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# Freedom eGEN System End-of-Line Functional Checklist

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## DANGER

### **RISK OF FIRE, ELECTRIC SHOCK, EXPLOSION, AND ARC FLASH**

This checklist is in addition to, and incorporates by reference, the relevant product manuals for each product in the Freedom eGEN System. Before reviewing this checklist you must read the relevant product manuals. Unless specified, information on safety, specifications, installation, and operation is as shown in the primary documentation received with the products. Ensure you are familiar with that information before proceeding.

**Failure to follow these instructions will result in death or serious injury.**

## Important Safety Notice

### **READ AND SAVE THESE INSTRUCTIONS - DO NOT DISCARD**

This checklist is intended for qualified personnel. Certain configuration tasks shall only be performed by qualified personnel in consultation with your local utility and/or an authorized dealer. Electrical equipment shall be installed, operated, serviced, and maintained only by qualified personnel. Servicing of batteries shall only be performed or supervised by qualified personnel with knowledge of lithium-ion batteries and their required precautions.

Qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment
- Applying applicable installation codes
- Analyzing and reducing the hazards involved in performing electrical work
- Installing and configuring lithium-ion batteries
- Selecting and using Personal Protective Equipment (PPE)

No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

**⚠ DANGER**

**HAZARD OF FIRE, ELECTRIC SHOCK, BURN, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Equipment shall only be installed and serviced by qualified electrical personnel.
- Never operate equipment energized with covers removed.
- Inverters are energized from multiple sources. Before removing covers of inverters and other equipment, identify all sources, de-energize, lock-out and tag-out, and wait 2 minutes for circuits to discharge.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.
- In case of fire, use only a Class ABC type (dry chemical) fire extinguisher. Water can be a dangerous extinguishing medium for energized equipment because of the risk of electrical shock.

**Failure to follow these safety instructions can result in death or serious injury.**

**⚠ WARNING**

**HAZARD OF ELECTRIC SHOCK, FIRE, OR PERSONAL INJURY**

- Do not expose any of the equipment to rain, snow, or liquids of any type. Products in the system are designed for indoor use only.
- Make sure that existing wiring is in good condition and that wires/cables are not undersized.
- Make sure that all DC and AC connections are properly tightened (to the correct torque specified by the manufacturer) and secured.
- Do not operate the inverter and other equipment with damaged or substandard wiring.
- Equipment such as the inverter must be provided with an equipment-grounding conductor connected to the AC input ground as well as a DC enclosure grounding conductor connecting the inverter chassis to the vehicle chassis.
- Install means of disconnection from all power sources, such as, AC and DC circuit breakers.
- Make sure the second alternator's temperature sensor is properly installed.

**Failure to follow these instructions can result in death or serious injury.**

**⚠ CAUTION**

**HAZARD OF HEAVY LOAD AND EQUIPMENT DAMAGE**

Do not lift heavy equipment by yourself. Use two or more people to lift and mount heavy equipment such as the inverter and battery. Use proper lifting techniques during installation to prevent injury and equipment damage.

**Failure to follow these instructions can result in injury and equipment damage.**

## End-of-Line Functional Check

Refer to the *Freedom eGEN System Installation Guide*, Step 11 of the Installation Procedure (in section 5), and perform the following end-of-line check step-by-step.

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**IMPORTANT:** The eGEN system must be de-energized prior to performing the end-of-line check including removing AC power, turning off vehicle ignition, turning off the battery disconnect switch, and making sure the BMS Power button is in the Off position. Follow all necessary safety precautions, use personal protective equipment (PPE), and perform a lock-out, tag-out (LOTO).

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1.  **Check main battery fuse.**

Check that all fuses are installed and are of the correct type and rating. Check that the fuse replacement label adjacent to the associated fuseholder matches the fuse installed. Use a multimeter and check the continuity across the main battery fuse.

2.  **Check resistance across system DC bus.**

Without powering up the system, use a multimeter (Ohm) and measure the resistance between the positive and negative DC bus bars. If the resistance measures less than 10 Ohm then there is potentially a short circuit in the system. Locate the short circuit and remove it before proceeding further.

3.  **Check BMS operation.**

Remove all DC loads. Press the Power button on the BMS to turn it on and listen for the clicking sound when the BMS internal contactor closes. The battery SoC gauge on the remote panel should light up once battery power is engaged.

4.  **Check the battery SoC gauge.**

When BMS is turned on, the battery SOC gauge should automatically start displaying battery status. Press the buttons on the SoC gauge to cycle through battery information and make sure the information is correct.

5.  **Power up the system.**

Turn on the battery disconnect switch to apply battery power to system DC bus.

The Freedom SW (FSW) Inverter/Charger should automatically begin the power-up sequence (the front LEDs and unit fans should come on briefly upon applying DC power).

6.  **Check FSW settings.**

Using the Combox tablet, make sure the configurations on the FSW Inverter / Charger are set correctly as follows.

Parameters	Setpoint
<b>Inverter Settings</b>	
Low Batt Cut Out	12.1V
LBCO Delay	10s

Parameters	Setpoint
High Batt Cut Out	14.8V
<b>Charger Settings</b>	
Battery Type	Custom
Equalize Support	Disabled
Bulk Voltage	14.6 V
Absorb Voltage	14.6 V
Float Voltage	13.4 V
Batt Capacity	600 Ah
Max Charge Rate	100%
Charge Cycle	3-Stage
Default Batt Temp	Warm
ReCharge Volts	12.4 V
Absorb Time	30 min
Auto Charge Enable	Enabled

7.  **Check the 2nd alternator's mechanical connection to the main engine.**

Make sure there are no objects, parts, or wires that can interfere with the auxiliary belt.

Make sure there are no fluids that have leaked or came into contact with the auxiliary belt or pulleys.

Check the 2nd alternator's engine belt. Use a straight edge or laser alignment tool to ensure pulleys are within 0.5 degrees of alignment. Then check the alignment of all the other belts. Correct as necessary.

When you start the vehicle, make sure the auxiliary belt, pulleys, and tensioner do not show excessive noise or vibration.

8.  **Check Balmar regulator operation.**

Turn on the vehicle's engine ignition.

Once the engine and the second alternator are running, the 7-segment display on the Balmar regulator should light up and begin cycling information.

Visually check the Balmar regulator display. However, skip this step if the Balmar regulator is installed in the engine compartment and cannot be viewed safely.

9.  **Check alternator charging.**

When the second alternator is running, monitor the battery voltage and current information displayed on the battery SoC gauge located on the remote display panel. As the alternator is charging, the battery voltage should slowly rise and a charging current shown with "+" sign will be displayed on the SoC gauge.

10.  **Test FSW inverter.**

Enable FSW inverter through the Combox tablet, or using the button on the front of the FSW unit.

Run your desired AC appliance to make sure there is AC output from the inverter.

Monitor the inverter status on the Combox tablet.

11.  **Test FSW charger.**

Apply AC shore power to the FSW AC input.

Ensure FSW charger is enabled on the Combox tablet. After a brief moment to qualify AC shore power, the FSW should begin charging.

If you already have AC appliances running on inverter power, they should not be interrupted as FSW automatically and seamlessly transfers shore power to support AC loads.

Monitor the FSW charger status on the Combox tablet.

Also, monitor the battery SoC gauge on the remote panel to ensure the battery information is displayed correctly there.

12.  **Test full load operation.**

Run DC and AC loads on the vehicle for an extended period of time as a system burn-in test.

Pay attention to any abnormal operations as well as overheating on wirings and connections.

13.  **Fully charge the battery.**

After testing the system at full load condition, turn off all DC and AC loads. Charge the Li-ion battery until it reaches 100% SoC.

14.  **Safely power down the system.**

Shut down and de-energize the system.

Remove AC shore power.

Remove all DC and AC loads.

Turn off the vehicle's engine ignition.

Check the Balmar regulator display is off.

- If the vehicle is to be stored for less than a month, turn off the BMS using the Reset button on the remote panel.
- If the vehicle is to be stored for more than one month, turn off the BMS using its Power button to put it in storage mode.

15.  **Attach the labels to the User Guide.**

Verify that the spare BMS and battery module serial number labels match the serial numbers on the BMS and battery module in the system.

Attach the spare serial number labels on to a *Freedom eGEN User Guide* in the designated spaces (two boxes are reserved in the main panel of the guide).

Place the User Guide in the vehicle's user manual folder.

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**Contact Information** [solar.schneider-electric.com](http://solar.schneider-electric.com)

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