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

MAINTENANCE MANUAL

SP7

BRISBANE CITY COUNCIL

DEPARTMENT OF WATER SUPPLY AND SEWERAGE

SEWERAGE PUMP STATION
FEROL STREET SP7

ORDER NO:- 481798 EF
DATE:- 1994
PROJECT CODE:- SFLK5/73

SCSQ

SECTION 1

MAINTENANCE INSTRUCTIONS

TEST REPORTS

SECTION 2

EQUIPMENT CATALOGUES

SECTION 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.

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FINAL CHECKING PROCEDURE FOR ALL SWITCHBOARDS

SWITCHBOARD TITLE: SP7 FEROL STREET

JOB NUMBER: 382-01

- ✓ 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.
- ✓ 10. Check general condition of Switchboard (Paintwork etc).
- ✓ 11. Check Switchboard has been cleaned out.
- ✓ 12. Meger Switchboard.

CIRCUIT	RESULT 1000V MEGER
R-E	500 MΩ
W-E	500 MΩ
B-E	500 MΩ
R-W	550 MΩ
R-B	550 MΩ
W-B	550 MΩ
NEUT-E	400 MΩ

COMMENTS:

CHECKED BY: G. Higgins

TERASAKI

Ensuring Service, Maintaining Quality

Publication
G20A
May 1993

Standard Series

High-fault Level Series

Motor Protection Series

Non-automatic Series

TemBreak

Total Protection, Complete Control

Selection Guide

NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD

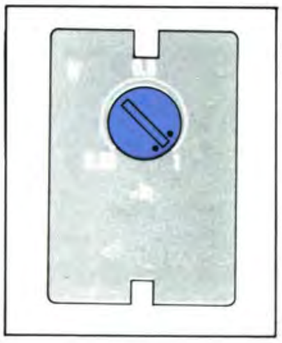
TemBreak
THREE SERIES, TWO TYPES

A new generation of MCCB's.
Procuring a major evolution in Low Voltage Distribution Systems. Offering a choice of 3 series (economical, standard and high fault) and two types. **Adjustable thermal magnetic** or **microprocessor** based **solid state O.C.R.** Both types have common construction features and interchangeable plug-in accessories. TemBreak thermal magnetic types offer the widest adjustment range and more flexibility than with 63% – 100% base current adjustment each MCCB is individually calibrated to ensure precision tripping on overcurrent.

TemBreak.
Widest choice, most flexibility.

Adjustable Rated Current

Adjustable Thermal Magnetic Range



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%.

Microprocessor Range

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 [Io] select switch and the rated current [I_1] 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.

Base current	0.63 0.8 1.0 ×In			63					80					100		
Current dial	0.8 0.85 0.95 0.9 1.0 ×Io	80	85	90	95	100	80	85	90	95	100	80	85	90	95	100
Breaker rated current	72% in this example	50	54	57	60	63	64	68	72	76	80	80	85	90	95	100

1 Selection Co-ordination

Standard Protective Characteristics

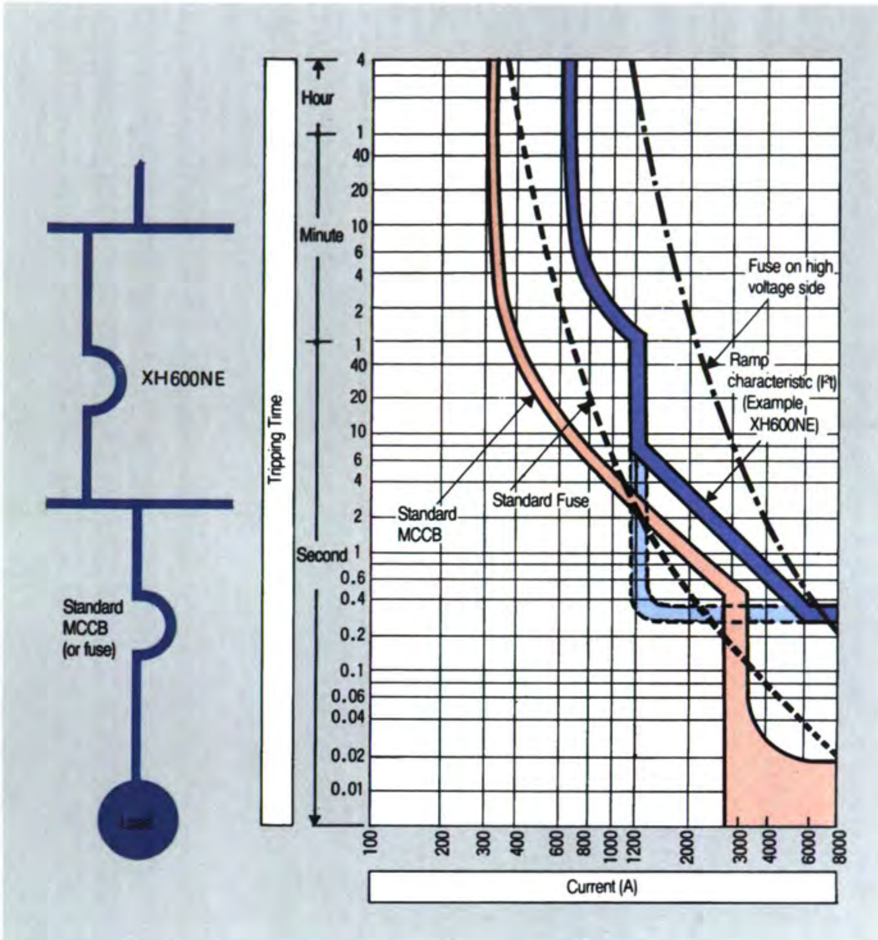
The electronic type TemBreak incorporates an adjustable long time-delay, short time-delay and instantaneous trips, enabling co-ordination with fuses on the high voltage side and down stream breakers.

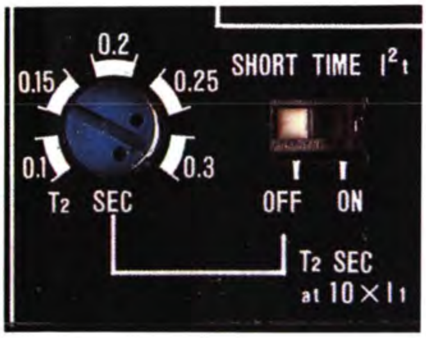
Adjustable LTD

Essential for general industrial plants and generator protection

Ramp Characteristic [I^2t], STD

The ramp characteristic [I^2t] enables precise co-ordination with thermal magnetic MCCBs or fuses.
The ramp characteristic or the definite time-delay characteristic can be used by operating the OFF-ON switch (on for [I^2t]) ramp characteristic).
The definite time-delay characteristic is 1000% of the rated current [I_1]





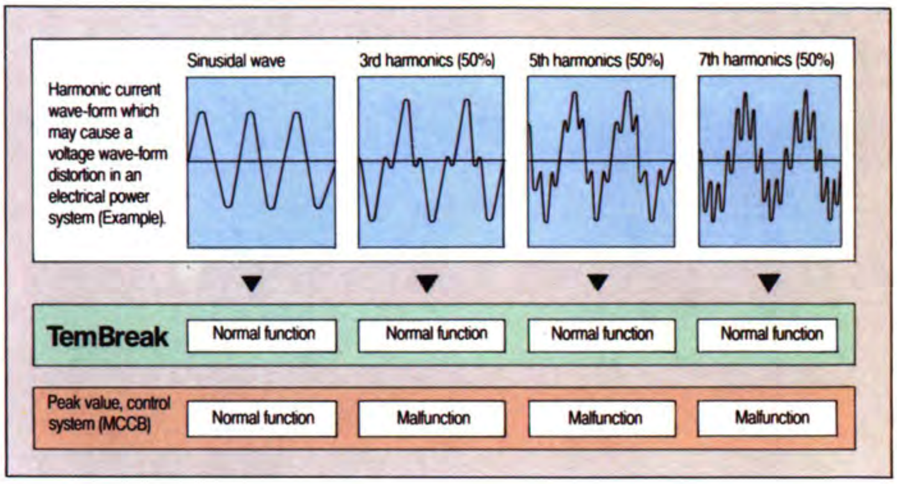
2 Adjustable rated current in 5 steps from 50-100%.

Optimum protection co-ordination is attainable depending on increase/decrease of the load.
NOTE: A cover is provided and sealed to prevent unauthorised changing of the settings.

Rated Current Adjustment Dial (Example)

3 TemBreak Electronic type) True r.m.s. value control system

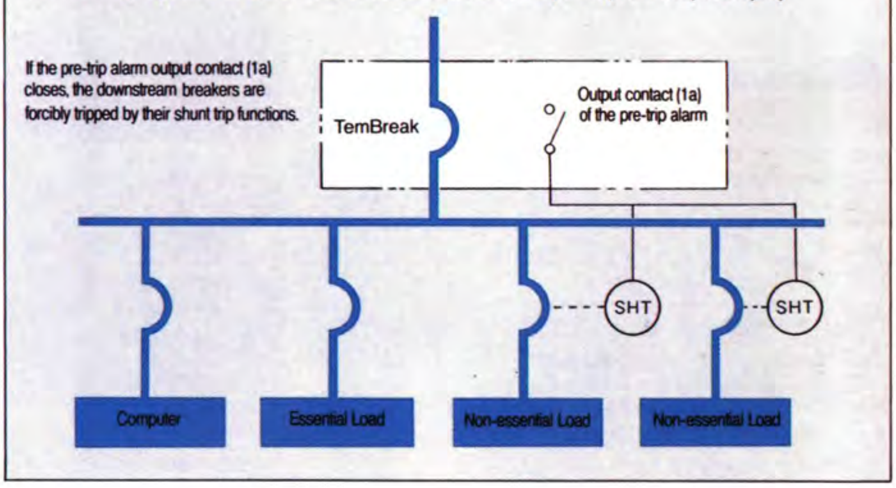
Semi-conductor controlled power equipment in a distribution system can be a source of harmonic currents which may cause malfunctioning in other equipment within the system.
TemBreak's electronic protective device detects the true r.m.s. value of the load current, therefore, remaining unaffected by harmonics.



4 Pre-trip alarm function (optional)

Electronic office equipment is being increasingly used in today's buildings and factories.
The power demand at peak time can reach overload levels of the breakers installed in the system. If such a situation continued a sudden trip may be generated by the long time-delay trip function of the breaker.
The pre-trip alarm prevents this "sudden trip" enabling uninterrupted power to computers and other important loads.

A forced trip system of a non-essential circuit due to a pre-trip alarm (example).



5 Fitted with Ground fault trip (GFT) (Optional)

The set current is continuously adjustable from 10%-40% of the C.T. rated current of the overcurrent trip device.

6 Fitted with Trip Indicators (Optional)

LED indication of which function tripped the breaker; Long time-delay (LTD), Short time-delay (STD), instantaneous (INST.) or ground fault trip (GFT).

7 Field checking of the trip functions

The OCR checker is an easy-to-use instrument for field testing the trip functions of TemBreak (Electronic type). It checks the pick-up current and tripping time values of the functions **independently** (LTD, STD, INST. and GFT).
The values are indicated digitally on a 3-digit LED display.
Power Source 100-110V AC or 220-240V AC. single phase: 50/60 Hz 30V A.
Dimension 200mm (W) x 84mm (H) x 130mm (D).

8 Electronic type TemBreak (E.M.C.) conformity

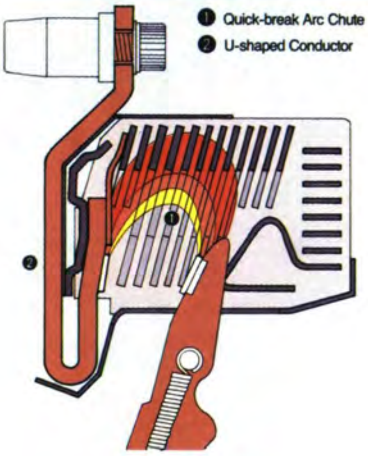
The electronic range of TemBreak MCCBs are "electromagnetic compatable" (E.M.C.) within a switchgear environment.

TemBreak Common features of a construction

1 FBM Fast Break Mechanism

HIGH SPEED, HIGHLY-EFFICIENT BREAKING ACHIEVED!!

U-shaped Conductors
Dual Repulsive Contacts
Quick-break Arc Chutes



2 Internal accessories are "plug-in type" for easy exchange

Shunt trip	Undervoltage trip
Auxiliary switches	Alarm switches

- The shunt trip device is equipped with anti-burnout switches.
- For 3-pole types the shunt trip or undervoltage trip, auxiliary switch and alarm switch can be installed.

3 All types of Tembreak are fitted with Push-To-Trip buttons

4 Contact status indication

IEC defined international symbols are used for Contact status indication I (ON) Red, (Trip) White, (OFF) Green.

5 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 other indication is necessary).

6 Plug-in mounting blocks, IP20 (Optional)

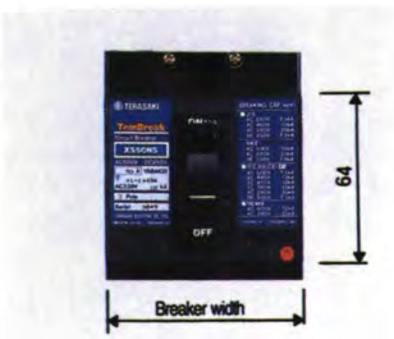
The degree of protection provided by the mounting blocks for plug-in type TemBreak breakers (for switchboard and distribution board use) is IP20 as defined in IEC Pub. 529.

7 Unified dimensions simplifies distribution board design

TemBreak frame sizes up to 400A, a range most often used in distribution boards, are unified in dimensions of two panel cut-out heights (64mm and 102mm).

● 102mm

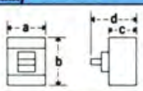
● 64mm



For further details please refer to Ratings and Specifications pages 6-10

Standard Series

Ampere Frame	125	125	225	250	400	400	400	630
Type	**XS125CJ**	**XS125NJ**	**XE225NS**	**XS250NJ**	**XS400CJ**	**XS400NJ**	**XS400NE**	**XS630CJ**
Number of Poles	*1 / 3 / 4	*1 / 3 / 4	3	3 / 4	3 / 4	3 / 4	3 / 4	3 / 4
■ Outside View *1:1-Pole breaker only, XS125CS and XS125NS respectively. NOTE: 2-pole breaker is a 3-pole breaker with the centre pole omitted.								
■ Rated Current (A).In ① (Calibrated at 45°C 50°C, available on request).	NRC / ASR min max 16 50 / 20 12.5 20 20 63 / 32 20 32 25 80 / 50 32 50 32 100 / 63 40 63 40 125 / 100 63 100 / 125 80 125	NRC / ASR min max 16 50 / 20 12.5 20 20 63 / 32 20 32 25 80 / 50 32 50 32 100 / 63 40 63 40 125 / 100 63 100 / 125 80 125	125 200 150 225 175	NRC / ASR min max 160 / 100 160 250 / 160 250	NRC / ASR min max 250 / 160 250 400 / 250 400	NRC / ASR min max 250 / 160 250 400 / 250 400	NRC / ASR min max 250 / 125 250 400 / 200 400	NRC / ASR min max 400 / 250 400 630 / 400 630
AC RATED INSULATION VOLTAGE (Ui)	660	690	660	690	690	690	690	690
AC RATED BREAKING CAPACITY sym r.m.s. (kA)					ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS
IEC 947-2(Icu) / IEC 947-2(Ics) BS 4752-1 (P-1) CEI 17-5 690V	–	– / 5/2.5	–	8/4	16/8	18/9	18/9	16/8
660V	–	– / 5/2.5	–	8/4	16/8	18/9	18/9	16/8
500V	– / 7.5/3.8	– / 12/6	10/5	22/11	22/11	30/15	30/15	25/13
440V	10/5 ⑥ / 10/5	22/11 ⑥ / 22/11	15/7.5	25/13	30/15	42/21	42/21	30/15
415V	14/7 ⑥ / 14/7	25/13 ⑥ / 25/13	15/7.5	25/13	30/15	50/25	50/25	35/18
400V	18/9 ⑥ / 18/9	25/13 ⑥ / 25/13	18/9	25/13	35/18	50/25	50/25	45/23
380V	18/9 ⑥ / 18/9	30/15 ⑥ / 30/15	18/9	35/18	35/18	50/25	50/25	45/23
240V	14/7 / 25/13	25/13 / 50/25	25/13	50/25	50/25	85/43	85/43	50/25
AS 2184 440V	14(⑥*1)	25(⑥*1)	15	30	36	50	50	36
415V	18(⑥*1)	30(⑥*1)	18	35	36	50	50	45
NEMA AB-1 600V	–	– / 12	–	22	22	30	30	25
480V	– / 10	– / 22	15	25	30	42	42	35
240V	14 / 25	25 / 50	25	50	50	85	85	50
without Inst. 240-690V	–	–	–	–	–	–	5	–
DC RATED BREAKING CAPACITY (kA) 250V	– / 10	– / 15	10	40	40	40	–	40
125V	15	15 / 20	15	40	40	40	–	40
■ RATED SHORT TIME CURRENT r.m.s. (kA) (Icw)	–	–	–	–	–	–	5(0.3 sec)	–
■ DIMENSIONS (mm) a	30 / 90 / 120	30 / 90 / 120	105	105 / 140	140 / 185	140 / 185	140 / 185	210 / 280
b	155	155	165	165	260	260	260	273
c	86	86	86	86	103	103	103	103
d	104	104	107	107	131	131	131	145
Weight (kg) ⊙ marked standard type	0.51 / 1.3 / 1.58	0.51 / 1.3 / 1.58	1.85	1.85 / 2.4	4.7 / 6.1	4.7 / 6.1	4.8 / 6.2	9.0 / 11.5
■ CONNECTIONS AND MOUNTINGS								
front connect (FC) terminal screw	⊙	⊙	⊙	⊙	⊙	⊙	⊙	–
attached flat bar	–	–	○(BAR)	○(BAR)	○(BAR)	○(BAR)	○(BAR)	⊙
solderless terminal (PWC)	○	○	○	○	○	○	○	○
rear connect (RC) bolt stud	○	○	–	–	–	–	–	–
flat bar stud	–	–	○	○	○	○	○	○
plug-in (PM) for switchboard	– / ○	– / ○	○	○	○	○	○	○
for distribution board	– / ○ / –	– / ○ / –	–	–	–	–	–	–
draw-out (DO)	–	–	–	–	○	○	○	○
■ STANDARD FEATURES contact indicator	•	•	•	•	•	•	•	•
trip button	– / •	– / •	•	•	•	•	•	•
■ PROTECTIVE FUNCTIONS								
Electronic type								
Adjustable LTD, STD & INST.	–	–	–	–	–	–	•	–
Adjustable GFT or Adjustable PTA (option)	–	–	–	–	–	–	•(PTA only)	–
trip indicators (option)	–	–	–	–	–	–	–	–
Thermal-magnetic type								
thermal and fixed magnetic trips	• / –	• / –	•	–	–	–	–	–
thermal and adjustable magnetic trips	–	–	–	–	–	–	–	–
adjustable thermal and fixed magnetic trips	– / •	– / •	–	•	–	–	–	–
adjustable thermal and magnetic trips	–	–	–	–	•	•	–	•
■ ACCESSORIES (option) CODE								
internally mounted auxiliary switch AX, AXE	– / •(AXE)	– / •(AXE)	•(AXE)	•(AXE)	•(AX)	•(AX)	•(AX)	•(AX)
alarm switch AL, ALE	– / •(ALE)	– / •(ALE)	•(ALE)	•(ALE)	•(AL)	•(AL)	•(AL)	•(AL)
shunt trip SHT	•	•	•	•	•	•	•	•
undervoltage trip ③ UVT	– / •	– / •	•	•	•	•	•	•
externally mounted motor operator MOT	– / •	– / •	•	•	•	•	•	•
external operating handle panel mounted type OHE	•	•	•	•	•	•	•	•
breaker mounted type OHG	– / •	– / •	•	•	•	•	•	•
variable depth type OHH	– / •	– / •	•	•	•	•	•	•
extension handle EHA	–	–	–	–	–	–	–	•
mechanical interlock front type MIF	– / •	– / •	•	•	•	•	•	•
rear type MIB	– / •	– / •	•	•	•	•	•	•
handle holder HH	•	•	•	•	•	•	•	•
handle lock HL	•	•	•	•	•	•	•	•
terminal cover front connect type TCF	– / •	– / •	•	•	•	•	•	•
rear/plug-in type TCR	– / •	– / •	•	•	•	•	•	•
interpole barrier TBA	– / •	– / •	•	•	•	•	•	•
accessory lead terminal LTF	– / •	– / •	•	•	•	•	•	•
door flange D.F	•	•	•	•	•	•	•	•



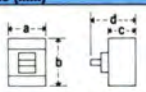
⊙ Standard. This configuration used unless otherwise specified.
○ Optional standard. Specify when ordering.
● 'yes' or 'available'
– 'no' or 'not available'

① DC rating available on request.
② Thermally Adjustable.
③ The UVT controller is installed externally with A.C. U.V.T.

④ One is supplied with every 5 MCCB's.
⑤ Applicable to the rear-connect type.
⑥ Value at 1/√3 times stated voltage.

Standard Series

Ampere Frame	630	630	800	800	1250	1600	2000	2500
Type	**XS630NJ**	**XS630NE**	**XS800NJ**	**XS800NE**	**XS1250NE**	**XS1600NE**	**XS2000NE**	**XS2500NE**
Number of Poles	3 | 4	3 | 4	3 | 4	3 | 4	3 | 4	3 | 4	3 | 4	3 | 4
■ Outside View								
■ Rated Current (A).In ①	NRC / ASR min max	NRC / ASR min max	NRC / ASR min max	NRC / ASR min max	NRC / ASR min max	NRC / ASR min max	NRC / ASR min max	NRC / ASR min max
(Calibrated at 45°C 50°C, available on request).	400 250 400 / 630 400 630	630 315 630	800 500 800	800 400 800	1000 500 1000 / 1250 630 1250	1600 800 1600	2000 1000 2000	2500 1250 2500
AC RATED INSULATION VOLTAGE (Ui)	690	690	690	690	690	690	690	690
AC RATED BREAKING CAPACITY sym r.m.s. (kA)	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS
IEC 947-2 (Icu) / IEC 947-2 (Ics), BS 4752-1(P-1), CEI 17-5 — 690V	20/10	20/10	20/10	20/10	25/19	45/34	45/42	45/42
660V	20/10	20/10	20/10	20/10	25/19	45/34	45/42	45/42
500V	35/18	35/18	35/18	35/18	45/34	65/49	65/49	65/49
440V	50/25	50/25	50/25	50/25	65/49	85/64	85/64	85/64
415V	50/25	50/25	50/25	50/25	65/49	85/64	85/64	85/64
400V	50/25	50/25	50/25	50/25	65/49	85/64	85/64	85/64
380V	65/33	50/25	65/33	50/25	85/64	100/75	100/75	100/75
240V	85/43	85/43	85/43	85/43	100/75	125/94	125/94	125/94
AS 2164 — 440V	50	50	50	50	65	85	85	85
415V	65	50	65	50	65	100	100	100
NEMA AB-1 — 600V	30	30	30	30	42	65	65	65
480V	50	50	50	50	65	85	85	85
240V	85	85	85	85	85	125	125	125
without Inst. — 240-690V	—	10	—	10	15	20	42	42
DC RATED BREAKING CAPACITY (kA) — 250V	40	—	40	—	—	—	—	—
125V	40	—	40	—	—	—	—	—
■ RATED SHORT TIME CURRENT r.m.s. (kA) (Icw)	—	10(0.3 sec)	—	10(0.3sec)	15(0.3sec)	20(0.3 sec)	42(0.3 sec)	42(0.3 sec)
■ DIMENSIONS (mm)								
a	210 | 280	210 | 280	210 | 280	210 | 280	210 | 280	210 | 280	320 | 429	320 | 429
b	273	273	273	273	370	370	450	450
c	103	103	103	103	120	140	185	185
d	145	145	145	145	171	191	245	245
Weight (kg) ⊙ marked standard type	9.0 | 11.5	9.6 | 12.0	9.4 | 12.2	9.7 | 12.5	22.0 | 28.0	27.0 | 35.0	54.0 | 67.0	62.5 | 78.2
■ CONNECTIONS AND MOUNTINGS								
front connect (FC) — terminal screw	—	—	—	—	—	—	—	—
attached flat bar	⊙	⊙	⊙	⊙	⊙	○	○	—
solderless terminal (PWC)	○	○	○	○	○	—	—	—
rear connect (RC) — bolt stud	—	—	—	—	—	—	—	—
flat bar stud	○	○	○	○	○	⊙	⊙	⊙
plug-in (PM) — for switchboard	○	○	○	○	○	—	—	—
for distribution board	—	—	—	—	—	—	—	—
draw-out (DO)	○	○	○	○	○	○	○	—
■ STANDARD FEATURES								
contact indicator	●	●	●	●	●	●	●	●
trip button	●	●	●	●	●	●	●	●
■ PROTECTIVE FUNCTIONS								
Electronic type								
Adjustable LTD, STD & INST.	—	●	—	●	●	●	●	●
Adjustable GFT or Adjustable PTA (option)	—	●	—	●	●	●	●	●
Trip indicators (option)	—	—	—	—	●	●	●	●
Thermal-magnetic type								
thermal and fixed magnetic trips	—	—	—	—	—	—	—	—
thermal and adjustable magnetic trips	—	—	—	—	—	—	—	—
adjustable thermal and fixed magnetic trips	—	—	—	—	—	—	—	—
adjustable thermal and magnetic trips	●	—	●	—	—	—	—	—
■ ACCESSORIES (option) — CODE								
internally mounted — auxiliary switch — AX, AXE	●(AX)	●(AX)	●(AX)	●(AX)	●(AX)	●(AX)	●(AX)	●(AX)
alarm switch — AL, ALE	●(AL)	●(AL)	●(AL)	●(AL)	●(AL)	●(AL)	●(AL)	●(AL)
shunt trip — SHT	●	●	●	●	●	●	●	●
undervoltage trip ③ — UVT	●	●	●	●	●	●	●	●
externally mounted — motor operator — MOT	●	●	●	●	●	●	●	●
external operating handle — panel mounted type — OHE	●	●	●	●	●	●	●	●
breaker mounted type — OHG	●	●	●	●	●	●	—	—
variable depth type — OHH	●	●	●	●	●	●	—	—
extension handle — EHA	●	●	●	●	●	●	● (Supplied as Standard)	● (Supplied as Standard)
mechanical interlock — front type — MIF	●	●	●	●	●	●	●	●
rear type — MIB	●	●	●	●	●	●	●	●
handle holder — HH	●	●	●	●	●	●	●	●
handle lock — HL	●	●	●	●	●	●	●	●
terminal cover — front connect type — TCF	●	●	●	●	●	—	—	—
rear/plug-in type — TCR	●	●	●	●	—	—	—	—
interpole barrier — TBA	●	●	●	●	●	●	—	—
accessory lead terminal — LTF	●	●	●	●	●	●	●	●
door flange — D.F	●	●	●	●	●	●	●	●

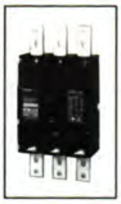
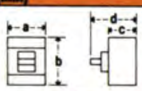


⊙ Standard. This configuration used unless otherwise specified.
o Optional standard. Specify when ordering.
● 'yes' or 'available'
'—' or 'not available'

① DC rating available on request.
② Thermally Adjustable.
③ The UVT controller is installed externally with A.C. U.V.T.

④ One is supplied with every 5 MCCB's.
⑤ Applicable to the rear-connect type.

High-fault Level Series

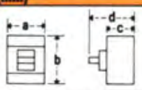
Ampere Frame	125	250	400	630	800	400	630/800	1250
Type	XH125NJ	XH250NJ	XH400NE	XH630NE	XH800NE	XV400NE	XV630/800NE	XV1250NE
Number of Poles	3 / 4	3 / 4	3 / 4	3 / 4	3 / 4			
■ Outside View								
■ Rated Current (A).In ①	NRC / ASR min / max	NRC / ASR min / max	NRC / ASR min / max	NRC / ASR min / max	NRC / ASR min / max	NRC / ASR min / max	NRC / ASR min / max	NRC / ASR min / max
(Calibrated at 45°C 50°C, available on request).	20 / 12.5 / 20	160 / 100 / 160	250 / 125 / 250	630 / 315 / 630	800 / 400 / 800	250 / 125 / 250	630 / 315 / 630	400 / 200 / 400
	32 / 20 / 32	250 / 160 / 250	400 / 200 / 400			400 / 200 / 400	800 / 400 / 800	800 / 400 / 800
	50 / 32 / 50							1000 / 500 / 1000
	63 / 40 / 63							1250 / 630 / 1250
	100 / 63 / 100							
	125 / 80 / 125							
AC RATED INSULATION VOLTAGE (Ui)	690	690	690	690	690	1150	1150	1150
AC RATED BREAKING CAPACITY sym r.m.s. (kA)	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS	ICS	ICS	ICS
IEC 947-2 (Icu) / IEC 947-2 (Ics) 690V	8/4	15/7.5	20/10	20/10	20/10	—	—	—
BS 5742-1(P-1) 660V	8/4	15/7.5	20/10	20/10	20/10	—	—	—
CEI 17-5 / AS 3858 500V	25/13	25/13	42/21	42/21	42/21	—	—	—
440V	42/21	42/21	65/33	65/33	65/33	—	—	—
415V	50/25	50/25	65/33	65/33	65/33	—	—	—
400V	50/25	50/25	65/33	65/33	65/33	—	—	—
380V	50/25	50/25	65/33	65/33	65/33	—	—	—
1100V	—	—	—	—	—	12.5	12.5	20
AS 2184 440V	50	50	65	65	65			
415V	50	50	65	65	65			
NEMA AB-1 600V	25	25	42	42	42			
480V	42	42	65	65	65			
240V	85	85	85	85	85			
without Inst. 240-690V	—	—	5	10	10			
DC RATED BREAKING CAPACITY (kA) 250V	40	40	—	—	—	—	—	—
125V	40	40	—	—	—	—	—	—
■ RATED SHORT TIME CURRENT r.m.s. (kA) (Icw)	—	—	5(0.3 sec)	10(0.3 sec)	10(0.3 sec)			
■ DIMENSIONS (mm)								
 a	90 / 120	105 / 140	140 / 185	210 / 280	210 / 280	140	210	210
b	155	165	260	273	273	260	273	370
c	86	103	103	103	103	103	103	120
d	104	124	131	145	145	131	145	171
Weight (kg) ⊙ marked standard type	1.3 / 1.58	2.1 / 2.6	4.8 / 6.2	9.6 / 12.0	9.7 / 12.5	4.8	9.7	22
■ CONNECTIONS AND MOUNTINGS								
front connect (FC) terminal screw	⊙	⊙	⊙	—	—	⊙		
attached flat bar	—	○(BAR)	○(BAR)	⊙	⊙	○	⊙	⊙
solderless terminal (PWC)	○	○	○	○	○	○		
rear connect (RC) bolt stud	○	—	—	—	—	—		
flat bar stud	—	○	○	○	○	○		
plug-in (PM) for switchboard	○	○	○	○	○	—		
for distribution board	○ / —	—	—	—	—	—		
draw-out (DO)	—	○	○	○	○			
■ STANDARD FEATURES								
contact indicator	●	●	●	●	●	●	●	●
trip button	●	●	●	●	●	●	●	●
■ PROTECTIVE FUNCTIONS								
Electronic type								
Adjustable LTD, STD & INST.	—	—	●	●	●	●	●	●
Adjustable GFT or Adjustable PTA (option)	—	—	●(PTA only)	●	●	●(PTA only)	●	●
trip indicators (option)	—	—	—	—	—		●	●
Thermal-magnetic type								
thermal and fixed magnetic trips	—	—	—	—	—			
thermal and adjustable magnetic trips	—	—	—	—	—			
adjustable thermal and fixed magnetic trips	●	●	—	—	—			
adjustable thermal and magnetic trips	—	—	—	—	—			
■ ACCESSORIES (option) CODE								
internally mounted auxiliary switch AX, AXE	●(AXE)	●(AXE)	●(AX)	●(AX)	●(AX)	●(AX)	●(AX)	
alarm switch AL, ALE	●(ALE)	●(ALE)	●(AL)	●(AL)	●(AL)	●(AL)	●(AL)	
shunt trip SHT	●	●	●	●	●	●	●	
undervoltage trip ③ UVT	●	●	●	●	●	●	●	
externally mounted motor operator MOT	●	●	●	●	●	●	●	
external operating handle panel mounted type OHE	●	●	●	●	●	●	●	
breaker mounted type OHG	●	●	●	●	●	●	●	
variable depth type OHH	●	●	●	●	●	●	●	●
extension handle EHA	—	—	—	●	●	●	●	
mechanical interlock front type MIF	●	●	●	●	●	●	●	
rear type MIB	●	●	●	●	●	●	●	
handle holder HH	●	●	●	●	●	●	●	
handle lock HL	●	●	●	●	●	●	●	
terminal cover front connect type TCF	●	●	●	●	●	●	●	
rear/plug-in type TCR	●	●	●	●	●	●	●	
interpole barrier TBA	●	●	●	●	●	●	●	
accessory lead terminal LTF	●	●	●	●	●	⊙	⊙	⊙
door flange D.F	●	●	●	●	●	●	●	

⊙ Standard. This configuration used unless otherwise specified.
o Optional standard. Specify when ordering.
● 'yes' or 'available'
'not available'

① DC rating available on request.
② Thermally Adjustable.
③ The UVT controller is installed externally with A.C. U.V.T.

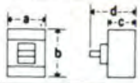
Motor Protection Series

Ampere Frame	50		50	
Type	**TP.50**		**XM30PS**	
Number of Poles	3		3	
■ **Outside View**				
■ **RATINGS**				
Voltage for motor	400–440V			
Motor output and rated current (Calibrated at 40°C or 45°C, please specify, 50°C available on request.)	(A) ②		(A)	
	1.6		0.8	1.25
	2.5		1.4	2.0
	4.0		2.6	3.6
	6.3		4.2	5.0
	8.0		7.4	8.0
	10.0		10	12
	16			
	25			
	40			
	50			
AC RATED INSULATION VOLTAGE (Ui)	660		660	
AC RATED BREAKING CAPACITY sym r.s.m. (kA)				
IEC 947-2(Icu) / IEC 947-2 (Ics) 690V				
660V				
500V			50	
440V	50		50	
415V	50/42		50	
400V	50/42		50	
380V	50/42			
240V				
AS2184 440V	50		–	
415V	50		–	
NEMA AB-1 600V				
480V				
240V				
without Inst. 240-690V	–		–	
DC RATED BREAKING CAPACITY 250V			–	
125V			–	
■ **RATED SHORT TIME CURRENT r.m.s. [kA] (Icw)**				
■ **DIMENSIONS (mm)** a	90/105		78	
b	130		147	
c	90		90	
d	109		109	
Weight (kg) ⊙ marked standard type	1.5		1.7	
■ **CONNECTIONS AND MOUNTINGS**				
front connect (FC) — terminal screw	•		○	
attached flat bar	–		–	
solderless terminal (PWC)	–			
rear connect (RC) — bolt stud	○		○	
flat bar stud	–			
plug-in (PM) — for switchboard	–		○	
for distribution board	–			
draw-out (DO)	–			
■ **STANDARD FEATURES**				
contact indicator	o		○	⑤
trip button	o		•	
over current trip type	Adj Therm Fix mag		Fixed	
■ PROTECTIVE FUNCTIONS				
Thermal-magnetic type				
adjustable thermal and fixed magnetic trips				
adjustable thermal and magnetic trips				
■ **ACCESSORIES (option)** — **CODE**				
internally ② mounted — auxiliary switch AX, AXE	o (AXE)		o	
alarm switch AL, ALE	o (ALE)		o	
shunt trip SHT	o		o	
undervoltage trip ① UVT	o			
externally ③ mounted — motor operator MOT	–			
external operating handle — panel mounted type OHE	–			
breaker mounted type OHG	–			
variable depth type OHH	o		•	
mechanical interlock — front type MIF	–		•	
rear type MIB	–		–	
handle holder HH	–		–	
handle lock HL	–		–	
terminal cover — front connect type TCF	o		–	
rear/plug-in type TCR	o		–	
interpole barrier TBA	o		–	
accessory lead terminal LTF	o		•	



Non-automatic Series

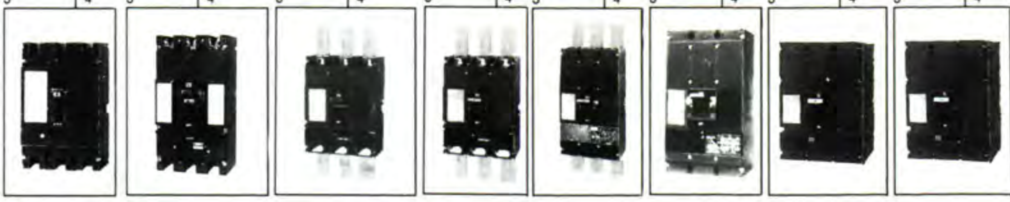
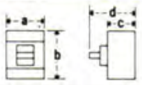
Type	**XS125NN**		
Number of Poles	3	4	
■ **Outside View**			
NOTE: 2-pole breaker is a 3-pole breaker with the centre pole omitted.			
■ **RATING**			
Rated Current (A)	125		
Rated Voltage (V) AC	690		
DC	250		
RATED SHORT CIRCUIT MAKING CAPACITY Peak/kA	3.5		
RATED SHORT TIME CURRENT r.m.s./kA 1 sec.	2.5		
DIMENSIONS (mm) a	60	90	120
b	155		
c	86		
d	86		
Weight (kg) ⊙ marked standard type	0.78	1.1	1.4
■ **CONNECTIONS & MOUNTINGS**			
front connected (FC) — terminal screw	⊙		
attached flat bar	–		
solderless terminal (PWC)	○		
rear connected (RC) — bolt stud	○		
flat bar stud	–		
plug-in (PM) — for switchboard	○		
for distribution board	○	–	
draw-out (DO)	–		
■ **STANDARD FEATURES**			
contact indication	•		
trip button	•		
■ **ACCESSORIES (option)** — **CODE**			
internally mounted — auxiliary switch AX, AXE	• (AXE)		
alarm switch AL, ALE	• (ALE)		
shunt trip SHT	•		
undervoltage trip UVT	•		
externally mounted — motor operator MOT	–	•	
external operating handle — panel mounted type OHE	•		
breaker mounted type OHG	–	•	
variable depth type OHH	–	•	
extension handle EHA	–		
mechanical interlock — front type MIF	–	•	
rear type MIB	–	•	
handle holder HH	•		
handle lock HL	•		
terminal cover — front-connect type TCF	•		
rear-connect/plug-in type TCR	•		
interpole barrier TBA	•		
accessory lead terminal LTF	•		
door flange D.F	•		
■ **BACK-UP BREAKER** ⑥	**XS250NJ**		
■ Max. Switching Current AC	750		
DC	313		
Endurance — No. of Ops. w/out Current	7000		
No. of Ops. with Current	1000		



- • Standard. This configuration used unless otherwise specified.
- o Optional standard. Specify when ordering.
- • 'yes' or 'available'
- – 'no' or 'not available'

① UVT controller is installed externally with AC UVT.
② Complies with IEC-292 - Overload Relay optional.
③ Accessories mounted externally.
④ Accessory Chassis optional.
⑤ Indication by handle only.
⑥ Contact NHP for details.

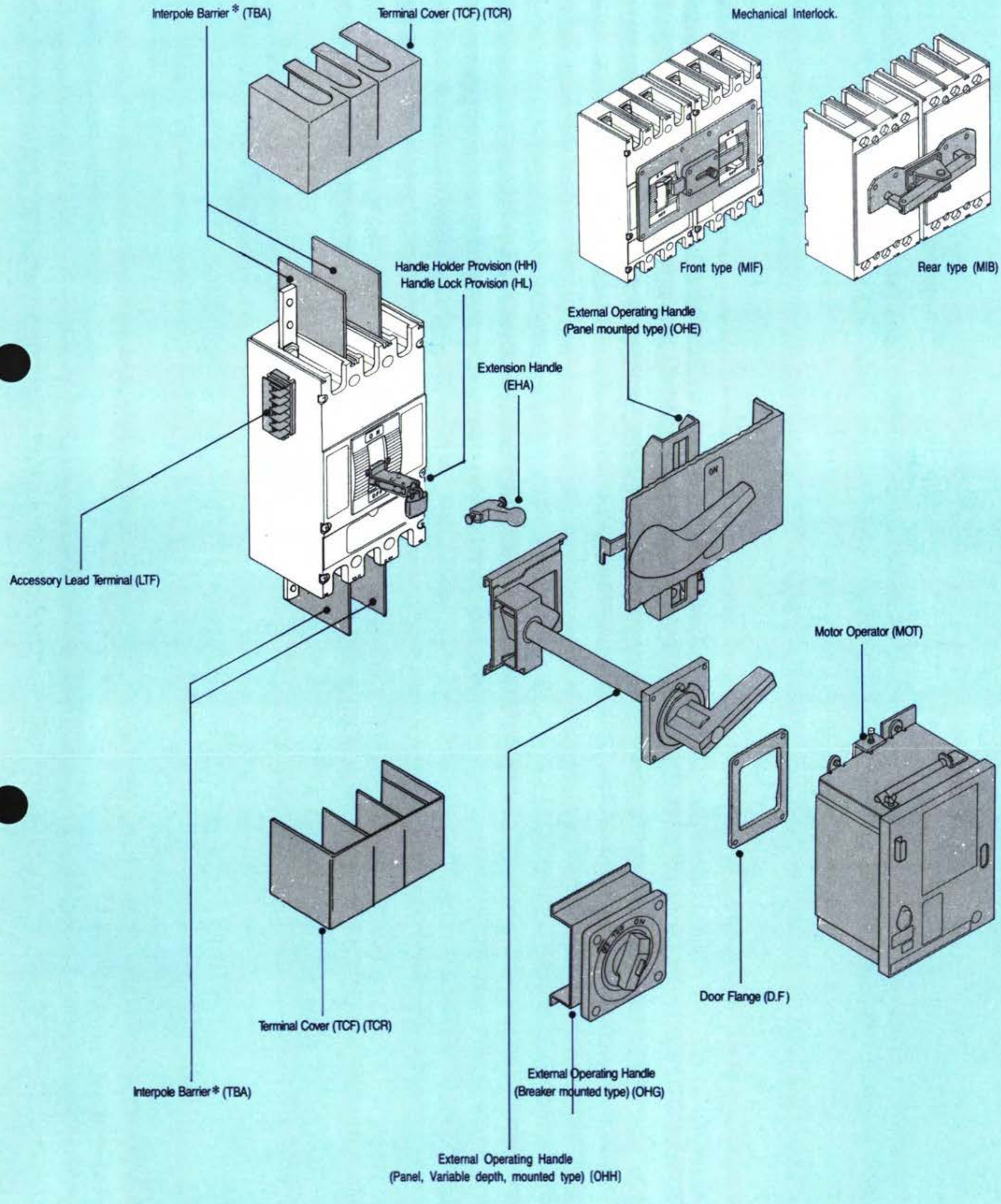
Non-automatic Series

Type	XS250NN		XS400NN		XS630NN		XS800NN		XS1250NN		XS1600NN		XS2000NN		XS2500NN	
Number of Poles	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4
NOTE: 2-pole breaker is a 3-pole breaker with the centre pole omitted.																
RATING																
Rated Current (A)	250		400		630		800		1250		1600		2000		2500	
Rated Voltage (V) AC	690		690		690		690		690		690		690		690	
Rated Voltage (V) DC	250		250		250		250		250		250		250		250	
RATED SHORT CIRCUIT MAKING CAPACITY Peak/kA	6		9		15		15		32		45		90		90	
RATED SHORT TIME CURRENT r.m.s./kA 1 sec.	4		5		9		9		15		20		35		35	
DIMENSIONS (mm) 																
a	105	140	140	185	210	280	210	280	210	280	210	280	320	429	320	429
b	165		260		273		273		370		370		450		450	
c	86		103		103		103		120		140		225		185	
d	107		131		145		145		171		191		285		245	
Weight (kg) ⊙ marked standard type	1.85	2.4	4.7	6.1	9.0	11.5	9.4	12.2	20.4	26.4	24.9	32.9	51.8	64.8	60	75.7
CONNECTIONS & MOUNTINGS																
front connected (FC) — terminal screw	⊙		⊙		–		–		–		–		–		–	
front connected (FC) — attached flat bar	○ (BAR)		○ (BAR)		⊙		⊙		⊙		○		○		–	
front connected (FC) — solderless terminal (PWC)	○		○		○		○		○		–		–		–	
rear connected (RC) — bolt stud	–		–		–		–		–		–		–		–	
rear connected (RC) — flat bar stud	○		○		○		○		○		⊙		⊙		⊙	
plug-in (PM) — for switchboard	○		○		○		○		○		–		–		–	
plug-in (PM) — for distribution board	–		–		–		–		–		–		–		–	
draw-out (DO)	–		○		○		○		○		○		○		–	
STANDARD FEATURES																
contact indication	•		•		•		•		•		•		•		•	
trip button	•		•		•		•		•		•		•		•	
ACCESSORIES (option) CODE																
internally mounted — auxiliary switch AX, AXE	• (AXE)		• (AX)		• (AX)		• (AX)		• (AX)		• (AX)		• (AX)		• (AX)	
internally mounted — alarm switch AL, ALE	• (ALE)		• (AL)		• (AL)		• (AL)		• (AL)		• (AL)		• (AL)		• (AL)	
internally mounted — shunt trip SHT	•		•		•		•		•		•		•		•	
internally mounted — undervoltage trip UVT	•		•		•		•		•		•		•		•	
externally mounted — motor operator MOT	•		•		•		•		•		•		•		•	
external operating handle — panel mounted type OHE	•		•		•		•		•		•		•		•	
external operating handle — breaker mounted type OHG	•		•		•		•		•		•		–		–	
external operating handle — variable depth type OHH	•		•		•		•		•		•		–		–	
extension handle EHA	–		–		•		•		• ④		• ④		• (supplied as standard)		• (supplied as standard)	
mechanical interlock — front type MIF	•		•		•		•		•		•		•		•	
mechanical interlock — rear type MIB	•		•		•		•		•		•		•		•	
handle holder HH	•		•		•		•		•		•		•		•	
handle lock HL	•		•		•		•		•		•		•		•	
terminal cover — front-connect type TCF	•		•		•		•		•		–		–		–	
terminal cover — rear-connect/plug-in type TCR	•		•		•		•		–		–		–		–	
interpole barrier TBA	•		•		•		•		•		•		–		–	
accessory lead terminal LTF	•		•		•		•		•		•		•		•	
door flange D.F	•		•		•		•		•		•		•		•	
BACK-UP BREAKER ⑥	XS400NJ		XS630NJ		XS800NJ		XS800NJ		–		–		–		–	
Max. Switching Current AC	1500		2400		3780		4800		7500		9600		12000		15000	
Max. Switching Current DC	625		1000		1575		2000		3125		4000		5000		6250	
Endurance — No. of Ops. w/out Current	7000		4000		4000		2500		2500		2500		2500		2500	
Endurance — No. of Ops. with Current	1000		1000		1000		500		500		500		500		500	

- • Standard. This configuration used unless otherwise specified.
- ○ Optional standard. Specify when ordering.
- ● 'yes' or 'available'
- – 'no' or 'not available'
- ④ One is supplied with every 5 MCCB's.
- ⑤ Applicable to the rear-connect type.
- ⑥ Contact NHP for details.

Remote tripping is possible with switches without automatic tripping element and with approximately six times the rated current switching capacity, when equipped with shunt trip and undervoltage trip. Auxiliary switches can also be used.
For details on specifications please refer to the appropriate breaker.

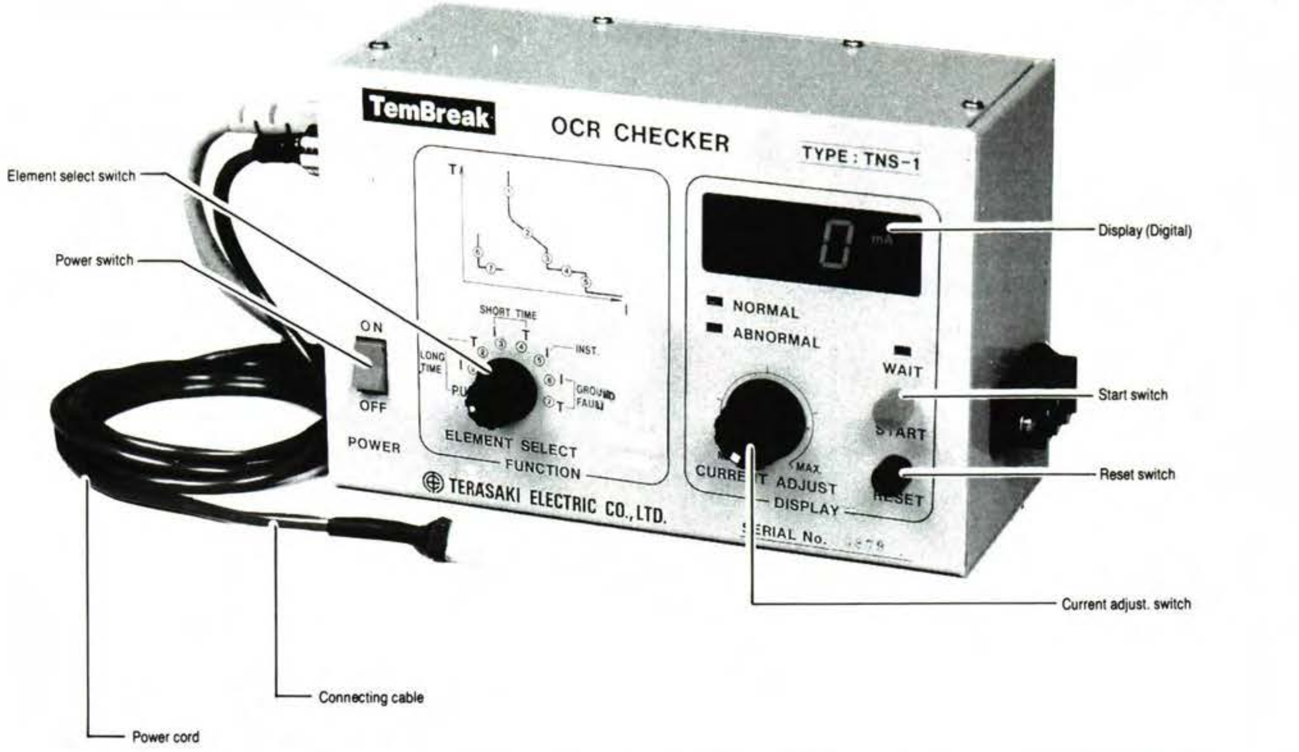
Versatile Accessories



NOTE: *1 for 2-pole, 2 for 3-pole
3 for 4-pole

OCR Checker, Inspection and Maintenance

OCR Checker TNS-1



The TemBreak (Electronic) OCR Checker, Type TNS-1, is a portable easy-to-use instrument for field testing the trip functions.
It checks the pick-up current and tripping time values of the LTD, STD, INST. and GFT functions.

Ratings and Specifications

Power Source	100~110V, 220~240V AC Single Phase 50/60Hz	
Power Consumption	30 VA	
Application	LTD	function check (Set current and trip time values)
	STD	function check (Set current and trip time values)
	INST	function check (Set current value)
	GFT	function check (set current and trip time values)
Measurement of set current values	Display	3-digit digital display
	Range	0-900mA
	Display	3-digit digital display
Measurement of tripping time values	Range	0.00-99.9 seconds
Outline dimensions	200mm (W) x 84mm (H) x 130mm (D)	
Weight	2.7kg	
Accessories	Power cord	3-core with grounding pole 2.4m one pc
	Connecting cable	2m one pc

NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD
ACN 004 304 812

Melbourne: 43-67 River Street, Richmond, Vic. 3121.
P.O. Box 199, Richmond 3121. Telephone: (03) 429 2999
Facsimile: (03) 429 1075. Telex: AA31644.

Sydney: 30-34 Day Street North, Silverwater, N.S.W. 2141.
P.O. Box 259, Ermington 2115. Telephone: (02) 748 3444
Facsimile: (02) 648 4353

Brisbane: 25 Turbo Drive, Coorparoo, Qld. 4151.
P.O. Box 1127, Coorparoo DC, 4151. Telephone: (07) 891 6008
Facsimile: (07) 891 6139

Adelaide: 50 Croydon Road, Keswick, S.A. 5035.
Telephone: (08) 297 9055. *Facsimile: (08) 371 0962*

Newcastle: 57 Crescent Road, Waratah, N.S.W. 2298.
Telephone: (049) 60 2220. *Facsimile: (049) 60 2203*

Rockhampton: 208 Denison Street, Rockhampton, Qld. 4700.
Telephone: (079) 27 2277. *Facsimile: (079) 22 2947*

Townsville: 62 Leyland Street, Garbutt, Qld. 4814.
Telephone: (077) 79 0700. *Facsimile: (077) 75 1457*

Toowoomba: Cnr Carroll St. & Struan Crt, Toowoomba, Qld. 4350.
Telephone: (076) 34 4799. *Facsimile: (076) 33 1796*

Perth: Trading as C.J. Young & Co
38-42 Railway Parade, Bayswater, W.A. 6053.
Telephone: (09) 271 8666. *Facsimile: (09) 272 3906*

AGENTS:

Hobart: H.M. Bamford (Hobart), 199 Harrington Street, Hobart, Tas. 7000. Telephone: (002) 34 9299. *Facsimile: (002) 31 1693*

Launceston: H.M. Bamford (Launceston), 59 Garfield Street, Launceston, Tas. 7250. Telephone: (003) 44 8811. *Facsimile: (003) 44 4069*

Darwin: J.Blackwood & Son Ltd. (inc. Tesco Pearce), Mataram Street, Winnellie N.T. 0820. Telephone: (089) 84 4255. *Facsimile: (089) 84 3945.* Telex: AA85454

NHP Proudly Australian

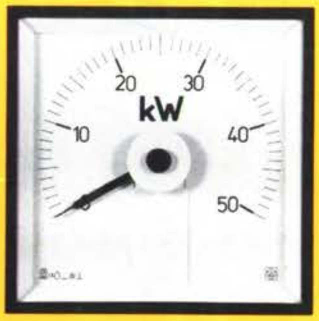
BULLETIN
IME-2
ISSUE 2
MAY 1990

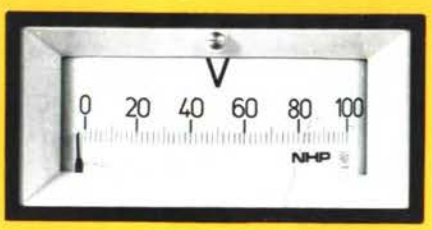
NHP

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.

NHP

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.

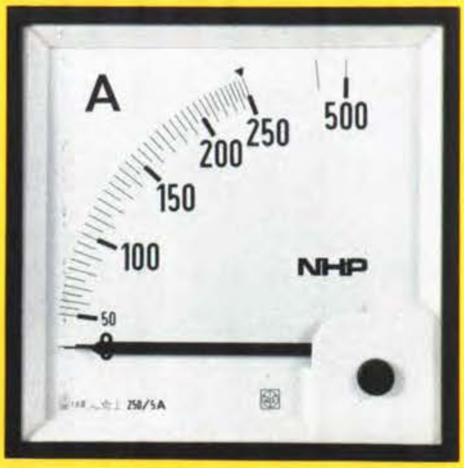
Extensive studies by IME have resulted in their research and development of an instrument design that fulfills the requirements of internationally adopted standards.

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 x144mm.

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

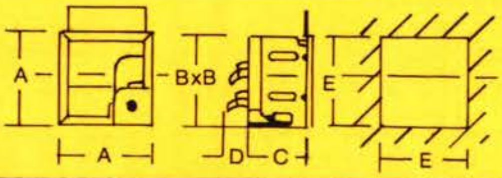
Ranges:
RQ48E, 1/2A, 2.5/5A, 5/10A, 10/20A
RQ72E, RQ96E, RQ144E, 1/2A, 2.5/5A, 5/10A, 10/20A, 15/30A, 25/50A, 40/80A, 60/120A, 100/200A
Current transformer connected meters standard scaling of all sizes for 1A and 5A C.T.'s
5/10A, 10/20A, 15/30A, 20/40A, 25/50A, 30/60A, 40/80A, 50/100A, 60/120A, 75/150A, 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	$45^{+0.6}$	110
72	66.5 x 66.5	44	12	$68^{+0.7}$	160
96	91 x 91	44	12	$92^{+0.8}$	220
144	137 x 137	53.5	12	138^{+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

90° METERS	RQ48M	RQ72M	RQ96M	RQ144M
DC AMMETERS				
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

240° METERS	AQ48M	AQ72M	AQ96M	AQ144M
DC AMMETERS				
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

RQ48.O*	RQ72.O	RQ96.O
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 Withstand:	10 x rated current for 1 sec. 1.2 x rated current indefinitely.

FREQUENCY METERS

Class 0.5

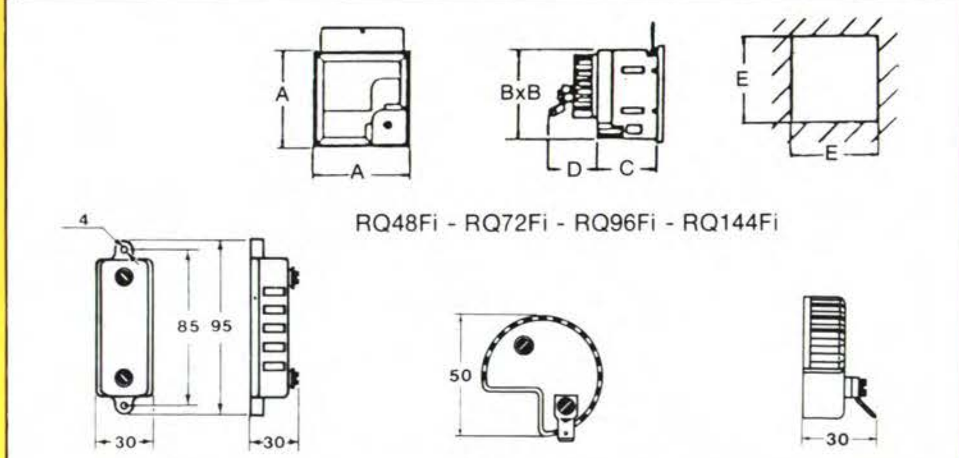
The transducer is contained within the housing of a 90° or 240° moving coil meter.

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



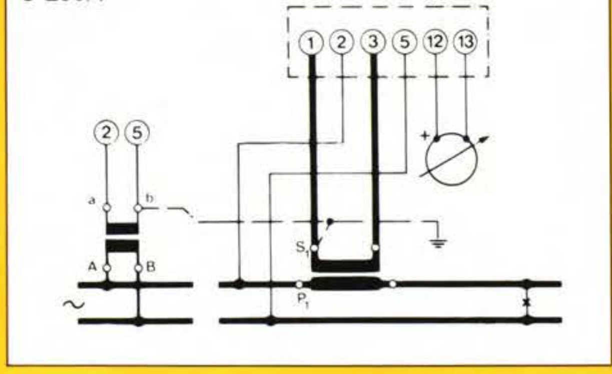
A	B	C	D	E	weight (g)
48	44.5 x 44.5	57.5	15	$45^{+0.6}$	130
72	66.5 x 66.5	44	30	$68^{+0.7}$	190
96	91 x 91	44	30	$92^{+0.8}$	260
144	137 x 137	53.5	30	138^{+1}	510

NHP SWITCHBOARD INSTRUMENTS

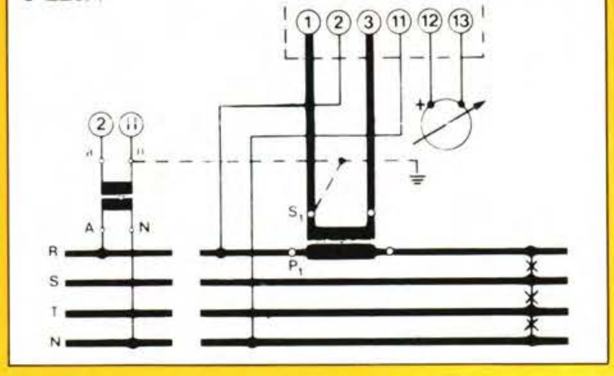
WIRING DIAGRAMS
WATT, VAR AND POWER FACTOR METERS

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.

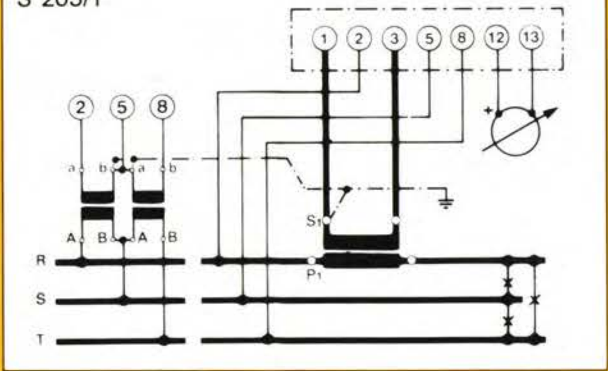
S 200/1



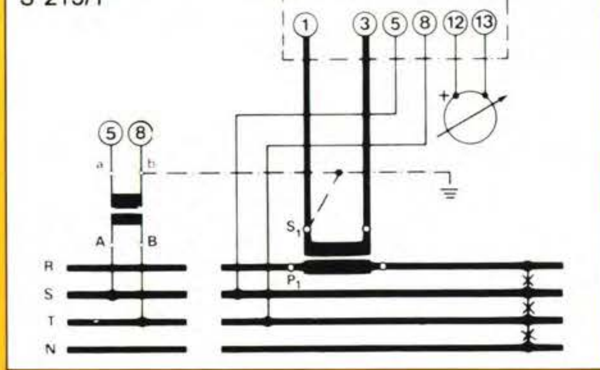
S 220/1



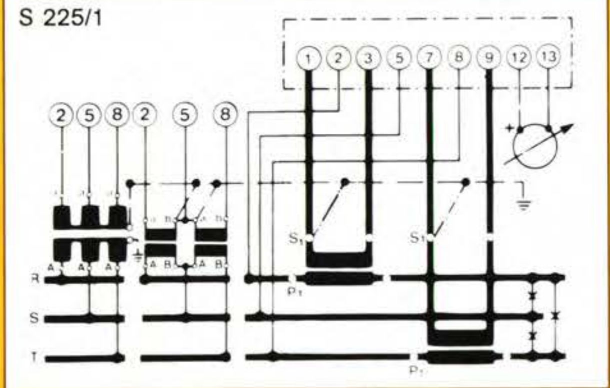
S 205/1



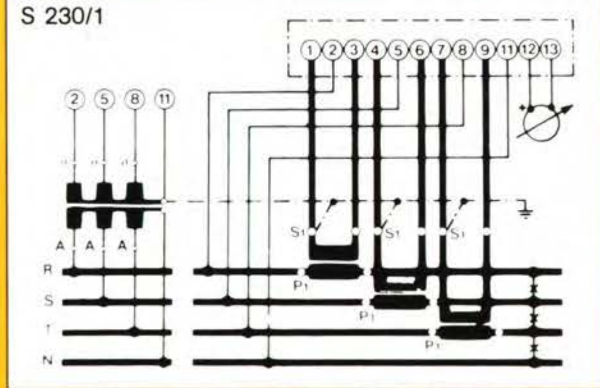
S 215/1



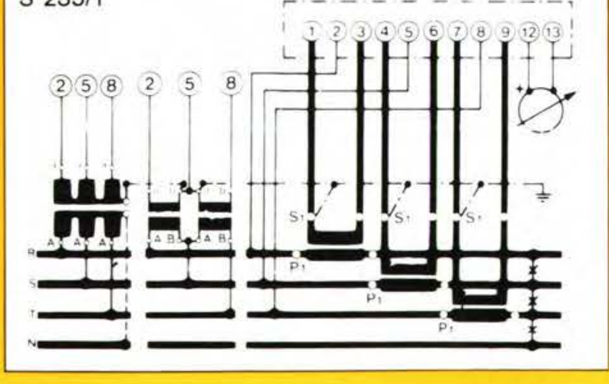
S 225/1



S 230/1



S 235/1



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

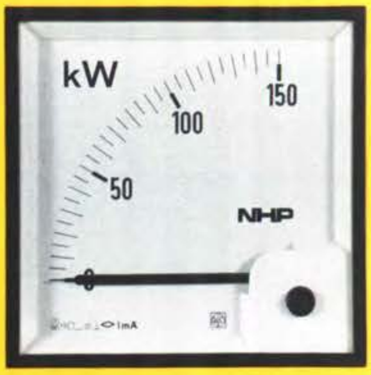
S 230/1 3 PHASE 4 WIRE WATT, UNBALANCED LOAD

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:-

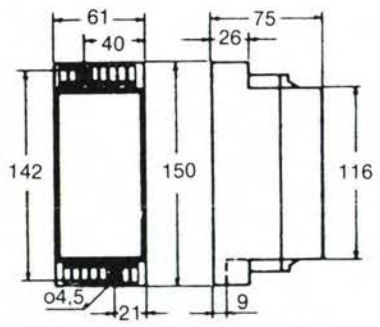
1. Type and size of indicator and full scale value.
2. Single or 3 phase, 3 or 4 wire system.
3. Balanced or unbalanced 3 phase load.
4. Phase to phase voltage.
5. Ratio of current transformer if already existing.
6. Ratio of potential transformers if used.

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.

DIMENSIONS (in mm)

FIG. 1



POWER FACTOR METERS

Class 1.5

Power factor meters consist of a moving coil indicator and transducer.

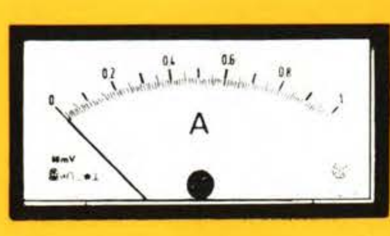
Single or 3 phase units, they are designed for signals of 1A or 5A to suit direct or C.T. current inputs and above 440V require a potential transformer.

Scaled in Cos Ø the standard range is 0.5 - 1 - 0.5 inductive - capacitive.

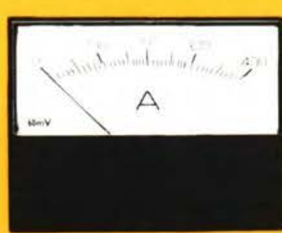
Wiring diagrams are reproduced on page 6 and dimensions of the transducer are as shown in Figure 1.

NHP SWITCHBOARD INSTRUMENTS

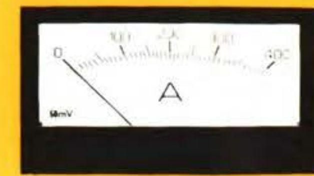
RECTANGULAR SECTOR SCALE MOVING COIL METERS



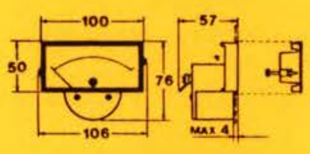
Mod. U2M

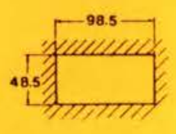


Mod. NP2M

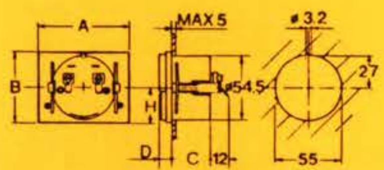


Mod. RP2M

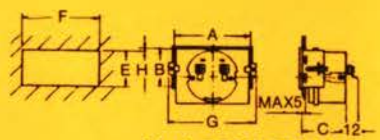




Mod. U2M



Mod. NP2M-NP3M



Mod. RP2M-RP3M

DC RANGES
100uA - 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	H
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	0.75
RP3M	94	73	48		54.8	94.5	107.8	0.25

EDGEWISE MOVING COIL METERS

(For Horizontal or Vertical Mounting)

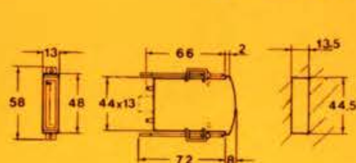
PC48M

DC RANGES 1 - 600mA
50, 60, 75, 100, 150mV
for external shunt.
4-20mA mech suppressed
0.5 - 600V
AC (rectified) 6 - 600V, RMS

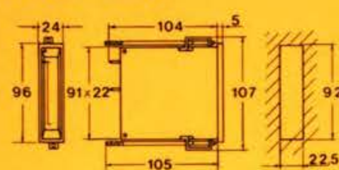
PA96M

DIMENSIONS (in mm)

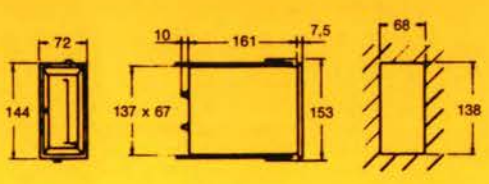
PR144M



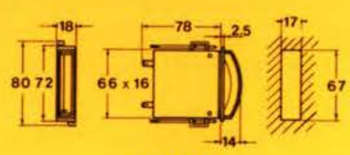
PC48M



PA96M



PR144M



PC72M

NHP CURRENT TRANSFORMERS

MEASUREMENT CURRENT TRANSFORMERS

SPECIFICATIONS:

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_{th})	60 - 100 times rated primary current for 1 sec.
Rated dynamic current	2.5 times I_{th}
Rated continuous thermal current	120% of rated primary current

All mounting material and busbar clamps supplied as standard.



5A C.T. TYPE ACCURACY/BURDEN

	TAS 20			TAS 40			TAS 63		TAS 80		TAS 125	
PRIMARY CURRENT	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	**INDICATORS:**	
1.3	1.33	0.69	Ammeters	1.1
1.4	1.54	0.59	Watt and P.F. Meters	0.5
1.5	1.76	0.51		
1.6	2.01	0.46	**TRANSDUCERS:**	
1.8	2.54	0.36	A.C. Amps	1.5
2	3.14	0.29	Watt and P.F. Meters	1
2.3	4.15	0.22		
2.6	5.3	0.17		
3	7.07	0.13		

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.

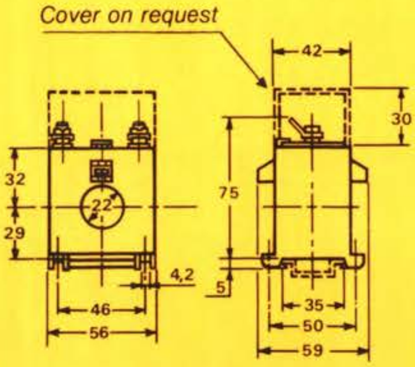
   Passing the 50A load cable 5 times through the larger C.T. gives the ratio of 50/5A up to a burden of 5VA so the meter may be remote by up to some 6.6 metres using cables of 1.54 sq. mm.

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.

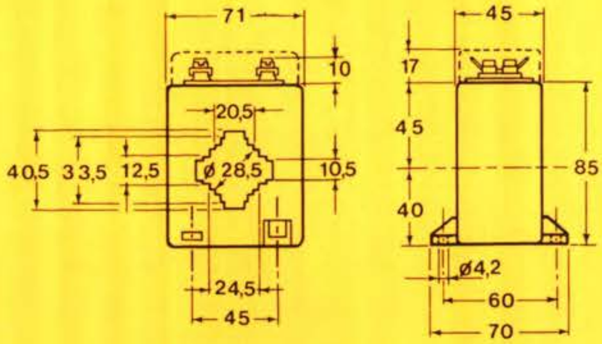
NHP **CURRENT TRANSFORMERS** IME

DIMENSIONS (in mm) (not to scale)

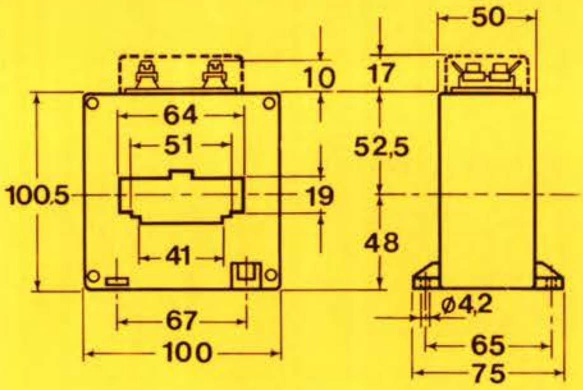


TAS 20B

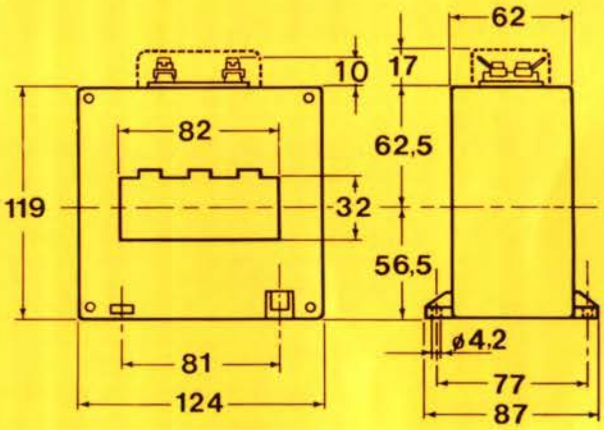
NOTE — NEW HOUSING INCLUDES BUILT-IN DIN RAIL MOUNTING



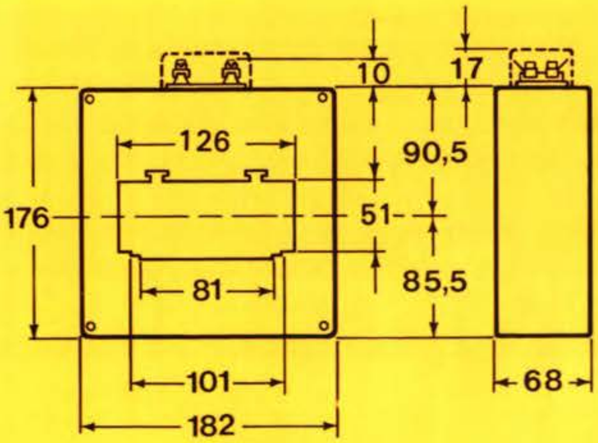
TAS 40



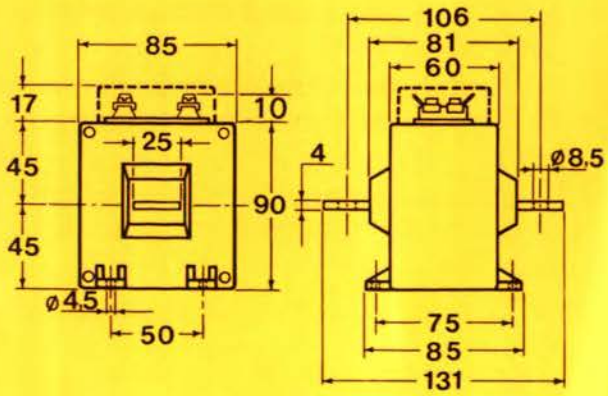
TAS 63



TAS 80



TAS 125



TAQ 10

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Telex: AA41097. *Fax: (07) 252 3415*

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Telephone: (003) 44 8811 *Fax: (003) 44 4069* Telex: AA58536

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QLD. **TOWNSVILLE:**
PATERSON ELECTRICAL ENGINEERING AGENCIES, 62 LEYLAND STREET, GARBUTT, 4814
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N.T. **DARWIN:**
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NHP *Proudly Australian*

DT 3

Control and signalling units

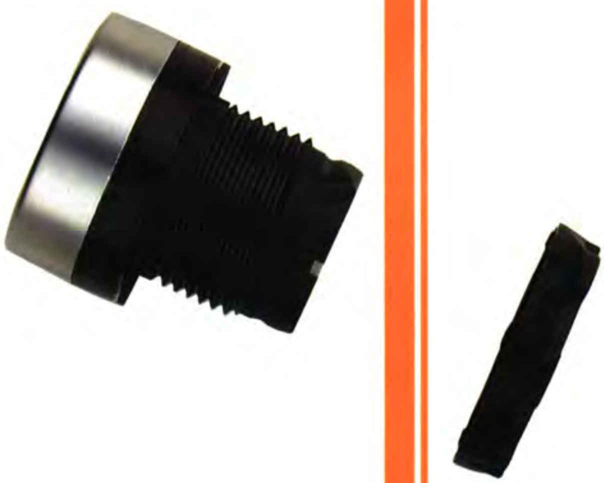
22.5mm diameter mounting

NHP

sprecher+ schuh

The ultimate in control devices

NEW



With time saving central nut mounting

- IP65 rated
- Attractive appearance
- Modular flexibility
- Round or square types
- Key switch version
- Selector switches

sprecher+ schuh

Control and signalling units for 22.5mm mounting

Standard pushbutton

New central nut mounting

DT 3 pushbuttons are now available with efficient central nut mounting, allowing for single handed fixing. Although a special tool is available, the lock nut can be easily tightened by hand. This modern design not only reduces assembly time but also gives the range a more attractive appearance, particularly when mounted in the clear lids of plastic enclosures.

Cat. No. DT 3-LT
DT 3 Locking Tool

Improved illumination

Enhancements to the range includes an improved light guide and lens and for the selector switches, a new reflective seal in the indicators and a textured lens on all inscription inserts. These measures serve to improve the light output on illuminated control units.

Cat. No. DT 3R-G-10 Pushbutton

Complete standard units

A full range of pushbuttons, indicators, selectors, key selectors, multi-function and emergency stop operators are available pre-packaged for your convenience.

Complete units to specification

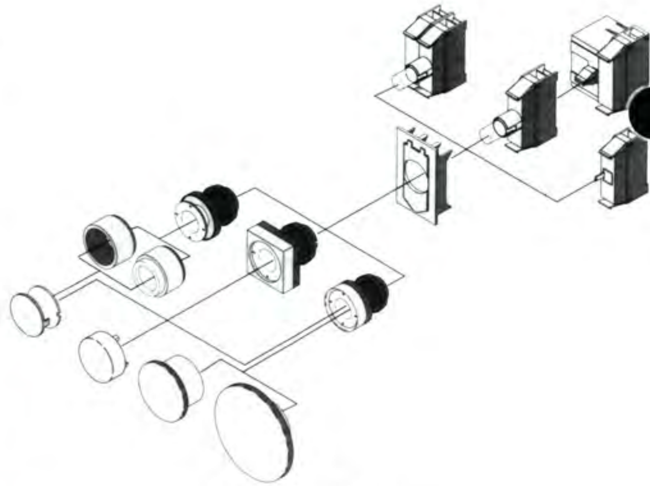
To cater for specific requirements, DT 3 control and signalling units can be built to order utilising variations of optional snap-on front rings, colour caps, control knobs, contact blocks and lamp holders.

Accessories

A comprehensive modular system of enclosures, legends and a locking tool DT 3-LT for positive fixing are available to complement the DT 3 range.

Literature

For further information on the DT 3 range of pushbuttons please refer to our Price List Catalogue Part 'A'. Ask your NHP stockist for details.



Component Assembly

NHP
A.C.N. 004 304 812

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Publication
SSR
October 1992

CONTACTOR AND STARTER SELECTION GUIDE

A technical reference for ratings dimensions and component selection

Now incorporating 'TYPE 2' short circuit co-ordination

NHP ELECTRICAL ENGINEERING PRODUCTS PTY LTD

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Contents

Sprecher + Schuh quality assurance ISO 9001

This certificate is your assurance of Sprecher + Schuh quality.

Sprecher + Schuh of Aarau Switzerland, is now one of the few switchgear producers which has achieved accreditation and total fulfilment to the stringent quality standard ISO 9001.

This standard covers all twenty classifications for the production process, from component design, to after sales service.

Even though Sprecher + Schuh have historically developed and implemented their own extensive quality system, gaining formal recognition by Switzerland's foremost independent authority, was an obvious progression to instill even greater confidence in their valuable reputation world wide.

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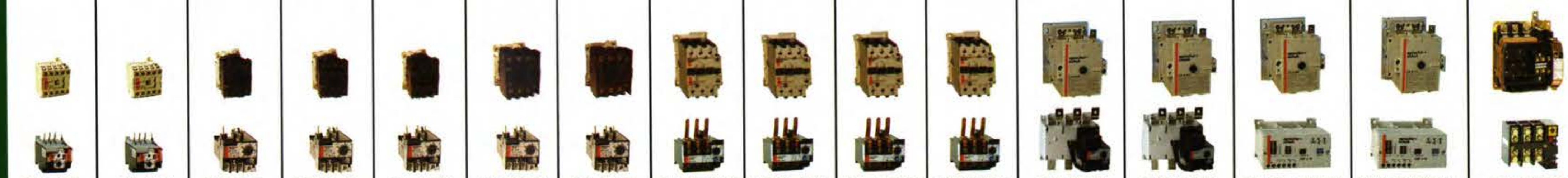
Ratings
To: AS 1029
BS 5424
IEC 158
IEC 947



		CA 4-5	CA 4-9	CA 3-9	CA 3-12	CA 3-16	CA 3-23	CA 3-30	CA 3-37N	CA 3-43N	CA 3-60N	CA 3-72N	CA 6-85	CA 6-105	CA 6-140 [17]) Available 1993	CA 6-170 [17]) Available 1993	CA 1-100
Rated voltage		- 500 Volts -		- 660 Volts -				- 660 Volts -					-1000 Volts- [10])				-660 Volts-
Current ratings at operational voltage 415V [12])																	
40°C I_{th} AC 1	Amps	20	20	25	25	25	45	45	63	63	90	90	160	160	250	250	200
60°C AC 1	Amps	16	16	16	16	16	30	30	45	45	75	75	120	120	210	210	140
60°C AC 2, AC 3 [8])		4.8	8.2	8	11	14	21	28	37	40	60	66	90	110	140	170	135
60°C AC 4 [8])		4.8	8.2	8	11	14	21	28	37	40	60	66	90	110	140	170	87
Motor starter ratings at operational voltage 415 V. All kW ratings approximate [12])																	
AC 2, AC 3 Slip-ring motors Cage motors	kW	2.2	4	4	5.5	7.5	11	15	20	22	33	37	50	63	81	98	75
AC 4 [16]) Inching/plugging		2.2	4	4	5.5	7.5	11	15	20	22	33	37	50	63	81	98	48
Star delta [1]) Line/delta	kW	3.7	7.5	7.5	11	15	18.5	26	37	40	55	67	90	110	140	170	132
Star point Y		7	12.5	12.5	17.5	22	32	48	63	65	90	110	150	190	240	270	230
Star point Δ		11	18.5	18.5	25	32	47	70	90	95	132	160	220	280	280	360	330
Auto transformer [2]) Line	kW	-	-	-	-	7.5	11	15	20	22	33	37	50	63	81	98	75
and Transformer		-	-	-	-	11	16	22	33	37	55	67	90	110	140	170	132
liquid resistance [4]) Star point Y		-	-	-	15	18.5	27	37	55	60	75	90	120	150	190	230	185
Star point Δ		-	-	-	25	30	45	60	85	90	125	150	210	260	315	380	300
Capacitor and lamp switching at operational voltage 415 V																	
Capacitor switching 40°C	KVAR	-	-	12.5	12.5	12.5	22.5	22.5	32	32	50	50	65	77	100	120	100
3 Phase 60°C		-	-	8	8	8	15	15	22	22	38	38	55	65	70	90	70
Tungsten per phase 40°C	Amps	4	7	12	12	12	22.5	22.5	32	32	56	56	-	-	88	113	88
Fluorescent [5]) *(compensated)* 40/60°C		18/14.5	18/14.5	22.5/14.5	22.5/14.5	22.5/14.5	40/27	40/27	57/40	57/40	81/67	81/67	-	-	180/126	216/162	180/126
Maximum switching capacity [3])	Amps	115	115	200	200	200	375	375	850	850	1000	1000	1350	1500	2100	2400	1600
Mechanical, electrical and coil data																	
Mechanical life	OPS	10 mill	10 mill	15 mill	15 mill	15 mill	10 mill	10 mill	10 mill	10 mill	10 mill	10 mill	10 mill	10 mill	8 mill	8 mill	10 mill
Electrical life at AC 3, 415 V	OPS	0.7 mill	0.7 mill	1.2 mill	1.2 mill	1.2 mill	1.2 mill	1.2 mill	1 mill	1 mill	1 mill	1 mill	1 mill	1 mill	1 mill	1 mill	1.2 mill
Contactor operations *(Max no. load)*	OPS/HR	8000	8000	6000	6000	6000	5000	5000	4000	4000	3000	3000	3000	3000	1200	1200	2500
Switching delay Make	mSEC	40	40	10-20	10-20	10-20	10-20	10-20	15-25	15-25	15-25	15-25	20-29	20-29			25-35
Break		20	20	8-18	8-18	8-18	8-18	8-18	10-20	10-20	10-20	10-20	7-12	7-12			20-30
Coil data AC Pick-up	VA(W)	24	24	59 (46)	59 (46)	59 (46)	90 (65)	90 (65)	190 (103)	190 (103)	190 (103)	190 (103)	650	650	250	250	900 (490)
Hold		4	4	7.2 (2.2)	7.2 (2.2)	7.2 (2.2)	8.6 (2.5)	8.6 (2.5)	17 (5)	17 (5)	17 (5)	17 (5)	50	50	15	15	65 (13)
DC Pick-up	W	2.5	2.5	7.4	7.4	7.4	150	150	350	350	350	350	310	310	-	-	470-760
Hold		2.5	2.5	7.4	7.4	7.4	3.8	3.8	5.5	5.5	5.5	5.5	9.5	9.5	-	-	28-45
Auxiliary contacts Available	Std/Max	1/5	1/5	1/5 [15])	1/5 [15])	1/5 [15])	1/6 [15])	1/6 [15])	2/7 [15])	2/7 [15])	2/7 [15])	2/7 [15])	2/8	2/8	2/8	2/8	2/6
Rated current internal @ 60°C	Amps	6	6	16	16	16	16	16	16	16	16	16	16	16	16	16	16
AC 15, 415V	Amps	2	2	4	4	4	4	4	4	4	4	4	-	-	-	-	-
Auxiliary block @ 60°C	Amps	6	6	12	12	12	12	12	12	12	12	12	-	-	-	-	-
AC 15, 415V	Amps	1	1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5
Thermal overloads to AS 1023 or motor protection circuit breakers (*where suitable*)																	
For use with contactors listed above	Types [9])	CT 4 KT 3-[14])	CT 4 KT 3-[14])	CT 3K-12 CT 3-12 KT 3-[14])	CT 3K-12 CT 3-12 KT 3-[14])	CT 3K-17 CT 3-12 CT 3-17 KT 3-[14])	CT 3-12 CT 3-17 CT 3-23 KT 3-[14])	CT 3-12 CT 3-17 CT 3-23 CT 3-32	CEF 1 or CT 3-42 CT 3-42a	CEF 1 or CT 3-42 CT 3-42a	CEF 1 or CT 3-42 CT 3-42a CT 3-52 CT 3-63	CEF 1 or CT 3-42 CT 3-42a CT 3-52 CT 3-63 CT 3-72	CEF 1 or CT 6-90	CEF 1 or CT 6-110	CEF 1 or CT 6-150	CEF 1 or CT 6-200	CEF 1 or CT 1-150 CT 1-150a CT 1-90
Overload range available	Amps	0.1-9	0.1-9	0.1-12.5	0.1-12.5	0.1-17.5	0.1-23	0.1-32	25-42	25-42	25-63	25-72.5	70-90	85-110	105-150	145-200	65-150

Notes:
1) Star-delta to AS 1202 part 2 class 0.3.
2) Auto-transformer to AS 1202 part 3 class 0.1 on load factor 60%. Ratings based on 80% tapping. Higher ratings for lower taps available.
3) CA 3-9/16 at PF 0.65 (415 V). CA 3-23 and above at PF 0.35 (415 V).
4) For liquid resistance starters use line and transformer contactor.
5) For 2 parallel paths 1.7 x le. For 3 parallel paths 2.5 x le .
6) For 3 + 4 pole contactors 185kW to 500kW refer cat 'Part A'.
7) Adjustable drop out delay 20-1000 mS refer contactor instructions.

Notes:
8) Ratings for CA 1-480 to CA 5-1250 are based on 55°C. Maximum 60°C with 0.85 derating.
9) CT 3 series 0.1 amps to 72 amps. CT1 series 65 amps to 400 amps. CEF 1 series 0.5 amps to 400 amps,or (1200 amps with primary CTs)
10) For 1000 V current and kW ratings refer your local NHP sales office.
12) All switching ratings are at 50/60 Hz. May also be suitable for 400 Hz, refer Cat 2200T.
13) Magnet systems to be replaced each 1 million operations.
14) For KT 3 MPCB selection refer pages 8 to 10.
15) Can be increased using CA 3-P-GE side mounted auxiliary blocks refer cat 'Part A'.
16) Based on reduced contact life refer technical catalogues.
17) Preliminary data.

sprecher+ schuh

Ratings
To: AS 1029
BS 5424
IEC 158
IEC 947

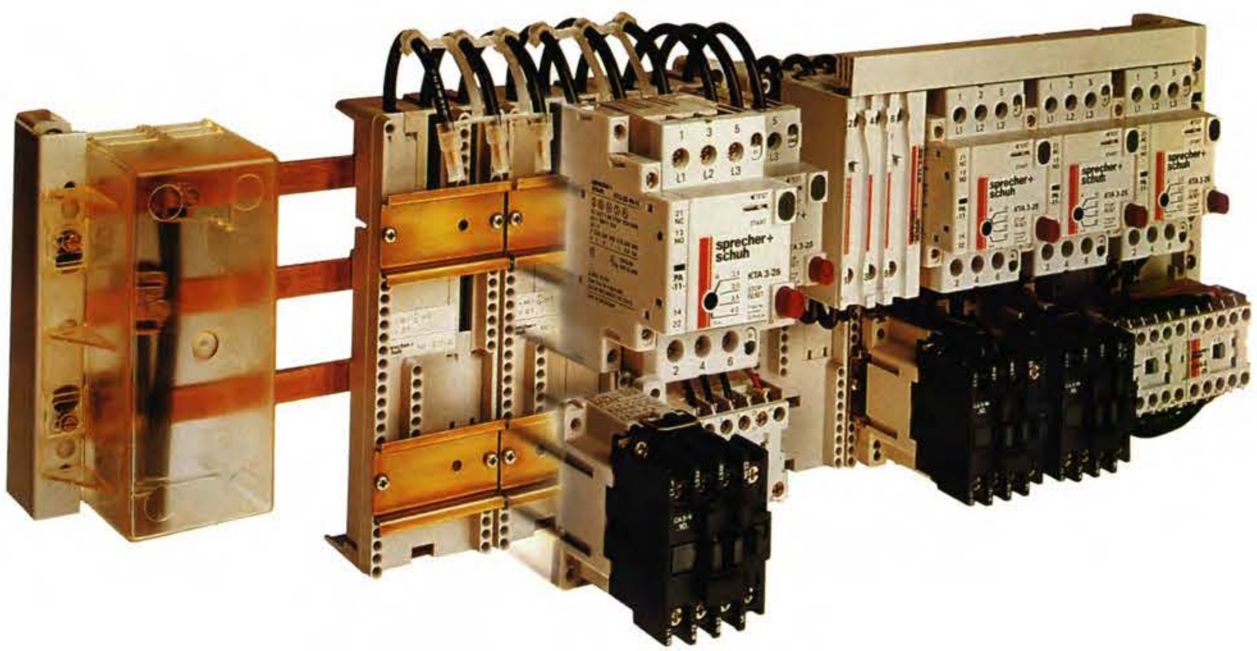
		CA 1-150	CA 1-250	CA 1-480	CA 5-450 [6]	CA 5-550 [6]	CA 5-700 [6]	CA 5-860 [6]	CA 5-1000	CA 5-1200
Rated voltage		- 660 Volts -			-1000 Volts- [10]				-660 Volts-	
Current ratings at operational voltage 415V [12]										
40°C I_{th} AC 1	Amps	240	300	500	600	780	900	1100	1200	1350
60°C AC 1	Amps	180	250	480	510	645	780	930	1080	1250
60°C AC 2, AC 3 [8]		170	250	480	450	550	700	860	1000	1200
60°C AC 4 [8]		150	250	325	285	350	420	510	630	700
Motor starter ratings at operational voltage 415 V. All kW ratings approximate [12]										
AC 2, AC 3 Slip-ring motors, Cage motors	kW	95	150	300	255	315	400	500	600	710
AC 4 [16] Inching/plugging		85	150	185	165	200	250	300	370	420
Star delta [1] Line/delta	kW	165	260	480	465	570	700	840	975	1200
Star point Y		300	450	600	800	850	1000	-	-	-
Star point Δ		440	600	820	915	1100	-	-	-	-
Auto transformer [2] and liquid resistance [4] Line	kW	95	150	300	270	325	400	500	600	710
Transformer		165	260	375	350	480	600	750	-	-
Star point Y		260	410	670	600	710	900	-	-	-
Star point Δ		375	560	900	810	975	-	-	-	-
Capacitor and lamp switching at operational voltage 415 V										
Capacitor switching 3 Phase 40°C	KVAR	120	150	250	220	350	430	500	550	630
60°C		90	125	240	200	300	360	450	500	600
Tungsten per phase 40°C	Amps	113	156	312	250	350	370	-	-	-
Fluorescent [5] *(compensated)* 40/60°C		216/162	270/225	450/432	-/325	-/470	-/500	-	-	-
Maximum switching capacity [9]	Amps	3000	4000	5000	3600	4500	5600	6900	8000	9600
Mechanical, electrical and coil data										
Mechanical life	OPS	3 mill	3 mill	2 mill	5 mill	5 mill	5 mill	5 mill	5 mill [13]	5 mill [13]
Electrical life at AC 3, 415 V	OPS	1.3 mill	1.3 mill	0.7 mill	0.6 mill	0.6 mill	0.6 mill	0.6 mill	0.6 mill	0.6 mill
Contactor operations *(Max no. load)*	OPS/HR	1200	1200	600	2400	2400	1200	1200	600	600
Switching delay Make	mSEC	30-45	20-35	25-40	50-100	50-100	60-105	60-105	30-80	30-80
Break		20-30	15-20	25-30	100-170 [7]	100-170 [7]	150-200 [7]	150-200 [7]	30-40	30-40
Coil data AC Pick-up	VA(W)	2000 (940)	2400 (1100)	4000 (1500)	950 (900)	950 (900)	1700 (1600)	1700 (1600)	2500 (2100)	2500 (2100)
AC Hold		90 (21)	85 (18)	150 (24)	11 (10)	11 (10)	25 (24)	25 (24)	75 (60)	75 (60)
DC Pick-up	W	1050-1700	1500-2400	2700-4300	850	850	1600	1600	2100	2100
DC Hold		37-60	45-75	50-80	10	10	24	27	50	50
Auxiliary contacts Available	Std/Max	2/8	2/8	2/8	4/8	4/8	4/8	4/8	2/7	2/7
Rated current internal @ 60°C	Amps	16	16	16	25	25	25	25	20	20
AC 15, 415V	Amps	-	-	-	-	-	-	-	-	-
Auxiliary block @ 60°C	Amps	-	-	-	-	-	-	-	-	-
AC 15, 415V	Amps	5	5	5	5	5	5	5	7.5	7.5
Thermal overloads to AS 1023 or motor protection circuit breakers (*where suitable*)										
For use with contactors listed above	Types [8]	CEF 1 or CT 1-150 CT 1-150a CT 1-90 CT 1-145 CT 1-200	CEF 1 or CT 1-145 CT 1-200 CT 1-290	CEF 1 or CT 1-200 CT 1-290 CT 1-400 CT 1-500	CET 3 CEF 1 or CT 1-400 CT 1-500	CET 3 CEF 1 or CT 1-400 CT 1-500	CET 3 CEF 1 or CT 1-400 CT 1-500	CET 3 CEF 1 or CT1 500	CET 3 CEF 1	CET 3 CEF 1
Overload range available	Amps	62-200	90-290	140-500	275-500	275-800	275-800	300-1200	300-1200	300-1200

Type '2'
Short circuit co-ordination details
refer page 16

What do you need to put together compact starters and load feeders?

The lastest solution in fuseless systems!

The new motor protection circuit breaker KT 3 and mounting system KA 1 from Sprecher + Schuh



KT 3 - motor protection circuit breaker

One component - four functions

- Short circuit protection
- Thermal overload protection
- Switching
- Signalling

KA 1 mounting system

- Space saving fuseless system
- Quick connection and release
- Continuity and ease of panel design

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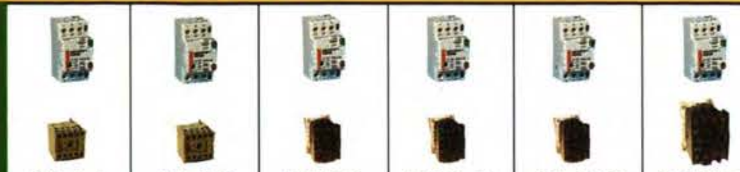
KT 3 motor protection circuit breakers



KT 3 is P2 rated [1]) Ratings at 415V			CA 4-5	CA 4-9	CA 3-9	CA 3-12	CA 3-16	CA 3-23
Rated voltage			- 500 Volts -		- 660 Volts -			
Current ratings at operational voltage 415V								
40°C I_{th}	AC 1	Amps	20	20	25	25	25	45
60°C	AC 1	Amps	16	16	16	16	16	30
	AC 2, AC 3		4.8	8.2	8	11	14	21
	AC 4		4.8	8.2	8	11	14	21
Motor starter ratings at operational voltage 415 V. All kW ratings approximate								
AC 2, AC 3	Slip-ring motors Cage motors	kW	2.2	4	4	5.5	7.5	11
AC 4	Inching/plugging		2.2	4	4	5.5	7.5	11

KT 3 Selection table

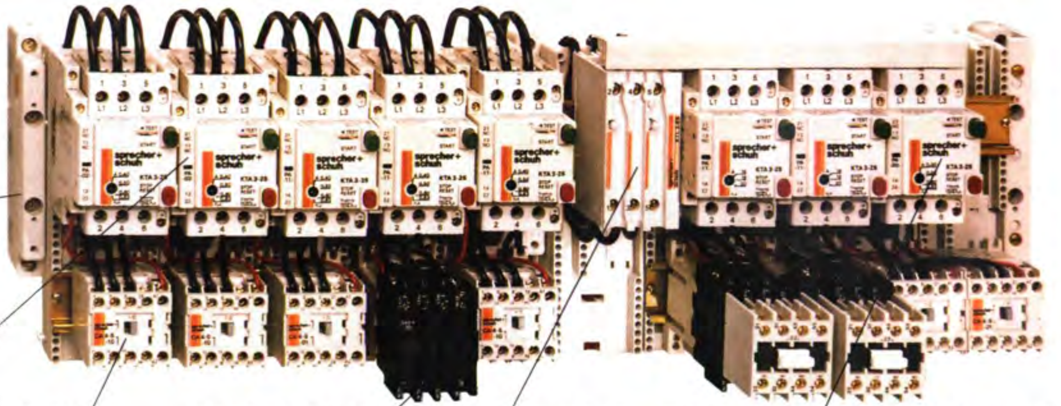
Motor (kW) at operating voltage 240V kW	415V kW	Thermal trip setting range (A)	Magnetic trip response current (A)	Cat. No.	CA 4-5	CA 4-9	CA 3-9	CA 3-12	CA 3-16	CA 3-23
	0.02	0.1...0.16	1.8	**KTA 3-25-0.16A**	❑	❑	❑	❑	❑	❑
	0.04	0.16...0.25	2.8	**KTA 3-25-0.25A**	❑	❑	❑	❑	❑	❑
	0.06	0.25...0.4	4.4	**KTA 3-25-0.4A**	❑	❑	❑	❑	❑	❑
	0.09				❑	❑	❑	❑	❑	❑
0.06	0.12	0.4...0.63	6.9	**KTA 3-25-0.63A**	❑	❑	❑	❑	❑	❑
0.12	0.18	0.63...1.0	11	**KTA 3-25-1A**	❑	❑	❑	❑	❑	❑
	0.25				❑	❑	❑	❑	❑	❑
0.18	0.37	1.0...1.6	18	**KTA 3-25-1.6A**	❑	❑	❑	❑	❑	❑
0.25	0.55				❑	❑	❑	❑	❑	❑
0.37	0.75	1.6...2.5	28	**KTA 3-25-2.5A**	❑	❑	❑	❑	❑	❑
0.55	1.1	2.5...4.0	44	**KTA 3-25-4A**	❑	❑	❑	❑	❑	❑
0.75	1.5				❑	❑	❑	❑	❑	❑
1.1	2.2	4.0...6.3	69	**KTA 3-25-6.3A**	❑	❑	❑	❑	❑	❑
1.5					❑	❑	❑	❑	❑	❑
2.2	3.7	6.3...10	110	**KTA 3-25-10A**		❑	❑	❑	❑	❑
3.7	5.5	10...16	176	**KTA 3-25-16A**				❑	❑	❑
	7.5							❑	❑	❑
5.5	10	16...20	220	**KTA 3-25-20A**						❑
7.5	11	20...25	275	**KTA 3-25-25A**						❑
	12.5									❑

Note: [1]) According to IEC 157-1 refer page 12.

Legend: ❑ Suitable combinations.

The new motor protection circuit breaker KT 3 and mounting system KA 1

The latest solution in fuseless systems!



Connection and mounting system KA 1

Auxiliary contact block

❑ *External or internal.*

Contactor CA 4

Contactor CA 3

Current limiter KTL 3-65

Upgrades the short circuit interruption capability of the KT 3 to 50 kA.

Motor protection circuit breaker KTA 3-25

❑ *Selectable trip indication.*

❑ *Test facility.*

❑ *High interrupt capacity.*

❑ *High current limiting capability.*

Mounting system KA 1

In these days, the demand on the industrial control system, as far as economy and flexibility is concerned, is very high indeed. The solution from Sprecher + Schuh is: modular load and motor feeders with the connection and mounting system KA 1, a futuristic starter concept, with the following advantages:

❑ Simple planning because of the modular system.

❑ Rapid, snap-on mounting of the adaptor units.

❑ Compact control systems due to the small dimensions of the complete load feeders.

❑ Increased safety for personnel due to the integrated protection against accidental human contact.

❑ Short circuit withstand capacity up to 50 kA.

Circuit breaker KTA 3-25

This is the key component of the modular system for load feeders. The technical specification is outstanding.

❑ A broad range of applications form 0.1 to 25A and at supply voltages up to 660V.

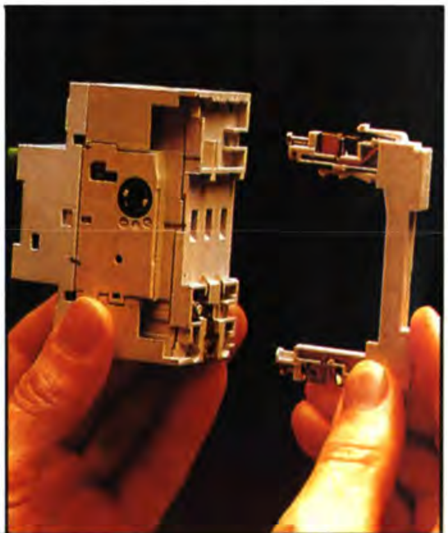
❑ Ultra-rapid short circuit protection with exceptional current protection and current limitation.

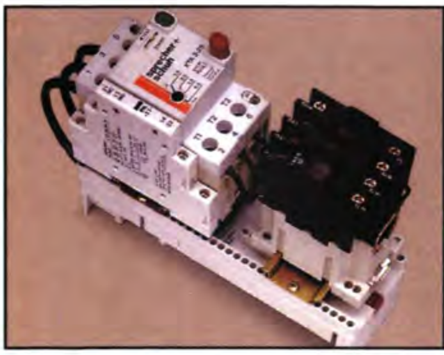
❑ Rated short circuit breaking capacity 100 kA (at 415V and up to a rated current of 6.3A).

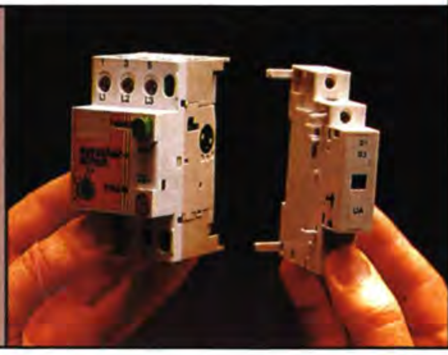
❑ High breaking capacity in the current range 6.3…25A, at 415V when used in conjunction with current limiting module KTL 3-65: I_{cn} = 50 kA.

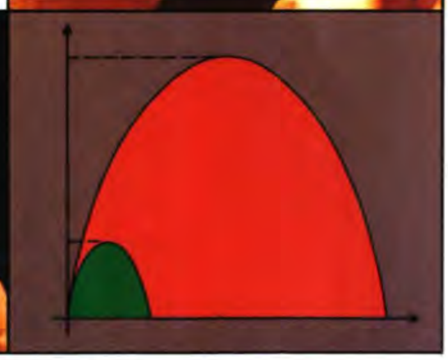
❑ Safe overload protection, due to the accurately calibrated bimetallic release.

Trip indication or auxiliary contacts









Motor protection circuit breaker KTA 3-25

❑ Selectable trip indication.

❑ Test facility.

❑ DIN rail mounting.

❑ Add on auxiliaries.

❑ Undervoltage or shunt trip release.

❑ High interrupt capacity.

❑ High current limiting capability.

❑ Padlock attachment.

Enhanced safety

The extremely rapid, all-pole short circuit interruption prevents damages to motors and equipment. Single-phase startup is virtually eliminated.

sprecher+ schuh

KT 3 motor protection circuit breakers

The KT 3 motor protection circuit breaker protects motors, cables and electrical equipment, against thermal overload and short circuit conditions. KT 3 also offers isolation, status indication and signalling, remote and U.V. trip features, as a compact high performance combination. Exceptional current limiting capabilities enable fuseless distribution systems to be engineered and specified with confidence. All KT 3 motor protection circuit breakers offer both P1 and P2 rated short circuit breaking capacity figures to IEC 157-1. Short circuit proof KT 3- *No ordinary motor protection circuit breaker!*

Technical data

Thermal trip setting range (A)	Magnetic trip response current (A)	Rated short-circuit breaking capacity I_{cn} [1]) Power categories P1 and P2 [2]) acc. to IEC 157-1, 40…60 Hz at: 240V P2 (kA)	240V P1 (kA)	415V P2 (kA)	415V P1 (kA)	500V P2 (kA)	500V P1 (kA)	660V P2 (kA)	660V P1 (kA)	Back-up fusing (gl, aM, gL, gG, gM) with short-circuit current in excess of rated make/break capacity 240V (A)	415V (A)	500V (A)	660V (A)
0.1…1.6	1.8	100	100	100	100	100	100	100	100				
1.6…2.5	2.8	100	100	100	100	100	100	4.5	4.5				50
2.5…4.0	44	100	100	100	100	100	100	6	8				50
4.0…6.3	69	100	100	100	100	20	30	6	8			80	80
6.3…10	110	100	100	10	15	4.5	6	3	4.5		80	80	80
10…16	176	20	30	6	10	4.5	4.5	3	3	80	80	80	80
16…20	220	15	20	6	6	4.5	4.5	3	3	80	80	80	80
20…25	275	15	20	6	6	4.5	4.5	3	3	80	80	80	80

Notes: [1])Power factor cosφ for I_{cn}

3 kA, cosφ = 0.9
4.5 kA, cosφ = 0.8
6 kA, cosφ = 0.7
10 kA, cosφ = 0.5
15 kA, cosφ = 0.3
20 kA, cosφ = 0.25
100 kA, cosφ = 0.2

[2]) Short circuit power categories:
P1: Still functionally serviceable after test with O-t-CO
P2: Suitable for normal operation after test with O-t-CO-t-CO
O = Break t = Defined pause
CO= Restart and break

Accessories for KT 3 motor protection circuit breakers

Auxiliary contact blocks			Cat. No.
Inserted from rear flush mount			
	with	1 make contact	**KT 3-25-PE1-10**
	or	1 make contact	**KT 3-25-PE2-10**
	or	1 break contact	**KT 3-25-PE1-01**
	or	1 break contact	**KT 3-25-PE2-01**
	or	1 early-make contact	**KT 3-25-PE-L10**
	or	trip signalling contact - 1 N/O	**KT 3-PF-10**
	or	trip signalling contact - 1 N/C	**KT 3-PF-01**
Add onto left hand side			
	with	1 make, 1 break contact	**KT 3-25-PA-11**
	or	2 make contacts	**KT 3-25-PA-20**
	or	2 break contacts	**KT 3-25-PA-02**
Undervoltage release Fits to right hand side Control voltages: 24V, 110V, 240V, 415V. 50 Hz.			**KT 3-25-UA-…V..**
Shunt trip Control voltages: 24V, 110V, 240V, 415V. 50 Hz.			**KT 3-25-AA-…V..**

Note: Other accessories available, include padlock attachment, current limiter, compact busbar and connection block. Refer NHP Part A catalogue or catalogues 2103 KT 3 or 2190 KA 1.

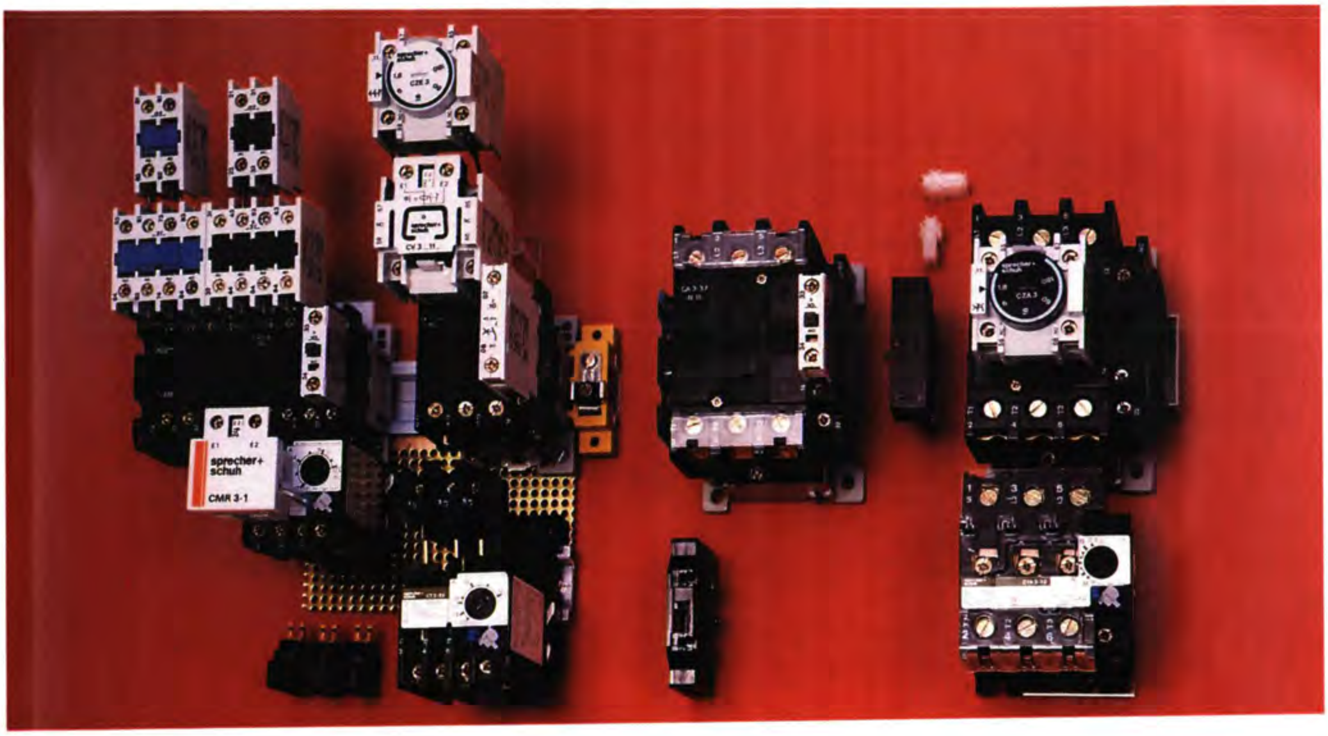
Standard modular contactors 4 to 72 kW

Quality, design and reliability

Sprecher + Schuh quality and design is renowned throughout the world in application where contactors and motor starters are used. The Sprecher + Schuh standard range of contactors provide complete reliability and long life, not equalled by most. The success of these products in Australia and elsewhere has been extraordinary, providing the user with a reliable product for all conditions.

Swiss precision and excellent design are the basis for the success of these products. Not only are the contactors dependable but they are supported by a range of thermal overload relays that offer outstanding motor protection under all conditions. Each thermal overload relay is individually calibrated at manufacture and thus provide a consistency of performance which is not matched by competitors.

The Sprecher + Schuh equipment is compact providing an extensive range of ancillary contacts, many options and accessories resulting in flexibility and versatility.



The range

Sprecher + Schuh offer a range of contactors totalling 24 different sizes which are designed to match standard motors giving the customer an optimum choice. The smallest units comprise the CA 4 range, designed for OEM use and are suitable for interfacing with PLC's. The specification provides for very low pull-in and holding currents and high frequency of operation.

The CA 3 programme illustrated above, is the most used range and provides 9 sizes from 4 to 37 kW. For ratings above 37 kW, Sprecher + Schuh provide a further 12 sizes.

When you specify Sprecher + Schuh you get additional quality at minimal extra cost. This quality results in reliability, as after all, there is no substitute for reliability!

Sprecher + Schuh provide that extra quality which means so much in service!

Features of the CA 3 contactor

- Rated to 60°C.
- Very compact.
- Mechanical life 10-15 million operations.
- Coil replacement in seconds from the front and without tools.
- Can be mounted:
  - On conventional base plates
  - On S+S rapid mounting gear tray
  - On DIN 35mm snap-on rail up to CA 3-30.
- Identification labelling:
  - Self adhesive labels
  - Strip labels with clear covers
  - S+S marking tags.
- Open type terminals.
- Captive pozi-drive screw.
- Self-lifting terminal washers.
- Tropic-proof coils are standard.
- Provision for snap-on auxiliary contact blocks.
- Provision for snap-on pneumatic time delay relay.
- Provision for snap-on mechanical latch.
- Compatible dimensions:
  - CA 3-12/16 similar size
  - CA 3-23/30 similar size
  - CA 3-37N/72N similar size.
- Guaranteed voltage pick-up.
- High operating frequency.
- Control voltages 50 Hz between 12V and 440V.
- Complies with BS 5424 and 587 SEV, VDE, AS 1029, IEC 158.

Auxiliary contact ratings for contactor auxiliaries and auxiliary contact blocks

For reference of AC 15 and AC 1 ratings for auxiliary contacts. Includes auxiliary contacts fitted as standard in contactors, auxiliary contacts "add on" types.

Description	AC 15 Auxiliary contacts I_{th} Contactors 240 (A)	Contactors 415 (A)	Aux. cont. block 240 (A)	Aux. cont. block 415 (A)	AC 1 Auxiliary contacts I_{th} Open Aux. Block (A)	Open Cont. (A)	Enclosed Aux. Block (A)	Enclosed Cont. (A)	Back-up fuse Aux. Block (A)	Back-up fuse Cont. (A)
CA 4 Contactor (Catalogue 22 04)										
For CA 4-5/CA 4-9	6	2	2	1	10	16	6	12	10	16
CA 3 Contactor (Catalogue 22 02)										
For CA 3-9 to CA 3-16	12	4	5.5	2.5	16	20	12	16	12	20
For CA 3-23 to CA 3-72N	12	4	5.5	2.5	16	20	12	16	12	25
CA 6 Contactor (Catalogue 22 08)										
For CA 6-85/CA 6-105	-	-	5.5	2.5	16	-	12	-	16	-
CA 1 Contactor (Catalogue 22 10)										
For CA 1-100 to CA 1-480	-	-	12	5	25	-	16	-	25	-
CA 5 Contactor (Catalogue 22 12)										
For CA 5-450/550 to CA 5-1200	-	-	-	4.5	25	-	16	-	25	-

Standard modular contactors 45 to 90 kW to 1000 volts

Quality, design and reliability

In keeping with modern industry requirements Sprecher + Schuh are in the process of designing a range of contactors 50 kW and upwards, suitable for a nominal 1000 volt operation.

Increasing demands by heavy industry and in particular the mining industry for switchgear at elevated voltages, has resulted in the new Sprecher + Schuh contractors - designated CA 6.

Years of research and development has now culminated in the introduction of the contactors CA 6-85 and CA 6-105.

Early in 1992 two further contactors will be added, the CA 6-140 (75 kW) and CA 6-190 (90 kW) will be introduced.

All new contactors incorporate the latest technology in switching techniques using the most modern materials and are designed for selection for the most arduous of industrial heavy current contactor applications.

These contactors are compact, robust and offer some outstanding advantages. The contactors can be mounted side by side as the switching arcs are extinguished internally and no venting occurs. The contactors have been designed for optimum safety and security as hand operation via the position indicator is impossible and thus an unintentional motor start is avoided.

Not only are the CA 6 contactors attractive in appearance, but they also permit advanced analogue solutions. Modules for protection against surge voltages are integrated into DC coils as a standard. The high voltage safety level of the magnet system reduce operational interruptions. Interlocks can be fitted between the contactors so that no additional spacing is required.

These contactors join the series CA 5-450/550/700/860 providing a very wide range of 1000 volts switching equipment.

Auxiliary contact blocks for AC contactors

Clip-on auxiliary contact blocks for CA 3-9 to CA 3-72N

Auxiliary contact block 1 pole — *Auxiliary contact block 1 pole (timed contacts)* — *Auxiliary contact block 2 pole* — *Auxiliary contact block 4 pole* — *Auxiliary contact block side mtg - convertible Cat. No. CA 3-P-GE*

Contact arrang.	Contacts N/O	Contacts N/C	Basic [1] cont.	Cat No.
23 / 24, Start PB	1	0	01, 10, 11	**CA 3-P-H10**
21 / 22	0	1	10	**CA 3-P-01**
01 / 02	0	1	01, 10, 11	**CA 3-P-L01 (late break)**
07 / 08	1	0	01, 10, 11	**CA 3-P-Z10 40ms (timed cont.)**
05 / 06	0	1	01, 10, 11	**CA 3-P-Z01 40ms (timed cont.)**
21 31 / 22 32	0	2	10	**CA 3-P-02**
21 33 / 22 34	1	1	10	**CA 3-P-11**

Contact arrang.	Contacts N/O	Contacts N/C	Basic [1] cont.	Cat. No.
31 / 32	0	1	01	**CA 3-P-S01**
33 / 34	1	0	01, 10, 11	**CA 3-P-S10**
31 43 / 32 44	1	1	01, 10, 11	**CA 3-P-S11**
31 41 53 63 / 32 42 54 64	2	2	01, 10, 11	**CA 3-P-S22**
	1	1 (convertible)	01, 10, 11	**CA 3-P-GE** [2]
21 31 43 53 / 22 32 44 54	2	2	10	**CA 3-P-22**
31 43 53 63 / 32 44 54 64	3	1	01, 10, 11	**CA 3-P-S31**
21 33 43 53 / 22 34 44 54	3	1	10	**CA 3-P-31**

Notes: [1]) The auxiliary contact blocks can be used with all CA 3 contactors.
The recommended basic contactors consider the correct terminal numbering to Cenelec standards.

Mounting options and auxiliary contact blocks

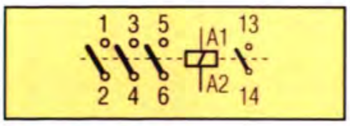
Contactors CA 3-9/16 [2])

One 1 pole or one 2 pole
One 1 pole + one 2 pole
One 4 pole

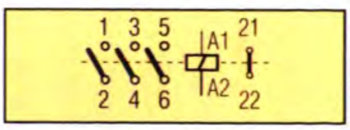
Contactors CA 3-23/72N [2])

One 1 pole or one 2 pole
One 1 pole + one 2 pole
One 4 pole
One 1 pole + one 4 pole

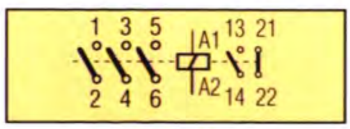
Notes: [2]) Side mount auxiliary contact (max. 2 per contactor) can be added in addition to top mount auxiliary contact.
Only 1 single contact block may be mounted, (on top right side).
Only 1 double contact block may be mounted, but it may be mounted with a single contact block.
Auxiliary contacts maximum: CA 3-9 to CA 3-16, 5 contacts. CA 3-23, CA 3-30, 6 contacts. CA 3-37N/72N, 7 contacts.



Basic contactor - 10
CA 3-9 to CA 3-30



Basic contactor - 01
CA 3-9 to CA 3-30



Basic contactor - 11
CA 3-37N to CA 3-72N

Auxiliary contact blocks and accessories for AC contactors

Auxiliary contact blocks (convertible) for CA 1-60 to CA 1-480
Terminal markings in accordance with DIN standards

Auxiliary contacts for CA 1-60/480

At delivery Off - On	Terminal marking	On conversion Off - On	Terminal marking	Cat. No.
	..3-..4 ..1-..2		..1-..2 ..3-..4	**154-01**
	..3-..4 ..1-..2	or	..3-..4 ..3-..4 ..1-..2 ..1-..2	**154-02**

Auxiliary contact blocks for CA 5-550 - CA 5-1200 contactors

Description	Cat. No.
2 N/O + 2 N/C Auxiliary block to suit CA 5-550/700/860	**CA 5-EF-22**
11-12 And 23-24 to suit CA 5-1000/1200	**CA 5-EB-11**
31-32 And 43-44 to suit CA 5-1000/1200	**CA 5-EB-11**
51-52 And 63-64 to suit CA 5-1000/1200	**CA 5-EB-11**
71-72 And 83-84 to suit CA 5-1000/1200	**CA 5-EB-11**

Auxiliary contact blocks for CA 6 [1]

Description	Contacts	Cat. No.
For fitting left	N/O + N/C	**CA 6-P1-11**
	N/O + N/C	**CA 6-P3-11**
For fitting right	N/O + N/C	**CA 6-P2-11**
	N/O + N/C	**CA 6-P4-11**
	N/O + N/C (late break)	**CA 6-P2-L11** [2]

Notes: [1] Maximum of four blocks per contactor.
[2] To be used with DC coil.

Accessories for CA 6 contactor

Mechanical interlock

Mechanical interlock	Cat. No.
For contactors CA 6-85 and CA 6-105	**CA 6-CM 6**

Main terminal cover

For contactors CA 6-85 and CA 6-105	(2 pieces per set)	**CA 6-105HA**
For electronic motor protection relay CEF 1	(2 pieces per set)	**CEF 1-HA**

Connection busbar

For electronic motor protection relay CEF 1 for direct-on line starting		
with short shank	(3 pieces per set)	**CEF 1-VS**
with long shank	(3 pieces per set)	**CEF 1-VK**
For separate fitting-straight without bracket	(3 pieces per set)	**CEF 1-VM**

Note: For more accessories in the CA 6 range refer catalogue 2208K2.

Auxiliary contact blocks and accessories for AC contactors

Auxiliary contact blocks CA 4-P

The terminal markings are in compliance with EN 50 012 and can be snap-fitted onto the CA 4 contactor in a 2 or 4 pole form.

All auxiliary blocks have *'bifurcated'* contacts which make them suitable for low voltage switching ie. PLC inputs etc.

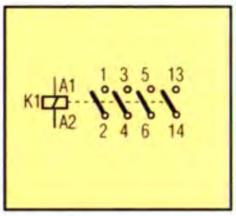
Auxiliary contact block CA 4-P-...

Auxiliary contacts blocks for contactors

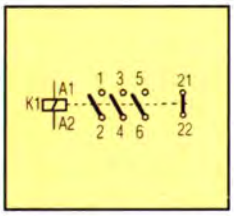
Contact arrangement	Cat. No.
21 31 / 22 32	**CA 4-P-02**
21 33 / 22 34	**CA 4-P-11**
43 53 21 31 / 44 54 22 32	**CA 4-P-22**

Auxiliary contact blocks for relays

Contact arrangement	Cat. No.
53 63 / 54 64	**CS 4-P-20**
53 61 / 54 62	**CS 4-P-11**
53 63 73 83 / 54 64 74 84	**CS 4-P-40**



Contact arrangement CA 4... -10



Contact arrangement CA 4... -01

Accessories for auxiliary contact blocks

Description		Cat. No.
Mechanical interlock [1]	(requires no additional space)	**CM 4**
Steel DIN rail 35mm	(2 metre lengths)	**SDR**
Star-delta timing relay – solid state	(110 or 240V AC)	**CRZY 4**
On time-delay – solid state		
0.1-3sec (CA 4 connection)		**CRZE 4-3S**
1-30secs (CA 4 connection)		**CRZE 4-30S**
Protective cover for CA 4 / CS 4		**CA 4-PC**
Adaptor for mounting time relay onto G or DIN rail		**CR 4-P**
RC link for coil suppression	24-48V or 110-240V 50Hz	**CRC 4**
Diode link for coil suppression	12-110V DC	**CRD 4**
Connection bridge	(50 amp rated)	**CB 4**

Note: [1]) Not available for use with DC contactors and relays.

Mounting accessories

The KTA 3-25-GP12-0 combination mounting plate allows you to mount two DIN rail devices onto one installed DIN rail.

Combination mounting plate KTA 3-25-GP12-0

Combination mounting plate fitted with KTA 3-25 circuit breaker and CA 4 contactor

Type '2' short circuit co-ordination Introduction - new IEC standard

Short circuit co-ordination between HRC fuses (BS88) and Sprecher + Schuh motor starters, contactors and overloads, are now covered under the new IEC standard. This new International standard is IEC 947-4-1, and supersedes the well known type 'c' co-ordination, as defined in IEC 292.

This standard (IEC 947-4-1) demands testing at two fault levels. A high fault level known as the **conditional short circuit current** ***Iq*** (eg 50kA) and a lower fault level known as the **prospective current 'r'**. The prospective current 'r' ranges from 1kA for small kilowatt starters, up to 42kA for large kilowatt starters.

The importance of testing at this lower fault level is significant, as the majority of short circuits which occur in the field are limited faults. That is, the fault level has been reduced by impedance in the circuit.

What many designers and consultants may not realise is that the worst short circuit condition for a contactor and overload is not necessarily the maximum fault level, or conditional short circuit current. In many cases the worst condition is a lower, or critical current level, and this critical fault level depends on the let-through energy of the protective fuse, and also the characteristics of the contactor and overload. Therefore, testing at this lower fault level can be more arduous on a motor starter than testing at, say, 50kA.

Tests were carried out at the Sydney County Council [1]) with a full range of Sprecher + Schuh contactors and overloads, backed up by HRC fuses as the short circuit protective device. It is important to point out that these tests, although carried out in accordance with the new standard IEC 947-4-1, were also conducted to comply with the requirements of the **Australian switchboard standard AS 1136-1** that is, the contactors and overloads were mounted in a motor control centre and tested basically in accordance with the switchboard standard. The subtle difference is that the switchboard standard does not normally allow for additional cable impedance, whereas component standards – that is, contactor or motor standards, do allow for a connection cable which, in turn, can limit the fault level actually experienced by the contactor and overload.

The following table recommends successful combinations of contactors, overloads and fuses, up to a prospective fault current level of 50kA. Please note, these combinations, although tested to the IEC 947-4-1 standard, are also suitable for the **Australian switchboard standard AS 1136-1**.

Type '2' motor starter co-ordination table

Conditional short circuit current 50kA [2]), 415V, to IEC 947-4-1 [3])

Motor kW	Rating AC 3 amps	Sprecher + Schuh contactor [4])	Sprecher + Schuh overload [4])	GEC [5]) HRC fuse Type T to BS 88
0.37	1.2	CA 4-5/CA 3-9	CT 4-1.2/CT 3-12	TIA-4
0.75	2	CA 4-5/CA 3-9	CT 4-2.7/CT 3-12	TIA-6
1.5	3.5	CA 4-5/CA 3-9	CT 4-4/CT 3-12	TIA-16
2.2	5	CA 4-5/CA 3-9	CT 4-6/CT 3-12	TIA-16
4	8	CA 4-9/CA 3-9	CT 4-9/CT 3-12	TIA-25
5.5	11	CA 3-16	CT 3-12	TIA-32
7.5	14	CA 3-16	CT 3-17	TIS-35
11	21	CA 3-23	CT 3-23	TIS-50
15	28	CA 3-30	CT 3-32	TIS-63
18.5	35	CA 3-37N	CT 3-42	TCP-80
22	40	CA 3-43N	CT 3-42a	TCP-100
30	55	CA 3-60N	CT 3-63	TCP-100
37	66	CA 3-72N	CT 3-72/CEF 1	TFP-125
45	80	CA 6-85	CT 6-90/CEF 1	TFP-160
55	100	CA 6-105	CT 6-110/CEF 1	TF-200
75	135	CA 1-100/CA 1-150 [6])	CT 1-145/CEF 1	TKF-250
90	160	CA 1-150	CT 1-200/CEF 1	TKF-250
150	250	CA 1-250	CT 1-290/CET 3	TMF-355
185	310	CA 5-450	CT 1-400/CET 3	TTM-450
250	425	CA 5-450/CA 1-480	CT 1-500/CET 3	TTM-500
320	538	CA 5-550	CET 3	TTM-630
380	650	CA 5-700	CET 3	TLM-800

Notes: [1]) 'Sydney County Council' are now known as 'Testing and Certification Australia'.

[2]) **Conditional short circuit current** ***Iq*****. and prospective current 'r'** -
1kA: 0.37kW to 7.5kW; **3kA:** 11kW to 30kW; **5kA:** 37kW to 55kW; **10kA:** 75kW to 250kW; **18kA:** 320kW to 380kW.

[3]) Combinations also suitable for Australian switchboard standard AS 1136-1, duty 1 + 2.

[4]) Alternative combinations of contactors and overloads are possible.

[5]) Other GEC Type T fuse cartridges of identical current ratings are also suitable.

[6]) CA 1-100 separately tested to AS1136-1.

[7]) Co-ordination details for reduced voltage starters available on request.

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Thermal overload relay selection and performance graphs for CT 3K

Thermal overload CT 3K-12

Economical compact CT 3K thermal overload relay for use with contactors CA 3

- Single phasing protection
- Ambient temperature compensated -20°C to +60°C (to IEC 292-1)
- Operating temperature -25°C to +70°C
- Tripping lever for testing
- No automatic reset available

DOL starting rating plate - outer calibration			Star delta starting rating plate - inner calibration			Contactor size	
Approx. kW (415V)	**Setting range (A)**	**Thermal overload Cat. No.** [1]	**Approx. kW (415V)**	**Setting range (A)**	**Thermal overload Cat. No.** [1]	**For direct attachment** [1]	**HRC fuse**
-	0.10- 0.15	**CT 3K-12**				CA 3-9	0.63A
-	0.15- 0.23	**CT 3K-12**	**Note:** Star delta thermal overloads must be connected in delta mesh			CA 3-9	1 A
-	0.23- 0.35	**CT 3K-12**				CA 3-9	2 A
0.15	0.35- 0.55	**CT 3K-12**				CA 3-9	2 A
0.15-0.25	0.55- 0.80	**CT 3K-12**				CA 3-9	2 A
0.25-0.40	0.80- 1.20	**CT 3K-12**				CA 3-9	4 A
0.40-0.75	1.20- 1.80	**CT 3K-12**				CA 3-9	4 A
0.75-1.10	1.80- 2.70	**CT 3K-12**				CA 3-9	6 A
1.10-1.70	2.70- 4.00	**CT 3K-12**	2.20- 3.00	4.70- 6.90	**CT 3K-12**	CA 3-9	10 A
1.70-2.75	4.00- 6.00	**CT 3K-12**	3.00- 5.00	6.90-10.40	**CT 3K-12**	CA 3-9	16 A
2.75-4.30	6.00- 9.00	**CT 3K-12**	5.00- 8.00	10.40-15.60	**CT 3K-12**	CA 3-9	20 A
4.30-6.00	9.00-12.50	**CT 3K-12**	8.00-11.00	15.60-21.60	**CT 3K-12**	CA 3-12	25 A
7.50	12.50-17.50	**CT 3K-17**	11.00-16.00	21.60-30.30	**CT 3K-17**	CA 3-16	35 A

Note: [1]) All CT 3K-12 and CT 3K-17 overloads can be fitted onto all contactors up to CA 3-30.

Time/current characteristics of thermal overload relay CT 3K

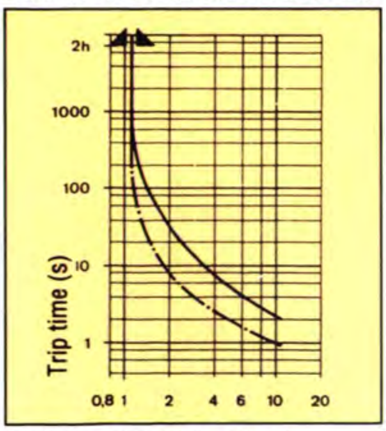
Thermally delayed overload relay.
Mean value of tolerance bands three-phase heated.
——— Curves relate to relay cold
– — – Curves relate to relay at operating temperature (at set current load).

Tolerance: trip time ±20% (±10% for current) Function limits and temperature compensation from -25°C to +70°C.

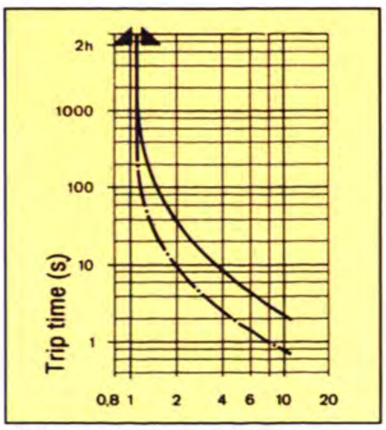
Tripping limits specified in IEC 292-1 for -5°C…+40°C are satisfied in range -20°C…+60°C.

Dual scale for direct-on-line and star delta starting.

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



Multiples of current setting I_e
CT 3K-12, 0. 1…4A



Multiples of current setting I_e
CT 3K-12, 4…12, 5A
CT 3K-17, 12,5…17, 5A

Two-phase loading

(phase failure):
Trip limits 1.05…1.32 of set current I_{ei} in accordance with IEC 292-1.

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Thermal overload relay selection for CT 3

Thermal overload CT 3-12

Standard type CT 3 thermal overload relay for use with contactors CA 3

- ❑ Relays designed for use with CA 3 contactors
- ❑ Incorporating 'differential action' single phase protection
- ❑ Three phase - ambient temperature compensated -20°C to +60°C (to IEC 292-1)
- ❑ Operating temperature -25°C to +70°C
- ❑ Tripping lever for testing
- ❑ Automatic reset (selectable)
- ❑ Overloads individually factory calibrated

DOL starting rating plate - outer calibration			Star delta starting rating plate - inner calibration			Contactor size		
Approx. kW (415V)	Setting range (A)	Thermal overload Cat. No. [1]	Approx. kW (415V)	Setting range (A)	Thermal overload Cat. No. [1]	For direct attachment [1]		HRC fuse
-	0.10 - 0.16	**CT 3-12**	**Note:** Star delta thermal overloads must be connected in delta mesh			CA 3-9		0.63A
-	0.15 - 0.24	**CT 3-12**				CA 3-9		1 A
-	0.24 - 0.38	**CT 3-12**				CA 3-9		2 A
0.15	0.38 - 0.62	**CT 3-12**				CA 3-9		2 A
0.15 - 0.35	0.62 - 1.00	**CT 3-12**				CA 3-9		4 A
0.35 - 0.60	1.00 - 1.60	**CT 3-12**				CA 3-9		4 A
0.60 - 1.10	1.60 - 2.50	**CT 3-12**				CA 3-9		6 A
1.10 - 1.70	2.50 - 4.00	**CT 3-12**	2.00 - 3.00	4.30- 6.90	**CT 3-12**	CA 3-9		10 A
1.70 - 2.75	3.80 - 6.00	**CT 3-12**	3.00 - 5.00	6.60- 10.40	**CT 3-12**	CA 3-9		20 A
2.75 - 4.50	6.00 - 9.50	**CT 3-12**	5.00 - 8.00	10.40- 16.50	**CT 3-12**	CA 3-9		25 A
4.00 - 6.00	8.50 -12.50	**CT 3-12**	7.00 -11.00	14.70- 21.70	**CT 3-12**	CA 3-12		25 A
6.00 - 8.00	12.00 -17.50	**CT 3-17**	11.00 -15.00	20.80- 30.30	**CT 3-17**	CA 3-16	3-16	35A
							3-23	40A
8.00 - 12.00	16.00-23.00	**CT 3-23**	15.00 -21.00	27.70- 39.80	**CT 3-23**	CA 3-23	3-23	50A
							3-30	50A
12.00 - 17.00	23.00-32.00	**CT 3-32**	21.00 -30.00	39.80- 55.40	**CT 3-32**	CA 3-30	3-30	63A
							3-37	80A
							3-43	80A
13.00 - 17.00	25.00-32.00	**CT 3-42**	25.00 -30.00	43.30- 55.40	**CT 3-42**	CA 3-37N	3-37	80A
							3-43	100A
17.00 - 23.00	32.00-42.00	**CT 3-42**	30.00 -40.00	55.40- 77.80	**CT 3-42**	CA 3-37N	3-60	125A
							3-72	125A
22.00 - 28.00	40.00-52.00	**CT 3-52**	38.00 -50.00	69.20- 90.00	**CT 3-52**	CA 3-43N	3-60	125A
							3-72	125A
28.00 - 35.00	52.00-63.00	**CT 3-63**	50.00 -62.00	90.00-110.00	**CT 3-63**	CA 3-72N	3-72	125A
35.00 - 40.00	64.00-72.50	**CT 3-72**	62.00 -72.00	110.00-125.00	**CT 3-72**	CA 3-72N	3-72	125A

Notes: Operational limits -25°C to +70°C.
[1]) CT 3-12 and CT 3-17 overloads can be fitted onto all contactors up to CA 3-30.

Direct mounting type CT 3-42

Separate mounting type CTA 3-52

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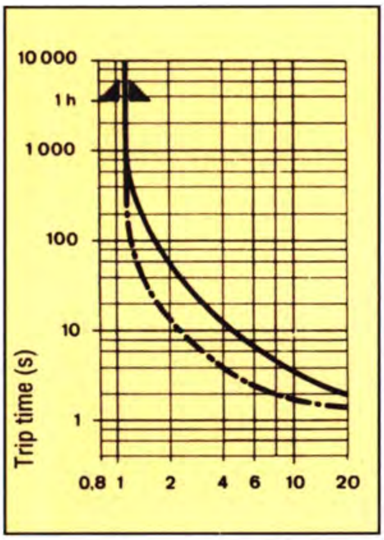
Thermal overload relay performance graphs for CT 3

Time/current characteristics of thermal overload relay CT 3

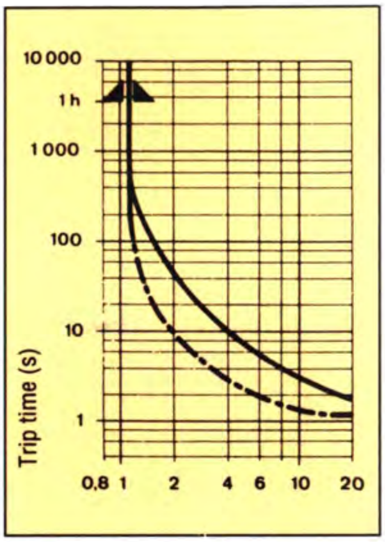
Thermally delayed over-current relay.
Mean value of tolerance bands, heated in three phases.
——— Curves from cold state,
– —– Curves in operationally warm state (loaded with the set current).
Tolerance: tripping time ±20% or current ± 10%.

Two-phase loading (single phase failure). Trip limiting current approximately 85% of 3-phase trip limiting current.

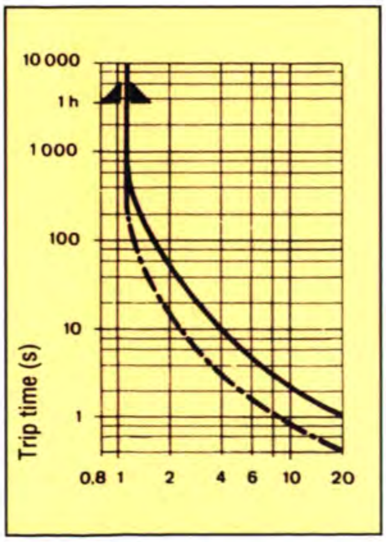
◢◣ Specified points from the cold state.



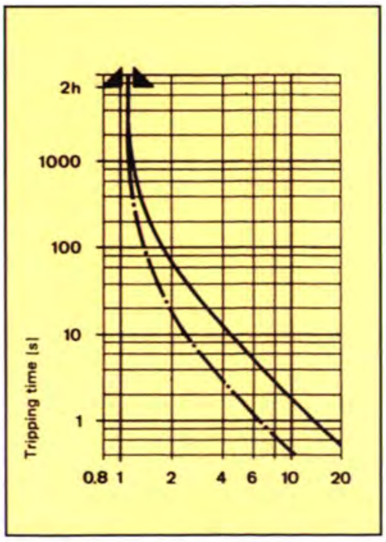
Multiples of current setting I_e
CT 3-12, 0.1…0.16 to 3.8…6A



Multiples of current setting I_e
CT 3-12, 6…9.5A, 8.5…12.5A



Multiples of current setting I_e
CT 3-17, CT 3-23, CT 3-32



Multiples of current setting I_e
CT 3-42, CT 3-52, CT 3-63, CT 3-72

Overload relay selection for CA 1 contactors

Heavy current – CT operated thermal and electronic overload relays. for use with contactors CA 1-60 to CA 5-1200

- 'Differential' single phasing protection [1] Current transformer operated [1]
- Three phase ambient temperature compensated -20°C to +60°C [2] (to IEC 292-1)

Thermal overload relay CT 1-290

DOL starting (Yellow rating plate)			Star delta (Inner scale calibration)			Contactor size	
Approx. kW (415V)	Setting range (A)	Thermal overload Cat. No.	Approx. kW (415V)	Setting range (A)	Thermal overload Cat. No.	For direct attachment	HRC fuse
35-55	65-100	**CT 1-150**	65-95	110-170	**CT 1-150**	CA 1-60	160/200 A
55-85	100-150	**CT 1-150a**	95-150	170-260	**CT 1-150a**	CA 1-100	160/250 A
						CA 1-150	200/250 A
37-50	70-90	**CT 1-90**	65-85	121-156	**CT 1-90**	CA 1-60	200 A
						CA 1-100	200 A
						CA 1-150	315 A
50-80	90-145	**CT 1-145**	85-140	156-251	**CT 1-145**	CA 1-150	250 A
						CA 1-250	315 A
80-115	140-200	**CT 1-200**	140-200	242-346	**CT 1-200**	CA 1-150	400 A
						CA 1-250	400 A
						CA 1-480	400 A
105-170	180-290	**CT 1-290**	180-300	312-502	**CT 1-290**	CA 1-250	500 A
						CA 1-480	500 A
160-230	275-400	**CT 1-400**	280-400	476-693	**CT 1-400**	CA 1-480	800 A
						CA 5-550 [3]	800 A
185-300	320-500	**CTA 1-500** [3]	320-520	554-866	**CTA 1-500** [3]	CA 1-480	800 A
						CA 5-450 [3]	800 A
						CA 5-550 [3]	800 A
						CA 5-700 [3]	1000 A
185-700	300-1200	**CEF 1-11P-1200** [3]	320-1200	520-2078	**CEF 1-11P-1200** [3]	CA 5-700	1000 A
		CEF 1-12P-1200 [3]			**CEF 1-12P-1200** [3]	CA 5-860	1250 A
						CA 5-1000	1600 A
						CA 5-1200	2000 A

Notes: [1]) CT 1-150 (a) is non differential and is not CT driven.
[2]) Operational limits -25°C to +70°C
[3]) Separately mounted only. (CEF complete with 3 x 1200/5 current transformers (supplied loose)).

Thermal overload motor protection and features

Sprecher + Schuh has always paid particular attention to the question of motor protection and is untiring in its never ending efforts to only manufacture motor protection devices which are really deserving of this description. Consistent high quality is only ensured by a costly ultimate tripping current calibration process. The lowest and the highest current settings are individually calibrated on every thermal overload relay. This takes place with 1.05 x I_e ie: (No trip occurrence) and 1.2 x I_e.

CT 1-150

- Suitable for AC and DC use. All 3 phases must be connected into the current path.
- Manual test trip.
- Reset convertible to <hand>, (with re-close prevention) or <auto> (without re-close prevention.
- Types with scales for direct-on-line (yellow) or star-delta starting (green).
- Short-circuit proof. No damage with the high rating back-up fuses permissible (type <c> in accordance with IEC 292-1).

CT 1-90 - CT 1-500

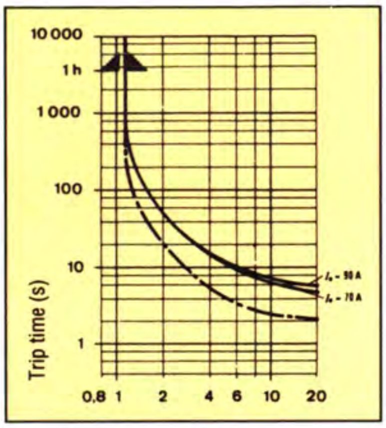
- Fitted with differential single-phasing protection. Accel. trip with the failure of a phase. Trip limiting current approx. 85% of the 3-phase limiting current.
- Current transformers for AC frequencies 50/60Hz.
- Slide for manual testing of the snap-action contact.
- Hand or automatic reset as required. Third position for test trip with reset button.
- Two scale division for direct-on-line and star-delta

Thermal overload relay performance graphs for CT 1

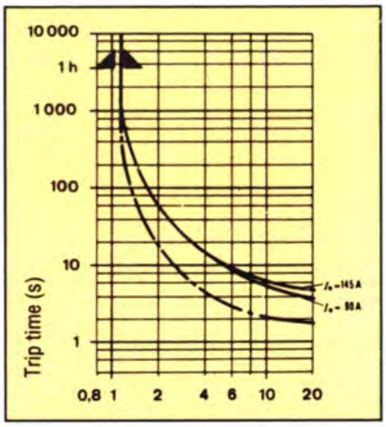
Time/current characteristics of thermal overload relay CT 1 for use with contactors CT 1-90 to CT 1-500

Average stray value heated in three phases.
——— Curves from cold state;
– — – Curves from operationally warm state (previously loaded with set current).
Stray - Tripping time ±20% or current ±10%
Standardised limits from operationally warm state to IEC 292-1 (type 1).

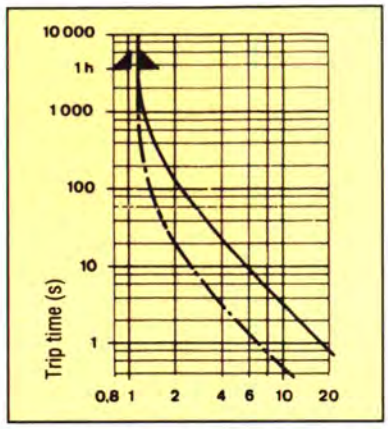
Single phasing
(loss of one phase):
CT 1-43, 1-72, 1-90…1-500: Ultimate tripping current approx. 85% of the 3 phase ultimate tripping current.
CT 1-10…CT 1-30, CT 1-150:
Ultimate tripping current approx. 105% of the 3 phase ultimate tripping current.



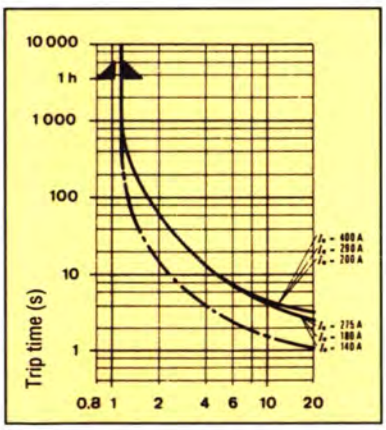
Multiples of current setting I_e
CT 1-90



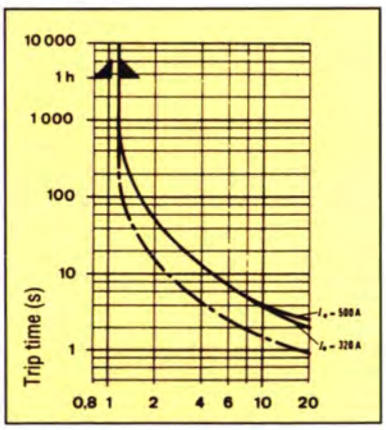
Multiples of current setting I_e
CT 1-145



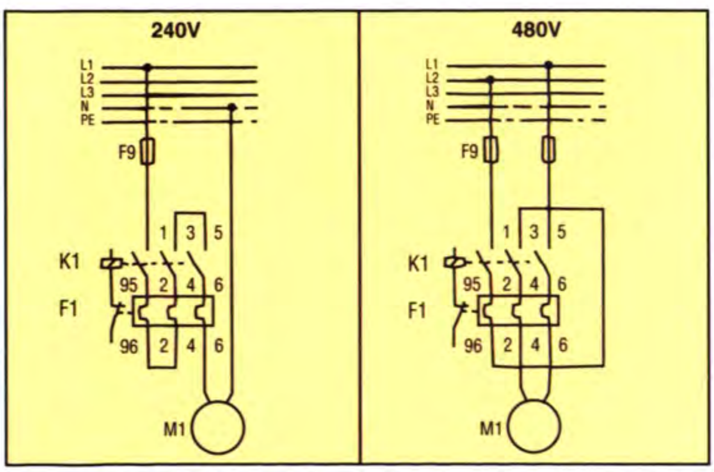
Multiples of current setting I_e
CT 1-150



Multiples of current setting I_e
CT 1-200…CT1-400



Multiples of current setting I_e
CT 1-500



Series connection of thermal overload relay poles for single-phase operation

Use of thermal overloads with single and two phase motors

When using a three-pole thermal overload relay with differential tripping for single-phase applications, the free poles must be connected in series so that no phase failure is simulated.

Series connection of thermal overload relay poles for single-phase operation.

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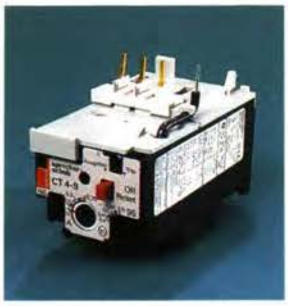
Thermal overload relay selection for CT 4



Thermal overload relay CT 4

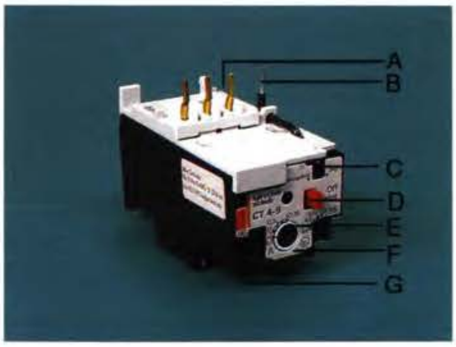
Features of thermal overload relay CT 4 to suit CA 4 contactors

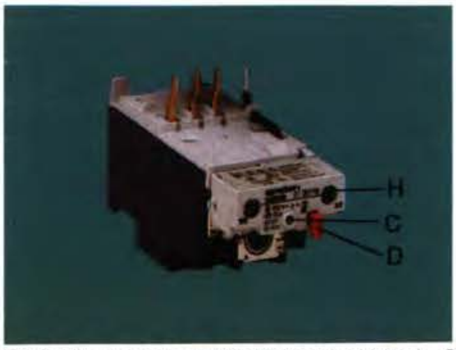
- High tripping accuracy
- Manual reset
- Trip indicator complies with AS 1023
- Maximum volts 660V
- Temperature compensation from -25°C to +75°C
- Snap-on signal contact available
- No automatic reset available

CT4 Thermal overload relays for mounting on CA 4-5 and CA 4-9 contactors


Contactor with add-on thermal overload relay

Adjustment range in amps (DOL)	Type T HRC fuse	Approx. kW 415V	Cat. No.
0.10 - 0.15	0.63A	0.06	**CT 4-0.15**
0.15 - 0.23	1	0.09	**CT 4-0.23**
0.23 - 0.35	2	0.12	**CT 4-0.35**
0.35 - 0.55	2	0.18	**CT 4-0.55**
0.55 - 0.80	2	0.25	**CT 4-0.80**
0.80 - 1.20	4	0.5	**CT 4-1.20**
1.20 - 1.80	4	0.55	**CT 4-1.80**
1.80 - 2.70	6	0.75	**CT 4-2.70**
2.70 - 4.00	10	1.5	**CT 4-4**
4.00 - 6.00	16	2.2	**CT 4-6**
6.00 - 7.70	20	3	**CT 4-7.70**
7.50 - 9.00	20	4	**CT 4-9**
Auxiliary signal contact block (N/O) - clip-on to thermal overload			**CT 3K-P-10**





CT 4 with snap on auxiliary contact block, CT 3K-P-10

A Electrical connection/mechanical attachment pins for direct attachment to contactors CA 4-5 and CA 4-9.

B Built-in wire connection from tripping contact (95) to coil (A2). Can be removed if required.

C Flag indicator (thermal overload relay ready for operation or tripped).

D Red O/L button: an integral off button for test tripping and resetting.

E Direct start current setting scale with setting knob.

F Auxiliary scale current setting for star delta starting.

G Front mounted trip contact connections.

H Signal contact connections.

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Thermal overload relay performance graphs for CT 4

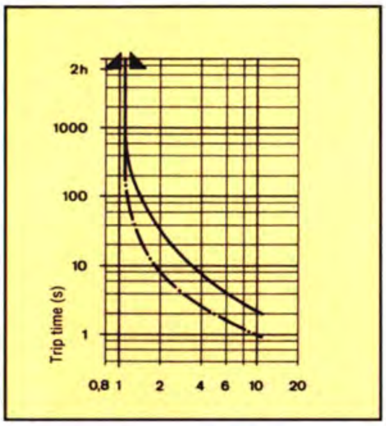
Time/current characteristics of thermal overload relay CT 4 for use with contactors CA 4

Thermally delayed overload relay
Mean value of tolerance bands 3-phase heated.
——— Full line curves relate to cold relay.
– —– Curves relate to relay at operating temperature (at set current load).
Tolerance: trip time ±20%, ±10% for current.
Function limits and temperature compensation from -25°C…+75°C.
Tripping limit specified in IEC 292-1 for -5°C…+40°C are included in the -20°C to +60C range.

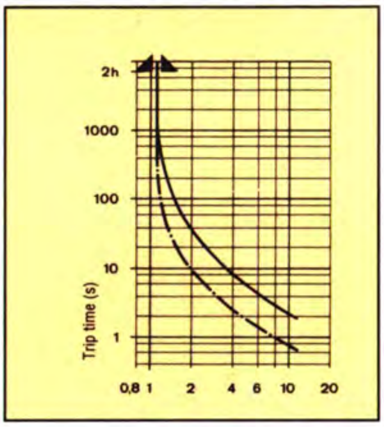
Single phasing (phase failure)

Trip limits 1.05 to 1.32 of set current I_{eF} (1.05 to 1.32 I_{eF} is permissible according to IEC 292-1). For motors up to 10 kW, the 2-phase trip at 1.25 I_{eF} maximum, guarantees heat build up limitation to the value which occurs in the event of a 3-phase trip at 1.2 I_{eF}.

▲▲ Specified points relative to operating temperature condition, in compliance with IEC 292-1 (type 1) and SEV publication number 138.

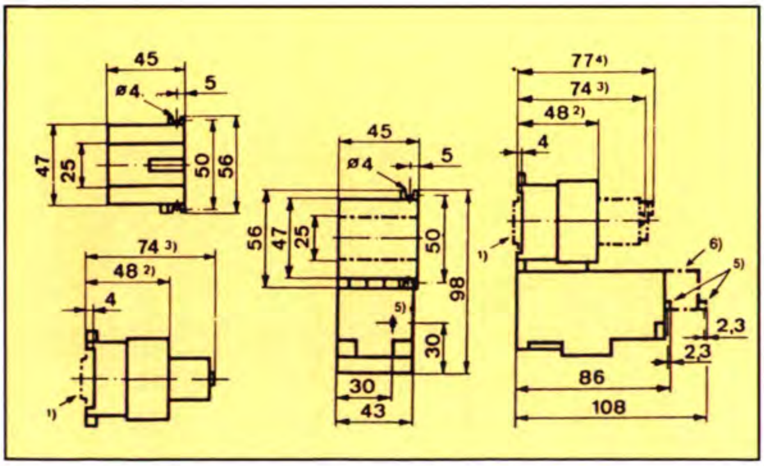


Multiples of current setting I_e
CT 4 0.1 ... 2.7 A

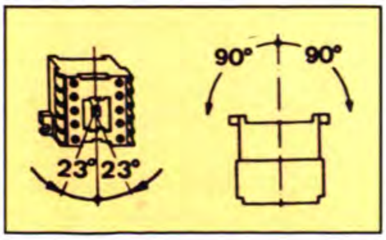


Multiples of current setting I_e
CT 4 2.7 ... 9 A

Dimensions for CA 4 contactors and starters



Mounting position



For direct current operation (DC) any mounting position is possible. For alternating current operation (AC) mounting is restricted as shown in diagram.

Notes: Control relay CS 4, contactors CA 4-5 and CA 4-9 with auxiliary block CS 4-P or CA 4-P.
1) DIN rail attachment possible.
2) Basic unit without modules.
3) With auxiliary contact block.
4) With CRZE 4 timing element.
5) Overload button: 2.3mm min. travel = off + reset.
6) With CT 3K-P-10 auxiliary on thermal relay.

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Thermal overload relay selection and performance graphs for CT 6

Features of thermal overload relay CT 6 to suit CA 6 contactors

- CT operated
- Direct connect or free standing available
- Suitable for 1000V operation
- RT-3 thermistor relay can be mounted on CT-6

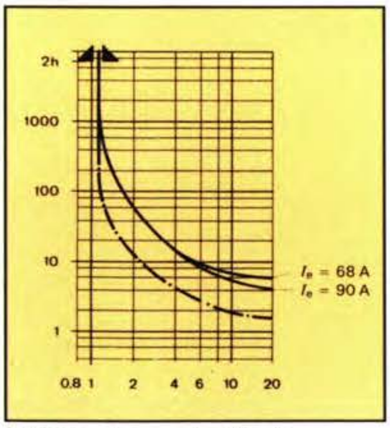
CA 6 with RT 3 mounted on CT 6

Thermal overload relay CT 6

Approx. kW (415V)	EE Type T HRC Fuse	Setting range for direct-on-line (A)	For Star-delta starting (A)	Thermal overload Cat. No.
For fitting to contactor CA 6				
40 - 50	200A	70...90	121...155	**CT 6-90**
49 - 61	200A	85...110	147...190	**CT 6-110**
For separate mounting				
40 - 50	200A	70...90	121...155	**CTA 6-90**
49 - 61	200A	85...110	147...190	**CTA 6-110**

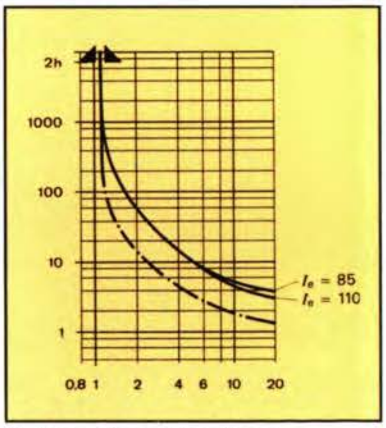
Time/current characteristics of thermal overload relay CT 6 for use with contactors CA 6

Mean value of thermal overload relay time/current characteristic (thermally delayed overcurrent relay)



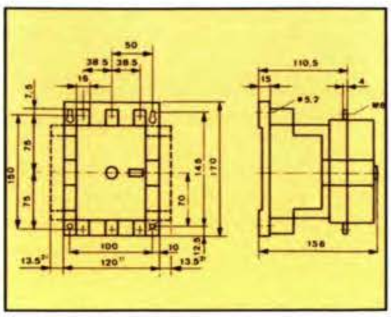
Multiple of current setting I_e
CT 6-90

Two-phase loading (loss of one phase (single-phasing)). Trip limiting current approx. 85% of the 3-phase tripping current.

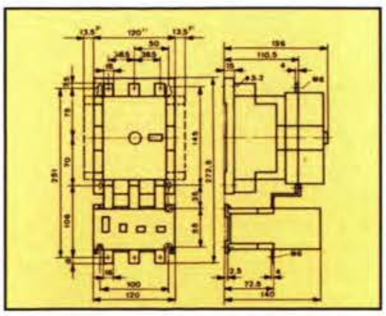


Multiple of current setting I_e
CT 6-110

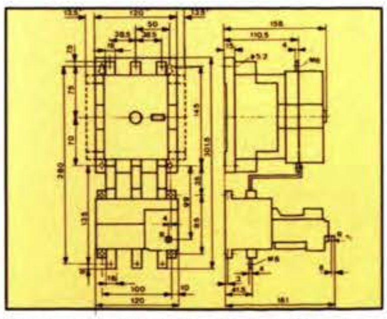
Dimensions for CA 6 contactors and starters



Contactor CA 6-85 and CA 6-105



Contactor CA 6-85, CA 6-105 and thermal overload relay CT 6



Contactor CA 6-85, CA 6-105 and motor protection unit CEF 1

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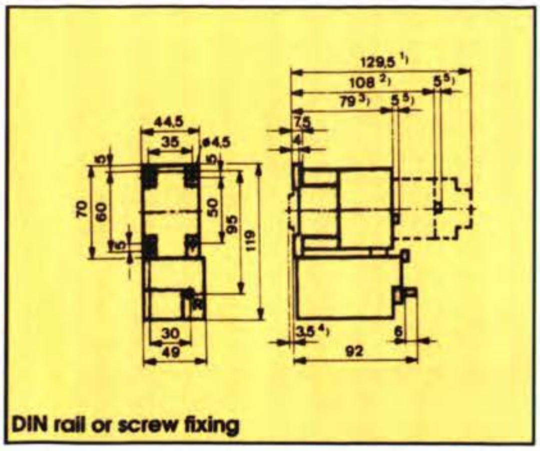
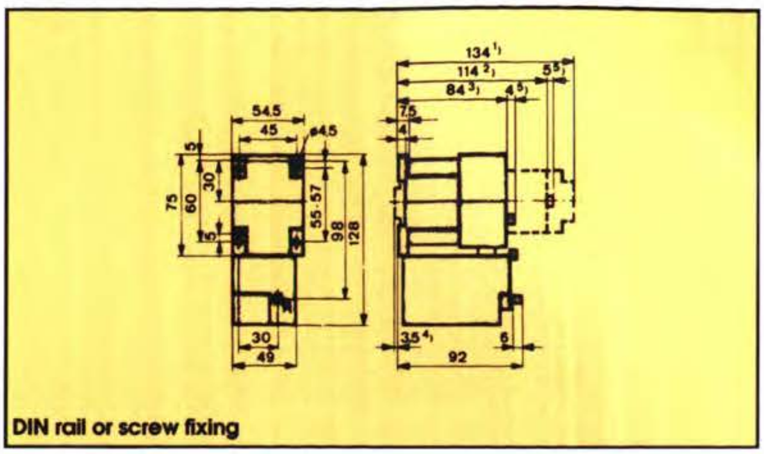
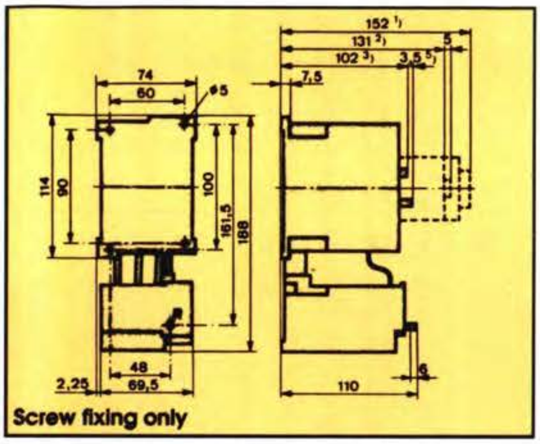
Dimensions for CA 3 contactors and starters



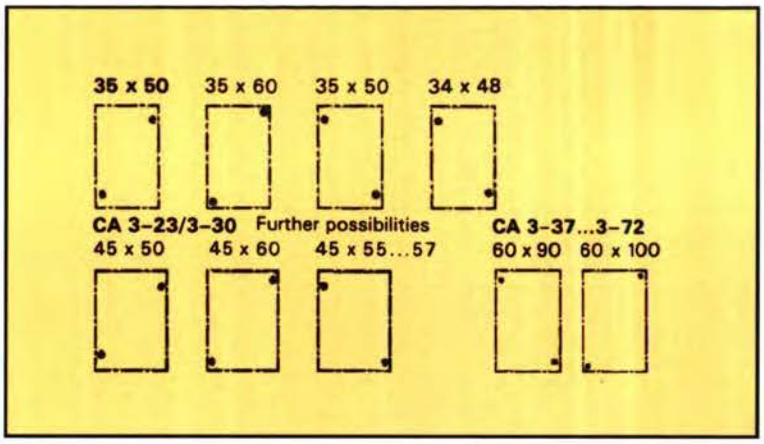
CA 3-9 (+CT 3) / CA 3-12 (+CT 3) / CA 3-16 (+CT 3)



CA 3-23 (+CT 3) / CA3-30 (+CT 3)



CA 3-37N (+CT 3) to CA 3-72N (+CT 3)



Legend:

[1]) With CZ 3 timing element, or with CV 3 mechanical latch, or with time delayed auxiliary contact

[2]) With auxiliary contact block

[3]) Basic device without any built-on elements

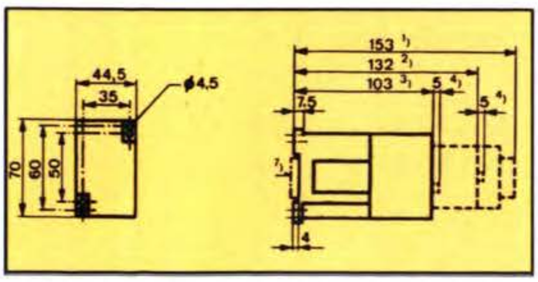
[4]) Fixing possibility onto 35mm din rail for CA 3-9 to CA 3-30

[5]) Not permissible to CSA, UL, DEMKO and Finland

Drilling plan

Two of the fixing holes conform to the preferred vertical distance between holes of 50mm 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 35mm. Further holes permit the use of other frequently used drilling plans.

Dimensions for DC versions



DC relay CS3 C, contactors CA 3-9 C, CA 3-12 C and CA 3-16 C

Legend:

[1]) With timing element CZ 3 or CV 3 latch, or time delayed auxiliary contact

[2]) With auxiliary contact block

[3]) Basic device without adder elements

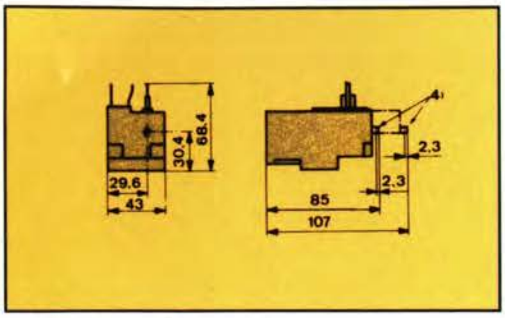
[4]) With marking tag carrier

[7]) Fixing possible onto 35mm Din Rail

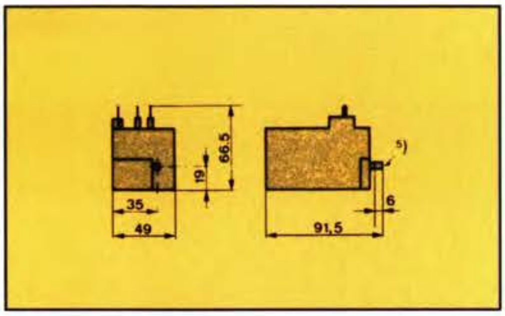
Note: If auxiliary contact blocks are fitted the contactors must not be mounted upside down.

Dimensions for CT 3 thermal overload relays

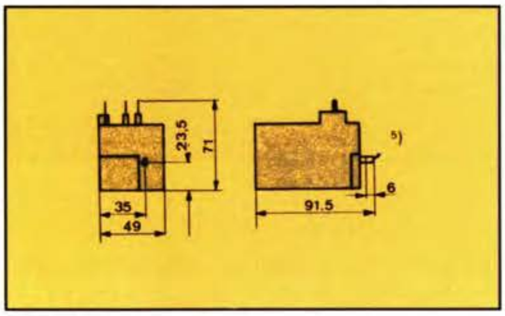
For mounting on contactors



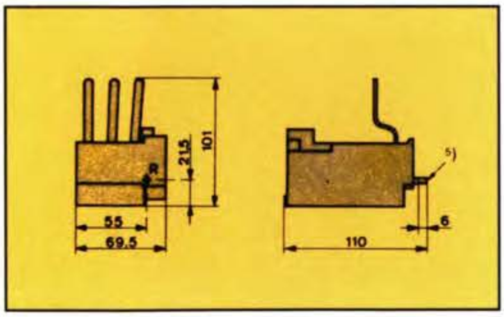
CT 3K-12 and CT 3K-17



CT 3-12 and CT 3-17

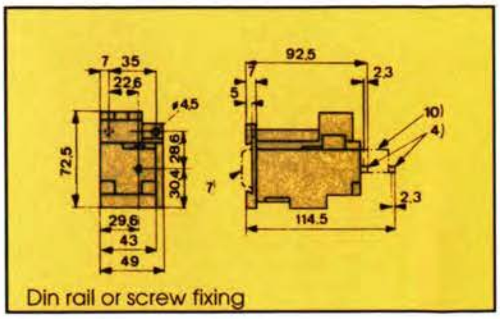


CT 3-23 and CT 3-32

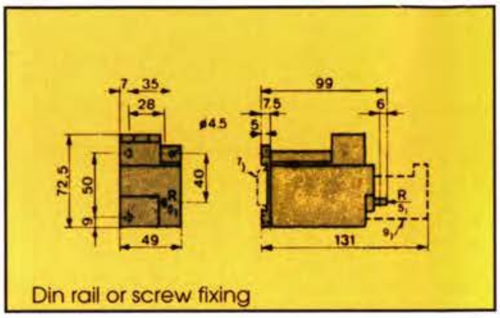


CT 3-42...CT 3-72

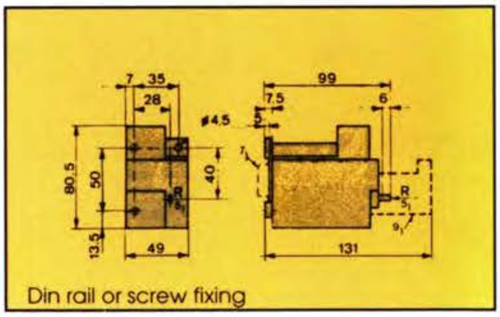
For separate mounting



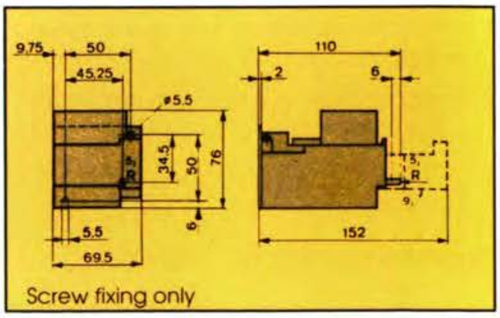
CTA 3K-12 and CTA 3K-17



CTA 3-12 and CTA 3-17



CTA 3-23 and CTA 3-32



CTA 3-42...CTA 3-72

Legend:

4) Reset pushbutton 2.3 mm travel = reset

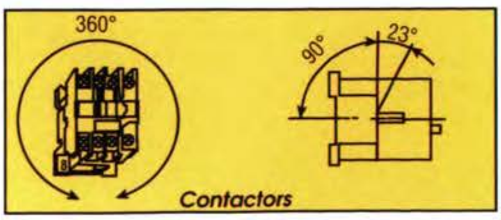
5) Reset buttons 3.5 mm away = reset 6 mm away = test

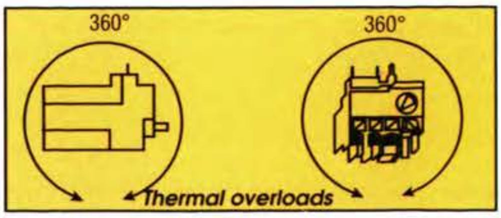
7) Possibility of mounting CTA onto mounting rail EN 50 022-35

9) With reset magnet CMR

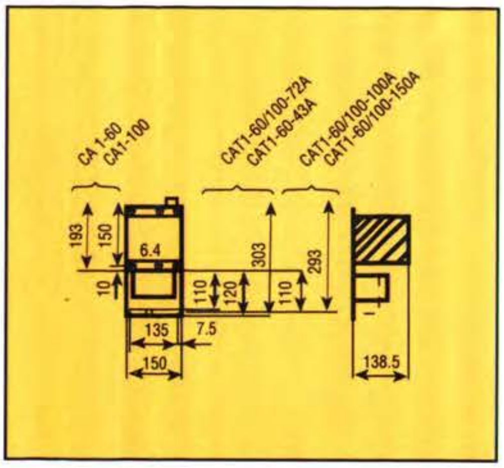
10) With auxiliary contact CT 3K-P10

Mounting positions

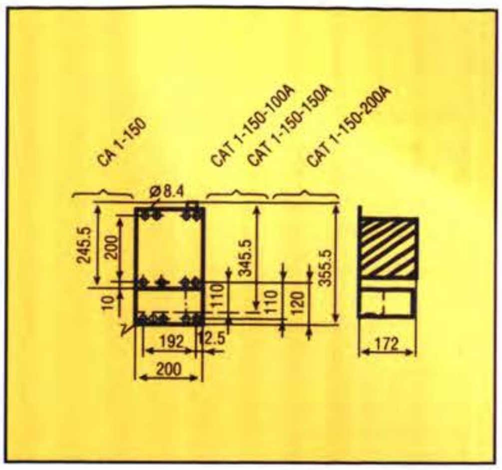




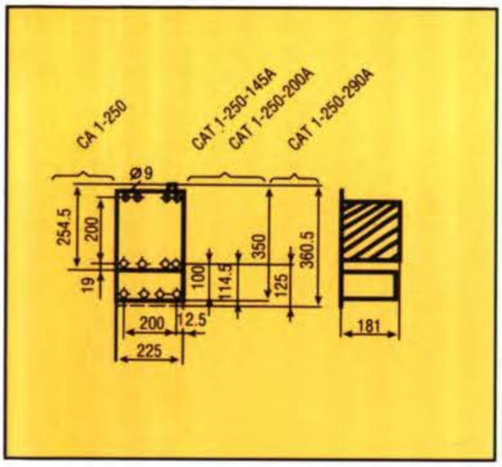
Dimensions for CA 1 and CA 5 contactors and starters



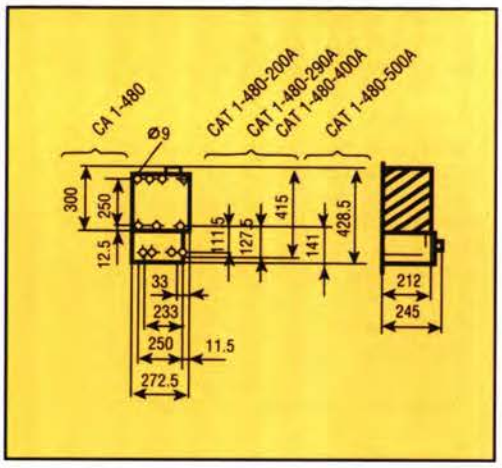
CA(T) 1-60/100



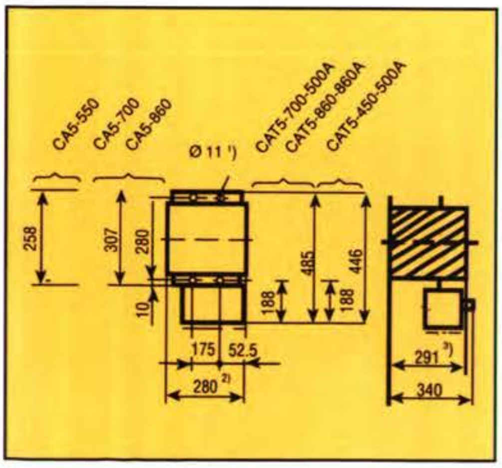
CA(T) 1-150



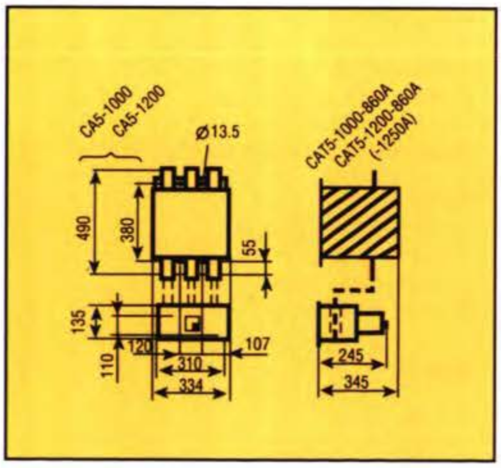
CA(T) 1-250



CA(T) 1-480



CA(T) 5-450/550/700/860



CA 5-1000/1200

Legend:

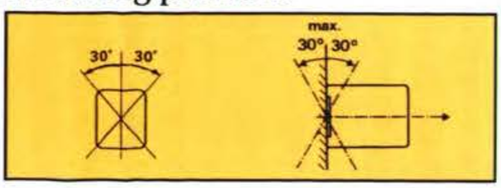
¹) For CA 5-450/550 mounting hole 9mm

²) CA 5-450/550 panel width 220mm

³) For CA 5-450/550 protrusion 225mm

For specific detailed information contact your nearest NHP Office or Distributor.

Mounting positions



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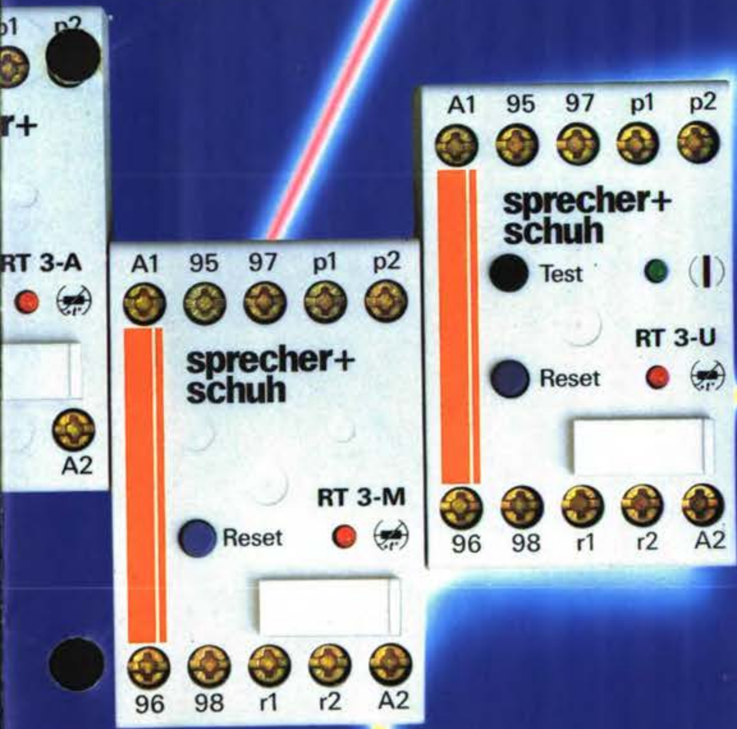
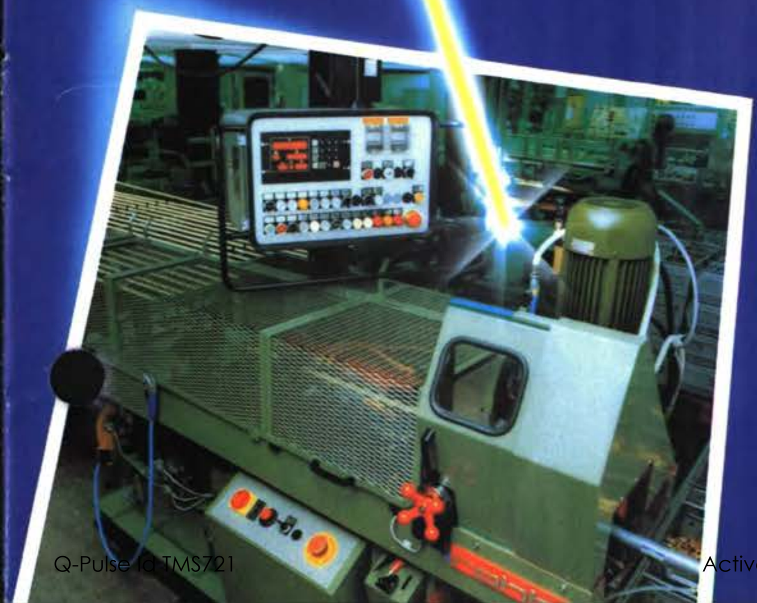




22 63

Thermistor Protection Relay RT 3

For direct temperature monitoring

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.

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.

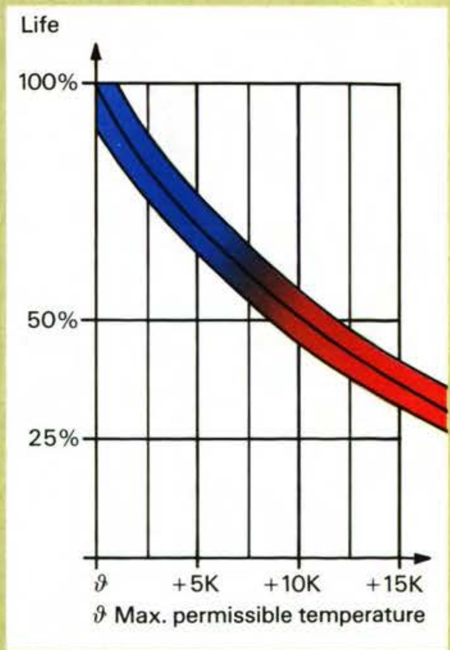
Additional protective functions possible

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.

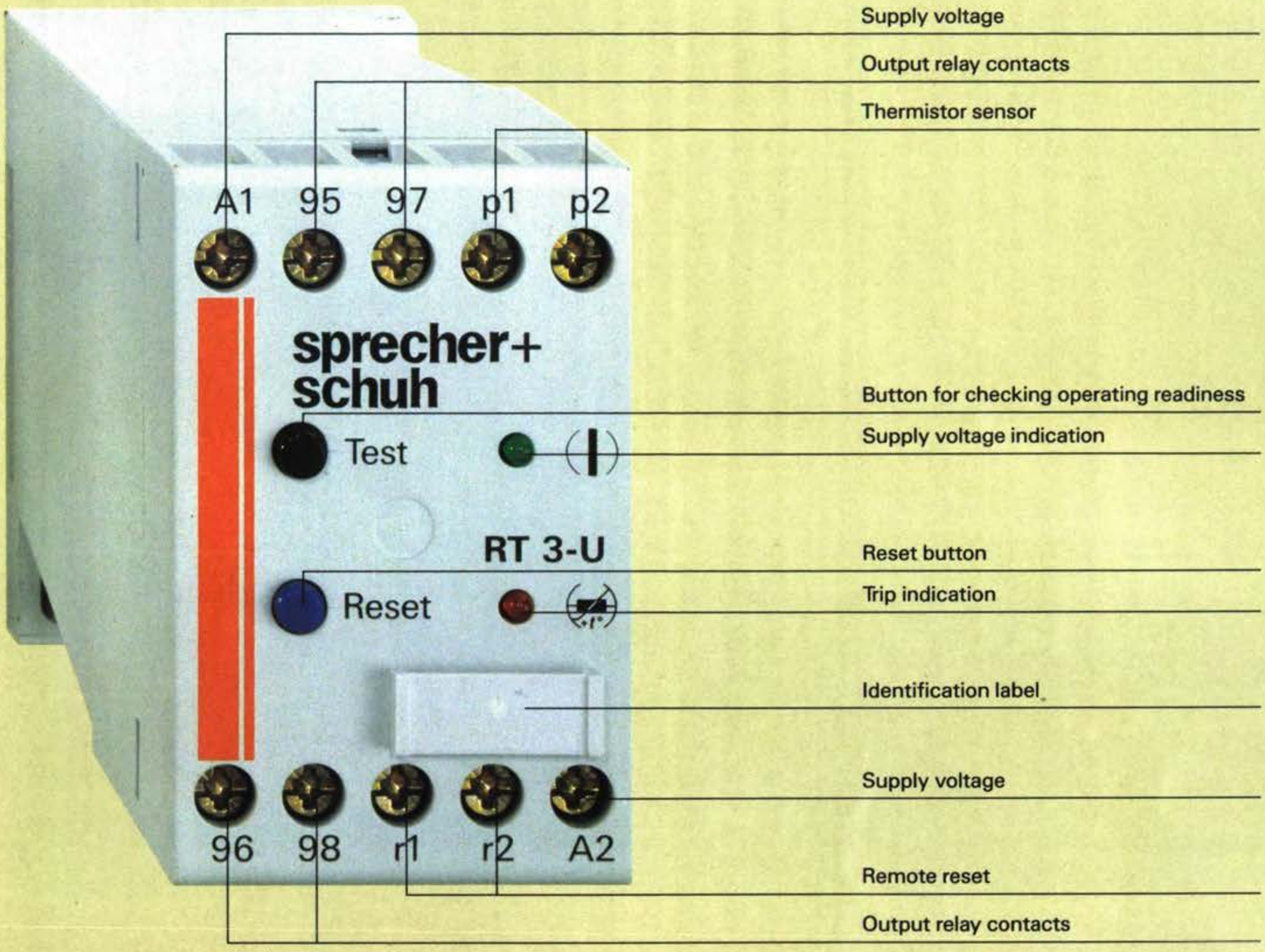
Direct temperature sensing at critical locations with thermistor sensors and its evaluation by the thermistor protection relay RT 3 provides a first-rate safeguard for motors and other temperature-critical devices.

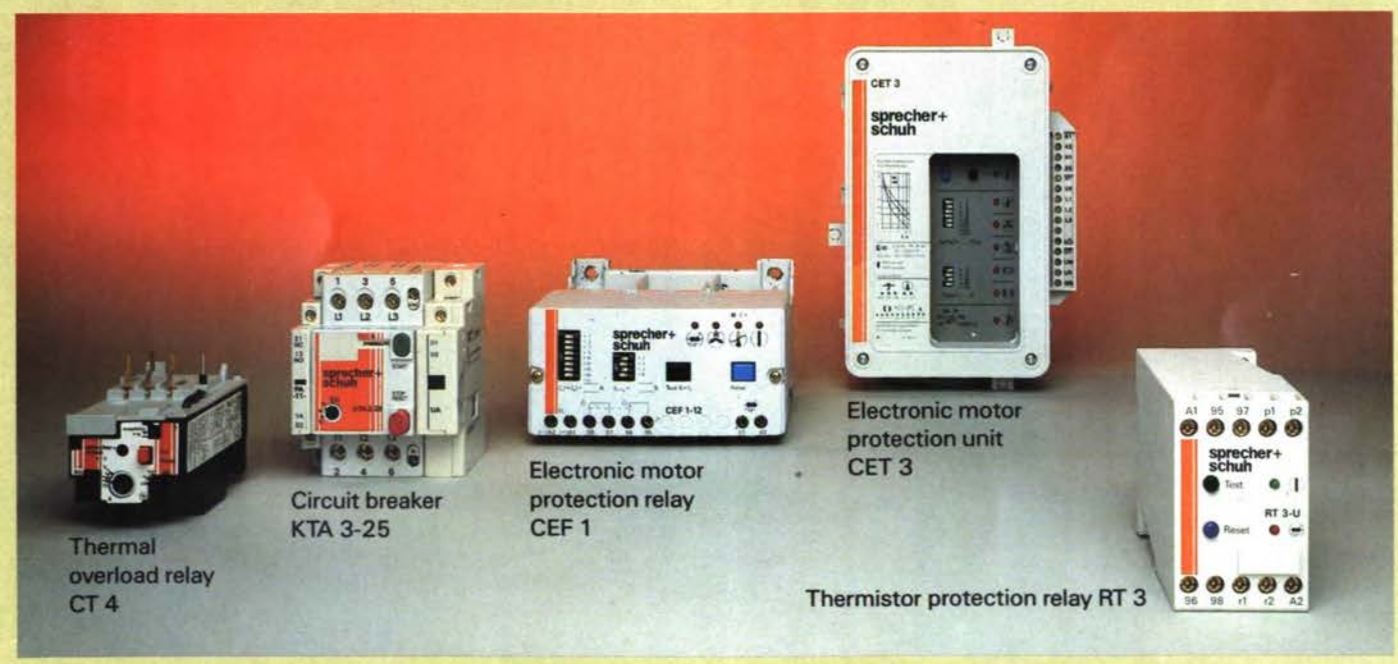
Temperature monitoring is no luxury

Observance of the maximum permissible temperature as stipulated by the manufacturer is especially important with motors. Just a constant increase of the maximum temperature by 10 degrees will halve the motor life. This is why most variable speed or large motors are equipped as standard with thermistor sensors in their windings. The RT 3 reacts with precision to the over-temperature signalled by the sensors, thus preventing damage by accurate and fast tripping.



Reduction of the average motor life with over-temperature.





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

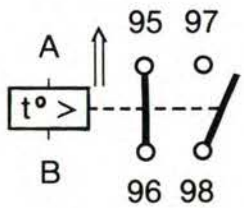
Thermistor protection relay RT 3
- for surface mounting
- with inadvertent contact protection to IP 67
- output relay (with 1 normally open and 1 normally closed contacts) in closed circuit connection

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: **RT 3-A-240V AC**

Model:	RT3 - A (Automatic Reset) RT3 - M (Manual Reset) RT3 - U (Unlimited Memory)
Control voltage and frequency: With direct current:	...V AC ...V DC



Wiring Diagram

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.

SEV
Switzerland

CSA
Canada

UL-recognized
USA

NEMKO
Norway

Electrical
Inspectorate
Finland

Approvals

The thermistor protection relay RT 3 complies with all important regulations.
The following approvals have been applied for:
SEV, CSA, UL-recognized, NEMKO, Finland.

Approval is being sought from the PTB (Physical and Technical Institute, Federal Republic of Germany) for the protection of motors in zones with a fire and explosion hazard (EEx e).

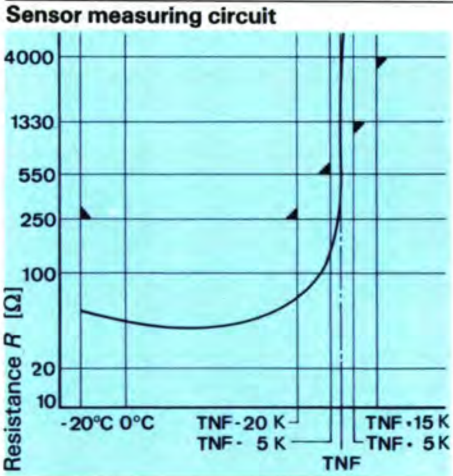
Technical data

Rated insulation voltage	acc. to IEC 255-8 440 V	acc. to AS, BS, VDE 0660 250 V
	acc. to SEV 380 V	acc. to CSA, UL 240 V
Test voltage between separated circuits	alternating current acc. to IEC 292-1	2.5 kV, 50/60 Hz, 1 min
	surge voltage acc. to IEC 255-4 and SEN 36 1503	5 kV, 1.2/50 μs
	interference voltage acc. to ANSI[1]) C 37.90 a-1974, IEC 255-6 and SEN 36 1503	2.5 kV, 1 MHz, 2 s
Ambient temperature	normal operation	−25°C...+60°C
	storage (in dry rooms)	−40°C...+60°C
Climatic classification	acc. to IEC 68-2-3 humid heat	40°C, 92% rel. humidity, 56 days
Protection class acc. to IEC 529	device (less terminals) IP 30	terminals (acc. to VBG 4) IP 20
Vibration resistance	acc. to IEC 68 (10...150 Hz)	3 g
Impact resistance	acc. to IEC 68-2-27 or DIN 40 046/7	12 g, shock duration 18 ms, semi-sinusoidal in the 3 directions x, y and z
Supply	rated supply voltage U_s AC	24, 48, 110, 240, 415, 440V AC
	DC	24, 48V
	permissible fluctuations AC	0.8...1.1 U_s, 50/60 Hz
	DC	0.9...1.2 U_s
	power consumption AC	1.5 VA (1.2 W) DC 1.2 W
Output relay contact data	contacts (electrically isolated)	1 make and 1 break

Operating voltage		[V]	24	48	110	240	415	440
Continuous thermal current		[A]	4	4	4	4	4	4
Rated operational current with AC	AC-11	[A]	4	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[2]), L/R=100 ms		[A]	0.6	0.6	0.5	0.5	-	-
Max. perm. make/break current		[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								

Terminals	open terminals	(captive)
	connection wire cross-sections	2 × 2.5 mm² single wire or 2 × 1.5 mm² with end ferrule

Sensor measuring circuit



Max. cold resistance of PTC sensor chain		1500 Ω
Max. number of series connected PTC sensors acc. to IEC/TC2 proposal		6
Response level	$\vartheta_A = -25°C... +60°C$	3300 Ω ± 100 Ω
Reset level	$\vartheta_A = -25°C... +60°C$	1650 Ω ± 100 Ω
Response level with short circuit in sensor circuit	$\vartheta_A = -25°C... +60°C$	⩽ 15 Ω
Measuring voltage acc. to IEC 34-11		DC < 2.5 V

Measuring line						
Minimum cross-section	[mm²]	0.5	0.75	1	1.5	2.5
Maximum length[3])	[m]	200	300	400	600	1000

Reset	RT 3-A	automatic
	RT 3-M	manual or automatic[4])
	RT 3-U	manual or automatic[4])

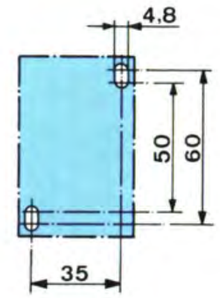
PTC sensor characteristic acc. to IEC/TC2 proposal TNF: Rated response temperature

Trip memory in event of power supply failure (zero-voltage safeguard)	**Storage time**	RT 3-M	at 25°C > 3h at 40°C > 1h at 60°C > 15 min
		RT 3-U	unlimited (not temperature-dependent)
Remote reset with RT 3-M, RT 3-U	External contact at r1–r2		potential-free make contact
	Max. line length for remote reset		up to 300 m twisted up to 1000 m screened

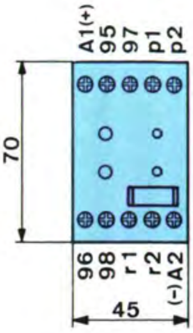
[1]) American National Standards Institute
[2]) With varistor link CRV 3 (DC 220...250 V) or RC link CRC 3 (DC 24...240 V) see catalogue 22 02.
[3]) RT 3 to motor; installation: up to 20 m parallel, up to 100 m twisted, longer than 100 m screened.
[4]) For automatic reset: connect r1–r2.

Dimensions [mm]
Mounting, circuit diagrams

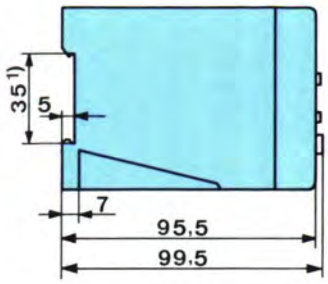
Hole plan RT 3

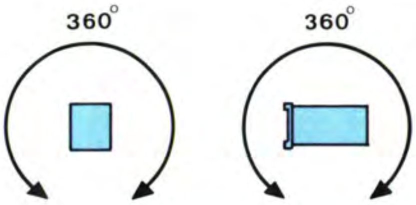


Position of terminals



r1 and r2 are not available on the RT 3-A



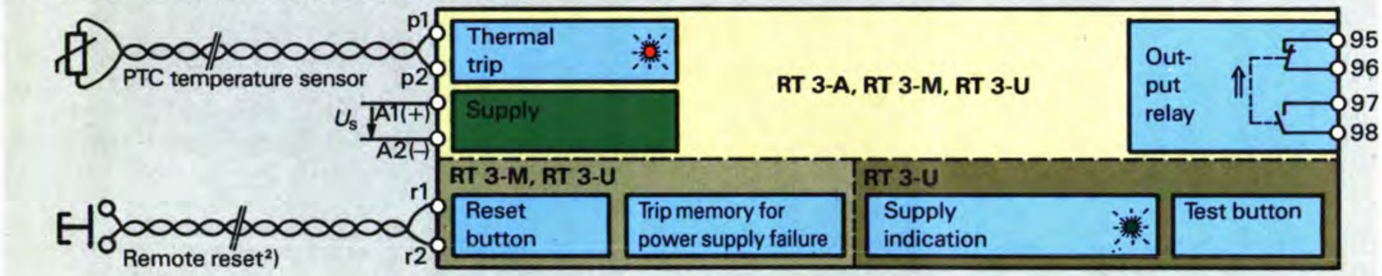


Installation

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 50 022-35×7.5.

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



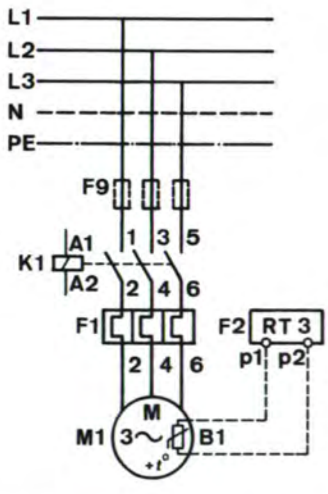
An application example
Starter CA+CT with additional RT 3

⇑ The contacts are drawn in their power-on position corresponding to those of a standard thermal overload relay in its ready to operate state.

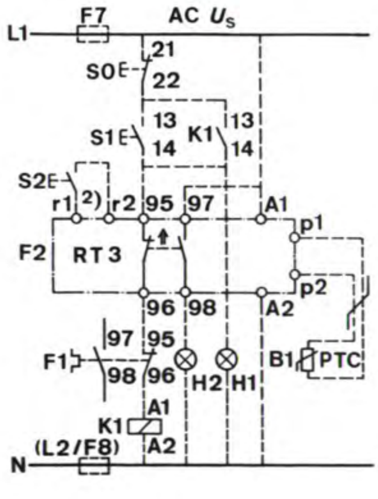
Legend

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_s	Supply voltage
H1	Signal lamp «Contactor ON»
H2	Signal lamp «RT 3 tripped»
B1	Thermistor in protected object

Circuit diagram
Main circuit

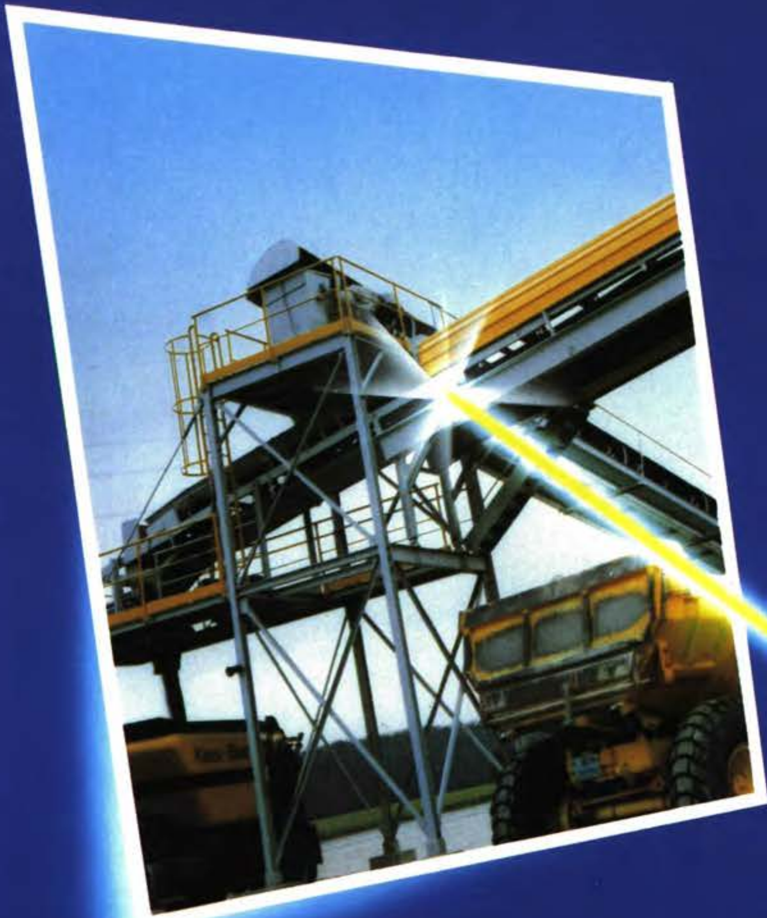


Control circuit
Impulse contact control



¹) For top hat rail 35 mm, EN 50 022.

²) For automatic reset with RT 3-M and RT 3-U: connect r1–r2.



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30-34 Day Street
Silverwater NSW 2141
Phone: (02) 647 2211
Fax: (02) 648 4353

Brisbane
39 Commercial Road
Fortitude Valley QLD. 4006
Phone: (07) 252 9517
Telex: AA41097
Fax: (07) 252 3415

Adelaide
29 Croydon Road
Keswick SA 5035
Phone: (08) 297 9055
Fax: (08) 371 0962

Agents

Perth
C.J. Young & Co. Pty. Ltd.
38-40 Railway Parade
Bayswater WA 6053
Phone: (09) 271 8666
Telex: AA93715
Fax: (09) 272 3906

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
Telex: AA58536
Fax: (003) 44 4069

Newcastle
Hunter Engineering Sales
64 Broadmeadow Road
Broadmeadow NSW 2292
Phone: (049) 69 3122
Telex: AA28158
Fax: (049) 69 6873

Townsville
Paterson Electrical
Engineering Agencies
62 Leyland Street
Garbutt QLD. 4814
Phone: (077) 79 0700
Fax: (077) 75 1457

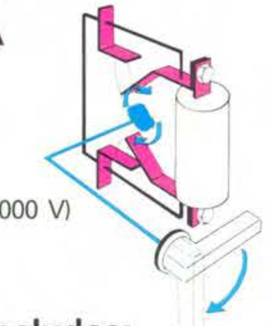
Darwin
J. Blackwood & Son Ltd.
(Inc. Tesco Pearce)
Mataram Street,
Winnellie NT 5789
Phone: (089) 84 4255
Telex: AA85454
Fax: (089) 84 3945

Technical changes reserved

2263/10.88

The complete range...

Switch fuse range OESA (BS-pattern) 32 A to 800 A, 660 V



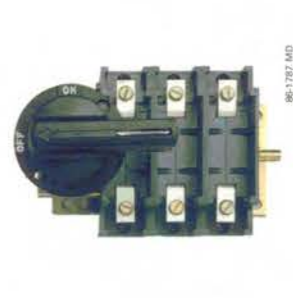
- Main switches
- Motor circuit switches (AC 23 ratings up to 1000 V)
- Isolator switches
- Local safety switches
- Special switches

Standard switch fuse delivery includes:

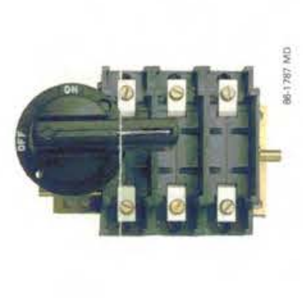
- Terminal bolts (sizes 32...63 have protected tunnel terminals)
- Black IP 54 handle with ON—OFF indication for BS-pattern (in United Kindom handle with 1—0 indication) and for North-American market, 1—0 indication for DIN- and NFC-pattern.
- Adjustable 6 mm square shaft in sizes 32...160 and 12 mm square shaft in sizes 200...800

Increased performance ratings...

ASTA tested...



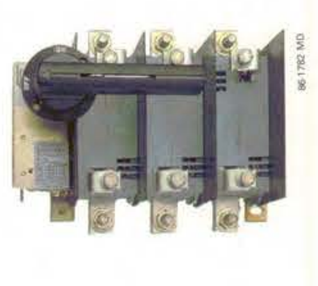
OESA 32 G 1



OESA 63 G 1

OESA 100 G 1

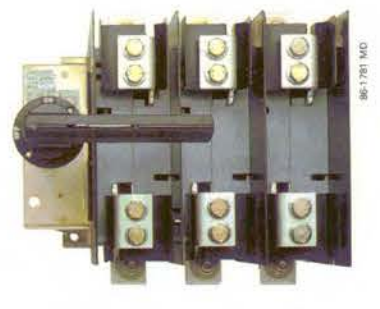
OESA 160 B 3



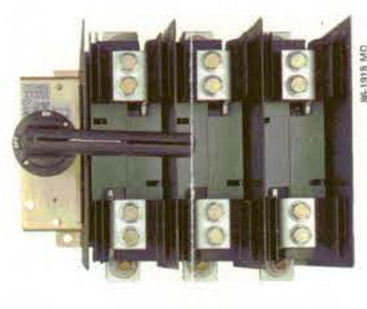
OESA 200 B 3

OESA 315 B 3

OESA 400 B 3



OESA 630 B 3



OESA 800 B 3

Size			32	63	125	160	200	315	400	630	800
Technical data (for BS-battern) [4]											
Rated operational voltage		V	500	660	660	660	660	660	660	660	660
Rated thermal current and operational current AC 22	In free air 660V	A	32	63	125	160[5]	200	315	400	630	800
(ambient 40°C)	Enclosed 660V	A	32	63	115	135[5]	200	290	345	560	720
Rated operational current AC 23	380V—500V	A	32	63	115	125	200	315	400	630	800
	660V	A	—	40	63	63	200	315	400	630	720
Rated breaking capacity AC 23 pf. 0.35	500V	A	300	500	800	800	3200	3200	3200	5000	5000
Fused short circuit current in closed position (RMS)	660V	kA	100	100	100	100	100	100	100	100	100
Rated fused short circuit making capacity (RMS)	500V	kA	80	50	100	50	100	100	100	80	80
	660V	kA	80	50	50	50	100	100	50	50	50
...with back up fuses of size		A	35	63	125	160	200	315	400	630	800
Weight 3-pole/4-pole		kg	1,6/1,9	1,6/1,9	1,8/2,3	1,8/2,3	6,9/7,9	7,3/8,3	7,8/8,8	15,5/19,0	17,0/21,0
Overall dimensions 3-pole/4-pole	H	mm	112/112	112/112	142/142	144/144	200/200	200/200	200/200	290/290	290/290
	W	mm	167/199	167/199	190/230	216/250	260/306	284/330	284/330	343/423	373/463
	D	mm	117/117	117/117	133/133	120/120	185/185	193/193	193/193	238/238	238/238
Switch fuse types and ordering information [4] (other types, see our brochure OESA 1 GB)											
BS-pattern	3-pole		**OESA 32 G1**	**OESA 63 G1**	**OESA 100 G1**	**OESA 160 B3**	**OESA 200 B3**	**OESA 315 B3**	**OESA 400 B3**	**OESA 630 B3**	**OESA 800 B3**
	4-pole[1]		**OESA 32 G4**	**OESA 63 G4**	**OESA 100 G4**	**OESA 160 B4**	**OESA 200 B4**	**OESA 315 B4**	**OESA 400 B4**	**OESA 630 B4**	**OESA 800 B4**
	3-pole, side operated [2]		**OESA 32 BM3**	**OESA 63 BM3**	—	—	**OESA 200 BM3** [3]	**OESA 315 BM3** [3]	**OESA 400 BM3** [3]	—	—
	4-pole, side operated [2]		—	—	—	—	**OESA 200 BM4** [3]	**OESA 315 BM4** [3]	**OESA 400 BM4** [3]	—	—
DIN-pattern	3-pole		**OESA 00—32**	**OESA 00—63**	**OESA 00**	**OESA 00—160**	**OESA 250 D3**	—	**OESA 400 D3**	**OESA 630 D3**	**OESA 800 D3**
NFC-pattern	3-pole		—	**OESA 14×51**	**OESA 22×58**	—	—	—	—	—	—
Switch Fuses for North-American market.	3-pole		**OESA-F30**	**OESA-F60**	**OESA-F100**	—	**OESA-F200**	—	**OESA-F400**	**OESA-F600**	—
Rated operational power in	220V/380V	kW	7,5/11	15/22	37/55	37/60	57/100	90/160	110/210	180/315	200/350
categories AC 23 and AC 3[10]	415V/500V	kW	15/15	30/30	60/75	65/80	110/140	180/220	230/280	340/400	380/470
	600V	kW	—	30	55	55	180	290	330	540	600
Accessories (for BS-battern) [4]											
Auxiliary contacts/Shrouds for auxiliary contacts	1 NO+1 NC		**OESAZX 46 / OESAZX 34**		**OESAZX 1 / OESAZX 19**		**OETLZX 33 / OESAZX 76**			**OESAZX 6 / OESAZX 20**	
	2 NO+2 NC		**OESAZX 32 / OESAZX 34**		**OESAZX 16 / OESAZX 19**		**OETLZX 34 / OESAZX 77**			**OESAZX 15 / OESAZX 20**	
Therminal shrouds	3-pole/4-pole		not required		**OESAZX 8 / OESAZX 41**	**OESAZX 75 / OESAZX 81**	**OESAZX 119**			**OESAZX 102**	
Fuse cover	3-pole/4-pole		**OESAZX 31 / OESAZX 37**		**OESAZX 3 / OESAZX 38**	**OESAZX 74 / OESAZX 80**	**OESAZX 66**	**OESAZX 68**		**OESAZX 103 / OESAZX 104**	**OESAZX 105 / OESAZX 106**
Standard and special handles — 32A...160A, suitable for 6 mm square shaft. 200A...800A, suitable for 12 mm square shaft. — Door drilling Ø 45 mm, for OETLZX 74 door drilling Ø 18 mm. — door interlock in ON-position — padlockable (with 3 padlocks in OFF-position)	IP 54 door interlock defeatable IP65		**YASDB 51** Black 1—0 **YASDB 50** Black ON—OFF **YASDB 49** Red-yellow 1—0 **YASDB 10** Black 1—0 **YASDB 20** Black ON—OFF **YASDB 8** Red—yellow 1—0 **YASDB 31** Black 1—0 **YASDB 32** Black ON—OFF **YASDB 33** Red—yellow 1—0					**YASDB 52** Black 1—0 **YASDB 53** Black ON—OFF **YASDB 55** Red-yellow 1—0 **YASDB 13** Black 1—0 **YASDB 16** Black ON—OFF **YASDB 11** Red-yellow 1—0 **YASDB 34** Black 1—0 **YASDB 35** Black ON—OFF **YASDB 36** Red-yellow 1—0 **YASDA 7** 1—0 (metallic) **YASDA 8** ON—OFF (metallic) **OETLZX 74** ON—OFF (metallic, for side-operated switch fuses)			
Standard shaft/Shaft length			**OESAZS 25** / 210 mm				**OESAZK 41** / 255 mm				
Detachable neutral link/Thermal current			**OESAZX 87** / 63 A		**OESAZX 86** / 160 A		**OESAZX 85** / 400 A			**OESAZX 88** / 800 A	
Change-over attachment kit/Shaft distance (incl. plastic handle with I-0-II indication)			**OESAZW 1** / 90 mm + (0...10) × 15 mm				3-pole: **OETLZW 11** / 210 mm + (0...11) × 20 mm, 4-pole: **OETLZW 12** / 210 mm + (0...20) × 20 mm				
Mechanical interlock kit / Shaft distance [7]			—				**OETLZW 14** / 250 mm, **OETLZW 3** / 300 mm, **OETLZW 15** / 500 mm				
Electrical interlock[8]			—							**OETLZT 80 A/coil voltage, OETLZT 80 L/coil voltage**	
Tunnel terminal sets/Cable cross section[9]			—/2,5...25 mm²		**OZXA 5** / 1,5...35 mm²	**OZXA 22** / 25...50 mm²	**OZXA 11** / 70...120 mm²			**OZXA 14** / 95...240 mm²	

Remarks:

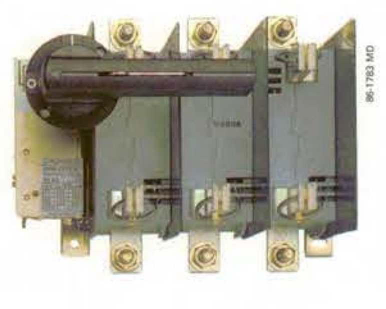
1) The fourth pole in OESA 32...160 and OESA 630...800 is provided with a solid link which can be replaced by a fuse link. OESA 200...400 have switched neutral only.
2) Including auxiliary contacts 2 NO + 2 NC.
3) Handle has to be ordered separately (metallic handle OETLZX 74 (incl. the shaft) or plastic handles YASDB 52, YASDB 53, YASDB 55, the shaft OETLZA 23 has to be ordered separately).
4) For further information, see our brochure OESA 1 GB.
5) Max. power dissipation of fuse link 16 W
6) In sizes OESA 125...200, full protection of the terminals is reached with two shrouds. In sizes OESA 315...800, the shroud type consists of a snap-on shroud for one terminal only. Full protection is reached with 6 or 8 shrouds.
7) The interlock attachment prevent one switch from closing to ON-position, if the other is not in OFF-position. The schaf distance is not adjustable.
8) Closed circuit principal, for interlocking the switch movement. When the coil circuit is dead, A-types can't be operated to ON-position and L-types to ON- or OFF-position. Coil voltages: 110V AC, 220V AC, 24V DC, 48V DC, 60V DC, 110V DC, 220V DC.
9) The terminal set type includes 6 pcs of clamp terminals.
10) Time interval between operations 20 s in AC 3. Some fuse links limit these figures further. Starting current characteristics must be considered separately.

Approvals:
ASTA
KEMA
UL-Listed, UL-Recognized
Ganadian Standards Association
SETI
NEMKO
DEMKO
Lloyds Register of Shipping
Germanischer Lloyd
USSR Register of Shipping

Comply with standards:
Bs 5419
VDE 0660, 0113
UL 98, UL 508, UL 512
Det Norske Veritas
AS 1775
CSA C22.2 No 4 and 14

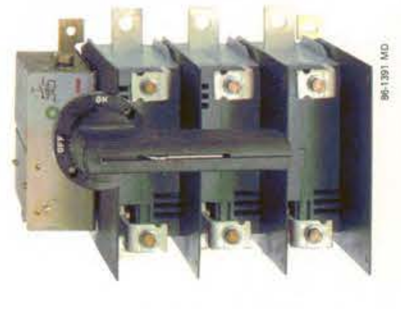
Tropical tests:
IEC 68-2 resistant to damp heat

Versatile in use...



OESA 250 D 3

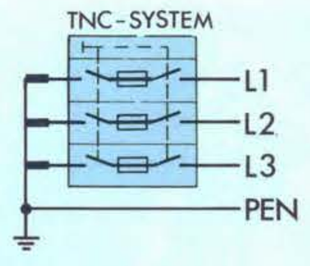
OESA 22 × 58



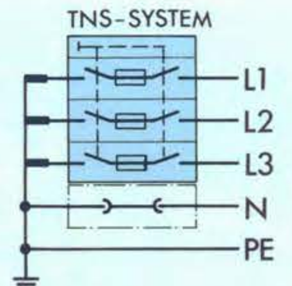
OESA F-200

32 A...800 A	63 A, 125 A	30 A...600 A
Switch fuses for DIN-fuse links	Switch fuses for French cylinder fuse links	Switch fuses for North-American market

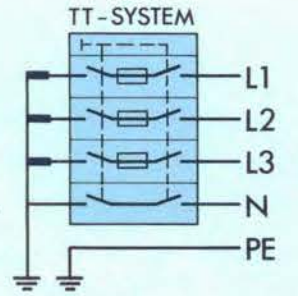
Switch fuses for various circuits:



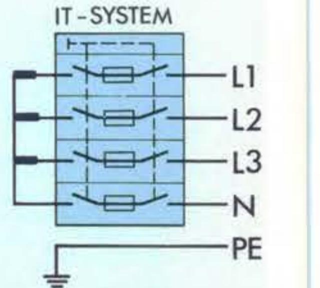
3-pole



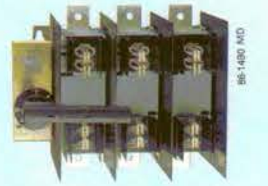
3-pole detachable neutral

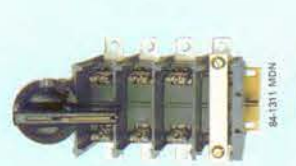


4-pole switched neutral



4-pole fused neutral





Change-over switch

Side operated switch fuse OESA 250 DM 3

Surface mounting switch fuses

STRÖMBERG

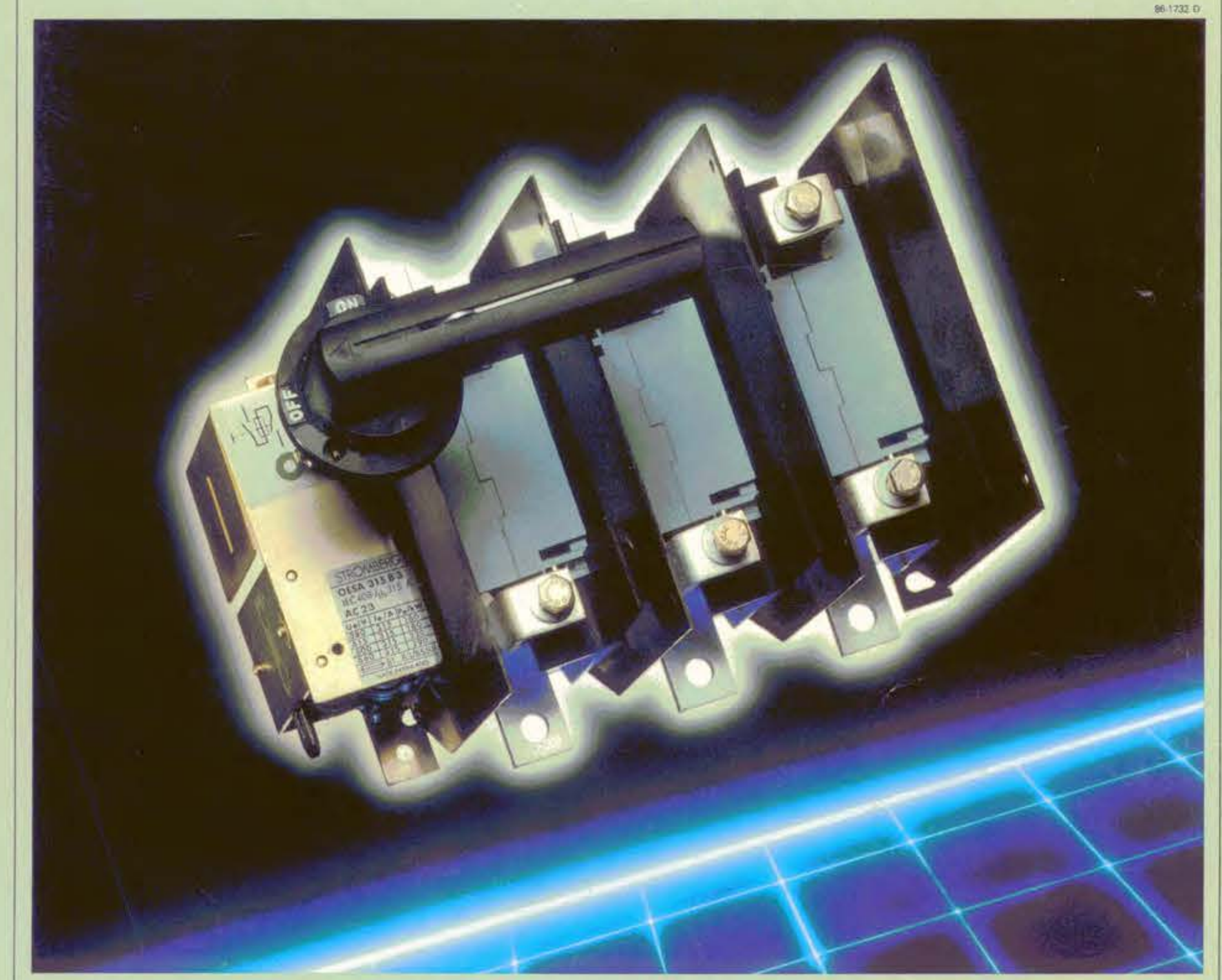
2

Switch Fuses OESA/BS

32 A...800 A, 660 V

- Reduced Panel size
- Reduced Assembly Costs
- Safety for Personnel
- Versatile Range

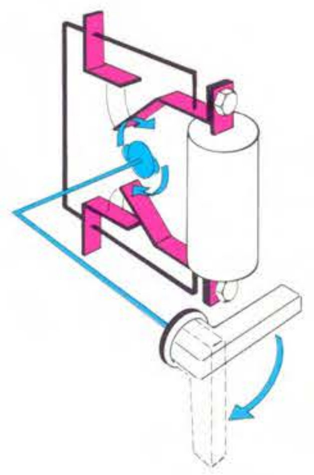
Overall cost efficiency



Brochure OESA/BS 3 GB 86-12/87-11

STRÖMBERG

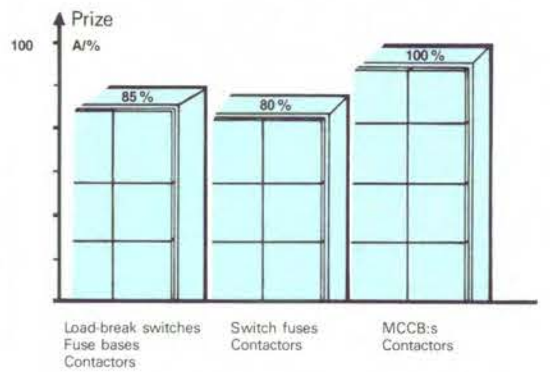
Complete range from the leading manufacturer



Strömberg is the largest manufacturer of switch fuses in Europe. The large manufacturing volume based on modular techniques guarantees reliable delivery and versatility in special applications. The kit techniques adopted on the accessories and special switches result in low stocks, thus keeping costs to a minimum.

Strömberg's switch fuse range is now exported everywhere in the world. It complies with the major international standards and has a comprehensive list of approvals. Strömberg's low voltage apparatus has gained international acknowledgement and customers have come to rely on Strömberg's service.

The overall cost efficiency of the switch fuse



Cost comparison of motor control centres

The switch fuse concept provides a motor control switch and short circuit protection in one unit within a minimum of panel space. The inbuilt assembly and safety features ensure short manufacturing time.

The compact design can reduce the panel space by 30 %.

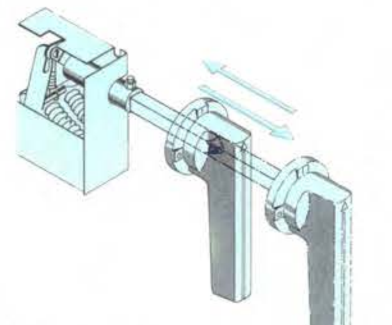
The versatility of use lowers the estimation costs. It is the combination of these features, that have proven the switch fuse to be the most economical protection device for motor control centres.

Inbuilt safety features

Complete safety during fuse change is achieved through door interlocking of the handle and the contacts on both side of the fuses. Thus any hazard even in case of back connection from the consumer side is eliminated. Reliable position indication in the handle and mechanism eliminates risks even in case of contacts welded. The switches include positive opening operation of the contacts and visible contacts as on additional safety feature for the sizes from 200 A through window enabling contact inspection after operation.
Fuse cover interlock in the ON-position prevents fuse change in live switch fuses, and padlocking of the mechanism in the OFF-position eliminates closing the circuit in maintenance situations on site. Thus Strömberg's switch fuses eliminate any hazard to personnel.

OESA 630 D3 with fuse cover and terminal shrouds.

Reduced assembly costs



Telescopic shaft.

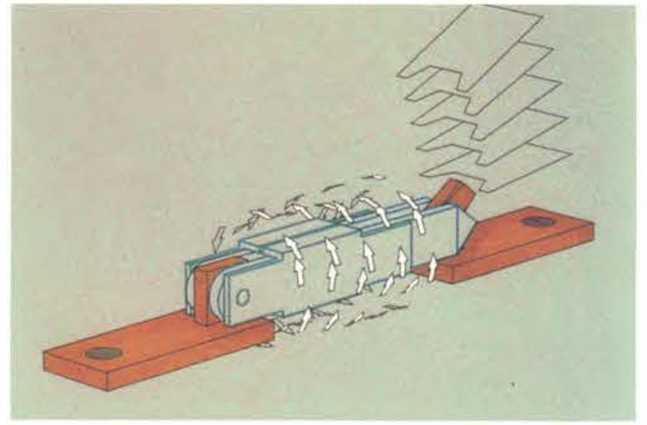
Close consultation with the customers together with flexible design has brought many valuable assembly features to the Strömberg switch fuses. The switch fuses can be easily installed in enclosures of different depths because the length of the telescopic shaft can be adjusted.
The installation of heavy switches which is normally difficult to install is made easier by key hole fixing.
The mounting of the terminal shrouds is quickly done by snap-on mounting.

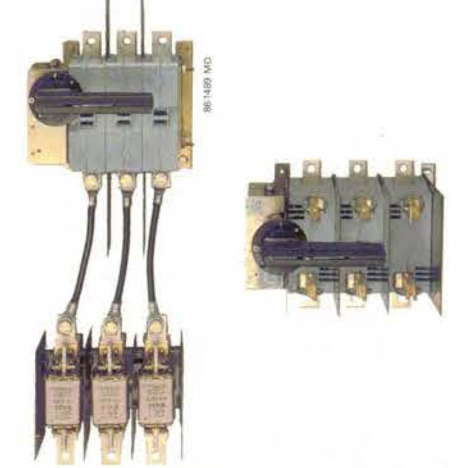
Track resistant material

The frame parts are of track resistant material and the construction are designed to stand the heat and humidity of the tropics as well as the extreme cold of arctic countries and the polluted enviroment of any process industry.

Compact size

In Strömberg switch fuses the fuse links are stationary between the contacts on the supply and consumer side. High breaking capacity can be achieved within a very compact body as only the mass of the moving contacts is moving. As a result long electrical life time is achieved and the Strömberg switch fuses occupy hardly more panel space than the appropriate fuse.





Switch fuse compared to load break switch plus fuse base.

A switch fuse compared to a load break switch plus a fuse base in a draw out system allows one unit for switching, interlocking, testing and short circuit protection.

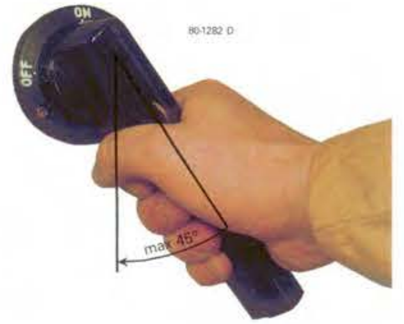
Patented contact construction

Strömberg switch fuses from 200 A to 800 A have a patented (USA) wiping type knife contact on both side of the fuse. The contact uses magnetic attraction forces in an innovative iron circuit in fault level situations. High breaking and making capacity even at 660 V is achieved and thus the derating on motor duty is minimum. The wiping effect of the contacts guarantee long thermal stability in the chemical industry and moisture tropical climates. Thus, the Strömberg switch fuse achieves maintenance free operation and long electrical life time however harsh the circumstances.

Complete handle

The switch fuses include as standard black handle with either 0—1 or ON-OFF indication. Protection degree for the standard handle IP54. Red-yellow emergency handle and metallic handles are optional extra. Protection degree up to IP65.

The door is interlocked in the ON-position. This can be defeated to allow authorized personnel access for inspection. The door is easy to close again. The handle can be padlocked in the OFF-position, thus preventing door opening and closing the circuit in maintenance situations.



In the case of contact welding the handle deviates from ON-position less than 45°

Electrical interlock

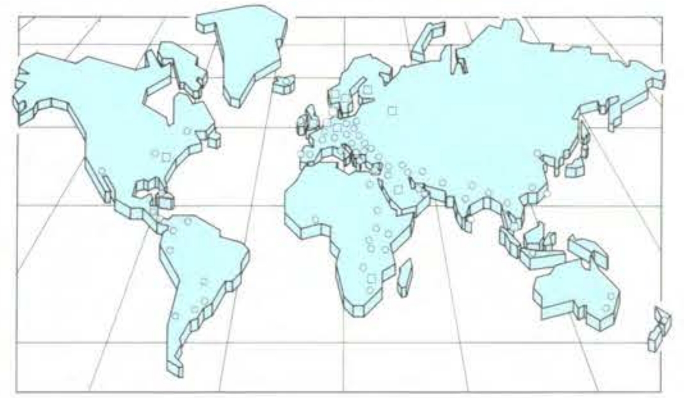
Padlockable switch mechanism

Flexibility in customer applications

Electrical interlocks, mechanical interlocks, plus Lowe + Fletcher / Castell interlocks together with auxiliary contacts add to the versatility of Strömberg's switch fuses large systems. The motor operator allows remote control of the large switch fuses.
The combination switches and side operated switch fuses contribute to space saving applications. The side operated switch fuses for draw-out design can be equipped with optional handle conversion kit providing test position for inbuilt auxiliary contacts.
The electronic or mechanical fuse monitor improve the reliability of applications.
Strömberg's switch fuses improve the overall cost efficiency and safety of customers' systems.

STRÖMBERG means quality in all environments

Strömberg switch fuses are known for their reliability and high quality everywhere in industry, where high productivity and expensive down time are desicive factors however harsh the environmental conditions are. Strömberg's switch fuses have world wide approval and availability troughout a distribution network in more than 50 countries.



STRÖMBERG

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TELEFAX +358-61-155 708

KRAUS & NAIMER

BLUE LINE SWITCHGEAR

Switch Types CA4, CA10, CA11, CA20, CA10B, CA11B, CA20B

- 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)

CA4	CA10 CA10B	CA11 CA11B	CA20 CA20B
500	660	660	660
300	300	600	600
380	660	660	660
380	380	380	380
250	380	380	380
10	20	20	32
10	16	16	30
10	16	16	25
10	20	20	32
10	16	16	30
-	12	12	20
2,5	6	6	8
1,5	4	4	5
A300	A300	A600	A600
10	16	16	30
4	10	10	16
2	7	7	10
2,5	4	4	5,5
4,5	7,5	7,5	11
5,5	10	10	15
-	10	10	13
1,5	3	3	4
2,2	5,5	5,5	7,5
3	5,5	5,5	7,5
-	5,5	5,5	7,5
0,3	0,6	0,6	1,5
0,55	2,2	2,2	3
0,75	3	3	3,7
1,8	3,7	3,7	5,5
3	7,5	7,5	11
3,7	7,5	7,5	11
-	7,5	7,5	11
0,37	0,75	0,75	1,5
0,75	2,5	2,5	3
1,1	3,7	3,7	5,5
1	1,5	1,5	2
1	3	3	5
-	-	5	10
0,33	0,5	0,5	1
0,75	1	1	2
0,75	2	2	3
-	-	2	5
10	25	25	35
3	5	5	10
1,5	2,5	2,5	4
14	12	12	10
1,5	2,5	2,5	4
14	12	12	10

ESSENTIAL MOUNTING

	Code	IP front	for type	
	E EF	40 65	CA4 CA10 CA11 CA20 CA10B CA11B CA20B	**Panel mounting** with shaft seal
	VE	40	CA10 CA11 CA20 CA10B CA11B CA20B	**Base mounting**
	FS1	65	CA4	**Single hole mounting** combined with 16 and 22 mm without escutcheon plate
	FS2	65	CA4	with escutcheon plate 30 x 30 mm
	FS4	65	CA4	with escutcheon plate 30 x 39 mm
	FT1	65	CA10 CA11 CA20	**Single hole mounting** combined with 22 and 30 mm without escutcheon plate
	FT2	65	CA10 CA11 CA20	with escutcheon plate 49 x 49 mm

The terminals of the CA series cam switches are accessible from both sides. This is an advantage in cases where the switch is prewired 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, AC 3 and AC 23 and the obviously unlimited number of switch developments are characteristic for the CA switches.

CA switches of this series are supplied with open terminals and protected against accidental finger contact in accordance with VDE 0106, section 100 (VBG 4). Captive plus-minus terminal screws and integrated screwdriver guides facilitate wiring.

The CA 4 switches offer maximum space saving benefits. A CA 4 switch in E mounting 1 stage long and 2 contacts fits into 30 x 30 x 30 mm cubicle. The additional length of any further stage is 8 mm. CA 4 contacts are supplied standard with gold plating of 1 µ.

Single hole mounting according to EN 50007 with protection IP 65 is suitable for either 16 or 22 and 22 or 30 mm diameter holes and is available with key operator, if required.

Switching angle of CA switches may be 30°, 45°, 60° or 90°. Switch type CA 4 is available with up to 18 contacts. CA 10, CA 11 and CA 20 switches are available with up to 24 contacts.

A wide range of optional extras and enclosures is available.

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**

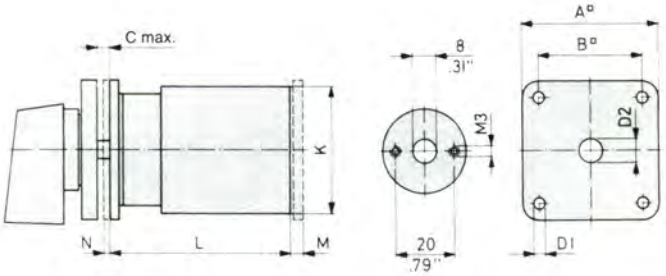
SWITCH TYPES

Nominal voltage				
	IEC/VDE/BS			V
	UL/CSA			V
	SEV			V
	CEE 24			V
Main switch characteristic				
	Isolator conditions are met up to:			V
Thermal current I_{th}				
	IEC/VDE/BS			A
	UL/CSA			A
	SEV		max.	A
Nominal current I_e				
AC 21	IEC/VDE/BS			A
AC 1	SEV		380 V	A
			660 V	A
AC 11	IEC/VDE		220-240 V	A
			380-440 V	A
	UL/CSA			
Pilot Duty — Contact Rating Code				
Ampere Rating				A
	CEE 24			
Resitive/Motor load				A
				A
Motor rating				
AC 2	IEC/VDE/BS	3 phase	220 - 240 V	kW
		3 pole	380 - 440 V	kW
			500 V	kW
			660 V	kW
AC 3	IEC/VDE/BS	3 phase	220 - 240 V	kW
		3 pole	380 - 440 V	kW
			500 V	kW
			660 V	kW
		1 phase	110 V	kW
		2 pole	220 V	kW
			380 - 440 V	kW
AC 23	IEC/VDE/BS	3 phase	220 - 240 V	kW
		3 pole	380 - 440 V	kW
			500 V	kW
			600 V	kW
		1 phase	110 V	kW
		2 pole	220 - 240 V	kW
			380 - 440 V	kW
	UL/CSA			
Standard motor load		3 phase	120 V	HP
		3 pole	240 V	HP
			480 - 600 V	HP
		1 phase	120 V	HP
		2 pole	240 V	HP
			277 V	HP
			480 - 600 V	HP
Max. fuse size (gL-characteristic)				A
Rated conditional short-circuit current				kA
Max. permissible wire gage				mm^2
stranded wire 2 x				AWG
flexible (with sleeve) 2 x				mm^2
				AWG

DIMENSIONS mm / inch

Panel mounting and base mounting

CA4 CA10-CA20B



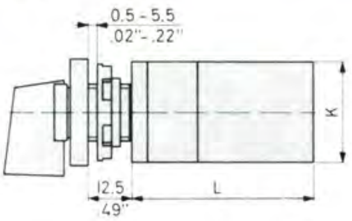
Mounting		CA4	CA10-CA20	CA10B-CA20B
E/EF/VE[1]	A	30 1.18	48 1.89	64 2.52
	B	-	36 1.42	48 1.89
E	C	4,5 .18	4 .16	4 .16
VE	C	-	10,5 .41	13,5 .53
E/EF/VE	D1	-	4,1 .16	4,1 .16

Mounting		CA4	CA10-CA20	CA10B-CA20B
E	D2	-	6 .24	8,5 .34
EF	D2	-	16 .63	20 .79
VE	M	-	4 .16	4 .16
EF	N	1 .04	2 .08	2 .08

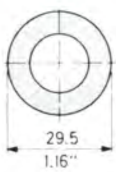
1) CA4: Dimensions of the escutcheon plate, excepting VE mounting

Single hole mounting 16 or 22 mm and 22 or 30 mm

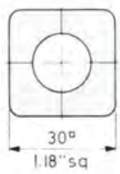
CA4



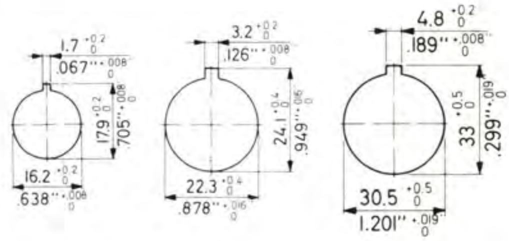
FS1



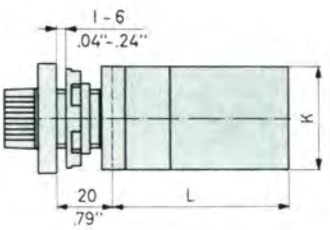
FS2



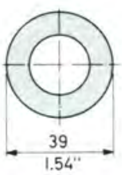
FS4



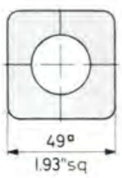
CA10 - CA20



FT1



FT2



Dimensions L and K

Type	No. of stages/Dimensions L 1	2	3	4	5	6	7	8	9	10	11	12	K
CA4	30 1.18	38 1.50	46 1.81	54 2.13	62 2.44	70 2.76	78 3.07	86 3.39	94 3.70	-	-	-	28 1.1
CA10	31,7 1.25	41,2 1.62	50,7 2.0	60,2 2.37	69,7 2.74	79,2 3.12	88,7 3.49	98,2 3.87	107,7 4.24	117,2 4.61	126,7 4.99	136,2 5.36	43 1.69
CA11	34,9 1.37	47,6 1.87	60,3 2.37	73,0 2.87	85,7 3.37	98,4 3.87	111,1 4.37	123,8 4.87	136,5 5.37	149,2 5.87	161,9 6.37	174,6 6.87	43 1.69
CA20	35,9 1.41	48,6 1.91	61,3 2.41	74 2.91	86,7 3.41	99,4 3.91	112,1 4.41	124,8 4.91	137,5 5.41	150,2 5.91	162,9 6.41	175,6 6.91	45 1.77
CA10B	37,9 1.49	47,4 1.87	56,9 2.24	66,4 2.61	75,9 2.99	85,4 3.36	94,9 3.74	104,4 4.11	113,9 4.48	123,4 4.86	132,9 5.23	138,4 5.45	56 2.2
CA11B	41,1 1.62	53,8 2.12	66,5 2.62	79,2 3.12	91,9 3.62	104,6 4.12	117,3 4.62	130 5.12	142,7 5.62	155,4 6.12	168,1 6.62	180,8 7.12	56 2.2
CA20B	42,1 1.66	54,8 2.16	67,5 2.66	80,2 3.16	92,9 3.66	105,6 4.16	118,3 4.66	131 5.16	143,7 5.66	156,4 6.16	169,1 6.66	181,8 7.16	56 2.2

australian solenoid co. pty. ltd.

(Registered in N. S. W.)

HEAD OFFICE

379 LIVERPOOL ROAD ASHFIELD N. S. W. 2131 P. O. BOX 109

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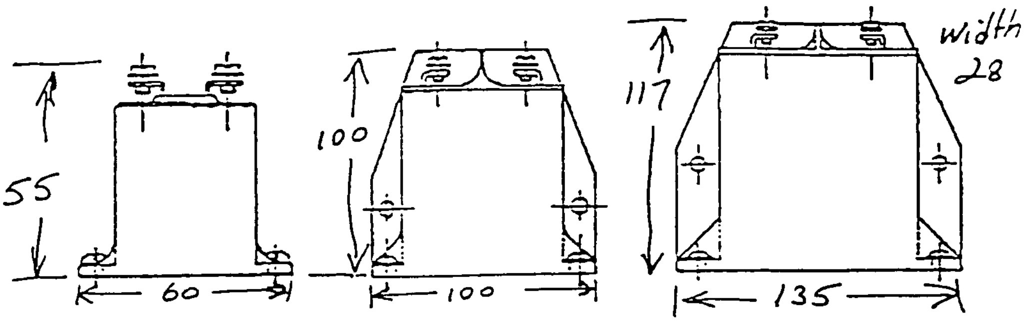
P0A A126 GB K 11.87

CRITEC BLOCK VARISTORS SA40 SA70 SA100



SPECIFICATIONS	SA40kA	SA70kA	SA100kA
Varistor element diameter	40mm	60mm	80mm
Varistor voltage (1mA)	110 - 1300V	110 - 2000V	190 - 2000V
Max.surge current (8/20uS)	40kA	70kA	100kA
Max.energy absorption	3600J	10,000J	15,000J
Average power dissipation	1.4W	1.6W	2.0W
Response time	<25nS	<25nS	<25nS
Storage temperature	-40/+110°C	-40/+110°C	-40/+110°C
Operating temp. (full load)	-40/+85°C	-40/+85°C	-40/+85°C
Climatic category in acc. with DIN 40040	GLF	GLF	GLF
Electric strength	>2.5kV	>2.5kV	>2.5kV
Approvals			
UL-E77005(M/N)	All types	All types	All types
CSA-LR63185-1	≥K130 all types	≥K130 all types	≥K130 all types
Design	Disk, moulded encapsulation	Disk, moulded encapsulation	Disk, moulded encapsulation
Ordering code	300460	300470	300473

Critec Pty Ltd A.C.N.009538729

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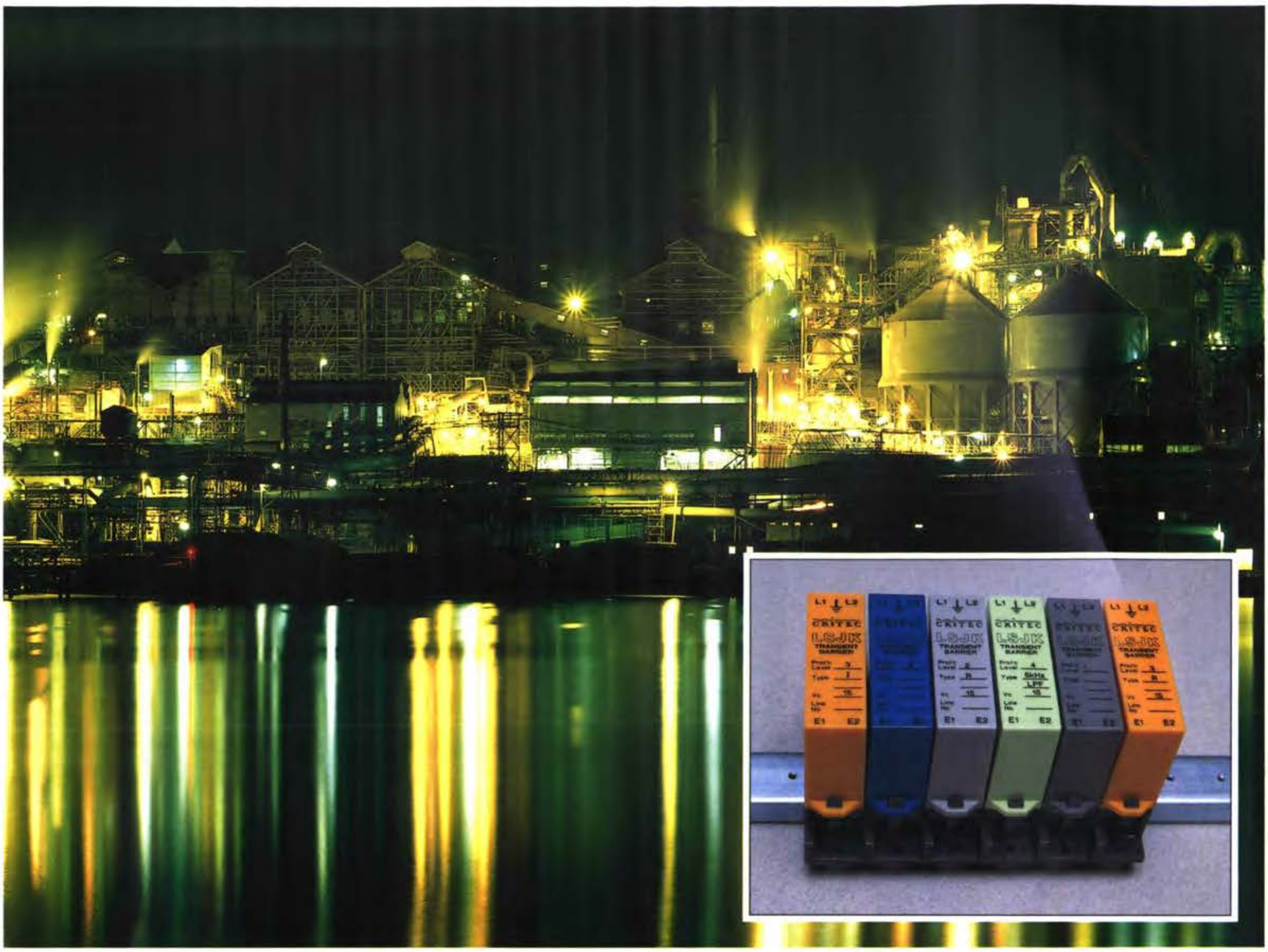


TRANSIENT SAFETY BARRIERS

LSJK

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 it own mounting rail which also provides the protective earth return or it may be adapted for DIN rail mounting.

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_{wkg} at 5µA (V)	SERIES IMPEDANCE [2] R_i (Ω)	L_i (µh)	I_{max} (A)	$V_{c(max)}$ 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_{wkg} at 5µA (V)	SERIES IMPEDANCE [2] R_i (Ω)	L_i (µh)	I_{max} (A)	$V_{c(max)}$ 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_{wkg} at 5µA (V)	SERIES IMPEDANCE [2] R_i (Ω)	L_i (µh)	I_{max} (A)	$V_{c(max)}$ 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 expsoure lines and lines susceptible to powerline induction.

LSJK-3I Level 3 Protection

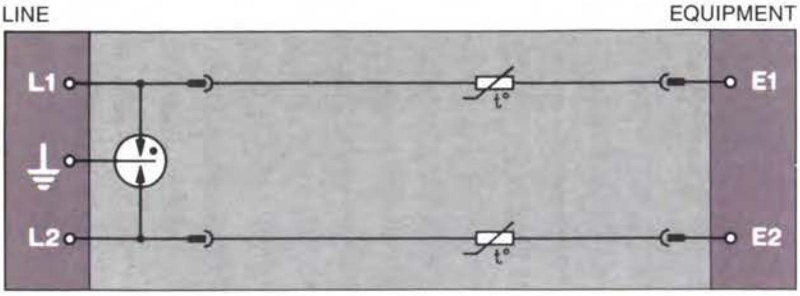
LSJK-3I provides 3 levels of protection in a low resistance, high current configuration for supply lines and power circuits.

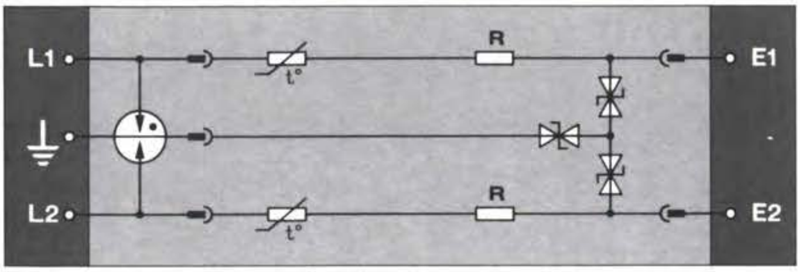
MODEL NUMBER	V_{wkg} at 5µA (V)	SERIES IMPEDANCE [2] R_i (Ω)	L_i (µh)	I_{max} (A)	$V_{c(max)}$ for 8/20µs [4] (V)	CATALOGUE NUMBER
LSJK-3R-7.5	6.1[1]	17.6	—	0.15	8	376350
LSJK-3R-15	12.2[1]	17.6	—	0.15	15	376360
LSJK-3R-18	14.7	17.6	—	0.15	18	376370
LSJK-3R-30	24.2	17.6	—	0.15	30	376380
LSJK-3R-36	29.0	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-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

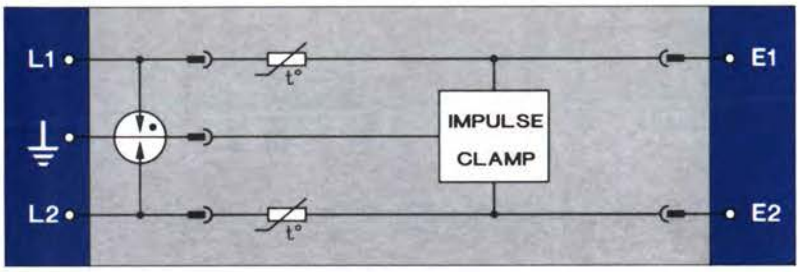
LSJK-4F Level 4 Protection

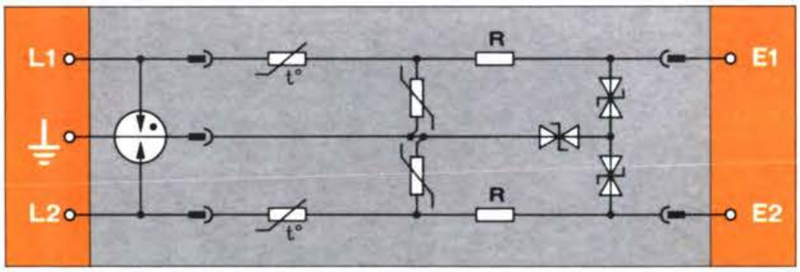
LSJK-4F provides 3 levels of transient protection in addition to a stage of filtering for RFI suppression etc. Standard is 50kHz low pass filter. Other cut off frequencies are available on request.

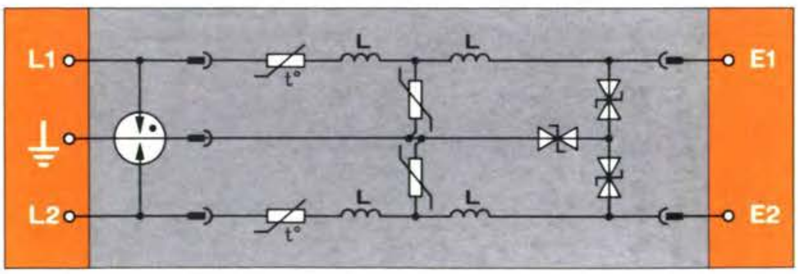
MODEL NUMBER	V_{wkg} at 5µA (V)	SERIES IMPEDANCE [2] R_i (Ω)	L_i (µh)	I_{max} (A)	$V_{c(max)}$ for 8/20µs [4] (V)	CATALOGUE NUMBER
LSJK-4F50-7.5	6.1[1]	10	750	0.15	8	376490
LSJK-4F50-15	12.2[1]	10	750	0.15	15	376500
LSJK-4F50-18	14.7	10	750	0.15	18	376510
LSJK-4F50-30	24.2	10	750	0.15	30	376520
LSJK-4F50-36	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

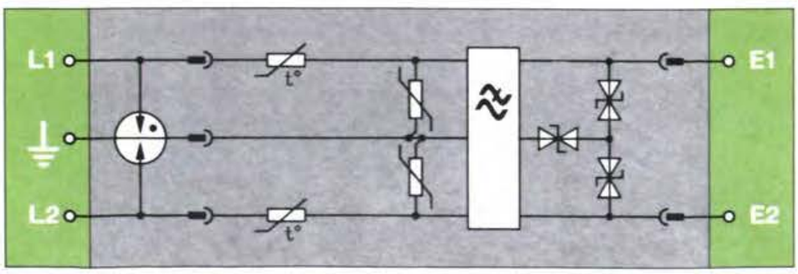












General Specifications

Transient performance:
exceeds ANSI/IEEE C62.41 category B. [4]

Rated surge current (8/20μs):
10KA (3 element gas arrester)

Response time:
< 1ns (levels 2 - 4 and S)

Frequency response:
to 1MHz except LSJK-4F

Overcurrent protection:
standard on all LSJK models. [3]

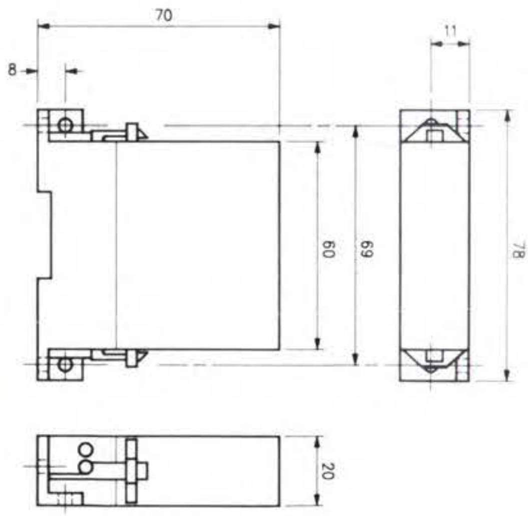
Operating temperature range:
−20°C to 60°C.

Weight:
100g (base and cap)

Case material:
ABS plastic

Cable terminations:
max. 2.5mm²

Mechanical details:



Notes:

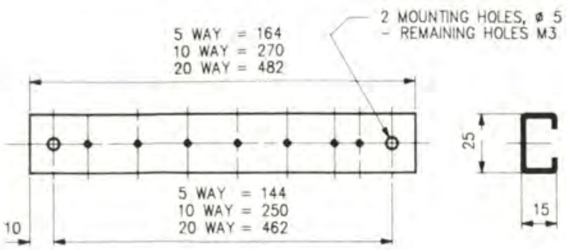
[1] V_{wkg} is the maximum voltage that should be applied to the barrier in normal use. For 7.5V and 15V barriers, V_{wkg} is specified for 500μA leakage current. LSJK-S is rated for standard telephone line voltages.

[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] $V_{c(max)}$ 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, misued, 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

Due to a policy of continuing product improvement, specifications are subject to change without notice.

For additional information, please contact:

CRITEC

Phone: 002 • 73 0066 Fax: 002 • 73 0399 International Code: +6102 •
Critec Pty Ltd, (ACN 009538729) Technopark, Dowsings Point, Tas. 7010 Australia Postal: GPO Box 536 Hobart 7001 Australia

CRITEC, AUSTRALIAN DESIGNED AND MANUFACTURED PROTECTION FOR HOSTILE ENVIRONMENTS

Specifically designed as three stage primary surge attenuators

SURGE REDUCTION FILTERS SAFELINE SRF

Applications

Lightning impulses can have currents exceeding 150,000 Amperes. It is this energy, together with the sharp voltage wavefront of the impulse, which gives rise to equipment damage and possible injury or loss of life.

The typical 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 into a reticulation system in a number of ways. Most obvious is the direct strike however, more subtle mechanisms such as 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 **SafeLine range** of panel mount Surge Reduction Filters from Critec incorporates high energy clamping with efficient low pass filtering. SafeLine SRFs are installed in series with the circuit, usually at the local switch board.

Careful attention to electronic and mechanical design has resulted in a range of filter inductors which neither saturate under pulse nor steady state conditions. This makes them ideal for supplying non-linear loads. All models can conduct crest factor currents of at least 3:1, a requirement of most modern computer or electronic installations incorporating switched mode power supplies.

SafeLine SRFs are available in single or three phase configurations for load currents of 10A and 16A per phase.

For larger installations, Critec's Proline range from 32A to 1600A is available in single or three phase – ask for Critec brochure SRF03.

- △ High performance low pass filter
- △ Protection to AS1768-91 Cat. C
- △ Very low let through voltages
- △ Cost effective protection
- △ **Multipulse™** surge capability
- △ Panel or switchboard mounting
- △ Electricity Authority certification

Critec, a wholly Australian owned company, designs and manufactures over 150 protection products. With in-house expertise and combined with our world wide engineering network, Critec has the people and experience to solve almost any power or signal line transient problem.

Maintaining a high voltage research facility housing some of Australia's most sophisticated surge and transient test equipment enables Critec to prove the performance of products and offer its customers the latest in technology at the most cost effective price.

It is this experience which gives Critec the leading edge in the field of transient protection.

SURGE REDUCTION FILTERS SAFELINE SRF

Specifications

Model	SRF110C-SF	SRF116C-SF	SRF316C-SF
8/20μS MOV rating	40kA/mode	40kA/mode	40kA/mode
Protection modes	A-N, A-E, N-E transverse & common (all models)		
Energy diversion	>1360J	>1360J	>1360J
Total absorption	>12kJ	>12kJ	>12kJ
Line voltage	220-254V	220-254V	380-440VAC
Number of phases	1	1	3
Frequency	50-60Hz	50-60Hz	50-60Hz
Line current rating	10A	16A	16A
Current crest factor	3:1	3:1	3:1
Frequency response*	<1kHz	<2kHz	<2kHz
Display status	Surge diversion failure indicator		
Size (W x H x D mm)	180 x 190 x 64	180 x 190 x 64	300 x 300 x 120
Packaging	Footprint	Footprint	Rittal
Weight	1kg	1kg	5kg
Let through (typ.)**	<500V	<600V	<600V
Multipulse capability***	Yes	Yes	Yes

* Freq response is based on a voltage fed from a 50ohm source impedance to the filter input. Attenuation is based on dB=20 logV1/V2 where V2 is the open circuit output voltage.

** 6kV/3kA 8/20μSec surge superimposed on a 240VAC mains waveform.

*** Critec devices rated for multipulse have been designed to absorb repetitive energy impulses consistent with multiple stroke lightning which occurs in 75% of events.

Installation

SRFs must be well earthed in accordance with the relevant National Electricity Standards. They should be installed physically close to the incoming power lines and earthed to the nearby main switchboard earth system. Alternatively, if the 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. It is important to create an equipotential earth plane, so that earth loops are avoided. SafeLine SRFs are designed for installation in both Multiple Earthed Neutral (MEN) and non MEM systems.

Ordering Information

Catalogue No.	Order Code	Detail
120100	SRF110C-SF	10A, 1Ø, 40kA, small footprint
120110	SRF116C-SF	16A, 1Ø, 40kA, small footprint
120120	SRF316C-SF	16A, 3Ø, 40kA, Rittal enclosure

AUSTRALIAN MADE

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: 002•73 0066
FACSIMILE: 002•73 0399
International code +6102•
Sales Support Hotline 008•808 948

EXPORT BULLETIN SF02

Due to a policy of continued product improvement, specifications are subject to change without notice.

Multipulse and Surge Reduction Filter are the ™Trademarks of Critec Pty. Ltd.

A sign of the Critec commitment to excellence. Available from:

Australian Design Award

Winner of a 1992 Australian Design Award for Critec's flagship DG12 UPS

Fuse Terminals Type ASK 1 SAKS 1 KSK

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).

KSK 2, KSK 3
Fuses to BS1362 (1" x ¼") range from 1 Amp to 13 Amps (250V) Fuses to DEF 59-96 Size O (1¼" x ¼") range from 0.25 Amps to 10 Amps (440V). Bussman (1¼" x ¼") 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.

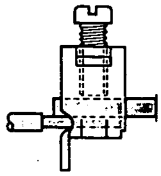
Guage rings are available as an option for the SAKS 2, SAKS 4 and SAKS 5. When fitted into the fuse terminal these prevent a higher rated fuse being inserted than that originally selected for that circuit.

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.

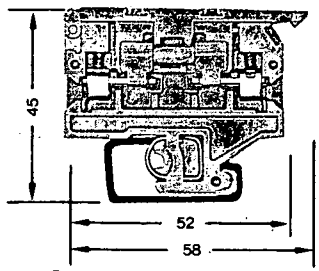
Suitability of fuses for the envisaged application must be checked with the fuse manufacturer.

Screw Clamp Connections

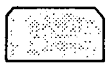
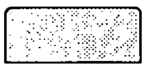
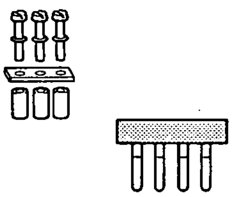
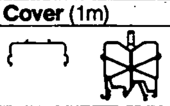


ASK 1 With hinged Cartridge Fuse Housing

250V 6.3A (max. fuse size available)



Thickness 8mm

Technical Data			
Conductor size	Solid (mm²)	0.5–4	
	Stranded (mm²)	0.5–4	
Insulation stripping length	(mm)	9	
Fuse size		20 x 5mm	
Ordering Data			**Cat. No.**
Moulding material			
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)		**Type**	**Cat. No.**
	Steel	TS 32	012280
	Steel (M6 Slots)	TS 32	067610
Locking pin (1m) — optional	Steel	SST 3	015270
End Bracket (thickness mm)			
		EWK 1 (8.5)	020616
End Plate (thickness mm)			
		AP (1.5)	038036
Partition (thickness mm)			
	Resin bonded paper	TW (0.5)	047470
Solid Brass Link			
		SBL (25 x 5)	044600
Cross Connections			
	2 way		
	3 way		
	4 way		
	10 way		
	Screw		
	Insulated comb 2 way	QB 2	046110
	Insulated comb 3 way	QB 3	046120
	Insulated comb 4 way	QB 4	046130
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.
KSK 1	389742
ASK 1	037676

Non-indicator cartridge fuse 20 x 5mm to IEG 127 CEE 4 Type 1 DIN 41660 250 Volts

Rating	Cat. No.
0.10	043030
0.20	043040
0.25	043050
0.50	043060
1.00	043070
1.60	043080
2.00	043090
2.50	043100
3.15	043110
4.00	043120
5.00	043130
6.30	043140

SAKS 1	019112

Indicator cartridge fuse 25 x 5mm to DIN 41576/CEE 250 Volts

Rating	Cat. No.
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

KSK 2	389752

Cartridge fuse 1" x ¼" to BS 1362 250 Volts

Rating	Cat. No.
1	043420
2	024510
3	043250
5	024520
7	045860
10	024530
13	024540

KSK 3, KSK 3	389762, 389772
SAKS 6	053182

Cartridge fuse 1¼" x ¼" to DEF59-96 Size 'O' 440 Volts — characteristic curves are shown on opposite page

Rating	Cat. No.
0.25	043180
0.50	043190
1	043200
2	029450
3	029470
5	029460
7	029580
10	029390

SAKS 4	032132

Indicating neozed fuse suitable for 380/415 Volts applications

Rating	Type	Cat. No.
6	E 14/6	032830
10	E 14/10	032840
16	E 14/16	032850

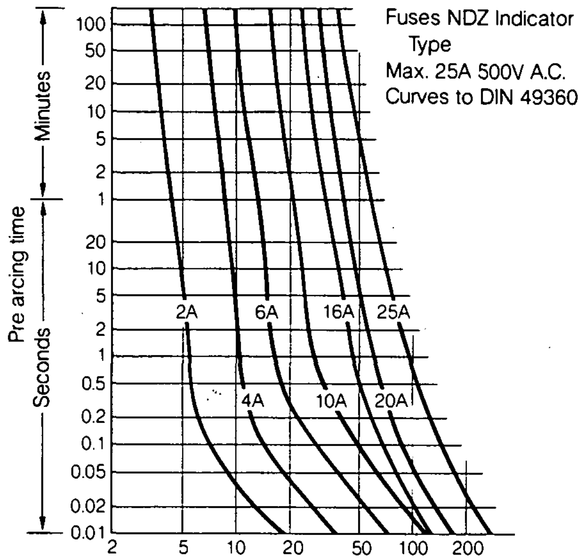
The fitting of gauge rings is recommended when using fuses of a low rating

SAKS 2	020682

HRC fuse cartridge 500 Volts

Rating	Type	NDZ Cat. No.	TNDZ Cat. No.
2	E 16/2	031740	046560
4	E 16/4	031750	046570
6	E 16/6	031760	046580
10	E 16/10	020850	046590
16	E 16/16	020860	045140
20	E 16/20	020870	045150
25	E 16/25	020880	045160

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

SAKS 5	035942

Neozed fuse suitable for 440 Volts application

Rating	Type	Cat. No.
20	E 18/20	036130
25	E 18/25	036140
35	E 18/35	036150
50	E 18/50	036160
63	E 18/63	036170

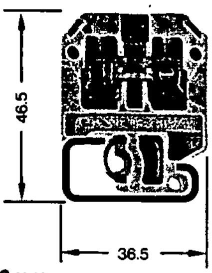
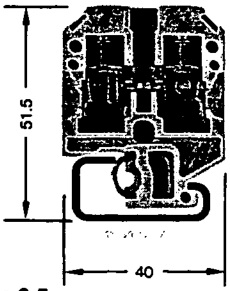
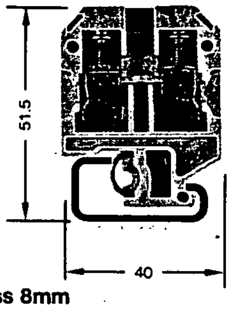
The fitting of gauge rings is recommended when using fuses of a low rating.

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

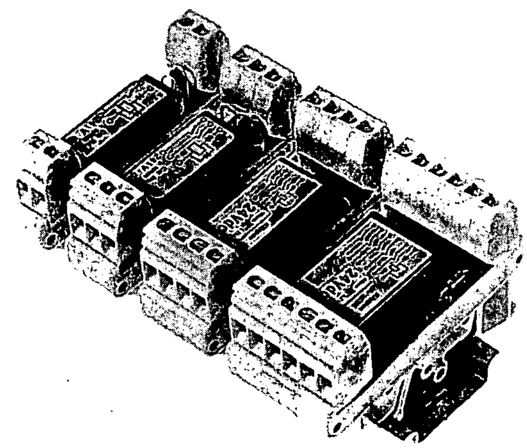
Please contact our Technical Department should you have any queries

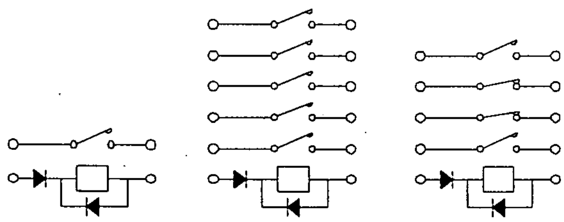
Klippon

SAK 2.5 750V 27A		SAK 4 750V 36A		SAK 6N 750V 47A	
					
Thickness 6mm		Thickness 6.5mm		Thickness 8mm	
0.5–4		0.5–6		0.5–10	
0.5–4		0.5–4		0.5–6	
9		12		12	
	Cat. No.		Cat. No.		Cat. No.
	027966		012836		019326
	027968		012838		019328
	027962		012832		019322
	027967		012837		019327
BASEEFA–Ex CEGB		BASEEFA–Ex CEGB		BASEEFA–Ex CEGB	
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)	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	019700	VL 2	019700
		VH 19	028510	VH 19	028510
		BS (M3 x 25)	029250	BS (M3 x 25)	029250
		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
HP 1	048556	HP 2	048566	HP 2	048566
DEKAFIX — Section T6		DEKAFIX — Section T6		DEKAFIX — Section T6	

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^2
		flexible	0.5-2.5mm^2
	Insulation stripping length		7mm

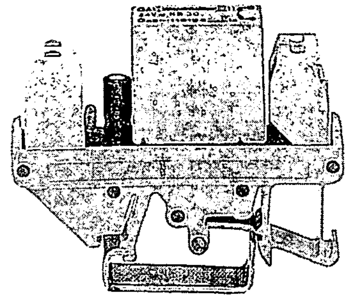
Ordering Data

Contacts	Operating Current (typ.)	Module Width	Type	Cat. No.
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

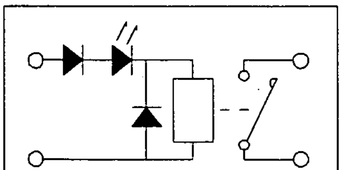
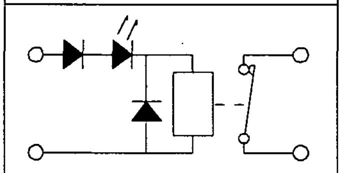
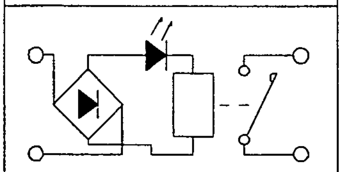
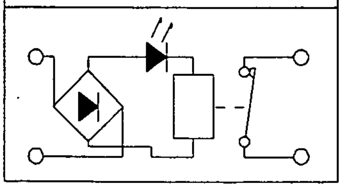
Slim single relay modules, 1N/O or 1 N/C contact



Specifications

Input:			see ordering data
Output:	Max. voltage		250V ac
	Max. current		see ordering data
	Max. power;	ac load	2000VA
		dc load	100W
Isolation:	Input to output		4kV ac eff.
Terminals:	Type		GSE5
	Conductor size;	solid	0.5-4.0mm^2
		flexible	0.5-2.5mm^2

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**
	24V dc	5A	**11009.2**
	48V dc	5A	**11011.2**
	110V dc	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) representitive for details.

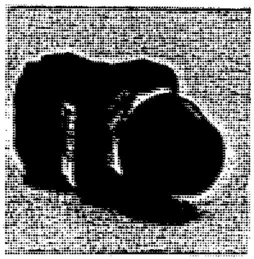
RELAY MODULES

ALLEN-BRADLEY
A ROCKWELL INTERNATIONAL COMPANY

800T

30.5 mm OiltightRange

PILOT LIGHTS
STANDARD UNITS



DESCRIPTION	Voltage	Colour	CATALOGUE NUMBER
TRANSFORMER TYPE 50 Hz (order colour cap separately)	110 Volt	See table below	800T-P16
	240 Volt		800T-P26
	480 Volt		800T-P46
FULL VOLTAGE TYPE AC/DC (order colour cap separately)	24 Volt	See table below	800T-Q24
	110 Volt		800T-Q10
	240 Volt❶		800T-Q20
LED TRANSFORMER TYPE 50 Hz (includes colour cap)	110 Volt	Amber	800T-PL16A
	110 Volt	Green	800T-PL16G
	110 Volt	Red	800T-PL16R
	240 Volt	Amber	800T-PL26A
	240 Volt	Green	800T-PL26G
	240 Volt	Red	800T-PL26R
LED FULL VOLTAGE TYPE AC/DC ❷ (includes colour cap)	24 Volt	Amber	800T-QL24A
	24 Volt	Green	800T-QL24G
	24 Volt	Red	800T-QL24R
	110 Volt	Amber	800T-QL10A
	110 Volt	Green	800T-QL10G
	110 Volt	Red	800T-QL10R

PILOT LIGHT COLOUR CAPS	Red	800T-N26R
	Green	800T-N26G
	Amber	800T-N26A
	Blue	800T-N26B
	White	800T-N26W
	Clear	800T-N26C

REPLACEMENT LAMPS AND LEDs

INCANDESCENT TYPE TO SUIT		(lamp voltage)		
Transformer Unit		6 Volt	–	800T-N65
Full Voltage Unit	24V	24 Volt	–	800T-N157
	110V	110 Volt	–	800T-N169
	240V❶	110 Volt	–	800T-N169

LED TYPE TO SUIT	(LED voltage)		
Transformer Unit	6.3 Volt AC	Amber	800T-N77A
	6.3 Volt AC	Green	800T-N77G
	6.3 Volt AC	Red	800T-N77R
Full Voltage AC/DC Unit ❷	9 Volt AC/DC	Amber	800T-N78A
	9 Volt AC/DC	Green	800T-N78G
	9 Volt AC/DC	Red	800T-N78R

❶ 240 volt full voltage devices are complete with power block which reduces voltage by 50%. A 100 Volt lamp is used.

❷ LED full voltage AC/DC type units are complete with power block which reduces voltage to approx. 9 volt.

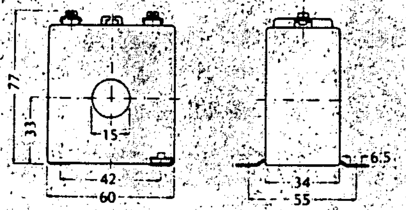
780 Series

HAWKER SIDDELEY
Crompton
INSTRUMENTS

Accuracies comply with BS3938: and IEC 185:

All measurements in millimetres

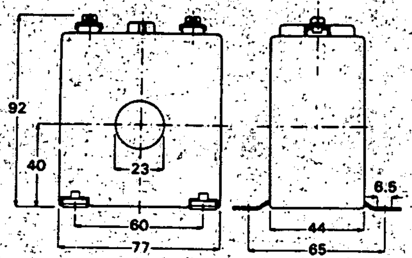
Type 780—943



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

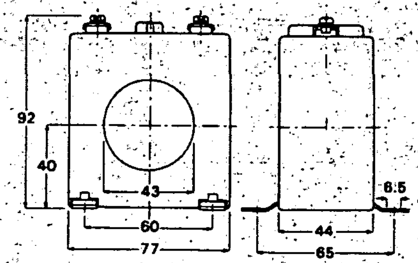
Type 781—943



Supplied with 4 fixing feet
Max cable Ø = 23mm
1A secondaries are available for all ratings

CT Ratio	VA at Class 3	1	VA at Class 3	1	VA at Class 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	10	5
200/5	5	—	7.5	5	15	10	7.5
250/5	5	2.5	7.5	5	20	15	10
300/5	5	2.5	7.5	5	20	15	10
400/5	5	2.5	10	5	30	15	15
500/5	5	2.5	10	5	30	15	15

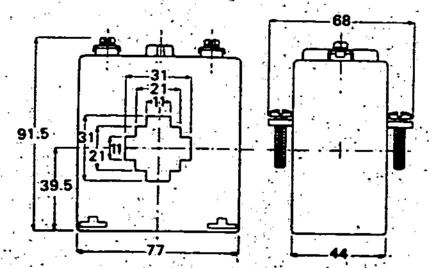
Type 782—943



Supplied with 4 fixing feet
Max cable Ø = 43mm
1A secondaries are available for all ratings except 1200A

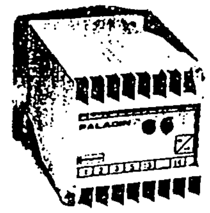
CT Ratio	VA at Class 3	VA at Class 3	1	VA at Class 3	1	0.5
100/5	2.5	—	—	—	—	—
120/5	2.5	5	2.5	—	—	—
125/5	2.5	5	2.5	—	—	—
150/5	2.5	7.5	4.5	—	5 or	3
200/5	2.5	7.5	5	10	6	2.5
250/5	5	7.5	5	10	7.5	5
300/5	5	7.5	5	10	7.5	5
400/5	5	7.5	5	15	7.5	5
500/5	—	—	—	10	7.5	5
600/5	—	—	—	12	10	7.5
750/5	—	—	—	15	10	10
800/5	—	—	—	15	10	10
1000/5	—	—	—	20	15	15
1200/5	—	—	—	20	15	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 3	1	VA at Class 3	1	VA at Class 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	7.5	2.5
200/5	5	—	7.5	5	15	10	5
250/5	5	2.5	10	7.5	20	15	10
300/5	5	2.5	15	10	20	15	10
400/5	5	2.5	15	10	20	15	10
500/5	—	—	—	—	30	15	10
600/5	—	—	—	—	30	15	15
750/5	—	—	—	—	30	15	15
800/5	—	—	—	—	30	15	15



INSTALLATION SHEET

IW250TA/V PALADIN, CURRENT & VOLTAGE TRANSDUCERS

HAWKER SIDDELEY Crompton INSTRUMENTS

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-TVR	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.

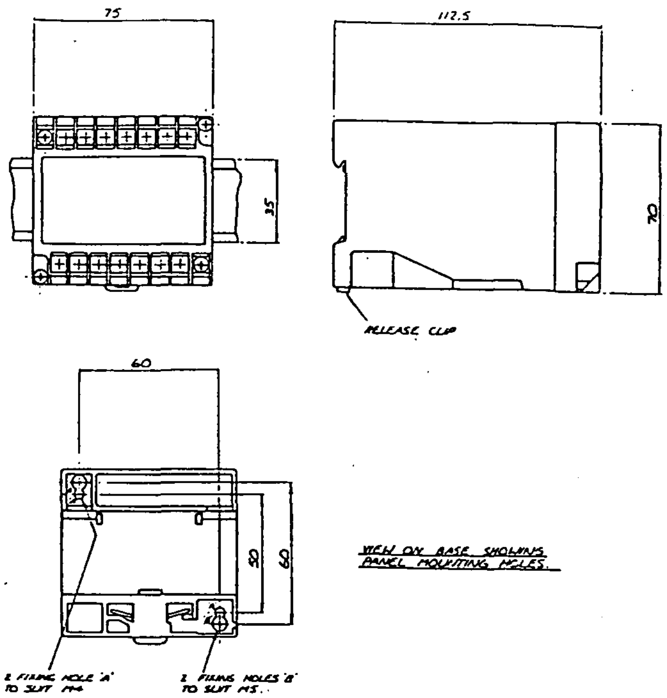
Connection wires should be sized to comply with applicable regulations or code of practice. Input cables must be routed away from high voltages & heavy current carrying cables. Note that dc auxiliary versions contain a square wave inverter & should not be located near any radio receiving equipment that 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)

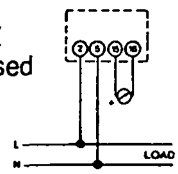
Dimensions



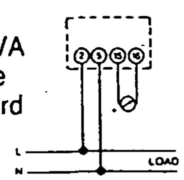
Connection Instructions

AC VOLTAGE TRANSDUCERS

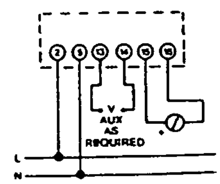
Type 253-TVZ suppressed zero voltage



Type 253-TVA voltage standard

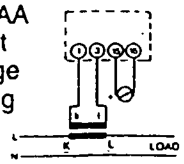


Types 253-TVL line zero voltage 253-TVR RMS voltage

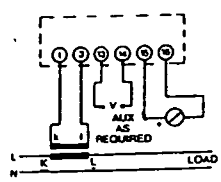


CURRENT TRANSDUCERS

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 ±20% 50/60Hz
Voltage dc	12V, 24V ±15% (other dc auxiliaries are available)
Burden	3VA, 3Wdc

OUTPUT

Span	0 to 1mA into 0 to 10 kΩ; 0 to 5mA into 0 to 20kΩ; 0 to 10mA into 0 to 1kΩ; 0 to 20mA into 0 to 500Ω; 4 to 20mA into 0 to 500Ω
Ripple	<0.5% of rated output
Zero adjustment	± 2% minimum not applicable to 253 TAA & TVA
Span adjustment	±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 developement 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

HAWKER SIDDELEY Crompton INSTRUMENTS

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

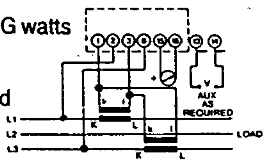
WATTS

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 (11/2 element)

VARS

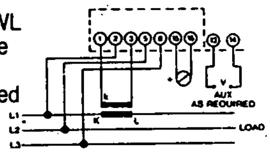
256-TXG	3 Phase 3 Wire Balanced
256-TXH	3 Phase 4 Wire Balanced
256-TXJ	3 Phase 4 Wire Unblanced
256-TXK	Single Phase
256-TXM	3 Phase 3 Wire Unblanced
256-TXN	3 Phase 4 Wire Unblanced Star
256-TXP	3 Phase 4 Wire Unblanced

Type 256-TWG watts 3 phase 3 wire balanced load

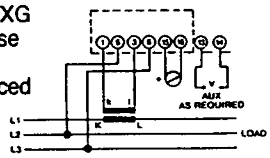


Reverse connected CTs

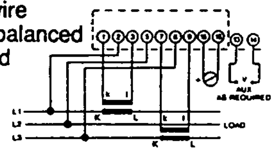
Type 256-TWL 3 phase 3 wire balanced load



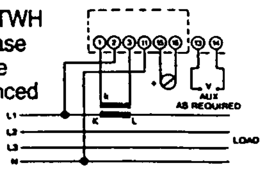
Type 256-TXG 3 phase 3 wire balanced load



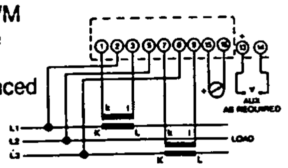
Type 256-TXM 3 phase 3 wire unbalanced load



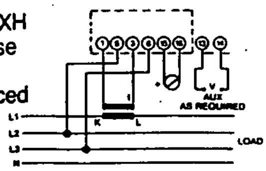
Type 256-TWH 3 phase 4 wire balanced load



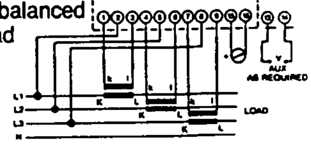
Type 256-TWM 3 phase 3 wire unbalanced load



Type 256-TXH 3 phase 4 wire balanced load

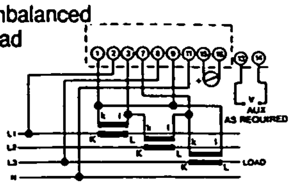


Type 256-TXN 3 phase 4 wire unbalanced load



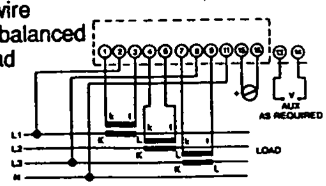
Star connected CTs

Type 256-TWJ 3 phase 4 wire unbalanced load



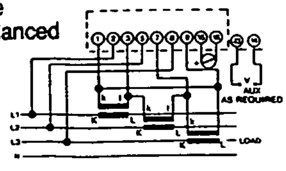
Delta connected CTs

Type 256-TWN 3 phase 4 wire unbalanced load



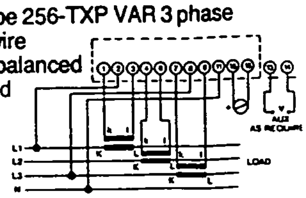
Star connected CTs

Type 256-TXJ 3 phase 4 wire unbalanced load



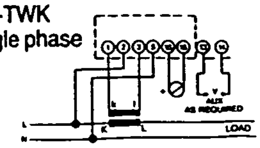
Delta connected CTs

Type 256-TXP VAR 3 phase 4 wire unbalanced load

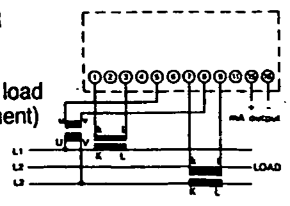


Star connected CTs

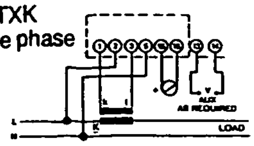
Type 256-TWK Single phase



Type 256-TWR 3 phase 3 wire balanced load (1½ element)



Type 256-TXK Single phase



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 degress 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, auxilliary 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 inder 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 seperate auxiliary is required when the transducer is to be operated at voltages below 80% of its rating.

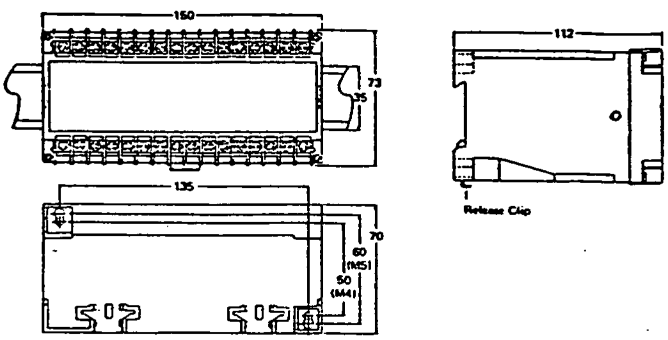
SPECIFICATION

GENERAL	
Accuracy Class	0.5%
Temp.coeff	0.03%/1 Degree Celsius Change
Frequency Coeff	0.05%/1hz except Single Phase 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 VAR Sin Ø 0.1 lead to 0.1 lag
Stability	+/- 0.25% per annum non cumulative
Performance	Designed to comply with B.S. 6253
Housing	Flame retardant plastic case.
Weight	2.4kg approximately.
CLIMATE	
Temperature Range	-20 to +70 degrees celsius storage. 0-60 degrees celsius operational. 23 degrees celsius calibrated.
Humidity	Upto 95% RH. Non-condensing
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 seperate 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	400mS for 1% to 99% of span.
Ripple	0.5% Max span
Span Adjustment	+/-10% Min
Zero Adjustment	+/-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

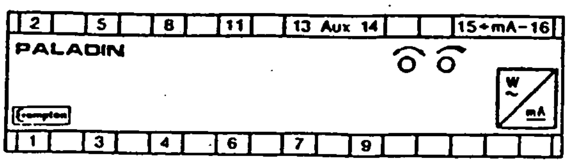
MAINTENANCE

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.

Model 256 Measurements in mm



Rear View showing panel mounting holes



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.

IW250PS. EDITION 3 APRIL 1993

INSTALLATION INSTRUCTIONS

PHASE BALANCE RELAY

Crompton INSTRUMENTS HAWKER SIDDELEY

INTRODUCTION

The phase balance relay module provides coontinuous 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.

PRODUCTS COVERED

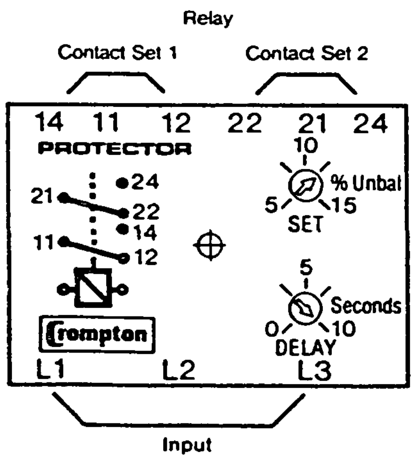
252-PSFW. Phase loss and unbalance only.
252-PSGW. Phase loss, unbalance and undervoltage.

TYPICAL APPLICATIONS

To provide continuous surveillance of a 3 phase system against, phase loss, phase reversal, unbalance and under-voltage.

The phase unbalance feature protects motors of any size, from full-load to no load, against excessive temperature rise due to unbalanced supplies e.g. a 10% unbalanced supply can increase the temperature rise by 150%.
In addition, this also protects against the phantom voltage generated during a single phase failure when running at low load.

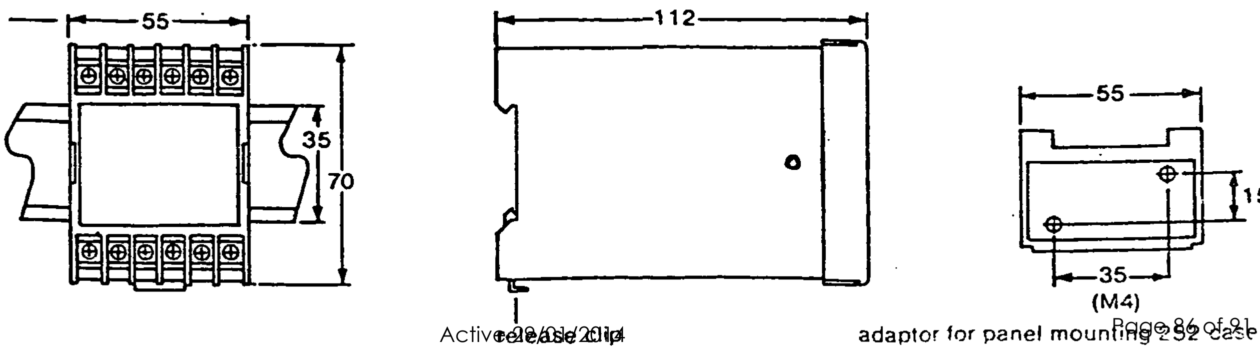
Connection Diagram



Note: Neutral connection not required.

Dimensions

measurements in mm
MODEL 252



adaptor for panel mounting 252 case only

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 excercise 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.

SPECIFICATION

Type 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.
Voltage Ratings:	100-125V, 200-250V or 380-450V.
Burden:	3VA
Voltage withstand:	1.2 times continuous. 1.5 times for 10x10 seconds.
SET POINTS	
Unbalance:	Adjustable 5% to 15%.
Time delay:	Typical. Adjustable to 10 sec. maximum. (not operative if voltage falls below 70% of nominal or set point on type 252-PSGW)
Under voltage: (Type 252-PSGW only)	Internally preset at -15% nominal voltage (other values between -10% and -30% available on request)
OUTPUT RELAY	
Type:	DP changeover.
Rating ac:	240V, 5A non-inductive.
dc:	24V, 2.5A resistive.
Operations:	2x10 at above loads.
Reset:	Automatic.
GENERAL	
Dielectric test:	2kV r.m.s for 1 min.to BS5458/IEC414.
Temperature range:	0 to 60 degrees celsius.
Storage temperature:	-20 to 60 degrees celsius.
Temp. co-efficient:	0.05% / degree celsius.
Interference immunity:	Electrical stress surge withstand and non-maloperation to IEEE Std 472, ANSI C37 90a, SEN 361503.
Enclosure code:	IP50 to BS5490, IEC529.
Housing:	Flame retardant plastic
Weight:	Approx. 0.3 kg.

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.

CONTROL OF THREE APPLIANCES IN A DISCHARGING SITUATION

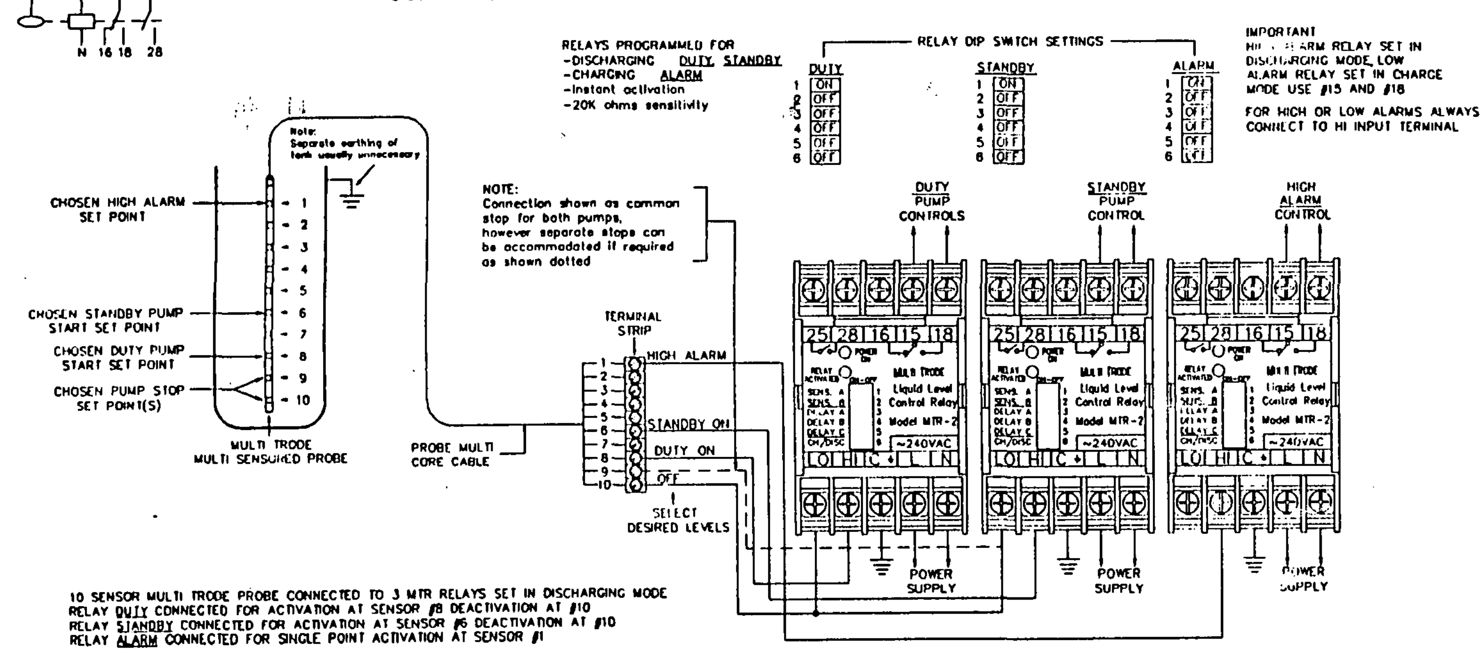
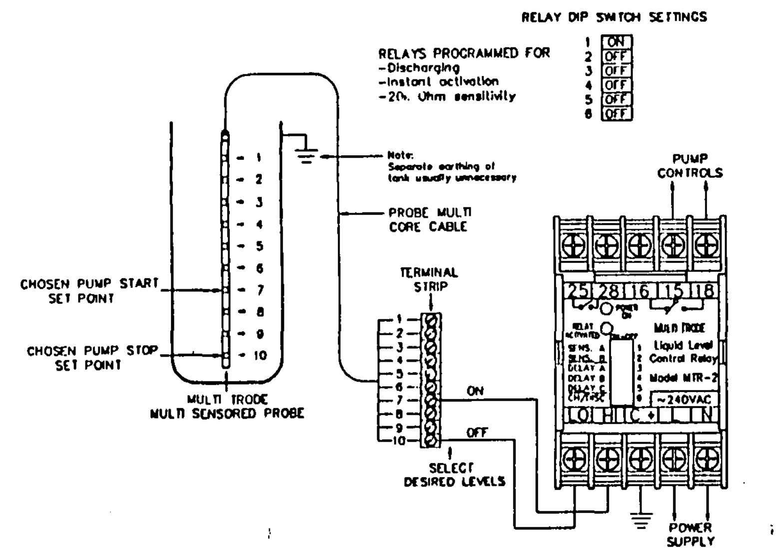


FIGURE-1

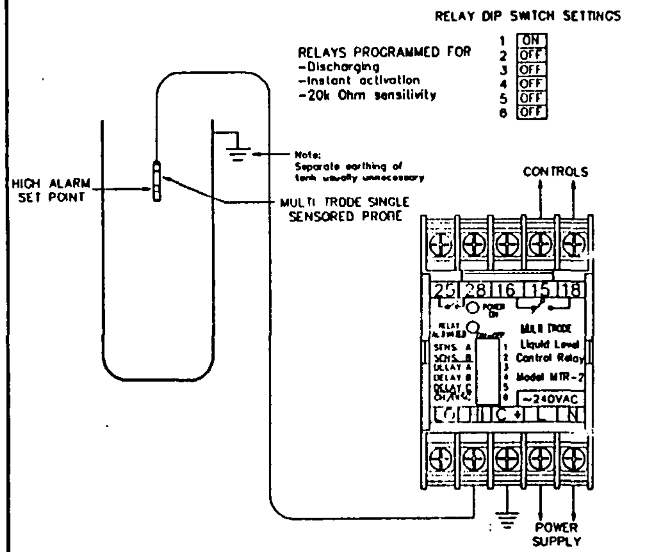
WARNING: *Always separate probe cables from power wiring*

ON-OFF CONTROL IN A DISCHARGING SITUATION



10 SENSOR MULTI TRODE PROBE CONNECTED TO SINGLE MTR RELAY SET IN DISCHARGE MODE
RELAY CONNECTED FOR ACTIVATION AT SENSOR #7
DEACTIVATED AT SENSOR #10

SINGLE POINT OPERATION FOR DISCHARGING



1 SINGLE SENSOR PROBE CONNECTED TO SINGLE MTR RELAY SET IN DISCHARGING MODE ACTIVATION AND DEACTIVATION AT SAME POINT

RELAY PROGRAM FUNCTIONS

SWITCH Nº SETTING 1	2	SENSITIVITY	
OFF	OFF	1k Ω	Concentrated Acids, Minerals, Alkalines
OFF	ON	4k Ω	Acids, Alkalines, Diluted brine, Sea water
ON	OFF	20k Ω	Sullage, Sewage effluent Town water
ON	ON	80k Ω	Low conductive liquids, Purified water

3	4	5	DELAY ON ACTIVATION
OFF	OFF	OFF	Zero Seconds
OFF	OFF	ON	2.5 Seconds
OFF	ON	OFF	5 Seconds
OFF	ON	ON	10 Seconds
ON	OFF	OFF	20 Seconds
ON	OFF	ON	40 Seconds
ON	ON	OFF	80 Seconds
ON	ON	ON	160 Seconds

6	MODE
OFF	Discharge
ON	Charge

SPECIFICATIONS

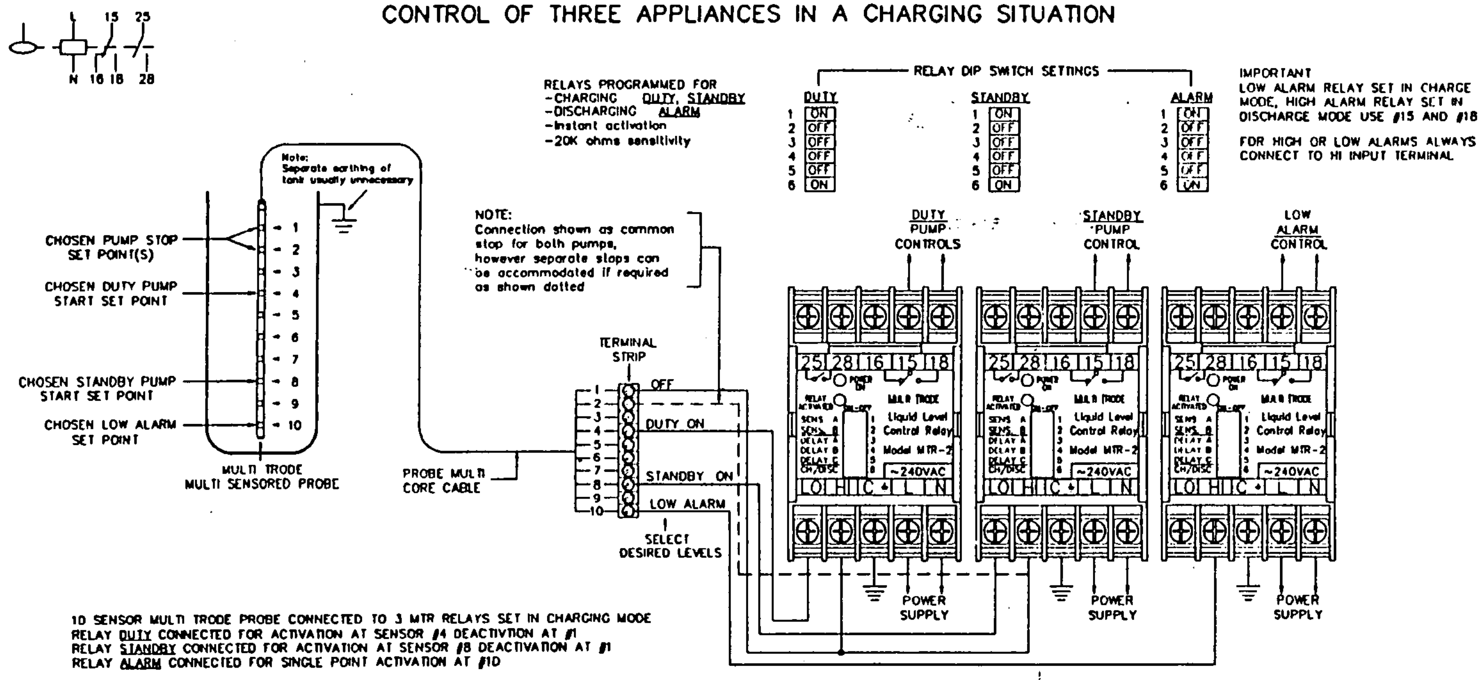
SENSOR VOLTAGE	12VAC NOMINAL
NUMBER OF OUTPUTS	2 SETS, 1 NO & 1 CHANGEOVER
CONTACT RATING	5 AMP 250VAC RESISTIVE
CONTACT LIFE	10^5 OPERATIONS
SUPPLY VOLTAGE(+-10%)	240, 110, 240VAC, 50/60Hz 24, 12VDC
POWER CONSUMPTION	3.4VA (MAX)
DIMENSIONS mm (inches)	H74(2.78) X W45(1.77) X D114(4.5)
TERMINAL SIZE mm (inches)	2 X 2.5mm² (0.64² INCH)
DISPLAY LEDS	GREEN - POWER ON RED - ACTIVATION
MOUNTING ARRANGEMENT	DIN RAIL OR 2X4mm SCREWS (3/16")
SENSITIVITY (OHMS)	SELECTABLE VIA SWITCHES 1K, 4K, 20K, 80K
MODE	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)

PHONE (07) 808-4011
FAX (07) 808-0011

MULTI TRODE

FOR		
TITLE MTR - WIRING DIAGRAMS		
DESIGNED BY [illegible]	REV.	SCALE NO
CHECKED F. TOWELL	DATE APRIL 93	
DRAWN BY S. SWART	DRAWING # 8565	

CONTROL OF THREE APPLIANCES IN A CHARGING SITUATION



10 SENSOR MULTI TRODE PROBE CONNECTED TO 3 MTR RELAYS SET IN CHARGING MODE
RELAY DUTY CONNECTED FOR ACTIVATION AT SENSOR #4 DEACTIVATION AT #1
RELAY STANDBY CONNECTED FOR ACTIVATION AT SENSOR #8 DEACTIVATION AT #1
RELAY ALARM CONNECTED FOR SINGLE POINT ACTIVATION AT #10

FIGURE-4

WARNING: Always separate probe cables from power wiring

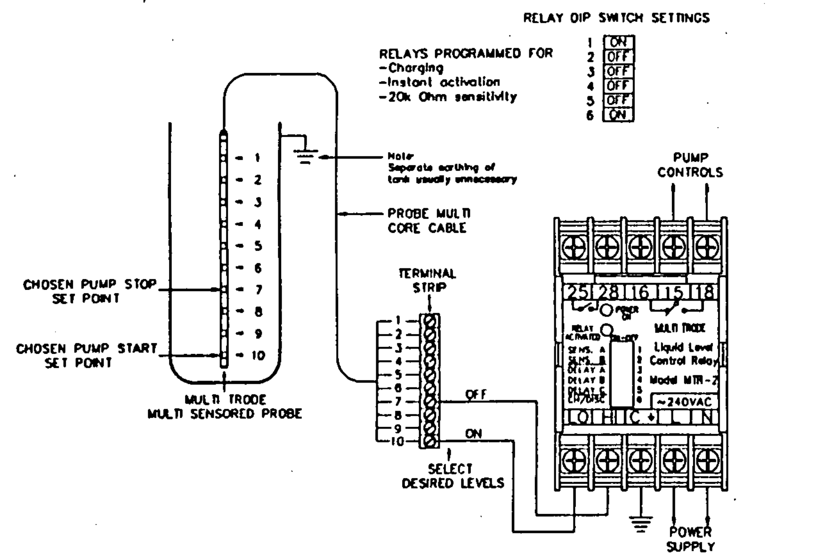
RELAY PROGRAM FUNCTIONS

SWITCH Nº SETTING 1	2	SENSITIVITY	
OFF	OFF	1k Ω	Concentrated Acids, Minerals, Alkalines
OFF	ON	4k Ω	Acids, Alkalines, Diluted brine, Sea water
ON	OFF	20k Ω	Sullage, Sewage effluent Town water
ON	ON	80k Ω	Low conductive liquids, Purified water

3	4	5	DELAY ON ACTIVATION
OFF	OFF	OFF	Zero Seconds
OFF	OFF	ON	2.5 Seconds
OFF	ON	OFF	5 Seconds
OFF	ON	ON	10 Seconds
ON	OFF	OFF	20 Seconds
ON	OFF	ON	40 Seconds
ON	ON	OFF	80 Seconds
ON	ON	ON	160 Seconds

6	MODE
OFF	Discharge
ON	Charge

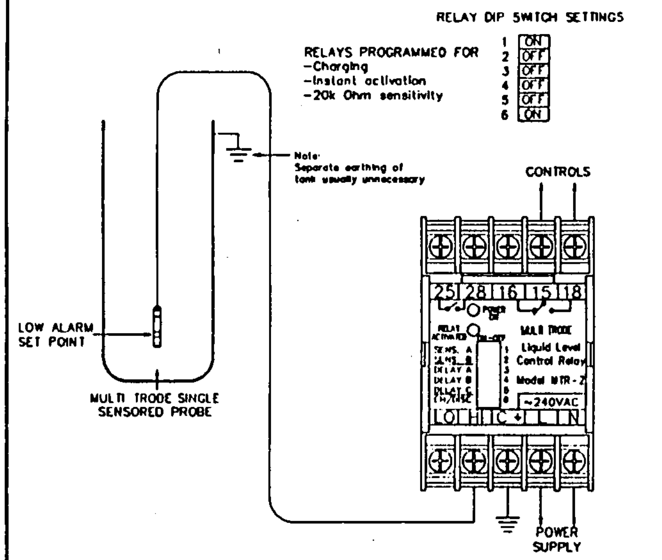
ON-OFF CONTROL IN A CHARGING SITUATION



10 SENSOR MULTI TRODE PROBE CONNECTED TO SINGLE MTR RELAY. SET IN DISCHARGING MODE
RELAY CONNECTED FOR ACTIVATION AT SENSOR #10
DEACTIVATED AT SENSOR #7

FIGURE-5

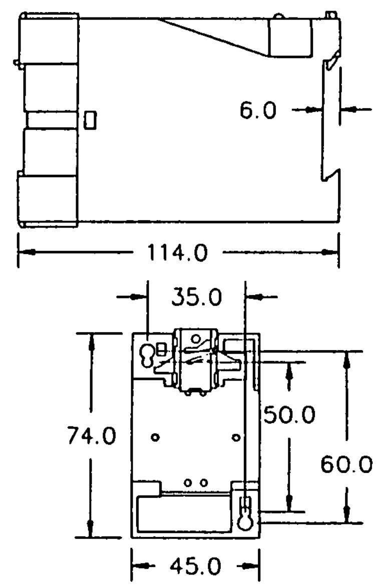
SINGLE POINT OPERATION IN A CHARGING SITUATION



1 SINGLE SENSOR PROBE CONNECTED TO SINGLE MTR RELAY IN CHARGING MODE ACTIVATION AND DEACTIVATION AT SAME POINT

FIGURE-6

MTR DIMENSIONS IN mm.



PHONE (07) 808-4011
FAX (07) 808-0011

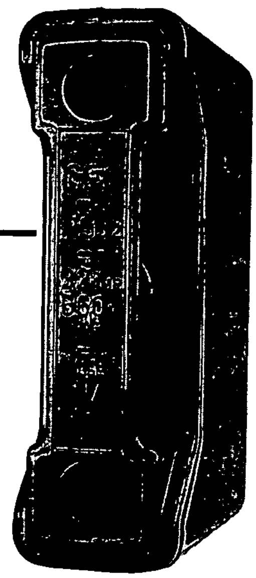
MULTI TRODE

FOR	
TITLE MTR - WIRING DIAGRAMS	
DESIGNED BY SARTEK	REV. SCALE NO
CHECKED P. TOWELL	DATE APRIL 93
DRAWN BY S. SWARTZ	DRAWING # A3-8563

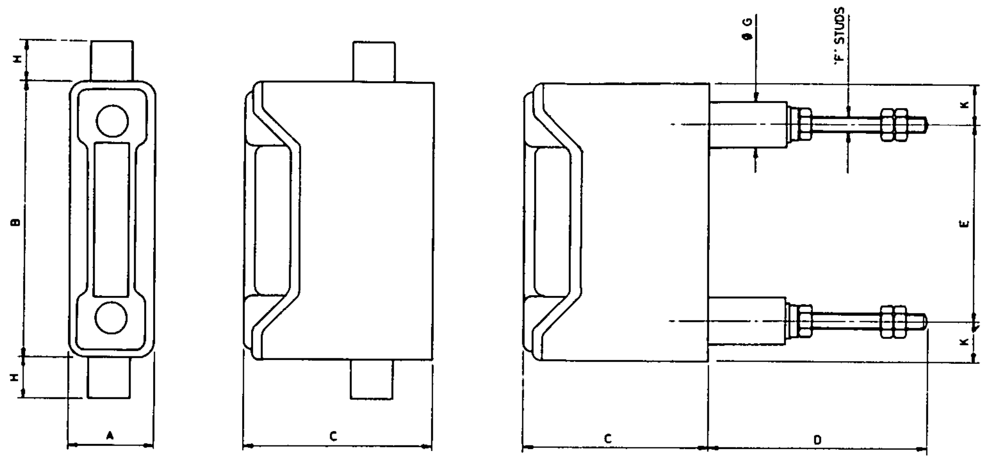
designed & manufactured by SARTEK Pty. Ltd. BRISBANE, AUSTRALIA

'RED SPOT'

HRC FUSE HOLDERS

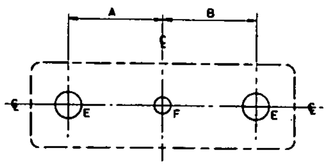


Dimensions

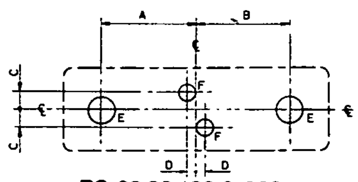


Type	Rating Amp	A	B	C	D P,PH ONLY	E	F P,PH ONLY	G DIA P,PH ONLY	H	K	Max Cable Size
RS20	20	27	80	54	63	35	M6	13,5	15	22,2	10mm²
RS32	32	32	103	70	81	73	M6	17,5	15	15,1	16mm²
RS63	63	35	110	75	84	78	M8	17,5	15	15,9	50mm²
RS100	100	51	140	100	87	94	M10	22,2	15	23	70mm²
RS200	200	70	216	136,5	95	171,5	M12	25,4	22	22,2	120mm²
RS400	400	98,5	254	192	114	140	M16	31,8	32	57,2	240mm²

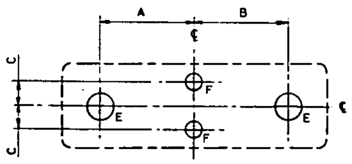
PANEL DRILLING DIMENSIONS



RS 20



RS 32,63,100 & 200



RS 400

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.									

(DIMENSIONS IN MILLIMETRES)

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
			3	4	6.4	NS20
SC32	H,P,BW	NS2-32A	4	5.5	8.1	NS25
			5.5	7.5	11.6	NS32
SC63	H,BW	* NS2-32	7.5	10	14.4	ES40
		ES40-63	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 RECOMMENOATIONS (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	—
			3	4	6.4	NIT20	—
		NIT20M25	4	5.5	8.1	—	NIT20M25
		NIT20M32	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	7.5	10	14.4	—	TIA32M35
		TIA32M50	11	15	21.1	—	TIA32M50
		TIA32M63	15	20	28	—	TIA32M63
RS63	H,P,PH,BW	TIA2-32A	7.5	10	14.4	TIS35	—
		TIS35-63A	11	15	21.1	TIS50	—
			15	20	28	TIS63	—
			18.5	25	35	—	TIS63M80
		TIS63M80	22	30	41	—	TIS63M80
		TIS63M100	30	40	55	—	TIS63M100
RS100	H,P,PH,BW	TCP80	22	30	41	TCP80	—
		TCP100	30	40	55	TCP100	—
		TCP100M125	37	50	69	—	TCP100M125
		TCP100M160	45	60	83	—	TCP100M160
		TCP100M200	55	75	99	—	TCP100M200
RS200	H,P,PH	TBC2-63A	37	50	69	TF125	—
		TC80-100A	45	60	83	TF160	—
		TF125-200A	55	75	99	TF200	—
		TF200M250	75	100	136	—	TF200M250
		TF200M250	90	120	162	—	TF200M250
RS400	H,P,PH	TKM250/315	110	150	200	TM355	—
			132	175	231	TM355	—
		TKM355/400	150	200	263	TM400	—
		TKM355/400	160	215	281	TM400	—
		TM400M450	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 & 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.