Power-IO™

HDD Family of Solid State Relays
Up to 75 Amps
Up to 600 Vdc switched

- Internal, oversized components + advanced metalized ceramic design = increased reliability, less thermal rise, and longer life
- Green LED that indicates input status for fast, visual diagnostics
- Optically isolated for 1500 volt isolation and 2100 volt peak
- **15 kHz, FAST** switching times for superior, consistent performance
- High immunity to voltage transients
- Directly compatible with PLCs, PCs, and most controllers
- Clear, IP20 finger-safe, snap on cover included
- Ideal for activating robotics, PWM loads, test equipment, DC servos, drone vehicle accessories, battery powered products, ATM motors, H Bridge, battery back-up systems, and alternative energy applications
- All parameters shown are at 40℃, a factory-hardened specification
- IGBT model HDD-6V15 for 0-600 Vdc applications
- Ultra low leakage HDD-2V14 for automatic test equipment applications

Model Numbers	HDD-06V75	HDD-1V20	HDD-1V40	HDD-2V14*	HDD-2V25	HDD-6V15

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

Output Specifications (All shown at 40℃, which is the typical industrial requirement, on appropriate heat sinks)

Operating Voltage, Vdc, Most Switched Loads	0-60	0-100	0-100	0-200	0-200	0-600
Operating Voltage, Motors or Highly Inductive Loads	0-30	0-50	0-50	0-100	0-100	0-300
Max Load Current [Continuous Arms] W/ Proper Heat Sink	75	20	40	14	25	15
Min Load Current [Arms]	0	0	0	0	0	0
Max Surge Current, Non-Repetitive	350	60	120	42	75	60
Max On-State Voltage Drop, Vdc @ Rated Current**	1.1	1.5	1.5	2.1	1.9	2.2
Thermal Resistance Junction to Case [℃/W]	0.55	1.0	0.55	1	0.55	1
Max. Off-State Leakage @ Rated Voltage @50℃ (Max)	1mA	2mA	2mA	25µamp	2mA	600µamp
On-State Resistance, Max, Ohm @ Current Output*	0.02	0.069	0.034	0.15	0.075	IGBT
Internal switching component	mosfet	mosfet	mosfet	mosfet	mosfet	IGBT
Max Turn-On Time, Control Input >8VDC, Line >8VDC	25µsec	25µsec	25µsec	150µsec*	25µsec	25µsec
Max Turn-Off Time, Control Input >8VDC, Line >8VDC	25µsecond					

** at 40℃ base plate temperature. At higher base plate temperatures, consult factory. Always use a properly sized heat sink!

High Speed On/Off Frequency Test: 100% of relays tested at 15Khz @50% duty cycle @10V control input. This is a PWM of 33 µsecond "on", 33 µsec "off", 33 µsec "on"….

*HDD-2V14 is tested at a slower turn ON speed and has a smaller leakage current when OFF.

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

Control Voltage Range	4-32 Vdc, with a green LED to indicate input status	
Min Turn-On Voltage and Current (-40℃ to 25℃)	4.35 Vdc / 10mA	4 Vdc / 10mA
Min Turn-On Voltage and Current (25℃ to 85℃)	4.35 Vdc / 10mA	3.75 Vdc/10mA
Max Turn-On Voltage and Current	32 Vdc / 20mA	
Max Turn-Off Voltage	1 Vdc	

General Specifications

Dielectric Strength: Input / Output / Base Plate	1500 Vrms, 2100 Vpk
Input To Output Capacitance	8pf
Ambient Operating Temperature Range	-40℃ to 85℃ when used with an appropriate heat sink and air flow
Ambient Storage Temperature Range	-40℃ to 125℃
Terminals	Four screws and saddle clamps provided, unmounted
Screw torque:	Control: 6-32 Screws 10 inch lbs.; Power: 8-32 screws 20 inch lbs.
Safety Cover	Clear, snap on, with 4 holes for multi-meter test probes
Shipping weight and size:	4.2 oz (130.6 g) typical. Box = 3.5x2x1.5 inches (87.5x50x37.5 mm)

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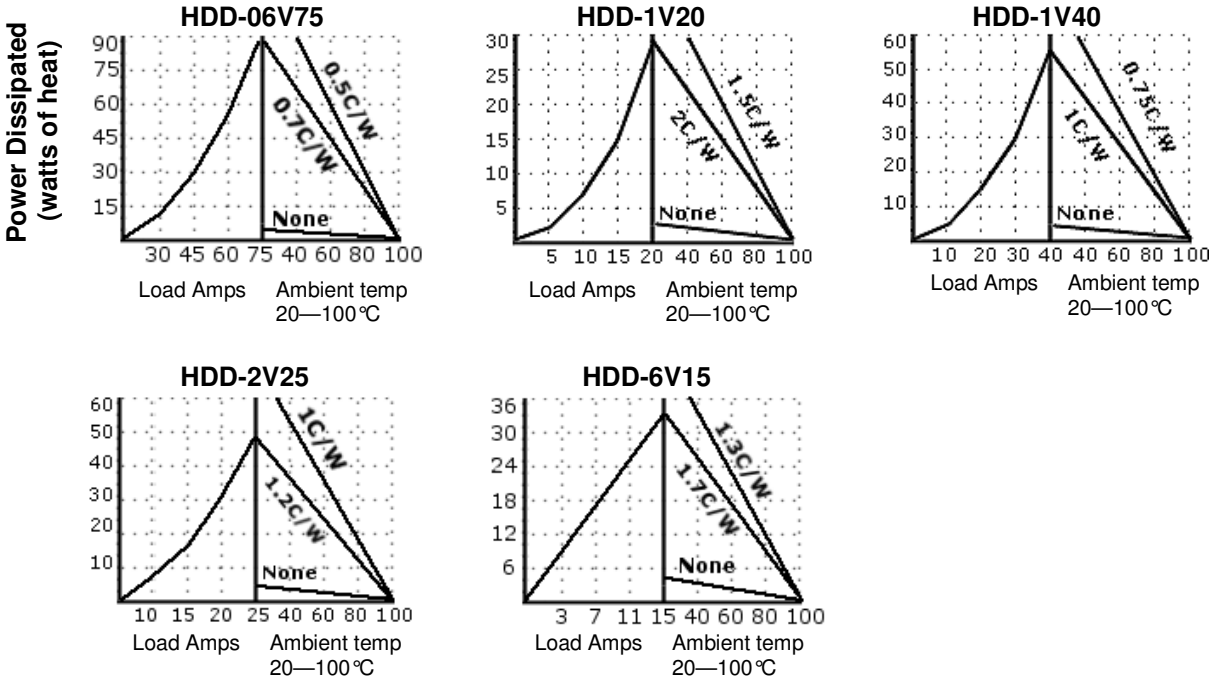
Heat sink calculations. The graph on the left shows the total power dissipated as watts of heat, when the relay is in the "on" state. The graph on the right shows how different heat sinks will "typically" dissipate this heat when in different ambient temperature applications, where unrestricted air is permitted to flow up and through the heat sink. As shown in the graphs, if you use no heat sink, the product must be de-rated to less than 5 amps.



Math calculations, in place of the chart information:

Thermal rise — Mosfet Based Models HDD-06Vxx—HDD-2Vxx:
Power dissipation (heat generated) for a Power-IO solid state relay for a Vdc switching application:

Amps squared x "on-state resistance max ohms"

For example: for a HDD-1V20 that is switching a 12 amp load: 12 x 12 x .069 = 9.94 watts (heat) power dissipation.

Thermal rise — IGBT Based Model HDD-6V15:
Power dissipation (heat generated) for a Power-IO solid state relay for a Vdc switching application using IGBTs:

Amps x 2.2

For example: a HDD-6V15 that is switching a 5 amp load. 5 x 2.2 = 11 watts (heat) power dissipation.

Recommended heat sink size:

(100 - ambient °C temperature) / (watts of power dissipation x 1.4)

For example: for a HDD-1V20 that is switching 12 amps in a 40°C warm electrical enclosure in a factory: (100 - 40°C) / (9.94 watts x 1.4) = 4.31
The required heat sink should be rated as 4.31°C/W or a SMALLER °C/W. The smaller the °C/W rating, the better the heat sink is at dissipating the heat. A 4°C/W heat sink would be good, and a 3°C/W or a 2°C/W would be better. Always use an adequate heat sink. Consult the www.power-io.com website for several high performance heat sinks.

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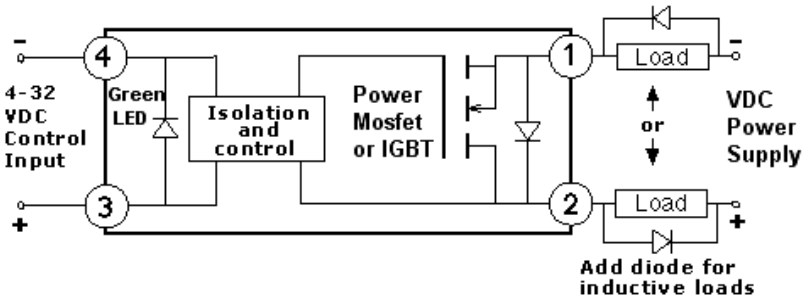
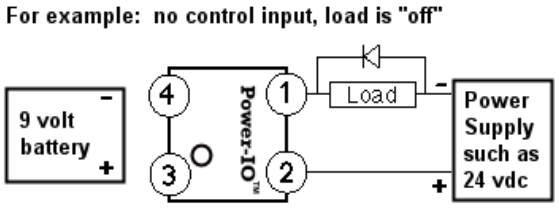
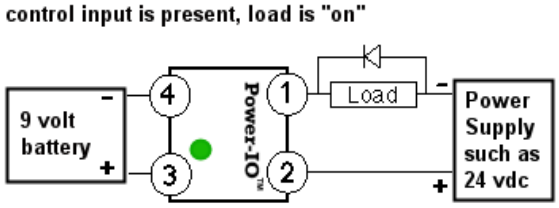


Installation instructions:
The relay should be installed on a heat sink using a Power-IO thermal pad or Dow Corning 340™ thermal transfer grease. The heat sink installation screws should be torqued to 20-25 inch pounds to ensure a firm thermal connection between the relay and the heat sink. The heat sink should be installed so that the unrestricted air flows up and through the heat sink's fins. When using the relay to activate inductive DC loads (most DC loads are somewhat inductive), always use a fast recovery diode that has a PIV rating greater than the VDC line voltage. For example: a recommended diode is a 2-3 amp diode, with a 600-800V reverse voltage, at 75ns (Power-IO PN: HDD_DIODE). This can be purchased from Power-IO or from other electrical suppliers. The purpose of the external diode is to minimize damage from the momentary EMF voltage surges that occur when an inductive load is turned OFF.

The maximum amperage and voltage of the solid state relay is shown in the part number and the data bulletin. Avoid amperage or voltage surges that exceed these values.

The solid state relay can be quickly tested by using a 9 volt battery as the control input signal on screw terminals 3 and 4. The Power-IO green "input status" LED will illuminate, and your load should turn ON.





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, SAE 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 full operating temperatures. 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.

Power-IO 537 Braemar Avenue Naperville, IL 60563 USA Tel: 630-717-7335 Specifications subject to change without notice.
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