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| PMP SERIES

PROPORTIONAL CONTROL SOLID STATE RELAYS

Introduction

The PMP Series of micro-controller based Single-Phase Proportional Control SSRs are designed to offer precise control of the power delivered to a resistive load in a compact 22.5mm housing, with ratings from 25 up to 90 Amps at 90 to 600 VAC. PMP Series solid state relays can vary the output load power proportionally to an analog control input from 0 to 100%. This can be achieved by two different methods: Phase Angle control and Burst Fire control (with Distributive Zero Cross). The control method to be used can be selected on the unit by means of a selector switch located on top of the SSR. This selector switch also allows to select the type of analog signal to be used at the control input. The available input types are: 0- 5 VDC, 0-10 VDC, and 4-20 mA. PMP Series Proportional SSRs are ideal for lamp dimming and resistive heating control, among other type of applications requiring proportional control.



Features

- Single Phase Proportional Controller
- Output ratings up to 90 Amps at 600 VAC
- Selectable operation mode: Phase Angle or Burst Fire control
- Selectable Control Input: 0-5 VDC, 0-10 VDC, 4-20 mA
- 50/60 Hz Adaptive Operational Frequency function
- 4-20 mA input does not require an auxiliary power supply
- LED multifunction status indicator
- Contactor configuration with “Elevator” screw terminals
- cURus, IEC Rated, CE & RoHS Compliant

PRODUCT SELECTION

Operating Voltage	25 A	50 A	90 A
90-280 VAC	PMP2425W	PMP2450W	PMP2490W
345-530 VAC	PMP4825W	PMP4850W	PMP4890W
420-600 VAC	PMP6025W	PMP6050W	PMP6090W

SPECIFICATIONS

Output Voltage (2)

Description	PMP24xxW	PMP48xxW	PMP60xxW
Operating Voltage (45-65Hz) [Vrms]	90-280	345-530	420-600
Transient Overvoltage [Vpk] 1	600	1200	1200
Maximum Off-State Leakage Current @ Rated Voltage [mArms]	4	2.2	2
Minimum Off-State dV/dt @ Maximum Rated Voltage [V/µsec]	500	500	500

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Output [2]

Description	25 A	50 A	90 A
Load Current, General Use UL508 @ 40°C [ARMS] [3]	25	50	90
Minimum Load Current [mArms] [4]	100	100	150
Maximum 1 Cycle Surge Current (50/60Hz) [Apk]	286/300	716/750	1290/1350
Maximum On-State Voltage Drop @ Rated Current [Vrms]	1.15	1.15	1.2
Maximum 1/2 Cycle I^2t for Fusing (50/60Hz) [A^2 sec]	409/375	2563/2343	8320/7593
Thermal Resistance Junction to Case (Rjc) [°C/W]	0.49	0.27	0.2
Maximum Power Dissipation @ Rated Current [W]	29	58	104
Recommended Heat Sink for Rated Current @ 40°C [°C/W]	2	1	0.36
Minimum Power Factor (at Maximum load)	0.7	0.7	0.7
Phase Angle Control Range [%]	0 to 100	0 to 100	0 to 100
Burst Fire Distributive Control Time Base Period	0 to 20 Cycles	0 to 20 Cycles	0 to 20 Cycles

Power Supply [2] [5] [6]

Description	PMP
Supply Voltage Range [VDC]	8-30
Maximum Supply Current [mA]	30
Overvoltage Protection	Limited to 35 VDC for 60 sec
Reverse Polarity Protection	Yes

Input [2]

Description	Voltage Control	Current Control
Valid Input Voltage [VDC] / Current [mA]	0-10, 0-5	4-20
Maximum Allowed Input Voltage [VDC] / Current [mA]	30	35
Maximum Reverse Voltage [VDC] /Current [mA]	-30	-35
Pick up Voltage [VDC] / Current [mA]	0.4	4.3
Dropout Voltage [VDC] / Current [mA]	0.1	4
Nominal Input Impedance [Ohms]	28.8k	230 @ 20 mA
Maximum Initialization Time [msec]	5 Cycles	5 Cycles
Response Time	1 Cycle	1 Cycle

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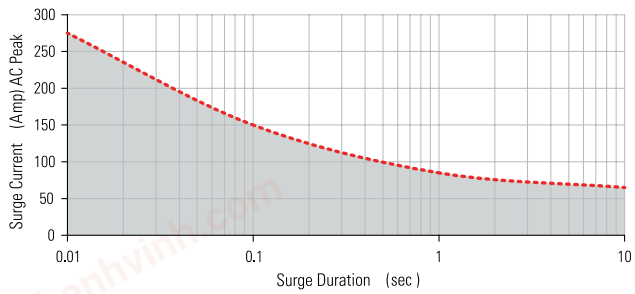
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General [2]

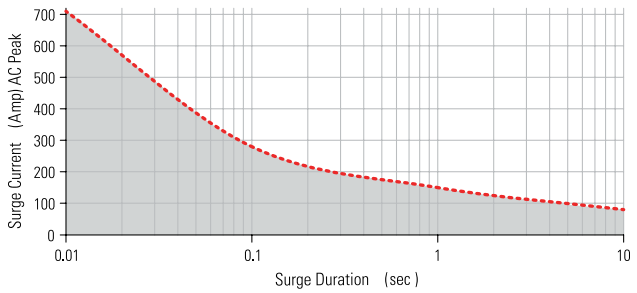
Description	Parameters
Dielectric Strength, Input to Output (50/60Hz)	4000 Vrms
Dielectric Strength, Input/Output to Baseplate (50/60Hz)	4000 Vrms
Minimum Insulation Resistance (@ 500 VDC)	10^9 Ohms
Maximum Capacitance, Input/Output	8 pF
Ambient Operating Temperature Range [7]	-25 to 70 °C
Ambient Storage Temperature Range [7]	-25 to 70 °C
Weight (typical)	2.6 oz (73 g)
Housing Material	UL94 V-0
Baseplate Material	Aluminum
Hardware Finish	Nickel Plating
SSR Mounting Screw Torque Range (lb-in/Nm)	20-25/2.2-2.8
Humidity per IEC 60068-2-78	93% non-condensing
LED Input Status Indicator	See Status Chart
Overvoltage Category	III
Impulse Withstand Voltage According to IEC 60664-1	6 kV
Adaptive Operational Frequency Function	Yes

SURGE CURRENT INFORMATION

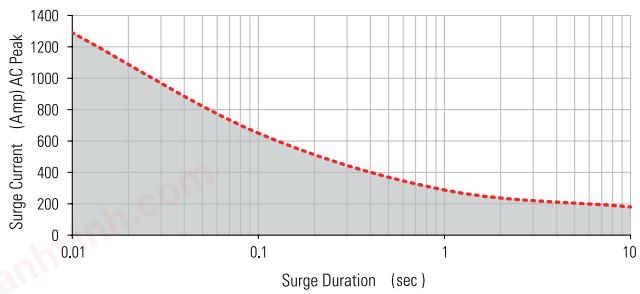
PMPxx25W



PMPxx50W



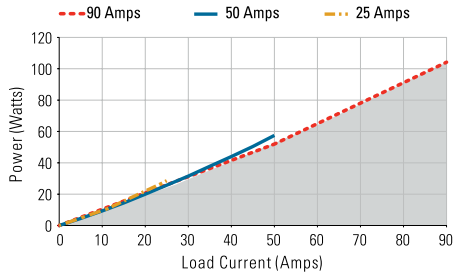
PMPxx90W



Single Pulse (8)

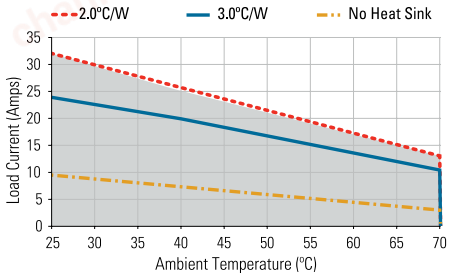
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POWER DISSIPATION

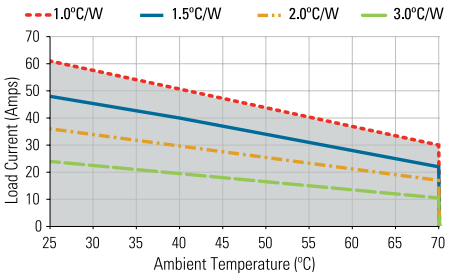


THERMAL DERATE INFORMATION [9]

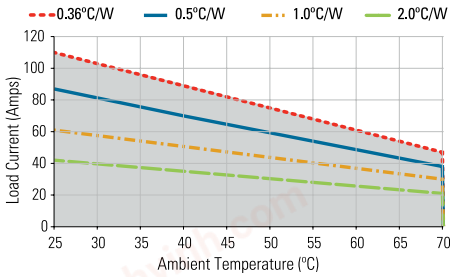
PMPxx25W



PMPxx50W

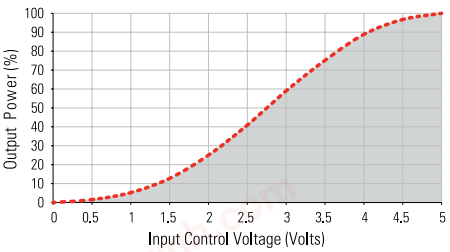


PMPxx90W

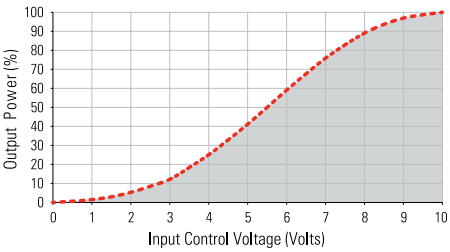


TRANSFER CHARACTERISTICS

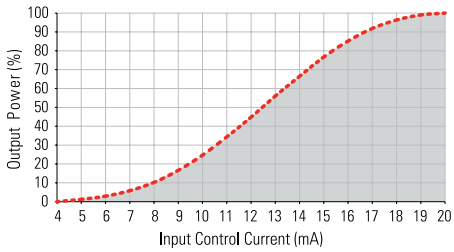
Phase Angle Control, 0-5 VDC Input



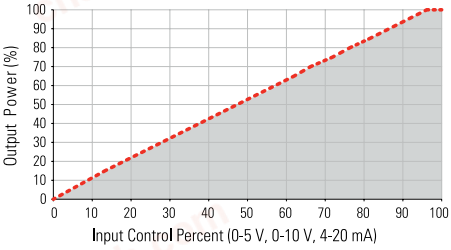
Phase Angle Control, 0-10 VDC Input



Phase Angle Control, 4-20 mA Input

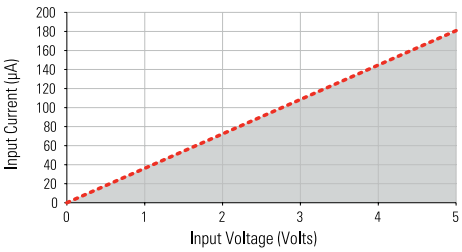


Burst Fire Control (All Input Options)

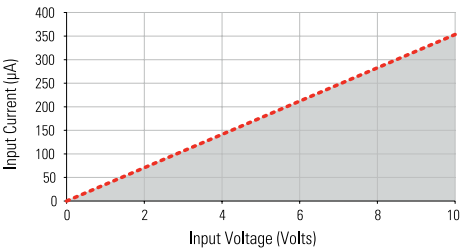


INPUT CURRENT VS INPUT VOLTAGE

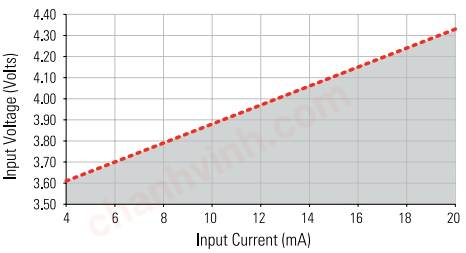
0-5 VDC Control Supply



0-10 VDC Control Supply



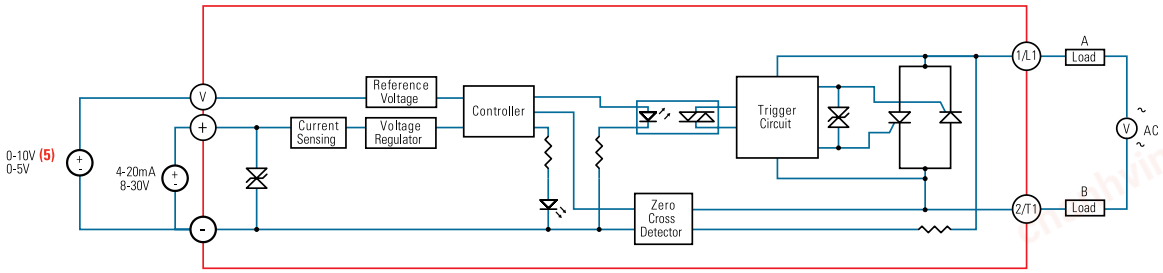
4-20 mA Control Supply



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EQUIVALENT CIRCUIT BLOCK DIAGRAM/WIRING DIAGRAM



INSTALLATION INSTRUCTIONS

Mounting on Heat Sink

- Select adequate heat sink (see thermal derating curves).
- Be sure to use a thermal pad or thermal compound (0.006-0.008 in layer thickness recommended) SSR and the selected heat sink.
- SSR housing mounting holes have a diameter of 0.341in (8.66mm). Two screws are needed to mount the SSR onto a heat sink (See Fig 1). Mounting screws are sold separately as HK8 and are suitable for all Crydom heat sinks. Otherwise, recommended screw size is 8-32 (socket) using an allen wrench (9/64 in) for the installation. Choose screw length considering mounting surface hole depth and SSR baseplate thickness of 0.125 in (3.2 mm).
- Before applying full torque tighten down both screws until they contact the baseplate. Then, tighten them to 20 in-lb (2.2 Nm) min.
- For optimal thermal performance heat sink fins should be oriented vertically to promote natural convection airflow.

Mounting on Panel

- Locate the panel section on which the SSR will be mounted. Panel mount surface must provide adequate heat sinking capability, uncoated, clean, flat (0.004 in/in recommended) and preferably aluminum.
- Be sure to use a thermal pad or thermal compound (0.006-0.008 in layer thickness recommended) between the SSR and the panel.
- SSR housing mounting slots have a diameter of 0.341 in (8.66 mm). Two screws are needed (not included) to mount the SSR onto a panel. Mounting screws are sold separately as HK8. Otherwise, recommended screw size is 8-32 (socket) using allen wrench (9/64 in) for the installation. Choose screw length considering the mounting surface and that the SSR baseplate thickness is 0.125 in (3.2 mm).
- Before applying full torque tighten down both screws until they contact the baseplate. Then, tighten them to 20 in-lb (2.2 Nm) min.

Wire input and output as shown in the Wiring Diagram. For recommended wire sizes and terminal torques see TABLE 1
Select operation mode using the parameter selector switch See TABLE 2

TABLE 1. Recommended Torque and Wire Sizes

Terminal	Max. Screw Torque [lb-in (Nm)]	Wire Size (Solid / Stranded)	Wire Pull-Out Strength (lb)[N]
Output	18-20 (2.0-2.2)	2 x 20 AWG (0.75 mm^2) [minimum]	25 [111]
		2 x 10 AWG (6 mm^2)	80 [355]
		2 x 8 AWG (10 mm^2) [maximum]	90 [400]
Input	5 (0.5)	28 AWG (0.09 mm^2) [minimum]	2.2 [9.8]
		28 AWG (0.09 mm^2) [minimum]	22 [98]

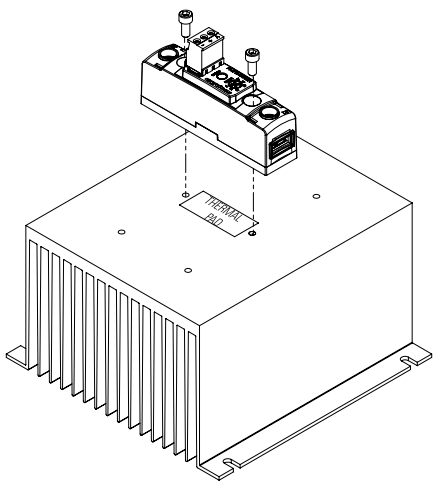
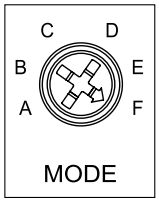


TABLE 2. Operation Mode

Parameter Selector Switch	Mode	Function
	A	Phase Angle, 0-5 VDC control
	B	Phase Angle, 0-10 VDC control
	C	Phase Angle, 4-20 mA control
	D	Burst Fire, 0-5 VDC control
	E	Burst Fire, 0-10 VDC control
	F	Burst Fire, 4-20 mA control

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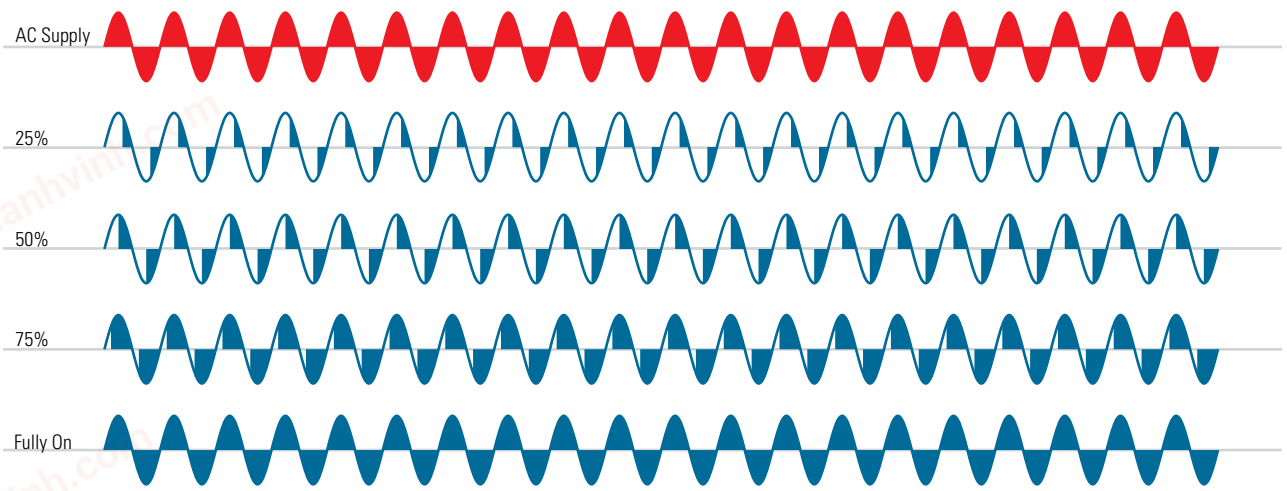
STATUS CHARTS

TABLE 3. LED Status		
Status	**LED Indicator**	**SSR Output**
No Mains Voltage [10]	Flashes twice intermittently	OFF
Frequency Out of Range	Flashes three times intermittently	OFF
Error on Selector	Flashes four times intermittently	OFF
Overtemperature [11]	Flashes five times intermittently	OFF
Phase Control	Varying brightness	ON
Burst Control	Varying pulsing rate	ON

Status Chart

Operation Condition	No Mains Voltage [10]	Frequency Out of Range	Error on Selector	Overtemperature [11]	Phase Control	Burst Control
Input						
SSR Output/ Load Current	870ms					
LED Indicator	150ms 280ms					

Phase Angle Control Operation Mode

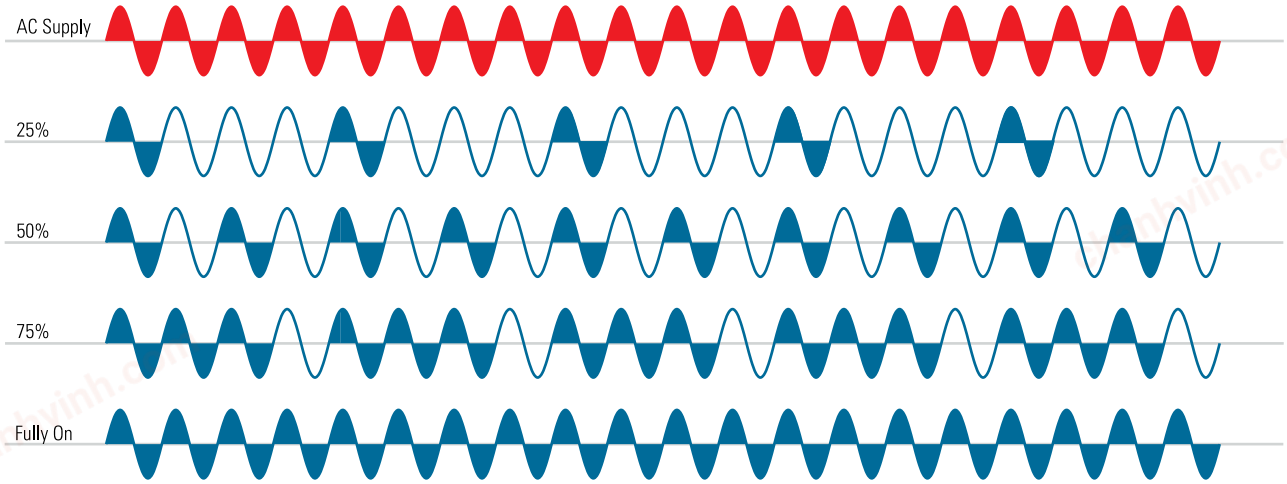


*Blue parts on waveform represent the output on the load

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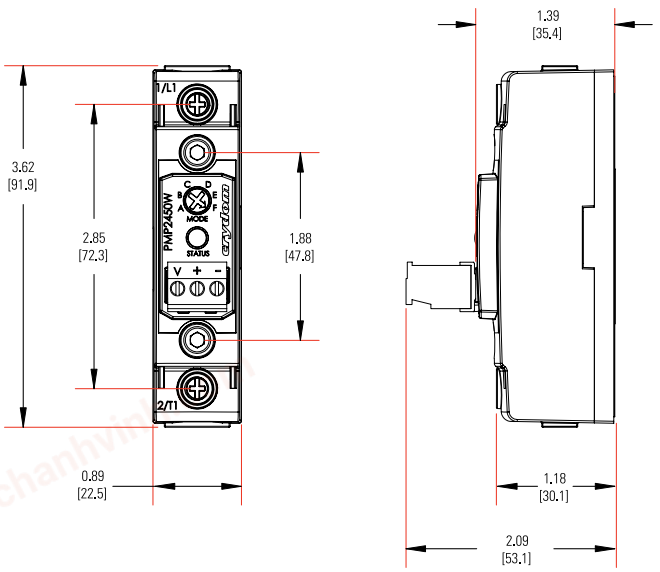
Burst Fire Control Operation Mode



*Blue parts on waveform represent the output on the load

MECHANICAL SPECIFICATIONS

*Tolerances: ±0.02 in / 0.5 mm All dimensions are in: inches [millimeters]



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ORDERING OPTIONS

Example : PMP2425WPH

PMP	24	25	W	P	H
Series	Operating Voltage	Rated Load Current	Terminal Layout	Overvoltage Protection [1]	Thermal Pad
PMP	**24:** 90-280 VAC **48:** 345-530 VAC **60:** 420-600 VAC	**25:** 25 Amps **50:** 50 Amps **90:** 90 Amps	**W:** Contactor Configuration (elevator screw)	**Blank:** Not Included **P:** Included	**Blank:** Not Included **H:** Included

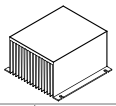
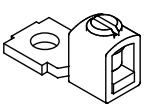
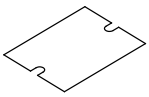
— Required for valid part number
☐ For options only and not required for valid part number

GENERAL NOTES

(1) **"P" option output will self-trigger between 450-600Vpk (for Operating Voltage option 24) or 900-1200Vpk (for Operating Voltage options 48 and 60). Not suitable for capacitive loads.**
(2) **All parameters at 25°C unless otherwise specified.**
(3) **Heat sinking required, see derating curves. For load currents greater than 50A use conductors with at least 75°C insulation.**
(4) **If load current is lower than SSR minimum current, connect resistor in parallel to the load to increase current.**
(5) **Not required for Current control.**
(6) **Input should be supplied by Class 2 or double insulated power supply.**
(7) **No freezing or condensation allowed.**
(8) **For single surge pulse Tc=25°C; Tj=125°C. For AC Output SSRs, AC RMS value of surge current equals the peak value divided by 2 (1.414).**
(9) **UL approved rating is the one that intersects at 40°C.**
(9) **This function is disabled when control signal is set at 100%.**
(10) **This condition can be caused by excessive ambient temperature, an incorrect heat sink or high input voltage. The condition will be cleared once the internal temperature cools down below 80 °C.**

ACCESSORIES

Recommended Accessories

 Hardware Kit	 Heat Sink Part No.	Thermal Resistance [°C/W]	 Lug Terminal	 Thermal Pad
HK8	HS259DR HS073 HS072 HS053 HS033 HS023	2.5 0.7 0.7 0.5 0.36 0.25	TRM0 TRM6	HSP-7

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AGENCY APPROVALS & CERTIFICATIONS

Conformances

United States Standard for Industrial Control Equipment - UL 508 and
Canadian Standard Association for Industrial Control Equipment – C22.2 No. 14.

Vibration Resistance: IEC 60068-2-6: Amplitude Range 10-500 Hz, Displacement 0.75mm

Shock Resistance: IEC 60068-2-27: Peak Acceleration 50g, Duration11ms.

Electromagnetic Compatibility				
Generic Standard	**Immunity Tests**	**Test Specification Level**		**Performance**
IEC 61000-6-2 Immunity for Industrial Environments	Electrostatic Discharge IEC 61000-4-2	8kV air discharge		Criterion A
		6kV contact discharge		Criterion A
	Fast transients (burst) IEC 61000-4-4	Output	2kV, 5kHz, 100kHz	Criterion B
		Input	1kV, 5kHz, 100kHz	Criterion B
	Surge IEC 61000-4-5	Output	1kV Line to Earth	Criterion B
			2kV Line to Earth	Criterion B
		Input Power Option	500 VDC +/-	Criterion A

WARNINGS



RISK OF MATERIAL DAMAGE AND HOT ENCLOSURE

- The product's side panels may be hot, allow the product to cool before touching
- Follow proper mounting instructions including torque values
- Do not allow liquids or foreign objects to enter this product

Failure to follow these instructions can result in serious injury, or equipment damage.



HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power before installing or working with this equipment
- Verify all connections and replace all covers before turning on power

Failure to follow these instructions will result in death or serious injury.

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CONTACT US

Americas
+1 (877) 502 5500
sales.crydom@sensata.com
Europe, Middle East & Africa
+44 (1202) 416170
ssr-info.eu@sensata.com
Asia Pacific
sales.isasia@list.sensata.com
China +86 (21) 2306 1500
Japan +81 (45) 277 7117
Korea +82 (31) 601 2004
India +91 (80) 67920890
Rest of Asia +886 (2) 27602006 ext 2808