

# Freedom e-GEN System End-of-Line Checklist

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Rev C

## **DANGER**

### HAZARD OF FIRE, ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

This Freedom e-GEN System End-of-Line Checklist is in addition to, and incorporates by reference, the relevant product manuals for each product in the power system. After reviewing this guide 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 product. Ensure you are familiar with that information before proceeding.

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

## Important Safety Information

### READ AND SAVE THESE INSTRUCTIONS

Electrical equipment shall be installed, operated, serviced, and maintained only by qualified personnel. Certain configuration tasks shall only be performed by qualified personnel in consultation with your local utility and/or an authorized dealer. Servicing of batteries and the BMS 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 Xantrex LLC for any consequences arising out of the use of this material.

## **DANGER**

### HAZARD OF FIRE, ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Equipment must only be installed and serviced by qualified electrical personnel.
- Equipment may be energized from multiple sources. Never operate equipment energized with covers removed.
- 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.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.
- Do not short-circuit the battery.
- Do not expose the battery to flames.
- Do not attempt to open or dismantle the lithium-ion battery. If the battery is damaged, do not touch the corrosive electrolyte or powder. In case battery content comes in contact with skin or eyes, immediately flush the affected area with large amount of clean water and seek medical help.
- Upon disposal, do not crush, puncture, drop, disassemble, dispose of in fire, or similar actions.

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

## **WARNING**

### HAZARD OF FIRE, ELECTRIC SHOCK, EXPLOSION, BURN, OR PERSONAL INJURY

- Always use the Xantrex Battery with the Xantrex BMS. Never bypass the BMS. The BMS must always be connected to the lithium-ion battery and in the circuit for proper operation and safety.
- Do not connect other battery types to the system DC load or the system DC bus.
- Do not expose any of the equipment to rain, snow, or liquids of any type. Products are designed for indoor use only.
- Battery is heavy. Employ precautions and appropriate lifting techniques when handling.
- Do not operate the battery or other equipment with damaged or substandard wiring.
- Do not replace the battery fuses or any other fuses in the system by yourself. Seek qualified assistance.
- Do not obstruct the air ventilation openings on the system devices. Do not install or operate any of the system devices in compartment containing flammable materials or in locations that require ignition-protected equipment.
- If the lithium-ion battery becomes damaged, it can release harmful gases. In such a case, ventilate the area whenever possible but evacuate the vicinity immediately.

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

## **CAUTION**

### RISK OF PERSONAL INJURY OR EQUIPMENT DAMAGE

- Use the right tools for the job. Use of improper tools may result in damage to equipment and personal injury.
- 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.
- Mount and fasten all devices securely according to their installation guides.

**Failure to follow these instructions can result in personal injury and/or damage to equipment and may void the warranty.**

## NOTICE

### RISK OF EQUIPMENT DAMAGE

- Only charge the Xantrex Battery with an approved charger. Contact Xantrex for details.
- Do not physically modify the system devices, wiring harness, and accessories.
- Do not stand on the battery.
- Do not alter the factory settings on any of the system devices including the BMS.
- Do not disassemble the Xantrex Battery or the BMS. They contain non-serviceable parts.
- Do not operate or store the battery outside of the specified environmental limits.
- Do not charge the battery in ambient temperature below freezing.
- Do not charge the battery above the recommended voltage.
- Do not allow the battery to be completely depleted.
- Do not disconnect the battery while it is being charged.
- Always install the Xantrex Battery in an upright position only relative to a horizontal plane with battery power terminals facing upward. Installing batteries on their side or at an angle can lead to long-term performance degradation of the battery. Charging cycles may become severely affected.
- Components which can be recycled must be recycled and those that cannot be recycled must be disposed of according to local, regional, and national environmental regulations.

**Failure to follow these instructions can result in damage to equipment and may void the warranty.**

## End-of-Line Functional Check

Refer to the Freedom eGEN System Installation Guide, Step 13 of the Installation Procedure (in section 4), and perform the following end-of-line check step-by-step.

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).

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 that all power sources (AC and DC) have their appropriate means of disconnection (Disconnect Devices) installed and located as close to the source as practical. Disconnect devices must be AC-rated for AC disconnection and DC-rated for DC disconnection.
3.  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.
4.  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.
5.  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.
  - Make sure the battery capacity is set correctly.
6.  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).
  - The Freedom XC PRO (FXCPRO) Inverter/Charger should automatically start. The display panel screen and the unit fans should come on briefly upon applying DC power).

7.  Check inverter/charger settings.

- If the inverter/charger is FSW, 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	10.5V
LBCO Delay	10s (min)
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 or 450Ah
Max Charge Rate	100%
Charge Cycle	3-Stage
Default Batt Temp	Warm
ReCharge Volts	13.0 V
Absorb Time	30 min
Auto Charge Enable	Enabled

- If the inverter/charger is the FXCPRO, using its display panel or the remote panel (if available), make sure the **Battery Type** (setting number 20) is set to *LFP*. and the **LBCO Voltage** (setting number 02) is set to *11.5*.
8.  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 alternator 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 including tension according to their manufacturer's specifications. Correct as necessary.
  - When you start the vehicle, make sure the auxiliary belt, pulleys, and tensioner do not show excessive noise or vibration.
  - If a skid-plate is installed (recommended), ensure that there is adequate space for correct operation meaning, no points of friction.
9.  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.
10.  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.

11.  Check combiner operation.
- With the engine running, verify that the combiner LED is blinking.
  - If the Xantrex Battery is below 12V, verify that the combiner is "combining" the currents by placing a current clamp on the cable from the solenoid to the Xantrex Battery. It should read above 30A.

12.  Test the inverter function.
- If you have the FSW:
- 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.
- If you have the FXCPRO:
- Enable the inverter by pressing the Power [Standby] button on the display panel or on the remote panel, if available.
  - Run your desired AC appliance to make sure there is AC output from the inverter.
13.  Test the charger function.
- If you have the FSW:
- 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.
- If you have the FXCPRO:
- Apply AC shore power to the FXCPRO AC input.
  - After a brief moment to qualify AC shore power, the FXCPRO should begin charging.
  - If you already have AC appliances running on inverter power, they should not be interrupted as FXCPRO automatically and seamlessly transfers shore power to support AC loads.
  - Monitor the display panel for charging indication or monitor the battery SoC gauge on the remote panel to ensure the battery information is displayed correctly there.
14.  Test full load operation.
- Run DC and AC loads on the vehicle for one complete discharge cycle of the battery as a system burn-in test.
  - Pay attention to any abnormal operations as well as overheating on all wiring and connections.
15.  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.
16.  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.
  - Turn off the BMS using the the Reset button on the remote panel or by using its Power button. If the vehicle is to be stored for longer than 3 months, refer to the Xantrex Battery Storage and Maintenance Guide (975-1005-01-01) for more information.

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