



# POWER ELECTRIC Switchboards PTY LTD

ACN 052 204 118

Manufacturers of Engineered Switchboards for Mining Industrial and Commercial Projects

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

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## MAINTENANCE MANUAL

BRISBANE CITY COUNCIL

DEPARTMENT OF WATER SUPPLY AND SEWERAGE

BARRAMUL STREET

SEWAGE PUMPING STATION

ORDER NO:- 466506 EF  
DATE:- 1993  
CONTRACT NO:- SPFP3/2

SP5 BARRAMUL STREET



**S E C T I O N        1**

**MAINTENANCE INSTRUCTIONS**

**TEST REPORTS**

**S E C T I O N        2**

**EQUIPMENT CATALOGUES**

**S E C T I O N        3**

**M.C.C. DRAWINGS**

## PREVENTATIVE MAINTENANCE INSTRUCTIONS

### 1. MAINS CONNECTIONS:

The mains must be checked annually to ensure:

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

### 2. MOTOR CONTROL CENTRE

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

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

### 3. Cleaning of Equipment

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

If it should happen that a component such as a relay is not working properly owing to dirt on its moving parts, its immediate replacement by a spare is to be recommended. In the case of grommets, connectors, contactors, etc., cleaning of the contact area can be done in place, using a cloth moistened with a solvent such as benzine or trichlorethylene plus a dab of vaseline.

All due care should be taken to de-energize the circuits associated with the location being serviced.

### Visual Inspection

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



# POWER ELECTRIC Switchboards PTY LTD

A.C.N. 052 204 118

Manufacturers of Engineered Switchboards for Mining, Industrial and Commercial Projects

## FINAL CHECKING PROCEDURE FOR ALL SWITCHBOARDS

SWITCHBOARD TITLE:

BRISBANE CITY COUNCIL - BARRAMUL STREET

JOB NUMBER:

323

✓
✓
✓
✓
✓
✓
✓
✓
✓
✓
✓
✓
✓
✓
✓
✓

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.

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

CIRCUIT	RESULT 1000V MEGGER
R-E	150 MΩ
W-E	150 MΩ
B-E	150 MΩ
R-W	150 MΩ
R-B	150 MΩ
W-B	150 MΩ
NEUT-E	150 MΩ

CHECKED BY: M. Kaini

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

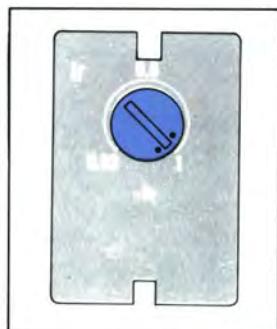
A new generation of MCCB's. Procuring a major evolution in Low Voltage Distribution Systems. Offering a choice of 3 series (economical, standard and high fault) and two types. **Adjustable thermal magnetic or microprocessor based solid state O.C.R.** Both types have common construction features and interchangeable 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)

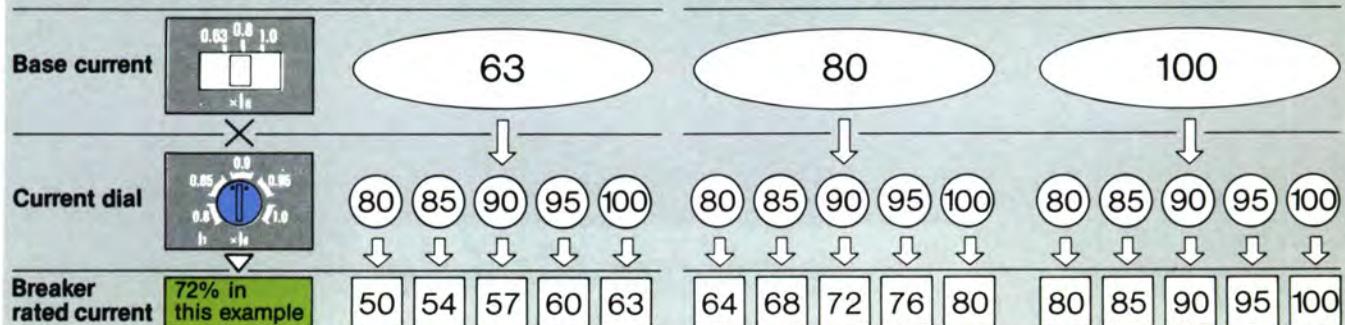
The rated current is continuously adjustable from 63% to 100% of the nominal rated current. The scale is marked at three positions; 63%, 80% and 100%.

### 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 [ $I_0$ ] select switch and the rated current [ $I_r$ ] setting dial.

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



**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**

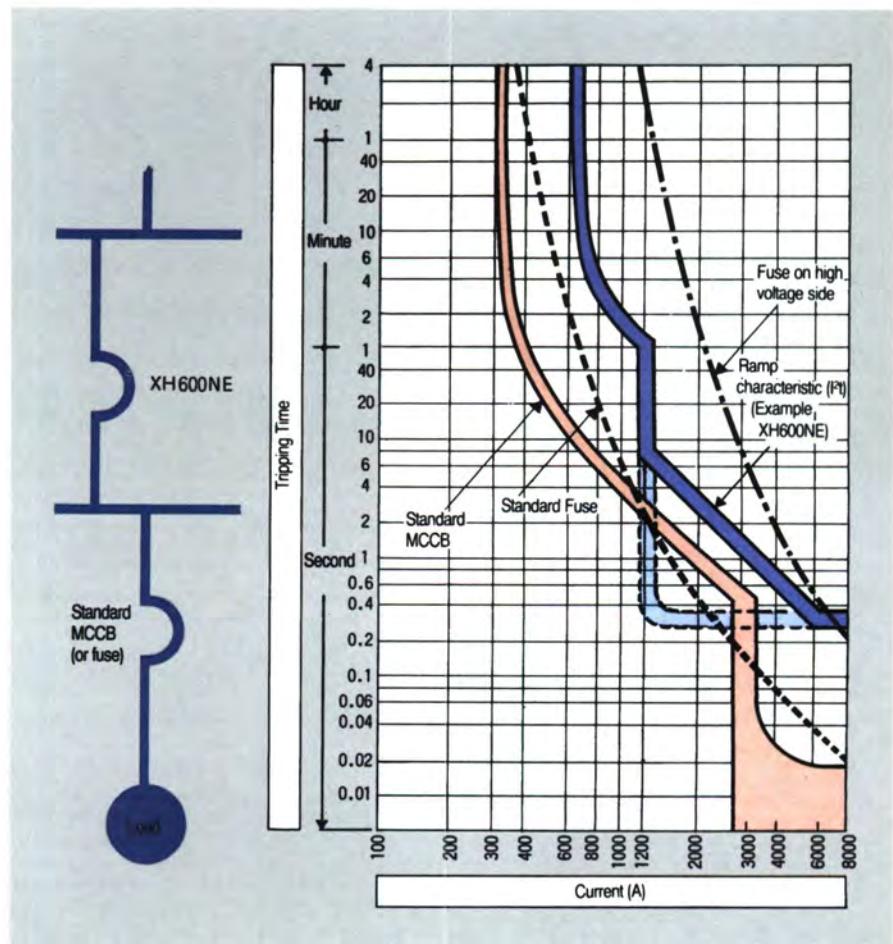
Essential for general industrial plants and generator protection

**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 [ $I_1$ ]

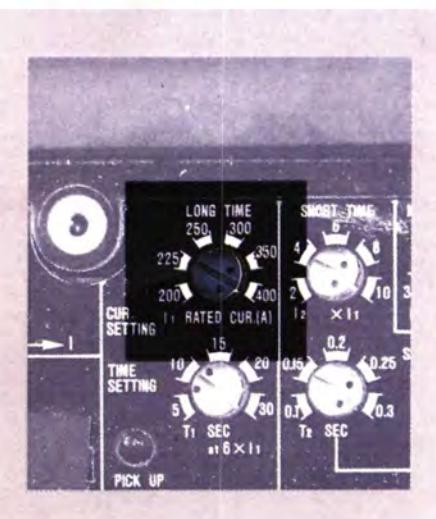


**Rated Current Adjustment Dial (Example)**

**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.



### 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.

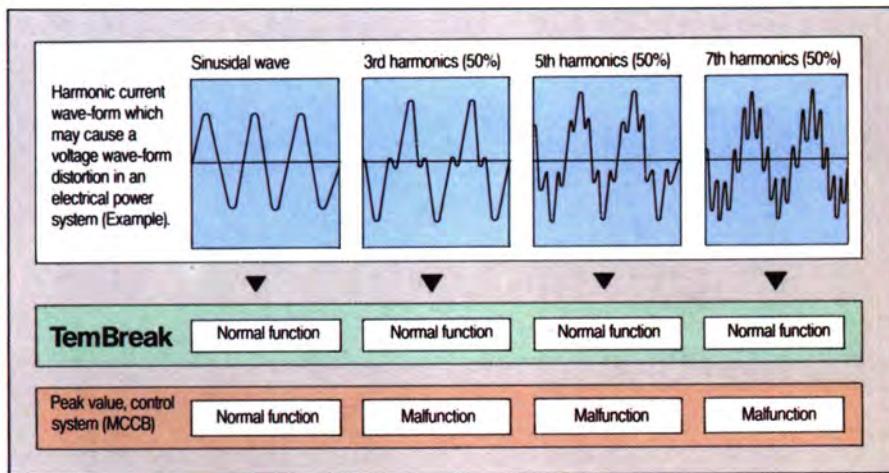
TemBreak's electronic protective device detects the true r.m.s. value of the load current, therefore, remaining unaffected by harmonics.

### 4 Pre-trip alarm function (optional)

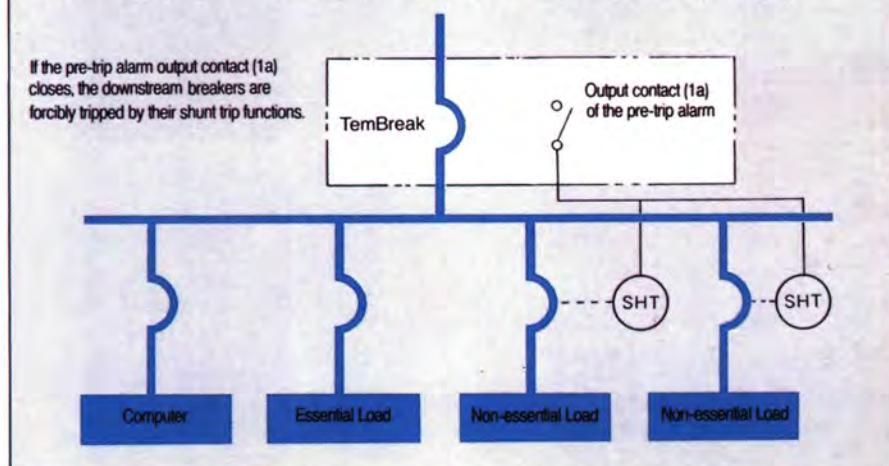
Electronic office equipment is being increasingly used in today's buildings and factories.

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).

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

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

### 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).

# TemBreak

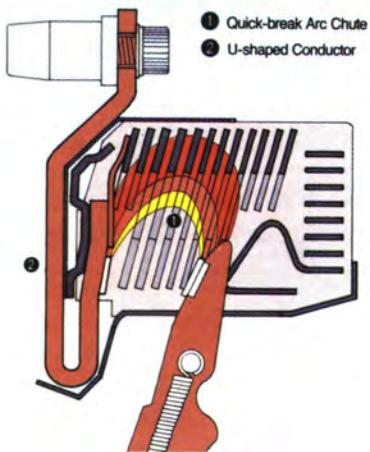
## Common features of a construction

**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.

**I(ON)**

Red

**TRIP**

White

**O(OFF)**

Green

**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



- 64 mm



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

**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).



# Standard Series

Ampere Frame	125	125	225	250	400	400	400	630
Type	XS125CJ	XS125MJ	XE225MS	XS250NJ	XS400CJ	XS400MJ	XS400NE	XS630CJ
Number of Poles	*1 3 4	*1 3 4	3	3 4	3 4	3 4	3 4	3 4
<b>■ Outside View</b>								
*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 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).								
	16 50   20 12.5 20	16 50   20 12.5 20			160 100   160	250 160   250	250 160   250	400 250   400
	20 63   32 20 32	20 63   32 20 32			250 160   250	400 250   400	400 250   400	630 400   630
	25 80   50 32 50	25 80   50 32 50						
	32 100   63 40 63	32 100   63 40 63						
	40 125   100 63 100	40 125   100 63 100						
	125 80 125	125 80 125			175			
<b>AC RATED INSULATION VOLTAGE (Ui)</b>								
<b>AC RATED BREAKING CAPACITY sym r.m.s. (kA)</b>								
IEC 947-2(Icu) / IEC 947-2(Ics)	690V				690	690	690	690
BS 4752-1 (P-1)	660V				ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS
CEI 17-5	500V	—	7.5/3.8	—	8/4	16/8	18/9	16/8
	440V	10/5	22/11 ⑥	22/11	10/5	22/11	18/9	18/9
	415V	14/7 ⑥	25/13 ⑥	25/13	15/7.5	25/13	30/15	25/13
	400V	18/9 ⑥	25/13 ⑥	25/13	18/9	25/13	30/15	25/13
	380V	18/9 ⑥	30/15 ⑥	30/15	18/9	35/18	50/25	45/23
	240V	14/7	25/13	25/13	50/25	50/25	50/25	50/25
AS 2184	440V	14(⑥)*1	25(⑥)*1	15	30	36	50	36
	415V	18(⑥)*1	30(⑥)*1	18	35	36	50	45
NEMA AB-1	600V	—	—	12	22	22	30	25
	480V	—	10	22	15	25	42	35
	240V	14	25	50	25	50	85	50
without Inst.	240-690V						5	—
<b>DC RATED BREAKING CAPACITY (kA)</b>	250V		—	—	—	40	—	40
	125V	—	10	15	10	40	—	40
	—	15	15	20	15	40	—	40
<b>■ RATED SHORT TIME CURRENT r.m.s. [kA] [Icw]</b>								
■ DIMENSIONS (mm)	30	90	120	105	105	140	140	185
	155	155	165	165	165	260	260	260
	86	86	86	86	86	103	103	103
	104	104	107	107	107	131	131	131
	0.51	1.3	1.58	1.85	1.85	4.7	4.7	6.1
					2.4	4.8	6.2	9.0
Weight (kg) ◊ marked standard type								
■ CONNECTIONS AND MOUNTINGS	a	b	c	d	a	b	c	d
front	terminal screw				◊	◊	◊	◊
connect (FC)	attached flat bar				◊(BAR)	◊(BAR)	◊(BAR)	◊(BAR)
	solderless terminal (PWC)				◊	◊	◊	◊
rear	bolt stud				◊	◊	◊	◊
connect (RC)	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)	• (AX)	• (AX)
	alarm switch	AL, ALE	—	• (ALE)	• (ALE)	• (ALE)	• (AL)	• (AL)
	shunt trip	SHT	•	•	•	•	•	•
	undervoltage trip	③ UVT	—	•	•	•	—	—
externally mounted	motor operator	MOT	—	•	•	•	•	•
	external panel mounted type	OHE	•	•	•	•	•	•
	operating breaker mounted type	OHG	—	•	•	•	•	•
	handle variable depth type	OHH	—	•	•	•	•	•
	extension handle	EHA	—	—	—	—	—	—
	mechanical front type	MIF	—	•	•	•	•	•
	interlock rear type	MIB	—	•	•	•	•	•
	handle holder	HH	•	•	•	•	•	•
	handle lock	HL	•	•	•	•	•	•
	terminal front connect type	TCF	—	•	•	•	•	•
	cover rear/plug-in type	TCR	—	•	•	•	•	•
	interpole barrier	TBA	—	•	•	•	•	•
	accessory lead terminal	LTF	—	•	•	•	•	•
	door flange	D.F	•	•	•	•	•	•

① Standard. This configuration used unless otherwise specified.  
② Optional standard. Specify when ordering.

③ 'yes' or 'available'

④ 'no' or 'not available'

⑤ DC rating available on request.

⑥ Thermally Adjustable.

⑦ The UVT controller is installed externally with A.C. U.V.T.

⑧ One is supplied with every 5 MCCB's.

⑨ Applicable to the rear-connect type.

⑩ Value at 1/v3 times stated voltage.

**Standard Series**

Ampere Frame
Type
Number of Poles
■ Outside View

**■ Rated Current (A).in** ①(Calibrated at 45°C  
50°C, available on request).

NRC	ASR	NRC	ASR	NRC	ASR	NRC	ASR	NRC	ASR	NRC	ASR
min	max	min	max	min	max	min	max	min	max	min	max
400	250	400	630	315	630	800	500	800	1000	500	1000
630	400	630				1250	630	1250	1600	800	1600

**AC RATED INSULATION VOLTAGE (Ui)****AC RATED BREAKING CAPACITY sym r.m.s. [kA]**

IEC 947-2 (Icu)	IEC 947-2 (ics)	690V
BS 4752-1(P-1)		20/10
CEI 17-5		20/10

NRC	ASR	NRC	ASR	NRC	ASR	NRC	ASR	NRC	ASR	NRC	ASR
min	max	min	max	min	max	min	max	min	max	min	max
800	400	800	500	800	400	1000	500	1000	1600	800	1600
						1250	630	1250	2000	1000	2000

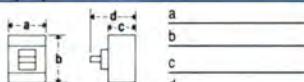
690	690	690	690	690	690	690	690	690	690	690	690
ICU/ICS											
20/10	20/10	20/10	20/10	20/10	20/10	25/19	25/19	45/34	45/42	45/42	45/42
20/10	20/10	20/10	20/10	20/10	20/10	25/19	25/19	45/34	45/42	45/42	45/42
35/18	35/18	35/18	35/18	35/18	35/18	45/34	45/34	65/49	65/49	65/49	65/49

AS 2164

440V	50	50	50	50	50	50	50	50	50	50	50
415V	65	50	65	50	65	50	65	50	65	50	65
600V	30	30	30	30	30	30	30	30	30	30	30
480V	50	50	50	50	50	50	50	50	50	50	50
240V	85	85	85	85	85	85	85	85	85	85	85

without Inst.

240-690V	—	10	—	10	—	10	—	15	20	42	42
DC RATED BREAKING CAPACITY [kA]	250V	40	—	40	—	40	—	—	—	—	—
CAPACITY [kA]	125V	40	—	40	—	40	—	—	—	—	—

**■ RATED SHORT TIME CURRENT r.m.s. [kA] [icw]****■ DIMENSIONS (mm)**

210	280	210	280	210	280	210	280	320	429	320	429
273		273		370		370		450		450	
103		103		120		140		185		185	
145		145		171		191		245		245	
9.4	12.2	9.7	12.5	22.0	28.0	27.0	35.0	54.0	67.0	62.5	78.2

Weight (kg) ○ marked standard type

**■ CONNECTIONS AND MOUNTINGS**

front	terminal screw	—	—	—	—	—	—	—	—	—	—
connect (FC)	attached flat bar	○	○	○	○	○	○	○	○	○	○
	solderless terminal (PWC)	○	○	○	○	○	○	○	○	○	○
rear	bolt stud	—	—	—	—	—	—	—	—	—	—
connect (RC)	flat bar stud	○	○	○	○	○	○	○	○	○	○
plug-in (PM)	for switchboard	○	○	○	○	○	○	—	—	—	—
	for distribution board	—	—	—	—	—	—	—	—	—	—
draw-out (DO)	○	○	○	○	○	○	○	○	○	○	○

210	280	210	280	210	280	210	280	320	429	320	429
273		370		370		450		450		450	
103		120		140		185		185		185	
145		171		191		245		245		245	
9.7	12.5	22.0	28.0	27.0	35.0	54.0	67.0	62.5	78.2		

**■ STANDARD FEATURES****■ PROTECTIVE FUNCTIONS****■ Electronic type**

Adjustable LTD, STD &amp; 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 auxiliary switch	AX, AXE	●(AX)									
mounted alarm switch	AL, ALE	●(AL)									
shunt trip	SHT	●	●	●	●	●	●	●	●	●	●
undervoltage trip	③ UVT	●	●	●	●	●	●	●	●	●	●
externally motor operator	MOT	●	●	●	●	●	●	●	●	●	●
mounted external panel mounted type	OHE	●	●	●	●	●	●	●	●	●	●
operating breaker mounted type	OHG	●	●	●	●	●	●	●	●	●	●
handle variable depth type	OHH	●	●	●	●	●	●	●	●	●	●
extension handle	EHA	●	●	●	●	●	●	●	●	●	●
mechanical front type	MIF	●	●	●	●	●	●	●	●	●	●
interlock rear type	MIB	●	●	●	●	●	●	●	●	●	●
handle holder HH	●	●	●	●	●	●	●	●	●	●	●
handle lock HL	●	●	●	●	●	●	●	●	●	●	●
terminal front connect type	TCF	●	●	●	●	●	●	●	●	●	●
cover rear/plug-in type	TCR	●	●	●	●	●	●	●	●	●	●
interpole barrier	TBA	●	●	●	●	●	●	●	●	●	●
accessory lead terminal	LTF	●	●	●	●	●	●	●	●	●	●
door flange	D.F	●	●	●	●	●	●	●	●	●	●

① Standard. This configuration used unless otherwise specified.

② Optional standard. Specify when ordering.

③ 'yes' or 'available'

④ 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	XH125NE	XH250NE	XH400NE	XH630NE	XH800NE	XV400NE	XV630/800NE	XV1250NE
Number of Poles	3	4	3	4	3	4	3	4
Outside View								
Rated Current (A), Is	125	250	400	630	800	400	630/800	1250
(Calibrated at 45°C 50°C, available on request).								
NRC	min	ASR	min	ASR	min	ASR	min	ASR
20	12.5	20	160	100	160	250	125	250
32	20	32	250	160	250	400	200	400
50	32	50						
63	40	63						
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)	IEC 947-2 (Icu) BS 5742-1(P-1) CEI 17-5	IEC 947-2 (Ics) AS 3858	690V	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS	ICU/ICS
8/4	15/7.5	8/4	15/7.5	20/10	20/10	20/10	—	—
25/13	25/13	25/13	25/13	20/10	20/10	20/10	—	—
42/21	42/21	42/21	42/21	42/21	42/21	42/21	—	—
50/25	50/25	50/25	50/25	65/33	65/33	65/33	—	—
400V	400V	400V	400V	65/33	65/33	65/33	—	—
415V	415V	415V	415V	65/33	65/33	65/33	—	—
380V	380V	380V	380V	65/33	65/33	65/33	—	—
1100V	1100V	1100V	1100V	65/33	65/33	65/33	—	—
AS 2184	440V	50	50	65	65	12.5	12.5	20
	415V	50	50	65	65			
NEMA AB-1	600V	25	25	42	42			
	480V	42	42	65	65			
	240V	85	85	85	85			
without Inst.	240-690V	—	—	5	10			
DC RATED BREAKING	250V	40	40	—	—			
CAPACITY (kA)	125V	40	40	—	—			
RATED SHORT TIME CURRENT r.m.s. (kA) [Is]	—	—	5(0.3 sec)	10(0.3 sec)	10(0.3 sec)			
DIMENSIONS (mm)	90	120	105	140	140	210	210	210
	155	165	260	273	273	260	273	370
	86	103	103	103	103	103	103	120
	104	124	131	145	145	131	145	171
	1.3	1.58	2.1	2.6	4.8	9.6	12.0	4.8
					6.2	9.7	12.5	9.7
								22
Weight (kg) <input checked="" type="checkbox"/> marked standard type								
CONNECTIONS AND MOUNTINGS	a	b	c	d				
front	terminal screw	—	—	—	—	—	—	—
connect (FC)	attached flat bar	○(BAR)	○(BAR)	○	○	○	○	○
	solderless terminal (PWC)	○	○	○	○	○	○	○
rear	bolt stud	○	—	—	—	—	—	—
connect (RC)	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	●(AXE)	●(AXE)	●(AX)	●(AX)	●(AX)	●(AX)	●(AX)
internally mounted	auxiliary switch	AX, AXE	●(ALE)	●(ALE)	●(AL)	●(AL)	●(AL)	●(AL)
	alarm switch	AL, ALE	●	●	●	●	●	●
	shunt trip	SHT	●	●	●	●	●	●
	undervoltage trip	③ UVT	●	●	●	●	●	●
externally mounted	motor operator	MOT	●	●	●	●	●	●
	external panel mounted type	OHE	●	●	●	●	●	●
	operating breaker mounted type	OHG	●	●	●	●	●	●
	handle variable depth type	OHH	●	●	●	●	●	●
	extension handle	EHA	●	—	●	●	●	●
	mechanical front type	MIF	●	●	●	●	●	●
	interlock rear type	MIB	●	●	●	●	●	●
	handle holder	HH	●	●	●	●	●	●
	handle lock	HL	●	●	●	●	●	●
	terminal front connect type	TCF	●	●	●	●	●	●
	cover rear/plug-in type	TCR	●	●	●	●	●	●
	interpole barrier	TBA	●	●	●	●	●	●
	accessory lead terminal	LTF	●	●	●	●	●	●
	door flange	D.F	●	●	●	●	●	●

● Standard. This configuration used unless otherwise specified.

① DC rating available on request.

○ Optional standard. Specify when ordering.

② Thermally Adjustable.

● 'yes' or 'available'

③ The UVT controller is installed externally with A.C. U.V.T.

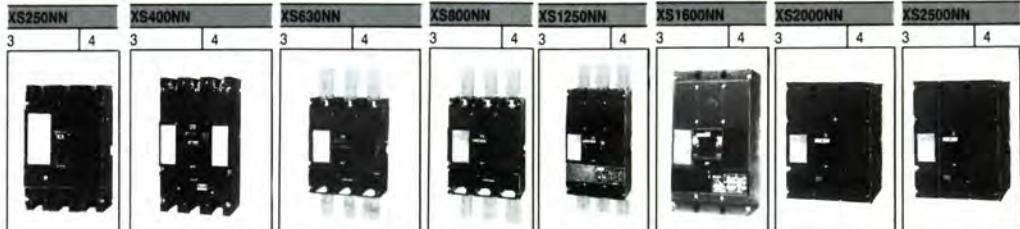




# Non-automatic Series

Type	XS250NN	XS400NN	XS630NN	XS800NN	XS1250NN	XS1600NN	XS2000NN	XS2500NN
Number of Poles	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)	
Rated Voltage (V)	AC DC

250	400	630	800	1250	1600	2000	2500
690	690	690	690	690	690	690	690
250	250	250	250	250	250	250	250

RATED SHORT CIRCUIT MAKING CAPACITY	Peak/kA
	1 sec.

DIMENSIONS (mm)	
	a
b	c
c	d
105	140
165	260
86	103
107	131
185	210
273	280
103	120
145	171
210	280
273	370
120	140
171	191
210	280
320	429
225	285
320	429
185	245

Weight (kg) <input checked="" type="checkbox"/> marked standard type	
--	--

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
	alarm switch	AL, ALE
	shunt trip	SHT
	undervoltage trip	UVT
externally mounted	motor operator	MOT
	external operating	panel mounted type OHE
	handle	breaker mounted type OHG
	extension handle	variable depth type OHH
	mechanical interlock	EHA
	handle holder	front type MIF
	handle lock	rear type MIB
	terminal cover	HH
	interpole barrier	HL
	accessory lead terminal	TCF
	door flange	TCR
		TBA
		LTF
		D.F

BACK-UP BREAKER <sup>(5)</sup>	
Max. Switching Current	AC
	DC

Endurance	No. of Ops. w/out Current	XS400NJ	XS630NJ	XS800NJ	XS800NJ	XS800NJ	XS800NJ
	No. of Ops. with Current	1500	2400	3780	4800	7500	9600

625	1000	1575	2000	3125	4000	5000	6250
7000	4000	4000	2500	2500	2500	2500	2500

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.

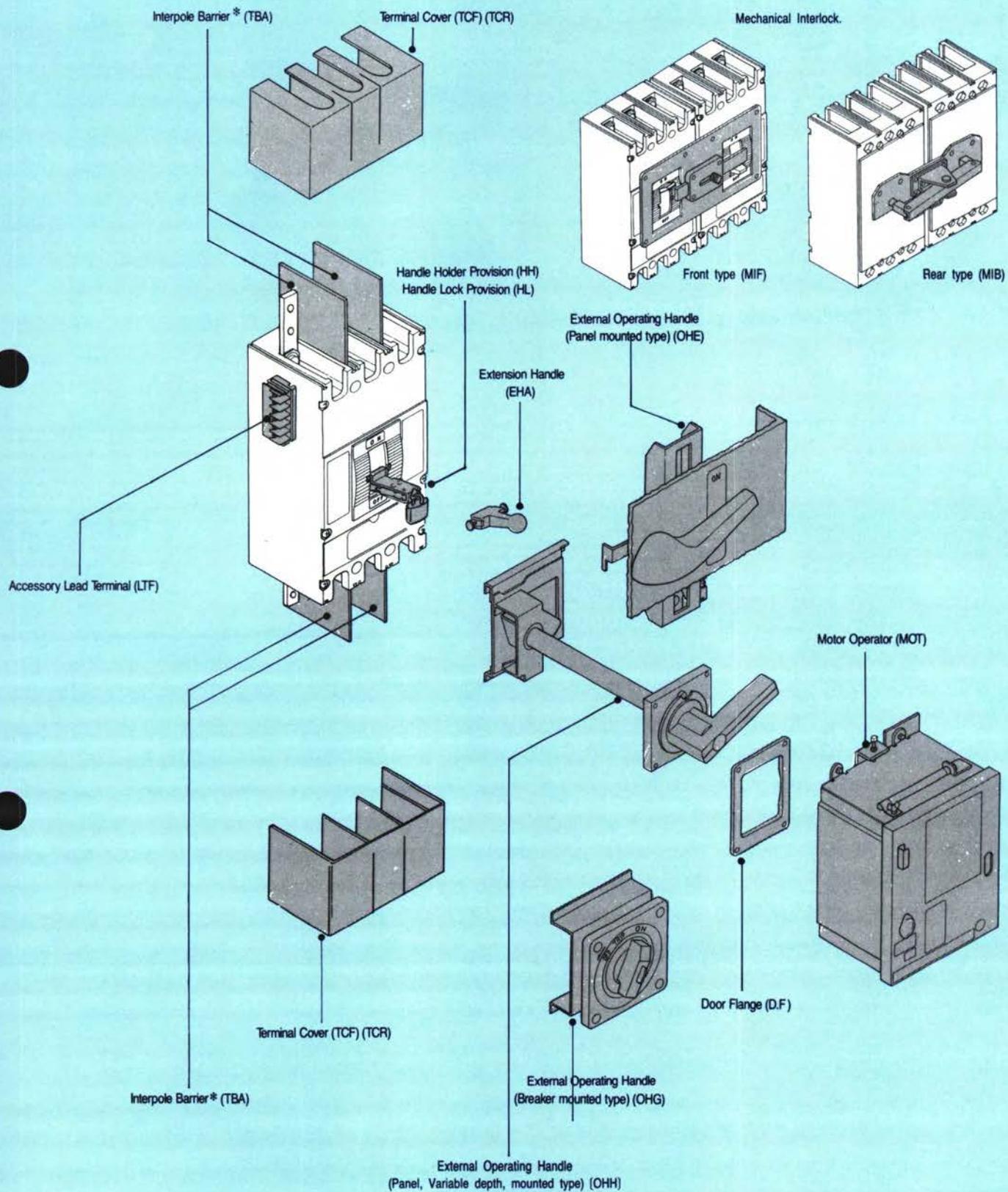
⑥ Contact NHP for details.

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

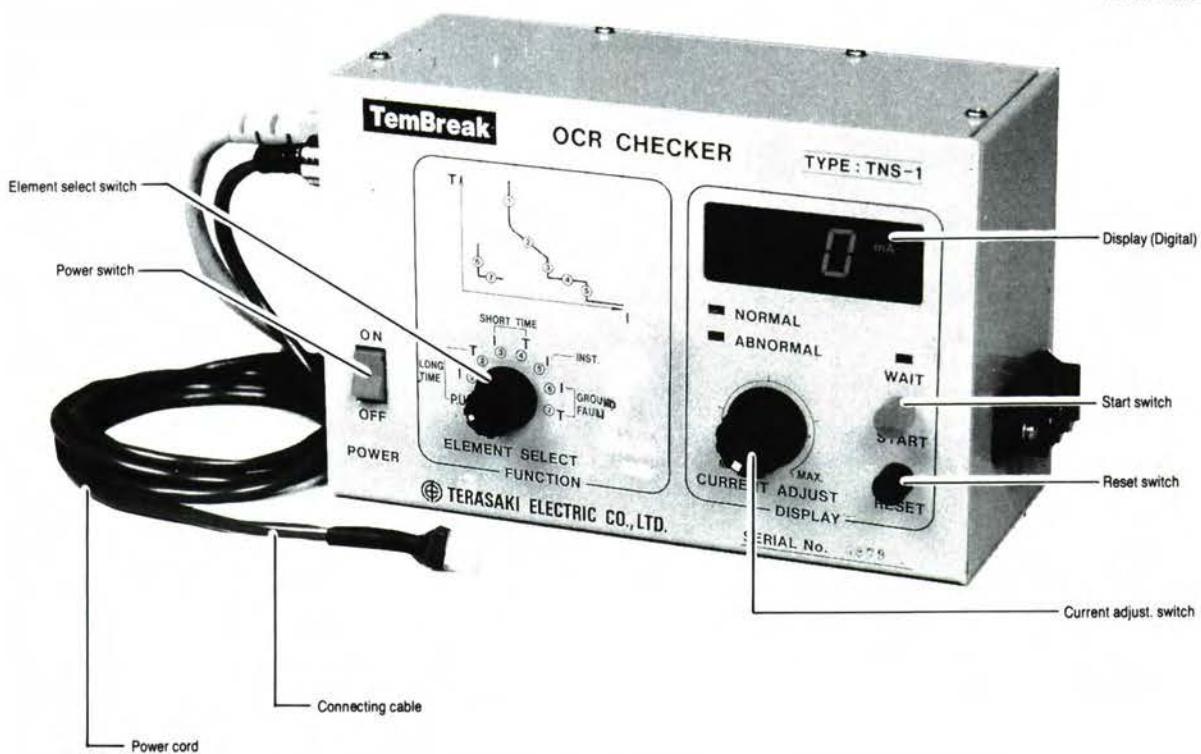


NOTE: \*1 for 2-pole, 2 for 3-pole  
3 for 4-pole



## **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

**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. 2307  
Telephone: (049) 60 2220. Facsimile: (049) 60 2203

**Rockhampton:** 208 Denison Street, Rockhampton, Qld  
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  
Telephone: (076) 34 4799. Facsimile: (076) 33 1796

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

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MAY 1989

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**sprecher + schuh**

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technical reference only,  
**FOR CURRENT PRICES  
PLEASE REFER TO THE  
LATEST EDITION.**

18 03

**DT 3 Control and Indicating Units, 22 mm Ø**

## DT 3 range: Better in design and operation

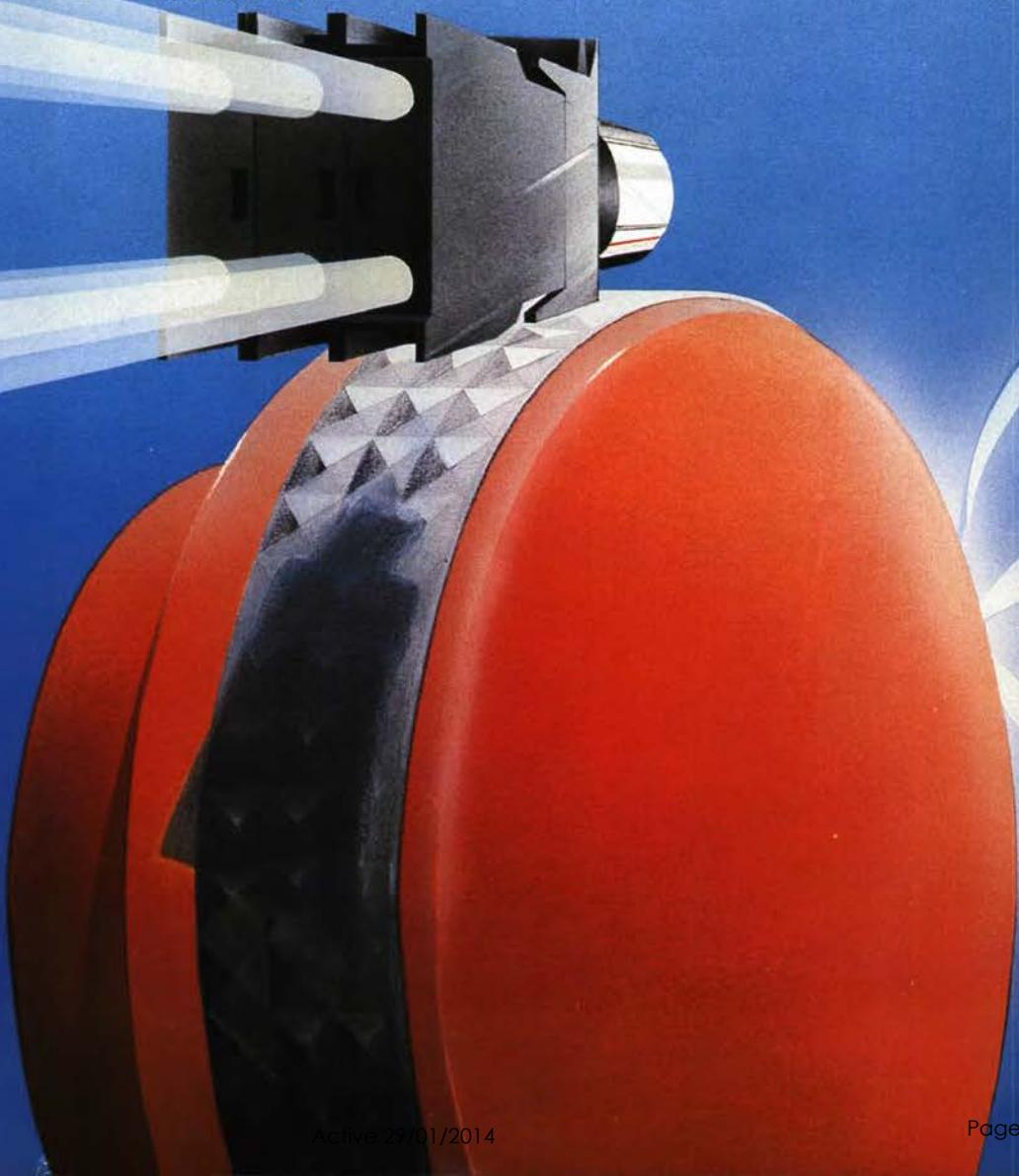
DT 3 brings together the technical solutions of Sprecher + Schuh engineers and the creativity of Italian designers.

### Added value for your leading products

Control and indicating units should and must be attractive. The control panel is what catches the eye in every installation. It should thus meet the highest aesthetic demands, and demonstrate externally what is hidden within: the high quality and reliability of your control system.



The creators of the DT 3 format:  
a design team at the famous I.D.E.A studios in Turin.



## A successful combination of design and function

Perfect design is at the same time functional and attractive. DT 3 control and indicating units demonstrate this in many ways: they are not only elegant, but also ergonomic.

The two colour front sections not only enhance the appearance of every frontpanel, but also improve recognition by the user.

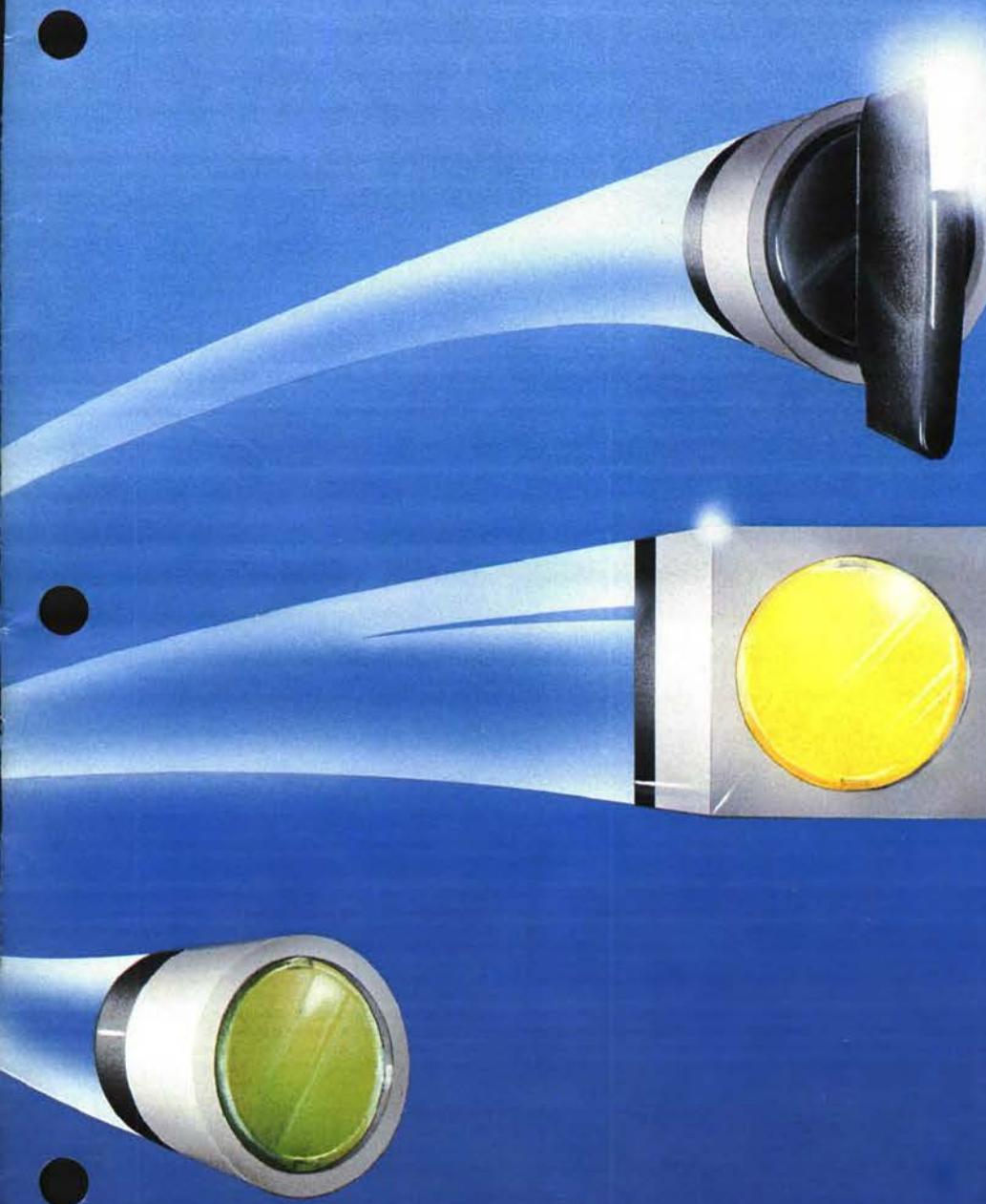
## Flexible in planning and application

Advanced technology provides a much wider selection of units, and allows unrestricted combination of front and rear elements. The harmony between design and technology leads to ease of use and functional integrity even under difficult conditions such as damp, dust, slurry or operation with gloves.

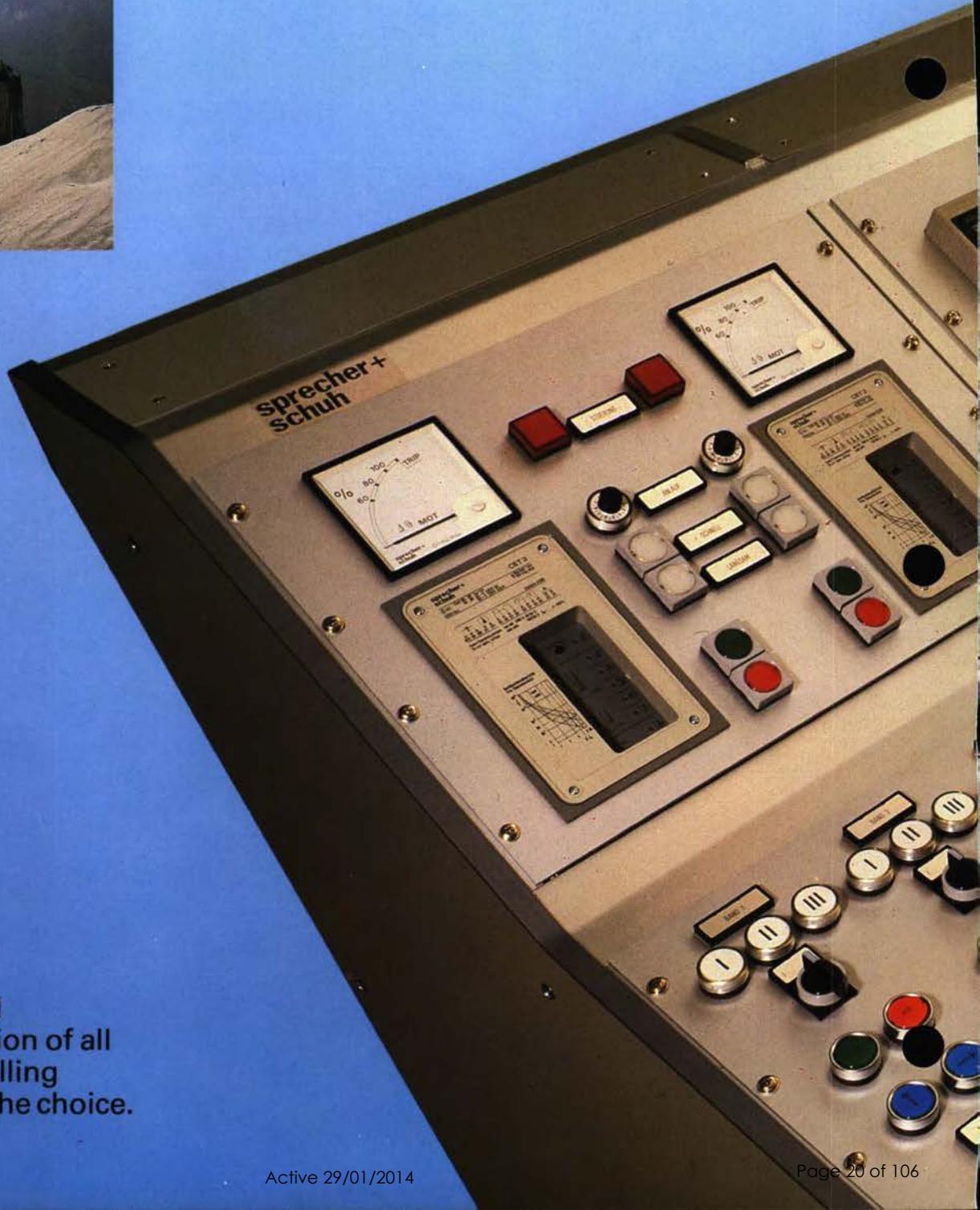
## Economy and security, through thoughtful application of technology

Technology with better design brings economy. For example: problem free compatibility with various inscription types.

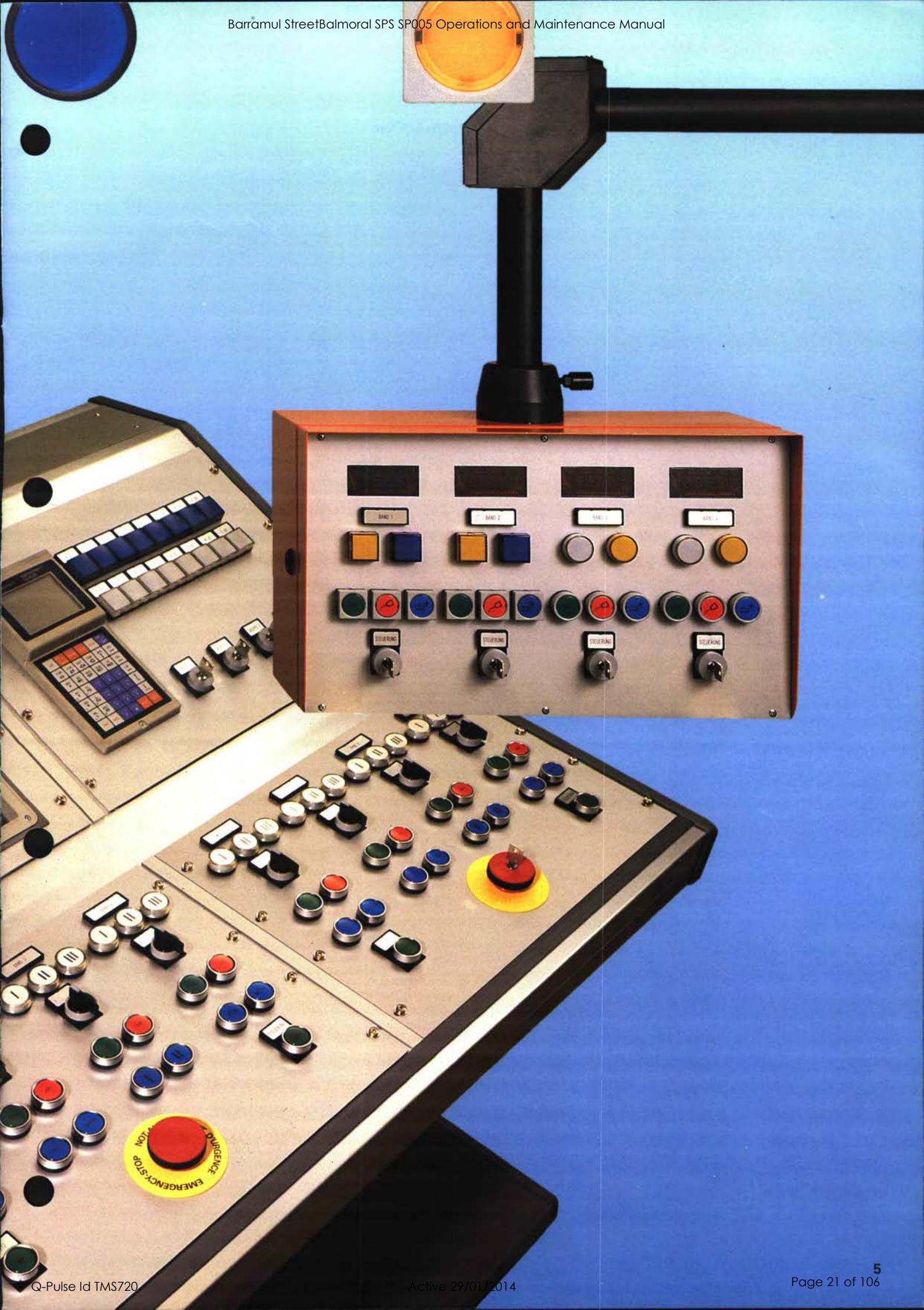
Design with better technology equals security, as in the design of the front rings to prevent unauthorised tampering, or the foolproof emergency stop pushbutton with two step reset «turn and pull».



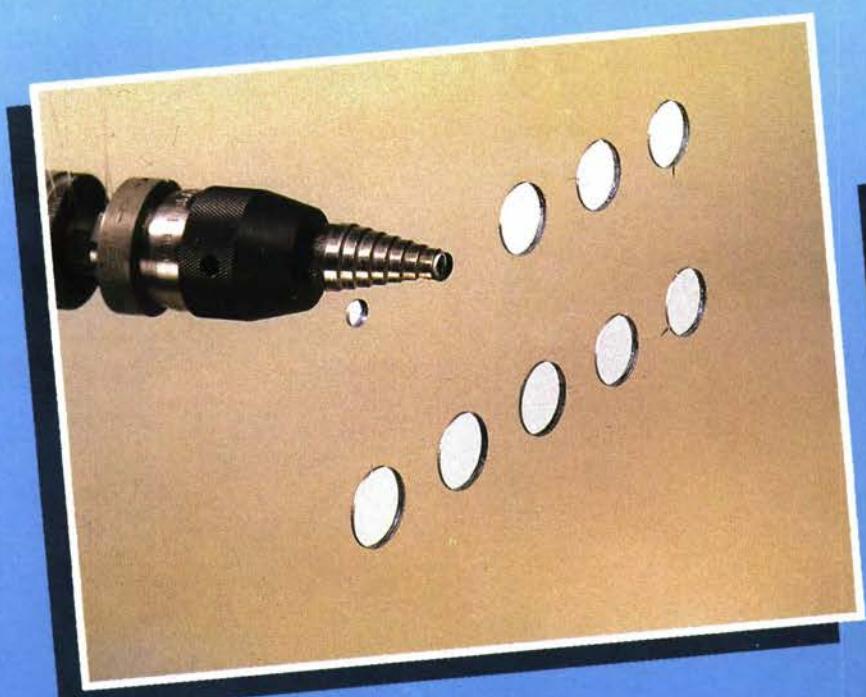
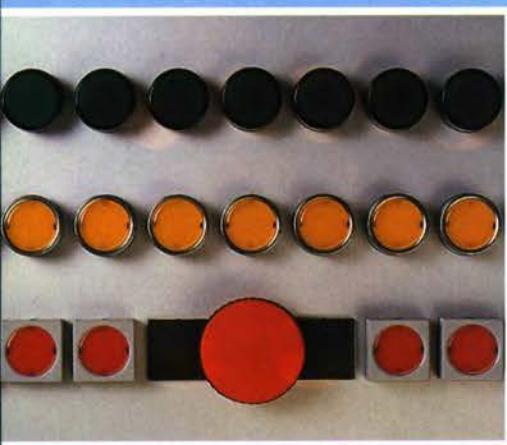
## The DT 3 range: created for practicality



For effortless and economical solution of all control and signalling problems DT 3 is the choice.

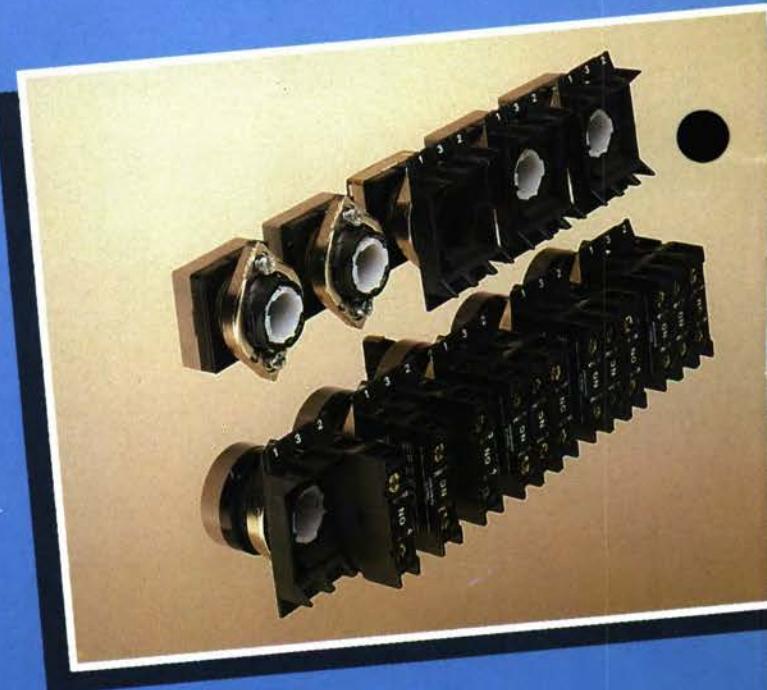


## The DT 3 range: modular, dependable, economical

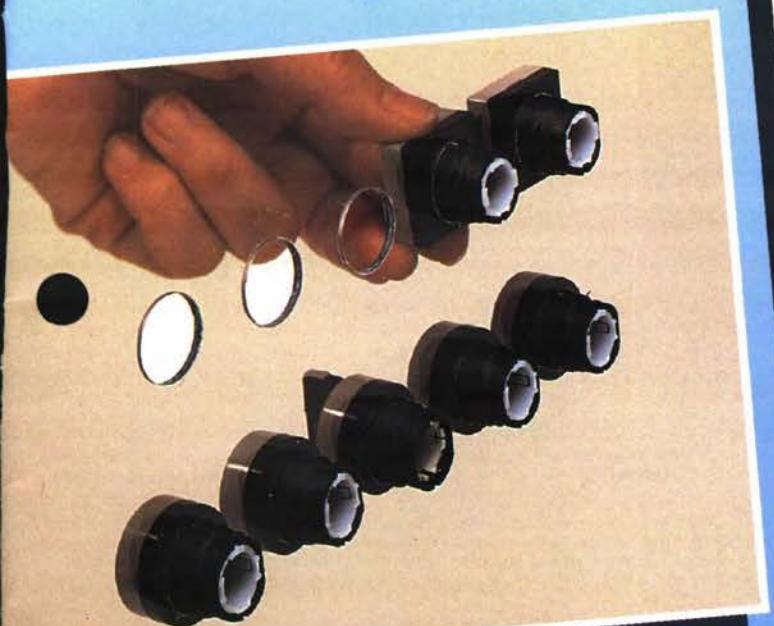


**Speed from the start**  
A simple round hole without slots is enough!

From innovative modular construction to reliability of function, from time saving mounting to simple wiring: DT 3 is in every respect the best solution.



**Compact variety**  
The depth required by the simply attached rear elements is in every case 50 mm whether contact block, lamp or transformer.



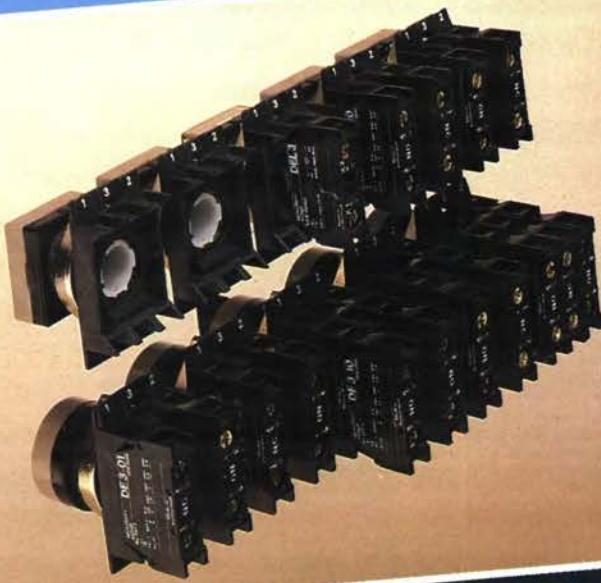
### Secure positioning

Front insertion front elements are held securely in place.



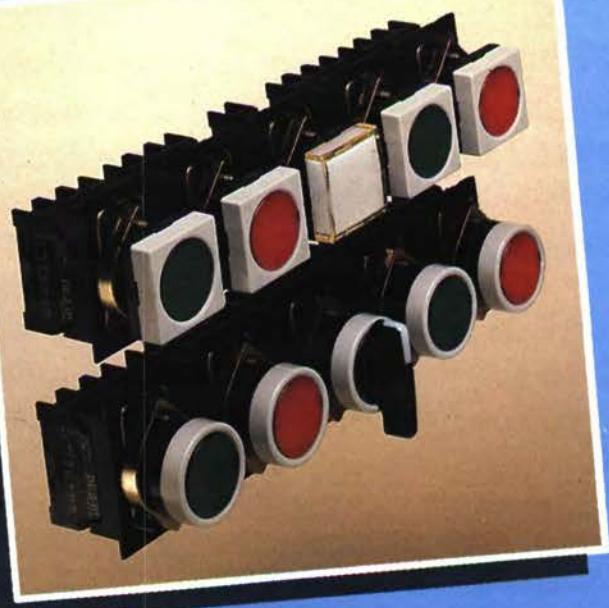
### Effortless mounting

Mounting needs only one person, even when the front of the panel is out of reach.



### Modular flexibility

The consistent modular construction allows additional elements to be fitted in one of two levels to meet even the most special requirements.



### Reliable operation

Reliability through and through: from the central lamp test to the electronics compatible H-bridge contacts.

# The DT 3 range: systematic ordering



## Ordering system 1 **simple system**

## Complete standards units

Right at the beginning you will find a list of the most common complete units with the corresponding short form order numbers.

## Ordering system 2 **comprehensive system**

## Complete units to your requirements

This system also needs only one order number per unit:  
To the type number you add details for round or rectangular front, colour, legend, contact and lamp elements.  
(The completed order numbers will be the same as for ordering system 1).

## Ordering system 3 **fully flexible system**

## Components for self assembly

Diagrams give a clear overview of all individual components and the way which they fit together.  
The index number refers to the description, variants and the order number.

## Enclosures

## Complete or empty

Required arrangement:  
Copy and complete the order form on page 23.



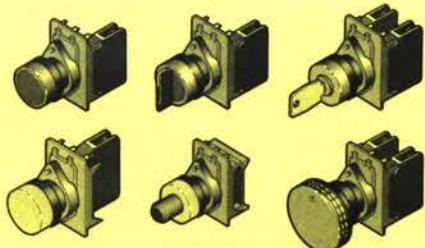
Three ordering systems to exactly match your specific requirements. Savings already – of selection time.

## Accessories, Elements for mounting, Legends, Technical information

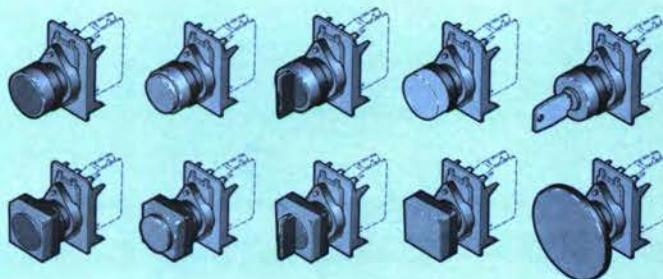
Comprehensive modular system of legends and accessories to suit even the most unusual needs.



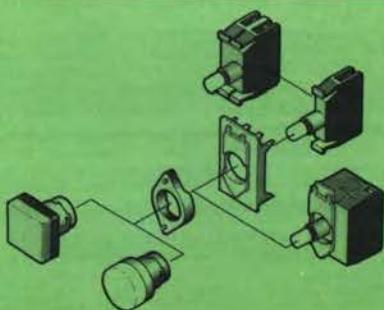
Page



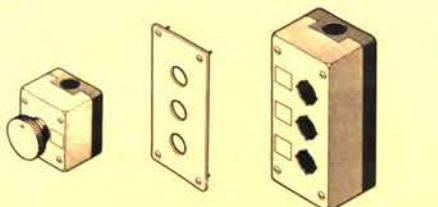
Pushbuttons DT 3	10
Illuminated pushbuttons DTL 3	10
Rotary switches DS 3	10
Rotary switches with key DSS 3	10
Indicator lamps DL 3	11
Emergency stop pushbutton DN 3	11
Potentiometer dial DR 3	11



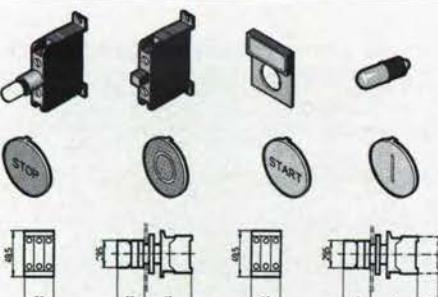
Pushbuttons DT 3	12
Latched pushbuttons DTV 3	12
Illuminated pushbuttons DTL 3	13
Latched illuminated pushbuttons DTLV 3	13
Mushroom pushbuttons DP 3	12
Latched mushroom pushbuttons DPV 3	12
Rotary switches DS 3	14
Illuminated rotary switches DSL 3	15
Rotary switches with key DSS 3	16
Indicator lamps DL 3	17



Indicator lamps DL 3	18
Pushbuttons DT 3	19
Illuminated pushbuttons DTL 3	19
Latched pushbuttons DTV 3	19
Latched illuminated pushbuttons DTLV 3	19
Mushroom pushbuttons DP 3	19
Latched mushroom pushbuttons DPV 3	19
Rotary switches DS 3	20
Illuminated rotary switches DSL 3	20
Rotary switches with key DSS 3	21



Enclosures, empty	22
Enclosures with emergency stop pushbutton	22
Front plates, empty	22
Enclosures, fully fitted	23
Front plates, fully fitted	23



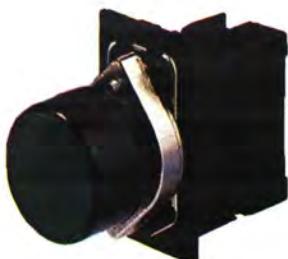
Accessories: Bulbs, small components	24
Contact and lamp blocks	25
Legend plates	25
Legends: Standard legends	26/27
Symbols for text-free legends	28/29
Special legends	34
Technical information	30/31
Dimensions	32/33
Mounting instructions	35

# Complete standard units



Design (for front mounting)	Contact	Order No.	Price \$
<b>DT 3 pushbuttons</b> with flush operator and contact blocks			
green	/ -	DT 3 P-G-10	10.80
red	/ F	DT 3 P-R-01	10.80
green (START) red (STOP)	/ -	DT 3 P-G-166-10	12.10
	/ F	DT 3 P-R-167-01	12.10
<b>DTL 3 illuminated pushbuttons</b> with contact blocks and BA 9s bulb holder, max. 250 V (without bulb) <sup>1)</sup>			
for filament bulbs, max. 2 W or neon bulbs			
green	/ -	DTL 3 P-G-E-10	15.60
red	/ F	DTL 3 P-R-E-01	15.60
with series diode and resistor for operating voltage AC 220 V (use 130 V filament bulb, see page 24)			
green	/ -	DTL 3 P-G-C-10	19.40
red	/ F	DTL 3 P-R-C-01	19.40
<b>DSK 3 rotary switch with knob operator</b> with contact blocks			
A	0 stay-put switching angle 90°		
O-I	0 --- I / -	DSK 3 P-A-10	20.40
D	0 stay-put switching angle 2×90°		
I-O-II	I --- II / - / -	DSK 3 P-D-10/10	23.70
<b>DSS 3 rotary switch with key</b> with contact blocks, all with same key – no. EG 0021			
A	0 stay-put switching angle 90°		
O-I	0 --- I / -	DSS 3 P-AF-10	50.40
key withdrawable in positions 0 and I			
D	0 stay-put switching angle 2×90°		
I-O-II	I --- II / - / -	DSS 3 P-DT-10/10	53.70
key withdrawable in positions I, O, II			

<sup>1)</sup> Bulbs – see page 24.



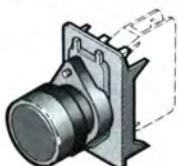
Design (for front mounting)	Contact	Order No.	Price \$
<b>DL 3 indicator lamp</b> with BA 9s bulb holder, max. 250 V (without bulb) <sup>1)</sup>			
for filament bulb, max. 2.6 W or neon bulbs			
green	DL 3R-G-E	11.75	
red	DL 3R-R-E	11.75	
white (clear)	DL 3R-W-E	11.75	
yellow	DL 3R-Y-E	11.75	
blue	DL 3R-B-E	11.75	
with series diode and resistor for operating voltage AC 240 V (use 130 V filament bulb, see page 24)			
green	DL 3R-G-C	17.90	
red	DL 3R-R-C	17.90	
white (clear)	DL 3R-W-C	17.90	
yellow	DL 3R-Y-C	17.90	
blue	DL 3R-B-C	17.90	
<b>DN 3 emergency stop pushbutton</b> <sup>2)</sup> colour red, complete with 1 N/C contact			
reset by turning clockwise			
Ø 30 mm			-
Ø 40 mm:			-
Ø 50 mm			-
	DN 3-30-01		
	DN 3-40-01		
	DN 3-50-01		
<b>DNS 3 emergency stop pushbutton</b> <sup>2)</sup> colour red, complete with 1 N/C contact			
release by key			
reset by turning clockwise			
Ø 30 mm			-
Ø 40 mm			-
Ø 50 mm			-
	DNS 3-30-01		
	DNS 3-40-01		
	DNS 3-50-01		
<b>DR 3 potentiometer dial</b> scale divisions 0...12, 360° legend size 2.5 mm (without potentiometer)			
for potentiometers with 6 mm spindles spindle length 50 mm	DR 3		26.20

<sup>1)</sup>Bulbs – see page 24.<sup>2)</sup>Legend rings – see page 24.

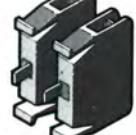
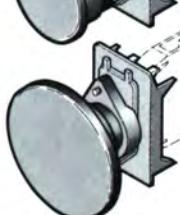
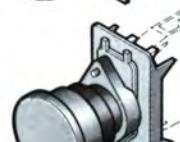
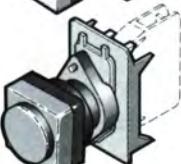
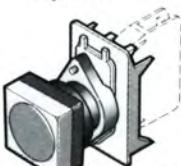
# Complete units to specification

## Pushbuttons

round



square



Design (for front mounting)	Order No. Type	front ring	colour cap	inscription cap	contact block	Weight [g]
<b>DT 3 pushbutton</b>	<b>DT 3</b>	-	-	-		44
<b>DTH 3 raised pushbutton<sup>1)</sup></b>	<b>DTH 3</b>	-	-	-		45
<b>DTV 3 latched pushbutton</b>	<b>DTV 3</b>	-	-	-		44
<b>DTVH 3 raised latched pushbutton<sup>1)</sup></b>	<b>DTVH 3</b>	-	-	-		45
<b>DP 3 mushroom pushbutton 42 mm Ø</b>	<b>DP 3</b>	-	-	-		44
<b>DPV 3 latched mush. pushbutton<sup>1)</sup> 42 mm Ø</b>	<b>DPV 3</b>	-	-	-		44
<b>DPG 3 mushroom pushbutton 68 mm Ø</b>	<b>DPG 3</b>	-	-	-		49
<b>DPGV 3 latched mush. pushbutton<sup>1)</sup> 68 mm Ø</b>	<b>DPGV 3</b>	-	-	-		49
<b>Order No. suffix</b>						
<b>Front ring</b>						
round	PB	Raised PB	Mush.			
grey plastic	P	P	P			2
black plastic	N	N	N			8
metal	L	L	L			10
metal extended	M	—	—			18
metal sealed	F	—	—			11
<b>square</b>						
grey plastic	QP					
black plastic	QN					
<b>Colour</b>						
	PB	Raised PB	Mush. 42	Mush. 68		
green	G	G	G	G		
red	R	R	R	R		
yellow	Y	Y	Y	—		
blue	B	—	—	—		
with	W	—	—	—		
black	N	—	N	—		
<b>Inscription cap</b>						
white		blank			<b>101</b>	
		I			<b>369</b>	
other text and symbols see pages 26...29	O				<b>370</b>	
	START				<b>166</b>	
	STOP				<b>167</b>	
	blank				<b>106</b>	
<b>DE 3 Contact blocks<sup>2)(3)</sup></b>						
none					<b>00</b>	
1 contact block					<b>01</b>	
					<b>10</b>	10
2 contact blocks					<b>02</b>	
					<b>11</b>	
					<b>20</b>	20
					<b>1L</b>	
3 contact blocks					<b>03</b>	
					<b>12</b>	
					<b>21</b>	
					<b>30</b>	30
					<b>2L</b>	

1) Legend caps cannot be used.

3) For operation of Contact block  
in centre position Operating bridge  
DT3-OB is required (see pages 24 and 35).2) Further contact blocks can be fitted at second level. Contact blocks  
for base mounting (separate mounting) see page 25.  
Legend carriers and legend inserts, see pages 25 and 27.

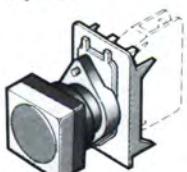


## Illuminated pushbuttons

round



square



### Design (for front mounting)

**DTL 3 illuminated pushbutton**

Order No. Typ	front ring	colour cap	inscription cap	lamp element	contact block	transformer block	Weight [g]
<b>DTL 3</b>	-	-	-	-	-	-	44
<b>DTLV 3</b>	-	-	-	-	-	-	44
<b>Order No. suffix</b>							
<b>Front ring</b>							
round	P N L M F						2 8 10 18 11
square	Q P Q N						6 12
<b>Colour cap</b>							
	G R Y B W						
<b>Inscription cap</b>							
white blank		101					0.5
other text and symbols	I O	369					
see pages 26...29	START STOP	370					
		166					
		167					
<b>DEL 3 Lamp elements<sup>1)</sup></b> with BA 9s bulb holder, max. 250V, 2W (without bulbs)							
		E					
<b>DELD 3</b> with diode and resistor for operating voltage AC 220 V <sup>2)</sup> *							
	D C						10
<b>DELK 3</b> with central lamp test							
	K						20
<b>DELDK 3</b> with central lamp test with diode and resistor for operating voltage AC 220 V <sup>2)</sup> *							
	DK DC						20
<b>Contact blocks<sup>3)</sup></b>							
none		00					
1 contact block	—	01					10
2 contact blocks	— — — —	10 02 11 20 1L					20
<b>DU 3 Transformer blocks</b>							
secondary: 6 V, 1.2 VA, 50/60 Hz							
primary: 110...120 V							
220...240 V							
380...415 V							
.../... V	*						
		U110 U220 U380 U...					78

<sup>1)</sup>Bulbs see page 24.<sup>2)</sup>Use 130 V bulbs. See page 24.

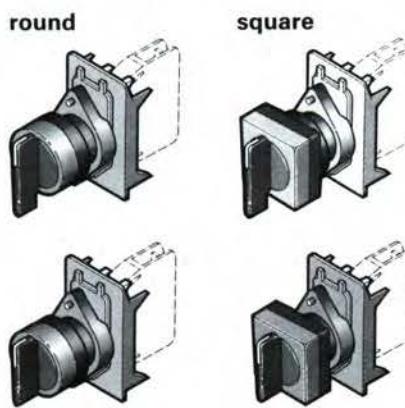
Legend carriers and legend inserts, see pages 25 and 27.

<sup>3)</sup>Further contact blocks can be fitted to illuminated push-buttons at the second level if no transformer block is used. Contact and lamp blocks for base (sep. mounting)s. page 25.

\* Please enquire

# Complete units to specification

## Rotary switches



Design (for front mounting)	Order No. Type	front ring switch positions contact block	Weight [g]
DSH 3 rotary switch with long operator	DSH 3	- - -	46
DSK 3 rotary switch with short operator	DSK 3	- - -	47
<b>Order No. suffix</b>			
Front ring			
round	grey plastic black plastic metal	P N L	2 8 10
square	grey plastic black plastic	Q P O N	6 12
<b>Switch positions</b>			
A	0 I ---II I-O-I stay-put switching angle 90°	A	
B	0 I ---II I-O-I momentary switching angle 45°	B	
D	0 I ---II I-O-II stay-put switching angle 2×90°	D	
E	I O II ---II I-O-II momentary switching angle 2×45°	E	
G	I O II ---II I-O-II right stay-put switching angle 90° left momentary switching angle 45°	G	
<b>DE 3 Contact blocks<sup>1)(2)</sup></b>			
none		00/00	
switch pos.	left	right	
1 contact block			01 10
2 contact blocks	/-/-	/-/-	01/01 10/01 10/10 01/10
3 contact blocks	/-/-/-	/-/-/-	20/10 10/20 20/01 10/11 01/20 01/11



<sup>1)</sup>Further contact blocks can be fitted at level 2. Contact blocks for base (separate) mounting, see page 25.

Legend carriers and legend inserts, see pages 25 and 27.

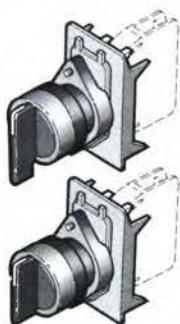
<sup>2)</sup>For operation of Contact block in centre position Operating bridge DT3-OB is required. (see pages 24 and 35).

Active 29/01/2014

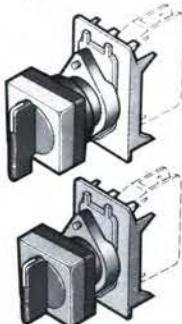


## Illuminated rotary switches

round



square



**Design**  
(for front mounting)

**DSHL 3 illuminated rotary switch**  
with long operator

Order No.	Type	front ring	switch positions	lamp element	contact block	transf. block	Weight [g]
-----------	------	------------	------------------	--------------	---------------	---------------	------------

**DSHL 3** - - - - - 46

**DSKL 3 illuminated rotary switch**  
with short operator

**DSKL 3** - - - - - 47

### Order No. suffix

#### Front ring

round	grey plastic metal	P	2
square	grey plastic	Q	10

#### Switch positions

A	0	O-I	stay-put sw. angle 90°	A
B	0	O-I	momentary sw. angle 45°	B
D	0	I-O-II	stay-put sw. angle 2×90°	D
E	0	I-O-II	momentary sw. angle 2×45°	E
G	0		right stay-put sw. angle 90° left momentary sw. angle 45°	G

#### DEL 3 Lamp elements

with BA 9s bulb holder, max. 250V, 2W  
(without bulbs<sup>1)</sup>)

	with diode and resistor for operating voltage AC 220 V <sup>2)</sup>	please enquire	D	10
	<b>DELD 3</b> AC 240 V <sup>2)</sup>	C		

#### DELK 3

with central lamp test

	with central lamp test with diode and resistor for operating voltage AC 220 V <sup>2)</sup>	please enquire	DK	20
	<b>DELDK 3</b> AC 240 V <sup>2)</sup>	DC		

#### DE 3 Contact blocks<sup>3)</sup>

none

switch pos.	left	right	00	10
1 contact block			01	
2 contact blocks			10	
			01/01	
			10/01	
			10/10	
			01/10	

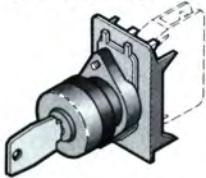
**Transformer blocks**  
see page 13

<sup>1)</sup> Bulbs see page 24.	Legend carriers and inserts, see pages 25 and 27.
<sup>2)</sup> Use 130 V bulbs, see page 24.	Contact and lamp blocks for base (separate) mounting, see page 25.
<sup>3)</sup> Further contact blocks can be fitted at the second level if no transformer block is used.	



# Complete units to specification

## Key operated rotary switches



Design (for front mounting)	Order No. Type	key	switch positions	contact block	Weight [g]
DSS 3 P rotary switch, grey, with key with two keys	DSS 3 P	-	-	-	48
DSS 3 N rotary switch, black, with key with two keys	DSS 3 N	-	-	-	
all with same key no. EG 0021	EG21				
with various random key no's <b>on request</b>	E . . .				
with specified key no's <b>on request</b>	E . . .				

### Order No. suffix

#### Switching and key removal positions

A	O	stay-put switching angle 90° key removable at pos.: Kaba-Micro type O 1707 D		AD	
O—I		1707-F		AF	
B	O	momentary switching angle 45° key removable at pos.: Kaba-Micro type O 1707-D		BD	
D	O	stay-put sw. angle 2×90° key removable at pos.: Kaba-Micro type O 1707-D		DD	
I and II		1707-Z		DZ	
O and II		1707-F		DF	
O and I and II		1707-T		DT	
E	I O II	momentary sw. angle 2×45° key removable at pos.: Kaba-Micro type O 1707-D		ED	
G	I O II	right stay-put switching angle 90° left momentary switching angle 45° key removable at pos.: Kaba-Micro type O 1707-D		GD	
		O and II 1707-F		GF	

### Contact blocks<sup>1)</sup>



none			00	
switch pos.	left	right		
1 contact block			01 10	10
2 contact blocks			01/01 10/01 10/10 01/10	20
3 contact blocks			20/10 10/20 20/01 10/11 01/20 01/11	30

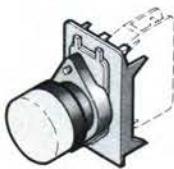
Legend carriers and legend inserts, see pages 25 and 27.

1) For operation of Contact blocks in centre position  
Operating bridge DT3-OB is required.  
(see pages 24 and 35).

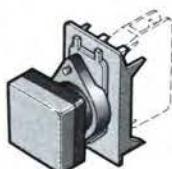


## Indicator lamps

round



square



**Design**  
(for front mounting)

Order No. Type	lens cap	colour	inscription cap	transformer block	lamp element	Weight [g]
-------------------	----------	--------	-----------------	-------------------	--------------	------------

**DL 3 indicator lamp**

**DL 3**

25

**Order No. suffix**

<b>Lens cap</b>	round	R
	square	Q

<b>Colour</b>	green	G
	red	R
	yellow	Y
	blue	B
	white	W

**Legend cap<sup>3)</sup>**

round	white blank	—
	I	669
	O	670

square	white blank	—
	I	869
	O	870

**DEL 3 Lamp elements**

with BA 9s bulb holder, max. 250V, 2W  
(without bulbs<sup>1)</sup>)

**E**

10

**DELD 3** with diode and resistor  
for operating voltage AC 220 V<sup>2)</sup> \*  
AC 240 V<sup>2)</sup>

**D**

10

**C**

**DELK 3**  
with central lamp test

**K**

20

**DELDK 3**  
with central lamp test  
with diode and resistor AC 220 V<sup>2)</sup> \*  
for operating voltage AC 240 V<sup>2)</sup>

**DK**

20

**DC**

**DLU 3**  
**Transformer blocks**  
with BA 9s bulb holder  
(without bulbs<sup>1)</sup>)  
secondary: 6 V, 1.2 VA, 50/60 Hz  
primary: 110...120 V  
220...240 V  
380...415 V  
. . . / . . . V

**U110**

**U220**

**U380**

78

**U . . .**

<sup>1)</sup>Bulbs see page 24.

<sup>2)</sup>Use 130 V bulbs, see page 24.

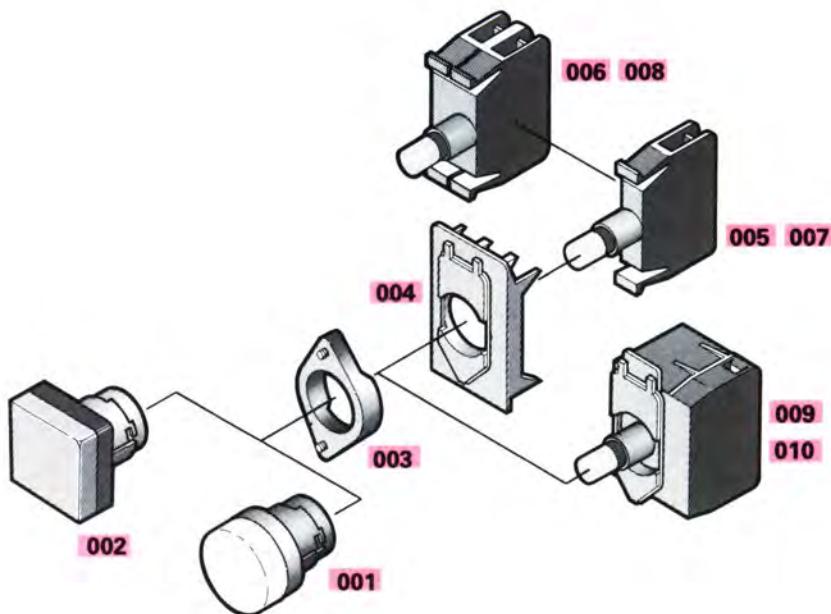
<sup>3)</sup>Legends and symbols see pages 26..29.  
Legend carriers and legend inserts, see pages 25 and 27.

\*Please enquire



# Components for self assembly

## DL 3 indicator lights



**Index No.**  
**Price \$**

**Front elements**

with blank inscription cap  
and colour cap

**-DL 3 R round**

green -G  
red -R  
yellow -Y  
blue -B  
white -W

**-DL 3 Q square**

green -G  
red -R  
yellow -Y  
blue -B  
white -W

**D 3-BR fixing ring**

for front elements

**001**

for filament bulbs, max. 2.6 W  
or neon bulbs

**002**

with central lamp test  
for filament bulbs, max. 2.6 W  
or neon bulbs

**003**

with diode and resistor  
for operating voltage

**004**

with central lamp test  
with diode und resistor  
for operating voltage

**DK AC 220V**  
**DC AC 240V**

**005**

**4.90**



secondary:  
6 V, 1.2 VA, 50/60 Hz  
primary:  
110...120 V  
220...240 V  
380...415 V

**009**

**29.00**

**010**

... / ... V

**please enquire**

<sup>11</sup>Bulbs, see page 24.

**006****006**

**9.50**



**-D AC 220 V**  
**-C AC 240 V**

**007**

**8.60**

130 V filament bulbs, s. page 24

**008****008**

**12.00**

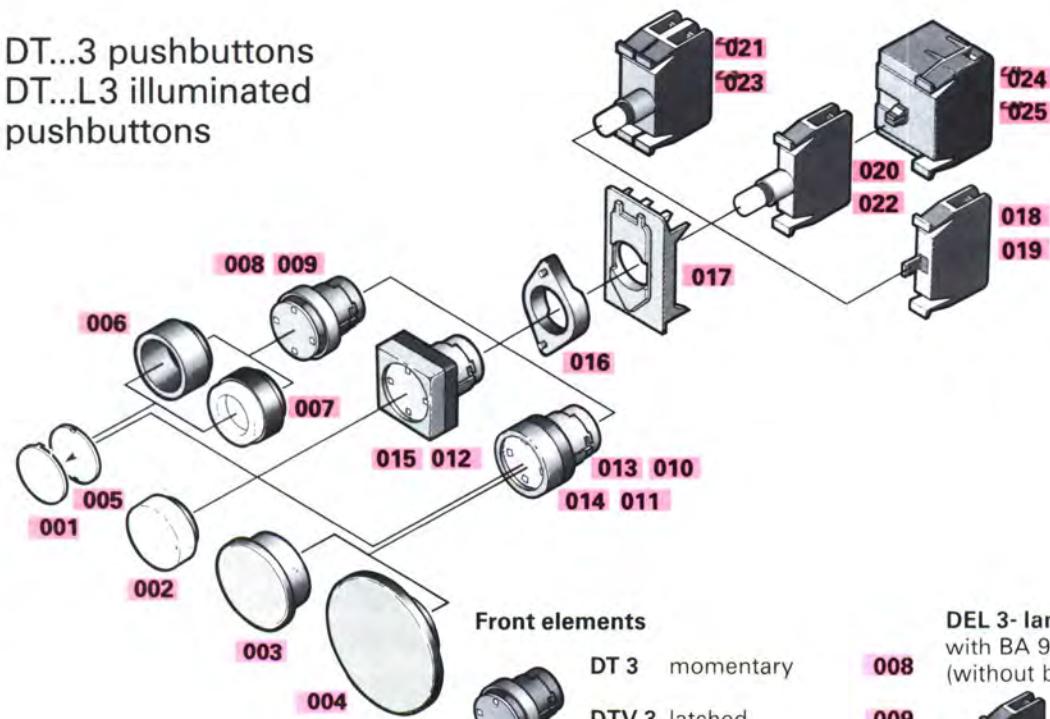
130 V filament lamps, s. page 24

**D 3-KE coupling plate**

for attachment  
of lamp blocks

**1.50**

DT...3 pushbuttons  
DT...L3 illuminated  
pushbuttons



## Operators

D 3- colour caps	<b>001</b>
green -G	
red -R	
yellow -Y	<b>0.28</b>
blue -B	
white -W	

D3-H Raised button <sup>1)</sup>	<b>002</b>
green -G	<b>4.24</b>
red -R	
yellow -Y	

Mushroom 42 mm Ø <sup>1)</sup>	<b>003</b>
DP 3	
green -G	
red -R	
yellow -Y	<b>5.00</b>
black -B	

Mushroom 68 mm Ø <sup>1)</sup>	<b>004</b>
DPG-3	
green -G	
red -R	<b>7.00</b>

Inscription cap	<b>005</b>
D3-101 white blank	
D3-106 black blank	<b>0.55</b>

Front rings	
DT 3-MFR extended front ring metal	<b>006</b>
DT 3-FFR sealed front ring metal	<b>007</b>

## Front elements

DT 3 momentary

**008**

DTV 3 latched

**009****13.05**

momentary

with plastic front ring

-P grey

-N black

**010****3.53**

with metal front ring

-L

**—**

with square front ring

-QP grey

-QN black

**012****3.53**

with diode

and resistor for

operating voltage

-D AC 220 V

-C AC 240 V

**022****8.60**

with central lamp test

with diode

and resistor for

operating voltage

-DK AC 220 V

-DC AC 240 V

**023****12.00**

130 V filament lamps, s. page 24

with central lamp test

with diode

and resistor for

operating voltage

-DK AC 220 V

-DC AC 240 V

**024****29.00**

130 V filament lamps, s. page 24

please enquire

## Index No.

## Price \$

## DEL 3- lamp elements

with BA 9s bulb holder, max. 250 V  
(without bulbs<sup>2)</sup>)**020**for filament bulbs, max. 2 W  
or neon bulbs**021**with central lamp test  
for filament bulbs, max. 2 W  
or neon bulbs**022**with central lamp test  
with diode  
and resistor for

operating voltage

**023**with diode  
and resistor for

operating voltage

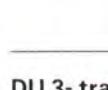
**024**

130 V filament lamps, s. page 24

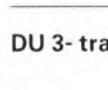
## DU 3-transformer blocks

for addition  
to lamp blockssecondary:  
6 V, 1.2 VA, 50/60 Hzprimary:  
110...120 V

220...240 V



380...415 V

**025**

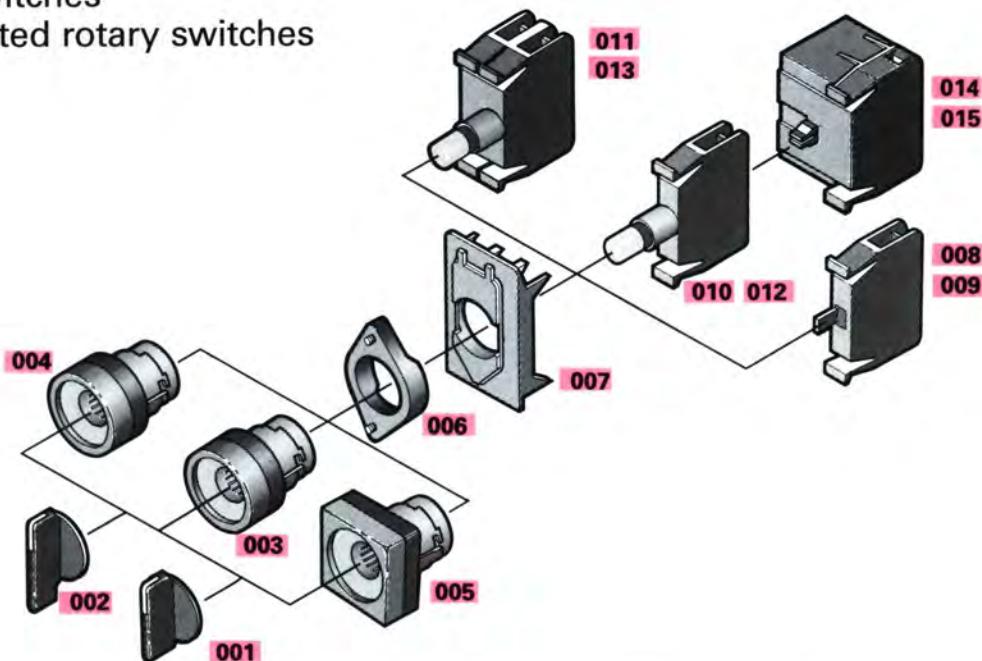
please enquire

<sup>1)</sup> Not suitable for illuminated pushbuttons.<sup>2)</sup> For bulbs see page 24.

# Components for self assembly

DS 3 rotary switches

DSL 3 illuminated rotary switches



**Index No.**  
**Price \$**

## Operating elements

**DSK 3- short operator**

**DSH 3- long operator**

## Round front elements

**DS 3P-with plastic front ring**

### Switch positions:

	A	grey black	12.00	—
	B	grey black	12.00	—
	D	grey black	12.00	—
	E	grey black	12.00	—
	G	grey black	12.00	—

**DS 3L- with metal front ring**

	A	—	12.00	—
	B	—	12.00	—
	D	—	12.00	—
	E	—	12.00	—
	G	—	12.00	—

## Square front elements

**DS 3Q- with plastic front ring**

### Switch positions:

	A	grey black	12.00	—
	B	grey black	12.00	—
	D	grey black	12.00	—
	E	grey black	12.00	—
	G	grey black	12.00	—

## D 3-BR fixing ring

**for front elements**

## DEL 3- lamp elements

with BA 9s bulb holder, max. 250 V  
(without bulbs<sup>1)</sup>)

for filament bulbs, max. 2 W or neon bulbs  
-E **4.90**

with central lamp test for filament bulbs, max. 2 W or neon bulbs  
-K **9.50**

with diode and resistor for operating voltage  
-D AC 220 V  
-C AC 240 V **8.60**

130 V filament bulbs, s. page 24  
with central lamp test with diode and resistor for operating voltage  
-DK AC 220 V  
-DC AC 240 V **12.00**

130 V filament lamps, s. page 24  
with central lamp test with diode and resistor for operating voltage  
-DK AC 220 V  
-DC AC 240 V **12.00**

## DU 3 transformer blocks

for addition to lamp blocks

secondary:  
6 V, 1.2 VA, 50/60 Hz

primary:  
110...120 V  
220...240 V  
380...415 V **29.00**

.../. . . V **015**  
**please enquire**

<sup>1)</sup>For bulbs see page 24.

## D 3-KE coupling plate

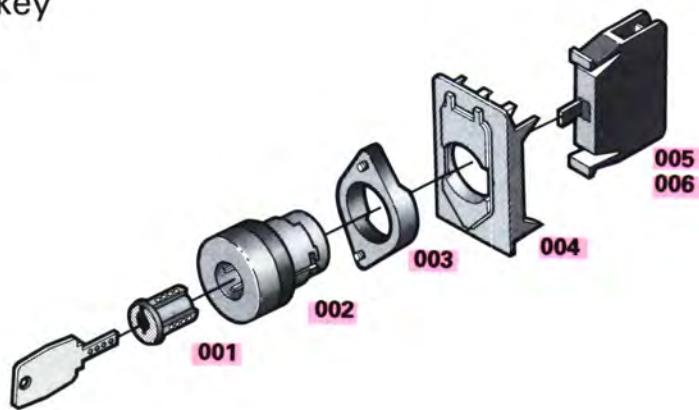
for attachment of contact and lamp blocks

## DE 3 contact blocks

	-10	3.25
	-01	3.25
	-0L	11.00



## DSS 3 rotary switch with key



### Warning:

During assembly ensure that the lock and front element are **correctly positioned** before fitting together.

For security reasons it is not possible to repeat this operation.

**Index No.**  
Price \$

### Kaba-micro 1707 lock with 2 keys

all with same  
key no. EG 1707<sup>1)</sup>



switch removal  
positions: positions:

A	O	(1707D)	34.00
	---	I (1707F)	34.00
B	O	(1707D)	34.00
	---	I (1707F)	34.00
D	O	(1707D)	34.00
	---	O II (1707F)	34.00
	I	II (1707Z)	34.00
I	---	O I II (1707T)	34.00
E	O	II O (1707D)	34.00
	---	O II (1707F)	34.00
G	O	(1707D)	34.00
	---	O II (1707F)	34.00

### 001 DSS 3 front elements



switch positions: colour

A	O	grey	10.00
	---	black	—

### 002 D 3-BR fixing ring



for front elements

### 003

1.69

B	O	grey	10.00
	---	black	—

### 004 D 3-KE coupling plate



for attachment  
of contact  
blocks

### 004

1.50

D	O	grey	10.00
	---	black	—

### 005 DE 3 contact blocks



-10  
-01

### 005

3.25

E	I	O	grey	10.00
	---	II	black	—

-0L

### 006

11.00

G	I	O	grey	10.00
	---	II	black	—

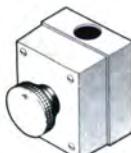
1) Other key number available on request.



# Enclosures

**Enclosures**

**Front plates**

**Enclosures with emergency stop pushbutton**

**Accessories**
**Legend plates**
**Dimensions**

	<b>Design</b>	<b>Total control positions</b>	<b>Order No.</b>	<b>Price \$</b>
grey plastic degree of protection IP 65 to IEC 529. Water jet protected to SEV 3047				
empty with 22.5 mm Ø mounting holes, and 2 cable entries 21.5 mm Ø, top with knock out, bottom with cable sleeve	1 2 3 5		DYA 3-1A DYA 3-2A DYA 3-3A DYA 3-5A	22.00 26.00 32.00 46.00
aluminium grey painted degree of protection IP 65 to IEC 529 water jet protected to SEV 3047				
empty with 22.5 mm Ø mounting holes	1 2 3 5		DZA 3-1A DZA 3-2A DZA 3-3A DZA 3-5A	45.00 50.00 62.00 84.00
empty without mounting holes	1 2 3 5		DZB 3-1A * DZB 3-2A * DZB 3-3A * DZB 3-5A *	— — — —
anodised aluminium plate with tight fitting rubber gasket and 4 captive fixing screws				
empty with 22.5 mm Ø mounting holes	1 2 3 4 5		DZE 1-1A * DZE 1-2A * DZE 1-3A * DZE 1-4A * DZE 1-5A *	— — — — —
yellow plastic complete with 1 N/C contact				
reset by turning clockwise			DYA 3-N-40-01	-
release by key reset by turning clockwise			DYA 3-NS-40-01	-
yellow aluminium complete with 1 N/C contact				
reset by turning clockwise			DZA 3-N-40-01	-
release by key reset by turning clockwise			DZA 3-NS-40-01	-
cable glands PG 16 mm with fixing nut	plastic brass		+P +M *	7.20
blanking plug PG 16 mm plastic, with fixing nut			+K	3.10
blank, page 23 with legend, page 27				
see page 33				

\*Please enquire



### Fully equipped enclosures Fully equipped front plates

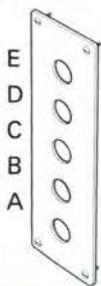
Assembled  
in plastic  
or aluminium enclosure

Positions:



Assembled on anodized  
aluminium front plate

Positions:



Order sheet  
for copying

Customer:

Order details  
for specially equipped enclosure  
or front plate

Originator:

Date:

Design	total	total positions	horizontal	vertical	top	bottom	Price
Enclosure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
plastic							
aluminium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Cable gland	<input type="checkbox"/>						
plastic							
brass							
Blanking plugs	<input type="checkbox"/>						
plastic							
Front plate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
anodised alum.							

Position Order No.

E  
D  
C  
B  
A  
total

## Ordering example

### Design

Plastic enclosure with 5 control positions.

Pos. E: Indicator lamp<sup>1)</sup>  
DL 3-R-Y-582-E (page 17)

Pos. D: Pushbutton  
DT 3L-G-369-21 (page 12)

Pos. C: Pushbutton  
DT 3L-R-370-11 (page 12)

Pos. B: Rotary switch  
with key  
DSS 3-AD-01 (page 16)

Pos. A: Round blanking plug  
18.104.207-51 (page 24)

Front elements  
(see pages 12...17).

Contact and lamp blocks for base  
mounting (see page 25).

Please order legend plates separately  
(see pages 25 and 27).

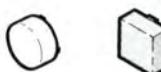
Design	total	total positions	horizontal	vertical	top	bottom	Price
Enclosure	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
plastic							
aluminium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
Cable gland	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
plastic							
brass							
Blanking plugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
plastic							
Front plate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
anodised alum.							

Position Order No.

E DL 3R-Y-582-E<sup>1)</sup>  
D DT 3L-G-369-21  
C DT 3L-R-370-11  
B DSS 3-AD-01  
A 18.104.207-51  
total

<sup>1)</sup> Lamp blocks E, D or C may be specified (see page 25).

# Accessories, small components



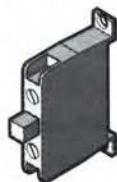
Design		Order No.	Price \$
<b>Miniature filament bulbs, clear (BA 9s)</b>			
voltage [V]	max. rating [W]		
6	1.2	<b>BA 9-6</b>	<b>3.00</b>
12	1.4	<b>BA 9-12</b>	
24	1.4	<b>BA 9-24</b>	
36	1.4	<b>BA 9-36</b>	
48	1.4	<b>BA 9-48-02</b>	
60	1.5	<b>BA 9-60-02</b>	
130	2.6	<b>BA 9-130</b>	<b>3.00</b>
for lamp blocks with diodes and resistors for operation from AC 220 V or 240 V			
<b>Miniature neon bulbs (BA 9s)</b>			
110 V...127 V clear		<b>BA 9N-110</b>	<b>5.20</b>
220 V...240 V clear		<b>BA 9N-240</b>	
<b>Lamp extractor</b>			
for BA 9s filament and neon lamps		<b>DT 3-LE</b>	<b>2.00</b>
<b>Emergency stop ring</b>			
yellow Ø 90 mm without legend		<b>DN 3-B</b>	<b>2.00</b>
with legend: EMERGENCY—STOP / NOT—AUS/ARRET D'URGENCE		<b>DN 3-E</b>	<b>2.50</b>
<b>Blanking plug</b>			
round		<b>DT 3R-BP</b>	<b>2.00</b>
square		<b>DT 3Q-BP</b>	<b>2.00</b>
<b>Operating bridge</b>			
for operating contacts in position 3		<b>DT 3-OB</b>	<b>0.25</b>
<b>Locking tab</b>			
for securing front ring (use 2, 90° apart)		<b>DT 3-LT</b>	<b>0.20</b>
<b>Replacement key</b>			
Kaba-Micro 1700		<b>DSS 3</b>	<b>6.00</b>
<b>Front rings for pushbuttons</b>			
round	plastic grey	<b>DT 3-PFR</b>	<b>0.45</b>
	plastic black	<b>DT 3-NFR</b>	<b>0.45</b>
	metal	<b>DT 3-LFR</b>	<b>1.00</b>
square	plastic grey	<b>DT 3Q-PFR</b>	<b>0.45</b>
	plastic black	<b>DT 3Q-NFR</b>	<b>0.45</b>
<b>Lens caps</b>			
round	for indicator lamps green red yellow blue white	<b>DT 3G-LC</b> <b>DT 3R-LC</b> <b>DT 3Y-LC</b> <b>DT 3B-LC</b> <b>DT 3W-LC</b>	<b>1.00</b>
square	green red yellow blue white	<b>DT 3Q-GLC</b> <b>DT 3Q-RLC</b> <b>DT 3Q-YLC</b> <b>DT 3Q-BLC</b> <b>DT 3Q-WLC</b>	<b>1.00</b>
<b>Legend caps<sup>1)</sup></b>			
round		<b>DT 3-LC</b>	<b>0.55</b>
square		<b>DT 3Q-LC</b>	<b>0.55</b>
<b>Reset Rod</b>			
for resetting overload relays		<b>DT 3-RR150</b>	<b>3.00</b>

<sup>1)</sup> With legends or symbols, see page 26-29

Active 29/01/2014



## Base mounting elements, legend plates



Design	Order No.	Price \$
<b>DA 3 contact blocks</b> for base mounting		
-10	DA 3-10	5.50
-E 10	DA 3-E10	10.50
-01	DA 3-01	5.50
-OL	DA 3-L01	10.50
<b>DAL 3 lamp elements</b> for base mounting with BA 9s bulb holder, max. 250 V (without bulb <sup>1)</sup> )		
for filament bulbs max. 2 W for DTL max. 2.6 W for DL or neon bulb		
-E	DAL 3-E	6.50
with diode and resistor for operating voltage		
-D AC 220 V	—	
-C AC 240 V	DALD-C	14.00
filament bulbs 130 V see page 24		
<b>Legend carriers</b>		
black plastic for use with legend inserts size 30×48 mm secured by front element	DT 3-30-LC	0.60
size 48×48 mm secured by front element	DT 3-48-LC	1.00
size 48×18 mm secured by double sided adhesive tape or by 2 screws	DT 3-18-LC	1.00
<b>Legend plates<sup>2)</sup></b>		
for legend carrier size 30×48 mm aluminised plastic without legend (10 pieces)	DT 3-30-LP	0.50
for legend carriers size 48×48 mm and 48×18 mm aluminised plastic without legend (10 pieces)	DT 3-48-LP	0.50
<b>Legend plates<sup>2)</sup></b>		
for enclosures size 19×19 mm aluminised plastic without legend (10 pieces)	DT 3-19-LP	0.60

<sup>1)</sup>For bulbs, see page 24.<sup>2)</sup>For legend plates with legends see page 27.

# Standard legends

To DIN 30 640 E

German  
English<sup>1)</sup><sup>2)</sup><sup>3)</sup>  
French

	Inscription caps for pushbuttons				Legend caps for indicator lamps			
	white black characters		black white characters		round		square	
	Order No.	Price \$	Order No.	Price \$	Order No.	Price \$	Order No.	Price \$
EIN ON MARCHE	DT3-151 -168• -183	1.30	DT3- -268•	1.30	DT3-551 -568•	1.30	DT3-751 -768• -783	1.30
AUS OFF ARRET	-152 -169• -184	1.30	-269•	1.30	-552 -569• -584	1.30	-752 -769• -784	1.30
AUF UP OUVRIR	-153 -170• -185	1.30	DT3-253 -270• -285	1.30	-570•	1.30	-770•	1.30
AB DOWN Descendre	-154 -171• -188	1.30	-254 -271•	1.30	-571•	1.30	-771•	1.30
ZU CLOSE FERMER	-155 -172 -186		-255 -272 -286					
HEBEN RAISE Monter	-156 -173• -187	1.30	-273•	1.30	-573•	1.30	-773•	1.30
SENKEN LOWER Descendre	-157 -174• -188	1.30	-274•	1.30	-574•	1.30	-774•	1.30
RECHTS RIGHT DROITE	-158 -175 -189							
LINKS LEFT GAUCHE	-159 -176 -190							
VOR FORWARD AVANT	-160 -177• -191	1.30	-260 -277• -291	1.30	-577•	1.30	-777•	1.30
ZURUECK REVERSE ARRIERE	-161 -178• -192	1.30	-261 -278• -292	1.30	-578•	1.30	-778•	1.30
SCHNELL FAST RAPIDE	-162 -179 -193		-262 -279 -293					
LANGSAM SLOW LENT	-163 -180 -194		-263 -280 -294					
Einrichten SET-UP Regler	-164 -181 -195		-264 -281 -295					
Betrieb RUN En service	165 -182 -196		-265 -282 -296		-565 -582 -596		-765 -782 -796	
START START MARCHE	-166 -166• -183	1.30	-266•	1.30	-566• -583	1.30	-766•	1.30
STOP STOP ARRET	-167 -167• -184	1.30	-267•	1.30	-567• -584	1.30	-767•	1.30
HAND HAND MANUEL	-197 -197 -199		-297 -297 -299		-597 -597 -599		-797 -797 -799	
AUTO AUTO AUTO	-198 -198 -198		-298 -298 -298		-598 -598 -598		-798 -798 -798	
RESET	-149		-249					

1) • NOTE: Stocked Labels - others on request

2) Lettering 4mm    3) Special legends \$0.55 per letter.

**Legend inserts**  
aluminised plastic  
size 30×18 mm  
for legend carrier 18.104.424-51

I-O-II

**Legend plates**  
aluminised plastic  
size 19 × 19 mm  
for enclosures

STOP

Legend	Order No.	Price
	1)2)3)	\$
II	<b>DT 3-973</b>	<b>1.30</b>
O	-972	
I	-971	
FAILURE	-970	
STOP	-967 •	1.30
START	-966 •	1.30
RUN	-965	
SLOW	-963	
FAST	-962	
REVERSE	-961 •	1.30
FORWARD	-960 •	1.30
LEFT	-959	
RIGHT	-958	
DOWN	-954 •	1.30
UP	-953 •	1.30
OFF	-952 •	1.30
ON	-951 •	1.30
O • I	<b>DT 3-998</b>	
FORW. OFF REV.	-997 •	1.30
I O AUTO	-996	
ON OFF AUTO	-995	
MAN. O AUTO	-994 •	1.30
HAND O AUTO	-993	
← O I	-992	
← O →	-991	
I O II	-990 •	1.30
MAN. AUTO	-987 •	1.30
HAND AUTO	-986	
SET-UP RUN	-985	
FORW. REV.	-984 •	1.30
UP DOWN	-983 •	1.30
OFF ON	-982 •	1.30
STOP START	-981	
FORWARD REVERSE	-980	
LEFT RIGHT	-979	
OFF ON	-978 •	1.30
I II	-977 •	1.30
O →	-976	
O I	<b>-975</b>	

1) • NOTE - Stock Legends - others on request.  
2) Lettering 4mm      3) Special Legends \$0.55 per letter.

# Symbols for text free legends

To DIN 30 600

To ISO R 369

## Inscription caps<sup>1)</sup> for pushbuttons

	white black characters	black white characters
	Order No.	Order No.
<b>Symbols for motion</b>		

→ DIN ISO 1	direction of continuous linear motion	DT 3-351	DT 3-451	DT 3-651	DT 3-851
↔ DIN ISO 2	linear motion in two directions	-352	-452	-652	-852
→I DIN ISO 4	direction of limited linear motion	-353	-453	-653	-853
→I DIN ISO 5	limited linear movement and return	-354	-454	-654	-854
→ DIN 100 ISO 7A	continuous clockwise rotation	-355	-455	-655	-855
→ DIN ISO 7B	continuous anti-clockwise rotation	-356	-456	-656	-856
WW DIN ISO 16	feed		-457	-657	-857
~~ DIN ISO 26	rapid traverse		-458	-658	-858
+	DIN ISO 28	increase a value	-359	-459	-659
-	DIN ISO 29	decrease a value	-360	-460	-660

## Equipment symbols

■ DIN ISO 41	electric motor	-461	-661	-861
○ DIN ISO 48	pump (general symbol)	-462	-662	-862

## Operational symbols

↶ DIN ISO 61	continuous regulation	-363		-663	-863
↗ DIN ISO 62	adjustable	-364		-664	-864
→↖ DIN ISO 63A	lock or tighten	-365	-465		
↖→   DIN ISO 64A	unlock, unclamp	-366	-466		
→↑ DIN ISO 65	brake on	-367			
↑→ DIN ISO 66	brake off	-368			
⟳ DIN ISO 267	automatic or semi-automatic cycle	-376		-676	-876
⟳ DIN ISO 35	hand-control	-375		-675	-875
DIN ISO 69	on	-369	-469	-669	-869
○ DIN ISO 70	off	-370		-670	-870
○ DIN ISO 71	on-off	-371			
○ DIN ISO 72	on, whilst pushbutton depressed	-372			
↓ DIN ISO 74	engaging	-373	-473		
↑ DIN ISO 75	disengaging	-374	-474		

1) These Legend and Inscription caps are available on indent only.

To DIN 30 600  
To ISO R 369

**Inscription caps<sup>1)</sup>  
for pushbuttons**

white  
black characters

Order  
No.

black  
white characters

Order  
No.

**Legend caps<sup>1)</sup>  
for indicator lamps**

round

square

Order  
No.

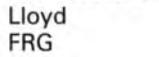
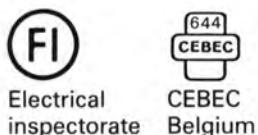
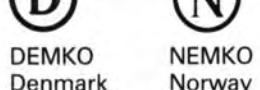
Order  
No.

**Safety and miscellaneous symbols**

	DIN 91 ISO 91	shear pin construction		
	DIN 131 ISO 92	danger high voltage		-684 -884
	DIN 93 ISO 93	caution		-685 -885
	DIN 94 ISO 94	main switch		-686 -886
	DIN 986 ISO	set up	DT 3-382	DT 3-482
	DIN 155 ISO	audible signal		-687 -887
	DIN 101 ISO	coolant	-388	
	DIN 139 ISO 102	light	-389	
	DIN 256 ISO 104	filling aperture	-390	-690 -890
	DIN 258 ISO 105	full level	-391	-691 -891
	DIN 257 ISO 106	drain	-392	-692 -892
	DIN 175 ISO 107	lubricant	493	-693 -893
	DIN 263 ISO 108	blowing unit	-494	-694 -894
	DIN 264 ISO 109	suction unit	-495	-695 -895
II		step 2	-377	-477
III		step 3	-378	-478
IV		step 4	-379	
V		step 5	-380	
R		reset	-381	

1) These Legend and Inscription caps are available on indent only.

# Technical information



## Standards

IEC 204-1, 337; SEV 1005, 1093; VDE 0113, 0660 part 201;  
BS 4794; CEE 24; CSA 22.2, No. 0, No. 14; UL 508, 486 E

## Approvals

SEV, CSA, UL, CEBEC, Germ. Lloyd,  
DEMKO, NEMKO, SEMKO, Finland,  
Buro Veritas, USSR Reg.

in preparation

## Rated insulation voltage $U_i$

IEC 337, VDE 0110, insulation group C	660 V
CSA, UL	600 V

## Test voltage

phase—phase	3 kV, 1s
phase—earth	4 kV, 1s

<b>Life</b>		<b>DT/DP</b>	<b>DS</b>	<b>DTV/DPV</b>	<b>DSS/DN/DNS</b>
mechanical	million operations	10	0.5	0.5	0.05

## UL utilisation category

heavy pilot duty	AC A 600
light pilot duty	DC Q 600

## Ambient temperature

AC-1, AC-11 operation	— 25 °C...+60 °C (T 85) (inside and outside the enclosure. For illuminated pushbuttons and switches max. external temperature 40 °C)
storage, transport	— 40 °C...+80 °C

## Climatic resistance

damp heat 40 °C / 95% rel. humidity	56 days
--	---------

humidity cycling 23 °C, 83%, 40 °C, 93%	20 cycles
--	-----------

## Degree of protection

to IEC 529, DIN 40050	IP 65 except rotary switch with key and emergency stop pushbutton with key (DSS 3, DNS 3) IP 54 DSS 3, DNS 3 IP 20 contact and lamp blocks
-----------------------	--

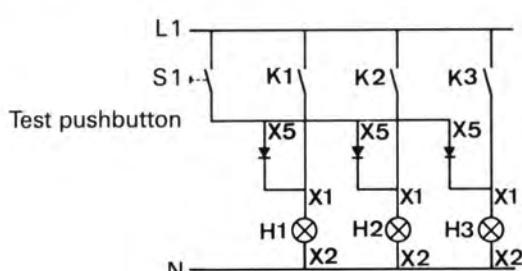
Protection against accidental contact to	VDE 0106, part 100
--	--------------------

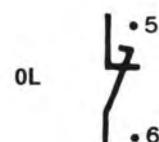
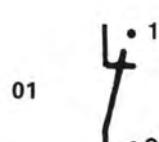
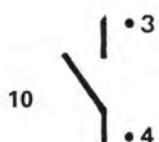
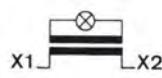
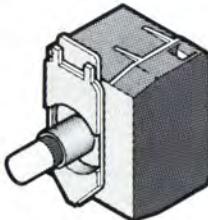
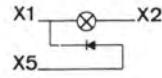
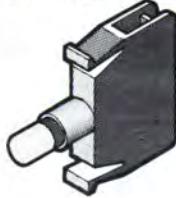
## Shock withstand

to IEC 68-2-27	30 g
----------------	------

<b>Mounting orientation</b>	as required
-----------------------------	-------------

## Example of central lamp test



**Contact blocks****Lamp elements****Rated thermal current  $I_{th}$** 

open (ambient 40 °C)  
enclosed (ambient 60 °C)

10 A  
6 A

**Nominal operating voltage  $U_e$** 

AC 660 V

**Nominal operating current  $I_e$** 

AC-1	10 A
AC-11	220 V 240 V 380 V 415 V 500 V 600 V 3 A 3 A 2.5 A 2.2 A 1.5 A 0.75 A
DC-11	24 V 48 V 110 V 220 V 440 V
DE 3 10/DE 3 01	
DA 3 10/DA 3 01	2 A 0.6 A 0.2 A 0.1 A 0.04 A
DE 3 L01/DA 3 L01	1.3 A 0.4 A 0.13 A 0.065 A 0.026 A

**Short circuit withstand**

without welding 10 A slow

**Back up fusing**

permissible rated current fast (D, gF)  
slow (DT, gL) 16 A  
10 A

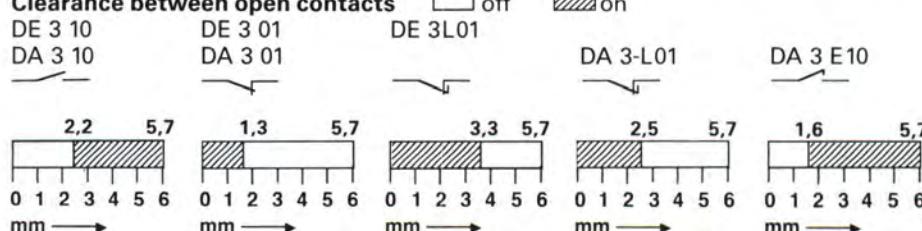
**Switching frequency**

6000 ops/h

Electrical life (AC-11)	$I_e$ mill. ops.	0.1 A	1 A	2 A	3 A
		10	3	1	0.5

**Contact security**

reliable for switching electronic circuits

**Clearance between open contacts****Terminal markings**

to DIN EN 50013

**Connections**0.75...2.5 mm<sup>2</sup> 18÷12 AWG**Lamp elements**

indicator lamps  
illuminated pushbuttons  
and illuminated switches

max. permissible  
2.6 W

2 W

**Standard element**

with BA 9s bulb holder

for filament or neon bulbs

max. 250 V (28 mm long, 10 mm Ø)

**Special elements**

with BA 9s bulb holder

with series diode and resistor  
for operating voltage  
for filament bulbs

AC 220 V or 240 V  
130 V (see page 24)

with central lamp test for filament  
or neon bulbs

max. 250 V (28 mm long, 10 mm Ø)

with series diode and resistor  
with central lamp test  
for operating voltage  
for filament bulbs

AC 220 V or 240 V  
130 V (see page 24)

with transformer for filament bulbs

6 V, max. 1.2 W

secondary: voltage

6 V

load

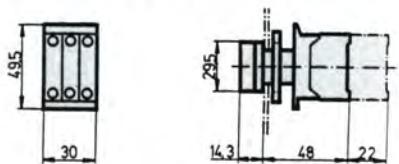
max. 1.2 VA, 50/60 Hz

primary: voltage

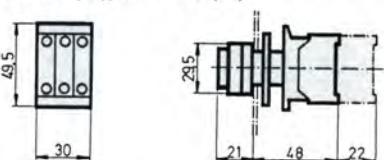
110...120 V, 220...240 V, 380...415 V

# Dimensions [mm]

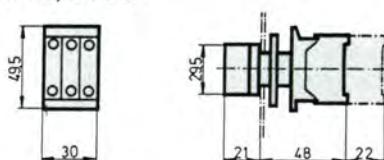
Pushbuttons DT 3 (Q), DTV 3 (Q)



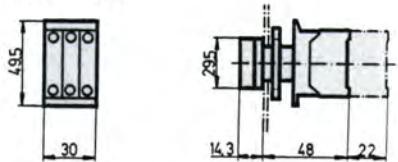
Pushbuttons with raised operator DTH 3 (Q), DTVH 3 (Q)



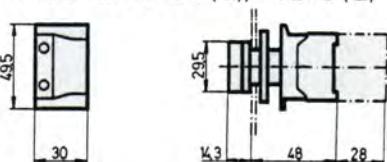
Pushbuttons with extended front ring DT 3, DTV 3



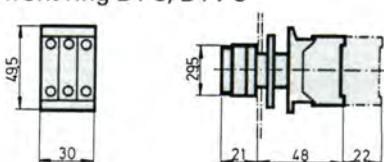
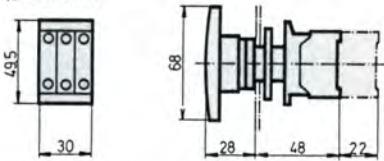
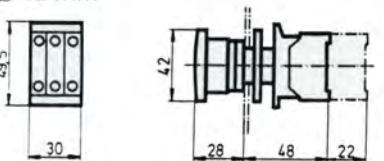
Illuminated pushbuttons DTL 3 (Q), DTLV 3 (Q)



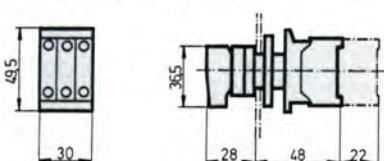
Illuminated pushbuttons with transformer DTL 3 (Q), DTLV 3 (Q)



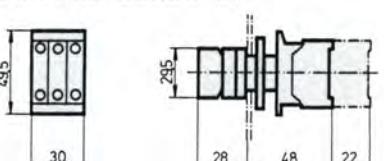
Illuminated pushbuttons with sealed front ring DT 3, DTV 3

Mushroom pushbuttons DPG 3, DPGV 3  
Ø 68 mmMushroom pushbuttons DP 3, DPV 3  
Ø 42 mm

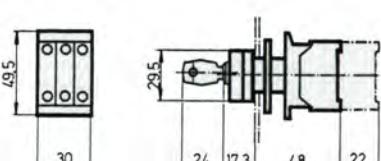
Rotary switch with long operator DSH 3 (Q), DSHL 3 (Q)



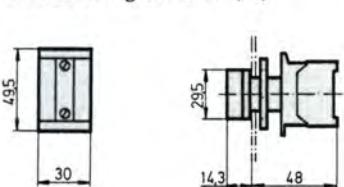
Rotary switch with short operator DSK 3 (Q), DSKL 3 (Q)



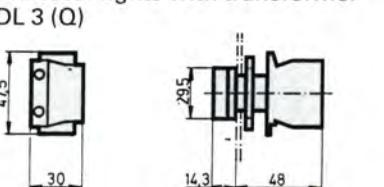
Rotary switch with key DSS 3



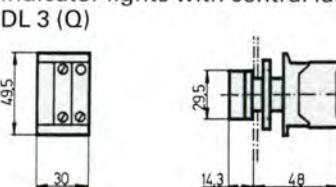
Indicator lights DL 3 (Q)



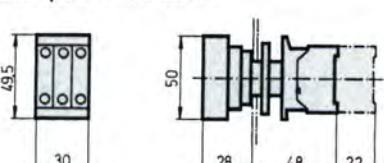
Indicator lights with transformer DL 3 (Q)



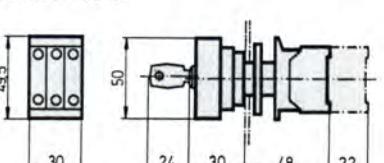
Indicator lights with central lamp test DL 3 (Q)



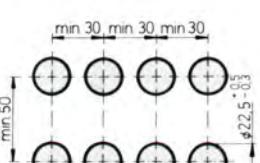
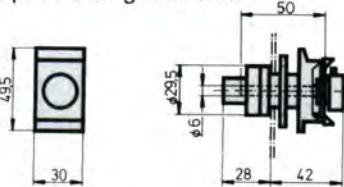
Emergency stop pushbutton with turn and pull reset DN 3



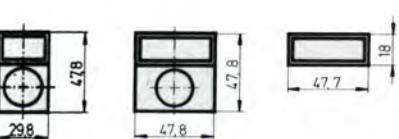
Emergency stop pushbutton with key reset DNS 3



Drilling detail

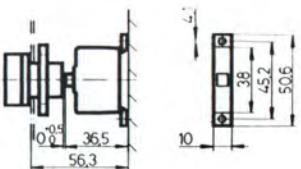
Potentiometer dial DR 3  
spindle lenght 50 mmBlanking plugs  
round and square

Legend plates

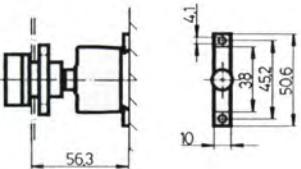


**Base mounting components**

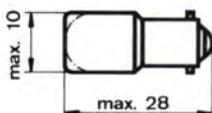
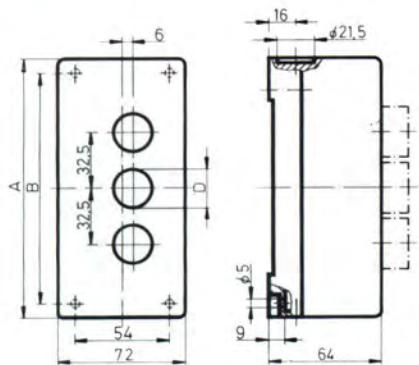
Pushbuttons



Indicator lamps



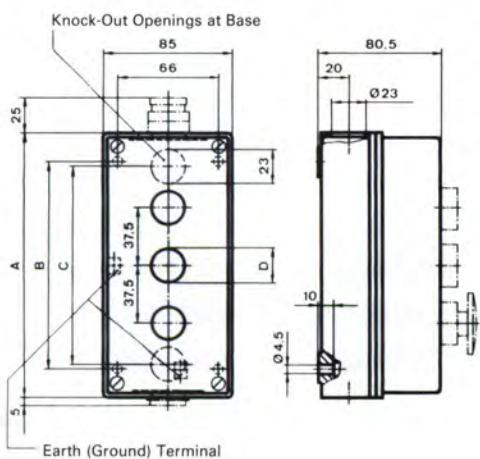
Bulbs for DL 3, DTL 3, DSL 3

**Plastic enclosure DY A 3<sup>1)</sup>**

Design

Total control positions

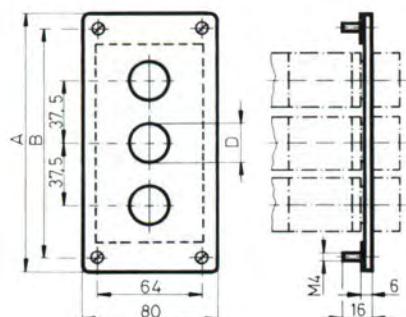
	A	B	D
DYA 3-1 A	84	67	22.5
DYA 3-2 A	117	100	22.5
DYA 3-3 A	150	133	22.5
DYA 3-5 A	215	198	22.5

<sup>1)</sup> Knock out opening at top, cable sleeve at bottom.**Aluminium enclosure DZA 3**

Design

Total control positions

	A	B	C	D
DZA 3-1 A	99	62	56	22.5
DZA 3-2 A	137	100	94	22.5
DZA 3-3 A	174	137	131	22.5
DZA 3-5 A	249	212	206	22.5

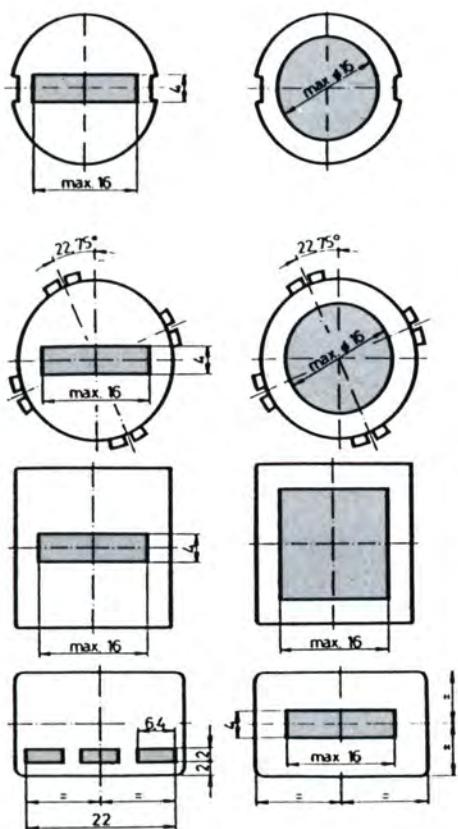
**Front plate DZE 1**

Design

Total control positions

	A	B	D
DZE 1-1 A	80	64	22.5
DZE 1-2 A	110	94	22.5
DZE 1-3 A	147	131	22.5
DZE 1-4 A	185	169	22.5
DZE 1-5 A	232	206	22.5

# Special legends

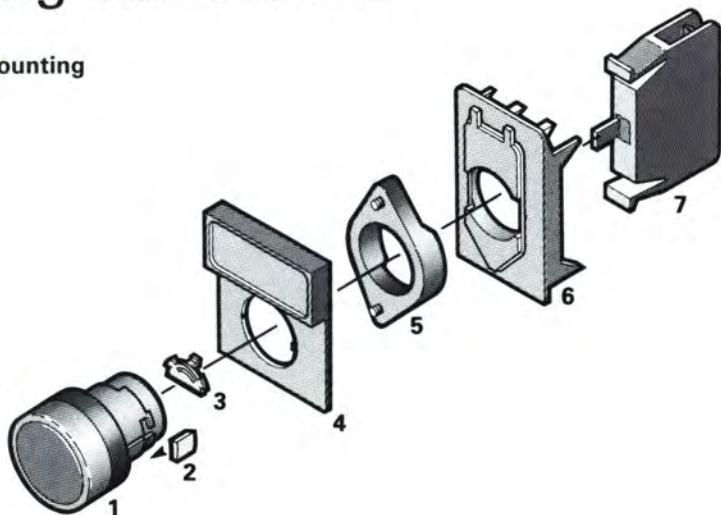


Process	Price \$
hot stamping	
<b>Details of requirements</b> clear drawing scale 2:1 provided by customer	
<b>Special symbols and text</b> for first order only, charge for stamp, which remains our property	P.O.A.
<u>set up (per text and order)</u>	P.O.A.
stamping charge per letter	0.55
<b>Inscription caps</b> for DT 3 pushbuttons	
standard legends see page 26 ISO symbols see pages 27/28 legend area: 4x16 mm or 16 mm Ø legend height: 4mm line spacing: as drawing	
<b>Legend caps</b> for DL 3 indicator lamps	
round standard legends see page 26 legend area: 4x16 mm or 16 mm Ø legend height: 4mm line spacing: as drawing	
square standard legends see page 26 ISO symbols see pages 27/28 legend area: 4x16 mm or 16x16 mm legend height: 4mm line spacing: as drawing	
<b>Legend inserts</b>	
for 30x48 mm legend carriers	
standard legends: see page 27 legend area: 4x16 mm or 3x2x6.4 mm legend height: 4mm	
for enclosures	
standard legends: see page 27 legend area: legend height: 3 mm	

# Mounting instructions

## Single person mounting

Front 1...4  
Rear 5...7



### 1 Front element

round or square, push, with the markings at the top, into the 22.5 mm hole in the mounting plate.

### 2 Locking tabs

for securing the front section against unauthorised removal.  
From the rear insert 2 of these 90° apart into the front element.

### 3 Bridge

for operating contacts at position 3 (centre position).

Fit to front element from the rear.  
Recommended with contact blocks on second level. (2 bridges required).

### 4 Legend carrier

for legend additional to that on front element. Insert tabs into slots in front element.

### 5 Fixing ring

engage bayonet with a slight twist to the right, and fix with 2 screws to prevent rotation.

### 6 Coupling plate

with securing clip to snap onto front element.  
Not required for base mounting.

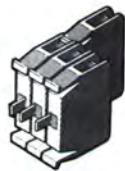
### 7 Contact blocks and lamp elements

snap onto coupling plate, or the rear of an existing contact block (2 levels of contacts).

For base mounting use elements with fixing feet (see page 23).

## Permissible combinations of contact blocks and lamp elements

pushbuttons DT 3, DTH 3, DTV 3, DTVH 3, DP 3, DPV 3, DPG 3, DPGV 3  
rotary switches DSH 3, DSK 3, DSS 3



illuminated pushbuttons DTL 3, DTLV 3  
illuminated rotary switches DSHL 3, DSKL 3

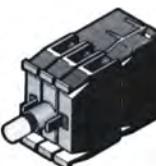
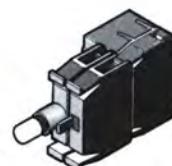
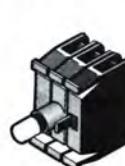
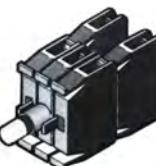
for filament bulbs 6...110 V

for filament bulbs with central lamp test 6...110 V

for filament bulbs with series diode 130 V, 2.6 W

for filament bulbs with series diode and resistor and central lamp test 130 V, 2.6 W

with transformer element



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Telex: AA85454

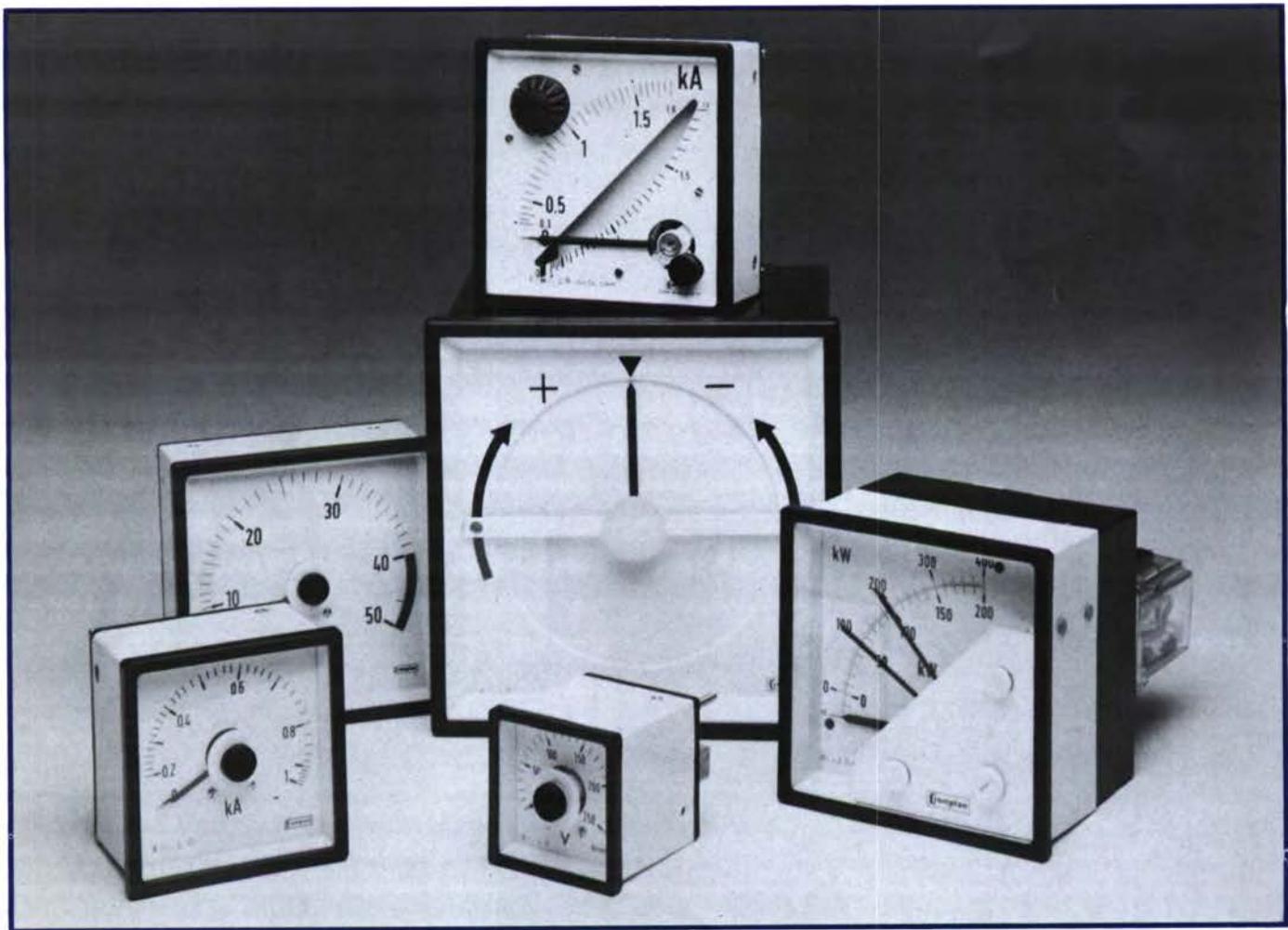
Fax: (089) 84 3945



# CROMPTON



## Quadratic 240 Series



# Quadratic 240 Series

**Selection table**

Symbol	Movement	Page	□				○			
			242	243	244	246	242	243	244	246
Ⓐ Ⓑ Ⓒ Ⓓ	A V A V A A	Moving Iron Moving Coil Maximum Demand Indicators Moving Iron + MDI	4	● ● - -	● ● ● -	● ● ● ●	● ● - -	● ● - -	● ● - -	
ⓧ ⓨ ⓩ ⓪	W VAR cos φ cos φ Hz	Wattmeter Varmeter Phase Angle meter Power Factor meter, 360° scale Frequency meter – pointer type	5	* * - ●	* * - ●	● ● - ●	* * - ●	* * - ●	● ● ● ●	
⌚ ⌈ ⌉ ⌋	Hz V ⌚	Frequency meter – reed type Synchronising Voltmeter Synchroscope, 360° scale Phase Sequence Indicator	6	- - - -	● - - ●	● - - -	- - - -	- - - -	- - ● ●	
ⓧ ⓨ ⓩ ⓪	A V rev/min °C	Moving Coil Rectifier Position Indicator Speed Indicator Temperature Indicators	7	● * ● *	● * ● *	● * ● *	● * ● *	● * ● *	● ● ● ●	
⌚ ⌈ ⌉ ⌋	h	Elapsed Time Meter Meter Relay	8	● -	● -	● -	- -	- -	- -	- -
		Current Transformers, Shunts, Transducers,	8	● self contained * with separate transducer - not presently in range						
		Connection diagrams Dimensions	9-11 12							

## Features

- ★ Shock-resistant taut band suspension
- ★ Vibration-proof Hi-Q damping
- ★ Suitable for tropical climates
- ★ Customised options & extras
- ★ Complementary transducers, current transformers, shunts, tachogenerators
- ★ 90° and 240° scale
- ★ Slide in dials for 90° volts amp frequency

## Standards

All instruments comply with the following specifications:

Case dimensions DIN43700

Benzels (slim) DIN43718

Scale markings DIN43802

Magnetic influence DIN43780

Performance }  
Accuracy } IEC 51  
Overloads }

Measuring ranges DIN43701

Safety requirements IEC414

Dial symbols IEC51

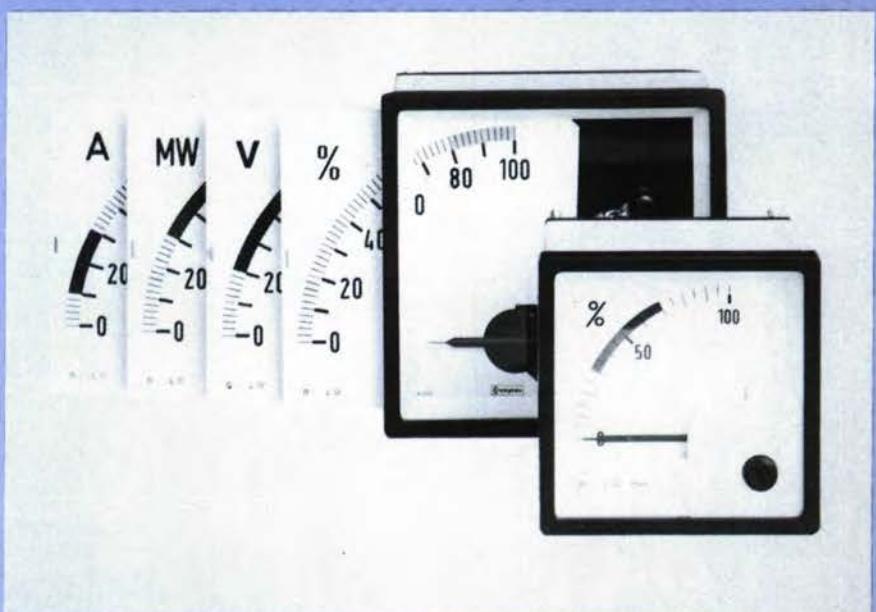
Enclosure IEC529

Optional compliance on request

Lloyds Marine

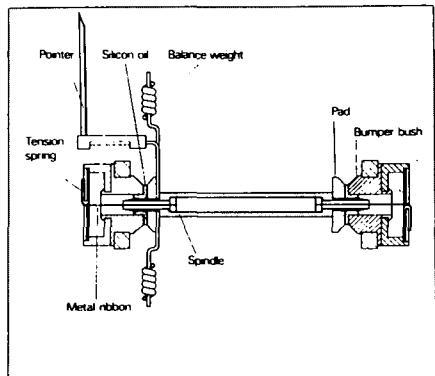
National Area Boards

Spec ES141 - 26 + 50 + 8



# Quadratic 240 Series

## Hi - Q Taut Band Suspension



In the Crompton world-patented 'Hi-Q' taut band suspension (see diagram) all the delicate parts of the traditional instruments are eliminated. There are no pivots, no jewel bearings, no hair-springs, no air damping vane. Instead, a tough metal ribbon suspends the moving element between front and rear tension springs.

Specially contoured pads are fitted to the ends of the spindle and the working gap at each end is filled with a high quality silicon fluid. The pads, together with the fluid reservoir, form a system which acts as resilient built-in shock absorbers. This provides both rotational and longitudinal damping as the moving element floats on oil with no bearing friction and is effectively cushioned against shock and vibration.

360° synchrosopes and power factor meters have robust pivot and jewel bearings.

All movements are self-shielded against external magnetic fields as defined in BS89, IEC51 and DIN 43780.

## Construction

Models 242, 243 and 244 have cases, bezels and terminal plates injection moulded in flame retardant engineering thermoplastic recognised by Underwriters Laboratory (UL)

Model 244 Meter Relay and all model 246 have pressed steel cases.

All instruments have glass windows, with zero adjusters where necessary. Non-reflecting glass or polycarbonate shatterproof windows are available.

## Enclosure

The cases comply with enclosure code IP54 to IEC 529. They are suitable for use in tropical conditions.

## Specification

### Performance

Instruments comply with IEC51.

### Accuracy

Class 1.5 is standard. Frequency meters offer Class 0.5 or 0.2. Maximum demand indicators are Class 3. Synchrosopes and 360° power factor meters are Class 2.5 (2° electrical).

### Overload withstand

1.2 times rated current or voltage for 2 hours. Ammeters 10 times rated current, voltmeters and frequency meters 2 times rated voltage for 5 seconds. Power instruments accept similar overloads.

### Dielectric test

2kV a.c. for 1 minute.

### Ambient Temperature

Instruments have a working ambient range of -20°C to 60°C (70°C Lloyds) with relative humidity up to 90%. They are calibrated for other temperatures within the working range can be specified.

(Lloyds Shipping at 35°C)

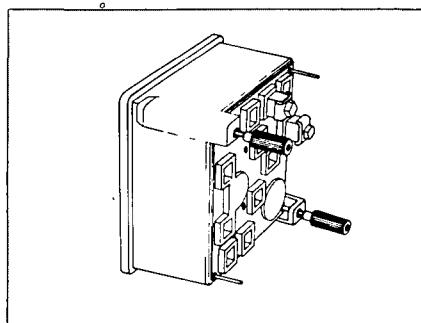
### Damping time

< 3 seconds is usual. More heavily damped movements are available on request.

## Illumination

Internally illuminated dials are available for Models 243, 244 and 246, 240° moving coil. The replaceable rear mounted lamps are supplied for 6, 12 or 24V.

## Mounting Clamps



Models 242, 243 and 244 are provided with two corner fixing clamps and tensioning thumb screws.

## Dials and Scales

Standard dials are acrylic matt white with black printed scales and bar pointers.

They are scaled in accordance to DIN 43802. Interchangeable slide-in dials are used on models 243 and 244 short scale moving iron and moving coil.

360° Instruments have platform dials.

Black dials with white or yellow scales and pointers are available.

General options include red supplementary pointers, red indexes (quadrant scales), red, green or blue lines, bands or segments, finely spaced divisions, multiscales and special scales and captions to customers' requirements.

All 243 and 244 90° scale voltmeters, ammeters and frequency meters have slide in dial, offering the benefit of low stock costs as only the basic instrument types need to be stocked together with ranges of dials. Other dials can be obtained rapidly from our local sales and service centres or agents.

## Mounting Angle

Standard instruments are calibrated for mounting on a vertical panel.

Special calibration for other mounting positions can be provided on request. Specify the angle of inclinations required in degrees,  $\alpha^\circ$  from the horizontal.

## World Patents

Crompton indicators incorporate features covered by one or more of the following patents:

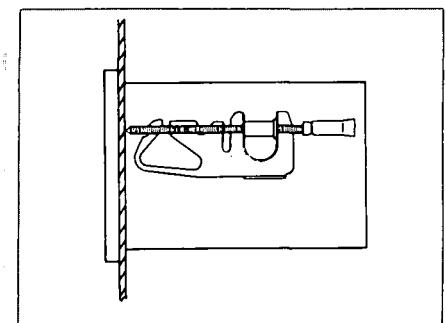
**GREAT BRITAIN:** 1,124,667; 1,295,935; 1,212,245; 29,466/77

**AUSTRALIA:** 415, 321.

**CANADA:** 792,902; 846,338

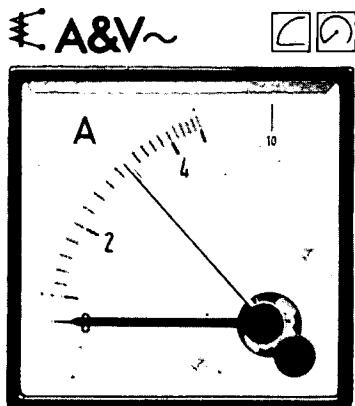
**GERMANY:** 1,591,864; PI,591,864.6; P 2747965.8; G 7732975.0.

**U.S.A.:** 3,439,273; 3,590,375; 845032



Model 246 and Meter Relay model 244-30, have two side fixing spring clips.

# Quadratic 240 Series



## Moving Iron

Designed to measure a.c. current or voltage, these rugged movements indicate true r.m.s. values substantially independent of system wave form. Scales are calibrated down to 20%. Ammeters can have overload scales  $\times 2$  or  $\times 6$  for motor start duty. Heavy damping is available. Ammeters are scaled for use with  $-/1A$  or  $-/5A$  current transformers for high ratings or remote indication. Calibration for d.c. can be arranged on  $90^\circ$  ratings.

### Accuracy

Class 1.5 (Class 2 model 242  $90^\circ$  scale)

### Ratings

Ammeters:

0.5A to 100A direct connected (25A for 242-90° &  $240^\circ$  scales)

Ratings for use with C.T.s.

Scales with  $\times 2$  or  $\times 6$  overload.

Low load scales (max 10A).

Voltmeters:

6V to 600V direct connected.

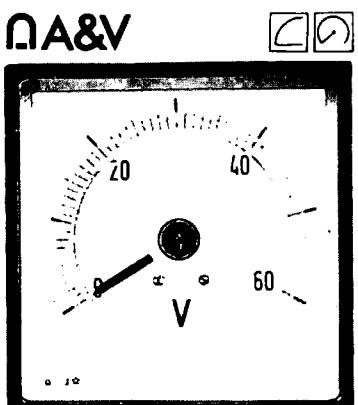
100, 133, 140, 150V for use with V.T.s.

Frequency 50 or 60 Hz. 400 Hz on request.

Burden at 50Hz.

Ammeters:  $90^\circ$  - 0.5VA,  $240^\circ$  - 1.5VA.

Voltmeters: 4.5VA max.



## Moving Coil

These self-shielded high-torque movements are suitable for all d.c. systems. The linear scale is calibrated down to zero and accuracy maintained down to 10%. High current ratings are measured with separate shunts and suitably scaled indicators. Suppressed, centre or off-set zero models are available and indicators can be calibrated for use with tachogenerators, transducer outputs, process signals and similar electrical sensors. Model 242 -  $90^\circ$  scale has a pivoted movement and eddy current damping.

### Accuracy

Class 1.5

### Ratings

Ammeters:

100 $\mu$ A to 25A direct connected. 4/20mA suppressed zero.

Voltmeters:

60m.V. to 600V direct connected.

1/5V suppressed zero.

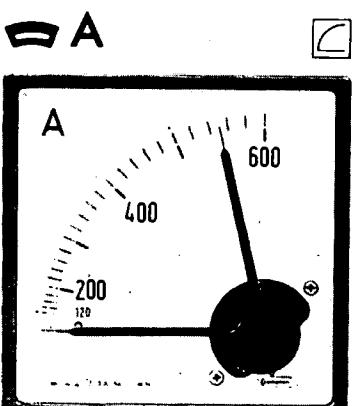
60, 75, 150mV for use with shunts.

Impedance

Voltmeters: 1000 $\Omega$ /V above 1V.

Ammeters: 75mV internal shunt above 60mA.

For values see publication T118.



## Maximum Demand Indicator

The thermal/time characteristic of MDIs monitors the most economic use of cable, fusegear and transformers. The directly heated bimetal element indicates mean r.m.s. current over 8, 15 or 20 mins. A red slave pointer shows highest value reached and has a wire sealable reset knob. The optional saturating C.T. limits the power into the MDI and is used where a protection relay is connected in series from the same C.T. Scales are calibrated to match the C.T. plus 20% overload (e.g. 0-5-6A).

### Accuracy Class 3

### Ratings

5A for use with separate C.T.

5/5A saturating C.T. (dim. 'C' page 12 becomes 83mm).

Burdens 50/60Hz

MDI - 2.5VA, CT - 2VA.

### Overload withstand

Standard: 5 x FL for 5 sec

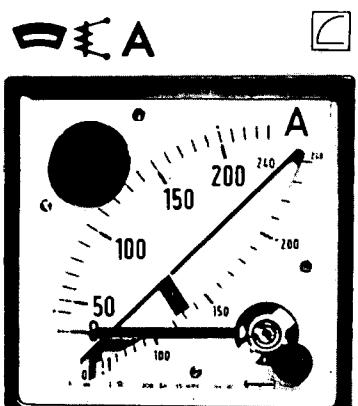
10 x FL for 1 sec

With saturating C.T.: 10 x FL for 3 sec

20 x FL for 1 sec

Frequency 50/60Hz

Models 243, 244,  $90^\circ$  scale.



## Moving Iron + MDI

Where the instantaneous and maximum demand currents are required, this instrument combines both movements in one case. It can replace an existing M.I. ammeter.

The scales are calibrated to match the C.T. primary plus 20% overload. End values are selected from: 1.2 1.8 2.4 3 3.6 4.8 6 7.2 9 and their multiples of 10 and 100.

### Accuracy

Bimetal element Class 3

Moving iron ammeter Class 1.5

### Ratings

5A for use with separate C.T.

5/5A saturating C.T. (dim. 'C' page 12 becomes 83mm).

Burdens 50/60Hz

MDI - 2.5VA, CT - 2VA, MI - 0.5VA.

### Overload withstand

Standard: 5 x FL for 5 sec

10 x FL for 1 sec

With saturating C.T.: 10 x FL for 3 sec

20 x FL for 1 sec

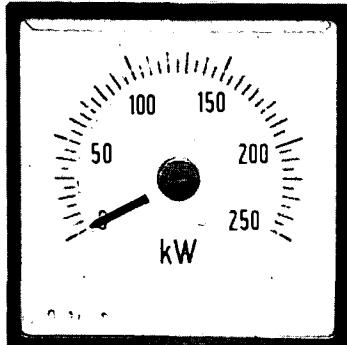
Frequency 50/60Hz

Model 244,  $90^\circ$  scale only.



# Quadratic 240 Series

**W&VAR**



## Wattmeters / Varmeters

Watt and Var meters are available in all models of the Quadratic range for the following a.c. systems:

- single phase
- 3 phase balanced load, 3 or 4 wire
- 3 phase unbalanced load, 3 or 4 wire

The measuring system comprises a moving coil indicator and power converting transducer.

Scales are linear down to zero. Centre and off-set zero scales are available for reverse power and Import/Export indication.

### Accuracy Class 1..5

#### Ratings

Current: 0.2A to 10A direct connected.  
1A or 5A for C.T.s.

Voltage: 100/125, 200/250, 380/450V,  
100—110 for V.T. use.

Frequency: 50Hz, 60Hz, 400Hz.

Power Factor: UPF assumed (range  
0.5/1/0.5)

#### Burdens at 50Hz

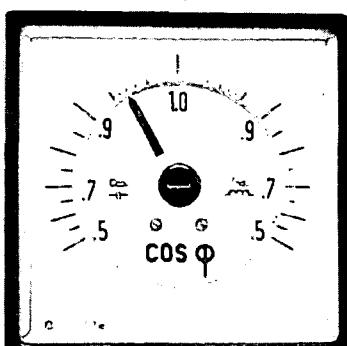
Current: 1VA each cct.

Voltage: 4VA each cct.

#### Models

244, 246 self-contained or with separate transducer. 242, 243 with separate transducer.

**COS φ**



## Phase Angle Meter

These meters indicate the phase displacement between current and voltage. Ideal value is unity power factor ( $\cos \phi = 1.0$  on the meter scale). Systems operating at lower values are using wattless power.

- single phase
- 3 phase 3 wire balanced load
- 3 phase 4 wire balanced load

The measuring system comprises a moving coil indicator and phase angle transducer.

### Accuracy Class 2.5 (2° electrical)

#### Ratings

Current: 1A or 5A for C.T.s.

Voltage: 100/125, 200/250, 380/450V  
100—110V for V.T. use.

Frequency: 50Hz, 60Hz, 400Hz.

#### Burdens at 50Hz

Current: 1VA

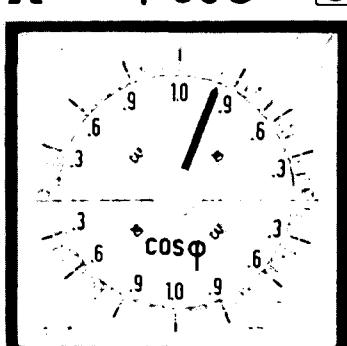
Voltage: 4VA

Current range 20% to 125%.

#### Models

244, self-contained or with separate transducer.  
242, 243, 246 with separate transducer.

**COS φ 360°**



## Power Factor Meter

For 3 phase 3 or 4 wire unbalanced load systems. These meters are suitable for generators or supplies operating in parallel.

The four quadrant 360° scale calibrated 0-1-0-1-0 cos φ indicates forward (export) and reverse (import) power flow for inductive and capacitive loads.

The rotating iron vane movement has spring-loaded bearings and silicon fluid damping.

### Accuracy Class 2.5 (2° electrical)

#### Ratings

Current: -/1A or -/5A for C.T.s.

Voltage: 100/125, 200/250V,  
380/450V

100-110V for V.T. use.

Frequency: 50Hz, 60Hz, 400Hz.

#### Burdens at 50Hz

Current: 2VA per coil.

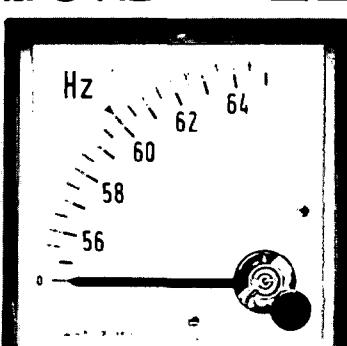
Voltage: 4VA per coil.

(7.5VA above 250V)

#### Models

244, 246 only.

**Hz**



## Frequency Meter

### Pointer type

Pointer type frequency meters are the most accurate and easy to read instrument of their type. Resolutions of 0.1 Hz can be observed.

The instrument comprises a moving coil indicator with a frequency transducer.

### Accuracy Class 0.2, Class 0.5

#### Ratings

Voltage: 100-125, 200-250, 380-440V.

100 — 110V for V.T. use.

#### Frequency spans

Class 0.5: 45/55, 55/65, 45/65,  
360/440Hz.

Class 0.2: 47/53, 57/63Hz.

#### Burdens Voltage: 4VA max.

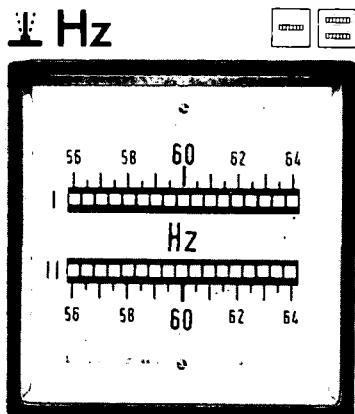
#### Models

242, 243, 244, 246-90° scale self-contained.

244, 246 - 240° scale self-contained.

242, 243 - 240° scale with separate transducer.

# Quadratic 240 Series



## Frequency Meters Vibrating reed

In this meter, frequency is indicated by vibrating reeds. Each reed is tuned to a different value in the frequency span.

For synchronising purposes, two reed assemblies are mounted adjacently in one case.

Reed frequency meters are suitable for situations where exact values are not required. Readings are unaffected by waveform.

### Accuracy Class 0.5

#### Ratings

Voltage: 100-125, 200-250, 380-440V.  
100 — 110 for V.T. use.

#### Frequency spans

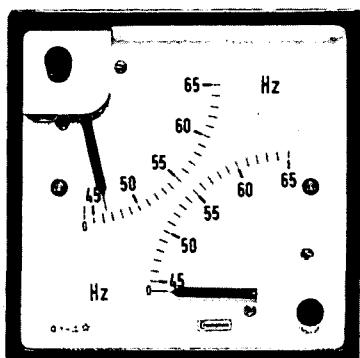
13 reed: 47/43, 57/63 Hz  
21 reed: 45/55, 55/65 Hz  
2 x 13 reed: 47/53, 57/63 Hz  
2 x 21 reed: 45/55, 55/65 Hz

#### Burdens 2.5VA max.

#### Models

243: 13 reed.

244: 13, 2 x 13, 2 x 21 reed



## Dual Frequency Volt and Amp Meters

The two instruments contained in the 96 x 96 mm case have 90° scale length and can be used to measure a wide range of frequency, Volts and Ampere parameters. These dual instruments save both space and time by only requiring one panel cut.

These products are ideal for Synchronising application. When an ac generator is to be connected to another generator or to mains voltage, phase and frequency must coincide. The 244-80L allows measurement of two independant voltages and 244-41D two independent frequencies.

Accuracy 244-41D Frequency Class 0.5. 244-80E/L Voltmeter and 244-80M/c Ammeter. Class 1.5

#### Ratings

244-41D 100-125, 200-250 380-440 volts 244-80E D.C. volts 60mV to 600V 1/5 volt suppressed zero 60, 75, 150mV for use with shunts. 244-80L A.C. volts 6 to 600 volts 25Hz to 3KHz (rectified) 50Hz standard 244-80M D.C. Amps 100µA to 25A direct connected 4-20mA suppressed zero 244-80F A.C. Amps 250µA-1Amp 25Hz to 3KHz (50Hz standard) Rectified.

#### Frequency:

255-41D 45/55, 55/65, 45/65, 360/440 Hz

#### Burden

244-41D 4VA max

#### Impedance

244-80E 1000Ω/volt above 1volt. 244-80M 75mV internal shunt above 60mA

#### Accuracy

Class 2.5 (2° electrical)

#### Ratings

Voltage: 100/125, 200/250, 380/450V. 100 - 110V for V.T. use.

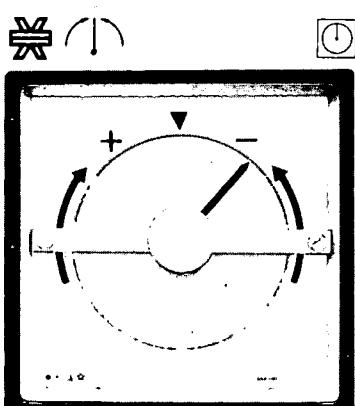
#### Frequency: 50, 60, 400Hz.

#### Burdens at 50Hz

5VA maximum

#### Models

244, 246



## Synchroscope

Where non-automatic paralleling of two a.c. systems is necessary, phase displacement, phase rotation and frequency of both systems can be monitored by a synchroscope.

The systems are synchronised when the pointer is stationary at the 12 o'clock position.

The continuously rated rotating iron vane movement has spring-loaded bearings and silicon fluid damping.

#### Accuracy

Class 2.5 (2° electrical)

#### Ratings

Voltage: 100/125, 200/250, 380/450V. 100 - 110V for V.T. use.

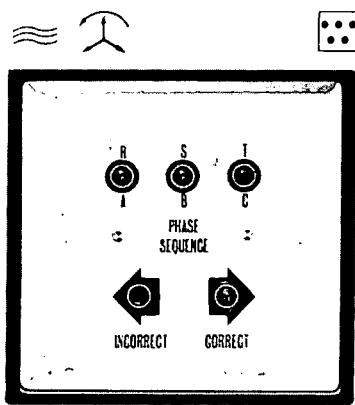
#### Frequency: 50, 60, 400Hz.

#### Burdens at 50Hz

5VA maximum

#### Models

244, 246



## Phase Sequence Indicator

Incorrect phase connection may cause motors to run in reverse resulting in serious damage to pumps, compressors, separators, ventilation etc.

Shore to ship supplies, mobile generators and remote installations are particularly vulnerable to this hazard.

The electronic phase sequence indicator both ensures correct phase rotation and the presence of all 3 phase supplies.

#### Ratings

Voltage: 100/550V

Frequency: 50/60Hz

#### Burden 2.5VA

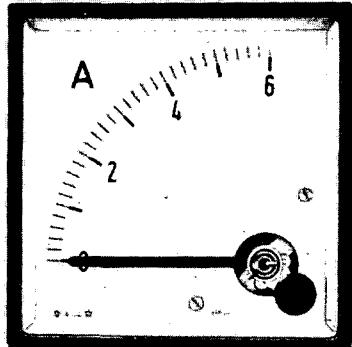
#### Model

244.

# Quadratic 240 Series



A&amp;V~



## Moving Coil Rectifier

For high frequency or linear full scale a.c. measurements.

These instruments measure average values of sinusoidal waveforms and are scaled in r.m.s. values.

The high quality silicon bridge rectifier gives a linear scale down to zero, except on low voltage where some compression occurs.

For ratings 1A to 100A use a 10mA instrument with a 770 Series miniature CT.

**Accuracy** Class 1.5 down to 10%.

### Ratings

Ammeters:

250µA to 1A direct connected.

1A for use with C.T.s.

Voltmeters: 6V to 600V direct connected.

### Frequency

50/60Hz. Other single frequencies 25-3000Hz on request.

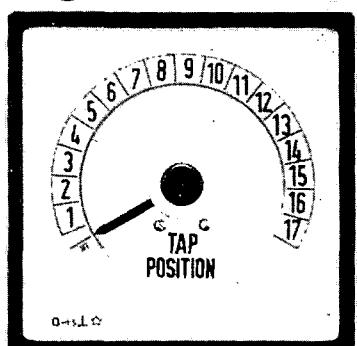
### Impedance

see publication T118.

### Models

242, 243, 244, 246, 90° and 240° scales.

A



## Position Indicator

The measuring system comprises a moving coil indicator, stabilised power source transducer and remote potentiometer or resistance thermometer sensor (supplied by customer).

The Position Indicator monitors transformer tap position, hoist or valve position, etc. It employs a 3 wire system. 11-18 positions can be provided using 400Ω steps.

**Accuracy** Class 1.5 overall

### Auxiliary supply

a.c. 50/60Hz, 45/55Hz: 100/125, 200/250V, 380/440V.

d.c. : 50, 110, 220V, ±15%

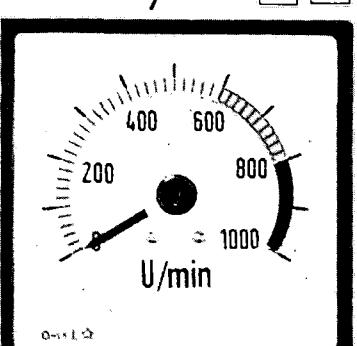
### Burden 2VA

### Models

244, 246 self-contained or with separate power source transducer.

242, 243 with separate Paladin power source transducer, see publication SW250T

rev/min



## Speed Indicator

These moving coil indicators can be calibrated for any d.c. or rectified a.c. tachogenerator or voltage/current signal source.

They can be scaled in any speed function where the relationship of output signal to speed is specified.

A suitable range of rectified 3 phase tachogenerators is available with foot or flange mounting options – see publication SW840.

### Accuracy

Class 1.5

### Models

242, 243, 244, 246

### Tachogenerator speed ranges

0/30 to 0/45 rev/min

0/46 to 0/50

0/51 to 0/85

0/86 to 0/120

0/121 to 0/180

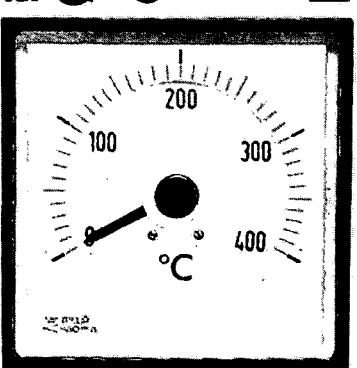
0/181 to 0/200

0/201 to 0/350

0/351 to 0/10000

Nominal output 1mA

°C



## Temperature Indicators

These indicators read temperature values, usually remotely, with RTD or Thermocouple sensors supplied by customer.

RTD (resistance thermometer) indicators measure the change in resistance of the sensor. A 2 or 3 wire system may be used.

Thermocouple indicators accept standard millivolt input signals. Cold junction compensation is provided and high scale thermocouple break indication is incorporated.

**Accuracy** Class 1.5—Indicator only

### RTD indicator -45RG

Suitable for 10Ω Copper or 100Ω

Platinum sensors.

Power in RTD 100µW approx.

### Thermocouple indicator

-45TG.

Suitable for standard thermocouple outputs 10-50 mV full scale value. 50Ω max. cct resistance.

### Auxiliary supply

-45RG 50, 110 or 220V a.c. 50/60Hz

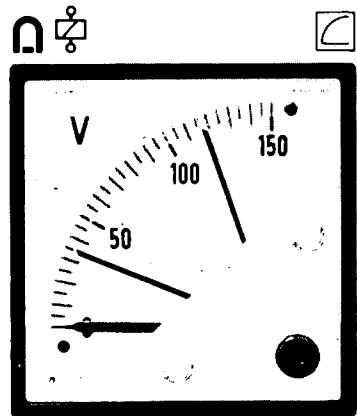
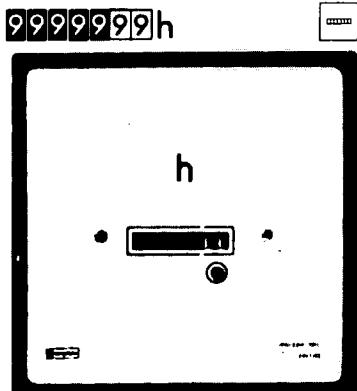
-45TG 110 or 220V a.c. 50/60Hz

**Burden** -45RG 2VA, -45TG 3VA

### Models

244, 246 self-contained. All models available with separate transducer. See SW250T.

# Quadratic 240 Series



Combining a highly accurate indicator with High and Low set-point relays, this robust unit is available in case sizes 96 x 96mm.

The relays can operate alarm and control circuits when the monitored signal value moves outside the set-point limits indicated by adjustable red index pointers.

#### Models

244-301G: 1 relay, 1 set-point for High, upscale energising.

244-307G: 1 relay, 1 set-point for Low, downscale energising.

244-302G: 2 relay, 2 set-points for High and Low energising.

244-30TG: 2 relay, 2 set-points for thermocouple operation; CJC and thermocouple break protection are provided.

244-300G: 1 relay, 2 set-points for level control. Low energising, High de-energising.

## Elapsed Time Meter

These synchronous motor driven cyclo-meters register in increments of 0.01 h up to 99999.99 h after which they recommence from zero.

A running indicator is provided. Hand reset not available.

Production efficiency, cost estimating and service periods are typical uses.

#### Ratings

Voltage: 100/125, 200/250, 380/440V

Frequency: 50Hz, 60Hz.

Burden 2.5VA max.

#### Models

242, 243, 244

## Meter Relay

- ★ Monitors and controls any variable parameter which can be converted into a d.c. or a.c. signal.
- ★ Indicator, relays and power unit in one housing.
- ★ Control function continues should indicator become damaged.
- ★ Stable electronic switching circuit does not use lamps, photocells, indicators or capacitors.
- ★ LED switching mode indication.
- ★ Isolated input signal.
- ★ Rugged shock and vibration resistant design.
- ★ Optional time delay relay.

#### Accuracy

Indicator: Class 1.5

Set-point: Class 1.5

Repeatability: 0.5%

Differential: 1% of span

Set-point adjustment: 98% of scale

Minimum span: 2% between set-points.

#### Auxiliary supply

a.c.: dual rating 100/125V and 200/250V, 50/60Hz.

d.c.: 12V or 24V

Other voltages to special order.

Burden: 3VA max.

#### Fixing Clips

Side fixing spring clips are provided.

#### Input signals

Volts d.c.: 20mV to 500V (10kΩ/V)

Volts a.c.: 6V to 500V (1000Ω/V)

50/60Hz. 25 – 3000Hz on request.

Current d.c.: 10μA to 15A (20mV drop).

Current a.c.: 100μA to 1A (1V drop)

50/60 Hz. 25 – 3000Hz on request.

-/1A or -/5A C.T. operation (0.5VA).

Thermocouples: Standard outputs.

Motor start duty with 1A/10mA or 5A/10mA internal C.T. permitting 1.2 times overload continuously and 10 times for 10s.

#### Output relay

Octal base plug-in relay

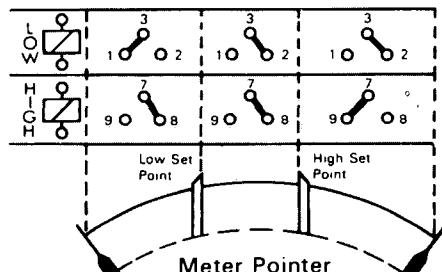
Type: SPDT contacts, each set-point.

Rating: 5A or 250V or 1000W non-inductive.

Operating time: 250ms overall

Optional time delay adjustable 1 – 10s

Relay contact position with input signal in zone indicated by meter pointer.



#### Shunts

A comprehensive range of high quality shunts to meet IEC51, BS89, AS1042, DIN43703, DIN43780.

DEF66-13, British PO CD746, USA MIL-S-61B and most specialised designs can be complied with.

Send for SW 820

## Current Transformers

Designed to IEC185, VDE 0414:70 and BS3938:73, and offering a full range of styles, ratings, outputs and accuracies to meet International Standards.

Ask for publications SW CT

## Transducers

These a.c. power to d.c. signal converters provide a complete measuring system when used with suitably calibrated 1mA moving coil indicators, close coupled or remote mounted.

Publication SW250IT details converting transducers for frequency, watts, vars. Current, voltage, position, temperature, resistance, etc are described in the SW250T series.

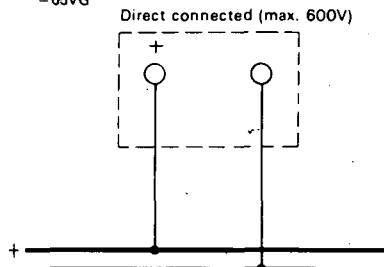
# Quadratic

## 240 Series

Symbols based on DIN43 807. Transformer terminal markings to BS3938/3941.

### VOLTMETER d.c.

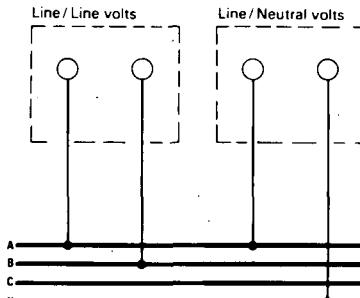
- 89VG
- 01VG
- 10VG
- 05VG



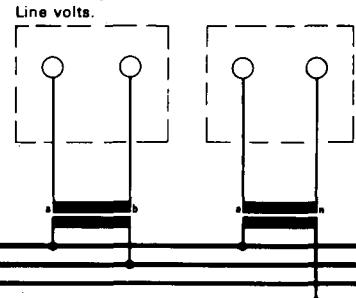
### VOLTMETER a.c.

- 02VG, -07VG, -03VG, -78VG
- 89WG, -01WG, -10WG, -05WG

#### Direct connected (max. 600V)

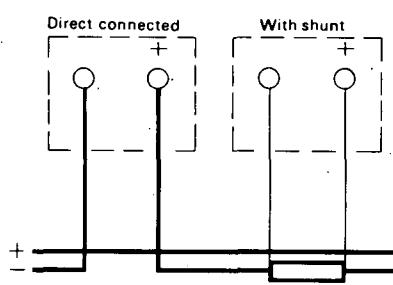


#### With voltage transformer



### AMMETER d.c.

- 89AG
- 01AG
- 10AG
- 05AG



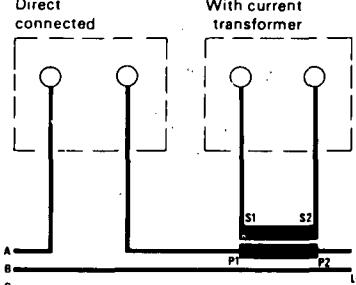
### AMMETER a.c.

- Moving iron
- 02AG, -022G, -026G
- 07AG, -072G, -076G
- 03AG, -032G, -036G
- 78G

- Moving Coil Rectifier
- 89BG, -01BG, -10BG, -05BG

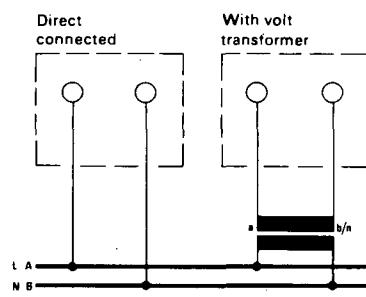
- MDI and MDI plus MI
- 16AG, -16BG
- 16CG, -16DG

#### Direct connected

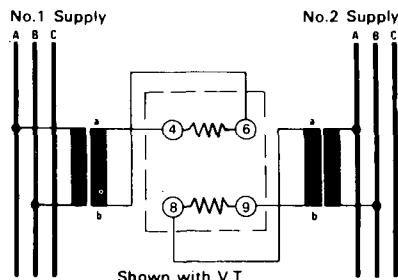


### FREQUENCY AND ELAPSED TIME METERS

- 41SG, -197G, -19RG
- 41LG, -199G, -19SG
- 155G, -156GG

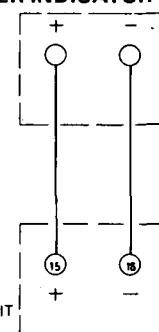


- Double vibrating reed
- 19TG



### TRANSDUCER INDICATOR

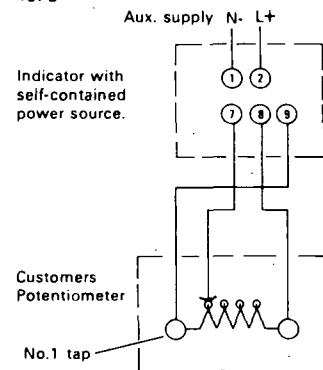
- 89
- 01
- 10
- 05



Separate 250 series transducer. See SW250IT & SW250T for Watts, Vars, Frequency, Amps Volts, Phase angle, Resistance, Temperature, Position etc.

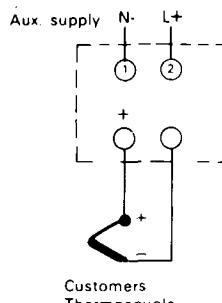
### POSITION INDICATOR

- 45QB
- 45PB

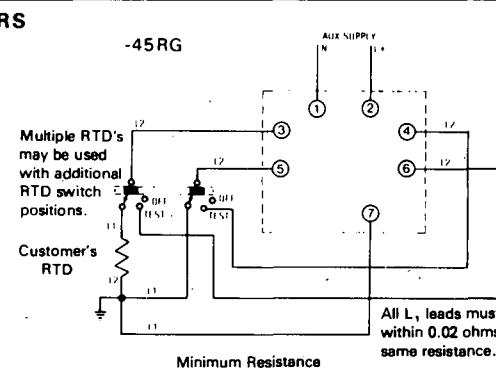


### TEMPERATURE INDICATORS

- 45TG



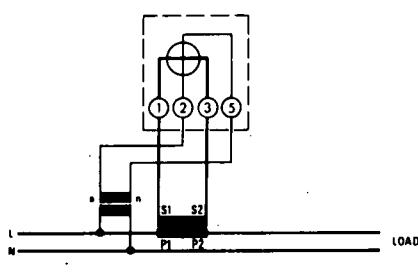
- 45RG



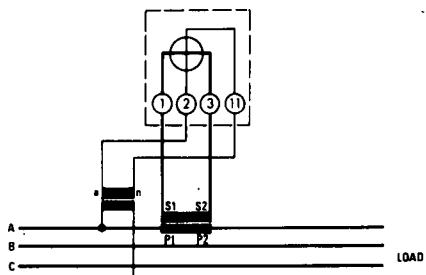
# Quadratic 240 Series

## WATTMETERS

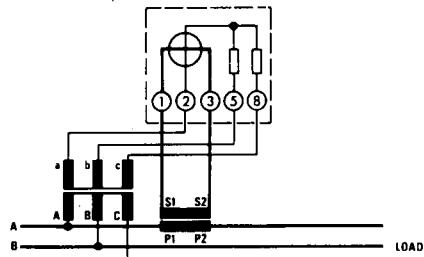
-210G & -215G  
Single Phase a.c.



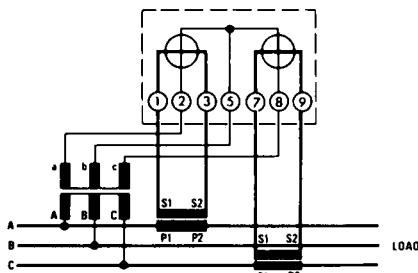
21CG & 21DG  
3 Phase, 4-wire, balanced load



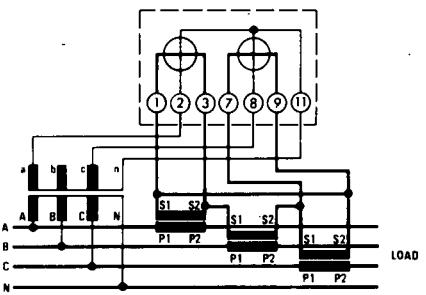
-211G & -216G  
3-phase, 3-wire, balanced load



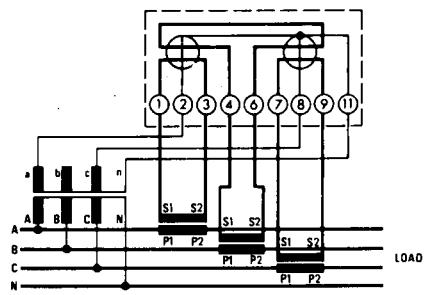
-213G & -218G  
3-phase, 3-wire, unbalanced load



-21EG & -21FG  
3-phase, 4-wire, unbalanced load  
with delta connected C.T.s.



-214G & -219G  
3-phase, 4-wire, unbalanced load  
with star connected C.T.s

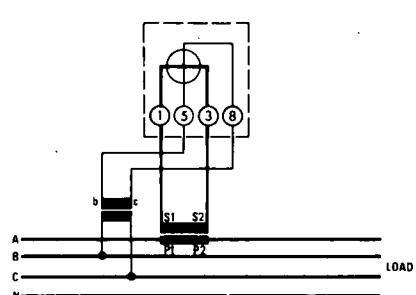


## VARMETERS

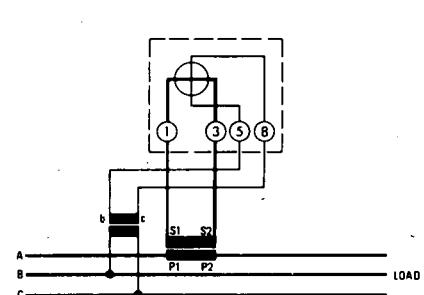
Single phase VAR meters are available using a Paladin type 256 TXKW transducer and transducer indicator.

See Publication SW250T

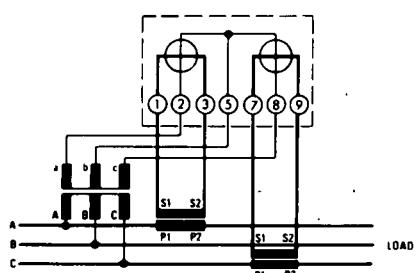
-310G & -315G  
3-phase, 4-wire, balanced load



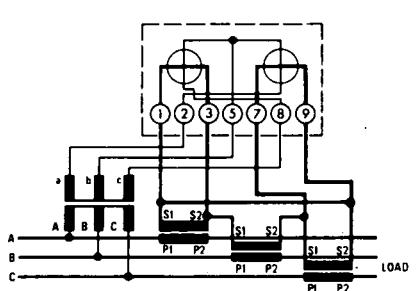
-310G & -315G  
3-phase, 3-wire, balanced load



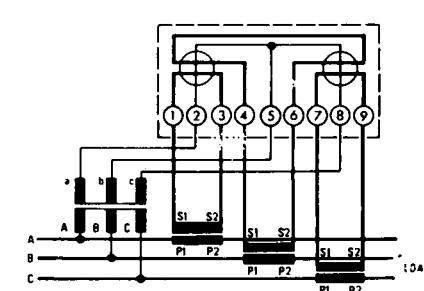
31SG & -31LG  
3-phase, 3-wire, unbalanced load



-31EG & -31FG  
3-phase, 4-wire, unbalanced load  
with delta connected C.T.s



-314G & -319G  
3-phase, 4-wire, unbalanced load  
with star connected C.T.s

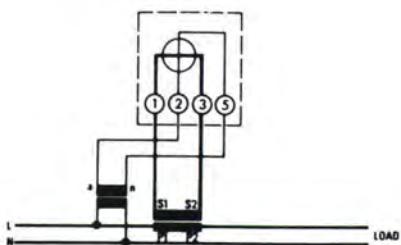


# Quadratic 240 Series



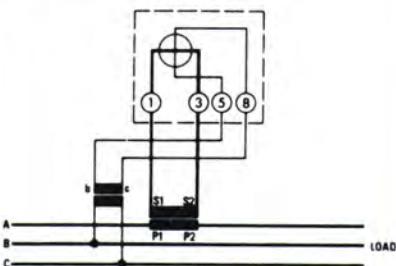
## PHASE ANGLE METER

-42BG  
-425G  
Single Phase  
Spans 0.5/1/0.5 or 0.8/1/0.2



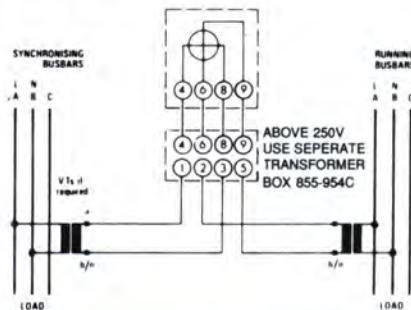
## PHASE ANGLE METER

-42AG  
-427G  
3-phase, 3-wire, or 4-wire, balanced load  
Span 0.5/1/0.5 or 0.8/1/0.2



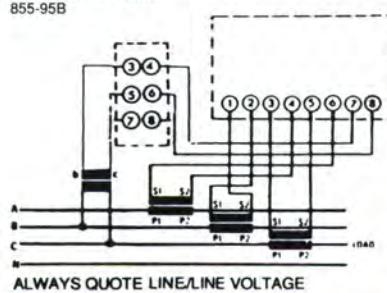
## SYNCHROSCOPE

-145G  
-146G  
Single or 3-phase systems



## 360° POWER FACTOR METER

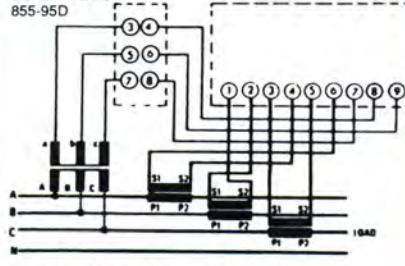
-13IG  
3-phase, 3 or 4-wire, balanced load  
3 current and 1 voltage element  
span 0/1/0  
ABOVE 250V USE  
TRANSFORMER BOX  
855-95B



ALWAYS QUOTE LINE/LINE VOLTAGE

## 360° POWER FACTOR METER

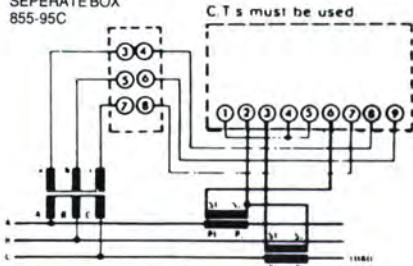
-136G  
3-phase, 3 or 4-wire, unbalanced load  
3 current and 3 voltage elements  
span 0/1/0  
ABOVE 250V USE  
SEPERATE BOX  
855-95D



ALWAYS QUOTE LINE/LINE VOLTAGE

## 360° POWER FACTOR METER

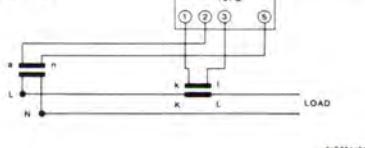
-136G (Alternative connection)  
3-phase, 3-wire unbalanced load  
2 current and 3 voltage elements  
span 0/1/0  
ABOVE 250V USE  
SEPERATE BOX  
855-95C



ALWAYS QUOTE LINE/LINE VOLTAGE

## 360° Power Factor Meter

360° POWER FACTOR METER Single phase 100-125V & 200-250V Ratings  
Type No -137G

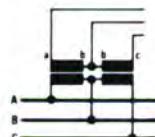


## 360° Power Factor Meter

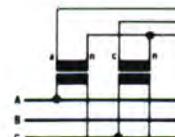
360° POWER FACTOR METER, 3 Phase 3 or 4 Wire Balanced Load  
1 Current & 3 Voltage Elements  
132G  
ABOVE 250V Use  
Transformer Box  
855-95D  
Always Quote Line/Line Voltage

## ALTERNATIVE V.T. CONNECTIONS

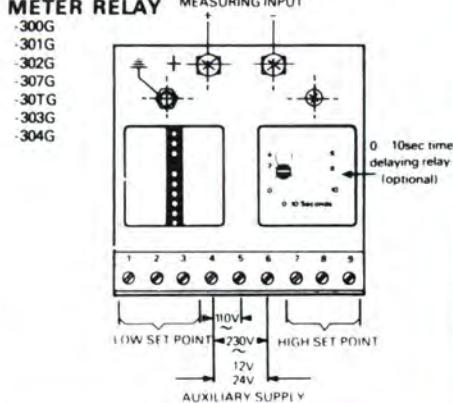
3-phase, 3-wire



3-phase, 4-wire

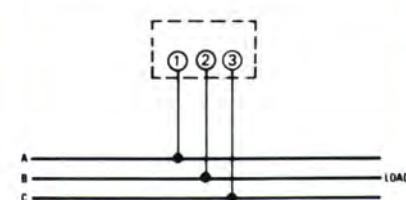


## METER RELAY



## PHASE SEQUENCE INDICATOR

-12PG



## NOTES

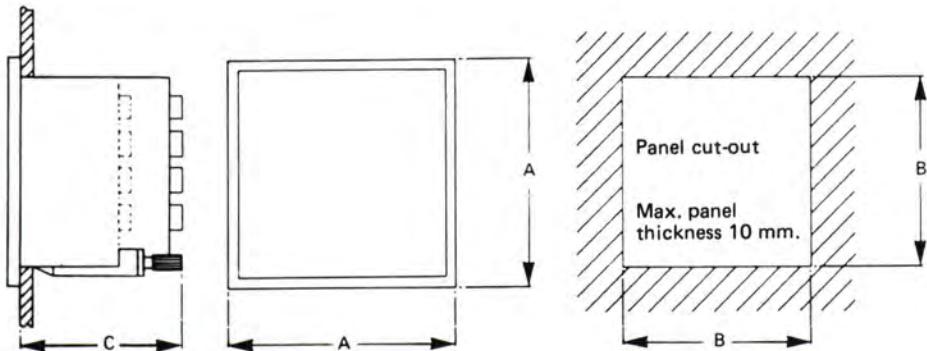
Where practical, all circuits should be earthed at one point.  
Voltagged circuits should be fused.  
C.T. circuits must not be open-circuited on load.  
Connection diagrams are shown with current and voltage transformers, which are subject to separate order.  
Direct connected ratings are usually available for voltages up to 600V and currents up to 10A.  
Calculate watt scales as follows:  
single phase =  $V \times A \times PF$   
3 phase =  $3 \times V \text{ phase} \times A \times PF$   
or =  $V \sqrt{3} \times V \text{ line} \times A \times PF$   
round off upwards, allowing for overloads.

# Quadratic 240 Series



## Dimensions

Case sizes to DIN43700. Narrow bezels to DIN43718.



Base cover available for 243 and 244 Slide - in dial instruments only.

Model	242	243	244	246
Bezel 'A'	48 x 48	72 x 72	96 x 96	144 x 144
Panel cut-out 'B'	45 x 45	68 x 68	92 x 92	138 x 138
Scale length: 90°	42	65	94	145
" " 240°C	72	112	150	230
Maximum overall depth 'C'	242	243	244	246
Ammeter and Voltmeter	75	78	78	95
Maximum Demand Indicator		78	78	95
Wattmeter, VArmetre	— 90°	★	★	87
	— 240°	★	★	145
Phase Angle, Power Factor Meter	— 90°	★	★	145
	— 240°	★	★	65
Frequency Meter	— 90°	★	78	95
	— 240°	★	★	126
★ M.C. Indicator with separate transducer	75	78	78	95
Reed Frequency Meter	—	78	78	—
Synchronising Voltmeter	—	—	78	—
Synchroscope, 360° Power Factor Meter	—	—	140	131
Phase Sequence Indicator	—	—	78	—
Position Indicator	★	★	140	131
Speed Indicator	75	78	78	95
Temperature Indicators	—	—	140	131
Elapsed Time Meter	—	78	78	—
Meter Relay	—	—	120	—



Terminal Boot available for all Quadratic Instruments.

Terminals: Voltage and current up to 30A — M5 screw clamps. Current above 30A — M8 studs with nuts.

\* Dimensions of external transducers for use with moving coil indicators are given in publication SW2501T or SW250T.

*The information contained in this specification is correct at the time of publication, but the right is reserved to supply instruments differing in construction and appearance from those illustrated and described.*

## CROMPTON INSTRUMENTS (AUSTRALIA) PTY. LTD.

### HEAD OFFICE:

N.S.W. Unit 20, Minto Industrial Park, 25-31 Airds Road, Minto, N.S.W. 2566 ..... Ph: 02 603 2066 Fax: 02 603 9335

### BRANCH OFFICES:

S.A. 350 Torrens Road, Croydon Park, S.A. 5008 ..... Ph: 08 347 1522 Fax: 08 347 3094  
 VIC. 3 Chesterville Road, Cheltenham, Vic. 3192 ..... Ph: 03 584 8844 Fax: 03 584 1042  
 W.A. Suite 1, 929 Wellington Street, West Perth, W.A. 6005 ..... Ph: 09 321 4387 Fax: 09 321 8901

### QUEENSLAND AGENTS:

Bartlett Marketing Co. Pty. Ltd., Underwood, Qld. 4119 ..... Ph: 07 841 1586 Fax: 07 841 1676  
 Industrial & Marine Electrics, Cairns, Qld. 4870 ..... Ph: 070 35 2722 Fax: 070 35 2723  
 Marcon Agencies Pty. Ltd., Garbutt, Qld. 4818 ..... Ph: 077 25 4499 Fax: 077 25 4511

### N.S.W. AGENTS:

Excell Control Pty. Ltd., Unanderra, N.S.W. 2526 ..... Ph: 042 72 1922 Fax: 042 72 1833  
 Borg Electrical Wholesalers Pty. Ltd., Broadmeadow, N.S.W. 2292 ..... Ph: 049 52 4366 Fax: 049 52 7490

### TASMANIAN AGENTS:

George Harvey Electric Pty. Ltd., Hobart, Tas. 7000 ..... Ph: 002 34 2233 Fax: 002 31 1347  
 George Harvey Electric Pty. Ltd., Launceston, Tas. 7250 ..... Ph: 003 31 6533 Fax: 003 34 1899

### NORTHERN TERRITORY AGENT:

I.S.A.S., Winnellie, N.T. 0820 ..... Ph: 089 47 2313 Fax: 089 47 0149

### SOUTH PACIFIC ISLANDS:

Export Procurement Pty. Ltd., Northgate, Qld. ..... Ph: 07 260 5499 Fax: 07 260 5546

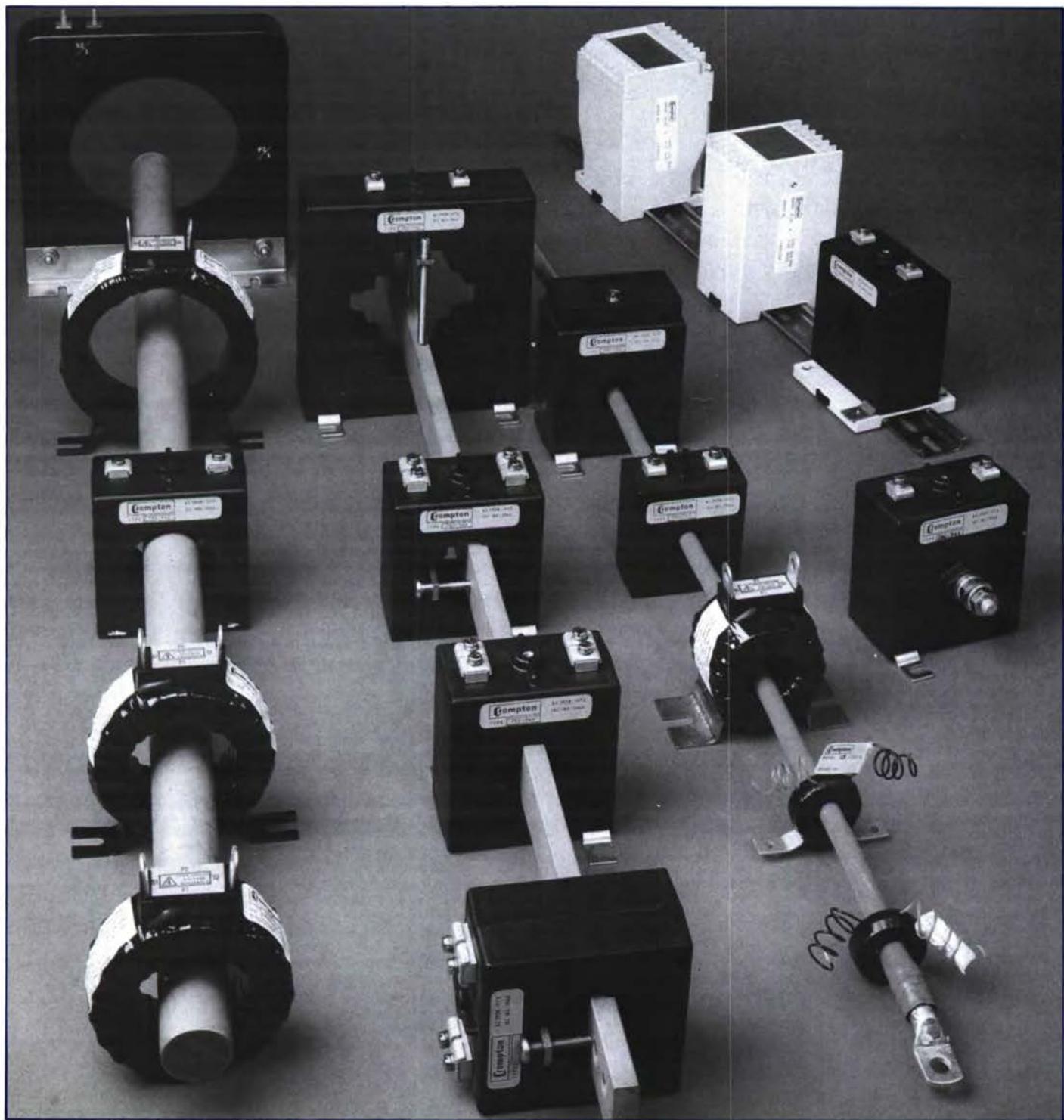
### NEW ZEALAND AGENT:

Electrade Limited, Auckland. ..... Ph: 09 525 1031 Fax: 09 525 1756

# CROMPTON



## CURRENT TRANSFORMERS





# Current Transformers

## Contents Guide

CASE STYLE	MODEL REFERENCE	PRIMARY CURRENT	SECONDARY CURRENT	SERVICE DUTY	PAGE
	Series 780 Moulded Case	1A — 2500A	1A & 5A	Metering Protection	4 — 7
	Series 770 Tape Insulated	1A — 100A	10mA — 100mA	Distance Metering Galvanic Isolation	8
	Single Phase Model 252-94 Three Phase Model 253-94 DIN Case	1A — 5A 1A — 5A	10mA 1A — 5A	Distance Metering Galvanic Isolation	9
	Series 810 Tape Insulated	40A — 3000A 100A — 3000A Specials	1A & 5A 5A & 1A Specials	Metering Protection Specials	10 — 14
	Model 809 Moulded Case	500A — 4000A	1A & 5A	Metering	15

## Multi-Ratio, Summation, Interposing, Core-Balance and Earth Leakage Current Transformers

These special duty current transformers can be supplied to customers' requirements. Please supply details of primary and secondary current ratios required, VA output and accuracy class.

## C.T's with alternative specifications

Customers special requirements can usually be met. Please supply full details.

## Low Current Ratios

Lower ratios than those listed can be obtained by passing the primary conductor through the ring more than once as specified below.

STANDARD CT RATIO	PRIMARY INSERTED TURNS TO OBTAIN REQUIRED RATIO								
	5/5	10/5	15/5	20/5	25/5	30/5	40/5	50/5	60/5
40/5	8	4	—	2	—	—	1	—	—
50/5	10	5	—	—	2	—	—	1	—
60/5	12	6	4	3	—	2	—	—	1
75/5	15	—	5	—	3	—	—	—	—
80/5	16	8	—	4	—	—	2	—	—
100/5	20	10	—	5	4	—	—	2	—
120/5	24	12	8	6	—	4	3	—	2



# Current Transformers

## Measuring Duty Current Transformers

### Accuracy selection

Class 0.2	Available on request. Designed to individual customer requirements, energy metering, micro control systems.
Class 0.5	Transducers, pay integration meters, test equipment, control systems
Class 1	Watt/VAr/Phase Angle meters, recording meters, protection devices, instrument transducers
Class 3	Industrial ammeters, maximum demand indicators

### VA Burden Guide

0.5	Short scale moving iron ammeters
0.75—1.5	240° scale moving iron ammeters
0.2—1	Rectified moving coil ammeters
1—1.25	Watt/VAr/Phase Angle meters
2—4	Recording ammeters
2—3.5	Maximum Demand Indicators
3—3.5	Combined MDI & MI
0.5—4	Paladin transducers
0.5—4	Protector modules
5—10	Electronic control systems

## Protection Duty Current Transformers

Protection duty current transformers are supplied to accuracy classes 5P or 10P. The figures 5 or 10 define the maximum composite errors in percentage permitted at the specified overload value. Letter 'P' indicates a protection duty.

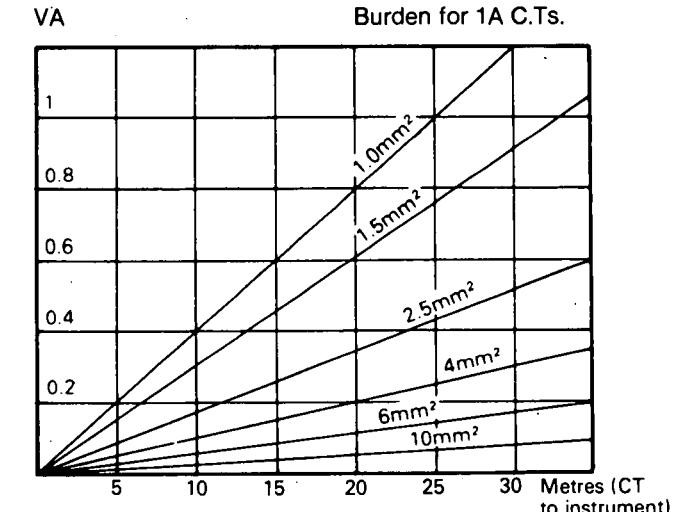
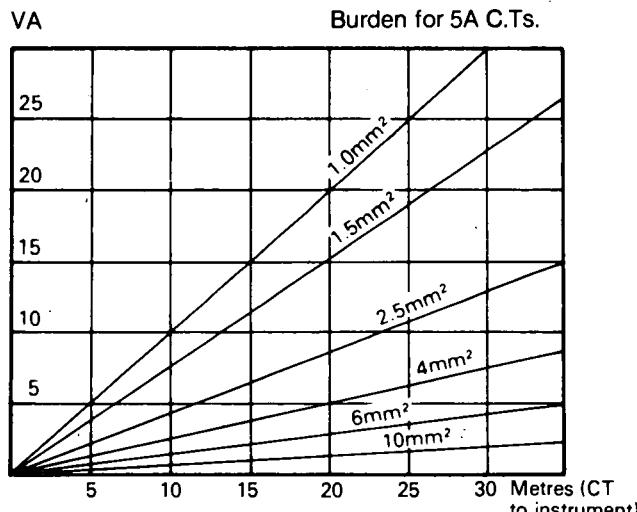
The rated accuracy limit factor (or overload multiple) is specified by a further figure added to the code. 5, 10 and 15 satisfy most applications and indicate overload values x5, x10 and x15. For more detailed information, see BS3938: 1973.

Rated outputs available in VA are 2.5, 5, 7.5, 10, 15. Correct selection requires reference to relay manufacturers recommendations.

The secondary circuit must not be open-circuited when primary is energised since a dangerously high voltage can build up in certain conditions. Terminals are not insulated against physical contact.

## Secondary Lead Burden

The resistance of the secondary lead circuit can be significant and must be taken into account when the current transformer burden is chosen. Where the current transformer is mounted remotely a 1 amp secondary should be used.



# 780 Series

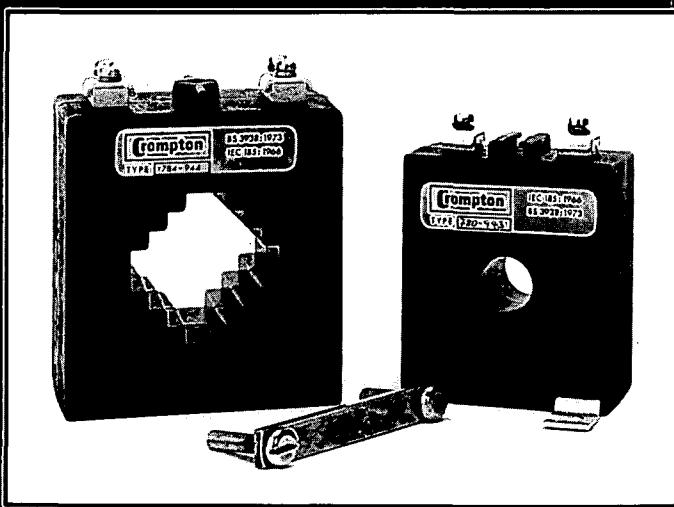


The Crompton 780 Series offers current ratios, VA outputs and accuracy classes to suit the requirements of modern electrical and electronic installations.

The tough moulded cases are designed for appropriate busbar or cable sizes and incorporate alternative foot or busbar fixing options.

They comply with most international standards for ring current transformers.

A major feature is the ease of installation with several base and busbar mounting arrangements.



## Features

- ★ high impact, flame-retardant moulded cases (classification UL94V-1)
- ★ secondary currents for 1A or 5A
- ★ primary currents 1A to 2500A
- ★ cable or busbar styles
- ★ simple busbar clamp or push-in fixing feet
- ★ alternative DIN rail mounting adaptor
- ★ single or twin screw terminals
- ★ alternative terminations with integral 600mm leads
- ★ wire sealable terminal cover

## Standards Compliance

Designed to international standards, the 780 Series complies with the following specifications.  
BS3938: 1973 (1982), IEC 135: 1966.

## Secondary Terminals

All models can be supplied with single or double M4 screw shell clamp terminals eliminating the use of cable shoes or tags.

When specified insulated flexible leads (600mm) can be provided in place of screw terminals.

## Performance

System voltage	= 660V max
Test voltage	= 3kV for 1m
System frequency	= 50/60Hz (400Hz available on request)
Short circuit thermal current (I <sub>th</sub> )	= 60 x rated primary current for 1 second
Rated dynamic current (I <sub>dyn</sub> )	= 2.55 x I <sub>th</sub>
Saturation co-efficient	= <5 for plain ring <10 for wound primary
Service temperature	: -20°C to 85°C
Insulation class BS2757	: Class A (max 105°C)
Enclosure code	: IP40

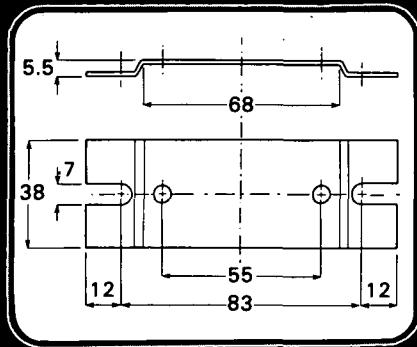
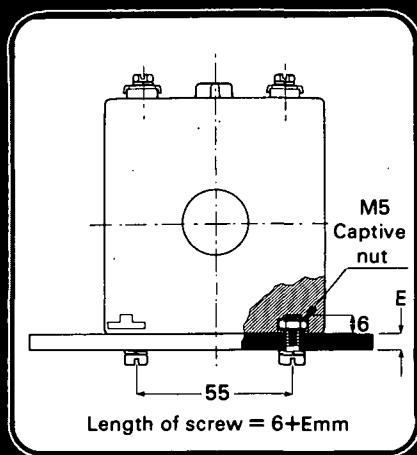
## Installation

A set of push-in fixing feet or busbar clamp, as necessary, are supplied with each CT.

In-line primary busbar inserts and centre insert are available for some models.

A 35mm DIN rail mounting adaptor is available for all models except 788.

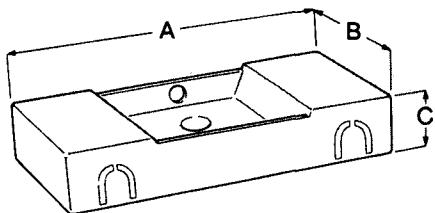
Models 781, 782, 783, 784, 785, 786 have two M6 screw fixings in the base.



# 780 Series

## Terminal cover

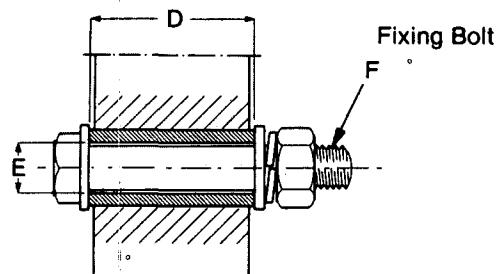
A wire sealable cover is available to insulate the secondary terminals.



Type No.	DIMENSIONS mm		
	A	B	C
780	56	31	14
All other Types	71	38	14

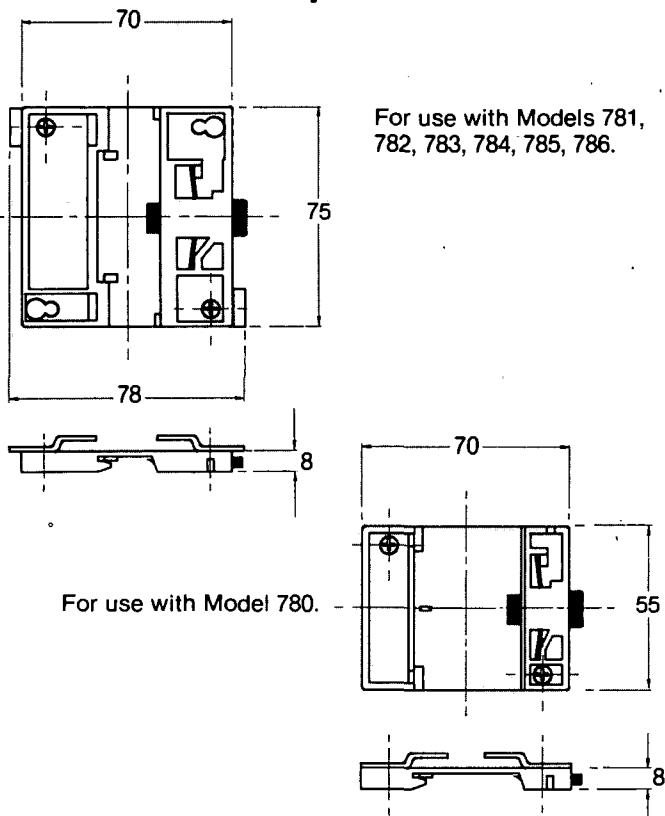
## Fixing between 2 conductors

A centre insert, designed for types 780 and 781 allows clamping between two bar or cable primary conductors.

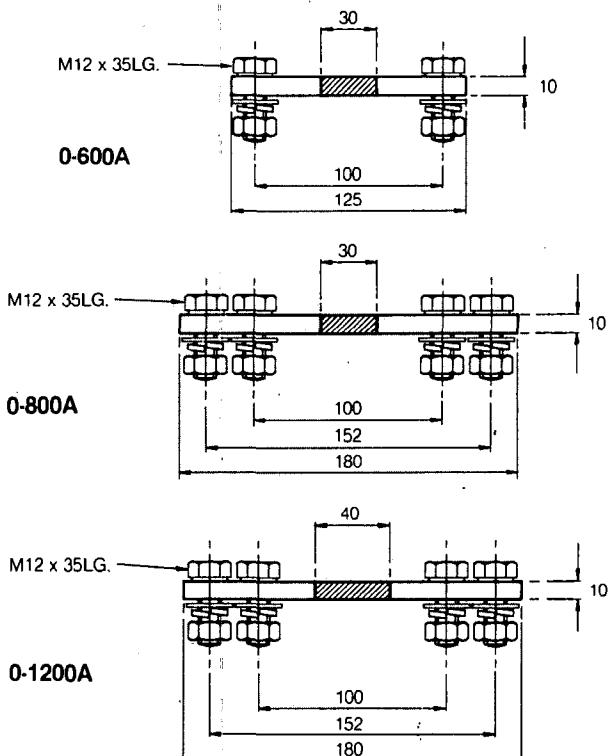


Type No.	DIMENSIONS mm		
	D	E	F
780	36	8.2	M8x50
781	46	14	M12x75

## DIN Rail Adaptor



## Primary Busbars

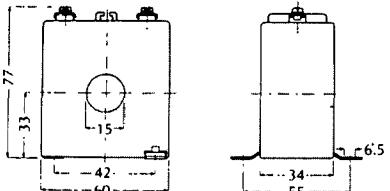


# 780 Series

Accuracies comply with BS3938: and IEC 185:

All measurements in millimetres

## Type 780—943



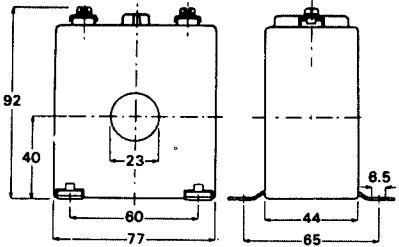
Supplied with 2 fixing feet.

Max cable Ø = 15mm.

1A secondaries are available for all ratings.

CT Ratio	VA at Class		
	5	3	1
30/5	1.5	—	—
40/5	2	1.5	—
50/5	2.8	2.5	—
60/5	3.5	3	—
75/5	5	4	—
80/5	5	4	—
100/5	—	5	2.5
120/5	—	5	2.5
125/5	—	5	2.5
150/5	—	5	2.5
200/5	—	6	3
250/5	—	7.5	4

## Type 781—943



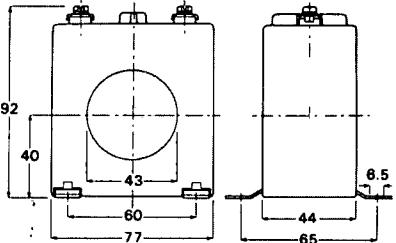
Supplied with 4 fixing feet

Max cable Ø = 23mm

1A secondaries are available for all ratings

CT Ratio	VA at Class		VA at Class		VA at Class		
	3	1	3	1	3	1	0.5
40/5	2.5	—	—	—	—	—	—
50/5	2.5	—	—	—	—	—	—
60/5	2.5	—	—	—	—	—	—
75/5	2.5	—	5	2.5	—	—	—
80/5	2.5	—	5	2.5	—	—	—
100/5	5	—	7.5	5	—	—	—
120/5	5	—	7.5	5	—	—	—
125/5	5	—	7.5	5	—	—	—
150/5	5	—	7.5	5	15	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



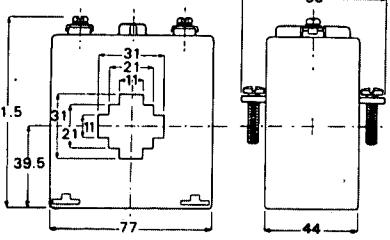
Supplied with 4 fixing feet

Max cable Ø = 43mm

1A secondaries are available for all ratings except 1200A

CT Ratio	VA at Class 3		VA at Class		VA at Class		
	3	1	3	1	3	1	0.5
100/5	2.5	—	—	—	—	—	—
120/5	2.5	5	2.5	—	—	—	—
125/5	2.5	5	2.5	—	—	—	—
150/5	2.5	7.5	4.5	—	5 or 3	—	—
200/5	2.5	7.5	5	10	6	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

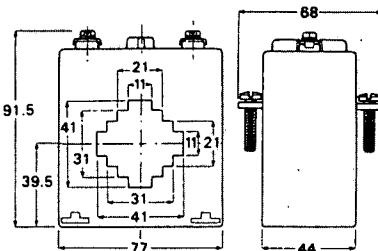
CT Ratio	VA at Class		VA at Class		VA at Class		
	3	1	3	1	3	1	0.5
75/5	2.5	—	—	—	—	—	—
80/5	2.5	—	—	—	—	—	—
100/5	2.5	—	5	2.5	—	—	—
120/5	2.5	—	5	5	—	—	—
125/5	2.5	—	5	5	—	—	—
150/5	2.5	—	5	5	10	7.5	2.5
200/5	5	—	7.5	5	15	10	5
250/5	5	2.5	10	7.5	20	15	10
300/5	5	2.5	15	10	20	15	10
400/5	5	2.5	15	10	20	15	10
500/5	—	—	—	—	30	15	10
600/5	—	—	—	—	30	15	15
750/5	—	—	—	—	30	15	15
800/5	—	—	—	—	30	15	15

# 780 Series



Accuracies comply with BS3938: and IEC 185:

## Type 784—944

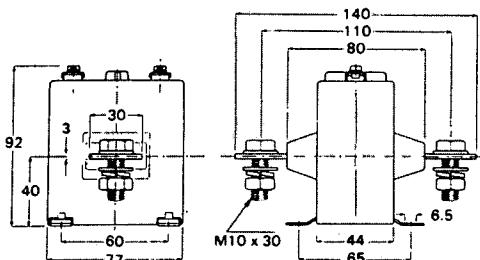


Supplied with busbar clamp

For busbar 40 x 10, 30 x 20mm and cable Ø 32mm.  
1A secondaries are available for all ratings  
except 1200A

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

## Type 785—946

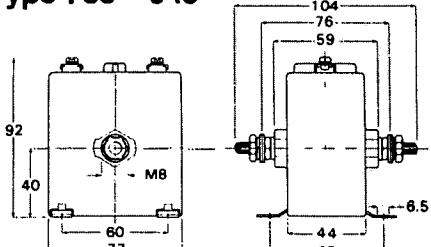


Supplied with 4 fixing feet

1A secondaries are available for all ratings

CT Ratio	VA at Class 3		VA at Class 3		VA at Class 3		
	3	1	3	1	0.5		
1/5	5	7.5	5	18	15	7.5	7.5
5/5	5	7.5	5	18	15	7.5	7.5
7.5/5	5	7.5	5	18	15	7.5	7.5
10/5	5	7.5	5	18	15	7.5	7.5
15/5	5	7.5	5	18	15	7.5	7.5
20/5	5	7.5	5	18	15	7.5	7.5
25/5	5	7.5	5	18	15	10	10
30/5	5	7.5	5	18	15	10	10
40/5	5	7.5	5	18	15	10	10
50/5	5	7.5	5	18	15	10	10
60/5	5	7.5	5	15	15	10	10
75/5	5	7.5	5	18	15	10	10
80/5	5	7.5	5	18	15	10	10
100/5	5	7.5	5	18	15	10	10
120/5	5	7.5	5	20	15	10	10
125/5	5	7.5	5	20	15	10	10
150/5	5	7.5	5	20	15	10	10
200/5	5	7.5	5	20	15	10	10
250/5	5	7.5	5	20	15	10	10

## Type 786—946

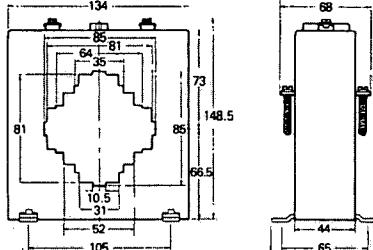


Supplied with 4 fixing feet

1A secondaries are available for all ratings

CT Ratio	VA at Class 3		VA at Class 3		VA at Class 3		
	3	1	3	1	0.5		
1/5	5	7.5	5	18	15	7.5	7.5
5/5	5	7.5	5	18	15	7.5	7.5
7.5/5	5	7.5	5	18	15	7.5	7.5
10/5	5	7.5	5	18	15	7.5	7.5
15/5	5	7.5	5	18	15	7.5	7.5
20/5	5	7.5	5	18	15	7.5	7.5
25/5	5	7.5	5	18	15	10	10
30/5	5	7.5	5	18	15	10	10
40/5	5	7.5	5	18	15	10	10
50/5	5	7.5	5	18	15	10	10

## Type 788—944



Supplied with busbar clamp

4 fixing feet are an optional extra

For busbar 80 x 30, 64 x 35, 50 x 50mm and cable Ø 63mm

1A secondaries are available for all ratings  
except 2500A

CT Ratio	VA at Class 3			VA at Class 3			10P10 VA
	3	1	0.5	3	1	0.5	
200/5	7.5	2.5	—	10	5	—	—
250/5	10	5	—	15	10	5	—
300/5	15	10	5	20	15	10	—
400/5	15	10	7.5	25	15	10	—
500/5	20	15	10	30	20	15	5
600/5	15	10	5	30	20	15	5
750/5	15	10	5	40	25	15	5
800/5	20	15	7.5	40	30	20	5
1000/5	25	20	10	50	40	30	5
1200/5	30	20	15	50	40	30	5
1500/5	30	20	15	50	40	30	5
1600/5	40	30	20	—	—	—	5
2000/5	50	40	30	—	—	—	5
2500/5	50	40	30	—	—	—	—

# 770 Series



## Miniature C.T's

### Features

- ★ Slips over mains cables
- ★ Plain ring, cable tie or foot mounted
- ★ Size permits pcb mounting
- ★ Tough PVC moisture resistant coating
- ★ Secondary output 10mA
- ★ Primary rating 1A — 100A
- ★ Multi-range version 10A — 100A

### Applications

- ★ Distance measuring via light conductors
- ★ Galvanic isolation for control circuits
- ★ Converts mains current to electronic signal values
- ★ Operates electronic relays
- ★ Moving coil rectifier meters, recorders, digital readouts

### Selection Table

Intermediate primary current ratings available.

### Performance

#### MODELS 771, 772

Primary ratings  
Secondary outputs

: 1A — 100A  
: 10mA standard  
Other outputs available on request  
: 0.03VA (3V at 10mA)

#### VA output

#### MODEL 773 MULTI-RANGE

Primary current range  
Secondary output  
VA output

: 10A — 100A  
: 10mA — 100mA  
: 0.015VA — 0.15VA

#### ALL MODELS

System frequencies  
Service temperature  
Insulation class BS2757  
Operating voltage  
Test voltage

: 50-60Hz, 400Hz  
: 0°C — 80°C  
: class Y (Max. 90°C)  
: 660V a.c. max.  
: 2000V d.c.

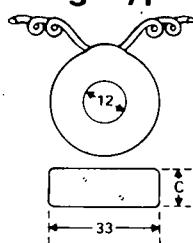
#### Accuracy class at standard VA load :

% rated	% total error (phase displacement and ratio error)
Primary current	: 1.5% max.
20-80%	: 1.0% max.

Alternative specifications to meet customers' special requirements can usually be accommodated.

#### 771-940

#### Ring Type

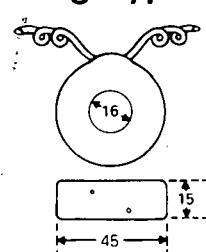


Leads 150mm Flexible

Primary current	Dimension C
10A	15
15A	14
20A	14
25A	14
30A	14

#### 773-940

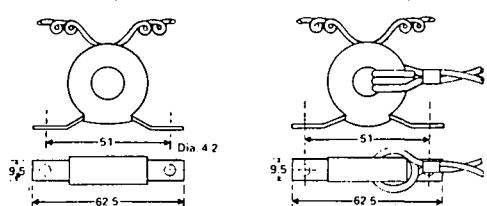
#### Ring Type — multi-range



Primary current	Secondary output	VA output
10A	10mA	0.015
↓ 100A	↓ 100mA	0.15

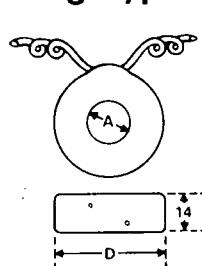
#### Foot Mounting Option

MODELS 771, 772 & 773-942 MODEL 771-94\* (Wound Primary)



#### 772-940

#### Ring Type



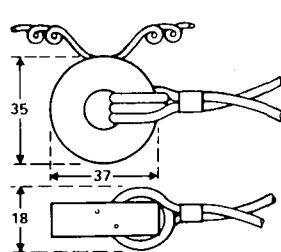
Leads 150mm Flexible

Primary current	Dimension A	Dimension D
40A	25	43
50A	25	43
60A	25	43
75A	25	43
100A	24	44

#### 771-945

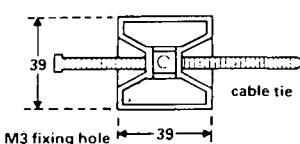
#### Wound Primary Type

150mm Leads



Primary current	Secondary output
1	
1.5	
2	
3	
5	10mA
7.5	0.03VA (3V)

#### Cable Tie (with or without self-adhesive mount) :



Code number becomes xxx — 948



# DIN Cased Current Transformers

## MODEL 252 — 94

These current transformers comprise a board mounted Wound Primary C.T., generally as Model 771-945 described on page 8.  
They are housed in a tough flame retardant moulded case complying with DIN 43604.  
The cases are designed for DIN rail mounting and an adaptor can be supplied for screw fixing.

### Styles available

Model 252-94A : Single phase, one C.T.  
Model 252-94B : Three phase, three C.T's.

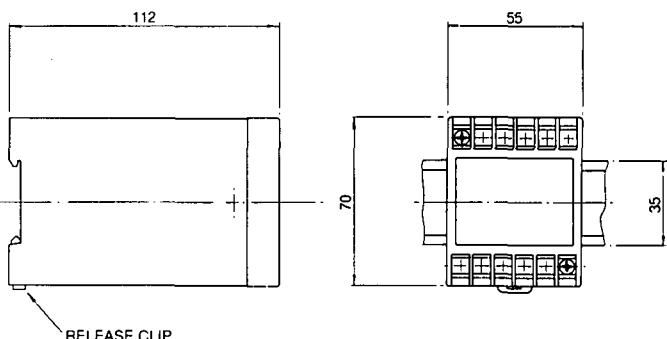
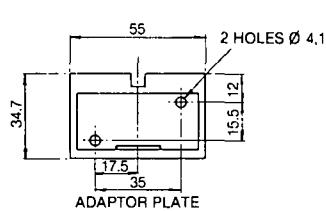
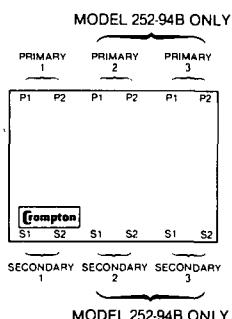
### Performance

Primary ratings	: 1A up to 7.5A
Secondary outputs	: 10mA standard Other outputs available on request
VA output	: 0.03VA (3V at 10mA)
System frequencies	: 50-60Hz, 400Hz
Service Temperature	: 0°C—80°C
Insulation class	: BS2757 class Y (Max. 90°C)
Operating voltage	: 660V ac max.
Test voltage	: 2000V ac
Accuracy class at standard VA load	
% rated	% total error
Primary current 20-80%	(phase displacement and ratio error) : 1.5% max.
81-120%	: 1.0% max.

Alternative specifications to meet customers' special requirements can usually be accommodated.

### Connections

Dimensions—measurements in mm.



## MODEL 253 — 94A

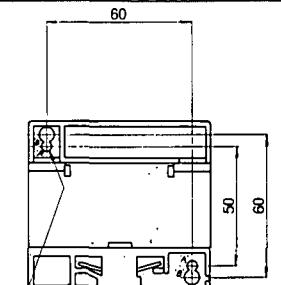
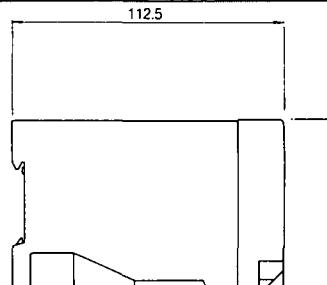
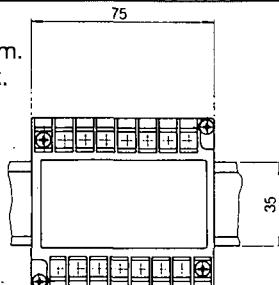
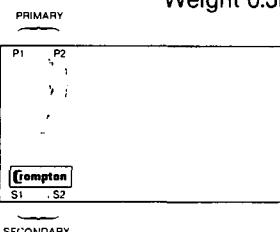
The Crompton Model 253 offers galvanic isolation and current ratio matching for 1 amp and 5 amp mains current C.T., secondaries.  
The current transformers are manufactured to the same high standard and specification as the 780 Series. They are housed in a tough flame retardant moulded case complying with DIN 43604.  
Cases can be DIN rail mounted or fixed by two screws.

### Performance

Primary current	: 1A or 5A
Secondary current	: 1A or 5A
	Any primary or secondary current between 1A and 5A available
System voltage	: 660V max.
Test voltage	: 3kV for 1m
System frequency	: 50/60Hz (400Hz available on request)
Short circuit thermal current (Ith)	: 60 x rated primary current for 1 second
Rated dynamic current (Idyn)	: 2.55 x Ith
Saturation co-efficient	: <5 for plain ring <10 for wound primary
Service temperature	: -20°C to 85°C
Insulation BS2757	: Class A (max 105°C)
Enclosure code	: IP40
Accuracy class	: 1% at 3VA, 5% at 7.5VA

### Connections

Dimensions—  
measurements in mm.  
Weight 0.3kg approx.



VIEW ON BASE SHOWING  
PANEL MOUNTING HOLES

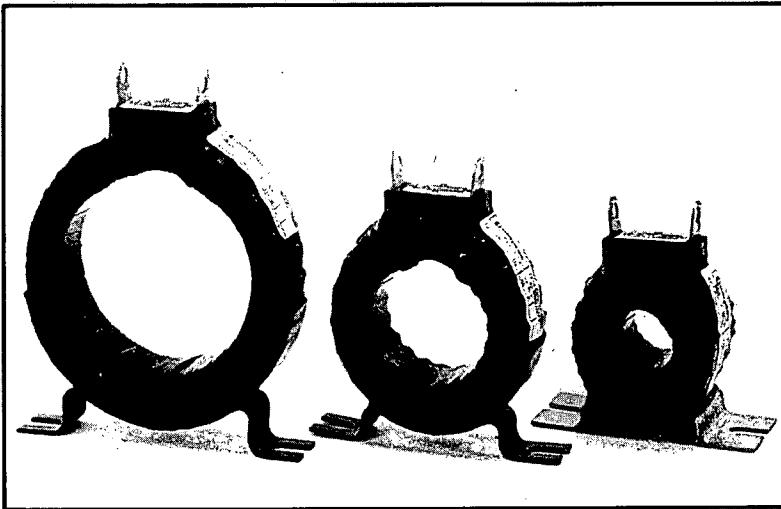
# 810 Series



The Crompton 810 Series provides a comprehensive range of Measuring and Protective duty ring current transformers for installation where traditional reliability, accuracy and quality are required.

## Features

- ★ Plain ring, foot mounting or busbar fixings
- ★ Substantial tag terminals or flexible leads
- ★ Measuring Duty ranges up to 3000A
- ★ Protection Duty classes 5P10 and 10P10
- ★ Special designs to customers requirements



## Performance

Designed to highest standards, 810 Series transformers have accuracy classes, outputs and performance to BS3938: 1973 and IEC185: 1966 for measuring and protective duties.

Overload withstand: to BS3938—IEC185

Operating voltage: 660V a.c. maximum

Test voltage: 2500V a.c.

System frequency: 50/60Hz or 400Hz

Service temperature: - 40°C to + 70°C

Insulation class: BS2757 class Y (Max. 90°C)

## Construction

High grade silicon iron cores are carefully selected, then insulated and protected by a polypropylene covering on which the secondary winding is toroidally wound by precision machines. The P.V.A. coated copper wire is additionally protected by a layer of half-lapped plasticised P.V.C. tape. A second layer of self-bonding P.V.C. tape is applied and vulcanised to provide a tough moisture-resistant coating.

A substantial terminal block with tag terminals and M6 screws and nuts is standard but M4 screws or insulated flex leads (normally 600mm) can be supplied. Integral fixing feet are normally provided but a busbar mount clamp or a plain ring may be specified.

## Style Selection Codes

CODE	- 940	- 941	- 942	- 943	- 944*	- 946 Wound Primary	- 947*
STYLE							
MOUNTING	Plain ring	Plain ring	Foot	Foot	Busbar	Foot	Busbar
WINDING TERMINATION	Flexible leads	Tag terminals	Flexible leads	Tag terminals	Tag terminals	Tag terminals	Flexible leads

\* Busbar mounted types - 944 and - 947 have bore diameter 'A' reduced by 6mm.

## Class X Current Transformers

In balanced earth fault protection systems, correct operation depends on the accuracy of the current transformers.

Class 5P and 10P are suitable where the definite minimum time is greater than 0.2 seconds. For shorter operating times, transient conditions may require current transformers to have cross sectional areas many

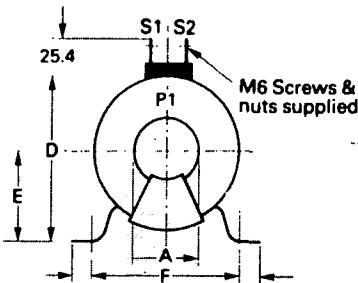
times greater than those of steady state faults. Class X is required for this duty and the following information is required.

- Turns ratio
- Knee point voltage
- Maximum excitation current
- Secondary circuit resistance.

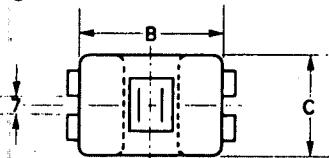
# 810 Series Selection Table



Current transformers can be manufactured to meet specific dimensional and accuracy requirements. (Code 811-94\*). All enquiries should be directed to a local sales centre stating all current, accuracy and dimensional requirements.



Dimensions of Standard 5A C.T.'s given in mm.



1A C.T., dimensions may vary by up to 10%

## Measuring Current Transformers

Accuracies comply with BS3938 and IEC 185.

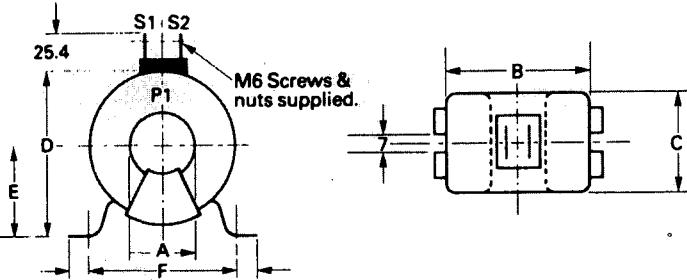
Model Type	Primary Current	VA at Class			Approx. 5 Amp Dimensions						Weight Kgs
		3	1	0.5	A	B	C	D	E	F	
812	40A	2	—	—	20	60	48	66	40	75	0.48
812	50A	2.5	—	—	20	60	48	66	40	75	0.48
813		5	—	—	30	102	65	108	61	105	2.2
812	60A	2.5	—	—	20	60	48	66	40	75	0.48
813		5	—	—	30	76	55	82	48	85	0.85
812	75A	5	—	—	20	60	48	66	40	75	0.5
813		5	3	—	30	76	55	82	48	85	0.85
813		10	6	4	30	102	100	108	61	105	3.4
812	80A	5	—	—	20	60	48	66	40	75	0.5
813		5	3	—	30	76	55	82	48	85	0.85
813		10	6	4	30	102	100	108	61	105	3.4
814	100A	5	—	—	42	84	35	90	52	85	0.5
815		10	5	2.5	42	108	45	114	64	105	1.6
815		15	7.5	4	42	108	73	114	64	105	2.65
814	120A	5	2.5	—	42	84	35	90	52	85	0.55
815		10	5	2.5	42	108	35	114	64	105	1.15
815		15	7.5	4	42	108	73	114	64	105	2.65
814	150A	7.5	5	—	42	84	35	90	52	85	0.55
815		20	10	5	42	84	45	90	52	85	0.8
814	200A	10	5	—	42	84	35	90	52	85	0.6
815		15	10	5	42	84	35	90	52	85	0.8
815		30	20	10	42	108	45	114	64	105	1.65
814	250A	10	5	—	42	84	35	90	52	85	0.65
815		15	10	5	42	84	35	90	52	85	0.65
815		35	25	15	42	108	45	114	64	85	0.65
814	300A	10	5	—	42	84	35	90	52	85	0.7
815		15	10	5	42	84	35	90	52	85	0.7
815		35	25	15	42	84	45	90	52	85	0.85
814	400A	20	10	5	42	84	35	90	52	85	0.75
815		30	20	10	42	84	35	90	52	85	0.75
816	500A	20	15	5	74	112	30	118	66	105	0.65
817		30	20	15	74	112	52	118	66	105	1
816	600A	20	15	5	74	112	30	118	66	105	0.7
817		30	20	15	74	112	52	118	66	105	1
816	750A	20	15	5	74	112	30	118	66	105	0.7
817		30	20	15	74	112	30	118	66	105	0.7
816	800A	30	20	10	74	112	30	118	66	105	0.7
817		30	25	20	74	112	30	118	66	105	0.7
818	1000A	40	30	15	98	142	33	148	81	125	0.85
818	1200A	50	30	15	98	142	33	148	81	125	0.9
818	1500A	50	30	20	98	142	33	148	81	125	1.05
818	1600A	50	30	20	98	142	33	148	81	125	1.15
818	2000A	60	45	30	98	142	33	148	81	125	1.3
819	2500A	60	45	30	114	170	36	176	95	140	1.55
819	3000A	60	45	30	114	170	36	176	95	140	1.7

# Selection Table



Dimensions of Standard 5A C.T.'s given in mm.

1A C.T., dimensions may vary by up to 10%



## Protective Current Transformers

Accuracies comply with BS3938 and IEC 185.

Model Type	Primary Current	VA Burden	Approx. 5 Amp Dimensions						Weight Kgs	
			A	B	C	D	E	F		
Accuracy Class 5P10										
81A	100A	2.5	38	140	76	150	78	125	5.4	
		5	38	140	142	150	78	125	10.8	
	150A	2.5	38	140	54	150	78	125	3.6	
		5	38	140	98	150	78	125	7.2	
	200A	2.5	38	140	54	150	78	125	3.6	
		5	38	140	76	150	78	125	5.4	
	250A	2.5	38	140	54	150	78	125	3.6	
		5	38	140	54	150	78	125	3.6	
	300A	2.5	38	140	32	150	78	125	1.8	
		5	38	140	54	150	78	125	3.6	
81B	400A	2.5	53	140	32	150	78	125	1.8	
		5	53	140	54	150	78	125	3.3	
	500A	2.5	53	140	32	150	78	125	1.9	
		5	53	140	54	150	78	125	3.4	
	600A	2.5	53	140	32	150	78	125	2	
		5	53	140	54	150	78	125	3.5	
81C	800A	5	63	114	42	124	65	105	1.4	
		7.5	63	114	66	124	65	105	2	
	1000A	10	63	114	66	124	65	105	2	
		5	63	114	37	124	65	105	1.3	
	1200A	7.5	63	114	42	124	65	105	1.5	
		10	63	114	66	124	65	105	2.1	
	1500A	5	63	114	37	124	65	105	1.4	
		7.5	63	114	42	124	65	105	1.6	
81D	1600A	10	63	114	66	124	65	105	2.2	
		5	73	132	35	142	74	125	1.5	
	1500A	7.5	73	132	35	142	74	125	1.5	
		10	73	132	57	142	74	125	2.5	
	1600A	5	73	132	35	142	74	125	1.6	
		7.5	73	132	35	142	74	125	1.6	
	1500A	10	73	132	57	142	74	125	2.6	
81E	2000A	5	82	148	30	158	82	125	1.7	
		7.5	82	148	35	158	82	125	2	
	2500A	10	82	148	47	158	82	125	2.6	
		15	82	148	57	158	82	125	3.2	
	3000A	5	80	150	30	160	83	125	1.8	
		7.5	80	150	35	160	83	125	2.1	
	3000A	10	80	150	35	160	83	125	2.1	
		15	80	150	47	160	83	125	2.8	
	3000A	5	78	152	30	162	84	125	2.1	
		7.5	78	152	35	162	84	125	2.5	
	3000A	10	78	152	35	162	84	125	2.5	
		15	78	152	47	162	84	125	3.2	



# 810 Series

## Selection Table continued

Model Type	Primary Current	VA Burden	Accuracy Class 10P10						Weight Kgs
			A	Approx. 5 Amp Dimensions	B	C	D	E	
81F	100A	5	32	102	93	112	59	105	3.3
		7.5	32	102	115	112	59	105	4.5
	150A	10	36	140	119	150	78	125	9.25
		5	32	102	61	112	59	105	2.1
	200A	7.5	32	102	93	112	59	105	3.35
		10	36	140	75	150	78	125	5.6
	250A	5	32	102	56	112	59	105	1.95
		7.5	32	102	77	112	59	105	2.8
	300A	10	32	102	93	112	59	105	3.4
		15	36	140	97	150	78	125	7.5
	400A	5	32	102	51	112	59	105	1.75
		7.5	32	102	61	112	59	105	2.15
	500A	10	32	102	83	112	59	105	3
		15	36	140	75	150	78	125	5.7
	600A	5	32	102	46	112	59	105	1.55
		7.5	32	102	61	112	59	105	2.2
	800A	10	32	102	72	112	59	105	2.65
		15	36	140	75	150	78	125	5.75
81G	400A	5	47	100	56	110	58	105	1.45
		7.5	47	100	83	110	58	105	2.25
	500A	10	47	100	93	110	58	105	2.55
		15	51	140	75	150	78	125	5.15
	600A	5	47	100	51	110	58	105	1.35
		7.5	47	100	83	110	58	105	2.3
	800A	10	47	100	88	110	58	105	2.5
		15	51	140	75	150	78	125	5.15
	1000A	5	44	103	49	113	60	105	1.25
		7.5	44	103	59	113	60	105	1.55
	1200A	10	44	103	86	113	60	105	2.35
		15	44	103	96	113	60	105	2.71
81H	1500A	5	58	115	44	125	66	105	1.2
		7.5	58	115	66	125	66	105	1.95
	1600A	10	58	115	66	125	66	105	1.95
		15	58	115	93	125	66	105	2.9
	1500A	5	58	115	39	125	66	105	1.1
		7.5	58	115	44	125	66	105	1.3
	1600A	10	58	115	66	125	66	105	2.1
		15	58	115	76	125	66	105	2.45
	1500A	5	58	115	39	125	66	105	1.2
		7.5	58	115	44	125	66	105	1.4
	1600A	10	58	115	66	125	66	105	2.2
		15	58	115	66	125	66	105	2.2
81J	1500A	5	71	131	34	141	74	124	1.25
		7.5	71	131	34	141	74	125	1.25
	1600A	10	71	131	56	141	74	125	2.3
		15	71	131	56	141	74	125	2.3
	1500A	5	68	134	37	144	75	125	1.3
		7.5	68	134	37	144	75	125	1.3
	1600A	10	68	134	59	144	75	125	2.35
		15	68	134	59	144	75	125	2.35

# 810 Series

## Selection Table continued

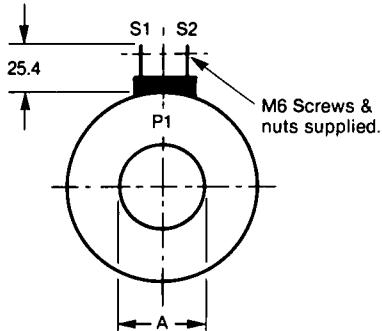
Accuracy Class 10P10									
Model Type	Primary Current	VA Burden	Approx. 5 Amp Dimensions						Weight Kgs
			A	B	C	D	E	F	
81K	2000A	5	78	149	33	159	83	125	1.35
		7.5	78	149	38	159	83	125	1.65
		10	78	149	50	159	83	125	2.35
		15	78	149	60	159	83	125	3
	2500A	5	78	149	33	159	83	125	1.5
		7.5	78	149	38	159	83	125	1.85
		10	78	149	38	159	83	125	1.85
		15	78	149	50	159	83	125	2.55
	3000A	5	78	152	30	162	84	125	2.1
		7.5	78	152	35	162	84	125	2.5
		10	78	152	35	162	84	125	2.5
		15	78	152	47	162	84	125	3.2

## Protection C.T.'s

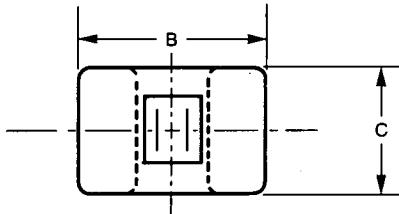
5A secondary is standard. Accuracies comply with BS3938 and IEC 185.

Accuracy Class 10P10									
Model Type	Primary Current	VA Burden	Approx. Dimensions						
			A	B	C	D	E	F	
81L	100	5	40	108	90				
	150	5	40	108	68				
	200	7.5	40	108	73				
	300	10	40	108	68				
	400	10	61	112	90				
	500	10	61	112	73				
	600	10	61	112	73				
	800	15	81	145	60				
	1000	15	81	145	53				
	1200	15	81	145	45				
	1600	15	94	153	49				
	2000	15	117	163	66				
	2500	15	114	166	59				
	3000	15	114	166	59				

### Dimensions



Fixing feet or Busbar clamps available on request.



Protection CT's can also be supplied to meet specific requirements and requests should be made in the same manner as with the 811—94\* Series.



# Model 809

This moulded case metering Current Transformer offers a tough reliable but inexpensive design where higher currents are to be measured.

## Features

- ★ Primary ratings 500A to 4000A
- ★ Secondary current 5A or 1A
- ★ For 100 x 10mm busbars, 108mm cable.
- ★ Square cases with foot or busbar mounting
- ★ Optional 600mm flexible lead terminations

## Performance

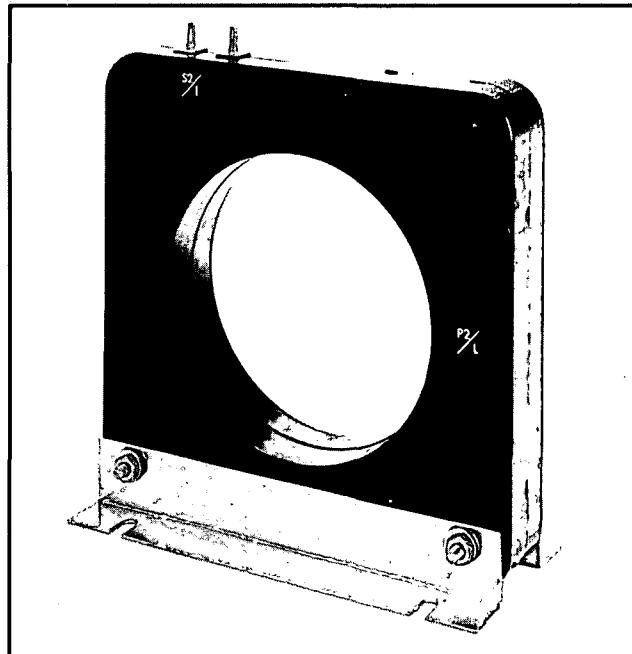
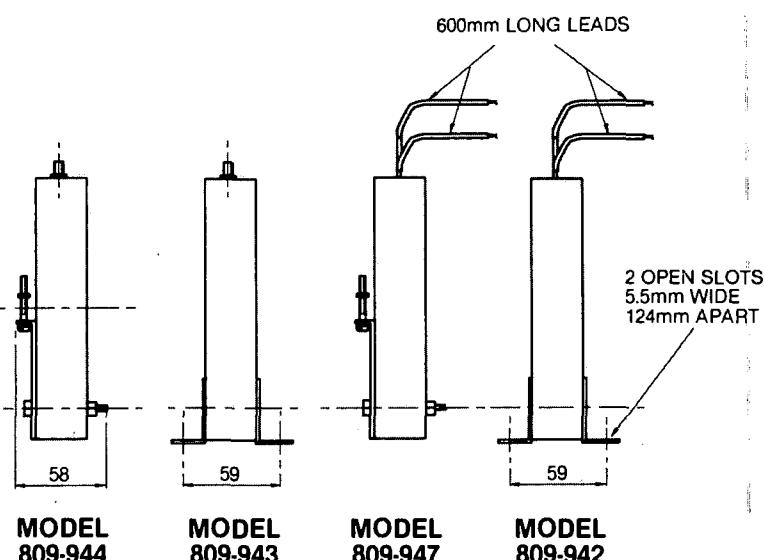
BS3938, IEC 185.

System voltage	: 660V max.
Dielectric test	: 2.5kV for 1m
System frequency	: 50, 60 or 400Hz
Service temperature	: -20°C to 85°C
Enclosure code	: IP40
Insulation class BS2757	: Class 'A' (Max. 105°C)
Accuracies comply with BS3938 and IEC 185	

## Dimensions

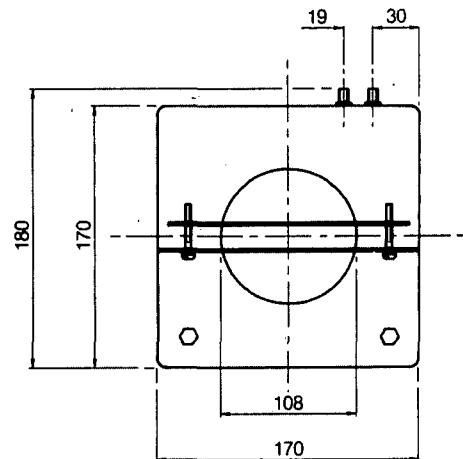
All dimensions in millimetres

BUSBAR MOUNTING      FOOT MOUNTING      BUSBAR MOUNTING      FOOT MOUNTING



## Selection Table

Primary Current A	VA Output at Class			Weight Kg
	3	1	0.5	
500	15	10	5	1.5
600	15	10	5	1.5
750	20	15	10	1.5
800	20	15	10	1.5
1000	25	20	15	1.55
1200	25	20	15	1.6
1500	25	20	15	1.15
1600	25	20	15	1.15
2000	25	20	15	1.25
2500	25	20	15	1.25
3000	30	25	15	1.45
4000	30	25	20	1.55





*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 or dimensions from those illustrated and described.*

#### CROMPTON INSTRUMENTS (AUSTRALIA) PTY. LTD.

##### HEAD OFFICE:

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##### BRANCH OFFICES:

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VIC. 3 Chesterville Road, Cheltenham, Vic. 3192 ..... Ph: 03 584 8844 Fax: 03 584 1042  
W.A. Suite 1, 929 Wellington Street, West Perth, W.A. 6005 ..... Ph: 09 321 4387 Fax: 09 321 8901

##### QUEENSLAND AGENTS:

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Industrial & Marine Electrics, Cairns, Qld. 4870 ..... Ph: 070 35 2722 Fax: 070 35 2723  
Marcon Agencies Pty. Ltd., Garbutt, Qld. 4818 ..... Ph: 077 25 4499 Fax: 077 25 4511

##### N.S.W. AGENTS:

Excell Control Pty. Ltd., Unanderra, N.S.W. 2526 ..... Ph: 042 72 1922 Fax: 042 72 1833  
Borg Electrical Wholesalers Pty. Ltd., Broadmeadow, N.S.W. 2292 ..... Ph: 049 52 4366 Fax: 049 52 7490

##### TASMANIAN AGENTS:

George Harvey Electric Pty. Ltd., Hobart, Tas. 7000 ..... Ph: 002 34 2233 Fax: 002 31 1347  
George Harvey Electric Pty. Ltd., Launceston, Tas. 7250 ..... Ph: 003 31 6533 Fax: 003 34 1899

##### NORTHERN TERRITORY AGENT:

I.S.A.S., Winnellie, N.T. 0820 ..... Ph: 089 47 2313 Fax: 089 47 0149

##### SOUTH PACIFIC ISLANDS:

Export Procurement Pty. Ltd., Northgate, Qld. ..... Ph: 07 260 5499 Fax: 07 260 5546

##### NEW ZEALAND AGENT:

Electrade Limited, Auckland. ..... Ph: 09 525 1031 Fax: 09 525 1756

# KRAUS & NAIMER

## BLUE LINE SWITCHGEAR



## Switch Types

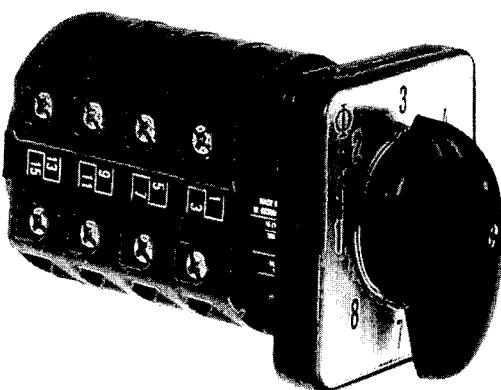
### CA4, CA10, CA11, CA20, CA10B, CA11B, CA20B



- 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	CA11	CA20
	CA10B	CA11B	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
	VE	40	CA10 CA11 CA20 CA10B CA11B CA20B
	FS1	65	Single hole mounting combined with 16 and 22 mm without escutcheon plate
	FS2	65	CA4 with escutcheon plate 30 x 30 mm
	FS4	65	with escutcheon plate 30 x 39 mm
	FT1	65	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 21, 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 CA4 switches offer maximum space saving benefits. A CA4 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. CA4 contacts are supplied standard with gold plating of 1  $\mu$ .

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 CA4 is available with up to 18 contacts. CA10, CA11 and CA20 switches are available with up to 24 contacts.

A wide range of optional extras and enclosures is available.

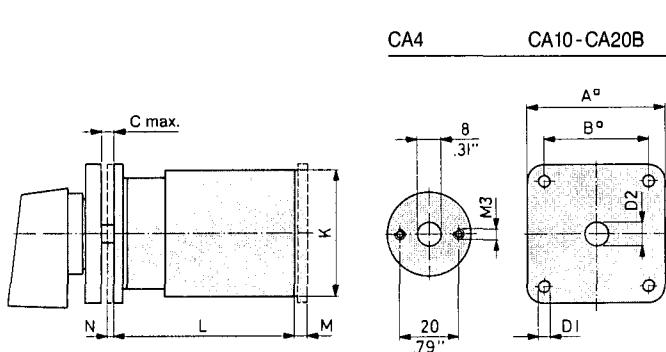
Your order should include the following data:

- 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

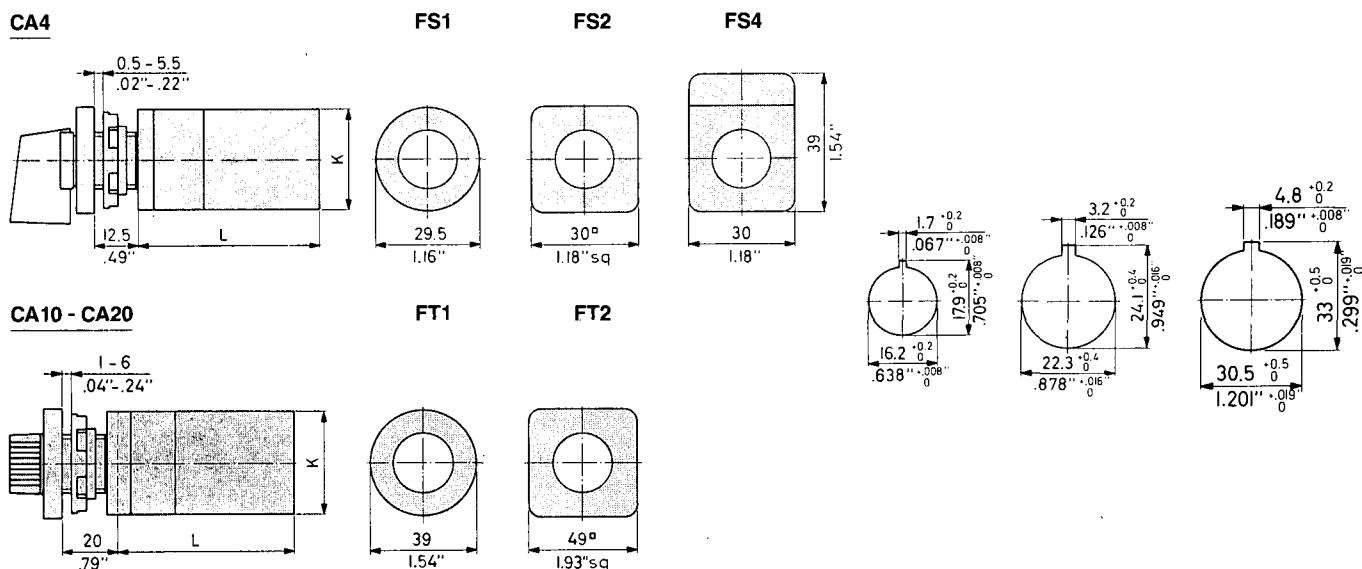
<b>Nominal voltage</b>				
IEC/VDE/BS	V			
UL/CSA	V			
SEV	V			
CEE 24	V			
<b>Main switch characteristic</b>				
Isolator conditions are met up to:	V			
<b>Thermal current <math>I_{th}</math></b>				
IEC/VDE/BS	A			
UL/CSA	A			
SEV	A	max.		
<b>Nominal current <math>I_e</math></b>				
AC 21 IEC/VDE/BS	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				
<b>Ampere Rating</b>				
CEE 24	A			
<b>Resitive/Motor load</b>				
AC 2 IEC/VDE/BS	220-240 V	kW		
	380-440 V	kW		
	500 V	kW		
	660 V	kW		
AC 3 IEC/VDE/BS	220-240 V	kW		
	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	220-240 V	kW		
	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	HP	
<b>Max. fuse size (gL-characteristic)</b>				
Rated conditional short-circuit current	A			
	ka			
<b>Max. permissible wire gage</b>				
stranded wire	2 x	mm <sup>2</sup>		
flexible (with sleeve)	2 x	AWG		
		mm <sup>2</sup>		
		AWG		

**DIMENSIONS** mm  
inch

**Panel mounting and base mounting**


	Mounting	CA4	CA10-CA20	CA10B-CA20B	Mounting	CA4	CA10-CA20	CA10B-CA20B
E/EF/VE <sup>1)</sup>	A	30 1.18	48 1.89	64 2.52	E	<b>D2</b>	6 .24	8,5 .34
	B	-	36 1.42	48 1.89	EF	<b>D2</b>	16 .63	20 .79
E	C	4,5 .18	4 .16	4 .16	VE	M	4 .16	4 .16
VE	C	-	10,5 .41	13,5 .53	EF	N	1 .04	2 .08
E/EF/VE	D1	-	4,1 .16	4,1 .16				

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

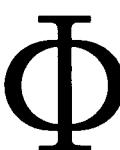
**Single hole mounting 16 or 22 mm and 22 or 30 mm**

**Dimensions L and K**

Type	No. of stages/Dimensions L												K
	1	2	3	4	5	6	7	8	9	10	11	12	
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

a u s t r a l i a n   s o l e n o i d   c o .   p t y .   l t d .

(Registered in N. S. W.)  
**HEAD OFFICE**

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# EASY SELECTION... • FOR THE BEST PROTECTION

A construction worker wearing a yellow hard hat and white shirt, holding a booklet titled "EASY SELECTION... FOR THE BEST PROTECTION". The booklet features a photograph of an industrial facility and a graphic showing three types of GEC fuses: a cartridge fuse, a SC20 circuit breaker, and an RS32 circuit breaker.

The image shows three different types of GEC fuses against a white background. From left to right:

- A cartridge fuse labeled "GEC ENGLISH ELECTRIC R.I.C. FUSE-LINK 32 AMP".
- A black "SAFECLIP" circuit breaker labeled "GEC TYPE SC 20 32 AMP 660v AC USE TIA".
- A black "SAFECLIP" circuit breaker labeled "GEC TYPE RS 32 32 AMP 660v AC USE TIA".

The background of the entire advertisement is a photograph of an industrial facility with large tanks and structures under a clear sky.

**GEC**  
**Fusegear**

# FUSE LINK / FUSE HOLDER SELECTION TABLE AND MOTOR START RECOMMENDATIONS

## CLIP-IN HRC FUSE LINKS AND HOLDERS - 415V.A.C.

Fuse Fitting	Connections Available	Associated Fuse Link	Kw	HP	FLC	Standard Fuse
SC20	H,P,BW	NS2-20A	.37	0.5	1	NS4
			.55	0.75	1.5	NS6
			.75	1	1.9	NS10
			1.1	1.5	2.5	NS10
			1.5	2	3.4	NS16
			2.2	3	4.8	NS16
SC32	H,P,BW	NS2-32A	3	4	6.4	NS20
			4	5.5	8.1	NS25
			5.5	7.5	11.6	NS32
SC63	H,BW	* NS2-32 ES40-63	7.5	10	14.4	ES40
			11	15	21.1	ES50
			15	20	28	ES63



## BOLT-IN HRC FUSE LINKS AND HOLDERS - 415V.A.C.

Fuse Fitting	Connections Available	Associated Fuse Links	† "DIRECT ON LINE MOTOR START RECOMMENDATIONS (415V AC)"				
			Kw	HP	FLC	Standard Fuse	Motor Fuse
RS20	H,P,PH,BW	NIT2-20A NIT20M25 NIT20M32	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	—
			4	5.5	8.1	—	NIT20M25
			5.5	7.5	11.6	—	NIT20M32
RS32	H,P,PH,BW	TIA2-32A TIA32M35 TIA32M50 TIA32M63	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	—
			7.5	10	14.4	—	TIA32M35
RS63	H,P,PH,BW	TIA2-32A TIS35-63A TIS63M80 TIS63M100	11	15	21.1	TIS50	—
			15	20	28	TIS63	—
			18.5	25	35	—	TIS63M80
			22	30	41	—	TIS63M80
			30	40	55	—	TIS63M100
RS100	H,P,PH,BW	TCP80 TCP100 TCP100M125 TCP100M160 TCP100M200	22	30	41	TCP80	—
			30	40	55	TCP100	—
			37	50	69	—	TCP100M125
			45	60	83	—	TCP100M160
			55	75	99	—	TCP100M200
RS200	H,P,PH	TBC2-63A TC80-100A TF125-200A TF200M250 TF200M250	37	50	69	TF125	—
			45	60	83	TF160	—
			55	75	99	TF200	—
			75	100	136	—	TF200M250
			90	120	162	—	TF200M250
RS400	H,P,PH	TKM250/315 TKM355/400 TKM355/400 TM400M450	110	150	200	TM355	—
			132	175	231	TM355	—
			150	200	263	TM400	—
			160	215	281	TM400	—
			185	250	324	—	TM400M450
			200	270	350	—	TM400M450

A FULL RANGE OF HRC FUSE LINKS ARE AVAILABLE FROM 2 AMP TO 1600 AMP

Refer publication IEF401 for technical details.

Asta 20 certified and complying with AS 2005 & BS88.

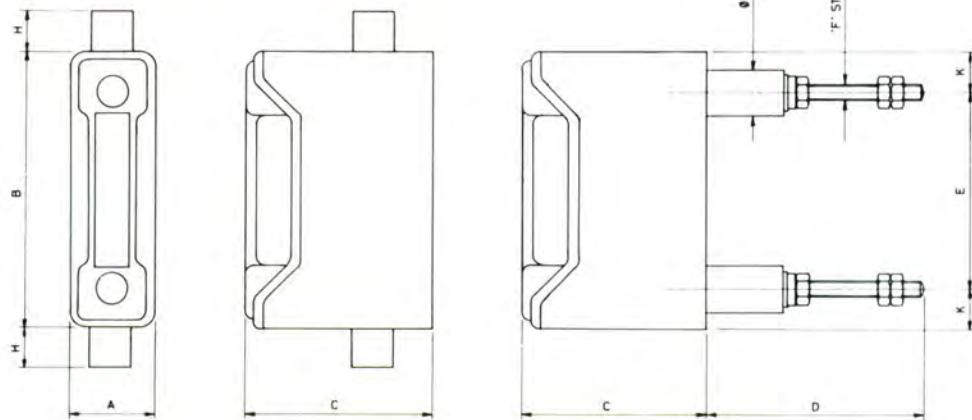
†D.O.L start based upon 7 x FLC for 10 seconds

\*To accommodate the 'NS' fuselink additional fuse carrier list No: SCA63 is required. This must be specified at the time of ordering.

# 'RED SPOT'

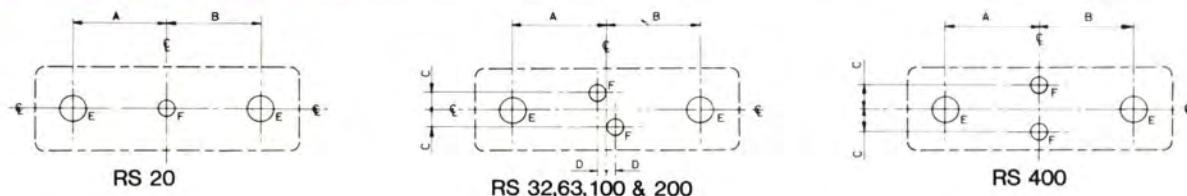
## HRC FUSE HOLDERS

### Dimensions



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

### PANEL DRILLING DIMENSIONS



DIM	FUSE HOLDER TYPE																					
	20 H	20 P	20 PH	20 BW	32 H	32 P	32 PH	32 BW	63 H	63 P	63 PH	63 BW	100 H	100 P	100 PH	100 BW	200 H	200 P	200 PH	400 H	400 P	400 PH
A	-	17,5	17,5	17,5	-	36,5	36,5	36,5	-	36,5	36,5	36,5	-	46,8	46,8	46,8	-	85,7	85,7	-	69,9	69,9
B	-	17,5	-	17,5	-	36,5	-	36,5	-	41,3	-	41,3	-	46,8	-	46,8	-	85,7	-	-	69,9	-
C	-	-	-	-	6,4	6,4	6,4	6,4	6,4	6,4	6,4	6,4	11,1	11,1	11,1	11,1	19,1	19,1	19,1	27	27	27
D	-	-	-	-	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	9,5	9,5	9,5	9,5	28,6	28,6	28,6	-	-	-
E	-	Ø15	Ø15	Ø8	-	Ø20	Ø20	Ø8	-	Ø20	Ø20	Ø8	-	Ø24	Ø24	Ø16	-	Ø27	Ø27	-	Ø35	Ø35
F	HOLES TO SUIT M5 SCREWS												HOLES TO SUIT M6 SCREWS.									

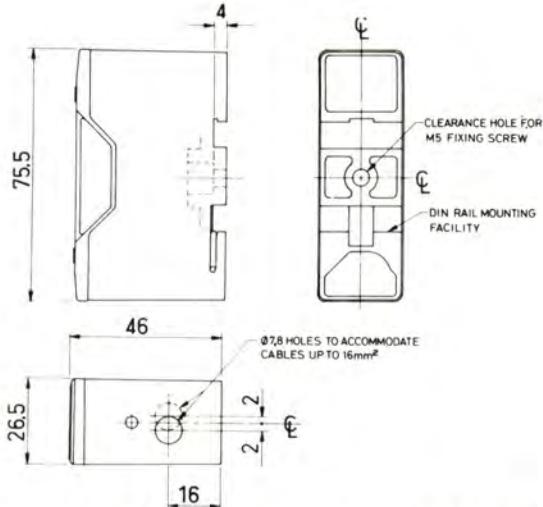
(DIMENSIONS IN MILLIMETRES)

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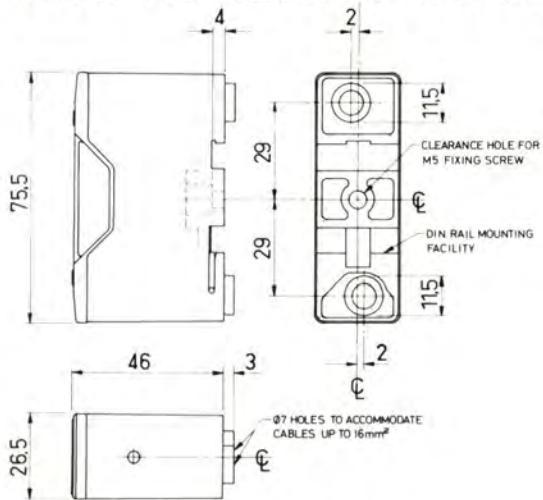
# 'SAFECLIP'

## Dimensions

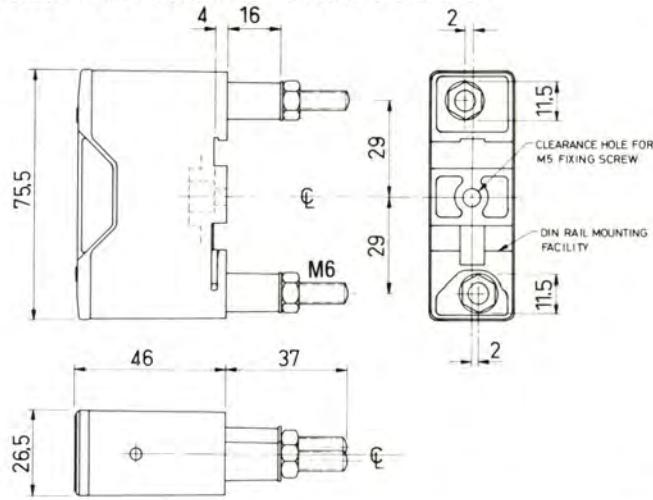
### SC20H AND SC32H; - FRONT CONNECT



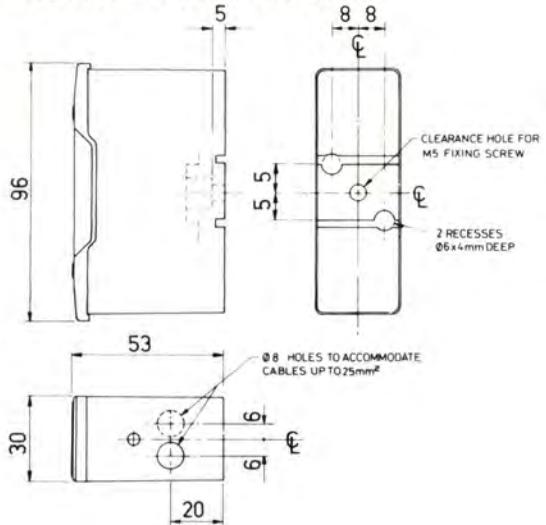
### SC20BW AND SC32BW; - BACK WIRING



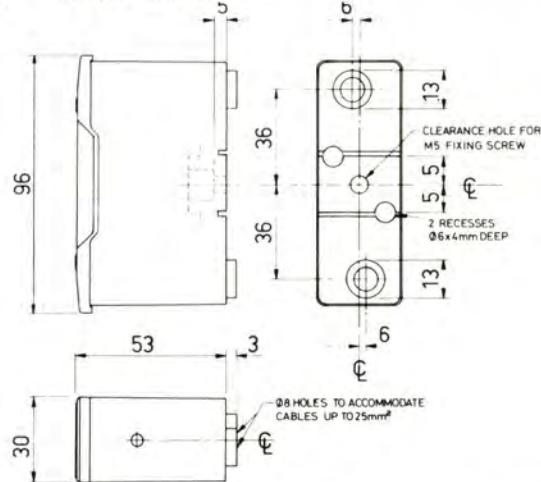
### SC20P AND SC32P; - BACK CONNECT



### SC63H; - FRONT CONNECT



### SC63BW; - BACK WIRING



(DIMENSIONS IN MILLIMETRES)

# GEC

## GEC Industrial Products

A Division of GEC Australia Limited  
Incorporated in New South Wales

Q-Pulse Id TMS720

25 Princes Road, Regents Park, N.S.W. 2143  
P.O. Box 22, Regents Park, N.S.W. 2143  
Telex 20729. Phone 645 0777

Branches in **Sydney**: (02) 645 0777 **Brisbane**: (07) 846 1122

**Newcastle**: (049) 24 883 **Melbourne**: (03) 561 2566

**Hobart**: (002) 34 5133 **Adelaide**: (08) 272 3100 **Perth**: (09) 277 4844

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**SIEMENS**

# **Elektronische Zeitrelais**

## **Electronic Time Relays**

## **Elektroniska tidreläer**

## **Relais temporisé électronique**

## **Relés de tiempo electrónicos**

## **Relè a tempo elettronico**

**7PU40 20, 7PU41 20, 7PU42 20  
7PU43 20, 7PU46 20**
**AC 250 V  
VDE 0435**
**Betriebsanleitung/Instructions****Bestell-Nr./Order No.: GWA 4NEB 963 0520-10c****Deutsch****English****Svenska****Technische Daten**

- 7PU40 20: Funktion ansprechverzögert, 1 Zeitbereich  
 7PU41 20: Funktion ansprechverzögert, 8 Zeitbereiche über Drehschalter an Frontseite einstellbar  
 7PU42 20: ① Funktion über Codierstecker ② und 8 Zeitbereiche über Drehschalter an Frontseite einstellbar  
 7PU43 20: ① Funktion über Codierstecker ② und 8 Zeitbereiche über Drehschalter an Frontseite einstellbar  
 7PU46 20: ① Funktion über Codierstecker ② und 8 Zeitbereiche über Drehschalter an Frontseite einstellbar

Nennbetriebsstrom  $I_n$  (AC-11) bei 220 V: 3 A $I_n$  (DC-11) bei 220 V: 0,1 A

Betätigungsspannung siehe Typschild

Kurzschlusssicherungen: max. 6 A träge

Einstellgenauigkeit:  $\pm 5\%$ 

Mindesteinschaltzeit (bei Funktionen mit Hilfsspannung):

 $\geq 35$  ms

Wiederbereitschaftszeit während Zeitablauf: 150 ms

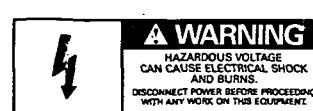
nach Zeitablauf: 50 ms

Wiederholgenauigkeit:  $\pm 1\%$ ,  $\pm 3$  ms (10 s Bereich) $\pm 0,5\%$ , (100 s Bereich) $\pm 0,2\%$ , (min/h Bereich)

Pausenzeit: Bei Funktionen Stern/Dreieck 50 ms

Nennisolationsspannung nach VDE 0110 Gruppe C bis

AC 250 V

**Technical data**

- 7PU40 20: ON-delay function, 1 time range  
 7PU41 20: ON-delay function, 8 time ranges, adjustable on front panel via rotary switch  
 7PU42 20: ① Function selectable via coding plug ② and 8 time ranges adjustable via rotary switch on front panel  
 7PU43 20: ① Function selectable via coding plug ② and 8 time ranges adjustable via rotary switch on front panel  
 7PU46 20: ① Function selectable via coding plug ② and 8 time ranges adjustable via rotary switch on front panel
- Rated operating current  $I_n$  (AC-11) at 220 V: 3 A  
 $I_n$  (DC-11) at 220 V: 0,1 A
- For operating voltage see rating plate
- Fuse rating: max. 6 A time-lag
- Setting accuracy:  $\pm 5\%$
- Minimum operating time (for functions requiring auxiliary voltage):**  $\geq 35$  ms
- Recovery time during operation: 150 ms  
 after operation: 50 ms
- Repeat accuracy:  $\pm 1\%$ ,  $\pm 3$  ms (10 s range)  
 $\pm 0,5\%$ , (100 s range)  
 $\pm 0,2\%$ , (min/h range)
- Interval pause for start/delta starting: 50 ms
- Rated insulation voltage up to 250 V AC to VDE 0110 Group C

**Tekniska data**

- 7PU40 20: Tillslagsfördröjd funktion, 1 tidsområde  
 7PU41 20: Tillslagsfördröjd funktion, 8 tidsområden inställbara på framsidan  
 7PU42 20: ① Funktion via kodningskontakt ② 8 tidsområden inställbara med väljare på framsidan  
 7PU43 20: ① Funktion via kodningskontakt ② 8 tidsområden inställbara med väljare på framsidan  
 7PU46 20: ① Funktion via kodningskontakt ② och 8 tidsområden inställbara på framsidan
- Märkdriftström  $I_n$  (AC-11) vid 220 V: 3 A  
 $I_n$  (DC-11) vid 220 V: 0,1 A
- Manöverspänning: se märkskytten,  
 Kortslutningsräckvidd: max. 6 A trög  
 Inställningsprecision:  $\pm 5\%$

Minsta tillslagstid (vid funktioner med hjälpspänning):  
 $\geq 35$  ms

Återgångstid under gång: 150 ms  
 efter tidsutgång: 50 ms

Upprepningsprecision:  $\pm 1\%$ ,  $\pm 3$  % (10 sek. område)  
 $\pm 0,5\%$ , (100 sek. område)  
 $\pm 0,2\%$ , (min/h område)

Paustdid: vid stjärntriangelfunktion: 50 ms  
 Märkisolationsspänning enl. VDE 0110 Grupp C till 250 VAC

**Français****Español****Italiano****Caractéristiques techniques**

- 7PU40 20: fonction tempérisation à l'attraction, 1 plage de tempérisation  
 7PU41 20: fonction tempérisation à l'attraction, 8 plages de tempérisation réglables par commutateur rotatif sur la face avant  
 7PU42 20: sélection de la fonction ① par cavalier de codage ② 8 plages de tempérisation réglables par commutateur rotatif sur la face avant  
 7PU43 20: sélection de la fonction ① par cavalier de codage ② 8 plages de tempérisation réglables par commutateur rotatif sur la face avant  
 7PU46 20: sélection de la fonction ① par cavalier de codage ② 8 plages de tempérisation réglables par commutateur rotatif sur la face avant

Courant nominal d'emploi  $I_n$  (AC-11) en 220 V: 3 A $I_n$  (DC-11) en 220 V: 0,1 A

Tension de commande voir plaque signalétique

Protection contre les courts-circuits: max. 6 A à fusion tempérisée

Précision de réglage:  $\pm 5\%$ Durée minimale de fermeture (pour les fonctions nécessitant une tension auxiliaire):  $\geq 35$  ms

Durée de réarmement pendant la température: 150 ms

après la température: 50 ms

Répétabilité:  $\pm 1\%$ ,  $\pm 3$  ms (plage 10 s) $\pm 0,5\%$ , (plage 100 s) $\pm 0,2\%$ , (plage min/h)

Temps de passage étoile/triangle: 50 ms

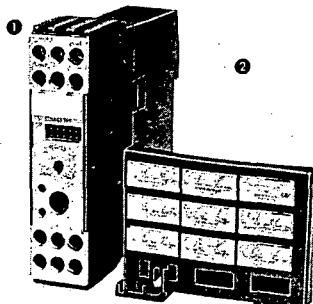
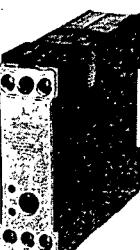
Tension nominale d'isolation selon VDE 0110, groupe C jusqu'à AC 250 V

**Datos técnicos**

- 7PU40 20: Función "Retardado a la conexión", 1 margen de tiempo  
 7PU41 20: Función "Retardado a la conexión", 8 márgenes de tiempo ajustables con selector giratorio en el frente  
 7PU42 20: ① Función ajustable con conector codificado ② y 8 márgenes de tiempo con selector giratorio en el frente  
 7PU43 20: ① Función ajustable con conector codificado ② y 8 márgenes de tiempo con selector giratorio en el frente  
 7PU46 20: ① Función ajustable con conector codificado ② y 8 márgenes de tiempo con selector giratorio en el frente
- Intensidad nominal  $I_n$  (AC-11) a 220 V: 3 A  
 $I_n$  (DC-11) a 220 V: 0,1 A
- Tensión de activación: v. la placa de características  
 Fusibles contra cortocircuitos: máx. 6 A lento  
 Precisión de ajuste:  $\pm 5\%$
- Duración mínima de conexión (en funciones con tensión auxiliar):  $\geq 35$  ms  
 Tiempo de rearmado durante la temporización: 150 ms  
 después de la temporización: 50 ms
- Precisión de repetición:  $\pm 1\%$ ,  $\pm 3$  ms (margen de 10 s)  
 $\pm 0,5\%$ , (margen de 100 s)  
 $\pm 0,2\%$ , (margen de min/h)
- Tiempo de pausa: En función estrella/tríangulo 50 ms  
 Tensión nominal de aislamiento según VDE 0110 grupo C hasta AC 250 V

**Dati tecnici**

- 7PU40 20: con funzione "ritardato alla eccitazione", 1 campo tempi  
 7PU41 20: con funzione "ritardato alla eccitazione", 8 campi tempi regolabili sul frontale mediante selettore rotante  
 7PU42 20: ① funzione regolabile mediante spina di codifica ② 8 campi tempi regolabili sul frontale mediante selettore rotante  
 7PU43 20: ① funzione regolabile mediante spina di codifica ② 8 campi tempi regolabili sul frontale mediante selettore rotante  
 7PU46 20: ① funzione regolabile mediante spina di codifica ② 8 campi tempi regolabili sul frontale mediante selettore rotante
- Corrente nominale d'impiego  $I_n$  (AC-11) con 220 V: 3 A  
 $I_n$  (DC-11) con 220 V: 0,1 A
- Per tensione d'impiego vedi targhetta.  
 Fusibili di corto circuito: max. 6 A lenti  
 Precisione di regolazione:  $\pm 5\%$
- Durata minima di inserzione (per funzioni che necessitano di tensione ausiliaria):  $\geq 35$  ms  
 Ripristino non ancora decorso: 150 ms  
 decorso il tempo impostato: 50 ms  
 Precisione di ripetizione:  $\pm 1\%$ ,  $\pm 3$  ms (campo di 10 s)  
 $\pm 0,5\%$ , (campo di 100 s)  
 $\pm 0,2\%$ , (campo min/ora)
- Pausa per avviamento stella/triangolo: 50 ms  
 Tensione nominale di isolamento fino a 250 V AC sec. VDE 0110, gruppo C

**7PU4320-B...; 7PU4220-B...****7PU4120-B...****7PU4020-A...**

**Deutsch****Montage**

- Schnappbefestigung auf Hutschiene 35 mm nach EN 50022. Schraubbefestigung mit Adapter 7PX9906
- Einbaulage beliebig.

**Maximale Anschlußquerschnitte**

eindrähtig  $2 \times 2,5 \text{ mm}^2$   
feindrähtig auch ohne Aderendhülse  $2 \times 1,5 \text{ mm}^2$

Anschlußschrauben M3,5

Anziehdrehmoment 0,8 ... 1,2 Nm

Anschlüsse sind für Maschinenschrauber geeignet.

**Zeitbereichseinstellung mit Schraubendreher an Frontseite.****Funktionsinstellung mit entsprechendem Codierstecker ②**

Siehe Geräteschaltpläne ⑥ und Funktionsdiagramme ⑦.

Codierstecker bündig in Frontplatte eingesteckt.

**Anwendungshinweise**

- Aenderung des Zeitbereichs u. der Funktion werden nur wirksam, wenn diese im spannungslosen Zustand vorgenommen werden.
- Starteingang B1 oder B3 erst dann ansteuern, wenn Versorgungsspannung anliegt.
- Gleiches Potential an A1 und B1 oder A3 und B3. ③ jeweils nur einen Spannungsbereich anschließen.
- Ohne Codierstecker ist das Gerät „ansprechverzögert“ programmiert.
- Die Ansteuerung von Lasten parallel zum Starteingang ist unzulässig. ④

**Français****Montage**

- Fixation par encliquetage sur profilé chapeau 35 mm selon EN 50022.
- Fixation par encliquetage avec adaptateur 7PX9906

**Position de montage indifférente.****Section max. des conducteurs**

ame massive  $2 \times 2,5 \text{ mm}^2$   
ame souple, également sans cosse  $2 \times 1,5 \text{ mm}^2$

Vis de serrage M 3,5

Couple de serrage 0,8 ... 1,2 Nm

L'utilisation d'une visseuse est possible.

**Réglage de la plage de temporisation au moyen d'un tournevis sur la face avant.****Selection de la fonction à l'aide du cavalier de codage ② approprié.**

Voir schémas électriques ⑥ et diagramme fonctionnel ⑦.

Cavalier enfiché à fleur de la face avant.

**Conseils d'utilisation**

- Un nouveau réglage de la plage de temporisation et de la fonction n'est efficace que lorsqu'il a été effectué à l'état hors tension.
- N'activer l'entrée de lancement B1 ou B3 que lorsque la tension d'alimentation est appliquée.
- A1 et B1 ou A3 et B3 ③ doivent être portés au même potentiel.
- Ne raccorder qu'une plage de tension
- Sans cavalier de codage, le relais fonctionne en "temporisation à l'attraction".
- La commande de charge en parallèle à l'entrée de lancement n'est pas admissible. ④

**English****English****Installation**

- Snapped on to standard mounting rail (35 mm) to EN 50022. Fixed by adapter 7PX9906.
- Can be mounted in any position.

**Maximum conductor cross-sections**

Solid  $2 \times 2,5 \text{ mm}^2$   
Stranded, also without end sleeve  $2 \times 1,5 \text{ mm}^2$

Terminal screws: M3,5

Tightening torque 0,8 to 1,2 Nm

Terminals suitable for power screwdrivers

Adjust time range with screwdriver on front panel.

Functions can be selected with appropriate coding plug ②.

See circuit diagrams ⑥ and functional diagrams ⑦.

Coding plug inserted flush in front plate.

**Notes**

- Changes of time range and function only become effective if carried out in de-energized state.
- Apply voltage to start input B1 or B2 only after supply voltage has been applied.
- Same potential must be applied to A1 and B1 or A3 and B3. ③ Connect only one voltage range
- The relay is programmed for "ON delay" when no coding plugs are inserted.
- No other load should be connected in parallel with the start input. ④

**Svenska****Montering**

- Snäppfäste på normskena 35 mm enl. EN 50022  
Skruffäste med adapter 7PX9906
- Monteringsläge valfritt.

**Maximata anslutningsareor:**

enträdig  $2 \times 2,5 \text{ mm}^2$   
finträdig utan ändhylsa  $2 \times 1,5 \text{ mm}^2$

Anslutningsskruvar M3,5

Altdragningsmoment 0,8 ... 1,2 Nm

Anslutningarna lämpade för maskindriven skruvmejsel.

Tidsområdet inställs med skruvmejsel på framsidan.

Funktionsinställning med motsvarande kodningskontakt ②

Se apparatscheman ⑥ och funktionsdiagram ⑦.

Kodningskontakten instickt i nivå med frontpanelen.

**Anvisningar för driften**

- Ändring av tidsområde eller funktion fungerar enbart när den företas i strömlöst tillstånd.
- Addressera inte startång B1 eller B3 förrän strömmen lagts på.
- Samma potential på A1 och B1 eller A3 och B3. ③ anslut bara ett spänningsområde.
- Utan kodningskontakt är relæt "programmerat" för tillslagsfordräjning
- Belastrningar kan ej kopplas parallellt med startångens. ④

**Español****Montaje**

- Fixación por resorte sobre carril en Ω de 35 mm según EN 50022.
- Fixación por tornillos con el adaptador 7PX9906

**Posición de montaje arbitraria.****Secciones máximas de conexión**

Conductor macizo  $2 \times 2,5 \text{ mm}^2$   
Conductor flexible, incluso sin vaina  $2 \times 1,5 \text{ mm}^2$

Tornillos de conexión M3,5

Par de apriete 0,8 ... 1,2 Nm

Los bornes son apropiados para destornilladores motorizados.

**Ajuste del margen de tiempo con destornillador en el frente.****Ajuste de la función con el correspondiente conector codificado ②.**

Véanse los esquemas internos de los aparatos ⑥ y los diagramas funcionales ⑦.

Conector codificado insertado a ras de la placa frontal.

**Indicaciones de uso**

- Las modificaciones del margen de tiempo y de la función solo surtirán efecto si se practican sin tensión
- Activar la entrada de arranque B1 o la B3 solo cuando el relé esté bajo tensión.
- Aplicar el mismo potencial en A1 y B1 o en A3 y B3. ③ Conectar solo un margen de tensiones.
- Sin conector de codificado el relé está programado para "Retardo a la conexión".
- Es inadmisible activar cargas en paralelo con la entrada de arranque. ④

**Italiano****Montaggio**

- fissaggio a scatto su profilato ad omega da 35 mm sec. EN 50022;
- fissaggio all'adattatore mediante viti 7PX9906

**Posizione di installazione: qualsiasi****Sezioni massime dei conduttori di allacciamento**

a filo unico  $2 \times 2,5 \text{ mm}^2$   
a fili sottili anche senza puntalino  $2 \times 1,5 \text{ mm}^2$

Viti di attacco M3,5

Coppia di serraggio 0,8 ... 1,2 Nm

Attacchi adatti per avvitatrice.

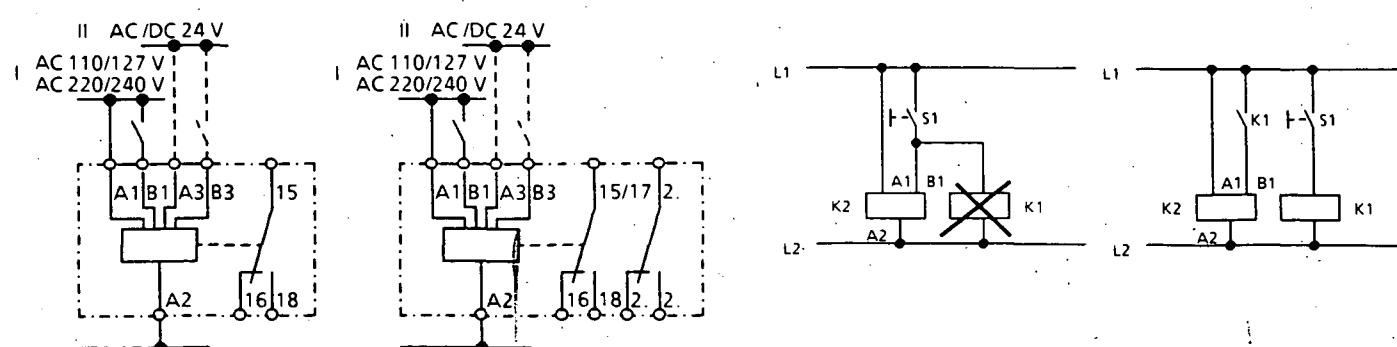
**Regolazione del campo di tempi: con cacciavite sul frontale.****Impostazione delle funzioni: mediante spina di codifica. ②**

Si vedano anche gli schemi circuituali ⑥ ed i diagrammi funzionali ⑦.

Connettore codificato inserito a raso rispetto alla piastra.

**Avvertenze per l'impiego**

- Variazioni del campo tempi e delle funzioni vengono effettuate solo se eseguite sul relè disinserito.
- Attivare l'ingresso di start B1 o B3 solo con rete ON.
- Potenziale uguale ad A1 e B1 opp. ad A3 e B3. ③ Sempre collegare un unico campo di tensione.
- Senza spina di codifica il relè è programmato per "ritardo alla eccitazione".
- Non è permesso attivare altri carichi in parallelo all'ingresso di start. ④



**Deutsch**

- ⑤ Maßbilder (mm)**
- ⑥ Geräteschaltpläne**
- Dargestellt: 2 Wechslerbestückung
- ⑦ Funktionsdiagramm**
- Zeitrelais erregt**
- Schaltglied geschlossen**
- Schaltglied geöffnet**
- a) ansprechverzögert
- b) ansprechverzögert (INST)  
Sofortkontakt nur bei Geräten mit 2 Wechslerbestückung!
- c) Stern/Dreieck  
Stern/Dreieck nur bei Geräten mit 2 Wechslerbestückung!
- d) rückfallverzögert
- e) ansprech-/rückfallverzögert
- f) Wischer Aus
- g) Wischer Ein
- h) Impulsformung
- i) Blinker
- Funktion durch mitgelieferte Codierstecker einstellbar
- Funktion mit Codiersteckerset 7PX9904 (für 1 Wechsler) bzw. 7PX9905 (für 2 Wechsler) erweiterbar!

**English**

- ⑤ Dimension drawings (mm)**
- ⑥ Circuit diagrams**
- Device with 2 changeover contacts is shown.
- ⑦ Functional diagram**
- Time relay energized**
- Contact closed**
- Contact open**
- a) ON delay
- b) ON delay (INST)  
Instantaneous contact only for devices with 2 changeover contacts!
- c) Star/delta  
Star/delta only for devices with 2 changeover contacts!
- d) OFF delay
- e) ON/OFF delay
- f) Passing contact OFF
- g) Passing contact ON
- h) Pulse shaping
- i) Flasher
- Function selectable with coding plugs (supplied with the relay)
- Function expandable with coding plug set 7PX9904 (for 1 changeover contact) or 7PX9905 (for 2 changeover contacts)!

**Svenska**

- ⑤ Måttsskisser (mm)**
- ⑥ Apparatscheman**
- Visar bestyckning med 2 växlingskontakter.
- ⑦ Funktionsdiagram**
- Tidreläet magnetiserat**
- Kopplingselementet stängt**
- Kopplingselementet öppnat**
- a) Tillslagsfördröjning
- b) Tillslagsfördröjning (INST)  
momentata kontakt enbart med apparater med 2 växlingskontakter!
- c) Stjärntriangelkoppling  
Stjärntriangelkoppling enbart på enheter med 2 växlingskontakter
- d) Frånslagsfördröjning
- e) Tillslags-/frånslagsfördröjning
- f) Impulskontakt från
- g) Impulskontakt till
- h) Pulsbildning
- i) Blinker
- Funktionen inställbar med medföljande kodningskontakt.
- Funktionen kan kompletteras med kodningskontaktsats 7PX9904 (1 växlingskontakt) eller 7PX9905 (2 växlingskontakter).

**Français**

- ⑤ Encombrements (mm)**
- ⑥ Schémas électriques**
- Représentant un relais à 2 contacts inverses
- ⑦ Diagramme fonctionnel**
- Relais temporisé excité**
- Contact fermé**
- Contact ouvert**
- a) Temporisation à l'attraction
- b) Temporisation à l'attraction (INST)  
Contact instantané uniquement sur appareils avec 2 inverses
- c) Etoile/triangle  
Uniquement sur relais avec 2 inverses
- d) Temporisation à la retombée
- e) Temporisation à l'attraction/la retombée
- f) Contact de passage au déclenchement
- g) Contact de passage à l'enclenchement
- h) Conformateur d'impulsions
- i) Clignotement
- Fonction réglable par le cavalier de codage livré conjointement
- Extension de la fonction par kit "cavalier de codage" 7PX9904 (1 contact inverseur) ou 7PX9905 (2 contacts inverseurs)!

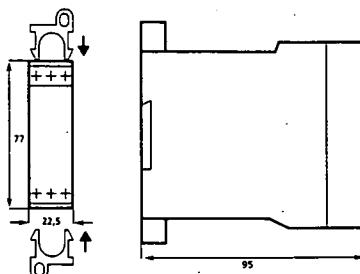
**Español**

- ⑤ Croquis acotados (mm)**
- ⑥ Esquemas de conexiones internas**
- Representación: con 2 contactos de conmutación
- ⑦ Diagramas de función**
- Relé de tiempo excitado**
- Contacto cerrado**
- Contacto abierto**
- a) Retardado a la conexión
- b) Retardado a la conexión (INST)  
contacto inmediato solo en relés con 2 contactos de conmutación
- c) Estrella/tríngulo  
Estrella/tríngulo solo en relés con 2 contactos de conmutación
- d) Retardado a la desconexión
- e) Retardado a la conexión/desconexión
- f) Contacto momentáneo DES
- g) Contacto momentáneo CON
- h) Formación de impulsos
- i) Intermitente
- Función ajustable con el conector codificado suministrado.
- Función ampliable con el juego de conectores codificados 7PX9904 (para 1 contacto de conmutación) o 7PX9905 (para 2 contactos de conmutación)

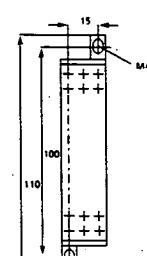
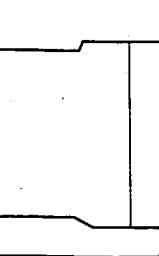
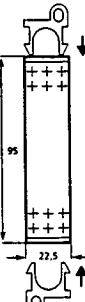
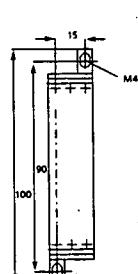
**Italiano**

- ⑤ Disegni quotati (in mm)**
- ⑥ Schemi circuitali dell'apparecchio**
- Rappresentato con 2 contatti di commutazione.
- ⑦ Diagramma funzionale**
- relè a tempo eccitato**
- contatto chiuso**
- contatto aperto**
- a) ritardato alla eccitazione
- b) ritardato alla eccitazione (INST)  
Contatto immediato possibile solo con apparecchi provvisti 2 contatti di commutazione!
- c) Strella/triangolo  
Strella/triangolo possibile solo con apparecchi provvisti di 2 contatti di commutazione
- d) ritardato alla disaccettazione
- e) ritardato alla eccitazione/disaccettazione
- f) contatto passante OFF
- g) contatto passante ON
- h) formazione di impulsi
- i) lampeggiatore
- Funzione regolabile mediante spina di codifica fornita in dotazione
- Funzioni ampliabili con le spine serie 7PX9904 per 1 contatto di commutazione opp. serie 7PX9905 per 2 contatti di commutazione.

5



7PU4.20-.A...



7PU4.20-.B...

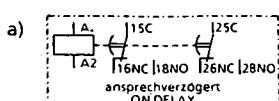
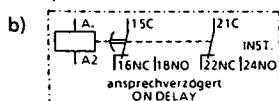
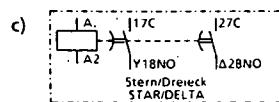
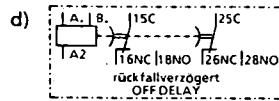
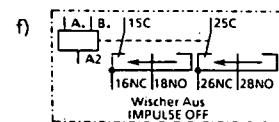
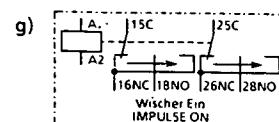
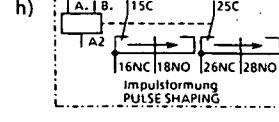
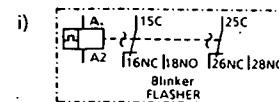
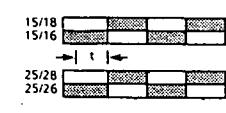
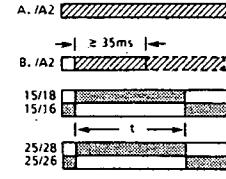
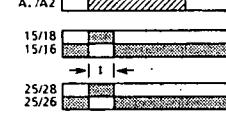
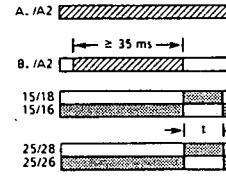
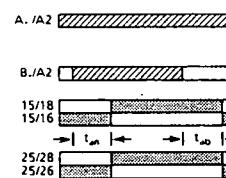
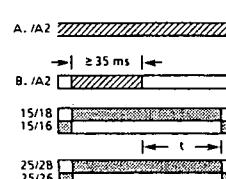
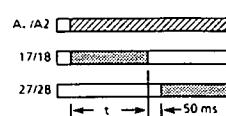
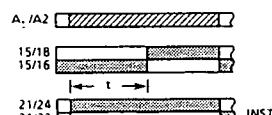
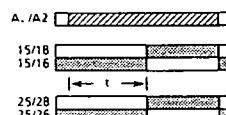
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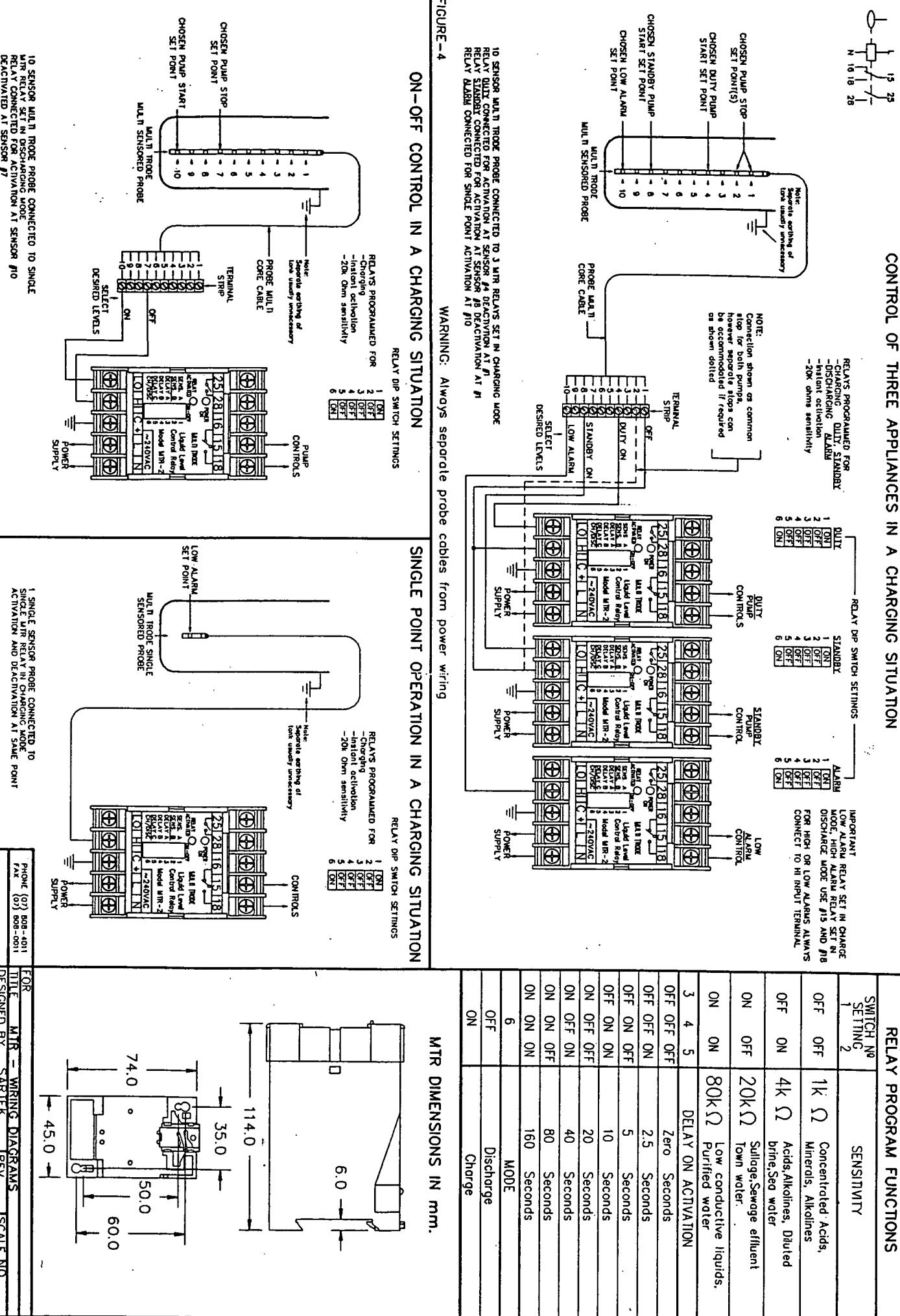
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7PU4320-2B..0

7PU4620-2A..0

7PU4620-2B..0

**6****b)****c)****d)****e)****f)****g)****h)****i)****7**



## CONTROL OF THREE APPLIANCES IN A DISCHARGING SITUATION

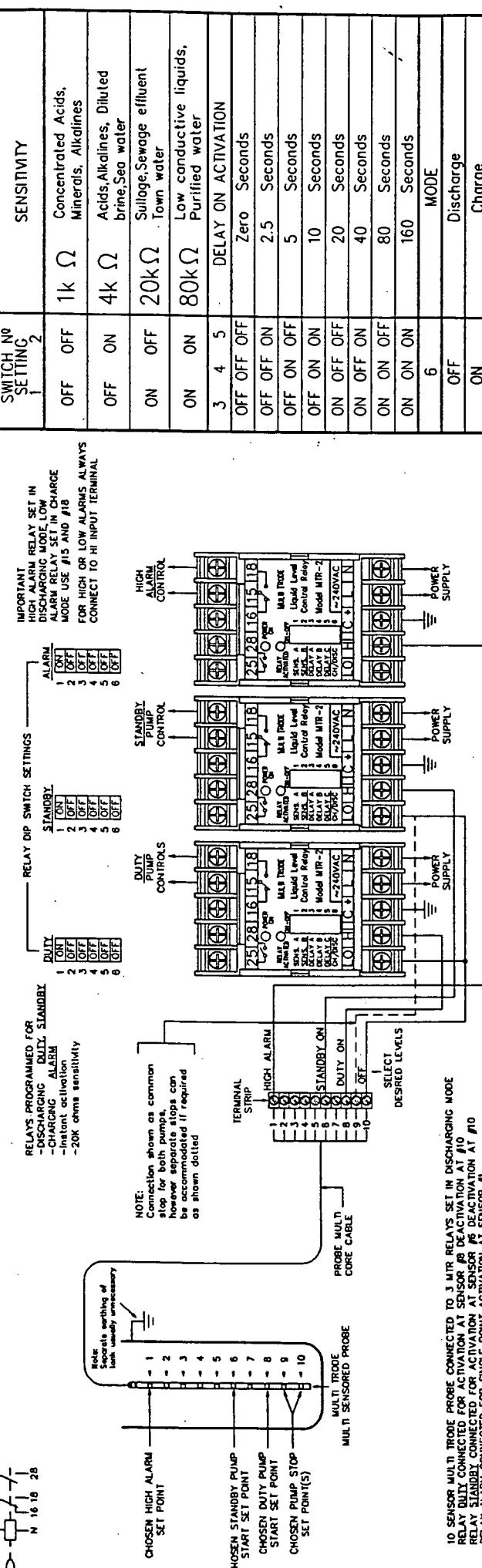
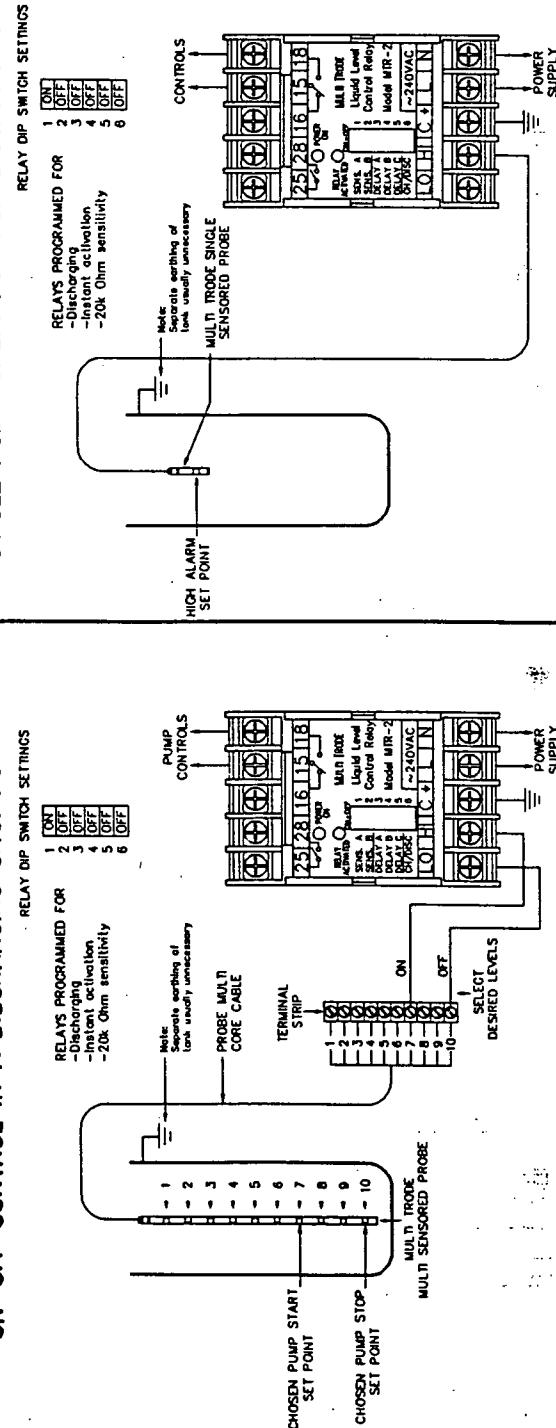


FIGURE-1

## ON-OFF CONTROL IN A DISCHARGING SITUATION



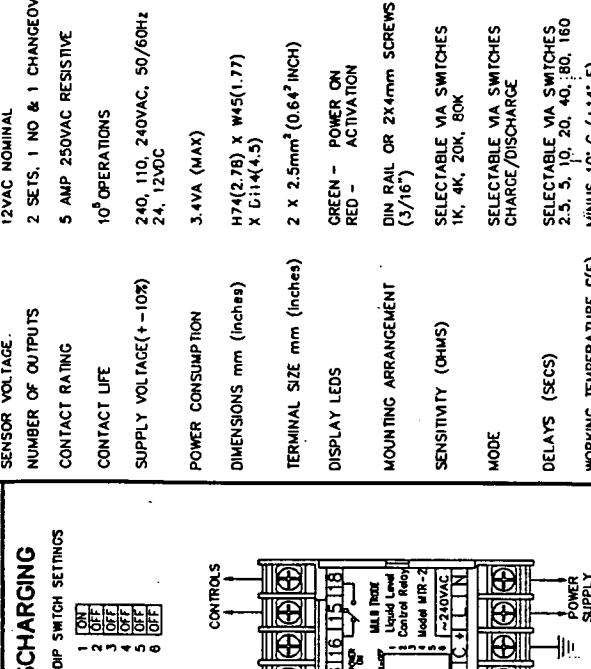
10 SENSOR MTR PROBE CONNECTED TO SINGLE MTR RELAY SET IN DISCHARGING MODE RELAY CONNECTED FOR ACTIVATION AT SENSOR #7 DEACTIVATED AT SENSOR #10

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

PHONE (07) 808-4011	FOR	WIRING DIAGRAMS
FAX (07) 808-0011	DESIGNED BY	SARTEK REV. SCALE NO
		DATE APRIL 93
	CHECKED P. TOWELL DRAWN BY S. SWART	DRAWING # B363
		designed & manufactured by SARTEK PTY LTD. BRISBANE, AUSTRALIA

FIGURE-3

## SINGLE POINT OPERATION FOR DISCHARGING



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

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

FIGURE-2

# Phase Balance Relay

The Crompton Protector Phase Balance module provides continuous surveillance of a 3-phase, 3 or 4 wire system and protects against:

- ★ Phase Loss
- ★ Phase Reversal
- ★ Sequence
- ★ Phase Unbalance
- ★ System Under Voltage

The module de-energises a relay should any one of the above faults occur. It is fitted with an adjustable time delay to eliminate premature operation on short duration supply fluctuations.

A red LED indicates that the supply is within limits and that the output relay is energised. N.B. the relay will not energise if the supply is connected in the wrong sequence.

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.

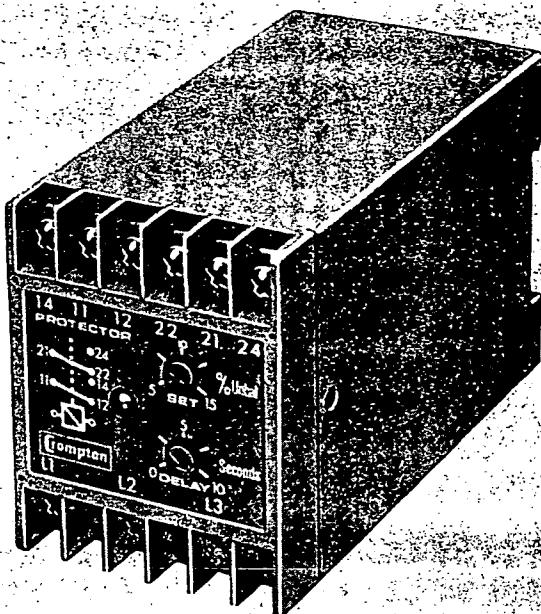
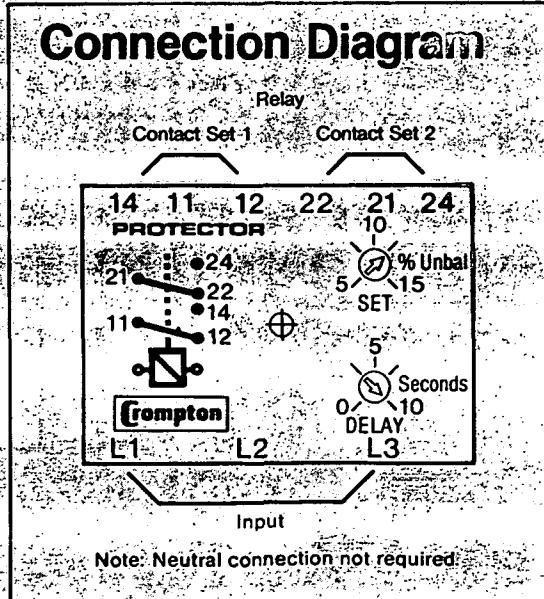
## Principle of Operation

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 de-energise in series.

The relay and LED will automatically energise again when all the supply parameters have returned to safe and acceptable limits.

## Connection Diagram



## 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 60Hz (specify)
Voltage Ratings:	100-125V, 200-250V or 380-450V (nominal voltage to be specified when ordering)
Burden:	3VA
Voltage Withstand:	1.2 times continuous 1.5 times for 10 x 10s To B.S. 6253
Set Points	Adjustable 5% to 15%
Unbalance:	200ms to 10s adjustable (not operative if voltage falls below 70% of nominal or set point or type 252-PSGW)
Time Delay:	Internally reset at -15% nominal voltage (other values between -10% and -30% available on request)
Under Voltage:	(Type 252-PSGW only): nominal voltage (other values between -10% and -30% available on request)
Output Relay	DP changeover
Type:	240V, 5A non-inductive
Rating ac:	24V, 5A resistive
dc:	2 x 10 <sup>6</sup> at above load
Operations:	Automatic
Reset:	Approx. 0.3kg
Weight:	

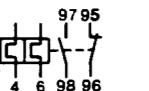
## **Basic Units, Coil A.C. Operated Modules**

## DIL Contactors

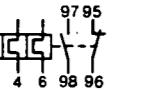
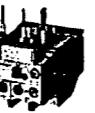
**Z Overload Relays**

With single-phasing sensitivity to IEC 947

1	2	3	4	5	6	7	8
Setting range	For use with	Suitable for the protection of EEx e motors PTB Certificate No. ZE: 3.53/38 0.793 Z 00:3.53/38 6.3288	Type	Price	Std. pack	Short-circuit protection gL Type of co-ordination 'a'	gL aM 'c' 'a'
A					each	Max. A	Max. A

0.1-0.16	DIL EM <sup>1)</sup> SDAINL EM MSE	 9795		<b>ZE-0.16</b>	3	25	0.5	-
0.16-0.24				<b>ZE-0.24</b>	3	25	1	-
0.24-0.4				<b>ZE-0.4</b>	3	25	2	-
0.4-0.6				<b>ZE-0.6</b>	3	25	2	-
0.6-1.0				<b>ZE-1.0</b>	3	25	4	-
1.0-1.6				<b>ZE-1.6</b>	3	25	6	-
1.6-2.4				<b>ZE-2.4</b>	3	25	6	-
2.4-4				<b>ZE-4</b>	3	25	16	-
4-6				<b>ZE-6</b>	3	25	20	-
6-9				<b>ZE-9</b>	3	50	25	20

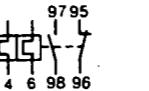
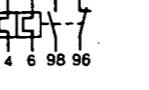
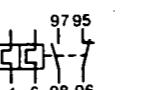
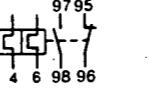
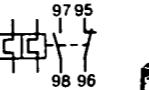
<sup>1)</sup> A distance of at least 5 mm should be ensured between overload relays when mounted together

0.1-0.16	DIL 00 M DIL 00 AM DILO M DILO AM DIUL 00 M/11(I) DIUL 00 AM/11(I) SDAINL 00 AM/11(I)	 9795		<b>Z 00-0.16</b>	3	25	0.5	-
0.16-0.24				<b>Z 00-0.24</b>	3	25	1	-
0.24-0.4				<b>Z 00-0.4</b>	3	25	2	-
0.4-0.6				<b>Z 00-0.6</b>	3	25	4	-
0.6-1.0				<b>Z 00-1.0</b>	3	25	4	-
1.0-1.6				<b>Z 00-1.6</b>	3	25	6	-
1.6-2.4				<b>Z 00-2.4</b>	3	25	10	-
2.4-4				<b>Z 00-4</b>	3	25	16	-
4-6				<b>Z 00-6</b>	3	25	20	-
6-10				<b>Z 00-10</b>	3	50	25	20
10-16				<b>Z 00-16</b>	3	63	35	35
16-24				<b>Z 00-24</b>	3	63	50	50

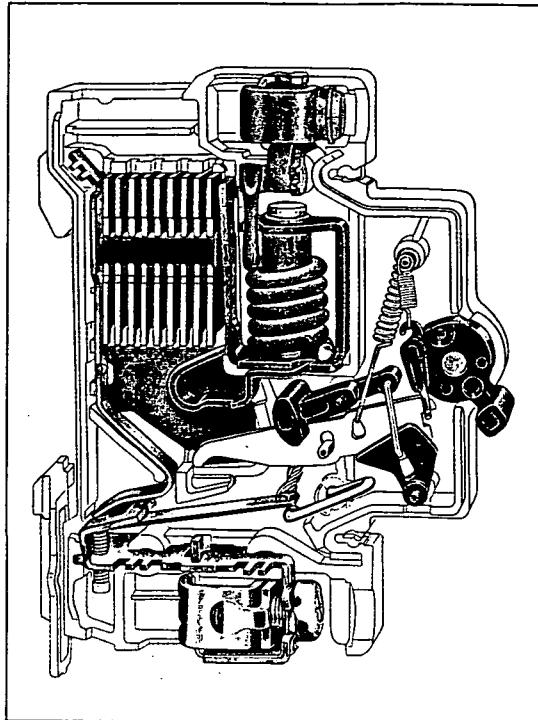
**Z Overload Relays**

With single-phasing sensitivity to IEC 947

1	2	3	4	5	6	7	8
Setting range	For use with	Suitable for the protection of EEx e motors PTB Certificate No. Z 1: 3.53/386.3397 Z 4: 3.53.35751/78 Z 3: in preparation	Type	Price	Std. pack	Short-circuit protection gL Type of co-ordination 'a'	gL aM 'c' 'a'
A					each	Max. A	Max. A

6-10	DIL 1 M DIL 1 AM	 9795		<b>Z 1-10</b>	2	50	25	20	-
10-16	DIL 2 M DIL 2 AM	 9795		<b>Z 1-16</b>	2	63	35	35	-
16-24	SDAINL 1 M(I) SDAINL 1 AM(I)			<b>Z 1-24</b>	2	63	50	50	-
24-40	SDAINL 2 M(I) SDAINL 2 AM(I)			<b>Z 1-40</b>	2	125	80	80	-
40-57				<b>Z 1-57</b>	2	160	100	80	-
50-63				<b>Z 1-63</b>	2	160	125	100	-
63-80	For separate mounting	 9795		<b>Z 1-80</b>	2	250	160	125	-
45-60	DIL 3 M SDAINL 3 M(I)	 9795		<b>Z 3-60</b>	1	160	125	100	-
60-75				<b>Z 3-75</b>	1	250	160	125	-
50-70	DIL 3-22	 9795		<b>Z 4-70/K 3</b>	1	250	160	160	2400
70-100				<b>Z 4-100/K 3</b>	1	400	200	250	2400
100-140				<b>Z 4-140/K 3</b>	1	500	250	250	2400
50-70	DIL 4-22 DIL 6-22			<b>Z 4-70</b>	1	250	160	160	2400
70-100				<b>Z 4-100</b>	1	400	200	250	2400
100-140				<b>Z 4-140</b>	1	500	250	250	2400
140-180				<b>Z 4-180</b>	1	500	315	315	2400
180-240				<b>Z 4-240</b>	1	600	500	500	2400
50-70	DIL 8-22			<b>Z 4-70/K 8</b>	1	250	160	160	2400
70-100				<b>Z 4-100/K 8</b>	1	400	200	250	2400
100-140				<b>Z 4-140/K 8</b>	1	500	250	250	2400
140-180				<b>Z 4-180/K 8</b>	1	500	315	315	2400
180-240				<b>Z 4-240/K 8</b>	1	600	500	500	2400

## Din - T SERIES — 6kA



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

**Mounting:**

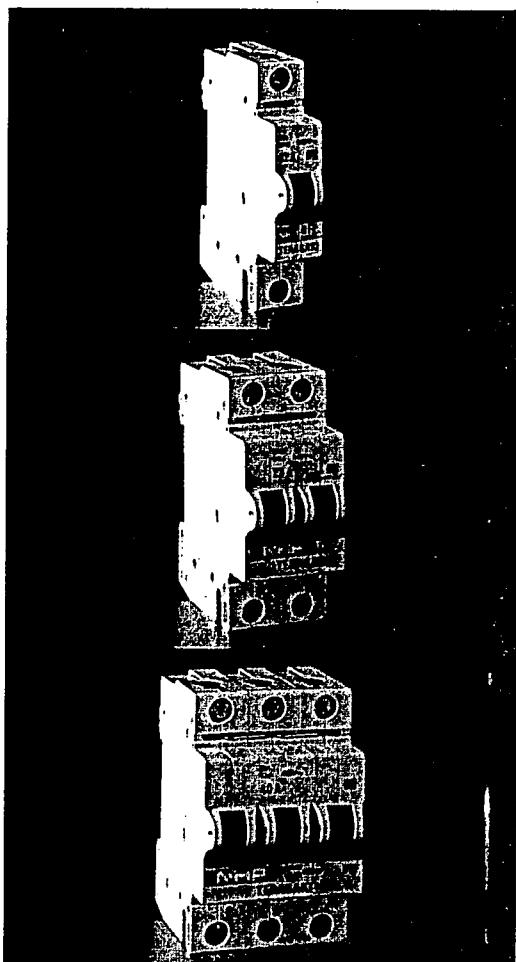
Suitable for quick mounting (snap-on) symmetric DIN rail.

**Ratings:**

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

The 6000 Series is of the highest protection and, as standard with the entire Din-T system, finger protected to IP20.

## Ordering Details



		<b>6 kA Interrupting Capacity to AS3111</b>	
		RATED CURRENT	Part No.
Single pole	2	2	Din-T 6 102
	4	4	Din-T 6 104
	6	6	Din-T 6 106
	10	10	Din-T 6 110
	16	16	Din-T 6 116
	20	20	Din-T 6 120
	25	25	Din-T 6 125
	32	32	Din-T 6 132
	40	40	Din-T 6 140
One protected pole	Double pole	2	Din-T 6 202
	4	4	Din-T 6 204
	6	6	Din-T 6 206
	10	10	Din-T 6 210
	16	16	Din-T 6 216
	20	20	Din-T 6 220
	25	25	Din-T 6 225
	32	32	Din-T 6 232
	40	40	Din-T 6 240
Two protected poles	Triple pole	2	Din-T 6 302
	4	4	Din-T 6 304
	6	6	Din-T 6 306
	10	10	Din-T 6 310
	16	16	Din-T 6 316
	20	20	Din-T 6 320
	25	25	Din-T 6 325
	32	32	Din-T 6 332
	40	40	Din-T 6 340
Three protected poles			

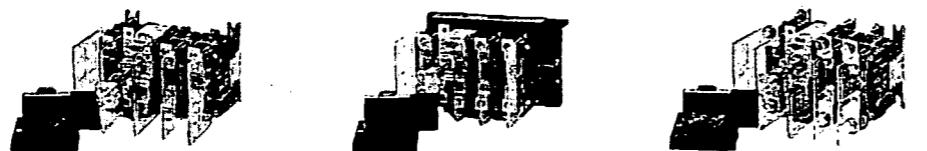
**Note 1** Din-T MCB's can be backed up by a 125 amp GEC Type-T or equivalent HRC fuse to 50kA fault level.

**NHP-LK**

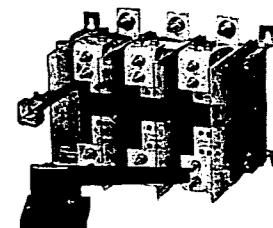
For motor switching and general purpose loads.

**LKS**

**Frame R1**  
**Rollcon and Plugcon fuse-switches**

40A 63A 100A<sup>1)</sup> 125A 160A**Frame R2****Rollcon and Plugcon fuse-switches**

160A 200A 250A 315A 400A 630A 800A

**Frame R3**

Standard fixed type fuse-switches	BS DIN	LKS1-40	LKS1-63	LKS1-100	LKS1-125	LKS1-160	LKS2-160	LKS2-200	LKS2-250	LKS2-315	LKS2-400	LKS3-630	LKS3-800
Plug-in fuse-switch for MCC applications suitable for IP20 cut-out (BS fuse type)		LKS1-40-PI	LKS1-63-PI		LKS1-125-PI	LKS1-160-PI	LKS2-160-DIN	LKS2-200-PI	LKS2-250-PI	LKS2-315-PI	LKS2-400-PI	LKS3-630-PI <sup>9)</sup>	LKS3-800-PI <sup>9)</sup>
ALL SWITCHES INCLUDE HANDLE AND SHAFT AS STANDARD (FOR OPTIONS REFER PAGES 16 to 17)													
Rated insulation voltage	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC	1000V AC
Rated conventional thermal current (ith)	63 Amps	80 Amps	100 Amps	160 Amps	160 Amps	160 Amps	160 Amps	200 Amps	400 Amps	400 Amps	400 Amps	800 Amps	800 Amps
Rated enclosed thermal current (ithe)	40 Amps	63 Amps	100 Amps	125 Amps	160 Amps	160 Amps	160 Amps	200 Amps	250 Amps	315 Amps	400 Amps	630 Amps	720A <sup>7)</sup>
Rated operational current and typical motor loads to AS1773	40A 22kW	63A 30kW	100A 55kW	125A 70kW	160A 90kW	160A 90kW	160A 90kW	200A 116kW	250A 145kW	315A 185kW	400A 235kW	630A 370kW	800A 485kW
Max breaking capacity at 600V AC 0.35PF DC - 2 poles in series 220V DC DC 23 operation - 3 poles in series 440V DC DC 23	500A	500A	1000A	1000A	2400A	2400A	2400A	2400A	250A	315A	400A	4800A	800A
Capacitor switching - 115V AC (kVA)	22	34	54	67	86	86	108	134	170	215	340	430	
Rated fused short circuit current - max. fuse size amps	100kA	100kA	100kA	100kA	50kA	100kA	100kA	100kA	250A	400A	100kA	100kA	100kA
Fuse types to AS-B.S. AS2005-2 DIN	A2, A3	A3	A4 (max 30 Ø)	B1, B2	B1, B2	B1, B2	B1, B2	B1, B2	B1, B4	B1, B4	B1, B4	C1-C3	C1-C3
Mechanical endurance operations	15000	15000	15000	15000	15000	12000	12000	12000	12000	12000	12000	3000	3000
Required switching torque Nm	7.5	7.5	7.5	7.5	7.5	16	16	16	16	16	16	30	30
Weight Kg	1.6	1.6	1.7	1.7	1.8	4.1	4.2	4.5	4.6	4.7	4.7	14.5	14.5
Outline dimensions	Hmm	100	100	116	116	146	146	160	160	160	160	270	270
	Wmm	155	155	155	184	240	240	240	240	240	240	345	345
	D (min) mm	165	165	165	165	220	220	220	220	220	220	250	250
	D (max) mm	225	225	225	225	270	270	270	270	270	270	265	265
By using a long shaft Dmm		385	385	385	385	390	390	390	390	390	390	529	529
Encl. (steel) surface mounted fuse-switches	LKS1-40-SE	LKS1-63-SE	LKS1-100-SE	LKS1-125-SE	LKS1-160-SE		LKS2-200-SE	LKS2-250-SE	LKS2-315-SE	LKS2-400-SE	LKS3-630-SE	LKS3-800-SE	
External dimensions	Hmm	300	300	300	300	400	500	500	500	500	800	800	
	Wmm	300	300	300	300	300	500	500	500	500	600	600	
	Dmm	200	200	200	200	200	250	250	250	250	300	300	
Spare enclosure used		3003	3003	3003	3003	3018	3025	3025	3025	3025	3057	3057	

**Notes:** For switchboard type flush mounting enclosures - refer page 20.  
For 'clip-on' neutral links and switched neutral blocks - refer page 15.

<sup>1)</sup> This fuse barrel diameter restriction will exclude some makes of 100 amps A4 fuses. However suitable fuses are available from NHP.

<sup>2)</sup> For DIN type plug-in switches, please contact NHP.

<sup>3)</sup> Before applying this rating, check availability of suitable 1000V AC fuse links.

<sup>4)</sup> Refer page 17 for fuse types by manufacturer.

<sup>5)</sup> Enclosed switches are B.S. type as standard. Many non standard enclosed switches can be catered for - refer your nearest NHP branch or agent.

<sup>6)</sup> This plug-in fuse-switch is not suitable for IP20 cut-out.

<sup>7)</sup> 800 amps in a ventilated enclosure or 720 amps totally enclosed.

**Notes:** For switchboard type flush mounting enclosures - refer page 20.  
For 'clip-on' neutral links and switched neutral blocks - refer page 15.

<sup>1)</sup> This fuse barrel diameter restriction will exclude some makes of 100 amps A4 fuses. However suitable fuses are available from NHP.

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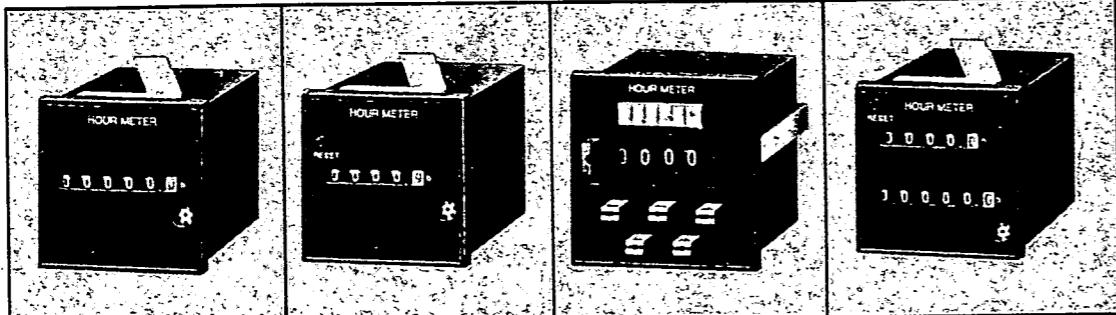
<sup>5)</sup> Enclosed switches are B.S. type as standard. Many non standard enclosed switches can be catered for - refer your nearest NHP branch or agent.

<sup>6)</sup> This plug-in fuse-switch is not suitable for IP20 cut-out.

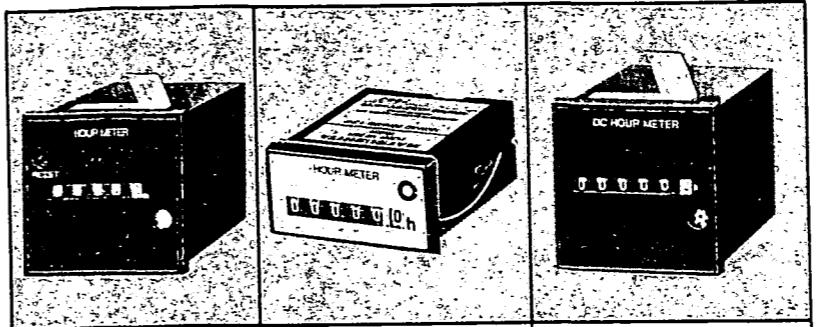
<sup>7)</sup> 800 amps in a ventilated enclosure or 720 amps totally enclosed.



## TIME ELAPSED METERS



<b>DESCRIPTION</b>	Hour Meter without reset	Hour Meter with reset	Preset Hour Meter	Dual Indicator Hour Meter
<b>TYPE NUMBER</b>	<b>TH14</b>	<b>TH24</b>	<b>TH30</b>	<b>TH40</b>
<b>RANGE OF MEASUREMENTS</b>	0-99999.9 Hrs	0-9999.9 Hrs	0-9999.9 Hrs	0-9999.9 Hrs 0-99999.9 Hrs
<b>DRIVE METHOD</b>	AC Motor	AC Motor	AC Motor	AC Motor
<b>SUPPLY VOLTAGES</b>				
Refer Ordering Details Page 15				
<b>CALCULATION INDICATOR</b>	Addition Type	Addition Type	Subtraction Type	Addition Type
<b>CALCULATION ACCURACY/MAX CALCULATION SPEED</b>	Synchronised with supply frequency			
<b>MINIMUM MEASUREMENT UNIT</b>	0.1 Hour (6 min)			
<b>RESET METHOD</b>	—	Pushbutton	Pushbutton	Pushbutton
<b>COUNT OUTPUT</b>	Contact	—	1 changeover	—
Output Operation	—	—	Self recording maintained up to reset	—
Output Contact Capacity	—	—	3A 250VAC resistive	—
<b>POWER CONSUMPTION</b>	1.5W	1.5W	1.5W	1.5W
<b>FREQUENCY</b>	50/60 Hz Common	50/60 Hz Common	50/60 Hz Common	50/60 Hz Common
<b>INSTALLATION METHOD</b>	Flush mounting with bracket (45 x 45mm)	Flush mounting with bracket (45 x 45mm)	Flush mounting with bracket (50 x 50mm)	Flush mounting with bracket (45 x 45mm)
<b>TERMINALS</b>	187 QC	187 QC	Power 187 QC Aux. contact 110QC	187 QC



Minute indicating Meter	Hour Meter without reset	DC Hour Meter
<b>TH50</b>	<b>TH63</b>	<b>TH70</b>
0-9999.9 Min	0-99999.9 Hrs	0-99999.9 Hrs

AC Motor	AC Motor	DC Quartz Motor
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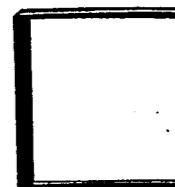
Refer Ordering Details opposite

Addition Type	Addition Type	Addition Type
Synchronised with supply frequency	Synchronised with supply frequency	Quartz oscillation
0.1 Min (6 sec)	0.1 Hour (6 min)	0.1 Hour (6 min)
Pushbutton	—	—
—	—	—
—	—	—
—	—	—
1.5W	1.5W	1.5W
50/60 Hz Common	50/60 Hz Common	
Flush mounting with bracket (45 x 45mm)	Flush mounting with spring	Flush mounting with bracket (45 x 45mm)
187QC	187QC	UL approved lead wire

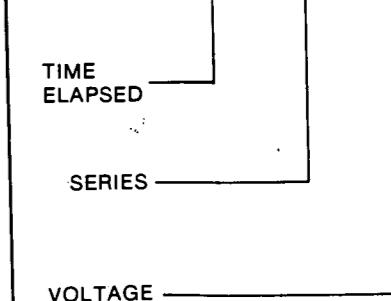
## ACCESSORIES

## TIME ELAPSED METERS

Mounting Frame

TH140-0020  
(For TH14, 24, 40, 50, 70)

## ORDERING DETAILS



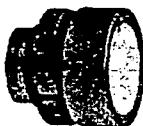
SERIES	VOLTAGES
14	3 12V
24	4 24V
30	7 115-120V
40	9 240V
50	
63	
70	

\*TH70 Available in 12V or 24V DC only.

# Control units Ø22 mm

 Telemecanique**Black, double insulated bezel - ZA2-B**

ZA2-BA .



ZA2-BA .8



ZA2-BL4



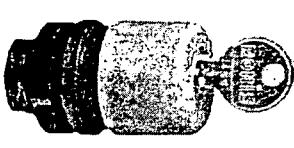
ZA2-BP .



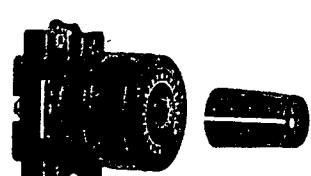
ZA2-BC44



ZA2-BS54



ZA2-BS74



ZA2-BD9\*2

**Pushbutton operating heads, spring return - IP65**

Description	Colour	Reference	Price \$
<b>Flush</b>	Black	ZA2-BA2	6.60
	Green	ZA2-BA3	6.60
	Red	ZA2-BA4	6.60
	Yellow	ZA2-BA5	6.60
	Blue	ZA2-BA6	6.60
<b>Flush</b> with transparent plunger for use with legend ZB2-BY1 ...	Green	ZA2-BA38	12.90
	Red	ZA2-BA48	12.90
<b>Flush</b> with function symbol marked on plunger	Green	Start	ZA2-BA333
	Red	Stop	ZA2-BA434
<b>Projecting</b>	Black	ZA2-BL2	10.00
	Green	ZA2-BL3	10.00
	Red	ZA2-BL4	10.00
	Yellow	ZA2-BL5	10.00
	Blue	ZA2-BL6	10.00
<b>Projecting</b> with function symbol marked on plunger	Red	Stop	ZA2-BL434
			10.00
<b>Booted</b>	Black	ZA2-BP2	10.00
	Green	ZA2-BP3	10.00
	Red	ZA2-BP4	10.00
	Yellow	ZA2-BP5	10.00
	Blue	ZA2-BP6	10.00
<b>Mushroom head pushbutton</b> <b>Spring return</b>	Red	Ø 30 mm	ZA2-BC44
		Ø 40 mm	ZA2-BC4
			11.30
			12.70

**Operating heads for emergency stop pushbuttons**

<b>Latching</b> "Push pull"	Standard	Red	Ø 40 mm	ZA2-BT4	22.00
	Padlockable	Red	Ø 40 mm	ZA2-BT409	53.50
<b>Latching</b> Turn to release		Red	Ø 30 mm	ZA2-BS44	26.10
			Ø 40 mm	ZA2-BS54	27.10
<b>Latching</b> Key release (Ronis key n 455)		Red	Ø 30 mm	ZA2-BS74	48.30
			Ø 40 mm	ZA2-BS14	49.60

**Potentiometer control knob (potentiometer not supplied) - IP65**

Head only with collar for potentiometer with shaft length 43 to 47 mm	For potentiometer with 6 mm shaft	ZA2-BD912	52.50
	For potentiometer with 6.35 mm shaft	ZA2-BD922	52.50

Other versions:

Key release mushroom head pushbuttons with other key numbers, please consult your Regional Sales office.



ZA2-BD9\*2

# Control & signalling units Ø22 mm

Black, double insulated bezel - ZA2-B



ZA2-BD•

## Operating heads for selector switches - IP65

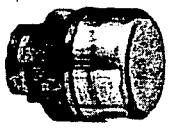
Description		Reference	Price
<b>2 position</b>	Stay put	ZA2-BD2	13.60
	Spring return from right to left	ZA2-BD4	15.60
<b>3 position</b>	Stay put	ZA2-BD3	13.60
	Spring return to centre position	ZA2-BD5	15.60
	1 spring return from right to centre	ZA2-BD8	15.60
	1 spring return from left to centre	ZA2-BD7	15.60



ZA2-BG•

## Key switch operating heads (Ronis key no. 455) - IP65

<b>2 position</b>	Stay put	ZA2-BG2	34.20
	Key withdrawal in LH position	ZA2-BG4	34.20
	Stay put - Key withdrawal in LH and RH position	ZA2-BG5	34.20
	Spring return from right to left	ZA2-BG6	40.20
	Key withdrawal in LH position	ZA2-BG7	40.20
<b>3 position</b>	Stay put	ZA2-BG3	34.20
	Key withdrawal in centre position	ZA2-BG9	34.20
	Stay put - Key withdrawal in LH and RH position	ZA2-BV03	6.90
	Stay put	ZA2-BV04	6.90
	Key withdrawal in LH position	ZA2-BV05	6.90
	2 Spring return from centre position	ZA2-BV06	6.90
	Key withdrawal in centre position	ZA2-BV07	10.50
	1 Spring return from left to centre position	ZA2-BV08	10.50
	Key withdrawal in RH position	ZA2-BV09	10.50



ZA2-BV0•

## Pilot light heads (lens + bezel) - IP65

Description	Colour	Reference	Price
<b>For use with incandescent bulbs</b>	Green	ZA2-BV03	6.90
	Red	ZA2-BV04	6.90
	Yellow	ZA2-BV05	6.90
	Blue	ZA2-BV06	6.90
	Clear	ZA2-BV07	6.90
<b>For use with neon bulbs or LED light sources</b>	Green	ZA2-BV033	10.50
	Red	ZA2-BV043	10.50
	Yellow	ZA2-BV053	10.50



ZA2-BW3•

## Operating heads for illuminated pushbuttons - IP65

Description	Colour	Reference	Price
<b>Flush</b>	Green	ZA2-BW33	13.70
	Red	ZA2-BW34	13.70
	Yellow	ZA2-BW35	13.70
	Blue	ZA2-BW36	13.70
	Clear	ZA2-BW37	13.70
<b>Projecting</b>	Green	ZA2-BW13	16.50
	Red	ZA2-BW14	16.50
	Yellow	ZA2-BW15	16.50

### Other versions

Key switches with other mechanical functions or other Ronis key numbers.

Operating heads for illuminated 2 or 3 position selector switches.

Please consult your Regional Sales Office



ZA2-BW14

# Control & signalling units Ø 22 mm

 Telemecanique

Black, double insulated bezel — ZA2-B



ZA2-BZ101

## Body assemblies with 1 contact block

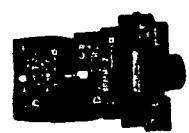
Description	Contact type	Scheme	Reference	Price \$
For pushbuttons and 2 position selector and key switches	N/O	13 14	Standard ZA2-BZ101	7.90
	N/C	21 22	Standard ZA2-BZ102	7.90



ZA2-BZ105

## Body assemblies with 2 contact blocks

For pushbuttons and 2 or 3 position selector and key switches	N/O+ N/O	13 23 14 24	Standard ZA2-BZ103	13.60
	N/C+ N/C	11 21 12 22	Standard ZA2-BZ104	13.60
	N/C+ N/O	21 13 22 14	Standard ZA2-BZ105	13.60



ZA2-BW06\*

## Illuminated pushbutton body/contact assemblies

Supply	Typical scheme	Supply voltage	Contact	Reference	Price \$
Direct bulb not supplied	X1 13 X2 14	110 V max	N/O ZA2-BW061	19.60	
			N/C ZA2-BW062	19.60	
			N/C + N/O ZA2-BW065	24.90	
Direct through resistor BA 9s, 130 V bulb supplied	X1 21 X2 22	220 V 250 V	N/O ZA2-BW071	35.20	
			N/C ZA2-BW072	35.20	
			N/C + N/O ZA2-BW075	40.20	
Via integral transformer 1.2 VA, BA 9s, 6 V bulb supplied	X1 13 23 X2 14 24	110 V/50 Hz 110-120 V/60 Hz	N/O ZA2-BW031	51.00	
			N/C ZA2-BW032	51.00	
			N/C + N/O ZA2-BW035	56.00	
		220/240 V/50 Hz	N/O ZA2-BW041	51.00	
			N/C ZA2-BW042	51.00	
			N/C + N/O ZA2-BW045	56.00	
		380/415 V/50 Hz	N/O ZA2-BW051	51.00	
			N/C ZA2-BW052	51.00	
			N/C + N/O ZA2-BW055	56.00	



ZB2-BE10\*

## Additional/replacement contact blocks

Description	Contact type	Scheme	Reference	Price \$
For making up body assemblies with 3, 4, 5 or maximum of 6 contact blocks or replacing	N/O	3 4	Standard ZB2-BE101	6.70
			For low power switching ZB2-BE1016	36.90
1st or 2nd contact	N/C	1 2	Standard ZB2-BE102	6.70
			For low power switching ZB2-BE1026	36.90

Telemecanique

# Signalling units Ø 22 mm

Black, double insulated bezel — ZA2-B

## Pilot light body/contact assemblies



ZA2-BV6

Supply	Scheme	Supply voltage	Reference	Price \$
Direct bulb not supplied	X1 X2	110 V max	ZA2-BV6	8.20



ZA2-BV4

Direct through resistor BA 9s, 130 V bulb supplied	X1 X2	220 V 250 V	ZA2-BV7	16.50
	X1 X2	110 V/50 Hz 110-120 V/60 Hz	ZA2-BV3	39.20
	X1 X2	220/240 V/50 Hz	ZA2-BV4	39.20
Via integral transformer 1.2 VA BA 9s, 6 V bulb supplied	X1 X2	380/415 V/50 Hz	ZA2-BV5	39.20
	X1 X2	110 V/50 Hz 110-120 V/60 Hz	ZA2-BV3	39.20
	X1 X2	220/240 V/50 Hz	ZA2-BV4	39.20

## BA9-s Bulbs and L.E.D.s



DL1-C\*\*\*

Description	Voltage	Colour	Reference	Price \$
Incandescent filament lamp (max. power 2.6W)	6	Clear	DL1-CB006	4.45
	12	Clear	DL1-CE012	4.45
	24	Clear	DL1-CE024	4.45
	48	Clear	DL1-CE048	4.45
	130	Clear	DL1-CE130	4.45

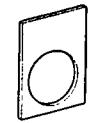


DL1-CJ10\*\*\*

LED Cluster lamp (8 cluster)	12°	Green	DL1-CJ0063	16.50
	12°	Red	DL1-CJ0064	16.50
	12°	Yellow	DL1-CJ0065	16.50
	24	Green	DL1-CJ0243	16.50
	24	Red	DL1-CJ0244	16.50
	24	Yellow	DL1-CJ0245	16.50

\* For use with transformer pilot lights/illuminated pushbuttons

## Accessories



ZB2-BY\*\*\*

Description	Reference	Price \$
Legend plates 30x40 mm (refer page 4/5)	ZB2-BY***	1.50



ZB2-BP\*

Add-on "push-push to release" mechanism for use with pushbuttons and illuminated pushbuttons	ZB2-BZ21	10.00	
	Black	ZB2-BP012	5.40
	Green	ZB2-BP013	5.40
	Red	ZB2-BP014	5.40
	Yellow	ZB2-BP015	5.40

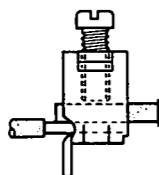


ZBF-X13

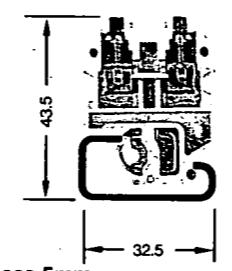
Tools	ZB2-BZ8	5.00
	XBF-X13	7.60
	ZA2-BZ905	13.00

# Feed-through Terminals Type SAK

## Screw Clamp Connections



**SAKD 2.5N**  
500V 20A



The SAK Series of feed-through terminal blocks are employed for the connection of various conductor sizes. The bare conductor is inserted directly into the yoke with no further preparation, and the tightening of the screw effects a vibration proof connection.

Most terminal types are available in either melamine moulding material or polyamide 6.6 and are designed to be mounted directly on assembly rail TS32 to EN50035. (BS5825)

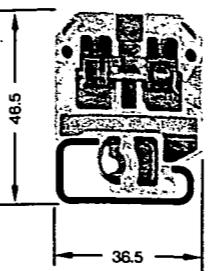
Cross connection can be achieved using standard QL2-QL10 jumper bars fitted in the centre of each terminal block. Switchable connections can be achieved using the switchable link VL2.

For additional safety covers type AD may be fitted with a plastic screw on top of the terminal block.

Technical Data		
Conductor size	Solid (mm <sup>2</sup> )	0.22-2.5
	Stranded (mm <sup>2</sup> )	0.22-2.5
Insulation stripping length	(mm)	9
Ordering Data		
Moulding material	Polyamide	021556
When ordering EEx'e' and Ex'N'	Polyamide	021558
terminals, add suffix 'e' or 'N' to the catalogue number	Melamine	
	Melamine	
Approvals		
All Approvals are listed in Approvals Guide	BASEEFA-Ex CEGB	CECB
Terminal Rail (2m)		
Steel	TS32	012280
Steel (M6 Slots)	TS32	067610
Locking pin (1m) — optional	Steel	SST3
		015270
End Bracket (thickness mm)		
	EWK1 (8.5)	020616
End Plate (thickness mm)		
Polyamide	AP (1.5)	015096
Polyamide	AP (1.5)	015098
Melamine		
Melamine		
Partition (thickness mm)		
Polyamide	TW (0.5)	019186
Polyamide	TW (0.5)	019188
Melamine		
Melamine		
Resin bonded paper	TW (0.5)	030750
Small partition	Polyamide	TSch 3
		036686
Cross Connections		
QL 2	2 way	021580
QL 3	3 way	021590
QL 4	4 way	021600
QL 10	10 way	033800
VH 8.5	Sleeve	026690
BS (M2.5 x 14)	Screw	036770
Captive on Screw	Washer	
Bi-pole plug		
Switching Link		
QL 2	2 way	015590
Sleeve		
Screw		
Washer		
Test Plug		
PS (2.3Ø)	Plug	018040
StB 8.5	Plug bolt	021570
Warning Label		
Label		
Plastic screw		
Cover (1m)		
Transparent cover	ADP 1	048520
Support bracket	HP 1	048556
Marking Tags		
All marking systems are shown in Section T6	DEKAFIX — SECTION T6	

For additional accessories see Section T6

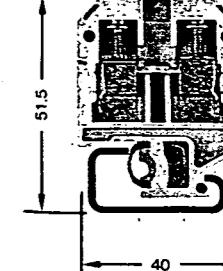
**SAK 2.5**  
750V 27A



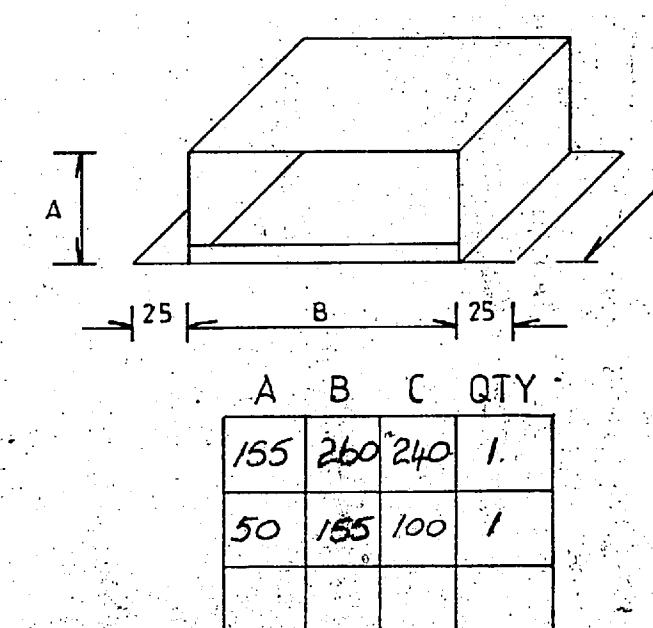
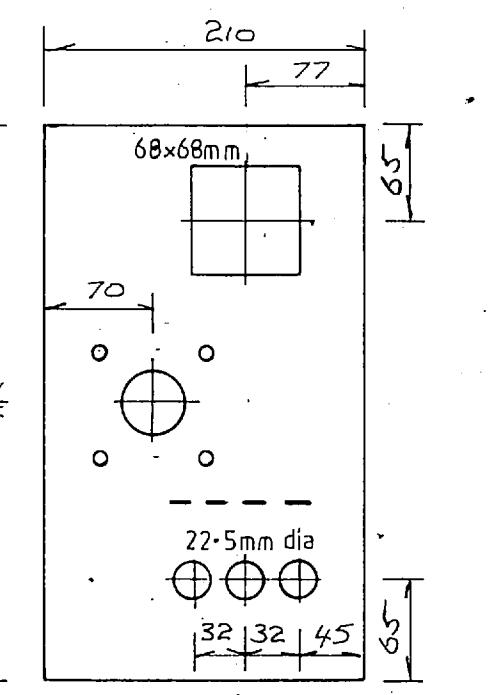
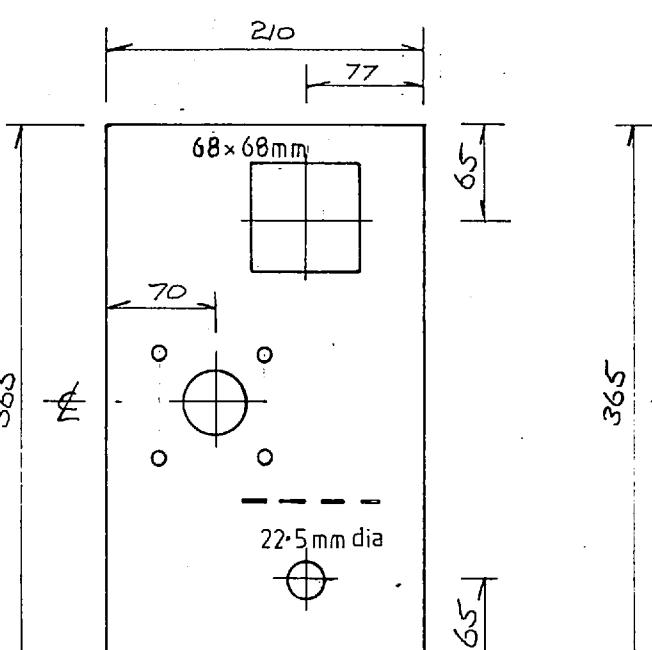
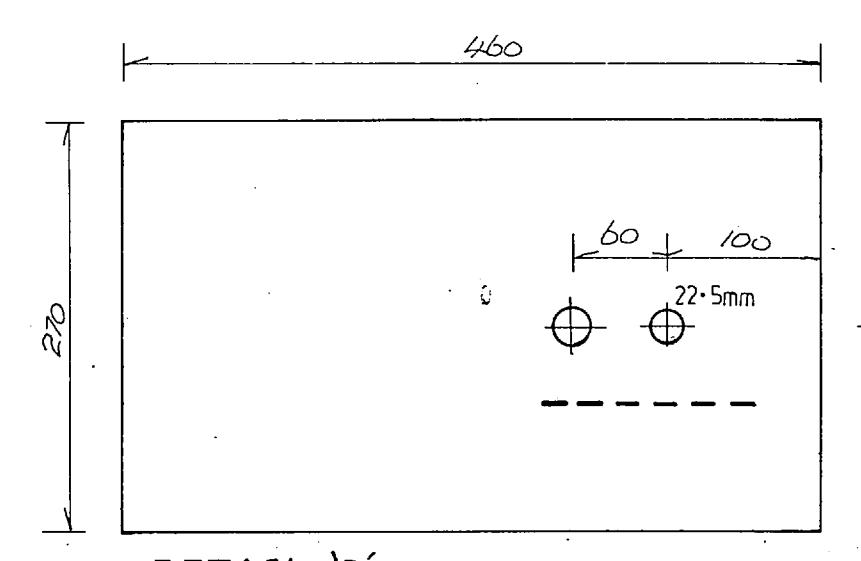
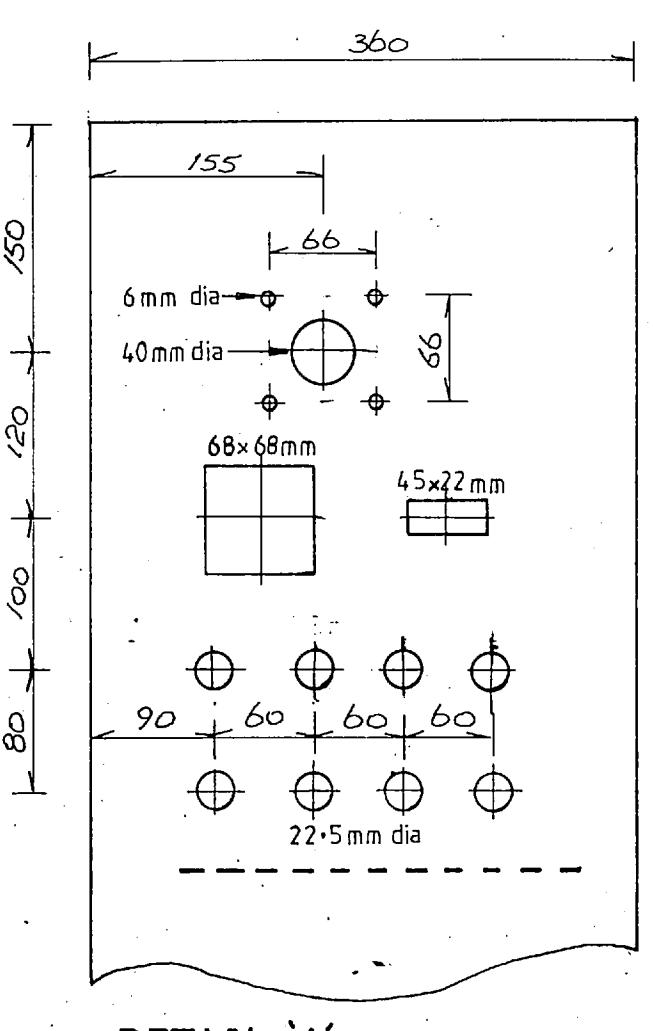
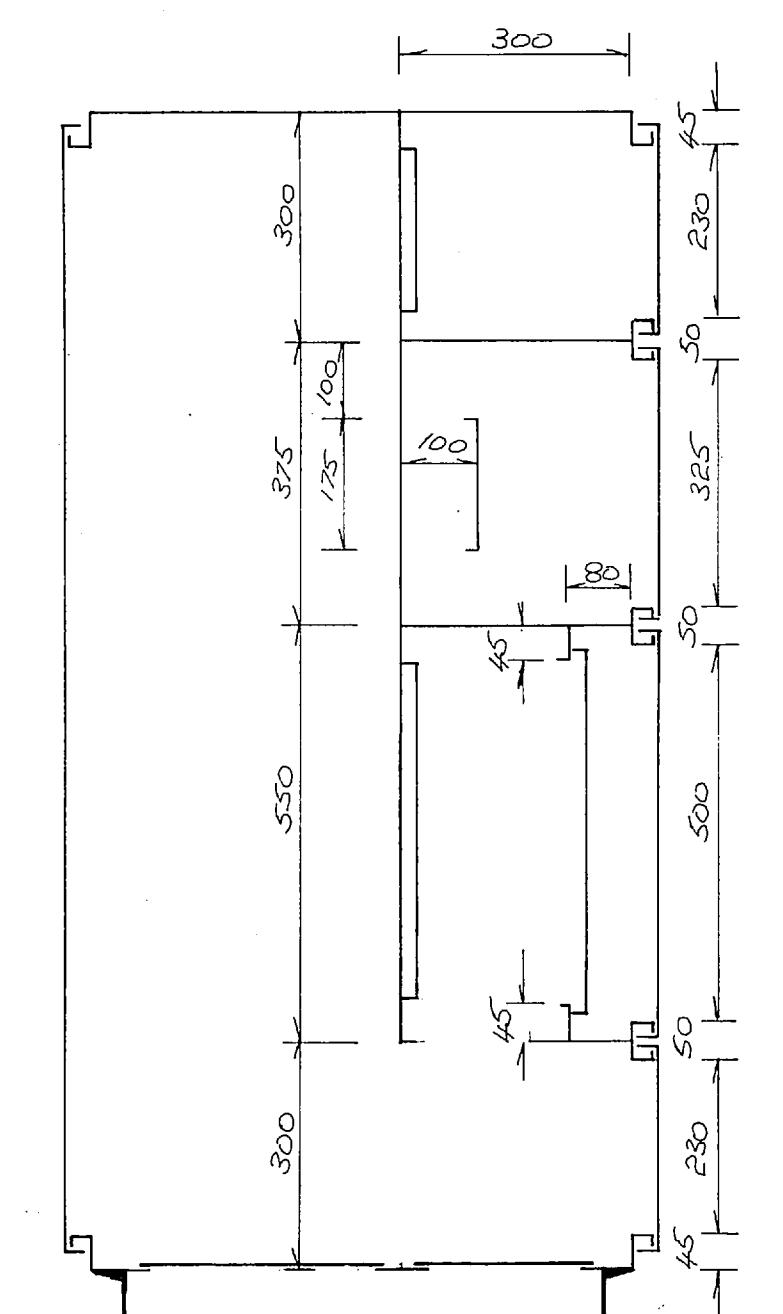
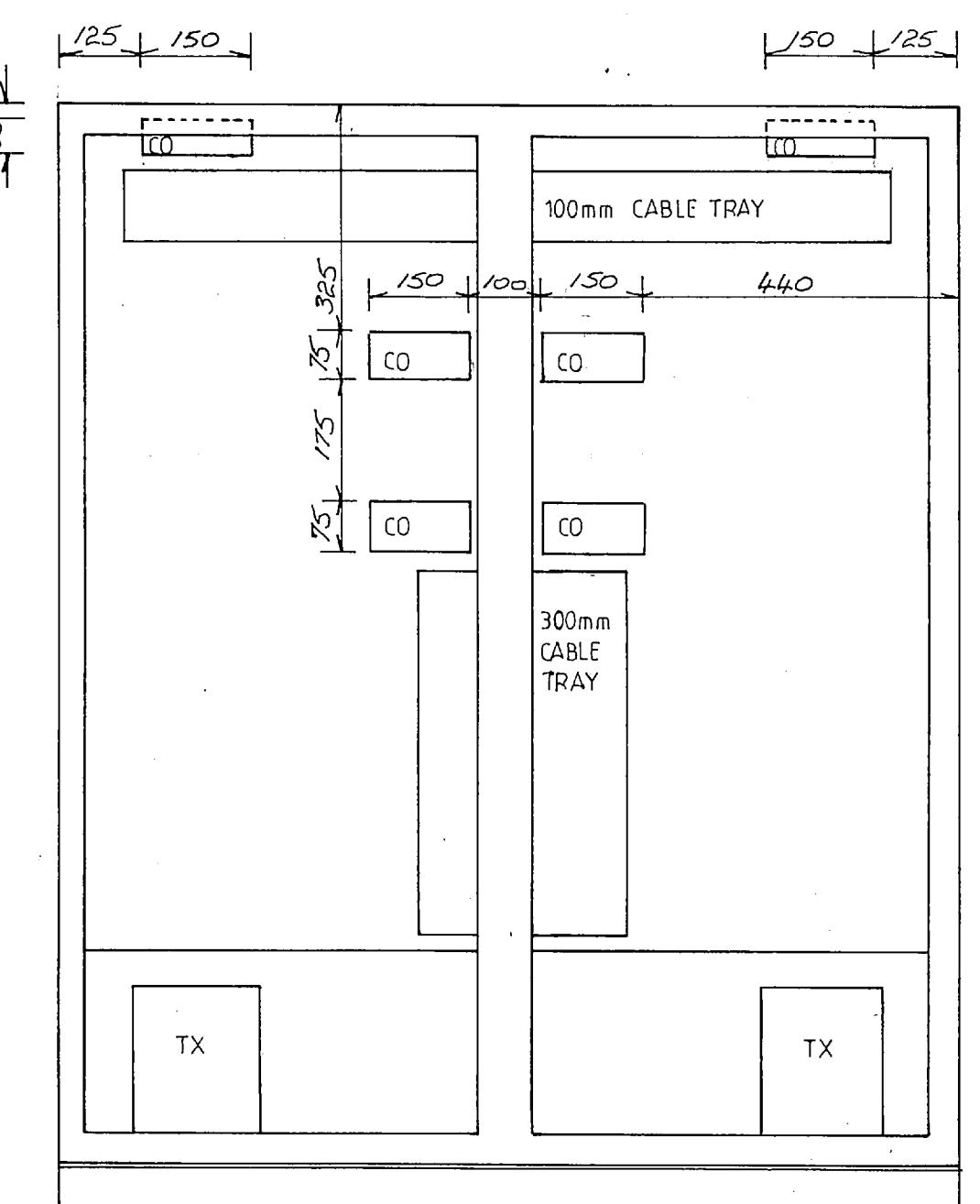
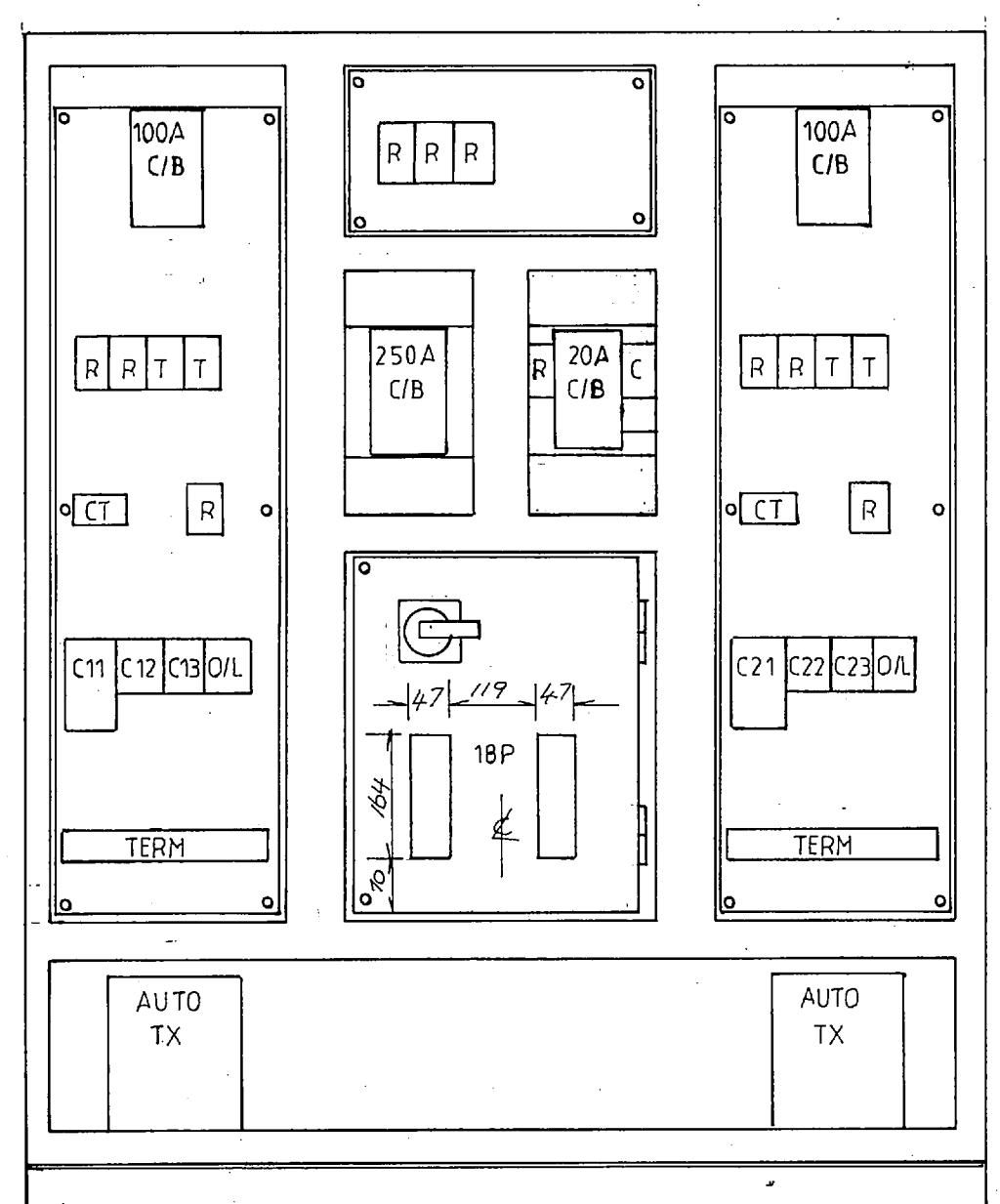
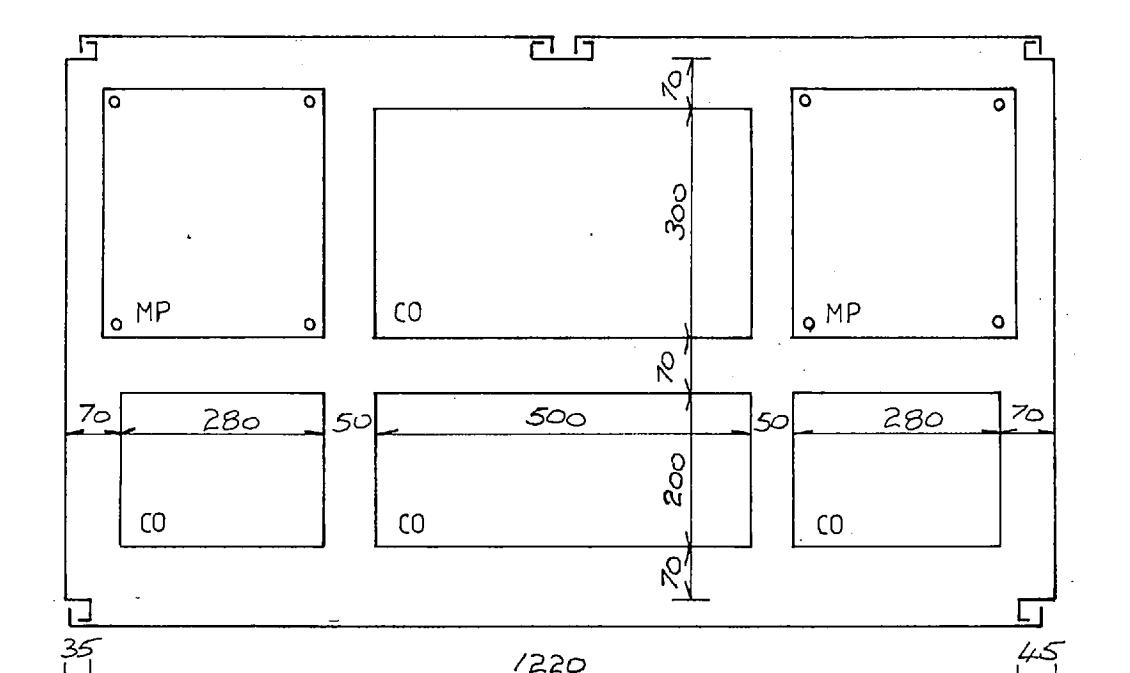
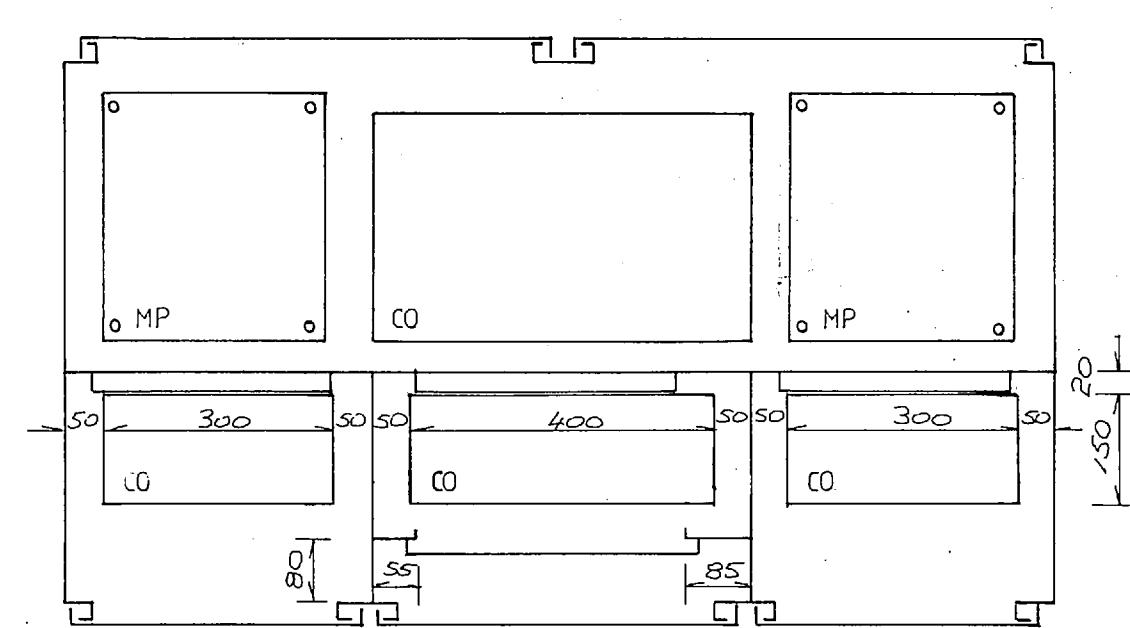
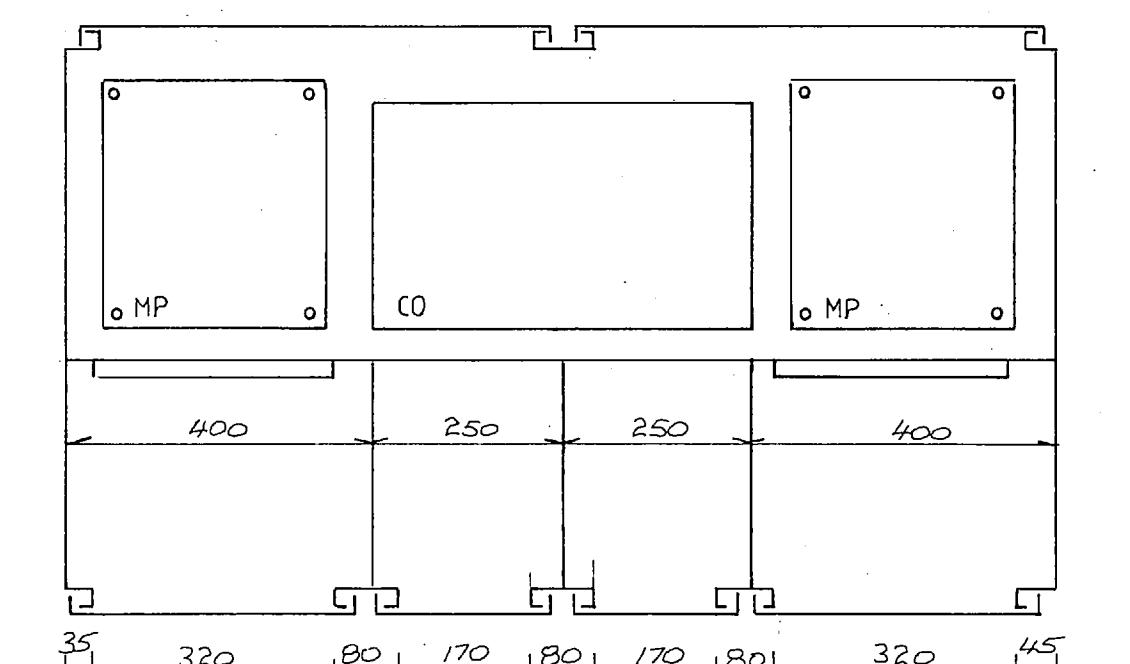
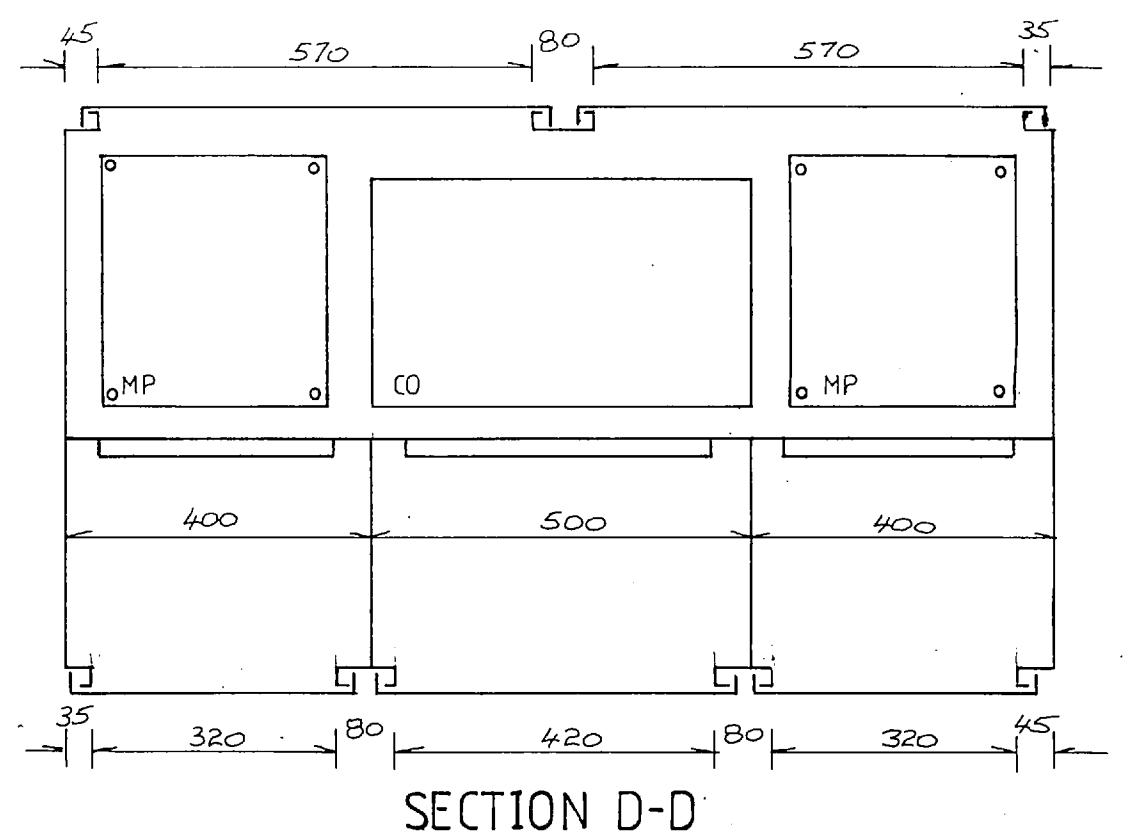
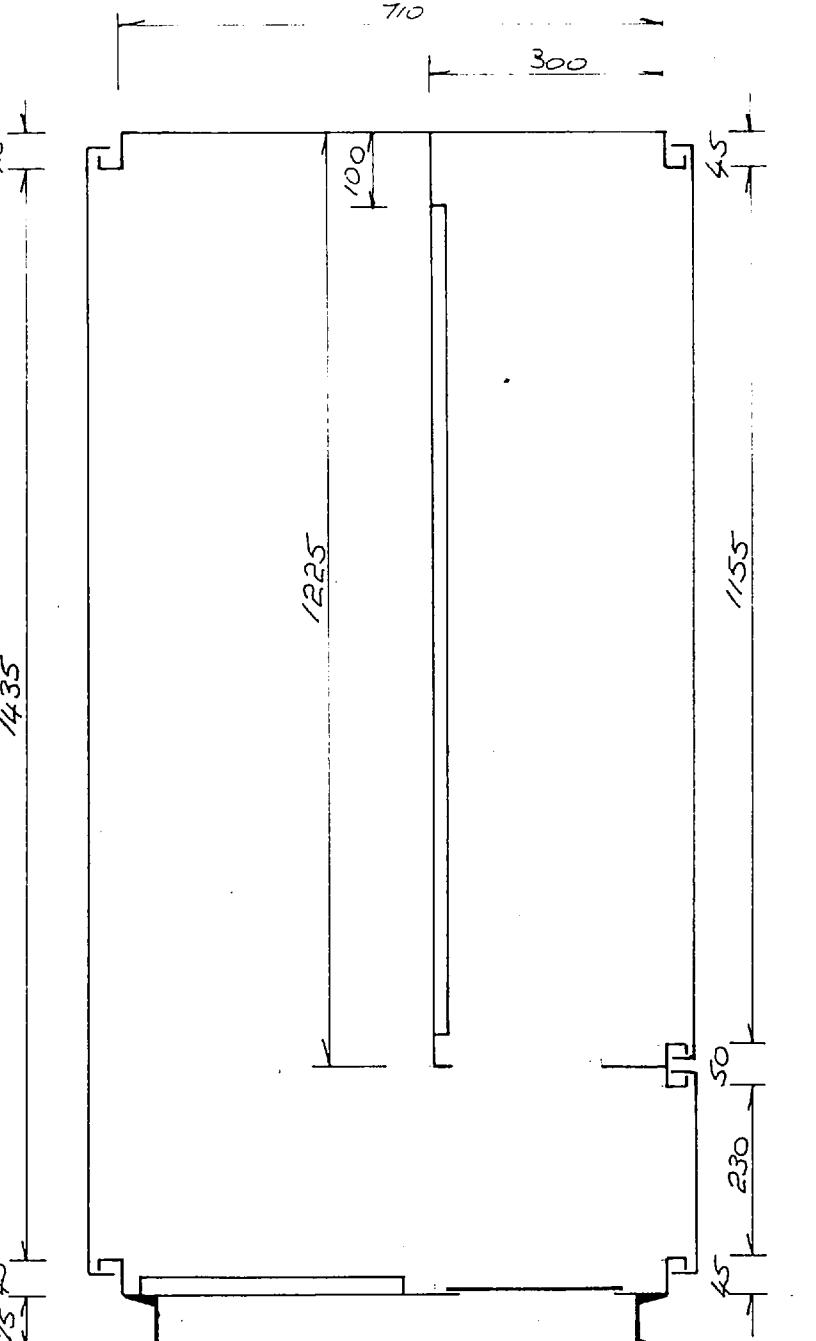
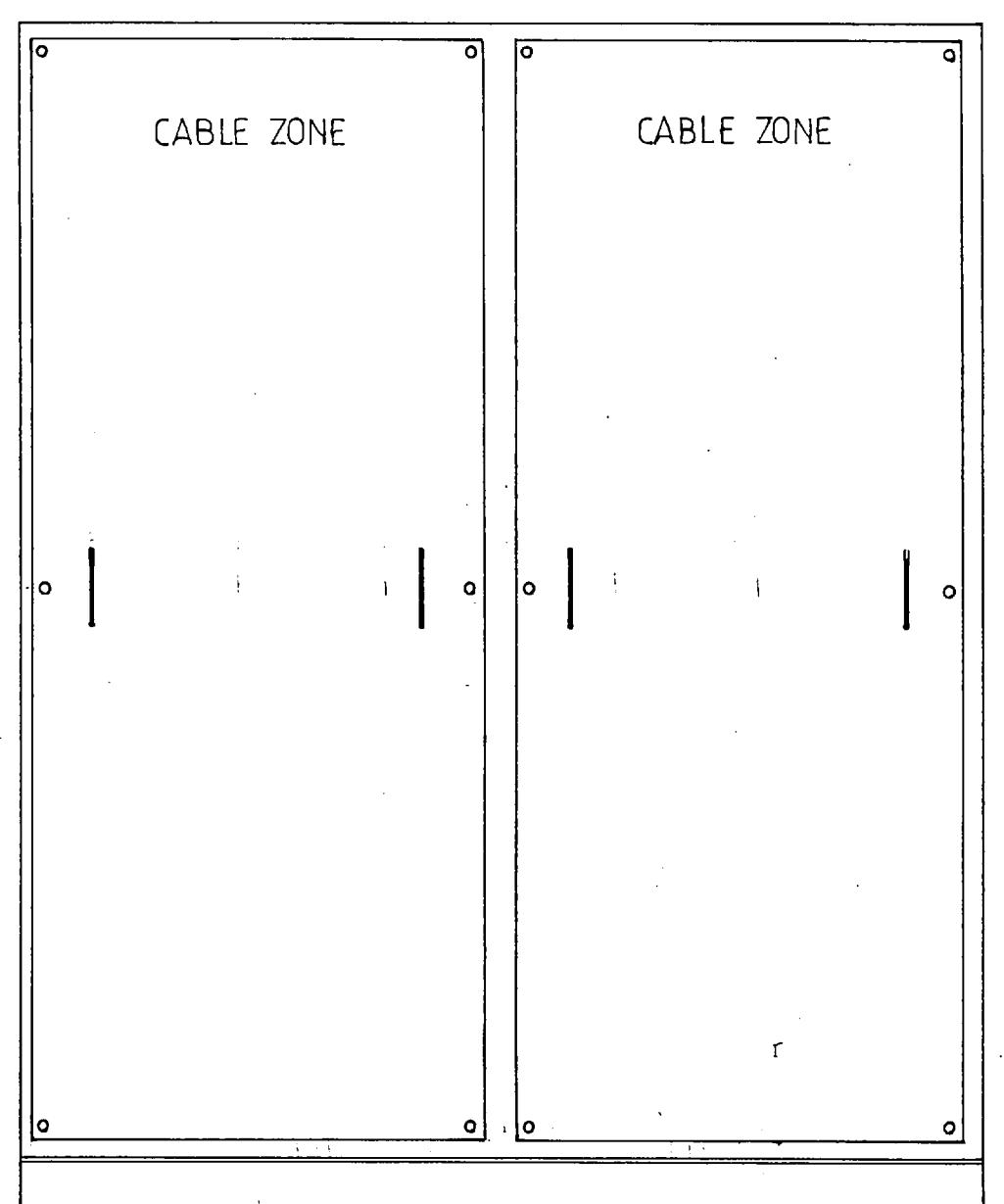
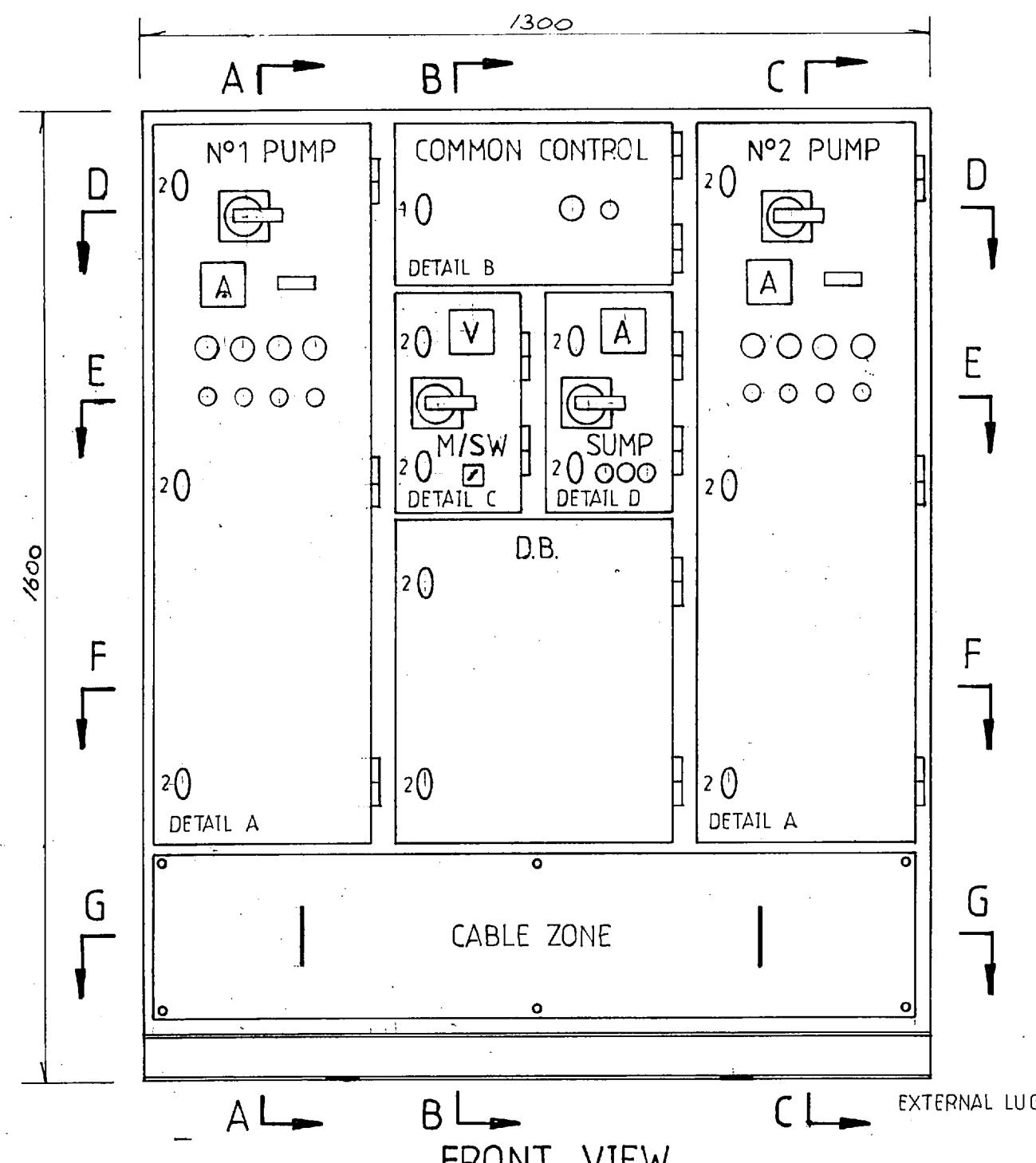
Thickness 6mm

<b>SAK 4</b> 750V 36A		
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
CECB	CECB	CECB
N	N	N
D	D	D
S	S	S
W	W	W
Type	Type	Type
TS32	TS32	TS32
012280	012280	012280
067610	067610	067610
SST 3	SST 3	SST 3
015270	015270	015270
EWK1 (8.5)	EWK1 (8.5)	EWK1 (8.5)
020616	020616	020616
AP (1.5)	AP (1.5)	AP (1.5)
027956	011796	011796
AP (1.5)	AP (1.5)	AP (1.5)
027958	011798	011798
AP (1.5)	AP (1.5)	AP (1.5)
027952	011792	011792
AP (1.5)	AP (1.5)	AP (1.5)
027957	011797	011797
TW (1.5)	TW (1.5)	TW (1.5)
030286	013016	013016
TW (1.5)	TW (1.5)	TW (1.5)
030288	013018	013018
TW (2.5)	TW (2.5)	TW (2.5)
030282	013012	013012
TW (2.5)	TW (2.5)	TW (2.5)
030281	013017	013017
TW (1.0)	TW (0.5)	TW (0.5)
029710	019710	019710
QL 2	QL 2	QL 2
015590	013060	019430
QL 3	QL 3	QL 3
015600	013070	019440
QL 4	QL 4	QL 4
015610	013080	019450
QL 10	QL 10	QL 10
033810	033820	033830
VH 8	VH 13.5	VH 12
026670	024850	024900
BS (M3 x 15)	BS (M3 x 20)	BS (M3 x 20)
035900	030300	030300
Captive on screw	Captive on screw	Captive on screw
DQS2 (See Section T6)	QS2	QS2
	021270	027096
VL 2	VL 2	VL 2
019700	019700	019700
VH 19	028510	028510
BS (M3 x 25)	029250	029250
SS	016440	016440
PS (2.3Ø)	PS (2.3Ø)	PS (4Ø)
018040	018040	029960
StB 8.5	StB 8.5	StB 14
		016990
AD 4	AD 4	AD 4
037560	037610	037600
BSK (M3 x 22)	BSK (M3 x 22)	BSK (M3 x 22)
012890	012890	012890
ADP 1	ADP 2	ADP 2
048520	048530	048530
HP 1	HP 2	HP 2
048556	048566	048566
DEKAFIX — Section T6	DEKAFIX — Section T6	DEKAFIX — Section T6

**SAK 6N**  
750V 47A



Thickness 8mm
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SUPPLY HAT SECTIONS LOOSE

Issue	Date	By	Revision

BRISBANE CITY COUNCIL  
SCOTT ST.  
SEWAGE PUMPING STATION  
GENERAL ARRANGEMENT

POWER ELECTRIC  
Switchboards PTY LTD

ACN 052 204 118  
Manufacturers of Engineered Switchboards for Mining, Industrial and Commercial Projects  
Telephone: (07) 274 3922 Facsimile: (07) 274 3929  
P.O. Box 6176, Fairfield Gardens, Brisbane, Queensland, 4103, Australia

Scale	1:10	Drawing No
Date	30-4-93	323-01
Drawn	JM	
Checked		Job No 323

Notes

**CONSTRUCTION :-**

FORM-2 FAULT RATING = 10KA FOR 1s  
2mm ZINCANEAL SHEET STEEL FOLDED AND WELDED TO PROVIDE A CUBICLE TO IP54 ( INDOOR USE )  
ALL VISIBLE SEAMS AND JOINTS OF MULLIONS TO BE FULLY WELDED AND GROUND SMOOTH WHERE NEEDED  
PROVIDE CABLE TRAY OR STRAPS WHERE SHOWN  
PROVIDE 2x6mm EARTH STUDS ONE TO THE DOOR AND ONE TO THE CUBICLE BODY  
PLINTH TO BE DRILLED FOR FLOOR MOUNTING WITH LUGS ( GALVANISED )  
STAR WASHERS ARE TO BE USED ON HINGE SCREWS  
FIT 'D' HANDLES WHERE SHOWN ON FRONT VIEW AND REAR VIEW  
ON END CUTOUTS FIT STEEL COVERS WITH NEOPRENE SEAL  
FIT 6mm ALUMINIUM GLAND PLATES WITH NEOPRENE SEAL TO CUTOUTS IN BOTTOM REINFORCED WITH 25x6mm FLAT STEEL  
DOORS AND COVERS SHALL HAVE A 25mm x 6mm NEOPRENE SEAL HOUSED IN A 'U' SHAPED CHANNEL  
LOCKS- ESCUTCHEONS AND COVERS-M6 STUD WITH ACORN NUTS  
LOCKS-DOORS L&F T HANDLE KEY 92268① NON-LOCKABLE ②

**PAINTWORK :-**

POWDER COATING  
MOUNTING PANELS ( 3mm. ZINCANEAL ) & ESCUTCHEONS IN GLOSS WHITE  
INTERIOR & EXTERIOR SURFACES, DOORS, COVERS IN X15 ORANGE