



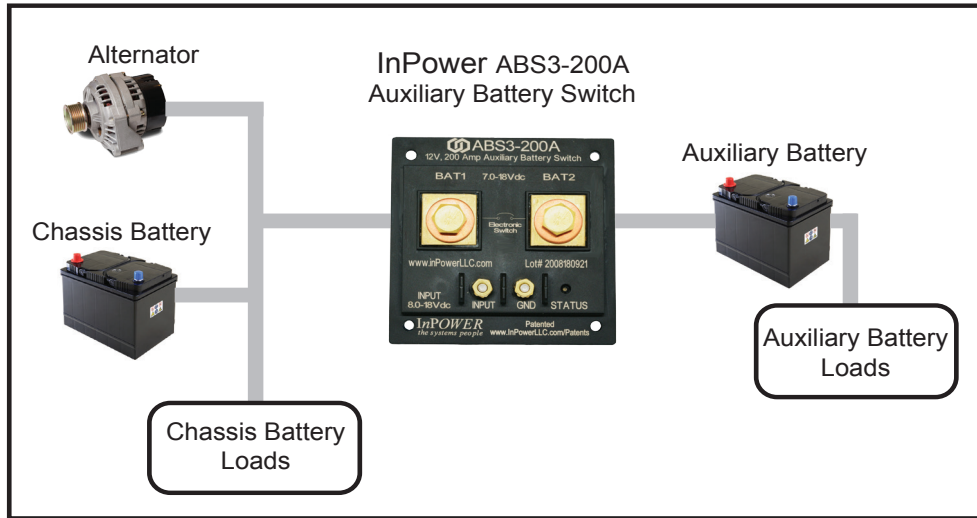
OWNERS MANUAL

Solid State Auxiliary Battery Switch

ABS3-200A 12V 200 Amp, 2 Lug

ABS3-200B 12V 200 Amp, 4 Lug

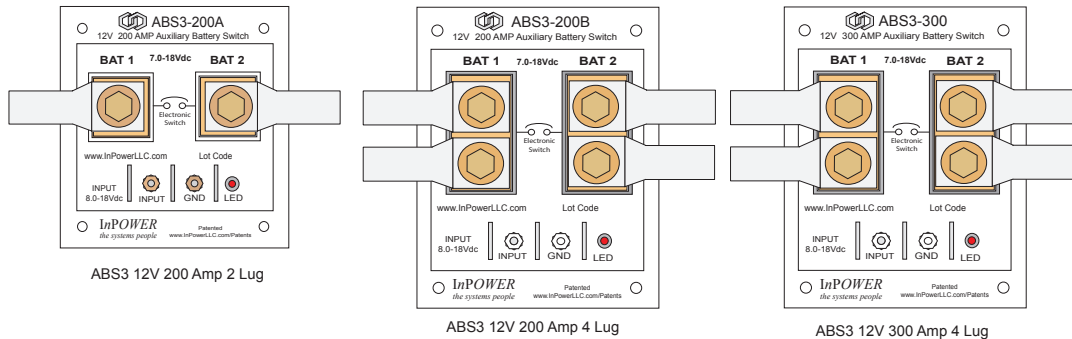
ABS3-300 12V 300 Amp, 4 Lug



1.0 Introduction

InPower's ABS3 Series Auxiliary Battery Switch is next generation technology for ideal charging and isolating an auxiliary battery from a vehicle's chassis battery and alternator. This provides automatic charging in either direction and also insures that the chassis battery will always be available for starting the Vehicle. In addition there is a Manual mode where the chassis and auxiliary batteries are tied together to provide additional starting power.

The ABS3 auxiliary battery switch uses InPower's proven Patented solid-state contactor technology, incorporating sophisticated microprocessor algorithms that include over-current, over-temperature, and over and under-voltage sensing. The ABS3 will automatically reconnect if the faults are no longer present. The ABS3 is available in 12V 200 Amp, 2 lug and 4 lug versions (ABS3-200A and ABS-200B) and a 12V, 300 Amp 4 lug version (ABS3-300).



2.0 Operation

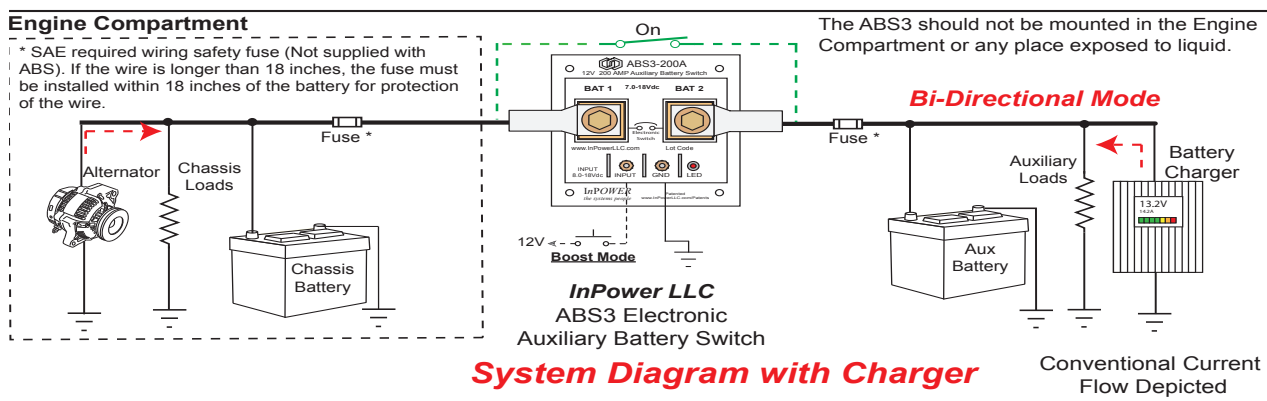
In a system with the ABS3, the auxiliary battery is charged from the chassis battery and alternator, while the chassis battery is protected from a total discharge, and therefore is available for starting the vehicle. As the ABS3 is bidirectional, a charging device (such as a battery charger or gen-set connected to the auxiliary battery) can also supply charging current to the chassis battery through the ABS3 while maintaining total discharge isolation.

The ABS3 switch accomplishes its tasks through the constant monitoring of voltage and current by its microprocessor controller. The proper time to transfer power in either direction between the chassis battery and the auxiliary battery is based on a proprietary algorithm that utilizes both battery voltage and current measurements. A “boost start” feature is provided that will allow the auxiliary battery to supply current to the chassis battery to aid engine starting.

Since this is an intelligent switch monitoring voltage, current, and temperature, it is possible to accommodate a wide variety of customer needs for operation, with programmable times, voltage and current settings. For custom requirements, please contact InPower LLC directly for your needs.

LED shows whether the ABS3 is ON (LED ON) or OFF (LED OFF).

2.1 Normal Operation



For normal operation, it is assumed that the engine is running and the alternator is supplying power to charge the chassis battery. When the chassis battery voltage (BAT 1) rises above 13.5 volts for 10 seconds, the ABS3 closes and passes current to the BAT 2 side. This connects the two batteries to now charge the auxiliary battery and power auxiliary loads.

Bidirectional Note: In the figure above, either the Alternator or the Battery Charger can charge the batteries based on the charge requirement of either of the two batteries in the system. For the Battery Charger source, the Auxiliary Battery becomes the Primary and the Chassis Battery becomes the Secondary Battery which the ABS3 turns on to charge.

Over-current fault handling: If the ABS3 rated current is exceeded, the ABS3 will turn off after 1 second. If no faults exist, the ABS3 will turn back on after 30 seconds

Automatic Operation:

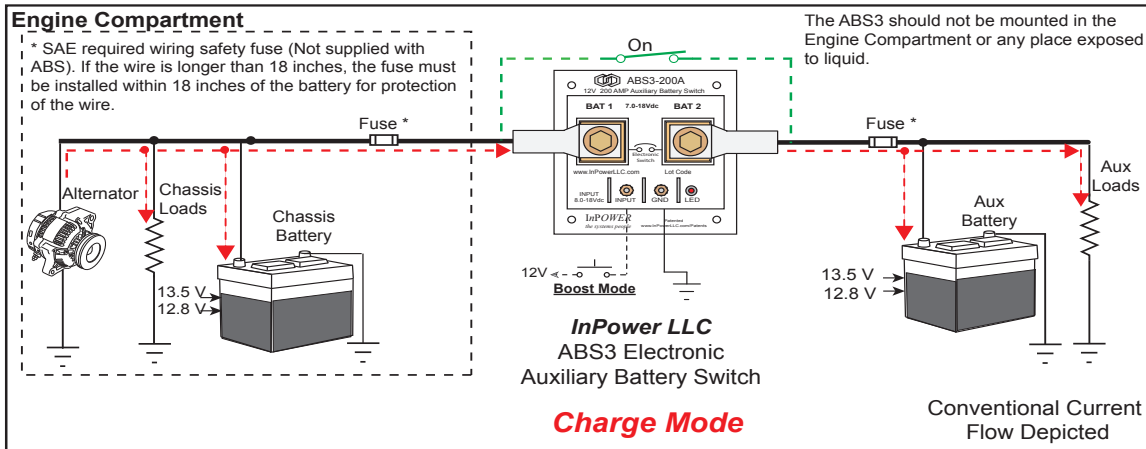
- Module will automatically turn **ON** when battery voltage on either BAT 1 or BAT 2 is greater than 13.5Vdc for greater than 10 seconds.
- Module will automatically turn **OFF** when the battery voltages on BAT 1 and BAT 2 are less than 12.80Vdc for greater than 10 seconds.

Manual Operation:

- Momentarily applying +12Vdc to **INPUT** terminal will cause the Module to turn **ON** if either BAT 1 and BAT 2 Voltage are at least 7.0Vdc as long as the voltage is present.

Voltage Requirements: The ABS3 switch requires one battery to be above 7.0 volts (in this case the chassis battery) before it can close.

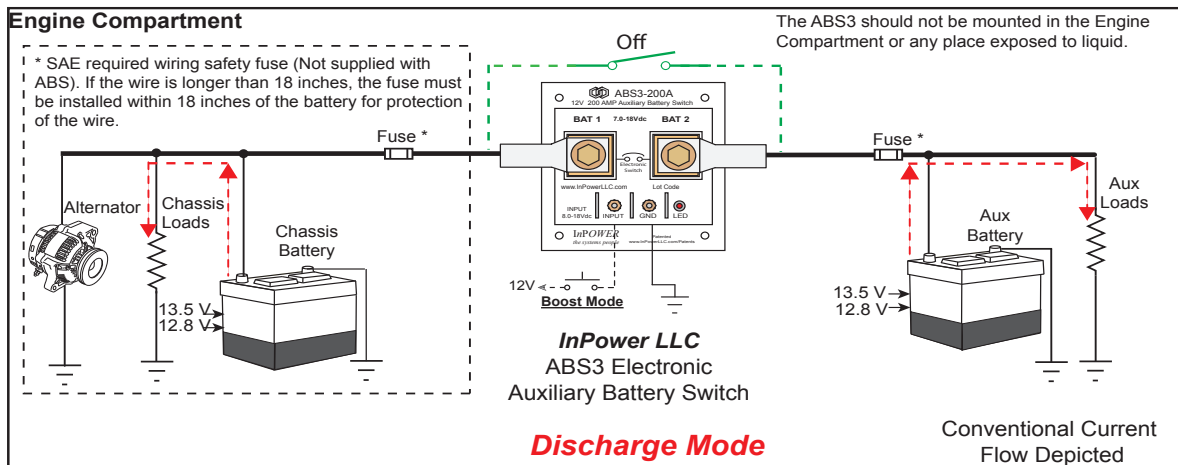
2.1.1 Charging Chassis and Aux from Alternator (Normal Operation)



When the engine is running and the alternator starts supplying current to the chassis battery and the chassis battery voltage rises above 13.5 volts for 10 seconds, the InPower ABS3 switch will close connecting the two batteries. The auxiliary battery will now recharge.

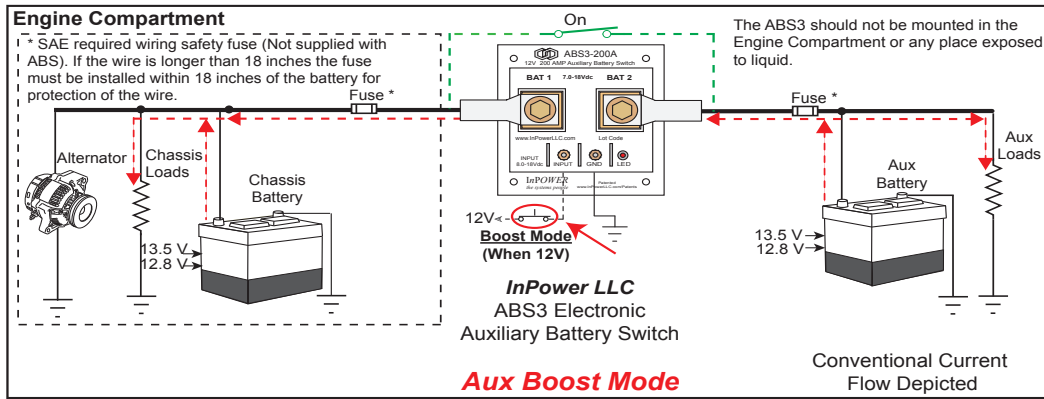
Note that the ABS switch requires one battery to be above 7.0 volts before it will close. If the ABS rated current is exceeded (100% to 110%) for 1 second the ABS switch will turn off. It will automatically reset after 30 seconds if no faults are present.

2.1.2 Discharging (Normal Operation)



If the engine is stopped, no alternator current is produced and the batteries begin to discharge. When the voltage of the combined batteries drops below 12.8 volts for 10 seconds, the ABS3 switch will open, isolating the auxiliary battery from the chassis battery to reserve engine starting capacity from the chassis battery.

2.1.3 Boost Mode (Manual Control)

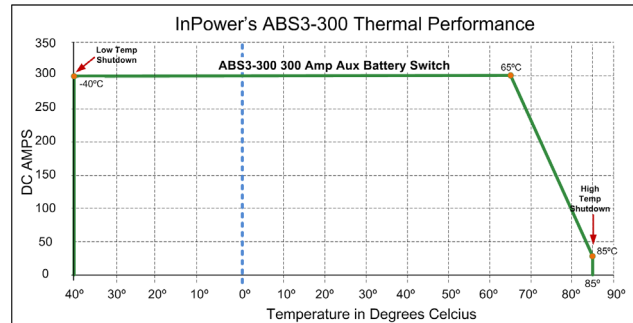
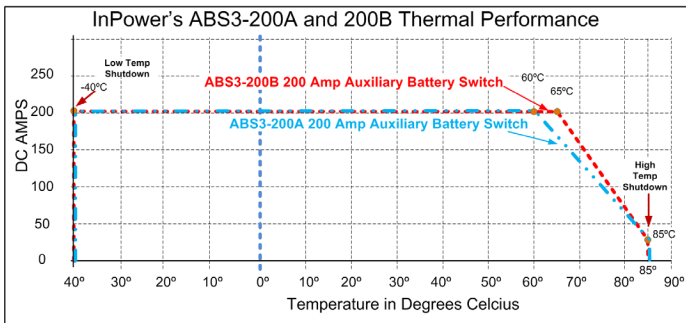


In the event the chassis battery is discharged, the auxiliary battery may be used to supply current to the chassis battery to aid engine starting. In this case, the Chassis Battery is in a discharged state, and the Boost Start control input to the ABS3 is activated from a remote momentary switch. The ABS3 connects the auxiliary battery to the chassis battery for the duration that the boost start switch is applied. Alternatively, the “boost start” can be made automatic by connecting the input to the engine start signal.

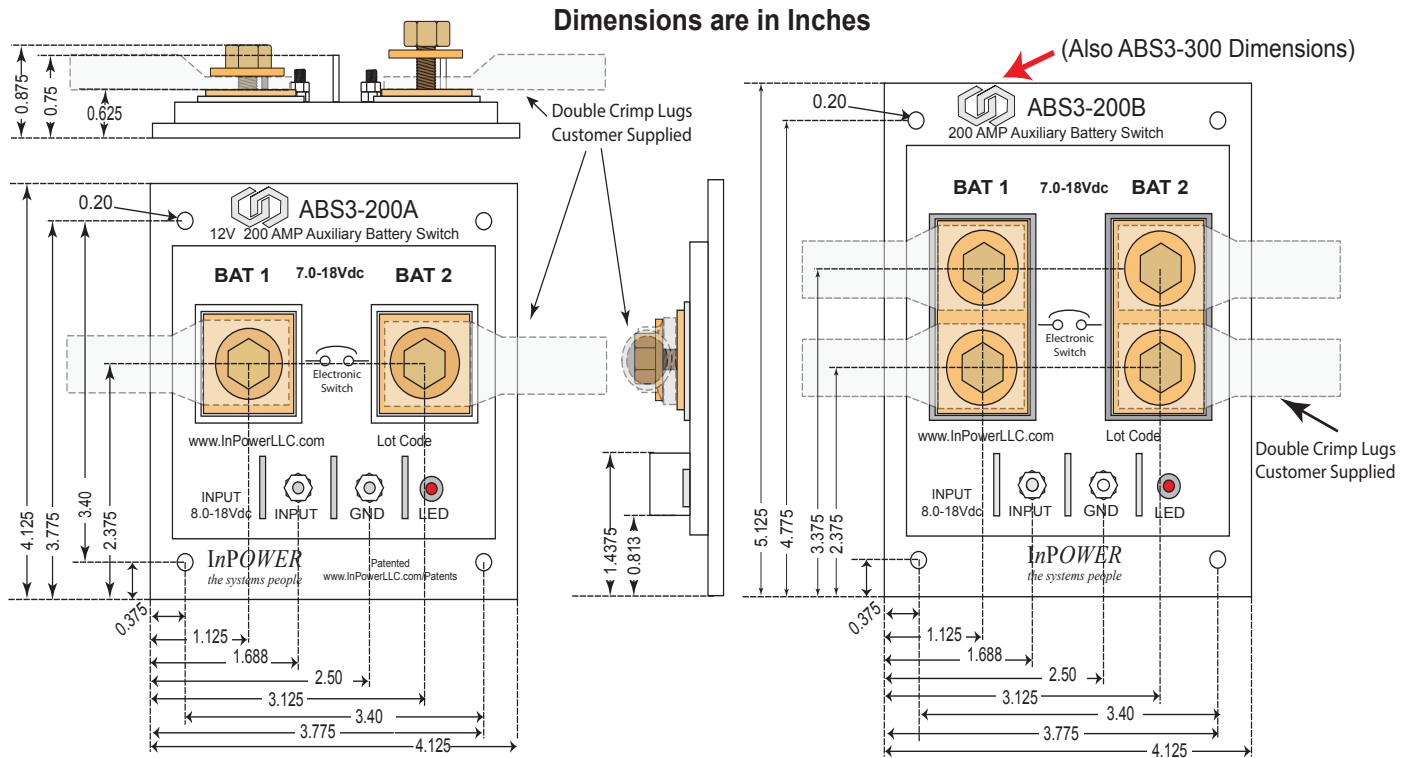
3.0 Specifications

3.1 Electrical Specifications

Current Rating:	200 Amps (ABS3-200A/B) 300 Amps (ABS3-300)
Standby Current:	3.8 milliamps
Over-current Protection Trip:	205 Amps (+/- 2 Amps) for 1 sec (ABS3-200A/B) 305 Amps (+/- 2 Amps) for 1 sec (ABS3-300)
Operational Temperature Range:	-40° to +185° F (-40° to +85° C)
Over-temperature Shutdown:	> 185° F (> 85° C)
Operational Voltage Range:	+7.0 to +18.0 Volts
Automatic Trip Voltages:	ON if BAT1 or BAT2 > 13.5 for >10Sec OFF if BAT1 or BAT2 < 12.8 for >10Sec
Manual Operation:	ON if +12V to INPUT Terminal (if BAT1 or BAT2 Volts > 7.0V)
Automatic Fault Reset:	ABS3 will automatically restart in 30 sec (if no faults exist)
LED Indicator:	Switch ON/OFF
INPUT Signal Voltage Range:	+8.0 to 18.0 Volts (True)
Standby Current:	<3.8mA
Environmental:	Designed to IP67
Power Terminal Torque:	Brass Bolts and Copper Washers supplied with ABS3 - 10 to 15 ft-lb
Input and Gnd Terminal Torque:	8/32 Screw Terminal with Brass Nuts (4 to 5 Inch Lbs)



3.2 Mechanical Specifications:



4.0 Integration Considerations

4.1 Wire Gauge

The first consideration is that of wire size for conduction of DC currents. Make certain to follow SAE recommendations, and make certain to size the wiring accordingly for surge, voltage loss across the length of wire, thermal load, thermal rating, and flexibility to facilitate easy installation for both +12V and return wires.

It actually can be less expensive and easier to install multiple, smaller wires than larger ones. This is due to both wire and lugs being less expensive as you purchase smaller gauges.

4.2 Grounding

In modern vehicles this is a major issue to remember that the ground path to the battery charging system must be of adequate size also. Conventional grounding to the frame may not be enough with some newer methods of connecting chassis components (using bolts and/or adhesives). Latest manufacturer's directives state that the only guaranteed ground is the Engine Block.

Make certain that you have a continuous path back to the batteries and charging system capable of handling the peak amperage.

4.3 Connector Lugs

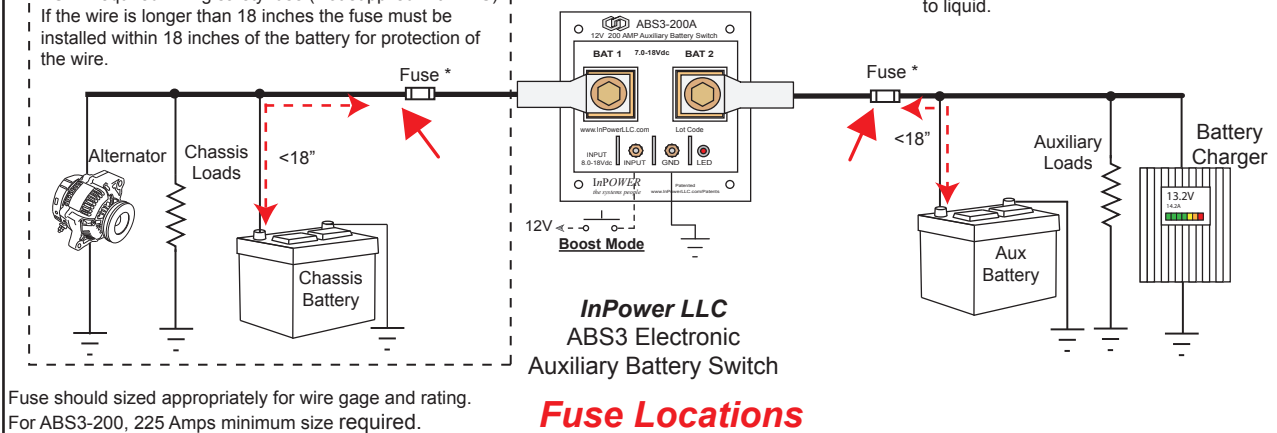
In addition to wiring considerations, to minimize losses in the system, double crimping lugs, or crimping technology for a 360 degree crimp is important to minimize resistance (electrical and thermal) for the wire to connector transition. In other words, maximize the good contact surface area.

4.4 Battery Cable Fusing for Wiring Protection

If the ABS3 is located further than 18 inches from the battery, a fuse must be installed within 18 inches of the respective battery. This fuse is for the protection of the wiring. For 200 Amp service it is suggested that 225 Amp fuses minimum are used to accommodate surges (the ABS3-200A is protected).

Engine Compartment

* SAE required wiring safety fuse (Not supplied with ABS).
If the wire is longer than 18 inches the fuse must be installed within 18 inches of the battery for protection of the wire.



5. Installation Procedure



5.1 Safety and Warranty Precautions

This electronic Auxiliary Battery Switch has been designed and manufactured to meet the intended application requirements and specifications. Any modifications to the product or to the installation procedure can be dangerous and will void InPower's warranty.

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.

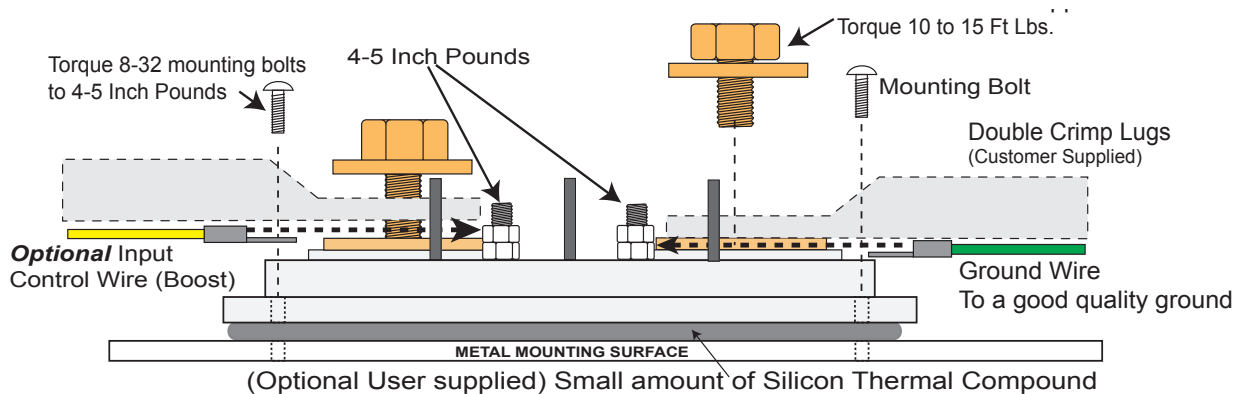
- Read and understand the instructions in this manual and other manuals before starting the installation.
- **Make sure that the vehicle battery power is disconnected during the installation of the ABS3.**
- **Load Considerations:** It should be noted that if Relays/Solenoids are used in this design (either on Battery or Load) that they incorporate Fly Back Suppression Diodes/Circuitry. Having inductive loads without Suppression will violate your unit's and (in some cases) your vehicle's warranty!
- Wear appropriate safety equipment, such as protective eyeglasses, face shield and clothing when installing equipment and handling the battery.
- Be careful when working near a battery. Make sure that 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. 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.
- Take great care when making modifications (welding) to the frame or body, making certain all Batteries are disconnected. Welding can not only damage or destroy the ABS3, but will also cause damage to the vehicle electrical systems and will void the warranty of the ABS and the vehicle itself.
- Do Not Stack Lugs on the ABS3-200A terminals - use an appropriate termination block for attaching multiple wires. Refer also to the ABS3-200B which can accommodate a second set of lugs or a single double holed lug.
- For maximum thermal efficiency, the mounting surface should be a thick metal surface such as an aluminum plate 1/8 x 12 x 12 inches or larger.

- The ABS3, although sealed, must be mounted in a protected and dry area.
- The ABS3 is not designed for exposure to saltwater spray, environmental debris or power washing.
- It must be mounted to a flat metal surface that maintains ambient temperature to dissipate excess heat.
- **The module must not be mounted in the engine compartment or any location near a source of extreme heat.**
- Take into consideration the routing of the two battery cables as well as the grounding cables.
- Connect only battery cables to the ABS3 power terminals.
- If desired, to aid in the heat transfer, spread an appropriate amount of Optional User-Supplied heat sink compound material.
 - Spread the heat transfer compound evenly over the heat sink plate on the bottom of the ABS3. Apply from the tube thinly and the goal is to cover the baseplate with 1/32 of an inch. Use a flat edge to insure that the material between the module and the mounting surface is even with no pockets or gaps in coverage.
- Secure the module to the flat metal surface using four #6 or #8 screws and tighten to a torque setting of 5 inch pounds. **Do not drill out the four mounting pad holes to use a larger size.**

5.2 Required Installation Hardware

#6 or #8 Mounting hardware (bolts and nuts)

5.3 Mounting Diagram



No Stacking of Lugs!

If multiple terminations are needed, please refer to the ABS3-200B or the ABS3-300

5.4 Making the Final Connections

Do not drill out the contactor's four mounting pad holes to use a larger bolt size. Drilling the mounting holes out will void the warranty.

Grounding

Proper operation of the ABS3 is dependent on a good quality ground system with appropriate sized wires for the load if the chassis is not a dependable source for a ground. Both the chassis battery and the auxiliary battery must be connected to a solid common ground. Be wary of attaching to the frame since many manufacturers only recommend grounding directly to the Engine Block as a guaranteed ground. Consult the recommended grounding documentation for your vehicle. The ABS3 must be connected to this common ground. Install a #16 AWG ground wire with a ring terminal under one of the four ABS mounting screws and connect it to the common battery ground. It is generally considered that the highest quality ground is at the chassis battery's negative terminal (although it is best to consult your chassis manufacturer's documentation).

Connect the Power Cables and Boost Input Prepare the cables to the batteries using a suitable size cable for the current required. Install a double crimped (or 360 degree crimped) lug terminal on the ends. Terminal BAT1 is connected to the positive terminal of the chassis battery and terminal BAT2 is connected to the positive terminal of the auxiliary battery.

For the Optional Boost Input Control, install a #16 AWG ground wire with a ring terminal and connect that to a 12V control voltage. This can be a switch or voltage source of your choice. Refer to the Input voltage specifications for this interface.

Torque the 8/32 Screw Terminal with Brass Nuts to 4 to 5 Inch Lbs).

6.0 Testing Procedure

Make the following resistance measurements with a digital multimeter with all wires removed from the ABS3-200.

1. Measure the resistance between the two power terminals (BAT 1 to BAT 2). The resistance should be 210-220 KOhms.
2. Measure the resistance from the control INPUT terminal to the GND terminal. The resistance should be 130 KOhms.
3. Measure the resistance of each power terminal to a GND terminal with the + probe on the power terminal.
4. The resistance should be 105-110KOhms (BAT 1) and 105-110KOhms (BAT 2).

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