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VOLTAGE MONITOR RELAYS

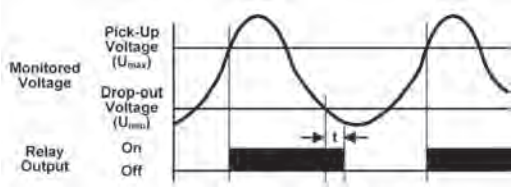
CATALOG OF PRODUCTS

PRODUCT SUMMARY

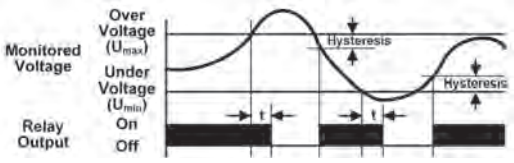
Voltage Monitor Relays monitor either AC single phase (50-60Hz) or DC voltages to protect equipment against voltage fault conditions. No separate supply (control) voltage is required on any Macromatic Voltage Monitor Relay since each unit is powered by monitored voltage. Versions are available in either a compact plug-in case utilizing an 8 pin octal socket or a 17.5mm DIN Rail mounted case.

Macromatic offers two styles of Voltage Monitor Relays:

- **Over/Under Voltage Relays**-provides protection to equipment where either an over or under voltage condition is potentially damaging. When used as an under voltage relay, they provide protection to equipment that is required to operate above a minimum voltage. When used as over voltage relays, they protect equipment against excessive voltage conditions. Over/Under Voltage Relays are designed to energize when the monitored voltage reaches a preset value (U_{max}) and drop-out when the monitored voltage drops to a level below the preset value (U_{min}).



- **Voltage Band Relays**-provides protection to equipment that is required to operate within an upper and lower voltage limit. As long as the monitored voltage remains within an OVER (U_{max}) and UNDER voltage (U_{min}) range, the internal relay stays energized. If the monitored voltage falls outside this range, the relay will drop-out.



These products are summarized below:

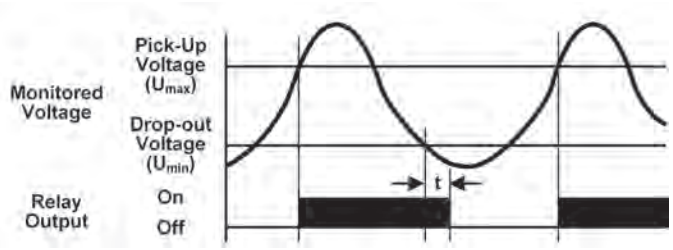
OVER/UNDER VOLTAGE RELAYS					
Monitored Voltage	**Pick-up Setting**	**Drop-out Setting**	**Time Delay on Drop-out (t)**	**Mounting**	**Series**
12V DC, 24V DC, 48V DC, 110V DC, 120V AC, 240V AC & 480V AC	Adjustable	Fixed	Fixed 0.5 Seconds	Plug-in	VMP
	Adjustable	Adjustable	Adjustable 0.1-10 Seconds	Plug-in	VAKP
VOLTAGE BAND RELAYS					
Monitored Voltage	**Overvoltage Setting**	**Undervoltage Setting**	**Time Delay on Drop-out (t)**	**Mounting**	**Series**
12V DC, 24V DC, 48V DC, 110V DC, 120V AC, 240V AC & 480V AC	Adjustable	Adjustable	Adjustable 0.1-10 Seconds	Plug-in	VWKP
24V DC, 120V AC, 240V AC	Adjustable	Adjustable	Adjustable 0.1-10 Seconds	DIN-Rail	VWKE

OVER/UNDER VOLTAGE | FIXED TIME DELAY & DROP-OUT

12-480V | VMP Series

Over/Under Voltage Relays provide protection to equipment where an over or under voltage condition is potentially damaging. They are designed to energize when the operating voltage reaches a preset value and drop-out when the operating voltage drops to a level below the preset value.

The pick-up voltage setting (U_{max}) is user-adjustable across the full range as shown in the table below. The VMP Series has a drop-out voltage setting (U_{min}) fixed at 95% of the pick-up voltage setting (an adjustable drop-out setting of 75-95% of the pick-up setting is available on the VAKP Series). The relay energizes (and the LED is Red) when the monitored voltage is above the pick-up setting for a period longer than the fixed pick-up time delay of 0.5 seconds. The relay de-energizes (and the LED is Green) when the monitored voltage is below the drop-out setting for a period longer than the drop-out time delay (t), which is fixed at 0.5 seconds.



Adjustable Pick-Up, Fixed Drop-Out Settings*
Fixed Time Delay on Drop-out at 0.5 Seconds

NOMINAL VOLTAGE	PICK-UP VOLTAGE (U_{MAX})	DROP-OUT* VOLTAGE (U_{MIN})	PRODUCT NUMBER	WIRING/ SOCKET
12V DC 24V DC 48V DC 110V DC	9-15V DC 18-30V DC 36-60V DC 83-138V DC	7-14V DC 14-28V DC 27-57V DC 62-130V DC	VMP012D VMP024D VMP048D VMP110D	8 Pin Octal **70169-D** MONITORED VOLTAGE **DIAGRAM 214**
120V AC 240V AC	90-150V AC 180-300V AC	68-142V AC 135-285V AC	VMP120A VMP240AX	8 Pin Octal **70169-D** MONITORED VOLTAGE **DIAGRAM 213**
240V AC 480V AC	180-300V AC 360-600V AC	135-285V AC 270-570V AC	VMP240A VMP480A ▲	8 Pin Octal **70169-D** MONITORED VOLTAGE **DIAGRAM 150**

* Drop-out Voltage is fixed at 95% of the adjusted Pick-up Setting.
▲ Requires a 600V-rated socket

Sockets & Accessories available

12-120V

240-480V

- Monitors AC single phase and DC voltages
- True RMS voltage measurement ensures more accurate sensing
- Wide range of user-adjustable pick-up voltages
- Fixed time delay on drop-out of 0.5 seconds
- LED indicates output relay status
- Pilot duty rating
- Compact plug-in case utilizing industry standard 8 pin octal socket

c UL us CE

c UL us

with appropriate socket

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VOLTAGE MONITOR RELAYS | PLUG-IN

OVER/UNDER VOLTAGE | ADJUSTABLE TIME DELAY & DROP-OUT

12-480V | VAKP SERIES

12-120V

240-480V

- Monitors AC single phase and DC voltages
- True RMS voltage measurement ensures more accurate sensing
- Wide range of user-adjustable pick-up voltages
- Adjustable time delay on drop-out of 0.1-10 seconds
- LED indicates output relay status
- Pilot duty rating
- Compact plug-in case utilizing industry standard 8 pin octal socket

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c UL us

with appropriate socket

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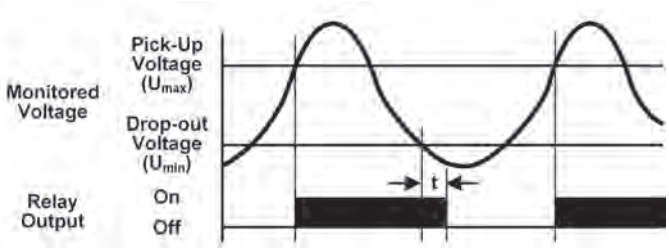
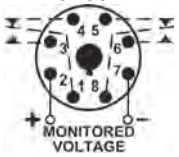
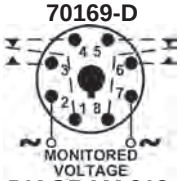
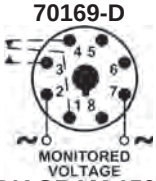
Over/Under Voltage Relays provide protection to equipment where an over or under voltage condition is potentially damaging. They are designed to energize when the operating voltage reaches a preset value and drop-out when the operating voltage drops to a level below the preset value.

The pick-up voltage setting (U_{max}) is user-adjustable across the full range as shown in the table below. The VAKP Series has an adjustable drop-out voltage setting (U_{min}) of 75-95% of the pick-up setting (a fixed drop-out voltage setting of 95% of the pick-up setting is available on the VMP Series). The relay energizes (and the LED is Red) when the monitored voltage is above the pick-up setting for a period longer than the fixed pick-up time delay of 0.5 seconds. The relay de-energizes (and the LED is Green) when the monitored voltage is below the drop-out setting for a period longer than the drop-out time delay (t), which is adjustable from 0.1-10 seconds.



Adjustable Pick-Up & Drop-Out Settings*
Adjustable Time Delay on Drop-out at 0.1-10 Seconds

NOMINAL VOLTAGE	PICK-UP VOLTAGE (U_{MAX})	DROP-OUT* VOLTAGE (U_{MIN})	PRODUCT NUMBER	WIRING/ SOCKET
12V DC 24V DC 48V DC 110V DC	9-15V DC 18-30V DC 36-60V DC 83-138V DC	7-14V DC 14-28V DC 27-57V DC 62-130V DC	VAKP012D VAKP024D VAKP048D VAKP110D	8 Pin Octal **70169-D**  **DIAGRAM 214**
120V AC	90-150V AC	68-142V AC	VAKP120A	8 Pin Octal **70169-D**  **DIAGRAM 213**
240V AC 480V AC	180-300V AC 360-600V AC	135-285V AC 270-570V AC	VAKP240A VAKP480A ▲	8 Pin Octal **70169-D**  **DIAGRAM 150**

* Drop-out Voltage is adjustable from 75-95% of the adjusted Pick-up Setting.
▲ Requires a 600V-rated socket

Sockets & Accessories available

OVER/UNDER VOLTAGE

12-480V | VMP & VAKP SERIES

OPERATING MODES

These relays can be used as either overvoltage or undervoltage relays, depending on the output contact used:

Overvoltage Relay

Provides protection to equipment that cannot handle excess voltages. Uses a normally closed contact (N.C.). As long as the monitored voltage remains below the maximum voltage the equipment can withstand U_{max}, the relay remains de-energized and the N.C. contact remains closed, keeping the load energized. If the operating voltage increases beyond the maximum rating of the equipment, the relay energizes and the N.C. contact opens, turning off the load. When the voltage falls below the U_{min} (hysteresis), the relay de-energizes and the N.C. contact re-closes, turning on the load.

Undervoltage Relay

Provides protection to equipment that is required to operate above a certain minimum voltage. Uses a normally open contact (N.O.). As long as the monitored voltage is above the minimum value required (U_{max}), the relay will energize and the N.O. contact closes, turning on the load. If the voltage drops below the U_{min} Setting (the minimum voltage required minus the hysteresis), the relay will de-energize and the N.O. contact will re-open, turning off the load.

APPLICATION DATA

Voltage Tolerance:
±50% of nominal AC (50-60Hz, ±5%) or DC voltage
No separate input voltage required since unit is powered by monitored voltage.

Load (Burden): Less than 2VA (12-120V); 30VA (240V & 480V)

Voltage Settings:
Pick-up (U_{max}): Adjustable across full range as shown in the product selection table
Drop-out (U_{min}): Fixed at 95% of pick-up setting (VMP)
Adjustable from 75-95% of pick-up setting (VAKP)

Setting Accuracy: Maximum Setting (Adjustable): +5%, -0%
Minimum Setting (Adjustable): +0%, -50%
Fixed Voltage Setting: ±2%

Repeatability: <1%

Sensing Accuracy: Constant conditions within specifications: ±2%
Variable conditions within specifications: ±5%
(percent base on nominal voltage)

Temperature: Operating: -28° to 65°C (-18° to 149°F)
Storage: -40° to 85°C (-40° to 185°F)

Output Contacts:
(All except VMP240AX): 10A @ 240V AC, 7A @ 30V DC, 1/4HP @ 120/240V AC, C300
(VMP240AX): 5A @ 277V AC, 5A @ 30V DC, 1/3HP @ 120/240V AC, B300 Pilot Duty

Life:
Mechanical: 10,000,000 operations
Full Load: 100,000 operations

Response Times:
Restart: 1 second (240 & 480V only)
Pick-up: 0.5 Seconds
Drop-out (t): 0.5 Seconds (VMP Series);
Adjustable 0.1 - 10 Seconds (VAKP Series)

Indicator LED: Red when Relay is energized; Green when Relay is Off.

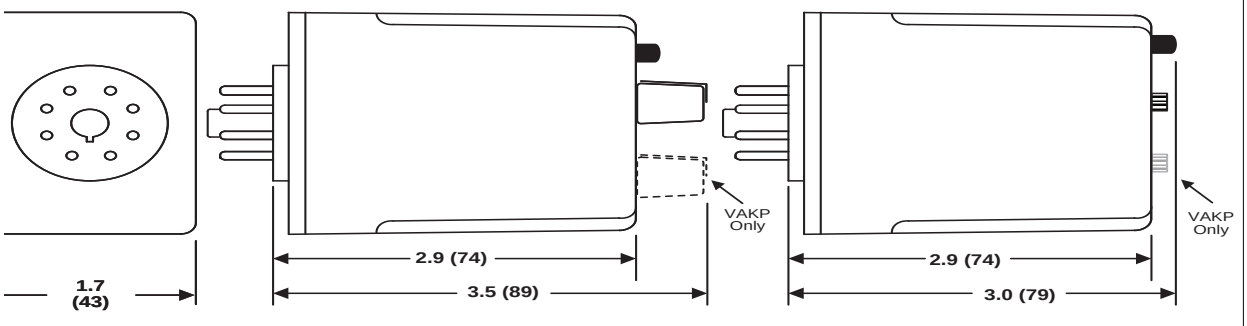
Transient Protection:
2000V per IEC 61000-4-5 Level 3 (±2kV)

Reset: Automatic

Approvals: File #E109466 with appropriate socket

DIMENSIONS

File #E109466



All Dimensions in
Inches (Millimeters)

VOLTAGE BAND (WINDOW)

12-480V | VWKP SERIES

12-120V

240-480V

- Monitors AC single phase and DC voltages
- Provides voltage band (window) protection
- True RMS voltage measurement ensures more accurate sensing
- Wide range of user-adjustable Over Voltage and Under Voltage settings
- Adjustable time delay on drop-out of 0.1-10 seconds
- LED indicates output relay status
- Compact plug-in case utilizing industry standard 8 pin octal socket
- Pilot duty rating
- 10A output contacts

c UL us CE

c UL us

with appropriate socket

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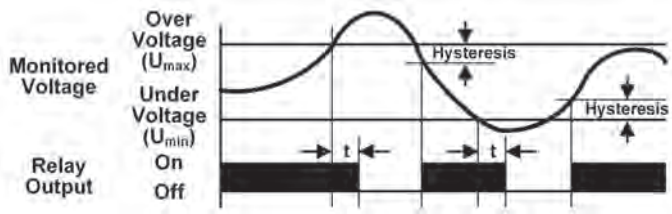
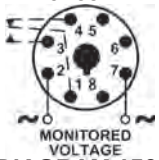
Voltage Band Relays provide protection to equipment that is required to operate within an upper and lower voltage limit. As long as the operating voltage remains within an Over and Under Voltage range, the internal relay stays energized. If the operating voltage falls outside this range, the relay will drop-out.

The over voltage setting (U_{max}) is adjustable across the full range as shown in the table below. The under voltage setting (U_{min}) is adjustable from 75-95% of the over voltage setting (U_{max}). The relay energizes (and the LED is Red) when the monitored voltage is between the over and under voltage settings. The relay de-energizes (and the LED is Green) when the monitored voltage falls outside the over or under voltage settings for a period longer than the drop-out time delay (t), which is adjustable from 0.1-10 seconds. The relay re-energizes when the monitored voltage returns to a value between the over and under voltage settings for a period longer than the pick-up time delay, which is fixed at 0.5 seconds.



Adjustable Overvoltage & Undervoltage Settings
Adjustable Time Delay on Drop-Out of 0.1 - 10 Seconds

NOMINAL VOLTAGE	OVER VOLTAGE (U_{MAX})	UNDER VOLTAGE (U_{MIN})	PRODUCT NUMBER	WIRING/ SOCKET
12V DC 24V DC 48V DC 110V DC	9-15V DC 18-30V DC 36-60V DC 83-138V DC	7-14V DC 14-28V DC 27-57V DC 62-130V DC	VWKP012D VWKP024D VWKP048D VWKP110D	8 Pin Octal **70169-D**  **DIAGRAM 214**
120V AC	90-150V AC	68-142V AC	VWKP120A	8 Pin Octal **70169-D**  **DIAGRAM 213**
240V AC 480V AC	180-300V AC 360-600V AC	135-285V AC 270-570V AC	VWKP240A VWKP480A▲	8 Pin Octal **70169-D**  **DIAGRAM 150**

▲ Requires a 600V-rated socket

Sockets & Accessories available

VOLTAGE BAND (WINDOW)

12-480V | VWKP SERIES

APPLICATION DATA

Voltage Tolerance:
±50% of nominal AC (50-60Hz, ±5%) or DC voltage
No separate control voltage required since unit is powered by monitored voltage.

Load (Burden): Less than 2VA (12-120V); 30VA (240V & 480V)

Voltage Settings:
Over Voltage (U_{max}): Across full range as shown in the product selection table
Under Voltage (U_{min}): 75-95% of Over/Under Voltage Setting

Setting Accuracy: Maximum Setting (Adjustable): +5%, -0%
Minimum Setting (Adjustable): +0%, -50%
Fixed Voltage Setting: ±2%

Repeatability: <1%

Sensing Accuracy: Constant conditions within specifications: ±2%
Variable conditions within specifications: ±5%
(percent base on nominal voltage)

Temperature: Operating: -28° to 65°C (-18° to 149°F)
Storage: -40° to 85°C (-40° to 185°F)

Indicator LED: Red when Relay is energized; Green when Relay is Off.

Reset: Automatic

Response Times:
Restart: 1 second (240 & 480V only)
Pick-up: 0.5 Seconds
Drop-out (t): Adjustable 0.1 -10 Seconds

Output Contacts:

10A @ 240V AC, 7A @ 30V DC, 1/4HP @ 120/240V AC, C300

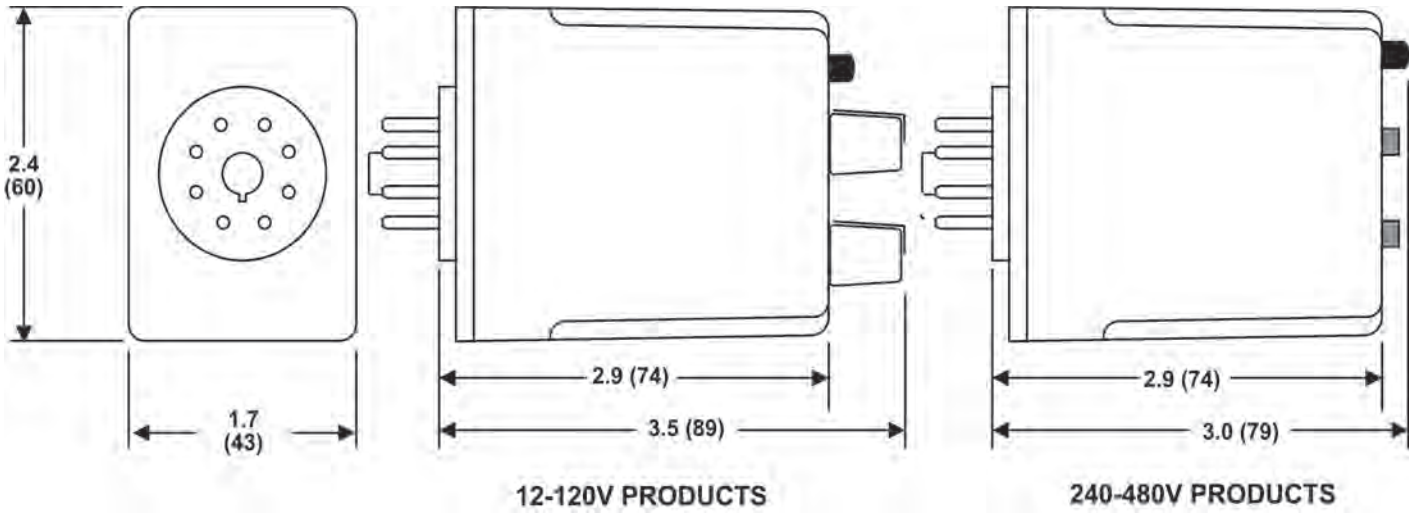
Life:
Mechanical: 10,000,000 operations
Full Load: 100,000 operations

Transient Protection:
2000V per IEC 61000-4-5 Level 3 (±2kV)

Approvals:
File #E109466

with appropriate socket
File #E109466

DIMENSIONS



All Dimensions in
Inches (Millimeters)

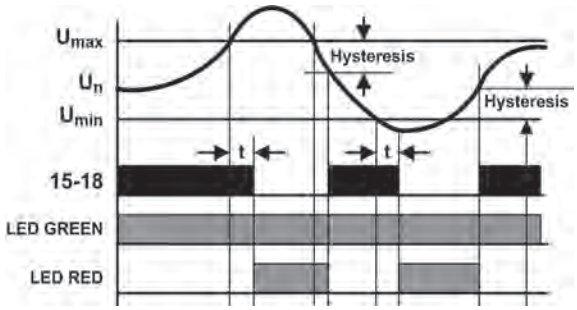
VOLTAGE BAND (WINDOW)

24-240V | VWKE SERIES

- Monitors AC single phase or DC voltages
- Provides voltage band (window) protection
- Wide range of user-adjustable Over Voltage and Under Voltage settings
- 15A SPDT output contacts
- Adjustable time delay on drop-out of 0.1 - 10 seconds
- LED indicates nominal voltage & output relay status
- Compact 17.5mm enclosure mounts on 35mm DIN rail

UL LISTED CE

Provides protection to equipment that is required to operate within an upper and lower AC single phase or DC voltage limit. As long as the monitored voltage remains between the Over Voltage (U_{max}) and Under Voltage (U_{min}) settings, the internal relay stays energized. If the monitored voltage falls outside this range, the relay will drop-out. The U_{max} dial sets the upper trip setting per the Overvoltage range of the product. The U_{min} dial sets the lower trip setting at 30-95% of the upper setting. This product has an adjustable time delay on relay drop-out (t) of 0.1-10 seconds to prevent nuisance tripping.



Catalog Number	VWKE024D	VWKE120A	VWKE240A
Monitored Voltage (U)	24V DC	120V AC (50/60 Hz)	240V AC (50/60 Hz)
Over Voltage Range (Umax)	18-30V DC	80-150V AC (50/60 Hz)	160-276V AC (50/60 Hz)
Under Voltage Range (Umin)	30 - 95% of Over Voltage Setting		
Time Delay on Pick-up	Fixed 0.1 Seconds		
Time Delay on Drop-out (t)	Adjustable 0.1 - 10 Seconds		

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VOLTAGE BAND (WINDOW)

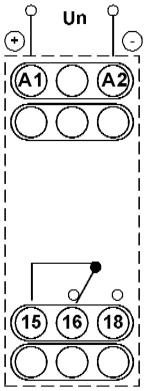
24-240V | VWKE SERIES

APPLICATION DATA

Catalog Number	VWKE024D	VWKE120A	VWKE240A
Operating Characteristics			
Monitored Voltage (U)	24V DC	120V AC (50/60 Hz)	240V AC (50/60 Hz)
Maximum Voltage	35V DC	200V AC (50/60 Hz)	280V AC (50/60 Hz)
Over Voltage Range (U_{max})	18-30V DC	80-150V AC (50/60 Hz)	160-276V AC (50/60 Hz)
Under Voltage Range (U_{min})	30 - 95% of Pick-up Setting		
Repeatability	<1%	<1%	<1%
Hysteresis	2-6%	2-6%	2-6%
Load (Burden)	1.7W	3VA	3VA
Timing			
Time Delay on Pick-up	Fixed 0.1 Seconds		
Time Delay on Drop-out (t)	Adjustable 0.1-10 Seconds		
Output			
Rating	15A @ 240V AC B300		
Minimum Switching	100mA @ 5V AC or 5V DC		
Contact Material	Silver Alloy		
Life	10 million operations mechanical; 70,000 electrical		
Other			
Mounting	35mm DIN Rail only		
Agency Approval	UL LISTED CE (File #E466100)		
Temperature	Storage: -30° to 70° C (-22° to 158° F) Operating: -20° to 55° C (-4° to 131° F)		
LED Indication	Green-Monitored Voltage Present Red-Relay Energized		
Terminations	14 AWG (2.5mm²)		

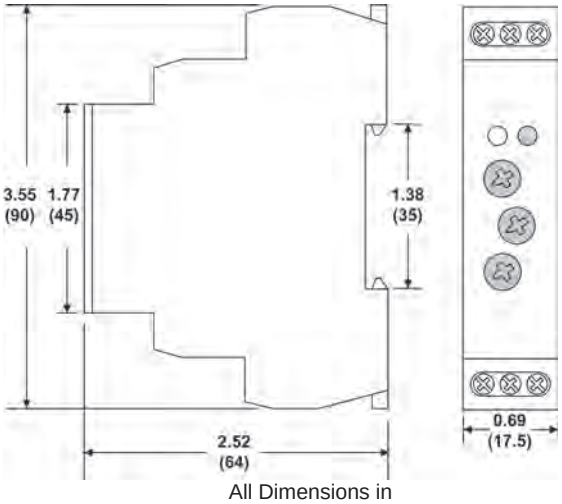
CONNECTION DIAGRAMS

VWKE120A
& VWKE240A



VWKE024D

DIMENSIONS



All Dimensions in
Inches (Millimeters)

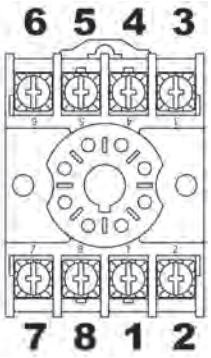
SOCKETS & ACCESSORIES

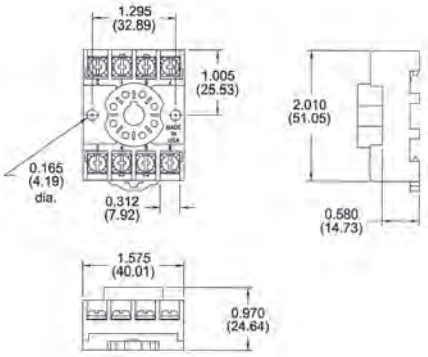
8 Pin Octal Socket-
Surface or DIN Rail-Mounted

- 10A @ 600V
- 1 or 2 #12-20 AWG Wire
- Pressure Wire Clamp Terminations
- Recommended Tightening Torque 12 in-lbs

File #E169693 File #LR701114

Catalog Number: 70169-D





Hold Down Spring

Can be used for:

- Panel-Mounted Sockets
- Sockets Mounted to 35mm DIN Rail *

* Requires two #8, 3/4" length machine screws with washers & nuts--contact Macromatic or www.macromatic.com/70166 for more information.

Catalog Number: 70166

Your source for quality, innovative industrial control solutions

Macromatic Industrial Controls, Inc. designs and manufactures control, monitoring and protection products to manage your electrical processes and to protect your equipment from damaging fault conditions.

With a 45-year legacy of high-quality products and outstanding customer service, we continue to introduce innovative solutions that help our customers be more productive and efficient.

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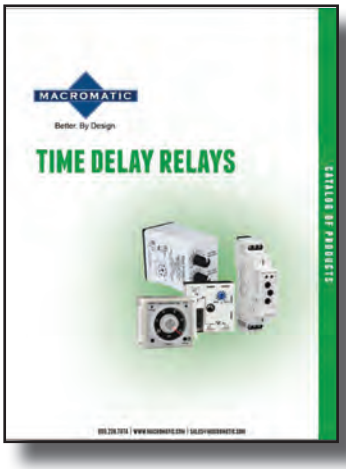
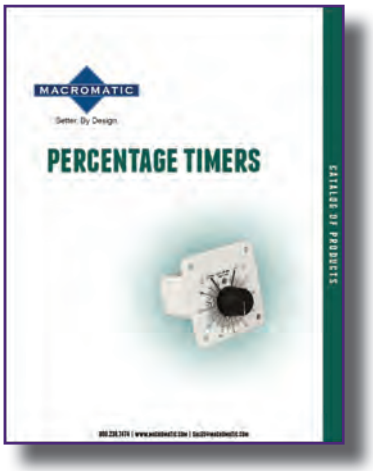
MACROMATIC INDUSTRIAL CONTROLS

MACROMATIC INDUSTRIAL CONTROLS
FAMILY OF PRODUCTS





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