

Provides protection for motors and other sensitive loads. Continuously measures the voltage of each of the three phases using a microcontroller 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.

## Features:

- Protects against phase loss & reversal; over, under & unbalanced voltages; short cycling
- Fixed trip points & delays
- Adjustable voltages from 208 to 480VAC in 4 ranges
- Monitor 600VAC lines by connecting VRM accessory
- Isolated, 10A, SPDT output contacts
- Bi-color LED indicates: output status, faults, time delays, phase reversal & setpoint
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Approvals:   

## Operation

Upon application of line voltage, the restart delay begins. The output is de-energized during restart delay. Under normal conditions, the output energizes after the restart delay. Undervoltage, overvoltage, and voltage unbalance must be sensed for the complete trip delay period before the output de-energizes. The restart delay begins as soon as the output de-energizes. If the restart delay is completed when a fault is corrected, the output energizes immediately. The output will not energize if a fault is sensed as the input voltage is applied. If the voltage selector is set between two voltage marks (i.e. between 220 and 230V), the LED will flash red rapidly. The TVW provides fault protection at the lower of the two line voltages (i.e. 220V).

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. If the voltage selector knob is between settings, it rapidly flashes red.

## Auxiliary Products:

- **3-phase fuse block/disconnect:**  
P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **DIN rail:** P/N: C103PM (Al)
- **Female quick connect:**  
P/N: P1015-13 (AWG 10/12)  
P/N: P1015-64 (AWG 14/16)  
P/N: P1015-14 (AWG 18/22)
- **Voltage reduction module:**  
P/N: VRM6048

## Available Models:

TVW575S1M  
TVW6510S0.4S  
TVW9510S0.4S

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

## Order Table:

TVW

X

### Line Voltage

- Wide Range
- 5 - 208-240VAC Selectable
- 6 - 208, 220, 230 & 240VAC
- 8 - 380, 400 & 415VAC
- 9 - 430, 440, 460 & 480VAC

X

### Voltage Unbalance

- Fixed - Specify 4-10% in 1% increments

X

### Trip Delay\*

- Fixed - Specify from 0.2-1s in 0.1s increments
- Fixed - Specify from 1-100s in 1s increments

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

X

### Restart Delay\*

- Fixed - Specify from 0.4-1s in 0.1s increments
- Fixed - Specify from 1-100s in 1s increments
- Fixed - Specify from 1-999min in 1min increments

## Specifications

### Line Voltage

Type	3-phase delta or wye with no connection to neutral
Input Voltage/Tolerance	208 to 480VAC in 4 ranges/-30% - 20%
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 0.4s - 999m ±15% or ±0.2s, whichever is greater

Phase Reversal & Phase Loss Response . . . . . ≤ 200ms; automatic reset

Phase Loss . . . . . ≥ 25% unbalance

### Output

Type	Isolated, SPDT
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 <sup>6</sup> ; Electrical - 1 x 10 <sup>6</sup>

### 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

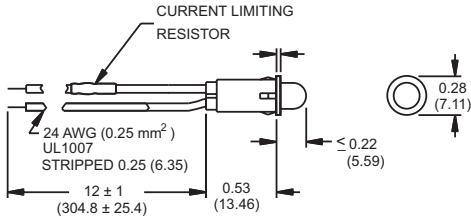
Mounting	Surface mount with one #8 (M5 x 0.8) screw
Dimensions	.2 x 2 x 1.25 in. (50.8 x 50.8 x 31.8 mm)
Termination	0.25 in. (6.35 mm) male quick connect terminals

### Environmental

Operating / Storage Temperature	-40° to 55°C / -40° to 85°C
Humidity	95% relative, non-condensing
Weight	± 2.8 oz (79 g)

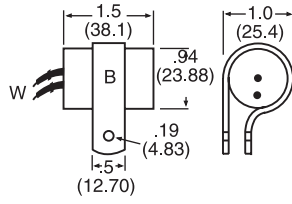
# Appendix B - Dimensional Drawings

**FIGURE 24**



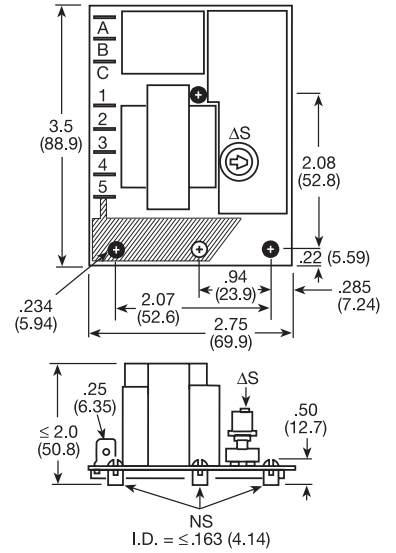
LPM

**FIGURE 25**



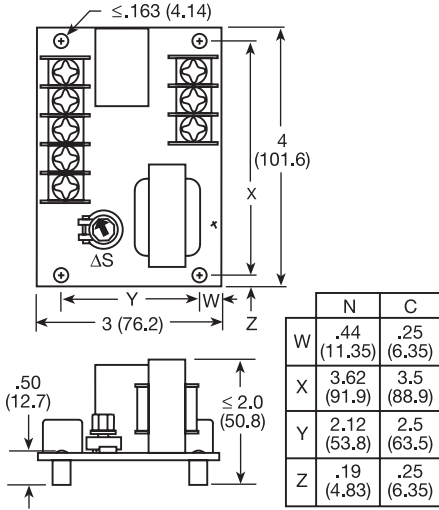
MSM

**FIGURE 26**



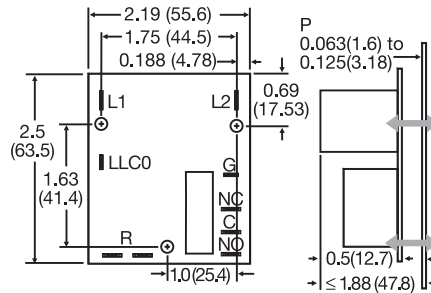
LLC1

**FIGURE 27**



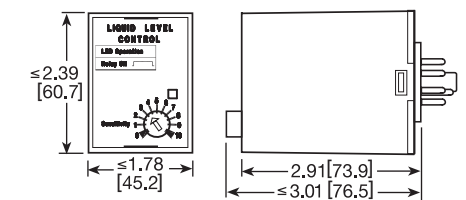
LLC2

**FIGURE 28**



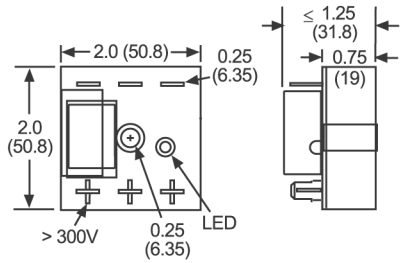
LLC8

**FIGURE 29**



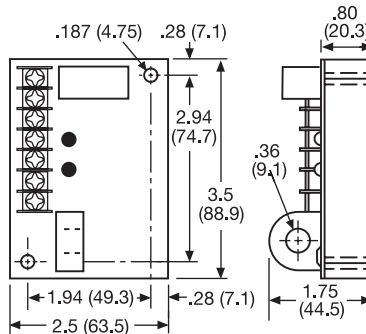
LLC5

**FIGURE 30**



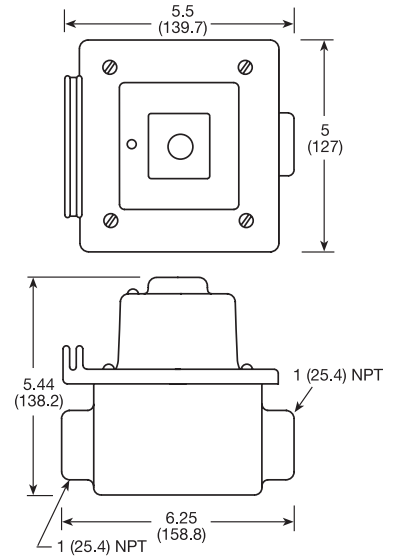
TVM; TVW

**FIGURE 32**



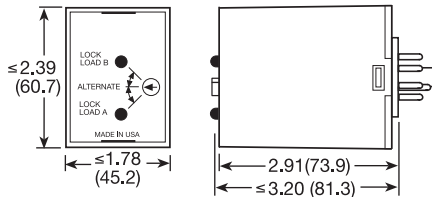
FB; SCR

**FIGURE 33**



PCR

**FIGURE 31**

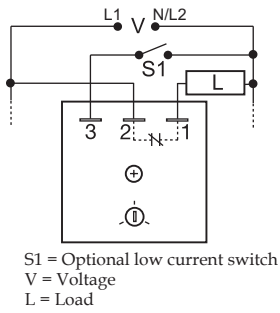


ARP

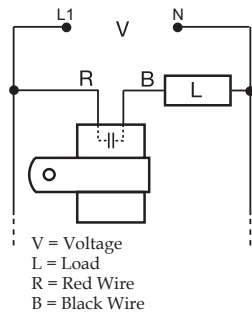
inches (millimeters)

# Appendix C - Connection Diagrams

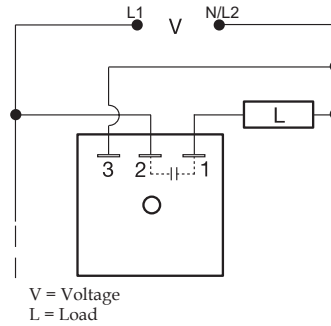
**FIGURE 1 - FSU1000 Series**



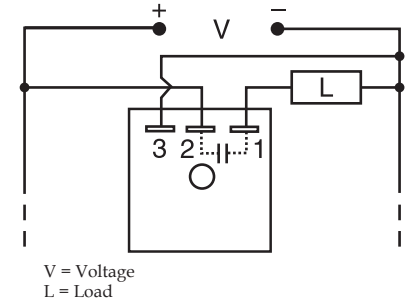
**FIGURE 2 - FS100 Series**



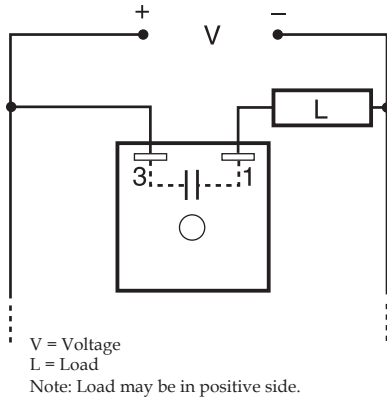
**FIGURE 3 - FS100 Series**



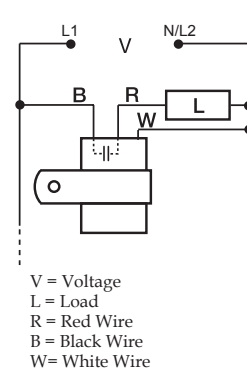
**FIGURE 4 - FS200 Series**



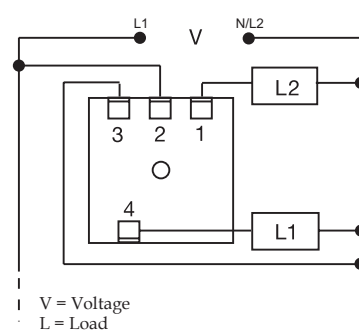
**FIGURE 5 - FS300 Series**



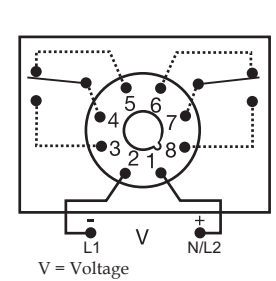
**FIGURE 6 - FS400 Series**



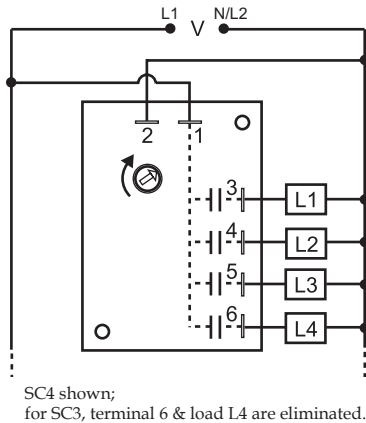
**FIGURE 7 - AF Series**



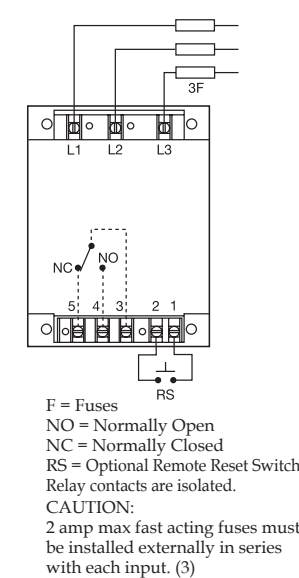
**FIGURE 8 - FS500 Series**



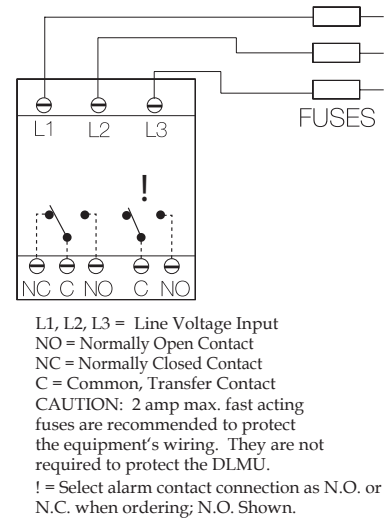
**FIGURE 9 - SC3/SC4 Series**



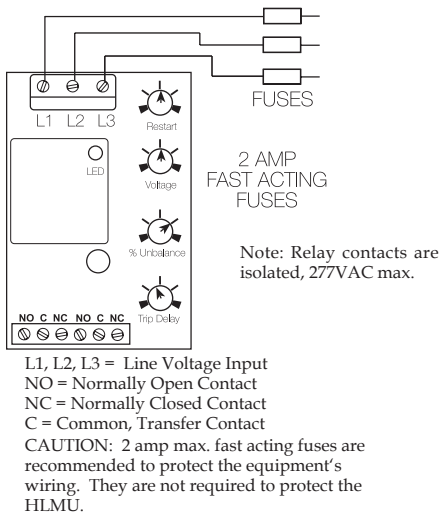
**FIGURE 10 - WVM Series**



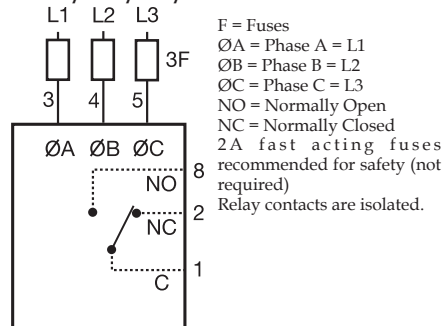
**FIGURE 11 - DLMU Series**



**FIGURE 12 - HLMU Series**



**FIGURE 13 - PLMU/PLM/PLR/PLS Series**



**FIGURE 14 - TVM/TVW Series**

