

SWITCHING RELAYS & CONTROLS

Simple controls perform a specific function such as changing lamp intensity; vary the speed of a motor; or manage temperature of a heater.

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PHS SERIES

Phase Control



Description

The PHS Series is an ideal method of changing lamp intensity, varying the speed of a fan/motor, or controlling the temperature of a heater. The effective output voltage is adjusted with an accessory external potentiometer suitable for line voltage applications.

Operation

Upon application of input voltage, effective output voltage can be varied by changing the external resistance value. As the external resistance increases, the effective output voltage decreases. The inverse is also true.

Features & Benefits

FEATURES	BENEFITS
External adjustment - 230VAC rated potentiometer	Allows control of heavy loads directly, solid state design will provide long life
Up to 20A steady state - 200A inrush	Allows control of heavy loads directly, solid state design will provide long life
Single hole surface mounting	Provides quick and easy installation

Accessories



P1004-174 (100kΩ 1W), **P1004-175** (200kΩ 2W)
Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.



P0700-7 Versa-Knob
Designed for 0.25 in. (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.



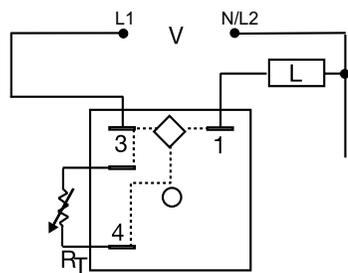
P1015-64 (AWG 14/16)
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.



P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

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Wiring Diagram



Triac Output Device
V = Voltage
L = Load
RT = External Adjustment

For dimensional drawing see: Appendix, page 512, Figure 19.

Ordering Information

MODEL	INPUT VOLTAGE	RATING
PHS120A10	120VAC	10A
PHS120A20	120VAC	20A
PHS120A6	120VAC	6A
PHS230A10	230VAC	10A
PHS230A20	230VAC	20A
PHS230A6	230VAC	6A

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SWITCHING RELAYS & CONTROLS

PHS SERIES

Specifications

Output

Type

Variable voltage phase angle control

Rating

Steady State (at 100% On) **Inrush***

1A	10A
6A	60A
10A	100A
20A	200A

Minimum Load Current

100mA

Voltage Drop

≅ 2.0V at rated current

Input

Voltage

120 or 230VAC

Tolerance

±20%

AC Line Frequency

50/60Hz

Protection

Dielectric Breakdown

≥ 2000V RMS terminals to mounting surface

Insulation Resistance

≥100MΩ

Mechanical

Mounting *

Surface mount with one #10 (M5 x 0.8) screw

Dimensions

H 50.8 mm (2"); **W** 50.8 mm (2");

D 38.4 mm (1.51")

Termination

0.25 in. (6.35 mm) male quick connect terminals

Environmental

Operating/Storage

Temperature

-20° to 60°C / -40° to 85°C

Humidity

95% relative, non-condensing

Weight

1A: ≅ 2.4 oz (68 g)

6, 10, & 20A: ≅ 3.9 oz (111 g)

External Adjustment

Potentiometer

120VAC

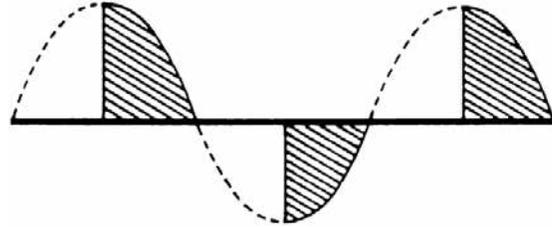
100KΩ rated at 1W

230VAC

200KΩ rated at 2W

Must have insulation resistance suitable for line voltage applications.

Typical Output Waveform



*Units rated ≥ 6A must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.

SIR SERIES

Solid-State Relay - Isolated



Description

The SIR Series is designed for industrial applications requiring rugged reliable operation. Provides an optically isolated, high capacity, solid-state output, with power switching capability up to 20A steady state, 200A inrush. Zero voltage switching SIR2 extends the life of an incandescent lamp up to 10 times. Random switching SIR1 is ideal for inductive loads. When fully insulated female terminals are used on the connection wires, the system meets the requirements for touch-proof connections.

Operation

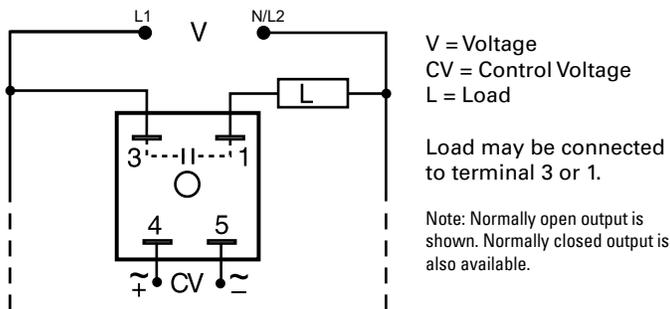
The solid-state output is located between terminals 1 and 3, and is normally open or normally closed without control voltage applied to terminals 4 and 5. When control voltage is applied to terminals 4 and 5, the solid-state output opens or closes respectively.

Reset: Removing control voltage resets the output. The unit is also reset if output voltage is removed.

Features & Benefits

FEATURES	BENEFITS
Compact design measures 2 in. (50.8mm) square	Perfect for OEM applications where space is limited
Totally solid state and encapsulated	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration and humidity
Up to 20A, 200A inrush output rating	Provides direct control of heavy inductive, incandescent or resistive loads
Switching output is optically isolated from the control input	Provides the ability to interface between 2 different electrical circuits
SIR1 models provide random switching	Designed for use with resistive and incandescent loads, extending lamp life up to 10 times
SIR2 models provide zero voltage switching	Perfect for resistive and incandescent loads
Metalized mounting surface	Facilitates heat transfer in high current applications

Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 19.

Ordering Information

MODEL	SWITCHING	CONTROL VOLTAGE	RATING	OUTPUT FORM	OUTPUT VOLTAGE
SIR1A1A4	Random	9 to 30VAC or DC	3A	Normally open	120VAC
SIR1A20A4	Random	9 to 30VAC or DC	20A	Normally open	120VAC
SIR1B6B4	Random	90 to 150VAC or DC	6A	Normally closed	120VAC
SIR1C20B6	Random	190 to 290VAC or DC	20A	Normally closed	230VAC
SIR2A20A4	Zero voltage	9 to 30VAC or DC	20A	Normally open	120VAC
SIR2B20A4	Zero voltage	90 to 150VAC or DC	20A	Normally open	120VAC
SIR2B20B4	Zero voltage	90 to 150VAC or DC	20A	Normally closed	120VAC

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SIR SERIES

Accessories

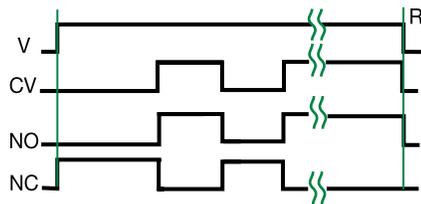


P1015-13 (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) **Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.



P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Function Diagram



V = Voltage
CV = Control Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
R = Reset
— = Undefined Time

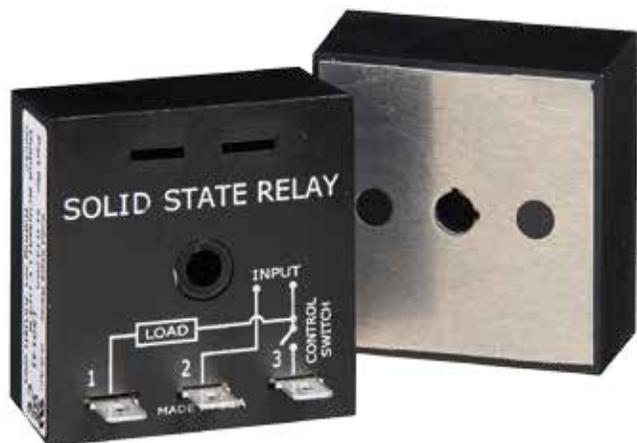
Specifications

Output Type	Optical isolation, totally solid state	
Form	SPST, NO or NC	
Voltage	24, 120, or 230VAC	
Tolerance	±20%	
Ratings	Steady State	Inrush* Output Device
	3A	30A Triac
	6A	60A Triac
	10A	100A Triac
	20A	200A Triac
Minimum Load Current	≅ 50mA	
Voltage Drop	≅ 2.0V at rated current	
Leakage Current (Open State)	≅ 6mA	
Input Type	Optical isolation LED/photo transistor	
Control Voltage	9 to 290VAC/DC in 3 ranges	
Power Consumption	≤ 0.5W	
Protection	Encapsulated	
Circuitry	≥ 2000V RMS terminals to mounting surface	
Dielectric Breakdown	≥ 100 MΩ	
Insulation Resistance		
Mechanical		
Mounting*	Surface mount with one #10 (M5 x 0.8) screw	
Dimensions	H 50.8 mm (2.0"); W 50.8 mm (2.0"); D 38.4 mm (1.51")	
Termination	0.25 in. (6.35 mm) male quick connect terminals	
Environmental		
Operating/Storage Temperature	-40° to 60°C / -55° to 85°C	
Humidity	95% relative, non-condensing	
Weight	≅ 3.9 oz (111 g)	

*Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.

SLR SERIES

Solid-State Relay - Non-Isolated



Description

The SLR Series has no isolation between the control switch input and the solid-state output. Select the SLR for applications where the control switch is the same voltage source as the load. Provides the noiseless, reliability and long life of a solid-state relay, without the cost of isolation circuitry. The SLR Series offers random switching and is normally used for inductive loads. When fully insulated female terminals are used on the connection wires, the system meets the requirements for touch-proof connections.

Operation

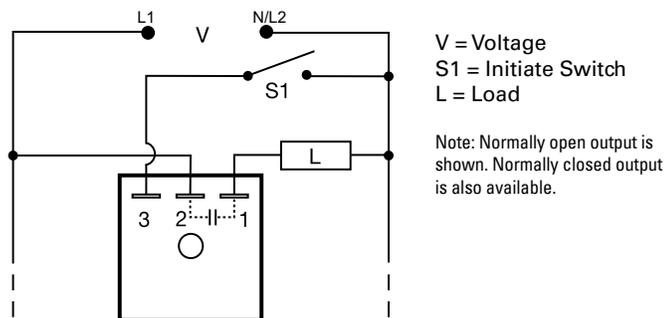
The solid-state output is located between terminals 1 and 2 and can be ordered as either normally open or normally closed, when voltage is applied and S1 is open. When S1 is closed, the solid-state output between terminals 1 and 2 closes (or opens). If S1 is opened, the solid-state output will open (or close).

Reset: Opening S1 resets the output to its original state. Reset is also accomplished by removing input voltage.

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SWITCHING RELAYS & CONTROLS

Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 19.

Ordering Information

MODEL	SWITCHING	INPUT VOLTAGE	OUTPUT RATING	OUTPUT FORM
SLR1420A	Random	120VAC	20A	Normally open
SLR1610A	Random	230VAC	10A	Normally open

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Features & Benefits

FEATURES	BENEFITS
Compact design measures 2 in. (50.8mm) square	Perfect for OEM applications where space is limited
Totally solid state and encapsulated	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
Up to 20A steady, 200A inrush output rating	Provides direct control of heavy inductive, resistive, or incandescent loads
Metalized mounting surface	Facilitates heat transfer in high current applications

Accessories



P1015-13 (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) **Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.



P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

SLR SERIES

Specifications

Output (Contact)

Type	Non-isolated solid state		
Form	SPST, NO or NC		
Voltage	24, 120, or 230VAC		
Tolerance	±20%		
Ratings	Steady State	Inrush*	Output Device
	1A	10A	SCR & Bridge Rectifier
	6 A	60A	Triac
	10A	100A	Triac
	20A	200A	Triac

Minimum Load Current ≅ 50mA

Voltage Drop (at Rated Current) ≅ 2.0V - 6, 10, & 20A units; ≅ 2.5V - 1A units

Leakage Current (Open State) ≤ 5mA

Initiate Switch Voltage Same as the output voltage

Power Consumption ≤ 0.5W

Protection

Circuitry Encapsulated

Dielectric Breakdown ≥ 2000V RMS terminals to mounting surface

Insulation Resistance ≥ 100MΩ

Mechanical

Mounting* Surface mount with one #10 (M5 x 0.8) screw

Dimensions **H** 50.8 mm (2.0"); **W** 50.8 mm (2.0");

D 38.4 mm (1.51")

Termination 0.25 in. (6.35 mm) male quick connect terminals

Environmental

Operating/Storage

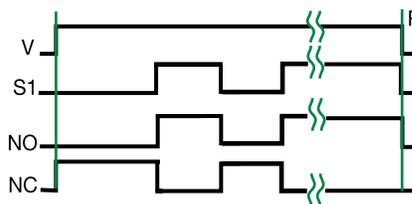
Temperature -20° to 60°C / -40° to 85°C

Humidity 95% relative, non-condensing

Weight 1A units: ≅ 2.4 oz (68 g);

6, 10, 20A units: ≅ 3.9 oz (111 g)

Function Diagram



V = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
R = Reset
— ≅ — = Undefined Time

*Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.

TCR9C

Temperature Controller



Description

The TCR9C of solid-state temperature control is a low cost modular approach to accurate control of temperature. The high power output is available in 20 amperes and provides setpoint temperature control. The efficient mounting surface allows for utilization of equipment as the heat sink. Designed for use with resistive loads.

Operation

Setpoint Control: TCR9C is a single setpoint temperature controller. When the thermistor resistance is high (above the setpoint), the solid-state output is ON. When the thermistor resistance decreases (temperature increases) to setpoint or below, the output turns OFF. It must be recognized that temperature differential (under and overshoot) is largely due to the system as a whole. The mass of the system, size of the heaters and sensor all play an important part. Single setpoint control is best when there is little or no lag time between heater and sensor, and when the heater is not oversized.

Features & Benefits

- NTC thermistor sensing for low cost setpoint control
- Solid-state output to control resistive heaters
- External adjustment of the setpoint
- Small package, encapsulated, single-screw mounting
- Metal mounting surface utilizes equipment as heat sink

Accessories



P1015-13 (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) **Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

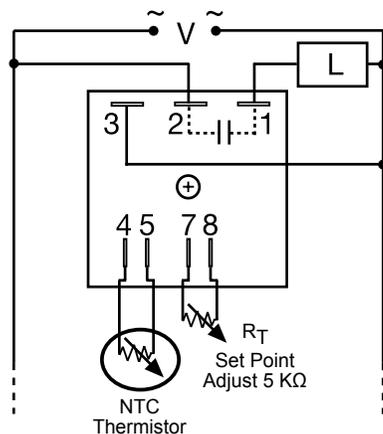
Specifications

Control Type	Single setpoint, negative temperature coefficient resistance sensing
Sensor Type	Thermistor, negative temperature coefficient (customer supplied) Electrically insulated for 1500V RMS min.
Adjustment	Temperature setpoint selected by means of an external resistance
Accuracy	≤ ±5% of the setpoint resistance Add the tolerance of the NTC thermistor and the drift of the adj. pot over temp. range
Setpoint vs. Ambient Temperature and Operating Voltage	±5% of setpoint resistance
Reset Time	≤ 150ms
Input Voltage	120 - 240VAC
Tolerance	±15%
AC Line Frequency	50/60 Hz

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SWITCHING RELAYS & CONTROLS

Wiring Diagram



V = Voltage
L = Load

Caution: NTC Thermistor must be electrically insulated, 1500 volts RMS minimum.

For dimensional drawing see: Appendix, page 512, Figure 19.

TCR9C

Output

Type Solid state
Form Non-isolated, single pole, zero voltage switching
Rating **Model** C **Steady State** 20A **Inrush*** 200A*

Minimum Load Current 100mA
Voltage Drop \approx 2V at rated current
Off State Leakage Current \approx 5mA @ 230VAC

Protection

Dielectric Breakdown \geq 2000 volts terminals to mounting surface
Isolation Voltage \geq 100m Ω
Circuitry Encapsulated

Mechanical

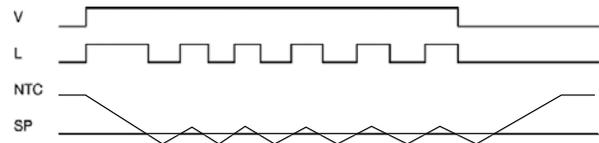
Mounting Surface mount with one #10 (M5 x 0.8) screw
Dimensions **H** 50.8 mm (2.0"); **W** 50.8 mm (2.0");
D 38.4 mm (1.51")
Termination 0.25 in. (6.35mm) male quick connect terminals

Environmental

Operating/Storage Temperature -40° to 60°C / -40° to 85°C
Humidity 95% relative, non-condensing
Weight \approx 2.7 oz (77 g)

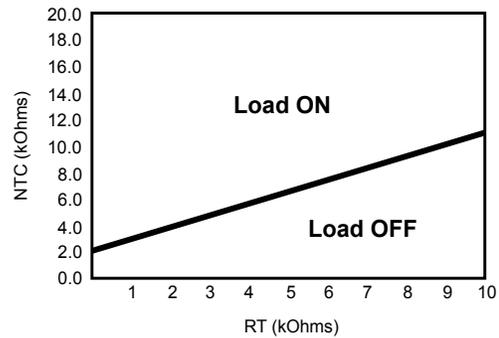
* Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: non-repetitive for 16ms.

Function Diagram



V = Voltage NTC = Negative Temperature Coefficient Thermistor
L = Load
SP = Setpoint

Adjustment vs. Thermistor Resistance



Note: If R_T value exceeds 13kOhms, the output will not energize.

