

OWNERS MANUAL

Low Voltage Disconnect Models: LVD20-100 (100 Amps) LVD20-150 (150 Amps) LVD20-200 (200 Amps)



Introduction

The InPower LVD20 Series is a family of high current, low voltage disconnects. These disconnects are available in current ratings of 100, 150 and 200 amps, and are packaged in a sealed metal case. As they have extremely low current draw when in the off state, they are ideally suited for use as battery disconnect switches. A key feature is the disconnect's highly efficient, low on-resistance DC power switch. This results in superior performance by producing a low voltage drop and generating only a small amount of internal heat.

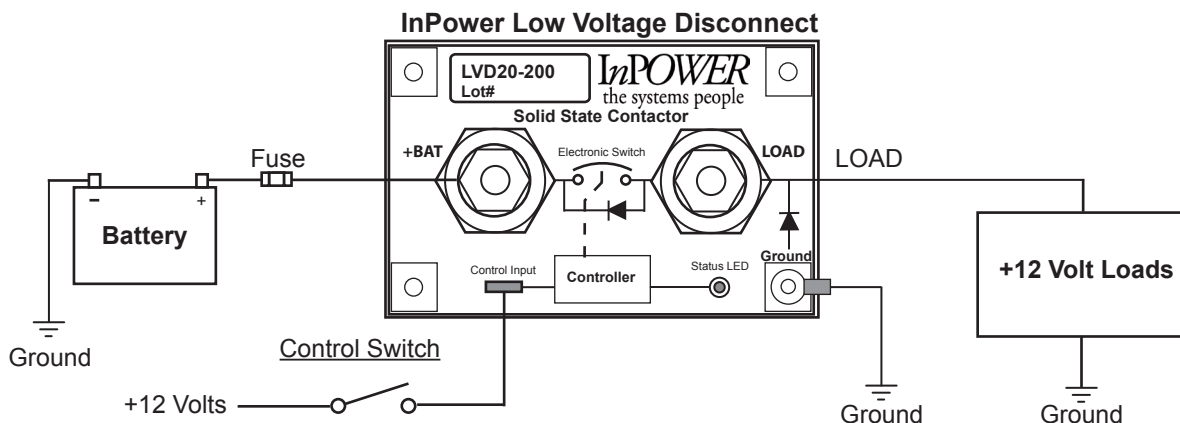
A status LED indicator is illuminated when the disconnect is on, and flashes to indicate a fault shutdown condition. Automatic fault shutdown is provided for over current, loss of ground and low battery voltage. Under a fault condition, the disconnect is latched in the off state. To reset the unit, the fault must be cleared, then the control input voltage must be removed and then re-applied. Removing the battery cable will also reset the unit.

The control input utilizes a ¼ inch male faston blade terminal. Connections for the high current DC cables utilize 3/8" - 16 stainless steel threaded studs with brass contact pads for low contact resistance. The terminal design allows the use of an optional rubber terminal protection boot for added protection from the environment, as well as accidental shorting. Four mounting contact pads allow for the required connection to ground.

System Operation

When positive voltage is applied to the control terminal, the disconnect switch turns ON to pass through battery power to its load output terminal. When the disconnect switch is on, its controller monitors the battery voltage at its battery terminal. When the battery voltage drops below 11.5 volts for 60 seconds (factory programmable) the disconnect switch turns off, removing power from the load terminal, and therefore removes the power draw on the battery.

When the battery is charging and the battery voltage exceeds the shut off preset voltage, the disconnect can be manually re-actuated by removing the control input voltage and re-applying it (an automatic turn-on may be custom programmed).



The Low Voltage Disconnect is controlled by a positive DC voltage on its control terminal. The turnon voltage is $\geq +9.5$ Vdc. The must release voltage is $\leq +8.5$ Vdc. **Note that the input voltage must drop to under +4.0 volts, then increase to $\geq +9.5$ volts to turn on again.**

Certain fault conditions will cause the power switch to turn off and remain latched off until the fault is cleared and the control input voltage is removed, then re-applied. The status LED will flash to indicate a fault. These fault conditions include:

1. An over-current condition for greater than 500 milliseconds.
2. Loss of ground
3. Low battery voltage

Specifications

Current Rating:	<u>LVD20-100</u>	<u>LVD20-150</u>	<u>LVD20-200</u>
Maximum current at 43° C (110° F)*			
Type A Mounting**	100 Amps	150 Amps	200 Amps
Type B Mounting**	75 Amps	100 Amps	125 Amps

On-resistance at maximum current and temperature:	2.2 milliohms	1.1 milliohms	0.75 milliohm
---	---------------	---------------	---------------

* Mounting surface temperature. Note - The maximum current rating will be derated above 43° C (110° F).

** Mounting surface types:

 Type A - Mounting surface such as an aluminum plate 0.125 x 16 x 16 inches.

 Type B - Mounting surface such as wood, plastic or free air

Mounting Environment:	Dry Environment free of water or chemicals on either Type A or Type B surface
Operating Voltage Range:	+9.5 to +18.5 volts
Case Maximum Temperature:	+185° F (85° C)
Shut Off Voltage:	<11.5Vdc for 60 seconds (with ignition ON). When the battery remains below 11.5V for 60 sec or more the LVD will turn OFF and disconnect the load. To Reset and Activate the
	Disconnect Switch, turn the ignition On (Control Voltage above 9.5V)
Loss of Ground Trip:	250 milliseconds
Over-Current Trip:	100% to 110% of rated amperage for 500 milliseconds
Logic Power Current Draw	
With Status LED Off:	80 milliwatts
With Status LED On:	150 milliwatts
Turn-On Delay:	25 milliseconds
Turn-Off Delay:	25 milliseconds
Control Connector Type:	0.25 inch male Faston blade terminal
Control Input Voltage:	>+9.5 Vdc to activate, <+8.5 Vdc to deactivate
Control Input Resistance:	120 K Ohm to ground
BAT+ to LOAD Terminal	
Leakage Current:	75 microamps maximum
Weight:	0.40 lbs (0.181 kg)
Dimensions:	2.85 (72.29 mm) x 4.35 (110.49) x 1.10 inches (27.94 mm)
Power Terminals:	Two (2) 3/8" - 16 threaded stainless steel studs, with locking nuts. Optional rubber terminal boots are available.
Power Terminal Torque:	10 Foot Pound Minimum, 15 Foot Pounds Maximum
Case Mounting Screw Torque:	5 Inch Pounds

Installation Procedure



WARNING

Do not weld on the vehicle with the Low Voltage Disconnect installed as damage to the product may result. If electric welding is necessary, disconnect the control terminal and the cables attached to the LOAD and BAT+ terminals. Damage due to electric welding while the unit is installed will void InPower's warranty.

Introduction

This manual provides instructions for installing InPower LVD20 Series Low Voltage Disconnects. It is important that you follow these instructions carefully and contact InPower if you need assistance or more information. You can reach InPower at:

InPower LLC
Customer Support
740-548-0965
www.InPowerLLC.com

Safety Precautions

This product requires the installer to be trained for installation and work on vehicle electrical systems. We recommend that all wiring meet the SAE and applicable vehicle manufacturer's wiring specifications. Inspect the product and all other components for damage before starting the installation. Do not perform the installation if any problems exist.

Make sure that the vehicle battery power is disconnected during installation of the Low Voltage Disconnect. Reconnect the battery when the installation is complete. Wear appropriate safety equipment such as eyeglasses, face shield and clothing when installing the equipment and handling the battery. Be careful when working near a battery. Make sure the area is well ventilated and that there are no flames near the battery. Never lay objects on the battery that can short the terminals together or to ground. If battery acid gets in your eyes immediately seek first aid. If acid gets on your skin immediately wash it off with soap and water.

Mounting Location

First determine where the LVD will be mounted. We recommend mounting it to a flat metal surface that can absorb heat produced by the disconnect (this will provide the best performance). Also take into consideration the maximum current needed and the maximum mounting surface temperature (See Specification Section). **The disconnect should not be mounted in the engine compartment or any location near the engine's heat. It is important that the LVD be mounted in a dry environment where it is not exposed to water or chemicals.** For maximum thermal efficiency the mounting surface should be a thick metal surface such as an aluminum plate 1/8 x 16 x 16 inches or larger. To facilitate heat transfer a square piece of thermal transfer material is supplied with each disconnect. Remove the clear plastic protective coating and insert the heat transfer material between the disconnect and the mounting surface. Secure the disconnect to the flat metal surface using four screws and tighten to a torque setting of 5 inch pounds. **Do not drill out the disconnect's four mounting pad holes to use a larger bolt size.** If the mounting surface is a good quality ground (low resistance to battery negative terminal) the mounting screws will provide a good ground connection. **If the mounting surface is not a good ground, or you are not sure, you must install a ground wire with a ring terminal under the Ground Terminal Pad.**

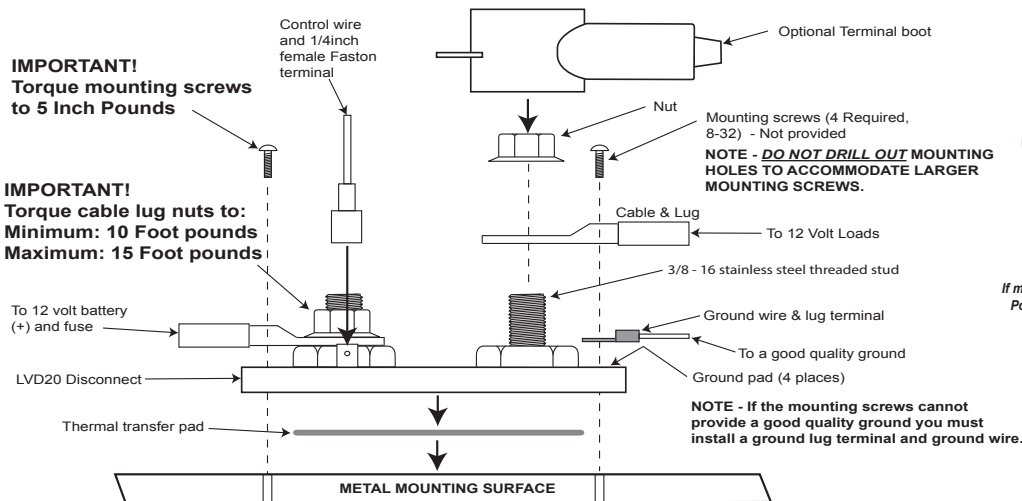
Connect the Power Cables

First, make sure that the battery is disconnected. Prepare the cable to the battery using a suitable size cable for the current required and install a crimped lug terminal on the end. **Be sure that you have installed a protection device (fuse, fuse link or circuit breaker) at the battery end of the cable.** If the optional rubber terminal boot is used install the boot over the cable and lug, then install the cable as shown in the diagram on page 4. **Torque the nut to the torque specification shown in the diagram.** Slide the boot over the lug and onto the power terminal. Prepare the cable to the loads and install the cable as you did with the battery cable.

Control Circuit

The control wire must provide a positive DC voltage of at least +9.5 volts to activate the power switch. This could be the ignition signal or a toggle switch wired to the +12 volt battery. Crimp a female 1/4 inch Faston terminal on the control wire and attach it to the male control input terminal.

Installation Diagram



Do Not Stack Lugs!

If more power terminations are needed, use a Power Junction Post or Termination Block

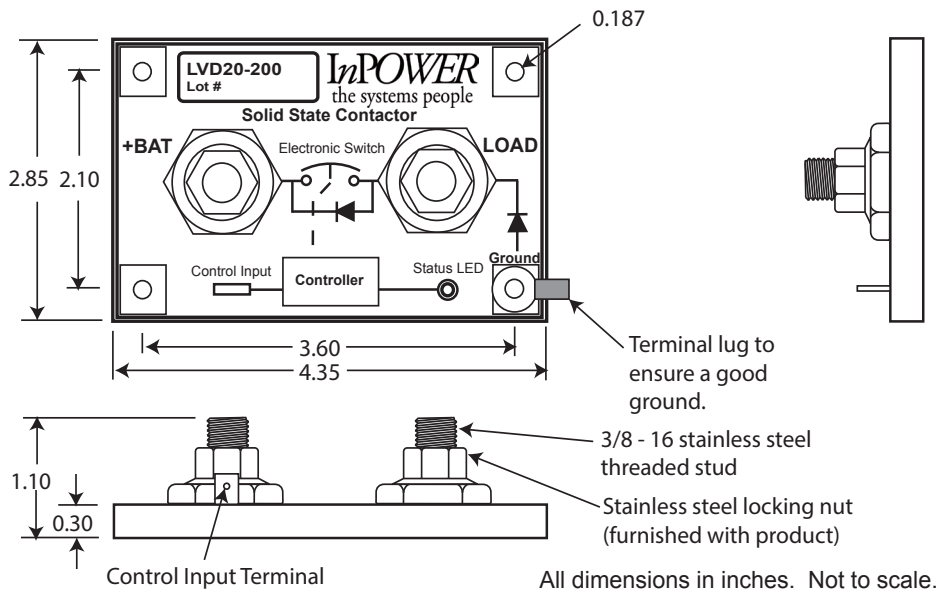
IMPORTANT!

The mounting surface provides a means to remove heat that is generated by the LVD. If this surface is a poor conductor of heat the LVD will have a lower current rating than if the surface is a good conductor of heat with a sufficiently large area. LVD20 to be mounted in a dry area, free of water or chemical spray.

WARNING:

1. Do Not Stack terminals on the BAT, LOAD, or GND Pads (the nuts may loosen).
2. Make certain that torque specs are adhered to and that all nuts will not back off or loosen (locking nuts)

Mechanical Diagram



Testing Procedure

Make the following resistance measurements with a digital multimeter with all wires removed from the LVD.

1. Measure the resistance between the two power terminals (+BAT & LOAD). The resistance should be 200 KOhms.
2. Measure the resistance from the Control Input terminal to one of the ground pads. The resistance should be 120 KOhms.
3. Measure the resistance of each power terminal to a ground pad with the + probe on the power terminal.
4. The resistance should be 120 KOhms.