voltage	AC voltage	$n \cdot U_s$	0.35...0.65
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	DC voltage	$n \cdot U_s$	0.1 ... 0.25
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**Ambient temperature**

Ambient temperature	Storage transport	-40°C...+80°C
---------------------	-------------------	---------------

	Operation AC-1 encapsulated AC-2...AC-4	-25°C...+60°C
--	---	---------------

with rated operating current

	with 85% rated operating current	-25°C...+70°C
--	----------------------------------	---------------

AC-1 open

	AC-1 open	-25°C...+40°C
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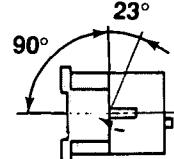
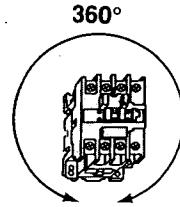
**Resistant to climatic conditions**

Damp heat 40°C/95% relative humidity	56 days
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Changing climatic conditions 23°C, 83%/40°C, 93 %	56 cycles
--	-----------

**Mounting position:**

As required within the given angle without limitation  
(full pullup voltage – and ambient temperature rang, any auxiliary contactblocks, timing element and latch).



SEV  
Switzerland



CSA  
Canada



UL listed  
U.S.A.



UL recognized  
U.S.A.



Electrical  
inspectorate  
Finland



CEBEC  
Belgium



DEMKO  
Denmark



NEMKO  
Norway



SEMKO  
Sweden



Germanischer  
Lloyd  
FRG



Lloyd's Reg.  
of Shipping  
UK



RINA  
Italy



Bureau  
Veritas  
France



USSR Reg.

**Worldwide usage**

As far as possible, and as they are compatible, various national and international specifications have been taken into consideration. The standard versions also fulfill the stringent North American requirements (with the same or slightly reduced performance characteristics, see pages 8...12). Worldwide usage is made possible by compliance with the following specifications.

IEC 158-1, 292-1, 292-2

AS 1023, 1029, 1202 Australia

BS 4941, 5424 Great Britain

CEI 17-3, 17-7, 17-8 Italy

VDE 0660 Germany

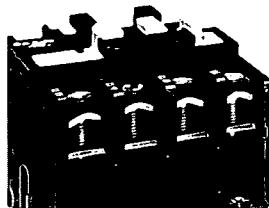
UTEN NFC 63 110 France

SEV 1025 Switzerland

For contactors, thermal overload relays and starters, the necessary approval has been obtained from those countries with comprehensive test, partial test and compulsory labelling. CSA and UL listed.

Most devices have approved for use on ships by Bureau Veritas, Lloyds of Germany and Registro Italiano Navale (nominal values in accordance with IEC); U.S.A. Marine and Lloyds Register of Shipping (nominal values as per CSA) and UL Marine (nominal values as per UL).

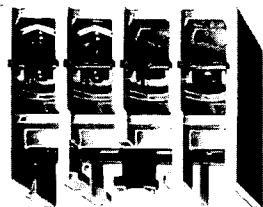
## Technical Information



### Open terminals

The terminals are opened at the factory in order to save an operation. Unused open terminals are seated firmly in the unit and cannot fall out. The uni-

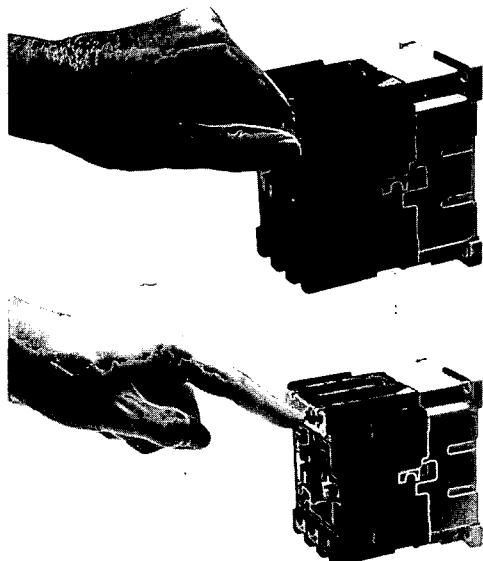
versal slot screws can be tightened with conventional or cross slot screwdrivers. Guides simplify the insertion of machine screws.



### Limit stop

Widely opened terminals permit trouble-free conductor insertion. A limit stop prevents the con-

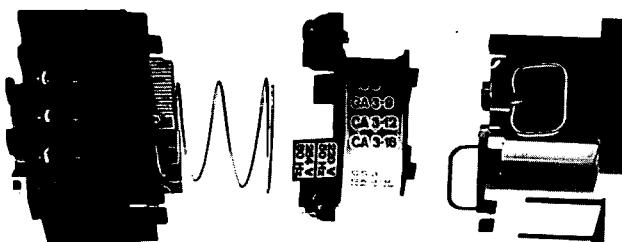
ductor from being pushed into the contact space when connecting.



### Touch protection

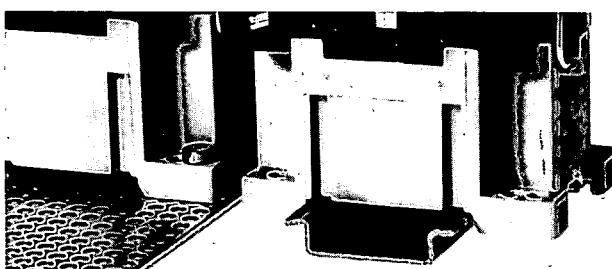
The live parts of the unit are protected against accidental touching and correspond to specification VBG 4.

	Finger protected	Back of hand protected
Contactors		
CS 3 (C), CA 3-9 (C)...CA 3-30	●	●
CA 3-37-N...CA 3-72-N (without cover)	●	●
with cover (see page 22)	●	●
Auxiliary contact blocks, accessories		
CS 3-P-..CA 3-P-..	●	●
CV 3, CZE 3, CZA 3	●	●
Thermal overload relays		
CT 3 K-12, CT 3 K-17	●	●
CT 3-12...CT 3-72	●	●



### Rapid coil change

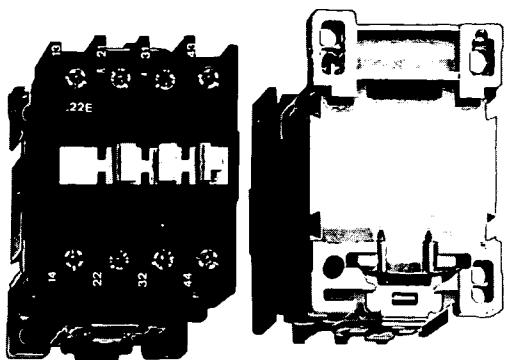
Special coil voltages are often required with export orders which necessitate a subsequent modification to the contactor. The contactor coils of contactors up to CA 3-30 can be changed in a few seconds without the need of tools: Two screws need to be loosened with the CA 3-43-N...CA 3-72-N contactors.



### Mounting

Numerous possibilities on base plates or perforated plates with 5 mm grid.

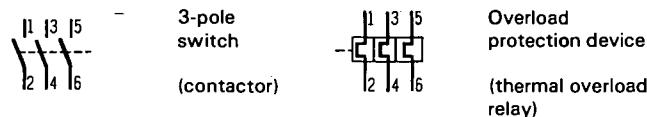
- Integrated snap fitting onto mounting rail EN 50 022-35 to CA 3-30. Restraint against sideways movement during operation.

**To international standards**

Terminal markings, number and type of auxiliary contacts as well as fixing dimensions comply with the European Standard.

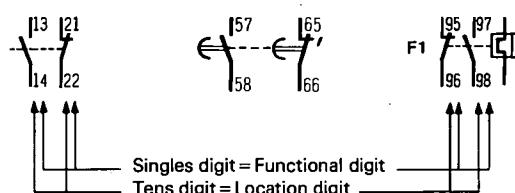
**European Standards**

In the European Standard EN 50 005, CENELEC (the European Committee for Electro-Technical Standards) has laid down uniform terminal markings and references for industrial low voltage switchgear.

**Main contacts for contactors and starters**

The main contact terminal are designated with single digit numbers.

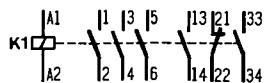
Non-delayed auxiliary contact elements      Delayed auxiliary contact elements      Overload protection device auxiliary contact elements



**Auxiliary contacts for contactors and starters**  
Auxiliary contacts are designated with two digit numbers. The two terminals of a contact always display the same location digit.

Example:  
Contactor CA 3-12-21

Reference numbers

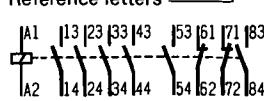
**Reference  
Contactors**

The number and type of auxiliary contacts is given with a reference:  
First digit: number of n/o contacts  
Second digit: number of n/c contacts

The European Standard EN 50 012 also specifies the terminal markings of n/o and n/c contacts of each reference for contactors having up to 5 auxiliary contacts.

Example:  
Control relay CS 3-62-E

Reference numbers

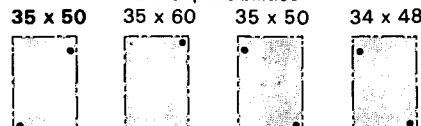
**Control relays**

On control relays complying with the European Standard EN 50 011, the reference can be extended by a reference letter. The reference letters E and Y refer to preferred arrangements through which the location of the contacts and terminal markings are clearly specified. The arrangement

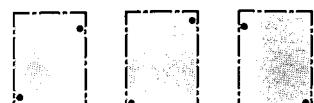
digit is also the location digit. The CS 3 control relay arrangements shown in this catalogue at the present time having references with no reference letters, correspond to the contact arrangement most often used. The terminal markings comply with EN 50 005.

**CS 3, CA 3-9...CA 3-16**

Further possibilities

**CA 3-23, CA 3-30**

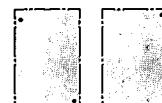
45 x 50    45 x 60    45 x 55...57

**Drilling plan**

Two of the fixing holes conform to the preferred vertical distance between holes of 50 mm complying with EN 50 002/EN 50 003. The horizontal distance between fixing holes on the CS 3 control relay and the CA 3-9...CA 3-16 contactors conforms with the widely used measurement of 35 mm. Further holes permit the use of other frequently used drilling plans.

**CA 3-37-N...CA 3-72-N**

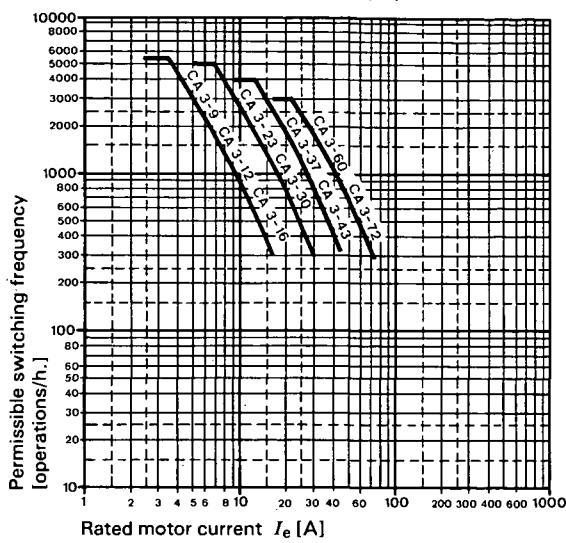
60 x 90    60 x 100



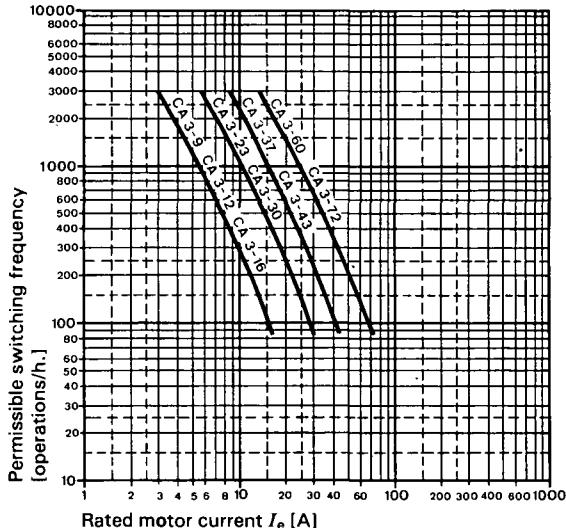
## Technical Information

### Permissible contactor switching frequency

**Interruption of running squirrel cage motors (AC-3)**  
run-up time  $t_A = 0.25$  sec; relative duty cycle 40%

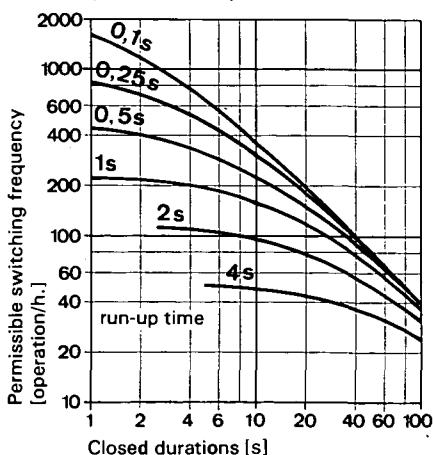


run-up time  $t_A = 1$  s

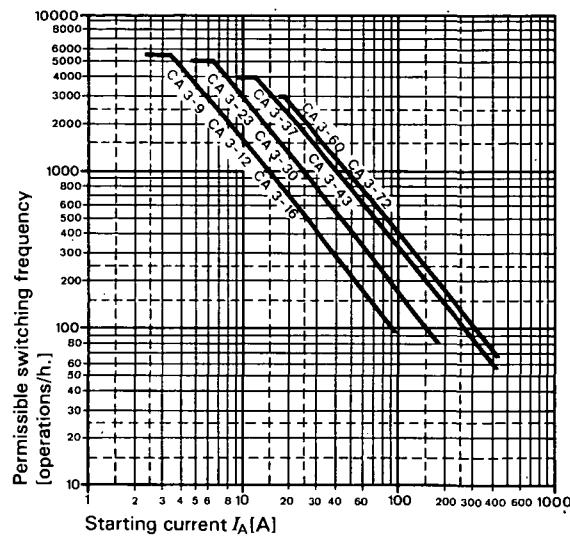


### Permissible switching frequency of the thermal overload relays (no tripping: for starters check contactors according to above diagrams)

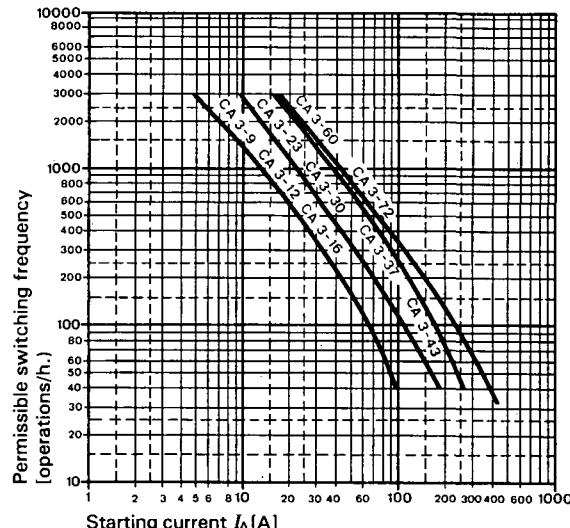
**Starting current  $I_A = 4 I_e$**   
e.g. direct-on-line starting of IEC standard motors up to 0.75 kW  
 $I_A = 2.3 I_e$  with CTY relay, with the star-delta starting)



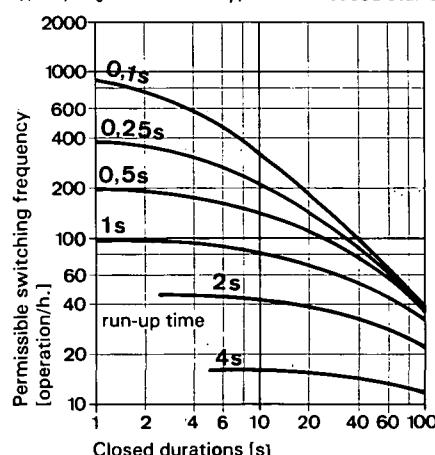
**Interruption of motors during starting (AC-2 and AC-4)**  
duty cycle  $t_{ED} = 0.25$  s ( $< t_A$ )



duty cycle  $t_{ED} = 1$  s ( $< t_A < t_A$ )



**Starting current  $I_A = 6 I_e$**   
e.g. direct-on-line starting of IEC standard motors larger than 1.1 kW  
 $I_A = 3.5 I_e$  with CTY relay, with increased star-delta starting)

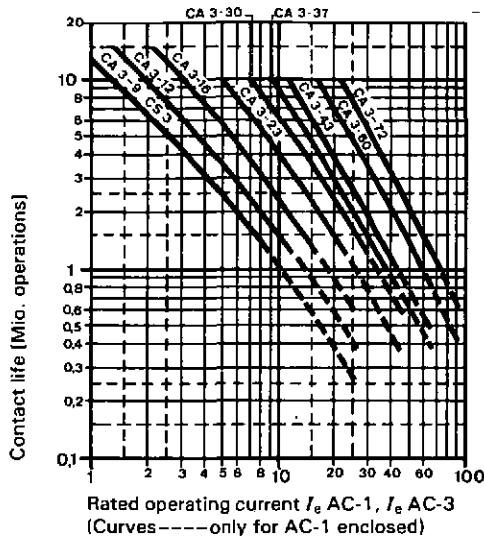


**Electrical life**

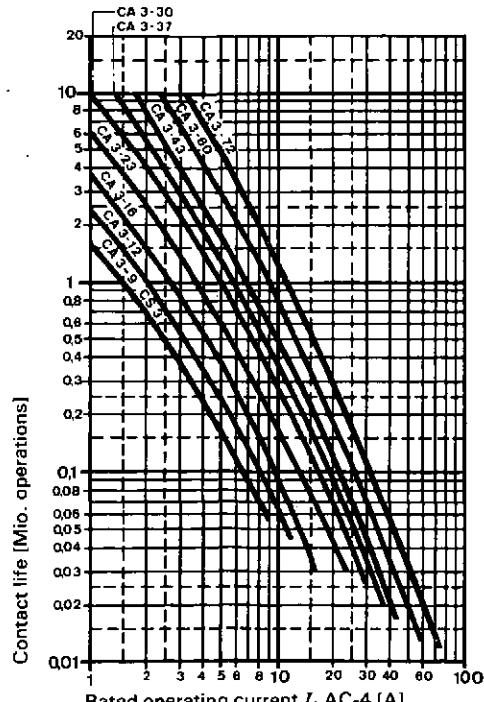
The diagrams below are valid for the operating conditions of the duty classifications AC-1...AC-4 at 380/415 V, 50/60 Hz defined in IEC 158-1.

$I_e$  Rated operational current       $U_e$  Rated operational voltage  
 $I$  Making current       $U$  Voltage before make  
 $I_c$  Breaking current       $U_r$  Recovery voltage

- AC-1** Non, or lightly inductive loads, resistance furnaces  
**AC-3** Interruption of running squirrel cage motors



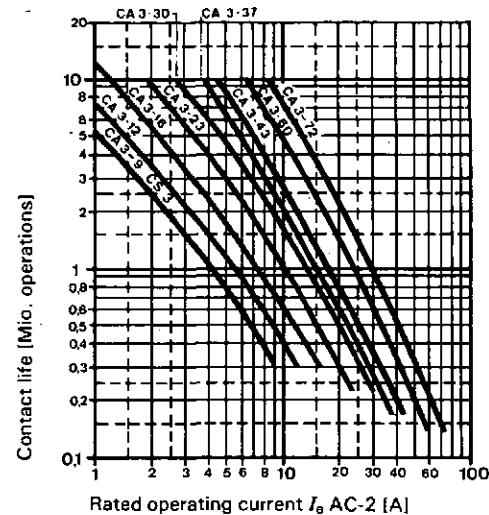
- AC-4** Inching (jogging) of squirrel cage motors



Switching conditions for proof of electrical life (number of operations under load) in compliance with 158-1 (AC-2 in compliance with UTE, NF C 63-110).

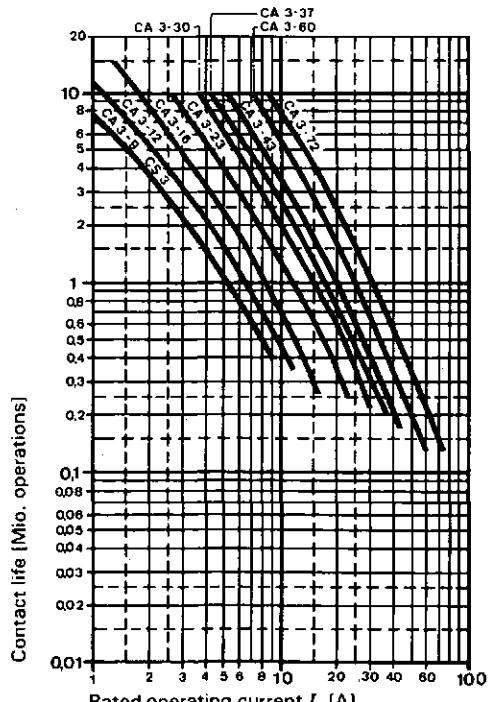
Duty Classification	Make $I/I_e$	Breaker $I_c/I_e$	$U/U_e$	$\cos\phi$	$U_r/U_e$	$\cos\phi$
AC-1	1	1	0.95	1	1	0.95
AC-2	2.5	1	0.65	2.5	1	0.65
AC-3	$I_e \leq 17$ A	6	1	0.65	1	0.17
	$I_e > 17$ A	6	1	0.35	1	0.17
AC-4	$I_e \leq 17$ A	6	1	0.65	6	1
	$I_e > 17$ A	6	1	0.35	6	1
						0.35

- AC-2** Inching (jogging) of slip-ring motors

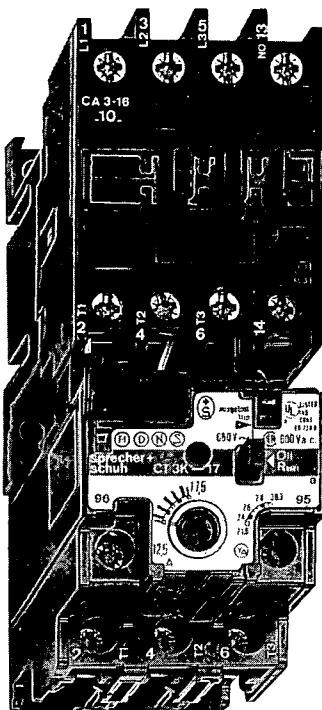


- Mixed duty with squirrel cage motors**

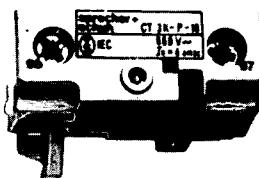
AC-3 90% Interruption of running squirrel cage motors  
 AC-4 10% Inching (jogging)



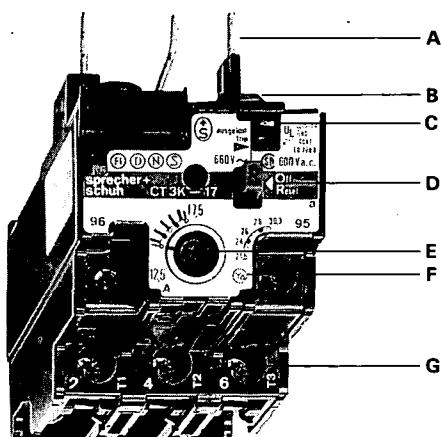
## Technical Information



Contactor with CT 3 K thermal overload relay attached



CT 3 K-P-10 auxiliary contact block pluggable onto thermal overload relay as an isolated auxiliary contact



CT 3 K thermal overload relay

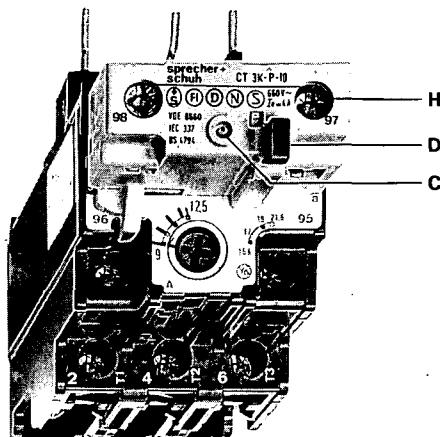
- A Electrical connection/mechanical attachment pins for direct attachment to contactors CA 3-9 (C), CA 3-12 (C), CA 3-16 (C).
- B Built-in wire connection from triggering contact (95) to coil (82). Can be removed if required.

**Reliable motor protection- a matter of confidence**  
Sprecher + Schuh has always paid particular attention to motor protection and to the production of top-quality motor protection equipment. Although they are simple and inexpensive devices, thermal overload relays are expected to reliably protect the motor against overloads. This requirement necessitates a high order of tripping accuracy and consistency. For trouble-free operation, tripping must be completely independent of installation location, installation position and ambient temperature. The consistently high quality of Sprecher + Schuh thermal overload relays is ensured by a complex longtime limiting current calibration procedure. Each individual unit is calibrated for the smallest and largest current. The accurate time/current characteristic curve obtained in this manner guarantees reliable motor protection for the user who must merely check that the wiring and the adjustment are correct.

### Perfect motor protection even in the event of phase failure

For motors rated up to 10 kW, the 2-phase trip at max.  $1.25 I_{eF}$  guarantee a heat buildup limitation to the value which occurs in the event of a 3-phase trip at  $1.2 I_{eF}$  (maximum permissible trigger current according to IEC 292-1). This conclusion can be drawn from a study of the numerous published articles dealing with this topic and from our own extensive practical experience.

Although the CT 3 K thermal overload relays possess no differential single-phasing protection, they nevertheless trip under 2-phase conditions at a maximum of  $1.25 \times$  set current ( $I_{eF}$ ) (IEC specifies a permissible value of  $1.32 I_{eF}$ ). This is achieved by the precision direct current calibration procedure: after a prolonged heating-up period until stable temperature relationships between all elements are established, the thermal overload relay is adjusted to trip under 3-phase conditions at  $1.13 \dots 1.14 I_{eF}$ . In this manner, the CT 3 thermal overload relays guarantee perfect motor protection even in the event of a phase failure.



With plugged on auxiliary contact block

- C Switch setting indicator (thermal overload relay ready for operation or tripped)
- D Red O/R button: an integral off button for test tripping and resetting.
- E Direct start current adjustment scale with setting knob.
- F Auxiliary scale for adjusting current for star delta starting.
- G Front mounted trigger contact connections.
- H Signal contact connections.

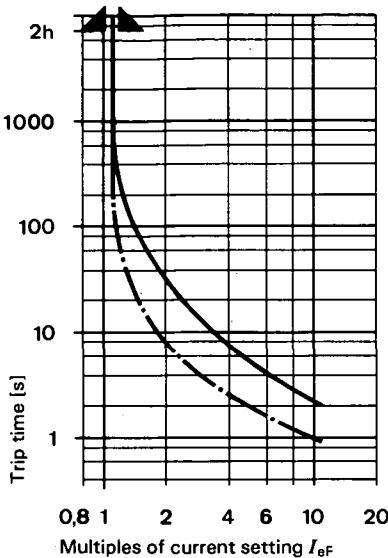
**Time/current characteristics of thermal overload relay (thermally delayed overload relay)**  
 Mean value of tolerance bands three-phase heated. — curves relate to relay cold - - - - - curves relate to relay at operating temperature (at set current load.). Tolerance: trip time  $\pm 20\%$  ( $\pm 10\%$  for current). Function limits and temperature compensation from  $-25^\circ\text{C}$ ...  
 $+70^\circ\text{C}$ .

Tripping limits specified in IEC 292-1 for  
-5°C...+40°C are satisfied in range -20°C...  
+60°C

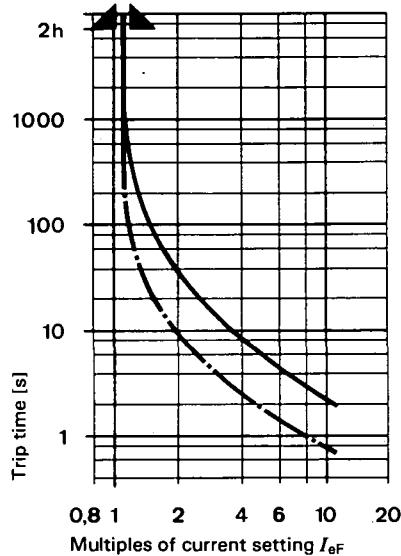
 specified points relative to operating temperature state in compliance with IEC 292-1 (type 1) and SEV publication 138.

**Two-phase loading (phase failure):**  
 Trip limits 1.05...1.32 of set current  $I_{\text{ef}}$  in accordance with IEC 292-1. For motors up to 10 kW, the two-phase trip at max. 1.25  $I_{\text{ef}}$  guarantees heat buildup limitation to the value which occurs on a threephase trip at 1.2  $I_{\text{ef}}$ .

CT 3 K-12, 0,1...4 A



**CT 3 K-12, 4...12,5 A CT 3 K-17, 12,5 ...17 ,5 A**



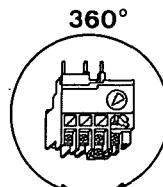
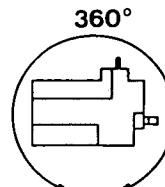
#### **Coordination with short-circuit protection**

Setting range		For fitting to contactor CA...		Max. current rating of backup fuse [A] <sup>1)</sup>	
Direct on-line starting [A]	Star-delta starting [A]			«B»	«C»
<b>CT 3 K-12</b>					
0.1 ... 0.15 <sup>4)</sup>	0.17 ... 0.26 <sup>4)</sup>	3-9 (C)	25	0,63 <sup>2)</sup>	
0.15 ... 0.23 <sup>4)</sup>	0.26 ... 0.40 <sup>4)</sup>	3-12 (C)	25	1	<sup>2)</sup>
0.23 ... 0.35 <sup>4)</sup>	0.40 ... 0.61 <sup>4)</sup>	3-16 (C)	25	2	
0.35 ... 0.55	0.61 ... 0.95		25	2	
0.55 ... 0.80	0.95 ... 1.40		25	2	
0.80 ... 1.20	1.40 ... 2.10		25	4	
1.20 ... 1.80	2.10 ... 3.10		25	4	
1.80 ... 2.70	3.10 ... 4.70		25	6	
2.70 ... 4	4.70 ... 6.90		25	10	
4 ... 6	6.90 ... 10.40		25	16	
6 ... 9	10.40 ... 15.60		25	20	
<b>9 ... 12.50</b>	<b>15.60 ... 21.60</b>	<b>12(C), 16(C)</b>	<b>40</b>		<b>25</b>
<b>CT 3 K-17</b>					
12.5 ... 17.5	21.6 ... 30.3	3-16 (C)	40		36

<b>Rated insulation voltage</b>			
Main and control circuit	IEC CSA/UL	AC AC	660 V 600 V
<b>Auxiliary contacts</b>	see page 50		
<b>Connections</b>	see page 13		
<b>Contacts</b>	Terminal markings in accordance with EN 50 005		

#### **Installation and current settings**

- Mounted on vertical surface, any orientation: setting current  $I_{eF}$  = rated operating current  $I_e$  of motor.
  - Mounted on horizontal surface with scale facing up: setting current  $I_{eF} = 0.91 I_e$ .



1) Aux. contacts: short-circuit protection without contact welding, in accordance with IEC 337-1 B

IEC 337-1 B.  
Contactor with thermal overload relay:  
Short circuit coordination type «a» according  
to IEC 292-1 A, contact welding or open-cir-  
cuit on thermal overload relay possible at high  
shorting currents.

Short circuit coordination type «c» according to IEC 292-1 A, easily defeated contact well.

ding possible. Thermal overload relay time/current characteristic remains unchanged, no other damage.

Low voltage and HRC fuses in accordance with IEC 269-2 and -3, gl, gll; VDE 0636/2 and /3, gL; SEV 1010, T; SEV 1018, T 2; SEV 1066, Gl; e.g. Sprecher + Schuh types SM and SN 2, GEC English Electric types T and GTF..., Siemens type 3 NA 1, slow acting screw-type fuses (DT). One current rating setting higher is

permissible in each case (max. 1.6  $I_n$ ) for fast acting screw-type fuses (D). Backup fuses in function of unaffected mains short-circuit current and welding protection available on request.

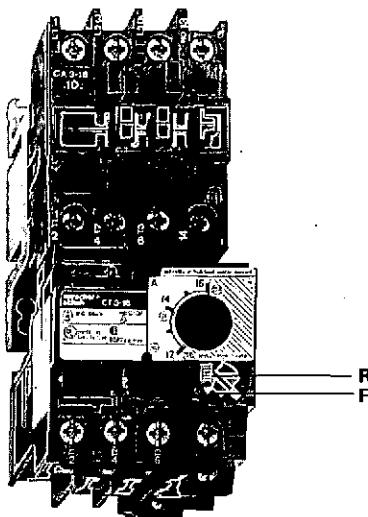
Not admissible according to SEV-HV.

Not admissible according to SEV-ITV.  
Max. 36 A according to SEMKO, DEMKO,  
NEMKO, Finland.

Not approved by DEMKO

Not approved by CSA and UL.

## Technical Information



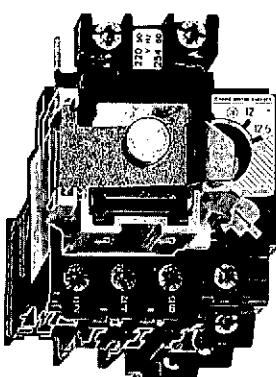
**CA 3-16 contactor with  
CT 3-16 thermal overload relay attached**

**Thermal overload relay for universal application**  
Thermal overload relays with special characteristics and additional equipment are required for specific applications: differential tripping, selectable automatic reset, attachable accessories such as reset rod, reset magnet and base for separate mounting. The CT 3 thermal overload relays fulfill all these requirements. When necessary, they are used in place of the CT 3 K thermal overload relays up to 12.5 A. Above this value, all thermal overload relays are of the universally useable type CT 3.

### Differential tripping for motor protection in the event of phase failure

Differential tripping must be provided for motor rated above 7.5 kW for reliable motor protection. This results in accelerated tripping in the event of a phase failure.

Motors rated below 7.5 kW are reliably protected by the CT 3 K thermal overload relay (without differential tripping). The more complex CT 3 thermal overload relays should be used only when has differential triggering, special thermal overload relay sensitive to phase failure or accelerated tripping in the event of phase failure are expressly requested.



**CA 3-12 thermal overload relay with  
CMR 3 reset magnet**

### Top-quality trip action

The CT 3 thermal overload relays are also subjected to a protracted limiting current calibration. Every thermal overload relay is individually calibrated for the lowest and highest current. The accurate time/current characteristic curve obtained in this manner guarantees reliable motor protection for the user who needs only check for correct wiring and adjustment.

The CT 3 thermal overload relays possess high tripping accuracy and consistency. Tripping is in no way dependent on the installation location, the mounting position or the ambient temperature.

### Completely equipped

- Function selection knob for the manual or automatic selection reset mode
- Third setting for test tripping with reset button
- Slider for checking the snap-action contact manually
- 3 labelling options: self-adhesive paper labels, paper tags or clip-on tags
- Integrated signal contact

### Operational selector-setting knob (F)

Set to required operation	test	man.	auto.
Automatic reset	No	No	Yes
Depressing button (R) gives rise to	Relay reset	Yes	Yes
	Contactor switch-off	Yes	No
			Yes

### Isolated signal contact

The integral signal contact (n/o) is isolated from the tripping contact (n/c). This permits the selection of trip signal voltage other than that of the control voltage.

### Simple module system

- Can be directly attached to a number of contactors
- Base for separate mounting with input terminals and integrated snap-action attachment for EN 50 022-35 top hat rails
- Attachable reset rod for reset button extention
- Attachable reset magnet for remote reset



**Base for separate mounting**

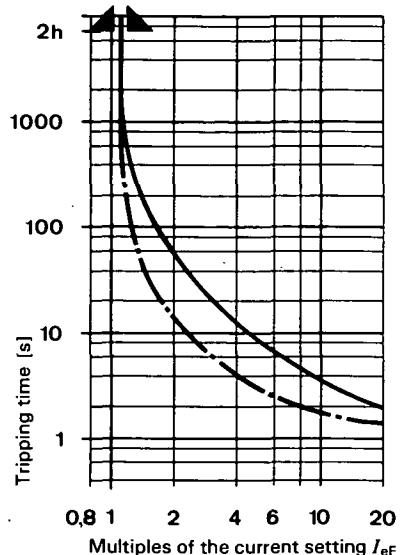
**Thermal overload relay time/current characteristic (thermally delayed over-current relay)**  
 Mean value of tolerance bands, heated in three phases. Curves — from cold state, curves - - - in operationally warm state (loaded with the set current). Tolerance: trip time  $\pm 20\%$  ( $\pm 10\%$  for current).

Function limits and temperature compensation from  $-25^{\circ}\text{C} \dots +70^{\circ}\text{C}$ . Tripping limits specified in IEC 292-1 for  $-5^{\circ}\text{C} \dots +40^{\circ}\text{C}$  are satisfied in range  $-20^{\circ}\text{C} \dots +60^{\circ}\text{C}$ .

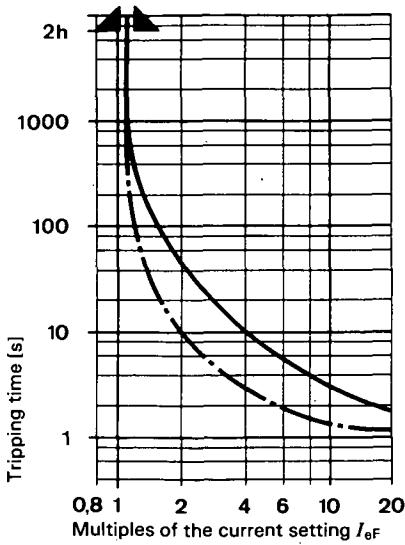
**Two-phase loading (single phase failure)**  
 Trip limiting current approx. 85% of the 3-phase trip limiting current

Specified points from the cold state in compliance with SEV-Publication no. 138 (quality sing)

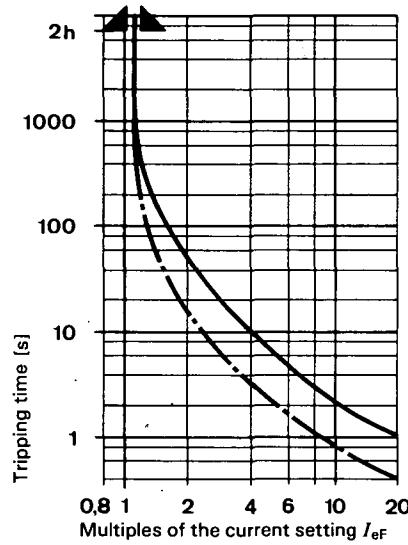
**CT 3-12,**  
 0,1...0,16  
 ...  
 3,8...6 A



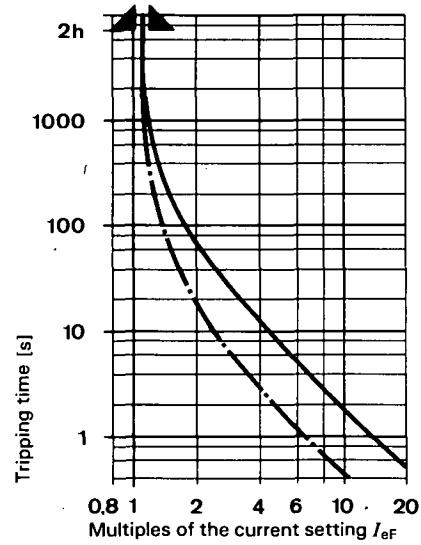
**CT 3-12, 6...9,5 A, 8,5...12,5 A**



**CT 3-17, CT 3-23, CT 3-32**



**CT 3-42, CT 3-52, CT 3-63, CT 3-72**



Setting range		For fitting to contactor co-ordination type CA 3-... «a»	Max. rated current of back-up fuse [A] <sup>1)</sup> «c»		
Direct-on-line starting [A]	Star-delta starting [A]		9 (C)	25	0.63 <sup>2)</sup>
<b>CT 3-12</b>					
0.1 ... 0.16	0.17...0.28	9 (C)	25	0.63 <sup>2)</sup>	
0.15...0.24	0.26...0.42	12 (C)	25	1 <sup>2)</sup>	
0.24...0.38	0.42...0.66	16 (C)	25	2	
0.38...0.62	0.66...1.07		25	2	
0.62...1	1.07...1.7		25	4	
1 ... 1.6	1.7 ... 2.8		25	4	
1.6 ... 2.5	2.8 ... 4.3		25	6	
2.5 ... 4	4.3 ... 6.9		25	10	
3.8 ... 6	6.6 ... 10.4		25	20	
6 ... 9.5	10.4...16.5		25	25	
8.5 ... 12.5	14.7...21.7	12 (C), 16 (C)	40	25	
<b>CT 3-17</b>					
12 ... 17.5	20.8...30.3	16 (C)	40	40 <sup>3)</sup>	
		23		40 <sup>3)</sup>	
		30		40	
<b>CT 3-23</b>					
16 ... 23	27.7...39.8	23		50	
		30		50	
<b>CT 3-32</b>					
23 ... 32	39.8...55.5	30		50	

Setting range		For fitting to contactor co-ordination type CA 3-...-N	Max. rated current of back-up fuse [A]	
Direct-on-line starting [A]	Star-delta starting [A]		«a»	«c»
<b>CT 3-42</b>				
25...32		43.3...55.5	37...72	80
32...42		55.5...72.5	37...72	100
<b>CT 3-52</b>				
40...52		70 ... 90	43, 60, 72	125
<b>CT 3-63</b>				
52...63		90 ... 110	60, 72	160
<b>CT 3-72</b>				
58...72.5		100 ... 125	72	160
<b>Rated insulation voltage</b>				
Main and control circuit		IEC CSA/UL	AC	660 V 600 V
<b>Auxiliary contacts</b>				
see page 50				
<b>Connections</b>				
see page 13				
<b>Mounting position:</b>				
any				
<b>Current adjustment:</b>				
adjustment current				
$I_{ef} = \text{rated current motor } I_e$				

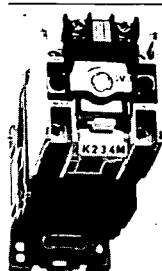
**Certification in accordance with PTB**  
 The CT 3-12 and CT 3-17 thermal overload relays are suitable for the protection of explosion-proof motors and can be used for electrical installations in hazardous locations as specified by VDE 0660/8.69 and VDE 0165/6.80.

Foot notes see page 47

## Technical Information

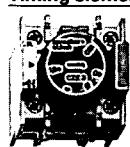
### CS 3 control relay and CA 3

contactor with CV 3 mechanical latch



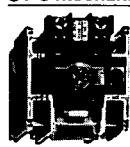
Pick-up power AC	same as for contactor without CV 3	(see pages 8...12)	
DC	CS 3, CA 3-9...CA 3-16	W	85
	CA 3-23...CA 3-30	W	130
	CA 3-37-N...CA 3-72-N	W	on request
Pick-up voltage	(on signal)	min./max.	
	CS 3, CA 3-9...CA 3-16	n · U <sub>s</sub>	0.80...1.1
	CA 3-23...CA 3-30	n · U <sub>s</sub>	0.85...1.1
	CA 3-37...CA 3-72-N	n · U <sub>s</sub>	0.85...1.1
Control voltage		AC	DC
Signal duration	(on signal)	s	0.05 min. 0.15...15 max.
Switching frequency	with 50 ms signal duration	ops./hr	3000 600
	at 15 s signal duration	ops./hr	240 30
Switching delay	(contacts on contactor)		
	on signal	ms	10...25
	off signal	ms	14...10

### Timing elements CZE 3, CZA 3



Mechanical service life	mill. of act.	5
<b>Repeatability</b>		
of set value and 1 mill. actuations under constant ambient conditions		
Adjustment range	0.3... 30 s	%
	1.8...180 s	%
		± 6 ± 10
Under changing ambient temp. conditions per 1 K	%	0.5
Setting: Logarithmic second scale for preselection: correction after timing		
Ambient conditions as for contactors (see page 6...12), with the exception of: extreme dust (filter choking) and cold moisture (icing)		

### CV 3 mechanical latch



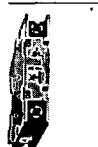
Mechanical service life	mill. of act.	3
Pick-up power	AC	VA (W) 45 (40)
	DC	W 25
Pick-up voltage	(off signal)	min./max. n · U <sub>s</sub> 0.6 ... 1.1
Signal duration	(off signal)	min./max. s 0.03...15
Switching frequency	30 ms signal duration	ops./hr 3000
	15 s signal duration	ops./hr 30
Switching delay	(contacts 57, 58, 65...68)	
	on signal	ms 24...45
	off signal	ms 6 ... 10

### CMR 3 reset magnet



Pick-up power	AC	VA (W) 90 (80)
	DC	W 30
Pick-up voltage	min./max.	n · U <sub>s</sub> 0.85...1.1
Dropout voltage	AC min./max.	n · U <sub>s</sub> 0.7...0.2
	DC min./max.	n · U <sub>s</sub> 0.7...0.1
Signal duration	AC min./max.	s 0.04...10 <sup>1</sup> )
	DC min./max.	s 0.04...10 <sup>1</sup> )

### CA 3-P-Z time-delayed auxiliary contact blocks



Mechanical service life	mill. of act	5
Switching delay	ON ms	approx. 40
	OFF ms	approx. 40

### RC voltage limiter links



For alternating current	RC link	CRC 3	
	Surge factor	n = U <sub>max.</sub> /U <sub>n</sub>	1 ... 2
For direct current	Diode link	CRD 3	
	Voltage limitation	n	0.2...0.8
	Switch-off delay		
CS 3 C, CA 3-9...CA 3-16 C		ms	60 ... 100
CA 3-23, CA 3-30			
CA 3-37-N...CA 3-72-N		ms	30 ... 40
Varistor link CRV-3			
Voltage limitation	n		1.2...2.5
			Switch-off delay unchanged see page 8...12

### Switching capacity of auxiliary contacts (auxiliary contact blocks, timing elements, mechanical latch, thermal overload relays)

Auxiliary contacts of

max. permissible  $I_{th}$  en-  
back-up fuse caps.

	[A]	[A]	48 V	110 V	220 V	240 V	380 V	415 V	440 V	500 V	660 V
Auxiliary contact blocks (aux.cont.oncontactor, s.p.8...12)											
Timing elements CZ..3	12	12	8	6,5	6	5,5	3	2,5	2	1,7	1
Mechanical latch CV 3											
Auxiliary contact block, time-delayed CA 3-P-Z	10	6									
Thermal overload relays CT 3, CT 3 K, cont. 95-96	10	4	4	3,5	3	2,5	1,6	1,4	1,25	1	0,15
cont. 97-98	6	4									

<sup>1)</sup> Operate in series only with early make/late break

50 22 02

Q-Pulse Id TMS612

Active 29/01/2014

Sprecher + Schuh

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Your responsibility  
for protection  
is on the line.



**NHP**  
SAFETY SWITCHES  
**Din-Safe RCDs**

## Din-Safe RCDs ARE THE PROTECTION SOLUTION



### **Protection is required by law**

Due to an increasing number of avoidable electrocutions, legislation throughout Australia has made the fitting of Residual Current Devices (RCDs) mandatory in new domestic installations.

While these units were once commonly known as 'Earth Leakage Circuit Breakers' - legislation now calls them 'Safety Switches' - they are known by most industry professionals as RCDs. Din-Safe RCDs are rapidly gaining a reputation as 'The Protection Solution'.

### **Preventing Electrocution**

Rarely electrocutions are caused by lighting or fixed appliances, the main danger is final sub circuits where faulty tools, portable equipment and appliances or damaged leads are connected.

In the United States and the United Kingdom, RCDs have been protecting people and property for many years. The United States Safety Council notes that since 1971 no electrocution has been recorded on domestic circuits fitted with RCDs.

### **Where RCDs are required**

For quite some time, RCD protection has been required on building sites, and in mines, hospitals and schools. And now, Standards Australia Technical Committees and Electrical Regulatory Authorities have agreed that RCD protection is required for all new

domestic installations whether they be new or existing. The only exceptions are outlets supplying fridges and freezers, where RCD protection is optional.

### **Respect for electricity remains essential**

While Din-Safe RCDs play an important role in the protection of life, it's still essential to remain safety-conscious and always take sensible precautions.

There are some instances where an RCD will not prevent an electric shock. For example, if a person contacts both an active and neutral wire, there may be no residual current to trigger the RCD. The body simply becomes part of the electric circuit. This would, of course, be a very rare situation.

### **Technical Support**

The Din-Safe range of Terasaki RCDs is backed by specialist technical support which is invaluable with the often unique requirements of the Australian market. Expert advice from NHP on the Din-Safe Protection Solution is only a phone call away.





### **What a Din-Safe RCD must do**

In accordance with Standards Australia AS3190-1990, a Din-Safe RCD has a rated residual current not exceeding 300mA; is designed for operation at low or medium voltage; has a rated load current not exceeding 100A A.C.; and is intended to isolate supply or initiate a tripping signal in the event of a current flow to earth in the protected circuit in excess of a predetermined level.

### **Testing**

In order to satisfy the requirements of this standard, comprehensive tests are carried out to verify that the Din-Safe RCD will operate successfully under all possible conditions.

### **Reliability**

Two separate reliability tests are carried out on the RCDs.

A 28 day climatic test at varying temperatures and humidity, and a second 28 day temperature rise test at 40°C ambient with the RCD carrying its rated current for 21 hours each day. At the conclusion of each test the RCDs must successfully trip when a residual current is applied. Also with the second test, the terminal temperature rise should not exceed 65°C.

### **Tripping Times**

RCDs are categorised into four types depending on their operating sensitivity and whether the operating time can be selected. The table shows the maximum allowable tripping time of RCDs at various percents of the residual current. The table below shows the maximum allowable tripping time. Naturally the higher the residual current the faster the operation needs to be to avoid injury.

### **MAXIMUM TRIPPING TIMES RCD**

RCD type	I	II	III	IV	
Sensitivity $I_{\text{th}}$	10mA	30mA	300mA	300mA (adjustable trip time)	
Test current	Maximum tripping time, ms			Tripping time, ms	
	RCD	Relay		Min.	Max.
100 ± 5 - 0 percent $I_{\text{th}}$	40ms	300	250	130	500
200 ± 5 percent $I_{\text{th}}$	40ms	150	100	60	200
500 ± 10 percent $I_{\text{th}}$	40ms	40	40	50	150

**THE PROTECTION**



## Din-Safe PROTECTION IN ACTION

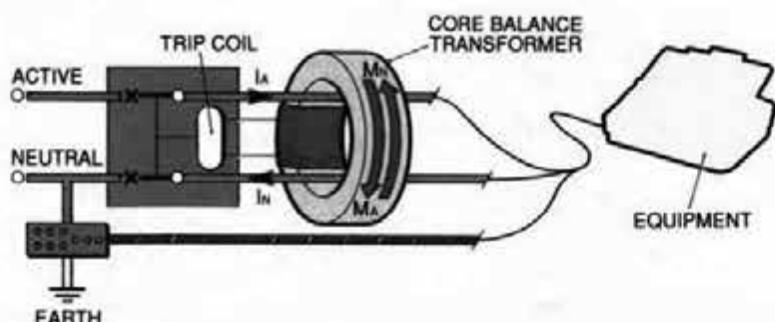
### Safe condition

- No residual current
- Single phase
- 240V connection
- Magnetic Field is Balanced and is Zero
- No Output from Secondary Winding to Signal Trip Circuit.

$I_A = I_N$

$M_A = M_N$

### BALANCED CIRCUIT



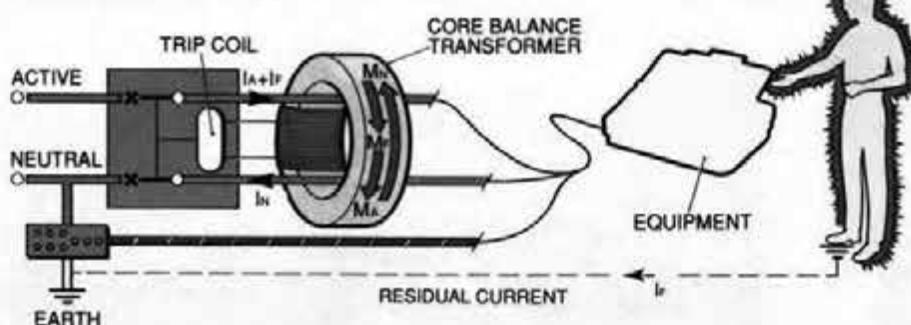
### Unsafe condition

- Residual current flowing
- Resultant Magnetic Field Produces Current in Secondary Winding.
- Trip Coil is Energised.

$I_A + I_F$  is Greater than  $I_N$

$M_A + M_F$  is Greater than  $M_N$

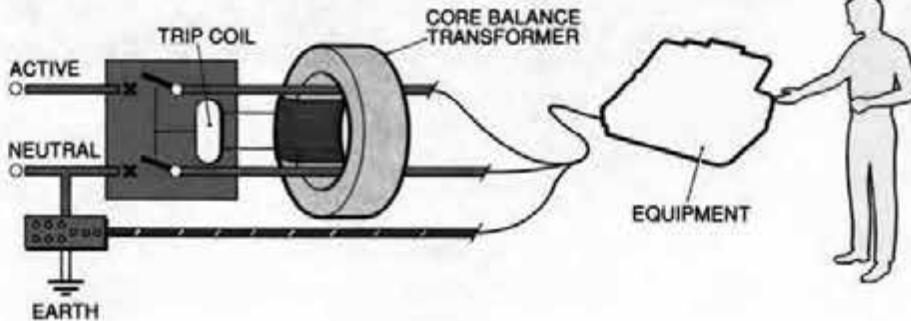
### DANGEROUS SITUATION



### Trip circuit activated

- Safety Switch Opens
- Electrocution is Avoided.

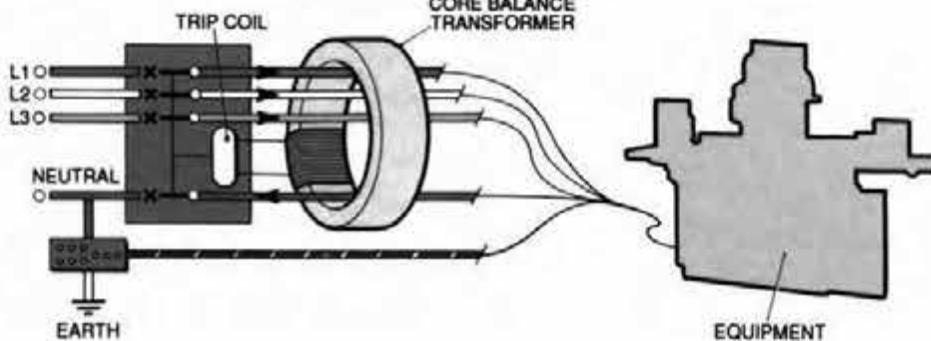
### RCD OPENS TO PROTECT LIFE

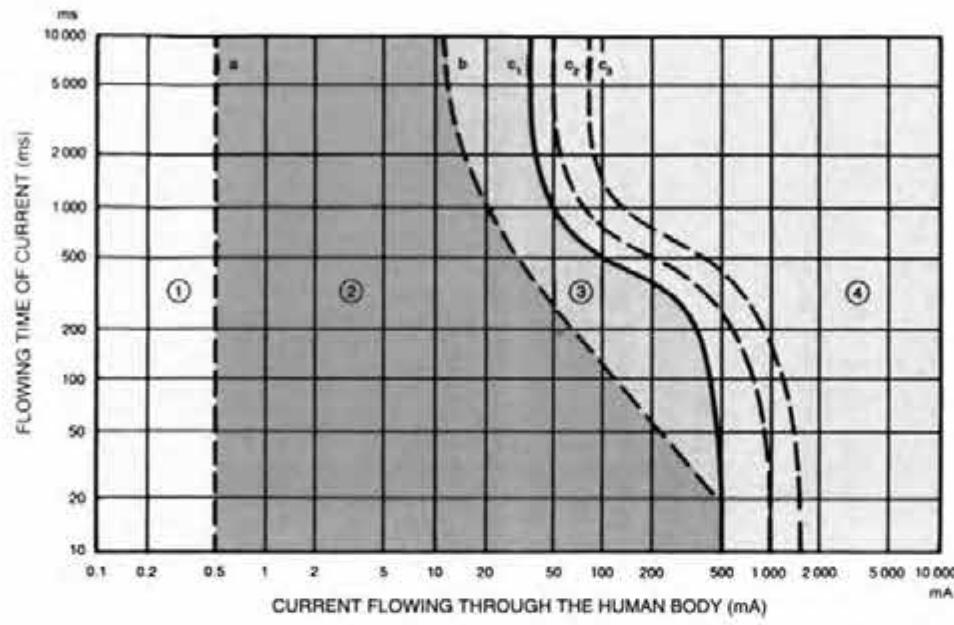


### 3 phase 415 Volt connection

- Principle of Operation is the same as Single Phase.

### TYPICAL 3 PHASE/4 WIRE ARRANGEMENT





TIME/CURRENT ZONE OF ALTERNATE CURRENT EFFECTS ON PEOPLE (15 TO 100Hz)

### How Din-Safe provides the protection solution

Both the speed with which the RCD responds, and its tripping sensitivity to a dangerous level of residual current, are critical specifications. This is because the severity of an electric shock is directly related to (a) the duration of the contact with a live appliance, and (b) the current's path through the body. The closer this path is to the heart, the worse the result.

Din-Safe RCDs operate on the electromagnetic principle of a balanced circuit. Through a toroidal transformer, the RCD continually monitors the magnetic field of the active conductor and the magnetic field of the neutral conductor as current passes through the protected circuit.

Under the normal conditions of a balanced circuit, these magnetic fields are equal. But under abnormal conditions, such as when a fault causes current to flow from the active conductor to earth, the residual current will increase the magnetic field of the active conductor.

The Din-Safe RCD detects the unbalanced circuit through the toroidal transformer and automatically cuts off the electricity supply to the protected circuit.

In terms of saving life and protecting equipment, that's why Din-Safe RCDs are regarded as the protection solution.

### Fast Operation

Din-Safe RCDs operate well within the safe operating time preventing any dangerous physical consequences. The table above shows the four zones of physiological effects on the human body when subjected to increasing residual current with increasing flowing time of that current. Therefore fast operation time as well as sensitivity of the RCD is significant in preventing injury.

### ZONES OF PHYSIOLOGICAL EFFECTS

**Zone 1** Normally no effect or consequences.

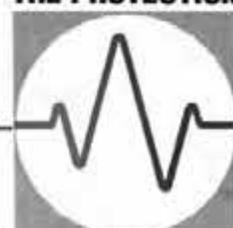
**Zone 2** Normally no dangerous physical consequences.

**Zone 3** Normally no organic damage. Possibility of muscle contraction, breathing difficulties and perturbation of heart beat including auricular fibrillation with temporary lack of cardiac pulsation without ventricular fibrillation. This increases with the current rating and time of exposure.

**Zone 4** In addition to Zone 3 effects, probable ventricular fibrillation increasing to 5% (C1) up to 50% (C2) and above (C3) increasing with current rating and time of exposure which can stop breathing function and heart beat and cause severe burns.

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**THE PROTECTION**

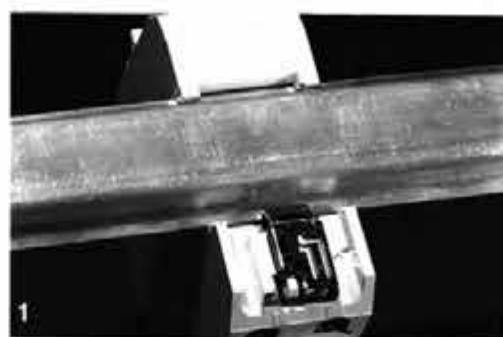


**SOLUTION**

## FEATURES OF THE Din-Safe PROTECTION SOLUTION

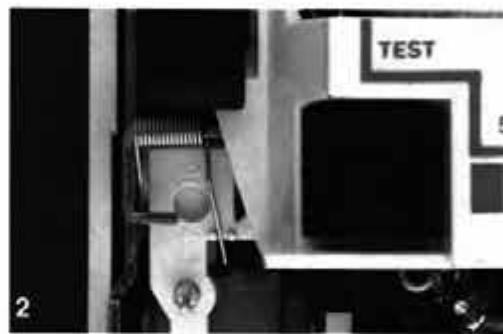
### Designed to be the first choice in protection

The range of Din-Safe RCDs are designed to provide reliable protection in appropriate applications. For domestic, commercial and industrial areas, there are Din-Safe RCDs to protect human life and property.



### 1. Installation

Ease of installation is a feature of the Din-Safe range. They mount directly onto 35mm DIN rail. The modular design of Din-Safe-M enables its direct attachment to DIN-T 9kA and 14kA MCBs.



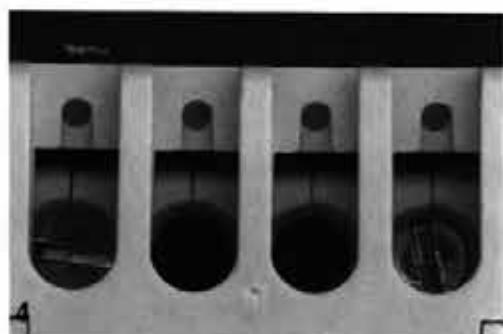
### 2. Test Trips

All Din-Safe units are fitted with test trip facilities to enable their recommended monthly operational test to be carried out easily.



### 3. Trip Indication

Trip Indication is standard on all Din-Safe units. The RCD's "on" or "tripped/off" status is clearly displayed either by an indicator window or by the toggle position.



### 4. High Quality

Thermoplastics are used in the manufacture of all Din-Safe products and terminal covers add to the unit's safety.



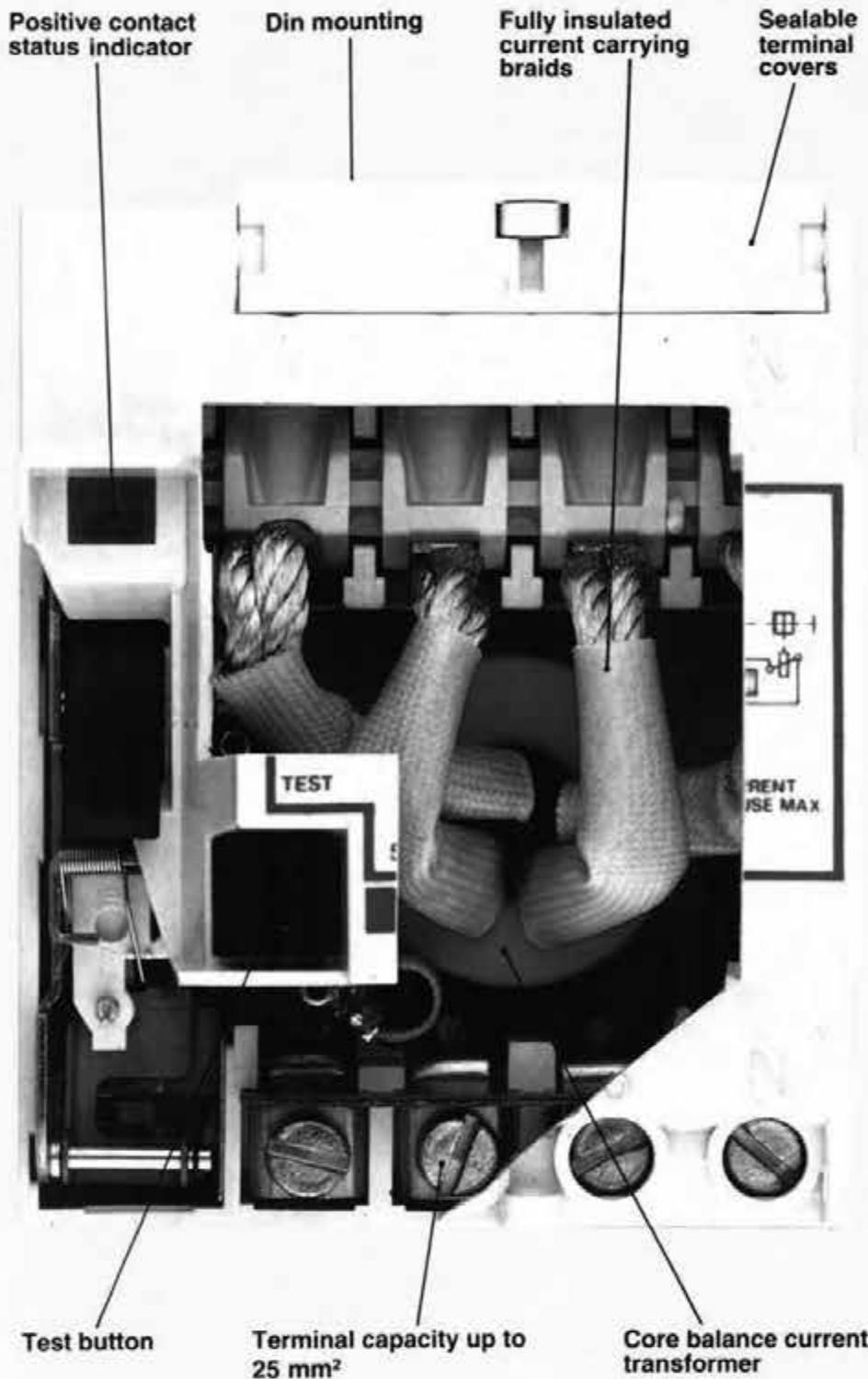
### 5. Meeting the Standards

The Din-Safe range of RCDs carries approval number N11649.

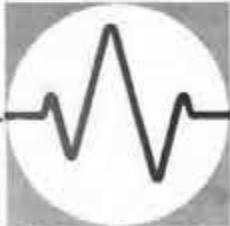
The NHP Din-T Din-Safe-M (module) range of RCDs carries approval number N11974.



**INSIDE Din-Safe**



**THE PROTECTION**



**SOLUTION**

## TESTING BEFORE AND AFTER INSTALLATION IS VITAL

In older installations, it's important to inspect the condition of the circuit wiring and cable insulation. Connections are sometimes incorrect and often the earth wire is burnt or corroded. This type of deterioration can cause unplanned or 'nuisance' tripping, so testing prior to RCD installation is essential.

### How to test before installation

There are two important tests to carry out prior to RCD installation. Before each test, it's essential to establish earth continuity.

1. Installation Resistance test. First, having isolated the circuit, disconnect the neutral at the neutral link and check earth continuity. Megger test Active-Earth and allow 250K ohm minimum. Megger test Neutral-Earth and allow a 40k ohm minimum. If these test readings are low, a separate megger test of the wiring and the equipment will isolate the problem.
2. Leakage test. With equipment plugged in and switched on, test active and neutral wires only - the earth wire must not be included. Allow a 10mA maximum. If the reading is high, test the wiring and the equipment separately. To test equipment, use a short extension lead with the earth wire separated so that the tong tester goes around active and neutral only.

### Important points:

- (a) The AS3000 wiring regulations

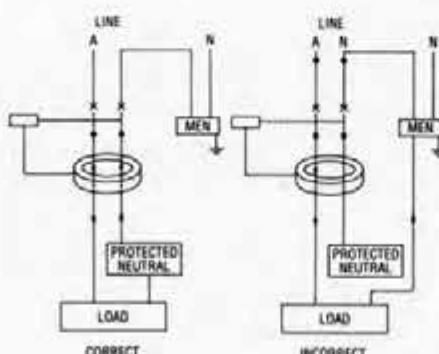
require that: insulation resistance of Active-Neutral and Active-Earth must be 1 megohm minimum; and earth continuity resistance from any earth point to the earth electrode must be 2 ohm maximum.

- b) As some equipment specifications permit up to 5mA leakage to earth (=48K ohms), it's important to ensure that the cumulative leakage of all connected equipment does not exceed 10mA.
- c) When testing the insulation resistance of the wiring plus equipment, allow 250K ohm (0.25M ohm) Active-Earth; and 40K ohm Neutral-Earth. During this test, equipment should be plugged in, but not switched on.

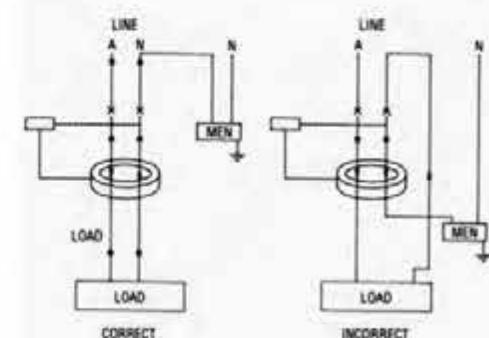
### How to test after installation

The following series of tests is strongly recommended.

1. Check that the RCD has been correctly installed and is protecting the intended circuit or circuits.
2. Ensure that the test button is functioning correctly.
3. Check the RCD's sensitivity and tripping time with an approved tester to verify that its calibration is within tolerance.
4. Residual test. Simulate an Active-Earth fault on the protected circuit by using a high resistance device such as a test lamp at the most distant power outlet from the RCD.
5. At the same outlet, connect a variety



**SAFETY SWITCH TRIPS ON LOAD  
INCORRECT NEUTRAL CONNECTION**



**SAFETY SWITCH TRIPS ON LOAD  
NEUTRAL NOT CONNECTED TO 'LINE' TERMINAL**

of typical equipment in turn. Things such as radiators, tools, and vacuum cleaners etc.

6. Establish that the end-user or operator knows how to use the test button and can reset the RCD.

#### **Planned tripping**

Din-Safe RCDs are designed to trip in the event of a dangerous earth leakage which can occur:

- a) via a person to earth causing loss of life,
- b) via equipment to earth causing a potentially devastating fire.

#### **Unplanned or "nuisance" tripping**

When an RCD trips unexpectedly without an earth leakage large enough to reach the threshold value, it is referred to as nuisance tripping. There can be a number of causes, but the most common is incorrect installation. Faulty appliances and equipment also cause nuisance tripping. This is why testing prior to installation to isolate and repair any pre-existing faults is essential.

A cumulative effect occurs when several pieces of equipment on the same circuit are each responsible for a small amount of earth leakage. This is insignificant in itself, but sufficient when combined to cause a nuisance trip. One cause of the problem is moisture inside equipment such as steam irons, washing machines and freezer defrost coils.

Similarly, inside kitchen and laundry equipment, dust with a carbon content can become moistured. The resulting contamination can allow a tracking path to develop between active conductors and earth.

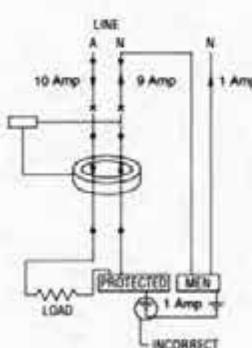
Solid state equipment containing thyristors can induce interference into the protected circuit to cause tripping.

External effects can also be responsible. These include lightning strikes and high frequency (electrical 'noise') disturbances, created by equipment such as welders, rectifiers and special purpose drive systems in nearby industrial installations.

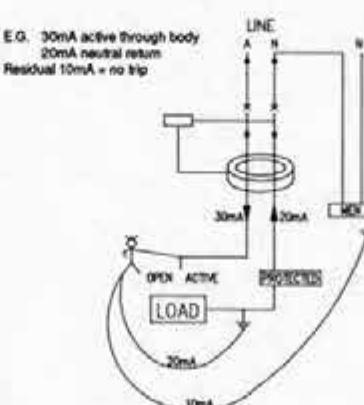
Designed to comply with the new requirements of AS3190, Din-Safe RCDs are immune to all but extreme levels of high frequency disturbance. However, it's still recommended that the cable feeding such circuits be segregated as much as possible.

#### **Non-operation**

Under some fault conditions an RCD will not trip. For example, when the earth leakage current is less than the RCD's trigger sensitivity (30mA). Or if a fault occurs between active conductors, or active and neutral. In these situations, an RCD will not trip unless it has an integral MCB or some other form of circuit protection. Also, if the wrong neutral is connected via the RCD tripping may not occur.



SAFETY SWITCH TRIPS ON LOAD  
PROTECTED NEUTRAL IS EARTHED



SAFETY SWITCH WILL NOT TRIP AT 30mA  
NEUTRAL TO EARTH FAULT

**THE PROTECTION**



## Din-Safe APPLICATIONS AND WIRING EXAMPLES

### There are Din-Safe RCDs to suit every situation

NHP offer a wide range of RCDs to cater for all requirements. For example, in one situation, the optimum plan may be to have a single RCD protecting an

entire installation. In another situation, a number of RCDs may be required to protect individual circuits. Here are some typical situations which should prove useful in establishing your RCD selection.

#### Din-Safe 2 POLE RCD

Din-Safe 2-63-30



#### Din-Safe 2 POLE RCD

Din-Safe 2-40-30



#### DOMESTIC APPLICATION

- Using a single Din-Safe 2-63-30, (without overload, 2 pole, 35mm width), to protect all power points.
- 30mA tripping current.
- Located in switchboard.
- Extra RCD neutral required.

- Retrofit requires service discrimination.
- No discrimination. A fault on any circuit will open all circuits.
- Economy could be negated by frequent service calls due to unplanned tripping.
- It's recommended that fridge and freezer power points be on a separate circuit.

#### COMMERCIAL APPLICATION - COMBINED PROTECTION

- Using a single Din-Safe 2-40-30, (2 pole, 35mm width) to protect all power points.
- Tripping current 30mA or 100mA.
- Existing overload protection remains.
- Located in switchboard. RCD neutral link required.
- Maximum total rating of power points is 80A.

- Retrofit on existing switchboard requires a 2 pole cover.
- Cumulative leakage from equipment and wiring may cause more frequent unplanned tripping.
- No discrimination. A fault on any circuit will open all protected circuits.
- Economy could be negated by the possibility of frequent service calls.

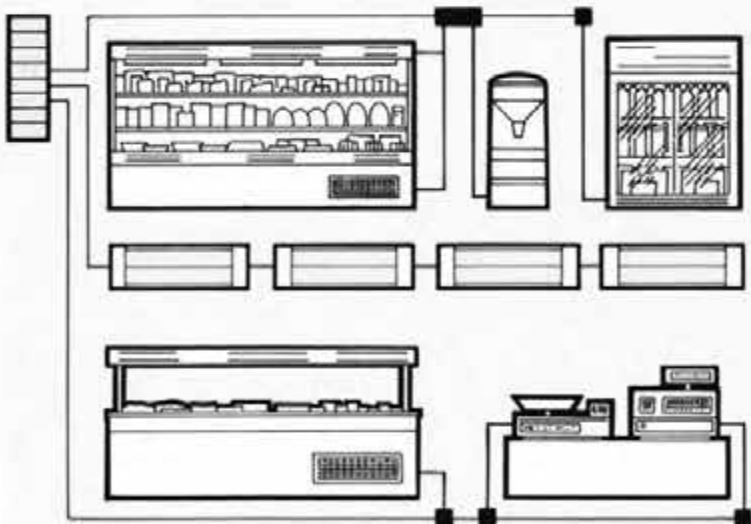
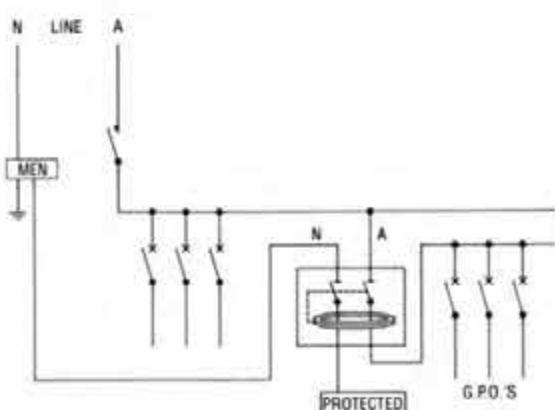
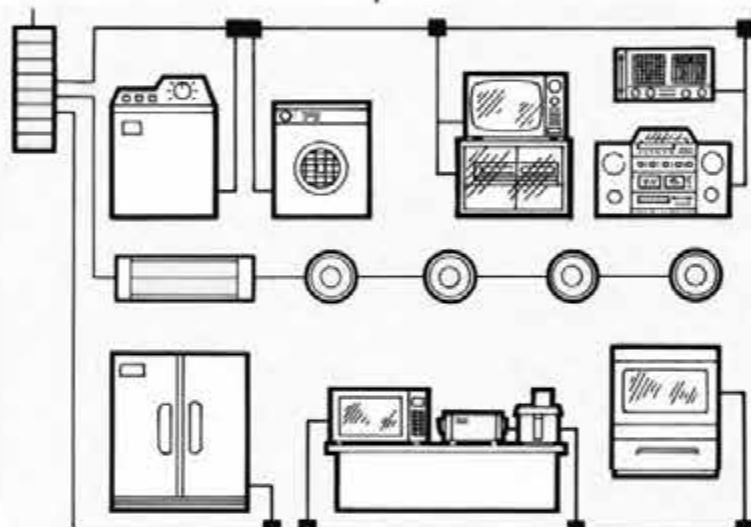
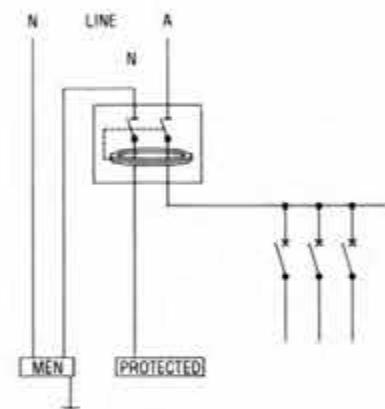
### Heavy Industrial RCDs

NHP also has a range of low-sensitivity heavy industrial RCDs specially designed for mining and heavy industrial plants.

These RCDs are designed primarily to protect equipment and electrical cables when low level earth faults occur. Protection is achieved by an external circuit breaker operating when the RCD detects unsafe conditions. (e.g. insulation breakdown, contamination, moisture in junction boxes.)

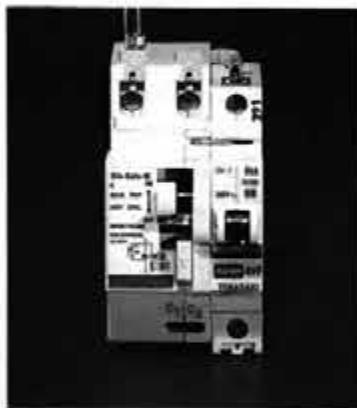
Heavy industrial RCDs prevent arc faults which can cause potentially devastating damage. They have lower

sensitivity than other RCDs as they need to cater for the increased earth leakage prevalent in heavy industrial equipment. They are available in 2 sensitivity ranges of 0.03 to 10Amp adjustable and instantaneous or adjustable time delay types. Time delay types are designed to prevent nuisance tripping during start up of large motors - and can also be used to achieve discrimination with instantaneous types.



### Din-Safe RCD MODULE PLUS SINGLE POLE MCB

Din-Safe-M1-32/30 c/w  
Din-T9116



### Din-Safe RCD MODULE PLUS TRIPLE POLE MCB

Din-Safe-M3-32/30 c/w  
Din-T9316



### Din-Safe 4 POLE MCB

Din-Safe 4-40-30



#### COMMERCIAL APPLICATION - INDIVIDUAL PROTECTION

##### Single Phase

- Using a Din-Safe-M combined RCD and MCB. One unit required per protected circuit.
- Tripping current 30mA, 100mA or 300mA.
- 54mm width includes single pole MCB.
- Rating 6A-32A, selected to suit cable.

- Located in switchboard, no extra neutral required.
- Retrofit on existing switchboard using surface mounted enclosures.
- Discrimination results in only a faulty circuit opening.
- Nuisance tripping is unlikely with individual circuit protection.
- Higher initial cost is offset by the greatly reduced chance of service calls due to the nuisance tripping which is possible when grouped circuit protection is employed.

#### INDUSTRIAL APPLICATION - INDIVIDUAL PROTECTION

##### Three Phase System

- Using a Din-Safe-M combined RCD and MCB. One unit required per circuit.
- Tripping current 30mA, 100mA or 300mA.
- 90mm width includes three pole MCB.
- Rating 6A-32A, selected to suit cable.

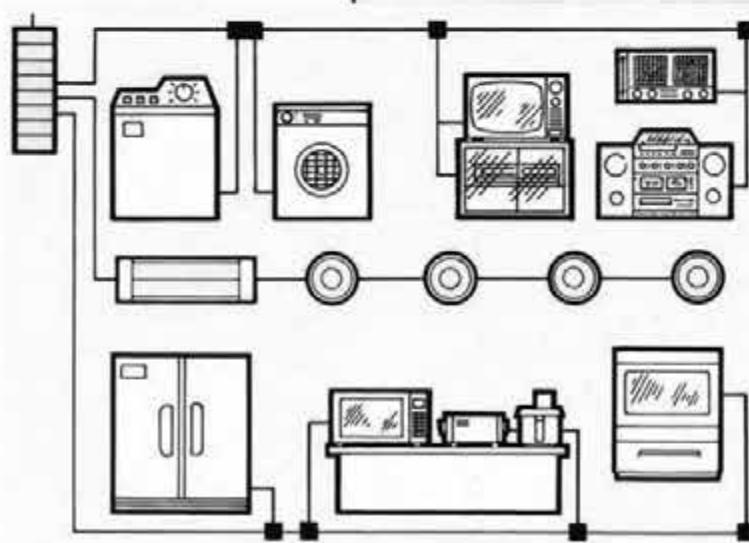
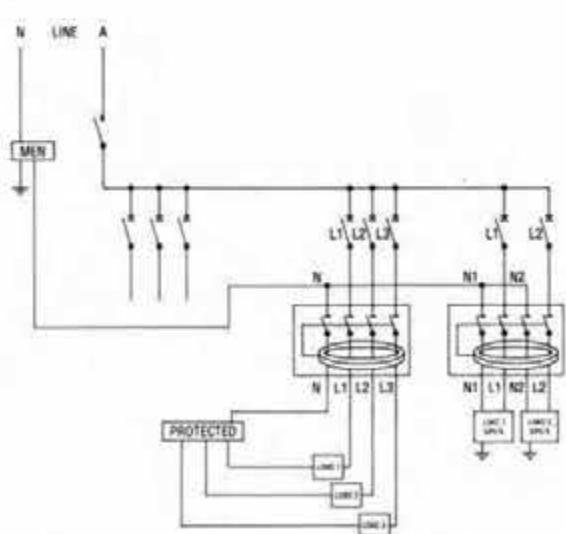
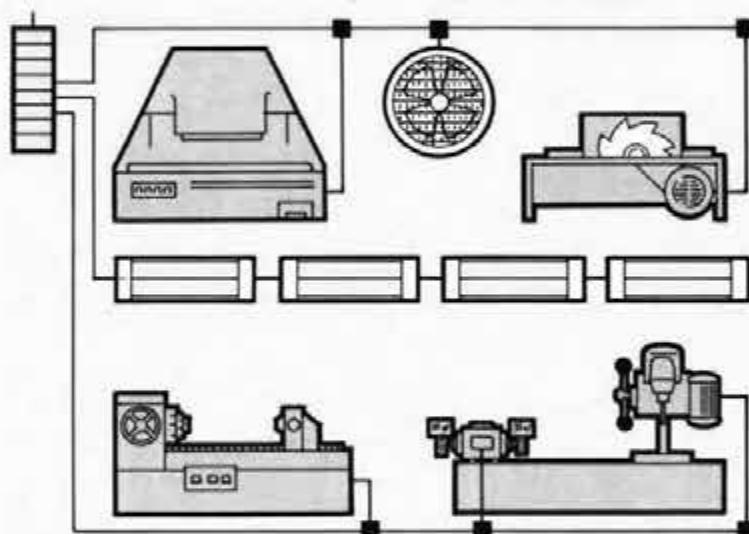
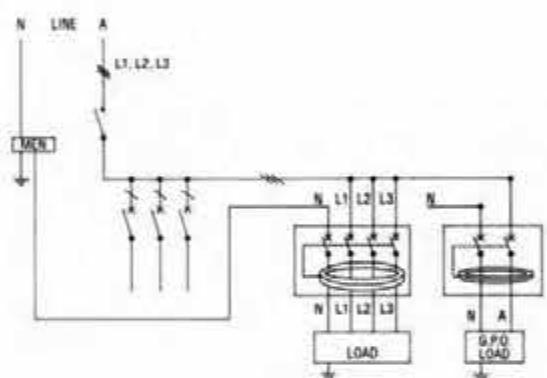
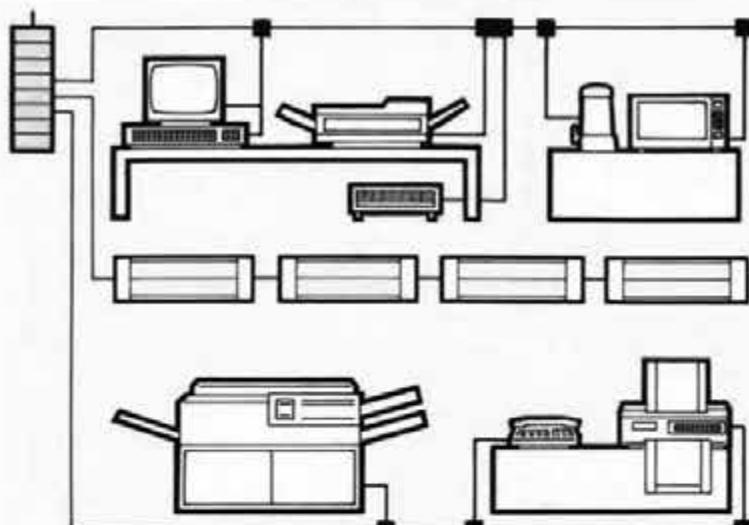
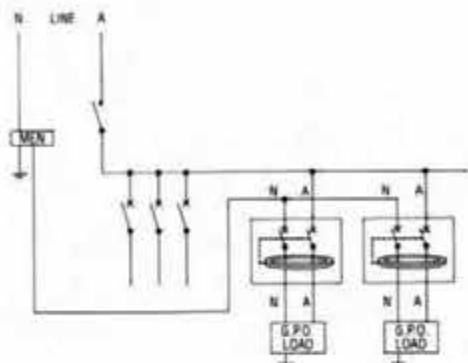
- Located in switchboard, no extra neutral required.
- Retrofit on existing switchboard using surface mounted enclosures.
- Discrimination results in only a faulty circuit opening.
- Unplanned tripping is unlikely with individual circuit protection.
- Higher initial cost is offset by the greatly reduced chance of service calls due to the nuisance tripping which is possible when grouped circuit protection is employed.

#### DOMESTIC APPLICATION

- Using a Din-Safe 4-40-30, (without overload, 72mm width)
- Rating (also available in 40, 63 and 80 Amps)
- Tripping current 30mA
- Existing overload protection remains.
- Connection can be NAAA (with the neutral link size to comply with AS 3000 clause 2.2.2.3 requiring the neutral reading to be the sum of the circuit ratings); or NANA.
- As current sharing is uncertain, do not parallel poles.
- Located in switchboard requires a 4

pole surface cover.

- Retrofit on existing switchboard requires a surface cover.
- Can be wired downstream from overload units on two or three circuits.
- Cumulative leakage from equipment and wiring will cause more frequent nuisance tripping than individual circuit RCDs.
- No discrimination. All protected circuits open when a fault occurs on any individual Din-Safe-M units, but not as low as a Din-Safe RCD. With no discrimination, service calls for unplanned tripping could occur.



## SPECIFICATIONS AND ORDERING INFORMATION

### Din-Safe 2 Pole Application

For protection of all circuits, the Din-Safe RCD can be used as a main switch.

For use on multiple overload and short circuit protected final sub-circuits requiring RCD protection.



• • • • • • • • • • •

### Specification

In accordance with Sensitivity	: AS3190-1990 : 30mA, 100mA, & 300mA*
Voltage	: 240V AC
Test Circuit	: 240V AC
Current Rating	: 40A, 63A, & 80A
Short time through current value	: 3kA r.m.s. (No HRC fuse protection as per AS 3190-1990 clause 9.13.3)
Poles	: 1 Pole & Neutral
Height	: 95mm
Width	: 35mm
Depth	: 68mm
Mounting	: 35mm DIN rail
Terminal Capacity	: 25mm <sup>2</sup> (line & load)

CAT. NO.	POLES	AMPS	SENSITIVITY
Din-Safe 2-40-30	2	40	30mA
Din-Safe 2-40-100*	2	40	100mA
Din-Safe 2-63-30	2	63	30mA
Din-Safe 2-63-100	2	63	100mA
Din-Safe 2-80-30	2	80	30mA
Din-Safe 2-80-100	2	80	100mA

### Din-Safe 4 Pole Application

For use on multiple overload and short circuit protected final sub-circuits requiring RCD protection.



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### Specification

In accordance with Sensitivity	: AS3190-1990 : 30mA, 100mA, & 300mA*
Voltage	: 415V AC/240V AC
Test Circuit	: 415V AC/240V AC
Current Rating	: 40A, 63A, & 80A
Short time through current value	: 3kA r.m.s. (No HRC fuse protection as per AS 3190-1990 clause 9.13.3)
Poles	: 3 Pole & Neutral
Height	: 92mm
Width	: 72mm
Depth	: 58mm
Mounting	: 35mm DIN rail
Terminal Capacity	: 25mm <sup>2</sup> (line & load)

CAT. NO.	POLES	AMPS	SENSITIVITY
Din-Safe 4-40-30	4	40	30mA
Din-Safe 4-40-100*	4	40	100mA
Din-Safe 4-63-30	4	63	30mA
Din-Safe 4-63-100	4	63	100mA
Din-Safe 4-80-100	4	80	100mA

Notes: 2 Pole Din-Safe 35mm wide  
4 Pole Din-Safe 72mm wide

\* Available on indent only.

**Din-Safe-M 1 Pole (1 Pole & Neutral) and Din-Safe-M 3 Pole (3 Pole & Neutral) Application**

When fitted to a Din-T 6kA, 9kA or 14kA 1 Pole MCB provides short circuit, overload and earth leakage protection for individual single phase circuits and 3 phase circuits.



Din-Safe-M  
1 Pole



Din-Safe-M  
3 Pole

**Specification**

In accordance with	:	AS3190-1990
Sensitivity	:	30mA, 100mA, & 300mA
Voltage	:	240V AC
Test Circuit	:	240V AC
Current Rating	:	0-32A & 40A-63A
Poles	:	1 Pole & Neutral 3 Pole & Neutral
Height	:	97mm
Width	:	54mm (includes 1 pole MCB) 0-32A 90mm * (inc. 3 pole MCB)
Depth	:	68mm
Mounting	:	35mm DIN rail
Terminal Capacity	:	16mm <sup>2</sup> for 0-32A (load side) 25mm <sup>2</sup> for 40A-63A (load side)

CAT. NO.	POLES	AMPS	Modules (without MCB)	SENSITIVITY
Din-Safe-M 1-32/30mA	1 & Neutral	32	2	30mA
Din-Safe-M 1-63/30mA	1 & Neutral	63	2	30mA
Din-Safe-M 1-32/100mA	1 & Neutral	32	2	100mA
Din-Safe-M 1-63/100mA	1 & Neutral	63	2	100mA
Din-Safe-M 1-32/300mA	1 & Neutral	32	2	300mA
Din-Safe-M 1-63/300mA	1 & Neutral	63	2	300mA
Din-Safe-M 3-32/30mA	3 & Neutral	32	2	30mA
Din-Safe-M 3-63/30mA	3 & Neutral	63	3	30mA
Din-Safe-M 3-32/100mA	3 & Neutral	32	2	100mA
Din-Safe-M 3-63/100mA	3 & Neutral	63	3	100mA
Din-Safe-M 3-32/300mA	3 & Neutral	32	2	300mA
Din-Safe-M 3-63/300mA	3 & Neutral	63	3	300mA

**Din-Safe-M6 modules (clip on) to suit  
Din-T6 MCBs**

CAT. NO.	POLES	AMPS	Modules (without MCB)	SENSITIVITY
Din-Safe-M6 1-32/30mA	1 & Neutral	32	2	30mA
Din-Safe-M6 3-32/30mA	3 & Neutral	32	2	30mA
Din-Safe-M6 1-32/100mA	1 & Neutral	32	2	100mA
Din-Safe-M6 3-32/100mA	3 & Neutral	32	2	100mA
Din-Safe-M6 1-32/300mA	1 & Neutral	32	2	300mA
Din-Safe-M6 3-32/300mA	3 & Neutral	32	2	300mA

Note: for 40, 50 and 63 Amp requirements use Din-T9 plus Din-Safe-M

**Note:**

Din-Safe Module is an Earth Leakage Relay only and must be used with a Circuit Breaker attached Din-T6kA, Din-T9kA or Din-T14kA .

**NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD**  
A.C.N. 004 304 812

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Fax: (03) 429 1075

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30 - 34 DAY STREET NORTH, SILVERWATER, N.S.W. 2141. Telephone: (02) 748 3444  
P.O. Box 259, ERMINGTON 2115  
Fax: (02) 648 4353

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39 COMMERCIAL ROAD, FORTITUDE VALLEY, QUEENSLAND 4006. Telephone: (07) 252 9517  
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Fax: (07) 252 3415

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Fax: (09) 272 3906

**NEWCASTLE:**

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Fax: (077) 75 1457

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**DARWIN:**

J. BLACKWOOD & SON LTD. (Inc. Tesco Pearce), MATARAM STREET, WINNELLIE, 0820  
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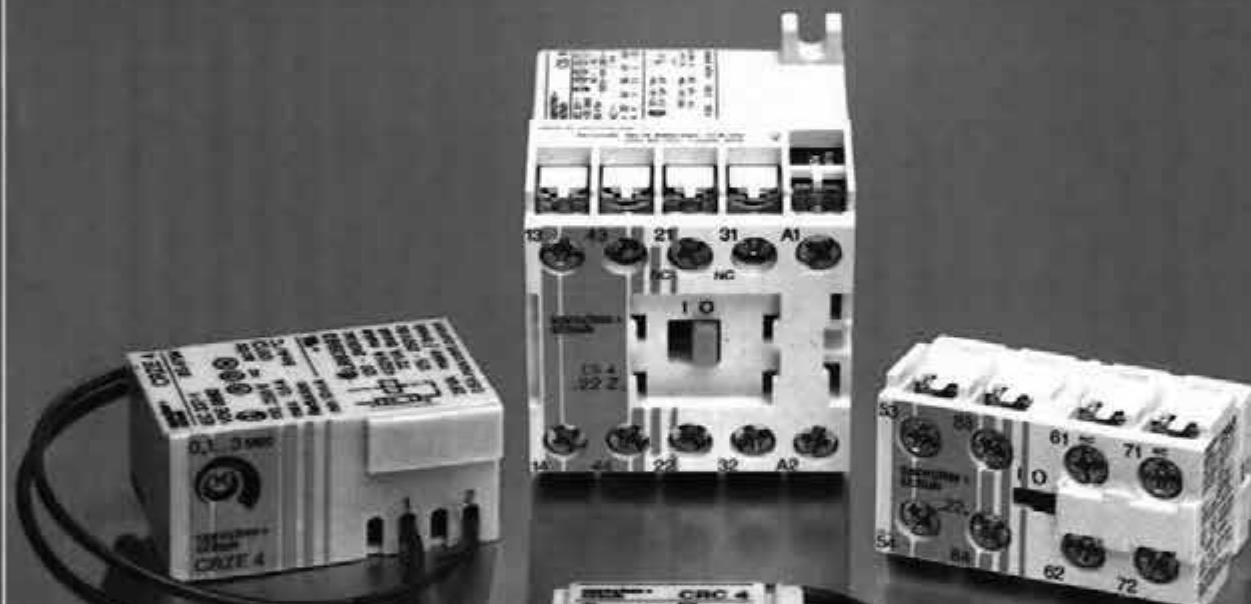
**NHP**

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**PUBLICATION  
RCS-1  
ISSUE 2  
APRIL 1990**

# Control Relay CS4



**NHP** ELECTRICAL ENGINEERING PRODUCTS PTY LTD

## CONTROL RELAY CS4

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Refer Bulletin 2204

# A closer look at CS4

- **Compact design**

AC and DC operated relays have the same mounting dimensions of 45mm.

- **Shallow mounting depth of only 48mm**

Ideal for use in small enclosures.

- **Simple and reliable connection**

Terminal screws suitable for use with manual or power screwdrivers.

- **High contact reliability**

Special contact design provides high reliability even with low voltages and currents such as encountered with PLC interfacing.

- **Time and cost savings -**

Through modern compact design with features offering full flexibility in ordering and application.

- **Fully compatible**

With other equipment in the CA4 compact system ie. CA4 contactors, CRZ timers and CRC surge suppressors.

- **Absolute undervoltage protection**

The coil is designed for total undervoltage reliability. Undervoltages below that required to close the control relay can be withheld indefinitely without damage.

- **Snap-on auxiliary contacts**

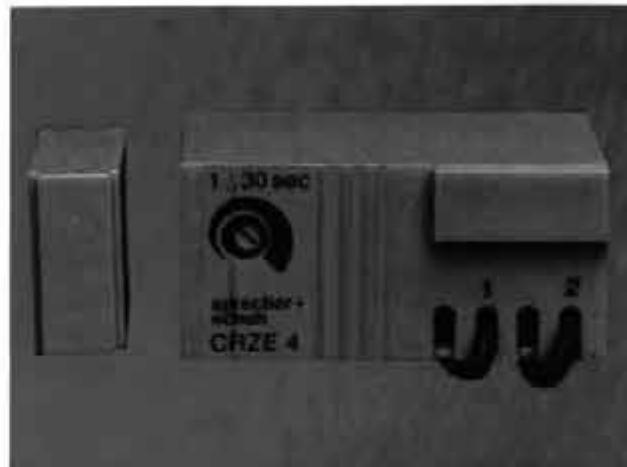
Provide the smallest 4, 6 or 8 pole relay of its type available.

- **Absolute undervoltage protection**

The coil is designed for total undervoltage reliability. Undervoltages below that required to close the control relay can be withheld indefinitely without damage.

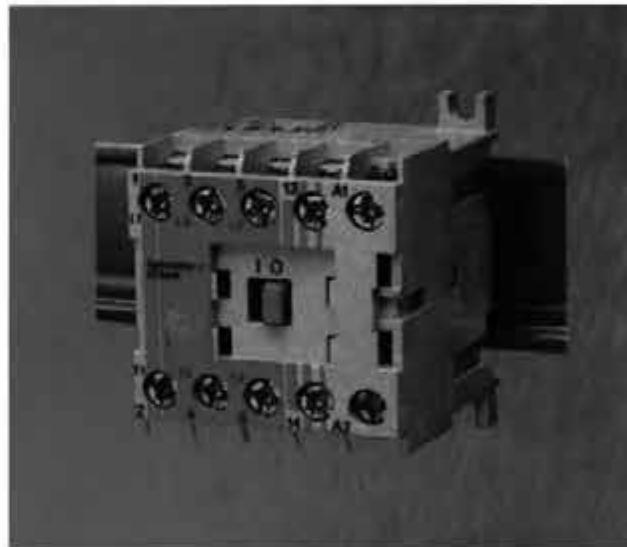
- **Simple panel layout**

Due to modular design of relays and accessories.



**Same spacing dimension for the timing element**

*The CRZE 4 timing element snaps on in place of an auxiliary contact block. Timing element operation requires no additional auxiliary contact.*



- **Snap-on mounting**

To 35mm DIN mounting rail or screw mounting if preferred.

- **Clear easy to read terminal identification**

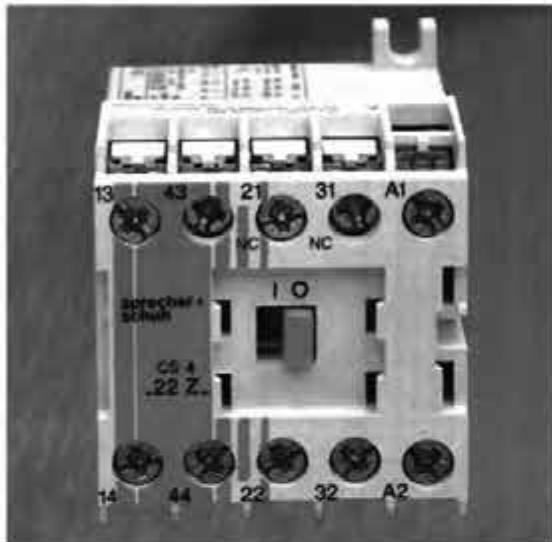
plus colour coding for relays and other CS4 modules.

**“Ideal for trouble-free PLC interfacing”**

# CONTROL RELAY

## CS4

Refer Bulletin 2204

**sprecher+schuh**
**Control relay CS4**

Terminal markings in compliance with EN 50 011  
Integrated snap-on fastener for EN 50 022-25 rail  
(DIN mounting rail)

Fixing hole distance 50 mm

<b>Operating voltage</b>	V	240	415
/th *) open	A	16	16
AC-1 *)	kW	6.7	11.5
enclosed	A	12	12
	kW	5	8.6
<b>Switching of 3-phase motors</b>			
AC-2	Slip ring motors	*) A	4.5
AC-3	Squirrel cage motors	*) kW	1.1
	Normal loading	HP	1.5
AC-4	Squirrel cage motors	A	4.6
	Heavy-duty operation	*) kW	1.1
	Inching	HP	1.5
			2
<b>Rated insulation voltage</b>			
according to IEC 158-1	V	500	
<b>Test voltage 1 minute</b>			
V	3000		
<b>Back-up fuse *)</b>			
without thermal overload relay	A	16	
<b>Auxiliary contacts</b>			
Auxiliary contact	AC-11	A	2
contact block	/th open	*) A	10
	/th encapsulated	*) A	6
	Back-up fuse	*) A	10
Contactor AC-11	A	5	2
	/th open	*) A	16
	/th encapsulated	*) A	12
	Back-up fuse	*) A	16
<b>Number of auxiliary contacts</b>			
AC burden		4..8	
AC	pickup VA(W)	22(20)	
	holding VA(W)	4 (14)	
DC	pickup W	2.5	
	holding W	2.5	
<b>Switching delay</b>			
closing mS		15..40 (AC); 18..40 (DC)	
opening mS		15..25 (AC); 6..12 (DC)	
<b>Service life</b>			
mechanical	mill.ops.	10 (AC); 20 (DC)	
Main contacts	AC-3	mill.ops.	0.7
<b>Approvals UL (USA), CSA (Canada)</b>			
Rated insulated voltage	V	300 (up to 1 Hp = 600)	
<b>Size</b>			
Continuous	300V A	12	
rated current	600V A	5	
Voltage	AC V*)	300 600	
Motor load (with/without thermal overload relay)		HIP 3 ph	
		HIP 1 ph	
Contact class NEMA		A 600, Q 600	

\*) /th according to IEC, AS, BS, SEV. Corresponds to continuous current  
/th 2 according to VDE.

\*) Rated operational capacity according to IEC, AS, BS, DEMKO, NEMKO, SEMKO, Finland, SEV, VDE when switching 3 resistive load 50-60 Hz.

AC 1 and /th according to approval	D	N	F	S
Contactor	CS 4(C) CA 4-5(C)	500 V	16 A	380 V 10 A
	CA 4-9(C)	500 V	16 A	380 V 12 A

Auxiliary contact blocks CS 4-P, CA 4-P 500 V 10 A 380 V 2 A

\*) "Open" values are in respect of an ambient temperature of 40°C.  
"enclosed" values are for 60°C.

\*) Rated operational current and rated operational capacity for 50/60 Hz according to IEC, AS, BS, SEV, VDE 0660.

\*) See page 9.

\*) Motors — Nominal voltages. The corresponding supply voltages are: 220..240 V, 440..480 V, 550..660 V.

**Basic Relay - 4 Pole**

Contact diagram	Contacts N/O N/C	AC or DC	Catalogue No. *)
	4	AC	CS4-40E
			CS4C-40E
	3	1	CS4-31Z
			CS4C-31Z
	2	2	CS4-22Z
			CS4C-22Z

\*) NOTE: Do not use auxiliary blocks with N/C contacts on basic relay.

\*) Add coil voltage: AC24, 32, 110, 240 or 415V  
(to catalogue number when ordering)

DC 12, 24, 48 or 110V.

**Technical Data**

Rated thermal current (AC-1)  
40°C 16 amps 60°C 12 amps

Auxiliary contact blocks  
40°C 10 amps  
60°C 6 amps

AC-1 240V — 5 amps (2 amps for add on blocks)  
AC-1 415V — 2 amps (1 amp for add on blocks)

Mechanical service life  
10 million ops (AC coil)  
20 million ops (DC coil)

Coil consumption  
AC — Pick up 22VA; hold 4VA  
DC — Pick up and hold 2.5W

\*) N/O and N/C contacts coupled

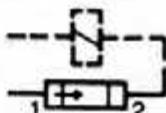
\*) Not to be used with basic relays 31Z and 22Z

# CONTROL RELAY CS4

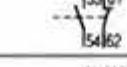
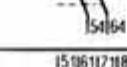
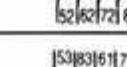
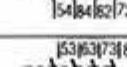
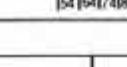
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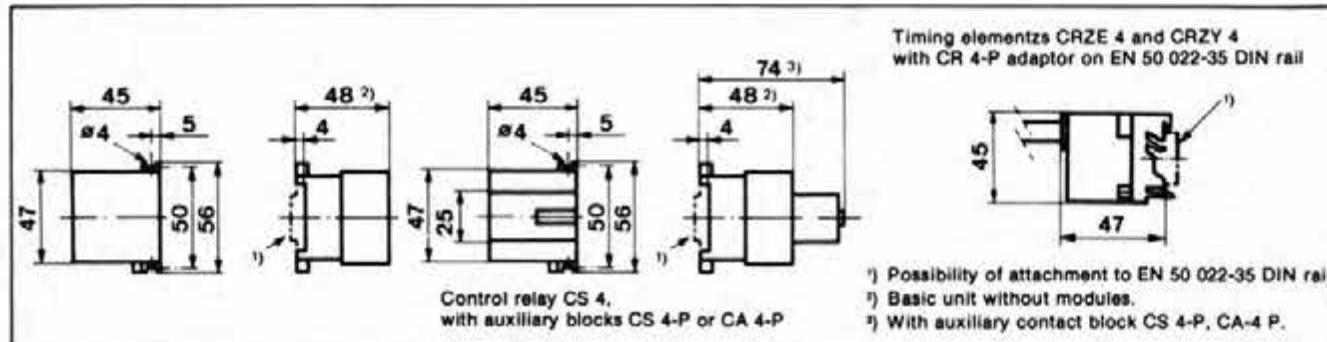
## Timing element CRZE4

		Timing element CRZE 4 setting time 1...30s	CRZE 4-30s
		setting time 0.1...3s	CRZE 4-3s

## Auxiliary Contact Blocks

Contact diagram	Contacts N/O	Contacts N/C	Catalogue No.	<b>AUXILIARY CONTACT BLOCKS</b>  Six types of auxiliary contact blocks can be added to the basic relay. For the 40 E relay versions any type of block can be used. For the versions 31 Z and 22 Z it is recommended to use only the blocks with N/O contacts. The auxiliary blocks have a special contact design making them particularly suitable for switching low voltages and currents such as required with PLC's.  <b>NOTE:</b> ①) Not to be used with basic relays 31 Z and 22 Z. ②) N/O and N/C contacts are coupled. • Do not use auxiliary blocks with N/C contacts on basic relay. • Add coil voltage:- AC 24, 32, 110, 240 or 415V (to catalogue number when ordering). DC 12, 24, 48 or 110V. • N/O and N/C contacts coupled.
	—	2	CS4-P-02 ①)	
	1	1	CS4-P-11	
	2	—		
	—	4	CS4-P-04 ①)	
	2	2	CS4-P-22 ①)	
	4	—		

Accessories					
	Label Sheet	Marking Tag Sheet	Transparent Cover	Tag Carrier	Neutral Links 16mm <sup>2</sup> , 10mm <sup>2</sup>
Catalogue No.	LS3	MS3	TRC3	TGC3	On request
					
	Adaptor	RC Link	Diode Link	Varistor Link	Mechanical Interlock
Catalogue No.	CR 4-P	CRC-4	CRD-4	CRV	CM 4



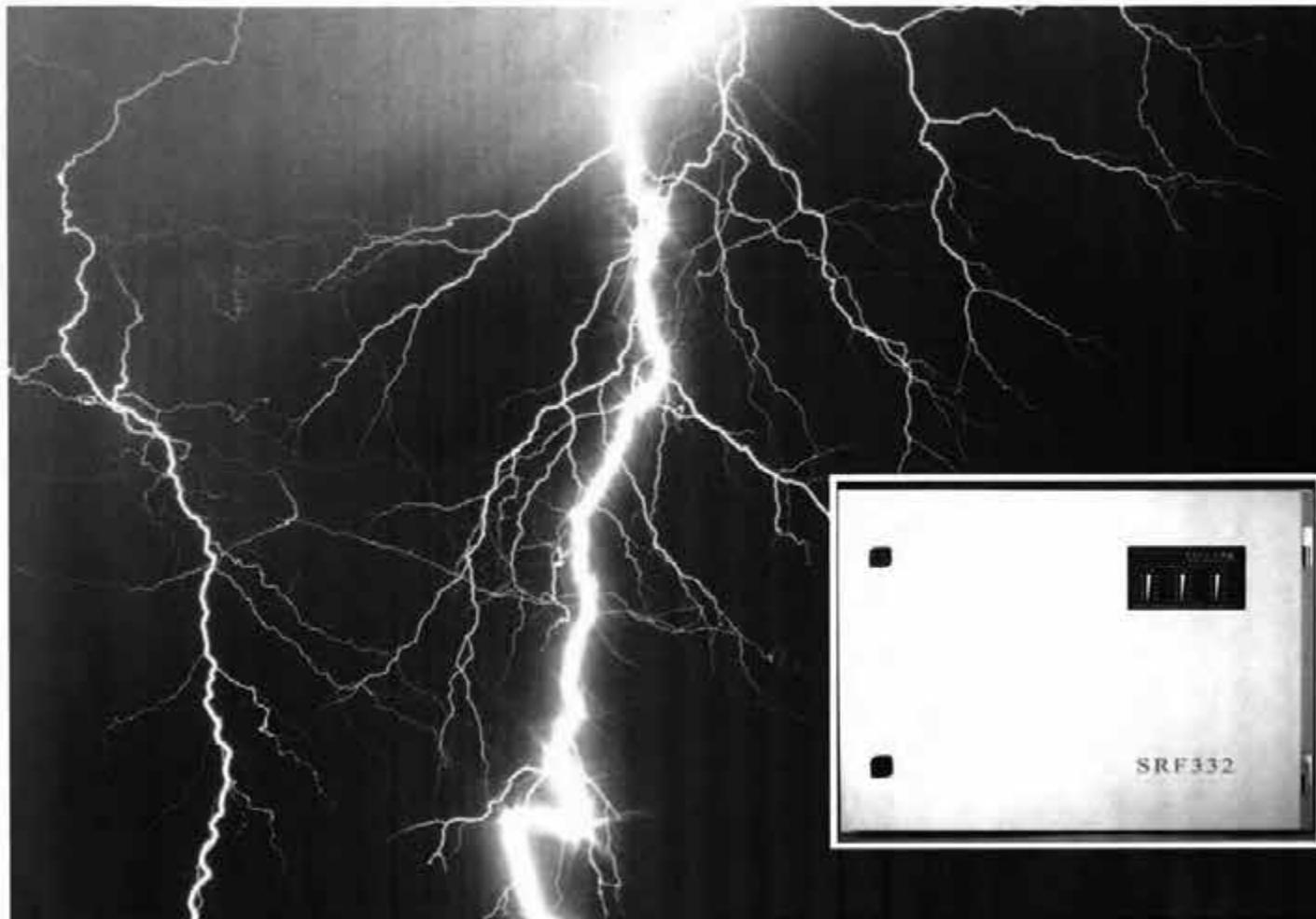
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**ELECTRICAL ENGINEERING PRODUCTS PTY LTD**

MELBOURNE: 43-67 RIVER STREET, RICHMOND, VIC. 3121  
 SYDNEY: 30-34 DAY STREET, SILVERWATER, N.S.W. 2141  
 BRISBANE: 39 COMMERCIAL ROAD, FORTITUDE VALLEY, QLD. 4006  
 ADELAIDE: 50 CROYDON ROAD, KESWICK, S.A. 5035  
 NEWCASTLE: 57 CRESCENT ROAD, WARATAH, N.S.W. 2298  
 ROCKHAMPTON: 208 DENISON STREET, ROCKHAMPTON, QLD. 47000

PHONE: 429 2999  
 PHONE: 748 3444  
 PHONE: 252 9517  
 PHONE: 297 9055  
 PHONE: 60 2220  
 PHONE: 27 2277

# Transient protection for hardwired power installations



## SURGE REDUCTION FILTERS™ PROLINE™

### Application

Costly damage and loss of operations are caused by lightning induced surges, power line faults and the switching of inductive loads and industrial machinery. Critec's **Proline** range of Surge Reduction Filters are specifically designed as three stage primary surge attenuators, ensuring safe clean power to your valuable installation.

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Communications          | <input type="checkbox"/> Hospitals                 | <input type="checkbox"/> Large UPS              |
| <input type="checkbox"/> Navigation aids         | <input type="checkbox"/> Alarm systems             | <input type="checkbox"/> Telemetry              |
| <input type="checkbox"/> Water industry          | <input type="checkbox"/> Mining                    | <input type="checkbox"/> Laboratories           |
| <input type="checkbox"/> Electronic equipment    | <input type="checkbox"/> Switchboards              | <input type="checkbox"/> Military installations |
| <input type="checkbox"/> Factory automation      | <input type="checkbox"/> Oil refineries            | <input type="checkbox"/> Airports               |
| <input type="checkbox"/> Telephone exchanges     | <input type="checkbox"/> Computers and peripherals |   |
| <input type="checkbox"/> TV / Radio broadcasting |  |   |

Critec Pty. Ltd. is a world leader in transient protection. Whether danger arrives via power, data, or telephone lines, Critec has the required protection product. If there is an unusual problem Critec engineers can draw on over 20 years of experience to find the right solution. New products are fully tested with in-house lightning and NEMP generators.

Power system protection up to 1600 Amps

Loadcell and transducer protectors

Line conditioner and power support products

EMP filters and lightning protection

Standby and Uninterruptible Power Supplies

Combination power/signal line protection

Transient barriers

PABX, data processing protection

LAN and coaxial data protectors

Modems and facsimile protection

Direct strike lightning protection

Earth impedance meters

Earthing materials

### Critec PROLINE SRF™ offer:

- High performance three stage surge reduction
- Highest Multipulse™ surge ratings
- MOVTEC™ redundancy
- Reduced costly downtime
- Reduction in physical damage
- Ease of installation and monitoring
- Cost effective and efficient protection
- Enhanced operational reliability of equipment

## The problem

Electronic technology continues to advance at a rapid pace. The move is towards smaller, compact semi-conductor designs which are inherently more sensitive to voltage and current surges whether man-made or natural. Modern installations such as computing, communications and control/alarm are particularly susceptible to power transients induced onto the mains reticulation grid. The cost of damage to capital equipment can be large but the hidden costs incurred by loss of operations and/or services, are often far greater. These costs are borne by equipment owners and their customers.

Lightning impulses can have peak currents approaching 150,000 Amperes. It is this energy, together with the fast voltage waveform of the lightning impulse, which gives rise to equipment damage and possible loss of life. The waveshape is characterised by a very sharp rise in voltage levels and a long tail current of excess energy content. These impulses can be coupled onto reticulation systems in a number of ways. Most obvious of these is the direct strike, however more subtle mechanisms such as resistive, inductive and capacitive coupling can allow the destructive influences of strikes many kilometres away to be felt on incoming power and data lines or local earthing systems.

The significance of the problem and some suggested solutions are more fully described in the Australian Standard on Lightning Protection, AS1768-1991 and the International Standard IEC1024.

## The solution

The Proline range of Surge Reduction Filters from Critec incorporates high energy clamping devices and special filtering circuitry. Proline SRFs are installed in series with the circuit, usually at the point of entry to the building or structure. They are available in single or three phase configurations for load currents from 32A to 1600A per phase. For smaller applications, Critec offers the Safeline range of SRFs from 10A to 16A. These are ideal for panel mount applications such as switchboards and similar industrial installations.

Users may choose from several surge ratings (in accordance with AS1768-1991) to match the SRF to the severity, strike density or exposure of their particular site. In general, higher surge ratings should be chosen for installations of a critical or strategic nature, geographically isolated areas of high lightning activity or where the facility being protected has a high capital cost or cost of downtime. Higher surge ratings are also required for large loads where induced surges are generally of much greater amplitude due to the low impedance of the overall circuit.

Proline SRF which are surge rated to category D and above incorporate Critec's MOVTEC (patent applied) clamping sub-assemblies. The MOVTEC is the most advanced surge attenuation technology currently in place to offer **Multipulse** protection. Since 75% of all lightning strikes comprise multiple strokes through the one air to ground channel, often as little as 30 milliseconds apart, conventional MOVs can rapidly accumulate heat and self destruct just when they are most needed. The high redundancy offered by Critec's MOVTEC arrays means that as individual elements exceed their thermal or energy rating they sequentially disconnect from the primary circuit leaving other segments active to maintain protection. It is also a well known fact that MOVs have a limited life and degrade in proportion to the magnitude and number of incident surges. MOVTEC segments are continuously monitored and their status is displayed on a 5 segment LED bar graph. This information is also duplicated on the Proline's annunciator panel. Reduction in surge handling capacity to below 80% activates a normally open (default) or normally closed set of alarm contacts which can be used to shut down the system or activate an external warning.



FIGURE 1. Special filter circuitry with high energy clamping devices make Proline SRF the optimum protection for all power transient problems.

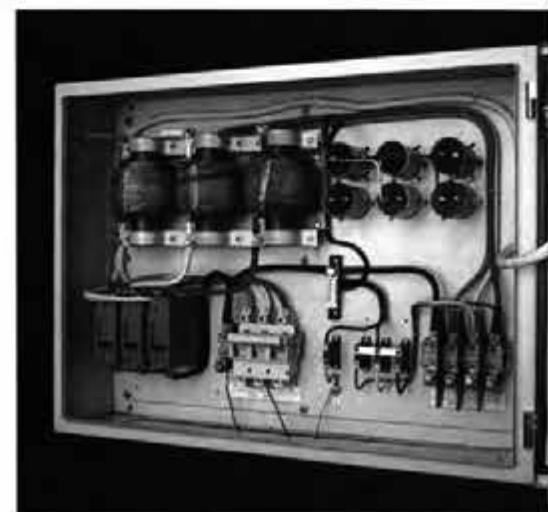


FIGURE 2. Proline's wide range of current and surge handling capabilities ensures that there is a correct product for your every application.

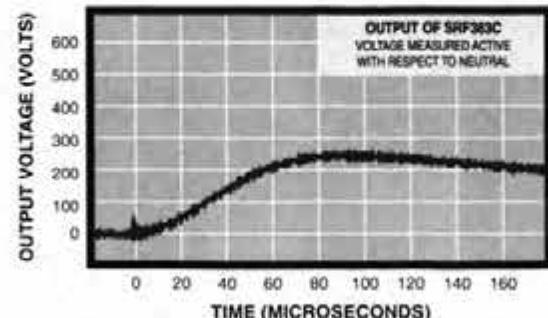
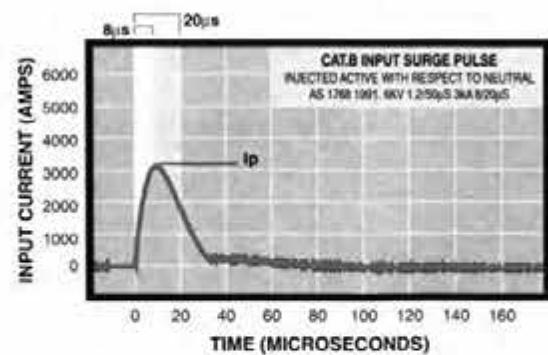


FIGURE 4. Typical differential mode performance (surge diversion and attenuation) of the Proline SRF 363C. Dual mode voltage/current input pulse 6kV, 1.2/50µS, 3kA Cat B applied active to neutral. Worst case peak let through voltage <600V when superimposed on peak mains.

## Applications

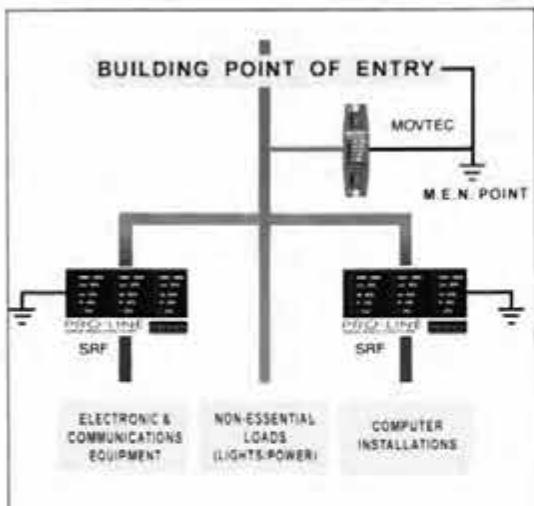


FIGURE 3. Proline SRFs are ideal for point of entry protection of main and sub-circuits

**Proline SRFs must be well earthed** in accordance with relevant National Electricity Standards. It is important to create an equipotential earth plane to eliminate earth loops. Proline SRFs should be installed physically close to the incoming power lines and earthed to the nearest switchboard earth (figure 3). Alternatively, if the Proline SRF is to be installed on a subcircuit it should be earthed in common with the earth of the equipment it is protecting, subject to Standards requirements. SRFs are designed for installation in Multiple Earthed Neutral (MEN) systems, please contact Critec for advice if other systems are in use. SRFs can be installed in front of PABX and at the power entry point for other communication, industrial, or military installations. SRFs are ideal for use in all industries that use electronics or sensitive electrical equipment. SRFs are also commonly installed in front of large Uninterruptible Power Supplies (UPS) to protect both the UPS itself and the load equipment should the UPS switch to by-pass. Proline SRFs have been conservatively designed to improve the operational reliability of equipment and to reduce costly damage and downtime.

## Surge performance

All **Proline** models are surge tested using Standards such as Category A, B and C pulses of ANSI/IEEE C62.41-1991 and AS1768-1991. All models are subjected to at least a 6kV 1.2/50 $\mu$ S voltage pulse, 3kA 8/20 $\mu$ S current pulse, combined voltage/current dual mode pulse, and a 6kV 100kHz ringwave pulse. Both Differential (transverse) and Common mode responses are tested. Higher current tests are conducted via international collaboration and using Critec's state of the art in-house High Voltage Test Facility. Typical responses are shown in figures 4 and 5 which reveal high quality diversion, attenuation, and filtering of large input transients.

## Filter performance

A Fourier transform of a typical 8/20 $\mu$ S lightning pulse reveals that most of the energy content is at relatively low frequencies, making low-pass filtering techniques essential for good protection. Figure 6 illustrates the typical filter performance under conventional small signal test conditions.

A characteristic of all **Proline** SRFs is that relative attenuation improves with an increase in the surge amplitude. This favourable response is the result of careful filter design and special layout attention to minimising lead inductance. Extensive research has resulted in a range of filter inductors which neither saturate under pulse conditions nor under steady state conditions when supplying non-linear loads. In addition, all the Critec **Proline** models are capable of supplying crest factor currents in excess of 3:1, a requirement of most modern computers or electronic installations incorporating switched mode power supplies.

An important parameter of any filter is its **let through voltage**. This has recently been defined in the new Australian Standard AS1768-1991 as that voltage (rounded up to the nearest 100V) which is passed by a filter under specified test conditions (ie Cat A or B pulses). All **Proline** SRF are 600V devices under Cat. B test conditions with typical worst case let through voltages of below 540V.

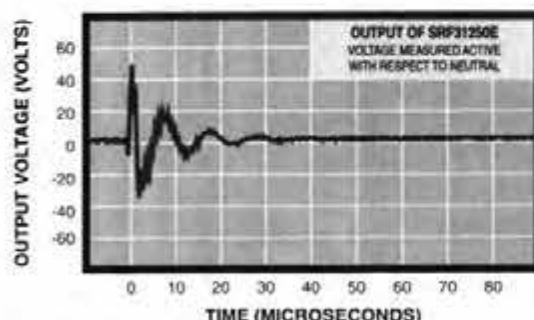
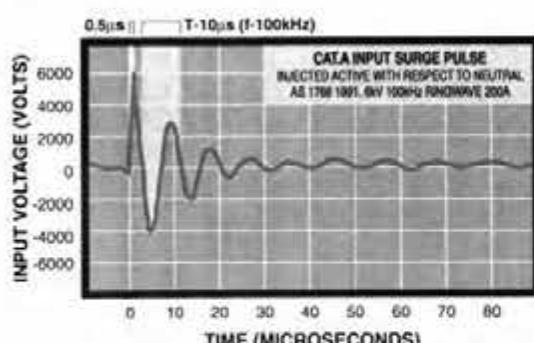


FIGURE 5. Typical differential mode performance (surge diversion and attenuation) of the Proline SRF 31250E. Ringwave 6kV, 200A, 100kHz Cat A pulse applied. Worst case peak let through voltage <400V when superimposed on mains.

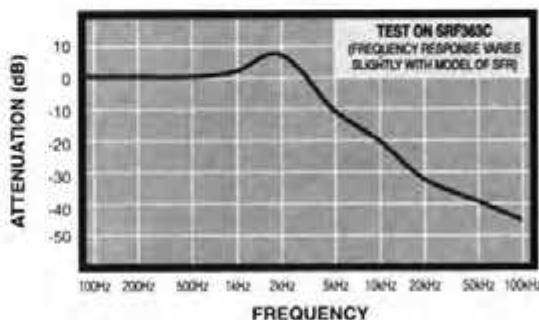


FIGURE 6. Typical no-load frequency response of a Proline filter. Frequency response is based on a voltage fed from a 50ohm source impedance. Attenuation is calculated as  $dB = -20 \log(V_1/V_2)$  where  $V_1$  is the voltage applied to the SRF terminals and  $V_2$  is the open circuit output voltage. Under load, filter performance is improved.

# ORDERING CODES

MOVTEC REDUNDANCY ANNUNCIATOR PANEL	POWER ANALYSER N - NOT APPLICABLE O - OPTIONAL EXTRA S - AS STANDARD	NEUTRAL-EARTH PROTECTION PEAK DIVERSION RATINGS			ENCLOSURE PARTICULARS		
		CURRENT kA	ENERGY Joules	WIDTH mm	HEIGHT mm	DEPTH mm	MASS kg
-	N	40	1360	335	350	190	15
-	N	40	1360	270	285		
Y	N	40	1360				
Y	N	40	1360				
-	N	40	1360	385	395	190	17
-	N	40	1360	320	330		
Y	N	40	1360				
Y	N	40	1360				
Y	N	40	1360	465	490	200	25
Y	N	40	1360	400	420		
Y	N	40	1360				
Y	N	40	1360				
-	N	40	1360	610	470	200	30
-	N	40	1360	545	405		
Y	N	40	1360				
Y	N	40	1360				
-	N	40	1360	670	510	220	42
-	N	40	1360	605	440		
Y	N	40	1360				
Y	N	40	1360				
Y	O	40	1360	825	630	220	63
Y	O	40	1360	760	560		
Y	O	40	1360				
Y	O	40	1360				
Y	O	40	1360	880	880	280	110
Y	O	40	1360	815	815		
Y	O	40	1360				
Y	O	40	1360				
Y	O	40	1360	980	980	350	200
Y	O	40	1360	900	900		
Y	O	40	1360				
Y	O	40	1360				
Y	S	70	2450	1280	1280	350	350
Y	S	70	2450	1200	1200		
Y	S	70	2450	1700	1700	400	650
Y	S	70	2450	1700	1700		
Y	S	70	2450	2050	2050	400	800
Y	S	70	2450	2050	2050		
Y	S	70	2450	2050	2050	400	800
Y	S	70	2450	2050	2050		

## Choosing an SRF

There is an SRF for every application. Choosing the appropriate unit depends upon site conditions. Firstly, determine the load in Amps and the number of phases. Secondly, make an engineering decision on the required surge rating. This decision is based on the required level of protection (see AS1768-1991), geographic area of operation, cost, site factors, and the strategic consequences if the equipment to be protected is damaged or non-operational.

The model number is determined as follows: **SRFabbbs-ee**

<b>a</b>	<b>bbb</b>	<b>s</b>	<b>ee</b>
1 for single phase	Load in A/phase	Surge Rating i.e. Cat. C,D,E	Enclosure and mounting CE-Critec, BP-Backplane
3 for three phase			

Eg: SRF3315E-CE is a three phase, 315A per phase SRF with 120 + 70kA surge rating (using a MOVTEC) and fitted in a proprietary Critec enclosure.

# PROLINE SRF SERIES

CATALOGUE No.	MODEL No.	LOAD A	MAXIMUM LINE RATINGS PER PHASE			PRIMARY PROTECTION PEAK DIVERSION RATINGS PER PHASE				SECONDARY PROTECTION PEAK DIVERSION RATINGS PER PHASE	
			PHASES #	LINE FUSE A		kA	Joules	SEGMENTS #	DEVICE* USED	kA	Joules
<b>SINGLE PHASE 220/380V-240/415V SRF</b>											
121210	SRF132C-CE	32	1	32		40	1360	1	SB	40	1360
121220	SRF132C-BP	32	1	32		40	1360	1	SB	40	1360
121260	SRF132D-CE	32	1	32		80	3120	5	MT	40	1360
121270	SRF132D-BP	32	1	32		80	3120	5	MT	40	1360
121310	SRF163C-CE	63	1	63		40	1360	1	SB	40	1360
121320	SRF163C-BP	63	1	63		40	1360	1	SB	40	1360
121360	SRF163D-CE	63	1	63		80	3120	5	MT	40	1360
121370	SRF163D-BP	63	1	63		80	3120	5	MT	40	1360
121410	SRF1125D-CE	125	1	125		80	3120	5	MT	40	1360
121420	SRF1125D-BP	125	1	125		80	3120	5	MT	40	1360
121460	SRF1125E-CE	125	1	125		120	4680	5	MT	70	2450
121470	SRF1125E-BP	125	1	125		120	4680	5	MT	70	2450
<b>THREE PHASE 220/380V-240/415V SRF</b>											
123210	SRF332C-CE	32	3	32		40	1360	1	SB	40	1360
123220	SRF332C-BP	32	3	32		40	1360	1	SB	40	1360
123260	SRF332D-CE	32	3	32		80	3120	5	MT	40	1360
123270	SRF332D-BP	32	3	32		80	3120	5	MT	40	1360
123310	SRF363C-CE	63	3	63		40	1360	1	SB	40	1360
123320	SRF363C-BP	63	3	63		40	1360	1	SB	40	1360
123360	SRF363D-CE	63	3	63		80	3120	5	MT	40	1360
123370	SRF363D-BP	63	3	63		80	3120	5	MT	40	1360
123410	SRF3125D-CE	125	3	125		80	3120	5	MT	40	1360
123420	SRF3125D-BP	125	3	125		80	3120	5	MT	40	1360
123460	SRF3125E-CE	125	3	125		120	4680	5	MT	70	2450
123470	SRF3125E-BP	125	3	125		120	4680	5	MT	70	2450
123510	SRF3200D-CE	200	3	200		80	3120	5	MT	40	1360
123520	SRF3200D-BP	200	3	200		80	3120	5	MT	40	1360
123560	SRF3200E-CE	200	3	200		120	4680	5	MT	70	2450
123570	SRF3200E-BP	200	3	200		120	4680	5	MT	70	2450
<b>THREE PHASE 220/380V-240/415V BUS BAR SRF</b>											
123610	SRF3315D-CE	315	3	315		80	3120	5	MT	40	1360
123620	SRF3315D-BP	315	3	315		80	3120	5	MT	40	1360
123660	SRF3315E-CE	315	3	315		120	4680	5	MT	70	2450
123670	SRF3315E-BP	315	3	315		120	4680	5	MT	70	2450
123710	SRF3630E-CE	630	3	630		120	4680	5	MT	100	3600
123720	SRF3630E-BP	630	3	630		120	4680	5	MT	100	3600
123810	SRF31000E-CE	1000	3	1000		120	4680	5	MT	100	3600
123820	SRF31000E-BP	1000	3	1000		120	4680	5	MT	100	3600
123910	SRF31250E-CE	1250	3	1250		120	4680	5	MT	100	3600
123920	SRF31250E-BP	1250	3	1250		120	4680	5	MT	100	3600
123950	SRF31630E-CE	1630	3	1600		120	4680	5	MT	100	3600
123960	SRF31630E-BP	1630	3	1600		120	4680	5	MT	100	3600

\*SB - Standard Block Metal Oxide

\*MT - Critec MOVTEC with 5 segment redundancy and Multipulse protection.

## Enclosures

10 and 16A SRF - Metal case for panel, wall or switchboard mounting - ask for Safeline brochure SF01.

32 to 1600A SRF - Modern, sheet metal fabricated case for back panel chassis and wall mounting, natural ventilation, oyster grey colour with Announcer Status Panel on some models. IP rated enclosures available on request for selected models.

## Aggregate energy diversion

Aggregate energy is defined as the summation of the joule ratings of primary and secondary protection multiplied by the number of phases

i.e. SRF3630E-CE = 3(4680 + 3600) or 24.84 kilojoules

## Product testing



**FIGURE 7.** Critec maintains a fully equipped High Voltage Test Laboratory. All product designs are extensively tested for surge handling capability, design optimisation and load performance. Seen above, a three phase Proline 1600A SRF under going full load current tests and burn in test cycles.

Critec's new purpose designed high voltage test facility offers both single pulse capabilities to AS1768-1991 Cat. C and above, as well as multipulse intershot capabilities. It is staffed by experienced professionals and enjoys continued investment ensuring state of the art development and performance testing of all Critec surge and transient products. The capital intensive test equipment is ideal for determining the susceptibility of components to EMI, EMP, and lightning pulses to the following international standards:-

AS1768-1991 • ANSI/IEEE C62.41-1991 IEEE857-1980 • IEC Reports 664 and 521 • CIGRE 36-05 • IEC TC65 • EDF HN54-530 • ENEL LVI504 • SEN 3611503Y • SEV1055-1978 • UL943 • UL217/UL268 • VDE418 • VDE0565 • VDE854 • IEC TC81/44 • IEC1024 (incl. Guides)

Critec products can be tested in-house to the lightning and EMP pulse standards of:

AS1768-1991, Cat A  
6kV 200A 100kHz ringwave

AS1768-1991, Cat B  
6kV 500A 100kHz ringwave, 6kV 1.2/50 $\mu$ S, 3kA 8/20 $\mu$ S

AS1768-1991, Cat C  
6kV 1.2/50μS, 20kA 8/20μS

**Multipulse surge capabilities**  
5 x 3kA 8/20μS @ 100mSec intervals

Other in-house tests are carried out to determine frequency responses, load characteristics to 1600A per phase and pulse characteristics to NATO 5/200μS, 12kV NEMP standards.

## Technical specifications

<b>Surge Ratings:</b>	
Peak Single Shot Pulse Current (8/20μS)	See Ordering Table
Peak Single Shot Energy (8/20μS)	See Ordering Table
<b>Operating Ratings:*</b>	
Single Phase	220-254VAC, 50-60Hz
Three Phase	380-440VAC, 50-60Hz
Multiple Earth Neutral (MEN) system.	
<b>Inductor Design:</b>	
Type	Aircored, non-saturating
Current crest factor capability	> 3:1

\* Note: Other operating voltages and frequencies are available on application, e.g. 120VAC, 500VAC and 400Hz.

All standard Critec Proline SRFs are guaranteed to have Australian Electricity Approval Certification.

## **EXPORT BULLETIN SRE04**

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**Due to a policy of continued product improvement, specifications are subject to change without notice.**

**Multipulse, Proline, Critec, MOVTEC and Surge Reduction Filter** are ™ trademarks of Critec Pty Ltd.



CRITEC

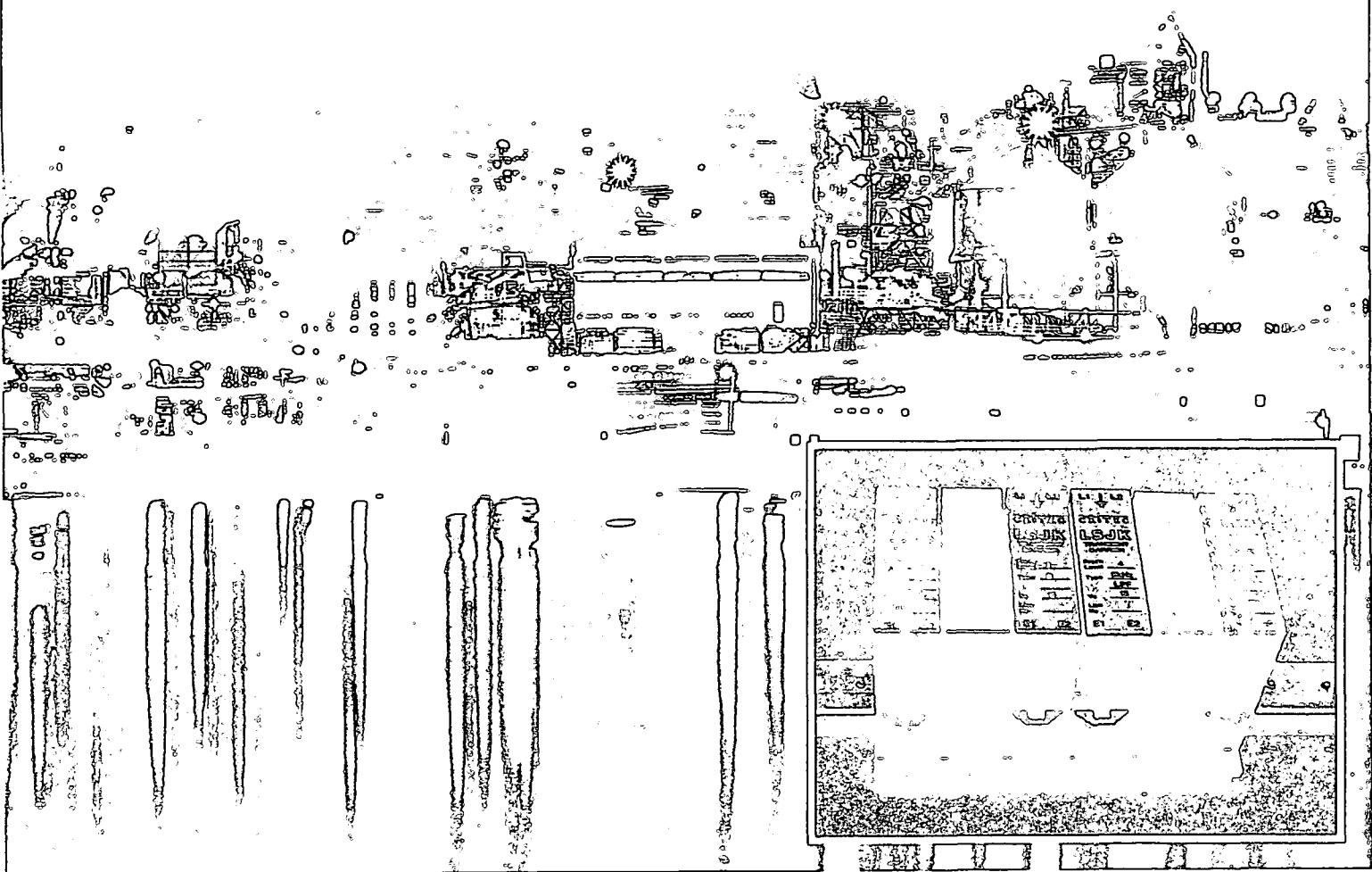
#### **Australia's leader in transient protection**

**Critec Pty Ltd** A.C.N.009538729  
Technopark, Dowsings Point, Tasmania 7010  
**POSTAL ADDRESS:** Box 536 GPO Hobart  
TAS 7001 Australia  
**TELEPHONE:** 00273 0066  
**FACSIMILE:** 00273 0399  
**International code** +6102-

*Actas del Congreso de la Asociación Argentina de Estadística* Available from:



Winner of a 1992 Australian Design Award  
for Critec's flagship DG12 UPS



## TRANSIENT SAFETY BARRIERS

### Application

LSJK transient barriers are designed to provide transient protection for balanced and unbalanced dataline, signal and communications circuits used in the process control, communications and computer industries.

With its unique base and cap combination LSJK provides extensive application flexibility. Each LSJK transient barrier consists of a base module containing a 10KA 3 element gas filled arrester providing primary transient protection. Secondary protection is available from a range of plug in caps which together with the base module makes up a complete transient protection package.

Four levels of transient protection are available ranging from a simple link circuit, level 1, to low pass filters, level 4, for frequency sensitive applications. All LSJK models are fitted with self resetting overcurrent protection.

LSJK may be mounted individually, on its own mounting rail which also provides the protective earth return or it may be adapted for DIN rail mounting.

**LSJK**

### Critec

Critec Pty Ltd is Australia's leader in transient protection. Whether danger arrives via power, data, or telephone lines, Critec engineers can draw on over 20 years experience to find the solution. Critec products include:

Surge Reduction Filters



Power Line Filters



Line Conditioners



UPS and SPS



Faxguard/Compuguard



Signal Line Transient Barriers



Intrinsically Safe Barriers



NEMP Filters



**CRITEC**

**LSJK-1 Level 1 Protection**

LSJK-1 provides gas arrester only protection for non critical circuits such as switch contacts and electromechanical circuitry.

MODEL NUMBER	V <sub>wkg</sub> at 5μA (V)	SERIES IMPEDANCE [2]	R <sub>i</sub> (Ω)	L <sub>i</sub> (μH)	I <sub>max</sub> (A)	V <sub>c(max)</sub> for 8/20μs [4] (V)	CATALOGUE NUMBER
LSJK-1	60	0.1	—	—	2.5	800	376100

**LSJK-2R Level 2 Protection**

LSJK-2R provides 2 levels of protection incorporating gas arrester and transient protection diodes for both transverse and common mode protection.

MODEL NUMBER	V <sub>wkg</sub> at 5μA (V)	SERIES IMPEDANCE [2]	R <sub>i</sub> (Ω)	L <sub>i</sub> (μH)	I <sub>max</sub> (A)	V <sub>c(max)</sub> for 8/20μs [4] (V)	CATALOGUE NUMBER
LSJK-2R-7.5	6.1[1]	17.6	—	—	0.15	8	376270
LSJK-2R-15	12.2[1]	17.6	—	—	0.15	15	376280
LSJK-2R-18	14.7	17.6	—	—	0.15	18	376290
LSJK-2R-30	24.2	17.6	—	—	0.15	30	376300
LSJK-2R-36	29.0	17.6	—	—	0.15	36	376310
LSJK-2R-60	48.6	17.6	—	—	0.15	60	376320
LSJK-2R-135	110.0	23.2	—	—	0.09	135	376330
LSJK-2R-200	162.0	23.2	—	—	0.09	200	376340

**LSJK-S Telephone Protection**

LSJK-S provides protection for telephone circuits. The patented impulse clamping circuit is transparent to all telephone signals yet clamps at a level lower than some of these signals.

MODEL NUMBER	V <sub>wkg</sub> at 5μA (V)	SERIES IMPEDANCE [2]	R <sub>i</sub> (Ω)	L <sub>i</sub> (μH)	I <sub>max</sub> (A)	V <sub>c(max)</sub> for 8/20μs [4] (V)	CATALOGUE NUMBER
LSJK-S	[1]	9.4	—	—	0.15	80	376650

**LSJK-3R Level 3 Protection**

LSJK-3R provides 3 levels of protection incorporating gas arrester, MOV and transient diodes designed for applications on long lines, high exposure lines and lines susceptible to powerline induction.

MODEL NUMBER	V <sub>wkg</sub> at 5μA (V)	SERIES IMPEDANCE [2]	R <sub>i</sub> (Ω)	L <sub>i</sub> (μH)	I <sub>max</sub> (A)	V <sub>c(max)</sub> for 8/20μs [4] (V)	CATALOGUE NUMBER
LSJK-3R-7.5	6.1[1]	17.6	—	—	0.15	8	376350
LSJK-3R-15	12.2[1]	17.6	—	—	0.15	15	376360
LSJK-3R-18	14.7	17.6	—	—	0.15	18	376370
LSJK-3R-30	24.2	17.6	—	—	0.15	30	376380
LSJK-3R-36	29.0	17.6	—	—	0.15	36	376390
LSJK-3R-60	48.6	17.6	—	—	0.15	60	376400
LSJK-3R-135	110.0	23.2	—	—	0.09	135	376410
LSJK-3R-200	162.0	23.2	—	—	0.09	200	376420

**LSJK-3I Level 3 Protection**

LSJK-3I provides 3 levels of protection in a low resistance, high current configuration for supply lines and power circuits.

MODEL NUMBER	V <sub>wkg</sub> at 5μA (V)	SERIES IMPEDANCE [2]	R <sub>i</sub> (Ω)	L <sub>i</sub> (μH)	I <sub>max</sub> (A)	V <sub>c(max)</sub> for 8/20μs [4] (V)	CATALOGUE NUMBER
LSJK-3I-7.5	6.1[1]	0.5	80	—	1.6	8	376430
LSJK-3I-15	12.2[1]	0.5	80	—	1.6	15	376440
LSJK-3I-18	14.7	0.5	80	—	1.6	18	376450
LSJK-3I-30	24.2	0.5	80	—	1.6	30	376460
LSJK-3I-36	29.0	0.5	80	—	1.6	36	376470
LSJK-3I-60	48.6	0.5	80	—	1.6	60	376480

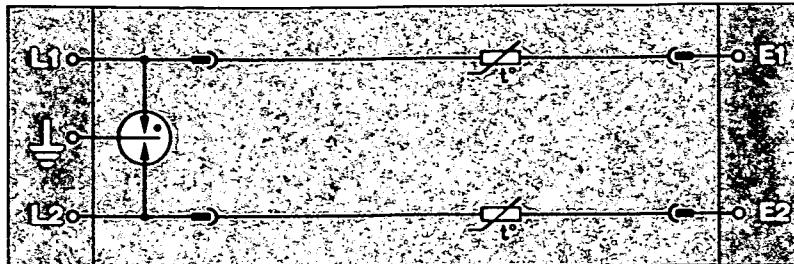
**LSJK-4F Level 4 Protection**

LSJK-4F provides 3 levels of transient protection in addition to a stage of filtering for RFI suppression etc. Standard is 50kHz low pass filter. Other cut off frequencies are available on request.

MODEL NUMBER	V <sub>wkg</sub> at 5μA (V)	SERIES IMPEDANCE [2]	R <sub>i</sub> (Ω)	L <sub>i</sub> (μH)	I <sub>max</sub> (A)	V <sub>c(max)</sub> for 8/20μs [4] (V)	CATALOGUE NUMBER
LSJK-4F50-7.5	6.1[1]	10	750	—	0.15	8	376490
LSJK-4F50-15	12.2[1]	10	750	—	0.15	15	376500
LSJK-4F50-18	14.7	10	750	—	0.15	18	376510
LSJK-4F50-30	24.2	10	750	—	0.15	30	376520
LSJK-4F50-36	29.0	10	750	—	0.15	36	376530
LSJK-4F50-60	48.6	10	750	—	0.15	60	376540
LSJK-4F50-135	110.0	15	750	—	0.09	135	376550
LSJK-4F50-200	162.0	15	750	—	0.09	200	376560

LINE

EQUIPMENT



## General Specifications

**Transient performance:**  
exceeds ANSI/IEEE C62.41 category B. [4]

**Rated surge current (8/20μs):**  
10KA (3 element gas arrester)

**Response time:**  
 $< 1\text{ns}$  (levels 2 - 4 and S)

**Frequency response:**  
to 1MHz except LSJK-4F

**Overcurrent protection:**  
standard on all LSJK models. [3]

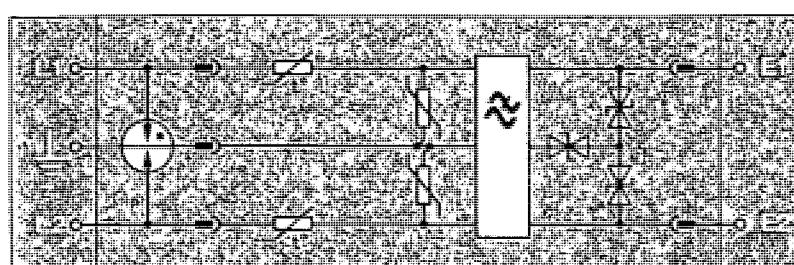
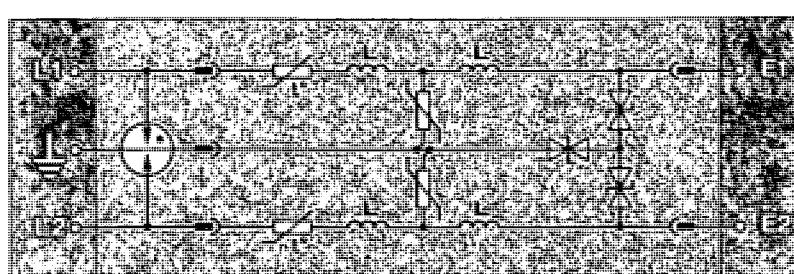
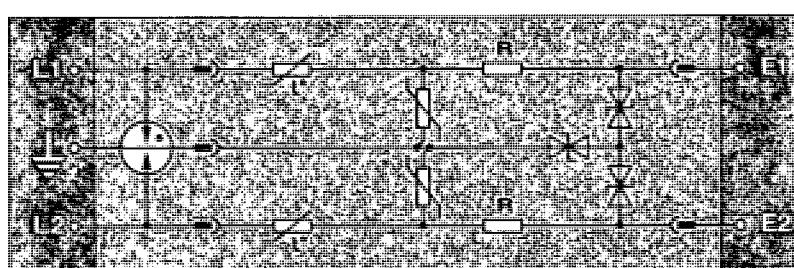
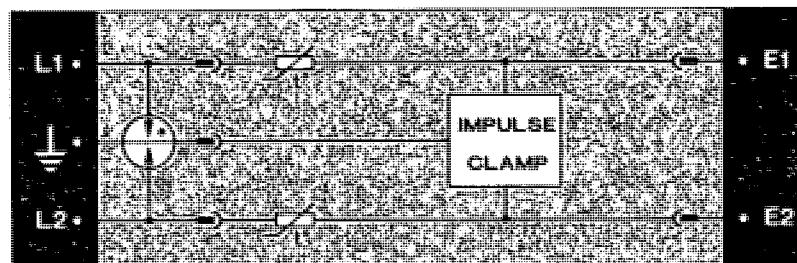
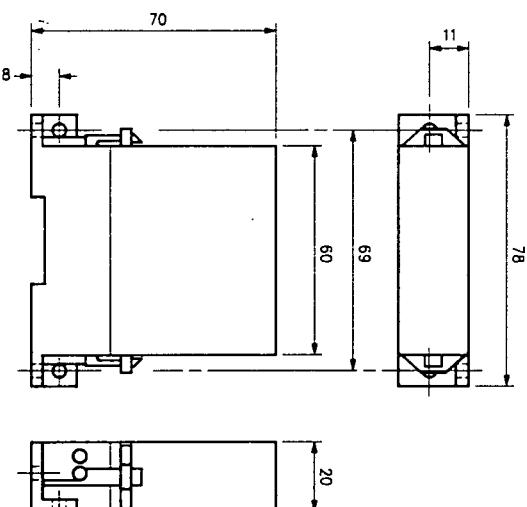
**Operating temperature range:**  
 $-20^\circ\text{C}$  to  $60^\circ\text{C}$ .

**Weight:**  
100g (base and cap)

**Case material:**  
ABS plastic

**Cable terminations:**  
max.  $2.5\text{mm}^2$

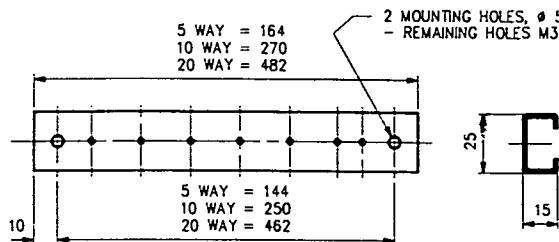
**Mechanical details:**



### Notes:

- [1]  $V_{wkg}$  is the maximum voltage that should be applied to the barrier in normal use. For 7.5V and 15V barriers,  $V_{wkg}$  is specified for 500μA leakage current. LSJK-S is rated for standard telephone line voltages.
- [2] The series impedance is the impedance of each leg of the barrier. Loop impedance is 2x series impedance.
- [3] Overcurrent limit is provided by a self resetting solid state thermal switch.
- [4]  $V_{c(\text{max})}$  is the maximum voltage measured at the equipment terminals of the barrier when a 6KV 1/50μs voltage pulse plus 3KA 8/20μs current pulse is applied to the line terminals. Protection is provided for both common and transverse modes.

## Installation Guide



LSJK is designed for individual mounting or on its own mounting rail. The LSJK rail may be mounted on a 35mm DIN rail by the use of adaptor clips. Where unused pairs in a cable are not connected, LSJK base modules alone should be installed and appropriately earthed. Caps may be added as cable pairs become allocated.

To provide effective protection LSJKs must be earthed. Two basic methods of earthing individual units are available. The first is via a screw connector located between the line side terminals. This method is recommended when LSJKs are individually mounted. When a mounting rail is used the rail mounting screw connects the LSJK earth to the mounting rail. A single earth can then be connected to one end of the rail which then forms an earth bus.

It is recommended that earth leads lay alongside incoming cable pairs and are kept remote from the equipment side cables. This technique will minimise magnetic induction between the protected and unprotected sides.

The prime requirement with earthing is to minimise lead inductance. Earth leads should therefore be as short and direct as possible.

CATALOGUE NUMBER	MODEL NUMBER	DESCRIPTION
373100	LSJK-MR5	5 way mounting rail
373110	LSJK-MR10	10 way mounting rail
373120	LSJK-MR20	20 way mounting rail
373130	LSJK-DIN	35mm DIN rail adaptor clip

## Warranty

All Critec electronic products are guaranteed to perform the function as specified in our product bulletins for a period of one year from the date of shipment, provided they are installed in accordance with the manufacturer's recommendations. Units suspected of being defective should be returned prepaid to the factory. The manufacturer's liability is limited to the repair or replacement of the product (at the manufacturer's option) which in its judgement has not been abused, misused, or operated under conditions exceeding the manufacturer's specifications. Warranty is void if units are overhauled or repaired by other than Critec factory personnel. Critec is not responsible for consequential or implied damages. This warranty is in addition to any rights accruing under the Australian Trade Practices Act.

### EXPORT BULLETIN

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Due to a policy of continuing product improvement, specifications are subject to change without notice.

For additional information, please contact:

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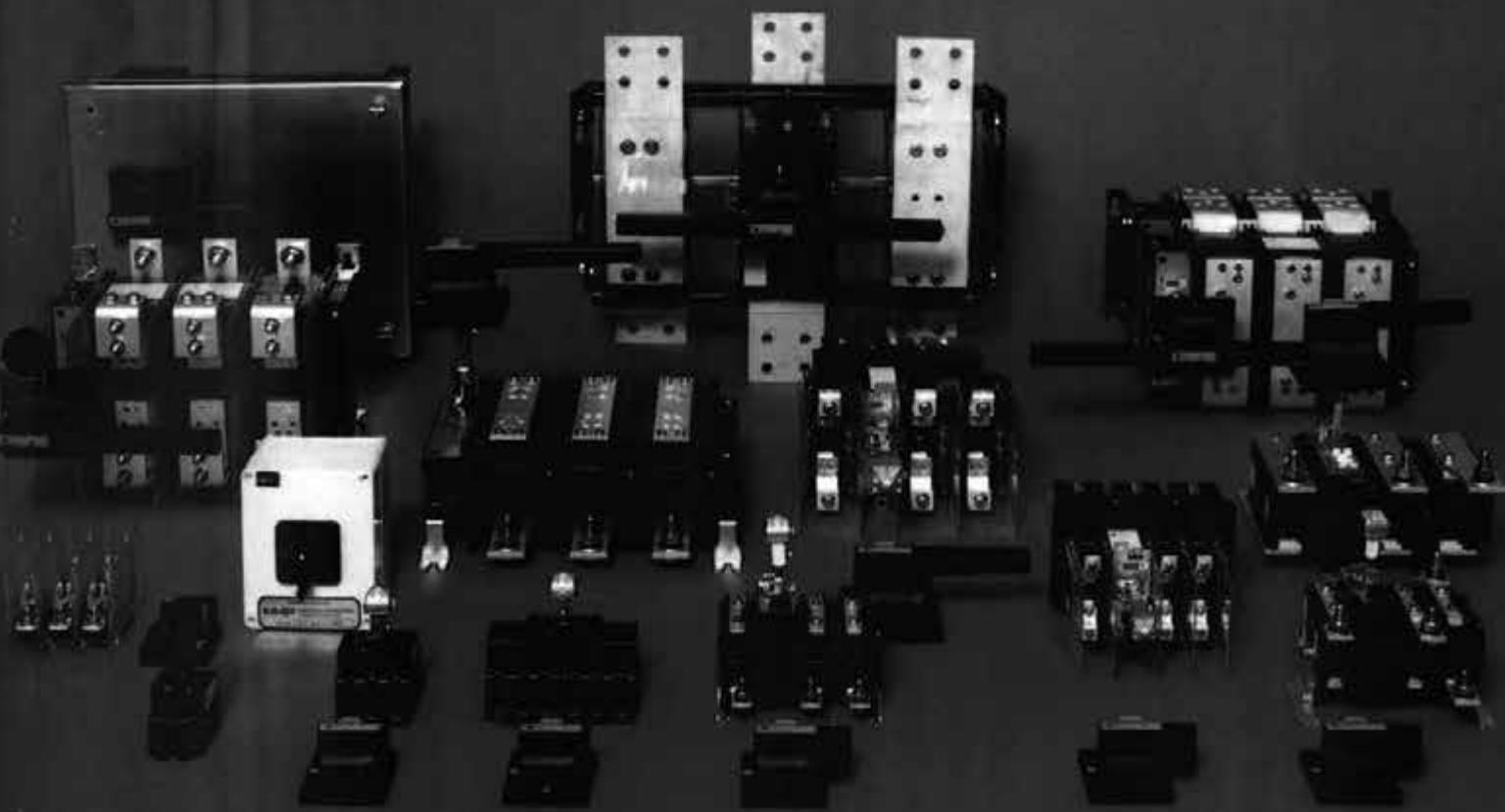
CRITEC, AUSTRALIAN DESIGNED AND MANUFACTURED PROTECTION FOR HOSTILE ENVIRONMENTS

**NHP-LK**

Publication  
**NL**  
April 1993

# **ROLLCON**

## **Fuse-switches and load-break switches**



**NHP** ELECTRICAL ENGINEERING PRODUCTS PTY LTD  
A.C.N. 004 304 812

# NHP-LK Rollcon



## NHP

In 1986 NHP were granted the agency for LK fuse switches and load-break switches. These products fitted in very well with existing products in the NHP programme.

The quality of the products and the high performance under fault currents we consider to be very important in complementing the range of Sprecher + Schuh contactors and circuit breakers used in motor control centres.

A very good co-operation developed between NHP and LK and a considerable number of new developments were produced by LK to suit Australian requirements as identified by NHP.

The outstanding design of this equipment has resulted in a substantial escalation in sales in Europe for the LK range. Product development is continuing at a high level to ensure the future needs of customers are met.

## NHP-LK Rollcon

The NHP-Rollcon newly introduced fuse switches and the Plugcon (plug-in fuse switches) are available through the NHP network. The very innovative roller contact system has been a key to the success of these products.

Much attention has been paid to the ease of mounting of these products to facilitate their use by switchboard builders. A large number of accessories are available thus providing the flexibility so often needed in the more complicated switching and distribution arrangements required today.

All NHP-LK Rollcon switches are tested to IEC 408 and comply with AS 1775.

*The NHP-LK Rollcon range offers **high quality** which means so much in service.*

## Contents

Rollcon switch concept	Pages 3 to 5
LKM mini load-break switches	Pages 6 to 7
LKS fuse-switches (also Plugcon)	Pages 8 to 9
LKA and LKP load-break switches	Pages 10 to 13
Accessories for all switches	Pages 14 to 18
Enclosed switches - surface mount	Page 19
Enclosed switches - flush mount	Page 20
Dimensions and drawings of all switches	Pages 21 to 31

# The importance of the right contacts

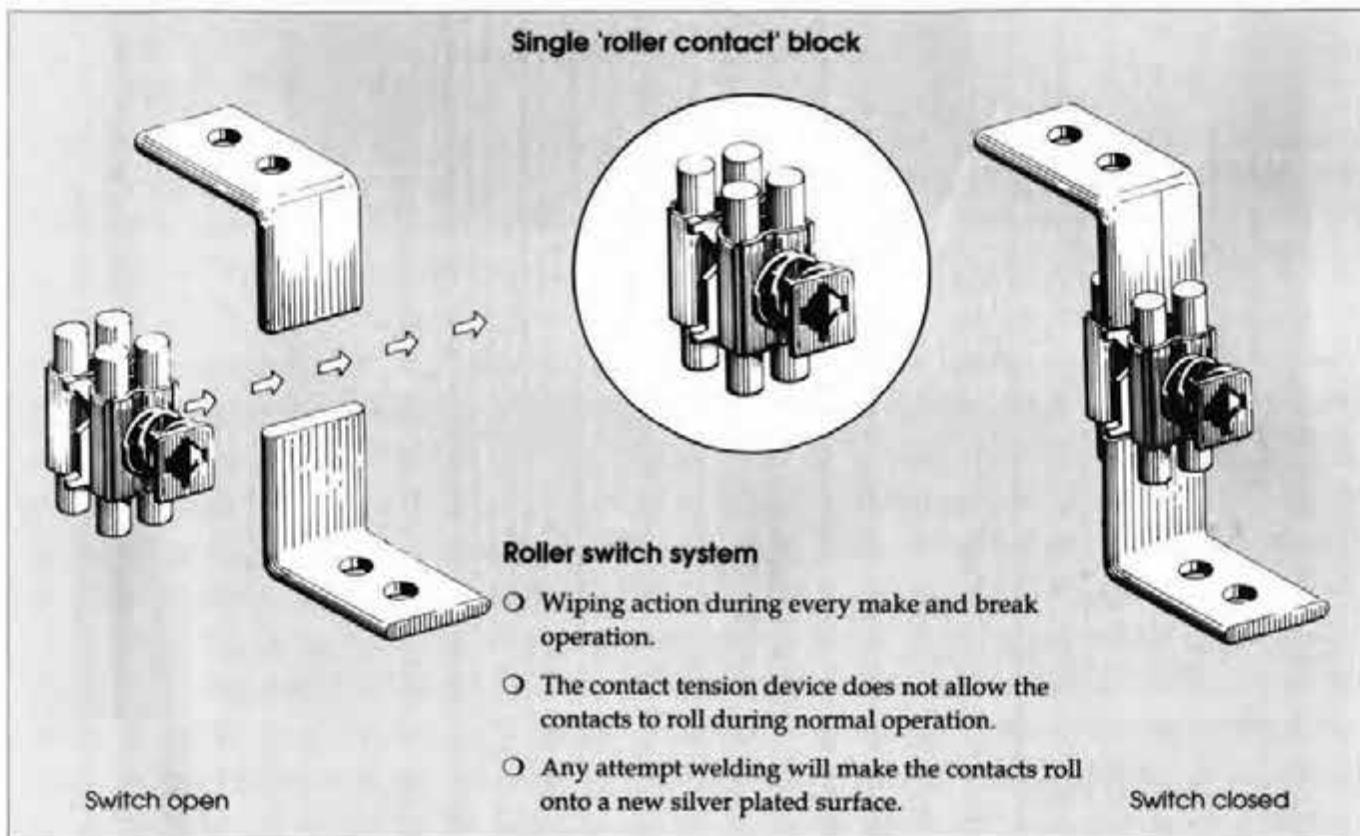
The Rollcon range of switches is the result of more than 50 years' development, and it complies with all requirements to short circuit capacity, breaking capacity, and isolating distance as specified in A.S., B.S. and IEC standards.

The Rollcon range has a recently developed moving contact system with unique features, combining the advantages found in knife - as well as roller contact systems.

The moving contact system is based on four spring loaded, silver plated copper rollers, held in position by a spring loaded steel retainer, which permits the rollers to rotate individually.

The spring pressure is so adjusted to the friction between the rollers and knife that, during operation, the rollers normally wipe the knife surface (i.e. no roller rotation - self cleaning effect).

However, if the contacts attempt to weld during closing under fault conditions, the mentioned roller knife friction increases and the rollers will rotate breaking the pin points where incipient welding has occurred thus preventing actual welding from taking place.



## Short circuit capacity

In the contact system described, each sector will carry only one fourth of the current, and during closing, the electro-dynamic repulsion force in each contact sector will be reduced to a low ( $1/4$ )<sup>2</sup> or to  $1/16$  of the normal amount.

This fact, together with the increase of the electro-dynamic forces between the parallel current paths in the copper rollers, prevents the contacts from opening, even at extreme fault currents of  $>100kA_{eff}$ . The effects described manifest themselves both in the case of through faults, and when the switches are closed on a short circuit, due to the high closing speed of the switch.

## Breaking capacity

The extreme breaking capacity (category AC 23 at 660V) is reached primarily by dividing the breaking process between four breaking points per phase.

This results in a distribution of the breaking load, to the effect that arcing time and contact burning are reduced, and that contact life is increased.

(Note: All Rollcon switches except the LKP type are designed for dedicated motor load switching).

Rollcon

## Isolating distance

In distribution systems it is a requirement that the feeder voltage from a transformer or a generator can be positively separated from the distribution switchboard.

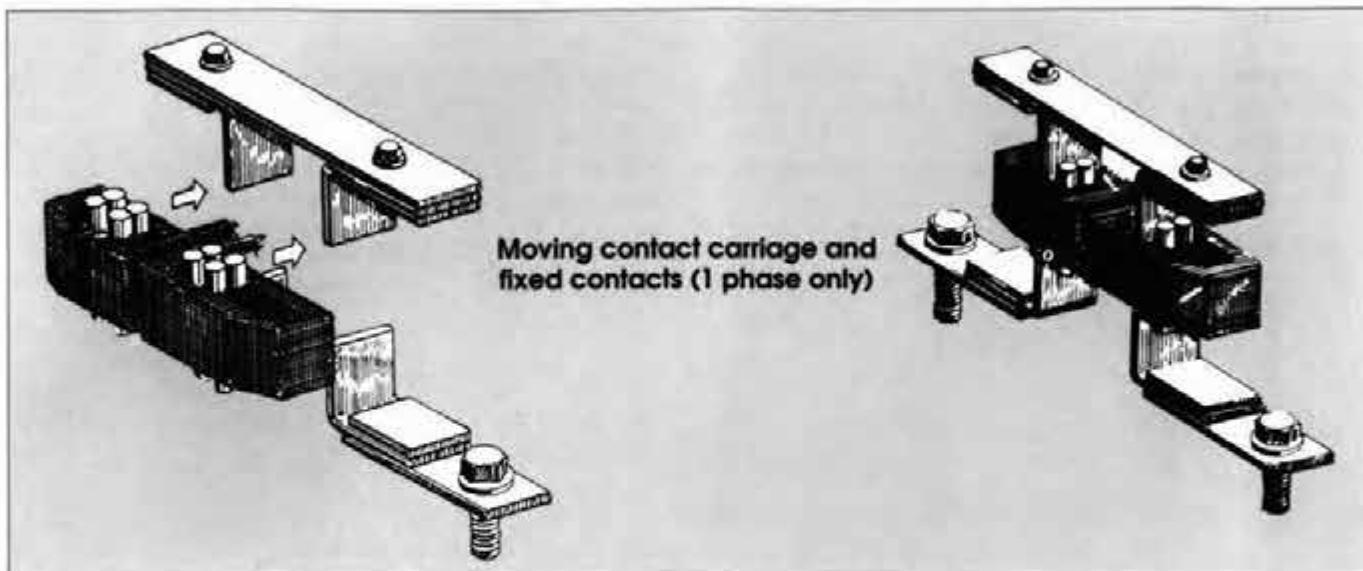
In the Rollcon range of switches this requirement is fully satisfied.

The required isolating distance is maintained not only across the fuse switch terminals, but also between terminals and fuse holders.

The double safety built into the design is important both when fuses are changed and when the distribution board is opened for inspection or maintenance.

The direct, mechanical connection between the operating handle and the moving contact system ensures that the opening movement of the handle causes the contacts to open, so that the position of the handle is a positive indication of the contact position referring to AS 1775 Clause 7.6.

# The best switch for any job



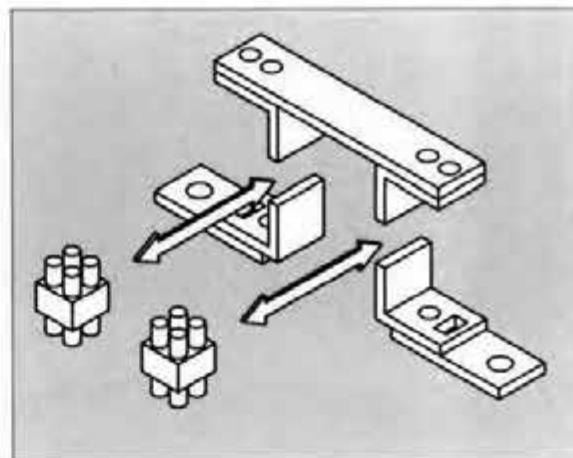
For any one frame size NHP-LK can offer three electrically different types of switches (LKA, LKP and LKS) in a variety of current ratings depending on the size of the copper and contacts etc.

## LKA fault make motor load-break switch 125 amp - 1000 amp

### For motor switching and general purpose loads

This style of switch is designed primarily for motor circuit applications, which has a similar contact design to fuse-switches. It therefore, has excellent motor/load (AC 23) characteristics due to 4 series breaks per pole. The thermal ratings differ from those of the fuse-switches, as the LKA does not have to dissipate the watts loss of a fuse cartridge. This contact arrangement makes it very suitable for special applications like capacitor or DC switching.

Fitted with IP65 handle as standard.



## LKP fault make load-break switch 250 amp - 3150 amp

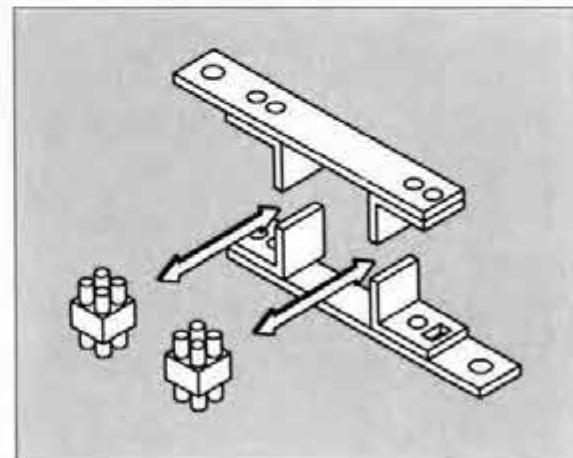
### For general purpose loads

Arranging the contacts pairs in parallel gives the LKP range significantly higher current capacity and short time withstand. For example, the largest rated switch is the LKP 3150 which can carry 3150 amps (enclosed) and has a short circuit withstand of 80kA for 1 second and 50kA for 3 seconds.

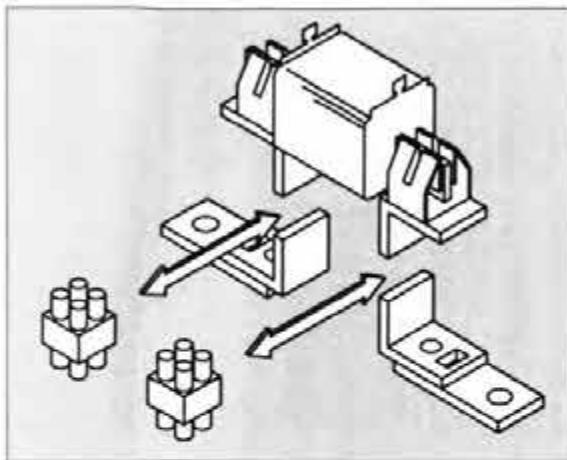
Most of the LKP range have ratings for AC 22 (mixed loads) and AC 21 (mostly static loads).

This range is the most popular for general light and power duties and main switch / isolator application.

Fitted with IP65 handle as standard.



# The best switch for any job



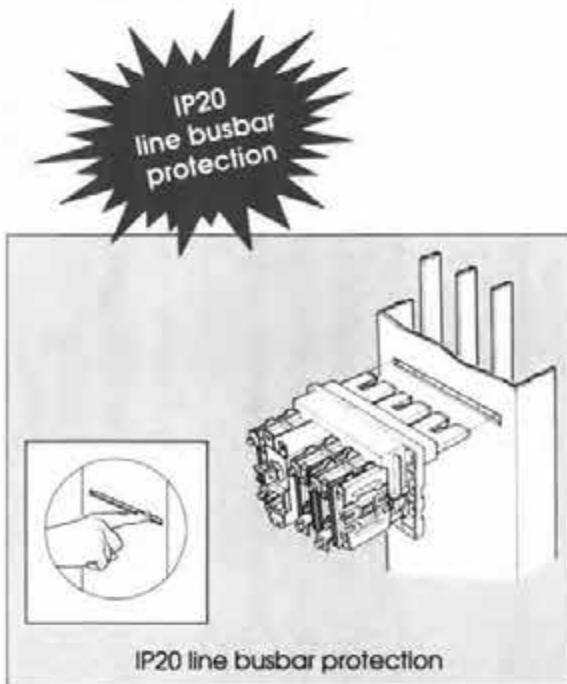
**LKS fuse-switch**  
400 amp - 800 amp

#### For motor switching and general purpose loads

All fuse-switch contacts are designed to fully isolate the fuse from both line and load side terminals.

This enables the switch to be fed from either direction without the danger of one side of the fuse being active when the switch is open. Also, as the line and load contact carrier move independently within the switch housing, the fuse cartridge does not have to suffer any shock during the very fast opening and closing operations. By using both contact pairs in series, all NHP-LK fuse-switches have a very high make/break capacity giving excellent motor load (AC 23) characteristics.

Fitted with IP65 handle as standard.



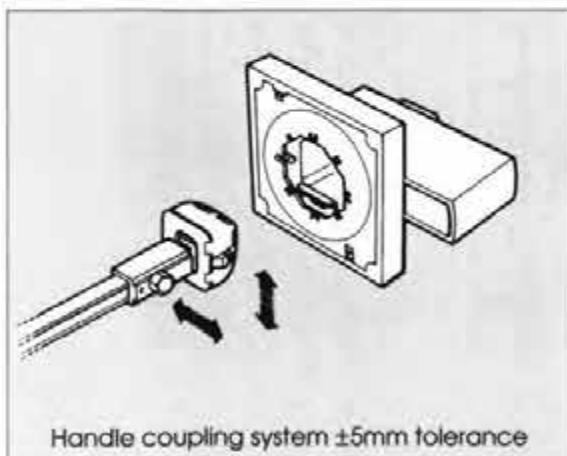
**LKS plug-in fuse-switch**

#### For motor control centre applications

Designed specifically for motor control centre applications. Suitable for motor switches, feeder switches or bus section switches.

These 'Plugcon' switches are built around the already popular Rollcon fuse-switches with anti-welding, self cleaning roller contacts but with the addition of a prefitted line side busbar plug. Although already established in the Australian market this new narrow plug can provide an MCC switchboard with IP20 busbar protection (63A to 400 amp).

This safety feature is very important when a module with a plug-in switch is withdrawn for maintenance.



Handle coupling system ±5mm tolerance

#### Premium handles

The NHP-LK premium glass reinforced handles have been designed for practicality and versatility, incorporating a aesthetically appealing appearance.

These handles operate a 'floating head' drive coupling fixed to a switch shaft. The drive coupling provides a ±5mm tolerance in all directions which allows for easier handle to coupling location.

These extremely robust handles are provided with a defeatable door interlocking feature, which can be padlockable in all positions, and have an IP65 rating as standard.

**NHP-LK**

Mini frame size with conventional contacts for all load types.

**LKM**

	Frame M1		Frame M2	
	Rollcon mini load-break switches			
	25A	40A	80A	100A



Cat. No.	LKM-25-		LKM-40-		LKM-80 -		LKM-100-	
<b>ALL SWITCHES INCLUDE HANDLE AND SHAFT AS STANDARD (FOR OPTIONS REFER PAGE 7)</b>								
Rated insulation voltage	660V AC		660V AC		1000V AC		1000V AC	
Rated conventional thermal current (ith)	25 Amps		40 Amps		80 Amps		100 Amps	
Rated enclosed thermal current (ithc)	25 Amps		40 Amps		80 Amps		100 Amps	
Rated operational current and typical motor loads to AS 1775	415/440V 660V	AC 23 AC 21	21A 11kW 25A		35A 18.5kW 40A		58A 32kW 80A	
Max. making capacity (unprotected) kA peak <sup>1)</sup>	1.5kA		1.5kA		3kA		3kA	
Short-time withstand current (1 sec. kA RMS)	0.5kA		0.8kA		1.6kA		2.1kA	
Rated fused short circuit current max. fuse size amps	500V AC, kA RMS	25kA 35A	50kA <sup>2)</sup> 50A	50kA <sup>2)</sup> 50A	25kA 80A	-	25kA 100A	50kA <sup>2)</sup> 80A
Mechanical endurance operations	100000		100000		100000		100000	
Weight Kg	0.2		0.21		0.45		0.46	
Outline dimensions <sup>3)</sup>	H mm W mm		64 50		64 50		80 70	
	Handle type		L	H	L	H	L	H
	D (min.) mm		84	85	84	85	89	94
	D (max.) mm		88	95	88	95	95	104
	By using a longer shaft D mm		238	262	238	262	242	270
DC operation 3 poles in series 110V DC, DC 21	25A		40A		80A		100A	

Notes: For 'clip-on' neutral links and switched neutral blocks - refer table below - accessories

Refer to page 7 for mini load-break switch types.

1) Rated short circuit making capacity (acc. to AS 1775 - 2.4.5).

2) Tested in motor control centre application to AS 1136.1 as a starter combination only. Other ratings should be used for distribution circuits.

3) Refer to page 31 for detailed dimensions.



A comprehensive array of 'clip on' accessories are available for all LKM switches. These include earth and neutral links, switched neutral and early break late make aux. contacts. (1 N/O, 1 N/C)



Additional terminal shrouds are available to give protection against screwdrivers etc.

### Accessories

#### Switch size (all versions)

Description	To suit LKM-25 Cat. No.	To suit LKM-80 Cat. No.
Switched neutral	LSN-M1	LSN-M2
Neutral link	LNL-M1	LNL-M2
Earth link	LEL-M1	LEL-M2
Aux. switch	LAX-M1-11	LAX-M2-11
Terminal shroud	LTS-M1	LTS-M2
Extension shaft 180mm (H or L)	LES-MHL	LES-MHL

# LKM mini load-break switch types

Version H (Base mount, variable depth handle).	Version L (Base mount, coupled to handle).	Version A (Panel mount).	Version C (Base mount, fixed handle).	Version K (Base mount, shallow handle).
				
This premier version is supplied with an premium super strong handle, padlockable, and with door interlock and variable depth shaft. This handle style is the same as that used with all Rollcon and Plugcon switches.	The switch is supplied with a padlockable moulded handle and fixed shaft, which can be extended (option).	This style of switch is uniquely arranged for door and drawer mounting [ie. MCC]. Note: The terminal screw holes are reversed for rear access.	These switches are suitable for DIN rail or screw fixing and are designed to fit flush into distribution boards and the like.	For panelboard applications that require a shallow mounting depth this 'K' type handle in only 22mm deep.
Catalogue Number	Catalogue Number	Catalogue Number	Catalogue Number	Catalogue Number
LKM-25H LKM-80H	LKM-25L LKM-80L	LKM-25A LKM-80A	LKM-25C LKM-80C	LKM-25K LKM-80K
LKM-40H LKM-100H	LKM-40L LKM-100L	LKM-40A LKM-100A	LKM-40C LKM-100C	LKM-40K LKM-100K

## Change-over switches

Version EH	Version EL
	
LKM-100 EH Change-over switch	LKM-40 Change-over switch
Catalogue Number	Catalogue Number
LKM-40EH LKM-100EH	LKM-40EL LKM-100EL

## 6 Pole motor switches

Version DL	Version DH
	
LKM-40DL 6 pole motor switch	LKM-100DH 6 pole motor switch
Catalogue Number	Catalogue Number
LKM-40DL LKM-100DL	LKM-40DH LKM-100DH

## Enclosed surface mounted load-break switches - 3 pole and multi-pole

Description	25A	40A	80A	100A
L-Type handle	Motor isolator	LKM-25L-SEP	LKM-40L-SEP	LKM-80L-SEP
	6 pole motor switch	-	LKM-40DL-SEP	-
	Change-over switch	-	LKM-40EL-SEP	-
H-Type handle	Motor isolator	LKM-25H-SEP	LKM-40H-SEP	LKM-80H-SEP
	6 pole motor switch	-	LKM-40DH-SEP	-
	Change-over switch	-	LKM-40EH-SEP	-
External dimensions	H mm	170	170	220
	W mm	135	135	168
	D mm	108	108	108
	Sarel enclosure used *)	352	352	362

Notes: \*) Hi-impact PVC encl.

**NHP-LK**

For motor switching and general purpose loads

**LKS**

## Frame R1

## Rollcon and Plugcon fuse-switches

40A

63A

100A<sup>1)</sup>

125A

160A



Standard fixed type fuse -switches	BS DIN	LKS1-40	LKS1-63	LKS1-100	LKS1-125	LKS1-160
Plug-in fuse-switch for MCC applications suitable for IP20 cut-out (BS fuse type) <sup>2)</sup>		LKS1-40-PI	LKS1-63-PI	-	LKS1-125-PI	LKS1-160-PI
ALL SWITCHES INCLUDE HANDLE AND SHAFT AS STANDARD (FOR OPTIONS REFER PAGES 16 to 17)						
Rated insulation voltage		1000V AC	1000V AC	1000V AC	1000V AC	1000V AC
Rated conventional thermal current (ith)		63 Amps	80 Amps	100 Amps	160 Amps	160 Amps
Rated enclosed thermal current (ithe)		40 Amps	63 Amps	100 Amps	125 Amps	160 Amps
Rated operational current and typical motor loads to AS 1775	415V AC, AC 23° 1000V AC, AC 23° 1000V AC, AC 22°	40A 22kW - - - 40A -	63A 30kW - - - 63A -	100A 55kW - - - 100A -	125A 70kW - - - 100A -	160A 90kW - - - 160A -
Max. breaking capacity at 660V AC, 0.35 P.F.		500A	500A	1000A	1000A	2400A
DC operation	2 poles in series 220V DC, DC 23° 3 poles in series 440V DC, DC 23°	40A 40A	63A 63A	100A 100A	125A 125A	160A 160A
Capacitor switching	415V AC (kVar)	22	34	54	67	86
Rated fused short circuit current	500V AC kA RMS max. fuse size amps	100kA 40A	100kA 63A	100kA 100A	100kA 125A	50kA 160A
Fuse types to AS 2005-2	A.S., B.S. DIN	A2, A3 -	A3 00	A4 (max. 30 Ø) <sup>3)</sup> -	B1, B2 00	B1, B2 -
Mechanical endurance operations		15000	15000	15000	15000	15000
Required switching torque Nm		7.5	7.5	7.5	7.5	7.5
Weight Kg		1.6	1.6	1.7	1.7	1.8
Outline dimensions	H mm W mm D (min.) mm D (max.) mm By using a long shaft D mm	100 155 165 225 385	100 155 165 225 385	116 155 165 225 385	116 155-DIN 165 225 385	127 184-85 165 225 385
Encl. (steel) surface mounted fuse-switches <sup>4)</sup>		LKS1-40-SE	LKS1-63-SE	LKS1-100-SE	LKS1-125-SE	LKS1-160-SE
External dimensions	H mm W mm D mm Sarel enclosure used	300 300 200 3003	300 300 200 3003	300 300 200 3003	300 300 200 3003	400 300 200 3018

Notes: For switchboard type flush mounting enclosures - refer page 20.

For 'clip-on' neutral links and switched neutral blocks - refer page 15.

1) This fuse barrel diameter restriction will exclude some makes of 100 amps A4 fuses. However suitable fuses are available from NHP.

2) For DIN type plug-in switches, please contact NHP.

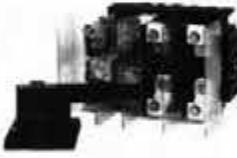
3) Before applying this rating, check availability of suitable 1000V AC fuse links.

4) Refer page 17 for fuse types by manufacturer.

5) Enclosed switches are B.S. type as standard. Many non standard enclosed switches can be catered for - refer your nearest NHP branch or agent.

6) This plug-in fuse-switch is not suitable for IP20 cut-out.

7) 800 amps in a ventilated enclosure or 720 amps totally enclosed.

Rollcon and Plugcon fuse-switches						
160A	200A	250A	315A	400A	630A	800A
						
LKS2-160 LKS2-160-DIN	LKS2-200 -	LKS2-250 LKS2-250-DIN	LKS2-315 -	LKS2-400 LKS2-400-DIN	LKS3-630 LKS3-630-DIN	LKS3-800 -
-	LKS2-200-PI	LKS2-250-PI	LKS2-315-PI	LKS2-400-PI	LKS3-630-PI*)	LKS3-800-PI*)
<b>ALL SWITCHES INCLUDE HANDLE AND SHAFT AS STANDARD (FOR OPTIONS REFER PAGES 16 to 17)</b>						
1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC
160 Amps	200 Amps	400 Amps	400 Amps	400 Amps	800 Amps	800 Amps
160 Amps	200 Amps	250 Amps	315 Amps	400 Amps	630 Amps	800A*) / 720A*)
160A 90kW	200A 116kW	250A 145kW	315A 185kW	400A 235kW	630A 370kW	800A 485kW
160A 230kW	200A 285kW	250A 355kW	250A 355kW	250A 355kW	315A 450kW	315A 450kW
160A -	200A -	250A -	315A -	400A -	630A -	800A -
2400A	2400A	2400A	2400A	2400A	4800A	4800A
160A	200A	250A	315A	400A	630A	800A
160A	200A	250A	315A	400A	630A	800A
86	108	134	170	215	340	430
100kA	100kA	100kA	100kA	100kA	100kA	100kA
160A	200A	250A	400A	400A	630A	800A
B1, B2	B1, B2	B1 - B4	B1 - B4	B1 - B4	C1 - C3	C1 - C3
00	-	1, 2	-	1, 2	3	3
12000	12000	12000	12000	12000	3000	3000
16	16	16	16	16	30	30
4.1	4.2	4.5	4.6	4.7	14	14.5
146	146	160	160	160	270	270
240	240	240	240	240	345	345
220	220	220	220	220	250	250
270	270	270	270	270	265	265
390	390	390	390	390	529	529
-	LKS2-200-SE	LKS2-250-SE	LKS2-315-SE	LKS2-400-SE	LKS3-630-SE	LKS3-800-SE
-	500	500	500	500	800	800
-	500	500	500	500	600	600
-	250	250	250	250	300	300
-	3025	3025	3025	3025	3057	3057

**Notes:** For switchboard type flush mounting enclosures - refer page 20.

For 'clip-on' neutral links and switched neutral blocks - refer page 15.

\*) This fuse barrel diameter restriction will exclude some makes of 100 amps A4 fuses. However suitable fuses are available from NHP.

\*) For DIN type plug-in switches, please contact NHP.

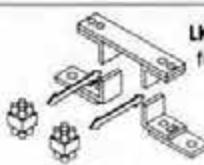
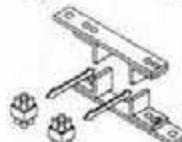
\*) Before applying this rating, check availability of suitable 1000V AC fuse links.

\*) Refer page 17 for fuse types by manufacturer.

\*) Enclosed switches are B.S. type as standard. Many non standard enclosed switches can be catered for - refer your nearest NHP branch or agent.

\*) This plug-in fuse-switch is not suitable for IP20 cut-out.

\*) 800 amps in a ventilated enclosure or 720 amps totally enclosed.

**NHP-LK**LKA - Series contacts  
for motor switching  
and general purpose.LKP - Parallel contacts  
for general purpose  
loads.**LKA**  
**LKP**

Frame R1

## Rollcon load-break switches

125A

160A

200A

250A



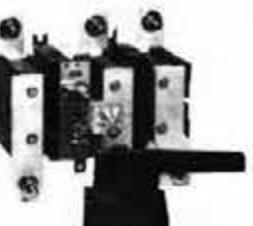
Cat. No.	LKA1-125	LKA1-160	LKA1-200	LKP1-250
<b>ALL SWITCHES INCLUDE HANDLE AND SHAFT AS STANDARD (FOR OPTIONS REFER PAGES 16 to 17)</b>				
Rated insulation voltage	1000V AC	1000V AC	1000V AC	1000V AC
Rated conventional thermal current (ith)	160 Amps	200 Amps	250 Amps	315 Amps
Rated enclosed thermal current (ithc)	125 Amps	160 Amps	200 Amps	250 Amps
Rated operational current and typical motor loads to AS 1775	415/440V AC 23	160A 90kW	200A 116kW	200A 116kW
	500V AC 22	160A	200A	200A
	660V AC 21	160A	200A	200A
	1000V AC 22/23	63A/-	63A/-	63A/-
Max. making capacity (unprotected) kA peak <sup>1)</sup>	20kA	20kA	20kA	39kA
Capacitor switching	415V AC (kVAr)	67 kVAr	86 kVAr	108 kVAr
Short-time withstand current (1 sec. kA RMS)		4kA	4kA	10kA
Rated fused short circuit current	500V AC, kA RMS max. fuse size amps	100kA 50kA 160A 200A	100kA 50kA 160A 200A	50kA 200A
Mechanical endurance operations		15000	15000	15000
Weight	Kg	1.5	1.6	1.7
Outline dimensions	H mm	116	127	127
	W mm	155	155	155
	D (min.) mm	140	140	140
	D (max.) mm	200	200	200
	By using a longer shaft D mm	385	385	385
DC operation	2 poles in series 220V DC, DC 23 3 poles in series 440V DC, DC 23	160A 160A	160A 160A	200A 200A
<b>Enclosed (insulated) surface mounted load-break switches</b>		LKA1-125-SEP	LKA1-160-SEP	LKA1-200-SEP
External dimensions	H mm	280	380	380
	W mm	190	280	280
	D mm	180	180	180
Fibox enclosure used	E-JBTd-grey	E-PETd-grey	E-PETd-grey	E-PETd-grey
<b>Enclosed (steel) surface mounted load-break switches</b>		LKA1-125-SE	LKA1-160-SE	LKA1-200-SE
External dimensions	H mm	300	400	400
	W mm	300	300	300
	D mm	200	200	200
Sarel enclosure used	3003	3018	3018	3018

Notes: For switchboard type flush mounting enclosures - refer page 20.

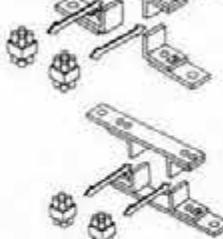
Many non standard enclosed switches can be catered for - refer your nearest NHP branch or agent.

For 'add on' neutral links and switched neutral blocks - refer page 15.

1) Rated short circuit making capacity (acc. to AS 1775-2.4.5).

Frame R1	Frame R2						
Rollcon load-break switches							
400A	400A	400A	630A	630A	800A	1000A	
							
<b>LKP1-400</b>	<b>LKA2-400</b>	<b>LKP2-400</b>	<b>LKP2-630</b>	<b>LKA2-630</b>	<b>LKP2-800</b>	<b>LKP2-1000</b>	
<b>ALL SWITCHES INCLUDE HANDLE AND SHAFT AS STANDARD (FOR OPTIONS REFER PAGE 16 to 17)</b>							
1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	
400 Amps	630 Amps	630 Amps	630 Amps	630 Amps	800 Amps	630 Amps	
400 Amps	400 Amps	400 Amps	630 Amps	630 Amps	800 Amps	1000 Amps	
-	400A / 235kW	-	-	630A / 370kW	-	-	
400A	400A	400A	630A	630A	630A	630A	
400A	400A	400A	630A	630A	800A	1000A	
-	400A / 425kW	-	-	630A / 425kW	-	-	
39kA	50kA	60kA	60kA	50kA	60kA	60kA	
-	215 kVAr	-	338 kVAr	274 kVAr	-	338 kVAr	
10kA	15kA	25kA	32kA	15kA	32kA	32kA	
<b>100kA 35kA</b>	<b>100kA</b>	<b>100kA</b>	<b>100kA</b>	<b>100kA</b>	<b>100kA</b>	<b>100kA</b>	
<b>250A 400A</b>	<b>400A</b>	<b>630A</b>	<b>630A</b>	<b>630A</b>	<b>800A</b>	<b>1000A</b>	
15000	12000	12000	12000	12000	12000	12000	
-	4.1	-	5.0	4.3	-	5.4	
143	160	160	170	160	218	218	
187	240	240	240	240	240	240	
155	166	166	166	166	177	177	
215	226	226	226	226	237	237	
400	390	390	390	390	401	401	
-	400A	-	630A	630A	-	-	
-	400A	-	500A	500A	-	-	
-	-	-	-	-	-	-	
-	-	-	-	-	-	-	
-	-	-	-	-	-	-	
-	-	-	-	-	-	-	
<b>LKP1-400-SE</b>	<b>LKA2-400-SE</b>	-	<b>LKP2-630-SE</b>	<b>LKA2-630-SE</b>	<b>LKP2-800-SE</b>	-	
400	500	-	600	600	800	-	
300	400	-	400	400	600	-	
200	200	-	200	200	250	-	
3018	3023	-	3026	3026	3056	-	

**Notes:** For switchboard type flush mounting enclosures - refer page 20.  
 Many non standard enclosed switches can be catered for - refer your nearest NHP branch or agent.  
 For 'add on' neutral links and switched neutral blocks - refer page 15.  
 1) Rated short circuit making capacity (acc. to AS 1775-2.4.5).

**NHP-LK****LKA  
LKP**LKA - Series contacts  
for motor switching.LKP - Parallel contacts for  
general purpose switching.

Frame R3

Frame R4

Frame R3

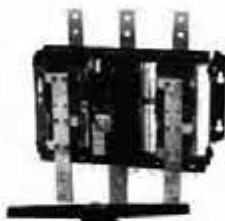
## Rollcon load-break switches

1000A

1250A

1250A

1600A



Cat. No.	LKA3-1000	LKP3-1250	LKP4-1250	LKP3-1600
ALL SWITCHES INCLUDE HANDLE AND SHAFT AS STANDARD (FOR OPTIONS REFER PAGE 16 to 17)				
Rated insulation voltage	1000V AC	1000V AC	1000V AC	1000V AC
Rated conventional thermal current (I <sub>th</sub> )	1000 Amps	1250 Amps	1250 Amps	1600 Amps
Rated enclosed thermal current (I <sub>the</sub> )	1000 Amps	1250 Amps	1250 Amps	1600 Amps
Rated operational current and typical motor loads to AS 1775	415/440V AC 23 500V AC 22 660V AC 21 1000V AC 22/23	AC 23 1000A 1000A 1000A/475kW	600kW 800A 1250A -	800A 1250A 1600A -
Max. making capacity (unprotected) kA peak <sup>1)</sup>	50kA	85kA	150kA	85kA
Capacitor switching	415V AC (kVAr)	539 kVAr	-	-
Short-time withstand current	(1 sec. kA RMS) (3 sec. kA RMS)	50kA	50kA	63kA
Rated fused short circuit current	500V AC, kA RMS max. fuse size amps	100kA 1000A	100kA 1250A	100kA 1600A
Mechanical endurance operations		3000	3000	3000
Weight	Kg	11.7	14.0	25.8
Outline dimensions	H mm W mm D (min.) mm D (max.) mm By using a longer shaft (pg 17) D mm	270 345 204 229 529	350 345 208 258 529	463 500 245 -
DC operation	2 poles in series 220V DC, DC 23 3 poles in series 440V DC, DC 23	1000A 800A	-	-

Notes: For switchboard type flush mounting enclosures - refer page 20.

Many non standard enclosed switches can be catered for - refer your nearest NHP branch or agent.

For 'add on' neutral links and switched neutral blocks - refer page 15.

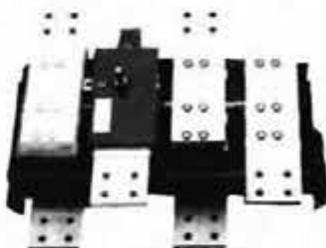
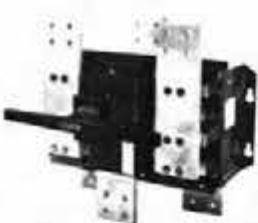
1) Making capacity according to AS 1775-2.4.5.

2) Without terminals

3) I<sub>th</sub><sub>e</sub> - 3150A in a ventilated enclosure / I<sub>th</sub><sub>e</sub> - 2800A when totally enclosed

4) Maximum breaker size amps

Frame R4	Frame 2 x R3 without terminals	Frame R4
Rollcon load-break switches		
1600A	2000A	2500A
2500A	3150A	



LKP4-1600	LKP4-2000	LKP3-2500WT <sup>1)</sup>	LKP4-2500	LKP4-3150
<b>ALL SWITCHES INCLUDE HANDLE AND SHAFT AS STANDARD</b>				
1000V AC	1000V AC	1000V AC	1000V AC	1000V AC
1600 Amps	2000 Amps	2500 Amps	2500 Amps	3150 Amps
1600 Amps <sup>2)</sup>	2000 Amps	2500 Amps	2500 Amps	3150 Amps <sup>3)</sup>
-	-	-	-	-
800A	-	-	-	-
1600A	2000A	2500A	2500A	3150A
-	-	-	-	-
150kA	150kA	130kA	150kA	150kA
-	-	-	-	-
<b>63kA</b>	<b>80kA</b>	<b>80kA</b>	<b>80kA</b>	<b>80kA</b>
-	50kA	50kA	50kA	50kA
100kA	100kA	100kA	100kA	100kA
1600A <sup>4)</sup>	2000A <sup>4)</sup>	2500A <sup>4)</sup>	2500A <sup>4)</sup>	3150A <sup>4)</sup>
3000	3000	1000	3000	3000
29.8	37.8	-	49.8	49.8
463	463	225	463	463
500	526	389	526	596
245	245	374	245	245
-	-	399	-	-
504	504	699	504	504
-	-	-	-	-
-	-	-	-	-

**Notes:** For switchboard type flush mounting enclosures - refer page 20.

Many non standard enclosed switches can be catered for - refer your nearest NHP branch or agent.

For 'add on' neutral links and switched neutral blocks - refer page 15.

<sup>1)</sup> Making capacity according to AS 1775-2.4.5.

<sup>2)</sup> Without terminals

<sup>3)</sup> Ithe - 3150A in a ventilated enclosure / Ithe - 2800A when totally enclosed

<sup>4)</sup> Maximum breaker size amps

## Rollcon selection chart

NHP-LK

Fuse-switch  
LKS

Load-break  
switch  
LKA, LKP, LKM

NB. All LKS switches  
are suitable  
for dedicated motor  
switching (AC 23)

For dedicated  
motor switching:  
(AC 23)  
LKM / LKA

Select  
appropriate  
rating

For general  
purpose use or  
less than 85%  
motor load

LKM-25 - 11kW  
LKM-40 - 18.5kW  
LKM-80 - 32kW  
LKM-100 - 37kW  
LKA1-125 - 90kW  
LKA1-160 - 116kW  
LKA1-200 - 116kW  
LKA2-400 - 235kW  
LKA2-630 - 370kW  
LKA3-1000 - 600kW

LKM/LKP

Select  
appropriate  
rating

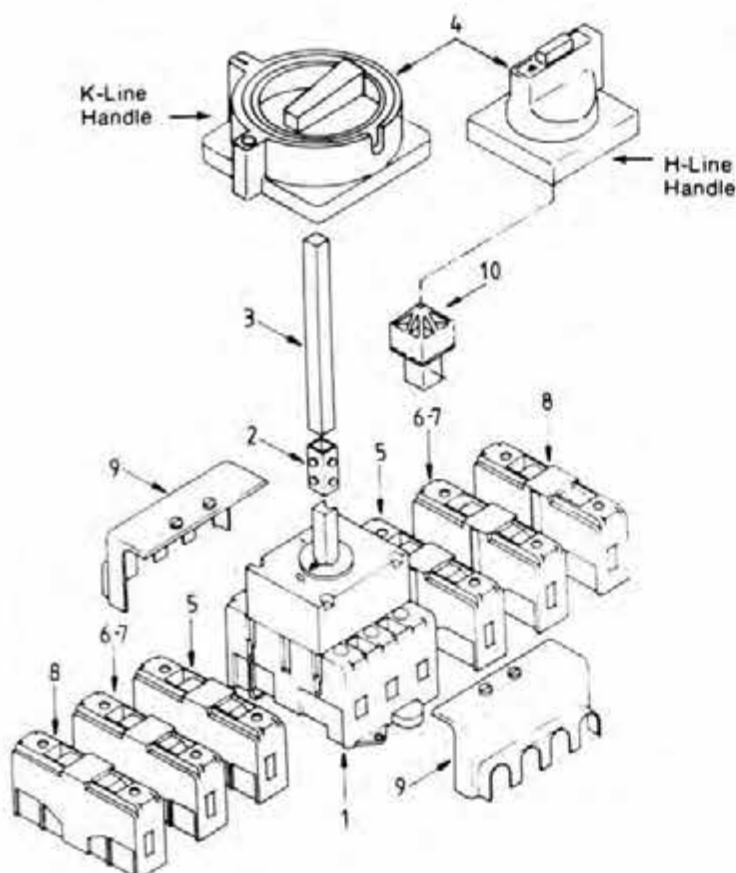
22kW -	LKS1-40	LKM-25 -	25A
30kW -	LKS1-63	LKM-40 -	40A
55kW -	LKS1-100	LKM-80 -	80A
70kW -	LKS1-125	LKM-100 -	100A
90kW -	LKS1-160	LKP1-250 -	250A
116kW -	LKS2-200	LKP1-400 -	400A
145kW -	LKS2-250	LKP2-400 -	400A
185kW -	LKS2-315	LKP2-630 -	630A
235kW -	LKS2-400	LKP2-800 -	800A 575kVA
370kW -	LKS3-630	LKP2-1000 -	1000A 718kVA
485kW -	LKS3-800	LKP3-1250 -	1250A 898kVA
		LKP3-1600 -	1600A 1150kVA
		LKP4-2000 -	2000A 1437kVA
		LKP4-2500 -	2500A 1797kVA
		LKP4-3150 -	3150A 2264kVA

Remember, all sizes indicate the totally enclosed rating of the switch, and all part numbers include the handle and shaft as standard.

# Accessories

All Rollcon switches are as standard, supplied with a suitable black moulded handle (23), IP65 gasket (22), drive coupling (21), variable depth shaft (8) and fuse barriers (24) on LKS fuse-switches. Other accessories and options are available as shown below.

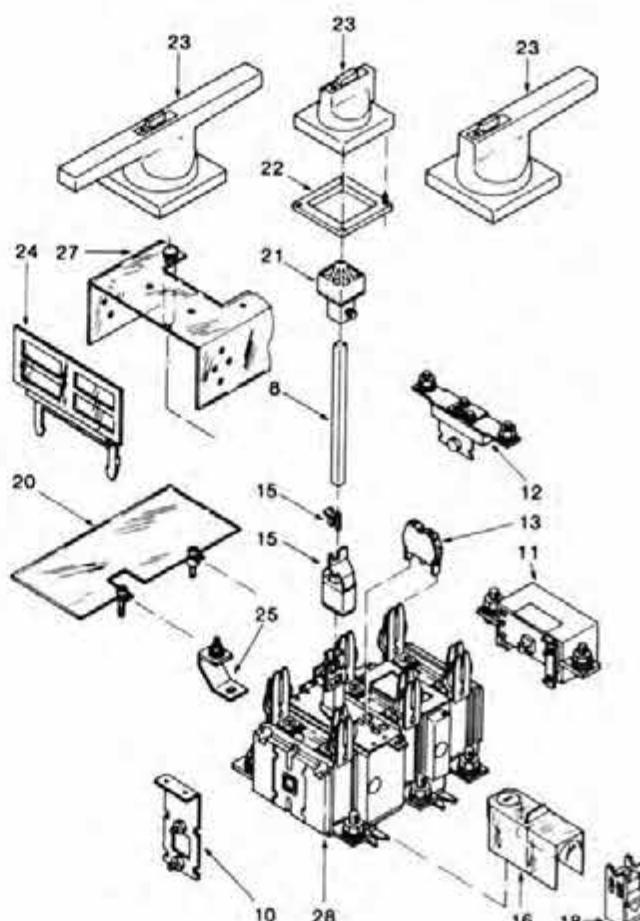
**Note:** None of these accessories require any factory fitting or switch modification.



## LKS, LKA, LKP Rollcon switches

### Frame 1 and 2

- 8 Hardened steel shaft (variable depth)
- 10 Front/side mounting bracket
- 11 'Add on' switched neutral pole
- 12 'Add on' neutral link
- 13 'Clip on' auxiliary switch (max. of 2 units)
- 15 Switch direct padlock device
- 16 Individual terminal shroud
- 18 Tunnel terminal attachment
- 20 Flat terminal shroud
- 21 Drive coupling
- 22 IP65 gasket (standard supply)
- 23 Choice of 3 types of padlockable handle
- 24 Fuse barrier (standard supply)
- 25 B.S. fuse adaptor (pre-fitted to B.S. switch)
- 27 Fuse shroud
- 28 fuse-switch body



Exploded diagram identifying some of the accessories available for LKS fuse-switches. Most of these accessories are common to the LKA and LKP load-break switches also.

## LKM mini load-break switches

### Frame M1 and M2

- 1 Switch body (3 pole) complete with 24mm shaft
- 2 6x6mm shaft link
- 3 6x6x180mm shaft extension
- 4 Handle (variety of types)
- 5 Switched neutral (clip on)
- 6 Solid neutral link (clip on)
- 7 Solid earth link (clip on)
- 8 N/O, N/C auxiliary contact (clip on)
- 9 Terminal cover
- 10 Drive coupling for H-line handle

# Accessories

All Rollcon switches are as standard, supplied with a suitable black moulded handle (23), IP65 gasket (22), drive coupling (21), variable depth shaft (8) and fuse barriers (24) on LKS fuse-switches (refer page 14). Other accessories and options are available as shown below.

**Note:** None of these accessories require any factory fitting or switch modification.

Description	Switch size	Max. rating	Cat. No.	
<b>Neutral links</b>				
	LKM-25, LKM-40 LKM-80, LKM-100 Frame R1 Frame R1 Frame R2 Frame R3 Frame R3	40A 100A 125A 250A 400A 1000A 1600A	LNL-M1 LNL-M2 LNL-R1-125 LNL-R1-250 LNL-R2-400 LNL-R3-1000 LNL-R3-1600	
<b>Note:</b> The LKM solid neutrals are not disconnectable.				
<b>Switched neutral</b>				
	LKM-25, LKM-40 LKM-80, LKM-100 Frame R1 Frame R1 Frame R1 Frame R2 Frame R2 Frame R3	40A 100A 63A 125A 400A 200A 630A 630A	LSN-M1 LSN-M2 LSN-R1-63 LSN-R1-125 LSN-R1-400 LSN-R2-200 LSN-R2-630 LSN-R3-630	
<b>Auxiliary switches (All late make, early break)</b>				
	These are a unique 'clip on' device which have either 1 N/O, 1 N/C contacts or 2 N/O contacts. A maximum of 2 clip on modules ie. 4 contacts, will fit on any one switch. The contacts are rated at 4 amps AC 11 or 10 amps AC 1.	LKM-25, LKM-40 LKM-80, LKM-100 Frame R1 & R2 + R4 Frame R1 & R2 + R4 Frame R1 & R2 + R4 Frame R3, 2 x R3	1 N/O, 1 N/C 1 N/O, 1 N/C 1 N/O 1 N/O, 1 N/C 2 N/O 1 N/O, 1 N/C	LAX-M1-11 LAX-M2-11 LAX-R124-10 LAX-R124-11 LAX-R124-20 LAX-R3-11
<b>Interlocks</b>				
To interlock two switches for mains to standby type application - 3 types of interlocks are available.				
<b>Key interlocking</b>				
	This is a cam which is fitted to the drive coupling. A L&F or Castell lock can then be added to interlock with other similarly keyed switches. (Lock & key not included).	Frame R1 Frame R2, R3 & R4	LKI-R1 LKI-R234	
<b>Mechanical interlock</b>				
	A mechanical interlock bar is connected between 2 switches of the same (or different) frame size. This gives 2 handle operation with one switch on and one off, or both switches off.	Frame R1 or R2 Frame R3	LMI-R12 LMI-R3	
<b>Single handle transfer</b>				
	This device operates in the same manner as the mechanical interlock but is driven by a single handle with 3 positions. (i.e. I-O-II). Interlocking between different frame sizes is possible.	Frame R1 Frame R2 Frame R3	LCO-R1 LCO-R2 LCO-R3	

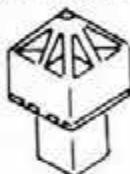
Cat. No. LKI-R1  
Key interlocking

Cat. No. LMI-R12  
Mechanical interlock bar

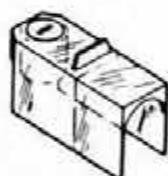
Cat. No. LCO-R1  
Single handle transfer

# Accessories

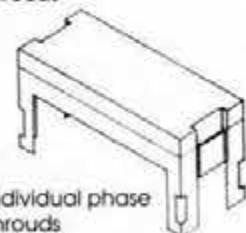
**Moulded handles**  
Available in a variety of sizes - all are padlockable and have inherent defeatable door interlock mechanism.  
Each size has the alternative of red/yellow emergency switch colouring.  
All are manufactured for a high impact resistance nylon moulding.



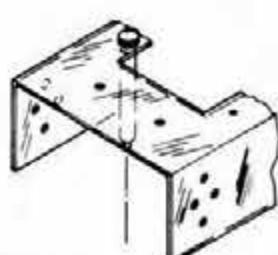
Drive coupling



Individual terminal shrouds



Individual phase shrouds



Fuse shroud to suit LKS fuse-switch

Description	Switch size	Cat. No.
<b>High mounting feet adaptors</b> For additional clearance underneath the switch. <b>Note:</b> Frame size R2 has adjustable feet.	Frame R1 (2 per switch) Frame R3	LHF-R1 LHF-R3
<b>A4 fuse adaptors</b> To mount (BS) A4 size fuses to switches designed for large B1 or B2 fuses. (eg. to fit 100A TCP fuses to LKS1-125).	A4 fuse adaptor (set of 3)	LFA-R1
<b>Handles (spare and optional)</b>		
Fixed handles	Frame R1 8 x 8mm Frame R2 10 x 10mm Frame R3 12 x 12mm	LFH-R1 LFH-R2 LFH-R3
Spare handle + coupling kit	LKM H1 Frame R1 H2 Frame R2 H3 Frame R3 H4 Frame R4 H6	LHD-H1 LHD-H2 LHD-H3 LHD-H4 LHD-H6
Red / yellow handles	LKM H1 Frame R1 H2 Frame R2 H3 Frame R3 H4 Frame R4 H6	LHD-H1R LHD-H2R LHD-H3R LHD-H4R LHD-H6R
<b>Note:</b> Red handle - yellow escutcheon. All premium handles (H1 - H6) are IP65 as standard.		
<b>Individual terminal shrouds</b> These have been designed to fit over the actual terminal bolt and lug or bar. Manufactured in clear polycarbonate	Bolt size M6 Bolt size M8 Bolt size M10	LIS-M6 LIS-M8 LIS-M10
<b>Terminal shroud</b> These are fitted onto the switch moulding and guard all three active terminals. Manufactured in clear polycarbonate.	LKM-25, LKM-40 LKM-80, LKM-100 Frame R1 Frame R2 Frame R3	LTS-M1 LTS-M2 LTS-R1 LTS-R2 LTS-R3
<b>Individual phase shrouds</b> These are available only for the frame size R1 + R2 switches. They can fit onto the front and/or the rear of the switch. Manufactured in thermoplastic, bright yellow in colour.	Frame R1 - front (3 shroud set) Frame R1 - rear (3 shroud set) Frame R2 - front or rear (3 shroud set)	LPS-R1F LPS-R1R LPS-R2
<b>Switch cover</b> This covers exposed copper bar on LKA and LKP load-break switches. Manufactured in clear polycarbonate.	Frame R3 - front Frame R3 - rear Frame R4	LSC-R3F LSC-R3R LSC-R4
<b>Fuse shroud</b> To suit LKS fuse-switches. Manufactured in folded clear polycarbonate.	LKS1-40, LKS1-63 LKS1-100 LKS1-125, LKS1-160 All frame R2 All frame R3	LFS-R1A LFS-R1B LFS-R1C LFS-R2 LFS-R3

**Notes:** Refer handle data page 18 for details of which handle will fit which switch and appropriate dimensions.

Part. Nos. shown do not include shaft or drive coupling as these along with standard handles are supplied with every switch (except where shown to suit LKM switches).

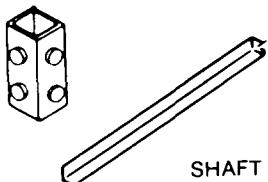
# Accessories

## Optional longer shafts

Occasionally it is necessary to use a longer shaft than that supplied as standard with the switch. For other depths it is necessary to substitute a longer shaft chosen from the list shown. In some cases even longer shafts are available - please contact NHP for further details.

Switch type	Mounting depth <sup>1)</sup>	Shaft size (mm)	Cat. No.
LKM	K handle	6 x 6 x 147 kit	LES-MK
	L/H handle	6 x 6 x 180 kit	LES-MHL
Frame R1	L2	8 x 8 x 300	LES-R1-3
		8 x 8 x 600	LES-R1-6
Frame R2	L2	10 x 10 x 300	LES-R2-3
		10 x 10 x 600	LES-R2-6
Frame R3 LKS	L2	12 x 12 x 380 kit	LES-R3-3K
		12 x 12 x 600 <sup>2)</sup>	LES-R3-6
Frame R3 LKA, LKP	L4	12 x 12 x 115	LES-R3-1
		12 x 12 x 380 kit	LES-R3-3K
Frame R4		12 x 12 x 380 kit	LES-R3-3K

SHAFT LINK



Shaft kit

## Other accessories for occasional use

Shaft link	6 x 6	LSL-M
Shaft link	8 x 8	LSL-R1
Shaft link	10 x 10	LSL-R2
Shaft link	12 x 12	LSL-R3
Shaft link	12 x 12 45°/90°	LSL-R3T

**Notes:** <sup>1)</sup> The drawings shown in the NHP-LK technical catalogue indicate the various mounting depths available. The small mounting depth (usually L1) is obtainable by using the standard shaft which is supplied with the switch.  
<sup>2)</sup> 12 x 12 shaft link will be required.

## Fuse selection - dimensional reference

### Fuse manufacturers part numbers - Australian/British standard

This chart is designed to help choose the correct fuse to fit a particular NHP-LK fuse-switch (or vice versa).

The data is from the manufacturers publications and as such cannot be guaranteed by NHP.

Beware that some motor start fuses are actually in a larger body size than a normal fuse. It is wise to consult the fuse manufacturers data to determine their particular fuse size (ie. A2-C3).

Fuse size to AS 2005	Holec	GEC	Nilsen	Hawker Sidley	MEM	Siemens
A2 32 amp	TIA	TIA	32B	H07	SB3	3NW TIA
A3 63 amp	TIS	TIS	63B	K07	SB4	3NW TIS
A4 100 amp <sup>3)</sup>	TCP	TCP	100B	L14	SD5	3NW TCP
Hybrid (A4) 200 amp <sup>4)</sup>	TFP	TFP		M14	SD6	3NW TFP
B1 100 amp	TC	TC	100B/C	L09	SF5	3NW TC
B2 200 amp	TF	TF	200B/C	M09	SF6	3NW TF
B3 315 amp	TKF	TKF	315B/C	N09	SF7	3NW TKF
B4 400 amp	TMF	TMF	400B/C	P09	SF8	3NW TMF
C1 400 amp	TM	TM	404B/C	P11	SH8	3NW TIM
C2 630 amp	TTM	TTM	504B/C	R11	SH9	3NW TTM
C3 800 amp	TLM	TLM	804B/C	S11	SH10	3NW TLM

### DIN pattern

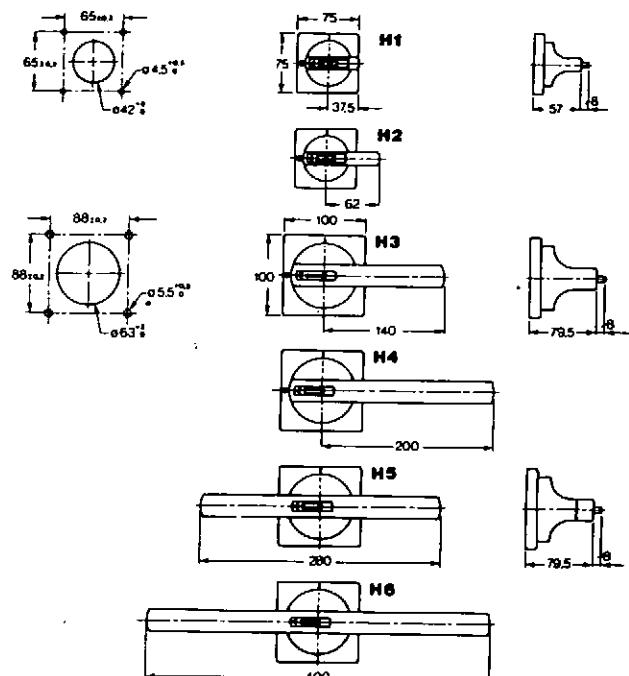
00	160 amp	P851.00	-	-	-	7999	3NA5
1	250 amp	P851.1	-	-	-	8001	3NA4 144
2	400 amp	P851.2	-	-	-	8002	3NA4 260
3	630 amp	P851.3	-	-	-	8003	3NA1

### Notes:

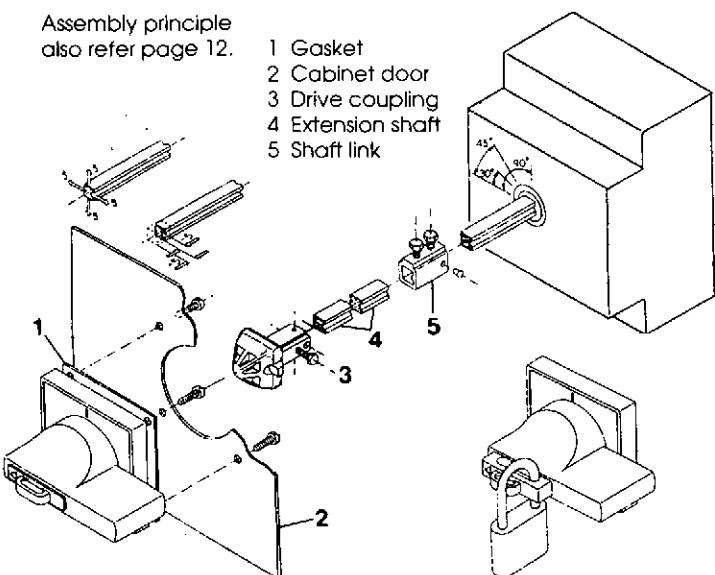
<sup>3)</sup> At present only the Holec TCP fuse will fit the LKS1-100 fuse-switch. If this fuse cannot be sourced use the LKS1-125 with A4 fuse adaptors.

<sup>4)</sup> This hybrid type fuse is actually an A4 size fuse but as it is over 100 amps it cannot be called an A4 fuse to AS 2005.

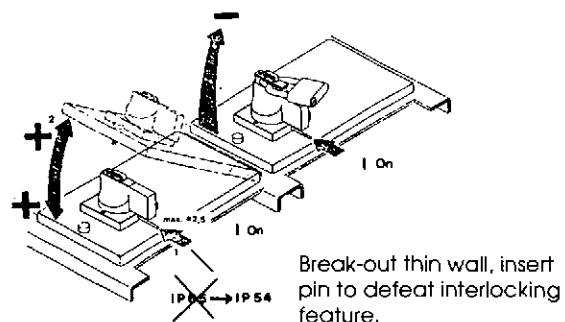
# Premium handles dimensions



Assembly principle  
also refer page 12.

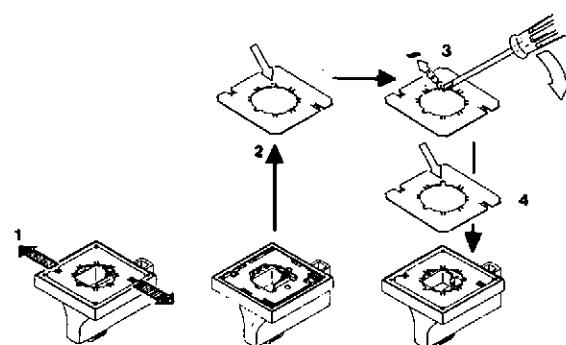
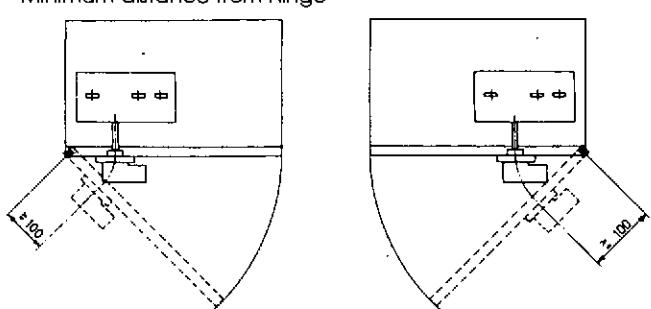


Defeating the door interlock feature



Revision of padlocking position

Minimum distance from hinge



# Surface mounting enclosed switches

## Fuse-switches

Combining the outstanding features of the **Sarel** standard enclosure range, Series 3000, with the reliable NHP-LK range of **Rollcon** switches, enables us to offer totally enclosed switches for separate surface mounting.



## Standard features

- Removable gland plate.
- Steel enclosure, rust proofed and impervious to ultraviolet deterioration.
- IP55 protection (weatherproof) including handle.
- Switch handle and enclosure door are lockable.

## Optional extras

A wide range of optional accessories and possibilities are available. These include IP65 protection, auxiliary contacts, neutral links, polycarbonate enclosures, extra cable space etc. Please contact NHP to discuss your requirements.

### Totally enclosed fuse-switches

Enclosed thermal current I <sub>th</sub>	Rated power 415V AC 23	No. poles	Sarel steel enclosure No.	External dimensions (mm) (1)			Fuse-switches Cat. No.
				Height	Width	Depth	
40A	22 kW	3	3003	300	300	200	LKS1-40-SE
63A	30 kW	3	3003	300	300	200	LKS1-63-SE
100A	55 kW	3	3003	300	300	200	LKS1-100-SE
125A	70 kW	3	3003	300	300	200	LKS1-125-SE
160A	90 kW	3	3018	400	300	200	LKS1-160-SE
200A	116 kW	3	3025	500	500	250	LKS2-200-SE
250A	145 kW	3	3025	500	500	250	LKS2-250-SE
315A	185 kW	3	3025	500	500	250	LKS2-315-SE
400A	235 kW	3	3025	500	500	250	LKS2-400-SE
630A	370 kW	3	3057	800	600	300	LKS3-630-SE
750A	450 kW	3	3057	800	600	300	LKS3-800-SE

### Totally enclosed load-break switches / motor isolators

Enclosed thermal current I <sub>th</sub>	Rated power 415V AC 23	No. poles	Sarel PVC or steel encl. No.	External dimensions (mm) (1)			Load-break switches Cat. No.
				Height	Width	Depth	
25A	11 kW	3	352(2)	170	135	108	LKM-25L-SEP
25A	11 kW	3	352(2)	170	135	108	LKM-25H-SEP
40A	18.5 kW	3	352(2)	170	135	108	LKM-40L-SEP
40A	18.5 kW	3	352(2)	170	135	108	LKM-40H-SEP
80A	32 kW	3	362(2)	220	168	108	LKM-80L-SEP
80A	32 kW	3	362(2)	220	168	108	LKM-80H-SEP
100A	37 kW	3	362(2)	220	168	108	LKM-100L-SEP
100A	37 kW	3	362(2)	220	168	108	LKM-100H-SEP
25A	11 kW	3	3015	300	200	150	LKM-25L-SE
25A	11 kW	3	3002	300	300	150	LKM-25H-SE
40A	18.5 kW	3	3015	300	200	150	LKM-40L-SE
40A	18.5 kW	3	3002	300	300	150	LKM-40H-SE
80A	32 kW	3	3015	300	200	150	LKM-80L-SE
80A	32 kW	3	3002	300	300	150	LKM-80H-SE
100A	37 kW	3	3015	300	200	150	LKM-100L-SE
100A	37 kW	3	3002	300	300	150	LKM-100H-SE
125A	90 kW	3	3003	300	300	200	LKA1-125-SE
160A	116 kW	3	3018	400	300	200	LKA1-160-SE
200A	116 kW	3	3018	400	300	200	LKA1-200-SE
315A	-	3	3018	400	300	200	LKP1-250-SE
400A	235 kW	3	3023	500	400	200	LKA2-400-SE
630A	370 kW	3	3026	600	400	200	LKA2-630-SE
630A	-	3	3026	600	400	200	LKP2-630-SE

**Notes:** 'LKM' type 'L' has a basic moulded padlockable handle. Type 'H' has a high strength glass fibre reinforced nylon premium handle complete with a padlocking facility, door interlock (defeatable), IP65 and using the unique NHP-LK floating head drive coupling. (1) External dimensions do not include handles and locks. (2) These are all high impact PVC enclosures.

Rollcon

# Flush mounting switches

## Fuse and load-break switches

To enable simple and quick installation of NHP-LK switches in switchboards, NHP offer their Australian designed and manufactured flush mounting enclosures.

Through the years NHP has gained a great deal of experience in the design and application of these enclosures. Some of the most important features are:-

- Three enclosure sizes for 32 amps to 1000 amps.
- Horizontal or vertical mounting.
- Front or rear connection.
- Removable door.
- Padlockable (on and off) handle and door.
- Stackable modular construction.
- Positive on-off indication.
- Door interlock with special defeat mechanism.
- Suitable for main switch, feeder switch, fuse-switch, motor switch, capacitor switch and safety switch.
- All enclosures are supplied in a passivated finish ready for painting.



## Flush mounting switches

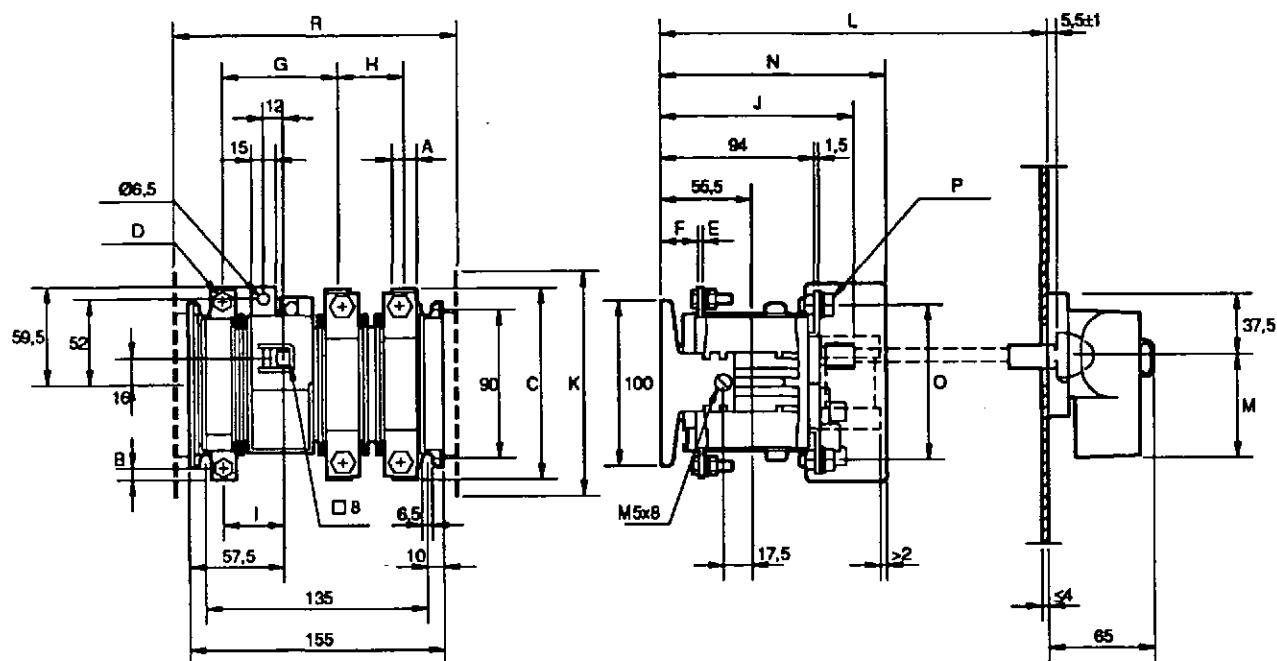
Enclosed rating	Rated power 415V AC 23	Vertical mounting Cat. No.	Horizontal mounting Cat. No.	Flush encl. kit only (without switch) Cat. No.
<b>Flush mounting fuse-switches</b>				
40A	22 kW	LKS1-40-FV	LKS1-40-FH	LK1FE
63A	35 kW	LKS1-63-FV	LKS1-63-FH	LK1FE
100A	56 kW	LKS1-100-FV	LKS1-100-FH	LK1FE
125A	70 kW	LKS1-125-FV	LKS1-125-FH	LK1FE
160A	90 kW	LKS1-160-FV	LKS1-160-FH	LK1FE
160A	90 kW	LKS2-160-FV	LKS2-160-FH	LK2FE
200A	116 kW	LKS2-200-FV	LKS2-200-FH	LK2FE
250A	145 kW	LKS2-250-FV	LKS2-250-FH	LK2FE
315A	185 kW	LKS2-315-FV	LKS2-315-FH	LK2FE
400A	235 kW	LKS2-400-FV	LKS2-400-FH	LK2FE
630A	370 kW	LKS3-630-FV	LKS3-630-FH	LK3FE
800A <sup>1)</sup>	450 kW	LKS3-800-FV	LKS3-800-FH	LK3FE
<b>Flush mounting load-break switches</b>				
125A	70 kW	LKA1-125-FV	LKA1-125-FH	LK1FE
160A	90 kW	LKA1-160-FV	LKA1-160-FH	LK1FE
200A	116 kW	LKA1-200-FV	LKA1-200-FH	LK1FE
400A	235 kW	LKA2-400-FV	LKA2-400-FH	LK2FE
630A	370 kW	LKA2-630-FV	LKA2-630-FH	LK2FE
1000A	600 kW	LKA3-1000-FV	LKA3-1000-FH	LK2FE

**Notes:** All flush enclosure kits are suitable for horizontal or vertical mounting.

Dimensions found on page 28 to 29.

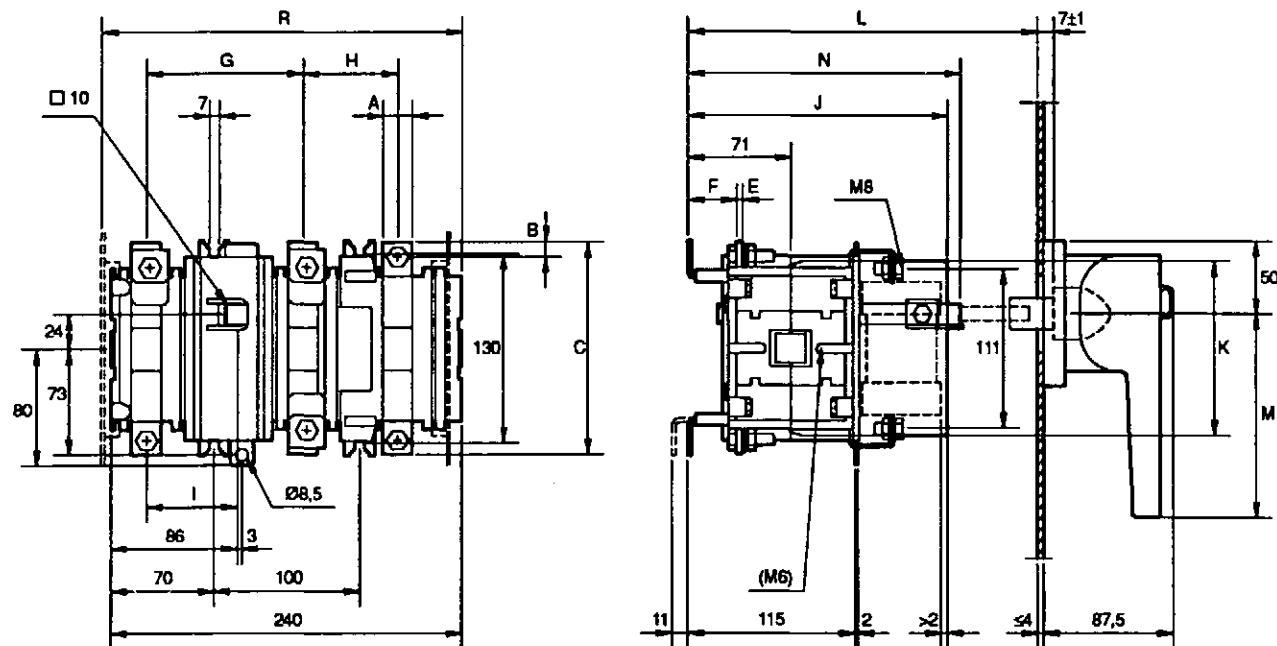
<sup>1)</sup> Ventilated.

# Rollcon LKS fuse-switch dimensions



Fuse-switches frame size R1

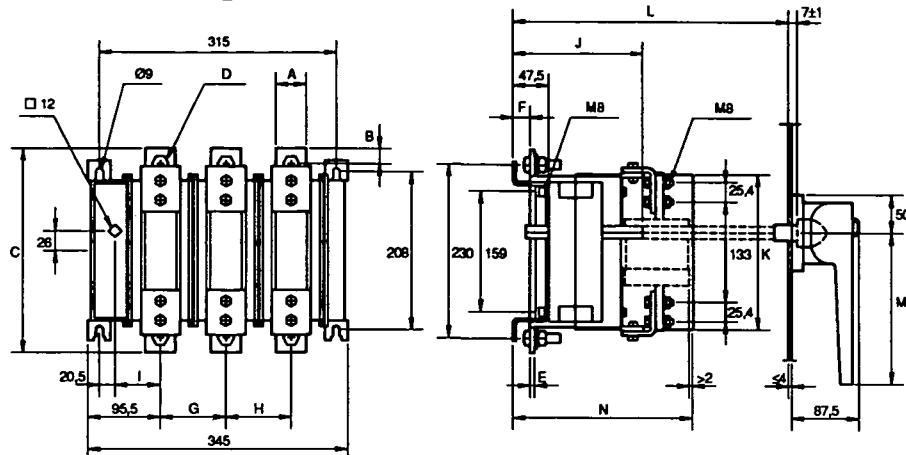
Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R
LKS1-40, LKS1-63	12	6	100	M5	2	24	72	38.5	38	118	95	165 - 385	62	155.5	73	M5	-
LKS1-100	15	7.5	116	M6	3	23	70	40.5	37	118	120	165 - 385	62	137.5	94	M8	-
LKS1-125	15	7.5	-	M6	3	23	70	40.5	37	118	150	165 - 385	62	137.5	112	M8	184
LKS1-160	20	10	-	M8	3	23	65	45.5	35	118	150	165 - 385	62	137.5	112	M8	184



Fuse-switches frame size R2

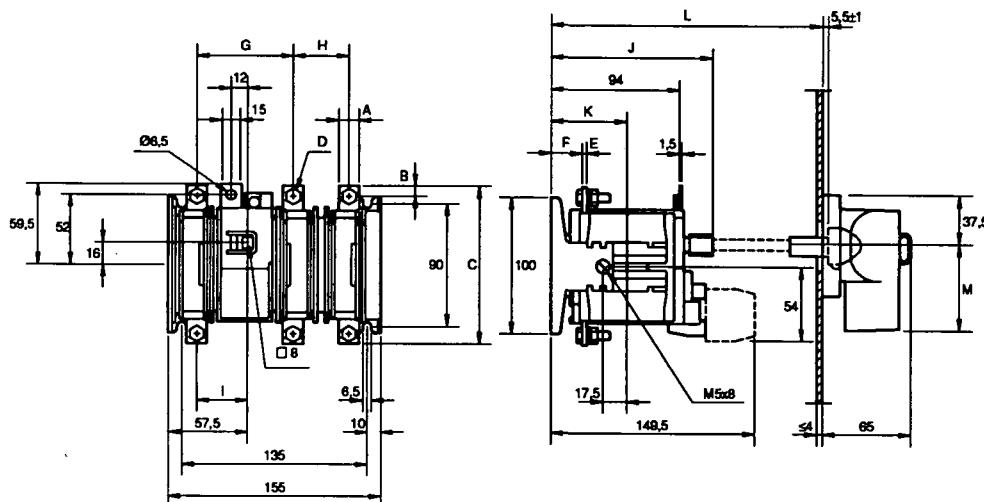
Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	R
LKS2-160	20	10	146	M8	4	33	107	65	62	188	120	220 - 390	140	178	-
LKS2-200	20	10	146	M8	4	33	107	65	62	188	120	220 - 390	140	178	-
LKS2-250	25	12.5	160	M10	4	29	107	65	59.5	188	160	220 - 390	140	198	246.5
LKS2-315	25	12.5	160	M10	6	27	107	65	59.5	188	160	220 - 390	140	198	246.5
LKS2-400	25	12.5	160	M10	6	27	107	65	59.5	188	160	220 - 390	140	198	246.5

# Rollcon LKS fuse-switch and LKA load-break switch dimensions



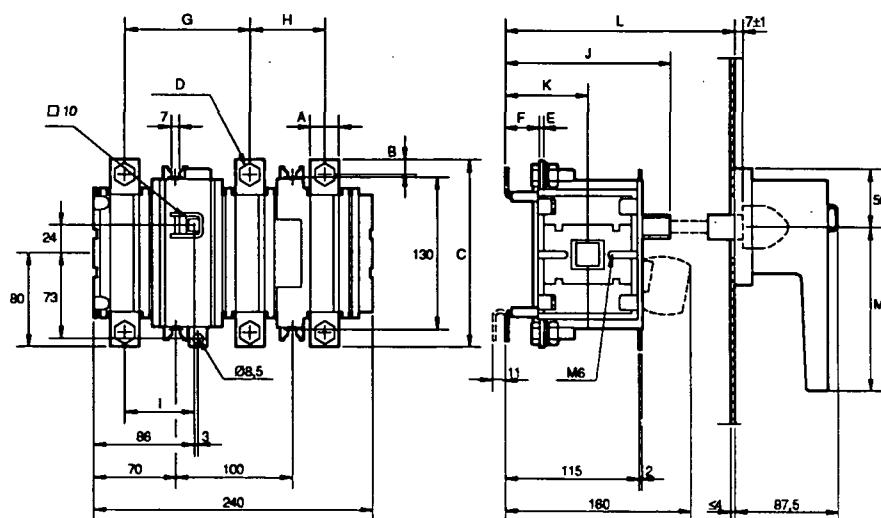
Fuse-switches frame size R3

Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N
LKS3-630	40	20	270	M12	6	23	87	87	60	173	205	250 - 529	200	240
LKS3-800	40	20	270	M12	6	23	87	87	60	173	205	250 - 529	200	240



Load-break switches frame size R1

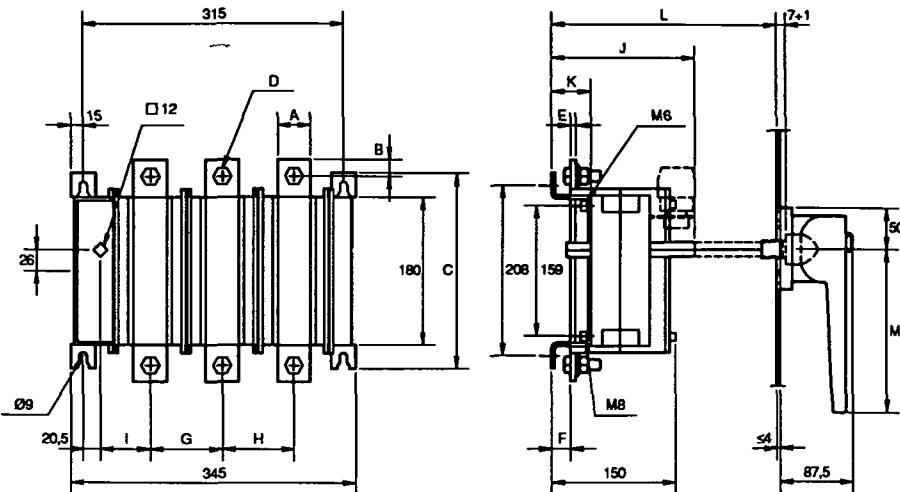
Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKA1-125	15	7.5	116	M6	3	23	70	40.5	37	118	55.5	140 - 385	62
LKA1-160	20	10	127	M8	3	23	65	45.5	35	118	55.5	140 - 385	62
LKA1-200	20	10	127	M8	3	23	65	45.5	35	118	55.5	140 - 385	62



Load-break switches frame size R2

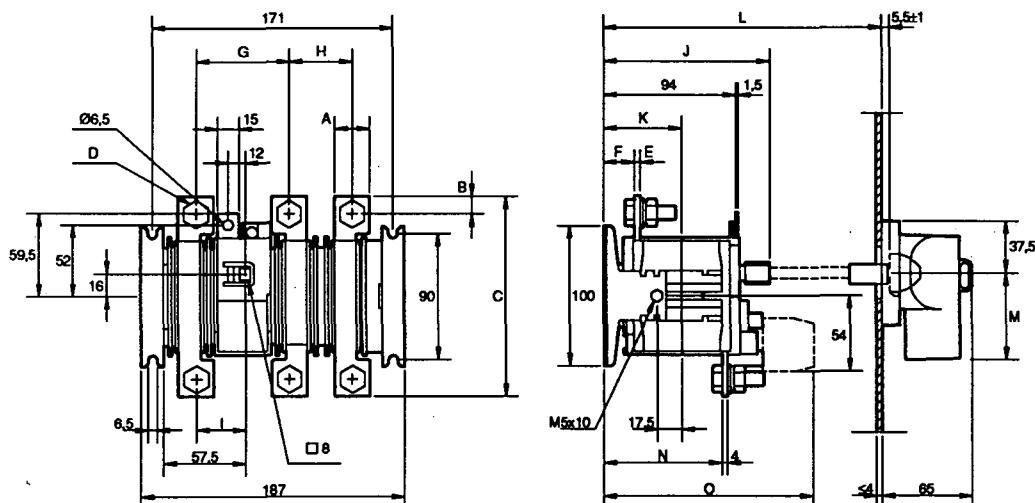
Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKA2-400	25	12.5	160	M10	4	29	107	65	59.5	143	71	166 - 390	140
LKA2-630	30	15	180	M10	6	27	107	65	59.5	143	71	166 - 390	140

# Rollcon LKA and LKP load-break switch dimensions



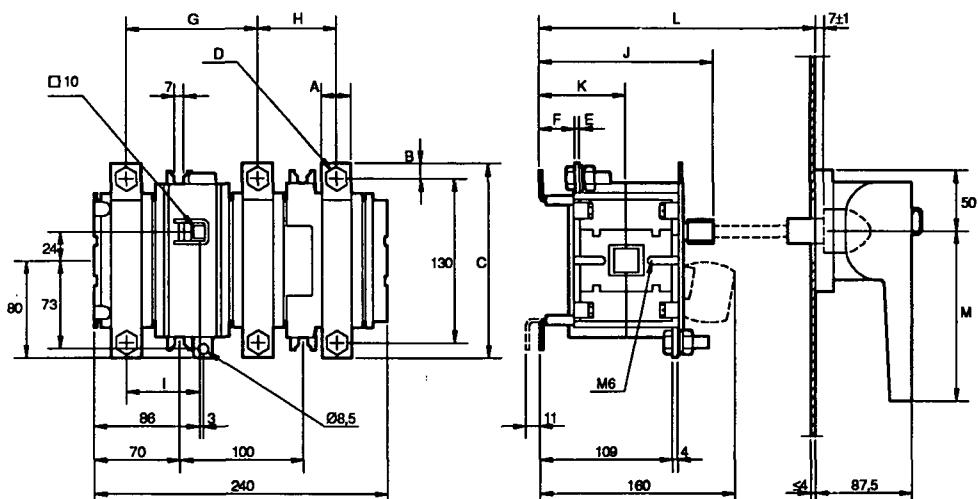
Load-break switches frame size R3

Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKA3-1000	40	20	270	M12	6	23	87	87	60	173	47.5	204 - 529	200



Load-break switches frame size R1

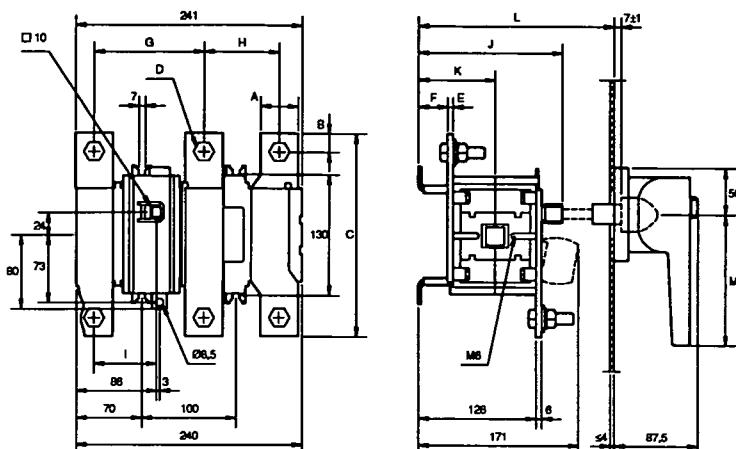
Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
LKP1-250	25	12.5	143	M10	4	22	66	44.5	35	118	55.5	140 - 385	62	84	149.5
LKP1-400	25	12.5	143	M10	4	38	85	35	44.5	133	70	155 - 400	62	99	164.5



Load-break switches frame size R2

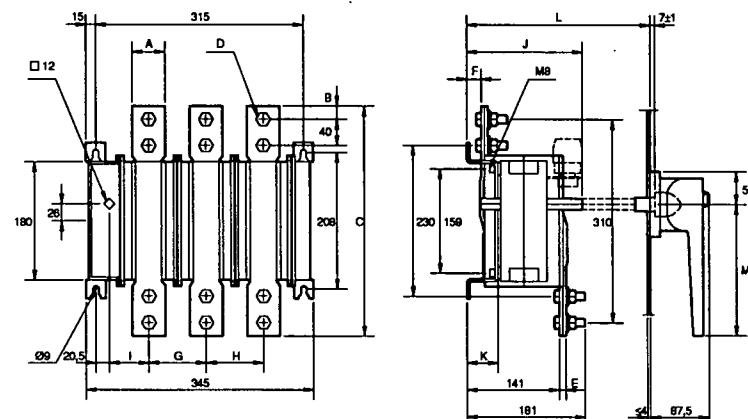
Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKP2-400	25	12.5	160	M10	4	29	107	65	59.5	143	71	166 - 390	140
LKP2-630	30	15	170	M10	5	28	107	65	59.5	143	71	166 - 390	140

# Rollcon LKP load-break switch dimensions



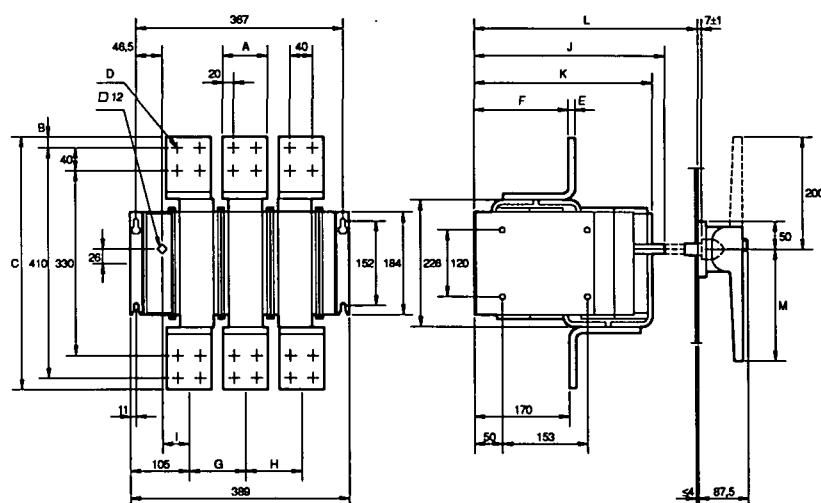
Load-break switches frame size R2

Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKP2-800	40	20	218	M12	6	31	117	80	67	154	82	166 - 401	140
LKP2-1000	40	20	218	M12	6	31	117	80	67	154	82	177 - 401	140



Load-break switches frame size R3

Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKP3-1250	40	20	350	2xM12	10	23	87	87	60	177	51.5	208 - 529	200
LKP3-1600	50	20	350	2xM12	10	23	87	87	60	177	51.5	208 - 529	200

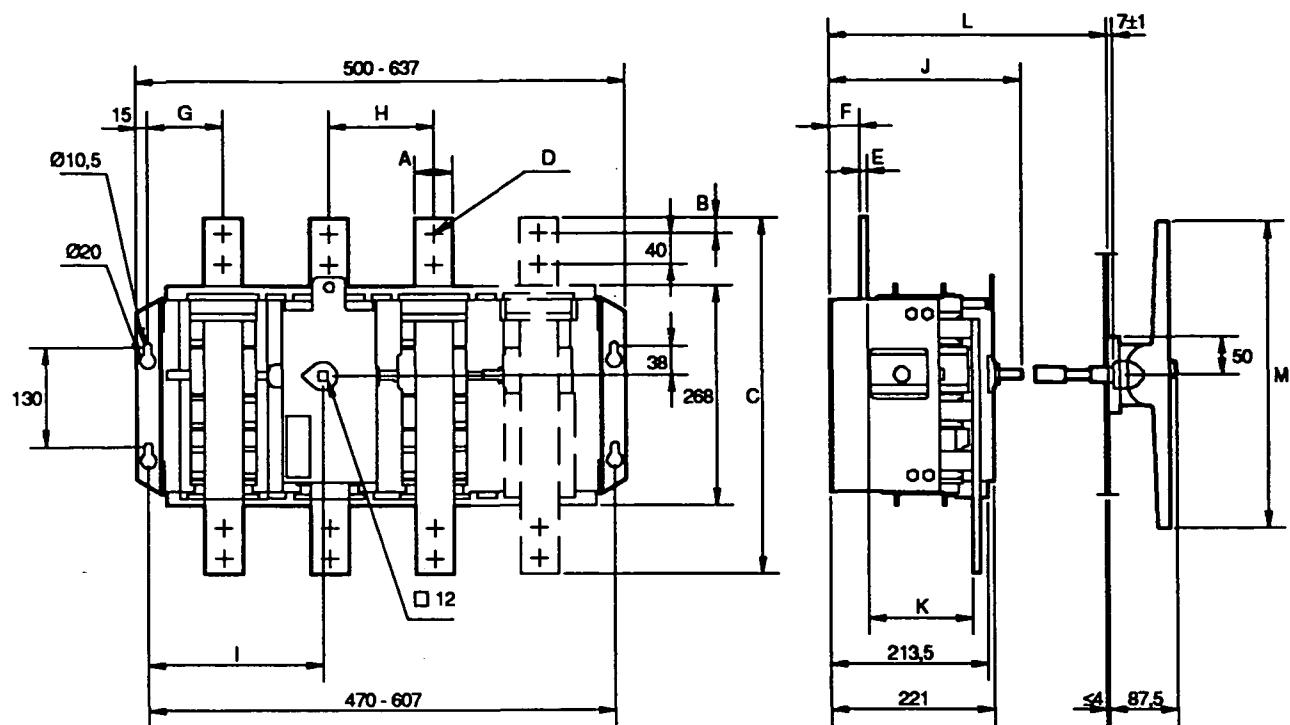


Load-break switches 2 x frame size R3

Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKP3-2500WT	80	20	450	4xØ14	12	170	100	100	46.5	342	325	374 - 699	200

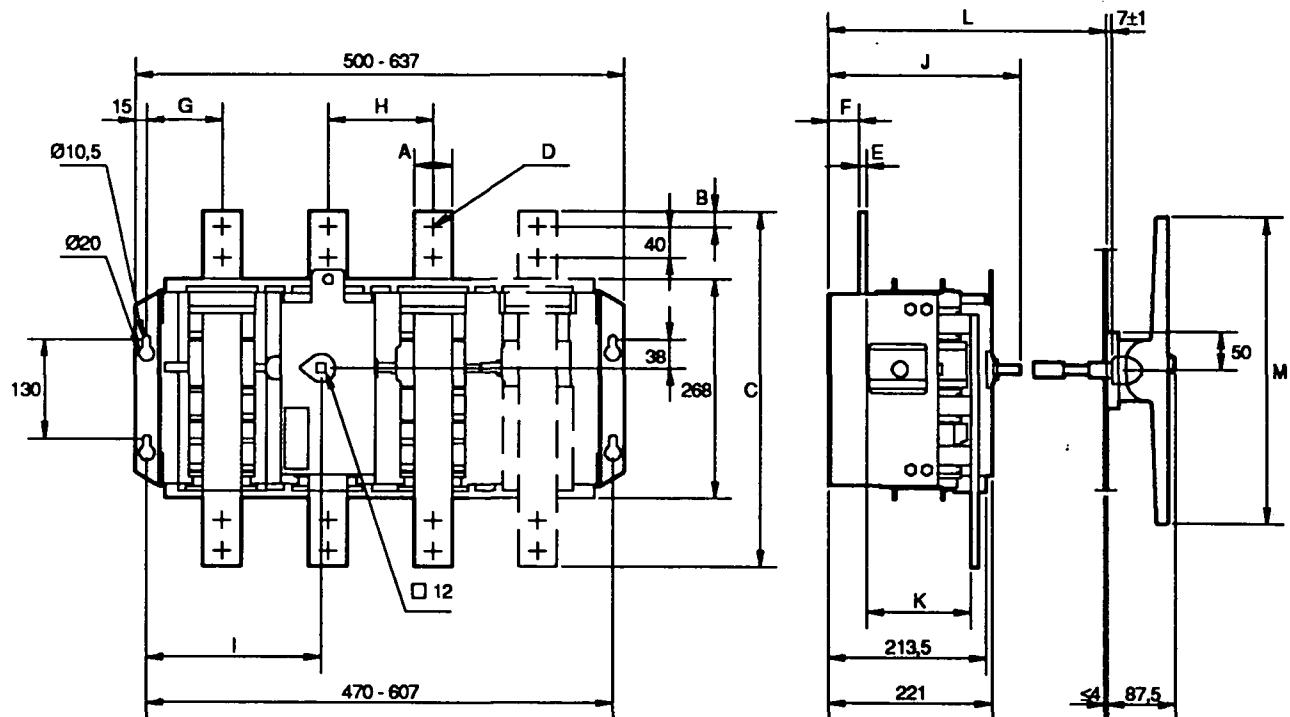
Note: Dimensions include recommended switch terminals. Switch supplied without terminals.

# Rollcon LKP load-break switch dimensions



Load-break switches R4 3 and 4 x frame size R2

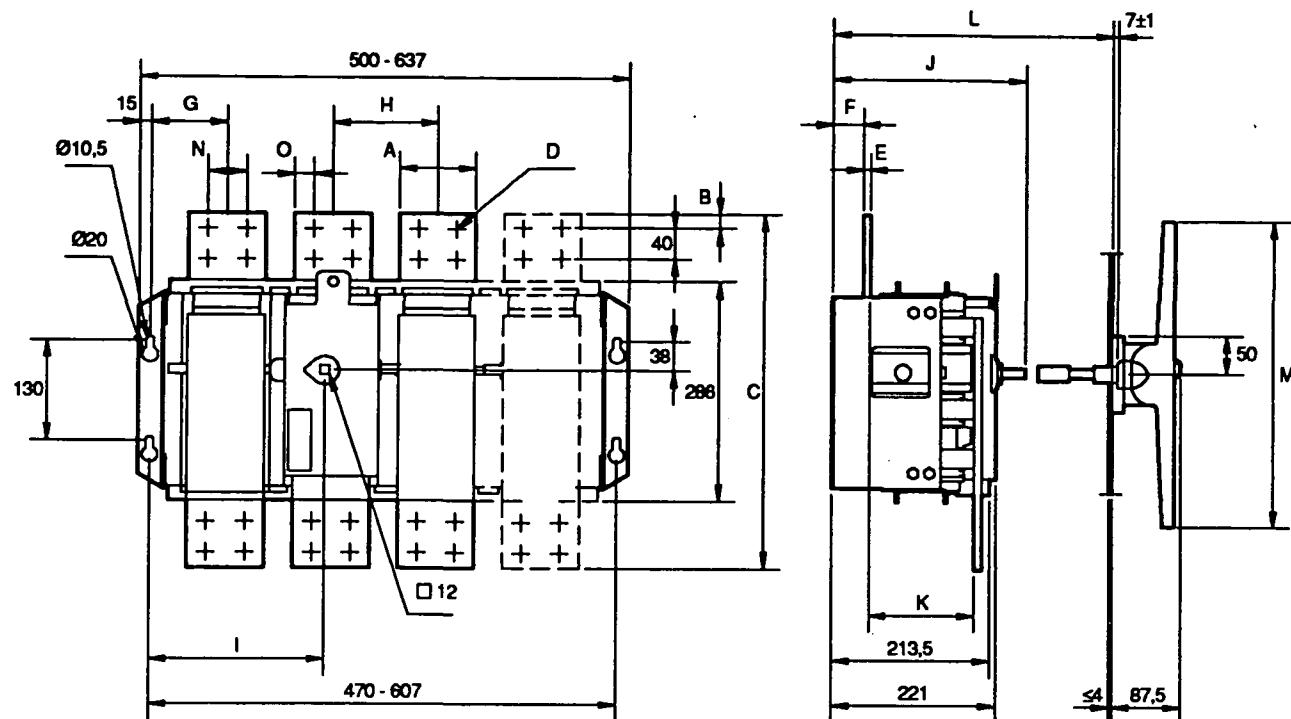
Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKP4-1250	40	20	463	2xØ14	10	40	98	137	226	252.5	136	245 - 504	400



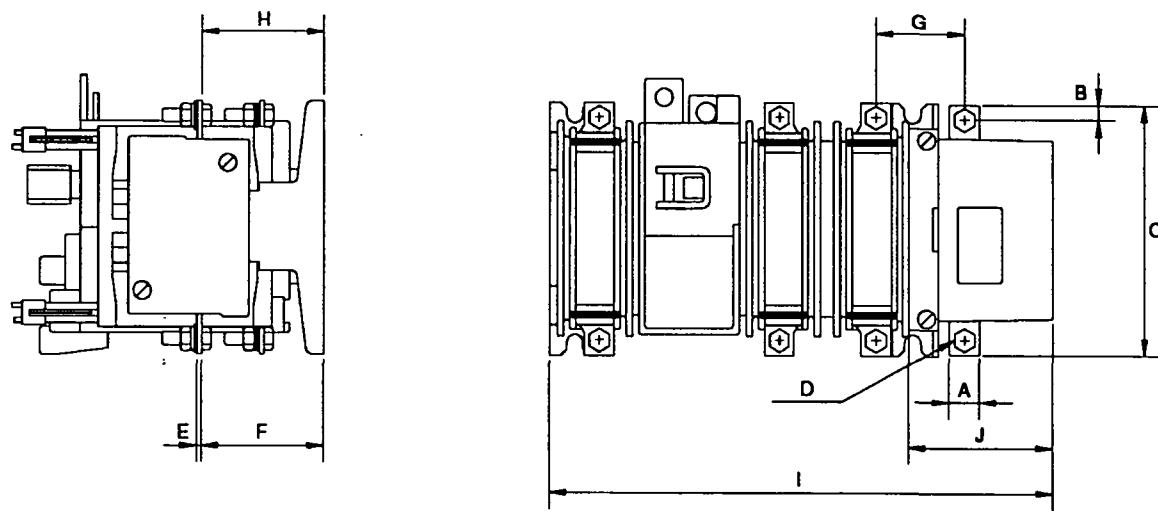
Load-break switches R4 3 and 4 x frame size R2

Type	A	B	C	D	E	F	G	H	I	J	K	L	M
LKP4-1600	50	20	463	2xØ14	10	40	98	137	226	252.5	136	245 - 504	400

# Rollcon LKP load-break switch and switched neutral dimensions



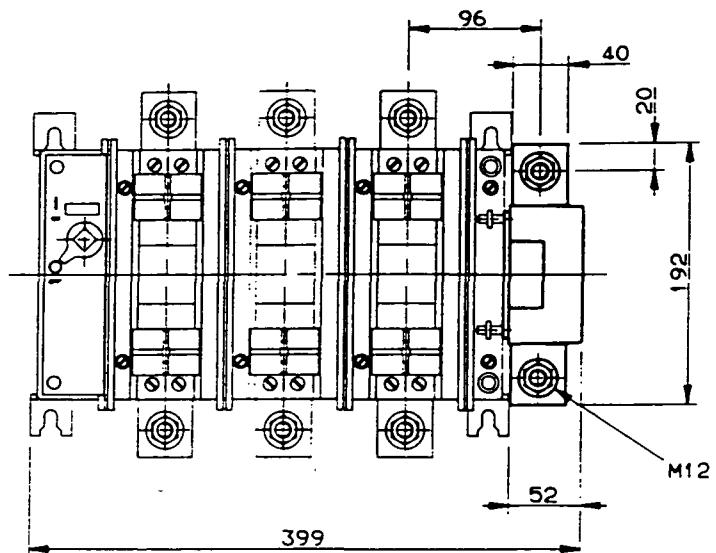
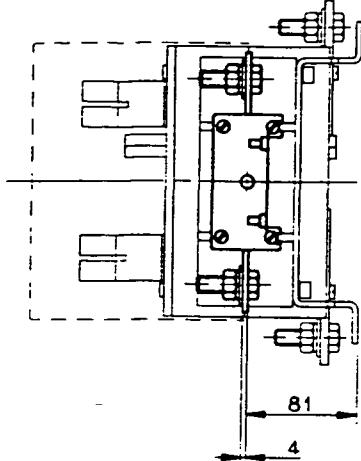
Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
LKP4-2000	80	20	463	4xØ14	12	38	98	137	226	252.5	136	245 - 504	400	40	20
LKP4-2500	100	20	463	4xØ14	14	36	98	137	226	252.5	136	245 - 504	400	50	25
LKP4-3150	100	20	463	4xØ14	14	36	98	137	226	252.5	136	245 - 504	400	50	25



Switched neutral pole for frame size R1 + R2

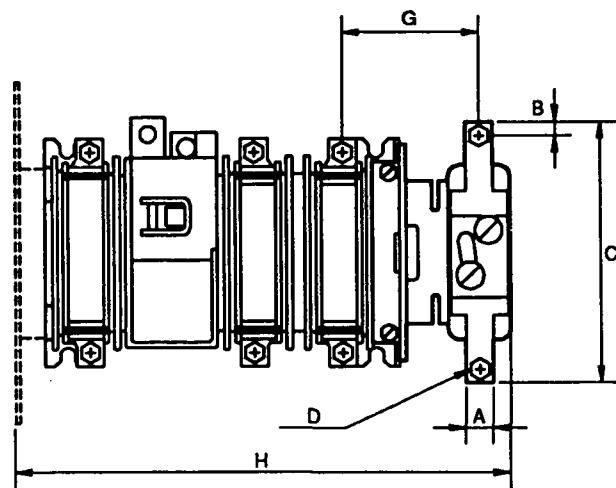
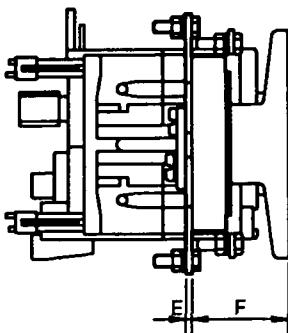
Type	A	B	C	D	E	F	G	H	I	J
LKS1-63	12	6	99	M5	2	48.5	36	48.5	200	45
LKS1-100/125, LKA1-125	15	7.5	105	M6	4.5	48.5	33.5	46	200	45
LKS1-160, LKA1-160/200	20	10	115	M8	4.5	48.5	32	46	200	45
LKS2-160/200	20	10	146	M8	4	69	53	69	299	53
LKS2-250/315/400	25	12.5	160	M10	4	69	55.5	69	299	53
LKA2-400/630	25	12.5	160	M10	4	69	55.5	69	293	53
LKP1-250/400	25	12.5	125	M8	4.5	48.5	32	46	200	45
LKP2-400, 630	25	12.5	160	M10	4	69	58	69	293	53
LKP2-800/1000	25	12.5	160	M10	4	69	40.5	69	293	53

# Rollcon switched neutral and neutral link dimensions



Switched neutral pole for frame size R3

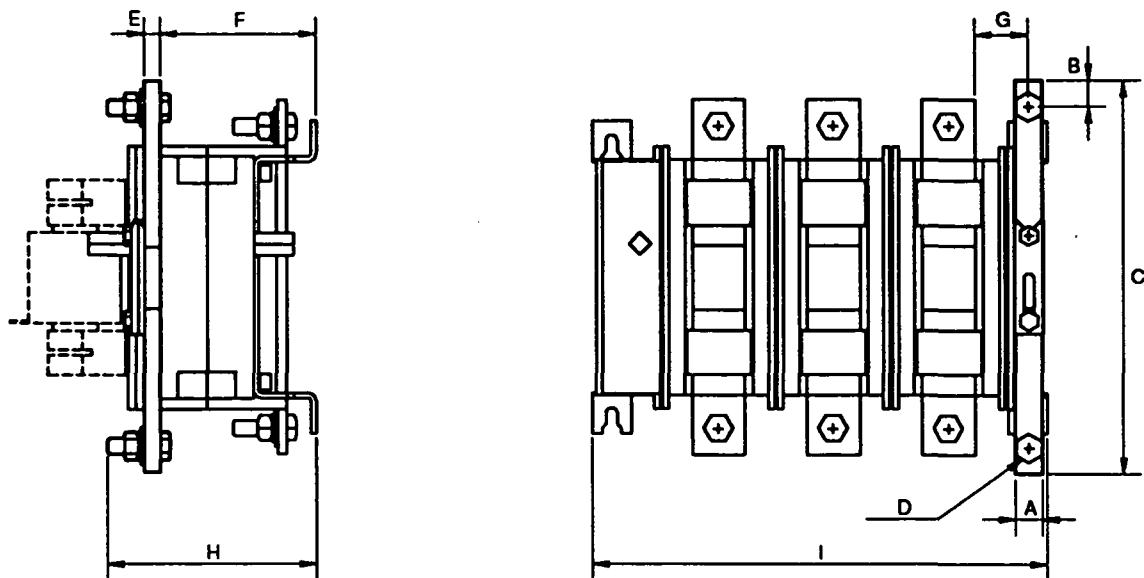
Type	A	B	C	D	E	F	G	H	I
LKS3-630/800, LKA-1000	52	20	192	M12	4	81	96	40	399
LKP3-1200/1600	52	20	192	M12	4	81	96	40	399



Neutral link for frame size R1 + R2

Type	A	B	C	D	E	F	G	H
LKS1-63	12	6	114.5	M5	2.5	41.5	57	203
LKS1-100	15	7.5	116.5	M6	3	41.5	56	203
LKS1-125	15	7.5	116.5	M6	3	41.5	56	216
LKS1-160	20	10	127	M8	3	41.5	54	216
LKS2-160/200	20	10	146	M8	4	70	79	296.5
LKS2-250/315/400	25	12.5	160	M10	4	70	76.5	296.5
LKA1-125	15	7.5	116	M6	3	41.5	56	203
LKA1-160/200	20	10	127	M8	3	41.5	54	203
LKA2-400/630	25	12.5	160	M10	4	70	76.5	290.5
LKP1-250/400	25	12.5	141.5	M10	4	42.5	56.5	219.5
LKP2-400	25	12.5	160	M10	4	68.5	56.5	285
LKP2-630	30	15	160	M10	5	67.5	56.5	285

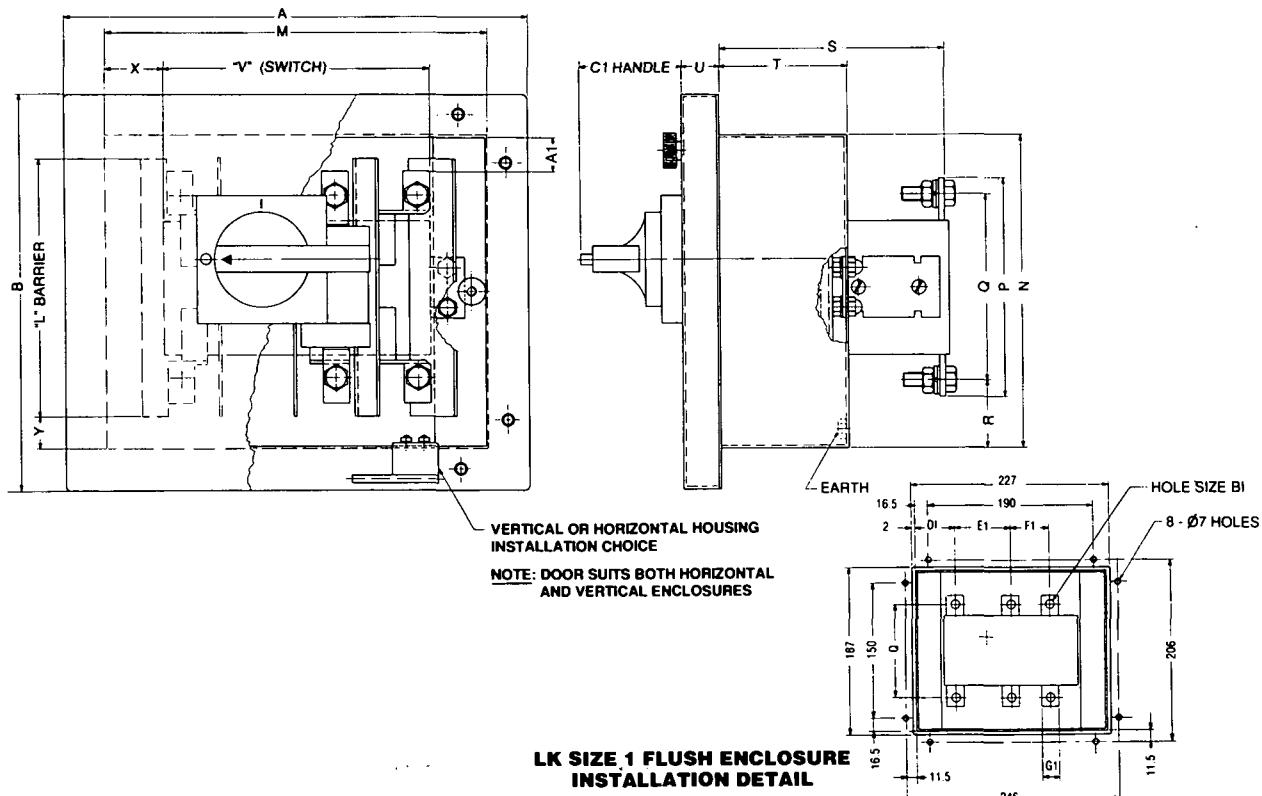
# Rollcon neutral link dimensions



Neutral link for frame size R3

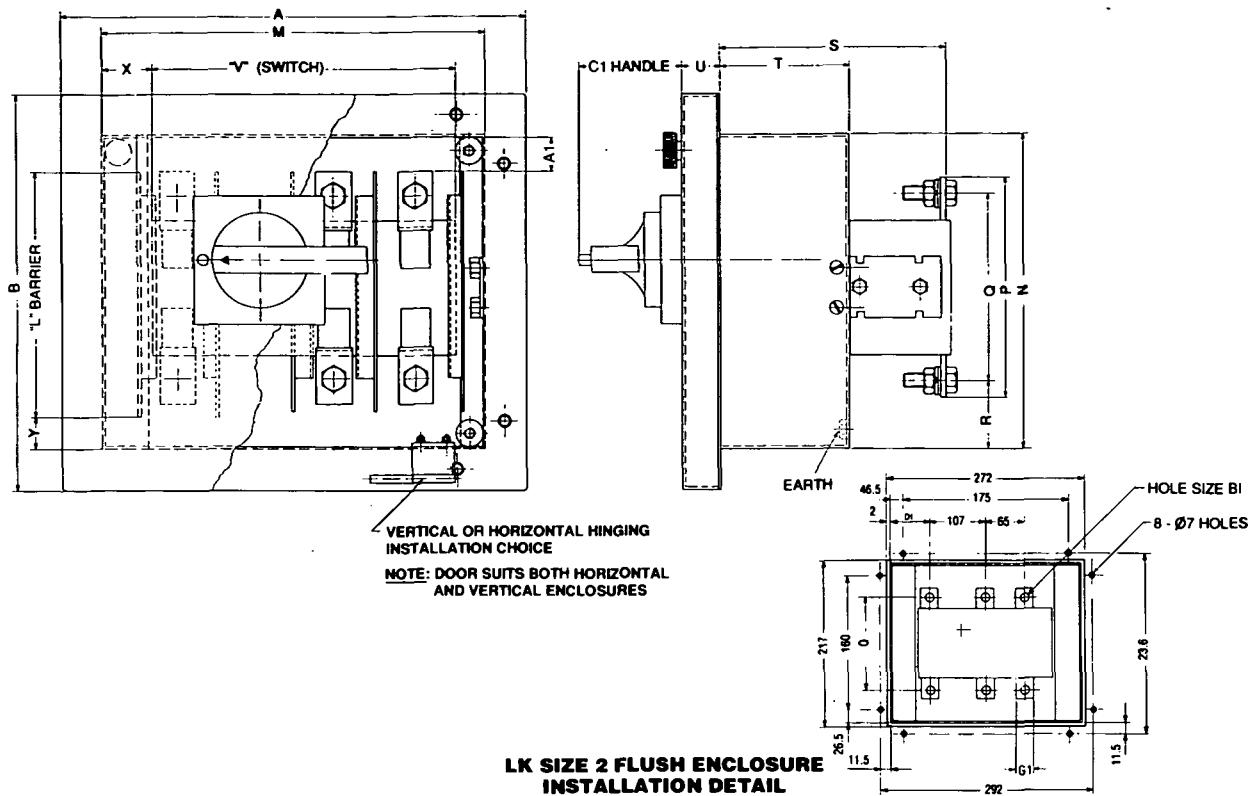
Type	A	B	C	D	E	F	G	H	I
LKS3-630/800, LKA-1000	20	20	300	M12	12	118.5	60.5	158.5	345
LKP3-1250/1600	30	20	300	M12	10	124	60.5	164	350

# Rollcon flush enclosure dimensions - frame 1

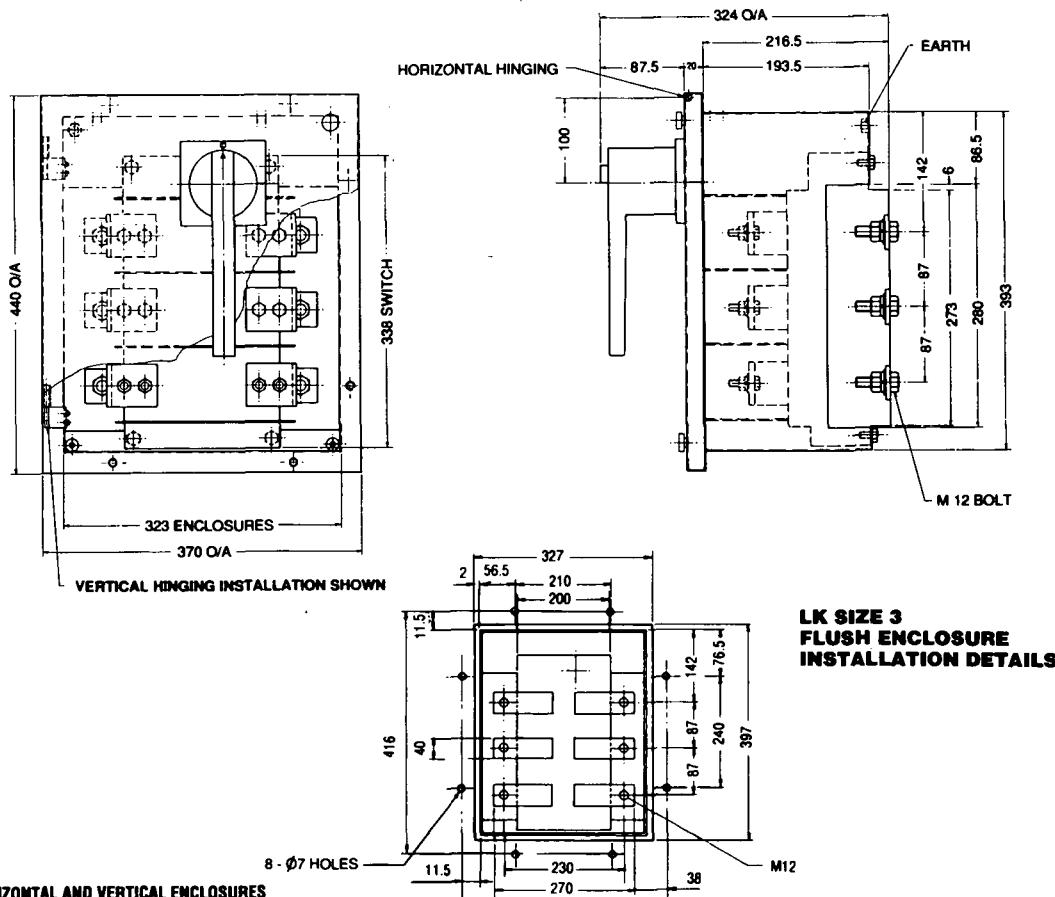


Type	A	B	L	M	N	P	Q	R	S	T	U	V	X	Y	A1	B1	C1	D1	E1	F1	G1
QSA 63-N1-DIN/BS	270	230	95	223	183	100	88	50	129.5	745	21.5	155	34	46.5	-	M5	65	53.5	72	38.5	12
QSA 100N1-BS	270	230	120	223	183	116	101	43.5	130.5	745	21.5	155	34	34	32.5	M6	65	54.5	70	40.5	15
QSA 125N1-BS	270	230	150	223	183	116	101	43.5	130.5	745	21.5	155	34	19	20	M6	65	54.5	70	40.5	15
QSA 160N1-BS	270	230	150	223	183	127	107	40.5	130.5	745	21.5	155	34	19	20	M8	65	56.5	65	45.5	20

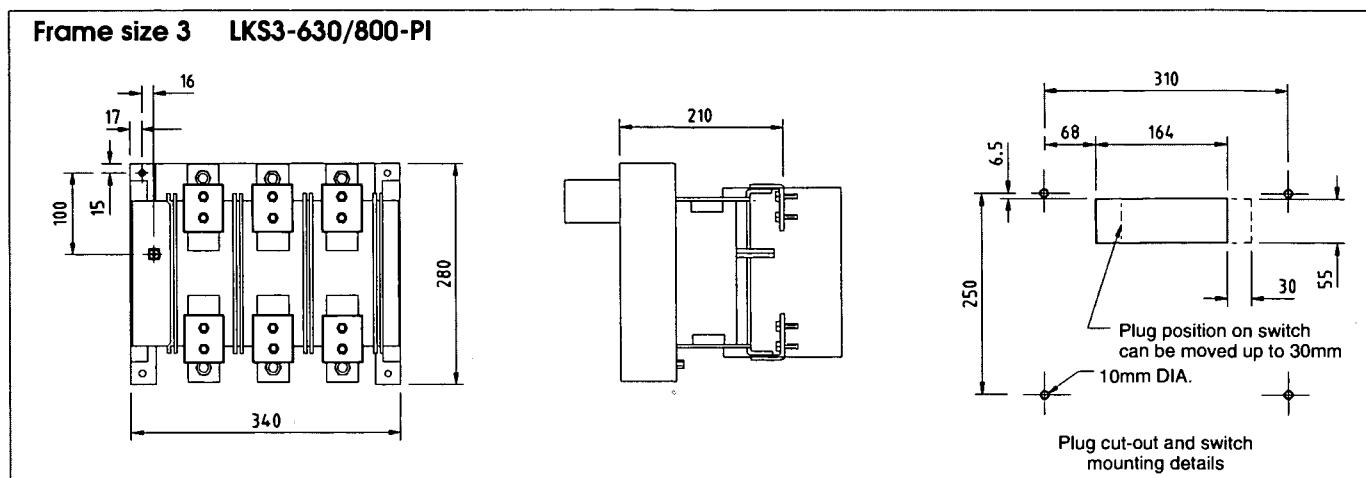
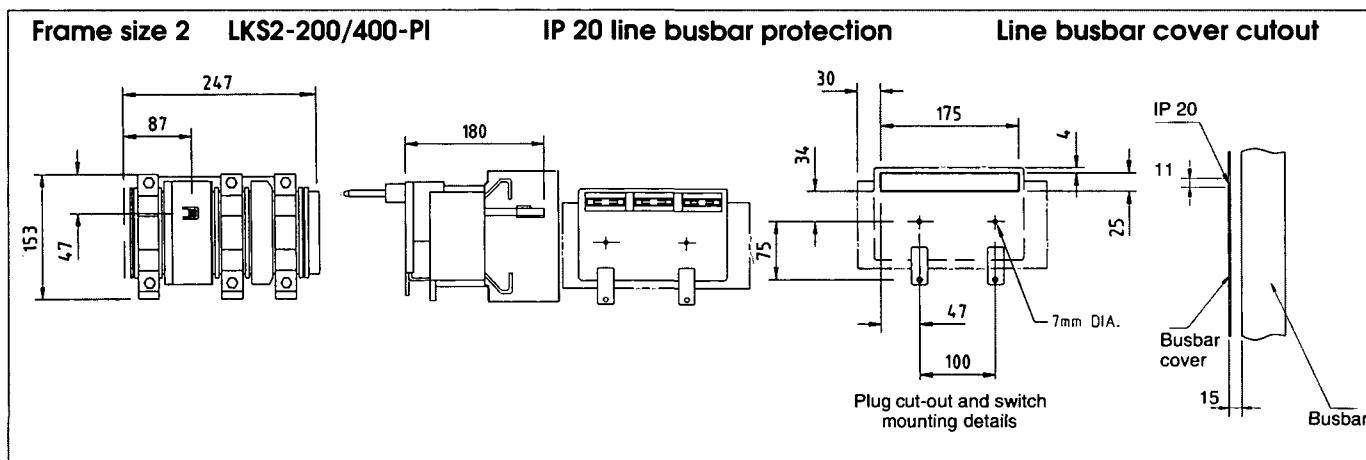
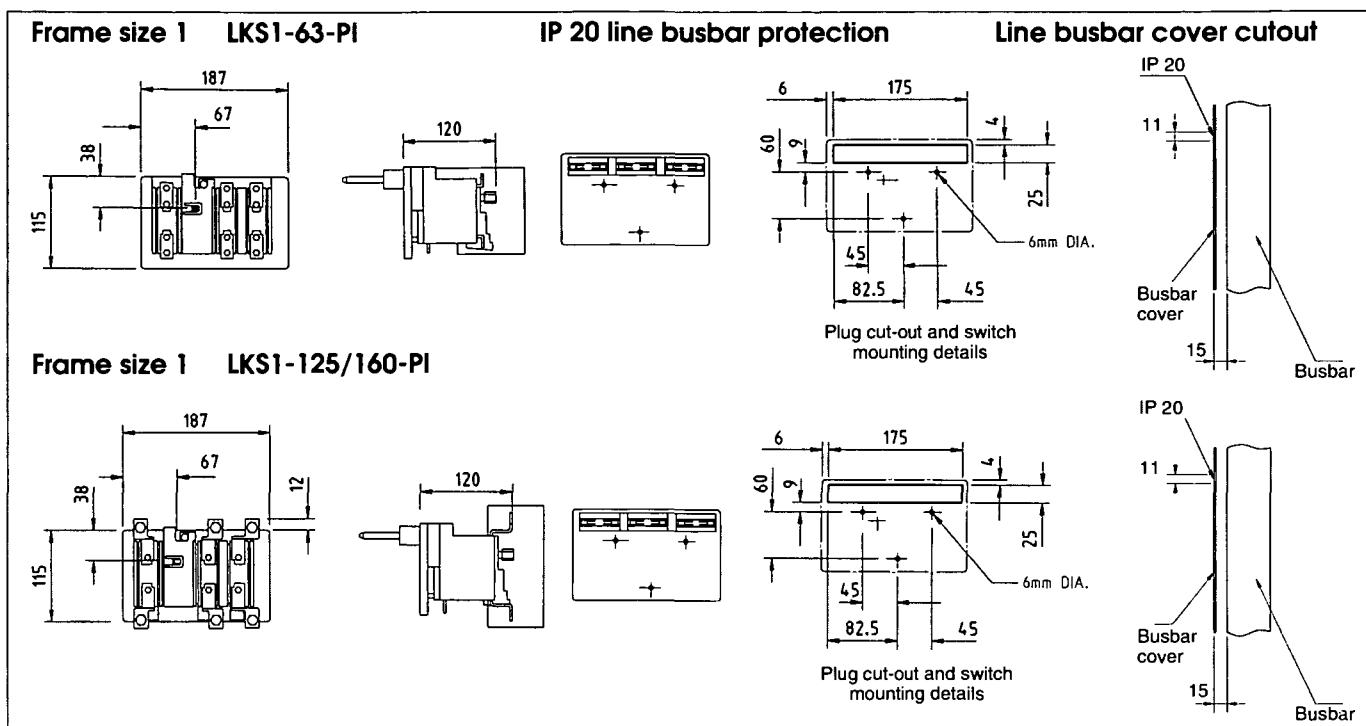
# Rollcon flush enclosure dimensions - frame 2



# Rollcon flush enclosure dimensions - frame 3

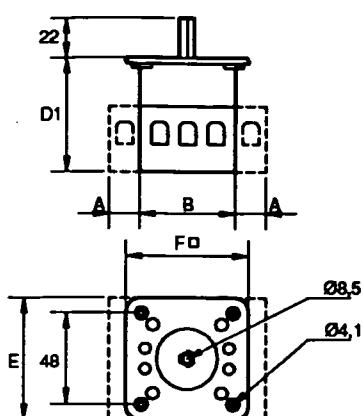


# Plugcon plug-in fuse-switch dimensions

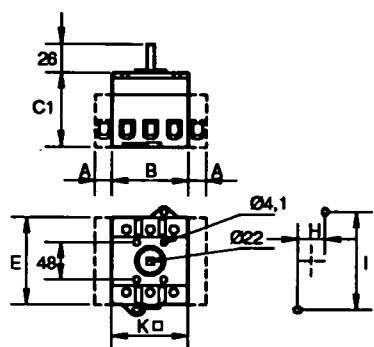


# Rollcon LKM mini load-break switches

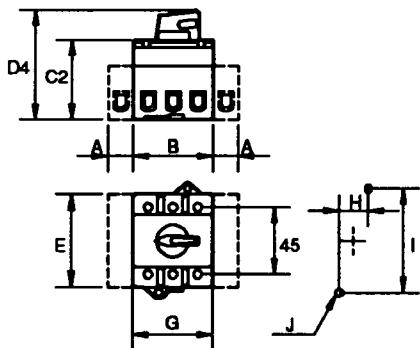
Version A



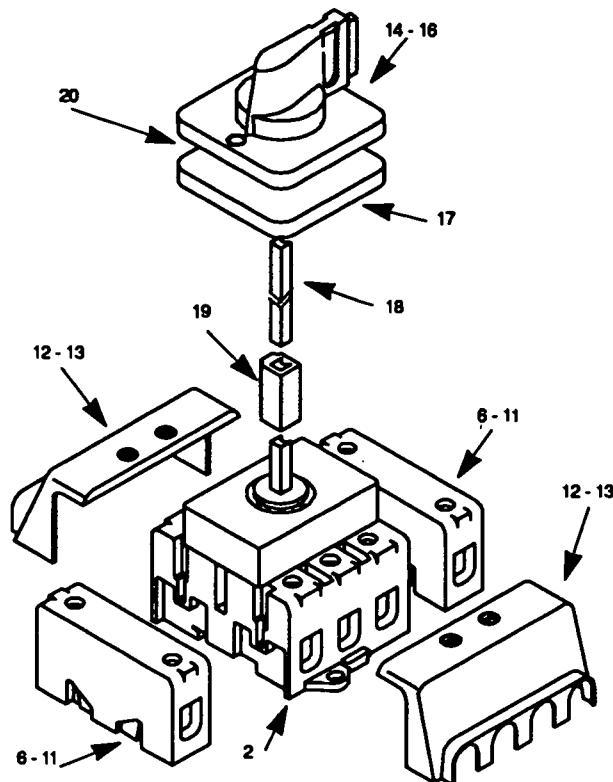
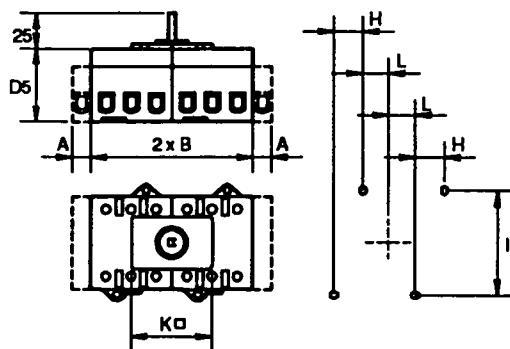
Version B



Version C



Version D - E



- 1 Switch, version A, for flush mounting, 3 poles
- 2 Switch, version B, for rear and DIN rail mounting, 3 poles
- 3 Switch, version C, for 45mm standard cut out, 3 poles
- 4 Switch, version D, for rear and DIN rail mounting, 6 poles
- 5 Change-over switch 1-0-2, version E, for rear and DIN rail mounting, 3 poles
- 6 Switched neutral pole for version A switches
- 7 Switched neutral pole version B, C, D and E switches
- 8 Neutral link, non-separable
- 9 Earth link
- 10 Auxiliary contact N/O - N/C for version A switches
- 11 Auxiliary contact N/O - N/C for version B, C, D and E switches
- 12 Terminal shroud, 3 poles
- 13 Terminal shroud, 4 poles
- 14 Handle LKM black excl. door mechanism, for pos. 1, 2 and 4
- 15 Handle LKM red/yellow, excl. door mechanism, for pos. 1, 2 and 4
- 16 Handle LKM black excl. door mechanism, for pos 5
- 17 Door mechanism
- 18 Shaft extension
- 19 Shaft coupling
- 20 Gasket for LKM handle, IP65

Type	A	B	C1	C2	D1	D5	E	G	H	I	J	K	L
LKM-25/40	16	50	61	64	60	61	64	52	25	70	Ø4.1	64	12.5
LKM-80/100	22	70	68	70	71	68	80	70	25	90	Ø4.1	64	22.5

# NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD

A.C.N. 004 304 812

## MELBOURNE:

43 - 67 RIVER STREET, RICHMOND, VICTORIA 3121. Telephone: (03) 429 2999  
P.O. Box 199, RICHMOND 3121  
Fax: (03) 429 1075

## SYDNEY:

30 - 34 DAY STREET NORTH, SILVERWATER, N.S.W. 2141. Telephone: (02) 748 3444  
P.O. Box 259, ERMINGTON 2115  
Fax: (02) 648 4353

## BRISBANE:\*

39 COMMERCIAL ROAD, FORTITUDE VALLEY, QUEENSLAND 4006. Telephone: (07) 252 9517  
P.O. Box 589, FORTITUDE VALLEY 4006  
Fax: (07) 252 3415

## ADELAIDE:

50 CROYDON ROAD, KESWICK, SOUTH AUSTRALIA 5035. Telephone: (08) 297 9055  
Fax: (08) 371 0962

## PERTH:

38 - 42 RAILWAY PARADE, BAYSWATER, WESTERN AUSTRALIA 6053. Telephone: (09) 271 8666  
Fax: (09) 272 3906

## NEWCASTLE:

57 CRESCENT ROAD, WARATAH, NEW SOUTH WALES 2298. Telephone: (049) 60 2220  
P.O. Box 326, MAYFIELD 2304  
Fax: (049) 60 2203

## ROCKHAMPTON:

208 DENISON STREET, ROCKHAMPTON, QUEENSLAND 4700. Telephone: (079) 27 2277  
Fax: (079) 22 2947

## TOWNSVILLE:

62 LEYLAND STREET, GARBUCK, QUEENSLAND 4814. Telephone: (077) 79 0700  
Fax: (077) 75 1457

## TOOWOOOMBA:

CNR CARROLL STREET & STRUAN COURT, TOOWOOOMBA, QUEENSLAND 4350. Telephone: (076) 34 4799  
Fax: (076) 33 1796

## AGENTS:

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H.M. BAMFORD (Hobart), 199 HARRINGTON STREET, HOBART, 7000  
Telephone: (002) 34 9299 Fax: (002) 31 1693

### LAUNCESTON:

H.M. BAMFORD (Launceston), 59 GARFIELD STREET, LAUNCESTON, 7250  
Telephone: (003) 44 8811 Fax: (003) 44 4069

### DARWIN:

J. BLACKWOOD & SON LTD. (Inc. Tesco Pearce), MATARAM STREET, WINNELLIE, 0820  
Telephone: (089) 84 4255 Fax: (089) 84 3945

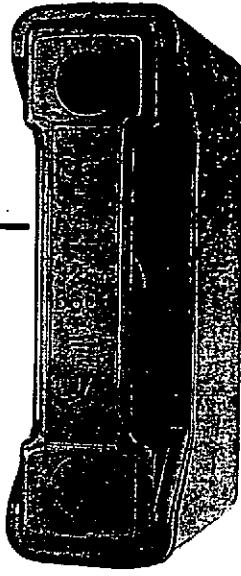
**NHP**

Proudly Australian

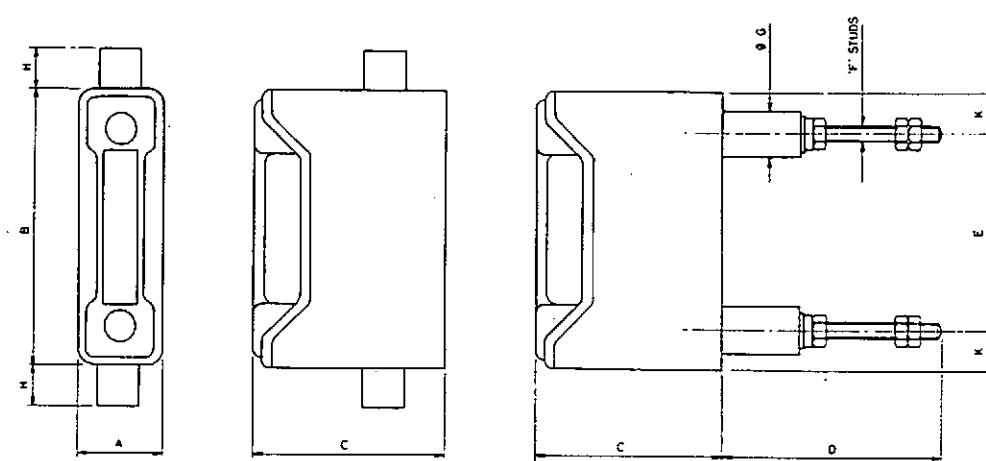
\* From July 1993 – 25 Turbo Drive, Coorparoo, Queensland 4151  
Telephone (07) 891 6008 Fax (07) 891 6139

# 'RED SPOT'

## HRC FUSE HOLDERS

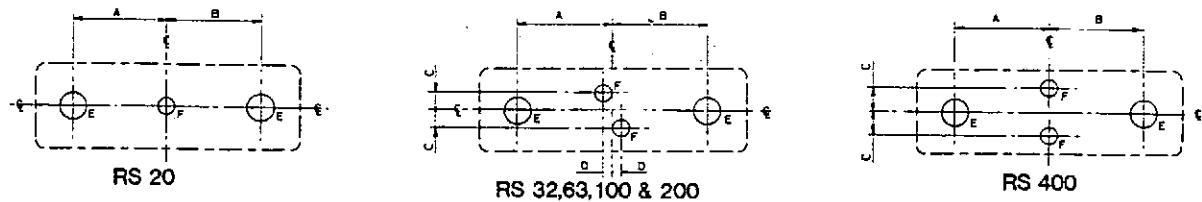


### Dimensions



Type	Rating Amp	A	B	C	D P.PH ONLY	E	F P.PH ONLY	G DIA P.PH ONLY	H	K	Max Cable Size
RS20	20	27	80	54	63	35	M6	13,5	15	22,2	10mm <sup>2</sup>
RS32	32	32	103	70	81	73	M6	17,5	15	15,1	16mm <sup>2</sup>
RS63	63	35	110	75	84	78	M8	17,5	15	15,9	50mm <sup>2</sup>
RS100	100	51	140	100	87	94	M10	22,2	15	23	70mm <sup>2</sup>
RS200	200	70	216	136,5	95	171,5	M12	25,4	22	22,2	120mm <sup>2</sup>
RS400	400	98,5	254	192	114	140	M16	31,8	32	57,2	240mm <sup>2</sup>

### PANEL DRILLING DIMENSIONS



DIM	FUSE HOLDER TYPE																					
	20 H	20 P	20 PH	20 BW	32 H	32 P	32 PH	32 BW	63 H	63 P	63 PH	63 BW	100 H	100 P	100 PH	100 BW	200 H	200 P	200 PH	400 H	400 P	400 PH
A	-	17,5	17,5	17,5	-	36,5	36,5	36,5	-	36,5	36,5	36,5	-	46,8	46,8	46,8	-	85,7	85,7	-	69,9	69,9
B	-	17,5	-	17,5	-	36,5	-	36,5	-	41,3	-	41,3	-	46,8	-	46,8	-	85,7	-	-	69,9	-
C	-	-	-	-	6,4	6,4	6,4	6,4	6,4	6,4	6,4	6,4	11,1	11,1	11,1	11,1	19,1	19,1	19,1	27	27	27
D	-	-	-	-	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	9,5	9,5	9,5	9,5	28,6	28,6	28,6	-	-	-
E	-	Ø15	Ø15	Ø8	-	Ø20	Ø20	Ø8	-	Ø20	Ø20	Ø8	-	Ø24	Ø24	Ø16	-	Ø27	Ø27	-	Ø35	Ø35
F	HOLES TO SUIT M5 SCREWS										HOLES TO SUIT M6 SCREWS.											

# FUSE LINK / FUSE HOLDER SELECTION TABLE AND MOTOR START RECOMMENDATIONS

CLIP-IN HRC FUSE LINKS AND HOLDERS – 415V.A.C.

Fuse Fitting	Connections Available	Associated Fuse Link	Kw	HP	FLC	Standard Fuse
SC20	H,P,BW	NS2-20A	.37	0.5	1	NS4
			.55	0.75	1.5	NS6
			.75	1	1.9	NS10
			1.1	1.5	2.5	NS10
			1.5	2	3.4	NS16
			2.2	3	4.8	NS16
SC32	H,P,BW	NS2-32A	3	4	6.4	NS20
			4	5.5	8.1	NS25
			5.5	7.5	11.6	NS32
SC63	H,BW	* NS2-32 ES40-63	7.5	10	14.4	ES40
			11	15	21.1	ES50
			15	20	28	ES63



BOLT-IN HRC FUSE LINKS AND HOLDERS – 415V.A.C.

Fuse Fitting	Connections Available	Associated Fuse Links	† "DIRECT ON LINE MOTOR START RECOMMENDATIONS (415V AC)"				
			Kw	HP	FLC	Standard Fuse	Motor Fuse
RS20	H.P.PH,BW	NIT2-20A	0.37	0.5	1	NIT4	—
			0.55	0.75	1.5	NIT6	—
			0.75	1	1.9	NIT10	—
			1.1	1.5	2.5	NIT10	—
			1.5	2	3.4	NIT16	—
			2.2	3	4.8	NIT16	—
		NIT20M25 NIT20M32	3	4	6.4	NIT20	—
			4	5.5	8.1	—	NIT20M25
			5.5	7.5	11.6	—	NIT20M32
RS32	H.P.PH,BW	TIA2-32A	0.37	0.5	1	TIA4	—
			0.55	0.75	1.5	TIA6	—
			0.75	1	1.9	TIA10	—
			1.1	1.5	2.5	TIA10	—
			1.5	2	3.4	TIA16	—
			2.2	3	4.8	TIA16	—
			3	4	6.4	TIA20	—
			4	5.5	8.1	TIA25	—
			5.5	7.5	11.6	TIA32	—
							TIA32M35 TIA32M50 TIA32M63
RS63	H.P.PH,BW	TJA2-32A TIS35-63A	7.5	10	14.4	TIS35	—
			11	15	21.1	TIS50	—
			15	20	28	TIS63	—
			18.5	25	35	—	TIS63M80
			22	30	41	—	TIS63M80
			30	40	55	—	TIS63M100
RS100	H.P.PH,BW	TCP80 TCP100 TCP100M125 TCP100M160 TCP100M200	22	30	41	TCP80	—
			30	40	55	TCP100	—
			37	50	69	—	TCP100M125
			45	60	83	—	TCP100M160
			55	75	99	—	TCP100M200
RS200	H.P.PH	TBC2-63A TC80-100A TF125-200A TF200M250 TF200M250	37	50	69	TF125	—
			45	60	83	TF160	—
			55	75	99	TF200	—
			75	100	136	—	TF200M250
			90	120	162	—	TF200M250
RS400	H.P.PH	TKM250/315 TKM355/400 TKM355/400 TM400M450	110	150	200	TM355	—
			132	175	231	TM355	—
			150	200	263	TM400	—
			160	215	281	TM400	—
			185	250	324	—	TM400M450
			200	270	350	—	TM400M450

A FULL RANGE OF HRC FUSE LINKS ARE AVAILABLE FROM 2 AMP TO 1600 AMP

Refer publication IEF401 for technical details.

Asta 20 certified and complying with AS 2005 &amp; BS88.

†D.O.L start based upon 7 x FLC for 10 seconds

\*To accommodate the 'NS' fuselink additional fuse carrier list No. SCA63 is required. This must be specified at the time of ordering.

**sprecher+schuh**

The Ultimate in  
Motor Control

Represented in Australia by

**NHP**

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Products Pty Ltd A.C.N. 004 304 812

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Cnr Carroll St. & Struan Crt.,  
Toowoomba, QLD. 4350  
Phone: (076) 34 4799 Fax: (076) 33 1796

Agents

Hobart

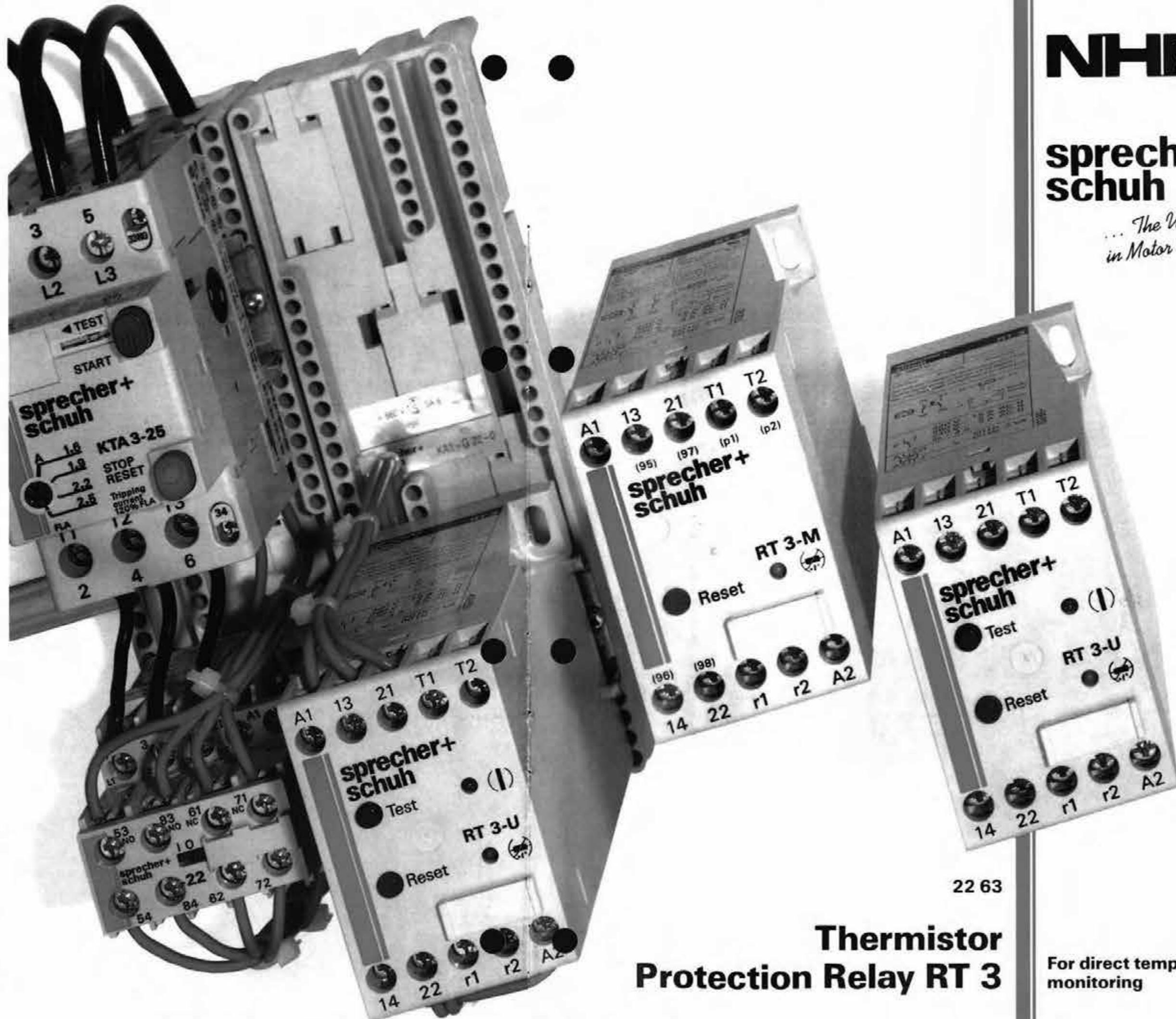
H.M. Bamford (Hobart)  
199 Harrington Street, Hobart TAS. 7000  
Phone: (002) 34 9299 Fax: (002) 31 1693

Launceston

H.M. Bamford (Launceston)  
59 Garfield Street, Launceston TAS. 7250  
Phone: (003) 44 8811 Fax: (003) 44 4069

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**NHP**

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... The Ultimate  
in Motor Control

## Thermistor Protection Relay RT 3

For direct temperature monitoring

22 63

# Thermistor Protection Relay RT 3: direct, precise, dependable



## The right device for each application

Thermistor protection relays RT 3 are employed in all those applications where accurate temperature monitoring is of crucial importance:

- motors and transformers
- bearings and machines
- heating systems
- gases and liquids

The RT 3 takes fully into account extraneous influences such as increased ambient temperature, ventilation system breakdown and obstructed cooling. Three models permit optimal selection according to application.

## Maximum safety for systems and personnel

The RT 3 does not only trip reliably in the event of over-temperature but also in the case of a short-circuit or an open-circuit in the sensor measuring circuit. Additionally two models give safeguards against supply failure, storing their switching state for more than three hours.

All voltage carrying parts of the RT 3 are protected against inadvertent contact according to VBG 4.

## Temperature monitoring is no luxury

Direct temperature sensing at critical locations with thermistor sensors and its evaluation by the thermistor protection relay RT 3 provides a first-rate safeguard for motors and other temperature-critical devices.

## Convenient operation

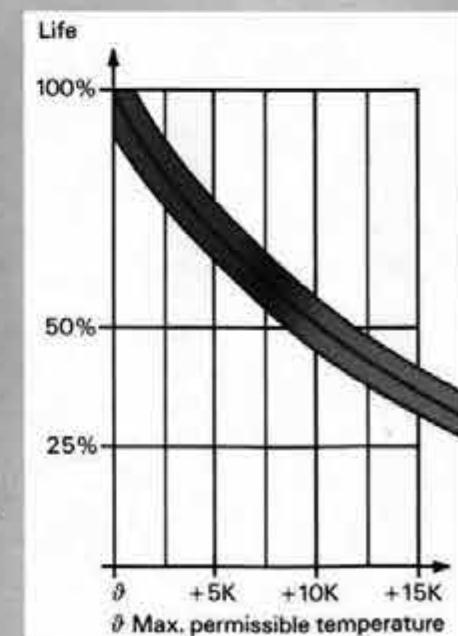
The RT 3 is designed arranged clearly and logically. Tripping is distinctly indicated by a red LED. Two models have a «Reset» button for manual reset and terminals for remote reset up to 1000 m. The model RT 3-U has a «Test» button for checking operating readiness and a green LED to indicate the supply-on state.

## Trouble-free installation

Nothing is simpler than installing an RT 3. No settings have to be made on the relay itself.

## Additional protective functions possible

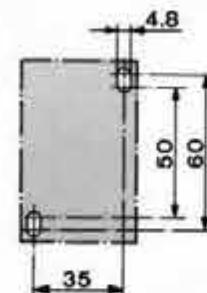
For the very highest protection requirements the RT 3 can be used in combination with thermal overload relay CT, circuit breaker KT 3 or the electronic motor protection unit CET 3. In this way further protective functions can be achieved permitting a reduction in the motor feeder line cross-section.



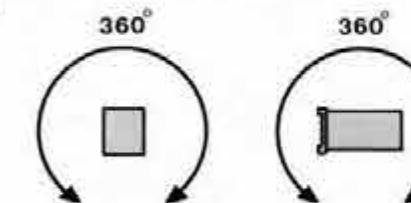
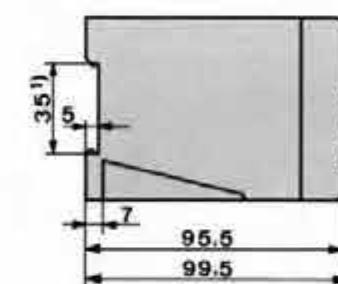
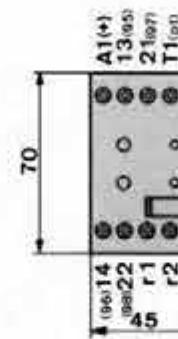
Reduction of the average motor life with over-temperature.

## Dimensions [mm] Mounting, circuit diagrams

Hole plan RT 3



Position of terminals

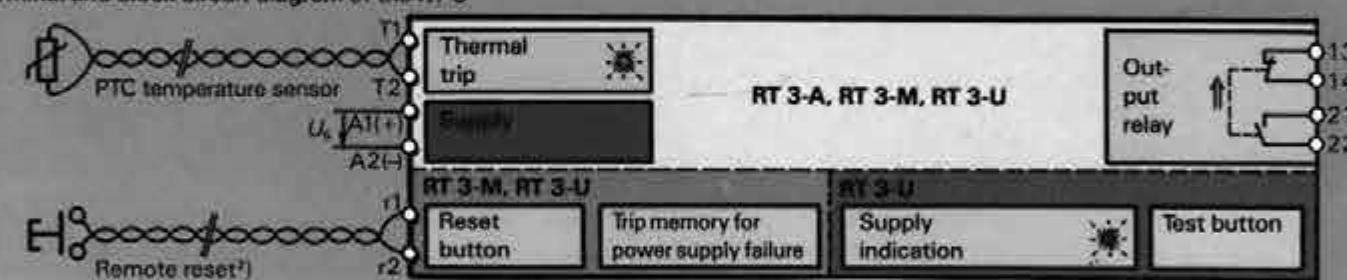


### Installation

The thermistor protection relay RT 3 is designed for surface mounting with screw fixing according to hole plan EN 50 002 or for snap-on fixing to a top hat rail EN 50 022-35 x 7.5.

Arrangement, assignment and marking of terminals in accordance with EN 50 005. The mounting position of the RT 3 does not influence its function.

Terminal and block circuit diagram of the RT 3



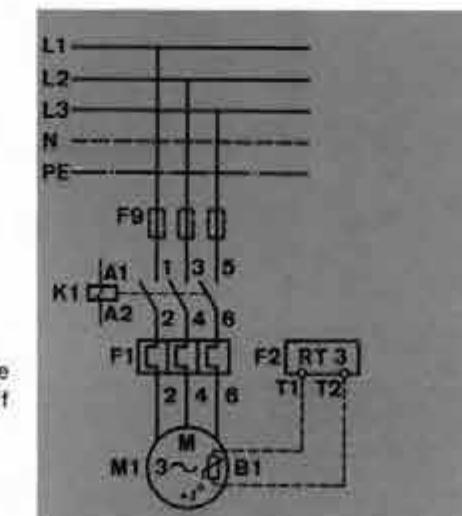
An application example  
Starter CA+CT with additional RT 3

### Legend

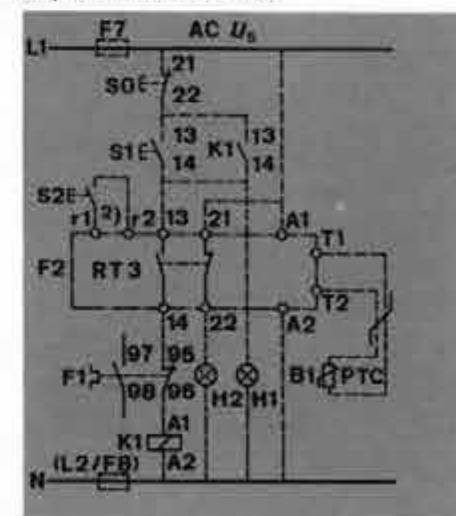
- K1 Contactor CA
- F1 Thermal overload relay CT
- F2 Thermistor protection relay RT 3
- S1 ON button
- S0 OFF button
- S2 Remote reset button
- U<sub>e</sub> Supply voltage
- H1 Signal lamp «Contactor ON»
- H2 Signal lamp «RT 3 tripped»
- B1 Thermistor in protected object

The contacts 13-14 and 21-22 of the output relay are drawn in their power-off position A1-A2.

Circuit diagram  
Main circuit

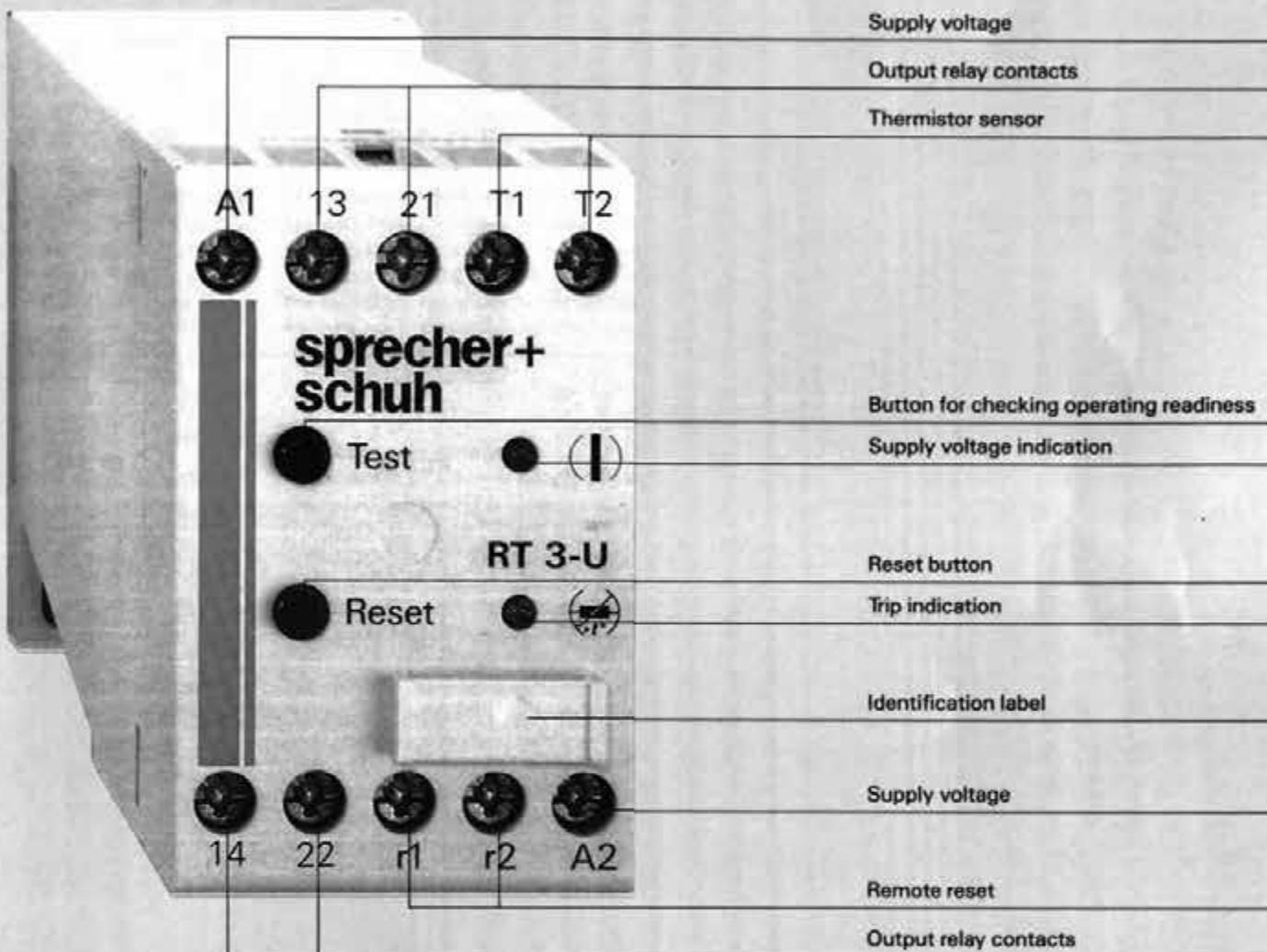


Control circuit  
Impulse contact control



<sup>1)</sup> For top hat rail 35 mm, EN 50 022.

<sup>2)</sup> For automatic reset with RT 3-M and RT 3-U: connect r1-r2.



*The thermistor protection relay RT 3 is an essential constituent of the comprehensive Sprecher+Schuh motor protection concept. Its combination possibilities with other motor protection devices enables the very highest demands to be satisfied.*

## Selection table

### Ordering information

#### Thermistor protection relay RT 3

- for surface mounting
- with inadvertent contact protection to VBG4 (IP20)
- output relay (with 1 normally open and 1 normally closed contacts) in closed circuit connection



Model	RT 3-A	RT 3-M	RT 3-U
Thermal overload protection	•	•	•
Short-circuit and open-circuit protection for sensor measuring circuit	•	•	•
Trip indication (red LED)	•	•	•
Automatic reset	•	•	•
Manual reset		•	•
Remote reset (external button)		•	•
Storage of status in event of power failure		•	•
for more than 3 hours at +25°C		•	•
unlimited (not temperature-dependent)			•
«Test»-button			•
Power-on indication (green LED)			•

Order No. structure	Example:
Model: RT3 - A (Automatic Reset) RT3 - M (Manual Reset) RT3 - U (Unlimited Memory)	RT 3-A-240V AC
Control voltage and frequency: With direct current:	...V AC ...V DC

Ordering information	Model	Order No.	Weight [g] 1 item
Thermistor protection relay	RT 3-A	RT 3-A-...V...	260
	RT 3-M	RT 3-M-...V...	265
	RT 3-U	RT 3-U-...V...	270
Order No. supplement			
Supply voltage:	AC 24, 48, 110, 240, 415, 440V	-...V	-
	DC 24, 48 V	-...V DC	-65

## Technical information

### General Functions Approvals



#### General

Thermistors are installed in the thermally critical localities of the object to be protected. For motors this is the stator winding.

The resistance of the thermistors has a positive temperature coefficient (PTC).

The resistance of the PTC sensor increases immediately the rated response temperature is exceeded. In this way the thermistor protection relay RT 3 initiates the switching off of the protected object – eg. a motor – and indicates the fault.

#### Functions

##### Tripping

The RT 3 trips in the event of a **thermal overtemperature** in the protected object also with a short-circuit and an open-circuit in the sensor measuring circuit. The red LED lights.

##### Test button

An overtemperature is simulated on the RT 3 by pressing the **Test** button. This is for checking the operational readiness of the device.

##### Reset

The RT 3-A is **automatically** reset once the resistance of the sensor measuring circuit falls back below the reset value on cooling down. The red LED trip indication goes out.

To prevent undesirable starting of the motor, automatic reset should only be provided with impulse contact control. The RT 3-M and RT 3-U have an optional reset facility of either manual (with the integrated «Reset» button or external remote reset button) or automatic.

##### Loss of supply voltage

In the event of a power supply failure the green LED on the RT 3-U goes out. On the RT 3-M and RT 3-U the switching status is stored for the manual reset. After restoration of the supply the output relay and the LED trip indicator revert to the status existing before the failure.

##### Temperature prewarning

If the manufacturer installs additional PTC sensors having a lower response temperature, a second RT 3 can be used to provide a preliminary temperature warning. This will permit the early detection of an impending fault and can prevent an operating interruption.

#### Approvals

The thermistor protection relay RT 3 complies with all important specifications. It has been approved by SEV, UL-recognized, Finland, CSA, NEMKO and USSR Register.

For the protection of motors used in explosion hazardous areas (EEx e) it has been approved by the PTB (Physikalisch-Technische Bundesanstalt = Physical Testing Institute, Federal Republic of Germany).



SEV  
Switzerland



CSA  
Canada



UL-recognized  
USA



NEMKO  
Norway



Electrical  
Inspectorate  
Finland

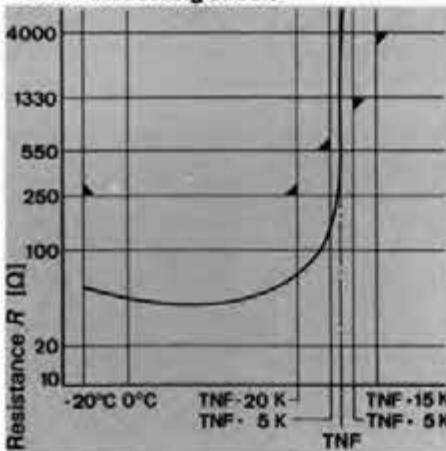


Physical  
Testing  
Institute FRG



USSR  
Register

## Technical data

<b>Rated voltage</b>	acc. to IEC 255-8 acc. to SEV	440 V 380 V	acc. to AS, BS, VDE 0660 acc. to CSA, UL	250 V 240 V	
<b>Test voltage</b>	alternating current acc. to IEC 292-1 surge voltage acc. to IEC 255-4 and SEN 36 1503		2.5 kV, 50/60 Hz, 1 min		
between separated circuits	interference voltage acc. to ANSI <sup>1)</sup> C 37.90 a-1974, IEC 255-6 and SEN 36 1503		5 kV, 1.2/50 µs		
<b>Ambient temperature</b>	normal operation storage (in dry rooms)		2.5 kV, 1 MHz, 2 s -25°C...+60°C -40°C...+60°C		
<b>Climatic classification</b>	acc. to IEC 68-2-3 humid heat		40°C, 92% rel. humidity, 56 days		
<b>Protection class acc. to IEC 529</b>	device (less terminals) IP 30		terminals (acc. to VBG 4) IP 20		
<b>Vibration resistance</b>	acc. to IEC 68 (10...150 Hz)		3 g		
<b>Impact resistance</b>	acc. to IEC 68-2-7 or DIN 40 046/7		30g, shock duration 11 ms, semi-sinusoidal in the 3 directions x, y and z		
<b>Supply</b>	rated supply voltage $U_s$		AC 24, 48, 110, 240, 415, 440 V AC DC 24, 48 V		
	permissible fluctuations		AC 0.8...1.1 $U_s$ , 50/60 Hz DC 0.9...1.2 $U_s$		
	power consumption		AC 2.5 VA (2.2 W) DC 2.2 W		
<b>Output relay contact data</b>	contacts (electrically isolated)		1 make and 1 break		
<b>Operating voltage</b>	[V]	24 48	110 240	415 440	
Continuous thermal current	[A]	4 4	4 4	4 4	
<b>Rated operational current with AC</b>	AC-11	[A]	4 4	3 2	1.5
Rated operational current with DC	DC-11				
without protection circuit, L/R=35 ms	[A]	0.6 0.3	0.15 0.05	- -	
with protection circuit <sup>2)</sup> , L/R=100 ms	[A]	0.6 0.6	0.5 0.5	- -	
<b>Max. perm. make/break current</b>	[A]	44 44	44 33	22 16.5	
Rated current of back-up fuse:			max. fast-acting (D) 16 A; slow-blow (DT) 10 A		
<b>Terminals</b>	open terminals		(captive)		
	connection wire cross-sections		2 x 2.5 mm <sup>2</sup> single wire or 2 x 1.5 mm <sup>2</sup> with end ferrule		
<b>Sensor measuring circuit</b>					
4000			Max. cold resistance of PTC sensor chain	1500 Ω	
1330			Max. number of series connected		
550			PTC sensors acc. to IEC/TC2 proposal	6	
250			Response level $\vartheta_A = -25^\circ\text{C}...+60^\circ\text{C}$	3300 Ω ± 300 Ω	
100			Reset level $\vartheta_A = -25^\circ\text{C}...+60^\circ\text{C}$	1800 Ω ± 300 Ω	
20			Response level with short circuit in sensor circuit $\vartheta_A = -25^\circ\text{C}...+60^\circ\text{C}$	≤ 15 Ω	
10			Measuring voltage acc. to IEC 34-11	DC < 2.5 V	
			Measuring line		
			Minimum cross-section [mm <sup>2</sup> ]	0.5 0.75 1 1.5 2.5	
			Maximum length <sup>3)</sup> [m]	200 300 400 600 1000	
			Reset	RT 3-A automatic	
				RT 3-M manual or automatic <sup>4)</sup>	
				RT 3-U manual or automatic <sup>4)</sup>	
			PTC sensor characteristic acc. to IEC/TC2 proposal	TNF: Rated response temperature	
<b>Trip memory</b>	Storage time	RT 3-M	at 25°C > 3h at 40°C > 1h at 60°C > 15 min		
In event of power supply failure (zero-voltage safeguard)		RT 3-U	unlimited (not temperature-dependent)		
			potential-free make contact		
<b>Remote reset with RT 3-M, RT 3-U</b>	External contact at r1-r2		up to 300 m twisted		
	Max. line length for remote reset		up to 1000 m screened		

<sup>1)</sup> American National Standards Institute<sup>2)</sup> With varistor link CRV 3

(DC 220...250 V) or

RC link CRC 3 (DC 24...240 V)

see catalogue 22 02.

<sup>3)</sup> RT 3 to motor; installation:

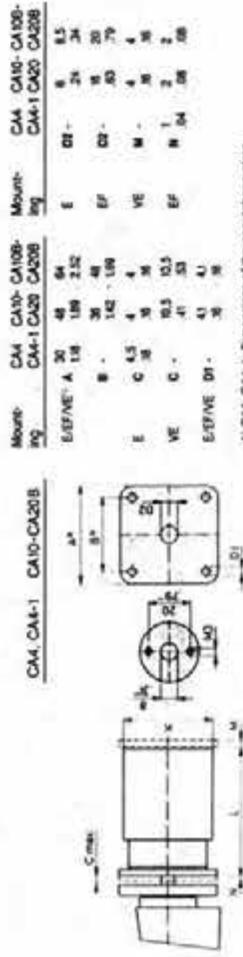
up to 200 m not screened

<sup>4)</sup> For automatic reset: connect r1-r2.

# KRAUS & NAIMER BLUE LINE SWITCH GEAR

## Switch Types CA4, CA4-1, CA10, CA11, CA20, CA10B, CA11B, CA20B

**DIMENSIONS**  
mm  
inch  
Panel mounting and base mounting



(1) CA4, CA4-1: Dimensions of the attachment plate, excluding VE mounting.

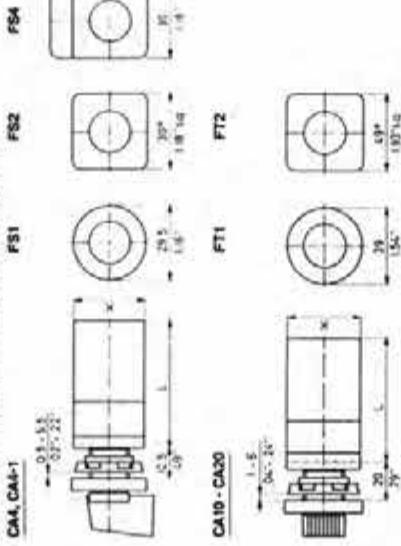


- compact design with the smallest escutcheon plate size of 30 x 30 mm (1.181" x 1.181")
- finger-proof acc. to VDE 0106, part 100 and VBG 4
- open terminals which are accessible from both sides
- captive plus-minus screws and screwdriver guide
- high switching capability
- contacts with gold plating (switch type CA4 and CA4-1)

	CA4, CA4-1	CA10, CA11	CA20	CA10B, CA11B	CA20B
Mounting	IN	IN	IN	IN	IN
CA4, CA4-1	EFINE A	EFINE A	EFINE A	EFINE A	EFINE A
CA10, CA11	EFINE C	EFINE C	EFINE C	EFINE C	EFINE C
CA20	EFINE D	EFINE D	EFINE D	EFINE D	EFINE D

(1) CA4, CA4-1: Dimensions of the attachment plate, excluding VE mounting.

### Single hole mounting 16 or 22 mm and 22 or 30 mm



Dimensions L and K

Type	1	2	3	4	5	6	7	8	9	10	11	12	K
CA4, CA4-1	30	38	46	54	62	70	78	86	94	102	110	118	-
CA10	138	150	158	165	173	181	189	197	205	213	221	229	237
CA11	217	412	507	602	697	792	887	982	1077	1172	1267	1362	1462
CA20	125	162	20	237	274	312	349	387	424	461	499	536	568
CA10B	24.9	47.6	60.3	73.0	85.7	98.4	111	125.8	149.2	161.9	174.6	187	202
CA11B	137	187	237	337	437	487	537	587	637	687	737	787	837
CA20B	26.9	48.6	61.3	74	86.7	99.4	112	124.8	137.5	150.2	162.9	175.6	185

No. of stages/Dimensions L

*australian solenoid co. pty. ltd*

(Headquarters N.S.W.)

HEAD OFFICE

ASHFIELD, N.S.W. 2131 P.O. BOX 9993

FAX: (02) 797-0092 CABLE ADDRESS: AUSTRASOL SYDNEY

PH-AUS-08

Φ

N 11/01

SWITCH TYPES	ESSENTIAL MOUNTING						Code	IP front type	Panel mounting
	CA4	CA4-1	CA10	CA11	CA20	CA10B CA11B CA20B			
Nominal voltage IEC/VDE/BS UL/CSA SEV CEE 24	V 500 300 max. V 10 380 380	V 500 300 380 380	V 660 600 660 380	V 660 600 660 380	V 660 600 660 380	V 660 600 660 380	E 40 EF	CA4 CA4-1 CA10 CA11 CA20	
Main switch characteristic Isolator conditions are met up to	V 250	V 250	V 380	V 380	V 380	V 380			
Thermal current $I_{th}$ IEC/VDE/BS UL/CSA SEV	A 10 10 10/-	A 10 10 10/-	A 10 10 10/-	A 20 16 16/12	A 20 16 16/12	A 32 30 25/20	VE	40	CA10 CA11 CA20
Nominal current $I_n$ AC 21 IEC/VDE/BS AC 1 SEV	A 380 V 660 V	A 380 V 660 V	A 220-240 V 380-440 V	A 2.5 1.5	A 2.5 1.5	A 6 4			
AC 11 IEC/VDE UL/CSA	A 380 V 660 V	A 380 V 660 V	A 380-440 V	A 1.5	A 1.5	A 4 4			
Pilot Duty — Contact Rating Code Amperes Rating CEE 24	A A A	A A A	A A A	A A A	A A A	A A A			
Resistive load Motor load	A 2	A 2	A 2	A 10	A 10	A 10 16 16	FS1	65	
Motor rating AC 3 IEC/VDE/BS	3 phase 3 pole 1)	3 phase 3 pole 1)	3 phase 3 pole 1)	3 phase 3 pole 1)	3 phase 3 pole 1)	3 phase 3 pole 1)	FS2	65	CA4 CA4-1
AC 23 IEC/VDE/BS	3 phase 3 pole 1)	1 phase 2 pole	FS3	65	CA10 CA11 CA20				
UL/CSA Standard motor load (Detach-on-line rating)	3 phase 3 pole	120 V 240 V 480-600 V	FS4	65					
Dry circuit ratings Operational voltage	max. min.	V 240 1	V 240 1	V 240 1	V 240 1	V 240 1			
AC 1	1/6 V 12/24 V 48/60 V	A A A	A A A	A A A	A A A	A A A	FT1	65	
DC 1	110-120/220-240 V 1/6 V 12/24 V 48/60 V	A A A	A A A	A A A	A A A	A A A			
Max. fuse size (gL-characteristic) Rated conditional short-circuit current	A 3	A 3	A 3	A 1	A 1	A 1			
Max. permissible wire gauge stranded wire Flexible (with sleeve)	2 x AWG 14	mm <sup>2</sup> AWG 14	1.5 1.5	1.5 1.5	1.5 1.5	1.5 1.5	FT2	65	
	2 x AWG 14	mm <sup>2</sup> AWG 14	1.5 1.5	1.5 1.5	1.5 1.5	1.5 1.5			



The terminals of the CA series cam switches are accessible from both sides. This is an advantage in cases where the switch is preferred for installation or in cases where the terminal wiring cannot be done in the sequence of the stage. The compact design, the excellent switching capabilities under AC 11, AC3 and AC23 and the obviously unlimited number of switch developments are characteristic for the CA switches.

The CA4 and CA4-1 switches offer maximum space saving benefits. A CA4 or a CA4-1 switch in E mounting has stage length and contact pitch of 30 x 30 x 30 mm cubic. The additional length of any further stage is 8 mm. CA4 and CA4-1 contacts are supplied standard with gold plating. (CA4 = 1 UL, CA4-1 = 35 UL).

Switching angle of CA switches may be 30°, 45°, 60° or 90°. Switching angle of CA switch types CA4 and CA4-1 are available with up to 16 contacts. CA10 to CA20B switches are available with up to 24 contacts. Available for either 18 or 22 or 30 mm diameter holes and is available with key operator, if required.

A wide range of optional extras and enclosures  
*Your order should include the following data:*

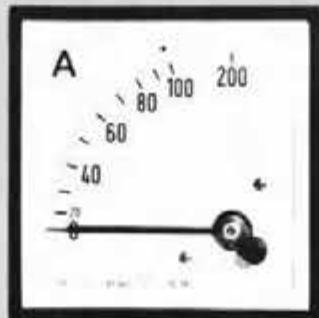
1. Switch type (selection according to the following tables)
  2. Switching program (order a prescribed form for special programs)

3. Mounting type	4. Escutcheon plate
5. Handle	6. Optional extras

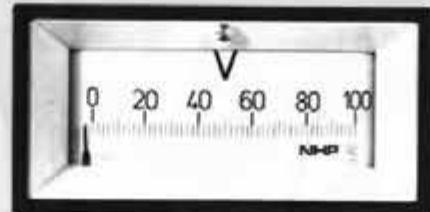
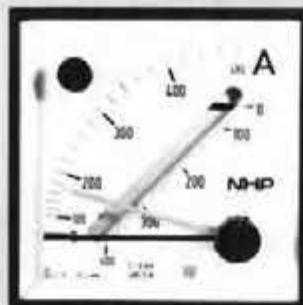
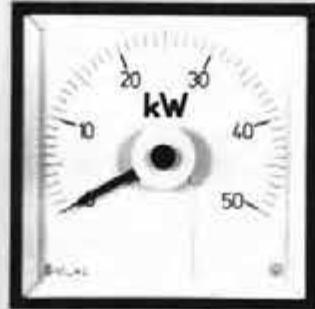
1) The max. nominal voltage should be noted.

**NHP****IME**

## ELECTRICAL MEASURING INSTRUMENTS



- Moving Iron Ammeters
- Moving Iron Voltmeters
- Max. Demand Ammeters
- Power Factor Meters
- Watt and Varmeters
- Synchronising Instruments
- Frequency Meters
- Current Transformers
- DC Ammeters
- DC Voltmeters
- Profile Meters
- Hour Run Meters

**NHP****ELECTRICAL ENGINEERING PRODUCTS PTY. LTD.**



*Melbourne Premises*

N.H.P. is a wholly Australian owned Company and represents a considerable number of overseas companies manufacturing equipment complimentary to the N.H.P. programme.

As suppliers to the full spectrum of the electrical industry N.H.P. continues to pursue improvement in both quality and range of products available.

Experienced Engineering and Management personnel continually visit world centres to ensure that the organisation may draw upon the technological advancements afforded by the research and development of specialising companies such as IME.

Extensive studies by IME have resulted in their research and development of an instrument design that fulfills the requirements of internationally adopted standards.

Housings, of self-extinguishing material offering IP52 protection, have dimensions to the universally used DIN 43700 for the four sizes 48 x 48, 72 x 72, 96 x 96 and 144 x 144mm.

Panel cut-outs are standard for both 90° and 240° indicators.

# NHP SWITCHBOARD INSTRUMENTS

## MOVING IRON AMMETERS AND VOLTMETERS FOR A.C. 90° QUADRANT

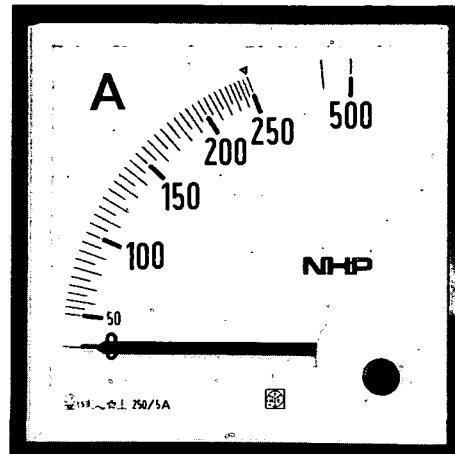
Accuracy Class 1.5  
Working Voltage 600V  
Test Voltage 2kV  
Overload Withstand

Ammeters: 10 x rated current for 1 sec.  
1.2 x rated current indefinitely

Voltmeters: 2 x rated voltage for 1 sec.  
1.2 x rated voltage indefinitely

Self extinguishing housing

Protection IP52



Ammeters will withstand motor starting currents to 8 times rated meter current therefore 200% overscaling is suitable for all normal applications.  
Overscaling of 500% is optional.

### Ammeters: Direct connected

#### Ranges:

RQ48E, 1/2A, 2.5/5A, 5/10A, 10/20A

RQ72E, RQ96E, RQ144E, 1/2A, 2.5/5A, 5/10A, 10/20A, 15/30A, 25/50A, 40/80A, 60/120A, 100/200A

**Current transformer connected meters standard scaling of all sizes for 1A and 5A C.T.'s**

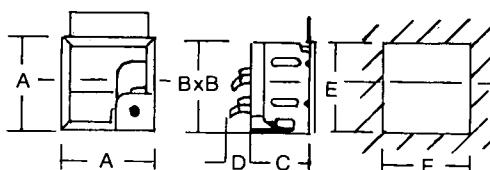
5/10A, 10/20A, 15/30A, 20/40A, 25/50A, 30/60A, 40/80A, 50/100A, 60/120A, 75/150A, 80/160A and their decade multiples.

At 1000A and above standard scales are marked in kA. Variations to this are non-standard and numbering is subject to space and numeral size.

**Voltmeters:** Standard ranges are 300V and 500V or ranged and scaled to suit potential transformers with secondary voltages of 100V or 110V e.g. transformer ratio 6.6kV/110V.

### DIMENSIONS AND WEIGHT

A	B	C	D	E	Weight (g)
48	44.5 x 44.5	40	22	45 $\pm$ 0.6	110
72	66.5 x 66.5	44	12	68 $\pm$ 0.7	160
96	91 x 91	44	12	92 $\pm$ 0.8	220
144	137 x 137	53.5	12	138 $\pm$ 1	510



### 240° CIRCULAR SCALE

Possessing the same general features as the 90° quadrant, circular scale moving iron meters have a depth of 80mm. The AQ48m/rad is a moving coil meter supplied by an AC converter and may not be overscaled.

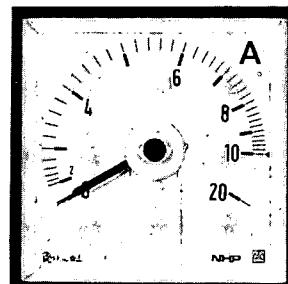
#### Ranges:

AQ48M/rad 1A and 5A;

AQ72E, AQ96E, AQ144E

1/2A, 2.5/5A, 5/10A, 10/20A

C.T. operated ranges as for 90° quadrant types



# NHP SWITCHBOARD INSTRUMENTS

## MOVING COIL METERS

IME moving coil instruments employ centre core magnet movements. This type of movement is not subject to sensitivity changes due to magnetic shunting when mounted in sheet steel panels and calibration remains unaffected.

Besides the use of their response to DC in measuring DC voltage and currents their low energy requirements are used to advantage in other applications.

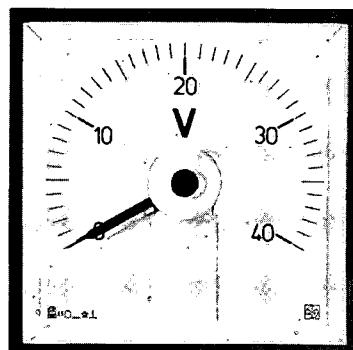
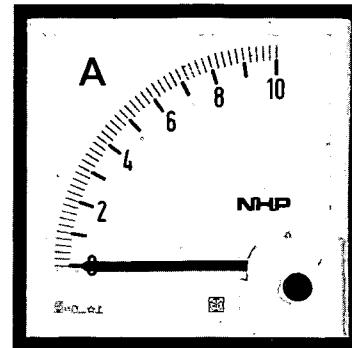
Low burden measurements of sinusoidal AC voltage using an internal rectifier are possible.

Their use with internal or external transducers provides frequency meters, wattmeters, tachometers, pressure, temperature indicators and indicators for any physical or electrical quantity for which a sensor or transducer is available to provide a DC signal.

Accuracy class: 1.5  
 Working Voltage 600V  
 Test Voltage 2kV  
 Overload withstand

Ammeters: 10 x rated current for 1 sec.  
 1.2 x rated current indefinitely

Voltmeters: 2 x rated voltage for 1 sec.  
 1.2 x rated voltage indefinitely



<b>90° METERS</b>	<b>RQ48M</b>	<b>RQ72M</b>	<b>RQ96M</b>	<b>RQ144M</b>
<b>DC AMMETERS</b>				
1 - 600mA	•	•	•	•
1, 4, 6, 10A		•	•	
15, 25, 40, 60A		•	•	
For use with external shunts of 50, 60, 75, 100, 150mV	•	•	•	•

**DC VOLTMETERS** (approx 1000 ohms/V 0.5 - 600V

**AC VOLTMETERS** (rectified) 6 - 600V. RMS

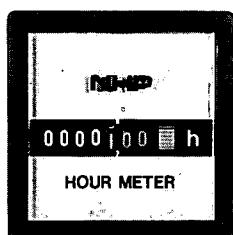
<b>240° METERS</b>	<b>AQ48M</b>	<b>AQ72M</b>	<b>AQ96M</b>	<b>AQ144M</b>
<b>DC AMMETERS</b>				
1 - 600mA	•	•	•	•
For use with external shunts of 50, 60, 75, 100, 150mV.	•	•	•	•

**DC VOLTMETERS** (Approx 1000ohms/V) 0.5-600V.

**AC VOLTMETERS** (rectified) 6 - 600V. RMS

## HOUR RUN METERS

### 7 DIGIT (2 decimal) DISPLAY AND RUN INDICATOR



<b>RQ48.O*</b>	<b>RQ72.O</b>	<b>RQ96.O</b>
55 x 55mm OR 48 x 48mm	72 x 72mm	96 x 96mm

24V, 110V, 240V, 415V, 50Hz voltages refer to all sizes

\* RQ48.0 cut-out alt. Ø 50mm

# NHP SWITCHBOARD INSTRUMENTS

## MAXIMUM DEMAND AMMETERS

**MAXIMUM DEMAND AMMETERS** are available in three sizes  
RQT72, RQT96 and RQT144

An ambient temperature compensated dual bi-metal movement is employed.

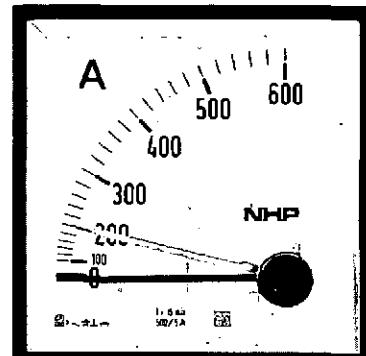
A red slave pointer remains at the highest position to which it was driven by the indicator and shows the maximum current taken by the load.

Reset of the slave is achieved using the front knob

Range: 5A overscaled 120% direct or via C.T.

Setting Time: 15 mins. avoids unwanted indication of short term transients.

Accuracy: Class 3



### COMBINED MAXIMUM DEMAND AMMETERS

RQTE72, RQTE96 and RQTE144

include a moving iron movement in the same measuring circuit as the bi-metal elements.

An instantaneous indication of prevailing circuit current is therefore available.

The characteristics of the bi-metal movement remain the same as the RQT series above.

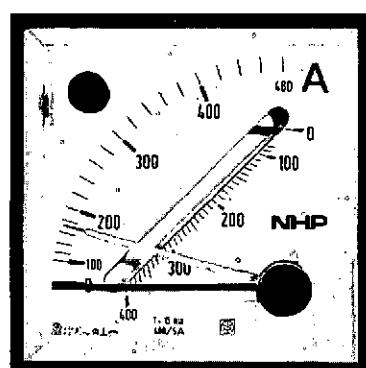
Moving Iron:-

Accuracy: Class 1.5

Range: 5A overscaled 200% if required

Overload: 10 x rated current for 1 sec.

Withstand: 1.2 x rated current indefinitely.



## FREQUENCY METERS

Class 0.5

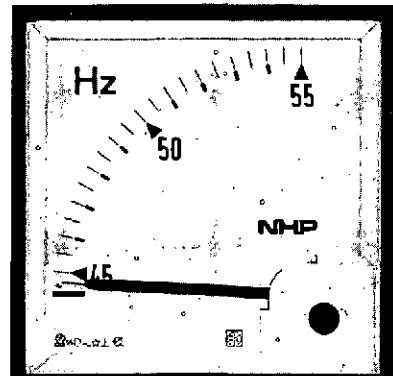
The transducer is contained within the housing of a 90° or 240° moving coil meter.

For normal power applications the indicating range is 45 - 55 Hz and a simple 2 wire supply connection is used.

The 240° indicator types are prefixed AQ.

Operating voltages:- 110V, 240V, 415V.

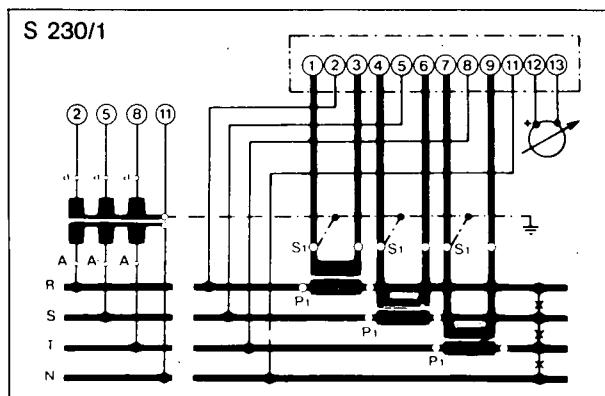
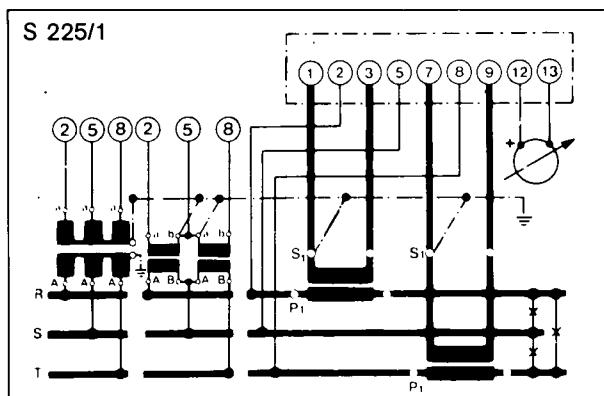
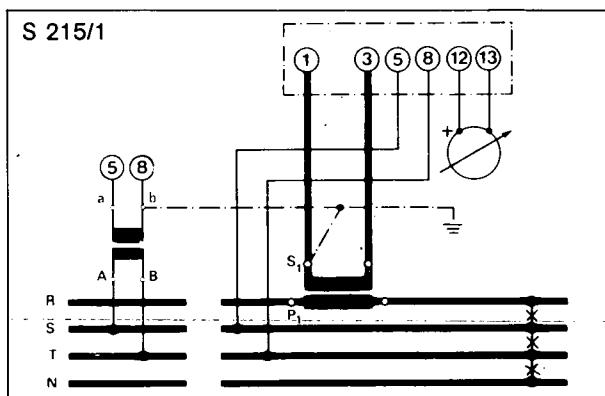
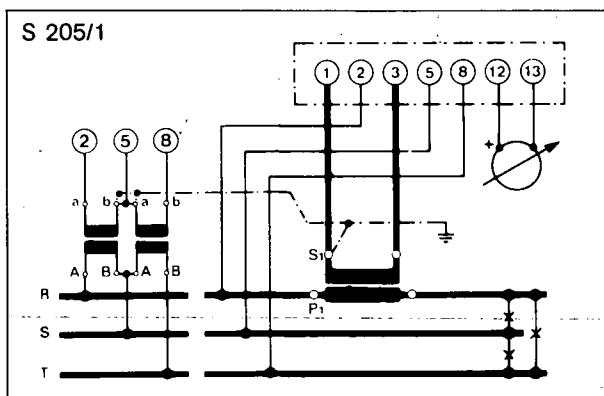
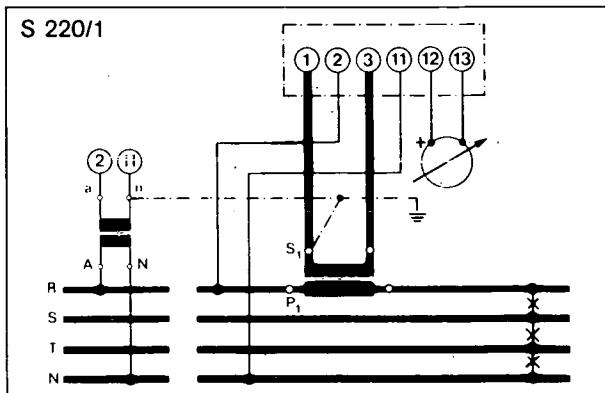
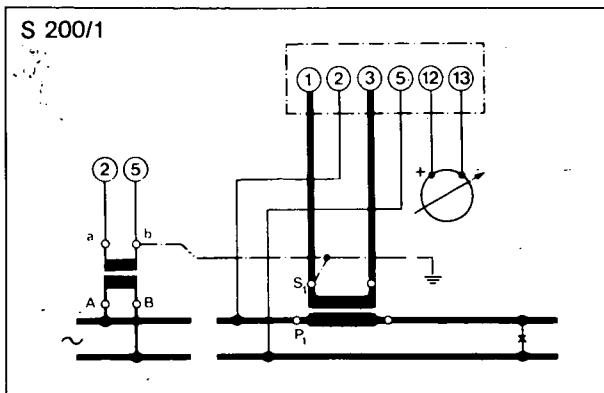
SPECIFICATIONS					
A	B	C	D	E	weight (g)
48	44.5 x 44.5	57.5	15	45 $\pm$ 0.6	130
72	66.5 x 66.5	44	30	68 $\pm$ 0.7	190
96	91 x 91	44	30	92 $\pm$ 0.8	260
144	137 x 137	53.5	30	138 $\pm$ 1	510



# **NHP SWITCHBOARD INSTRUMENTS**

# **WIRING DIAGRAMS WATT, VAR AND POWER FACTOR METERS**

Each transducer as an integral part of a measuring system carries the wiring diagram appropriate to its application on its housing. The reproductions below are in the interests of quickly determining the requirement and identifying the system by drawing number. They also permit establishment of the number of current transformers needed and their correct phasing. The potential transformers shown on the left of the diagram only become necessary at line voltages above 440V.



## S 200/1 SINGLE PHASE WATT, VAR, POWER FACTOR

S 220/1 3 PHASE 4 WIRE WATT. BALANCED LOAD

S 205/1 3 PHASE 3 WIRE WATT, POWER FACTOR

S 215/1 3 PHASE 3 & 4 WIRE VAR, BALANCED LOAD

S 225/1 3 PHASE 3 WIRE WATT, VAR, UNBALANCED LOAD

S 230/1 3 PHASE 4 WIRE WATT. UNBALANCED LOAD

S 235/1 3 PHASE 4 WIRE VAR. UNBALANCED LOAD

# NHP SWITCHBOARD INSTRUMENTS

## WATTMETERS AND VARMETERS

### Class 1.5

Wattmeters and Varmeters are comprised of a moving coil indicator and a transducer. The indicating meter may be 90° or 240°. Transducer types are determined by the supply system involved, single or 3 phase, 3 or 4 wire and by the nature of the load, balanced or unbalanced.

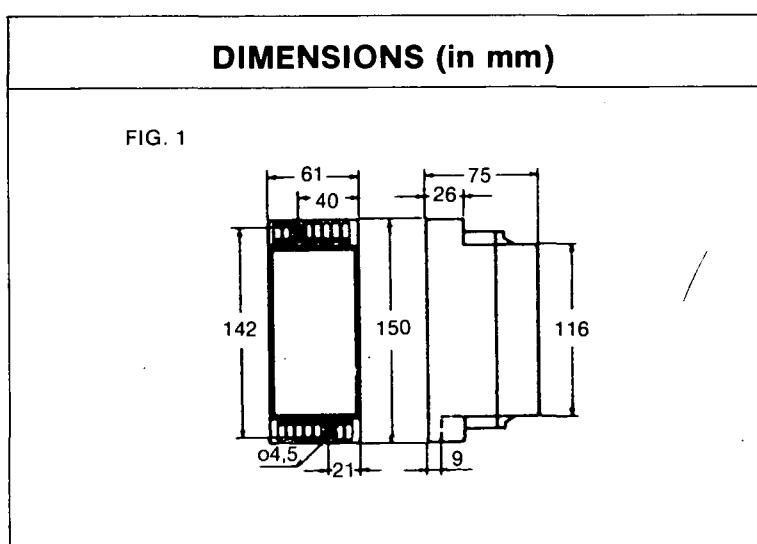
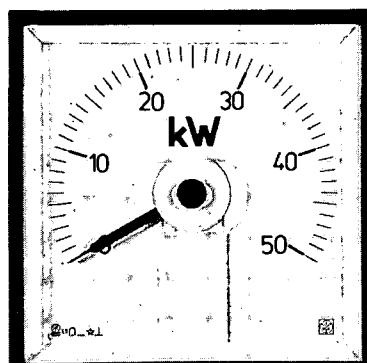
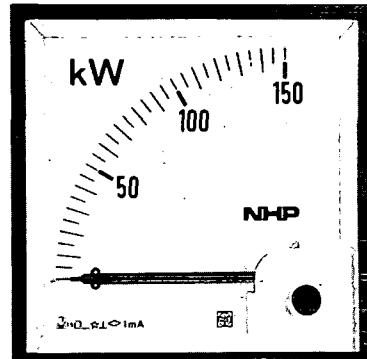
For high voltage systems above 440V, potential transformers are necessary.

Data to be advised when ordering:-

1. Type and size of indicator and full scale value.
2. Single or 3 phase, 3 or 4 wire system.
3. Balanced or unbalanced 3 phase load.
4. Phase to phase voltage.
5. Ratio of current transformer if already existing.
6. Ratio of potential transformers if used.

Each transducer carries its appropriate wiring diagram. These are reproduced on page 6, and the diagram number can be quoted in place of 2 and 3 above.

Figure 1 shows the dimensions of the transducers.



## POWER FACTOR METERS

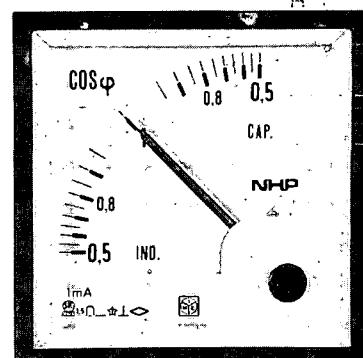
### Class 1.5

Power factor meters consist of a moving coil indicator and transducer.

Single or 3 phase units, they are designed for signals of 1A or 5A to suit direct or C.T. current inputs and above 440V require a potential transformer.

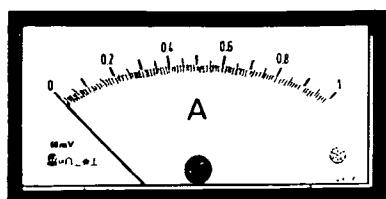
Scaled in  $\cos \phi$  the standard range is 0.5 - 1 - 0.5 inductive - capacitive.

Wiring diagrams are reproduced on page 6 and dimensions of the transducer are as shown in Figure 1.

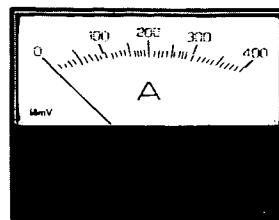


# NHP SWITCHBOARD INSTRUMENTS

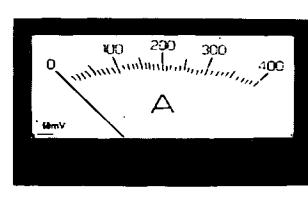
## RECTANGULAR SECTOR SCALE MOVING COIL METERS



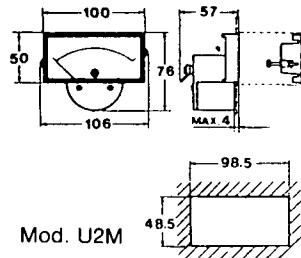
Mod. U2M



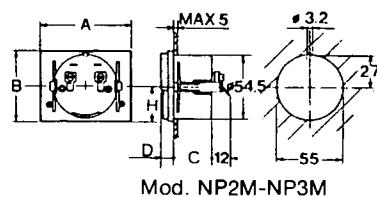
Mod. NP2M



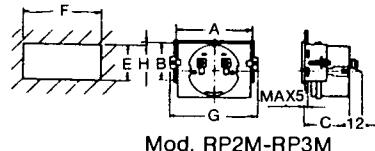
Mod. RP2M



Mod. U2M



Mod. NP2M-NP3M



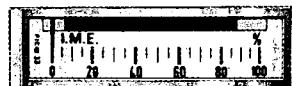
Mod. RP2M-RP3M

### DC RANGES

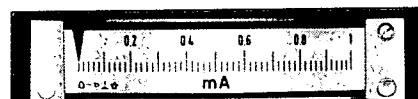
100 $\mu$ A - 600mA  
50, 60, 75, 100, 150mV  
for external shunt.  
4-20mA mech suppressed  
0.5 - 600V  
**AC (rectified)**  
6 - 600V RMS

DIMENSIONS (in mm)							
MODEL NO.	A	B	C	D	E	F	G
NP2M	76	58	32.5	10.5			29
NP3M	94	73	32.5	10.5			30
RP2M	76	58	48		40.5	76.5	89.5
RP3M	94	73	48		54.8	94.5	107.8
							0.75
							0.25

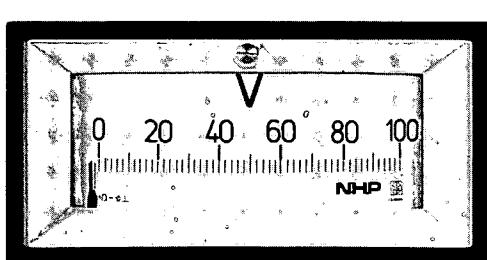
## EDGEWISE MOVING COIL METERS (For Horizontal or Vertical Mounting)



PC48M

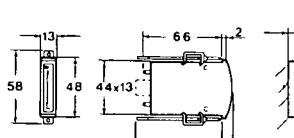


PA96M

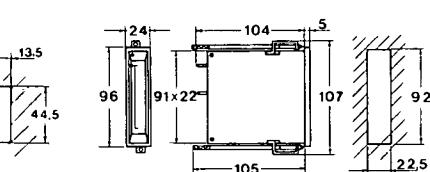


PR144M

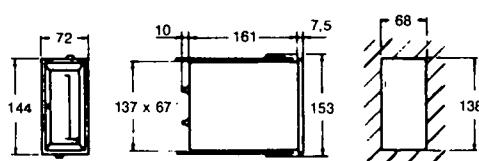
### DIMENSIONS (in mm)



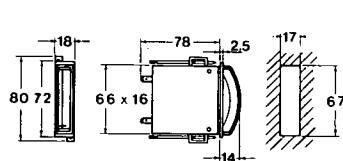
PC48M



PA96M



PR144M



PC72M

# NHP CURRENT TRANSFORMERS

## MEASUREMENT CURRENT TRANSFORMERS

<b>SPECIFICATIONS:</b>	Housing	Self-extinguishing
	Highest system voltage	600V
	Test Voltage	3kV RMS 50Hz for 1 min.
	Frequency of operation	40 - 60 Hz
	Insulation	Class E (120°C)
	Short circuit thermal current ( $I_{sh}$ )	60 - 100 times rated primary current for 1 sec.
	Rated dynamic current	2.5 times $I_{sh}$
	Rated continuous thermal current	120% of rated primary current

All mounting material and busbar clamps supplied as standard.



5A C.T. TYPE ACCURACY/BURDEN

PRIMARY CURRENT	TAS 20			TAS 40			TAS 63		TAS 80		TAS 125	
	CL 0.5 VA	CL 1 VA	CL 3 VA	CL 0.5 VA	CL 1 VA	CL 3 VA	CL 0.5 VA	CL 1 VA	CL 0.5 VA	CL 1 VA	CL 0.5 VA	CL 1 VA
50	-	-	2									
60	-	-	2.5									
75	-	-	2.5									
80	-	-	3									
100	-	2	4									
120	-	3	5									
150	2	4	6	1	3	6						
200	3	6	8	1.5	4	7						
250	5	8	10	2.5	5	8						
300				4	6	10						
400				6	10	12						
500				8	10	12	6	12				
600				10	12	15	10	20				
800				10	12	15	12	25				
1000				10	12	15	15	30	20	40		
1200							20	40	25	40		
1500							20	40	40	80	40	80
2000									50	100	50	100
2500									60	120	60	120
4000											100	200

### WOUND PRIMARY C.T. TAQ 10

High V.A. at Low Ratios

5A Secondary

10VA Class 0.5

15VA Class 1



### PRIMARY CURRENTS

5A 10A 15A

20A 25A 30A

40A 50A 60A

75A 80A 100A

C.T. Dimensions; Drawings Page 11.

# NHP CURRENT TRANSFORMERS

## MEASUREMENT CURRENT TRANSFORMERS

Current transformers (CT's) are required:-

- (a) When load currents exceed 100A, the highest rating manufactured for direct connection of standard conveniently sized meters.
- (b) When it is difficult or uneconomical to install heavy load cables to and from the meter.
- (c) When isolation of the meter from mains voltage is desirable to remove possible hazard.

### Main feature of IME C.T.'s include:

Housing:	self extinguishing
Test voltage:	3kV 50Hz for 1 minute
Insulation:	Class E (120°C)
Highest system Voltage:	600V

The table below shows typical burden figures for ammeters and the current circuits of various instruments. Also shown are figures of the burden per metre represented by various sizes of cables interconnecting the meter and the C.T.

VA/METER (FIGURES ARE FOR DOUBLE CABLES)				
Cable Diam. mm	Cable cross area sq.mm	VA/metre 5A C.T.	Meter Burdens Typical	VA
1	0.78	1.16		
1.1	0.95	0.97		
1.2	1.13	0.85		
1.3	1.33	0.69		
1.4	1.54	0.59		
1.5	1.76	0.51		
1.6	2.01	0.46		
1.8	2.54	0.36		
2	3.14	0.29		
2.3	4.15	0.22		
2.6	5.3	0.17		
3	7.07	0.13		
			INDICATORS: Ammeters Watt and P.F. Meters	1.1 0.5
			TRANSDUCERS: A.C. Amps Watt and P.F. Meters	1.5 1

The addition of the VA figures obtained from the table when compared with the accuracy class burden of C.T.'s assists in determining the expected performance of a proposed measuring system.

The mostly used ring or passing cable C.T.'s have diminishing VA capabilities with lower ratios. Should the meter need to be mounted at a distance greater than that normally encountered within switchboards the VA available may not be sufficient to preserve the required accuracy.

This may be overcome by several methods.

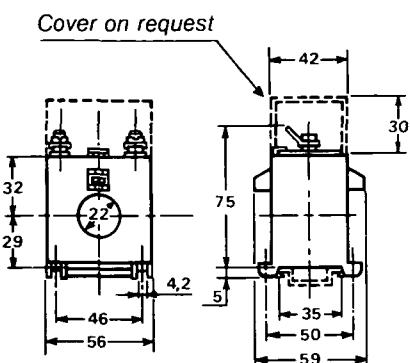
1. A C.T. of higher ratio, hence higher VA, is selected and the light load cable passed through its core the required number of times to obtain the correct current ratio. e.g. A 50/5A C.T. provides Class 3 at up to 2VA burden. A 250/5A C.T. provides 5VA at Class 1.
- Passing the 50A load cable 5 times through the larger C.T. gives the ratio of 50/5A up to a burden of 5VA so the meter may be remote by up to some 6.6 metres using cables of 1.54 sq. mm.
2. The above technique is already employed in a Wound Primary C.T. (See TAQ10-10VA at Class 0.5 and 15VA at Class 1). The load cable is terminated at bolted lugs on each side of the C.T.
3. For extremely remote indications a C.T. of the ring type may be connected to a transducer providing a 1mA to 10mA DC output for a 5Amp AC input. The indicator is a moving coil meter of appropriate sensitivity and can provide a linear scale.



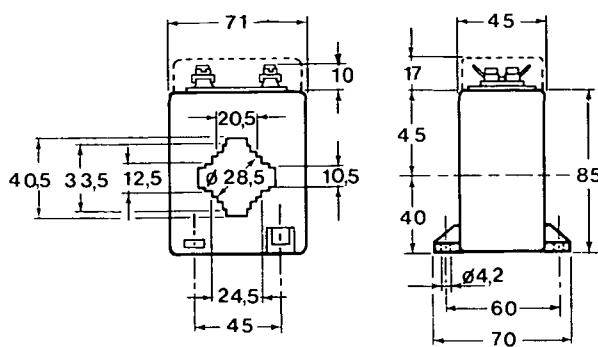
## CURRENT TRANSFORMERS



## DIMENSIONS (in mm) (not to scale)

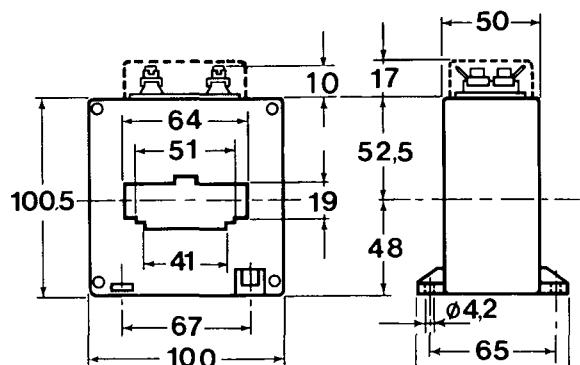


TAS 20B

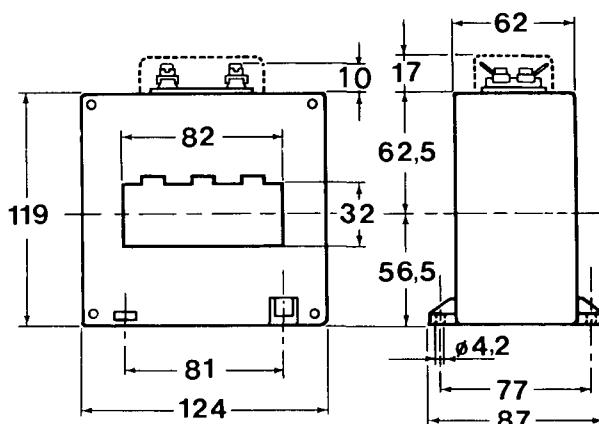


TAS 40

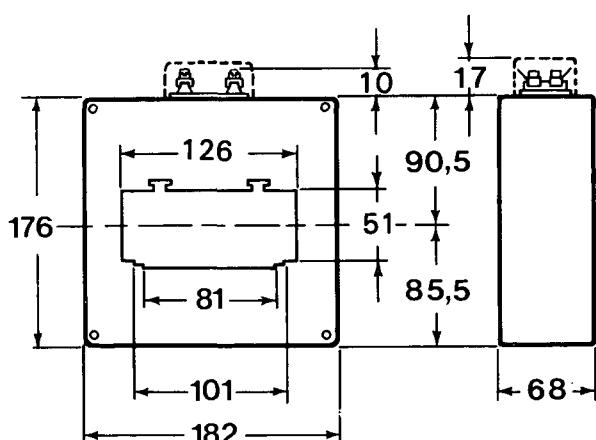
**NOTE — NEW HOUSING INCLUDES  
BUILT-IN DIN RAIL MOUNTING**



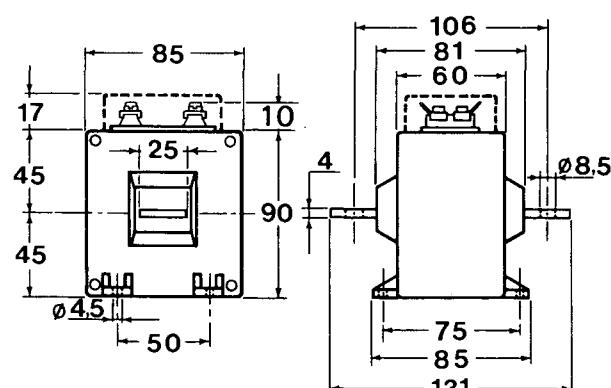
TAS 63



TAS 80



TAS 125



TAQ 10

# NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD

## MELBOURNE:

51-67 RIVER STREET, RICHMOND, VICTORIA 3121. Telephone: (03) 429 2999  
P.O. Box 199, RICHMOND 3121  
Telex: AA31644. Fax: (03) 429 1075

## SYDNEY:

30-34 DAY STREET, SILVERWATER, N.S.W. 2141. Telephone: (02) 647 2211  
P.O. Box 259, ERMINGTON 2115  
Fax: (02) 648 4353

## BRISBANE:

39 COMMERCIAL ROAD, FORTITUDE VALLEY, QUEENSLAND 4006. Telephone: (07) 252 9517  
P.O. Box 589, FORTITUDE VALLEY 4006  
Telex: AA41097. Fax: (07) 252 3415

## ADELAIDE:

29 CROYDON ROAD, KESWICK, SOUTH AUSTRALIA 5035. Telephone: (08) 297 9055  
Fax: (08) 371 0962

## AGENTS:

**W.A.** **PERTH:**  
C.J. YOUNG & CO. PTY. LTD., 38-40 RAILWAY PARADE, BAYSWATER, 6053.  
Telephone: (09) 271 8888 Fax: (09) 272 3906 Telex: AA93715

**TAS.** **HOBART:**  
H.M. BAMFORD (Hobart), 199 HARRINGTON STREET, HOBART, 7000  
Telephone: (002) 34 9299 Fax: (002) 31 1693

**LAUNCESTON:**  
H.M. BAMFORD (Launceston), 59 GARFIELD STREET, LAUNCESTON, 7250  
Telephone: (003) 44 8811 Fax: (003) 44 4069 Telex: AA58536

**N.S.W.** **NEWCASTLE:**  
HUNTER ENGINEERING SALES, 64 BROADMEADOW ROAD, BROADMEADOW, 2292  
Telephone: (049) 69 3122 Fax: (049) 69 6873 Telex: AA28158

**QLD.** **TOWNSVILLE:**  
PATERSON ELECTRICAL ENGINEERING AGENCIES, 62 LEYLAND STREET, GARBUZZ, 4814  
Telephone: (077) 79 0700 Fax: (077) 75 1457

**N.T.** **DARWIN:**  
J. BLACKWOOD & SON LTD. (Inc. Tesco Pearce), MATARAM STREET, WINNELLIE, 5789  
Telephone: (089) 84 4255 Fax: (089) 84 3945 Telex: AA85454

# NHP

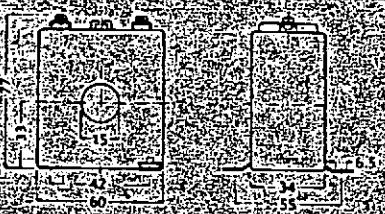
Proudly Australian

# 780 Series

Accuracies comply with BS3938 and IEC 185.

All measurements in millimetres.

## Type 780—943



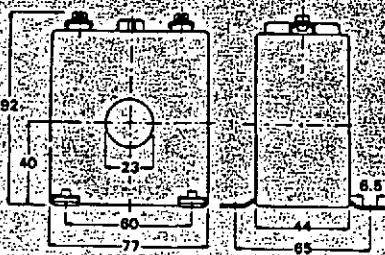
Supplied with 2 fixing feet.

Max cable Ø = 15mm.

1A secondaries are available for all ratings.

CT Ratio	VA at Class		
	5	3	1
30/5	1.5	—	—
40/5	2	1.5	—
50/5	2.8	2.5	—
60/5	3.5	3	—
75/5	5	4	—
80/5	5	4	—
100/5	—	5	2.5
120/5	—	5	2.5
125/5	—	5	2.5
150/5	—	5	2.5
200/5	—	6	3
250/5	—	7.5	4

## Type 781—943



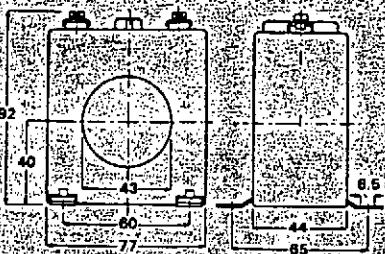
Supplied with 4 fixing feet.

Max cable Ø = 23mm.

1A secondaries are available for all ratings.

CT Ratio	VA at Class		VA at Class		
	3	1	3	1	0.5
40/5	2.5	—	—	—	—
50/5	2.5	—	—	—	—
60/5	2.5	—	—	—	—
75/5	2.5	—	5	2.5	—
80/5	2.5	—	5	2.5	—
100/5	5	—	7.5	5	—
120/5	5	—	7.5	5	—
125/5	5	—	7.5	5	—
150/5	5	—	7.5	5	15
200/5	5	—	7.5	5	10
250/5	5	2.5	7.5	5	7.5
300/5	5	2.5	7.5	5	10
400/5	5	2.5	10	5	15
500/5	5	2.5	10	5	15

## Type 782—943



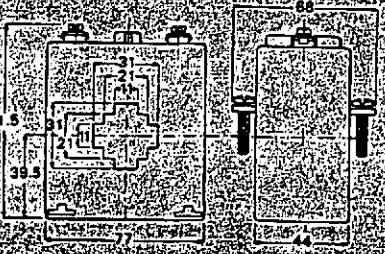
Supplied with 4 fixing feet.

Max cable Ø = 43mm.

1A secondaries are available for all ratings except 1200A.

CT Ratio	VA at Class 3		VA at Class		
	3	1	3	1	0.5
100/5	2.5	—	—	—	—
120/5	2.5	5	2.5	—	—
125/5	2.5	5	2.5	—	—
150/5	2.5	7.5	4.5	—	5 or 3
200/5	2.5	7.5	5	10	6
250/5	5	7.5	5	10	7.5
300/5	5	7.5	5	10	7.5
400/5	5	7.5	5	15	7.5
500/5	—	—	—	10	7.5
600/5	—	—	—	12	10
750/5	—	—	—	15	10
800/5	—	—	—	15	10
1000/5	—	—	—	20	15
1200/5	—	—	—	20	15

## Type 783—944



Supplied with busbar clamp.

For busbar 30 x 10, 20 x 20mm and cable Ø 25mm.

1A secondaries are available for all ratings.

CT Ratio	VA at Class		VA at Class		
	3	1	3	1	0.5
75/5	2.5	—	—	—	—
80/5	2.5	—	—	—	—
100/5	2.5	—	5	2.5	—
120/5	2.5	—	5	5	—
125/5	2.5	—	5	5	—
150/5	2.5	—	5	5	10
200/5	5	—	7.5	5	15
250/5	5	2.5	10	7.5	20
300/5	5	2.5	15	10	20
400/5	5	2.5	15	10	20
500/5	—	—	—	—	30
600/5	—	—	—	—	30
750/5	—	—	—	—	30
800/5	—	—	—	—	30

IW250PS. EDITION 3 APRIL 1993

**INSTALLATION INSTRUCTIONS****PHASE BALANCE RELAY****INTRODUCTION**

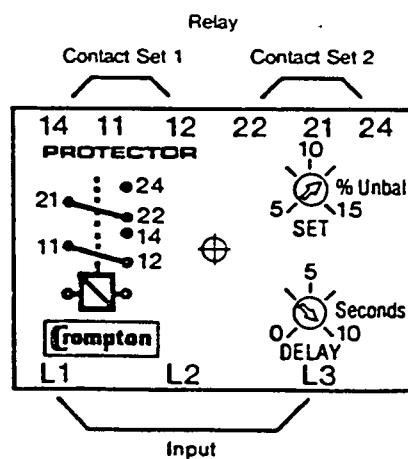
The phase balance relay module provides continuous surveillance of a 3-phase, 3 or 4 wire system and protects against:

1. Phase loss.
2. Phase reversal
3. Phase unbalance
4. System under voltage

The module de-energises a relay should any of the above faults occur.

An adjustable time delay is fitted to eliminate spurious operation on short term supply fluctuations.

A red LED indicates that the supply is within limits.

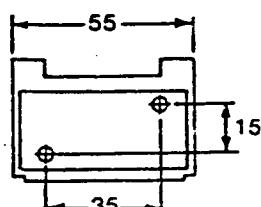
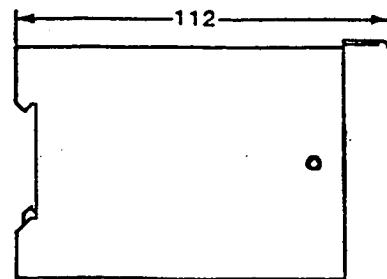
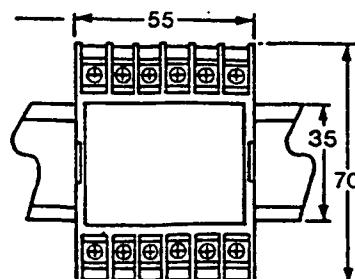
**Connection Diagram**

Note: Neutral connection not required.

**Dimensions**

measurements in mm

**MODEL 252**



OPERATION

The module comprises monitoring circuits for voltage, phase reversal and phase unbalance. Outputs from these circuits are fed to a comparator which changes state under fault conditions.

When the comparator switches, the output relay will de-energise after a pre-set time delay and the red LED will also extinguish.

The relay will automatically energise again and the LED light when all the supply parameters have returned to safe and acceptable limits.

INSTALLATION

Units should be installed in a dry position, not in direct sunlight and where the ambient temperature is reasonably stable and will not be outside the range 0 to 60 degrees celsius during operation. Mounting will normally be on a vertical surface but other positions will not affect operation. Vibration should be kept to a minimum. 252 units are also designed for mounting on a 35 mm rail to DIN 46277. Alternatively they may be screw fixed using an adaptor.

To mount a unit on a DIN rail, the top edge of the cutout on the back is hooked over one edge of the rail and the bottom edge carrying the release clip clicked into place. Check that the unit is firmly fixed. Removal or repositioning may be achieved by levering down the release clip and lifting the unit up and off the rail.

Connection wires should be sized to comply with applicable regulations or code of practice.

Ensure that phase sequence is connected correctly. Devices are for single frequency use only.

Side labels carry data including type no, serial no, input voltage and state of relay at trip.

SETTING UP

Two front panel adjustments are provided. SET adjusts the percentage unbalance to activate the trip, whilst DELAY sets the time delay period before trip occurs. The SET and DELAY controls are adjustable with a screwdriver. The SET control is continuously variable between 5 & 15% unbalance and the DELAY control between 0 & 10 seconds.

WARNING

Should the power supply fail or go to a very low level then there will be negligible time delay on undervoltage units.

Voltages dangerous to human life may be present at some of the terminal connections of this unit. Ensure all supplies are de-energised before attempting any connection/disconnection. If it is necessary to make adjustments with the power connected then exercise extreme caution.

Ensure that any protective cover provided is properly fitted after installation or adjustment of this unit.

MAINTENANCE

No routine maintenance is required. Should repair be necessary, it is recommended that the transducer be returned to the factory or the nearest Crompton Instrument Service Centre.

SPECIFICATIONType No:

252-PSFW. Phase loss and unbalance only.

252-PSGW. Phase loss, unbalance and undervoltage.

Input:System:

3 phase, 3 or 4 wire, 50 or 60 Hz.

100-125V, 200-250V or 380-450V.

3VA

1.2 times continuous.

1.5 times for 10x10 seconds.

SET POINTSUnbalance:

Adjustable 5% to 15%.

Typical. Adjustable to 10 sec. maximum.

(not operative if voltage falls below 70% of nominal or set point on type 252-PSGW)

Internally preset at -15% nominal voltage (other values between -10% and -30% available on request)

OUTPUT RELAYType:

DP changeover.

240V, 5A non-inductive.

24V, 2.5A resistive.

2x10 at above loads.

Automatic.

GENERALDielectric test:

2kV r.m.s for 1 min. to BS5458/ IEC414.

0 to 60 degrees celsius.

-20 to 60 degrees celsius.

0.05% / degree celsius.

Electrical stress surge withstand and non-maloperation to IEEE Std 472, ANSI C37 90a, SEN 361503.

IP50 to BS5490, IEC529.

Flame retardant plastic

Approx. 0.3 kg.

Enclosure code:Housing:Weight:CALIBRATION

The calibrating controls are only good for 10% setting accuracy if using the scales.

If more accurate settings are required then an accurate voltmeter should be used.

Our policy is one of continuous development and although the information is correct at the time of publication, we reserve the right to supply products differing in construction, dimensions or specification from those illustrated and described.



## IW250 TW/TX. EDITION 3. JULY 1992.

### INSTALLATION INSTRUCTIONS

### WATT & VAR TRANSDUCERS

#### INTRODUCTION

Watt and Var Transducers give an output proportional to the input WATTS or VARS. Zero and span adjustments are accessible without opening the unit. Cases are moulded in a tough flame retardant thermoplastic material and may be DIN rail mounted or screw fixed.

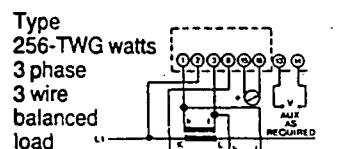
#### PRODUCTS COVERED

##### WATTS

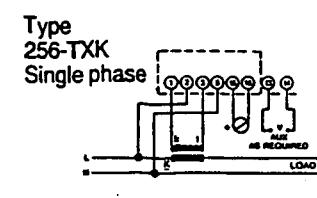
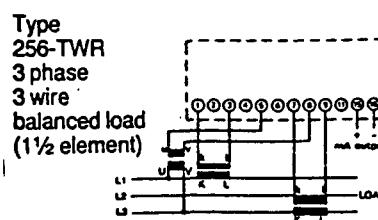
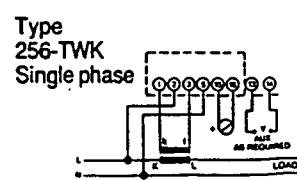
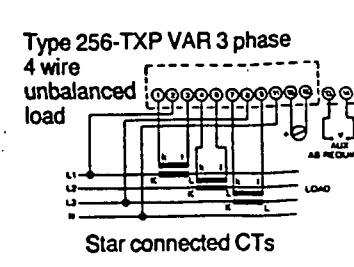
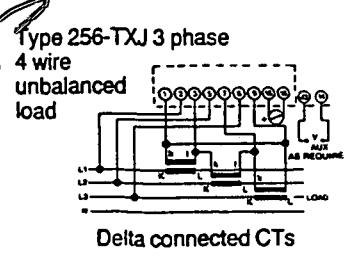
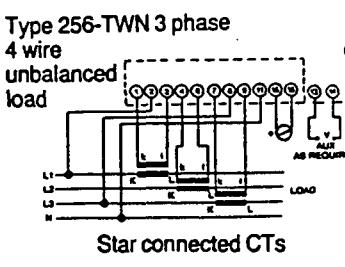
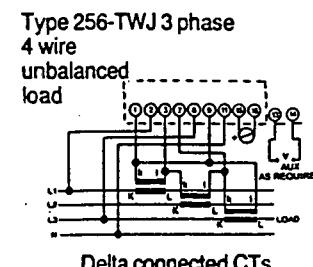
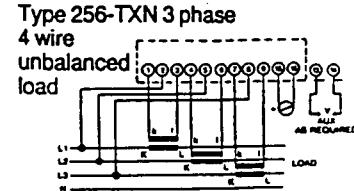
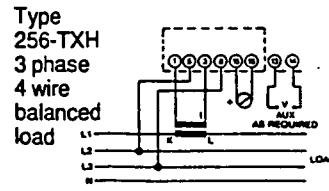
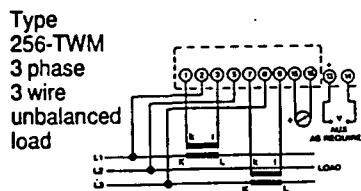
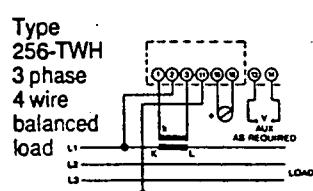
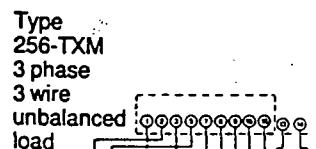
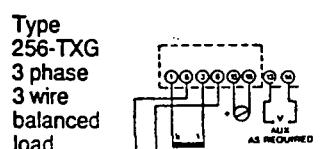
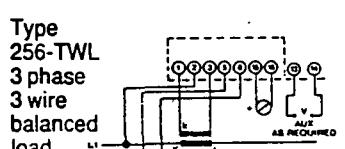
256-TWG	3 Phase 3 Wire Balanced
256-TWH	3 Phase 4 Wire Balanced
256-TWJ	3Phase 4 Wire Unbalanced
256-TWK	Single Phase
256-TWL	3 Phase 3 Wire Balanced
256-TWM	3 Phase 3 Wire Unbalanced
256-TWN	3 Phase 4 Wire Unbalanced Star
256-TWR	3 Phase 3 Wire Balanced (1½ element)

##### VARS

256-TXG	3 Phase 3 Wire Balanced
256-TXH	3 Phase 4 Wire Balanced
256-TXJ	3 Phase 4 Wire Unblanced
256-TXK	Single Phase
256-TXM	3 Phase 3 Wire Unblanced
256-TXN	3 Phase 4 Wire Unblanced Star
256-TXP	3 Phase 4 Wire Unblanced



Reverse connected CTs



## INSTALLATION

Units should be installed in a dry position, not indirect sunlight and where the ambient temperature is reasonably stable and not be outside the range 0 to 60 degrees celsius. Mounting will normally be on a vertical surface but other positions will not affect operation. Vibration should be kept to a minimum. 256 units are designed for mounting on a 35mm rail to DIN 46277. Alternatively they may be screw fixed.

To mount on a DIN rail, the top edge of the cutout on the back is hooked over one edge of the rail and the bottom edge carrying the release clips clicked into place. Check that the unit is firmly fixed. Removal or repositioning may be achieved by levering down the release clips and lifting the unit up and off the rail.

Connection diagrams should be carefully followed to ensure correct polarity and phase rotation. External current and voltage transformers may be used to extend the range.

Current transformers must be used with models 256-TWG, 256-TWH and 256-TWN. Connection wires should be sized to comply to applicable regulations and codes of practice.

Side labels show full connection information and data including type No: input in WATTS or VARS, maximum voltage, frequency, auxiliary supply when required, class index and output.

## SETTING UP

Units are adjusted before despatch but should it be necessary to trim the transducer output this may be carried out by adjusting the potentiometers located under the bungs on the front panel. To trim the output it will be necessary to connect a 0.1% watt standard into the input and inject the full secondary current and voltage into the transducer. With all connections made, apply voltage and auxiliary supply if applicable and adjust the zero control to give the desired output. Apply current to bring WATT input up to the value to give the desired output. Adjust span control to give the desired output.

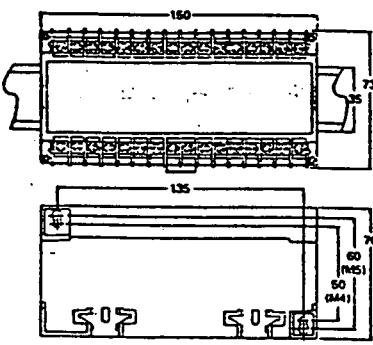
## TYPICAL APPLICATIONS

To match input signals for monitoring or recording power in a.c. circuits and transmitting a signal over long distances.

## OPERATION

The voltage and current are fed into a square wave oscillator and chopper circuit. The output from this consists of a pulse train, each pulse has a height proportional to the amplitude of the input current and a width proportional to the input voltage, representing instantaneous power. Integration of the pulses and filtering, produces a signal proportional to RMS power. This is further amplified to give a current output. VAR measurement is achieved by shifting either current or voltage input through 90 degrees. This is achieved either by an internal network or by external connections. A separate auxiliary is required when the transducer is to be operated at voltages below 80% of its rating.

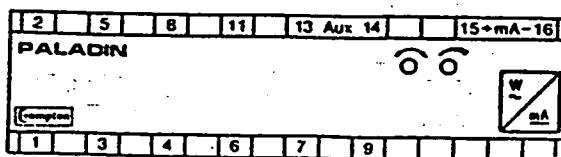
Model 256 Measurements in mm



Rear View showing panel mounting holes

## SPECIFICATION

GENERAL	0.5%
Accuracy Class	0.03%/1 Degree Celsius Change
Temp.coef	0.05%/1hz except Single Phase
Frequency Coeff	Var & 256-TWE which have a frequency range of +/- 1% of nominal input.
P.F. Range	WATT Cos Ø 0.1 lead to 0.1 lag
Stability	VAR Sin Ø 0.1 lead to 0.1 lag
Performance	+/- 0.25% per annum non cumulative
Housing	Designed to comply with B.S. 6253
Weight	Flame retardant plastic case. 2.4kg approximately.
CLIMATE	
Temperature Range	-20 to +70 degrees celsius storage. 0-60 degrees celsius operational. 23 degrees celsius calibrated. Upto 95% RH. Non-condensing
Humidity	
INPUT	
Frequency	50/60Hz
Current	Between 0/0.2A & 0/10A
Range	0/125%
Burden	1VA Maximum
Voltage	Between 50V & 480V
Range	+/-20% (0/120% with separate aux.) Burden 2VA max.
OUTPUT D.C.	
	0/1mA into 0/10k ohms 0/5mA into 0/2k ohms 0/10mA into 0/1k ohms 0/20mA into 0/500 ohms 4/20mA into 0/500 ohms
RESPONSE TIME	
Ripple	400mS for 1% to 99% of span.
Span Adjustment	0.5% Max span
Zero Adjustment	+/-10% Min +/-2% Min
AUXILIARY SUPPLY	
(When required)	Nominal 115V, 230V, 415V, 50/60Hz Range +/-20%. Burden 2VA Max
ELECTRICAL TESTS	
Dielectric Test	2kV RMS to B.S. 5458
Impulse Test	5kV transient as BEAMA 219 & B.S. 923
Surge Withstand	ANSI C37-90A
MAINTENANCE	
	No routine maintenance is required. Should repair be necessary it is recommended that the transducer be returned to the factory or to the nearest CROMPTON INSTRUMENTS SERVICE CENTRE.

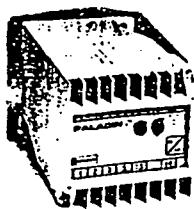


## WARNING

Voltages dangerous to human life may be present at some of the terminal connections of this unit. Ensure all supplies are de-energised before attempting any connection/disconnection.

If it is necessary to make adjustments with the power connected then exercise extreme caution.

Ensure that any protective cover provided is properly fitted after installation or adjustment of this unit. Our policy is one of continuous development and although the information is correct at the time of publication, we reserve the right to supply products differing in construction, dimensions or specification from those illustrated and described.



## INSTALLATION SHEET

### IW250TA/V PALADIN, CURRENT & VOLTAGE TRANSDUCERS



Edition 5 October 1992

#### Products Covered

Waveform	Current	Voltage	Aux Supply	Output
Sinusoidal		253-TVZ	No	All listed
Sinusoidal	253-TAA	253-TVA	No	Other than 4-20mA
Sinusoidal	253-TAL	253-TVL	Yes	4-20mA only
Non-sinus.	253-TAR	253-TVР	Yes	All listed

The 253-TVZ, TAA, TAL, TVA & TVL are average sensing & are calibrated on sinusoidal supplies. 253-TAR & TVR have an rms detector which will tolerate waveforms with up to 30% 3rd harmonic content.

#### Introduction

A range of current & voltage transducers capable of accepting a variety of ac voltage or current inputs and producing a dc current output directly proportional to the input.

#### Installation

Units should be installed in a dry position, not in direct sunlight and where the ambient temperature is reasonably stable and will not be outside the range 0 to 60 degrees celsius during operation. Mounting will normally be on a vertical surface but other positions will not affect operation. Vibration should be kept to a minimum. 253 case types are designed for mounting on a DIN rail to DIN 46277. Units may also be screw fixed. To mount a unit on a DIN rail, the top edge of the cutout on the back is hooked over one edge of the rail and the bottom edge carrying the release clip clicked into place. Check that the unit is firmly fixed. Removal or repositioning may be achieved by levering down the release clip and lifting the unit up and off the rail.

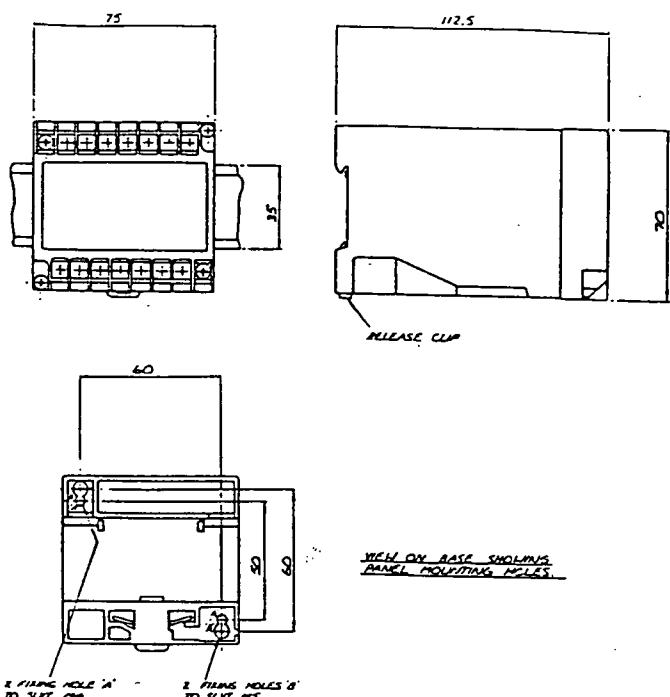
Connection wires should be sized to comply with applicable regulations or code of practice. Input cables must be routed away from high voltages & heavy current carrying cables. Note that dc auxiliary versions contain a square wave inverter & should not be located near any radio receiving equipment that may be susceptible to RFI.

Labels affixed to the unit show full connection information and data including, auxiliary supply, input, class index and output as applicable.

#### Setting Up

Units are adjusted before despatch and therefore no adjustments are normally required. However, a zero adjuster and span adjuster are located under cover bungs on the front panel, should trimming to local conditions be found necessary. (Not applicable to 253-TAA & TVA)

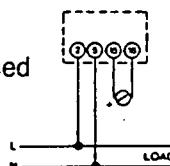
#### Dimensions



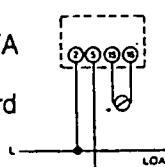
#### Connection Instructions

##### AC VOLTAGE TRANSDUCERS

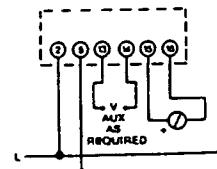
Type  
253-TVZ  
suppressed  
zero  
voltage



Type  
253-TVA  
voltage  
standard

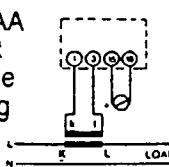


Types  
253-TVЛ  
line zero  
voltage  
253-TVР  
RMS  
voltage

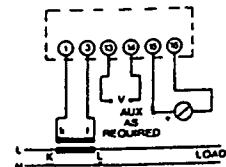


#### CURRENT TRANSDUCERS

Type  
253-TAA  
current  
average  
sensing



Types  
auxiliary  
power  
253-TAL  
current  
253-TAR  
RMS  
current



**SPECIFICATION** See sales brochure SW250T for complete details.**INPUT**

Voltage	63.5-480V Standard ranges 63.5, 110, 120, 220, 240, 380 & 415V
Current	0.2-10A direct or via CT secondary. Standard ranges 1A & 5A

**AUXILLIARY SUPPLY**

Voltage ac	63.5V, 110V, 220V, 240V, 380V, 415V $\pm 20\%$ 50/60Hz
Voltage dc	12V, 24V $\pm 15\%$ (other dc auxiliaries are available)
Burden	3VA, 3Wdc

**OUTPUT**

Span	0 to 1mA into 0 to 10 k $\Omega$ 0 to 20mA into 0 to 500 $\Omega$	0 to 5mA into 0 to 20k $\Omega$ 4 to 20mA into 0 to 500 $\Omega$	0 to 10mA into 0 to 1k $\Omega$
Ripple	<0.5% of rated output		
Zero adjustment	$\pm 2\%$ minimum not applicable to 253 TAA & TVA		
Span adjustment	$\pm 10\%$ minimum		
Accuracy class	0.5%		
Accuracy range	0 to 125% of span, except TVA & TAA		

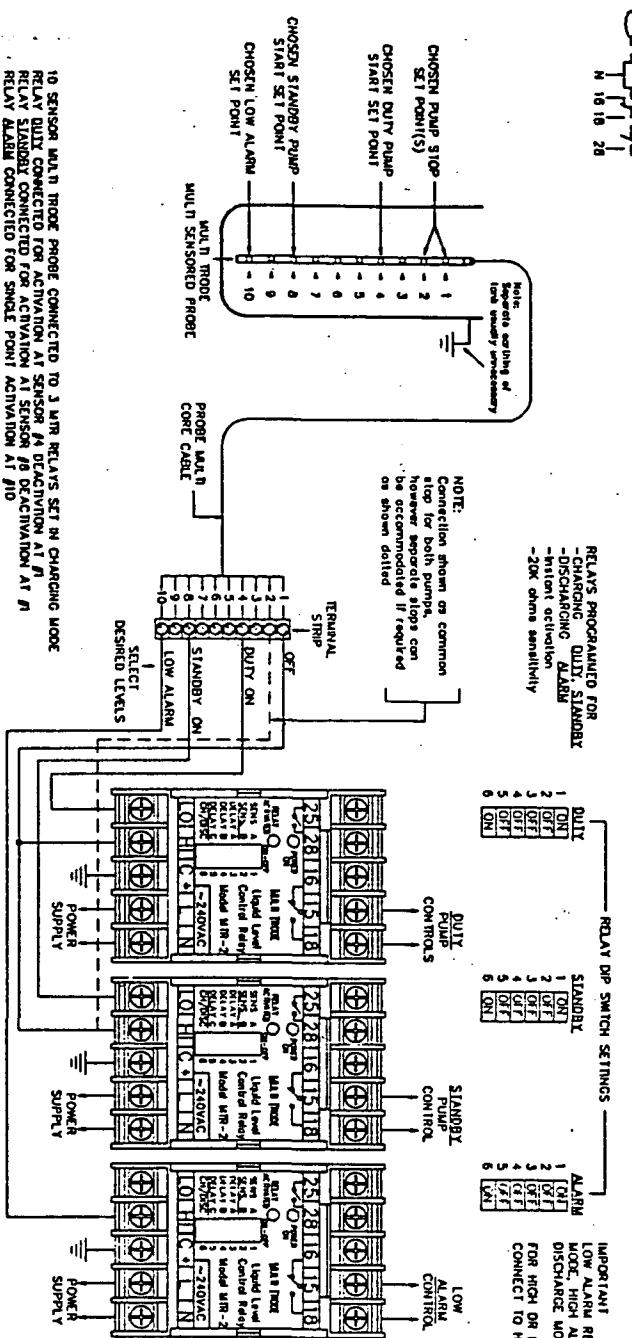
**GENERAL**

Safety requirements	BS5458, IEC 414
Temperature range	0 to +60°C operational, -20 to +70°C storage. Coefficient 0.03%/°C
Humidity	Upto 95% RH non condensing
Enclosure	Flame retardant plastic case. Code IP50 to BS5490, IEC529. Weight 0.4kg maximum
Performance	Designed to comply with BS 6253 & IEC688
Response Time	<400ms to 99% of rated output
Electrical	Electrical stress surge withstand & non maloperation to IEEE std 472, ANSI C37 90a, SEN 361503 isolation. Input/output. Dielectric test voltage 2kV rms to ANSI C37

**WARNING**

Voltages dangerous to human life may be present at some of the terminal connections of this unit. Ensure all supplies are de-energised before attempting any connection/disconnection. It is necessary to make adjustments with the power connected then exercise extreme caution. Ensure that any protective cover provided is properly fitted after installation or adjustment of this unit. Our policy is one of continuous development and although the information is correct at the time of publication, we reserve the right to supply products differing in construction, dimensions or specification from those illustrated and described.

## CONTROL OF THREE APPLIANCES IN A CHARGING SITUATION



**FIGURE - 4**

10 SENSOR MTR MODE PROBE CONNECTED TO 3 MTR RELAYS SET IN CHARGING MODE  
RELAY GND CONNECTED FOR ACTIVATION AT SENSOR #10  
RELAY LADDER CONNECTED FOR ACTIVATION AT SENSOR #9  
RELAY GND CONNECTED FOR DEACTIVATION AT SENSOR #10

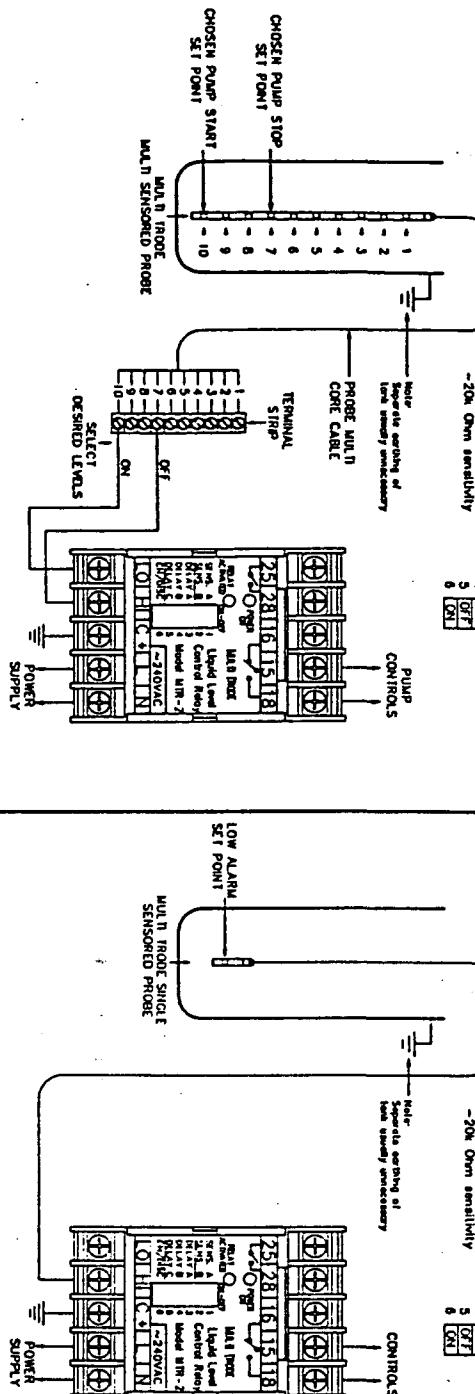
**WARNING:** Always separate probe cables from power wiring

### ON-OFF CONTROL IN A CHARGING SITUATION

RELAY DIP SWITCH SETTINGS	
1	ON
2	OFF
3	OFF
4	OFF
5	OFF
6	ON

**RELAYS PROGRAMMED FOR**

- Charging
- Instant activation
- 20K Ohm sensitivity

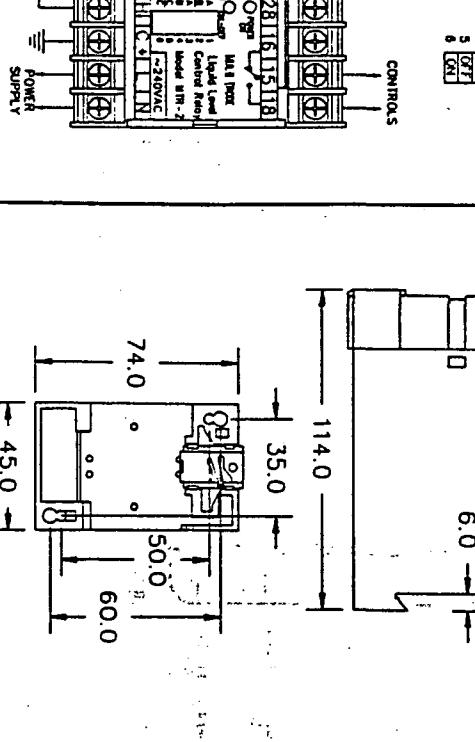


### SINGLE POINT OPERATION IN A CHARGING SITUATION

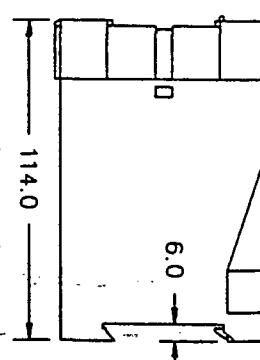
RELAY DIP SWITCH SETTINGS	
1	ON
2	OFF
3	OFF
4	OFF
5	OFF
6	ON

**RELAYS PROGRAMMED FOR**

- Charging
- Instant activation
- 20K Ohm sensitivity



### MTR DIMENSIONS IN mm.



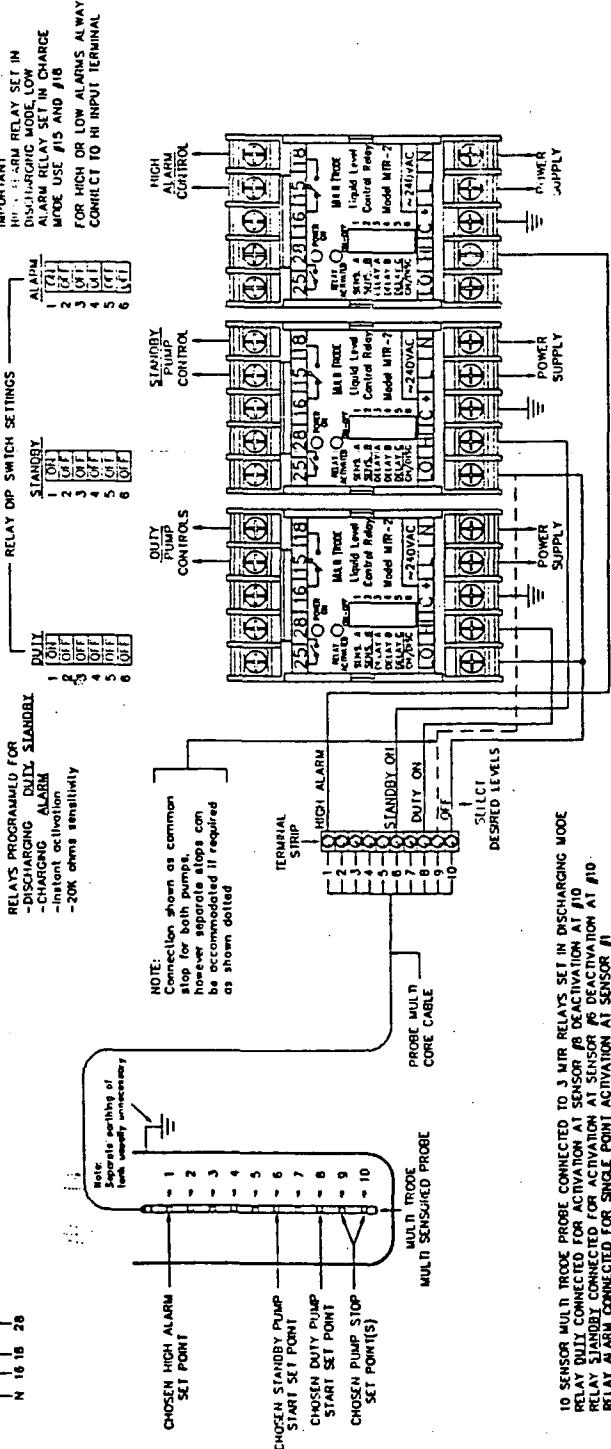
**FIGURE - 5**

**FIGURE - 6**

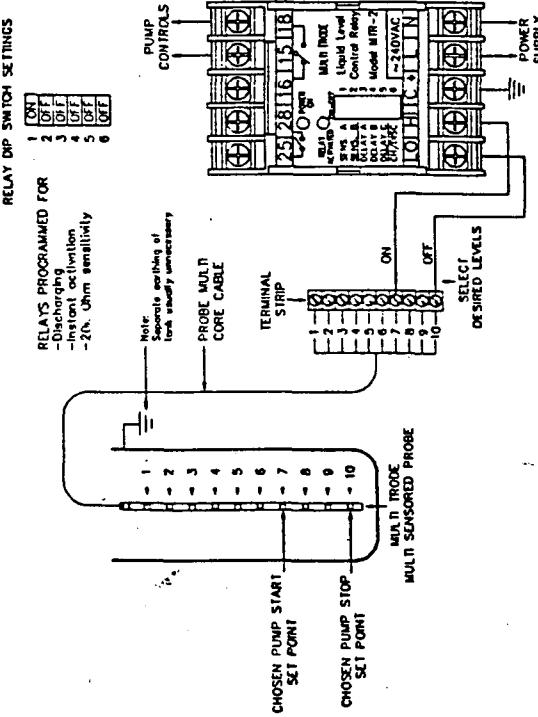
1	10	1	1	1
2	10	2	2	2
3	10	3	3	3
4	10	4	4	4
5	10	5	5	5
6	10	6	6	6

PHONE (07) 292-0011  
FAX (07) 292-0011  
TITLE MTR - WIRING DIAGRAMS  
DESIGNED BY SARTEK REV. 1 SCALE NO.  
CHECKED P. TOWELL DATE APRIL 93  
DRAWN BY S. SWARTZ DRAWING # AS-3863  
designed & manufactured by SARTEK PTY LTD. BRISBANE, AUSTRALIA

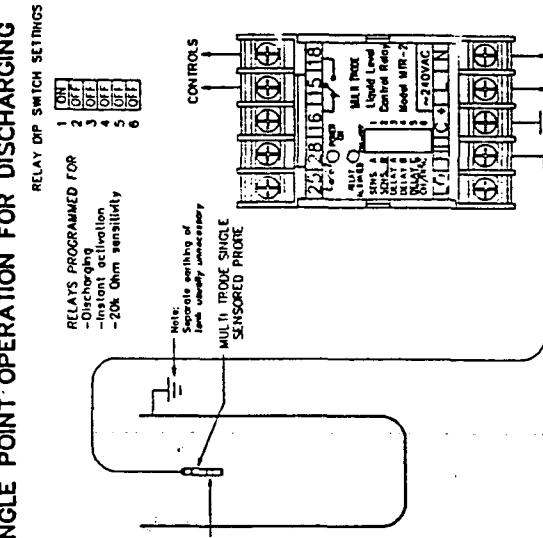
## CONTROL OF THREE APPLIANCES IN A DISCHARGING SITUATION



## ON-OFF CONTROL IN A DISCHARGING SITUATION



## SINGLE POINT OPERATION FOR DISCHARGING



## SPECIFICATIONS

SENSOR VOLTAGE	12V NOMINAL
NUMBER OF OUTPUTS	2 SETS, 1 NO & 1 CHANGE-OVER
CONTACT RATING	5 AMP 250VAC RESISTIVE
CONTACT LIFE	10 <sup>5</sup> OPERATIONS
SUPPLY VOLTAGE (+ -10%)	240, 110, 240VAC, 50/60Hz 24, 12VDC
POWER CONSUMPTION	3.4VA (MAX)
DIMENSIONS mm (inches)	H74(2.78) x W45(1.77) x D114(4.5)
TERMINAL SIZE mm (inches)	2 x 2.5mm <sup>2</sup> (0.6 <sup>2</sup> INCH)
DISPLAY LEDS	GREEN = POWER ON RED = ACTIVATION
MOUNTING ARRANGEMENT	DIN RAIL OR 2x4mm SCREWS (3/16")
SENSITIVITY (OMMS)	SELECTABLE VIA SWITCHES 1K, 4K, 20K, 80K
NOTE	SELECTABLE VIA SWITCHES CHARGE/DISCHARGE
DELAYS (SECS)	SELECTABLE VIA SWITCHES 2.5, 5, 10, 20, 40, 80, 160
WORKING TEMPERATURE C(F)	MINUS 10° C (+14° F) PLUS 60° C (140° F)

10 SENSOR MULTI MODE PROBE CONNECTED 10 SINGLE  
MTR RELAY SET IN DISCHARGE MODE  
RELAY CONNECTED FOR ACTIVATION AT SENSOR #7  
DEACTIVATED AT SENSOR #10

1 SINGLE SENSOR PROBE CONNECTED TO  
SINGLE MTR RELAY SET IN DISCHARGING MODE  
ACTIVATION AND DEACTIVATION AT SAME POINT

MULTI TRODE

PHONE (07) 842-4011  
FAX (07) 842-4011

DESIGNED BY [Signature]  
CHECKED BY [Signature]

REV [Signature]  
DATE APRIL 93

PRINTED BY [Signature]  
INQUIRIES: # 8563

**sprecher + schuh**

The Ultimate in  
Motor Control

Represented in Australia by

**NHP**

**Electrical Engineering  
Products Pty Ltd** A.C.N. 004 304 812

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Phone: (03) 429 2999. Fax: (03) 429 1075

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**Phone: (02) 748 3444. Fax: (02) 648 4353**

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39 Commercial Road,  
Fortitude Valley QLD, 4006  
**Phone:** (07) 252 9517, **Fax:** (07) 252 3415

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50 Croydon Road, Keswick S.A. 5035  
**Phone: (08) 297 9055, Fax: (08) 371 0962**

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57 Crescent Road, Waratah N.S.W. 2298  
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**Rockhampton**  
208 Denison Street,  
Rockhampton QLD 4700  
**Phone: (079) 27 2277, Fax: (079) 22 2947**

**Townsville**  
62 Leyland Street,  
Garbutt QLD. 4814  
Phone: (077) 79 0700, Fax: (077) 75 1457

**Toowoomba**  
Cnr Carroll St. & Struan Cr.,  
Toowoomba, QLD. 4350  
**Phone: (076) 34 4799, Fax: (076) 33 1796**

**Perth**  
Trading as C.J. Young & Co  
38 - 42 Railway Parade,  
Bayswater W.A. 6053  
**Phone: (09) 271 8666, Fax: (09) 272 3906**

## Agents

**Hobart**  
H.M. Barnford (Hobart)  
199 Harrington Street, Hobart TAS. 7000  
Phone: (002) 34 9299, Fax: (002) 31 1693

**Launceston**  
H.M. Bamford (Launceston)  
59 Garfield Street, Launceston TAS. 7250  
Phone: (003) 44 8811, Fax: (003) 44 4069

**Darwin**  
J. Blackwood & Son Ltd  
(Inc. Tesco Pearce)  
Mataram Street, Winnellie N.T. 0820  
Phone: (089) 84 4255, Fax: (089) 84 3945

DT3-F/2.92/18M



- Pushbutton and signal lamp modules DT 3, Ø 22.5mm

The new line

# What gives your equipment and control systems that final touch?

## The new DT 3 line from Sprecher + Schuh

### Rotary switch

- Lever or toggle handle
- Illuminated or non illuminated
- Round or square front elements
- 5 selectable switching position sequences
- Front ring available in grey, black or metallic



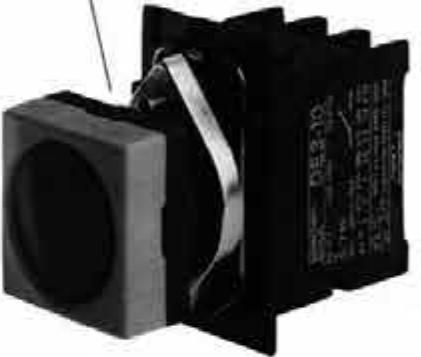
### Rotary switch with lock

- Different lock variations available on request
- 5 selectable switching position sequences
- Front ring available in grey or black



### Pushbutton, illuminated

- Colours: green, red, yellow, blue and white
- Impulse or latching operation
- Round or square front elements
- Front ring available in grey, black or metallic



### Indicator lamp, round

- Colours: green, red, yellow, blue and white
- Engraving available



### Indicator lamp, square

- Colours: green, red, yellow, blue and white
- Engraving available



### Potentiometer operating knob

- Scale incrementation 0...10, 300°
- Accommodates standard shaft size



### Pushbuttons

- Colours: green, red, yellow, blue, white and black
- Button flush or raised
- Impulse or latched operation
- Also available with mushroom head ø 42mm or ø 68mm
- Round or square front elements
- Front ring available in grey, black or metallic



### Emergency STOP button

- With or without key for unlocking
- Three sizes available
- Resetting by turning
- Enclosed control stations available



### Stand alone operation

A range of 1, 2, 3 and 5 way aluminium or plastic enclosures are available, for stand alone operation.



### Pushbuttons

DT 3 pushbuttons and signal lamps are fast and uncomplicated to install. Only one person is needed, even if the front panel is so large that the installer cannot reach behind.



### Modular flexibility

All elements at the rear have the same dimensions and can be arbitrarily interchanged or supplemented. Mounting of a second level is possible. (Maximum of 6 permissible).



### Reliable contacts

All contacts are H-shaped and are therefore electronic/PLC compatible. They are self cleaning on every switching cycle, thereby achieving high contact reliability.



### Robust by design

DT 3 emergency stop buttons provide users with the reliability and flexibility they specify. Available in 30, 40, and 50mm sizes (with key lock also), their robust design and ease of operation will satisfy any specification.

Detailed information on the DT 3 range, is provided in catalogue 1803. Refer your nearest NHP office.

# Sprecher + Schuh DT 3 Control Devices 22.5mm



Pushbutton – round grey front ring, large legend carrier



Pushbutton – square black front ring, small legend carrier



Illuminated pushbutton – round metal front ring, large legend carrier



Pushbutton – round extended metal front ring, small legend carrier



Illuminated pushbutton – round sealed front ring, large legend carrier



Raised pushbutton – round grey front ring, small legend carrier



Pushbutton – mushroom operator, round grey front ring, large legend carrier



Indicator lamp (round) – small legend carrier



Indicator lamp (square) – small legend carrier



Rotary switch – round grey front ring, short operator, small legend carrier



Rotary switch – round metal front ring, long operator, large legend carrier



Rotary switch – square black front ring, short operator, large legend carrier



Rotary key switch – round grey front ring, large legend carrier



30mm Emergency stop pushbutton – large legend carrier



50mm Emergency stop pushbutton – large legend carrier



40mm Emergency stop key lockable pushbutton – large legend carrier



Potentiometer dial – large legend carrier



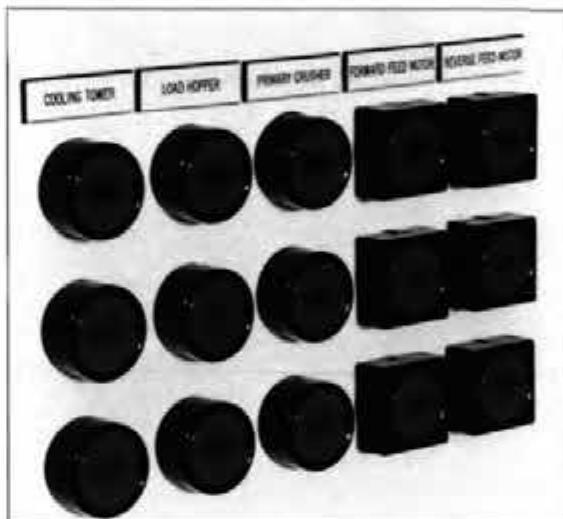
Indicator lamp (square) – large legend carrier

# Customise the appearance and presentation of your DT 3 Control Devices



Combination of pushbuttons, indicating lights, and illuminated pushbuttons. The interchangeable front rings are available in round or square & grey or black.

Both round & square formats in black can be used together for an attractive presentation or to identify their function.

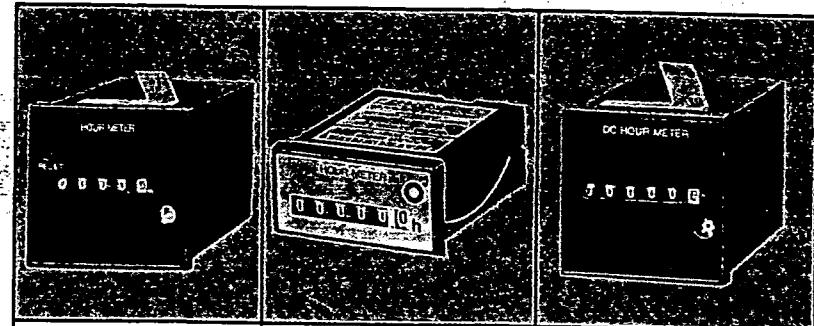


Large & small legend carriers add to this extensive range which provides an almost endless selection of combinations and accessories to customise your requirements.



Or simply design your control panels using a standardised format in black.

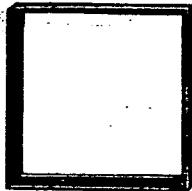
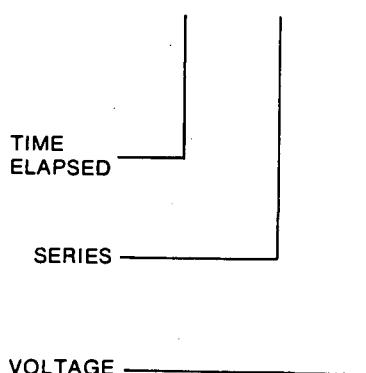


**TIME ELAPSED METERS****I&H**

Minute indicating Meter	Hour Meter without reset	DC Hour Meter
<b>TH50</b>	<b>TH63</b>	<b>TH70</b>
0-9999.9 Min	0-99999.9 Hrs	0-99999.9 Hrs

Refer Ordering Details opposite

Addition Type	Addition Type	Addition Type
Synchronised with supply frequency	Synchronised with supply frequency	Quartz oscillation
0.1 Min (6 sec)	0.1 Hour (6 min)	0.1 Hour (6 min)
Pushbutton	—	—
—	—	—
—	—	—
—	—	—
1.5W	1.5W	1.5W
50/60 Hz Common	50/60 Hz Common	
Flush mounting with bracket (45 x 45mm)	Flush mounting with spring	Flush mounting with bracket (45 x 45mm)
187QC	187QC	UL approved lead wire

**ACCESSORIES****TIME ELAPSED METERS****Mounting Frame**TH140-0020  
(For TH14, 24, 40, 50, 70)**ORDERING DETAILS****SERIES      VOLTAGES**

14	3	12V
24	4	24V
30	7	115-120V
40	9	240V
50		
63		
*70		

\*TH70 Available in 12V or 24V DC only.



# XA2-B double insulated control and signalling units



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# The strong points of the XA2-B range of double insulated control and

YOU WISH TO ENHANCE  
THE APPEARANCE OF  
YOUR INSTALLATIONS ?



The XA2-B range is aesthetically pleasing and enhances the Man-Machine dialogue panel.

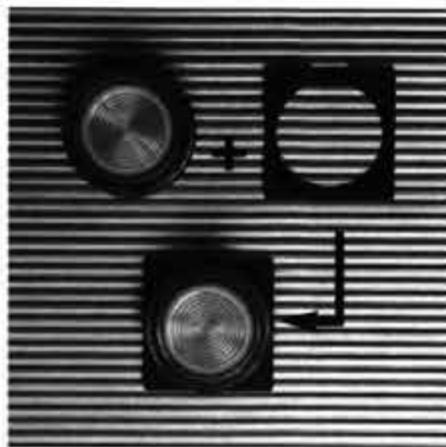
YOU HAVE  
A VARIETY OF NEEDS ?



The XA2-B range includes :

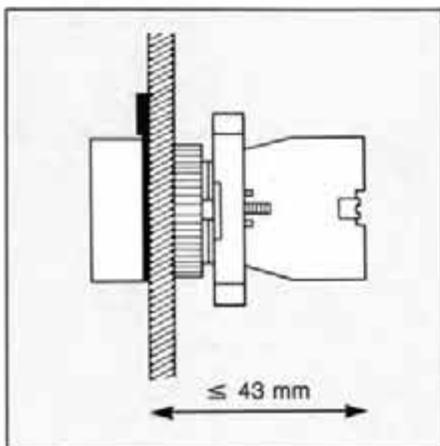
- Illuminated selector switches,
- Joystick controllers,
- Mushroom head emergency stop buttons Ø 30, 40, 60 mm,
- Square heads
- Double-headed units,
- Coloured legends...

YOU REQUIRE  
FLEXIBLE PRODUCTS ?



The addition of an optional square bezel designed to fit all the XA2-B range of heads, doubles the presentation possibilities.

YOU HAVE  
SPACE PROBLEMS ?

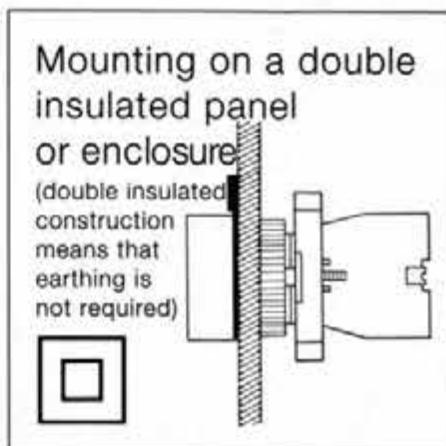


The compact size and shallow depth of the XA2-B range reduces the surface area and volume needed for Man-Machine dialogue.

YOUR PRODUCTS  
MUST BE  
TAMPERPROOF ?

The operating heads cannot be removed from the front.

YOU MUST HAVE  
COMPLETE PROTECTION  
AGAINST ELECTRIC  
SHOCK ?



Mounting on a double insulated panel or enclosure

(double insulated construction means that earthing is not required)



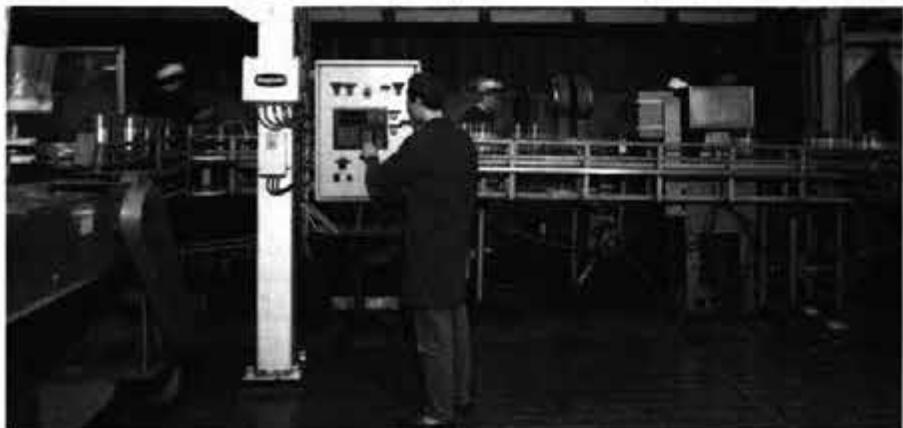
# signalling units

THESE PRODUCTS  
ARE SUITABLE  
FOR SPECIAL  
APPLICATIONS  
AND RESIST  
HARSH ENVIRONMENTS



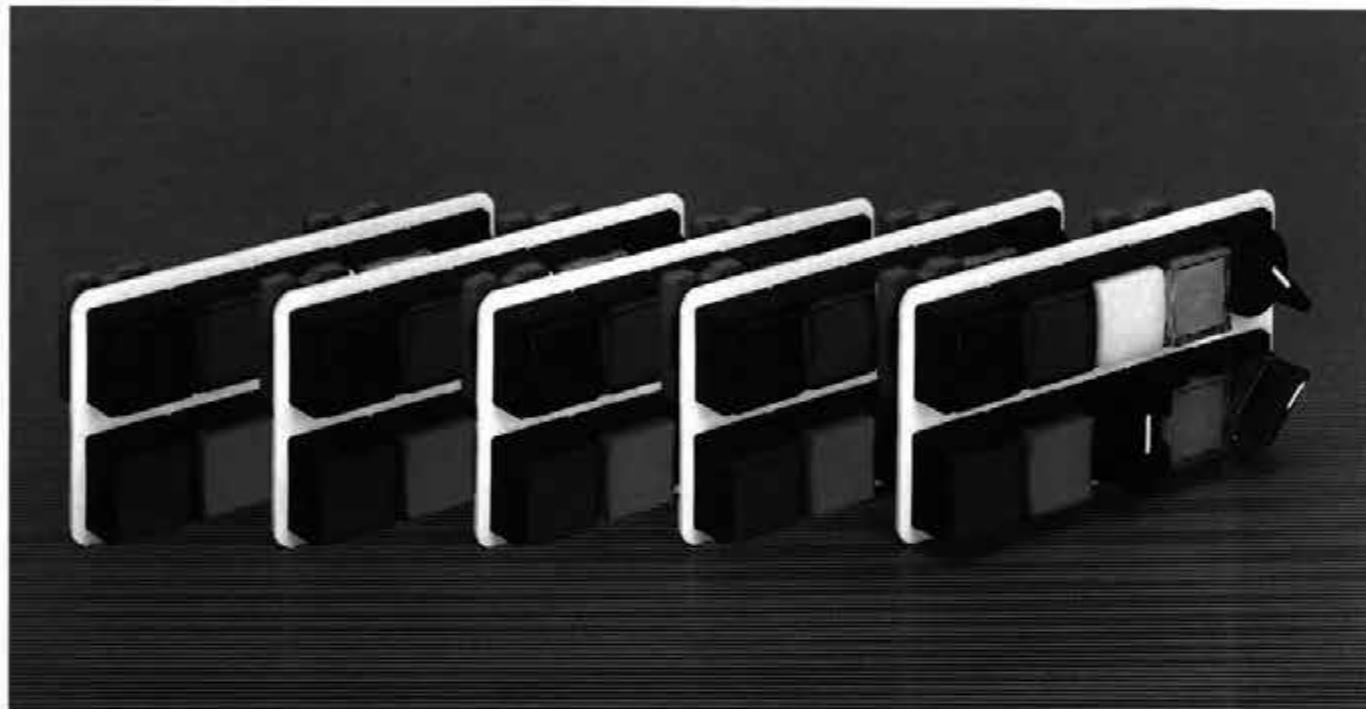
Typical application sectors :

- Chemicals
- Food industry
- Surface treatment
- Painting



# XA2-B double insulated control and signaling units for printed circuit board connection

YOU CONSTRUCT OPERATOR DIALOGUE PANELS IN LARGE QUANTITIES  
WITH AN IDENTICAL CIRCUIT ARRANGEMENT

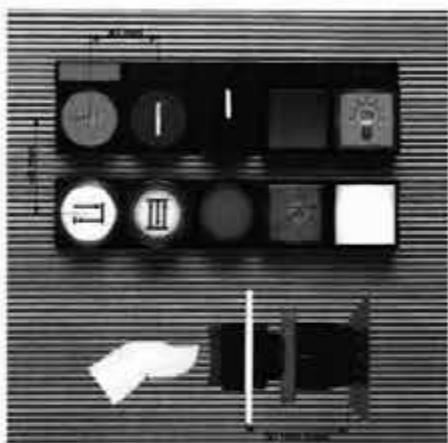


THE XA2-B RANGE CONNECTS DIRECTLY TO PRINTED CIRCUITS



## THE PRINTED CIRCUIT VERSION OFFERS YOU :

- Excellent ergonomics with compact size

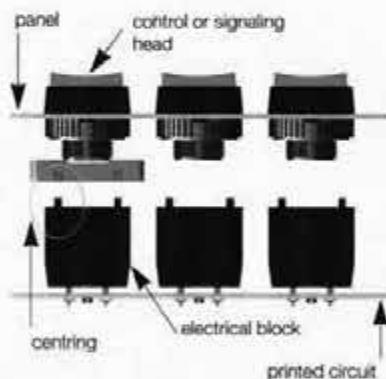


- Savings in time and cost

In mounting  
and wiring



In centring and assembly  
of components



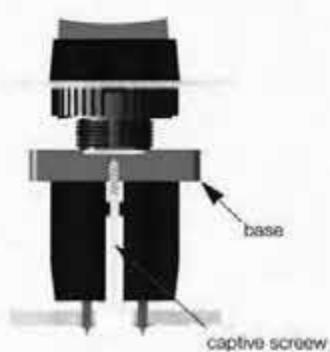
- A high degree of safety

No more cable markers  
or wiring errors



No screwed or soldered spacers  
between support and printed circuit

Safe fixing of the complete unit  
Easy disassembly



Uses the heads from the standard  
XA2-B range ;  
reduction of stock

The mechanical strength of the fixing  
between the control  
and signalling heads  
and the electrical blocks is provided  
by a **screw which becomes captive  
after assembly**,  
joining the electrical blocks  
to a sub-base fixed to the head.

# The XA2-B range

Control units



Signalling units  
and  
digital  
displays

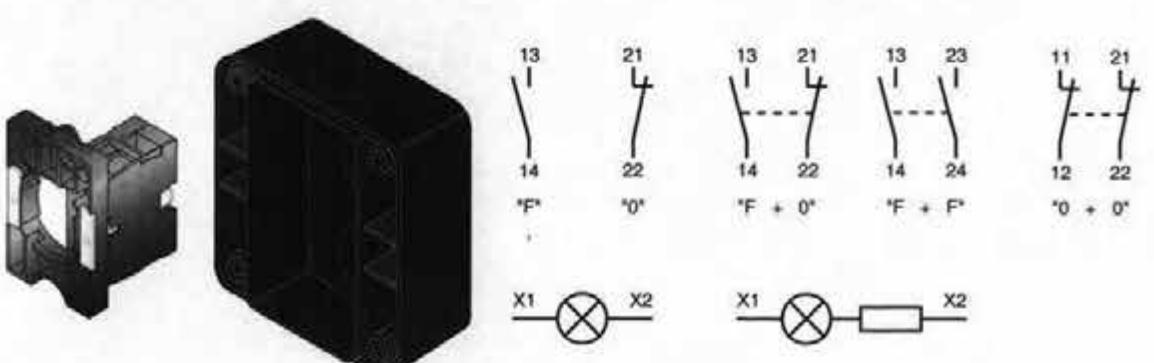
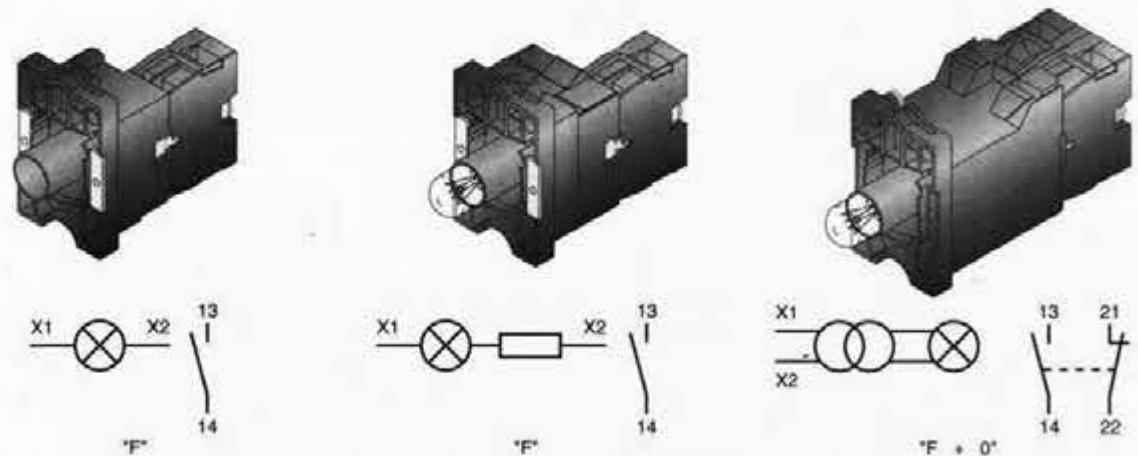
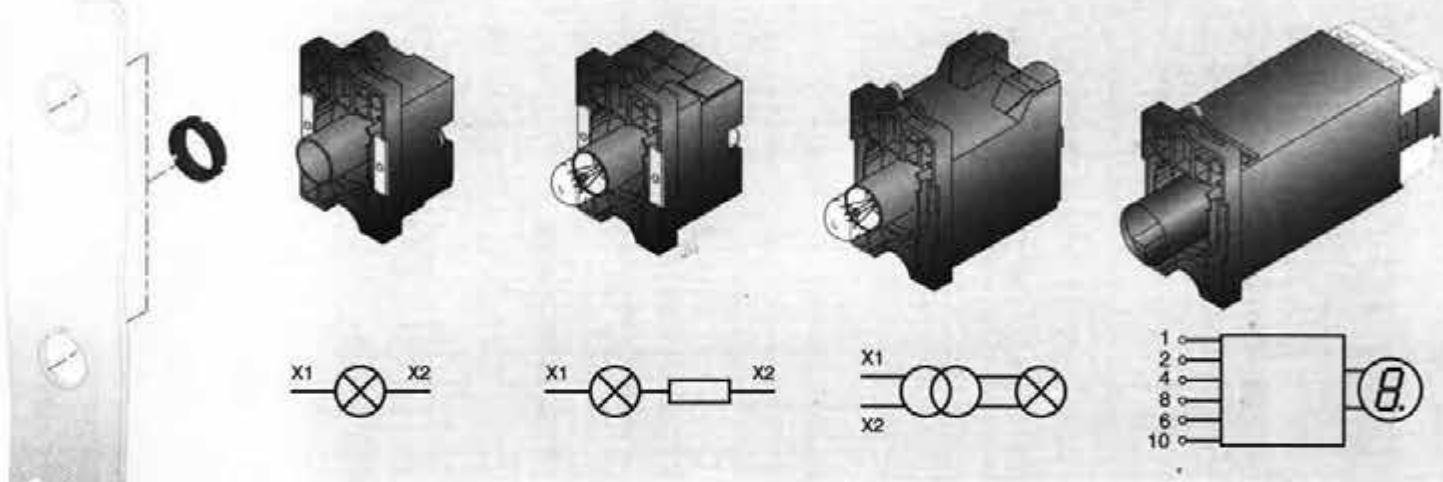
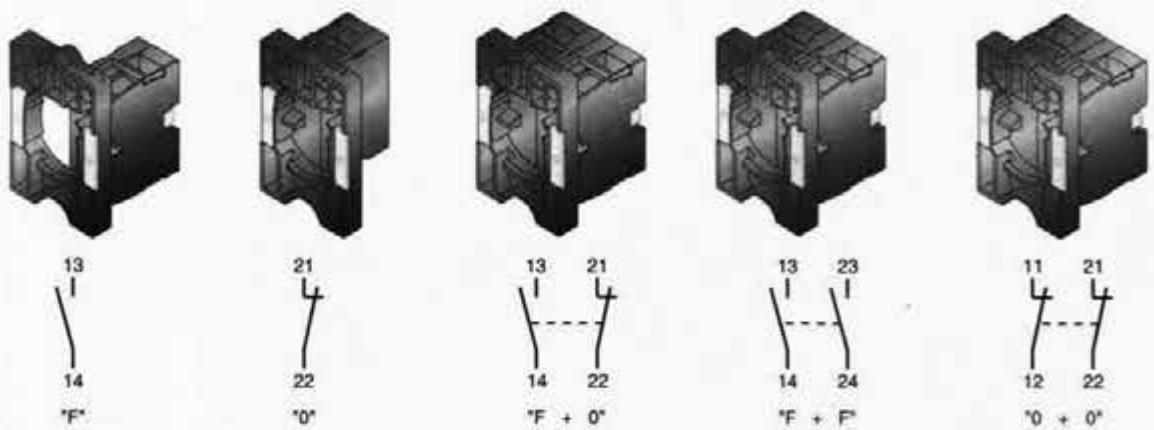


Control  
and  
signalling units



Control stations





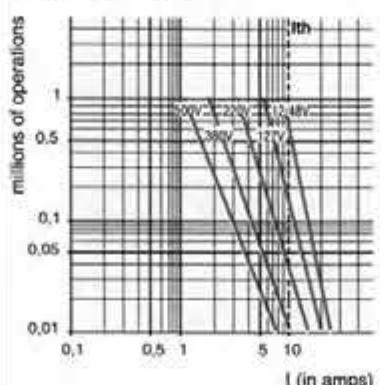
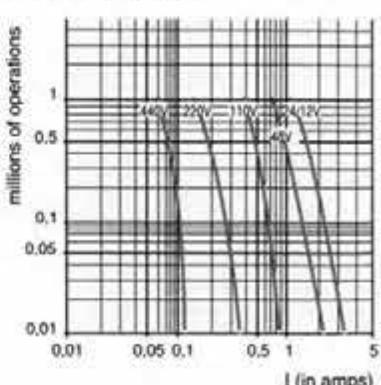
## XA2-B

## General characteristics

## Environment

<b>Conformity to standards</b>	IEC-947-5-1, NF C 63-140, ASE 0119, ASE 1003, BS 4794, VDE 0660 part 200, UL 508, CSA C 22-2 n° 14.
<b>Approvals</b>	Standard version : CSA, UL (Listed) : pushbuttons and selector switches : A 600-Q 600 ; direct led pilot lights and illuminated pushbuttons (120 V max) transformer pilot lights and illuminated pushbuttons (600 V) ASE, DEMKO, NEMKO, SEMKO, F.I.
<b>Protective treatment</b>	"TC" (all climates).
<b>Ambient temperature</b>	For storage : from -40 to +70°C. For operation : from -25 to +70°C.
<b>Operating position</b>	All positions.
<b>Resistance to vibration</b>	Ø 60 mm mushroom head : 4 g. Other pushbuttons : 10 g. Joystick controllers : 5 g. Transformer operated pilot lights : 4 g. (40 Hz < frequency < 500 Hz) conforming to IEC 68-2-6.
<b>Resistance to shock</b>	Pushbuttons : 70 g. Mushroom head pushbuttons : 15 g. Selector switches : 120 g. Conforming to IEC 68-2-27.
<b>Electric shock protection</b>	Class II, conforming to IEC 536 and NF C 20-030
<b>Degree of protection conforming to IEC 529 and NF C 20-010</b>	IP 65.
<b>Mechanical life</b>	1 million operations (except, latching mushroom head pushbuttons : 300 000 operations, illuminated selector switches : 100 000 operations).

## Contact block characteristics

<b>Rated insulation voltage</b>	600 V conforming to UL 508 and CSA C 22-2 n° 14, 500 V conforming to NF C 20-040, VDE 0110		
<b>Insulation category</b>	Group C conforming to NF C 20-040 and VDE 0110.		
<b>Contact operation</b>	Slow break (N/C contact with positive opening operation).		
<b>Operating force</b>	Flush and projecting pushbuttons - with 1 N/O contact : 1 daN - with 1 N/C contact : 0,8 daN. For each supplementary contact - N/O : + 0,5 daN - N/C : + 0,3 daN.		
<b>Terminal marking</b>	Conforming to CENELEC EN 50013		
<b>Short-circuit protection</b>	10 A cartridge fuse gF		
<b>Rated power conforming to IEC 947-5-14</b>	<ul style="list-style-type: none"> <li>- Duty category : A600 - Q600</li> <li>- A.C. supply ~ (ac) 50-60 Hz</li> <li>AC 15</li> <li>Inductive circuit</li> </ul> 		
	<ul style="list-style-type: none"> <li>D.C. supply --- (dc)</li> <li>DC 13</li> <li>Inductive circuit</li> </ul> 		
<b>Cabling</b>	<ul style="list-style-type: none"> <li>- Screw and captive cable clamp terminals, capacity : - min. 1 x 0,5 mm²</li> <li>Units supplied ready-to-wire (clamps open) - max. 2 x 2,5 mm² with cable end.</li> <li>- Connection by 6,35 mm clips also available, details on request.</li> </ul>		

# Control units

XA2-B

Complete units (circular head, black plastic bezel)



XA2-BA21



XA2-BL42



XA2-BC42



XA2-BL4322



XA2-BT42



XA2-BS542



XA2-BS9445



XA2-BD33



XA2-BG33

## Spring return pushbuttons

Description	Contact	Diagram	Colour	Reference	Weight Kg
Flush	N/O		Black Green	XA2-BA21	0,070
	N/C		Red	XA2-BA31	0,070
Projecting	N/C		Red	XA2-BL42	0,070
Mushroom head Ø 40 mm	N/C		Red	XA2-BC42	0,090

## Spring return pushbuttons with function legend marked into plunger by double-injection moulding

Description	Contact	Diagram	Colour	Reference	Weight Kg
Flush	N/O		Green	I XA2-BA3311	0,070
Projecting	N/C		Red	O XA2-BL4322	0,070

## "Emergency stop" latching mushroom head pushbuttons

Description	Contact	Diagram	Reference	Weight Kg	
"Push-Pull" Red	N/C		Ø 40	XA2-BT42	0,070
Turn to release Red	N/C		Ø 40	XA2-BS542	0,070
Release by Ronis key N° 455 N/C Red	N/C		Ø 40	XA2-BS142	0,090

## "Emergency stop" latching mushroom head pushbuttons - trigger action

Release by Ronis key N° 455 N/C + N/O Red		Ø 40	XA2-BS9445	0,105
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## Selector switches

Description	Contact	Diagram	Operator	Reference	Weight Kg
2 positions stayput	N/O		Long handle	XA2-BD21	0,085
3 positions stayput	N/O + N/O		Long handle	XA2-BD33	0,100

## Key operated selector switches (Ronis key N° 455)

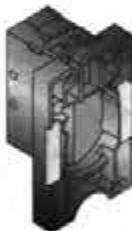
Description	Contact	Diagram	Key withdrawal	Reference	Weight Kg
2 positions stayput	N/O		left hand position	XA2-BG21	0,110
3 positions stayput	N/O + N/O		centre position	XA2-BG33	0,125

Positions O, I, II, correspond to the front view of the control unit.

## XA2-B

## Control units

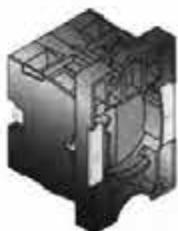
## Body/contact block assemblies



ZA2-BZ101

## Complete bodies (pre-assembled contact blocks and mounting collar)

Description	Utilisation	Diagram	Reference	Weight Kg
With 1 contact block	For push-buttons and 2 position selector switches	N/O 13 14	<u>ZA2-BZ101</u>	0,020
		N/C 21 22	<u>ZA2-BZ102</u>	0,020
With 2 contact blocks	For push-buttons and 2 or 3 position selector switches	N/O+N/O 13 23 14 24	<u>ZA2-BZ103</u>	0,030
		N/C+N/C 11 21 12 22	<u>ZA2-BZ104</u>	0,030
		N/C+N/O 21 13 22 14	<u>ZA2-BZ105</u>	0,030



ZA2-BZ103

## Additional contact blocks

Utilisation	Diagram	Reference	Weight Kg
For converting body/contact assemblies to 3 or 4 contacts maximum or replacing 1st or 2nd contact block	N/O .3 .4	<u>ZB2-BE101</u>	0,010
	N/C .1 .2	<u>ZB2-BE102</u>	0,010



ZB2-BE101



ZB2-BZ21

## Intermediary "Push/Push to release" mechanism

For pushbuttons and illuminated pushbutton (except mushroom head units) To be fitted between the mounting collar and the electrical block	<u>ZB2-BZ21</u>	0,008

# Control units

XA2-B

## Pushbutton operators (heads with black plastic bezel)



ZA2-BA5



ZA2-BA31



ZA2-BA434



ZA2-BB2



ZA2-CA2

### Operating heads for spring return pushbuttons

Description	Colour	Reference	Weight kg
Flush round	Blank	ZA2-BA2	0,015
	Black	ZA2-BA2	0,015
	Green	ZA2-BA3	0,015
	Red	ZA2-BA4	0,015
	Yellow	ZA2-BA5	0,015
	Blue	ZA2-BA6	0,015
With legend (marked by double-injection moulding)	I	ZA2-BA31	0,015
	II	ZA2-BA36	0,015
	III	ZA2-BA37	0,015
	IV	ZA2-BA38	0,015
	(L)	ZA2-BA345	0,015
	START	ZA2-BA33	0,015
	ON	ZA2-BA341	0,015
	MARCHE	ZA2-BA342	0,015
	O	ZA2-BA432	0,015
	ARRET	ZA2-BA433	0,015
	STOP	ZA2-BA434	0,015
	OFF	ZA2-BA435	0,015
	(↑ ↓)	ZA2-BA34	0,015
	(↑ ↓)	ZA2-BA35	0,015
	(← →)	ZA2-BA32	0,015
	(← →)	ZA2-BA39	0,015
	(● ●) "hare"	ZA2-BA346	0,015
With transparent push for use with ZB2-BY1*** legend (see page 29)	Green	ZA2-BA38	0,015
	Red	ZA2-BA48	0,015
	Yellow	ZA2-BA58	0,015
	Blue	ZA2-BA68	0,015
	Clear	ZA2-BA78	0,015
Wobblestick operating in all directions	Black	ZA2-BB2	0,060
	Red	ZA2-BB4	0,060
Flush square	Blank	ZA2-CA2	0,015
	Black	ZA2-CA2	0,015
	Green	ZA2-CA3	0,015
	Red	ZA2-CA4	0,015
	Yellow	ZA2-CA5	0,015
	Blue	ZA2-CA6	0,015

## XA2-B

## Control units

## Pushbutton operators (heads with black plastic bezel)



ZA2-BL4

## Operating heads for spring return pushbuttons

Description		Colour	Reference	Weight Kg
<b>Round projecting</b>	Blank	Black	<b>ZA2-BL2</b>	0,015
		Green	<b>ZA2-BL3</b>	0,015
		Red	<b>ZA2-BL4</b>	0,015
		Yellow	<b>ZA2-BL5</b>	0,015
		Blue	<b>ZA2-BL6</b>	0,015
	With legend (marked by double-injection moulding)	O	Red <b>ZA2-BL432</b>	0,015
		ARRET	Red <b>ZA2-BL433</b>	0,015
		STOP	Red <b>ZA2-BL434</b>	0,015
		OFF	Red <b>ZA2-BL435</b>	0,015
<b>Round booted</b> (with silicone boot)	Flush	Black	<b>ZA2-BP2</b>	0,015
		Green	<b>ZA2-BP3</b>	0,015
		Red	<b>ZA2-BP4</b>	0,015
		Yellow	<b>ZA2-BP5</b>	0,015
		Blue	<b>ZA2-BP6</b>	0,015
<b>Round booted</b>	Recessed	Black	<b>ZA2-BA29</b>	0,015
		Green	<b>ZA2-BA39</b>	0,015
		Red	<b>ZA2-BA49</b>	0,015
<b>Round</b> <b>with full guard</b>	Flush	Black	<b>ZA2-BA24</b>	0,015
		Green	<b>ZA2-BA34</b>	0,015
		Red	<b>ZA2-BA44</b>	0,015
		Yellow	<b>ZA2-BA54</b>	0,015
		Blue	<b>ZA2-BA64</b>	0,015
	With legend (marked by double- injection moulding)	.. "Tortoise"	Black <b>ZA2-BA2447</b>	0,015
<b>Round</b> <b>with half guard</b>	Flush	Black	<b>ZA2-BA22</b>	0,015
		Green	<b>ZA2-BA32</b>	0,015
		Red	<b>ZA2-BA42</b>	0,015
		Yellow	<b>ZA2-BA52</b>	0,015
		Blue	<b>ZA2-BA62</b>	0,015
<b>Square projecting</b>	Blank	Black	<b>ZA2-CL2</b>	0,015
		Green	<b>ZA2-CL3</b>	0,015
		Red	<b>ZA2-CL4</b>	0,015
		Yellow	<b>ZA2-CL5</b>	0,015
		Blue	<b>ZA2-CL6</b>	0,015



ZA2-BA24



ZA2-BA32



ZA2-CL5

# Control units

XA2-B

Pushbutton operators (heads with black plastic bezel)



ZA2-BC34



ZA2-BC34



ZA2-BR2



ZA2-BT4



ZA2-BS44



ZA2-BS74



ZA2-BS14



ZA2-BS934



ZA2-BS944

## Operators for mushroom head pushbuttons

Description	Colour	Reference	Weight Kg
Spring return	Ø 30 mm	Black <b>ZA2-BC24</b>	0,020
	Green	<b>ZA2-BC34</b>	0,020
	Red	<b>ZA2-BC44</b>	0,020
	Yellow	<b>ZA2-BC54</b>	0,020
	Blue	<b>ZA2-BC64</b>	0,020
Ø 40 mm	Black	<b>ZA2-BC2</b>	0,030
	Green	<b>ZA2-BC3</b>	0,030
	Red	<b>ZA2-BC4</b>	0,030
	Yellow	<b>ZA2-BC5</b>	0,030
	Blue	<b>ZA2-BC6</b>	0,030
Ø 60 mm	Black	<b>ZA2-BR2</b>	0,040
	Red	<b>ZA2-BR4</b>	0,040
	Black	<b>ZA2-BT2</b>	0,050
	Red	<b>ZA2-BT4</b>	0,050
	Black	<b>ZA2-BX2</b>	0,060
Ø 60 mm	Red	<b>ZA2-BX4</b>	0,060
	Red	<b>ZA2-BS44</b>	0,040
	Red	<b>ZA2-BS54</b>	0,050
	Red	<b>ZA2-BS64</b>	0,060
	Red	<b>ZA2-BS834</b>	0,040
Standard	Ø 30 mm	Red <b>ZA2-BS74</b>	0,060
	Ø 40 mm	Red <b>ZA2-BS14</b>	0,070
	Ø 60 mm	Red <b>ZA2-BS24</b>	0,080
	Ø 30 mm	Red <b>ZA2-BS934</b>	0,060
	Ø 40 mm	Red <b>ZA2-BS944</b>	0,070
Trigger action	Ø 30 mm	Red <b>ZA2-BS844</b>	0,050
	Ø 40 mm	Red <b>ZA2-BS844</b>	0,050
Standard	Ø 30 mm	Red <b>ZA2-BS74</b>	0,060
	Ø 40 mm	Red <b>ZA2-BS14</b>	0,070
	Ø 60 mm	Red <b>ZA2-BS24</b>	0,080
	Ø 30 mm	Red <b>ZA2-BS934</b>	0,060
	Ø 40 mm	Red <b>ZA2-BS944</b>	0,070
Other versions :		<ul style="list-style-type: none"> <li>- Spring return and push-pull mushroom head pushbuttons with elastomer bellows for increased dust and damp protection.</li> <li>- Mushroom head pushbuttons, key release with other Ronis key number. Please consult our local sales office.</li> </ul>	

## XA2-B

## Control units

Pushbutton operators (heads with black plastic bezel)



ZA2-BA8134



ZA2-BA8234



ZA2-BL8334



ZA2-BL9434



ZB2-BA008

## Operators for spring return double headed pushbuttons

Description	Colour	Marking	Reference	Weight Kg
<b>2 flush</b> Degree of protection IP 40	Green Red	Blank	<b>ZA2-BA8134</b>	0,030
<b>2 flush</b> Degree of protection IP 40	Green Red	I O	<b>ZA2-BA8234</b>	0,030
<b>2 flush</b> Degree of protection IP 65	Green Red	Blank	<b>ZA2-BA9134</b>	0,030
<b>2 flush</b> Degree of protection IP 65	Green Red	I O	<b>ZA2-BA9234</b>	0,030
<b>1 flush</b> <b>1 projecting</b> Degree of protection IP 40	Green Red	Blank	<b>ZA2-BL8334</b>	0,030
<b>1 flush</b> <b>1 projecting</b> Degree of protection IP 40	Green Red	I O	<b>ZA2-BL8434</b>	0,030
<b>1 flush</b> <b>1 projecting</b> Degree of protection IP 65	Green Red	Blank	<b>ZA2-BL9334</b>	0,030
<b>1 flush</b> <b>1 projecting</b> Degree of protection IP 65	Green Red	I O	<b>ZA2-BL9434</b>	0,030
<b>Sealing boot</b> For degree of protection IP 66	Clear silicone		<b>ZB2-BA008</b>	0,004
<b>Other versions</b>	Operating heads with other colour combinations, or "Start-Stop" marking : Please consult our local sales office.			

# Control units

XA2-B

## Selector switch operators (heads with black plastic bezel)



ZA2-BD3



ZA2-BD39



ZA2-BJ2



ZA2-BD48



ZA2-BG3

### Operators for selector switches

Description			Reference	Weight Kg
<b>With black handle</b>	2 positions	stayput	ZA2-BD2	0,020
		1 spring return from right to left	ZA2-BD4	0,020
	3 positions	stayput	ZA2-BD3	0,020
		2 spring return to centre	ZA2-BD5	0,020
		1 spring return from right to centre	ZA2-BD8	0,020
		1 spring return from left to centre	ZA2-BD7	0,020
<b>With black knurled knob</b>	2 positions	stayput	ZA2-BD29	0,025
		1 spring return from right to left	ZA2-BD49	0,025
	3 positions	stayput	ZA2-BD39	0,025
		2 spring return to centre	ZA2-BD59	0,025
		1 spring return from right to centre	ZA2-BD89	0,025
		1 spring return from left to centre	ZA2-BD79	0,025
<b>With long black handle</b>	2 positions	stayput	ZA2-BJ2	0,025
		1 spring return from right to left	ZA2-BJ4	0,025
	3 positions	stayput	ZA2-BJ3	0,025
		2 spring return to centre	ZA2-BJ5	0,025
		1 spring return from right to centre	ZA2-BJ8	0,025
		1 spring return from left to centre	ZA2-BJ7	0,025
<b>Toggle switch with black handle (available Sept. 91)</b>	2 positions	stayput	ZA2-BD28	0,020
	2 position	spring return	ZA2-BD48	0,020

### Operators for key switches (Ronis key N° 455)

Description		Key withdrawal	Reference	Weight Kg
<b>2 positions</b>	stayput	left hand position	ZA2-BG2	0,045
		left and right hand position	ZA2-BG4	0,045
	1 spring return from right to left	left hand position	ZA2-BG6	0,045
<b>3 positions</b>	stayput	centre position	ZA2-BG3	0,045
		left and right hand position	ZA2-BG5	0,045
		left hand position	ZA2-BG9	0,045
	2 spring return to centre	centre position	ZA2-BG7	0,045
	1 spring return from left to centre	right hand position	ZA2-BG1	0,045
	1 spring return from right to centre	left hand position	ZA2-BG08	0,045

**Other versions :** selector switches with alternative key numbers.  
Please consult your local sales office.

XA2-B

# Signalling units and control + signalling units

Complete units (circular heads with black plastic bezel)



XA2-BV63

## Pilot lights

Supply	Diagram	Supply voltage	Colour	Reference	Weight Kg
Direct bulb not supplied *	X1 	≤ 380 V	Green	<b>XA2-BV63</b>	0,070
			Red	<b>XA2-BV64</b>	0,070
			Clear	<b>XA2-BV67</b>	0,070
With resistor bulb BA 9s, 130 V supplied	X1 	220 V 250 V	Green	<b>XA2-BV73</b>	0,080
			Red	<b>XA2-BV74</b>	0,080
			Clear	<b>XA2-BV77</b>	0,080



XA2-BV77

## Illuminated pushbuttons with flush operator and 1 N/O + 1 N/C contact

Supply	Diagram	Supply voltage	Colour	Reference	Weight Kg
Direct bulb not supplied *	X1 	≤ 380 V	Green	<b>XA2-BW3365</b>	0,085
			Red	<b>XA2-BW3465</b>	0,085
			Clear	<b>XA2-BW3765</b>	0,085
With resistor bulb BA 9s 130 V supplied	X1 	220 V 250 V	Green	<b>XA2-BW3375</b>	0,090
			Red	<b>XA2-BW3475</b>	0,090
			Clear	<b>XA2-BW3775</b>	0,090



XA2-BW3365



XA2-BW3775

\* Type of bulb to use :

BA9s base fitting, maximum length 28 mm.

- incandescent bulb,  $U \leq 130$  V, maximum power 2,6 W,
- neon bulb,  $110 V \leq U \leq 380$  V,
- LED (see page 30)

# Signalling units

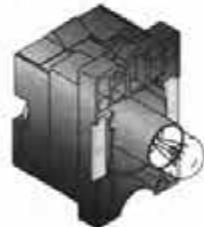
XA2-B

Pilot light bodies and heads

Black plastic bezel



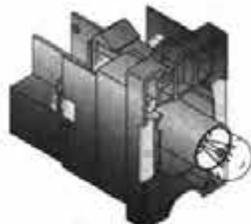
ZA2-BV6



ZA2-BV7



ZA2-BV156



ZA2-BV157



ZA2-BV01



ZA2-BV033



ZA2-CV01

## Complete bodies (pre-assembled lamp holder and mounting collar)

Supply	Diagram	Maximum voltage	Reference	Weight Kg
Direct * bulb not supplied	X1 X2	≤ 380 V	ZA2-BV6	0,025
With resistor BA9s bulb, 130 V, supplied	X1 X2	220 V to 250 V	ZA2-BV7	0,030
Via integral transformer 1,2 VA BA9s bulb, 6 V, supplied	X1 X2	110-127 V : 50 Hz 120 V : 60 Hz	ZA2-BV3	0,090
		220 V : 50 Hz	ZA2-BV4	0,090
		380 V : 50 Hz	ZA2-BV5	0,090

## Complete bodies with "Test" facility

Direct * bulb not supplied	TEST X2 X1	≤ 380 V	ZA2-BV156	0,030
With resistor BA9s bulb, 130 V, supplied	TEST X2 X1	220 V to 250V	ZA2-BV157	0,035

\* Type of bulb to use : BA9s base fitting, maximum length 28 mm.  
 - incandescent bulb,  $U \leq 130$  V, maximum power 2,6 W.  
 - neon bulb,  $110 \leq U \leq 380$  V.  
 - LED (see page 30)

## Round pilot light heads

Description	Colour	Reference	Weight Kg
For incandescent bulbs	White	ZA2-BV01	0,015
	Green	ZA2-BV03	0,015
	Red	ZA2-BV04	0,015
	Yellow	ZA2-BV05	0,015
	Blue	ZA2-BV06	0,015
	Clear	ZA2-BV07	0,015
For neon bulbs or LED	LED	ZA2-BV033	0,010
	Neon bulb or LED	ZA2-BV043	0,010
	Neon bulb or LED	ZA2-BV053	0,010
	Neon bulb	ZA2-BV073	0,010

## Square pilot light heads

Description	Colour	Reference	Weight Kg
For incandescent bulbs	White	ZA2-CV01	0,015
	Green	ZA2-CV03	0,015
	Red	ZA2-CV04	0,015
	Yellow	ZA2-CV05	0,015
	Blue	ZA2-CV06	0,015
	Clear	ZA2-CV07	0,015

## XA2-B

## Control and signalling units

## Body/contact block assemblies

## Complete bodies (pre-assembled blocks and mounting collar)

Supply	Diagram	Maximum supply voltage	Contacts	Reference	Weight Kg
Direct * bulb not supplied		$\leq 380 \text{ V}$	N/O	ZA2-BW061	0,040
			N/C	ZA2-BW062	0,040
			N/O + N/O	ZA2-BW063	0,050
			N/C + N/C	ZA2-BW064	0,050
			N/C + N/O	ZA2-BW065	0,050
With resistor BA9s bulb, 130 V supplied		220 V to 250 V	N/O	ZA2-BW071	0,045
			N/C	ZA2-BW072	0,045
			N/O + N/O	ZA2-BW073	0,055
			N/C + N/C	ZA2-BW074	0,055
			N/C + N/O	ZA2-BW075	0,055
Via integral transformer BA9s bulb, 1,2 VA supplied		110-127 V : 50 Hz 120 V : 60 Hz	N/O	ZA2-BW031	0,100
			N/C	ZA2-BW032	0,100
			N/O + N/O	ZA2-BW033	0,110
			N/C + N/C	ZA2-BW034	0,110
			N/C + N/O	ZA2-BW035	0,110
			N/O	ZA2-BW041	0,100
			N/C	ZA2-BW042	0,100
			N/O + N/O	ZA2-BW043	0,110
			N/C + N/C	ZA2-BW044	0,110
			N/C + N/O	ZA2-BW045	0,110
		380 V : 50 Hz	N/O	ZA2-BW051	0,100
			N/C	ZA2-BW052	0,100
			N/O + N/O	ZA2-BW053	0,110
			N/C + N/C	ZA2-BW054	0,110
			N/C + N/O	ZA2-BW055	0,110

\* Type of bulb to use : BA9s base fitting, maximum length 28 mm,

- incandescent bulb,  $U \leq 130 \text{ V}$ , maximum power 2,6 W,
- neon bulb,  $110 \text{ V} \leq U \leq 380 \text{ V}$ ,
- LED (see page 30)

## Additional contact blocks

Utilisation	Diagram	Reference	Weight Kg
For converting body/contact assemblies to 3 or 4 contacts maximum or replacing 1st or 2nd contact block		ZB2-BE101	0,010
		ZB2-BE102	0,010

## Intermediary "push and push to release" mechanism

## For illuminated pushbuttons

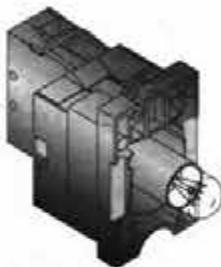
To be fitted between the mounting collar and the electrical block.

ZB2-BZ21

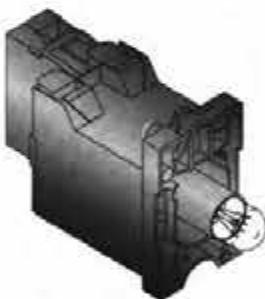
0,008



ZA2-BW061



ZA2-BW071



ZA2-BW031



ZB2-BE101



ZB2-BZ21

# Control and signalling units

XA2-B

## Pushbutton operators (heads with black plastic bezel)



ZA2-BW31

### Operators for spring return illuminated pushbuttons (round heads)

Description	Colour	Reference	Weight Kg
<b>Flush</b>	For use with incandescent bulb	White	ZA2-BW31
		Green	ZA2-BW33
		Red	ZA2-BW34
		Yellow	ZA2-BW35
		Blue	ZA2-BW36
		Clear	ZA2-BW37
<b>Projecting</b>	For use with neon bulb or LED	Green	ZA2-BW333
		Red	ZA2-BW343
		Yellow	ZA2-BW353
<b>Flush with half guard</b>	For use with incandescent bulb	White	ZA2-BW11
		Green	ZA2-BW13
		Red	ZA2-BW14
		Yellow	ZA2-BW15
		Blue	ZA2-BW16
		Clear	ZA2-BW17
<b>Projecting</b>	For use with neon bulb or LED	Green	ZA2-BW133
		Red	ZA2-BW143
		Yellow	ZA2-BW153
<b>Flush with half guard</b>	For use with incandescent bulb	White	ZA2-BW312
		Green	ZA2-BW332
		Red	ZA2-BW342
		Yellow	ZA2-BW352
		Blue	ZA2-BW362
		Clear	ZA2-BW372
<b>Projecting</b>	For use with neon bulb or LED	Green	ZA2-BW3322
		Red	ZA2-BW3422
		Yellow	ZA2-BW3522



ZA2-BW16



ZA2-BW312

### Operators for latching mushroom head illuminated pushbuttons (turn to release)

Description	Colour	Reference	Weight Kg
<b>Mushroom head</b>	White	ZA2-BW71	0,050
		Green	ZA2-BW73
		Red	ZA2-BW74
		Yellow	ZA2-BW75
		Blue	ZA2-BW76
		Clear	ZA2-BW77



ZA2-BW74



ZA2-CW31

### Operators for illuminated spring return pushbuttons (square heads)

Description	Colour	Reference	Weight Kg
<b>Flush</b>	For use with incandescent bulb	White	ZA2-CW31
		Green	ZA2-CW33
		Red	ZA2-CW34
		Yellow	ZA2-CW35
		Blue	ZA2-CW36
		Clear	ZA2-CW37
<b>Projecting</b>	For use with incandescent bulb	White	ZA2-CW11
		Green	ZA2-CW13
		Red	ZA2-CW14
		Yellow	ZA2-CW15
		Blue	ZA2-CW16
		Clear	ZA2-CW17



ZA2-CW13

## XA2-B

## Control and signalling units

Pushbutton and selector switch operators (head with black plastic bezel)



ZA2-BW84354

## Operators for spring return double headed pushbuttons with indicator light

Description	Operator colour	Pilot light colour	Reference	Weight Kg	
<b>2 flush</b> blank Degree of protection IP 40	Black Green Green	Red Red Red	Yellow Yellow Clear	ZA2-BW81254 ZA2-BW81354 ZA2-BW81374	0,030 0,030 0,030
<b>2 flush</b> marked I-O Degree of protection IP 40	Black Green Green	Red Red Red	Yellow Yellow Clear	ZA2-BW82254 ZA2-BW82354 ZA2-BW82374	0,030 0,030 0,030
<b>1 flush</b> <b>1 projecting</b> blank Degree of protection IP 40	Black Green Green	Red Red Red	Yellow Yellow Clear	ZA2-BW83254 ZA2-BW83354 ZA2-BW83374	0,030 0,030 0,030
<b>1 flush</b> <b>1 projecting</b> marked I-O, Degree of protection IP 40	Black Green Green	Red Red Red	Yellow Yellow Clear	ZA2-BW84254 ZA2-BW84354 ZA2-BW84374	0,030 0,030 0,030
<b>Sealing boot</b> For degree of protection IP 66			Clear silicone	ZB2-BW008	0,005

## Operators for illuminated selector switches

Description	Colour	Reference	Weight Kg	
<b>With handle</b>				
2 positions	stayput	Green Red Yellow Blue Clear	ZA2-BK123 ZA2-BK124 ZA2-BK125 ZA2-BK126 ZA2-BK127	0,020 0,020 0,020 0,020 0,020
1 spring return from right to left	Green Red Yellow Blue Clear	ZA2-BK143 ZA2-BK144 ZA2-BK145 ZA2-BK146 ZA2-BK147	0,020 0,020 0,020 0,020 0,020	
3 positions	stayput	Green Red Yellow Blue Clear	ZA2-BK133 ZA2-BK134 ZA2-BK135 ZA2-BK136 ZA2-BK137	0,020 0,020 0,020 0,020 0,020
2 spring return to centre	Green Red Yellow Blue Clear	ZA2-BK153 ZA2-BK154 ZA2-BK155 ZA2-BK156 ZA2-BK157	0,020 0,020 0,020 0,020 0,020	
1 spring return from right to centre	Green Red Yellow Blue Clear	ZA2-BK183 ZA2-BK184 ZA2-BK185 ZA2-BK186 ZA2-BK187	0,020 0,020 0,020 0,020 0,020	
1 spring return from left to centre	Green Red Yellow Blue Clear	ZA2-BK173 ZA2-BK174 ZA2-BK175 ZA2-BK176 ZA2-BK177	0,020 0,020 0,020 0,020 0,020	

ZB2-BW008



ZA2-BK133

# Digital display

XA2-B

Type	7 segments LED display + decimal point (height : 14 mm).
Mounting	Panel fixing by Ø 22,3 mm hole. Possibility of grouping (2 display units) : - mechanically : by dual legend plate (combined reading) or - electrically : by parallel connection (multiplexing for the version with latch).

## Environment

Ambient temperature	For operation : from - 25°C to + 70°C. For storage : from - 40°C to + 85°C.
Resistance to vibration	10 g (10 to 500 Hz) conforming to IEC 68-2-6.
Resistance to shock	160 g, duration 11 ms, conforming to IEC 68-2-27.
Electric shock protection	Class II, conforming to IEC 536 and NF C 20-030.
Degree of protection	IP 65 conforming to IEC 529 and NF C 20-010.

## Electrical characteristics

Supply voltage	24 V ... (ie : 40 mA max.).
Voltage limits	13 V (70 mA) to 30 V (36 mA max.).
Protection	Against reverse polarity
Logic inputs	State 0 : - 30 V (0 mA) to + 5 V (1,4 mA). State 1 : + 13 V (4 mA) to + 30 V (9,5) mA.
Wiring	Screw terminals. Cable capacity 0,5 to 2,5 mm <sup>2</sup> .
Change of displayed value	<p>Diagram:</p> <p>5 ms. minimum</p>

## Wiring diagrams and input tables

Decimal + BCD	BCD + Latch	Decimal	BCD																																																																																																																																																																																																																		
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DP = decimal point

Latch = storage

BCD = binary coded decimal

## Adaptable sub-assemblies

	Description	Version	Reference	Weight kg
ZA2-VA1.	Body	Decimal + BCD BCD + LATCH	● ZA2-VA11 ● ZA2-VA12	0,060 0,060
	Head	Green Red Yellow	● ZA2-VA03 ● ZA2-VA04 ● ZA2-VA05	0,020 0,020 0,020
ZA2-VA04	Standard legend carrier with blank legend plate	Black or red background White or yellow background	● ZA2-BZ35101 ● ZA2-BZ35102	0,001 0,001
	Double legend carrier with blank legend plate	Black or red background White or yellow background	● ZA2-VZ3101 ● ZA2-VZ3102	0,001 0,005
ZA2-BZ35101				
ZA2-VZ3102				

## XA2-B

## Units for printed circuit board connection

## General characteristics

## General

<u>Compatibility</u>	This method of connection for the XA2-B range uses special electrical blocks (see facing page), combined with the range of standard operators detailed in this catalogue. (apart from two exceptions, see page 24).
<u>Conformity to standards</u>	IEC 947-5-1, NF C 63-140, ASE 0119, ASE 1003, BS 4794, VDE 0660 part 200, UL 508, CSA C 22-2 n°14.
<u>Approvals</u>	Pending : UL, CSA, ASE, DEMKO, NEMKO, SEMKO, F.I.
<u>Protective treatment</u>	"TC" (all climates).
<u>Ambient temperature</u>	For storage : -40 to +70°C. For operation : from -25 to +70°C.
<u>Operating positions</u>	All positions.
<u>Resistance to vibration</u>	Ø 60 mm mushroom head pushbuttons : 4 g. Other pushbuttons : 10 g. Joystick controller : 5 g.
<u>Resistance to shock</u>	Pushbuttons : 70 g. Mushroom head pushbuttons : 15 g. Selector switches : 120 g. Conforming to IEC 68-2-27.
<u>Electric shock protection</u>	Class II, conforming to IEC 536 and NF C 20-030.
<u>Degree of protection</u> conforming to IEC 529 and NF C 20-010	IP65.
<u>Mechanical life</u>	1 million operations (latching mushroom head pushbuttons : 300 000 operations, illuminated selector switches : 100 000 operations).

## Setting up characteristics

<u>Printed circuit board assembly</u>	The special sub-bases, type ZA2-BZ079 must be used (see facing page).
<u>Printed circuit board</u>	Thickness : from 1.6 to 3.2 mm.
<u>Flow soldering</u>	Maximum temperature : 250°C Speed : 1.2 m/s.

## Contact block characteristics

<u>Rated insulation voltage</u>	300 V conforming to UL 508 and CSA C 22-2 n°14, 250 V conforming to NF C 20-040, VDE 0110.
<u>Insulation category</u>	Group C conforming to NF C 20-040 and VDE 0110.
<u>Contact operation</u>	Slow break (N/C contact with positive opening operation).
<u>Operating force</u>	Flush and projecting pushbuttons - with 1 N/O contact : 1 daN - with 1 N/C contact : 0.8 daN. Additional contacts : N/O : + 0.5 daN, N/C : + 0.3 daN.
<u>Terminal referencing</u>	Unmarked
<u>Short-circuit protection</u>	10 A cartridge fuses nF.
<u>Rated power</u> Conforming to IEC 947-5-14	Utilisation category : A300 - Q300.

# Units for printed circuit board connection XA2-B

## Electrical blocks and assembly items

### Contact blocks (see operators on pages 11 to 15)



ZB2-BE701

Description	Utilisation	Diagram	Reference	Weight Kg
Normally open contact block Sold in lots of 10	For pushbuttons and selector switches	N/O 13 14	ZB2-BE701	0,020
Normally closed contact block Sold in lots of 10	For pushbuttons and selector switches	N/C 21 22	ZB2-BE702	0,020



ZB2-BE702



ZB2-BV67

### Signalling unit (see heads on page 17)

Signalling block (direct supply) Sold in lots of 10	X1 X2	ZB2-BV67	0,020
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ZB2-BW0672

### Combined control and signalling units (see operators on pages 19 and 20)



ZA2-CZ31

Control and signalling block (direct supply pilot light + N/O contact) Sold in lots of 10	X1 X2	ZB2-BW0671	0,020
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ZA2-BZ079

Control and signalling block (direct supply pilot light + N/C contact) Sold in lots of 10.	X1 X2	ZB2-BW0672	0,020
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Control and signalling block (direct supply pilot light + single pole changeover contact with 4 terminals) Sold in lots of 10:	X1 X2	ZB2-BW0675	0,020
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### Assembly items



ZB2-BZ005

Spacer for use with ZA2-C square heads. (p. 11, 12, 17 and 19.) Sold in lots of 10	ZA2-CZ31	0,020
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Printed circuit board fixing sub-base Sold in lots of 10	ZA2-BZ079	0,020
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Screws for fixing the electrical blocks onto the sub-base Sold in lots of 10	ZB2-BZ005	0,020
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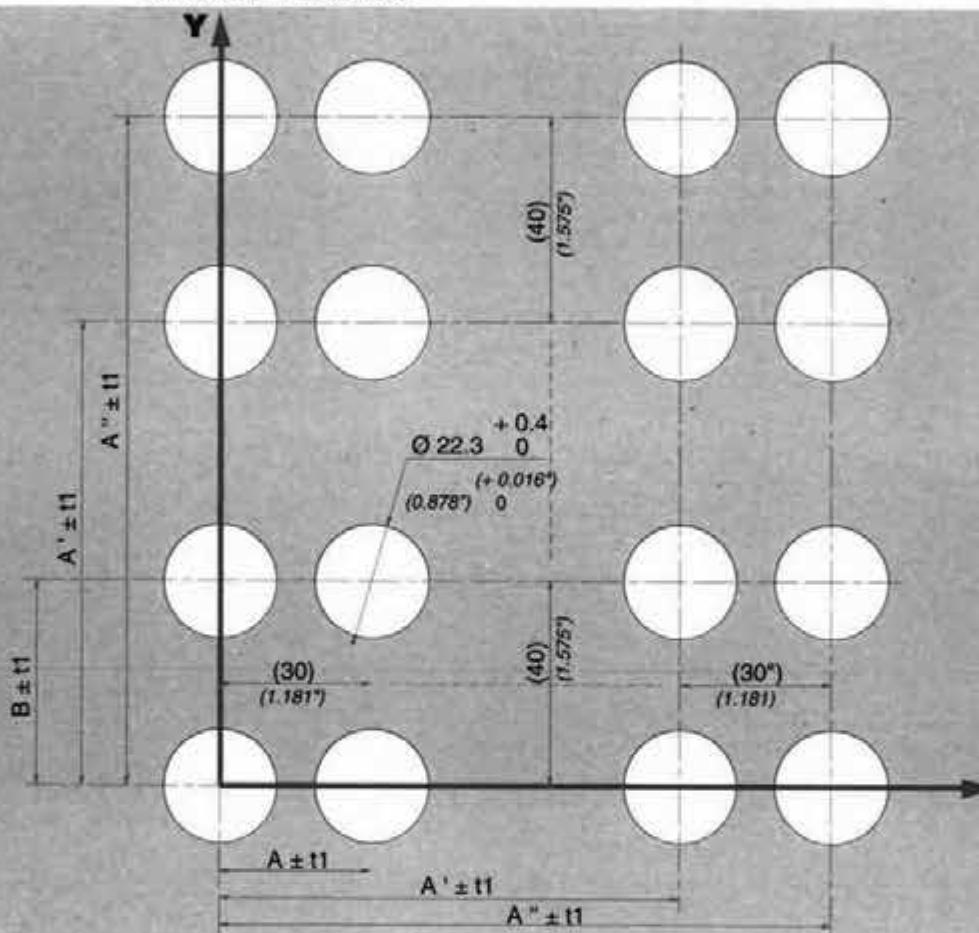
## XA2-B

## Printed circuit board connection

## Fixing

## Panel cut-outs

Dimensions in mm and inches



## Overall tolerances of the

The sum of the absolute values of the drilling

- in the horizontal direction X  
→ Dimensions - A on the panel  
- C on the printed circuit

- and in the vertical direction Y  
→ Dimensions - B on the panel  
- D on the printed circuit

## Mounting precautions

a) Panel cut-out diameter:  $\text{Ø } 22.3 +0.4 -0.016" (.878") 0$

b) When the head and fixing sub-base assembly are fixed and tightened onto the panel, the sub-base must be oriented at a maximum angle of  $\pm 5^\circ$ .

c) If any of the heads are fitted with legend plate carriers (see pages 26 and 27), it is essential that all the products are fitted with legend plate carriers.

d) If ZA2-C square operators (see pages 11, 12, 17 and 19) are used in conjunction with ZA2-B round operators, it is essential to use:

- the ZA2-CZ31 spacer with the ZA2-C. square heads.

- the ZA2-BZ34... legend carriers or the ZA2-BZ31 square collar adaptor with the ZA2-B. round heads.

e) Note : the following heads cannot be used :

- double headed pushbutton operators with indicator light ZB2-BW8...

- 3 position illuminated selector switches ZA2-BK13, BK15, BK17 and BK18.

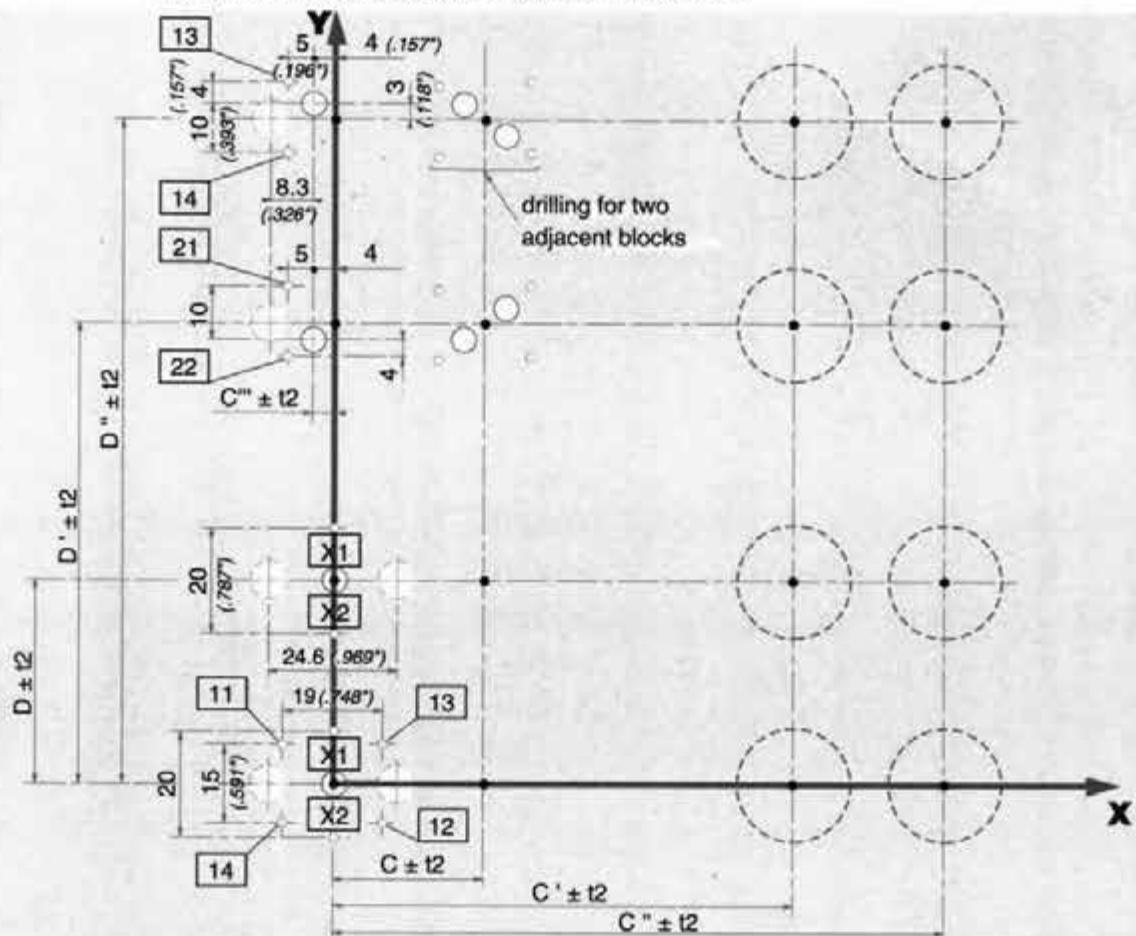
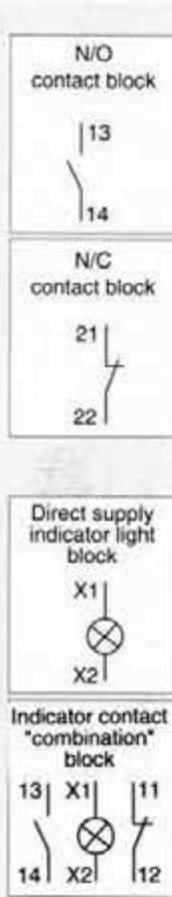
# Printed circuit board connection

## Fixing

XA2-B

### Printed circuit board drilling

View from the electrical block side; Dimensions in mm and inches



### panel/printed circuit assembly

tolerance must not exceed

0,5 mm (.196")

i.e.:  $t_1 + t_2 = 0,5 \text{ mm max.}$ 

### Legends for printed circuit drillings and terminal marking

3 different types of drilling are necessary :

○ → HOLES FOR CONNECTIONS :  $\varnothing 1.5 \pm 0.1 (\varnothing .059 \pm .0039")$

○ → CENTRING HOLE OF THE ELECTRICAL BLOCK :  $\varnothing 4.5 \pm 0.1 (\varnothing .177 \pm .0039")$

○ → SCREWDRIVER CLEARANCE HOLE :  $(\varnothing .275) \pm .0039" (\text{AS REQUIRED})$   
for the introduction of an electrical block assembling screw to a sub-base.  
It is recommended to fit a screw every 90 mm (3.54") horizontally and 120 mm (4.72") vertically

[13] — [14] Terminal marking conforming to CENELEC EN 50013  
Indicates the function of the electrical block.

## XA2-B

## Spare parts and accessories



ZA2-BZ32304

## Legend carriers retaining round shape of head (30 X 40 mm)

## With standard "snap in" legend plate and standard text

"Start function" : white letters on black background. "Stop" function : white letters on red background

Text	Reference	Weight kg	Text	Reference	Weight kg
O	ZA2-BZ32146	0,001	Off	ZA2-BZ32312	0,001
I	ZA2-BZ32147	0,001	Off-On	ZA2-BZ32367	0,001
O-I	ZA2-BZ32178	0,001	On	ZA2-BZ32311	0,001
I-II	ZA2-BZ32179	0,001	Open	ZA2-BZ32313	0,001
I-O-II	ZA2-BZ32186	0,001	Power on	ZA2-BZ32326	0,001
Auto	ZA2-BZ32115	0,001	Reset	ZA2-BZ32323	0,001
Auto-Hand	ZA2-BZ32364	0,001	Reverse	ZA2-BZ32306	0,001
Auto-O-Hand	ZA2-BZ32385	0,001	Run	ZA2-BZ32334	0,001
Close	ZA2-BZ32314	0,001	Slow	ZA2-BZ32327	0,001
Down	ZA2-BZ32308	0,001	Start	ZA2-BZ32303	0,001
Emergency stop	ZA2-BZ32330	0,001	Stop	ZA2-BZ32304	0,001
Fast	ZA2-BZ32328	0,001	Up	ZA2-BZ32307	0,001
Forward	ZA2-BZ32305	0,001	↔	ZA2-BZ32912	0,001
Hand	ZA2-BZ32316	0,001	↑↓	ZA2-BZ32913	0,001
Inch	ZA2-BZ32321	0,001			

Description	Colour	Reference	Weight kg
Blank "snap in" legend plates	Black or red background	ZA2-BZ32101	0,001
	White or yellow background	ZA2-BZ32102	0,001

Without legend plate (sold in lots of 10)

ZA2-BZ32 0,001



ZA2-BZ33

## Legend carriers retaining round shape of head (30 X 50 mm)

Blank "snap in" legend plate	Black or red background	ZA2-BZ33101	0,001
	White or yellow background	ZA2-BZ33102	0,001
Without legend plate (sold in lots of 10)		ZA2-BZ33	0,001

# Spare parts and accessories

XA2-B



ZA2-BZ34304

## Legend carriers for square aspect head (30 X 40 mm)

### With standard "snap in" legend plate and standard text

"Start" function : white letters on black background. "Stop" function : white letters on red background.

Text	Reference	Weight kg	Text	Reference	Weight kg
O	ZA2-BZ34146	0,001	Off	ZA2-BZ34312	0,001
I	ZA2-BZ34147	0,001	Off-On	ZA2-BZ34367	0,001
O-I	ZA2-BZ34178	0,001	On	ZA2-BZ34311	0,001
I-II	ZA2-BZ34179	0,001	Open	ZA2-BZ34313	0,001
I-O-II	ZA2-BZ34186	0,001	Power on	ZA2-BZ34326	0,001
Auto	ZA2-BZ34115	0,001	Reset	ZA2-BZ34323	0,001
Auto-Hand	ZA2-BZ34364	0,001	Reverse	ZA2-BZ34306	0,001
Auto-O-Hand	ZA2-BZ34385	0,001	Run	ZA2-BZ34334	0,001
Close	ZA2-BZ34314	0,001	Slow	ZA2-BZ34327	0,001
Down	ZA2-BZ34308	0,001	Start	ZA2-BZ34303	0,001
Emergency stop	ZA2-BZ34330	0,001	Stop	ZA2-BZ34304	0,001
Fast	ZA2-BZ34328	0,001	Up	ZA2-BZ34307	0,001
Forward	ZA2-BZ34305	0,001	↔	ZA2-BZ34912	0,001
Hand	ZA2-BZ34316	0,001	↑↓	ZA2-BZ34913	0,001
Inch	ZA2-BZ34321	0,001			



ZA2-BZ35

## Legend carriers for square aspect head (30 X 50 mm)

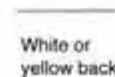
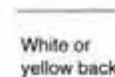
### With blank legend plate



Description	Colour	Reference	Weight kg
With "snap in" blank legend plate	Black or red background	ZA2-BZ34101	0,001
	White or yellow background	ZA2-BZ34102	0,001
Without "snap in" legend plate (sold in lots of 10)		ZA2-BZ34	0,001

## Legend carriers for square aspect head (30 X 50 mm)

### With blank legend plate



### Without legend plate (sold in lots of 10)

With blank legend plate	Black red background	ZA2-BZ35101	0,001
	White or yellow background	ZA2-BZ35102	0,001
Without legend plate (sold in lots of 10)		ZA2-BZ35	0,001

## XA2-B

## Spare parts and accessories

## Separate legend plates for (30 X 40 mm) legend carrier

With standard text

"Start function": white letters on black background. "Stop" function : white letters on red background.

Text	Reference	Weight Kg	Text	Reference	Weight Kg
O	ZA2-BZ4146	0,001	Off	ZA2-BZ4312	0,001
I	ZA2-BZ4147	0,001	Off-On	ZA2-BZ4367	0,001
O-I	ZA2-BZ4178	0,001	On	ZA2-BZ4311	0,001
I-II	ZA2-BZ4179	0,001	Open	ZA2-BZ4313	0,001
I-O-II	ZA2-BZ4186	0,001	Power on	ZA2-BZ4326	0,001
Auto	ZA2-BZ4115	0,001	Reset	ZA2-BZ4323	0,001
Auto-Hand	ZA2-BZ4364	0,001	Reverse	ZA2-BZ4306	0,001
Auto-O-Hand	ZA2-BZ4385	0,001	Run	ZA2-BZ4334	0,001
Close	ZA2-BZ4314	0,001	Slow	ZA2-BZ4327	0,001
Down	ZA2-BZ4308	0,001	Start	ZA2-BZ4303	0,001
Emergency stop	ZA2-BZ4330	0,001	Stop	ZA2-BZ4304	0,001
Fast	ZA2-BZ4328	0,001	Up	ZA2-BZ4307	0,001
Forward	ZA2-BZ4305	0,001		ZA2-BZ4912	0,001
Hand	ZA2-BZ4316	0,001		ZA2-BZ4913	0,001
Inch	ZA2-BZ4321	0,001			

Description	Colour	Reference	Weight Kg
Without text	Black or red background	ZA2-BY4101	0,001
	White or yellow backgd.	ZA2-BY4102	0,001
With special text on request (1 line of 11 characters maximum)	Black background	ZA2-BY4002	0,001
	Red background	ZA2-BY4004	0,001
	White background	ZA2-BY4001	0,001
	Yellow background	ZA2-BY4005	0,001

## Separate legend plates for (30 X 50 mm) legend carrier

Without text	Black or red background	ZA2-BY5101	0,001
	White or yellow backgd.	ZA2-BY5102	0,001
With special text on request (2 lines of 11 characters maximum)	Black background	ZA2-BY5002	0,001
	Red background	ZA2-BY5004	0,001
	White background	ZA2-BY5001	0,001
	Yellow background	ZA2-BY5005	0,001

ZA2-BY4 \*\*\*

ZA2-BY5 \*\*\*

# Spare parts and accessories

XA2-B

STOP  
ZB2-BY1304EMERGENCY  
STOP

ZB2-BY9130



ZA2-BZ31



ZA2-BZ36



ZA2-SZ3



ZA2-SZ5



ZA2-BZ009



ZB2-BZ001



ZA2-BZ905



ZB2-BZ8

## Circular legend plates

Description	Sold in lots of 10	Reference	Weight Kg
For transparent pushbuttons, pilot light and illuminated pushbuttons	Without text	ZB2-BY1101	0,001
	O	ZB2-BY1146	0,001
	I	ZB2-BY1147	0,001
	II	ZB2-BY1148	0,001
	Start	ZB2-BY1303	0,001
	Stop	ZB2-BY1304	0,001
	Auto	ZB2-BY1115	0,001

*Note : alternative symbols are available, please consult your local sales office.*

## Square legend plate

For square pilot lights and illuminated pushbuttons	Sold in lots of 10	Without text	ZA2-CY1101	0,001

## Legend plates for "Emergency stop" mushroom head pushbuttons

Plastic circular legend plate	Without text	One side white, one side yellow	Ø 60 mm	ZB2-BY9101	0,007
			Ø 90 mm	ZB2-BY8101	0,008
	With text	"Emergency stop"	Ø 60 mm	ZB2-BY9130	0,007
			Ø 90 mm	ZB2-BY8130	0,008

## Square collar adaptor (sold in lots of 10)

For "square aspect" head if ZA2-BZ34*** or ZA2-BZ35*** is not used (see p. 26 et 27 )	ZA2-BZ31	0,001

## Mounting ring with locating pip (sold in lots of 10)

For mounting in a Ø 22,2 hole with key location only required where a legend carrier or a square collar adaptor is not used	ZA2-BZ36	0,001

## Blanking plugs

Black colour	Round	ZB2-SZ3	0,001
	Square	ZA2-SZ5	0,001

## Mounting collar

For contact blocks only	(Note : not suitable for printed circuit board mounting)	ZA2-BZ009	0,005

## Legend carrier

For labelling of individual bodies or body/contact assemblies (sold in lots of 10)	ZB2-BZ001	0,010

## Tools

Socket key for tightening the operating head locking ring	ZA2-BZ905	0,060

Bezel key for round pushbuttons with "transparent push"	ZB2-BZ8	0,020

Tightening key and lens extractor for ZA2-C square heads.	ZA2-CZ12	0,010

BA9s bulb extractor	XBF-X13	0,005

XA2-B

## Spare parts and accessories



ZB2-BE101

## Adaptable contact blocks

Utilisation	Diagram	Reference	Weight Kg
For converting body/contact assemblies to 3 or 4 contacts maximum or replacing 1st or 2nd contact block	N/O 3 4	ZB2-BE101	0,010
	N/C 1 2	ZB2-BE102	0,010



ZB2-BZ21

## Intermediary "Push and push to release" mechanism

For pushbuttons and illuminated pushbuttons (except mushroom head pushbuttons)	ZB2-BZ21	0,008
To be fitted between the mounting collar and the electrical block		

## Bulbs

Description	Voltage	Power	Unit reference	Weight Kg
<b>Incandescent bulb</b> BA9s base, Ø 11 mm maximum max length 28 mm (sold in lots of 10)	6 V	1,2 W	DL1-CB006	0,002
	12 V	2,6 W	DL1-CE012	0,002
	24 V	2,6 W	DL1-CE024	0,002
	48 V	2,6 W	DL1-CE048	0,002
	130 V	2,6 W	DL1-CE130	0,002

<b>Neon bulb</b> BA9s base, Ø 11 mm maximum max length 28 mm (sold in lots of 10)	for red, yellow or clear pilot lights	110 V	DL1-CF110	0,002
		220 V	DL1-CF220	0,002
		380 V	DL1-CF380	0,002
	for green pilot lights	220 V	DL1-CG220	0,002
		380 V	DL1-CG380	0,002

Description	Voltage	Power	Reference	Weight Kg
<b>LEDs</b> BA9s base Ø 11 mm max max length 28 mm (sold singly)	for direct supply signalling units	24 V ~	Green DL1-CJ0243	0,002
			Red DL1-CJ0244	0,002
			Yellow DL1-CJ0245	0,002
	48 V ~	Green	DL1-CJ0483	0,002
		Red	DL1-CJ0484	0,002
		Yellow	DL1-CJ0485	0,002
for units with integral transformer	6 V ~	Green	DL1-CD0063	0,002
		Red	DL1-CD0064	0,002
		Yellow	DL1-CD0065	0,002

# Additional products

XA2-B

## Adaptable sub assemblies



ZA2-BD912



ZA2-BA83



ZA2-BL8401



ZA2-BZ13



XDL-PA14



ZD2-GY2\*\*\*



ZD2-GY4\*\*\*

### Potentiometer control knob (potentiometer not supplied)

Description	Utilisation	Reference	Weight Kg
Head only with collar for potentiometer with shaft length 43 to 47 mm	For potentiometer with 6 mm shaft	ZA2-BD912	0,060
	For potentiometer with 6,35 mm shaft	ZA2-BD922	0,060

### Overload reset buttons (10 mm travel)

Description	Operator Colour	Reference	Weight Kg
Operator (cannot be used with ZA2-BZ10* body/contact assemblies page 10)	Flush	Blank	
		Green	ZA2-BA83
		Red	ZA2-BA84
		Blue	ZA2-BA86
	With marking (double injection moulding)	O Red	ZA2-BA8401
		R Blue	ZA2-BA8602
Projecting	With marking	O red	ZA2-BL8401
			0,015
<b>Clear silicone boot (for use with flush operators only)</b>		<b>ZA2-BP037</b>	<b>0,005</b>
<b>Operating rod (can be cut to required length)</b>	Sold in lots of 10	<b>ZA2-BZ13</b>	<b>0,100</b>
The overall operating distance may be set between 17 and 120 mm, as measured from the front face of the mounting plate.			

### Joystick controller (with one N/O contact per direction)

Complete unit	2 directions 	(A) ← → (B)	Without spring return to zero	XDL-PA12	0,095
			With spring return to zero	XDL-PA22	0,095
		(A) ← → (B)	Without spring return to zero	XDL-PA14	0,125
		(C) ↑ ↓ (D)	With spring return to zero	XDL-PA 24	0,125

### Legend plates for joystick controller

2 directions 30 X 48 mm	Blank	One side black, one side red One side white, one side yellow	ZD2-GY2201 ZD2-GY2401	0,002 0,002
	With text (2 lines of 11 characters max. Text to be specified when ordering)	On white background On black background On red background On yellow background	ZD2-GY2001 ZD2-GY2002 ZD2-GY2004 ZD2-GY2005	0,002 0,002 0,002 0,002
4 directions 48 X 48 mm	Blank	One side black, one side red One side white, one side yellow	ZD2-GY4201 ZD2-GY4401	0,003 0,003
	With text (2 lines of 11 characters max. Text to be specified when ordering)	On white background On black background On red background On yellow background	ZD2-GY4001 ZD2-GY4002 ZD2-GY4004 ZD2-GY4005	0,003 0,003 0,003 0,003

XA2-B

## Control stations

### Adaptable sub-assemblies



XAL-B01

Pre-drilled plastic enclosures for 1 to 5 units

Description	Colour	Reference	Weight Kg
<b>For 1 unit</b>	Grey base and cover	XAL-B01	0.095



XAL-B03

Grey base and yellow cover XAL-J01 0,095

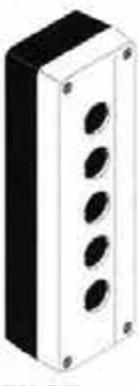


YAL-802



XAL-B04

For 4 units Grey base and cover XAL-B04 0.155



XAL-B05

## Notes

- Notes**

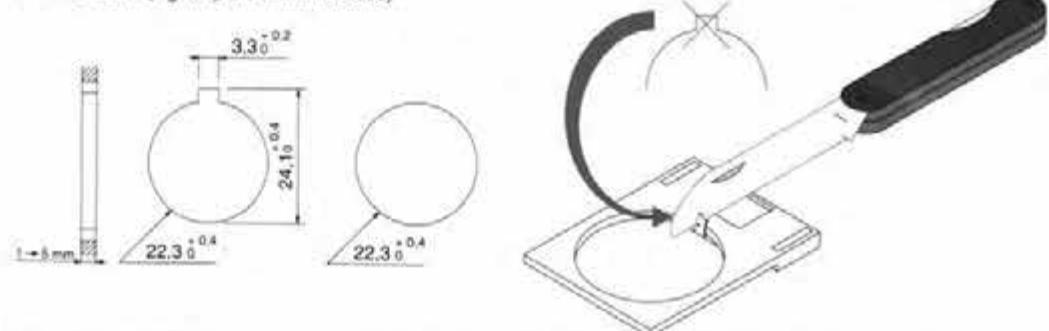
  - 1- XAL\*\*\* control stations are not suitable for use with transformer operated pilot lights or illuminated pushbuttons.
  - 2- When used with ZA2-C\* square operating heads, it is essential to use a ZA2-BZ32\*\* or ZA2-BZ33\*\*\* legend carrier or a ZA2-CZ31 spacer.

Electrical units can be fixed to the back of the enclosure. Please consult our local sales office.

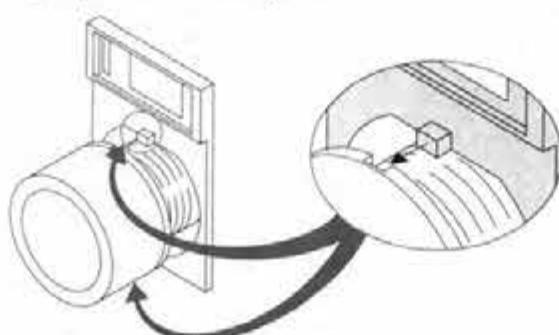
# Mounting

XA2-B

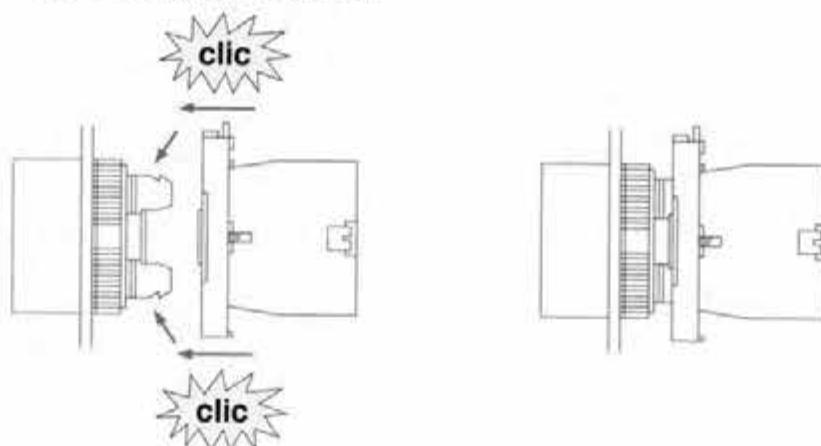
Panel cut-out : (legend plate carrier included)



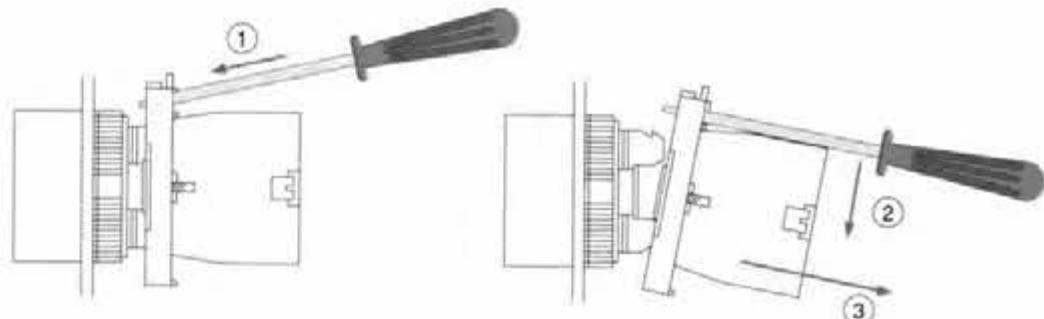
Legend plate carrier mounting :



Fixing the operating head onto the body :

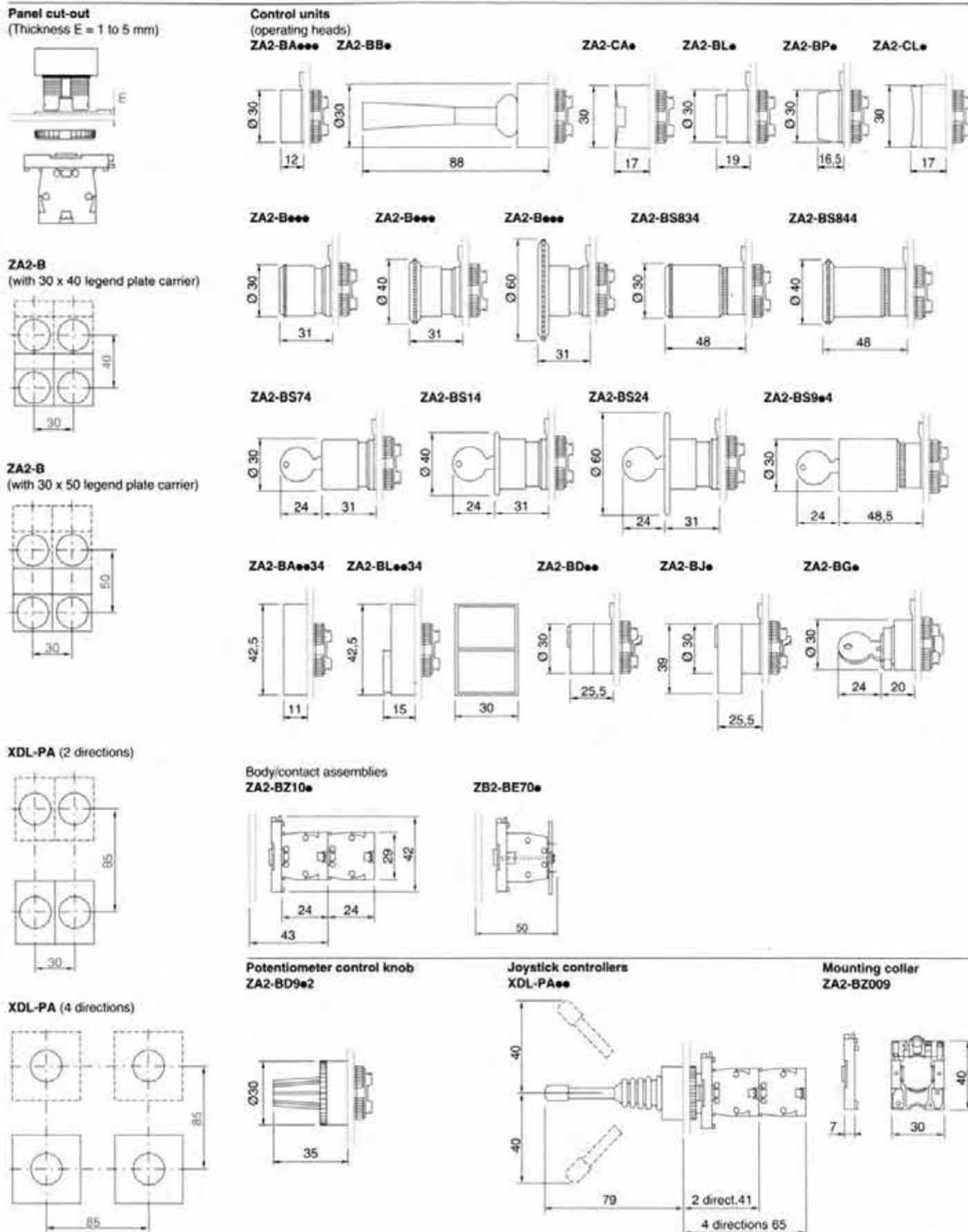


Removing the body :



## XA2-B

## Dimensions

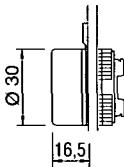


# Dimensions

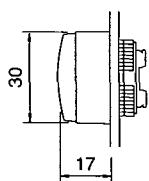
XA2-B

**Signalling units  
(heads)**

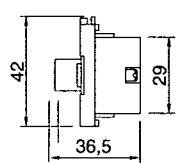
ZA2-BVO•



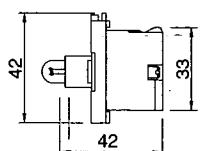
ZA2-CVO•



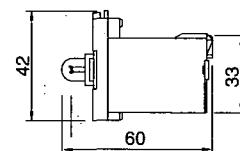
**(bodies)**  
ZA2-BV6



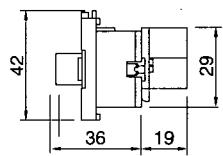
ZA2-BV7



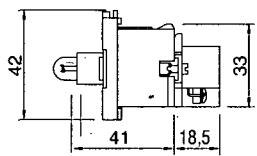
ZA2-BV3, BV4, BV5



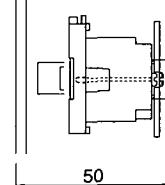
ZA2-BV156



ZA2-BV157

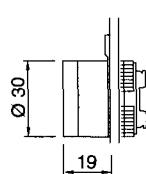


ZA2-BV67

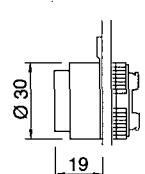


**Combined control and signalling units  
(heads)**

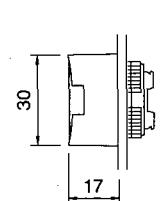
ZA2-BV3••



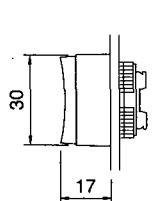
ZA2-BV1•



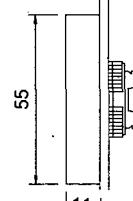
ZA2-CW3•



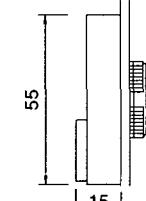
ZA2-CW1•



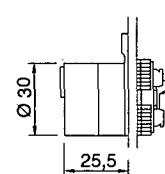
ZA2-BW8•••4



ZA2-BW8•••4

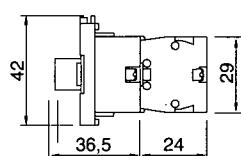


ZA2-BK1••

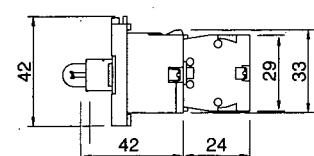


**(bodies)**

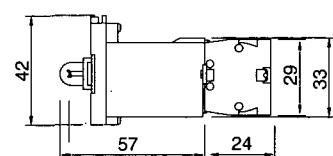
ZA2-BW06



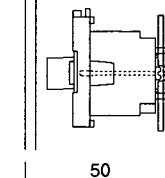
ZA2-BW07



ZA2-BW03•, BW04•, BW05•

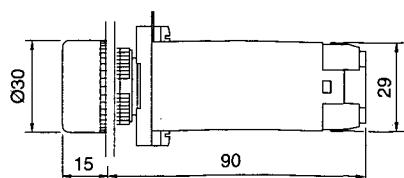


ZA2-BW067•



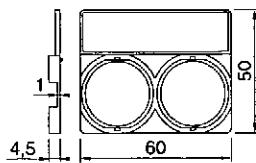
**Digital display**

ZA2-VA1• + ZA2-VA0•

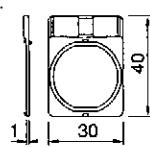
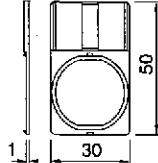
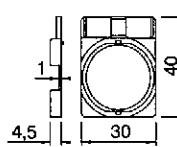
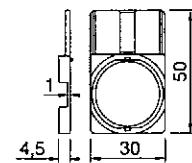


**XA2-B****Dimensions**

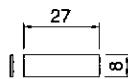
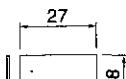
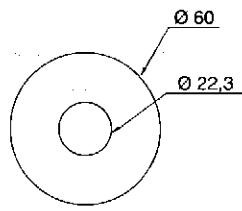
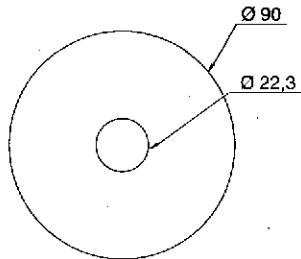
**Double legend plate carrier**  
**ZA2-VZ310\***



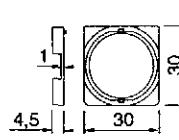
**Legend plate carrier**  
**ZA2-BZ32**

**ZA2-BZ33****ZA2-BZ34****ZA2-BZ35**

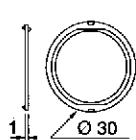
**Legend plates**  
**ZA2-BY4\*\*\***

**ZA2-BY5\*\*\*****ZB2-BY9101****ZB2-BY8101**

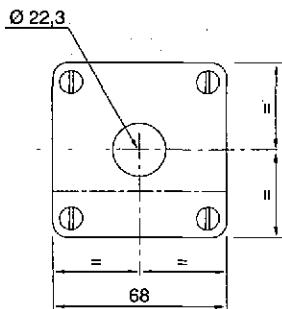
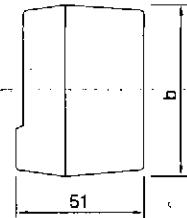
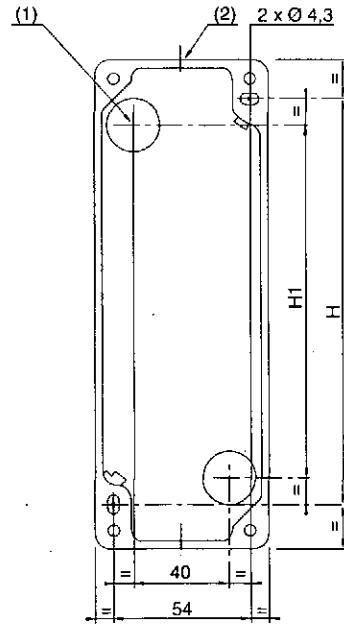
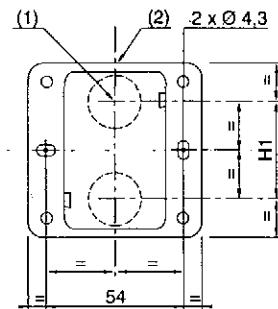
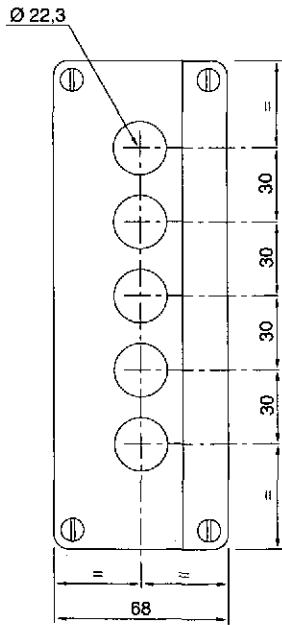
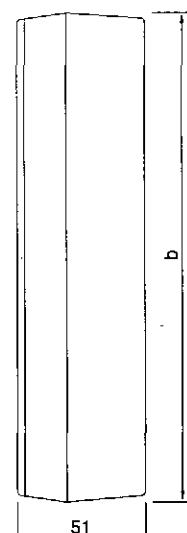
**Square**  
**ZA2-BZ31**



**Round**  
**ZA2-BZ36**



**Pre-drilled enclosures**  
**XAL-B01**

**XAL-B0\***

XAL-	b	H	H1
B02	104	68	48
B03	134	98	78
B04	164	128	108
B05	194	158	138

(1) 2 Ø 19 knock-outs for rear cable entry  
(2) Knock-outs for CM12 cable glands at the top and bottom

# Telemecanique Worldwide

F1GB - 01-10-1990



## Subsidiaries

Country	Main office	Telephone (T) Telefax (Tfx)	Telex
<b>Argentina</b>	La Telemecanique Electrique Argentina S.A. Viamonte 2850 - (1678) Caseros - Pcia. de Buenos Aires	T : (54)750.24.25 Tfx : (54.1)759.07.77	17558
<b>Australia (Sydney)</b>	Telemecanique (Australia) Pty Ltd Unit 3 and 4 Building A - Forestview Estate Cnr. Rodborough and Allambie Roads French's Forest - NSW 2086	T : (612)975.11.77 Tfx : (612)975.13.60	23608
<b>Austria</b>	Telemecanique Ges.m.b.H. Forchheimergasse 5 - 1233 Wien	T : (43)222/86.24.36 Tfx : (43)222/86.24.36.13	131022
<b>Belgium</b>	Telemecanique S.A.-N.V. Chaussée de Mons.181 - Leeuw-Saint-Pierre 1600	T : (32)2/371.12.11 Tfx : (32)2/378.11.21	21174
<b>Brazil</b>	Telemecanique S.A. Avenida das Nações Unidas, 23223 São Paulo CEP 4795	T : (55)11/524.52.33 Tfx : (55)11/522.51.34	1122800
<b>Canada</b>	Telemecanique Canada Ltée 580, avenue Lépine, Dorval Montréal H9P 1G2 - Province du Québec	T : (1)514.636.95.60 Tfx : (1)514.636.12.07	5821849
<b>Colombia</b>	Telemecanique de Colombia S.A. Avenida Eldorado - Carrera 103 bis Bodega 2C - Bogota 6DE	T : (57)1/413.91.81 Tfx : (57)1/413.90.12	43191
<b>Denmark</b>	Telemecanique Electrique A.S. Marielundvej 46A - 2730 Herlev	T : (45)42.91.70.11 Tfx : (45)42.91.70.35	35270
<b>Eire</b>	Telemecanique Limited Unit 801 - Western Industrial Estate - Knockmitten Lane - Dublin 12	T : (353)1/56.28.66 Tfx : (353)1/56.27.19	90959
<b>Finland</b>	Telemecanique Oy Siinikalliontie 16 - 02630 Espoo	T : (358)0/52.45.22 Tfx : (358)0/52.42.61	121923
<b>France</b>	Telemecanique S.A. BP 236 - 43-45, bd. Franklin Roosevelt - 92504 Rueil-Malmaison Cedex	T : (33)1/47.32.92.12 Tfx : (33)1/47.08.01.59	203369
<b>Great Britain</b>	Telemecanique Electrique (Great Britain) Ltd University of Warwick Science Park Sir William Lyons Road Coventry CV4 7EZ	T : (44)203/416255 Tfx : (44)203/417517	317290
<b>Greece</b>	Telemecanique Hellas S.A. 14 Km Athinon Lamias - 14564 Kifissia	T : (30)1/807.77.03 Tfx : (30)1/807.28.03	216913
<b>Hong Kong</b>	Telemecanique Asia Pacific Ltd Cornwall House 20/F North 28 Tong Chong St. Taikoo Trading Estate - POB 3215 - Hong Kong	T : (852)5650621 Tfx : (852)8111029	86508
<b>Iran</b>	Telemecanique Iran 1047, av. Vali Asr - POB 15875 - 3547 - Tehran	T : (98)21.62.01.42	215417
<b>Italy</b>	Telemecanique S.p.A. Via Orbettello 140 - 10148 - Torino	T : (39)11.25.22.12 Tfx : (39)11/216.57.93	220262
<b>Japan</b>	Telemecanique Japan Ltd Landic Akasaka Bidg. 3-4 - Akasaka 2 - Chōme Minato Ku - Tokyo 107	T : (813)585.66.72 Tfx : (813)585.66.93	25463
<b>Mexico</b>	Telemecanique Mexico SA de CV Avenida Primero de Mayo nº 83 Colonia San Luis Tlalito Naucalpan Edo Mexico - CP 53630 Mexico	T : (525)358.86.33 Tfx : (525)358.86.33	1761379
<b>Morocco</b>	Ateliers Électriques et Mécaniques 20, rue Al Bachir Al Ibrahim - BP 2097 Casa Gare Casablanca 03	T : (212)30.09.38 Tfx : (212)30.53.17	26021
<b>Netherlands</b>	Telemecanique B.V. Waarderweg 40 - 2031 BP Haarlem - Postbus 836 - 2003 RV Haarlem	T : (31)23.15.47.00 Tfx : (31)23/31.77.57	41216
<b>New Zealand</b>	Telemecanique (New Zealand) limited P.O. Box 15355 - Avondale - Auckland	T : (64.9)88.10.99 Tfx : (64.9)88.22.25	21225
<b>Norway</b>	Telemecanique a.s. Solgaard Skog 2 - Postboks 128 - 1501 - Moss	T : (47)9.25.70.41 Tfx : (47)9.25.78.71	76812
<b>Portugal</b>	Telemecanique - Automatismos Industriais, Lda Rua Castilho 167 - 2 - 1000 Lisboa	T : (351)1/65.85.47 Tfx : (351)1/68.57.99	14842
<b>Singapore</b>	Telemecanique Far East Co Pte Ltd 5012 Ang Mo Kio Ave. 5 - 02-02 to 09 Ang Mo Kio Industrial Park 2 - Singapore 2056	T : (65)48.23.323 Tfx : (65)48.18.639	RS 22119
<b>Spain</b>	Telemecánica Eléctrica Española SA Carretera de Andalucía, km 13 Polígono Industrial "Los Angeles" - Getafe Madrid Apartado de Correos nº 17056 - 28080 Madrid	T : (34)1/695.71.00 Tfx : (34)1/682.08.74	22702
<b>Sweden</b>	Telemecanique Svenska A.B. Drottninggatan 22 - Box 503 - 64200 Flen	T : (46)157.652.00 Tfx : (46)157.110.47	64128
<b>Switzerland</b>	Telemecanique A.G. Schermerwaldstrasse 11 - 3063 Ittigen	T : (41)31/58.88.11 Tfx : (41)31/58.80.35	911802
<b>Taiwan</b>	Telemecanique Taiwan CO., LTD. 4 Fl., No. 1, Chung Yang Road Nan Kan Taipei, Taiwan, R.O.C.	T : 886.2.786.3203 Tfx : 886.2.786.3212	
<b>Turkey</b>	Telemecanique Elektrik - Cihazlar Sanayi A.S. Seyit Nizam Mah Ambarilar Cd. Nº 6/A Bl. 34780 - Zeytinburnu - Istanbul	T : (90)1.558.78.82 Tf : (90)1.558.27.49	30696
<b>United States</b>	Telemecanique Incorporated 2002 Bethel Road Westminster - Maryland 21157	T : (301)876.2214 Tfx : (301)857.7577	265502
<b>Venezuela</b>	Telemecanique de Venezuela s.a. Urbanizacion "La Urbina" Calle 3A. Centro Profesional "La Urbina" Planta Baja. Local C. Caracas Distrito Federal	T : (582)241.1344 Tf : (582)241.8961	23710
<b>West Germany</b>	Deutsche Telemecanique Electrique GmbH Elisabethstrasse 17 - Postfach 1261 - 4030 - Ratingen 2	T : (49)2102.4040 Tfx : (49)2102.4042.56	172102325

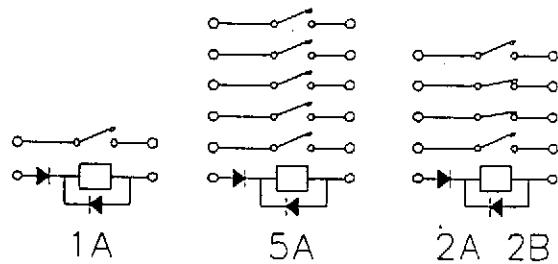
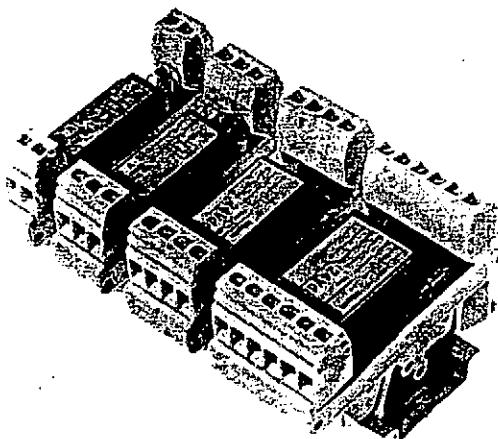
### Representations

For all countries throughout the world or countries not mentioned on this page (except France), coordination is ensured by:

Telemecanique International Division  
Rueil 2000  
7, rue Henri Becquerel  
92508 Rueil Malmaison Cedex - France

## 30 Series Reed Relays

Small multi-contact relay modules



### Specifications

Input:	Voltage	24Vdc (other voltages also available)
Current		see ordering data
Output:	Max. voltage	200Vdc
	Max. current	750mA
	Max. power	10W
	Initial contact resistance	100mohms
	Operate time	1.5ms
	Release time	1.5ms
Terminals:		
Type		GSE5
Conductor size; solid		0.5-4.0mm <sup>2</sup>
flexible		0.5-2.5mm <sup>2</sup>
Insulation stripping length		7mm

### Ordering Data

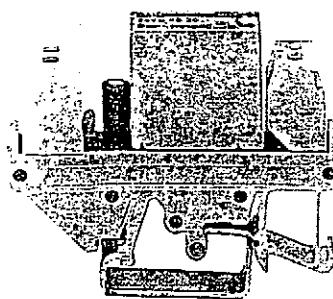
Contacts	Operating Current	Module Width	Type	Cat. No.
	(typ.)			
1A	7.3mA	11.2mm	30100-024D	38403.6
2A	14mA	16.2mm	30200-024D	38413.6
3A	18mA	21.2mm	30300-024D	38423.6
4A	24mA	26.2mm	30400-024D	38433.6
5A	32mA	31.2mm	30500-024D	38443.6
1B	8.7mA	16.2mm	30010-024D	38453.6
2B	12mA	21.2mm	30020-024D	38463.6
1A 1B	18mA	21.2mm	30110-024D	38473.6
2A 2B	21mA	26.2mm	30220-024D	38483.6

A = Normally open contact

B = Normally closed contact

## RS 30

Slim single relay modules, 1NO or 1NC contact



### Specifications

Input:	Max. voltage	see ordering data
Output:	Max. current	250V ac
	Max. power;	see ordering data
	ac load	2000VA
	dc load	100W
Isolation:	Input to output	4kV ac eff.
Terminals:	Type	GSE5
	Conductor size; solid	0.5-4.0mm <sup>2</sup>
	flexible	0.5-2.5mm <sup>2</sup>

### Ordering Data

Input Voltage	Switching Current (max)	Cat. No.
12V dc	5A	11294.2
24V dc	5A	11016.2
48V dc	5A	11018.2
110V dc	5A	11551.2
12Vdc	5A	11295.2
24Vdc	5A	11009.2
48Vdc	5A	11011.2
110Vdc	5A	11552.2
110V ac	5A	11021.2
240V ac	3A	EA20140
110V ac	5A	11014.2
240V ac	3A	EA20141

Other types featuring plug/socket inputs and outputs, and changeover contacts are also available. Contact your Weidmüller (Klippon Products) representative for details.

## Fuse Terminals

### Type ASK 1

### SAKS 1

### KS K

In accordance with the appropriate regulations, all electrical equipment needs to be protected against overload and short circuits. In general, fuses are placed at the input of a circuit, at each point where current ratings are reduced, or where short circuit capability is reduced in order to protect against short-circuit or overload. The fuse terminal range has been designed to accommodate high-rupturing capacity fuses in the G-type, Diazed and Neozed ranges, as follows:-

#### ASK 1, SAKS 1, KSK

G-type fuses with or without indicator to DIN 41660 (5 x 20mm). Fuse range 0.08 Amps to 6.3 Amps (250V).

#### SAKS 2

D-fuse inserts E16 to DIN 49360 Diazed System fuse range 2 Amps to 25 Amps (500V).

#### KS K, KSK 3

Fuses to BS1362 (1" x 1/4") range from 1 Amp to 13 Amps (250V) Fuses to DEF 59-96 Size O (1 1/4" x 1/4") range from 0.25 Amps to 10 Amps (440V). Bussman (1 1/4" x 1/4") type ABC range from 0.25 Amps to 15 Amps (250V).

#### SAKS 4

D-fuse inserts D01 to DIN 49522, Neozed System, range from 6 Amps to 16 Amps (380/415V).

#### SAKS 5

D-fuse inserts D02 to DIN 49522, Neozed System, range from 20 Amps to 63 Amps (440V).

Cross Connection Links QL provide the facility to build fuse distribution assemblies. Ideally, input supply should be at the centre of the assembly with the highest fuse load adjacent to the input terminal.

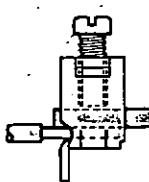
Gauge rings are available as an option for the SAKS 2, SAKS 4 and SAKS 5. When fitted into the fuse terminal these prevent a higher rated fuse being inserted than that originally selected for that circuit.

Characteristic curves for fuses are available on request.

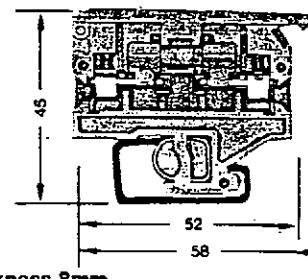
NOTE: The removal or insertion of fuses should not be undertaken without the mains supply being isolated beforehand.

Suitability of fuses for the envisaged application must be checked with the fuse manufacturer.

## Screw Clamp Connections



## ASK 1 With hinged Cartridge Fuse Housing 250V 6.3A (max. fuse size available)

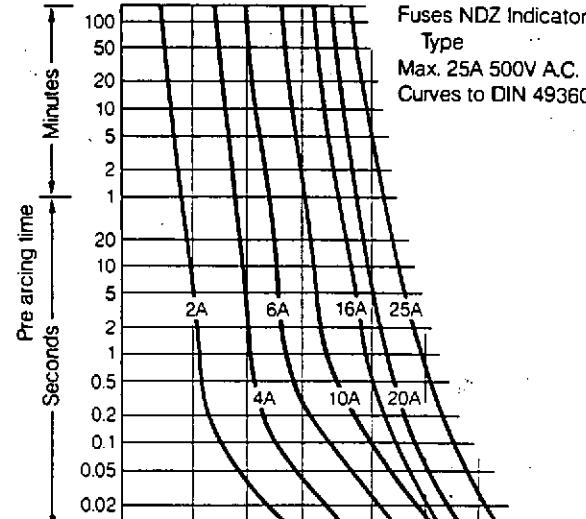


Technical Data		
Conductor size	Solid (mm <sup>2</sup> )	0.5-4
	Stranded (mm <sup>2</sup> )	0.5-4
Insulation stripping length	(mm)	9
Fuse size		20 x 5mm
Ordering Data		
Moulding material		Cat. No.
When ordering EEx'e' and Ex'N' terminals, add suffix 'e' or 'N' to the catalogue number	Polyamide	037676
Approvals		
All Approvals are listed in Approvals Guide		
Terminal Rail (2m)		
	Steel	TS 32
	Steel (M6 Slots)	TS 32
Locking pin (1m) — optional		
	Steel	SST 3
End Bracket (thickness mm)		
		EWK 1 (8.5)
End Plate (thickness mm)		
		AP (1.5)
Partition (thickness mm)		
	Resin bonded paper	TW (0.5)
Solid Brass Link		
		SBL (25 x 5)
Cross Connections		
	2 way	
	3 way	
	4 way	
	10 way	
	Screw	
	Insulated comb 2 way	QB 2
	Insulated comb 3 way	QB 3
	Insulated comb 4 way	QB 4
Fuse		
A list of all fuses stocked is shown at the end of this section		
Hinged Fuse Holder (Spare)		
	TH	037706
Cover (1m)		
	Transparent cover	
	Support bracket	
Marking Tags		
All marking systems are shown in Section T6		DEKAFIX — Section T6

## List of Preferred Cartridge Fuses

For use with

Terminal Type	Cat. No.	SAKS 2	020682		
	389742				
	037676	HRC fuse cartridge 500 Volts			
Non-indicator cartridge fuse 20 x 5mm to IEC 127 CEE 4 Type 1 DIN 41660 250 Volts					
<b>Rating</b>	<b>Cat. No.</b>	<b>Rating</b>	<b>Type</b>	<b>NDZ Cat. No.</b>	<b>TNDZ Cat. No.</b>
0.10	043030	2	E 16/2	031740	046560
0.20	043040	4	E 16/4	031750	046570
0.25	043050	6	E 16/6	031760	046580
0.50	043060	10	E 16/10	020850	046590
1.00	043070	16	E 16/16	020860	045140
1.60	043080	20	E 16/20	020870	045150
2.00	043090	25	E 16/25	020880	045160
2.50	043100				
3.15	043110				
4.00	043120				
5.00	043130				
6.30	043140				
<b>SAKS 1</b>	<b>019112</b>				
Indicator cartridge fuse 25 x 5mm to DIN 41576/CEE 250 Volts					
<b>Rating</b>	<b>Cat. No.</b>				
0.08	042900				
0.10	042910				
0.125	042920				
0.16	042930				
0.20	042940				
0.25	042950				
0.40	042960				
0.50	042970				
0.80	042980				
1.00	068020				
1.25	042990				
1.60	051740				
2.00	068030				
4.00	068040				
6.30	068050				
<b>KSK 2</b>	<b>389752</b>				
Cartridge fuse 1" x 1/4" to BS 1362 250 Volts					
<b>Rating</b>	<b>Cat. No.</b>	<b>SAKS 5</b>	<b>035942</b>		
1	043420				
2	024510				
3	043250				
5	024520				
7	045860				
10	024530				
13	024540				
<b>KSK 3, KSK 3</b>	<b>389762, 389772</b>				
<b>SAKS 6</b>	<b>053182</b>	The fitting of gauge rings is recommended when using fuses of a low rating.			
Cartridge fuse 1 1/4" x 1/4" to DEF59-96 Size 'O' 440 Volts — characteristic curves are shown on opposite page					
<b>Rating</b>	<b>Cat. No.</b>				
0.25	043180				
0.50	043190				
1	043200				
2	029450				
3	029470				
5	029460				
7	029580				
10	029390				
<b>SAKS 4</b>	<b>032132</b>				
Indicating neozed fuse suitable for 380/415 Volts applications					
<b>Rating</b>	<b>Type</b>	<b>Cat. No.</b>			
6	E 14/6	032830			
10	E 14/10	032840			
16	E 14/16	032850			
The fitting of gauge rings is recommended when using fuses of a low rating					



Mean current/time characteristics of 500 V quick-response fuse  
Timelag TNDZ types also available

Fuse characteristic curves are not included but you are invited to ask our Technical Dept. for any assistance.

**Gauge Rings**   **Type**   **Cat. No.**

for E 14 fuses   P 14/6 6A   032860

P 14/10 10A   032870

for E 16 fuses   P 16/2 2A   031770

P 16/4 4A   031780

P 16/6 6A   031790

P 16/10 10A   020890

P 16/16 16A   020900

P 16/20 20A   020910

for E 18 fuses   P 18/20 20A   036180

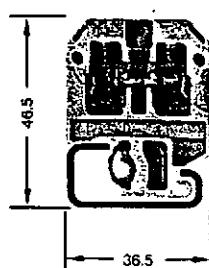
P 18/25 25A   036190

P 18/35 35A   036200

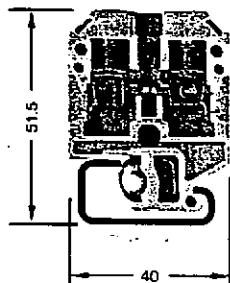
P 18/50 50A   036210

Please contact our Technical Department should you have any queries

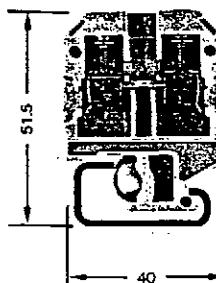
Active 29/01/2014

**SAK 2.5  
750V 27A**

Thickness 6mm

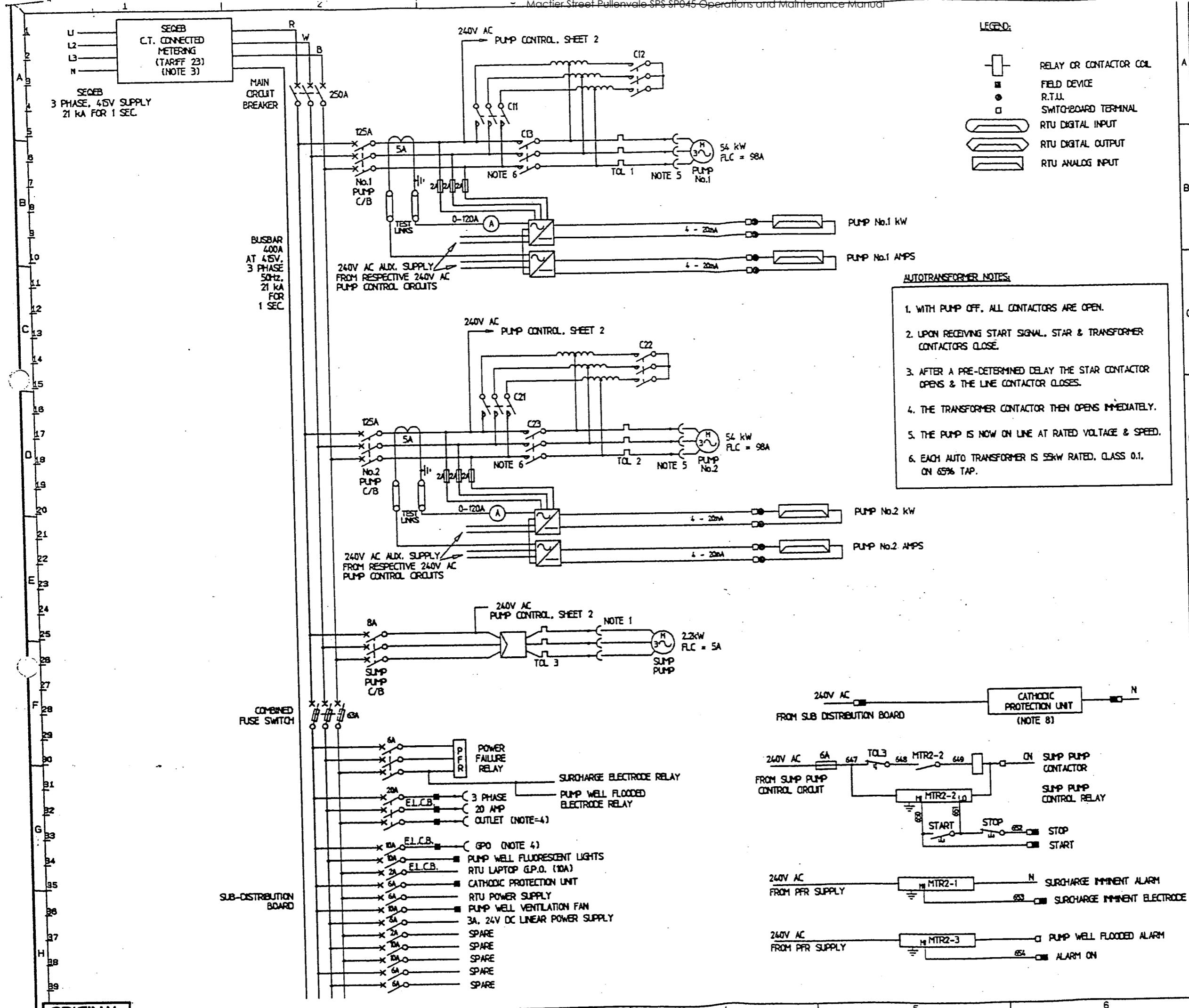
**SAK 4  
750V 36A**

Thickness 6.5mm

**SAK 6N  
750V 47A**

Thickness 8mm

Type	Cat. No.	Type	Cat. No.	Type	Cat. No.
TS32	012280	TS32	012280	TS32	012280
TS32	067610	TS32	067610	TS32	067610
SST 3	015270	SST 3	015270	SST 3	015270
EWK 1 (8.5)	020616	EWK 1 (8.5)	020616	EWK 1 (8.5)	020616
AP (1.5)	027956	AP (1.5)	011796	AP (1.5)	011796
AP (1.5)	027958	AP (1.5)	011798	AP (1.5)	011798
AP (1.5)	027952	AP (1.5)	011792	AP (1.5)	011792
AP (1.5)	027957	AP (1.5)	011797	AP (1.5)	011797
TW (1.5)	030286	TW (1.5)	013016	TW (1.5)	013016
TW (1.5)	030288	TW (1.5)	013018	TW (1.5)	013018
TW (2.5)	030282	TW (2.5)	013012	TW (2.5)	013012
TW (2.5)		TW (2.5)	013017	TW (2.5)	013017
TW (1.0)	029710	TW (0.5)	019710	TW (0.5)	019710
QL 2	015590	QL 2	013060	QL 2	019430
QL 3	015600	QL 3	013070	QL 3	019440
QL 4	015610	QL 4	013080	QL 4	019450
QL 10	033810	QL 10	033820	QL 10	033830
VH 8	026670	VH 13.5	024850	VH 12	024900
BS (M3 x 15)	035900	BS (M3 x 20)	030300	BS (M3 x 20)	030300
Captive on screw		Captive on screw		Captive on screw	
DQS2 (See Section T6)		QS2	021270	QS2	027096
VL 2		VL 2	019700	VL 2	019700
VH 19		VH 19	028510	VH 19	028510
BS (M3 x 25)		BS (M3 x 25)	029250	BS (M3 x 25)	029250
SS		SS	016440	SS	016440
PS (2.3Ø)	018040	PS (2.3Ø)	018040	PS (4Ø)	029960
StB 8.5	021570	StB 8.5	021570	StB 14	016990
AD 4	037560	AD 4	037610	AD 4	037600
BSK (M3 x 22)	012890	BSK (M3 x 22)	012890	BSK (M3 x 22)	012890
ADP 1	048520	ADP 2	048530	ADP 2	048530
fP 1	048556	HP 2	048566	HP 2	048566
DEKAFIX — Section T6		DEKAFIX — Section T6		DEKAFIX — Section T6	



- A**
- Existing sump pump outlet located in upper section of pump well.
  - Switchboard neutral & earth links to be positioned adjacent to each other in close proximity to the main incoming switch.
  - New tariff 23 meters & time switch to be located in a 316 SS enclosure mounted on the external wall of the pump station building. C.T.s, fuses & terminals to be supplied by BCC for installation into the switchboard by the contractor.
  - Existing outlets mounted in pump station dry well.
  - Motor 150A, 6 pin power decontactor MARECHAL model DSZ/200, mounted on mezzanine floor just above pump level supplied & installed by BCC.
  - Autotransformers to be class 0.1 intermittent duty, to AS 1202, Part 3 - 1976.
  - Field side & protected side wiring to lightning protection units shall be kept fully segregated in separate ducts, minimum separation 300mm.
  - C.P.U. mounted external to switchboard.
- |    |                                       |          |
|----|---------------------------------------|----------|
| D  | 8.94 AS BUILT                         | O.L.P.   |
| C  | 5.94 REVISED FOR CONSTRUCTION         | O.L.P.   |
| B  | 3.94 ISSUED FOR CONSTRUCTION          | O.L.P.   |
| A  | 2.94 ISSUED FOR QUOTATION             | O.L.P.   |
| No | DATE AMENDMENT / ISSUE TO / ISSUE FOR | INITIALS |

**AMENDMENT & ISSUE REGISTER**

MANAGER	DIRECTOR OF PLANNING & DESIGN	DATE:
		DATE:
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEV. OPERATIONS / W.S. DISTRIBUTION

DESIGN	DRAWN	TRACED	CHECKED	DATE:
K.H.	O.L.P.		KH	24.2.94
				25.2.94
				30.3.94

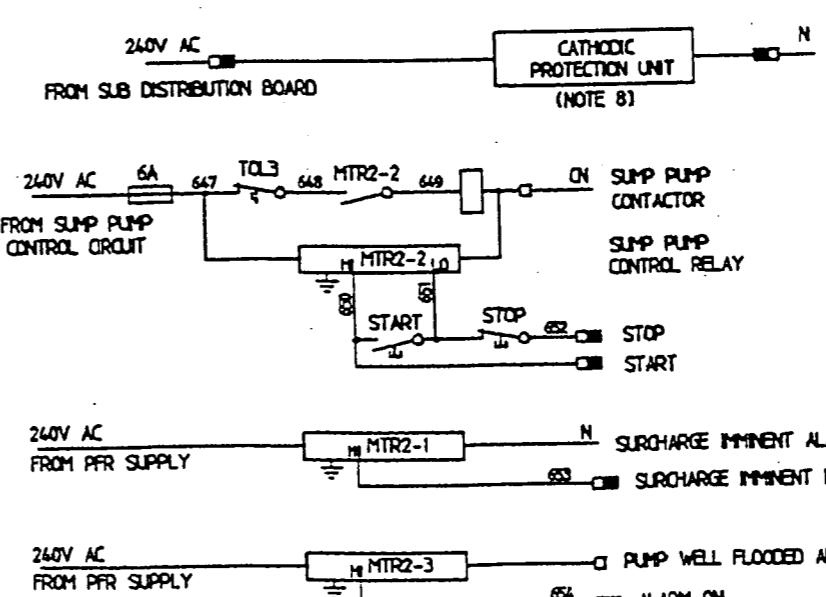
F CAD FILE NO. REFERENCES  
77T102D

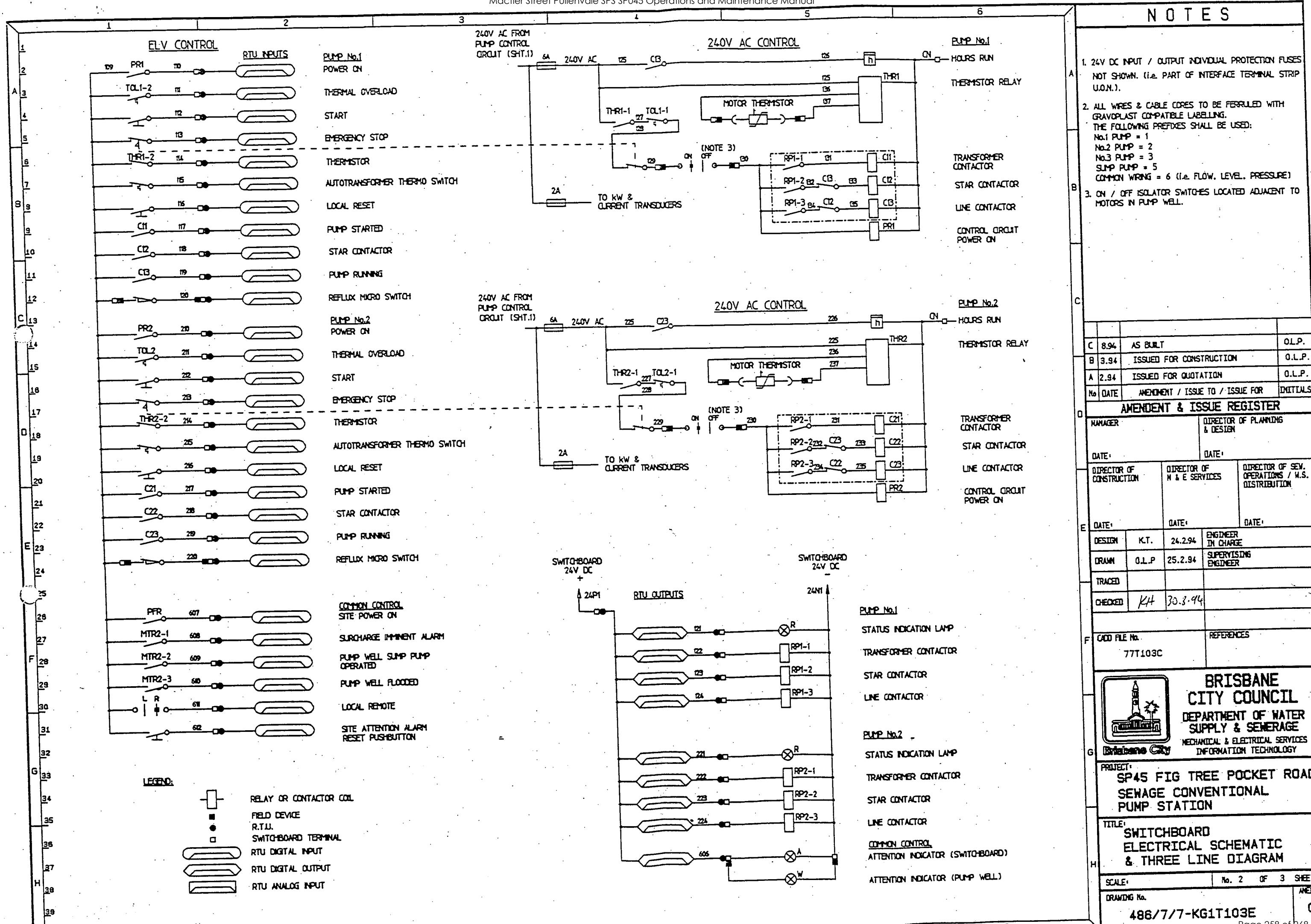


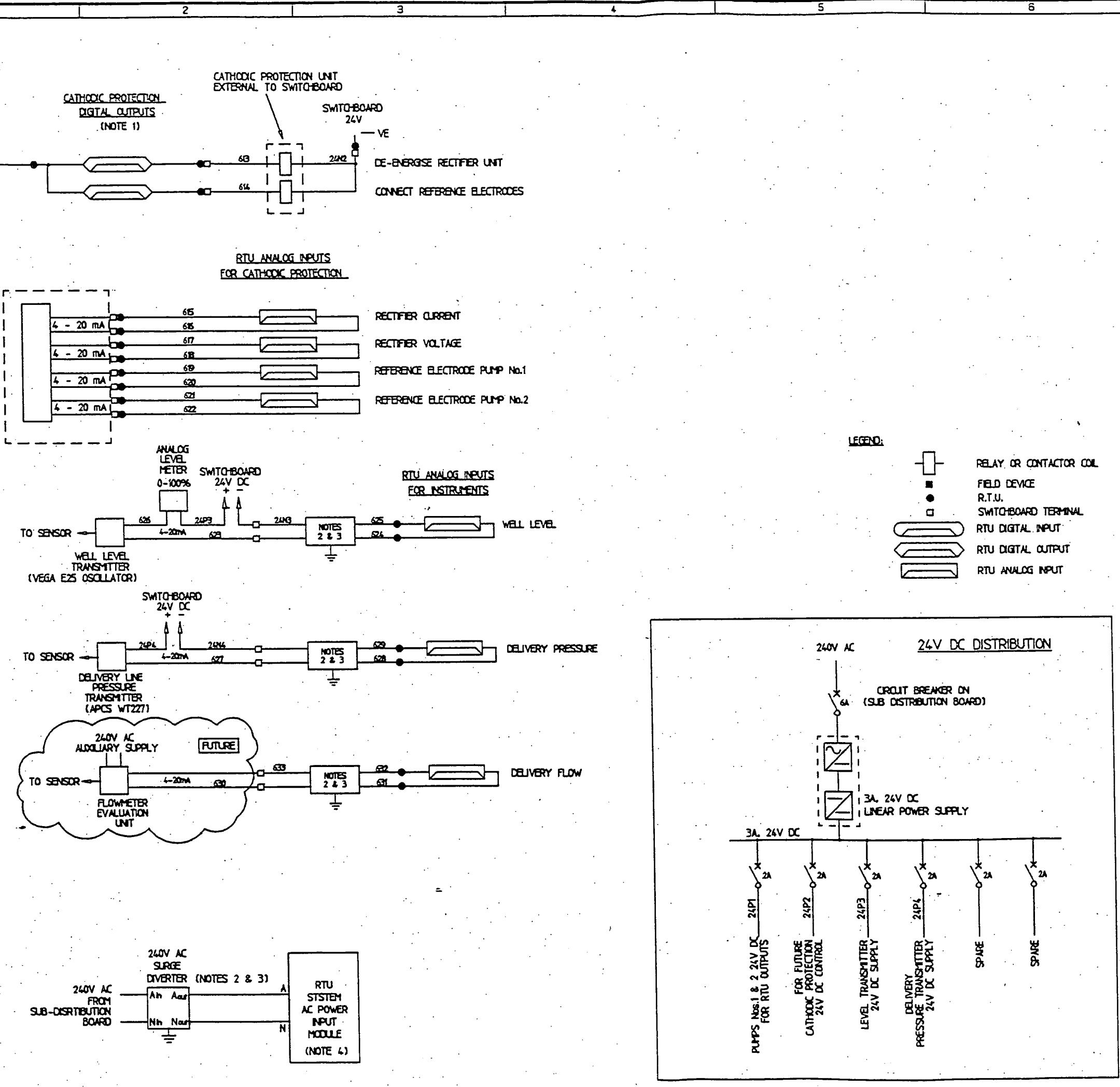
**PROJECT:** SP45 FIG TREE POCKET ROAD SEWAGE CONVENTIONAL PUMP STATION

**TITLE:** SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM

**SCALE:** M.T.S. **NO. 1 OF 3 SHEETS**  
**DRAWING NO.** 486/7/7-KG1T102E **AMEND.** D





**NOTES**

- THE TWO (2) 24V DC INTERFACE RELAYS ARE PART OF THE CATHODIC PROTECTION UNIT CONTROL SYSTEM (BY OTHERS).
- TRANSIENT SAFETY BARRIER.
- FIELD SIDE & PROTECTED SIDE WIRING TO LIGHTNING PROTECTION UNITS SHALL BE KEPT FULLY SEGREGATED IN SEPARATE DUCTS. MINIMUM SEPARATION 300mm.
- RTU SYSTEM AC POWER INPUT MODULE LOCATED IN MOSCAD 6 SLOT RTU CABINET. ALL SUPPLIED BY BCC.

D	8.94	AS BUILT	O.L.P.
C	5.94	REVISED FOR CONSTRUCTION	O.L.P.
B	3.94	ISSUED FOR CONSTRUCTION	O.L.P.
A	2.94	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

**AMENDMENT & ISSUE REGISTER**

MANAGER	DIRECTOR OF PLANNING & DESIGN
	DATE:
DIRECTOR OF CONSTRUCTION	DIRECTOR OF H & E SERVICES
	DATE:
	DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION
	DATE:

DESIGN	K.H.	24.2.94	ENGINEER IN CHARGE
DRAWN	O.L.P.	25.2.94	SUPERVISING ENGINEER
TRACED			
CHECKED	KH	30.3.94	

CADD FILE No.	REFERENCES
77T1040	

**BRISBANE CITY COUNCIL**DEPARTMENT OF WATER SUPPLY & SEWERAGE  
MECHANICAL & ELECTRICAL SERVICES INFORMATION TECHNOLOGY

PROJECT: <b>SP45 FIG TREE POCKET ROAD SEWAGE CONVENTIONAL PUMP STATION</b>	REFERENCES
TITLE: <b>SWITCHBOARD ELECTRICAL SCHEMATIC &amp; THREE LINE DIAGRAM</b>	

SCALE:	No. 3 OF 3 SHEETS
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DRAWING No.	AMEND.
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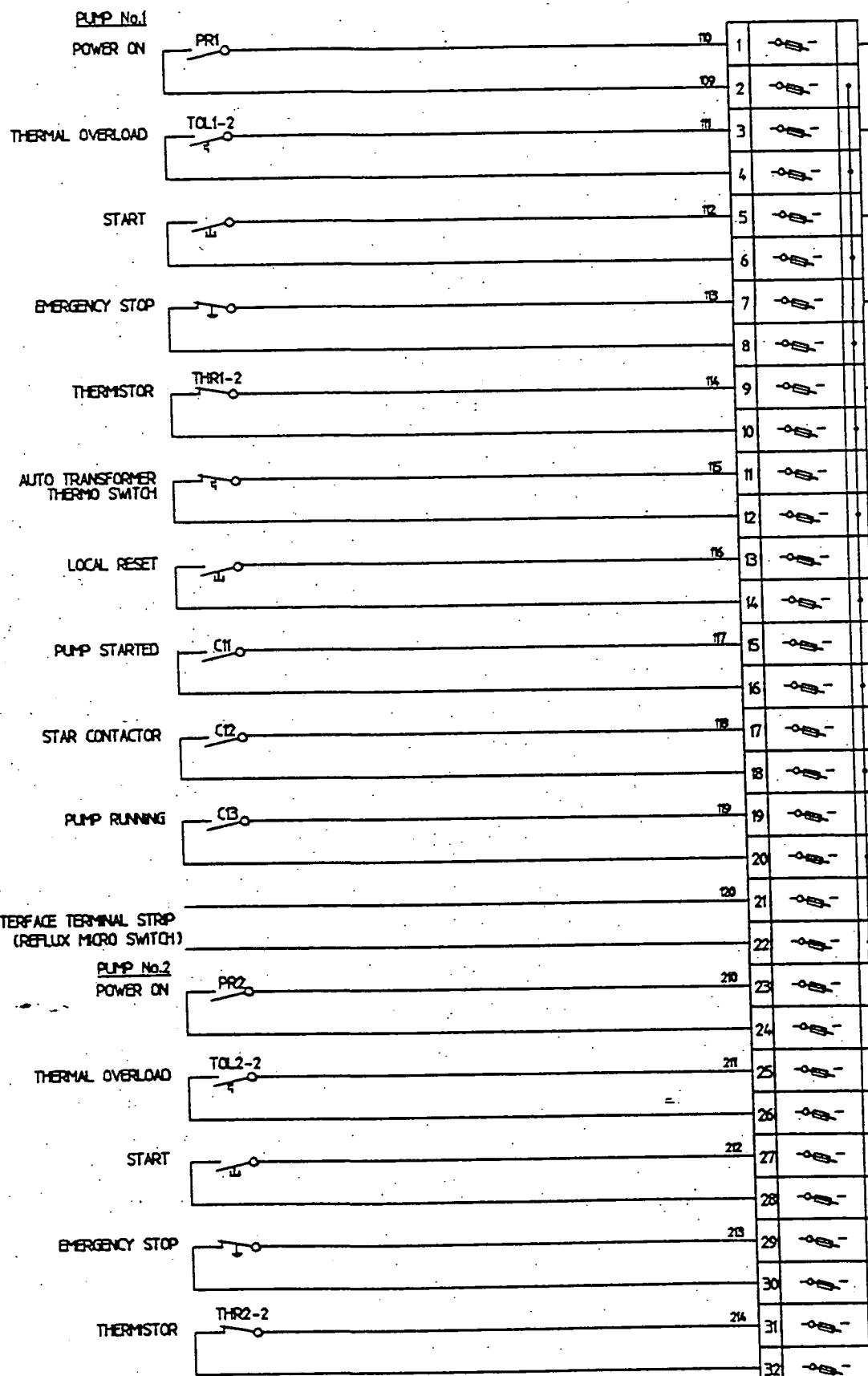
486/7/7-KG1T104E

Page 259 of 268



SWITCHBOARD

24V DC INTERFACE  
TERMINAL STRP  
(NOTE 1)



REMOTE TELEMETRY UNIT  
DIGITAL INPUT MODULE No.1, TYPE FRN 1420, SLOT 1

- 1 (NOT USED)  
2 (NOT USED)

1. FUSES ARE 100 mA RATED.

## NOTES

D	8.94	AS BUILT	O.L.P.
C	5.94	REVISED FOR CONSTRUCTION	O.L.P.
B	3.94	ISSUED FOR CONSTRUCTION	O.L.P.
A	2.94	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

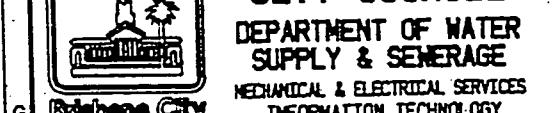
## AMENDMENT &amp; ISSUE REGISTER

MANAGER	DIRECTOR OF PLANNING & DESIGN		
DATE:	DATE:		
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES		
E			
DATE:	DATE:		
DESIGN	K.H.	24.2.94	ENGINEER IN CHARGE
DRAWN	O.L.P.	25.2.94	SUPERVISING ENGINEER
TRACED			
CHECKED	KH	30.2.94	

FILE NO.	REFERENCES
7771060	

## BRISBANE CITY COUNCIL

DEPARTMENT OF WATER SUPPLY & SEWERAGE  
MECHANICAL & ELECTRICAL SERVICES INFORMATION TECHNOLOGY



PROJECT:  
SP45 FIG TREE POCKET ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

TITLE:  
SWITCHBOARD  
TERMINATION DIAGRAM  
DIGITAL INPUTS

SCALE: No. 1 OF 2 SHEETS

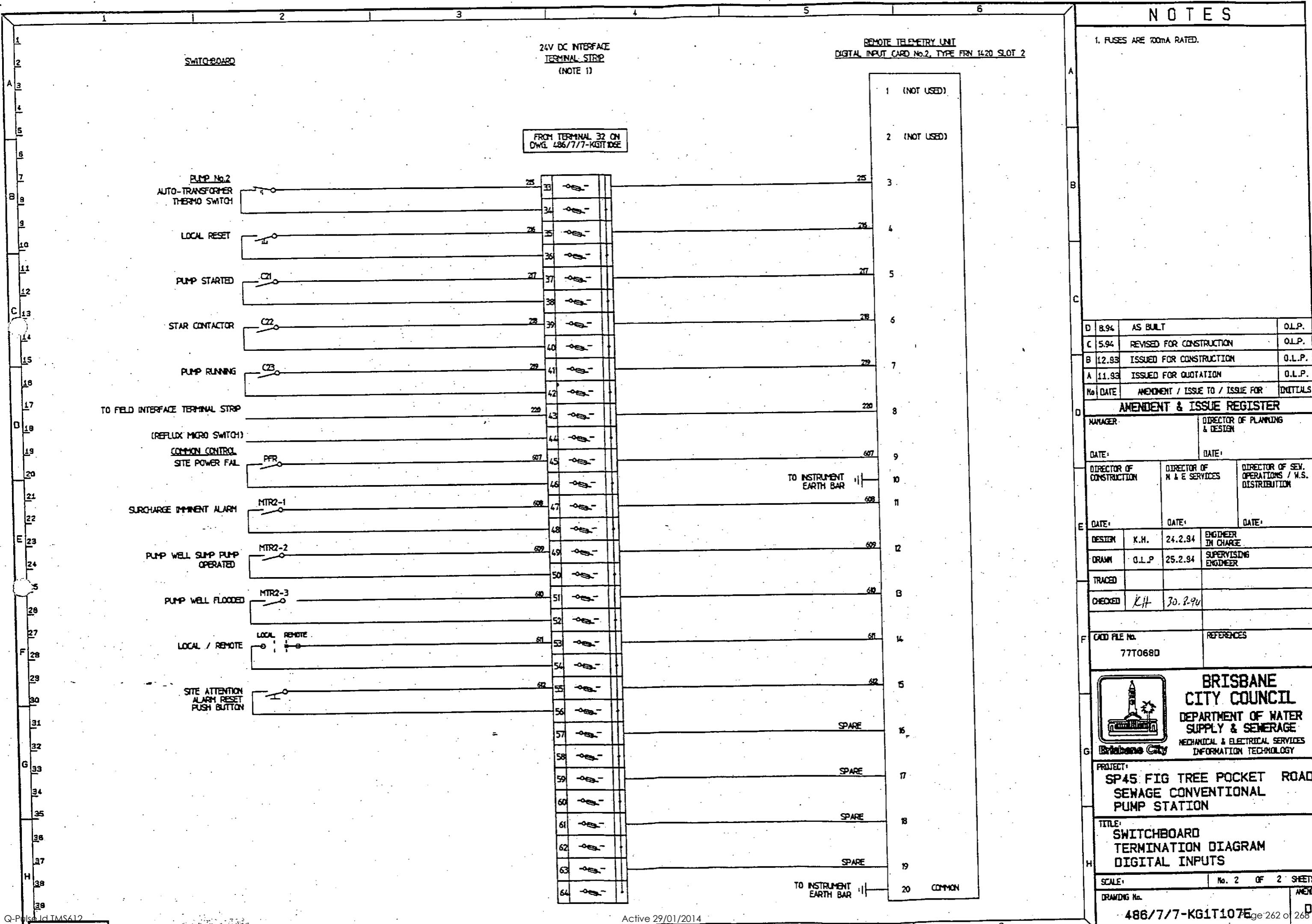
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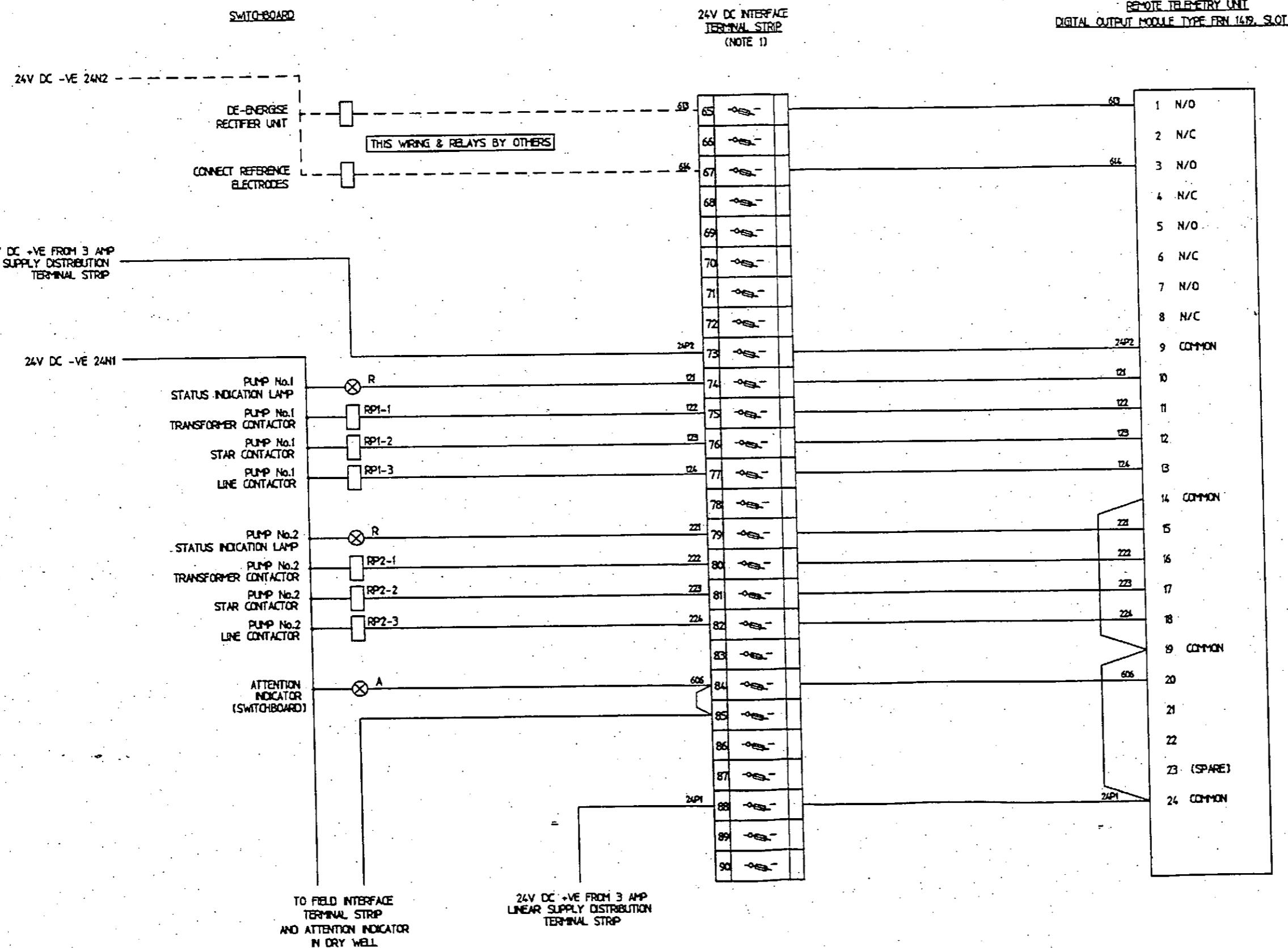
486/7/7-KG1T106E

Page 261 of 268

CONTINUED ON DWG. 486/7/7-KG1T106E

TO INSTRUMENT EARTH BAR





## NOTES

1 FUSES RATED TO SUIT LOAD.

C	8.94	AS BUILT	O.L.P.
B	3.94	ISSUED FOR CONSTRUCTION	O.L.P.
A	2.94	ISSUED FOR QUOTATION	O.L.P.
No.	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

## **AMENDMENT & ISSUE REGISTER**

**MANAGER**      **DIRECTOR OF PLANNING  
& DESIGN**

DATE: \_\_\_\_\_ | DATE: \_\_\_\_\_

DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEN. OPERATIONS / M.S. DISTRIBUTION
--------------------------	----------------------------	---

DATE: DATE: DATE:  
ENGINER

DESIGNER	R.H.	24.2.94	IN CHARGE
DRAWN	O.I.P	25.2.94	SUPERVISING ENGINEER

OWNER	NAME	POSITION	ENGINEER
TRACED			

checked	XH	30.3-14
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COMBINE #	REFERENCES
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77T108C

**BRISBANE**



**BRISBANE  
CITY COUNCIL  
DEPARTMENT OF WATER  
SUPPLY & SEWERAGE  
MECHANICAL & ELECTRICAL SERVICES  
INFORMATION TECHNOLOGY**

PROJECT: SP45 FIG TREE POCKET ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

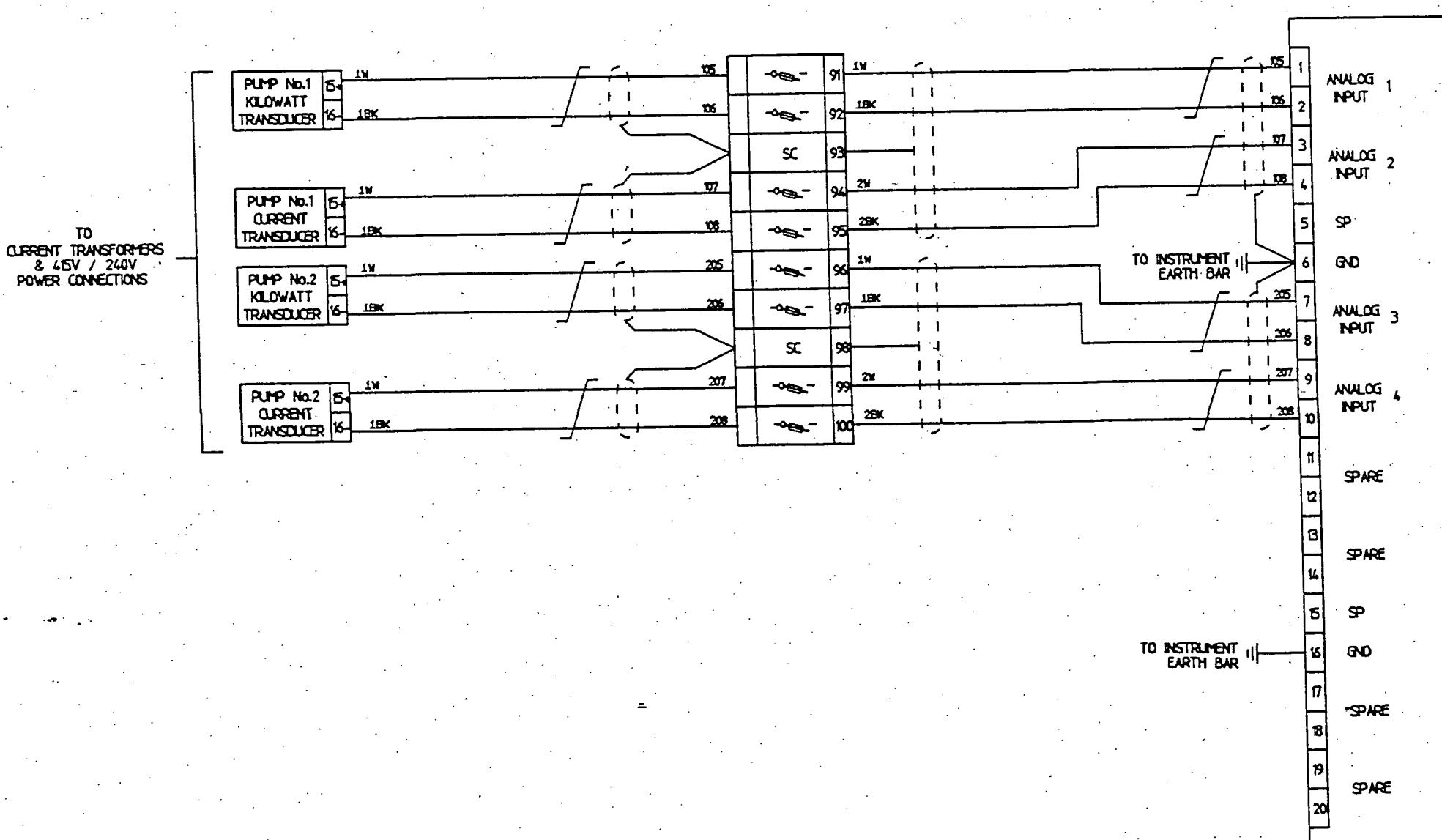
**TITLE:**  
**SWITCHBOARD**  
**TERMINATION DIAGRAM**  
**DIGITAL OUTPUTS**

SEARCHED  
SERIALIZED  
INDEXED  
FILED  
NOV 1 1968

1864743-XG1T108E

NOTES

1. FUSES ARE 100mA RATED.

INSTRUMENT TRANSMITTERS24V DC INTERFACE  
TERMINAL STRIP  
(NOTE 1)REMOTE TELEMETRY UNIT  
ANALOG INPUT MODULE No.1 TYPE FRN 1421, SLOT 4

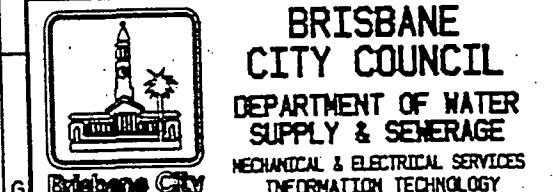
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C	5.93	REVISED FOR CONSTRUCTION	O.L.P.
B	3.94	ISSUED FOR CONSTRUCTION	O.L.P.
A	2.94	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

## AMENDMENT &amp; ISSUE REGISTER

MANAGER	DIRECTOR OF PLANNING & DESIGN	DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION
DATE:	DATE:	DATE:

DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION
DATE:	DATE:	DATE:
DESIGN	K.H.	24.2.94 ENGINEER IN CHARGE
DRAWN	O.L.P.	25.2.94 SUPERVISING ENGINEER
TRACED		
CHECKED	K.H.	30.3.94

CADD FILE NO.	REFERENCES
777109D	



PROJECT:  
SP45 FIG TREE POCKET ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

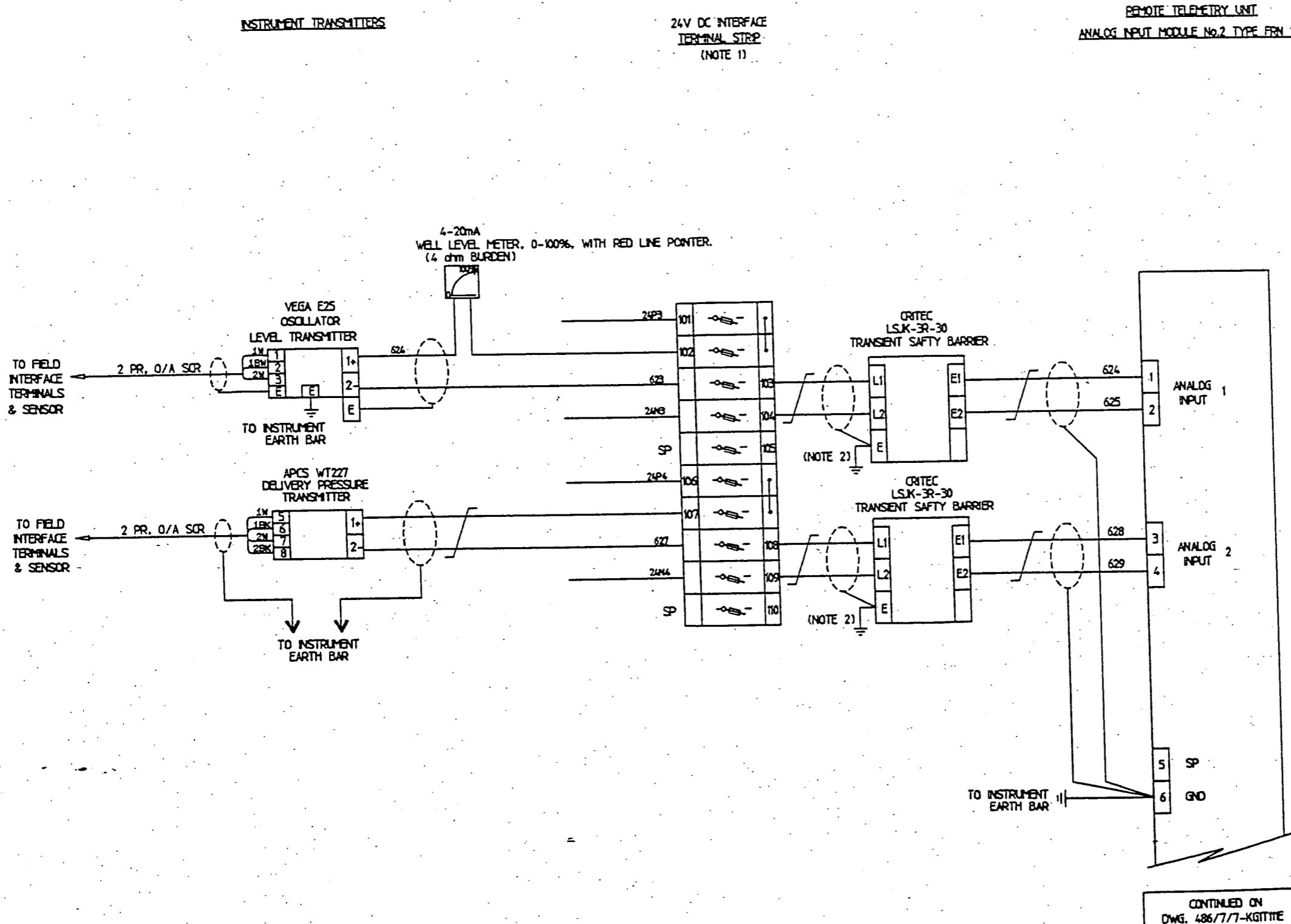
TITLE:  
SWITCHBOARD  
TERMINATION DIAGRAM  
ANALOG INPUTS

SCALE: No. 1 OF 3 SHEETS

DRAWING NO. ANERO. D

486/7/7-KG1T109E

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CONTINUED ON  
DWG. 486/7/7-KGTTTE

## NOTES

1. FUSES ARE 100mA RATED.
  2. CONNECT PROTECTIVE EARTH TERMINAL TO MAIN CUBICLE EARTH.

D	8.94	AS BUILT	O.L.P.
C	5.94	REVISED FOR CONSTRUCTION	O.L.P.
B	3.94	ISSUED FOR CONSTRUCTION	O.L.P.
A	2.94	ISSUED FOR QUOTATION	O.L.P.
No.	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

**AMENDMENT & ISSUE REGISTER**

MANAGER	DIRECTOR OF PLANNING & DESIGN
DATE:	DATE:

**DATE:** **DATE:**

DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEV. OPERATIONS / W.S. DISTRIBUTION
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**DATE:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

DATE:	DATE:	DATE:
DESIGN	K.H.	24.2.94 ENGINEER IN CHARGE
DRAWN	O.L.P	25.2.94 SUPERVISING ENGINEER

卷之三

SEARCHED		
CHECKED	KH	30.3.94

#### **REFERENCES**



**BRISBANE  
CITY COUNCIL**

**DEPARTMENT OF WATER  
SUPPLY & SEWERAGE**

**MECHANICAL & ELECTRICAL SERVICES**

**INFORMATION TECHNOLOGY**

PROJECT:  
SP45 FIG TREE POCKET ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

**TITLE:**  
**SWITCHBOARD**  
**TERMINATION DIAGRAM**  
**ANALOG INPUTS**

2014-5 12 3 OE 3 SHEETS

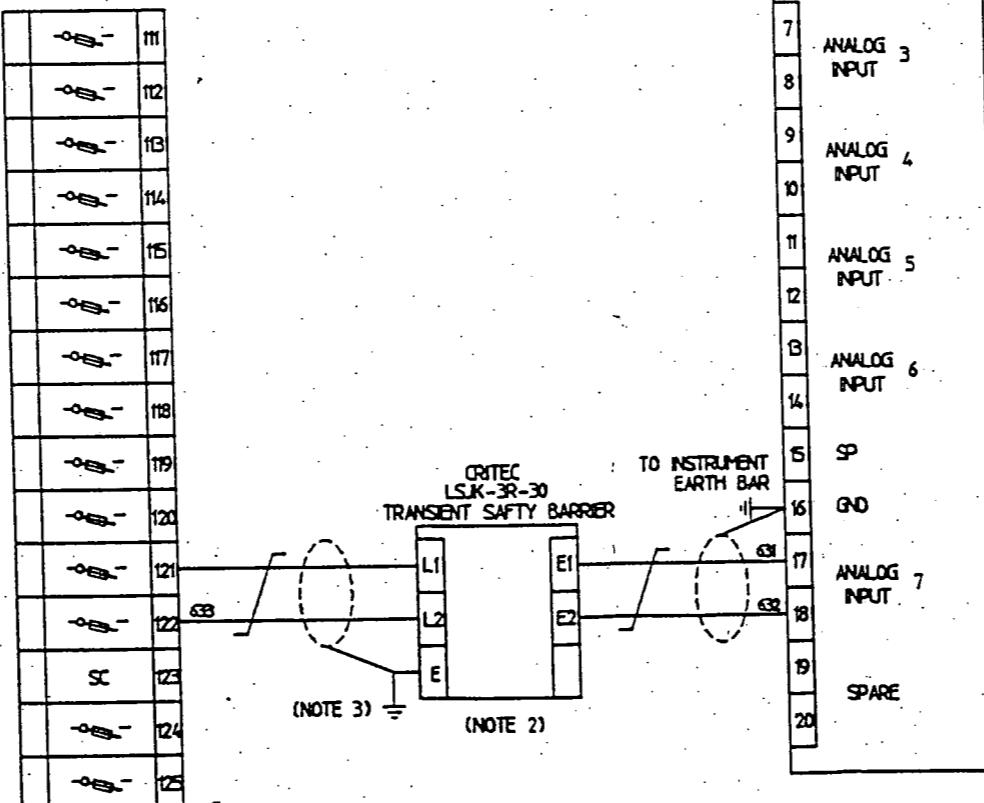
**ANNEX II**

卷之三

1 2 3 4 5 6

## NOTES

1. FUSES ARE 100mA RATED.  
 2. THIS TRANSIENT SAFETY BARRIER FOR FUTURE FLOW METER INSTALLATION SHALL BE SUPPLIED & INSTALLED BY SWITCHBOARD CONTRACTOR.  
 3. CONNECT PROTECTIVE EARTH TERMINAL TO MAIN CUBICLE EARTH.

CATHODIC PROTECTION UNIT  
& FLOW METER24V DC INTERFACE  
TERMINAL STRIP  
(NOTE 1)REMOTE TELEMETRY UNIT  
ANALOG INPUT MODULE No.2 TYPE FRN 1421, SLOT 5TERMINALS FOR  
FUTURE  
CATHODIC  
PROTECTION  
UNITTERMINALS FOR FUTURE CONNECTION  
OF FLOW METER 4-20mA  
SIGNAL FROM FIELD INTERFACE  
TERMINAL STRIP.

D	8.94	AS BUILT	O.L.P.
C	5.94	REVISED FOR CONSTRUCTION	O.L.P.
B	3.94	ISSUED FOR CONSTRUCTION	O.L.P.
A	2.94	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

## AMENDMENT &amp; ISSUE REGISTER

MANAGER DIRECTOR OF PLANNING &amp; DESIGN

DATE: DATE:

DIRECTOR OF CONSTRUCTION DIRECTOR OF M &amp; E SERVICES DIRECTOR OF SEV. OPERATIONS / W.S. DISTRIBUTION

DATE: DATE: DATE:

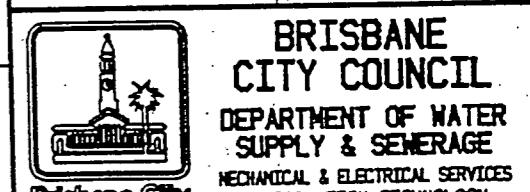
DESIGN K.H. 24.2.94 ENGINEER IN CHARGE

DRAWN O.L.P. 25.2.94 SUPERVISING ENGINEER

TRACED

CHECKED XH 30.9.94

CADD FILE NO. 77T1110 REFERENCES



PROJECT: SP45 FIG TREE POCKET ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

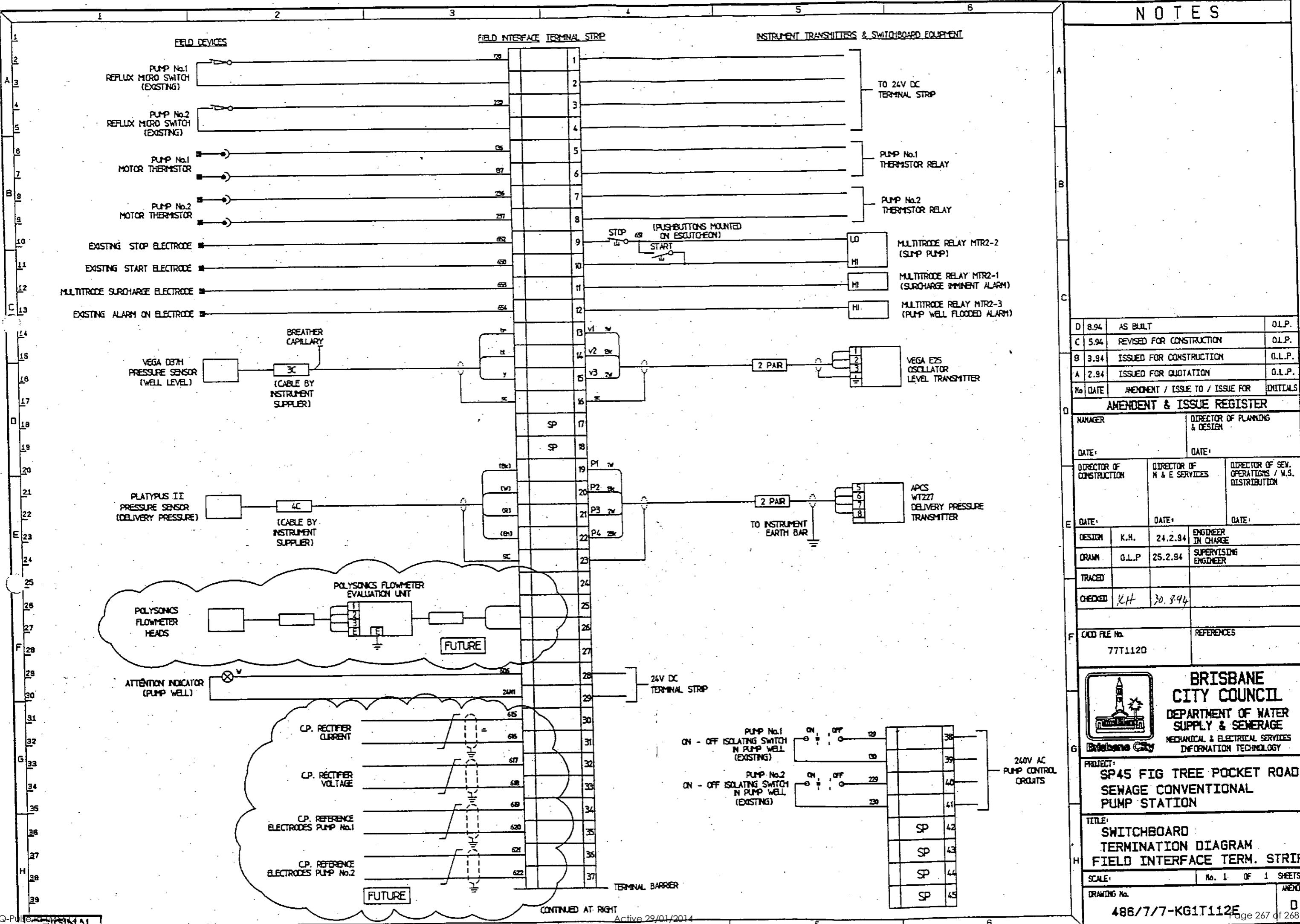
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TERMINATION DIAGRAM  
ANALOG INPUTS

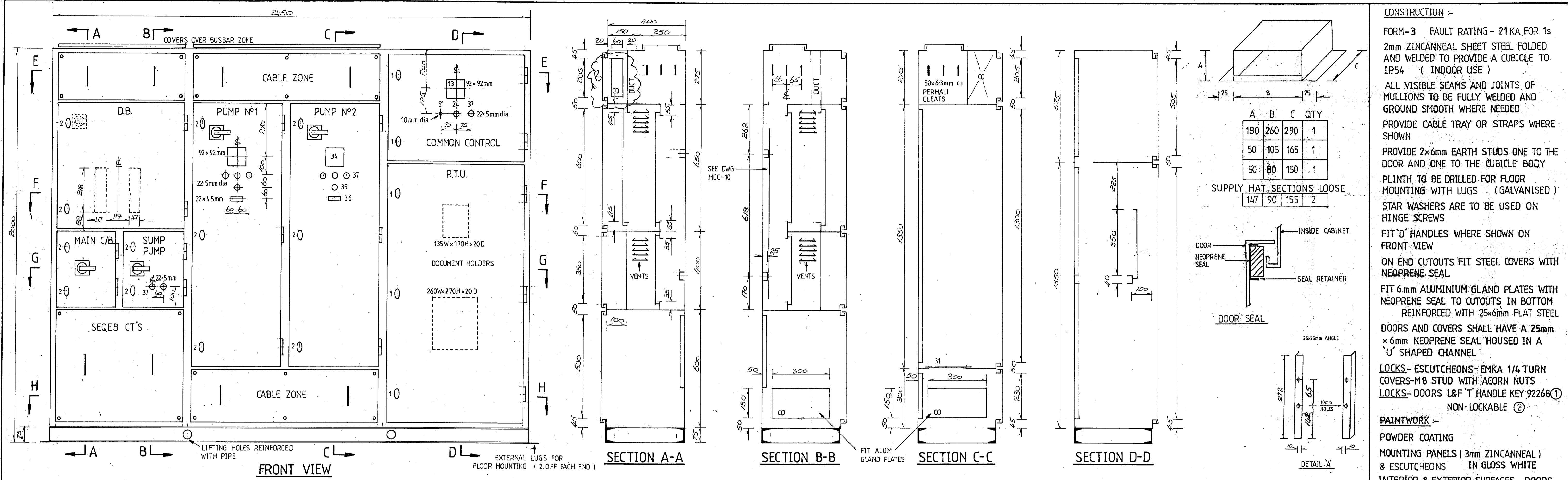
SCALE: No. 3 OF 3 SHEETS

DRAWING NO. AMEND.

486/7/7-KG1T111E

Page 266 of 268



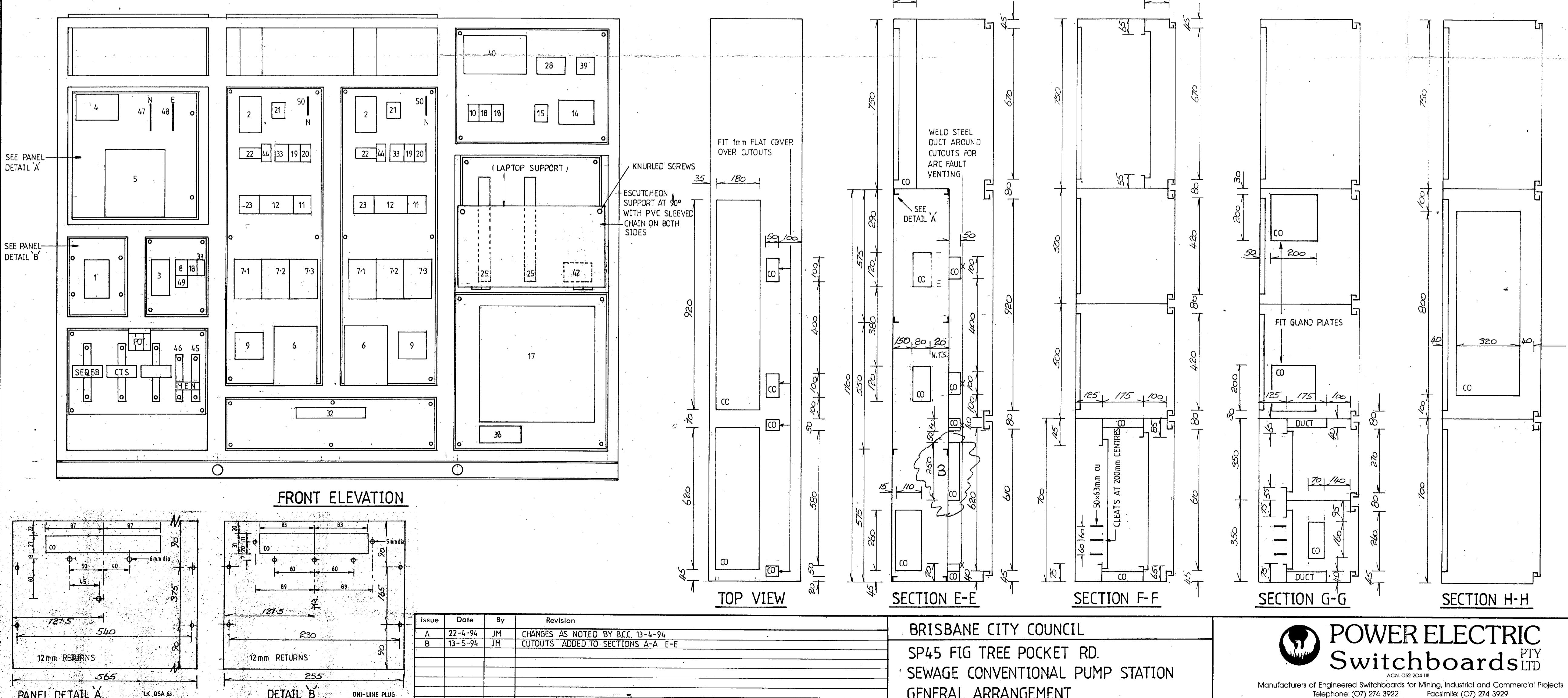


**CONSTRUCTION**

FORM-3 FAULT RATING - 21 KA FOR 1s  
2mm ZINCANNEAL SHEET STEEL FOLDED AND WELDED TO PROVIDE A CUBICLE TO IP54 (INDOOR USE)  
ALL VISIBLE SEAMS AND JOINTS OF MULLIONS TO BE FULLY WELDED AND GROUND SMOOTH WHERE NEEDED  
PROVIDE CABLE TRAY OR STRAPS WHERE SHOWN  
PROVIDE 2x6mm EARTH STUDS ONE TO THE DOOR AND ONE TO THE CUBICLE BODY  
PLINTH TO BE DRILLED FOR FLOOR MOUNTING WITH LUGS (GALVANISED)  
STAR WASHERS ARE TO BE USED ON HINGE SCREWS  
FIT 'D' HANDLES WHERE SHOWN ON FRONT VIEW  
ON END CUTOUTS FIT STEEL COVERS WITH NEOPRENE SEAL  
FIT 6mm ALUMINIUM GLAND PLATES WITH NEOPRENE SEAL TO CUTOUTS IN BOTTOM REINFORCED WITH 25x6mm FLAT STEEL  
DOORS AND COVERS SHALL HAVE A 25mm x 6mm NEOPRENE SEAL HOUSED IN A 'U' SHAPED CHANNEL  
LOCKS- ESCUTCHEONS- EMKA 1/4 TURN COVERS-M8 STUD WITH ACORN NUTS  
LOCKS- DOORS L&F T HANDLE KEY 92268(1) NON-LOCKABLE (2)

**PAINTWORK**

POWDER COATING  
MOUNTING PANELS (3mm ZINCANNEAL) & ESCUTCHEONS IN GLOSS WHITE  
INTERIOR & EXTERIOR SURFACES, DOORS, COVERS IN X15 ORANGE



No.	ITEM
1	INCING CIRCUIT BREAKER
2	MOTOR CIRCUIT BREAKERS FOR PUMPS 1 & 2
3	SUMP PUMP CIRCUIT BREAKER
4	CHAINED FUSE SWITCH FOR SUBISTRIBUTION BOARD
5	SUBISTRIBUTION BOARD 3 WAY CHASSIS
6	AUTO TRANSFORMER 54 KW, 12 STARTS / HOUR
7	AUTO TRANSFORMER CONTACTORS
7.1	LINE
7.2	TRANSFORMER
7.3	STAR
8	UMP PUMP STARTER
9	PUMPS 1 & 2 THERMAL OVERLOAD RELAYS
10	POWER FAILURE RELAY
11	CURRENT TRANSFORMER
12	KILOWATT TRANSFORMER
13	ANALOG LEVEL METER (4-20mA) 96 x 96
14	LEVEL TRANSMITTER
15	PRESSURE TRANSMITTER EVALUATION UNIT
16	REMOTE TELEMETRY UNIT
17	MULTIMODE RELAY
18	TEMPERATURE RELAY
19	24V AC INTERFACE RELAY
20	24V DC INTERFACE RELAYS
21	CT'S (MOTORS) CLASS 1 TORQS SA SECONDARY
22	PROTECTION FUSES FOR METERING & TRANSFORMERS
23	ATTENTION INDICATOR
24	24V DC INTERFACE TERMINALS
25	SAFETY CIRCUIT BREAKERS FOR PUMP CONTROL
26	24V AC CONTROL TERMINALS
27	24V DC MINIATURE CIRCUIT BREAKERS
28	24V DC MINIATURE CIRCUIT BREAKERS
29	SURGE ABSORBER FOR INSULATING POWER SUPPLY
30	CARBON FIBRE REINFORCED PLATEMENT
31	GLAND PLATES
32	FIELD DEVICE INTERFACE TERMINALS (POWER, CONTROL, EARTHING)
33	CONTROL FUSE
34	AMMETER (66 x 96)
35	LED CLUSTER INDICATING LIGHT
36	HOLDS RUN METER
37	PUSH BUTTON
38	SURGE ABSORBER FOR RTU POWER SUPPLY
39	SURGE ABSORBERS FOR ANALOG SIGNALS
40	3A, 230V DC LINEAR POWER SUPPLY
41	EMERGENCY POWER SUPPLY
42	DA G.P.O.
43	
44	C.T. TEST LINKS
45	MAIN EARTH LINK
46	MAIN NEUTRAL LINK
47	SUB DISTRIBUTION NEUTRAL LINK
48	SUB DISTRIBUTION EARTH LINK
49	UMP PUMP THERMAL OVERLOAD UNIT
50	CONTROL NEUTRAL LINK
51	SELECTOR SWITCH (66 x 64)
52	
53	

BRISBANE CITY COUNCIL  
SP45 FIG TREE POCKET RD.  
SEWAGE CONVENTIONAL PUMP STATION  
GENERAL ARRANGEMENT

POWER ELECTRIC  
Switchboards LTD

Manufacturers of Engineered Switchboards for Mining, Industrial and Commercial Projects  
Telephone: (07) 274 3922 Facsimile: (07) 274 3929  
P.O. Box 616, Fairfield Gardens, Brisbane, Queensland, 4103, Australia

Scale	1:10	Drawing No
Date	7-4-94	410-01
Drawn	JM	Rev. A B
Checked	09	Job No 410