

# MODEL 16-1-X-X

## Over / Under Voltage Monitor with Trip and Restart Delay

- Monitors AC or DC single phase voltages for over, under or over/under voltage
- Adjustable Trip & Restart, can be disabled
- 5 LED's: Trip, Normal & Delay status
- Universal range: 12–30 or 30–277 Vac/Vdc
- 8 pin plug-in case - 2 SPDT relays
- Surface mount case - 1 SPDT relay

### DESCRIPTION

The **Model 16-1-X-X** protects equipment from Over, Under, Over/Under voltage or rapid cycling conditions that can damage valuable equipment. Trip and restart delays are adjustable, or can be disabled. Input voltage ranges are 12-30 Vac/Vdc or 30-277 Vac/Vdc. The 8-pin plug-in has 2 SPDT relays, while the surface mount case has 1 SPDT relay. See *Ordering Information* for details. 8-pin plug-in versions require an 8-pin socket, such as Time Mark's Model 51X120.

A proprietary microcontroller-based sensing circuit de-energizes the relay(s) after the trip delay (if enabled) upon detection of harmful voltage conditions. The relay(s) will energize after power line conditions return to an acceptable level and the restart delay time has expired (if enabled). Trip delays can be added to avoid nuisance tripping while restart delays can be used to stagger the startup of equipment or protect compressors. Time Mark's proprietary microcontroller-based design offers maximum flexibility with an easy to use interface.



8-pin case

Surface mount case

### SPECIFICATIONS

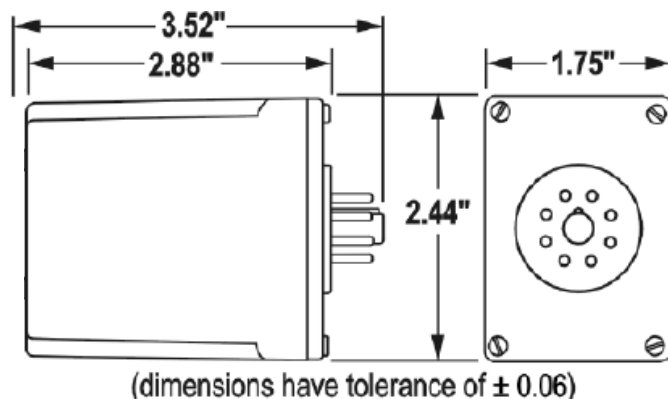
MODEL	16-1-X-X
Input Voltage-L version -H version	12 - 30 Vac or Vdc Single Phase 30 - 277 Vac or Vdc Single Phase
Frequency	DC, 50 / 60Hz
Supply Current	8 pin: 65mA Surface mount: 32mA
Initial Startup	< 3 seconds
Response time	48mS (<100 mS w/ relay flight time)
Restart Delay	0 - 300 sec
Trip Delay	0 - 30 sec
Transient Protection	1500W / 1mS
Repeat Accuracy	+ /- 0.1%
Reset Type	Automatic
Dead Band	2%
Output Contacts	8-pin: SPDT x 2 10A @ 240 Vac Surface mount: SPDT 10A @ 240 Vac
Expected Relay life	Mechanical: 10,000,000 Electrical: 100,000 min @ rated load
Enclosure Material	ABS plastic
Operating Temperature	0 deg. F to +130 deg. F
Humidity Tolerance	0 - 97% w/o condensation
Mounting	8 pin socket (Time Mark # 51X120) Surface mount w/ 5 blade connectors
Weight	8 pin: 4.4 oz Surface mount: 4.0 oz

### ORDERING INFORMATION:

16	-	1	-	X	-	X
Model		Series		Input Voltage		Enclosure
16		<b>1=Over/Under Voltage</b>		L= 12 - 30 Vac or Vdc H= 30 - 277 Vac or Vdc		P=8-pin plug-in case Two (2) SPDT Relays S=Surface mount case with 5 spade connections One (1) SPDT Relay
		<b>2=Over/Under Voltage %</b> <i>see model 16-2 datasheet</i>				
		<b>3=Voltage Pickup/Dropout</b> <i>see model 16-3 datasheet</i>				

**example: 16-1-H-S** orders an Over/Under single phase voltage monitor that accepts an AC/DC input voltage between 30 - 277 volts in a surface mount enclosure with 5 spade connections and a SPDT relay

### DIMENSIONS - 8 Pin Case



Telephone: Main (918) 438-1220  
Sales (800) 862-2875  
Fax: (918) 437-7584

E-mail: sales@time-mark.com  
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# MODEL 16-1-X-X

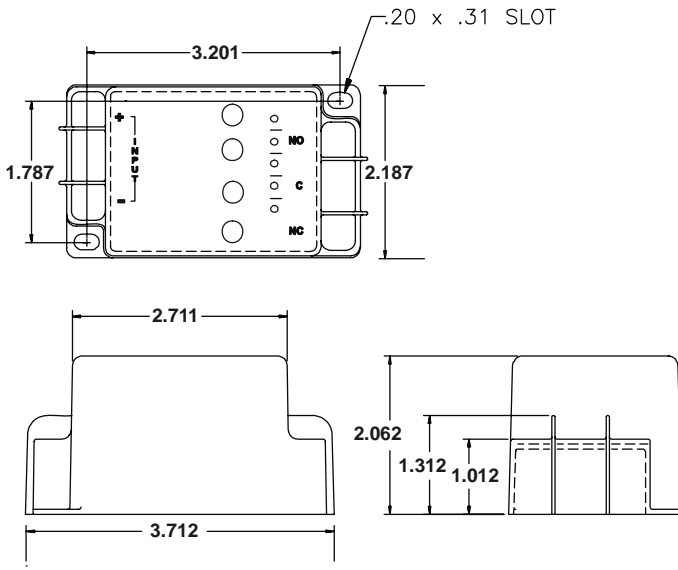
## Over/Under Voltage Monitor with Trip and Restart Delay

READ ALL INSTRUCTIONS BEFORE INSTALLING, OPERATING OR SERVICING THIS DEVICE.  
KEEP THIS DATA SHEET FOR FUTURE REFERENCE.

### GENERAL SAFETY

POTENTIALLY HAZARDOUS VOLTAGES ARE PRESENT AT THE TERMINALS OF THE MODEL 16.  
ALL ELECTRICAL POWER SHOULD BE REMOVED WHEN CONNECTING OR DISCONNECTING WIRING.  
THIS DEVICE SHOULD BE INSTALLED AND SERVICED BY QUALIFIED PERSONNEL.

### DIMENSIONS - Surface Mount Case



### INSTALLATION AND ADJUSTMENT

Begin with NO POWER APPLIED to the unit, making adjustments with a non-conductive tool being careful not to apply to much torque to the controls.

Adjust the HIGH SETPOINT control fully clockwise (right toward +), adjust the LOW SETPOINT control fully counter-clockwise (left toward -).

Adjust the TRIP DELAY fully clockwise (right toward + for max) and RESTART DELAY fully counter-clockwise (left toward - for disabled).

**8-Pin Case:** Connect the voltage to be monitored to the socket using the pin diagram on the unit **OR**  
**Surface Mount Case:** Attach 1/4" terminal lugs to the input voltage wires, and connect to the terminals marked INPUT (refer to diagram on unit).

Apply power to the unit. The LED lights will sequence on during self test. Complete the setup procedure in the following box for either an **Over Voltage, Under Voltage** or **Over/Under Voltage** monitor depending on how you wish to configure your Model 16-1.

(cont.)

#### **Over voltage with trip and restart delay**

Slowly rotate the HIGH SETPOINT control counter-clockwise (left toward -), until the UPPER TRIP LED illuminates, and the TRIP DELAY LED blinks. Adjust HIGH SETPOINT control clockwise (right toward +) until the DEVICE NORMAL LED illuminates and the TRIP DELAY LED stops blinking.

#### **Under voltage with trip and restart delay**

Slowly rotate the LOW SETPOINT control clockwise (right toward +), until the LOWER TRIP LED illuminates, and the TRIP DELAY LED blinks. Adjust LOW SETPOINT counter-clockwise (left toward -) until the DEVICE NORMAL LED illuminates and the TRIP DELAY LED stops blinking.

#### **Over/Under voltage with trip and restart delay**

Follow the instructions above for **Over voltage with trip and restart delay** and **Under voltage with trip and restart delay** to enable both ranges.

Adjust the TRIP DELAY and RESTART DELAY time to the desired setting. A TRIP DELAY or RESTART DELAY is optional, and can be disabled by turning the control fully counter-clockwise (left toward -) if desired.

Specific setpoints will require the use of an adjustable voltage source such as a VARIAC and a voltmeter. Note: TRIAC type light dimmers do not provide a full sine wave and will not provide a reliable calibration voltage.

### WARRANTY

The **Model 16-1 Over/Under Voltage Monitor** is warranted to be free from defects in materials or workmanship for a period of 5 years from the date of manufacture. See Time Mark's Terms and Conditions of Sale or contact Time Mark's Sales department at 1-800-862-2875 or 1-918-438-1220 Monday through Friday; 8 a.m. to 5 p.m., CST, for further details.

Telephone: Main (918) 438-1220  
Sales (800) 862-2875  
Fax: (918) 437-7584

E-mail: sales@time-mark.com  
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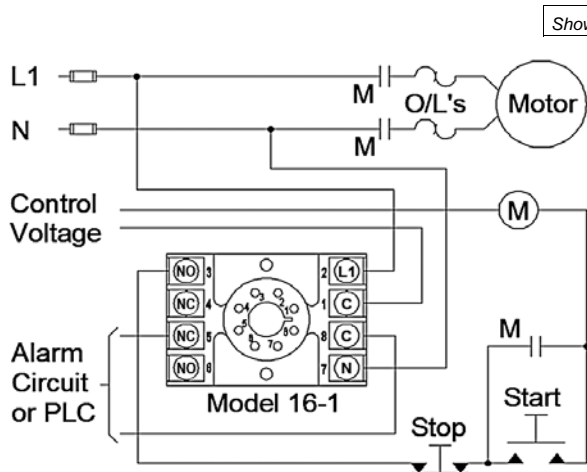
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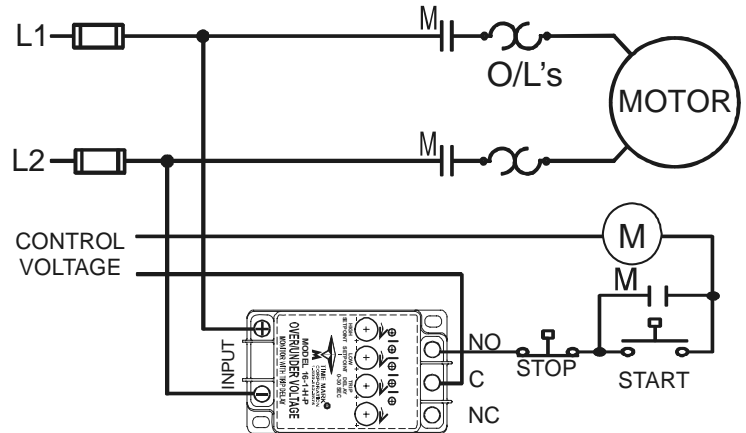
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### TYPICAL APPLICATION - 8 pin mount



### TYPICAL APPLICATION - Surface mount



### TROUBLESHOOTING

SYMPTOM	LED STATUS	REMARKS
No LED's are on. The unit is completely dead.	NONE	Measure input voltage and verify the voltage falls within the range of the unit.
UPPER TRIP or LOWER TRIP LED's are on.	RED	The voltage is outside the set parameters. Verify voltage is at an acceptable level before adjustments are made to trip parameters.
RESTART DELAY LED is blinking, motor is NOT running	RESTART DELAY - Yellow Blinking	The Model 16 is in a restart delay.
DEVICE NORMAL green LED is on, but the motor does not start.	GREEN	The Model 16 is in run mode. Check for loose wiring, faulty switches, blown fuses, or other control devices.

Should problems persist, contact the factory at 800-862-2875 or 918-438-1220, for assistance (Monday thru Friday, 8 a.m. to 5 p.m. CST).

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