

OutBack Power EnergyCell 5 Integration

With the recent launch of the OutBack Power EnergyCell 5 Lithium Iron Phosphate battery, this Application Note explains what is needed and how to connect it to existing OutBack systems. OutBack Power continues to develop new Energy Storage System (ESS) solutions, providing customers with top-tier storage options and features.

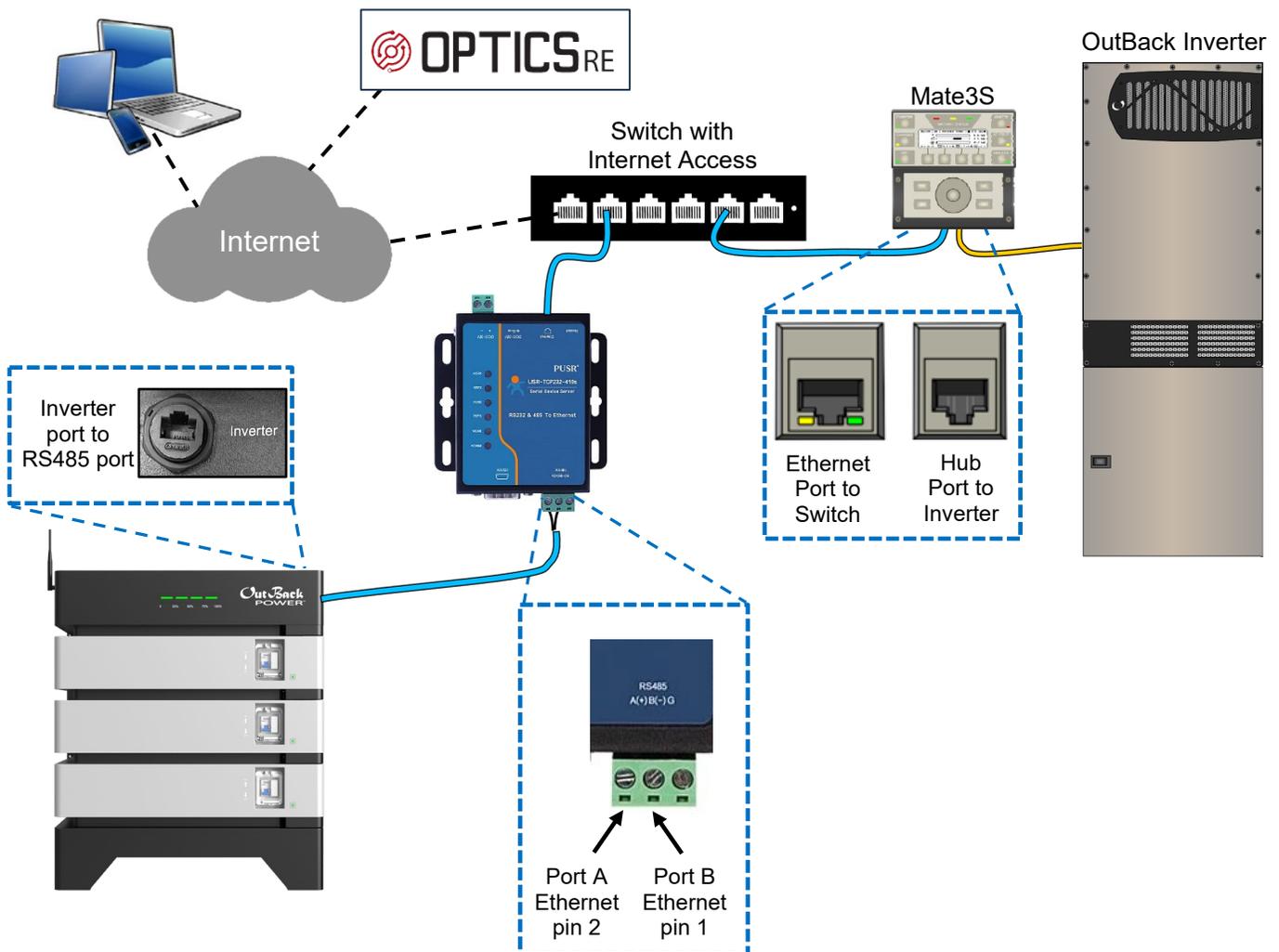
Battery Management System Overview

All lithium-ion battery systems require a battery management system (BMS) to regulate current and voltage for each cell. The BMS may or may not require active communication with the inverter and/or charge controllers. When needed, communication generally uses a standard protocol like CANBUS or MODBUS, though the commands and data exchanged are often specific to the BMS or battery brand.

EnergyCell 5 can fully integrate with Mate3S and OpticsRE through closed-loop communication, providing a seamless end-to-end ESS solution. Refer to the entire application note when connecting EnergyCell 5 to an existing OutBack Power system.

Topology Overview

Review the high-level topology overview below to understand the hardware and connections used for closed-loop communication between EnergyCell 5, the OutBack inverter, and Optics RE.



Connect the Required Cables

Use the Topology Overview image on the previous page as a reference when connecting the following cables:

Mate3S

- ❑ Make sure the Mate3S hub port is connected either to the inverter or to an OutBack hub that is connected to the OutBack inverter.
- ❑ Connect the Mate3S Ethernet port to a network switch with internet access using a standard CAT5 or CAT6 Ethernet cable. Having internet access will enable the connection to OpticsRE.

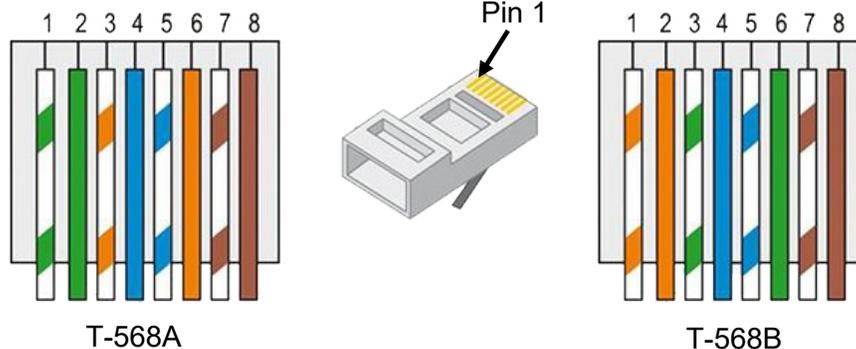
PUSR USR-TCP232-410S

- ❑ Connect the PUSR Ethernet port to a network switch that is on the same network as the Mate3S Ethernet connection using a standard CAT5 or CAT6 Ethernet cable.
- ❑ Connect the power adapter to the power port on the PUSR device.
- ❑ Locate a standard Ethernet CAT5 or CAT6 cable long enough to connect the EnergyCell Control Module to the PUSR device. Cut one end of the Ethernet cable. Strip the outer sheathing, then strip the wire ends connected to pins 1 and 2. Connect the cable previously attached at pin 1 to port B and the cable previously attached at pin 2 to port A.



NOTE: Use the proper wires for pins 1 and 2

There are two types of Ethernet cable pinout standards: T-568A and T-568B. With the connector tab facing away (down), pin 1 is on the far left. A white wire with a green stripe at pin 1 indicates a T-568A cable. A white wire with an orange stripe at pin 1 indicates a T-568B cable. When selecting and stripping back the wires previously connected to pins 1 and 2, verify the connector type on the other end of the cable and match the color wires for pins 1 and 2. The remaining six wires on the cut end can be snipped off or taped over, as they will not be used.



EnergyCell 5

- ❑ Connect the Ethernet cable from the PUSR device ports A and B to the “Inverter” port on the EnergyCell 5 Control Module.

EnergyCell 5 Battery Installation

Refer to the EnergyCell 5 User Manual for detailed instructions on installing and setting up the EnergyCell 5 battery system. Scan the QR code or click here: [EnergyCell 5 User Manual](#)



TCP Modbus Gateway Installation

To allow Mate3S to communicate with the EnergyCell 5 BMS, a hardware device known as a TCP Modbus Gateway must be installed and configured. Many brands and models may work, but the PUSR USR-TCP232-410S has been tested and is used in this guide for configuration.

The battery's RS-485 communication bus is converted to Ethernet TCP/IP using the **PU SR USR-TCP232 410S** device. The manufacturer's full user manual can be found at: <https://www.pusr.com/support/download/user-manual-usr-m511-user-manual.html>

The device can be configured through either the device web interface or by downloading and installing the manufacturer's app from: <https://www.pusr.com/support/downloads/usr-tcp232-m4-v2-3-4-106.html>

The configuration steps described below were completed using a web browser.

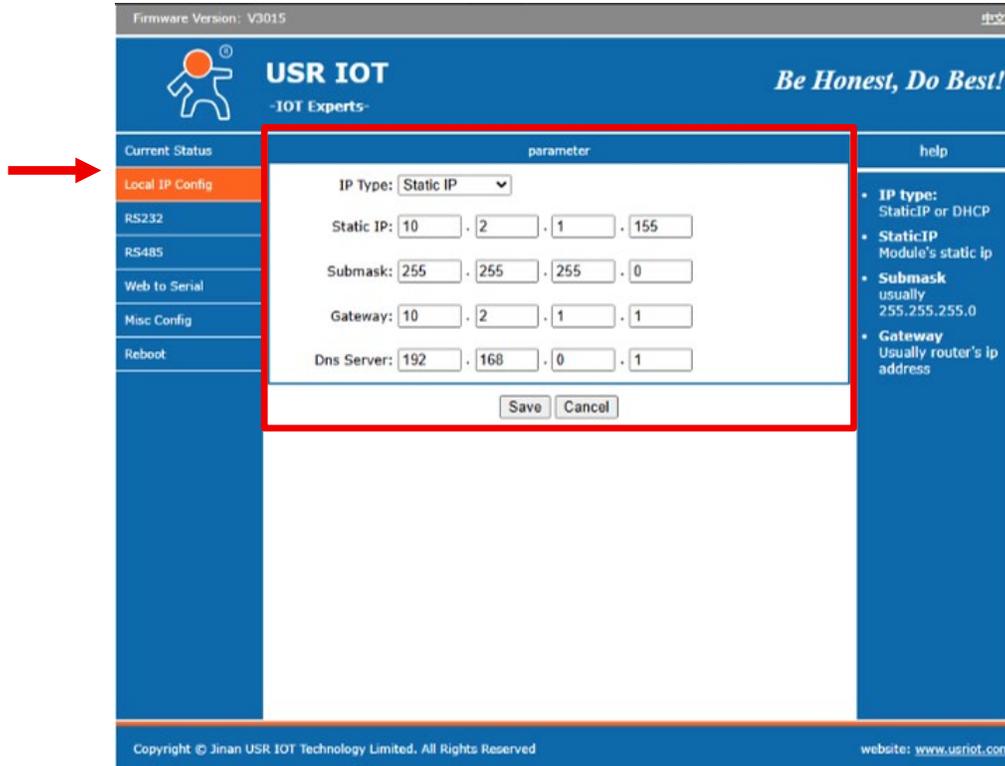
1. Using a web browser, log in to the PUSR device using the following information:
 - **Web server IP address Default settings:** 192.168.0.7
 - **Username:** admin
 - **Password:** admin

Once logged in, the main user interface appears with a left-hand menu for navigation.

	NOTE: The username and password can be modified on the "Misc Config" tab. The device's status can be seen in the "Current Status" tab.
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2. Configure the local IP address. See the image on the next page for reference.
 - a. Select the "Local IP Config" tab.
 - b. Select Static IP
 - c. Type in the "Static IP", "Submask", "Gateway", and "Dns Server".
 - d. Select **Save**.

	NOTE: The "IP Type" can be chosen as either dynamic or static. It is recommended to set the IP Type as "static IP" so the IP address stays the same in the future. Allowing a router to assign a dynamic IP address may result in a different IP later, which could disrupt network communication with the device and its connection to other devices components.
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NOTE:

Coordination with the local router might be needed when configuring a static IP address. If the router uses DHCP, conflicts can happen if it assigns the same IP address to another device as the static IP address of this device.

Contact the network administrator or log into the router to find the range of IP addresses assigned by the DHCP server. Then, select an IP address outside that range but still on the same subnet.

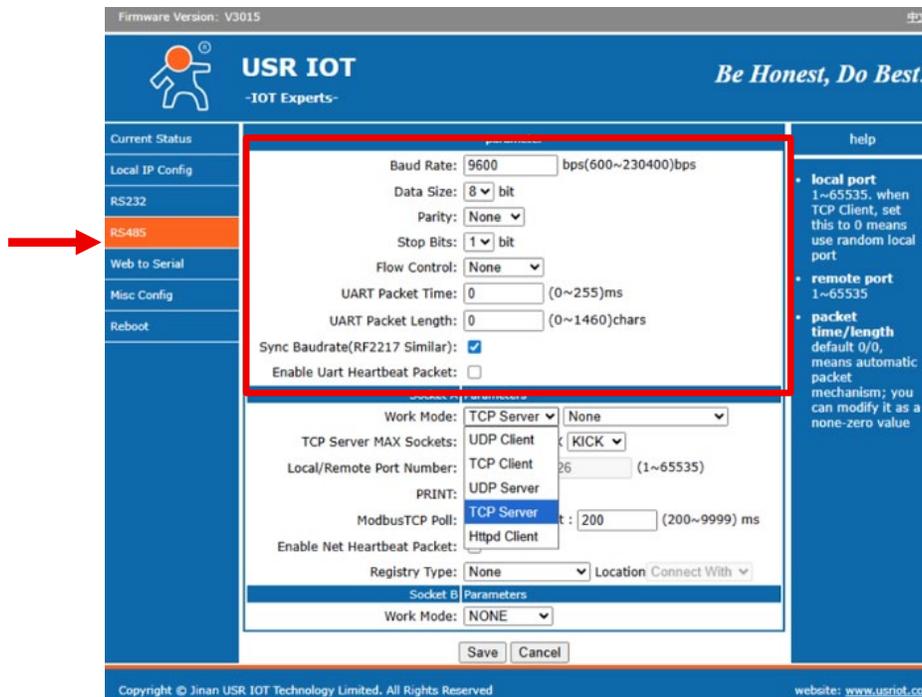
Example:

- **Router's IP range for DHCP addressing:**
 - 192.168.1.100 to 192.168.1.199
- **Assign a static IP outside the range above:**
 - Use something like 192.168.1.10, since the DHCP pool starts at 100.

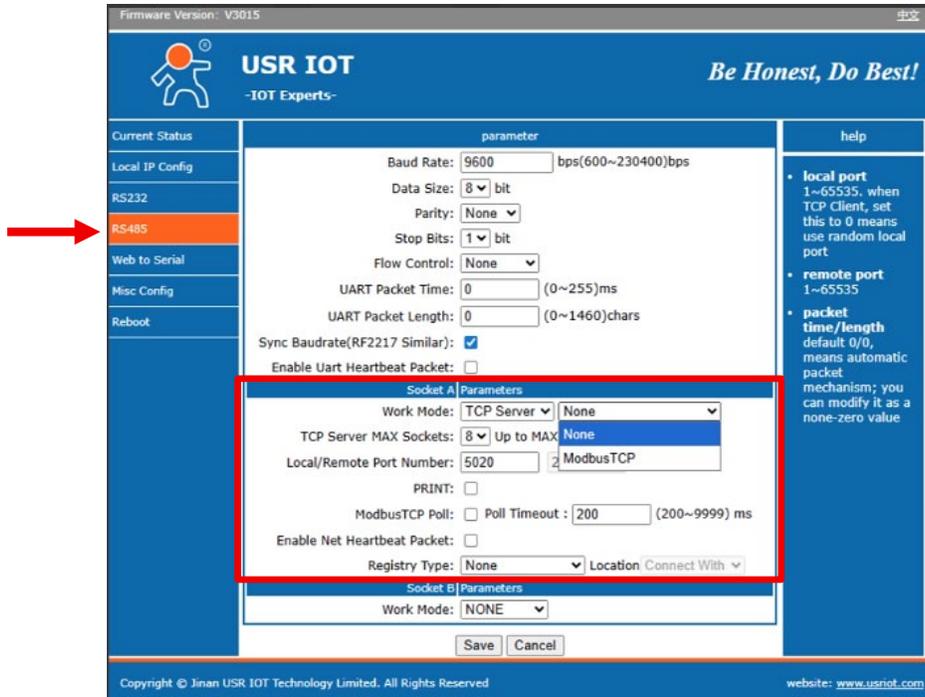
- Configure the device's RS-485 Communication Settings.
 - Select the "RS-485" tab.

	<p>NOTE:</p> <p>The settings under the "parameter" heading relate to the serial/RS-485 configuration. The settings listed under the "Socket A parameters" heading pertain to the network Modbus TCP configuration. The settings under the "Socket A parameters" heading are not used.</p>
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- Configure the following serial port parameters:
 - Baud Rate:** 9600
 - Data Size:** 8 bit
 - Parity:** None
 - Stop Bits:** 1 bit
 - Flow Control:** None
 - UART Packet Time:** 0
 - UART Packet Length:** 0
 - Sync Baudrate (RF2217 Similar):** checked
 - Enable UART Heartbeat Packet:** unchecked



- c. Configure the following Socket A parameters:
- **Work Mode:** TCP Server and ModbusTCP
 - **TCP Server MAX Sockets:** 8 **Up to MAX:** KICK
 - **Local/Remote Port Number:** 5020
 - **PRINT:** unchecked
 - **ModbusTCP Poll:** unchecked **Poll Timeout:** 200
 - **Enable Net Heartbeat Packet:** unchecked
 - **Registry Type:** NONE



d. Select **Save**.

4. To complete the setup, reboot the device.
- a. Select **Reboot** on the left navigation menu.
 - b. Select **reboot** to reboot the device.

Mate3S Configuration

Once the USR-TCP232-410S device is configured, the Mate3S/SR can be configured to connect to it by following the steps in this section.

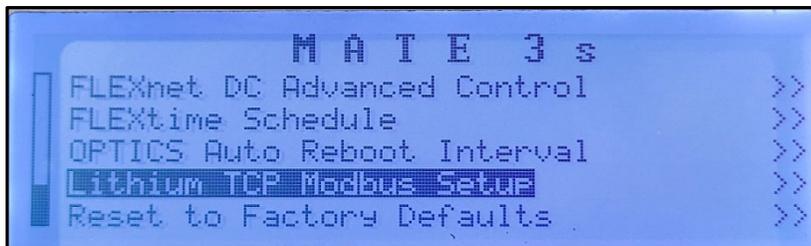


IMPORTANT:

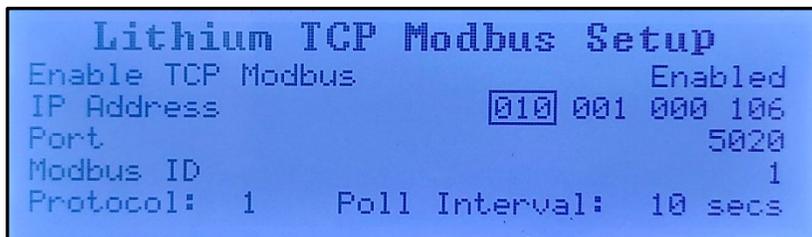
The proper settings won't be available without a firmware upgrade. Before proceeding, update the firmware to 1.5.0

See the following guides for assistance with upgrading Mate3S firmware. [Firmware Update Page](#) [Mate3S Documentation](#)

1. Navigation to the **Mate3S/SR** configuration menu from the “Outback Power” screen:
 - a. Press the “Lock” button
 - b. Enter the password **141** to enter the system configuration settings
 - c. From the “Main Menu,” navigate to **Settings > Mate3s > Lithium TCP Modbus Setup** and press the enter button.

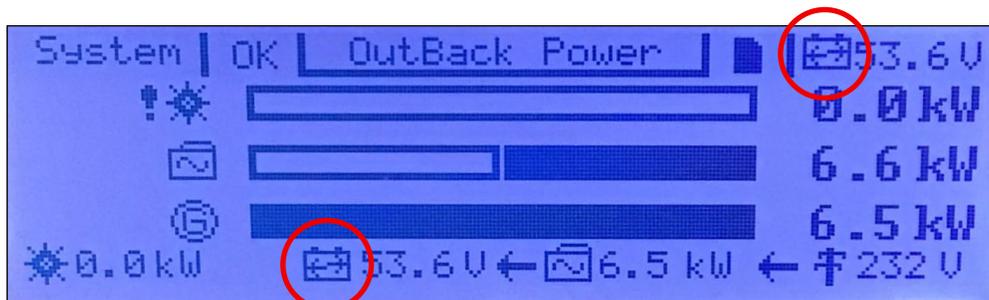


2. Configure the following:
 - **Enable TCP Modbus:** Enabled (*The functionality can be enabled and disabled*)
 - **IP Address:** xxx.xxx.xxx.xxx (*Use the IP address configured during the USR-TCP232-410S configuration.*)
 - **Port:** 5020 (*Use the TCP port that was configured or noted during the USR-TCP232-410S configuration*)
 - **Modbus ID:** 1 (*The modbus ID/address of the battery. Protocol 0 - Outback Stackable Battery, Protocol 1 – Outback Stackable Battery - ID = 1*)
 - **Protocol:** 1 (*Configures the Mate3S/SR to receive Outback battery data. 0 is Legacy and 1 is Outback Stackable Battery - Expanded data (preferred setting)*)
 - **Poll Interval:** 10 secs



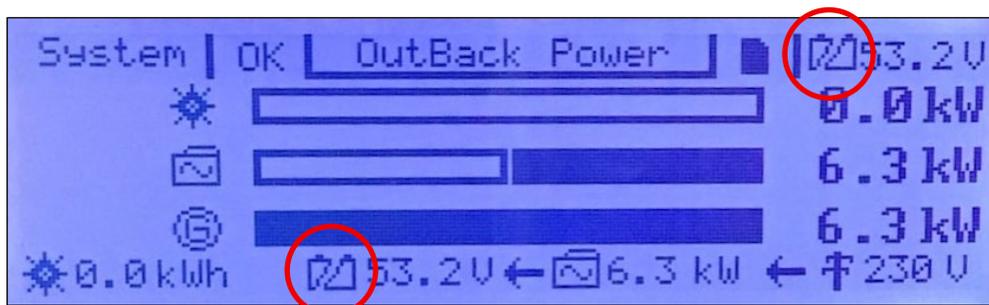
3. Verify closed-loop communication is functioning:

- **Healthy Link:** A normal battery icon indicates that the EnergyCell 5 master battery is

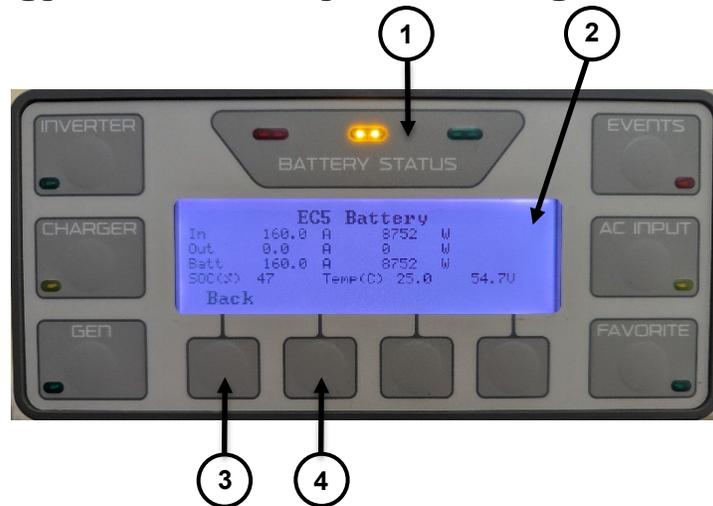


communicating properly with the Mate3S.

- **Broken Link:** A broken icon indicates there is no established connection to the EnergyCell 5 master battery.



Viewing EnergyCell 5 Battery Data using the Mate3S



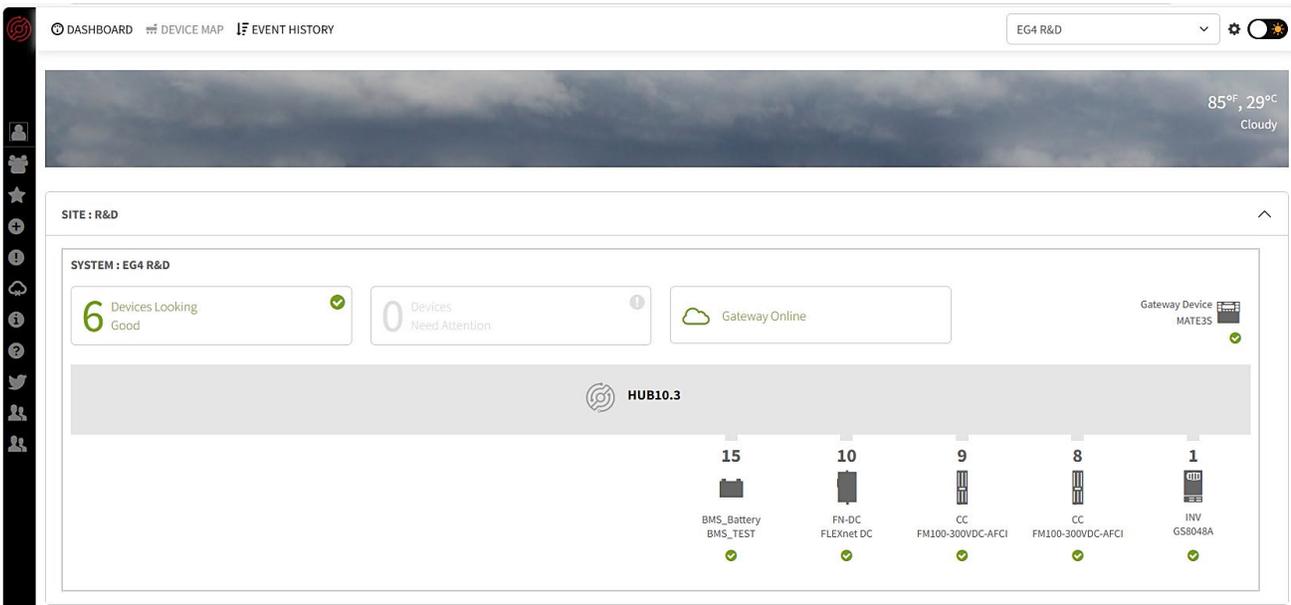
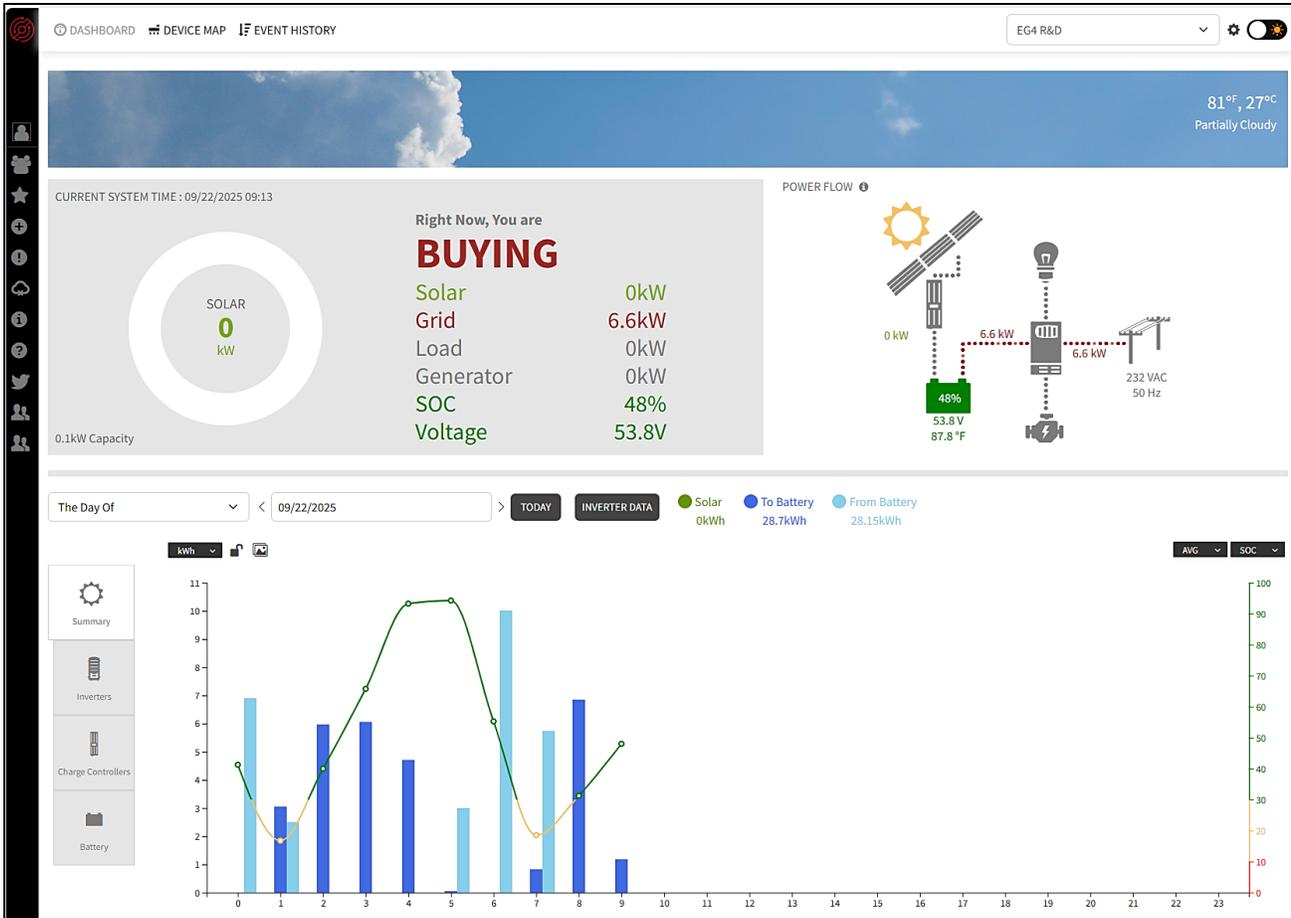
1. Battery Status LEDs
 - Green – SOC is greater than or equal to 60%
 - Yellow – SOC in the range of 59% - 30%
 - Red (solid) - SOC in the range of 29% - 1%
 - Red (blinking) - SOC 0%
2. EC5 Battery data
 - Shows the current and kW either entering or leaving the battery
 - Shows the latest battery SOC, Temperature, and DC Voltage measurements
3. Press this button to return to the main page.
4. From the home screen, press this button to access the EC5 Battery data screen.

Troubleshooting

- A red blinking “Battery Status” LED and a broken “Battery Icon” indicate that communication with the master battery has not been established or has been lost. Verify that the TCP Modbus Gateway and the Mate3S are correctly configured, and that the supported cabling is used.
- A red blinking “Battery Status” LED and a normal “Battery Icon” indicate the EC5 battery SOC is at a critically low level. Charge the battery above a critically low level.
- While the Mate3S is powering up or resetting, the red “Battery Status” LED will blink, and the “Battery Icon” will appear broken. Once communication is restored, the battery SOC will be shown by the “Battery Status” LEDs, and the “Battery Icon” will display normally.

OpticsRE+ Setup and Usage

OpticsRE+ can read data from EnergyCell 5 BMS once all the previously described setups and configurations are completed.



Supported OutBack Hardware

Inverters

FM100

Radian 8048A

Charge Controllers

FM Series: All versions

Mate3S

Must have an Ethernet port

Minimum firmware version: 1.5.0

About OutBack Power

OutBack Power is a leader in advanced energy conversion technology. OutBack products include true sine wave inverterchargers, maximum power point tracking charge controllers, and system communication components, as well as circuit breakers, batteries, accessories, and assembled systems.

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Other

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