

OWNERS MANUAL

Solid State Contactors

Models:

LVD21-100 (100 Amps)

LVD21-150 (150 Amps)

LVD21-200 (200 Amps)

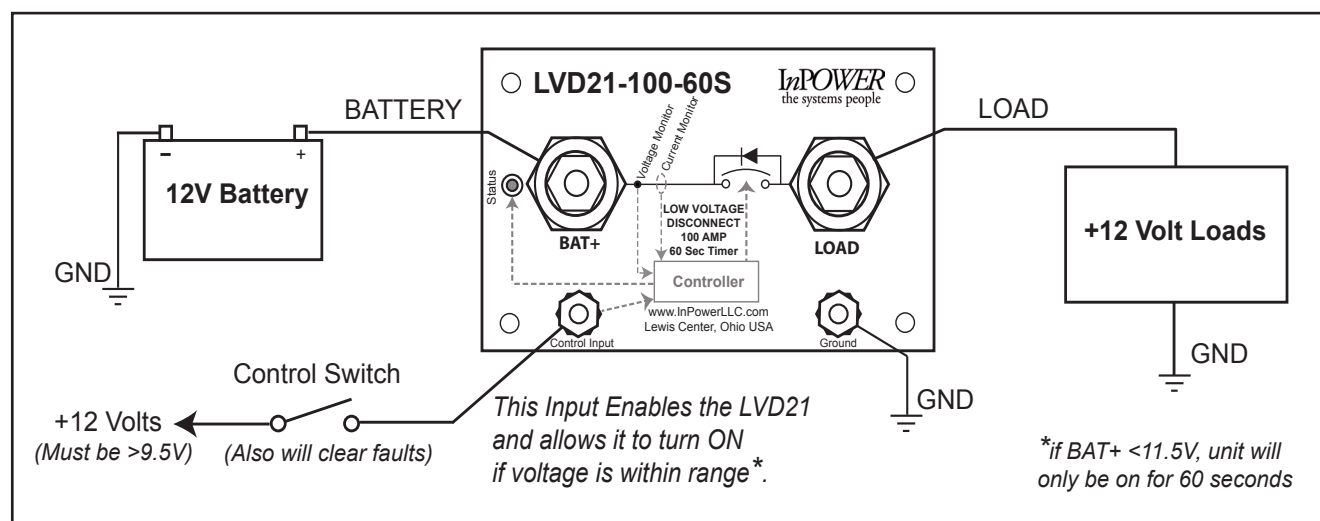


Introduction

The InPower LVD21 Series is a family of high current solid state DC contactors. These **Low Voltage Disconnects (LVDs)** 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 contactor'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 lit when the LVD 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 contactor is latched in the off state. To reset the unit the fault must be cleared; then the control input voltage must be removed, then re-applied. Removing the +BAT cable will also reset the unit.

The Control input (Enables the LVD21) utilizes an 8-32 stud (with brass nuts) for connection. Likewise the GND connection is also through an 8-32 stud (with brass nuts). 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 holes are used to secure the LVD21 to the mounting surface. **NOTE: do not drill out the mounting holes! To do so can damage the LVD21 and void the warranty!**



System Operation

The Low Voltage Disconnect is controlled by the processor monitoring the input Battery Voltage. The must operate voltage is >11.5 Vdc (If there is >9.5V on the Control Terminal). If the Battery Voltage drops below 11.5V for more than 60 seconds, the LVD will open the switch and disconnect the Load from the Battery.

Certain fault conditions will cause the Low Voltage Disconnect to turn off and remain latched off until the faults are cleared and a control input voltage is removed and then applied (>9.5V) to the Control Terminal. If the Battery Voltage is below +11.5Vdc, the LVD will be on for only 60 Seconds

If Faults are present, 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>LVD21-100</u>	<u>LVD21-150</u>	<u>LVD21-200</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:	+7.5 to +20.0 volts
Case Maximum Temperature:	+185° F (85° C)
Low Battery Voltage Trip:	<+11.5 Vdc for 60seconds
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/GND Connections:	2 8-32 Studs with two brass nuts ea.
Control Input Voltage:	>+9.5 Vdc to Turn ON , <+7.0 Vdc to Turn OFF (if BAT+ is <11.5V, ON for 60 Sec)
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:	4.40 (111.76 mm) x 2.90 (73.66mm) x 1.30 inches (33.02 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



Do not weld on the vehicle with the solid state contactor 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.

Installation Procedure, Continued

Introduction

This manual provides instructions for installing InPower LVD21 Series Solid State Contactors. 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**

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 solid state contactor. 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 Low Voltage Disconnect will be mounted. We recommend mounting it to a flat metal surface that can absorb heat produced by the contactor. Also take into consideration the maximum current needed and the maximum mounting surface temperature (See Specification Section). **The contactor should not be mounted in the engine compartment or any location near the engine's heat. It is important that the Contactor 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 contactor. Remove the clear plastic protective coating and insert the heat transfer material between the contactor and the mounting surface. Secure the contactor to the flat metal surface using four screws and tighten to a torque setting of 5 inch pounds. **Do not drill out the contactor'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 one of the four mounting screws.**

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.

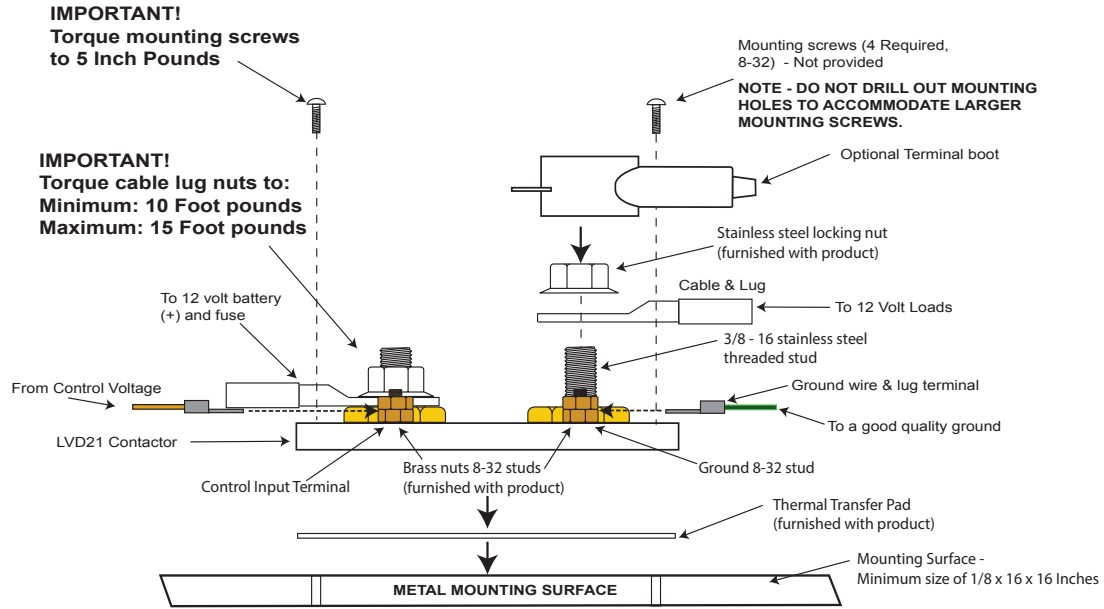
Control Circuit

The control wire must provide a positive DC voltage of at least +9.5 volts to **ENABLE** the LVD21. This could be, for example, a toggle switch wired to the +12 volt battery. Crimp a female Ring Terminal or Spade lug on the control wire and attach it to the Stud control input terminal.

Ground

The Grounding Stud for the LVD21 must be connected to a SOLID Battery Ground to insure proper operation. Crimp a female Ring Terminal or Spade lug on the grounding wire and attach it to the Stud Ground terminal.

Installation Diagram



IMPORTANT!
The mounting surface provides a means to remove heat that is generated by the LVD21. If this surface is a poor conductor of heat the LVD21 contactor will have a lower current rating than if the surface is a good conductor of heat with a sufficiently large area.

LVD21 to be mounted in a dry area, free of water or chemical spray

Mechanical Diagram

