

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 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 setpoint and the acceptable frequency range are fixed. Both delta and wve 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.

# **Features:**

- · Protects against phase & reversal; over, under & unbalanced voltages; & over & under frequency
- 35mm DIN rail or surface mounting
- Isolated, 10A, relay contacts
- Isolated, 2A, NO or NC, SPST relay contact
- · LED indicates relay, faults, & time delays
- Universal line voltage 240 to 480VAC
- 600VAC 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: ( cultusted

# **Auxiliary Products:**

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

# **Available Models:**

DLMHBRAAA DLMUBNAAN DLMUBRAAA

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

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.

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)

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.

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** 

Line Voltage -**U** - 200-480ŬAC **└H** - 500-600VAC Output **-B** - ŜPDT & NO -C - SPDT & NC

Restart Function

-L - Lockout, min off time -R - Staggered restarting -N - No Restart Delay

Voltage Unbalance -**A** - Adjustable 2-10% -Fixed - Specify unbalance 2-10% in 1% increments using two digits [04]

Trip Delay ·A - Adjustable 1-30s Fixed - Specify delay 1-30s in 1s increments, using two digits [20]

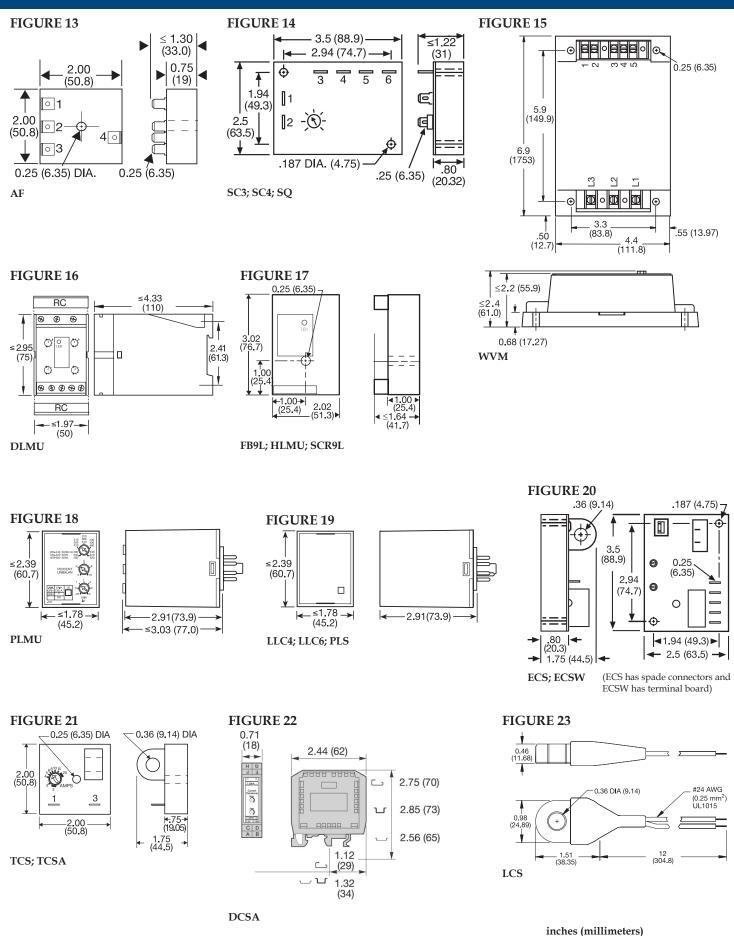
Restart Delay -**A\*** - Adjustable 0.6-300s └N - No Ŕestart Delay Selection "A" is only available for L or R Restart Functions

# **Specifications**

ge				
	3-phase delta o	r wye with no con:	nection to neutral	
Voltage	_	•		
C Range	Voltage Adj.Range	Line Frequency	Line Voltage Max.	
240	200-240VAC	50/60Hz	_	
380	340-420VAC	50Hz		
480	400-480VAC	60Hz	550VAC	
600	500-600VAC	50/60Hz	600VAC	
AC Line Frequency				
Phase Loss ≥ 25% unbalance				
Response Time ≤200ms				
Undervoltage & Voltage Unbalance				
Type				
Overvoltage TripVoltage109 - 113% of the adjusted line voltage				
Reset Voltage ≅ -3% of the trip voltage				
Undervoltage Trip Voltage 88 - 92% of the adjusted line voltage				
Reset Volta	ge≅ +3% of the tri	p voltage		
Voltage UnbalanceAdjustable 2 - 10% or specify fixed unbalance of 2 - 10%				
	in 1% incremen	its		
Reset on balar	nce≅ -0.7% unbalar	nce		
Active On	Over/undervol	ltage, voltage unba	alance, over/under freq	
Range	Adjustable from	n 1 - 30s or specify	fixed delay 1 - 30s in 1s	
	increments			
Tolerance	± 15%			
	Voltage C Range 240 380 480 600 equency Time uge & Voltage U Exercise Trip Voltage Reset Voltage			

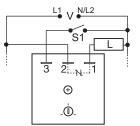
	, , , , , , , , , , , , , , , , , , , ,			
	selected a 0.6s initialization delay applies			
Tolerance± 15%				
	Over/Under Frequency ±4%; Reset ±3%; 50/60 Hz			
	Phase Sequence			
	Response Time -Phase Reversal & Phase Loss ≤200 ms			
	ResetAutomatic			
	Output			
	TypeIsolated Electromechanical Relay			
	Rating			
	NO-1/4 hp @ 120VAC; 1/3 hp @ 240VAC			
	Life			
	Protection			
	Surge			
	Isolation Voltage ≥ 2500V RMS input to output			
	Mechanical			
	Mounting Surface mount with 2 #8 (M4 x 0.7) screw or snap on			
	35mm DIN Rail			
	Note: 0.25 in.(6.35 mm) spacing between units or other devices is required			
	Dimensions			
y	Termination Screw terminals with captive wire clamps for up to			
	#14 AWG (2.5 mm²) wire			
	Environmental			
	Operating / Storage Temperature40° to 60°C / -40° to 85°C			
	Humidity95% relative, non-condensing			
	Weight			

# Appendix B - Dimensional Drawings



# Appendix C - Connection Diagrams

# FIGURE 1 - FSU1000 Series



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

LIJ. 0 V = Voltage L = LoadR = Red Wire

FIGURE 2 - FS100 Series

FIGURE 3 - FS100 Series

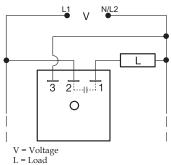


FIGURE 4 - FS200 Series

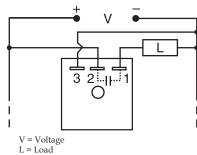
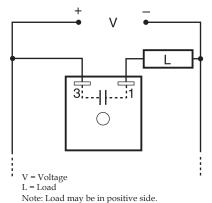
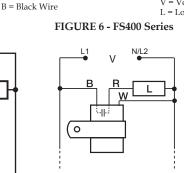


FIGURE 5 - FS300 Series





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

L2 2 3 0

FIGURE 7 - AF Series

V = Voltage L = Load

FIGURE 8 - FS500 Series

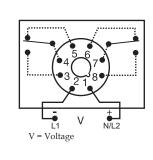
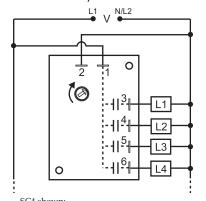


FIGURE 11 - DLMU Series

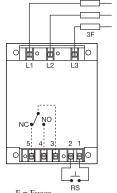
L1

# FIGURE 9 - SC3/SC4 Series



for SC3, terminal 6 & load L4 are eliminated.

# FIGURE 10 - WVM Series

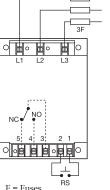


F = Fuses

NC = Normally Closed Relay contacts are isolated.

CAÚTION:

be installed externally in series with each input. (3)



NO = Normally Open

RS = Optional Remote Reset Switch

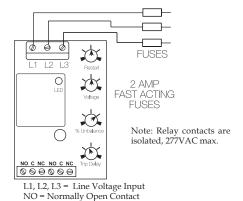
2 amp max fast acting fuses must

# $\Theta$

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.

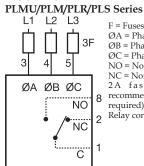
L1, L2, L3 = Line Voltage Input

# FIGURE 12 - HLMU Series



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.

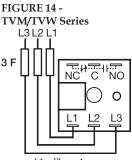
# FIGURE 13 -



F = Fuses  $\emptyset$ A = Phase A = L1  $\emptyset$ B = Phase B = L2  $\emptyset$ C = Phase C = L3 NO = Normally Open

NC = Normally Closed 2A fast acting fuses recommended for safety (not required)

Relay contacts are isolated.



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