LIONENERGY™

EMS-C Communication Module

Energy Management System Compact / For Sanctuary 2 and Sanctuary 3 Inverters



Instruction Manual

Updated 4/13/25



READ THIS USER MANUAL IN ITS ENTIRETY BEFORE OPERATING THE UNIT.

This unit provides safe, quiet, and renewable electric power. It is very important to carefully read this Installation Guide before using the product. Keep this guide for future reference.

Carefully read and comply with all safety directives before installing and using the Sanctuary System. Otherwise, personal bodily injury or death may result.

Symbols Used:

WARNING: Indicates a hazardous situation which, if not avoided, could result in injury or death.

CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor injury or damage to the equipment.

NOTE: Indicates an important step or tip that leads to best results, but is not safety or damage related.

Follow these directives for safe use:

System Integrity: The inverter and all system components must not be disassembled or altered by unauthorized personnel. Unauthorized modifications can compromise system safety, void warranties, and result in serious injury or death.

Electrical Hazard: Always disconnect all power sources, including the AC and DC terminals, before performing any maintenance or cleaning. Use lockout/tagout procedures to ensure the system remains de-energized during maintenance.

Grounding Requirements: Proper grounding is essential for safe operation. Ensure that the system is connected to a permanent, grounded wiring system, and comply with all applicable grounding and bonding requirements.

Load Calculations: Ensure all connections follow the specifications outlined in the Installation Guide and comply with the National Electric Code (NEC). Using incorrect wire sizes, breaker ratings, or failing to properly balance loads can lead to system malfunction or pose safety hazards. Always verify that all load connections meet both installation and code requirements.

Heavy Equipment: This system includes heavy equipment. Use lifting assistance during installation to prevent injury.

Compliance with Regulations: All installation and maintenance activities must comply with local, state, and national electrical codes and standards, including but not limited to UL 9540 and UL 1973. Adherence to these standards is mandatory to ensure safety and compliance.

Final Continuity Check: Do not power on the system until a final continuity check is performed to ensure all connections are secure and correctly installed.

Battery Handling: Strictly follow the manufacturer's instructions for handling and installation of batteries. Failure to do so may result in fire, explosion, or electric shock.

Tool Usage: Exercise caution when using metal tools around batteries and electrical components. Dropping tools can cause short circuits, leading to potential explosions or fires.

Ventilation: The installation location must provide adequate ventilation to prevent overheating of the system components. Ensure that the unit is installed in a well-ventilated area according to the manufacturer's recommendations.

Weatherproofing – IP65 Compliance: When installing the Sanctuary system outdoors, it is critical to maintain IP65 and NEMA 3R protection to ensure long-term performance and safety. • Any holes made in the wire box for conduit or wiring must be sealed using the appropriate fittings and components. • Improper sealing may lead to water or dust ingress, which can cause equipment damage, corrosion, or electrical faults. • Always use the appropriate conduit connectors, grommets, and glands to maintain enclosure integrity. • It is the installer's responsibility to ensure that the final installation meets the appropriate standards for outdoor use.

Qualified Personnel Only: Installation, service, and maintenance of this Sanctuary system must be performed by qualified personnel/technicians. Only certified professionals with the appropriate training should install or service the unit, with or without a battery. For questions on how to become certified for installing the Lion Energy Sanctuary, please contact the Lion Energy ESS Support team.

General Safety Guidelines

Emergency Procedures: In case of fire, evacuate the area and contact emergency services immediately.

Handling of Damaged Equipment: If the unit or any of its components are damaged, do not operate the system. Contact a qualified technician, or Lion Energy's ESS Support Team for inspection and repair.

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Introduction

About the EMS-C

The EMS-Compact (EMS-C) is Lion Energy's proprietary Energy Management System for Sanctuary 2 and Sanctuary 3 systems. It operates as the primary communications and command gateway between the inverter and Lion Energy's systems while also providing a secure interface for the end user.
The EMS-C collects operating data from the inverter and uploads it so you can view it on the Lion Smart app (Apple), (Android), or on the web at smart.lionenergy.com.

Communications

- Bluetooth: for local diagnostics and commissioning
- Cellular: SIM card included that provides limited connectivity for reporting alarm status and allowing for remote troubleshooting when the WiFi is inaccessible.
- WiFi: Remote monitoring, firmware updates, and analytics
- RS-485 (inverter port): for communication between the EMS-C and the inverter.
- RS-485 port: for future integration
- CAN: for future integration
- DIO (Digital in/out): for future integration
- USB: for future integration

Backup Power

Integrated backup battery keeps the EMS-C on when parallel inverters are power-cycled during commissioning.

Utility Integration

SunSpec 2030.5 CSIP Certified

Certification

PTCRB certified – tested and approved to meet North American cellular network standards

LED Indicators

Status

○ No Lights = Not commissioned

🟡 1s Blink Yellow = Connecting

🟡 Solid Yellow = EMS-C or Inverter Updating

🔵 Solid Blue = Connected

🔵 100ms blink Blue = Uploading or downloading data

🔴 Solid Red = Disconnected (or EMS has faulted)

🔵 **Cellular**

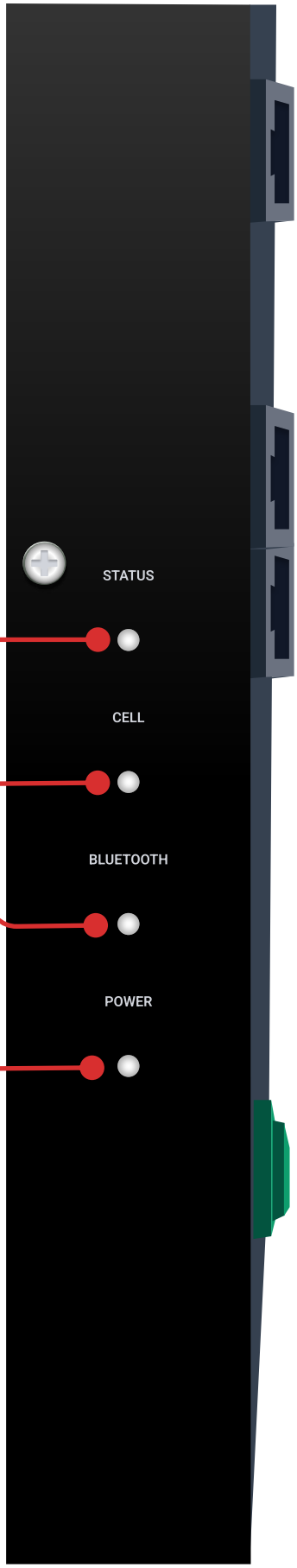
- Off = cellular is off
- 500ms Blinking = Connecting
- Solid = Connected

🔵 **Bluetooth**

- Off = Bluetooth is off
- 500ms Blinking = Advertising.
- Solid = Paired with Bluetooth host (cell phone or laptop)

🔵 **Power**

- Off = Power not present
- On = Power present



Wiring The EMS-C

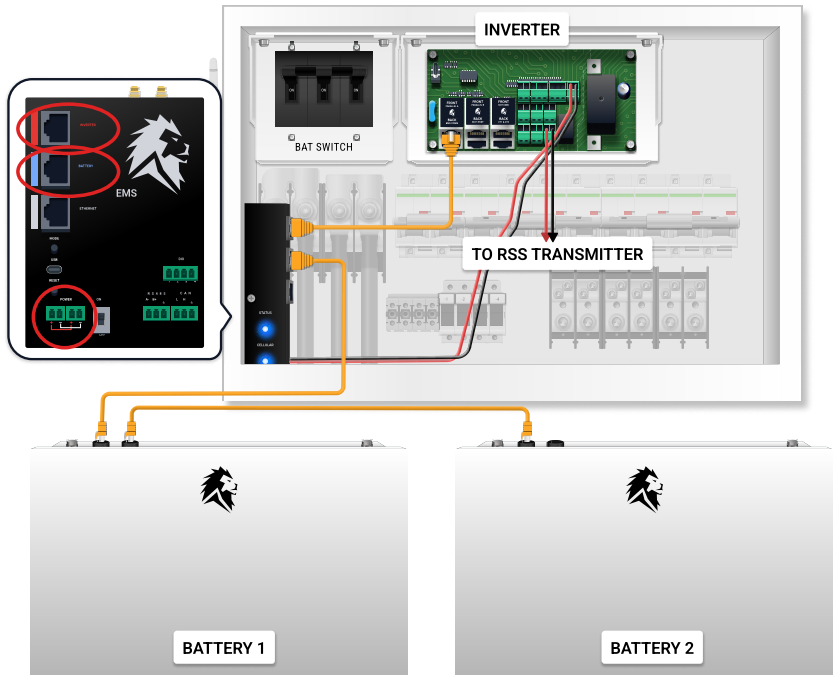
Sanctuary 3 Wiring Diagram for the EMS-C

For Sanctuary 3, the EMS-C communicates with the inverter through the inverter's "Parallel A" port. That port on the inverter has two CAN busses and an RS-485 bus. For parallel inverter systems, "Parallel B" connects to the next inverter's "Parallel A" port.

The batteries communicate with the inverter over CAN by being passed through the EMS-C to the inverter's "Parallel A" port. The batteries self-address according to the communication cable wiring.

The battery communication wire order must be as follows:

- The EMS-C battery port connects to battery #1 COMM1.
- COMM2 of battery #1 connects to COMM1 of battery #2.
- Repeat this order until the last battery.
- The last battery doesn't have anything connected on COMM2.



1 Inverter X 2 Batteries Example

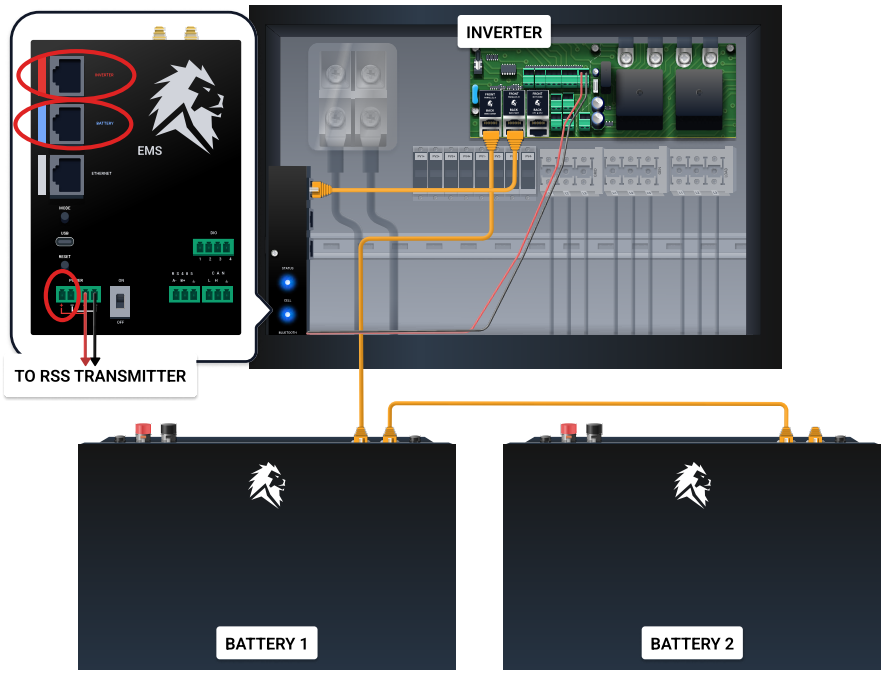
When the AC Power button or the remote shutdown switch turns off AC power on the inverter, the RSS 12V supply also turns off. However, the EMS-C 12V power remains on, supplied directly by the inverter's control board. For Sanctuary 3, do not connect the RSS transmitter 12V power to the EMS-C.

Sanctuary 2 rev4 Wiring Diagram for the EMS-C

For Sanctuary 2, the EMS-C communicates with the inverter through the inverter's WiFi port, not the inverter's parallel port.

The BMS communication cables from the batteries connect directly to the parent inverter's BMS port. All batteries are on the same RS-485 bus. The battery port on the EMS-C is only used during commissioning to set the address on each battery. After commissioning, the BMS cables are moved to the inverter's BMS port.

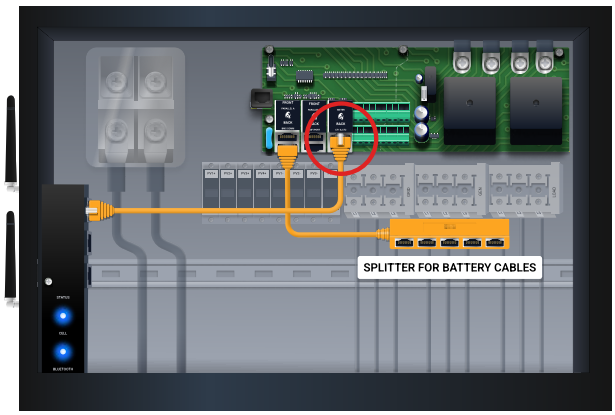
On all Sanctuary 2 models, the EMS-C is powered by the 12V power for the RSS transmitter. When either the AC Power button or the remote shutdown switch turns off the AC power on the inverter, the RSS 12V supply also turns off, effectively removing 12V power from the EMS-C and from any RSS transmitters connected to the EMS-C.



1 Inverter X 2 Batteries Example

Sanctuary 2 rev3

The **inverter port on the EMS-C connects to the inverter's meter port (front right)** with a specially wired cable. The rev3 inverters have a board that looks like the diagram below.



Sanctuary 2 rev3 Example

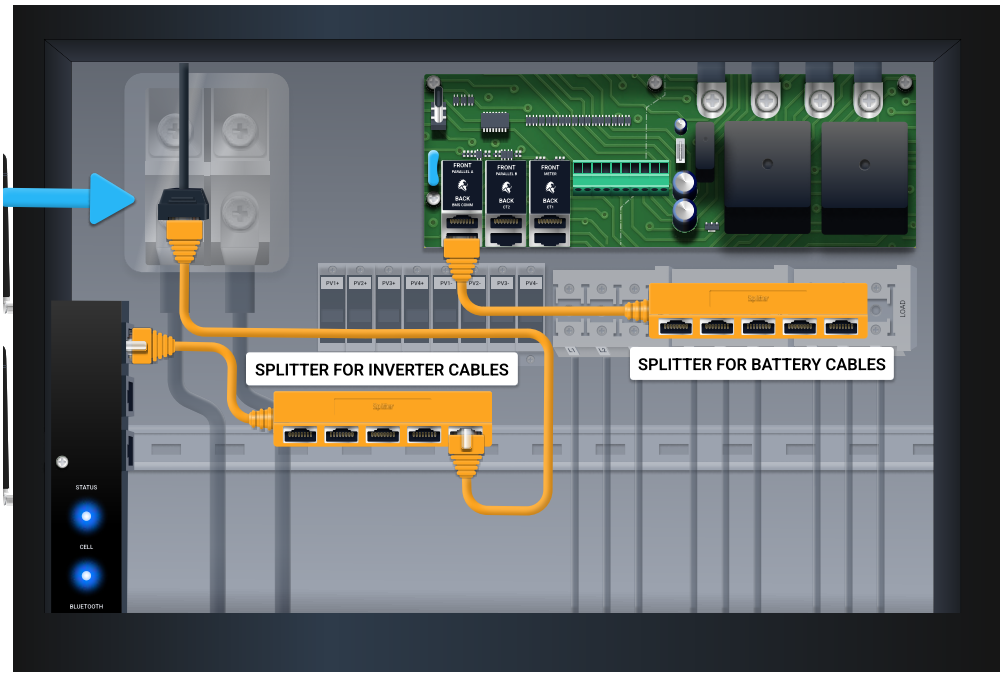
Custom Inverter Cable (rev3 only)

A special cable is used to interface between the EMS-C and the inverter. This cable was supplied with the rev3 originally, but **can be custom made from Ethernet cable and RJ-45 ends using the following wiring:**

T-568B end	Meter end
1. white/orange 5V	1. orange
2. orange	2. white/orange 5V
3. white green	3. white/green
4. blue	4. white/brown RS485 A
5. white/blue	5. white/blue
6. green GND	6. brown RS485 B
7. white/brown RS485 A	7. blue
8. brown RS485 B	8. green GND

Sanctuary 2 revs 1 & 2

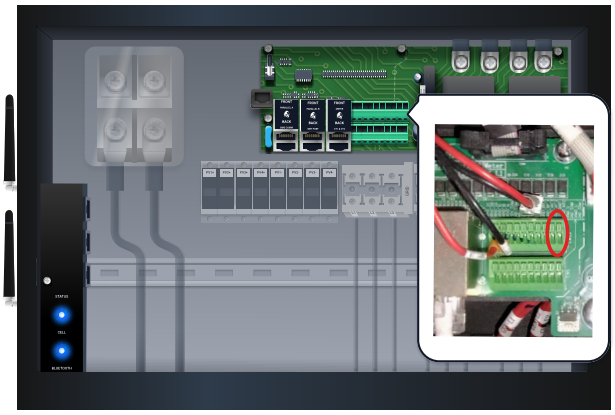
Using a standard Ethernet cable, connect the EMS-C “inverter” port to the RJ-45 dongle that is hanging near the battery terminals on the inverter.



Inverter With Dongle

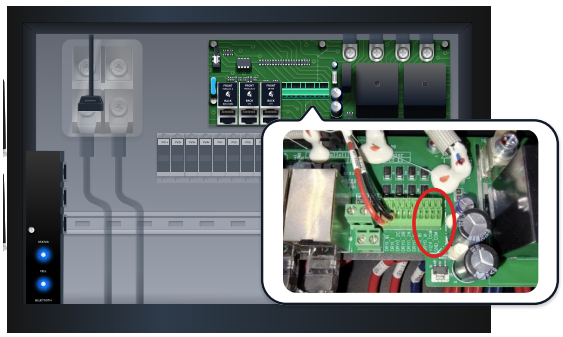
Power Connection

EMS-C Power Connection on Earlier Sanctuary 2 Models



Sanctuary 2 rev3

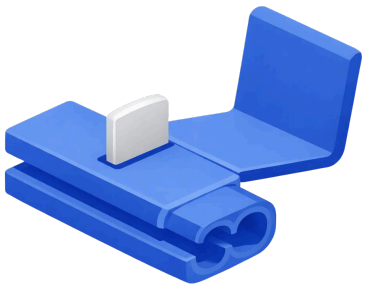
Use the top row, right two connectors +12V_COM and GND_COM. These connectors work best with solid 18 to 20 AWG copper wire. The silk screen labels for this connector are above and to the left.



Sanctuary 2 rev2 (shown) and rev1 (similar):

Use the right two connectors +12V_COM and GND_COM. These connectors work best with solid 18 to 20 AWG copper wire.





Splice Connector

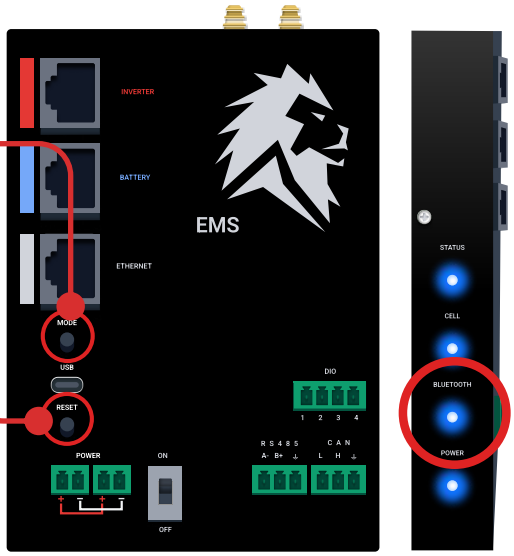
Work Around For Broken Connectors:

If the green 12V RSS connectors for Sanctuary 2 revs 1, 2, or 3 are broken, it's possible to tap into the power wires under the top cover. On the connector indicated, the left wire (black) is the GND_COM wire, and the green wire (third from left) is +12V_COM.

EMS-C Buttons

The EMS-C has two buttons:

- **Mode:** switches between local Bluetooth connection and WiFi
- **Reset:** reboots the EMS-C



When the Bluetooth light is solid, the EMS-C is paired to a cell phone or laptop.

Bluetooth communication is used to troubleshoot or commission a Sanctuary. The EMS-C is generally connected to Wi-Fi to upload data.

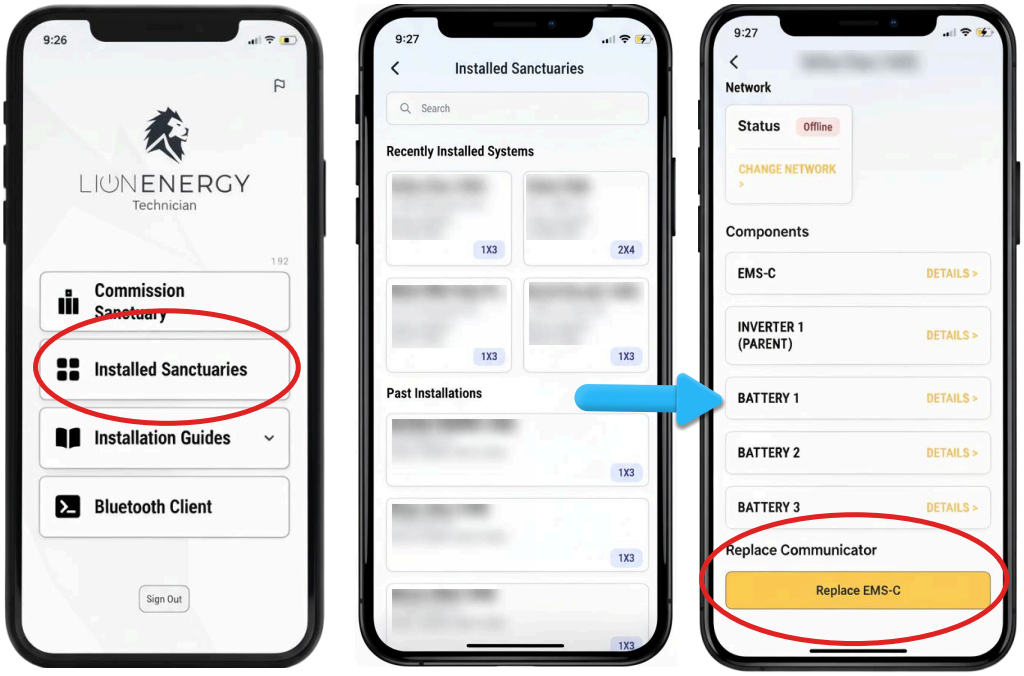
Replacing a WCM with an EMS-C

Currently, commissioning on Sanctuary 2 revs 1-3 must be done using a WCM.

Step 1: Open the Lion Technician app, click on “Installed Sanctuaries”, find the Sanctuary and scroll down to Replace Communicator.

Step 2: Click on the yellow button “Replace WCM”. Follow the prompts.

If you don’t see the button to replace the communicator, contact ESS support to obtain the correct permissions. The old WCM should be retained if it still functions.



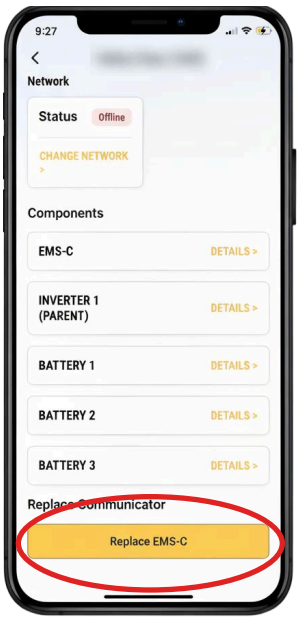
Re-Installation

The EMS-C now comes standard on Sanctuary 2 (rev4) and Sanctuary 3. The older Sanctuary 2 models (revs 1-3) came standard with a WCM (Wireless Communication Module). All older Sanctuary 2 models can be retrofitted with the EMS-C.

For systems with multiple inverters, a single EMS-C should be used in the designated parent inverter.

EMS-C Replacement on Sanctuary 3

Using the **Lion Technician app,** navigate to the customer's product, scroll down to the bottom of the page and **click on "Replace EMS-C". Follow the prompts** and the new EMS-C will be associated with the customer's Sanctuary.



If the option to replace the EMS-C does not exist in your app, please contact ESS support to get the permissions activated on your account.

App Prompt 1: To replace the EMS-C, first disconnect all wires/cables from the EMS-C. Press down on the bracket release to release the old EMS-C from the DIN rail.

App Prompt 2: Attach the new EMS-C to the antenna cables. **Make sure the antennas are connected to the correct port.** Although the antennas look identical, they are not interchangeable. One is for cellular and the other is for WiFi/Bluetooth. Look for the label stamped in the antenna sheath. The label is faint so additional light may be needed.

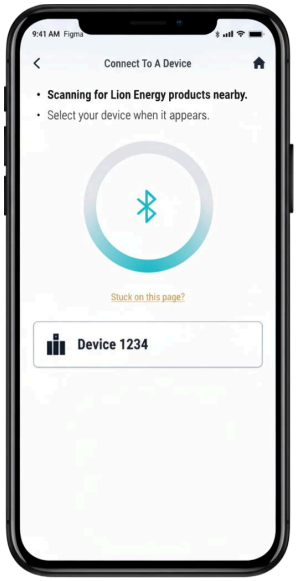


App Prompt 3: Rotate the EMS-C assembly upward and secure it onto the DIN rail, positioning it to the left of the battery cables. Then, lower the assembly until it locks into place with a click.

App Prompt 4: Connect the correct end of the EMS-C power cable to the +12V_COM/GND_COM port on the inverter. **Make sure the red wire is on the positive terminal.**

App Prompt 5: Connect the cable that was in the old EMS-C Inverter port to the new EMS-C inverter port (red). The other end of this cable should connect to the inverter "Parallel A" port.

App Prompt 6: Flip the “ON/OFF” switch on the EMS-C to the “ON” position. The blue power indication light should illuminate.



App Prompt 7: Use the app to connect to the EMS-C Bluetooth.

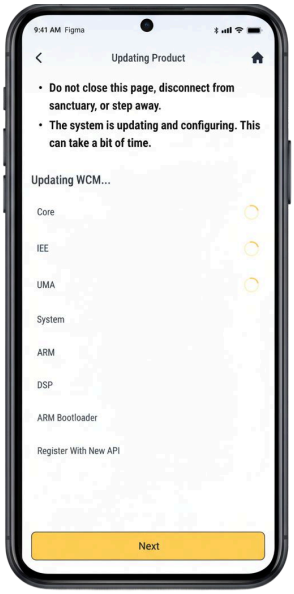
App Prompt 8: Select which type of network connection (Ethernet or Wi-Fi) the EMS-C will connect to.

App Prompt 9: Keep the app open while updates are pushed to the EMS-C.

EMS-C Replacement on Sanctuary 2 rev4

Step 1: Remove the EMS-C, mounting bracket, EMS-C power cable, antennas, and antenna cables from the box.

> **Use the longer EMS-C mounting bracket** so that the EMS-C will fit on the DIN rail. For revs 1-3, a DIN rail is not provided, and the EMS-C doesn’t have a designated mounting location inside the inverter’s compartment.



Step 2: Using the **Lion Technician app**, navigate to the customer’s product, scroll down to the bottom of the page and **click on “Replace EMS-C”. Follow the prompts** and the new EMS-C will be associated with the customer’s Sanctuary.

App Prompt 1: Attach the new EMS-C to the antenna cables. **Make sure the antennas are connected to the correct port.** The antennas look the same, but they’re different. **One is for cellular, and the other is for WiFi / Bluetooth.** The antennas are labeled, but the lettering on the antennas may be hard to read.

App Prompt 2: Rotate the EMS-C assembly upward and secure it onto the DIN rail, positioning it to the left of the battery cables. Then, lower the assembly until it locks into place with a click.

App Prompt 3: Connect the correct end of the EMS-C power cable to the +12V_COM/GND_COM port on the inverter. **Make sure the red wire is on the positive terminal.**

App Prompt 4: Connect the cable that was in the WCM COMM port to the EMS-C inverter port (red). Connect the other end of the inverter communication cable into the back center port on Sanctuary 2 rev4 communication board.

App Prompt 5: Flip the “ON/OFF” switch on the EMS-C to the “ON” position. The blue power indication light should illuminate.

App Prompt 6: Use the app to connect to the EMS-C Bluetooth.

App Prompt 7: Select which type of network connection (Ethernet or Wi-Fi) the EMS-C will connect to.

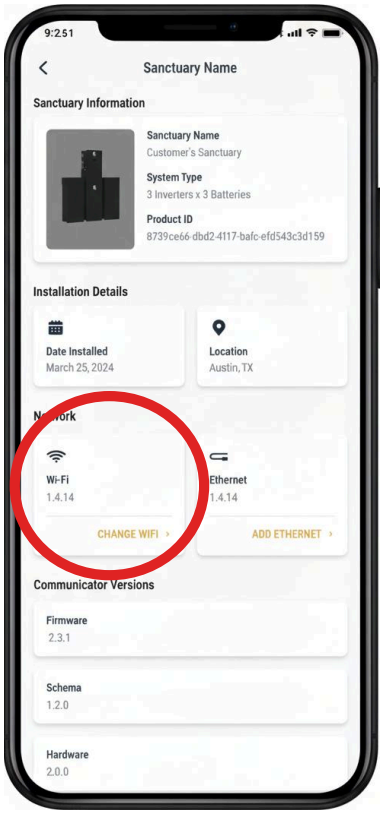
App Prompt 8: Keep the app open while updates are pushed to the EMS-C.

Changing the WiFi SSID/Password

Changing the WiFi SSID and password may be done either in the Lion Technician app, or on the web page smart.lionenergy.com. You must be within Bluetooth range of the EMS-C. The phone / tablet / laptop you're using must be able to communicate on Bluetooth.

If the EMS-C (or WCM) is already connected to the internet, it will automatically switch to Bluetooth mode and wait for you to pair with it. If it cannot connect to WiFi, it will cycle between attempting to connect to WiFi and entering Bluetooth pairing mode. To manually enter Bluetooth pairing mode at any time, press the Mode button. When the Bluetooth LED is solid, the device is paired.

Using the Lion Technician app



Step 1: Open the Lion Technician app.

Step 2: Click on "Installed Sanctuaries".

Step 3: Under Network, click on CHANGE NETWORK. **After pairing the EMS-C, follow the prompts.**

When finished, click Continue and close the app. If the EMS-C is still in Bluetooth mode, press the mode button so that the Bluetooth LED flashes, or wait until the EMS-C tries to connect to WiFi.

Using the web page

Step 1: Open a browser and go to smart.lionenergy.com. Login and find the Sanctuary system. In the upper right corner, click on the menu and select "settings".

Step 2: Under Settings, **make sure you're not in the advanced settings page** and click on CHANGE INTERNET.



Step 3: Click on the lionems device and then click Pair. If the device does not show up in the list, press the mode button on the EMS-C to enable Bluetooth communication. Choose WI-FI and follow the prompts.

Step 4: Select the Wi-Fi network, enter the password, and click CONNECT.

Step 5: When finished, scroll down and click PRODUCT to return to the product page.

When finished, click Continue and close the app. If the EMS-C is still in Bluetooth mode, press the mode button so that the Bluetooth LED flashes, or wait until the EMS-C tries to connect to WiFi.

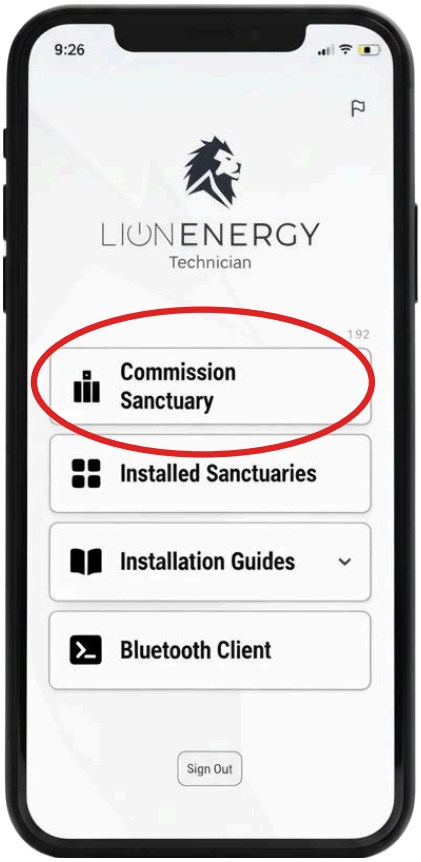
Commissioning

> ⚠ Commissioning should only be performed on new installations or when changing the number of inverters or batteries. **Re-commissioning is not a troubleshooting tool.** If you are experiencing issues, refer to the Support section.

To commission a Sanctuary system, open the Lion Technician app and select “Commission Sanctuary”.

What commissioning does:

- Sets the inverter settings to default
- Sets inverter parallel settings
- Sets inverter addresses
- Addresses batteries (Sanctuary 2 only)
- Registers the communicator with Lion Energy and associates it with a product



Re-commissioning

Replacing the WCM or EMS-C is now supported without needing to recommission.

Recommissioning is ONLY required when:

- Changing the number of inverters
- Changing the number of batteries

Support

For troubleshooting, please see info.lionenergy.com, lionenergy.com/pages/installers, or contact ESS support.

Sanctuary (ESS) Support

Monday-Friday | 8:00 AM - 5:00 PM, Mountain Time

(435) 244-3352