

# HLMU SERIES



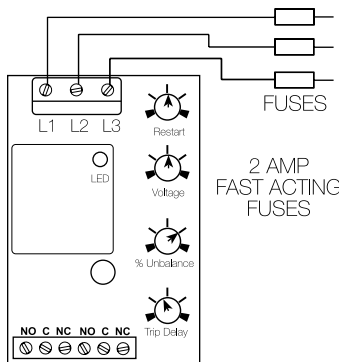
## Description

The HLMU Series is a universal voltage, encapsulated, 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, DPDT 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 wye systems can be monitored; no connection to neutral is required.

## Features & Benefits

FEATURES	BENEFITS
<b>Proprietary microcontroller based circuitry</b>	Constant monitoring to protect against phase loss, phase reversal; over, under, and unbalanced voltage; over and under frequency
<b>Universal line voltage range</b>	Flexibility to work in 200 to 480VAC applications
<b>DIN rail (35mm) or surface mounting</b>	Installation flexibility
<b>LED indication</b>	Provides diagnostics of relay, fault and time delay status
<b>Encapsulated</b>	Protects against shock, vibration, and humidity
<b>Finger-safe terminal blocks</b>	Meets IEC 61000 safety requirements

## Wiring Diagram



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.

**NOTE:** Relay contacts are isolated, 277VAC max.

## 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 at  $\pm 10\%$  of the adjusted line voltage. 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,

## Ordering Information

MODEL	OUTPUT	RESTART FUNCTION	VOLTAGE UNBALANCE	TRIP DELAY	RESTART DELAY
HLMUDLAAA	DPDT	Lockout, min off time	Adjust. 2 - 10%	Adjust. 1 - 30s	Adjust. 0.6 - 300s
HLMUDN0405N	DPDT	No restart delay	Fixed, 4%	Fixed, 5s	None
HLMUDNAAA	DPDT	No restart delay	Adjust. 2 - 10%	Adjust. 1 - 30s	None
HLMUDRAAAA	DPDT	Staggered restart	Adjust. 2 - 10%	Adjust. 1 - 30s	Adjust. 0.6 - 300s

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# HLMU SERIES

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.

## Accessories



**LPSM003ZXID (Indicating), LPSM003Z (Non-indicating) Fuse Holders**  
Littelfuse POWR-SAFE Dead Front holders provide optimum protection to personnel for Class CC and Midget-Style fuses. 600 VAC/DC



**OKLK002.T Midget Fuse (2 Amp)**  
10 x 38 fast acting, high-interrupting capacity, current-limiting type fuse. 600 VAC/500 VDC



**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## Specifications

### Line Voltage

**Type** 3-phase delta or wye with no connection to neutral

### Operating Voltage

**200 - 480VAC**

Range	Voltage Adj. Range	Frequency
240	200-240VAC	50 or 60Hz
380	340-420VAC	50Hz
480	400-480VAC	60Hz

### Line Voltage Max.

550VAC

### AC Line Frequency

50/60 Hz automatically detected

### Phase Loss

≥ 25% unbalance

### Response Time

≤200ms

### Undervoltage & Voltage Unbalance Type

Voltage detection with delayed trip & automatic reset

### Overvoltage

#### Trip Voltage

109 - 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 Setpoint

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 - 30s or specify fixed delay 1 - 30s in 1s increments  
± 15%

### Tolerance

#### Restart Delay

#### Range

Adjustable from 0.6 - 300s; if no restart delay is selected a 0.6s initialization delay applies

#### Tolerance

± 15%

### Over/Under Frequency

#### Phase Sequence

±4%; Reset ±3%; 50/60 Hz

### Response Time-Phase

#### Reversal & Phase Loss

≤200 ms

### Reset

Automatic

### Output

#### Type

Isolated Electromechanical Relay

#### Form

DPDT

#### Rating

10A resistive @ 240VAC;  
8A resistive @ 277VAC; NO-1/4 hp @ 120VAC;  
1/3 hp @ 240VAC

### Life

Mechanical - 1 x 10<sup>6</sup>  
Electrical (at 10A) - DPDT - 1 x 30<sup>3</sup>

### Protection

#### Phase Reversal/Failure

ASME A17.1 Rule 210.6

#### Motors and Generators

NEMA MG1 14:30, 14:35

#### Surge

IEEE C62.41-1991 Level B

#### Isolation Voltage

≥ 2500V RMS input to output

#### Circuitry

Encapsulated

### Mechanical

#### Mounting

Surface mount with one #10 (M5 x 0.7) screw  
*Note: 0.25 in. (6.35 mm) spacing between units or other devices is required*

### Dimensions

**H** 76.7 mm (3.0"); **W** 50.8 mm (2.0");

**D** 41.7 mm (1.64")

### Termination

Screw terminal connection up to 12 AWG (3.3 mm<sup>2</sup>) wire

### Environmental

#### Operating/Storage

#### Temperature

-40° to 60°C / -40° to 85°C

#### Humidity

95% relative, non-condensing

#### Weight

≅ 3.9 oz (111 g)