BROYCE CONTROL

Passionate about protection and control

Product Technical Information

Issue 2.0

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• earth leakage relays • earth fault relays • overcurrent relays • three phase relays • time delay relays • control relays • level control relays • pump control relays •

• speed control relays • temperature control relays • protection devices • generator protection • hours run meter • sockets • bespoke products •

BROYCE CONTROL

NEW earth leakage relays

earth fault relays

overcurrent relays

NEW three phase relays

time delay relays

NEW control relays

level control relays

NEW pump control relays

speed control relays

NEW temperature control relays

protection devices

generator protection

hours run meter

NEW discontinued

bespoke & special products

Product FOCUS

Select your category above and click….!

Click here for New Products

Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN. England
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BROYCE CONTROL

new products

• Earth Leakage relay with dual outputs

We have introduced a variant of the ELRM44 that offers the user two relay outputs that operate simultaneously. The relays are configured to energise when the ELR trips which provides the user with the option to use one contact to operate the main switching device (i.e. shunt trip) and the other contact to be used for operating a lamp or buzzer for example.

Three models are available with limiting maximum trip settings of 3A, 10A and 30A.

ELRM44V-(3, 10 or 30)/2

- 2 Relay outputs
- Both relays energise on trip
- 3 models available (3A, 10A and 30A)
- Selectable trip level
- Selectable time delay
- Toroid open and short circuit detection
- Remote Test and Reset option
- DIN Rail mounting

Click on a product part number to take you straight to a comprehensive technical data sheet!

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BROYCE CONTROL

new products

• Earth leakage relays

We are pleased to introduce our new range of advanced Earth Leakage Relays built on the success of the ELRM44 but now incorporating a new level of technology. Both products include NFC (Near Field Communication) that allows the user to both configure/set-up the Earth Leakage Relay and also retrieve data from it using their compatible smartphone and installed app[1]!

Two current sensing ranges are offered, 30mA to 30A as previously offered on the ELRM44V-30 but also a lower sensing range of 6mA to 1A. This lower range makes the product ideal for very sensitive applications such as personnel protection around swimming pools, in hospitals, etc.

A new, internal switched-mode power design offers advantages such as covering several key voltages in one unit with emphasis on energy efficiency, overcoming the risk of incorrectly connecting to the wrong supply voltage type and reducing the overall product weight.

Key features

- Compliant with IEC 60947-2 / Annex M
- NFC option
- Two ranges available
  - 6mA – 1A (Model: ELR01PN)
  - 30mA – 30A (Model: ELR30PN)
- True RMS
- Type A
- Latch or Auto-reset tripping modes
- Single button Test/Reset
- Wide operating supply voltage – 24 - 230V AC/DC

Key features when NFC specified and app installed

- Ability to set:
  - Trip level
  - Time delay
  - Ratio to match externally connected toroid
  - Bandwidth
  - Relay operation
- Auto-reclosure option
- View live R.M.S. measurement
- Retrieve historical data:
  - Last trip information
  - Event recording
- Product status (trip and time delay settings, relay status, etc)

ELR01PN/30PN

- Configured using installed app on Smartphone[3]
- Selectable trip level
- Selectable time delay
- Toroid open and short circuit detection
- Remote Test and Reset option
- 2 Relay outputs – user configurable
- DIN Rail mounting

[1]App available from

GET IT ON Google Play

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BROYCE CONTROL

new products

• Three phase relay - DPDT

The new PUVR44 Under voltage relay is designed to monitor a three-phase 4-wire supply for an under voltage condition on one or more phases. It can also detect phase and neutral loss. The product offers the user a choice 6 selectable nominal voltages as well as adjustments for under voltage trip setting, differential setting and time delay. Wide operating supply voltage, clear LED indication for supply and relay status and DPDT relay output complete the features offered.

Due to the nature of the design, the product is also capable of being used in applications that suffer from disturbances on the supply such as excessive overvoltage's and harmonics. Such key features ensure that the product will continue to operate and only trip when a genuine fault occurs.

PUVR44

- Designed to withstand overloads up to 125% continuous (150% for 10s)
- Suited to 3P + N supplies
- 6 Selectable nominal voltages (220, 230, 240, 254, 265 and 277V L>N)
- Adjustable Differential and Under voltage trip level
- Adjustable Time delay
- DPDT Relay output 8A
- DIN Rail mounting

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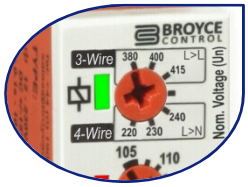
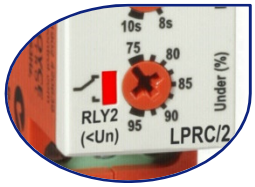
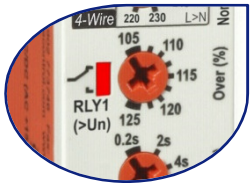
BROYCE CONTROL

new products







UL LISTED L-Series

• Single and Three phase relays - DPDT

Extending the L-Series range of Phase monitoring relays further is the **introduction of the Double-Pole variants providing either two SPDT or one DPDT relay outputs (model dependant).** A nominal voltage selector switch allows the user to set the product to monitor either a 3-wire or 4-wire supply and with a choice of key nominal voltages. This flexibility ensures these products will suit most applications. **These products along with the "LX" products are all UL Listed.**

New to the range also are Phase asymmetry relays offered in two product variants – the LPRA/2 and LPMP/2. The LPMP/2 has in addition to the LPRA/2 has fixed under and over voltage monitoring as well as a restart delay. For example, this particular model is suitable for the control of compressors in the air conditioning market.

A single phase under and over voltage monitor is also available which has independent relay outputs so that an under voltage condition can be distinguished from an over voltage condition simply by the relay contacts that operate during these conditions.

Finally, for the existing "LX" products, we have added the LXPRC/S/RD which now replaces the MXPRC/S/RD. (This has a SPDT relay output).

Installation of these products is easy and straightforward and the clearly marked adjustments allow for quick setting of the user definable parameters. The slim line design (just 17.5mm wide) allows these relays to be used in even the most compact installations!

Clear LED indication allows the installer/user to visually check the status of the supply and internal relay. These indicators also serve as a means of diagnosing an application during a fault condition.

Key features

- True RMS
- Selectable 3-wire or 4-wire monitoring modes[2]
- Selectable nominal voltages
- Adjustable Trip level(s)
- LED indication showing supply and relay status
- Compact DIN rail enclosure (17.5mm wide)
- QR code for each product allows smartphone users to access to the latest data sheets
- UL Listed
- Bespoke^

[2] *Excludes LXPRC/S/RD and LCVR/2*

^ Contact Sales for further information

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NEW L-Series

• Single and Three phase relays - DPDT (continued)

3-Phase, 3 or 4-wire

LPRC/2
- Under and Over voltage monitoring
- Phase and Neutral Loss[3]
- Phase Reversal
- Adjustable Time delay
- Independent Relay outputs
- 2 x SPDT Relays 5A

LPRT/2
- Under voltage monitoring
- Phase and Neutral Loss[3]
- Phase Reversal
- Adjustable Time delay
- DPDT Relay 5A

LPRD/2
- Under monitoring
- Phase and Neutral Loss[3]
- Phase Reversal
- Adjustable Restart delay
- Adjustable Time delay
- DPDT Relay 5A

3-Phase, 3 or 4-wire

LPRA/2
- Phase asymmetry detection
- Phase and Neutral Loss[3]
- Phase Reversal
- Adjustable Time delay
- DPDT Relay 5A

LPMP/2
- Under and Over voltage monitoring
- Phase and Neutral Loss[3]
- Adjustable Restart delay
- Adjustable Time delay
- DPDT Relay 5A

Single Phase

LCVR/2
- Under and Over voltage monitoring
- Adjustable Time delay
- Independent Relay outputs
- 2 x SPDT Relays 5A

[3] Neutral loss detection only possible if 4-wire monitoring mode selected.

Click on a product part number to take you straight to a comprehensive technical data sheet!

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new products

L-Series

• Thermistor relay

Our new Thermistor relay is designed to be used in conjunction with a PTC thermistor for monitoring over temperature in a motor winding. The Operate and Release resistances are fixed at pre-defined thresholds which are in accordance with standard DIN 44081.

Key features

- 17.5mm wide
- Auto-resetting
- Multi-voltage supply voltage – 100 - 230V AC/DC suits global applications
- Isolated Auxiliary supply

LTMR

- Over Temperature detection
- Used in conjunction with PTC thermistor (to DIN 44081)
- Operate resistance 3100Ω
- Release resistance 1650Ω
- DIN Rail mounting

Click on a product part number to take you straight to a comprehensive technical data sheet!

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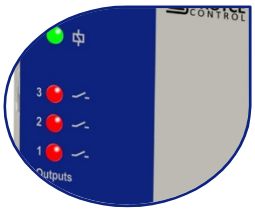
new products



• Logic relays[4]

Two new Logic Relays are available with a fixed switching pattern and are aimed predominantly at balancing the wear between pumps or compressors by alternating the operation of each. The LR44/2 can switch up to two loads whereas the LR44/3 can switch up to 3.

These relays include a "Help" function that allows the other relay outputs to energise if required. This feature is useful should it be necessary to have multiple loads running at the same time when one load is unable to keep up with the demand.

Key features

- Multi-voltage supply voltage – 100 - 230V AC/DC suits global applications
- Help function
- Customisable (contact sales to discuss your requirements)

[4] Also known as "Load Sharing Relay" or "Alternating Relay"

LR44/3

- Accepts up to 3, Voltage-free, N.O. contacts
- "Help" function
- 3 Relay outputs
- Wide auxiliary operating supply voltage 85 – 265V AC/DC
- DIN Rail mounting

LR44/2

- Accepts up to 2, Voltage-free, N.O. contacts
- "Help" function
- 2 Relay output
- Wide auxiliary operating supply voltage 85 – 265V AC/DC
- DIN Rail mounting

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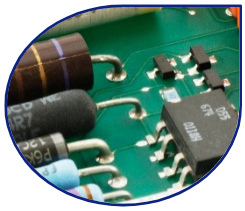

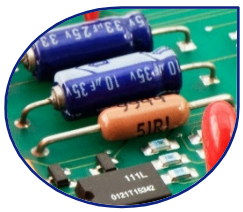

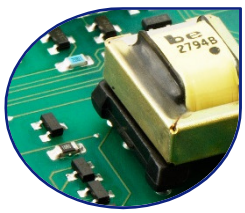

- **Bespoke!**

A key advantage to the L-Series range is the ability to customise the product to suit customer's specific needs. These can range from alternative trip level ranges or fixed trip levels to longer time delays to name but a few.

Using a microprocessor is the key to the L-Series "adaptability" and hence changes made are typically carried out in software. This allows modifications to be simple primarily through software changes and guarantees that sampling the product before a production run is quick!

Contact Sales to discuss you specific requirements.

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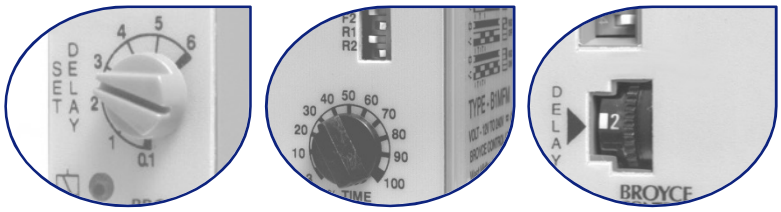

• Discontinued items cross reference

The following cross reference table shows the products that have now been made obsolete and their replacements.

Old Part Number	Replaced by:	
Click part number below to take you to product data sheet[5]	*Click part number below to view data sheet within this catalogue*	*Click part number below to view data sheet on our website*[5]
45050	LMCVR-500V	LMCVR-500V
45051	LCVR/2	LCVR/2
45080	*No replacement*	
45081	LXPRT	LXPRT
45085	LPRC/2	LPRC/2
45085-4W	LPRC/2	LPRC/2
45095	LPRA/2	LPRA/2
45150	LMCCR-10A	LMCCR-10A
45205	LR44/2	LR44/2
45OCR	LMCCR-10A	LMCCR-10A
45OVR	LMCVR-500V	LMCVR-500V
45UCR	LMCCR-10A	LMCCR-10A
45UVR	LMCVR-500V	LMCVR-500V
B15*E Relays	*No replacement*	
B1ARM	LART/2	LART/2
B1CVR	LXCVR	LXCVR
B1DF	LEDF	LEDF
B1DFM	*No replacement*	
B1DK	LEDK	LEDK
B1DN	LMMT/2	LMMT/2
B1DO	LEDO/2	LEDO/2
B1DO/WT	LEDO/2	LEDO/2
B1DOF	*No replacement*	
B1LCE	B1LCR	B1LCR
B1LCF	B1LCR	B1LCR
B1LDE	B1LCR	B1LCR
B1LDF	B1LCR	B1LCR
B1LR	LR44/2	LR44/2
B1MAT	LMAT	LMAT
B1MFM	LMMT/2	LMMT/2
B1MFT	LMMT/2	LMMT/2
B1OCS	LMCCR-10A	LMCCR-10A
B1OFZ	45OFR	45OFR
B1OVR	LMCVR-500V	LMCVR-500V
B1PA	LPRA/2	LPRA/2
B1PB	*No replacement*	
B1PR	LXPRT	LXPRT
B1PRC	LXPRC	LXPRC
B1PRC-4W	LXPRC-4W	LXPRC-4W

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B1PRF	LXPRF	LXPRF
B1RF	LART/2	LART/2
B1RN	LART/2	LART/2
B1TS	LRTM/2	LRTM/2
B1UCS	LMCCR-10A	LMCCR-10A
B1UFZ	45UFR	45UFR
B1UVR	LMCVR-500V	LMCVR-500V
B1YD	LEYD/A	LEYD/A
B8DF	LEDF	LEDF
B8DK	LEDK	LEDK
B8DKH	LEDK	LEDK
B8DO	LEDO/2	LEDO/2
B8DO/WT	LEDO/2	LEDO/2
B8DOF	*No replacement*	
B8LCE	B8LCR	B8LCR
B8LCF	B8LCR	B8LCR
B8LDE	B8LCR	B8LCR
B8LDF	B8LCR	B8LCR
B8MAT	LMAT	LMAT
B8PM	LXPRT	LXPRT
B8PM/2	LXPRT	LXPRT
B8PMC	LXPRC/S	LXPRC/S
B8PMU	LXPRT	LXPRT
B8PR	LXPRT	LXPRT
B8PRC	LXPRC	LXPRC
B8RF	LART/2	LART/2
B8RN	LART/2	LART/2
B8TS	LRTM/2	LRTM/2
B8YD	LEYD/A	LEYD/A
BC4 Relay	*No replacement*	
ELRV-10	ELRM44V-10	ELRM44V-10
ELRV-3	ELRM44V-3	ELRM44V-3
ELRV-30	ELRM44V-30	ELRM44V-30
M1ARM	LART	LART
M1BVR	LBVR/A	LBVR/A
M1CVR	LXCVR	LXCVR
M1DFD	LMMT	LMMT
M1DID	LMMT	LMMT
M1DOM	LEDO	LEDO
M1DOM/S	*No replacement*	
M1EDF	LEDF	LEDF
M1EDF/F	*No replacement*	
M1EDK	LEDK	LEDK
M1EDO	LEDO	LEDO
M1EFL	LMMT	LMMT
M1EIN	LEIN	LEIN
M1ESDO	*No replacement*	
M1ESF	LMMT	LMMT
M1ESN	LART	LART
M1ESW	LESW	LESW
M1EYD	LEYD/A	LEYD/A
M1EYD/2	LEYD/A	LEYD/A
M1ISM	LEIN	LEIN
M1ISM/S	*No replacement*	
M1MFM	LMMT	LMMT
M1MFR	LXCVR	LXCVR
M1MFT	LMMT	LMMT
M1PR	LXPRF	LXPRF

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M1PRC/S	LXPRC/S	LXPRC/S
M1PRC/S-4W	LXPRC/S-4W	LXPRC/S-4W
M1PRT	LXPRT	LXPRT
M1PRT-4W	LXPRT-4W	LXPRT-4W
M1SMT	LMMT	LMMT
M1UVR	*No replacement*	
M3DOM	LEDO/2	LEDO/2
M3FFR	LR44/2	LR44/2
M3LS3	LR44/3	LR44/3
M3MCR	LMCCR-10A	LMCCR-10A
M3MFT	LMMT/2	LMMT/2
M3MVR	LMCVR-500V	LMCVR-500V
M3PA	LPRA/2	LPRA/2
M3PR	LXPRT	LXPRT
M3PR-4W	LXPRT-4W	LXPRT-4W
M3PRC	LXPRC	LXPRC
M3PRC-4W	LXPRC-4W	LXPRC-4W
M3PRC/S	LXPRC/S	LXPRC/S
M3PRC/S-4W	LXPRC/S-4W	LXPRC/S-4W
M3PRC/S/2	LPRC/2	LPRC/2
M3PRC/S/2-4W	LPRC/2	LPRC/2
M3PRT	LXPRT	LXPRT
M3PRT-4W	LXPRT-4W	LXPRT-4W
M3PRT/2	LPRT/2	LPRT/2
M3PRT/2-4W	LPRT/2	LPRT/2
M3RFM	LART	LART
M3RNM	LART	LART
M3RTM	LRTM/2	LRTM/2
M3VRC	*No replacement*	
MXCVR	LXCVR	LXCVR
MXPRC	LXPRC	LXPRC
MXPRC-4W	LXPRC-4W	LXPRC-4W
MXPRC/S	LXPRC/S	LXPRC/S
MXPRC/S-4W	LXPRC/S-4W	LXPRC/S-4W
MXPRC/S/F	LXPRC/S/F	LXPRC/S/F
MXPRC/S/RD	LXPRC/S/RD	LXPRC/S/RD
MXPRF	LXPRF	LXPRF
MXPRF-4W	LXPRF-4W	LXPRF-4W
MXPRT	LXPRT	LXPRT
MXPRT-4W	LXPRT-4W	LXPRT-4W

[5] Requires internet connection

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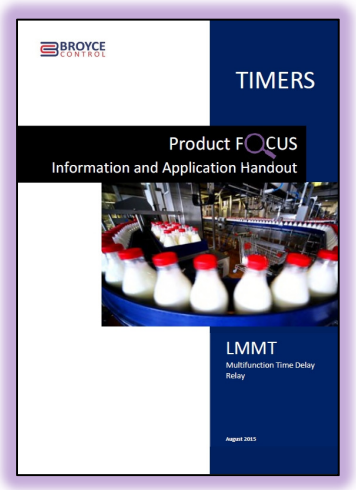
• Product FOCUS Handouts

Our recently introduced **Product FOCUS** handouts provide customers with detailed technical information about specific products. The documents contain information specific to a particular "key" product and provides technical information that covers:

- Overview about the product
- What it's used for
- Where it's used
- User settings/controls and indicators
- Other products that may be available in the same range
- Glossary of terminology used with that type of product

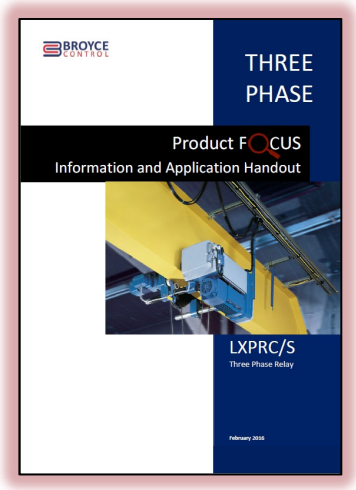
Examples below cover the products taken from our current range of Timers, Earth Leakage and Three Phase Relays.

LMMT



ELRM44V-30

LXPRC/S



[6] Click on one of the above images to find out more!

Our aim is to further the knowledge and understanding of our key products within the industry such that users become more familiar with them and generally how they operate.

We believe these documents (of which are constantly being added to and covering other product types) will help benefit specifiers, installers and end users alike.

[6] Requires internet connection

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QMS ISO 9001 REGISTERED
ISO 9001:2015
Cert. No. 14125771

earth leakage relays

- Type A – With NFC Technology
- Type A – Variable Sensitivity / Time Delay
- Type A – Fixed Sensitivity / Time Delay
- Type A – with Integral Toroid
- BZCT Circular Toroids
- BZCTR Rectangular Toroids

Choose your category

Click the above for further information…!

Click here for Main Page

Type: ELRM44V-3/2, V-10/2 & V-30/2 (0.5s)

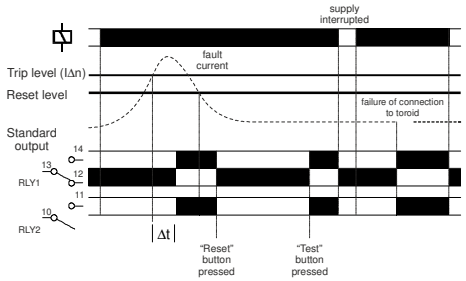
Earth Leakage Relay (Variable) - Type A

- **44mm (2.5 modules) wide DIN rail housing**
- **2 Relay outputs – (S.O.) Standard Output operation (Relays energise on trip)**
- **3 Models available (3A, 10A and 30A)**
- **Designed to monitor and detect true RMS earth fault currents (up to 30A) in conjunction with a separate toroid**
- **LED bargraph provides constant indication of any leakage current**
- **Microprocessor controlled with internal monitoring (self-checking)**
- **Adjustable Sensitivity (IΔn) and Time Delay (Δt) - 0 (instantaneous)* to 0.5 seconds**
- **Separate "Test" and "Reset" push buttons**
- **Connection facility for remote "Test" and "Reset" push buttons or N.O. contacts**
- **Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)**
- **LED indication of Supply status and fault condition after unit has tripped**

Dims:
to DIN 43880
W 44mm

Terminal Protection to IP20

• FUNCTION DIAGRAM



• INSTALLATION

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below (N.B. certain features may not be required and therefore do not need to be connected).
- Apply power, the green **"supply on"** LED will illuminate and the relays will remain de-energised. The relays will energise if:

  a, the fault current level exceeds the set trip level (IΔn)
  b, there is a failure of the connection between the relay and the toroid (Note the red **"tripped"** LED will flash during this condition)

- Prior to a fault occurring, the LED bargraph will indicate the % of IΔn being detected (the display is scaled between 25, 50, and 75% of the actual trip level). After all 3 LED's have illuminated and the unit trips due to an excessive fault current, the red **"tripped"** LED will illuminate. The unit will now remain in a latched condition.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the **"Test"** button on the front of the unit (or by pressing the remote **"Test"** button - if fitted). The output relays operate accordingly.
- Press the **"Reset"** button on the front of the unit (or remotely - if fitted) to reset the unit. The output relays revert back to their "non-tripped" state.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

Troubleshooting

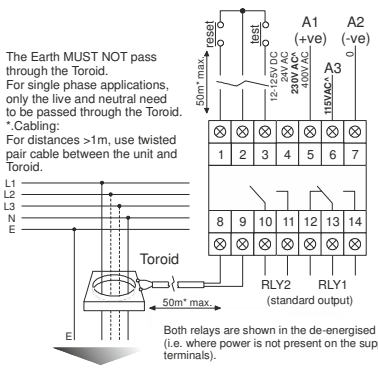
- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

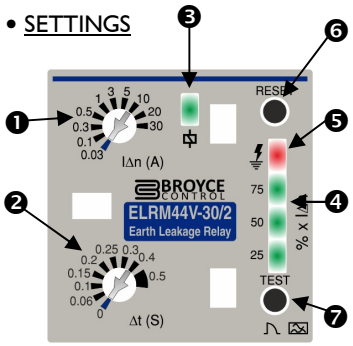
The operating function of this unit is classed as a **Type A** for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping . This unit will also satisfy the requirements for **Type AC** devices which only need to detect residual alternating currents.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc).

• CONNECTION DIAGRAM



• SETTINGS



Key:
1. Trip setting adjustment (IΔn) in Amps
2. Time delay adjustment (Δt) in Seconds
3. Green "Power On" LED indication
4. Green "Leakage Current" LED indication (% x IΔn)
5. Red "Tripped" LED indication
6. "RESET" button
7. "TEST" button

• TECHNICAL SPECIFICATION

Please state Supply voltage when ordering.

Supply voltage Un (5, **6**, 7):	12 - 125V DC (85 - 110% of U)
(see connection diagram)	24, 115/230, 400V AC (85 - 115% of Un)
All AC supplies are galvanically isolated between Supply and Toroid and remote test/reset connections.	
Frequency range:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	800V (24V AC supplies), 2.5kV (115V AC supplies)
(1.2 / 50µS) IEC 60664	4kV (230V, 400V AC supplies)
Power consumption (max.):	6VA (AC supplies) 5W (DC supplies)
Monitored leakage current:	Up to 30A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 8 and 9)
Sensitivity IΔn (see Accessories also)	
ELRM44V-3/2	30, 50, 100, 200, 300, 500, 750mA, 1, 2, 3A (user selectable)
ELRM44V-10/2	30, 100, 300, 500, 750mA, 1, 3, 5, 7.5, 10A (user selectable)
ELRM44V-30/2	30, 100, 300, 500mA, 1, 3, 5, 10, 20, 30A (user selectable)
Trip level limits:	80 - 90% of IΔn
Reset Value:	≈ 85% of tripped level
Time delay Δt:	0*, 60, 100, 150, 200, 250, 300, 400, 500mS (user selectable)
Actual delay for "0" or "Instantaneous" is <25mS when fault current @ 5 x IΔn.	

Note:
1. For IΔn setting of 30mA, the time delay is fixed to 0 (instantaneous) and is not adjustable (i.e. any other time delay cannot be selected when 30mA is set).
2. The unit is factory set to 30mA trip and instantaneous delay. Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

Reset time:	≈ 2S (from supply interruption)
LED indication:	
Power supply present:	Green
Bargraph:	Green x 3 (25, 50 and 75% of actual trip level)
Tripped:	Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button
Ambient temp:	-20 to +55°C (-5 to +40°C in accordance with IEC 60755)
Relative humidity:	+95%

Output :	1 x SPNO, 1 x SPDT relays		
Output rating:		RLY 1 (12, 13, 14)	RLY 2 (10, 11)
	AC1 (250V)	8A (2000VA)	6A (1500VA)
	AC15 (250V)	2.5A	4A
	DC1 (25V)	8A (200W)	6A (150W)

Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Remote "Test" / "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)
Minimum trigger time:	>80mS (Actual trigger time = 80mS + Δt setting for remote "test")
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 190g (AC power supplies) ≈ 110g (DC power supplies)
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm² stranded, ≤ 4mm² solid
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5, -6, -12 and -16. CISPR 22. CE and Compliant.

( ) Numbers in brackets shown above refer to terminal numbers on the relay housing.

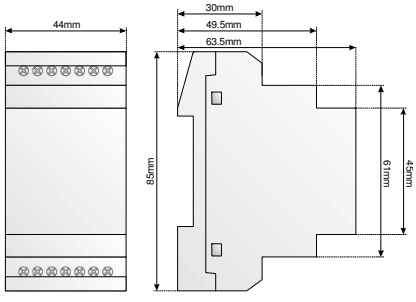
- **Options**

1. For other supply voltages, alternative trip levels or time delays, please consult the sales office.

- **Accessories – Toroids**

Toroid Type:	Internal diameter:	IΔn (min.) A	Toroid Type:	Internal diameter:	IΔn (min.) A
BZCT035	35mm Ø	0.03	BZCT120	120mm Ø	0.1
BZCT050	50mm Ø	0.03	BZCT160	160mm Ø	0.1
BZCT070	70mm Ø	0.03	BZCT210	210mm Ø	0.3

• MOUNTING DETAILS



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ELRM44V_2-1-A.DOC

ISO 9001:2015
Cert. No. 14125771

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: ELR01PN/30PN

Earth Leakage Relay – Type A (with NFC Technology)

Terminal Protection to IP20

Dims: to DIN 43880
W. 44mm

- Programmable user settings/adjustments
- Built-in NFC (Near Field Communication) allows user to access and change settings via compatible Smartphone with installed app^ as well as retrieve historical data
- Two ranges available 6mA – 1A (ELR01PN) and 30mA – 30A (ELR30PN) – True R.M.S. measurements
- Option to select alternative toroid ratio, tripping method (latch or auto-reclosure modes), output relay logic (pre-alarm, energise or de-energise on trip) and filter cut-off points
- Connection facility for remote "Test" and "Reset" push buttons or N.O. contacts
- Toroid open and short-circuit detection forces unit to trip (Red LED flashes during this condition)
- 2 Relay outputs – Relay 1 (SPDT) and Relay 2 (SPNO) - User configurable
- Wide auxiliary operating supply voltage - 24 – 230V AC/DC
- Compliant with IEC 60947-2 / Annex M

NFC™

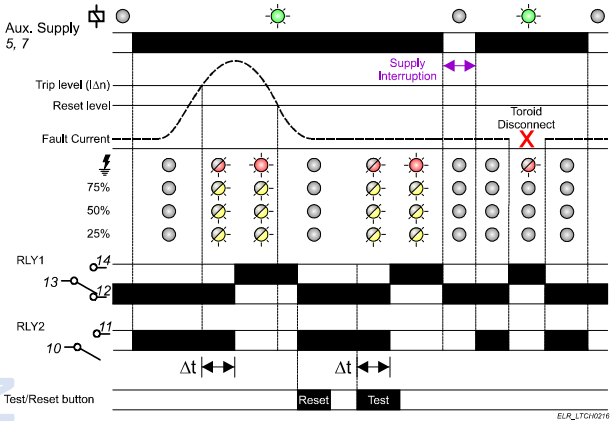
^ App available from:

GET IT ON Google Play

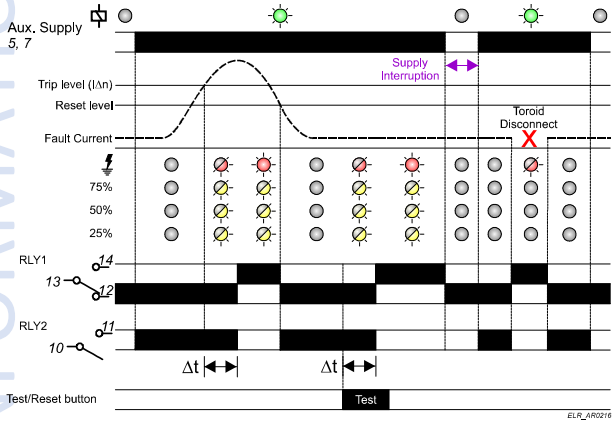
FUNCTION DIAGRAMS

The following operational modes are either enabled using the App or by adding external links

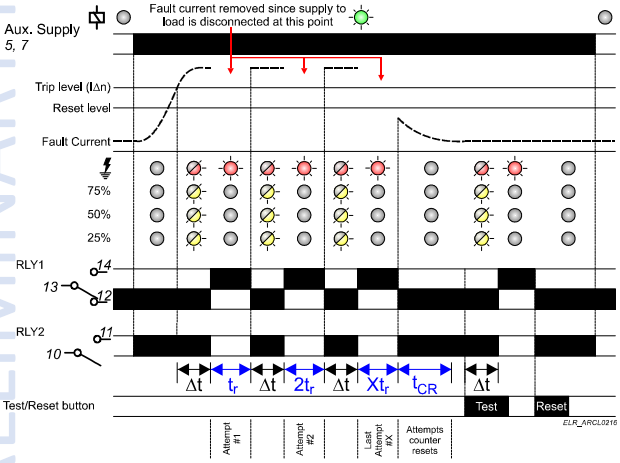
Latching mode (factory default)



Auto-reset mode (enabled by linking terminals 1 and 2)



Auto-reclosure mode (enabled via App)



Note: relays are shown operating in their factory default states
i.e. RLY1 = Standard Output and RLY2 = Positive Safety Output

LED legend
Off On Flashing

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below on the next page (N.B. certain features may not be required and therefore do not need to be connected).
- Ensure the Auxiliary supply voltage to be connected to terminals 5 and 7 matches the rating of the product.
- A suitably rated fuse should be installed in series with connection to terminal 5 (A1) in order to protect the unit. See Technical specification for further information.

Setting up

- The unit should be set according to the requirements of the application. If setting up via a smartphone, follow the on-screen instructions shown on the app.

Applying power

- Apply power and the green "supply on" LED will illuminate.
- Assuming the relays are in their factory default state will operate as follows: The "positive safety output" (RLY2) relay will energise.
- The positive safety output relay will de-energise if:
  a, the fault current level exceeds the set trip level (IΔn) **
  b, there is a failure of the connection between the relay and the toroid ** (Note the red "tripped" LED will flash during this condition)
  c, the supply to the unit is removed

  ** causes the "standard output" relay (RLY1) to energise in response to the fault condition.
- Prior to a fault occurring, the LED bargraph will indicate the % of IΔn being detected (the display is scaled between 25, 50, and 75% of the actual trip level). After all 3 LED's have illuminated and the unit trips due to an excessive fault current, the red "tripped" LED will illuminate.
- After the fault has cleared, the unit will then continue to operate as follows depending on how initially setup:
  a, remain in the latched state
  b, automatically reset (if the fault current has cleared and terminals 1 and 2 are linked externally)
  c, carry out the auto-reclosing function (if enabled)

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the "Test/Reset" button on the front of the unit (or by pressing the remote "Test" button - if fitted). The output relays operate accordingly. *Note, if the time delay (Δt) is set, the "Test" button must be held for this duration before tripping occurs.*
- Press the same "Test/Reset" button on the front of the unit (or remote "Reset" button - if fitted) to reset the unit. The output relays revert back to their "non-tripped" state.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

Troubleshooting

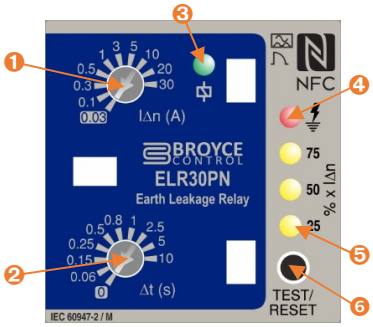
- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

The operating function of this unit is classed as a **Type A** for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping. This unit will also satisfy the requirements for **Type AC** devices which only need to detect residual alternating currents.

SETTING DETAILS

1. IΔn Trip level selector
2. Δt Time delay selector
3. Power on LED indication (Green)
4. "Tripped" LED indication (Red)
5. Bargraph LED indication (Yellow)
6. Combined "Test/Reset" button



PRELIMINARY INFORMATION

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: ELR01PN/30PN

Earth Leakage Relay – Type A (with NFC Technology)

TECHNICAL SPECIFICATION

Auxiliary Power Supply (5, 7)		
Voltage range (Us):	24 – 230V AC/DC	
1.25A (T) rated fuse should be installed in line with terminal 5 (A1)		
Frequency range (AC supply):	50/60Hz	
Supply variation:	85 – 115% of Us	
Auxiliary supply is galvanically isolated from the Toroid and Remote Test/Reset connections		
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	AC: 6VA, DC: 5W	
Monitored input (via external Toroid connected to terminals 8 and 9)		
Unit classification:	Type A	
Measurement principle:	True R.M.S.	
Input DSP filter cut-off	150, 300 or 450Hz *(factory default = 150Hz)*	
External Toroid ratio:	Selectable between 600:1 and 1000:1 in 100:1 steps *(factory default = 1000:1)*	
Monitored leakage current range:	**ELR01PN**	**ELR30PN**
	1.5mA – 1A	7.5mA – 30A
User adjustments		
	ELR01PN	**ELR30PN**
Trip level settings (IΔn):	6mA, 10mA, 30mA, 50mA, 100mA, 200mA, 300mA, 500mA, 750mA, 1A	30mA, 100mA, 300mA, 500mA, 1A, 3A, 5A, 10A, 20A, 30A
Trip level limits:	80 – 90% of IΔn	
Reset level:	≈ 85% tripped level	
Time delay settings (Δt):	0[1], 60ms, 150ms, 250ms, 500ms, 800ms, 1s, 2.5s, 5s, 10s [1] *actual delay when set to 0 (instantaneous) is <25ms @ 5 x IΔn*	

Note:

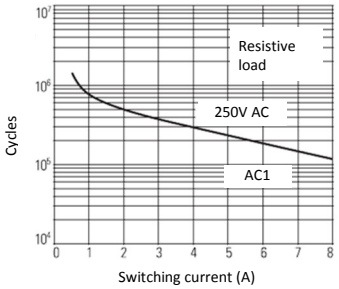
1. For IΔn of 30mA or less (model dependant) the Time delay is fixed to 0 (instantaneous) and is not adjustable (i.e. any other delay cannot be set)
2. The unit is factory set to 30mA (and instantaneous delay). Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

Reset time:	<1s (from supply interruption)	
LED indication		
Power Supply	Green x1	LED is usually permanently lit but will flash if there is a communication error with the smartphone
Tripped	Red x 1	LED flashes during a time out (i.e. before tripping) or if the external toroid is disconnected. LED will also flash prior to unit reclosing if "auto-reclosure" mode enabled.
Bargraph (25, 50, 75%)	Yellow x3	
Test and Reset		
	Front push button	Remote N.O. push button(s)
"Test" method (assuming unit is in the non-tripped state)	Press once to trip the unit	Press "Test" button to trip the unit (connected to terminals 2 and 3)
"Reset" method (assuming unit is in the tripped state and fault current cleared)	Press once to reset the unit	Press "Reset" button to reset the unit (connected to terminals 1 and 2)
Minimum trigger time:	n/a	>80ms + Δt setting (only applicable to remote "Test")
Auto-reset		
To enable:	Place wire link between terminals 1 and 2	
Auto-reclosure		
To enable and adjust parameters:	Via app only	
Reclosure attempts:	Selectable between 1 and 10 *(factory default = 6)*	
Time between reclosure attempts (t_r):	t_r after first attempt which doubles after each attempt i.e. 2t_r, 4 t_r, 8 t_r, etc. Options are: 1, 2.5, 5, 7.5 and 10s *(factory default = 7.5s)*	
Timeout:	Selectable between 1 and 20mins *(factory default = 15mins)*	
Relay operational modes		
To change modes:	Via app only	
	RLY1	**RLY2**
Key (assuming non-tripped state):	S.O. *(factory default)*	P.S.O. *(factory default)*
S.O. = Standard Output (relay normally de-energised)	S.O.	Pre-alarm*
	P.S.O.	P.S.O.
P.S.O = Positive Safety Output (relay normally energised)	S.O.	S.O.
	* Relay energises when Pre-alarm threshold exceeded *(factory*	

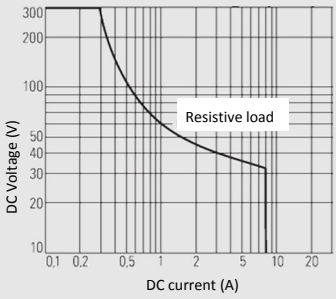
TECHNICAL SPECIFICATION (continued)

Temperature rating		
Operating:	-20 to +60°C	
Storage:	-30 to +70°C	
Relative humidity:	+95% max.	
Output		
	RLY1	RLY2
Terminals:	**12, 13, 14**	**10, 11**
Contact arrangement:	1 x SPDT	1 x SPNO
AC1 (250V)	8A (2000VA)	8A (2000VA)
AC15 (250V)	3A	3A
DC1 (25V)	8A (200W)	8A (200W)

Electrical life:



DC load capacity:



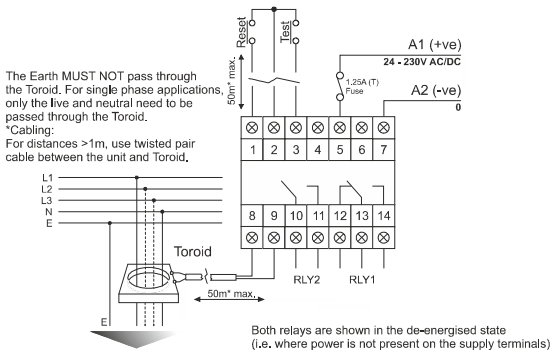
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664
Housing	
Material:	Grey flame retardant Lexan UL94 V0
Weight:	120g
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715

Terminal conductor size			
Cable type:			
Nominal cross section:	0.2 – 4mm²	0.2 – 2.5mm²	0.2 – 2.5mm²
	30 – 12AWG	30 – 12AWG	30 – 12AWG
Stripping length:	6mm		

Standards	
Product:	IEC 60947-2 / Annex M, IEC 60755, IEC 62020
EMC:	IEC 61543, IEC 61000-4 Series, CISPR 22
	CE and RoHS Compliant. C-tick

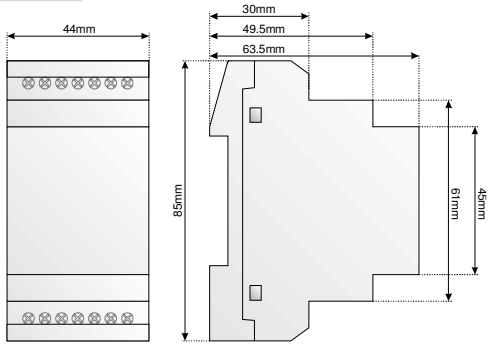
Toroid options			
Part number:	Aperture	Internal diameter/size:	IΔn (min.) A
BZCT035	○	35mm ∅	0.006
BZCT050	○	50mm ∅	0.006
BZCT070	○	70mm ∅	0.03
BZCT120	○	120mm ∅	0.1
BZCT160	○	160mm ∅	0.1
BZCT210	○	210mm ∅	0.3
BZCTR305	□	115 x 305mm	0.3
BZCTR350	□	150 x 350mm	0.3
BZCTR470	□	160 x 470mm	0.3

CONNECTION DIAGRAM



Both relays are shown in the de-energised state (i.e. where power is not present on the supply terminals)

DIMENSIONS



The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: ELRM44V-3/V-10 (0.5S)

Earth Leakage Relay (Variable) - Type A

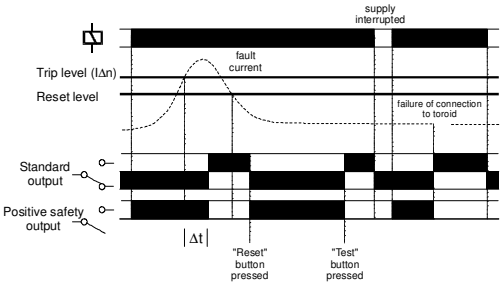
- **44mm (2.5 modules) wide DIN rail housing**
- **2 models available (3A or 10A)**
- **Designed to monitor and detect true RMS earth fault currents in conjunction with a separate toroid**
- **LED bargraph provides constant indication of any leakage current**
- **Microprocessor controlled with internal monitoring (self-checking)**
- **Adjustable Sensitivity (IΔn) and Time Delay (Δt) - 0 (instantaneous)* to 0.5 seconds**
- **Separate "Test" and "Reset" push buttons**
- **Connection facility for remote "Test" and "Reset" push buttons or N.O. contacts**
- **Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)**
- **2 Relay outputs - Standard Output (S.O.) and Positive Safety Output (P.S.O.)**
- **LED indication of Supply status and fault condition after unit has tripped**

Image shown as representative example

Dims:
to DIN 43880
W. 44mm

Terminal Protection to IP20

• FUNCTION DIAGRAM



• INSTALLATION

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below (N.B. certain features may not be required and therefore do not need to be connected).
- Apply power, the green **"supply on"** LED will illuminate and the **"positive safety output"** relay will energise. The relay will de-energise if:
  - a, the fault current level exceeds the set trip level (IΔn) **
  - b, there is a failure of the connection between the relay and the toroid ** (Note the red **"tripped"** LED will flash during this condition)
  - c, the supply to the unit is removed
  - d, the relay fails internally

  ** causes the **"standard output"** relay to energise in response to the fault condition.
- Prior to a fault occurring, the LED bargraph will indicate the % of IΔn being detected (the display is scaled between 25, 50, and 75% of the actual trip level). After all 3 LED's have illuminated and the unit trips due to an excessive fault current, the red **"tripped"** LED will illuminate. The unit will now remain in a latched condition.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the **"Test"** button on the front of the unit (or by pressing the remote **"Test"** button - if fitted). The output relays operate accordingly.
- Press the **"Reset"** button on the front of the unit (or remotely - if fitted) to reset the unit. The output relays revert back to their "non-tripped" state.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

Troubleshooting

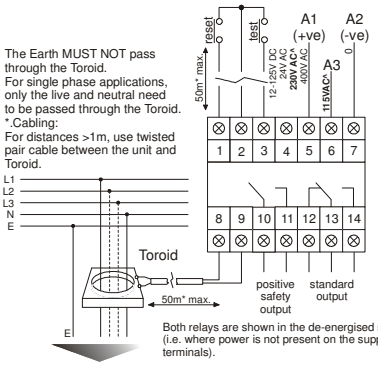
- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

The operating function of this unit is classed as a **Type A** for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping ⎍. This unit will also satisfy the requirements for **Type AC** devices which only need to detect residual alternating currents.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc).

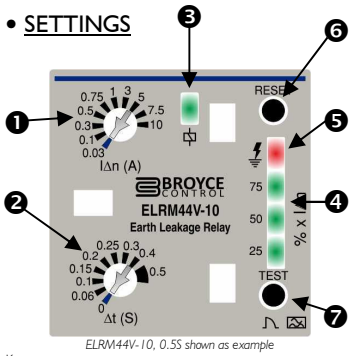
• CONNECTION DIAGRAM



Both relays are shown in the de-energised state (i.e. where power is not present on the supply terminals).

^ Dual voltage only available as 115/230V AC. For 115V AC, connect across 6 and 7. For 230V AC (and other voltages), connect across 5 and 7.

• SETTINGS



ELRM44V-10, 0.5S shown as example

Key:
1. Trip setting adjustment (IΔn) in Amps
2. Time delay adjustment (Δt) in Seconds
3. Green "Power On" LED indication
4. Green "Leakage Current" LED indication (% x IΔn)
5. Red "Tripped" LED indication
6. "RESET" button
7. "TEST" button

• TECHNICAL SPECIFICATION

Please state Supply voltage when ordering.

Supply voltage Un (5, **6**, 7):	12 - 125V DC (85 - 110% of U)
(see connection diagram)	24, 115/230, 400V AC (85 - 115% of Un)
All AC supplies are galvanically isolated between Supply and Toroid and remote test/reset connections.	
Frequency range:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	800V (24V AC supplies), 2.5kV (115V AC supplies)
(1.2 / 50µS) IEC 60664	4kV (230V, 400V AC supplies)
Power consumption (max.):	6VA (AC supplies) 5W (DC supplies)
Monitored leakage current:	Up to 10A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 8 and 9)
Sensitivity IΔn (see Accessories also)	
ELRM44V-3:	30, 50, 100, 200, 300, 500, 750mA, 1, 2, 3A (user selectable)
ELRM44V-10:	30, 100, 300, 500, 750mA, 1, 3, 5, 7.5, 10A (user selectable)
Trip level limits:	80 - 90% of IΔn
Reset Value:	≈ 85% of tripped level
Time delay Δt:	0*, 60, 100, 150, 200, 250, 300, 400, 500mS (user selectable)

**Actual delay for "0" or "Instantaneous" is <25mS when fault current @ 5 x IΔn.*

Note:
1. For IΔn setting of 30mA, the time delay is fixed to 0 (instantaneous) and is not adjustable (i.e. any other time delay cannot be selected when 30mA is set).
2. The unit is factory set to 30mA trip and instantaneous delay. Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

Reset time:	≈ 2S (from supply interruption)
LED indication:	
Power supply present:	Green
Bargraph:	Green x 3 (25, 50 and 75% of actual trip level)
Tripped:	Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button
Ambient temp:	-20 to +55°C (-5 to +40°C in accordance with IEC 60755)
Relative humidity:	+95%
Output :	1 x SPNO, 1 x SPDT relays

Output rating:	**S.O.** (12, 13, 14)	**P.S.O.** (10, 11)
AC1 (250V)	8A (2000VA)	6A (1500VA)
AC15 (250V)	2.5A	4A
DC1 (25V)	8A (200W)	6A (150W)

Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Remote "Test" / "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)
Minimum trigger time:	>80mS (Actual trigger time = 80mS + Δt setting for remote "test")
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 190g (AC power supplies) ≈ 110g (DC power supplies)
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm² stranded, ≤ 4mm² solid
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5 , -6, -12 and -16. CISPR 22. CE and ✓ Compliant.

( ) Numbers in brackets shown above refer to terminal numbers on the relay housing.

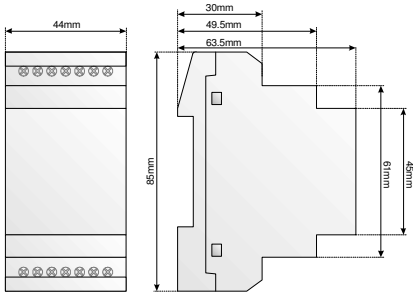
- **Options**

1. For other supply voltages, alternative trip levels or time delays, please consult the sales office.

- **Accessories – Toroids**

Toroid Type:	Internal diameter:	IΔn (min.) A	Toroid Type:	Internal diameter:	IΔn (min.) A
BZCT035	35mm Ø	0.03	BZCT120	120mm Ø	0.1
BZCT050	50mm Ø	0.03	BZCT160	160mm Ø	0.1
BZCT070	70mm Ø	0.03	BZCT210	210mm Ø	0.3

• MOUNTING DETAILS



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ELRM44V3_10_500MS-4-A

ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: ELRM44V-10/V-30

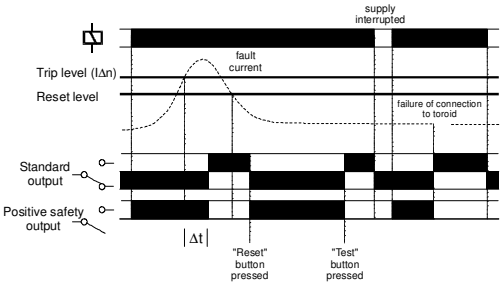
Earth Leakage Relay (Variable) - Type A

- ❑ **44mm (2.5 modules) wide DIN rail housing**
- ❑ **2 models available (10A or 30A)**
- ❑ **Designed to monitor and detect true RMS earth fault currents (up to 30A) in conjunction with a separate toroid**
- ❑ **LED bargraph provides constant indication of any leakage current**
- ❑ **Microprocessor controlled with internal monitoring (self-checking)**
- ❑ **Adjustable Sensitivity (IΔn) and Time Delay (Δt) - 0 (instantaneous)* to 10 seconds**
- ❑ **Separate "Test" and "Reset" push buttons**
- ❑ **Connection facility for remote "Test" and "Reset" push buttons or N.O. contacts**
- ❑ **Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)**
- ❑ **2 Relay outputs - Standard Output (S.O.) and Positive Safety Output (P.S.O.)**
- ❑ **LED indication of Supply status and fault condition after unit has tripped**

Dims:
to DIN 43880
W. 44mm

Terminal Protection to IP20

• FUNCTION DIAGRAM



• INSTALLATION

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.

Installation work must be carried out by qualified personnel.

- Connect the unit as shown in the diagram below (N.B. certain features may not be required and therefore do not need to be connected).
- Apply power, the green **"supply on"** LED will illuminate and the **"positive safety output"** relay will energise. The relay will de-energise if:
  - a, the fault current level exceeds the set trip level (IΔn) **
  - b, there is a failure of the connection between the relay and the toroid ** (Note the red **"tripped"** LED will flash during this condition)
  - c, the supply to the unit is removed
  - d, the relay fails internally

  ** causes the **"standard output"** relay to energise in response to the fault condition.
- Prior to a fault occurring, the LED bargraph will indicate the % of IΔn being detected (the display is scaled between 25, 50, and 75% of the actual trip level). After all 3 LED's have illuminated and the unit trips due to an excessive fault current, the red **"tripped"** LED will illuminate. The unit will now remain in a latched condition.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the **"Test"** button on the front of the unit (or by pressing the remote **"Test"** button - if fitted). The output relays operate accordingly.
- Press the **"Reset"** button on the front of the unit (or remotely - if fitted) to reset the unit. The output relays revert back to their "non-tripped" state.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

Troubleshooting

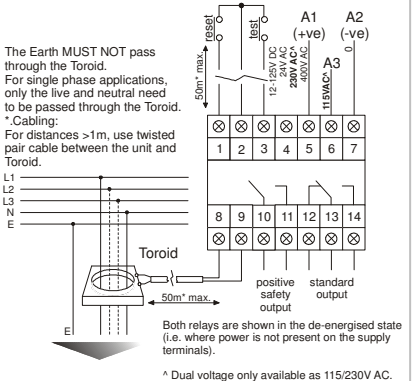
- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

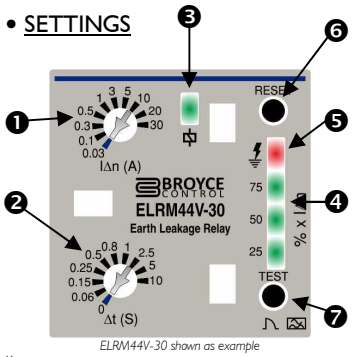
The operating function of this unit is classed as a **Type A** for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping ⎍. This unit will also satisfy the requirements for **Type AC** devices which only need to detect residual alternating currents.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc).

• CONNECTION DIAGRAM



• SETTINGS



ELRM44V-30 shown as example

Key:

1. Trip setting adjustment (IΔn) in Amps
2. Time delay adjustment (Δt) in Seconds
3. Green "Power On" LED indication
4. Green "Leakage Current" LED indication (% x IΔn)
5. Red "Tripped" LED indication
6. "RESET" button
7. "TEST" button

• TECHNICAL SPECIFICATION

Please state Supply voltage when ordering.

Supply voltage Un (5, **6**, 7):	12 - 125V DC (85 - 110% of U)
(see connection diagram)	24, 115/230, 400V AC (85 - 115% of Un)
All AC supplies are galvanically isolated between Supply and Toroid and remote test/reset connections.	
Frequency range:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	800V (24V AC supplies), 2.5kV (115V AC supplies)
(1.2 / 50µS) IEC 60664	4kV (230V, 400V AC supplies)
Power consumption (max.):	6VA (AC supplies) 5W (DC supplies)
Monitored leakage current:	Up to 30A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 8 and 9)
Sensitivity IΔn (see Accessories also)	
ELRM44V-10:	30, 100, 300, 500, 750mA, 1, 3, 5, 7.5, 10A (user selectable)
ELRM44V-30:	30, 100, 300, 500mA, 1, 3, 5, 10, 20, 30A (user selectable)
Trip level limits:	80 - 90% of IΔn
Reset Value:	≈ 85% of tripped level
Time delay Δt:	0*, 60, 150, 250, 500, 800mS, 1, 2.5, 5, 10 sec. (user selectable)
**Actual delay for "0" or "Instantaneous" is <25mS when fault current @ 5 x IΔn.*	

Note:
1. For IΔn setting of 30mA, the time delay is fixed to 0 (instantaneous) and is not adjustable (i.e. any other time delay cannot be selected when 30mA is set).
2. The unit is factory set to 30mA trip and instantaneous delay. Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

Reset time:	≈ 2S (from supply interruption)
LED indication:	
Power supply present:	Green
Bargraph:	Green x 3 (25, 50 and 75% of actual trip level)
Tripped:	Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button
Ambient temp:	-20 to +55°C (-5 to +40°C in accordance with IEC 60755)
Relative humidity:	+95%
Output :	1 x SPNO, 1 x SPDT relays

Output rating:	**S.O.** (12, 13, 14)	**P.S.O.** (10, 11)
AC1 (250V)	8A (2000VA)	6A (1500VA)
AC15 (250V)	2.5A	4A
DC1 (25V)	8A (200W)	6A (150W)

Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Remote "Test" / "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)
Minimum trigger time:	>80mS (Actual trigger time = 80mS + Δt setting for remote "test")
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 190g (AC power supplies) ≈ 110g (DC power supplies)
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm² stranded, ≤ 4mm² solid
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5 , -6, -12 and -16. CISPR 22. CE and ✔ Compliant.

( ) Numbers in brackets shown above refer to terminal numbers on the relay housing.

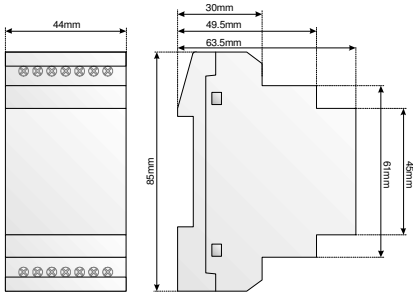
- **Options**

1. For other supply voltages, alternative trip levels or time delays, please consult the sales office.

- **Accessories – Toroids**

Toroid Type:	Internal diameter:	IΔn (min.) A	Toroid Type:	Internal diameter:	IΔn (min.) A
BZCT035	35mm Ø	0.03	BZCT120	120mm Ø	0.1
BZCT050	50mm Ø	0.03	BZCT160	160mm Ø	0.1
BZCT070	70mm Ø	0.03	BZCT210	210mm Ø	0.3

• MOUNTING DETAILS



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ELRM44V10_30-4-A

ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: ELRM44V-30AR

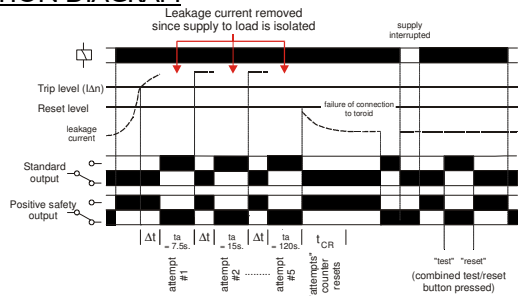
Earth Leakage Relay (Variable) - Type A with Auto Reclosing Facility

- ❑ **Designed to monitor and detect true RMS earth fault currents (up to 30A) in conjunction with a separate toroid**
- ❑ **Automatically recloses (max. of 6 attempts) to check if fault has cleared**
- ❑ **Remains in "tripped" condition if max. number of attempts is exceeded (manual reset required)**
- ❑ **LED bargraph provides constant indication of any leakage current**
- ❑ **Microprocessor controlled with internal monitoring (self-checking)**
- ❑ **Adjustable Sensitivity (IΔn) - 30mA to 30A and Time Delay (Δt) - 0 (instantaneous)* to 10 seconds**
- ❑ **Separate "Test" and "Reset" push buttons**
- ❑ **Connection facility for remote "Test" and "Reset" push buttons or N.O. contacts**
- ❑ **Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)**
- ❑ **2 Relay outputs - Standard Output (S.O.) and Positive Safety Output (P.S.O.)**
- ❑ **LED indication of Supply status, fault condition after unit has tripped and pre-warning of reset attempt**

Dims:
to DIN 43880
W. 44mm

Terminal Protection to IP20

FUNCTION DIAGRAM



INSTALLATION

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.

Installation work must be carried out by qualified personnel.

- Connect the unit as shown in the diagram below (N.B. certain features may not be required and therefore do not need to be connected).
- Apply power, the green **"supply on"** LED will illuminate and the **"positive safety output"** relay will energise. The relay will de-energise if:
  - a, the fault current level exceeds the set trip level (IΔn) **
  - b, failure of the connection between the relay and the toroid occurs ** (Red **"tripped"** LED will flash during this condition)
  - c, the supply to the unit is removed
  - d, the relay fails internally

  ** causes the **"standard output"** relay to energise in response to the fault condition.
- Prior to a fault occurring, the LED bargraph will indicate the % of IΔn being detected (the display is scaled between 25, 50, and 75% of the actual trip level). After all 3 LED's have illuminated and the unit trips due to an excessive fault current, the red **"tripped"** LED will illuminate.
- After tripping, the 1st attempt period (#1) will commence after which the unit will reclose automatically re-connecting the load. If the fault still exists, then after time delay Δt, the unit will trip again and the 2nd attempt period (#2) commences (2 x the duration of the first). After the second attempt period a reclosing attempt is made again. If after the 6th attempt, the fault is still present, the unit will remain in a **"tripped"** condition. Manual resetting is then required.
- If after any reclosure attempt, the fault current is no longer present the unit will remain in the "no fault" condition and if maintained for greater than 15 minutes, the attempts counter will then reset to zero.

NOTE: The red **"tripped"** LED will flash rapidly for approx. 2 seconds before for end of the delay period (ta). This is to pre-warn the user of an attempt to re-close.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the **"Test"** button on the front of the unit (or by pressing the remote **"Test"** button - if fitted). The output relays operate accordingly. Note that the Test mode has no effect on the auto-reclosing feature i.e. it will not commence when the test mode is initiated.
- Press the **"Reset"** button on the front of the unit (or remotely - if fitted) to reset the unit. The output relays revert back to their "non-tripped" state. Note that pressing the **"Reset"** button will clear and reset the counter to zero.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

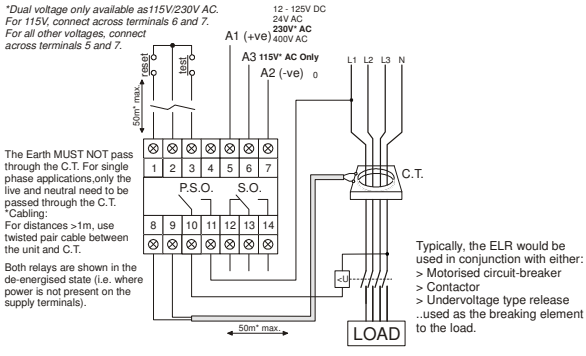
Troubleshooting

- If the unit fails to operate correctly check that all wiring and connections are good.

NOTE: The operating function of this unit is classed as a Type A for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping. This unit will also satisfy the requirements for Type AC devices which only need to detect residual alternating currents.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc).

CONNECTION DIAGRAM



TECHNICAL SPECIFICATION

Supply voltage Un (5, **6**, 7):	12 - 125V DC (85 - 110% of U)
(see connection diagram)	24, 115/230, 400V AC (85 - 115% of Un)
All AC supplies are galvanically isolated between the supply and the toroid and remote test/reset connections.	Please state Supply voltage when ordering.
Frequency range:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage: (1.2 / 50µS) IEC 60664	800V (24V AC supplies), 2.5kV (115V AC supplies) 4kV (230V, 400V AC supplies)
Power consumption (max.):	6VA (AC supplies) 5W (DC supplies)
Monitored leakage current:	0 to 30A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 8 and 9)
Sensitivity IΔn (see Accessories)	30, 100, 300, 500mA, 1, 3, 5, 10, 20, 30A (user selectable)
Trip level limits:	80 - 90% of IΔn
Reset Value:	≈ 85% of tripped level
Time delay Δt:	0*, 60, 150, 250, 500, 800mS, 1, 2.5, 5, 10 sec. (user selectable)
**Actual delay for "0" or "Instantaneous" is <25mS when fault current @ 5 x IΔn.*	

Note:
1. For IΔn setting of 30mA, the time delay is fixed to 0 (instantaneous) and is not adjustable (i.e. any other time delay cannot be selected when 30mA is set).
2. The unit is factory set to 30mA trip and instantaneous delay. Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

Reset time:	≈ 2S (from supply interruption)
Auto-reclosing attempts:	6 max. (factory set)
Delay period between two auto-reclosing attempts (ta):	7.5, 15, 30, 60, 120 and 240 seconds. (factory set)
Delay period (fault free) before counter for auto-reclosing attempts resets to zero (t_{CR}):	15 minutes. (factory set)
LED indication:	
Power supply present:	Green
Bargraph:	Green x 3 (25, 50 and 75% of actual trip level)
Tripped:	Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button
Ambient temp:	-20 to +55°C (-5 to +40°C in accordance with IEC 60755)
Relative humidity:	+95%
Output :	1 x SPNO, 1 x SPDT relays
Output rating:	**S.O.** (12, 13, 14) **P.S.O.** (10, 11)
AC1 (250V)	8A (2000VA) 6A (1500VA)
AC15 (250V)	2.5A 4A
DC1 (25V)	8A (200W) 6A (150W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Remote "Test" / "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)
Minimum trigger time:	>80mS (Actual trigger time = 80mS + Δt setting for remote "test")
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 190g (AC power supplies) ≈ 110g (DC power supply)
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm² stranded, ≤ 4mm² solid
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5 , -6, -12 and -16. CISPR 22. CE and Compliant.

( ) Numbers in brackets shown above refer to terminal numbers on the relay housing.

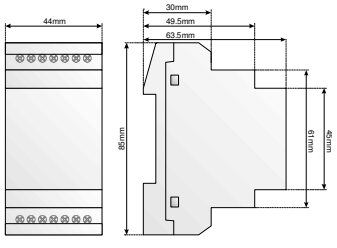
Options

1. For other supply voltages, alternative trip levels or time delays, please consult the sales office.

Accessories – Toroids

Toroid Type:	Internal diameter:	IΔn (min.) A	Toroid Type:	Internal diameter:	IΔn (min.) A
BZCT035	35mm Ø	0.03	BZCT120	120mm Ø	0.1
BZCT050	50mm Ø	0.03	BZCT160	160mm Ø	0.1
BZCT070	70mm Ø	0.03	BZCT210	210mm Ø	0.3

MOUNTING DETAILS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: ELRP48V-30

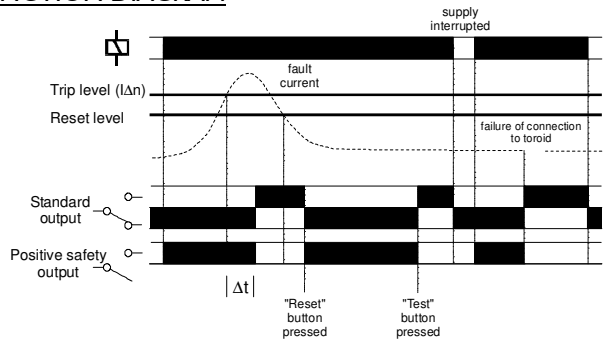
Earth Leakage Relay (Variable) - Type A

- **76mm length[1], 48 x 48mm Panel mount housing - Supplied complete with retaining clips and screws**
- **Pluggable connectors located at the rear of the unit and supplied with mating, re-wireable sockets**
- **Designed to monitor and detect true RMS earth fault currents (up to 30A) in conjunction with a separate C.T.**
- **LED bargraph provides constant indication of any leakage current**
- **Microprocessor controlled with internal monitoring (self-checking)**
- **Adjustable Sensitivity (IΔn) - 30mA to 30A**
- **Adjustable Time Delay (Δt) - 0 (instantaneous)* to 10 seconds**
- **Separate "Test" and "Reset" push buttons**
- **Connection facility for remote "Test" and "Reset" push buttons**
- **Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)**
- **2 Relay outputs - Standard Output (S.O.) and Positive Safety Output (P.S.O)**
- **LED indication of Supply status and fault condition after unit has tripped**

[1] behind panel and excluding pluggable connectors.

Front Panel Protection to IP40

FUNCTION DIAGRAM



INSTALLATION

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.

Installation work must be carried out by qualified personnel.

- Connect the unit as shown in the diagram below (N.B. certain features may not be required and therefore do not need to be connected).
- Apply power, the green **"supply on"** LED will illuminate and the **"positive safety output"** relay will energise. The relay will de-energise if:
  - a, the fault current level exceeds the set trip level (IΔn) **
  - b, there is a failure of the connection between the relay and the toroid ** (Note the red **"tripped"** LED will flash during this condition)
  - c, the supply to the unit is removed
  - d, the relay fails internally

  ** causes the **"standard output"** relay to energise in response to the fault condition.
- Prior to a fault occurring, the LED bargraph will indicate the % of IΔn being detected (the display is scaled between 25, 50, and 75% of the actual trip level). After all 3 LED's have illuminated and the unit trips due to an excessive fault current, the red **"tripped"** LED will illuminate. The unit will now remain in a latched condition.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the **"Test"** button on the front of the unit (or by pressing the remote **"Test"** button - if fitted). The output relays operate accordingly.
- Press the **"Reset"** button on the front of the unit (or remotely - if fitted) to reset the unit. The output relays revert back to their "non-tripped" state.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

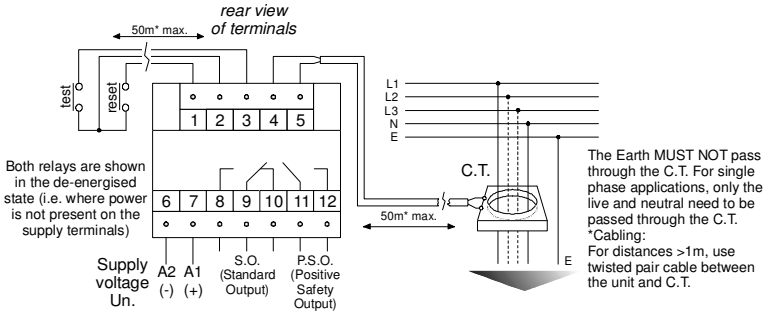
Troubleshooting

- If the unit fails to operate correctly check that all wiring and connections are good.
- For the DC supply version, ensure the polarity to terminals 6 and 7 (A1 and A2) are correct.

Note:

The operating function of this unit is classed as a Type A for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping. This unit will also satisfy the requirements for Type AC devices which only need to detect residual alternating currents.

CONNECTION DIAGRAM



The Earth MUST NOT pass through the C.T. For single phase applications, only the live and neutral need to be passed through the C.T.
*Cabling:
For distances >1m, use twisted pair cable between the unit and C.T.

TECHNICAL SPECIFICATION

Supply voltage Un (6, 7):	12 - 125V DC (85 - 110% of U)
(see connection diagram)	24, 115, 230V AC (85 - 115% of Un)
All AC supplies are galvanically isolated between the supply and the toroid and remote test/reset connections.	Please state Supply voltage when ordering.
Frequency range:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	800V (24V AC supplies), 2.5kV (115V AC supplies)
(1.2 / 50µS) IEC 60664	4kV (230V AC supplies)
Power consumption (max.):	6VA (AC supplies) 5W (DC supplies)
Monitored leakage current:	0 to 30A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 4 and 5)
Sensitivity IΔn (see Accessories)	30, 100, 300, 500mA, 1, 3, 5, 10, 20, 30A (user selectable)
Trip level limits:	80 - 90% of IΔn
Reset Value:	≈ 85% of tripped level
Time delay Δt:	0*, 60, 150, 250, 500, 800mS, 1, 2.5, 5, 10 sec. (user selectable)

**Actual delay for "0" or "Instantaneous" is <25mS when fault current @ 5 x IΔn.*

Note:
1. For IΔn setting of 30mA, the time delay is fixed to 0 (instantaneous) and is not adjustable (i.e. any other time delay cannot be selected when 30mA is set).
2. The unit is factory set to 30mA trip and instantaneous delay. Adjustment of these settings can be made if necessary to suit the requirements of the installation. A seal is supplied allowing the user to secure the clear window and hence prevent any unnecessary adjustment of the settings.

Reset time:	≈ 2S (from supply interruption)
LED indication:	
Power supply present:	Green
Bargraph:	Green x 3 (25, 50 and 75% of actual trip level)
Tripped:	Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button
Ambient temp:	-20 to +55°C (-5 to +40°C in accordance with IEC 60755)
Relative humidity:	+95%
Output :	1 x SPDT, 1 x SPNO relays

Output rating:	S.O. (8, 9, 10)	P.S.O. (11, 12)
AC1 (250V)	8A (2000VA)	6A (1500VA)
AC15 (250V)	2.5A	4A
DC1 (25V)	8A (200W)	6A (150W)

Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Remote "Test" / "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)
Minimum trigger time:	>80mS (Actual trigger time = 80mS + Δt setting for remote "test")
Housing:	Black, self-extinguishing noryl UL94 VO (ABS for front plate and rear clip)
IP Protection:	Terminals: IP20. Housing: IP30 (when clips are inserted)
Weight:	≈ 190g (AC power supplies) ≈ 110g (DC power supply)
Mounting:	Through 45 x 45mm panel cut-out and secured to panel using retaining clips/screws (2 of each supplied). Panel thickness 4mm typ.
Terminal conductor size:	≤ 2.5mm²
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5 , -6, -12 and -16. CISPR 22. CE and C-Tick Compliant.

( ) Numbers in brackets shown above refer to terminal numbers on the relay housing.

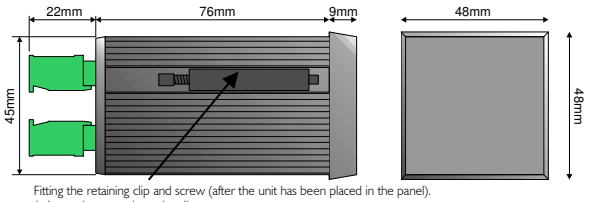
Options

1. For other supply voltages, alternative trip levels or time delays, please consult the sales office.

Accessories – Toroids (C.T.)

Toroid Type:	Internal diameter:	IΔn (min.) A	Toroid Type:	Internal diameter:	IΔn (min.) A
BZCT035	35mm Ø	0.03	BZCT120	120mm Ø	0.1
BZCT050	50mm Ø	0.03	BZCT160	160mm Ø	0.1
BZCT070	70mm Ø	0.03	BZCT210	210mm Ø	0.3

MOUNTING DETAILS



Fitting the retaining clip and screw (after the unit has been placed in the panel).
1. Insert the screw in to the clip.
2. Push the clip in to the side of the housing and slide towards the back until secured in place.

Panel cut-out size: 45 x 45mm

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ISO 9001 REGISTERED FIRM

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Type: ELRM44F-0030, 0100 & 0300

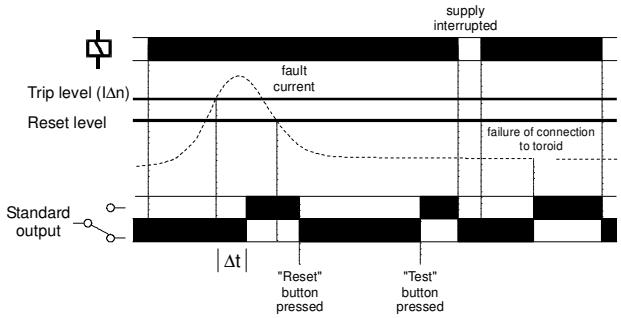
Earth Leakage Relay (Fixed) - Type A

- ❑ **44mm (2.5 modules) wide DIN rail housing**
- ❑ **Designed to monitor and detect true RMS earth fault currents in conjunction with a separate toroid**
- ❑ **Microprocessor controlled with internal monitoring (self-checking)**
- ❑ **Fixed Sensitivity (IΔn) - 30, 100 or 300mA***
- ❑ **Fixed Time Delay (Δt) - 0 (instantaneous)**
- ❑ **Separate "Test" and "Reset" push buttons**
- ❑ **Connection facility for remote "Test" and "Reset" push buttons or N.O. contacts**
- ❑ **Toroid open circuit detection forces unit to trip (Red LED flashes during this condition)**
- ❑ **SPDT relay output 8A**
- ❑ **LED indication of Supply and fault condition after unit has tripped**

Dims:
to DIN 43880
W. 44mm

Terminal Protection to IP20

FUNCTION DIAGRAM



INSTALLATION

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below.
- Apply power, the green **"supply on"** LED will illuminate. The output relay will energise and the red **"tripped"** LED illuminate if:
  a, the fault current level exceeds the fixed trip level (IΔn), or
  b, there is a failure of the connection between the relay and the toroid (Note the red **"tripped"** LED will flash during this condition)
- The relay will now remain in a latched condition.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the **"Test"** button on the front of the unit (or by pressing the remote **"Test"** button - if fitted). The output relay operates accordingly.
- Press the **"Reset"** button on the front of the unit (or remotely - if fitted) to reset the unit. The output relay reverts back to the "non-tripped" state.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

Troubleshooting

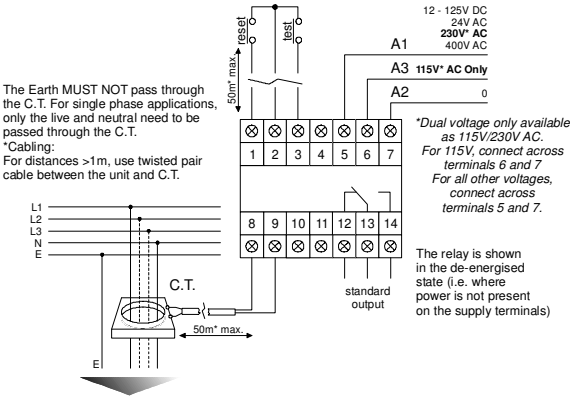
- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

The operating function of this unit is classed as a Type A for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping. This unit will also satisfy the requirements for Type AC devices which only need to detect residual alternating currents.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc)

CONNECTION DIAGRAM



TECHNICAL SPECIFICATION

Supply voltage Un (5, **6**, 7):	12 - 125V DC (85 - 110% of U)
(see connection diagram)	24, 115/230, 400V AC (85 - 115% of Un)
All AC supplies are galvanically isolated between the supply and the toroid, remote test and remote reset connections.	Please state Supply voltage when ordering.
Frequency range:	50/60/400Hz (AC supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	800V (24V AC supplies), 2.5kV (115V AC supplies)
(1.2 / 50µS) IEC 60664	4kV (230V, 400V AC supplies)
Power consumption (max.):	6VA (AC supplies) 5W (DC supplies)
Monitored leakage current:	0 to 30A (15 - 400Hz) (through external toroid with 1000:1 ratio and connected to terminals 8 and 9)
Sensitivity IΔn (see Accessories):	30, 100 or 300 mA (*to be specified when ordering)
Trip level limits:	80 - 90% of IΔn
Reset Value:	≈ 85% of tripped level
Time delay Δt:	instantaneous (*Actual delay is <25mS when fault current @ 5 x IΔn*)
Reset time:	≈ 2S (from supply interruption)
LED indication:	
Power supply present:	Green
Tripped:	Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button
Ambient temp:	-20 to +55°C
	-5 to +40°C (in accordance with IEC 60755)
Relative humidity:	+95%
Output :	SPDT relay (12, 13, 14)
Output rating:	AC1 250V 8A (2000VA)
	AC15 250V 2.5A
	DC1 25V 8A (200W).
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Remote "Test" and "Reset" (1, 2, 3)	Requires N.O. contacts. (i.e. push buttons)
Minimum trigger time:	>80mS
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 190g (AC power supplies) ≈ 110g (DC power supply)
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm² stranded, ≤ 4mm² solid
Approvals:	Conforms to: IEC60755, 60947, 62020, 61543. IEC 61000-4-2, -3, -4, -5 , -6, -12 and -16. CISPR 22. CE and cULus Compliant.

( ) Numbers in brackets shown above refer to terminal numbers on the relay housing.

Options

1. For other supply voltages, alternative trip levels or time delays, please consult the sales office.

Ordering*

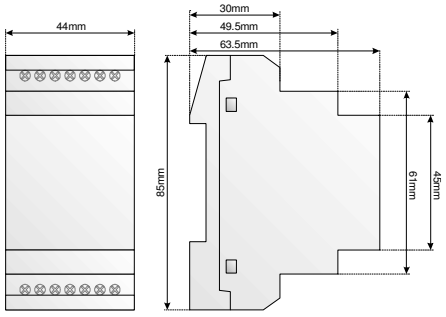
Please state full part number and voltage when ordering. The suffix, which should follow ELRM44F, is **0030** (30mA), **0100** (100mA) or **0300** (300mA).

Example: **ELRM44F-0030** 24V AC

Accessories – Toroids

Toroid Type:	Internal diameter:	IΔn (min.) A	Toroid Type:	Internal diameter:	IΔn (min.) A
BZCT035	35mm Ø	0.03	BZCT120	120mm Ø	0.1
BZCT050	50mm Ø	0.03	BZCT160	160mm Ø	0.1
BZCT070	70mm Ø	0.03	BZCT210	210mm Ø	0.3

MOUNTING DETAILS



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ISO 9001 REGISTERED FIRM

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Type: ELR-IF-0030, 0100 & 0300

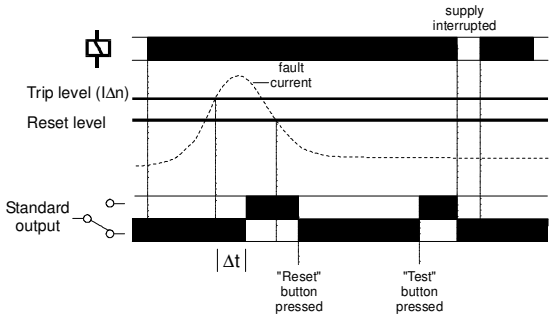
Earth Leakage Relay with Integral Toroid (Fixed) - Type A

- ❑ **DIN Rail or Surface mount enclosure**
- ❑ **Integral toroid - 25mm ∅**
- ❑ **Designed to monitor and detect true RMS earth fault currents**
- ❑ **Protected against nuisance tripping**
- ❑ **Microprocessor controlled**
- ❑ **Three versions available - 30mA (instantaneous), 100mA (100mS) or 300mA (100mS)***
- ❑ **Separate "Test" and "Reset" push buttons**
- ❑ **SPDT relay output 5A**
- ❑ **Green LED indicates presence of power supply**
- ❑ **Red LED indicates fault current is >50% of IΔn if flashing, or relay has tripped if permanently illuminated**

Dims:
W. 70mm
H. 110mm
D. 37mm

Terminal Protection to IP20

FUNCTION DIAGRAM



INSTALLATION

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below.
- DO NOT install the unit in close proximity to equipment generating high magnetic fields.
- Ensure the conductors that pass through the aperture are straight, and as central as possible. Ensure the conductors do not cause any undue stress on the unit itself.

Applying power

- Ensure the voltage to be applied to terminals **"a"** and **"b"** corresponds with the voltage marked on the unit itself.
- Apply power, the green **"supply on"** LED will illuminate. The output relay will remain de-energised and red **"tripped"** LED extinguished. If the fault current is >50% of IΔn, then the red LED will flash to provide early indication that a fault current is present. When the fault current exceeds the fixed trip level (IΔn), the output relay will energise and red LED illuminate after the fixed delay (Δt).
- The relay will now remain in a latched condition until reset.

Fault simulation (Test mode)

- The unit can be placed into a fault condition by pressing the **"Test"** button on the unit. The output relay will energise.
- Press the **"Reset"** button on the front of the unit to reset the unit. The output relay will de-energise.
- The unit can also be reset by interrupting the power supply.
- To satisfy regulations, it is recommended that the device be tested periodically to ensure correct operation.

Troubleshooting

- If the unit fails to operate correctly check that all wiring and connections are good.

Note:

The operating function of this unit is classed as a Type A for which tripping is ensured for residual sinusoidal alternating currents and residual pulsating direct currents, whether applied suddenly or slowly rising. Additionally, this unit is protected against nuisance tripping. This unit will also satisfy the requirements for Type AC devices which only need to detect residual alternating currents.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc)

TECHNICAL SPECIFICATION

Supply voltage Un (a, b)*: **(see connection diagram)**	120, 240V AC (85 - 115% of Un)
Frequency range:	48 - 63Hz
Isolation:	Over voltage cat. III
Rated impulse withstand voltage: (1.2 / 50µS) IEC 60664	2.5kV (120V AC supply) 4kV (240V AC supply)
Power consumption (max.):	2W

Please state Supply voltage when ordering.

Rated current:	2-wire: 167A (35mm²) 3-wire: 136A (25mm²) / 4-wire: 100A (16mm²)
Applicable wire sizes: (using 600V AC tri-rated wiring conforming to BS 6231)	2-wire: 35mm² 3-wire: 25mm² / 4-wire: 16mm²
Monitored leakage current:	0 to 1A (15 - 400Hz)
Sensitivity IΔn (Time delay Δt)*:	30mA (0 / instantaneous**), 100mA (100mS) or 300mA (100mS) (*to be specified when ordering)

***Actual delay for "0" or "Instantaneous" is <25mS when fault current @ 5 x IΔn.*

Trip level:	75% of IΔn (nominal)
Hysteresis:	8% of IΔn
Accuracy:	±10%
Reset time:	≈ 2S (from supply interruption)
LED indication:	
Power supply present:	Green
Tripped:	Red (see "INSTALLATION" to the left)
Memory:	storage of the leakage fault and reset with the "Reset" push button
Ambient temp:	-20 to +55°C -5 to +40°C (in accordance with IEC 60755)
Relative humidity:	+95%
Output :	SPDT relay (21, 22, 24)
Output rating:	AC1 250V 5A (1250VA) AC15 250V 2.5A DC1 25V 5A (125W).
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 190g
Mounting option:	1. Using the two fixing holes for mounting directly to a back plate 2. On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm² stranded, ≤ 4mm² solid
Approvals:	Conforms to: IEC60755, IEC 61543 (EMC) CE and cULus Compliant.

( ) Numbers in brackets shown above refer to terminal identification on the housing.

Options

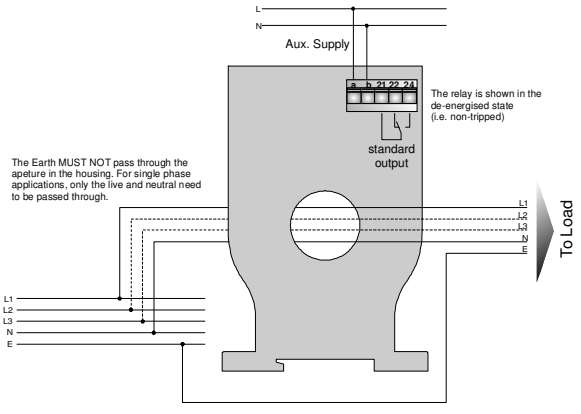
For other supply voltages, alternative trip levels or time delays, please consult the sales office.

Ordering*

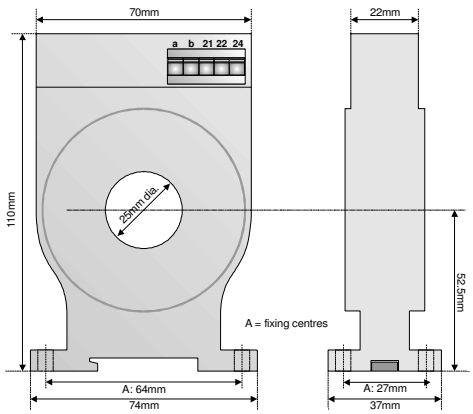
Please state full part number and voltage when ordering. The suffix, which should follow ELR-IF, is **0030** (30mA), **0100** (100mA) or **0300** (300mA), then the voltage.

Example: **ELR-IF-0100** 240V AC

CONNECTION DIAGRAM



MOUNTING DETAILS



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ELR-IF-3-A
012371

Type: BZCT035, 050, 070, 120, 160 & 210

Circular Toroids (Zero Current Transformers)

- For use in conjunction with Broyce "Type A" Earth Leakage Relays
- Designed to detect leakage current and transmit a proportional signal to an Earth Leakage Relay
- Surface mounting with 4 fixing slots (BZCT160 and 210 supplied with separate mounting feet)
- Slim design
- DIN Rail fixing clip available for 35mm ∅ toroid (Part no. BZCT035/CP)

DIN Rail clip fitted to BZCT035

ISO 9001:2015

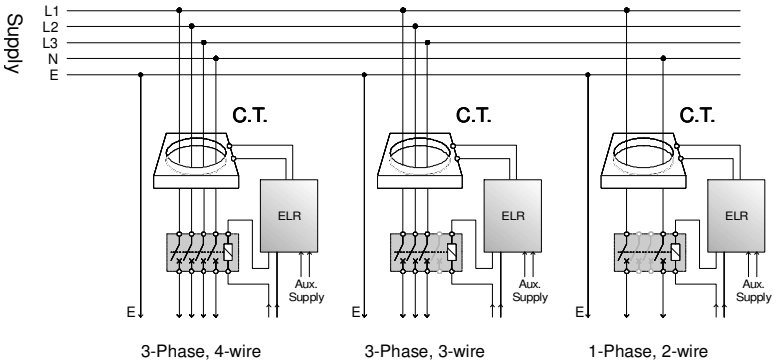
INSTALLATION

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY TO THE CABLES THAT ARE TO BE PASSED THROUGH THE TOROID.
- Installation of the toroid, along with the Earth Leakage Relay must be carried out in accordance with the latest wiring practices and regulations.

CONNECTION DIAGRAM

Typical connection examples are shown below.



TECHNICAL SPECIFICATION

Size availability* and part number: * *internal diameter*	**35mm ∅** (BZCT035) **50mm ∅** (BZCT050) **70mm ∅** (BZCT070)	**120mm ∅** (BZCT120) **160mm ∅** (BZCT160) **210mm ∅** (BZCT210)
Rated system voltage:	720V AC	
Insulation level:	3kV AC	
Current ratio:	1/1000	
Rated operational current (I.e.):	BZCT035 – **65A** (25mm²) BZCT050 – **85A** (50mm²) BZCT070 – **160A** (95mm²)	BZCT120 – **250A** (240mm²) BZCT160 – **320A** (400mm²) BZCT210 – **400A** (500mm²)
Max. cross-section/phase cable size shown in brackets and assumes 3P + N copper cables		
Max. permissible current:	1kA cont., 5kA for 1.5s, 100kA for 0.05s	
Minimum IΔn setting on ELR for each size of toroid:	0.03A – 35, 50 and 70mm ∅ 0.1A – 120mm ∅ 0.3A – 160 and 210mm ∅	
Max. Distance	50m (max.) *Between toroid and ELR*	
Ambient temperature: Relative humidity:	-20 to +60°C +95%	
Housing: Mounting option:	Grey ABS Surface mount only using fixing slots provided (BZCT160 and 210 require separate mounting feet which are included)	
Terminal conductor size:	≤ 2.5mm² solid ≤ 1.5mm² stranded	
Approvals:	CE Compliant. Conforms to: IEC44-1, IEC185 & BS7676	

INSTALLATION DO'S AND DON'T'S

Correct installation of the Earth Leakage Relay and toroid should ensure trouble free operation, in particular, if this document is followed.

1. Always ensure the Earth conductor DOES NOT pass through the toroid. If it is unavoidable, the Earth must be routed back through the toroid again and around, as shown in Fig.1.
2. As a rule, select a toroid that has an inside diameter which is twice that or greater than the outsider diameter of the cable(s) to be passed through.
3. Ensure the cable is central in the toroid.
4. Place the toroid on a straight section of cable, not near a bend
5. Keep the cable and toroid away from intense magnetic fields from nearby equipment.
6. **DO NOT** pass individual conductors through separate toroids, as shown in Fig. 3.

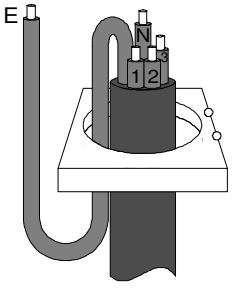


Fig. 1

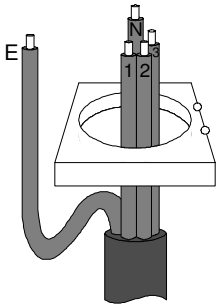


Fig. 2

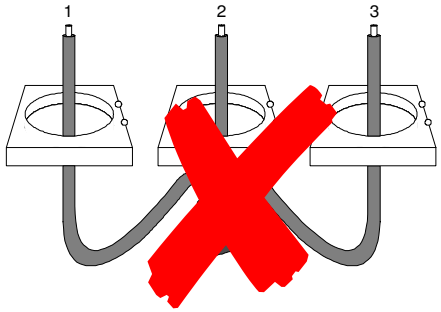


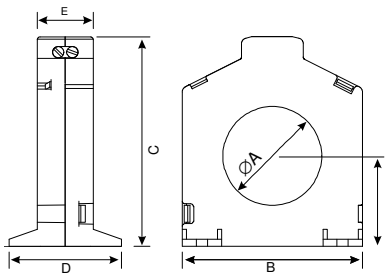
Fig. 3

DIMENSIONS

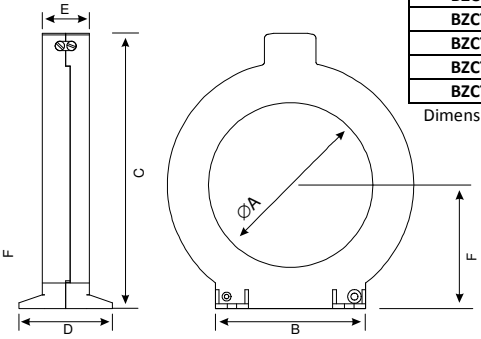
Toroid Type:	AØ	B	C	D	E	F	Weight
BZCT035	35	64	74	40	20	32	77g
BZCT050	50	63	98	40	20	42	88g
BZCT070	70	105	117	40	20	53	135g
BZCT120	120	155	170	40	20	80	265g
BZCT160	160	150	253	60^	33	120	1075g
BZCT210	210	149	304	60^	33	145	1300g

Dimensions in mm

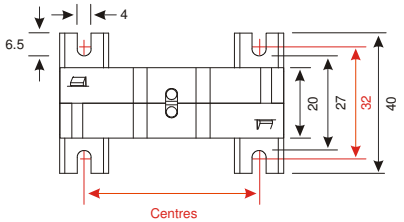
^ exc. mounting feet



BZCT035



BZCT050, 070, 120, 160 & 210



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BZCT-7-A.DOCX

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Type: BZCTR305, 350 & 470

Rectangular Toroids

- ❑ **For use in conjunction with Broyce "Type A" Earth Leakage Relays**
- ❑ **Designed to detect leakage current and transmit a proportional signal to an Earth Leakage Relay**
- ❑ **Suitable for installations that use busbars**
- ❑ **Three sizes available**

BZCTR3xx

BZCTR470

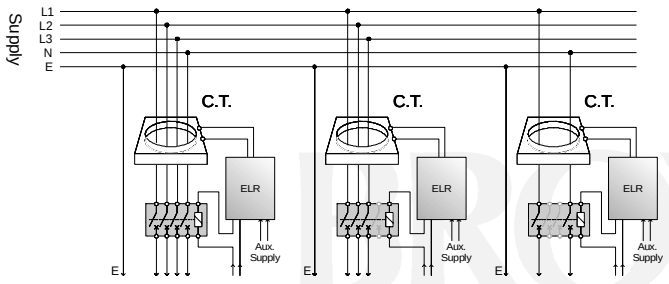
• INSTALLATION NOTE

Installation work must be carried out by qualified personnel.

- **BEFORE INSTALLATION, ISOLATE THE SUPPLY TO THE BUSBARS/CONDUCTORS THAT ARE TO BE PASSED THROUGH THE TOROID.**
- Installation of the toroid, along with the Earth Leakage Relay must be carried out in accordance with the latest wiring practices and regulations.

• CONNECTION EXAMPLES

Typical connection examples are shown below.



• TECHNICAL SPECIFICATION

Size availability and part number:	115 x 305mm (BZCTR305)[1] 150 x 350mm (BZCTR350)[1] 160 x 470mm (BZCTR470)
Current ratio:	1/1000
Maximum permissible current:	2kA (BZCTR305 & 350) 2.5kA (BZCTR470)
Rated supply voltage:	720V AC
Rated insulation voltage:	3kV AC
Minimum IΔn setting on Earth Leakage Relay:	1A
Distance between toroid and relay:	50 metres (max.)
Ambient temp:	-10 to +50°C
Relative humidity:	+95%
Housing:	Self extinguishing, shock resistant, black ABS (Resin cast, natural finish for BZCTR470)
Mounting:	Using fixing slots provided on metal bracket (Using 4 x 9mmØ corner holes for BZCTR470)
Approvals:	CE Compliant.

Note:

[1] Part number change as of August 2010 (see below)

BZCTR305 (previously known as BZCTR115)
BZCTR350 (previously known as BZCTR150)

• INSTALLATION DO's and DONT's

- Correct installation of the Earth Leakage Relay and toroid should ensure trouble free operation, in particular, if this document is followed.

1. Always ensure the Earth conductor DOES NOT pass through the toroid. If it is unavoidable, the Earth must be routed back through the toroid again and around.
2. Ensure the busbars are located centrally in the toroid. (Fig.1)
3. Place the toroid on a straight section of the busbars, not near a bend.
4. Keep the busbars and toroid away from intense magnetic fields from nearby equipment.
5. DO NOT pass individual busbars through separate toroids.

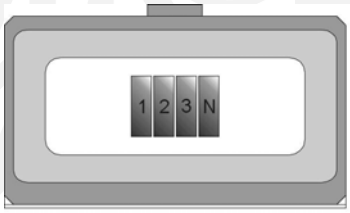


Fig. 1

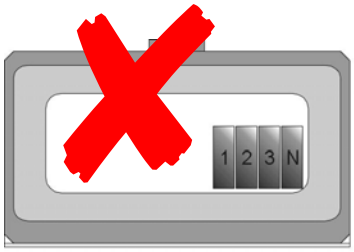
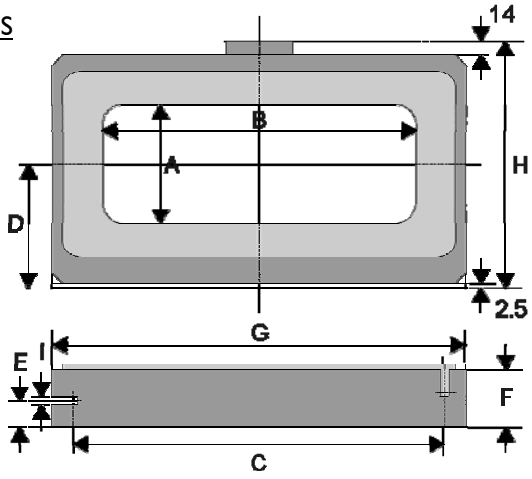
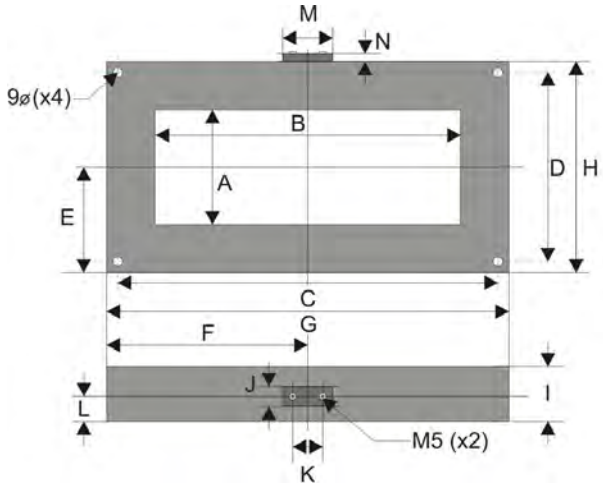


Fig. 2

• DIMENSIONS



BZCTR305 & 350



BZCTR470

Dimensions in mm

Toroid Type:	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Weight
BZCTR305	115	305	360	116	25	55	402	240	8						5.45kg
BZCTR350	150	350	415	140	28	55	460	285	8						7.40kg
BZCTR470	160	470	552	242	131.5	286	572	263	72	32	40	36	80	8	14kg

Tolerances = ±0.1

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ISO 9001 REGISTERED FIRM

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• earth leakage relays • **earth fault relays** • **overcurrent relays** • three phase relays • time delay relays • control relays • level control relays • pump control relays •

• speed control relays • temperature control relays • protection devices • generator protection • hours run meter • sockets • bespoke products •

earth fault & overcurrent relays

- Overcurrent and Earth Fault with Voltage Monitoring
- Overcurrent and Earth Fault
- Overcurrent Only
- Earth Fault Only

Choose your category

Click the above for further information…!

Click here for Main Page

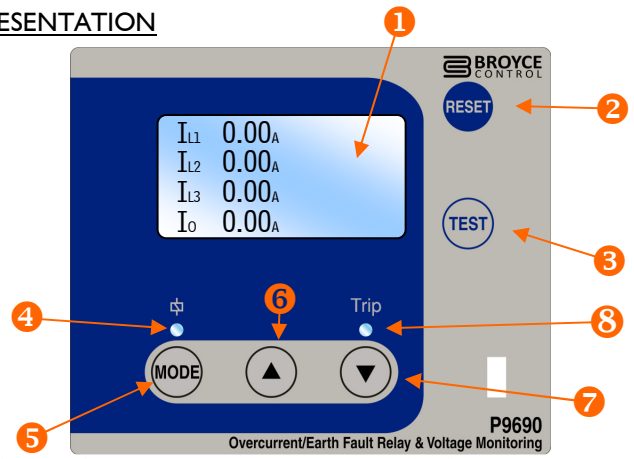
Type: P9690

Combined Overcurrent / Earth Fault Relay and Voltage Monitoring

- **True R.M.S. measurements**
- **Low Set and High Set tripping thresholds for both Overcurrent and Earth Fault detection**
- **6 selectable IDMT (Inverse Definite Minimum Time) characteristic curves or adjustable DT (Definitive Time)**
- **Three phase over current and earth fault detection with live display of individual phase and earth fault currents**
- **Last trip memory (last 10 trips stored and can be recalled)**
- **Pre-defined selectable CT ratio's (5:5….6000:5)**
- **Display of measured phase to neutral or phase to phase voltages**
- **Display of measured frequency, power, power factor and hours run**
- **Microprocessor based (self checking) with non-volatile memory**
- **"Ecosmart" Energy efficient power supply design**
- **Rear mounted pluggable connectors for supply, relay contacts and current inputs**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 100mm

PRESENTATION



1. LCD (Liquid Crystal Display) for user information
2. **"RESET"** button
3. **"TEST"** button
4. **"Power supply"** green LED indication
5. **"MODE"** button*
6. Parameter increment button*
7. Parameter decrement button*
8. **"Trip status"** red LED indication

* accessible only when the front cover is open

OPERATION & OVERVIEW

The P9690 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect Overcurrent on individual phases and non-directional Earth faults (by measurement of the neutral current) in 3-phase applications. Typically the P9690 is wired in conjunction with external current transformers of the feeder to be protected.

In addition, the P9690 is also able to measure and display, phase to neutral or phase to phase voltages along with the system frequency. It can also calculate the power factor and power for each phase. Finally, it will indicate total hours for as long as it remains powered. Note that tripping of this product only occurs on Overcurrent or Earth faults. It will not trip due to voltage or power issues.

A clear backlit LCD provides all key information the user requires for both operation and setting up. Setting is achieved in a few simple steps and requires no previous knowledge of product operation.

Normal operation provides the user with actual live individual phase currents and earth fault current all on one screen. The actual phase current represents that of the current passing through the primary side of the externally connected CT's. This is achieved by the setting of the ratio for the CT.

Programming mode allows the user to assign the operation mode for both internal relays. They can be individually assigned to Overcurrent, Earth fault or a combination of both. They can also be configured for Auto or Manual resetting. Relay 2 has the added option of being allowed to energise at the start or end of a time out period. If assigned to energise at the start, the Relay can be used to operate a buzzer or lamp giving early warning before a system actually shuts down.

Low-set and High-set thresholds can be programmed for both Overcurrent and Earth fault detection. The time current characteristic of the low-set units are selectable between Normal Inverse curve 3/10, Normal Inverse curve 1.3/10, Long Time Inverse curve, Very Inverse curve, Extremely Inverse curve, Extremely Inverse 0.65 curve and Definite Time. High-set units are the Definitive Time type. Instantaneous tripping is possible by setting the time to minimum.

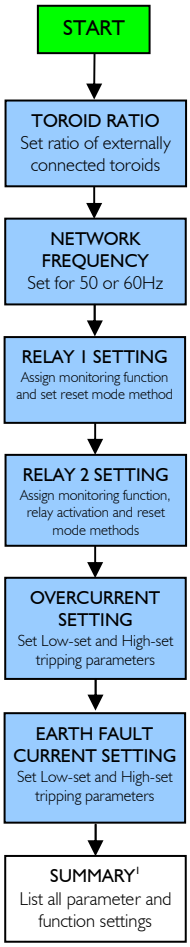
Two simple Summary screens are displayed once the programming is complete. The same screens can also be displayed by presses of the **"RESET"** button. This allows the user to access key information with the tamperproof transparent cover closed and sealed.

A Test mode is provided (also accessible with tamperproof cover closed) to confirm the correct operation of the internal relays. The relays will energise when the **"TEST"** button is pressed and de-energise when the button is released (AUTO Reset) or when the **"RESET"** button is pressed (MAN Reset).

Following a trip condition, the information about the trip is then stored. This can then be recalled later if required using the **"RESET"** button to access the information. The P9690 has the ability to store up to 10 trips and using the "Up" and "Down" buttons, allows each trip to be displayed individually. Each trip is also marked with a time stamp showing the time from power up as well as the time from the previous trip. This feature is very useful for establishing a pattern on particular inputs, knowing when they occurred and how frequent!

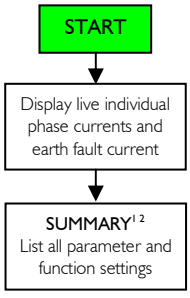
FUNCTION OVERVIEW

Programming mode.



Programmable parameters

User settings summary mode



[1] Summary screens are split into two with one screen showing Overcurrent settings and the other showing Earth fault settings.

[2] Displaying of the Summary screens during normal operation is achieved via subsequent presses of the "RESET" button. See Section 8. QUICK VIEW OF USER SETTINGS for further information.

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INSTALLATION

Installation work must be carried out by qualified personnel.

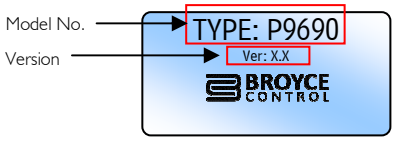
- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED ^**
- Remove the P9690 from the packaging.
- Lift the raised part of the side clip in order to withdraw from the housing. Carry this out on each side.
- Insert the P9690 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Wire the supplied female pluggable connectors as required.
- Plug the connectors into the relevant sockets on the rear of the unit.
- The P9690 is now ready for powering and programming.

☞*The front window of the P9690 is supplied with a clear protective film which can be removed as and when necessary.*

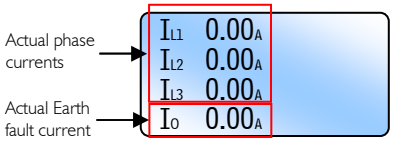
^ When carrying out future maintenance on the product or application and it becomes necessary to disconnect the connectors from the product, ensure for the Current Transformer connector, **they do not remain open circuit**. This can lead to high voltages being present on this connector.

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.
- The LCD will momentarily display a welcome screen as shown…



….then after a short delay reverts to indicating the following information:



TEST MODE

- Press and hold the TEST button and both relays will energise. The LCD will display the characters **"TEST"** and the product part number (as below). The LCD backlight and red **"Trip"** LED will flash.

- Release the TEST button and the relay(s) will remain energised if set to Manual reset or de-energise if set to Auto reset.
- Press the RESET to de-energise relay(s) which are set to Manual reset. The LCD will revert back to Normal operation. The LCD backlight and red **"Trip"** LED will stop flashing.

☞*Testing should be carried out on a regular basis to check the integrity of the P9690.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

PROGRAMMING

Programming/setting of the P9690 is carried out using the 3 buttons located behind the transparent cover.

The MODE button selects the required parameter to be changed. The ▲ ▼ buttons either increment or decrement a value accordingly.

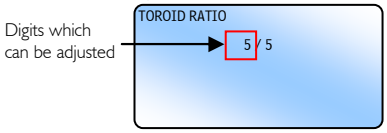
Any adjustments made are stored by the pressing and holding of the RESET button until the LCD shows the word "**Saved!**" See Section 7. SAVING OF SETTINGS.

☞*Please read the **"Notes during programming"** before commencing with the following.*

1A. TOROID RATIO

☞*Setting the Toroid Ratio will allow the "actual" Phase currents (IL1, IL2, IL3) and Neutral current (Io) displayed on the LCD to represent that of the currents flowing through the external CT's. If no CT's are used, the parameter should be set to 5/5 (i.e. 1:1). The setting applies to all CT's.*
☞*Default setting is "5/5"*

- Press and hold the MODE button. The LCD displays a screen showing the characters "**User Settings**" then the following screen appears…



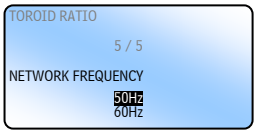
- Press either ▲ or ▼ to set the primary value of the external CT's.

☞*The digit after the forward slash "/" cannot be changed.*

1B. NETWORK FREQUENCY

☞*Default setting is "50Hz"*

- Whilst in the same screen as that for the Toroid Ratio (see 1A.), press the MODE button to display the options for **NETWORK FREQUENCY**.

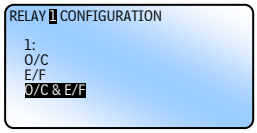


- Press either ▲ or ▼ to select between 50Hz or 60Hz. This should be set to suit the frequency of the network being monitored.
- Press and hold the MODE button to set the options for **"Relay 1"** as described in the next section.

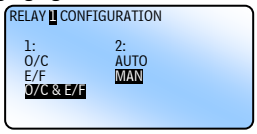
2. RELAY 1 SETTING

☞*Default setting for Relay 1 is linked to "O/C & E/F". Resetting mode is Manual.*

- The LCD displays the following screen. The options under **"1:"** are displayed and the default setting highlighted.



- Press either ▲ or ▼ to select how Relay 1 is assigned to tripping.
- Press the MODE button and the options under "**2:**" for resetting are displayed and the default setting highlighted.



Actual LCD presentation when adjustable parameters are displayed.

- Press either ▲ or ▼ to select between **AUTO** resetting or **MAN**UAL resetting (after a fault has occurred).

continued on next page…

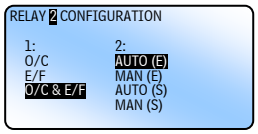
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

- **PROGRAMMING (continued)**
- Press and hold the MODE button to set the options for "**Relay 2**" as described in the next section.

3. RELAY 2 SETTING

☞Default setting for Relay 2 is linked to "O/C & E/F" and energising at the end of the time out period. Resetting mode is Auto.

- Setting of "Relay 2" is carried out in a similar manner as "Relay 1", however it is necessary to assign the relay to either energise at the start (S) or end (E) of the time out period.



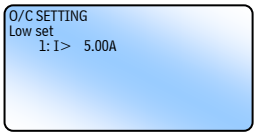
Actual LCD presentation when adjustable parameters are displayed.

- Press and hold the MODE button to set the options for **"OVERCURRENT"** as described in the next section.

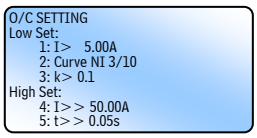
4. OVERCURRENT SETTING

☞The description for the Curves is abbreviated when displayed on the screen. Refer to "IDMT Characteristic Curves" for further explanation.
☞Default settings for Overcurrent are shown in the last LCD screen example in this section.

- Settings for Overcurrent are displayed in turn following subsequent presses of the MODE button. The Low-set trip current (I>) is displayed first.



- Press either ▲ or ▼ to change the current.
- Press the MODE button to select the remaining settings and use the ▲ and ▼ buttons to change them.



Actual LCD presentation when adjustable parameters are displayed.
Screen example above also shows the default settings for OVERCURRENT.

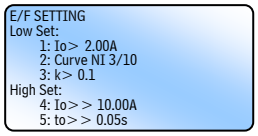
- Press and hold the MODE button to set the options for **"EARTH FAULT"** as described in the next section.

☞If the Curve in selection "2:" is set to Definite Time, then selection "3:" will display "3: t>" and the required delay can then be set.
☞If High-set is set to Disable in selection "4:", then I>> or t>> cannot be adjusted.

5. EARTH FAULT SETTING

☞Default settings for Earth Fault are shown in the LCD screen example in this section.

- Settings for Earth Fault are carried out in the same manner as described for Overcurrent.



Screen example showing the default settings for EARTH FAULT.

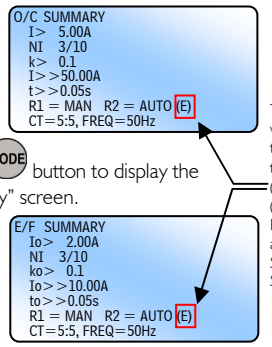
- Press and hold the MODE button to see a summary of the **"OVERCURRENT"** then **"EARTH FAULT"** settings as described in the next section.

☞If the Curve in selection "2:" is set to Definite Time, then selection "3:" will display "3: to>" and the required delay can then be set.
☞If High-set is set to Disable in selection "4:", then Io>> or to>> cannot be adjusted.

6. OVERCURRENT & EARTH FAULT SUMMARY

☞It is not possible to edit settings when these screens are displayed.

- Following the setting of "Earth Fault", the LCD displays the "Overcurrent Summary" screen showing a summary of the settings made during programming. All settings are displayed. The selected CT ratio, Network Frequency and Relay operation (following a Reset) information is also displayed.



The letter in brackets refers to whether Relay 2 has been set to trigger at the start or end of the time out period.
(E) = End of time out
(S) = Start of time out
Either abbreviation can appear after the word MAN or AUTO
See Section 3. RELAY 2 SETTING

- Press and hold the MODE button to display the "Earth Fault Summary" screen.

7. SAVING OF SETTINGS

- If after viewing the Summary screens the settings are correct, press and hold the RESET button until the word **"Saved."** appears. Any new settings are now stored.
- The screen will revert back to Normal operation.

8. QUICK VIEW OF USER SETTINGS

☞It is not possible to edit settings when these screens are displayed.
☞This feature can also be activated with the front window closed!

- Press and hold the RESET button to display the initial power up screen.
- Press the same button again to display the "Last Tripped Information" screen *(refer to the next page for further information on this feature).*
- Press again to display the "Overcurrent Summary" screen.
- Press again to display the "Earth Fault Summary" screen.
- Press again to display the contact details for Broyce Control.
- Press again to revert back to Normal operation.

9. LAST TRIPPED INFORMATION

☞Refer to next page for detailed information of this feature

Notes during programming

☞If during programming it is necessary to abort, press the RESET button briefly.
☞Pressing and holding either ▲ or ▼ for > 1sec. will increment or decrement the new value at a quicker rate.
☞Stepping through each User Setting screen is performed by pressing and holding the MODE button until the desired screen is displayed.
Short presses of the MODE button will allow further editable settings to be changed within a specific screen.
☞If the user remains in a setting or summary screen where no adjustments or button presses are made within a certain period, the screen will revert back to Normal operation. Additionally, any settings that have been made but not stored will not be saved.
☞"O/C" refers to Overcurrent and "E/F" refers to Earth fault.

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

- **PROGRAMMING (continued)**

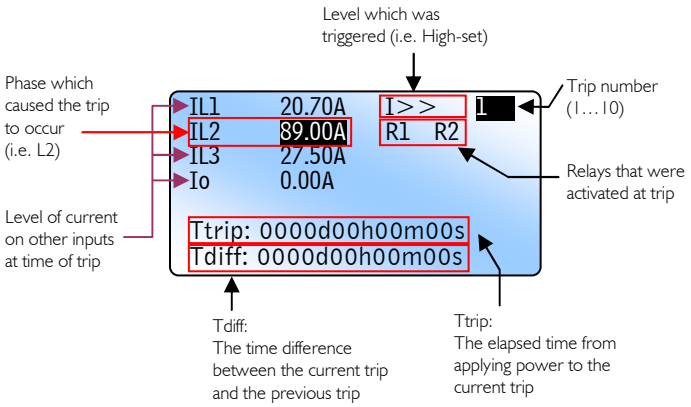
9A. LAST TRIPPED INFORMATION

☞This information is held in memory even if power is removed.

This feature allows the user to view and recall the key information relating to the last trip event and it can store up to 10 trip events. It is accessed as described in Section 8 on the previous page.

The information displayed highlights the cause of the trip (i.e. which phase for example), the level of current at the time the trip occurred; the triggering method (Low-set or High-set) and which relays were activated. It also shows the elapsed time from powering the P9690 to the trip occurring and displayed against "Ttrip" as well as showing the time difference between the trip displayed and the one previous to that. This is shown against "Tdiff".

An example of the screen layout is shown below.



☞If there is only one trip event stored in the memory, the display will show "Tdiff: ----d--h--m--s" when viewed.

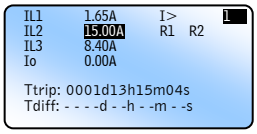
9B. RECALLING THE LAST TRIPPED INFORMATION

☞If the unit has logged the maximum number of trips which can be stored, then the display will show "Tdiff: ----d--h--m--s" when trip screen 10 is viewed.

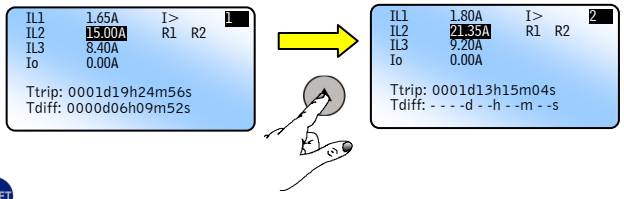
☞The screen will revert back to Normal operation after 1 minute if no further button presses are made.

☞If a trip condition occurs whilst in this mode, the screen will automatically change to display the information relating to the current status.

- As described in Section 8, use the RESET to gain access to the Last Tripped Information screen. The display will show the most recent trip information as follows:



- If more than one trip event is stored, use the ▲ and ▼ buttons to select the screens accordingly.



The example on the left shows the problem on phase L2 on both trip events. The difference between the first recorded trip and second was **6h 09m** and **52s**.

- Press the RESET button to exit the screen information when finished or allow to time out automatically.

9C. CLEARING THE LAST TRIPPED INFORMATION HISTORY

☞Once the information has been deleted, it will not be possible to recall this.

☞"Ttrip" information is still retained but won't be displayed after the carrying out this operation (See 9D)

- Press the RESET button to access the relevant screen.
- Press the ▲ and ▼ buttons simultaneously to delete the information. When this is complete, the screen will show:

- Press the RESET button again to exit.

9D. CLEARING "Ttrip" INFORMATION

☞If the tripping history hasn't been deleted, previous information will be displayed from the last time the unit was powered up.

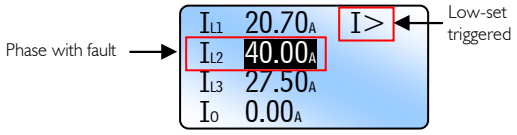
- The "Ttrip" information will still be held in memory after deleting the trip history is made and also if power is removed and re-applied. However, when power is re-applied, the internal counter will reset and start from zero
- Only when a new trip condition occurs will the "Ttrip" information get updated and be displayed on the most recent screen.

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

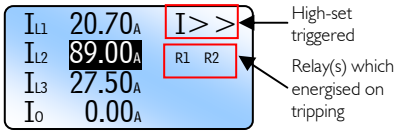
- **TRIPPING MODES**

1. OVERCURRENT

- A fault which develops on a phase will be indicated by an increase in current reading on the LCD. When the level of current exceeds the Low-set setting, the phase at fault will be highlighted by the digits flashing.
- The LCD backlight will flash.
- Relay 2 will energise if assigned to Overcurrent and set to energise at the start of the time out period (See Section 3. RELAY 2 SETTING).
- The characters "I>" will display to indicate the Low-set has been triggered.



- If the current continues to increase above the High-set setting, the characters **"I>"** will change and display **"I>>"** to indicate the High-set has been triggered.

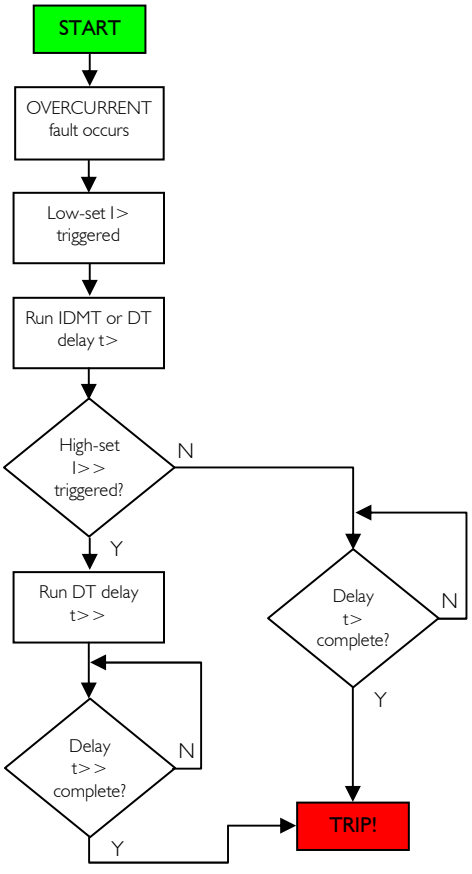


- When the unit finally trips, the digits of the phase at fault will stop flashing and remain highlighted. This allows the user to see which phase was at fault and caused the unit to trip.
- The red **"Tripped"** LED will also flash.
- The relays which energised are also displayed on the screen after tripping.
- Press RESET to reset and return the unit back to normal operation (assuming the fault has been cleared). The LCD reverts back to displaying the normal system currents and the red **"Tripped"** LED stops flashing.

☞*If either relay is set for Auto resetting, then they would have de-energised after the fault had cleared. The corresponding relay ident (i.e. R1 and/or R2) on the display would also disappear. Pressing the **"RESET"** button will only clear the LCD. If either relay is set for Manual resetting, then pressing the **"RESET"** button will de-energise the relay(s) and clear the LCD.*

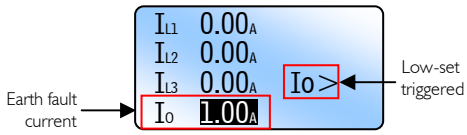
In the event of an Overcurrent condition, the basic sequence of events is shown below.

☞*Assuming High-set trip is enabled.*

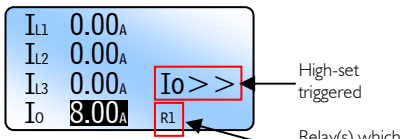


2. EARTH FAULT

- When an Earth fault occurs causing a flow in current through the Neutral, an increase in current reading on the LCD will occur. When the level of current exceeds the Low-set setting, the reading will be highlighted by the digits flashing.
- The LCD backlight will flash.
- Relay 2 will energise if assigned to Earth fault and set to energise at the start of the time out period (See Section 3. RELAY 2 SETTING).
- The characters **"Io>"** will display to indicate the Low-set has been triggered.



- If the current continues to increase above the High-set setting, the characters **"Io>"** will change and display **"Io>>"** to indicate the High-set has been triggered.

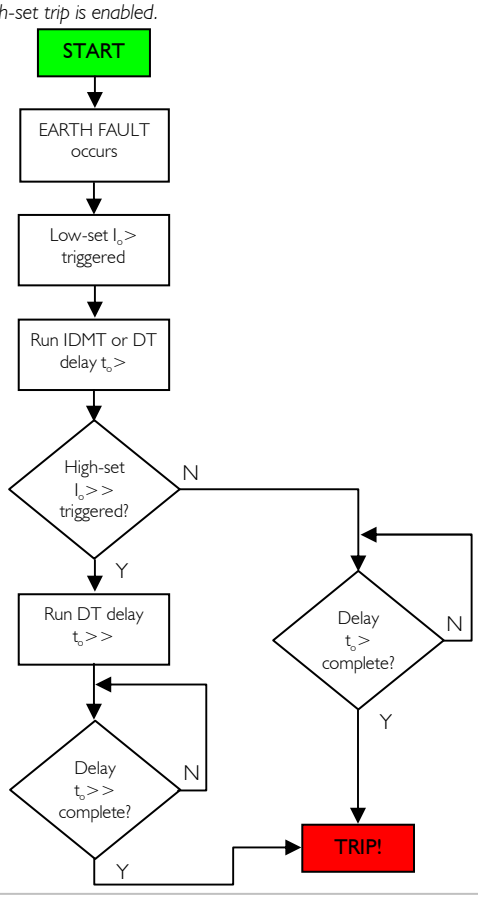


- When the unit finally trips, the digits will stop flashing and remain highlighted. This allows the user to see what caused the unit to trip.
- The red **"Tripped"** LED will also flash.
- The relays which energised are also displayed on the screen after tripping.
- Press RESET to reset and return the unit back to normal operation (assuming the fault has been cleared). The LCD reverts back to displaying the normal system currents and the red **"Tripped"** LED stops flashing.

☞ *If either relay is set for Auto resetting, then they would have de-energised after the fault had cleared. The corresponding relay ident (i.e. R1 and/or R2) on the display would also disappear. Pressing the **"RESET"** button will only clear the LCD. If either relay is set for Manual resetting, then pressing the **"RESET"** button will de-energise the relay(s) and clear the LCD.*

In the event of an Earth fault condition, the basic sequence of events is shown below.

☞*Assuming High-set trip is enabled.*



The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

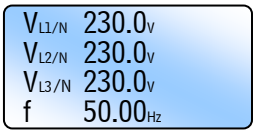
- ## ADDITONAL MEASUREMENTS

With the 4-way connector wired and plugged in to the rear of the P9690, voltage and current present, it will be possible to measure and display the following information.

1. VOLTAGE MEASUREMENTS
PHASE TO NEUTRAL OR PHASE TO PHASE

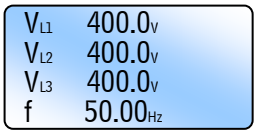
☞The frequency measurement "f" is derived from L1 and will therefore only appear on the LCD if L1 is present and the voltage is >12V phase to neutral.

- Quickly press the ▲ button and the following will appear on the LCD which provides the phase to neutral measurements of the phases connected. The system measured frequency is also displayed.



Screen example showing the phase to neutral voltages and frequency

- Press the same button again to display the measured phase to phase voltages.

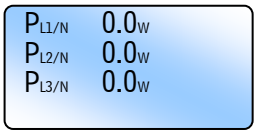


Screen example showing the phase to phase voltages and frequency

2. POWER

☞The actual power displayed will also be dependant on the selected Toroid ratio's. See examples on the right.

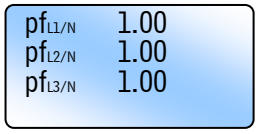
- After viewing the phase to phase voltages, pressing the same button again displays the calculated power for each phase.



3. POWER FACTOR

☞By default, the displayed Power Factor will be 1.00.

- After viewing the calculated power, pressing the same button again displays the calculated power factor for each phase.



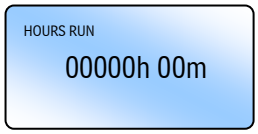
4. HOURS RUN

☞This will run for as long as power is applied to the relay.

☞The displayed time cannot be reset.

☞The displayed time will be retained in memory during removal of power to the relay.

- After viewing the calculated power factor, pressing the same button again displays the hours run.



- Pressing the same button again will revert back to display the measured phase currents.

Notes

☞If alterations to the User Settings are required whilst in one of the above screens, it will be necessary to exit first by pressing the RESET *briefly.*

5. FAULT CONDITION

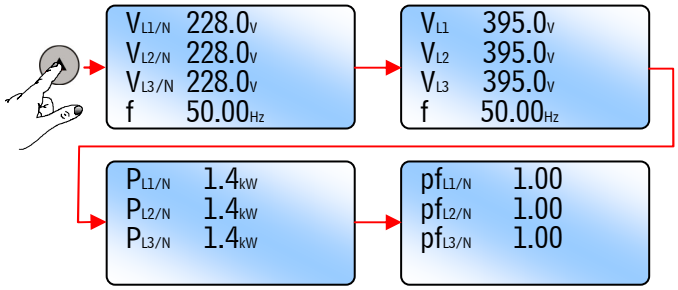
- If any of the examples shown on the left appear on the LCD, it will be exited automatically should a fault occur which initiates an Overcurrent or Earth fault time out.
- The LCD will then revert to displaying which phase is at fault or whether the fault exists on the neutral. See "Tripping Modes" on the previous page.

6. EXAMPLES

The following examples show the expected measured information based on the voltage and currents present at the inputs. Trip settings are not taken in to account in the examples.

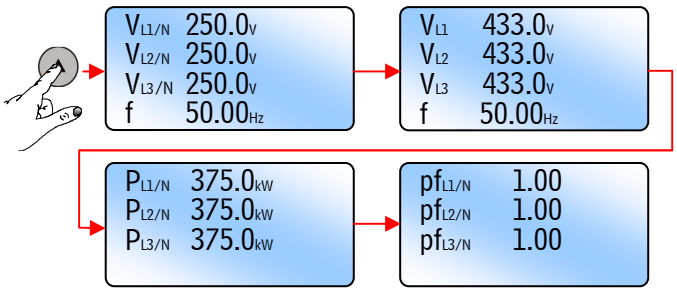
Example. 1

VL1/L2/L3 = 228V, IL1/L2/L3 = 6.35A, f = 50Hz, CT ratio = 5:5



Example. 2

VL1/L2/L3 = 250V, IL1/L2/L3 = 1500A[1], f = 50Hz, CT ratio = 2000:5



[1] Current on the primary side of the externally connected 2000A CT's

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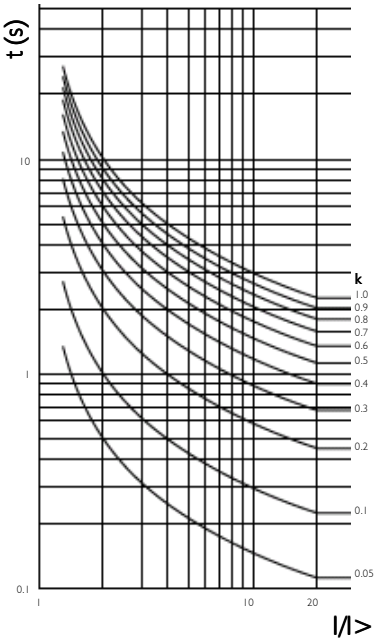
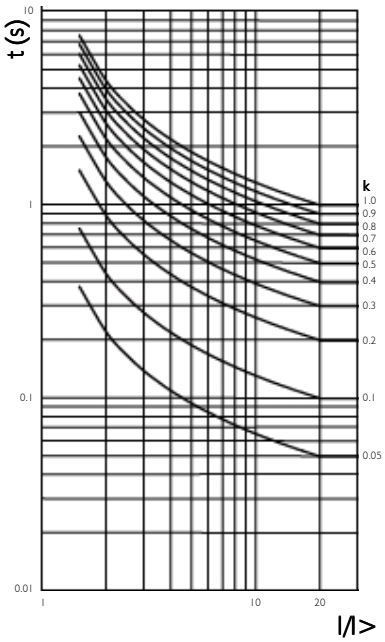
- IDMT CHARACTERISTIC CURVES

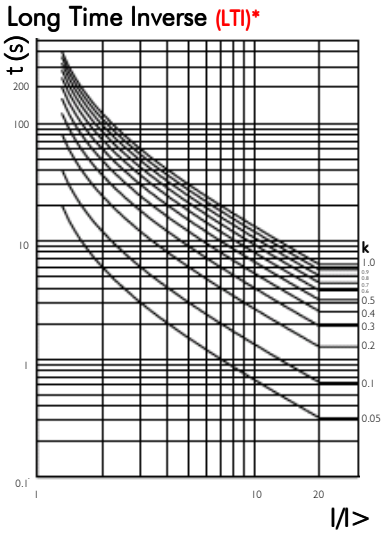
Normal Inverse 3/10 (NI 3/10)*



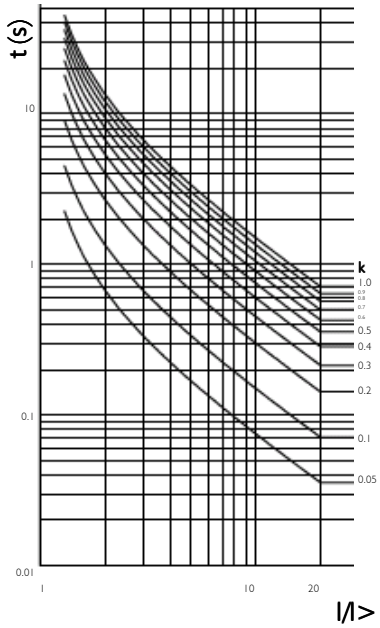
Normal Inverse 1.3/10 (NI 1.3/10)*



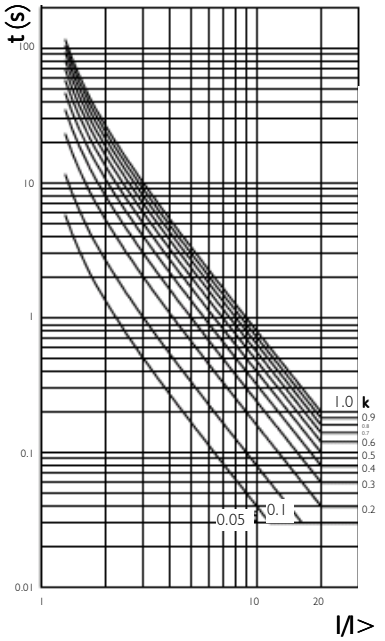
Long Time Inverse (LTI)*



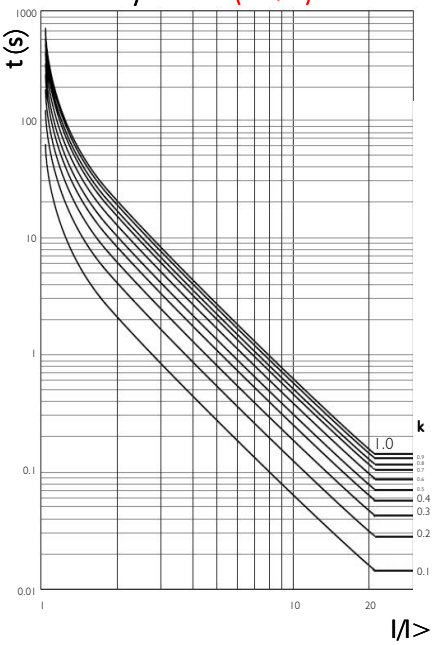
Very Inverse (VI)*



Extremely Inverse (EI)*

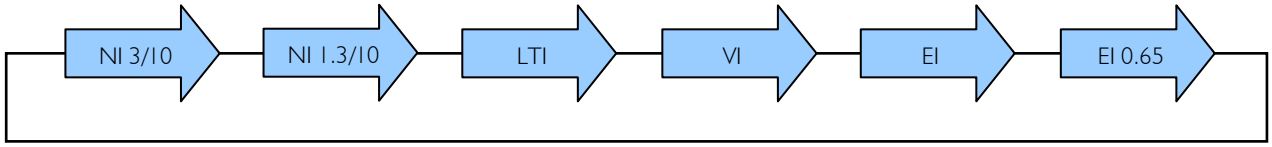


Extremely Inverse (EI 0.65)*



* Abbreviations used in the LCD screen for the selected IDMT characteristic curve.

The sequence of curves that are presented to the user when programming is shown below



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• TECHNICAL SPECIFICATION

Aux. Supply voltage Un (**1, 2**):	85 – 265VAC/85 - 370VDC[1] 18 – 55VAC/18 – 72VDC* *(Voltage range should be specified at time of ordering)*
Rated frequency:	50/60Hz (AC Supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	[1]4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.

* If connecting a fuse externally, a Time Delay type is recommended with a rating of 0.5A or higher.

3-Phase voltage input (**L1, L2, L3, N**):	3-Phase, 3 or 4-wire
Rated frequency:	50/60Hz
Measured voltage range:	12 – 400V phase to neutral
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664

Rated current input In:	5A (directly connected)
Rated frequency:	50/60Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)

External CT's (**9……16**):	Class P recommended. (with 5A secondary)
Maximum CT primary current rating:	6000A

Overcurrent settings:	
Low-set trip (I>):	0.50 – 10.00A (10 – 200%)
Low-set time multiplier (k>):	0.05 – 1.00
Low-set definite time (t>):	0.05 – 100s
High-set trip (I>>):	0.5 – 100A (10 – 2000%) or disable
High-set definite time (t>>):	0.05 – 2.5s

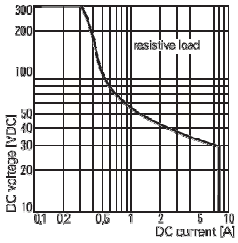
Earth fault settings:	
Low-set trip (I_o>):	0.10 – 5.00A (2 – 100%)
Low-set time multiplier (k_o>):	0.05 – 1.00
Low-set definite time (t_o>):	0.05 – 100s
High-set trip (I_o>>):	0.10 – 50.00A (2 – 1000%) or disable
High-set definite time (t_o>>):	0.05 – 2.5s

Pick up value:	+2% of trip setting
Accuracy:	
Protection thresholds:	± 5%
Time delay (DT):	± 5% (with a minimum of 50mS)
Time delay (IDMT):	± 5% (with a minimum of 50mS and I > 1.2 x set-trip)
Actual phase current:	± 1% of rated current In
Actual Earth fault current:	± 1% of rated current In
Voltage:	0.5% (>100V AC)
Power:	2% of full scale (-90° to +90°)
Power factor:	2% (0.5 < pf < 1)
Frequency:	± 0.2Hz (45 to 65Hz)

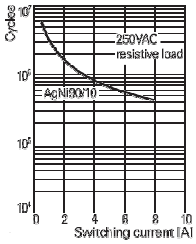
Display update time:	< 1 sec. (All measurements)
Repeat accuracy:	± 0.5% @ constant conditions

Ambient temperature:	-10 to +60°C
Relative humidity:	+95%

Output:	
(RL1 - **3, 4, 5**):	1 x SPDT relay
(RL2 - **6, 7, 8**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



Max. DC Load Breaking Capacity



Electrical Endurance

Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 640g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm

Terminal type:	UL94-V0 rated pluggable and re-wireable female connectors comprising: 2-way (Power supply **1, 2**) 6-way (Relay contacts **3….8**) 8-way (Phase current and neutral inputs **9….16**) 4-way (3-Phase Voltage Input **L1….N**)
Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	4.4in lb (0.5Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)

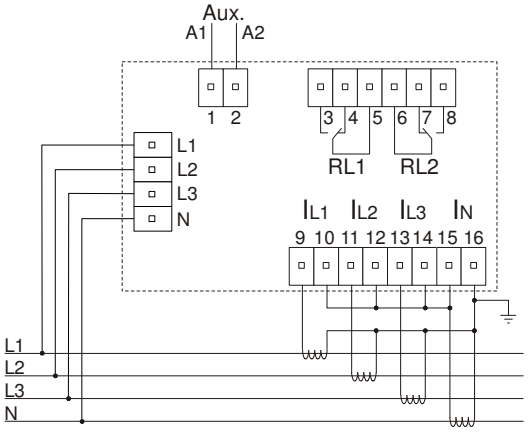
Approvals:	Conforms to IEC. CE and cULus and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

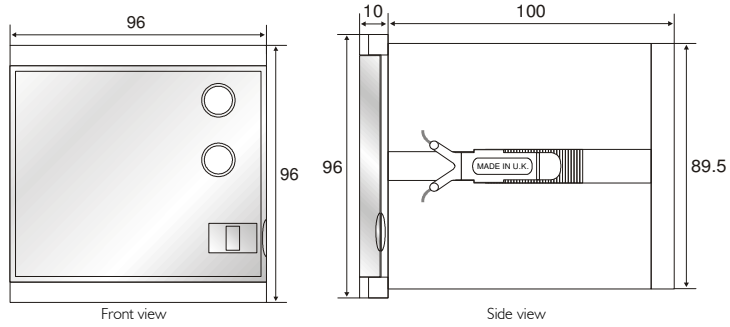
Options:

The P9600 range also includes individual Overcurrent or Earth fault relays available with either IDMT or DT characteristics. Please refer to separate data sheets.

• CONNECTION DIAGRAM



• DIMENSIONS



All dimensions are in mm.

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ISO 9001 REGISTERED FIRM

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

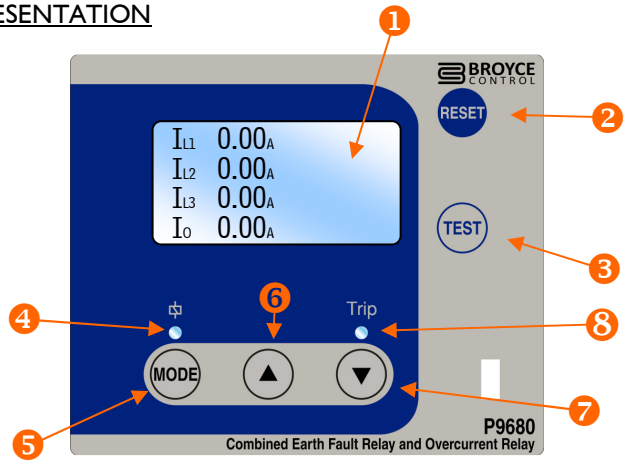
Type: P9680

Combined Overcurrent and Earth Fault Relay

- **True R.M.S. measurements**
- **Low Set and High Set tripping thresholds for both Overcurrent and Earth Fault detection**
- **6 selectable IDMT (Inverse Definite Minimum Time) characteristic curves**
- **Adjustable DT (Definitive Time)**
- **Three phase over current and earth fault detection with live display of individual phase and earth fault currents**
- **Last trip memory (last 10 trips stored and can be recalled)**
- **Pre-defined selectable CT ratio's (5:5….6000:5)**
- **Microprocessor based (self checking) with non-volatile memory**
- **"Ecosmart" Energy efficient power supply design**
- **Rear mounted pluggable connectors for supply, relay contacts and current inputs**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 100mm

PRESENTATION



1. LCD (Liquid Crystal Display) for user information
2. **"RESET"** button
3. **"TEST"** button
4. **"Power supply"** green LED indication
5. **"MODE"** button*
6. Parameter increment button*
7. Parameter decrement button*
8. **"Trip status"** red LED indication

* accessible only when the front cover is open

OPERATION & OVERVIEW

The P9680 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect Overcurrent on individual phases and non-directional Earth faults (by measurement of the neutral current) in 3-phase applications. Typically the P9680 is wired in conjunction with external current transformers of the feeder to be protected.

A clear backlit LCD provides all key information the user requires for both operation and setting up. Setting is achieved in a few simple steps and requires no previous knowledge of product operation.

Normal operation provides the user with actual live individual phase currents and earth fault current all on one screen. The actual phase current represents that of the current passing through the primary side of the externally connected CT's. This is achieved by the setting of the ratio for the CT.

Programming mode allows the user to assign the operation mode for both internal relays. They can be individually assigned to Overcurrent, Earth fault or a combination of both. They can also be configured for Auto or Manual resetting. Relay 2 has the added option of being allowed to energise at the start or end of a time out period. If assigned to energise at the start, the Relay can be used to operate a buzzer or lamp giving early warning before a system actually shuts down.

Low-set and High-set thresholds can be programmed for both Overcurrent and Earth fault detection. The time current characteristic of the low-set units are selectable between Normal Inverse curve 3/10, Normal Inverse curve 1.3/10, Long Time Inverse curve, Very Inverse curve, Extremely Inverse curve, Extremely Inverse 0.65 curve and Definite Time. High-set units are the Definitive Time type. Instantaneous tripping is possible by setting the time to minimum.

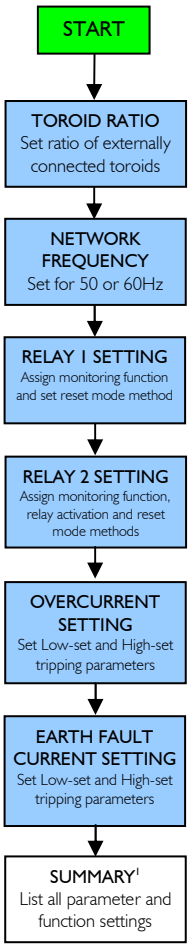
Two simple Summary screens are displayed once the programming is complete. The same screens can also be displayed by presses of the **"RESET"** button. This allows the user to access key information with the tamperproof transparent cover closed and sealed.

A Test mode is provided (also accessible with tamperproof transparent cover closed) to confirm the correct operation of the internal relays. The relays will energise when the **"TEST"** button is pressed and de-energise when the button is released (AUTO Reset) or when the **"RESET"** button is pressed (MAN Reset).

Following a trip condition, the information about the trip is then stored. This can then be recalled later if required using the **"RESET"** button to access the information. The P9680 has the ability to store up to 10 trips and using the "Up" and "Down" buttons, allows each trip to be displayed individually. Each trip is also marked with a time stamp showing the time from power up as well as the time from the previous trip. This feature is very useful for establishing a pattern on particular inputs, knowing when they occurred and how frequent!

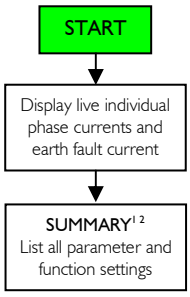
FUNCTION OVERVIEW

Programming mode.



Programmable parameters

User settings summary mode



[1] Summary screens are split into two with one screen showing Overcurrent settings and the other showing Earth fault settings.

[2] Displaying of the Summary screens during normal operation is achieved via subsequent presses of the "RESET" button. See Section 8. QUICK VIEW OF USER SETTINGS for further information.

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INSTALLATION

Installation work must be carried out by qualified personnel.

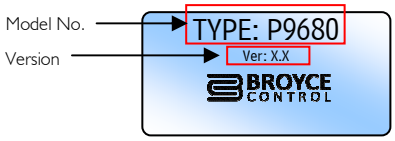
- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED ^**
- Remove the P9680 from the packaging.
- Lift the raised part of the side clip in order to withdraw from the housing. Carry this out on each side.
- Insert the P9680 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Wire the supplied female pluggable connectors as required.
- Plug the connectors into the relevant sockets on the rear of the unit.
- The P9680 is now ready for powering and programming.

☞*The front window of the P9680 is supplied with a clear protective film which can be removed as and when necessary.*

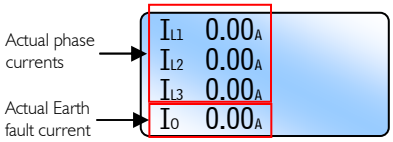
^ When carrying out future maintenance on the product or application and it becomes necessary to disconnect the connectors from the product, ensure for the Current Transformer connector, **they do not remain open circuit**. This can lead to high voltages being present on this connector.

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.
- The LCD will momentarily display a welcome screen as shown…



….then after a short delay reverts to indicating the following information:



TEST MODE

- Press and hold the TEST button and both relays will energise. The LCD will display the characters **"TEST"** and the product part number (as below). The LCD backlight and red **"Trip"** LED will flash.

- Release the TEST button and the relay(s) will remain energised if set to Manual reset or de-energise if set to Auto reset.
- Press the RESET to de-energise relay(s) which are set to Manual reset. The LCD will revert back to Normal operation. The LCD backlight and red **"Trip"** LED will stop flashing.

☞*Testing should be carried out on a regular basis to check the integrity of the P9680.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

PROGRAMMING

Programming/setting of the P9680 is carried out using the 3 buttons located behind the transparent cover.

The MODE button selects the required parameter to be changed. The ▲ ▼ buttons either increment or decrement a value accordingly.

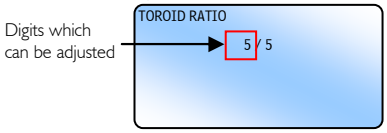
Any adjustments made are stored by the pressing and holding of the RESET button until the LCD shows the word "**Saved!**" See Section 7. SAVING OF SETTINGS.

☞*Please read the **"Notes during programming"** before commencing with the following.*

1A. TOROID RATIO

☞*Setting the Toroid Ratio will allow the "actual" Phase currents (IL1, IL2, IL3) and Neutral current (Io) displayed on the LCD to represent that of the currents flowing through the external CT's. If no CT's are used, the parameter should be set to 5/5 (i.e. 1:1). The setting applies to all CT's.*
☞*Default setting is "5/5"*

- Press and hold the MODE button. The LCD displays a screen showing the characters "**User Settings**" then the following screen appears…



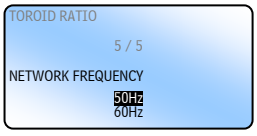
- Press either ▲ or ▼ to set the primary value of the external CT's.

☞*The digit after the forward slash "/" cannot be changed.*

1B. NETWORK FREQUENCY

☞*Default setting is "50Hz"*

- Whilst in the same screen as that for the Toroid Ratio (see 1A.), press the MODE button to display the options for **NETWORK FREQUENCY**.

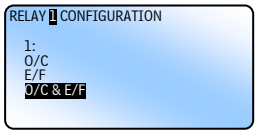


- Press either ▲ or ▼ to select between 50Hz or 60Hz. This should be set to suit the frequency of the network being monitored.
- Press and hold the MODE button to set the options for **"Relay 1"** as described in the next section.

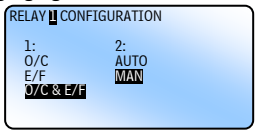
2. RELAY 1 SETTING

☞*Default setting for Relay 1 is linked to "O/C & E/F". Resetting mode is Manual.*

- The LCD displays the following screen. The options under **"1:"** are displayed and the default setting highlighted.



- Press either ▲ or ▼ to select how Relay 1 is assigned to tripping.
- Press the MODE button and the options under "**2:**" for resetting are displayed and the default setting highlighted.



Actual LCD presentation when adjustable parameters are displayed.

- Press either ▲ or ▼ to select between **AUTO** resetting or **MAN**UAL resetting (after a fault has occurred).

continued on next page…

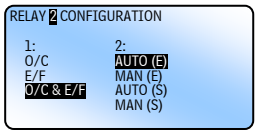
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

- PROGRAMMING (continued)
- Press and hold the MODE button to set the options for "**Relay 2**" as described in the next section.

3. RELAY 2 SETTING

☞Default setting for Relay 2 is linked to "O/C & E/F" and energising at the end of the time out period. Resetting mode is Auto.

- Setting of "Relay 2" is carried out in a similar manner as "Relay 1", however it is necessary to assign the relay to either energise at the start (S) or end (E) of the time out period.



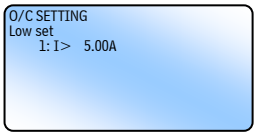
Actual LCD presentation when adjustable parameters are displayed.

- Press and hold the MODE button to set the options for **"OVERCURRENT"** as described in the next section.

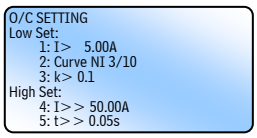
4. OVERCURRENT SETTING

☞The description for the Curves is abbreviated when displayed on the screen. Refer to "IDMT Characteristic Curves" for further explanation.
☞Default settings for Overcurrent are shown in the last LCD screen example in this section.

- Settings for Overcurrent are displayed in turn following subsequent presses of the MODE button. The Low-set trip current (I>) is displayed first.



- Press either ▲ or ▼ to change the current.
- Press the MODE button to select the remaining settings and use the ▲ and ▼ buttons to change them.



Actual LCD presentation when adjustable parameters are displayed.
Screen example above also shows the default settings for OVERCURRENT.

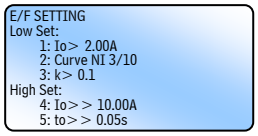
- Press and hold the MODE button to set the options for **"EARTH FAULT"** as described in the next section.

☞If the Curve in selection "2:" is set to Definite Time, then selection "3:" will display "3: t>" and the required delay can then be set.
☞If High-set is set to Disable in selection "4:", then I>> or t>> cannot be adjusted.

5. EARTH FAULT SETTING

☞Default settings for Earth Fault are shown in the LCD screen example in this section.

- Settings for Earth Fault are carried out in the same manner as described for Overcurrent.



Screen example showing the default settings for EARTH FAULT.

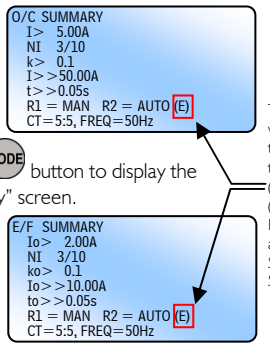
- Press and hold the MODE button to see a summary of the **"OVERCURRENT"** then **"EARTH FAULT"** settings as described in the next section.

☞If the Curve in selection "2:" is set to Definite Time, then selection "3:" will display "3: to>" and the required delay can then be set.
☞If High-set is set to Disable in selection "4:", then Io>> or to>> cannot be adjusted.

6. OVERCURRENT & EARTH FAULT SUMMARY

☞It is not possible to edit settings when these screens are displayed.

- Following the setting of "Earth Fault", the LCD displays the "Overcurrent Summary" screen showing a summary of the settings made during programming. All settings are displayed. The selected CT ratio, Network Frequency and Relay operation (following a Reset) information is also displayed.



The letter in brackets refers to whether Relay 2 has been set to trigger at the start or end of the time out period.
(E) = End of time out
(S) = Start of time out
Either abbreviation can appear after the word MAN or AUTO
See Section 3. RELAY 2 SETTING

- Press and hold the MODE button to display the "Earth Fault Summary" screen.

7. SAVING OF SETTINGS

- If after viewing the Summary screens the settings are correct, press and hold the RESET button until the word **"Saved."** appears. Any new settings are now stored.
- The screen will revert back to Normal operation.

8. QUICK VIEW OF USER SETTINGS

☞It is not possible to edit settings when these screens are displayed.
☞This feature can also be activated with the front window closed!

- Press and hold the RESET button to display the initial power up screen.
- Press the same button again to display the "Last Tripped Information" screen *(refer to the next page for further information on this feature).*
- Press again to display the "Overcurrent Summary" screen.
- Press again to display the "Earth Fault Summary" screen.
- Press again to display the contact details for Broyce Control.
- Press again to revert back to Normal operation.

9. LAST TRIPPED INFORMATION

☞Refer to next page for detailed information of this feature

Notes during programming

☞If during programming it is necessary to abort, press the RESET button briefly.
☞Pressing and holding either ▲ or ▼ for > 1sec. will increment or decrement the new value at a quicker rate.
☞Stepping through each User Setting screen is performed by pressing and holding the MODE button until the desired screen is displayed.
Short presses of the MODE button will allow further editable settings to be changed within a specific screen.
☞If the user remains in a setting or summary screen where no adjustments or button presses are made within a certain period, the screen will revert back to Normal operation. Additionally, any settings that have been made but not stored will not be saved.
☞"O/C" refers to Overcurrent and "E/F" refers to Earth fault.

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- **PROGRAMMING (continued)**

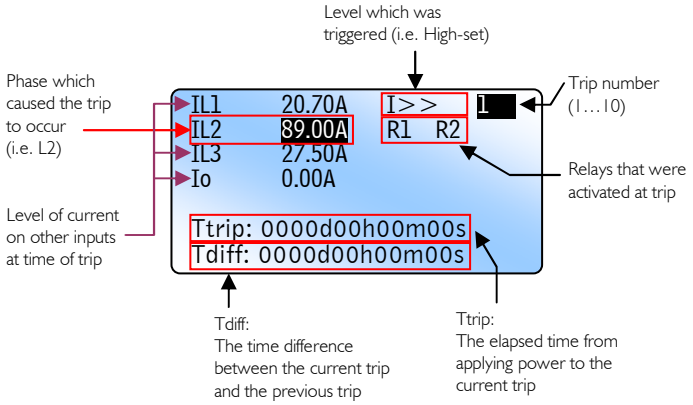
9A. LAST TRIPPED INFORMATION

☞*This information is held in memory even if power is removed.*

This feature allows the user to view and recall the key information relating to the last trip event and it can store up to 10 trip events. It is accessed as described in Section 8 on the previous page.

The information displayed highlights the cause of the trip (i.e. which phase for example), the level of current at the time the trip occurred; the triggering method (Low-set or High-set) and which relays were activated. It also shows the elapsed time from powering the P9680 to the trip occurring and displayed against "Ttrip" as well as showing the time difference between the trip displayed and the one previous to that. This is shown against "Tdiff".

An example of the screen layout is shown below.



☞If there is only one trip event stored in the memory, the display will show "Tdiff: ----d--h--m--s" when viewed.

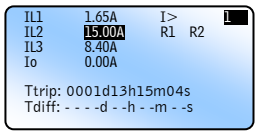
9B. RECALLING THE LAST TRIPPED INFORMATION

☞*If the unit has logged the maximum number of trips which can be stored, then the display will show "Tdiff: ----d--h--m--s" when trip screen 10 is viewed.*

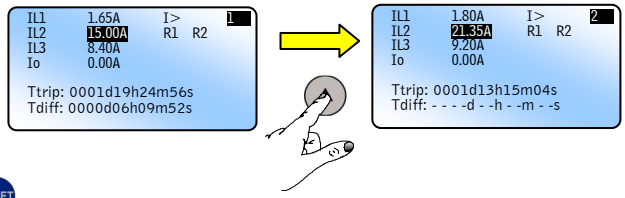
☞*The screen will revert back to Normal operation after 1 minute if no further button presses are made.*

☞*If a trip condition occurs whilst in this mode, the screen will automatically change to display the information relating to the current status.*

- As described in Section 8, use the RESET to gain access to the Last Tripped Information screen. The display will show the most recent trip information as follows:



- If more than one trip event is stored, use the ▲ and ▼ buttons to select the screens accordingly.



The example on the left shows the problem on phase L2 on both trip events. The difference between the first recorded trip and second was **6h 09m** and **52s**.

- Press the RESET button to exit the screen information when finished or allow to time out automatically.

9C. CLEARING THE LAST TRIPPED INFORMATION HISTORY

☞*Once the information has been deleted, it will not be possible to recall this.*

☞*"Ttrip" information is still retained but won't be displayed after the carrying out this operation (See 9D)*

- Press the RESET button to access the relevant screen.
- Press the ▲ and ▼ buttons simultaneously to delete the information. When this is complete, the screen will show:

- Press the RESET button again to exit.

9D. CLEARING "Ttrip" INFORMATION

☞*If the tripping history hasn't been deleted, previous information will be displayed from the last time the unit was powered up.*

- The "Ttrip" information will still be held in memory after deleting the trip history is made and also if power is removed and re-applied. However, when power is re-applied, the internal counter will reset and start from zero
- Only when a new trip condition occurs will the "Ttrip" information get updated and be displayed on the most recent screen.

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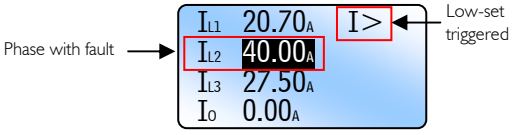
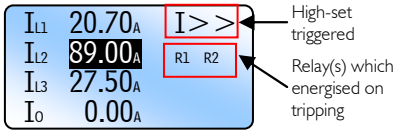
- **TRIPPING MODES**

1. OVERCURRENT

- A fault which develops on a phase will be indicated by an increase in current reading on the LCD. When the level of current exceeds the Low-set setting, the phase at fault will be highlighted by the digits flashing.
- The LCD backlight will flash.
- Relay 2 will energise if assigned to Overcurrent and set to energise at the start of the time out period (See Section 3. RELAY 2 SETTING).
- The characters **"I>"** will display to indicate the Low-set has been triggered.



- If the current continues to increase above the High-set setting, the characters **"I>"** will change and display **"I>>"** to indicate the High-set has been triggered.

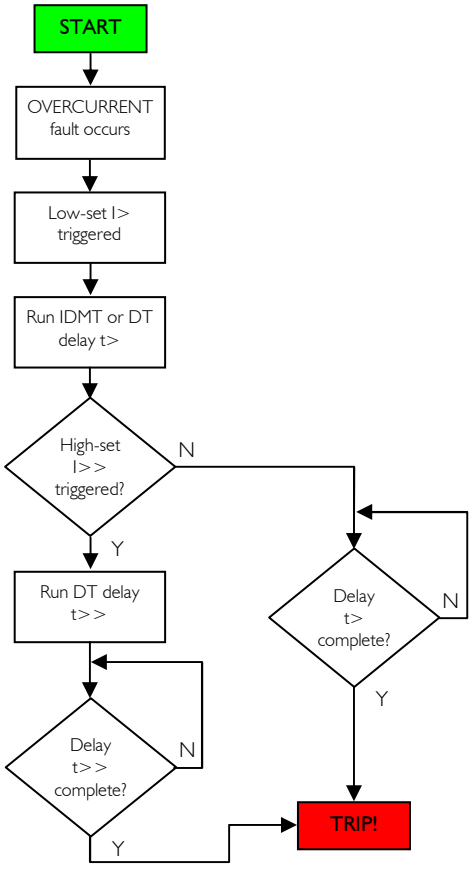


- When the unit finally trips, the digits of the phase at fault will stop flashing and remain highlighted. This allows the user to see which phase was at fault and caused the unit to trip.
- The red **"Tripped"** LED will also flash.
- The relays which energised are also displayed on the screen after tripping.
- Press RESET to reset and return the unit back to normal operation (assuming the fault has been cleared). The LCD reverts back to displaying the normal system currents and the red **"Tripped"** LED stops flashing.

*☞If either relay is set for Auto resetting, then they would have de-energised after the fault had cleared. The corresponding relay ident (i.e. R1 and/or R2) on the display would also disappear. Pressing the **"RESET"** button will only clear the LCD. If either relay is set for Manual resetting, then pressing the **"RESET"** button will de-energise the relay(s) and clear the LCD.*

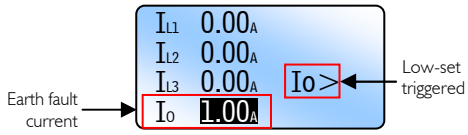
In the event of an Overcurrent condition, the basic sequence of events is shown below.

☞Assuming High-set trip is enabled.

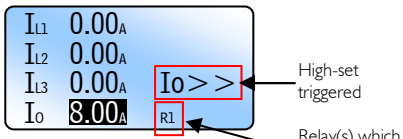


2. EARTH FAULT

- When an Earth fault occurs causing a flow in current through the Neutral, an increase in current reading on the LCD will occur. When the level of current exceeds the Low-set setting, the reading will be highlighted by the digits flashing.
- The LCD backlight will flash.
- Relay 2 will energise if assigned to Earth fault and set to energise at the start of the time out period (See Section 3. RELAY 2 SETTING).
- The characters **"Io>"** will display to indicate the Low-set has been triggered.



- If the current continues to increase above the High-set setting, the characters **"Io>"** will change and display **"Io>>"** to indicate the High-set has been triggered.

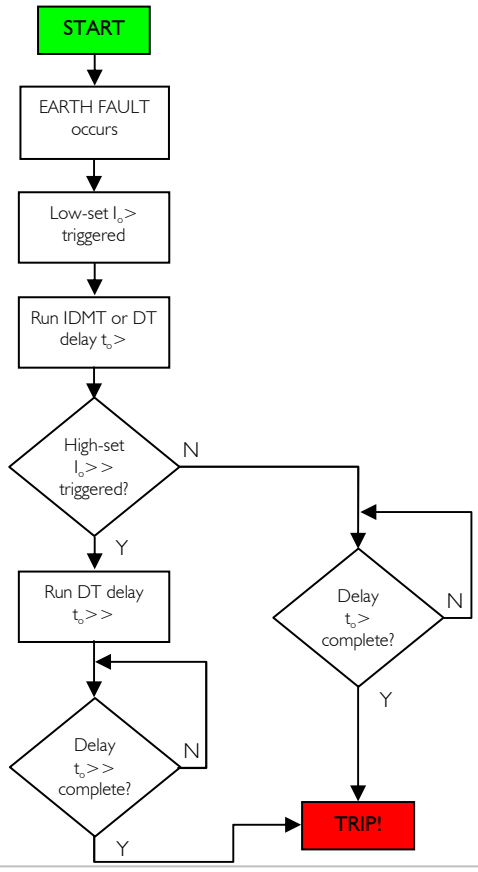


- When the unit finally trips, the digits will stop flashing and remain highlighted. This allows the user to see what caused the unit to trip.
- The red **"Tripped"** LED will also flash.
- The relays which energised are also displayed on the screen after tripping.
- Press RESET to reset and return the unit back to normal operation (assuming the fault has been cleared). The LCD reverts back to displaying the normal system currents and the red **"Tripped"** LED stops flashing.

*☞ If either relay is set for Auto resetting, then they would have de-energised after the fault had cleared. The corresponding relay ident (i.e. R1 and/or R2) on the display would also disappear. Pressing the **"RESET"** button will only clear the LCD. If either relay is set for Manual resetting, then pressing the **"RESET"** button will de-energise the relay(s) and clear the LCD.*

In the event of an Earth fault condition, the basic sequence of events is shown below.

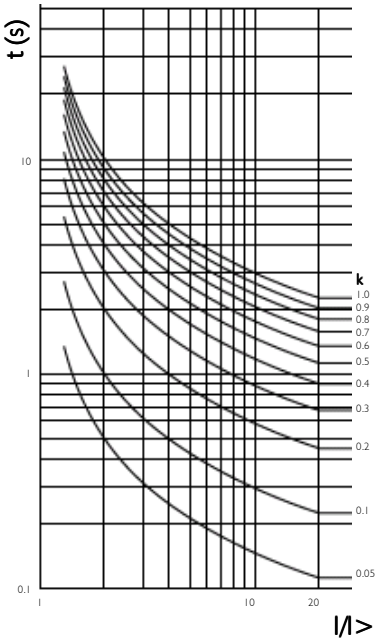
☞Assuming High-set trip is enabled.



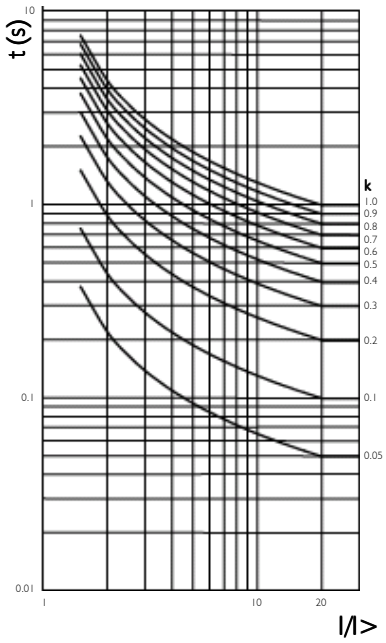
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

- IDMT CHARACTERISTIC CURVES

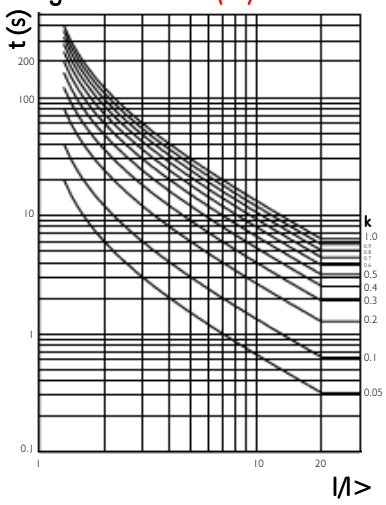
Normal Inverse 3/10 (NI 3/10)*



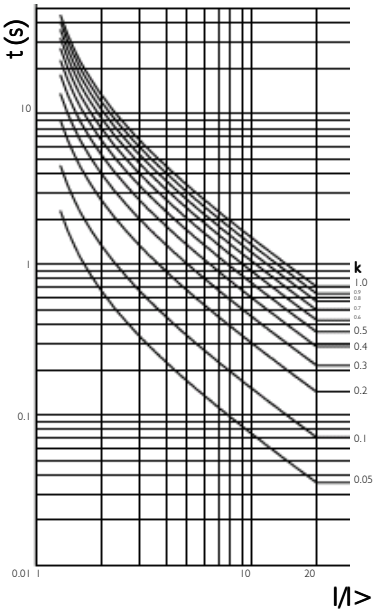
Normal Inverse 1.3/10 (NI 1.3/10)*



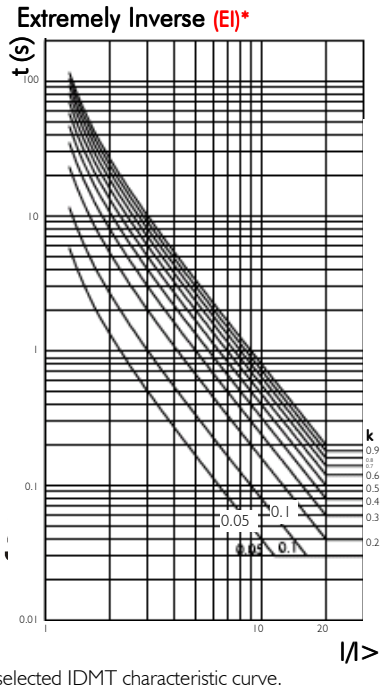
Long Time Inverse (LTI)*



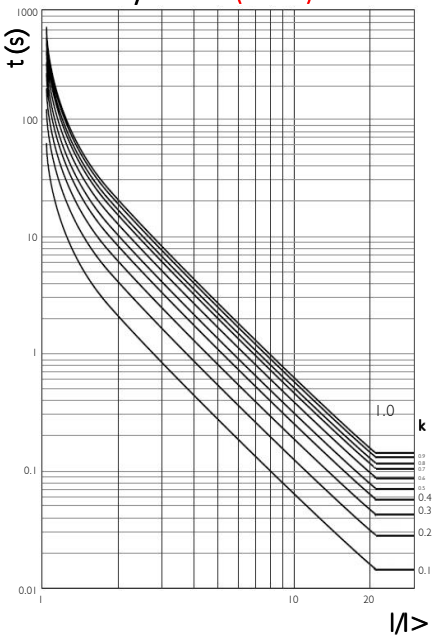
Very Inverse (VI)*



Extremely Inverse (EI)*

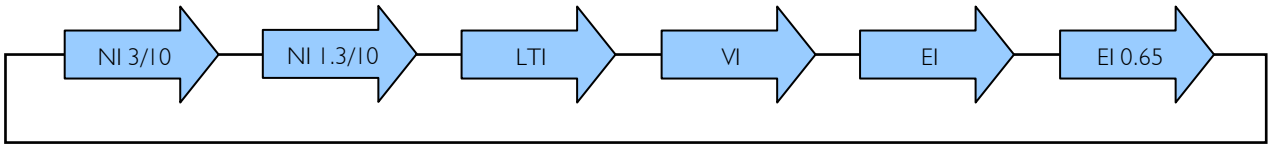


Extremely Inverse (EI 0.65)*



* Abbreviations used in the LCD screen for the selected IDMT characteristic curve.

The sequence of curves that are presented to the user when programming is shown below



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• TECHNICAL SPECIFICATION

Aux. Supply voltage Un (**1, 2**):	85 – 265VAC/85 - 370VDC[1] 18 – 55VAC/18 – 72VDC* *(Voltage range should be specified at time of ordering)*
Rated frequency:	50/60Hz (AC Supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	[1]4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.

* If connecting a fuse externally, a Time Delay type is recommended with a rating of 0.5A or higher.

Rated current input In:	5A (directly connected)
Rated frequency:	50/60Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)

External CT's (**9.....16**):	Class P recommended. (with 5A secondary)
Maximum CT primary current rating:	6000A

Overcurrent settings:	
Low-set trip (I>):	0.50 – 10.00A (10 – 200%)
Low-set time multiplier (k>):	0.05 – 1.00
Low-set definite time (t>):	0.05 – 100s
High-set trip (I>>):	0.5 – 100A (10 – 2000%) or disable
High-set definite time (t>>):	0.05 – 2.5s

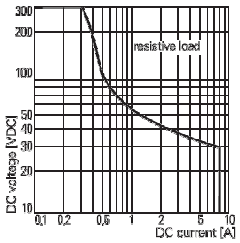
Earth fault settings:	
Low-set trip (I_o>):	0.10 – 5.00A (2 – 100%)
Low-set time multiplier (k_o>):	0.05 – 1.00
Low-set definite time (t_o>):	0.05 – 100s
High-set trip (I_o>>):	0.10 – 50.00A (2 – 1000%) or disable
High-set definite time (t_o>>):	0.05 – 2.5s

Pick up value:	+2% of trip setting
Accuracy:	
Protection thresholds:	± 5%
Time delay (DT):	± 5% (with a minimum of 50mS)
Time delay (IDMT):	± 5% (with a minimum of 50mS and I > 1.2 x set-trip)
Actual phase current:	± 1% of rated current In
Actual Earth fault current:	± 1% of rated current In
Display update time:	< 1 sec.
Repeat accuracy:	± 0.5% @ constant conditions

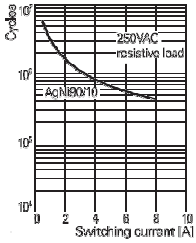
Ambient temperature:	-10 to +60°C
Relative humidity:	+95%

Output:	
(RL1 - **3, 4, 5**):	1 x SPDT relay
(RL2 - **6, 7, 8**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)

Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



Max. DC Load Breaking Capacity



Electrical Endurance

Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 600g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm

Terminal type:	UL94-V0 rated pluggable and re-wireable female connectors comprising: 2-way (Power supply **1, 2**) 6-way (Relay contacts **3....8**) 8-way (Phase current and neutral inputs **9....16**)
Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	4.4in lb (0.5Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)

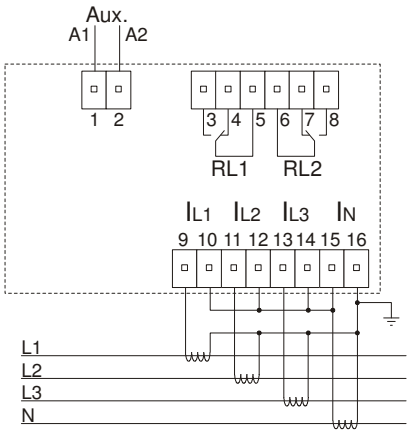
Approvals:	Conforms to IEC. CE and ✓ and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

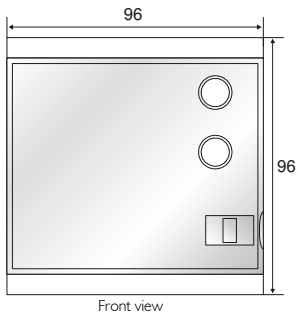
Options:

The P9600 range also includes individual Overcurrent or Earth fault relays available with either IDMT or DT characteristics. Please refer to separate data sheets.

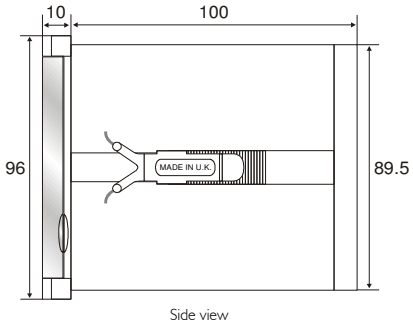
• CONNECTION DIAGRAM



• DIMENSIONS



Front view



Side view

All dimensions are in mm.

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ISO 9001 REGISTERED FIRM
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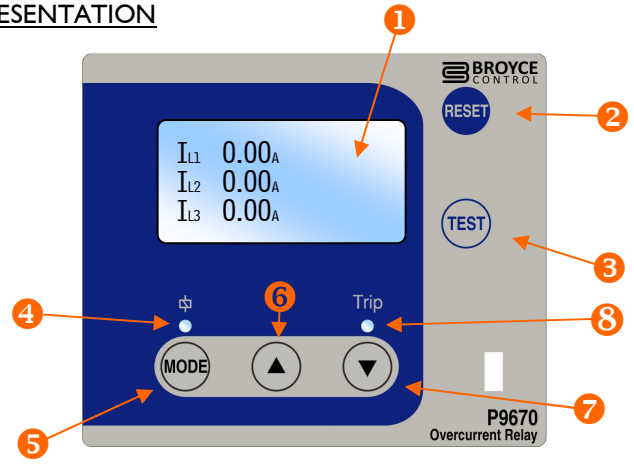
Type: P9670

Overcurrent Relay

- ❑ **True R.M.S. measurements**
- ❑ **Low Set and High Set tripping thresholds**
- ❑ **6 selectable IDMT (Inverse Definite Minimum Time) characteristic curves**
- ❑ **Adjustable DT (Definitive Time)**
- ❑ **Measurement and live display of individual phase currents**
- ❑ **Last trip memory (last 10 trips stored and can be recalled)**
- ❑ **Pre-defined selectable CT ratio's (5:5….6000:5)**
- ❑ **Microprocessor based (self checking) with non-volatile memory**
- ❑ **"Ecosmart" Energy efficient power supply design**
- ❑ **Rear mounted pluggable connectors for supply, relay contacts and current input**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 100mm

PRESENTATION



1. LCD (Liquid Crystal Display) for user information
2. **"RESET"** button
3. **"TEST"** button
4. **"Power supply"** green LED indication
5. **"MODE"** button*
6. Parameter increment button*
7. Parameter decrement button*
8. **"Trip status"** red LED indication

* accessible only when the front cover is open

OPERATION & OVERVIEW

The P9670 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect Overcurrent on individual phases in a 3-phase application. Typically the P9670 is wired in conjunction with external current transformers of the feeder to be protected.

A clear backlit LCD provides all the key information that the user requires for both operation and the setting up. Setting is achieved in a few simple steps and requires no previous knowledge of product operation.

Normal operation provides the user with actual live individual phase currents all on one screen. The actual phase current represents that of the current passing through the primary side of the externally connected CT's. This is achieved by the setting of the ratio for the CT.

Programming mode allows the user to assign the operation of both internal relays for either Auto or Manual resetting. Relay 2 has the added option of being allowed to energise at the start or end of a time out period. If assigned to energise at the start, the Relay can be used to operate a buzzer or lamp giving early warning before a system actually shuts down.

Low-set and High-set thresholds can be programmed for the Overcurrent detection. The time current characteristic of the low-set units are selectable between Normal Inverse curve 3/10, Normal Inverse curve 1.3/10, Long Time Inverse curve, Very Inverse curve, Extremely Inverse curve, Extremely Inverse 0.65 curve and Definite Time. High-set units are the Definitive Time type. Instantaneous tripping is possible by setting the time to minimum.

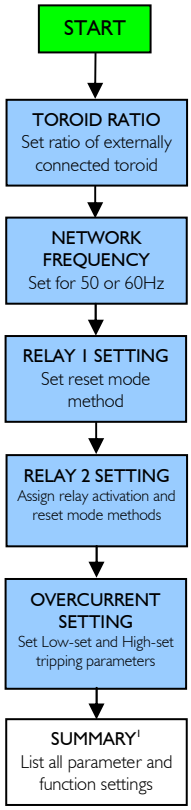
A simple Summary screen is displayed once the programming is complete. The same screen can also be displayed by subsequent presses of the **"RESET"** button. This allows the user to access key information with the tamperproof transparent cover closed and sealed.

A Test mode is provided (also accessible with the tamperproof transparent cover closed) to confirm the correct operation of the internal relays. The relays will energise when the **"TEST"** button is pressed and de-energise when the button is released (AUTO Reset) or when the **"RESET"** button is pressed (MAN reset).

Following a trip condition, the information about the trip is then stored. This can then be recalled later if required using the **"RESET"** button to access the information. The P9670 has the ability to store up to 10 trips and using the "Up" and "Down" buttons, allows each trip to be displayed individually. Each trip is also marked with a time stamp showing the time from power up as well as the time from the previous trip. This feature is very useful for establishing a pattern on particular inputs, knowing when they occurred and how frequent!

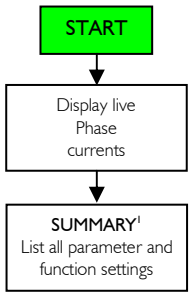
FUNCTION OVERVIEW

Programming mode.



Programmable parameters

User settings summary mode



[1] Displaying of the Summary screen during normal operation is achieved via subsequent presses of the "RESET" button. See Section 7. QUICK VIEW OF USER SETTINGS for further information.

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INSTALLATION

Installation work must be carried out by qualified personnel.

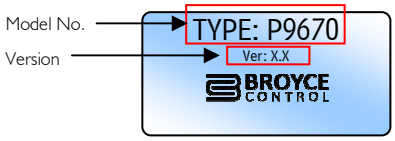
- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED ^**
- Remove the P9670 from the packaging.
- Lift the raised part of the side clip in order to withdraw from the housing. Carry this out on each side.
- Insert the P9670 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Wire the supplied female pluggable connectors as required.
- Plug the connectors into the relevant sockets on the rear of the unit.
- The P9670 is now ready for powering and programming.

☞*The front window of the P9670 is supplied with a clear protective film which can be removed as and when necessary.*

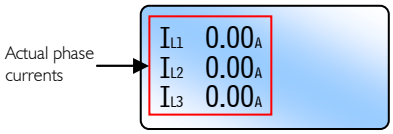
^ When carrying out future maintenance on the product or application and it becomes necessary to disconnect the connectors from the product, ensure for the Current Transformer connector, **they do not remain open circuit**. This can lead to high voltages being present on this connector.

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.
- The LCD will momentarily display a welcome screen as shown…



….then after a short delay reverts to indicating the following information:



TEST MODE

- Press and hold the TEST button and both relays will energise. The LCD will display the characters **"TEST"** and the product part number (as below). The LCD backlight and red **"Trip"** LED will flash.

- Release the TEST button and the relay(s) will remain energised if set to Manual reset or de-energise if set to Auto reset.
- Press the RESET to de-energise relay(s) which are set to Manual reset. The LCD will revert back to Normal operation. The LCD backlight and red **"Trip"** LED will stop flashing.

☞*Testing should be carried out on a regular basis to check the integrity of the P9670.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

PROGRAMMING

Programming/setting of the P9670 is carried out using the 3 buttons located behind the transparent cover.

The MODE button selects the required parameter to be changed. The ▲ ▼ buttons either increment or decrement a value accordingly.

Any adjustments made are stored by the pressing and holding of the RESET button until the LCD shows the word "**Saved!**" See Section 6. SAVING OF SETTINGS.

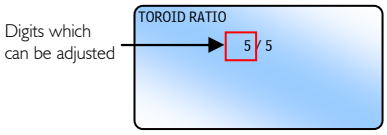
☞*Please read the **"Notes during programming"** before commencing with the following.*

1A. TOROID RATIO

☞*Setting the Toroid Ratio will allow the "actual" Phase currents (IL1, IL2, IL3) displayed on the LCD to represent that of the currents flowing through the external CT's. If no CT's are used, the parameter should be set to 5/5 (i.e. 1:1). The setting applies to all CT's.*

☞*Default setting is "5/5"*

- Press and hold the MODE button. The LCD displays a screen showing the characters "**User Settings**" then the following screen appears…



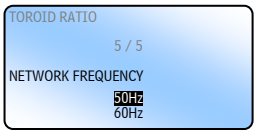
- Press either ▲ or ▼ to set the primary value of the external CT's.

☞*The digit after the forward slash "/" cannot be changed.*

1B. NETWORK FREQUENCY

☞*Default setting is "50Hz"*

- Whilst in the same screen as that for the Toroid Ratio (see 1A.), press the MODE button to display the options for **NETWORK FREQUENCY**.



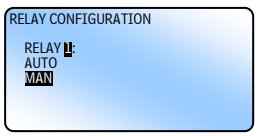
- Press either ▲ or ▼ to select between 50Hz or 60Hz. This should be set to suit the frequency of the network being monitored.
- Press and hold the MODE button to set the options for **"Relay 1"** as described in the next section.

2. RELAY 1 SETTING

☞*Default setting for Relay 1 is Manual resetting mode.*

☞*The same screen is used for setting both Relay 1 and Relay 2"*

- The LCD displays the following screen. The options under **"RELAY 1:"** are displayed and the default setting highlighted.



Actual LCD presentation when adjustable parameters are displayed.

- Press either ▲ or ▼ to select between **AUTO** resetting or **MAN**UAL resetting (after a fault has occurred).
- Press and hold the MODE button to set the options for "**Relay 2"** as described in the next section.

continued on next page…

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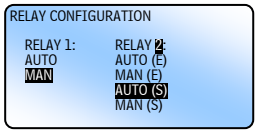
• PROGRAMMING (continued)

3. RELAY 2 SETTING

☞Default setting for Relay 2 is to energise at the end of the time out period. Resetting mode is Auto.

- Setting of **"Relay 2"** is carried out in a similar manner as **"Relay 1"**; however it is necessary to assign the relay to either energise at the start (S) or end (E) of the time out period.



Actual LCD presentation when adjustable parameters are displayed.

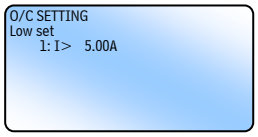
- Press and hold the MODE button to set the options for **"OVERCURRENT"** as described in the next section.

---

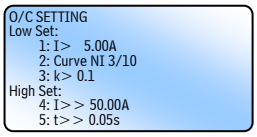
4. OVERCURRENT SETTING

☞The description for the Curves is abbreviated when displayed on the screen. Refer to "IDMT Characteristic Curves" for further explanation.
☞Default settings for Overcurrent are shown in the last LCD screen example in this section.

- Settings for Overcurrent are displayed in turn following subsequent presses of the MODE button. The Low-set trip current (I>) is displayed first.



- Press either ▲ or ▼ to change the current.
- Press the MODE button to select the remaining settings and use the ▲ and ▼ buttons to change them.



Actual LCD presentation when adjustable parameters are displayed.
Screen example above also shows the default settings for OVERCURRENT.

- Press and hold the MODE button to set the options for **"EARTH FAULT"** as described in the next section.

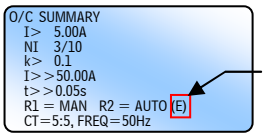
☞If the Curve in selection "2:" is set to Definite Time, then selection "3:" will display "3: t>" and the required delay can then be set.
☞If High-set is set to Disable in selection "4:", then I>> or t>> cannot be adjusted.

---

5. OVERCURRENT SUMMARY

☞It is not possible to edit settings when this screen is displayed.

- Following the setting of "Overcurrent", the LCD displays the "Overcurrent" screen showing a summary of the settings made during programming. All settings are displayed. The selected CT ratio, Network Frequency and Relay operation (following a Reset) information is also displayed.



The letter in brackets refers to whether Relay 2 has been set to trigger at the start or end of the time out period.
(E) = **E**nd of time out
(S) = **S**tart of time out
Either abbreviation can appear after the word MAN or AUTO
See Section 3. RELAY 2 SETTING

---

6. SAVING OF SETTINGS

- If after viewing the Summary screen the settings are correct, press and hold the RESET button until the word **"Saved."** appears. Any new settings are now stored.
- The screen will revert back to Normal operation.

---

7. QUICK VIEW OF USER SETTINGS

☞It is not possible to edit settings when these screens are displayed.
☞This feature can also be activated with the front window closed!

- Press and hold the RESET button to display the initial power up screen.
- Press the same button again to display the "Last Tripped Information" screen *(refer to the next section for further information on this feature).*
- Press again to display the "Overcurrent Summary" screen.
- Press again to display the contact details for Broyce Control.
- Press again to revert back to Normal operation.

---

8. LAST TRIPPED INFORMATION

☞Refer to next page for detailed information of this feature

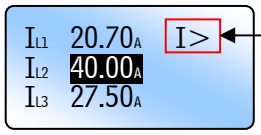
Notes during programming

☞If during programming it is necessary to abort, press the RESET button briefly.

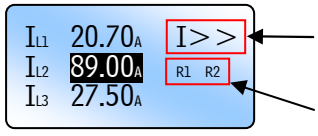
☞Pressing and holding either ▲ or ▼ for > 1sec. will increment or decrement the new value at a quicker rate.
☞Stepping through each User Setting screen is performed by pressing and holding the MODE button until the desired screen is displayed.
Short presses of the MODE button will allow further editable settings to be changed within a specific screen.
☞If the user remains in a setting or summary screen where no adjustments or button presses are made within a certain period, the screen will revert back to Normal operation. Additionally, any settings that have been made but not stored will not be saved.
☞"O/C" refers to Overcurrent.

• TRIPPING MODE

- A fault which develops on a phase will be indicated by an increase in current reading on the LCD. When the level of current exceeds the Low-set setting, the phase at fault will be highlighted by the digits flashing.
- The LCD backlight will flash.
- Relay 2 will energise if assigned to Overcurrent and set to energise at the start of the time out period (See Section 3. RELAY 2 SETTING).
- The characters **"I>"** will display to indicate the Low-set has been triggered.



- If the current continues to increase above the High-set setting, the characters **"I>"** will change and display **"I>>"** to indicate the High-set has been triggered.



- When the unit finally trips, the digits of the phase at fault will stop flashing and remain highlighted. This allows the user to see which phase was at fault and caused the unit to trip.
- The red **"Tripped"** LED will also flash.
- The relays which energised are also displayed on the screen after tripping.
- Press RESET to reset and return the unit back to normal operation (assuming the fault has been cleared). The LCD reverts back to displaying the normal system currents and the red **"Tripped"** LED stops flashing.

*☞If either relay is set for Auto resetting, then they would have de-energised after the fault had cleared. The corresponding relay ident (i.e. R1 and/or R2) on the display would also disappear. Pressing the **"RESET"** button will only clear the LCD. If either relay is set for Manual resetting, then pressing the **"RESET"** button will de-energise the relay(s) and clear the LCD.*

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

- **PROGRAMMING (continued)**

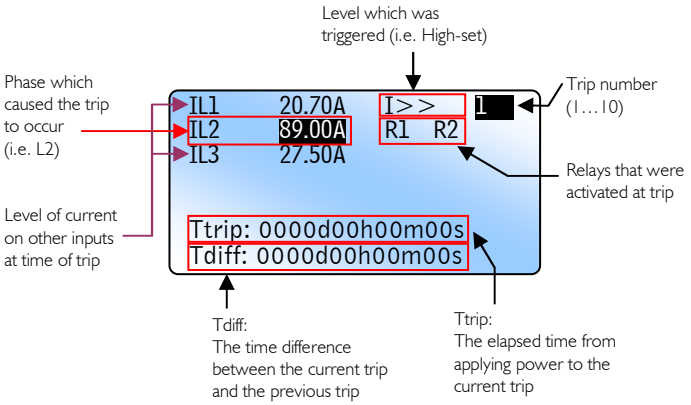
8A. LAST TRIPPED INFORMATION

☞This information is held in memory even if power is removed.

This feature allows the user to view and recall the key information relating to the last trip event and it can store up to 10 trip events. It is accessed as described in Section 7 on the previous page.

The information displayed highlights the cause of the trip (i.e. which phase for example), the level of current at the time the trip occurred; the triggering method (Low-set or High-set) and which relays were activated. It also shows the elapsed time from powering the P9670 to the trip occurring and displayed against "Ttrip" as well as showing the time difference between the trip displayed and the one previous to that. This is shown against "Tdiff".

An example of the screen layout is shown below.

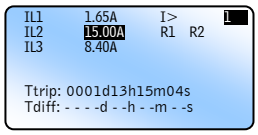


☞If there is only one trip event stored in the memory, the display will show "Tdiff: ----d--h--m--s" when viewed.

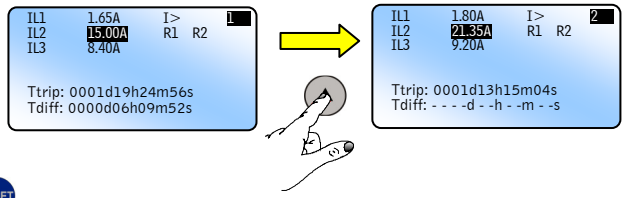
8B. RECALLING THE LAST TRIPPED INFORMATION

☞If the unit has logged the maximum number of trips which can be stored, then the display will show "Tdiff: ----d--h--m--s" when trip screen 10 is viewed.
☞The screen will revert back to Normal operation after 1 minute if no further button presses are made.
☞If a trip condition occurs whilst in this mode, the screen will automatically change to display the information relating to the current status.

- As described in Section 7, use the RESET to gain access to the Last Tripped Information screen. The display will show the most recent trip information as follows:



- If more than one trip event is stored, use the ▲ and ▼ buttons to select the screens accordingly.



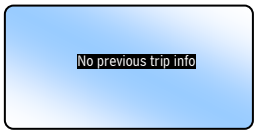
The example on the left shows the problem on phase L2 on both trip events. The difference between the first recorded trip and second was **6h 09m** and **52s**.

- Press the RESET button to exit the screen information when finished or allow to time out automatically.

8C. CLEARING THE LAST TRIPPED INFORMATION HISTORY

☞Once the information has been deleted, it will not be possible to recall this.
☞"Ttrip" information is still retained but won't be displayed after the carrying out this operation (See 8D)

- Press the RESET button to access the relevant screen.
- Press the ▲ and ▼ buttons simultaneously to delete the information. When this is complete, the screen will show:



- Press the RESET button again to exit.

8D. CLEARING "Ttrip" INFORMATION

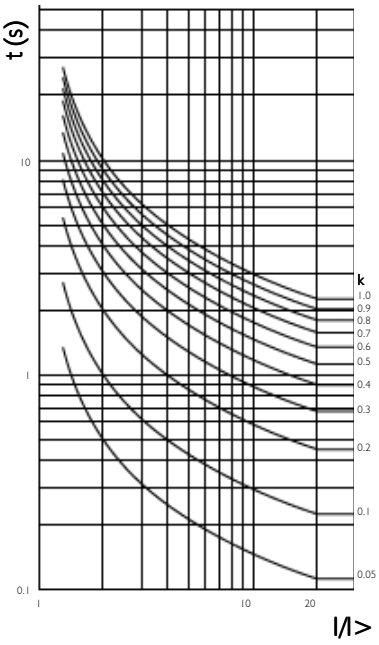
☞If the tripping history hasn't been deleted, previous information will be displayed from the last time the unit was powered up.

- The "Ttrip" information will still be held in memory after deleting the trip history is made and also if power is removed and re-applied. However, when power is re-applied, the internal counter will reset and start from zero
- Only when a new trip condition occurs will the "Ttrip" information get updated and be displayed on the most recent screen.

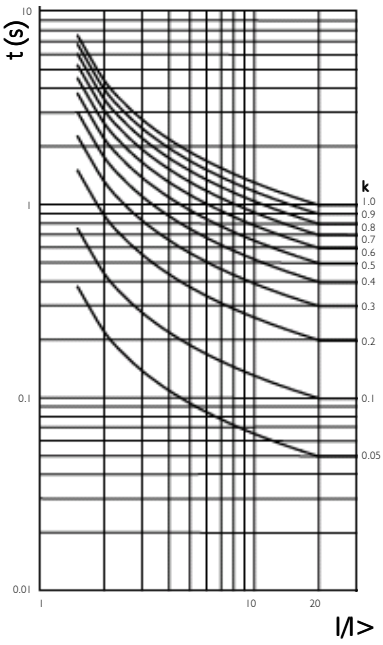
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

- IDMT CHARACTERISTIC CURVES

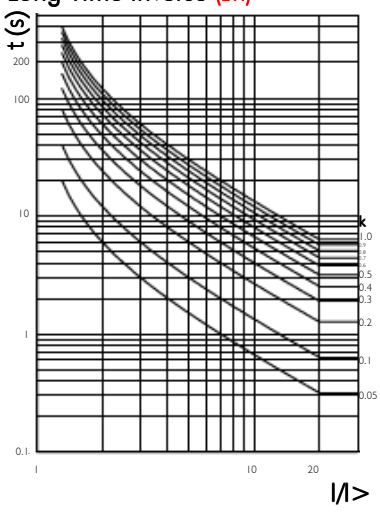
Normal Inverse 3/10 (NI 3/10)*



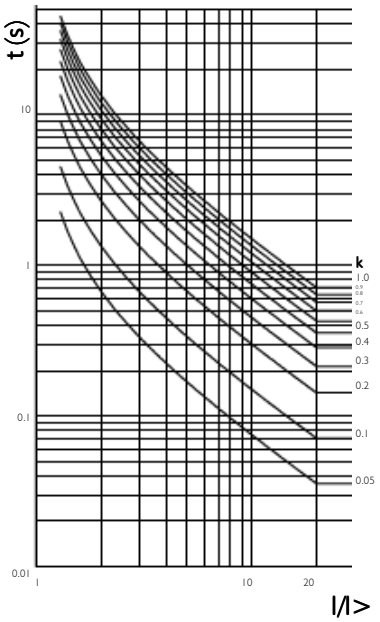
Normal Inverse 1.3/10 (NI 1.3/10)*



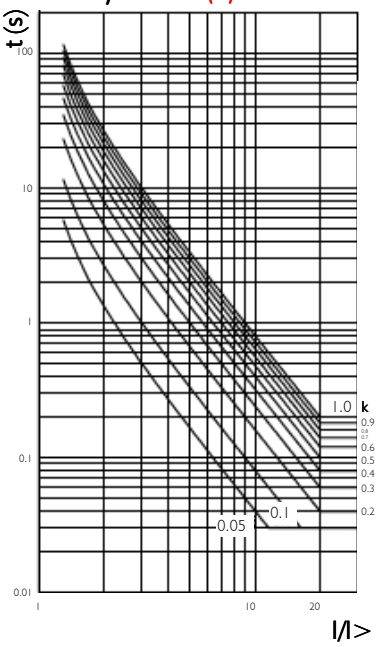
Long Time Inverse (LTI)*



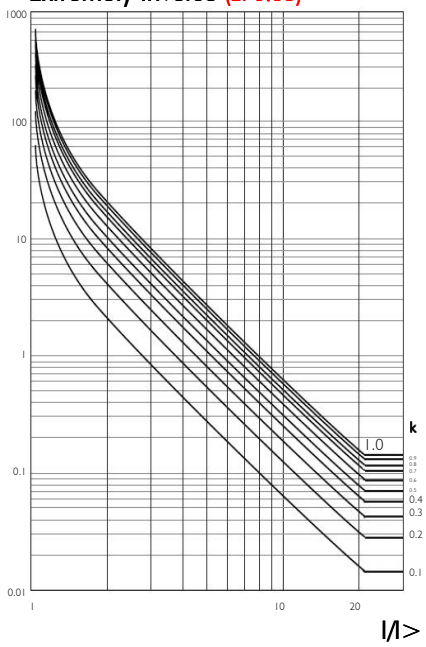
Very Inverse (VI)*



Extremely Inverse (EI)*

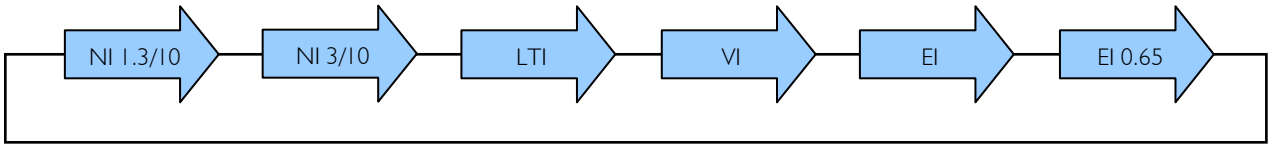


Extremely Inverse (EI 0.65)*



* Abbreviations used in the LCD screen for the selected IDMT characteristic curve.

The sequence of curves that are presented to the user when programming is shown below



The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

• TECHNICAL SPECIFICATION

Aux. Supply voltage Un (**1, 2**):	85 – 265VAC/85 - 370VDC[1] 18 – 55VAC/18 – 72VDC* *(Voltage range should be specified at time of ordering)*
Rated frequency:	50/60Hz (AC Supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	[1]4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.

* If connecting a fuse externally, a Time Delay type is recommended with a rating of 0.5A or higher.

Rated current input In:	5A (directly connected)
Rated frequency:	50/60Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)

External CT (**15,16**):	Class P recommended. (with 5A secondary)
Maximum CT primary current rating:	6000A

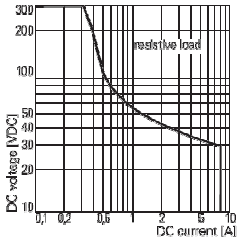
Overcurrent settings:	
Low-set trip (I>):	0.50 – 10.00A (10 – 200%)
Low-set time multiplier (k>):	0.05 – 1.00
Low-set definite time (t>):	0.05 – 100s
High-set trip (I>>):	0.5 – 100A (10 – 2000%) or disable
High-set definite time (t>>):	0.05 – 2.5s

Pick up value:	+2% of trip setting
Accuracy:	
Protection threshold:	± 5%
Time delay (DT):	± 5% (with a minimum of 50mS)
Time delay (IDMT):	± 5% (with a minimum of 50mS and I > 1.2 x set-trip)
Actual Earth fault current:	± 1% of rated current In
Display update time:	<1 sec.
Repeat accuracy:	± 0.5% @ constant conditions

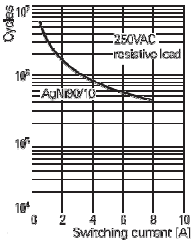
Ambient temperature:	-10 to +60°C
Relative humidity:	+95%

Output:	
(RL1 - **3, 4, 5**):	1 x SPDT relay
(RL2 - **6, 7, 8**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)

Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



Max. DC Load Breaking Capacity



Electrical Endurance

Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 520g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm

Terminal type:	UL94-V0 rated pluggable and re-wireable female connectors comprising: 2-way (Power supply **1, 2**) 6-way (Relay contacts **3….8**) 8-way (Phase current inputs **9….14**) Note that terminals **15 and 16** are not used on this model and should be left unconnected.

Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	4.4in lb (0.5Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)

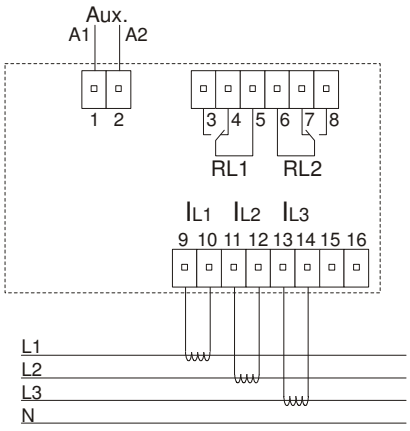
Approvals:	Conforms to IEC. CE and and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

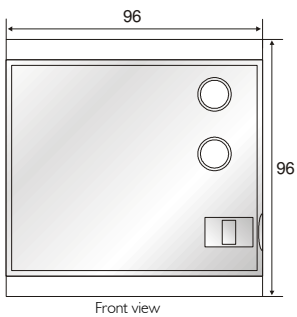
Options:

The P9600 range also includes combined Overcurrent or Earth fault relays available with either IDMT or DT characteristics. Additionally, a voltage, power and frequency monitoring only product is also available. Please refer to separate data sheets.

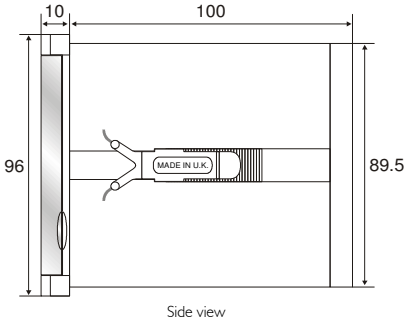
• CONNECTION DIAGRAM



• DIMENSIONS



Front view



Side view

All dimensions are in mm.

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ISO 9001 REGISTERED FIRM
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

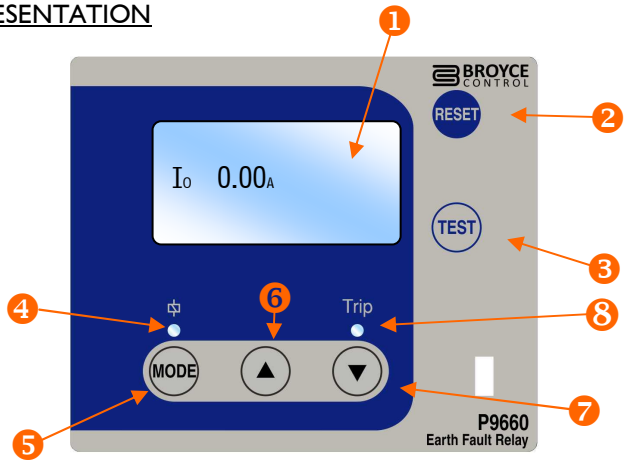
Type: P9660

Earth Fault Relay

- **True R.M.S. measurements**
- **Low Set and High Set tripping thresholds**
- **6 selectable IDMT (Inverse Definite Minimum Time) characteristic curves**
- **Adjustable DT (Definitive Time)**
- **Measurement and live display of earth fault current**
- **Last trip memory (last 10 trips stored and can be recalled)**
- **Pre-defined selectable CT ratio's (5:5….6000:5)**
- **Microprocessor based (self checking) with non-volatile memory**
- **"Ecosmart" Energy efficient power supply design**
- **Rear mounted pluggable connectors for supply, relay contacts and current input**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 100mm

PRESENTATION



1. LCD (Liquid Crystal Display) for user information
2. **"RESET"** button
3. **"TEST"** button
4. **"Power supply"** green LED indication
5. **"MODE"** button*
6. Parameter increment button*
7. Parameter decrement button*
8. **"Trip status"** red LED indication

* accessible only when the front cover is open

OPERATION & OVERVIEW

The P9660 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect an Earth fault current by measurement of the imbalance of the current from a current transformer arrangement as shown in the Connection Diagram on Page 6.

A clear backlit LCD provides all the key information that the user requires for both operation and the setting up. Setting is achieved in a few simple steps and requires no previous knowledge of product operation.

Normal operation provides the user with the actual live earth fault current on one screen. The actual current represents that of the current passing through the primary side of the externally connected CT. This is achieved by the setting of the ratio for the CT.

Programming mode allows the user to assign the operation of both internal relays for either Auto or Manual resetting. Relay 2 has the added option of being allowed to energise at the start or end of a time out period. If assigned to energise at the start, the Relay can be used to operate a buzzer or lamp giving early warning before a system actually shuts down.

Low-set and High-set thresholds can be programmed for the Earth fault detection. The time current characteristic of the low-set units are selectable between Normal Inverse curve 3/10, Normal Inverse curve 1.3/10, Long Time Inverse curve, Very Inverse curve, Extremely Inverse curve, Extremely Inverse 0.65 curve and Definite Time. High-set units are the Definitive Time type. Instantaneous tripping is possible by setting the time to minimum.

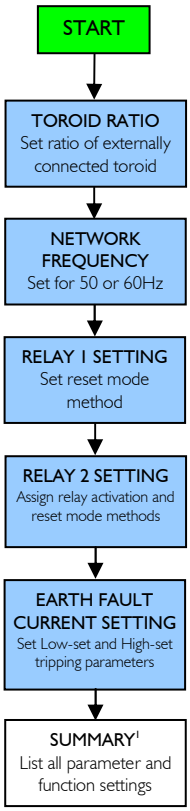
A simple Summary screen is displayed once the programming is complete. The same screen can also be displayed by subsequent presses of the **"RESET"** button. This allows the user to access key information with the tamperproof transparent cover closed and sealed.

A Test mode is provided (also accessible with the tamperproof transparent cover closed) to confirm the correct operation of the internal relays. The relays will energise when the **"TEST"** button is pressed and de-energise when the button is released (AUTO Reset) or when the **"RESET"** button is pressed (MAN reset).

Following a trip condition, the information about the trip is then stored. This can then be recalled later if required using the **"RESET"** button to access the information. The P9660 has the ability to store up to 10 trips and using the "Up" and "Down" buttons, allows each trip to be displayed individually. Each trip is also marked with a time stamp showing the time from power up as well as the time from the previous trip. This feature is very useful for establishing a pattern knowing when tripping occurred and how frequent!

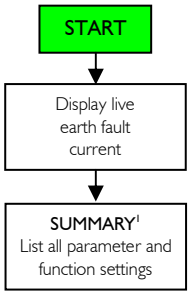
FUNCTION OVERVIEW

Programming mode.



Programmable parameters

User settings summary mode



[1] Displaying of the Summary screen during normal operation is achieved via subsequent presses of the "RESET" button. See Section 7. QUICK VIEW OF USER SETTINGS for further information.

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ISO 9001 REGISTERED FIRM

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

INSTALLATION

Installation work must be carried out by qualified personnel.

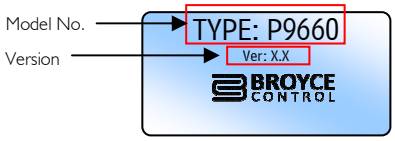
- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED ^**
- Remove the P9660 from the packaging.
- Lift the raised part of the side clip in order to withdraw from the housing. Carry this out on each side.
- Insert the P9660 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Wire the supplied female pluggable connectors as required.
- Plug the connectors into the relevant sockets on the rear of the unit.
- The P9660 is now ready for powering and programming.

☞*The front window of the P9660 is supplied with a clear protective film which can be removed as and when necessary.*

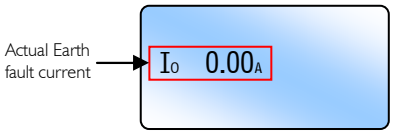
^ When carrying out future maintenance on the product or application and it becomes necessary to disconnect the connectors from the product, ensure for the Current Transformer connector, **they do not remain open circuit**. This can lead to high voltages being present on this connector.

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.
- The LCD will momentarily display a welcome screen as shown…



….then after a short delay reverts to indicating the following information:



TEST MODE

- Press and hold the TEST button and both relays will energise. The LCD will display the characters **"TEST"** and the product part number (as below). The LCD backlight and red **"Trip"** LED will flash.

- Release the TEST button and the relay(s) will remain energised if set to Manual reset or de-energise if set to Auto reset.
- Press the RESET to de-energise relay(s) which are set to Manual reset. The LCD will revert back to Normal operation. The LCD backlight and red "Trip" LED will stop flashing.

☞*Testing should be carried out on a regular basis to check the integrity of the P9660.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

PROGRAMMING

Programming/setting of the P9660 is carried out using the 3 buttons located behind the transparent cover.

The MODE button selects the required parameter to be changed. The ▲ ▼ buttons either increment or decrement a value accordingly.

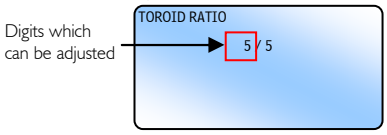
Any adjustments made are stored by the pressing and holding of the RESET button until the LCD shows the word "**Saved!**" See Section 6. SAVING OF SETTINGS.

☞*Please read the **"Notes during programming"** before commencing with the following.*

1A. TOROID RATIO

☞*Setting the Toroid Ratio will allow the "actual" Earth fault current (Io) to be displayed on the LCD which represents that of the current flowing through the parallel connected, external CT's. If no CT's are used, the parameter should be set to 5/5 (i.e. 1:1). Use this if the fault current is likely to be <5A.*
☞*Default setting is "5/5"*

- Press and hold the MODE button. The LCD displays a screen showing the characters "**User Settings**" then the following screen appears…



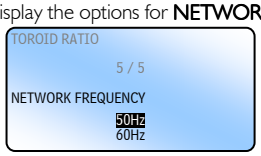
- Press either ▲ or ▼ to set the primary value of the external CT's.

☞*The digit after the forward slash "/" cannot be changed.*

1B. NETWORK FREQUENCY

☞*Default setting is "50Hz"*

- Whilst in the same screen as that for the Toroid Ratio (see 1A.), press the MODE button to display the options for **NETWORK FREQUENCY**.

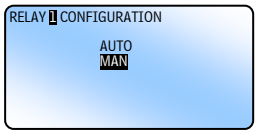


- Press either ▲ or ▼ to select between 50Hz or 60Hz. This should be set to suit the frequency of the network being monitored.
- Press and hold the MODE button to set the options for **"Relay 1"** as described in the next section.

2. RELAY 1 SETTING

☞*Default setting for Relay 1 is Manual resetting mode.*

- The LCD displays the following screen.



Actual LCD presentation when adjustable parameters are displayed.

- Press either ▲ or ▼ to select between **AUTO** resetting or **MAN**UAL resetting (after a fault has occurred).
- Press and hold the MODE button to set the options for "**Relay 2"** as described in the next section.

continued on next page…

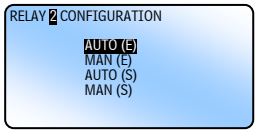
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

- ## PROGRAMMING (continued)

3. RELAY 2 SETTING

☞Default setting for Relay 2 is to energise at the end of the time out period. Resetting mode is Auto.

- Setting of **"Relay 2"** is carried out in a similar manner as **"Relay 1"**; however it is necessary to assign the relay to either energise at the start (S) or end (E) of the time out period.



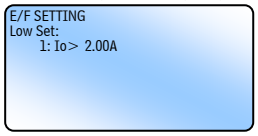
Actual LCD presentation when adjustable parameters are displayed.

- Press and hold the MODE button to set the options for **"EARTH FAULT"** as described in the next section.

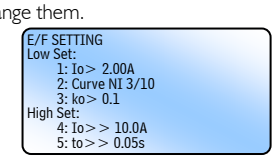
4. EARTH FAULT SETTING

☞Default settings for Earth Fault are shown in the LCD screen example in this section.

- Settings for Earth fault are displayed in turn following subsequent presses of the MODE button. The Low-set trip current (Io>) is displayed first.



- Press either ▲ or ▼ to change the current.
- Press the MODE button to select the remaining settings and use the ▲ and ▼ buttons to change them.



Actual LCD presentation when adjustable parameters are displayed.
Screen example above also shows the default settings for OVERCURRENT.

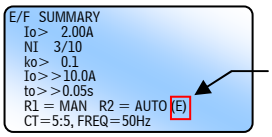
- Press and hold the MODE button to view the summary of settings for **"EARTH FAULT"** as described in the next section.

☞If the Curve in selection "2:" is set to Definite Time, then selection "3:" will display "3: t>" and the required delay can then be set.
☞If High-set is set to Disable in selection "4:", then Io>> or to>> cannot be adjusted.

5. EARTH FAULT SUMMARY

☞It is not possible to edit settings when this screen is displayed.

- Following the setting of "Earth Fault", the LCD displays the "Earth Fault" screen showing a summary of the settings made during programming. All settings are displayed. The selected CT ratio, Network Frequency and Relay operation (following a Reset) information is also displayed.



The letter in brackets refers to whether Relay 2 has been set to trigger at the start or end of the time out period.
(E) = End of time out
(S) = Start of time out
Either abbreviation can appear after the word MAN or AUTO
See Section 3. RELAY 2 SETTING

6. SAVING OF SETTINGS

- If after viewing the Summary screen the settings are correct, press and hold the RESET button until the word **"Saved."** appears. Any new settings are now stored.
- The screen will revert back to Normal operation.

7. QUICK VIEW OF USER SETTINGS

☞It is not possible to edit settings when these screens are displayed.
☞This feature can also be activated with the front window closed!

- Press and hold the RESET button to display the initial power up screen.
- Press the same button again to display the "Last Tripped Information" screen *(refer to the next section for further information on this feature).*
- Press again to display the "Earth Fault Summary" screen.
- Press again to display the contact details for Broyce Control.
- Press again to revert back to Normal operation.

8. LAST TRIPPED INFORMATION

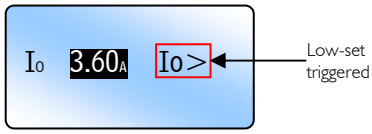
☞Refer to next page for detailed information of this feature

Notes during programming

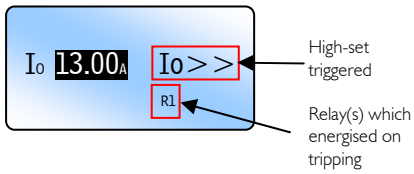
☞If during programming it is necessary to abort, press the RESET button briefly.
☞Pressing and holding either ▲ or ▼ for > 1sec. will increment or decrement the new value at a quicker rate.
☞Stepping through each User Setting screen is performed by pressing and holding the MODE button until the desired screen is displayed.
Short presses of the MODE button will allow further editable settings to be changed within a specific screen.
☞If the user remains in a setting or summary screen where no adjustments or button presses are made within a certain period, the screen will revert back to Normal operation. Additionally, any settings that have been made but not stored will not be saved.
☞"E/F" refers to Earth fault.

- ## TRIPPING MODE

- When an Earth fault condition occurs, the current displayed on the LCD increased accordingly. When the level of current exceeds the Low-set setting, the reading will be highlighted by the digits flashing.
- The LCD backlight will flash.
- Relay 2 will energise immediately if set to energise at the start of the time out period (See Section 3. RELAY 2 SETTING).
- The characters **"Io>"** will display to indicate the Low-set has been triggered.



- If the current continues to increase above the High-set setting, the characters **"Io>"** will change and display **"Io>>"** to indicate the High-set has been triggered.



- When the unit finally trips, the digits will stop flashing and remain highlighted. This allows the user to see what current caused the unit to trip.
- The red **"Tripped"** LED will also flash.
- The relays which energised are also displayed on the screen after tripping.
- Press RESET to reset and return the unit back to normal operation (assuming the fault has been cleared). The LCD reverts back to displaying the normal system currents and the red **"Tripped"** LED stops flashing.

*☞ If either relay is set for Auto resetting, then they would have de-energised after the fault had cleared. The corresponding relay ident (i.e. R1 and/or R2) on the display would also disappear. Pressing the **"RESET"** button will only clear the LCD. If either relay is set for Manual resetting, then pressing the **"RESET"** button will de-energise the relay(s) and clear the LCD.*

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

- **PROGRAMMING (continued)**

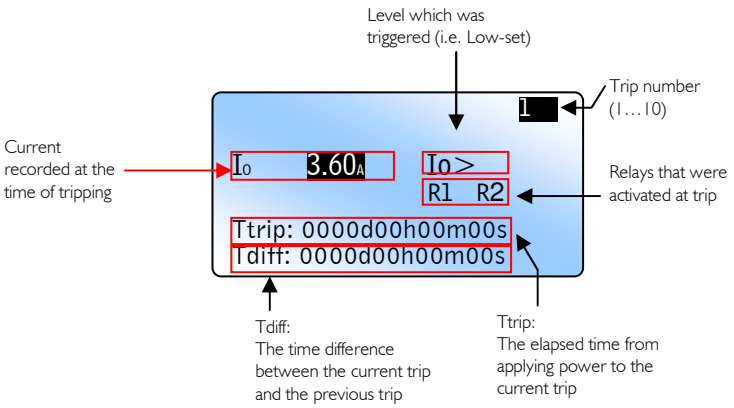
8A. LAST TRIPPED INFORMATION

☞This information is held in memory even if power is removed.

This feature allows the user to view and recall the key information relating to the last trip event and it can store up to 10 trip events. It is accessed as described in Section 7 on the previous page.

The information displayed highlights the level of current at the time the trip occurred; the triggering method (Low-set or High-set) and which relays were activated. It also shows the elapsed time from powering the P9660 to the trip occurring and displayed against "Ttrip" as well as showing the time difference between the trip displayed and the one previous to that. This is shown against "Tdiff".

An example of the screen layout is shown below.

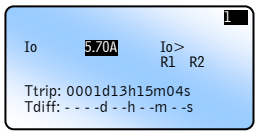


☞If there is only one trip event stored in the memory, the display will show "Tdiff: ----d--h--m--s" when viewed.

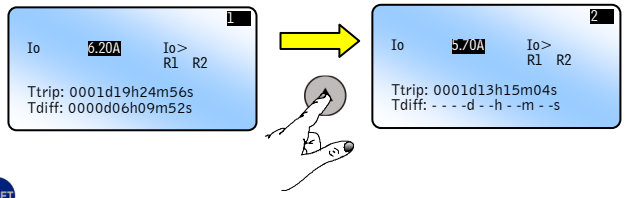
8B. RECALLING THE LAST TRIPPED INFORMATION

☞If the unit has logged the maximum number of trips which can be stored, then the display will show "Tdiff: ----d--h--m--s" when trip screen 10 is viewed.
☞The screen will revert back to Normal operation after 1 minute if no further button presses are made.
☞If a trip condition occurs whilst in this mode, the screen will automatically change to display the information relating to the current status.

- As described in Section 7, use the RESET to gain access to the Last Tripped Information screen. The display will show the most recent trip information as follows:



- If more than one trip event is stored, use the ▲ and ▼ buttons to select the screens accordingly.



The example on the left shows the level of current recorded on both trip events. The difference between the first recorded trip and second was **6h 09m** and **52s**.

- Press the RESET button to exit the screen information when finished or allow to time out automatically.

8C. CLEARING THE LAST TRIPPED INFORMATION HISTORY

☞Once the information has been deleted, it will not be possible to recall this.
☞"Ttrip" information is still retained but won't be displayed after the carrying out this operation (See 9D)

- Press the RESET button to access the relevant screen.
- Press the ▲ and ▼ buttons simultaneously to delete the information. When this is complete, the screen will show:

- Press the RESET button again to exit.

8D. CLEARING "Ttrip" INFORMATION

☞If the tripping history hasn't been deleted, previous information will be displayed from the last time the unit was powered up.

- The "Ttrip" information will still be held in memory after deleting the trip history is made and also if power is removed and re-applied. However, when power is re-applied, the internal counter will reset and start from zero
- Only when a new trip condition occurs will the "Ttrip" information get updated and be displayed on the most recent screen.

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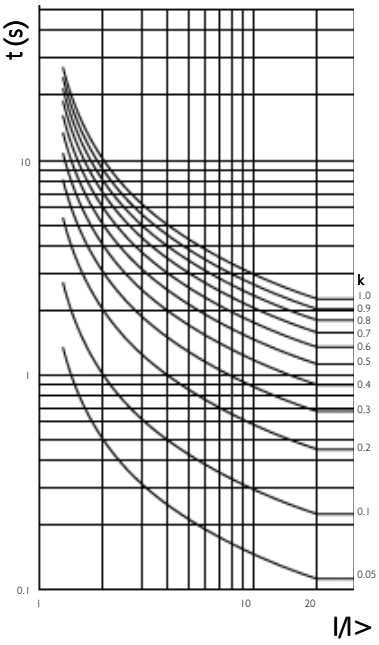
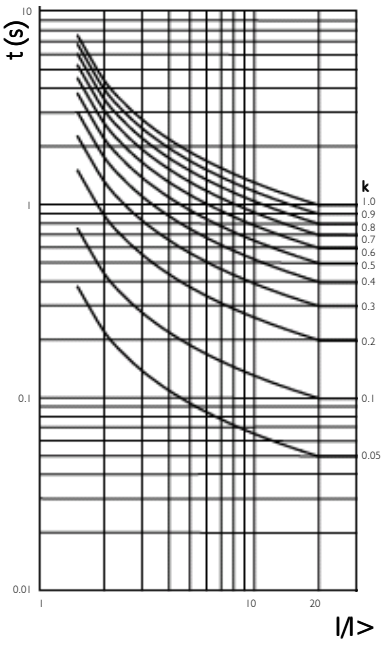
- IDMT CHARACTERISTIC CURVES

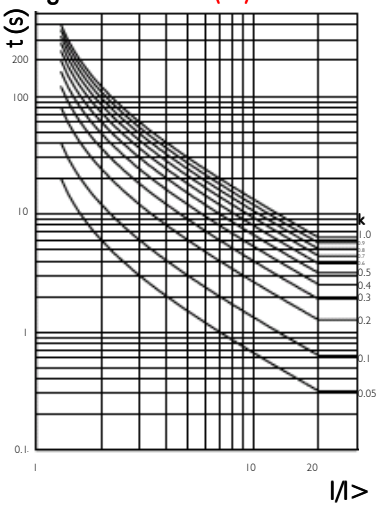
Normal Inverse 3/10 (NI 3/10)*



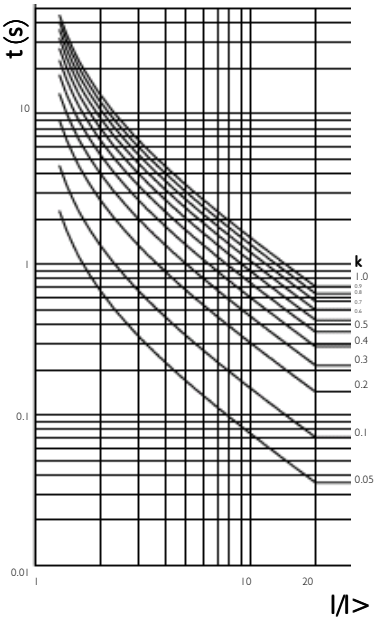
Normal Inverse 1.3/10 (NI 1.3/10)*



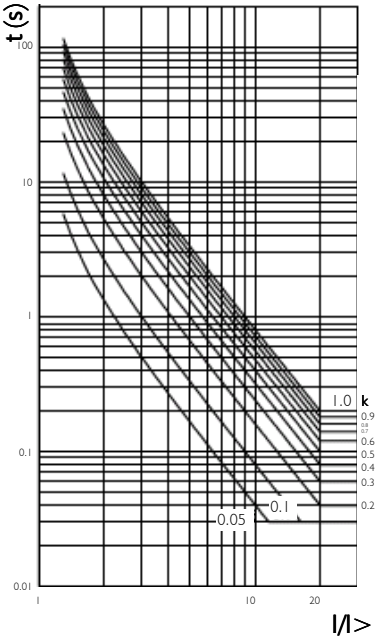
Long Time Inverse (LTI)*



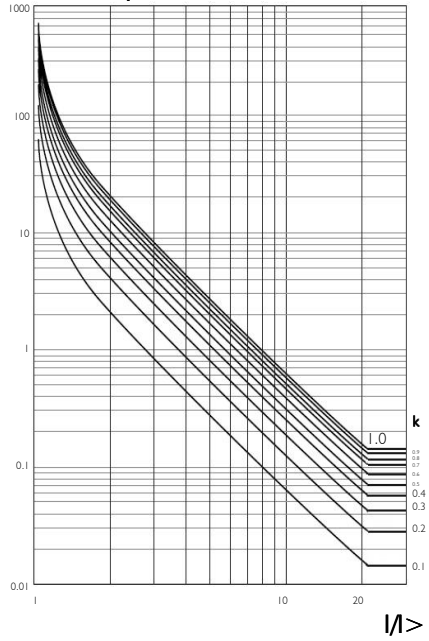
Very Inverse (VI)*



Extremely Inverse (EI)*

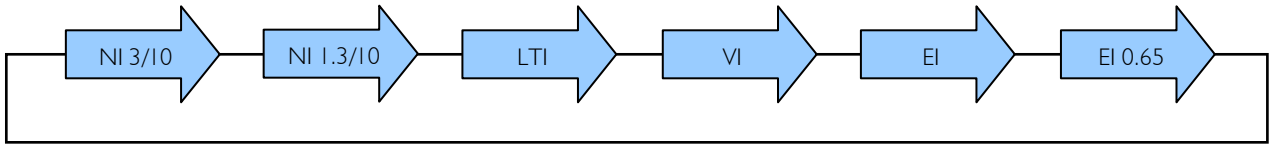


Extremely Inverse (EI 0.65)*



* Abbreviations used in the LCD screen for the selected IDMT characteristic curve.

The sequence of curves that are presented to the user when programming is shown below



The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

• TECHNICAL SPECIFICATION

Aux. Supply voltage Un (**1, 2**):	85 – 265VAC/85 - 370VDC[1] 18 – 55VAC/18 – 72VDC* *(Voltage range should be specified at time of ordering)*
Rated frequency:	50/60Hz (AC Supplies)
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	[1]4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.

* If connecting a fuse externally, a Time Delay type is recommended with a rating of 0.5A or higher.

Rated current input In:	5A (directly connected)
Rated frequency:	50/60Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)

External CT (**15,16**):	Class P recommended. (with 5A secondary)
Maximum CT primary current rating:	6000A

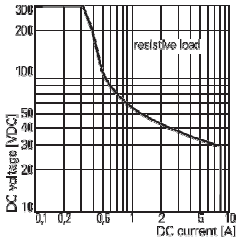
Earth fault settings:	
Low-set trip (I_o>):	0.10 – 5.00A (2 – 100%)
Low-set time multiplier (k_o>):	0.05 – 1.00
Low-set definite time (t_o>):	0.05 – 100s
High-set trip (I_o>>):	0.10 – 50.0A (2 – 1000%) or disable
High-set definite time (t_o>>):	0.05 – 2.5s

Pick up value:	+2% of trip setting
Accuracy:	
Protection threshold:	± 5%
Time delay (DT):	± 5% (with a minimum of 50mS)
Time delay (IDMT):	± 5% (with a minimum of 50mS and I > 1.2 x set-trip)
Actual Earth fault current:	± 1% of rated current In
Display update time:	<1 sec.
Repeat accuracy:	± 0.5% @ constant conditions

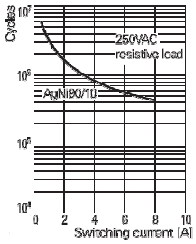
Ambient temperature:	-10 to +60°C
Relative humidity:	+95%

Output:	
(RL1 - **3, 4, 5**):	1 x SPDT relay
(RL2 - **6, 7, 8**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)

Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



Max. DC Load Breaking Capacity



Electrical Endurance

Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 410g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm

Terminal type:	UL94 V-0 rated pluggable and re-wireable female connectors comprising: 2-way (Power supply **1, 2**) 6-way (Relay contacts **3….8**) 8-way (CT input **15, 16**) Note that terminals **9 to 14** are not used on this model and should be left unconnected.
Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	4.4in lb (0.5Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)

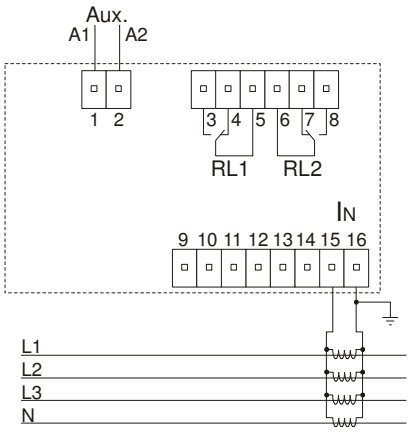
Approvals:	Conforms to IEC. CE and cULus and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

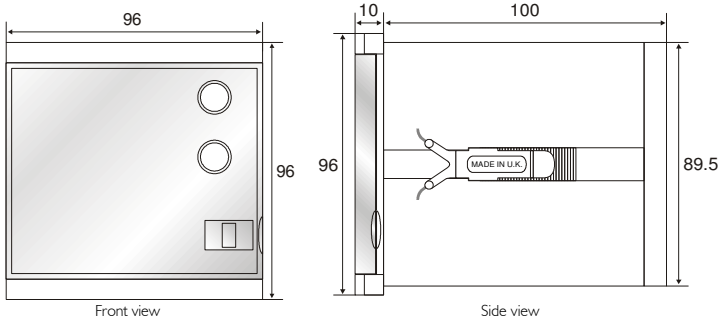
Options:

The P9600 range also includes combined Overcurrent or Earth fault relays available with either IDMT or DT characteristics. Additionally, a voltage, power and frequency monitoring only product is also available. Please refer to separate data sheets.

• CONNECTION DIAGRAM



• DIMENSIONS



All dimensions are in mm.

Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN. England
Tel: +44 (0) 1902 773746 Fax: +44 (0) 1902 420639 Email: sales@broycecontrol.com Web: www.broycecontrol.com

ISO 9001 REGISTERED FIRM

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

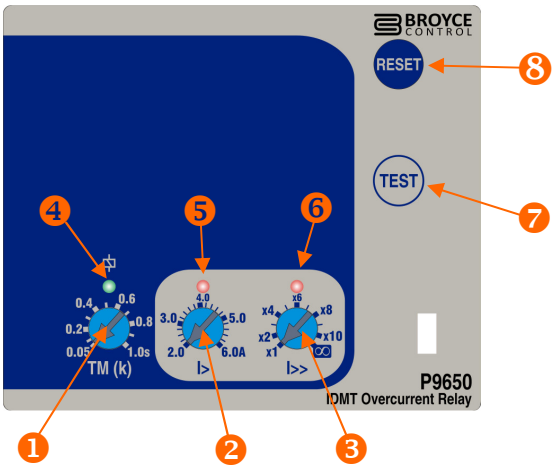
Type: P9650

Inverse Definite Minimum Time (IDMT) Overcurrent Relay

- ❑ **True R.M.S. measurements**
- ❑ **Adjustable Low-set and High-set tripping threshold (with option to disable High-set tripping)**
- ❑ **Adjustable Time Multiplier for defining curve tripping characteristic (applicable to Low-set triggering only)**
- ❑ **Normal Inverse 3/10 tripping characteristics (Low-set threshold only)**
- ❑ **Instantaneous tripping on High-set triggering**
- ❑ **Test and Reset button for simulating and clearing of fault condition**
- ❑ **Red LED indication of Low-set or High-set triggering and tripping**
- ❑ **Green LED indication for Auxiliary power supply presence**
- ❑ **Microprocessor based (self checking) with non-volatile memory**
- ❑ **Terminals suitable for 2 x 2.5mm² wires (complete with protective cover)**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 107mm

PRESENTATION



1. **"Time Multiplier"** adjustment*
2. **"Low-set I>"** trip adjustment*
3. **"High-set I>>"** trip adjustment*
4. **"Power supply"** green LED indication
5. **"Low-set triggered"** red LED indication
6. **"High-set triggered"** red LED indication
7. **"TEST"** button
8. **"RESET"** button

* accessible only when the front cover is open

GENERAL OVERVIEW

The P9650 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect Overcurrents in 3-phase applications. Typically the P9650 is wired in conjunction with external current transformers (1 per phase) of the feeder to be protected.

The adjustments and indicators are laid out such to help the user during set-up and fault finding. The adjustment for the **Low-set** for example has its corresponding red LED positioned above it so it is clear to which function this LED relates to. The same also applies to the **High-set** adjustment and LED. Adjustment and LED operation is explained further on the next page.

The adjustment for **TM (k)** (which defines the curve response to tripping) is assigned to the **Low-set** triggering only. The **High-set** does not have any additional adjustments and hence will trip instantaneously if triggered. If required, the **High-set** can be set to disabled.

A Test mode is provided (also accessible with the tamperproof transparent cover closed) to confirm the correct operation of the internal relays. The relay will energise when the **"TEST"** button is pressed and de-energise when the **"RESET"** button is pressed.

OPERATION

Example 1.

When an Overcurrent occurs in one of the phases and the level of current exceeds the **"Low-set I>"** trip threshold, the corresponding red LED above the adjustment illuminates. The time out then commences however the point at which tripping occurs is defined by:

A, the level of current that is above the trip threshold.
B, the Time Multiplier setting.

When tripping finally occurs, the red LED will then flash indicating a tripped condition.

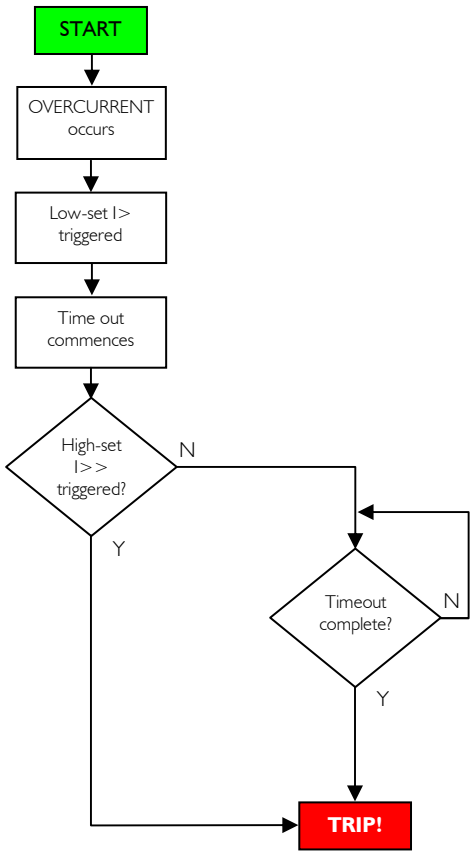
If the fault current has been removed, pressing the **"RESET"** button will return the relay back to normal operation. The red LED will then extinguish.

Example 2.

If a fault current occurs such that it exceeds the **"High-set I>>"** trip threshold the relay will de-energise with no delay. The red LED above the **"High-set I>>"** adjustment will flash.

In the event of an Overcurrent condition, the basic sequence of events is shown below.

☞*Assuming High-set trip is enabled.*



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ISO 9001 REGISTERED FIRM

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INSTALLATION

Installation work must be carried out by qualified personnel.

- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED**
- Remove the P9650 from the packaging.
- Lift the raised part of the side clip in order to remove from the housing. Carry this out on each side.
- Insert the P9650 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Connect wires to the rear terminals as required.
- The P9650 is now ready for powering and setting.

☞*The front window of the P9650 is supplied with a clear protective film which can be removed as and when necessary.*

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.

TEST MODE

- Press and hold the TEST button and the relay will energise. Both the red **"I>"** and **"I>>"** LED's will illuminate.
- Release the TEST button and the relay will remain energised.
- Press the RESET button to de-energise the relay. Both red LED's will extinguish.

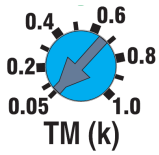
☞*Testing should be carried out on a regular basis to check the integrity of the P9650.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

SETTING & OPERATION

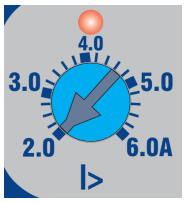
Setting of the P9650 is carried out using the 3 potentiometers located behind the transparent cover.

1. Time Multiplier (TM (k))



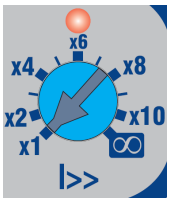
The adjustment for **"TM (k)"** (Time Multiplier) defines the tripping characteristic when the **"Low-set"** threshold **"I>"** has been exceeded. The lower the setting, the faster the response to tripping. The higher the setting, the slower the response.

2. Low-Set Trip threshold (I>)



The adjustment for the **"Low-set"** can be set from 2 to 6A. When the threshold is exceeded due to an Overcurrent condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red LED will then flash.

3. High-Set Trip threshold (I>>)



The adjustment for the **"High-set"** can be set from x1 to x10 then disable i.e.

The scale markings are multipliers of what has been set on the **"Low-set"** threshold. For example if the **"Low-set"** is set to 4A and **"High-set"** x8, this will be the equivalent of 4 x 8 = 32A.

When the threshold is exceeded due to an Overcurrent condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red LED will then flash.

☞*If tripping occurs whereby the High-set level is exceeded, only the LED for the High-set will illuminate/flash. This allows the user to clearly identify which threshold was triggered causing the trip.*
☞*There is no delay associated with High-set therefore, tripping is instantaneous.*

LED FUNCTION SUMMARY

☞*The green LED will remain illuminated for as long as power is applied to the Aux. connections (Terminals 1 and 2).*

In response to an Overcurrent condition:

Status	I>	I>>
Normal	○	○
Low-set triggered	✸	○
Low-set Tripped	◐	○
High-set triggered	○	✸
High-set Tripped	○	◐

In response to Test and Reset button operation:

Button press	I>	I>>
TEST	✸	✸
RESET	○	○

Key:

LED off ○
LED on ✸
LED flashing ◐

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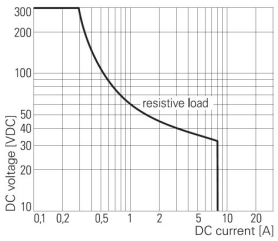
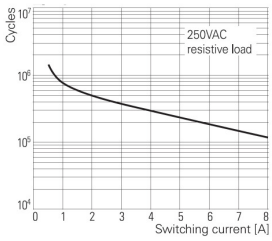
• TECHNICAL SPECIFICATION

Supply voltage Un (**1, 2**):	115VAC ±15% 230VAC ±15% *(Voltage should be specified at time of ordering)*
Rated frequency:	50/60Hz
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.
Rated current input In:	5A (directly connected)
Rated frequency:	50Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)
External CT's (**9, 10, 11, 12, 13, 14**):	Class P recommended. (with 5A secondary)
Overcurrent settings:	
Low-set trip (I>):	2.0 – 6.0A (40 – 120%)
Time multiplier (TM):	0.05 – 1.0
High-set trip (I>>):	x1 – x10 or disable (∞)
High-set definite time:	Instantaneous (<50mS)
Pick up value:	+2% of trip setting
Accuracy:	
Protection thresholds:	± 5%
Response time:	± 5% (with a minimum of 50mS)
Repeat accuracy:	± 0.5% @ constant conditions
Ambient temperature:	-10 to +60°C
Relative humidity:	+95% (non-condensing)
Output:	
(RL1 - **3, 4, 5**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



Max. DC Load Breaking Capacity



Electrical Endurance

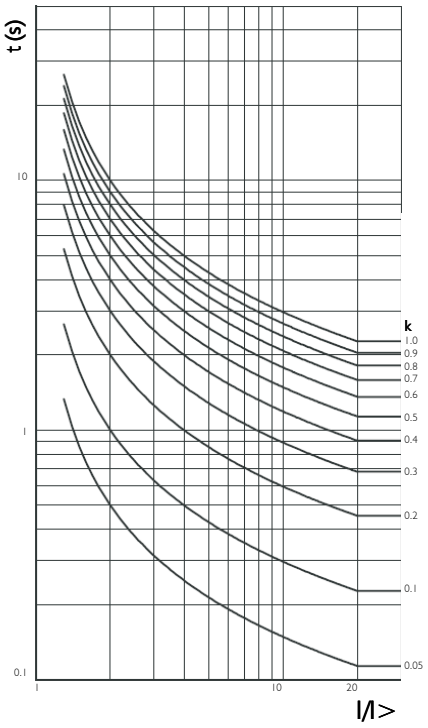
Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 590g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm
Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	10in lb (1Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)
Approvals:	Conforms to IEC. CE and and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

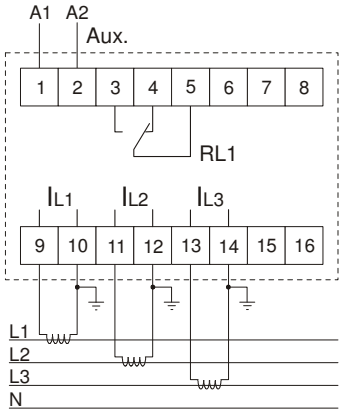
Options:

The P9600 range also includes individual Overcurrent or Earth fault relays available with either IDT or IDMT tripping characteristics. Please refer to separate data sheets.

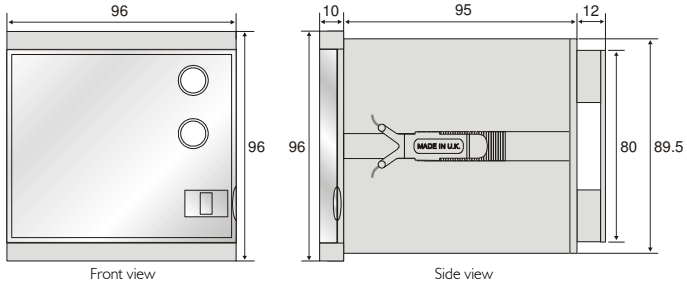
Tripping Curve Characteristics (Normal Inverse 3/10).



• CONNECTION DIAGRAM



• DIMENSIONS



All dimensions are in mm.

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Type: P9640 1.3/10 or 3/10^

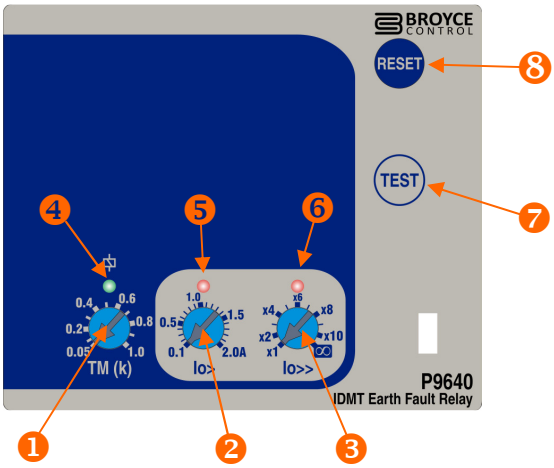
Inverse Definite Minimum Time (IDMT) Earth Fault Relay

- **True R.M.S. measurements**
- **Adjustable Low-set and High-set tripping threshold (with option to disable High-set tripping)**
- **Adjustable Time Multiplier for defining curve tripping characteristic (applicable to Low-set triggering only)**
- **Normal Inverse 1.3/10 or 3/10 tripping characteristics (Low-set threshold only)^**
- **Instantaneous tripping on High-set triggering**
- **Test and Reset button for simulating and clearing of fault condition**
- **Red LED indication of Low-set or High-set triggering and tripping**
- **Green LED indication for Auxiliary power supply presence**
- **Microprocessor based (self checking) with non-volatile memory**
- **Terminals suitable for 2 x 2.5mm² wires (complete with protective cover)**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 107mm

^ *1.3/10 or 3/10 must be specified at time of ordering*

PRESENTATION



1. **"Time Multiplier"** adjustment*
2. **"Low-set Io>"** trip adjustment*
3. **"High-set Io>>"** trip adjustment*
4. **"Power supply"** green LED indication
5. **"Low-set triggered"** red LED indication
6. **"High-set triggered"** red LED indication
7. **"TEST"** button
8. **"RESET"** button

* accessible only when the front cover is open

GENERAL OVERVIEW

The P9640 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect Earth faults in 3-phase applications. Typically the P9640 is wired in conjunction with external current transformers of the feeder to be protected.

The P9640 can be supplied with either a Normal Inverse 1.3/10 or Normal Inverse 3/10 tripping curve. This should be specified at the time of ordering. Either version is clearly marked at both the front and rear of the product.

The adjustments and indicators are laid out to help the user during set-up and fault finding. The adjustment for the **Low-set** for example has its corresponding red LED positioned above it so it is clear to which function this LED relates to. The same also applies to the **High-set** adjustment and LED. Adjustment and LED operation is explained further on the next page.

The adjustment for **TM (k)** (which defines the curve response to tripping) is assigned to the **Low-set** triggering only. The **High-set** does not have any additional adjustments and hence will trip instantaneously if triggered. If required, the **High-set** can be set to disabled.

A Test mode is provided (also accessible with the tamperproof transparent cover closed) to confirm the correct operation of the internal relay. The relay will energise when the **"TEST"** button is pressed and de-energise when the **"RESET"** button is pressed.

OPERATION

Example 1.

When an Overcurrent occurs in one of the phases and the level of current exceeds the **"Low-set Io>"** trip threshold, the corresponding red LED above the adjustment illuminates. The time out then commences however the point at which tripping occurs is defined by:

A, the level of current that is above the trip threshold.
B, the Time Multiplier setting.

When tripping finally occurs, the red LED will then flash indicating a tripped condition.

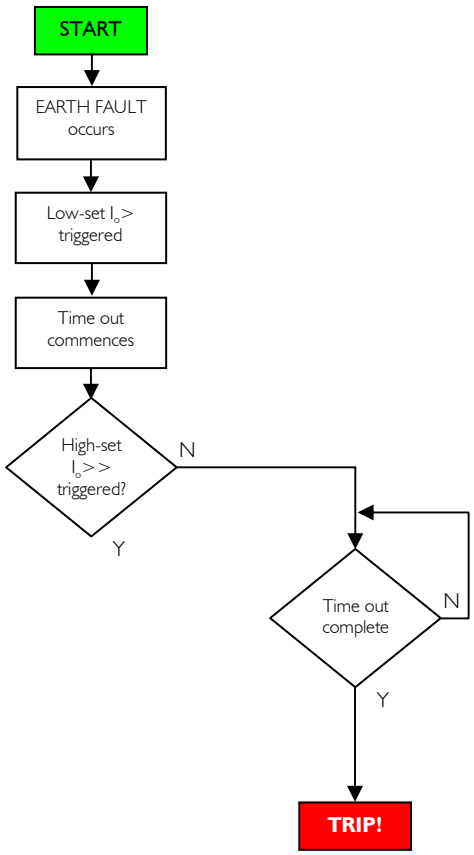
If the fault current has been removed, pressing the **"RESET"** button will return the relay back to normal operation. The red LED will then extinguish.

Example 2.

If a fault current occurs such that it exceeds the **"High-set Io>>"** trip threshold the relay will de-energise with no delay. The red LED above the **"High-set Io>>"** adjustment will flash.

In the event of an Earth fault condition, the basic sequence of events is shown below.

☞*Assuming High-set trip is enabled.*



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INSTALLATION

Installation work must be carried out by qualified personnel.

- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED**
- Remove the P9640 from the packaging.
- Lift the raised part of the side clip in order to remove from the housing. Carry this out on each side.
- Insert the P9640 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Connect wires to the rear terminals as required.
- The P9640 is now ready for powering and setting.

☞*The front window of the P9640 is supplied with a clear protective film which can be removed as and when necessary.*

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.

TEST MODE

- Press and hold the TEST button and the relay will energise. Both the red **"Io>"** and **"Io>>"** LED's will illuminate.
- Release the TEST button and the relay will remain energised.
- Press the RESET button to de-energise the relay. Both red LED's will extinguish.

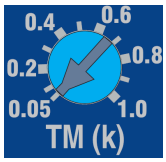
☞*Testing should be carried out on a regular basis to check the integrity of the P9640.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

SETTING & OPERATION

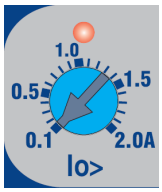
Setting of the P9640 is carried out using the 3 potentiometers located behind the transparent cover.

1. Time Multiplier (TM (k))



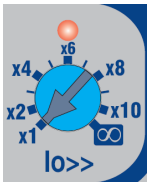
The adjustment for **"TM (k)"** (Time Multiplier) defines the tripping characteristic when the **"Low-set"** threshold **"Io>"** has been exceeded. The lower the setting, the faster the response to tripping. The higher the setting, the slower the response.

2. Low-Set Trip threshold (Io>)



The adjustment for the **"Low-set"** can be set from 0.1 to 2A. When the threshold is exceeded due to an Earth fault condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red LED will then flash.

3. High-Set Trip threshold (Io>>)



The adjustment for the **"High-set"** can be set from x1 to x10 then disable i.e.

The scale markings are multipliers of what has been set on the **"Low-set"** threshold. For example if the **"Low-set"** is set to 1.5A and **"High-set"** x6, this will be the equivalent of 1.5 x 6 = 9A.

When the threshold is exceeded due to an Earth fault condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red LED will then flash.

☞*If tripping occurs whereby the High-set level is exceeded, only the LED for the High-set will illuminate/flash. This allows the user to clearly identify which threshold was triggered causing the trip.*
☞*There is no delay associated with High-set therefore, tripping is instantaneous.*

LED FUNCTION SUMMARY

☞*The green LED will remain illuminated for as long as power is applied to the Aux. connections (Terminals 1 and 2).*

In response to an Earth fault condition:

Status	Io>	Io>>
Normal	○	○
Low-set triggered	✳	○
Low-set Tripped	✳	○
High-set triggered	○	✳
High-set Tripped	○	✳

In response to Test and Reset button operation:

Button press	Io>	Io>>
TEST	✳	✳
RESET	○	○

Key:

LED off ○
LED on ✳
LED flashing ✳

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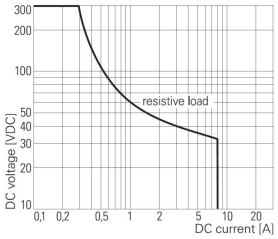
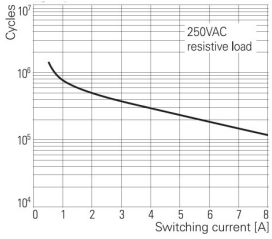
• TECHNICAL SPECIFICATION

Supply voltage Un (**1, 2**):	115VAC ±15% 230VAC ±15% *(Voltage should be specified at time of ordering)*
Rated frequency:	50/60Hz
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.
Rated current input In:	5A (directly connected)
Rated frequency:	50Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)
External CT's (**15, 16**):	Class P recommended. (with 5A secondary)
Earth fault settings:	
Low-set trip (I_o>):	0.10 – 2.0A (2 – 40%)
Time multiplier (TM):	0.05 – 1.0
High-set trip (I_o>>):	x1 – x10 or disable (∞)
High-set definite time:	Instantaneous (<50mS)
Pick up value:	+2% of trip setting
Accuracy:	
Protection thresholds:	± 5%
Response time:	± 5% (with a minimum of 50mS)
Repeat accuracy:	± 0.5% @ constant conditions
Ambient temperature:	-10 to +60°C
Relative humidity:	+95% (non-condensing)
Output:	
(RL1 - **3, 4, 5**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



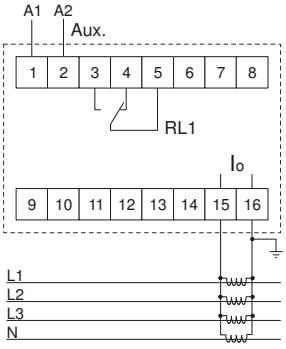
Max. DC Load Breaking Capacity



Electrical Endurance

Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 450g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm
Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	10in lb (1Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)

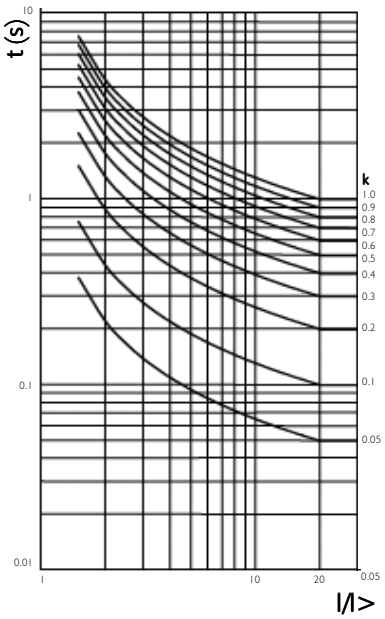
• CONNECTION DIAGRAM



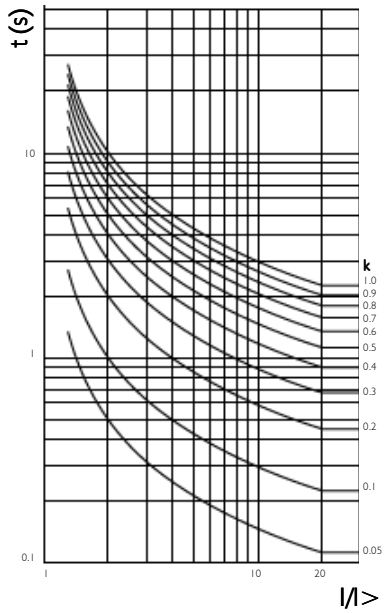
Approvals:	Conforms to IEC. CE and ✓ and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

Tripping Curve Characteristics (Normal Inverse 1.3/10) ^



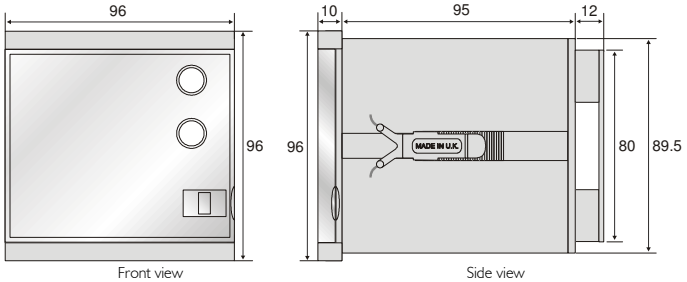
Tripping Curve Characteristics (Normal Inverse 3/10) ^



Options:

The P9600 range also includes individual Overcurrent or Earth fault relays available with either IDT or IDMT tripping characteristics. Please refer to separate data sheets.

• DIMENSIONS



All dimensions are in mm.

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

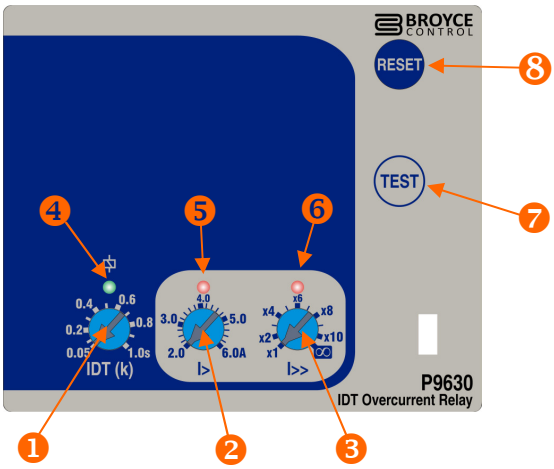
Type: P9630

Inverse Definite Time (IDT) Overcurrent Relay

- **True R.M.S. measurements**
- **Adjustable Low-set tripping threshold**
- **Adjustable High-set tripping threshold with option to disable**
- **Adjustable Time Multiplier for defining curve tripping characteristic (applicable to Low-set triggering only)**
- **Instantaneous tripping on High-set triggering**
- **Test and Reset button for simulating and clearing of fault condition**
- **Red LED indication of Low-set or High-set triggering and tripping**
- **Green LED indication for Auxiliary power supply presence**
- **Microprocessor based (self checking) with non-volatile memory**
- **Terminals suitable for 2 x 2.5mm² wires (complete with protective cover)**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 107mm

PRESENTATION



1. **"Time Multiplier"** adjustment*
2. **"Low-set I>"** trip adjustment*
3. **"High-set I>>"** trip adjustment*
4. **"Power supply"** green LED indication
5. **"Low-set triggered"** red LED indication
6. **"High-set triggered"** red LED indication
7. **"TEST"** button
8. **"RESET"** button

* accessible only when the front cover is open

GENERAL OVERVIEW

The P9630 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect Overcurrents in 3-phase applications. Typically the P9630 is wired in conjunction with external current transformers (1 per phase) of the feeder to be protected.

The adjustments and indicators are laid out such to help the user during set-up and fault finding. The adjustment for the **Low-set** for example has its corresponding red LED positioned above it so it is clear to which function this LED relates to. The same also applies to the **High-set** adjustment and LED. Adjustment and LED operation is explained further on the next page.

The adjustment for **IDT** (which defines the curve response to tripping) is assigned to the **Low-set** triggering only. The **High-set** does not have any additional adjustments and hence will trip instantaneously if triggered. If required, the **High-set** can be set to disabled.

A Test mode is provided (also accessible with the tamperproof transparent cover closed) to confirm the correct operation of the internal relay. The relay will energise when the **"TEST"** button is pressed and de-energise when the **"RESET"** button is pressed.

OPERATION

Example 1.

When an Overcurrent occurs in one of the phases and the level of current exceeds the **"Low-set I>"** trip threshold, the corresponding red LED above the adjustment illuminates. The time out then commences however the point at which tripping occurs is defined by:

A, the level of current that is above the trip threshold.
B, the Time Multiplier setting.

When tripping finally occurs, the red LED will then flash indicating a tripped condition.

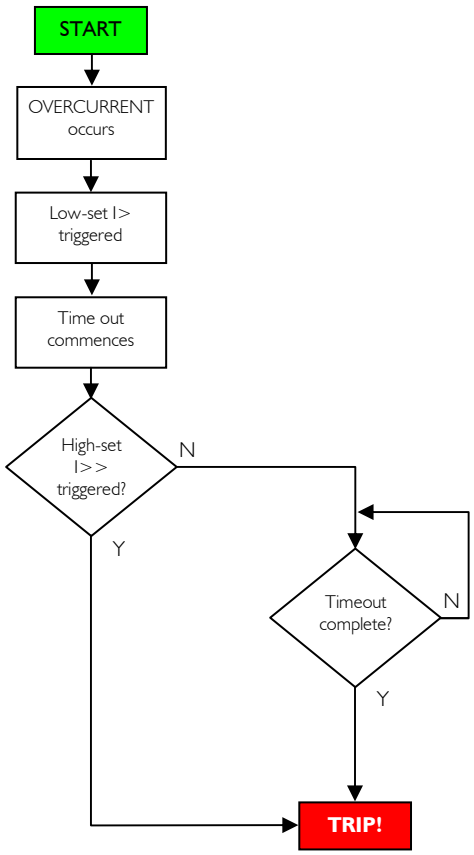
If the fault current has been removed, pressing the **"RESET"** button will return the relay back to normal operation. The red LED will then extinguish.

Example 2.

If a fault current occurs such that it exceeds the **"High-set I>>"** trip threshold the relay will de-energise with no delay. The red LED above the **"High-set I>>"** adjustment will flash.

In the event of an Overcurrent condition, the basic sequence of events is shown below.

☞*Assuming High-set trip is enabled.*



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ISO 9001 REGISTERED FIRM

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

INSTALLATION

Installation work must be carried out by qualified personnel.

- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED**
- Remove the P9630 from the packaging.
- Lift the raised part of the side clip in order to remove from the housing. Carry this out on each side.
- Insert the P9630 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Connect wires to the rear terminals as required.
- The P9630 is now ready for powering and setting.

☞*The front window of the P9630 is supplied with a clear protective film which can be removed as and when necessary.*

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.

TEST MODE

- Press and hold the TEST button and the relay will energise. Both the red **"I>"** and **"I>>"** LED's will illuminate.
- Release the TEST button and the relay will remain energised.
- Press the RESET button to de-energise the relay. Both red LED's will extinguish.

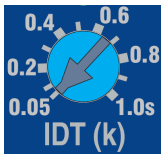
☞*Testing should be carried out on a regular basis to check the integrity of the P9630.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

SETTING & OPERATION

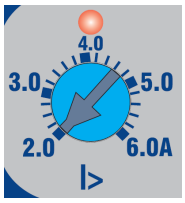
Setting of the P9630 is carried out using the 3 potentiometers located behind the transparent cover.

1. IDT (k)



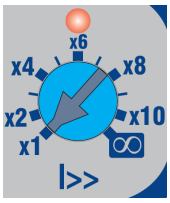
The adjustment for **"IDT (k)"** (Time Multiplier) defines the tripping characteristic when the **"Low-set"** threshold **"I>"** has been exceeded. The lower the setting, the faster the response to tripping. The higher the setting, the slower the response.

2. Low-Set Trip threshold (I>)



The adjustment for the **"Low-set"** can be set from 2 to 6A. When the threshold is exceeded due to an Overcurrent condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red LED will then flash.

3. High-Set Trip threshold (I>>)



The adjustment for the **"High-set"** can be set from x1 to x10 then disable i.e.

The scale markings are multipliers of what has been set on the **"Low-set"** threshold. For example if the **"Low-set"** is set to 4A and **"High-set"** x8, this will be the equivalent of 4 x 8 = 32A.

When the threshold is exceeded due to an Overcurrent condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red LED will then flash.

☞*If tripping occurs whereby the High-set level is exceeded, only the LED for the High-set will illuminate/flash. This allows the user to clearly identify which threshold was triggered causing the trip.*
☞*There is no delay associated with High-set therefore, tripping is instantaneous.*

LED FUNCTION SUMMARY

☞*The green LED will remain illuminated for as long as power is applied to the Aux. connections (Terminals 1 and 2).*

In response to an Overcurrent condition:

Status	I>	I>>
Normal	○	○
Low-set triggered	✳	○
Low-set Tripped	◐	○
High-set triggered	○	✳
High-set Tripped	○	◐

In response to Test and Reset button operation:

Button press	I>	I>>
TEST	✳	✳
RESET	○	○

Key:

LED off ○
LED on ✳
LED flashing ◐

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ISO 9001 REGISTERED FIRM
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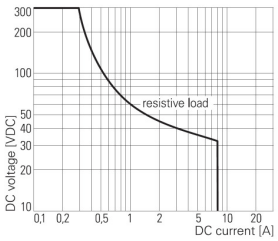
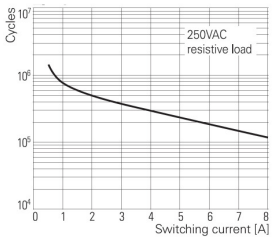
• TECHNICAL SPECIFICATION

Supply voltage Un (**1, 2**):	115VAC ±15% 230VAC ±15% *(Voltage should be specified at time of ordering)*
Rated frequency:	50/60Hz
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.
Rated current input In:	5A (directly connected)
Rated frequency:	50Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)
External CT's (**9, 10, 11, 12, 13, 14**):	Class P recommended. (with 5A secondary)
Overcurrent settings:	
Low-set trip (I>):	2.0 – 6.0A (40 – 120%)
Time multiplier (IDT):	0.05 – 1.0
High-set trip (I>>):	x1 – x10 or disable (∞)
High-set definite time:	Instantaneous (<50mS)
Pick up value:	+2% of trip setting
Accuracy:	
Protection thresholds:	± 5%
Response time:	± 5% (with a minimum of 50mS)
Repeat accuracy:	± 0.5% @ constant conditions
Ambient temperature:	-10 to +60°C
Relative humidity:	+95% (non-condensing)
Output:	
(RL1 - **3, 4, 5**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



Max. DC Load Breaking Capacity



Electrical Endurance

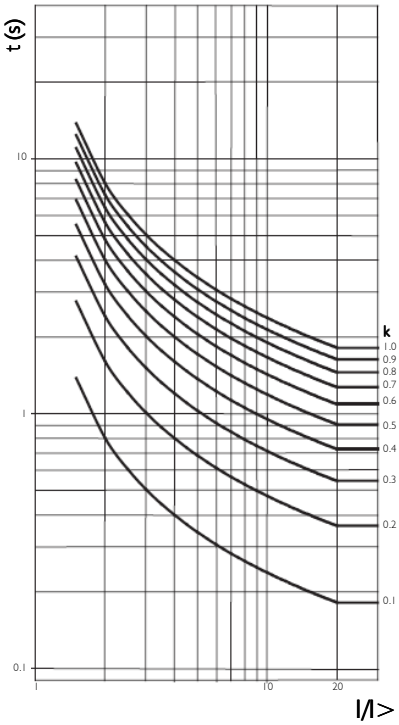
Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 590g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm
Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	10in lb (1Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)
Approvals:	Conforms to IEC. CE and and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

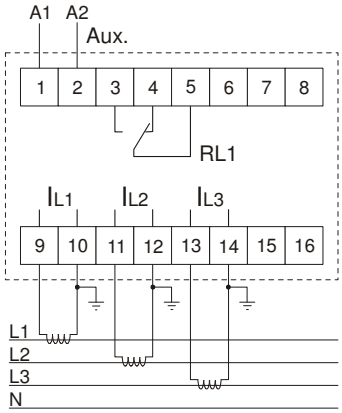
Options:

The P9600 range also includes individual Overcurrent or Earth fault relays available with either IDT or IDMT tripping characteristics. Please refer to separate data sheets.

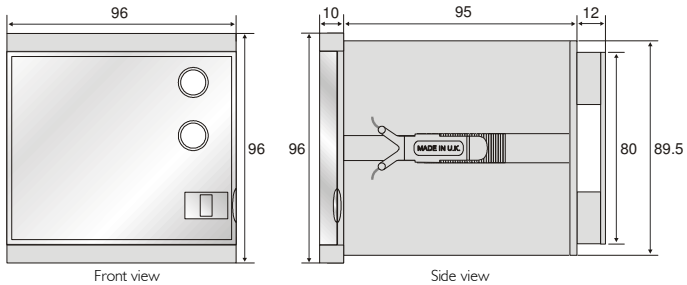
Tripping Curve Characteristics.



• CONNECTION DIAGRAM



• DIMENSIONS



All dimensions are in mm.

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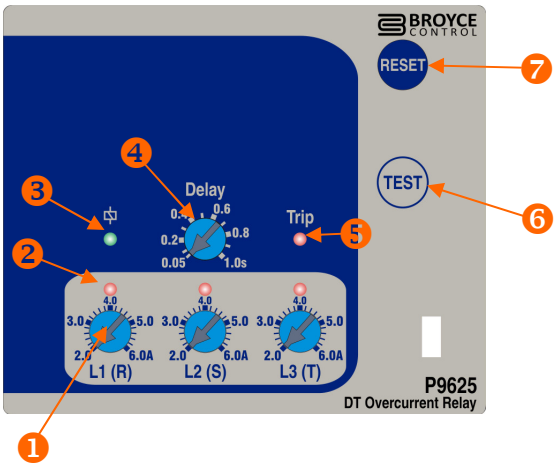
Type: P9625

Definite Time (DT) Overcurrent Relay

- ❑ **True R.M.S. measurements**
- ❑ **Individual Trip Level adjustment for each phase**
- ❑ **Adjustable Delay setting**
- ❑ **Test and Reset button for simulating and clearing of fault condition**
- ❑ **Red LED indication of which phase has been triggered**
- ❑ **Red LED indication of actual tripped condition**
- ❑ **Green LED indication for Auxiliary power supply presence**
- ❑ **Microprocessor based (self checking) with non-volatile memory**
- ❑ **Terminals suitable for 2 x 2.5mm² wires (complete with protective cover)**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 107mm

• PRESENTATION



1. **"Phase"** trip adjustment*
2. **"Phase"** trip level exceeded red LED indication
3. **"Power supply"** green LED indication
4. **"Delay"** adjustment*
5. **"Trip"** red LED indication
6. **"TEST"** button
7. **"RESET"** button

* accessible only when the front cover is open

• GENERAL OVERVIEW

The P9625 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect Overcurrents in 3-phase applications. Typically the P9625 is wired in conjunction with external current transformers (1 per phase) of the feeder to be protected.

The adjustments and indicators are laid out such to help the user during set-up and fault finding. The adjustment for the **L1 (R)** for example has its corresponding red LED positioned above it so it is clear as to which phase this LED relates to. Adjustment and LED operation is explained further on the next page.

The adjustment for the **Delay** is a global adjustment that is connected with any one phase that exceeds the set threshold and delays the relay from energising.

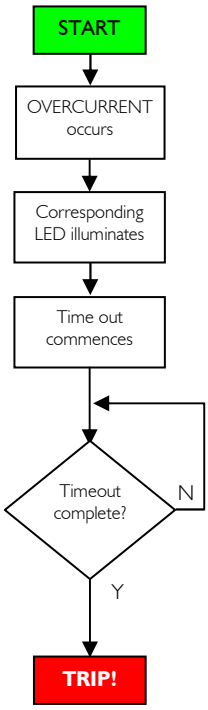
A Test mode is provided (also accessible with the tamperproof transparent cover closed) to confirm the correct operation of the internal relay. The relay will energise when the **"TEST"** button is pressed and de-energise when the **"RESET"** button is pressed.

• OPERATION

When an Overcurrent occurs in one of the phases and the level of current exceeds the trip threshold, the corresponding red LED above the adjustment illuminates. The time out then commences and the relay energises after the delay has run. The red **"Trip"** LED will then flash indicating a tripped condition.

If the fault current has been removed, pressing the **"RESET"** button will return the relay back to normal operation. The red LED's will then extinguish.

In the event of an Overcurrent condition, the basic sequence of events is shown below.



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ISO 9001 REGISTERED FIRM

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INSTALLATION

Installation work must be carried out by qualified personnel.

- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED**
- Remove the P9625 from the packaging.
- Lift the raised part of the side clip in order to remove from the housing. Carry this out on each side.
- Insert the P9625 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Connect wires to the rear terminals as required.
- The P9625 is now ready for powering and setting.

☞*The front window of the P9625 is supplied with a clear protective film which can be removed as and when necessary.*

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.

TEST MODE

- Press and hold the TEST button and the relay will energise after the delay period. All red LED's will illuminate.
- Release the TEST button, the relay will remain energised and all red LED's lit.
- Press the RESET button to de-energise the relay. All red LED's will extinguish.

☞*Testing should be carried out on a regular basis to check the integrity of the P9625.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

SETTING & OPERATION

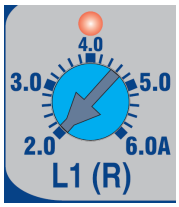
Setting of the P9625 is carried out using the 4 potentiometers located behind the transparent cover.

1. Delay

The adjustment for **"Delay"** defines the delay period between exceeding a trip threshold on any of the phases and the relay energising.

The delay can be set from 50mS to 1.0s.

2. Trip threshold



Individual adjustments for the trip threshold allow the user to set each phase independently of each other. When the threshold is exceeded on any phase due to an Overcurrent condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red **"Trip"** LED will then flash.

In response to an Overcurrent condition (on any phase):

Status	Phase LED*	Trip
Normal	○	○
Phase triggered	✳	○
Tripped	✳	✳

In response to Test and Reset button operation:

Button press	Phase LED*	Trip
TEST	✳	✳
RESET	○	○

* Can be L1(R), L2 (S) or L3(T)

Key:

LED off ○

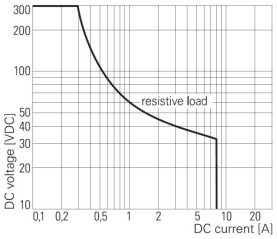
LED on ✳

LED flashing ✳

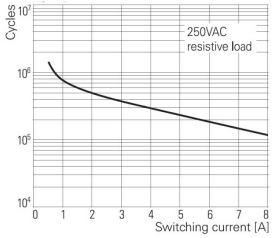
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

• TECHNICAL SPECIFICATION

Supply voltage Un (**1, 2**):	115VAC ±15% 230VAC ±15% *(Voltage should be specified at time of ordering)*
Rated frequency:	50/60Hz
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.
Rated current input In:	5A (directly connected)
Rated frequency:	50Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)
External CT's (**9, 10, 11, 12, 13, 14**):	Class P recommended. (with 5A secondary)
Overcurrent settings:	
Trip threshold:	2.0 – 6.0A (40 – 120%)
Time Delay:	0.05 – 1.0s
Pick up value:	+2% of trip setting
Accuracy:	
Protection thresholds:	± 5%
Response time:	± 5% (with a minimum of 50mS)
Repeat accuracy:	± 0.5% @ constant conditions
Ambient temperature:	-10 to +60°C
Relative humidity:	+95% (non-condensing)
Output: (RL1 - **3, 4, 5**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



Max. DC Load Breaking Capacity



Electrical Endurance

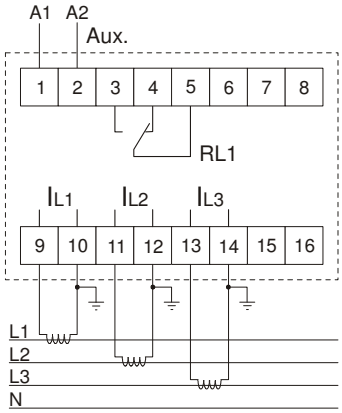
Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 590g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm
Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	10in lb (1Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)
Approvals:	Conforms to IEC. CE and and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

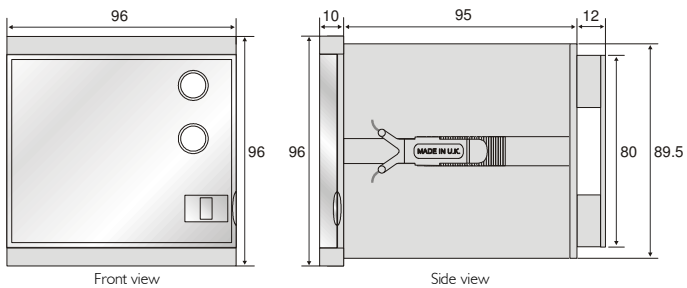
Options:

The P9600 range also includes individual Overcurrent or Earth fault relays available with either IDT or IDMT tripping characteristics. Please refer to separate data sheets.

• CONNECTION DIAGRAM



• DIMENSIONS



All dimensions are in mm.

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ISO 9001 REGISTERED FIRM

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

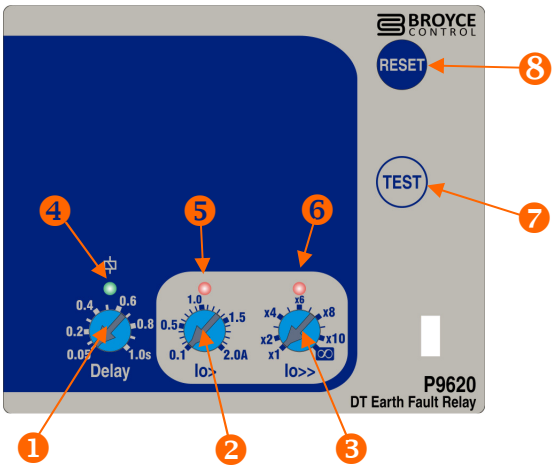
Type: P9620

Definite Time (DT) Earth Fault Relay

- ❑ **True R.M.S. measurements**
- ❑ **Adjustable Low-set tripping threshold**
- ❑ **Adjustable High-set tripping threshold with option to disable**
- ❑ **Adjustable Definite Time setting (applicable to Low-set triggering only)**
- ❑ **Instantaneous tripping on High-set triggering**
- ❑ **Test and Reset button for simulating and clearing of fault condition**
- ❑ **Red LED indication of Low-set or High-set triggering and tripping**
- ❑ **Green LED indication for Auxiliary power supply presence**
- ❑ **Microprocessor based (self checking) with non-volatile memory**
- ❑ **Terminals suitable for 2 x 2.5mm² wires (complete with protective cover)**

Dims:
W x H. 96 x 96mm (front)
W x H. 89.5 x 89.5mm (main body)
L. 107mm

• PRESENTATION



1. **"Delay"** adjustment*
2. **"Low-set Io>"** trip adjustment*
3. **"High-set Io>>"** trip adjustment*
4. **"Power supply"** green LED indication
5. **"Low-set triggered"** red LED indication
6. **"High-set triggered"** red LED indication
7. **"TEST"** button
8. **"RESET"** button

* accessible only when the front cover is open

• GENERAL OVERVIEW

The P9620 (from the P9600 series family of IDMT/DT relays) is a microprocessor based relay designed to monitor and detect Earth faults in 3-phase applications. Typically the P9620 is wired in conjunction with external current transformers of the feeder to be protected.

The adjustments and indicators are laid out such to help the user during set-up and fault finding. The adjustment for the **Low-set** for example has its corresponding red LED positioned above it so it is clear to which function this LED relates to. The same also applies to the **High-set** adjustment and LED. Adjustment and LED operation is explained further on the next page.

The adjustable time delay **Delay** is assigned to the **Low-set** triggering only. The **High-set** does not have any adjustable delay and hence will trip instantaneously if triggered. If required, the **High-set** can be set to disabled.

A Test mode is provided (also accessible with the tamperproof transparent cover closed) to confirm the correct operation of the internal relay. The relay will energise when the **"TEST"** button is pressed and de-energise when the **"RESET"** button is pressed.

• OPERATION

Example 1.

When an Earth fault occurs and the level of current exceeds the **"Low-set Io>"** trip threshold, the corresponding red LED above the adjustment illuminates. If the current remains for greater than the time delay set by the adjustment marked **"Delay"**, the relay will then energise. The red LED will then flash indicating a tripped condition.

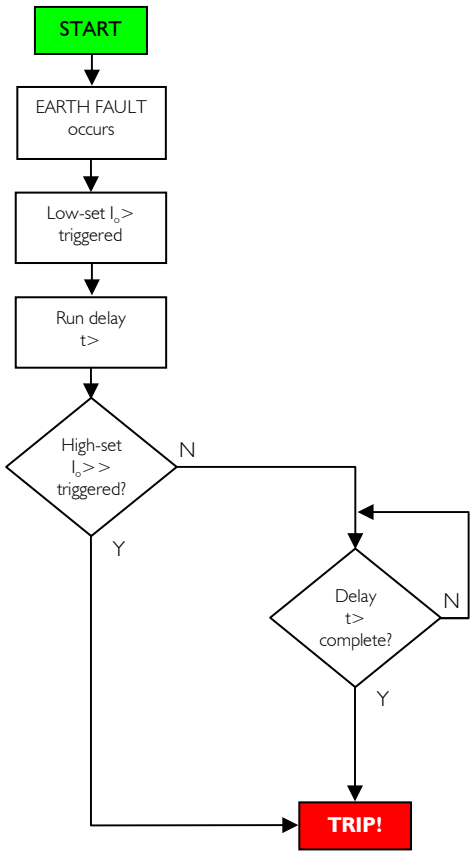
If the fault current has been removed, pressing the **"RESET"** button will return the relay back to normal operation. The red LED will then extinguish.

Example 2.

If a fault current occurs such that it exceeds the **"High-set Io>>"** trip threshold (and before the **"Delay"** has had time to elapse), the relay will de-energise with no delay. The red LED above the **"High-set Io>>"** adjustment will flash.

In the event of an Earth fault condition, the basic sequence of events is shown below.

☞*Assuming High-set trip is enabled.*



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INSTALLATION

Installation work must be carried out by qualified personnel.

- **BEFORE INSTALLATION, ISOLATE THE SUPPLY. THIS PRODUCT IS DESIGNED TO CONNECT TO SEVERAL TYPES OF CIRCUITS. ENSURE ALL ARE ISOLATED**
- Remove the P9620 from the packaging.
- Lift the raised part of the side clip in order to remove from the housing. Carry this out on each side.
- Insert the P9620 into the panel cut-out and fit the side clips back on to the housing.
- Slide the clips towards the front of the unit until they come in to contact with the reverse of the panel. The unit is now secured in place.
- Connect wires to the rear terminals as required.
- The P9620 is now ready for powering and setting.

☞*The front window of the P9620 is supplied with a clear protective film which can be removed as and when necessary.*

NORMAL OPERATION

- Apply power to the unit and the green **"Power supply"** LED will illuminate.

TEST MODE

- Press and hold the TEST button and the relay will energise. Both the red **"Io>"** and **"Io>>"** LED's will illuminate.
- Release the TEST button and the relay will remain energised.
- Press the RESET button to de-energise the relay. Both red LED's will extinguish.

☞*Testing should be carried out on a regular basis to check the integrity of the P9620.*

*DO NOT use this product to provide a means of isolating circuits in order to work on when placed in the **"TEST"** mode. This should only be done by means of operating isolators, circuit breakers or other methods of removing power in this application.*

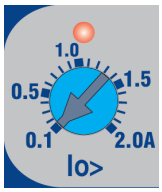
SETTING & OPERATION

Setting of the P9620 is carried out using the 3 potentiometers located behind the transparent cover.

1. Delay

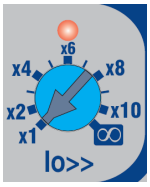
The adjustment for **"Delay (s)"** sets the period that the P9620 waits before the relay energises once the **"Low-set"** threshold **"Io>"** has been exceeded.

2. Low-Set Trip threshold (Io>)



The adjustment for the **"Low-set"** can be set from 0.1 to 2A. When the threshold is exceeded due to an Earth fault condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red LED will then flash.

3. High-Set Trip threshold (Io>>)



The adjustment for the **"High-set"** can be set from x1 to x10 then disable i.e.

The scale markings are multipliers of what has been set on the **"Low-set"** threshold. For example if the **"Low-set"** is set to 1.5A and **"High-set"** x6, this will be the equivalent of 1.5 x 6 = 9A.

When the threshold is exceeded due to an Earth fault condition, the corresponding red LED above the adjustment illuminates indicating activity. When tripping finally occurs, the red LED will then flash.

☞*If tripping occurs whereby the High-set level is exceeded, only the LED for the High-set will illuminate/flash. This allows the user to clearly identify which threshold was triggered causing the trip.*
☞*There is no delay associated with High-set therefore, tripping is instantaneous.*

LED FUNCTION SUMMARY

☞*The green LED will remain illuminated for as long as power is applied to the Aux. connections (Terminals 1 and 2).*

In response to an Earth fault condition:

Status	Io>	Io>>
Normal		
Low-set triggered		
Low-set Tripped		
High-set triggered		
High-set Tripped		

In response to Test and Reset button operation:

Button press	Io>	Io>>
TEST		
RESET		

Key:

LED off
LED on
LED flashing

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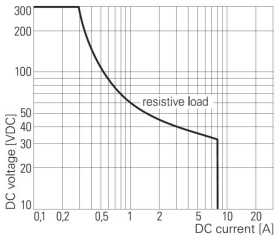
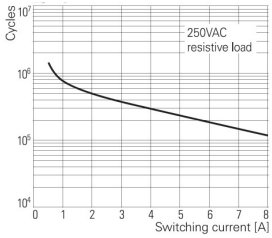
• TECHNICAL SPECIFICATION

Supply voltage Un (**1, 2**):	115VAC ±15% 230VAC ±15% *(Voltage should be specified at time of ordering)*
Rated frequency:	50/60Hz
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Power consumption:	3W max.
Rated current input In:	5A (directly connected)
Rated frequency:	50Hz
Burden:	<0.4VA @ In
Overload:	4 x In (continuous)
External CT's (**15, 16**):	Class P recommended. (with 5A secondary)
Earth fault settings:	
Low-set trip (I_o>):	0.10 – 2.0A (2 – 40%)
Low-set definite time (t>):	0.05 – 1.0s
High-set trip (I_o>>):	x1 – x10 or disable (∞)
High-set definite time:	Instantaneous (<50mS)
Pick up value:	+2% of trip setting
Accuracy:	
Protection thresholds:	± 5%
Time delay (DT):	± 5% (with a minimum of 50mS)
Repeat accuracy:	± 0.5% @ constant conditions
Ambient temperature:	-10 to +60°C
Relative humidity:	+95% (non-condensing)
Output:	
(RL1 - **3, 4, 5**):	1 x SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (1250VA) DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2 / 50µS) IEC 60664



Max. DC Load Breaking Capacity



Electrical Endurance

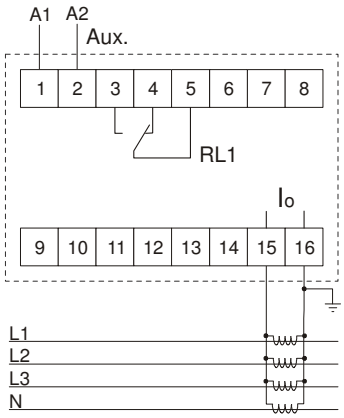
Housing:	Flame retardant Lexan
Protection:	IP55 / IP20 (rear)
Weight:	≈ 450g
Mounting:	Panel mounting. Cut-out = 91 x 91mm (± 0.5mm)
Max. panel thickness:	12mm
Terminal conductor size:	0.05 - 2.5mm² (30 - 12AWG)
Recommended tightening torque:	10in lb (1Nm)
Wire stripping length:	0.24 – 0.30in (6 – 7.5mm)
Approvals:	Conforms to IEC. CE and and RoHS Compliant. EMC: Immunity: EN/IEC 61000-6-2 Emissions: EN/IEC 61000-6-4 Generic: IEC 60255-26 (EMC), IEC 255-3, IEC 60255-151

( ) Bold digits in brackets refer to terminal numbers on the rear of the unit.

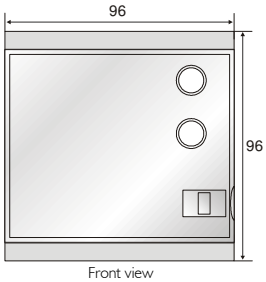
Options:

The P9600 range also includes individual Overcurrent or Earth fault relays available with either IDT or IDMT tripping characteristics. Please refer to separate data sheets.

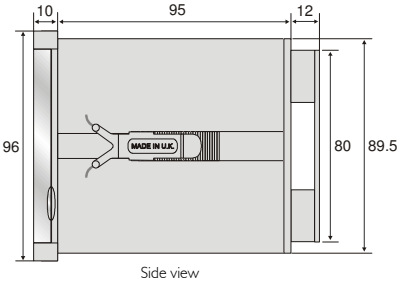
• CONNECTION DIAGRAM



• DIMENSIONS



Front view



Side view

All dimensions are in mm.

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• earth leakage relays • earth fault relays • overcurrent relays • **three phase relays** • time delay relays • control relays • level control relays • pump control relays •

• speed control relays • temperature control relays • protection devices • generator protection • hours run meter • sockets • bespoke products •

- Phase Asymmetry / Sequence / Failure / Under & Over Voltage / Restart Delay
- Phase Sequence / Failure / Under & Over Voltage / Restart Delay
- Phase Sequence / Failure / Under & Over Voltage
- Phase Sequence / Failure / Under Voltage
- Phase Sequence / Failure
- Phase Failure / Under & Over Voltage
- Phase Under Voltage
- Phase Under Voltage (Timed)
- Phase Over Voltage
- Phase Presence / Sequence Indicator
- Phase Asymmetry

Choose your category

Click the above for further information…!

Click here for Main Page

Type: LPRC/2

Phase Failure, Phase Sequence, Under and Over Voltage plus Time Delay

Terminal Protection to IP20

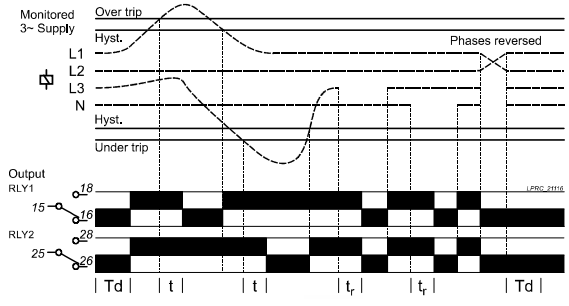
Dims: to DIN 43880
W. 17.5mm

- **Compact 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring measuring phase to phase (3-wire) or phase to neutral (4-wire) voltages**
- **Selectable nominal voltages to suit most popular 3-wire or 4-wire supply voltages**
- **Monitors own supply and detects if one or more phases exceed the set Under or Over voltage trip levels**
- **Detects incorrect phase sequence, phase loss and neutral loss[1]**
- **Adjustments for Under and Over voltage trip levels**
- **Adjustment for Time delay**
- **Independent relay outputs - Under voltage monitoring (RLY2) / Over voltage monitoring (RLY1)**
- **2 x SPDT relay output 5A**
- **Green LED indication for supply status**
- **Individual Red LED indication for both relay statuses**

[1] Only when 4-wire monitoring selected

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.
- Only connect the Neutral if available and 4-wire monitoring is required.

Applying power.

- Set the "Nominal (Un)" ❹ voltage selector to match that of the voltage being monitored.
- Set the Over %" ❺ adjustment to maximum and the "Under %" ❼ adjustment to minimum. Set the "Delay (t)" ❻ to minimum.
- Apply power and the green "Power supply" ❶ LED will illuminate. Both the red "RLY1" ❷/"RLY2" ❸ LED's will illuminate and corresponding RLY1 and RLY2 relays energise after the short Power on delay (Td).
- Refer to the Troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and both relays de-energise immediately).

Troubleshooting.

The table below shows the status of the unit during a particular fault condition.

Supply fault	Green LED ❶	Red LED ❷	Red LED ❸	Relay RLY1	Relay RLY2
Phase or neutral missing	Flashing[1]	Off	Flashing[1]	De-energised	De-energised
Phases reversed (no delay)	Flashing	Off	Off	De-energised	De-energised
Under voltage condition (during timing)	On	On	Flashing	Energised	En for delay (t)
Under voltage condition (after timing)	On	Off	Off	Energised	De-energised
Over voltage condition (during timing)	On	Flashing	On	En for delay (t)	Energised
Over voltage condition (after timing)	On	Off	On	De-energised	Energised
Phases < fixed under trip level [2]	On	Off	Off	De-energised	De-energised

[1] Green and Red LED's alternate in this fault condition

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un **(L1, L2, L3, (N)):**		3-wire monitoring **3-Wire**	4-wire monitoring **4-Wire**	
	LPRC/2 (LV)*	110, 208, 220V AC	63.5, 120, 127V AC	
	LPRC/2 (HV)*	380, 400, 415V AC	220, 230, 240V AC	
Frequency range:		48 – 63Hz		
Supply variation:		LV: 70 – 286V HV: 243- 540V AC (L>L)		
Overvoltage category:		III (IEC 60664)		
Rated impulse withstand voltage:		4kV (1.2/50µS) IEC 60664		
Power consumption (max.):		2.5VA		
Monitoring mode:		Under and Over voltage		
Trip levels:				
	Under [2]:	Fixed ± 2% *see below*		
	Under:	75 – 95% of Un		
	Over:	105 – 125% of Un		

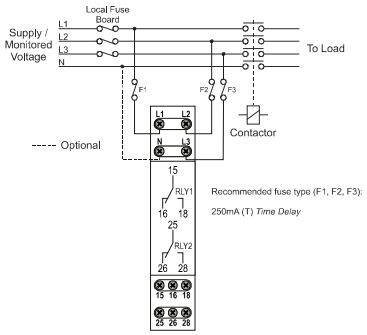
* Please state model variant when ordering

Measuring ranges:		Nominal (Un)	Under [2]	Under	Over
LPRC/2 (LV)	3-wire (L>L)	**110V**	70V	83 – 105V	116 – 138V
		208V	133V	156 – 198V	218 – 260V
		220V	140V	165 – 209V	231 – 275V
	4-wire (L>N)	**63.5V**	40V	48 – 60V	67 – 79V
		120V	76V	90 –114V	126 – 150V
		127V	81V	95 – 121V	133 – 159V
LPRC/2 (HV)	3-wire (L>L)	**380V**	243V	285 – 361V	399 – 475V
		400V	256V	300 – 380V	420 – 500V
		415V	265V	311 – 394V	436 – 519V
	4-wire (L>N)	**220V**	140V	165 – 209V	231 – 275V
		230V	147V	173 – 219V	242 – 288V
		240V	153V	180 – 228V	252 – 300V

Hysteresis:	≈ 2% of trip level (factory set)	
Setting accuracy:	± 3%	
Repeat accuracy:	± 0.5% at constant conditions	
Immunity from micro power cuts:	<50ms	
Response time (t_r):	≈ 50ms	
Time delay (t):	0.2 – 10s (± 5%)	
	Note: actual delay (t) = adjustable delay + response time	
Power on delay (Td):	≈ 1s (worst case = Td x 2)	
Reset time:	50 – 100ms	
Power on indication:	Green LED	
Relay status indication:	Red LED x2	
Ambient temperature:	-20 to +60°C	
Relative humidity:	+95% max.	
Output **(15, 16, 18 / 25, 26, 28)**:	2 x SPDT relay	
Output rating:	AC1	250V 5A (1250VA)
	AC15	250V 2A
	DC1	25V 5A (125W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	90g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4	

Note:
"L>L" has the same meaning as "phase to phase" and "L>N", the same as "phase to neutral"

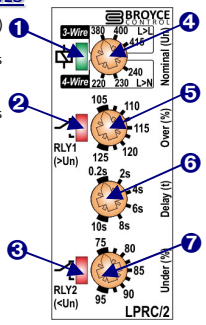
CONNECTION DIAGRAM



SETTING DETAILS

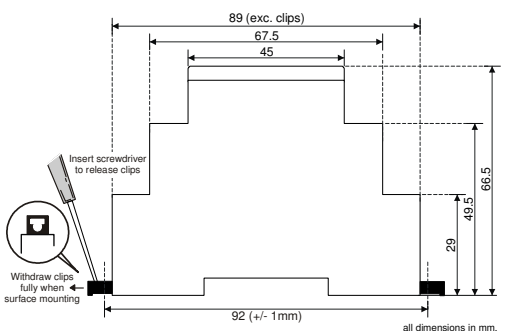
1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED for Over voltage tripping
3. Relay output / Timing status (Red) LED for Under voltage tripping
4. "Nominal (Un)" voltage selector
5. "Over %" trip level adjustment^
6. "Delay (t)" adjustment
7. Under %" trip level adjustment^

^scaled as % of the selected nominal voltage "Un"



Above example showing LPRC/2 (HV)

DIMENSIONS



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Type: LPRT/2

Phase Failure, Phase Sequence, Under Voltage plus Time Delay

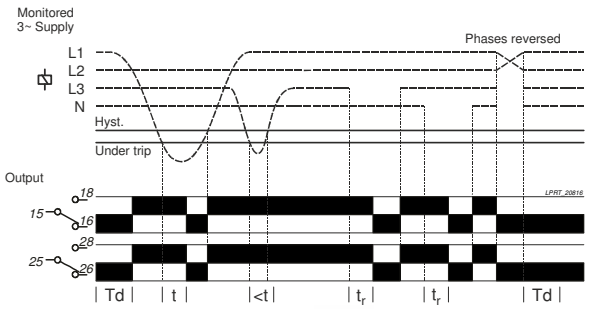
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- ❑ **Compact 17.5mm DIN rail housing**
- ❑ **Microprocessor based**
- ❑ **True R.M.S. monitoring measuring phase to phase (3-wire) or phase to neutral (4-wire) voltages**
- ❑ **Selectable nominal voltages to suit most popular 3-wire or 4-wire supply voltages**
- ❑ **Monitors own supply and detects an Under voltage condition on one or more phases**
- ❑ **Detects incorrect phase sequence, phase loss and neutral loss[1]**
- ❑ **Adjustment for Under voltage trip level**
- ❑ **Adjustment for Time delay**
- ❑ **DPDT relay output 5A**
- ❑ **Green LED indication for supply status**
- ❑ **Red LED indication for relay status**

[1] Only when 4-wire monitoring selected

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.
- Only connect the Neutral if available and 4-wire monitoring is required.

Applying power.

- Set the "Nominal (Un)" ❸ voltage selector to match that of the voltage being monitored.
- Set the "Under %" ❺ adjustment to minimum. Set the "Delay (t)" ❹ to minimum.
- Apply power and the green "Power supply" ❶ LED will illuminate. The red LED ❷ will illuminate and relay energise after the short Power on delay (Td).
- Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Accurate setting can be achieved by adjusting the trip level "Under (%)" until the unit trips (relay de-energises) then by decreasing the trip level "Under (%)" until the relay re-energises. Close setting of the trip level ensures the unit will detect a phase loss even with a large percentage of re-generative voltage.
- In order to set the unit as previously described but without causing disruption to the equipment being controlled/monitored, set the "Delay (t)" to maximum. It will now be possible to establish the trip point when the red LED starts to flash. Decrease the trip level setting to stop the LED flashing.
  (Note: If the time delay is allowed to expire, the output relay will de-energise)
- If large supply variations are anticipated, the trip level should be set further from the nominal voltage.
- Set the "Delay (t)" as required. (Note that the delay is only effective should the supply drop below the set trip level. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relays de-energise).

Troubleshooting.

The table below shows the status of the unit during a particular fault condition.

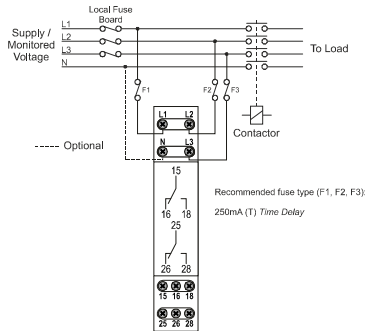
Supply fault	Green LED ❶	Red LED ❷	Relay
Phase or neutral missing	LED's flash alternately		De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Under voltage condition (during timing)	On	Flashing	Energised for delay (t)
Under voltage condition (after timing)	On	Off	De-energised
Phases < fixed under trip level [2]	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un **(L1, L2, L3, (N)):**	3-wire monitoring	3-Wire	4-wire monitoring	4-Wire
	380, 400, 415V AC		220, 230, 240V AC	
Frequency range:	48 – 63Hz			
Supply variation:	243 - 540V AC (L>L)			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	2.5VA			
Monitoring mode:	Under voltage			
Trip levels:				
Under [2]:	Fixed ± 2% *see below*			
Under:	75 – 95% of Un			
Measuring ranges:	Nominal (Un)	Under [2]	Under	
3-wire (L>L)	**380V**	243V	285 – 361V	
	400V	256V	300 – 380V	
	415V	265V	311 – 394V	
4-wire (L>N)	**220V**	140V	165 – 209V	
	230V	147V	173 – 219V	
	240V	153V	180 – 228V	
Hysteresis:	≈ 2% of trip level (factory set)			
Setting accuracy:	± 3%			
Repeat accuracy:	± 0.5% at constant conditions			
Immunity from micro power cuts:	<50ms			
Response time (t_r):	≈ 50ms			
Time delay (t):	0.2 – 10s (± 5%)			
	Note: actual delay (t) = adjustable delay + response time			
Power on delay (Td):	≈ 1s (worst case = Td x 2)			
Reset time:	50 – 100ms			
Power on indication:	Green LED			
Relay status indication:	Red LED			
Ambient temperature:	-20 to +60°C			
Relative humidity:	+95% max.			
Output **(15, 16, 18 / 25, 26, 28)**:	DPDT relay			
Output rating:	AC1		250V 5A (1250VA)	
	AC15		250V 2A	
	DC1		25V 5A (125W)	
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	90g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4			

Note:
"L>L" has the same meaning as "phase to phase" and "L>N", the same as "phase to neutral"

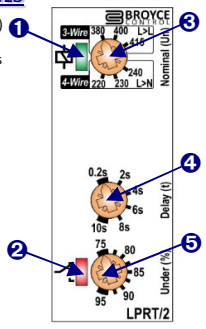
CONNECTION DIAGRAM



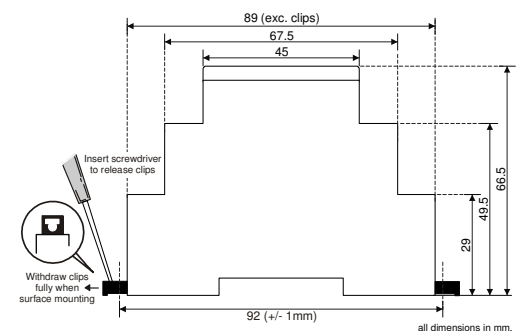
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Nominal (Un)" voltage selector
4. "Delay (t)" adjustment
5. "Under %" trip level adjustment^

^scaled as % of the selected nominal voltage "Un"



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: LPRA/2

Phase Asymmetry, Failure, Sequence, Under Voltage plus Time Delay

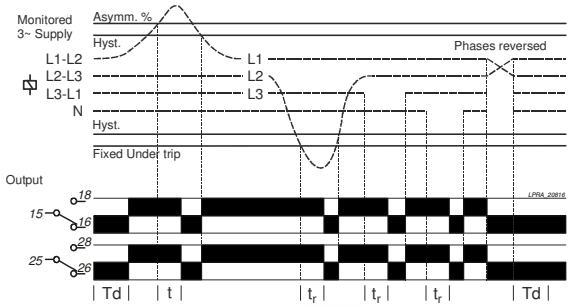
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- **Compact 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring measuring phase to phase (3-wire) or phase to neutral (4-wire) voltages**
- **Selectable nominal voltages to suit most popular 3-wire or 4-wire supply voltages**
- **Monitors own supply and detects phase asymmetry/unbalance**
- **Detects incorrect phase sequence, phase loss and neutral loss[1]**
- **Adjustment for Asymmetry trip level**
- **Adjustment for Time delay**
- **DPDT relay output 5A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

[1] Only when 4-wire monitoring selected

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.
- Only connect the Neutral if available and 4-wire monitoring is required.

Applying power.

- Set the "Nominal (Un)" ❸ voltage selector to match that of the voltage being monitored.
- Set the "Asymmetry %" ❺ adjustment to maximum. Set the "Delay (t)" ❹ to minimum.
- Apply power and the green "Power supply" ❶ LED will illuminate. The red LED ❷ will illuminate and relay energise after the short Power on delay (Td).
- Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Assuming all phases are perfectly balanced it should be possible to set the "Asymmetry (%)" adjustment to minimum which will ensure that it will detect the smallest of changes in the phase voltages. However, if large changes in phase voltages are likely, then the "Asymmetry (%)" setting should be increased.
- The formula used for calculating "Asymmetry" is as follows:

$$\text{Asymmetry} = \frac{\text{Maximum deviation from } V_{ave}}{V_{ave}} \times 100\%$$

[ANSI/NEMA MG 1-2001]

where V_{ave} is the average of the three phases
Note that "Phase asymmetry" can also referred to as "Phase unbalance"

- Set the "Delay (t)" as required. (Note that the delay is only effective should any phases exceed the set trip point. However, if the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relays de-energise immediately).

Troubleshooting.

The table below shows the status of the unit during a particular fault condition.

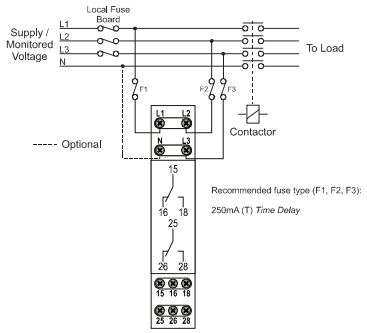
Supply fault	Green LED ❶	Red LED ❷	Relay
Phase or neutral missing	LED's flash alternately		De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Phase asymmetry trip point exceeded (during timing)	On	Flashing	Energised for delay (t)
Phase asymmetry trip point exceeded (after timing)	On	Off	De-energised
Phases < fixed under trip level [2]	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un **(L1, L2, L3, (N)):**	3-wire monitoring **3-Wire**	4-wire monitoring **4-Wire**
	380, 400, 415V AC	220, 230, 240V AC
Frequency range:	48 – 63Hz	
Supply variation:	243- 540V AC (L>L)	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	2.5VA	
Monitoring mode:	Asymmetry	
Trip levels:		
Under [2]:	Fixed ± 2% *see below*	
Asymmetry:	2 – 22%	
Measuring ranges:	Nominal (Un) / Under [2]	
3-wire (L>L)	**380V** 243V	
	400V 256V	
	415V 265V	
4-wire (L>N)	**220V** 140V	
	230V 147V	
	240V 153V	
Hysteresis:	≈ 2% of trip level (factory set)	
Setting accuracy:	± 3%	
Repeat accuracy:	± 0.5% at constant conditions	
Immunity from micro power cuts:	<50ms	
Response time (t_r):	≈ 50ms	
Time delay (t):	0.2 – 10s (± 5%)	
	Note: actual delay (t) = adjustable delay + response time	
Power on delay (Td):	≈ 1s (worst case = Td x 2)	
Reset time:	50 – 100ms	
Power on indication:	Green LED	
Relay status indication:	Red LED	
Ambient temperature:	-20 to +60°C	
Relative humidity:	+95% max.	
Output **(15, 16, 18 / 25, 26, 28)**:	DPDT relay	
Output rating:	AC1	250V 5A (1250VA)
	AC15	250V 2A
	DC1	25V 5A (125W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	90g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, ✔ and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4	

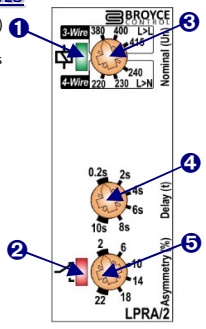
Note:
"L>L" has the same meaning as "phase to phase" and "L>N", the same as "phase to neutral"

CONNECTION DIAGRAM

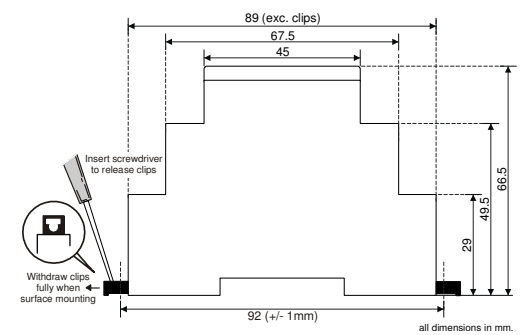


SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Nominal (Un)" voltage selector
4. "Delay (t)" adjustment
5. "Asymmetry %" trip adjustment



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: LPRD/2

Phase Failure, Phase Sequence, Under Voltage plus Restart Delay

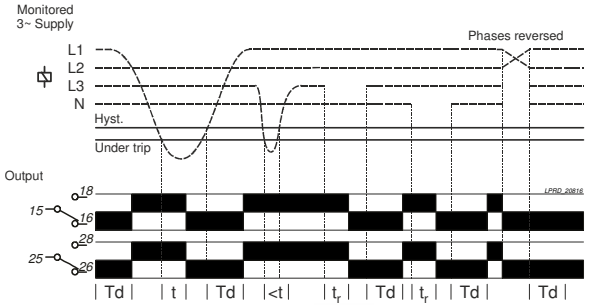
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- ❑ **Compact 17.5mm DIN rail housing**
- ❑ **Microprocessor based**
- ❑ **True R.M.S. monitoring measuring phase to phase (3-wire) or phase to neutral (4-wire) voltages**
- ❑ **Selectable nominal voltages to suit most popular 3-wire or 4-wire supply voltages**
- ❑ **Monitors own supply and detects an Under voltage condition on one or more phases**
- ❑ **Detects incorrect phase sequence, phase loss and neutral loss[1]**
- ❑ **Adjustment for Under voltage trip level**
- ❑ **Adjustment for Restart delay**
- ❑ **Adjustment for Time delay**
- ❑ **DPDT relay output 5A**
- ❑ **Green LED indication for supply status**
- ❑ **Red LED indication for relay status**

[1] Only when 4-wire monitoring selected

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.
- Only connect the Neutral if available and 4-wire monitoring is required.

Applying power.

- Set the "Nominal (Un)" ❸ voltage selector to match that of the voltage being monitored.
- Set "Under %" ❻ adjustment to minimum.
- Set the "Delay (t)" ❺ and "Restart Delay" ❹ adjustments to minimum.
- Apply power and the green "Power supply" ❶ LED will illuminate. The red relay ❷ LED will flash and relay remain de-energised for the Power on delay (Td). After this period has elapsed, the LED will remain lit and relay energised. *Note the red LED flashes at twice the rate of that when delaying the relay to de-energising. This is to help distinguish the two modes.*
- Refer to the Troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Accurate setting can be achieved by adjusting the trip level "Under (%)" until the unit trips (relay de-energises) then by decreasing the trip level "Under (%)" until the relay re-energises. Close setting of the trip level ensures the unit will detect a phase loss even with a large percentage of re-generative voltage.
- In order to set the unit as previously described but without causing disruption to the equipment being controlled/monitored, set the "Delay (t)" to maximum. It will now be possible to establish the trip point when the red LED starts to flash. Decrease the trip level setting to stop the LED flashing.
- (Note: If the time delay is allowed to expire, the output relays will de-energise)
- If large supply variations are anticipated, the trip level should be set further from the nominal voltage.
- Set the "Delay (t)" and "Restart delay" as required. (Note that the delay "t" is only effective should any phases fall below the set trip point. However, if the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relays de-energise immediately).

Troubleshooting.

The table below shows the status of the unit during a particular fault condition.

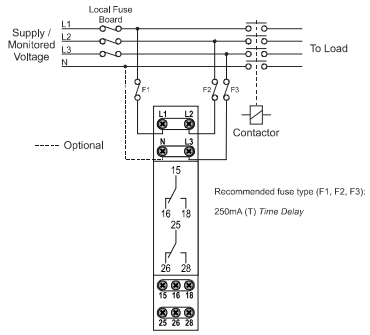
Supply fault	Green LED ❶	Red LED ❷	Relay
Phase or neutral missing	LED's flash alternately		De-energised
Phase or neutral restored (during restart timing)	On	Flashing (x2)	De-energised for delay (Td)
Phases reversed (no delay)	Flashing	Off	De-energised
Under voltage condition (during timing)	On	Flashing	Energised for delay (t)
Under voltage condition (after timing)	On	Off	De-energised
Voltage returned from Under voltage (during restart timing)	On	Flashing (x2)	De-energised for delay (Td)
Phases < fixed under trip level [2]	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un (L1, L2, L3, (N)):	3-wire monitoring 3-Wire		4-wire monitoring 4-Wire
	380, 400, 415V AC		220, 230, 240V AC
Frequency range:	48 – 63Hz		
Supply variation:	243- 540V AC (L>L)		
Overvoltage category:	III (IEC 60664)		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Power consumption (max.):	2.5VA		
Monitoring mode:	Under voltage		
Trip levels:			
Under [2]:	Fixed ± 2% *see below*		
Under:	75 – 95% of Un		
Measuring ranges:	Nominal (Un)	Under [2]	Under
3-wire (L>L)	**380V**	243V	285 – 361V
	400V	256V	300 – 380V
	415V	265V	311 – 394V
4-wire (L>N)	**220V**	140V	165 – 209V
	230V	147V	173 – 219V
	240V	153V	180 – 228V
Hysteresis:	≈ 2% of trip level (factory set)		
Setting accuracy:	± 3%		
Repeat accuracy:	± 0.5% at constant conditions		
Immunity from micro power cuts:	<50ms		
Response time (t_r):	≈ 50ms		
Time delay (t):	0.2 – 10s (± 5%)		
	Note: actual delay (t) = adjustable delay + response time		
Restart/Power on delay (Td):	1s – 5m (± 5%)		
Reset time:	50 – 100ms		
Power on indication:	Green LED		
Relay status indication:	Red LED		
Ambient temperature:	-20 to +60°C		
Relative humidity:	+95% max.		
Output **(15, 16, 18 / 25, 26, 28)**:	DPDT relay		
Output rating:	AC1		250V 5A (1250VA)
	AC15		250V 2A
	DC1		25V 5A (125W)
Electrical life:	≥ 150,000 ops at rated load		
Dielectric voltage:	2kV AC (rms) IEC 60947-1		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Housing:	Orange flame retardant UL94		
Weight:	90g		
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.		
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded		
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4		

Note:
"L>L" has the same meaning as "phase to phase" and "L>N", the same as "phase to neutral"

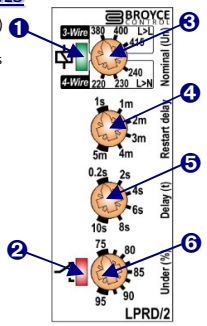
CONNECTION DIAGRAM



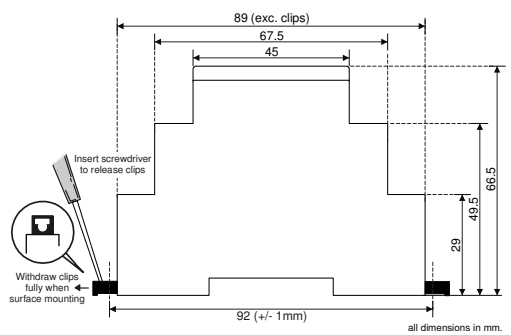
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Nominal (Un)" voltage selector
4. "Restart delay" adjustment
5. "Delay (t)" adjustment
6. Under %" trip level adjustment^

^scaled as % of the selected nominal voltage "Un"



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: LPMP/2

Phase Asymmetry, Failure, Sequence, Under and Over Voltage plus Restart Delay

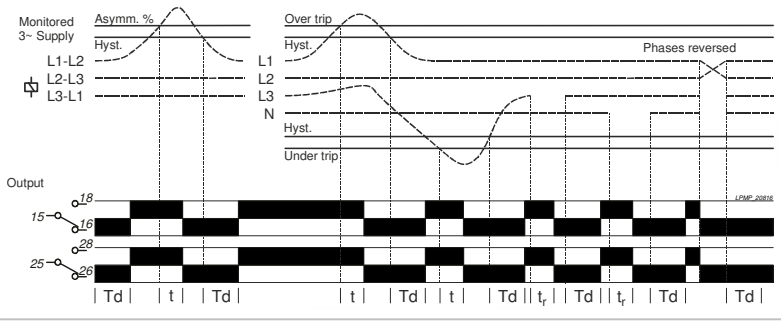
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- ❑ **Compact 17.5mm DIN rail housing**
- ❑ **Microprocessor based**
- ❑ **True R.M.S. monitoring measuring phase to phase (3-wire) or phase to neutral (4-wire) voltages**
- ❑ **Selectable nominal voltages to suit most popular 3-wire or 4-wire supply voltages**
- ❑ **Monitors own supply, detects phase asymmetry and if fixed Under or Over voltage trip levels are exceeded**
- ❑ **Detects incorrect phase sequence, phase loss and neutral loss[1]**
- ❑ **Adjustment for phase asymmetry/unbalance**
- ❑ **Adjustment for Restart delay**
- ❑ **Adjustment for Time delay**
- ❑ **DPDT relay output 5A**
- ❑ **Green LED indication for supply status**
- ❑ **Red LED indication for relay status**

[1] Only when 4-wire monitoring selected

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.
- Only connect the Neutral if available and 4-wire monitoring is required.

Applying power.

- Set the "Nominal (Un)" ❸ voltage selector to match that of the voltage being monitored.
- Set the "Asymmetry %" ❻ adjustment to maximum.
- Set the "Delay (t)" ❺ and "Restart delay" ❹ adjustments to minimum.
- Apply power and the green "Power supply" ❶ LED will illuminate. The red LED ❷ will illuminate and relay energise after the short delay period (Td).
- Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Assuming all phases are perfectly balanced it should be possible to set the "Asymmetry (%)" adjustment to minimum which will ensure that it will detect the smallest of changes in the phase voltages. However, if large changes in phase voltages are likely, then the "Asymmetry (%)" setting should be increased.
- The formula used for calculating phase asymmetry is shown on the right at the bottom of the Technical Specification.
- Set the "Delay (t)" and "Restart delay" as required. (Note that the delay "t" is only effective should any phases exceed the set trip point. However, if the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises immediately).

Troubleshooting.

The table below shows the status of the unit during a particular fault condition.

Supply fault	Green LED ❶	Red LED ❷	Relay
Phase or neutral missing	LED's flash alternately		De-energised
Phase or neutral restored (during restart timing)	On	Flashing (x2)	De-energised for delay (Td)
Phases reversed (no delay)	Flashing	Off	De-energised
Under or Over voltage condition (during timing)	On	Flashing	Energised for delay (t)
Under or Over voltage condition (after timing)	On	Off	De-energised
Voltage returned from Under/Over volt. (during restart timing)	On	Flashing (x2)	De-energised for delay (Td)
Phase asymmetry trip point exceeded (during timing)	On	Flashing	Energised for delay (t)
Phase asymmetry trip point exceeded (after timing)	On	Off	De-energised
Phase asymmetry below trip point (during restart timing)	On	Flashing (x2)	De-energised for delay (Td)
Phases < fixed under trip level [2]	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un **(L1, L2, L3, (N)):**	3-wire monitoring **3-Wire**		4-wire monitoring **4-Wire**	
	380, 400, 415V AC		220, 230, 240V AC	
Frequency range:	48 – 63Hz			
Supply variation:	243- 540V AC (L>L)			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	2.5VA			
Monitoring mode:	Asymmetry, Under and Over voltage			
Trip levels:				
Under [2]:	Fixed ± 2% *see below*			
Under:	Fixed – 90% of Un			
Over:	Fixed – 110% of Un			
Asymmetry:	2 – 8%			
Measuring ranges:	Nominal (Un)	Under [2]	Under	Over
3-wire (L>L)	**380V**	243V	342V	418V
	400V	256V	360V	440V
	415V	265V	374V	457V
4-wire (L>N)	**220V**	140V	198V	242V
	230V	147V	207V	253V
	240V	153V	216V	264V
Hysteresis:	≈ 2% of trip level (factory set)			
Setting accuracy:	± 3%			
Repeat accuracy:	± 0.5% at constant conditions			
Immunity from micro power cuts:	<50ms			
Response time (t_r):	≈ 50ms			
Time delay (t):	0.2 – 10s (± 5%)			
	Note: actual delay (t) = adjustable delay + response time			
Restart/Power on delay (Td):	1s – 500s			
Reset time:	50 – 100ms			
Power on indication:	Green LED			
Relay status indication:	Red LED			
Ambient temperature:	-20 to +60°C			
Relative humidity:	+95% max.			
Output **(15, 16, 18 / 25, 26, 28)**:	DPDT relay			
Output rating:	AC1		250V 5A (1250VA)	
	AC15		250V 2A	
	DC1		25V 5A (125W)	
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	90g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4			

Note:
"L>L" has the same meaning as "phase to phase" and "L>N", the same as "phase to neutral"

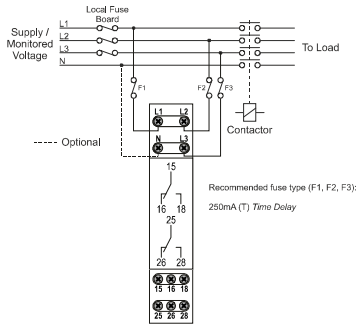
"Asymmetry" formula

$$\text{Asymmetry} = \frac{\text{Maximum deviation from } V_{ave}}{V_{ave}} \times 100\%$$

[ANSI/NEMA MG 1-2001]

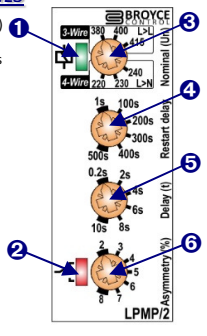
where V_{ave} is the average of the three phases
Note that "Phase asymmetry" can also referred to as "Phase unbalance"

CONNECTION DIAGRAM

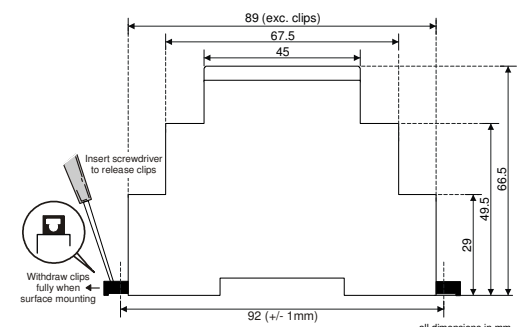


SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Nominal (Un)" voltage selector
4. "Restart delay" adjustment
5. "Delay (t)" adjustment
6. "Asymmetry %" trip adjustment



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

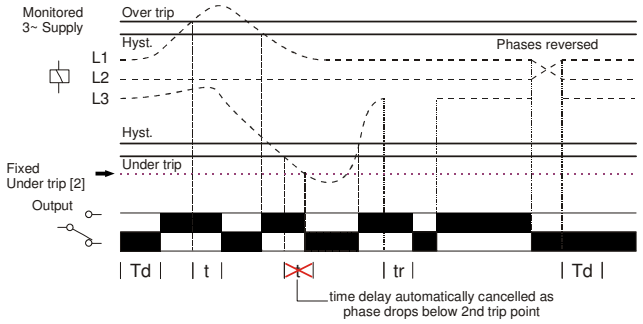
Type: LXPRC/S

Phase Failure, Phase Sequence, Under and Over Voltage plus Time Delay

- ❑ ***NEW*** **17.5mm DIN rail housing**
- ❑ **Microprocessor based**
- ❑ **True R.M.S. monitoring**
- ❑ **Monitors own supply and detects if one or more phases exceed the set Under or Over voltage trip levels**
- ❑ **Measures phase to phase voltages**
- ❑ **Detects incorrect phase sequence and phase loss**
- ❑ **Adjustments for Under and Over voltage trip levels**
- ❑ **Adjustment for Time delay (from an Under or Over voltage condition)**
- ❑ **1 x SPDT relay output 8A**
- ❑ **Green LED indication for supply status**
- ❑ **Red LED indication for relay status**

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Over %" ❸ adjustment to maximum and the "Under %" ❺ adjustment to minimum. Set the "Delay (t)" ❹ to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the maximum "Over %" trip setting by approx. 5% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

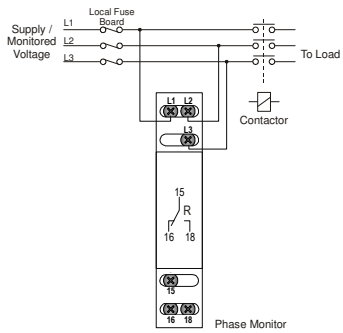
Supply fault	Green LED	Red LED	Relay
Phase missing	On	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Under or Over Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under or Over Voltage condition (after timing)	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage			
Un* **(L1, L2, L3):**	110, 208, 220, 380[1], 400[1], 415V[1] AC		
Frequency range:	48 – 63Hz		
Supply variation:	70 – 130% Un		
Overvoltage category:	III (IEC 60664)		
Rated impulse withstand voltage:	[1]4kV (1.2/50µS) IEC 60664		
Power consumption (max.):	8VA		
Monitoring mode:	Under and Over voltage		
Trip levels:			
Under [2]:	70% of Un (fixed) ± 2%		
Under:	75 – 95% of Un		
Over:	105 – 125% of Un		
Measuring ranges:	Under [2]	Under	Over
110V:	77V	83 – 105V	116 – 138V
208V:	146V	156 – 197V	218 – 260V
220V:	154V	165 – 209V	231 – 275V
380V:	266V	285 – 361V	399 – 475V
400V:	280V	300 – 380V	420 – 500V
415V:	290V	311 – 394V	436 – 519V
Hysteresis:	≈ 2% of trip level (factory set)		
Setting accuracy:	± 3%		
Repeat accuracy:	± 0.5% at constant conditions		
Immunity from micro power cuts:	<50mS		
Response time:	≈ 50mS		
Time delay (t):	0.2 – 10 sec. (± 5%)		
	Note: actual delay (t) = adjustable delay + response time		
Delay from Phase loss (tr):	≈ 150mS (worst case = tr x 2)		
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)		
Power on indication:	Green LED		
Relay status indication:	Red LED		
Ambient temp:	-20 to +60°C		
Relative humidity:	+95%		
Output **(15, 16, 18)**:	SPDT relay		
Output rating:	AC1	250V 8A (2000VA)	
	AC15	250V 5A (no), 3A (nc)	
	DC1	25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load		
Dielectric voltage:	2kV AC (rms) IEC 60947-1		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Housing:	Orange flame retardant UL94		
Weight:	75g		
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.		
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded		
Approvals:	Conforms to IEC. CE, ✔ and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4		

* Please state Supply/monitoring voltage when ordering

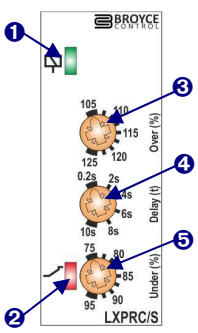
CONNECTION DIAGRAM



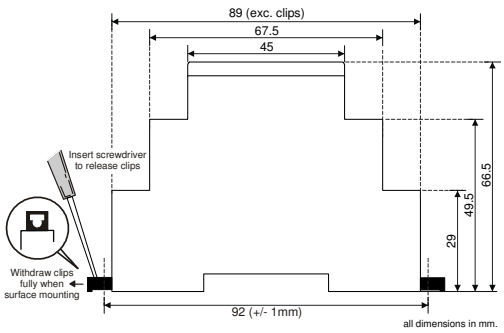
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Over %" trip level adjustment^
4. "Delay" adjustment
5. Under %" trip level adjustment^

^scaled as % of the nominal voltage "Un"



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

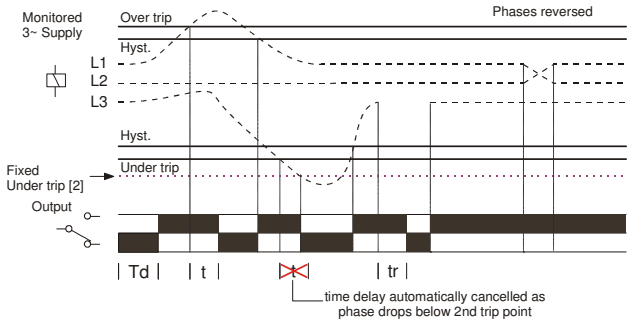
Type: LXPRC

Phase Failure, Under and Over Voltage plus Time Delay

- ***NEW* 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects if one or more phases exceed the set Under or Over voltage trip levels**
- **Measures phase to phase voltages**
- **Detects phase loss and operates irrespective of phase sequence**
- **Adjustments for Under and Over voltage trip levels**
- **Adjustment for Time delay (from an Under or Over voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Over %" ❸ adjustment to maximum and the "Under %" ❺ adjustment to minimum. Set the "Delay (t)" ❹ to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the maximum "Over %" trip setting by approx. 5% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

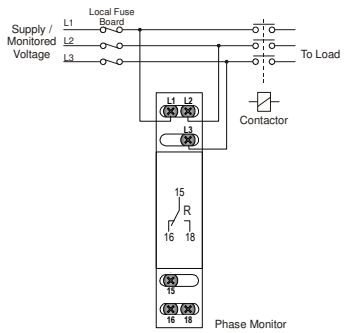
Supply fault	Green LED	Red LED	Relay
Phase missing	On	Off	De-energised
Under or Over Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under or Over Voltage condition (after timing)	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage			
Un* **(L1, L2, L3):**	110, 208, 220, 380[1], 400[1], 415V[1] AC		
Frequency range:	48 – 63Hz		
Supply variation:	70 – 130% Un		
Overvoltage category:	III (IEC 60664)		
Rated impulse withstand voltage:	[1]4kV (1.2/50µS) IEC 60664		
Power consumption (max.):	8VA		
Monitoring mode:	Under and Over voltage		
Trip levels:			
Under [2]:	70% of Un (fixed) ± 2%		
Under:	75 – 95% of Un		
Over:	105 – 125% of Un		
Measuring ranges:	Under [2]	Under	Over
110V:	77V	83 – 105V	116 – 138V
208V:	146V	156 – 197V	218 – 260V
220V:	154V	165 – 209V	231 – 275V
380V:	266V	285 – 361V	399 – 475V
400V:	280V	300 – 380V	420 – 500V
415V:	290V	311 – 394V	436 – 519V
Hysteresis:	≈ 2% of trip level (factory set)		
Setting accuracy:	± 3%		
Repeat accuracy:	± 0.5% at constant conditions		
Immunity from micro power cuts:	<50mS		
Response time:	≈ 50mS		
Time delay (t):	0.2 – 10 sec. (± 5%)		
	Note: actual delay (t) = adjustable delay + response time		
Delay from Phase loss (tr):	≈ 150mS (worst case = tr x 2)		
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)		
Power on indication:	Green LED		
Relay status indication:	Red LED		
Ambient temp:	-20 to +60°C		
Relative humidity:	+95%		
Output **(15, 16, 18)**:	SPDT relay		
Output rating:	AC1	250V 8A (2000VA)	
	AC15	250V 5A (no), 3A (nc)	
	DC1	25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load		
Dielectric voltage:	2kV AC (rms) IEC 60947-1		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Housing:	Orange flame retardant UL94 V0		
Weight:	75g		
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.		
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded		
Approvals:	Conforms to IEC. CE, ✔ and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4		

* Please state Supply/monitoring voltage when ordering

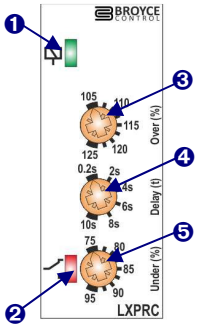
CONNECTION DIAGRAM



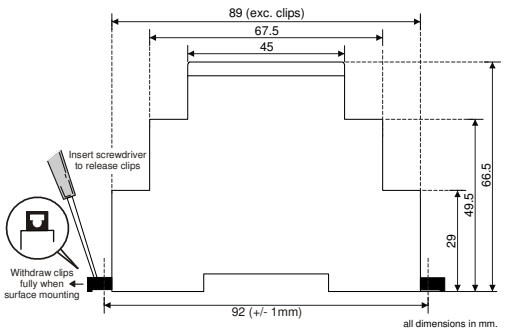
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Over %" trip level adjustment *
4. "Delay" adjustment
5. Under %" trip level adjustment^

^scaled as % of the nominal voltage "Un"



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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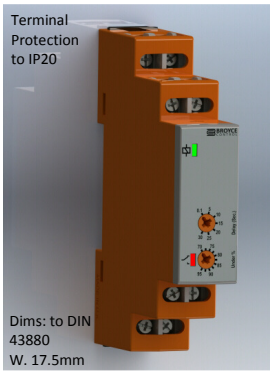
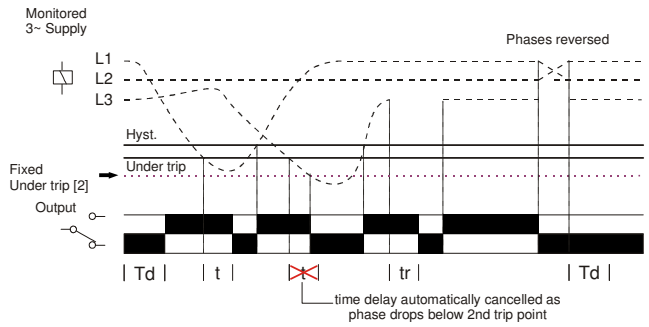
Type: LXPRT

Phase Failure, Phase Sequence, Under Voltage plus Time Delay



- ***NEW* 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects an Under voltage condition on one or more phases**
- **Measures phase to phase voltages**
- **Detects incorrect phase sequence and phase loss**
- **Adjustment for Under voltage trip level**
- **Adjustment for Time delay (from an Under voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "<U (volts)" ❹ and "Delay (t)" ❸ adjustment to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, relay energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Accurate setting can be achieved by adjusting the trip level "<U (volts)" until the unit trips (relay de-energises) then by decreasing the trip level "<U (volts)" until the relay re-energises. Close setting the trip level ensures the unit will detect a phase loss even with a large percentage of re-generative voltage.
- In order to set the unit as previously described but without causing disruption to the equipment being controlled/monitored, set the "Delay (t)" to maximum. It will now be possible to establish the trip point when the red "Relay" LED starts to flash. Decrease the trip level setting to stop the LED flashing.
  (Note: If the time delay is allowed to expire, the output relay will de-energise)
- If large supply variations are anticipated, the trip level should be set further from the nominal voltage.
- Set the "Delay (t)" as required. (Note that the delay is only effective should the supply drop below the set trip level. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the maximum "<U" trip setting by approx. 10% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

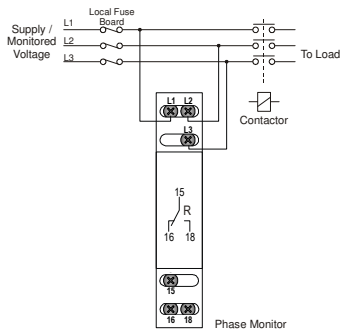
Supply fault	Green LED	Red LED	Relay
Phase missing	On	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Under Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under Voltage condition (after timing)	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage			
U* **(L1, L2, L3):**		77 - 143V, 161 - 300V, 280 – 520V[1] AC	
Frequency range:		48 – 63Hz	
Supply variation:		± 30%	
Overvoltage category:		III (IEC 60664)	
Rated impulse withstand voltage:		[1]4kV (1.2/50µS) IEC 60664	
Power consumption (max.):		8VA	
Monitoring mode:		Under voltage	
Trip levels:		Under [2]	Under
Supply voltage	77 – 143V:	77V	83 – 138V
	161 – 300V:	161V	173 – 288V
	280 – 520V:	280V	300 – 500V
Hysteresis:		≈ 2% of trip level (factory set)	
Setting accuracy:		± 3%	
Repeat accuracy:		± 0.5% at constant conditions	
Immunity from micro power cuts:		<50mS	
Response time:		≈ 50mS	
Time delay (t):		0.2 – 10 sec. (± 5%)	
		Note: actual delay (t) = adjustable delay + response time	
Delay from Phase loss (tr):		≈ 150mS (worst case = tr x 2)	
Power on delay (Td):		≈ 1 sec. (worst case = Td x 2)	
Power on indication:		Green LED	
Relay status indication:		Red LED	
Ambient temp:		-20 to +60°C	
Relative humidity:		+95% max.	
Output **(15, 16, 18)**:		SPDT relay	
Output rating:		AC1	250V 8A (2000VA)
		AC15	250V 5A (no), 3A (nc)
		DC1	25V 8A (200W)
Electrical life:		≥ 150,000 ops at rated load	
Dielectric voltage:		2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:		4kV (1.2/50µS) IEC 60664	
Housing:		Orange flame retardant UL94	
Weight:		75g	
Mounting option:		On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size		≤ 2 x 2.5mm² solid or stranded	
Approvals:		Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4	

* Please state Supply/monitoring voltage when ordering

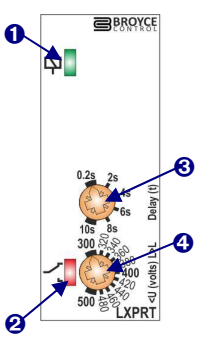
CONNECTION DIAGRAM



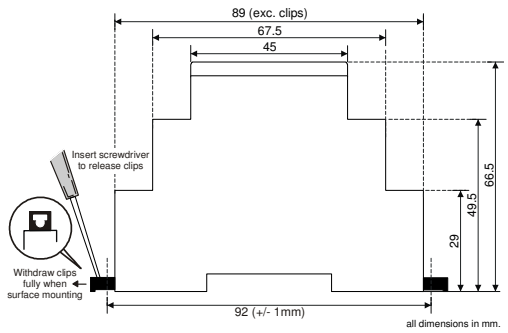
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Delay" adjustment
4. "<U (volts) Under voltage trip level adjustment^

^Example on the right shows the 280 – 520V version.



DIMENSIONS



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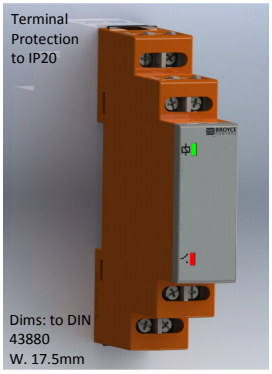
ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

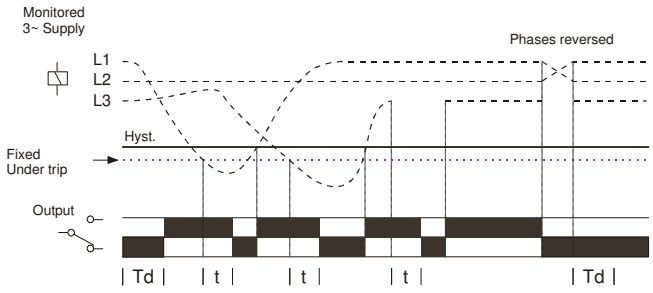
Type: LXPRF

Phase Failure, Phase Sequence and Under Voltage



- ***NEW* 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects an Under voltage condition on one or more phases**
- **Measures phase to phase voltages**
- **Detects incorrect phase sequence and phase loss**
- **Fixed Under voltage trip level**
- **Fixed Time delay**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, relay energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Note:

If the supply voltage increases above the maximum supply/monitoring voltage range by approx. 10% or more, the relay will de-energise immediately.

This device is not suitable for applications where there could be a percentage of re-generative voltage present during a fault condition, i.e. fuse failure. During these conditions a monitor that includes an adjustable under voltage trip level is necessary which allows this type of fault to be detected. It is therefore recommended that the LXPRT or LXPRT-4W phase monitors be considered.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

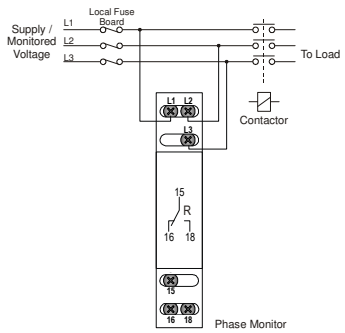
Supply fault	Green LED	Red LED	Relay
Phase missing	On	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage		
U* **(L1, L2, L3):**	77 - 143V, 161 - 300V, 280 – 520V[1] AC	
Frequency range:	48 – 63Hz	
Supply variation:	± 30%	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	[1]4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	8VA	
Monitoring mode:	Under voltage	
Trip level (fixed) ± 2%:	Under	
Supply voltage 77 – 143V:	77V	
161 – 300V:	161V	
280 – 520V:	280V	
Hysteresis:	≈ 2% of trip level (factory set)	
Setting accuracy:	± 3%	
Repeat accuracy:	± 0.5% at constant conditions	
Immunity from micro power cuts:	<50mS	
Response time:	≈ 50mS	
Time delay (t):	≈ 100mS	
	Note: actual delay (t) = delay + response time	
Delay from Phase loss (tr):	≈ 150mS (worst case = tr x 2)	
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)	
Power on indication:	Green LED	
Relay status indication:	Red LED	
Ambient temp:	-20 to +60°C	
Relative humidity:	+95% max.	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 8A (2000VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94 V0	
Weight:	75g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4	

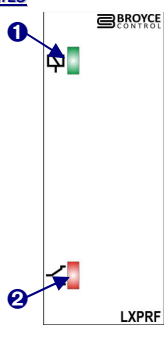
* Please state Supply/monitoring voltage when ordering

CONNECTION DIAGRAM

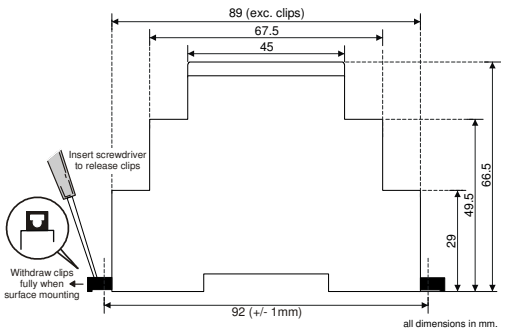


SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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Type: LXPRC/S/F

Phase Failure, Phase Sequence, Under and Over Voltage plus Time Delay

Terminal Protection to IP20

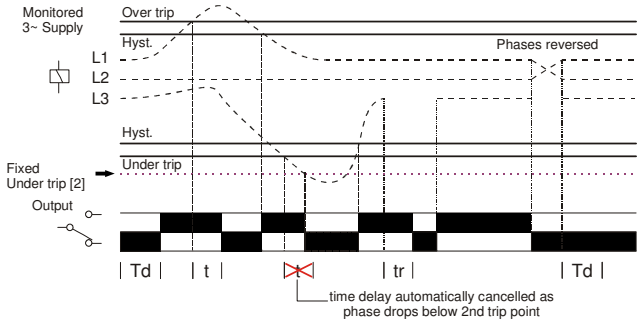
Dims: to DIN 43880
W. 17.5mm

- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects if one or more phases exceed the fixed Under or Over voltage trip levels**
- **Measures phase to phase voltages**
- **Detects incorrect phase sequence and phase loss**
- **Fixed Under and Over voltage trip levels (-10% 400V/+10% of 415V)**
- **Adjustment for Time delay (from an Under or Over voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

ISO 9001:2015
Cert. No. 14125771

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Delay (t)" ❸ to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the fixed trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the Over trip setting by approx. 20% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
Phase missing	On	Off	De-energised
Phases reversed i.e. L1,L3, L2 (no delay)		Off	De-energised
Under Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under Voltage condition (after timing)		Off	De-energised
Over Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Over Voltage condition (after timing)		Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

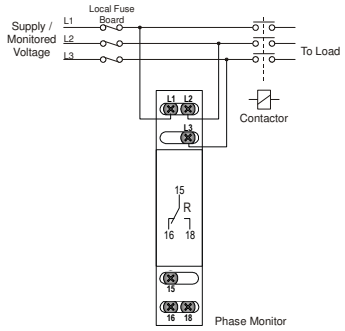
TECHNICAL SPECIFICATION

Supply/monitoring voltage		
Un* **(L1, L2, L3):**	415V AC	
Frequency range:	48 – 63Hz	
Supply variation:	70 – 130% Un	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	8VA	
Monitoring mode:	Under and Over voltage	
Fixed Trip levels:		
Under [2]:	291V (fixed) ± 2%	
Under:	360V (-10% of 400V)	
Over:	457V (+10% of 415V)	
Trip accuracy:	± 1%	
Hysteresis:	≈ 1% of trip level (factory set)	
Setting accuracy:	± 3%	
Repeat accuracy:	± 0.5% at constant conditions	
Immunity from micro power cuts:	<50mS	
Response time:	≈ 50mS	
Time delay (t):	0.2 – 10 sec. (± 5%)	
	Note: actual delay (t) = adjustable delay + response time	
Delay from Phase loss (tr):	≈ 150mS (worst case = tr x 2)	
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)	
Power on indication:	Green LED	
Relay status indication:	Red LED	
Ambient temp:	-20 to +60°C	
Relative humidity:	+95%	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 8A (2000VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	75g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Terminal screw:	M3 (Designed for use with **PZ1** "pozi" driver)	
Tightening torque:	0.6Nm Max.	

Approvals: UL LISTED IND. CONT. EQ. E111187

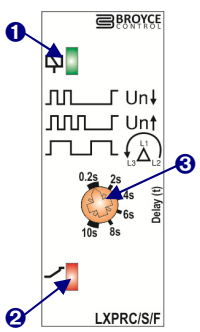
Conforms to IEC. CE, and RoHS Compliant.
EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz)
Emissions: EN 61000-6-4

CONNECTION DIAGRAM

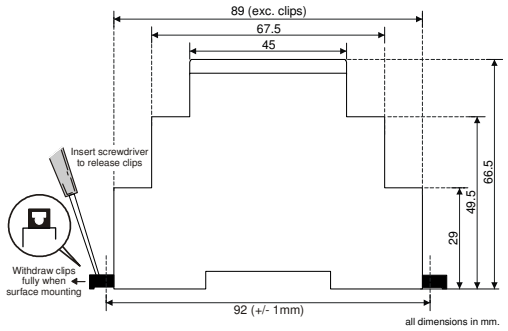


SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Delay" adjustment



DIMENSIONS



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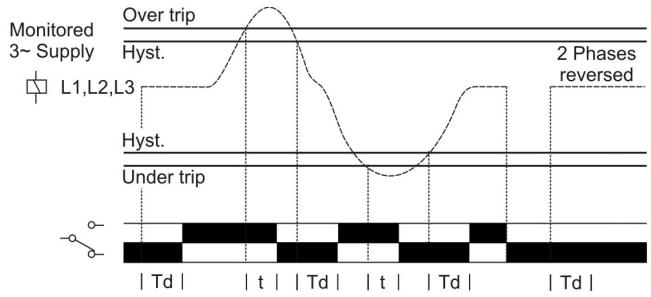
Type: LXPRC/S/RD

Phase Failure, Phase Sequence, Under and Over Voltage plus Restart Delay

- ***NEW* 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects if one or more phases exceed the fixed Under or Over voltage trip levels**
- **Measures phase to phase voltages**
- **Detects incorrect phase sequence and phase loss**
- **Selectable Nominal voltages (Un)**
- **Fixed Under and Over voltage trip levels (±10% of selected Nominal voltage)**
- **Adjustment for Restart delay (1 – 500 seconds)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Setting the unit.

- Set the "Nominal Voltage (Un)" ❸ selector to match the voltage of the supply to be monitored.
- Set the "Restart Delay" ❹ to the desired position.

Applying power.

- Apply power and the green "Power supply" LED ❶ will illuminate. The red LED ❷ will flash for the duration that is set on the "Restart Delay" adjustment.
- After the set delay has elapsed, the relay will energise and contacts 15 and 18 will close. The red LED will now remain illuminated. Refer to the troubleshooting table if the unit fails to operate correctly.

Under / Overvoltage Fault condition.

- If the monitored supply voltage increases above the fixed over voltage or decreases below the fixed under voltage trip level, the relay will de-energise after delay "t". The red LED will extinguish when the relay de-energises.
- The relay will re-energise after the Restart Delay (Td) when the voltage either increases above the under voltage trip level plus the hysteresis or decreases below the over voltage trip level minus the hysteresis.

Troubleshooting.

The table below shows the status of the unit during/after a fault condition.

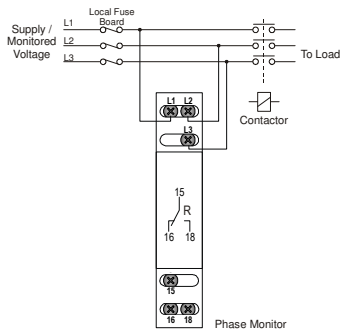
Supply fault	Green LED	Red LED	Relay
After power applied / fault cleared	On	Flashing	De-energised for set delay (Td)
Phase missing	On	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Under or Over Voltage condition (during delay "t")	On	On for delay (t)	Energised for delay (t)
Under or Over Voltage condition (after delay "t")	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage		
Un* **(L1, L2, L3):**	208, 220V AC	
	380[1], 400[1], 415[1], 440[1], 460V[1] AC	
Frequency range:	48 – 63Hz	
Supply variation:	70 – 130% Un	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	[1]4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	8VA	
Monitoring mode:	Under and Over voltage	
Trip levels:		
Under:	90% of Un (fixed)	
Over:	110% of Un (fixed)	
Trip voltages for select Nominal:		
Nominal	Under	Over
208V:	187V	229V
220V:	198V	242V
380V:	342V	418V
400V:	360V	440V
415V:	374V	457V
440V:	396V	484V
460V:	414V	506V
Trip level accuracy:	± 2%	
Hysteresis:	≈ 2% of trip level (factory set)	
Repeat accuracy:	± 0.5% at constant conditions	
Immunity from micro power cuts:	<50mS	
Response time:	≈ 50mS	
Time delay (t):	4 sec. (± 5%)	
	Note: actual delay (t) = time delay + response time	
Restart delay (Td):	1 – 500 sec.	
Setting accuracy:	± 3%	
Delay from Phase loss (tr):	≈ 1 sec. (worst case = tr x 2)	
Power on indication:	Green LED	
Relay status indication:	Red LED	
Ambient temp:	-20 to +60°C	
Relative humidity:	+95%	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 8A (2000VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	75g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4	

* Please state Supply/monitoring voltage when ordering

CONNECTION DIAGRAM

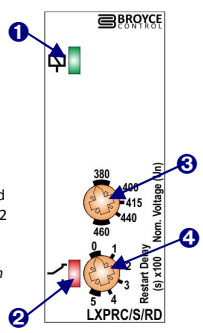


SETTING DETAILS

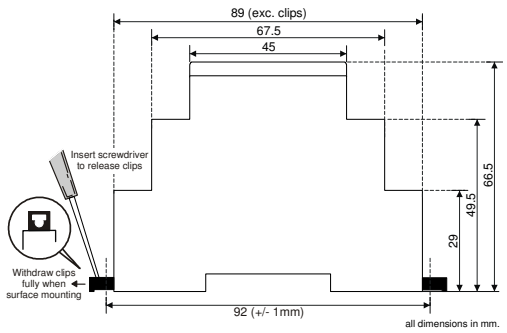
1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Nominal Voltage (Un)" selector
4. "Restart Delay" adjustment^

^scale digits to be multiplied by 100 for actual delay (i.e. 2 x 100 = 200 seconds)

Front layout example shown for the 380 > 460V version.



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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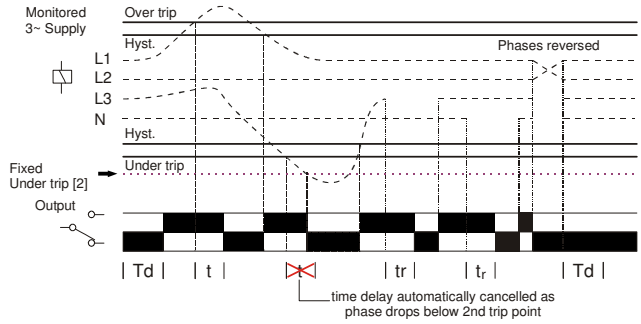
Type: LXPRC/S-4W

Phase Failure, Phase Sequence, Under and Over Voltage plus Time Delay

- ❑ ***NEW*** **17.5mm DIN rail housing**
- ❑ **Microprocessor based**
- ❑ **True R.M.S. monitoring**
- ❑ **Monitors own supply and detects if one or more phases exceed the set Under or Over voltage trip levels**
- ❑ **Measures phase to neutral voltages**
- ❑ **Detects incorrect phase sequence, phase loss and neutral loss**
- ❑ **Adjustments for Under and Over voltage trip levels**
- ❑ **Adjustment for Time delay (from an Under or Over voltage condition)**
- ❑ **1 x SPDT relay output 8A**
- ❑ **Green LED indication for supply status**
- ❑ **Red LED indication for relay status**

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Over %" ❸ adjustment to maximum and the "Under %" ❺ adjustment to minimum. Set the "Delay (t)" ❹ to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the maximum "Over %" trip setting by approx. 5% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
Phase or neutral missing	On	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Under or Over Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under or Over Voltage condition (after timing)	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

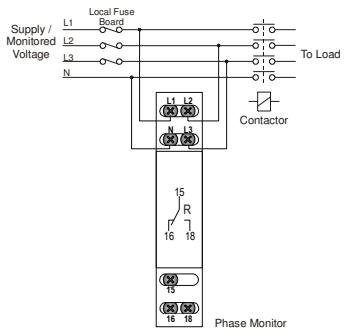
TECHNICAL SPECIFICATION

Supply/monitoring voltage			
Un* **(L1, L2, L3, N):**	120, 127, 220, 230, 240V AC (see note)		
Frequency range:	48 – 63Hz		
Supply variation:	70 – 130% Un		
Overvoltage category:	III (IEC 60664)		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Power consumption (max.):	6VA		
Monitoring mode:	Under and Over voltage		
Trip levels:			
Under [2]:	70% of Un (fixed) ± 2%		
Under:	75 – 95% of Un		
Over:	105 – 125% of Un		
Measuring ranges:	Under [2]	Under	Over
120V:	84V	90 – 114V	126 – 150V
127V:	89V	95 – 121V	133 – 159V
220V:	154V	165 – 209V	231 – 275V
230V:	161V	173 – 218V	241 – 288V
240V:	168V	180 – 228V	252 – 300V
Hysteresis:	≈ 2% of trip level (factory set)		
Setting accuracy:	± 3%		
Repeat accuracy:	± 0.5% at constant conditions		
Immunity from micro power cuts:	<50mS		
Response time:	≈ 50mS		
Time delay (t):	0.2 – 10 sec. (± 5%)		
	Note: actual delay (t) = adjustable delay + response time		
Delay from Phase/Neutral loss (tr):	≈ 150mS (worst case = tr x 2)		
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)		
Power on indication:	Green LED		
Relay status indication:	Red LED		
Ambient temp:	-20 to +60°C		
Relative humidity:	+95% max.		
Output **(15, 16, 18)**:	SPDT relay		
Output rating:	AC1	250V 8A (2000VA)	
	AC15	250V 5A (no), 3A (nc)	
	DC1	25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load		
Dielectric voltage:	2kV AC (rms) IEC 60947-1		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Housing:	Orange flame retardant UL94		
Weight:	75g		
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.		
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded		
Approvals:	Conforms to IEC. CE, ✔ and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4		

* Please state Supply/monitoring voltage when ordering

Note:
The "Supply / monitoring voltage Un" refers to the phase to neutral nominal voltage for the product and voltage variants available. To convert these voltages to a phase to phase voltage, multiply by 1.732.

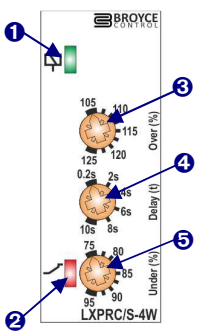
CONNECTION DIAGRAM



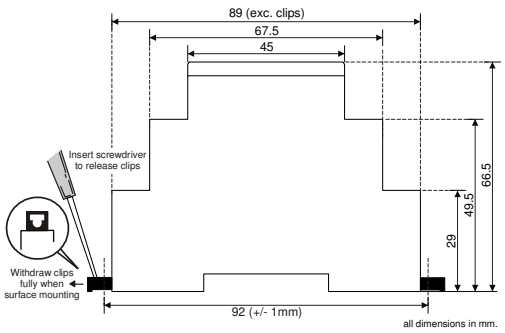
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Over %" trip level adjustment^
4. "Delay (t)" adjustment
5. Under %" trip level adjustment^

^scaled as % of the nominal voltage "Un"



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

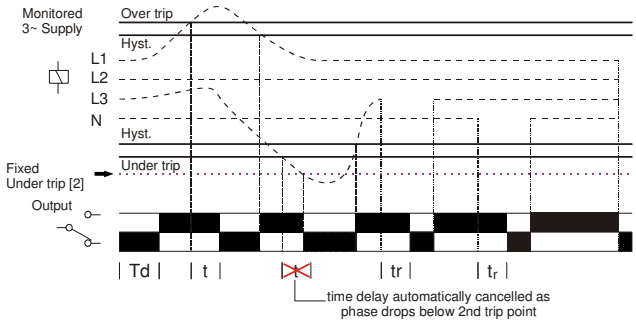
Type: LXPRC-4W

Phase Failure, Under and Over Voltage plus Time Delay

- ***NEW* 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects if one or more phases exceed the set Under or Over voltage trip levels**
- **Measures phase to neutral voltages**
- **Detects phase loss and neutral loss and operates irrespective of phase sequence**
- **Adjustments for Under and Over voltage trip levels**
- **Adjustment for Time delay (from an Under or Over voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Over %" ❸ adjustment to maximum and the "Under %" ❺ adjustment to minimum. Set the "Delay (t)" ❹ to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the maximum "Over %" trip setting by approx. 5% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
Phase or neutral missing	On	Off	De-energised
Under or Over Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under or Over Voltage condition (after timing)	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

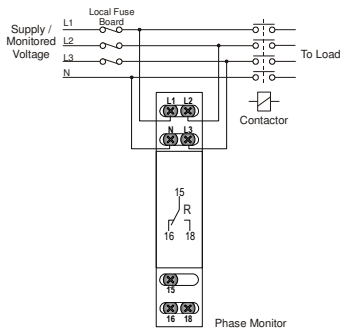
TECHNICAL SPECIFICATION

Supply/monitoring voltage			
Un* **(L1, L2, L3, N)**:	120, 127, 220, 230, 240V AC (see note)		
Frequency range:	48 – 63Hz		
Supply variation:	70 – 130% Un		
Overvoltage category:	III (IEC 60664)		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Power consumption (max.):	6VA		
Monitoring mode:	Under and Over voltage		
Trip levels:			
Under [2]:	70% of Un (fixed) ± 2%		
Under:	75 – 95% of Un		
Over:	105 – 125% of Un		
Measuring ranges:	Under [2]	Under	Over
120V:	84V	90 – 114V	126 – 150V
127V:	89V	95 – 121V	133 – 159V
220V:	154V	165 – 209V	231 – 275V
230V:	161V	173 – 218V	241 – 288V
240V:	168V	180 – 228V	252 – 300V
Hysteresis:	≈ 2% of trip level (factory set)		
Setting accuracy:	± 3%		
Repeat accuracy:	± 0.5% at constant conditions		
Immunity from micro power cuts:	<50mS		
Response time:	≈ 50mS		
Time delay (t):	0.2 – 10 sec. (± 5%)		
	Note: actual delay (t) = adjustable delay + response time		
Delay from Phase/Neutral loss (tr):	≈ 150mS (worst case = tr x 2)		
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)		
Power on indication:	Green LED		
Relay status indication:	Red LED		
Ambient temp:	-20 to +60°C		
Relative humidity:	+95% max.		
Output **(15, 16, 18)**:	SPDT relay		
Output rating:	AC1	250V 8A (2000VA)	
	AC15	250V 5A (no), 3A (nc)	
	DC1	25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load		
Dielectric voltage:	2kV AC (rms) IEC 60947-1		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Housing:	Orange flame retardant UL94 V0		
Weight:	75g		
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.		
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded		
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4		

* Please state Supply/monitoring voltage when ordering

Note:
The "Supply / monitoring voltage Un" refers to the phase to neutral nominal voltage for the product and voltage variants available. To convert these voltages to a phase to phase voltage, multiply by 1.732.

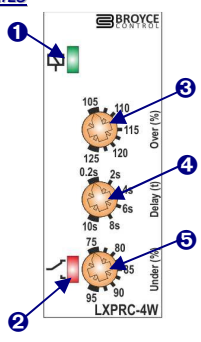
CONNECTION DIAGRAM



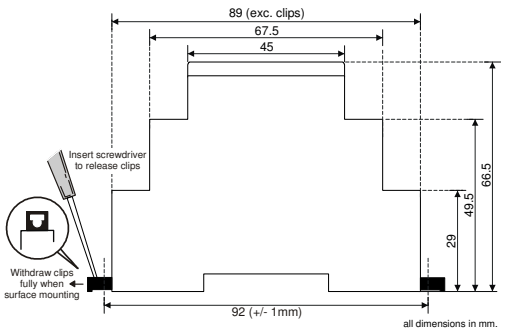
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Over %" trip level adjustment^
4. "Delay" adjustment
5. Under %" trip level adjustment^

^scaled as % of the nominal voltage "Un"



DIMENSIONS



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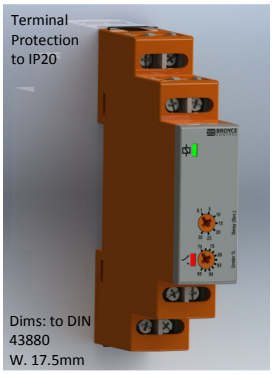
ISO 9001 REGISTERED FIRM

LXPRC-4W-1-A

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

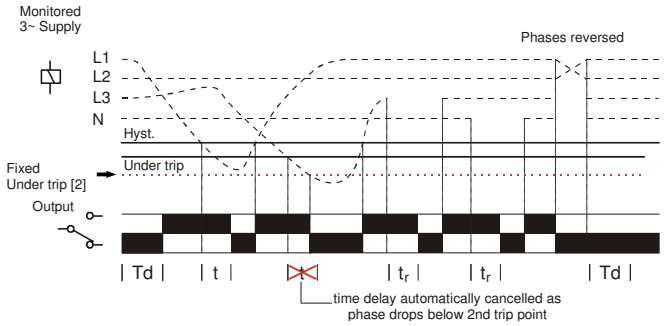
Type: LXPRT-4W

Phase Failure, Phase Sequence, Under Voltage plus Time Delay



- ***NEW* 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects an Under voltage condition on one or more phases**
- **Measures phase to neutral voltages**
- **Detects incorrect phase sequence, phase loss and neutral loss**
- **Adjustment for Under voltage trip level**
- **Adjustment for Time delay (from an Under voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "<U (volts)" ❹ and "Delay (t)" ❸ adjustment to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, relay energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Accurate setting can be achieved by adjusting the trip level "<U (volts)" until the unit trips (relay de-energises) then by decreasing the trip level "<U (volts)" until the relay re-energises. Close setting the trip level ensures the unit will detect a phase loss even with a large percentage of re-generative voltage.
- In order to set the unit as previously described but without causing disruption to the equipment being controlled/monitored, set the "Delay (t)" to maximum. It will now be possible to establish the trip point when the red "Relay" LED starts to flash. Decrease the trip level setting to stop the LED flashing. (Note: If the time delay is allowed to expire, the output relay will de-energise)
- If large supply variations are anticipated, the trip level should be set further from the nominal voltage.
- Set the "Delay (t)" as required. (Note that the delay is only effective should the supply drop below the set trip level. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the maximum "<U" trip setting by approx. 10% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
Phase or neutral missing	On	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Under Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under Voltage condition (after timing)	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised

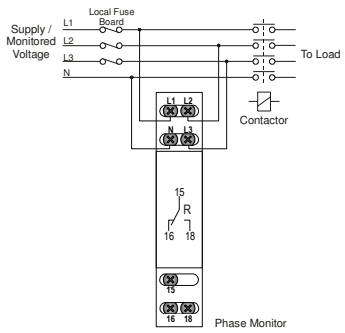
TECHNICAL SPECIFICATION

Supply/monitoring voltage			
U* **(L1, L2, L3, N):**		63.5V (110V), 133V (230V), 230V (400V)[1] AC (see note)	
Frequency range:		48 – 63Hz	
Supply variation:		± 30%	
Overvoltage category:		III (IEC 60664)	
Rated impulse withstand voltage:		[1] 4kV (1.2/50µS) IEC 60664	
Power consumption (max.):		6VA	
Monitoring mode:		Under voltage	
Trip levels:		Under [2]	Under
Supply voltage	63.5V:	44.5V	48 – 79V
	133V:	93V	100 – 166V
	230V:	161V	173 – 288V
Hysteresis:		≈ 2% of trip level (factory set)	
Setting accuracy:		± 3%	
Repeat accuracy:		± 0.5% at constant conditions	
Immunity from micro power cuts:		<50mS	
Response time:		≈ 50mS	
Time delay (t):		0.2 – 10 sec. (± 5%)	
		Note: actual delay (t) = adjustable delay + response time	
Delay from Phase/Neutral loss (tr):		≈ 150mS (worst case = tr x 2)	
Power on delay (Td):		≈ 1 sec. (worst case = Td x 2)	
Power on indication:		Green LED	
Relay status indication:		Red LED	
Ambient temp:		-20 to +60°C	
Relative humidity:		+95%	
Output **(15, 16, 18)**:		SPDT relay	
Output rating:		AC1	250V 8A (2000VA)
		AC15	250V 5A (no), 3A (nc)
		DC1	25V 8A (200W)
Electrical life:		≥ 150,000 ops at rated load	
Dielectric voltage:		2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:		4kV (1.2/50µS) IEC 60664	
Housing:		Orange flame retardant UL94	
Weight:		75g	
Mounting option:		On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size		≤ 2 x 2.5mm² solid or stranded	
Approvals:		Conforms to IEC. CE, ✔ and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4	

* Please state Supply/monitoring voltage when ordering

Note:
The "Supply / monitoring voltage U" refers to the phase to neutral nominal voltage for the product and voltage variants available. To convert these voltages to a phase to phase voltage, multiply by 1.732. The voltage shown in brackets is the equivalent phase to phase voltage.

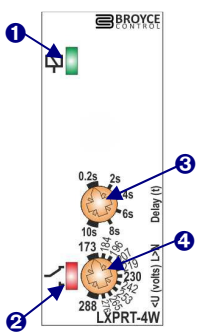
CONNECTION DIAGRAM



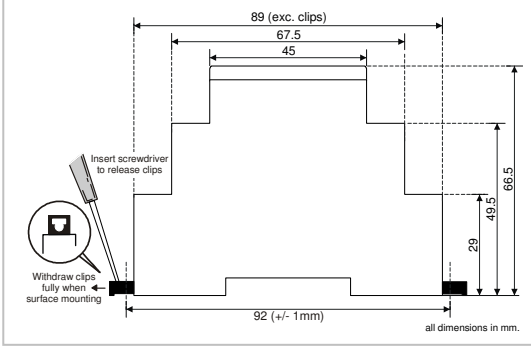
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Delay" adjustment
4. "<U (volts) Under voltage trip level adjustment^

^Example on the right shows the 230V (400V) version. The voltages shown on the scale are phase/line to neutral voltages.



DIMENSIONS



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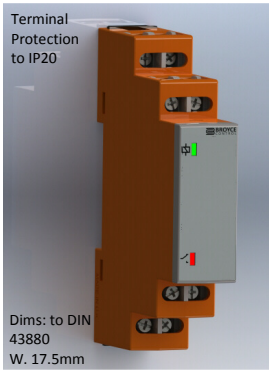
LXPRT-4W-1-A

ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

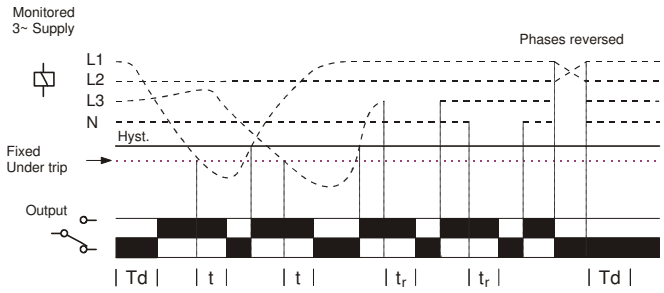
Type: LXPRF-4W

Phase Failure, Phase Sequence and Under Voltage



- ***NEW* 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects an Under voltage condition on one or more phases**
- **Measures phase to neutral voltages**
- **Detects incorrect phase sequence, phase loss and neutral loss**
- **Fixed Under voltage trip level**
- **Fixed Time delay**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, relay energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Note:

If the supply voltage increases above the maximum supply/monitoring voltage range by approx. 10% or more, the relay will de-energise immediately.

This device is not suitable for applications where there could be a percentage of re-generative voltage present during a fault condition, i.e. fuse failure. During these conditions a monitor that includes an adjustable under voltage trip level is necessary which allows this type of fault to be detected. It is therefore recommended that the LXPRT or LXPRT-4W phase monitors be considered.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
Phase or neutral missing	On	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Phase below 70% (fixed under trip level)	On	Off	De-energised

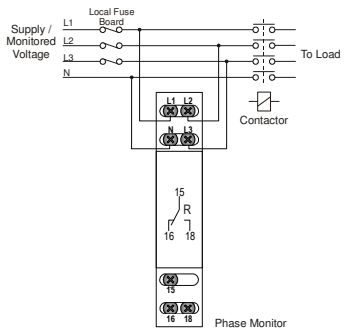
TECHNICAL SPECIFICATION

Supply/monitoring voltage		
U* **(L1, L2, L3, N):**	63.5V (110V), 133V (230V), 230V (400V) [1] AC (see note)	
Frequency range:	48 – 63Hz	
Supply variation:	± 30%	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	[1] 4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	6VA	
Monitoring mode:	Under voltage	
Trip level (fixed) ± 2%:	Under	
Supply voltage 63.5V:	44.5V	
133V:	93V	
230V:	161V	
Hysteresis:	≈ 2% of trip level (factory set)	
Repeat accuracy:	± 0.5% at constant conditions	
Immunity from micro power cuts:	<50mS	
Response time:	≈ 50mS	
Time delay (t):	≈ 100mS	
	Note: actual delay (t) = delay + response time	
Delay from Phase/Neutral loss (tr):	≈ 150mS (worst case = tr x 2)	
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)	
Power on indication:	Green LED	
Relay status indication:	Red LED	
Ambient temp:	-20 to +60°C	
Relative humidity:	+95% max.	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 8A (2000VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94 V0	
Weight:	75g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Approvals:	CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4	

* Please state Supply/monitoring voltage when ordering

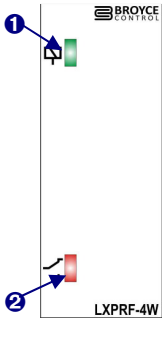
Note:
The "Supply / monitoring voltage U" refers to the phase to neutral nominal voltage for the product and voltage variants available. To convert these voltages to a phase to phase voltage, multiply by 1.732. The voltage shown in brackets is the equivalent phase to phase voltage.

CONNECTION DIAGRAM

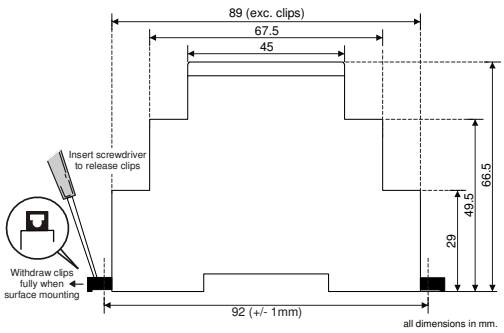


SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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Type: PUVR44

Phase Under Voltage plus Time Delay

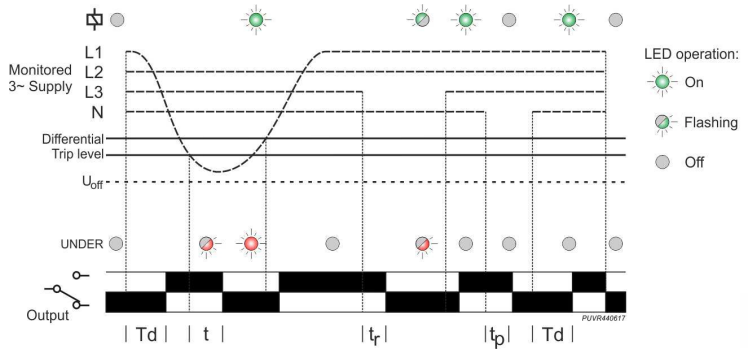
Terminal Protection to IP20

Dims: to DIN 43880
W. 44mm

- Designed to withstand overloads up to 125% (cont.), 150% (10s)
- Microprocessor based
- True R.M.S. monitoring
- Selectable nominal voltages (220, 230, 240, 254, 265, 277V (L>N))
- Monitors own supply and detects an Under voltage condition on one or more phases
- Adjustment for Differential and Under voltage trip level
- Adjustment for Time delay
- DPDT relay output 8A
- Green LED indication for supply status
- Red LED indication for fault/timing status

QMS ISO 9001 REGISTERED
ISO 9001:2015
Cert. No. 14125771

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Setting the unit and applying power.

- Set the "Nominal Voltage (Un)" ❸ voltage adjustment to match that of the supply voltage being monitored.
- Set the "Trip Level" ❺ and "Differential" ❻ adjustments to minimum. Set the "Time Delay" ❹ to minimum.
- Apply power and the green "Power supply" ❶ LED will illuminate and relay will energise after the short Power on delay (Td). The red "UNDER" LED ❷ will remain extinguished.
- Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Accurate setting can be achieved by adjusting the "Trip Level" until the unit trips (relay de-energises/red LED lit) then by decreasing the "Trip Level" until the relay re-energises again (red LED extinguished). Close setting of the trip level ensures the unit will detect a phase loss even with a large percentage of re-generative voltage.
- In order to set the unit as previously described but without causing disruption to the equipment being controlled/monitored, set the "Time Delay" to maximum. It will now be possible to establish the trip point when the red LED starts to flash. Decrease the trip level setting to stop the LED flashing.
  (Note: If the time delay is allowed to expire, the output relay will de-energise)
- If large supply variations are anticipated, the trip level should be set further from the nominal voltage.
- Set the "Delay (t)" as required. (Note that the delay is only effective should the supply drop below the set trip level. However, if during an under voltage condition the supply drops below the fixed "U_{off}" trip level any set time delay is automatically cancelled and the relay de-energises).

Troubleshooting.

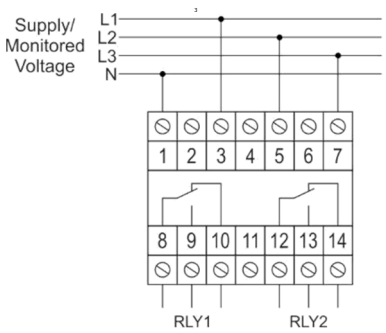
The table below shows the status of the unit during a particular fault condition.

Supply fault	Green LED ❶	Red LED ❷	Relay
Under voltage condition (during timing)	On	Flashing	Energised for delay (t)
Under voltage condition (after timing)	On	On	De-energised
Phase missing/below supply threshold (U_{off})	LED's flash alternately		De-energised
Neutral missing	Off	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un		
(1, 3, 5, 7):	220 - 277V AC (L>N)	
Frequency range:	45 – 65Hz	
Supply variation:	132 - 346V AC (L>N)	
Maximum overload (L>N):	416V for 10s	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	3VA/1.7W	
Monitoring mode:	Under voltage	
Trip levels:		
Supply threshold (U_{off}):	140V ± 2% (fixed)	
Under:	70 – 100% of Un	
Measuring ranges:	Nominal (Un)	Under
	220V	154 - 220V
	230V	161 - 230V
	240V	168 - 240V
	254V	178 - 254V
	265V	185 - 265V
	277V	194 - 277V
Differential:	1 – 15% of Un	
Setting accuracy:	± 3%	
Repeat accuracy:	± 0.5% at constant conditions	
Immunity from micro power cuts:	<50ms	
Delay from Phase loss (t_r):	<300ms (150ms typical)	
Delay from Neutral loss (t_p):	<300ms (150ms typical)	
Delay to relay re-energising:	<500ms (after fault clearing)	
Time delay (t):	0.5 – 10s (± 5%)	
Power on delay (Td):	≈ 0.5s (worst case = Td x 2)	
Reset time:	50 – 100ms	
Power on indication:	Green LED	
Fault/timing status indication:	Red LED	
Ambient temperature:	-20 to +60°C	
Relative humidity:	+95% max.	
Output **(8, 9, 10 / 12, 13, 14)**:	DPDT relay	
Output rating:	AC1	250V 8A (2000VA)
	AC15	250V 3A
	DC1	25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Grey flame retardant Lexan UL94 V0	
Weight:	100g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, ✔ and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4	

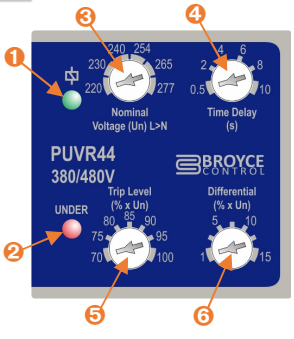
CONNECTION DIAGRAM



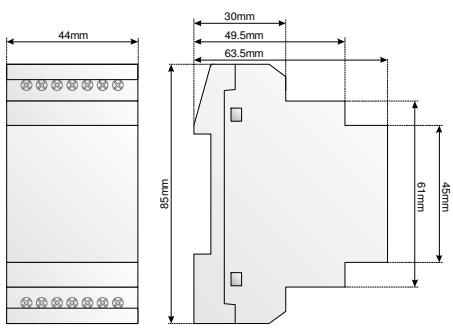
SETTING DETAILS

1. Power supply status (Green) LED
2. Fault / Timing status (Red) LED
3. "Nominal Voltage (Un)" selector
4. "Time Delay (s)" adjustment
5. "Trip Level (% x Un)" adjustment^
6. "Differential (% x Un)" adjustment^

^scaled as % of the selected "Nominal Voltage"



DIMENSIONS



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Type: M3PRC/S-4W (High Voltage)

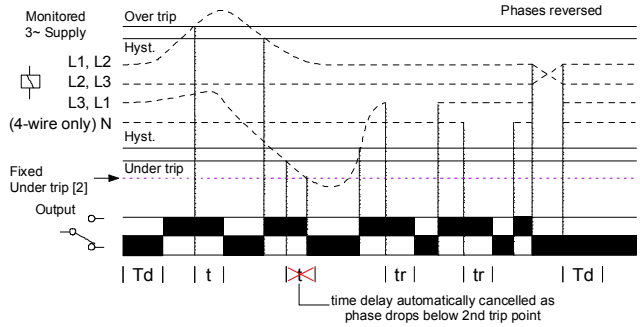
Phase Failure, Phase Sequence, Under and Over Voltage plus Time Delay

- **35mm DIN rail housing**
- **Microproccessor controlled with internal monitoring (self-checking)**
- **Monitors own supply and detects if one or more phases exceed the set Under or Over Voltage trip levels**
- **Specifically suited to high voltage supplies of 575V or 600V phase to phase**
- **Unit measures phase to neutral voltage**
- **Detects incorrect phase sequence, phase loss and neutral loss**
- **Adjustments for under and over voltage trip levels**
- **Adjustment for time delay (from an under or over voltage condition)**
- **1 x SPDT relay output 8A**
- **Intelligent LED indication for supply and relay status**

Dims:
to DIN 43880
W. 35mm

Terminal Protection to IP20

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The diagram below shows a typical installation, whereby the supply to the load is being monitored by the relay. If a fault should occur (i.e. fuse blowing), the contactor is de-energised removing the 3-phase supply to the load. The contactor only re-energises after the fault has cleared.

Applying power.

- Set the "over %" adjustment to maximum and the "under %" adjustment to minimum. Set the "time delay" to minimum.
- Apply power and the green "supply on" and red "relay" LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit.

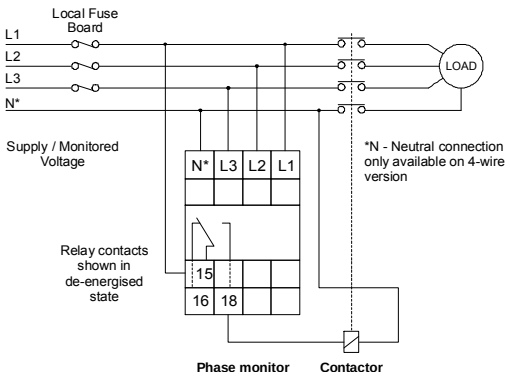
- Set the "over %" and the "under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "time delay" as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).

Troubleshooting.

The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
Phase or Neutral missing	Off	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Under or Over Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under or Over Voltage condition (after timing)	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised
Phase below 50% of Un	Off	Off	De-energised

CONNECTION DIAGRAM



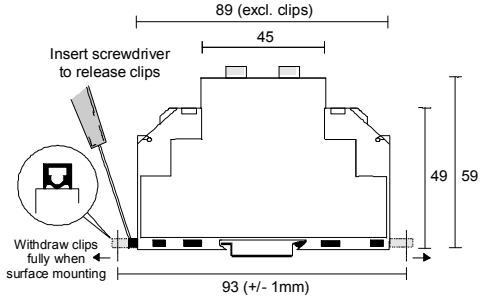
TECHNICAL SPECIFICATION

Supply / monitoring voltage Un* (L1, L2, L3, N):	332, 346V AC (phase to neutral)
Frequency range:	48 - 63Hz
Supply variation:	70 - 130% of Un
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	6kV (1.2 / 50µS) IEC 60664
Power consumption: (max.)	L1: 20VA L2: 0.1VA L3: 0.1VA

Trip levels:		
Under [2]:	70% of Un (fixed) (± 2%)	
Under:	75 - 95% of Un	
Over:	105 - 125% of Un	
Measuring ranges**:	Under	Over
332V:	249 - 315V	348 - 415V
346V:	259 - 329V	363 - 432V
	** measured phase to neutral	
Repeat accuracy:	± 0.5% @ constant conditions	
Hysteresis:	≈ 2% of trip level (factory set)	
Response time:	≈ 50 mS	
Time delay (t):	0.2 - 10 sec (± 5%) Note: actual delay (t) = adjustable delay + response time	
Delay from phase/neutral loss (tr):	≈ 100 mS (worst case = tr x 2)	
Power on delay (Td):	≈ 1sec. (worst case = Td x 2)	
Ambient temp:	-20 to +60°C	
Relative humidity:	+95%	
Output (15, 16, 18):	SPDT relay	
Output rating:	AC1	250V 8A (2000VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impluse withstand voltage:	4kV (1.2 / 50µS) IEC 60664	
Housing:	Orange flame retardant UL94 VO	
Weight:	≈ 120g	
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) Or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size:	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to UL & IEC. CE and Compliant.	

* Voltage must be stated when ordering. For other supply/monitoring voltages, please contact the sales office.

MOUNTING DETAILS



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Type: M3PRT & M3PRT-4W (High Voltage)

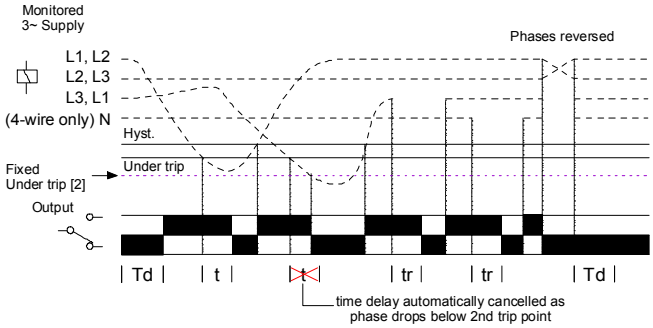
Phase Failure, Phase Sequence and Under Voltage plus Time Delay

- **35mm DIN rail housing**
- **Microprocessor controlled with internal monitoring (self-checking)**
- **Monitors own supply and detects an Under voltage condition on one or more phases**
- **Specifically suited to high voltage supplies up to 600V phase to phase**
- **M3PRT measures phase to phase voltage and M3PRT-4W measures phase to neutral voltage**
- **Detects incorrect phase sequence, phase loss and neutral loss (4-wire only)**
- **Adjustment for under voltage trip level**
- **Adjustment for time delay (from an under voltage condition)**
- **1 x SPDT relay output 8A**
- **Intelligent LED indication for supply and relay status**

Dims:
to DIN 43880
W. 35mm

Terminal Protection to IP20

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The diagram below shows a typical installation, whereby the supply to the load is being monitored by the relay. If a fault should occur, the contactor is de-energised removing the 3-phase supply to the load. The contactor only re-energises after the fault has cleared.

Applying power.

- Set the "trip level" and the "time delay" to minimum.
- Apply power and the green "supply on" and red "relay" LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to troubleshooting table if the unit fails to operate correctly.

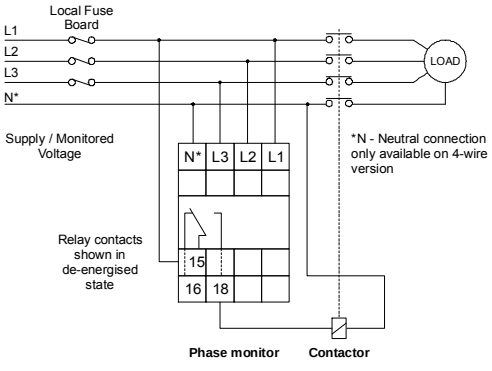
Setting the unit.

- Accurate setting can be achieved by adjusting the "trip level" until the unit trips (relay de-energises) then by decreasing the "trip level" setting until the relay re-energises. By close setting of the "trip level", the unit will also detect a phase loss even with a large percentage of re-generative voltage.
- In order to set the unit as previously described but without causing disruption to the equipment being controlled/monitored, set the "time delay" to maximum. It will now be possible to establish the trip point when the red "relay" LED starts to flash. Decrease the trip level setting to stop the LED flashing. (Note: If the time delay is allowed to expire, the output relay will de-energise).
- If large supply variations are anticipated, the "trip level" should be set further from the nominal voltage.
- Set the "time delay" as required. (Note that the delay is only effective should the supply drop below the set "trip level". However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).

Troubleshooting. The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
Phase or Neutral (4-wire only) missing	Off	Off	De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Under Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under Voltage condition (after timing)	On	Off	De-energised
Phase below 70% of Un (fixed under trip level [2])	On	Off	De-energised
Phase below 50% of Un	Off	Off	De-energised

CONNECTION DIAGRAM



TECHNICAL SPECIFICATION

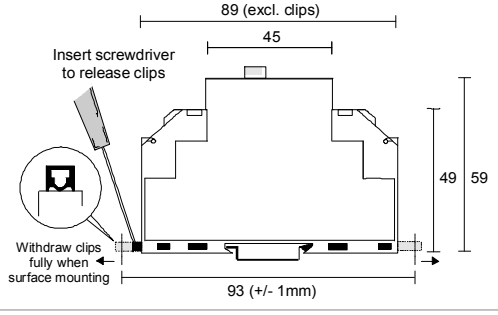
Supply / monitoring voltage U* (L1, L2, L3):	3-wire: 336 - 624V AC (phase to phase)
(L1, L2, L3, N):	4-wire: 194 - 360V AC (phase to neutral)
	To comply with UL1283, the maximum supply/monitoring voltage must not exceed 600V phase to phase
Frequency range:	48 - 63Hz
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	6kV (1.2 / 50µS) IEC 60664
Power consumption: (max.)	L1: 30VA (3-wire), 20VA (4-wire) L2: 0.2VA (3-wire), 0.1VA (4-wire) L3: 30VA (3-wire), 0.1VA (4-wire)
Trip levels:	
Under [2] (fixed):	3-wire: 336V 4-wire: 194V (phase to neutral)
Under (adjustable):	3-wire: 360 - 600V 4-wire: 208 - 346V (phase to neutral)
Repeat accuracy:	± 0.5% @ constant conditions
Hysteresis:	≈ 2% of trip level (factory set)
Response time:	≈ 50 mS
Time delay (t):	0.2 - 10 sec (± 5%) Note: actual delay (t) = adjustable delay + response time
Delay from phase/neutral loss (tr):	≈ 100 mS (worst case = tr x 2)
Power on delay (Td):	≈ 1sec. (worst case = Td x 2)
Ambient temp:	-20 to +60°C
Relative humidity:	+95%
Output (15, 16, 18):	SPDT relay
Output rating:	AC1 250V 8A (2000VA) AC15 250V 5A (no), 3A (nc) DC1 25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impluse withstand voltage:	4kV (1.2 / 50µS) IEC 60664
Housing:	Orange flame retardant UL94 VO
Weight:	≈ 120g
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) Or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.
Terminal conductor size:	≤ 2 x 2.5mm² solid or stranded
Approvals:	Conforms to UL & IEC. CE and Compliant.

* Voltage must be stated when ordering.

Options:

1. For other supply/monitoring voltages, please consult the sales office.
2. For alternative time delays or trip levels, please consult the sales office.

MOUNTING DETAILS



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Type: M1TVR-4W

Timed Under Voltage Relay (Delayed Restart)

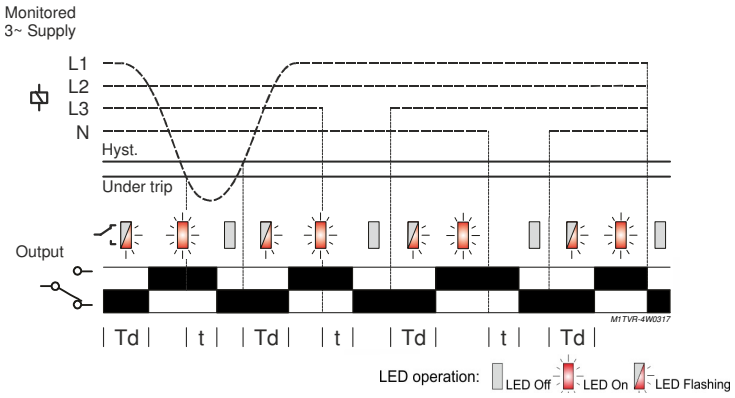
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- **Red LED flashes during restart delay period (Td) confirming power is present and all phases are above the 75% trip level**
- **Meets DEWA regulations (Section 8.2)***
- **Temperature rating up to +60°C**
- **Monitors own supply and detects an Under voltage condition on one or more phases**
- **Detects phase loss and neutral loss**
- **Fixed Under voltage trip level (75% of Un)**
- **Adjustable Time delay (5 – 10m)**
- **SPDT relay output 6A**
- **Red LED also used for relay status**
- **Compact 17.5mm DIN rail housing**

QMS ISO 9001 REGISTERED
ISO 9001:2015
Cert. No. 14125771

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the unit. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Apply power and assuming all phases and neutral are present, the phase voltages are above the fixed trip level (plus hysteresis) the delay period (Td) will commence. The relay will remain de-energised and red LED ❶ flash during this period.
- After the set delay has elapsed, the relay will energise red LED will remain on.

Setting the unit

- Set the "Delay (Td)" ❷ adjustment as required.

Troubleshooting.

The table below shows the status of the unit during a particular condition.

Supply status	Red LED	Relay
Phase or neutral missing	Off	De-energised
Under voltage condition	Off	De-energised
Following phase/neutral loss or voltage returning > 75% of Un	Flashing	De-energised for delay period (Td)

TECHNICAL SPECIFICATION

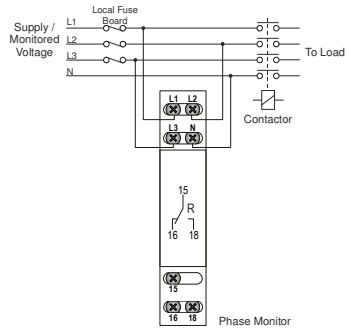
Supply/monitoring voltage		
Un **(L1, L2, L3, N):**	230/400V AC	
Frequency range:	48 – 63Hz	
Supply variation:	70 – 110% Un	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	10VA (L3), <0.1VA (L1, L2) @ 1.1 x Un	
Monitoring mode:	Under voltage	
Trip levels:		
Under:	75% of Un (Fixed)	
Trip accuracy:	± 5%	
Hysteresis:	≈ 2% of fixed trip level (factory set)	
Response time (t):	< 150ms	
Restart time delay (Td):	5 – 10m (± 5%)	
Setting accuracy:	± 5%	
Repeat accuracy:	± 0.5% at constant conditions	
Reset time:	≈ 150ms	
LED indication:	Red LED (Relay/timing status)	
Ambient temperature:	-20 to +60°C	
Relative humidity:	+95% max.	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 6A (1500VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 6A (150W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	65g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Terminal screw:	M3 (Designed for use with **PZ1** "pozi-driver")	
Tightening torque:	0.6Nm Max.	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4	

** The following extract is taken from **DEWA Regulations for Electrical Installations***

8.2 **UNDER VOLTAGE (U.V.) RELAYS WITH AUTO-RESET TIMER**

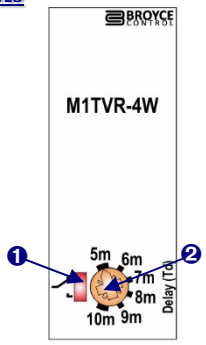
8.2.1 All air-conditioners or air-conditioning units/plants/equipment installed within the consumer's installation shall be provided with Under Voltage (U.V.) relays with fixed voltage cut off setting at 75% of the nominal supply voltage and auto-reset timer with adjustable time setting between 5 and 10 minutes.

CONNECTION DIAGRAM

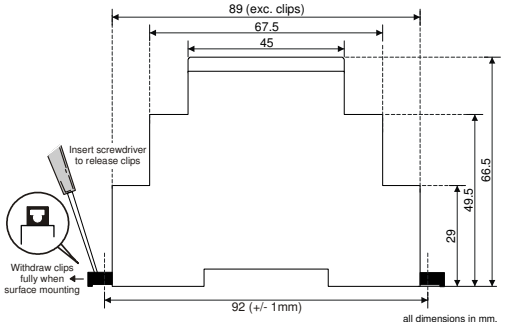


SETTING DETAILS

1. Relay output/timing status (Red) LED
2. "Delay (Td)" adjustment



DIMENSIONS



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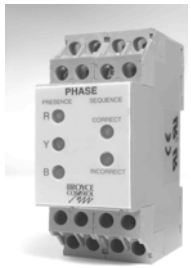
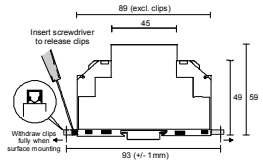
The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

M3PPI

Phase Sequence / Failure Indicator • Séquence de phase / Indicateur de défaillance
Phasenfolge / Ausfallanzeige • Sequenza di fase / Indicatore guasti

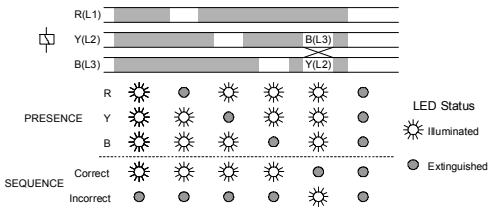


MOUNTING DETAILS
INSTRUCTIONS DE MONTAGE
MONTAGEAUFÜHRUNGEN
ISTRUZIONI DI MONTAGGIO

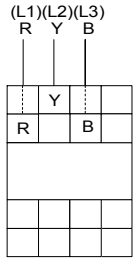


Width / largeur / Breite / Largh.. 35 mm (DIN 43880)

TIMING DIAGRAM
DIAGRAMME DES TEMPS
ZEITDIAGRAMM
DIAGRAMMA TEMPI



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS
DIAGRAMMA DI CONNESSIONE



- ❑ **INCORRECT PHASE SEQUENCE / ROTATION**
- ❑ **PHASE FAILURE / LOSS**

- ❑ **SÈQUENCE DE PHASE INCORRECTE / ROTATION**
- ❑ **DÈFAILLANCE DE PHASE / PERTE**

- ❑ **PHASENFOLGE FALSCH / AMLAUF**
- ❑ **PHASENAUSFALL / VERLUST**

- ❑ **SEQUENZA DI FASE ERRATA / ROTAZIONE**
- ❑ **GUASTO DI FASE / PERDITA**

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram above.
- Apply power (red R, Y & B LED's on, green 'Correct' LED on).

Troubleshooting

- Check wiring and voltage present.
- If incorrect sequence.
- Reverse any 2 phases.

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.
- Appliquer la puissance (LEDS rouges R, Y & B allumée, LED verte 'correcte' allumée).

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.
- Si séquence incorrecte.
- Inverser 2 phases.

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.
- Energie anbringen (LED rot R, Y & B an, LED grün 'richtig' an).

Störungsbehebung

- Überprütung von Leitungen und gegenwärtiger Spannung.
- Folgefehler.
- 2 phasen umschalten.

• MONTAGGIO E REGOLAZIONE

Il lavoro dell'installazione deve essere effettuato dai personali qualificati.

- PRIMA DELL'INSTALLAZIONE, ISOLARE L'ALIMENTAZIONE
- Collegare l'unità come illustrato nel diagramma in alto.
- Applicare la potenza (LED rossi R, Y & B accesi, LED verde 'Corretto' acceso).

Localizzazione guasti

- Verificare il cablaggio e la presenza della tensione.
- Verificare se la sequenza è errata.
- Invertire 2 fasi.

• TECHNICAL SPECIFICATION

Supply/monitoring voltage U: (phase to phase)	1. 180 - 260V AC 48 - 63Hz 2. 300 - 500V AC 48 - 63Hz
Rated impulse withstand voltage:	4kV (1.2/50µS)
Power consumption:	< 4VA
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Housing:	to UL94 VO
Weight:	= 81g
Mounting option:	to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 2.5mm² solid / stranded
Approvals:	UL, CUL, CSA. CE and Compliant

• FICHES TECHNIQUES

Voltage d ' alimentation ntrôlée U: (mise en phase)	1. 180 - 260V AC 48 - 63Hz 2. 300 - 500V AC 48 - 63Hz
Impulsion nominale résistant à la tension:	4kV (1.2/50µS)
Puissance consommée:	< 4VA
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Boitier:	à UL94 VO
Poids:	= 81g
Option de montage:	à BS5584:1978 (EN50 002, DIN 46277-3)
Taille du conducteur terminal:	≤ 2 x 2.5mm² toron / multi-filaire
Homologations:	UL, CUL, CSA. CE et Déférence

• TECHNISCHE DATEN

Stromversorgung / Spannungskontrolle U: (phase zu phase)	1. 180 - 260V AC 48 - 63Hz 2. 300 - 500V AC 48 - 63Hz
Nenn-Impulse Spannungswiderstand:	4kV (1.2/50µS)
Energieverbrauch:	< 4VA
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Gehäuse:	bis UL94 VO
Gewicht:	= 81g
Befestigungswahl:	bis BS5584:1978 (EN50 002, DIN 46277-3)
Anschlussklemme / Kabelgrösse:	≤ 2 x 2.5mm² Festdraht / Litze
Genehmigungen:	UL, CUL, CSA. CE und Übereinstimmung

• SCHEDA TECNICA

Alimentazione/controllo tensione U: (da fase a fase)	1. 180 - 260V AC 48 - 63Hz 2. 300 - 500V AC 48 - 63Hz
Impulso nominale resistenza alla tensione:	4kV (1.2/50µS)
Consumo energetico:	< 4VA
Temperatura ambiente:	-20 to +60°C
Umidità relativa:	+95%
Alloggiamento:	secondo UL94 VO
Peso:	= 81g
Opzione montaggio:	secondo BS5584:1978 (EN50 002, DIN 46277-3)
Dimensioni cavo conduttore terminale:	≤ 2 x 2.5mm² a filo pieno / a trefolo
Omologazioni:	UL, CUL, CSA. Conformità CE

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Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

Le informazioni fornite nel presente documento sono precise (salvo modifiche senza preavviso); l'utente si assume tuttavia ogni rischio circa l'uso che ne farà.

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• earth leakage relays • earth fault relays • overcurrent relays • three phase relays • **time delay relays** • control relays • level control relays • pump control relays •

• speed control relays • temperature control relays • protection devices • generator protection • hours run meter • sockets • bespoke products •

BROYCE CONTROL

time delay relays

- Multi Function
- Delay On Operate
- Delay On Operate (with Instantaneous Contact)
- Interval
- Switch Initiated Delay Off
- True Delay Off
- Star Delta Start
- Symmetrical Recycling
- Asymmetrical Recycling
- Dual Function

Choose your category

Click the above for further information…!

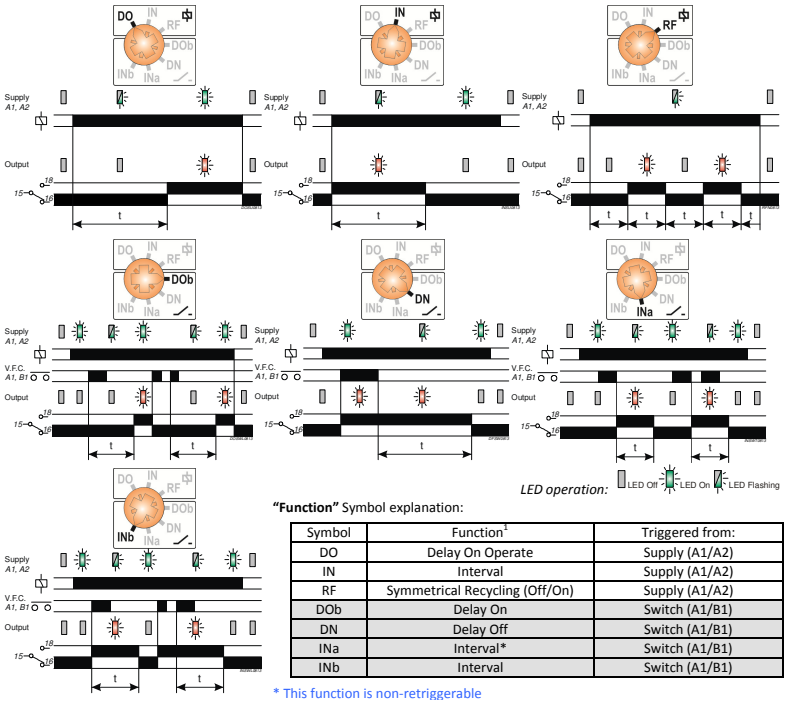
Click here for Main Page

Type: LMMT

Multifunction, Multi-voltage Timer

- ***NEW*** **17.5mm DIN rail housing**
- **7 Selectable functions (3 Supply Initiated, 4 Switch Initiated)**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **LED warning indication if function is changed whilst powered**
- **Switch initiated functions ideal for use in Watchdog circuits**
- **Multi-voltage input (12 – 230V AC/DC)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAMS



"Function" Symbol explanation:

Symbol	Function[1]	Triggered from:
DO	Delay On Operate	Supply (A1/A2)
IN	Interval	Supply (A1/A2)
RF	Symmetrical Recycling (Off/On)	Supply (A1/A2)
DOb	Delay On	Switch (A1/B1)
DN	Delay Off	Switch (A1/B1)
INa	Interval*	Switch (A1/B1)
INb	Interval	Switch (A1/B1)

* This function is non-retriggerable

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Function" selector ❺ to the required position[1].
- Set the "Range" ❹ to the required position (depending on whether seconds, minutes or hours are required), then set the "Set %" adjustment ❸ as required. The "Set %" is a % of the selected range, so 60% of the 1 – 10 hour range will give 6 hours.

Applying power.

- Apply power and the green LED ❶ will illuminate or start flashing depending on Function selected. If a Switch initiated function is selected, the LED will begin flashing upon closing of the external input.
- The red relay LED ❷ will illuminate to indicate the relay is in the energised state.

Note:

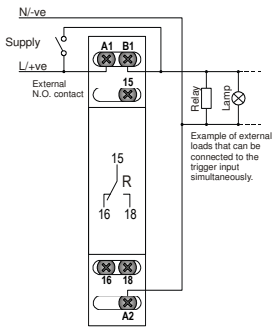
[1] If the "Function" selector is changed whilst the power is applied, the relay will remain in its current state and the green LED will flash at a faster rate. Power must be removed and re-applied for the new Function to operate.

[2] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change. The dip / interruption duration and levels are defined in the product standard.

TECHNICAL SPECIFICATION

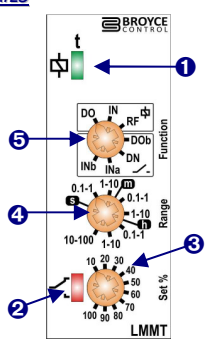
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+/ - 15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.3VA	0.4VA	1.3VA	3.4VA
DC:	0.26W	0.24W	0.47W	0.95W
Timing functions (7):				
Supply initiated:	Delay On (DO), Interval (IN), Symmetrical Recycling Off/On (RF)			
Switch initiated:	Delay On (DOb), Delay Off (DN), Interval (Trailing) (INa), Interval (Leading) (INb)			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
External trigger input **(A1 > B1)**:	Volt Free Contact, Open Collector			
External loading:	Yes, between B1 and A2 (i.e. LED, Relay, Lamp)			
Trigger threshold:	>75% of voltage present between A1 and A2 (auto-set)			
Minimum trigger time:	AC: 60mS DC: 40mS (B1 terminal unloaded)			
Maximum input frequency:	10 Hz (with 50:50 duty cycle)			
Maximum cable length:	10m (between Timer and external switching device)			
Power on indication / Timing[2]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 60g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

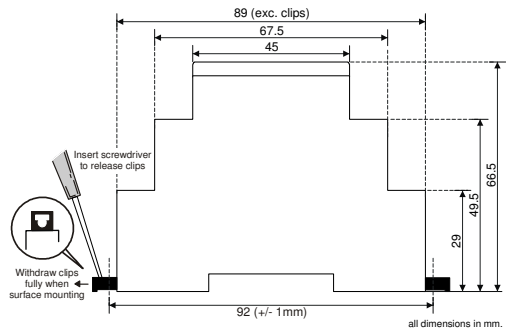


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "Set %" adjustment
4. Time delay "Range" selector
5. Timing "Function" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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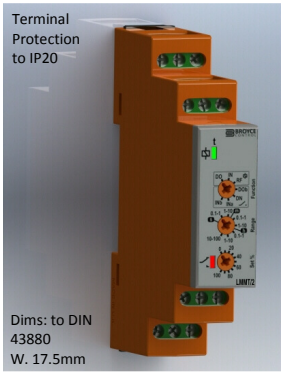
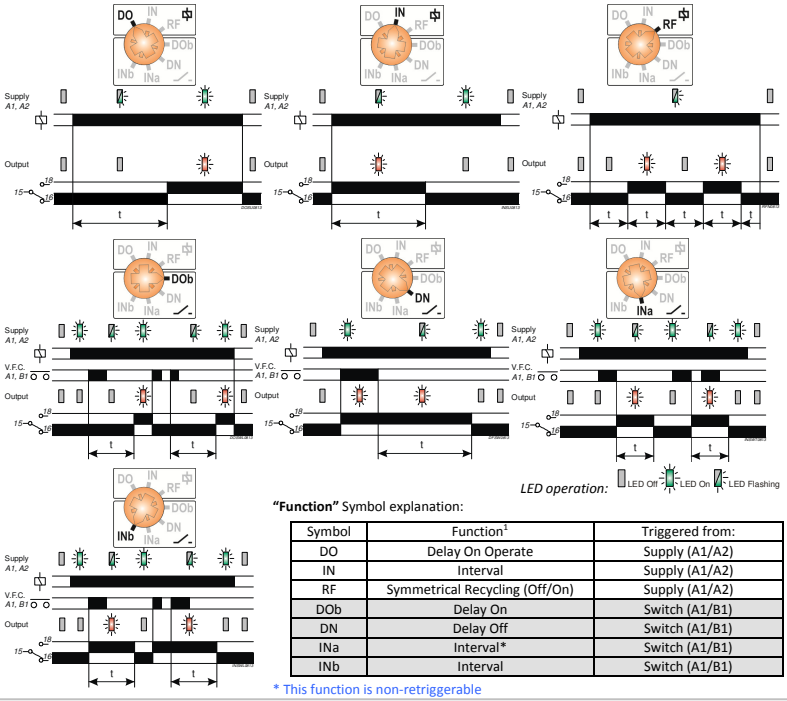
Type: LMMT/2

Multifunction, Multi-voltage Timer



- ***NEW*** **17.5mm DIN rail housing**
- **7 Selectable functions (3 Supply Initiated, 4 Switch Initiated)**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **LED warning indication if function is changed whilst powered**
- **Switch initiated functions ideal for use in Watchdog circuits**
- **Multi-voltage input (12 – 230V AC/DC)**
- **1 x DPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAMS



"Function" Symbol explanation:

Symbol	Function[1]	Triggered from:
DO	Delay On Operate	Supply (A1/A2)
IN	Interval	Supply (A1/A2)
RF	Symmetrical Recycling (Off/On)	Supply (A1/A2)
DOb	Delay On	Switch (A1/B1)
DN	Delay Off	Switch (A1/B1)
INa	Interval*	Switch (A1/B1)
INb	Interval	Switch (A1/B1)

* This function is non-retriggerable

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Function" selector ❺ to the required position[1].
- Set the "Range" ❹ to the required position choosing seconds, minutes or hours then set the "Set %" adjustment ❸ as required. The "Set %" is a % of the selected range, so 60% of the 1 – 10 hour range will give 6 hours.

Applying power.

- Apply power and the green LED ❶ will illuminate or start flashing depending on Function selected. If a Switch initiated function is selected, the LED will begin flashing upon closing of the external input.
- The red relay LED ❷ will illuminate to indicate the relay is in the energised state.

Note:

[1] If the "Function" selector is changed whilst the power is applied, the relay will remain in its current state and the green LED will flash at a faster rate. Power must be removed and re-applied for the new Function to operate.

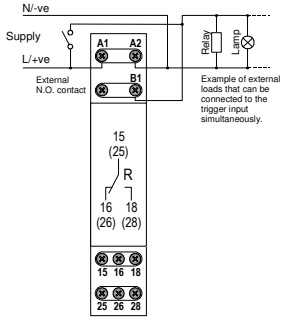
[2] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change.

[3] The dip / interruption (reset) duration and levels are defined in the product standard however, the standard allows for these to be different from the levels actually specified.

TECHNICAL SPECIFICATION

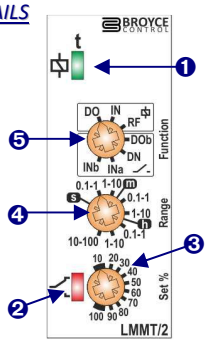
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	AC: +15/-10% DC: +/-15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.6VA	0.8VA	2.6VA	6.8VA
DC:	0.52W	0.48W	0.94W	1.9W
Timing functions (7):				
Supply initiated:	Delay On (DO), Interval (IN), Symmetrical Recycling Off/On (RF)			
Switch initiated:	Delay On (DOb), Delay Off (DN), Interval (Trailing) (INa), Interval (Leading) (INb)			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time[3]:	< 100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
External trigger input **(A1 > B1)**:	Volt Free Contact, Open Collector			
External loading:	Yes, between B1 and A2 (i.e. LED, Relay, Lamp)			
Trigger threshold:	>75% of voltage present between A1 and A2 (auto-set)			
Minimum trigger time:	AC: 60mS DC: 40mS (B1 terminal unloaded)			
Maximum input frequency:	10 Hz (with 50:50 duty cycle)			
Maximum cable length:	10m (between Timer and external switching device)			
Power on indication / Timing[2]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18 / 25, 26, 28)**:	DPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 70g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

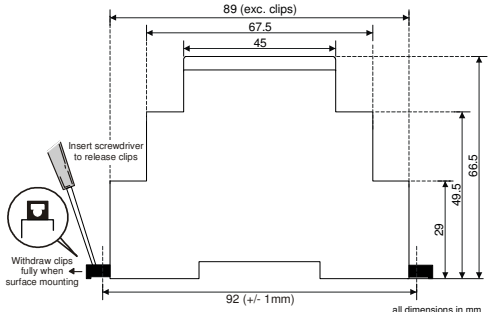


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "Set %" adjustment
4. Time delay "Range" selector
5. Timing "Function" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

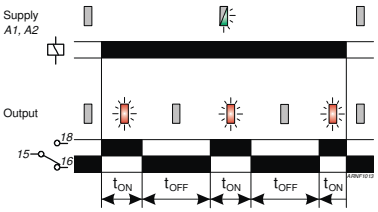
Type: LART

Asymmetrical Recycling, Multi-voltage Timer

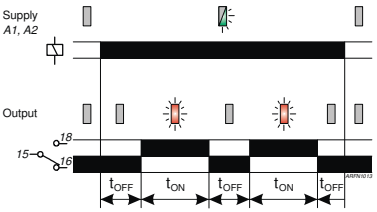
- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **Recycling "On / Off" function AN (or "Off / On" AF when external link fitted)**
- **Separate adjustments for "on" and "off" ranges**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAMS

Asymmetrical Recycling On / Off **(AN)**



Asymmetrical Recycling Off / On **(AF)**
(terminals A1 and B1 linked)



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.
- If Asymmetrical Recycling "Off / On" is required, placed a link between terminals A1 and B1.

Setting the unit.

- Set the "t_{OFF}" ❹ and "t_{ON}" ❺ "Range" selectors to the required position (depending on whether seconds, minutes or hours are required).
- Set the "Set %" adjustment for the "t_{OFF}" ❸ and "t_{ON}" ❻ as required. The "Set %" is a % of the selected range, so 60% of the 1 – 10 hour range will give 6 hours.

Applying power.

- Apply power and the green LED ❶ will start flashing to indicate timing is in progress.
- The red relay LED ❷ will illuminate to indicate the relay is the energised state when the "t_{ON}" delay is running.
- When the "t_{OFF}" delay is running and relay is de-energised, the red LED will remain extinguished.

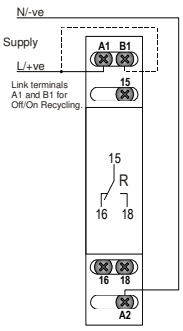
Note:

[1] *In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change. The dip / interruption duration and levels are defined in the product standard.*

TECHNICAL SPECIFICATION

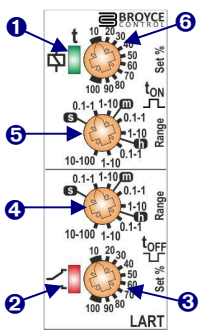
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+/ - 15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.3VA	0.4VA	1.3VA	3.4VA
DC:	0.26W	0.24W	0.47W	0.95W
Timing functions (2):				
	Asymmetrical Recycling "On / Off" (AN)			
	Asymmetrical Recycling "Off / On" (AF) *(A1 > B1 linked)*			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
(applies to "t_{ON}" and "t_{OFF}")	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Power on indication / Timing[1]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1		250V 8A (2000VA)	
	AC15		250V 5A (no), 3A (nc)	
	DC1		25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94 V0			
Weight:	≈ 60g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm^2 solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

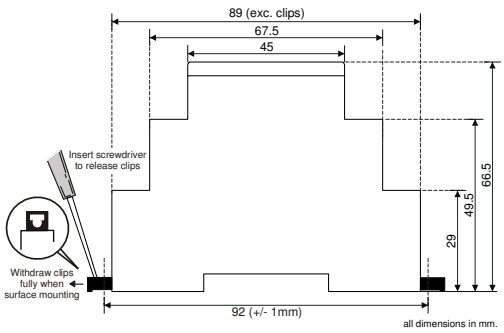


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "t_{OFF}" delay "Set %" adjustment
4. "t_{OFF}" delay "Range" selector
5. "t_{ON}" delay "Set %" adjustment
6. "t_{ON}" delay "Range" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

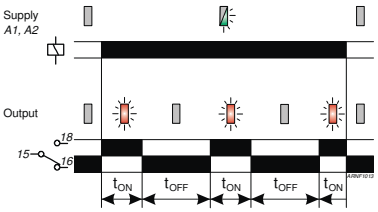
Type: LART/2

Asymmetrical Recycling, Multi-voltage Timer

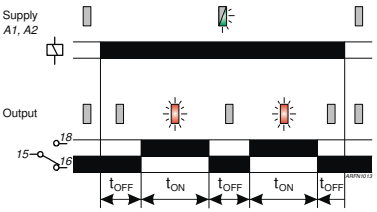
- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **Recycling "On / Off" function AN (or "Off / On" AF when external link fitted)**
- **Separate adjustments for "on" and "off" ranges**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **1 x DPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAMS

Asymmetrical Recycling On / Off **(AN)**



Asymmetrical Recycling Off / On **(AF)**
(terminals A1 and B1 linked)



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.
- If Asymmetrical Recycling "Off / On" is required, placed a link between terminals A1 and B1.

Setting the unit.

- Set the "t_{OFF}" ❹ and "t_{ON}" ❺ "Range" selectors to the required position (depending on whether seconds, minutes or hours are required).
- Set the "Set %" adjustment for the "t_{OFF}" ❸ and "t_{ON}" ❻ as required. The "Set %" is a % of the selected range, so 60% of the 1 – 10 hour range will give 6 hours.

Applying power.

- Apply power and the green LED ❶ will start flashing to indicate timing is in progress.
- The red relay LED ❷ will illuminate to indicate the relay is the energised state when the "t_{ON}" delay is running.
- When the "t_{OFF}" delay is running and relay is de-energised, the red LED will remain extinguished.

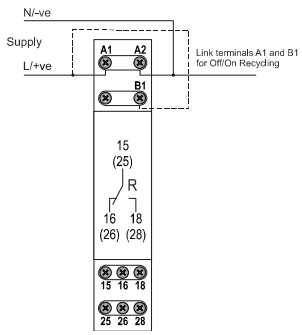
Note:

[1] *In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change. The dip / interruption duration and levels are defined in the product standard.*

TECHNICAL SPECIFICATION

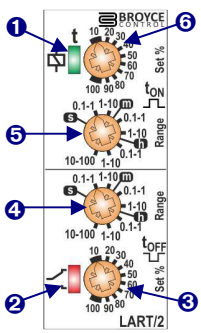
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	AC: +15/-10% DC: +/-15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.6VA	0.8VA	1.6VA	6.8VA
DC:	0.52W	0.48W	0.94W	1.9W
Timing functions (2):				
	Asymmetrical Recycling "On / Off" (AN)			
	Asymmetrical Recycling "Off / On" (AF) *(A1 > B1 linked)*			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
(applies to "t_{ON}" and "t_{OFF}")	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Power on indication / Timing[1]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18, 25, 26, 28)**:	DPDT relay			
Output rating:	AC1		250V 8A (2000VA)	
	AC15		250V 5A (no), 3A (nc)	
	DC1		25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94 V0			
Weight:	≈ 70g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm^2 solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

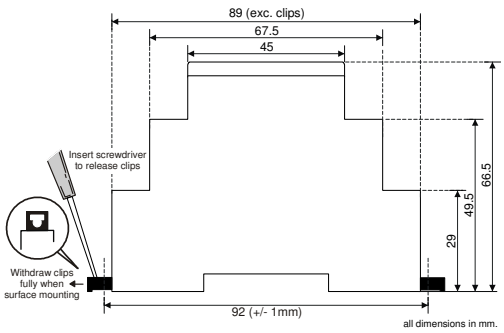


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "t_{OFF}" delay "Set %" adjustment
4. "t_{OFF}" delay "Range" selector
5. "t_{ON}" delay "Set %" adjustment
6. "t_{ON}" delay "Range" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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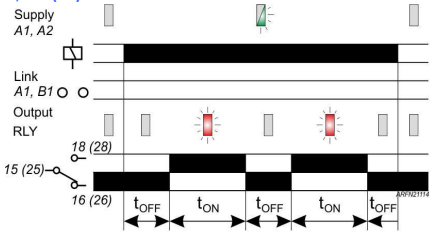
Type: LRTM/2

Asymmetrical Recycling / Delayed Pulse Timer

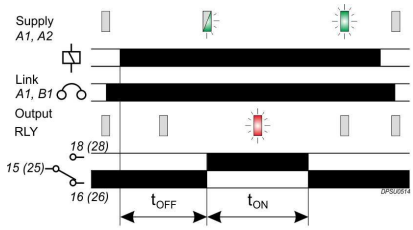
- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **Dual Function - Asymmetrical recycling "Off/On" AF or Delayed Pulse DP**
- **Separate adjustments for "on" and "off" ranges**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **DPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAMS

Asymmetrical Recycling Off / On **(AF)**



Delayed Pulse **(DP)**
(terminals A1 and B1 linked)



LED operation: LED Off · LED On · LED Flashing

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.
- If the Delayed Pulse function is required, place a link between terminals A1 and B1.

Setting the unit.

- Set the "t_{OFF}" ❹ and "t_{ON}" ❻ "Range" selectors to the required position (depending on whether seconds, minutes or hours are required).
- Set the "Set %" adjustment for the "t_{OFF}" ❸ and "t_{ON}" ❺ as required. The "Set %" is a % of the selected range, so 60% of the 1 – 10 hour range will give 6 hours.

Applying power.

- Apply power and the green LED ❶ will start flashing to indicate timing is in progress.
- The red relay LED ❷ will illuminate to indicate the relay is the energised state when the "t_{ON}" delay is running.
- When the "t_{OFF}" delay is running and relay is de-energised, the red LED will remain extinguished.
- If the Delayed Pulse function is selected, the green LED will stop flashing and remain illuminated when the relay de-energises after the "t_{ON}" period.

Note:

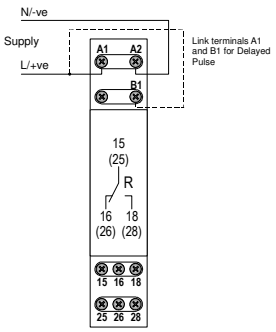
[1] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change.

[2] The dip / interruption (reset) duration and levels are defined in the product standard however, the standard allows for these to be different from the levels actually specified.

TECHNICAL SPECIFICATION

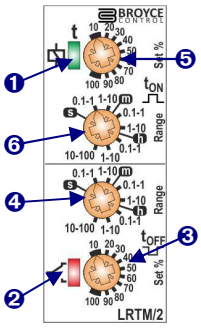
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	AC: +15/-10% DC: +/-15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.6VA	0.8VA	2.6VA	6.8VA
DC:	0.52W	0.48W	0.94W	1.9W
Timing function:	Asymmetrical Recycling "Off / On" or Delayed Pulse *(A1 > B1 linked)*			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
(applies to "t_{ON}" and "t_{OFF}")	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time[2]:	<100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Power on indication / Timing[1]:	Green LED			
Relay status:	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18 / 25, 26, 28)**:	DPDT relay			
Output rating:	AC1		250V 8A (2000VA)	
	AC15		250V 3A	
	DC1		25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 80g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

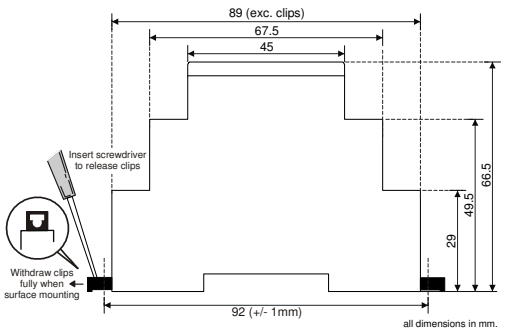


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "t_{OFF}" delay "Set %" adjustment
4. "t_{OFF}" delay "Range" selector
5. "t_{ON}" delay "Set %" adjustment
6. "t_{ON}" delay "Range" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

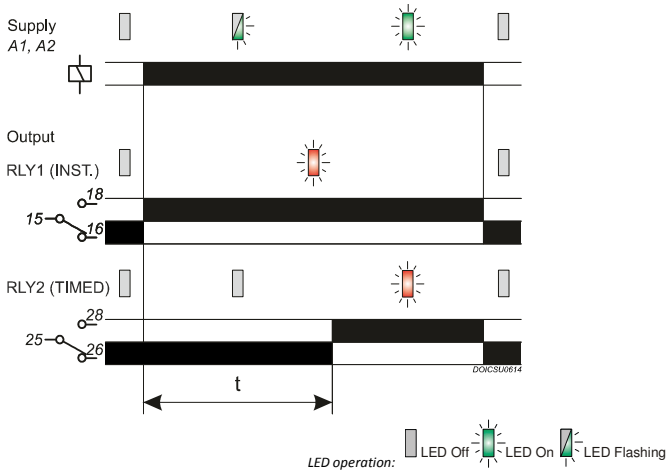
The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: LEDK

Delay On Operate with Instantaneous Contact Timer

- ***NEW* 17.5mm DIN rail housing**
- **Instantaneous Contact (Relay 1)**
- **Delay On Operate timing function (Relay 2)**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **2 x SPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay statuses**
- **Conforms to IEC 61812**

FUNCTION DIAGRAMS



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Range" ❹ to the required position (depending on whether seconds, minutes or hours are required), then set the "Set %" adjustment ❺ as required. The "Set %" is a % of the selected range, so 60% of the 1 – 10 hour range will give 6 hours.

Applying power.

- Apply power and the green LED ❶ will start flashing to indicate timing is in progress. Contacts 15 and 18 will close as soon as power is applied (Instantaneous Relay - RLY1) and the red relay LED ❸ will illuminate. Contacts 25 and 26 (Timed Relay - RLY2) will remain closed during this period
- At the end of the delay period "t" contacts 25 and 26 will open 25 and 28 will close. The red relay LED ❷ will illuminate.
- Both relays will remain in the energised state until power is removed. Re-applying power will repeat the whole process again.

Note:

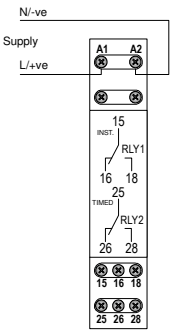
[1] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change.

[2] The dip / interruption (reset) duration and levels are defined in the product standard however, the standard allows for these to be different from the levels actually specified.

TECHNICAL SPECIFICATION

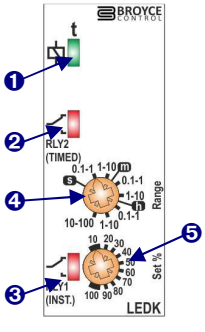
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	AC: +15/-10% DC: +/-15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.6VA	0.8VA	2.6VA	6.8VA
DC:	0.52W	0.48W	0.94W	1.9W
Timing function (RLY1):	Instantaneous Contact			
Time delay:	<100mS (to relay energising)			
Timing function (RLY2):	Delay On Operate			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time[2]:	<100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Power on indication / Timing[1]:	Green LED			
Relay status (Instantaneous - RLY1)	Red LED			
Relay status (Delay On Op. - RLY2)	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18 / 25, 26, 28)**:	SPDT relay (x2)			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 80g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

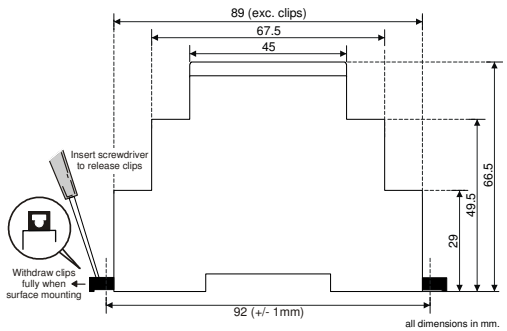


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay 2 output status (Red) LED
3. Relay 1 output status (Red) LED
4. Time delay "Range" selector
5. "Set %" adjustment



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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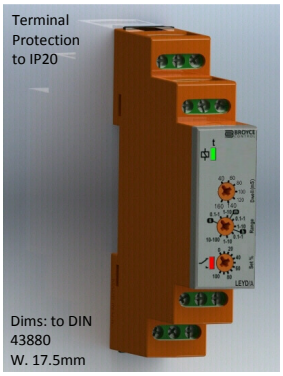
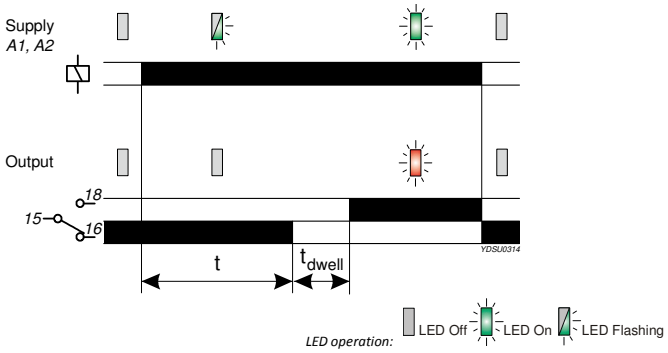
Type: LEYD/A

Star/Delta Start Timer



- ***NEW*** **17.5mm DIN rail housing**
- **Star/Delta timing function**
- **7 Selectable Dwell time settings (40 – 160mS)**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAMS



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Dwell (ms)" selector ❺ to the required position.
- Set the "Range" ❹ to the required position (depending on whether seconds, minutes or hours are required), then set the "Set %" adjustment ❸ as required. The "Set %" is a % of the selected range, so 60% of the 1 – 10 hour range will give 6 hours.

Applying power.

- Apply power and the green LED ❶ will start flashing to indicate timing is in progress. Contacts 15 and 16 will remain closed during this period.
- At the end of the delay period "t", contacts 15 and 16 will open for the period set by the Dwell time.
- After the Dwell time, contacts 15 and 18 will close and the red relay LED ❷ will illuminate to indicate the relay is in the energised state.
- The relay will remain in the energised state until power is removed. Re-applying power will repeat the whole process again.

Note:

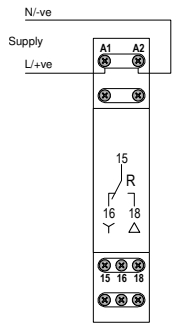
[1] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change. The dip / interruption duration and levels are defined in the product standard.

[2] The dip / interruption (reset) duration and levels are defined in the product standard however, the standard allows for these to be different from the levels actually specified.

TECHNICAL SPECIFICATION

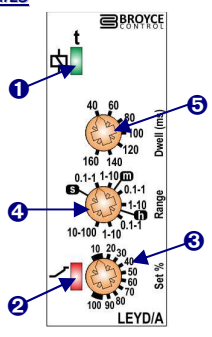
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	AC: +15/-10% DC: +/-15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.6VA	0.8VA	2.6VA	6.8VA
DC:	0.52W	0.48W	0.94W	1.9W
Timing function:	Star/Delta Start			
Selectable Dwell (t_{dwell})				
time settings (7):	40, 60, 80, 100, 120, 140, 160ms			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time[2]:	< 100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Power on indication / Timing[1]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1		250V 6A (1500VA)	
	DC1		30V 6A (180W)	
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 70g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick ✔ and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

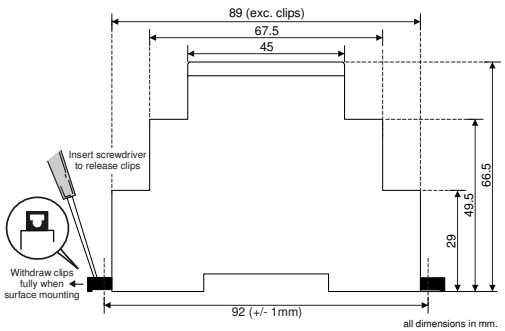


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "Set %" adjustment selector
4. Time delay "Range" selector
5. "Dwell" time adjustment



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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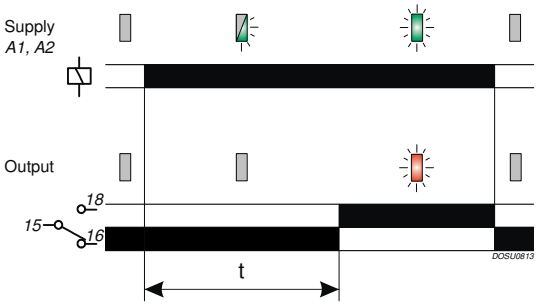
Type: LEDO

Delay On Operate, Multi-voltage Timer

- ***NEW*** **17.5mm DIN rail housing**
- **Supply Initiated Delay On Operate timing function**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAM



LED operation:

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Range" ❹ to the required position (depending on whether seconds, minutes or hours are required).
- Set the "Set %" adjustment ❸ as required. The "Set %" is a % of the selected range; so for example, a 30% setting on the 1 – 10 hour range will give 3 hours.

Applying power.

- Apply power across terminals "A1" and "A2" and the green LED ❶ will start flashing indicating timing in progress.
- The relay will remain de-energised (contacts **15** / **16** closed and **15** / **18** open) and red LED ❷ extinguished.
- After the delay period "t" has elapsed, the relay will energise (contacts **15** / **16** open and **15** / **18** closed) and the red LED will illuminate.
- The green LED will remain permanently lit.
- The whole timing process is repeated by removing and re-applying power.

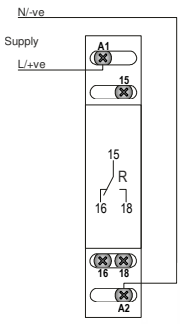
Note:

[1] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change. The dip / interruption duration and levels are defined in the product standard.

TECHNICAL SPECIFICATION

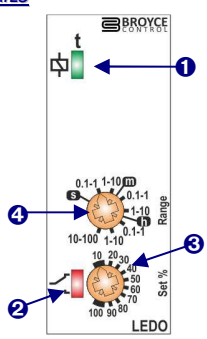
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+/ - 15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.3VA	0.4VA	1.3VA	3.4VA
DC:	0.26W	0.24W	0.47W	0.95W
Timing function:	Delay On Operate (Supply Initiated)			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Power on indication / Timing[1]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 60g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

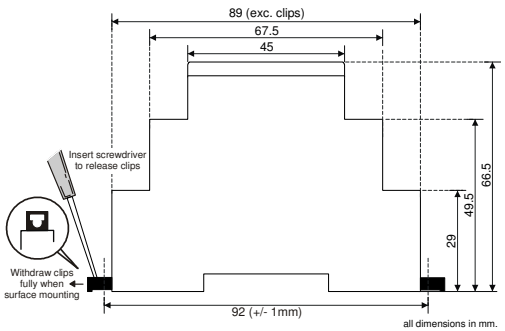


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "Set %" adjustment
4. Time delay "Range" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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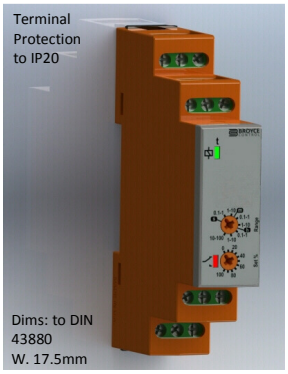
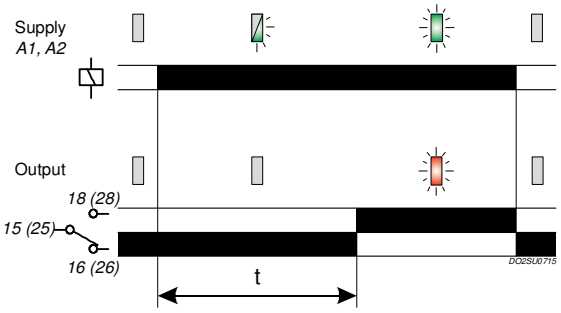
Type: LEDO/2

Delay On Operate, Multi-voltage Timer



- ***NEW*** **17.5mm DIN rail housing**
- **Supply Initiated Delay On Operate timing function**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **1 x DPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGAM



LED operation:

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Range" ❹ to the required position (depending on whether seconds, minutes or hours are required).
- Set the "Set %" adjustment ❸ as required. The "Set %" is a % of the selected range; so for example, a 30% setting on the 1 – 10 hour range will give 3 hours.

Applying power.

- Apply power across terminals "A1" and "A2" and the green LED ❶ will start flashing indicating timing in progress.
- The relay will remain de-energised (contacts **15** / **16** and **25 / 26** closed, **15** / **18** and **25 / 28** open) and red LED ❷ extinguished.
- After the delay period "t" has elapsed, the relay will energise (contacts **15** / **16** and **25 / 26** open, **15** / **18** and **25 / 28** closed) and the red LED will illuminate.
- The green LED will remain permanently lit.
- The whole timing process is repeated by removing and re-applying power.

Note:

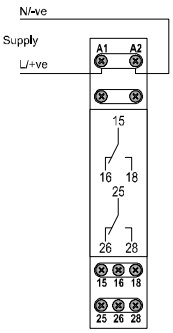
[1] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change.

[2] The dip / interruption (reset) duration and levels are defined in the product standard however, the standard allows for these to be different from the levels actually specified.

TECHNICAL SPECIFICATION

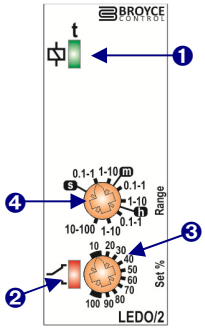
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	AC: +15/- 10% DC: +/-15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.6VA	0.8VA	2.6VA	6.8VA
DC:	0.52W	0.48W	0.94W	1.9W
Timing function:	Delay On Operate (Supply Initiated)			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time[2]:	<100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Power on indication / Timing[1]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18/25, 26, 28)**:	DPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 70g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

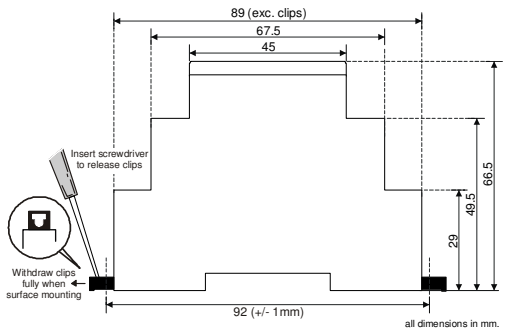


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "Set %" adjustment
4. Time delay "Range" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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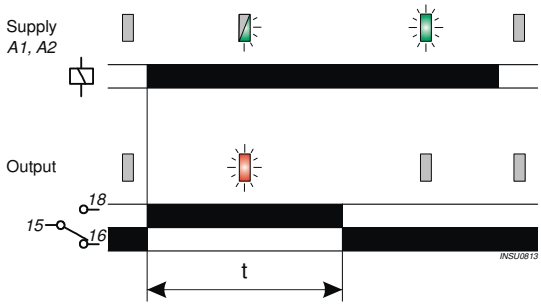
Type: LEIN

Interval (Single Shot), Multi-voltage Timer

- ***NEW* 17.5mm DIN rail housing**
- **Supply Initiated Interval (Single Shot) timing function**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAM



LED operation:

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Range" ❹ to the required position (depending on whether seconds, minutes or hours are required).
- Set the "Set %" adjustment ❸ as required. The "Set %" is a % of the selected range; so for example, a 30% setting on the 1 – 10 hour range will give 3 hours.

Applying power.

- Apply power across terminals **A1** and **A2** and the green LED ❶ will start flashing indicating timing in progress.
- The relay will energise (contacts **15** / **16** open and **15** / **18** closed) and red LED ❷ illuminate.
- After the delay period "t" has elapsed, the relay will de-energise (contacts **15** / **16** and **15** / **18** open) and the red LED will extinguish.
- The green LED will now remain permanently lit.
- The whole timing process is repeated by removing and re-applying power.

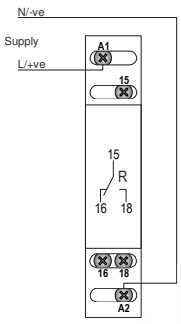
Note:

[1] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change. The dip / interruption duration and levels are defined in the product standard.

TECHNICAL SPECIFICATION

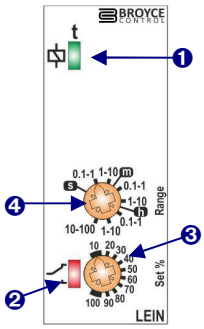
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+/ - 15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.3VA	0.4VA	1.3VA	3.4VA
DC:	0.26W	0.24W	0.47W	0.95W
Timing function:	Interval (Supply Initiated)			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Power on indication / Timing[1]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 60g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

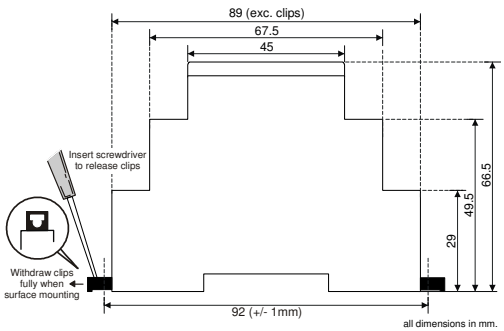


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "Set %" adjustment
4. Time delay "Range" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

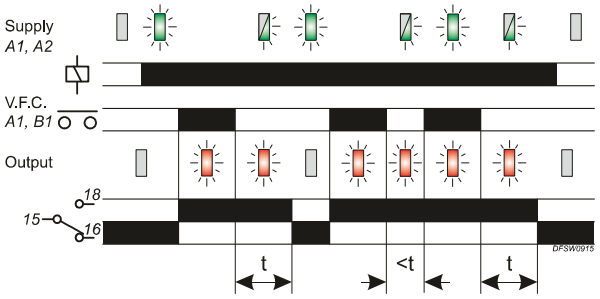
The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: LESW

Switch Initiated Delay Off (Delay On Release), Multi-voltage Timer

- ***NEW*** **17.5mm DIN rail housing**
- **Switch Initiated Delay Off (Delay On Release) re-triggerable timing function**
- **7 Selectable time ranges (0.1 seconds – 100 hours)**
- **Fine adjustment of selected time range**
- **Multi-voltage input (12 – 230V AC/DC)**
- **External trigger input can be from Voltage Free Contact or Solid State**
- **Timer will still function with load connected to trigger (B1) input**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay status**
- **Conforms to IEC 61812**

FUNCTION DIAGRAM



LED operation:

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Range" ❹ to the required position (depending on whether seconds, minutes or hours are required).
- Set the "Set %" adjustment ❸ as required. The "Set %" is a % of the selected range; so for example, a 30% setting on the 1 – 10 hour range will give 3 hours.

Applying power.

- Apply power across terminals **A1** and **A2** and the green LED ❶ will illuminate.
- The relay will remain de-energised (contacts **15** / **16** closed and **15** / **18** open) and red LED ❷ extinguished.
- Close the contact across **A1** and **B1** and the relay will energise (contacts **15** / **16** open and **15** / **18** closed) and red LED illuminate.
- When the contact across **A1** and **B1** opens, the delay period "t" will begin and the green LED will flash to indicate timing is now in progress.
- After the delay period "t" has elapsed, the relay will de-energise (contacts **15** / **16** closed and **15** / **18** open) and the red LED will extinguish.
- The green LED will now remain permanently lit.
- The whole timing process is repeated by removing and re-applying power.
- If during the time period "t", the contact across **A1** and **B1** closes, timing will stop and restart over again the next time the contact opens.

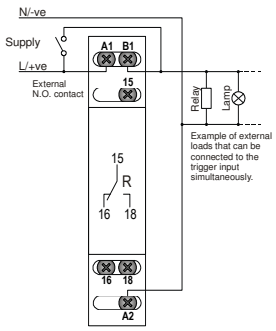
Note:

[1] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change. The dip / interruption duration and levels are defined in the product standard.

TECHNICAL SPECIFICATION

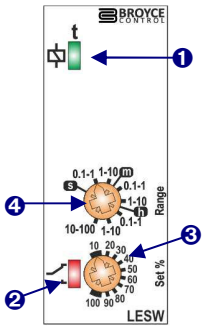
Supply voltage U **(A1, A2)**:	12 – 230V AC/DC			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+/ - 15%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	12V	24V	110V	230V
AC:	0.3VA	0.4VA	1.3VA	3.4VA
DC:	0.26W	0.24W	0.47W	0.95W
Timing function:	Switch Initiated Delay Off			
Timing ranges (7):	Seconds:	Minutes:	Hours:	
	0.1 – 1	0.1 – 1	0.1 – 1	
	1 – 10	1 – 10	1 – 10	
			10 - 100	
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions (IEC 61812)			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
External trigger input **(A1 > B1)**:	Volt Free Contact, Open Collector			
External loading:	Yes, between B1 and A2 (i.e. LED, Relay, Lamp)			
Trigger threshold:	>75% of voltage present between A1 and A2 (auto-set)			
Minimum trigger time:	AC: 60mS DC: 40mS (B1 terminal unloaded)			
Maximum input frequency:	10 Hz (with 50:50 duty cycle)			
Maximum cable length:	10m (between Timer and external switching device)			
Power on indication / Timing[1]:	Green LED			
Relay status	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 60g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

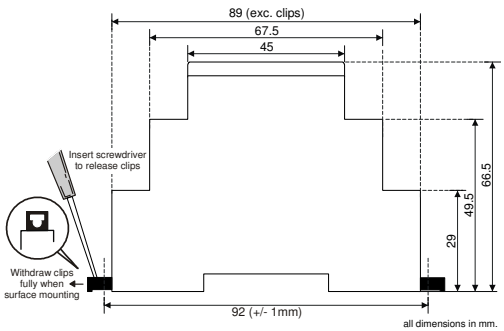


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. Relay output status (Red) LED
3. "Set %" adjustment
4. Time delay "Range" selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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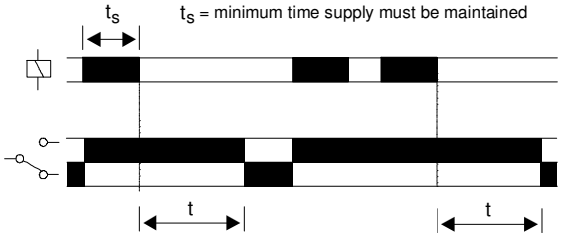
Type: LEDF

True Delay Off Timer (Delay On Release)

- ***NEW* 17.5mm DIN rail housing**
- **True Delay Off timing function**
- **Adjustment of time delay range**
- **Dual-voltage input**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below.
- If 24V AC/DC operation is required then terminals "A1" and "A3" must be linked.

Setting the unit.

- Set the "Delay (t)" adjustment ❷ as required.

Applying power.

- Apply power and the green LED ❶ will illuminate.
- The relay will energise and contacts 15 and 18 close.
- When the power is removed, the green LED will extinguish. The relay will remain energised for delay period "t" then de-energise. Contacts 15 and 18 will open.

Note:

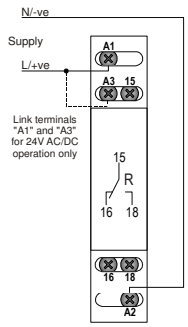
The supply must be maintained for a minimum period of 500mS (t_s) for correct operation. For the 10 minute version, the minimum period is 1 second.

TECHNICAL SPECIFICATION

Supply voltage Un **(A1, A2, A3[1])**	24V AC/DC[1] // 110V AC		
(see note)	24V AC/DC[1] // 230V AC		
	[1] *For 24VAC operation, terminals A1 and A3 are linked*		
Frequency range:	48 - 63Hz		
Supply variation:	+/ - 15%		
Power consumption (@ 1.15 x Un):	24V	110V	230V
AC:	1.3VA	2.7VA	12.8VA
DC:	0.62W	-	-
Timing function:	True Delay Off		
Timing delay (t) options:	Seconds:	Minutes:	
(see note)	0.5 – 10	0.5 – 10	
	1 – 30		
	2 – 60		
Min. power on period (t_s)	500mS		
	1 second (10 minute units)		
Reset time:	200mS		
Repeat accuracy:	± 1% at constant conditions		
Power on indication:	Green LED		
Ambient temp:	-20 to +60°C		
Relative humidity:	+95% max.		
Output **(15, 16, 18)**:	SPDT relay		
Output rating:	AC1		250V 8A (2000VA)
	AC15		250V 3A
	DC1		25V 8A (200W)
Electrical life:	≥ 100,000 ops at rated load (AC1)		
Housing:	Orange flame retardant UL94 V0		
Weight:	≈ 75g		
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.		
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded		
Approvals:	CE, C-tick and RoHS Compliant.		

Note:
Supply voltage and time delay should be specified at the time of ordering.

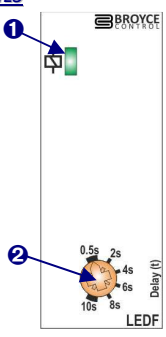
CONNECTION DIAGRAM



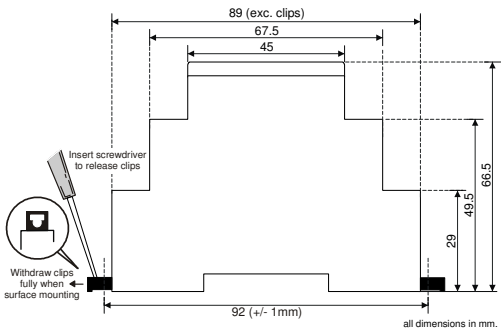
SETTING DETAILS

1. Power supply status (Green) LED
2. Time "Delay (t)" adjustment^

^ 0.5 – 10 second delay version shown on example on the right.



DIMENSIONS



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control relays

- AC Voltage
- AC / DC Voltage
- Under Voltage (Timed)
- DC Voltage
- AC / DC Current
- Frequency
- Logic

Choose your category

Click the above for further information…!

Click here for Main Page

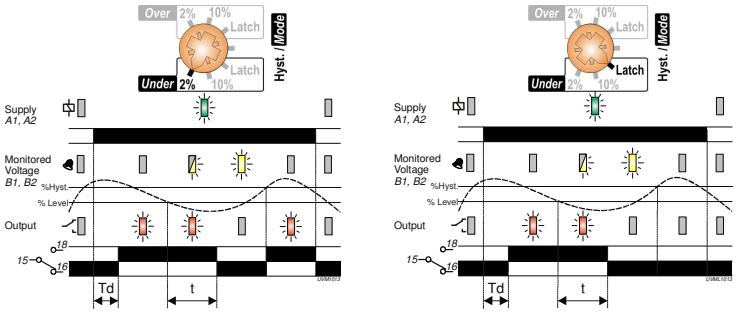
Type: LMCVR-500V

Multifunction, Combined Voltage Relay

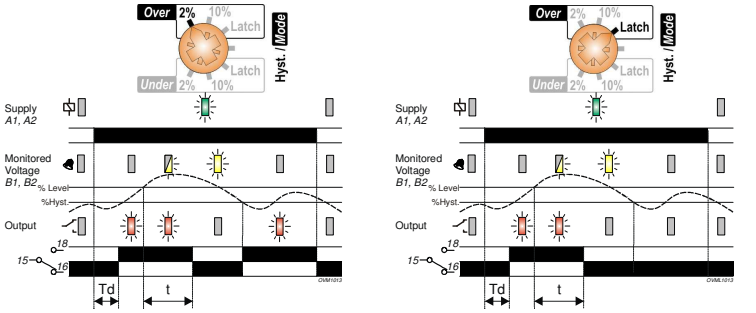
- ❑ ***NEW* 17.5mm DIN rail housing**
- ❑ **Microprocessor based**
- ❑ **True R.M.S. monitoring**
- ❑ **7 Selectable monitoring ranges (20 – 500V AC/DC)**
- ❑ **Selectable Under or Over Voltage monitoring**
- ❑ **Selectable hysteresis or latch option**
- ❑ **Adjustable trip level and time delay**
- ❑ **Isolated Auxiliary Supply (24 – 230V AC/DC) [1]**
- ❑ **1 x SPDT relay output 8A**
- ❑ **Green LED indication for supply status**
- ❑ **Yellow LED indication for alarm status**
- ❑ **Red LED indication for relay status**

FUNCTION DIAGRAMS

Under Voltage Monitoring (with and without Latch enabled)



Over Voltage Monitoring (with and without Latch enabled)



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the Auxiliary and Monitored Inputs as required.

Setting the unit.

- Set the "Hyst. / Mode" selector ❼ to the required position depending whether under or over monitoring is required. Select either a suitable hysteresis setting of 2% or 10% or choose Latch if required.
- Set the "Range" ❻ to the required position (depending on monitored input voltage to be monitored).
- Set the "Trip Level %" ❺ and "Delay" ❹ to suit the selected monitoring range and delay to tripping period.

Applying power.

- Apply power and the green LED ❶ will illuminate.

If Under voltage mode is selected:

- Relay energises / red LED ❸ illuminate if the voltage is above the set "Trip Level". If the voltage falls below the "Trip Level", yellow LED ❷ flashes for the set "Delay" then remains lit. Red LED extinguishes / relay de-energises.

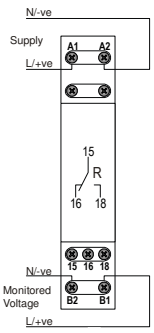
If Over voltage mode is selected:

- Relay energises / red LED ❸ illuminate if the voltage is below the set "Trip Level". If the voltage rises above the "Trip Level", yellow LED ❷ flashes for the set "Delay" then remains lit. Red LED extinguishes / relay de-energises.

TECHNICAL SPECIFICATION

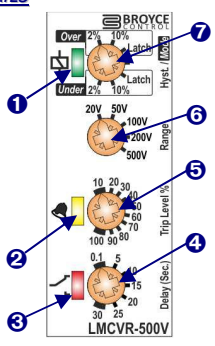
Auxiliary supply voltage U **(A1, A2)**:	24 – 230V AC/DC [1](12 – 60V AC/ DC also available)			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+15%/ - 10%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	24V	48V	115V	230V
AC:	0.84 VA	0.82 VA	1.1 VA	1.4 VA
DC:	0.6 W	0.47 W	0.46 W	0.53 W
Monitoring mode:	Under or Over voltage (selectable)			
Hysteresis:	2 or 10% (selectable)			
Latch:	Enabled using Mode selector switch			
Monitoring ranges:	2 – 20V, 5 – 50V, 10 – 100V, 20 – 200V, 50 – 500V			
Trip level:	10 – 100% of selected monitoring range			
Time delay (t):	0.1 – 30S (from fault occurring to relay de-energising)			
Power up delay (Td):	1 second (fixed)			
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Monitoring input **(B1, B2)**:	0.2 to 500V AC/DC			
Frequency:	DC, 48 – 500Hz			
Maximum input rating:	1.2 x 500V			
Overload:	1kV for 1s			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power on indication:	Green LED			
Alarm status indication:	Yellow LED			
Relay status indication:	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	63g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	CE and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

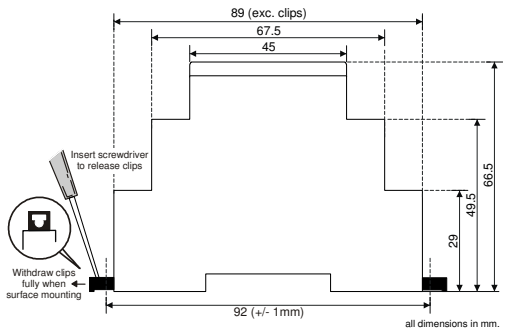


SETTING DETAILS

1. Power supply status (Green) LED
2. Alarm status (Yellow) LED
3. Relay output status (Red) LED
4. Time delay adjustment
5. Trip level adjustment
6. Monitoring range selector
7. Hysteresis / Mode selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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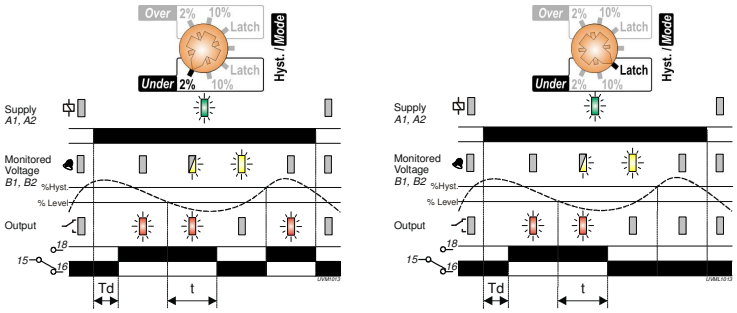
Type: LMCVR-20V

Multifunction, Combined Voltage Relay

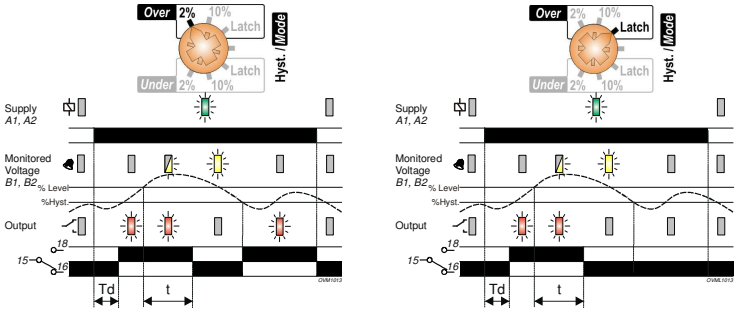
- ***NEW* 17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **7 Selectable monitoring ranges (0.1 – 20V AC/DC)**
- **Selectable Under or Over Voltage monitoring**
- **Selectable hysteresis or latch option**
- **Adjustable trip level and time delay**
- **Isolated Auxiliary supply (24 – 230V AC/DC) [1]**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Yellow LED indication for alarm status**
- **Red LED indication for relay status**

FUNCTION DIAGRAMS

Under Voltage Monitoring (with and without Latch enabled)



Over Voltage Monitoring (with and without Latch enabled)



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the Auxiliary and Monitored Inputs as required.

Setting the unit.

- Set the "Hyst. / Mode" selector ❼ to the required position depending whether under or over monitoring is required. Select either a suitable hysteresis setting of 2% or 10% or choose Latch if required.
- Set the "Range" ❻ to the required position (depending on monitored input voltage to be monitored).
- Set the "Trip Level %" ❺ and "Delay" ❹ to suit the selected monitoring range and delay to tripping period.

Applying power.

- Apply power and the green LED ❶ will illuminate.

If Under voltage mode is selected:

- Relay energises / red LED ❸ illuminate if the voltage is above the set "Trip Level". If the voltage falls below the "Trip Level", yellow LED ❷ flashes for the set "Delay" then remains lit. Red LED extinguishes / relay de-energises.

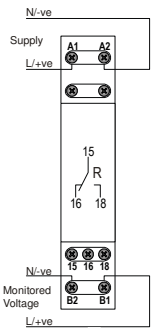
If Over voltage mode is selected:

- Relay energises / red LED ❸ illuminate if the voltage is below the set "Trip Level". If the voltage rises above the "Trip Level", yellow LED ❷ flashes for the set "Delay" then remains lit. Red LED extinguishes / relay de-energises.

TECHNICAL SPECIFICATION

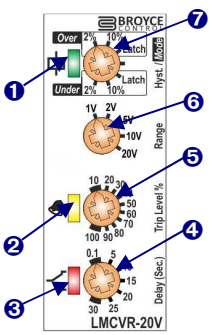
Auxiliary supply voltage U **(A1, A2)**:	24 – 230V AC/DC [1](12 – 60V AC/ DC also available)			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+15%/ - 10%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	24V	48V	115V	230V
AC:	0.84 VA	0.82 VA	1.1 VA	1.4 VA
DC:	0.6 W	0.47 W	0.46 W	0.53 W
Monitoring mode:	Under or Over voltage (selectable)			
Hysteresis:	2 or 10% (selectable)			
Latch:	Enabled using Mode selector switch			
Monitoring ranges:	0.1 – 1V, 0.2 – 2V, 0.5 – 5V, 1 – 10V, 2 – 20V			
Trip level:	10 – 100% of selected monitoring range			
Time delay (t):	0.1 – 30S (from fault occurring to relay de-energising)			
Power up delay (Td):	1 second (fixed)			
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Monitoring input **(B1, B2)**:	0.1 to 20V AC/DC			
Frequency:	DC, 48 – 500Hz			
Maximum input rating:	1.2 x 20V			
Overload:	TBC			
Overvoltage category:	TBC			
Rated impulse withstand voltage:	TBC			
Power on indication:	Green LED			
Alarm status indication:	Yellow LED			
Relay status indication:	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	63g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	CE and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

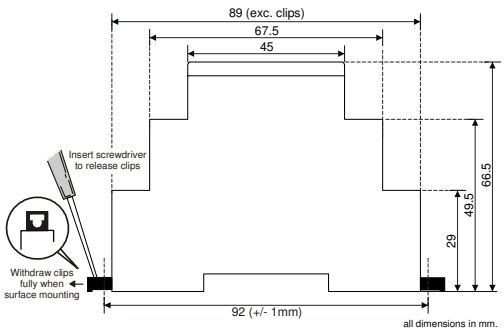


SETTING DETAILS

1. Power supply status (Green) LED
2. Alarm status (Yellow) LED
3. Relay output status (Red) LED
4. Time delay adjustment
5. Trip level adjustment
6. Monitoring range selector
7. Hysteresis / Mode selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

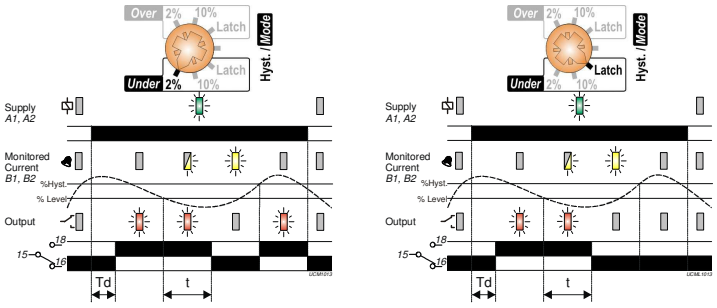
Type: LMCCR-10A

Multifunction, Combined Current Relay

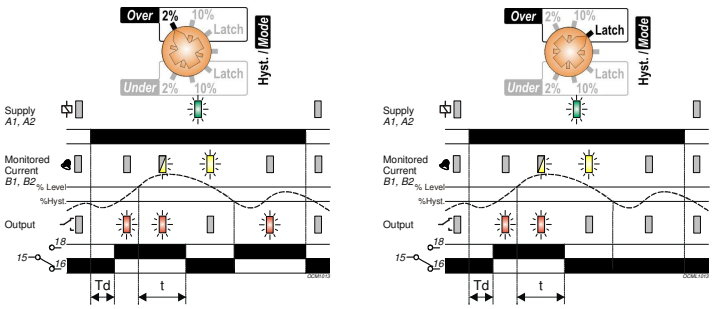
- ❑ ***NEW*** **17.5mm DIN rail housing**
- ❑ **Microprocessor based**
- ❑ **True R.M.S. monitoring**
- ❑ **Monitoring input (0.2 – 10A) split in to 3 selectable ranges**
- ❑ **Selectable Under or Over current monitoring**
- ❑ **Selectable hysteresis or latch option**
- ❑ **Adjustable trip level and time delay**
- ❑ **Isolated Auxiliary supply (24 – 230V AC/DC) [1]**
- ❑ **1 x SPDT relay output 8A**
- ❑ **Green LED indication for supply status**
- ❑ **Yellow LED indication for alarm status**
- ❑ **Red LED indication for relay status**

FUNCTION DIAGRAMS

Under Current Monitoring (with and without Latch enabled)



Over Current Monitoring (with and without Latch enabled)



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the Auxiliary and Monitored Inputs as required.

Setting the unit.

- Set the "Hyst. / Mode" selector ❼ to the required position depending whether under or over monitoring is required. Select either a suitable hysteresis setting of 2% or 10% or choose Latch if required.
- Set the "Range" ❻ to the required position (depending on monitored input current to be monitored). Set the "Power Up Delay" according to whether start up currents are likely in the application.
- Set the "Trip Level %" ❺ and "Delay" ❹ to suit the selected monitoring range and delay to tripping period.

Applying power.

- Apply power and the green LED ❶ will illuminate.

If Under current mode is selected:

- Relay energises / red LED ❸ illuminate if the current is above the set "Trip Level". If the current falls below the "Trip Level", yellow LED ❷ flashes for the set "Delay" then remains lit. Red LED extinguishes / relay de-energises.

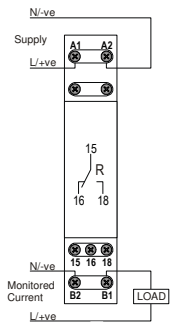
If Over current mode is selected:

- Relay energises / red LED ❸ illuminate if the current is below the set "Trip Level". If the current rises above the "Trip Level", yellow LED ❷ flashes for the set "Delay" then remains lit. Red LED extinguishes / relay de-energises.

TECHNICAL SPECIFICATION

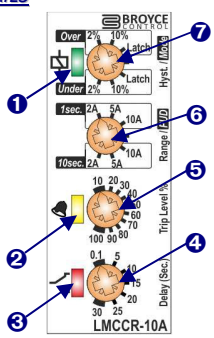
Auxiliary supply voltage U **(A1, A2)**:	24 – 230V AC/DC [1](12 – 60V AC/ DC also available)			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+15%/ - 10%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	24V	48V	115V	230V
AC:	0.84 VA	0.82 VA	1.1 VA	1.4 VA
DC:	0.6 W	0.47 W	0.46 W	0.53 W
Monitoring mode:	Under or Over voltage (selectable)			
Hysteresis:	2 or 10% (selectable)			
Latch:	Enabled using Mode selector switch			
Monitoring ranges:	0.2 – 2A, 0.5 – 5A, 1 – 10A			
Trip level:	10 – 100% of selected monitoring range			
Time delay (t):	0.1 – 30S (from fault occurring to relay de-energising)			
Power up delay (Td):	1 or 10 seconds			
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Monitoring input **(B1, B2)**:	0.01 to 12A AC/DC			
Frequency:	DC, 48 – 70Hz			
Maximum input rating:	1.2 x 10A			
Overload:	20A for 1s			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power on indication:	Green LED			
Alarm status indication:	Yellow LED			
Relay status indication:	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 63g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	CE and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

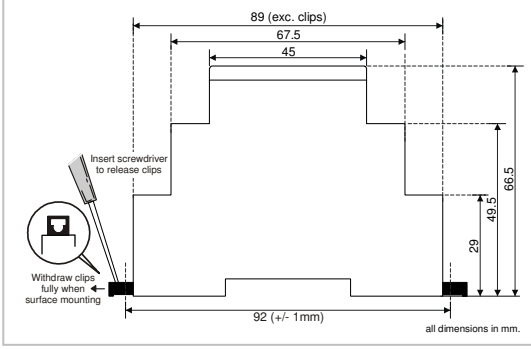


SETTING DETAILS

1. Power supply status (Green) LED
2. Alarm status (Yellow) LED
3. Relay output status (Red) LED
4. Time delay adjustment
5. Trip level adjustment
6. Power up delay / Monitoring range selector
7. Hysteresis / Mode selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

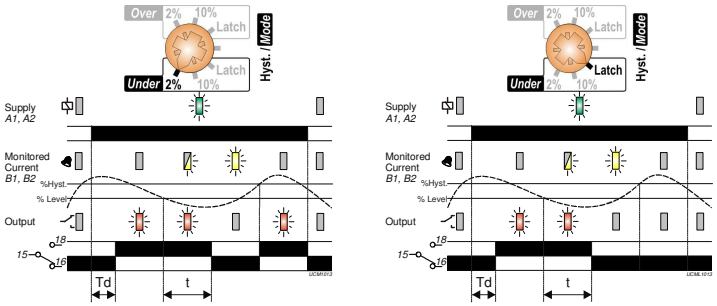
Type: LMCCR-2A

Multifunction, Combined Current Relay

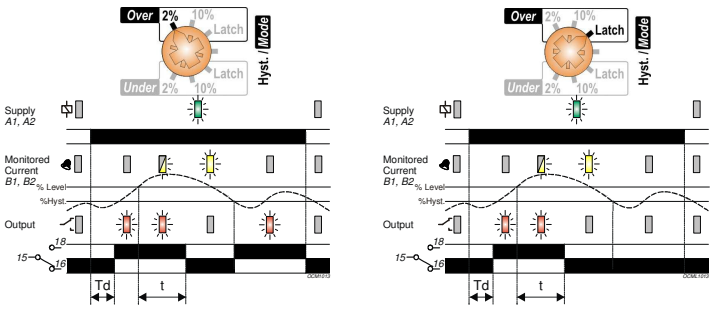
- ❑ ***NEW*** **17.5mm DIN rail housing**
- ❑ **Microprocessor based**
- ❑ **True R.M.S. monitoring**
- ❑ **Monitoring input (0.02 – 2A) split in to 3 selectable ranges**
- ❑ **Selectable Under or Over current monitoring**
- ❑ **Selectable hysteresis or latch option**
- ❑ **Adjustable trip level and time delay**
- ❑ **Isolated Auxiliary supply (24 – 230V AC/DC) [1]**
- ❑ **1 x SPDT relay output 8A**
- ❑ **Green LED indication for supply status**
- ❑ **Yellow LED indication for alarm status**
- ❑ **Red LED indication for relay status**

FUNCTION DIAGRAMS

Under Current Monitoring (with and without Latch enabled)



Over Current Monitoring (with and without Latch enabled)



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the Auxiliary and Monitored Inputs as required.

Setting the unit.

- Set the "Hyst. / Mode" selector ❼ to the required position depending whether under or over monitoring is required. Select either a suitable hysteresis setting of 2% or 10% or choose Latch if required.
- Set the "Range" ❻ to the required position (depending on monitored input current to be monitored). Set the "Power Up Delay" according to whether start up currents are likely in the application.
- Set the "Trip Level %" ❺ and "Delay" ❹ to suit the selected monitoring range and delay to tripping period.

Applying power.

- Apply power and the green LED ❶ will illuminate.

If Under current mode is selected:

- Relay energises / red LED ❸ illuminate if the current is above the set "Trip Level". If the current falls below the "Trip Level", yellow LED ❷ flashes for the set "Delay" then remains lit. Red LED extinguishes / relay de-energises.

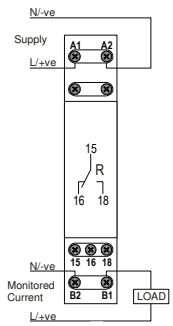
If Over current mode is selected:

- Relay energises / red LED ❸ illuminate if the current is below the set "Trip Level". If the current rises above the "Trip Level", yellow LED ❷ flashes for the set "Delay" then remains lit. Red LED extinguishes / relay de-energises.

TECHNICAL SPECIFICATION

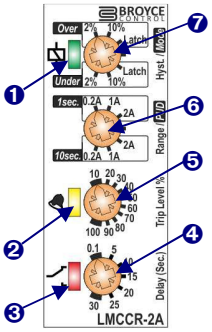
Auxiliary supply voltage U **(A1, A2)**:	24 – 230V AC/DC [1](12 – 60V AC/ DC also available)			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+15%/ - 10%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	24V	48V	115V	230V
AC:	0.84 VA	0.82 VA	1.1 VA	1.4 VA
DC:	0.6 W	0.47 W	0.46 W	0.53 W
Monitoring mode:	Under or Over voltage (selectable)			
Hysteresis:	2 or 10% (selectable)			
Latch:	Enabled using Mode selector switch			
Monitoring ranges:	0.02 – 0.2A, 0.1 – 1A, 0.2 – 2A			
Trip level:	10 – 100% of selected monitoring range			
Time delay (t):	0.1 – 30S (from fault occurring to relay de-energising)			
Power up delay (Td):	1 or 10 seconds			
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Monitoring input **(B1, B2)**:	0.01 to 2.4A AC/DC			
Frequency:	DC, 48 – 70Hz			
Maximum input rating:	1.4 x 5A			
Overload:	5A for 1s			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power on indication:	Green LED			
Alarm status indication:	Yellow LED			
Relay status indication:	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	≈ 63g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	CE and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

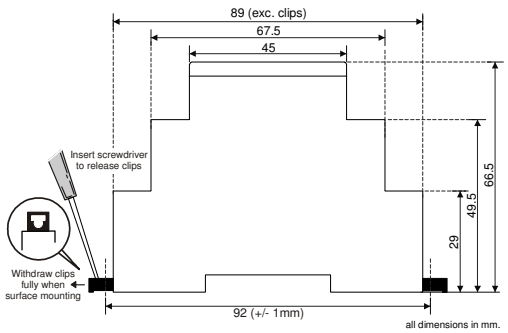


SETTING DETAILS

1. Power supply status (Green) LED
2. Alarm status (Yellow) LED
3. Relay output status (Red) LED
4. Time delay adjustment
5. Trip level adjustment
6. Power up delay / Monitoring range selector
7. Hysteresis / Mode selector



DIMENSIONS



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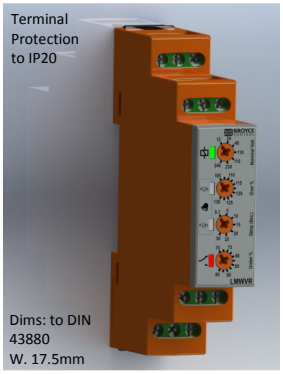
ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: LMWVR

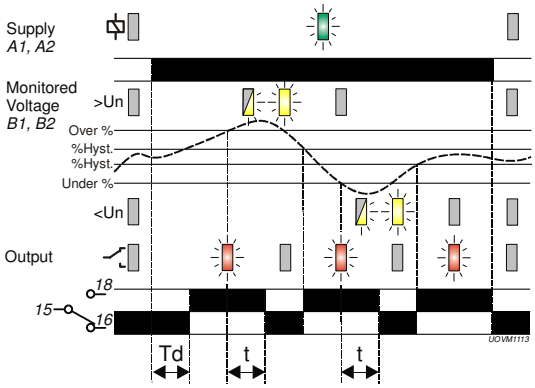
Multifunction, Window Voltage Relay



- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **7 Selectable Nominal voltage ranges (12 – 240V AC/DC)**
- **Window operation Under and Over voltage monitoring**
- **Adjustable Under and Over voltage trip levels**
- **Adjustable time delay**
- **Isolated Auxiliary supply (24 – 230V AC/DC) [1]**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Separate Red LED indication for Under or Over voltage condition**

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the Auxiliary and Monitored Inputs as required.

Setting the unit.

- Set the "Nominal voltage" selector ❽ to the match that of the voltage being monitored on terminals B1 and B2.
- Set the "Under %" ❺ and "Over %" ❼ trip levels as required. These are scaled as a % of the selected nominal voltage.
- Set the "Delay" ❻ as required.

Applying power.

- Apply power and the green LED ❶ will illuminate. Both yellow LED's will remain extinguished and the relay will energise. The red LED ❷ will also illuminate.

Under voltage condition:

- If the monitored voltage falls below the "Under %" trip level the yellow "<Un" LED ❸ will start flashing. The relay will de-energise and red LED extinguish after the delay period "t" has elapsed. The yellow LED will then remain illuminated to indicate an under voltage condition. The relay will re-energise/red LED illuminate (and yellow LED extinguish) when the voltage rises above the trip level plus the hysteresis.

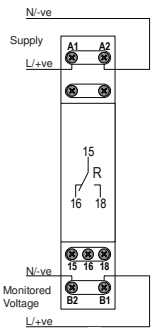
Over voltage condition:

- If the monitored voltage rises above the "Over %" trip level the yellow ">Un" LED ❷ will start flashing. The relay will de-energise and red LED extinguish after the delay period "t" has elapsed. The yellow LED will then remain illuminated to indicate an over voltage condition. The relay will re-energise/red LED illuminate (and yellow LED extinguish) when the voltage falls below the trip level minus the hysteresis.

TECHNICAL SPECIFICATION

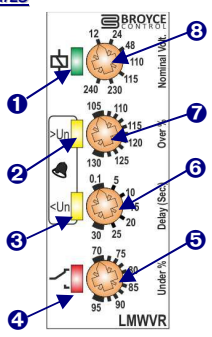
Auxiliary supply voltage U **(A1, A2)**:	24 – 230V AC/DC [1](12 – 60V AC/ DC also available)			
Frequency range:	48 - 63Hz (AC supplies)			
Supply variation:	+15%/ - 10%			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	24V	48V	115V	230V
AC:	0.84 VA	0.82 VA	1.1 VA	1.4 VA
DC:	0.6 W	0.47 W	0.46 W	0.53 W
Monitoring mode:	Under and Over voltage (Window)			
Hysteresis:	2% fixed			
Selectable nominal voltages (Un):	12, 24, 48, 110, 115, 230, 240V			
Under trip level adjustment:	70 – 95% of Un			
Over trip level adjustment:	105 – 130% of Un			
Time delay (t):	0.1 – 30S (from fault occurring to relay de-energising)			
Power up delay (Td):	1 second (fixed)			
Reset time:	100mS			
Accuracy:	± 1% of maximum full scale			
Adjustment accuracy:	< 5% of maximum full scale			
Repeat accuracy:	± 0.5% at constant conditions			
Drift with temperature:	± 0.05% / °C			
Drift with voltage:	± 0.2% / V			
Monitoring input **(B1, B2)**:	0.2 to 350V AC/DC			
Frequency:	DC, 48 – 500Hz			
Maximum input rating:	500V			
Overload:	1kV for 1s			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power on indication:	Green LED			
Under voltage trip indication:	Yellow LED			
Over voltage trip indication:	Yellow LED			
Relay status indication:	Red LED			
Ambient temp:	-20 to +60°C			
Relative humidity:	+95%			
Output **(15, 16, 18)**:	SPDT relay			
Output rating:	AC1	250V 8A (2000VA)		
	AC15	250V 5A (no), 3A (nc)		
	DC1	25V 8A (200W)		
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	63g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	CE and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4			

CONNECTION DIAGRAM

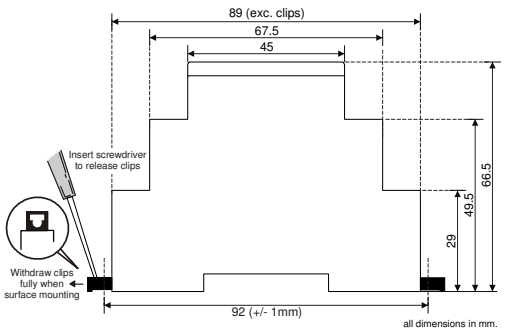


SETTING DETAILS

1. Power supply status (Green) LED
2. Over voltage trip indication (Yellow) LED
3. Under voltage trip indication (Yellow) LED
4. Relay energised (Red) LED
5. Under voltage trip level adjustment
6. Time delay adjustment
7. Over voltage trip level adjustment
8. Nominal voltage selector



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

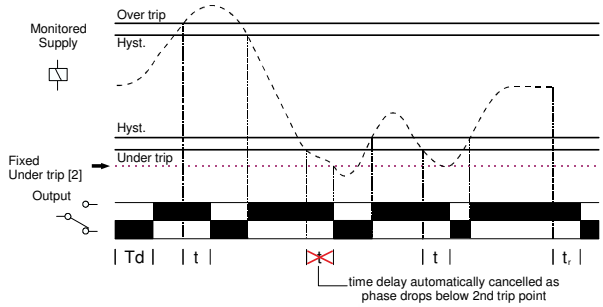
Type: LXCVR

Single Phase, Under and Over Voltage plus Time Delay

- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects if the supply exceeds the set Under or Over voltage trip levels**
- **Single Phase operation**
- **Adjustment for Under voltage trip level**
- **Adjustment for Over voltage trip level**
- **Adjustment for Time delay (from an Under or Over voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Over %" ❸ adjustment to maximum and the "Under %" ❺ adjustment to minimum. Set the "Delay (t)" ❹ to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the maximum "Over %" trip setting by approx. 5% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

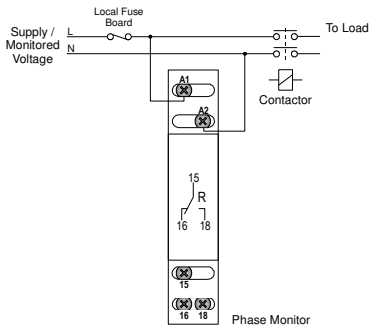
Supply fault	Green LED	Red LED	Relay
No supply	Off	Off	De-energised
Under or Over Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under or Over Voltage condition (after timing)	On	Off	De-energised
Supply below 70% of Un (fixed under trip level [2])	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un* **(A1, A2):**	110, 115, 220[1], 230[1], 240V[1] AC		
Frequency range:	48 – 63Hz		
Supply variation:	70 – 130% Un		
Overvoltage category:	III (IEC 60664)		
Rated impulse withstand voltage:	[1]4kV (1.2/50µS) IEC 60664		
Power consumption (max.):	8VA		
Monitoring mode:	Under and Over voltage		
Trip levels:			
Under [2]:	70% of Un (fixed) ± 2%		
Under:	75 – 95% of Un		
Over:	105 – 125% of Un		
Measuring ranges:	Under [2]	Under	Over
110V:	77V	83 – 105V	116 – 138V
115V:	80V	86 – 109V	121 – 144V
220V:	154V	165 – 209V	231 – 275V
230V:	161V	173 – 218V	242 – 288V
240V:	168V	180 – 228V	252 – 300V
Hysteresis:	≈ 2% of trip level (factory set)		
Setting accuracy:	± 3%		
Repeat accuracy:	± 0.5% at constant conditions		
Immunity from micro power cuts:	<50mS		
Response time:	≈ 50mS		
Time delay (t):	0.2 – 10 sec. (± 5%)		
	Note: actual delay (t) = adjustable delay + response time		
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)		
Power on indication:	Green LED		
Relay status indication:	Red LED		
Ambient temp:	-20 to +60°C		
Relative humidity:	+95%		
Output **(15, 16, 18)**:	SPDT relay		
Output rating:	AC1	250V 8A (2000VA)	
	AC15	250V 5A (no), 3A (nc)	
	DC1	25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load		
Dielectric voltage:	2kV AC (rms) IEC 60947-1		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Housing:	Orange flame retardant UL94		
Weight:	75g		
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.		
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded		
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4		

* Please state Supply/monitoring voltage when ordering

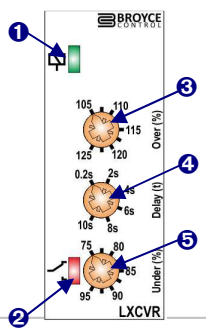
CONNECTION DIAGRAM



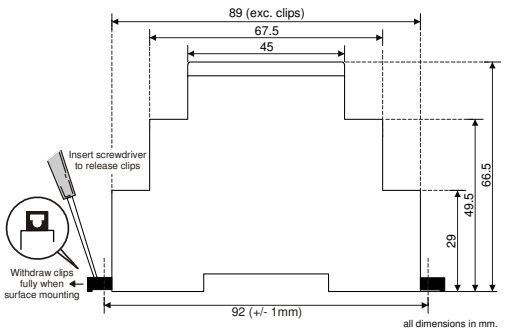
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Over %" trip level adjustment^
4. "Delay" adjustment
5. Under %" trip level adjustment^

^scaled as % of the nominal voltage "Un"



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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Type: LCVR/2

Under and Over Voltage plus Time Delay

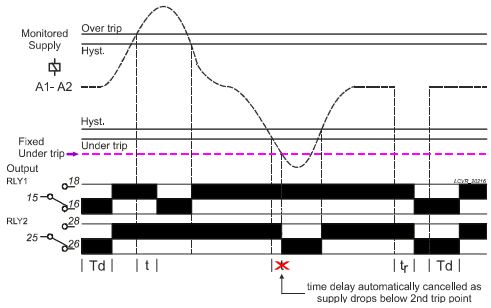
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- Compact 17.5mm DIN rail housing
- Microprocessor based
- True R.M.S. monitoring
- Selectable nominal voltages to suit most popular single phase supply voltages
- Monitors own supply and detects if the set Under or Over voltage trip levels are exceeded
- Adjustments for Under and Over voltage trip levels
- Adjustment for Time delay
- Independent relay outputs - Under voltage monitoring (RLY2) / Over voltage monitoring (RLY1)
- 2 x SPDT relay output 5A
- Green LED indication for supply status
- Individual Red LED indication for both relay statuses

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Voltage monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Nominal (Un)" ❹ voltage selector to match that of the voltage being monitored.
- Set the Over %" ❺ adjustment to maximum and the "Under %" ❼ adjustment to minimum. Set the "Delay (t)" ❻ to minimum.
- Apply power and the green "Power supply" ❶ LED will illuminate. Both the red "RLY1" ❷/"RLY2" ❸ LED's will illuminate and corresponding RLY1 and RLY2 relays energise after the short Power on delay (Td).
- Refer to the Troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and both relays de-energise immediately).

Troubleshooting.

The table below shows the status of the unit during a particular fault condition.

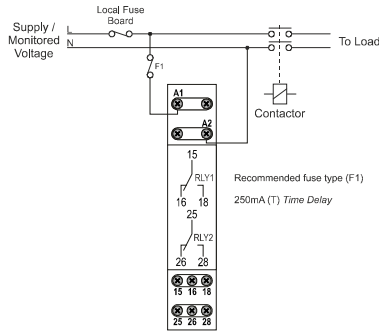
Supply fault	Green LED ❶	Red LED ❷	Red LED ❸	Relay RLY1	Relay RLY2
Under voltage condition (during timing)	On	On	Flashing	Energised	En for delay (t)
Under voltage condition (after timing)	On	Off	Off	Energised	De-energised
Over voltage condition (during timing)	On	Flashing	On	En for delay (t)	Energised
Over voltage condition (after timing)	On	Off	On	De-energised	Energised
Supply < fixed under trip level [2]	On	Off	Off	De-energised	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un **(A1, A2):**				
LCVR/2 (LV)*	110, 115V AC			
LCVR/2 (HV)*	220, 230, 240V AC			
Frequency range:	48 – 63Hz			
Supply variation:	LV: 70 – 150V HV: 140 – 315V AC			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	2.5VA			
Monitoring mode:	Under and Over voltage			
Trip levels:				
Under [2]:	Fixed ± 2% *see below*			
Under:	75 – 95% of Un			
Over:	105 – 125% of Un			
Measuring ranges:	Nominal (Un)	Under [2]	Under	Over
LCVR/2 (LV)	**110V**	70V	83 – 105V	116 – 138V
	115V	74V	156 – 198V	218 – 260V
LCVR/2 (HV)	**220V**	140V	165 – 209V	231 – 275V
	230V	147V	173 – 219V	242 – 288V
	240V	153V	180 – 228V	252 – 300V
Hysteresis:	≈ 2% of trip level (factory set)			
Setting accuracy:	± 3%			
Repeat accuracy:	± 0.5% at constant conditions			
Immunity from micro power cuts:	<50ms			
Response time:	≈ 50ms			
Time delay (t):	0.2 – 10s (± 5%)			
	Note: actual delay (t) = adjustable delay + response time			
Power on delay (Td):	≈ 1s (worst case = Td x 2)			
Reset time:	50 – 100ms			
Power on indication:	Green LED			
Relay status indication:	Red LED x2			
Ambient temperature:	-20 to +60°C			
Relative humidity:	+95% max.			
Output **(15, 16, 18 / 25, 26, 28)**:	2 x SPDT relay			
Output rating:	AC1		250V 5A (1250VA)	
	AC15		250V 2A	
	DC1		25V 5A (125W)	
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	90g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4			

* Please state model variant when ordering

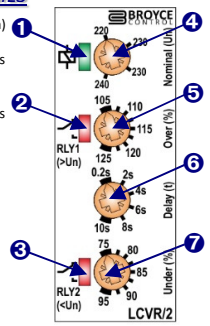
CONNECTION DIAGRAM



SETTING DETAILS

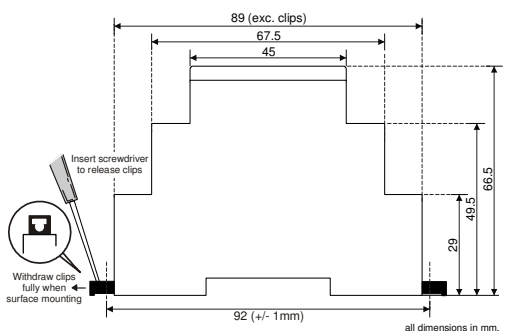
1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED for Over voltage tripping
3. Relay output / Timing status (Red) LED for Under voltage tripping
4. "Nominal (Un)" voltage selector
5. "Over %" trip level adjustment^
6. "Delay (t)" adjustment
7. Under %" trip level adjustment^

^scaled as % of the selected nominal voltage "Un"



Above example showing LCVR/2 (HV)

DIMENSIONS



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ISO 9001 REGISTERED FIRM

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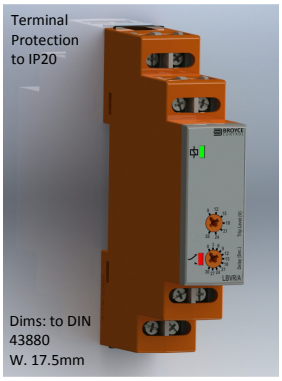
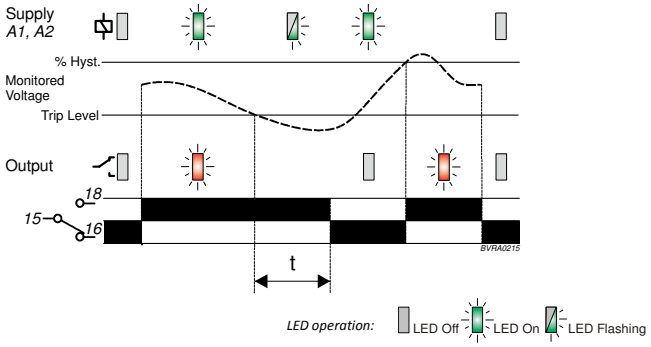
Type: LBVR/A

Battery Voltage Relay



- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **Suited to 12V and 24V batteries**
- **Monitors own supply and detects and Under voltage condition**
- **Adjustment for Under voltage trip level (9 – 28V)**
- **Adjustment for Time delay (from an Under voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required taking note of the polarity of the connections. Terminal **A1** is the positive connection and **A2** the negative.

Setting the unit.

- Set the Under voltage "Trip Level (V)" ❹ adjustment to the voltage required.
- Set the "Delay (t)" ❸ to minimum.

Applying power.

- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.
- If the supply voltage drops below the trip level setting, the green LED will start to flash. The relay will then de-energise (contacts 15 and 18 open) after the delay period "t" and the red LED will extinguish. The green LED will then remain permanently lit.
- When the voltage increases above the trip level + hysteresis, then relay will re-energise and red LED illuminate.

Troubleshooting.

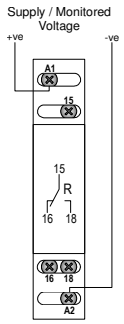
The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
No supply	Off	Off	De-energised
Under voltage condition (during timing)	Flashing	On	Energised for set delay (t)
Under voltage condition (after timing)	On	Off	De-energised

TECHNICAL SPECIFICATION

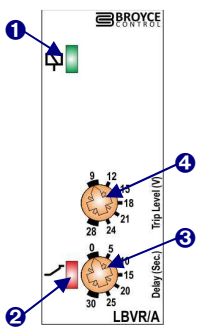
Supply/monitoring voltage U **(A1, A2):**	12 – 24V DC	
Supply variation:	75 – 125% U	
Power consumption (max.):	3W	
Monitoring mode:	Under voltage	
Trip level:	9 – 28V DC	
Hysteresis:	≈ 5% of trip level (factory set)	
Setting accuracy:	± 10%	
Repeat accuracy:	± 0.5% at constant conditions	
Response time:	≈ 100mS	
Time delay (t):	0 – 30 Sec. (± 5%)	
	Note: actual delay (t) = adjustable delay + response time	
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)	
Power on indication:	Green LED	
Relay status indication:	Red LED	
Ambient temp:	-20 to +60°C	
Relative humidity:	+95%	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 8A (2000VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	70g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity/Emissions to EN 61000-6	

CONNECTION DIAGRAM

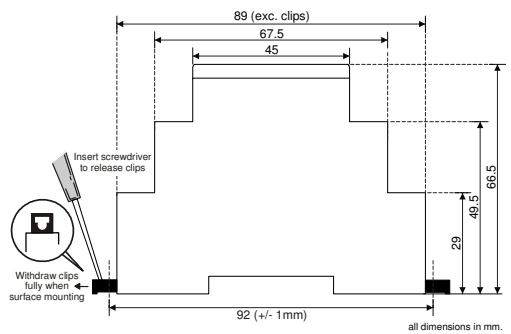


SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output status (Red) LED
3. "Delay" adjustment
4. "Under" trip level adjustment



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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Type: M1TVR

Timed Under Voltage Relay (Delayed Restart)

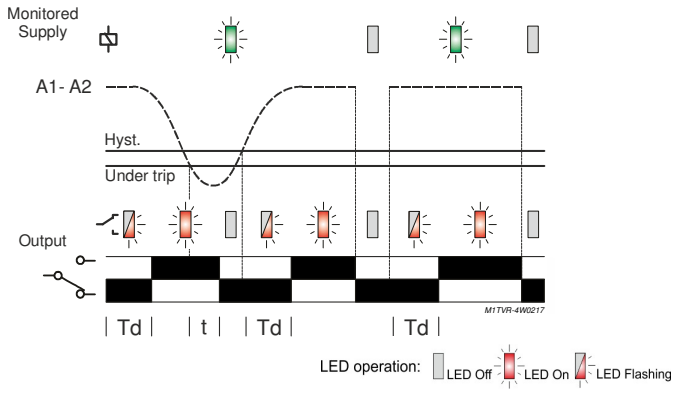
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- **Red LED flashes during restart delay period (Td) confirming supply is above the fixed trip level**
- **Meets DEWA regulations (Section 8.2)***
- **Temperature rating up to +60°C**
- **Monitors own supply and detects an Under voltage condition**
- **Fixed Under voltage trip level (75% of Un)**
- **Adjustable Time delay (5 – 10m)**
- **SPDT relay output 6A**
- **Green LED indication for supply status**
- **Red LED also used for relay status**
- **Compact 17.5mm DIN rail housing**

QMS ISO 9001 REGISTERED
ISO 9001:2015
Cert. No. 14125771

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the unit. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Apply power and the green LED ❶ will illuminate. The relay will remain de-energised.
- Assuming the supply voltage is above the fixed trip level (plus hysteresis) the delay period (Td) will commence and the red LED ❷ will flash during this period.
- After the set delay has elapsed, the relay will energise and red LED ❷ remain on.

Setting the unit

- Set the "Delay (Td)" ❸ adjustment as required.

Troubleshooting.

The table below shows the status of the unit during a particular condition.

Supply status	Green LED ❶	Red LED ❷	Relay
No supply	Off	Off	De-energised
Under voltage condition	On	Off	De-energised
Following supply loss or voltage returning > 75% of Un	On	Flashing	De-energised for delay period (Td)

TECHNICAL SPECIFICATION

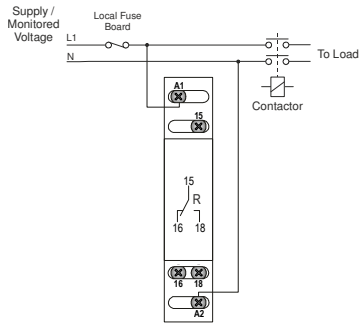
Supply/monitoring voltage		
Un **(A1, A2):**	230V AC	
Frequency range:	48 – 63Hz	
Supply variation:	70 – 110% Un	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	10VA @ 1.1 x Un	
Monitoring mode:	Under voltage	
Trip levels:		
Under:	75% of Un (Fixed)	
Trip accuracy:	± 5%	
Hysteresis:	≈ 2% of fixed trip level (factory set)	
Response time (t):	< 150ms	
Restart time delay (Td):	5 – 10m (± 5%)	
Setting accuracy:	± 5%	
Repeat accuracy:	± 0.5% at constant conditions	
Reset time:	≈ 150ms	
LED indication:	Green LED (Power supply)	
	Red LED (Relay/timing status)	
Ambient temperature:	-20 to +60°C	
Relative humidity:	+95% max.	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 6A (1500VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 6A (150W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	61g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Terminal screw:	M3 (Designed for use with **PZ1** "pozi-driver")	
Tightening torque:	0.6Nm Max.	
Approvals:	Conforms to IEC. CE, ✔ and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4	

** The following extract is taken from **DEWA Regulations for Electrical Installations***

8.2 **UNDER VOLTAGE (U.V.) RELAYS WITH AUTO-RESET TIMER**

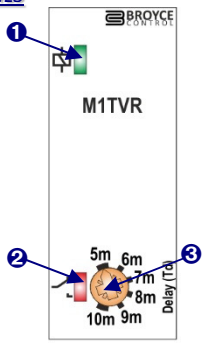
8.2.1 All air-conditioners or air-conditioning units/plants/equipment installed within the consumer's installation shall be provided with Under Voltage (U.V.) relays with fixed voltage cut off setting at 75% of the nominal supply voltage and auto-reset timer with adjustable time setting between 5 and 10 minutes.

CONNECTION DIAGRAM

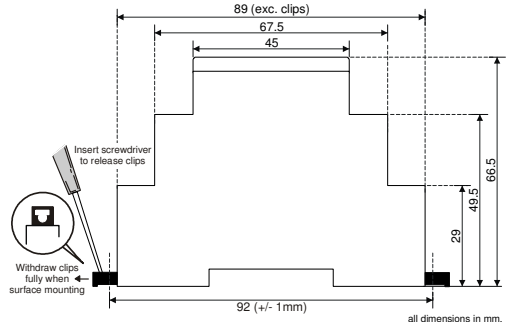


SETTING DETAILS

1. Supply status (Green) LED
2. Relay output/timing status (Red) LED
3. "Delay (Td)" adjustment



DIMENSIONS



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The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: 45 UFR & 45 OFR

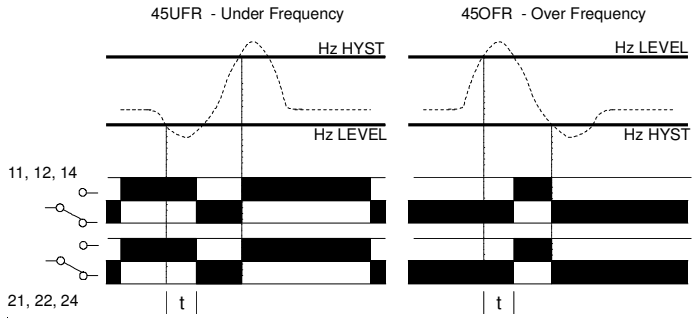
Frequency Relay

The unit is designed to monitor the frequency of its own supply. The 45UFR is used for monitoring under frequency conditions, whereby the relay will de-energise when the frequency drops below the adjustable trip point. The relay re-energises when the frequency increases above the trip point plus the hysteresis. The 45OFR functions by energising the relay when the frequency rises above the adjustable trip point and de-energises when the frequency drops below the trip point minus the hysteresis. A green LED indicates the supply is present whilst a red LED indicates the relay is energised.

Dims:
H.78 mm
W.45 mm
L.99 mm

Terminal Protection to IP20

▪ TIMING DIAGRAM



▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green **'supply on'** LED should illuminate.

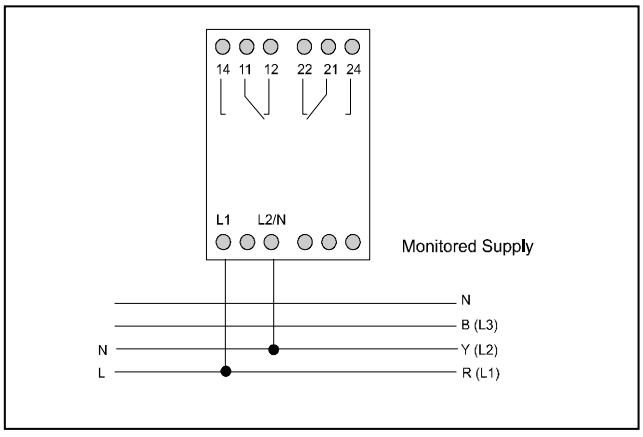
45UFR: The red **'relay'** LED should illuminate and the relay energise if the frequency is above the set **'Hz level'**

45OFR: The red **'relay'** LED should remain extinguished and the relay de-energised if the frequency is below the set **'Hz level'**

If on either unit the green LED illuminates but the red LED and relay indicate a fault, then check all connections and the voltage present

Set the **'Hz level'** and the **'Hz hyst'** adjustments as required.

▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply Voltage Un:	110, 230, 400V AC 40 - 73Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	3VA @ Un
Trip Level:	1. 40 - 60Hz (45UFR & 45OFR) 2. 50 - 70Hz (45UFR & 45OFR) (Specify range when ordering)
Hysteresis:	0.3 to 3Hz (user adjustable)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	≈ 200mS (see Options 1 & 2)
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	300g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal Conductor Size:	Max 2 x 1.5mm^2 stranded (terminated) Max 2 x 2.5mm^2 solid
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE Compliant

▪ OPTIONS

1. The above units can be supplied with an internally set time delay which prevents the relay from changing state immediately the frequency passes the trip point. The delay (ranging from 1 to 10 seconds) should be specified, prior to ordering.
2. Where it is necessary for the user to set the time delay, the unit can be supplied with the hysteresis adjustment replaced with a time delay adjustment. On these units, the delay is adjustable from 0.2 to 10 seconds. The hysteresis is then factory set to 1%.

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level control relays

- Conductive – Fixed Sensitivity (2 level)
- Conductive – Fixed Sensitivity (2 level + Alarm)
- Conductive – Selectable Pump Up / Pump Down

Choose your category

Click the above for further information…!

Click here for Main Page

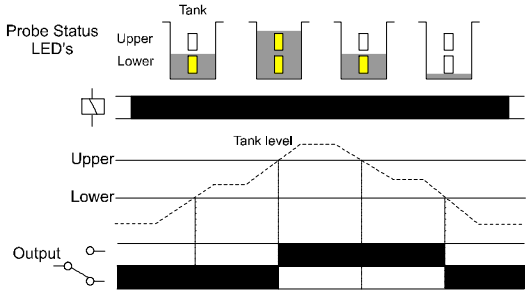
Type: E-FLC2

Floatless Level Controller

- ❑ **Designed to monitor the level of a liquid within a tank or container**
- ❑ **2 levels of monitoring - Low and High levels**
- ❑ **Fixed Operate and Release Resistance**
- ❑ **Up to 1km distance between controller and probes**
- ❑ **Built in Surge Arrestors protect each probe input against lightning strikes**
- ❑ **Unique LED indication of probe/tank level status**
- ❑ **Additional LED indication for supply and relay output status**
- ❑ **1 x SPDT relay output**

Dims:
W. 70mm
Terminal Protection
to IP20

FUNCTION DIAGRAM



INSTALLATION AND SETTING

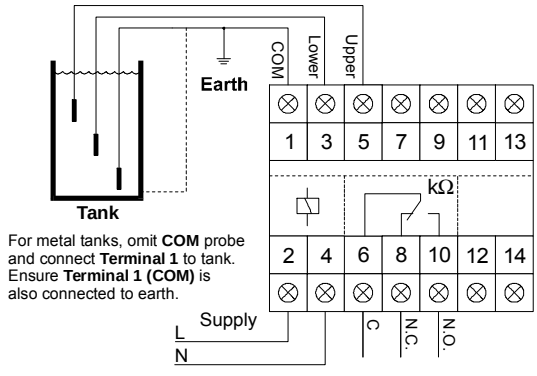
Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below. For metal tanks, the COM probe can be connected to the tank itself. For non-metallic tanks, ensure the COM probe is located below the other two probes (i.e., at the bottom).
- NOTE: Terminal 1 (COM) must be connected to Earth at all times.
- Apply power and the green "power on" LED will illuminate.
- The LED's on the front of the controller will illuminate according to the level of the liquid within the tank.
- When the Lower and Upper probes are covered by the liquid, both yellow LED's will illuminate and the output relay will energise. The relay will remain energised until both probes are uncovered. Both yellow LED's will extinguish. A red LED is provided to indicate the status of this relay (illuminated when energised).

Note: For testing purposes only (and with the tank empty), it is possible to energise the output relay by connecting a N.O. push button between COM and Upper probe. The relay will de-energise when the push button is released.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc)

CONNECTION DIAGRAM



TECHNICAL SPECIFICATION

Supply voltage Un:	230V AC 50/60Hz
Supply variation:	85 - 115% of Un
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664
Power consumption:	≈ 4 VA
Interelectrode voltage:	≈ 8 V AC
Maximum current:	≈ 5mA AC
Function resistance	
Operate:	≈ 4kΩ min.
Release:	≈ 15kΩ max.
Time delay	
Operate:	≤ 80mS
Release:	≤ 160mS
Distance between probes and relay:	1km max.
Surge Protection (applied to each probe input when referenced to COM)	
Spark-over voltage:	90V DC ±20V
Impulse discharge current:	10kA (8/20µS waveform)
Ambient temp:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x SPDT
Output rating:	AC 1 250V AC 8A (2000VA) AC 15 250V AC 2.5A DC 1 25V DC 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 170g
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm² stranded ≤ 4mm² solid
Approvals:	Conforms to IEC. CE and Compliant

OPTIONS

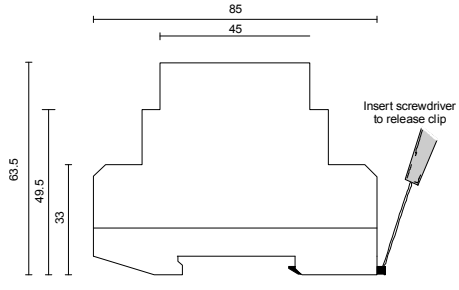
1. The operation of the relay can be inverted such that the relay de-energises when the lower and the upper probes are covered by the liquid.

Please specify option when ordering.

ACCESSORIES

Please refer to latest catalogue for probes, probe holders, etc

MOUNTING DETAILS



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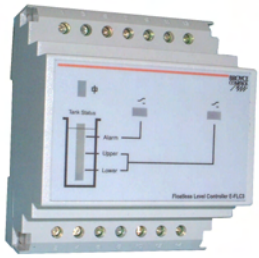
Type: E-FLC3

Floatless Level Controller with Alarm Output

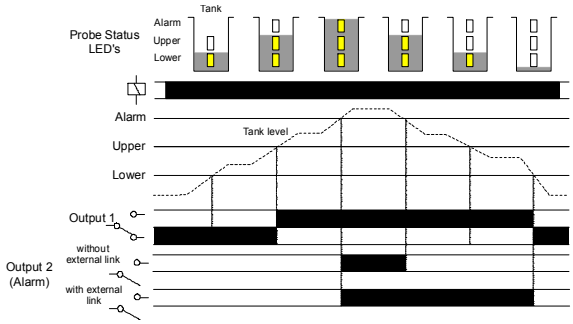
- ❑ **Designed to monitor the level of a liquid within a tank or container**
- ❑ **3 levels of monitoring - Low, High and Alarm levels**
- ❑ **Fixed Operate and Release Resistance**
- ❑ **Up to 1km distance between controller and probes**
- ❑ **Built in Surge Arrestors protect each probe input against lightning strikes**
- ❑ **Unique LED indication of probe/tank level status**
- ❑ **Additional LED indication for supply and relay output status**
- ❑ **1 x SPDT relay output (Output 1) and 1 x SPNO relay output (Output 2 - Alarm)**



Dims:
W. 70mm

Terminal Protection to IP20

FUNCTION DIAGRAM



INSTALLATION AND SETTING

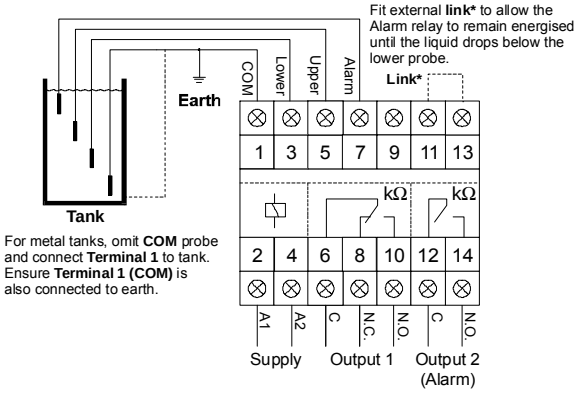
Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below. For metal tanks, the COM probe can be connected to the tank itself. For non-metallic tanks, ensure the COM probe is located below the other probes (i.e., at the bottom).
- NOTE: Terminal 1 (COM) must be connected to Earth at all times.
- Apply power and the green "power on" LED will illuminate.
- The LED's on the front of the controller will illuminate according to the level of the liquid within the tank.
- When the Lower and Upper probes are covered by the liquid, both yellow LED's will illuminate and "output 1" relay will energise. The relay will remain energised until both probes are uncovered. Both yellow LED's will extinguish. A red LED is provided to indicate the status of this relay (illuminated when relay is energised).
- If the Alarm probe is also covered by the same liquid, the yellow "Alarm covered" LED will illuminate and "output 2" relay will energise. This will remain energised until:
  a, the Alarm probe is uncovered, (terminals 11 and 13 NOT linked), or
  b, the liquid drops below the Lower probe (terminals 11 and 13 linked).
  A red LED illuminates when this relay is energised.

Note: For testing purposes only (and with the tank empty), it is possible to energise the "output 1" relay by connecting a N.O. push button between COM and Upper probe. The relay will de-energise when the push button is released.

This unit should be installed in conjunction with the latest wiring regulations and practices (IEE, etc)

CONNECTION DIAGRAM



TECHNICAL SPECIFICATION

Supply voltage Un:	230V AC 48 - 63Hz
Supply variation:	85 - 115% of Un
Isolation:	Over voltage cat. III
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664
Power consumption:	≈ 3VA @ Un. ≈ 8VA @ 1.15 x Un.
Interelectrode voltage:	≈ 8 V AC @ Un
Maximum current:	≈ 5mA AC
Function resistance	
Operate:	≈ 4kΩ min.
Release:	≈ 15kΩ max.
Time delay	
Operate:	≤ 80mS
Release:	≤ 160mS
Distance between probes and relay:	1km max.
Surge Protection (applied to each probe input when referenced to COM)	
Spark-over voltage:	90V DC ±20V
Impulse discharge current:	10kA (8/20µS waveform)
Ambient temp:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x SPDT (Output 1), 1 x SPNO (Output 2 - Alarm)
Output rating:	AC 1 250V AC 8A (2000VA) AC 15 250V AC 2.5A DC 1 25V DC 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Dielectric voltage:	2kV AC (rms) IEC 60947-1
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664
Housing:	Grey flame retardant Lexan UL94 VO
Weight:	≈ 300g
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2.5mm² stranded ≤ 4mm² solid
Approvals:	Conforms to IEC. CE and Compliant.

OPTIONS

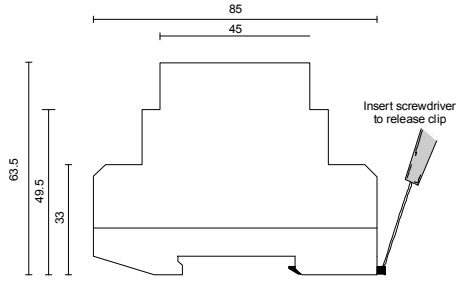
1. The operation of the "output 1" relay can be inverted such that the relay de-energises when the lower and the upper probes are covered by the liquid. Please order as E-FLC3/R when this option is required.

2. For other supply voltages, please contact Sales.

ACCESSORIES

Please refer to latest catalogue for probes, probe holders, etc

MOUNTING DETAILS



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Type: 45225

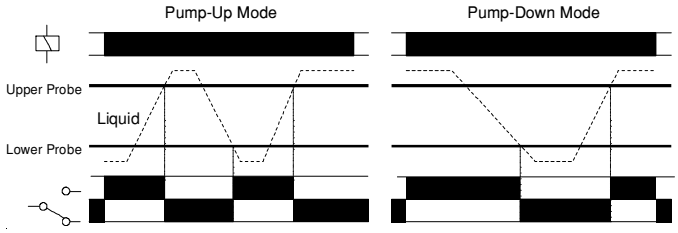
Level Control Relay (Pump Up, Pump Down)

The unit is designed to control the maximum and/or minimum levels of conductive liquids (user selectable via front switch). When power is applied, the green "supply on" LED will illuminate. In the "Pump-Up" mode, the relay energises and the red LED illuminates when the level drops below the lower level probe then de-energises (red LED extinguishes) when the level rises above the upper level probe. In the "Pump-down" mode, the relay de-energises when the level drops below the lower level probe then re-energises when the level rises above the upper level probe.

Terminal Protection to IP20

Dims:
H.78 mm
W.45 mm
L.99 mm

▪ TIMING DIAGRAM



▪ INSTALLATION AND SETTING

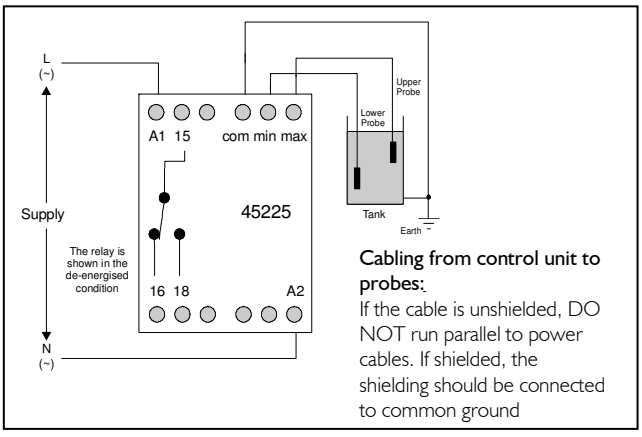
BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply and the probes as shown in the diagram below. Set the **'sensitivity'** adjustment to minimum. Immerse both probes in the liquid to be monitored then apply power and the green **'supply on'** LED should illuminate. Rotate the **'sensitivity'** adjustment until the relay changes state. Remove the probes from the liquid and the relay should change state again. Now set the **'sensitivity'** adjustment midway between the setting obtained and maximum. This should now be the correct setting for the liquid. Finally, set the switch to **'pump-up'** or **'pump-down'** as required.

Note 1: If using a metal tank, connect terminal **'com'** and earth to the tank

Note 2: If the supply is interrupted for ≤ 0.5S in the 'pump-up' mode, the relay will energise immediately. In the 'pump-down' mode, the relay will remain de-energised.

Note 3: For single probe operation, link terminals **'com'** and **'max'**.

▪ CONNECTION DIAGRAM



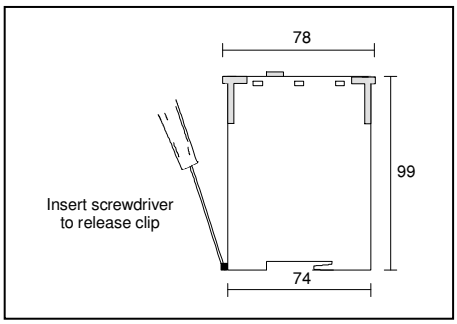
Cabling from control unit to probes:
If the cable is unshielded, DO NOT run parallel to power cables. If shielded, the shielding should be connected to common ground

▪ TECHNICAL SPECIFICATION

Supply Voltage Un:	24, 110, 230, 400V AC 48 - 63Hz
Supply Variation:	85 - 115% of Un
Isolation:	Over voltage cat. III (IEC 664)
Power Consumption:	1.5VA
Inter-Electrode Voltage:	≈ 17V AC
Operate Resistance:	5 to 100KΩ
Release Resistance:	≈ 7.5KΩ
Response Time:	High Level - 100mS Low Level - 500mS
Maximum Cable Length:	100 metres (control unit to probes see note with connection diagram)
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	SPDT AC 1 250V AC 10A (2500VA) AC 15 250V AC 6A DC 1 25V DC 10A (250W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	224g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (ENSO 002, DIN 46277-3)
Terminal Conductor Size:	Max 2 x 1.5mm² stranded (terminated) Max 2 x 2.5mm² solid
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE Compliant

For suitable probes/accessories see main product catalogue

▪ MOUNTING DETAILS



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45225-B991080

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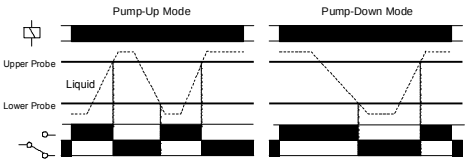
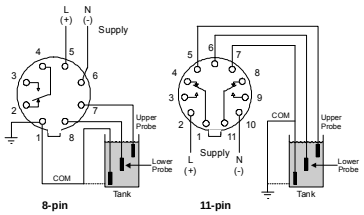
B8LCR & B1LCR

Liquid Level Control
Contrôle du niveau de liquide
Flüssigkeitskontrollstand

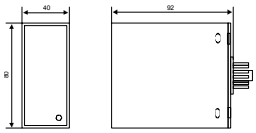
FUNCTION DIAGRAM
DIAGRAMMEDE FONCTION
FUNKTIONSDIAGRAM



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



DIMENSIONS
DIMENSIONS
ABMESSUNGEN



- **"PUMP UP" OR "PUMP DOWN" MODE SWITCH - SELECTABLE**
- **1 OR 2 PROBE OPERATION**
- **USES LOW VOLTAGE AC CURRENT ACROSS PROBES PREVENTING ELECTROLYSIS PHENOMENON**
- **ADJUSTABLE SENSITIVITY**
- **8-PIN PLUG-IN (B8LCR)**
- **11-PIN PLUG-IN (B1LCR)**

- **POMPER OU VIDER, INTERRUPTEUR DE MODE SÉLECTIONNABLE**
- **OPÉRATION DE 1 OU 2 CAPTEURS**
- **UTILISATEUR DE BAS VOLTAGE, COURANT ALTERNATIF DANS LES CAPTEURS POUR EMPÊCHER LES PHÉNOMÈNES D'ÉLECTROLYSE**
- **SENSIBILITÉE RÉGLABLE**
- **BRANCHEMENT - 8 AIGUILLES (B8LCR)**
- **BRANCHEMENT - 11 AIGUILLES (B1LCR)**

- **"ANPUMPEN" ODER "ABPUMPEN", BETRIEBSWEISE, WAHLSCHALTER**
- **1 ODER 2 PRÜFKOPF-OPERATIONEN**
- **NIEDERSPANNUNG BENUTZEN, WECHSELSTROM ÜBER PRÜFKÖPFE (VERHINDERT ELEKTROLYSEN PHÄNOMEN)**
- **EINSTELLBARE EMPFINDLICHKEIT**
- **8-NADEL STECKDOSE (B8LCR)**
- **11-NADEL STECKDOSE (B1LCR)**

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY
- Connect the unit as shown in the diagram above.
- Apply power (green LED on).

Troubleshooting

- Check wiring and voltage present.

ⓘ

1. If using metal tank, connect "1" (B8LCR) / "7" (B1LCR) to the tank.
2. If supply is interrupted ≤ 0.5s, relay will energise (pump-up) / remain de-energised (pump-down).
3. For single probe operation:
   link "1" and "7" (B8LCR)
   link "5" and "7" (B1LCR)

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.
- Appliquer la puissance (LED verte allumée)

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

ⓘ

1. Si on utilise un réservoir en métal, connecter "1" (B8LCR) / "7" (B1LCR) au réservoir.
2. Si l'alimentation est interrompue ≤ 0.5s, le relais va s'activer (pomper) / reste désactivé (vidé)
3. Pour des opérations à un seul capteur:
   relier "1" et "7" (B8LCR)
   relier "5" et "7" (B1LCR)

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.
- Energie anbringen (LED grün an)

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

ⓘ

1. Wenn Metalltank benutzt wird, "1" (B8LCR) / "7" (B1LCR) an Tank anschliessen.
2. Ist die Versorgung unterbrochen ≤ 0.5s, wird das Relais ansteuern (anpumpen) / bleibt in Ruhestellung (abpumpen).
3. Für einzel Prüfkopf-Einsatz
   "1" und "7" verbinden (B8LCR)
   "5" und "7" verbinden (B1LCR)

• TECHNICAL SPECIFICATION

Supply voltage Un:	24, 110, 230, 400V AC 48 - 63Hz Galvanic isolation (Integral transformer)
Supply variation:	0.85 - 1.10 x Un
Isolation:	Overvoltage category III
Power consumption:	≈ 1.5VA
Inter-electrode voltage:	≈ 17V AC
Sensitivity:	5 - 100KΩ
Response time:	High level: 100mS Low level: 500mS
Cable length (max.):	100m (control unit to probes)
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x C.O. (B8LCR) 2 x C.O. (B1LCR)
Output rating:	

	B8LCR	B1LCR
AC1 250V AC	10A (2500VA)	8A (2000VA)
AC15 250V AC	6A	2.5A
DC1 25V DC	10A (250W)	8A (200W)

Electrical life:	≥ 150,000 (AC1)
Housing:	to UL94 VO
Weight:	≈ 170g
Approvals:	UL and CUL. CE Compliant.

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

• FICHES TECHNIQUES

Tension d ' alimentation Un:	24, 110, 230, 400V AC 48 - 63Hz Isolation galvanique (Transformateur intégral)
Variation d ' alimentation:	0.85 - 1.10 x Un
Isolement:	Survoltage catégorie III
Puissance consommée:	≈ 1.5VA
Voltage inter-électrode:	≈ 17V AC
Sensibilité:	5 - 100KΩ
Temps de résponse:	Haut niveau: 100mS Bas niveau: 500mS
Longueur des câbles (max.):	100m (Unité de contrôle au capteur)
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Sortie:	1 x Inverseur (B8LCR) 2 x Inverseur (B1LCR)
Mesure de sortie:	

	B8LCR	B1LCR
AC1 250V AC	10A (2500VA)	8A (2000VA)
AC15 250V AC	6A	2.5A
DC1 25V DC	10A (250W)	8A (200W)

Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 VO
Poids:	≈ 170g
Homologations:	UL et CUL. CE Déférence.

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

• TECHNISCHE DATEN

Versorgungsspannung Un:	24, 110, 230, 400V AC 48 - 63Hz Galvanische Isolierung (Integraltransformator)
Wechselversorgung:	0.85 - 1.10 x Un
Isolation:	Überspannung Kategorie III
Energieverbrauch:	≈ 1.5VA
Inter-Elektroden Spannung:	≈ 17V AC
Empfindlichkeit:	5 - 100KΩ
Ansprechzeit:	Hochstand: 100mS Tiefstand: 500mS
Länge der Kabel (max.):	100m (Ansteuergerät zu Prüfkopf)
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	1 x Wechsler (B8LCR) 2 x Wechsler (B1LCR)
Ausgangsleistung:	

	B8LCR	B1LCR
AC1 250V AC	10A (2500VA)	8A (2000VA)
AC15 250V AC	6A	2.5A
DC1 25V DC	10A (250W)	8A (200W)

Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 VO
Gewicht:	≈ 170g
Genehmigungen:	UL und CUL. CE Übereinstimmung.

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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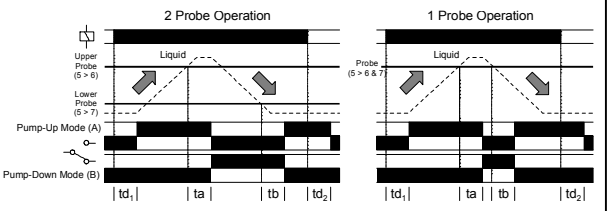
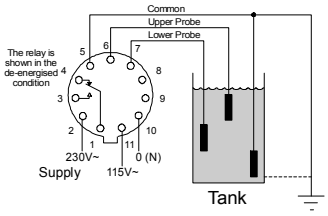
P48LCR

Liquid Level Control
Contrôle du niveau de liquide
Flüssigkeitskontrollstand

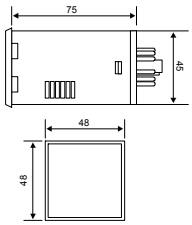
FUNCTION DIAGRAM
DIAGRAMMEDE FONCTION
FUNKTIONSDIAGRAM



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



DIMENSIONS
DIMENSIONS
ABMESSUNGEN



- ❑ **"PUMP UP" OR "PUMP DOWN" MODE SWITCH - SELECTABLE***
- ❑ **1 OR 2 PROBE OPERATION**
- ❑ **USES LOW VOLTAGE AC CURRENT ACROSS PROBES PREVENTING ELECTROLYSIS PHENOMENON**
- ❑ **ADJUSTABLE SENSITIVITY**
- ❑ **DUAL VOLTAGE**
- ❑ **OUTPUT RELAY 8A**
- ❑ **11-PIN PLUG-IN**

* Via preset pot through side aperture

- ❑ **POMPER OU VIDER, INTERRUPTEUR DE MODE SÉLECTIONNABLE***
- ❑ **OPÉRATION DE 1 OU 2 CAPTEURS**
- ❑ **UTILISATEUR DE BAS VOLTAGE, COURANT ALTERNATIF DANS LES CAPTEURS POUR EMPÊCHER LES PHÉNOMÈNES D'ÉLECTROLYSE**
- ❑ **SENSIBILITÉE RÉGLABLE**
- ❑ **DOUBLE VOLTAGE**
- ❑ **RELAIS DE SORTIE 8A**
- ❑ **BRANCHEMENT - 11 AIGUILLES**

* vers un système prérégle à travers une ouverture latérale

- ❑ **"ANPUMPEN" ODER "ABPUMPEN", BETRIEBSWEISE, WAHLSCHALTER***
- ❑ **1 ODER 2 PRÜFKOPF-OPERATIONEN**
- ❑ **NIEDERSPANNUNG BENUTZEN, WECHSELSTROM ÜBER PRÜFKÖPFE (VERHINDERT ELEKTROLYSEN PHÄNOMEN)**
- ❑ **EINSTELLBARE EMPFINDLICHKEIT**
- ❑ **DOPPELSPANNUNG**
- ❑ **AUSGANGSRELAIS 8A**
- ❑ **11-NADEL STECKDOSE**

* zu voreingestellter Büchse über Seiteneingang

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY
- Connect the unit as shown in the diagram above.
- Select **"pump up"** or **"pump down"** mode on base of unit (Fig.1)
- Apply power (green LED on).

Troubleshooting

- Check wiring and voltage present.

ⓘ

1. If using metal tank, connect **"5"** to the tank.
2. For single probe operation: link **"6"** and **"7"**

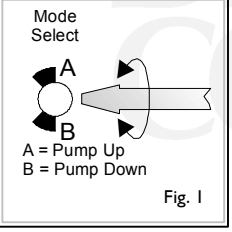


Fig. 1

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.
- Sélectionner le mode **"pump up"** ou **"pump down"** la base de l ' unite. (Fig.1)
- Appliquer la puissance (LED verte allumée)

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

ⓘ

1. Si on utilise un réservoir en métal, connecter **"5"** au réservoir.
2. Pour des opérations à un seul capteur: relier **"6"** et **"7"**

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.
- Betriebsweise **"pump up"** oder **"pump down"** als Einheitsbasis wählen. (Fig.1)
- Energie anbringen (LED grün an)

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

ⓘ

1. Wenn Metalltank benutzt wird, **"5"** an Tank anschliessen.
2. Für einzel Prüfkopf-Einsatz **"6"** und **"7"** verbinden

• TECHNICAL SPECIFICATION

Supply voltage Un:	115 or 230V AC 48 - 63Hz Galvanic isolation (Integral transformer)
Supply variation:	0.85 - 1.15 x Un
Isolation:	Overvoltage category III
Power consumption (1.15 x Un):	≈ 3.2VA (115V), ≈ 4.2VA (230V)
Inter-electrode voltage:	≈ 9V AC
Sensitivity:	5 - 100KΩ ±20%
Response time:	ta: 320mS max. tb: 320mS max.
Time delay:	td_1: 800mS max. td_2: 130mS max.
Cable length (max.):	100m (control unit to probes)
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x C.O.
Output rating:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Electrical life:	≥ 150,000 (AC1)
Housing:	to UL94 V2
Weight:	≈ 170g
Approvals:	Conforms to: IEC CE and Compliant

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

• FICHES TECHNIQUES

Tension d ' alimentation Un:	115 ou 230V AC 48 - 63Hz Isolation galvanique (Transformateur intégral)
Variation d ' alimentation:	0.85 - 1.15 x Un
Isolement:	Survoltage catégorie III
Puissance consommée: (1.15 x Un):	≈ 3.2VA (115V), ≈ 4.2VA (230V)
Voltage inter-électrode:	≈ 9V AC
Sensibilité:	5 - 100KΩ ±20%
Temps de résponse:	ta 320mS max. tb: 320mS max.
Délai de temps:	td_1: 800mS max. td_2: 130mS max.
Longueur des câbles (max.):	100m (Unité de contrôle au capteur)
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Sortie:	1 x Inverseur
Mesure de sortie:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 V2
Poids:	≈ 170g
Homologations:	Se conformer à: IEC CE et Déférence

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

• TECHNISCHE DATEN

Versorgungsspannung Un:	115 oder 230V AC 48 - 63Hz Galvanische Isolierung (Integraltransformator)
Wechselversorgung:	0.85 - 1.15 x Un
Isolation:	Überspannung Kategorie III
Energieverbrauch: (1.15 x Un):	≈ 3.2VA (115V), ≈ 4.2VA (230V)
Inter-Elektroden Spannung:	≈ 9V AC
Empfindlichkeit:	5 - 100KΩ ±20%
Ansprechzeit:	ta: 320mS max. tb: 320mS max.
Zeitsteuerung:	td_1: 800mS max. td_2: 130mS max.
Länge der Kabel (max.):	100m (Ansteuergerät zu Prüfkopf)
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	1 x Wechsler
Ausgangsleistung:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 V2
Gewicht:	≈ 170g
Genehmigungen:	Anmerkung: IEC CE und Übereinstimmung

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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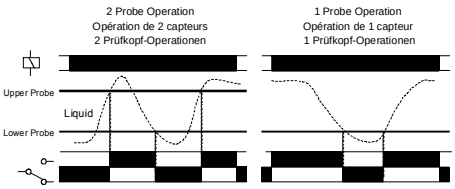
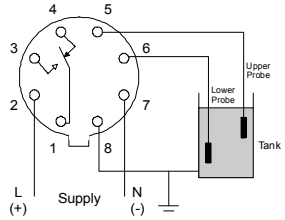
B8HLD

Liquid Level Control
Contrôle du niveau de liquide
Flüssigkeitskontrollstand

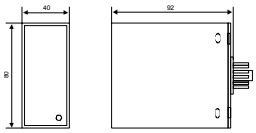
FUNCTION DIAGRAM
DIAGRAMMEDE FONCTION
FUNKTIONSDIAGRAM



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



DIMENSIONS
DIMENSIONS
ABMESSUNGEN



- ❑ **STANDARD (EMPTY)**
- ❑ **1 OR 2 PROBE OPERATION**
- ❑ **USES LOW VOLTAGE AC CURRENT ACROSS PROBES PREVENTING ELECTROLYSIS PHENOMENON**
- ❑ **FIXED SENSITIVITY**
- ❑ **OUTPUT RELAY 8A**
- ❑ **RELAY INDICATION**
- ❑ **8-PIN PLUG-IN**

- ❑ **STANDARD (VIDE)**
- ❑ **OPÉRATION DE 1 OU 2 CAPTEURS**
- ❑ **UTILISATEUR DE BAS VOLTAGE, COURANT ALTERNATIF DANS LES CAPTEURS POUR EMPÊCHER LES PHÉNOMÈNES D'ÉLECTROLYSE**
- ❑ **SENSIBILITÊ FIXE**
- ❑ **RELAIS DE SORTIE 8A**
- ❑ **INDICATION DE RELAIS**
- ❑ **BRANCHEMENT - 8 AIGUILLES**

- ❑ **STANDARD (LEER)**
- ❑ **1 ODER 2 PRÜFKOPF-OPERATIONEN**
- ❑ **NIEDERSPANNUNG BENUTZEN, WECHSELSTROM ÜBER PRÜFKÖPFE (VERHINDERT ELEKTROLYSEN PHÄNOMEN)**
- ❑ **FESTSENSITIVITÄT**
- ❑ **AUSGANGSRELAIS 8A**
- ❑ **RELAIS INDIKATION**
- ❑ **8-NADEL STECKDOSE**

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY
- Connect the unit as shown in the diagram above.
- Immerse both probes in the liquid to be monitored.
- Apply power (contacts 1 and 3 closed, red "relay" LED on).
- Remove probes from the liquid and the relay should change state again.

Troubleshooting

- Check wiring and voltage present.

ⓘ

1. If using metal tank, connect "8" to the tank.
2. For single probe operation, link "5" and "6".
3. If unshielded cable is used, DO NOT run parallel to power cables. If the cable is shielded, the shielding should be connected to common ground.

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.
- Immerger les deux capteurs dans le liquide à contrôler.
- Appliquer la puissance (contacts 1 et 3 fermés, LED rouge "relay" allumée).
- Quand on enléve les capteurs du liquide, le relais devrait changer à nouveau.

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

ⓘ

1. Si on utilise un réservoir en métal, connecter "8" au réservoir.
2. Pour des opérations à un seul capteur, relier "5" et "6".
3. Si un cable non blindé est utilisé, EVITER les cables de tension. Si le cable est blindé, le blindage devrait être connecté à la terre commune.

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.
- Eintauchen beider Prüfköpfe in der zu kontrollierenden Flüssigkeit.
- Energie anbringen (Kontakte 1 und 3 geschlossen, LED rot "relay" an).
- Nach herausnehmen der Prüfköpfe aus der Flüssigkeit soll das Relais wieder den Zustand wechseln.

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

ⓘ

1. Wenn Metalltank benutzt wird, "8" an Tank anschliessen.
2. Für einzel Prüfkopf-Einsatz "5" und "6" verbinden.
3. Wenn ein nicht abgeschirmtes Kabel benutzt wird, darf es nicht paralell zum Stromkabel verlegt werden. Ist das Kabel abgeschirmt, muss die Abschirmung an den Sternpunkt angeschlossen werden.

• TECHNICAL SPECIFICATION

Supply voltage Un:	110, 230, 415V AC 48 - 63Hz Galvanic isolation (Integral transformer)
Supply variation:	0.85 - 1.15 x Un
Isolation:	Overvoltage category III
Power consumption:	≈ 1.5VA
Inter-electrode voltage:	≈ 17V AC
Sensitivity:	4KΩ
Release value:	> 15KΩ
Response time:	100mS (Operate and release)
Cable length(max.):	100m (control unit to probes)
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x C.O.
Output rating:	AC1 250V AC 8A (2000VA) AC15 250V AC 3A DC1 25V DC 8A (200W)
Electrical life:	≥ 150,000 (AC1)
Housing:	to UL94 VO
Weight:	≈ 170g (200g = 415V)
Approvals:	Conforms to: UL, CUL, CSA & IEC. CE and ✓ Compliant.

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

• FICHES TECHNIQUES

Tension d ' alimentation Un:	110, 230, 415V AC 48 - 63Hz Isolation galvanique (Transformateur intégral)
Variation d ' alimentation:	0.85 - 1.15 x Un
Isolement:	Survoltage catégorie III
Puissance consommée:	≈ 1.5VA
Voltage inter-électrode:	≈ 17V AC
Sensibilité:	4KΩ
Valeur de déclanchement:	> 15KΩ
Temps de résponse:	100mS (Opération et repos)
Longueur des câbles (max.):	100m (Unité de contrôle au capteur)
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Sortie:	1 x Inverseur
Mesure de sortie:	AC1 250V AC 8A (2000VA) AC15 250V AC 3A DC1 25V DC 8A (200W)
Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 VO
Poids:	≈ 170g (200g = 415V)
Homologations:	Sec onformer à: UL, CUL, CSA & IEC. CE et ✓ Déférence.

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

• TECHNISCHE DATEN

Versorgungsspannung Un:	110, 230, 415V AC 48 - 63Hz Galvanische Isolierung (Integraltransformator)
Wechselversorgung:	0.85 - 1.15 x Un
Isolation:	Überspannung Kategorie III
Energieverbrauch:	≈ 1.5VA
Inter-Elektroden Spannung:	≈ 17V AC
Empfindlichkeit:	4KΩ
Ausrückwerte:	>15KΩ
Ansprechzeit:	100ms (Steuern und Freigeben)
Länge der Kabel (max.):	100m (Ansteuergerät zu Prüfkopf)
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	1 x Wechsler
Ausgangsleistung:	AC1 250V AC 8A (2000VA) AC15 250V AC 3A DC1 25V DC 8A (200W)
Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 VO
Gewicht:	≈ 170g (200g = 415V)
Genehmigungen:	Anmerkung: UL, CUL, CSA & IEC. CE und ✓ Übereinstimmung.

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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☎ +44 (0) 1902 773746 🖷 +44 (0) 1902 420639 Email: sales@broycecontrol.com Web: http://www.broycecontrol.com

Type: LP01

Liquid Level Controller Electrode

- **Designed for use with ALL Broyce Level Control Relays**
- **Single electrode**
- **Stainless Steel material suitable for most non-flammable liquids**
- **Wire termination to probe using crimp method**
- **Protective rubber cover**

ISO 9001:2015
Cert. No. 14125771

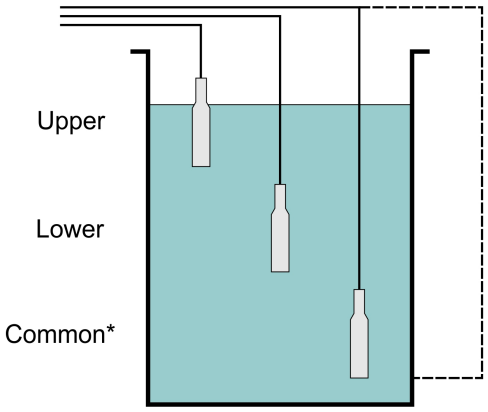
INSTALLATION

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE ANY SUPPLIES.
- Take the wire from the Level Controller and terminate the stripped end in the crimp attached to the end of the electrode.
- Place the electrode in the container or tank at a suitable position where the liquid level needs to be sensed.
- Repeat the above process for the remaining number of electrodes.

Note that for tanks/containers that are conductive, the "Common" connection from the Level controller can be terminated directly to it.

Typical example of electrode arrangements *(2 Level monitoring):*

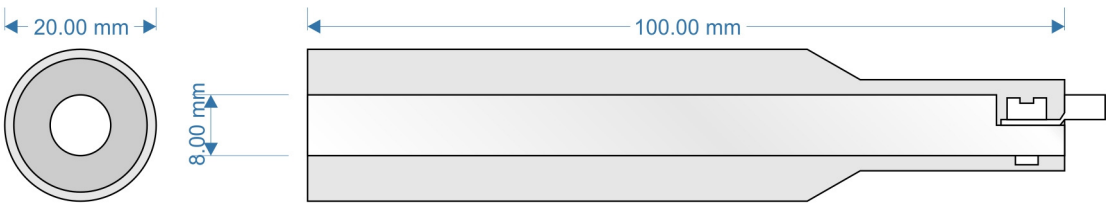


*Common probe not required if tank/container conductive. Connection from Level controller can then be made directly as shown by the dashed line.

TECHNICAL SPECIFICATION

Mounting:	Free
Connection method:	Via M3 screw terminal/crimp
Electrode material:	Stainless steel (Grade 1.4305)
Weight:	≈60g
Maximum temperature:	70°C

DIMENSIONS



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• earth leakage relays • earth fault relays • overcurrent relays • three phase relays • time delay relays • control relays • level control relays • **pump control relays** •

• speed control relays • temperature control relays • protection devices • generator protection • hours run meter • sockets • bespoke products •

pump control relays

- Mains Restoration (Delay On Operate)
- Mains Restoration (Interval)
- Load Sharing/Logic Relay

Choose your category

Click the above for further information…!

Click here for Main Page

Type: LR44/3

Logic Relay[1] - 3 Outputs

Terminal Protection to IP20

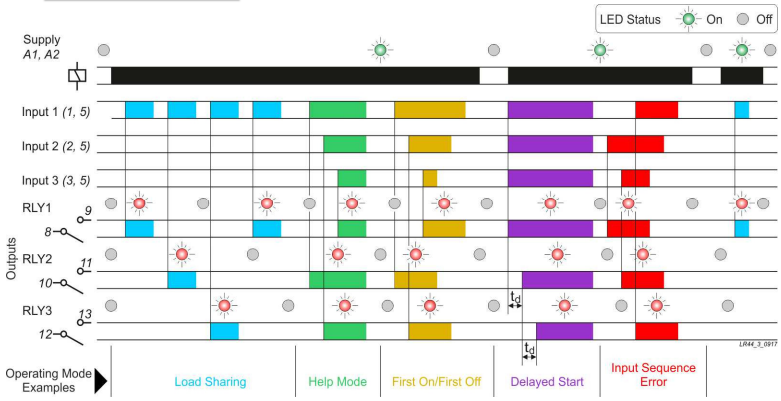
Dims: to DIN 43880
W. 44mm

- Designed to balance the operation between motors, compressors, generators, etc
- "Help" function (allows 2nd and 3rd relay to energise if required)
- Microprocessor based
- Isolated power supply with wide auxiliary operating supply voltage - 100 – 230V AC/DC
- Accepts up to 3, Voltage-free, N.O. contacts (i.e. pressure switches, relay contacts)
- Indicates error if inputs are applied in alternative sequence
- 3 x SPNO relay outputs 5A
- Green LED indication for supply status
- Individual Red LED indication for relay status
- Compact 44mm DIN Rail housing
- Other logic/switching patterns available on request[2]
- Can replace existing M3LS3

ISO 9001:2015
Cert. No. 14125771

[1] Also known as "Load Sharing Relay", "Alternating Relay" or "Flip Flop Relay"

FUNCTION DIAGRAM [2]



INSTALLATION AND OPERATION

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below and ensure the voltage of the supply to be connected to terminals "6" and "7" is within the voltage rating of this product.
- Connect the external contact for "Input 1" across terminals "1" and "5, "Input 2" across terminals "2" and "5" and "Input 3" across terminals "3" and "5".
- The connections to the Output Relays (shown as "RLY1", "RLY2" and "RLY3") should be wired according to the external load they are controlling/switching.
- Note that the LED's correspond to the Relay Outputs as follows: "Output 1" LED = "RLY1" status, "Output 2" LED = "RLY2" status and "Output 3" LED = "RLY3" status.

Applying power.

- Apply power and the green "Power supply" ❹ LED will illuminate.
- If the external contacts are open the three red "Output 1" ❶/"Output 2" ❷/"Output 3" ❸ LED's will remain extinguished.

Operating the unit (with power applied).

- Close the external contact connected to "Input 1" and "RLY1" will energise and corresponding red LED ❶ illuminate. Open the contact and "RLY1" will de-energise and red LED extinguish.
- Close the same contact again and now "RLY2" will energise and corresponding red LED ❷ will illuminate. Open the contact and "RLY2" will de-energise and red LED extinguish.
- Close the same contact for a third time and now the "RLY3" will energise and corresponding red LED ❸ will illuminate. Open the contact and "RLY3" will de-energise and red LED extinguish.
- Next time "Input 1" contact is closed, "RLY1" will re-energise and the sequence between the relays will continue.

"Help" function/feature

- With one of the external contacts already closed and output relay energised, closing the second (or third) external contacts will energise the other relays. This allows loads to run simultaneously if required. Additionally, if two inputs close simultaneously, there is a 1 second delay (t_d) in between the other relays energising.

Troubleshooting

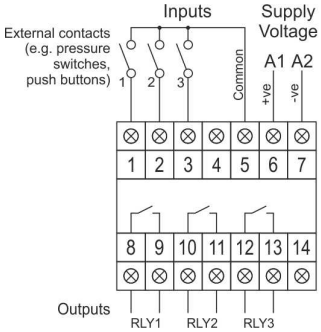
If the unit fails to operate correctly or as described, check the wiring is correct, supply voltage is present and within the operating limits specified. Please also see additional note in the Technical Specification column on the right.

TECHNICAL SPECIFICATION

Aux. Supply voltage Us **(6, 7):**	100 – 230V AC/DC	
Frequency range:	48 – 63Hz (AC supplies)	
Supply variation:	85 – 115% of Us	
Power consumption (max.):	3VA	
Pollution degree:	2	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
No. of Monitored inputs **(1, 2, 3, 5):**	3	
Max. cable length:	50m (relay to external contacts)	
Typical response times:		
To relay energising	< 1s	
To relay de-energising	< 1s	
Time delay (t_d):	1s	
Reset time:	380ms max.	
Repeat accuracy:	0.5% @ constant conditions	
Power on indication:	Green LED	
Relay status indication:	Red LED x3	
Ambient temperature:	-20 to +60°C	
Relative humidity:	+95% max.	
Output:		
RLY1 **(8, 9)**:	SPNO	
RLY2 **(10, 11)**:	SPNO	
RLY3 **(12, 13)**:	SPNO	
Output rating (all relays):	AC1	250V 5A (1250VA)
	AC15	250V 2A
	DC1	30V 3A (90W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Grey flame retardant Lexan UL94 V0	
Weight:	125g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715	
Terminal conductor size:	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-3	

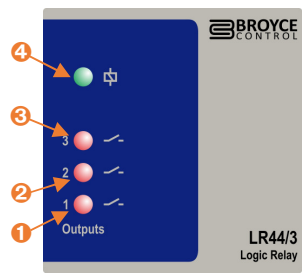
Numbers shown above in bold/within brackets refer to terminal numbers on housing.

CONNECTION DIAGRAM



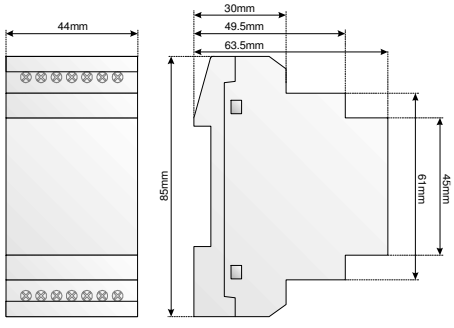
FRONT LED INDICATION

1. Output 1 status (Red) LED
2. Output 2 status (Red) LED
3. Output 3 status (Red) LED
4. Power supply status (Green) LED



There are no user adjustments on this product

DIMENSIONS



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Type: LR44/2

Logic Relay[1] - 2 Outputs

Terminal Protection to IP20

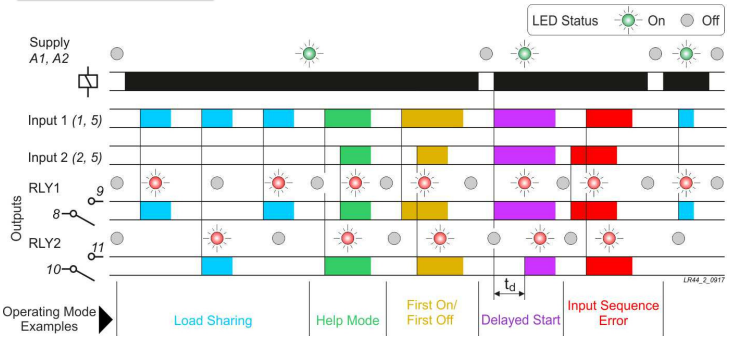
Dims: to DIN 43880
W. 44mm

- Designed to balance the operation between motors, compressors, generators, etc
- "Help" function (allows 2nd relay to energise if required)
- Microprocessor based
- Isolated power supply with wide auxiliary operating supply voltage - 100 – 230V AC/DC
- Accepts up to 2, Voltage-free, N.O. contacts (i.e. pressure switches, relay contacts)
- Indicates error if inputs are applied in alternative sequence
- 2 x SPNO relay outputs 5A
- Green LED indication for supply status
- Individual Red LED indication for relay status
- Compact 44mm DIN Rail housing
- Other logic/switching patterns available on request[2]
- Can replace existing M3FFR

QMS ISO 9001 REGISTERED
ISO 9001:2015
Cert. No. 14125771

[1] Also known as "Load Sharing Relay", "Alternating Relay" or "Flip Flop Relay"

FUNCTION DIAGRAM [2]



INSTALLATION AND OPERATION

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below and ensure the voltage of the supply to be connected to terminals "6" and "7" is within the voltage rating of this product.
- Connect the external contact for "Input 1" across terminals "1" and "5" and the contact for "Input 2" across terminals "2" and "5".
- The connections to the Output Relays (shown as "RLY1" and "RLY2") should be wired according to the external load they are controlling/switching.
- Note that the LED's correspond to the Relay Outputs as follows: "Output 1" LED = "RLY1" status and "Output 2" LED = "RLY2" status.

Applying power.

- Apply power and the green "Power supply" ❸ LED will illuminate.
- If the external contacts are open both the red "Output 1" ❶/"Output 2" ❷ LED's will remain extinguished.

Operating the unit (with power applied).

- Close the external contact connected to "Input 1" and "RLY1" relay will energise and corresponding red LED ❶ illuminate. Open the contact and "RLY1" will de-energise and red LED extinguish.
- Close the same contact again and now "RLY2" relay will energise and corresponding red LED ❷ illuminate. Open the contact and "RLY2" will de-energise and red LED extinguish.
- Next time "Input 1" contact is closed, "RLY1" will re-energise and the alternating sequence between the relays will continue.

"Help" function/feature

- With one of the external contacts already closed and output relay energised, closing the second external contact will energise the other relay. This allows both loads to run simultaneously if required. Additionally, if two inputs close simultaneously, there is a 1 second delay (t_d) in between the other relay energising.

Troubleshooting

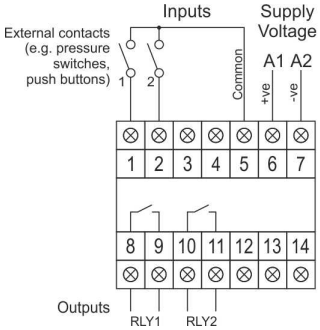
If the unit fails to operate correctly or as described, check the wiring is correct, supply voltage is present and within the operating limits specified. Please also see additional note in the Technical Specification column on the right.

TECHNICAL SPECIFICATION

Aux. Supply voltage Us **(6, 7):**	100 – 230V AC/DC	
Frequency range:	48 – 63Hz (AC supplies)	
Supply variation:	85 – 115% of Us	
Power consumption (max.):	3VA	
Pollution degree:	2	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
No. of Monitored inputs **(1, 2, 5):**	2	
Max. cable length:	50m (relay to external contacts)	
Typical response times:		
To relay energising	< 1s	
To relay de-energising	< 1s	
Time delay (t_d):	1s	
Reset time:	380ms max.	
Repeat accuracy:	0.5% @ constant conditions	
Power on indication:	Green LED	
Relay status indication:	Red LED x2	
Ambient temperature:	-20 to +60°C	
Relative humidity:	+95% max.	
RLY1 **(8, 9)**:	SPNO relay	
RLY2 **(10, 11)**:	SPNO relay	
Output rating (all relays):	AC1	250V 5A (1250VA)
	AC15	250V 2A
	DC1	30V 3A (90W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Grey flame retardant Lexan UL94 V0	
Weight:	120g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715	
Terminal conductor size:	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-3	

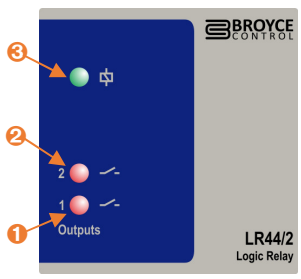
Numbers shown above in bold/within brackets refer to terminal numbers on housing.

CONNECTION DIAGRAM



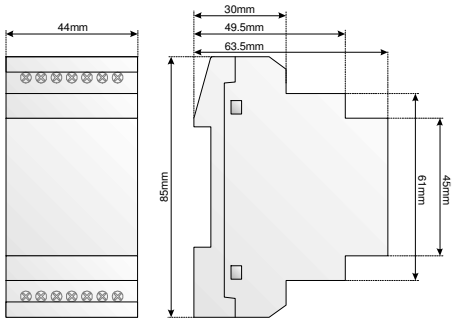
FRONT LED INDICATION

1. Output 1 status (Red) LED
2. Output 2 status (Red) LED
3. Power supply status (Green) LED



There are no user adjustments on this product

DIMENSIONS



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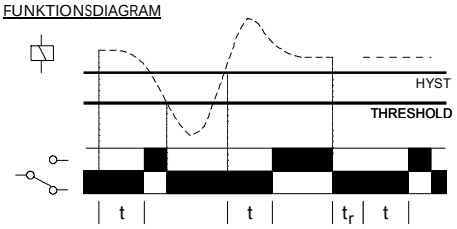
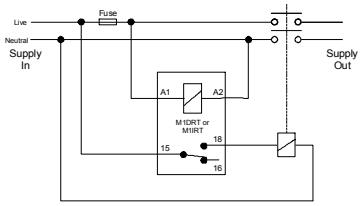
M1DRT

Mains Restoration Auto Restart Timer
Timer de redémarrage automatique de restauration principale
Haupt-Rückerstattung des automatischen Wiederanlaufs- Zeitschalters

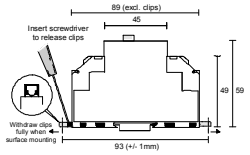
FUNCTION DIAGRAM
DIAGRAMMEDE FONCTION
FUNKTIONSDIAGRAM



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



MOUNTING DETAILS
INSTRUCTIONS DE MONTAGE
MONTAGEAUFÜHRUNGEN



Width / largeur / Breite. 17.5 mm (DIN 43880)

- **DELAY ON OPERATE FUNCTION**
- **VOLTAGE THRESHOLD 80%**
- **20mS OR 100mS RESET TIME (t_r)**
- **OUTPUT RELAY 8A**
- **DIN RAIL HOUSING (17.5mm)**
- **SUPPLY INDICATION**
- **RELAY INDICATION**

- **FONCTION D'OPERATION DE MISE EB DÉLAI**
- **LIMITE DE VOLTAGE 80%**
- **TEMPS DE REMISE EN MARCHE 20mS OU 100mS (t_r)**
- **RELAIS DE SORTIE 8A**
- **LOGEMENT DU RAIL DIN (17.5mm)**
- **INDICATION D ' ALIMENTATION**
- **INDICATION DE RELAIS**

- **VERZÖGERUNG BEI FUNKTIONS - STEURUNG**
- **SCHWELLENSPANNUNG 80%**
- **20mS ODER 100mS RÜCKSTELLZEIT (t_r)**
- **AUSGANDSRELAIS 8A**
- **DIN SCHIENENGEHÄUSE (17.5mm)**
- **VERSORGUNGS - INDIKATION**
- **RELAIS INDIKATION**

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram above.
- Apply power (green LED on)
- Unit will operate according to function selected (see 'function diagram').

Troubleshooting

- Check wiring and voltage present.

MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.
- Appliquer le puissance (LED verte allumée).
- L ' unité opérera selon la fonction sélectionne (voir 'Diagrammede fonction').

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.
- Stromzufuhr (LED grün an)
- Einheit schaltet sich je nach der gewählten Funktion ein (siehe 'Funktionsdiagram').

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

TECHNICAL SPECIFICATION

Supply/monitored voltage Un:	24, 48, 110, 115, 230V AC* 24, 48V DC (*AC 48 - 63Hz)
Supply variation:	0.80 - 1.15 x Un
Isolation:	Overvoltage category III
Power consumption:	≈ 4.7VA (@ 1.15 x Un)
Voltage threshold:	0.80 x Un
Hysteresis:	≈ 5%
Reset Time:	20 or 100mS (see below)
Time delay (t):	0.5 - 10, 1 - 30, 2 - 60S 0.5 - 10, 2 - 60M
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x C.O.
Output rating:	AC1 250V AC 8A (2000VA) AC15 250V AC 5A (no), 3A (nc) DC1 25V DC 8A (200W)
Electrical Life:	≥ 150,000 (AC1)
Housing:	to UL94 VO
Weight:	≈ 70g
Mounting option:	to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 2.5mm² solid / stranded
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE and ✓ Compliant

Please specify reset time when ordering

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

FICHES TECHNIQUES

Tension d ' alimentation contrôlée Un:	24, 48, 110, 115, 230V AC* 24, 48V DC (*AC 48 - 63Hz)
Variation d ' alimentation:	0.80 - 1.15 x Un
Isolation:	Survoltage catégorie III
Puissance consommée:	≈ 4.7VA (@ 1.15 x Un)
Limite de voltage:	0.80 x Un
Hystérèse:	≈ 5%
Temps de remise à zéro	20 or 100mS (voir ci-dessous)
Délai de temps (t):	0.5 - 10, 1 - 30, 2 - 60S 0.5 - 10, 2 - 60M
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Sortie:	1 x Inverseur
Mesure de sortie:	AC1 250V AC 8A (2000VA) AC15 250V AC 5A (travail), 3A (repos) DC1 25V DC 8A (200W)
Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 VO
Poids:	≈ 70g
Option de montage:	à BS5584:1978 (EN50 002, DIN 46277-3)
Taille du conducteur terminal:	≤ 2 x 2.5mm² toron / multi-filaire
Homologations:	Se conformer à: UL, CUL, CSA, IEC. CE et ✓ Déférence

SVP spécifier le temps de réglage à la commande

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

TECHNISCHE DATEN

Stromversorgung / Spannungskontrolle Un:	24, 48, 110, 115, 230V AC* 24, 48V DC (*AC 48 - 63Hz)
Wechselversorgung:	0.80 - 1.15 x Un
Isolierung:	Überspannung Kategorie III
Energieverbrauch:	≈ 4.7VA (@ 1.15 x Un)
Schwellenspannung:	0.80 x Un
Hysterese:	≈ 5%
Stellzeit:	20 or 100mS (siehe unten)
Zeitsteuerung (t):	0.5 - 10, 1 - 30, 2 - 60S 0.5 - 10, 2 - 60M
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	1 x Wechsler
Ausgangsleistung	AC1 250V AC 8A (2000VA) AC15 250V AC 5A (Schließer), 3A (Öffner) DC1 25V DC 8A (200W)
Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 VO
Gewicht:	≈ 70g
Befestigungswahl:	bis BS5584:1978 (EN50 002, DIN 46277-3)
Anschlussklemme / Kabelgrösse:	≤ 2 x 2.5mm² Festdraht / Litze
Genehmigungen:	Anmerkung: UL,CUL,CSA,IEC. CE und ✓ Übereinstimmung

Bitte die Zeitrückstellung bei der Bestellung angeben

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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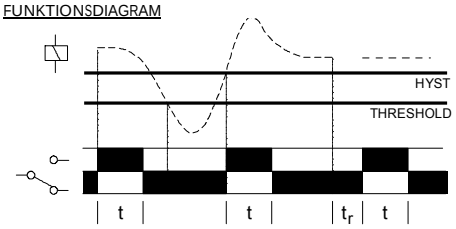
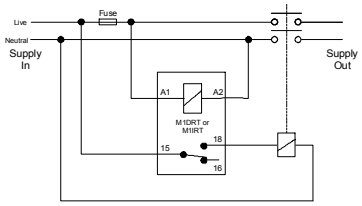
M1IRT

Mains Restoration Auto Restart Timer
Timer de redémarrage automatique de restauration principale
Haupt-Rückerstattung des automatischen Wiederanlaufs- Zeitschalters

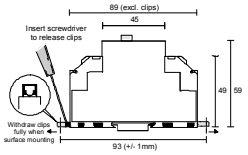
FUNCTION DIAGRAM
DIAGRAMMEDE FONCTION
FUNKTIONSDIAGRAM



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



MOUNTING DETAILS
INSTRUCTIONS DE MONTAGE
MONTAGEAUFÜHRUNGEN



Width / largeur / Breite. 17.5 mm (DIN 43880)

- **INTERVAL**
- **VOLTAGE THRESHOLD 80%**
- **20mS OR 100mS RESET TIME (t_r)**
- **OUTPUT RELAY 8A**
- **DIN RAIL HOUSING (17.5mm)**
- **SUPPLY INDICATION**
- **RELAY INDICATION**

- **INTERVALLE**
- **LIMITE DE VOLTAGE 80%**
- **TEMPS DE REMISE EN MARCHE 20mS OU 100mS (t_r)**
- **RELAIS DE SORTIE 8A**
- **LOGEMENT DU RAIL DIN (17.5mm)**
- **INDICATION D ' ALIMENTATION**
- **INDICATION DE RELAIS**

- **INTERVALL**
- **SCHWELLENSPANNUNG 80%**
- **20mS ODER 100mS RÜCKSTELLZEIT (t_r)**
- **AUSGANDSRELAIS 8A**
- **DIN SCHIENENGEHÄUSE (17.5mm)**
- **VERSORGUNGS - INDIKATION**
- **RELAIS INDIKATION**

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram above.
- Apply power (green LED on)
- Unit will operate according to function selected (see 'function diagram').

Note: Applying power to the M1IRT in an under voltage condition may energise the relay for ≤ 500mS.

Troubleshooting

- Check wiring and voltage present.
- Check polarity (for DC supplies only).

MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.
- Appliquer le puissance (LED verte allumée).
- L ' unité opérera selon la fonction sélectionne (voir 'Diagrammede fonction').

Remarque: Appliquer la puissance au M1IRT avec un voltage trop faible peut fournir de l'énergise au relais pour moins de ≤ 500mS.

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.
- Vérifier la polarisation (seulement pour les alimentations en courant continu).

EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.
- Stromzufuhr (LED grün an)
- Einheit schaltet sich je nach der gewählten Funktion ein (siehe 'Funktionsdiagram').

Bemerkung: Anwendung von Energie zu M1IRT mit einer zu schwachen Spannung, kann das Relais mit weniger als ≤ 500mS anregen

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.
- Überprüfung von Polung (nur für Gleichstromversorgung).

TECHNICAL SPECIFICATION

Supply/monitored voltage Un:	24, 110, 115, 230V AC 24V DC (AC 48 - 63Hz)
Supply variation:	0.80 - 1.15 x Un
Isolation:	Overvoltage category III
Power consumption:	≈ 4.7VA (@ 1.15 x Un)
Voltage threshold:	0.80 x Un
Hysteresis:	≈ 5%
Reset Time:	20 or 100mS (see below)
Time delay (t):	0.5 - 10, 1 - 30, 2 - 60S 0.5 - 10, 2 - 60M
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x C.O.
Output rating:	AC1 250V AC 8A (2000VA) AC15 250V AC 5A (no), 3A (nc) DC1 25V DC 8A (200W)
Electrical Life:	≥ 150,000 (AC1)
Housing:	to UL94 VO
Weight:	≈ 70g
Mounting option:	to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 2.5mm² solid / stranded
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE and Compliant

Please specify reset time when ordering

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

FICHES TECHNIQUES

Tension d ' alimentation contrôlée Un:	24, 110, 115, 230V AC 24V DC (AC 48 - 63Hz)
Variation d ' alimentation:	0.80 - 1.15 x Un
Isolation:	Survoltage catégorie III
Puissance consommée:	≈ 4.7VA (@ 1.15 x Un)
Limite de voltage:	0.80 x Un
Hystérèse:	≈ 5%
Temps de remise à zéro	20 or 100mS (voir ci-dessous)
Délai de temps (t):	0.5 - 10, 1 - 30, 2 - 60S 0.5 - 10, 2 - 60M
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Sortie:	1 x Inverseur
Mesure de sortie:	AC1 250V AC 8A (2000VA) AC15 250V AC 5A (travail), 3A (repos) DC1 25V DC 8A (200W)
Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 VO
Poids:	≈ 70g
Option de montage:	à BS5584:1978 (EN50 002, DIN 46277-3)
Taille du conducteur terminal:	≤ 2 x 2.5mm² toron / multi-filaire
Homologations:	Se conformer à: UL, CUL, CSA, IEC. CE et Déférence

SVP spécifier le temps de réglage à la commande

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

TECHNISCHE DATEN

Stromversorgung / Spannungskontrolle Un:	24, 110, 115, 230V AC 24V DC (AC 48 - 63Hz)
Wechselversorgung:	0.80 - 1.15 x Un
Isolierung:	Überspannung Kategorie III
Energieverbrauch:	≈ 4.7VA (@ 1.15 x Un)
Schwellenspannung:	0.80 x Un
Hysterese:	≈ 5%
Stellzeit:	20 or 100mS (siehe unten)
Zeitsteuerung (t):	0.5 - 10, 1 - 30, 2 - 60S 0.5 - 10, 2 - 60M
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	1 x Wechsler
Ausgangsleistung	AC1 250V AC 8A (2000VA) AC15 250V AC 5A (Schließer), 3A (Öffner) DC1 25V DC 8A (200W)
Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 VO
Gewicht:	≈ 70g
Befestigungswahl:	bis BS5584:1978 (EN50 002, DIN 46277-3)
Anschlussklemme / Kabelgrösse:	≤ 2 x 2.5mm² Festdraht / Litze
Genehmigungen:	Anmerkung: UL,CUL,CSA,IEC. CE und Übereinstimmung

Bitte die Zeitrückstellung bei der Bestellung angeben

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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speed control relays

- Underspeed
- Shaft Rotation
- Tachometer

Choose your category

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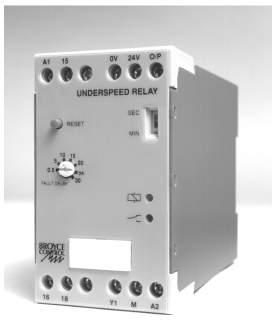
• earth leakage relays • earth fault relays • overcurrent relays • three phase relays • time delay relays • control relays • level control relays • pump control relays •

• speed control relays • temperature control relays • protection devices • generator protection • hours run meter • sockets • bespoke products •

Type: 45175

Underspeed Relay

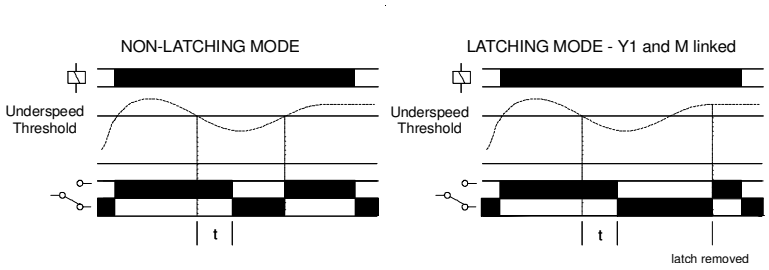
- **Monitors incoming pulses from external NPN sensor or voltage free contact**
- **Time delay with adjustable setting and seconds/minutes range switch**
- **Latch facility (requires external n/c contact or switch)**
- **Built-in "reset" button**
- **DIN rail housing**
- **1 x SPDT relay output**
- **LED indication for supply and relay status**



Dims:
H. 78mm
W. 45mm
L. 99mm

Terminal Protection to IP20

• TIMING DIAGRAM



• INSTALLATION AND SETTING

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below.
- Connect the proximity switch to the **'0V'**, **'24V'** and **'O/P'** terminals**.**
- If using an external contact, connect between **'0V'** and **'O/P'** terminals**.**
- Set the **'range'** switch to **'seconds'.**
- Set the **'delay'** adjustment to minimum.
- Apply power (green **'supply on'** and red **'relay'** LED's will illuminate, the relay will energise and contacts 15 and 18 will close if the unit receives pulses within the set time period).

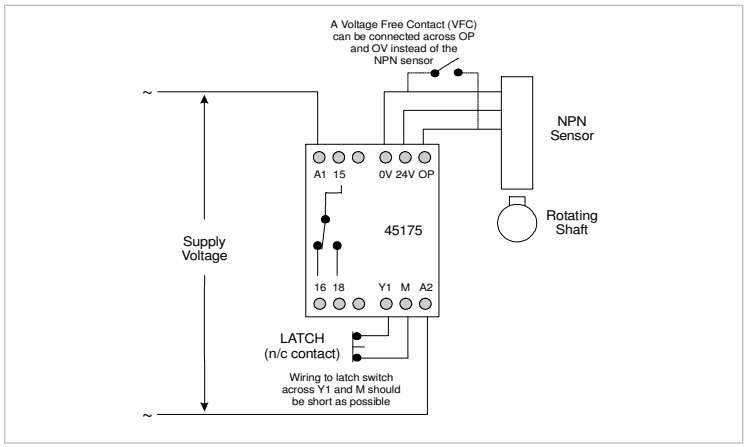
To set the unit:

- Set the **'range'** switch and the **'delay'** adjustment as required.
- **Latch facility:** If the latch is used on the unit, the external contact connected across **'Y1'** and **'M'** must be normally closed. After the relay de-energises, the unit can be reset by pressing **'reset'** button or momentarily removing external contact.

Troubleshooting.

- If the unit fails to operate as described, check the wiring and voltages present on the supply terminals.
- Check proximity switch or external contact is connected correctly.

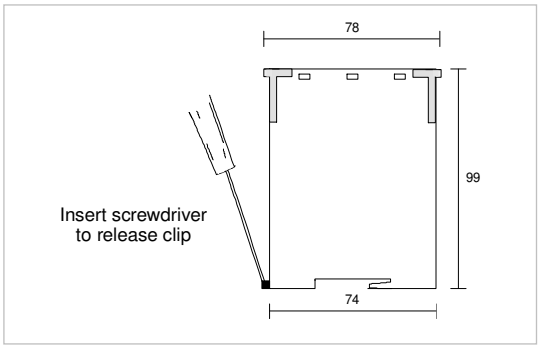
• CONNECTION DIAGRAM



• TECHNICAL SPECIFICATION

Supply voltage Un:	24, 115, 230V AC 48 - 63Hz (Galvanic isolation by transformer)
Supply variation:	85 - 115% of Un
Isolation:	Over voltage cat. III (IEC 664)
Power consumption:	≈ 3 VA
Monitored input:	Pulses from an NPN open collector proximity switch or voltage free contact
Minimum pulse width:	≈ 17μS (≈ 30kHz frequency with 1:1 ratio)
Adjustable time: delay (t)	0.5 to 30 seconds/minutes (± 20%)
Range switch:	seconds or minutes
Reset time:	≈ 70mS
Ambient temp:	-20 to +60°C
Relative humidity:	+95%
Contact rating:	SPDT AC 1 250V AC 10A (2500VA) AC 15 250V AC 6A DC 1 25V DC 10A (250W)
Electrical life:	≥ 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	≈ 230g
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Approvals:	Conforms to UL, CUL, CSA & IEC CE Compliant

• MOUNTING DETAILS



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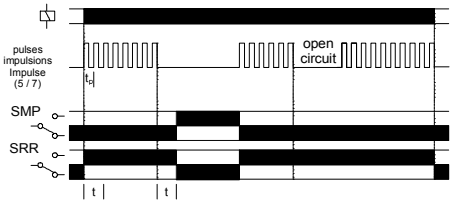
45175-C1999-08-24

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

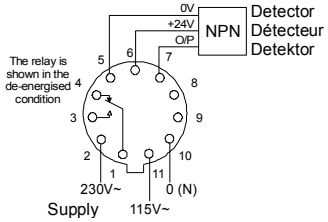
P48SRR & P48SMP

Shaft Rotation
Rotation de l'axe
Rotationsachse

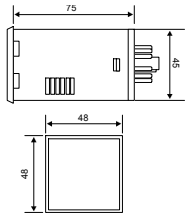
FUNCTION DIAGRAM
DIAGRAMMEDE FONCTION
FUNKTIONSDIAGRAM



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



DIMENSIONS
DIMENSIONS
ABMESSUNGEN



- ❑ **MONITORS PULSES FROM NPN DETECTOR**
- ❑ **OPEN CIRCUIT DETECTION**
- ❑ **DUAL VOLTAGE**
- ❑ **OUTPUT RELAY 8A**
- ❑ **SUPPLY INDICATION**
- ❑ **RELAY INDICATION**
- ❑ **11-PIN PLUG-IN**
- ❑ **PANEL MOUNT**

- ❑ **IMPULSION DU MONITEUR À PARTIR DU DÉTECTEUR NPN**
- ❑ **DÉTECTION DES CIRCUITS OUVERT**
- ❑ **DOUBLE VOLTAGE**
- ❑ **RELAIS DE SORTIE 8A**
- ❑ **INDICATION D ' ALIMENTATION**
- ❑ **INDICATION DE RELAIS**
- ❑ **BRANCHEMENT - 11 AIGUILLES**
- ❑ **SUPPORT DU PANNEAU**

- ❑ **MONITORIMPULSE VON NPN DETEKTOR**
- ❑ **AN SCHALTDETEKTOR**
- ❑ **DOPPELSPANNUNG**
- ❑ **AUSGANGSRELAIS 8A**
- ❑ **VERSORGUNGS - INDIKATION**
- ❑ **RELAIS INDIKATION**
- ❑ **11-NADEL STECKDOSE**
- ❑ **BEFESTIGUNGSPLATTE**

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram above.
- Apply power (green LED on).
  P48SRR - Relay remains energised when receiving pulses (Red LED on).
  P48SMP - Relay remains de-energised when receiving pulses. (Red LED off).

Note: When using detector with external contact or NPN output, a resistor should be fitted across pins 5 and 6 to ensure the relay will operate.

Troubleshooting

- Check wiring and voltage present.

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.
- Appliquer le puissance (LED verte allumée).
  P48SRR - Les relais restent activés quand ils reçoivent des impulsions (LED rouge allumée).
  P48SMP - Les relais restent désactivés quand ils reçoivent des impulsions (LED rouge éteinte).

Remarque: Quand on utilise un détecteur avec contact extérieur ou sortie NPN, une résistance doit être placée entre broches 5 et 6 pour garantir le fonctionnement.

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.
- Energie anbringen (LED grün - an).
  P48SRR - Relais bleibt unter Spannung bei Impulsempfang (LED rot - an).
  P48SMP - Relais bleibt ohne Spannung bei Impulsempfang (LED rot - aus).

Bemerkung: Wenn ein Detektor mit aussen Kontakt oder NPN Ausgang benutzt wird, solte ein Widerstand zwischen Stift 5 und 6 eingepasst werden, um das Ablaufen zu gewährleisten.

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

• TECHNICAL SPECIFICATION

Supply voltage Un:	115 or 230V AC 48 - 63Hz
Supply variation:	0.85 - 1.15 x Un
Power consumption:	4VA Max.
Time delay (t):	1 - 30, 2 - 60S
Accuracy:	± 0.5% (constant conditions)
Detector type:	NPN open collector
Detector supply:	> 2mA / < 25mA (@ 24V DC)
Minimum pulse width:	3mS assuming 1:1 ratio (≅ 10,000 RPM)
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x C.O.
Output rating:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Electrical life:	≥ 150,000 (AC1)
Housing:	to UL94 V2
Weight:	≈ 170g
Approvals:	Conforms to: IEC. CE and ✔ Compliant

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

• FICHES TECHNIQUES

Tension d ' alimentation Un:	115 ou 230V AC 48 - 63Hz
Variation d ' alimentation:	0.85 - 1.15 x Un
Puissance consommée:	4VA Max.
Délai de temps (t):	1 - 30, 2 - 60S
Précision:	± 0.5% (condition constante)
Type de détecteur:	NPN open collector
Alimentation de détecteur:	> 2mA / < 25mA (@ 24V DC)
Largeur minimal d'impulsion:	3mS supposons 1:1 rapport (≅ 10,000 RPM)
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Sortie:	1 x Inverseur
Mesure de sortie:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 V2
Poids:	≈ 170g
Homologations:	Se conformer à: IEC. CE et ✔ Déférence

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

• TECHNISCHE DATEN

Versorgungsspannung Un:	115 oder 230V AC 48 - 63Hz
Wechselversorgung:	0.85 - 1.15 x Un
Energieverbrauch:	4VA Max.
Zeitsteuerung (t):	1 - 30, 2 - 60S
Genauigkeit:	± 0.5% (Bedingungen gleichbleibend)
Typ Detektor:	NPN open collector
Stromversorgungs-Detektor:	> 2mA / < 25mA (@ 24V DC)
Minimal Impuls Breite:	3mS angenommen 1:1 Verhältnis (≅ 10,000 RPM)
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	1 x Wechsler
Ausgangsleistung:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 V2
Gewicht:	≈ 170g
Genehmigungen:	Anmerkung: IEC CE und ✔ Übereinstimmung

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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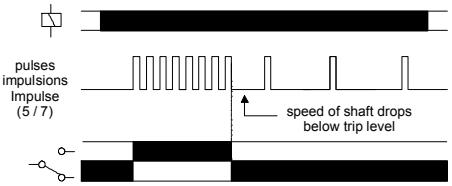
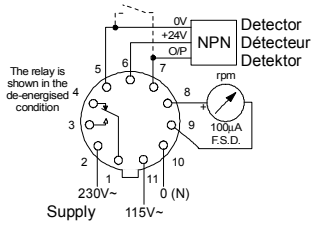
P48TR

Tachometer
Tachymètre
Tachometer

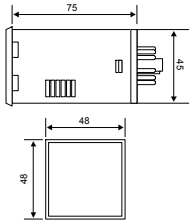
FUNCTION DIAGRAM
DIAGRAMMEDE FONCTION
FUNKTIONSDIAGRAM



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



DIMENSIONS
DIMENSIONS
ABMESSUNGEN



- ❑ **ADJUSTABLE SPEED TRIP**
- ❑ **CONNECTION TO EXTERNAL METER**
- ❑ **DUAL VOLTAGE**
- ❑ **OUTPUT RELAY 8A**
- ❑ **SUPPLY INDICATION**
- ❑ **RELAY INDICATION**
- ❑ **11-PIN PLUG-IN**
- ❑ **PANEL MOUNT**

- ❑ **VITESSE DE DÉPLACEMENT AJUSTABLE**
- ❑ **CONNECTION AU COMPTEUR EXTERIEUR**
- ❑ **DOUBLE VOLTAGE**
- ❑ **RELAIS DE SORTIE 8A**
- ❑ **INDICATION D ' ALIMENTATION**
- ❑ **INDICATION DE RELAIS**
- ❑ **BRANCHEMENT - 11 AIGUILLES**
- ❑ **SUPPORT DU PANNEAU**

- ❑ **EINSTELLBARER GESCHWINDIGKEITSAUSLÖSER**
- ❑ **ANSCHLUSS ZU AUSSENZÄHLER**
- ❑ **DOPPELSPANNUNG**
- ❑ **AUSGANGSRELAIS 8A**
- ❑ **VERSORGUNGS - INDIKATION**
- ❑ **RELAIS INDIKATION**
- ❑ **11-NADEL STECKDOSE**
- ❑ **BEFESTIGUNGSPLATTE**

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram above.
- Apply power (green LED on). Relay remains energised when receiving pulses (red LED on).

Troubleshooting

- Check wiring and voltage present.

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.
- Appliquer le puissance (LED verte allumée). Les relais restent activés quand ils reçoivent des impulsions (LED rouge allumée).

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.
- Energie anbringen (LED grün - an) Relais bleibt unter Spannung bei Impulsempfang (LED rot - an).

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

• TECHNICAL SPECIFICATION

Supply voltage Un:	115 or 230V AC 48 - 63Hz
Supply variation:	0.85 - 1.15 x Un
Power consumption:	4VA Max.
Scale range and calibration:	200 - 10,000 RPM / -0 +5% FSD
Meter output:	Suitable to drive 100µA FSD
Meter calibration:	Via preset pot through side aperture
Input Impedance (Z):	15KΩ (24V)
Detector type:	NPN open collector
Detector supply:	< 25mA (@ 24V DC)
Ambient temperature:	-20 to +50°C
Relative humidity:	+95%
Output:	1 x C.O.
Output rating:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Electrical life:	≥ 150,000 (AC1)
Housing:	to UL94 V2
Weight:	≈ 170g
Approvals:	Conforms to: IEC CE and Compliant

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

• FICHES TECHNIQUES

Tension d ' alimentation Un:	115 ou 230V AC 48 - 63Hz
Variation d ' alimentation:	0.85 - 1.15 x Un
Puissance consommée:	4VA Max.
Domaine d'échelle et de calibrage:	200 - 10,000 RPM / -0 +5% FSD
Sortie vers le compteur:	bon pour le service 100µA FSD
Calibrage du compteur:	vers un système prérégle à travers une ouverture latérale
Impédance d'entrée (Z):	15KΩ (24V)
Type de détecteur:	NPN open collector
Alimentation de détecteur:	< 25mA (@ 24V DC)
Température ambiante:	-20 à +50°C
Humidité relative:	+95%
Sortie:	1 x Inverseur
Mesure de sortie:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 V2
Poids:	≈ 170g
Homologations:	Se conformer à: IEC CE et Déférence

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

• TECHNISCHE DATEN

Versorgungsspannung Un:	115 oder 230V AC 48 - 63Hz
Wechselversorgung:	0.85 - 1.15 x Un
Energieverbrauch:	4VA Max.
Messbereich und Kalibrierung:	200 - 10,000 RPM / -0 +5% FSD
Zählerausgang:	zum Antrieb geeignet 100µA FSD
Kalibrierungszähler:	zu voreingestellter Büchse über Seiteneingang
Impedanz Eingang (Z):	15KΩ (24V)
Typ Detektor:	NPN open collector
Stromversorgungs-Detektor:	< 25mA (@ 24V DC)
Umgebungstemperatur:	-20 bis +50°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	1 x Wechsler
Ausgangsleistung:	AC1 250V AC 8A (2000VA) AC15 250V AC 2.5A DC1 25V DC 8A (200W)
Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 V2
Gewicht:	≈ 170g
Genehmigungen:	Anmerkung: IEC CE und Übereinstimmung

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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temperature control relays

- Thermistor
- PT100
- Voltage & Thermistor

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Type: LTMR

PTC Thermistor Monitoring Relay

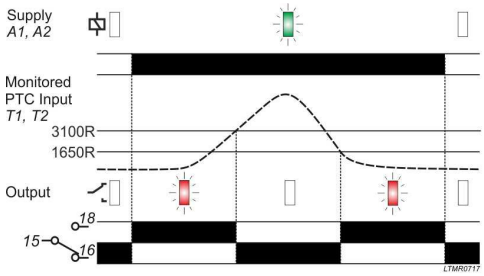
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- **Compact 17.5mm DIN rail housing**
- **Used in conjunction with PTC (Positive Temperature Coefficient) thermistor typically embedded in motor windings**
- **Detects when the resistance of thermistor exceeds the fixed Operate threshold and de-energises internal relay**
- **Auto-resets (relay re-energises) when resistance returns below the Release threshold**
- **Isolated Auxiliary Supply (100 – 230V AC/DC)**
- **1 x SPDT relay output 5A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

QMS ISO 9001 REGISTERED
ISO 9001:2015
Cert. No. 14125771

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below.
- The connection to the thermistor is not polarity sensitive and can therefore be connected either way around.

Applying power.

- Apply power and the green "Power supply" ❶ LED will illuminate. The red LED ❷ will illuminate and relay energise provided the measured temperature is below the "Operate" trip threshold.
- Refer to the Troubleshooting table if the unit fails to operate correctly.

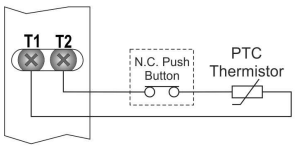
Testing.

- If it is necessary to provide a means of testing the unit (i.e. simulating an over temperature condition), and external push button may be connected as shown below.
  N.B. It is recommended that a push button be used rather than a switch as to eliminate the risk of the switch being left in the open position.

Test Simulation

Pressing the N.C. push button will temporarily disconnect the thermistor forcing the relay to de-energise. Release the push button to re-energise the relay.

LTMR Test Circuit



Troubleshooting.

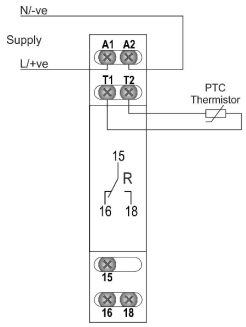
The table below shows the status of the unit during a particular condition.

Status	Green LED ❶	Red LED ❷	Relay
No supply	Off	Off	De-energised
Measured temperature above trip threshold	On	Off	De-energised
Thermistor disconnected/open circuit	On	Off	De-energised
Thermistor short circuit	On	On	Energised

TECHNICAL SPECIFICATION

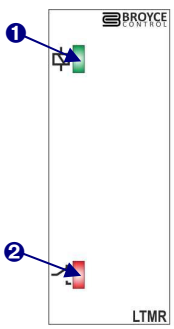
Aux. Supply voltage Us **(A1, A2):**	100 – 230V AC/DC	
Frequency range:	48 – 63Hz	
Supply variation:	+/-15%	
Overvoltage category:	III (IEC 60664)	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Power consumption (max.):	1VA	
Monitoring mode:	Over temperature	
Operate resistance/threshold:	3100Ω ±10% (in accordance with DIN 44081)	
Release resistance/threshold:	1650Ω ±10%	
Repeat accuracy:	± 0.5% at constant conditions	
Response time:	< 0.5s (to relay de-energising) < 50ms (to relay re-energising)	
Monitored Input **(T1, T2):**	PTC Thermistor	
Max. cable length:	50m	
Power on indication:	Green LED	
Relay status indication:	Red LED	
Ambient temperature:	-20 to +60°C	
Relative humidity:	+95% max.	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 5A (1250VA)
	AC15	250V 2A
	DC1	25V 5A (125W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	67g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size:	≤ 2 x 2.5mm² solid or stranded	
Terminal screw:	M3 (Designed for use with **PZ1** "pozi-driver")	
Tightening torque:	0.6Nm Max.	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4	

CONNECTION DIAGRAM

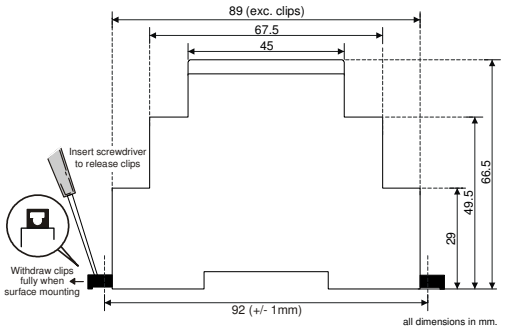


FRONT LED INDICATION

1. Power supply status (Green) LED
2. Relay output status (Red) LED



DIMENSIONS



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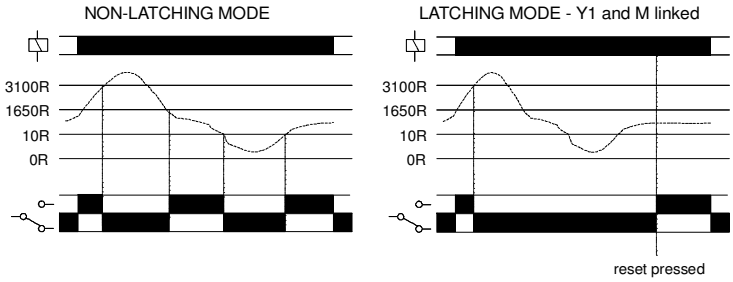
Type: 45200
Thermistor Relay

The unit monitors equipment which have in-built PTC thermistors to DIN 44081. The unit will monitor upto 6 thermistors in a chain. When power is applied, the green 'supply on' LED illuminates, the relay energises and red 'relay' LED illuminates, provided the resistance of the thermistors is below the release level. If the resistance of the thermistors rises above the release level or a short circuit occurs the relay will de-energise and red LED extinguish. If terminals Y1 and M are linked together, the unit remains latched until the reset button is pressed, the link or the supply is removed.

Dims:
H.78 mm
W.45 mm
L.99 mm

Terminal Protection to IP20

▪ TIMING DIAGRAM



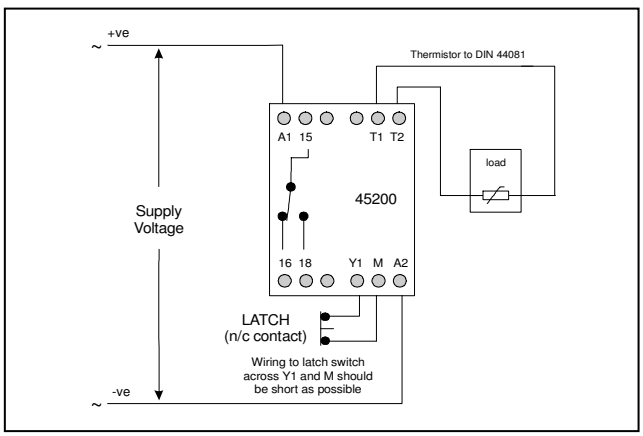
▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply and the thermistor(s) as shown in the diagram below. Apply power and the green **'supply on'** and the red **'relay'** LED's should illuminate. If this does not occur, isolate the supply and check the connections to the thermistor of the machine being monitored and the supply connections to the unit. If the latching facility is required, then connect a link or a normally closed push button across terminals **'Y1'** and **'M'.**

Note: 1. The unit also has a built in **'reset'** button which is used in conjunction with terminals **'Y1'** and **'M'** being linked and a **'test'** button which is used to simulate a fault.

2. If the unit is required to detect a short circuit condition, ensure that the actual resistance of the wires connected to the thermistor(s) is less than 10 Ω. This can be usually prevented by keeping the wires as short as possible.

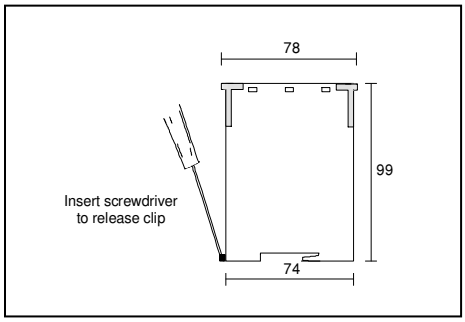
▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Auxiliary Supply Un:	24V, 110V, 230V AC 48 - 63Hz (Galvanic isolation by transformer)
Supply Variation:	85 - 115% of Un
Isolation:	Overvoltage cat. III (IEC 664)
Power Consumption:	≈ 3VA
Max Resistance of cold sensors:	1500 Ω (i.e. 1 to 6 sensors can be connected)
Release Value:	3100 Ω ±10% (in accordance with DIN 44081)
Reset Value:	1650 Ω ±10%
Short Circuit Detection:	0 to 10 Ω
Response Time:	≈ 50mS
Reset Time	≈ 350mS
Temperature Range:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	SPDT AC 1 250V AC 10A (2500VA) AC 15 250V AC 6A DC 1 25V DC 10A (250W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	234g
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal Conductor Size:	Max 2 x 1.5mm² stranded (terminated) Max 2 x 2.5mm² solid
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE Compliant

▪ MOUNTING DETAILS



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45200-I2004-06-24

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Type: 45TCR

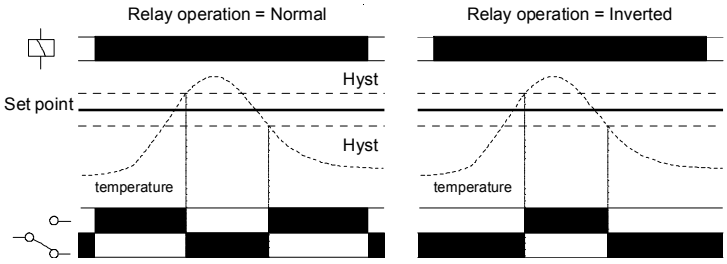
PT100 Temperature Control Relay

- **2 or 3 wire PT100 input**
- **Monitoring or control of temperature -50°C to 300°C (5 ranges)**
- **Adjustable set point and hysteresis**
- **Relay Operation Inversion switch - Normal/Inverted**
- **Analogue output (0 - 10V DC) relative to set point or measured temperature**
- **Dual voltage supply (AC only)**
- **LED indication of relay, probe and supply status**

Dims:
W. 45mm

Terminal Protection to IP20

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as shown in the diagram below. (Ensure the correct terminals are used when connecting the supply).
- Select the required temperature range. (N.B. fit link between terminals "Y1" and "Z" for 200 to 300°C range)
- Set the relay inversion switch to either "N" (Normal) or "I" (Inverted).
- Apply power (green LED on).

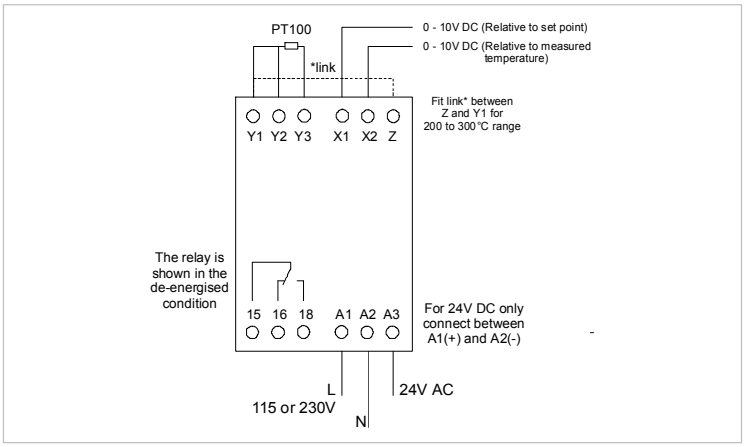
Analogue outputs (0 - 10V DC)

- Connecting between terminals "Y1" and "X1" provides DC voltage relative to the set point (i.e. set point @ 20% = 2V DC out).
- Connecting between terminals "Y1" and "X2" provides DC voltage relative to the measured temperature within any range selected.

Troubleshooting

- Check wiring and voltage present.
- If the red LED flashes, check PT100 connections

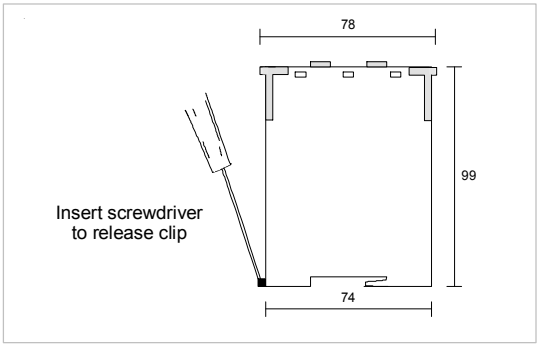
CONNECTION DIAGRAM



TECHNICAL SPECIFICATION

Supply voltage Un:	24V DC 24V / 115V AC 45 - 65Hz* 24V / 230V AC 45 - 65Hz* *Integral transformer
Supply variation:	85 - 115% of Un
Isolation:	3.75kV (N.B. There is no isolation between input and analogue output)
Power consumption:	≈ 4.5VA (27.6V AC), 4.8VA (264V AC)
(@ 115% x Un)	≈ 1W (27.6V DC)
Input:	PT100 2 or 3-wire (to DIN 43760)
Temperature ranges:	-50 to 50°C, 0 to 50°C, 0 to 100°C,
(selectable)	100 to 200°C, 200 to 300°C
Set point:	0 - 100% of selected temperature range
Hysteresis:	0.5 - 20%
Temperature drift:	0.05%/°C (max.)
Time delay:	200mS (worst case 5 x τ)
Ambient temp:	-20 to +50°C
Relative humidity:	+95%
Output:	1 x SPDT
Output rating:	AC 1 250V AC 8A (2000VA) AC 15 250V AC 5A (no), 3A (nc) DC 1 25V DC 8A (200W)
Electrical life:	≥ 150,000 ops at rated load
Analogue output:	0 - 10V DC (relative to set point or measured temperature) I_{max} = 2mA $R_{load} \geq 5K\Omega$
Housing:	to UL94 VO
Weight:	≈ 200g
Mounting option:	On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 1.5mm² stranded wire ≤ 2 x 2.5mm² solid wire
Approvals:	Conforms to UL, CUL, CSA & IEC CE and RCM Compliant

MOUNTING DETAILS



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Type: 45PTR

Three Phase Voltage and Thermistor Relay

The unit is designed to monitor a three phase supply for phase loss, undervoltage, incorrect phase sequence and/or PTC thermistor (to DIN 44081) for over temperature or short circuit. When power is applied, the green 'supply on' LED illuminates.

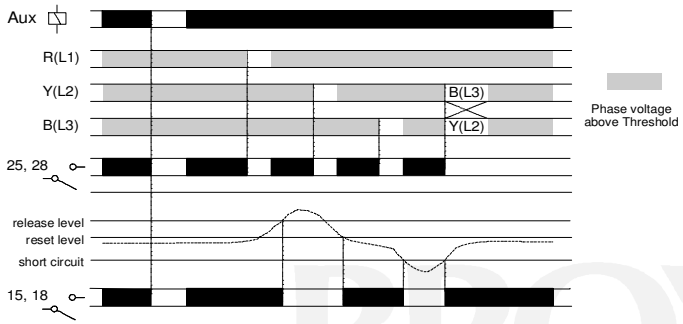
Three Phase Monitoring: The relay energises when all phases are present, above the fixed threshold value and the sequence is correct. If one or more phases fall below 60% of the nominal three phase supply, or the phase sequence becomes reversed, the relay will de-energise.

Thermistor Monitoring: The relay energises when the resistance of the thermistor is below the release level and above the short circuit (s/c) level. If resistance rises above the release level or goes s/c, the relay will de-energise.

Dims:
H.78 mm
W.45 mm
L.99 mm

Terminal Protection to IP20

▪ TIMING DIAGRAM

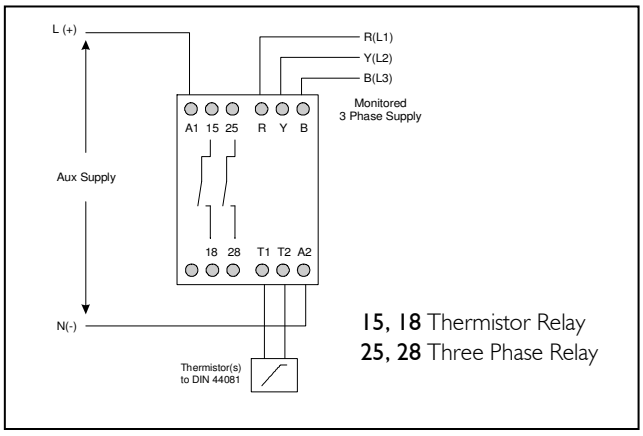


▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the auxiliary supply, three phase supply and thermistor as shown in the diagram below. Apply power and the green **'supply on'** LED should illuminate. The three phase relay should energise and red LED **'V'** illuminate. The thermistor relay should also energise and red LED **'T'** illuminate. If the thermistor LED **'T'** remains extinguished, then check the thermistor connections. If the green LED illuminates but the red LED **'V'** does not, isolate both supplies and reverse any two of the phase inputs.

Note: If the unit is required to detect a short circuit condition, ensure that the actual resistance of the wires connected to the thermistor(s) is less than 10 Ω. This can be usually prevented by keeping the wires as short as possible.

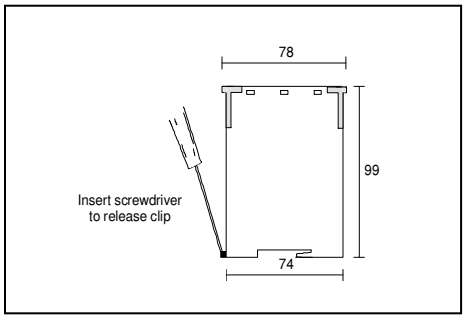
▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Auxiliary Supply Un:	24, 110, 230, 400V AC 48 - 63Hz (Galvanic isolation by transformer)
Supply Variation:	85 - 115% of Un
Isolation:	Overvoltage cat. III (IEC 664)
Power Consumption:	≈ 3VA (@ 115% of Un)
Monitored Voltage:	3 x 400V, Three Phase (3-wire)
Threshold Voltage:	60% of Un
Release Value:	3100 Ω ±10% (in accordance with DIN 44081)
Reset Value:	1650 Ω ±10%
Short Circuit Detection:	0 to 10 Ω
Response Time:	≈ 15mS
Reset Time	≈ 50mS
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	2 x SPNO AC 1 250V AC 10A (2500VA) AC 15 250V AC 6A DC 1 25V DC 10A (250W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	268g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal Conductor Size:	Max 2 x 1.5mm² stranded (terminated) Max 2 x 2.5mm² solid
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE Compliant

▪ MOUNTING DETAILS



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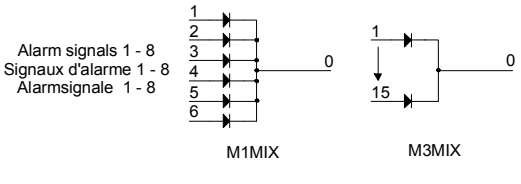
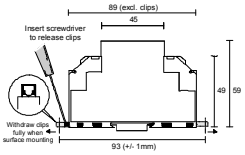
M1MI(X) & M3MI(X)

Multi Input Relay
Relais à entrées multiples
Multi Eingangs Relais

CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



MOUNTING DETAILS
INSTRUCTIONS DE MONTAGE
MONTAGEAUFÜHRUNGEN



Width / largeur / Breite. (DIN 43880)
- 17.5mm M1MI(X)
- 35mm M3MI(X)

- **ALLOWS UP TO 6 INPUTS - M1MI(X)**
- **ALLLOWS UP TO 15 INPUTS - M3MI(X)**
- **FOR USE WITH M3MIR AND M5MAR**
- **DIN RAIL HOUSING**

- **PERMET JUSQU'À 6 ENTRÉES - M1MI(X)**
- **PERMET JUSQU'À 15 ENTRÉES - M3MI(X)**
- **POUR UTILISER AVEC M3MIR ET M5MAR**
- **LOGEMENT DU RAIL DIN**

- **ERLAUBT BIS ZU 6 EINGÄNGE - M1MI(X)**
- **ERLAUBT BIS ZU 15 EINGÄNGE - M3MI(X)**
- **ZUR VERWENDUNG MIT M3MIR UND M5MAR**
- **DIN SCHIENENGEHÄUSE**

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY
- Connect the unit as shown in the diagram above.

Troubleshooting

- Check wiring and voltage present.

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

• TECHNICAL SPECIFICATION

Supply voltage Un:	230V AC/DC (AC: 48 - 63Hz)
Supply variation:	1.15 x Un max.
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Housing:	to UL94 VO
Weight:	
M1MI(X):	≈ 50g
M3MI(X):	≈ 100g
Mounting option:	to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 2.5mm² solid /stranded
Approvals:	CE and Compliant

• FICHES TECHNIQUES

Tension d ' alimentation Un:	230V AC/DC (AC: 48 - 63Hz)
Variation d ' alimentation:	1.15 x Un max.
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Boitier:	à UL94 VO
Poids:	
M1MI(X):	≈ 50g
M3MI(X):	≈ 100g
Option de montage:	à BS5584:1978 (EN50 002, DIN 46277-3)
Taille du conducteur terminal:	≤ 2 x 2.5mm² toron / multi-filaire
Homologations:	CE et Déférence

• TECHNISCHE DATEN

Versorgungsspannung Un:	230V AC/DC (AC: 48 - 63Hz)
Wechselversorgung:	1.15 x Un max.
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Gehäuse:	bis UL94 VO
Gewicht:	
M1MI(X):	≈ 50g
M3MI(X):	≈ 100g
Befestigungswahl:	bis BS5584:1978 (EN50 002, DIN 46277-3)
Anschlussklemme / Kabelgrösse:	≤ 2 x 2.5mm² Festdraht / Litze
Genehmigungen:	CE und Übereinstimmung

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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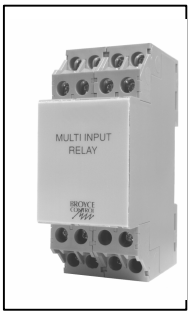
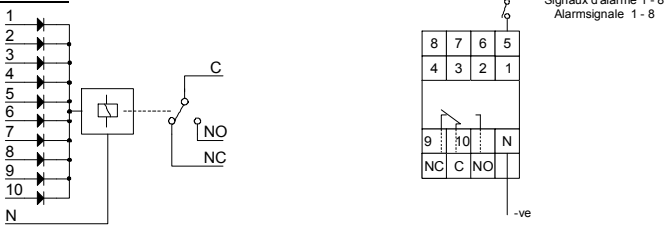
M3MIR

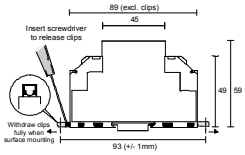
Multi Input Relay
Relais à entrées multiples
Multi Eingangs Relais



CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



MOUNTING DETAILS
INSTRUCTIONS DE MONTAGE
MONTAGEAUFÜHRUNGEN



Width / largeur / Breite. 35 mm (DIN 43880)

- ❑ **ALLOWS UP TO 10 INPUTS**
- ❑ **ANY ONE INPUT WILL ENERGISE OUTPUT RELAY**
- ❑ **EXPANDABLE USING M1MI(X)**
- ❑ **OUTPUT RELAY 5A**
- ❑ **DIN RAIL HOSUING (35mm)**

- ❑ **PERMET JUSQU'À 10 ENTRÉES**
- ❑ **N'IMPORTE QUELLE ENTRÉE VA ACTIVER LE RELAIS DE SORTIE**
- ❑ **CONSOMMABLE UTILISANT M1MI(X)**
- ❑ **RELAIS DE SORTIE 5A**
- ❑ **LOGEMENT DU RAIL DIN (35mm)**

- ❑ **ERLAUBT BIS ZU 10 EINGÄNGE**
- ❑ **JEDER EINZELNE EINGANG KANN DAS AUSGANGSRELAIS ANSTEUERN**
- ❑ **EXPANSION ZUM BENUTZEN FÜR M1MI(X)**
- ❑ **AUSGANGSRELAIS 5A**
- ❑ **DIN SCHIENENGEHÄUSE (35mm)**

• INSTALLATION AND SETTING

- BEFORE INSTALLATION, ISOLATE THE SUPPLY
- Connect the unit as shown in the diagram above.

Note: All inputs must be same phase with common neutral. Further inputs may be monitored by adding M1MI(X) extension units.

Troubleshooting

- Check wiring and voltage present.

• MONTAGE ET MISE AU POINT

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.

Remarque: Toutes les entrées doivent avoir la même phase avec un neutre commun. D'autres entrées peuvent être contrôlées en ajoutant des unités d'extrusion M1MI(X).

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

• EINBAU UND EINSTELLUNG

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.

Bemerkung: Alle Eingänge müssen mit der gleichen Phase und einen gemeinsamen Nullpunkt verschen sein. Weitere Eingänge können überwacht werden indem man M1MI(X) Erweiterungseinheiten hinzufügt.

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

• TECHNICAL SPECIFICATION

Installation work must be carried out by qualified personnel.

Supply voltage Un:	24V DC 24, 110, 230V AC 48 - 63Hz
Supply variation:	0.85 - 1.15 x Un
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Output:	1 x C.O.
Output rating:	AC1 250V AC 5A DC1 25V DC 5A
Electrical life:	≥ 150,000 (AC1)
Housing:	to UL94 VO
Weight:	≈ 120g
Mounting option:	to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 2.5mm² solid /stranded
Approvals:	CSA CE and ✓ Compliant

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

• FICHES TECHNIQUES

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

Tension d ' alimentation Un:	24V DC 24, 110, 230V AC 48 - 63Hz
Variation d ' alimentation:	0.85 - 1.15 x Un
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Sortie:	1 x Inverseur
Mesure de sortie:	AC1 250V AC 5A DC1 25V DC 5A
Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 VO
Poids:	≈ 120g
Option de montage:	à BS5584:1978 (EN50 002, DIN 46277-3)
Taille du conducteur terminal:	≤ 2 x 2.5mm² toron / multi-filaire
Homologations:	CSA CE et ✓ Déférence

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

• TECHNISCHE DATEN

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

Versorgungsspannung Un:	24V DC 24, 110, 230V AC 48 - 63Hz
Wechselversorgung:	0.85 - 1.15 x Un
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	1 x Wechsler
Ausgangsleistung:	AC1 250V AC 5A DC1 25V DC 5A
Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 VO
Gewicht:	≈ 120g
Befestigungswahl:	bis BS5584:1978 (EN50 002, DIN 46277-3)
Anschlussklemme / Kabelgrösse:	≤ 2 x 2.5mm² Festdraht / Litze
Genehmigungen:	CSA CE und ✓ Übereinstimmung

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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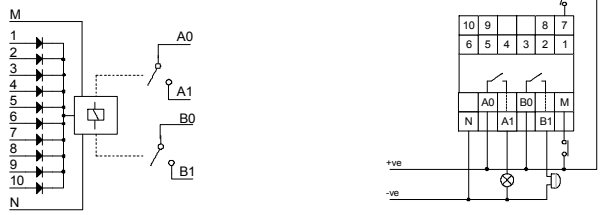
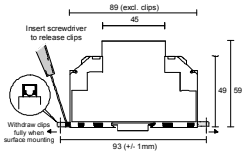
M5MAR(T)

Multi Input (Alarm) Relay - Re-triggerable
Relais d'entrées multiples (alarme) redéclenchables
Multi Eingangs (Alarm) Relais wiederauslösbar

CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS



MOUNTING DETAILS
INSTRUCTIONS DE MONTAGE
MONTAGEAUFÜHRUNGEN



Width / largeur / Breite. 52.5 mm (DIN 43880)

- ALLOWS UP TO 10 INPUTS
- ANY ONE INPUT WILL ENERGISE OUTPUT RELAY
- SEPARATE RELAYS FOR AUDIBLE AND VISUAL ALARM
- MUTE INPUT FOR AUDIBLE ALARM
- RE-TRIGGERABLE ALARM SYSTEM
- EXPANDABLE USING M1MI(X)
- OUTPUT RELAY 8A
- DIN RAIL HOSUING (52.5mm)

- PERMET JUSQU'À 10 ENTRÉES
- N'IMPORTE QUELLE ENTRÉE VA ACTIVER LE RELAIS DE SORTIE
- RELAIS SÉPARÉS POUR TOUTES ALARMES AUDIBLES ET VISIBLES
- ENTRÉE MUETTE POUR DES ALARMES SONORES
- SYSTÈME D'ALARME REDÉCLENCHABLE
- CONSOMMABLE UTILISANT M1MI(X)
- RELAIS DE SORTIE 8A
- LOGEMENT DU RAIL DIN (52.5mm)

- ERLAUBT BIS ZU 10 EINGÄNGE
- JEDER EINZELNE EINGANG KANN DAS AUSGANGSRELAIS ANSTEUERN
- GETRENNTE RELAIS FÜR AKUSTISCHEN UND OPTISCHEN ALARM
- STUMMER EINGANG FÜR AKUSTISCHEN ALARM
- WIEDERAUSLÖSBARE ALARMANLAGE
- EXPANSION ZUM BENUTZEN FÜR M1MI(X)
- AUSGANGSRELAIS 8A
- DIN SCHIENENGEHÄUSE (52.5mm)

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY
- Connect the unit as shown in the diagram above.

Note: All inputs must be same phase with common neutral. Further inputs may be monitored by adding M1MI(X) extension units. The audible alarm relay can be muted by applying a positive voltage to the "M" terminal.

Troubleshooting

- Check wiring and voltage present.

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.

Remarque: Toutes les entrées doivent avoir la même phase avec un neutre commun. D'autres entrées peuvent être contrôlées en ajoutant des unités d'extrusion M1MI(X). Le relais d'alarme sonore peut être rendu silencieux en appliquant un voltage positif au terminal "M".

Intervention (pour régler un problème)

- Vérifier les fils et le voltage présent.

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.

Bemerkung: Alle Eingänge müssen mit der gleichen Phase und einen gemeinsamen Nullpunkt verschen sein. Weitere Eingänge können überwacht werden indem man M1MI(X) Erweiterungseinheiten hinzufügt. Das akustische Alarm Relais kann stillgelegt werden durch Verwendung einer plus Spannung zur "M" Anschluss.

Störungsbehebung

- Überprüfung von Leitungen und gegenwärtiger Spannung.

• TECHNICAL SPECIFICATION

Supply voltage Un:	110, 230V AC 48 - 63Hz
Supply variation:	0.85 - 1.15 x Un
Rest time:	≈ 100mS
Minimum trigger time:	≈ 50mS (Mute)
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Output:	2 x N.O.
Output rating:	AC1 250V AC 8A AC15 250V 3A DC1 25V DC 8A
Electrical life:	≥ 150,000 (AC1)
Housing:	to UL94 VO
Weight:	≈ 200g
Mounting option:	to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 2.5mm² solid /stranded
Approvals:	CE and ✓ Compliant

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

• FICHES TECHNIQUES

Tension d ' alimentation Un:	110, 230V AC 48 - 63Hz
Variation d ' alimentation:	0.85 - 1.15 x Un
Temps de remise à zéro:	≈ 100mS
Temps de déclenchement minimum:	≈ 50mS (muette)
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Sortie:	2 x Travail
Mesure de sortie:	AC1 250V AC 8A AC15 250V 3A DC1 25V DC 8A
Durée de vie électrique:	≥ 150,000 (AC1)
Boitier:	à UL94 VO
Poids:	≈ 200g
Option de montage:	à BS5584:1978 (EN50 002, DIN 46277-3)
Taille du conducteur terminal:	≤ 2 x 2.5mm² toron / multi-filaire
Homologations:	CE et ✓ Déférence

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

• TECHNISCHE DATEN

Versorgungsspannung Un:	110, 230V AC 48 - 63Hz
Wechselversorgung:	0.85 - 1.15 x Un
Stellzeit:	≈ 100mS
Minimum Zeitauslöser:	≈ 50mS (Stummer)
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Ausgang:	2 x Schließer
Ausgangsleistung:	AC1 250V AC 8A AC15 250V 3A DC1 25V DC 8A
Elektrische Lebensdauer:	≥ 150,000 (AC1)
Gehäuse:	bis UL94 VO
Gewicht:	≈ 200g
Befestigungswahl:	bis BS5584:1978 (EN50 002, DIN 46277-3)
Anschlussklemme / Kabelgrösse:	≤ 2 x 2.5mm² Festdraht / Litze
Genehmigungen:	CE und ✓ Übereinstimmung

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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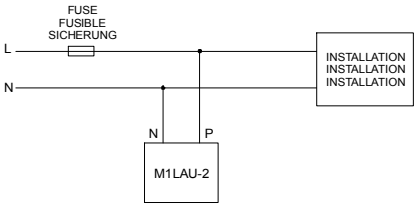
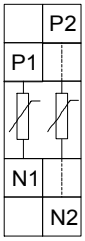
M1LAU-2

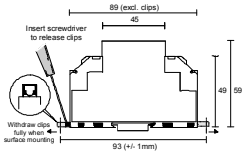
Surge Arrestor
Arrêteur de surtension
Spannungsstoss Ableiter

CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS





MOUNTING DETAILS
INSTRUCTIONS DE MONTAGE
MONTAGEAUFÜHRUNGEN



Width / largeur / Breite. 17.5 mm (DIN 43880)

- **INCORPORATES 2 TRANSIENT VOLTAGE SUPPRESSORS**
- **DESIGNED TO BE CONNECTED ACROSS A SUPPLY OR REACTIVE LOAD E.G. SOLENOIDS**
- **DIN RAIL HOUSING (17.5mm)**

- **INCORPORE 2 SUPPRESSEURS DE TRANSITION DE VOLTAGE**
- **CONÇU POUR ÊTRE CONNECTÉ UNE ALIMENTATION OU UNE CHARGE RÉACTIVE, PAR EXEMPLE SOLÉNOÏDES**
- **LOGEMENT DU RAIL DIN (17.5mm)**

- **2 EINGEBAUTE AUSGLEIEHSSPANNUNG-SUNTERDRÜCKUNGEN**
- **VORGESEHEN ZUM ZUSCHALTEN ZUR STROMVERSORGUNG ODER BLINDLAST z.B. SPULE**
- **DIN SCHIENENGEHÄUSE (17.5mm)**

INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY
- Connect the unit as shown in the diagram above.

MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.

EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un:	240V AC/DC
Supply variation:	1.15 x Un
Current rating:	16A (when used with suitable Miniature Circuit Breaker)
Response time:	≤ 25nS
Capacitance:	< 5nF @ 1kHz
Insulation resistance:	> 1000 MΩ
Voltage temperature co-efficient:	- 0.05% / °C
Max. clamping voltage: (with current waveform 1.2 / 50µS - Short circuit current 100A ± 10A)	680V (Phase / neutral) 680V (Phase / earth)
Transient withstand capacity:	x 2 @ 6.5kA (8 / 20µS waveform)
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Housing:	to UL94 VO
Weight:	≈ 50g
Mounting option:	to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 2.5mm² solid /stranded

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

FICHES TECHNIQUES

Voltage d ' alimentation contrôlée Un:	240V AC/DC
Variation d ' alimentation:	1.15 x Un
Mesure des courants:	16A (Quand utilisé avec les coupeurs de circuits miniatures adaptés)
Temps de résponse:	≤ 25nS
Capacitance:	< 5nF @ 1kHz
Résistance d'isolation:	> 1000 MΩ
Coefficient voltage température:	- 0.05% / °C
Voltage maximum d'accrochage: (avec la forme d'onde courante 1.2 / 50µS - courant de court-circuit 100A ± 10A)	680V (Phase / neutre) 680V (Phase / de terre)
Capacité de résistance transitoire:	x 2 @ 6.5kA (Forme d'onde de 8 / 20µS)
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Boitier:	à UL94 VO
Poids:	≈ 50g
Option de montage:	à BS5584:1978 (EN50 002, DIN 46277-3)
Taille du conducteur terminal:	≤ 2 x 2.5mm² toron / multi-filaire

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

TECHNISCHE DATEN

Stromversorgung / Spannungskontrolle Un:	240V AC/DC
Wechselversorgung:	1.15 x Un
Nennstrom:	16A (wenn mit geeigneten Miniatur Stromunterbrecher benutzt)
Ansprechzeit:	≤ 25nS
Kapazitanz:	< 5nF @ 1kHz
Isolationswiderstand:	> 1000 MΩ
Spannungstemperatur Koeffizient:	- 0.05% / °C
Maximale Klemmspannung: (mit Stromwellenform von 1.2 / 50µS - Kurzschluss Strom 100A ± 10A)	680V (Phase / neutral) 680V (Phase / Erde)
Vorübergehende Widerstands Kapazität:	x 2 @ 6.5kA (Wellenform von 8 / 20µS)
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Gehäuse:	bis UL94 VO
Gewicht:	≈ 50g
Befestigungswahl:	bis BS5584:1978 (EN50 002, DIN 46277-3)
Anschlussklemme / Kabelgrösse:	≤ 2 x 2.5mm² Festdraht / Litze

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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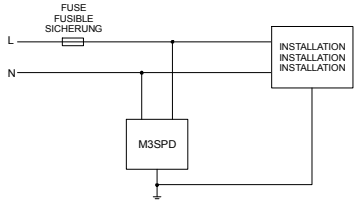
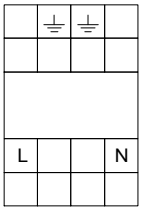
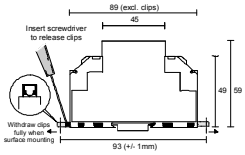
M3SPD

CONNECTION DIAGRAM
DIAGRAMME DE CONNECTION
SCHALTBILDANSCHLUSS





MOUNTING DETAILS
INSTRUCTIONS DE MONTAGE
MONTAGEAUFÜHRUNGEN



Width / largeur / Breite. 35 mm (DIN 43880)

- **PROTECTS AGAINST OVER VOLTAGE TRANSIENTS**
- **INCORPORATES METAL OXIDE VARISTORS AND GAS DISCHARGE TUBE**
- **LONG WORKING LIFE**
- **FAST RESPONSE TIME**
- **DIN RAIL HOUSING (35mm)**

- **PROTÉGE CONTRE LES SURTENSIONS TRANSITOIRES**
- **INCORPORE DES VARIATEURS À OXYDE MÉTALLIQUE OU DES TUBES À DÉCHARGE**
- **LONGUE DURÉE DE VIE DE FONCTIONNEMENT**
- **TEMPS DE RÉPONSE RAPIDE**
- **LOGEMENT DU RAIL DIN (35mm)**

- **SCHUTZ GEGEN VORÜBERGEHENDE ÜBERSPANNUNG**
- **EINGEBAUT SIND METALLOXID VARISTORE UND GASENTLADUNGSRÖHRE**
- **LANGE GEBRAUCHSDAUER**
- **SCHNELLE ANSPRECHZEIT**
- **DIN SCHIENENGEHÄUSE (35mm)**

• INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY
- Connect the unit as shown in the diagram above.

• MONTAGE ET MISE AU POINT

Des travaux d'installation doivent être menés à bien par le personnel qualifié.

- AVANT MONTAGE, ISOLER L ' ALIMENTATION
- Branchement comme indiqué dans le diagramme ci-dessus.

• EINBAU UND EINSTELLUNG

Installation Arbeit muß von qualifiziertem Personal durchgeführt werden.

- VOR EINBAU DIE STROMVERSORGUNG ISOLIEREN
- Stromversorgung anschliessen wie im Schaltbild unten angezeigt.

• TECHNICAL SPECIFICATION

Supply/monitoring voltage Un:	220 / 240V AC/DC (AC: 50 - 60Hz)
Supply variation:	0.90 - 1.10 x Un
Current rating:	16A (when used with suitable Miniature Circuit Breaker)
Leakage current:	100µA @ 250V AC
Response time:	≤ 25nS
Capacitance:	< 5nF @ 1kHz
Insulation resistance:	> 1000 MΩ (applicable to metal oxide varistors only)
Voltage temperature co-efficient:	- 0.05% / °C (applicable to metal oxide varistors only)
Max. clamping voltage: (with current waveform 1.2 / 50µS - Short circuit current 100A ± 10A)	≤ 900V (Phase / neutral) ≤ 1300V (Phase / earth)
Transient withstand capacity:	x 5 @ 5kA (Phase / neutral) x 3 @ 5kA (Phase / earth) (8 / 20µS waveform)
Ambient temperature:	-20 to +60°C
Relative humidity:	+95%
Housing:	to UL94 VO
Weight:	≈ 100g
Mounting option:	to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal conductor size:	≤ 2 x 2.5mm² solid /stranded

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk

• FICHES TECHNIQUES

Voltage d ' alimentation contrôlée Un:	220 / 240V AC/DC (AC: 50 - 60Hz)
Variation d ' alimentation:	0.90 - 1.10 x Un
Mesure des courants:	16A (Quand utilisé avec les coupeurs de circuits miniatures adaptés)
Courant de fuite:	100µA @ 250V AC
Temps de résponse:	≤ 25nS
Capacitance:	< 5nF @ 1kHz
Résistance d'isolation:	> 1000 MΩ (applicable seulement aux variateurs à oxyde métallique)
Coefficient voltage température:	- 0.05% / °C (applicable seulement aux variateurs à oxyde métallique)
Voltage maximum d'accrochage: (avec la forme d'onde courante 1.2 / 50µS - courant de court-circuit 100A ± 10A)	≤ 900V (Phase / neutre) ≤ 1300V (Phase / de terre)
Capacité de résistance transitoire:	x 5 @ 5kA (Phase / neutre) x 3 @ 5kA (Phase / de terre) (Forme d'onde de 8 / 20µS)
Température ambiante:	-20 à +60°C
Humidité relative:	+95%
Boitier:	à UL94 VO
Poids:	≈ 100g
Option de montage:	à BS5584:1978 (EN50 002, DIN 46277-3)
Taille du conducteur terminal:	≤ 2 x 2.5mm² toron / multi-filaire

Les indications contenues dans ce document sont exactes (sous réserve de changement sans avis préalable) toutefois aux risques et périls de l ' utilisateur

• TECHNISCHE DATEN

Stromversorgung / Spannungskontrolle Un:	220 / 240V AC/DC (AC: 50 - 60Hz)
Wechselversorgung:	0.90 - 1.10 x Un
Nennstrom:	16A (wenn mit geeigneten Miniatur Stromunterbrecher benutzt)
Kriechstrom:	100µA @ 250V AC
Ansprechzeit:	≤ 25nS
Kapazitanz:	< 5nF @ 1kHz
Isolationswiderstand:	> 1000 MΩ (Nur für Metalloxid Varistore geeignet)
Spannungstemperatur Koeffizient:	- 0.05% / °C (Nur für Metalloxid Varistore geeignet)
Maximale Klemmspannung: (mit Stromwellenform von 1.2 / 50µS - Kurzschluss Strom 100A ± 10A)	≤ 900V (Phase / neutral) ≤ 1300V (Phase / Erde)
Vorübergehende Widerstands Kapazität:	x 5 @ 5kA (Phase / neutral) x 3 @ 5kA (Phase / Erde) (Wellenform von 8 / 20µS)
Umgebungstemperatur:	-20 bis +60°C
Allgemeiner Feuchtigkeitsgehalt:	+95%
Gehäuse:	bis UL94 VO
Gewicht:	≈ 100g
Befestigungswahl:	bis BS5584:1978 (EN50 002, DIN 46277-3)
Anschlussklemme / Kabelgrösse:	≤ 2 x 2.5mm² Festdraht / Litze

Es handelt sich in diesen Unterlagen um uns genau bekannte Angaben, (Änderungen vorbehalten) jedoch diese Änderungen laufen auf eigene Gefahr des Benutzers.

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BROYCE CONTROL

generator protection

- Battery Voltage
- Frequency
- Multi Attempt to Start
- Reverse Power
- Synchronising Check
- Single Phase Voltage
- Three Phase Voltage
- Three Phase Current

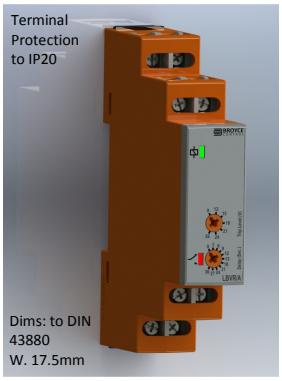
Choose your category

Click the above for further information…!

Click here for Main Page

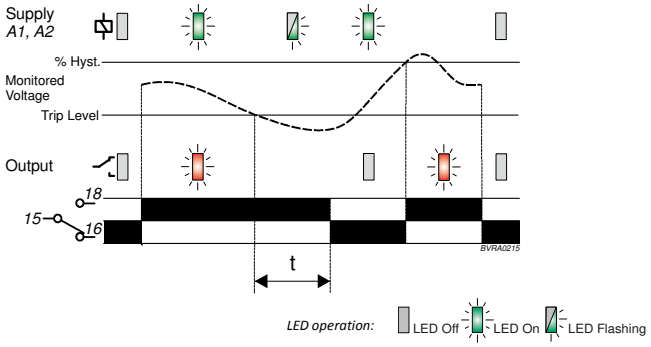
Type: LBVR/A

Battery Voltage Relay



- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **Suited to 12V and 24V batteries**
- **Monitors own supply and detects and Under voltage condition**
- **Adjustment for Under voltage trip level (9 – 28V)**
- **Adjustment for Time delay (from an Under voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required taking note of the polarity of the connections. Terminal **A1** is the positive connection and **A2** the negative.

Setting the unit.

- Set the Under voltage "Trip Level (V)" ❹ adjustment to the voltage required.
- Set the "Delay (t)" ❸ to minimum.

Applying power.

- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.
- If the supply voltage drops below the trip level setting, the green LED will start to flash. The relay will then de-energise (contacts 15 and 18 open) after the delay period "t" and the red LED will extinguish. The green LED will then remain permanently lit.
- When the voltage increases above the trip level + hysteresis, then relay will re-energise and red LED illuminate.

Troubleshooting.

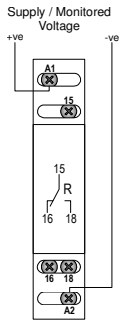
The table below shows the status of the unit during a fault condition.

Supply fault	Green LED	Red LED	Relay
No supply	Off	Off	De-energised
Under voltage condition (during timing)	Flashing	On	Energised for set delay (t)
Under voltage condition (after timing)	On	Off	De-energised

TECHNICAL SPECIFICATION

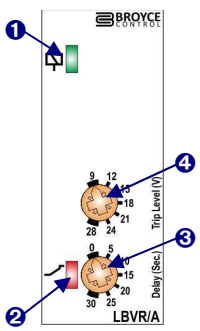
Supply/monitoring voltage U **(A1, A2):**	12 – 24V DC	
Supply variation:	75 – 125% U	
Power consumption (max.):	3W	
Monitoring mode:	Under voltage	
Trip level:	9 – 28V DC	
Hysteresis:	≈ 5% of trip level (factory set)	
Setting accuracy:	± 10%	
Repeat accuracy:	± 0.5% at constant conditions	
Response time:	≈ 100mS	
Time delay (t):	0 – 30 Sec. (± 5%)	
	Note: actual delay (t) = adjustable delay + response time	
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)	
Power on indication:	Green LED	
Relay status indication:	Red LED	
Ambient temp:	-20 to +60°C	
Relative humidity:	+95%	
Output **(15, 16, 18)**:	SPDT relay	
Output rating:	AC1	250V 8A (2000VA)
	AC15	250V 5A (no), 3A (nc)
	DC1	25V 8A (200W)
Electrical life:	≥ 150,000 ops at rated load	
Dielectric voltage:	2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664	
Housing:	Orange flame retardant UL94	
Weight:	70g	
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded	
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity/Emissions to EN 61000-6	

CONNECTION DIAGRAM

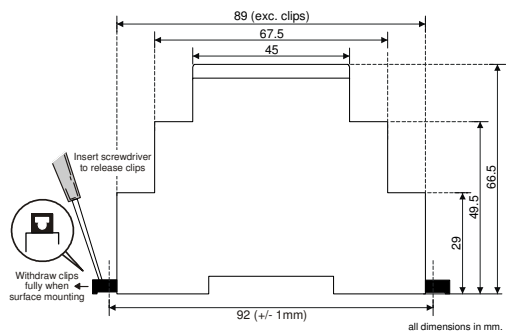


SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output status (Red) LED
3. "Delay" adjustment
4. "Under" trip level adjustment



DIMENSIONS



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ISO 9001 REGISTERED FIRM

The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

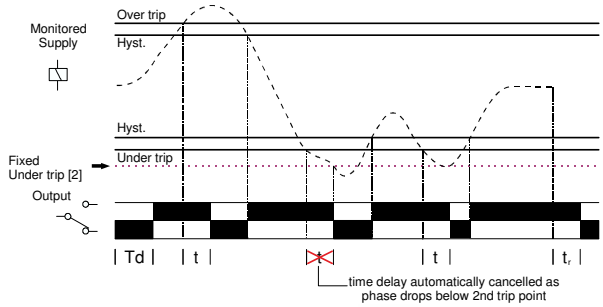
Type: LXCVR

Single Phase, Under and Over Voltage plus Time Delay

- ***NEW*** **17.5mm DIN rail housing**
- **Microprocessor based**
- **True R.M.S. monitoring**
- **Monitors own supply and detects if the supply exceeds the set Under or Over voltage trip levels**
- **Single Phase operation**
- **Adjustment for Under voltage trip level**
- **Adjustment for Over voltage trip level**
- **Adjustment for Time delay (from an Under or Over voltage condition)**
- **1 x SPDT relay output 8A**
- **Green LED indication for supply status**
- **Red LED indication for relay status**

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Phase monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Over %" ❸ adjustment to maximum and the "Under %" ❺ adjustment to minimum. Set the "Delay (t)" ❹ to minimum.
- Apply power and the green "Power supply" ❶ and red "Relay" ❷ LED's will illuminate, the relay will energise and contacts 15 and 18 will close. Refer to the troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and the relay de-energises).
  Note: If the supply voltage increases above the maximum "Over %" trip setting by approx. 5% or more, the relay will de-energise immediately.

Troubleshooting.

The table below shows the status of the unit during a fault condition.

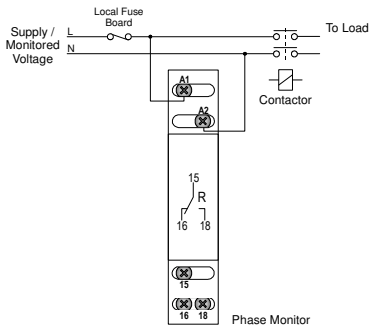
Supply fault	Green LED	Red LED	Relay
No supply	Off	Off	De-energised
Under or Over Voltage condition (during timing)	On	Flashing	Energised for set delay (t)
Under or Over Voltage condition (after timing)	On	Off	De-energised
Supply below 70% of Un (fixed under trip level [2])	On	Off	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un* **(A1, A2):**	110, 115, 220[1], 230[1], 240V[1] AC		
Frequency range:	48 – 63Hz		
Supply variation:	70 – 130% Un		
Overvoltage category:	III (IEC 60664)		
Rated impulse withstand voltage:	[1]4kV (1.2/50µS) IEC 60664		
Power consumption (max.):	8VA		
Monitoring mode:	Under and Over voltage		
Trip levels:			
Under [2]:	70% of Un (fixed) ± 2%		
Under:	75 – 95% of Un		
Over:	105 – 125% of Un		
Measuring ranges:	Under [2]	Under	Over
110V:	77V	83 – 105V	116 – 138V
115V:	80V	86 – 109V	121 – 144V
220V:	154V	165 – 209V	231 – 275V
230V:	161V	173 – 218V	242 – 288V
240V:	168V	180 – 228V	252 – 300V
Hysteresis:	≈ 2% of trip level (factory set)		
Setting accuracy:	± 3%		
Repeat accuracy:	± 0.5% at constant conditions		
Immunity from micro power cuts:	<50mS		
Response time:	≈ 50mS		
Time delay (t):	0.2 – 10 sec. (± 5%)		
	Note: actual delay (t) = adjustable delay + response time		
Power on delay (Td):	≈ 1 sec. (worst case = Td x 2)		
Power on indication:	Green LED		
Relay status indication:	Red LED		
Ambient temp:	-20 to +60°C		
Relative humidity:	+95%		
Output **(15, 16, 18)**:	SPDT relay		
Output rating:	AC1	250V 8A (2000VA)	
	AC15	250V 5A (no), 3A (nc)	
	DC1	25V 8A (200W)	
Electrical life:	≥ 150,000 ops at rated load		
Dielectric voltage:	2kV AC (rms) IEC 60947-1		
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664		
Housing:	Orange flame retardant UL94		
Weight:	75g		
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.		
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded		
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 15V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4		

* Please state Supply/monitoring voltage when ordering

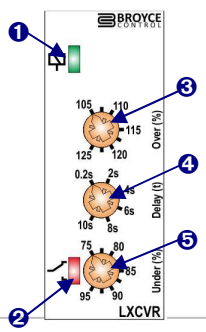
CONNECTION DIAGRAM



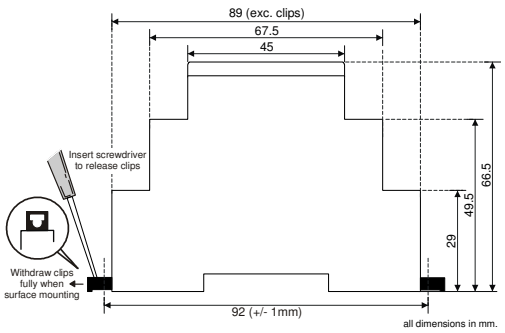
SETTING DETAILS

1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED
3. "Over %" trip level adjustment^
4. "Delay" adjustment
5. Under %" trip level adjustment^

^scaled as % of the nominal voltage "Un"



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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Type: LCVR/2

Under and Over Voltage plus Time Delay

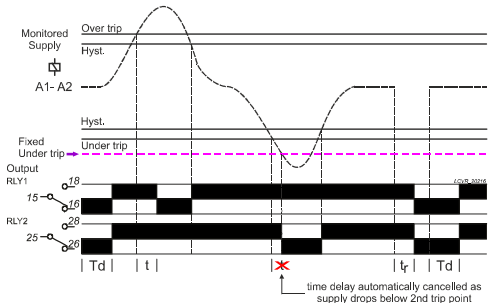
Terminal Protection to IP20

Dims: to DIN 43880
W. 17.5mm

- Compact 17.5mm DIN rail housing
- Microprocessor based
- True R.M.S. monitoring
- Selectable nominal voltages to suit most popular single phase supply voltages
- Monitors own supply and detects if the set Under or Over voltage trip levels are exceeded
- Adjustments for Under and Over voltage trip levels
- Adjustment for Time delay
- Independent relay outputs - Under voltage monitoring (RLY2) / Over voltage monitoring (RLY1)
- 2 x SPDT relay output 5A
- Green LED indication for supply status
- Individual Red LED indication for both relay statuses

FUNCTION DIAGRAM

Under and Over Voltage Monitoring



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required. The Connection Diagram below shows a typical installation, whereby the supply to a load is being monitored by the Voltage monitoring relay. If a fault should occur (i.e. fuse blowing), the relay will de-energise and assuming control of the external Contactor, de-energise the Contactor as well.

Applying power.

- Set the "Nominal (Un)" ❹ voltage selector to match that of the voltage being monitored.
- Set the Over %" ❺ adjustment to maximum and the "Under %" ❼ adjustment to minimum. Set the "Delay (t)" ❻ to minimum.
- Apply power and the green "Power supply" ❶ LED will illuminate. Both the red "RLY1" ❷/"RLY2" ❸ LED's will illuminate and corresponding RLY1 and RLY2 relays energise after the short Power on delay (Td).
- Refer to the Troubleshooting table if the unit fails to operate correctly.

Setting the unit (with power applied).

- Set the "Over %" and the "Under %" adjustments to give the required monitoring range.
- If large supply variations are anticipated, the adjustments should be set further from the nominal voltage.
- Set the "Delay (t)" adjustment as required. (Note that the delay is only effective should the supply increase above or drop below the set trip levels. However, if during an under voltage condition the supply drops below the 2nd under voltage trip level, any set time delay is automatically cancelled and both relays de-energise immediately).

Troubleshooting.

The table below shows the status of the unit during a particular fault condition.

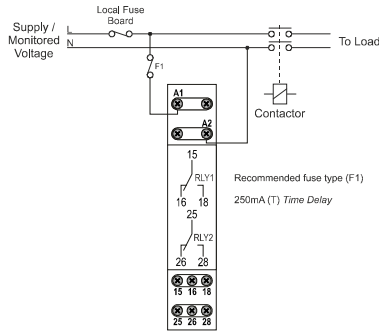
Supply fault	Green LED ❶	Red LED ❷	Red LED ❸	Relay RLY1	Relay RLY2
Under voltage condition (during timing)	On	On	Flashing	Energised	En for delay (t)
Under voltage condition (after timing)	On	Off	Off	Energised	De-energised
Over voltage condition (during timing)	On	Flashing	On	En for delay (t)	Energised
Over voltage condition (after timing)	On	Off	On	De-energised	Energised
Supply < fixed under trip level [2]	On	Off	Off	De-energised	De-energised

TECHNICAL SPECIFICATION

Supply/monitoring voltage Un **(A1, A2):**				
LCVR/2 (LV)*	110, 115V AC			
LCVR/2 (HV)*	220, 230, 240V AC			
Frequency range:	48 – 63Hz			
Supply variation:	LV: 70 – 150V HV: 140 – 315V AC			
Overvoltage category:	III (IEC 60664)			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Power consumption (max.):	2.5VA			
Monitoring mode:	Under and Over voltage			
Trip levels:				
Under [2]:	Fixed ± 2% *see below*			
Under:	75 – 95% of Un			
Over:	105 – 125% of Un			
Measuring ranges:	Nominal (Un)	Under [2]	Under	Over
LCVR/2 (LV)	**110V**	70V	83 – 105V	116 – 138V
	115V	74V	156 – 198V	218 – 260V
LCVR/2 (HV)	**220V**	140V	165 – 209V	231 – 275V
	230V	147V	173 – 219V	242 – 288V
	240V	153V	180 – 228V	252 – 300V
Hysteresis:	≈ 2% of trip level (factory set)			
Setting accuracy:	± 3%			
Repeat accuracy:	± 0.5% at constant conditions			
Immunity from micro power cuts:	<50ms			
Response time:	≈ 50ms			
Time delay (t):	0.2 – 10s (± 5%)			
	Note: actual delay (t) = adjustable delay + response time			
Power on delay (Td):	≈ 1s (worst case = Td x 2)			
Reset time:	50 – 100ms			
Power on indication:	Green LED			
Relay status indication:	Red LED x2			
Ambient temperature:	-20 to +60°C			
Relative humidity:	+95% max.			
Output **(15, 16, 18 / 25, 26, 28)**:	2 x SPDT relay			
Output rating:	AC1		250V 5A (1250VA)	
	AC15		250V 2A	
	DC1		25V 5A (125W)	
Electrical life:	≥ 150,000 ops at rated load			
Dielectric voltage:	2kV AC (rms) IEC 60947-1			
Rated impulse withstand voltage:	4kV (1.2/50µS) IEC 60664			
Housing:	Orange flame retardant UL94			
Weight:	90g			
Mounting option:	On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.			
Terminal conductor size	≤ 2 x 2.5mm² solid or stranded			
Approvals:	Conforms to IEC. CE, and RoHS Compliant. EMC: Immunity: EN 61000-6-2 Emissions: EN 61000-6-4			

* Please state model variant when ordering

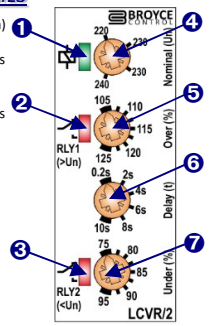
CONNECTION DIAGRAM



SETTING DETAILS

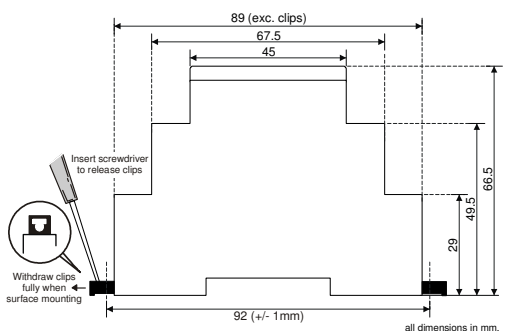
1. Power supply status (Green) LED
2. Relay output / Timing status (Red) LED for Over voltage tripping
3. Relay output / Timing status (Red) LED for Under voltage tripping
4. "Nominal (Un)" voltage selector
5. "Over %" trip level adjustment^
6. "Delay (t)" adjustment
7. Under %" trip level adjustment^

^scaled as % of the selected nominal voltage "Un"



Above example showing LCVR/2 (HV)

DIMENSIONS



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ISO 9001 REGISTERED FIRM

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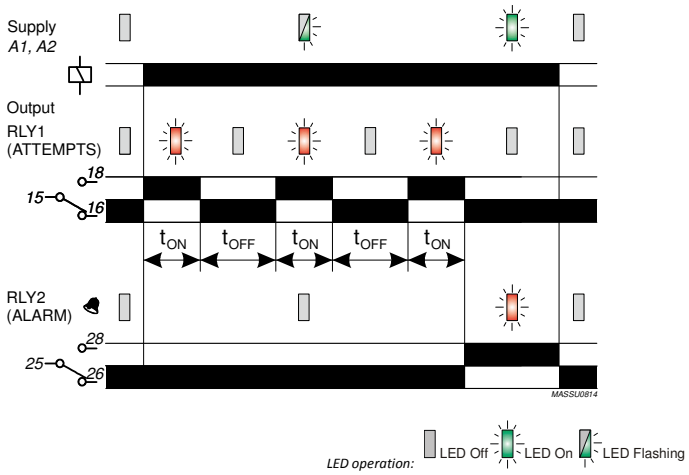
Type: LMAT

Multi Attempts to Start Timer

- ***NEW*** **17.5mm DIN rail housing**
- **Two relay outputs (RLY1 - "Attempts", RLY2 - "Alarm")**
- **7 Selectable "No. of Attempts" (2 – 8)**
- **Separate adjustments for RLY1 "On" and "Off" times (1 – 60 seconds)**
- **Multi-voltage input (12 – 48V AC/DC)**
- **2 x SPDT relay output 8A**
- **Green LED indication for supply / timing status**
- **Red LED indication for relay statuses**
- **Conforms to IEC 61812**

FUNCTION DIAGRAMS



INSTALLATION AND SETTING

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.
- Connect the unit as required.

Setting the unit.

- Set the "Start Attempts" ❹ selector to the required position depending on how many attempts the equipment is allowed before the alarm output operates.
- Set the "On Time (s)" ❺ and "Off Time (s)" ❻ adjustments as required. "On Time" is used to set the duration the relay is energised for and "Off Time" how long it remains de-energised.

Applying power.

- Apply power and the green LED ❶ will start flashing to indicate timing is in progress.
- Contacts 15 and 18 will close as soon as power is applied (RLY1) and the red relay LED ❸ will illuminate. This will remain for the duration set by the "On Time". At the end of this Contacts 15 and 18 will open and 15 and 16 close with the red LED ❸ extinguishing for the duration set by the "Off Time".
- If RLY1 is allowed to energise for the final attempt, at the end of the last "t_{ON}" period it will then de-energise and RLY2 will then energise (Contacts 25 and 28 closing). Red LED ❷ will illuminate and green LED ❶ will remain permanently on.
- The unit will then remain in this state until power is removed. Re-applying power will repeat the whole timing sequence again.

Note:

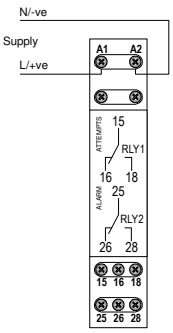
[1] In accordance with IEC 61812, the green LED is permitted to extinguish during a voltage dip or momentary interruption of the power supply providing the state of the output relay does not change.

[2] The dip / interruption (reset) duration and levels are defined in the product standard however, the standard allows for these to be different from the levels actually specified.

TECHNICAL SPECIFICATION

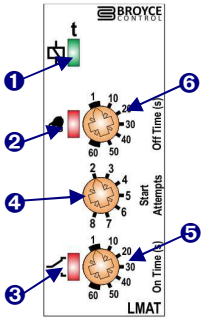
Supply voltage U **(A1, A2)**:		12 – 48V AC/DC	
Frequency range:		48 - 63Hz (AC supplies)	
Supply variation:		+15/-30%	
Power consumption (max.):		12V	24V
	AC:	0.6VA	0.8VA
	DC:	0.52W	0.48W
Attempts to Start (7) settings:		2, 3, 4, 5, 6, 7 or 8	
Timing function (RLY1):		Attempts to Start Output	
Timing delay adjustment:		1 – 60 seconds "t_{ON}" and "t_{OFF}"	
Timing function (RLY2):		Alarm Output	
Time delay:		Instantaneous after RLY1 has de-energised following the last attempt	
Reset time[2]:		< 100mS	
Accuracy:		± 1% of maximum full scale	
Adjustment accuracy:		< 5% of maximum full scale	
Repeat accuracy:		± 0.5% at constant conditions (IEC 61812)	
Drift with temperature:		± 0.05% / °C	
Power on indication / Timing[1]:		Green LED	
Relay status (RLY1)		Red LED	
Relay status (RLY2 - Alarm)		Red LED	
Ambient temperature:		-20 to +60°C	
Relative humidity:		+95%	
Output **(15, 16, 18 / 25, 26, 28)**:		SPDT relay (x2)	
Output rating:		AC1	250V 8A (2000VA)
		AC15	250V 5A (no), 3A (nc)
		DC1	25V 8A (200W)
Electrical life:		≥ 150,000 ops at rated load	
Dielectric voltage:		2kV AC (rms) IEC 60947-1	
Rated impulse withstand voltage:		4kV (1.2/50µS) IEC 60664	
Housing:		Orange flame retardant UL94	
Weight:		≈ 80g	
Mounting option:		On to 35mm symmetric DIN rail to BS EN 60715 or direct surface mounting via 2 x M3.5 or 4BA screws using the black clips provided on the rear of the unit.	
Terminal conductor size		≤ 2 x 2.5mm² solid or stranded	
Approvals:		Conforms to IEC 61812. CE, C-tick and RoHS Compliant. EMC: Immunity: EN 61000-6-2 (EN 61000-4-3 10V/m 80MHz - 2.7GHz) Emissions: EN 61000-6-4	

CONNECTION DIAGRAM

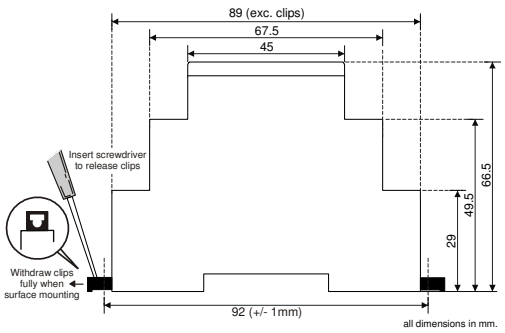


SETTING DETAILS

1. Power supply status / Timing (Green) LED
2. RLY2 "Alarm" output status (Red) LED
3. RLY1 output status (Red) LED
4. "Start Attempts" selector
5. "On Time [t_{ON}]" adjustment
6. "Off Time [t_{OFF}]" adjustment



DIMENSIONS



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ISO 9001 REGISTERED FIRM

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Type: 45 UFR & 45 OFR

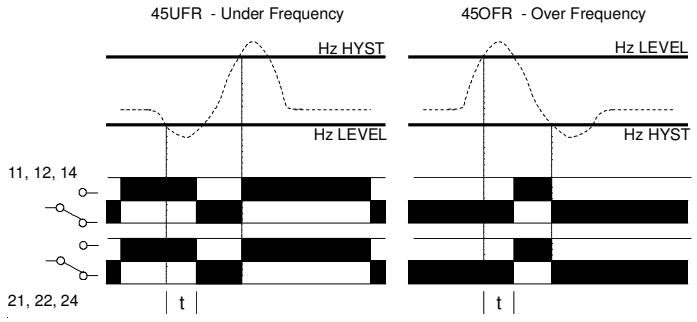
Frequency Relay

The unit is designed to monitor the frequency of its own supply. The 45UFR is used for monitoring under frequency conditions, whereby the relay will de-energise when the frequency drops below the adjustable trip point. The relay re-energises when the frequency increases above the trip point plus the hysteresis. The 45OFR functions by energising the relay when the frequency rises above the adjustable trip point and de-energises when the frequency drops below the trip point minus the hysteresis. A green LED indicates the supply is present whilst a red LED indicates the relay is energised.

Dims:
H.78 mm
W.45 mm
L.99 mm

Terminal Protection to IP20

▪ TIMING DIAGRAM



▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green **'supply on'** LED should illuminate.

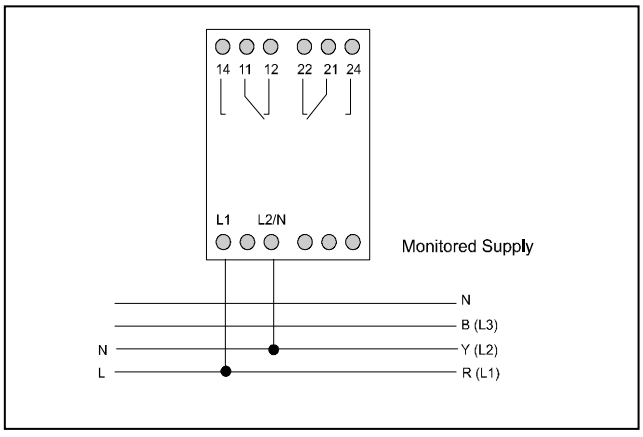
45UFR: The red **'relay'** LED should illuminate and the relay energise if the frequency is above the set **'Hz level'**

45OFR: The red **'relay'** LED should remain extinguished and the relay de-energised if the frequency is below the set **'Hz level'**

If on either unit the green LED illuminates but the red LED and relay indicate a fault, then check all connections and the voltage present

Set the **'Hz level'** and the **'Hz hyst'** adjustments as required.

▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply Voltage Un:	110, 230, 400V AC 40 - 73Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	3VA @ Un
Trip Level:	1. 40 - 60Hz (45UFR & 45OFR) 2. 50 - 70Hz (45UFR & 45OFR) (Specify range when ordering)
Hysteresis:	0.3 to 3Hz (user adjustable)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	≈ 200mS (see Options 1 & 2)
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	300g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal Conductor Size:	Max 2 x 1.5mm^2 stranded (terminated) Max 2 x 2.5mm^2 solid
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE Compliant

▪ OPTIONS

1. The above units can be supplied with an internally set time delay which prevents the relay from changing state immediately the frequency passes the trip point. The delay (ranging from 1 to 10 seconds) should be specified, prior to ordering.
2. Where it is necessary for the user to set the time delay, the unit can be supplied with the hysteresis adjustment replaced with a time delay adjustment. On these units, the delay is adjustable from 0.2 to 10 seconds. The hysteresis is then factory set to 1%.

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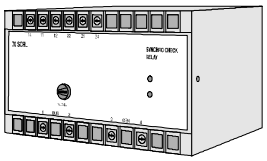
Type: 70 SCRD & 70 SCRL

Synchronising Check Relay

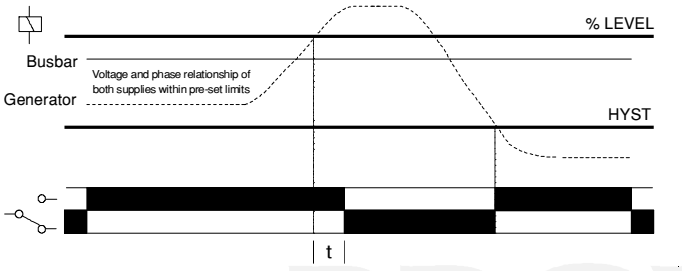
The 70SCRD and SCRL synchronising check relays (also known as paralleling relays) are designed to monitor two AC supplies in a system. For a system to be "synchronised", the voltage, frequency and phase angle of both supplies have to be within pre-set limits. The 70SCRL can monitor either mains busbar and generator, or two generator supplies. When the voltage and phase relationship of both supplies are within the pre-set limits (user adjustable), the relay will energise and the red LED will illuminate. The 70SCRD functions as the SCRL but incorporates a "dead bus" facility which allows the relay to energise with a generator supply only, which is a common requirement during mains failure.



Terminal Protection to IP20 W.100 mm

▪ TIMING DIAGRAM

Example shown for 70SCRL



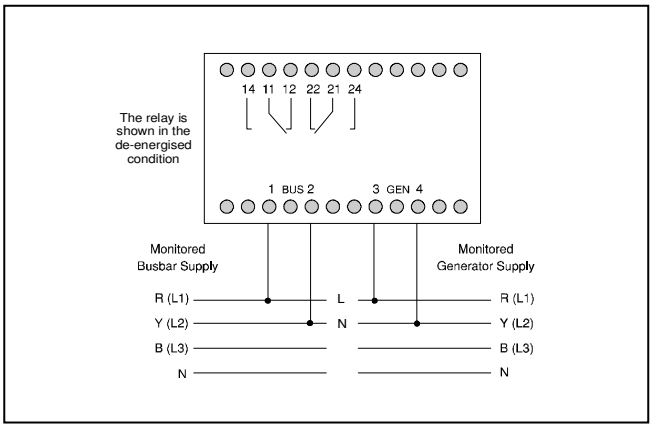
▪ INSTALLATION AND SETTING

70SCRL:
BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the Generator and Busbar supplies as shown in the diagram below. Apply power and the green LED should illuminate. The red **'relay'** LED should illuminate and the relay energise providing the voltage and phase angle difference between both supplies is below the set **'% level'.**

70SCRD:
BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the Generator supply as shown in diagram below. Apply power and the green LED should illuminate. The red **'relay'** LED should illuminate and the relay energise .

If either unit fails to operate as described, check all connections and voltages present. **Note:** Both units can be used on 1or 3 phase supplies.

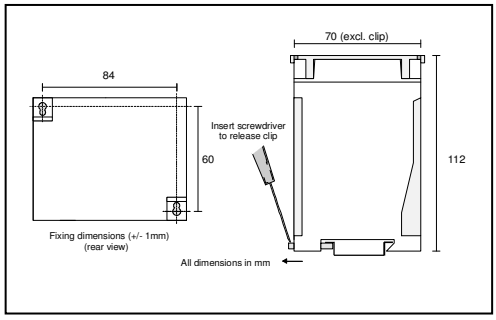
▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply Voltage Un:	110, 220, 230, 380, 400V AC 45 - 65Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	<4VA @ Un (Generator Supply) <2VA @ Un (Busbar Supply)
Trip Level:	10 - 30% of Un (6 - 20 electrical degrees)
Hysteresis:	5% (factory set)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	≈ 500mS
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Grey flame retardant UL94 VO
Weight:	590g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) Or direct surface mounting via 2 x M3.5 or 4BA screws using the fixing slots provided on the unit
Terminal Conductor Size:	Max 2 x 2.5mm^2 solid or stranded
Approvals:	Conforms to: UL, CUL, CSA, IEC CE Compliant

▪ MOUNTING DETAILS



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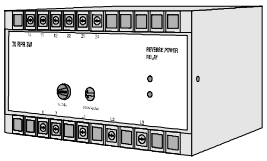
Type: 70 RPR-3W & 70 RPR-4W

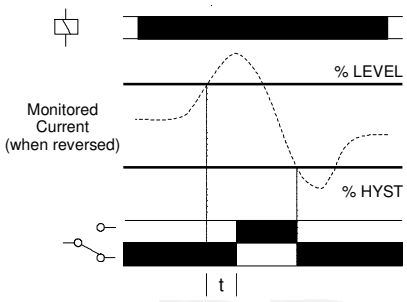
Reverse Power Relay



Terminal Protection to IP20 W.100 mm

The 70RPR 3-wire and 4-wire units are designed to monitor AC generators operating in parallel or for boosting mains supplies. If the current in the supply being monitored is reversed to a value greater than the adjustable trip point, the relay will energise after the time delay (user adjustable). The relay will de-energise when the current drops below the trip point minus the hysteresis. Accurate setting of the trip point and time delay will ensure protection against "motoring" in the event of generator failure and prevent tripping due to surges encountered during synchronising. A green LED indicates the supply is present whilst a red LED indicates the relay is energised.

▪ TIMING DIAGRAM



▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green LED should illuminate and the relay remain de-energised (red LED extinguished).

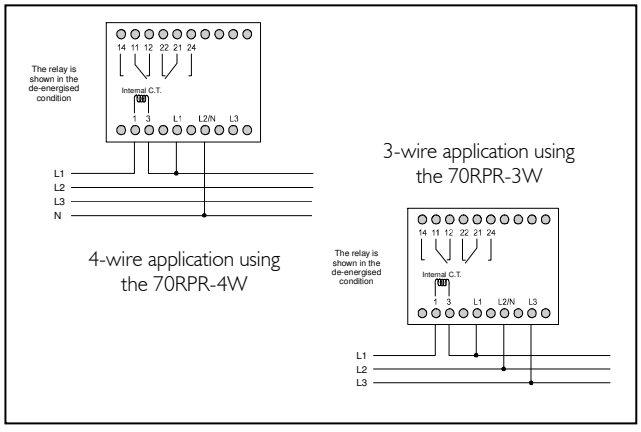
Setting the unit:

The **'% level'** adjustment relates to the % of the input current e.g. a 20% setting is equal to 1A for 5A nominal current (In).

To set the unit, rotate the **'% level'** adjustment as required, 7.5 to 10% is normal. The accuracy of the setting can be checked by reversing the connections to terminals **'1'** and **'3'**, and with forward power, measuring the trip point value on a suitable ammeter. Ensure the connections are restored on completion. Now set the **'delay'** as required.

Note: The supply to the 70RPR-4W unit is derived between phase and neutral in a three phase 4-wire supply. The same unit can also be used in single phase supplies, again connecting between live/phase and neutral.

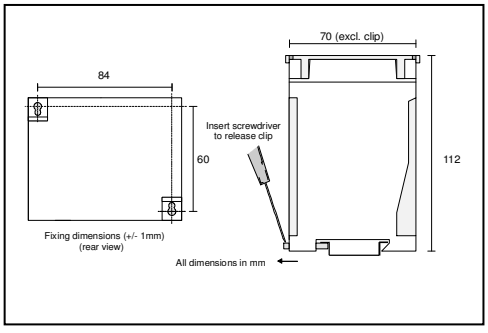
▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply Voltage Un:	110, 230V AC 45 - 65Hz (4Wire) 220, 380, 400V AC 45 - 65Hz (3Wire) (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	3VA @ Un
Monitored Current (In):	5A AC (50/60Hz)
Trip Level:	2 - 20% Reverse current
Hysteresis:	1% (factory set)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	0.2 to 20S
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Grey flame retardant UL94 VO
Weight:	480g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) Or direct surface mounting via 2 x M3.5 or 4BA screws using the fixing slots provided on the unit
Terminal Conductor Size:	Max 2 x 2.5mm^2 solid or stranded
Approvals:	Conforms to: UL, CUL, CSA, IEC CE Compliant

▪ MOUNTING DETAILS



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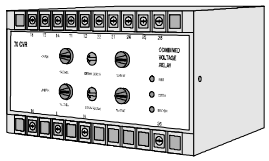
Type: 70 CVR

Under/Over Voltage Relay

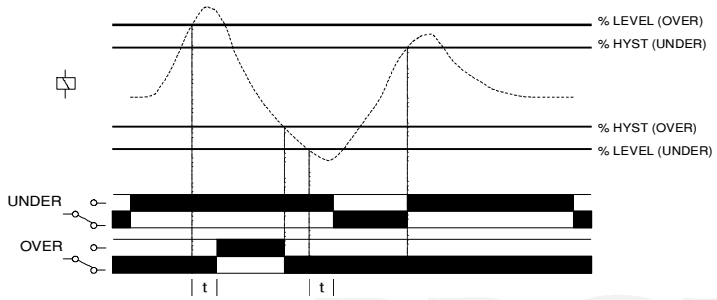
The unit is designed to monitor a single phase supply for an under or over voltage condition. The Under Voltage relay de-energises when the monitored supply drops below the adjustable trip point. The relay re-energises when the supply rises above the trip point plus the hysteresis. The Over Voltage relay energises when the monitored supply rises above the adjustable trip point. The relay will de-energise when the supply drops below the trip point minus the hysteresis. A green 'aux.' LED indicates the supply is present whilst a red LED (one for each relay) indicates the relay is energised.



Terminal Protection to IP20

Dims: W.100 mm

▪ TIMING DIAGRAM

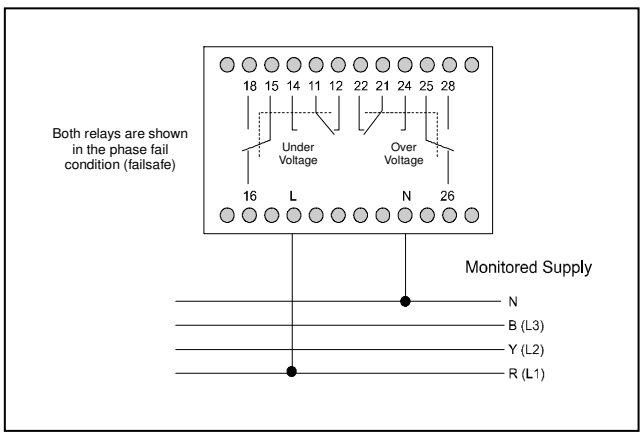


▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green **'aux.'** LED should illuminate. If the supply is at the nominal voltage (Un) then the Under Voltage relay will energise and the red **'under'** LED illuminate. The Over Voltage relay should remain de-energised and the red **'over'** LED extinguished. If the green LED illuminates but the relays operate differently to that described above at power on, then check all connections and voltages present.

Set the **'% level'** and the **'% hyst'** adjustment on both levels as required. If large supply variations are anticipated and acceptable, the settings should be adjusted further to avoid false tripping.

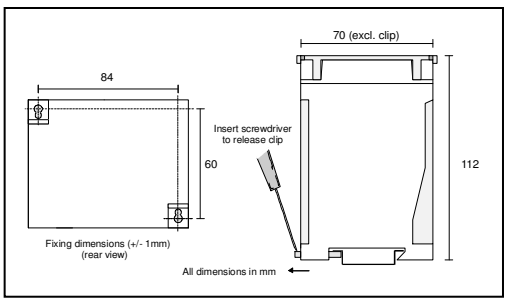
▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply/Monitored Voltage Un:	110, 230V AC 45 - 65Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	≈ 4VA @ Un
Trip Level:	75 - 100% Under voltage 100 - 125% Over voltage
Hysteresis:	1 to 15% on both levels (user adjustable)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	≈ 0.2S
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	2 x DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Grey flame retardant UL94 VO
Weight:	480g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) Or direct surface mounting via 2 x M3.5 or 4BA screws using the fixing slots provided on the unit
Terminal Conductor Size:	Max 2 x 2.5mm^2 solid or stranded
Approvals:	Conforms to: UL, CUL, CSA, IEC CE Compliant

▪ MOUNTING DETAILS



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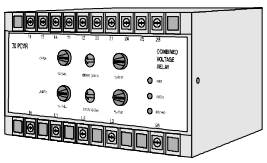
70CVR-D1999-07-22

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: 70 PCVR

Three Phase, Under/Over Voltage Relay

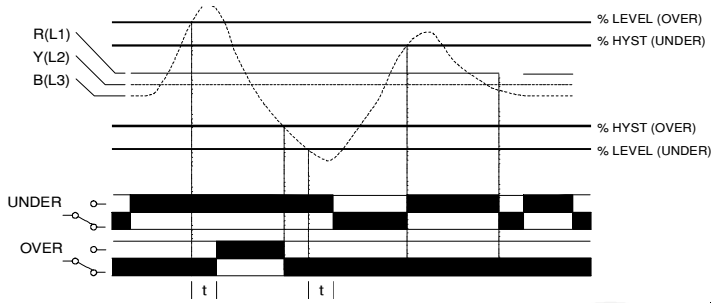
The unit is designed to monitor a three phase, 3 wire supply for an under or over voltage condition. The Under Voltage relay de-energises when the monitored supply drops below the adjustable trip point. The relay re-energises when the supply rises above the trip point plus the hysteresis. The Over Voltage relay energises when the monitored supply rises above the adjustable trip point. The relay will de-energise when the supply drops below the trip point minus the hysteresis. A green 'aux.' LED indicates the supply is present whilst a red LED (one for each relay) indicates the relay is energised.



Terminal Protection to IP20

Dims: W.100 mm

▪ TIMING DIAGRAM



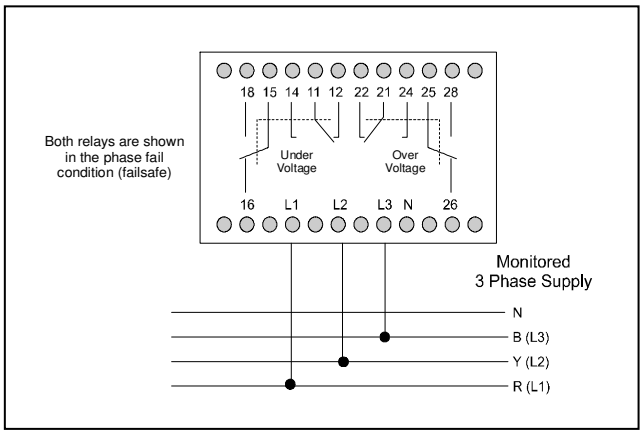
▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green **'aux.'** LED should illuminate. If the supply is at the nominal voltage (Un) then the Under Voltage relay will energise and the red **'under'** LED illuminate. The Over Voltage relay should remain de-energised and the red **'over'** LED extinguished. If the green LED illuminates but the relays operate differently to that described above at power on, then check all connections and voltages present.

Set the **'% level'** and the **'% hyst'** adjustment on both levels as required. If large phase variations are anticipated and acceptable, the settings should be adjusted further to avoid false tripping.

Note: During phase loss, all LED's may be extinguished. Where monitoring a supply for correct phase sequence is important, the 45PSR Phase Sequence Relay should be used.

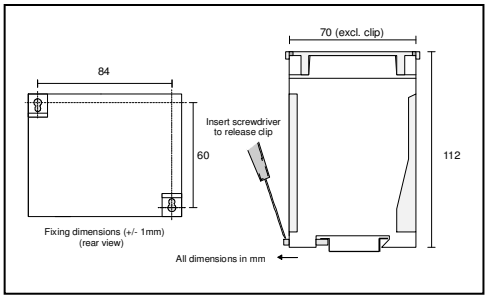
▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply/Monitored Voltage Un: (phase to phase)	220, 380, 400V AC 45 - 65Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	≈ 4VA @ Un (red and blue phases only) 0.2VA @ Un (yellow phase only)
Trip Level:	75 - 100% Under voltage 100 - 125% Over voltage
Hysteresis:	1 to 15% on both levels (user adjustable)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	≈ 0.2S
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	2 x DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Grey flame retardant UL94 VO
Weight:	480g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) Or direct surface mounting via 2 x M3.5 or 4BA screws using the fixing slots provided on the unit
Terminal Conductor Size:	Max 2 x 2.5mm^2 solid or stranded
Approvals:	Conforms to: UL, CUL, CSA, IEC CE Compliant

▪ MOUNTING DETAILS



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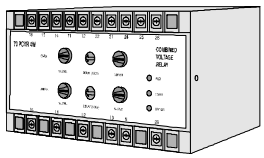
70PCVR-D1999-07-22

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: 70 PCVR-4W

Three Phase, 4 Wire Under/Over Voltage Relay

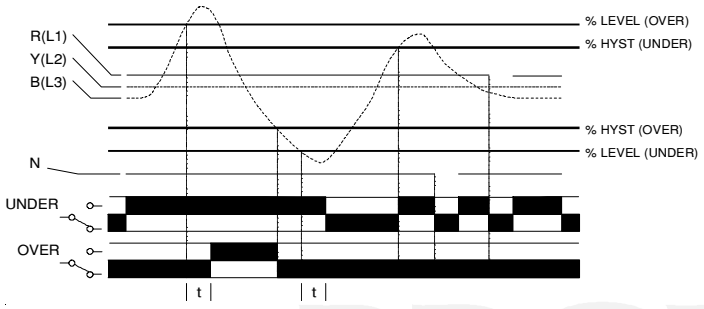
The unit is designed to monitor a three phase, 4 wire supply for an under or over voltage condition. The Under Voltage relay de-energises when the monitored supply drops below the adjustable trip point. The relay re-energises when the supply rises above the trip point plus the hysteresis. The Over Voltage relay energises when the monitored supply rises above the adjustable trip point. The relay will de-energise when the supply drops below the trip point minus the hysteresis. A green 'aux'. LED indicates the supply is present whilst a red LED (one for each relay) indicates the relay is energised



Terminal Protection to IP20

Dims: W.100 mm

▪ TIMING DIAGRAM



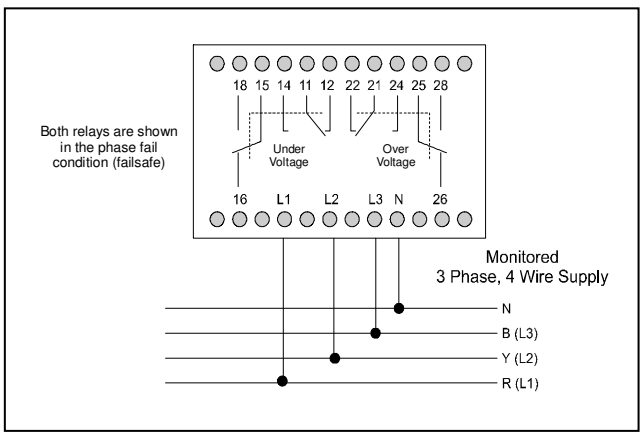
▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green **'aux.'** LED should illuminate. If the supply is at the nominal voltage (Un) then the Under Voltage relay will energise and the red **'under'** LED illuminate. The Over Voltage relay should remain de-energised and the red **'over'** LED extinguished. If the green LED illuminates but the relays operate differently to that described above at power on, then check all connections and voltages present.

Set the **'% level'** and the **'% hyst'** adjustment on both levels as required. If large phase variations are anticipated and acceptable, the settings should be adjusted further to avoid false tripping.

Note: During phase loss, all LED's may be extinguished. Where monitoring a supply for correct phase sequence is important, the 45PSR Phase Sequence Relay should be used.

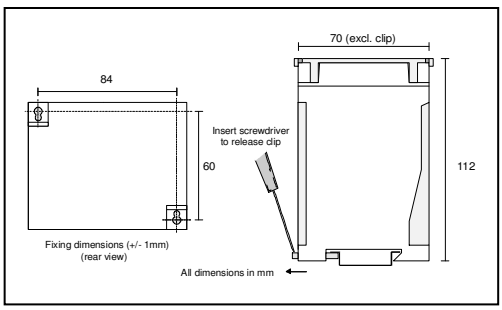
▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply/Monitored Voltage Un: (phase to phase)	220, 380, 400V AC 45 - 65Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	≈ 4VA @ Un (red phase only) 0.2VA @ Un (yellow and blue phases)
Trip Level:	75 - 100% Under voltage 100 - 125% Over voltage
Hysteresis:	1 to 15% on both levels (user adjustable)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	≈ 0.2S
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	2 x DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Grey flame retardant UL94 VO
Weight:	480g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) Or direct surface mounting via 2 x M3.5 or 4BA screws using the fixing slots provided on the unit
Terminal Conductor Size:	Max 2 x 2.5mm^2 solid or stranded
Approvals:	Conforms to: UL, CUL, CSA, IEC CE Compliant

▪ MOUNTING DETAILS



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70PCVR4W- C1999-07-22

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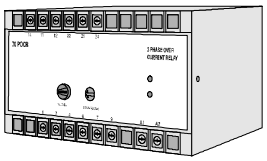
The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: 70 PUCR & 70 POCR

Three Phase, AC Current Relay

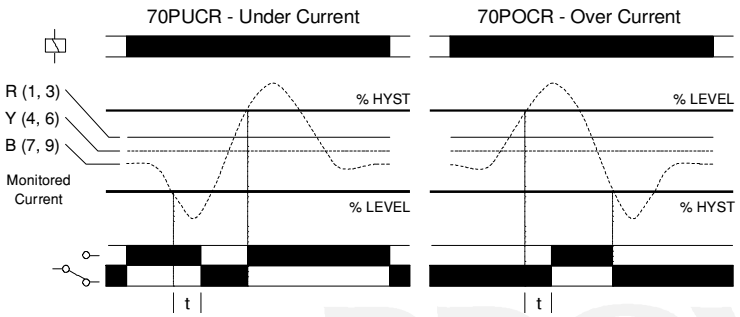
The unit is designed to monitor the AC current taken by each load when connected to a three phase supply. The 70PUCR is used for monitoring under current conditions, whereby the relay de-energises (after the adjustable time delay), when the current drops below the adjustable trip point. The relay re-energises when the current rises above the trip point plus the hysteresis. The 70POCR functions by energising the relay (after the adjustable time delay) when the current rises above the adjustable trip point and de-energises when the current drops below the trip point minus the hysteresis. A green LED indicates the supply is present whilst a red LED indicates the relay is energised



Terminal Protection to IP20

Dims: W.100 mm

▪ TIMING DIAGRAM



▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply and the monitored current connections in each phase, as shown in diagram below. **Note:** Where higher currents are to be monitored, an external C.T. with a 5A secondary should be used. Apply power and the green **'aux.'** LED should illuminate.

70PUCR: The red **'relay'** LED should illuminate and the relay energise if the current is above the set **'% level'.**

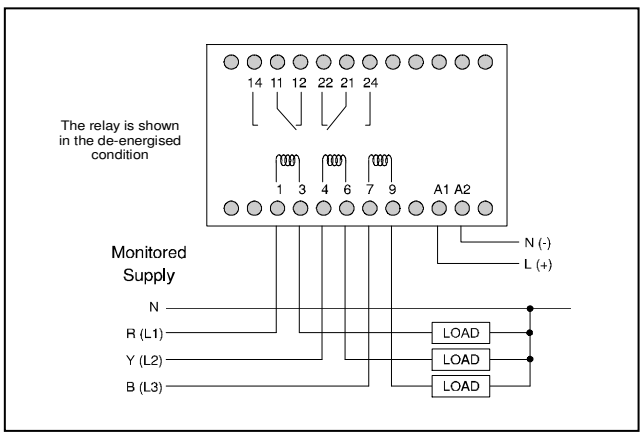
70POCR: The red **'relay'** LED should remain extinguished and the relay de-energised if the current is below the set **'% level'.**

If on either unit the green LED illuminates but the red LED and relay indicate a fault, then check all connections and the voltage present on **'A1'** and **'A2'.** Also, check the current passing through the terminals **'1'** and **'3', '4'** and **'6', '7'** and **'9'.**

Set the **'% level'** and the **'time delay'** adjustments as required.

Note: The sequence of connection is not important on either unit.

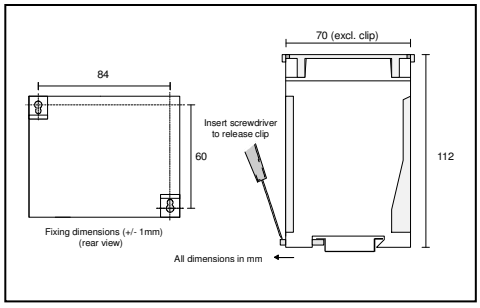
▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply Voltage Un:	110, 230, 400V AC 45 - 65Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	≈ 4VA @ Un
Monitored Current (In): (per phase)	5A AC (50/60Hz)
Trip Level:	0 - 80% of In (70PUCR) 40 - 120% of In (70POCR)
Time Delay (t):	0.2 to 10S
Hysteresis:	≈ 5% @ 5A setting
Repeat Accuracy:	± 0.5% at constant conditions
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Grey flame retardant UL94 VO
Weight:	600g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) Or direct surface mounting via 2 x M3.5 or 4BA screws using the fixing slots provided on the unit
Terminal Conductor Size:	Max 2 x 2.5mm^2 solid or stranded
Approvals:	Conforms to: UL, CUL, CSA, IEC CE Compliant

▪ MOUNTING DETAILS



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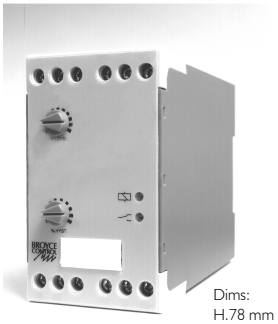
70PCR-D1999-07-22

The information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.

Type: 45 PUVR & 45 POVR

Three Phase, Voltage Relay

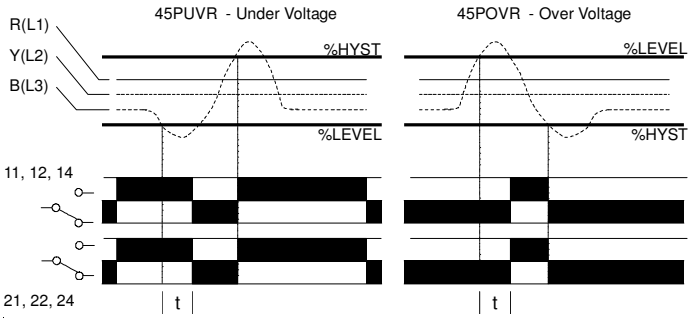
The unit is designed to monitor a three phase, 3 wire supply for an under voltage condition (45PUVR) or an over voltage condition (45POVR). The 45PUVR relay de-energises when the monitored supply drops below the adjustable trip point. The relay re-energises when the supply rises above the trip point plus the hysteresis. The 45POVR functions by energising the relay when the voltage rises above the trip point. The relay de-energises when the supply drops below the trip point minus the hysteresis. A green LED indicates the supply is present whilst a red LED indicates the relay is energised. Note: During phase loss, the relay will de-energise on both units.



Terminal Protection to IP20

Dims:
H.78 mm
W.45 mm
L.99 mm

▪ TIMING DIAGRAM



▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green **'supply on'** LED should illuminate.

45PUVR: The red **'relay'** LED should illuminate and the relay energise if the supply voltage is above the set **'% level'**

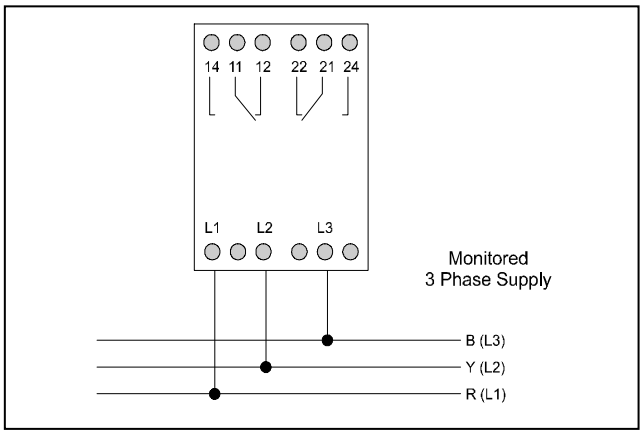
45POVR: The red **'relay'** LED should remain extinguished and the relay de-energised if the supply voltage is below the set **'% level'**

If on either unit the green LED illuminates but the red LED and relay indicate a fault, then check all connections and voltages present.

Set the **'% level'** and the **'% hyst'** adjustments as required. If large phase variations are anticipated and acceptable, the **'% level'** and the **'% hyst'** settings should be adjusted further to avoid false tripping.

Note: During phase loss, both LED's may be extinguished. Where monitoring a supply for correct phase sequence is important, the 45PSR Phase Sequence Relay should be used.

▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply/Monitored	
Voltage Un:	110, 220, 380, 400V AC 45 - 65Hz
(phase to phase)	(Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous
	2 x Un for 3 seconds
Power	
Consumption:	0.2VA @ Un (blue phase only)
	3VA @ Un (red and yellow phases)
Trip Level:	75 - 100% Under voltage (45PUVR)
	100 -125% Over voltage (45POVR)
Hysteresis:	1 to 15% (user adjustable)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	≈ 200mS (see Options 1 & 2)
Ambient	
Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	DPDT
	AC 1 250V AC 8A (2000VA)
	AC 15 250V AC 3A
	DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	300g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal	
Conductor Size:	Max 2 x 1.5mm^2 stranded (terminated)
	Max 2 x 2.5mm^2 solid
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE Compliant

▪ OPTIONS

1. The above units can be supplied with an internally set time delay which prevents the relay from changing state immediately the supply voltage passes the trip point. The delay (ranging from 1 to 10 seconds) should be specified, prior to ordering.
2. Where it is necessary for the user to set the time delay, the unit can be supplied with the hysteresis adjustment replaced with a time delay adjustment. On these units, the delay is adjustable from 0.2 to 10 seconds. The hysteresis is then factory set to 1%.

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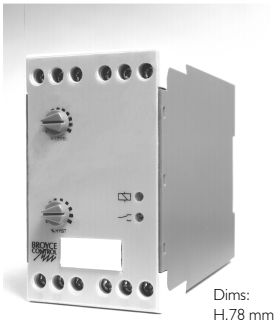
Type: 45 PUVR-4W & 45 POVR-4W

Three Phase, 4 Wire Voltage Relay

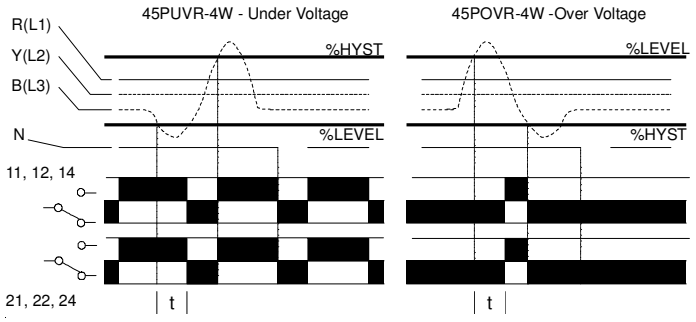
The unit is designed to monitor a three phase, 4 wire supply for an under voltage condition (45PUVR-4W) or an over voltage condition (45POVR-4W). The 45PUVR-4W relay de-energises when the monitored supply drops below the adjustable trip point. The relay re-energises when the supply rises above the trip point plus the hysteresis. The 45POVR-4W functions by energising the relay when the voltage rises above the trip point. The relay de-energises when the supply drops below the trip point minus the hysteresis. A green LED indicates the supply is present whilst a red LED indicates the relay is energised. Note: During phase or neutral loss, the relay will de-energise on both units.



Terminal Protection to IP20

Dims:
H.78 mm
W.45 mm
L.99 mm

▪ TIMING DIAGRAM



▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green **'supply on'** LED should illuminate.

45PUVR-4W: The red **'relay'** LED should illuminate and the relay energise if the supply voltage is above the set **'% level'**

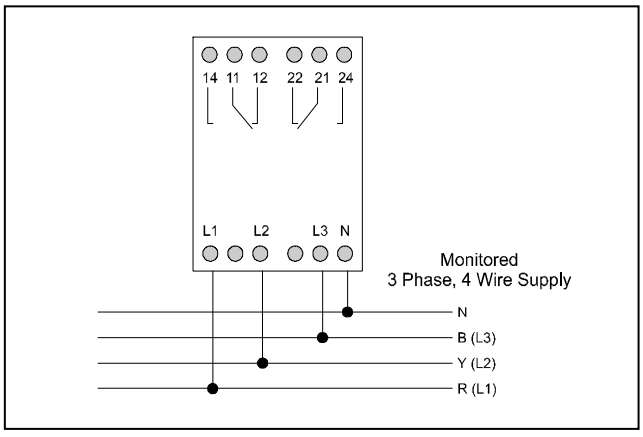
45POVR-4W: The red **'relay'** LED should remain extinguished and the relay de-energised if the supply voltage is below the set **'% level'**

If on either unit the green LED illuminates but the red LED and relay indicate a fault, then check all connections and voltages present.

Set the **'% level'** and the **'% hyst'** adjustments as required. If large phase variations are anticipated and acceptable, the **'% level'** and the **'% hyst'** settings should be adjusted further to avoid false tripping

Note: During phase loss, both LED's may be extinguished. Where monitoring a supply for correct phase sequence is important, the 45PSR Phase Sequence Relay should be used.

▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply/Monitored Voltage Un: (phase to phase)	220, 380, 400V AC 45 - 65Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	3VA @ Un (blue phase only) 0.2VA @ Un (red and yellow phases)
Trip Level:	75 - 100% Under voltage (45PUVR) 100 -125% Over voltage (45POVR)
Hysteresis:	1 to 15% (user adjustable)
Repeat Accuracy:	± 0.5% at constant conditions
Reaction Time (t):	≈ 200mS (see Options 1 & 2)
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	300g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal Conductor Size:	Max 2 x 1.5mm² stranded (terminated) Max 2 x 2.5mm² solid
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE Compliant

▪ OPTIONS

1. The above units can be supplied with an internally set time delay which prevents the relay from changing state immediately the supply voltage passes the trip point. The delay (ranging from 1 to 10 seconds) should be specified, prior to ordering.
2. Where it is necessary for the user to set the time delay, the unit can be supplied with the hysteresis adjustment replaced with a time delay adjustment. On these units, the delay is adjustable from 0.2 to 10 seconds. The hysteresis is then factory set to 1%.

Broyce Control Ltd., Pool Street, Wolverhampton, West Midlands WV2 4HN. England 45PVR4W-B990304
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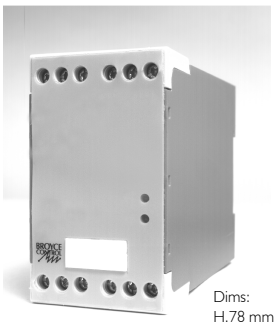
Type: 45 PSR

Phase Sequence Relay

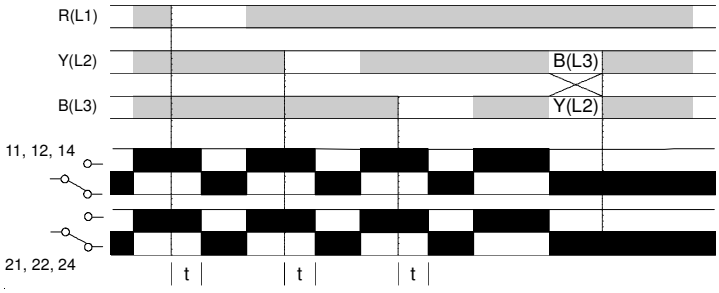
The unit is designed to monitor a three phase, 3 or 4 wire supply for incorrect phase sequence or phase loss. When power is applied, the relay energises and the green "correct" LED illuminates providing all the phases are present and rotating in the correct sequence. If the phase sequence is incorrect when power is applied, the relay remains de-energised and the red "incorrect" LED illuminates.



Dims:
H.78 mm
W. 45 mm
L.99 mm

Terminal Protection to IP20

▪ TIMING DIAGRAM



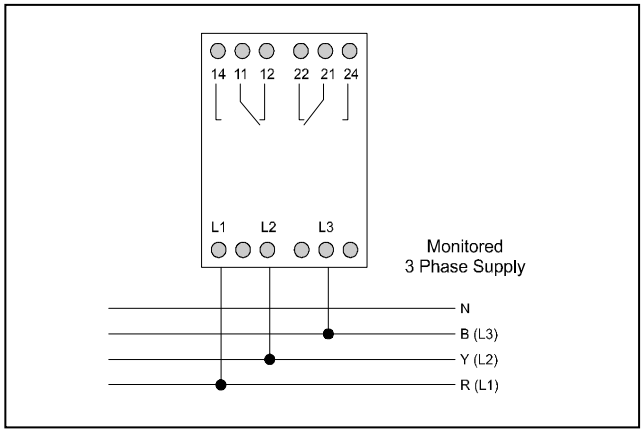
▪ INSTALLATION AND SETTING

BEFORE INSTALLATION, ISOLATE THE SUPPLY. Connect the supply as shown in diagram below. Apply power and the green **'correct'** LED should illuminate and the relay should energise. If this does not occur and instead the red **'incorrect'** LED illuminates, disconnect the supply and reverse any two of the phase inputs. If after re-applying the supply, the red LED still remains illuminated, check that all phases are connected, and that the voltage levels are correct.

Using the 45PSR to detect phase loss: The 45PSR can also be used to monitor phase loss on a supply providing the re-generated voltage is less than 70% of the nominal supply voltage. Where there is a possibility of a higher re-generated voltage, the 45PUVR or 45095 relays should be used.

Note: During phase loss, both LED's may be extinguished.

▪ CONNECTION DIAGRAM



▪ TECHNICAL SPECIFICATION

Supply/Monitored Voltage Un: (phase to phase)	220, 380, 400V AC 45 - 65Hz (Galvanic isolation by transformer)
Supply Variation:	75 - 125% of Un
Isolation:	Over voltage cat. III (IEC 664)
Overload:	1.5 x Un continuous 2 x Un for 3 seconds
Power Consumption:	3VA @ Un (red and yellow phases) 0.1VA @ Un (blue phase only)
Reaction Time (t):	≈ 200mS
Ambient Temperature:	-20 to +60°C
Relative Humidity:	+95%
Contact Rating:	DPDT AC 1 250V AC 8A (2000VA) AC 15 250V AC 3A DC 1 25V DC 8A (200W)
Electrical Life:	Minimum 150,000 ops at rated load
Housing:	Orange flame retardant UL94 VO
Weight:	300g approx.
Mounting Option:	Onto 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3)
Terminal Conductor Size:	Max 2 x 1.5mm^2 stranded (terminated) Max 2 x 2.5mm^2 solid
Approvals:	Conforms to: UL, CUL, CSA, IEC. CE Compliant

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- Panel Mount

Click the above for further information…!

Click here for Main Page

Type: BHRM

Hours Run Meter

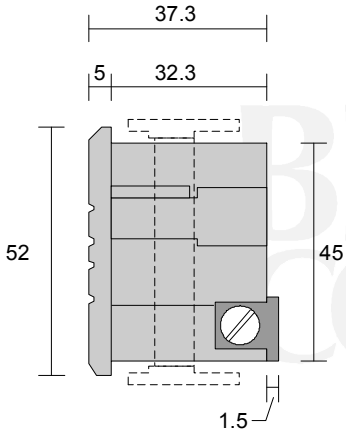
- **Non Resettable**
- **Measures Elapsed Time**
- **Rotating Disc for Indication of Operation**
- **Panel Mounting**
- **IP65 Protection (Front Face)**

- INSTALLATION NOTE

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.

- DIMENSIONS & PANEL CUT-OUT DETAILS



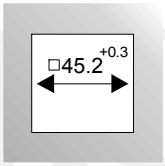


Fig.1

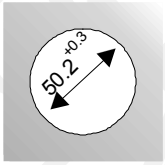


Fig.2

- TECHNICAL SPECIFICATION

Supply voltage:	10 – 80V DC 24, 115, 230V AC 50Hz
Supply voltage tolerance:	+/-10% (AC Supply versions)
Current consumption: (at rated supply voltage)	DC: 1.5 - 15mA AC: ≈10mA
Counting capacity:	99,999.99 Hours
Ambient temp:	-30 to +80°C
Protection:	DIN 40050, housing IP65 (front)
Weight:	≈ 46g
Mounting:	Flush, Panel cut-out options 1. 45.2mm +0.3 (See Fig.1) 2. ∅ 50.2mm +0.3 (See Fig.2)
Terminations:	Terminal screw connection
Approvals:	CE Compliant.

Please state Supply voltage when ordering.

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BROYCE CONTROL

- 8-pin
- 11-pin

Click the above for further information…!

Click here for Main Page

Type: PF8-S & PF11-S

8 & 11-pin Sockets

- **35mm DIN Rail or Surface Mounting**
- **Self Rising Washers**
- **Screwdriver release clip**
- **2 x 2.5mm cable acceptance**
- **Compact size**
- **Shrouded terminals (to IP20)**
- **Dual terminal numbering to IEC 67 & DIN 46 199**

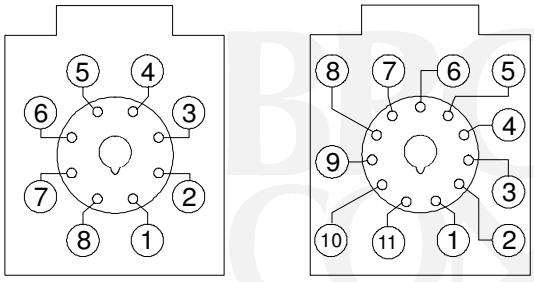
Dims:
H. 30mm
W. 43mm
D. 51mm

- INSTALLATION NOTE

Installation work must be carried out by qualified personnel.

- BEFORE INSTALLATION, ISOLATE THE SUPPLY.

- PINNING DETAILS

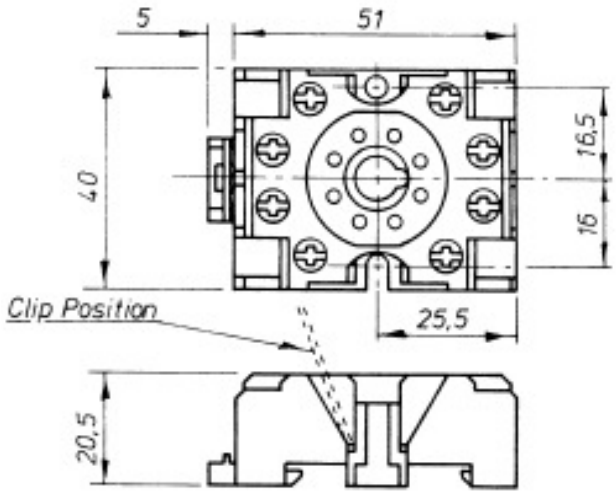


PF8-S PF11-S

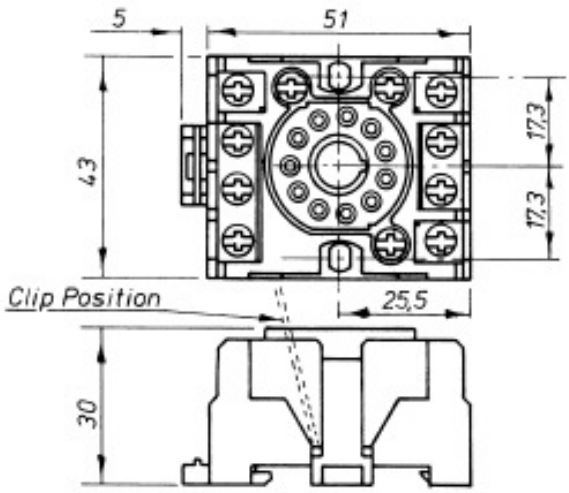
- TECHNICAL SPECIFICATION

Voltage rating:	380V AC
Current rating:	10A
Dielectric strength:	>2kV
Ambient temp:	-45 to +60°C
Material:	Black Self extinguishing glass filled PPO. UL94 V1
Weight:	≈ 37g (PF8-S) ≈ 52g (PF11-S)
Mounting option:	1. On to 35mm symmetric DIN rail to BS5584:1978 (EN50 002, DIN 46277-3) 2. Surface mounting using the two fixing holes provided. Fixing centres are 34.6mm, Ø 4.2mm
Approvals:	UL, CUL. CE Compliant.

- DIMENSIONS



PF8-S



PF11-S

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• earth leakage relays • earth fault relays • overcurrent relays • three phase relays • time delay relays • control relays • level control relays • pump control relays •

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For any additional information about products in this catalogue or if you have any special requirements for bespoke or customised products please contact us.

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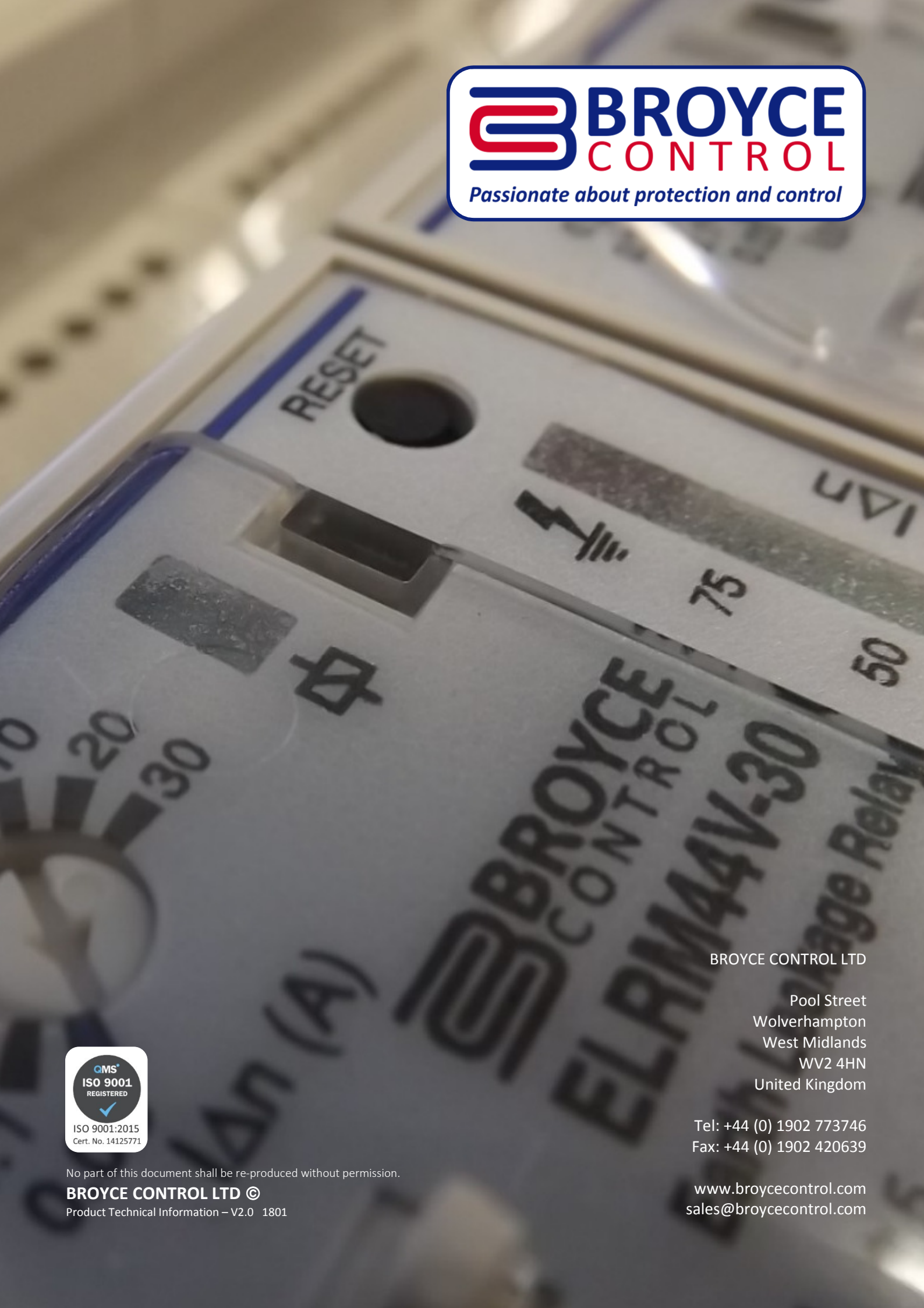
• speed control relays • temperature control relays • protection devices • generator protection • hours run meter • sockets • **bespoke products** •

index

45175	ELRP48V-30	M1MI[X]
45200	ELR-IF-0030	M1TVR
45225	ELR-IF-0100	M1TVR-4W
45OFR	ELR-IF-0300	M3MI[X]
45POVR	E-FLC2	M3MIR
45POVR-4W	E-FLC2/R	M3PPI
45PSR	E-FLC3	M3PRC/S-4W [HV]
45PTR	E-FLC3/R	M3PRT[HV]
45PUVR		M3PRT-4W[HV]
45PUVR-4W	LART	M3SPD
45TCR	LART/2	M5MAR[T]
45UFR	LBVR/A	
	LCVR/2	P48LCR
70CVR	LEDF	P48SMP
70PCVR	LEDK	P48SRR
70PCVR-4W	LEDO	P48TR
70POCR	LEDO/2	P9620
70PUCR	LEIN	P9625
70RPR-3W	LESW	P9630
70RPR-4W	LEYD/A	P9640
70SCRD	LMCCR-2A	P9650
70SCRL	LMCCR-10A	P9660
	LMCVR-20V	P9670
B1LCR	LMCVR-500V	P9680
B8HLD	LMAT	P9690
B8LCR	LMMT	
BHRM	LMMT/2	PF-8
	LMWVR	PF-11
BZCT035	LP01	
BZCT050	LPRA/2	PUVR44
BZCT070	LPRC/2	
BZCT120	LPRD/2	
BZCT160	LPRT/2	
BZCT210	LPMP/2	
BZCTR305	LRTM/2	
BZCTR350	LR44/2	
BZCTR470	LR44/3	
	LTMR	
CP Discontinued from 02/2018	LXCVR	
	LXPRC	
ELR01PN	LXPRC-4W	
ELR30PN	LXPRC/S	
ELRM44F-0030	LXPRC/S/F	
ELRM44F-0100	LXPRC/S/RD	
ELRM44F-0300	LXPRC/S-4W	
ELRM44V-3 (0.5s)	LXPRF	
ELRM44V-3/2 (0.5s)	LXPRF-4W	
ELRM44V-10	LXPRT	
ELRM44V-10 (0.5s)	LXPRT-4W	
ELRM44V-10/2 (0.5s)		
ELRM44V-30	M1DRT	
ELRM44V-30/2 (0.5s)	M1IRT	
ELRM44V-30AR	M1LAU-2	[HV] denotes High Voltage



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