

Series Included

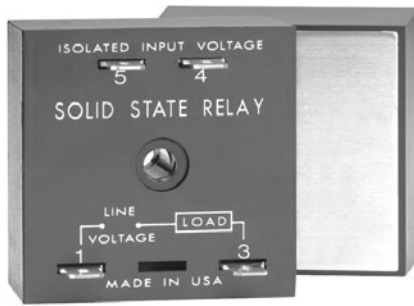
Solid-State Relays

SIR145
SLR.....	.146
NLF147

PHS Series

PHS148
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Solid-State Relays



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.

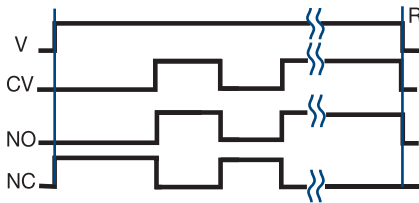
For more information see:
Appendix B, page 165, Figure 4 for dimensional drawing.
Appendix C, page 172, Figure 37 for connection diagram.

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.

Function:



V = Voltage
CV = Control Voltage
R = Reset
NC = Normally Closed Output
NO = Normally Open Output

— = Undefined time

Features:

- SIR1 - Random switching for inductive loads
- SIR2 - Zero voltage switching for resistive & incandescent loads
- Normally open or normally closed output
- 3 - 20A with up to 200A inrush
- Encapsulated circuitry
- Optically isolated output
- 0.25 in. (6.35 mm) terminals with single hole mounting

Approvals:

Auxiliary Products:

- **Quick connect to screw adaptor:**
P/N: P1015-18
- **Female quick connect:**
P/N: P1015-13 (AWG 10/12)
P/N: P1015-64 (AWG 14/16)
P/N: P1015-14 (AWG 18/22)

Available Models:

SIR1A10A6	SIR1B6B4
SIR1A6A2	SIR1C20B6
SIR1B10A4	SIR2A20A4
SIR1B10B4	SIR2B20A4
SIR1B20A4	SIR2B20B4

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

Order Table:

X Series
-SIR1 - Random Switching
-SIR2 - Zero Voltage Switching

X Control Voltage
-A - 9 - 30VAC or DC
-B - 90 - 150VAC or DC
-C - 190 - 290VAC or DC

X Rating
-1 - 3A
-6 - 6A
-10 - 10A
-20 - 20A

Solid-state Output Contact

X Form
-A - Normally Open
-B - Normally Closed

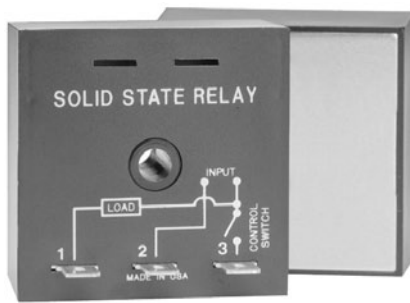
X Voltage
-2 - 24VAC
-4 - 120VAC
-6 - 230VAC

Specifications

Output	Optical isolation, totally solid state		
Type	SPST, NO or NC		
Form	24, 120, or 230VAC		
Voltage	±20%		
Tolerance	Steady State	Inrush*	Output Device
Ratings	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	Optical isolation LED/photo transistor		
Type	9 to 290VAC/DC in 3 ranges		
Control Voltage	≅ 0.5W		
Power Consumption			

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	2 x 2 x 1.51 in. (50.8 x 50.8 x 38.4 mm)
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	≅ 3.9 oz (111 g)

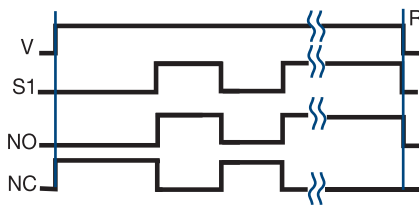
*Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.



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. Zero voltage switching SLR2 can extend the life of an incandescent lamp up to 10 times its normal life. Random switching SLR1 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.

For more information see:
Appendix B, page 165, Figure 4 for dimensional drawing.
Appendix C, page 172, Figure 38 for connection diagram.

Function:



V = Voltage
S1 = Initiate Switch
R = Reset
NO = Normally Open Output
NC = Normally Closed Output
— = Undefined time

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.

Features:

- SLR1 - Random switching for inductive loads
- SLR2 - Zero voltage switching for resistive & incandescent loads
- Normally open or normally closed output
- 1 - 20A with up to 200A inrush
- 0.25 in. (6.35 mm) termination with single hole mounting
- Noiseless switching, reliability, and long life

Approvals:   

Auxiliary Products:

- **Quick connect to screw adaptor:**
P/N: P1015-18
- **Female quick connect:**
P/N: P1015-13 (AWG 10/12)
P/N: P1015-64 (AWG 14/16)
P/N: P1015-14 (AWG 18/22)

Available Models:

SLR1410B
SLR1420A
SLR1610A

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

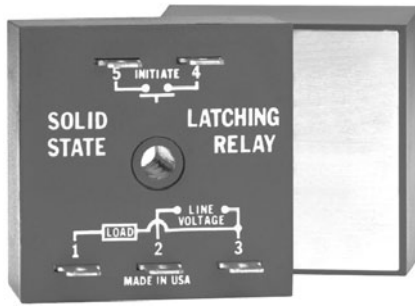
Order Table:

X Series	X Voltage	X Output Rating	X Output Form
-SLR1 - Random Switching -SLR2 - Zero Voltage Switching	-2 - 24VAC -4 - 120VAC -6 - 230VAC	-1 - 1A -6 - 6A -10 - 10A -20 - 20A	-A - Normally Open -B - Normally Closed

Specifications

Output (Contact)	Protection
Type Non-isolated solid state	Circuitry Encapsulated
Form SPST, NO or NC	Dielectric Breakdown $\geq 2000V$ RMS terminals to mounting surface
Voltage 24, 120, or 230VAC	Insulation Resistance $\geq 100M\Omega$
Tolerance $\pm 20\%$	Mechanical
Ratings Steady State Inrush* Output Device	Mounting* Surface mount with one #10 (M5 x 0.8) screw
1A 10A SCR & Bridge Rectifier	Dimensions 2 x 2 x 1.51 in. (50.8 x 50.8 x 38.4 mm)
6 A 60A Triac	Termination 0.25 in. (6.35 mm) male quick connect terminals
10A 100A Triac	Environmental
20A 200A Triac	Operating / Storage Temperature -20° to 60°C / -40° to 85°C
Minimum Load Current $\geq 50mA$	Humidity 95% relative, non-condensing
Voltage Drop (at Rated Current) $\geq 2.0V$ - 6, 10, & 20A units; $\geq 2.5V$ - 1A units	Weight 1A units: ≥ 2.4 oz (68 g); 6, 10, 20A units: ≥ 3.9 oz (111 g)
Leakage Current (Open State) $\leq 5mA$	
Initiate Switch Voltage Same as the output voltage	
Power Consumption $\leq 0.5W$	

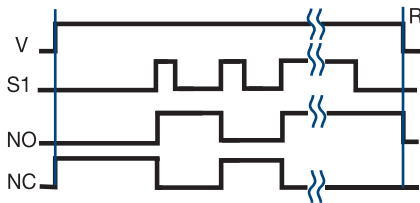
*Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.



The NLF1 and NLF2 Series provide a flip-flop latching function. Each time the control switch is closed, the solid-state output changes state and latches. The NLF Series has no isolation between the control switch and the solid-state output, which lowers cost and reduces the number of connections required. For use where the control switch is the same voltage source as the load. Zero voltage switching NLF2 extends the life of an incandescent lamp by up to 10 times. Random switching NLF1 is ideal for inductive loads. When accessory fully insulated female terminals are used on the connection wires, the system meets the requirements for touch-proof connections.

For more information see:
Appendix B, page 165, Figure 4 for dimensional drawing.
Appendix C, page 172, Figure 39 for connection diagram.

Function:



V = Voltage
S1 = Initiate Switch
R = Reset
NO = Normally Open Output
NC = Normally Closed Output
— = Undefined time

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. When S1 is closed, the solid-state output between terminals 1 and 2 closes (or opens). If S1 is opened and reclosed, the solid-state output will open (or close).

Reset: Open and reclose S1. Reset is also accomplished by removing and reapplying input voltage.

Features:

- Totally solid-state latching relay - encapsulated
- Non-isolated to reduce cost
- 1 - 20A with 200A inrush
- 24, 120, or 230VAC input voltages
- NLF1 - Random switching for inductive loads
- NLF2 - Zero voltage switching for lamp & resistive loads

Auxiliary Products:

- **Quick connect to screw adaptor:**
P/N: P1015-18
- **Female quick connect:**
P/N: P1015-13 (AWG 10/12)
P/N: P1015-64 (AWG 14/16)
P/N: P1015-14 (AWG 18/22)

Available Models:

NLF126A
NLF141A
NLF1620A

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

Order Table:

<p>X Series</p> <ul style="list-style-type: none"> -NLF1 - Random Switching -NLF2 - Zero Voltage Switching 	<p>X Input</p> <ul style="list-style-type: none"> -2 - 24VAC -4 - 120VAC -6 - 230VAC 	<p>X Output Rating</p> <ul style="list-style-type: none"> -1 - 1A -6 - 6A -10 - 10A -20 - 20A 	<p>X Output Form</p> <ul style="list-style-type: none"> -A - Normally Open -B - Normally Closed
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Specifications

Output		
Type	Non-isolated solid state	
Form	SPST, NO or NC	
Ratings	Steady State	Inrush*
	1A	10A
	6A	60A
	10A	100A
	20A	200A
Minimum Load Current	50mA	
Voltage Drop (at Rated Current)	≅ 2.0V - 6, 10, & 20A units; ≅ 2.5V - 1A units	
Leakage Current (Open State)	≅ 5mA	
Input		
Type	Non-isolated, switch contact (customer supplied)	
Voltage	24, 120, or 230VAC ±20%	
Power Consumption	≅ 0.5W	
Operations Per Second	≅ 5	

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	6, 10, 20A units: 2 x 2 x 1.51 in. (50.8 x 50.8 x 38.4 mm)
	1A units: 2 x 2 x 1.21 in. (50.8 x 50.8 x 30.7 mm)
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)

*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.



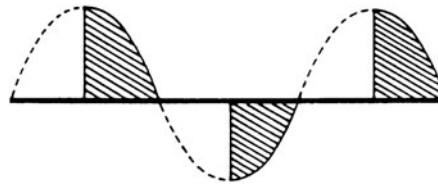
The PHS Series is an ideal method of changing lamp intensity, varying the speed of a fan/motor, or controlling the temperature of a heater. The effective output voltage is adjusted with an accessory external potentiometer suitable for line voltage applications.

For more information see:
Appendix B, page 165, Figure 4 for dimensional drawing.
Appendix C, page 172, Figure 40 for connection diagram.

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.

Typical Output Waveform



Features:

- External adjustment - 230VAC rated potentiometer
 - 120 or 230VAC input voltages available
 - Up to 20A steady state - 200A inrush
 - Single hole surface mounting
- Approvals:

Auxiliary Products:

- **Versa-knob:** P/N: P0700-7
- **Quick connect to screw adaptor:** P/N: P1015-18
- **Female quick connect:** P/N: P1015-13 (AWG 10/12)
P/N: P1015-64 (AWG 14/16)
P/N: P1015-14 (AWG 18/22)
- **Potentiometers:** P/N: P1004-174 (100kΩ 1W)
P/N: P1004-175 (200kΩ 2W)

Available Models:

PHS120A10	PHS230A10
PHS120A20	PHS230A20
PHS120A6	PHS230A6
PHS230A1	

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

Order Table:

PHS	X	X
	Input Voltage	Rating
	-120A - 120VAC	-1 - 1A
	-230A - 230VAC	-6 - 6A
		-10 - 10A
		-20 - 20A

Specifications

Output	Variable voltage phase angle control	Mechanical	
Type		Mounting *	Surface mount with one #10 (M5 x 0.8) screw
Rating	Steady State (at 100% On)	Dimensions	2 x 2 x 1.51 in. (50.8 x 50.8 x 38.4 mm)
	1A	Termination	0.25 in. (6.35 mm) male quick connect terminals
	6A	Environmental	
	10A	Operating / Storage Temperature	-20° to 60°C / -40° to 85°C
	20A	Humidity	95% relative, non-condensing
Minimum Load Current	100mA	Weight	1A: ≅ 2.4 oz (68 g) 6, 10, & 20A: ≅ 3.9 oz (111 g)
Voltage Drop	≅ 2.0V at rated current	External Adjustment Potentiometer	
Input		120VAC	100KΩ rated at 1W
Voltage	120 or 230VAC	230VAC	200KΩ rated at 2W
Tolerance	±20%		Must have insulation resistance suitable for line voltage applications.
AC Line Frequency	50/60Hz		
Protection			
Dielectric Breakdown	≥ 2000V RMS terminals to mounting surface		
Insulation Resistance	≥ 100MΩ		

*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.