ELECTRICAL INSTALLATION INSTRUCTIONS

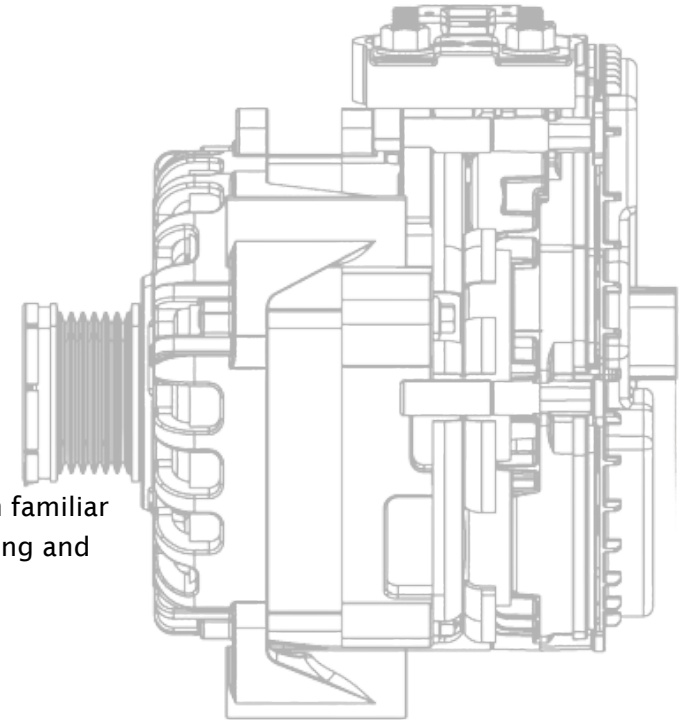
Smart Alternator

The document applies only to the electrical installation of Lithionics Smart Alternator with the Standard Wire Harness and a Lithionics Battery System*. Complete the mechanical installation before proceeding.

This document does NOT cover the smart alternator mechanical installation, electrical components assembly such as crimping ring terminal lugs, applying heat-shrink tubing, mechanical skills such as torquing and aligning of parts during installation, etc. These aspects and skills shall be understood and practiced before attempting installation.

For a Mercedes Benz compliant (BEG) installation, the PowerFit Smart Alternator must be used on the Sprinter OM654 I-4 platform as it meets the requirements per the official Mercedes Benz Sprinter Body Equipment Guidelines (BEG).

This alternator is capable of charging at idle. However, to comply with Mercedes-Benz requirements for the W907/W910 chassis equipped with the OM654 engine, charging should only occur at engine speeds above 1,200 RPM. See the section below “Enforcing an Idle-Limit” on how to configure this. Additional limitations may have been introduced since the time of this document’s creation. Always consult your chassis supplier for the most current requirements to ensure the alternator is configured accordingly.



Installation shall be performed by an SAE automotive technician familiar with the applicable vehicle platform as well as CANbus networking and wiring topology.

Requires a Lithionics Battery System Version 9 or later.

Parts required for installation:

- SmartPower Alternator
- SmartPower Standard Wire Harness:
    - 20ft version – Lithionics **#85-302-240**

      OR
    - 6ft version – Lithionics **#85-302-1**
- M12-8 edge harness for exposing the Lithionics IonBus CAN-High and CAN-Low wires (Lithionics **#75-525-36-RR** wire harness can be adapted for this)
- 1/0AWG Cable, Red & Black, 105°C.
    - Recommend tinned copper for corrosion resistance, example specification: **UL1426 BC-5W2**
- 2x 1/0AWG 5/16" Hole Copper Ring Terminal Lugs, **Quick Cable #5955E**
- Adhesive-Lined/Marine Heat-shrink tubing, Red & Black, for 1/0AWG ring terminal lugs to 1/0AWG cable
- 150A 58VDC (or higher voltage) rated fuse, ex. Eaton Bussmann **#MRBF-150** and applicable fuse holder
- 5A in-line fuse
- Ring terminal boot covers
- 1/0 Cable Protection, ex. Split-tube loom/sleeving
- Misc. electrical wiring tools and parts such as connectors (butt-splice crimps), crimpers, cutters, cable ties etc.

Installation Steps:

Step 1

Turn off your 51V house power battery system. Confirm 0V output with a digital multimeter. Prepare your 1/0AWG cables with ring terminal lugs and terminal boot covers. Mount the positive (red) alternator cable to the rear positive alternator terminal with embossed "**+**" mark. Mount the negative (black) alternator cable to the front negative alternator terminal with embossed "**-**" mark. Ensure the cable lugs are oriented straight on the terminals, install and torque the provided terminal nuts using a 13mm socket to **19Nm (14 ft-lbs)**. Use a paint pen and torque stripe the terminal nuts. Position the terminal boot covers over the alternator terminals to protect them.

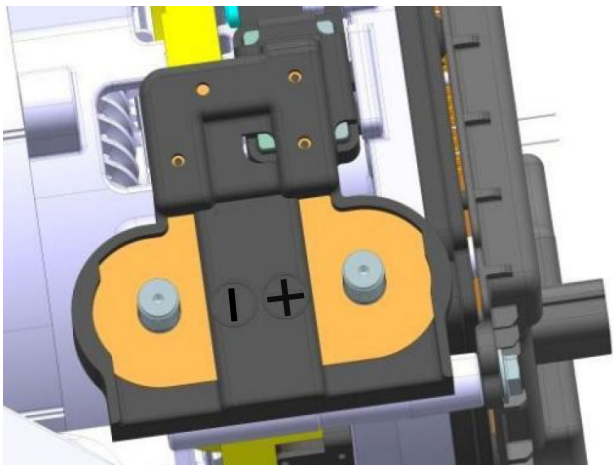


Figure 1: N62 Mount Base, Terminal Connection Location

Step 2

At the rear of the alternator, connect the SmartPower Wire harness molex connector. After connecting, ensure that the red clip is then pushed forward which locks the connector in place (Fig. 2).

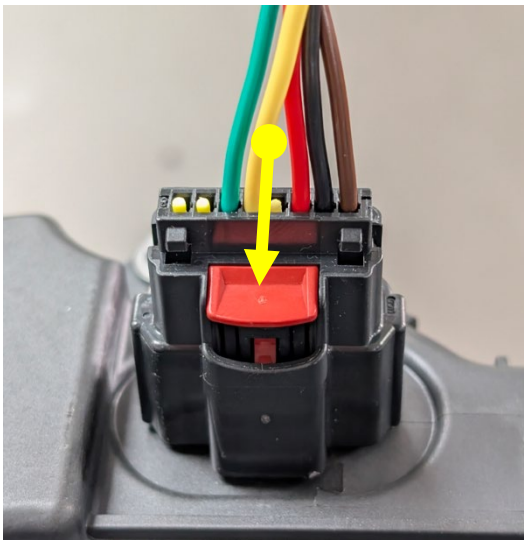


Figure 2: Molex Connector Connection Point

Step 3

Route the 1/0AWG power cables and SmartPower harness through the engine bay and into the interior space towards your house bank. Avoid any heat sources or mechanical components that may cause damage. Avoid any low-slung areas where the cables may become damaged from road debris. Avoid any sharp edges which may damage the cable's insulation over time. Protect the cables from chaffing as necessary.

Step 4

The power connections to the 51V house bank shall be distributed by a busbar system rated for the voltage and current necessary for the system components. Determining the exact model and rating for the busbar is outside the scope of this document since it varies by application and system design. Connect the positive 1/0AWG cable to your 150A fuse, then connect it to your 51V positive busbar.

Step 5

Connect the negative 1/0AWG cable to your 51V negative busbar.

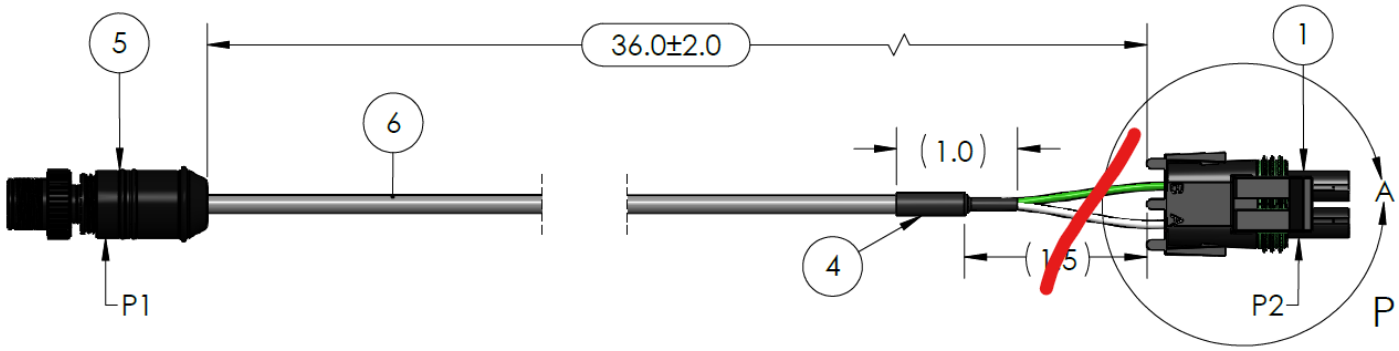
Step 6

The SmartPower Wire Harness (#85-302-240) contains 5 wires that need to be connected and are defined below.

- It is recommended that Pins 1 and 3 (12V Ignition and 12V Battery) are both connected to switched ignition/engine run 12V+ and protected with a single 5A in-line fuse.
- Pin 2 connects to chassis negative/ground.
- Pins 5 and 6 are the CANbus signal wires that need to connect to the Lithionics IonBus network in order for the Smart Alternator to receive data commands from the BMS (Battery Management System). Cutting the 2-pin connector end off of Lithionics #75-525-36-RR and joining it with butt-splice connectors can accomplish this, see figure 4 below.

PINOUT				
FROM	PIN#	WIRE COLOR	TO	FUNCTION
P1	1	BROWN	W1	12V IGNITION
P1	2	BLACK	W2	NEGATIVE
P1	3	RED	W3	12V BATTERY
P1	4		PLUG	NC
P1	5	YELLOW	W5	CAN-H
P1	6	GREEN	W6	CAN-L
P1	7		PLUG	CAN-H
P1	8		PLUG	CAN-L

Figure 3: Pin Guide



PINOUT						
FROM	PIN#	WIRE COLOR		TO	PIN#	FUNCTION
P1	4	GREEN		P2	B	CAN HIGH
P1	5	WHITE		P2	A	CAN LOW

Figure 4: illustrating where to cut the 2-pin connector from Lithionics #75-525-36-RR.

Step 7

Connect the BMS CAN-high to the alternator CAN-High (green wire to yellow wire, pin 5). Connect the BMS CAN-low to the alternator CAN-low (white wire to green wire, pin 6).

Step 8

Connect the circular connector of the 75-525-36-RR to the Lithionics Battery System CANbus.

Step 9

Measure resistance between CAN-high and CAN-low to determine CANbus termination. Appropriate CANbus resistance with all CANbus devices connected is 60Ω. Adjust the number of CANbus terminators in the system to achieve this value as necessary.

Testing the Electrical System

1. Once installation is complete, clear the engine bay and work area of tools. Reconnect the engine 12V battery and the 51V house bank and power them on as necessary. Once the area is clear, start the van and let it run for approximately 30 seconds.

2. Connect to the BMS via the Lithionics App and verify that the power flow is around 2,000 watts at idle, this amount will fluctuate based on idle RPM of the van.

3. Once the vehicle is at operating temperature, while in park, gently increase engine RPM to around 2,500, you should see the current output increase to around 120A charge to the Battery System. Note: This may not work if the battery system is at or near full charge 100%. In this case, discharge the battery to <90% and repeat this test.

Enforcing an Idle-Limit

To enforce the Idle-Limit feature, perform the following:

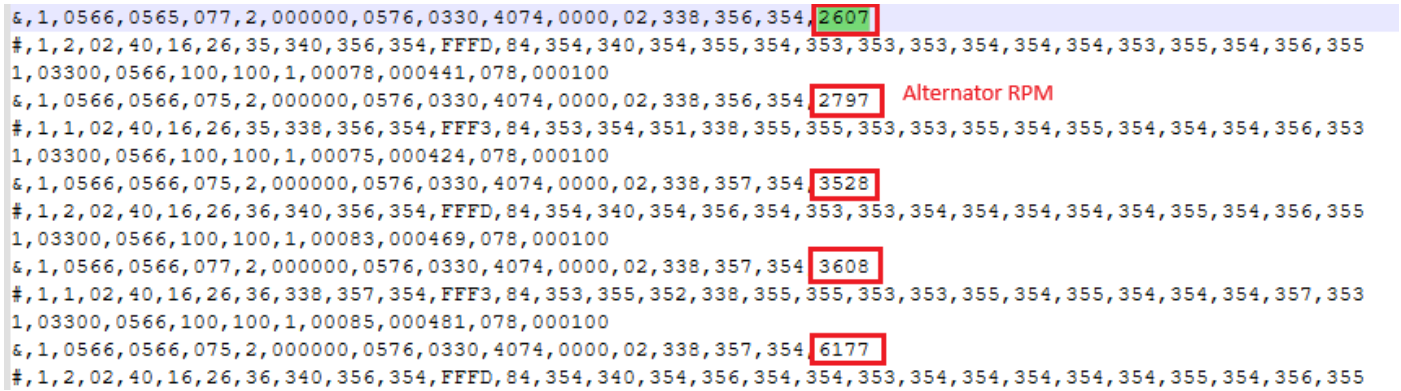
1. Turn the vehicle's ignition on to the accessory position, but do not start the engine.
2. Connect to the BMS V9 unit via the Lithionics App.
3. Enable the Idle-Limit feature by sending the following command via the Lithionics App Terminal Console to the BMS V9 unit.

    a. **ALTRPM=XXXX**
    where **XXXX** = the alternator's RPM that represents the engine RPM threshold at which the alternator shall no longer generate power.

    For example. the BEG 2024-9 requires that the alternator does not transfer power from the engine below **1,200**RPM. The pulley ratio on a 2025 MB sprinter with N62 kit is **~3.3:1**.
    1,200 x **3.3** = **3,960**. Add 10 more RPM to guarantee it will trigger before. So, the code entered into the Terminal console would be: **ALTRPM=3970**

    b. Video link on Terminal Console usage:
    https://www.youtube.com/watch?v=c6eWrdzmTR0&t=99s

    c. Alternatively, this calculation can be also performed by monitoring the terminal console data, which has the actual live alternator RPM reported. Perform this by holding the engine RPM steady at the desired point, and note the live alternator RPM (red boxes below) in the Li3 App Terminal Console live data.



Troubleshooting Table

Issue	Possible Reason	Solution
No Charge Output	Battery is Fully Charged	• N/A – discharge first
	No CANbus data to alternator	• CAN-high and CAN-low opposite polarity • Broken/Open connection • Under or Over-terminated CANbus
	No power signal to alternator	• Check 12V Ignition, 12V battery, and Negative wires connection to alternator
	Blown 150A fuse	• Investigate the cause of blown fuse. • Replace fuse as necessary.
	Broken drive belt	• Inspect and replace the belt as necessary.
Charge Output Lower than Expected	BMS commanded	• BMS has commanded the Smart Alternator to reduce power output. • Normal for a balancing battery or end of charge.
	High resistance connection	• Check all bolted and crimped conductors for loose connection and repair.
Excessive drive belt noise and/or vibration	Drive belt is not properly tensioned	• Tension drive belt
	Drive belt has excessive wear	• Replace drive belt
	Drive belt is wrong specification	• Install correct specification drive belt

For further troubleshooting, please contact Lithionics directly at Support : Lithionics