

# Universal 3 Phase Voltage Monitor DLMU Series (SPDT & N.O. or N.C.) Motor Protector



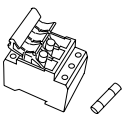
ANSI Device #27/47/59



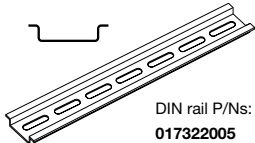
- Protects Against: Phase Loss, Phase Reversal, Over, Under and Unbalanced Voltages, Over/Under Frequency
- 35 mm DIN Rail or Surface Mounting
- SPDT Isolated 10A Relay Contact
- N.O. or N.C. SPST Isolated 2A Relay Contact
- LED Indicates: Relay, Faults, & Time Delays
- Universal Line Voltage 240 ... 480 V AC in One Unit
- 600 V AC Version Available
- 3 Wire Connection for Delta or Wye Systems
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Approvals:

### Accessories



3-phase fuse block/disconnect  
P/N: **FH3P**  
2 Amp Fuse  
P/N: **PO600-11**



DIN rail P/Ns:  
**017322005**

See accessory pages for specifications.

### Description

Preliminary Data Sheet - Available 1st Quarter 2008

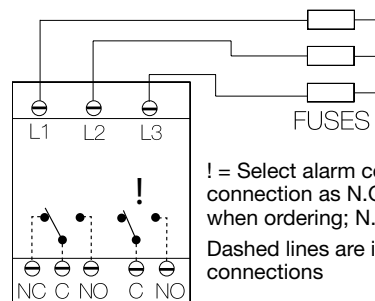
The DLMU Series is a universal voltage, 3 Phase Voltage Monitor. It continuously measures the voltage of each of the three phases with microcontroller accuracy and compares the value to preset trip points. It separately senses Phase Reversal, Over, Under and Unbalanced voltages including Phase Loss and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

### Operation

Upon application of line voltage, the output is de-energized and the restart delay begins. If all the three 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 under voltage 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 200 ms 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.

### Connection



! = Select alarm contact connection as N.O. or N.C. when ordering; N.O. Shown.  
Dashed lines are internal connections

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.

### 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.

### LED Flashing Table

Trip Delay	Red	ON/OFF	120 FPM
Restart Delay	Green	ON/OFF	60 FPM
Phase Reversal	Red/Green	Alternate	120 FPM

FPM = Flashes per minute

### Ordering Table

DLM Series	X Line Voltage	X Output	X Restart Function	X Voltage Unbalance	X Trip Delay	X Restart Delay
	-U - 200... 480 V AC -H - 500... 600 V AC	-B - SPDT & N.O. -C - SPDT & N.C.	-L - Lockout, Min Off Time -R - Staggered Restarting -N - No Restart Delay	-A - Adjustable 2 ... 10% Fixed: Specify Unbalance 2...10% in 1% increments using two digits [ 04 ]	-A - Adjustable 1...30s Fixed: Specify delay 1... 30 s in 1 s increments, using two digits [ 20 ]	-A - Adjustable* 0.6 ...300 s -N - No Restart Delay

### Example P/N:

- DLMUBLAAA** = 200 ... 480 V, SPDT & N.O., Lockout Function Delay, Adjustable Unbalance, Trip and Restart Delay
- DLMUBRAAA** = 200 ... 480 V, SPDT & N.O., Restart Delay on fault correction, Adjustable Unbalance, Trip and Restart Delay
- DLMUCNAAN** = 200 ... 480 V, SPDT & N.C., No Restart Delay, Adjustable Unbalance and Trip Delay
- DLMUCL0420A** = 200 ... 480 V, SPDT & N.C., Lockout Function, 4% Unbalance, 20 s Trip Delay, Adjustable Restart Delay

**Note:** \* Selection "A" is only available for L or R restart functions

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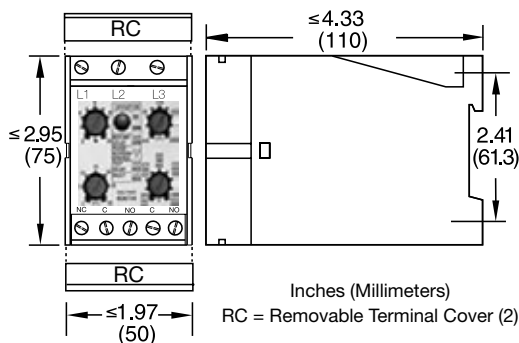
Voltage  
Monitors

## Technical Data

<b>Line Voltage</b>			3 phase Delta or Wye with no connection to neutral
Type			
Operating Voltage	200 ... 480 V AC	<b>Range</b>	<b>Voltage Adjustment Range</b>
		240	200 ... 240 V AC
		380	340 ... 420 V AC
		480	400 ... 480 V AC
	600 V AC	600	500 ... 600 V AC
Line Frequency			<b>Line Frequency</b>
<b>Phase Loss</b>			<b>Line Voltage Max.</b>
Response Time			50 or 60 Hz
			50 Hz
			60 Hz
			50 or 60 Hz
			550 V AC
			600 V AC
<b>Undervoltage and Voltage Unbalance</b>			
Type			Voltage detection with delayed trip & automatic reset
Overvoltage:	Trip Voltage		109 to 113% of the adjusted line voltage
	Reset Voltage		≅ -3% of the trip voltage
Undervoltage:	Trip Voltage		88 ... 92% of the adjusted line voltage
	Reset Voltage		≅ +3% of the trip voltage
Voltage Unbalance:	Trip Set Point		Adjustable 2 ... 10%; or specify fixed unbalance of 2 ... 10% in 1% increments
	Reset on Balance		≅ -0.7% Unbalance
Trip Delay	Active On		Over/Undervoltage, Voltage Unbalance, Over/Under Frequency
	Range		Adjustable from 1 ... 30 s; or specify fixed delay 1 ... 30 s in 1 s increments
	Tolerance		± 15%
Restart Delay	Range		Adjustable from 0.6 ... 300 s; if no restart delay is selected a 0.6 s initialization delay applies
	Tolerance		± 15%
Over/Under Frequency	Trip / Reset		±4%; Reset ±3%; 50 or 60 Hz
Phase Sequence			A, B, C, L1, L2, L3
Response Time -Phase Reversal & Phase Loss			≤200 ms
Reset			Automatic
<b>Output</b>			
Type			Isolated Electromechanical Relay
Control Contact	Form		Single pole double throw (SPDT) (1 c/o)
	Rating		10 A resistive at 240 V AC; 8 A resistive at 277 V AC; N.O.-1/4 hp at 120 V AC; 1/3 hp at 240 V AC
Alarm Contact	Form		N.O. or N.C. SPST (selected in part number)
	Rating		2 A resistive at 240 V AC
Life			Mechanical -- 1 x 10 <sup>6</sup> Electrical -- 1 x 30 <sup>3</sup>
<b>Protection</b>			
Surge			IEEE C62.41-1991 Level B
Isolation Voltage			≥ 2500 V RMS input to output
<b>Mechanical</b>			
Mounting			Surface mount with 2 #8 (M4 x 0.7) screw or snap on 35mm DIN Rail
Package			Note: 0.25 in.(6.35 mm) spacing between units or other devices is required
Termination			4.33 x 2.95 x 1.97 in. (110 x 75 x 50 mm)
			Screw terminals with captive wire clamps for up to #14 AWG (2.5 mm <sup>2</sup> ) wire
			IP 20 Touch Proof with removable covers installed
<b>Environmental</b>			
Operating Temperature			-40°C ... +60°C
Storage Temperature			-40°C ... +85°C
Humidity			95% relative, non-condensing
Weight			≅ 8.6 oz (244 g)

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### Mechanical View



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