Power-IO™

H Family of Solid State Relays
1-125 Amps
up to 330 Vac or 660 Vac switched

- **Maximum Surge Survival**™ technology for triple-layer surge protection
- Internal, oversized components + advanced direct copper bonding capability = increased reliability, less thermal rise, and longer life
- Optically isolated for 4000 volt isolation
- International green input status LED
- International terminal markings (L1, T1, A1, A2)
- 800 volt transient blocking voltage (in the 3V models)
- 1200 volt transient blocking voltage (in the 6V models)
- Precise zero voltage turn-on for low EMI (noise) without the need for CE filters or other external components
- Internal, rugged, snubber circuit for robust performance on all models
- Clear safety cover included
- All parameters are at 40°C, as required by the latest CE EN60947-4-3, which is the industrial SSR specification (toughest specification).
- New 90 -125 amp models. Ultra high inrush capability and rugged performance for industrial, commercial or laboratory applications.

1-75 amps
76 -125 amps, approvals pending

Model Numbers	DC Control input	HDA-3V25	HDA-3V50	HDA-3V90	HDA-6V50	HDA-6V90	HDA-6V125
	AC Control input	HAA-3V25	HAA-3V50	HAA-3V90	HAA-6V50	HAA-6V90	HAA-6V125

Items marked in green are engineering enhancements that typically lead the industry resulting in better, long term performance.

Output Specifications (All shown at **40°C**, per CE EN60947-4-3, and tested on appropriate heat sinks)

Operating Voltage (47-63 Hz) [Vrms}	24-330	24-330	24-330	24-660	24-660	24-660
Max Load Current [Arms] with heat sink	25	50	90	50	90	125
Min Load Current [Arms]	0.10	0.10	0.15	0.10	0.15	0.15
Transient Overvoltage [Vpk]	800	800	800	1200	1200	1200
Max Surge Current for 16.7ms [Apk]	250	625	1500	625	1500	1800
Max On-State Voltage Drop @ Rated Current [Vpk]	1.6	1.5	1.3	1.5	1.3	1.3
Thermal Resistance Junction to Case [°C/W]	0.97	0.34	0.14	0.34	0.14	0.11
Max I^2T for fusing (8.3 msec) [A^2sec]	260	1620	11250	1620	11250	16000
Max. Off-State Leakage @ Rated Voltage [mArms]	5	10	10	10	10	10
Min Off-State dv/dt @ Max Rated Voltage [V/µsec]	>750	>2000	>3000	>2000	>3000	>3000
Max Turn-On Time	1/2 sinewave (HDA), 1 sinewave (HAA), max imbalance = 1/2 sinewave					
Max Turn-Off Time	1/2 sinewave (HDA), 1 sinewave (HAA), max imbalance = 1/2 sinewave					

Input Specifications (All shown at -40°C to +85°C)

Control Voltage Range	DC Control: 4-32 Vdc. AC Control: 100-280 Vac, 47 - 63 Hz					
Min Turn-Off Voltage (HDA DC control models)	1 VDC / 0.02mA.					
Min Turn-Off Voltage (HAA AC control models)	20 Vrms / 2mA (> than most PLC's triac leakage = eliminates false activation)					
HAA models can be activated by triac output PLCs, PID controllers, etc. typically WITHOUT the extra burden resistor.						
Control inputs are **current limited** (consistent mA) and include the green "input status" LED requirements						
HDA -Nominal Input Current Regulation @ 4-32 Vdc	8 mA	5 mA	5 mA	5 mA	5 mA	5 mA
HAA -Nominal Input Impedance of 10K @ 120 Vac	12 mA	12 mA	12 mA	12 mA	12 mA	12 mA
HAA -Nominal Input Impedance of 12K @ 240 Vac	20 mA	20 mA	20 mA	20 mA	20 mA	20 mA

General Specifications

Dielectric Strength: Input / Output / Base	4000 Vrms
Ambient Operating Temperature Range	-40°C to 85°C, when used with an appropriate heat sink and air flow
Ambient Storage Temperature Range	-40°C to 125°C
Terminals	Four screws and saddle clamps provided, unmounted
Screw torque:	6-32 screws 10 inch lbs (1.13 N.m); 8-32 screws 20 inch lbs (2.26 N.m).
Max wire size (copper wire only)	Output: 2 of 8 AWG (3.88 mm) Input: 2 of 12 AWG (2.5 mm)
Safety Cover	IP20, clear, snap on, with 4 holes for multi-meter test probes
Shipping	4.2 oz (130.6 g) weight typical. Box = 3.5x2x1.5 inches (87.5x50x37.5 mm)

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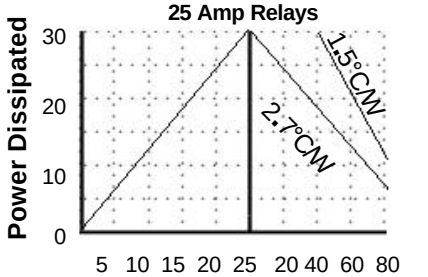
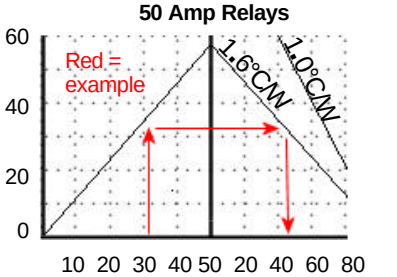
Heat sink calculations. The graph on the left shows the total power dissipated as watts of heat, when the relay is in the "on" state. The graph on the right shows how different heat sinks will "typically" dissipate this heat when in different ambient temperature applications, where unrestricted air is permitted to flow up and through the heat sink. Between the relay and the heat sink, you should install: a Power-IO thermal transfer pad, OR a 0.002 thick layer of Dow Corning 340™ thermal transfer compound, OR an equivalent thermal transfer gel. The relay should be screwed to the heat sink with a mounting torque of 20-30 in/lbs.

25 Amp Relays



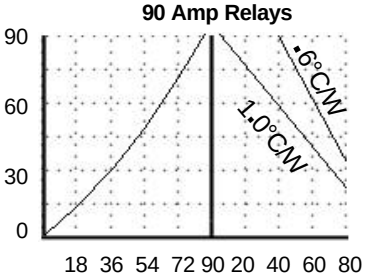
Max Base Plate=85°C
Rt=0.021 ohms Pwr Ref: V_0=0.80V_0

50 Amp Relays



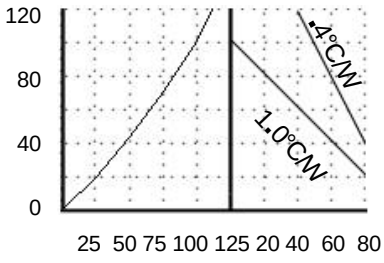
Max Base Plate=95°C
Rt=0.0092 ohms Pwr Ref: V_0=0.80V_0

90 Amp Relays



Max Base Plate=100°C
Rt=0.0039 ohms Pwr Ref: V_0=0.80V_0

125 Amp Relays



Max Base Plate=100°C
Rt=0.0029 ohms Pwr Ref: V_0=0.80V_0

Math calculations, in place of the chart information:
1) Power dissipation (heat generated) for a Power-IO solid state relay:

$(0.9 \times Irms \times V_0) + (Irms^2 \times Rt)$ = watts of heat generated

For example: Use a HDA-6V50 (50 amp relay) for a 31 amp application:
(0.9 x 31Amps x 0.80) + (31Amps² x 0.0092 ohms) = 31.16 watts of heat

2) What size heat sink do I need?:

(Max Base Plate Temp - Max Ambient Temp) / Watts Dissipated = ___°C/W

For example: For the solid state relay in example 1 above,
(95°C max base plate - 45°C industrial installation) / 31.16 watts = 1.6°C/W
You need a heat sink that is rated 1.6 °C/W or LOWER. The Power-IO 1.6°C/W heat sink would be a good choice and the 1.0°C/W heat sink would offer even better performance. Our calculations include the thermal junctions between the relay, the thermal compound, and the heat sink. We also use a conservative 115°C max for the heat sink which is 10°C below the theoretical 125°C limit.

Custom products:
Power-IO is also able to produce solid state relays for other amperage ranges, control inputs, line frequencies, or voltage ranges. The relays can be built as pre-assembled packages including heat sinks, thermal pads, and other components. Please contact us for a quotation for custom products.

Precautions:
The products that are designed, manufactured, or sold by POWER-IO are intended to be installed and serviced by trained personnel. In addition, there are local, national, factory, and other regulations (sometimes referred to as the NEC, National Electrical Code, OSHA, or equivalent) that must be strictly followed during the installation and use of any POWER-IO product. Failure to follow all of these regulations can result in downtime, damage, injury, or death. It is important that the customer anticipate the temperature requirements of the product. To ensure the longest possible life, it is customary that the electrical design not exceed 80% of the max amperage for relays, circuit breakers, fuses, wiring and other electronic components in an installation, when at the full operating temperature. Power-IO warrants its products for a period of 2 years from the date of manufacture to be free from defects in both workmanship and materials. See www.power-io.com for further information.

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