

Power-IO™

H Family of Solid State Relays 1-90 Amps up to 277 Vac or 600 Vac switched

- **Maximum Surge Survival™** technology for triple-layer surge protection
- Internal, oversized components = 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)
- 1600 volt transient blocking voltage (in the 6V models)
- Clear safety cover included
- 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
- All parameters are at 40°C, as required by the latest CE EN60947-4-3, which is the industrial SSR specification (toughest specification).
- UL 60947 (UL 60947 replaces UL 508 and is encouraged for all new applications by late 2017)
- Made in the USA



Model Numbers	DC Control input	HDA-3V25E	HDA-3V50E	HDA-3V90E	HDA-6V50E	HDA-6V90E
	AC Control input	HAA-3V25E	HAA-3V50E	HAA-3V90E	HAA-6V50E	HAA-6V90E

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, on appropriate sized heat sinks)

Operating Voltage (47-63 Hz) [Vrms]	24-277	24-277	24-277	24-600	24-600
Max Load Current [Arms] with heat sink	25	50	90	50	90
Min Load Current [Arms]	0.10	0.10	0.15	0.10	0.15
Transient Overvoltage [Vpk]	800	800	800	1600	1600
Max Surge Current for 16.7ms [Apk]	260	560	1500	560	1500
Max I ² T for fusing (8.3 msec) [A ² sec]	560	2600	18600	2600	18600
Max. Off-State Leakage @ Rated Voltage [mArms]	10	10	10	10	10
Off-State dv/dt @ Max Rated Voltage [V/μsec]	1000	2000	2000	2000	2000
Power dissipation (watts of heat per amp switched)	1.1	1.2	1.2	1.2	1.2
Max Baseplate Temperature Permitted at Full Current	90C	100C	100C	100C	100C
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)

DC Control Voltage Range (LED ON at 3.5 VDC)	3-32 VDC	3-32 VDC	3-32 VDC	4-32 VDC	4-32 VDC
AC Control Voltage Range	AC Control: 90-264 Vac, 60 Hz				
Min Turn-Off Voltage (HDA DC control models)	1 VDC/0.02mA.			2 VDC	2 VDC
Min Turn-Off Voltage (HAA AC control models)	30 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 Requirement Minimum	5.5 mA	5.5 mA	5.5 mA	5.5 mA	5.5 mA
HDA -Nominal Input Current Limit [Typical]	8 mA	8 mA	8 mA	8 mA	8 mA
HAA -Nominal Input Impedance [Ohms, typical]	15K	15K	15K	15K	15K

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 8-32 screws and saddle clamps provided, pre-installed
Screw torque:	Control screws 15 inch lbs.; Power screws 20 inch lbs.
Safety Cover	Clear, snap on, with 4 holes for multi-meter test probes or screwdrivers
Shipping [Typical]	Weight = 3.0 oz (85 g). Box = 2.6 x 2 x 1.5 inches (66 x 50 x 37.5 mm)

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Heat sink calculations. The solid state relay generates approximately 1.1 - 1.2 watts of heat for every amp being switched, when ON. If you fail to properly heat sink that thermal rise, the solid state relay will increase in internal temperature and it will fail. The purpose of a properly sized heat sink is to remove this thermal rise so that the maximum base plate temperature is never exceeded. 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 FIRMLY (20 inch pounds) to the heat sink in order to achieve the best thermal transfer capability.

Math calculations:

1) Power dissipation (heat generated) for a Power-IO solid state relay:

AMPS x 1.2 thermal rise

For example: Use a HDA-6V50E (50 amp relay) for a 31 amp application:

$31 \times 1.2 = 37.2$ watts of heat.

2) What size heat sink do I need?:

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

For example: For the solid state relay in example 1 above,

$(100^{\circ}\text{C max base plate} - 40^{\circ}\text{C warm industrial installation}) / 37.2 \text{ watts} = 1.61 \text{ C/W}$

You need a heat sink that is rated 1.61 °C/W or LOWER, when installed in a warm industrial installation. The Power-IO 2.0C/W heat sink would be a weak choice and the 1.0°C/W heat sink would be a stronger choice. Our calculations include the thermal junctions between the relay, the thermal compound, and the heat sink.



A Power-io solid state relay, installed on a HEATSK-DIN-2.0
The assembly part number is:
H _ _ _ _ -HS2.0

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A Power-io solid state relay, installed on a HEATSK-DIN-1.0U

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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 National Electrical Code, NEC, 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 1 year from the date of manufacture to be free from defects in both workmanship and materials. See www.power-io.com for further information.