



The WVM Series provides protection against premature equipment (motor) failure caused by voltage faults on the 3-phase line. The WVM's microcontroller design provides reliable protection even if regenerated voltages are present. It combines dependable fault sensing with a 10 fault memory and a 6 LED status display. Part instrument, part control, the WVM protects your equipment when you're not there and displays what happened when you return. The WVM is fully adjustable and includes time delays to prevent nuisance tripping and improve system operation. Time delays include a 0.25 to 30s adjustable trip delay, an adjustable 0.25 to 64m (in 3 ranges) restart delay, plus a unique 3 to 15s true random start delay. The random start delay prevents voltage sags caused by simultaneous restarting of numerous motor loads after a power outage.

For more information see:
Appendix B, page 166, Figure 15 for dimensional drawing.
Appendix C, page 168, Figure 10 for connection diagram.

Operation

The output relay is energized when all conditions are acceptable and the WVM is reset. A restart and/or random start delay may occur before the output relay is energized.

Field Adjustment: Select the line voltage listed on the motor's name plate. This automatically sets the over and undervoltage trip points. No further adjustment should be required to achieve maximum equipment protection.

Read Memory: Fault(s) stored in the memory are indicated when the yellow LED is flashing, up to 10 faults are noted.

Memory Reset: To clear the memory of all faults stored, rotate selector to Clear Memory for 5 seconds. The yellow LED will turn off.

Memory Overload: Only the 10 most recent faults are retained.

Random Start Delay: A new 3 to 15s random start delay is selected by the microcontroller when a fault is corrected and when the operating voltage (L1, L2, L3) is applied to the WVM. A random start delay does not occur when the reset is manual.

Automatic Restart: Upon fault correction, the output will re-energize after a random start delay.

Automatic Restart Upon Fault Trip: When a fault is sensed for the full trip delay, the output de-energizes and a restart delay is initiated. This delay locks out the output for the delay period. Should the fault be corrected by the end of the restart delay, the output will re-energize after a random start delay. A restart delay will also occur when operating voltage (L1, L2, L3) is applied to the WVM.

Manual Reset: After a fault condition is corrected, the WVM can be manually reset. There are two methods; a customer supplied remote switch, or the onboard selector switch.

Manual Reset (Onboard): Rotate selector switch from the Manual Reset position to Auto Restart w/ Delay then back again to Manual Reset within 3 seconds. The output will immediately energize.

Remote Reset: Reset (Restart) is accomplished by a momentary contact closure across terminals 1 & 2. The output will immediately energize. Remote switch requirements are $\geq 10\text{mA}$ @ 20VDC and the reset terminals are not isolated from line voltage. A resistance of $\leq 20\text{K}\Omega$ across terminals 1 & 2 will cause immediate automatic restart.

Automatic Restart Upon Fault Correction: (P/N includes an R)

When a fault is sensed for the full trip delay, the output relay de-energizes. Upon correction of the fault, a restart delay begins. At the end of this delay, the output will re-energize after a random start delay. If a fault occurs during restart timing, the restart time delay will be reset to zero, and the output will not energize until the restart delay is completed.

Features:

- Protects against phase loss & reversal; over, under & unbalanced voltages; & short cycling
- 10 fault memory & status displayed on 6 LED readout
- Switch selectable automatic restart, delayed automatic restart, & manual reset
- 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:

- **3-phase fuse block/disconnect:** P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **DIN rail:** P/N: C103PM (A)

Available Models:

WVM011AL	WVM911AL
WVM611AH	WVM911AL-60
WVM611AL	WVM911RL
WVM811AH	WVM911RN-60
WVM911AH	

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

Order Table:

WVM	X	X	X	X	X
	3-Phase Line Voltage	Unbalance	Trip Delay	Reset Method	Restart Delay
	-6 - 200-240VAC	-1 - 2-10%	-1 - 0.25-30s	-A - Switch Selectable: Automatic restart upon fault trip	-L - 0.25-64s
	-8 - 355-425VAC			-R - Switch Selectable: Automatic restart upon fault correction	-N - 6-300s
	-9 - 400-480VAC				-H - 0.25-64m
	-0 - 500-600VAC				

-60 Option: Add the suffix -60 to any automatic restart part number to remove the random start delay feature.

Specifications

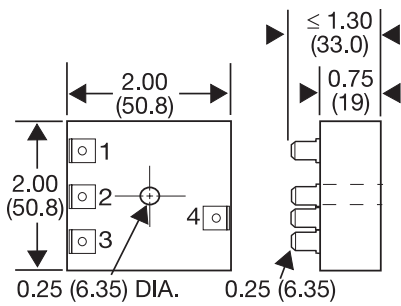
Line Voltage		
Type	3-phase delta or wye with no connection to neutral	
Operating Voltage	Model	Adj. Line Voltage Range
	240	200-240VAC
	380	355-425VAC
	480	400-480VAC
	600	500-600VAC
AC Line Frequency	50/60 Hz	
Overvoltage, Undervoltage, & Voltage Unbalance		
Overvoltage Trip Point	109-113% of adjusted voltage	
Reset Voltage	-2% of trip point	
Undervoltage Trip Point	88-92% of adjusted voltage	
Reset Voltage	+2% of trip point	
Voltage Unbalance	Adjustable from 2-10%*	
Trip Delay	Adjustable from 0.25 - 30s $\pm 15\%$	
Phase Loss	$\geq 15\%$ unbalance	
Response Time	≤ 200 ms	
Random Start Delay Range	3 - 15s	
Reset (Restart) Delay		
Low Range	0.25-64s $\pm 15\%$	
Normal Range	6-300s $\pm 15\%$	
High Range	0.25-64m $\pm 15\%$	

Fault Memory	
Type	Nonvolatile RAM
Capacity	Stores last 10 faults
Status Indicators	6 LEDs provide existing status & memory readout
	Note: 50% of operating line voltage must be applied to L1 & L2 for operation of status indicators
Output	
Type	Electromechanical relay
Form	Isolated, SPDT
Rating	10A resistive @ 250VAC; 6A inductive (0.4 PF) @ 250VAC
Life	Mechanical - 1×10^7
Protection	
Surge	IEEE 62.41-1991 Level B
Isolation Voltage	$\geq 2500\text{V}$ RMS input to output
Mechanical	
Mounting	Surface with 2 or 4 #8 (M4 x 0.7) screws
Dimensions	6.9 x 4.4 x 2.4 in. (175.3 x 111.8 x 61.0 mm)
Termination	Screw terminals with captive wire clamps for up to #12 AWG (3.2 mm ²) wire
Environmental	
Operating / Storage Temperature	-40° to 65°C / -40° to 85°C
Weight	≈ 25 oz (709 g)

* Unbalance reset is 90% of the unbalance setting (i.e. VUB at 5% reset is 4.5%)

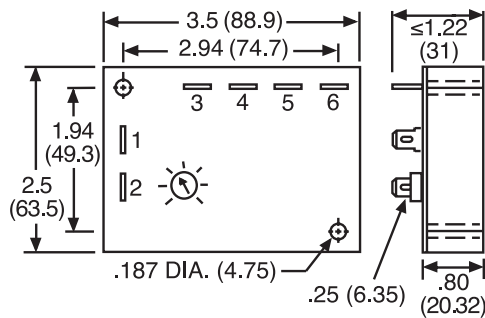
Appendix B - Dimensional Drawings

FIGURE 13



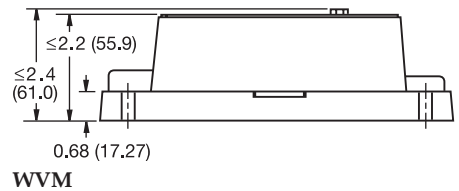
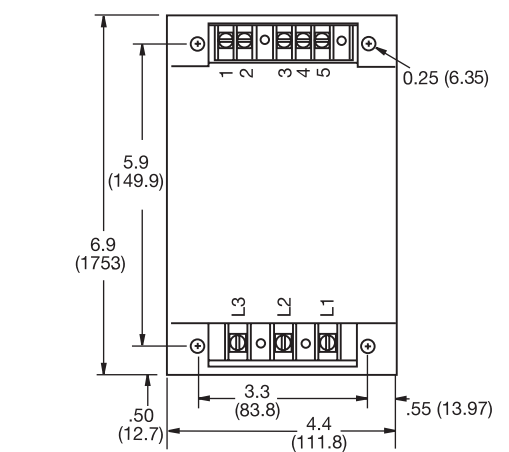
AF

FIGURE 14



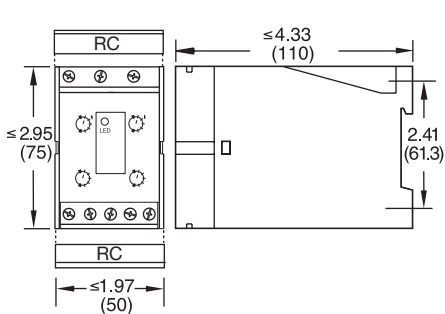
SC3; SC4; SQ

FIGURE 15



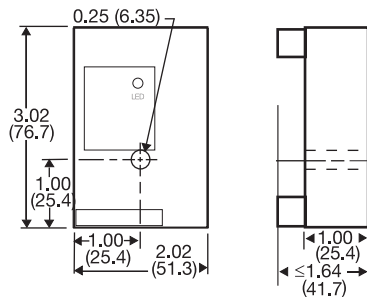
WVM

FIGURE 16



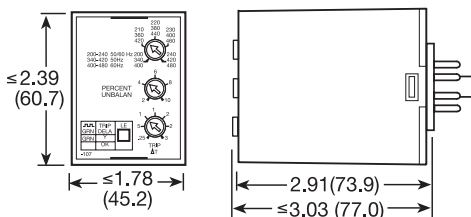
DLMU

FIGURE 17



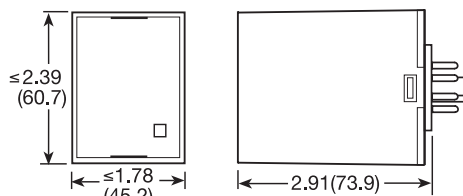
FB9L; HLMU; SCR9L

FIGURE 18



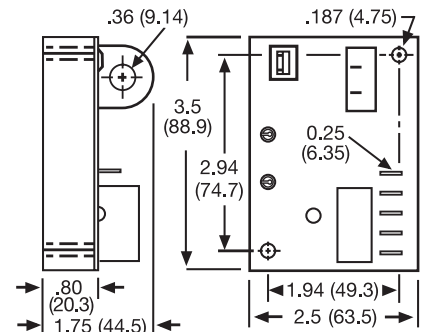
PLMU

FIGURE 19



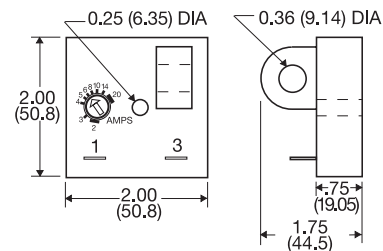
LLC4; LLC6; PLS

FIGURE 20



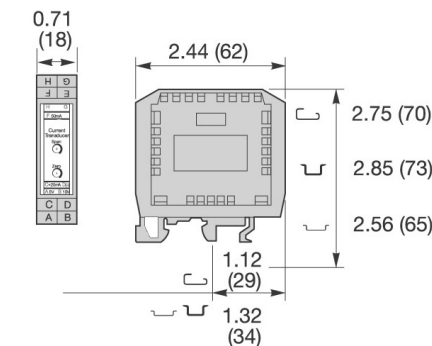
ECS; ECSW (ECS has spade connectors and ECSW has terminal board)

FIGURE 21



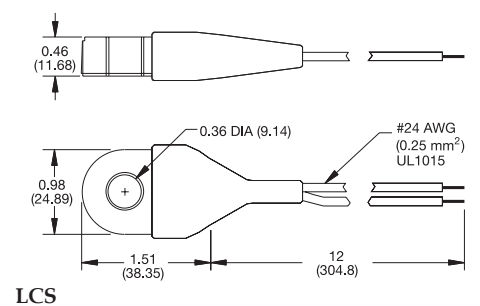
TCS; TCSA

FIGURE 22



DCSA

FIGURE 23



LCS

inches (millimeters)

Appendix C - Connection Diagrams

FIGURE 1 - FSU1000 Series

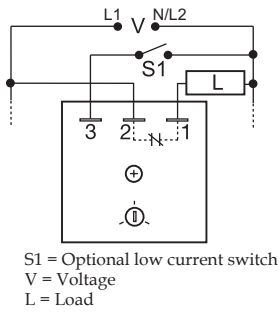


FIGURE 2 - FS100 Series

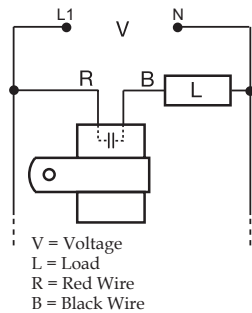


FIGURE 3 - FS100 Series

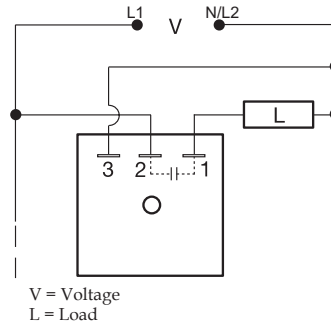


FIGURE 4 - FS200 Series

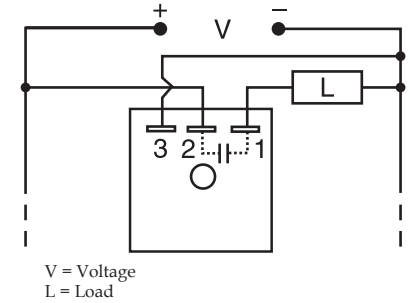


FIGURE 5 - FS300 Series

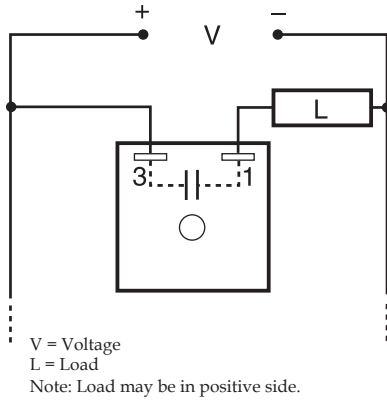


FIGURE 6 - FS400 Series

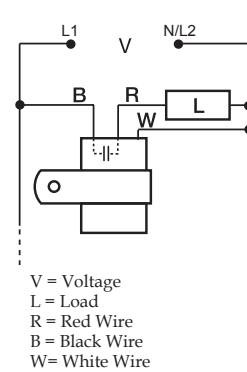


FIGURE 7 - AF Series

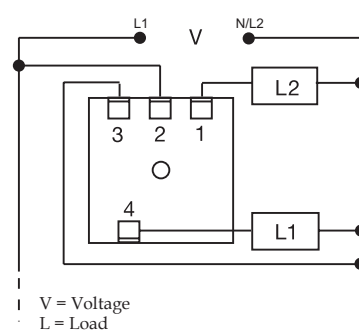


FIGURE 8 - FS500 Series

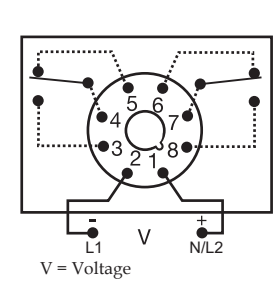


FIGURE 9 - SC3/SC4 Series

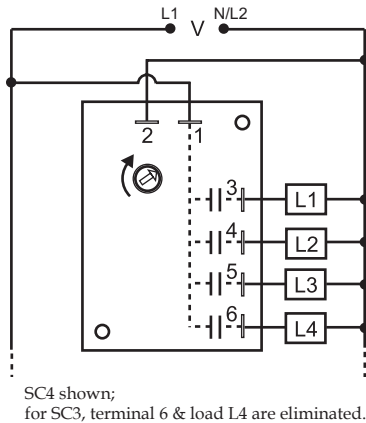


FIGURE 10 - WVM Series

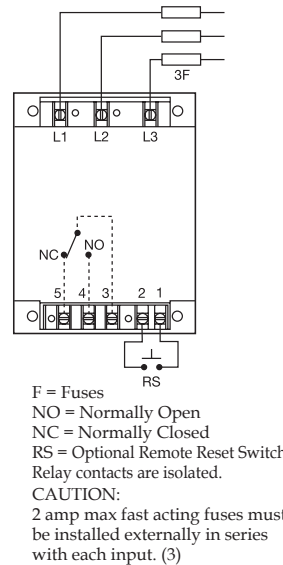


FIGURE 11 - DLMU Series

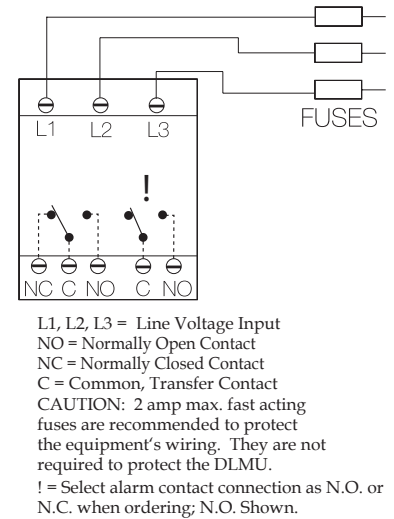


FIGURE 12 - HLMU Series

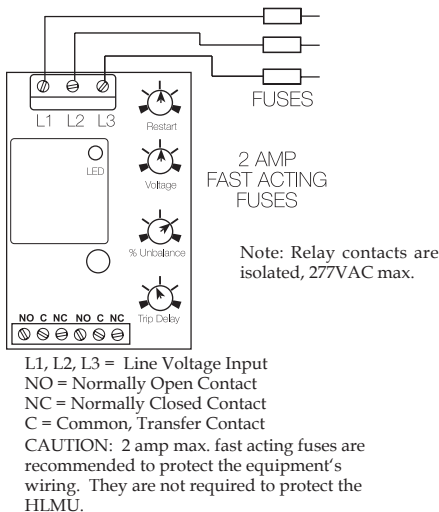


FIGURE 13 - PLMU/PLM/PLR/PLS Series

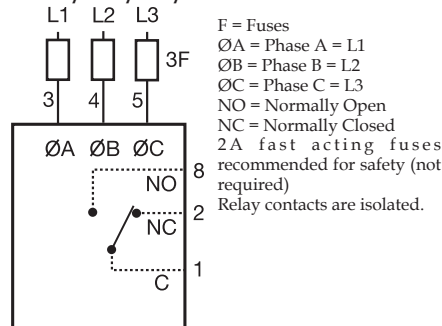


FIGURE 14 - TVM/TVW Series

