Type: LPRA/2

Phase Asymmetry, Failure, Sequence, Under Voltage plus Time Delay

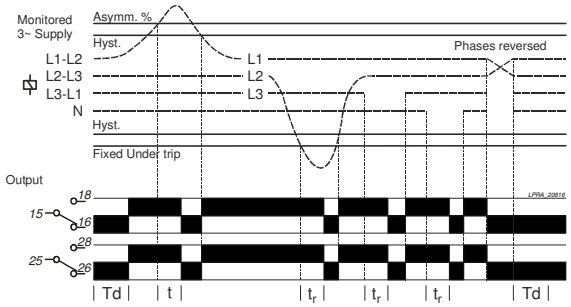
Terminal Protection to IP20

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.

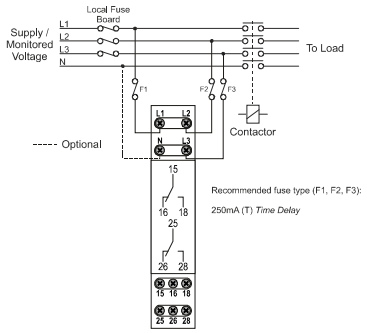
Supply fault	Green LED ❶	Red LED ❷	Relay
Phase or neutral missing	LED's flash alternately		De-energised
Phases reversed (no delay)	Flashing	Off	De-energised
Phase asymmetry trip point exceeded (during timing)	On	Flashing	Energised for delay (t)
Phase asymmetry trip point exceeded (after timing)	On	Off	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			

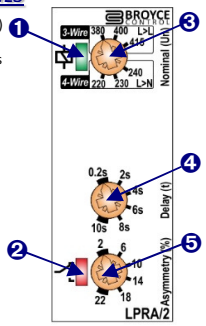
Note:
"L>L" has the same meaning as "phase to phase" and "L>N", the same as "phase to neutral"

CONNECTION DIAGRAM

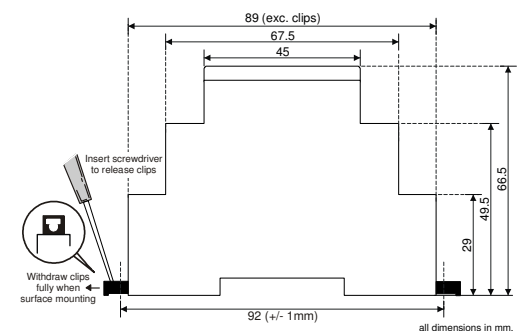


SETTING DETAILS

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



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