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.

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 (Al)

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.

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 ≥10mA @ 20VDC and the reset terminals are not isolated from line voltage. A resistance of ≤20KΩ 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.

Order Table:

WVM **X** **3-Phase Line Voltage**
- **6** - 200-240VAC
- **8** - 355-425VAC
- **9** - 400-480VAC
- **0** - 500-600VAC

X **Unbalance**
- **1** - 2-10%

X **Trip Delay**
- **1** - 0.25-30s

X **Reset Method**
- **A** - Switch Selectable: Automatic restart upon fault trip
- **R** - Swith Selectable: Automatic restart upon fault correction

X Restart Delay
- **L** - 0.25-64s
- **N** - 6-300s
- **H** - 0.25-64m

-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 ±15%
Phase Loss . . . . . ≥ 15% unbalance
Response Time . . . . . ≤ 200 ms
Random Start Delay Range . . . . . 3 - 15s

Reset (Restart) Delay

Low Range . . . . . 0.25-64s ±15%
Normal Range . . . . . 6-300s ±15%
High Range . . . . . 0.25-64m ±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 x 10^7

Protection

Surge . . . . . IEEE 62.41-1991 Level B
Isolation Voltage . . . . . ≥ 2500V 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

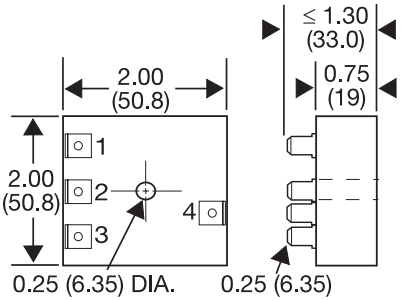
Environmental

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%)

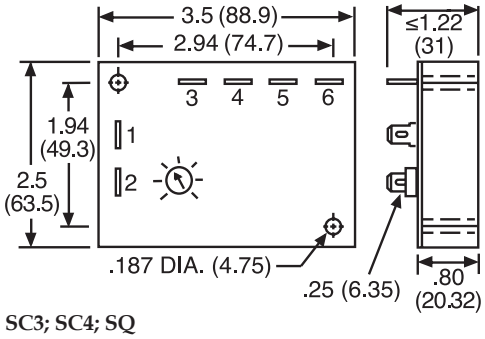
Appendix B - Dimensional Drawings

FIGURE 13



AF

FIGURE 14



SC3; SC4; SQ

FIGURE 15

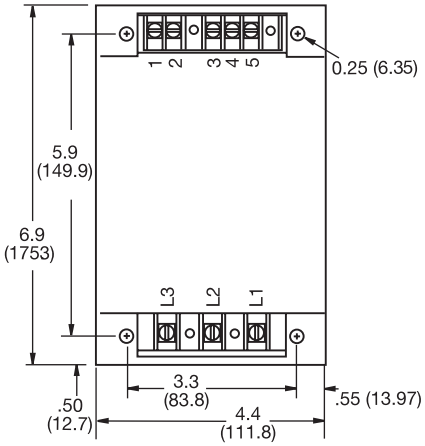
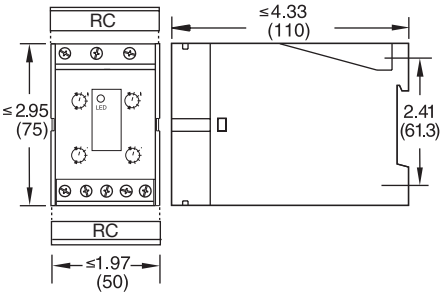
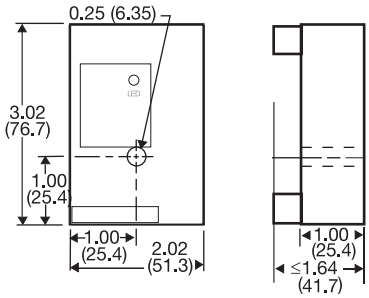


FIGURE 16

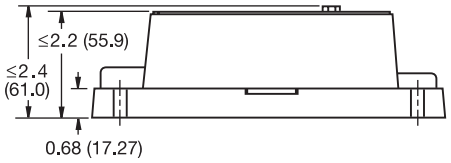


DLMU

FIGURE 17

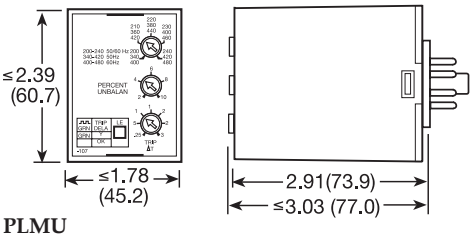


FB9L; HLMU; SCR9L



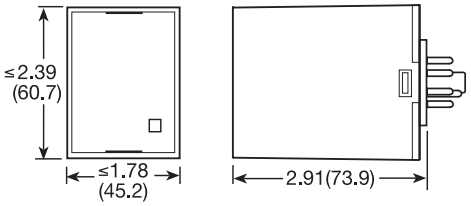
WVM

FIGURE 18



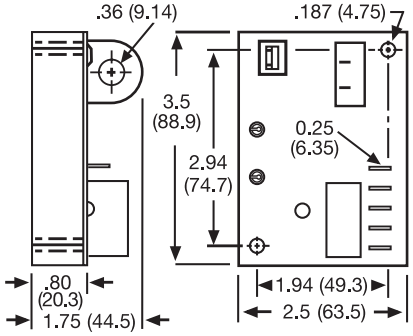
PLMU

FIGURE 19



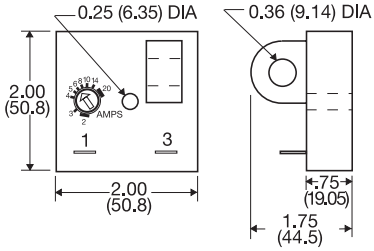
LLC4; LLC6; PLS

FIGURE 20



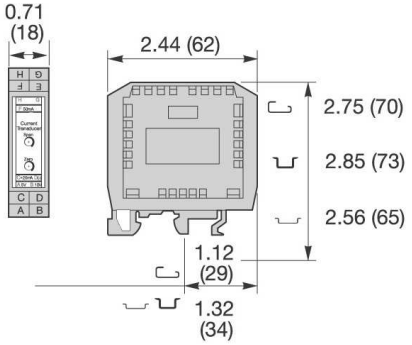
ECS; ECSW (ECS has spade connectors and ECSW has terminal board)

FIGURE 21



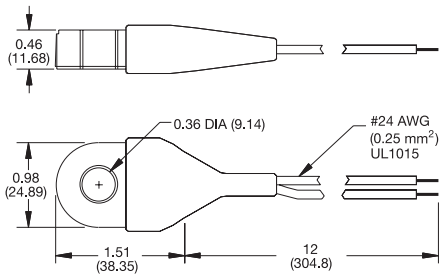
TCS; TCSA

FIGURE 22



DCSA

FIGURE 23

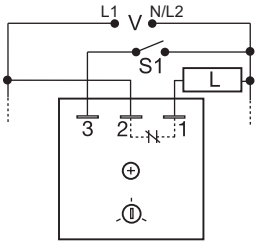


LCS

inches (millimeters)

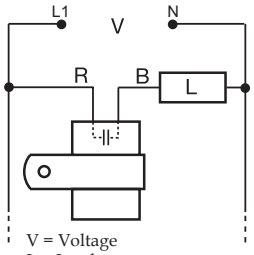
Appendix C - Connection Diagrams

FIGURE 1 - FSU1000 Series



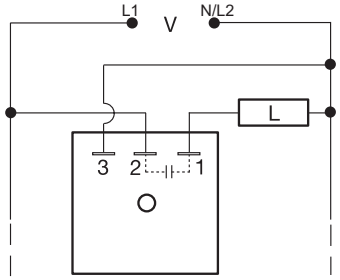
S1 = Optional low current switch
V = Voltage
L = Load

FIGURE 2 - FS100 Series



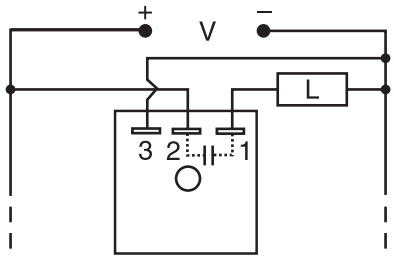
V = Voltage
L = Load
R = Red Wire
B = Black Wire

FIGURE 3 - FS100 Series



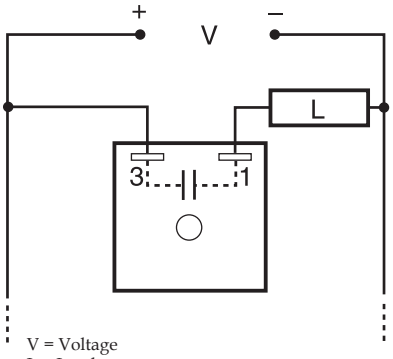
V = Voltage
L = Load

FIGURE 4 - FS200 Series



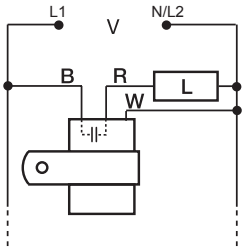
V = Voltage
L = Load

FIGURE 5 - FS300 Series



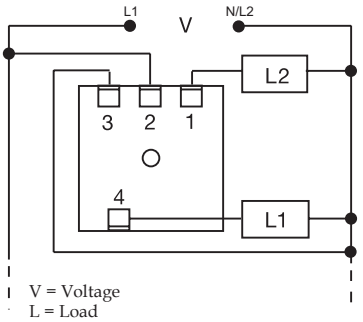
V = Voltage
L = Load
Note: Load may be in positive side.

FIGURE 6 - FS400 Series



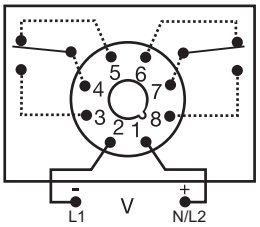
V = Voltage
L = Load
R = Red Wire
B = Black Wire
W= White Wire

FIGURE 7 - AF Series



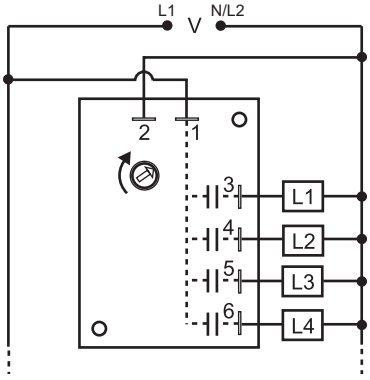
V = Voltage
L = Load

FIGURE 8 - FS500 Series



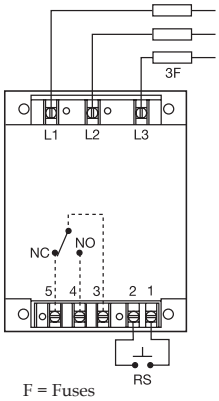
V = Voltage

FIGURE 9 - SC3/SC4 Series



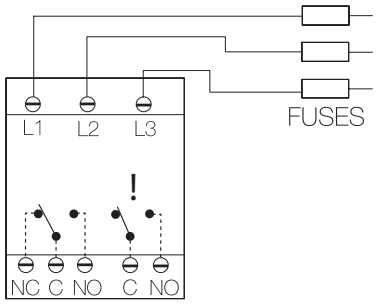
SC4 shown;
for SC3, terminal 6 & load L4 are eliminated.

FIGURE 10 - WVM Series



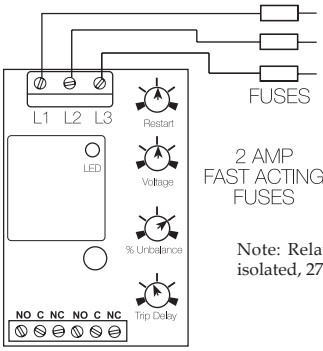
F = Fuses
NO = Normally Open
NC = Normally Closed
RS = Optional Remote Reset Switch
Relay contacts are isolated.
CAUTION:
2 amp max fast acting fuses must be installed externally in series with each input. (3)

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

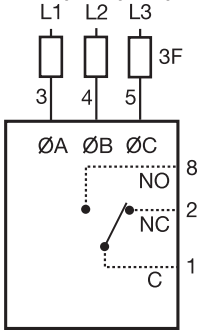


2 AMP
FAST ACTING
FUSES

Note: Relay contacts are isolated, 277VAC max.

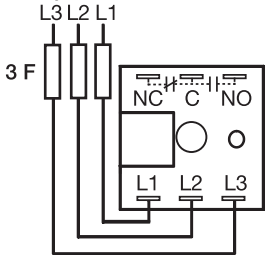
L1, L2, L3 = Line Voltage Input
NO = Normally Open Contact
NC = Normally Closed Contact
C = Common, Transfer Contact
CAUTION: 2 amp max. fast acting fuses are recommended to protect the equipment's wiring. They are not required to protect the HLMU.

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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