The PLM Series continuously measures the voltage of each of the three phases. The PLM Series uses a microcontroller circuit design that senses undervoltage, voltage unbalance, phase loss, and phase reversal. Protection is assured when regenerated voltages are present. Both delta and wye systems can be monitored; no connection to neutral is required.

For more information see:
Appendix B, page 165, Figure 8 for dimensional drawing.
Appendix C, page 168, Figure 13 for connection diagram.

Features:

- Protects against phase loss & reversal; & under & unbalanced voltages
- 8-pin plug-in base
- Adjustable low voltage trip point
- Factory fixed unbalance & trip delay
- Line voltages 200 to 480VAC in 3 ranges
- Isolated, 10A, SPDT output contacts
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Approvals:

Auxiliary Products:

- **Panel mount kit:** P/N: BZ1
- **Octal 8-pin socket:** P/N: OT08PC
- **3-phase fuse block/disconnect:** P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **DIN rail:** P/N: C103PM (Al)

Available Models:

PLM6405	PLM9405
PLM6502	PLM9502
PLM6805	PLM9805
PLM8405	PLM9820
PLM8805	

If desired part number is not listed, please call us to see if it is technically possible to build.

Operation

The output relay is energized and the LED glows green when all voltages are acceptable and the phase sequence is correct. Under and unbalanced voltages must be sensed for a continuous trip delay period before the relay de-energizes. Reset is automatic upon correction of the fault condition. The output relay will not energize if a fault condition is sensed as power is applied. The LED flashes red during the trip delay, then glows red when the output de-energizes. The LED flashes green/red if phase reversal is sensed.

Field Adjustment:

Set voltage adjustment knob at the desired operating line voltage for the equipment. This adjustment automatically sets the undervoltage trip point. Apply power. If the PLM fails to energize, (LED glows red) check wiring of all 3 phases, voltage, and phase sequence. If phase sequence is incorrect, the LED flashes green/red. To correct this, swap any two line voltage connections at the mounting socket. No further adjustment should be required.

Order Table:

PLM **X** **X** **X**

Line Voltage
- **6** - 240VAC
- **8** - 380VAC
- **9** - 480VAC

Voltage Unbalanced
- **Fixed -** Specify - **4-8**% in 1% increments

Trip Delay
- **Fixed** - Specify from **2-20**s in 1s increments using two digits

Specifications

Line Voltage

Type . . . . . 3-phase delta or wye with no connection to neutral

Operating Voltage:	Model	Adj. Line Voltage Range	Line Voltage Max.
	240	200-240VAC	270VAC
	380	360-430VAC	480VAC
	480	400-480VAC	530VAC

AC Line Frequency . . . . . 50/100 Hz
Phase Sequence . . . . . ABC
Power Consumption . . . . . ≅ 2W for 240V units
≅ 3W for 380 - 480V units

Low Voltage & Voltage Unbalance

Type . . . . . Voltage detection with delayed trip & automatic reset

Low Voltage
Trip Voltage . . . . . 88 - 92% of adjusted line voltage
Reset Voltage . . . . . Plus 3% of trip voltage

Voltage Unbalance
Trip Unbalance . . . Factory fixed from 4 - 8%
Reset on Balance . . -0.7% unbalance typical

Trip Delay
Range . . . . . Factory fixed from 2 - 20s
Tolerance . . . . . ±15%

Phase Reversal & Phase Loss
Response Time:
Phase Reversal . . . . . ≤ 200ms
Phase Loss . . . . . ≤ 200ms
Phase Loss . . . . . ≥ 35% unbalance
Reset . . . . . Automatic

Output

Type . . . . . Electromechanical relay
Form . . . . . Isolated, SPDT
Rating . . . . . 10A resistive @ 240VAC, 277VAC max; 1/2 Hp @ 240VAC; 1/4 Hp @ 120VAC
Life . . . . . Mechanical - 1 x 10^7; Electrical - 1 x 10^5

Protection

Surge . . . . . IEEE C62.41-1991 Level B
Isolation Voltage . . . . . ≥ 2500V RMS input to output

Mechanical

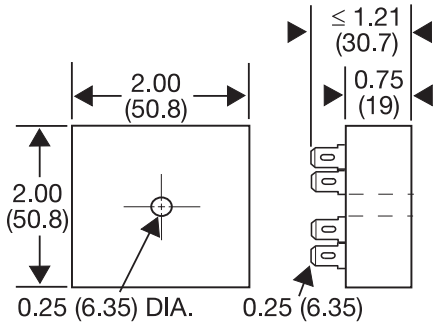
Mounting* . . . . . 8-pin plug-in socket rated 600VAC
Dimensions . . . . . 3.2 x 2.39 x 1.78 in. (81.3 x 60.7 x 45.2 mm)

Environmental

Operating / Storage Temperature . . . . . -40° to 60°C / -40° to 85°C
Weight . . . . . ≅ 4.4 oz (125 g)

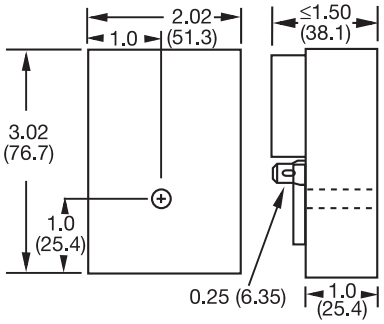
*CAUTION: Select an octal socket rated for 600VAC operation.

FIGURE 1



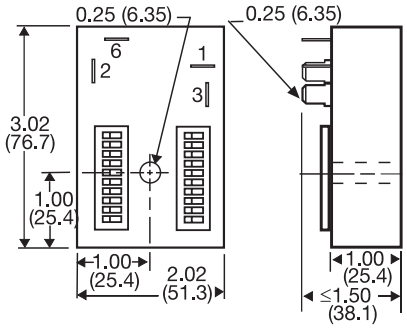
CT; ESD5; ESDR; FS100; FS200; FS300; KRD3; KRD9; KRDB; KRDI; KRDM; KRDR; KRDS; KRPD; KRPS; KSD1; KSD2; KSD3; KSD4; KSDB; KSDR; KSDS; KSDU; KSPD; KSPS; KSPU; KVM; T2D; TA; TAC1; TAC4; TDU; TDUB; TDUI; TDUS; TL; TMV8000; TS1; TS2; TS4; TS6; TSB; TSD1; TSD2; TSD3; TSD4; TSD6; TSD7; TSDB; TSDR; TSDS; TSS; TSU2000

FIGURE 2



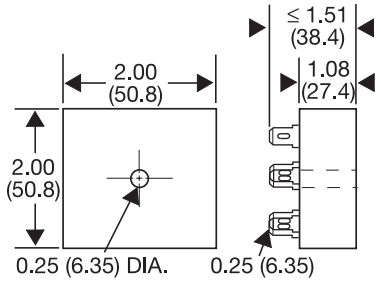
HLV; HRD3; HRD9; HRDB; HRDI; HRDM; HRDR; HRDS; HRID; HRIS; HRIU; HRPD; HRPS; HRPU; HRV; RS

FIGURE 3



HSPZ

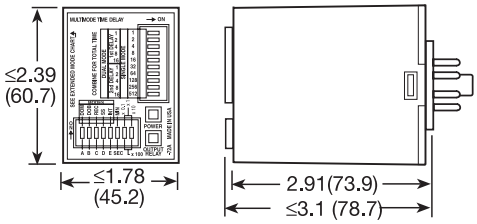
FIGURE 4



FA; FS; FSU1000*; NHPD; NHPS; NHPU; NLF1*; NLF2*; PHS*; PTHF*; SIR1; SIR2; SLR1*; SLR2*; TH1; TH2; THC; THD1; THD2; THD3; THD4; THD7; THDB; THDM; THDS; THS

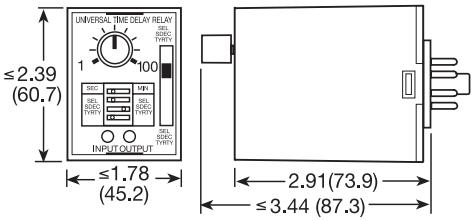
*If unit is rated @ 1A, see Figure 1

FIGURE 5



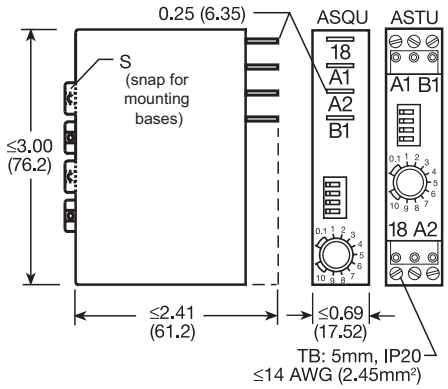
TRDU

FIGURE 6



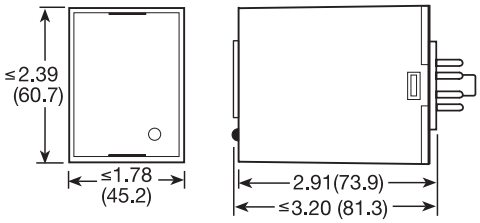
TRU

FIGURE 7



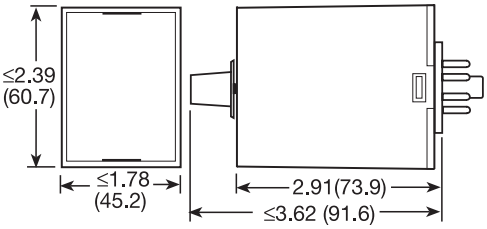
ASQU; ASTU; DSQU; DSTU

FIGURE 8



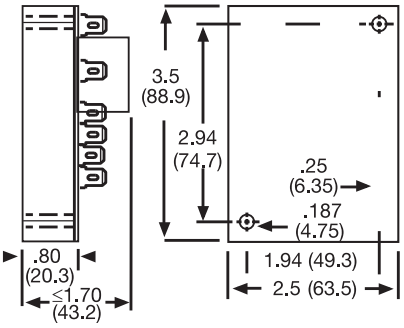
PLM; PLR; TDB; TDBH; TDBL; TDI; TDIH; TDIL; TDM; TDMB; TDMH; TDML; TDR; TDS; TDSH; TDSL

FIGURE 9



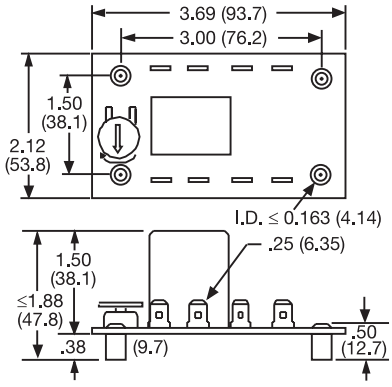
FS500; PRLB; PRLM; PRLS; TRB; TRM; TRS

FIGURE 10



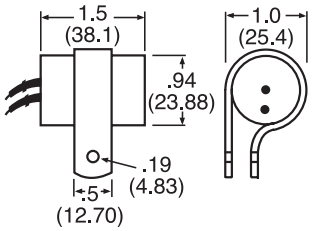
ERD3; ERDI; ERDM

FIGURE 11



ORB; ORM; ORS

FIGURE 12

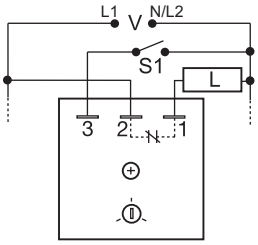


FS100; FS400

inches (millimeters)

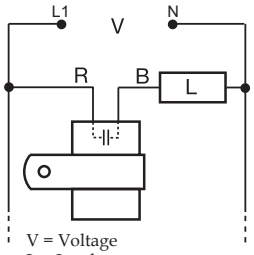
Appendix C - Connection Diagrams

FIGURE 1 - FSU1000 Series



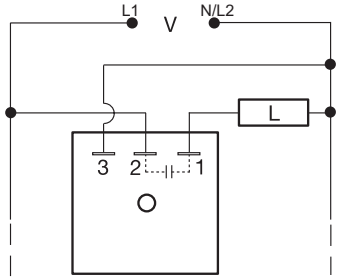
S1 = Optional low current switch
V = Voltage
L = Load

FIGURE 2 - FS100 Series



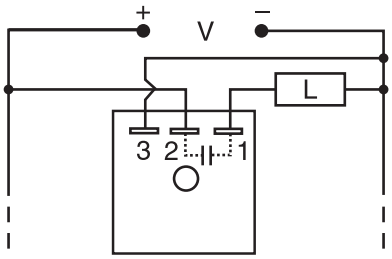
V = Voltage
L = Load
R = Red Wire
B = Black Wire

FIGURE 3 - FS100 Series



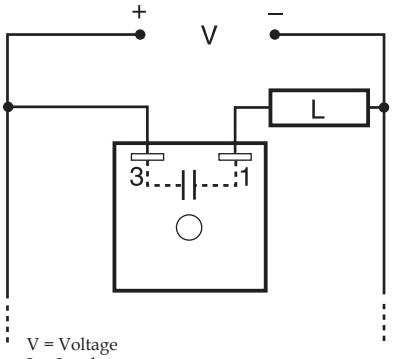
V = Voltage
L = Load

FIGURE 4 - FS200 Series



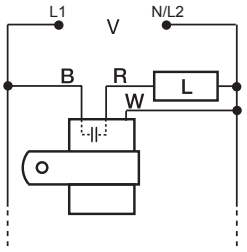
V = Voltage
L = Load

FIGURE 5 - FS300 Series



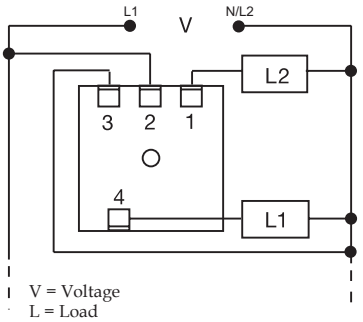
V = Voltage
L = Load
Note: Load may be in positive side.

FIGURE 6 - FS400 Series



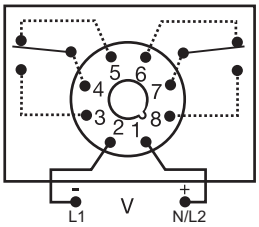
V = Voltage
L = Load
R = Red Wire
B = Black Wire
W= White Wire

FIGURE 7 - AF Series



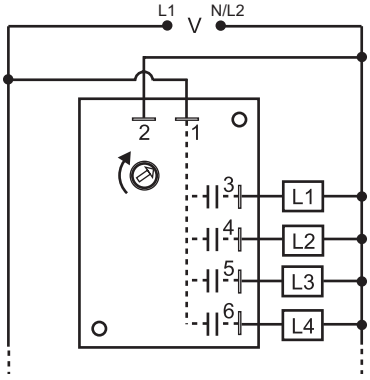
V = Voltage
L = Load

FIGURE 8 - FS500 Series



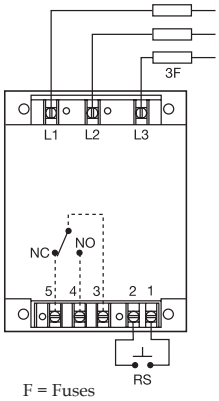
V = Voltage

FIGURE 9 - SC3/SC4 Series



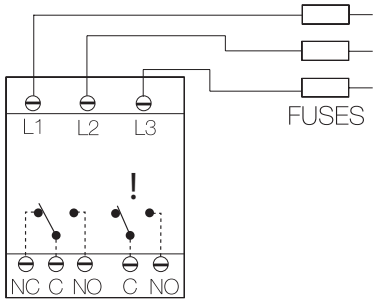
SC4 shown;
for SC3, terminal 6 & load L4 are eliminated.

FIGURE 10 - WVM Series



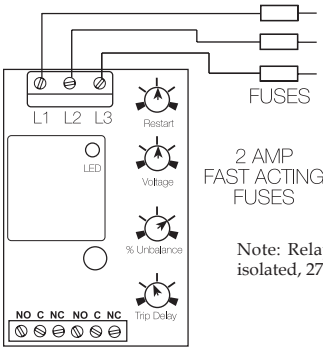
F = Fuses
NO = Normally Open
NC = Normally Closed
RS = Optional Remote Reset Switch
Relay contacts are isolated.
CAUTION:
2 amp max fast acting fuses must be installed externally in series with each input. (3)

FIGURE 11 - DLMU Series



L1, L2, L3 = Line Voltage Input
NO = Normally Open Contact
NC = Normally Closed Contact
C = Common, Transfer Contact
CAUTION: 2 amp max. fast acting fuses are recommended to protect the equipment's wiring. They are not required to protect the DLMU.
! = Select alarm contact connection as N.O. or N.C. when ordering; N.O. Shown.

FIGURE 12 - HLMU Series

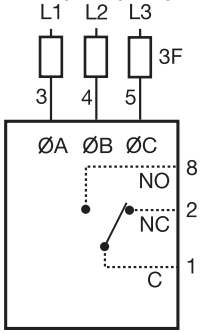


2 AMP
FAST ACTING
FUSES

Note: Relay contacts are isolated, 277VAC max.

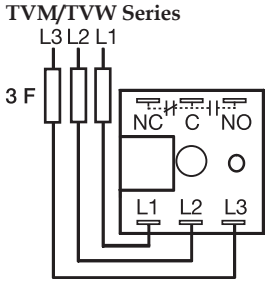
L1, L2, L3 = Line Voltage Input
NO = Normally Open Contact
NC = Normally Closed Contact
C = Common, Transfer Contact
CAUTION: 2 amp max. fast acting fuses are recommended to protect the equipment's wiring. They are not required to protect the HLMU.

FIGURE 13 - PLMU/PLM/PLR/PLS Series



F = Fuses
ØA = Phase A = L1
ØB = Phase B = L2
ØC = Phase C = L3
NO = Normally Open
NC = Normally Closed
2A fast acting fuses recommended for safety (not required)
Relay contacts are isolated.

FIGURE 14 - TVM/TVW Series



L1 = Phase A
L2 = Phase B
L3 = Phase C
NO = Normally Open
NC = Normally Closed
C = Common, Transfer Contact
Relay contacts are isolated.
F = 2A Fast acting fuses are recommended, but not required

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