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Voltage Monitors & Phase Monitors



The WVM Series provides protection against premature equipment (motor) failure caused by voltage faults on the 3-phase line. The WVM's microcontroller design provides reliable protection even if regenerated voltages are present. It combines dependable fault sensing with a 10 fault memory and a 6 LED status display. Part instrument, part control, the WVM protects your equipment when you're not there and displays what happened when you return. The WVM is fully adjustable and includes time delays to prevent nuisance tripping and improve system operation. Time delays include a 0.25 to 30s adjustable trip delay, an adjustable 0.25 to 64m (in 3 ranges) restart delay, plus a unique 3 to 15s true random start delay. The random start delay prevents voltage sags caused by simultaneous restarting of numerous motor loads after a power outage.

For more information see:

Appendix B, page 166, Figure 15 for dimensional drawing.

Appendix C, page 168, Figure 10 for connection diagram.

Operation

The output relay is energized when all conditions are acceptable and the WVM is reset. A restart and/or random start delay may occur before the output relay is energized.

Field Adjustment: Select the line voltage listed on the motor's name plate. This automatically sets the over and undervoltage trip points. No further adjustment should be required to achieve maximum equipment protection.

Read Memory: Fault(s) stored in the memory are indicated when the yellow LED is flashing, up to 10 faults are noted.

Memory Reset: To clear the memory of all faults stored, rotate selector to Clear Memory for 5 seconds. The yellow LED will turn off.

Memory Overload: Only the 10 most recent faults are retained.

Random Start Delay: A new 3 to 15s random start delay is selected by the microcontroller when a fault is corrected and when the operating voltage (L1, L2, L3) is applied to the WVM. A random start delay does not occur when the reset is manual.

Automatic Restart: Upon fault correction, the output will re-energize after a random start delay.

Automatic Restart Upon Fault Trip: When a fault is sensed for the full trip delay, the output de-energizes and a restart delay is initiated. This delay locks out the output for the delay period. Should the fault be corrected by the end of the restart delay, the output will re-energize after a random start delay. A restart delay will also occur when operating voltage (L1, L2, L3) is applied to the WVM.

Manual Reset: After a fault condition is corrected, the WVM can be manually reset. There are two methods; a customer supplied remote switch, or the onboard selector switch.

Manual Reset (Onboard): Rotate selector switch from the Manual Reset position to Auto Restart w/ Delay then back again to Manual Reset within 3 seconds. The output will immediately energize.

Remote Reset: Reset (Restart) is accomplished by a momentary contact closure across terminals 1 & 2. The output will immediately energize. Remote switch requirements are $\geq 10\text{mA}$ @ 20VDC and the reset terminals are not isolated from line voltage. A resistance of $\leq 20\text{K}\Omega$ across terminals 1 & 2 will cause immediate automatic restart.

Automatic Restart Upon Fault Correction: (P/N includes an R)

When a fault is sensed for the full trip delay, the output relay de-energizes. Upon correction of the fault, a restart delay begins. At the end of this delay, the output will re-energize after a random start delay. If a fault occurs during restart timing, the restart time delay will be reset to zero, and the output will not energize until the restart delay is completed.

Features:

- Protects against phase loss & reversal; over, under & unbalanced voltages; & short cycling
- 10 fault memory & status displayed on 6 LED readout
- Switch selectable automatic restart, delayed automatic restart, & manual reset
- Isolated, 10A, SPDT output contacts
- ASME A17.1 Rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Approvals:   

Auxiliary Products:

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

Available Models:

WVM011AL	WVM911AL
WVM611AH	WVM911AL-60
WVM611AL	WVM911RL
WVM811AH	WVM911RN-60
WVM911AH	

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

Order Table:

WVM	X	3-Phase Line Voltage	X	Unbalance	X	Trip Delay	X	Reset Method	X	Restart Delay
		-6 - 200-240VAC		-1 - 2-10%		-1 - 0.25-30s		-A - Switch Selectable: Automatic restart upon fault trip		-L - 0.25-64s
		-8 - 355-425VAC						-R - Switch Selectable: Automatic restart upon fault correction		-N - 6-300s
		-9 - 400-480VAC								-H - 0.25-64m
		-0 - 500-600VAC								

-60 Option: Add the suffix -60 to any automatic restart part number to remove the random start delay feature.

Specifications

Line Voltage		
Type	3-phase delta or wye with no connection to neutral	
Operating Voltage	Model	Adj. Line Voltage Range
	240	200-240VAC
	380	355-425VAC
	480	400-480VAC
	600	500-600VAC
AC Line Frequency	50/60 Hz	
Overvoltage, Undervoltage, & Voltage Unbalance		
Overvoltage Trip Point	109-113% of adjusted voltage	
Reset Voltage	-2% of trip point	
Undervoltage Trip Point	88-92% of adjusted voltage	
Reset Voltage	+2% of trip point	
Voltage Unbalance	Adjustable from 2-10%*	
Trip Delay	Adjustable from 0.25 - 30s $\pm 15\%$	
Phase Loss	$\geq 15\%$ unbalance	
Response Time	≤ 200 ms	
Random Start Delay Range	3 - 15s	
Reset (Restart) Delay		
Low Range	0.25-64s $\pm 15\%$	
Normal Range	6-300s $\pm 15\%$	
High Range	0.25-64m $\pm 15\%$	

Fault Memory	
Type	Nonvolatile RAM
Capacity	Stores last 10 faults
Status Indicators	6 LEDs provide existing status & memory readout
Note: 50% of operating line voltage must be applied to L1 & L2 for operation of status indicators	
Output	
Type	Electromechanical relay
Form	Isolated, SPDT
Rating	10A resistive @ 250VAC; 6A inductive (0.4 PF) @ 250VAC
Life	Mechanical - 1×10^7
Protection	
Surge	IEEE 62.41-1991 Level B
Isolation Voltage	$\geq 2500\text{V}$ RMS input to output
Mechanical	
Mounting	Surface with 2 or 4 #8 (M4 x 0.7) screws
Dimensions	6.9 x 4.4 x 2.4 in. (175.3 x 111.8 x 61.0 mm)
Termination	Screw terminals with captive wire clamps for up to #12 AWG (3.2 mm ²) wire
Environmental	
Operating / Storage Temperature	-40° to 65°C / -40° to 85°C
Weight	≈ 25 oz (709 g)

* Unbalance reset is 90% of the unbalance setting (i.e. VUB at 5% reset is 4.5%)



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 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:

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

<p>Line Voltage</p> <p>Type 3-phase delta or wye with no connection to neutral</p> <p>Operating Voltage</p> <table border="0"> <tr> <td>200-480VAC</td> <td>Range</td> <td>Voltage Adj.Range</td> <td>Line Frequency</td> <td>Line Voltage Max.</td> </tr> <tr> <td>240</td> <td></td> <td>200-240VAC</td> <td>50/60Hz</td> <td></td> </tr> <tr> <td>380</td> <td></td> <td>340-420VAC</td> <td>50Hz</td> <td></td> </tr> <tr> <td>480</td> <td></td> <td>400-480VAC</td> <td>60Hz</td> <td>550VAC</td> </tr> <tr> <td>600VAC</td> <td></td> <td>500-600VAC</td> <td>50/60Hz</td> <td>600VAC</td> </tr> </table> <p>AC Line Frequency 50/60 Hz automatically detected</p> <p>Phase Loss $\geq 25\%$ unbalance</p> <p>Response Time ≤ 200ms</p> <p>Undervoltage & Voltage Unbalance</p> <p>Type Voltage detection with delayed trip & automatic reset</p> <p>Overvoltage Trip Voltage 109 - 113% of the adjusted line voltage</p> <p>Reset Voltage $\pm 3\%$ of the trip voltage</p> <p>Undervoltage Trip Voltage 88 - 92% of the adjusted line voltage</p> <p>Reset Voltage $\pm 3\%$ of the trip voltage</p> <p>Voltage Unbalance Adjustable 2 - 10% or specify fixed unbalance of 2 - 10% in 1% increments</p> <p>Reset on balance $\pm 0.7\%$ unbalance</p> <p>Trip Delay Active On Over/undervoltage, voltage unbalance, over/under frequency</p> <p>Range Adjustable from 1 - 30s or specify fixed delay 1 - 30s in 1s increments</p> <p>Tolerance $\pm 15\%$</p>	200-480VAC	Range	Voltage Adj.Range	Line Frequency	Line Voltage Max.	240		200-240VAC	50/60Hz		380		340-420VAC	50Hz		480		400-480VAC	60Hz	550VAC	600VAC		500-600VAC	50/60Hz	600VAC	<p>Restart Delay Range Adjustable from 0.6 - 300s; if no restart delay is selected a 0.6s initialization delay applies</p> <p>Tolerance $\pm 15\%$</p> <p>Over/Under Frequency $\pm 4\%$; Reset $\pm 3\%$; 50/60 Hz</p> <p>Phase Sequence A, B, C, L1, L2, L3</p> <p>Response Time -Phase Reversal & Phase Loss. ≤ 200 ms</p> <p>Reset Automatic</p> <p>Output</p> <p>Type Isolated Electromechanical Relay</p> <p>Rating 10A resistive @ 240VAC; 8A resistive @ 277VAC; NO-1/4 hp @ 120VAC; 1/3 hp @ 240VAC</p> <p>Life Mechanical - 1 x 10⁶; Electrical - 1 x 30³</p> <p>Protection</p> <p>Surge IEEE C62.41-1991 Level B</p> <p>Isolation Voltage ≥ 2500V RMS input to output</p> <p>Mechanical</p> <p>Mounting Surface mount with 2 #8 (M4 x 0.7) screw or snap on 35mm DIN Rail</p> <p>Note: 0.25 in. (6.35 mm) spacing between units or other devices is required</p> <p>Dimensions 4.33 x 2.95 x 1.97 in. (110 x 75 x 50 mm)</p> <p>Termination Screw terminals with captive wire clamps for up to #14 AWG (2.5 mm²) wire</p> <p>Environmental</p> <p>Operating / Storage Temperature -40° to 60°C / -40° to 85°C</p> <p>Humidity 95% relative, non-condensing</p> <p>Weight ≈ 8.6 oz (244 g)</p>
200-480VAC	Range	Voltage Adj.Range	Line Frequency	Line Voltage Max.																						
240		200-240VAC	50/60Hz																							
380		340-420VAC	50Hz																							
480		400-480VAC	60Hz	550VAC																						
600VAC		500-600VAC	50/60Hz	600VAC																						

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:

Auxiliary Products:

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

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 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:

- Protects against phase loss & reversal; over, under & unbalanced voltages; & over & under frequency
- Encapsulated circuitry
- Isolated, 10A, DPDT output contacts
- LED indicates relay status, faults, & time delays
- Universal line voltage 200 to 480VAC in one unit
- Compact design
- Finger-safe terminal blocks, up to 12 AWG
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Approvals: 

Auxiliary Products:

- **3-Phase fuse block/disconnect:**
P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **DIN rail:** P/N: C103PM (Al)
- **DIN rail adaptor:** P/N: P1023-20

Available Models:

HLMUDLAAA	HLMUDRAAA
HLMUDN0405N	HLMUSR0604A
HLMUDNAAA	

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

For more information see:

Appendix B, page 166, Figure 17 for dimensional drawing.

Appendix C, page 168, Figure 12 for connection diagram.

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, 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:

HLMU

X	X	X	X	X	
Output	Restart Function	Voltage Unbalance	Trip Delay	Restart Delay	
-D - DPDT -S - SPDT	-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 1-30s in 1s increments, using two digits [05]	-A* - Adjustable 0.6-300s -N - No Restart Delay	*Selection "A" is only available for Restart Functions "L" and "R"

Specifications

Line Voltage	3-phase delta or wye with no connection to neutral			Over/Under Frequency	$\pm 4\%$; Reset $\pm 3\%$; 50/60 Hz	
Type				Phase Sequence	A, B, C, L1, L2, L3	
Operating Voltage	200 - 480VAC	Range	Voltage Adj. Range	Frequency	Response Time-Phase Reversal & Phase Loss. ≤ 200 ms	
		240	200-240VAC	50 or 60Hz	Reset	Automatic
		380	340-420VAC	50Hz	Output	
		480	400-480VAC	60Hz	Type	Isolated Electromechanical Relay
Line Voltage Max.	550VAC			Form.	DPDT	
AC Line Frequency	50/60 Hz automatically detected			Rating	10A resistive @ 240VAC; 8A resistive @ 277VAC; NO-1/4 hp @ 120VAC; 1/3 hp @ 240VAC	
Phase Loss	$\geq 25\%$ unbalance			Life	Mechanical - 1 x 10 ⁶ Electrical (at 10A) - DPDT - 1 x 30 ³	
Response Time	≤ 200 ms			Protection		
Undervoltage & Voltage Unbalance				Surge	IEEE C62.41-1991 Level B	
Type	Voltage detection with delayed trip & automatic reset			Isolation Voltage	≥ 2500 V RMS input to output	
Overvoltage	Trip Voltage	109 - 113% of the adjusted line voltage		Circuitry	Encapsulated	
	Reset Voltage	$\pm 3\%$ of the trip voltage		Mechanical		
Undervoltage	Trip Voltage	88 - 92% of the adjusted line voltage		Mounting	Surface mount with one #10 (M5 x 0.7) screw	
	Reset Voltage	$\pm 3\%$ of the trip voltage		Note:	0.25 in. (6.35 mm) spacing between units or other devices is required	
Voltage Unbalance	Trip Setpoint	Adjustable 2 - 10% or specify fixed unbalance of 2 - 10% in 1% increments		Dimensions	3 x 2 x 1.64 in. (76.7 x 51.3 x 41.7 mm)	
	Reset on Balance	$\pm 0.7\%$ unbalance		Termination	Screw terminal connection up to 12 AWG (3.3 mm ²) wire	
Trip Delay	Active On	Over/undervoltage, voltage unbalance, over/under frequency		Environmental		
	Range	Adjustable from 1 - 30s or specify fixed delay 1 - 30s in 1s increments		Operating / Storage Temperature	-40° to 60° C / -40° to 85° C	
	Tolerance	$\pm 15\%$		Humidity	95% relative, non-condensing	
Restart Delay	Range	Adjustable from 0.6 - 300s; if no restart delay is selected a 0.6s initialization delay applies		Weight	≈ 3.9 oz (111 g)	
	Tolerance	$\pm 15\%$				






The PLMU Series continuously measures the voltage of each of the three phases to provide protection for 3-phase motors and sensitive loads. Its microcontroller senses under and overvoltage, voltage unbalance, phase loss, and phase reversal. Protection is provided even when regenerated voltages are present. Universal voltage operation and standard base connection allows the PLMU to replace hundreds of competitive part numbers.

For more information see:
Appendix B, page 166, Figure 18 for dimensional drawing.
Appendix C, page 168, Figure 13 for connection diagram.

Operation

Upon application of power, a 0.6s random start delay begins and the PLMU measures the voltage levels and line frequency and selects the voltage range. The output relay is energized and the LED glows green when all voltages are acceptable and the phase sequence is correct. LED flashes green during trip delay, glows red when output de-energizes. Undervoltage, overvoltage, and voltage unbalance must be sensed for continuous trip delay before the relay de-energizes. Re-energization is automatic upon fault correction. The output relay will not energize if a fault condition is sensed as 3-phase input voltage is applied. The LED alternately flashes red/green when phase reversal is sensed. Line voltage is selected with the knob, setting the over and under voltage trip points. Voltage range is automatically selected by the microcontroller.

Features:

- Protects against phase & reversal; & over, under & unbalanced voltages
 - Octal plug-in
 - Isolated, 10A, SPDT output contacts
 - Operates from 200 to 480VAC
 - LED indicator glows green when voltages are acceptable, red for faults
 - Indicates reverse-phase wiring
 - Simple 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:   

Auxiliary Products:

- **Panel mount kit:** P/N: BZ1
- **8-pin octal socket:** P/N: OT08PC
- **3-phase fuse block/disconnect:** P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **DIN rail:** P/N: C103PM (AI)

Available Models:

PLMU11

Order Table:

Voltage Unbalance	Trip Delay	Part Number
Adjustable 2-10%	Adjustable 0.25-30s	PLMU11

LED Indicator	
Steady Green	Energized
Steady Red	De-energized (tripped on fault)
Flashing Green	Trip Delay
Alternate Flashing Red/Green	Phase Reversal

Specifications

Line Voltage	Type	3-phase delta or wye with no connection to neutral	Trip Delay Range	Adjustable from 0.25 - 30s Factory fixed from 2 - 30s ±15% (a minimum order quantity applies)
Line Voltage	Adjustable Voltage Ranges (Automatic Range Selection)	200 to 480VAC ±15%, 50/60 Hz ±2 Hz 200 to 240VAC, 50/60 Hz 340 to 420VAC, 50 Hz 400 to 480VAC, 60 Hz	Severe Unbalance - 2X Selected Unbalance	0.25 - 2s; disabled when the trip delay is less than 2s
Maximum Voltage	Phase Sequence	552VAC ABC	Random Start Delay	≅ 0.6s
Overvoltage, Undervoltage, & Voltage Unbalance	Type	Voltage detection with delayed trip & automatic reset	Phase Reversal & Phase Loss Trip Time	≤ 150ms
Overvoltage & Undervoltage	Undervoltage Trip Point	88 - 92% of adjusted line voltage	Phase Loss Setpoint	≥ 15% unbalance
	Reset Voltage	+2% of trip voltage	Reset Type	Automatic
	Overvoltage Trip Point	109 - 113% of adjusted line voltage	Output Type	Energized when voltages are acceptable
	Reset Voltage	-2% of trip voltage	Rating	10A resistive @ 240VAC; 1/4 hp @ 125VAC; 1/3 hp @ 250VAC; max. 277VAC
Voltage Unbalance Trip Point	Voltage Unbalance Trip Point	Adjustable from 4 - 10% Factory fixed from 4 - 10% (a minimum order quantity applies)	Life	Mechanical - 1 x 10 ⁶ ; Electrical - 1 x 10 ⁵
Reset on Balance (%):	Selected Unbalance	2 3 4 5 6 7 8 9 10	Protection	Surge
Reset	Reset	1.5 2.5 3.5 4.5 5.4 6.3 7.2 8.1 9		IEEE C62.41-1991 Level B
				Isolation Voltage
				≥ 2500V RMS input to output
				Mechanical
				Mounting*
				Plug-in socket rated 600VAC
				Termination
				Octal 8-pin plug-in
				Dimensions
				3.03 x 2.39 x 1.78 in. (77.0 x 60.7 x 45.2 mm)
				Environmental
				Operating / Storage Temperature
				-40° to 60°C / -40° to 85°C
				Weight
				≅ 8.6 oz (244 g)

*CAUTION: Select an octal socket rated for 600VAC operation.



The PLM Series continuously measures the voltage of each of the three phases. The PLM Series uses a microcontroller circuit design that senses undervoltage, voltage unbalance, phase loss, and phase reversal. Protection is assured when regenerated voltages are present. Both delta and wye systems can be monitored; no connection to neutral is required.

For more information see:
Appendix B, page 165, Figure 8 for dimensional drawing.
Appendix C, page 168, Figure 13 for connection diagram.

Operation

The output relay is energized and the LED glows green when all voltages are acceptable and the phase sequence is correct. Under and unbalanced voltages must be sensed for a continuous trip delay period before the relay de-energizes. Reset is automatic upon correction of the fault condition. The output relay will not energize if a fault condition is sensed as power is applied. The LED flashes red during the trip delay, then glows red when the output de-energizes. The LED flashes green/red if phase reversal is sensed.

Field Adjustment:

Set voltage adjustment knob at the desired operating line voltage for the equipment. This adjustment automatically sets the undervoltage trip point. Apply power. If the PLM fails to energize, (LED glows red) check wiring of all 3 phases, voltage, and phase sequence. If phase sequence is incorrect, the LED flashes green/red. To correct this, swap any two line voltage connections at the mounting socket. No further adjustment should be required.

Features:

- Protects against phase loss & reversal; & under & unbalanced voltages
- 8-pin plug-in base
- Adjustable low voltage trip point
- Factory fixed unbalance & trip delay
- Line voltages 200 to 480VAC in 3 ranges
- Isolated, 10A, SPDT output contacts
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Approvals:   

Auxiliary Products:

- **Panel mount kit:** P/N: BZ1
- **Octal 8-pin socket:** P/N: OT08PC
- **3-phase fuse block/disconnect:** P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **DIN rail:** P/N: C103PM (AI)

Available Models:

PLM6405	PLM9405
PLM6502	PLM9502
PLM6805	PLM9805
PLM8405	PLM9820
PLM8805	

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

Order Table:

<u>PLM</u>	<u>X</u>	<u>X</u>	<u>X</u>
	Line Voltage	Voltage Unbalanced	Trip Delay
	-6 - 240VAC	Fixed - Specify - 4-8%	Fixed - Specify from 2-20s
	-8 - 380VAC	in 1% increments	in 1s increments using two digits
	-9 - 480VAC		

Specifications

Line Voltage				Phase Loss	≥ 35% unbalance
Type	3-phase delta or wye with no connection to neutral			Reset	Automatic
Operating Voltage:				Output	
Model	Adj. Line Voltage Range	Line Voltage Max.		Type	Electromechanical relay
240	200-240VAC	270VAC		Form	Isolated, SPDT
380	360-430VAC	480VAC		Rating	10A resistive @ 240VAC, 277VAC max; 1/2 Hp @ 240VAC; 1/4 Hp @ 120VAC
480	400-480VAC	530VAC		Life	Mechanical - 1 x 10 ⁷ ; Electrical - 1 x 10 ⁵
AC Line Frequency	50/100 Hz			Protection	
Phase Sequence	ABC			Surge	IEEE C62.41-1991 Level B
Power Consumption	≅ 2W for 240V units ≅ 3W for 380 - 480V units			Isolation Voltage	≥ 2500V RMS input to output
Low Voltage & Voltage Unbalance				Mechanical	
Type	Voltage detection with delayed trip & automatic reset			Mounting*	8-pin plug-in socket rated 600VAC
Low Voltage	Trip Voltage	88 - 92% of adjusted line voltage		Dimensions	3.2 x 2.39 x 1.78 in. (81.3 x 60.7 x 45.2 mm)
	Reset Voltage	Plus 3% of trip voltage		Environmental	
Voltage Unbalance	Trip Unbalance	Factory fixed from 4 - 8%		Operating / Storage Temperature	-40° to 60°C / -40° to 85°C
	Reset on Balance	-0.7% unbalance typical		Weight	≅ 4.4 oz (125 g)
Trip Delay	Range	Factory fixed from 2 - 20s		*CAUTION: Select an octal socket rated for 600VAC operation.	
	Tolerance	±15%			
Phase Reversal & Phase Loss					
Response Time:	Phase Reversal	≤ 200ms			
	Phase Loss	≤ 200ms			



Provides protection for motors and other sensitive loads. Continuously measures the voltage of each of the three phases using a microcontroller circuit design that senses under and overvoltage, voltage unbalance, phase loss, and phase reversal. Protection is provided even when regenerated voltages are present. Includes a trip delay to prevent nuisance tripping and a restart delay to prevent short cycling after a momentary power outage.

For more information see:
Appendix B, page 167, Figure 30 for dimensional drawing.
Appendix C, page 168, Figure 14 for connection diagram.

Operation

Upon application of line voltage, the restart delay begins. The output is de-energized during restart delay. Under normal conditions, the output energizes after the restart delay. Undervoltage, overvoltage, and voltage unbalance must be sensed for the complete trip delay period before the output de-energizes. The restart delay begins as soon as the output de-energizes. If the restart delay is completed when a fault is corrected, the output energizes immediately. The output will not energize if a fault is sensed as the input voltage is applied. If the voltage selector is set between two voltage marks (i.e. between 220 and 230V), the LED will flash red rapidly. The TVW provides fault protection at the lower of the two line voltages (i.e. 220V).

Reset: Reset is automatic upon correction of a fault.

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 the voltage selector knob is between settings, it rapidly flashes red.

Features:

- Protects against phase loss & reversal; over, under & unbalanced voltages; short cycling
- Fixed trip points & delays
- Adjustable voltages from 208 to 480VAC in 4 ranges
- Monitor 600VAC lines by connecting VRM accessory
- Isolated, 10A, SPDT output contacts
- Bi-color LED indicates: output status, faults, time delays, phase reversal & setpoint
- ASME A17.1 rule 210.6
- NEMA MG1 14:30, 14:35
- IEEE C62.41-1991 Level B

Approvals:   

Auxiliary Products:

- **3-phase fuse block/disconnect:** P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **DIN rail:** P/N: C103PM (Al)
- **Female quick connect:** P/N: P1015-13 (AWG 10/12)
P/N: P1015-64 (AWG 14/16)
P/N: P1015-14 (AWG 18/22)
- **Voltage reduction module:** P/N: VRM6048

Available Models:

TVW575S1M
TVW6510S0.4S
TVW9510S0.4S

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

Order Table:

TVW	X	X	X	X
	Line Voltage	Voltage Unbalance	Trip Delay*	Restart Delay*
	Wide Range	Fixed - Specify 4-10% in 1% increments	Fixed - Specify from 0.2-1s in 0.1s increments	Fixed - Specify from 0.4-1s in 0.1s increments
	5 - 208-240VAC		Fixed - Specify from 1-100s in 1s increments	Fixed - Specify from 1-100s in 1s increments
	Selectable			Fixed - Specify from 1-999min in 1min increments
	6 - 208, 220, 230 & 240VAC			
	8 - 380, 400 & 415VAC			
	9 - 430, 440, 460 & 480VAC			

*Must indicate (S) for secs. or (M) for mins.

Specifications




Line Voltage	Type 3-phase delta or wye with no connection to neutral	Phase Reversal & Phase Loss Response ≤ 200ms; automatic reset
Input Voltage/Tolerance 208 to 480VAC in 4 ranges / -30% - 20%	AC Line Frequency 50 - 100 Hz	Phase Loss ≥ 25% unbalance
Phase Sequence ABC	Power Consumption Approx. 2W for 240V units Approx. 3W for 480V units	Output
Overvoltage, Undervoltage, & Voltage Unbalance		Type Isolated, SPDT
Overvoltage & Undervoltage Voltage detection with delay trip & automatic reset		Rating 208 to 240VAC (55°C) 10A resistive @ 125VAC, 5A @ 250VAC, 1/4 hp @ 125VAC
Undervoltage Trip Point 88 - 92% of the selected line voltage		380 to 480VAC 10A resistive @ 240VAC, 1/4 hp @ 125VAC, 1/3 hp @ 250VAC, max. voltage 277VAC
Reset Voltage ± 3% of trip voltage		Life Mechanical - 1 x 10 ⁶ ; Electrical - 1 x 10 ⁶
Overvoltage Trip Point 109 - 113% of the selected line voltage		Protection
Reset Voltage ± 3% of trip voltage		Surge IEEE C62.41-1991 Level B
Trip Variation vs Temperature ≤ ±2%		Dielectric Breakdown 208 to 240VAC ≥ 1500V RMS input to output terminals 380 to 480VAC ≥ 2500V RMS input to output terminals
Voltage Unbalance Factory fixed, from 4 - 10%		Mechanical
Reset On Balance ± 0.7% unbalance		Mounting Surface mount with one #8 (M5 x 0.8) screw
Trip Delay Range Fixed from 0.2 - 100s ±15% or ±0.1s, whichever is greater		Dimensions 2 x 2 x 1.25 in. (50.8 x 50.8 x 31.8 mm)
Restart Delay Range Fixed from 0.4s - 999min ±15% or ±0.2s, whichever is greater		Termination 0.25 in. (6.35 mm) male quick connect terminals
		Environmental
		Operating / Storage Temperature -40° to 55°C / -40° to 85°C
		Humidity 95% relative, non-condensing
		Weight ± 2.8 oz (79 g)



Provides protection for motors and other sensitive loads. Continuously measures the voltage of each of the three phases using a microcomputer circuit design that senses under and overvoltage, voltage unbalance, phase loss, and phase reversal. Protection is provided even when regenerated voltages are present. Includes a trip delay to prevent nuisance tripping and a restart delay to prevent short cycling after a momentary power outage.

For more information see:
Appendix B, page 167, Figure 30 for dimensional drawing.
Appendix C, page 168, Figure 14 for connection diagram.

Features:

- Protects against phase loss & reversal; over, under & unbalanced voltages; short cycling
 - Fixed trip points & delays
 - Fixed voltages from 208 to 480VAC
 - Isolated, 10A, SPDT output contacts
 - Bi-color LED indicator shows: output status, faults, time delays & phase reversal
 - ASME A17.1 rule 210.6
 - NEMA MG1 14:30, 14:35
 - IEEE C62.41-1991 Level B
- Approvals:   

Auxiliary Products:

- **Female quick connect:**
P/N: P1015-13 (AWG 10/12)
P/N: P1015-64 (AWG 14/16)
P/N: P1015-14 (AWG 18/22)
- **3-phase fuse block/disconnect:**
P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **Voltage reduction module:**
P/N: VRM6048

Available Models:

TVM208A100.5S3S	TVM460A510S5S
TVM230A101S1S	TVM460A75S2M
TVM400A101S1S	TVM480A100.5S3S
TVM460A101S1S	TVM480A50.5S2S
TVM460A41S5M	

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

Operation

Upon application of line voltage, the restart delay begins. The output relay is de-energized during restart delay. Under normal conditions, the output energizes after restart delay. Undervoltage, overvoltage, and voltage unbalance must be sensed for continuous trip delay period before the output is de-energized. The output will not de-energize if a fault is corrected during the trip delay. The restart delay begins as soon as the output relay de-energizes. If the restart delay is completed when the fault is corrected, the output relay will energize immediately. The output relay will not energize if a fault or phase reversal is sensed as 3-phase input voltage is applied.

Reset: Reset is automatic upon correction of a fault.

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.

Order Table:

TVM	X	X	X	X
	Line Voltage	Voltage Unbalance	Trip Delay*	Restart Delay*
	—208A - 208VAC	Fixed - Specify 4-10% in 1% increments	— Fixed - Specify from 0.2-1s in 0.1s increments	— Fixed - Specify from 0.5-1s in 0.1s increments
	—220A - 220VAC		— Fixed - Specify from 1-100s in 1s increments	— Fixed - Specify from 1-100s in 1s increments
	—230A - 230VAC			— Fixed - Specify from 1-999min in 1min increments
	—240A - 240VAC			
	—380A - 380VAC			
	—400A - 400VAC			
	—415A - 415VAC			
	—440A - 440VAC			
	—460A - 460VAC			
	—480A - 480VAC			

*Must indicate (S) for secs. or (M) for mins.

Specifications

Line Voltage	Type	3-phase delta or wye with no connection to neutral	Output	Type	Isolated SPDT relay contacts
Input Voltage	208 to 480VAC		Rating	208 to 240VAC (55°C)	10A resistive @ 125VAC, 5A @ 250VAC, 1/4 hp @ 125VAC
AC Line Frequency	50 - 100 Hz			380 to 480VAC	10A resistive @ 240VAC, 1/4 hp @ 125VAC, 1/3 hp @ 250VAC, max. voltage 277VAC
Phase Sequence	ABC		Life		Mechanical - 1 x 10 ⁶ ; Electrical - 1 x 10 ⁵
Power Consumption	Approx. 2W for 240V units Approx. 3W for 480V units		Protection		
Overvoltage, Undervoltage, & Voltage Unbalance			Surge		IEEE C62.41-1991 Level B
Overvoltage & Undervoltage	Voltage detection with delay trip & automatic reset		Dielectric Breakdown	208 to 240VAC	≥ 1500V RMS input to output terminals
Undervoltage Trip Point	88 - 92% of the selected line voltage			380 to 480VAC	≥ 2500V RMS input to output terminals
Reset Voltage	≅ +3% of trip voltage		Mechanical		
Overvoltage Trip Point	109 - 113% of the selected line voltage		Mounting		Surface mount with one #8 (M5 x 0.8) screw
Reset Voltage	≅ -3% of trip voltage		Dimensions		2 x 2 x 1.25 in. (50.8 x 50.8 x 31.8 mm)
Trip Variation vs Temperature	≤ ±2%		Termination		0.25 in. (6.35 mm) male quick connect terminals
Voltage Unbalance	Factory fixed from 4 - 10%		Environmental		
Reset On Balance	≅ -0.7% unbalance		Operating / Storage Temperature		-40° to 55°C / -40° to 85°C
Trip Delay Range	Fixed from 0.2 - 100s ±15% or ±0.1s, whichever is greater		Humidity		95% relative, non-condensing
Restart Delay Range	Fixed from 0.5s - 999m ±15% or ±0.2s, whichever is greater		Weight		≅ 2.8 oz (79 g)
Phase Reversal & Phase Loss Response	≤ 200ms; automatic reset				
Phase Loss	≥ 25% unbalance				



The PLR Series provides a cost effective means of preventing 3-phase motor startup during adverse voltage conditions. Proper A-B-C sequence must occur in order for the PLR's output contacts to energize. In addition, the relay will not energize when an undervoltage or phase loss condition is present. The PLR protects a motor against undervoltage operation. The adjustment knob sets the undervoltage trip point.

For more information see:
Appendix B, page 165, Figure 8 for dimensional drawing.
Appendix C, page 168, Figure 13 for connection diagram.

Operation

The output relay is energized and the LED glows when all voltages are acceptable and the phase sequence is correct. Undervoltage must be sensed for a continuous dropout delay period before the relay de-energizes. Reset is automatic upon correction of the fault condition. The output relay will not energize if a fault condition is sensed as power is applied.

Field Adjustment: Turn the adjustment knob fully counterclockwise and apply three-phase power. The LED should be ON. Increase adjustment until the LED goes OFF. Decrease adjustment until LED glows again. If nuisance tripping occurs, decrease the adjustment slightly.

NOTE: When properly adjusted and operating in an average system, a voltage unbalance of 10% or more is required for phase loss detection. When a phase is lost while the motor is running, a voltage will be induced into the open phase nearly equal in magnitude to the normal phase-to-phase voltage. This condition is known as regeneration. When regenerated voltages are present, the voltage unbalance during single phasing may not exceed 10% for some motors. The PLR Series may not provide protection under this condition. For systems that require superior phase loss protection, select the PLMU Series.

Order Table:

Voltage	Part Number
95-140VAC	PLR120A
190-270VAC	PLR240A
340-450VAC	PLR380A
380-500VAC	PLR480A

Specifications

Line Voltage	3-phase delta or wye with no connection to neutral	
Type	Undervoltage Dropout Adj Range	Line Voltage Max.
120VAC	85 to 130VAC	143VAC
240VAC	170 to 240VAC	270VAC
380VAC	310 to 410VAC	480VAC
480VAC	350 to 480VAC	530VAC
AC Line Frequency	50/60Hz	
Phase Sequence	ABC	
Response Times		
Pull-in	≤ 400ms	
Drop-out	≤ 100ms	
Hysteresis	Pull-in/Drop-out ≅ 2%	
Output		
Type	Electromechanical relay, energized when all voltages are acceptable	
Form	SPDT	
Rating	5A resistive @ 240VAC, 1/4 Hp @ 120VAC	
Maximum Voltage	250VAC	

Protection		
Surge	IEEE C62.41-1991 Level B	
Isolation Voltage	120 & 240VAC	≥ 1500V RMS input to output
	380 & 480VAC	≥ 2500V RMS input to output

Mechanical		
Dimensions	3.2 x 2.39 x 1.78 in. (81.3 x 60.7 x 45.2 mm)	
Mounting*	Plug-in socket	
Termination	Octal 8-pin, plug-in	
Environmental		
Operating/ Storage Temperature	0° to 55°C / -40° to 85°C	
Weight	≅ 6 oz (170 g)	

*CAUTION: Select an octal socket rated for 600VAC operation.

Features:

- Protects against phase loss (on startup), phase reversal & undervoltage
- Used where moderate voltage unbalance protection is not required
- Direct replacement for most popular 3-phase monitors
- 8-pin octal base connection
- Isolated, 5A, SPDT output contacts
- AMSE A17.1 rule 210.6
- NEMA MG1 14.30, 14.35
- IEEE C62.41-1991 Level B

Approvals:   

Auxiliary Products:

- **Panel mount kit:** P/N: BZ1
- **Octal 8-pin socket:** P/N: OT08PC
- **3-phase fuse block/disconnect:** P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **DIN rail:** P/N: C103PM (AI)

Available Models:

PLR120A
PLR240A
PLR380A
PLR480A

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



The PLS Series is a low cost phase sensitive control that provides an isolated contact closure when the proper A-B-C phase sequence is applied. Protects sensitive 3-phase equipment and equipment operators from reverse rotation. Designed to be compatible with motor overloads or other 3-phase equipment protection devices. Protection for equipment control centers where frequent reconnection or electrical code makes reverse rotation protection essential. Examples include: mobile refrigerated containers, construction equipment, hoists, pumps, conveyors, elevators and escalators.

For more information see:
Appendix B, page 166, Figure 19 for dimensional drawing.
Appendix C, page 168, Figure 13 for connection diagram.

Operation

The internal relay and LED are energized when the phase sequence is correct. The output relay will not energize if the phases are reversed. Reset is automatic upon correction of the fault.

Features:

- Protects against phase reversal
- Low cost protection, one unit for all sized motors
- 3-wire connection for delta or wye systems
- Octal base connect - industry standard wiring
- Isolated, SPDT output contacts
- Factory calibrated - no adjustments required

Approvals:   

Auxiliary Products:

- **Panel mount kit:** P/N: BZ1
- **Octal 8-pin socket:** P/N: OT08PC
- **3-phase fuse block/disconnect:** P/N: FH3P
- **2 Amp fuse:** P/N: P0600-11
- **Din rail:** P/N: C103PM (AI)

Available Models:

- PLS120A
- PLS240A
- PLS480A

Order Table:

<u>Voltage</u>	<u>Part Number</u>
120VAC	PLS120A
208/240VAC	PLS240A
380/415VAC	PLS380A
440/480VAC	PLS480A

Specifications

Line Voltage	3-phase delta or wye with no connection to neutral			Maximum Voltage	250VAC
Type	Nominal Voltage	Minimum Voltage	Maximum Voltage	Protection	
	120VAC	95VAC	135VAC	Isolation Voltage	120 & 240VAC ... ≥ 1500V RMS input to output
	208/240VAC	175VAC	255VAC		380 & 480VAC ... ≥ 2500V RMS input to output
	380/415VAC	310VAC	430VAC	Mechanical	
	440/480VAC	380VAC	500VAC	Mounting*	Plug-in socket
AC Line Frequency	50/60 Hz			Dimensions	3.2 x 2.39 x 1.78 in. (81.3 x 60.7 x 45.2 mm)
Phase Sequence	ABC			Termination	Octal 8-pin plug-in
Response Times	Environmental				
Pull-in	≤ 300ms			Operating / Storage Temperature	-40° to 55°C / -40° to 85°C
Drop-out	≤ 50ms			Weight	≈ 6 oz (170 g)
Output	*CAUTION: Select an octal socket rated for 600VAC operation.				
Type	Electromechanical relay, energized when the phase sequence is correct				
Form	Isolated SPDT				
Rating	120 & 240VAC	10A resistive @ 240VAC			
	380 & 480VAC	8A resistive @ 240VAC			

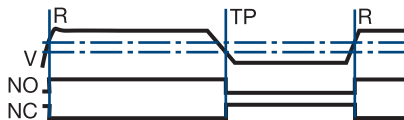


The KVM Series is a single-phase undervoltage monitor designed to protect sensitive equipment against brownout undervoltage conditions. The compact design and encapsulated construction make the KVM an excellent choice for OEM equipment.

For more information see:
Appendix B, page 165, Figure 1 for dimensional drawing.
Appendix C, page 169, Figure 16 for connection diagram.

Operation

The output relay is energized and the LED glows green when the input voltage is above the reset voltage threshold. If the input voltage drops below the undervoltage setpoint, the output relay and LED will de-energize. The output relay will remain de-energized as long as the input voltage is below the reset voltage. Reset is automatic when the input voltage returns to a normal range.



TP = Undervoltage Setpoint
R = Reset Point

Features:

- Economical single-phase brownout/undervoltage protection
 - Isolated, 8A, SPDT output contacts
 - Protects sensitive 110 to 120VAC or 220 to 240VAC loads
 - Adjustable low voltage trip point
 - LED Indicator
- Approvals:

Auxiliary Products:

- **Quick connect to screw adaptor:**
P/N: P1015-18
- **Female quick connect:**
P/N: P1015-64 (AWG 14/16)
- **DIN rail:** P/N: C103PM (Al)
- **DIN rail adaptor:** P/N: P1023-20

Available Models:

- KVM4
- KVM6

Order Table:

<u>Undervoltage Setpoint</u>	<u>Maximum Line Voltage</u>	<u>Part Number</u>
78 to 99VAC	132VAC	KVM4
156 to 199VAC	264VAC	KVM6

Specifications

Line Voltage	Single phase	Life	Mechanical - 1×10^6 ; Electrical - 1×10^5
Type	Single phase	LED Indicator	Glows green when output is energized
Input Voltage	110 to 120VAC or 220 to 240VAC	Protection	
AC Line Frequency	50/60 Hz	Surge	IEEE C62.41-1991 Level A
Power Consumption	2.5W @ 132VAC; 4.5W @ 264VAC	Circuitry	Encapsulated
Power Off Reset Time	$\leq 150\text{ms}$	Isolation Voltage	$\geq 1500\text{V RMS}$ input to output
Undervoltage Detection		Insulation Resistance	$\geq 100 \text{ M}\Omega$ minimum
Undervoltage Setpoint	KVM4: 78 to 99VAC KVM6: 156 to 199VAC	Mechanical	
Undervoltage Reset Point	KVM4: Fixed at 104VAC KVM6: Fixed at 209VAC	Mounting	Surface mount with one #10 (M5 x 0.8) screw
Repeatability	$\pm 0.5\%$ under fixed conditions $\pm 1\%$ over temperature range	Dimensions	2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm)
Voltage Sensing Accuracy	$\pm 2\%$ at 25°C	Termination	0.25 in. (6.35 mm) male quick connect terminals
Output		Environmental	
Type	Electromechanical relay	Operating / Storage Temperature	-25 to 55°C / -40 to 85°C
Form	SPDT	Humidity	95% relative, non-condensing
Rating	8A resistive @ 120VAC, 1/3 hp @ 120/240VAC	Weight	2.6 oz (74 g)