

# Universal 3 Phase Voltage Monitor

## DLMU & DLMH Series (SPDT & N.O. or N.C.)

### Motor Protector



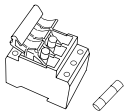
ANSI Device #27/47/59



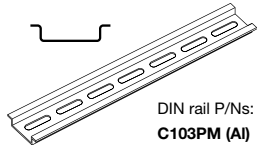
- Protects Against: Phase Loss, Phase Reversal, Over, Under and Unbalanced Voltages, Over/Under Frequency
- 35 mm DIN Rail or Surface Mounting
- SPDT Isolated 10A Relay Contact
- N.O. or N.C. SPST Isolated 2A Relay Contact
- LED Indicates: Relay, Faults, & Time Delays
- Universal Line Voltage 240 ... 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: **P0600-11**



DIN rail P/Ns:  
**C103PM (AI)**

See accessory pages for specifications.

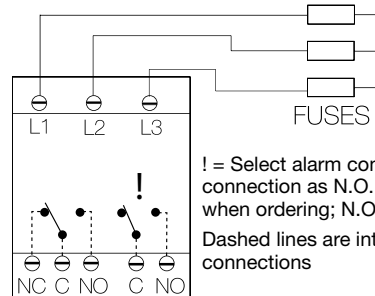
#### Description

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.

#### Available Models-

DLMUBLAAA  
DLMHBRAAA

•DLMUBNAAN

•DLMUBRAAA

**Don't see what you need? Call us for a minimum quantity and price quote!**

#### 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

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

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

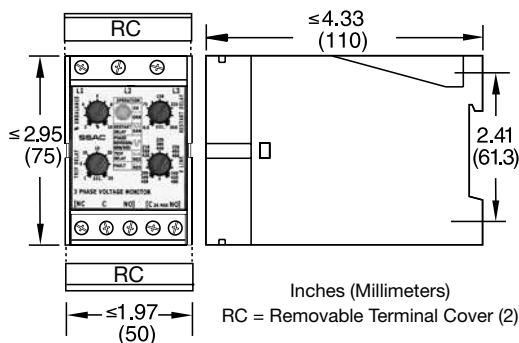
Voltage  
Monitors

## Technical Data

<b>Line Voltage</b>		3 phase Delta or Wye with no connection to neutral	<b>Range</b>	<b>Voltage Adjustment Range</b>	<b>Line Frequency</b>	<b>Line Voltage Max.</b>
Type						
Operating Voltage	200 ... 480 V AC					
	600 V AC					
Line Frequency	50 or 60 Hz Automatically detected					
<b>Phase Loss</b>		≥ 25% Unbalance				
	Response Time	≤ 200ms				
<b>Undervoltage and Voltage Unbalance</b>		Voltage detection with delayed trip & automatic reset				
Type		109 to 113% of the adjusted line voltage				
Overvoltage:	Trip Voltage	≅ -3% of the trip voltage				
	Reset 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>		Isolated Electromechanical Relay				
Type		Single pole double throw (SPDT) (1 c/o)				
Control Contact	Form	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				
	Rating					
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>		IEEE C62.41-1991 Level B				
Surge		≥ 2500 V RMS input to output				
Isolation Voltage						
<b>Mechanical</b>		Surface mount with 2 #8 (M4 x 0.7) screw or snap on 35mm DIN Rail				
Mounting		Note: 0.25 in.(6.35 mm) spacing between units or other devices is required				
Package		4.33 x 2.95 x 1.97 in. (110 x 75 x 50 mm)				
Termination		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>		-40°C ... +60°C				
Operating Temperature		-40°C ... +85°C				
Storage Temperature		95% relative, non-condensing				
Humidity		≅ 8.6 oz (244 g)				
Weight						

7

## Mechanical View



DLMU2BOP

09.10