# QUEENSLAND URBAN UTILITIES 

SP046 - BOTTICELLI STREET SEWAGE PUMPING STATION

## ELECTRICAL SWITCHBOARD

 OPERATION AND MAINTENANCE MANUAL
## Developed by:



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## 1 INTRODUCTION

These operating instructions cover the following Sewage pumping stations electrical equipment supplied by J \& P Richardson Industries Pty Ltd in 2012.

- SP046 Botticelli Street


### 1.1 OPERATING INSTRUCTIONS

Normal operation of the pumping station is in the automatic mode with control by means of a Logica (RTU), which receives level signals from the Level Measurement System in the wet well.

Manual Emergency operation control of the station is available by means of selector switch on the common control compartment of the switchboard.

## 2 DESCRIPTION OF OPERATION

### 2.1 MODE SELECTION

The station can be operated either in Local-Remote (automatic) or manual emergency mode with selection being made by means of the mode selector switch mounted on common control section escutcheon of the switchboard. The selector switch designated for Manual Emergency Mode is made by means with the following mode selections NORMAL-RUN.

### 2.2 MANUAL EMERGENCY CONTROL

Each pumping unit can be run in manual emergency control from the individual pump starter section by: -
a) Selecting the "ON" setting on the "MODE SELECTOR SWITCH" as described in Clause 2.1.
b) The Duty Pump will start.
c) After a time delay, the Standby Pump will start.
d) Return the selector switch back to "NORMAL".

## N.B. DO NOT LEAVE IN MANUAL EMERGENCY WHILE SELECTION STATION UNATTENDED

### 2.3 AUTOMATIC CONTROL

For automatic control of the station: -
a) The "MODE SELECTOR SWITCH" on the common control section should be in the "REMOTE" position.
b) The automatic starting and stopping of the pumps is controlled by signals from the Logica RTU.

For NORMAL OPERATION, each of the pump selector switches should have "EMERGENCY PUMP OFF" mode selected.

In the LOCAL / REMOTE mode the selected Duty Pump unit will start automatically as preset by the level in the wet well. In the event of the duty pump not being capable of supplying enough flow to continue draining the wet well and the well level rises to a second pre-set level, then the Standby Pump unit will automatically start, to provide additional pumping. The supplementary pump unit also takes over for the respective pump duty on the occurrence of the Duty Pump unit failing.

## 3 ELECTRICAL EQUIPMENT TECHNICAL INFORMATION

### 3.1 Circuit Breakers, Chassis \& Isolators

3.2 Control Devices \& Sockets
3.3 Fuses \& Surge Protective Devices
3.4 Switches, Indicators \& Pushbuttons
3.5 Power Supply \& Radio Devices
3.6 Instrumentations \& Lights
3.7 Soft Starter \& Pump Devices
3.8 Terminals \& Links
3.9 Other Accessories

### 3.1 CIRCUIT BREAKERS, CHASSIS \& ISOLATORS

- TERASAKI - CD-2-24/18-3U - Distribution Board Chassis
- TERASAKI - DSRCBH-6-30A - Circuit Breaker
- TERASAKI - DSRCBH-10-30A - Circuit Breaker
- TERASAKI - DSRCBH-16-30A - Circuit Breaker
- TERASAKI - DTCB15306C - Circuit Breaker
- TERASAKI - DTCB6104C - Circuit Breaker
- TERASAKI - DTCB6106C - Circuit Breaker
- TERASAKI - DTCB6110C - Circuit Breaker
- TERASAKI - DTCB6210C - Circuit Breaker
- TERASAKI - DTCB6306C - Circuit Breaker
- TERASAKI - DTCB6310C - Circuit Breaker
- TERASAKI - MTSS2PE12533 - Manual Transfer Switch
- TERASAKI - S125GJ/20 - Circuit Breaker + T2HS Handle
- TERASAKI - S125NJ/32 - Sub-Distribution Board Circuit Breaker
- TERASAKI - S250PE/125 - Circuit Breaker + N/O Aux. Contact

Panelboards, loadcentres and accessories

## CONCEPT•PLUS and Premier busbar chassis - Din-T

■ Standards AS/NZS 3439

- Current rating 250 A
- Withstand rating $250 \mathrm{~A} / 20 \mathrm{kA}$ for 0.2 sec
- Splayed busbar to suit $160 \mathrm{~A} \& 250 \mathrm{~A}$ switch
- Top and bottom feed - splayed top \& bottom
- Tee-offs stripped and $50 \%$ capped
- Top power feed stripped and capped
- Full 35 mm DIN rail, improved MCB mounting security
- Improved insulation coating

Concept Din-T - 250 to suit Din-T MCBs ( 18 mm pole pitch) ${ }^{3}$ )
$\left.\begin{array}{l|l|}\hline \text { Pole capacity } & \begin{array}{l}\text { 250 A } \\ \text { Cat. No. }\end{array} \\ \hline 12\end{array}\right)$

Notes: ${ }^{1}$ ) 4 pole and other special configurations available to special order refer NHP. 'OFF' (line) side of MCB connects to chassis tee-off. MCB DIN clips may be disengaged or removed when mounting onto "CD" chassis. If applicable use insulated tool provided to disengage DIN clip when removing MCB from chassis.
${ }^{3}$ ) Not suitable for CONCEPT economy Panelboards. Contact NHP for availability. Available on indent only.

Accessories
Description
Split tariff kit 250/355 A (supplied loose)
Split tariff kit (fitted)

Plastic tee-off cap 250 / 355 A

Cat. No.

| STKCD |
| :--- |
| REFER NHP |
| CD250TOPC |


| Technical data - CD/CT busbar chassis <br> Description |  |  |
| :--- | :--- | :--- |
| CD-250 A |  |  |
| Busbar rating | (Amp) | 250 |
| Voltage rating | (V) | 415 |
| Short circuit rating | $(\mathrm{kA})$ | 20 |
| Short circuit time | (sec) | 0.2 |
| Insulation material |  | Polyolefin <br>  |

Catalogue number structure - CD/CT busbar chassis


## Panelboards, loadcentres and accessories

## Dimensions (mm)

CD chassis 250 to suit Din-T6, 10 and 15


Escutcheon cut-out details


Notes: ${ }^{1}$ ) " X " insert $2=250 \mathrm{~A}$ or $\mathbf{3}=355 \mathrm{~A}$, current rating does not effect above dims. Maximum current rating of tee-off $=100 \mathrm{~A}$. 'OFF' (line) side of MCB connects to chassis tee-off. MCB DIN clips may be disengaged or removed when mounting onto "CD" chassis Use insulated tool provided to disengage DIN clip when removing MCB from chassis.

## Miniature circuit breakers

## Din-Safe single pole width residual current circuit breaker (RCBO) 10 kA

```
Standards AS/NZS 61009
Approval N17482
\square One module wide (18 mm)
 Short circuit, overcurrent and earth leakage protection
Short circuit protection, 10 kA
- Sensitivity 30 mA, 10 mA
DIN rail mount
Suits NC or CD chassis
\square Type 'A' residual current device
- 240 V AC
```

Trip

| sensitivity | Amp rating (A) | Cat. $\left.{ }^{(1)}{ }^{1}\right)^{2}$ ) |
| :---: | :---: | :---: |
| 10 mA | 6 | 1) DSRCBH0610A |
|  | 10 | DSRCBH1010A |
|  | 16 | DSRCBH1610A |
|  | 20 | DSRCBH2010A |
|  | 25 | i DSRCBH2510A |
|  | 32 | (i) DSRCBH3210A |
|  | 40 | - DSRCBH4010A |
| 30 mA | 6 | DSRCBH0630A |
|  | 10 | DSRCBH1030A |
|  | 16 | DSRCBH1630A |
|  | 20 | DSRCBH2030A |
|  | 25 | DSRCBH2530A |
|  | 32 | DSRCBH3230A |
|  | 40 | DSRCBH4030A |

Operation
This unit combines the overload and short circuit protection of an MCB with earth leakage protection of an RCD. The unit occupies one, sub- circuit (one pole) of the distribution board and provides single phase protection against overload, short circuit and earth leakage current.

- $\quad$ The MCB element provides thermal and magnetic tripping protection which is rated to 6 kA prospective fault current.
- $\quad$ The RCD element of the device provides core-balance detection of the difference between the active and neutral currents and amplification to provide high sensitivity. The rated residual operating current ( $\mathrm{I} \Delta \mathrm{n}$ ) is 30 mA .
- The white earth reference cable, in case of loss of supply neutral, ensures the device will continue to provide earth leakage protection and will operate normally upon detection of an earth leakage current.
Dimensions (mm)



## Application

The Din-Safe single pole width residual current circuit breaker will fit the standard Din-T chassis for use in NHP panelboards. The design makes it possible to provide an MCB complete with earth leakage protection in an 18 mm wide module, which allows a greater number of devices to be fitted into a distribution board.

## Connection diagram



| Accessories | Page |
| :--- | :--- |
| Padlock bracket | $1-45$ |
| Link bars and terminals | $1-44$ to $1-45$ |
| Enclosures | Section 2 |
| Technical data | Page |
| Tripping characteristics | Section 3 |
| Technical data / wiring | Section 3 |

## Notes: ${ }^{1}$ ) Neutral not switched.

${ }^{2}$ ) Will not accept Din-T side mounting accessories.
30 mA tripping characteristics: $0.5 \times \mathrm{I} \Delta \mathrm{n}=$ no tripping, $1 \times \mathrm{I} \Delta \mathrm{n}=\mathrm{T} \leq 300 \mathrm{mS}$

$$
2 \times \mathrm{I} \Delta \mathrm{n}=\mathrm{T} \leq 150 \mathrm{mS}, 5 \times \mathrm{I} \Delta \mathrm{n}=\mathrm{T} \leq 40 \mathrm{mS}
$$

Nuisance tripping may be experienced in VFD and motor starting applications refer NHP.
i Available on indent only

## Miniature circuit breakers

## Din-T6 series 6 kA MCB

Standards AS/NZS 60898
Approval No. N17481
Current range 2-63 Amps 1, 2 and 3 pole
Sealable and lockable handle
Available in curve type C and D
Mounts on NC or CD chassis
Padlockable in off position

1 pole 1 module

| In (A) | D - Curve <br> 10-20 In <br> Cat. No. |
| :--- | :--- |
| 2 | DTCB6102D |
| 4 | DTCB6104D |
| 6 | DTCB6106D |
| 10 | DTCB6110D |
| 13 | i |
| 16 | DTCB6113D |
| 20 | DTCB6116D |
| 25 | DTCB6120D |
| 32 | DTCB6125D |
| 40 | DTCB6132D |
| 50 | DTCB6150D |
| 63 | DTCB6163D |

2 pole 2 modules

| 2 | DTCB6202C |
| :--- | ---: |
| 4 | DTCB6204C |
| 6 | DTCB6206C |
| 10 | DTCB6210C |
| 13 | i |
| DTCB6213C |  |
| 16 | DTCB6216C |
| 20 | DTCB6220C |
| 25 | DTCB6225C |
| 32 | DTCB6232C |
| 40 | DTCB6240C |
| 50 | DTCB6250C |
| 63 | DTCB6263C |


| 2 | DTCB6202D |
| :--- | ---: |
| 4 | DTCB6204D |
| 6 | DTCB6206D |
| 10 | DTCB6210D |
| 13 | i |
| DTCB6213D |  |
| 16 | DTCB6216D |
| 20 | DTCB6220D |
| 25 | DTCB6225D |
| 32 | DTCB6232D |
| 40 | DTCB6240D |
| 50 | DTCB6250D |
| 63 | DTCB6263D |

3 pole 3 modules

| 2 | DTCB6302C |
| :--- | ---: |
| 4 | DTCB6304C |
| 6 | DTCB6306C |
| 10 | DTCB6310C |
| 13 | i |
| 16 | DTCB6313C |
| 20 | DTCB6316C |
| 25 | DTCB6320C |
| 32 | DTCB6332C |
| 40 | DTCB6340C |
| 50 | DTCB6350C |
| 63 | DTCB6363C |


| 2 | DTCB6302D |
| :--- | ---: |
| 4 | DTCB6304D |
| 6 | DTCB6306D |
| 10 | DTCB6310D |
| 13 | i |
| 16 | DTCB6313D |
| 20 | DTCB6316D |
| 25 | DTCB6325D |
| 32 | DTCB6332D |
| 40 | DTCB6340D |
| 50 | DTCB6350D |
| 63 | DTCB6363D |

Short circuit capacity 6 kA

| In (A) | $\mathbf{2 - 6 3}$ |
| :--- | :--- |
| 1 P | 240 V AC |
| 2 P | $240-415 \mathrm{~V} \mathrm{AC}$ |
| 3 P | $240-415 \mathrm{~V} \mathrm{AC}$ |
| DC use | $\mathbf{1} \mathbf{P}$ |
| Short circuit | 20 kA |
| Max.voltage (DC) | $\mathbf{4 8} \mathrm{V}$ |

## Use at DC

When using Din-T6 in a DC application the magnetic tripping current is approximately $40 \%$ higher than in AC $50 / 60 \mathrm{~Hz}$.

Shock resistance (In X, Y, Z directions).
20 g with shock duration 10 ms (minimum 18 shocks).
40 g with shock duration 5 ms (minimum 18 shocks).
Vibration resistance (In X, Y, Z directions).
3 g in frequency range 10 to 55 Hz (operating time at least 30 min ).
According to IEC 60068-2-6.
Storage temperature
From $-55^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$, according to IEC 88 part 2-1 (duration 96 hours).

Operating temperature
From $-25^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$, according to
VDE 0664 parts 1 and 2.
Use at 400 Hz
At 400 Hz the magnetic trip current is approximately $50 \%$ higher than in AC $50 / 60 \mathrm{~Hz}$.

| Accessories | Page |
| :--- | :--- |
| Add on RCD | $1-28,1-29$ |
| Auxiliary/alarm | $1-32$ to $1-35$ |
| Shunt trip | $1-36$ to $1-38$ |
| UVT | $1-39,1-40$ |
| Padlockable bracket | $1-45$ |
| Link bars \& terminals | $1-44,1-45$ |
| Enclosures | Section 2 |
| Busbar chassis | $2-52$ |
| Technical data | Page |
| Technical data | Section 3 |
| Tripping characteristics | $3-6,8$ |
| Dimensions | $3-24$ |

Notes: ${ }^{1}$ ) 2 pole MCB connected in series. The line side is the "OFF" (bottom) side of the MCB, and connects to NC or CD chassis tee-offs. i) Available on indent only.

## Miniature circuit breakers

## Din-T15 series 15 kA, 20 kA, 25 kA MCBs

- Standards AS/NZS 60947-2
- Current range 6-63 Amp 1, 2, 3 and 4 pole
- Sealable and lockable handle
- Modular design
- Mounts on NC or CD chassis
- Industrial applications

1 pole 1 module ${ }^{1}$ )

| In (A) | Icu (kA) | C - Curve <br> $5-10$ In |
| :--- | :--- | :--- |
| 6 | 25 | DTCB15106C |
| 10 | 25 | DTCB15110C |
| 13 | 25 | i |
| 16 | 25 | DTCB15113C |
| 20 | 25 | DTCB15116C |
| 25 | 25 | DTCB15120C |
| 32 | 20 | DTCB15125C |
| 40 | 20 | DTCB15140C |
| 50 | 15 | DTCB15150C |
| 63 | 15 | DTCB15163C |

3 pole 3 modules ${ }^{1}$ )

| 6 | 25 | DTCB15306C |
| :--- | :--- | :--- |
| 10 | 25 | DTCB15310C |
| 13 | 25 | i |
| DTCB15313C |  |  |
| 16 | 25 | DTCB15316C |
| 20 | 25 | DTCB15320C |
| 25 | 25 | DTCB15325C |
| 32 | 20 | DTCB15332C |
| 40 | 20 | DTCB15340C |
| 50 | 15 | DTCB15350C |
| 63 | 15 | DTCB15363C |

2 pole 2 modules ${ }^{1}$ )

| In (A) | Icu (kA) | C - Curve <br> $5-10$ In |
| :--- | :--- | ---: |
| 6 | 25 | i |
| DTCB15206C |  |  |
| 10 | 25 | DTCB15210C |
| 13 | 25 | i |
| 16 | 25 | DTCB15213C |
| 20 | 25 | DTCB15216C |
| 25 | 25 | DTCB15220C |
| 32 | 20 | DTCB15225C |
| 40 | 20 | i |
| 50 | 15 | DTCB15232C |
| 63 | 15 | DTCB15240C |

4 pole 4 modules $\left.{ }^{1}\right)^{2}$ )

| 6 | 25 | $i$ |
| :--- | :--- | :--- |
| DTCB15406C |  |  |
| 10 | 25 | $i$ |
| 13 | 25 | DTCB15410C |
| 16 | 25 | i |
| 20 | 25 | DTCB15413C |
| 25 | 25 | DTCB15416C |
| 32 | 20 | DTCB15420C |
| 40 | 20 | DTCB15425C |
| 50 | 15 | DTCB15432C |
| 63 | 15 | DTCB15440C |



| In (A) | $\mathbf{6 - 6 3}$ |
| :--- | :--- |
| $1 P$ | 240 V AC |
| $2 P$ | $240 / 415 \mathrm{~V} \mathrm{AC}$ |
| $3 P$ | $240 / 415 \mathrm{~V} \mathrm{AC}$ |
| 4 P | $240 / 415 \mathrm{~V} \mathrm{AC}$ |

Shock resistance (in $\mathrm{x}, \mathrm{y}, \mathrm{z}$ direction) 20 g with shock duration of 10 ms (minimum 18 shocks)
40 g with shock duration of 5 ms (minimum 18 shocks)

Vibration resistance (in $x, y, z$ direction) 3 g in frequency range 10 to 55 Hz (operating time at least 30 mins ) according to IEC 60068-2-6

## Storage temperature

from $-55^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ according to VDE 0664 parts 1 and 2
Operating temperature from $-25^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ according to VDE 0664 Parts 1 and 2.

Use at 400 Hz
At 400 Hz the magnetic tripping current is approximately $50 \%$ higher than at AC $50 / 60 \mathrm{~Hz}$

Notes: ${ }^{1}$ ) Refer Section 3 for kA ratings at $240 / 415 \mathrm{~V}$. The above ratings are at 415 V AC.
${ }^{2}$ ) All poles include overcurrent and short circuit protection.
i Available on indent only.
The LINE-side is the OFF or bottom of the MCB and connects to CD chassis tee-offs.

| Accessories | Page |
| :--- | :--- |
| Add-on RCD | $1-28$ to $1-29$ |
| Shunt trip | $1-36$ to $1-38$ |
| UVT | $1-39$ to $1-40$ |
| Auxiliary/alarm | $1-32$ to $1-35$ |
| Padlock bracket | $1-45$ |
| Link bars and terminals | $1-44$ to $1-45$ |
| Enclosures | Section 2 |
| Busbar chassis | $2-52$ |
| Technical data | Page |
| Technical data | Section 3 |
| Tripping characteristics | $3-6,3-8$ |
| Dimensions | $3-24$ |

Din－T MCBs＋RCDs Technical data Selection table MCBs

| Series | Application | No．of Poles | Add－on devices | Tripping characteristic | Current rating （A） | Short－circuit capacity（kA） |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Din－T6 | 管最 1 | 1，1＋N，2，3， 4 | yes | C | 0．5－63 | $610 \quad 20$ |
|  |  |  | yes | D | 0．5－63 | $610 \quad 20$ |
| Din－T10 | 人 3 | 1，1＋N，2，3， 4 | yes | B | 6－63 | $10-15>$ |
|  |  |  | yes | C | 0．5－63 | $10-15>$ |
|  |  |  | yes | D | 0．5－63 | $10>15>30$ |
| Din－T15 | $12=$ | 1，2，3， 4 | yes | C | 0．5－63 | $15>20>25$ |
|  |  |  | yes | D | 0．5－63 | $15>20>25$ |
| Din－TDC | $12=$ | 1， 2 | yes | C | 0．5－63 | 610 |
| Din－T10H | V14\％ | 1，2，3， 4 | yes | C | 80－125 | $10>15$ |
|  |  |  | yes | D | 80－125 | 7.5 |
| Safe－T | 栍 $18=$ | 1，2，3， 4 | yes | NEMA device curve | 6－100 | 6 |
|  | domestic <br> commercial industrial |  |  | B $:$ $3-5$ <br> C $:$ $5-10$ <br> D $:$ $10-2$ <br> NEMA Zero  <br>    <br>  extin  <br>  curv  | int shing | AS／NZS 60898 <br> AS／NZS 60947－2 <br> NEMA AB1 |

## Din-T MCBs + RCDs Technical data



## Line protection <br> by means of MCBs

Protective devices shall be capable of breaking any overcurrent up to and including the prospective short-circuit current at the point where the device is installed. One of the protective devices complying with those conditions is the MCB.

## Protection against short-circuit

According to IEC 60364 protective devices shall be provided to break any short-circuit current flowing in the circuit conductors before such a current could cause danger due to thermal and mechanical effects produced in conductors and connections. To consider that an installation is well protected against short-circuits, it is required that the protective device complies with the following conditions:

- The breaking capacity shall not be less than the prospective short-circuit current at the place of its installation.

$$
\mathrm{Icu} \geq \mathrm{Icc}
$$

- Let-through energy I²t smaller than admissible energy of the cable.
- According to IEC 60364-4-473 there are some cases where the omission of devices for protection against overload is recommended for circuits supplying current-used equipment where unexpected opening of the circuit could cause danger.

Examples of such cases are:

- Excitation circuit of rotating machines.
- Supply circuit of lifting magnets.
- Secondary circuits of current transformers.

As in those cases the Iu>Iz, it is necessary to verify the shortcircuit value at the point of the installation to ensure the protection (Icc min).


Icc: Maximum value of the short-circuit current in that point.

Icu: Short-circuit capacity of the protective device.

## Calculation of Icc

The value of the short-circuit current flowing at the end of a cable depends on the short-circuit current flowing at the beginning of the cable (transformer terminals), the cross-section as well as its length.


Short-circuit current at the transformer terminals (Icco)
Three phase oil transformer - 400 V

| Transformer power <br> kVA | Voltage Ucc <br> In \% | In <br> A RMS | Icco <br> kA RMS |
| :---: | ---: | ---: | ---: |
| 250 | 4 | 352 | 8.7 |
| 315 | 4 | 443 | 10.9 |
| 400 | 4 | 563 | 13.8 |
| 500 | 4 | 704 | 17.1 |
| 630 | 4 | 887 | 21.6 |
| 800 | 4.5 | 1126 | 24.1 |
| 1000 | 5 | 1408 | 27 |
| 1250 | 6 | 1760 | 30.4 |
| 1600 | 6.5 | 2253 | 35.5 |
| 2000 | 7 | 3516 | 40.5 |
| 2500 | 7 | 4435 | 46.6 |
| 3150 |  | 57.6 |  |

# Din-T MCBs + RCDs Technical data Characteristics according to AS/NZS 60898 

Miniature Circuit Breakers are intended for the protection of wiring installations against both overloads and short-circuits in domestic or commercial wiring installations where operation is possible by uninstructed people

Tripping characteristic curves


## Magnetic release

An electromagnet with plunger ensures instantaneous tripping in the event of short-circuit. The NHP Din-T range has 3 different types, following the current for instantaneous release: types B, C and $D$ curve.

| Icn <br> (A) | Test <br> current | Tripping <br> time | Applications |
| :---: | :---: | :---: | :--- |
| B | $3 \times$ In | $0.1<\mathrm{t}<45 \mathrm{~s}(\mathrm{In} \leq 32 \mathrm{~A})$ | Only for resistive loads eg: |
|  | $5 \times$ In | $0.1<\mathrm{t}<90 \mathrm{~s}(\mathrm{In}>32 \mathrm{~A})$ | - electrical heating |
|  |  | $\mathrm{t}<0.1 \mathrm{~s}$ | - water heater |
|  |  | stoves. |  |


| C$5 \times \operatorname{In}$ $0.1<\mathrm{t}<15 \mathrm{~s}(\operatorname{In} \leq 32 \mathrm{~A})$ | Usual loads such as: <br> $10 \times \operatorname{In}$ | $0.1<\mathrm{t}<30 \mathrm{~s}(\operatorname{In}>32 \mathrm{~A})$ |
| :---: | :---: | :--- | | - lighting |
| :--- |
|  |
|  |
|  |
|  |
| $\mathrm{t}<0.1 \mathrm{~s}$ |

D $10 \times \operatorname{In} 0.1<\mathrm{t}<4 \mathrm{~s}\left({ }^{* *}\right)(\mathrm{In} \leq 32 \mathrm{~A})$ Control and protection of $20 \times \operatorname{In} \quad 0.1<t<8 \mathrm{~s}(\mathrm{In}>32 \mathrm{~A})$ t<0.1 s circuits having important transient inrush currents (large motors)
** If In $\leq 10 \mathrm{~A},+<8 \mathrm{~s}$
Thermal release
The release is initiated by a bimetal strip in the event of overload. The standard defines the range of releases for specific overload values. Reference ambient temperature is $30^{\circ} \mathrm{C}$.

| Test <br> current | Tripping <br> time |
| :---: | :---: |
| $1.13 \times \operatorname{In}$ | $\mathrm{t} \geq 1 \mathrm{~h}(\operatorname{In} \leq 63 \mathrm{~A})$ |
|  | $\mathrm{t} \geq 2 \mathrm{~h}(\mathrm{In}>63 \mathrm{~A})$ |
| $1.45 \times \operatorname{In}$ | $\mathrm{t}<1 \mathrm{~h}(\operatorname{In} \leq 63 \mathrm{~A})$ |
|  | $\mathrm{t}<2 \mathrm{~h}(\operatorname{In}>63 \mathrm{~A})$ |
| $2.55 \times \mathrm{In}$ | $1 \mathrm{~s}<\mathrm{t}<60 \mathrm{~s}(\operatorname{In} \leq 32 \mathrm{~A})$ |
|  | $1 \mathrm{~s}<\mathrm{t}<120 \mathrm{~s}(\operatorname{In}>32 \mathrm{~A})$ |

## Rated short-circuit breaking capacity (Icn)

Is the value of the short-circuit that the MCB is capable of withstanding in the following test of sequence of operations: $0-\mathrm{t}-\mathrm{CO}$.
After the test the MCB is capable, without maintenance, to withstand a dielectric strength test at a test voltage of 900 V . Moreover, the MCB shall be capable of tripping when loaded with 2.8 In within the time corresponding to 2.55 In but greater than 0.1 s .
Service short-circuit breaking capacity (Ics)
Is the value of the short-circuit that the MCB is capable of withstanding in the following test of sequence of operations: $0-\mathrm{t}-\mathrm{CO}-\mathrm{t}-\mathrm{CO}$.

After the test the MCB is capable, without maintenance, to withstand a dielectric strength test at a test voltage of 1500 V . Moreover, the MCB shall not trip at a current of 0.96 In. The MCB shall trip within 1 h when current is 1.6 In.

0 - Represents an opening operation
C - Represents a closing operation followed by an automatic opening.
t - Represents the time interval between two successive short-circuit operations: 3 minutes.

The relation between the rated short-circuit capacity (Icn) and the rated service short-circuit breaking capacity (Ics) shall be as follows:

| Icn (A) | Ics (A) |
| :---: | :---: |
| $\leq 6000$ | 6000 |
| $>6000$ | 0.75 Icn min. 6000 |
| $\leq 10000$ | 0.75 Icn min. 7500 |
| $>10000$ |  |

In both sequences all MCBs are tested for emission of ionized gases during short-circuit (grid distance), in a safety distance between two MCBs of 35 mm when devices are installed in two different rows in the enclosure. This performance allows the use of any NHP/Terasaki enclosure.


# Din-T MCBs + RCDs Technical data Characteristics according to AS/NZS 60947-2 

Miniature Circuit Breakers are intended for the protection of the lines against both overloads and short-circuits in industrial wiring installations where normal operation is done by instructed people

Tripping characteristic curves


## Magnetic release

An electromagnet with plunger ensures instantaneous tripping in the event of short-circuit. The standard leaves the calibration of magnetic release to the manufacturers discretion.
NHP offers instantaneous tripping ranges:

- release between 3 and 5 In (typically 4 In)
- release between 5 and 10 In (typically 8.5 In)
- release between 10 and 20 In (typically 14 In)


## Thermal release

The release is initiated by a bimetal strip in the event of overload. The standard defines the range of release for two special overload values. Reference ambient temperature is $40^{\circ} \mathrm{C}$.

| Test <br> current | Tripping <br> time |
| :---: | :---: |
| $1.05 \times \operatorname{In}$ | $\mathrm{t} \geq 1 \mathrm{~h}(\operatorname{In} \leq 63 \mathrm{~A})$ |
|  | $\mathrm{t} \geq 2 \mathrm{~h}(\operatorname{In}>63 \mathrm{~A})$ |
| $1.30 \times \operatorname{In}$ | $\mathrm{t}<1 \mathrm{~h}(\operatorname{In} \leq 63 \mathrm{~A})$ |
|  | $\mathrm{t}<2 \mathrm{~h}(\mathrm{In}>63 \mathrm{~A})$ |

Rated ultimate short-circuit breaking capacity (Icu) Is the value of the short-circuit that the MCB is capable of withstanding in the following test of sequence of operations: $0-\mathrm{t}-\mathrm{CO}$.
After the test the MCB is capable, without maintenance, to withstand a dielectric strength test at a test voltage of 1000 V . Moreover the MCB shall be capable of tripping when loaded with 2.5 In within the time corresponding to 2 In but greater than 0.1 s .

Rated service short-circuit breaking capacity (Ics) Is the value of the short-circuit that the MCB is capable of withstanding in the following test of sequence of operations: 0-t-CO-t-CO.

After the test the MCB is capable, without maintenance, to withstand a dielectric strength test at a test voltage of twice its rated insulation voltage with a minimum of 1000 V . A verification of the overload releases on In and moreover the MCB shall trip within 1 h when current is 1.45 In (for $\operatorname{In}<63 \mathrm{~A}$ ) and 2 h (for $\mathrm{In}>63 \mathrm{~A}$ ).

0 - Represents an opening operation
C - Represents a closing operation followed by an automatic opening.
t - Represents the time interval between two successive short-circuit operations: 3 minutes.

Category A: Without a short-time withstand current rating.

## Utilisation

category Application with respect to selectivity
A Circuit breakers not specifically intended for selectivity under short-circuit conditions with respect to other short-circuit protective devices in series on the load side, i.e. without an intentional short-time delay provided for selectivity under short-circuit conditions, and therefore without a short-time withstand current rating according to 4.3.5.4

B Circuit breakers specifically intended for selectivity under short-circuit conditions with respect to other short-circuit protective devices in series on the load side, i.e. without an intentional short-time delay (which may be adjustable), provided for selectivity under short-circuit conditions. Such circuit-breakers have a short-time withstand current rating according to 4.3.5.4

Din-T MCBs + RCDs Technical data
Tripping curves according to AS/NZS 60898

The following tables show the average tripping curves of the Terasaki Din-T MCBs based on the thermal and magnetic characteristics.

Curve B


## Curve D



# Din-T MCBs + RCDs Technical data Definitions related to circuit breakers 

MCB = Miniature Circuit Breaker

## Short-circuit (making and breaking)

 capacityAlternating component of the prospective current, expressed by its RMS value, which the circuit breaker is designed to make, to carry for its opening time and to break under specified conditions.

Ultimate or rated short-circuit breaking capacity (Icn - AS/NZS 60898)
A breaking capacity for which the prescribed conditions, according to a specified test sequence, do not include the capability of the MCB to carry 0.96 times its rated current for the conventional time.

Ultimate short-circuit breaking capacity (Icu - AS/NZS 60947-2)
A breaking capacity for which the prescribed conditions, according to a specified test sequence, do not include the capability of the MCB to carry its rated current for the conventional time.

Service short-circuit breaking capacity (Ics - AS/NZS 60898)
A breaking capacity for which the prescribed conditions, according to a specified test sequence, include the capability of the MCB to carry 0.96 times its rated current for the conventional time.

## Prospective current

The current that would flow in the circuit, if each main current path of the MCB were replaced by a conductor of negligible impedance.

Conventional non-tripping current (Int) A specified value of current which the circuit breaker is capable of carrying for a specified time without tripping.

## Open position

The position in which the predetermined clearance between open contacts in the main circuit of the MCB is secured.

Closed position
The position in which the predetermined continuity of the main circuit of the MCB is secured.

Maximum prospective peak current (Ip) The prospective peak current when the initiation of the current takes place at the instant which leads to the highest possible value.

## Din-T MCBs + RCDs Technical data <br> Influence of ambient air temperature on the rated current

The maximum value of the current which can flow through an MCB depends on the nominal current of the MCB, the conductor cross-section and the ambient air temperature.
The values shown in the table below are for devices in free air. For devices installed with other modular devices in the same switchboard, a correction factor (K) shall be applied relative to the mounting situation of the MCB, the ambient temperature and the number of main circuits in the installation.

| No of devices | K $^{1}$ ) |
| :---: | :--- |
| 2 or 3 | 0.9 |
| 4 or 5 | 0.8 |
| 6 or 9 | 0.7 |
| $>10$ | 0.6 |

## Calculation example

Within a distribution board consisting of eight 2 Pole, $16 \mathrm{~A}, ~ ' \mathrm{C}$ ' curve type MCBs, with an operating ambient temperature of $45^{\circ} \mathrm{C}$, which is the highest temperature the MCB can operate at without unwanted tripping?

## Calculation

The correction factor $\mathrm{K}=0.7$, for use in an eight circuit installation: $16 \mathrm{~A} \times 0.7=11.2 \mathrm{~A}$
As the MCB is working at $45^{\circ} \mathrm{C}$ it shall be given another factor ( $90 \%=0.9$ ):
In at $45^{\circ} \mathrm{C}=$ In at $30^{\circ} \mathrm{C} \times 0.9=11.2 \mathrm{~A} \times 0.9=10.1 \mathrm{~A}$.

Note: ${ }^{1}$ ) Applicable for MCBs working at maximum rated currents.

The thermal calibration of the MCBs was carried out at an ambient temperature of $30^{\circ} \mathrm{C}$. Ambient temperatures different from $30^{\circ} \mathrm{C}$ influence the bimetal and this results in earlier or later thermal tripping.

## 0.5-6 A



## 10 A



16-40 A


50-63 A


## Din-T MCBs + RCDs Technical data

## Effects of frequency on the tripping characteristic

All the MCBs are designed to work at frequencies of $50-60 \mathrm{~Hz}$, therefore to work at different values, consideration must be given to the variation of the tripping characteristics. The thermal tripping does not change with variation of the frequency but the magnetic tripping values can be up to $50 \%$ higher than the ones at $50-60 \mathrm{~Hz}$.

Tripping current variation

| $\mathbf{6 0 ~ H z}$ | $\mathbf{1 0 0 ~ H z}$ | $\mathbf{2 0 0 ~ H z}$ | $\mathbf{3 0 0} \mathrm{Hz}$ | $\mathbf{4 0 0 ~ H z}$ |
| :---: | :---: | :---: | :---: | :---: |
| 1 | 1.1 | 1.2 | 1.4 | 1.5 |

## Power losses

The power losses are calculated by measuring the voltage drop between the incoming and the outgoing terminals of the device at rated current.

Power loss per pole

| In <br> $(\mathbf{A})$ | Voltage drop <br> $(\mathrm{V})$ | Energy loss <br> $(\mathrm{W})$ | Resistance <br> $(\mathrm{m0hm})$ |
| :---: | :---: | :---: | :---: |
| 0.5 | 2.230 | 1.115 | 4458.00 |
| 1 | 1.270 | 1.272 | 1272.00 |
| 2 | 0.620 | 1.240 | 310.00 |
| 3 | 0.520 | 1.557 | 173.00 |
| 4 | 0.370 | 1.488 | 93.00 |
| 6 | 0.260 | 1.570 | 43.60 |
| 8 | 0.160 | 1.242 | 19.40 |
| 10 | 0.160 | 1.560 | 15.60 |
| 13 | 0.155 | 2.011 | 11.90 |
| 16 | 0.162 | 2.586 | 10.10 |
| 20 | 0.138 | 2.760 | 6.90 |
| 25 | 0.128 | 3.188 | 5.10 |
| 32 | 0.096 | 3.072 | 3.00 |
| 40 | 0.100 | 4.000 | 2.50 |
| 50 | 0.090 | 4.500 | 1.80 |
| 63 | 0.082 | 5.160 | 1.30 |
| 80 | 0.075 | 6.000 | 0.90 |
| 100 | 0.075 | 7.500 | 0.75 |
| 125 | 0.076 | 9.500 | 0.60 |
| 2 |  |  |  |
| 2 |  |  |  |

## Limitation curves

## Let-through energy $\mathrm{I}^{2} \mathrm{t}$

The limitation capacity of an MCB in short-circuit conditions, is its capacity to reduce the value of the let-through energy that the short-circuit would be generating.
Peak current Ip
Is the value of the maximum peak of the short-circuit current limited by the MCB.


See following pages

Din-T MCBs + RCDs Technical data
Din-T 6
6 kA
C curve
$1^{2}$ t Let-through energy at 240/415 V


Id Limited peak current at $230 / 400 \mathrm{~V}$


## Din-T MCBs + RCDs Technical data

## Din-T 15

15 kA

## C curve

$\mathbf{1}^{\mathbf{2}} \mathbf{t}$ Let-through energy at $\mathbf{2 4 0} \mathbf{V}$


Ip Limited peak current at 230/400 V


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## Din-T MCBs + RCDs Technical data Selectivity and Cascade

An installation with some protective devices in series (a protective device must be placed at the point where a reduction of the cross sectional area of the conductors or another change causes modification in the characteristics of the installation) is considered selective when, in the event of shortcircuit, the installation is interrupted only by the device which is immediately upstream of the fault point. Selectivity is ensured when the characteristic time/current of the upstream MCB (A) is above the characteristic time/current of the downstream MCB (B). Selectivity may be total or partial.


## SCPD: Short circuit protective device

## Cascade (Back-up protection)

Cascading is achieved by using an upstream device to assist (back-up) a downstream device in clearing a fault current that happens to be greater than the breaking capacity of the downstream device.
In Cascading applications, the upstream device may have to trip (unlatch) in order to give sufficient protection to the downstream device, thus interrupting supply of power to all devices downstream. Therefore, Cascading is generally used in applications involving the supply of non-essential loads, such as basic lighting. The main benefit of Cascading is that in certain circumstances circuit breakers with breaking capacities lower than the prospective fault level, hence lower in cost, can be safely used downstream provided it is backed-up by the relevant upstream breaker.

## Total selectivity

Selectivity is total in the event of a short-circuit fault and only disconnects the protective device (B) immediately upstream of the fault point.
The let-through energy $\left(\mathrm{I}^{2} \mathrm{t}\right)$ of the downstream protective device shall be lower than the upstream protective device.


## Partial selectivity

Selectivity is partial when the disconnection of the protective device $(A)$ is ensured only up to a certain level of the current.


Refer MCB Selectivity and Cascade tables in section 13

## Din-T MCBs + RCDs Technical data Use in DC installations

## Selection criteria

The selection of an MCB to protect a DC installation depends on the following parameters:

■ The nominal current

- The nominal voltage of the power supply, which determines the number of poles to switch the device
- The maximum short-circuit current, to determine the shortcircuit capacity of the MCB
- Type of power supply

In the event of an insulation fault, it is considered as an overload when one pole or an intermediate connection of the power supply is connected to earth, and the conductive parts of the installation are also connected to earth.

## Insulated generator

In insulated generators there is no earth connection, therefore, an earth leakage in any pole has no consequence. In the event of a fault between the two poles (+ and -) there is a shortcircuit in the installation, the value of which will depend on the impedance of the installation as well as of the voltage Un. Each polarity shall be provided with the appropriate number of poles.


## Generator with one earthed pole

In the event of a fault occuring in the earthed pole (-) there is no consequence. In the event of a fault between the two poles (+ and -) or between the pole + and earth, then there is a short-circuit in the installation, the value of which depends on the impedance of the installation as well as of the voltage Un. The unearthed pole (+) shall be provided with the necessary number of poles to break the maximum short-circuit.


## Generator with centre point earth connection

In the event of short-circuit between any pole (+ or -) and earth, there is an Isc<Isc max because the voltage is Un/2. If the fault occurs between the two poles there is a short-circuit in the installation, the value of which depends on the impedance of the installation as well as the voltage Un. Each polarity shall be provided with the necessary number of poles to break the maximum short-circuit at Un/2.


## Din-T MCBs + RCDs Technical data Use of standard MCB for DC use

For MCBs designed to be used in alternating current but used in installations in direct current, the following should be taken into consideration:

- For protection against overloads it is necessary to connect the two poles to the MCB. In these conditions the tripping characteristic of the MCB in direct current is similar to alternating current.
- For protection against short-circuits it is necessary to connect the two poles to the MCB. In these conditions the tripping characteristic of the MCB in direct current is $40 \%$ higher than the one in alternating current.

Use of special MCB Din-T DC for DC use.
(UC = Universal current)
For MCBs designed to work in both alternating and direct current, it is necessary to respect the polarity of the terminals since the device is equipped with a permanent magnet.

Use in DC selection table

|  | Rated <br> current (A) | 48 V 1 pole <br> Icu (kA) | 110 V 2 poles in series <br> Icu (kA) | 250 V 1 pole <br> Icu (kA) | 440 V 2 poles in series <br> Series | $0.5 \ldots .63 \mathrm{~A}$ |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: |

Installation of Din-T DC MCBs in direct current
Example of utilisation for maximum voltage between lines according to the number of poles

| MCB | Din-T DC 1 P | Din-T DC 2 P |  |  | Din-T DC 4 P |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Maximum voltage between lines | $250 \mathrm{~V}=$ | 250 V $-=-$ | $500 \mathrm{~V}=$ | $500 \mathrm{~V}-\mathrm{-}$ | $880 \mathrm{~V}=-$ |
| Maximum voltage between lines and earth | $250 \mathrm{~V}=$ | $250 \mathrm{~V}=\underline{--0}$ | $500 \mathrm{~V}=-{ }^{1}$ ) | $250 \mathrm{~V} \overline{---}{ }^{2}$ ) | $440 \mathrm{~V}-\mathrm{-E}^{2}$ ) |
| Power supply at bottom terminals |  |  |  |  |  |
| Power supply at top terminals |  |  |  |  |  |

Example of utilisation for maximum voltage between lines according to the number of poles

| MCB | Din-T DC 2 P |  | Din-T DC 4 P |
| :---: | :---: | :---: | :---: |
| Maximum voltage between lines | $500 \text { V DC }$ <br> Multi-pole breaking | $500 \mathrm{~V} \text { DC }$ <br> Multi-pole breaking | 880 V DC <br> Multi-pole breaking |
| Maximum voltage between lines and earth | 250 V DC <br> Generator with centre point earth connection | 500 V DC <br> Generator without earth connection or with one earthed pole | 440 V DC <br> Generator with centre point earth connection |

[^0]
## Din-T MCBs + RCDs Technical data Text for specifiers

## MCB Series Din-T 6 and 10

- According to AS/NZS 60898 standard
- For DIN rail mounting
(top hat rail 35 mm )
- Grid distance 35 mm
- Working ambient temperature from $-25^{\circ} \mathrm{C}$ up to $+50^{\circ} \mathrm{C}$
- Approved by CEBEC, VDE, KEMA, IMQ
- Lloyd listed
- 1 pole is a module of 18 mm wide
- Nominal rated currents are:
0.5/1/2/3/4/6/10/13/16/20/25/32/40/50/63 A
- Tripping characteristics: B,C,D (B curve Din-T 10 only)
- Number of poles: 1 P, 2 P, 3 P, 4 P
- The short-circuit breaking capacity is: $6 / 10 \mathrm{kA}$, energy limiting class 3
- Terminal capacity from 1 up to $35 \mathrm{~mm}^{2}$ rigid wire or 1.5 up to $25 \mathrm{~mm}^{2}$ flexible wire
- Screw head suitable for flat or Pozidrive screwdriver
- Can be connected by means of both pin or fork busbars
- The toggle can be sealed in the ON or OFF position
- Captive locking option
- Rapid closing
- Both incoming and outgoing terminals have a protection degree of IP 20 and they are sealable
- Isolator function thanks to Red/Green printing on the toggle
- Maximum voltage between two phases; $440 \mathrm{~V} \sim$

■ Maximum voltage for utilisation in DC current: 48 V 1 P and 110 V 2 P

- Two position rail clip
- Mechanical shock resistance 40 g (direction $\mathrm{x}, \mathrm{y}, \mathrm{z}$ ) minimum 18 shocks 5 ms half-sinusoidal acc. to IEC 60068-2-27
- Vibration resistance: 3 g (direction $\mathrm{x}, \mathrm{y}, \mathrm{z}$ ) minimum 30 min . according to IEC 60068-2-6
- Extensions can be added on both left or right hand side
- Auxiliary contact
- Shunt trip
- Undervoltage release
- Motor operator
- Panelboard switch

Add-on RCD can be coupled

## MCB Series Din-T 15

- According to AS/NZS 60947.2 standard
- For DIN rail mounting
(top hat rail 35 mm )
- Working ambient temperature from $-25^{\circ} \mathrm{C}$ up to $+50^{\circ} \mathrm{C}$
- 1 pole is a module of 18 mm wide
- Nominal rated currents are:

6/10/13/16/20/25/32/40/50/63 A

- Tripping characteristic: C
- Number of poles: 1 P, 2 P, 3 P, 4 P

■ Short-circuit capacity is: 15 kA

- Terminal capacity from 1 up to $35 \mathrm{~mm}^{2}$ rigid wire or 1.5 up to $25 \mathrm{~mm}^{2}$ flexible wire

■ Screw head suitable for flat or Pozidrive screwdriver

- Can be connected by means of both pin or fork busbars
- The toggle can be sealed in the ON or OFF position
- Captive locking option
- Rapid closing
- Both incoming and outgoing terminals have a protection degree of IP 20 and they are sealable
- Isolator function thanks to Red/Green printing on the toggle
■ Maximum voltage between two phases; $440 \mathrm{~V} \sim$
- Maximum voltage for utilisation in DC current: 48 V 1 P and 110 V 2 P
- Two position rail clip
- Mechanical shock resistance 40 g (direction $\mathrm{x}, \mathrm{y}, \mathrm{z}$ ) minimum 18 shocks 5 ms half-sinusoidal acc. to IEC 60068-2-27
- Vibration resistance: 3 g (direction $\mathrm{x}, \mathrm{y}, \mathrm{z}$ ) minimum 30 min . according to IEC 60068-2-6
- Extensions can be added on both left or right hand side
- Auxiliary contact
- Shunt trip
- Undervoltage release
- Motor operator
- Panelboard switch

Add-on RCD can be coupled

## Din-T MCBs + RCDs Technical data



Notes: Refer page 3-25 for information on Safe-T MCBs.

| ${ }^{1}$ ) Poles in series | $\left.{ }^{4}\right) 10(250 \mathrm{VDC})$ |  |
| :--- | :--- | :--- |
| $\left.{ }^{2}\right)$ | $0.5-4 \mathrm{~A} / 6-25 \mathrm{~A} / 32-40 \mathrm{~A} / 50-63 \mathrm{~A}$ | ${ }^{5}$ ) On request. |
| $\left.{ }^{3}\right) 10(125 \mathrm{VC})$ |  |  |

Din-T MCBs + RCDs Technical data
Miniature circuit breakers - Din-T 6, 10, 15 / Easy-fit

Dimensions in mm.


Miniature circuit breakers - Din-T 10H


Miniature circuit breakers - Din-T DC


Manual transfer switches

## 3 and 4 pole

| MCCBs used | Ampere Range | Interrupting cap.(415 V) |  | OCR type | Overall (3 pole) ${ }^{4}$ ) dimensions (mm) |  |  | 3 pole MTS Cat. No. ${ }^{1}$ ) | 4 pole MTS Cat. No. ${ }^{1}$ ) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Icu | Ics |  | W | $\mathrm{H}^{3}$ ) | D ${ }^{\text {) }}$ |  |  |
| XS125CJ | 40-63 | 18 | 9 | Therm Mag | 305 | 209 | 209 | MS1C633 | MS1C644 |
| XS125CJ | 63-100 | 18 | 9 | Therm Mag | 305 | 209 | 209 | MS1C133 | MS1C144 |
| XS125CJ | 79-125 | 18 | 9 | Therm Mag | 305 | 209 | 209 | MS1C233 | MS1C244 |
| XS125NJ | 40-63 | 30 | 15 | Therm Mag | 305 | 209 | 209 | MS1N633 | MS1N644 |
| XS125NJ | 63-100 | 30 | 15 | Therm Mag | 305 | 209 | 209 | MS1N133 | MS1N144 |
| XS125NJ | 79-125 | 30 | 15 | Therm Mag | 305 | 209 | 209 | MS1N233 | MS1N244 |
| XH125NJ | 40-63 | 50 | 25 | Therm Mag | 305 | 209 | 209 | MH1N633 | MH1N644 |
| XH125NJ | 63-100 | 50 | 25 | Therm Mag | 305 | 209 | 209 | MH1N133 | MH1N144 |
| XH125NJ | 79-125 | 50 | 25 | Therm Mag | 305 | 209 | 209 | MH1N233 | MH1N244 |
| XH125PJ | 40-63 | 50 | 50 | Therm Mag | 305 | 209 | 209 | MH1P633 | MH1P644 |
| XH125PJ | 63-100 | 50 | 50 | Therm Mag | 305 | 209 | 209 | MH1P133 | MH1P144 |
| XH125PJ | 79-125 | 50 | 50 | Therm Mag | 305 | 209 | 209 | MH1P233 | MH1P244 |
| XH160PJ | 100-160 | 50 | 50 | Therm Mag | 336 | 237 | 156 | MH2P133 | MH2P144 |
| XS250NJ | 100-160 | 35 | 18 | Therm Mag | 336 | 237 | 139 | MS2N133 | MS2N144 |
| XS250NJ | 163-250 | 35 | 18 | Therm Mag | 336 | 237 | 139 | MS2N233 | MS2N244 |
| XH250NJ | 100-160 | 50 | 25 | Therm Mag | 336 | 237 | 156 | MH2N133 | MH2N144 |
| XH250NJ | 100-250 | 50 | 25 | Therm Mag | 366 | 237 | 156 | MH2N233 | MH2N244 |
| XS400CJ | 100-250 | 35 | 18 | Therm Mag | 500 | 314 | 165 | MS4C233 | MS4C244 |
| XS400CJ | 250-400 | 35 | 18 | Therm Mag | 500 | 314 | 165 | MS4C433 | MS4C444 |
| XS400NJ | 163-250 | 50 | 25 | Therm Mag | 500 | 314 | 165 | MS4N233 | MS4N244 |
| XS400NJ | 250-400 | 50 | 25 | Therm Mag | 500 | 314 | 165 | MS4N433 | MS4N444 |
| XH400PJ | 250-400 | 65 | 50 | Therm Mag | 500 | 314 | 165 | MH4P433 | MH4P444 |
| XS400SE | 125-250 | 50 | 25 | Electronic | 500 | 314 | 165 | MS4S233 | MS4S244 |
| XS400SE | 200-400 | 50 | 25 | Electronic | 500 | 314 | 165 | MS4S433 | MS4S444 |
| XH400SE | 125-250 | 65 | 33 | Electronic | 500 | 314 | 165 | MH4S233 | MH4S244 |
| XH400SE | 200-400 | 65 | 33 | Electronic | 500 | 314 | 165 | MH4S433 | MH4S444 |
| XH400PE | 125-250 | 65 | 50 | Electronic | 500 | 314 | 165 | MH4P233 | MH4P244 |
| XH400PE | 200-400 | 65 | 50 | Electronic | 500 | 314 | 165 | MH4P433 | MH4P444 |
| XS630CJ | 250-400 | 45 | 23 | Therm Mag | 550 | 433 | 182 | MS6C433 | MS6C444 |
| XS630CJ | 400-630 | 45 | 23 | Therm Mag | 550 | 433 | 182 | MS6C633 | MS6C644 |
| XS630NJ | 250-400 | 65 | 33 | Therm Mag | 550 | 433 | 182 | MS6N433 | MS6N444 |
| XS630NJ | 400-630 | 65 | 33 | Therm Mag | 550 | 433 | 182 | MS6N633 | MS6N644 |
| XH630PJ | 250-400 | 85 | 50 | Therm Mag | 550 | 433 | 182 | MH6P433 | MH6P444 |
| XH630PJ | 400-630 | 85 | 50 | Therm Mag | 550 | 433 | 182 | MH6P633 | MH6P644 |
| XS630SE | 315-630 | 50 | 25 | Electronic | 550 | 433 | 182 | MS6S633 | MS6S644 |
| XH630SE | 315-630 | 65 | 33 | Electronic | 550 | 433 | 182 | MH6S633 | MH6S644 |
| XH630PE | 315-630 | 65 | 50 | Electronic | 550 | 433 | 182 | MH6P633 | MH6P644 |
| XS800NJ | 500-800 | 65 | 33 | Therm Mag | 550 | 433 | 182 | MS8N833 | MS8N844 |
| XH800PJ | 500-800 | 85 | 50 | Therm Mag | 550 | 433 | 182 | MH8P833 | MH8P844 |
| XS800SE | 400-800 | 50 | 25 | Electronic | 550 | 433 | 182 | MS88833 | MS8S844 |
| XH800PE | 400-800 | 65 | 50 | Electronic | 550 | 433 | 182 | MH8P833 | MH8P844 |
| XS1250SE | 500-1000 | 65 | 49 | Electronic | 553 | 570 | 198 | MS12S1033 | MS12S1044 |
| XS1250SE | 625-1250 | 65 | 49 | Electronic | 553 | 550 | 198 | MS12S1233 | MS12S1244 |
| XS1600SE | 800-1600 | 85 | 64 | Electronic | 553 | 570 | 198 | MS16S1633 | MS16S1644 |
| XS2000SE | 1000-2000 | 100 | 64 | Electronic | 774 | 450 | 361 | MS20E2033 | MS20E2044 |
| XS2500SE | 1250-2500 | 100 | 64 | Electronic | 774 | 450 | 361 | MS25E2533 | MS25E2544 |
| TL100NJ | 40-63 | 85 | 85 | Therm Mag | 305 | 300 | 209 | MT1N633 | MT1N644 |
| TL100NJ | 63-100 | 85 | 85 | Therm Mag | 305 | 300 | 209 | MT1N133 | MT1N144 |
| TL250NJ | 163-250 | 100 | 100 | Therm Mag | 500 | 342 | 165 | MT2N233 | MT2N244 |
| TL400NE | 200-400 | 100 | 100 | Electronic | 500 | 342 | 165 | MT4E433 | MT4E444 |
| TL630NE | 315-630 | 125 | 70 | Electronic | 550 | 570 | 198 | MT6E633 | MT6E644 |
| TL800NE | 400-800 | 125 | 70 | Electronic | 550 | 570 | 198 | MT8E833 | MT8E844 |
| TL1250NE | 625-1250 | 125 | 65 | Electronic | 550 | 570 | 198 | MT12E1233 | MT12E1244 |

[^1]
## Transfer switches



Power interruptions can affect productivity,
cost dollars and at times, cost dollars and at times, safety

In today's highly competitive environment it is essential to be able to rely on a continuous power supply. Modern buildings and industrial complexes have critical loads such as essential lighting, computers and continuously operating industrial equipment. An uninterrupted power supply is vital for these functions.

## Circuit condition sensing circuit

Reliability of your power supply can be achieved with a Terasaki automatic transfer switch comprising a basic transfer switch for the actual switching and a logic control panel, or control circuit, to automatically sense when to switch. Whenever mains voltage drops below $85 \%$ of the nominal line voltage, the logic
 controller signals the emergency source engine to start, then automatically transfers the load to the emergency source by activating the motor driven circuit breakers in the BTS (basic transfer switch).
The transfer operation is initiated and controlled by a compact logic panel comprising voltage and phase monitoring relays, time delay relays and logic relay (or PLC logic type). An adjustable time delay relay prevents changeover due to momentary voltage fluctuation. When the load has been transferred the supply is continually monitored to determine when the load can be transferred back to the preferred supply. An adjustable time delay relay (TDEN) prevents the transfer switch returning the load to the normal supply until the voltage has stabilised.

The basic transfer section comprising motor operated circuit breakers and interlocks is controlled by the logic panel and performs the automatic transfer only when commanded to do so by the logic panel.

The logic control also provides a voltage-free contact to initiate starting the emergency engine.
The standard TemLogic panels may be customised with up to 13 optional functions (refer pages 9-21 to 9-24 for details)


Vertical Slimline type Basic transfer switch (400 A)


Transfer switch with common loadside busbar option (125 A)


TemLogic control panel (Micro PLC type)

## Transfer switches

## Basic transfer switches

Terasaki transfer switches may be supplied without TemLogic control panels where customers prefer to design their own automatic control. This assembly is known as a basic transfer switch (BTS).

Each basic transfer switch includes two motor operated circuit breakers mechanically and electrically interlocked for safety. One additional auxiliary switch for customer use is supplied as standard on each circuit breaker. The assembly is mounted on a white painted base plate and wired to WAGO terminals allowing for simple customer connection.

## BTS options:

Extra auxiliary contacts
Alarm switch.
Shunt trip.
Other options include:
Common loadside busbars.
Enclosure.
Voltage:
Standard voltage is 240 VAC .
Special voltages:
110 V, AC, 110 V DC, 24 V DC
available on request.


## Transfer switches

## Multiple functions - Protection, isolation and switching in one compact device

Circuit breaker transfer switches provide integral circuit protection, automatic switching and circuit isolation in one compact device. Other features include:

- A choice of moulded case or air circuit breaker.

■ Auxiliary and optional alarm contacts which indicate the status of each MCCB 'on - off or tripped', and may be used to signal to a master controller or building management system.

- Indicator flags on the motor mechanism to show motor operation status.
- Dual mechanical and electrical interlocking is provided for safety.
- Simple connection. Control wiring is pre-wired to a terminal strip. External control connections are simple 3 wire on-off/reset common. Terasaki automatic transfer switches are space saving, economical and more flexible when compared to the alternative arrangement using electro-magnetic contactors and switch fuse units for circuit protection.


## Precise protection co-ordination

MCCBs with microprocessor overcurrent relays, have the flexibility to provide multiple protective functions. Their precise co-ordination enables the transfer switch to become an integral part of the overall grading (selectivity) scheme.

Terasaki electronic MCCB protection characteristics


## Transfer switches

## Conserving energy

Circuit breaker transfer switches have three stable positions: 'on', 'off' and 'tripped'. These positions are maintained mechanically, thus energy consumption and maintenance is reduced by eliminating the need for electromagnetic coils.

3 Stable positions


Stable positions - conserve energy, reduce maintenance Each position is mechanically stable eliminating the need for continuously energised coils curtailing waste energy and reducing maintenance compared to electrically held devices.

## True RMS monitoring unaffected by harmonics

Tem-Break MCCBs with electronic OCRs detect true RMS of the load current. Therefore, the tripping characteristics are unaffected by harmonics. Thermal magnetic MCCBs are also unaffected. Nuisance tripping is avoided and precise protection is maintained.


## Automatic transfer switches

## Quality assurance

Each Terasaki automatic transfer switch is made to an identical bill of materials. A wiring schematic and connection diagram is supplied with each BTS to simplify installation and wiring. Quality Assurance is in accordance with Australian Standards.


## Remote emergency off (optional)

A shunt trip (optional) is available with Terasaki automatic or basic transfer switches. This optional feature enables remote tripping of the mains or emergency circuit breakers.


Shunt trip

## Auto reset (optional)

Each basic transfer switch may be equipped for auto reset. If either circuit breaker is tripped manually via a shunt trip or by the sensing of overcurrent, the auto reset automatically returns the MCCB to the 'off' position. This feature requires the use of one additional auxiliary contact or an alarm contact. Please specify when ordering.


Alarm / auxiliary switch

## Transfer switches

## Manual Transfer Switch (MTS)

An MTS is a simple and economical means of transferring from normal to emergency supply. A walking beam mechanical interlock prevents both supplies being energised together. Circuit protection and isolation are provided in a compact device. The MTS is mounted on a white painted steel base plate to facilitate easier installation.

Optional features include: auxiliary contacts, trip alarm contact, and twin handle operation available on request. Specify when ordering.


## Mechanical interlocking

The standard moulded case basic transfer switch section is equipped with a reliable rear mounting, walking beam mechanical interlock, to prevent simultaneous closing of both MCCBs.

The walking beam once installed and adjusted, usually needs no further adjustment though periodic inspection or operation is recommended. An electrical interlock is provided for additional safety.


Rear interlock

The electrical interlock prevents the mechanical interlock being subjected to mechanical damage.

## Transfer switches

## Slimline BTS



Slimline transfer switches. Available in horizontal or vertical configurations.

Slimline transfer switches featuring the cable/rod mechanical interlock system are more flexible than the standard walking beam models and can save valuable switchboard width when in the vertical configuration. The Slimline is available in two forms:
a) Fully assembled, wired and mounted, vertical or horizontal on a base plate (with rod type mechanical interlock).
b) Without baseplate and wiring. An interlocking cable is supplied loose.

The arrangement described in b) above finds its application in Form 2, 3 and 4 compartmented switchboards. This model is supplied partially assembled to enable the interlocking cable (wire) to be passed from one compartment to another without disturbing segregation barriers.

The MCCBs are supplied with motor, mechanical interlock fitting and auxiliary contacts fully assembled. The switchboard manufacturer then has the option of mounting the MCCBs complete with accessories in the position which best suits the switchboard construction.

## Flexibility in MCCB selection

Different current (and frame size) rated MCCBs may be selected where the EMERGENCY supply feeds essential circuits only. By using a smaller frame MCCB on the emergency circuit, a more economical arrangement can be achieved.
A wide diversity of Slimline transfer switches are available featuring models as diverse as $2500 \mathrm{~A}-400 \mathrm{~A}$. Three pole/four pole models are also available.

$$
\begin{aligned}
& \text { Slimpine - } \\
& \text { a mix of Mcos sizes, } \\
& \text { horizontal or vertical }
\end{aligned}
$$

## Transfer switches

## Choice of logic controller

## NHP offers a choice of electromechanical (relay) logic panels or PLC types with options.

Electromechanical logic control panels
The standard TemLogic relay logic panel features a proven circuit design and is guaranteed by NHP to carry out the transfer functions when linked to a Terasaki basic transfer switch. A 'mode' selector switch is provided with every logic panel. The selector switch enables the operator to select any one of up to 4 modes of operating for the transfer switch.

The 'automatic' position allows the logic controller to perform the control function.
When in the 'off' position, the logic circuitry is disabled preventing transfer from occurring. Both circuits are isolated.
The 'manual' position allows the transfer switch to be operated manually via the handle and pushbutton on the motor operator; a changeover may be effected manually.
In the 'test' position, the load is transferred to the emergency source to test the functioning of that source. The transfer switch will remain in the 'emergency' position and the generator will feed the load until the selector switch is returned to the 'automatic' mode.

The standard logic panel may be customised with up to 15 standard optional functions:


## Automatic transfer switches

## Compact and flexible PLC logic panels

PLC logic panels usually comprise an NHP / Mitsubishi micro PLC. PLC logic panels provide flexibility, space saving and centralised control. The added advantage of integrating the 13 optional functions of the standard logic panel as well as other control functions into a centralised scheme is possible when using a PLC controller. PLC controllers are compact enough to mount on a standard TemLogic panel gear tray (though as standard they are in a vertical configuration). Voltage and phase sequence functions are monitored by external voltage relays. PLC controllers require 20 inputs and 26 outputs minimum to incorporate the standard logic plus all options. Specify PLC controllers when ordering.

Enclosed automatic transfer switches free standing or wall mounted
Enclosed automatic transfer switches are assembled to order from stock components on a fast track delivery system. The basic transfer switch section and associated logic panel are housed inside prespecified Eldon enclosures. A mode selector is supplied as standard and optional indicator lights may be mounted externally on the cabinet door.

Standard features include:

- IP rating to be specified at time of ordering
- Common loadside busbars
- Standard 240 V control or other voltages on application
- Neutral and earth bars


## Optional features:

- Busbar flags for large cable termination
- Pushbutton or other front control



## Basic transfer switches (BTS)

## With motor

| MCCBs used | Ampere Range | Interrupting cap(415 V) |  | OCR type | Overall 3 pole ${ }^{4}$ ) dimensions (mm) |  |  | 3 pole <br> BTS <br> Cat. No. ${ }^{1}$ ) | 4 pole <br> BTS <br> Cat. No. ${ }^{1}$ ) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Icu | Ics |  | W | $\mathrm{H}^{2}$ ) | D |  |  |
| XS125CJ | 40-63 | 18 | 9 | Therm Mag | 305 | 209 | 235 | BS1C633 | BS1C644 |
| XS125CJ | 63-100 | 18 | 9 | Therm Mag | 305 | 209 | 235 | BS1C133 | BS1C144 |
| XS125CJ | 79-125 | 18 | 9 | Therm Mag | 305 | 209 | 235 | BS1C233 | BS1C244 |
| XS125NJ | 40-63 | 30 | 15 | Therm Mag | 305 | 209 | 235 | BS1N633 | BS1N644 |
| XS125NJ | 63-100 | 30 | 15 | Therm Mag | 305 | 209 | 235 | BS1N133 | BS1N144 |
| XS125NJ | 79-125 | 30 | 15 | Therm Mag | 305 | 209 | 235 | BS1N233 | BS1N244 |
| XH125NJ | 40-63 | 50 | 25 | Therm Mag | 305 | 209 | 235 | BH1N633 | BH1N644 |
| XH125NJ | 63-100 | 50 | 25 | Therm Mag | 305 | 209 | 235 | BH1N133 | BH1N144 |
| XH125NJ | 79-125 | 50 | 25 | Therm Mag | 305 | 209 | 235 | BH1N233 | BH1N244 |
| XH125PJ | 40-63 | 50 | 50 | Therm Mag | 305 | 209 | 235 | BH1P633 | BH1P644 |
| XH125PJ | 63-100 | 50 | 50 | Therm Mag | 305 | 209 | 235 | BH1P133 | BH1P144 |
| XH125PJ | 79-125 | 50 | 50 | Therm Mag | 305 | 209 | 235 | BH1P233 | BH1P244 |
| XH160PJ | 100-160 | 50 | 50 | Therm Mag | 336 | 237 | 258 | BH2P133 | BH2P144 |
| XS250NJ | 100-160 | 35 | 18 | Therm Mag | 336 | 237 | 241 | BS2N133 | BS2N144 |
| XS250NJ | 163-250 | 35 | 18 | Therm Mag | 336 | 237 | 241 | BS2N233 | BS2N244 |
| XH250NJ | 100-160 | 50 | 25 | Therm Mag | 336 | 237 | 258 | BH2N133 | BH2N144 |
| XH250NJ | 100-250 | 50 | 25 | Therm Mag | 336 | 237 | 258 | BH2N233 | BH2N244 |
| XS400CJ | 100-250 | 35 | 18 | Therm Mag | 500 | 323 | 325 | BS4C233 | BS4C244 |
| XS400CJ | 250-400 | 35 | 18 | Therm Mag | 500 | 323 | 325 | BS4C433 | BS4C444 |
| XS400NJ | 163-250 | 50 | 25 | Therm Mag | 500 | 323 | 325 | BS4N233 | BS4N244 |
| XS400NJ | 250-400 | 50 | 25 | Therm Mag | 500 | 323 | 325 | BS4N433 | BS4N444 |
| XH400PJ | 250-400 | 65 | 50 | Therm Mag | 500 | 323 | 325 | BH4P433 | BH4P444 |
| XS400SE | 125-250 | 50 | 25 | Electronic | 500 | 323 | 325 | BS4S233 | BS4S244 |
| XS400SE | 200-400 | 50 | 25 | Electronic | 500 | 323 | 325 | BS4S433 | BS4S444 |
| XH400SE | 125-250 | 65 | 33 | Electronic | 500 | 323 | 325 | BH4S233 | BH4S244 |
| XH400SE | 200-400 | 65 | 33 | Electronic | 500 | 323 | 325 | BH4S433 | BH4S444 |
| XH400PE | 125-250 | 65 | 50 | Electronic | 500 | 323 | 325 | BH4P233 | BH4P244 |
| XH400PE | 200-400 | 65 | 50 | Electronic | 500 | 323 | 325 | BH4P433 | BH4P444 |
| XS630CJ | 250-400 | 45 | 23 | Therm Mag | 550 | 433 | 341 | BS6C433 | BS6C444 |
| XS630CJ | 400-630 | 45 | 23 | Therm Mag | 550 | 433 | 341 | BS6C633 | BS6C644 |
| XS630NJ | 250-400 | 65 | 33 | Therm Mag | 550 | 433 | 341 | BS6N433 | BS6N444 |
| XS630NJ | 400-630 | 65 | 33 | Therm Mag | 550 | 433 | 341 | BS6N633 | BS6N644 |
| XH630PJ | 250-400 | 85 | 50 | Therm Mag | 550 | 433 | 341 | BH6P433 | BH6P444 |
| XH630PJ | 400-630 | 85 | 50 | Therm Mag | 550 | 433 | 341 | BH6P633 | BH6P644 |
| XS630SE | 315-630 | 50 | 25 | Electronic | 550 | 433 | 341 | BS6S633 | BS6S644 |
| XH630SE | 315-630 | 65 | 33 | Electronic | 550 | 433 | 341 | BH6S633 | BH6S644 |
| XH630PE | 315-630 | 65 | 50 | Electronic | 550 | 433 | 341 | BH6P633 | BH6P644 |
| XS800NJ | 500-800 | 65 | 33 | Therm Mag | 550 | 433 | 341 | BS8N833 | BS8N844 |
| XH800PJ | 500-800 | 85 | 50 | Therm Mag | 550 | 433 | 341 | BH8P833 | BH8P844 |
| XS800SE | 400-800 | 50 | 25 | Electronic | 550 | 433 | 341 | BS8S833 | BS8S844 |
| XH800PE | 400-800 | 65 | 50 | Electronic | 550 | 433 | 341 | BH8P833 | BH8P844 |
| XS1250SE | 500-1000 | 65 | 49 | Electronic | 553 | 530 | 300 | BS12S1033 | BS12S1044 |
| XS1250SE | 625-1250 | 65 | 49 | Electronic | 553 | 530 | 300 | BS12S1233 | BS12S1244 |
| XS1600SE | 800-1600 | 85 | 64 | Electronic | 553 | 570 | 320 | BS16S1633 | BS16S1644 |
| XS2000SE | 1000-2000 | 100 | 64 | Electronic | 774 | 490 | $\left.361{ }^{3}\right)$ | BS20E2033 | BS20E2044 |
| XS2500SE | 1250-2500 | 100 | 64 | Electronic | 774 | 490 | $361{ }^{3}$ ) | BS25E2533 | BS25E2544 |
| TL100NJ | 40-63 | 85 | 85 | Therm Mag | 305 | 300 | 235 | BT1N633 | BT1N644 |
| TL100NJ | 63-100 | 85 | 85 | Therm Mag | 305 | 300 | 235 | BT1N133 | BT1N144 |
| TL250NJ | 163-250 | 100 | 100 | Therm Mag | 500 | 323 | 325 | BT2N233 | BT2N244 |
| TL400NE | 200-400 | 100 | 100 | Electronic | 500 | 323 | 325 | BT4E433 | BT4E444 |
| TL630NE | 315-630 | 125 | 70 | Electronic | 553 | 490 | 320 | BT6E633 | BT6E644 |
| TL800NE | 400-800 | 125 | 70 | Electronic | 553 | 490 | 320 | BT8E833 | BT8E844 |
| TL1250NE | 625-1250 | 125 | 65 | Electronic | 553 | 490 | 320 | BT12E1233 | BT12E1244 |
| Note: ${ }^{1}$ ) | Ordering sheet refer page 9-20 |  |  |  | Depth does not include rear connect busbars. Detailed dimensions $3 / 4$ pole refer following pages. |  |  |  |  |

## Automatic transfer switches

## Moulded case interlocked pairs

The versatility of the cable mechanical interlock fitting allows us to offer almost any combination of MCCBs from 400 A to 2500 A as an interlocked pair. Each MCCB is supplied asembled with cable mechanical interlock fitting, motor operator and auxiliary contacts for electrical interlocking plus one for customer use. The auxiliary contact leads are terminated at an auxilary connection block on the side of the breaker for convenience of customer wiring.
The cable wire is supplied. Please specify length.


Interlocked 3 pole type MCCB to MCCB

## Enclosed automatic transfer switches

Enclosed automatic transfer switches are assembled to order from stock components on a fast track delivery system. The basic transfer switch section and associated logic panel are housed inside a standard pre-specified Eldon enclosure. A mode selector is supplied as standard and optional indicator lights may be mounted externally on the cabinet door.

Standard features include:

- IP 55 rated enclosure
- Common loadside busbars
- Standard 240 V control or other voltage on application

Optional features:

- Busbar flags for large cable termination


Common loadside busbars available (optional)

| Busbar <br> Ampere | Overall <br> dimensions (mm) |  | Cat. No | Cat. No |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Rating | H | W | D | 3 pole | 4 pole |
| 250 | 97 | 128 | 118 | CLSBB25033 | CLSBB25044 |
| 400 | 130 | 160 | 141 | CLSBB40033 | CLSBB40044 |
| $630 / 800$ | 200 | 250 | 178 | CLSBB63033 | CLSBB63044 |
| $1000 / 1250$ | 420 | 360 | 108 | CLSBB125033 | CLSBB125044 |



Automatic transfer switch with common loadside busbar fitted

## Automatic transfer switches

## Walking beam interlock type

The standard basic transfer switch comprises two motor operated circuit breakers, mechanically and electrically interlocked for safety. An additional auxiliary switch for customer use is supplied as standard on each circuit breaker. The complete assembly is mounted on a white painted steel base plate and wired for simple 3 wire customer connection. Common loadside busbars are an option (CLSBB - see previous page).

## Basic types

MTS


ATS


The basic transfer switch when coupled with a TemLogic control panel will effect automatic changeover to a standby source in the event of a power failure or incorrect phase sequence.
The standard models feature a simple and reliable walking beam mechanical interlock to prevent both breakers being in the ON position at the same time.

BTS


The standard arrangement of MCCBs

| Normal | Emergency |
| :--- | :--- |
| Left | Right |
| 3 P | $3 \mathbf{P}$ |

MTS = Manual transfer switch: no motors and no logic panel
BTS = Basic transfer switch: MCCBs have motors mounted on them, no logic panel
ATS $=$ BTS and logic panel

Basic transfer switches (BTS)
3 and 4 pole combinations

| MCCBs used | Ampere Range | Interrupting cap.$(415 \mathrm{~V})$ |  | OCR type | Overall dimensions (mm) ${ }^{4}$ ) |  |  | $\begin{aligned} & 3 \mathrm{P}+4 \mathrm{P} \\ & \text { BTS } \\ & \text { Cat. No. }{ }^{1} \text { ) } \end{aligned}$ | $\begin{aligned} & 4 P+3 P \\ & \text { BTS } \\ & \text { Cat. No. }{ }^{1} \text { ) } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Icu | Ics |  | W (4 pole) | $\mathrm{H}^{2}$ ) | D |  |  |
| XS125CJ | 40-63 | 18 | 9 | Therm Mag | 350 | 209 | 235 | BS1C634 | BS1C643 |
| XS125CJ | 63-100 | 18 | 9 | Therm Mag | 350 | 209 | 235 | BS1C134 | BS1C143 |
| XS125CJ | 79-125 | 18 | 9 | Therm Mag | 350 | 209 | 235 | BS1C234 | BS1C243 |
| XS125NJ | 40-63 | 30 | 15 | Therm Mag | 350 | 209 | 235 | BS1N634 | BS1N643 |
| XS125NJ | 63-100 | 30 | 15 | Therm Mag | 350 | 209 | 235 | BS1N134 | BS1N143 |
| XS125NJ | 79-125 | 30 | 15 | Therm Mag | 350 | 209 | 235 | BS1N234 | BS1N243 |
| XH125NJ | 40-63 | 50 | 25 | Therm Mag | 350 | 209 | 235 | BH1N634 | BH1N643 |
| XH125NJ | 63-100 | 50 | 25 | Therm Mag | 350 | 209 | 235 | BH1N134 | BH1N143 |
| XH125NJ | 79-125 | 50 | 25 | Therm Mag | 350 | 209 | 235 | BH1N234 | BH1N243 |
| XH125PJ | 40-63 | 50 | 50 | Therm Mag | 350 | 209 | 235 | BH1P634 | BH1P643 |
| XH125PJ | 63-100 | 50 | 50 | Therm Mag | 350 | 209 | 235 | BH1P134 | BH1P143 |
| XH125PJ | 79-125 | 50 | 50 | Therm Mag | 350 | 209 | 235 | BH1P234 | BH1P243 |
| XH160PJ | 100-160 | 50 | 50 | Therm Mag | 406 | 237 | 258 | BH2P134 | BH2P143 |
| XS250NJ | 100-160 | 35 | 18 | Therm Mag | 406 | 237 | 241 | BS2N134 | BS2N143 |
| XS250NJ | 163-250 | 35 | 18 | Therm Mag | 406 | 237 | 241 | BS2N234 | BS2N243 |
| XH250NJ | 100-160 | 50 | 25 | Therm Mag | 406 | 237 | 258 | BH2N134 | BH2N143 |
| XH250NJ | 100-250 | 50 | 25 | Therm Mag | 406 | 237 | 258 | BH2N234 | BH2N243 |
| XS400CJ | 100-250 | 35 | 18 | Therm Mag | 500 | 323 | 325 | BS4C234 | BS4C243 |
| XS400CJ | 250-400 | 35 | 18 | Therm Mag | 500 | 323 | 325 | BS4C434 | BS4C443 |
| XS400NJ | 163-250 | 50 | 25 | Therm Mag | 500 | 323 | 325 | BS4N234 | BS4N243 |
| XS400NJ | 250-400 | 50 | 25 | Therm Mag | 500 | 323 | 325 | BS4N434 | BS4N443 |
| XH400PJ | 250-400 | 65 | 50 | Therm Mag | 500 | 323 | 325 | BH4P434 | BH4P443 |
| XS400SE | 125-250 | 50 | 25 | Electronic | 500 | 323 | 325 | BS4S234 | BS4S243 |
| XS400SE | 200-400 | 50 | 25 | Electronic | 500 | 323 | 325 | BS4S434 | BS4S443 |
| XH400SE | 125-250 | 65 | 33 | Electronic | 500 | 323 | 325 | BH4S234 | BH4S243 |
| XH400SE | 200-400 | 65 | 33 | Electronic | 500 | 323 | 325 | BH4S434 | BH45443 |
| XH400PE | 125-250 | 65 | 50 | Electronic | 500 | 323 | 325 | BH4P234 | BH4P243 |
| XH400PE | 200-400 | 65 | 50 | Electronic | 500 | 323 | 325 | BH4P434 | BH4P443 |
| XS630CJ | 250-400 | 45 | 23 | Therm Mag | 690 | 433 | 341 | BS6C434 | BS6C443 |
| XS630CJ | 400-630 | 45 | 23 | Therm Mag | 690 | 433 | 341 | BS6C634 | BS6C643 |
| XS630NJ | 250-400 | 65 | 33 | Therm Mag | 690 | 433 | 341 | BS6N434 | BS6N443 |
| XS630NJ | 400-630 | 65 | 33 | Therm Mag | 690 | 433 | 341 | BS6N634 | BS6N643 |
| XH630PJ | 250-400 | 85 | 50 | Therm Mag | 690 | 433 | 341 | BH6P434 | BH6P443 |
| XH630PJ | 400-630 | 85 | 50 | Therm Mag | 690 | 433 | 341 | BH6P634 | BH6P643 |
| XS630SE | 315-630 | 50 | 25 | Electronic | 690 | 433 | 341 | BS6S634 | BS6S643 |
| XH630SE | 315-630 | 65 | 33 | Electronic | 690 | 433 | 341 | BH6S634 | BH6S643 |
| XH630PE | 315-630 | 65 | 50 | Electronic | 690 | 433 | 341 | BH6P634 | BH6P643 |
| XS800NJ | 500-800 | 65 | 33 | Therm Mag | 690 | 433 | 341 | BS8N834 | BS8N843 |
| XH800PJ | 500-800 | 85 | 50 | Therm Mag | 690 | 433 | 341 | BH8P834 | BH8P843 |
| XS800SE | 400-800 | 50 | 25 | Electronic | 690 | 433 | 341 | BS8S834 | BS8S843 |
| XH800PE | 400-800 | 65 | 50 | Electronic | 690 | 433 | 341 | BH8P834 | BH8P843 |
| XS1250SE | 500-1000 | 65 | 49 | Electronic | 693 | 530 | 300 | BS12S1034 | BS12S1043 |
| XS1250SE | 625-1250 | 65 | 49 | Electronic | 693 | 530 | 300 | BS12S1234 | BS12S1243 |
| XS1600SE | 800-1600 | 85 | 64 | Electronic | 693 | 570 | 320 | BS16S1634 | BS16S1643 |
| XS2000SE | 1000-2000 | 100 | 64 | Electronic | 994 | 490 | $\left.361{ }^{3}\right)$ | BS20E2034 | BS20E2043 |
| XS2500SE | 1250-2500 | 100 | 64 | Electronic | 994 | 490 | $361{ }^{3}$ ) | BS25E2534 | BS25E2543 |
| TL100NJ | 40-63 | 85 | 85 | Therm Mag | 350 | 300 | 235 | BT1N634 | BT1N643 |
| TL100NJ | 63-100 | 85 | 85 | Therm Mag | 350 | 300 | 235 | BT1N134 | BT1N143 |
| TL250NJ | 163-250 | 100 | 100 | Therm Mag | 500 | 323 | 325 | BT2N234 | BT2N243 |
| TL400NE | 200-400 | 100 | 100 | Electronic | 500 | 323 | 325 | BT4E434 | BT4E443 |
| TL630NE | 315-630 | 125 | 70 | Electronic | 693 | 490 | 320 | BT6E634 | BT6E643 |
| TL800NE | 400-800 | 125 | 70 | Electronic | 693 | 490 | 320 | BT8E834 | BT8E843 |
| TL1250NE | 625-1250 | 125 | 65 | Electronic | 693 | 490 | 320 | BT12E1234 | BT12E1243 |

[^2]
## Automatic transfer switches

## Slimline rod interlock horizontal mounting 3 pole type

The versatility and flexibility of the rod interlock mechanism used in the Slimline transfer switches enables NHP to provide the widest range of transfer switches available on the Australian market. Slimline transfer switches allow different MCCB frame sizes to be interlocked together. The full range of accessories available for standard basic transfer switches also apply to Slimline models.

## Main components supplied as standard:

2 mechanically interlocked breakers with motor operators



Note: ${ }^{1}$ ) Ordering Example. How to complete a transfer switch catalogue number which contains an XS1250SE10003FC \& XS400SE4003 MCCB.

[^3]
## Automatic transfer switches

## Slimline rod interlock vertical model

Slimline transfer switches are mounted vertically and feature a unique rod type interlock. The Slimline model in the standard form with the MCCBs mounted one above the other in a space saving arrangement, enables the incoming and emergency supplies to be confined to one switchboard construction. Slimline models have great flexibility and are available in vertical construction (standard) or with a combination of uneven sized MCCBs

## Standard features:

- Slimline base plate
- Mechanical and electronic interlock ${ }^{2}$ )

■ Motor operators ${ }^{2}$ )

- 1 spare auxiliary switch contact per MCCB ${ }^{2}$ )
- Wiring of terminals

Options

- Attached busbars
- Extra auxiliary contacts
- Shunt trip
- Enclosed models


Slimline transfer switch with MCCBs of the same size - vertical type.

| Ampere | Interrupting cap. (415 V) |  |  | Overall dimensions (mm) |  |  | MCCBs | Slimline BTS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Range | Icu | Ics | OCR type | H | W | D | used | Cat. No. ${ }^{1}{ }^{2}$ ) |
| 100-250 | 35 | 18 | Therm Mag | 825 | 350 | 358 | XS400CJ | SVS4C2 |
| 250-400 | 35 | 18 | Therm Mag | 825 | 350 | 358 | XS400CJ | SVS4C4 |
| 163-250 | 50 | 25 | Therm Mag | 825 | 350 | 358 | XS400NJ | SVS4N2 |
| 250-400 | 50 | 25 | Therm Mag | 825 | 350 | 358 | XS400NJ | SVS4N4 |
| 250-400 | 65 | 50 | Therm Mag | 825 | 350 | 358 | XH400PJ | SVH4P4 |
| 125-250 | 50 | 25 | Electronic | 825 | 350 | 358 | XS400SE | SVS4S2 |
| 200-400 | 50 | 25 | Electronic | 825 | 350 | 358 | XS400SE | SVS4S4 |
| 125-250 | 65 | 33 | Electronic | 825 | 350 | 358 | XH400SE | SVH4S2 |
| 200-400 | 65 | 33 | Electronic | 825 | 350 | 358 | XH400SE | SVH4S4 |
| 125-250 | 65 | 50 | Electronic | 825 | 350 | 358 | XH400PE | SVH4E2 |
| 200-400 | 65 | 50 | Electronic | 825 | 350 | 358 | XH400PE | SVH4E4 |
| 250-400 | 45 | 23 | Therm Mag | 900 | 360 | 361 | XS630CJ | SVS6C4 |
| 400-630 | 45 | 23 | Therm Mag | 900 | 360 | 361 | XS630CJ | SVS6C6 |
| 250-400 | 65 | 33 | Therm Mag | 900 | 360 | 361 | XS630NJ | SVS6N4 |
| 400-630 | 65 | 33 | Therm Mag | 900 | 360 | 361 | XS630NJ | SVS6N6 |
| 250-400 | 85 | 50 | Therm Mag | 900 | 360 | 361 | XH630PJ | SVH6P4 |
| 400-630 | 85 | 50 | Therm Mag | 900 | 360 | 361 | XH630PJ | SVH6P6 |
| 315-630 | 65 | 33 | Electronic | 900 | 360 | 361 | XS630SE | SVS6S6 |
| 315-630 | 65 | 33 | Electronic | 900 | 360 | 361 | XH630SE | SVH6S6 |
| 315-630 | 65 | 50 | Electronic | 900 | 360 | 361 | XH630PE | SVH6E6 |
| 500-800 | 65 | 33 | Therm Mag | 900 | 360 | 361 | XS800NJ | SUS8N8 |
| 500-800 | 85 | 50 | Therm Mag | 900 | 360 | 361 | XH800PJ | SVH8P8 |
| 400-800 | 50 | 25 | Electronic | 900 | 360 | 361 | XS800SE | SVS888 |
| 400-800 | 65 | 50 | Electronic | 900 | 360 | 361 | XH800PE | SVH8E8 |

Note: ${ }^{1}$ ) Insert pole combination eg: $3 \mathrm{P} / 3 \mathrm{P}, 3 \mathrm{P} / 4 \mathrm{P}, 4 \mathrm{P} / 4 \mathrm{P}$, or $4 \mathrm{P} / 3 \mathrm{P}$.
An example would be: SVS8S833. This is an 800 A Slimline using $2 \times 3$ pole XS800SE MCCBs.
${ }^{2}$ ) To obtain a combination not listed simply insert the MCCB part numbers.
Contact NHP for any dimension requirements not listed.

## Automatic transfer switches

## Enclosed type

Main components supplied as standard:

- 2 mechanically interlocked breakers with motor operators
- Built to specification


Ordering details ${ }^{3}$ )

| Dimensions (mm) |  |  |  | Eldon enclosure ${ }^{2}$ ) | (415 V) |  | Ampere <br> Range (A) | MCCBs used | $\begin{aligned} & 3 \text { pole } \\ & \text { Cat. No. }{ }^{1} \text { ) } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| H | W | D | OCR type |  | Icu | Ics |  |  |  |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 25 | 40-63 | XH125NJ | EH1N6 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 25 | 63-100 | XH125NJ | EH1N1 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 25 | 79-125 | XH125NJ | EH1N2 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 50 | 40-63 | XH125PJ | EH1P6 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 50 | 63-100 | XH125PJ | EH1P1 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 50 | 79-125 | XH125PJ | EH1P2 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 35 | 50 | 100-160 | XH160PJ | EH2P1 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 35 | 18 | 100-160 | XS250NJ | ES2N1 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 18 | 163-250 | XS250NJ | ES2N2 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 25 | 100-160 | XH250NJ | EH2N1 |
| 800 | 600 | 300 | Therm Mag | MAS0806030 | 50 | 25 | 100-250 | XH250NJ | EH2N2 |
| 1200 | 1800 | 400 | Therm Mag | On application | 50 | 25 | 163-250 | XS400NJ | ES4N2 |
| 1200 | 1800 | 400 | Therm Mag | " | 65 | 25 | 250-400 | XS400NJ | ES4N4 |
| 1200 | 1800 | 400 | Therm Mag | " | 50 | 50 | 250-400 | XH400PJ | EH4P4 |
| 1200 | 1800 | 400 | Electronic | " | 50 | 25 | 125-250 | XS400SE | ES4S2 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 25 | 200-400 | XS400SE | ES4S4 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 33 | 125-250 | XH400SE | EH4S2 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 33 | 200-400 | XH400SE | EH4S4 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 50 | 125-250 | XH400PE | EH4P2 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 50 | 200-400 | XH400PE | EH4P4 |
| 1200 | 1800 | 400 | Therm Mag | On application | 65 | 33 | 250-400 | XS630NJ | ES6N4 |
| 1200 | 1800 | 400 | Therm Mag | " | 65 | 33 | 400-630 | XS630NJ | ES6N6 |
| 1200 | 1800 | 400 | Therm Mag | " | 85 | 50 | 250-400 | XH630PJ | EH6P4 |
| 1200 | 1800 | 400 | Therm Mag | " | 85 | 50 | 400-630 | XH630PJ | EH6P6 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 33 | 315-630 | XS630SE | ES6S6 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 33 | 315-630 | XH630SE | EH6S6 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 50 | 315-630 | XH630PE | EH6P6 |
| 1200 | 1800 | 400 | Therm Mag | On application | 65 | 33 | 500-800 | XS800NJ | ES8N8 |
| 1200 | 1800 | 400 | Therm Mag | " | 85 | 50 | 500-800 | XH800PJ | EH8P8 |
| 1200 | 1800 | 400 | Electronic | " | 50 | 25 | 400-800 | XS800SE | ES8S8 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 50 | 400-800 | XH800PE | EH8P8 |
| 1200 | 1800 | 400 | Electronic | On application | 65 | 49 | 500-1000 | XS1250SE | ES12S10 |
| 1200 | 1800 | 400 | Electronic | " | 65 | 49 | 625-1250 | XS1250SE | ES12S12 |
| 1200 | 1800 | 400 | Electronic | On application | 85 | 64 | 800-1600 | XS1600SE | ES16S16 |

Note: ${ }^{1}$ ) Insert pole combination eg: $3 \mathrm{P} / 3 \mathrm{P}, 3 \mathrm{P} / 4 \mathrm{P}, 4 \mathrm{P} / 4 \mathrm{P}$ or $4 \mathrm{P} / 3 \mathrm{P}$.
An example would be: ES8S833. This is an 800 A enclosed switch using $2 \times 3$ pole XS800SE MCCBs.
${ }^{2}$ ) Specify any alternate Eldon enclosure at time of quoting or ordering.
${ }^{3}$ ) Specify any special control requirements, cover controls etc. at time of quoting or ordering.

## Temlogic controllers <br> Electromechanical types

NHP offers a choice of electromechanical (relay) logic control panels with up to 13 options. The basic model includes the following standard features: voltage and sequence relays, timing relays, time delay normal to emergency and time delay emergency to normal and common power supply relays. A four position mode selector switch is provided loose (manual/automatic/test/off-SSW3). Up to 13 optional features are available, see table below. Special custom designed models


Basic TemLogic panel TLP1 using relay logic are available on application.

TemLogic controllers

| Description |  | Cat. No. |
| :--- | :--- | :--- |
| Basic TemLogic panel | TLP1 |  |
| Option | Description |  |
| 1 | Emergency supply phase sequence relay | EPFR $^{1}$ ) |
| 2 | Emergency supply voltage sensing relay | EVSR $^{1}$ ) |
| 3 | Emergency supply frequency relay | ESFR |
| 4 | Engine run-on time delay | ERTD |
| 5 | Engine start time delay | ESTD |
| 6 | Inhibit return control <br> Prevents auto return to normal from emergency |  |
| 7 | Cranking limiter time delay | CLTD |
| 8 | Additional mode selection "Normal supply" | SSW2 |
| 9 | Additional contacts for remote indication of mode <br> switch position (includes option 8 ) | SSW3 |
| 10 | Alarm lock-out relay. Prevents breaker closure after <br> overload or short circuit trip | ALR |
| 11 | Changeover time delay <br> (required for ACB C/0 switch) | COTD |
| 12 | Normal supply phase sequence relay | STANDARD |
| 13 | Mains stability timer | NPFR ${ }^{2}$ ) |

## 3 Panel sizes

NHP has limited the number of gear tray plates to three (3) standard sizes which cover all optional features. Custom designed panels are available on application.

NHP stock basic TLP1 logic panels. Other types are built to order.
Refer order form page 9-24.

Special logic panels ${ }^{2}$ )

| Option | Description |
| :--- | :--- |
| 14 | Special custom logic panels |

Note: PLC based control panels - refer next page.
${ }^{1}$ ) Both options 1 and 2 are combined with Carlo Gavazzi relays which are now standard.
${ }^{2}$ ) Option 12 is now standard.

## Temlogic controllers

## PLC based types

NHP offers a choice of PLC based logic control panels with up to 15 options. The basic model includes the following standard features: voltage and sequence relays and common power supply relays. All other logic switching and timing functions are internal to the PLC. A four position mode selector switch is provided loose (manual/automatic/test/off-SSW4). Up to 15 optional features are available, see table below. Special custom designed models are available on application.

## PLC based TemLogic controllers

| Descrip |  | Cat. No. |
| :---: | :---: | :---: |
| Basic Te | gic PLC panel | TLPC1 |
| Option | Description |  |
| 1 | Emergency supply phase sequence relay | EPFR ${ }^{1}$ ) |
| 2 | Emergency supply voltage sensing relay | EVSR ${ }^{1}$ ) |
| 3 | Emergency supply frequency relay | ESFR |
| 4 | Engine run-on time delay <br> in PLC logic panels | ERTD |
| 5 | Engine start time delay | ESTD |
| 6 | Inhibit return control <br> Prevents auto-return to normal from emergency | IRC |
| 7 | Cranking limiter time delay | CLTD |
| 8 | Additional mode selection "Normal supply" | SSW2 |
| 9 | Additional contacts for remote indication of mode switch position (includes option 8) | SSW3 |
| 10 | Alarm lock-out relay. Prevents breaker closure after overload or short circuit trip | ALR |
| 11 | Changeover time delay in PLC logic panels (required for ACB C/0 switch) |  |
| 12 | Normal supply phase sequence relay STANDARD | NPFR |
| 13 | Mains stability timer | MSTD |
| 14 | Interface with building management system ${ }^{2}$ ) |  |
| 15 | Load shedding control ${ }^{2}$ ) |  |



TemLogic PLC panel TPLC1

## 3 Panel sizes

NHP has limited the number of gear tray plates to three (3) standard sizes which cover all optional features. Custom designed panels are available on application. PLC logic panels, built to order. Refer order form page 9-24.

| Special logic panels <br> Option | Description |
| :--- | :--- |

[^4]
# Automatic transfer switches 

## Method of operation - TemLogic

Mode selector switches - SSW3 (TLP1) - SSW4 (TPLC1)

## Automatic control

"Automatic Control", position 2 on the selector switch. When the normal supply is interrupted, the automatic transfer logic will signal the standby alternator to start by the closing of a voltage free contact. The option of a normally closed contact opening is available. When the alternator supply is available, the load will be transferred to the emergency supply after the set time of TDNE (Time Delay Normal to Emergency).

When the normal supply is restored the signal for the standby alternator to run will be cancelled. The load will be transferred back to normal supply after the time set on timer TDEN (Time Delay Emergency to Normal).

Isolate load and reset
"Isolate Load and Reset", position 1 on the selector switch. Both circuit breakers will be open (driven off) regardless of the source of supply. The logic of the control panel is inhibited.
Manual control
"Manual Control", position 3 on the selector switch. Control power is disconnected from the motor operators and opening and closing devices. Moulded case circuit breakers can be operated by their direct drive levers/handles, or the manual open and close button located on the front of air circuit breakers.

## Do not attempt to operate the circuit breakers manually in any other selected operation mode.

Emergency supply and test
"Emergency Supply and Test", position 4 on the selector switch. This mode simulates loss of normal supply. The unit will transfer to emergency supply and remain there until the switch position is changed.

Note: If the standby alternator should fail to start it will leave the normal supply circuit breaker on.

## Functional options

## Option 1

Emergency supply phase sequence relay (EPFR) detects the phase sequence is correct in the emergency supply before allowing a changeover to occur. ¹)

## Option 2

Emergency supply voltage sensing relay (EVSR) detects if the emergency supply is at the correct voltage before allowing the changeover to take place. ${ }^{1}$ )

## Option 3

Emergency supply frequency relay (EFR) detects if emergency supply is at the correct frequency before allowing the changeover to take place.

Option $4{ }^{2}$ )
Engine run-on time delay (ERTD) allows engine to continue running and gives run-on time delay for engine cooling.
Option 5
Engine start time delay (ESTD) delays engine start-up when mains failure is momentary only and quickly restored.
Option 6
Inhibit return control (IRC) prevents automatic return to normal supply after a changeover. Normal supply must be restored manually unless the emergency supply fails.

Option 7
Cranking limiter time delay (CLTD) limits the time the emergency engine can be cranked by the starter motor. This prevents damage to the starter motor and battery in the event of engine failure.
Option 8
Additionally, mode selector "Normal Supply" (selector switch) (SSW2) disables the control logic, maintaining the system on the normal supply.

## Option 9

Mode indication (selector switch) (SSW3) facilitates connection of indicator lights to provide the operator with a visual indication of the mode of the automatic transfer switch, eg. isolate load and reset, automatic, manual, emergency supply on, normal supply on.

## Option 10

Alarm lock-out relay (NALR-EALR) locks out the system and prevents transfer taking place when the circuit breakers are tripped due to overload, short circuit or manual operation of the trip button.

## Option $11{ }^{2}$ )

Changeover time delay (NCOTD-ECOTD) introduces an additional time delay between one circuit breaker opening and the other circuit breaker closing.

Option 12
Normal supply phase sequence relay (NPFR) detects that normal supply phase is correct. Note: This option is now standard in basic TLP1 and TPLC1 logic panels.

Option 13
Normal supply time delay (NSTD) a timer with an interval function which inhibits the normal supply from the logic panel while the circuit breakers are transferring to the emergency supply. The time set on NSTD must be greater than the time set on ECOTD if fitted.

Option $14{ }^{3}$ )
Load shedding control.
Option $15{ }^{3}$ )
Building automation system interface.

Note: Custom design logic panels available on application.
${ }^{1}$ ) These options are now combined.
${ }^{2}$ ) Options 4 and 11 are standard in PLC based logic panels.
${ }^{3}$ ) Options 14 and 15 are available in PLC logic panels only.

## Logic Panel wiring \& dimensions

## Basic TemLogic Panel - TLP 1

Wiring diagram



MCCB transfer switch
Layout and dimensions

All dimensions in mm no motor

Manual transfer switches (MTS)
125AF 3 pole


250AF 3 pole


4 pole width 406 mm


MCCB transfer switch
Layout and dimensions

Manual transfer switches (MTS)
250AF (3 pole XH250 - XH160)


400AF 3 pole



4 pole width 500 mm



## MCCB transfer switch <br> Layout and dimensions

All dimensions in mm no motor

Manual transfer switches (MTS)
630/800AF 3 pole


4 pole width 690 mm


1250AF 3 pole


4 pole width 693 mm

## MCCB transfer switch

All dimensions in mm no motor

Manual transfer switches (MTS)
1600AF 3 pole



4 pole width 693 mm


## Short Form Catalogue

# ACDC <br> WM-DYNAMICS 

ELECTRICAL \& ELECTRONICS DISTRIBUTORS \& MANUFACTURERS


## TemBreak

## Moulded Case Circuit Breakers

 \& Accessories

## Up to 40kA - Small size

160A frame


## TEMBREAK LITE MCCBs




## TEMBREAK MCCB'S

65kA - Adjustable settings Rated Voltage: 690VAC

|  |  | 3-Pole 4-Pole | $\begin{aligned} & \text { S125-GJ } \\ & \text { S125-GJ4 } \end{aligned}$ | $\begin{aligned} & \text { S160-GJ } \\ & \text { S160-GJ4 } \end{aligned}$ | $\begin{aligned} & \text { S250-GJ } \\ & \text { S250-GJ4 } \end{aligned}$ | $\begin{aligned} & \text { S400-GJ } \\ & \text { S400-GJ4 } \end{aligned}$ | $\begin{aligned} & \text { S630-GE } \\ & \text { S630-GE4 } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 0 |  |  | $20 \mathrm{~A}(12.5-20)$ | 160A (100-160) | 200A (126-200) | 400A (250-400) | 630A (250-630) |
|  |  |  | 32A (20-32) |  | 250A (160-250) |  |  |
|  |  |  | 50A (32-50) |  |  |  |  |
| \% | Nominal Curre | Ratings | 63A (40-63) |  |  |  |  |
|  | -5 to $50^{\circ} \mathrm{C}$ |  | 100A (63-100) |  |  |  |  |
|  | 2000m |  | 125A (80-125) |  |  |  |  |
|  | Ratings: | Ui / Ue | 800/690V | 800/690V | 800/690V | 800/690V | 800/690V |
|  | Icu/ | 400/415V | $65 \mathrm{kA} / 36 \mathrm{kA}$ | $65 \mathrm{kA} / 36 \mathrm{kA}$ | $65 \mathrm{kA} / 36 \mathrm{kA}$ | 70kA/50kA | 70kA/50kA |
| S250-GJ |  | Ics 525V | 25kA/22kA | $25 \mathrm{kA} / 25 \mathrm{kA}$ | 25kA/25/kA | 30kA/30kA | 30kA/30kA |
| Plu | Protection: | Thermal | 0.63-1 x In | 0.63-1 x In | 0.63-1 x In | 0.63-1 x In |  |
| lable |  | Magnetic | 6-12 $\times$ In | $6-13 \times$ In | $6-13 \times$ In | $6-12 \times$ In | Electronic |
|  | Dimensions | h | 155 mm | 165 mm | 165 mm | 260 mm | 260 mm |
| $\xrightarrow{2}+1 \rightarrow$ |  | d1 | 68 mm | 68 mm | 68 mm | 103 mm | 103 mm |
| $\exists \uparrow$ |  | d2 | 92 mm | 92 mm | 92 mm | 145 mm | 145 mm |
| $\exists$ |  | w-3P | 90 mm | 105 mm | 105 mm | 140 mm | 140 mm |
| Dimensions |  | w-4P | 120 mm | 140 mm | 140 mm | 185 mm | 185 mm |
| Dimensions | Panel d | with VDH | 543mm | 543 mm | 543 mm | 610 mm | 610 mm |

XS1250SE


Dimensions


1 Front M ting Fi Id-Installable Accessories
2) Internal Accessories are common for TemBreak (20-630Amp) See pages 4 and 5
2) Internal Accessories are common for TemBreak Lite (15-250Amp) See page 1


## MCCB ACCESSORIES FOR TEMBREAK 2

| Auxiliary Switches (AX) | Frame Size | 125A | 160-250A | 400-630A | 800A | 1250-1600A |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | E400 | XS800 |  |
|  |  | S125 | S250 | S400 / S630 | - | XS1600 |
| General purpose | Aux |  |  |  |  |  |
|  | 1 ClO | A000348 | A000348 | A000348 | A215001005 | A212001006 |
|  | 2 ClO | - | - | - | A215001015 | A212001016 |
|  | $3 \mathrm{C} / 0$ | - | - | - | A215001025 | A212001026 |
|  | Rating |  | 3 A @ 240V |  | 5A@ 250V |  |
|  |  |  |  |  | 3A@ 500V |  |
| Heavy Duty (AX) | N/O | A000300 | A000300 | A000300 | - | - |
|  | N/C | A000317 | A000317 | A000317 | - | - |
|  | Rating |  | 4A @ 240V <br> 1A @ 500 V |  |  |  |
|  |  |  |  |  |  |  |
| Alarm Switches (AL) Aux Alarm |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| General purpose fros at | $1 \mathrm{C} / 0$ <br> 10 | A000744 | A000744 | A000744 | A215001070 | A212001071 |
|  | $1 \mathrm{C} / 0$ 1 Cl | - | - | - | A215001042 | A212001043 |
| 12 L | Rating |  | 3A@ 240V |  | 5A @ 250V |  |
|  |  |  |  |  |  |  |
| Heavy Duty (AL) | N/O | A000706 | - | - | - | - |
|  | N/C | A000713 | - | - | - | - |
|  | Rating |  | $\begin{aligned} & 4 \mathrm{~A} @ 240 \mathrm{~V} \\ & 1 \mathrm{~A} @ 500 \mathrm{~V} \end{aligned}$ |  |  |  |
| Shunt Trips (SHT) | AC100-120V | S000904 | S000904 | S000904 | S215002006 | S212002007 |
|  | AC200-240V | S000911 | S000911 | S000911 | - | - |
| 0 - | AC200-480V | - | - | - | S215002014 | S121002015 |
| T2900200 | AC380-450V | S000928 | S000928 | S000928 | - | S212002015 |
| Num | DC 12V | 5000973 | S000973 | S000973 | - | - |
| $125-630 \mathrm{~A} \quad 800-1600 \mathrm{~A}$ | DC 24V | S000935 | S000935 | S000935 | S215002032 | S212002033 |
|  | Other voltages available ex-i |  |  |  |  |  |
| Undervoltage Trips (UVT) | AC100-120V | U001208 | U001208 | U001208 | U215002067 | U212002068 |
| Instantaneous Type$125-630 \mathrm{~A}$ | AC200-240V | U001215 | U001215 | U001215 | U215002075 | U212002076 |
|  | AC380-450V | U001222 | U001222 | U001222 | - | - |
|  | DC 24V | U001239 | U001239 | U001239 | U215002093 | - |
| $\begin{aligned} & 500 \mathrm{mS} \\ & 800-1600 \mathrm{~A} \end{aligned}$ | 100-120V | - | - | - | U215002119 | U212002120 |
|  | 200-240V | - | - | - | U215002127 | U212002128 |
|  | Other voltages available ex-indent <br> For Maximum configuratl |  |  |  |  |  |

## Covers

|  | 125A | 160-250A | 400-630A | 800A | 1250A-1600A |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Terminal covers for Front Connection 3P 2 covers | C080425 | C080456 | C080807 | C215004015 | C211004020 |
| Terminal covers for Front Connection 4P 3 covers | C080432 | C080463 | C080814 | - | - |
| Interpole Barriers 2 Pieces per 3P MCCB | C043062 | C043161 | C043338 | C215004042 | C211004042 |
| Door Flange | C044908 | C044908 | C045400 | C215005160 | C211005161 |

## MCCB ACCESSORIES FOR TEMBREAK 2

| External Operating Handles | andles Frame Size | 125A | 160-250A | 400-630A | 800A | 1250A | 1600A |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Door Mount IP54 | Black Daros Handle | 120-45-0200-01 | 120-45-0200-01 | 121-45-0202-01 | 121-45-0204-01 | 121-45-0206-01 | 121-45-0208-01 |
| Door Mount IP54 | Black Handle | H727993 | H728952 | H729911 | H215005378 | H211005382 | H211005382 |
| Door Mount IP65 | Black Handle | H728037 | H728990 | H729959 | H215005379 | H211005383 | H211005383 |
| Breaker Mount |  | H727993 | H726347 | H727061 | - | - | - |
| Padlock Attachment | Handle Locks | H037016 | H037016 | H037207 | H215011004 | H211011005 | H211011005 |
| Padlock Attachment | Slide Locks + Hat Stand | TLSB-125 | TLSB-250 | TLSB-630 | TLSB-800 | - | - |



Breaker Mount Toggle lock slide bracket Symmetrical mount

Daros Handles IP54



Chain Drive Mechanism for larger MCCBs

## Motor Operators



| Mechanical \& Electrical Interlocks | 125A | 160-250A | 400-630A | 800A | 1250A-1600A |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Slide Type Mechanical Interlocks | M033513 | M033605 | M033704 | M211009023 | See below |
| Front Rear Connection 3P (*1) |  |  |  |  |  |
| Slide Type Mechanical Interlocks Front Rear Connection 4P (*1) <br> Link Type Mechanical Interlocks Right Side (*2) | M033520 M035005 | $\begin{aligned} & \text { M033612 } \\ & \text { M035104 } \end{aligned}$ | $\begin{aligned} & \text { M033711 } \\ & \text { M035265 } \end{aligned}$ |  |  |
| Link Type Mechanical Interlocks Left Side 3P (*2) | M035012 | M035111 | M035272 | Rear Interlock | See below |
| Link Type Mechanical Interlocks Left Side 4P (*2) | M035029 | M035128 | M035289 | - | - |
| Cable Type Mechanical Interlocks Interlock (*2) | M036026 | M036125 | M036248 | - | - |
| Cable Type Mechanical Interlocks 1 m Length Interlock Cable ( ${ }^{(22)}$ | M036064 | M036064 | M036064 | M21509035 | - |
| Cable Type Mechanical Interlocks 1.5 m Length Interlock Cable ( ${ }^{(2)}$ | M036057 | M036057 | M036057 | 1250 | 1600 |
| Rear Mechanical Interlock Toggle Type |  |  |  | M211009025 | M211009027 |
| Rear Mechanical Interlock Cable Type |  |  |  | M211009036 | M211009037 |

(*1) Order one part between two MCCBs
(*2) Order one Interlock part for each MCCB


Toggle Type


## ISOLATORS

| 3 Pole Isolator | S125-NN | S160-NN | S250-NN | S400-NN | S630-NN | XS800-NN | XS1250-NN |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4 Pole Isolator Early make, Late break Neutral | S125-NN4 | S160-NN4 | S250-NN4 | S400-NN4 | S630-NN4 | XS800-NN4 | XS1250-NN4 |
| Terasaki Professional Switching Solutions 100\% Rated Neutral <br> For more economical 160A or 250A isolators, see page 1. <br> Ratings |  |  |  |  |  |  |  |
| Rated Current Amps | 125A | 160A | 250A | 400A | 630A | 800A | 1250A |
| Rated Voltage Ue AC | 690 V | 690 V | 690 V | 690 V | 690 V | 690 V | 690 V |
| Rated short circuit making capacity Peak | 3.6kA | 6kA | 6kA | 9kA | 9kA | 15 kA | 32kA |
| Rated short time current 0.3 seconds | 2 kA | 3kA | 3kA | 5 kA | 5kA | 9.6kA | 15kA |
| Dimensions $\leftarrow \mathrm{w} \rightarrow\|\quad \leftarrow \underset{1}{\mathrm{~d} 2} \rightarrow \mathrm{~d} \rightarrow\| \quad \mathrm{w} \text { - 3-Pole }$ | 90 mm | 105mm | 105mm | 140 mm | 140 mm | 210 mm | 210 mm |
| w-4-Pole | 120 mm | 140 mm | 140 mm | 185 mm | 185 mm | 280 mm | 280 mm |
| $\bar{F} \quad \text { h } \quad \mathrm{C} \quad \mathrm{C}$ | 155 mm | 165 mm | 165 mm | 260 mm | 260 mm | 273 mm | 370 mm |
| $\square$ d1 | 68 mm | 68 mm | 68 mm | 103 mm | 103 mm | 103 mm | 120 mm |
| d2 | 92 mm | 92mm | 92 mm | 145 mm | 145 mm | 145 mm | 171 mm |
| For accessories see CB | S125-NJ | S160-NJ | S250-NJ | S400-NJ | S630-NE | XS800-NJ | XS1250-SE |
| Back-Up Circuit Breaker | S125-NJ | S160-NJ | S250-NJ | S400-NJ | S630-NE | XS800-NJ | - |
| Maximum switching current AC | 750A | 1000A | 1500A | 2400A | 3780A | 4800A | 7500A |

MOTORISED INTERLOCKED MCCBS

Motorised, Electrical \& Mechanically interlocked

- 160-800kVA
- Ideal for gensets
- One part number

Each set comprises:
$2 \times 3$-pole MCCBs
$2 \times$ Motor operators
2 x Aux interlocks
1 x Mechanical interlock set


Other combinations involving circuit breakers and isolators can be assembled to your order.

| 1x Mekanicalnerlock set |  | Supplied in kit format |  |  |  |  | Workshop Assembly |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Code | EEM125* | EEM250* | EEM400* | EEM630* | XSM800* | XSM1250* |
| Ratings: | Voltage | Ue | 525 V | 525 V | 690 V | 690 V | 690 V | 690 V |
|  | Current | In | 125A | 250A | 400A | 600A | 500-800A | 630-1250A |
|  | Gensets | Icu 400/415 | 80kVA | 160kVA | 250kVA | 400 kVA | 450-500kVA | 550-850kVA |
| Overload Protection: |  |  | 25kA | 25kA | 36kA | 36kA | 65 kA | 85kA |
|  |  | Thermal | 0.63-1 x In | 0.63-1 x In | 0.63-1 x In | 0.63-1 x In | Adj. 63-1 x IIn | Electronic |
|  |  | Instant | Adj. 6-12 x In | Adj. 6-12 x In | Adj.6-12 In | Electronic | Adj. 5-10 x In | Electronic |
| Description Qty |  |  |  |  |  |  |  |  |
| Moulded Case MCCB |  | 2 | E125-NJ 125A | E250-NJ 250A | S400-CJ 400A | E630-NE 630A | - | - |
| Motor Operator |  | 2 | MO755620 | M0755729 | MO756009 | M0756009 | - | - |
| Auxiliary Switch |  | 2 | A000317 | A000317 | A000317 | A000317 | - | - |
| RHS Mechanical Interlock |  | 1 | M033520 | M033612 | M033711 | M033711 | - | - |
| LHS Mechanical Interlock |  | 1 | M035005 | M035104 | M035265 | M035265 | - | - |
| Dimensio |  | w | 240 | 270 | 340 | 340 | 420 | 420 |
|  |  | h | 155 | 165 | 260 | 260 | 340 | 530 |
|  |  | d | 170 | 170 | 233 | 233 | 300 | 360 |
| For accessories \& further specs, see CB |  |  | E125 | E250 | S400 | E630 | XS800 | XS1250 |

## TEMBREAK 1100 V MCCBs



## MCCBS WITH INTEGRATED EARTH LEAKAGE PROTECTION



240-525VAC Suitable for
Single Phase installation

| AC Breaking Capacity: | Icu $400 \mathrm{~V} / 415 \mathrm{~V}$ | 25kA | 36kA | 65kA | 25 kA | 36kA | 65 kA |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 525 V | 8kA | 22 kA | 25kA | 10 kA | 25 kA | 25kA |
| Protection: | Earth Leakage | 30 mA - 3 A | 30mA - 3A | 30mA - 3A | 30 mA - 3 A | 30mA - 3 A | 30mA - 3A |
|  | Thermal | 0.63-1 x In | 0.63-1 x In | 0.63-1 x In | 0.63-1 x In | 0.63-1 x In | 0.63-1 x In |
|  | Magnetic Fixed | 10-12 x In | 10-12 x In | 10-12 $\times$ In | 10-13 $\times$ In | 10-13 x In | 10-13 x In |
| Dimensions | see CB | E125 | S125 | S125 | E250 | S250 | S250 |

For Accessories see page 4 \& 5

| EARTH FAULT ${ }^{\text {EHLAYS }}$ |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |
| Type | DIN Mount 70 mm | Base Mount Internal CT | Panel | t $96 \times 96$ | Panel Mount 96 x 96 3 Digit Display |
| Code | ELR-3C ${ }^{\dagger}$ | $\emptyset 35 \mathrm{~mm}$ ELRC-1/35 | ELR-1 ${ }^{\dagger}$ | *ELR-M2S ${ }^{\dagger}$ | DER2N ${ }^{\dagger}$ |
|  |  | $\varnothing 60 \mathrm{~mm}$ ELRC-1/60 | *With mechanical t indicator and alarm rela |  | DER2NM ${ }^{\dagger}$ |
|  |  | $\varnothing 80 \mathrm{~mm}$ ELRC-1/80 |  |  | with 10 day memory for actual |
|  |  | $\varnothing 110 \mathrm{~mm}$ ELRC-1/110 |  |  |  |
| Output Relay | Trip only | Trip only | Trip only | Trip \& Alarm | Trip \& Pre Alarm |
| Supply Volts |  | 110VAC/DC, 230/400VAC |  |  | 110/230/400VAC or 525VAC |
| Features: <br> - Selectable current threshold adjustable 0.025 mA to 25 A <br> - Trip delay adjustable 0.025 to 5 seconds <br> - Test pushbutton |  | - Reset pushbutton <br> - Relay output 5A @ 250VAC <br> - Standards IEC 255, IEC947.7 |  | For motor protection, 75 kW and above, $t$ always required. <br> $\dagger$ Select one CT below for use with one relay. |  |

Toroidal transformers supplied separate
The toroidal current transformer to be coupled to any
of the above ${ }^{\dagger}$ ) marked relays. Has two separate
windings: Test and monitor.

| Closed | Ø | Split-type |
| :--- | :--- | :--- |
| CT- $1 / 35$ | 35 mm |  |
| CT-1/60 | 60 mm | CTA- $1 / 60$ |
| CT-1/80 | 80 mm |  |
| CT-1/110 | 110 mm | CTA-1/110 |
| CT-1/160 | 160 mm | CTA- $1 / 160$ |
| CT-1/210 | 210 mm | CTA- $1 / 210$ |


#### Abstract

TemPower2 is the world's first "Double Break" ACB, having two breaking contacts per phase. The unique pole structure means that the short time withstand rating (Icw, 1sec) is equal to the service short-circuit breaking capacity (Ics) for all models.

TemPower2 ACBs have the world's smallest depth resulting in space saving in switchboards.


## $\nabla$ Features

- One of the smallest ACBs in the world.



## Benefits

- Reducing switchboard size and cost.
- Double contact breaking system. Fast clearing time of 30 msec .
- Increast reliabilty and extendad life under fault conditions
- Double insulated front body, field fit accessories. - Facilitates simple maintenance, upgrade and retro fitting.
- $\mathrm{Icu}=\mathrm{Ics}=\mathrm{Icw}$.
$65 \mathrm{kA}, 85 \mathrm{kA}, 100 \mathrm{kA}$ and 120 kA versions.
- High short circuit withstand provides full selectivity up to 100 kA and means no reduction of performance when tripped by an external relay.
- Characteristic curve to IEC 60255-3.

True generator protection curves in accordance with Marine Classification Rules.

- The most flexible relay on the market ensures selectivity and protection are always achieved.
- Monitoring of contact temperature.
- Reverse power protection.

Zone Interlocking Unrestricted and/or restricted ground fault protection.

- Provides diagnostic information and reduces factory down time.
- Integrated generator protection functions within the one relay.
- Double opening and closing coils.
- Increased reliability for critical applications.
- All standard voltage options are available for protection relays.
- Withdrawable plug-in version - main clusters fitted to $A C B$, not to fixed busbars.
- No additional cost or configuration.
- Clusters can be maintained without mains being switched off.


## AIR CIRCUIT BREAKERS - FIXED \& DRAWOUT

## Simplified Ordering

Standard part number Includes :

- Protection Relay LSI (AGR-11BL-AL)
- Dial Type-2 (LCD available on request)
- 4 AB Auxiliary Contacts
- Padlockable Mechanical Close \& Open Buttons
- Mechanical Close \& Open Indicators
- Mechanical Indicator for Charged/Discharged State


## Drawout Only

- Position Indicator
- Drawout Handle
- Horizontal or Vertical Connections
- Chassis
- Safety Shutters
- Terminal Cover

Ics=Icw



Time and current setting range for $A G R-11 B L-G L$

Double break contacts


Drawout Type
ACB Frame Size
Rated Current
ACB Model 3 pole
$-5-40^{\circ} \mathrm{C}$

| $-5.40^{\circ} \mathrm{C}$ |  | ACDC2F316HH | ACDC3F332VV* |
| :---: | :---: | :---: | :---: |
|  |  | ACDC2F320VV | - |
| Rated Operational Voltage | Ue | 690 V | 690 V |
| AC Rated Insulation Voltage | Ui | 1000 V | 1000 V |

## Ics Service Breaking Capacity

| $(\mathrm{kA}$, symmetrical r.m.s) | 690 V | 50 | 65 |
| :---: | :---: | :---: | :--- |
|  | 440 V | 65 | 85 |
|  | $400 / 415 \mathrm{~V}$ | 65 kA | 85 kA |

Icm Making Capacity

| (kA, asymmetrical peak) | 690 V | 105 | 143 |
| :--- | ---: | ---: | :--- |
|  | 440 V | 143 | 187 |
|  | $400 / 415 \mathrm{~V}$ | 143 | 187 |
| Icw Short - Time Withstand |  |  |  |
|  | 1 sec | 65 |  |
| (kA rms) | 3 sec | 50 | 65 |
|  |  |  |  |

Endurance (Number of operating
cycles)
Mechanical (C/W maintenance)
Mechanical (W/O maintenance)
Electrical (CW maintenance AC460V)
Electrical (W/O maintenance AC460V)

## Times

| Total Breaking Time (sec) max |  | 0.03 | 0.03 |
| :---: | :---: | :---: | :---: |
| Spring Charging Time (sec) max |  | 10 | 10 |
| Closing Time (sec) max |  | 0.08 | 0.08 |
| Dimensions |  |  |  |
|  | W 3 pole | 360 mm | 466 mm |
| - | H | 460 mm | 460 mm |
| 1 | D | 290 mm | 345 mm |


| 0.03 | 0.03 | 0.03 | 0.05 |
| :--- | :--- | :--- | :--- |
| 10 | 10 | 10 | 10 |
| 0.08 | 0.08 | 0.08 | 0.08 |
|  |  |  |  |
| 354 mm | 460 mm | 460 mm | 799 mm |
| 460 mm | 460 mm | 460 mm | 460 mm |
| 345 mm | 345 mm | 380 mm | 380 mm |

For other configurations, contact AC/DC tecnical support

* Available Ex-Indent

4 Pole ACBs on request

## AIR CIRCUIT BREAKERS ACCESSORIES



Mechanical Interlock Kits - Cable Type. Interlocking is possible between any frame sizes within the Tempower2 range

## 2-Way Vertical

Code 116311906

For vertical interlocking 2 ACB's
800 mm pitch (includes connecting rods for 800 mm pitch).
Type-C Horizontal Code 116311907
For horizontal interlocking 2 ACB 's. Pitch 1000 mm . (includes 2 cables 1000 mm pitch 1520 mm long).

| Type-B Two - 2 Mains \& 1 Bus Coupler |
| :--- | :--- |
| Code 116311908 |

For horizontal interlocking 3 ACB's, 2 ACB's can be closed. (incl. 4 cables for 1000 mm \& 2 for 2000 mm pitches.)
Type-D - Only 1 ACB can be closed out of 3

## Code <br> 116311909

For horizontal interlocking 3 ACB's, one can be closed (includes 4 cables 1000 mm \& 2 for 2000 mm pitches).

Type-A - Generator interlocked with 2 mains supplies mains not interlocked for horizontal interlocking 3 ACB's

## Code

116311609
Generator interlocked with 2 mains (incl. 2 cables for 1000 mm \& 2 for 2000 mm pitches). Generator $A C B$ positioned on left-hand side or righthand side.

For other pitch/c le/rod lengths, please contact AC/DC Dynamics

## RETROFIT APPLICATIONS



The TemPower2 ACB has a compact and versatile design. It can be used to replace existing ACBs in almost any switchboard, whilst retaining original copper work and steelwork.



English Electric OB3 Switchgear for Power Station. Circa 1950. Replaced by the Terasaki AR216S 3-Pole ACB retrofit kit, complete with ASTA tested and certified copper work to BSEN 60439, 50kA for 3 seconds.

We have developed retrofit kits using TemPower2 which can replace ACBs by:
GEC
Mitsubishi
Ellison
Siemens
Merlin Gerin
Westinghouse
ABB
Others


## APPLICATION DATA

## Discrimination Tables

Upstream：TemPower 2 ACB with or without integral Protection Relay．
Downstream：TemBreak 2 MCCB．
Upstream ACB

| Frame |  |  | 800A |  | 1250A |  | 1600A |  | 2000A |  | 2500A |  | 3200A |  | 4000A | 5000A | 6300A |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Model |  |  |  | $\begin{aligned} & \stackrel{\sim}{\tilde{x}} \\ & \text { Nux } \end{aligned}$ | $\begin{aligned} & \text { 포N } \\ & \stackrel{\text { x }}{4} \end{aligned}$ | $\begin{aligned} & \text { g } \\ & \stackrel{\rightharpoonup}{\underset{~ x}{4}} \end{aligned}$ | 흘 采 | 登 | 도 |  | 甭 妥 | 㒇 |  |  | $\begin{aligned} & \text { 음 } \\ & \text { 몬 } \end{aligned}$ | $\begin{aligned} & \text { 은 } \\ & \text { 눈 } \end{aligned}$ |
|  |  | Breaking Capacity | 65kA | 80kA | 65kA | 80kA | 65kA | 80kA | 65kA | 80kA | 85kA | 100kA | 85kA | 100kA | 100kA | 100kA | 120kA |
| 125A | E125NJ | 25kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S125NJ | 36kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S125GJ | 65kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | H125NJ | 125kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | L125NJ | 200kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
| $\begin{aligned} & 160 \mathrm{~A} / \\ & 250 \mathrm{~A} \end{aligned}$ | S160NJ | 36kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S160GJ | 65kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | N250NJ | 25kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S250NJ | 36kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S250GJ | 65kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S250NE | 50kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S250GE | 65kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S250PE | 70kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | H250NJ | 125kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | L250NJ | 200kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
| $\begin{aligned} & 430 \mathrm{~A} \\ & 630 \mathrm{~A} \end{aligned}$ | E400NJ | 25kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S400CJ | 36kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S400NJ | 50kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S400NE | 50kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S400GJ | 70kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S400GE | 70kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | H400NJ | 125kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | H400NE | 125kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | E630NE | 36kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S630CE | 50kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | S630GE | 70kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
| 800A | XS800NJ | 65kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | XH800SE | 65kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | XH800PJ | 100kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
|  | XS800SE | 50kA | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
| 1250A／ | XS1250SE | 65kA | － | － | T | T | T | T | T | T | T | T | T | T | T | T | T |
| 1600A | XS1600SE | 85kA | － | － | － | － | T | T | T | T | T | T | T | T | T | T | T |

Type 2 Coordination for Motor Starters：For details of Type 2 Coordination for motor starters，please contact our Sales or Product Manager，or technical support team
Type Tested Assemblies：For details of certified Type－Tested Assemblies using Terasaki ACBs and MCCBs，please contact our Product Manager，or technical support team．

## Maximum Configurations for Installation of TemBreak2 Accessories

| Accessory | MCCB 125A | MCCB 160A－250A | MCCB 400A－630A | MCCB 800－1600A |
| :---: | :---: | :---: | :---: | :---: |
| General purpose Auxiliary Switch | 2 | 2 | 3 | 3 |
| General purpose Alarm Switch | 1 | 1 | 1 | 1 |
| Shunt Trip or UVT | 1 | 1 | 1 | 1 |
| Shunt＋ | 0 | 0 | 0 | 0 |
| Auxillery | 0 | 0 | 0 | 0 |
| OR |  |  |  |  |
| Accessory | MCCB 125A | MCCB 160A－250A | MCCB 400A－630A |  |
| Heavy Duty Auxiliary Switch | 2 | 2 | 3 |  |
| Heavy Duty Alarm Switch | 1 | 1 | 1 |  |
| Shunt Trip or UVT | 1 | 1 | 1 |  |

## APPLICATION DATA

## Cascading Tables

Upstream：TemBreak 2 MCCB
Downstream：TemBreak 2 MCCB．
Upstream MCCB


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

| Frame |  |  | 400A |  |  |  |  | 630A |  |  |  | 800A |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Model |  | $\begin{aligned} & \text { J্ర゙ } \\ & \text { שi } \end{aligned}$ |  | 宫㝕 |  | 気崖亭 | $\begin{aligned} & \text { 嵩 } \\ & \text { n } \end{aligned}$ | $\begin{aligned} & \text { 山్ర } \\ & \text { Üס } \end{aligned}$ |  | $\stackrel{\text { 崖 }}{\substack{\text { • } \\ \hline}}$ | $\begin{aligned} & \text { 山̈ } \\ & \text { O} \\ & \text { OXX } \end{aligned}$ | $\begin{aligned} & \Sigma_{\mathbf{O}}^{0} \\ & \text { O्x } \end{aligned}$ | 岩 品 场 | 嵩 | $\begin{aligned} & \text { 欨 } \\ & \text { Hin } \\ & \text { क्र人 } \end{aligned}$ |  |
|  |  | Breaking Capacity | 36kA | 50kA | 70kA | 125kA | 200kA | 36kA | 50kA | 70kA | 125kA | 50kA | 65kA | 65kA | 125kA | 85kA | 100kA |
| 125A | E125NJ | 25kA | 36 | 36 | 50 | 65 | 85 | 36 | 36 | 50 | － | 36 | 36 | 36 | － | － | － |
|  | S125NJ | 36kA | － | 50 | 65 | 85 | 125 | － | 50 | 65 | － | 50 | 50 | 50 | － | － | － |
|  | S125GJ | 65kA | － | － | 70 | 125 | 150 | － | － | 70 | － | － | － | － | － | － | － |
|  | H125NJ | 125kA | － | － | － | － | 200 | － | － | － | － | － | － | － | － | － | － |
| 160A／ | S160NJ | 36kA | － | 50 | 65 | 85 | 125 | － | 50 | 65 | － | 50 | 65 | 65 | 65 | － | － |
| 250A | S160GJ | 65kA | － | － | 70 | 125 | 150 | － | － | 70 | － | － | － | － | － | － | － |
|  | H160NJ | 125kA | － | － | － | － | 200 | － | － | － | － | － | － | － | － | － | － |
|  | E250NJ | 25kA | 36 | 36 | 50 | 65 | 85 | 36 | 36 | 50 | － | 36 | 50 | 50 | 50 | － | － |
|  | S250NJ | 36kA | － | 50 | 65 | 85 | 125 | － | 50 | 65 | － | 50 | 65 | 65 | 65 | － | － |
|  | S250GJ | 65kA | － | － | 70 | 125 | 150 | － | － | 70 | － | － | － | － | － | － | － |
|  | S250NE | 50kA | － | － | － | 125 | 150 | － | － | － | － | － | － | － | － | － | － |
|  | S250GE | 65kA | － | － | － | 125 | 150 | － | － | － | － | － | － | － | － | － | － |
|  | S250PE | 70kA | － | － | － | 125 | 150 | － | － | － | － | － | － | － | － | － | － |
|  | H250NJ | 125kA | － | － | － | － | 200 | － | － | － | － | － | － | － | － | － | － |
| 400A | E400NJ | 25kA | 36 | 36 | 50 | 65 | 85 | 36 | 36 | 50 | 36 | 36 | 50 | 50 | 636 | 36 | 36 |
|  | S400CJ | 36kA | － | 50 | 65 | 70 | 100 | － | 50 | 65 | 50 | 50 | 65 | 65 | 50 | 50 | 50 |
|  | S400NJ | 50kA | － | － | 70 | 85 | 125 | － | － | 70 | 65 | － | － | 65 | 65 | 65 | 65 |
|  | S400GJ | 75kA | － | － | － | 125 | 150 | － | － | － | － | － | － | － |  | － | 85 |
|  | H400NJ | 125kA | － | － | － | － | 200 | － | － | － | － | － | － | － |  | － | － |

## Notes：

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

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## Thermal magnetic type S125GJ

## 65kA

Current rating:
12.5-125A

Approvals and Tests:
Standards AS/NZS 3947-2, and IEC60947-2


Interrupting capacity:

|  | Voltage | ICu | ICS |
| :--- | :--- | :--- | :--- |
| AC use | $380 / 400$ | 65 | 36 |
| DC use | 250 V | 40 | 40 |

Trip unit:
Adjustable thermal ( 0.63 Ir to $100 \%$ Ir) and adjustable magnetic (6 Im to 12 Im)

Dimensions (mm)

| Poles | 3 | 4 |
| :--- | :--- | ---: |
| $H$ | 155 | 155 |
| W | 90 | 120 |
| D (less toggle) | 68 | 68 |
| Toggle cut-out |  | Standard DIN |



Replaces: XH125NJ, TL100NJ, Note: check exact ratings or dimenions to suit your application requirement

## (9) IEMASH

TEMBREAK 2 MCCBs

## DIMENSIONS

## E125-NJ, S125-NJ, S125-GJ

ASL: Arrangement Standard Line
H: Handle Frame Centre Line


## OPERATING CHARACTERISTICS

## THERMAL MAGNETIC CHARACTERISTICS

125A Frame MCCBs

Time/current characteristic curves
E125-NJ, S125-NJ, S125-GJ


Time/current characteristic curves
H125-NJ,L125-NJ


TEMBREAK 2 MCCBs

## OPERATING CHARAGTERISTICS

THERMAL MAGNETIC PROTECTION
Adjustment Dials


1. $I_{\mathrm{R}}$ is the thermal element adjustment dial and is used to set the rated current to match the conductor rating.
$I_{\mathrm{R}}$ can be set between 0.63 and 1.0 times $I_{\mathrm{n}}$.
2. $I_{\mathrm{i}}$ is the magnetic element adjustment dial and is used to set the short circuit tripping threshold to suit the application.
$I_{\mathrm{i}}$ can be set between 6 and 12 times $I_{\mathrm{n}}$ on 125 A and 400 A frame models.
$I_{\mathrm{i}}$ can be set between 6 and 13 times $I_{\mathrm{n}}$ on 250A frame models with ratings
of $160 \mathrm{~A}, 200 \mathrm{~A}$ and 250 A .
$I_{\mathrm{i}}$ can be set between 6 and 12 times $I_{\mathrm{n}}$ on 250 A frame models with ratings of 125 A and less.

Models, Types and Rated Currents of Thermal Elements

| Model | Type | Current Rating In (A) |
| :--- | :--- | :--- |
| S125 | -NF | $16,20,25,32,40,50,63,80,100,125$ |
| E125 | -NJ | $20,32,50,63,100,125$ |
| S125 | -NJ | $20,32,50,63,100,125$ |
| S125 | -GJ | $20,32,50,63,100,125$ |
| H125 | -NJ | $20,32,50,63,100,125$ |
| L125 | -NJ | $20,32,50,63,100,125$ |
| S160 | -NF | $16,20,25,32,40,50,63,80,100,125,160$ |
| S160 | -NJ | $20,32,50,63,100,125,160$ |
| S160 | -GJ | $50,63,100,125,160$ |
| H160 | -NJ | 160 |
| L160 | -NJ | 160 |
| E250 | -NJ | $20,32,50,63,100,125,160,200,250$ |
| S250 | -NJ | $160,200,250$ |
| S250 | -GJ | $160,200,250$ |
| H250 | -NJ | 160,250 |
| L250 | -NJ | 160,250 |
| E400 | -NJ | 250,400 |
| S400 | -CJ | 250,400 |
| S400 | -NJ | 250,400 |
| S400 | -GJ | 250,400 |
| H400 | -NJ | 250,400 |
| L400 | -NJ | 250,400 |

## T1HS / T2HS HANDLES

For Terasaki moulded case circuit breakers up to 1600 A.


- IP55 rated plastic handle
- Long variable depth shaft supplied standard
- Heavy duty metal locking lever standard
- Internal door interlocking components are all metal
- All handles mount in a $31-37 \mathrm{~mm}$ hole
- Short lever handles on MCCBs to 250 A, longer types 400-1600 A
- $105 \mathrm{~mm}^{2}$ or $130 \mathrm{~mm}^{2}$ escutcheon plates are optional
- Handles are padlockable in the OFF position as standard
- ON padlocking optional via on site handle modification
- Accepts up to three 4-8 mm locks or multi lock devices
- Door opens when handle is switched to OFF position
- Door will not open when handle is padlocked OFF
- Door defeat function standard
- Door defeat non functional when padlocked OFF
- Padlock option for handle mechanism mounted on MCCB
- All handle mechanisms allow MCCB dial setting viewing and access
- For IP 65 applications T1HP/T2HP handles are available
- ON indication flag on handle mechanism
- Prosafe trapped key interlock options


# T1HS / T2HS Handles <br> For Terasaki moulded case circuit breakers 

## Features

- IP 55 rated plastic handle
- Suitable for MCCBs 0.7 A to 1600 AF
- Long variable depth shaft supplied standard
- Heavy duty METAL locking lever standard
- Internal door interlocking components are metal
- All handles mount in a $31-37 \mathrm{~mm}$ hole

- Short lever handles on MCCBs to 250 A , longer types 400-1600 A (short handles optional for 400/630 A)
- $100 \mathrm{~mm}^{2}$ escutcheon plates are optional
- Handles are padlockable in the OFF position as standard
- ON padlocking optional via on site handle modification
- Accepts up to three 4-8 mm locks or multi lock devices
- Door opens when handle is switched to OFF position
- Door will not open when handle is padlocked OFF

- Door defeat function standard
- Door defeat non functional when padlocked OFF
- Padlock option for handle mechanism mounted on MCCB
- All handle mechanisms allow MCCB dial setting viewing and access
- For IP 65 applications T1HP/T2HP handles are available

Field applications

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


Metal lock lever standard


Handle escutcheon plate option


MCCB setting viewing window

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

| MCCB Ampere Frame | $\mathbf{0 . 7 - 1 2 A}$ | 125AF | 250AF | 400/630AF | 630/800AF | 1250/1600AF |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Grey handle: | T1HS03R5GM | T2HS12R5GM | T2HS25R5GM | T2HS40R5GM | T1HS80R5GM | T1HSX6R5GM |
| Red/Yellow handle: | T1HS03R5RM | T2HS12R5RM | T2HS25R5RM | T2HS40R5RM | T1HS80R5RM | T1HSX6R5RM |
| MCCB Amp ratings: | XM30PB | E125NJ | S160NJ/GJ | E400NJ | XS / XH630 | XS1250SE |
|  |  | S125NJ | H / L160NJ | S400CJ / NJ | XV630PE | XV1250NE |
| 15 A to 1600 A | S125GJ | E250NJ | S400NE | XS /SH800 | XS1600SE |  |
|  | ZS250GJ | S250NJ/GJ/PE | S400GJ | XV800PE | TL630NE |  |
|  | H125NJ | H250NJ /NE | S400NE /GE | TL800NE |  |  |
|  | L125NJ | L250NJ | E630NE |  | TL1250NE |  |
|  |  | ZS125GJ | S630CE /GE |  |  |  |

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

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

## Panel mount external operating handle Type T1HS/T2HS

Handle type


Handle assembly


Shaft installation


# Panel mount external operating handles Type T1HS/T2HS 

Handle operation


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

Handle lock operation


TRIP Operation with the panel open


Panel opening procedure


ON position locking
Modifying T1HS/T2HS handles to lock in the 0 N position

1. Unclip and remove the cover from the rear of the handle.
2. Locate and remove the knock-out tab in the rear of the handle to enable locking pin movement.
3. Check operation for ON locking.
4. Replace the clip on rear cover onto the rear of the handle.
5. The handle can now be installed. It will lock in both 0 N and 0 FF .

Panel opening procedure by panel lock release

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

## Panel mount external operating handles Type T1HS/T2HS



T2HS40


T1HS80
T1HSX6 / T1HSX6


TemBreak 2 MCCB accessories
T1HS / T2HS Handle dimensions (mm)

## T2HS handle with E125NJ, S125NJ, S125GJ, ZS125GJ



Notes: 1. Distance 'A' is total distance from front of gear plate to front surface of escutcheon. Minimum with plastic cone is $(187+25) 212$, without it is (136+25) 161 mm . Using special shaft 'T2HS250SHAFT', this can be reduced to $(136+6) 142 \mathrm{~mm}$.
2. Cut plastic sleeve to length ' $B$ ' determined by. $B=A-(136+25)$.
3. Cut shaft to length ' $C$ ' determined by $C=(A+23)-115$.

Handle orientation options for OFF/ON


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


Alternative orientation


Handle padlock lever fully extended

## Electronic type S250PE

## 70kA

Current rating: $50-250 \mathrm{~A}$
Approvals and Tests:
Standards AS/NZS 3947-2, and IEC60947-2
Interrupting capacity:


## Over Current Relay:



- Electronic, for general \& selectivity applications
- 7 dial selectable characteristic curves suited for a variety of applications
- Base current Ir is adjustable from $40 \%-100 \%$ of the nominal rated current In.
- STD setting 2.5-10 ( $\left.\mathbf{x} \boldsymbol{I}_{\mathbf{R}}\right)^{2}$ )
- INST setting 13-14 ( $\mathbf{x} I_{R}$ ) ${ }^{2}$ )


## OCR Options:

- Neutral Pole protection for 4 pole MCCBs only (AN)
- Pre-Trip Alarm (AP)

Dimensions (mm)

| Poles | 3 | 4 |
| :--- | :--- | ---: |
| $H$ | 165 | 165 |
| W | 105 | 140 |
| (less toggle) | 103 | 103 |
| Toggle cut-out |  | Standard DIN |

Ampere

| Rating <br> Rat <br> NRC | $I_{R}$ Adjustment |  |
| :--- | :--- | :--- |
| $\mathbf{M i n}-$ Max. | Cat. No. 1) |  |
| $\mathbf{2 5 0}$ | $50-125$ | S250 PE 125 |

Price Adder - if OCR options are required, add the selected OCR option price below to the above MCCB price to calculate the total MCCB cost.
3 P OCR options: PTA 3) S250 PE 3 AP \#

| 4 P OCR options: | PTA 3) | S250 PE 4 AP \# |
| :---: | :---: | :---: |
|  | AP 3) | S250 PE 4 AN \# |
|  | PTA + NP 3) | S250 PE 4 APN \# |

1) Add poles to complete MCCB catalogue number. Eg: 3 pole 250A: S250PE $\underline{3} 250$. "\#" add OCR trip unit rating where shown.
2) The STD and Instantaneous pickup currents ( $I_{\mathrm{sd}} \& I_{\mathrm{i}}$ ) settings are not individually adjustable, however by selecting different curve types and different $I_{R}$ settings the values will vary. Curve $1 \& 2 I_{s d}=2.5 \times I_{R}$, curve $3 I_{s d}=5 \times I_{R}$, curve $4-7 I_{s d}=10 \times I_{R}$. $I_{R}$ dial setting $0.4-0.9 I_{\mathrm{i}}=14 \times \mathrm{I}_{\mathrm{R}}$ and $I_{\mathrm{R}}$ dial setting $0.95-1.0 I_{\mathrm{i}}=13 \times \mathrm{I}_{\mathrm{R}}$. Refer curve examples \& setting data on pages 18 to 30 .
$N R C=$ Nominal rated current,$\quad I_{R}=$ Current adjustment dial setting, $\quad S T D=$ Short Time Delay, $\quad$ INST $=$ instantaneous
3) To order a MCCB with the above options insert the required option after the pole to make up the cat. number. Eg: S250PE 4 APN 250 is a S250PE 4 Pole 250A MCCB c/w Pre-trip Alarm and Neutral Protection.

## ACCESSORIES

## INSULATION ACCESSORIES

Terminal Covers for Front Connection (CF)
Terminal covers for front connection are suitable for covering the exposed live parts of conductors terminated on the MCCB.


Terminal Covers for Front Connection


Flush Terminal Covers

## Flush Terminal Covers (CS)

Flush terminal covers are useful for increasing the ingress protection rating at the terminals without increasing the overall length. They can be used with busbar and for direct entry of stranded cable (with solderless cable clamp terminals (FW), refer to Section 6, Installation).
Flush terminal covers are identical to rear terminal covers for 400A and 630A frame models.
The user can remove a section of the rear terminal cover using a tool to allow entry of the conductor.

## Terminal covers for Rear Connection (CR)

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


Terminal Covers for Rear Connection

## ACCESSORIES

## INSULATION ACCESSORIES

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

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


MCCB Fitted with Interpole Barriers on Both Ends


Interpole Barriers between Adjacent MCCBs

## ACCESSORIES

## ACCESSORIES FOR DUAL SUPPLY CHANGEOVER SYSTEMS

Where more than one AC voltage source is available to a distribution system it is often necessary to prevent multiple sources supplying the system at one time. Interlocking accessories are used together with two MCCBs to prevent both being in the ON state simultaneously. This provides a secure mechanical means of preventing the connection of two supply sources.

An automatic changeover controller can monitor the status of two supplies and control the switching of two MCCBs according to pre-programmed parameters. When an automatic changeover controller is interfaced to a pair of interlocked MCCBs fitted with remote control accessories, a secure, fully automatic changeover system is achieved.


Link Interlock


Changeover Pair with Link Interlock and Motor Operators


## Link Interlock (ML)

Link interlocks consist of a mechanism mounted to each MCCB in an adjacently mounted pair. The link between each mechanism inhibits the closure of one MCCB unless the other is in the OFF position.
Link interlocks can be used on a mixture of 3 and 4 pole breakers of the same frame size.
The TemBreak 2 link interlock is an innovative design breakthrough which will save space, time and money for switchboard builders in that:

- Installation is extremely simple. Link interlocks are field-installable and only require a screwdriver to fit.
- Link interlocks replace the accessory cover on the front of the breaker
- Motor operators and operating handles are compatible with link interlocks
- The interlock is installed on the front of the MCCB and does not therefore interfere with copperwork or cables
- No need to buy factory-built backplates with MCCBs and interlocks pre-fitted
- An automatic changeover pair consisting of an interlocked pair of MCCBs with internal control accessories and motor operators can be assembled in a few minutes!


## ACCESSORIES

## ACCESSORIES FOR DUAL SUPPLY CHANGEOVER SYSTEMS

## Wire Interlock (MW)

Wire interlocks consist of two mechanisms connected by a cable. The mechanisms are mounted on two MCCBs located at a distance from each other which is limited by the length and bend radius of the cable. The mechanisms and cable inhibit the closure of one MCCB unless the other is in the OFF position. Each mechanism is ordered separately. Cables of 1.0 m or 1.5 m length are also ordered as separate items.
Wire interlocks can be used on a mixture of 3 and 4 pole MCCBs of different frame sizes. This allows potential cost savings by using lower rated MCCBs for the alternative power supply. MCCBs can be mounted in different switchboard compartment or on different planes.


View from above

The TemBreak 2 wire interlock is an innovative design breakthrough which will save space, time and money for switchboard builders in that:

- Installation is extremely simple. Wire interlocks are field-installable.
- Wire interlocks replace the accessory cover on the front of the breaker


## Slide Interlock (MS)

Slide interlocks are manually operated toggle locking devices which can be installed between two adjacent MCCBs. Depending on the position of the slide, one or other of the MCCBs on either side of a slide interlock is inhibited from being in the ON position.
Slide interlocks can be used between MCCBs of the same number of poles and of the same frame size.
Slide interlocks can be installed in the field and are padlockable in both positions.

- Motor operators and operating handles are compatible with wire interlocks
- Interlocking of MCCBs mounted in different compartments is possible
- No need to buy factory-built backplates with MCCBs and interlocks pre-fitted
- An automatic changeover pair consisting of an interlocked pair of MCCBs with internal control accessories and motor operators can be assembled in a few minutes!


Slide Interlock Installed Between two MCCBs

## MODULAR SFZES



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


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

TEMBREAK 2 MCCBs

## INSTALLATION

## TEMBREAK 2 <br> MOULDED CASE CIRCUIT BREAKERS <br> 16A TO 630A

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

- Connection and Mounting Options and Accessories
- Insulation Distances
- Mounting Angle
- Direction of Power Supply
- Standard Installation Environment and Special Treatments
- Temperature Ratings


## 7. Dimensions



## INSTALLATION

## CONNECTION AND MOUNTING OPTIONS AND ACCESSORIES

TemBreak 2 MCCBs connection and mounting accessories facilitate easy installation in any arrangement. Breakers and accessories are easy to fit. They are designed to provide safe and secure termination and mounting points. 125 A and $160 \mathrm{~A} / 250 \mathrm{~A}$ frame models have a choice of 45 mm front cutout patterns


Optional 45 mm Cutout Patterns


Overview of Connection and Mounting Accessories

Please refer to Section 2, Ratings and Specifications, for details of the connection and mounting options which are available for each model.

Please refer to Section 7, Dimensions, for detailed dimensions of connection and mounting options and accessories.

Note that one set of mounting screws is supplied as standard with every circuit breaker or switch disconnector purchased.

## INSTALLATION

## CONNECTION AND MOUNTING OPTIONS AND ACCESSORIES Connection of Busbars and Terminated Cables

This connection method is standard for all front connected (FC) MCCB models. Solid conductors or cables terminated with crimp lug terminals can be used.

## Serrated Terminal Surface

Each terminal on 160A and 250A models has a serrated surface. This provides excellent grip for heavy cables terminated with crimp lug terminals, thereby preventing sideways rotation of the lug.


| Maximum Dimensions of Compression Terminals |  |  |  |
| :--- | :--- | :--- | :--- |
| Frame Size (A) | $125^{*}$ | $160 \& 250$ | $400 \& 630$ |
| Width, W (mm) | 17 | 25 | 25 |
| Diameter, d (mm) | 9 | 9 | 11 |
| Maximum from centre to tip, e(mm) | 8.5 | 10 | 12 |

## Connection of Large Conductors and Multiple Conductors

Flat bars (FB) are terminal extensions which can be fitted to line or load side terminals and are used to connect large conductors and multiple conductors. Available for field fitting in sets of 3 or 4 bars.


## INSTALLATION

## CONNECTION AND MOUNTING OPTIONS AND ACCESSORIES

## Direct Entry of Stranded Cable

Solderless clamp terminals (FW) can be used to secure stranded cable directly to the MCCB. Available for field fitting in sets of 3 or 4 .


| MCCB Model | Cable Capacity (mm²) |
| :--- | :---: |
| E125, S125, S125-NF | 1.5 to 50 (1 cable) |
| H125, L125, S160-NF | 1.5 to 70 (1 cable) |
| S160, E250, S250, H250, L250 | 35 to 120 (1 cable) |
| E400, S400, H400, L400 | 80 to 240 (1 cable) |
|  | 60 to 120 (2 cables) |

Termination in Separate Compartment
Rear connections (RC) allow termination of conductors in a different switchboard compartment to the MCCB body.

The terminal bar can be rotated in steps of 45 degrees in the field.


## INSTALLATION

## CONNECTION AND MOUNTING OPTIONS AND ACCESSORIES

Plug-in Mounting
The plug in mounting system allows fast replacement of the MCCB body without the need to disturb the terminations. Solid conductors or cables terminated with compression terminals can be used.

Plug-In Safety Lock


The plug-in MCCB body is automatically locked to the base when the contacts are closed (toggle ON). It cannot be removed unless the contacts are in the isolated position (toggle OFF or TRIPPED). This system ensures safe removal of the MCCB from the base.


The connection bars for plug-in bases are optional and can be configured in the field either for front or rear access. The illustrations below show possible mounting and connection options for plug in bases.


1. Mounted on base plate with connection bars mounted for front access.
Insulation plates are supplied as standard and must be fitted.

2. Terminations in separate compartment. Connection bars are mounted for top access at the top and rear access at the bottom.

3. Mounted on angle bars. Connection bars are mounted for rear access.

## OPERATING CHARACTERISTICS

## LET-THROUGH PEAK CURRENT CHARACTERISTICS

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


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


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


Prospective short circuit current in RMS sym.(kA)
S400-CJ, S400-NJ, S400-NE, S400-GJ, S400-GE, 690 V AC.


## SYMMETRIGAL DOOR GUTOUT PATTERNS



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


## DIMENSIONS

# H125-NJ, L125-NJ, H160-NJ, L160-NJ, S250-PE, H250-NJ, H250-NE, L250-NJ. Plug-in Versions 

ASL: Arrangement Standard Line
it: Handle Frame Centre Line


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

(rear view)


Detail of connecting part
Oriented for rear access


Terminal bars should be connected alternately on adjacent poles.

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


Detail of connecting part Oriented for rear access


Terminal bars shou.
on adjacent poles.


## (9) TEFREAT

TEMBREAK 2 MCCBs

## OPERATING CHARACTERISTICS

## ELECTRONIC CHARACTERISTICS

S250-PE, H250-NE


In = 250A; 160A; 125A; 40A

|  | IR (A) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | LTD Pick-up current $I_{\text {R }}$ |  | x/n | 0.4 | 0.5 | 0.63 | 0.8 | 0.9 | 0.95 | 1.0 |
|  | Characteristics |  | No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Standard | LTD | $t_{\text {R }}$ | (s) | 11 | 21 | 21 | 5 | 10 | 19 | 29 |
|  | LTD |  |  | at $200 \% \times I_{\text {R }}$ |  |  | at $600 \% \times I_{R}$ |  |  |  |
|  | STD | $I_{\text {sd }}$ | $x / \mathrm{R}$ | 2.5 |  | 5 | 10 |  |  |  |
|  |  | $t_{\text {sd }}$ | (s) | 0.1 |  |  |  | 0.2 |  |  |
|  | INST | $\mathrm{l}_{\mathrm{i}}$ | $\mathrm{x} / \mathrm{R}$ | 14(Max: $13 \times \mathrm{ln}$ ) Note (1) |  |  |  |  |  |  |
| Option | PTA | Ip | $\mathrm{x} / \mathrm{R}$ | 0.8 |  |  |  |  |  |  |
|  |  | $t_{\mathrm{p}}$ | (s) | 40 |  |  |  |  |  |  |
|  | N | IN | $\mathrm{x} / \mathrm{n}$ | 1.0 |  |  |  |  |  |  |
|  |  | $t_{N}$ | (s) | $t_{\mathrm{N}}=t_{\mathrm{R}} \quad$ Note(2) |  |  |  |  |  |  |

Note
(1) $I_{\mathrm{i}}$ max. $=13 x I_{\mathrm{n}}$. (2) Standard setting of $I_{N}$ is $100 \%$ of $I_{\mathrm{n}}$. For any other setting please specify when ordering.

TEMBREAK 2 MCCBs

## INSTALLATION

## TEMPERATURE RATINGS \& DERATINGS

Calibration Temperature: $45^{\circ} \mathrm{C}$

| MCCB Type | Connection Type | Rating at calibration temperature $\left(50^{\circ} \mathrm{C}\right)$ | Rated Current (A) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $50^{\circ} \mathrm{C}$ | $55^{\circ} \mathrm{C}$ | $60^{\circ} \mathrm{C}$ | $65^{\circ} \mathrm{C}$ |
| $\begin{aligned} & \text { E125-NJ } \\ & \text { S125-NJ } \\ & \text { S125-GJ } \end{aligned}$ | Front Rear <br> Plug-in | 20A | 19 | 18.5 | 18 | 17.5 |
|  |  | 32A | 31 | 30.5 | 30 | 29 |
|  |  | 50A | 48 | 45 | 43 | 41 |
|  |  | 63A | 60 | 57 | 55 | 52 |
|  |  | 100A | 97 | 94 | 90 | 87 |
|  |  | 125A | 121 | 117 | 113 | 109 |
| $\begin{aligned} & \mathrm{H} 125-\mathrm{NJ} \\ & \mathrm{~L} 125-\mathrm{NJ} \end{aligned}$ | Front <br> Rear <br> Plug-in | 20A | 19 | 18.5 | 18 | 17.5 |
|  |  | 32A | 31 | 30 | 29 | 28 |
|  |  | 50A | 48 | 47 | 45 | 44 |
|  |  | 63A | 61 | 59 | 57 | 55 |
|  |  | 100A | 97 | 95 | 92 | 89 |
|  |  | 125A | 121 | 118 | 114 | 111 |
| $\begin{aligned} & \text { S160-NJ } \\ & \text { S160-GJ } \end{aligned}$ | Front Rear Plug-in | 20A | 19 | 18.5 | 18 | 17.5 |
|  |  | 32A | 31 | 30 | 29 | 28 |
|  |  | 50A | 48 | 46 | 44 | 42 |
|  |  | 63A | 61 | 59 | 57 | 55 |
|  |  | 100A | 97 | 94 | 91 | 88 |
|  |  | 125A | 121 | 117 | 113 | 109 |
|  |  | 160A | 156 | 151 | 146 | 141 |
| $\begin{aligned} & \text { H160-NJ } \\ & \text { L160-NJ } \end{aligned}$ | Front Rear Plug-in | 160A | 156 | 151 | 147 | 143 |
| E250-NJ | Front Rear Plug-in | 20A | 19 | 18.5 | 18 | 17.5 |
|  |  | 32A | 31 | 30 | 29 | 28 |
|  |  | 50A | 48 | 46 | 44 | 42 |
|  |  | 63A | 61 | 59 | 57 | 55 |
|  |  | 100A | 97 | 94 | 91 | 88 |
|  |  | 125A | 121 | 117 | 113 | 109 |
| E250-NJ S250-NJ S250-GJ | Front Rear <br> Plug-in | 160A | 156 | 151 | 146 | 141 |
|  |  | 250A | 243 | 235 | 227 | 219 |
| $\begin{aligned} & \mathrm{H} 250-\mathrm{NJ} \\ & \text { L250-NJ } \end{aligned}$ | Front <br> Rear <br> Plug-in | 160A | 156 | 151 | 147 | 143 |
|  | Front Rear | 250A | 244 | 237 | 230 | 223 |
| $\begin{aligned} & \text { E400-NJ } \\ & \text { S400-CJ } \\ & \text { S400-NJ } \\ & \text { S400-GJ } \end{aligned}$ | Front Rear Plug-in | 250A | 244 | 237 | 230 | 223 |
|  |  | 400A | 390 | 380 | 369 | 358 |
|  |  |  |  |  |  |  |
| $\begin{aligned} & \mathrm{H} 400-\mathrm{NJ} \\ & \mathrm{~L} 400-\mathrm{NJ} \end{aligned}$ | Front Rear | 250A | 243 | 237 | 230 | 223 |
|  |  | 400A | 390 | 381 | 371 | 361 |
|  | Plug-in | 250A | 243 | 237 | 231 | 224 |
|  |  | 400A | 392 | 384 | 376 | 368 |

Calibration Temperature: $30^{\circ} \mathrm{C}$

| MCCB Type | Connection <br> Type | Rating at calibration <br> temperature $\left(30^{\circ} \mathrm{C}\right)$ | $35^{\circ} \mathrm{C}$ |  |  |  |  |  |  |  | $40^{\circ} \mathrm{C}$ | $45^{\circ} \mathrm{C}$ | $50^{\circ} \mathrm{C}$ | $55^{\circ} \mathrm{C}$ | $60^{\circ} \mathrm{C}$ | $65^{\circ} \mathrm{C}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{H} 250-\mathrm{NJ}$ <br> $\mathrm{L} 250-\mathrm{NJ}$ | Plug-in Conn. | 250 A | 244 | 236 | 225 | 219 | 209 | 200 | 190 |  |  |  |  |  |  |  |


| MCCB Type | Connection Type | Rating | Rated Current (A) |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $30^{\circ} \mathrm{C}$ | $35^{\circ} \mathrm{C}$ | $40^{\circ} \mathrm{C}$ | $45^{\circ} \mathrm{C}$ | $50^{\circ} \mathrm{C}$ | $55^{\circ} \mathrm{C}$ | $60^{\circ} \mathrm{C}$ | $65^{\circ} \mathrm{C}$ |
| $\begin{aligned} & \text { S250-PE } \\ & \text { H250-NE } \end{aligned}$ | Front | 250A | 250 | 250 | 250 | 250 | 237.5 | 225 | 200 | 200 |
|  | Plug-in | 250A | 250 | 237.5 | 225 | 225 | 200 | 200 | 157.5 | 157.5 |
| $\begin{aligned} & \text { S400-NE } \\ & \text { S400-GE } \end{aligned}$ | $\begin{aligned} & \text { Front } \\ & \text { Rear } \\ & \text { Plug-in } \end{aligned}$ | 250A | 250 | 250 | 250 | 250 | 250 | 250 | 225 | 200 |
|  |  | 400A | 400 | 400 | 400 | 400 | 400 | 380 | 360 | 320 |
| $\begin{aligned} & \text { H400-NE } \\ & \text { L400-NE } \end{aligned}$ | Front Rear | 250A | 250 | 250 | 250 | 250 | 250 | 250 | 225 | 200 |
|  |  | 400A | 400 | 400 | 400 | 400 | 400 | 380 | 360 | 320 |
|  | Plug-in | 250A | 250 | 250 | 250 | 250 | 250 | 250 | 225 | 200 |
|  |  | 400A | 400 | 400 | 400 | 400 | 400 | 380 | 360 | 320 |
| $\begin{aligned} & \text { E630-NE } \\ & \text { S630-CE } \end{aligned}$ S630-GE | Front Rear* | 630A | 630 | 630 | 630 | 630 | 598.5 | 598.5 | 567 | 504 |

## OPERATING CHARACTERISTICS

## LET-THROUGH ENERGY CHARACTERISTICS

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


Prospective short circuit current in RMS sym.(kA)

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


H160-NJ, L160-NJ, S250-PE, H250-NE, H250-NJ, L250NJ. 690 V AC.


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


### 3.2 CONTROL DEVICES \& SOCKETS

- CARLO GAVAZZI - DPB01CM48W4 - Phase Failure Relay
- FINDER - 38.51 24VDC - Relay
- IDEC - RH2B-UL-24VDC + SH2B-05 - 24VDC Relay
- IDEC - RH2B-ULD-24VDC + SH2B-05 - 24VDC Relay
- IDEC - RH4B-ULD-24VDC + SH4B-05 - Test Relay
- MULTITRODE - MTR-5 - 24VDC Level Relay
- SPRECHER \& SCHUH - RZ7-FSA 3E U23 - Timer
- SPRECHER \& SCHUH.- RZ7-FSD3C U23 - Power On Reset Timer
- SPRECHER \& SCHUH.- CA7-30 - 24VDC Coil + CA7-PV-22
- CLIPSAL - 15/15+90B (SHROUD) - 1 Phase 15A Outlet
- CLIPSAL - 25+449A+449AP - LAPTOP GPO - TWIN 10A
- CLIPSAL - 56C410 - 3 Phase Switched Outlet
- CLIPSAL - 56SO310 - 1 Phase Outlet
- MARECHAL - DS1 3114013972 + 51BA058 - Socket Outlet + Incline Sleeve
- MARECHAL - DS1 3118013972 + 311A013 - Inlet Plug + Handle
- MARECHAL - PN7C 01P4060 + 01NA053 - Socket Outlet + Incline Sleeve
- MARECHAL - PN7C 01P8060 + 01NA313 - Inlet Plug + Handle
- MENNEKES - MEN361 - 3 Phase N\&E Appliance Inlet



## Product Description

3 -phase or 3-phase+neutral line voltage monitoring relay for phase sequence, phase loss, over and under voltage (separately adjustable set
points) with built-in time delay function.
Supply ranges from 208 to 480 VAC covered by two multivoltage relays.

- 3-phase over and under voltage, phase sequence and phase loss monitoring relays
- Detect when all 3 phases are present and have the correct phase sequence
- Detect if all the 3-phase-phase or phase-neutral voltages are within the set limits
- Upper and lower limits separately adjustable
- Measure on own power supply
- Selection of measuring range by DIP-switches
- Adjustable voltage on relative scale
- Adjustable delay function ( 0.1 to 30 s)
- Output: 8 A SPDT relay N.E.
- For mounting on DIN-rail in accordance with DIN/EN 50022 (DPB01) or plug-in module (PPB01)
- 22.5 mm Euronorm housing (DPB01) or 36 mm plug-in module (PPB01)
- LED indication for relay, alarm and power supply ON


## Ordering Key

DPB 01 C M23
Housing
Function
Type
Item number
Output
Power supply

## Type Selection

| Mounting | Output |
| :--- | :--- |
| DIN-rail SPDT <br> Plug-in  | SPDT |
| Input Specifications |  |


| Supply: 208 to 240 VAC |  | Supply: $\mathbf{3 8 0}$ to 480 VAC |
| :--- | :--- | :--- |
| DPB 01 C M23 |  | DPB 01 C M48 |
| PPB 01 C M23 |  | PPB 01 C M48 |

## Output Specifications

Input
L1, L2, L3, N

|  |
| :--- |
| Measuring ranges |
| 208 to $240 \Delta$ VAC |
| 380 to $480 \Delta$ VAC (DPB01CM48) |
| 380 to $415 \Delta$ VAC (PPB01CM48) |

177 to $275 \Delta$ VAC
323 to $550 \Delta$ VAC
323 to $475 \Delta$ VAC
Ranges
Upper level
Lower level
Note: The imput voltage must not exceed the maximum rated voltage or drop below the minumum rated voltage reported above.
+2 to $+22 \%$
of the nominal voltage
-22 to -2\%
of the nominal voltage

| Output <br> Rated insulation voltage | SPDT relay 250 VAC |
| :---: | :---: |
| Contact ratings ( $\mathrm{AgSnO}_{2}$ ) | $\mu$ |
| Resistive loads AC 1 | 8 A @ 250 VAC |
| DC 12 | 5 A @ 24 VDC |
| Small inductive loads AC 15 | 2.5 A @ 250 VAC |
| DC 13 | 2.5 A @ 24 VDC |
| Mechanical life | $\geq 30 \times 10^{6}$ operations |
| Electrical life | $\begin{aligned} & \geq 10^{5} \text { operations } \\ & \text { (at } 8 \mathrm{~A}, 250 \mathrm{~V}, \cos \varphi=1 \text { ) } \end{aligned}$ |
| Operating frequency | $\leq 7200$ operations/h |
| Dielectric strength Dielectric voltage Rated impulse withstand volt. | $\begin{aligned} & 2 \mathrm{kVAC}(\mathrm{rms}) \\ & 4 \mathrm{kV}(1.2 / 50 \mu \mathrm{~s}) \end{aligned}$ |

## Supply Specifications

| Power supply |  |
| :---: | :---: |
| Rated operational voltage through terminals: |  |
| L1, L2, L3, N | L3, N (DPB01) |
| 5, 6, 7, 11 | 11 (PPB01) |
| M23-D | M23-Delta Voltage: |
|  | M48- Delta Voltage: |
|  | M48-Star Voltage: |
| Rated operational power |  |
| DPB01CM23, PPB01CM23 |  |
| DPB01CM48, PPB01CM48 |  |

Overvoltage cat. III (IEC 60664, IEC 60038)

208 to 240 VAC $\pm 15 \%$ 45 to 65 Hz 380 to 480 VAC $\pm 15 \%$ 45 to 65 Hz
220 to 277 VAC $\pm 15 \%$ 45 to 65 Hz

13 VA @ $230 \Delta V A C, 50 \mathrm{~Hz}$ 13 VA @ $400 \Delta V A C, 50 \mathrm{~Hz}$ Supplied by L1 and L2

## General Specifications

| Power ON delay | $1 \mathrm{~s} \pm 0.5 \mathrm{~s}$ or $6 \mathrm{~s} \pm 0.5 \mathrm{~s}$ |
| :---: | :---: |
| Reaction time |  |
| Incorrect phase sequence or total phase loss | 00 |
| Voltage level | (input signal variation from |
|  | $-20 \%$ to $+20 \%$ or from |
|  | +20\% to -20\% of set value) |
| Alarm ON delay | $<200 \mathrm{~ms}$ (delay < 0.1 s) |
| Alarm OFF delay | $<200 \mathrm{~ms}$ (delay < 0.1 s) |
| Accuracy | (15 min warm-up time) |
| Temperature drift | $\pm 1000 \mathrm{ppm} /{ }^{\circ} \mathrm{C}$ |
| Delay ON alarm | $\pm 10 \%$ on set value $\pm 50 \mathrm{~ms}$ |
| Repeatability | $\pm 0.5 \%$ on full-scale |
| Indication for |  |
| Power supply ON | LED, green |
| Alarm ON | LED, red (flashing 2 Hz during delay time) |
| Output relay ON | LED, yellow |
| Environment |  |
| Degree of protection | IP 20 |
| Pollution degree | 3 (DPB01), 2 (PPB01) |
| Operating temperature |  |
| @ Max. voltage, 50 Hz | -20 to $60^{\circ} \mathrm{C}$, R.H. $<95 \%$ |
| @ Max. voltage, 60 Hz | -20 to $50^{\circ} \mathrm{C}$, R.H. < $95 \%$ |
| Storage temperature | -30 to $80^{\circ} \mathrm{C}$, R.H. $<95 \%$ |
| Housing dimensions |  |
| DIN-rail version | $22.5 \times 80 \times 99.5 \mathrm{~mm}$ |
| Plug-in version | $36 \times 80 \times 87 \mathrm{~mm}$ |
| Weight | Approx. 120 g |
| Screw terminals |  |
| Tightening torque | Max. 0.5 Nm according to IEC 60947 |
| Approvals | UL, CSA |
| CE Marking | Yes |
| EMC | Electromagnetic Compatibility |
| Immunity | According to EN 61000-6-2 |
| Emissions | According to EN 50081-1 |

## Mode of Operation

Connected to the 3 phases (and neutral) DPB01 and PPB01 operate when all 3 phases are present at the same time, the phase sequence is correct and the phase-phase (or phase-neutral) voltage levels are within set limits.

If one or more phase-phase or phase-neutral voltages exceeds the upper set level or drops below the lower set level, the red LED starts
flashing 2 Hz and the output relay releases after the set time period. In any case if phase-neutral measurement is selected both phasephase and phase-neutral voltages are monitored. If the phase sequence is wrong or one phase is lost, the output relay releases immediately. Only 200 ms delay occurs. The failure is indicated by the red LED flashing 5 Hz during the alarm condition.
Example 1
(mains network monitoring)

## Example 2

(load monitoring)
The relay monitors over and under voltage, phase loss and correct phase sequence.

The relay releases in case of interruption of one or more phases, when one or more voltages drop below the lower set level or exceed the upper set level.

## CARLO GAVAZZI

## Function/Range/Level and Time Delay Setting

Adjust the input range setting the DIP switches 3 and 4 as shown below.

Select the desired function setting the DIP switches 1 and 2 as shown below.

To access the DIP swiches open the grey plastic cover as shown below

## Selection of level and time delay:

Upper knob:
Setting of lower level on relative scale.

Centre knob:
Setting of upper level on relative scale.

## Lower knob:

Setting of delay on alarm time on absolute scale (0.1 to 30 s ).


## Power ON delay

$\mathrm{ON}: 6 \mathrm{~s} \pm 0.5 \mathrm{~s}$
OFF: $1 \mathrm{~s} \pm 0.5 \mathrm{~s}$
Monitored voltage
ON: Phase-Neutral
OFF: Phase-Phase

| Measuring range   <br> SW3 ON ON <br> SW4 ON OFF <br> M23 Ph-Ph 208 VAC 220 VAC <br> Voltage   |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
| M48 Ph-Ph <br> Voltage | 380 VAC | 400 VAC | OFF |  |
| M48 Ph-N <br> Voltage | 220 VAC | 230 VAC | 240 VAC | 480 VAC <br> DPB01 only <br> DPB01 only |

## Wiring Diagrams



Example 1


Example 2


## Operation Diagrams



Refer catalogue F1

## Relay interface module

## DIN rail mount

- Interface module with 34 series relay
- Ultra-slim profile, only 6.2 mm wide
- Integral LED and diode

■ Simple removal of relay for replacement
■ DIN rail mounting

## Contact specifications



Cat. No.
38.51...V DC
$38.51 \ldots$... AC/DC


Cat. No.
38.61...V DC
38.61...V AC/DC

| Contact configuration | $1 \mathrm{C} / 0$ |
| :--- | :---: |
| Rated current | 6 A |
| Rated voltage | 250 V AC |
| Rated load in AC 1 | $1,500 \mathrm{VA}$ |
| Rated load in AC 15 (230 V AC) | 300 VA |
| Breaking capacity in DC 1:30/110/220 V | $6 / 0.2 / 0.15 \mathrm{~A}$ |
| Maximum peak current | 10 A |
| Maximum switching voltage | 400 V AC |
| Minimum switching load | 500 mW |

## Coil specifications

| Nominal voltage ( $U_{N}$ ) | $\begin{array}{r} (50 / 60 \mathrm{~Hz}) \mathrm{AC} / \mathrm{DC} \\ \mathrm{DC} \end{array}$ | $\begin{aligned} & 24,110,240 \\ & 6 \text { i] } 12,48 \text { i }, 60 \text { i } \end{aligned}$ |
| :---: | :---: | :---: |
| Rated power AC/DC | ( $50 / 60 \mathrm{~Hz}$ ) AC/DC | (0.2..0.9)W |
|  | DC | 0.3W |
| Operation range | ( $50 / 60 \mathrm{~Hz}$ ) AC/DC | (0.83..1.1) $U_{N}$ |
|  | DC | (0.83..1.2) $U_{N}$ |
| Holding voltage AC/DC |  | $0.6 \mathrm{U}_{\mathrm{N}} / 0.6 \mathrm{U}_{\mathrm{N}}$ |
| Must drop-out voltage AC/DC |  | $0.1 \mathrm{U}_{\mathrm{N}} / 0.1 \mathrm{U}^{\text {N }}$ |

## Technical data

| Mechanical life AC/DC | -/10.10 ${ }^{6}$ |
| :---: | :---: |
| Electrical life @ rated load AC 1 | $60.10^{3}$ |
| Insulation between coil and contacts | 6 kV |
| Ambient temperature range | $-40^{\circ} \mathrm{C} . . .+55^{\circ} \mathrm{C}$ |
| Protection rating | IP 20 |
| Connection diagram | $\left.\left.\right\|_{11} ^{12}\right\|_{A_{A 2}} ^{14}$ |
| Accessories | 93.01 Isolating plate 93.20 Jumperlink 20 way 93.64 Identification labels |

Notes: $\quad$ The equipment on this page is rated $230 / 400 \mathrm{~V}$ and is suitable for use on 240/415 V systems as per AS 60038:2000.
i Available on indent only.

Refer catalogue F1

## Relay interface module

## Accessories

|  |  |  |  |
| :--- | :--- | :--- | :--- |
|  | Isolates varying voltages <br> mounted in the same row. <br> One isolating plate every <br> four relays is recommended | Reduced wiring and <br> installation costs | Easy identification for <br> maintenance |
| Cat. No. | $\mathbf{9 3 . 0 1}$ | $\mathbf{9 3 . 2 0}$ | 93.64 |
| Description | Isolating plate | Jumperlink 20 way <br> $36 \mathrm{~A}, 250 \mathrm{~V}$ rating | Identification labels <br> $(64$ tags in a pack) |
| Relay to suit | $38.51,38.61$ | $38.51,38.61$ | $38.51,38.61$ |

## Relay dimensions (mm)

## 38 Series

Cat. No. 38.51


Cat. No. 38.61


## RH Series Compact Power Relays



1. *Carries no UL recognition mark.
2. PCB terminal relays are designed to mount directly to a circuit board without any socket.

## Ordering Information

When ordering, specify the Part No. and coil voltage code:
(example) RH3B-U AC120V
Part No. $\quad$ Coil Voltage Code

Sockets (for Blade Terminal Models)


Hold Down Springs \& Clips


AC Coil Ratings

| Voltage (V) | Rated Current ( mA ) $\pm 15 \%$ at $\mathbf{2 0}{ }^{\circ} \mathrm{C}$ |  |  |  |  |  |  |  | Coil Resistance ( $\Omega$ ) $\pm 10 \%$ at $20^{\circ} \mathrm{C}$ |  |  |  | Operation Characteristics (against rated values at $20^{\circ} \mathrm{C}$ ) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | AC 50Hz |  |  |  | AC 60Hz |  |  |  |  |  |  |  |  |  |  |
|  | SPDT | DPDT | 3PDT | 4PDT | SPDT | DPDT | 3PDT | 4PDT | SPDT | DPDT | 3PDT | 4PDT | Max. Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| 6 | 170 | 240 | 330 | 387 | 150 | 200 | 280 | 330 | 330 | 9.4 | 6.4 | 5.4 |  |  |  |
| 12 | 86 | 121 | 165 | 196 | 75 | 100 | 140 | 165 | 165 | 39.3 | 25.3 | 21.2 |  |  |  |
| 24 | 42 | 60.5 | 81 | 98 | 37 | 50 | 70 | 83 | 83 | 153 | 103 | 84.5 |  |  |  |
| 110 | 9.6 | - | 18.1 | 21.6 | 8.4 | - | 15.5 | 18.2 | 18.2 | - | 2,200 | 1,800 |  |  |  |
| 110-120 | - | $\begin{aligned} & 9.4- \\ & 10.8 \end{aligned}$ | - | - | - | 8.0-9.2 | - | - | - | - | - | - | 110\% | 80\% maximum | $30 \%$ minimum |
| 120 | 8.6 | - | 16.4 | 19.5 | 7.5 | - | 14.2 | 16.5 | 16.5 | - | 10,800 | 7,360 |  |  |  |
| 220 | 4.7 | - | 8.8 | 10.7 | 4.1 | - | 7.7 | 9.1 | 9.1 | - | 10,800 | 7,360 |  |  |  |
| 220-240 | - | 4.7-5.4 | - | - | - | 4.0-4.6 | - |  | - | 18,820 | - | - |  |  |  |
| 240 | 4.9 | - | 8.2 | 9.8 | 4.3 | - | 7.1 | 8.3 | 8.3 | - | 12,100 | 9,120 |  |  |  |

## DC Coil Ratings

| Voltage (V) | Rated Current (mA) $\pm 15 \%$ at $20^{\circ} \mathrm{C}$ |  |  |  | Coil Resistance ( $\Omega$ ) $\pm 10 \%$ at $20^{\circ} \mathrm{C}$ |  |  |  | Operation Characteristics (against rated values at $20^{\circ} \mathrm{C}$ ) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | SPDT | DPDT | 3PDT | 4PDT | SPDT | DPDT | 3PDT | 4PDT | Max. Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| 6 | 128 | 150 | 240 | 250 | 47 | 40 | 25 | 24 | 110\% | $\begin{aligned} & \text { 80\% } \\ & \text { maximum } \end{aligned}$ | $\begin{aligned} & 10 \% \\ & \text { minimum } \end{aligned}$ |
| 12 | 64 | 75 | 120 | 125 | 188 | 160 | 100 | 96 |  |  |  |
| 24 | 32 | 36.9 | 60 | 62 | 750 | 650 | 400 | 388 |  |  |  |
| 48 | 18 | 18.5 | 30 | 31 | 2,660 | 2,600 | 1,600 | 1,550 |  |  |  |
| 100-110 | - | 8.2-9.0 | - | - | - | 12,250 | - | - |  |  |  |
| 110 | 8 | - | 12.8 | 15 | 13,800 | - | 8,600 | 7,340 |  |  |  |



| Specifications |  |  |
| :---: | :---: | :---: |
| Contact Material |  | Silver cadmium oxide |
| Contact Resistance ${ }^{1}$ |  | $50 \mathrm{~m} \Omega$ maximum |
| Minimum Applicable Load |  | 24 V DC, $30 \mathrm{~mA} ; 5 \mathrm{~V}$ DC, 100 mA (reference value) |
| Operate Time ${ }^{2}$ | SPDT <br> DPDT | 20ms maximum |
|  | 3PDT <br> 4PDT | 25ms maximum |
| Release Time ${ }^{2}$ | SPDT <br> DPDT | 20ms maximum |
|  | $\begin{aligned} & \text { 3PDT } \\ & \text { 4PDT } \end{aligned}$ | 25ms maximum |
| Power Consumption (approx.) | SPDT | AC: 1.1VA (50Hz), 1VA (60Hz) DC: 0.8 W |
|  | DPDT | AC: $1.4 \mathrm{VA}(5 \mathrm{OHz}), 1.2 \mathrm{VA}(6 \mathrm{~Hz}) \quad$ DC: 0.9 W |
|  | 3PDT | AC: $2 \mathrm{VA}(5 \mathrm{OHz}), 1.7 \mathrm{VA}(60 \mathrm{~Hz}) \quad$ DC: 1.5 W |
|  | 4PDT | AC: $2.5 \mathrm{VA}(5 \mathrm{OHz}), 2 \mathrm{VA}(6 \mathrm{OHz}) \quad$ DC: 1.5 W |
| Insulation Resistance |  | 100M 2 minimum (500V DC megger) |
| Dielectric Strength ${ }^{3}$ | SPDT | Between live and dead parts: $2,000 \mathrm{~V} \mathrm{AC,1} 1$ minute <br> Between contact and coil: $2,000 \mathrm{~V} \mathrm{AC,1}$ minute <br> Between contacts of the same pole: $1,000 \mathrm{~V} \mathrm{AC,1} 1$ minute  |
|  | $\begin{aligned} & \text { DPDT } \\ & \text { 3PDT } \\ & \text { 4PDT } \end{aligned}$ | Between live and dead parts: $2,000 \mathrm{~V} \mathrm{AC,1}, 1$ minute <br> Between contact and coil: $2,000 \mathrm{~V} \mathrm{AC,1}, 1$ minute <br> Between contacts of different poles:  <br> Between contacts of the same pole: $1,000 \mathrm{~V} \mathrm{VC}, 1$ Ainute 1 minute |
| Operating Frequency |  | Electrical: 1,800 operations/hour maximum <br> Mechanical: 18,000 operations/hour maximum |
| Vibration Resistance |  | Damage limits: 10 to 55 Hz , amplitude 0.5 mm <br> Operating extremes: 10 to 55 Hz , amplitude 0.5 mm |
| Shock Resistance |  | Damage limits: $1,000 \mathrm{~m} / \mathrm{s}^{2}(100 \mathrm{G})$ <br> Operating extremes: <br>  <br> $200 \mathrm{~m} / \mathrm{s}^{2}(20 \mathrm{G}-\mathrm{SPDT}$, DPDT) <br> $100 \mathrm{~m} / \mathrm{s}^{2}(10 \mathrm{G}-3 P D T, 4 P D T)$ |
| Mechanical Life |  | 50,000,000 operations minimum |
| Electrical Life | DPDT | 500,000 operations minimum (120V AC, 10A) |
|  | $\begin{aligned} & \text { SPDT } \\ & \text { 3PDT } \\ & \text { 4PDT } \end{aligned}$ | 200,000 operations minimum (120V AC, 10A) |
| Operating Temperature ${ }^{4}$ | SPDT | -25 to $+50^{\circ} \mathrm{C}$ (no freezing) |
|  | $\begin{aligned} & \text { DPDT } \\ & \text { 3PDT } \\ & \text { 4PDT } \end{aligned}$ | -25 to $+40^{\circ} \mathrm{C}$ (no freezing) |
| Operating Humidity |  | 45 to 85\% RH (no condensation) |
| Weight (approx.) |  | SPDT: 24 g , DPDT: $37 \mathrm{~g}, 3$ PDT: $50 \mathrm{~g}, 4 \mathrm{4PDT}: 74 \mathrm{~g}$ |

1. Measured using $5 \mathrm{~V} D \mathrm{DC}, 1 \mathrm{~A}$ voltage drop method

## Characteristics (Reference Data)

## Electrical Life Curves

AC Load


(RH3/RH4) 1000

## Maximum Switching Capacity



Load Voltage (V)

## DC Load



(RH3/RH4)


Continuous Load Current vs. Operating Temperature Curve (Basic Type, With Check Button, and Top Bracket Mounting Type)
(RH1)

(RH2)

(RH3/RH4)


Internal Connection (View from Bottom)
Basic Type

SPDT



3PDT


4PDT


With Check Button


Contacts can be operated by pressing the check button.

With Indicator (-L type)

| SPDT |  | 3PDT | 4PDT |  | DPDT |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { Below } \\ & \text { 100V } \\ & \text { AC/DC } \end{aligned}$ |  |  |  | $\begin{aligned} & \text { Below } \\ & \text { 24V } \\ & \text { AC/DC } \end{aligned}$ |  | When the relay is energized, <br> the indicator goes on. <br> - Relay coils less than 100 V <br> DC do not contain a protec |
| 100 V <br> AC/DC <br> and over |  |  |  | $24 V$ <br> AC/DC <br> and over |  | - Relay coils below 100 V use LED indicator, coils above 100 V use neon lamp indicator. |

With Diode (-D type)

| SPDT | DPDT | 3PDT | 4PDT |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Contains a diode to absorb the back emf generated when the coil is de-energized. The release time is slightly longer. Available for DC coil only. <br> - Diode Characteristics Reverse withstand voltage: $1,000 \mathrm{~V}$ Forward current: 1A |

With Indicator LED \& Diode (-LD type)


Dimensions (mm)

RH1B-U/RH1B-UL/RH1B-UD/RH1B-ULD


RH4B-U/RH4B-UL/RH4B-UD/RH4B-LD


## RH1B-UT



RH3B-U/RH3B-UL/RH3B-D/RH3B-LD


## RH2B-UT



RH3B-UT


## Dimensions con't (mm)

## RH1V2-U/RH1V2-UD



RH2V2-U/RH2V2-UL/RH2V2-UD


RH3V2-U/RH3V2-UL/RH3V2-D


RH4V2-U/RH4V2-UL/RH4V2-UD



SH3B-05


Terminal Arrangement


SH4B-05


## Dimensions con't (mm)

\section*{Finger-safe DIN Rail Mount Sockets

\section*{SH1B-05C

## SH1B-05C <br> SH2B-05C

SH3B-05C


SH4B-05C



SH2B-51


SH4B-51


## Dimensions con't (mm)

## PCB Mount Sockets

## SH1B-62



SH3B-62


SH4B-62


SH2B-62


## MTR Level Relay



## The MTR level relay has proven itself to be simple and extremely reliable in pump stations everywhere. The MTR controls one pump or one alarm. The MTRA controls one pump and one alarm.

- Safe

The extra low sensing voltage ensures maintenance staff and operators are protected at all times.

- Four sensitivities

Allows the relay to operate effectively in a wide range of conductive liquids.

- Activation delays

Each output can have a different time delay to overcome wave action and turbulence.

- LED indication

High intensity LED indicators ensure clear signals. Power On (green). Alarm On (red). Pump On (yellow).

- Dipswitch programmable

All settings are easily selectable from the front panel.

- Proven reliability

The proven design and performance of the relay ensures long-term reliability of the MultiTrode system.

- I.S application

Perfect for I.S application when used with an MTISB.

- Unique two-sensor operation (MTRA only)

Pump and alarm can be controlled using two or three sensors. Two-sensor operation is ideal for budget applications or where space is limited.

- DIN rail or screw mounting
- Low installed cost


## Specifications

Mode of operation:

MTR Mode MTRA Mode

Charge/Discharge (Fill or Empty) Discharge ONLY

Probe Inputs: Sensor inputs Sensor voltage Sensor current Sensitivity

MTR : 2 / MTRA : 3 10/12VAC Nominal 0.8 mA max. (per sensor) 1k, 4k, 20k, 80k

Relay Outputs:

| MTR relay output | 2 contact sets :1 N/O \& $1 \mathrm{C} / \mathrm{O}$ |
| :--- | :--- |
| MTR Output delay | $0,2.5,5,10,20,40,80,160 \mathrm{sec}$ |
|  |  |
| MTRA relay output | 2 relays : both N/O |
| MTRA Output delay | Pump: $0.5,10 ;$ Alarm: $0.5,15 \mathrm{sec}$ |
|  |  |
| Relay contact rating | 250 VAC |
|  | 5 R Resistive, 2A Inductive |
| Relay contact life | $10^{5}$ Operations <br> Terminal size |
| $2 \times 13$ AWG $/ 2.5 \mathrm{~mm}^{2}$ |  |

Terminal size

| Display |  |  |  |
| :---: | :--- | :--- | :--- |
| LEDs: | Power On | Pump | Alarm |
| MTR | Green | Red |  |
| MTRA | Green | Yellow | Red |

Physical Product:
Dimensions
Mounting
Enclosure
2.7/8H x 1.3/4W x 4.1/2D (Inches) $72 \mathrm{Hx} 45 \mathrm{~W} x 114 \mathrm{D}$ (mm)
DIN Rail or 2 x \#6 Screws / $2 \times \mathrm{M} 4$ Screws Makrolon (self-extinguishing)


## Power Supply:

| Supply Voltage AC | $24,110,240,415 \mathrm{VAC}^{*}-50 / 60 \mathrm{~Hz}$ |
| :--- | :--- |
| Power Consumption | 3.5 Watts max |
| Supply Voltage DC | 12 or 24 VDC, |
| Power Consumption only) | 3 Watts max |


| Environmental Range:   <br> Centigrade <br> Fahrenheit $-10^{\circ}$ to $+60^{\circ} \mathrm{C}$  <br>  $+14^{\circ}$ to $+140^{\circ} \mathrm{F}$ N1653 |  |  |
| :--- | :--- | :--- | :--- |

Available Models \& Ordering Information

| 415VAC | MTR-1 | n/a |
| :--- | :--- | :--- |
| 240VAC | MTR-2 | MTRA-2 |
| 110VAC | MTR-3 | MTRA-3 |
| 24VAC | MTR-4 | MTRA-4 |
| 24VDC | MTR-5 | MTRA-5 |
| 12VDC | MTR-6 | MTRA-6 |

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## 1 Introduction

The MultiTrode level control relay is a solid-state electronic module in a hi-impact plastic case with a DIN rail attachment on the back, making a snap-on-snap-off installation. Any number of relays can be easily added to the DIN metal rail then wired together to form a complex pumping system that other wise may have to be controlled and operated by a programmed PLC.
The relay is normally matched with the MultiTrode probe which works in conjunction with the relay and uses the conductivity of the liquid to complete an electrical circuit.

## 2 Electrical Overview



There are 10 screw terminals on the unit. Facing the relay as shown, we look at the bottom terminals (left to right):

- Lo - (Charge mode). This is the point when the probe is dry the relay will turn on.
- Lo - (Discharge mode). This is the point when the probe in the tank is dry the relay will turn off.
- $\mathrm{Hi}-$ (Charge mode). This is the point when the probe in the tank is wet a relay will turn off
- Hi - (Discharge mode). This is the point when the probe in the tank is wet a relay will turn on.
- C - is common earth. All earth bonding must be terminated here for correct operation.
- "L" is "live" (240V AC)
- " $N$ " is "neutral" (240V AC)

If the tank is plastic, or if you are conducting tests in a plastic bucket, or the vessel has no earth point inside, you must install an earth rod within the tank, vessel or bucket and make sure that it is bonded back to $C$ on the relay unit.

## 3 DIP Switches

### 3.1 DIP Switches

(See Wiring Diagram for full program functions.)

### 3.1.1 DIP 1 \& 2

DIP 1 and 2 control the Sensitivity, in other words the cleaner the liquid the higher the sensitivity setting must be. Concentrated acids, minerals are by their own chemical composition highly conductive, so a low level of sensitivity is required, purified water is almost an insulator against electrical current flow so a higher sensitivity inside the relay is required.

### 3.1.2 DIP 3, 4 \& 5

DIP switches 3,4 and 5 , control delay on activation. For example, in discharge mode with DIP switches 3,4 and 5 set to 10 seconds, when the Hi point becomes wet it will activate the motor and it will take 10 seconds of continual coverage of the probe sensor to make the relay close and start the pump. This is invaluable when the probe is in a turbulent part of a well where fluid is splashing around touching the sensors momentarily, and false activation cannot be tolerated.

### 3.1.3 DIP 6

DIP switch 6 controls the charge/discharge function. Set "ON" for charge, and "OFF" for discharge

### 3.2 Relay Contacts \& their Applications

### 3.2.1 Contacts 15,16 \& 18

Contacts 15,16 , and 18 are used for electronic or visual notification of a change in state at the pump itself. Contacts 15,16 , and 18 are used for more advanced applications because they are a changeover relay, their state may be the same as contacts 25,28 or the opposite. Both sets of contactors are triggered simultaneously. An example is when in discharge mode, (see Figure 1).

You have a gravity flow coming in so the fluid reaches the lower sensor PB1, contacts 15 and 18 are open (15 being common to both contact 16 and 18) contacts 25 and 28 are also normally open but contacts 1516 in this current situation are closed, whether PB1 is wet or dry is of no concern all will stay the same. The level now rises to PB2 and both relays change state, contacts 25 and 28 close to turn on the pump, contacts 15 and 16 are open, with 15 and 18 closed.
In advanced applications this state change may be fed into a logic device to indicate the pump is running or the pump has stopped and perhaps light an LED or incandescent light source for visual confirmation that a change has occurred in the relay.

### 3.2.2 Contacts 25 \& 28

Contacts 25 and 28 are used to control pump states. Contacts 25 and 28 are mostly used for turning on motors via a starting relay or solenoid, so, these sets of contacts react to the rising or falling levels of the fluid inside the tank, they will operate to turn on a pump in discharge mode when the top sensor is wet and in charge mode turn on the pump when the bottom sensor is dry.

## 4 Practical Overview

### 4.1 Discharge Mode - DIP switch 6 set to "OFF"



Figure 1 - Discharge Mode
Figure 1 shows two probes, (PB1 connected to Lo and PB2 connected to Hi ). The pit is mostly underground and there is a gravity-fed inlet at the top left-hand side. The pit is empty with PB1 completely dry. Dipswitch 6 is set to "OFF."


The relay operation depends on the electrical conductivity of liquid in the pit, i.e. no liquid = no current flow. The level starts to rise and covers PB1.

This is a discharge operation so we do not want the relay to close and start a pump until the well is full so as the water rises it reaches PB2, the relay closes and the pump starts. The level now drops below PB2 but the pump still continues to run, the level continues to drop below PB1 the relay opens the pump stops.

### 4.2 Charge Mode - DIP switch 6 set to "On"



Figure 2 - Charge Mode
Note: "C" is connected to common bonded earth. The unit will not operate correctly if not earthed.
Let's look at the same relay but in a tank that is charging (DIP 6 is now on). See Figure 3, where liquid is being pumped into a tank, and discharging through a gravity feed, the tank is on steel stands " $x$ " metres above the ground.


With the tank full, PB1 and PB2 will be wet, the relay is off, and the pump has stopped. Water is slowly fed out from the bottom, and now as PB2 (HI) becomes dry nothing happens; the water now drops to below PB1 (Lo), and the pumps restarts to fill the tank.

The pump will continue to fill the tank until PB2 (HI), becomes wet again.

### 4.3 MTRA Relay with Alarm (Discharge Applications Only)



Figure 3 - MTRA Operation

The MTRA relay works in the same way as the MTR relay except the MTRA has a separate alarm output, and does not have a charge mode. The planned application is to close a contact to illuminate a warning alarm light. . Various other applications have included introducing a third probe to latch another relay.

In Figure 2 we see three probes in a pit that is plastic, note the steel rod in the tank. (In a plastic vessel a steel rod must be used to create an earth return in the liquid so probes can function.) PB1, PB2, and PB3 are dry, and the relay power LED is on. When water enters the pit and wets PB1, nothing happens, water now reaches PB2 causing contacts 13 and 14 to close, the pump LED to light, and the water to drop.

If, for example, the pump has its inlet partially blocked, the level continues to rise and wets PB3. This closes a separate relay that can activate a red flashing light, an audible fog horn or send a 5 volt pulse into another device with the common cause to warn human beings that a spill is due to occur. If the pumps become unclogged and PB3 becomes dry the alarm opens again and breaks the circuit that stops the light from flashing or the foghorn from sounding.

## 5 Most Common Installation Problems

The relay requires a path between the probes to earth through the liquid. If you are testing in a plastic bucket, have installed the probe in a plastic tank or have no good earthing in the vessel you will need to install a separate earth and make sure all earth bonding comes back to the $C$ terminal. Most problems like these are traced back to a lack of or poor earthing, or open circuits in the probe wiring.
Now is the time to check the relay by using "the bridge testing line technique" remember you must simulate a fluid flow to correctly ascertain a good relay or a bad one. (All DIPswitch settings from 1 to 6 should be off.)

Cut two pieces of insulated flexible copper wire one black one red 250 mm long, strip both ends back 10 mm on both cables, and join one black end and one red end. Insert the joined ends into C on the relay box, observing all safe electrical practises. You should have one black wire and one red wire free.

Set your relay for discharge mode (DIP switch 6 is off) with no sensors connected to the unit, connect the red wire to Lo - nothing should happen (if it does return the relay for replacement or repair*). Now connect the black wire to the Hi terminal the relay activated LED should light instantly (if it does not, the relay should be returned for repair*).

## 6 Troubleshooting

| I have checked all the DIPswitches and settings but in discharge mode as soon as the bottom sensor gets wet the pump turns on then turns off almost straight away. | This is the most common problem encountered with relay set up and commissioning, the probe in the bottom of the tank is wired into the Hi terminal instead of the Lo terminal. |
| :---: | :---: |
| The installation went fine but now and again the pump will not turn on even though I am sure the probe is wet. | - Check the sensitivity level set on the relay, some times the level is set for foul water but due to changes in the flow the water becomes grey or clear, try changing the setting from $20 \mathrm{~K} \Omega$ to $80 \mathrm{~K} \Omega$ and monitor the results carefully. |
| All wiring is complete and all DIPswitches have been checked but the pump will not turn on at all. | If you have completed the test schedule for the relay and it passed then check the wiring to the sensors - for this is now where the problem lies or in the earthing arrangements. If possible check the resistance between the sensor cable and the steel sensor on the probe to prove a solid connection. |

* Please contact your distributor or agent before returning any product for repair or warranty claim.

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# Electronic Tüniing Relays with Adjustiabble Modes 

## RZ7 Standard, Economy and EX

## Full Featured Functionality

\author{
Easy to Use DIN Rail or Panel \& Install

Mountable
}

## Hazardous Location Models

## Multiple Voltage Ranges

Standard supply voltage ranges from 24...48V DC \& 24...240V AC.

## Functional Choices

Single, Multi- or Special Function models address most industrial timing needs.

## Adjustable Timing Ranges from 0.5 s up to 60 hours

Adjustment dial for 0 to $100 \%$ of timing adjustment range on both models means less inventory to stock.

## LED Output indicator

Both FS and FE models have LED indicators for output status conditions.

## Multiple Mounting Options

The RZ7 are surface or DIN-Rail mountable for easy installation.

## Special Hazardous Location Models Available

The RZ7-FS_EX models are approved for use in hazardous location areas such as in the oil \& gas industries.

- UL Class 1, Div. 2, Groups A,B,C,D UL Class 1, Zn 2, Group IIC
- Ex II 3 G, EEx nL IIC T4 2A 32VDC max. Ta $70^{\circ} \mathrm{C}$
- cULus E317176


## RZ7-FS High-Performance Model



RZ7-FE Economy Model

## Solid State Accuracy \& Reliability

Solid state electronics and microprocessor control means accuracy within $0.2 \%$ for FS, and $0.1 \%$ for FE models.

## One Tool Installation

Same size screw driver installs and adjusts functions and timing ranges. No need for multiple tools.

## Safety \& Convenience Features

- IP40 finger \& hand protection
- Open, captive terminals for fast connections
- All functions accessible from front of unit
- Open screw terminals with dual chamber system for control wires


## Standard Model Approvals

- CULuS E14840
- CE Marked


## RZ7 Adjustable Electronic timing Relays

## QUICK SELECTION GUIDE



## Functional, Reliable Timing Relays

Sprecher + Schuh's RZ7 Series of electronic timing rela
Ititude popular output functions in a versatile, compact package. This series is especially designed for applications where a high quality timing rela
lude ON-delay, OFF-delay, Wye-Delta and many other choices. All models are easily installed and adjusted for set and forget it usability.

## Contact your local Sprecher + Schuh representative for more details.

## RZ7-FS

Electronic
Timing
Relays

## Precision DIN-rail mounted timing relays for any industrial application



The new multifunction RZ7-FSM Electronic Timing Relay provides eight different timing functions and ten different timing ranges.

Sprecher + Schuh's new RZ7-FS precision electronic timing rela 19 different output functions applicable to all types of industrial control. In addition to standard ON-Delay and OFF-Delay relays, the series also includes many specials such as an OFFDelay that operates without supply voltage. Various timing ranges from 0.05 seconds to 60 hours are available, with many relays offering multi-time setting capability in the same device.

## Solid state accuracy and reliability

Except for their hard silver contacts, all RZ7-FS timing relays are built with solid state electronics and controlled by a microprocessor. They are accurate to within 0.2 percent. Their ruggedness and high level of accuracy is due to the thorough testing of function, timing characteristics and surge voltage strength performed on each device prior to shipment.
In addition, RZ7-FS relays function reliably from $15 \%$ under rated operating voltage to $10 \%$ over rated voltage (AC). Voltage tolerance is even greater in DC applications.

## Eliminates additional relays

The standard RZ7-FS is supplied with one single pole double throw (SPDT) contact within a compact case only 22.5 mm wide. If more contacts are required, several relays are available that provide two separate, electrically isolated SPDT contacts within the same narrow footprint. Output two is selectable as an instantaneous contact, which can eliminate the need for auxiliary rela lex installations. These two pole relays can also be used with an external potentiometer for remote time setting.


## Multiple functions and timing ranges in one relay

The RZ7-FSM combines eight separate timing functions (plus ON and OFF functions) into one device. In addition, ten timing ranges are individually selectable from 0.05 seconds to 60 hours. These special relays reduce inventories and are ideal for maintaining remote installations where stocking several different timing relays would not be practical.

## Many safety and convenience features

- Every RZ7 accepts a broad range of AC and DC supply voltages without special ordering.
- Each relay is equipped with an LED that indicates four output status conditions.
- Finger and back of hand protection to IP40.
- Terminals are captive and supplied in the open position.
- All R

> ly of CA7/CS7 or CA4/CS4 devices.

- RZ7 relays can be mounted in any plane.
- Terminals, setting knob and LED's are all accessible from the front of the unit.
- RZ7 Timing Relays are very compact, measuring approximately 1" x 3 " x 4 ".
- Hazardous location timing relays also available.

Quick Selection Guide

| Single Function Timing Relays |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| RZ7-FS | A | 3 | A | U23 |
| Type | Function <br> A On-Delay <br> B Off-Delay <br> C On and Off-Delay <br> D One Shot / Watchdog <br> E Fleeting Off-Delay <br> F Symmetric flasher starting with a pulse <br> G Symmetric flasher starting with a pause <br> On-Delay pulse generator <br> On-Delay (pulse controlled) <br> K One Shot / Watch Dog (pulse controlled) <br> L Impulse Converter | Contacts <br> All functions: <br> 3 One single pole double throw contact <br> Functions A \& B only: <br> 4 Two single pole double throw contacts 2 (Available with Time Range " $U$ " only. Not available with "U18 supply voltage) | Time Ranges <br> A 0.05... 1 second <br> B 0.15... 3 seconds <br> C $0.5 \ldots .10$ seconds <br> D 1.5... 30 seconds <br> E 0.05... 1 minute <br> F 0.15... 3 minutes <br> G 0.5... 10 minutes <br> H 1.5... 30 minutes <br> I 0.05... 1 hour <br> 0.15 ... 3 hours <br> K $0.5 \ldots 10$ hours <br> L $\quad 3.0 \ldots 60$ hours <br> U 0.05s... 60 hours $\mathbf{( 1}$ | Supply Voltages <br> Standard: <br> U23 24...48VDC <br> 24...240V 50/60Hz <br> Special Order: <br> U18* 24...240VAC or DC <br> A40 346...440V 50/60Hz 3 <br> Z12 12VDC <br> * Not available with Time Range "U" |
| RZ7-FS | Q | 3 | Q | U18 |
| Type | Function <br> Q Off-Delay Without Supply Voltage | Contacts <br> 3 One single pole double throw contact <br> 4 Two single pole double throw contacts $(2$ | Time Ranges <br> Q 0.15s... 10 minutes 0 | Supply Voltages U18 24...240VAC or DC |


| Multi-Function Timing Relay |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| RZ7-FS | M | 3 | U | U23 |
| Type | Function <br> M Multi-Function <br> Eight single functions plus ON \& OFF function (for installation/maintenance) <br> - On-Delay <br> - Off-Delay <br> - On and Off-Delay <br> - One Shot / Watchdog <br> - Fleeting Off-Delay <br> - Symmetric flasher starting with a pulse | Contacts <br> 3 One single pole double throw contact <br> 4 Two single pole double throw contacts 2 | Time Ranges <br> U 0.05... 60 hours $\mathbf{0}$ | Supply Voltages <br> Standard: <br> U23 24...48VDC <br> 24...240V 50/60Hz <br> Special Order: <br> U18 24...240VAC or DC <br> A40 346...440V 50/60Hz © <br> Z12 12VDC |

\begin{tabular}{|c|c|c|c|c|}
\hline \multicolumn{5}{|c|}{Special Function Timing Relays} \\
\hline R27-FS \& H \& 3 \& U \& U23 \\
\hline Type \& \begin{tabular}{l}
Function \\
H Repeat Cycle Timer (Flasher) Includes four separate functions \\
- Supply voltage controlled, output starts with a pause \\
- Supply voltage controlled, output starts with a pulse \\
- Pulse controlled, output starts with a pause \\
- Pulse controlled, output starts with a pulse
\end{tabular} \& \begin{tabular}{l}
Contacts \\
All functions: \\
3 One single pole double throw contact
\end{tabular} \& \begin{tabular}{l}
Time Ranges \\
For equal timing of pulse and pause \\
U 0.05s... 60 hours \(\mathbf{1}\) \\
For separate timing of pulse and pause \\
V \(2 \times 0.05 \mathrm{~s}\)... 60 hours

 \& 

Supply Voltages <br>
Standard: <br>
U23 24...48VDC <br>
24...240V 50/60Hz <br>
Special Order: <br>
A40 346...440V 50/60Hz 3 <br>
Z12 12VDC
\end{tabular} <br>

\hline R27-FS \& Y \& 2 \& C \& U23 <br>

\hline Type \& | Function |
| :--- |
| Y Wye Delta Timing Relay | \& | Contacts |
| :--- |
| 2 Two normally open contacts | \& |  | Time Ranges |
| :--- | :--- |
|  | C |
| O.5...10 seconds |  |
| D | $1.5 \ldots . \ldots 3$ seconds |
| E | $0.05 . .1$ minute |
| F | $0.15 . .3$ minutes |
| G | $0.5 \ldots 10$ minutes | \& | Supply Voltages |
| :--- |
| Standard: |
| U23 24...48VDC |
| 24... $240 \mathrm{~V} 50 / 60 \mathrm{~Hz}$ |
| Special Order: |
| A40 $346 \ldots 440 \mathrm{~V} 50 / 60 \mathrm{~Hz}$ (3 | <br>

\hline
\end{tabular}

(1) Multi-time setting range. See Technical Section for specific time settings.

Second output selectable as timed or instantaneous.
(3) Timers with supply voltage code A40 (346...440VAC) are not UL listed. RZ7-FSx4 models are not available with supply voltage code A40.

RZ7-FS Timing Relays - Single Function, One and Two Pole

| Functional Description | Functional Diagram | Terminal Arrangement | Type | Catalog Number | Price |
| :---: | :---: | :---: | :---: | :---: | :---: |
| ON-Delay Timing Relay (A) When supply voltage is applied, output contact(s) change state after time dela |  |  | - One SPDT contact <br> - Single timing range | RZ7-FSA3*U23 | 102 |
|  |  |  | - One SPDT contact <br> - Multi-timing range (from 0.05s to 60h) 4 | RZ7-FSA3UU23 | 107 |
|  |  |  | - Two SPDT contacts 2 <br> - Multi-timing range (from 0.05s to 60h) 4 | RZ7-FSA4UU23 | 141 |
| OFF-Delay Timing Relay (B) When control contact "S" closes, output contact(s) change state immediately. When control contact S opens, output contact(s) change state after time delay $t$. Constant supply voltage required on terminals A1/A2. <br> Note: Control pulse duration minimum 50ms (AC) - 30ms (DC). |  |  | - One SPDT contact <br> - Single timing range | RZ7-FSB3*U23 | 102 |
|  |  |  | - One SPDT contact <br> - Multi-timing range (from 0.05s to 60h) 4 | RZ7-FSB3UU23 | 107 |
|  |  |  | - Two SPDT contacts 2 <br> - Multi-timing range (from 0.05s to 60h) © | RZ7-FSB4UU23 | 141 |
| Off-Delay Without Supply Voltage (Q) 6 When supply voltage is applied, output contact(s) change state immediately. When supply voltage is removed, output contact(s) change state after time delay $t$. |  |  | - One SPDT contact <br> - Multi-timing range (from 0.15 s to 10 min$) \boldsymbol{\Theta}$ | RZ7-FSQ3QU18 | 203 |
|  |  |  | - Two SPDT contacts <br> - Multi-timing range (from 0.15 s to 10 min ) $\boldsymbol{\Theta}$ | RZ7-FSQ4QU18 | 237 |

## Supply Voltage

Single Function RZ7-FS...U23 timers (except RZ7-FSQ) accept supply voltages of $24 \ldots 48 \mathrm{VDC}$ and $24 \ldots 240 \mathrm{VAC}$ (RZ7-FSQ accepts $24 \ldots 240$ VAC or DC). Other voltages are available by special order. See Quick Selection Guide on page G37 for details or contact your Sprecher + Schuh representative for information.
(1) For timing control, a voltage other than the supply voltage can also be used.
(2) Output two is selectable as an instantaneous contact by sliding a switch on the faceplate.
3 Bridge or potentiometer $10 \mathrm{k} \Omega$, min. 0.25 W (low voltage) for external time setting.
(4) Timing range is screwdriver selectable from the faceplate. Timing range selections include those found in the Timing Range Code chart.
(6) Timing range is screwdriver selectable from the faceplate. Exact timing ranges can be found in the Technical Section.
(6) Due to shock during shipment, the state of the contacts should be verified before initial use. Electronic Timing Relays

## RZ7-FS Timing Relays - Single Function, One Pole

| Functional Description | Functional Diagram | Terminal Arrangement | Type | Catalog Number | Price |
| :---: | :---: | :---: | :---: | :---: | :---: |
| ON and OFF-Delay Timing Relay (C) When control contact "S" closes, output contact changes state after time dela When control contact $S$ opens, output contact changes state again after time delay $t$. Constant supply voltage required on terminals A1/A2. <br> Note: Closure duration of $S$ must be greater than $t$. |  |  | - One SPDT contact <br> - Single timing range | RZ7-FSC3*U23 | 114 |
| One Shot / Watchdog Relay (D) When supply voltage is applied, the output contact changes state for time period $t$. |  |  | - One SPDT contact <br> - Single timing range | RZ7-FSD3*U23 | 114 |
| Fleeting OFF-Delay Timing Relay (E) When control contact " S " is pulsed, output contact changes state for time period $t$. <br> Note: Control pulse duration minimum 50ms (AC) - 30ms (DC). |  |  | - One SPDT contact <br> - Single timing range | RZ7-FSE3*U23 | 114 |
| Symmetric Flasher Starting <br> With A Pulse (F) <br> When supply voltage is applied, output contact changes state immediately and then repeatedly changes after every time period $t_{\mathrm{t}}$ continuing until supply voltage is removed. |  |  | - One SPDT contact <br> - Single timing range | RZ7-FSF3*U23 | 114 |

## Supply Voltage

Single Function RZ7-FS...U23 timers accept supply voltages of $24 \ldots 48 \mathrm{VDC}$ and $24 \ldots 240 \mathrm{VAC}$. Other voltages are available by special order. See Quick Selection Guide on page G37 for details or contact your Sprecher + Schuh representative for information.

## Timing Range Codes

Replace (*) with Timing Range Code

| Timing Range | Code |
| :---: | :---: |
| $0.05 \ldots 1 \mathrm{sec}$ | $\mathbf{A}$ |
| $0.15 \ldots 3 \mathrm{sec}$ | $\mathbf{B}$ |
| $0.5 \ldots 10 \mathrm{sec}$ | $\mathbf{C}$ |
| $1.5 \ldots 30 \mathrm{sec}$ | $\mathbf{D}$ |
| $0.05 \ldots 1 \mathrm{~min}$ | $\mathbf{E}$ |
| $0.15 \ldots 3 \mathrm{~min}$ | $\mathbf{F}$ |
| $0.5 \ldots 10 \mathrm{~min}$ | $\mathbf{G}$ |
| $1.5 \ldots 30 \mathrm{~min}$ | $\mathbf{H}$ |
| $0.05 \ldots 1$ hour | I |
| $0.15 \ldots 3$ hour | $\mathbf{J}$ |
| $0.5 \ldots .10$ hour | $\mathbf{K}$ |
| $3.0 \ldots 60$ hour | $\mathbf{L}$ |



Technical Data
Timing Characteristics (according to VDE 0435, Part 2021)
Timing ranges for
RZ7-FSM-A, B, C, D, E, F: I, \& L
RZ7-FSH


| Pulse Control (B1) <br> Impulse duration | $\geq 50 \mathrm{~ms}$ (AC), $\geq 30 \mathrm{~ms}$ (DC) |
| :--- | :--- |
| Input voltage | Supply voltage range |
| Input current | 1 mA |
| Max. Leakage Current | 400 micro Amps |
| Cable length | max. $250 \mathrm{~mm}(800 \mathrm{ft}$.) without parallel load between |
|  | B1 \& A2 |
|  | max. 50 mm (160 ft.) with load (<3k 2 ) between |
| B1 \& A2 |  |


| Life expectancy (electrical) | 4 million ops. at $1 \mathrm{~A} / 250 \mathrm{VAC}, \cos \varphi=1$ <br> 0.2 million ops. at $6 \mathrm{~A} / 250 \mathrm{VAC}, \cos \varphi=1$ <br> 1.5 million ops. at $1 \mathrm{~A} / 250 \mathrm{VAC}, \cos \varphi=0.3$ <br> 0.3 million ops. at $3 \mathrm{~A} / 250 \mathrm{VAC}, \cos \varphi=0.3$ <br> 0.5 million ops. at $6 \mathrm{~A} / 24 \mathrm{VDC}$, resistive <br> 2 million ops. at $4 \mathrm{~A} / 24 \mathrm{VDC}$, resistive <br> 2 million ops. at 0.2A/230VDC, resistive <br> 1 million ops. at $0.4 \mathrm{~A} / 24 \mathrm{VDC}, \mathrm{L} / \mathrm{R}=20 \mathrm{~ms}$ <br> 1 million ops. at $0.2 \mathrm{~A} / 110 \mathrm{VDC}, \mathrm{L} / \mathrm{R}=20 \mathrm{~ms}$ <br> 1 million ops. at $0.1 \mathrm{~A} / 230 \mathrm{VDC}, \mathrm{L} / \mathrm{R}=20 \mathrm{~ms}$ <br> 30 million operations |
| :---: | :---: |
| General Data Insulation Characteristics | $2 \mathrm{kVAC} / 50 \mathrm{~Hz}$ test voltage according to VDE 0435 and 6 kV $1.2 / 50 \mu$ s surge voltage according to IEC 947-1 between all inputs and outputs |
| EMC/Interference Immunity | Performance of following requirements: <br> - Surge capacity of the supply voltage according to IEC1000-4-5: $4 \mathrm{kV} 1.2 / 50 \mu \mathrm{~s}$ <br> - Burst according to IEC 1000-4-4: 6 kV/ 6/50ns <br> - ESD discharge according to IEC 1000-4-2: <br> - Contact 8 kV, air 8 kV <br> - Electromagnetic HF field according to IEC 801-3 and conducted electromagnetic HF signal according to IEC 801-6: Level 3 |
| EMC/Emission | Electromagnetic fields according to EN 55 022: Class B |
| Safe isolation | According to VDE 106, part 101 |
| Climatic withstand | 56 cycles (24h) at $25 \ldots 40^{\circ} \mathrm{C}$ and $95 \%$ relative humidity according to IEC 68-2-30 and IEC 68-2-3. |
| Vibration resistance | 4 g in 3 axis at $10 \ldots 500 \mathrm{~Hz}$, test FC according to IEC 68-2-6 |
| Shock resistance | 50 g according to IEC 68-2-27 |
| Protection class |  |
| Weight | 100 g |
| Approvals/Standards | UL, C-UL up to 240VAC, CE |
| Ambient temperature | Open: $-25^{\circ} \mathrm{C} \ldots+60^{\circ} \mathrm{C}$ <br> Enclosed: $-25^{\circ} \mathrm{C} \ldots+45^{\circ} \mathrm{C}$ <br> Storage $-25^{\circ} \mathrm{C} \ldots+85^{\circ} \mathrm{C}$ |
| Connections Screw <br> terminal | M3.5 for Pozidrive No.2, Phillips and slotted screws No. 2 suitable for power screwdriver. |
| Rated tightening torque Wire Size - <br> Finger Protection - | 0.8 Nm (max. 1.2 Nm ) - [8.8 Ib-in] <br> Dual-chamber system for terminal cross-sections of $1 \times 0.5 \mathrm{~mm}^{2}$ (solid) or $2 \times 2.5 \mathrm{~mm}^{2}$ (flexible with sleeve), AWG 20... 14 . <br> According to VDE 0106 |
| Mounting Rela | - Snap-on mounting ( 35 mm DIN-rail) <br> - Side mounting on CA7contactors and CS7 with dovetail joint [surface mounting in any position] <br> - Screw fixing by Panel Mount Adapter and two screws (M4) [surface mounting in any position] |
| 1 | Synthetic material without dioxin according to EC/EFTA notification No. 93/0141/D. Electrical contacts contain cadmium. |
| Standards | EN 60947-1, EN 60947-5-1, EN 50081-1, IEC 947, UL 508. CSA 22.2 No. 14 |

## RZ7 Relative Scale Setting Knob

Series RZ7 Timing Rela le" setting knob numbered 0 to 1.0. Think about this as 0 to $100 \%$ of the rela 's built-in time range. Example: To set an RZ7-FS timing rela 1 minute range) to activate after 25 seconds:

1) Divide the desired activation time ( 25 seconds) by the maximum time limit of the rela

$$
5 \div 60=.416
$$

2) Rotate the setting knob to just past the 4 mark.


## Series RZ7-FS Timing Relays (one and two pole)

Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.


RZ7-FS (1 SPDT contact)


RZ7-FS (2 SPDT contacts)

Panel Mount Adaptor (26.506.221-01)


## CONTACTORS, OVERLOADS AND DOL STARTERS

Easy Selection Guide



Follow the " 3 Easy Steps" to select the right contactor for your application.

## STEP 1: Select Your Current Rating



Contactors are most commonly used in motor applications. Motor ratings are referred to as AC3 Motor Amps or Motor Full Load Current (page 6).

What is the Motor Full Load Current?
This rating can be obtained from the nameplate of the motor or from the motor manufacturer. When selecting a CA 7 contactor for the motor, be sure to refer to the column labelled as AC3 Motor Amps.
There may be occasions where only the motor size (in kW) is supplied. Please use the table below to estimate the AC3 Motor Amps rating.

| Typical ratings for 3-phase motor |  |
| :---: | :---: |
| Motor size (kW) | Approx. full load current @ $415 \mathbf{~ V}$ (AC 3 amps) |
| 0.06 | 0.3 |
| 0.09 | 0.4 |
| 0.12 | 0.5 |
| 0.18 | 0.6 |
| 0.25 | 0.8 |
| 0.37 | 1.1 |
| 0.55 | 1.5 |
| 0.75 | 1.8 |
| 1.1 | 2.6 |
| 1.5 | 3.4 |
| 2.2 | 4.8 |
| 3.7 | 7.6 |
| 4 | 8.2 |
| 5.5 | 11 |
| 7.5 | 14 |
| 11 | 21 |
| 15 | 28 |
| 18.5 | 34 |
| 22 |  |
| 30 |  |
| 37 |  |
| 45 |  |
| 55 |  |

While contactors are most commonly used in motor applications, they can also be used with resistive loads such as a water heater. The ratings of these loads are referred to as nominal current. These ratings are supplied by the manufacturer of the load. When selecting a CA 7 contactor for resistive loads, be sure to refer to the column labelled $A C 1$ amps (page 6).

## STEP 2: Select Your Coil Voltage

CA 7 contactors are most commonly supplied with a 240 V AC rated coil. However, they can be ordered complete with other coil voltages.
Coils are easily interchangeable for alternative coil voltages.
Select from 24, 110 and 415 V AC coils from the table labelled Spare Coils (page 7), and then follow the three easy steps to change from a standard 240 V AC coil to the alternative chosen.

Change your coil in three easy steps:


1. Place two "flat-head" screw drivers in position $1 \& 2$.

Unclip top half by pulling the clips back (away from the contactor).
2. Top half will spring off.

Pull old coil out, and place spare in position 3.
Ensure spring is in place to mount top half above the new coil 4.
3. Place the two screw drivers in positions $5 \& 6$.

Push clips back into their original position.
Top half is now securely mounted and contactor is ready for use.

## STEP 3: Select Auxiliary Contacts (Optional)



As an additional option, CA 7 contactors have auxiliary contacts.
CA 7-9 to CA 7-23 have either $1 \times \mathrm{N} / \mathrm{O}$ or $1 \times \mathrm{N} / \mathrm{C}$ auxiliary contact in-built.
CA 7-30 to CA 7-97 do not have in-built auxiliary contacts, therefore may require auxiliary contact blocks to be externally mounted.

These can be mounted on the top or side of the CA 7 contactors.
When selecting an auxiliary contact block, please refer to the Auxiliary Contacts Blocks Table (page 6). These can be supplied separately.



An Electrical fitter requires an AC contactor for a motor with full load current of 11 amps , a $230 \mathrm{~V} \mathrm{AC} \mathrm{rated} \mathrm{coil} \mathrm{and} 1 \times \mathrm{N} / \mathrm{C}$ contact.


The fitter also requires an AC contactor for a motor with Full Load Current of 40 amps , a 24 V AC rated coil and $2 \times \mathrm{N} / \mathrm{O}$ contacts.

|  | $\begin{gathered} \text { AC } 3 \\ \hline \text { Motor amps } \end{gathered}$ | $\begin{gathered} \text { AC } 3 \\ \hline \text { Motor size (kW) } \\ \hline \end{gathered}$ | AC 1 <br> Amps | Auxiliary contacts |  | Cat. No. ${ }^{1}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | N/O | N/C |  |
|  | 9 | 4 | 32 | 1 | 0 | CA7-9-10-240V-AC |
|  |  |  |  | 0 | 1 | CA7-9-01-240V-AC |
|  | 12 | 5.5 | 3 | 1 | 0 | CA7-12-10-240V-AC |
|  |  |  |  | 0 | 1 | CA7-12-01-240V-AC |
|  | 16 | 7.5 | 32 | 1 | 0 | CA7-16-10-240V-AC |
|  |  |  |  | 0 | 1 | CA7-16-01-240V-AC |
|  | 23 | 11 | 32 | 1 | 0 | CA7-23-10-240V-AC |
|  |  |  |  | 0 | 1 | CA7-23-01-240V-AC |
|  | 30 | 15 | 65 | 0 | 0 | CAT-30-00-240V-AC |
|  | 37 | 18.5 | 65 | 0 | 0 | CA7-37-00-240V-AC |
| Select $\qquad$ <br> contactor rated up to 43 amps | $\longrightarrow 43$ | 22 | 85 | 0 | 0 | CA7-43-00-240V-AC |
|  | 60 | 32 | 100 | 0 | 0 | CA7-60-00-240V-AC |
|  | 72 | 40 | 100 | 0 | 0 | CA7-72-00-240V-AC |
|  | 85 | 45 | 100 | 0 | 0 | CA7-85-00-240V-AC |
|  | 97 | 55 | 130 | 0 | 0 | CA7-97-00-240V-AC |


| Fit new $\qquad$ coil in contactor | Take 230 V AC coil out and select the following |  |  |
| :---: | :---: | :---: | :---: |
|  | Coils with alternative voltages for AC contactors | To suit | Cat. No. |
|  |  | CA7-9 to CA-16 | CAC7-16-24V-AC |
|  | 24VAC | CA7-23 to CA7-37 | CAC7-37-24V-AC |
|  | $\rightarrow \quad 24 \mathrm{VAC}$ | CA7-43 | CAC7-43-24V-AC |
|  |  | CA7-60 to CA7-85 | CAC7-85-24V-AC |
|  |  | CA7-97 | CAC7-97-24V-AC |
|  |  | CA7-9 to CA-16 | CAC7-16-110V-AC |
|  |  | CA7-23 to CA7-37 | CAC7-37-110V-AC |
|  | 110 VAC | CA7-43 | CAC7-43-110V-AC |
|  |  | CA7-60 to CA7-85 | CAC7-85-110V-AC |
|  |  | CA7-97 | CAC7-97-110V-AC |
|  |  | CA7-9 to CA-16 | CAC7-16-240V-AC |
|  |  | CA7-23 to CA7-37 | CAC7-37-240V-AC |
|  | 240 VAC | CA7-43 | CAC7-43-240V-AC |
|  |  | CA7-60 to CA7-85 | CAC7-85-240V-AC |
|  |  | CA7-97 | CAC7-97-240V-AC |
|  |  | CA7-9 to CA-16 | CAC7-16-415V-AC |
|  |  | CA7-23 to CA7-37 | CAC7-37-415V-AC |
|  | 415 V AC | CA7-43 | CAC7-43-415V-AC |
|  |  | CA7-60 to CA7-85 | CAC7--85415V-AC |
|  |  | CA7-97 | CAC7-97-415V-AC |



## CA 7 Contactors $4-45 \mathrm{~kW}$ with AC Coil



| AC 3 | AC 3 | AC 1 | Auxiliary contacts |  | Cat. No. ${ }^{1}$ ) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Motor amps | Motor size (kW) | Amps | N/O | N/C |  |
| 9 | 4 | 32 | 1 | 0 | CA 7-9-10-240V-AC |
|  |  |  | 0 | 1 | CA 7-9-01-240V-AC |
| 12 | 5.5 | 32 | 1 | 0 | CA 7-12-10-240V-AC |
|  |  |  | 0 | 1 | CA 7-12-01-240V-AC |
| 16 | 7.5 | 32 | 1 | 0 | CA 7-16-10-240V-AC |
|  |  |  | 0 | 1 | CA 7-16-01-240V-AC |
| 23 | 11 | 32 | 1 | 0 | CA 7-23-10-240V-AC |
|  |  |  | 0 | 1 | CA 7-23-01-240V-AC |
| 30 | 15 | 65 | 0 | 0 | CA 7-30-00-240V-AC |
| 37 | 18.5 | 65 | 0 | 0 | CA 7-37-00-240V-AC |
| 43 | 22 | 85 | 0 | 0 | CA 7-43-00-240V-AC |
| 60 | 32 | 100 | 0 | 0 | CA 7-60-00-240V-AC |
| 72 | 40 | 100 | 0 | 0 | CA 7-72-00-240V-AC |
| 85 | 45 | 100 | 0 | 0 | CA 7-85-00-240V-AC |
| 97 | 55 | 130 | 0 | 0 | CA 7-97-00-240V-AC |

${ }^{1}$ ) Contactors can be ordered complete with alternative coils.
Replace 240 with 24, 32, 110 \& 415.

## Auxiliary Contact Blocks (Top Mounting) ${ }^{2)}$

| No. of poles | Auxiliary contacts |  | Suit (A7 ${ }^{3}$ ) | Cat. No. |
| :---: | :---: | :---: | :---: | :---: |
|  | N/O | N/C |  |  |
| 2 | 1 | 1 | CA 7-9 to CA 7-23 | CA 7-PV-S11 |
| 2 | 1 | 1 | CA 7-30 to CA 7-97 | CA 7-PV-11 |
| 2 | 1 | 1 | All | CS 7-PV-11 |
| 4 | 2 | 2 | CA 7-9 to CA 7-23 | CA 7-PV-S22 |
| 4 | 2 | 2 | CA 7-30 to CA 7-97 | CA 7-PV-22 |
| 4 | 4 | 0 | All | CS 7-PV-40 |

One top-mount auxiliary per contactor only.
${ }^{3)}$ Recommendation only. All auxiliary contacts will fit any CA 7 contactor.

## Auxiliary Contact Blocks (Side Mounting) ${ }^{\text {4) }}$

| No. of poles | Auxiliary contacts |  | Cat. No. |
| :---: | :---: | :---: | :---: |
|  | N/O | N/C |  |
| 1 | 0 | 1 | CA -PA-10 |
| 1 | 1 | 0 | CA 7-PA-11 |
| 2 | 1 | 1 | CS 7-PA |
| 2 | 2 | 0 | CA 7-PA-20 |

[^5]Spare Coils

| Coil voltages | To suit | Cat. No. |
| :---: | :---: | :---: |
| 24 V AC | CA 7-9 to CA-16 | CA C7-16-24V-AC |
|  | CA 7-23 to CA 7-37 | CA C7-37-24V-AC |
|  | CA 7-43 | CA C7-43-24V-AC |
|  | CA 7-60 to CA 7-85 | CA C7-85-24V-AC |
|  | CA7-97 | CAC7-97-24V-AC |
| 110 V AC | CA 7-9 to CA -16 | CA C7-16-110V-AC |
|  | CA 7-23 to CA 7-37 | CA C7-37-110V-AC |
|  | CA 7-43 | CA C7-43-110V-AC |
|  | CA 7-60 to CA 7-85 | CA C7-85-110V-AC |
|  | CA7-97 | CAC7-97-110V-AC |
| 240 V AC | CA 7-9 to CA -16 | CA C7-16-240V-AC |
|  | CA 7-23 to CA 7-37 | CA C7-37-240V-AC |
|  | CA 7-43 | CA C7-43-240V-AC |
|  | CA 7-60 to CA 7-85 | CA C7-85-240V-AC |
|  | CA7-97 | CAC7-97-240V-AC |
| 415 V AC | CA 7-9 to CA-16 | CA C7-16-415V-AC |
|  | CA 7-23 to CA 7-37 | CA C7-37-415V-AC |
|  | CA 7-43 | CA C7-43-415V-AC |
|  | CA 7-60 to CA 7-85 | CA C7-85-415V-AC |
|  | CA7-97 | CAC7-97-415V-AC |

## CA 7 Contactors - Accessories \& Spares



| Function | Description | Cat. No. |
| :---: | :---: | :---: |
| pneumatic on-delay timer | time range |  |
|  | $0.3-30$ seconds | CZ E-7-30 |
|  | 1.8-180 seconds | CZ E-7-180 |
| pneumatic off-delay timer | Time range |  |
|  | $0.3-30$ seconds | CZA-7-30 |
|  | 1.8-180 seconds | CZA-7-180 |
| mechanical interlock | interlock only | CM7 |
|  | Interlock with $2 \times \mathrm{N} / \mathrm{C}$ | CM7-02 |
| electronic PLC interface ${ }^{1}$ ) | Digital input |  |
|  | 18-30V DC (10-15mA) | CRI-7E |

## Bi-Metal Thermal Overloads



## CT 7N

- Bi-Metal thermal overload for standard motors up to 95 kW
- Manual reset
- Standard trip class 10 overload curve
- Suitable for single phase and 3-phase applications.

To choose your Bi -Metal Thermal Overload, check the motor name plate for the full load current and match it to the "Motor Current Range (A)". Also ensure the overload selected suits the CA 7 contactor.

| Approx. motor size (kW) | Motor current range (A) | To suit contactor | Cat. No. |
| :---: | :---: | :---: | :---: |
| - | 0.1 to 0.16 | CA 7-9 to CA 7-23 | CT 7N-23-A16 |
| - | 0.16 to 0.25 | CA 7-9 to CA 7-23 | CT 7N-23-A25 |
| 0.06 or 0.09 | 0.25 to 0.40 | CA 7-9 to CA 7-23 | CT 7N-23-A40 |
| 0.09 or 0.12 | 0.35 to 0.50 | CA 7-9 to CA 7-23 | CT 7N-23-A50 |
| 0.18 | 0.45 to 0.63 | CA 7-9 to CA 7-23 | CT 7N-23-A63 |
| 0.18 or 0.25 | 0.55 to 0.80 | CA 7-9 to CA 7-23 | CT 7N-23-A80 |
| 0.25 | 0.75 to 1.0 | CA 7-9 to CA 7-23 | CT 7N-23-B10 |
| 0.37 | 0.9 to 1.3 | CA 7-9 to CA 7-23 | CT 7N-23-B13 |
| 0.55 | 1.1 to 1.6 | CA 7-9 to CA 7-23 | CT 7N-23-B16 |
| 0.55 or 0.75 | 1.4 to 2.0 | CA 7-9 to CA 7-23 | CT 7N-23-B20 |
| 0.72 or 1.1 | 1.8 to 2.5 | CA 7-9 to CA 7-23 | CT 7N-23-B25 |
| 1.1 | 2.3 to 3.2 | CA 7-9 to CA 7-23 | CT 7N-23-B32 |
| 1.5 | 2.9 to 4.0 | CA 7-9 to CA 7-23 | CT 7N-23-B40 |
| 2.2 | 3.5 to 4.8 | CA 7-9 to CA 7-23 | CT 7N-23-B48 |
| 2.2 | 4.5 to 6.3 | CA 7-9 to CA 7-23 | CT 7N-23-B63 |
| - | 5.5 to 7.5 | CA 7-9 to CA 7-23 | CT 7N-23-B75 |
| 3.7 | 7.2 to 10 | CA 7-9 to CA 7-23 | CT 7N-23-C10 |
| 5.5 | 9 to 12.5 | CA 7-12 to CA 7-23 | CT 7N-23-C12 |
| 5.5 | 11.3 to 16 | CA 7-16 to CA 7-23 | CT 7N-23-C16 |
| 7.5 | 15 to 20 | CA 7-16 to CA 7-23 | CT 7N-23-C20 |
| - | 17.5 to 21.5 | CA 7-16 to CA 7-23 | CT 7N-23-C21 |
| 11 | 21 to 25 | CA 7-16 to CA 7-23 | CT 7N-23-C25 |
| 7.5 | 15 to 20 | CA 7-30 to CA 7-37 | CT 7N-37-C20 |
| 11 | 17.5 to 21.5 | CA 7-30 to CA 7-37 | CT 7N-37-C21 |
| 11 | 21 to 25 | CA 7-30 to CA 7-37 | CT 7N-37-C25 |
| 15 | 24.5 to 30 | CA 7-30 to CA 7-37 | CT 7N-37-C30 |
| 18.5 | 29 to 36 | CA 7-30 to CA 7-37 | CT 7N-37-C36 |
| 18.5 | 33 to 38 | CA 7-30 to CA 7-37 | CT 7N-37-C38 |
| 11 | 17 to 25 | CA 7-43 | CT 7N-43-C25 |
| 15 or 18.5 | 24.5 to 36 | CA 7-43 | CT 7N-43-C36 |
| 18.5 or 22 | 35 to 47 | CA 7-43 | CT 7N-43-C47 |
| 18.5 or 22 | 35 to 47 | CA 7-60 to CA 7-97 | CT 7N-85-C47 |
| 30 | 45 to 60 | CA 7-60 to CA 7-97 | CT 7N-85-C60 |
| 37 | 58 to 75 | CA 7-60 to CA 7-97 | CT 7N-85-C75 |
| 45 | 72 to 90 | CA 7-60 to CA 7-97 | CT 7N-85-C90 |



## Electronic Overloads for 3-Phase motors

## CEP 7-ED

- Standard overload for motors up to 15 kW
- Also suits CAT 7N DOL starters
- Reduced power consumption and heat output
- Manual reset button
- Reduces stock levels due to wide current range
- Trip class 10 overload curve for standard motors.

| Approx. motor kW range | Motor current <br> range $(A)$ | To suit contactor | Cat. No. |
| :---: | :---: | :---: | :---: |
| 0.02 to 0.12 | 0.1 to 0.5 | CA 7-9 to CA 7-23 | CEP7-ED1AB |
| 0.06 to 0.25 | 0.2 to 1 | CA 7-9 to CA 7-23 | CEP7-ED1BB |
| 0.25 to 2.2 | 1 to 5 | CA 7-9 to CA 7-23 | CEP7-ED1CB |
| 1.5 to 7.5 | 3.2 to 16 | CA 7-9 to CA 7-23 | CEP7-ED1DB |
| 2.2 to 15 | 5.4 to 27 | CA 7-9 to CA 7-23 | CEP7-ED1EB |

## Electronic Overloads for 3-Phase Motors

## CEP 7-EE

- Enhanced overload for motors up to 45 kW
- Accepts side mount modules
- Reduced power consumption and heat output
- Ideal for motors with longer run up times
- Automatic \& manual reset button
- Adjustable trip classes - 10, 15, 20, 30 (dip switches).

| Approx. motor <br> kW range ${ }^{1}$ ) | Motor current <br> range $(A)$ | To suit contactor | Cat. No. |
| :---: | :---: | :---: | :---: |
| 0.02 to 0.12 | 0.1 to 0.5 | CA 7-9 to CA 7-23 | CEP7-EEAB |
| 0.06 to 0.25 | 0.2 to 1 | CA 7-9 to CA 7-23 | CEP7-EEBB |
| 0.25 to 2.2 | 1 to 5 | CA 7-9 to CA 7-23 | CEP7-EECB |
| 1.5 to 7.5 | 3.2 to 16 | CA 7-9 to CA 7-23 | CEP7-EEDB |
| 2.2 to 15 | 5.4 to 27 | CA 7-9 to CA 7-23 | CEP7-EEEB |
| 2.2 to 15 | 5.4 to 27 | CA 7-30 to CA 7-43 | CEP7-EEED |
| 4 to 22 | 9 to 45 | CA 7-30 to CA 7-43 | CEP7-EEFD |
| 11 to 45 | 18 to 90 | CA 7-60 to CA 7-97 | CEP7-EEGE |
| 22 to 55 | 60 to 120 | CA 7-30 to CA 7-97 | CEP7-EEVE |

${ }^{1)}$ Refer to NHP Part A for higher kW ratings.

## Overload Accessories

| Function | Description | To suit overload | Cat. No. |
| :---: | :---: | :---: | :---: |
| Remote reset module | For remote reset after an <br> overload trip | CT 7N Range | CMR7N240VAC 1) |
| Remote reset module | For remote reset after an <br> overload trip | CEP 7-EE Range | CEP7-ERR |

1) Change control voltage to Cat. no., when ordering $24,110 \mathrm{AC}$ or $24,48 \mathrm{DC}$.


## 1. Select Enclosure Type with CA 7 Contactor

To choose your bi-metal thermal overload, check the motor name plate for the full load current and match it to the "motor current range (A)". Also ensure the overload selected suits the CA 7 contactor.

| Approx. motor kW range | Contactor type | DOL setting range | Cat. No. ${ }^{1}$ ) |
| :---: | :---: | :---: | :---: |
| Insulated enclosure with green start and red stop button |  |  |  |
| 5.5 | CA 7-12 | 0.1 to 16 | CAT7N-5.5P-240-V-AC |
| 7.5 | CA 7-16 | 3.2 to 17.5 | CAT7N-7.5P-240V-AC |
| Insulated enclosure with blue reset button only |  |  |  |
| 5.5 | CA 7-12 | 0.1 to 16 | CAT7N-5.5R-240-V-AC |
| 7.5 | CA 7-16 | 3.2 to 17.5 | CAT7N-7.5R-240V-AC |
| Insulated enclosure with green start and red mushroom stop button |  |  |  |
| 5.5 | CA 7-12 | 0.1 to 16 | CAT7N-5.5PM-240-V-AC |
| ${ }^{1}$ ) For 3-phase voltage, a | in place of 240. |  |  |

## 2A. Select Electronic Overload to Suit

For more flexibility (large kW ranges) select electronic overload.


| Approx. motor kW range | Motor current range $(\mathbf{A})$ | Cat. No. |
| :---: | :---: | :---: |
| 0.02 to 0.12 | 0.1 to 0.5 | CEP7-ED1AB |
| 0.06 to 0.25 | 0.2 to 1 | CEP7-ED1BB |
| 0.25 to 2.2 | 1 to 5 | CEP7-ED1CB |
| 1.5 to 7.5 | 3.2 to 16 | CEP7-ED1DB |
| 2.2 to 15 | 5.4 to 27 | CEP7-ED1EB |

## 2B. Select Thermal Bi-Metal Overload

For typical motor applications with standard motor size select Thermal Bi-Metal Overload.

| Approx. motor $k W$ range | Motor current range $(A)$ | Cat. No. |
| :---: | :---: | :---: |
| - | 0.1 to 0.16 | CT7N-23-A16 |
| - | 0.16 to 0.25 | CT7N-23-A25 |
| - | 0.25 to 0.40 | CT7N-23-A40 |
| 0.13 to 0.18 | 0.35 to 0.50 | CT7N-23-A50 |
| 0.15 to 0.25 | 0.45 to 0.63 | CT7N-23-A63 |
| 0.23 to 0.34 | 0.55 to 0.80 | CT7N-23-A80 |
| 0.3 to 0.48 | 0.75 to 1.0 | CT7N-23-B10 |
| 0.38 to 0.65 | 0.9 to 1.3 | CT7N-23-B13 |
| 0.52 to 0.8 | 1.1 to 1.6 | CT7N-23-B16 |
| 0.72 to 1.1 | 1.4 to 2.0 | CT7N-23-B20 |
| 1 to 1.4 | 1.8 to 2.5 | CT7N-23-B25 |
| 1.3 to 1.7 | 2.3 to 3.2 | CT7N-23-B32 |
| 1.6 to 2.2 | 2.9 to 4.0 | CT7N-23-B40 |
| 2 to 2.8 | 3.5 to 4.8 | CT7N-23-B48 |
| 2.5 to 3.5 | 4.5 to 6.3 | CT7N-23-B63 |
| 3.3 to 5 | 5.5 to 7.5 | CT7N-23-B75 |
| 4.3 to 6 | 7.2 to 10 | CT7N-23-C10 |
| 5.2 to 8 | 9 to 12.5 | CT7N-23-C12 |

## EASY SELECTION GUIDE:

## Sprecher + Schuh Rating Chart and Sprecher Wheel

NHP have developed a brochure and a ratings chart to ensure your industrial control needs are met promptly and effortlessly.


Ratings Chart includes:

- Clear pictures of entire Sprecher + Schuh contactor range
- Easy look-up table for overloads matching corresponding contactor chosen
- Complete ratings (current \& motor starter ratings, capacitor switching and mechanical, electrical and coil data)
- Keep the chart handy to make your selection process quick and easy.


## Sprecher Wheel:

- Product selection guide for three phase motor control and protection
- Follow the simple instructions on the front of the wheel and notice how easy it is to use
- Put it in your toolbox and take it where ever you go.


## CONTACTOR SELECT IPHONE APP

If you like the Sprecher Wheel, make sure you download the NHP iPhone App called 'Contactor Select' which is the digital version with added bonuses such as 'one click' ordering and service support.
NOW AVAILABLE ON THE ITUNES APP STORE NOW OR AT NHP.COM.AU.


| AUSTRALIA | NEW SOUTH WALES | QUEENSLAND | NEW ZEALAND |
| :---: | :---: | :---: | :---: |
| nhp.com.au | Sydney <br> 30-34 Day Street North | Brisbane <br> 16 Riverview Place | nhp-nz.com |
| 1300 NHP NHP | Silverwater <br> NSW 2128 | Murarrie <br> QLD 4172 | 0800 NHP NHP |
| VICTORIA | Tel +61 297483444 | Tel +61 739094999 | PO Box 62-009 Mount Wellington |
|  | Newcastle | Townsville | Auckland 1641 |
| 43-67 River Street | 575 Maitland Road | 5 Leyland Street | New Zealand |
| Richmond | Mayfield West | Garbutt |  |
| VIC 3121 | NSW 2304 | QLD 4814 | Auckland |
| Tel +61 394292999 | Tel +61 249602220 | Tel +6174779 0700 | 7 Lockhart Place |
| Laverton | Campbelltown | Rockhampton | $\text { Tel +64 } 800695364$ |
| William Angliss Drive | 2/8 Rose Street Campbelltown | 14 Robison Street QLD 4701 | Napier |
| Laverton North | NSW 2560 | Tel +61 749272277 | 126 Taradale Rd |
| VIC 3026 <br> Tel +61 393682901 | Tel +61246204311 | Toowoomba | Onekawa 4110 <br> Tel +64 800695364 |
| Albury / Wodonga | ACT | Struan Court | New Plymouth |
| 847 Ramsden Drive | Canberra | QLD 4350 | 2 Dean Place |
| Albury NSW 2640 | 1/187 Gladstone Street Fyshwick | Tel +61746344799 | Waiwhakaiho 4312 <br> Tel +64800695364 |
| Tel +61 260490600 | ACT 2609 | Cairns <br> 2/1 Bramp Close | Wellington |
| Dandenong | Tel +61 262809888 | Portsmith | 52 Victoria Street |
| 40-42 Cyber Loop Dandenong South | WESTERN AUSTRALIA | $\begin{aligned} & \text { QLD } 4870 \\ & \text { Tel }+61740356888 \end{aligned}$ | Lower Hutt 5010 <br> Tel +64 800695364 |
| VIC 3175 <br> Tel +61387736400 | Perth <br> 38 Belmont Ave <br> Rivervale | SOUTH AUSTRALIA | Christchurch 85 Gasson Street |
| TASMANIA | WA 6103 <br> Tel +61 892771777 | Adelaide <br> 36-38 Croydon Road | Sydenham 8023 <br> Tel +64 800695364 |
| Hobart |  | Keswick |  |
| 2/65 Albert Street | NORTHERN | SA 5035 |  |
| Moonah | TERRITORY | Tel +61882979055 |  |
| $\text { Tel +61 } 362289575$ | Darwin <br> 3 Steele Street |  |  |
| Launceston <br> 3/13-17 Merino Street <br> Kings Meadows <br> TAS 7249 <br> Tel +61363452600 | Winnellie <br> NT 0820 <br> Tel +61 889472666 |  |  |
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 LIVING ELECTRICAL
clipsal.com

## THE 2000 SERIES



Clipsal 2000 Series Switches, Sockets and Accessories have celebrated more than a decade of innovative design and performance.

In fact, the contemporary styling and flexibility of the 2000 Series have made it Clipsal's most popular range of switches and sockets - and the forerunner to our Prestige P2000, Classic C2000, Slimline SC2000, Eclipse SL2000 and Neo Series switches.

The feature that sets the 2000 Series apart from any other range is its unique grid assembly and surround which come in a comprehensive range of colours that can be mixed and matched to complement any décor in homes or commercial premises.

The surrounds also hide all mounting screws and can be easily removed when redecorating to disguise any overpainting or untidy trim marks from wallpaper.

The 2000 Series also offers you the flexibility of an extensive product range that includes dimmers, fan speed controllers, time delays, room access card operated switches, weatherprotected switches and TV and data sockets.

With unsurpassed versatility and reliability, it's not surprising that the 2000 Series continues to be so popular.


## HOW TO ORDER SWITCHED SOCKET OUTLETS

Switched Socket Outlets are often referred to as GPOs (General Purpose Outlets), Powerpoints or Power Outlets. So that there is no confusion, the description 'Switched Socket Outlets' will be used throughout this brochure. Single and Twin Socket Outlets are available in 2000 Series in horizontal and vertical formats.

This number indicates the number of switched sockets included in the product. The plate size remains the same for both single and twin switched socket outlets, only the number of switches and sockets vary.

Catalogue Numbers will vary depending on the number of sockets and whether the product is horizontally or vertically mounted.


Please note: Single Automatically Switched Socket Outlets are also available (Catalogue Number 2010

- Page 28).


## Special Features and Options

2000 Series Switched Socket Outlets may also be ordered with special features, including an extra switch mechanism, safety shutters, neons, double pole switched versions, deep plate format products and more. Please see the main part of the brochure for Combination (Page 30) and Automatic (Page 28) versions with special features.


Refer to '2000 Series Colours' on page 12 for colour options and their corresponding codes.

2000 Series Surface Mounted Switched Socket Outlets and accessories are innovative products that allow extra wiring room for single and double powerpoints. These understated products take up very little wall space, resulting in a much safer installation and a product that is aesthetically pleasing. 2000 Series Surface Mounted Switched Socket Outlets and accessories are perfect for situations where wiring room is limited.

## Surface Mounting Kit (2000SMK)

This kit enables you to surface mount standard size 2000 Series gridplates. Included in the kit is a 2449ASD Surface Mounting Spacer Flange and a 2000SM Deep Surround. These items are also available separately.

## Surface Mounting Flange (2449ASD)

A 2000 Series Surface Mounting Flange (2000SM) for 2000 Series accessories is available.

## Surface Mounting Block (449A)

The 449A Mounting Block is designed to accept all standard pattern 2000 Series grid assemblies. This product is ideal for use where a 2000 Series installation is required with surface wiring. The 449A has six mounting screw positions and twelve combined cable/conduit cut-outs.

## SURFACE MOUNTED SWITCHED SOCKET OUTLETS

| SURFACE MOUNTED SWITCHED SOCKET OUTLETS |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| Cat. No. | Length | Width | Depth | Mounting Centres |
| All Products | 116 mm | 76 mm | 30 mm | 84 mm apart |
| 2015SM | A | Single Switched Socket Outlet, 250V/10A - standard pattern surface <br> mounted single combination switched socket with deep type curved sided <br> surround. |  |  |
| 2015XASM | B | Single Switched Socket Outlet, 250V/10A - standard pattern surface <br> mounted single combination switched socket with deep type curved sided <br> surround, with removable extra switch. |  |  |
| 2025SM | CTwin Switched Socket Outlet, 250V/10A - standard pattern surface mounted <br> double combination switched socket with deep type curved sided surround. |  |  |  |
| 2025XASM | Twin Switched Socket Outlet, 250V/10A - standard pattern surface <br> mounted double combination switched socket with deep type curved <br> sided surround, with removable extra switch. |  |  |  |

* Refer to Page 53 for mounting templates.


## SURFACE MOUNTED ACCESSORIES

| Cat. No. | Length | Width | Depth | Mounting Centres |
| :--- | :--- | :--- | :--- | :--- |
| 2000SMK | 118 mm | 78 mm | 27 mm | 84 mm apart |
| 2449ASD | 114 mm | 69 mm | 14 mm | 84 mm apart |
| 449A | 122 mm | 80 mm | 34 mm | 84 mm apart |
| 2000SM | A | Surface Mounting Kit for 2000 Series grid assemblies. Incorporates <br> 2449ASD Surface Mounting Spacer Flange and 2000SM Deep Surround. |  |  |
| 2000SMK | Mounting Flange for 2000 Series accessories, six mounting positions (for <br> use with 2000SM Deep Surround). |  |  |  |
| 2449ASD | Surface Mounting Block for 2000 Series, six mounting positions and <br> twelve combined cable/conduit cut-outs. |  |  |  |
| 2000SM | Surface Mounting Deep Surround, standard pattern, curved sided. |  |  |  |



SCHEMATIC WIRING DIAGRAMS

## Standard Pattern Mounting

 Twin CombinationTwin Switched Sockets with Extra Switch


Earth Leakage Protected
Twin Switched Sockets


## 2000 SERIES PRODUCT LISTING

## STANDARD SIZE SINGLE AUTOMATICALIY SWITCHED SOCKET OUTLETS - HORIZONTAL MOUNTING

| Cat ${ }^{\text {No}}$ | Description | Length | Width | Depth | Mounting Centres | PAGE |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2010 | Single Auto Socket Outlet, 250V/10A | 116 mm | 76 mm | 31 mm | 84 mm apart | 29 |
| 2010/15 | Single Auto Socket Outlet, 250V/15A | 116 mm | 76 mm | 31 mm | 84mm apart | 29 |
| 2010/15N | Single Auto Socket Outlet, $250 \mathrm{~V} / 15 \mathrm{~A}$, with safety shutter and neon | 116 mm | 76 mm | 31 mm | 84 mm apart | 29 |
| 2010/15S | Single Auto Socket Outlet, 250V/15A, with safety shutter | 116 mm | 76 mm | 31 mm | 84mm apart | 29 |
| 2010/20 | Single Auto Socket Outlet, 250V/20A, with round earth pin | 116 mm | 76 mm | 31 mm | 84mm apart | 29 |
| 20101 | Single Auto Socket Outlet, 250V/10A, with round earth pin | 116 mm | 76 mm | 31 mm | 84mm apart | 29 |
| 2010LN | Single Auto Socket Outlet, 250V/10A, with round earth pin, safery shutter and neon | 116 mm | 76 mm | 31 mm | 84 mm apart | 29 |
| 2010LS | Single Auto Socket Outee, 250V/10A, with round earth pin and safety shutter | 116 mm | 76 mm | 31 mm | 84mm apart | 29 |
| 2010N | Single Auto Socket Outlet, 250V/10A, with safety shutter and neon | 116 mm | 76 mm | 31 mm | 84 mm apart | 29 |
| 20105 | Single Auto Socket Outlet, 250V/10A, with safety shutter | 116 mm | 76 mm | 31 mm | 84mm apart | 29 |

STANDARD SIZE SINGLE SWITCHED SOCKET OUTLETS - HORIZONTAL MOUNTING

| 2015 | Single Switched Socket Outlet, 250V/10A | 116 mm | 76 mm | 28mm | 84mm apart | 31 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2015S | Single Switched Socket Outlet, 250V/10A, with sofety shutter | 116 mm | 76 mm | 28 mm | 84mm apart | 31 |
| 2015N | Single Switched Socket Outet, 250V/10A, with safety shutter and neon | 116 mm | 76 mm | 28mm | 84 mm apart | 31 |
| 2015D | Single Switched Socket Outlet, 250V/10A, double pole | 116 mm | 76 mm | 28 mm | 84mm apart | 31 |
| 2015L | Single Switched Socket Outet, 250V/10A, with round earth pin | 116 mm | 76 mm | 28 mm | 84mm apart | 31 |
| 2015/15 | Single Switched Socket Outlet, 250V/15A | 116 mm | 76 mm | 28 mm | 84mm apart | 31 |
| 2015/15N | Single Switched Socket Outlet, 250V/15A, with safety shutter and neon | 116 mm | 76 mm | 28 mm | 84mm apart | 31 |
| 2015/20 | Single Switched Socket Outlet, 250V/20A | 116 mm | 76 mm | 28 mm | 84 mm apart | 31 |
| 2015N20 | Single Switched Socket Outlet, 250V/20A, with neon | 116 mm | 76 mm | 28 mm | 84mm apart | 31 |
| 2015D20 | Single Swithed Socket Outlet, 250V/20A, double pole | 116 mm | 76 mm | 28 mm | 84 mm apart | 31 |
| 2015DN20 | Single Switched Socket Outlet, 250V/20A, double pole with neon and safety shutter | 116 mm | 76 mm | 28 mm | 84 mm apart | 31 |
| 2015X | Single Switched Socket Outlet, 250V/10A, with removable extra switch | 116 mm | 76 mm | 28 mm | 84mm apart | 31 |
| 2015XN | Single Swithed Socket Outte, 250V/10A, with sfefty shutter, neon ond removable extra swith | 116 mm | 76 mm | 28 mm | 84mm apart | 31 |
| 2015XX | Single Switched Socket Outlet, 250V/10A, with 2 removable extra switches | 116 mm | 76 mm | 28 mm | 84 mm apart | 31 |
| 2015VXXN | Single Switched Socket Outet, 250V/10A, ssfetystuuter, neon, 2 removoble extra swithes (verical) | 116 mm | 76 mm | 28 mm | 84 mm apart | 31 |
| 2015SM | Single Switched Socket Outlet, 250V/10A, with sufface mounting kit | 116 mm | 76 mm | 30 mm | 84 mm apart | 31 |
| 2015XSM | Single Switched Socket Outiet, 250V/10A, with sufface mounting kit ond extra swith | 116 mm | 76 mm | 30 mm | 84mm apart | 31 |

SURFACE MOUNTED SOCKET OUTLETS \& ACCESSORIES

| 2015SM | Single Socket Outlet, 250V/10A - sufface mounted | 116 mm | 76 mm | 30 mm | 84mm apart | 32 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2015XASM | Single Socket Outlet, 250V/10A - sufface mounted, with removable extra switch | 116 mm | 76 mm | 30 mm | 84mm apart | 32 |
| 2025SM | Double Socket Outte, 250V/10A - sufface mounted | 116 mm | 76 mm | 30 mm | 84mm apart | 32 |
| 2025XASM | Double Socket Outet, 250V/10A - sufface mounted, with removable extra swith | 116 mm | 76 mm | 30 mm | 84mm apart | 32 |
| 2000SMK | Sufface Mounting Kif for 2000 Series grid assemblies | 118 mm | 78 mm | 27 mm | 84mm apart | 32 |
| 2449ASD | Mounting Flange for 2000 Series accessories, six mounting positions | 114 mm | 69 mm | 14 mm | 84mm apart | 32 |
| 449A | Sufface Mounting Block for 2000 Series | 122 mm | 80 mm | 34 mm | 84mm apart | 32 |
| 2000SM | Sufface Mounting Deep Surround for 2000 Series | 116 mm | 76 mm | 26 mm | N/A | 32 |

## 2000 SERIES PRODUCT LISTING

| STANDARD SIZE TWIN SWITCHED SOCKET OUTLETS - HORIZONTAL MOUNTING |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Cat No | Description | Length | Width | Depth | Mounting Centres | PAGE |
| 2025 | Twin Switched Socket Outlet, 250V/10A | 116 mm | 76 mm | 28mm | 84 mm apart | 33 |
| 2025S | Twin Switched Socket Outlet, $250 \mathrm{~V} / 10 \mathrm{~A}$, with safety shutters | 116 mm | 76 mm | 28 mm | 84mm apart | 33 |
| 2025N | Twin Switched Socket Outlet, 250V/10A, with sofety shutters ond neons | 116 mm | 76 mm | 28 mm | 84mm apart | 33 |
| 2025L | Twin Switched Socket Outle, 250V/10A, with round earth pin | 116 mm | 76 mm | 28 mm | 84mm apart | 33 |
| 2025QC | Twin Switched Socket Outlet, 250V/10A, Quick Connect | 116 mm | 76 mm | 31 mm | 84mm apart | 33 |
| 2025F0 |  | 116 mm | 76 mm | 28mm | 84mm apart | 33 |
| 2025V3/30PF | Six Switched Socket Outlets + F-Type Pay TV outlet, 2000/4 surround, 250V/10A | 290 mm | 116 mm | 13mm | See Template | 33 |
| 2025XA | Twin Switched Socket Outlet, 250V/10A, with removable extra switch | 116 mm | 76 mm | 28mm | 84mm apart | 33 |
| 2025XAN | Twin Switched Socket Outite, 250V/10A, scofety shutter, neons, removable extro swith | 116 mm | 76 mm | 28 mm | 84mm apart | 33 |
| 2025SM | Twin Switched Socket Outle, 250V/10A | 116 mm | 76 mm | 30 mm | 84mm apart | 33 |
| 2025XAS | Twin Switched Socket Outet, $250 \mathrm{~V} / 10 \mathrm{~A}$, with removoble extra switch ond safery shuters | 116 mm | 76 mm | 30 mm | 84 mm apart | 33 |

STANDARD SIZE SINGLE SWITCHED SOCKET OUTLETS - VERTICAL MOUNTING

| 2015V | Single Switched Socket Outlet, 250V/10A (vertical) | 116 mm | 76 mm | 28mm | 84 mm apart | 34 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2015VN | Single Switched Socket Outtet, 250V/10A, with safety shutter and neon (verrical) | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2015 V 15 | Single Switched Socket Outlet, 250V/15A (vertical) | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2015V15N | Single Switched Socket Outlet, 250V/15A, with safety shutter and neon (verrical) | 116 mm | 76 mm | 28 mm | 84mm apart | 34 |
| 2015VX | Single Switched Socket Outee, 250V/10A, with removable extra switch (verical) | 116 mm | 76 mm | 28mm | 84 mm apart | 34 |
| 2015VXN | Single Switched Socket Outee, 250V/10A, sfefers suuter, neon, removoble extra swith (verical) | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2015VXX | Single Switched Socket Outet, 250V/10A, with 2 removable switches (verrical) | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2015XXN | Singe Swithed Socket Outte, 250V/10A, sfefery shutter, neon and 2 removoble extro switches | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2015VD | Single Switched Socket Outlet, 250V/10A, double pole (verical) | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2015VDX | Single Switched Socket Outtet, 250V/10A, double pole with extra swith (vertical) | 116 mm | 76 mm | 28mm | 84 mm apart | 34 |

STANDARD SIZE TWIN SWITCHED SOCKET OUTLETS - VERTICAL MOUNTING

| 2015/2V | Twin Switched Socket Outlet, 250V/10A - two piece base (vertical) | 116 mm | 76 mm | 38mm | 84mm apart | 34 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2015D2V | Twin Switched Socket Outte, 250V/10A, double pole | 116 mm | 76 mm | 38 mm | 84 mm apart | 34 |
| 2015/2VN | Twin Switched Socket Outet, 250V/10A, with sofety shutters, neons | 116 mm | 76 mm | 38 mm | 84 mm apart | 34 |
| 2015/2VS | Twin Switched Socket Outlet, $250 \mathrm{~V} / 10 \mathrm{~A}$, with sofety shutters | 116 mm | 76 mm | 38 mm | 84 mm apart | 34 |
| 2025V | Twin Switched Socket Outlet, 250V/10A - one piece base (verrical) | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2025VN | Twin Switched Socket Outlet, 250V/10A, with safety shutters, neons | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2025VXA | Twin Switched Socket Outlet, 250V/10A, with removable switch | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |
| 2025VXN | Twin Switched Socket Outlet, 250V/10A, with removable switch and neon | 116 mm | 76 mm | 28mm | 84 mm apart | 34 |
| 2025VXS | Twin Switched Socket Outet, $250 \mathrm{~V} / 10 \mathrm{~A}$, with removable swith ond safety shutters | 116 mm | 76 mm | 28 mm | 84 mm apart | 34 |

PROTECTED SOCKET OUTLETS

| 2025RC | Twin Switched Socket Outlet, 250V/10A, with RCD protection - 30mA | 116 mm | 76 mm | 47 mm | 84 mm apart | $\mathbf{3 5}$ |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| 2025RC10 | Twin Switched Socket Outlet, 250V/10A, with RCD protection - 10 mA | 116 mm | 76 mm | 47 mm | 84 mm apart | $\mathbf{3 5}$ |
| 2025SF | Twin Switched Socket Outlet, 250V/10A, with surge protection | 116 mm | 76 mm | 45 mm | 84 mm apart | $\mathbf{3 5}$ |

## UNIVERSAL SHAVER OUTLETS

| 2727 | Universal Shaver Outlet, Dual Voltage (240V-115V) | 116 mm | 76 mm | 57 mm | 84 mm apart | $\mathbf{3 5}$ |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| $2727 R C 30$ | Shaver Outlet, $250 \mathrm{~V} / 20 \mathrm{~A}$, double pole with RCD-30mA - horizontal | 219 mm | 116 mm | 57 mm | 84 mm apart (3 sets) | $\mathbf{3 6}$ |
| 2727VRC30 | Shaver Outlet, $250 \mathrm{~V} / 20 \mathrm{~A}$, double pole with RCD-30mA - vertical | 219 mm | 116 mm | 57 mm | 84 mm apart ( 3 sets) | $\mathbf{3 6}$ |

## 56 Series Modules - designed to mix and match.



## READY REFERENCE GUIDE

## For fast product selection

The following Reference Guide has been included to help you quickly find the most commonly used 56 and 66 Series Industrial Switchgear.

## 56 SERIES



## Combination Switched Socket Outlets

- Versions from 250 V 10 A to 500 V 50 A .
- All internal phase connections between switches and sockets are factory wired.
- Sockets include a dustproof and hoseproof flap with snap latch.



## Surface Socket Outlets

- Versions from 250 V 10 A to 500 V 50 A .
- Sockets include a clear dustproof and hoseproof flap with snap latch.
- Tough polyester terminal housings.



## Appliance Inlets

- Screwed lock ring secures extension sockets and appliance connectors and ensures IP rating.
- Impact resistant and UV stabilised housings.
- Downward facing, angled pin housing available on 500 V units.



## Surface Switches

- Versions from 250V 10A to 500 V 63 A
- Positive rotary switch action.
- Provision for 2 padlocks.



## Key Operated Switches

- Versions from 250 V 20 A to 500 V 50 A .
- Available in 3 versions - Standard Security, Medium Security and High Security.
- Locking in 'off' and 'on' positions.



## Timer Switches

- Available in digital and mechanical versions.
- Digital and mechanical versions available with 150 hour battery backup.



## Sunset Switches

- Automatically turns lights on when natural light falls below a predetermined level.
- Suitable for surface or flush mounting.


## COMBINATION SWITCHED SOCKET OUTLETS

The Clipsal range of three phase combinations includes two module units and one-piece cover models.

All internal phase connections between switches and sockets are factory wired.

The 4 and 5 pin, 10 and 20A onepiece cover models have integral wiring between the switch and socket outlet. Installation time is reduced by not having to check factory wire terminations. There is also no likelihood of wires falling out during installation.

Combination sockets feature a clear dustproof and hoseproof flap with a snap catch latch. Both the superseded non IP56 plain plugs and the current IP66 retention ring plugs can be accommodated. $250 \mathrm{~V}, 110 \mathrm{~V}$ and extra low voltage two module combinations are also available.

Earth and neutral connectors accommodating $3 \times 6 \mathrm{~mm}^{2}$ cables are supplied with 500 V models.

## Options available

- With Neon - add N to Catalogue Number-e.g. 56C410 becomes 56C410N.
- Less Enclosure - add LE to Catalogue Number e.g. 56C410 becomes 56C410LE.
- Versions with key operated switches available to special order.
- Internal interlock facility available on three phase, one piece cover combinations - add I to Catalogue Number e.g. 56CV410 becomes 56CVI410.
- Resistant Orange - add RO to Catalogue Number e.g. 56CV410 becomes 56CV410RO.
- Resistant White - add RW to Catalogue Number e.g. 56C410 becomes 56C410RW.
- Two piece versions available in Chemical Grey. Chemical Grey add CG to Catalogue Number e.g. $56 C 410$ becomes 56C410CG.


## SURFACE SOCKET OUTLETS

Clipsal Surface Socket Outlets range in size from 250 V 10 A to 500 V 50A.

All sockets feature hoseproof and dust resistant flaps with automatic snap catch latches. The transparent flap enables instant visual inspection of socket condition and pin configuration.

The full range of sockets accommodate both the superseded IP56 plain plugs and the current IP66 retention ring plugs in order to rationalise the number of variations required.

Earth and neutral connectors accommodating $3 \times 6 \mathrm{~mm}^{2}$ cable are supplied with all 500 V models.

Terminal housings are moulded in tough polyester to minimise damage.

## Optionsavailable

- Less Enclosure - add LE to Catalogue Number e.g. 56SO410 becomes 56SO410LE.
- Resistant Orange - add RO to Catalogue Number e.g. 56SO410 becomes 56SO410RO.
- Resistant White - add RW to Catalogue Number e.g. 56SO310 becomes 56SO310RW.


## 250V \& Extra Low Voltage Sockets



Note: 56 Series 250 V and extra low voltage sockets effectively accommodate Clipsal 439 Series Plug Tops. The IP56 Rating is ensured when the 437PR Coupling Ring is used in conjunction with the Clipsal 439 Series Plug Top. Alternatively, the Clipsal 56P or 56PA Plugs will also ensure the IP66 integrity.

500V 3 Phase Sockets


Refer to page 47 for explanation of socket configuration.

| Catalogue <br> Number | $\begin{aligned} & I_{\text {the }} \\ & \text { (A) } \end{aligned}$ | $\begin{aligned} & U_{i} \\ & \text { (V) } \end{aligned}$ | Number of Sockets | Cond. Term in $\mathrm{mm}^{2}$ |  | IP Rating | O/A * Dims.$\text { (H) } \times(\mathrm{W}) \times(\mathrm{D})$ | Matching Plug Straight | Matching Plug Angled | Socket Config. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Min. | Max/cont. |  |  |  |  |  |
| 56SO210 | 10 | 250 | 2 Parallel Flat | 1.5 | 16 | 66 | 107x101x80 | 56P210 |  | D |
| 56SO215/32 | 15 | 32 | 2 Pin Polarised | 1.5 | 6 | 66 | 107x101x80 | 56P215/32 |  | E |
| 56SO3/110 | 10 | 110 | 2 Round \& Flat Earth | 1.5 | 6 | 66 | 107x101x80 | 56P3/110 |  | $J$ |
| 56SO310RP | 10 | 250 | 3 Round | 1.5 | 6 | 66 | 107x101x80 | 56P310RP |  | G |
| 56SO310 | 10 | 250 | 3 Flat | 1.5 | 6 | 66 | 107x101x80 | 56P310 |  | A |
| 56SO315 | 15 | 250 | 3 Flat | 1.5 | 6 | 66 | 107x101x80 | 56P315 |  | B |
| 56SO310A | 10 | 250 | 3 Flat auto-switched D/P | 1.5 | 10 | 66 | 107x101x80 | 56P310 |  | A |
| 56SO315A | 15 | 250 | 3 Flat auto-switched D/P | 1.5 | 10 | 66 | 107x101x80 | 56P315 |  | B |
| 56SO310L | 10 | 250 | 2 Flat \& Round Earth | 1.5 | 6 | 66 | 107x101x80 | 56P310L |  | C |
| 56SO320 | 20 | 250 | 3 Round | 2.5 | 6 | 66 | 107x101x104 | 56P320 | 56PA320 | H |
| 56SO320F | 20 | 250 | 3 Flat Pins | 2.5 | 6 | 66 | 107x101x80 | 56P320F | - | F |
| 56SO332 | 32 | 250 | 3 Round | 6 | 16 | 66 | $107 \times 101 \times 104$ | 56P332 | 56PA332 | I |
| 56SO410 | 10 | 500 | 4 Round | 1.5 | 6 | 66 | 107x101×104 | 56P410 | 56PA410 | K |
| 56SO416K | 16 | 500 | 4 Round (unique key configuration) | 1.5 | 6 | 66 | $107 \times 101 \times 104$ | 56P416K | 56PA416K | M |
| 56SO420 | 20 | 500 | 4 Round | 2.5 | 6 | 66 | 107x101×104 | 56P420 | 56PA420 | L |
| 56SO432 | 32 | 500 | 4 Round | 4 | 16 | 66 | $107 \times 101 \times 104$ | 56P432 | 56PA432 | N |
| 56SO440 | 40 | 500 | 4 Round | 6 | 16 | 66 | $107 \times 101 \times 104$ | 56P440 | 56PA440 | 0 |
| 56SO450 | 50 | 500 | 4 Round | 10 | $16^{* *}$ | 66 | $107 \times 101 \times 104$ | 56P450 | 56PA450 | P |
| 56SO510 | 10 | 500 | 5 Round | 1.5 | 6 | 66 | 107x101x104 | 56P510 | 56PA510 | Q |
| 56SO520 | 20 | 500 | 5 Round | 2.5 | 6 | 66 | $107 \times 101 \times 104$ | 56P520 | 56PA520 | R |
| 56SO532 | 32 | 500 | 5 Round | 4 | 16 | 66 | $107 \times 101 \times 104$ | 56P532 | 56PA532 | S |
| 56SO540 | 40 | 500 | 5 Round | 6 | 16 | 66 | 107x101x104 | 56P540 | 56PA540 | T |
| 56SO550 | 50 | 500 | 5 Round | 10 | 16** | 66 | $107 \times 101 \times 104$ | 56P550 | 56PA550 | U |
| 56SO610 | 10 | 500 | 4 Round Power <br> 2 Round Control | 1.5 | 6/2.5 | 66 | $107 \times 101 \times 104$ | 56P610 | 56PA610 | V |
| 56SO710 | 10 | 500 | 5 Round Power <br> 2 Round Control | 1.5 | 6/2.5 | 66 | $107 \times 101 \times 104$ | 56P710 | 56PA710 | W |
| 56SO720 | 20 | 500 | 5 Round Power 2 Round Control | 2.5 | 6/2.5 | 66 | $107 \times 101 \times 104$ | 56P720 | 56PA720 | X |

[^6]$\mathrm{U}_{\mathrm{i}}$ - Insulation Voltage

* Refer rear of Catalogue for further details.



Advantages
Core range DS1-30A DS3-50A DS6-90A DS9-150A DS2-250A Dimensions

## Electrical features

- From $\mathbf{3 0}$ to 250 Amps - Voltage up to 1000 Volts AC and up to 250 Volts DC
- Integral switching device as defined in clause 2.8 of IEC/EN 60309-1 standard
- Equipped with silver-nickel butt-contacts and metal braid for added reliability and lifetime
- Socket-outlet safety shutter provides IP4X protection


The locked safety shutter prevents access to the electrical contacts of the socketoutlet when the plug is removed (IP4X protection against solid foreign objects and access to hazardous parts).
The socket-outlet contacts are kept clean and inaccessible (to 1 mm diameter wires) even when the socket-outlet lid is open.

- Unique keying system allows discrimination between 24 different power supplies (voltage, frequency, AC and DC current)
- Number of cycles under normal operation and overload conditions from 2 to 8 times (depending on rated current) more than those required by IEC / EN 60309-1 standard
- Versions with auxiliary contacts


## Mechanical features

- Automatic IP54/55 watertightness. 150 A and 250 A models available also in IP66/67
- Casings made of glass fibre reinforced polyester ( 30 to 150 A ) providing excellent electric insulation, high resistance to corrosive, UV and chemical agent environments and high mechanical resistance (IK08 impact resistance)
- Casings made of anti-corrosion treated metal ( 90 to 250 A ) providing high temperature resistance and excellent mechanical resistance (IKog impact resistance)
- Ambient temperature: $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ (for temperatures outside this range, please contact us)
- Spring assisted terminals unaffected by vibration and thermal cycling
- Self-opening lid; self-returning lid on request


## Regulatory features

DS decontactors comply with:

- The IEC 60309-1 International standard and EN 60309-1 European standard (plugs and socket-outlets for industrial purposes),
- The European Low Voltage Directive (decree $N^{\circ} 95-1081$ dated $3^{\text {rd }}$ October 1995),
- The French decree $\mathbf{N}^{\circ} \mathbf{8 8 - 1 0 5 6}$ dated $14^{\text {th }}$ November 1988 relating to workers' protection,
- The decrees relating to workers' protection in Belgium, Spain and Italy,
- The load breaking capacity according to utilisation categories AC22 and AC23 of IEC / EN 60947-3 (switch standard).
Also certified by VERITAS LCIE, UL, AS and CSA (French, American, Australian and Canadian inspection laboratories).


оєсонастовт" The range

## Marechal's modular system



DS decontactors meet the modularity system described on the front cover flap. Before consulting the 'part number' pages, determine the parts required for the needed configuration.


Example : a wall mounting socket-outlet includes an active part, the socket-outlet (female) and an installation accessory,

the wall box. Each part has its own part number.
Therefore, the order should have two part numbers.

## DS part number system

- Standard DS part numbers are made up of 7 characters. All part numbers start with a ' $\mathbf{3}$ '.
- The choice of an option or a version with auxiliary contacts results in adding a suffix (of 1 to 3 characters).

| $1^{\text {st }}$ character | $2{ }^{\text {nd }}$ character | $3^{\text {rd }}$ character | $4^{\text {th }}$ character | Characters from 5 to 7 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Range | Casing | Rated current | Usage | Supply voltage** | Frequency | Polarity |
| 3 = DS | 1 = Blue poly | $\mathbf{1}=\mathbf{D S} 1$ (30A) | 4 = Socket-outlet | $08 \mathrm{~A}=20-24 \mathrm{~V}$ | 50 Hz | 2P |
|  | 4 = Grey poly | 3 = DS3 (50A) | $8=$ Inlet | $033=190-230 \mathrm{~V}$ | 50 Hz | $3 \mathrm{P}+\mathrm{E}$ |
|  | 5 = Black poly | $\mathbf{6}$ = DS6 (90A) |  | $015=220-250 \mathrm{~V}$ | 50 Hz | $1 \mathrm{P}+\mathrm{N}+\mathrm{E}$ |
|  | 9 = Blue metal | $\mathbf{9}$ = DS9 (150A) |  | $013=380-440 \mathrm{~V}$ | 50 Hz | $3 \mathrm{P}+\mathrm{E}$ |
|  |  | 2 = DS2 (250A) |  | $017=380-440 \mathrm{~V}$ | 50 Hz | $3 \mathrm{P}+\mathrm{N}+\mathrm{E}$ |
|  |  |  |  | $193=660-690 \mathrm{~V}$ | 50 Hz | $3 \mathrm{P}+\mathrm{E}$ |
|  |  |  |  | $197=660-690 \mathrm{~V}$ | 50 Hz | $3 \mathrm{P}+\mathrm{N}+\mathrm{E}$ |
|  |  |  | A = Installation accessory | $013=$ Handle |  |  |
|  |  |  |  | 027 = Inclined sleeve |  |  |
|  |  |  |  | 053 = Wall box |  |  |

** 24 different power supplies (voltage, frequency) and 12 polarities are available: see international standard and colour-code on page 8

## Check that the DS part number meets the need ...

Example : the need is for a $30 \mathrm{~A}, 400 \mathrm{~V}, 3 \mathrm{P}+E$ blue poly wall mounting socket.

- The DS with a 30A rated current is DS1 (see pages 34 and 35).
- Order a 30 A socket-outlet (S) and a wall box (B).
- In the standard socket-outlet part numbers table, select the part number for a $400 \mathrm{~V}, 3 \mathrm{P}+\mathrm{E}$ socket-outlet: $\mathbf{3 1 1 4} \mathbf{0 1 3}$
- In the standard wall box part number table, choose the accessory that suits you e.g. a $30^{\circ}$ blue poly wall box with a M20 threaded entry: 31 1A 053

You can check the two part numbers found:


## DS

## The DS core range

In the following table are described the most frequent configurations. Take a look:
if the required configuration is there, do not look further in the 'part number' pages.
Each configuration includes two part numbers: one for the active part (socket-outlet or inlet) and one for the installation accessory (wall box, inclined sleeve or handle).

## Core range

DS1-30A
DS3-50A
DS6-90A
DS9-150A DS2-250A Dimensions

| Wall mounting <br> socket | Inclined <br> socket | Coupler socket | Plug | Wall mounting <br> appliance inlet | Inclined <br> appliance inlet |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Socket-outlet | Socket-outlet | Socket-outlet | Inlet | Inlet | Inlet |
| B Wall box | Si Inclined sleeve | H Handle | H Handle | B Wall box | Si Inclined sleeve |

DS 130 A (poly)

| Voltage Polarity | Part Number |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 230 V 1P+N+E | 3114015 | 3114015 | 3114015 | 3118015 | 3118015 | 3118015 |
| + installation accessory: | 31 1A 053 | 311 A 027 | 31 1A 013 | 311 A 013 | 311 A 053 | 31 1A 027 |
| 400 V 3P+E | 3114013 | 3114013 | 3114013 | 3118013 | 3118013 | 3118013 |
| + installation accessory: | 311 A 053 | 311 A 027 | 31 1A 013 | 311 A 013 | 31 1A 053 | 31 1A 027 |
| 400 V * 3P+N+E | 3114017 * | 3114017 * | 3114017 * | 3118017 | 3118017 | 3118017 |
| + installation accessory: | 31 1A 053 | 31 1A 027 | 311 A 013 | 31 1A 013 | 31 1A 053 | 31 1A 027 |
| DS3 50 A (p |  | Example described at bottom of previous page |  |  |  |  |
| Voltage Polarity | Part Number |  |  |  |  |  |
| $230 \mathrm{~V} \quad 1 \mathrm{P}+\mathrm{N}+\mathrm{E}$ | 3134015 | 3134015 | 3134015 | 3138015 | 3138015 | 3138015 |
| + installation accessory: | 313 A 053 | 313 A 027 | 313 A 013 | 313 A 013 | 313 A 053 | 313 A 027 |
| 400 V 3P+E | 3134013 | 3134013 | 3134013 | 3138013 | 3138013 | 3138013 |
| + installation accessory: | 313 A 053 | 313 A 027 | 313 A 013 | 313 A 013 | 313 A 053 | 313 A 027 |
| 400V * 3P+N+E | 3134017 * | 3134017 * | 3134017 * | 3138017 | 3138017 | 3138017 |
| + installation accessory: | 31 3A 053 | 313 A 027 | 31 3A 013 | 313 A 013 | 313 A 053 | 313 A 027 |


| DS $\underset{\substack{\text { оссомасторт }}}{ } 90$ A (poly or metal) |  |  | Finding the metal version part number is easy! <br> When a part number is preceded by ${ }^{\bullet}$, a metal version is also available: To find its part number, just change the 31 into 39 ( $1=$ poly, $9=$ metal $)$. |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 400 V 3P+E | - 3164013 | - 3164013 | - 3164013 | - 3168013 | - 3168013 | - 3168013 |
| + installation accessory: | - 316 A 053 | - 31 6A 027 | 31 6A 013 | 316 A 013 | - 31 6A 053 | - 31 6A 027 |
| 400V * 3P+N+E | - 3164017 * | - 3164017 * | - 3164017 * | - 3168017 | - 3168017 | - 3168017 |
| + installation accessory: | - 31 6A 053 | - 31 6A 027 | 31 6A 013 | 3164013 | - 31 6A 053 | - 31 6A 027 |

## DS 150 (poly or metal) <br> Voltage $\quad$ Polarity $\quad$ Part Number

| 400 V 3P+E | - 3194013 | - 3194013 | - 3194013 | - 3198013 | - 3198013 | - 3198013 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| + installation accessory: | 39 9A 053 | - 31 9A 027 | 659 A 013 D45 (E) | 659 Ca 013 D45 (E) | 39 9A 053 | - 31 9A 027 |
| 400V * 3P+N+E | - 3194017 * | - 3194017 * | - 3194017 * | - 3198017 | - 3198017 | - 3198017 |
| + installation accessory: | 39 9A 053 | - 31 9A 027 | 65 9A 013 D45 (E) | 65 9A 013 D45 (E) | 39 9A 053 | - 31 9A 027 |

DS2 250 A (metal)

| Voltage Polarity | Part Number |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 400V 3P+E | 3924013 | 3924013 | 3924013 | 3928013 | 3928013 | 3928013 |
| + installation accessory: | 39 2A 053 | 39 2A 027 | 39 2A 013 (N) | 3924013 (N) | 39 2A 053 | 39 2A 027 |
| 400 V * 3P+N+E | 3924017 * | 3924017 * | 3924017 * | 3928017 | 3928017 | 3928017 |
| + installation accessory: | 39 2A 053 | 39 2A 027 | 39 2A 013 (N) | 39 2A 013 (N) | 39 2A 053 | 39 2A 027 |

[^7]DS1

*See Operating Instruction on page 168


Stop button


## DECONTACTOR ${ }^{\text {TM }}$ 30 A

## Main features:

| - (socket-outlet) IP | 55 |
| :--- | :--- |
| - (socket-outlet + inlet) IP | 54 |
| - IK (poly) | 08 |

- Umax
- Rated currents (IEC / EN 60309-1)
- Rated currents and operating voltages
(load breaking capacity according to IEC / EN 60947-3)


## (S)

Socket-outlet (female)


| Voltage | Polarity | Material | Part \# |
| :--- | :--- | :--- | :--- |
| $\mathbf{2 0 - 2 4 V}$ | $2 P$ | Polyester | $3114 \mathbf{0 8 A}$ |
| $\mathbf{1 9 0 - 2 3 0 V}$ | $3 P+E$ | Polyester | 3114033 |
| $\mathbf{2 2 0 - 2 5 0 V}$ | $1 P+N+E$ | Polyester | 3114015 |
| $\mathbf{3 8 0 - 4 4 0 V}$ | $3 P+\mathrm{E}$ | Polyester | $3114 \mathbf{0 1 3}$ |
| Dual voltage* | $3 P+N+E$ | Polyester | $3114 \mathbf{0 1 7}$ |

* see front cover flap

Other voltages, polarities: see page 8
Socket-outlet (Umax 400 V ) with auxiliary contacts
With 2 auxiliary contacts (30A) Socket \# + 972

If you want to add an option to this kind of socket-outlet: call us at +33 (0) 145116000.

| Socket-outlet options |  |
| :--- | :--- |
| Socket \# + $\mathbf{6 0 0}$ |  |
| Device for self-ejecting coupler socket | Socket \# + $\mathbf{3 5 4}$ |
| Device for self-ejecting plug | Socket \# + $\mathbf{3 5 2}$ |
| Self-returning lid | Socket \# + |
| $180^{\circ}$-opening lid | Socket \# + 10 |
| $180^{\circ}$-opening and self-returning lid | Socket \# + 18 |
| Padlocking shaft up to 3 padlocks 8 mm $\emptyset$ | Socket \# + 844 |
| Stop button | Socket \# + 453 |
| Rubber cover for polyester latch | Socket \# + 833 |

If you want to equip a socket with two or more options: call us at +33 (0) 145116000 .

Socket-outlet accessories
Closing mechanism (finger draw plate)
31 1A 346
(I) Inlet (male)


| Voltage | Polarity | Material | Part \# |
| :--- | :--- | :--- | :--- |
| $\mathbf{2 0 - 2 4 V}$ | $2 P$ | Polyester | $3118 \mathbf{0 8 A}$ |
| $\mathbf{1 9 0 - 2 3 0 V}$ | $3 P+E$ | Polyester | $3118 \mathbf{0 3 3}$ |
| $\mathbf{2 2 0 - 2 5 0 V}$ | $1 P+N+E$ | Polyester | $3118 \mathbf{0 1 5}$ |
| $\mathbf{3 8 0 - 4 4 0 V}$ | $3 P+E$ | Polyester | $3118 \mathbf{0 1 3}$ |
| $\mathbf{3 8 0 - 4 4 0 V}$ | $3 P+N+E$ | Polyester | $3118 \mathbf{0 1 7}$ |

Inlet (Umax 400 V ) with auxiliary contacts
With 2 auxiliary contacts ( 30 A )
Inlet \# + 972

## Inlet options

IP67 watertightness Inlet \# + 600

Inlet accessories

| IP67 cap | 31 1A 126 |
| :--- | :--- |
| Self-closing lid | 31 1A 226 |
| Closing mechanism (finger draw plate) | 31 1A 346 |
| Ejecting mechanism (shark fin) | 31 1A 338 |
| Tension cord | 31 1A 336 |

Advantages

## Installation accessories



The boxes are supplied without any cable gland. The $70^{\circ}$ boxes are not drilled (drilled at extra cost).



Industrial - Domestic adapters


Domestic socket-outlet 10/16A $230 \mathrm{~V}+$ marechal industrial inlet $1 \mathrm{P}+\mathrm{N}+\mathrm{E}, 10 \mathrm{~A} 230 \mathrm{~V}$ fuse protection

| Type | Material | Part number |
| :--- | :--- | :--- |
| UK | Poly | 3118015 D40 * |
| FR with safety shutter | Poly | 3118015 D16 |

* All these domestic socket-outlets are available to foreign standards : replace D40 by D11 for France, D30 for Germany, D06 for Italy, D08 for Switzerland, D67 for Australia, D80 for USA etc


## zOoM <br>  <br> Wall boxes and $70^{\circ}$ sleeves

These wall boxes are designed for:
easy wiring, recommended for large conductor cross-sections (up to $5 \times 35 \mathrm{~mm}^{2}$ )

- entries and exits either at top, bottom or sides
stock reduction, as the same wall box is common to several products The sleeves are angled $\left(70^{\circ}\right)$ to reduce the socket-outlet protrusion and impact risk (for lifts ...).

See full range of boxes on page 86


## DECONTACTOR ${ }^{\text {TM }}$ 50 A



## Main features:

- (socket-outlet) IP
$\begin{array}{ll}\text { - (socket-outlet + inlet) IP } & 54 \\ \text { - IK (poly) } & 08\end{array}$


54

Uma
1000V AC - 250V DC

- Wiring (min - max) flexible
- Wiring (min - max) stranded
$4 / 10 \mathrm{~mm}^{2}$
- Other wiring on request max flexible
- Rated currents (IEC / EN 60309-1)
- Rated currents and operating voltages
(load breaking capacity according to IEC / EN 60947-3)


## (5) Socket-outlet (female)



| Voltage | Polarity | Material | Part \# |
| :--- | :--- | :--- | :--- |
| 20-24V | $2 P$ | Polyester | $3134 \mathbf{0 8 A}$ |
| $\mathbf{1 9 0 - 2 3 0 V}$ | $3 P+E$ | Polyester | $3134 \mathbf{0 3 3}$ |
| $\mathbf{2 2 0 - 2 5 0 V}$ | $1 P+N+E$ | Polyester | $3134 \mathbf{0 1 5}$ |
| $\mathbf{3 8 0 - 4 4 0 V}$ | 3P+E | Polyester | $3134 \mathbf{0 1 3}$ |
| Dual voltage* | $3 P+N+E$ | Polyester | $3134 \mathbf{0 1 7}$ |

* See front cover flap

Other voltages, polarities: see page 8

Socket-outlet (Umax 400 V ) with auxiliary contacts

| With 2 auxiliary contacts (16A) | Socket \# + 972 |
| :--- | :--- |
| With 4 auxiliary contacts $(16 \mathrm{~A})$ | Socket \# + $\mathbf{2 6 4}$ |

If you want to add an option to this kind of socket-outlet:
call us at +33 (0) 145116000 .

## Socket-outlet options

| IP67 watertightness | Socket \# + $\mathbf{6 0 0}$ |
| :--- | :--- |
| Device for self-ejecting coupler socket | Socket \# + $\mathbf{3 5 4}$ |
| Device for self-ejecting plug | Socket \# + $\mathbf{3 5 2}$ |
| Self-returning lid | Socket \# + $\mathbf{R}$ |
| $180^{\circ}$-opening lid | Socket \# + 10 |
| $180^{\circ}$-opening and self-returning lid | Socket \# + 18 |
| Padlocking shaft up to 3 padlocks 8mm $\emptyset$ | Socket \# + 844 |
| Stop button | Socket \# + 453 |
| Rubber cover for polyester latch | Socket \# + 833 |

If you want to equip a socket-outlet with two or more options: call us at +33 (0) 145116000.

| $50 \mathrm{~A} / 400 \mathrm{~V}$ | $50 \mathrm{~A} / 690 \mathrm{~V}$ |
| ---: | ---: |
| $50 \mathrm{~A} / 400 \mathrm{~V}$ | $32 \mathrm{~A} / 690 \mathrm{~V}$ |
| $(\mathrm{AC} 23)$ | $(\mathrm{AC22})$ |

$30 \mathrm{~A} / 1000 \mathrm{~V}$
(-)

## (I) Inlet (male)



| Voltage | Polarity | Material | Part \# |
| :--- | :--- | :--- | :--- |
| $\mathbf{2 0 - 2 4 V}$ | $2 P$ | Polyester | $3138 \mathbf{0 8 A}$ |
| $\mathbf{1 9 0 - 2 3 0 V}$ | $3 P+E$ | Polyester | $3138 \mathbf{0 3 3}$ |
| $\mathbf{2 2 0 - 2 5 0 V}$ | $1 P+N+E$ | Polyester | $3138 \mathbf{0 1 5}$ |
| $\mathbf{3 8 0 - 4 4 0 V}$ | 3P+E | Polyester | $3138 \mathbf{0 1 3}$ |
| $\mathbf{3 8 0 - 4 4 0 V}$ | $3 P+N+E$ | Polyester | $3138 \mathbf{0 1 7}$ |

Inlet (Umax 400V) with auxiliary contacts

| With 2 auxiliary contacts (16A) | Inlet\# + 972 |
| :--- | :--- |
| With 4 auxiliary contacts (16A) | Inlet\# + $\mathbf{2 6 4}$ |

Inlet options
IP67 watertightness
Inlet \# + 600

Inlet accessories

| IP67 cap | 31 3A $\mathbf{1 2 6}$ |
| :--- | :--- |
| Self-closing lid | 31 3A 226 |
| Ejecting mechanism (shark fin) | 31 3A $\mathbf{3 3 8}$ |
| Tension cord | 31 1A $\mathbf{3 3 6}$ |

## Installation accessories



The boxes are supplied without any cable gland. The $70^{\circ}$ boxes are not drilled (drilled at extra cost).

Handle for flat or steel armoured cables on request.


| Handle | Straight <br> poly |
| :--- | :--- |
| Cable dia. |  |
| $10-30 \mathrm{~mm}$ | 313 A 013 |
| $10-30 \mathrm{~mm}$ | $313 \mathrm{~A} \mathbf{4 7 3}$ * |

* With built-in finger draw plate (for in-line connections)

|  | Straight poly with poly cable gland | for ejection option * | Straight m metal cabl | tal with gland | Straight poly flowerpot with metric threaded entry * |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Cable dia. |  |  | Cable dia. |  | Entry |
| 6-12mm | 313 A 253 20P | 313 4443 20P | 6-12 mm | 31 3A 953 20M | M20 31 3A 253417 |
| $13-18 \mathrm{~mm}$ | 313 7 753 | 31 3A 463 | $10-18 \mathrm{~mm}$ | 313 A 963 | M25 31 3A 253418 |
| $18-25 \mathrm{~mm}$ | 313 A 253 32P | 313 3443 32P | $16-24 \mathrm{~mm}$ | 31 3A 953 32M | M32 31 3A 253419 |
| 22-32 mm | 313 A 253 40P | 3134443 40P | 22-32 mm | 31 3A 953 40M | M40 313 253 420 |
| * Handle with | eyelet for tension cord |  |  |  | * Cable gland on request. |


|  | Straight poly with poly cable gland | for ejection option * | Straight m metal cabl | tal with gland | Straight poly flowerpot with metric threaded entry * |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Cable dia. |  |  | Cable dia. |  | Entry |
| 6-12mm | 313 A 253 20P | 313 4443 20P | 6-12 mm | 31 3A 953 20M | M20 31 3A 253417 |
| $13-18 \mathrm{~mm}$ | 313 7 753 | 31 3A 463 | $10-18 \mathrm{~mm}$ | 313 A 963 | M25 31 3A 253418 |
| $18-25 \mathrm{~mm}$ | 313 A 253 32P | 313 3443 32P | $16-24 \mathrm{~mm}$ | 31 3A 953 32M | M32 31 3A 253419 |
| 22-32 mm | 313 A 253 40P | 3134443 40P | 22-32 mm | 31 3A 953 40M | M40 313 253 420 |
| * Handle with | eyelet for tension cord |  |  |  | * Cable gland on request. |



* Handle with eyelet for tension cord

|  | Straight poly with poly cable gland | for ejection option * | Straight m metal cabl | tal with gland | Straight poly flowerpot with metric threaded entry * |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Cable dia. |  |  | Cable dia. |  | Entry |
| 6-12mm | 313 A 253 20P | 313 4443 20P | 6-12 mm | 31 3A 953 20M | M20 31 3A 253417 |
| $13-18 \mathrm{~mm}$ | 313 7 753 | 31 3A 463 | $10-18 \mathrm{~mm}$ | 313 A 963 | M25 31 3A 253418 |
| $18-25 \mathrm{~mm}$ | 313 A 253 32P | 313 3443 32P | $16-24 \mathrm{~mm}$ | 31 3A 953 32M | M32 31 3A 253419 |
| 22-32 mm | 313 A 253 40P | 3134443 40P | 22-32 mm | 31 3A 953 40M | M40 313 253 420 |
| * Handle with | eyelet for tension cord |  |  |  | * Cable gland on request. |



Straight metal with metal cable gland

## Cable dia.

22-32mm 313 A 953 40M

Sleeve
-

This straight handle is recommended for in-line connections.


## Handle with built-in finger draw plate

## zopm

Perfect cable fit and broad tightening range

A special anchoring system provides a perfect cable fit and a broad tightening range (multi-layer bush to choose best cable fit).

Advantages

# DS range dimensions Socket-outlet plug 

Socket-outlet

YBB: $180^{\circ}$ OPENING LID


|  | A | BB | BH | C | D | E | H | YB | YBB | Z | ZB | Ød |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DS1/DS24C | 65 | 50 | 45 | 69 | 58 | 48 | 15 | 65 | 108 | 121 | 76 | 5 |
| DS3/DS37C | 69 | 55 | 54 | 80 | 70 | 55 | 21 | 100 | 132 | 121 | 57 | 5 |
| DS6/DS7C3 | 76 | 63 | 60 | 98 | 80 | 66 | 27 | 110 | 152 | 146 | 87 | 5.5 |
| DS9 | 113 | 75 | 70 | 113 | 100 | 81 | 24 | 137 |  | 197 |  | 6 |
| DS2/DS7C9 | 110 | 75 | 92 | 131 | 118 | 98 | 38 | 115 |  | 213 |  | 6.5 |

Plug


A B Ø
$\begin{array}{lll}144 & 70 & 5-21\end{array}$
$148 \quad 82 \quad 10-30$
$175 \quad 98$ 13-36
195 125 25-45
$260 \quad 141$ 40-58

Plug connected (Ai)/ disconnected (Ao) in a socket-outlet


|  | A1 | A0 |
| :--- | :---: | :---: |
| DS1/DS24C | 166 | 182 |
| DS3/DS37C | 174 | 190 |
| DS6/DS7C3 | 197 | 221 |
| DS9 | 246 | 275 |
| DS2/DS7C9 | 310 | 341 |

$30^{\circ}$ wall mounting socket

YB: $180^{\circ}$ OPENING LID

$\begin{array}{lllllllllllll}A & B & B & C A & C P & D & E 1 & E 2 & H & Y & Y B & Z & \emptyset d\end{array}$

|  | A | B | B' | CA | CP | D | E1 | E2 | H | Y | YB | Z | $\emptyset d$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DS1/DS24C | 135 | 128 |  | 84 | 69 | 84 | 70 | 70 | 18 | 175 | 189 | 128 | 6 |
| DS3/DS37C | 154 | 151 |  | 89 | 80 | 100 | 77 | 88 | 24 | 216 | 216 | 129 | 6.5 |
| DS6/DS7C3 P0LY | 192 | 185 |  | 105 | 98 | 128 | 89 | 112 | 31 | 262 | 269 | 168 | 7.5 |
| DS6/DS7C3 METAL | 173 | 151 |  | 80 | 98 | 130 | 105 | 105 | 28 | 220 | 239 | 181 | 7 |
| DS9 | 250 | 188 | 285 | 138 | 113 | 285 | 163 | 116 | 50 | 279 |  | 258 | 7 |
| DS2/DS7C9 $\left(60^{\circ}\right)$ | 314 | 256 | 315 | 180 | 131 | 315 | 202 | 154 | 50 | 379 |  | 187 | 10 |

Plug connected (A1)/ disconnected ( $A 0$ ) in a $30^{\circ}$ wall mounting socket

YB: $180^{\circ}$ OPENNG LID


DS1/DS24C DS3/DS37C

A1 A0 $\quad$ B1 $\quad$ B0 $\quad Y \quad Y_{B}$ $\begin{array}{lllllll}232 & 246 & 184 & 192 & 216 & 216\end{array}$ DS6/DS7C3 POLY $\begin{array}{lllllll}283 & 304 & 220 & 232 & 262 & 269\end{array}$ DS6/DS7C3 METAL $268 \quad 289193 \quad 205 \quad 220 \quad 239$ DS9 355380243258279 DS2/DS7C9 (60 ${ }^{\circ}$ ) $383399433 \quad 460 \quad 379$

Plug connected (A1)/ disconnected (Ao) in a $70^{\circ}$ wall mounting socket

A1 A0 B1 B0 $Y$
$231-219170-170 \quad 158-159-139 \quad 39-2896.5$


$\begin{array}{llllll}\text { DS1/DS24C } & 213 & 219 & 260 & 276 & 234 \\ \text { DS3/DS37C } & 245 & 253 & 313 & 335 & 289\end{array}$
DS6/DS7C3 POLY $\begin{array}{llllll}251 & 260 & 338 & 362 & 316\end{array}$
$30^{\circ}$ inclined socket

YB: $180^{\circ}$ OPENING LID


A $\quad$ B $\quad$ CA $\quad$ CP $\quad$ D $\quad$ D1
DS1/DS24C
DS3/DS37C DS6/DS7C3
DS9
DS2/DS7C9 (60 $)$

$\begin{array}{lllllllll}116 & 137 & 70 & 69 & 107 & 05 & \text { D2 } & \text { E1 } & \text { E2 } \\ \text { Y }\end{array}$ $\begin{array}{lllllllllllll}125 & 145 & 76 & 80 & 107 & 65 & 68 & 63 & 95 & 210 & 210 & 109 & 5.5\end{array}$ $\begin{array}{lllllllllllll}138 & 177 & 102 & 98 & 136 & 111 & 90 & 87 & 122 & 254 & 261 & 114 & 6.5\end{array}$ $\begin{array}{llllllllllll}200 & 198 & 140 & 113 & 142 & 110 & 100 & 124 & 124 & 299 & 169 & 7\end{array}$ $\begin{array}{lllllllllllll}223 & 249 & 183 & 131 & 183 & 150 & 150 & 165 & 165 & 380 & 96 & 7\end{array}$


Plug connected (A1)/ disconnected (Ao) in a $30^{\circ}$ inclined socket

YB: $180^{\circ}$ OPENING LID

$\begin{array}{llllll}\text { A1 } & \text { A0 } & \text { B1 } & B 0 & Y & Y B\end{array}$
$\begin{array}{llllllll}\text { DS1/DS24C } & 192 & 206 & 170 & 178 & 184 & 198\end{array}$
$\begin{array}{lllllll}\text { DS3/DS37C } & 203 & 217 & 178 & 186 & 210 & 210\end{array}$
DS6/DS7C3 229250212224254261
DS9
302327242257299
DS2/DS7C9 (60 $) \quad 292 \quad 308 \quad 347 \quad 374 \quad 293$
 $\begin{array}{llllllll}\text { DS3/DS37C } & 153 & 219 & 170 & 170 & 159 & 289 & 4.5\end{array}$ DS6/DS7C3 POLY $1 \begin{array}{llllllll}160 & 237 & 170 & 170 & 159 & 316 & 4.5\end{array}$

Plug connected (A1)/ disconnected (Ao) in a $70^{\circ}$ inclined socket

A1 A0 B1 B0 Y
DS1/DS24C $\begin{array}{llllll}135 & 141 & 260 & 276 & 234\end{array}$ DS3/DS37C $\begin{array}{llllll}167 & 175 & 313 & 335 & 289\end{array}$ DS6/DS7C3 POLY 173182338362316


## Coupler socket + inlet




DS
Advantages
Core range
DS1-30A
DS3-50A
DS6-90A
DS9-150A
DS2-250A
Dimensions


DS1/DS24C
DS3/DS37C
DS6/DS7C3 DS9 $48 \quad B \begin{array}{llllll} & B H & C & D & E & H \\ \emptyset d\end{array}$


Coupler socket connected (A1)/ disconnected (AO) in an inlet

|  | A1 | A0 |
| :--- | :---: | :---: |
| DS1/DS24C | 166 | 182 |
| DS3/DS37C | 174 | 190 |
| DS6/DS7C3 | 197 | 221 |
| DS9 | 246 | 275 |
| DS2/DS7C9 | 310 | 341 |

$30^{\circ}$ wall mounting appliance inlet


Coupler socket connected (A1)/ disconnected (Ao) in a $30^{\circ}$ wall mounting appliance inlet

BB: $180^{\circ}$ OPENING LID


|  | A | B | B' | CA | CP | D | E1 | E2 | H | Ød |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DS1/DS24C | 111 | 105 |  | 84 | 67 | 84 | 70 | 70 | 18 | 6 |
| DS3/DS37C | 129 | 126 |  | 89 | 66 | 100 | 77 | 88 | 24 | 6.5 |
| DS6/DS7C3 POLL | 170 | 158 |  | 105 | 92 | 128 | 89 | 112 | 31 | 7.5 |
| DS6/DS7C3 METAL | 150 | 121 |  | 127 | 92 | 130 | 105 | 105 | 28 | 7 |
| DS9 | 203 | 153 | 320 | 183 | 113 | 285 | 163 | 116 | 50 | 7 |
| DS2/DS7C9 $\left(60^{\circ}\right)$ | 267 | 233 | 400 | 226 | 130 | 315 | 202 | 154 | 50 | 10 |

$70^{\circ}$ wall mounting
appliance inlet


A B Ca D E E1 E2 H2 Ød
DS1/DS24C
DS1/DS24C
DS3/DS37C $\begin{array}{llllllllll}208 & 201 & 170 & 170 & 158 & 159 & 139 & 39 & 6.5\end{array}$

Coupler socket connected (A1)/ disconnected (Ao) in a $70^{\circ}$ wall mounting appliance inlet

$\begin{array}{llllll}\text { A1 } & \text { A0 } & \text { B } & \text { B1 } & \text { B0 } & \text { BB }\end{array}$
$\begin{array}{lllllll}\text { DS1/DS24C } & 193 & 199 & 221 & 260 & 276 & 151\end{array}$
$\begin{array}{llllllll}\text { DS3/DS37C } & 225 & 217 & 249 & 313 & 334 & 180\end{array}$
DS6/DS7C3 POLY $\begin{array}{llllllll}245 & 261 & 282 & 338 & 362 & 210\end{array}$
Coupler socket connected (A1)/ disconnected (AO) in a $30^{\circ}$ inclined appliance inlet
BB: $180^{\circ}$ OPENING LID


|  | A | B | CA | CP | D | D1 | D2 | E1 | E2 | Ød |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DS1/DS24C | 92 | 114 | 76 | 67 | 107 | 65 | 62 | 63 | 95 | 5.5 |
| DS3/DS37C | 100 | 120 | 76 | 66 | 107 | 65 | 68 | 63 | 95 | 5.5 |
| DS6/DS7C3 | 109 | 146 | 102 | 92 | 136 | 111 | 90 | 87 | 122 | 6.5 |
| DS9 | 153 | 159 | 140 | 113 | 142 | 110 | 100 | 124 | 124 | 7 |
| DS2/DS7C9 $\left(60^{\circ}\right)$ | 176 | 226 | 183 | 130 | 183 | 150 | 150 | 165 | 165 | 7 |

DS1/DS24C
DS3/DS37C
DS6/DS7C3
DS9
DS2/DS7C9 (60 $)$
$\begin{array}{llllll}\text { A1 } & \text { A0 } & \text { B } & \text { B1 } & \text { B0 } & \text { BB }\end{array}$ $\begin{array}{llllll}192 & 206 & 184 & 170 & 178 & 199\end{array}$ $\begin{array}{llllll}203 & 217 & 215 & 178 & 186 & 215\end{array}$ $\begin{array}{llllll}229 & 250 & 248 & 212 & 224 & 254\end{array}$ $302327311242 \quad 257$ 292308427347374
$70^{\circ}$ inclined appliance inlet

$\begin{array}{llllll}\text { A } & \text { B } & \text { CA } & \text { D } & \text { E1 } & \emptyset d\end{array}$

DS1/DS24C
DS3/DS37C
DS6/DS7C3
$\begin{array}{llllll}104 & 157 & 127 & 127 & 116 & 4.5\end{array}$ $\begin{array}{llllll}130 & 201 & 170 & 170 & 159 & 4.5\end{array}$ $\begin{array}{llllll}134 & 212 & 170 & 170 & 159 & 4.5\end{array}$

Coupler socket
connected (A1)/ disconnected (Ao)
in a $70^{\circ}$ inclined
appliance inlet



MARECHAL ELECTRIC multicontact plugs and socketoutlets are used for signal and control purposes. They convey information (power) and signals (low voltage). Example: telephone line connection, travelling crane controls ..

The silver-nickel alloy used for the contact tips provides optimum conductivity and high durability (several thousand cycles).
The casings provide high resistance to the most extreme conditions of use.

## Multicontact plugs \& sockets


P 12C
P $7 c$
DSN24C
DNge
\& 37C
\& 20 C

## Electrical features

| Plugs and socket-outlets for applications where low voltage signals are combined with high currents. | 6 to 7 contacts |  |  | 6 to 9 contacts (DNgC) and 6 to 20 contacts (DN2Oc) |
| :---: | :---: | :---: | :---: | :---: |
| Compact plug and socket-outlet | 6 to 12 co |  | 6 to 24 co (DSN24C) to 37 cont (DSN37C) |  |
| Current | 5 to 10 A | 16 to 25 A | 5 to 10 A | 25 to 30 A |
| Voltage | max. 500 | / 130 VDC | $\begin{aligned} & \text { max. } 415 \\ & \text { / } 130 \text { VDC } \end{aligned}$ | $\max .480 \mathrm{VAC}$ 1130 VDC |
| Contacts | Silver-nickel butt-contacts with metal braid |  |  |  |
| Active parts protected (with socket-outlet lid open) | IP2X | IP2X | IP2X | IP2X |
| Keying system (2) | 6 | 5 | 3 | from 2 (DNgc) to 4 (DN2OC) |
| Mechanical features |  |  |  |  |
| Automatic watertightness (3) | IP66/67 | IP66/67 | IP66/67 | IP54/55 |
| Watertightness $\begin{aligned} & \text { version with } \\ & \text { self-closing lid }\end{aligned}$ | IP55 | IP55 |  |  |
| Wiring (terminals) to be ... | soldered | mechanical | soldered | mechanical |
| Casing in metal (4) | $\checkmark$ | $\checkmark$ |  | $\checkmark$ |
| Ambient temperature | $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ (for temperatures outside this range, please contact us) |  |  |  |
| Casing in polyester (5) | $\checkmark$ | $\checkmark$ | $\checkmark$ |  |
| Ambient temperature | $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ (for temperatures outside this range, please contact us) |  |  |  |

[^8](4) anti-corrosion treated metal providing high temperature resistance and excellent mechanical resistance (IKog impact resistance)
(5) glass fibre reinforced polyester providing excellent electric insulation, high resistance to corrosive, UV and chemical agent environments and high mechanical resistance (IK08 impact resistance)

P $7 c$


Reversed interior and contacts
(female inlet) with IP54 cap


## Padlocking

(left - Padlock not supplied) or locking by triangular screw (right)


IP67 inlet cap

# Plugs and socket-outlets 6 to 7 contacts / 16 or 25 A 

Main features:

- (socket-outlet) IP
- (socket-outlet + inlet) IP
- |K (poly/metal)
- Umax AC

54 or 66/67 54 or 66/67 08/09 500 V

- Wiring (min - max) flexible
$1.5 / 4 \mathrm{~mm}^{2}$
- Wiring (min - max) stranded $2.5 / 6 \mathrm{~mm}^{2}$
- Keying positions

5

## (S) Socket-outlet (female)



IP55 socket-outlet with self-closing lid

|  | Poly version |  | Metal version |  |
| :---: | :---: | :---: | :---: | :---: |
| Polarity | U/I * | Part \# | U/I * | Part \# |
| 5P | 50/25 | 01 P4 050 | 50/25 | 09 P4 050 |
| 6P | 50/16 | 01 P4 060 | 50/16 | 09 P4 060 |
| 7P | 50/16 | 01 P4 070 | 50/16 | 09 P4 070 |
| $4 \mathrm{P}+\mathrm{E}$ | 500/25 | 01 P4 041 | 415/25 | 09 P4 041 |
| $5 \mathrm{P}+\mathrm{E}$ | 500/16 | 01 P4 051 | 415/16 | 09 P4 051 |
| $6 \mathrm{P}+\mathrm{E}$ | 500/16 | 01 P4 061 | 415/16 | 09 P4 061 |

* Maximum voltage (V) / Rated current (A)


## Version with self-closing lid (IP55):

Choose from the part numbers above and change letter $P$ for an $H$.

| Socket-outlet options |  |
| :--- | :--- |
| Reversed interior and contacts | Socket \# + 001 |
| Self-returning lid * | Socket \# + $\mathbf{R}$ |
| $180^{\circ}$-opening lid | Socket \# + 10 |
| 180-opening and self-returning lid * | Socket \# + 18 |
| Padlocking (padlock 4mm Ø) without shaft * | Socket \# + 843 |
| Locking by triangular screw * | Socket \# + 22 |
| * except for IP55 version |  |

## (1) Inlet (male)


poly and metal versions


|  | Poly version |  | Metal version |  |
| :--- | :--- | :--- | :--- | :--- |
| Polarity | U/I * | Part \# | U/I * | Part \# |
| 5P | $50 / 25$ | $01 \mathrm{P8} \mathbf{0 5 0}$ | $50 / 25$ | 09 P8 050 |
| 6P | $50 / 16$ | $01 \mathrm{P8} \mathbf{0 6 0}$ | $50 / 16$ | 09 P8 060 |
| 7P | $50 / 16$ | $01 \mathrm{P8} \mathbf{0 7 0}$ | $50 / 16$ | 09 P8 070 |
| 4P+E | $500 / 25$ | $01 \mathrm{P8} \mathbf{0 4 1}$ | $415 / 25$ | 09 P8 041 |
| 5P+E | $500 / 16$ | $01 \mathrm{P8} \mathbf{0 5 1}$ | $415 / 16$ | 09 P8 051 |
| 6P+E | $500 / 16$ | $01 \mathrm{P8} \mathbf{0 6 1}$ | $415 / 16$ | 09 P8 061 |

* Maximum voltage (V) / Rated current (A)

Inlet options
Reversed interior and contacts Inlet \# + 137

Inlet accessories
IP67 cap
01 NA 126

[^9]Multicontact plugs \& sockets
Advantages
PN12C-5/10 A
DSN24C-5A
DSN $37 C-5 A$
PN7C - 16 / 25 A
DNgC - 30 A
DN20C-25 A

## Installation accessories



## Our solutions for flat or steel armoured cables

You need a handle designed for flat or steel armoured cables?
Call us at 0145116000.


## MENNEKES ${ }^{\circledR}$

Plugs for the world

## Industrial plugs and sockets

## MENNEKES - highest quality world-wide.

# Create connections. 



Neudorf works / Germany


Production facilities in Kirchhundem / Germany


## Made in Germany

# Keep connections. 

For the world market we produce at three locations. The headquarter is in Kirchhundem / Germany.
Through regional sales offices, subsidiaries and international agencies we are truly a global company. More than 720 employees make sure, that MENNEKES products are popular in the whole world.


Only our products that pass the MENNEKES vigourous testing will bear the name.
Extremes of cold, heat, dust and water are tested in our laboratories again and again.
After this, the products are certified by accredited institutions.
According to international standards.

| Plugs |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | PowerTOP with external strain relief |  |  | PowerTOP with external strain relief |  |  |
| A | P | 110V | 230V | 400 V | 110V | 230V | 400 V |
| 63 | 3 | 1226A | 1227A | 1228A | 1570A | 1571A | 1572A |
| 63 | 4 | 1229A | 1230A | 1231A | 1108A | 1109A | 1110A |
| 63 | 5 | 1233A | 1234A | 1235A | 1112A | 1113A | 1114A |
| 125 | 3 | - | - | - | 3399A | 3400A | - |
| 125 | 4 | - | - | - | 1441A | 1442A | 1443A |
| 125 | 5 | - | - | - | 1445A | 1446A | 1447A |
|  |  | Power with nal str relief | OP <br> ter- <br> in |  | Powe with nal s relief | TOP <br> xterain |  |
| A | P | 110V | 230V | 400 V | 110V | 230V | 400 V |
| 63 | 3 | 1236A | 1237A | 1238A | 1573A | 1574A | 1575A |
| 63 | 4 | 1239A | 1240A | 1241A | 1115A | 1116A | 1117A |
| 63 | 5 | 1243A | 1244A | 1245A | 1119A | 1120A | 1121A |
| 125 | 3 | - | - | - | 3389A | 3390A | - |
| 125 | 4 | - | - | - | 1448A | 1449A | 1450A |
| 125 | 5 | - | - | - | 1452A | 1453A | 1454A |
| Receptacles |  |  |  |  |  |  |  |

Receptacles

|  |  |  |  | $\Delta \text { IP } 44$ |  |  | $\text { IP } 67$ |  |  | IP 67 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| A | P | 110V | 230V | 400 V | 110V | 230V | 400V | 110V | 230V | 400 V |
| 63 | 3 | 1136A | 1137A | 1138A | 856 | 128A | 129A | - |  | - |
| 63 | 4 | 1139A | 1140A | 1141A | 130A | 131A | 132A | - | - | - |
| 63 | 5 | 1143A | 1144A | 1145A | 134A | 135A | 136A | - | - | - |
| 125 | 3 | - | - | - | - | - | - | - | - | - |
| 125 | 4 | - | - | - | - | - | - | 137 | 138 | 139 |
| 125 | 5 | - | - | - | - | - | - | 141 | 142 | 143 |

PowerTOP with high heat resistant contact carrier and frame terminals, cable gland and external strain relief, plugs with nickel plated contacts.
Connectors
63A: with SoftCONTACT
125A: with TorsionSpringCONTACT

Panel mounted receptacles


| A | P | 110V | 230V | 400 V | 110V | 230V | 400V | 110V | 230V | 400 V | 110V | 230V | 400 V |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 63 | 3 | 1260A | 1261A | 1262A | 1263A | 1264A | 1265A | 1146A | 1147A | 1148A | 2179A | 2180A | 2181A |
| 63 | 4 | 1246A | 1247A | 1248A | 1122A | 1123A | 1124A | 1149A | 1150A | 1151A | 203A | 204A | 205A |
| 63 | 5 | 1250A | 1251A | 1252A | 1126A | 1127A | 1128A | 1153A | 1154A | 1155A | 207A | 208A | 209A |
| 125 | 3 | - | - | - | - | 3380 | - | - | - | - | - | 3575 | - |
| 125 | 4 | - | - | - | 1455 | 1456 | 1457 | - | - | - | 210A | 211A | 212A |
| 125 | 5 | - | - | - | 1459 | 1460 | 1461 | - | - | - | 214A | 215A | 216A |



### 3.3 FUSES \& SURGE PROTECTIVE DEVICES

- CRITEC - DAR-275V - Surge Filter Alarm Relay
- CRITEC - TDF-10A-240V - Surge Reduction Filter
- CRITEC- TDS1100-2SR-277 - Surge Diverter
- NHP - 63AMP 63MS - Fuses \& Holders
- POLYPHASER CORPORATION - IS-50NX-C2 - Radio Coax Surge Protection Unit

DINLINE ALARM RELAY (DAR)

## INSTALLATION INSTRUCTIONS



## 1. PREPARATION



DANGER: Electrical shock or burn hazard. Installation of this device should only be made by qualified personnel. Failure to lockout electrical power during installation or maintenance can result in fatal electrocution or severe burns. Before making any connections be sure that power has been removed from all associated wiring, electrical panels, and other electrical equipment.

## CAUTION NOTES:

1. The installation of this device should follow all applicable electrical codes, such as the National Electrical Code.
2. Check to make sure line voltage does not exceed DAR275V voltage ratings.
3. Follow all instructions to ensure correct and safe operation.
4. Do not attempt to open or tamper with the DAR in any way as this may compromise performance and will void warranty. No user serviceable parts are contained.

## 2. INTRODUCTION

Selected DSD, TDS \& TDF DINLINE Surge Protection Devices include status monitoring circuits which provide visual status display of device capacity. They may also provide a low voltage opto-coupler alarm output circuit that can be connect to the DAR to provide potential free (Form C) change-over contacts. The DAR alarm contacts may be used to provide output to external alarm systems or remote monitoring circuits.

One DAR can be used per DSD/TDS/TDF opto-coupler alarm or up to 16 DSD opto-coupler alarms can be connected in series to the one DAR to provide a common output. It is recommended that the DAR be powered from the same power circuit that feeds the device(s) being monitored, however the DAR can be powered from other circuits. This allows for example, one DAR unit to be connected to separate SPDs that are protecting a three phase circuit.

Note. Depending upon the usage of the DAR output contacts, failure of power to the DAR may be interpreted as a failure of one or more of the SPDs being monitored. Visual inspection of the DAR and SPDs status displays would determine this.

## 3. MOUNTING

The DAR is designed to clip to 35 mm (top hat) DIN rails (standard EN50022). Unless otherwise mechanically restrained, use horizontal DIN rails with the DAR module spring clips to the bottom and the label text the correct way up.

NOTE: The DAR must be installed in an enclosure or panel that:

- prevents the DAR temperature from exceeding

$$
131^{\circ} \mathrm{F}\left(55^{\circ} \mathrm{C}\right)
$$

- provides adequate electrical and safety protection
- prevents the ingress of moisture and water
- allows DAR status indicators to be inspected


## 4. ELECTRICAL CONNECTION

The interconnecting wiring should:

- be of size \#10 to \#14 AWG ( $2.5 \mathrm{~mm}^{2}$ to $6 \mathrm{~mm}^{2}$ ) solid or stranded conductor.
- The wire insulation should be stripped back $5 / 16$ " ( 8 mm ).
- NOTE: Do not use greater than 9inlbs (1Nm) of torque when tightening the terminals.


## CONNECTION TO TELECOMMUNICATIONS NETWORKS

The DAR is approved for use in Australia where the alarm contacts may be connected to private lines or building cabling associated with the telecommunications network. NO direct connection to the public switched network should be made.

## INSTALLATION INSTRUCTIONS

## 5. INTERCONNECTION

When connecting the DAR to a single opto-coupler output the + terminal of the SPD should connect to the + terminal on the DAR. The - terminal should connect to the -- terminal.

+/- terminal connections are polarity sensitive. Do not reverse.

When connecting the DAR to multiple opto-couplers the optocouplers should be connected in series with + terminal of one connected to the - terminal of the next. The DAR + terminal should connect to + SPD terminal at one end of the series connection and the - DAR terminal connect to the - SPD terminal at the other end of the series connection.


## 5. STATUS INDICATION

| STATUS | Protection Operational | Protection Alarm | Fault Mode |
| :---: | :--- | :--- | :--- |
| DISPLAY | Normal operation | DSDin alarm mode or power <br> to DSD has been removed | Power to DAR removed <br> Protection status unknown |
| EXPLANATION | Normal (green) indicator ON <br> Red indicator OFF <br> Relay is energised <br> Power is supplied | Normal (green) indicator OFF <br> Red indicator ON <br> Relay is de-energised <br> Power is supplied | Normal (green) indicatorOFF <br> Red indicator OFF <br> Relay is de-energised <br> Power is OFF |

## 6. FUSING AND ISOLATION

Overcurrent protection must be installed in the upstream circuit of the power supply to the DAR to provide protection to the unit itself and the wiring in case of fault conditions.
The fuse rating should be based on the wiring size used to connect to the DAR Ph \& N terminals. Australian regulations AS3000-1991, Table B2 specifies the following upstream protection for single phase circuits, unenclosed in air.

| Cable Size | HRC Fuse or | CB Rewirable Fuse |
| :--- | :---: | :---: |
| $1.5 \mathrm{~mm}^{2}$ | 16 A | 12 A |
| $2.5 \mathrm{~mm}^{2}$ | 20 A | 16 A |
| $4 \mathrm{~mm}^{2}$ | 25 A | 20 A |
| $6 \mathrm{~mm}^{2}$ | 32 A | 25 A |

Where overcurrent protection of the appropriate rating or smaller is already fitted in the upstream circuit, overcurrent protection at the DAR will not be required

## 6. MAINTENANCE \& TESTING

Before removing a DAR unit from service, ensure that the power has been removed. Maintenance, testing and replacement should only be undertaken by qualified personnel.

Testing of a DAR unit which is connected to a fully functional DSD unit can be accomplished by removing power to the DSD only. The DAR Status indication and output contacts should alter from the Normal to Fault condition.

Testing of the DAR unit alone may be accomplished by disconnecting the $+/$-connections to the unit. When power is applied the DAR "Fault" Status Indicator should be illuminated. By connecting the $+/$ - terminals together, the "Normal" Status Indicator should be illuminated. The output contacts should alter to the appropriate state.

## 7. USE OF OTHER INTERFACES

Only DAR units are recommended for the interfacing of equipment to the DSD, TDS \& TDF opto-coupler alarm output circuit(s). The direct connection of other equipment to these opto-coupler alarm outputs may not provide sufficient isolation or exceed the opto-coupler specifications. This may damage the SPD and/or the connected equipment. Warranty may be voided under such circumstances.

NOTE: In connecting to the SPD opto-coupler alarm output(s), do not reverse the +/- connections as damage may occur.


## Detailed specifications for ERICO's

## TRANSIENT DISCRIMINATING FILTER, TDF-10A SERIES

## Applications

jightning transients and surges are a major cause of expensive electronic squipment failure and business disruption. Damage may result in loss of computers, data commmunications, loss of revenue, and loss of profits. [he new Transient Discriminating Filter ${ }^{\mathrm{TM}}$ family of TVSS devices offer sconomical and reliable protection from power transients with the convenence of easy installation on 35 mm DIN rail mountings.
[he TDF series has been specifically designed for process control applicaions to protect the switched mode power supply units on devices such as ?LC controllers, SCADA systems and motor controllers. Units are availible for 3A, 10A and 20A loads and in a range of clamping voltages ncluding $30 \mathrm{~V}, 150 \mathrm{~V}, 275 \mathrm{~V}$. The range is intended for use in conjunction vith ERICO's Universal Transient Barrier UTB's to provide a coordinated ipproach to protection of both the power and data control circuits.
[he TDF is a series connected single phase surge filter providing an ıggregate surge capacity of 50kA ( $8 / 20 \mu \mathrm{~s}$ ) - 20kA L-N \& L-G and 10kA V-G. The space efficient low pass filter, provides some 65 dB of attenuaion to voltage transients. Not only does this reduce the residual let hrough voltage, but it helps further reduce the steep rates of rise of voltIge and current providing superior protection for sensitive electronic squipment.

## Features

- Compact design fits into most distribution boards and motor control centres
- High efficiency filtering - ideal for the protection of switched mode power supplies from large $\mathrm{dv} / \mathrm{dt}$ and di/dt transients
- Three modes of protection L-N, L-G, N-G
- 35mm DIN rail mount - DIN 43880 profile matches common MCB's
- LED indication and opto-isolated output for remote status monitoring
- Transient Discriminating Technology ensures safe operation during abnormal over-voltage events
- UL1449 Edition 2 recognized
- Large 50kA surge capacity provides a high level of protection and long operational life
- 5 year limited warranty


## PROCESS CONTROL TVSS PROTECTION



Due to a policy of continual product development, specifications are subject to change without notice. (C) Copyright 1999

Part Number Description
TDF-10A-120V 120V 1 phase, 50kA $8 / 20 \mu \mathrm{~s}$, 10A series TVSS protector TDF-10A-240V 240V 1 phase, 50kA $8 / 20 \mu \mathrm{~s}$, 10A series TVSS protector


ERICO's coordinated approach to facility protection - CADWELD, CRITEC, ERITECH www.erico.com

## EnTrenHo

## Features

- CRITEC® TD Technology with thermal disconnect protection
- Compact design fits into DIN distribution panel boards and motor control centers
- 35 mm DIN rail mount
- DIN 43880 profile matches common circuit breakers
- Indication flag and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module
- 100kA 8/20 maximum surge rating provides protection suitable for sub-distribution panels and a long operational life
- Available in various operating voltages to suit most common power distribution systems


## CRITEC ${ }^{\circ}$ TDS 1100 TDS Surge Diverter TDS1100 Series



Surges and voltage transients are a major cause of expensive electronic equipment failure and business disruption. Damage may result in the loss of capital outlays, such as computers and communications equipment, as well as consequential loss of revenue and profits due to unscheduled system down-time.

The TDS1100 series of surge suppressors provide economical and reliable protection from voltage transients on power distribution systems. They are conveniently packaged for easy installation on 35 mm DIN rail within main distribution panelboards.

CRITEC ${ }^{\circledR}$ TD technology helps ensure reliable and continued operation during sustained and abnormal over-voltage events. Internal thermal disconnect devices help ensure safe or at end-of-life. A visual indicator flag provides user-feedback in the event of such operation. As standard, the TDS1100 provides a set of voltage-free contacts for remote signaling that maintenance is due.

The convenient plug-in module, and separate base design, facilitates replacement of a failed surge module without needing to undo installation wiring.

## ERITECHㅁ <br> CRITEC ${ }^{*}$ TDS 1100 TDS Surge Diverter TDS1100 Series

| Model | TDS11002SR150 | TDS11002SR240 | TDS11002SR277 | TDS11002SR560 |
| :---: | :---: | :---: | :---: | :---: |
| Nominal Voltage Un | 120-150V~ | 220-240V~ | 240-277V~ | 480-560V~ |
| Max. Cont. Operating Voltage $U_{C}$ | 170V~ | 275V~ | 320V~ | 610V~ |
| Stand off Voltage | 240V~ | 440V~ | 480V~ | 700V~ |
| Frequency | $0-100 \mathrm{~Hz}$ |  |  |  |
| Short Circuit Current Rating Isc | 25kAIC |  |  |  |
| Required Back-up Fuse | 125AgL, if supply > 100A |  |  |  |
| Technology Used | TD with thermal disconnect |  |  |  |
| Protection |  |  |  |  |
| Maximum Discharge Current Imax | 100kA 8/20رs |  |  |  |
| Nominal Discharge Current In | 50kA 8/20 $/$ s | 40kA 8/20رs | 40kA 8/20رs | 40kA 8/20رs |
| Protection Modes | Single mode (L-G, L-N or N-G) |  |  |  |
| Voltage Protection Level Up @ 3kA | < 400V | < 700V | < 800V | < 1.6 kV |
| Voltage Protection Level Up @ 20kA | < 650 | < 1000 | < 1.1 kV | < 2kV |
| Alarms and Indicators |  |  |  |  |
| Status Indication | Mechanical flag / remote contacts Change-over, 250V~ / 0.5A, max $1.5 \mathrm{~mm}^{2}$ (\#14AWG) terminals |  |  |  |
| Physical Data |  |  |  |  |
| Dimensions | 2 modules wide, $90 \mathrm{~mm} \times 68 \mathrm{~mm} \times 35 \mathrm{~mm}$ |  |  |  |
| Weight | 0.24 kg approx. |  |  |  |
| Enclosure | DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1) |  |  |  |
| Connection | $\begin{aligned} & \leq 35 \mathrm{~mm}^{2} \text { (\#2AWG) solid } \\ & \leq 25 \mathrm{~mm}^{2} \text { (\#4AWG) stranded } \end{aligned}$ |  |  |  |
| Mounting | 35 mm top hat DIN rail |  |  |  |
| Temperature | $-40^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}\left(-40^{\circ} \mathrm{F}\right.$ to $\left.+176^{\circ} \mathrm{F}\right)$ |  |  |  |
| Humidity | 0 to 90\% |  |  |  |
| Test Standards |  |  |  |  |
| Approvals | CE, IEC ${ }^{\text {TM }}$ 61643-1, UL ${ }^{\text {® }} 1449$ Pending |  |  |  |
| Surge Rated to Meet | IEC 61643-1 Class I and II ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C |  |  |  |

## Ordering Information

| PART NUMBER | DESCRIPTION |
| :--- | :--- |
| TDS1102SR150 | TDS Surge Diverter, Uc 170V, In 50kA, Imax 100kA, Remote |
| TDS1102SR240 | TDS Surge Diverter, Uc 275V, In 40kA, Imax 100kA, Remote |
| TDS1102SR277 | TDS Surge Diverter, Uc 320V, In 40kA, Imax 100kA, Remote |
| TDS1102SR560 | TDS Surge Diverter, Uc 610V, In 40kA, Imax 100kA, Remote |
| TDS150150M | 150V Replacement Surge Module |
| TDS150240M | 240V Replacement Surge Module |
| TDS150277M | 277V Replacement Surge Module |
| TDS150560M | 560V Replacement Surge Module |

Due to a policy of continual product development, specifications are subject to change without notice.

[^10]
## www.erico.com

Refer Catalogue NF
( Ratings from 2 to 1250A
$\bigcirc$ Reduced dimensions
Superior short circuit protection
O Complies with BS88

- Low watts loss


## 

## NVCB8

Rating (A) BS 88 Ref Cat. No.
Clip-in offset tags

| 2 | F1 | NNS 2 |  |
| :---: | :--- | :--- | :--- |
| 4 | F1 | NNS 4 |  |
| 6 | F1 | NNS 6 |  |
| 10 | F1 | NNS 10 |  |
| 16 | F1 | NNS 16 |  |
| 20 | F1 | NNS 20 |  |
| 25 | F1 | NNS 25 |  |
| 32 | F1 | NNS 32 |  |
| 20 M25 | F1 | NS 20M25 |  |
| $20 M 32$ | F1 | NS 20M32 |  |
| 20 | F2 | NES 20 |  |
| 25 | F2 | NES 25 |  |
| 32 | F2 | NES 32 |  |
| 40 | F2 | NES 40 |  |
| 50 | F2 | NES 50 |  |
| 63 | F2 | NES 63 |  |

Note: $\quad \mathrm{M}$ in catalogue No. denotes motor starting type.


| BS solid links |  |  |  |
| :---: | :--- | :--- | :--- |
| Type | To suit fuse <br> holder | Cat. No. |  |
| Clip-in | NV32 | 32CLK |  |
| Clip-in | NV63 | 63CLK |  |
| Bolt-in | N20_ | 20MFNL |  |
| Bolt-in | N32_ | 32MFNL |  |
| Bolt-in | N63_ | 63MFNL |  |
| Bolt-in | N100_ | 100MFNL |  |
| Bolt-in | N200_ | 200MFNL |  |

8 way comb busbar

- Suits NV20FW/NV32FW fuses

Cat. No.

| 8 way comb busbar |
| :---: |

Rating (A) BS 88 Ref Cat. No.
Bolted pattern offset tags


Refer Catalogue NF
This chart is designed to help choose the correct fuse to fit a particular Strömberg switch fuse (or vice versa) and to help choose the correct replacement fuse. Some data is from other manufacturers publications and as such cannot be guaranteed by NHP. Beware that some motor start fuses are in a larger body size than a normal fuse. It is wise to consult the fuse manufacturers data to determine their particular fuse sizes (ie. A2-C3).

Fuse manufacturers part numbers - Australian/British standard

| BS <br> Ref. | Amps |  | Alstrom | Holec | GEC | Dorman Smith | Federal | Brush | Siemens |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| F1 | 2... 32 | NNS | SN2 | NS | NS | NSD | 20/32C | F06 | 3NW NS |
| F2 | 20... 63 | NES | SP | NES | ES | ESD | - | - | 3NW ES |
| A1 | 2... 32 | NNIT | SA2 | NIT | NIT | NITD | 20/32B | F21 | 3NW NIT |
| A2 | 2... 32 | NTIA | SB3 | TIA | TIA | AAO | 32B | H07 | 3NW TIA |
| A3 | 35... 63 | NTIS | SB4 | TIS | TIS | BAO | 63B | K07 | 3NW TIS |
| - | 80... 100 | NOS | SO | - | OS | OSD | - | K07R | 3NW OS |
| A4 | 80... 100 | NTCP | SD5 | TCP | TCP | CEO | 100B | L14 | 3NW TCP |
| Hybrid (A4) | 125... 200 | NTFP ${ }^{1}$ ) | SD6 | TFP | TFP | DEO | - | M14 | 3NW TFP |
| - | 2... 32 | NTB | SE3 | TB | TB | AC | - | K08 | - |
| B1 | 2... 32 | NTBC | SF3 | TBC | TBC | AD | - | K09 | 3NW TBC |
| - | 40... 63 | NTB | SE4 | TB | TB | BC | - | K08 | 3NW TB |
| B1 | 40... 63 | NTBC | SF4 | TBC | TBC | BD | 63B/C | K09 | 3NW TBC |
| B1 | 80... 100 | NTC | SF5 | TC | TC | CD | 100B/C | L09 | 3NW TC |
| B2 | 125... 200 | NTF | SF6 | TF | TF | DD | 200B/C | M09 | 3NW TF |
| B3 | 250... 315 | NTKF | SF7 | TKF | TKF | ED | 315B/C | N09 | 3NW TKF |
| - | 250... 315 | NTKM | SG7 | TKM | TKM | - | - | N11 | 3NW TKM |
| B4 | 355... 400 | NTMF | SF8 | TMF | TMF | ED | 400B/C | P09 | 3NW TMF |
| C1 | 355... 400 | NTM | SH8 | TM | TM | EF | 404B/C | P11 | 3NW TM |
| C 2 | 450... 630 | NTTM | SH9 | TTM | TTM | FF | 504B/C | R11 | 3NW TTM |
| - | 450... 630 | NTT | SY9 | - | TT | FG | - | R12 | - |
| C3 | 710... 800 | NTLM | SH10 | TLM | TLM | GF | 804B/C | S12 | 3NW TLM |
| - | 710... 800 | NTLT | SY10 | - | TLT | GG | - | S12 | 3NW TLT |
| D1 | 1000... 1250 | NTXU | SJ11 | - | TXU | GH | - | U44 | - |
| Din pattern |  |  |  |  |  |  |  |  |  |
| 00 | 6... 160 | N00 | 7999 | P851.00 | NHG-00 | - | - | - | 3NA5 |
| 1 | 25... 250 | N1 | 8001 | P851.1 | NHG-1 | - | - | - | 3NA4 144 |
| 2 | 80... 400 | N2 | 8002 | P851.2 | NHG-2 | - | - | - | 3NA4 260 |
| 3 | 315... 630 | N3 | 8003 | P851.3 | NHG-3 | - | - | - | 3NA1 |
| Fuse holders |  |  |  |  |  |  |  |  |  |
| Clip in | 20A | NV20FW | V20FW | J2011 | SC20 |  |  |  | 3NW CM2OF |
|  | 32A | NV32FW | V32FW | - | SC32 |  |  |  | 3NW 32NNSF |
| Front wired | 20A | N20FW | 20MFB | - | RS20H |  |  |  | - |
|  | 32A | N32FW | 32MFB | J3211 | RS32H |  |  |  | 3NW CM32F |
|  | 63A | N63FW | 63MFB | J6311 | RS63H |  |  |  | 3NW CM63F |
|  | 100A | N100FW | 100MFB | J9911 | RS100H |  |  |  | 3NW CM100F |
|  | 200A | N200FW | 200MFB | J1991 | RS200H |  |  |  | 3NW 200DF |
| Stud/ <br> front wired | 20A | N20SFW | 20MFD | - | RS20PH |  |  |  | - |
|  | 32A | N32SFW | 32MFD | - | RS32PH |  |  |  | - |
|  | 63A | N63SFW | 63MFD | - | RS63PH |  |  |  | - |
|  | 100A | N100SFW | 100MFD | - | RS100PH |  |  |  | - |
|  | 200A | N200SFW | 200MFD | - | RS200PH |  |  |  | 3NW 200DFB |

Note: $\quad{ }^{1}$ ) This hybrid type fuse is actually an A4 size fuse, but as it is over 100 amps it cannot be called an A4 fuse to AS 2005.

## HRC cartridge fuse-links

NHP Compact fuses


#### Abstract

NHP Compact 415 V fuse-links are available in ratings from 2A up to 1250A and advanced design techniques mean that watts loss figures have been substantially reduced whilst protection characteristics remain unchanged.


All NHP Compact HRC fuse-links are manufactured using precision assembly methods to ensure that their performance will conform with the published characteristics within very close tolerances.
Cartridge barrels are extruded under vacuum to prevent the occurrence of air pockets. Each fuse is then fully filled, using a vibratory method, with specially prepared, dried and graded powdered silica. The end caps are press fitted on to the precision ground barrels ensuring a very tight fit.
Fuse elements are accurately shaped and manufactured for consistency and reliability.
All NHP Compact fuse-links are subjected to a resistance test to prove correct assembly.
NHP Compact HRC fuse-links, other than motor rated patterns, have utilisation categories gG.
Schedules of equivalent fuse-links made by certain other manufacturers are included in the following pages. No claim is made of identical performance under all conditions, the schedules being provided to assist on the selection of fuse-links having similar ratings, dimensions and fixing centres. Characteristic curves and associated data are provided to aid accurate discrimination.

## Motor rated fuse-links

BS88 now aligns with the international fuse specification IEC 269. The concept of "fusing factor" has been replaced with "utilisation category". Class Q1 fusing factor is now referred to as " $\mathrm{gG}^{\prime}$ " and motor rated fuse-links are referred to as " $\mathrm{gM}^{\prime}$ ". Special motor rated fuse-links are also listed and are available in various barrel sizes, in each case fitted with special fuse elements. Their selection frequently permits the use of lower rated switch and/or fusegear than would be the case using Class gG fuse-links. This range of fuse-links has been ASTA certified for a breaking capacity of 80 kA at 415 V AC.
NHP Compact industrial bolted pattern fuse-links conform with BS 88: Part 2: 1988 and, have been ASTA certified for a breaking capacity of 80 kA at 415 V AC or 550 V AC and have utilisation categories gG .
NHP Compact fuse-links are suitable for back-up protection in motor circuits, having excellent time delay characteristics with low fusing factor and high rupturing capacity.
Fuses for use in motor circuits should be selected in accordance with the requirements for the protection of motor control gear as specified by the control gear manufacturer.

As a guide, the following table shows the minimum fuse sizes that may be associated with motors based on the assumption that the starting conditions for typical 3 phase 4 pole 415 V motors are; $8 \times$ F.L.C. for 6 secs [D.O.L.] and $4 \times$ F.L.C. for 12 secs [Star Delta].
Should more specific information be required to assist on individual projects please contact your nearest NHP office or distributor.
fuse-link selection for motor circuit protection

| Mot kW | hp | Approx f.l.c. amps | D.O.L. standard fuse-link amps | Starting motor circuit fuse-link | Assisted start standard fuse-link amps |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 0.19 | 0.25 | 0.7 | 4 |  | 2 |
| 0.37 | 0.5 | 1.3 | 6 |  | 4 |
| 0.55 | 0.75 | 1.6 | 6 |  | 4 |
| 0.75 | 1.0 | 1.8 | 10 |  | 4 |
| 1.1 | 1.5 | 2.6 | 10 |  | 6 |
| 1.5 | 2.0 | 3.4 | 10 |  | 10 |
| 2.2 | 3.0 | 5.0 | 16 |  | 10 |
| 3.0 | 4.0 | 6.5 | 16 |  | 10 |
| 4.0 | 5.5 | 8.0 | 20 | 20M25 | 16 |
| 5.5 | 7.5 | 11.0 | 25 | 20M32 | 16 |
| 7.5 | 10 | 15 | 40 | 32M40 | 25 |
| 11.0 | 15 | 22 | 50 | 32M50 | 32 |
| 15.0 | 20 | 28 | 63 | 32M63 | 40 |
| 18.5 | 25 | 36 | 80 | 63M80 | 50 |
| 22 | 30 | 39 | 80 | 63M80 | 63 |
| 30 | 40 | 52 | 100 | 63M100 | 63 |
| 37 | 50 | 69 | 160 | 100M160 | 80 |
| 45 | 60 | 79 | 160 | 100M160 | 100 |
| 55 | 75 | 96 | 200 |  | 160 |
| 75 | 100 | 125 | 200 | 200M250 | 160 |
| 90 | 125 | 156 | 250 | 200M250 | 160 |
| 110 | 150 | 189 | 315 |  | 200 |
| 132 | 175 | 224 | 355 |  | 250 |
| 150 | 200 | 255 | 355 |  | 250 |
| 160 | 220 | 275 | 400 |  | 315 |
| 185 | 250 | 318 | 450 |  | 315 |
| 200 | 270 | 339 | 500 |  | 355 |
| 220 | 300 | 374 | 560 |  | 400 |
| 257 | 350 | 450 | 630 |  | 450 |
| 295 | 400 | 500 | 710 |  | 500 |
| 315 | 430 | 535 | 710 |  | 560 |
| 355 | 483 | 580 | 800 |  | 630 |
| 400 | 545 | 646 | 800 |  | 710 |
| 450 | 612 | 725 | 1000 |  | 800 |




NNS-Type staggered contacts br
Overall Overall

| Current rating A Normal Motor | Overall length mm | Overall dia. mm | NHP <br> Cat No. | Cross reference |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | MEM | GEC/Lawson | Siemens | Brush/ Hawker | Bussman/ Dorman Smith |
| 2 |  |  | NNS2 | 2SN2 | NS2 | 3NW NS2 | 2F06 | NSD2 |
| 4 |  |  | NNS4 | 4SN2 | NS4 | 3NW NS4 | 4F06 | NSD4 |
| 6 |  |  | NNS6 | 6SN2 | NS6 | 3NW NS6 | 6F06 | NSD6 |
| 10 |  |  | NNS10 | 10SN2 | NS10 | 3NW NS10 | 10 F 06 | NSD10 |
| 16 |  |  | NNS16 | 16SN2 | NS16 | 3NW NS16 | 16 F 06 | NSD16 |
| 20 | 60 | 14 | NNS20 | 20SN2 | NS20 | 3NW NS20 | 20 F 06 | NSD20 |
| $20 \quad 25$ |  |  | NNS 20M25 | 20SN2M25 | NS20M25 | 3NW M25 | 20M25F06 | NSD20M25 |
| $20 \quad 32$ |  |  | NNS 20M32 | 20SN2M32 | NS20M32 | 3NW M32 | 20M32F06 | NSD20M32 |
| 25 |  |  | NNS25 | 25SN2 | NS25 | 3NW NS25 | $25 \mathrm{FO6}$ | NSD25 |
| 32 |  |  | NNS32 | 32SN2 | NS32 | 3NW NS32 | 32F06 | NSD32 |

NES-Type staggered contacts breaking capacity 80kA at 415V AC to ASTA certified to BS 88: Part 6: 1988


| 20 |  |  | NES20 | 20SP | - | - |  | ESD20 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 25 |  |  | NES25 | 25SP | - | - | - | ESD25 |
| 32 |  | 17 | NES32 | 32SP | - | - | - | ESD32 |
| 40 |  | 17 | NES40 | 40SP | 40ES | 3NWES40 | 40G05 | 3SD40 |
| 50 |  |  | NES50 | 50SP | 50ES | 3NWES50 | 50G05 | ESD50 |
| 63 |  |  | NES63 | 63SP | 63ES | 3NWES63 | 63G05 | ESD63 |



Industrial bolted pattern. Offset contacts ASTA certified to BS 88: Part 2: 1988.
Complies with IEC 269 Parts 1 and 2. Tested to 80kA at 415V AC

| NHP Compact industrial bolted pattern. Centre contacts, ASTA certified to BS 88: Part 2: 1988. Complies with IEC 269 parts 1 and 2. Tested to 80kA at 415V AC. *550V AC. |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Current rating A |  | Fixing centres | $\begin{aligned} & \text { BS88 } \\ & \text { ref } \end{aligned}$ | NHP <br> Cat No. | Cross reference |  |  |  |  |
|  |  |  |  |  |  |  | Brush/ | Bussman/ |
| Normal | Motor |  |  |  | MEM | GEC/Lawson | Siemens | Hawker | Dorman Smith |
| 2 |  |  |  |  | NTB2* | 2SE3 | TB2 | 3NWTB2 | 2K08 | AC2 |
| 4 | - |  |  | NTB4* | 4SE3 | TB4 | 3NWTB4 | 4K08 | AC4 |
| 6 | - |  |  | NTB6* | 6SE3 | TB6 | 3NWTB6 | 6K08 | AC6 |
| 10 | - |  |  | NTB10* | 10SE3 | TB10 | 3NWTB10 | 10K08 | AC10 |
| 16 | - |  |  | NTB16* | 16SE3 | TB16 | 3NWTB16 | $16 \mathrm{K08}$ | AC16 |
| 20 |  |  |  | NTB20* | 20SE3 | TB20 | 3NWTB20 | 20K08 | AC20 |
| 25 |  |  | - | NTB25* | 25SE3 | TB25 | 3NWTB25 | 25K08 | AC25 |
| 32 | - |  |  | NTB32* | 32SE3 | TB32 | 3NWTB32 | 32K08 | AC32 |
| 40 | - |  |  | NTB40* | 40SE3 | TB40 | 3NWTB40 | 40K08 | BC40 |
| 50 | - |  |  | NTB50* | 50SE3 | TB50 | 3NWTB50 | 50K08 | BC50 |
| 63 |  |  |  | NTB63* | 63SE3 | TB63 | 3NWTB63 | 63K08 | BC63 |
| 63 | 80 |  |  | NTB63M80 | 63SE4M80 | TB63M80 | 3NWTB63M80 | - | - |
| 63 | 100 |  |  | NTB63M100 | 63SE4M100 | TB63M100 | 3NWTB63M100 | - |  |
| 2 |  |  |  | NTBC2 | 2SF3 | TBC2 | 3NW TBC2 | 2K09 | AD2 |
| 4 | - |  |  | NTBC4 | 4SF3 | TBC4 | 3NW TBC4 | 4K09 | AD4 |
| 6 | - |  |  | NTBC6 | 6SF3 | TBC6 | 3NW TBC6 | 6K09 | AD6 |
| 10 | - |  |  | NTBC10 | 10SF3 | TBC10 | 3NW TBC10 | $10 \mathrm{KO9}$ | AD10 |
| 16 | - |  |  | NTBC16 | 16SF3 | TBC16 | 3NW TBC16 | $16 \mathrm{KO9}$ | AD16 |
| 20 |  |  |  | NTBC20 | 20SF3 | TBC20 | 3NW TBC20 | 20K09 | AD20 |
| 25 |  |  | B1 | NTBC25 | 25SF3 | TBC25 | 3NW TBC25 | 25K09 | AD25 |
| 32 | - |  |  | NTBC32 | 32SF3 | TBC32 | 3NW TBC32 | 32K09 | AD32 |
| 40 |  |  |  | NTBC40 | 40SF3 | TBC40 | 3NW TBC40 | 40K09 | AD40 |
| 50 | - |  |  | NTBC50 | 50SF3 | TBC50 | 3NW TBC50 | 50K09 | AD50 |
| 63 |  |  |  | NTBC63 | 63SF3 | TBC63 | 3NW TBC63 | 63K09 | AD63 |
| 63 | 80 |  |  | NTBC63M80 | 63SF4M80 | TBC63M80 | 3NW TBC63M80 | - |  |
| 63 | 100 |  |  | NTBC63M100 | 63SF4M100 | TBC63M100 | 3NW TBC63M100 |  |  |
| 80 |  |  |  | NTC80 | 80SF5 | TC80 | 3NW TC80 | 80L09 | CD80 |
| 100 |  | 111 | B1 | NTC100 | 100SF5 | TC100 | 3NW TC100 | 100L09 | CD100 |
| 100 | 125 |  |  | NTC100M125 | 100SF5M125 | TC100M125 | 3NW TC100M125 | 100M125L09 | CD100M125 |
| 100 | 160 |  |  | NTC100M160 | 100SF5M160 | TC100M160 | 3NW TC100M160 | 100M160L09 | CD100M160 |
| 100 | 200 |  |  | NTC100M200 | 100SF5M200 |  |  |  |  |
| $125$ |  |  |  | NTF125 | 125SF6 | TF125 | 3NW TF125 | 125M09 | DD125 |
| 160 |  | 111 | B2 | NTF160 | 160SF6 | TF160 | 3NW TF160 | 160M09 | DD160 |
| 200 |  |  |  | NTF200 | 200SF6 | TF200 | 3NW TF200 | 200M09 | DD200 |
| 200 | 250 |  |  | NTF200M250 | 200SF6M250 | TF200M250 | 3NW TF200M250 | 200M250MO9 | DD200M250 |
| 200 | 315 |  |  | NTF200M315 | 200SF6M315 | TF200M315 | 3NW TF200M315 | 200M315M09 |  |
|  |  |  | B3 | NTKF250 | 250SF7 | TKF250 | 3NW TKF250 | 250NO9 | ED250 |
| 315 | $-\quad\}$ | 111 |  | NTKF315 | 315SF7 | TKF315 | 3NW TKF315 | 315N09 | ED315 |
| 315 | 400 |  |  | NTKF315M400 | 315SF7M400 |  | 3NW TKF315M400 |  |  |
| 250 |  | 133 | - | NTKM250 | 250SG7 | TKM250 | 3NW TKM250 | 250N11 | EFS250 |
| 315 | \} |  |  | NTKM315 | 315SG7 | TKM315 | 3NW TKM315 | 315N11 | EFS315 |
| 355 |  | 111 | B4 | NTMF355 | 355SF8 | TMF355 | 3NW TMF355 | 355P09 | ED355 |
| 400 | - J |  |  | NTMF400 | 400SF8 | TMF400 | 3NW TMF400 | 400P09 | ED400 |
| 355 | - $\}$ | 133/ | C1 | NTM355 | 355SH8 | TM355 | 3NW TM355 | 355P11 | EF355 |
| 400 | - J | 184 |  | NTM400 | 400SH8 | TM400 | 3NW TM400 | 400P11 | EF400 |
| 450 | - |  |  | NTTM450 | 450SH9 | TTM450 | 3NW TTM450 | 450R11 | FF450 |
| 500 | - | 133/ | C2 | NTTM500 | 500SH9 | TTM500 | 3NW TTM500 | 500R11 | FF500 |
| 560 | - $\quad$ - |  |  | NTTM560 | 560SH9 | TTM560 | 3NW TTM560 | 560R11 | GF550 |
| 630 | - |  |  | NTTM630 | 630SH9 | TTM630 | 3NW TTM630 | 630R11 | GF630 |
| 450 |  | 165/ | - | NTT450 | 450SY9 | TT450 | 3NWTT450 | 450R12 | FG450 |
| 500 |  | 229 |  | NTT500 | 500SY9 | TT500 | 3NWTT500 | 500R12 | FG500 |
| 560 |  |  |  | NTT560 | 560SY9 | TT560 | 3NWTT560 | 560R12 | FG560 |
| 630 |  |  |  | NTT630 | 630SY9 | TT630 | 3NWTT630 | 630R12 | FG630 |
| 710 |  | 165/ | - | NTLT710 | 710 SY10 | TLT710 | 3NWTLT710 | 710 S12 | GG710 |
| 800 |  | 229 |  | NTLT800 | 800 SY10 | TLT800 | 3NWTLT800 | 800 S12 | GG800 |
| $710$ |  | 133/ | C3 | NTLM710 | 710SH10 | TLM710 | 3NW TLM710 | 700S11 | GF710 |
| 800 |  | 184 |  | NTLM800 | 800SH10 | TLM800 | 3NW TLM800 | 800 S11 | GF800 |
| 1000 |  |  |  | NTXU1000 | 1000SJ11 | TXU1000 | - | 1000U44 | GH1000 |
|  | - | 149 | D1 |  |  |  |  |  |  |
| 1250 |  | , |  | NTXU1250 | 1250SH11 | TXU1250 | - | 1250 U44 | GH1250 | HRC cartridge fuse-links


| Dimens | ns ( |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Fuse link type | A max. mm | B <br> max. <br> mm | D <br> max. <br> mm | E mm | F mm | G <br> nom. <br> mm | H mm | J mm | L mm |
| NNIT | 36 | 14 | 55 | 11 | 0.8 | 44.5 | 4.8 | - | - |
| $\left.\begin{array}{l} \text { NTIA } \\ \text { NTIS } \end{array}\right\}$ | 56 | 21 | 86 | 9 | 1.2 | 73 | 5.5 | 7.5 | - |
| NTIS(M) | 45 | 27 | 90 | 13 | 1.6 | 73 | 5.8 | 10 | - |
| NOS | 45 | 27 | 90 | 13 | 1.6 | 73 | 5.8 | 10 | - |
| NTCP | 48 | 27 | 111 | 16 | 3.2 | 94 | 9 | - | - |
| NTCP(M) | 48 | 30 | 111 | 19 | 3.2 | 94 | 9 | - | - |
| NTFP | 48 | 30 | 111 | 19 | 3.2 | 94 | 9 | - | - |
| NTFP(M) | 48 | 40 | 111 | 19 | 3.2 | 94 | 9 | - | - |
| NTB | 57 | 21 | 114 | 13 | 1.6 | 97 | 7.2 | 11 | - |
| NTB...M... | 57 | 26 | 116 | 13 | 1.6 | 97 | 7.2 | 11 | - |
| NTBC | 57 | 21 | 134 | 16 | 2.0 | 111 | 8.7 | 16 | - |
| NTBC...M... | 58 | 26 | 136 | 16 | 3.2 | 111 | 8.7 | 16 | - |
| NTC | 48 | 27 | 134 | 16 | 3.2 | 111 | 9 | 12.5 | - |
| NTF | 48 | 30 | 137 | 19 | 3.2 | 111 | 9 | 12.5 | - |
| NTKF | 48 | 40 | 137 | 19 | 3.2 | 111 | 9 | 12.5 | - |
| NTMF | 51 | 40 | 138 | 25 | 5.0 | 111 | 9 | 12.5 | - |
| NTKM | 48 | 40 | 159 | 19 | 3.2 | 133 | 10.5 | 14 | - |
| NTM | 51 | 40 | 211 | 25 | 5.0 | 133/184 | 10.5 | 14 | 25.4 |
| NTTM | 59 | 53 | 212 | 25 | 6.3 | 133/184 | 10.5 | 14 | 25.4 |
| NTLM | 84 | 82 | 210 | 26 | 10 | 133/184 | 10.3 | 16 | 25.4 |
| NTT | 83 | 74 | 267 | 38 | 6.5 | 165 | 10.3 | 16 | 32 |
| NTLT | 84 | 82 | 267 | 38 | 10 | 165 | 10.3 | 16 | 32 |
| NTXU | 83 | 100 | 198 | 63.5 | 9.5 | 149 | 14.3 | 19 | 32 |



NTT, NTLT, NTM, NTTM, NTLM types


NTXU type


## $I^{2}$ t characteristics

| $1{ }^{2} \mathrm{t}$ characteristics |  |  |  |
| :---: | :---: | :---: | :---: |
| Rating <br> (amperes) | $I^{2} t$ pre-arcing | $I^{2} t$ total <br> @ 240 volts | $I^{2}$ t total @ 415 volts |
| 2 | 2 | 2 | 4 |
| 4 | 10 | 15 | 21 |
| 6 | 34 | 52 | 74 |
| 10 | 188 | 289 | 408 |
| 16 | 92 | 211 | 412 |
| 20 | 155 | 355 | 690 |
| 20M25 | 574 | 1084 | 1809 |
| 20M32 | 574 | 1561 | 2605 |
| 25 | 826 | 1084 | 1809 |
| 32 | 826 | 1561 | 2605 |
| 35 | 1200 | 2400 | 4100 |
| 32M40 | 2482 | 4416 | 7019 |
| 32M50 | 3305 | 5879 | 9345 |
| 32M63 | 5875 | 10452 | 16612 |
| 40 | 2482 | 4416 | 7019 |
| 50 | 3305 | 5879 | 9345 |
| 63 | 5875 | 10452 | 16612 |
| 80 \& 63M80 | 7800 | 15500 | 26000 |
| 100 \& 63M100 | 14000 | 28000 | 46000 |
| 125 \& 100M125 | 30000 | 51000 | 75500 |
| 160 \& 100M160 | 58500 | 99000 | 145000 |
| 200 \& 100M200 | 120000 | 205000 | 300000 |
| 250 \& 200M250 | 210000 | 360000 | 530000 |
| 315 \& 200M315 | 270000 | 460000 | 680000 |
| 355 | 365000 | 620000 | 915000 |
| 400 \& 315M400 | 480000 | 820000 | 1200000 |
| 450 | 755000 | 1300000 | 1900000 |
| 500 | 1100000 | 1850000 | 2700000 |
| 560 | 1200000 | 2400000 | 4000000 |
| 630 | 1550000 | 3100000 | 5150000 |
| 710 | 1903565 | 2992861 | 4306813 |
| 800 | 3820349 | 6006505 | 8643534 |
| 1000 | 7000000 | 1500000 | 16000000 |
| 1250 | 12000000 | 20500000 | 30000000 | Fuse curves




## NHP Compact

 BS fuses cut-off current data from 20 to 630 ampsFuse curves

## NHP Compact

 BS fuses from 80A to 630 amps (including motor rated fuses)NHP Compact BS fuses cut-off current data from 80 to 630 amps




NHP Compact DIN fuses
Pre-arcing and Total ${ }^{12}$ t energies, from 6 to 630 amps

NHP Compact DIN fuses cut-off current data from 6 to 500 amps



NHP Compact DIN fuses
Fuse curves
from 6 to 630 amps

## Technical Support

## Explanatory Notes

## Lightning Protection

Lightning damages equipment at radio communications sites every day. Although lightning is a DC pulse, the time from zero current to peak current can be very fast. When lightning energy travels through a coaxial cable, there is a slight propagation delay that occurs due to the unbalanced inductances of the shield and centre conductor, and the centre conductor's capacitive relationship through the dielectric to the shield. The higher-frequency shield energy will arrive at the equipment first, followed by the centre conductor energy. Since the pulse energy arrives at different times, a differential voltage occurs. A properly designed coaxial protector equalises this potential difference, which prevents current flow and therefore damage to the site's equipment.

However, the choice of a standard gas tube type coaxial protector without DC blocking may not offer the user complete protection. The fast rise-time lightning pulse can produce over 1000 Volts across the gas tube before the gas can ionise and become conductive. Since there is no DC blocking mechanism, this high voltage is applied directly to the equipment input before the gas tube turns on.

A quarter wave stub coaxial protector creates a band-pass filter, at a frequency determined by the length of the quarter wave coaxial section from the horizontal centre conductor to the grounded base. However, if the equipment input is DC-shorted, the quarter wave stub can allow significant divided DC and low frequency energy to flow towards the equipment input.

A "DC blocking mechanism" inside the protector (no DC continuity through the protector) will prevent harmful levels of throughput energy from reaching the equipment. RFI stocks and distributes the patented PolyPhaser DC-blocked coaxial protector line, which has the lowest throughput specifications in the industry. There is also a series of PolyPhaser coaxial protectors that block DC in the RF path to the equipment, and either inject, pass through, or pick off a specified DC voltage on the feeder's coaxial cable centre conductor. This series of protectors is particularly suited to applications requiring DC to be passed up the coaxial feeder cable to power tower-top amplifier electronics.

Remember that no matter how good your lightning protector is, it's not a fuse. It still needs to be correctly installed and connected to a suitable grounding system. RFI offers a complete range of products to protect your system, including the coaxial protector, grounding rods, copper strapping and grounding kits for the feeder cables.



## IS-B5OHN-CO

Throughput Energy: $\leq 20 \mathrm{~mJ} \mathrm{~J}^{*}$ ( N Connector/ Bulkhead)
Frequency Range: 1.5 MHz to 400 MHz Max Power: HF 3kW, VHF 500W, UHF 250W

## IS-B5OLN-C1

Throughput Energy: $\leq 600 \mu J^{*}$ (N Connector/ Bulkhead)
Frequency Range: 50 MHz to 700 MHz Max Power: VHF 375W, UHF 125W
IS-B5OHN-C1
Throughput Energy: $\leq 1 \mathrm{~mJ}$ * (N Connector/ Bulkhead)
Frequency Range: 50 MHz to 700 MHz Max. Power: VHF 500W, UHF 250W
IS-B50LN-C2
Throughput Energy $\leq 220 \mu \mathrm{~J}^{*}$ ( N Connector/ Bulkhead)
Frequency Range: 125 MHz to 1000 MHz Max. Power VHF 375W, UHF (low) 125W 900 MHz to 1 GHz 50 W
IS-B50HN-C2
Throughput Energy: $\leq 800 \mu \mathrm{~J} *$ (N Connector/ Bulkhead)
Frequency Range: 125 MHz to 1000 MHz Max. Power: VHF 500W, UHF (low) 250W 800 MHz to 1 GHz 125 W
IS-B50UX-CO
Throughput Energy: $\leq 10 \mathrm{~mJ}{ }^{*}$ (UHF Connector/ Surface)
Frequency Range: 1.5 MHz to 400 MHz Max. Power: HF 2kW, VHF 375W, UHF 125W

## IS-50UX-C1

Throughput Energy: $\leq 600 \mu \mathrm{~J}^{*}$ (UHF Connector/ Surface)
Frequency Range: 50 MHz to 700 MHz Max Power: VHF 375W, UHF 125W
IS-50NX-CO
Throughput Energy: $\leq 10 \mathrm{~mJ}{ }^{*}$ ( N Connector/ Surface)
Frequency Range: 1.5 MHz to 400 MHz
Max Power: HF 2kW, VHF 375W, UHF 125W
IS-B50NX-C1
Throughput Energy: $\leq 600 \mu \mathrm{~J}^{*}$ ( N Connector/ Surface)
Frequency Range: 50 MHz to 700 MHz
Max. Power: VHF 375W, UHF 125W
IS-B5ONX-C2
Throughput Energy $\leq 220 \mu \mathrm{~J}^{\star}$ ( N Connector/ Surface)
Frequency Range: 125 MHz to 1000 MHz
Max. Power VHF 375W, UHF (low) 125W
800 MHz to 1 GHz 50 W
IS-75F-C1
Throughput Energy: $\leq 1 \mathrm{~mJ}{ }^{*}$ (F Connector/ Surface)
Frequency Range: 4 MHz to 900 MHz VSWR $\leq 1.2: 1$
Max. Power: HF 100W, VHF 100W, UHF 25W
Add suffix - MA for male antenna port connector
Add suffix - ME for female antenna port connector

### 3.4 SWITCHES, INDICATORS \& PUSHBUTTONS

- KRAUS \& NAIMER - CAD11-A720-600-FT2-F758 -

Mode Switch Engrave 'LOCAL - REMOTE'

- OMRON - DZ-10GW2-1B - Door Switch
- PEPPERL \& FUCHS - NCB5-18GM40-Z0 - Mode Switch
- SPRECHER \& SCHUH - D7P-LSM25 + D7-N3Y + D7-X10 (2) Mode Switch Engrave 'OFF - ON'
- SPRECHER \& SCHUH.- D7P-F3-PX10 - 24VDC Coil + CA7-PV-22
- SPRECHER \& SCHUH.- D7P-F4-PX01 - Power On Reset Timer
- SPRECHER \& SCHUH.- D7P-F6-PX10 + D7P-PX10 - Push Button
- SPRECHER \& SCHUH.- D7P-MT34-PX01S c/w D7-15YE112 + PX01S EM/STOP Push Button


#  <br> BLUE LINE switchgear <br> 2012 <br> Short Form Catalogue ALL PRICES EXCLUSIVE OF G.S.T 



# FOR COMPLETE PRODUCT RANGE VISIT www. krausnaimer.com.au 



## Kraus \& Naimer

## BLUE LINE switchgear

The development of the Blue Line rotary switch, load break switches disconnectors - switch disconnectors, contactor and motor starter product ranges is based on
One Hundred years experience by Kraus \& Naimer.
In the Design and manufacture of electrical switchgear,
Kraus and Naimer have pioneered the introduction of the cam operated rotary switch, and continues to be recognised as the world leader in that product field.

## BLUE LINE

Blue Line products are protected by numerous patents throughout the industrial world. They are built to national and international standards and designed to withstand adverse temperatures and climates.

Blue Line products are accepted and universally recognised for their quality and workmanship. They are supported by the world-wide sales and service organisation.

The Kraus \& Naimer Registered Trademark


## WORLDWIDE SYMBOL FOR QUALITY SWITCHGEAR

# Contents 



## Rotary Cam Switches 10A-2400A

- Control, Instrument, Motor Switches
- Infinite number of switch programmes
- CA / CG / CH Switches with fingerproof terminals
- CA / CG / CH Switches with captive plus-minus terminal screws
- CAD Switches having self-cleaning "H" Bridge with 'cross wire' contacts
- $\quad$ CHR Switches with captive terminal screws for use with ring terminals
- $\quad$ Special Switches designed to any contact programme

UPS Maintenance Bypass Switches
13

Smart Switches (Available from wholesalers)

Enclosed KG Main Switches 20A - 315A

- Padlockable maintenance and safety switches
- Enclosed IP 65 protection in Plastic or Stainless Steel
- $\quad 3,4,6$ and 8 pole models available
- Enclosure cable entries top, bottom, sides and rear, or blank

KG Main Switches 20A-315A 16-18

- Padlockable main and emergency switches
- Modular frame sizes
- $\quad 3,4,6$ and 8 pole models available
- Forced positive contact movement
- Cam operated auxilliary contacts

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- Control and indicating devices
- $\quad 22 \mathrm{~mm}$ IP65 / IP69K
- Fingerproof connections
- Pot drive unit

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Dimensions
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Technical Data

| Rated Operational Current |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Multi cross point contacts |  | 1V | 6V | 12V | 24V | 48V | 110V | 240V |
| CA4/CG4 | $\begin{aligned} & \text { AC21A } \\ & \text { DC21 B } \end{aligned}$ | - |  |  | $\begin{aligned} & 10 \\ & 10 \end{aligned}$ | $\begin{aligned} & 10 \\ & 6 \end{aligned}$ | $\begin{aligned} & 10 \\ & 0.7 \end{aligned}$ | $\begin{aligned} & 10 \\ & 0.2 \end{aligned}$ |
| H-Bridge cross wire contacts |  | 53 | $\begin{aligned} & 2 \\ & 1.2 \end{aligned}$ | $\begin{aligned} & 1.2 \\ & 0.7 \end{aligned}$ | $\begin{aligned} & 0.7 \\ & 0.4 \end{aligned}$ | $\begin{aligned} & 0.45 \\ & 0.25 \end{aligned}$ | $\begin{aligned} & 0.25 \\ & 0.13 \end{aligned}$ | $\begin{aligned} & 0.15 \\ & 0.08 \end{aligned}$ |
| CGD4-1 | AC21A DC21B |  |  |  |  |  |  |  |
| CAD11 | AC21A <br> DC21B | 5 4 | $\begin{aligned} & 3 \\ & 2.5 \end{aligned}$ | $\begin{aligned} & 2 \\ & 1.5 \end{aligned}$ | $\begin{aligned} & 1 \\ & 0.8 \end{aligned}$ | $\begin{aligned} & 0.8 \\ & 0.3 \end{aligned}$ | $\begin{aligned} & 0.4 \\ & 0.2 \end{aligned}$ | $\begin{aligned} & 0.2 \\ & 0.1 \end{aligned}$ |
| CAD12 | AC21A <br> DC21B |  | $\begin{aligned} & 5 \\ & 4 \end{aligned}$ | $\begin{aligned} & 5 \\ & 3 \end{aligned}$ | $\begin{aligned} & 5 \\ & 2.2 \end{aligned}$ | $\begin{aligned} & 4 \\ & 1.2 \end{aligned}$ | $\begin{aligned} & 3 \\ & 0.6 \end{aligned}$ | $\begin{aligned} & 2 \\ & 0.3 \end{aligned}$ |
| Special Contact Systems |  |  |  |  |  |  |  |  |
| CA4/CG4 (@1 $\mu$ gold plating) <br> A high contact reliability is achieved by the use of multiple crosspoint contacts, having a four point contact face to minimise contact resistance. Terminals on the CA series are accessible from both sides, and the terminals on the CG series are accessible from the rear. Both switches have finger proof terminals. These are the smallest cam switch 30 mm sq. |  |  |  |  |  |  |  |  |  |  |
| CAD11/CAD12 / CGD4-1 <br> H -bridge cross wire contact system. The moving contact is made of spring type material to absorb possible contact bounce. These corrosive resistant contacts are capable of operating on systems voltages as low as 1 volt. CAD11 = Gold contacts. CAD12 $=$ Silver contacts. Both switches have screw driver guides, finger proof terminals and captive plus-minus terminal screws capable of accepting two variant cable sizes. |  |  |  |  |  |  |  |  |

## C/CA

Switches C/CA have finger proof terminals and captive plus-minus terminal screws. Each stage contains two rigid, double-break silver alloy contacts. The terminals are accessible from both sides. Ranging from 20~315 amperes these switches will accept a wide range of "optional extras".


KG/KH Switches: This durable switch line possesses high short circuit withstand capabilities, with positive movement during both making and breaking functions. The KG/KH range of isolators and changeover switches exhibit excellent AC-3 and AC-23 making and breaking capabilities.

This 'Short Form' catalogue illustrates only a small selection of the KRAUS \& NAIMER switches. Other switches available are:- A11, A14, A30, AD11, AD12, CH10 ~ CHR16B, D10 ~ D14R, DH, DHR, DK, DKR, L350 ~ L1251,X63 ~ X630. Additional information available on request.

Rotary Cam Switches - Panel Mounting

|  | Selection Data | IEC 60947-3, EN 60947, VDE 0660 |  |  | CG 4 | $\begin{aligned} & \text { CG } 8 \\ & \text { CH } 10 \end{aligned}$ |  | C26 |  | C32 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Rated Thermal Current |  | $\mathrm{I}_{\mathrm{u}}=\mathrm{th}_{\text {th }}$ | A | 10 | 20 | 25 | 32 | 40 | 50 |
|  | Rated Category | $3 \times 380 \mathrm{~V} / 440 \mathrm{~V}$ | AC-23A | kW | 3 | 7.5 | 11 | 15 | 18.5 | 22 |
|  |  |  |  |  | C 42 | C 80 | C125 | C200-4 | C315 | L400 |
|  | Rated Thermal Current |  | $\mathrm{I}_{\mathrm{u}}=\mathrm{I}_{\text {th }}$ | A | $\begin{aligned} & \text { CA } 63 \\ & 63 \end{aligned}$ | 115 | 150 | 200 | 315 |  |
|  | Rated Category | $3 \times 380 \mathrm{~V} / 440 \mathrm{~V}$ | AC-23A | kW | 30 | 45 | 75 | 75 | 132 | 132 |


(1) If Preclosing 4th Pole Required Change A223 To A673

Optional Extras


Dimensions mm

Rotary Cam Switches - Panel Mounting


## E Panel Mounting

## Size 0 - Size 3

|  | CG4 | CAD‘s CA10 | CA20 | CA25 | $\begin{gathered} \text { CA63 } \\ \text { CA50 } \\ \text { CA40 } \\ \text { C26 } \end{gathered}$ | C32 | C42 | C80 |  | C315 L400 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| A | 30 | 48 | 48 | 48 | 64 | 64 | 64 | 88 | 88 | 130 |
| B | 28 | 43 | 45 | 46 | 45/58 | 60 | 66 | 84 | 88 | 126 |
| C | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5,5 | 5,5 | 7 |
| D1 | 3,2 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 7 |
| D2 | 8 | 8 | 8 | 10 | 10 | 10 | 10 | 13 | 13 | 16 |
| E | - | 36 | 36 | 36 | 48 | 48 | 48 | 68 | 68 | 104 |
| M | - | 4,5 | 4,5 | 5,5 | 6,5 | 7.5 | 7.5 | 9,4 | 9,4 | 11,9 |

## Length L



Dimensions mm
KG Main Switches
Panel Mounting


| $\mathbf{A}$ | B | C | D1 | D2 | F | G | H | $\mathbf{L}$ | M1 | M2 | M3 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 48 | 36 | 4 | 11 | 5 | 48 | 48 | 50 | 48.2 |  |  |  |
| 48 | 36 | 4 | 10 | 5 | 48 | 42 | 54 | 53.8 |  |  |  |
| 64 | 48 | 4 | 10 | 5 | 64 | 42 | 54 | 53.8 | 13.5 | 9 | 2 |
| 64 | 48 | 4 | 10 | 5 | 64 | 50 | 64 | 60.5 | 16 | 12.5 | 16 |
| 64 | 48 | 4 | 10 | 5 | 70 | 70 | 80 | 70.6 | 22 | 10 | 25 |
| 88 | 68 | 5.5 | 13 | 6 | - | 112 | 108 | 96 | 38 | 21 | 22 |
| 88 | 68 | 5.5 | 13 | 6 | - | 145 | 126 | 103 | 52.5 | 21 | $24.5 \times 2$ |

M1 = Extra Length 4th Pole / Neutral Contact / Earth Block M2 = Extra Length Top Mounted Auxilliary Contacts M3 = Extra Length Terminal Cover

## Base Mounted

3 and 4 Pole
Note : 6 Pole Width $=3$ Pole Width $\times 2$


KG10
KG20A, KG32A
KG20B, KG32B
KG41B, KG64B KG80, KG100, KG105 KG126, KG161 KG251, KG316

| $\mathbf{A}$ | $\mathbf{B}$ | $\mathbf{C}$ | D1 | D2 | $\mathbf{G}$ | $\mathbf{H}$ | $\mathbf{L}$ | M1 | M2 | M3 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 48 | 36 | 12 | 8 | 5 | 48 | 50 | 49.2 |  |  |  |
| 48 | 36 | 12 | 8 | 5 | 42 | 54 | 50 |  |  |  |
| 64 | 48 | 13.5 | 10 | 5 | 42 | 54 | 50 | 13.5 | - | 20 |
| 64 | 48 | 13.5 | 10 | 5 | 50 | 64 | 61 | 16 | 10 | 16 |
| 64 | 48 | 13.5 | 10 | 5 | 70 | 80 | 68 | 22 | 10 | 25 |
| 88 | 68 | 16 | 13 | 6 | 112 | 108 | 91 | 38 | 0 | 22 |
| 88 | 68 | 16 | 13 | 6 | 145 | 126 | 98 | 52.5 | 0 | $24.5 \times 2$ |

M1 = Extra Length 4th Pole / Neutral Contact / Earth Block
M2 = Extra Length Top Mounted Auxilliary Contacts
M3 = Extra Length Terminal Cover

Padlock Device V840G
36 mm sq. Fixation
KG10, KG20, KG32


Door Interlock M280E 48mm sq.
36 mm sq. Fixation
KG10, KG20, KG32

## Padlock Device V840G

48 mm sq. Fixation
KG10B, KG20B, KG32B, KG41B, KG64B, KG80, KG100, KG105


Door Interlock M280E 64mm sq.
48mm sq. Fixation
KG10, KG20, KG32, KG41, KG64, KG80, KG100, KG105

Padlock Device V845
68mm sq. Fixation
KG126, KG161, KG251, KG316


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Door Interlock M280E 88mm sq. 68mm sq. Fixation
KG126, KG161, KG251, KG316


Single Hole Mounting FS1/FS2
(Size 00)

To accomodate
16.2 in 22.3 Hole S00 T160-01


## SWITCH ORDERING CHART

## Mounting Requirements

E Panel Mount. (5 hole mount) $\square$ L100 Various shaft lengths (metal)VE Base mount suitable for door clutch etc.
M004 Adjustable shaft (advise length).

E-V Panel Mount.(vertical access to terminalsE22 Panel mount. ( 3 hole, size 0)ER Combined panel square base plates.

T146 K DIN rail mounting plate. (size 0 and size 1 )
FT1 Single hole mtg. w/o esc. plate IP65. $(\mathrm{SO}=22.3 \mathrm{~mm})$

FT2 Single hole mtg . wth square plate IP65. $(\mathrm{S} 0=22.3 \mathrm{~mm})$
EF Panel seal IP65. (mounts between switch and panel).KD/KN
Heavy duty mounting plate and metal shaft.PF Enclosure ABS IP56GK Enclosure aluninium IP54.

M280E Door clutch (specify depth required).

6 CL Enclosure 56 series.
6 SS Enclosure stainless steel.
KS/KL Enclosures IP65.
$6 S 115 \times 70$ Wall plate stainless or PlasticOther, nominate type of mounting required.

## Handle Operation

Normal/standard handle (G251) or $\qquad$$\square$ V840A/.Padlockable handle (So \& S1).V750D Key operator size $00 \sim 0$.V845 Padlock Handle. (c/w esc.plate)

V755A or C Key operator (530 series). $\square$ V840G Padlock device.
$\square$ V750/A9 Key operator size 0 switch.(Lockwood) $\square$ V850 Padlockable with handle device6SOLW V750 Key operator (201 Lockwood etc.) $\square$ V400 Push-button interlock device.V760 Seperate key and handle (programmable). $\square$ Other specify

## Essential Data

1. Switch/circuit requirement. . .

Amp $\qquad$ Volts $\qquad$ kW $\qquad$
2. Cable size $\qquad$ or limiting dimensions $\qquad$
3. $A C$ or $D C$ (DC voltage required). $\qquad$ Duty:- AC21/AC22/AC23/AC11 or other.
4. PLC/Electronic circuit/dry circuit or standard switch.

## Ohm's Law

## SYMBOLS

$\mathrm{U}=$ Voltage in volts
$\mathrm{I}=$ Current in amperes
R = Resistance on ohms
P = Power in watts

## Useful Formulae



| $k W=k V A \times p F$ | Line Amps $=\frac{\mathrm{hp} \times 746}{\text { Line volts } \times 1.732 \times \mathrm{Eff} \times \mathrm{pF}}$ |
| :---: | :---: |
| $\mathrm{kW}=\frac{\mathrm{hp} \times 746}{1000 \times \mathrm{Eff}} \quad \frac{\mathrm{hp} \times 746 \times 100}{1000 \times \% \mathrm{Eff}}$ | $\begin{aligned} & \text { Horsepower }=\frac{\text { kVA } \times 1000 \times \text { Eff }}{746} \\ & (h p) \end{aligned}$ |
| $\mathrm{kW}=\frac{\text { Line amps } \times \text { Line volts } \times 1.732 \times \mathrm{pF}}{1000}$ | $h p=\frac{k V A \times 1000 \times \text { Eff } p F}{}$ |
| $\mathrm{kVA}=\frac{\mathrm{kW}}{\mathrm{pF}}$ | $h p=\frac{\text { Line amps } \times \text { Linevolts } \times 1.732 \times \text { Eff } \times p F}{}$ |
| $\mathrm{kVA}=\frac{\mathrm{hp} \times 756}{1000 \times \text { Eff } \times p F}$ | 1 Watt = 1 joule/second |
| $\mathrm{kVA}=\frac{\text { Line amps } \times \text { Line volts } \times 1.732}{1000}$ | $1 \mathrm{hp}=746$ Watts |
| $\text { Line Amps }=\frac{k V A \times 1000}{\text { Line volts } \times 1.732}$ |  |
| $\text { Line Amps }=\frac{\mathrm{kW} \times 1000}{\text { Line volts } \times 1.732 \times \mathrm{pF}}$ | $1 \mathrm{hp}=746$ joules/second |

VOLT-DROP Single Phase
Service Voltage $=240 \mathrm{~V}$
Max Permissible Vd $=\frac{240 \times 2.5}{100} \quad(2.5 \%$ Service Voltage $)$

$$
=6 \mathrm{~V}
$$

Max Unit Vd $=\underset{1 \times \text { distance }}{\operatorname{Max~Vdx~} 1000}$ (Length of cable run)

The Range of Blue Line Switchgear

Technical Catalogues for the following products are available from our website. www.krausnaimer.com.au
Main Switches and Main Switches with Emergency Function 16 A-315 A
Maintenance Switches 20 A-315 A
Switch Disconnectors 20 A-315 A
500
According to IEC 60947-3, EN 60947-3, VDE 0660 part 107, IEC 60204, EN 60204 and VDE 0113

## CL SWitches 10 A-20 A

C, CA and CAD Switches 10 A-315 A and L Switches 350 A- 2400 A
$\mathrm{C}, \mathrm{CA}$ andCAD switches are designed for universal application. They are recommended for instument, isolator, double-throw and motor 100 control.
L switches are designed for load and off-load applications. They are used to switch resistive or low inductive loads.

## Optional Extras and Enclosures <br> The complete product line, a large number of oiptional extras is available, including door interlocks, push-pull devces, cylinder and padlock <br> attachments, control and indicator devices, Ac motor drives, as well as enclosures, both inslated and metal.

A and AD Switches 6 A-25 A
A and $A D$ Switches have 4 contacts in each switching stage. These switches provide an extensive range of switch functions and require a
110 minimum mounting depth. Up to 36 switching postions are possible, with availability of 48 contacts per 12 stage column.

## CG, CH and CHR Switches 10 A-25 A

Ultra compact CG, CH and CHR switches are ideally suited for control and instumentation applications.
Switch terminals are 'finger-proof' and conveniently accessible for wiring and are delivered open. All CG4 ewiches offer specially designed
gold plated contacts or H -bridges with 'cross-wire' contact systems, which facilitates their use in electronic circuitry and chemically aggressive environments.

## DH, DHR, DK and DKR Switches 6 A-16 A

DH, DHR, DK, and DKR switches incorporate unique corrosion resistant contacts that permit operation on system voltage as low as 1 V . They have fully enclosed and protected contacts which can be operated either by rotary and/or lateral handle movement. D switches are used in calibration and semiconductor circuits. They are also used for relay and contactor control.

## X Switches 80 A-630 A

$X$ swiches can be applied for load, tap and gang duties. They incorporate 6 contacts in each switching stage. Their compact design provides
140 a minimum lengtgh dimension for mounting purpose.

## KG Switches 20 A-315 A and KH and KHR Switches 16 A-80 A

KC, KG, KH anh KHR switches are excellent circuit interruptors. They have high through fault and fault making capacities and are especially designed for use as isolators and safety switches for machine tools, distribution panels and switchboards. KG ON/OFF switches offer unusually high dimensioned air and creepage distances between terminals which are designed for time saving 'straight-line' wiring. ON/OFF switches are available with up to 8 poles and double-throw switches are available with up to 4 poles.
KC switches offer spring cage terminals for greater termination security.

## Push Buttons and Pilot Lights, $22.5 \mathrm{~mm} \varnothing$

A complete range of state-of-the-art push buttons and pilot lights represent an ideal combination of functional security economical efficiency in a modular design.

## Disconnectors for Photovoltaic

Maintence Switches for EMC - Compliant Connection
Frequency regulated motors.

We reserve the right to make technical and dimensional changes without prior notice. Any errors or omissions are not binding.

Kraus \& Naimer ${ }_{\text {pry } \text { Led }}$ BLUE LINE switchgear

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# Adelaide <br> Unit9/780-802 South Road Glandore, SA 5037 <br> Telephone: +6188371 1443 Fax: +6188371 0901 <br> Email: salessa@krausnaimer.com 

## Distributor:

The Cam Switch Creators and Innovators.
Dimensions

## Accessories

## EXG-18

Quick mounting bracket with dead stop
BF 18
Mounting flange, 18 mm


## Special-purpose Basic Switch

## DZ

## DPDT Basic Switch for Two Independent Circuit Control

- Incorporates two completely independent built-in switches.
- Ideal for switching the circuits operating on two different voltages, and for controlling two independent circuits.
- Interchangeable with OMRON Z Basic Switches, as both switches are identical in mounting hole dimensions, mounting pitch and pin plunger position.



## Ordering Information

| Terminal |  |  | Solder terminal (-1A) ¢ | Screw terminal (-B) 写 |
| :---: | :---: | :---: | :---: | :---: |
| Actuator |  | OT (min.) | Model | Model |
| Pin plunger | -n | 0.13 mm | DZ-10G-1A | DZ-10G-1B |
| Hinge lever | ner | 1.6 mm | DZ-10GW-1A | DZ-10GW-1B |
|  |  | 0.4 mm | DZ-10GV-1A | DZ-10GV-1B |
| Short hinge roller lever | $\underset{\sim}{Q}$ | 0.9 mm | DZ-10GW22-1A | DZ-10GW22-1B |
|  |  | 0.13 mm | DZ-10GV22-1A | DZ-10GV22-1B |
| Hinge roller lever | $\underset{\sim}{Q}$ | 1.2 mm | DZ-10GW2-1A | DZ-10GW2-1B |
|  |  | 0.26 mm | DZ-10GV2-1A | DZ-10GV2-1B |

## Model Number Legend



## 1. Ratings

10: 10 A (250 VAC)
2. Contact Gap
$\mathrm{G}: 0.5 \mathrm{~mm}$
3. Actuator

None: Pin plunger Low OT Levers:
V: Hinge lever
V22: Short hinge roller lever
V2: Hinge roller lever
High OT Levers:
W: Hinge lever
W22: Short hinge roller lever
W2: Hinge roller lever
4. Contact Form

1: DPDT
5. Terminals

A: Solder terminal
B: Screw terminal

## Specifications

## Characteristics

| Operating speed |  | 0.1 mm to $1 \mathrm{~m} / \mathrm{s}$ (See note 1) |
| :---: | :---: | :---: |
| Operating frequency | Mechanical | 240 operations/min |
|  | Electrical | 20 operations/min |
| Contact resistance |  | $15 \mathrm{~m} \Omega$ max. (initial value) |
| Insulation resistance |  | $100 \mathrm{M} \Omega \mathrm{min}$. (at 500 VDC ) |
| Dielectric strength |  | 1,000 VAC, $50 / 60 \mathrm{~Hz}$ for 1 min between non-continuous terminals 1,500 VAC, $50 / 60 \mathrm{~Hz}$ for 1 min between current-carrying metal parts and non-current-carrying metal part, and between current-carrying metal part and ground and between switches |
| Vibration resistance | Malfunction | 10 to $55 \mathrm{~Hz}, 1.5-\mathrm{mm}$ double amplitude (See note 2) |
| Shock resistance | Destruction | $1,000 \mathrm{~m} / \mathrm{s}^{2} \mathrm{max}$. |
|  | Malfunction | $300 \mathrm{~m} / \mathrm{s}^{2} \mathrm{max}$. (See notes 1 and 2) |
| Degree of protection |  | IP00 |
| Degree of protection against electric shock |  | Class I |
| Proof tracking index (PTI) |  | 175 |
| Ambient operating temperature |  | $-25^{\circ} \mathrm{C}$ to $80^{\circ} \mathrm{C}$ (with no icing) |
| Ambient operating humidity |  | 35\% to 85\%RH |
| Service life | Mechanical | 1,000,000 operations min. |
|  | Electrical | 500,000 operations min. |
| Weight |  | Approx. 30 to 50 g |

Note: 1. The values are for pin plunger models.
2. Malfunction: 1 ms max.

## Ratings

| Rated voltage (V) | Non-inductive load (A) |  |  |  | Inductive load (A) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Resistive load |  | Lamp load |  | Inductive load |  | Motor load |  |
|  | NC | NO | NC | NO | NC | NO | NC | NO |
| 125 VAC | $\begin{aligned} & 10 \\ & 10 \\ & \hline \end{aligned}$ |  | 2 | 1 | $\begin{aligned} & 6 \\ & 4 \\ & 4 \end{aligned}$ |  | 3 | 1.5 |
| 250 VAC |  |  | 1.5 | 0.7 |  |  | 2 | 1 |
| 8 VDC | 10 |  | 3 | 1.5 |  |  | 5 | 2.5 |
| 14 VDC | 10 |  | 33 | 1.5 |  |  | 5 | 2.5 |
| 30 VDC |  |  | 1.5 | 40.05 |  | 3 | 1.5 |
| 125 VDC | 0.50.25 |  |  |  |  |  |  |  |  |
| 250 VDC |  |  | 0.25 |  | 0.03 |  | 0.03 |  |

Note: 1. The above values are for steady-state current.
2. Inductive load has a power factor of 0.4 min . (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.

## ■ Contact Specifications

| Contacts | Material | Silver alloy |
| :--- | :--- | :---: |
|  | Gap (standard value) | 0.5 mm |
| Inrush current | NC | 30 A max. |
|  | NO | 15 A max. |

4. Motor load has an inrush current of 6 times the steady-state current.
5. The ratings values apply under the following test conditions:
(1) Ambient temperature: $20 \pm 2^{\circ} \mathrm{C}$
(2) Ambient humidity: $65 \pm 5 \% \mathrm{RH}$
(3) Operating frequency: 20 operations/min

## Safety Standard Ratings

ULICSA

| Rated voltage | DZ-10G |
| :---: | :---: |
| $\mathbf{1 2 5}$ VAC | 10 A and $1 / 8 \mathrm{HP}$ |
| $\mathbf{2 5 0}$ VAC | 10 A and $1 / 4 \mathrm{HP}$ |
| $\mathbf{4 8 0}$ VAC | 2 A |
| $\mathbf{1 2 5}$ VDC | 0.5 A |
| $\mathbf{2 5 0}$ VDC | 0.25 A |

## Engineering Data

## ■ Mechanical Durability (DZ-10G-1B) <br> Electrical Durability (DZ-10G-1B)




## Structure

## Contact Form (DPDT)



## Dimensions

Note: Unless otherwise specified, all units are in millimeters and a tolerance of $\pm 0.4 \mathrm{~mm}$ applies to all dimensions.

## Terminals

Screw Terminals (-1B)
 (with toothed washer)

## Solder Terminals (-1A)



## Mounting

All switches can be mounted using M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to $1.47 \mathrm{~N} \cdot \mathrm{~m}$.


Note: 1. The solder terminal model has a suffix "-1A" in its model number and its omitted dimensions are the same as the corresponding dimensions of the pin plunger model.
2. Unless otherwise specified, all units are in millimeters and a tolerance of $\pm 0.4 \mathrm{~mm}$ applies to all dimensions.

## Pin Plunger



* Stainless-steel pin plunger

Hinge Lever DZ-10GW-1B


DZ-10GV-1B


| OF max. | 200 gf |
| :--- | :---: |
| RF min. | 13 gf |
| PT max. | 6 mm |
| OT min. | 0.4 mm |
| MD max. | 1.7 mm |
| OP | $18.3 \pm 1 \mathrm{~mm}$ |

Short Hinge Roller Lever DZ-10GW22-1B


DZ-10GV22-1B


| OF $\max$. | 430 gf |
| :--- | :---: |
| RF $\min$. | 42 gf |
| PT max. | 3 mm |
| OT min. | 0.13 mm |
| MD max. | 0.6 mm |
| OP | $29.4 \pm 0.8 \mathrm{~mm}$ |

* Stainless-steel lever

Note: 1. The solder terminal model has a suffix "-1A" in its model number and its omitted dimensions are the same as the corresponding dimensions of the pin plunger model.
2. Unless otherwise specified, all units are in millimeters and a tolerance of $\pm 0.4 \mathrm{~mm}$ applies to all dimensions.


## Safety Precautions

Be sure to read the precautions and information common to all Snap Action and Detection Switches, contained in the Technical User's Guide, "Snap Action Switches, Technical Information" for correct use.

## Precautions for Safe Use

## Terminal Connection

When soldering lead wires to the Switch, make sure that the capacity of the soldering iron is 60 W maximum. Do not take more than 5 s to solder any part of the Switch. The characteristics of the Switch will deteriorate if a soldering iron with a capacity of more than 60 W is applied to any part of the Switch for 5 s or more.

## Operation

- Make sure that the switching frequency or speed is within the specified range.

1. If the switching speed is extremely slow, the contact may not be switched smoothly, which may result in a contact failure or contact welding.
2. If the switching speed is extremely fast, switching shock may damage the Switch soon. If the switching frequency is too high, the contact may not catch up with the speed.
The rated permissible switching speed and frequency indicate the switching reliability of the Switch.
The life of a Switch is determined at the specified switching speed. The life varies with the switching speed and frequency even when they are within the permissible ranges. In order to determine the life of a Switch model to be applied to a particular use, it is best to conduct an appropriate durability test on some samples of the model under actual conditions.

- Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to $70 \%$ to $100 \%$ of the rated OT.


## Precautions for Correct Use

## Mounting Location

- Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.
- Switches are generally not constructed with resistance against water. Use a protective cover to prevent direct spraying if the switch is used in locations subject to splashing or spurting oil or water, dust adhering.

- Install the switch in a location that is not directly subject to debris and dust from cutting. The actuator and the switch body must be protected from accumulated cutting debris and dirt.

- Do not use the switch in locations subject to hot water (greater than $60^{\circ} \mathrm{C}$ ) or in water vapor.
- Do not use the switch outside the specified temperature and atmospheric conditions.
The permissible ambient temperature depends on the model. (Refer to the specifications in this catalog.) Sudden thermal changes may cause thermal shock to distort the switch and result in faults.


Separate the installation location from - heat sources.

- Mount a cover if the switch is to be installed in a location where worker inattention could result in incorrect operation or accidents.

- Subjecting the switch to continuous vibration or shock may result in contact failure or faulty operation due to abrasion powder and in reduced durability. Excessive vibration or shock will cause the contacts to operate malfunction or become damaged. Mount the switch in a location that is not subject to vibration or shock and in a direction that does not subject the switch to resonance.
- If silver contacts are used with relatively low frequency for a long time or are used with microloads, the sulfide coating produced on the contact surface will not be broken down and contact faults will result. Use a microload switch that uses gold contacts.
- Do not use the switch in atmospheres with high humidity or heat or in harmful gases, such as sulfide gas $\left(\mathrm{H}_{2} \mathrm{~S}, \mathrm{SO}_{2}\right)$, ammonia gas $\left(\mathrm{NH}_{3}\right)$, nitric acid gas $\left(\mathrm{HNO}_{3}\right)$, or chlorine gas $\left(\mathrm{Cl}_{2}\right)$. Doing so may impair functionality, such as with damage due to contacting faults or corrosion.
- The switch includes contacts. If the switch is used in an atmosphere with silicon gas, arc energy may cause silicon oxide $\left(\mathrm{SiO}_{2}\right)$ to accumulate on the contacts and result in contact failure. If there is silicon oil, silicon filling, silicon wiring, or other silicon products in the vicinity of the switch, use a contact protection circuit to limit arcing and remove the source of the silicon gas.


## Omron Electronic Components, LLC

## Terms and Conditions of Sales

## 1. GENERAL

1. Definitions: The words used herein are defined as follows.
(a) Terms: $\quad$ These terms and conditions
(b) Seller: Omron Electronic Components LLC and its subsidiaries
(c) Buyer: The buyer of Products, including any end user in section III through VI (d) Products: Products and/or services of Seller
(e) Including: Including without limitation
2. Offer; Acceptance: These Terms are deemed part of all quotations, acknowledgments, invoices, purchase orders and other documents, whether electronic or in writing, relating to the sale of Products by Seller. Seller hereby objects to any Terms proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
3. Distributor: Any distributor shall inform its customer of the contents after and including section III of these Terms.
4. Prices; Payment: All prices stated are current, subject to change without notice by Seller. Buyer agrees to pay the price in effect at the time the purchase order is accepted by Seller. Payments for Products received are due net 30 days unless otherwise stated in the invoice. Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice.
5. Discounts: Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (a) the invoice is paid according to Seller's payment terms and (b) Buyer has no past due amounts owing to Seller.
6. Interest: Seller, at its option, may charge Buyer $1.5 \%$ interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
7. Orders: Seller will accept no order less than 200 U.S. dollars net billing.
8. Currencies: If the prices quoted herein are in a currency other than U.S. dollars, Buyer shall make remittance to Seller at the then current exchange rate most favorable to Seller; provided that if remittance is not made when due, Buyer will convert the amount to U.S. dollars at the then current exchange rate most favorable to Seller available during the period between the due date and the date remittance is actually made.
9. Governmental Approvals: Buyer shall be responsible for all costs involved in obtaining any government approvals regarding the importation or sale of the Products.
10. Taxes: All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Seller or required to be collected directly or indirectly by Seller for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Seller.
11. Financial: If the financial position of Buyer at any time becomes unsatisfactory to Seller, Seller reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Seller may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
12. Cancellation; Etc: Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Seller fully against all costs or expenses arising in connection therewith.
13. Force Majeure: Seller shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
14. Shipping: Delivery: Unless otherwise expressly agreed in writing by Seller:
(a) All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Seller), at which point title to and all risk of loss of the Products shall pass from Seller to Buyer, provided that Seller shall retain a security interest in the Products until the full purchase price is paid by Buyer;
(b) Delivery and shipping dates are estimates only; and
(c) Seller will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
15. Claims: Any claim by Buyer against Seller for shortage or damage to the Products occurring before delivery to the carrier or any claim related to pricing or other charges must be presented in detail in writing to Seller within 30 days of receipt of shipment.

## III. PRECAUTIONS

1. Suitability: IT IS THE BUYER'S SOLE RESPOINSIBILITY TO ENSURE THAT ANY OMRON PRODUCT IS FIT AND SUFFICIENT FOR USE IN A MOTORIZED VEHICLE APPLICATION. BUYER SHALL BE SOLELY RESPONSIBLE FOR DETERMINING APPROPRIATENESS OF THE PARTICULAR PRODUCT WITH RESPECT TO THE BUYER'S APPLICATION INCLUDING (A) ELECTRICAL OR ELECTRONIC COMPONENTS, (B) CIRCUITS, (C) SYSTEM ASSEMBLIES, (D) END PRODUCT, (E) SYSTEM, (F) MATERIALS OR SUBSTANCES OR (G) OPERATING ENVIRONMENT. Buyer acknowledges that it alone has determined that the Products will meet their requirements of the intended use in all cases. Buyer must know and observe all prohibitions of use applicable to the Product/s.
2. Use with Attention: The followings are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible use of any Product, nor to imply that any use listed may be suitable for any Product:
(a) Outdoor use, use involving potential chemical contamination or electrical interference.
(b) Use in consumer Products or any use in significant quantities.
(c) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
(d) Systems, machines, and equipment that could present a risk to life or property.
3. Prohibited Use: NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
4. Motorized Vehicle Application: USE OF ANY PRODUCT/S FOR A MOTORIZED VEHICLE APPLICATION MUST BE EXPRESSLY STATED IN THE SPECIFICATION BY SELLER.
5. Programmable Products: Seller shall not be responsible for the Buyer's programming of a programmable Product.

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ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937 . To convert grams into ounces, multiply by 0.03527 .

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## sprecher+ schuh

INDUSTRIAL SWITCHGEAR \& AUTOMATION SPECIALISTS $\square$


New D7...
Experience a Touch of Quality


Introducing the all new D7 range from Sprecher + Schuh. The D7 range is the latest in a long line of quality 22.5 mm control and signalling equipment from a company with a long built reputation for combining high quality manufacturing skills and attention to detail to produce only the finest quality products.

Available in both thermoplastic and metal variations, the D7 range incorporates all the features that you have come to expect from Sprecher + Schuh and raises the bar one step further with a functional low profile design and all new stylish appearance.

Once you get past the new appearance you will find the D7 range has some unique features incorporated, such as improved operational feel on the pushbuttons for a positive "tactile" response and a new positive detent on selector switches. In addition optional time saving cage style termination on contact blocks, improved LED illumination on pilot lights and hard wearing laser engraving have also been included.

Utilising state of the art modelling technologies and finite element analysis, you can be sure every component used in the D7 range has been optimised for durability and reliability with the aim of providing the ultimate in control and indication.

Designed and manufactured to meet the most exacting performance, the new D7 range is the pushbutton to use in today's demanding environments.


## D7 at a glance...



## "Auto Break" Safety contacts

Separation of the contact block assembly from the front operator or mounting latch can prevent an Emergency Stop from shutting down the controlled process in an emergency. Correct contact block installation is critical to ensure that the normally closed contacts will open when the emergency stop operator is active. The exclusive Sprecher + Schuh "Auto Break" contact block monitors itself to ensure it is always correctly installed.
A normally open "Auto Break" contact is physically moulded and wired in series with a standard set of normally closed contacts. When correctly installed the operator creates a maintained pressure on the normally open "Auto Break" contact and automatically closes the contact. In this state the normally closed contact operates as normal.
If the contact block assembly should separate from the front operator, the pressure releases and the "Auto Break" contact will automatically open. Because the "Auto Break" contact is wired in series with the normally closed, the opening of either set of contacts will open the circuit controlled by the emergency stop operator.


## Goupling plates and contact blocks

Choice of metal or plastic coupling plates
Rotating collar with "snap secure" system ensures fast one-hand removal
Contact blocks snap-fit and are hinged at one end for easy installation
Colour coded contact block plungers for easy identification
H -bridge contact design and the option of gold contacts provides cleaner current flow for maximum reliability at lower voltages
Bifurcated contacts provide excellent wiping and optimal switching reliability
Option of Cage style wire termination or Screw clamp
Live components are shrouded and touch safe to IP 20


## Inscription caps and diffusers

Durable abrasion-proof press plates
6 colour choices
Ergonomically contoured design
Diffusers constructed in two colour moulded assembly
Durable wear resistant laser printing available


Metal and plastic enclosures In choices to accommodate up to $6 \times 22.5 \mathrm{~mm}$ operators Yellow thermoplastic pendant style enclosure available for up to 2 operators
20 mm metric cable entry Suitable for base or panel mount contact blocks
Accepts two piece snap-in legend

## Illumination



Modern and compact integrated
LED lamp modules
Superior illumination qualities
5 colour choices
11 year lamp life (100,000 hrs)
Maintenance free
Vibration and shock resistant
24 V AC/DC, 110 V AC and
240 V AC

## Design

Functional low profile appearance
Ergonomic easy to operate handles
Reduced depth contact blocks
Improved positive "tactile" operation on pushbuttons Improved "positive detent" on rotary selector switches
Durable two colour plastic caps and laser engraving


## Improved safety

Unique "Auto break" self-monitoring emergency contact system
IP 20 touch protection
Tamperproof rear fixing nut


## Time saving

New design snap-lock, twist-to-reset rotating collar on coupling plates for easier mounting and assembly
Snap-on components
Redesigned anti-rotation tab


## Flexibility

Thermoplastic or metal operators
Latching or impulse operators
Five different colour choices
Maximum of six contact blocks
Full voltage and transformer lamp blocks


## Improved reliability

IP 65/66 sealing across the range for reliability in dusty and wet conditions
Improved vibration resistance
Continuous wiping contact for improved reliability
Tested to IEC 947
Positive detent on rotary switches which ensures operation will not "hang up" between positions

## Contact blocks

Improved mounting from "Snapsecure" snap fit mounting system
Colour coded plungers for easy identification
Optional Quadfurcated Gold contacts for improved low voltage switching
Optional spring clamp termination on contact blocks for reduced wiring time

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D7 22.5 mm CONTROL \& SIGNALLING PRODUCTS

Non-Illuminated Momentary Pushbuttons


Dimensions in (mm)

Metal or plastic options
Improved momentary action for fast response

Low mounting depth from panel


| Plastic Body | Metal Body |
| :--- | :--- |
| Cat. No. | Cat. No. |

Flush Pushbutton
with Green insert
with Red insert
with Blue insert
$\qquad$
$\qquad$

D7P-F3-PX10 ${ }^{1}$ )
D7P-F4-PX01 ${ }^{\text {² }}$ )
D7P-F6-PX10 ${ }^{1}$ )
D7M-F3-MX10 ${ }^{1}$ ) D7M-F4-MX01 ${ }^{1}$ ) D7M-F6-MX10 ${ }^{1}$ )


Dimensions in (mm)


D7P-E4-PX01


D7M-E4-MX01

| Description | Contact | Plastic Body <br> Cat. No. | Metal Body <br> Cat. No. |
| :--- | :--- | :--- | :--- |
| Extended Pushbutton <br> with Red insert |  | D7P-E4-PX01 ${ }^{1}$ ) | D7M-E4-MX01 ${ }^{1}$ ) |

Non-Illuminated Momentary Pushbuttons with labelled Press Plates



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D7 22.5 mm CONTROL \& SIGNALLING PRODUCTS

D7PS / D7MS Non illuminated short handle 2 position selector switch operators
D7PLS / D7MLS Illuminated short handle 2 position selector switch operators

Protection class IP 66 Individually packaged 2 part ordering

Note: ${ }^{1}$ ) Illuminated operators available in a choice of six different knob colours.
Green = 3, Red =4, Yellow = 5, Blue. =6, Clear = 7
Example D7P-LSM24 = Red Knob

2


D7PX / D7PQ Pre-assembled clip-on rear elements with plastic coupling plate D7MX / D7MQ Pre-assembled clip-on rear elements with metal coupling plate

| Description | Screw Cat. No. | Spring Clamp Cat. No. | Metal Screw Cat. No. | Metal <br> Spring Clamp Cat. No. |
| :---: | :---: | :---: | :---: | :---: |
| 1 N/O contact block | D7PX10 | D7PQ10 | D7MX10 | D7MQ10 |
| $1 \mathrm{~N} / \mathrm{C}$ contact block | D7PX01 | D7PQ01 | D7MX01 | D7MQ01 |
| $1 \mathrm{~N} / \mathrm{O}$ and $1 \mathrm{~N} / \mathrm{C}$ contact block | D7PX11 | D7PQ11 | D7MX11 | D7MQ11 |
| 1 N/O and $1 \mathrm{~N} / \mathrm{C}$ contact block and incandescent lamp block | D7PD ${ }^{2}$ ) ${ }^{\text {CX11 }}$ | D7PD ${ }^{2}$ ) ${ }^{\text {c }} 11$ | D7MD ${ }^{2}$ CX11 | D7MD ${ }^{2}$ CQ11 |
| $1 \mathrm{~N} / \mathrm{O}$ and $1 \mathrm{~N} / \mathrm{C}$ contact block and integrated LED lamp block | D7PN ${ }^{2}$ ) ${ }^{3}$ ) ${ }^{\text {1 }}$ (1 | D7PQ $\left.{ }^{2}\right)^{3}$ )Q11 | D7MN $\left.{ }^{2}\right)^{3}$ ) ${ }^{\text {(11 }}$ | D7MQ $\left.\left.{ }^{2}\right)^{3}\right)$ Q11 |

[^11]Dimensions (mm) and panel hole spacing


Non-Illuminated and Illuminated Momentary
Flush pushbutton Operators


Illuminated and Non-Illuminated Momentary Extended pushbutton Operators


Illuminated Momentary Guarded pushbutton Operators


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## Dimensions (mm)

Reset Operators with Reset Rod


Illuminated and Non-Illuminated 2-Position Multi-Function Operators


Non-Illuminated
3-Position Multi-Function Operators


Pilot Light Operators


Illuminated and Non-Illuminated Knob Selector Switch and Potentiometer Operators


Illuminated and Non-Illuminated Push-Pull Mushroom Operators $30 \mathrm{~mm}, 40 \mathrm{~mm}$ and 60 mm


| Operator | A |
| :---: | :---: |
| 30 mm | 30.0 |
| 40 mm | 40.0 |
| 60 mm | 60.0 |

Illuminated and Non-Illuminated Momentary Mushroom Operators 40 mm and 60 mm


Non-Illuminated Knob Lever Selector Switch Operators


Illuminated and Non-Illuminated
Twist-to-Release Operators $30 \mathrm{~mm}, 40 \mathrm{~mm}$ and 60 mm


| Operator | A |
| :---: | :---: |
| 30 mm | 30.0 |
| 40 mm | 40.0 |
| 60 mm | 60.0 |

## Product selection made easy

Until now, NHP has been easily recognisable by its logo NP- . However, we realise that, as a customer you need to locate the products and information most relevant to you quickly and easily. That's why we're phasing in our new product icons, to help you differentiate the product information you need amongst the clutter that is business today.

You may have already come across these icons, prominent on the front of our literature as new catalogues and flyers become available. These brightly coloured icons in an obvious location mean no longer will you have to worry about searching for product information amongst the mounds of promotional literature. No more flicking through pages of catalogues, wondering where the things you need might be. We've done the searching for you. Just look for the icon that suits your product needs.......your guide to save yourself time. $\qquad$ .so that you can get back to your business.


When it comes to motor control, our product package is by far the most technically advanced and comprehensive.
This includes the leading Sprecher+Schuh motor starting and protection products, well known for their reliability in service.


NHP offers an extensive range of power quality products to maintain and protect your power distribution network. All our products, from Terasaki circuit protection devices through to our load-break and switch-fuses, offer high levels of security and reliability.

Automation and communication systems are central to your productivity and efficiency. Our range consists of the world's best and proven products, from Hitachi drives to the technically advanced Adroit SCADA system.

Our control and switching range keeps the risk of human error to a minimum with pushbuttons, cam switches, pendant controllers, foot switches, relays and timers.


We are specialists in safety products and our vast range reflects that. From Schmersal safety switches through to Sunx light curtains, our safety and protection products enable you to provide and maintain 'Safety in the Workplace'. Our range also includes sirens, sounders and bells.


Our power quality range helps you to condition your power supply through power factor correction, surge protection and filtering, reducing your power consumption costs and saving you money while also protecting valuable equipment.


The NHP Ex Hazardous area equipment range helps you protect people and property in areas such as petro-chemical and grain handling. Products include Exde control equipment and Ex Lighting products.


If it's there, our sensing and detection products will see it, touch it, or find it. From beam sensors and magnetic reed switches to limit switches, we offer numerous variations of each sensor type.


When you need to know how high or low a level is, how much you have used or how long there is to go, NHP offers a vast series of measuring and display instruments, for panel, base or DIN rail mounting.


Our enclosures and termination products answer all your housing and cabling needs. The range includes insulated, weatherproof and stainless steel enclosures, slotted and solid cable duct and DIN rail mounting terminals.


These products are sold exclusively through electrical wholesaling outlets, and include such items as the BelMate conduit bell tool and the TestPro range of voltage and continuity testers.



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### 3.5 POWER SUPPLY \& RADIO DEVICES

- POWERBOX - PB251A-24CM-CC-T - RTU Power Supply 24VDC
- POWERBOX - PBIH-2412J-CC - Radio 24V/13.8VDC Converter
- WEIDMULLER - $\mathbf{8 9 5 1 3 4 0 0 0 0}$ - 240VAC-24VDC Power Supply
- TRIO - DR900-07A02-D0 - Radio
- TRIO - YAGI ANT13AL - Radio Antenna
- YUASA - UXH50-12 - Batteries (Including Spill Trays)
- LOGICA CMG - MD3311EAL/271D-0-7 - Telemetry Unit


## PB251 Series

## 220-330 WATTS DC UPS

## Features

- Ultra-low noise output
- Independent battery charging output
- DC output OK \& battery OK alarms \& LEDs
- Battery-LVD and alarm
- Over-temperature protection
- Battery fuse fail LED


## Specifications

INPUT

| Voltage: | 190 to 264 vac, or 190 to 400 VDC |
| :--- | :--- |
| Line regulation: | $0.2 \%$ typical |
| Current: | 1.4 A maximum |
| Inrush current: | 10 A maximum |
| Frequency: | 45 to 65 Hz |

OUTPUT

| Voltage | See table |
| :--- | :--- |
| Current | See table |
| Load regulation | $0.5 \%$ typical |
| Current limit type - load cct | Constant current |
| Current limit type - batt. cct | Constant current |
| Short circuit protection | Indefi nite, auto-resetting |
| Over-voltage protection | 17.5 to 20V latching (13.8Vdc output) |
|  | 31.5 to 39 V latching (27.6Vdc output) |
| Ripple \& noise | $28 \mathrm{mVp}-\mathrm{p}(13.8 \mathrm{Vdc}$ output) |
| 100 MHz bandwidth | $55 \mathrm{mVp}-\mathrm{p}$ (27.6Vdc output) |

ENVIRONMENTAL

| Operating temperature | 0 to $70^{\circ} \mathrm{C}$ ambient with derating, 5...90\% <br> relative humidity <br> (non-condensing) |
| :--- | :--- |
| Over-temperature protection | Automatic \& auto-resetting |
| Cooling requirement | Natural convection |
| Efficiency | $80 \%$ minimum |

## Selection Table



STANDARDS \& APPROVALS

| Safety | Complies with AS/NZS 60950, class 1, <br>  <br>  <br> NSW Office of Fair Trading Approval N20602 |
| :--- | :--- |
| EMC | Emissions comply with AS/NZS CISPR11, |
|  | Group 1, Class B. Complies with ACA EMC |
|  | Scheme, Safety \& EMC Regulatory Compliance |
|  | Marked |
| Isolation i/p-o/p | 4242VDC for 1 minute |
| i/p-ground | 2121VDC for 1 minute |
| o/p-ground | 707VDC for 1 minute |

ALARMS \& BATTERY FUNCTIONS

| Converter ON/OK alarm | Indicated by voltage-free changeover relay <br>  |
| :--- | :--- |
| green LED | ON=PSU OK |
| Battery low (\& fuse) alarm | 10.2 to 12.6V for 12V battery, adjustable 20.4 <br> to 25.2V for 24V battery, adjustable Indicated <br>  <br> green LED: ON=BATT OK |
| Low voltage disconnect | 9.6 to 12V for 12V battery, adjustable <br> 19.2 to 24V2 for 4V battery, adjustable |
| Charger over-load protection | Auto-resetting electronic circuit breaker |
| Reverse polarity protection | Internal battery fuse |
| Battery to load voltage drop | 0.2 to. 0.25V typical |
| MECHANICAL |  |
| Case size | 264 L x 172 W x 67 H mm |
| Case size with heatsink | 264 L x 186 W x 67 H mm |
| Rack size | $232 \mathrm{D} \mathrm{x} \mathrm{19"} \mathrm{~W} \mathrm{x} \mathrm{2RU} \mathrm{H}$ |
| Weight | 1.9 kg |
| Weight with heatsink | 2.1 kg |
| Weight (rack mounted version) | 5.5 kg |


| MODEL NUMBER | OUTPUT |  |  | OUTPUT | Note: Non standard battery charging current available on request. ie PB251-12CM-H-10 for 10A. |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | VDC | ILOAD | $\\|_{\text {batt }}$ | POWER |  |
| PB251-12CM | 13.8V | 16A | 2A | 220W |  |
| PB251-12CM-H | 13.8 V | 20A | 2A | 275W |  |
| PB251-24CM | 27.6 V | 11A | 2A | 300 W |  |
| PB251-24CM-H | 27.6 V | 12A | 2A | 330 W |  |
| PB251-12RML | 13.8 V | 20A | 4A | 275W |  |
| PB251-12B | 13.8 V | 20A | 4A | 275W |  |
| PB251-24RML | 27.6 V | 12A | 2A | 330W |  |

## PB251 Series

275-330 WATTS DC UPS

Technical Illustrations
PB251**RML \& -12B ME CHANICAL OUTLINE

NOTES:

1. $2 R \mathrm{KU} \times 19^{\prime \prime}$ rack enclosure per IEC 297
2. Mounting slots are suitable for M6 hardware.
3. Input connector is a 10A Class 1 IEC 60320 inlet
4. 2 meter IEC mains cord with Australian plug is supplied with unit
5. PB251-12B alarm terminal is DB25 female.
6. PB251-12B output and battery connector is Hirose pn. HS 28R-4A.
Mating connector is Hirose pn. HS 28P-4A (not supplied).
7. PB251-w*RML alarm and output terminals are M3.5 screws
suitable for ring or fork lugs up to 8 mm wide.

RONT VIEW

REAR VIEW (PB251~*RML)
PB251-12B ALARM CONNECTOR
PB251*RML $\&-12$ MECHANICAL OUTLINE
Pb251-*rml alarm and output terminals


PB251-12B OUTPUT \& BATTERY CONNECTOR


REAR VIEW (PB251-12B)


## Features

- Wide selection of models
- 4 input voltage ranges
- High efficiency
- Low output ripple
- Proven reliability
- Good thermal margins


Specifications
INPUT

| Input voltage | 12VDC (9.2-16) |
| :---: | :---: |
|  | 24VDC (19-32) |
|  | 48VDC (38-63) |
|  | 110VDC (85-140) |
| Inrush current | 20A max. for 110V only |
| OUTPUT |  |
| Output voltage | See table |
| Voltage adjustment | $\pm 10 \%, \pm 5 \%$ for PBIH-F |
| Output current | See table |
| Ripple \& noise | Output Volts $\times 1 \%+50 \mathrm{mV}$ to -100mV pk-pk |
| Line regulation | 0.8\% over input range |
| Load regulation | 0.9\%, 0\%-100\% load |
| Temperature coefficient | $0^{\circ} \mathrm{C}$ to $50^{\circ} \mathrm{C}, 0.03 \%$ per ${ }^{\circ} \mathrm{C}$ |
| Overvoltage protection | O.V. clamp, PBIH-F |
|  | Output shutdown, PBIH-G, J, M, R - input must be switched off for at least 30S to reactivate |
| Overcurrent protection | Fold back - PBIH-F |
|  | Current limiting, PBIH-G, J, M, R (PBIH-R series is adjustable); PBIH110xxR models are not adjustable |
| Drift | Output $\mathrm{V} \times 0.5 \%+15(\mathrm{mV})$ per 8 hrs after 1 hr warm-up |
| Rise Time | 200mS max. - PBIH-F, M, R |
|  | 100 mS max . - PBIH-G, J (at $25^{\circ} \mathrm{C}$ ) |
| Holdup time | 10 mS (only 110 V input) |
| Remote sense | PBIH-R Series only |


| OPERATING |  |
| :---: | :---: |
| Efficiency | 70\%-89\% |
| Safety isolation (1 minute) | Type - 12, 24, 48V input <br> Input - Output: 1500VAC <br> Input- Case: 1500VAC <br> Output- Case: 500VAC <br> Type-110V input <br> Input- Output: 2000VAC <br> Input- Case: 2000VAC <br> Output- Case: 500VAC |
| Insulation resistance | 50M (500VDC) Input - Case |
| Parallel operation | Consult sales office for details |
| Remote control | PBIH-R Series: <br> Open link: output normal Short link: output off |
| ENVIRONMENTAL |  |
| Operating temperature | $0^{\circ} \mathrm{C}$ to $50^{\circ} \mathrm{C}$ full load |
| Cooling | Convection cooled |
| Storage temperature | $-20^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$ |
| Humidity | 85\% |
| Shock | 30G, PBIH-F, G and J |
| Vibration | ( $5 \mathrm{~Hz}-10 \mathrm{~Hz}, 10 \mathrm{~mm}$ ), <br> ( $10 \mathrm{~Hz}-50 \mathrm{~Hz}$ ) 2G, PBIH-F, G and J |
| STANDARDS AND APPROVALS |  |
| Safety | Designed to UL1950 |
| C-tick | AS/NZS CISPR11 Group 1, Class A |
| MECHANICAL |  |
| Weight | PBIH-F : 250g <br> PBIH-G : 380g <br> PBIH-J : 410 g <br> PBIH-M : 800g <br> PBIH-R : 1.4 kg |

## PBIH Series

15-150 WATTS DC/DC SINGLE OUTPUT

## Selection Table

| MODEL <br> NUMBER | INPUT | OUTPUT | OUTPUT |
| :--- | :---: | :---: | :---: | :---: |
| POWER |  |  |  |


| MODEL NUMBER | INPUT | OUTPUT |  | OUTPUT POWER |
| :---: | :---: | :---: | :---: | :---: |
| PBIH-11012G | 85-140V | 12V | 2.1A | 25W |
| PBIH-11015G | 85-140V | 15 V | 1.7A | 25W |
| PBIH-11024G | $85-140 \mathrm{~V}$ | 24 V | 1.1 A | 25W |
| PBIH-11048G | $85-140 \mathrm{~V}$ | 48 V | 0.5A | 25W |
| PBIH-1205J | $9.2-16 \mathrm{~V}$ | 5 V | 8A | 50W |
| PBIH-1212J | $9.2-16 \mathrm{~V}$ | 12 V | 3.3A | 50W |
| PBIH-1215J | $9.2-16 \mathrm{~V}$ | 15 V | 2.7A | 50W |
| PBIH-1224J | $9.2-16 \mathrm{~V}$ | 24 V | 1.7A | 50W |
| PBIH-1248J | $9.2-16 \mathrm{~V}$ | 48 V | 0.8A | 50W |
| PBIH-2405J | 19-32V | 5 V | 10A | 50W |
| PBIH-2412J | 19-32V | 12 V | 4.3 A | 50W |
| PBIH-2415J | 19-32V | 15 V | 3.4 A | 50W |
| PBIH-2424J | 19-32V | 24 V | 2.5 A | 50W |
| PBIH-2448J | $19-32 \mathrm{~V}$ | 48 V | 1A | 50W |
| PBIH-4805J | $38-63 \mathrm{~V}$ | 5 V | 10A | 50W |
| PBIH-4812J | 38-63V | 12 V | 4.3 A | 50W |
| PBIH-4815J | $38-63 \mathrm{~V}$ | 15 V | 3.4A | 50W |
| PBIH-4824J | $38-63 \mathrm{~V}$ | 24 V | 2.5 A | 50W |
| PBIH-4848J | $38-63 \mathrm{~V}$ | 48 V | 1A | 50W |
| PBIH-11005J | $85-140 \mathrm{~V}$ | 5 V | 10A | 50W |
| PBIH-11012J | $85-140 \mathrm{~V}$ | 12 V | 4.3 A | 50W |
| PBIH-11015J | $85-140 \mathrm{~V}$ | 15 V | 3.4 A | 50W |
| PBIH-11024J | $85-140 \mathrm{~V}$ | 24 V | 2.5A | 50W |
| PBIH-11048J | $85-140 \mathrm{~V}$ | 48 V | 1A | 50W |
| PBIH-1205M | $9.2-16 \mathrm{~V}$ | 5 V | 18A | 100W |
| PBIH-1212M | $9.2-16 \mathrm{~V}$ | 12 V | 9A | 100W |
| PBIH-1215M | $9.2-16 \mathrm{~V}$ | 15 V | 7 A | 100W |
| PBIH-1224M | $9.2-16 \mathrm{~V}$ | 24 V | 4.5A | 100W |
| PBIH-1248M | $9.2-16 \mathrm{~V}$ | 48 V | 2A | 100W |
| PBIH-2405M | 19-32V | 5 V | 20A | 100W |
| PBIH-2412M | 19-32V | 12 V | 9A | 100W |
| PBIH-2415M | 19-32V | 15 V | 7 A | 100W |


| MODEL NUMBER | INPUT | OUTPUT |  | OUTPUT POWER |
| :---: | :---: | :---: | :---: | :---: |
| PBIH-2424M | 19-32V | 24 V | 5A | 100W |
| PBIH-2448M | 19-32V | 48 V | 2A | 100W |
| PBIH-4805M | $38-63 \mathrm{~V}$ | 5 V | 20A | 100W |
| PBIH-4812M | $38-63 \mathrm{~V}$ | 12 V | 9A | 100W |
| PBIH-4815M | $38-63 \mathrm{~V}$ | 15 V | 7A | 100W |
| PBIH-4824M | $38-63 \mathrm{~V}$ | 24 V | 5A | 100W |
| PBIH-4848M | $38-63 \mathrm{~V}$ | 48 V | 2A | 100W |
| PBIH-11005M | $85-140 \mathrm{~V}$ | 5 V | 20A | 100W |
| PBIH-11012M | $85-140 \mathrm{~V}$ | 12 V | 9A | 100W |
| PBIH-11015M | $85-140 \mathrm{~V}$ | 15 V | 7A | 100W |
| PBIH-11024M | $85-140 \mathrm{~V}$ | 24 V | 5A | 100W |
| PBIH-11048M | $85-140 \mathrm{~V}$ | 48 V | 2A | 100W |
| PBIH-1205R | $9.2-16 \mathrm{~V}$ | 5 V | 27A | 150W |
| PBIH-1212R | $9.2-16 \mathrm{~V}$ | 12 V | 13A | 150W |
| PBIH-1215R | 9.2-16V | 15 V | 10A | 150W |
| PBIH-1224R | $9.2-16 \mathrm{~V}$ | 24 V | 6.5A | 150W |
| PBIH-1248R | $9.2-16 \mathrm{~V}$ | 48 V | 3.3 A | 150W |
| PBIH-2405R | 19-32V | 5 V | 30A | 150W |
| PBIH-2412R | 19-32V | 12 V | 14A | 150W |
| PBIH-2415R | 19-32V | 15 V | 11 A | 150W |
| PBIH-2424R | 19-32V | 24 V | 7 A | 150W |
| PBIH-2448R | $19-32 \mathrm{~V}$ | 48 V | 3.5 A | 150W |
| PBIH-4805R | $38-63 \mathrm{~V}$ | 5 V | 30A | 150W |
| PBIH-4812R | $38-63 \mathrm{~V}$ | 12 V | 14 A | 150W |
| PBIH-4815R | $38-63 \mathrm{~V}$ | 15 V | 11A | 150W |
| PBIH-4824R | $38-63 \mathrm{~V}$ | 24 V | 7 A | 150W |
| PBIH-4848R | $38-63 \mathrm{~V}$ | 48 V | 3.5 A | 150W |
| PBIH-11005R | $85-140 \mathrm{~V}$ | 5 V | 30A | 150W |
| PBIH-11012R | $85-140 \mathrm{~V}$ | 12 V | 14A | 150W |
| PBIH-11015R | $85-140 \mathrm{~V}$ | 15V | 11A | 150W |
| PBIH-11024R | $85-140 \mathrm{~V}$ | 24 V | 7A | 150W |
| PBIH-11048R | $85-140 \mathrm{~V}$ | 48 V | 3.5 A | 150W |

## PBIH-F



## PBIH Series

15-150 WATTS SINGLE OUTPUT

PBIH-G

| Terminal | Connection |
| :---: | :---: |
| 0 | FG |
| 1 | $\mathrm{DC}+\mathrm{V}$ in |
| 2 | 0 V in |
| 3 | LFG |
| 4 | NO |
| 5 | NO |
| 6 | -V out |
| 7 | +V out |

PBIH-J


| Terminal | Connection |
| :---: | :---: |
| 1 | FG |
| 2 | $\mathrm{DC}+\mathrm{V}$ in |
| 3 | 0 V in |
| 4 | LFG |
| 5 | -V out |
| 6 | +V out |
| 7 | NC |

PBIH-M


PBIH-R


| Terminal | Connection |
| :---: | :---: |
| 1,2 | +V out |
| 3 | +S |
| 4 | -S |
| 5,6 | -V out |
| 7 | Remote |
| 8 | Control |
| 8 | $\mathrm{DC}+\mathrm{V}$ in |
| 9 | DC OV in |
| 10 | FG |

## PRO-M Series Power Supplies



Weidmuller's new PRO-M Series Switchmode Power Supplies offer a host of advantages. Available in 10 different versions, the 24 VDC PRO-M power supplies all feature a solid ultra-slim metal housing, and are designed to mount on a DIN-rail with no ventilation gap required between multiple units. This feature provides up to a $50 \%$ savings in space and allows the PRO-M to fit into the tightest spaces in control cabinets or machines.

These compact and efficient power supplies are optimized for machinery, with features that include overload resistance and high performance reserves. They also provide an increased level of reliability. Should one phase fail, the three-phase PRO-M power supply modules continue to work reliably in a two-phase operation.

The PRO-M Series power supplies are available in single-phase and three-phase versions from 70 W to 1000 W , making them particularly suited for use in many automation applications. The wide-ranging AC and DC inputs, broad operating temperature range and international approvals make the PRO-M supplies a strong choice.

- Slim housings for space saving installation in the cabinet
- DIN-rail mountable without any gap (no clearance necessary)
- Operating temperature range of $-25^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
- Autoselect Input for wide input range without any switch; for DC and AC voltages
- Power boost of $120 \%$ enables inductive and capacitive loads; additional starting capacity with up to a 2-minute boost
- Parallel connections allow simple power increase for up to five units without diode module
- MTBF > 500,000 Hours


## Canada

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## Mexico

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## United States

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Website: www.weidmuller.com


Max. limiting average on state current [A] $\begin{array}{lllll}\text { Type|Temp. } & 45^{\circ} \mathrm{C} & 50^{\circ} \mathrm{C} & 55^{\circ} \mathrm{C} & 60^{\circ} \mathrm{C} \\ 65^{\circ} \mathrm{C} & 70^{\circ} \mathrm{C}\end{array}$

| 1 ph $24 \mathrm{~V} / 3 \mathrm{~A}$ | 3.6 | 3.3 | 3.0 | 2.6 | 2.2 | 1.8 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| $1 \mathrm{ph} 24 \mathrm{~V} / 5 \mathrm{~A}$ | 6 | 5.5 | 5.0 | 4.4 | 3.8 | 3.1 |
| $1 \mathrm{ph} 24 \mathrm{~V} / 7.5 \mathrm{~A}$ | 9 | 8.6 | 8.25 | 7.5 | 6.75 | 5.6 |
| 1 ph $24 \mathrm{~V} / 10 \mathrm{~A}$ | 12 | 11.5 | 11 | 10 | 9 | 7.5 |
| $1 \mathrm{ph} 24 \mathrm{~V} / 20 \mathrm{~A}$ | 24 | 23 | 22 | 20 | 18 | 15 |
| $1 \mathrm{ph} 24 \mathrm{~V} / 40 \mathrm{~A}$ | 48 | 46 | 44 | 40 | 36 | 30 |
| $3 \mathrm{ph} 24 \mathrm{~V} / 5 \mathrm{~A}$ | 6 | 5.75 | 5.5 | 5 | 4.5 | 3.7 |
| $3 \mathrm{ph} 24 \mathrm{~V} / 10 \mathrm{~A}$ | 12 | 11.5 | 11 | 10 | 9 | 7.5 |
| $3 \mathrm{ph} 24 \mathrm{~V} / 20 \mathrm{~A}$ | 24 | 23 | 22 | 20 | 18 | 15 |
| $3 \mathrm{ph} 24 \mathrm{~V} / 40 \mathrm{~A}$ | 48 | 46 | 44 | 40 | 36 | 30 |



Technical Data

## General Specifications

| Current lim ting | $>120 \% I_{N}$ |
| :---: | :---: |
| Armbient temp. operating / storage | $-25^{\circ} \mathrm{C} \ldots+70^{\circ} \mathrm{C} /-40^{\circ} \mathrm{C} \ldots+85^{\circ} \mathrm{C}$ |
| Max. perm. air humidity (operation) | 20 \% ... 95 \% RH |
| Protection class | IP20 |
| Class of protection | I, with PE connection |
| Overvoltage category | II |
| Pollution severity | 2 |
| Insulation voltage | $4 \mathrm{kV} \mathrm{I} / \mathrm{O} / 2 \mathrm{kV} \mathrm{I} /$ ground / $0.5 \mathrm{kV} \mathrm{O} /$ ground |
| MTBF | $>500,000 \mathrm{~h}$ acc. to IEC 1709 (SN29500) |
| Protection against reverse voltages from the load | $30 . .35 \mathrm{~V}$ DC |
| Parallel connection option | yes, without diode module |
| Housing version | metal, corrosion resistant |
| Indication | operation, green LED |
| Mounting position, installation notice | horizontal on mounting rail TS35, 50 mm spacing top and bottom for free air circulation, can be mounted side by side with no space in between |
| EMC / shock / vibration |  |
| Noise emission acc. to EN55022 | Class B |
| Noise immunity tests acc. to | EN61000-4-2 (ESD), EN61000-4-3 and EN61000-4-8 (Fields), <br> EN61000-4-4 (Burst), EN61000-4-5 (Surge), EN610004-6 (conducted), <br> EN61000-4-11 (Dips) |
| Limiting of mains voltage harmonic currents | Acc. to EN 61000-3-2 |
| Resistance against vibration and shock | Acc. to EN50178, shock: 5 g in all directions |
| Electrical safety (applied standards) |  |
| Electrical equipment of machines | Acc. to EN60204 |
| Safety transformers for switched-mode power units | Acc. to EN61558-2-17 |
| Machinery with electronic equipment | Acc. to EN50178 / VDE0160 |
| Safety extra-low voltage | SELV acc. to EN60950, PELV acc. to EN60204 |
| Protective separation / protection against electrical shock | VDE0100-410 / acc. to DIN57100-410 |
| Protection against dangerous shock currents | Acc. to VDE0106-101 |

## Project Planning Data



Single Phase Input Power Supplies


## D Series

## Data Radio Modem

## DR900 - Digital Radios

Trio DataCom's D Series are high performance cost effective data radio modems designed as an alternative to hard wired data transport. Transmit your data over radio with a fully integrated data radio modem designed for fixed point-to-point and point-to-multipoint applications.
The D Series is available as either a half duplex or a full duplex* $853-929 \mathrm{MHz}+/-5 \mathrm{MHz}$ radio, including a fully integrated $4800 / 9600 \mathrm{bps}$ data modem. These units operate equally well in either a stand-alone configuration, or as part of a large communication system.


This complete package forms an attractively priced product for the transmission of data over radio in fixed applications thus providing a viable alternative to costly networks of buried media.

## Features:

* Fully integrated half and full duplex* radio and modem
* Transparent and non-intrusive remote diagnostic facilities (Optional)
* Inbuilt data routing and multiplexing capabilties, multi-port operation
* Simultaneous delivery of multiple protocols using Trio DataCom's unique MultiStream ${ }^{\text {TM }}$ technology
* Digital Signal Processing (DSP) modem
* Selectable 300-19,200 bps asynchronous RS232 user interface
* Built-in antenna diplexer*
* Integrated supervisory data channel
* Unique collision avoidance facility, for unsolicited report-byexception
* Software selectable configuration parameters
* Internal repeater operation
* Housed in an attractive yet robust metal enclosure
* Range of ancillary equipment - full duplex base / repeater stations and hot-standby base station


## Radio

The D Series radio has been designed to meet worldwide regulatory guidelines, including FCC, and has adjustable power output up to 5 Watts. This fully synthesised radio is programmable in $6.25 / 7.5 \mathrm{kHz}$ increments to accommodate various worldwide channel spacings. The receiver section has a wide tuning range with an excellent signal-to-noise ratio. Exceptional frequency stability is achieved by intelligent microprocessor controlled temperature compensation. An extended operating temperature range of -30 to $60^{\circ} \mathrm{C}$ makes the unit ideal for commercial and industrial applications.

## Modem

The in-built modem includes a custom DSP developed for data communications over narrow band radio systems.

This system offers minimum occupied bandwidth and optimal data integrity (using the standard HDLC protocol with CCITT CRC error detection) inhibiting the transfer of any rogue unwanted data caused by interference or squelch headers / tails.
The Trio DataCom DSP provides:

- the interface between the asynchronous RS232 user communication and the synchronous radio link layer.
- an inbuilt multipexer / router which allows for simultaneous transportation of multiple protocols over the one radio network.


## Applications

The D Series is ideal for use in a variety of sophisticated and critical SCADA and Distributed Information Systems, where complex routing of multiple data protocols and remote diagnostics and wireless network management are important factors.
Remote units and a number of full duplex base station / repeater models, suitable for a variety of requirements, make up the D Series. At the top of the range, the DH model is a genuine, duplicated hot standby base for systems where nothing short of ultra reliability is acceptable.
Telemetry Systems - Utilities (Gas, Water, Electricity), Railways, Mining, Telecommunications, Industry. Where network status, system control, data collection and fault conditions are required.

Transaction Processing - Point of Sale Credit Terminals, Stock Control, Direct Order, Banks, Building Societies, Stock Brokers, Gambling Organizations, etc, where Point of Sale, inventory, credit, or transaction data requires collection and distribution.

Common Carrier Data Services - The high speed, low cost and spectrum efficiency of this device make it well suited to all forms of common carrier data networking.

Alarm Monitoring - Fire, Power, Intrusion \& Essential Services Alarm Reporting.
*Available for DR900 full duplex 1 W version ( $853 \pm 5 \mathrm{MHz} / 929 \pm 5 \mathrm{MHz}$ )

## D Series - Data Radio Modem <br> DR900 - Digital Radios

## Configuration

Configuration using Trio's D Series programming software (DRProg) is completely Windows ${ }^{\ominus}$ based for all parameters, such as; frequency, transmitter power, digital mute level, PTT timer, system configurations, port settings.

## Network Management \& Diagnostic (Optional)

A large distributed network, or even a simple point-to-point link, requires comprehensive fault reporting and diagnostics to ensure a high level of availability. Trio D Series data radio modem products offer sophisticated in-built diagnostics using the optional TView ${ }^{\top \mathrm{TM}}$ software. This capability allows the customer to remotely monitor and maintain their system, minimising the likelihood of failures, by pointing out component degradation and decreasing the time to diagnose and repair. There is no necessity to visit the master station or interfere with the host data integrity, other than additional data transfer. For further details, consult the TView data sheet.

## Specifications:

\(\left.$$
\begin{array}{|ll|}\hline \text { RADIO } & \\
\hline \text { Frequency Range** } & \begin{array}{l}853-929 \mathrm{MHz}+/-5 \mathrm{MHz} \\
\text { Channel Selection } \\
\text { Frequency Splits } \\
\text { Fully programmable } \\
76 \mathrm{MHz} \mathrm{Tx/Rx} \text { frequency split available } \\
\text { including simplex } \\
\pm 1 \text { ppm }\left(-10 \text { to } 60^{\circ} \mathrm{C} \text { ambient, opt. }-30 \text { to } 70^{\circ} \mathrm{C}\right) \\
\text { Figher frequency stability options are available } \\
\text { due to intelligent processor controlled } \\
\text { temperature compensation }\end{array}
$$ <br>
<= 1ppm/annum <br>

half duplex or full duplex*\end{array}\right\}\)| $4800 / 9600$ bps |  |
| :--- | :--- |
| Aging | All configuration via Windows software |

TRANSMITTER

| Tx Power | $5 \mathrm{~W}(+37 \mathrm{dBm})$ or $1 \mathrm{~W}^{*}(+30 \mathrm{dBm})$ (software programmable) |
| :---: | :---: |
| Modulation | Narrow band digital filtering binary GMSK |
| Occupied Bandwidth | Meets various international regulatory guidelines for point-to-point and point-to-multipoint |
| Tx Attach Time | < 1 mSecond |
| Timeout Timer | Programmable 1-255 seconds |
| Tx Spurious | $<=-65 \mathrm{dBm}$ |
| RECEIVER |  |
| Sensitivity | -115 dBm for 12 dB SINAB |
| Blocking | $>75 \mathrm{~dB}$ (EIA) |
| Intermodulation | <= 70 dB (EIA) |
| Spurious Response | <= 70 dB (EIA) |
| Select. and Desense | 70 dB (EIA) |
| AFC Tracking | $\pm 3 \mathrm{kHz}$ tracking @ -90 dBm/attack time <10 mS |
| Mute | Programmable digital mute |

## Collision Avoidance

A unique fully integrated, yet independent, low speed supervisory data channel embedded within the primary bit-stream provides collision avoidance facilities which are transparent to the user. The use of this feature makes this product ideally suited for reliable, error free data transmissions between stations in high density point-to-multipoint data networks.
The benefits include:

- Multiple asynchronous applications operating on the one radio channel.
- Enhanced performance of report-by-exception networks.


## Related Products

* Base Stations (DB900)
* Hot Standby Base Station (DH900)
* 9 Port Stream Router Multiplexer (MSR)
* Network Management and Diagnostic Software (TView ${ }^{\text {TM }}$ )
* D Series Programming Software (DRProg ${ }^{M}$ )

| CONNECTIONS |  |
| :---: | :---: |
| User Data Port | $2 \times$ DB9 RS232 female ports |
| Antenna | SMA female bulkhead (optional N) |
| Power | 2 pin locking. Mating connector supplied |
| MODEM |  |
| Data Serial Port \#1 | Full duplex, DB9 RS232, DCE (modem), 30019,200 bps asynchronous, hardware/software handshaking |
| Data Serial Port \#2 | Full duplex, DB9 RS232, 300-9600 bps asynchronous, software handshaking |
| Data Storage | On-board RAM |
| Channel Data Rate | 4800 / 9600 bps , full duplex |
| Bit Error Rate | $\begin{aligned} & <1 \times 10^{-6} @-108 \mathrm{dBm}(4800 \mathrm{bps}) \\ & <1 \times 10^{-6} @-105 \mathrm{dBm}(9600 \mathrm{bps}) \end{aligned}$ |
| Collision Avoidance | Trio DataCom's unique supervisory channel C/DSMA collision avoidance system |
| MultiStream ${ }^{\text {TM }}$ | Trio DataCom's unique simultaneous delivery of multiple data streams (protocols) |
| CENERAL |  |
| Power Supply | 13.8 Vdc nominal (11-16 Vdc) |
| Transmit Current | 600 mA max. @ 1 W 1700 mA max. @ 5 W |
| Receive Current | 175 mA |
| Dimensions | $260 \times 161 \times 65 \mathrm{~mm}$ (robust metal enclosure) |
| Weight | 1.3 kg |

*Available for DR900 full duplex 1 W version ( $853 \pm 5 \mathrm{MHz} / 929 \pm 5 \mathrm{MHz}$ )
** Various sub-frequency bands available.
Note: Model codes previously known as xxxDR are now depicted as DRxxx.
designs

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## Technical Note TN-13

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Carrum Downs 3201 Australia
Tel : 61397750505
Fax: 61397750606

## 900 MHz YAGI <br> Antenna Characteristics

## Type (model \#)

Number of Elements
Gain Note 1
Impedance
Boom Length
Wind Loading (160 kph)
Tail Connection
Mounting Arrangements
Weight (incl. clamp)

## TC-ANT13(ALISS)

15
13dBd
50 Ohm
1.7 m
13.22 kg

100mm N type female
55 mm max. U clamp (pas cad)
$1.7 \mathrm{~kg}(\mathrm{AL}) 2.8 \mathrm{~kg}(\mathrm{SS})$

## TC-ANT9(ALISS)

6
9 dBd
50 Ohm
0.78 m
5.96 kg

100 mm N type female
55 mm max U clamp (pas cad)
$1.2 \mathrm{~kg}(\mathrm{AL}) 1.7 \mathrm{~kg}(\mathrm{SS})$

Note 1 - Gain is referred to a standard dipole and varies with frequency as follows-


H plane Polar Characteristics (nominal and mounting dependant)

## Type

3dB beamwidth E plane
3dB beamwidth H plane First (major lobe) null Front to back ratio

Maximum sidelobe

TC-ANT13ALISS)
$\pm 14$ Degrees
$\pm 15$ Degrees
$\pm 30$ degrees
$-20 \mathrm{dBr}$
$-17 \mathrm{dBr}$

TC-ANT9(ALISS)
$\pm 23$ Degrees
$\pm 26$ Degrees
$\pm 50$ Degrees
$-20 \mathrm{dBr}$
$-13 \mathrm{dBr}$


Available in either 6000 series marine grade aluminium (AL) or high grade stainless steel (SS)
L:\Docs\TECHNOTE\trio datacom Tn-13n.lwp June 19, 2001

## General Characteristics

## -DISCHARGE CHARACTERISTICS


-CHARGING CHARACTERISTICS


## Peripheral Device

Alife diagnosis devies for valve reguloted lead-acid batteries, "JUST FEEL". The battery monitor, JUST FEEL, diagnoses life of valve regulated lead-etid batteries. attrery life can be diagnesed without disconnecting a power supply as a result of measuring battery internal impedance during floating charge.

- Diognoier batter lifio during locting charge.
- Com be vised for a bo dope ver
- Mourved with corparotor funcion.


-Specifications subject to change without prior notice
Distributed by:
GS Yuasa International Ltd.
1-8.1. Nash-Shimbashi, Minato-ku
Toivo 105-0003
Japan



## UXH SERIES

The latest in YUASA's state-of-the-art technology has brought about a new UXH series capable of yielding even greater capacity than comparable batteries.
YUASA UXH batteries are designed with unique valve regulating devices and acid free constructions, ensuring safety and suitability to the contemporary business environment.

## Designed Life

10 years

## Features

Up to $15 \%$ more capacity Maintenance-free Higher energy efficiency Negligible gas emissions Valve regulated
Systems compatible
Fitted with explosion proof filter
(Except UXH100-12N and UXH200-6N)
No equalizing charge required
(Option) Flame reterdant version available No tree Acid (Non-spillable Battery)

## Applications

UPS
Telecommunications
Alarm systems
Fire \& security systems
Emergency lighting
Engine starting
Solar powered systems
Utilities
Rail

## General Specifications

| Beltry M Model | Nomind Velogen M | $\begin{array}{\|l\|} \hline 20+2 \text { Reted } \\ C o p o c i s) \\ \hline 1 \end{array}$ | $\begin{gathered} \text { Internel } \\ \text { Renidtrae } / \mathrm{ma} \text { ] } \end{gathered}$ | Approc Dimeatios, menindi] |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | lengh | Widh | theid | Onerel He eigt |  |  |  |
| W0:18.12 | 12 | 38 | 70 | $23519.3)$ | 128 [50] | 190 7.51 | $217{ }^{(8.5)}$ | 17 | (37) | - |
| Wersoli2 | 12 | so | 60 | 299 (11.8) | 128 (5.0) | 190 7.51 | 217 (8.5) | 21 | (48) | - |
| W0:46-12 | 12 | 63 | 50 | $3631143)$ | 128 - 509 | $190 \quad 7.5$ | 217 (85) | 25 | (ss) | $\bigcirc$ |
| W00756 | 6 | 75 | 2.2 | 217 [8.5) | 128 (5.0) | 1907 | 217 (8.8) | 16 | (35) | $\bigcirc$ |
| Wx+100 6 | 6 | 100 | 18 | 231 (11.) | ${ }^{128} \quad 15.0 \mid$ | 190 7.51 | 217 (8.5) | 20 | (4) | - |
| W-H1256 | s | 125 | 15 | 3451384 | 1288509 | 190 7.54 | $217 \quad 18.5$ | 24 | (53) | - |
| Werricoulin | 12 | 100 | 40 | 405718.01 | $172.516 .8)$ | $210 \quad 18.31$ | $240 \quad 19.4)$ | ${ }^{39}$ | (38) | $\times$ |
| W0-200 in | 6 | 200 | 1.3 | 398 (15.6) | $17616.9)$ | 216 [8.5] | 250 (99) | 39 | (38) | $\times$ |

[^12]
Q-Pulse Id: TMS202


Float charge voltage: $\mathbf{2 . 2 7 5 V}$ per cell Permissible operating temperature: $\cdot 15 \sim 45^{\circ} \mathrm{C}$ Contoiner material: ABS
Terminal: L terminal

Performance Data af $25^{\circ} \mathrm{C}\left(77^{\circ} \mathrm{F}\right)$
(Amperes and Watts per cell)
Amperes to F.V. 1.60 Volts Per Cell

| Tolst |  | $\frac{1}{\min }$ | $5$ | $\begin{aligned} & 10 \\ & \min \end{aligned}$ | $\begin{gathered} 15 \\ \hline \text { min } \end{gathered}$ | $20$ | $25$ | $\begin{aligned} & 30 \\ & \text { min } \end{aligned}$ | $\begin{aligned} & 35 \\ & \text { min } \end{aligned}$ | $40$ | $45$ | $\frac{1}{6}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| U0138-12 | A | 14.0 | 119.0 | 86.3 | 63.5 | 50.9 | 426 | 376 | 33.4 | 308 | 23.0 | 22.8 |
|  | w | 229.0 | 199.0 | 154.0 | 116.0 | 94.2 | 79.4 | 71.1 | 635 | 58.5 | 536 | 437 |
| Ux+150.12 | A | 1850 | 156.0 | 114.0 | 33.5 | 67.0 | 56.0 | 495 | 44.0 | 40.5 | 370 | 30.0 |
|  | w | 3020 | 262.0 | 203.0 | 153.0 | 124.0 | 105.0 | 935 | 3.5 | 77.0 | 705 | 57.5 |
| UNH63-12 | A | 2330 | 197.0 | 143.0 | 105.0 | 84.4 | 70.6 | 62.4 | 55.4 | 51.0 | 4s8 | 37:8 |
|  | w | 3850 | 330.0 | 255.0 | 193.0 | 156.0 | 1320 | 1180 | 1050 | 97.0 | 888 | 72.5 |
| UNH75-6 | A | 2780 | 2340 | 170.0 | 125.0 | 101.0 | 84.0 | 763 | 660 | 608 | 55.5 | 450 |
|  | w | 4520 | 393.0 | 304.0 | 2300 | 186.0 | 157.0 | 1000 | 125.0 | 1160 | 1050 | 36.3 |
| U0-100-6 | A | 370.0 | 312.0 | 227.0 | 1670 | 1340 | 1120 | 990 | 880 | 81.0 | 740 | 600 |
|  | w | 603.0 | 524.0 | 405.0 | 3060 | 248.0 | 209.0 | 1870 | 167.0 | 1540 | 1410 | 1150 |
| U0-1256 | A | 463.0 | 390.0 | 284.0 | 209.0 | 168.0 | 140.0 | 1240 | 1100 | 101.0 | 22.5 | 75.0 |
|  | w | 7540 | 655.0 | 506.0 | 383.0 | 310.0 | 261.0 | 2340 | 2090 | 1920 | 1780 | 1440 |
| U0-100-12 2 N | A | 370.0 | 312.0 | 277.0 | 167.0 | 1340 | 1120 | 990 | 88. | 81.0 | 740 | 60.0 |
|  | w | 6030 | 524.0 | 405.0 | 306.0 | 248.0 | 209.0 | 1870 | 16780 | 1510 | 1410 | 1150 |
| UNH2006 | A | 740.0 | 624.0 | 452.0 | 334.0 | 268.0 | 224.0 | 1980 | 1760 | 1620 | 1430 | 1200 |
|  | w | 12040 | 1048.0 | 808.0 | 8120 | 498.0 | 416.0 | 3740 | 3340 | 308.0 | 2320 | 230.0 |

Amperes to F.V. 1.70 Volts Per Cell

| Mortill Time |  | $1$ | $5$ | min | $\frac{15}{\min }$ | $\begin{gathered} 20 \\ \quad \text { min } \end{gathered}$ | $25$ | min | $35$ | $\begin{aligned} & 40 \\ & \min \end{aligned}$ | $45$ | 1 | $\stackrel{2}{6}$ | ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (00-38-12 | A | 123.0 | 1060 | 737 | 57.4 | 4.9 | 4.4 | 365 | 32.3 | 29.3 | 27.0 | 220 | 13.7 | 9.9 |
|  | w | 211.0 | 1860 | 133.0 | 106.0 | 88.9 | 779 | 69.2 | 61.6 | 55.9 | 51.7 | 426 | 26.6 | 19.4 |
| U00-150-12 | A | 1620 | 1390 | 97.0 | 75.5 | 63.0 | 54.5 | 480 | 42.5 | 38.5 | 355 | 290 | 18.0 | 13.0 |
|  | w | 2770 | 2450 | 1760 | 139.0 | 117.0 | 00.0 | 91.0 | 81.0 | 73.5 | 68.0 | 56.0 | 35. | 25.5 |
| UNH63-12 | A | 2040 | 175.0 | 1220 | 95.1 | 79.4 | 687 | 605 | 53.6 | 48.5 | 44.7 | 365 | 227 | 16.4 |
|  | w | 3490 | 308.0 | 221.0 | 1750 | 17.0 | 290 | 1150 | 1020 | 926 | 857 | 706 | 441 | 32.1 |
| UNH75-6 | A | 243.0 | 209.0 | 1660 | 113.0 | 94.5 | 81.8 | 720 | 63.8 | 778 | 52.3 | 635 | 27.0 | 19.5 |
|  | w | 4180 | 367.0 | 263.0 | 209.0 | 1760 | 150 | 1370 | 1220 | 1100 | 102.0 | 840 | 525 | 383 |
| UN-1006 | A | 324.0 | 278.0 | 1940 | 151.0 | 1260 | 109.0 | 980 | 85.0 | 770 | 710 | 580 | 36.0 | 260 |
|  | w | 5540 | 489.0 | 351.0 | 278.0 | 2340 | 2050 | 1820 | 1620 | 1470 | 1360 | 112 | 70.0 | 51.0 |
| PH2 256 | A | 050 | 348.0 | 243 | 189.0 | 158.0 | 360 | 1200 | 106.0 | 963 | 88.8 | 725 | 45. | 325 |
|  | v | 693.0 | 611.0 | 439.0 | 348 | 2930 | 256.0 | 2280 | 203.0 | 1840 | 170. | 160 | 87.5 | 03.8 |
| -100-12N | A | 3240 | 2780 | 1940 | 1510 | 1260 | 1090 | 960 | 850 | 77.0 | 71.0 | 58 | 36.0 | 260 |
|  | w | 5540 | 4890 | 351.0 | 2780 | 2340 | 2050 | 1820 | 1620 | 1470 | 1360 | 1120 | 70.0 | 51.0 |
| U012006 | A | 848.0 | 5560 | 388.0 | 3020 | 2520 | 218.0 | 1920 | 1700 | 1540 | 1420 | 1160 | 72.0 | 520 |
|  | w | 1108 | 976.0 | 700.0 | 556.0 | 488.0 | 40 | 3860 | 324.0 | 2940 | 2720 | 224.0 | 140 | 102 |

Amperes to F.V. 1.80 Volts Per Cell

|  |  | $\min$ | $\underset{\text { min }}{5}$ |  | $15$ | min | min |  |  | min | min |  |  | $3$ | $5$ | $\frac{8}{h}$ | $\begin{gathered} 10 \\ h \end{gathered}$ | ${ }_{2}^{20}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (50-38-1 | A | 99.2 | 26 | 63 | 528 | 44.8 | 38. | 35 | 11.2 | 231 | 262 | 21. | 128 | Q | 6.1 | 42 | 35 | 1.90 |
|  | w | 179.0 | 157.0 | 8. | ค. | 84. | 73 | 66. | 59. | St | 505 | 11. | 251 | 18.6 | 122 | 8. | 68 | 320 |
| S0-12 | A | 131.0 | 14. | 240 | 49.5 | 59.0 | 51.0 | 460 | 41. | 37. | 345 | 230 | 17. | 12.5 | 8.0 | 5.5 |  | 250 |
|  | w | 2360 | 207.0 | 560 | 1310 | 1120 | 97.0 | 880 | 78.5 | 71. | 665 | 545 | 330 | 24.5 | 16.0 | 11.0 | 0 | 5.00 |
| 163 | A | 164.0 | 430 | 06 | 87.4 | 74.3 | 64.3 | 580 | 51. | 48.8 | 43.5 | 353 | 21.4 | 15.8 | 10.1 | 6.9 | 58 | 3.15 |
|  | w | 297.0 | 2600 | 960 | 1840 | 1400 | 22. | 1110 | 989 | 901 | 82.8 | 697 | 41 | 308 | 202 | 139 | 13 | 63 |
| UNO5 | A | 196.0 | 700 | 260 | 1040 | 83.5 | 765 | 690 | 61.5 | 55.5 | 51.8 | 420 | 25. | 188 | 12 | 83 | 59 | 378 |
|  | w | 353.0 | 100 | 2330 | 1980 | 167.0 | 46. | 1320 | 18. | 1070 | 99.8 | 81.8 | 485 | 368 | 240 | 165 | 135 | 750 |
| UWH00 | A | 261.0 | 27.0 | 88 | 1390 | 18 C | 020 | 92 | 320 | 740 | 62.0 | \$80 | 310 | 250 | 60 | 11 | 93 | 500 |
|  | W | 471.0 | 130 | 311.0 | 281.0 | 223.0 | 94. | 1780 | 157.0 | 143 | 230 | 109 | eso | 19.0 | 32. | 22. | 180 | 00 |
| 125 | A | 326 | 2340 | 00 | 1740 | 143. | 28. | 115 | C30 | 23 | 863 | 700 |  | 31.3 | 20.0 | 13. |  | 62 |
|  | W | 589.0 | 5160 | 39 | 328 | 279 | 24.0 | 220 | 98.0 | 79. | 1660 | 38 | 325 | 61.3 | 40. | 27.5 | 225 |  |
| -00-12 | A | 261.0 | 227. | 480 | 1380 | 118. | 1020 | 920 | 820 | 74 | 69.0 | se | 340 | 25 | 16 | 11. | 3 |  |
|  | w | 71. | 4130 | 311.0 | 2810 | 2230 | 194.0 | 1760 | 1570 | 143 | 133.0 | 1096 | sso | 49.0 | 320 | 22. | 180 |  |
| UNH200 | A | 520.0 | 4520 | - | 2780 | 236.0 | 204.0 | 1840 | 1640 |  | 138. | 1120 | 85 | 50.0 | 32. | 22. | 18 | 0.00 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

### 3.6 INSTRUMENTATIONS \& LIGHTS

- CORTEC - VPCI-110 OR 111 - Corrosion Inhibitor
- CROMPTON INSTRUMENTS - 244-01KG-HG-IP-SR 4-20mA - Level Indicator
- NHP - RQ4801080VDC - 24VDC Hour Run Meter
- LUMIFA - LF1B-C3S-2THWW4 - Led Lights
- REDLION - G306A000 - Graphic Display Free Issue


## VPCIM EMITTING SYSTEMS \& ELECTRONIC PRODUCTS

## VpCl ${ }^{\circledR}-110$ Emitter, Patented



## PRODUCT DESCRIPTION

Cortec ${ }^{\circledR} \mathrm{VpCl}-110$ emitters are designed to provide corrosion protection for metal components and parts enclosed in non-ventilated control boxes, cabinets, or tool boxes up to 10 cubic feet ( 283 liters) in volume. The Vapor phase Corrosion Inhibitor ( VpCl ) emits vapors which form a molecular layer on internal metal surfaces to protect critical, complex, and expensive electronic equipment and other metal components during operation, shipping, or storage. VpCl-110 is a small foam emitter through which corrosion inhibitors are slowly released, and moisture and air pollutants can enter to be absorbed. It provides long-term protection against corrosion even in the presence of adverse conditions including salt, moisture, airborne contaminants, $\mathrm{H}_{2} \mathrm{~S}$, $\mathrm{SO}_{2}, \mathrm{NH}_{3}$, and others.

## TYPICAL APPLICATIONS

$\mathrm{VpCl}-110$ can be effectively used for:

- O perations, packaging, and storage electrical equipment
- Marine navigation and communication electronic equipment
- Aerospace electrical controls
- Electric motors
- Switching equipment
- Fuse boxes and power boxes
- Medical equipment
- Electrical wireways and terminal boxes
- Scientific and measuring instruments
- Telecommunications equipment
- Remote electronics devices
- Tool-boxes, parts-storage, and other containers holding metals


## FEATURES

- Economical to use
- Provides continuous protection for up to 24 months during operation and/or shutdown
- Effective in polluted and humid environments
- Does not interfere with electrical, optical, or mechanical performance
- Multimetal protection
- Q uick and easy installation
- Non-toxic and safe to handle
- Compact and space-saving
- Free of nitrites, halogens, and phosphates
- No spraying, wiping, or dipping required
- Low VOC values
- Meets Southern California Clean Air Act and other N ational and local regulations
- Self-stick back
- Self-stick date label
- Accepted by FDA for corrosion protection of electrical and electronic equipment within food processing plants
- Canadian Food Inspection Agency acceptance for indirect food contact
- NSN 6850-01-456-2971
- Conforms to MIL I-22110C
- Federal Standard 101, Ardec Technical Report 9905, Picatinny Arsenal, N ew J ersey, USA

CORTEC
CORPORATION

## METHOD OF APPLICATION

$\mathrm{VpCl}-110$ is extremely simple and convenient to install. The device should be installed at the earliest possible time. Simply select a space within enclosure where corrosion protection would be useful. Verify the surface is clean and free of debris. Peel off the protective peel strip from the bottom of the device and attach it to the clean surface.
$\mathrm{VpCl}-110$ emitters can be installed in any position. For volumes greater than 10 cubic feet (283 liters), use more than one device. If the enclosure is not totally airtight, or if the access doors are opened frequently, replace the $\mathrm{VpCl}-110$ device more often than every 2 years. After periods of heavy maintenance replace the device. For additional protection spray the enclosure very lightly with ElectriCorr® ${ }^{\circledR} \mathrm{VpCI}-238$ or $\mathrm{VpCl}-239$.

## SPECIFICATIONS

Packaging
Protection
Standard Size

12 individually wrapped emitters per carton up to $10 \mathrm{ft}^{3}$ (283 liters) per device
Foam device with adhesive backing $2.5^{\prime \prime} \mathrm{D} \times 2$ " H ( 6.4 cm D x 5 cm H )

## FOR INDUSTRIAL USE ONLY

## KEEP OUT OF REACH OF CHILDREN

## KEEP CONTAINER TIGHTLY SEALED

## NOT FOR INTERNAL CONSUMPTION

## CONSULT MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION

## LIMITED WARRANTY

All statements, technical information and recommendations contained herein are based on tests Cortec Corporation believes to be reliable, but the accuracy or completeness thereof is not guaranteed.
Cortec Corporation warrants Cortec ${ }^{8}$ products will be free from defects when shipped to customer. Cortec Corporation's obligation under this warranty shall be limited to replacement of product that proves to be defective. To obtain replacement product under this warranty, the customer must notify Cortec Corporation of the claimed defect within six months after shipment of product to customer. All freight charges for replacement products shall be paid by customer.
Cortec Corporation shall have no liability for any injury, loss or damage arising out of the use of or the inability to use the products.

BEFO RE USING, USER SHALL DETERMINE THE SUITABILITY OF THE PRO DUCT FOR ITS INTENDED USE, AND USER ASSUMES ALL RISK AND LIABILITY WHATSO EVER IN CONNECTIO N THEREWITH. No representation or recommendation not contained herein shall have any force or effect unless in a written document signed by an officer of Cortec Corporation.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATU TO RY, IN CLUDING WITHO UT LIMITATIO N ANY IM PLIED WARRANTY O F MERCHAN TABILITY O RO F FITN ESS FOR A PARTICULAR PURPO SE. IN NO CASE SHALL CORTEC CORPO RATIO N BE LIABLE FOR INCIDENTAL OR CONSEQ UENTIAL DAMAGES.

Enimnoraly sab yparwer Texnsogen
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Phone (651) 429-1100, Fax (651) 429-1122
Toll Free (800) 4-CO RTEC, E-mail info@ cortecvci.com Internet http://www.CortecVCI.com

## Catalogue Numbering System

Guide to Catalogue Numbering System - Example Code: 244-03AG - LSPK - C6 - ER
$\qquad$ A $\qquad$ G LS
LS -
PK _ C6 ER


## SERIES

016 - Fiesta
075 - Short-case switchboard
077 - Standard switchboard
078 - Hi-shock sealed
079 - 83/4" switchboard
083 - 2" sealed
$084-2^{1 / 2} 2^{\prime \prime}$ sealed
242 - 48mm DIN
243-72mm DIN
244-96m DIN
246 - 144mm DIN
E242-48mm short-scale
E243-72mm short-scale
E244-96mm short-scale


TYPE / FUNCTION
A - Amperes DC
B - Rectified amperes
C - Center zero amps
D - Zero offset current
F - Amperes AC
G - Volts AC
H - High middle
K - DC input non electrical scaling
L - VAr self contained
N - Center zero voltage
P - Zero offset voltage
R - Live zero current
S - Live zero voltage
V - Volts DC
W - Rectified voltage
Y - Expanded scale AC
Z - Expanded scale DC
2-2x overload ammeters
$3-3 x$ overload ammeters
5 - 1-phase 2 -wire watts
$6-6 x$ overload ammeters
8 - 3 -phase 3 -wire watts
9 - 3 -phase 4 -wire watts


MOVEMENT CODE

01 - Short-scale AC and DC

- Short-scale AC
- Long-scale AC and DC
- Long-scale AC and DC
- Edgewise AC DC
- Long-scale AC
- Edgewise AC and DC
- Long-scale DC
- Phase sequence meter
- 360 rotating iron PFI
- Synchroscope
- Elapsed time meter
- Thermal demand ammeter
- Wattmeter
- Meter relay
- VArmeter

41L - Frequency meter long-scale
41 S - Frequency meter short-scale
42

- Power factor meter
- RTD temperature
- Shunts
- Current transformers
- Kilowatt hour class 1.0

KH - Kilowatt hours
KW - Kilowatt hours class 2.0

## NATIONAL STANDARD

A - ANSI C39.1
B - BS 89
G - DIN
I - ANSI fixing captions
$J$ - Japanese instrument Standard

## SCALING OR OUTPUT

BX - Volt free relay contacts
FA -1 mA
HG - 4/20mA
PK - 0/100
PZ - 0/150
RL - 0/200
RX - 0/300
SC - 0/400
SJ - 0/600
SS - 0/1000
TM - 0/2000
UB - 0/4000
UJ - 0/5000 etc

[^13]
## 244 Series Analogue Meter Relays



244 series meter relays combine a highly accurate indicator with high and low set-points which can operate alarm and control circuits when the monitored signal value moves outside the set-point limits indicated by the adjustable red index pointers.

These relays monitor and control any parameter which can be converted into an A.C. or D.C. signal.

The indicator, relays and power unit are in one housing and the control function continues should the indicator become damaged. A time delay is available as an optional extra.

| Meter Relays | Product Code |
| :---: | :---: |
| 1 relay, 2 set-points |  |
| Upscale de-energised, downscale energised | 244-300 |
| 1 relay, 1 set-point |  |
| Upscale de-energised, downscale energised | 244-301 |
| 2 relays, 2 set-points |  |
| Mid-band de-energised, outside band energised | 244-302 |
| 2 relays, 2 set-points |  |
| Both upscale energised, downscale de-energised | 244-303 |
| 2 relays, 2 set-points |  |
| High \& low mid-band energised, outside band de-energised | 244-304 |
| 2 relays, 2 set-points |  |
| Both upscale de-energised, downscale energised | 244-305 |
| 1 relay, 1 set-point |  |
| Upscale de-energised, downscale energised | 244-307 |
| 2 relays, 2 set-points |  |
| High and high upscale de-energised | 244-308 |
| 1 relay, 2 set-points |  |
| Low de-energised, high energised | 244-309 |
| RDT operated 2 relays, 2 set-points |  |
| Mid-band de-energised, outside band energised | 244-30R |
| Thermo couple 2 relays, 2 set-points |  |
| Mid-band de-energised, outside band energised | 244-30T |

## Options

| BP | Polycarbonate window | SM | Customer logo on dial |
| :--- | :--- | :--- | :--- |
| CT | Calibrated at customer specified | SN | No logo on dial |
|  | temperature | SR | Red index line on dial |
| DS | Dual scale | SZ | Coloured band on dial |
| FK | Finger knob adjustment | TB | Time delay $0.3-10 \mathrm{sec}$ |
| LB | Both relays latch, remove auxiliary | TC | Time delay $0.3-30 \mathrm{sec}$ |
|  | supply to reset | TD | Time delay $0.3-20 \mathrm{sec}$ |
| LH | High relays latch, remove auxiliary <br>  <br> supply to reset | TH | Time delay $0.3-10 \mathrm{sec}$ high relay |
| LL | Low relays latch, remove auxiliary supply | TI | Time delay $0.3-30 \mathrm{sec}$ high relay |
|  | to reset | TL | Time delay $0.3-10 \mathrm{sec}$ low relay |
| PD | Heavily damped movement | TM | Time delay $0.3-30 \mathrm{sec}$ low relay |
| PG | Panel gasket | TP | Time proportional control |
| SL |  |  |  |

## 244 Series Analogue Meter Relays

Specification

| Accuracy Indicator: | Class 1.5 | Optional Ratings: |  |
| :---: | :---: | :---: | :---: |
| Set-point: | Class 1.5 | D.C. Volts: | 20 mV to 500V (10Ks2/V) |
| Repeatability: | 0.5\% | D.C. Current: | $10 \mu \mathrm{~A}$ to 15A (20mV drop) |
| Differential: | 1\% of span | Thermocouple: | Types J, K, R, S, T minimum |
| Set-point adjustment: | 98\% of scale |  | 10 mV span |
| Minimum span: | $2 \%$ between set points | RTD: | 2 wire $10 \Omega$ copper $100 \Omega$ platinum, $120 \Omega$ nickel |
| A.C. Volts: | 6 V to 500 V ( $1 \mathrm{~K} \Omega / \mathrm{V}$ ) | Auxiliary Supply: |  |
| Single Frequencies: | $50 / 60 \mathrm{~Hz}$ 25 Hz to 3 kHz on request | A.C.: | Dual rating 100/125V or 200/250V 50/60Hz. |
| A.C. Current: | $100 \mu \mathrm{~A}$ to 1 A ( 1 V drop) 1 A \& 5A C.T. operation (0.5VA) $50 / 60 \mathrm{~Hz}$. | D.C.: | 12 V or $24 \mathrm{~V} .+/-14 \%$ Maximum 15\% ripple on unregulated supplies |
| Frequencies: | 25 Hz to 3 kHz on request | Burden: | 3VA maximum |
| Time delay: | 0.3 to 10 or 0.3 to 30 seconds | Fixing: <br> Enclosure: | Screw clamps IP52 |

## Dimensions



## Connections



## Contaore - RQ480 $54 \times 54 \mathrm{~mm}$ <br> Hourmeter - RQ480 $54 \times 54 \mathrm{~mm}$

Conteggia il tempo complessivo di funzionamento di macchine, motori o di qualsiasi apparecthiatura elettrica. II conteggio dei tempi di funzionamento permette la programmazione di interventi di manutenzione, la rilevazione di costi, il controllo dei termini di garanzia, ecc. Conteggio del tempo in ore e centesimi di ora Numeratore meccanico 7 difre

Conteggio massimo: 99.999,99 (aux. ra) - 999.999,9 (aux.cc) Alimentazione ausiliaria ca: $24-48-100 \ldots 115-230 \ldots 240-400 \ldots . .415 \mathrm{VCa}$ Frequenza: 50 oppure 60 Hz Alimentazione ausiliaria cc: $10 \ldots 80-110 \mathrm{Vtc}$

It counts the total working time
for machines, motors or
any electrical device.
Counting of working times allows to program maintenance interventions, to survey costs, to check
the guarantee terms, otc.
Time counting in hours and hundredths of hour
7-digit mechanical counter
Maximum display:
$99.999,99$ (aux. ace) - 999.999,9 (aux. dc)
Auxiliary supply ac:
$24-48-100 . . .115-230 \ldots 240-400 \ldots 415 \mathrm{Vac}$
Frequency: 50 oppure 60 Hz
Auxiliary supply dc: $10 . . .80$ - 110 Vdc


Indicatore visivo di funzionamento


Ausiliaria cc amxilley dc

Sewage Pump Station SP046 Botticelli Street Electrical Installation Operations and Maintenance Manual

| CODICE ORDINAZIONE <br> ORDER CODE | ALIMENTAZIONE AUSILIARIA <br> AUKILARY SUPPLY | FREQUENZA <br> FREQUENCY |
| :---: | :---: | :---: | :---: |
| ANPA1 | $100-115 \mathrm{~V}$ |  |
| ANPA3 | $230-240 \mathrm{~V}$ |  |
| FRONTPROTECTION |  |  |

## VISUALIZZAZIONE

| Frontale: nero |
| :--- |
| Numeratore: 7 cite |
| Colore cifre: bianco (ore) - rosso (decimali) |
| Altezza cifre: 4 mm |
|  |
| Conteggio massimo |
| Max, counter |
| Numero decimall |
| Decimal number |
| Risoluzione |
| Resolution |
| Precisione |
| Accuracy |



## Conteggio: non azzerabile

Pagginnto il massinto valore ( $99.999,99$ opp. 999.999,9) il conleggio riperte automaticamente da zero
Indicatore visivo di funzionam ento

## ALIMENTAZIONE AUSILIARIA

Valore nominale Uaux.ca: $24-48-100-115-230-240-400-415 \mathrm{~V}$
Varizzione ammessa: $\pm 10 \%$ Uaux

Counting: no resettable
When the highest valve is reached ( $99.909,99$ or $999.990,0$ ), count starts again from zero.
Working visual Indicator
AUXILIARY SUPPLY
Rated value Uaux.ac: 24-48-100-115-230-240-400-415V
Tolerance: $\pm 10 \%$ Uaux

| Frequenza: $50-80 \mathrm{~Hz}$ | Frequency: $50-60 \mathrm{~Hz}$ |
| :---: | :---: |
| Autoconsumo: $\leq 8 \mathrm{~mA}$ | Rated burden: $\leq \theta \mathrm{mA}$ |
| Valore nominale Uaux.ce: 10..60-110 Wes | Fated value Uaux.de: $10 . . .80-110 \mathrm{Vdc}$ |
| Varizzione ammeesa: $\pm 10 \%$ Ueux (Ueux. 110Vcc) | Tolerance: $\pm 10 \%$ Uaux (Uaux. 110Vck) |
| Autoconsumo: 59 mA | Rated burden: 59 mA |
| CONDIZIONI AMBIENTALI | ENVIRONMENTAL CONDITIONS |
| Temperatura di riterimento: $23^{\circ} \mathrm{C}$ | Reference temperature: $23^{\circ} \mathrm{C}$ |
| Campo nominale di utilizo: $5 . .40^{\circ} \mathrm{C}$ | Nominal range of use: $6 \ldots . .40^{\circ} \mathrm{C}$ |
| Campo dil funzionamento: -20..700 | Operating range: - $20 . . .70^{\circ} \mathrm{C}$ |
| Campo limite per limmagazzinamento e trasporto: -20. $70^{\circ} \mathrm{C}$ | $4 \mathrm{~m} / \mathrm{t}$ range for storage and transport: $\cdot 20 . . .70^{\circ} \mathrm{C}$ |
| CUSTODIA | HOUSING |
| Fissaggio: incasso | Mounting: fusht mounting |
| Foratura pannello: $45 \times 45 \mathrm{~mm}$ | Panel cutout: $45 \times 45 \mathrm{~mm}$ |
| Frontale: $54 \times 54 \mathrm{~mm}$ | Front frame: $54 \times 64$ mm? |
| Protondità: 42 mm | Depth: 42 mm |
| Conncsaioni: morsetil a vite | Connectlons: screw termina's |
| Materiale custodia: policarbonato autoestinguente | Housing matertal: seff extinguishing paricatoonate |
| Grado di protezione (ENAEC 60528): IP40 frontale. \|P20 morseti | Protection degree (ENMEC 6052S): :1P40 front frane, iP20 terminals |
| Opzione: protezione frontale IP54 | Option: protection !P54 front frame |
| Peeo: 50 grammi | Welght: 60 grams |

## DIMENSIONI DIMENSIONS



LF1B series LED Illumination Units LUMMFFim


IDEC CORPORATION


## Features

- Brightness: 62.5 Lumens/Watt
- Low heat generation.
- Less energy usage, longer operation life, smaller mounting space, and no electrical noise.
- $71 \%$ reduction of power and $\mathrm{CO}_{2}$ emission when compared to 20W fluorescent lamps (LF1B-C/D)
- Thin and slim style fits into compact spaces.
- Two cover colors: clear and white (diffused light)
- Cool white, warm white, yellow and red illumination colors available.
- UL Listed \& IP54 protection against dust and water splash (IEC 60529)


## Part No. Development

## LF1B- C 3 S -2 THWW4

LED Module Arrangement
A: 3 LEDs $\times 1$ row
B: 6 LEDs $\times 1$ row
C: 12 LEDs $\times 1$ row
D: 24 LEDs $\times 1$ row


## LED Optics Specifications

| Illumination Color | Cool White | Warm White | Yellow | Red |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Luminous Intensity (typ.) (Single LED module) | 5000 mcd | 4500 mcd | 2300 mcd | 1800 mcd |  |
| Color Temperature (typ.)/Dominant Wavelength (typ.) | 5500 K | 2800 K | 590 nm | 625 nm |  |
| Reference Illuminance (typ.) at <br> 500 mm (clear cover) | 3 LEDs $\times 1$ row | 90 lx | 60 lx | 20 lx | 20 lx |
|  | 6 LEDs $\times 1$ row | 170 lx | 110 lx | 40 lx | 40 lx |
|  | 12 LEDs $\times 1$ row | 330 lx | 200 lx | 75 lx | 75 lx |
|  | 24 LEDs $\times 1$ row | 560 lx | 350 lx | 125 lx | 125 lx |

Note: Illumination colors and illuminance may vary. Specifications shown in the above table are typical values and may vary depending upon actual environment.

## Performance Specifications

| Rated Voltage |  | 24V DC (non-polarized) |
| :---: | :---: | :---: |
| Input Current (typ.) <br> (at the rated voltage) | LF1B-A | 30 mA |
|  | LF1B-B | 60 mA |
|  | LF1B-C | 120 mA |
|  | LF1B-D | 240 mA |
| Power Consumption (typ.) (at the rated voltage) | LF1B-A | 0.8W |
|  | LF1B-B | 1.5W |
|  | LF1B-C | 2.9W |
|  | LF1B-D | 5.8W |
| Insulation Resistance |  | 100M $\Omega$ minimum (500V DC megger) |
| Dielectric Strength |  | 1000 V AC, 1 minute (between live and dead parts) |
| Vibration Resistance (damage limits) |  | Frequency: 5 to 55 Hz Amplitude: 0.5 mm |
| Shock Resistance (damage limits) |  | $1000 \mathrm{~m} / \mathrm{s}^{2}$ |
| Operating Temperature |  | -30 to $+55^{\circ} \mathrm{C}$ (no freezing) |
| Operating Humidity |  | 45 to 85\% RH (no condensation) |
| Storage Temperature |  | -35 to $+70^{\circ} \mathrm{C}$ (no freezing) |
| Operating Atmosphere |  | No corrosive gas |
| Life |  | 40000 hours (The total illumination duration in which the luminance maintains a minimum of $70 \%$ of the initial value.) |
| Degree of Protection |  | IP54 |
| Material |  | End cover, conduit: polyamide Cover: polycarbonate Wire: US20276T AWG24 $\times 2$ C |
| Weight (approx.) | LF1B-A | 95g |
|  | LF1B-B | 125 g |
|  | LF1B-C | 165 g |
|  | LF1B-D | 255 g |

- Do not use the LF1B illumination units in environments subject to corrosive gases, otherwise illuminance may deteriorate.


## Dimensions



| Type No. | A | B | C |
| :---: | :---: | :---: | :---: |
| LF1B-A | 134 | 64 | 123 |
| LF1B-B | 210 | 140 | 199 |
| LF1B-C | 330 | 260 | 319 |
| LF1B-D | 580 | 510 | 569 |



All dimensions in mm.

## Internal Circuit



## MODEL G306-GRAPHIC COLOR LCD OPERATOR INTERFACE TERMINAL WITH QVGA DISPLAY AND TOUCHSCREEN



Class I, Division 2, Groups A, B, C, and D
Class II, Division 2, Groups F and G
Class III, Division 2

- CONFIGURED USING CRIMSON SOFTWARE (VERSION 2.0 OR LATER)
- UP TO 5 RS-232/422/485 COMMUNICATIONS PORTS (2 RS-232 AND 1 RS-422/485 ON BOARD, 1 RS-232 AND 1 RS422/485 ON OPTIONAL COMMUNICATIONS CARD)
- 10 BASE T/100 BASE-TX ETHERNET PORT TO NETWORK UNITS AND HOST WEB PAGES
- USB PORT TO DOWNLOAD THE UNIT'S CONFIGURATION FROM A PC OR FOR DATA TRANSFERS TO A PC
- UNIT'S CONFIGURATION IS STORED IN NON-VOLATILE MEMORY (4 MBYTE FLASH)
- COMPACTFLASH ${ }^{\circledR}$ SOCKET TO INCREASE MEMORY CAPACITY
- 5.7-INCH STN PASSIVE MATRIX 256 COLOR QVGA $320 \times 240$ PIXEL LCD
- 5-BUTTON KEYPAD FOR ON-SCREEN MENUS
- THREE FRONT PANEL LED INDICATORS
- POWER UNIT FROM 24 VDC $\pm 20 \%$ SUPPLY
- RESISTIVE ANALOG TOUCHSCREEN


## GENERAL DESCRIPTION

The G306 Operator Interface Terminal combines unique capabilities normally expected from high-end units with a very affordable price. It is built around a high performance core with integrated functionality. This core allows the G306 to perform many of the normal features of the Paradigm range of Operator Interfaces while improving and adding new features.

The G306 is able to communicate with many different types of hardware using high-speed RS232/422/485 communications ports and Ethernet 10 Base T/100 Base-TX communications. In addition, the G306 features USB for fast downloads of configuration files and access to trending and data logging. A CompactFlash socket is provided so that Flash cards can be used to collect your trending and data logging information as well as to store larger configuration files.

In addition to accessing and controlling of external resources, the G306 allows a user to easily view and enter information. Users can enter data through the touchscreen and/or front panel 5-button keypad.

## SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use the controller to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the controller.


The protective conductor terminal is bonded to conductive parts of the equipment for safety purposes and must be connected to an external protective earthing system.


WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2/CLASS II, DIVISION 2/CLASS III, DIVISION 2


CAUTION: Risk Of Danger. Read complete instructions prior to installation and operation of the unit.


CAUTION: Risk of electric shock.

CompactFlash is a registered trademark of CompactFlash Association.

## CONTENTS OF PACKAGE

- G306 Operator Interface.
- Panel gasket.
- Template for panel cutout.
- Hardware packet for mounting unit into panel.
- Terminal block for connecting power.

ORDERING INFORMATION

| MODEL NO. | DESCRIPTION | PART NUMBER |
| :---: | :---: | :---: |
| G306 | Operator Interface for indoor applications, textured finish with embossed keys | G306C000 |
| G3CF | 64 MB CompactFlash Card ${ }^{5}$ | G3CF064M |
|  | 256 MB CompactFlash Card ${ }^{5}$ | G3CF256M |
|  | 512 MB CompactFlash Card ${ }^{5}$ | G3CF512M |
| G3RS | RS232/485 Optional Communications Cards | G3RS0000 |
| G3CN | CANopen Optional Communications Cards | G3CN0000 |
| PSDR7 | DIN Rail Power Supply | PSDR7000 |
| SFCRM2 | Crimson $2.0{ }^{2}$ | SFCRM200 |
| CBL | RS-232 Programming Cable | CBLPROG0 |
|  | USB Cable | CBLUSB00 |
|  | Communications Cables ${ }^{1}$ | CBLxxxxx |
| DR | DIN Rail Mountable Adapter Products ${ }^{3}$ | DRxxxxxx |
|  | Replacement Battery ${ }^{4}$ | BAL3R004 |
| G3FILM | Protective Films | G3FILM06 |

1 Contact your Red Lion distributor or visit our website for complete selection.
${ }^{2}$ Use this part number to purchase Crimson on CD with a printed manual, USB cable, and RS-232 cable. Otherwise, download for free from www.redlion.net.
${ }^{3}$ Red Lion offers RJ modular jack adapters. Refer to the DR literature for complete details.
${ }^{4}$ Battery type is lithium coin type CR2025.
${ }^{5}$ Industrial grade two million write cycles.

## PECIFICATIONS

## 1. POWER REQUIREMENTS

Must use Class 2 or SELV rated power supply
Power connection via removable three position terminal block.
Supply Voltage: $\quad+24$ VDC $\pm 20 \%$
Typical Power ${ }^{1}$ : 8 W
Maximum Power ${ }^{2}$ : 14 W
Notes:

1. Typical power with +24 VDC, RS232/485 communications, Ethernet communications, CompactFlash card installed, and display at full brightness.
2. Maximum power indicates the most power that can be drawn from the G306. Refer to "Power Supply Requirements" under "Installing and Powering the G306."
3. The G306's circuit common is not connected to the enclosure of the unit. See "Connecting to Earth Ground" in the section "Installing and Powering the G306."
4. Read "Power Supply Requirements" in the section "Installing and Powering the G306" for additional power supply information
5. BATTERY: Lithium coin cell. Typical lifetime of 10 years.
6. LCD DISPLAY:

| SIZE | 5.7-inch |
| :--- | :---: |
| TYPE | STN |
| COLORS | 256 |
| PIXELS | $320 \times 240$ |
| BRIGHTNESS | $165 \mathrm{~cd} / \mathrm{m}^{2}$ |
| BACKLIGHT* | $20,000 \mathrm{HR}$ TYP. |

*Lifetime at room temperature. Refer to "Display" in "Software/Unit Operation"
4. 5-KEY KEYPAD: for on-screen menus.
5. TOUCHSCREEN: Resistive analog
6. MEMORY

On Board User Memory: 4 Mbyte of non-volatile Flash memory.
Memory Card: CompactFlash Type II slot for Type I and Type II CompactFlash cards.
7. COMMUNICATIONS

USB Port: Adheres to USB specification 1.1. Device only using Type B connection


WARNING - DO NOT CONNECT OR DISCONNECT CABLES WHILE POWER IS APPLIED UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS. USB PORT IS FOR SYSTEM SET-UP AND DIAGNOSTICS AND IS NOT INTENDED FOR PERMANENT CONNECTION.

Serial Ports: Format and Baud Rates for each port are individually software programmable up to 115,200 baud.
PGM Port: RS232 port via RJ12.
COMMS Ports: RS422/485 port via RJ45, and RS232 port via RJ12.
DH485 TXEN: Transmit enable; open collector, $\mathrm{V}_{\mathrm{OH}}=15 \mathrm{VDC}$, $\mathrm{V}_{\mathrm{OL}}=0.5 \mathrm{~V} @ 25 \mathrm{~mA}$ max.
Note: For additional information on the communications or signal common and connections to earth ground please see the "Connecting to Earth Ground" in the section "Installing and Powering the G306."
Ethernet Port: 10 BASE-T / 100 BASE-TX
RJ45 jack is wired as a NIC (Network Interface Card).
Isolation from Ethernet network to G3 operator interface: 1500 Vrms
8. ENVIRONMENTAL CONDITIONS

Operating Temperature Range: 0 to $50^{\circ} \mathrm{C}$
Storage Temperature Range: -20 to $70^{\circ} \mathrm{C}$
Operating and Storage Humidity: $80 \%$ maximum relative humidity (noncondensing) from 0 to $50^{\circ} \mathrm{C}$.
Vibration: Operational 5 to $8 \mathrm{~Hz}, 0.8^{\prime \prime}(\mathrm{p}-\mathrm{p}), 8$ to 500 Hz , in X, Y, Z direction, duration: 1 hour, 3 g .
Shock: Operational $40 \mathrm{~g}, 9 \mathrm{msec}$ in 3 directions.
Altitude: Up to 2000 meters.

## CERTIFICATIONS AND COMPLIANCES

SAFETY
UL Recognized Component, File \#E179259, UL61010-1, CSA 22.2 No.61010-1 Recognized to U.S. and Canadian requirements under the Component Recognition Program of Underwriters Laboratories, Inc.
UL Listed, File \#E211967, UL61010-1, UL1604, CSA 22.2 No. 61010.1, CSA 22.2 No. 213-M1987
LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
Type 4X Enclosure rating (Face only), UL50
IECEE CB Scheme Test Certificate \#US/9737/UL, CB Scheme Test Report \#E179259-V01-S04 Issued by Underwriters Laboratories Inc.
IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
IP66 Enclosure rating (Face only), IEC 529
ELECTROMAGNETIC COMPATIBILITY
Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

## Immunity to Industrial Locations:

| Electrostatic discharge | EN 61000-4-2 | Criterion A <br> 4 kV contact discharge <br> 8 kV air discharge |
| :---: | :---: | :---: |
| Electromagnetic RF fields | EN 61000-4-3 | $\begin{aligned} & \text { Criterion A } \\ & 10 \mathrm{~V} / \mathrm{m} \end{aligned}$ |
| Fast transients (burst) | EN 61000-4-4 | Criterion A <br> 2 kV power <br> 1 kV signal |
| Surge | EN 61000-4-5 | Criterion A 1 kV L-L, 2 kV L\&N-E power |
| RF conducted interference | EN 61000-4-6 | $\begin{aligned} & \text { Criterion A } \\ & 3 \mathrm{~V} / \mathrm{rms} \end{aligned}$ |
| Emissions: |  |  |
| Emissions | EN 55011 | Class A |

Note:

1. Criterion A: Normal operation within specified limits.
2. CONSTRUCTION: Steel rear metal enclosure with NEMA 4X/IP66 aluminum front plate for indoor use only when correctly fitted with the gasket provided. Installation Category II, Pollution Degree 2.
3. MOUNTING REQUIREMENTS: Maximum panel thickness is $0.25^{\prime \prime}$ (6.3 mm ). For NEMA 4X/IP66 sealing, a steel panel with a minimum thickness of $0.125^{\prime \prime}(3.17 \mathrm{~mm})$ is recommended.
Maximum Mounting Stud Torque: 17 inch-pounds ( $1.92 \mathrm{~N}-\mathrm{m}$ )
4. WEIGHT: $3.0 \mathrm{lbs}(1.36 \mathrm{Kg})$

## DIMENSIONS In inches (mm)



## Installing and Powering the G306

## MOUNTING INSTRUCTIONS

This operator interface is designed for through-panel mounting. A panel cutout diagram and a template are provided. Care should be taken to remove any loose material from the mounting cut-out to prevent that material from falling into the operator interface during installation. A gasket is provided to enable sealing to NEMA 4X/IP66 specification. Install the ten kep nuts provided and tighten evenly for uniform gasket compression.

Note: Tightening the kep nuts beyond a maximum of 17 inch-pounds (1.92 Nm) may cause damage to the front panel.


ALL NONINCENDIVE CIRCUITS MUST BE WIRED USING DIVISION 2 WIRING METHODS AS SPECIFIED IN ARTICLE $501-$ 4 (b), 502-4 (b), AND 503-3 (b) OF THE NATIONAL ELECTRICAL CODE, NFPA 70 FOR INSTALLATION WITHIN THE UNITED STATES, OR AS SPECIFIED IN SECTION 19-152 OF CANADIAN ELECTRICAL CODE FOR INSTALLATION IN CANADA.
CONNECTING TO EARTH GROUND


The protective conductor terminal is bonded to conductive parts of the equipment for safety purposes and must be connected to an external protective earthing system.

Each G306 has a chassis ground terminal on the back of the unit. Your unit should be connected to earth ground (protective earth).

The chassis ground is not connected to signal common of the unit. Maintaining isolation between earth ground and signal common is not required to operate your unit. But, other equipment connected to this unit may require isolation between signal common and earth ground. To maintain isolation between signal common and earth ground care must be taken when connections are made to the unit. For example, a power supply with isolation between its signal common and earth ground must be used. Also, plugging in a USB cable may connect signal common and earth ground. ${ }^{1}$

1. USB's shield may be connected to earth ground at the host. USB's shield in turn may also be connected to signal common.

## POWER SUPPLY REQUIREMENTS

The G306 requires a 24 VDC power supply. Your unit may draw considerably less than the maximum rated power depending upon the options being used. As additional features are used your unit will draw increasing amounts of power. Items that could cause increases in current are additional communications, optional communications card, CompactFlash card, and other features programmed through Crimson.

In any case, it is very important that the power supply is mounted correctly if the unit is to operate reliably. Please take care to observe the following points:

- The power supply must be mounted close to the unit, with usually not more than 6 feet $(1.8 \mathrm{~m})$ of cable between the supply and the operator interface. Ideally, the shortest length possible should be used.
- The wire used to connect the operator interface's power supply should be at least 22 -gage wire. If a longer cable run is used, a heavier gage wire should be used. The routing of the cable should be kept away from large contactors, inverters, and other devices which may generate significant electrical noise.
- A power supply with a Class 2 or SELV rating is to be used. A Class 2 or SELV power supply provides isolation to accessible circuits from hazardous voltage levels generated by a mains power supply due to single faults. SELV is an acronym for "safety extra-low voltage." Safety extra-low voltage circuits shall exhibit voltages safe to touch both under normal operating conditions and after a single fault, such as a breakdown of a layer of basic insulation or after the failure of a single component has occurred.


## Communicating With the G306

## CONFIGURING A G306

The G306 is configured using Crimson software. Crimson is available as a free download from Red Lion's website, or it can be purchased on CD. Updates to Crimson for new features and drivers are posted on the website as they become available. By configuring the G306 using the latest version of Crimson, you are assured that your unit has the most up to date feature set. Crimson software can configure the G306 through the RS232 PGM port, USB port, or CompactFlash.

The USB port is connected using a standard USB cable with a Type B connector. The driver needed to use the USB port will be installed with Crimson.

The RS232 PGM port uses a programming cable made by Red Lion to connect to the DB9 COM port of your computer. If you choose to make your own cable, use the "G306 Port Pin Out Diagram" for wiring information.

The CompactFlash can be used to program a G3 by placing a configuration file and firmware on the CompactFlash card. The card is then inserted into the target G3 and powered. Refer to the Crimson literature for more information on the proper names and locations of the files.

## USB, DATA TRANSFERS FROM THE COMPACTFLASH CARD



WARNING - DO NOT CONNECT OR DISCONNECT CABLES WHILE POWER IS APPLIED UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS. USB PORT IS FOR SYSTEM SET-UP AND DIAGNOSTICS AND IS NOT INTENDED FOR PERMANENT CONNECTION.
In order to transfer data from the CompactFlash card via the USB port, a driver must be installed on your computer. This driver is installed with Crimson and is located in the folder C:\Program Files\Red Lion Controls\Crimson 2.0\Device\ after Crimson is installed. This may have already been accomplished if your G306 was configured using the USB port.

Once the driver is installed, connect the G306 to your PC with a USB cable, and follow "Mounting the CompactFlash" instructions in the Crimson 2 user manual.

## CABLES AND DRIVERS

Red Lion has a wide range of cables and drivers for use with many different communication types. A list of these drivers and cables along with pin outs is available from Red Lion's website. New cables and drivers are added on a regular basis. If making your own cable, refer to the "G306 Port Pin Outs" for wiring information.

## ETHERNET COMMUNICATIONS

Ethernet communications can be established at either 10 BASE-T or 100 BASE-TX. The G306 unit's RJ45 jack is wired as a NIC (Network Interface Card). For example, when wiring to a hub or switch use a straight-through cable, but when connecting to another NIC use a crossover cable.

The Ethernet connector contains two LEDs. A yellow LED in the upper right, and a bi-color green/amber LED in the upper left. The LEDs represent the following statuses:

| LED COLOR | DESCRIPTION |
| :--- | :--- |
| YELLOW solid | Link established. |
| YELLOW flashing | Data being transferred. |
| GREEN | 10 BASE-T Communications |
| AMBER | 100 BASE-TX Communications |

On the rear of each unit is a unique 12-digit MAC address and a block for marking the unit with an IP address. Refer to the Crimson manual and Red Lion's website for additional information on Ethernet communications.

## RS232 PORTS

The G306 has two RS232 ports. There is the PGM port and the COMMS port. Although only one of these ports can be used for programming, both ports can be used for communications with a PLC.

The RS232 ports can be used for either master or slave protocols with any G306 configuration.

Examples of RS232 communications could involve another Red Lion product or a PC. By using a cable with RJ12 ends on it, and a twist in the cable, RS232 communications with another G3 product or the Modular Controller can be established. Red Lion part numbers for cables with a twist in them are CBLPROG0 ${ }^{1}$, CBLRLC01 ${ }^{2}$, or CBLRC02 ${ }^{3}$.

G3 RS232 to a PC

| Connections |  |  |  |
| :---: | :---: | :---: | :---: |
| G3: RJ12 | Name | PC: DB9 | Name |
| 4 | COMM | 1 | DCD |
| 5 | Tx | 2 | Rx |
| 2 | Rx | 3 | Tx |
|  | N/C | 4 | DTR |
| 3 | COM | 5 | GND |
|  | N/C | 6 | DSR |
| 1 | CTS | 7 | RTS |
| 6 | RTS | 8 | CTS |
|  | N/C | 9 | RI |


${ }^{1}$ CBLPROG0 can also be used to communicate with either a PC or an ICM5.
${ }^{2}$ DB9 adapter not included, 1 foot long.
${ }^{3}$ DB9 adapter not included, 10 feet long.


## RS422/485 COMMS PORT

The G306 has one RS422/485 port. This port can be configured to act as either RS422 or RS485.


Note: All Red Lion devices connect $A$ to $A$ and $B$ to $B$, except for Paradigm devices. Refer to www.redlion.net for additional information.

## DH485 COMMUNICATIONS

The G306's RS422/485 COMMS port can also be used for Allen Bradley DH485 communications.

WARNING: DO NOT use a standard DH485 cable to connect this port to Allen Bradley equipment. A cable and wiring diagram are available from Red Lion.

G3 to AB SLC 500 (CBLAB003)

| Connections |  |  |  |
| :---: | :---: | :---: | :---: |
| RJ45: RLC | Name | RJ45: A-B | Name |
| 1 | TxB | 1 | A |
| 2 | TxA | 2 | B |
| 3,8 | RxA | - | 24 V |
| 4,7 | RxB | - | COMM |
| 5 | TxEN | 5 | TxEN |
| 6 | COMM | 4 | SHIELD |
| 4,7 | TxB | - | COMM |
| 3,8 | TxA | - | $24 V$ |

## Examples of RS485 2-Wire Connections

G3 to Red Lion RJ11 (CBLRLC00) DLC, IAMS, ITMS, PAXCDC4C

| Connections |  |  |  |
| :---: | :---: | :---: | :---: |
| G3: RJ45 | Name | RLC: RJ11 | Name |
| 5 | TxEN | 2 | TxEN |
| 6 | COM | 3 | COM |
| 1 | TxB | 5 | B- |
| 2 | TxA | 4 | A+ |

G3 to Modular Controller (CBLRLC05)

| Connections |  |  |  |
| :---: | :---: | :---: | :---: |
| G3 | Name | Modular Controller | Name |
| 1,4 | TxB | 1,4 | TxB |
| 4,1 | RxB | 4,1 | RxB |
| 2,3 | TxA | 2,3 | TxA |
| 3,2 | RxA | 3,2 | RxA |
| 5 | TxEN | 5 | TxEN |
| 6 | COM | 6 | COM |
| 7 | TxB | 7 | TxB |
| 8 | TxA | 8 | TxA |

## Software/Unit Operation

## CRIMSON SOFTWARE

Crimson software is available as a free download from Red Lion's website or it can be purchased on a CD, see "Ordering Information" for part number. The latest version of the software is always available from the website, and updating your copy is free.

## DISPLAY

This operator interface uses a liquid crystal display (LCD) for displaying tex and graphics. The display utilizes a cold cathode fluorescent tube (CCFL) for lighting the display. The CCFL tubes can be dimmed for low light conditions.
These CCFL tubes have a limited lifetime. Backlight lifetime is based upon the amount of time the display is turned on at full intensity. Turning the backlight off when the display is not in use can extend the lifetime of your backlight. This can be accomplished through the Crimson software when configuring your unit.

## FRONT PANEL LEDS

There are three front panel LEDs. Shown below is the default status of the LEDs.

| LED | INDICATION |
| :---: | :--- |
| RED (TOP, LABELED "PWR") |  |
| FLASHING | Unit is in the boot loader, no valid configuration is loaded. ${ }^{1}$ |
| STEADY | Unit is powered and running an application. |
| YELLOW (MIDDLE) |  |
| OFF | No CompactFlash card is present. |
| STEADY | Valid CompactFlash card present. |
| FLASHING <br> RAPIDLY | CompactFlash card being checked. |
| FLICKERING | Unit is writing to the CompactFlash, either because it is storing <br> data, or because the PC connected via the USB port has <br> locked the drive. ${ }^{2}$ |
| FLASHING | Incorrectly formatted CompactFlash card present. |
| SLOWLY |  |
| GREEN (BOTTOM) |  |
| FLASHING | A tag is in an alarm state. |
| STEADY | Valid configuration is loaded and there are no alarms present. |

1. The operator interface is shipped without a configuration. After downloading a configuration, if the light remains in the flashing state continuously, try cycling power. If the LED still continues to flash, try downloading a configuration again.
2. Do not turn off power to the unit while this light is flickering. The unit writes data in two minute intervals. Later Microsoft operating systems will not lock the drive unless they need to write data; Windows 98 may lock the drive any time it is mounted, thereby interfering with logging. Refer to "Mounting the CompactFlash" in the Crimson 2 User Manual.

## TOUCHSCREEN

This operator interface utilizes a resistive analog touchscreen for user input. The unit will only produce an audible tone (beep) when a touch on an active touchscreen cell is sensed. The touchscreen is fully functional as soon as the operator interface is initialized, and can be operated with gloved hands.

## KEYPAD

The G306 keypad consists of five keys that can be used for on-screen menus.

## TROUBLESHOOTING YOUR G306

If for any reason you have trouble operating, connecting, or simply have questions concerning your new G306, contact Red Lion's technical support. For contact information, refer to the back page of this bulletin for phone and fax numbers.

EMAIL: techsupport@redlion.net
Web Site: http://www.redlion.net

## BATTERY \& TIME KEEPING



WARNING - EXPLOSION HAZARD - THE AREA MUST BE KNOWN TO BE NON-HAZARDOUS BEFORE SERVICING/ REPLACING THE UNIT AND BEFORE INSTALLING OR REMOVING I/O WIRING AND BATTERY.


WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN DISCONNECTED AND THE AREA IS KNOWN TO BE NON-HAZARDOUS.

A battery is used to keep time when the unit is without power. Typical accuracy of the G306 time keeping is less than one minute per month drift. The battery of a G306 unit does not affect the unit's memory, all configurations and data is stored in non-volatile memory.


## CAUTION: RISK OF ELECTRIC SHOCK

The inverter board, attached to the mounting plate, supplies the high voltage to operate the backlight. Touching the inverter board may result in injury to personnel.


CAUTION: The circuit board contains static sensitive components. Before handling the operator interface without the rear cover attached, discharge static charges from your body by touching a grounded bare metal object. Ideally, handle the operator interface at a static controlled clean workstation. Also, do not touch the surface areas of the circuit board. Dirt, oil, or other contaminants may adversely affect circuit operation.

To change the battery of a G306, remove power, cabling, and then the rear cover of the unit. To remove the cover, remove the four screws designated by the arrows on the rear of the unit. Then, by lifting the top side, hinge the cover, thus providing clearance for the connectors on the bottom side of the PCB as shown in the illustration below. Install in the reverse manner.


Remove the old battery* from the holder and replace with the new battery. Replace the rear cover, cables, and re-apply power. Using Crimson or the unit's keypad, enter the correct time and date.

* Please note that the old battery must be disposed of in a manner that complies with your local waste regulations. Also, the battery must not be disposed of in fire, or in a manner whereby it may be damaged and its contents come into contact with human skin.

The battery used by the G306 is a lithium type CR2025.


## Optional Features and Accessories

## OPTIONAL COMMUNICATION CARD

Red Lion offers optional communication cards for fieldbus communications These communication cards will allow your G306 to communicate with many of the popular fieldbus protocols.

Red Lion is also offering a communications card for additional RS232 and RS422/485 communications. Visit Red Lion's website for information and availability of these cards.

## CUSTOM LOGO

Each G3 operator interface has an embossed area containing the Red Lion logo. Red Lion can provide custom logos to apply to this area. Contact your distributor for additional information and pricing.


## COMPACTFLASH SOCKET

CompactFlash socket is a Type II socket that can accept either Type I or II cards. Use cards with a minimum of 4Mbytes with the G306's CompactFlash socket. Cards are available at most computer and office supply retailers.
CompactFlash can be used for configuration transfers, larger configurations, data logging, and trending.

the CompactFlash card while
power is applied. Refer to
"Front Panel LEDs."

Information stored on a CompactFlash card by a G306 can be read by a card reader attached to a PC. This information is stored in IBM (Windows ${ }^{\circledR}$ ) PC compatible FAT16 file format.

## NOTE

For reliable operation in all of our products, Red Lion recommends the use of SanDisk ${ }^{\circledR}$ and SimpleTech brands of CompactFlash cards.

Industrial grade versions that provide up to two million write/erase cycles minimum are available from Red Lion.

## LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products. The customer agrees to hold Red Lion Controls harmless from, defend, and indemnify RLC against damages, claims, and expenses arising out of subsequent sales of RLC products or products containing components manufactured by RLC and based upon personal injuries, deaths, property damage, lost profits, and other matters which Buyer, its employees, or sub-contractors are or may be to any extent liable, including without limitation penalties imposed by the Consumer Product Safety Act (P.L. 92-573) and liability imposed upon any person pursuant to the Magnuson-Moss Warranty Act (P.L. 93-637), as now in effect or as amended hereafter.
No warranties expressed or implied are created with respect to The Company's products except those expressly contained herein. The Customer acknowledges the disclaimers and limitations contained herein and relies on no other warranties or affirmations.

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### 3.7 SOFT STARTER \& PUMP DEVICES

- DANFOSS MCD5 - MCD50021 + MODBUS COMMS 175G9000 Pump Soft Starter
- DANFOSS - LCP501-17560096 - External Keypad Kit
- IDEC - GT3A-4-AD24 + IDEC BASE - Emergency Pumping Mode Timer
- MULTITRODE - $\mathbf{2}$ off - 020130FSP-Shield - Single Point Probes
- VEGA - VEGABAR52-BR52XXCA1?HPMAS - Pressure Transmitter
- VEGA - VEGADIS62-DIS62XXKMAXX - Level Probe
- VEGA - VEGAWELL52-WL52XXA4AMD1DD1X - Level Probe
- VEGA - ADAPTOR 4 - Triclove Fitting For VEGABAR52


## VLT ${ }^{\oplus}$ Soft Starter MCD 500

VLT ${ }^{\otimes}$ Soft Starter MCD 500 is a total motor starting solution. Current transformers measure motor current and provide feedback for controlled motor ramp profiles.


AAC, Adaptive Acceleration Control, automatically employs the best starting and stopping profile for the application.

Adaptive Acceleration Control means that for each start and stop, the soft starter compares and adapts the process to the chosen profile fitting to the application.

VLT ${ }^{\otimes}$ Soft Starter MCD 500 has a four line graphical display and a logic keypad making programming easy. Advanced setup is possible displaying operational status.

Three menu systems: Quick Menu, Application Setup and Main Menu provide optimum programming approach.

## Power range:

21 - 1600 A, 7.5 - 850 kW
(1.2 MW inside Delta Connection)

Versions for 200 - 690 VAC

| Feature | Benefit |
| :--- | :--- |
| AAC Adaptive Acceleration Control | - Automatically adapts to the chosen <br> starting and stopping profile |
| Adjustable bus bars allow for both top and <br> bottom entry (360-1600 A, $160-850 \mathrm{~kW}$ ) | - Space saving, less cable cost <br> and easy retrofitting |
| DC injection braking distributed evenly <br> over three phases | - Less installation cost and <br> less stress on the motor |
| Inside Delta (6-wire connection) | Smaller soft starter can be selected <br> for the application |
| Log menus, 99 events and trip log provide <br> information on events, trips and performance | - Eases analysis of the application |
| Auto Reset | - Less down-time |
| Jog (slow-speed operation) | Application flexibility |
| Second-order thermal model |  |
| Potential without damage from overloading |  |



Three Adaptive Acceleration Control (AAC) start profiles; early, constant and late acceleration

## Fully featured Soft Starter for motors up to 850 kW

- Total motor starting solution
- Advanced start, stop and protection features
- Adaptive Acceleration Control
- Inside Delta connection
- 4-line graphical display
- Multiple programming setup menus


## Optional:

- Modules for serial communication:
- DeviceNet
- Profibus
- Modbus RTU
- USB
- Control Panel VLT ${ }^{\oplus}$ LCP 501
- PC software:
- WinMaster
- VLT ${ }^{\oplus}$ MCT10



## Control Panel VLT ${ }^{\text {® }}$ LCP 501

- Same user interface as MCD500
- Plug \& play with MCD500
- Copy paste of parameters
- Multiple monitoring set-up
- Door-mount kit - 3m cable
- IP65 (NEMA 12)

Specifications

| Mains voltage (L1, L2, L3) |  |
| :---: | :---: |
| MCD5-xxxx-T5 | 200 VAC ~ 525 VAC ( $\pm 10 \%$ ) |
| MCD5-xxxx-T7 | $380 \text { VAC ~ } 690 \text { VAC ( } \pm 10 \%)$ <br> (in-line connection) |
| MCD5-xxxx-T7 | $380 \text { VAC } \sim 600 \text { VAC ( } \pm 10 \%)$ <br> (inside delta connection) |
| Control voltage (terminals A4, A5, A6) |  |
| CV1 (A5, A6) | 24 VAC/VDC ( $\pm 20 \%$ ) |
| CV2 (A5, A6) | 110~120 VAC (+ 10\% / - 15\%) |
| CV2 (A4, A6) | 220~240 VAC (+10\% / - 15\%) |
| Mains frequency | $50 / 60 \mathrm{~Hz}$ ( $\pm 10 \%$ ) |
| Rated insulation voltage to earth | 600 VAC |
| Rated impulse withstand voltage | 4 kV |
| Form designation | Bypassed or continuous, semiconductor motor starter form 1 |
| Short circuit capability |  |
| Coordination with semiconductor fuses | Type 2 |
| Coordination with HRC fuses | Type 1 |
| MCD500-0021B to 0215B | Prospective current of 65 kA |
| MCD500-0245C | Prospective current of 85 kA |
| MCD500-1200C to 1600C | Prospective current of 100 kA |
| Electromagnetic capability (compliant with EU Directive 89/336/EEC) |  |
| EMC Emissions (Terminals 13 \& 14) | IEC 60947-4-2 Class B and Lloyds Marine No. 1 Specification |
| EMC Immunity | IEC 60947-4-2 |
| Outputs |  |
| Relay Outputs | 10A @ 250 VAC resistive, 5A <br> @ 250 VAC AC15 pf 0.3 |
| Programmable Outputs |  |
| Relay A $(13,14)$ | Normally open |
| Relay B ( $21,22,24$ ) | Changeover |
| Relay C $(33,34)$ | Normally open |
| Analogue Output (07, 08) | 0-20 mA or 4-20 mA (selectable) |
| Maximum load | $600 \Omega$ (12 VDC @ 20 mA ) (accuracy $\pm 5 \%$ ) |
| 24 VDC Output $(16,08)$ Maximum load | 200 mA (accuracy $\pm 10 \%$ ) |
| Environmental |  |
| Protection MCD5-0021B ~ MCD5-0105B | IP 20 \& NEMA, UL Indoor Type 1 |
| Protection MCD5-0131B ~ MCD5-1600C | IP 00, UL Indoor Open Type |
| Operating temperature | $-10^{\circ} \mathrm{C}$ to $60^{\circ} \mathrm{C}$, above $40^{\circ} \mathrm{C}$ with derating |
| Storage temperature | $-25^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ |
| Operating Altitude | $0-1000 \mathrm{~m}$, above 1000 m with derating |
| Humidity | 5\% to 95\% Relative Humidity |
| Pollution degree | Pollution Degree 3 |
| Heat Dissipation |  |
| During start | 4.5 watts per ampere |

## Dimensions

| Current rating [A] | Weight [kg] | Height [mm] | Width [mm] | Depth [mm] | Frame size |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $21,37,43$ and 53 | 4.2 |  |  | 183 |  |
| 68 | 4.5 | 295 | 150 |  | G1 |
| 84,89 and 105 | 4.9 |  |  | 213 |  |
| $131,141,195$ and 215 | 14.9 | 438 | 275 | 250 | G2 |
| 245 | 23.9 | 460 | 390 | 279 | G3 |
| 360,380 and 428 | 35 | 689 | 430 | 302 | G4 |
| $595,619,790$ and 927 | 45 |  |  | 364 | G5 |
| 1200,1410 and 1600 | 120 | 856 | 585 | 364 |  |

## I NSTALLATI ON I NSTRUCTI ONS: MCD MODBUS MODULE

Order Code: 175G9000

## 1. Introduction

Danfoss soft starters can be controlled and monitored across an RS485 serial communication network using the Modbus RTU and AP ASClI protocols.

For users requiring simple control of MCD 200 and MCD 500 soft starters using Modbus RTU or AP ASCII, the instructions below describe the installation and operation of the Modbus Module.

MCD 3000 soft starters have AP ASCII protocol support built in - see the MCD 3000 Users Manual for details of message formats. The MCD 3000 supports Modbus RTU control when used in conjunction with a Remote Operator.

This document describes Modbus and AP ASCII messaging and Appendix A describes how to connect the Remote Operator and use it as a Modbus RTU or AP ASCII slave device.

## 2. Installation

1. Remove control power and mains supply from the soft starter.
2. Attach the Modbus Module to the starter as shown.
3. Apply control power to the soft starter.


Remove the Modbus Module using the following procedure:

1. Disconnect the RS485 cable from the module.
2. Remove control power and mains supply from the soft starter.
3. Push a small flat-bladed screwdriver into the slots at the top and bottom of the module and depress the retaining clips.
4. Pull the module away from the soft starter.


## CAUTI ON

Remove mains and control voltage from the soft starter before attaching or removing accessories. Failure to do so may damage the equipment.

## 3. Adjustment

Network communication parameters must be set on the Modbus Module. DIP switch settings take effect on the power-up of the Modbus Module via the soft starter.


## 4. Connection

For the Modbus Module to accept serial commands, a link must be fitted across terminals A1-N2 on MCD 200 Series starters.

In order for the MCD 500 to accept commands from the serial network, the soft starter must be in Auto On mode and links must be fitted to terminals 17 and 25 to 18.

In Hand On mode, the starter will not accept commands from the serial network but the starter's status can still be monitored.


## N.B.!:

If MCD 500 parameter 3-2 Comms in Remote is set to Disable Comms in Remote, the starter will not accept start or stop commands from the serial network (the starter will still accept reset commands and allow status monitoring).

## 5. Network Status LED

The Network Status LED indicates the state of the communications link between the module and the network. LED operation is as follows:


| Off | On | Flashing |
| :--- | :--- | :--- |
| No connection or soft starter not <br> powered up | Communication active | Communication inactive |

## N.B.!:

If communication is inactive, the soft starter may trip if the Communications Timeout function has been set on the module. When communication is restored, the soft starter will require a Reset.

| 6. Modous Reotster |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Register Address | Type | Description |  |  | N N O U L |  |  |
| 40002 <br> Command | Single Write | 1 = Start |  | $\square$ | $\square$ | $\square$ | $\square$ |
|  |  | 2 = Stop |  | $\square$ | $\square$ | $\square$ | $\square$ |
|  |  | 3 = Reset |  | $\square$ | $\square$ | $\square$ | $\square$ |
|  |  | 4 = Quick stop (coast to stop) |  | $\square$ | $\square$ | $\square$ | $\square$ |
|  |  | 5 = Forced communication trip |  | $\square$ | $\square$ | $\square$ | $\square$ |
| 40003 <br> Starter <br> status | Multiple Read | Bit | Description |  |  |  |  |
|  |  | $0 \text { to } 3$ | 1 = Ready | ■ | ■ | ■ | ■ |
|  |  |  | 2 = Starting | $\square$ | ■ | $\square$ | $\square$ |
|  |  |  | 3 = Running | $\square$ | $\square$ | $\square$ | $\square$ |
|  |  |  | 4 = Stopping (including braking) | $\square$ | $\square$ | $\square$ | $\square$ |
|  |  |  | 5 = Restart delay (including <br> Temperature check) |  |  | $\square$ | $\square$ |
|  |  |  | $6=$ Tripped | $\square$ | $\square$ | $\square$ | $\square$ |
|  |  |  | 7 = Program mode |  |  | $\square$ | $\square$ |
|  |  |  | 8 = Jog forward |  |  | $\square$ |  |
|  |  |  | 9 = Jog reverse |  |  | $\square$ |  |
|  |  | 4 | 1 = Positive phase sequence (only valid if bit $6=1$ ). Always $=0$ |  |  |  |  |
|  |  | 5 | 1 = Current exceeds FLC |  | ■ | $\square$ |  |
|  |  | 6 | $\begin{aligned} & 0=\text { Uninitialised } \\ & 1=\text { Initialised } \end{aligned}$ |  | ■ | $\square$ | ■ |
|  |  | 7 | Always $=0$ |  |  |  |  |
| 40004 <br> Trip Code | Multiple Read | See Trip Code table. |  |  |  |  |  |
| $\begin{array}{\|l} 40005^{1} \\ \text { Motor } \\ \text { current } \end{array}$ | Multiple Read | Average 3 phase motor current (A) |  |  | ■ | $\square$ | $\square$ |
| $\begin{array}{\|l\|} \hline 40006 \\ \text { Motor } \\ \text { temperature } \\ \hline \end{array}$ | Multiple Read | Motor temperature (thermal model) |  |  | $\square$ | $\square$ | $\square$ |
| 40007 <br> Product Type and Version | Multiple Read | Bit | Description |  |  |  |  |
|  |  | 0 to 2 | Product parameter list version | $\square$ | $\square$ | $\square$ | ■ |
|  |  | 3 to 7 | $\begin{aligned} & 1=\text { MCD } 3000 \\ & 4=\text { MCD } 200 \\ & 7=\text { MCD } 500 \end{aligned}$ | $\square$ | $\square$ | $\square$ | $\square$ |
| $\begin{array}{\|l\|} \hline 40008 \\ \text { Serial } \\ \text { Protocol } \\ \text { Version } \\ \hline \end{array}$ | Multiple Read |  |  | $\square$ | $\square$ | $\square$ | ■ |
| $40009^{2} \sim$ <br> Parameter management | Single Write and Multiple Read | Paramet | 1-A (Motor FLC) to: <br> - MCD 500 Par. 20-6 (Pedestal Detect) <br> - MCD 3000 Par. 60 (Min Run Frequency) |  |  |  | $\square$ |

${ }^{1}$ For MCD 500 models MCD5-0068B and smaller this value will be 10 times greater than the value displayed on the LCP.
${ }^{2}$ See the relevant soft starter literature for a complete parameter list. The first product parameter is always allocated to register 40009. The last product parameter is allocated to register 40XXX, where XXX $=008$ plus total number of available parameters in the product.

## N.B.!:

The numbering of parameter options via serial communications differs slightly from the numbering displayed on the LCP. Numbering via the Modbus Module starts at 0 , so for Par. 2-1 Phase Sequence, the options are 1~3 on the LCP but 0~2 via the module.

| 7. rio cooes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Trip Code | Trip Name | $\begin{aligned} & \text { N} \\ & \text { N } \\ & \text { N } \\ & \text { N } \end{aligned}$ | $N$ N N U U | $\circ$ in U U | O 0 M U L |
| 1 | Excess start time |  | $\square$ | $\square$ | $\square$ |
| 2 | Motor overload (thermal model) |  | $\square$ | $\square$ | $\square$ |
| 3 | Motor thermistor |  | $\square$ | $\square$ | $\square$ |
| 4 | Current imbalance |  | $\square$ | $\square$ | $\square$ |
| 5 | Frequency (Mains supply) | $\square$ | $\square$ | $\square$ | $\square$ |
| 6 | Phase sequence |  | $\square$ | $\square$ | $\square$ |
| 7 | Instantaneous overcurrent |  |  | $\square$ | $\square$ |
| 8 | Power loss (Power circuit) | $\square$ | $\square$ | $\square$ | $\square$ |
| 9 | Undercurrent |  |  | $\square$ | $\square$ |
| 10 | Heatsink overtemperature |  |  | $\square$ | $\square$ |
| 11 | Motor connection |  |  | $\square$ | $\square$ |
| 12 | Input A trip (Auxiliary input A) |  |  | $\square$ |  |
| 13 | FLC too high (FLC out of range) |  |  | $\square$ | $\square$ |
| 14 | Unsupported option (Not available in 6-wire) |  |  | $\square$ |  |
| 15 | Starter communication | $\square$ | $\square$ | $\square$ | $\square$ |
| 16 | Network communication | $\square$ | $\square$ | $\square$ | $\square$ |
| 17 | Internal fault |  |  | $\square$ |  |
| 23 | EEPROM fail |  |  | $\square$ |  |
| 26 | L1 phase loss |  |  | $\square$ |  |
| 27 | L2 phase loss |  |  | $\square$ |  |
| 28 | L3 phase loss |  |  | $\square$ |  |
| 29 | L1-T1 Shorted |  |  | $\square$ |  |
| 30 | L2-T2 Shorted |  |  | $\square$ |  |
| 31 | L3-T3 Shorted |  |  | $\square$ |  |
| 33 | Time-overcurrent (Bypass overload) |  | $\square$ | $\square$ |  |
| 35 | Battery/clock |  |  | $\square$ |  |
| 36 | Thermistor circuit |  |  | $\square$ |  |
| 255 | No trip | $\square$ | $\square$ | $\square$ | $\square$ |

## 8. Modbus Functions

The Modbus Module supports the following Modbus functions:

- 03 Read multiple registers
- 06 Write single register

Modbus broadcast functions are not supported.
MCD 200 soft starters (including Remote Operator):
■ Read multiple registers 40003 to 40008
■ Write single register 40002
MCD 500 soft starters:
■ Read multiple registers starting from 40003 up to a maximum of 125 register blocks
■ Write single register 40002 or 40009 to 40599

## N.B.!:

A multiple read across register boundary 40008/40009 will result in a Modbus Error code 05 at the Master.
Modbus Module version 3 and earlier (serial number xxxxxx-3) can read a maximum of 119 register blocks.

### 8.1. Master Configuration

For standard Modbus 11-bit transmission, the Master must be configured for 2 stop bits with No Parity and 1 stop bit for odd or even parity.

For 10-bit transmission, the Master must be configured for 1 stop bit.
In all cases, the Master baud rate and slave address must match those set on the Modbus Module DIP switches.

Command: Start

| Message | Starter <br> Address | Function Code | Register <br> Address | Data | CRC |
| :---: | :---: | :---: | :---: | :---: | :---: |
| In | 20 | 06 | 40002 | 1 | CRC1, CRC2 |
| Out | 20 | 06 | 40002 | 1 | CRC1, CRC2 |

Starter status: Running

| Message | Starter <br> Address | Function Code | Register <br> Address | Data | CRC |
| :---: | :---: | :---: | :---: | :---: | :---: |
| In | 20 | 03 | 40003 | 1 | CRC1, CRC2 |
| Out | 20 | 03 | 2 (bytes) | 3 | CRC1, CRC2 |

Trip code: Motor overload

| Message | Starter <br> Address | Function Code | Register <br> Address | Data | CRC |
| :---: | :---: | :---: | :---: | :---: | :---: |
| In | 20 | 03 | 40004 | 1 | CRC1, CRC2 |
| Out | 20 | 03 | 2 (bytes) | 2 | CRC1, CRC2 |

Download parameter from starter
MCD 500: Read Parameter 1, Motor FLC (Parameter 1-1), 100 A

| Message | Starter <br> Address | Function <br> Code | Register <br> Address | Data | CRC |
| :---: | :---: | :--- | :--- | :--- | :--- |
| In | 20 | 03 | 40009 | 1 | CRC1, CRC2 |
| Out | 20 | 03 | 2 (bytes) | 100 | CRC1, CRC2 |

Upload parameter to starter
MCD 500: Write Parameter 4, Current Limit (Parameter 1-4), set $=400 \%$ FLC

| Message | Starter <br> Address | Function <br> Code | Register <br> Address | Data | CRC |
| :---: | :---: | :---: | :---: | :---: | :--- |
| In | 20 | 06 | 40012 | 400 | CRC1, CRC2 |
| Out | 20 | 06 | 40012 | 400 | CRC1, CRC2 |

## 9. Modbus Error Codes

| Code | Description | Example |
| :---: | :--- | :--- |
| 01 | Illegal function code | Function other than 03 or 06 |
| 02 | Illegal data address | Register number invalid |
| 03 | Not readable data | Register not allowed for data reading |
| 04 | Not writable data | Register not allowed for data writing |
| 05 | Data boundary fault | Multiple data transfer across data boundary or data size more than <br> 125 |
| 06 | Invalid command code | e.g. writing "6" into 40003 |
| 07 | Illegal parameter read | Invalid parameter number |
| 08 | Illegal parameter write | Invalid parameter number, read only, or hidden parameter |
| 09 | Unsupported command | Sending a serial command to MCD 500 with parameter 3-2 = <br> Disable control in RMT. |
| 10 | Local communication error | Communication error between Modbus slave and starter |

N.B.!:

Some of the above codes are different from those defined in the Modbus Application Protocol Specification available on www.modbus.org.
10. AP ASCI I Protocol

The message fragments used to communicate with the Modbus Module as an AP ASCII slave device are shown below. The message fragments may be assembled into complete messages as described in the sections that follow.

## N.B.!:

Data must be transmitted in 8 -bit ASCII, no parity, one stop bit.

| Message Fragment Type | ASCII Character String or (Hexadecimal Character String) |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Send address | $\begin{aligned} & \text { EOT } \\ & \text { (04h } \end{aligned}$ | $\begin{aligned} & {[\mathrm{nn}]} \\ & {[\mathrm{nn}]} \\ & \hline \end{aligned}$ | [Irc] <br> [Irc] | ENQ or 05h) |
| Send command | STX | [ccc] | [IIrc] | ETX or |
| Send request | (02h | [ccc] | [IIrc] | 03h) |
| Receive data | $\begin{aligned} & \text { STX } \\ & \text { (02h } \end{aligned}$ | [dddd] [dddd] | [Irc] <br> [Irc] | $\begin{aligned} & \text { ETX or } \\ & \text { 03h) } \end{aligned}$ |
| Receive status | $\begin{aligned} & \text { STX } \\ & \text { (02h } \end{aligned}$ | $\begin{aligned} & \text { [ssss] } \\ & \text { [ssss] } \end{aligned}$ | [IIc] <br> [Irc] | $\begin{aligned} & \text { ETX or } \\ & \text { 03h) } \end{aligned}$ |
| ACK (acknowledge) | $\begin{aligned} & \text { ACK } \\ & (06 \mathrm{~h}) \end{aligned}$ | or |  |  |
| NAK (negative acknowledge) | $\begin{aligned} & \text { NAK } \\ & (15 \mathrm{~h}) \end{aligned}$ | or |  |  |
| ERR (error) | $\begin{aligned} & \text { BEL } \\ & (07 \mathrm{~h}) \end{aligned}$ | or |  |  |

$\mathrm{nn}=\quad$ two byte ASCII number representing the soft starter address where each decimal digit is represented by n .
Irc = two byte longitudinal redundancy check in hexadecimal.
$\mathrm{ccc}=\quad$ three byte ASCII command number where each character is represented by c.
dddd $=$ four byte ASCII number representing the current or temperature data where each decimal digit is represented by d.
ssss $=\quad$ four byte ASCII number. The first two bytes are ASCII zero. The last two bytes represent the nibbles of a single byte of status data in hexadecimal.

### 10.1. Commands

Commands can be sent to the soft starter using the following format:

| Send <br> address | Send <br> command | ACK |
| :---: | :---: | :---: | :---: |

Possible error responses:


|  | Master |  |
| :--- | :--- | :--- |
| $\quad$ Slave (soft starter) |  |  |
|  | ASCI I | Comment |
| Start | B10 | Initiates a start |
| Stop | B12 | Initiates a stop |
| Reset | B14 | Resets a trip state |
| Quick stop | B16 | Initiates an immediate removal of voltage from the motor. Any soft <br> stop settings are ignored. |
| Forced communication trip | B18 | Causes a communications trip |

### 10.2. Status Retrieval

Soft starter status can be retrieved using the following format:

= Master $\square$ = Slave (MCD)
177HA316.12

| Request | ASCII | Receive Status (ssss) |  |
| :---: | :---: | :---: | :---: |
| Trip code | C18 | See the trip code table. |  |
| Starter status | C22 | Bit | Description |
|  |  | 0 to 3 | $\begin{aligned} & 1=\text { Ready } \\ & 2=\text { Starting } \\ & 3=\text { Running } \\ & 4=\text { Stopping (including braking) } \\ & 5=\text { Restart delay (including Temperature check) } \\ & 6=\text { Tripped } \\ & 7=\text { Program mode } \end{aligned}$ |
|  |  | 4 | 1 = Positive phase rotation (only valid if bit $6=1$ ) |
|  |  | 5 | 1 = Current exceeds FLC |
|  |  | 6 | $\begin{aligned} & 0=\text { Uninitialised } \\ & 1=\text { Initialised } \end{aligned}$ |
|  |  | 7 | $0=$ Communications are OK <br> 1 = Communications device fault |

### 10.3. Data Retrieval

Data can be retrieved from the soft starter using the following format:


### 10.4. Calculating the Checksum (LRC)

Each command string sent to and from the starter includes a checksum. The form used is the longitudinal redundancy check (LRC) in ASCII hex. This is an 8-bit binary number represented and transmitted as two ASCII hexadecimal characters.

To calculate LRC:

1. Sum all ASCII bytes
2. Mod 256
3. 2's complement
4. ASCII convert

For example Command String (Start):

| ASCII | STX | B 1 | 0 |  |
| :---: | :---: | :---: | :---: | :---: |
| or | 02h | 42h 31h | 30h |  |
| ASCII | Hex | Binary |  |  |
| STX | 02h | 00000010 |  |  |
| B | 42h | 01000010 |  |  |
| 1 | 31h | 00110001 |  |  |
| 0 | 30h | 00110000 |  |  |
|  | A5h | 10100101 |  | SUM (1) |
|  | A5h | 10100101 |  | MOD 256 (2) |
|  | 5Ah | 01011010 |  | 1's COMPLEMENT |
|  | 01h | 00000001 |  | +1 = |
|  | 5Bh | 01011011 |  | 2's COMPLEMENT (3) |
| ASCII | 5 | B |  | ASCII CONVERT (4) |
| or | 35h | 42h |  | LRC CHECKSUM |

The complete command string becomes:

| ASCII | STX | B | 1 | 0 | 5 | B | ETX |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| or | 02 h | 42 h | 31 h | 30 h | 35 h | 42 h | 03 h |

To verify a received message containing an LRC:

1. Convert last two bytes of message from ASCII to binary
2. Left shift $2^{\text {nd }}$ to last byte four bits
3. Add to last byte to get binary LRC
4. Remove last two bytes from message
5. Add remaining bytes of message
6. Add binary LRC
7. Round to one byte
8. The result should be zero

Response or status bytes are sent from the starter as an ASCII string:
$\begin{array}{llllll}\text { STX } & {[\mathrm{d} 1] \mathrm{h}} & {[\mathrm{d} 2] \mathrm{h}} & {[\mathrm{d} 3] \mathrm{h}} & {[\mathrm{d} 4] \mathrm{h}} & \text { LRC1 }\end{array} \quad$ LRC2 $\quad$ ETX $]$

STX 30h 30h 31h 46h LRC1 LRC2 ETX

## 11. Appendix A - Modbus Control via Remote



To control a soft starter via an RS485 serial communications network using the Remote Operator, connect the Remote Operator to the network as described in the following sections.

### 11.1. Grounding and Shielding

Twisted pair data cable with earth shield is recommended. The cable shield should be connected to a GND device terminal at both ends and one point of the site protective earth.

### 11.2. Termination Resistors

In long cable runs prone to excessive noise interference, termination resistors should be installed between the data lines at both ends of the RS485 cable. This resistance should match the cable impedance (typically $120 \Omega$ ). Do not use wire wound resistors.


### 11.3. RS485 Data Cable Connection

Daisy chain connection is recommended. This is achieved by parallel connections of the data cable at the actual device terminals.

### 11.4. Remote Operator RS485 Network Connection Specifications

Input impedance:
$12 \mathrm{k} \Omega$
Common mode voltage range:
Input sensitivity:
-7 V to +12 V
$\pm 200 \mathrm{mV}$
Minimum differential output voltage:
1.5 V (with max loading of $54 \Omega$ )

### 11.5. Using the Remote Operator with MCD 200



### 11.6. Using the Remote Operator with MCD 500

In order for the MCD 500 to accept commands from the serial network, the soft starter must be in Auto On mode and links must be fitted to terminals 17 and 25 to 18.

The Modbus Module must be used as an interface between the soft starter and the Remote Operator. The DIP switches on the Modbus Module must be set as follows:


| $\mathbf{1}$ | Protocol $=$ AP ASCII |
| :--- | :--- |
| $\mathbf{2}$ | Address $=20$ |
| $\mathbf{3}$ | Baud Rate $=9600$ |
| $\mathbf{4}$ | Parity $=$ No parity |
| $\mathbf{5}$ | Timeout $=$ No timeout |

The Remote Operator internal parameters must be set as follows:
Parameter 1 (RS485 network baud rate) = set to match Modbus master
Parameter 2 (RS485 network address) = unique number between $1 \sim 99$
Parameter 3 (RS485 network timeout) = set as required
Parameter 4 (RS485 network protocol) = Modbus RTU
Parameter 5 (Modbus protocol parity) = set to match Modbus master


### 11.7. Using the Remote Operator with MCD 3000

In order to operate correctly on the network, the MCD 3000 must be set for local operation only (i.e. set Parameter $20=2$ ). The Remote Operator's default communications protocol setting is AP ASCII. This must be changed to Modbus RTU.

The RS485 Network Timeout setting on the Remote Operator applies to the link between the Remote Operator and the network. This can be set to any value between 0 and 100 seconds.


The Serial Timeout setting on the MCD 3000 (Parameter 24) applies to communications between the Remote Operator and the MCD 3000. See the MCD 3000 Operating Instructions for soft starter configuration details.

### 11.8. Programming

The Remote Operator must be configured to operate on the network. In order to access Programming Mode, the Remote Operator must be powered up when the soft starter is not running.

### 11.8.1. Programming Procedure

1. To enter Programming Mode, hold down the Data/Prog pushbutton for four seconds. The default value of the first parameter will be displayed.
2. Use the Data/Prog pushbutton to advance to the next parameter.
3. Use the Stop/+ and Reset/- pushbuttons to adjust parameter values.

Programming Mode closes when the Data/Prog pushbutton is pressed after Parameter 8.

## N.B.!:

There is a 20 second timeout when the Remote Operator is in Programming Mode. Programming Mode will automatically close if no input is registered for 20 seconds. Any changes already made will be saved.

### 11.8.2. Programmable Parameters

The Remote Operator offers the following programmable parameters:

| Parameter <br> Number | Description | Default <br> Setting | Adjustable Range |
| :---: | :---: | :---: | :---: |
| 1 | RS485 network <br> baud rate | 4 (9600 baud) | $\begin{aligned} & 2=2400 \text { baud } \\ & 3=4800 \text { baud } \\ & 4=9600 \text { baud } \\ & 5=19200 \text { baud } \\ & 6=38400 \text { baud } \end{aligned}$ |
| 2 | RS485 network satellite address | 20 | 1 to 99 |
| 3 | RS485 network <br> timeout | 0 seconds (= off) | 0 to 100 seconds |
| 4 | RS485 network <br> protocol | $\begin{gathered} 1 \\ \text { (AP ASCII) } \\ \hline \end{gathered}$ | $\begin{aligned} & 1=\text { AP ASCII protocol } \\ & 2=\text { Modbus RTU protocol } \end{aligned}$ |
| 5 | Modbus protocol parity | 0 <br> (no parity) | $\begin{aligned} & 0=\text { no parity } \\ & 1=\text { odd parity } \\ & 2=\text { even parity } \\ & 3=10-\text { bit transmission } \end{aligned}$ |
| 6 | Motor FLC (A) | 10 | 1 to 2868 |
| 7 | Analog output <br> 4 mA offset (\%) | 100 | 80 to 120 |
| 8 | Start, Stop, <br> Quick stop function disable | 0 | $0=$ Remote Operator and Network start, stop, quick stop function enabled. <br> 1 = Remote Operator start, stop, quick stop function enabled. Network start, stop, quick stop function disabled. <br> 2 = Remote Operator start, stop, quick stop function disabled. Network start, stop, quick stop function enabled. <br> 3 = Remote Operator start, stop, quick stop function disabled. Network start, stop, quick stop function disabled. |
| 9 | Current $\div 10$ | 0 | $\begin{aligned} & 0=\text { off (required for models MCD5-0084B } \sim \text { MCD5-1600C) } \\ & 1=\text { on (required for models MCD5-0021B } \sim \text { MCD5-0068B) } \end{aligned}$ |

* Remote Operator Reset pushbutton is always enabled.
** RS485 Network reset and forced communication trip functions are always enabled.


## N.B.!:

Remote Operator Par. 9 Current $\div 10$ normalises the displayed current and analog output for models MCD5-0021B ~ MCD5-0068. Use Par. 9 in conjunction with Par. 6 Motor FLC as follows:

1. Set Par. 6 to a value 10 times greater than the actual motor nameplate FLC (e.g. for actual FLC = 4.6 A, set Par. 6 to 46).
2. Set Par. $9=1$.

### 11.9. Troubleshooting

The Remote Operator display and status indication LEDs can indicate abnormal operating and system conditions.

| Display <br> Indication | Problem | Possible Solution |
| :--- | :--- | :--- |
| nEt on <br> display | A loss of communication <br> has been detected on the <br> RS485 link to the network. | The Remote Operator has an RS485 Network Timeout <br> Protection setting (Parameter 3). This error is reported when <br> no communication occurs for longer than the timeout setting. <br> The system will become active as soon as communication is <br> restored. <br> To clear nEt from the display, press the Data/Prog pushbutton <br> momentarily or send a Reset command from the network <br> Master. |
| SP flashing <br> on display | Soft starter is off and being <br> programmed from the serial <br> network. | Finish soft starter network programming procedure and exit <br> Programming Mode. |

## 12. Appendix B - Specifications

Enclosure

| $\begin{aligned} & \text { Dim } \\ & \text { Wei } \end{aligned}$ |
| :---: |
| we |
|  |  |
|  |  |
|  |  |

Protection ............................................................................................................................... IP20

## Mounting

Spring-action plastic mounting clips (x 2)
Connections

| Soft starter | 6-way pin assembly |
| :---: | :---: |
| Network ........ | 5-way male and unpluggable female connector (supplied) |
| Maximum cable size | ............................. 2.5 mm² |
| Settings |  |
| Protocol | ... Modbus RTU, AP ASCII |
| Address range | .... 0 to 31 |
| Data rate (bps) | ..... 4800, 9600, 19200, 38400 |
| Parity | None, Odd, Even, 10-bit |
| Timeout | $\ldots . . . .$. None (off), $10 \mathrm{~s}, 60 \mathrm{~s}, 100 \mathrm{~s}$ |
| Certification |  |
| C $V$ | ............................. IEC 60947-4-2 |
| CE | .............................................. IEC 60947-4-2 |

## I nstructions: MCD Control Panel LCP 501

Order Code: 175G0096

## 1. Description

The MCD 500 LCP can be mounted up to 3 metres away from the soft starter, allowing remote control and monitoring. The LCP is rated IP65 when mounted correctly in accordance with these instructions.

## 2. Packing List

$1 \times$ LCP
$1 \times$ Cable, DB9, 3 metres
1 x Gasket, foam
$1 \times$ Instruction sheet
$4 \times$ M3 x 16 Screw
$4 \times$ M3 Flat washer
$4 \times$ M3 Spring washer
$4 \times$ M3 Nut
$2 \times$ Jack screw

## 3. Specifications

Maximum cable length Protection

3 metres
IP65 and NEMA12

## 4. Mounting the LCP

今
Models MCD5-0021 to MCD5-0105: The LCP can be removed or replaced while the starter is running. It is not necessary to remove mains or control voltage.
Models MCD5-0131 to MCD5-1600: The bus bar and/or heatsink are live whenever mains voltage is connected. Remove mains and control voltage from the soft starter before removing the cover.

1. Use the template to drill four mounting holes and two holes for the DB9 connector.
2. Apply the foam gasket to the back of the LCP.
3. Align the LCP over the holes and screw in place.

4. Plug the cable into the LCP and the soft starter.


MCD5-0021 to MCD5-0105


MCD5-0131 to MCD5-1600

## 5. Synchronising the LCP and the Starter

The DB9 cable can be connected/disconnected from the LCP while the starter is running.

The first time a LCP is plugged into a starter, the starter will copy its parameter settings to the LCP.

New Display Detected If the LCP has previously been used with a MCD 500, the operator can select whether to copy the parameters to the starter, or to copy the MCD 500's parameter settings into the LCP.

Select the required option using the [ $\boldsymbol{\Delta}$ ] and
 keys. The selected option is surrounded by a dotted line. Press [OK] to proceed with the selection.

## Copy Parameters Display to Starter <br> Starter to Display

If the parameter software version in the LCP is different from the software version of the starter, only Starter to Display will be available.


While the LCP is synchronising, only the
] [OK] and [OFF] keys are enabled.

## 6. Mounting template

Drill four mounting holes for screws (one in each corner) and two holes for the DB9 connector.

Image is not to scale.
Dimensions are given with faceplate removed.


## ON-Delay 1 (power start)

When voltage is applied to the coil, the relay contacts remain in the off state and the set time begins. When the set time has elapsed, the relay contacts transfer to the on state. The contacts remain in the on state until the timer is reset. The timer is reset by removing the coil voltage. Applicable models: RTEP(B)1, GT3A-1, -2, -3, GE1A, GT5Y and GT5P.

| Type No. | GT3A-1,-2,-3 | RTE-*1 |
| :--- | :---: | :---: |
| Mode | A | A |
| See Page | 843 | 836 |
| Type No. |  | GE1A |
| See Page | 866 | GT5Y/GT5P |

## Interval 1 (power start)

When voltage is applied to the coil, the relay contacts transfer immediately to the on state and the set time begins. When the set time has elapsed, the relay contacts transfer to the off state. The contacts remain in the off state until the timer is reset. The timer is reset by removing the coil voltage. Applicable models: RTE-P(B)1, GT3A-1, -2, -3.



| Type No. | GT3A-1, $-2,-3$ | RTE-*1 |
| :--- | :---: | :---: |
| Mode | B | B |
| See Page | 843 | 836 |

## Timing Diagrams Overview

## Guide to Reading Timing Function Diagrams



A
. If power is disconnected during actual timing, most electronic timers reset to the preset time, ready for the re-application of supply voltage (except for GT3F "true power OFF Delay").
2. $\mathrm{NO}=$ Normally open.
3. $\mathrm{NC}=$ Normally closed.

## Timing Function Diagrams Overview

## ON-Delay 2 (signal start)

Voltage is applied to the coil at all times. When a start input is supplied, the relay contacts remain in the off state and the set time begins. When the set time has elapsed, the relay contacts transfer to the on state. The contacts remain in the on state until the timer is reset. The timer is reset by applying a reset input or by removing the coil voltage. Applicable models: GT3A-4 and RTE-P(B) 2.


## Interval 2 (signal start)

Voltage is applied to the coil at all times. When a start signal is supplied, the relay contacts transfer immediately to the on state and the set time begins. When the set time has elapsed, the relay contacts transfer to the off state. The contacts remain in the off state until the timer is reset. The timer is reset by applying a reset input or by removing the coil voltage. Applicable model: GT3A-5.


| Type No. |  |
| :--- | :---: |
| Mode | A |
| See Page | 843 |

1. $T=$ set time, $\mathrm{T}^{\prime}=$ shorter than set time, T = one shot output time
2. For more detailed timing diagrams, see specifications for individual timer models.

Q-Pulse Id: TMS202

## Cycle 1 (power start, OFF first)

When voltage is applied to the coil, the contacts remain in the off state and the set time begins. At the end of the set time, the contacts transfer to the on state and remain in the on state until the set time elapses. The timer cycles between the two states until power is removed from the coil. Removing the coil voltage resets the timer. The set time for both the on state and the off state is the same. Applicable models: GT3A-1, $-2,-3$ and RTE-P(B)1.


## Cycle 3 (power start, ON first)

When voltage is applied to the coil, the contacts immediately transfer to the on state and the set time begins. At the end of the set time, the contacts transfer to the off state and remain in the off state until the set time elapses. The timer cycles between the two states until power is removed from the coil. Removing the coil voltage resets the timer. The set time for both the off state and the on state is the same. Applicable models: GT3A-1, $-2,-3$ and RTE-P(B)1.

| Power |  |  |
| :---: | :---: | :---: |
| Output |  |  |
|  |  |  |
|  | $T \longrightarrow T$ | $\xrightarrow{T}$ |
| Type No. | GT3A-1, -2, -3 | RTE-*1 |
| Mode | D | D |
| See Page | 843 | 836 |

## One Shot 1 (signal start, retriggerable)

Voltage is applied to the coil at all times. When a start signal is supplied, the contacts immediately transfer to the on state and the set time begins. If another start signal is supplied (before set time has elapsed) the set time restarts, as the contacts remain in the on state. Successive pulses at a frequency greater than the set time will cause the contacts to remain in the "On state" indefinitely. When the set time has elapsed the contacts transfer back to the off state. The contacts remain in the off state until the next start signal is supplied (no reset is necessary). The timer can be reset by application of a reset input or by removing coil voltage. Applicable model: GT3A-6.


| Type No. | GT3A-6 |
| :--- | :---: |
| Mode | A |
| See Page | 843 |

## Cycle 2 (signal start, OFF first)

Voltage is applied to the coil at all times. When a start signal is supplied, the relay contacts remain in the off state and the set time begins. At the end of the set time, the contacts transfer to the on state and remain in the on state until the set time elapses. The timer cycles between the two states until the timer is reset. The set time for both the on state and the off state are the same. The timer is reset by application of a reset input or by removing coil voltage. Applicable models: GT3A-4 and RTE-P(B) 2.


## One Shot Cycle (signal start)

Voltage is applied to the coil at all times. When a start signal is supplied, the contacts remain in the off state and the set time begins. At the end of the set time, the contacts transfer to the on state and remain in the on state for the set time. After the set time has elapsed, the contacts return to the off state. The contacts remain in the off state until the timer is reset. The timer is reset by application of a reset input or by removing coil voltage. Applicable model: GT3A-5.


## One Shot 2 (signal start)

Voltage is applied to the coil at all times. When a start signal is supplied, the contacts immediately transfer to the on state and the set time begins. If another start signal is supplied (before set time has elapsed), the set time will not be affected. When the set time has elapsed, the contacts transfer back to the off state. The contacts remain in the off state until the next start signal is supplied (no reset is necessary). The timer can be reset by application of a reset input or by removing coil voltage. Applicable models: GT3A-6 and RTE-P(B)2.


1. $\mathrm{T}=$ set time, $\mathrm{T}^{\prime}=$ shorter than set time, $\mathrm{Ts}=$ one shot output time
2. For more detailed timing diagrams, see specifications for individual timer models.

## Signal ON/OFF-Delay 1

Voltage is supplied to the coil at all times. When a maintained start signal is supplied, the contacts immediately transfer to the on state and the set time begins. When the set time has elapsed, the contacts transfer to the off state. The contacts remain in the off state until the start signal is removed. The contacts transfer back to the on state and remain in the on state for the set time. When the set time has elapsed, the contacts transfer to the off state and remain in the off state until the start signal is supplied again (no reset is necessary). The timer is reset by application of a reset input or by removing coil voltage. Applicable models: GT3A-4 and RTE-R(B)2.

## Signal ON/OFF-Delay 3

Voltage is supplied to the coil at all times. When a momentary start signal is supplied, the contacts remain in the off state and the set time begins. When the set time has elapsed, the contacts transfer to the on state. The contacts remain in the on state until another momentary input is supplied. The contacts then remain in the on state for the set time. When the set time has elapsed, the contacts transfer to the off state and remain in the off state until the start signal is supplied again (no reset is necessary). The timer is reset by application of a reset input or by removing coil voltage. Applicable model: GT3A-6.


| Type No. | GT3A-6 |
| :--- | :---: |
| Mode | D |
| See Page | 843 |

## One Shot ON-Delay (signal start)

When voltage is applied to the coil, the preset time is initiated and the contacts remain in the off state for the preset time. Following the preset time, the contacts transfer to the on state, and remain in the on state until the start input is supplied. Following the start input, the contacts transfer to the off state for the preset time. After the preset time has elapsed, the contacts transfer back to the on state and remain there until either the next start input is supplied or the timer is reset. The timer can be reset by either a reset input or removal of the coil voltage. Applicable model: GT3A-6.


| Type No. | GT3A-6 |
| :--- | :---: |
| Mode | B |
| See Page | 843 |

## Signal ON/OFF-Delay 2

Voltage is supplied to the coil at all times. When a maintained start signal is supplied, the contacts remain in the off state and the set time begins. When the set time has elapsed, the contacts transfer to the on state. The contacts remain in the on state until the start signal is removed. Once the start signal is removed, the contacts remain in the on state and the set time begins again. Once the set time has elapsed, the contacts transfer back to the off state. The timer is ready for the next start signal. The timer is reset by the application of a reset signal or removal of power. Applicable model: GT3A-5.


## Signal OFF-Delay 1

Voltage is applied to the coil at all times. When a start signal is supplied, the contacts immediately transfer to the on state. The set time begins when the start signal is removed. When the set time has elapsed, the contacts transfer to the off state. The contacts remain in the off state until the next start signal is supplied (no reset is necessary). The timer can be reset by application of a reset input or by removing coil voltage. Applicable models: RTE-P(B)2 and GT3A-4.


## Signal OFF-Delay 2

Voltage is applied to the coil at all times. When a maintained start signal is supplied, the contacts remain in the off state. When the "start signal is removed", the contacts transfer to the "On state" and the set time begins. When the set time has elapsed, the contacts transfer back to the off state. They remain in the off state until the next start signal is supplied (no reset is necessary. The timer can be reset by application of a reset input or by removing coil voltage. Applicable model: GT3A-5.


| Type No. | GT3A-5 |
| :--- | :---: |
| Mode | D |
| See Page | 843 |

Q-Pulse Id: TMS202

## Sequential Start (power start)

When voltage is applied to the coil, both contacts remain in the OFF state and the set time, T1, begins. When T1 has elapsed, output 1 comes on and T2 begins. When T2 has elapsed, output 2 comes on. Both outputs remain on until power is removed from the coil. Applicable model: GT3W-A.


| Type No. | GT3W-A |
| :--- | :---: |
| Mode | A |
| See Page | 856 |

Se

$$
856
$$

## Recycler Outputs (power start)

When voltage is applied to the coil, both contacts remain in the off state and time T1 begins. When T1 has elapsed, both contacts transfer to the ON state and T2 begins. When T2 has elapsed, both contacts transfer back to the OFF state and T 1 begins again. The cycle continues until power is removed, at which time both contacts transfer back to the OFF state. Applicable model: GT3W-A.

2. For more detailed timing diagrams, see specifications for individual timer models.

## True Power-OFF Delay

When voltage is applied, output comes on immediately; when voltage is removed from the coil, the timer begins timing (internal capacitors power the timing circuit). When time has expired, contacts transfer back to the OFF state. If power is reapplied before the elapsed time has expired, the timing function will reset back to the starting point. Applicable models: GT3F-1, 2.


| Type No. | GT3F-1, 2 |
| :--- | :---: |
| Mode | Power OFF-Delay |
| See Page | 851 |

# MultiTrode Level Sensing Standard Control \& Backup Systems 



# MULTITRODE 

## MultiTrode is a world leader in pump station management systems, with customers in the USA, Australia, Asia, South America and Europe.

MultiTrode has installed more than 12,000 pump controllers and station supervisors in pump stations worldwide, and probes in more than 100,000 pump stations. With offices in the USA and Australia, the company has provided water and wastewater solutions to municipal authorities throughout the world for almost 20 years.

MultiTrode level sensors and control systems are used in a variety of municipal, commercial and industrial applications.


## Product applications

## Sewer wet well - primary control

MultiTrode probes used in conjunction with a choice of control systems have proven to be the most reliable and cost effective liquid level control solution available.

## Relay \& probe backup system

The EPA encourages authorities to install backup systems in case the main system fails. The MTR together with a single sensor probe provides a highly reliable backup alarming solution. The MTRA and three-sensor probe can keep a pump station operating as well as provide an alarm.
Sewer wet well - backup level sensing
The MT2PC can handle an existing 4-20mA device such as a pressure transducer or ultrasonic sensor as well as the high reliability MultiTrode probe as a backup. If the existing $4-20 \mathrm{~mA}$ device fails the probe takes over.

## Slaughterhouse - level sensing, agitation \& pumping

Even in the worst conditions of fat, grease, debris and foam, the MultiTrode probe handles effluent extremely well. The MT2PC controls an agitator and a pump.

Sump Pits - level sensing and control The MT2PC and probe provide reliable level sensing and control. The level indicator on the MT2PC removes the need for building managers to open the well cover.

## Fire trucks

Fire trucks carry one tank for water and one for concentrated liquid foam. Monitoring foam levels is unreliable using pressure transducers, floats and conductivity devices. The MultiTrode probe has proved to be the only reliable answer and has become first choice for monitoring of foaming liquid.


## The MultiTrode Probe


#### Abstract

MultiTrode probes are unsurpassed for rugged reliability, cost effectiveness and simplicity. Designed for the tough, turbulent conditions found in water, sewage and industrial tanks and sumps, the probes can be found in the simplest and the most complex water and wastewater management systems around the world.


- Low maintenance
- Simple installation
- Excellent in turbulence
- Short \& long term cost savings
- Environmentally friendly
- Safe, low sensing voltage
- Unaffected by fat, grease, debris and foam
- Positive pump cut-out
- Safe - MTISB Barrier


## Reliable in all conditions

Operation is unaffected by build up of fat, grease debris and foam, which causes other systems such as floats, bubblers, pressure and ultrasonic transducers to fail. Turbulence does not affect the probe operation. The rugged, streamlined design eliminates tangling and is ideal for confined spaces.

## Positive pump cut-out

Operational consistency is important to longevity, low maintenance and cost control. The positive pump cut-out ensures pumps are turned off at the same level every time. This avoids damage due to pump over run and the cost of additional control equipment.

## Safe for people and environment

The extra low sensing voltage ensures operators and maintenance staff are protected. All MultiTrode products are environmentally safe, containing no mercury or other harmful contaminants.

## Cost savings

The low cost of equipment, installation and maintenance makes MultiTrode one of the most efficient level control systems available. Plus robust construction and longevity ensures continued cost savings when compared to other systems on the market.

## Standard and custom probes

MultiTrode manufactures a wide range of standard probes, from a single sensor $(200 \mathrm{~mm})$ to a ten-sensor probe $(1000 \mathrm{~mm}$ increasing to a maximum of nine metres). Custom probes can be manufactured to suit your requirements.

## Installation

Installation is straightforward. Probes are easy to install without entering the wet area. The probe is simply lowered in from the top and suspended by its own cable, using the mounting kit supplied.

## MTAK-1 Mounting Kit (Supplied)

The mounting bracket is a standard accessory supplied with all multi-sensor probes (not standard with 0.2/1-xx single sensor probe).

The MTAK-1 mounting bracket has an integral cleaning device. All metal components are stainless steel.


## MTAK-2 Mounting Kit (Optional extra)

This extended bracket provides up to 300 mm extra wall clearance. This bracket is not included as standard with probes.


## Ordering Examples and Information

| Model <br> Code | Probe <br> Length <br> $(\mathbf{m} / \mathbf{i n})$ | Sensor <br> Separation <br> $(\mathbf{m m} / \mathbf{i n})$ | Cable <br> Length* <br> $(\mathbf{m} / \mathbf{f t})$ | Number of <br> Sensors |
| :---: | :---: | :---: | :---: | :---: |
| $0.2 / 1-10$ | $0.2 / 8$ | $\mathrm{~N} / \mathrm{A}$ | $10 / 33$ | 1 |
| $0.5 / 3-10$ | $0.5 / 16$ | $150 / 6$ | $10 / 33$ | 3 |
| $1.0 / 10-10$ | $1 / 40$ | $100 / 4$ | $10 / 33$ | 10 |
| $1.5 / 10-30$ | $1.5 / 60$ | $150 / 6$ | $30 / 100$ | 10 |
| $2.0 / 10-30$ | $2 / 80$ | $200 / 8$ | $30 / 100$ | 10 |
| $2.5 / 10-30$ | $2.5 / 96$ | $250 / 10$ | $30 / 100$ | 10 |
| $3.0 / 10-30$ | $3 / 115$ | $300 / 12$ | $30 / 100$ | 10 |
| $6.0 / 10-30$ | $6 / 224$ | $600 / 24$ | $30 / 100$ | 10 |
| $9.0 / 10-30$ | $9 / 368$ | $900 / 40$ | $30 / 100$ | 10 |

*Cable Length $10 \mathrm{~m} / 33 \mathrm{ft}$ or $30 \mathrm{~m} / 100 \mathrm{ft}$

| Probe Length <br> (meters) | Sensor <br> Points | Cable Length <br> (meters) |
| :---: | :---: | :---: |
| 2.5 | 10 | 10 |

## VEGABAR 52

## Profibus PA

## Pressure transmitter with CERTEC $^{\circledR}$ measuring cell



## Area of application

The VEGABAR 52 pressure transmitter can be used universally for measurement of gases, vapours and liquids. Also substances such as sand are not problem for the abrasion-resistant ceramic measuring cell. The VEGABAR 52 is an economical solution for a multitude of applications in all areas of industry.

## Advantages

- High plant availability through maximum overload and vacuum resistance of the ceramic measuring cell
- Measurement down to the last drop through extremely small measuring ranges with high accuracy.
- Low costs for maintenance thanks to wear-free ceramic measuring cell


## Function

The heart of the pressure transmitter is the pressure measuring cell that transforms pressure into an electrical signal. This pressure-dependent signal is converted into a standard output signal by the integrated electronics.
The sensor element is the CERTEC ${ }^{\circledR}$ measuring cell with excellent longterm stability and high overload resistance. The CERTEC ${ }^{\circledR}$ measuring cell is also equipped with a temperature sensor. The temperature value can be displayed via the indicating and adjustment module or processed via the signal output.

| Technical data |  |
| :---: | :---: |
| Measuring ranges | $\begin{aligned} & -1 \ldots+72 \mathrm{bar} /-100 \mathrm{kPa} \ldots+7200 \mathrm{kPa} \\ & (-14.5 \ldots+1044 \mathrm{psig}) \end{aligned}$ |
| Smallest measuring range | +0.1 bar/+10 kPa (+1.45 psig) |
| Deviation | < 0.075 \%, optionally up to < 0.05 \% |
| Process fitting | Thread G1⁄2 (EN 837), thread from G1½ (DIN 3852-A), flanges from DN 25 or ANSI 1 ", fittings for the food processing and paper industry |
| Process temperature | $-40 \ldots+150^{\circ} \mathrm{C}\left(-40 \ldots+302{ }^{\circ} \mathrm{F}\right)$ |
| Ambient, storage and transport temperature | $-40 \ldots+80^{\circ} \mathrm{C}\left(-40 \ldots+176{ }^{\circ} \mathrm{F}\right)$ |
| Betriebsspannung | $9 \ldots 32 \mathrm{~V}$ DC |

## Materials

The wetted parts of the instrument are made of 316L, PVDF, Hastelloy, C4-plated or Sapphire-ceramic ${ }^{\circledR}$. The process seal is available in FKM, FFKM as well as EPDM.
You will find a complete overview of the available materials and seals in the "configurator" on our homepage under www.vega.com/configurator.

## Housing versions

The housings are available as single chamber or double chamber version in plastic, stainless steel or aluminium.
They are available in protection ratings up to IP 68 ( 25 bar ) with external electronics.

## Electronics versions

The instruments are available in different electronics versions. Apart from the two-wire electronics with $4 \ldots 20 \mathrm{~mA}$ or $4 \ldots 20 \mathrm{~mA} / \mathrm{HART}$, two purely digital versions with Profibus PA and Foundation Fieldbus are available.

## Approvals

The instruments are suitable for use in hazardous areas and are approved e.g. according to ATEX and IEC. The instruments have also different ship approvals such as e.g. GL, LRS or ABS.
You can find detailed information on the existing approvals in the "configurator" on our homepage under www.vega.com/configurator.

## Bedienung

Die Bedienung des Gerätes erfolgt über das optional einsetzbare Anzeige- und Bedienmodul PLICSCOM oder über einen PC mit der Bediensoftware PACTware und entsprechendem DTM. Eine alternative Bedienmöglichkeit ist das herstellerspezifische Bedienprogramm PDM.


Elektrischer Anschluss


Elektronik- und Anschlussraum Einkammergehäuse

## 1 Steckverbinder für VE ( $I^{2} C$-Schnittstelle)

2 Federkraftklemmen zum Anschluss der externen Anzeige VEGADIS 61
3 Erdungsklemme zum Anschluss des Kabelschirms
4 Federkraftklemmen für Spannungsversorgung und Signalausgang
Details zum elektrischen Anschluss finden Sie in der Betriebsanleitung des Gerätes auf unserer Homepage unter www.vega.com/downloads.

## Dimensions


(1)

Dimensions VEGABAR 52
1 Threaded version G1⁄2 A (manometer connection EN 837)

2 Threaded version G1½ A
3 Flange version DN 50

## Information

You can find further information about the VEGA product line on our homepage www.vega.com.
In the download section under www.vega.com/downloads you'll find free operating instructions, product information, brochures, approval documents, instrument drawings and much, much more.
There, you will also find GSD and EDD files for Profibus PA systems as well as DD and CFF files for Foundation Fieldbus systems.

## Instrument selection

With the "finder" you can select the most suitable measuring principle for your application: www.vega.com/finder.
You can find detailed information on the instrument versions in the "configurator" on our homepage under www.vega.com/configurator.

## Contact

You can find the VEGA agency serving your area on our homepage www.vega.com.

## VEGAWELL 52



## Product Information

## Contents

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2 Type overview ..... 4
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5 Operation
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## Take note of safety instructions for Ex applications

Please note the Ex specific safety information which you can find on our homepage www．vega．comlservicesldownloads and which comes with every instrument．In hazardous areas you should take note of the appropriate regulations，conformity and type approval certificates of the sensors and power supply units．The sensors must only be operated on intrinsically safe circuits．The permissible electrical values are stated in the certificate．

## 1 Description of the measuring principle

## Measuring principle

VEGAWELL 52 pressure transmitters work according to the hydrostatic measuring principle, which functions independently of the dielectric properties of the product and is not influenced by foam generation.
The sensor element of VEGAWELL 52 is the dry ceramic-capacitive CERTEC ${ }^{\circledR}$ measuring cell in two sizes. Base element and diaphragm consist of high purity sapphire-ceramic ${ }^{\circledR}$.

The hydrostatic pressure of the product causes via the diaphragm a capacitance change in the measuring cell. This capacitance change is converted into an appropriate output signal.


Fig. 1: Configuration of the CERTEC ${ }^{\oplus}$ measuring cell with VEGAWELL 52
1 Diaphragm
2 Soldered glass bond
3 Base element
The advantages of the CERTEC ${ }^{\circledR}$ measuring cell are:

- Very high overload resistance
- No hysteresis
- Excellent long-term stability
- Completely front flush installation
- Good corrosion resistance
- Very high abrasion resistance


## Wide application range

VEGAWELL 52 is suitable for level measurement in deep wells and ballast tanks as well as for gauge measurement in open flumes. Typical media are drinking water and waste water as well as water containing abrasive substances. All signal outputs are available in $4 \ldots 20 \mathrm{~mA}$ and $4 \ldots 20 \mathrm{~mA} / \mathrm{HART}$ - Pt 100.
In the $4 \ldots 20 \mathrm{~mA} / \mathrm{HART}$ - Pt 100 version, a temperature sensor Pt 100 in four-wire technology is integrated in the transducer. Power supply or processing are carried out via an external temperature transducer.

## 2 Type overview

## VEGAWELL 52

Measuring cell:
Media:
Process fitting:
Material process fitting:
316L
Material, suspension cable:
Material transmitter:
316L, 1.4462 (Duplex), each also with PE coating, PVDF, Titanium
Diameter transmitter: depending on material and version at least 22 mm

Measuring range:
Process temperature:
Deviation:
Signal output:
Operation:
$0 \ldots 0.1$ bar up to $0 \ldots 25$ bar
$-20 \ldots+80^{\circ} \mathrm{C}\left(-4 \ldots+176^{\circ} \mathrm{F}\right)$
$<0.2 \%,<0.1 \%$
4 ... $20 \mathrm{~mA}, 4$... $20 \mathrm{~mA} / \mathrm{HART}$
depending on the version via PACTware/PC

## 3 Mounting instructions

## Mounting position

The following illustration shows a mounting example for VEGAWELL 52. The VEGA price list contains suitable mounting brackets under the section Accessories. With these parts, standard mounting arrangements can be realised quickly and reliably.


Fig. 3: VEGAWELL 52 in a pump shaft with VEGABOX 02
VEGAWELL 52 must be mounted in a calm area or in a suitable protective tube. This avoids lateral movements of the transmitter and the resulting corruption of measurement data.


## Note:

As an alternative to fixing the transmitter, the use of a measuring instrument holder from VEGA's line of mounting accessories is recommended.

Beside the connection and suspension cables, the suspension cable also contains a capillary for atmospheric pressure compensation. All versions can be shortened on site.

With VEGAWELL 52, the electronics is completely integrated in the transmitter. The cable end can be lead directly to a dry connection compartment. Pressure compensation is then carried out via the filter element of the capillaries.

## Note:

The pressure compensation housing VEGABOX 02 is recommended for connecting VEGAWELL 52.

It contains a high-quality ventilation filter and terminals. A protective cover is optionally available for use outdoors.

## Mounting versions

The following illustrations show the different mounting versions depending on the instrument type.

Mounting with straining clamp

Fig. 5: Straining clamp
1 Suspension cable
2 Suspension opening
3 Clamping jaws

Mounting with screw connection

Fig. 6: Screw connection
1 Suspension cable
2 Seal screw
3 Cone bushing
4 Seal cone
5 Screw connection
6 Seal



Mounting with housing and thread


Fig. 7: Housing with thread G1½ A
1 Housing
2 Seal
3 Thread

## 4 Electrical connection

### 4.1 General requirements

The supply voltage range can differ depending on the instrument version. You can find exact specifications in chapter "Technical data".

The national installation standards as well as the valid safety regulations and accident prevention rules must be observed.

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

### 4.2 Power supply

Supply voltage and current signal are carried on the same twowire cable. The requirements on the power supply are specified in chapter "Technical data".

The VEGA power supply units VEGATRENN 149AEx, VEGASTAB 690, VEGADIS 371 as well as VEGAMET signal conditioning instruments are suitable for power supply. When one of these instruments is used, a reliable separation of the supply circuits from the mains circuits according to DIN VDE 0106 part 101 is ensured.

### 4.3 Connection cable

## In general

An outer diameter of $5 \ldots 9 \mathrm{~mm}$ ensures the seal effect of the cable entry. If electromagnetic interference is expected, screened cable should be used for the signal lines.

The sensors are connected with standard two-wire cable without screen.

In Ex applications, the corresponding installation regulations must be noted for the connection cable.

### 4.4 Cable screening and grounding

If screened cable is necessary, the cable screen must be connected on both ends to ground potential. If potential equalisation currents are expected, the connection on the evaluation side must be made via a ceramic capacitor (e.g. $1 \mathrm{nF}, 1500 \mathrm{~V}$ ).

### 4.5 Wiring plan VEGAWELL 52-4 ... 20 mA

## Direct connection



Fig. 8: Wire assignment, suspension cable
1 blue (-): to power supply or to the processing system
2 brown (+): to power supply or to the processing system
3 Shielding
4 Breather capillaries with filter element

## Connection via VEGABOX 02



Fig. 9: Terminal assignment VEGABOX 02
1 To power supply or the processing system
2 Shielding ${ }^{1)}$

## Connection via housing



Fig. 10: Terminal assignment of the housing
1 To power supply or the processing system
2 Shielding ${ }^{2)}$

[^14]
### 4.6 Wiring plan VEGAWELL 52-4.. HART - Pt 100

## Direct connection



Fig. 11: Wire assignment, connection cable
1 blue (-): to power supply or to the processing system
2 Brown (+): to power supply or to the processing system
3 White: for processing of the integrated Pt 100 (power supply)
4 Yellow: for processing of the integrated Pt 100 (measurement)
5 Red: for processing of the integrated Pt 100 (measurement)
6 Black: for processing of the integrated Pt 100 (power supply)
7 Shielding
8 Breather capillaries with filter element

## Connection via VEGABOX 02



Fig. 12: Terminal assignment VEGABOX 02
1 To power supply or the processing system (signal pressure transmitter)
2 To power supply or the processing system (connection cables resistance thermometer Pt 100)
3 Shielding ${ }^{3)}$

Connection via VEGABOX 02 with integrated temperature sensor


Fig. 13: Terminal assignment VEGABOX 02
1 To power supply or the processing system (signal pressure transmitter)
2 For voltage supply or to processing system (resistance thermometer Pt 100)
3 Shielding ${ }^{4}$

## Connection via housing



Fig. 14: Terminal assignment of the housing
1 To power supply or the processing system (signal pressure transmitter)
2 For voltage supply or to processing system (resistance thermometer Pt 100)
3 Shielding ${ }^{5}$

[^15]
## 5 Operation

### 5.1 Overview

VEGAWELL $524 \ldots 20 \mathrm{~mA}$
VEGAWELL 52-4... 20 mA has no adjustment options.
VEGAWELL 524 ... 20 mA/HART - Pt 100

- Adjustment software according to FDT/DTM standard, e.g. PACTware and PC
- HART handheld


### 5.2 Adjustment with PACTware

## Connecting the PC to the signal cable



Fig. 15: Connection of the PC to VEGABOX 02 or communication resistor
1 PC with PACTware
2 RS232 interface (with VEGACONNECT 3), USB interface (with VEGACONNECT 4)
3 VEGACONNECT 3 or 4
4 Communication resistor $250 \Omega$
5 Power supply unit

Necessary components:

- VEGAWELL 52
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT with HART adapter cable
- HART resistor approx. $250 \Omega$
- Power supply unit


## - Note:

1
With power supply units with integrated HART resistance (internal resistance approx. $250 \Omega$ ), an additional external resistance is not necessary (e.g. VEGATRENN 149A, VEGAMET 381/624/625, VEGASCAN 693). In such cases, VEGACONNECT can be connected parallel to the $4 \ldots 20 \mathrm{~mA}$ cable.

## 6 Technical data

## Materials and weights

Materials, wetted parts

- Transmitter

316L, 316L with PE coating, 1.4462 (Duplex), 1.4462 with PE coating,

- Diaphragm PVDF, Titanium
sapphire ceramic ${ }^{\circledR}$ (99.9 \% oxide ceramic)
- Measuring cell seal

FKM (VP2/A) - FDA and KTW approved, FFKM (Perlast G75S), EPDM (A+P 75.5/KW75F)

- Suspension cable
- Cable gland on the transmitter

PE (FDA and KTW-approved), FEP, PUR
316L

- Process fitting

316L

- Straining clamp
1.4301
- Unassembled screw connection

316L, PVDF

- Threaded connection on the housing

316L
Materials, non-wetted parts

- Housing
plastic PBT (Polyester), 316L
Weight approx.
- Basic weight
0.8 kg (1.764 lbs)
- Suspension cable
$0.1 \mathrm{~kg} / \mathrm{m}(0.07 \mathrm{lbs} / \mathrm{ft})$
- Straining clamp
0.2 kg ( 0.441 lbs )
- Screw connection
$0.4 \mathrm{~kg}(0.882 \mathrm{lbs})$
- Plastic housing
$0.8 \mathrm{~kg}(1.764 \mathrm{lbs})$
- Stainless steel housing


## Input variable

| Measured value | Level |
| :--- | :--- |
| Measuring range | see product code |
| Recommended max. turn down | $10: 1$ |

## Output variable

4 ... 20 mA
Output signal
Signal resolution
Failure signal
$4 . .20 \mathrm{~mA}$
$2 \mu \mathrm{~A}$
Max. output current
$<3.6 \mathrm{~mA}$

Run-up time
Step response time
Fulfilled NAMUR recommendations
mA

100 ms (ti: $0 \mathrm{~s}, 0 \ldots 63 \%$ )

4 ... 20 mA/HART - Pt 100
Output signal
Signal resolution
Failure signal
Max. output current
Run-up time
Step response time
NE 43

Fulfilled NAMUR recommendations
$4 \ldots 20 \mathrm{~mA} / \mathrm{HART}$
$2 \mu \mathrm{~A}$
< 3.6 mA ; 20.5 mA ; 22 mA ; unchanged (adjustable via PACTware)
22 mA

15 s
200 ms (ti: 0 s, $0 \ldots 63$ \%)
NE 43

## Additional output parameter - temperature

| integrated resistance thermometer | Pt 100 according to DIN EN 60751 |
| :--- | :--- |
| Range | $-50 \ldots+100^{\circ} \mathrm{C}\left(-58 \ldots+212^{\circ} \mathrm{F}\right)$ |
| Resolution | $1^{\circ} \mathrm{K}$ |

## Deviation for 4 ... 20 mA version ${ }^{6}$

Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.
Deviation with version < 0.2 \%

- Turn down 1: 1 up to 5 : 1
< 0.2 \%
- Turn down > 10 : 1

$$
<0.04 \% \times \text { TD }
$$

6) Determined according to the limit point method according to IEC 60770, incl. non-linearity, hysteresis and non-repeatability.

Deviation with version $<0.1$ \%

- Turn down 1:1 up to 5:1

$$
\begin{aligned}
& <0.1 \% \\
& <0.02 \% \text { x TD }
\end{aligned}
$$

## Deviation for version $4 \ldots 20 \mathrm{~mA} / \mathrm{HART}$ - Pt 100 ${ }^{\text {7 }}$

Applies to digital HART interface as well as to analogue current output $4 \ldots 20 \mathrm{~mA}$. Specifications refer to the set span. Turn down (TD) is the relation nominal measuring range/set span.

Deviation with version < 0.2 \%

- Turn down 1:1 up to $5: 1$

$$
\begin{aligned}
& <0.2 \% \\
& <0.04 \% \text { x TD } \\
& \\
& <0.1 \% \\
& <0.02 \% \text { x TD }
\end{aligned}
$$

- Turn down > 10: 1

Deviation with version $<0.1 \%$

- Turn down 1:1 up to 5:1 <0.1\%
- Turn down > 10 : 1


## Influence of the product or ambient temperature

Applies to digital HART interface as well as to analogue current output $4 \ldots 20 \mathrm{~mA}$. Specifications refer to the set span. Turn down (TD) is the relation nominal measuring range/set span.

## Average temperature coefficient of the zero signal

In the compensated temperature range of $0 \ldots+80^{\circ} \mathrm{C}\left(+32 \ldots+176^{\circ} \mathrm{F}\right)$, reference temperature $20^{\circ} \mathrm{C}\left(68^{\circ} \mathrm{F}\right)$.
Average temperature coefficient of the zero signal

- Turn down 1:1
- Turn down 1: 1 up to 5 : 1 $<0.05 \% / 10 \mathrm{~K}$
- Turn down > 10:1

Outside the compensated temperature range
Average temperature coefficient of the zero signal

- Turn down 1:1

$$
\text { typ. < } 0.05 \% / 10 \mathrm{~K}
$$

## Long-term stability (similar to DIN 16086, DINV 19259-1 and IEC 60770-1)

Applies to digital HART interface as well as to analogue current output $4 \ldots 20 \mathrm{~mA}$. Specifications refer to the set span. Turn down (TD) is the relation nominal measuring range/set span.
Long-term drift of the zero signal

```
< (0.1 % x TD)/year
```


## Ambient conditions

Ambient temperature

- Connection cable PE
$-40 \ldots+60^{\circ} \mathrm{C}\left(-40 \ldots+140^{\circ} \mathrm{F}\right)$
- Connection cable PUR, FEP
$-40 \ldots+85^{\circ} \mathrm{C}\left(-40 \ldots+185^{\circ} \mathrm{F}\right)$
Storage and transport temperature
$-20 \ldots+80^{\circ} \mathrm{C}\left(-4 \ldots+176^{\circ} \mathrm{F}\right)$


## Process conditions

## Process pressure

Max. process pressure, transmitter ${ }^{8)}$

- Measuring range 0.1 bar (1.45 psig) 15 bar (218 psig)
- Measuring range 0.2 bar ( 2.9 psig )

20 bar (290 psig)

- Measuring range $\leq 0.4$ bar ( 5.8 psig )

25 bar (363 psig)
Pressure stage, process fitting

- Unassembled screw connection

316L: PN 3, PVDF: unpressurized

- Thread on the housing PN 3
Product temperature, depending on the version

[^16]| Suspension cable | Transmitter | Product temperature |
| :--- | :--- | :--- |
| PE | All | $-20 \ldots+60^{\circ} \mathrm{C}\left(-4 \ldots+140^{\circ} \mathrm{F}\right)$ |
| PUR | All | $-20 \ldots+80^{\circ} \mathrm{C}\left(-4 \ldots+176{ }^{\circ} \mathrm{F}\right)$ |
| PUR | PE coating | $-20 \ldots+60^{\circ} \mathrm{C}\left(-4 \ldots+140^{\circ} \mathrm{F}\right)$ |
| FEP | All | $-20 \ldots+80^{\circ} \mathrm{C}\left(-4 \ldots+176{ }^{\circ} \mathrm{F}\right)$ |
| FEP | PE coating | $-20 \ldots+60^{\circ} \mathrm{C}\left(-4 \ldots+140^{\circ} \mathrm{F}\right)$ |

Vibration resistance mechanical vibrations with 4 g and $5 \ldots 100 \mathrm{~Hz}^{9)}$

## Electromechanical data

Suspension cable

- Configuration six wires, one suspension cable, one breather capillary, screen braiding,
- Tensile strength
foil, mantle
$\geq 1200 \mathrm{~N}$ (270 pound force)
- Max. length

1000 m (3280 ft)

- Min. bending radius

25 mm (with $25^{\circ} \mathrm{C} / 77^{\circ} \mathrm{F}$ )

- Diameter approx.

8 mm ( 0.315 in )

- colour (non-Ex/Ex) - PE
black/blue
- colour (non-Ex/Ex) - PUR, FEP
blue/blue
Cable entry housing or VEGABOX 02
1 x cable gland $\mathrm{M} 20 \times 1.5$ (cable: $\varnothing 5 \ldots 9 \mathrm{~mm}$ ), $1 \times$ blind stopper $\mathrm{M} 20 \times 1.5$
Screw terminals


## Supply voltage - 4 ... 20 mA

Operating voltage
Permissible residual ripple
$-<100 \mathrm{~Hz}$
$-100 \mathrm{~Hz} \ldots 10 \mathrm{kHz}$
Load

8 ... 36 V DC
$\mathrm{U}_{\mathrm{ss}}<1 \mathrm{~V}$
$\mathrm{U}_{\mathrm{ss}}<10 \mathrm{mV}$
see diagram


Fig. 16: Voltage diagram
1 Voltage limit
2 Operating voltage

## Supply voltage - $4 \ldots 20 \mathrm{~mA} / \mathrm{HART}$ - Pt 100

Operating voltage
Permissible residual ripple

- < 100 Hz
- 100 Hz ... 10 kHz
Load
$9.6 \ldots 36 \vee D C$
$\mathrm{U}_{\mathrm{ss}}<1 \mathrm{~V}$
$\mathrm{U}_{\mathrm{ss}}<10 \mathrm{mV}$
see diagram

9) Tested according to the regulations of German Lloyd, GL directive 2.


Fig．17：Voltage diagram
HART load
Voltage limit
Operating voltage

## Electrical protective measures

Protection

| －Transmitter | IP 68 （30 bar） |
| :--- | :--- |
| －Housing | IP 66／IP 67 |
| －VEGABOX 02 | IP 65 |
| Overvoltage category | III |
| Protection class | III |

## Existing approvals or approvals applied for

| Gas explosion protection | e．g．according to ATEX and IEC |
| :--- | :--- |
| Fire－damp protection | e．g．according to ATEX |
| Overfill protection | e．g．according to WHG |
| Ship approval | e．g．according to GL，LRS，ABS，RINA |

The available approvals can be selected via the configurator on www．vega．com．

Depending on the version，instruments with approvals can have different technical data．For these instruments，please note the corresponding approval documents．They can be downloaded in the download section on www．vega．com．

## CE conformity

| EMC $(2004 / 108 / E G)$ | EN 61326－1： 2006 |
| :--- | :--- |
| LVD $(2006 / 95 / E G)$ | EN 61010－1： 2001 |

## Environmental instructions

VEGA environment management system
certified according to DIN EN ISO 14001
You can find detailed information under www．vega．com．

## 7 Dimensions

## VEGAWELL 52 - suspension cable 1



Fig. 18: VEGAWELL 52 - suspension cable
1 Transmitter Duplex, with straining clamp
2 TransmitterDuplex for deep wells, with unassembled screw connection G1½ A (11/2 NPT) and closing cap
3 Transmitter Duplex, with PE coating
4 Transmitter with screwed connection of PVDF
5 TransmitterTitanium/Titanium with glass leadthrough, with thread G1 A (1 NPT) and plastic housing

VEGAWELL 52 - suspension cable 2


Fig. 20: VEGAWELL 52 - suspension cable
1 Transmitter 316L, with straining clamp
2 Transmitter Titanium, with unassembled screw connection G1 A (1 NPT)

VEGAWELL 52 - threaded fitting


Fig. 22: VEGAWELL 52 - thread
1 Threaded fitting G1⁄2 inner G1/4
2 Threaded fitting G1

## 8 Product code

## VEGAWELL 52




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www.vega.com

会 (EX)

## VEGADIS 62

## External indicating and adjustment unit without external energy



## Application area

VEGADIS 62 is suitable for measured value indication and adjustment of sensors with HART protocol. The instrument is looped directly into the signal line at any location. VEGADIS 62 can be also used as indicator for bus participants in a HART multidrop system. VEGADIS 62 operates as a pure indicating instrument in a $4 \ldots 20 \mathrm{~mA}$ current loop.

## Advantages

- Digital and quasianalogue indication of the measured value
- Digital LC display with 4-key adjustment
- Detachable indicating and adjustment module


## Function

VEGADIS 62 measures the current in the current loop and indicates the measured value in digital and quasianalogue format.
The instrument operates in different modes. In basic mode at $4 \ldots 20 \mathrm{~mA}$, all settings of VEGADIS 62 are carried out by means of the front keys. In HART standard and HART multidrop mode, the instrument listens permanently to the HART communication of the control system with the sensor. Modifications of unit and/or measuring range are adapted automatically.

## Technical data

## General data

Materials

- Housing
- Inspection window in hous- Polycarbonate (UL-746-C listed) ing cover for indicating and adjustment module
- Ground terminal

316Ti/316L
Weight approx.
$0.35 \mathrm{~kg}(0.772 \mathrm{lbs})$

## Supply circuit

Voltage supply and data trans- via the signal circuit mission
Current range $\quad 3.5 \ldots 22.5 \mathrm{~mA}$

## Indicating and adjustment module

Display

- Principle LCD
- Measured value presenta- 7 segments, 5 -digit, height of digits 9 mm tion (0.354 in), indication range -99999 ... 99999
- Bar graph 20 segments
$\begin{array}{ll}\text { - Info line } & 14 \text { segments, } 6- \\ & 5.5 \mathrm{~mm}(0.217 \mathrm{in})\end{array}$
Adjustment elements 4 keys
Materials
- Housing
- Inspection window

ABS
Polyester foil

## Ambient conditions

Ambient temperature $\quad-20 \ldots+70^{\circ} \mathrm{C}\left(-4 \ldots+158^{\circ} \mathrm{F}\right)$
Storage and transport temper- $-40 \ldots+80^{\circ} \mathrm{C}\left(-40 \ldots+176{ }^{\circ} \mathrm{F}\right)$
ature
Electromechanical data
Cable gland
$2 \times$ cable entry M $20 \times 1.5$ (cable: $\varnothing 5 \ldots 9 \mathrm{~mm}$ )
Spring-loaded terminals for wire cross-section

- Massive wire, cord $\quad 0.2 \ldots 2.5 \mathrm{~mm}^{2}$ (AWG $24 \ldots$ 14)
- Cord with cable end sleeve $0.2 \ldots 1.5 \mathrm{~mm}^{2}$ (AWG $24 \ldots$ 16)


## Electrical protective measures

Protection rating

- Housing plastic IP 66/IP 67
- Housing Aluminium, stain- IP 66/IP 68 (0.2 bar) less steel


## Approvals

You can find detailed information on the existing approvals in the "configurator" on our homepage under www.vega.com/configurator.

## Operation

The adjustment of VEGADIS 62 is menu-controlled via four keys on the front and one LC display.
(3)

## Indicating and adjustment elements

1 Status information (HART mode, unit lock, warning or error information)
2 Unit and information line
3 Digital measured value indication
3 Bar graph for quasianalogue measured value indication
3 Adjustment keys

## Electrical connection



## Wiring plan VEGADIS 62

1 To the sensor
2 For power supply
3 For connection cable to indicating and adjustment module


Installation example VEGADIS 62 in conjunction with an individual sensor

## Sensor

VEGADIS 62
HART resistor > $150 \Omega$ (with low impedance power supply necessary)
Voltage supply/Processing
You can find details on the electrical connection in the operating instructions of the instruments on our homepage under www.vega.com/downloads.

## Dimensions



### 3.8 TERMINALS \& LINKS

- CLIPSAL - BP165/7 - Active Links
- CLIPSAL - L 7 - Link
- CLIPSAL - L7A - Link
- DORE ELEC.- 165E12 - Link
- DORE ELEC.- 165E24 - Link
- PHOENIX CONTACT - AP-2 + AP2-TU - Cover Profile (Shrouding) + Carrier Plate
- PHOENIX CONTACT - FBS - Plug-In Bridge
- PHOENIX CONTACT - PIT 2.5 - Through Terminals
- PHOENIX CONTACT - PIT 2.5-MT - Disconnect Terminals (Grey)
- PHOENIX CONTACT - PIT 2.5-TWIN-TG - Fuse / Disconnect Terminals
- PHOENIX CONTACT - PS-5 - Test Plug
- PHOENIX CONTACT - UIK16 - Cathodic Protection Probe Terminals
- PHOENIX CONTACT - UK6N + PSB4 -

Cathodic Protection Test Terminals + Test Socket

- PHOENIX CONTACT - TCP 'x' A + UK6FSI/C Miniature Thermal Circuit Breaker
- PHOENIX CONTACT - UBE - Group Marker Carrier



## DESIGNED FOR EASY INSTALLATION

## PANEL MOUNTED

(\%)

## switchboard accessories

Blue Point is a name synonymous with switchboard accessories in Australia.

Established in 1936, the company specialised in producing bakelite products before expanding into the area of switchboard accessories.

In 1947 Blue Point introduced a product that is today regarded as the generic term for all connectors, the BP1.

Purchased by Gerard Industries in 1973 to complement the Clipsal range of brass bars, connectors, terminal bars and neutral link bars, Blue Point Products is Australia's largest manufacturer of panel mounted accessories for domestic, commercial and industrial applications.


## AND TROUBLE FREE PERFORMANCE



Designed for easy installation, the Blue Point product range consists of active, neutral and earth link bars, single connectors, as well as blocks and strips, in a wide range of sizes for commercial and industrial switchboards.

Drilling and tapping are carried out using state-of-theart computerised equipment that ensures the highest quality products.

Blue Point has an excellent reputation for specialising in jobbing work where "one-off" special bars are required.

For further information on the Blue Point range, please contact your Clipsal Representative or the Blue Point Factory.

## HEAVY DUTY LINKS

BP165/7
500V 165A 7 Hole Link.


## BP165/7ETP

500V 165A 7 Hole Link with tin-plate link and screws. Two screws per tunnel. Black unbreakable, transparent polycarbonate base and cover.
Dimensions: $100 \times 43 \times 40 \mathrm{~mm}$. Terminal bar: $16 \times 16 \times 76 \mathrm{~mm}$. 2 tunnels: 9.5 mm diameter accommodate $50 \mathrm{~mm}^{2}$ cables. 1 tunnel: 8.0 mm diameter accommodates $35 \mathrm{~mm}^{2}$ cable. 2 tunnels: 7.1 mm diameter accommodate $25 \mathrm{~mm}^{2}$ cables. 2 tunnels: 5.5 mm diameter accommodate $16 \mathrm{~mm}^{2}$ cables. Mounting centres: $71 \times 29 \mathrm{~mm}$. Available in red.

## BP165/7BW

500V 165A 7 Hole Back Wiring Link.
2 terminal tunnels: 9.5 mm diameter accommodate $50 \mathrm{~mm}^{2}$ cable, have single screw connection.
5 remaining terminals have 2 screws per tunnel. See BP165/7 above. Temperature rating: $120^{\circ} \mathrm{C}$ maximum.

## BP165/13

500V 165A 13 Hole Link. Two screws per tunnel. Black unbreakable, transparent polycarbonate base and cover.
Dimensions: $120 \times 47 \times 52 \mathrm{~mm}$. Terminal Bar: $19 \times 16 \times 95.3 \mathrm{~mm}$. 2 tunnels: 9.5 mm diameter accommodate $50 \mathrm{~mm}^{2}$ cable. 5 tunnels: 6.4 mm diameter accommodate $16 \mathrm{~mm}^{2}$ cable. 6 tunnels: 4.8 mm diameter accommodate $10 \mathrm{~mm}^{2}$ cable. Mounting centres: $90 \times 34 \mathrm{~mm}$. Available in red.
Temperature rating: $125^{\circ} \mathrm{C}$ maximum.


## BP165/13ETP

Same as BP165/13 with electro tinplate link and screws.

## BP350/7

500V 7 Hole Link. Incoming cables clamped with single grub screw. Supplied with Allen key. Two screws per take off tunnel. Black base and cover.
Dimensions: $120 \times 47 \times 52 \mathrm{~mm}$. Terminal bar: $25.4 \times 19 \times 95.3 \mathrm{~mm}$. 2 tunnels: 15.0 mm diameter accommodate $120 \mathrm{~mm}^{2}$ cables. 2 tunnels: 9.5 mm diameter accommodate $50 \mathrm{~mm}^{2}$ cables. 2 tunnels: 8.0 mm diameter accommodate $35 \mathrm{~mm}^{2}$ cables. 1 tunnel: 5.5 mm diameter accommodates $16 \mathrm{~mm}^{2}$ cables. Mounting centres: $90 \times 34 \mathrm{~mm}$. Available in red.
Temperature rating $125^{\circ} \mathrm{C}$ maximum.


## BP350/7ETP

Same as BP350/7 with electro tinplate link and screws.

## BP350/13

500V 13 Hole Link. Incoming cables clamped with single grub screw. Supplied with Allen key. Two screws per take off tunnel. Black unbreakable, transparent polycarbonate base and cover.
Dimensions: $120 \times 47 \times 52 \mathrm{~mm}$. Terminal bar: $25.4 \times 19 \times 95.3 \mathrm{~mm}$. 2 tunnels: 15.0 mm diameter accommodate $120 \mathrm{~mm}^{2}$ cables. 1 tunnel: 8.0 mm diameter accommodates $35 \mathrm{~mm}^{2}$ cable. 8 tunnels: 5.5 mm diameter accommodate $16 \mathrm{~mm}^{2}$ cable. 2 tunnels: 4.8 mm diameter accommodate $10 \mathrm{~mm}^{2}$.
Mounting centres: $90 \times 34 \mathrm{~mm}$. Available in red.
Temperature rating: $125^{\circ} \mathrm{C}$ maximum.


## BP350/13ETP

Same as BP350/13 with electro tin-plate link and screws.

## CLIPSAL

## NEUTRAL / ACTIVE / METER

LINKS

Clipsal Links are produced from Impact Resistant materials to prevent cracking in transit or during installation.

The transparent covers enable you to check wiring and locate the sealing screw at a glance. The sealing screw (nylon with brass insert) resists stripping. Voltage and amperage ratings are clearly marked on both the cover and brass bar.

All links are available with black or red covers and bases for neutral, active or meter applications as required by local authorities.

## T-Type - 500 Volt 140 <br> Ampere

## L4T35

500V 140A 4 Hole Neutral Link with two screws per tunnel. Black base and cover.

## L4T35R

500V 140A 4 Hole Active Link. Red base and cover.
Dimensions: $65 \times 46 \times 43 \mathrm{~mm}$ Mounting centres: 28 mm . 1 tunnel 8.7 mm diameter accommodate $1 \times 25 \mathrm{~mm}^{2}$ cable.
3 tunnels 7.7 mm diameter accommodate $1 \times 25 \mathrm{~mm}^{2}$ cable. Certificate of Suitability No. CS2252N.


## Mini Links with Cover

 500V 100A2 screws per tunnel.

## L5

500V 100A 5 Hole Neutral Link with two screws per tunnel. Black base and cover.

## L5R

500 V 100A 5 Hole Active Link. Red base and cover.
Dimensions: $65 \times 46 \times 43 \mathrm{~mm}$. Mounting centres: 46 mm . 3 tunnels, 6.3 mm diameter accommodate $1 \times 16 \mathrm{~mm}^{2}$. 2 tunnels, 5.8 mm diameter accommodate $1 \times 16 \mathrm{~mm}^{2}$.

## L5BW

500V 110A 5 Hole Back Wiring Neutral Link with two screws per tunnel. Black base and cover.

## L5BWR

500V 110A 5 Hole Back Wiring Active Link. Red base and cover.
Dimensions: $65 \times 46 \times 43 \mathrm{~mm}$. Mounting centres: 46 mm . 5 tunnels, 7 mm diameter accommodate $1 \times 25 \mathrm{~mm}^{2}$. Transparent black cover, with cut outs.

## L6

500V 100A 6 Hole Neutral Link with two screws per tunnel. Black base and cover.

## L6R

500 V 100A 6 Hole Active Link. Red base and cover.

Dimensions: $65 \times 46 \times 43 \mathrm{~mm}$. Mounting centres: 46 mm . 3 tunnels, 6.3 mm diameter accommodate $1 \times 16 \mathrm{~mm}^{2}$ cable. 3 tunnels, 5.8 mm diameter accommodate $1 \times 16 \mathrm{~mm}^{2}$ cable.

## L6/25

500V 110A 6 Hole Neutral Link with 2 screws per tunnel. Black base and cover.

## L6/25R

500V 110A 6 Hole Active Link. Red base and cover.

Dimensions: $65 \times 46 \times 43 \mathrm{~mm}$. Mounting centres: 46 mm . 2 tunnels, 7.5 mm diameter accommodate $2 \times 25 \mathrm{~mm}^{2}$ cable. 1 tunnel, 5.5 mm diameter accommodates $1 \times 16 \mathrm{~mm}^{2}$ cable. 3 tunnels, 4.7 mm diameter accommodate $3 \times 10 \mathrm{~mm}^{2}$ cable. Transparent black cover with cut-outs.

## L7

500V 100A 7 Hole Neutral Link with two screws per tunnel. Black base and cover.


## Mini Links Less Cover

500V 100A
Mounting centres: 46 mm .

## L5A

5 Hole - two screws per tunnel.
Black base.


## L6A

6 Hole - two screws per tunnel.
Black base.

## L6RA

6 Hole - two screws per tunnel. Red base.

## L7A

7 Hole - two screws per tunnel.
Black base.
Overall dimensions: $57 \times 30 \times 26 \mathrm{~mm}$.
Mounting centres: 46 mm .
Tunnel and cable detail same as L5 to L7 Series Covered Links.

## Standard Links Less Cover

500V 100A
Mounting centres: 59-67mm.

## L8A

8 Hole - two screws per tunnel.


L10A
10 Hole - two screws per tunnel.

## L12A

12 Hole - two screws per tunnel.

## L14A

14 Hole - two screws per tunnel.

## L16A

16 Hole - two screws in 6 tunnels, and one screw in 10 tunnels.

## L18A

18 Hole - two screws per tunnel in 6 tunnels, and one screw in 12 tunnels.
Overall dimensions: $80 \times 32 \times 22 \mathrm{~mm}$.
Mounting centres: 59-67mm.
Tunnel and cable detail same as L8 to L18 Series Covered Links.
All link bases are black.

Brass Link Bars
500V 100A

## L5P

5 Hole - two screws per tunnel.
Length 41 mm .

## L6P

6 Hole - two screws per tunnel.
Length 48 mm .

## L8P

8 Hole - two screws per tunnel. Length 61 mm .


## L10P

10 Hole - two screws per tunnel. Length 75 mm .

## L12P

12 Hole - two screws per tunnel. Length 80 mm .
Brass bar section: $13 \times 10 \mathrm{~mm}$. Tunnel and cable detail same as L5 to L12 Series Covered Links.

## L14P

14 Hole - two screws in 8 tunnels and one screw in 6 tunnels.


## L16P

16 Hole - two screws in 6 tunnels and one screw in 10 tunnels.

## L18P

18 Hole - two screws in 6 tunnels and one screw in 12 tunnels.
Brass bar section: $19 \times 10 \mathrm{~mm}$ tunnel. Cable detail same as L14 and L18 Series Covered Links.

## L7P

7 Hole - two screws per tunnel.
Length 54 mm .

Buzzers - IP44

| Part No. | Type | Dia. | dB |
| :--- | :--- | :--- | :---: |
| BZ22R12AC/DC | Flashing-Red | 22 mm | 80 |
| BZ22R24AC/DC | Flashing-Red | 22 mm | 80 |
| BZ22R240 | Flashing-Red | 22 mm | 80 |
| BZ30DC24 | Flush | 30 mm | 75 |
| BZ30AC24 | Flush | 30 mm | 75 |
| BZ30AC110 | Flush | 30 mm | 75 |
| BZ30AC240 | Flush | 30 mm | 75 |
| BZ80DC24 | Flush | 80 mm | 85 |
| BZ80AC24 | Flush | 80 mm | 85 |
| BZ80AC240 | Flush | 80 mm | 85 |
| BZ82AC12 | Surface | 82 mm | 85 |
| BZ82DC12 | Surface | 82 mm | 85 |
| BZ82DC24 | Surface | 82 mm | 85 |
| BZ82AC24 | Surface | 82 mm | 85 |
| BZ82AC240 | Surface | 82 mm | 85 |


| SCZDC24 | Siren | 100 mm | 105 |
| :--- | :--- | ---: | :--- |
| TCZAC230 | Siren | 75 mm | 105 |
| TSDAC220 | Siren | 123 mm | 120 |
| TCZDC24 | Hooter | 135 mm | 105 |
| TCZAC240 | Hooter | 135 mm | 105 |

## Earth \& Neutral Bars - 165 Amp \& 250 Amp

- Earth Links = 2 Main Screws for - 2 Screws per Tunnel for 16mm Cable.

165 Amp Bars

| No. of Holes | Part No. |
| :--- | :--- |
| 6 | 165E6 |
| 12 | 165E12 |
| 18 | 165E18 |
| 24 | 165E24 |
| 30 | 165E30 |
| 36 | 165E36 |
| 42 | 165E42 |
| 48 | 165E48 |
| 54 | 165E54 |
| 60 | 165E60 |
| 72 | 165E72 |
| 80 | 165E80 |
| 84 | 165E84 |
| 96 | 165E96 |
| 108 | 165E108 |

## Mounting Feet

E/NFEET

250 Amp Bars

| Part No. |
| :--- |
|  |
|  |
| 250 E 24 |
| 250 E 36 |
| 250 E 48 |
| 250 E 60 |
| 250 E 72 |
| 250 E 84 |
| 250 E 96 |



165E24


250E24

## 

## Extract from the online catalog

## AP 2-TU

Order No.: 5022630
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=5022630


Cover profile carrier for mounting on NS 32 or NS 35/7,5 DIN rail for attaching the cover profile AP 2.2 mm thick

| Commercial data |  |
| :--- | :--- |
| EAN | 4017918095239 |
| Pack | 50 pcs. |
| Customs tariff | 39169010 |
| Weight/Piece | 0.005823 KG |
| Catalog page information | Page 703 (CL-2009) |

## Product notes

WEEE/RoHS-compliant since: 01/01/2003

## http://

www.download.phoenixcontact.com Please note that the data given here has been taken from the online catalog. For comprehensive information and data, please refer to the user documentation. The General Terms and Conditions of Use apply to Internet downloads.

## Technical data

## General

| Length (b) | 55.6 mm |
| :--- | :--- |
| Height | 68.5 mm |

[^17]AP 2-TU Order No.: 5022630
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=5022630

| Width (a) | 2.1 mm |
| :--- | :--- |
| Color | gray |
| Inflammability class acc. to UL 94 | V2 |
| Material | PA |

## Diagrams/Drawings

Dimensioned drawing


## RPCocindix

## Extract from the online catalog

## FBS 20-5

Order No.: 3030226
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3030226

Cross connector/bridge, Number of positions: 20, Color: red

|  |  | Product notes |
| :---: | :---: | :---: |
| Commercial data |  | WEEE/RoHS-compliant since: $01 / 01 / 2003$ |
| EAN | 4017918188559 | [89\% |
| Pack | 10 pcs. |  |
| Customs tariff | 85389099 |  |
| Weight/Piece | 0.01779 KG |  |
| Catalog page information | Page 330 (CL-2009) | http:// <br> www.download.phoenixcontact.com Please note that the data given here has been taken from the online catalog. For comprehensive information and data, please refer to the user documentation. The General Terms and Conditions of Use apply to Internet downloads. |
|  |  |  |

## RPPucind

## Extract from the online catalog

## PIT 2,5

Order No.: 3209510
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3209510

Feed-through modular terminal block, Type of connection: Leg spring connection, Leg spring connection, Cross section: $0.14 \mathrm{~mm}^{2}-4$ $\mathrm{mm}^{2}$, A $\quad-12$, Width: 5.2 mm , Color: gray, Mounting type: NS 35/7,5, NS 35/15

| Commercial data |  |
| :--- | :--- |
| EAN | 4046356329781 |
| Electrical Number | 1264906 |
| Pack | 50 |
| Customs tariff | 85369010 |
| country of origin | DE |
| Catalog page information | Page 180 (CL-2009) |



## http://

www.download.phoenixcontact.com Please note that the data given here has been taken from the online catalog. For comprehensive information and data, please refer to the user documentation. The General Terms and Conditions of Use apply to Internet downloads.

## Technical data

General

| Number of levels | 1 |
| :--- | :--- |
| Number of connections | 2 |
| Color | gray |

PIT 2,5 Order No.: 3209510
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3209510

| Insulating material | PA |
| :---: | :---: |
| Inflammability class acc. to UL 94 | Vo |
| Dimensions |  |
| Width | 5.2 mm |
| Length | 48.5 mm |
| Height NS 35/7,5 | 36.5 mm |
| Height NS 35/15 | 44 mm |
| Technical data |  |
| Rated surge voltage | 8 kV |
| Surge voltage category | III |
| Insulating material group | I |
| Connection in acc. with standard | IEC 60947-7-1 |
| Nominal current $I_{N}$ | 24 A (For $2.5 \mathrm{~mm}^{2}$ ) |
| Nominal voltage $U_{N}$ | 800 V |
| Open side panel | ja |
| Connection data |  |
| Conductor cross section solid min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section solid max. | $4 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded max. | $2.5 \mathrm{~mm}^{2}$ |
| Conductor cross section AWG/kcmil min. | 26 |
| Conductor cross section AWG/kcmil max | 12 |
| Conductor cross section stranded, with ferrule without plastic sleeve min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule without plastic sleeve max. | $2.5 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule with plastic sleeve min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule with plastic sleeve max. | $2.5 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max. | $0.5 \mathrm{~mm}^{2}$ |
| Type of connection | Leg spring connection |
| Stripping length | 10 mm |
| Internal cylindrical gage | A3 |

PIT 2,5 Order No.: 3209510
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3209510

## Certificates / Approvals

| Certification |  | CUL, UL |
| :---: | :---: | :---: |
| CSA |  |  |
| Nominal voltage $\mathrm{U}_{\mathrm{N}}$ |  | 600 V |
| Nominal current $I_{N}$ |  | 20 A |
| AWG/kcmil |  | 24-12 |
| CUL |  |  |
| Nominal voltage $\mathrm{U}_{\mathrm{N}}$ |  | 600 V |
| Nominal current $\mathrm{I}_{\mathrm{N}}$ |  | 20 A |
| AWG/kcmil |  | 24-12 |
| UL |  |  |
| Nominal voltage $\mathrm{U}_{\mathrm{N}}$ |  | 600 V |
| Nominal current $\mathrm{I}_{\mathrm{N}}$ |  | 20 A |
| AWG/kcmil |  | 24-12 |
| Accessories |  |  |
| Item | Designation | Description |
| Assembly |  |  |
| 3030721 | ATP-ST 4 | Partition plate, Length: 61 mm , Width: 2 mm , Height: 42 mm , Color: gray |
| 3022276 | CLIPFIX 35-5 | Snap-on end bracket, for NS $35 / 7.5$ or NS $35 / 15$ DIN rail, can be fitted with Zack strip ZB 5 and ZBF 5, terminal strip marker KLM 2 and KLM, parking facility for FBS...5, FBS...6, KSS 5 , KSS 6 , width: $5,15 \mathrm{~mm}$, color: gray |
| 3036725 | DP PS-5 | Spacer plate, Color: red |
| 3030417 | D-ST 2,5 |  Color: gray |
| 0801704 | NS 35/ 7,5 AL UTEN HULL 2M | DIN rail, material: Aluminum, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 0801762 | NS 35/ 7,5 CU UTEN HULL 2M | DIN rail, material: Copper, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1208131 | NS 35/ 7,5 HULLET/... | DIN rail, Color: silver |

PIT 2,5 Order No.: 3209510
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3209510

| 1207640 | NS 35/ 7,5 HULLET 755MM | NS 35 DIN rail, height 7.5 mm , length 755 mm |
| :---: | :---: | :---: |
| 1207666 | NS 35/ 7,5 HULLET 1155MM | NS 35 DIN rail, height 7.5 mm , length 1155 mm |
| 0801733 | NS 35/ 7,5 HULLET 2M | DIN rail, material: Steel, galvanized and passivated with a thick layer, perforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1207653 | NS 35/ 7,5 HULLET 955MM | NS35 DIN rail, height 7.5 mm , length 955 mm |
| 1208115 | NS 35/ 7,5 UTEN HULL/... | DIN rail, Color: silver |
| 0801681 | NS 35/ 7,5 UTEN HULL 2M | DIN rail, material: Steel, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1208128 | NS 35/ 7,5 UTEN HULL/SO/... | DIN rail, Color: silver |
| 0801377 | NS 35/ 7,5 V2A UTEN HULL 2M | DIN rail, Width: 35 mm , Height: 7.5 mm , Length: 2000 mm , Color: silver |
| 1206421 | NS 35/ 7,5 ZN HULLET 2M | DIN rail, material: Galvanized, perforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1206434 | NS 35/ 7,5 ZN UTEN HULL 2M | DIN rail, material: Galvanized, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1201895 | NS 35/15 CU UTEN HULL 2M | DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm, width 35 mm , length: 2 m |
| 1201730 | NS 35/15 HULLET 2M | DIN rail, material: Steel, perforated, height 15 mm , width 35 mm , length: 2 m |
| 1208144 | NS 35/15 UTEN HULL/... | DIN rail, Color: silver |
| 1201714 | NS 35/15 UTEN HULL 2M | DIN rail, material: Steel, unperforated, height 15 mm , width 35 mm , length: 2 m |
| 1208157 | NS 35/15 UTEN HULL/SO/... | DIN rail, Color: silver |
| 1206586 | NS 35/15 ZN UTEN HULL 2M | DIN rail, material: Galvanized, unperforated, height 15 mm , width 35 mm , length: 2 m |
| 3038943 | RB ST (2,5/4)-1,5 | Reducing bridge, Number of positions: 2 , Color: red |

Bridges

| 3030161 | FBS 2-5 | Plug-in bridge, Number of positions: 2, Color: red |
| :--- | :--- | :--- |
| 3030174 | FBS 3-5 | Plug-in bridge, Number of positions: 3, Color: red |
| 3030187 | FBS 4-5 | Plug-in bridge, Number of positions: 4, Color: red |
| 3030190 | FBS 5-5 | Plug-in bridge, Number of positions: 5, Color: red |
| 3030213 | FBS 10-5 | Plug-in bridge, Number of positions: 10, Color: red |
| 3030226 | FBS 20-5 | Plug-in bridge, Number of positions: 20, Color: red |
| 3038930 | FBS 50-5 | Plug-in bridge, Number of positions: 50, Color: red |
| General |  |  |
| 0810588 | GBS 5-25X12 | Group marker label, snaps onto terminal center for screw, spring- <br> cage and quick connection terminal blocks, labeled with a 25 x 12 <br> mm label or manually with the B-STIFT, in the foot part with ZB 5 |

PIT 2,5 Order No.: 3209510
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3209510

| 0809298 | GBS-ZB/26X6 | Group marking label, snaps onto terminal center for screw, springcage and quick connection terminal blocks, labeled with ESL $26 \times 6 \mathrm{~mm}$ or EST $25 \times 6 \mathrm{~mm}$, in the foot part with Zack marker strip, length: 29 mm |
| :---: | :---: | :---: |
| Marking |  |  |
| 0818108 | UC-TM 5 | UniCard sheets, for labeling terminal blocks using Zack marker strip groove,96-section, labeling with BLUEMARK X1 and CMS-P1-PLOTTER, color: White |
| 0824581 | UC-TM 5 CUS | UniCard sheets, for labeling terminal blocks with a zack marker strip groove, can be printed as per customer requirements |
| 0819796 | UC-TMF 5L | UniCard sheets, for labeling terminal blocks using a flat Zack marker strip groove, 192-section, can be labeled with CMS-P1PLOTTER, color: White |
| Plug/Adapter |  |  |
| 3002843 | ISH 2,5/0,2 | Insulation stop sleeve, Color: white |
| 3002856 | ISH 2,5/0,5 | Insulation stop sleeve, Color: gray |
| 3002869 | ISH 2,5/1,0 | Insulation stop sleeve, Color: black |
| 0201731 | MPS-IH BK | Insulating sleeve, Color: black |
| 0201689 | MPS-IH BU | Insulating sleeve, Color: blue |
| 0201702 | MPS-IH GN | Insulating sleeve, Color: green |
| 0201728 | MPS-IH GY | Insulating sleeve, Color: gray |
| 0201676 | MPS-IH RD | Insulating sleeve, Color: red |
| 0201715 | MPS-IH VT | Insulating sleeve, Color: violet |
| 0201663 | MPS-IH WH | Insulating sleeve, Color: white |
| 0201692 | MPS-IH YE | Insulating sleeve, Color: yellow |
| 0201744 | MPS-MT | Metal part |
| 3030925 | PAI-4 | Test adapter, Color: gray |
| 3030983 | PS-5 | Test adapter, Color: red |
| Tools |  |  |
| 1204517 | SZF 1-0,6X3,5 | Screwdriver, blade: $0.6 \times 3.5 \times 100 \mathrm{~mm}$, length 180 mm |
| Diagrams/Drawings |  |  |
| Circuit diagram |  |  |



## 

## Extract from the online catalog

## PIT 2,5-MT

Order No.: 3210156

http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210156

Disconnect and test disconnect terminal block, Connection type: Leg spring connection, Cross section: $0.14 \mathrm{~mm}^{2}-4 \mathrm{~mm}^{2}$, AWG: $26-12$, Nominal current: 20 A, Nominal voltage: 400 V, Length: 62 mm , Width: 5.2 mm, Color: gray, Assembly: NS 35/7,5, NS 35/15

| Commercial data |  |
| :--- | :--- |
| EAN | 4046356333597 |
| Electrical Number | 1264914 |
| Pack | 50 |
| Customs tariff | 85369010 |
| countr | PL |
| Catalog page information | Page 192 (CL-2009) |



## http://

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## Technical data

General

| Number of levels | 1 |
| :--- | :--- |
| Number of connections | 2 |
| Color | gray |

PIT 2,5-MT Order No.: 3210156
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210156

| Insulating material | PA |
| :---: | :---: |
| Inflammability class acc. to UL 94 | Vo |
| Dimensions |  |
| Width | 5.2 mm |
| Length | 62 mm |
| Height NS 35/7,5 | 36.5 mm |
| Height NS 35/15 | 44 mm |
| Technical data |  |
| Rated surge voltage | 6 kV |
| Pollution degree | 3 |
| Surge voltage category | III |
| Insulating material group | 1 |
| Connection in acc. with standard | IEC 60947-7-1 |
| Nominal current $\mathrm{I}_{\mathrm{N}}$ | 20 A (the maximum load current must not be exceeded by the total current of all connected conductors) |
| Nominal voltage $\mathrm{U}_{\mathrm{N}}$ | 400 V |
| Open side panel | ja |
| Connection data |  |
| Conductor cross section solid min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section solid max. | $4 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded max. | $2.5 \mathrm{~mm}^{2}$ |
| Conductor cross section AWG/kcmil min. | 26 |
| Conductor cross section AWG/kcmil max | 12 |
| Conductor cross section stranded, with ferrule without plastic sleeve min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule without plastic sleeve max. | $2.5 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule with plastic sleeve min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule with plastic sleeve max. | $2.5 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max. | $0.5 \mathrm{~mm}^{2}$ |
| Type of connection | Leg spring connection |
| Stripping length | 10 mm |

PIT 2,5-MT Order No.: 3210156
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210156

| Internal cylindrical gage | A3 |
| :--- | :--- |

## Certificates / Approvals

## (61)

Certification
GL

CUL

| Nominal voltage $U_{N}$ | 300 V |
| :--- | :--- |
| Nominal current $\mathrm{I}_{\mathrm{N}}$ | 20 A |
| AWG/kcmil | $24-12$ |

UL

| Nominal voltage $U_{N}$ | 300 V |
| :--- | :--- |
| Nominal current $I_{N}$ | 20 A |
| AWG/kcmil | $24-12$ |

## Accessories

Item Designation Description

| Assembly |  |  |
| :---: | :---: | :---: |
| 3030789 | A -ST-TWIN | Partition plate, Length: 76.6 mm , Width: 2 mm , Height: 45 mm , Color: gray |
| 3022276 | CLIPFIX 35-5 | Snap-on end bracket, for NS 35/7.5 or NS 35/15 DIN rail, can be fitted with Zack strip ZB 5 and ZBF 5, terminal strip marker KLM 2 and KLM, parking facility for FBS...5, FBS...6, KSS 5, KSS 6, width: $5,15 \mathrm{~mm}$, color: gray |
| 3036725 | DP PS-5 | Spacer plate, Color: red |
| 3036602 | DS-ST 2,5 | Cover segment, Length: 72 mm , Height: 36.5 mm , Color: gray |
| 0801704 | NS 35/ 7,5 AL UTEN HULL 2M | DIN rail, material: Aluminum, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 0801762 | NS 35/ 7,5 CU UTEN HULL 2M | DIN rail, material: Copper, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1208131 | NS 35/ 7,5 HULLET/... | DIN rail, Color: silver |
| 1207640 | NS 35/ 7,5 HULLET 755MM | NS 35 DIN rail, height 7.5 mm , length 755 mm |
| 1207666 | NS 35/ 7,5 HULLET 1155MM | NS 35 DIN rail, height 7.5 mm , length 1155 mm |
| 0801733 | NS 35/ 7,5 HULLET 2M | DIN rail, material: Steel, galvanized and passivated with a thick layer, perforated, height 7.5 mm , width 35 mm , length: 2 m |

PIT 2,5-MT Order No.: 3210156
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210156

| 1207653 | NS 35/ 7,5 HULLET 955MM | NS35 DIN rail, height 7.5 mm , length 955 mm |
| :---: | :---: | :---: |
| 1208115 | NS 35/ 7,5 UTEN HULL/... | DIN rail, Color: silver |
| 0801681 | NS 35/ 7,5 UTEN HULL 2M | DIN rail, material: Steel, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1208128 | NS 35/ 7,5 UTEN HULL/SO/... | DIN rail, Color: silver |
| 0801377 | NS 35/ 7,5 V2A UTEN HULL 2M | DIN rail, Width: 35 mm, Height: 7.5 mm, Length: 2000 mm, Color: silver |
| 1206421 | NS 35/ 7,5 ZN HULLET 2M | DIN rail, material: Galvanized, perforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1206434 | NS 35/ 7,5 ZN UTEN HULL 2M | DIN rail, material: Galvanized, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1201895 | NS 35/15 CU UTEN HULL 2M | DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm , width 35 mm , length: 2 m |
| 1201730 | NS 35/15 HULLET 2M | DIN rail, material: Steel, perforated, height 15 mm , width 35 mm , length: 2 m |
| 1208144 | NS 35/15 UTEN HULL/... | DIN rail, Color: silver |
| 1201714 | NS 35/15 UTEN HULL 2M | DIN rail, material: Steel, unperforated, height 15 mm , width 35 mm , length: 2 m |
| 1208157 | NS 35/15 UTEN HULL/SO/... | DIN rail, Color: silver |
| 1206586 | NS 35/15 ZN UTEN HULL 2M | DIN rail, material: Galvanized, unperforated, height 15 mm , width 35 mm , length: 2 m |
| 3038943 | RB ST (2,5/4)-1,5 | Reducing bridge, Number of positions: 2, Color: red |
| Bridges |  |  |
| 3030161 | FBS 2-5 | Plug-in bridge, Number of positions: 2, Color: red |
| 3030174 | FBS 3-5 | Plug-in bridge, Number of positions: 3, Color: red |
| 3030187 | FBS 4-5 | Plug-in bridge, Number of positions: 4, Color: red |
| 3030190 | FBS 5-5 | Plug-in bridge, Number of positions: 5, Color: red |
| 3030213 | FBS 10-5 | Plug-in bridge, Number of positions: 10, Color: red |
| 3030226 | FBS 20-5 | Plug-in bridge, Number of positions: 20, Color: red |
| 3038930 | FBS 50-5 | Plug-in bridge, Number of positions: 50, Color: red |

General

| 3211003 | D-PIT 2,5-MT | Cover, Length: 62 mm, Width: 2.2 mm, Color: gray |
| :--- | :--- | :--- |
| 0810588 | GBS 5-25X12 | Group marker label, snaps onto terminal center for screw, spring- <br> cage and quick connection terminal blocks, labeled with a 25 $\times 12$ <br> mm label or manually with the B-STIFT, in the foot part with ZB 5 |
| 0809298 | GBS-ZB/26X6 | Group marking label, snaps onto terminal center for screw, spring- <br> cage and quick connection terminal blocks, labeled with ESL <br> $26 \times 6 \mathrm{~mm}$ or EST $25 \times 6 \mathrm{~mm}$, in the foot part with Zack marker strip, <br> length: 29 mm |

PIT 2,5-MT Order No.: 3210156
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210156

| Marking |  |  |
| :--- | :--- | :--- |
| 3037643 | STP 5-2-ZB | Double marker carrier, snaps onto the spring-cage terminal blocks <br> ST 2.5..., labeled with ZB 5 or ZBF 5 |
| 0818108 | UC-TM 5 | UniCard sheets, for labeling terminal blocks using Zack marker <br> strip groove,96-section, labeling with BLUEMARK X1 and CMS- <br> P1-PLOTTER, color: White |
| 0824581 | UC-TM 5 CUS | UniCard sheets, for labeling terminal blocks with a zack marker <br> strip groove, can be printed as per customer requirements |
| 0819796 | UC-TMF 5L | UniCard sheets, for labeling terminal blocks using a flat Zack <br> marker strip groove, 192-section, can be labeled with CMS-P1- <br> PLOTTER, color: White |

Plug/Adapter

| 3002843 | ISH 2,5/0,2 | Insulation stop sleeve, Color: white |
| :--- | :--- | :--- |
| 3002856 | ISH 2,5/0,5 | Insulation stop sleeve, Color: gray |
| 3002869 | ISH 2,5/1,0 | Insulation stop sleeve, Color: black |
| 0201731 | MPS-IH BK | Insulating sleeve, Color: black |
| 0201689 | MPS-IH BU | Insulating sleeve, Color: blue |
| 0201702 | MPS-IH GN | Insulating sleeve, Color: green |
| 0201728 | MPS-IH GY | Insulating sleeve, Color: gray |
| 0201676 | MPS-IH RD | Insulating sleeve, Color: red |
| 0201715 | MPS-IH VT | Insulating sleeve, Color: violet |
| 0201663 | MPS-IH WH | Insulating sleeve, Color: white |
| 0201692 | MPS-IH YE | Insulating sleeve, Color: yellow |
| 0201744 | MPS-MT | Metal part |
| 3030925 | PAI-4 | Test adapter, Color: gray |
| 3030983 | PS-5 | Test adapter, Color: red |
| Tools |  |  |
| 1204517 | SZF 1-0,6X3,5 | Screwdriver, blade: $0.6 \times 3.5 \times 100 \mathrm{~mm}$, length 180 mm |

## Diagrams/Drawings

Circuit diagram


# RPRHCNITM 

## Extract from the online catalog

## PIT 2,5-TG

Order No.: 3210185

http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210185

Disconnect terminal block, Connection type: Leg spring connection,
Cross section: $0.14 \mathrm{~mm}^{2}-4 \mathrm{~mm}^{2}$, AWG: $26-12$, Nominal current: 20
A, Nominal voltage: 400 V , Length: 62 mm , Width: 5.2 mm ,
Color: gray, Assembly: NS 35/7,5, NS 35/15

| Commercial data |  |
| :--- | :--- |
| EAN | 4046356333566 |
| Electrical Number | 1264928 |
| Pack | 50 |
| Customs tariff | 85369010 |
| countr | PL |
| Catalog page information | Page 194 (CL-2009) |



## http://

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## Technical data

General

| Number of levels | 1 |
| :--- | :--- |
| Number of connections | 2 |
| Color | gray |

PIT 2,5-TG Order No.: 3210185
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210185

| Insulating material | PA |
| :---: | :---: |
| Inflammability class acc. to UL 94 | Vo |
| Dimensions |  |
| Width | 5.2 mm |
| Length | 62 mm |
| Height NS 35/7,5 | 36.5 mm |
| Height NS 35/15 | 44 mm |
| Technical data |  |
| Rated surge voltage | 6 kV |
| Pollution degree | 3 |
| Surge voltage category | III |
| Insulating material group | 1 |
| Connection in acc. with standard | IEC 60947-7-1 |
| Nominal current $\mathrm{I}_{N}$ | 20 A (the maximum load current must not be exceeded by the total current of all connected conductors) |
| Nominal voltage $\mathrm{U}_{\mathrm{N}}$ | 400 V () |
| Open side panel | ja |
| Connection data |  |
| Conductor cross section solid min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section solid max. | $4 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded max. | $2.5 \mathrm{~mm}^{2}$ |
| Conductor cross section AWG/kcmil min. | 26 |
| Conductor cross section AWG/kcmil max | 12 |
| Conductor cross section stranded, with ferrule without plastic sleeve min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule without plastic sleeve max. | $2.5 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule with plastic sleeve min. | $0.14 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule with plastic sleeve max. | $2.5 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max. | $0.5 \mathrm{~mm}^{2}$ |
| Type of connection | Leg spring connection |
| Stripping length | 10 mm |

PIT 2,5-TG Order No.: 3210185
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210185

| Internal cylindrical gage | A3 |
| :--- | :--- |

## Certificates / Approvals

## (61)

Certification
GL

CUL

| Nominal voltage $U_{N}$ | 300 V |
| :--- | :--- |
| Nominal current $\mathrm{I}_{\mathrm{N}}$ | 20 A |
| AWG/kcmil | $24-12$ |

UL

| Nominal voltage $U_{N}$ | 300 V |
| :--- | :--- |
| Nominal current $\mathrm{I}_{\mathrm{N}}$ | 20 A |
| AWG/kcmil | $24-12$ |

## Accessories

Item Designation Description

| Assembly |  |  |
| :--- | :--- | :--- |
| 3030789 | ATP-ST-TWIN | Partition plate, Length: 76.6 mm , Width: 2 mm , Height: 45 mm, <br> Color: gray |
| 3022276 | CLIPFIX 35-5 | Snap-on end bracket, for NS $35 / 7.5$ or NS $35 / 15$ DIN rail, can be <br> fitted with Zack strip ZB 5 and ZBF 5, terminal strip marker KLM <br> 2 and KLM, parking facility for FBS...5, FBS...6, KSS 5, KSS 6, <br> width: $5,15 \mathrm{~mm}$, color: gray |
| 3036725 | DP PS-5 | Spacer plate, Color: red |

PIT 2,5-TG Order No.: 3210185
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210185

| 1207653 | NS 35/ 7,5 HULLET 955MM | NS35 DIN rail, height 7.5 mm , length 955 mm |
| :---: | :---: | :---: |
| 1208115 | NS 35/ 7,5 UTEN HULL/... | DIN rail, Color: silver |
| 0801681 | NS 35/ 7,5 UTEN HULL 2M | DIN rail, material: Steel, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1208128 | NS 35/ 7,5 UTEN HULL/SO/... | DIN rail, Color: silver |
| 0801377 | NS 35/ 7,5 V2A UTEN HULL 2M | DIN rail, Width: 35 mm, Height: 7.5 mm, Length: 2000 mm, Color: silver |
| 1206421 | NS 35/ 7,5 ZN HULLET 2M | DIN rail, material: Galvanized, perforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1206434 | NS 35/ 7,5 ZN UTEN HULL 2M | DIN rail, material: Galvanized, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1201895 | NS 35/15 CU UTEN HULL 2M | DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm , width 35 mm , length: 2 m |
| 1201730 | NS 35/15 HULLET 2M | DIN rail, material: Steel, perforated, height 15 mm , width 35 mm , length: 2 m |
| 1208144 | NS 35/15 UTEN HULL/... | DIN rail, Color: silver |
| 1201714 | NS 35/15 UTEN HULL 2M | DIN rail, material: Steel, unperforated, height 15 mm , width 35 mm , length: 2 m |
| 1208157 | NS 35/15 UTEN HULL/SO/... | DIN rail, Color: silver |
| 1206586 | NS 35/15 ZN UTEN HULL 2M | DIN rail, material: Galvanized, unperforated, height 15 mm , width 35 mm , length: 2 m |
| 3038943 | RB ST (2,5/4)-1,5 | Reducing bridge, Number of positions: 2, Color: red |
| Bridges |  |  |
| 3030161 | FBS 2-5 | Plug-in bridge, Number of positions: 2, Color: red |
| 3030174 | FBS 3-5 | Plug-in bridge, Number of positions: 3, Color: red |
| 3030187 | FBS 4-5 | Plug-in bridge, Number of positions: 4, Color: red |
| 3030190 | FBS 5-5 | Plug-in bridge, Number of positions: 5, Color: red |
| 3030213 | FBS 10-5 | Plug-in bridge, Number of positions: 10, Color: red |
| 3030226 | FBS 20-5 | Plug-in bridge, Number of positions: 20, Color: red |
| 3038930 | FBS 50-5 | Plug-in bridge, Number of positions: 50, Color: red |

General

| 3211003 | D-PIT 2,5-MT | Cover, Length: 62 mm, Width: 2.2 mm, Color: gray |
| :--- | :--- | :--- |
| 0810588 | GBS 5-25X12 | Group marker label, snaps onto terminal center for screw, spring- <br> cage and quick connection terminal blocks, labeled with a 25 $\times 12$ <br> mm label or manually with the B-STIFT, in the foot part with ZB 5 |
| 0809298 | GBS-ZB/26X6 | Group marking label, snaps onto terminal center for screw, spring- <br> cage and quick connection terminal blocks, labeled with ESL <br> $26 \times 6 \mathrm{~mm}$ or EST $25 \times 6 \mathrm{~mm}$, in the foot part with Zack marker strip, <br> length: 29 mm |

PIT 2,5-TG Order No.: 3210185
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210185

| Marking |  |  |
| :--- | :--- | :--- |
| 3037643 | STP 5-2-ZB | Double marker carrier, snaps onto the spring-cage terminal blocks <br> ST 2.5..., labeled with ZB 5 or ZBF 5 |
| 0818108 | UC-TM 5 | UniCard sheets, for labeling terminal blocks using Zack marker <br> strip groove,96-section, labeling with BLUEMARK X1 and CMS- <br> P1-PLOTTER, color: White |
| 0824581 | UC-TM 5 CUS | UniCard sheets, for labeling terminal blocks with a zack marker <br> strip groove, can be printed as per customer requirements |
| 0819796 | UC-TMF 5L | UniCard sheets, for labeling terminal blocks using a flat Zack <br> marker strip groove, 192-section, can be labeled with CMS-P1- <br> PLOTTER, color: White |

Plug/Adapter

| 3002843 | ISH 2,5/0,2 | Insulation stop sleeve, Color: white |
| :--- | :--- | :--- |
| 3002856 | ISH 2,5/0,5 | Insulation stop sleeve, Color: gray |
| 3002869 | ISH 2,5/1,0 | Insulation stop sleeve, Color: black |
| 0201731 | MPS-IH BK | Insulating sleeve, Color: black |
| 0201689 | MPS-IH BU | Insulating sleeve, Color: blue |
| 0201702 | MPS-IH GN | Insulating sleeve, Color: green |
| 0201728 | MPS-IH GY | Insulating sleeve, Color: gray |
| 0201676 | MPS-IH RD | Insulating sleeve, Color: red |
| 0201715 | MPS-IH VT | Insulating sleeve, Color: violet |
| 0201663 | MPS-IH WH | Insulating sleeve, Color: white |
| 0201692 | MPS-IH YE | Insulating sleeve, Color: yellow |
| 0201744 | MPS-MT | Tetal part |
| 3030925 | PAI-4 | Test adapter, Color: red |
| 3030983 | PS-5 |  |
| Tools |  | Screwdriver, blade: 0.6 x 3.5 x 100 mm, length 180 mm |
| 1204517 | SZF 1-0,6X3,5 |  |
| Additional products | Description |  |
| Item | Designation |  |
| Assembly |  | Component connector, Nominal current: 6 A, Length: 24 mm, |
| 3036796 | P-CO | Width: 5.2 mm, Height: 22 mm, Color: gray |

PIT 2,5-TG Order No.: 3210185
http://eshop.phoenixcontact.no/phoenix/treeViewClick.do?UID=3210185

Plug/Adapter

| 3032460 | P-CO 1N4007/L-R | Component connector, Length: 24 mm, Width: 5.2 mm, Height: 22 <br> mm, Color: gray |
| :--- | :--- | :--- |
| 3032457 | P-CO 1N4007/R-L | Component connector, Length: 24 mm , Width: 5.2 mm, Height: 22 <br> mm, Color: gray |
| 3036783 | P-DI | Isolating connectors, Length: 10.5 mm, Width: 3.5 mm, <br> Height: 23.1 mm, Color: orange |
| 3038956 | P-FIX | Feed-through connector, Length: 10.5 mm, Width: 4 mm, <br> Color: gray |
| 3036806 | P-FU 5X20 | Fuse plug, Nominal current: 6.3 A, Length: 28 mm, Width: 6.2 mm, <br> Height: 25 mm, Color: black |
| 3036835 | P-FU 5X20 LA 250 | Fuse plug, Nominal current: 6.3 A, Length: 28 mm, Width: 6.2 mm, <br> Height: 25 mm, Color: black |
| 3036819 | P-FU 5X20 LED 24 | Fuse plug, Nominal current: 6.3 A, Length: 28 mm, Width: 6.2 mm, <br> Height: 25 mm, Color: black |
| 3036822 | P-FU 5X20 LED 60 | Fuse plug, Nominal current: 6.3 A, Length: 28 mm, Width: 6.2 mm, <br> Height: 25 mm, Color: black |

Diagrams/Drawings

Circuit diagram



## (ppeocinlx

## Extract from the online catalog

## PS-5

Order No.: 3030983
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3030983

Test adapter, Color: red

| Commercial data |  | Product notes <br> WEEE/RoHS-compliant since: |  |
| :--- | :--- | :--- | :--- |
| EAN | 4017918818920 |  |  |
| Pack | 10 pcs. |  |  |

PS-5 Order No.: 3030983
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3030983

## Diagrams/Drawings

Dimensioned drawing


## RPCocindix

## Extract from the online catalog

## UIK 16

Order No.: 3006153
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3006153

Feed-through modular terminal block, Screw connection, Cross
section: $2.5 \mathrm{~mm}^{2}-25 \mathrm{~mm}^{2}$, A $\quad-4$, Width: 12.2 mm , Color: gray, Mounting type: NS 35/7,5, NS 35/15, NS 32

| Commercial data |  |
| :--- | :--- |
| EAN | 4017918091378 |
| Pack | 50 pcs. |
| Customs tariff | 85369010 |
| Weight/Piece | 0.02202 KG |
| Catalog page information | Page 416 (CL-2009) |

## Product notes

WEEE/RoHS-compliant since: 01/01/2005


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## Technical data

General

| Number of levels | 1 |
| :--- | :--- |
| Number of connections | 2 |
| Color | gray |
| Insulating material | PA |

UIK 16 Order No.: 3006153
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3006153

| Inflammability class acc. to UL 94 | V2 |  |
| :--- | :--- | :---: |
| Dimensions |  |  |
| Width | 12.2 mm |  |
| Length | 42.5 mm |  |
| Height NS 35/7,5 | 47 mm |  |
| Height NS 35/15 | 54.5 mm |  |
| Height NS 32 | 52 mm |  |

Technical data

| Maximum load current | 101 A (with $25 \mathrm{~mm}^{2}$ conductor cross section) |
| :--- | :--- |
| Rated surge voltage | 6 kV |
| Pollution degree | 3 |
| Surge voltage category | III |
| Insulating material group | I |
| Connection in acc. with standard | IEC 60947-7-1 |
| Nominal current $I_{N}$ | 76 A |
| Nominal voltage $U_{N}$ | 400 V |

## Connection data

| Conductor cross section solid min. | $2.5 \mathrm{~mm}^{2}$ |
| :--- | :--- |
| Conductor cross section solid max. | $25 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded min. | $4 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded max. | $16 \mathrm{~mm}^{2}$ |
| Conductor cross section AWG/kcmil min. | 12 |
| Conductor cross section AWG/kcmil max | 4 |
| Conductor cross section stranded, with ferrule <br> without plastic sleeve min. | $1.5 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule <br> without plastic sleeve max. | $16 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule <br> with plastic sleeve min. | $1.5 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule <br> with plastic sleeve max. | $16 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, solid min. | $1.5 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, solid max. | $6 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded | $1.5 \mathrm{~mm}^{2}$ |
| min. |  |

[^18]UIK 16 Order No.: 3006153
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3006153

| 2 conductors with same cross section, stranded <br> max. | $6 \mathrm{~mm}^{2}$ |
| :--- | :--- |
| 2 conductors with same cross section, stranded, <br> ferrules without plastic sleeve, min. | $1.5 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, <br> ferrules without plastic sleeve, max. | $4 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, <br> TWIN ferrules with plastic sleeve, min. | $0.75 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, | $10 \mathrm{~mm}^{2}$ |
| TWIN ferrules with plastic sleeve, max. | Screw connection |
| Type of connection | 11 mm |
| Stripping length | M 4 |
| Screw thread | 1.5 Nm |
| Tightening torque, min | 1.8 Nm |
| Tightening torque max |  |

## Certificates / Approvals

Certification CCA, CSA, CUL, KEMA, UL

CSA

| Nominal voltage $U_{N}$ | 600 V |
| :--- | :--- |
| Nominal current $I_{N}$ | 85 A |
| AWG/kcmil | $22-4$ |
| CUL |  |
| Nominal voltage $U_{N}$ | 600 V |
| Nominal current $I_{N}$ | 85 A |
| AWG/kcmil | $22-4$ |

UL

| Nominal voltage $U_{N}$ | 600 V |
| :--- | :--- |
| Nominal current $I_{N}$ | 85 A |
| AWG/kcmil | $22-4$ |

UIK 16 Order No.: 3006153
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3006153

## Drawings

## Circuit diagram




1 = cover
2 = fixed bridge
3 = insertion bridge
4 = switch bar for 2 terminal blocks
5 = separating plate
$6=$ partition plate
7 = test plug socket, for test connection with test plug PS
8 = test plug socket, insulated, can only be used with FBI

## RPCocindix

## Extract from the online catalog

## UK 6 N

Order No.: 3004524
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3004524

Universal terminal block with screw connection, cross section: 0.2-6 $\mathrm{mm}^{2}$, AWG: 24-8, width: 8.2 mm , color: gray

|  |  |
| :--- | :--- |
| Commercial data | 4017918090821 |
| EAN | 50 Pcs. |
| Pack | 85369010 |
| Customs tariff | 0.01384 KG |
| Weight/Piece | Page 278 (CL-2007) |
| Catalog page information |  |

## Product notes

WEEE/RoHS-compliant since: 01/01/2003

## http://

www.download.phoenixcontact.com Please note that the data given here has been taken from the online catalog. For comprehensive information and data, please refer to the user documentation. The General Terms and Conditions of Use apply to Internet downloads.

## Technical data

| General |  |
| :--- | :--- |
| Number of levels | 1 |
| Number of connections | 2 |
| Color | gray |

UK 6 N Order No.: 3004524
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3004524

| Insulating material | PA |
| :--- | :--- |
| Inflammability class acc. to UL 94 | V0 |
| Dimensions |  |
| Width | 8.2 mm |
| Length | 42.5 mm |
| Height NS 35/7,5 | 47 mm |
| Height NS 35/15 | 54.5 mm |
| Height NS 32 | 52 mm |

## Technical data

| Maximum load current | 57 A (with $10 \mathrm{~mm}^{2}$ conductor cross section) |
| :--- | :--- |
| Rated surge voltage | 8 kV |
| Pollution degree | 3 |
| Surge voltage category | III |
| Insulating material group | I |
| Connection in acc. with standard | IEC 60947-7-1 |
| Nominal current $I_{N}$ | 57 A |
| Nominal voltage $U_{\mathrm{N}}$ | 800 V |
| Open side panel | ja |
|  |  |

## Connection data

| Conductor cross section solid min. | $0.2 \mathrm{~mm}^{2}$ |
| :--- | :--- |
| Conductor cross section solid max. | $10 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded min. | $0.2 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded max. | $6 \mathrm{~mm}^{2}$ |
| Conductor cross section AWG/kcmil min. | 24 |
| Conductor cross section AWG/kcmil max | 8 |
| Conductor cross section stranded, with ferrule <br> without plastic sleeve min. | $0.25 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule <br> without plastic sleeve max. | $6 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule <br> with plastic sleeve min. | $0.25 \mathrm{~mm}^{2}$ |
| Conductor cross section stranded, with ferrule <br> with plastic sleeve max. | $6 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, solid min. | $0.2 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, solid max. | $2.5 \mathrm{~mm}^{2}$ |

[^19]UK 6 N Order No.: 3004524
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3004524

| 2 conductors with same cross section, stranded <br> min. | $0.2 \mathrm{~mm}^{2}$ |
| :--- | :--- |
| 2 conductors with same cross section, stranded <br> max. | $2.5 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, <br> TWIN ferrules with plastic sleeve, min. | $0.5 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, <br> TWIN ferrules with plastic sleeve, max. | $4 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, <br> ferrules without plastic sleeve, min. | $0.25 \mathrm{~mm}^{2}$ |
| 2 conductors with same cross section, stranded, <br> ferrules without plastic sleeve, max. | $1.5 \mathrm{~mm}^{2}$ |
| Cross-section with insertion bridge, solid max. | $4 \mathrm{~mm}^{2}$ |
| Cross-section with insertion bridge, stranded max. | $4 \mathrm{~mm}^{2}$ |
| Type of connection | Screw connection |
| Stripping length | $10 \mathrm{~mm}^{2}$ |
| Internal cylindrical gage | A 5 |
| Screw thread | M 4 |
| Tightening torque, min | 1.5 Nm |
| Tightening torque max | 1.8 Nm |

## Certificates / Approvals

## Approval logo

## 

CSA

| Nominal voltage $U_{N}$ | 600 V |
| :--- | :--- |
| Nominal current $I_{N}$ | 50 A |
| AWG/kcmil | $26-8$ |
| CUL |  |
| Nominal voltage $U_{N}$ | 600 V |
| Nominal current $I_{N}$ | 50 A |
| AWG/kcmil | $26-8$ |
| UL |  |
| Nominal voltage $U_{N}$ | 600 V |

UK 6 N Order No.: 3004524
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3004524

| Nominal current $I_{N}$ | 50 A |
| :--- | :--- |
| AWG/kcmil | $26-8$ |
| Certification | ABS, BV, CCA, CSA, CUL, DNV, KEMA, KR, LR, NK, PRS, RS, |
|  | UL |

## requested approbations

| Certification Ex: | CUL-EX, FM, GL-EX, IECEX, KEMA-EX, UL-EX |
| :--- | :--- |


| Accessories |  |
| :--- | :--- |
| Item $\quad$ Designation | Description |


| Assembly |  |  |
| :---: | :---: | :---: |
| 3003224 | A -UK | Separating plate, for visual and electrical separation of terminal groups, width: 1.5 mm , color: Gray |
| 3022218 | CLIPFIX 35 | Snap-on end bracket, for 35 mm NS 35/7.5 or NS $35 / 15$ mounting rail, can be fitted with Zack strip ZB 8 and ZB 8/27, terminal strip marker KLM 2 and KLM, width: 9.5 mm , color: gray |
| 3003020 | D-UK 4/10 | Cover, width: 1.8 mm, color: gray |
| 1201442 | E/UK | End clamp, f lectronic base. If mounted vertically, 2 end clamps are required in each case |
| 1024014 | EA 5 | Single covers, color: transparent |
| 1024085 | EA 5-WS | Single covers, for covering one terminal block, with black symbol (lightning flash) snap fit, color: transparent/yellow |
| 1201028 | NS 32 AL UNPERF 2000MM | G rail 32 mm (NS 32) |
| 1201280 | NS 32 CU/120QMM UNPERF 2000MM | G-profile DIN rail, deep-drawn, material: Copper, unperforated, height 15 mm , width 32 mm , length 2 m |
| 1201358 | NS 32 CU/35QMM UNPERF 2000MM | G-profile DIN rail, material: Copper, unperforated, height 15 mm , width 32 mm , length 2 m |
| 1201002 | NS 32 PERF 2000MM | G-profile DIN rail, material: Steel, perforated, height 15 mm , width 32 mm , length 2 m |
| 1201015 | NS 32 UNPERF 2000MM | G-profile DIN rail, material: Steel, unperforated, height 15 mm , width 32 mm , length 2 m |
| 0801762 | NS 35/ 7,5 CU UNPERF 2000MM | DIN rail, material: Copper, unperforated, height 7.5 mm , width 35 mm, length: 2 m |
| 0801733 | NS 35/ 7,5 PERF 2000MM | DIN rail, material: Steel, perforated, height 7.5 mm , width 35 mm , length: 2 m |
| 0801681 | NS 35/ 7,5 UNPERF 2000MM | DIN rail, material: Steel, unperforated, height 7.5 mm , width 35 mm, length: 2 m |
| 1201756 | NS 35/15 AL UNPERF 2000MM | DIN rail, deep-drawn, high profile, unperforated, 1.5 mm thick, material: Aluminum, height 15 mm , width 35 mm , length 2 m |
| 1201895 | NS 35/15 CU UNPERF 2000MM | DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm, width 35 mm , length: 2 m |

UK 6 N Order No.: 3004524
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3004524

| 1201730 | NS 35/15 PERF 2000MM | DIN rail, material: Steel, perforated, height 15 mm , width 35 mm , length: 2 m |
| :---: | :---: | :---: |
| 1201714 | NS 35/15 UNPERF 2000MM | DIN rail, material: Steel, unperforated, height 15 mm , width 35 mm, length: 2 m |
| 1201798 | NS 35/15-2,3 UNPERF 2000MM | DIN rail, material: Steel, unperforated, 2.3 mm thick, height 15 mm , width 35 mm , length: 2 m |
| 1302215 | TS-K | Separating plate, for electrical separation of neighboring bridges, can be fitted later, no loss of pitch, color: Gray |
| Bridges |  |  |
| 0202154 | EB 2-8 | Insertion bridge, 2-pos., fully insulated |
| 0202141 | EB 3-8 | Insertion bridge, 3-pos., fully insulated |
| 0202138 | EB 10-8 | Insertion bridge, 10-pos., divisible, fully insulated |
| 3029224 | FB 2-8-EX | Fixed bridge, for cross connections, with screws, screw heads without insulation, 2-pos. |
| 0202167 | FB 3-8 | Fixed bridge, for cross connections, with screws, screw heads without insulation, 3-pos. |
| 0202183 | FB 4-8 | Fixed bridge, for cross connections, with screws, screw heads without insulation, 4-pos. |
| 0202170 | FB 10-8 | Fixed bridge, for cross connections, with screws, screw heads without insulation, 10-pos. |
| 3003185 | FB 10-8-EX | Fixed bridge, for cross connections, with screws, screw heads without insulation, 10-pos. |
| 0200020 | FBI 2-8 | Fixed bridge, for cross connections, with screws, screw heads without insulation, 2-pos. |
| 0200059 | FBI 3-8 | Fixed bridge, for cross connections, with screws, screw heads without insulation, 3-pos. |
| 0200046 | FBI 4-8 | Fixed bridge, for cross connections, with screws, screw heads without insulation, 4-pos. |
| 0203263 | FBI 10-8 | Fixed bridge, 10-pos., screw heads with insulating collar, divisible, with screws |
| 1303337 | IS-K 10 | Bridge bar isolator, as distance piece |
| 0301534 | ISSBI 10-8 | Isolator bridge bar, 10-position, divisible, with screws, f tchable branches |
| 0200062 | SB 2-8/13 N | Switching bridge, 2-pos. |
| Marking |  |  |
| 1007235 | SBS 8:UNBEDRUCKT | Marker cards for modular terminal blocks, color: white |
| 1004128 | WS 3-8 | Warning plate, with 2 plastic screws, across 3 terminal blocks, pitch 8 mm |
| 1004212 | WS 4-8 | Warning plate, with 2 plastic screws, across 4 terminal blocks, pitch 8 mm |

UK 6 N Order No.: 3004524
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3004524

| 1004416 | WS 5-8 | Warning plate, with 2 plastic screws, across 5 terminal blocks, pitch 8 mm |
| :---: | :---: | :---: |
| 1050512 | ZB 8:SO/CMS | Zack strip, 10-section, divisible, special printing, marking according to customer requirements |
| Plug/Adapter |  |  |
| 0311540 | KSS 8 | Short circuit connector, for short circuiting neighboring terminal blocks, can only be used with PSB or PSBJ, 2-pos., pitch: 8.2 mm , color: Black |
| 0311647 | PS-MT | Test plug, consisting of: metal part f and insulating sleeve for PS metal part |
| 0303299 | PSB 4/7/6 | Test plug socket, not insulated, length: 7 mm , screw thread width: 4 mm , socket width: 6 mm |
| 0303406 | PSBJ 4/15/6 BK | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material in black |
| 0303354 | PSBJ 4/15/6 BU | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material in blue |
| 0303419 | PSBJ 4/15/6 FARBLOS | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material transparent |
| 0303370 | PSBJ 4/15/6 GN | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material in green |
| 0303396 | PSBJ 4/15/6 GY | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material in gray |
| 0303325 | PSBJ 4/15/6 RD | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material in red |
| 0303383 | PSBJ 4/15/6 VT | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material in violet |
| 0303312 | PSBJ 4/15/6 WH | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material in white |
| 0303367 | PSBJ 4/15/6 YE | Test plug socket, insulated, length: 15 mm , screw thread width: 4 mm , socket width: 6 mm , insulation material in yellow |

## RPRHNNNN

## Extract from the online catalog

## PSB 4/7/6

Order No.: 0303299

The illustration shows various versions of the article
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=0303299

Female test connector, Color: silver

|  |  | Product notes |
| :---: | :---: | :---: |
| Commercial data |  | WEEE/RoHS-compliant since: 01/01/2003 |
| EAN | 4017918000417 | A1085 |
| Pack | 10 pcs. | \% |
| Customs tariff | 85369010 |  |
| Weight/Piece | 0.00218 KG |  |
| Catalog page information | Page 448 (CL-2009) | http:// <br> www.download.phoenixcontact.com Please note that the data given here has been taken from the online catalog. For comprehensive information and data, please refer to the user documentation. The General Terms and Conditions of Use apply to Internet downloads. |
|  |  |  |

PSB 4/7/6 Order No.: 0303299
http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=0303299

## Drawings

Dimensioned drawing


## Thermal device circuit breaker - TCP 2A - 0712217

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Thermal miniature circuit breaker, pluggable in screw-type fuse terminal block UK 6-FSI/C and spring-cage fuse terminal block ST 4-FSI/C

## Product description

Thermal miniature circuit breaker, pluggable in screw-type fuse terminal block UK 6-FSI/C and spring-cage fuse terminal block ST 4FSI/C

Why buy this product

- A version with screw or spring-cage connection is used as a basic terminal block
- The reclosable thermal circuit breaker is available in nine nominal current levels ranging from 0.25 to 10 A

The integrated switching function enables immediate reclosure and therefore ensures the availability of the system

- Compact design



## Key commercial data

| Packing unit | 1 |
| :---: | :---: |
| Minimum order quantity | 20 |
| Catalog page | Page 197 (TT-2011) |
| GTIN |  |
| Weight per piece (including packing) | 0.0 GRM |
| Weight per Piece (excluding packing) | 11.62 GRM |
| Country of origin | INDONESIA |

## Technical data

General

| Note | When mounted in rows, the nominal device current can be limited <br> to just $80 \%$ or must be overdimensioned accordingly. |
| :--- | :--- |
| Color | black |
| Insulating material | PA |
| Inflammability class according to UL 94 | V0 |
| Dimensions | 8.2 mm |
| Width | 24.5 mm |
| Length |  |

## Thermal device circuit breaker - TCP 2A - 0712217

## Technical data

Dimensions

| Height NS 35/7.5 | 55 mm |
| :--- | :--- |

## Technical data

| Fuse | Slow-blow |
| :--- | :--- |
| Fuse type | Automatic device |
| Pollution degree | 2 |
| Nominal current IN | 2 A |
| Nominal voltage UN | 250 V AC |
| Nominal voltage UN | 65 V DC |
| Switching capacity ICN | $(6 \times \mathrm{IN}$ for nominal currents 0.25 A to 4 A$)$ |
| Switching capacity ICN | $(8 x$ IN for nominal currents 6 A to 10 A$)$ |
| Ambient temperature (operation) | $-20^{\circ} \mathrm{C} \ldots 60^{\circ} \mathrm{C}$ |

Classifications
eclass

| eClass 4.0 | 27141116 |
| :--- | :--- |
| eClass 4.1 | 27141116 |
| eClass 5.0 | 27141116 |
| eClass 5.1 | 27141116 |
| eClass 6.0 | 27141116 |

etim

| ETIM 2.0 | EC000899 |
| :--- | :--- |
| ETIM 3.0 | EC000899 |
| ETIM 4.0 | EC000899 |

unspsc

| UNSPSC 6.01 | 30211812 |
| :--- | :--- |
| UNSPSC 7.0901 | 39121411 |
| UNSPSC 11 | 39121411 |
| UNSPSC 12.01 | 39121411 |
| UNSPSC 13.2 | 39121411 |

## Approvals

## Certificates

## Certification

CSA / UL Recognized / VDE approval of drawings / cUL Recognized / GOST / cULus Recognized

## Certification EX

## Thermal device circuit breaker - TCP 2A - 0712217

## Approvals

Certification submitted

## Approval details

| CSA |  |
| :--- | :--- |
|  | 2 A |
| Nominal current IN | 250 V |
| Nominal voltage UN |  |

## UL Recognized

## VDE approval of drawings

cUL Recognized

GOST
cULus Recognized

## Accessories

## Accessories

Marking
Flat zack marker sheet - ZBFM 5/WH:UNBEDRUCKT - 0803595
Flat zack marker sheet, Sheet, white, Unlabeled, Can be labeled with: Plotter, Mounting type: Snap into flat marker groove, F

Flat zack marker sheet - ZBFM 5/OG:UNBEDRUCKT - 0807180
Flat zack marker sheet, Sheet, orange, Unlabeled, Can be labeled with: Plotter, Mounting type: Snap into flat marker groove,


## Thermal device circuit breaker - TCP 2A - 0712217

## Accessories

Flat zack marker sheet - ZBFM 5:SO/CMS - 0803647
Flat zack marker sheet, white, For terminal block width: 5.2 mm


## Additional products

Fuse modular terminal block - UK 6-FSI/C - 3118203


Fuse modular terminal block - ST 4-FSI/C - 3036372


Fuse terminal block for mounting on NS 35, for miniature circuit breakers, terminal width: $8,2 \mathrm{~mm}$, color: Black

Fuse modular terminal block - ST 4-FSI/C-LED 24-3036505


Fuse terminal block with LED for mounting on NS 35, for miniature circuit breakers, terminal width: 8.2 mm, color: Black

Fuse modular terminal block - UK 6-FSI/C - 3118203


Flat-t fuse terminal block, cross section: 0.2-6 mm², AWG: 26-8, width: 8.2 mm , color: black

## Thermal device circuit breaker - TCP 2A - 0712217

## Accessories

Fuse modular terminal block - UK 6-FSI/C-LED12-3001925


Flat-t fuse terminal block, cross section: 0.2-6 mm², AWG: 26-8, width: 8.2 mm , color: black, with light indicator, voltag

Fuse modular terminal block - UK 6-FSI/C-LED24-3001938


Flat-type fuse terminal block, cross section: 0.2-6 mm², AWG: 26-8, width: 8.2 mm , color: black, with light indicator, voltag

## Drawings

Application drawing


[^20]Thermal device circuit breaker - TCP 2A - 0712217

Application drawing


Fuse terminal block in single arrangement,
block consisting of one fuse terminal block and 4 feed-through terminal blocks

Thermal device circuit breaker - TCP 2A - 0712217

Diagram


## Thermal device circuit breaker - TCP 2A - 0712217

Dimensioned drawing


## Thermal device circuit breaker - TCP 2A - 0712217

Dimensioned drawing

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Flat-type fuse terminal block, cross section: 0.2-6 mm, AWG: 26-8, width: 8.2 mm , color: black


Order number
3118203
Type
UK 6-FSI/C

## Barcode number

4017918100605
Unit pack
50 Piece
Customs tariff
85369010000

Technical data

## General

Number of levels 1
Number of connections 2
Color black
Insulating material PA
Inflammability class acc. to UL 94 V0

## Dimensions

| Width | 8.2 mm |
| :--- | :--- |
| Length | 64 mm |
| Height NS 35:7,5 | 52 mm |
| Height NS 35:15 | 59.5 mm |
| Height NS 32 | 57 mm |

## Technical data

Fuse C
Rated surge voltage 4 kV
Contamination class 3
Surge voltage category III
Insulating material group I
Connection in acc. with standard IEC/ DIN VDE
Nominal voltage $U_{N}$
250 V
Maximum current with single arrangement
30 A (Special arrangements on request)

## Connection data

Min. conductor cross section, rigid $0.2 \mathrm{~mm}^{2}$
Conductor cross section, rigid max. $10 \mathrm{~mm}^{2}$
Conductor cross section flexible min. $0.2 \mathrm{~mm}^{2}$
Max. conductor cross section, flexible $6 \mathrm{~mm}^{2}$
Min. conductor cross section AWG/kcmil 24
Conductor cross section AWG/kcmil max 8
Min. conductor cross section, flexible, with ferrule with $0.25 \mathrm{~mm}^{2}$ plastic sleeve
Conductor cross section flexible, with ferrule without $6 \mathrm{~mm}^{2}$ plastic sleeve max.
Conductor cross section flexible, with ferrule with plastic $0.25 \mathrm{~mm}^{2}$ sleeve min.
Max. conductor cross section, flexible, with ferrule with $4 \mathrm{~mm}^{2}$ plastic sleeve
2 conductors with same cross section, solid min. $0.2 \mathrm{~mm}^{2}$
2 conductors with same cross section, solid max. $\quad 2.5 \mathrm{~mm}^{2}$
2 conductors of the same cross section, flexible, min. $0.2 \mathrm{~mm}^{2}$
2 conductors with same cross section, flexible max. $\quad 2.5 \mathrm{~mm}^{2}$
2 conductors of the same cross section, flexible, with $0.25 \mathrm{~mm}^{2}$
AEH without plastic sleeve, min.
2 conductors with identical cross section, flexible with $2.5 \mathrm{~mm}^{2}$
AEH with plastic sleeve max.
2 conductors of the same cross section, flexible, with $0.5 \mathrm{~mm}^{2}$
TWIN-AEH with plastic sleeve, min.
2 conductors with identical cross section, flexible with $4 \mathrm{~mm}^{2}$
TWIN-AEH with plastic sleeve max.
Type of connection Screw connection
Stripping length
10 mm
Screw thread
M 4
Tightening torque
1.5 Nm

## Certificates

## CSA

| Nominal voltage $U_{N}$ | 32 V |
| :--- | :--- |
| Nominal current $I_{N}$ | 30 A |
| AWG/kcmil | $26-8$ |

UL
Nominal voltage $\mathrm{U}_{\mathrm{N}} \quad 300 \mathrm{~V}$
Nominal current $\mathrm{I}_{\mathrm{N}} \quad 30 \mathrm{~A}$
AWG/kcmil
26-8

## Drawings

## Diagram



## Circuit diagram



## Approval logo

## Accessories

| Item | Designation | Description |
| :---: | :---: | :---: |
| Assembly |  |  |
| 3022218 | CLIPFIX 35 | Snap-on end bracket, for 35 mm NS $35 / 7.5$ or NS $35 / 15$ mounting rail, can be fitted with Zack strip ZB 8 and ZB 8/27, terminal strip marker KLM 2 and KLM, width: 9.5 mm , color: gray |
| 1201442 | E/UK | End clamp, for supporting the electronic base, if mounted vertically, 2 end clamps are required in each case |
| 1201002 | NS 32 GELOCHT METER | G-profile DIN rail, material: Steel, perforated, height 15 mm , width 32 mm , length 2 m |
| 1201015 | NS 32 UNGELOCHT METER | G-profile DIN rail, material: Steel, unperforated, height 15 mm , width 32 mm , length 2 m |
| 1201028 | NS 32-AL UNGELOCHT METER | G rail 32 mm (NS 32) |
| 1201358 | NS 32-CU/ 35 QMM UNGEL. METER | G-profile DIN rail, material: Copper, unperforated, height 15 mm , width 32 mm , length 2 m |
| 1201280 | NS 32-CU/120 QMM UNGEL. METER | G-profile DIN rail, deep-drawn, material: Copper, unperforated, height 15 mm , width 32 mm , length 2 m |
| 0801733 | NS 35/ 7,5 GELOCHT METER | DIN rail, material: Steel, perforated, height 7.5 mm , width 35 mm , length: 2 m |
| 0801681 | NS 35/ 7,5 UNGELOCHT METER | DIN rail, material: Steel, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 0801762 | NS 35/ 7,5-CU UNGELOCHT METER | DIN rail, material: Copper, unperforated, height 7.5 mm , width 35 mm , length: 2 m |
| 1201730 | NS 35/15 GELOCHT METER | DIN rail, material: Steel, perforated, height 15 mm , width 35 mm , length: 2 m |
| 1201714 | NS 35/15 UNGELOCHT METER | DIN rail, material: Steel, unperforated, height 15 mm , width 35 mm , length: 2 m |
| 1201798 | NS 35/15-2,3 UNGELOCHT METER | DIN rail, material: Steel, unperforated, 2.3 mm thick, height 15 mm , width 35 mm , length: 2 m |
| 1201756 | NS 35/15-AL UNGELOCHT METER | DIN rail, deep-drawn, high profile, unperforated, 1.5 mm thick, material: Aluminum, height 15 mm , width 35 mm , length 2 m |
| 1201895 | NS 35/15-CU UNGELOCHT METER | DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm , width 35 mm , length: 2 m |
| 2770215 | TS-KK 3 | Separating plate, color: gray |

## Bridges

| 0200020 | FBI 2-8 |
| :--- | :--- |
| 0200059 | FBI 3-8 |
| 0200046 | FBI 4-8 |
| 0203263 | FBI 10-8 |

Fixed bridge, 2-pos.
Fixed bridge, for cross connections, with screws, screw heads without insulation, 3-pos.
Fixed bridge, for cross connections, with screws, screw heads without insulation, 4-pos.
Fixed bridge, 10-pos., screw heads with insulating collar, divisible, with screws

## Marking

| 1007235 | SBS 8:UNBEDRUCKT |
| :--- | :--- |
| 1050512 | ZB 8:SO/CMS |

Marker cards for modular terminal blocks, color: white Zack strip, 10-section, divisible, special printing, marking according to customer requirements

## Marker carriers - UBE/D + ES/KMK 3-1004076

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (http://download.phoenixcontact.com)


Terminal strip marker carriers for marking terminal group, for mounting on the terminal strip NS 32 or NS 35/7.5, lettering field size: $40 \times 17 \mathrm{~mm}$

## The figure shows a version of

 the article
## Key commercial data

| Packing unit | 1 |
| :---: | :---: |
| Minimum order quantity | 10 |
| GTIN |  |
| Custom tariff number | 39269097 |
| Country of origin | GERMANY |

## Technical data

General

| Length (b) | 42.5 mm |
| :--- | :--- |
| Height | 51.5 mm |
| Width (a) | 20 mm |
| Color | gray |
| Base element material | PA |
| Inflammability class according to UL 94 | V 2 |
| Ambient temperature (operation) | $-40^{\circ} \mathrm{C} \ldots 100^{\circ} \mathrm{C}$ |
| Components | free from silicone and halogen |

## Classifications

eclass

| eCl@ss 4.0 | 24190208 |
| :--- | :--- |
| eCl@ss 4.1 | 24190208 |
| eCl@ss 5.0 | 27149103 |
| eCl@ss 5.1 | 27149103 |
| eCl@ss 6.0 | 27141137 |

Marker carriers - UBE/D + ES/KMK 3-1004076

## Classifications

etim

| ETIM 2.0 | EC000761 |
| :--- | :--- |
| ETIM 3.0 | EC000761 |
| ETIM 4.0 | EC000761 |

unspsc

| UNSPSC 6.01 | 30211811 |
| :--- | :--- |
| UNSPSC 7.0901 | 39121410 |
| UNSPSC 11 | 39121410 |
| UNSPSC 12.01 | 39121410 |
| UNSPSC 13.2 | 39121410 |

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### 3.9 OTHER ACCESSORIES

- CLIPSAL - BP26 - LINE TAP - Bonding To Earthing Rod
- COPPER ROD - 13mm Diameter- Earthing Rod
- H.A. REED LOCKSMITHS - ENERGEX PADLOCK - Key No. 325 \& S/S Shackle
- NESCO - ERB1 - Earth Rod Connection Box
- PULSE - N-203HS - Coax Plug
- R.F. INDUSTRIES - ANDREW - CNT400 - External Coax Cable
- R.F. INDUSTRIES - UNV - U Clamps
- TRIO - SMAM/NM/TL23 - Internal Coax Cable


## Medium Duty Neutral Bars <br> With $2 \times$ BP22 Line Taps Front Wiring

## BPMD2/10 Series

Complete with $2 \times$ BP22 Line Taps. $13 \times 9.5 \mathrm{~mm}$ brass.

All bars have 1-1/4 Whitworth screw with flat brass washer and 2 number BPMD2 Line Taps provided for incoming cables ( $16 \mathrm{~mm}^{2}$ ).
All 4 mm diameter tunnels with single screw per tunnel for up to $6 \mathrm{~mm}^{2}$ cable.
All tunnels are numbered.
Two 4 mm diameter countersunk recessed fixing holes.
Back wired neutral bar.


## Bare Links with Mounting Blocks

## BPQL Series

90A Link Bars with moulded mounting blocks. (BP165FD)
Bar section $13 \times 13 \mathrm{~mm}$.
Temperature rating: $190^{\circ} \mathrm{C}$ maximum. Two $1 / 4$ " hexagon head studs for 90 ampere cable lugs.
All 5.5 diameter tunnels with single screw to accommodate up to $16 \mathrm{~mm}^{2}$ cables.
All tunnels are numbered.


| Catalogue <br> Number | Single Screw <br> Tunnels | Overall <br> Length (mm) |
| :--- | :---: | :---: |
| BPMD2/3 | 3 | 105 |
| BPMD2/4 | 4 | 111 |
| BPMD2/5 | 5 | 121 |
| BPMD2/7 | 7 | 135 |
| BPMD2/9 | 9 | 150 |
| BPMD2/10 | 10 | 157 |
| BPMD2/12 | 12 | 174 |
| BPMD2/15 | 15 | 195 |
| BPMD2/18 | 18 | 219 |
| BPMD2/20 | 20 | 235 |
| BPMD2/24 | 24 | 268 |
| BPMD2/25 | 25 | 275 |
| BPMD2/30 | 30 | 313 |
| BPMD2/36 | 36 | 357 |


| Catalogue <br> Number | Single Screw <br> Tunnels | Overall <br> Length (mm) |
| :--- | :---: | :---: |
| BPQL12 | 12 | 143 |
| BPQL18 | 18 | 182 |
| BPQL24 | 24 | 219 |
| BPQL30 | 30 | 257 |
| BPQL36 | 36 | 295 |
| BPQL48 | 48 | 363 |
| BPQL50 | 50 | 383 |
| BPQL60 | 60 | 447 |

## Line Taps

Line Taps can be drilled, tapped and fitted with screws on request.

BP22
Line Tap for $16 \mathrm{~mm}^{2}$ cables.
Overall length 30 mm .


## BP22ETP

As above but electro tin-plated.

## BP24

Line Tap for $35 \mathrm{~mm}^{2}$ cables.
Overall length 35 mm .
BP24ETP
As above but electro tin-plated.

## BP25

Line Tap for $50 \mathrm{~mm}^{2}$ cables.
Overall length 44 mm .

## BP25ETP

As above but electro tin-plated.

## BP26

Line Tap for $95 \mathrm{~mm}^{2}$ cables.
Overall length 50 mm .

## BP26ETP

As above but electro tin-plated.

## BP28

Line Tap for $185 \mathrm{~mm}^{2}$ cables.
Overall length 67 mm .
BP28ETP
As above but electro tin-plated.

## SERVI CE PITS \& LIDS

## NOTE ON ORDERI NG OF PITS

GVK have simplified the process of ordering pits by kitting them together with lids. When ordering please where ever possible use the Kit Part Number.
The other part numbers are for individual parts should you require to buy them as separate items.

| PIT DATA |  | Dimensions (mm): |  |
| :--- | :--- | :---: | :---: |
| Description | Diameter | Depth |  |
| PR - plastic distribution pit | External | 430 | 630 |
|  | Internal | 340 | 550 |
|  |  |  | Kit Part Number |
| LID DATA | Diameter |  |  |
| Description |  |  |  |
|  | 390 | PITVICK |  |
| 5RLIDE - Elec Concrete Lid |  | 390 | PITVICKC |
| 5RLIDC - Comms Concrete Lid | 390 | PITVICKS |  |



PITVICKS


PITVICK

## EARTH PITS



- Withstands over 5 tones
- Lightweight (1.20Kg)
- Lockable lid opened only with a security key
- Suitable for both paving a hot tar applica-


Part number
ERB1
Description Earth Rod Cover, Cast Aluminium

- Hinged inspection lid.
- Cable entry hole on side.
- Ample space for conductors and clamps.
- $\quad 140 \mathrm{~mm} \mathrm{~L} \times 140 \mathrm{~mm} \mathrm{~W} \times 75 \mathrm{~mm} \mathrm{H}$



## DATA SHEET

Coax Cable Connector
N-203HS
N-201

## Description



Straight Cable Plug Crimp
Suits Cables: LMR400 CNT400 BELDEN 9913

## Technical Data

## Electrical

Impedance 50 Ohm
Max Frequency $\quad 11$ GHz

## Mechanical \& Environmental Data

| Centre contact | Crimp |  |  |
| :---: | :---: | :---: | :---: |
| Outer Contact | Crimp |  |  |
| Mating | 5/8"-24 threaded coupling |  |  |
| Durability | 500 matings |  |  |
| Coupling nut retention | 1001bs Max |  |  |
| Cable Retention | 40 lbs min |  |  |
| Tempreture Range | $-65^{\circ}$ to $165^{\circ} \mathrm{C}$ |  |  |
| Vibration | MIL-STD-202 Test Cond B |  |  |
| Salt Spray | MIL-STD-101 Test Cond B |  |  |
| Thermal Shock | MIL-STD-107 Test Cond B |  |  |
| Material Data |  |  |  |
| Parts | Material | Plating |  |
|  |  | N-203HS | N-201 |
| Connector Body | Brass | Silver | White Bronze |
| Centre contact | Brass | Gold | Gold |
| Insulation | Teflon | - |  |
| Gasket | Silicone Rubber | - | - |
| Crimp Ferrule | Anneald Copper | Silver | White Bronze |

N Connectors are medium size threaded couplers which will operate between DC to 11 GHz . Offering consistent low broadband VSWR, they have proved very popular over the years in mobile radio applications and are often used in high vibration installations. Their threaded design guaranteeing a stable connection.

| Model. No. | Description | Cable Type | Centre Conductor | Crimp Set* or Tool |
| :---: | :---: | :---: | :---: | :---: |
| Cable Jacks |  |  |  |  |
| N-28 | Clamp - Nickel | RG213, RG214 | Solder, captive | CST-213 |
| N-30 | Clamp - Nickel | RG58, 9001, 9006 | Solder, captive | CST-399 |
| N-96 | Crimp - Silver plated | RG142, RG223 | Crimp, captive | A |
| N-98 | Crimp - Silver plated | RG58, 9001, 9006 | Crimp, captive | A |
| N-118 | Crimp - Nickel | RG213 | Crimp, captive | C |
| N-200 | Crimp, White Bronze plated | CNT400, LMR400 | Spring finger | D |
| 400PNF-C-CR | Crimp Tri Metal Plated | CNT-400, LMR-400 | Spring Finger | BCPT-3400/RCT-214 |
| N-202 | Crimp, Nickel plated | CNT400, LMR400 | Spring finger | D |
| N-204 | Crimp, Nickel plated | CNT400, LMR400 | Solder, captive | D |
| N-210 | Crimp, Silver plated | RG59 | Crimp, captive | B |
| N-285 | Crimp, Silver plated | RG214 | Crimp, captive | D |
| L4TNF-PS | Ring Flare | LDF4-50, RXL4-50 | Captive, spring finger | EASIAX ${ }^{\circledR}$ Plus |
| AL5NF-PSA | One Piece Ring Flare | AVA5-50/AL5-50 | Captive, spring finger | EASIAX ${ }^{\circledR}$ Plus |
| 12EZNF | Clamp Tri Metal Plated | FXL-540 | Captive | 540-EZPT/12 HPT |
| 78EZNF | Clamp Tri Metal Plated | FXL-780 | Captive | 780-EZPT/78 HPT |
| 114EZNF | Clamp Tri Metal Plated | FXL-1480 | Captive | 1480-EZPT/114 HPT |
| 158EZNF | Clamp Tri Metal Plated | FXL-1873 | Captive | 1873-EZPT/158 HPT |
| AL7NF-PS | Ringflare | AVA7-50/AL7-50 | Captive, spring finger | CPTL7 |
| F4PNF-C | Clamp, Self Flare | FSJ4-50 | Captive, spring finger | EASIAX ${ }^{\text {® }}$ |
| Panel Mount Jacks |  |  |  | Mounting size and direction |
| N-09 | Flange Mount, nickle plated |  | Solder pot, captive | 11 mm (front) 16 mm (rear) |
| N-12 | Bulkhead mount |  | Solder pot, captive | 13 mm (front) |
| N-20 | Bulkhead mount, silver plated |  | Solder pot, captive | 13mm (front) |
| N-38 | Cable mounted, bulkhead, RG213 |  | Solder pot, captive | 16mm (front) 13.5 mm across flat |
| 400PNF-BHC | Clamp Tri Metal Plated B/H |  | Spring Finger | ВСРТ-3400 |
| N-120 | Flange mount, silver plated |  | Solder pot, captive | 16 mm (front) 15 mm (rear) |
| N-213 | Cable mounted flange, nickle plated RG213 |  | Crimp, captive | 18 mm (front) 16 mm (rear) |
| N-237 | Cable mounted flange, nickle plated RG58 |  | Solder, captive | 13 mm (front) 16 mm (rear) |
| N-288 | Cable mounted bulkhead nickel plated RG58, 9001, 9006 |  | Crimp, captive | 16 mm (rear) 13.7 mm across flats |
| Adaptors |  |  |  |  |
| N-10 | F-F barrel |  |  |  |
| N-48 | F-F-F Tee adaptor |  |  |  |
| N-49 | M-F-F Tee adaptor |  |  |  |
| N-243 | M-M barrel, Nickel plated |  |  |  |
| N-245 | M-F Right angle adaptor, nickel plated |  |  |  |

* See Page 24 for Crimp Tools Matrix and Page 25 for Cable Prep Tools
** All listed N connectors feature the standard 50 Ohm interface dimensions. 75 Ohm interface dimensional connectors and an expanded range of other N connectors are available. Contact your nearest sales office for details.


## N Series

Available in crimp, clamp, spring finger, solder and a variety of finishes including silver and white bronze.


| Model. No. | Description | Cable Type | Centre Conductor | Crimp Set* or Tool |
| :---: | :---: | :---: | :---: | :---: |
| Cable Plugs |  |  |  |  |
| 400PNM | Clamp Tri Metal Plated | CNT-400, LMR-400 | Solder | ВСРТ-3400 |
| F4PNMV2-HC | Self Flare | FSJ4-50 | Captive, Spring finger | MCPT-1412 |
| F4PNR-C | Right Angle Self Flare | FSJ4-50 | Captive, Spring finger | MCPT-1412 |
| L4TNM-PS | Ringflare | LDF4-50 | Captive, Spring finger | MCPT-L4 |
| AL5NM-PSA | Self Flare | AVA5-50/AL5-50 | Captive, Spring finger | MCPT-78 |
| AL7NM-PSA | Ringflare | AVA7-50/AL7-50 | Captive, Spring finger | CPTL7 |
| 12EZNM | Clamp Tri Metal Plated | FXL-540 | Captive | 540-E2PT/12HPT |
| 78EZNM | Clamp Tri Metal Plated | FXL-780 | Captive | 780-E2PT/78HPT |
| 114EZM | Clamp Tri Metal Plated | FXL-1480 | Captive | 1480-PT/114HPT |
| 158EZNM | Clamp Tri Metal Plated | FXL-1873 | Captive | 1873-PT/158HPT |
| Cable Jacks |  |  |  |  |
| 400PNF | Clamp Tri Metal Plated | CNT-400, LMR-400 | Solder | ВСРТ-3400 |
| * See Pages 24 for Crimp Tools Matrix |  |  |  |  |


N-118

$\mathrm{N}-30$

N-204

N-288

N-28
AL5NM-PS

L4TNM-PS

N-119

N-284

N-201


FP Series


The Flat Plate Series are lightweight galvanised clamps with stainless steel U-bolts for mounting in $90^{\circ}$ or in-line applications.

See the table below for mounting applications.

## UB Series



UB1

The UB1 antenna clamps are simple U-Bolt assemblies with "teeth", around the inside of locating plates to prevent the antenna from slipping
or shifting once mounted. Two separate clamps illustrated

See the table below for suggested mounting applications.
Stainless steel U-Bolt assemblies also available: UB2

| CLAMPS | UB1 | UB2 | UNV | UNV2 | FP-1 | FP-2 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Weight per clamp kg | 0.21 | 0.19 | 0.41 | 0.48 | 1.5 | 1.5 |
| Body Finish | Zinc plated | Stainless Steel | Galvanised | Stainless Steel | Galvanised | Galvanised |
| Fastener Finish | Zinc plated | Stainless Steel | Galvanised | Stainless Steel | Stainless Steel | Stainless Steel |
| Min. boom size mm | 25 | 25 | 20 | 20 | 25 | Min. sq boom size 19 <br> Min. boom size 30 |
| Max. boom size mm | 52 | 52 | 52 | 52 | 50 | 50 |
| Application | In-line mounting small colinear <br> and ground plane antennas | Mount small antennas <br> in $90^{\circ}$ arrangement | Right angle mounting <br> of antenna or tube |  |  |  |

## 4 SWITCHBOARD WORKS TEST RESULTS

## J. \&P. RICHARDSON INDUSTRIES PTYLTD

114 Campbell Avenue, WACOL QLD 4076 Ph: (07) 327I 2911 -Fax: (07) 32713623

E-mail: jpr@jpr.com.au
$C 54464$

## SWITCHBOARD \& SHEETMETAL INSPECTION REPORT



## J. \& P. RICHARDSON INDUSTRIES PTY. LTD.

114 Campbell Avenue, WACOL QLD 4076 Ph: (07) 32712911 - Fax: (07) 32713623

E-mail: jpr@jpr.com.au

## SWITCHBOARD / SHEETMETAL INSPECTION CHECKLIST

| CLIENT: QUCl |  |  |  | JOB NO:C/S/M 54464 |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| PRODUCT DESCRIPTION: SPO46 ROIIICELLI street Sewage Pump station |  |  | DRAWING \& SCHEDULE NUMBERS 486/5/71-0258-000A. |  |  |
| CONSTRUCTION | Q QuAlity |  | COMPLIANCE WITH DRAWINGS |  | REMARKS ORACTION |
| . . | GOOD | POOR | YES | NO |  |
| 1. Folds | r |  | $l$ |  |  |
| 2. Welds | $\bigcirc$ | . | $r$ |  |  |
| 3. Edges / File |  |  |  |  |  |
| 4. Gauge |  |  | 1 |  |  |
| 5. Material ' | $\cdots$ |  | 7 |  |  |
| 6. Ventilation Openings / Filter Bracket |  |  | 1 |  |  |
| 7. Water Ingress Test |  |  | $l$ |  |  |
| 8. Equipment Mounting Arrangement |  |  | $l$ | . |  |
| 9. Doors Stiffened | \% |  | $l$ |  |  |
| 10. Escutcheons and Lexan Covers | . |  | $\checkmark$ |  |  |
| 11. Cable Saddles |  |  | 1 |  |  |
| 12. Grinding - |  |  | / |  |  |
| 13. Door Stays Fitted |  |  | 7 |  | * |
| 14. Earth Studs |  |  | 7 |  |  |
| 15. Rubber Retainer |  |  | $N / A$ | . |  |
| 16. Drawing Holder |  |  | 1 |  |  |
| 17. Hat Sections |  |  | $\checkmark$ |  | $\cdots$ |
| 18. Locking Bars Fitted |  |  | $\checkmark$ |  |  |
| 19. External Crevice Welded and Ground | $\because$ |  | 1 |  |  |
| 20. Legend Cards |  |  | 7 |  |  |
| 21. General Conditions Satisfactory |  |  | $\stackrel{ }{7}$ |  |  |
| 22. Cabinet Clean |  |  | 7 |  |  |
| 23. Job Name and Number Marked on Board and Panels |  |  |  | - | $\because$ |
| 24. Lap Top Tray |  |  | $\checkmark$ |  |  |
| 25. Gland Plates Fitted . |  |  | 7 |  |  |
| 26. Sunshields Fitted |  | - | $/$ |  |  |


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| :---: | :---: | :---: | :---: | :---: | :---: |
| CONSTRUCTION | QUALITY |  | COMPLIANCE WITH DRAWINGS |  | REMARKS OR ACTION |
|  | GOOD | POOR | YES | NO |  |
| 27. Mullion Welded to Divider |  |  | $J$ |  |  |
| 28. Double Hinge Meter Panel Fitted |  |  | / |  |  |
| 29. Plinth Fitted |  |  | / |  |  |
| 30. Wall Mount Brackets |  |  | / |  |  |
| 31. Light Switch Brackets |  |  | 7 |  |  |
| 32. Cowls |  |  |  | 7 |  |
| INSPECTED BY: JTuegt | ATE: 1 | $6 / 12$ |  |  |  |
| AFFIX STATUS HERE $\quad \begin{aligned} & \text { Yellow } \\ & \text { Green } \\ & \text { Red }\end{aligned}$ | Awaiting Inspection <br> Inspected/Tested Passed <br> Inspected/Tested Awaiting Rectification |  |  |  | , |

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SWITCHBOARD ELECTRICAL INSPECTION \& TEST REPORT


|  |
| :---: |

$\square$

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E-mail: jpr@jpr.com.au
SWITCHBOARD CONTINUITY \& INSULATION TEST REPORT


| InSuramurest |  |  |  | 1變Btitow |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1000 v Test (M) | 50 | 366 | 562 | $50 \%$ | 500 | 5rem |  |
| 2.5 kV Test (mA)* |  |  |  |  |  |  |  |
| 1000 v Test (MA) |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| *285KY \%estarimminues |  |  |  |  | [3/3max | 2Wew | 2-x M |
| Comments: |  |  |  |  |  |  |  |

## SWITCHBOARD ELECTRICAL INSPECTION \& TEST REPORT EARTH LEAKAGE TEST



## SWITCHBOARD ELECTRICAL INSPECTION \& TEST REPORT VFD \& SOFT STARTER SETUP

Customer Name: $\quad \mathbb{Q} \cup X$

Project: BOTTME SQ 1 S7\% Peril ST9TION

JPR Job No: 1754464
Item: $S P 246$
Drive:
Constructed by: Jo NoRRN
Drive Type: $\quad V \angle T \quad M C D-5 \infty 0$
Drive Rating:
Drive Setup Details:


## All other parameters are default settings.

Comments:
Drive if address set as per instruction from JOHN Claton

## LIVE LOW VOLTAGE WORK

## TESTING SWITCHBOARDS AND CONTROL PANELS WITHIN OUR MANUFACTURING PREMISES

APPROVED BY: Eric McCulloch (WHSO)
LOCATION: WACOL WORKSHOP DATE: 23.1 .2 .12


I understand and am fully aware of the requirements of this job safety analysis.


## LIVE LOW VOLTAGE WORK

TESTING SWITCHBOARDS AND CONTROL PANELS WITUIN OUR MANUFACTURING PREMISES

APPROVED BY: Eric McCulloch (WHSO)
LOCATION: WACOL WORKSHOP
DATE: 24..7..! \%

| AUTHORISATIONS | PERSONAL PROTECTIYE EQUIPMENT |  |
| :---: | :---: | :---: |
| - Authorisation from person in charge | YES <br> - Long cotton clothing <br> - Insulating work gloves in test <br> - Insulating mats / covers in test <br> - Switchboard rescue kit in test | 0 YES <br> (0) YES <br> $\emptyset$ YES <br> Of YES |
| TASK <br> LIVE LOW VOLTAGE WORK <br> TESTING SWITCHBOARDS <br> AND CONTROL PANELS WITHIN OUR MANUFACTURING REMISES <br> OPTION <br> OPTION | - Isolation points identified and accessible <br> - Work area clear of obstructions <br> - Unauthorised access prevented to work area <br> - P.P.E. is fit for purpose <br> - Test equipment is fit for purpose <br> - Written authority to proceed has been obtained from a person in charge. <br> - JPR authorisation to conduct live work is current <br> - Approved dedicated power supply only used for testing. <br> - Approved dedicated power supply in current test <br> (A) RCD protected outputs used at power supply <br> $>$ RCD protection checked daily prior to use <br> $>$ Safety Observetis / is not required <br> (B) Non RCD protected outputs used at power supply <br> $>$ Supervisor consulted prior to use <br> $>$ Safety Observer is in attendance | 0  <br> 0 YES <br> 0 YES <br> 0 YES <br> 0 YES <br> 0 YES <br> 0 YES <br> 0 YES <br> 0 YES <br> $\square$ YES <br> 0 YES <br> 0 YES <br> 0 YES <br> 0 YES <br> $\square$ YES <br> $\square$ YES |

I understand and am fully aware of the requirements of this job safety analysis.

| Signatures: | $1 . \leqslant$ 寿 | 2. | 3. | 4. | 5. |
| :--- | :--- | :--- | :--- | :--- | :--- |

## 5 "AS INSTALLED" DRAWINGS

## \section*{OUEENSLAND} <br> UrbanUtilities

## SP046 BOTTICELLI STREET SEWAGE PUMPING STATION <br> SITE COVER SHEET



| STANDARD DESIGN OPTIONS |  |  |
| :---: | :---: | :---: |
| OPTION | DESCRIPTION | FITTED |
| A | INDIVIDUAL PUMP MOIS TURE IN OIL IMIO）SENSOR AND FAUL T RELAY | N0 |
| B | INDIVIDUAL PUMP MOTOR AUX PROTECTION SENSORS AND FAULT RELAYS | N0 |
| C | INDIVIIUUAL PUMP REFLUX VAL VE MICROS WITCH | N0 |
| D | STA TION MANHOLE SURCHARGE MMIINENT | No |
| E | STA TION DRY WELL SUMP PUMP AND LE VEL INOICATION SENS ORS AND RELA Y | N0 |
| F | STATION PERMANENT GENERA TOR－ATS AND CONTROL CONNECTIONS | N0 |
| G | STATION EMERGENCY STORA GF LEVEL SENSOR | No |
| H | STATION DELIVERY FLOWMETER | N0 |
| 1 | BACKUP COMMUNICATION－ | N0 |
| J | PUMP CONNECTION（Via De－contactors） | YES 戌 |
| K | CATHODIC PROTECTION | YES |
| L | MOTOR THERMISTORS（Via Intergrated Disconnect Cubicle） | YES 㲎 |
| M | ODOUR CONTROL | N0 |
| N | CURRENT TRANSFORMER（CT）METERING | 区 No |
| 0 |  | YES NO |
| P | WET WELL WASHER | N0 |
| 0 | AUX PIT SUMP PUMP AND LEVEL PROBE | N0 |
| R | TELEMETRY RADIO | YES 戌 |
| 5 | WET WELL UL TRA SONG LEVEL SENSOR | 四 No |
| T | DOUBLE SWITCHBOARD PLINTH EXTENSION FITTED | YES |
| U | DELIVERY PRESSURE TRANSMITTER | YES |
| v | CHEMICAL DOSING | ＊N0 |





RESERVED FOR DRY WELL SUMP PUMP

RESERVED FOR GENERATOR ATS



















# RESERVED FOR generator connection cubicle 


(2)


## 6 SERVICE \& MAINTENANCE

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

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

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

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

## Periodic checks should ensure

The switchboard is clean and free of any contaminants, which could reduce the insulation properties of the switchboard.
All entries are sealed to ensure no vermin can enter.
There is no evidence of overheating, arcing or moisture.
The earthing system is maintained and is adequate to allow correct operation of protective devices.
Insulation resistance is maintained to appropriate levels.
Check terminations for correct tension.
Test operation of protective devices.
Re-calibrate instrument loops as required.
Refer to AS-BUILT electrical drawings for details of protection equipment settings.
No special tools or equipment are required to perform routine maintenance.


[^0]:    Notes: ${ }^{1}$ ) Negative pole connected to earth
    ${ }^{2}$ ) Centre point earth connection

[^1]:    Note: ${ }^{1}$ ) Ordering sheet refer page 9-20
    ${ }^{3}$ ) Height includes attached busbar on MCCBs $630 \mathrm{~A} \&$ above.
    ${ }^{2}$ ) Depth excludes toggle.
    ${ }^{4}$ ) Detailed dimensions including 4 pole types refer following pages.

[^2]:    Note: ${ }^{1}$ ) Ordering sheet refer page 9-20.
    ${ }^{2}$ ) Height includes attached busbar on sizes $630 \mathrm{~A} \&$ above.
    ${ }^{3}$ ) Depth does not include rear connect busbars. ${ }^{4}$ ) Refer NHP for dimensions (generally similar to 4 pole sizes).

[^3]:    Looking from the front, going from right to left, use the part number SLHUXS1250SE12503FC/XS400SE4003. Specify separately any internal or external accessories required.
    ${ }^{2}$ ) Dimensions include attached busbar, except 2000/2500 A rear connect types. Contact NHP for detailed dimensions.

[^4]:    Notes: ${ }^{1}$ ) Both options 1 and 2 are combined using Carlo Gavazzi relays, which are now standard ${ }^{2}$ ) Options 14 and 15 are available in PLC logic panels only.

[^5]:    4) Two side-mount auxiliaries per contactor only (one on each side).

    Side \& top auxiliary contact blocks can be utilised together.

[^6]:    ** - L1, L2, L3 Cable Size Max. 25 mm²
    $\mathrm{I}_{\text {the }}$ - Conventional Enclosed Thermal Current

[^7]:    * A dual voltage 230/400 V socket-outlet with $3 P+N+E$ accepts a 400 V plug with $3 P+N+E$ or $3 P+E$ as well as a 230 V plug with $1 P+N+E$ (see front cover flap)

[^8]:    (1) metal version: 415 V max
    (2) allows discrimination between several different power supplies (voltage, frequency, $A C$ and $D C$ current)
    (3) achieved as soon as the plug is fully inserted into the socket-outlet or when the socket lid is closed. No rings to turn.

[^9]:    If you want to equip a socket with two or more options:
    call us at +33 (0) 145116000 .

[^10]:    WARNING
    ERICO products shall be installed and used only as indicated in ERICO's product instruction sheets and training materials. Instruction sheets are available at www.erico.com and from your ERICO customer service representative. Improper installation, misuse, misapplication or other failure to completely follow ERICO's instructions and warnings may cause product malfunction, property damage, serious bodily injury and death.

    IEC is a registered service mark of Independent Electrical Contractors, Inc
    UL is a registered trademark of The Underwriters Laboratories, Inc.
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    CADDY, CADWELD, CRITEC, ERICO, ERITECH, ERIFLEX, and LENTON are registered trademarks of ERICO International Corporation.

[^11]:    
    Example D7PD3CX11 = 24 V AC/DC Incandescent lamp block, lamp ordered separately (24, 110, 240 available with LED)
    ${ }^{2}$ ) Enter lamp colour $\mathbf{C}=$ clear (incandescent), $\mathbf{R}=\operatorname{Red} L E D, \mathbf{G}=$ Green LED, $\mathbf{Y}=$ Yellow LED, $\mathbf{W}=$ White LED,
    $\mathbf{B}=$ Blue LED - Example D7PN3RX11 = 24V AC/DC RED integrated LED lamp block.

[^12]:    *1 Final Yologe: $1.80 \mathrm{~V} / \mathrm{col}$, Temperavere $25 \mathrm{C}\left(7 /{ }^{\circ}\right)$

[^13]:    This guide is not inclusive of all catalogue numbers and should be used for reference only, as improper combinations can be achieved.

[^14]:    ${ }^{1)}$ Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.
    ${ }^{2)}$ Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.

[^15]:    ${ }^{3)}$ Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.
    ${ }^{4)}$ Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.
    ${ }^{5}$ ) Connect screen to ground terminal. Connect ground terminal on the outside of the housing as prescribed. The two terminals are galvanically connected.

[^16]:    7) Determined according to the limit point method according to IEC 60770, incl. non-linearity, hysteresis and non-repeatability.

    Limited by the overpressure resistance of the measuring cell.

[^17]:    PHOENIX CONTACT Inc., USA
    Page 1 / 3 http://www.phoenixcon.com

[^18]:    PHOENIX CONTACT GmbH \& Co. KG
    Page 2 / 5
    http://ww .phoenixcontact.de
    Jul 10, 2009

[^19]:    PHOENIX CONTACT GmbH \& Co. KG
    Page $2 / 7$ http://www.phoenixcontact.de

[^20]:    Fuse terminal blocks in interconnected arrangement, block consisting of 5 fuse terminal blocks

