



Provides protection for motors and other sensitive loads. Continuously measures the voltage of each of the three phases using a microcomputer circuit design that senses under and overvoltage, voltage unbalance, phase loss, and phase reversal. Protection is provided even when regenerated voltages are present. Includes a trip delay to prevent nuisance tripping and a restart delay to prevent short cycling after a momentary power outage.

For more information see:
Appendix B, page 167, Figure 30 for dimensional drawing.
Appendix C, page 168, Figure 14 for connection diagram.

Operation

Upon application of line voltage, the restart delay begins. The output relay is de-energized during restart delay. Under normal conditions, the output energizes after restart delay. Undervoltage, overvoltage, and voltage unbalance must be sensed for continuous trip delay period before the output is de-energized. The output will not de-energize if a fault is corrected during the trip delay. The restart delay begins as soon as the output relay de-energizes. If the restart delay is completed when the fault is corrected, the output relay will energize immediately. The output relay will not energize if a fault or phase reversal is sensed as 3-phase input voltage is applied. Reset: Reset is automatic upon correction of a fault.

LED Operation

The LED flashes green during the restart delay, then glows green when the output energizes. It flashes red during the trip delay then glows red when the output de-energizes. It flashes red/ green if phase reversal is sensed.

Features:

- Protects against phase loss & reversal; over, under & unbalanced voltages; short cycling
- Fixed trip points & delays
- Fixed voltages from 208 to 480VAC
- Isolated, 10A, SPDT output contacts
- Bi-color LED indicator shows: output status, faults, time delays & phase reversal
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Approvals:

Auxiliary Products:

- **Female quick connect:**
P/N: P1015-13 (AWG 10/12)
P/N: P1015-64 (AWG 14/16)
P/N: P1015-14 (AWG 18/22)
- **3-phase fuse block/disconnect:**
P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **Voltage reduction module:**
P/N: VRM6048

Available Models:

TVM208A100.5S3S	TVM460A510S5S
TVM230A101S1S	TVM460A75S2M
TVM400A101S1S	TVM480A100.5S3S
TVM460A101S1S	TVM480A50.5S2S
TVM460A41S5M	

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

Order Table:

TVM	X	X	X	X
	Line Voltage	Voltage Unbalance	Trip Delay*	Restart Delay*
	—208A - 208VAC	—Fixed - Specify 4-10% in 1% increments	—Fixed - Specify from 0.2-1s in 0.1s increments	—Fixed - Specify from 0.5-1s in 0.1s increments
	—220A - 220VAC		—Fixed - Specify from 1-100s in 1s increments	—Fixed - Specify from 1-100s in 1s increments
	—230A - 230VAC			—Fixed - Specify from 1-999min in 1min increments
	—240A - 240VAC			
	—380A - 380VAC			
	—400A - 400VAC			
	—415A - 415VAC			
	—440A - 440VAC			
	—460A - 460VAC			
	—480A - 480VAC			

*Must indicate (S) for secs. or (M) for mins.

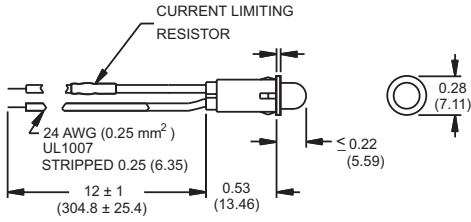
Specifications

Line Voltage	Type	3-phase delta or wye with no connection to neutral
Input Voltage		208 to 480VAC
AC Line Frequency		50 - 100 Hz
Phase Sequence		ABC
Power Consumption		Approx. 2W for 240V units Approx. 3W for 480V units
Overvoltage, Undervoltage, & Voltage Unbalance		
Overvoltage & Undervoltage		Voltage detection with delay trip & automatic reset
Undervoltage Trip Point		88 - 92% of the selected line voltage
Reset Voltage		≅ +3% of trip voltage
Overvoltage Trip Point		109 - 113% of the selected line voltage
Reset Voltage		≅ -3% of trip voltage
Trip Variation vs Temperature		≤ ±2%
Voltage Unbalance		Factory fixed from 4 - 10%
Reset On Balance		≅ -0.7% unbalance
Trip Delay Range		Fixed from 0.2 - 100s ±15% or ±0.1s, whichever is greater
Restart Delay Range		Fixed from 0.5s - 999m ±15% or ±0.2s, whichever is greater
Phase Reversal & Phase Loss Response		≤ 200ms; automatic reset
Phase Loss		≥ 25% unbalance

Output	Type	Isolated SPDT relay contacts
Rating	208 to 240VAC (55°C)	10A resistive @ 125VAC, 5A @ 250VAC, 1/4 hp @ 125VAC
	380 to 480VAC	10A resistive @ 240VAC, 1/4 hp @ 125VAC, 1/3 hp @ 250VAC, max. voltage 277VAC
Life		Mechanical - 1 x 10 ⁶ ; Electrical - 1 x 10 ⁵
Protection		
Surge		IEEE C62.41-1991 Level B
Dielectric Breakdown	208 to 240VAC	≥ 1500V RMS input to output terminals
	380 to 480VAC	≥ 2500V RMS input to output terminals
Mechanical		
Mounting		Surface mount with one #8 (M5 x 0.8) screw
Dimensions		2 x 2 x 1.25 in. (50.8 x 50.8 x 31.8 mm)
Termination		0.25 in. (6.35 mm) male quick connect terminals
Environmental		
Operating / Storage Temperature		-40° to 55°C / -40° to 85°C
Humidity		95% relative, non-condensing
Weight		≅ 2.8 oz (79 g)

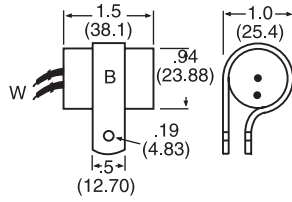
Appendix B - Dimensional Drawings

FIGURE 24



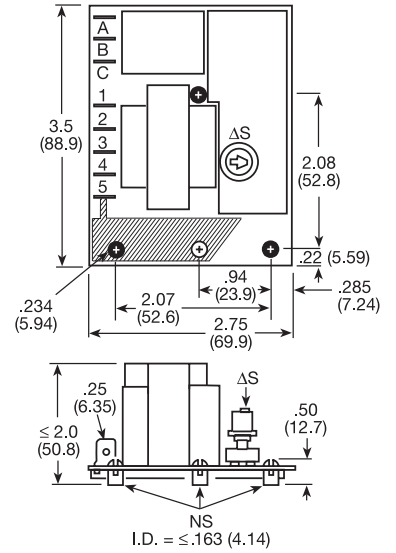
LPM

FIGURE 25



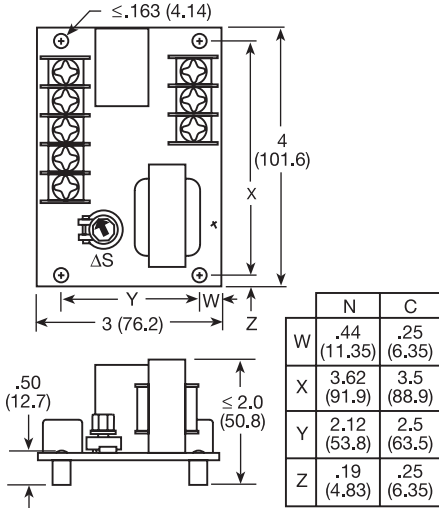
MSM

FIGURE 26



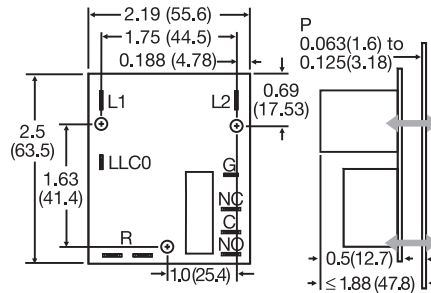
LLC1

FIGURE 27



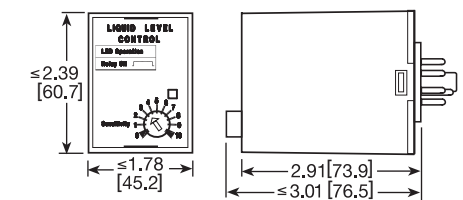
LLC2

FIGURE 28



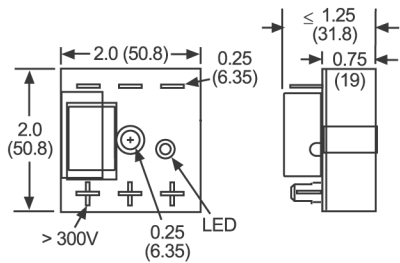
LLC8

FIGURE 29



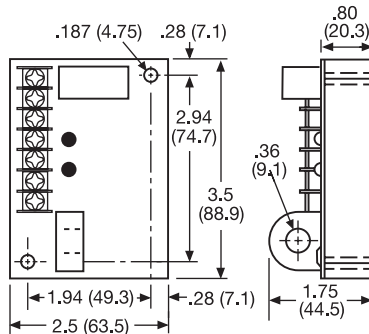
LLC5

FIGURE 30



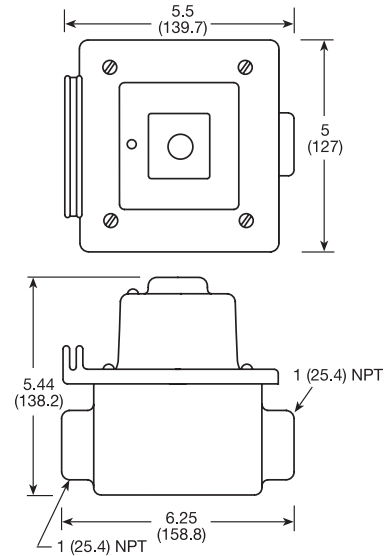
TVM; TVW

FIGURE 32



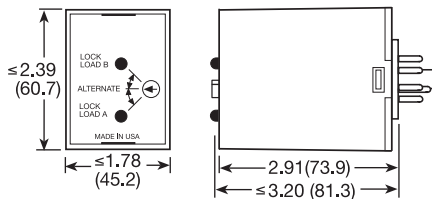
FB; SCR

FIGURE 33



PCR

FIGURE 31



ARP

inches (millimeters)

Appendix C - Connection Diagrams

FIGURE 1 - FSU1000 Series

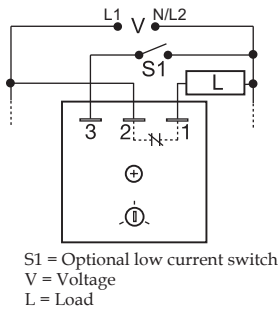


FIGURE 2 - FS100 Series

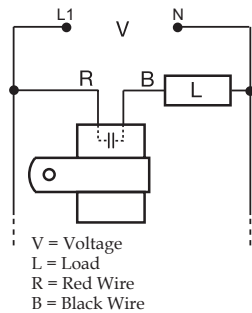


FIGURE 3 - FS100 Series

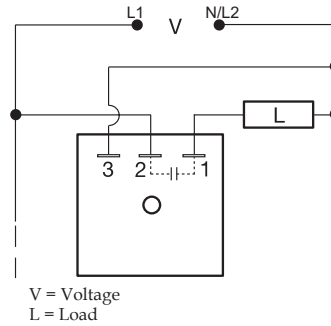


FIGURE 4 - FS200 Series

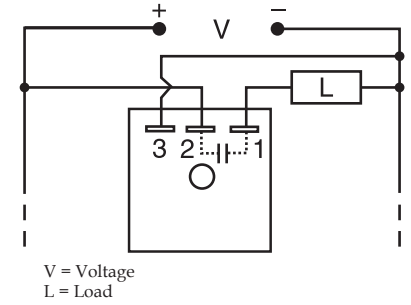


FIGURE 5 - FS300 Series

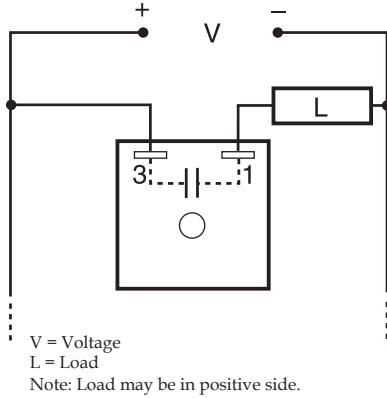


FIGURE 6 - FS400 Series

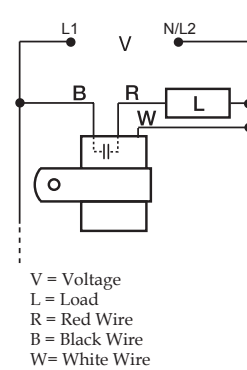


FIGURE 7 - AF Series

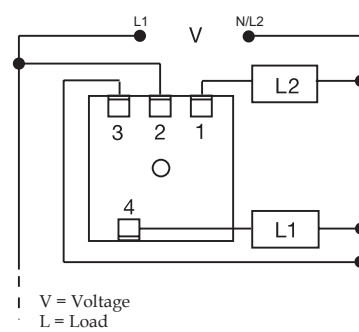


FIGURE 8 - FS500 Series

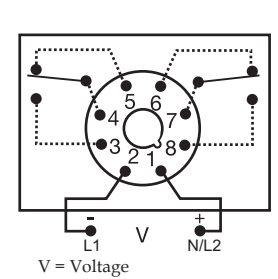


FIGURE 9 - SC3/SC4 Series

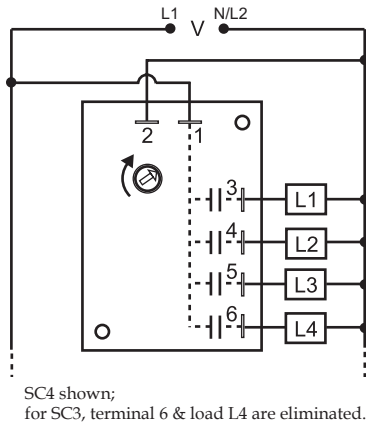


FIGURE 10 - WVM Series

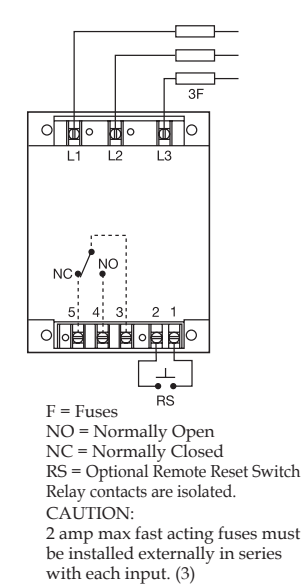


FIGURE 11 - DLMU Series

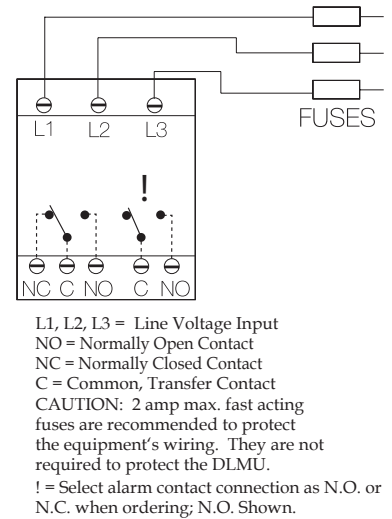


FIGURE 12 - HLMU Series

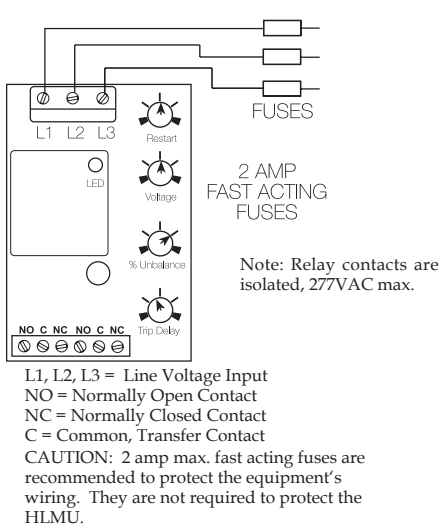


FIGURE 13 - PLMU/PLM/PLR/PLS Series

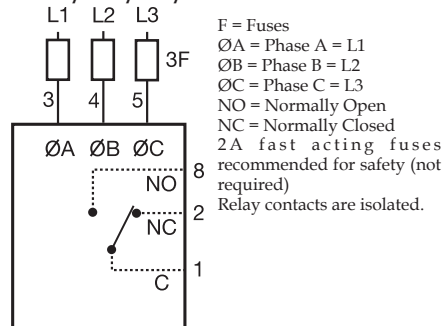


FIGURE 14 - TVM/TVW Series

