



## HELLROARING TECHNOLOGIES, INC.

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### HBD-50250-600V-5P-TTL

The **HBD-50250-600V-5P-TTL** is designed for DC power switching to loads that require polarity reversal. Designed for power source voltages up to 300 Vdc (600 Vdc max across the terminals with transients). It switches either polarity with a 5 volt power source and TTL control input relative to the 5V common. This Solid State H-Bridge Driver provides fast switching transitions of less than 10 microseconds and it has the following additional features.

**Under voltage shutdown** (shuts down if the power source becomes inadequate.)

**Overcurrent shutdown** (shuts down if current exceeds a set threshold of voltage across the output transistors) Factory set to approximately 200 amps. Higher peak pulse currents to 250 amps can be obtained by disabling the overcurrent protection feature. This is done by removing the wires from 3, 6, 9, and 12, and then jumping 3 to 1, 6 to 4, 9 to 7, and 12 to 10. After doing this, more care should be used to ensure that excess current does not remain ON for excessive time as there is a higher risk of damage without the over current shutdown circuit active.

Should you have a specific application or question not covered here, feel free to send an e-mail technical support request. Include as much detail as practical regarding your application. Send to: [sales12@hellroaring.com](mailto:sales12@hellroaring.com). Or check our web site for current e-mail address.

Depending on your power source capability and wire size utilized, appropriate circuit protection should be installed. The following table includes recommendations for wire protection values. In all cases, we recommend using circuit protection no greater than 60 amps.

Wire Size AWG	Circuit protection
4	150 A
6	100 A
8	60 A
10	40 A
12	25 A

The circuit protection listed is for continuous current.

# Hellroaring HBD-50250-600V-5P-TTL Instructions

## Industrial Switching Applications:

Wire per diagram illustrated below. **Diode suppression** for inductive loads is recommended for most applications. An external **transient suppression device is required** across the output terminals. The value chosen should be above the max power source voltage and less than 600 volts at the transient current level expected. We recommend one with a standoff voltage of about 350 Volts.

For installation, follow these steps:

1. Connect the load to the Output terminals. The switched output polarity will be per the logic input on the polarity input terminal.
2. Connect the power source Negative (-) and Positive (+) cables (not powered yet). We suggest using appropriate circuit protection (**fuse or circuit breaker**). **Important!** to ensure the transient energy of an inductive load goes into the transient suppression module, the power source needs to have reverse polarity blocking such as through a diode capable of carrying your power source current and have a PIV greater than 600V. This is because when the output terminals are energized by the load such as the collapsing field of the inductance, it will feed that voltage back to the power source. So, for power sources such as a battery, it will be necessary to feed its power through a diode if you desire to have the inductive kickback to build up to the TVS voltage. Otherwise the that voltage will be limited by the battery voltage and lengthen the transient duration. For power supplies that naturally block reverse voltage, it needs to be capable of blocking in excess of 600V without damage.
- 2) Connect a regulated +5 Vdc to the +5V input terminal.
- 3) Connect the 5V return to the RTN terminal.
- 4) Connect the ON/OFF and Polarity input terminals to your logic signals. These should be fast rise time TTL compatible signals. Route these cables away from any load wires so the switching transients are less likely to be interfere with the control inputs.

The unit is now ready for switching. Apply the + 5V power. Apply your high voltage power source. Then apply your logic inputs as desired.

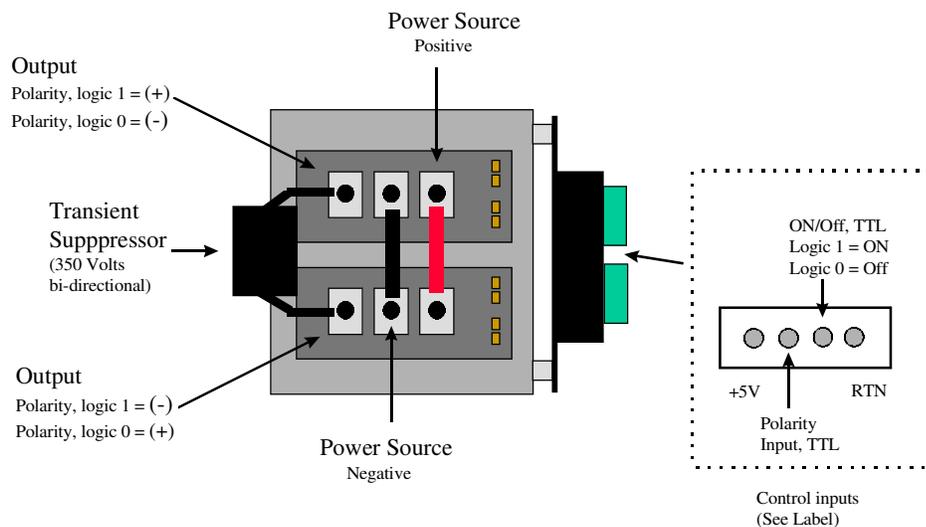
## Figure 1

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9/29/2003

### HBD-50250-600V-5P-TTL

H-Bridge Driver, 600V, 50 amp continuous to 250 amp pulse max

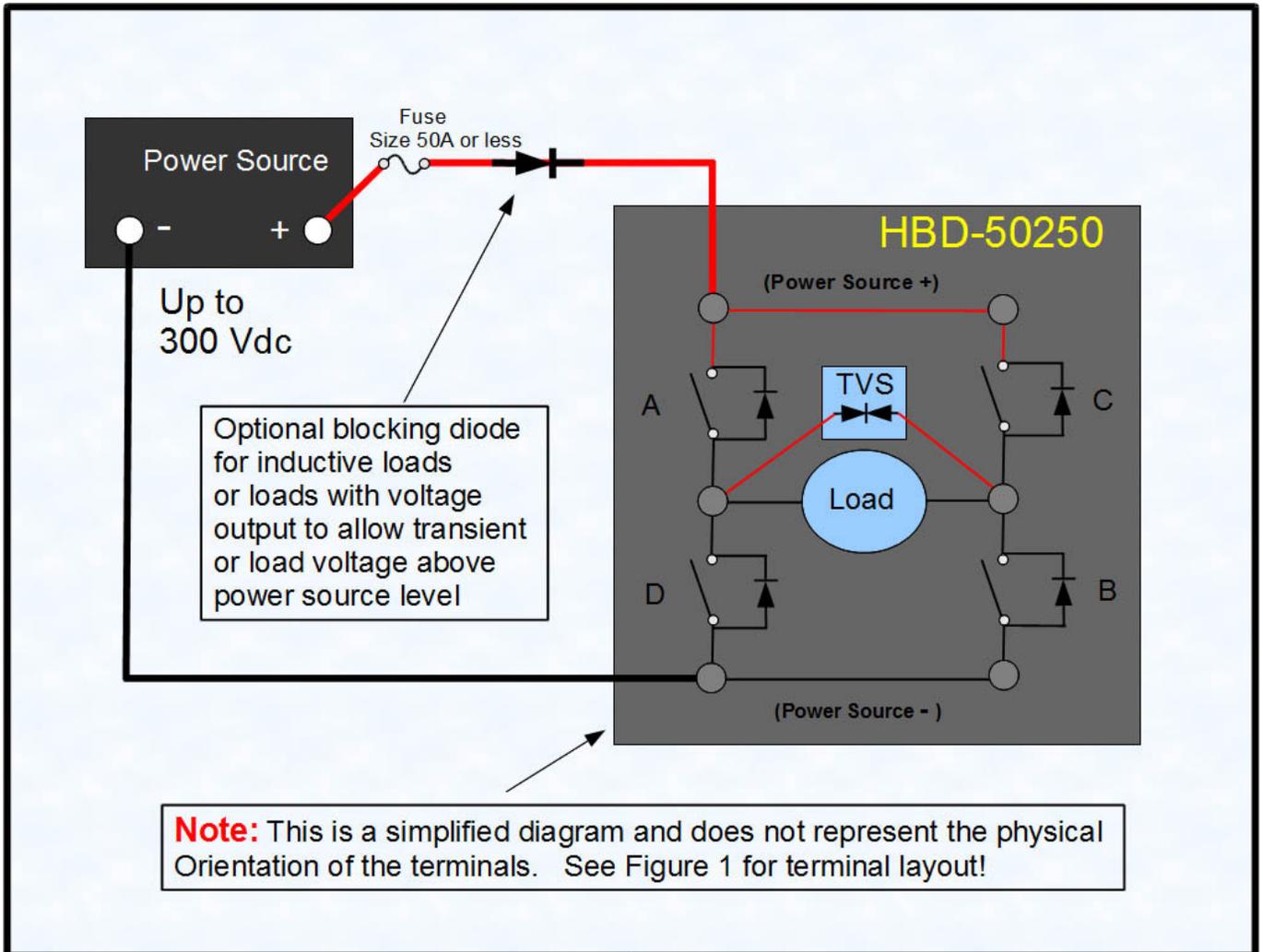
(Limit power source to less than the TVS rating (350V))



**Note: Output polarity is reverse from above on Rev B & up.**

For applications assistance, you can send e-mail to [sales12@hellroaring.com](mailto:sales12@hellroaring.com).

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When ON, switches A and B turn On, for one polarity, or switches C and D turn ON for the opposite polarity. When the load generates a high voltage such as an inductive kickback, that voltage will be fed back towards the power source through the diodes. If the power source is a battery and unless a blocking diode is used, the transient will dissipate into the battery as a charge and the transient voltage will be limited by the battery voltage. If the power source is a power supply, and if it has internal reverse current blocking, it needs to be capable of greater than 600V applied to it without it being damaged.

# Hellroaring HBD-50250-600V-5P-TTL Instructions

## **Definitions:**

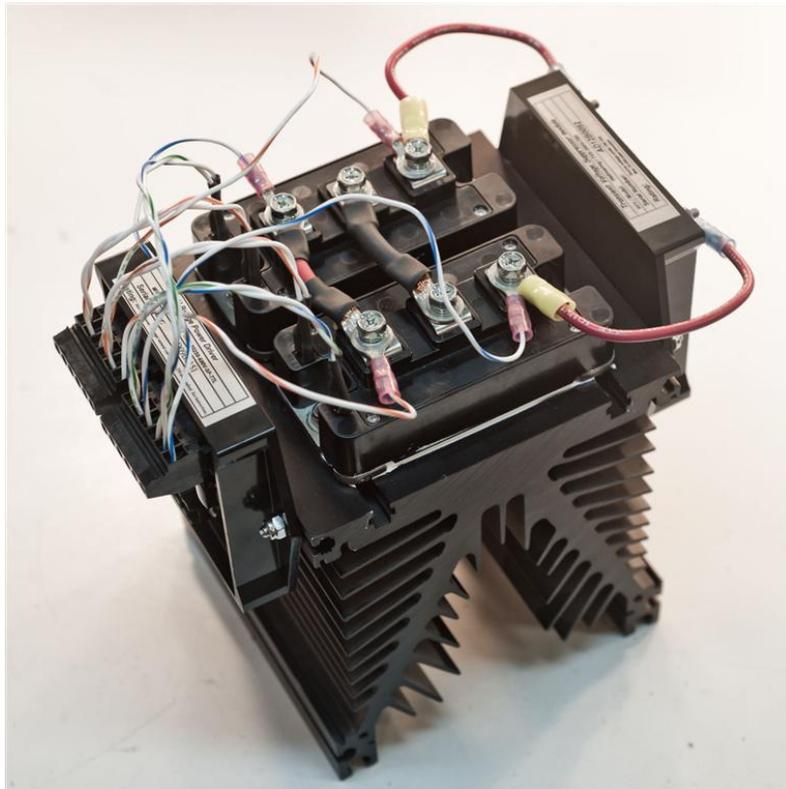
**Power Terminals:** These terminal requires +5 Vdc (+4.75 to +5.25 Vdc) with a 200 mA capability. Typical current draw is about 100 to 120 mA with the output OFF, and about 180 mA with the output ON. This supply should be isolated from the high voltage power supply.

**ON/OFF Input:** This terminal, when connected to a TTL signal and driven to a logic high, will cause the output transistors to switch ON. The polarity will be dependent on the Polarity input logic. A logic low, will cause the output transistors to switch OFF.

**Polarity Input:** This terminal controls the output polarity. A logic high drives the output in one polarity and a logic low drives it the opposite polarity. See Figure 1 above.

**Dimensions:** 4.8" long, by 7.2" wide, by 7.0" tall.

**Weight:** 96 Oz., typical.



**HBD-50250-600V-5P-TTL with TVS-350VB-75K module**

## Hellroaring HBD-50250-600V-5P-TTL Instructions

### **Specifications:**

<b>HBD-50250-600V-5P-TTL:</b>		Unless specified <b>otherwise, ambient temp = +65C</b> ; max current.
<b>Max voltage</b>	600 Volts	
Recommended operating voltage	< 300 Vdc	
Recommended TVS on output terminals	350V nominal, 25KW peak.	
<b>Absolute Max ON Current</b>	50 Amps	100% duty cycle 65C ambient to 300 Vdc <b>Natural Convection (NC).</b> (35C ambient to keep the sink under 100C)
	80 Amps	33% duty cycle, 5 min ON time max, NC
	125 Amps	15% duty cycle, 2 min ON time max, NC
	150 Amps	10% duty cycle, 60 sec ON time max, NC
	200 Amps	1% duty cycle, 10 sec ON time max, NC
	80 Amps	100% duty cycle, 100 CFM air flow.
	125 Amps	50% duty cycle, 100 CFM air flow, 2 min ON time max
	150 Amps	25% duty cycle, 100 CFM air flow, 60 sec ON time max.
	200 Amps	2% duty cycle, 100 CFM air flow, 10 sec ON time max
	250 Amps	1% duty cycle, 100 CFM air flow, 5 sec ON time max, +45C ambient.
Control Power	+ 5.0 Vdc	
Control Input (On/OFF, Polarity)	TTL signals	
Switch on transient time Tr	< 10 uS	
Switch off transient time Tf	< 10 uS	

Note: Specifications are subject to change without notice.

# Hellroaring HBD-50250-600V-5P-TTL Instructions

## **Standard Terms and Conditions of Sale**

The sale of Hellroaring Technologies, inc. products shall be governed by the laws of the state of Montana. All sales shall transfer title within the state of Montana via common carrier. Hellroaring Technologies, inc. will not collect sales taxes for any other state. Should the unlikely event, a cause of action arises, buyer agrees that such action shall be held and governed in the state of Montana. The buyer recognizes that there exists inherent risks associated with batteries and installation & operation of battery devices. It is understood that any technical information published by Hellroaring Technologies, inc. including any installation instructions is of a general nature only and it is the user's responsibility to determine the proper application, installation, and operation of products. The buyer assumes all risk and agrees to indemnify Hellroaring Technologies, inc. against any and all causes for injury or damage to third parties that arises from use of such product.

## **Return Policy**

Should any single unit product sold by Hellroaring Technologies, inc. not meet or exceed your expectations, you may, within 30 days of our shipment to you, return such product for a full refund (credit on credit card orders) less a 15% restock charge, provided that:

- a) You obtain an RMA number and provide your shipping address by calling customer service at 406 883-3801 or send an RMA request via e-mail (include the model #, serial number, and your phone number), and
- b) The product, including all accessories, is returned in original and re-saleable condition, and
- c) Units are Shipped (prepaid and insured for damage in transit) in the original or equivalent packaging, and
- d) (optional) You include a simple note as to the reason for dissatisfaction. (This can help us improve our products)

For quantity orders, or custom products, sales are final and our standard limited warranty applies.

## **Limited Warranty**

This Limited Warranty is extended to the original purchaser. Hellroaring Technologies, inc. warrants that our SSR products will be free from defects in materials and workmanship upon delivery. All claims for defects must be made within 30 days of delivery. The sole and exclusive remedy for failure of the product shall be for us, at our option, to repair or replace the product, to whatever extent we deem necessary to restore the product to proper operating condition. We may make replacements with new or functionally equivalent products of equal value. Should Hellroaring Technologies, inc. be unable to repair or replace the product within a reasonable time, we reserve the right, at our option, to issue a refund or credit of the purchase price in lieu of repair or replacement. We reserve the right to assess a \$15 fee for units returned and proven not to be defective. To obtain warranty service you must:

- 1) Call Customer Service at 406-883-3801 for a Return Material Authorization (RMA) number and shipping address. Or send an RMA request via e-mail (include the model #, serial number, and your phone number and your return shipping address)
- 2) Return the product in the original or equivalent packaging (Shipping prepaid and insured for damage in transit), together with the RMA number AND a description of the problem. Include your return shipping address and your phone number.

Do not attempt to disassemble, or otherwise tamper with any of the 4 nuts on the bottom of each unit. Doing so will void this limited warranty. For quantity orders, extended warranty for switching applications may be available on an application specific basis at slight extra cost.

## **Exclusions**

This Limited Warranty is made expressly in lieu of and to the exclusion of any and all warranties, express or implied, oral or written, including, without limitation, any and all implied warranties of merchantability or fitness for a particular purpose, and all such other warranties are expressly disclaimed. This Limited Warranty shall not be applicable to failures of the product that result from accident, abuse, misapplication or alteration, improper installation or maintenance, unauthorized repair attempts, operation or attempts to operate it beyond its mechanical, chemical, thermal, or electrical capacity intentionally or otherwise, and we assume no liability as a consequence of such events under the terms of this warranty. Hellroaring Technologies, inc. shall not be liable for any special, indirect, incidental, consequential, exemplary, or punitive damages for claims in any claim, action, suit or proceeding arising out of the purchase, use or performance of the product, and whether or not it has been advised of the possibility of such damages. The foregoing allocation of risk is reflected in the price of the product. Nor shall there be any liability thereunder for claims of labor, loss, profit, goodwill, repairs or other expenses incidental to the repair or replacement of such product.

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