



The DLMU Series is a universal voltage, 3-phase voltage monitor. It continuously measures the voltage of each of the three phases with microcontroller accuracy and compares the value to preset trip points. It separately senses phase reversal and loss; over, under and unbalanced voltages; and over or under frequency. Protection is assured during periods of large average voltage fluctuations or when regenerated voltages are present. The unit trips within 200ms when phase loss is detected. Adjustable time delays are included to prevent nuisance tripping and short cycling of sensitive equipment. The isolated, 10A, SPDT and 2A alarm output relay contacts for the trip delay. Nominal line voltage, voltage unbalance, and time delays are knob adjustable. The phase loss setpoint and the acceptable frequency range are fixed. Both delta and wye systems can be monitored; no connection to neutral is required.

For more information see:
Appendix B, page 166, Figure 16 for dimensional drawing.
Appendix C, page 168, Figure 11 for connection diagram.

Operation

Upon application of line voltage, the output is de-energized and the restart delay begins. If all the 3-phase voltages are within the acceptable range, the output energizes at the end of the restart delay. The microcontroller circuitry automatically senses the voltage range, and selects the correct operating frequency (50 or 60Hz). The over and undervoltage trip points are set automatically. When the measured value of any phase voltage exceeds the acceptable range limits (lower or upper) the trip delay begins. At the end of the trip delay the output relay de-energizes. If the phase voltage returns to an acceptable value before the trip delay expires, the trip delay is reset and the output remains energized. Under, over, and unbalanced voltages plus over or under frequency must be sensed for the complete trip delay before the unit trips. The unit trips in 200ms when phase loss or reversal are sensed. The unit will not energize if a fault is sensed as the line voltage is applied. Reset: Reset is automatic upon correction of the voltage or frequency fault or phase sequence.

Restart Delay Options:

L= Lockout or minimum OFF time. The restart delay begins when the output trips. The unit cannot be re-energized until the restart delay is complete. This provides a minimum off time or lockout time to allow equipment sensitive to short cycling, time to reset. If the fault is corrected after the restart delay is complete the output energizes immediately. The restart delay also occurs when line voltage is applied/reapplied.

R= Restart Delay on fault correction. The restart delay begins when line voltage is reapplied or when a voltage fault is corrected. This option is normally selected when staggered restarting of multiple motors on a power system is required.

N= No Restart Delay. 0.6 second initialization delay on application of line voltage applies.

Restart Notes:

All restart options remain reset when the following conditions are detected:

- 1.) Phase loss (phase unbalance greater than 25%)
 - 2.) Average line voltage less than 120VAC
 - 3.) Phase reversal
- The restart delay begins when the condition is corrected.

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 a fault is sensed during the restart delay, the LED will glow red during that portion or the full restart delay.

Order Table:

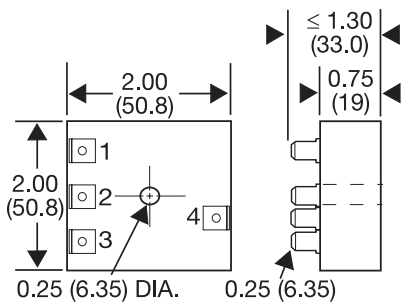
DLM	X	X	X	X	X	X
	Line Voltage	Output	Restart Function	Voltage Unbalance	Trip Delay	Restart Delay
	-U - 200-480VAC	-B - SPDT & NO	-L - Lockout, min off time	-A - Adjustable 2-10%	-A - Adjustable 1-30s	-A* - Adjustable 0.6-300s
	-H - 500-600VAC	-C - SPDT & NC	-R - Staggered restarting	-Fixed - Specify unbalance	-Fixed - Specify delay	-N - No Restart Delay
			-N - No Restart Delay	2-10% in 1% increments	1-30s in 1s increments,	* Selection "A" is only available
				using two digits [04]	using two digits [20]	for L or R Restart Functions

Specifications

Line Voltage	3-phase delta or wye with no connection to neutral			Restart Delay	Range Adjustable from 0.6 - 300s; if no restart delay is selected a 0.6s initialization delay applies	
Type				Tolerance	± 15%	
Operating Voltage	Range	Voltage Adj.Range	Line Frequency	Line Voltage Max.	Over/Under Frequency	±4%; Reset ±3%; 50/60 Hz
200-480VAC	240	200-240VAC	50/60Hz		Phase Sequence	A, B, C, L1, L2, L3
	380	340-420VAC	50Hz		Response Time -Phase Reversal & Phase Loss.	≤200 ms
	480	400-480VAC	60Hz	550VAC	Reset	Automatic
600VAC	600	500-600VAC	50/60Hz	600VAC	Output	
AC Line Frequency50/60 Hz automatically detected			Type	Isolated Electromechanical Relay	
Phase Loss	≥ 25% unbalance			Rating	10A resistive @ 240VAC; 8A resistive @ 277VAC;	
Response Time	≤200ms			NO-1/4 hp @ 120VAC; 1/3 hp @ 240VAC		
Undervoltage & Voltage Unbalance				Life	Mechanical - 1 x 10 ⁶ ; Electrical - 1 x 30 ³	
Type	Voltage detection with delayed trip & automatic reset			Protection		
Overvoltage	Trip Voltage	109 - 113% of the adjusted line voltage		Surge	IEEE C62.41-1991 Level B	
	Reset Voltage	≅ -3% of the trip voltage		Isolation Voltage	≥ 2500V RMS input to output	
Undervoltage	Trip Voltage	88 - 92% of the adjusted line voltage		Mechanical		
	Reset Voltage	≅ +3% of the trip voltage		Mounting	Surface mount with 2 #8 (M4 x 0.7) screw or snap on 35mm DIN Rail	
Voltage Unbalance	Adjustable 2 - 10% or specify fixed unbalance of 2 - 10% in 1% increments			Note: 0.25 in.(6.35 mm) spacing between units or other devices is required		
	Reset on balance	≅ -0.7% unbalance		Dimensions	4.33 x 2.95 x 1.97 in. (110 x 75 x 50 mm)	
Trip Delay	Active On	Over/undervoltage, voltage unbalance, over/ under frequency		Termination	Screw terminals with captive wire clamps for up to #14 AWG (2.5 mm ²) wire	
	Range	Adjustable from 1 - 30s or specify fixed delay 1 - 30s in 1s increments		Environmental		
	Tolerance	± 15%		Operating / Storage Temperature	-40° to 60°C / -40° to 85°C	
				Humidity	95% relative, non-condensing	
				Weight	≅ 8.6 oz (244 g)	

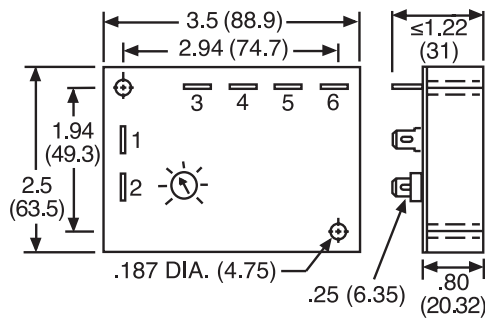
Appendix B - Dimensional Drawings

FIGURE 13



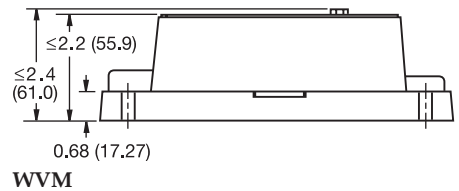
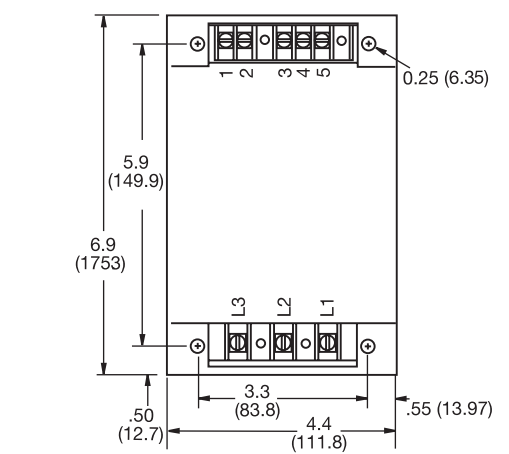
AF

FIGURE 14



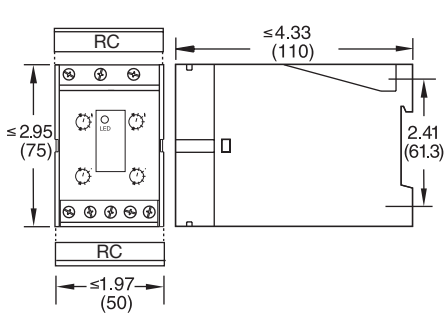
SC3; SC4; SQ

FIGURE 15



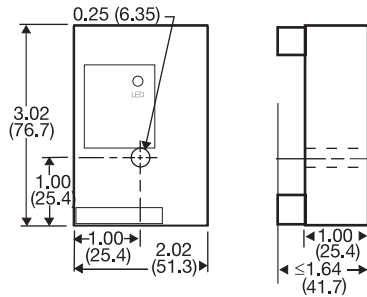
WVM

FIGURE 16



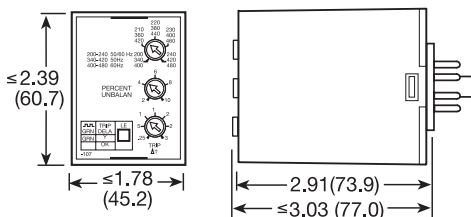
DLMU

FIGURE 17



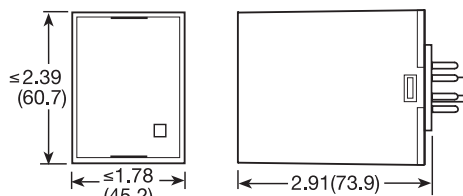
FB9L; HLMU; SCR9L

FIGURE 18



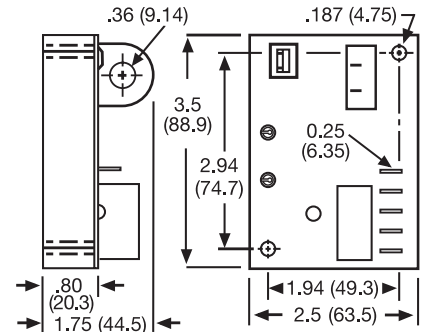
PLMU

FIGURE 19



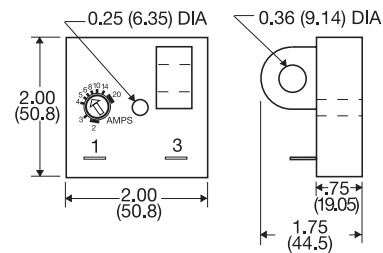
LLC4; LLC6; PLS

FIGURE 20



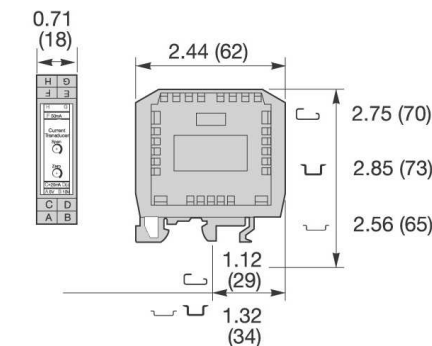
ECS; ECSW (ECS has spade connectors and ECSW has terminal board)

FIGURE 21



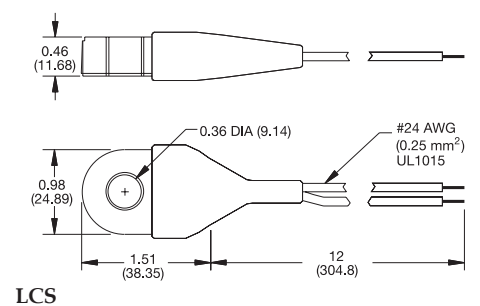
TCS; TCSA

FIGURE 22



DCSA

FIGURE 23



LCS

inches (millimeters)

Appendix C - Connection Diagrams

FIGURE 1 - FSU1000 Series

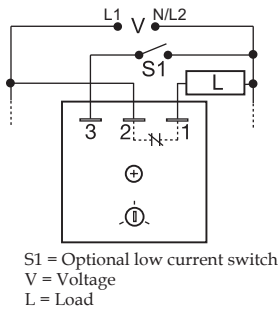


FIGURE 2 - FS100 Series

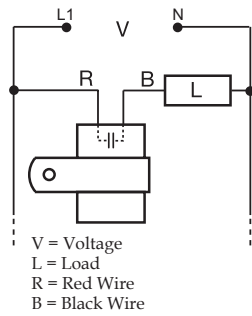


FIGURE 3 - FS100 Series

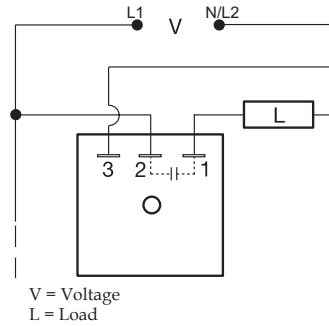


FIGURE 4 - FS200 Series

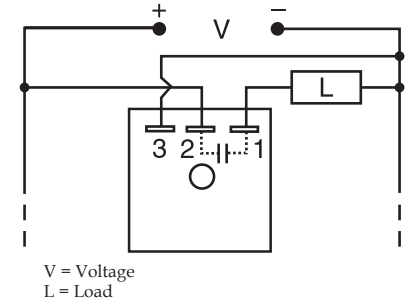


FIGURE 5 - FS300 Series

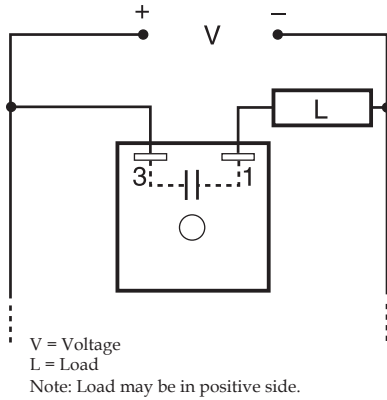


FIGURE 6 - FS400 Series

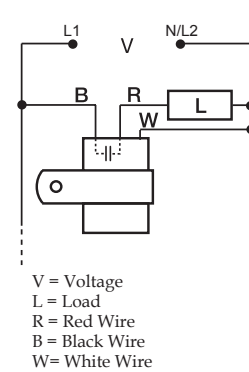


FIGURE 7 - AF Series

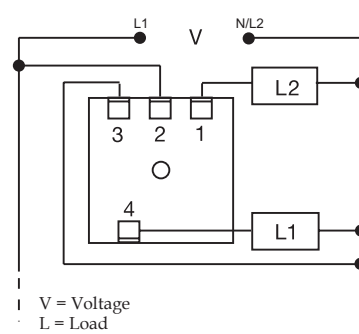


FIGURE 8 - FS500 Series

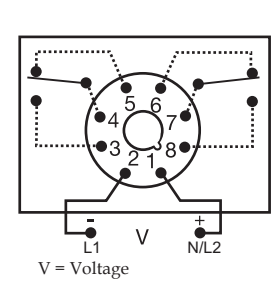


FIGURE 9 - SC3/SC4 Series

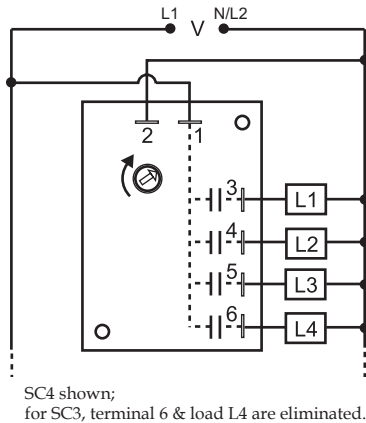


FIGURE 10 - WVM Series

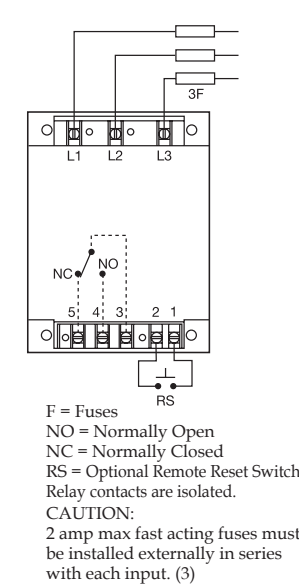


FIGURE 11 - DLMU Series

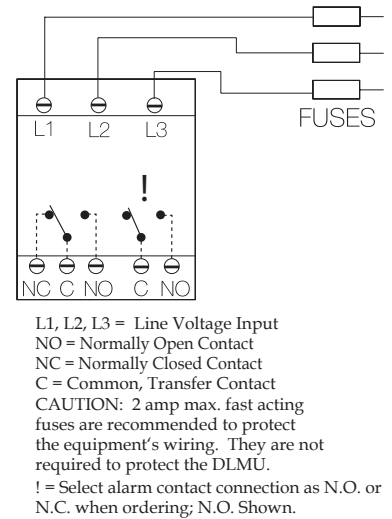


FIGURE 12 - HLMU Series

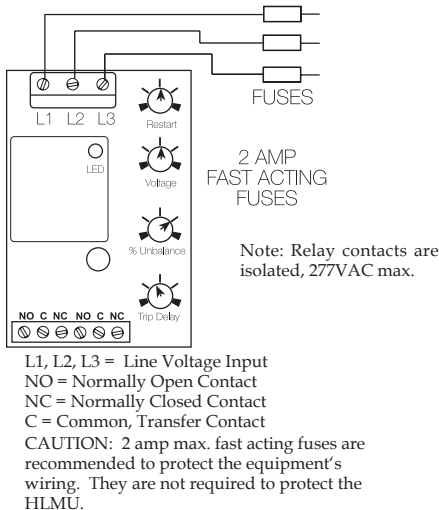


FIGURE 13 - PLMU/PLM/PLR/PLS Series

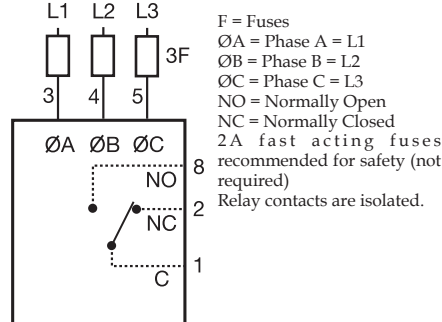


FIGURE 14 - TVM/TVW Series

