MICROGREEN

Travel Life Battery User Manual

Lithium Battery
12V 302 Ah

Model ET 12302B

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Table of Contents

1 How to use this manual

WARNING

This **warning symbol** appears throughout this manual to alert the reader that a particular action, or inaction, may result in damage to the battery or the vehicle, and potential risk of injury.

Please read this entire manual before using the Travel Life batteries. This manual contains detailed instructions for operating and troubleshooting the Travel Life Lithium Batteries. You must follow the usage and precautions in the manual when using this product. Microgreen is not responsible for any damage caused by using the product not in accordance with the manual.

Proper disposal of batteries is required in accordance with local regulations

Please keep this manual for future reference

2 Travel Life Lithium Battery Overview

The RV contains two Travel Life 302AH lithium batteries to supply 604Ah (7.7kWh combined capacity) for powering the house appliances without using a generator or shore power.

There are different types of chemistry in commercial lithium batteries. Travel Life 302AH lithium batteries use Lithium Ferrous Phosphate (LFP) chemistry which has been proven as the safest chemistry available.

Each Travel Life lithium battery is equipped with a BMS (Battery Management System) which controls the operation of the battery for maximum safety, efficiency and longevity.

The battery's real time operation status can be monitored by the Smart BMS app. The batteries can be charged by the solar power, the shore power, or by the under-hood generator.

Under normal usage, the batteries can be left on all the time. They can be turned on and off via the Firefly screen.

3 Important Safety Information

WARNING

Your Travel Life Lithium Batteries are installed under the chassis of the RV, and are not accessible from inside the vehicle. Proper equipment and training are needed to safely access and service these batteries. Please take your RV to a qualified service center for service or repairs.

- Do NOT open, dismantle, repair, tamper with, or modify the battery.
- Do NOT puncture, drop, crush or step on the battery.
- Do NOT expose the battery to direct flame.
- Do NOT touch any exposed battery contents if the battery is damaged.
- Do NOT use the battery outside its operating environment temperature range of -20°C to +50°C (-4°F to 122°F). Using this product in an ultra-high temperature environment may result in fire or explosion. Conversely, using the product at ultra-low temperature will seriously degrade the product performance and may cause the product to stop working.
- Do NOT submerge the battery in water or drive through deep puddles (20cm / 8in).
- Drive ONLY on roadways designed to provide ground clearance of 8in and be mindful to inspect the battery in the event of any suspected object impact under the vehicle

Any tampering with the Travel Life lithium batteries **may result in damage, malfunction, or safety risks** and **will void the warranty**.

Safe Operation: If the Travel Life lithium batteries show any signs of malfunction, and the issue cannot be resolved using the steps in the Troubleshooting Section of this manual, stop using them immediately and contact a qualified service center for assistance.

WARNING – LIMITATIONS ON USE

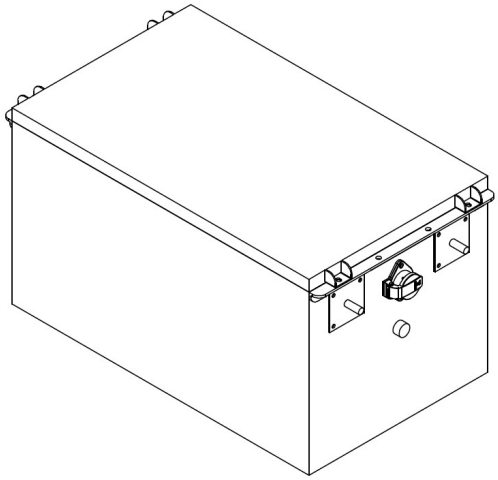
Travel Life lithium batteries should not be used as the only power source for medical devices, equipment, or systems. A secondary source of power for these critical devices should always be available.

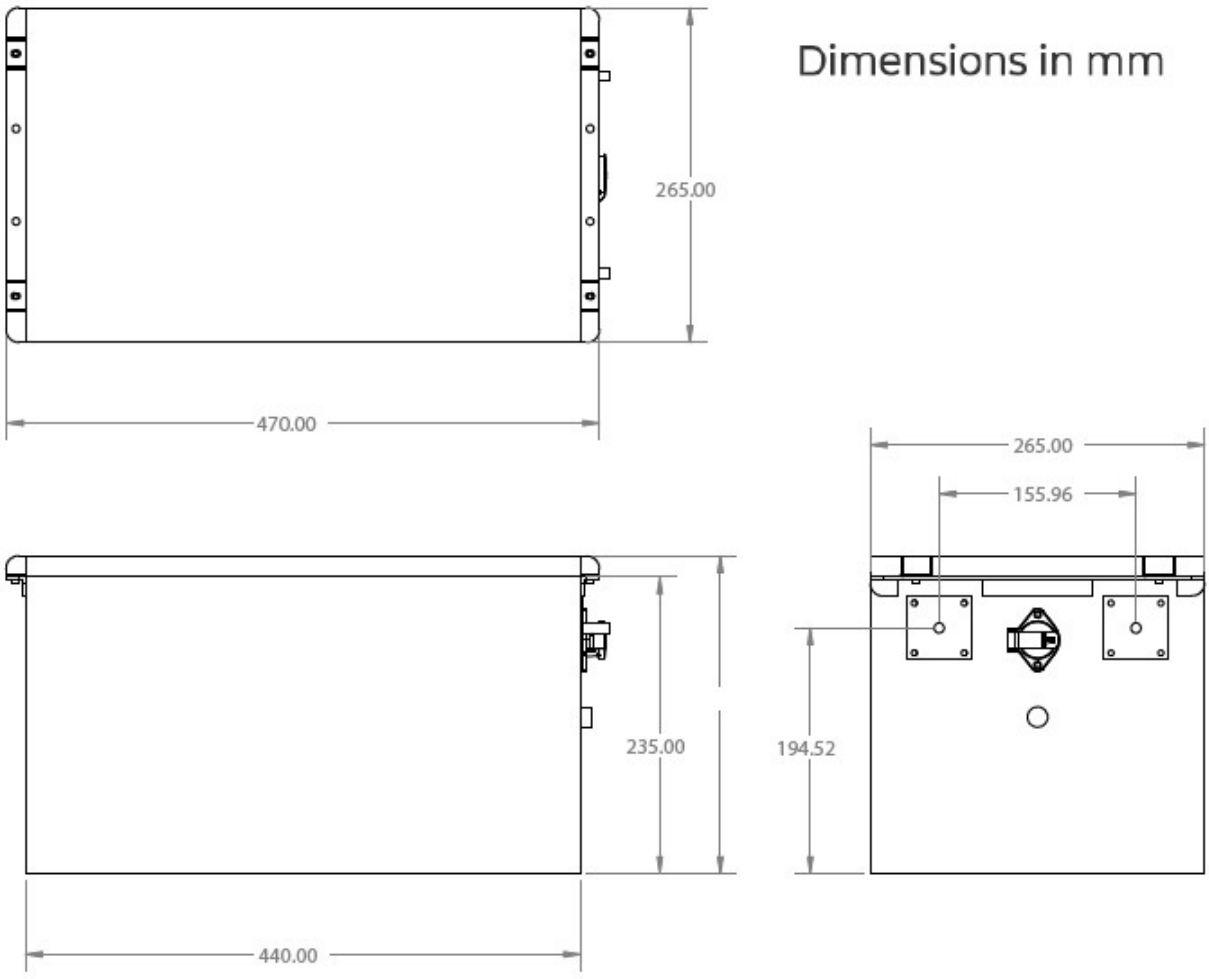
4 Technical Specifications

Specifications are listed for a single battery. The RV has 2 batteries connected together in parallel.

PRODUCT NAME	Travel Life Lithium Battery
Model No.	ET12302B
Battery Chemistry	LiFePO4
Nominal Voltage (V)	12.8V
Rated Capacity (Ah)	302Ah @ 0.5C
Rated Capacity (KWh)	3.86kWh
Operating Voltage (V)	12.0V - 14.0V
Standard Charge / Discharge Current (A)	150A (0.5C)
Max. Continuous Charge / Discharge Current (A)	200A
Max. Surge (2 sec) Discharge Current (A)	400A
Battery Self-Consumption Power when Battery is turned ON (W)	6W
Battery Heating Pad	50W when heating is ON, STARTS ≤ 5°C (41°F), STOPS > 8°C (46°F)
Charging Operating Temp. (°C)	2°C to 50°C (36°F to 122°F)
Discharging Operating Temp. (°C)	-20°C to 50°C (-4°F to 122°F)
Battery Life (Charging Cycles)	6000 cycles
Communication	Bluetooth, RS485, CAN
Recommended Terminal Torque Setting	11.1 N-m (8.2 ft-lb)
Battery Weight	38.5 kg (85 lbs)
Battery Dimensions L x W x H	440 mm x 265 mm x 252 mm (17.5 inch x 10.5 inch x 10 inch)

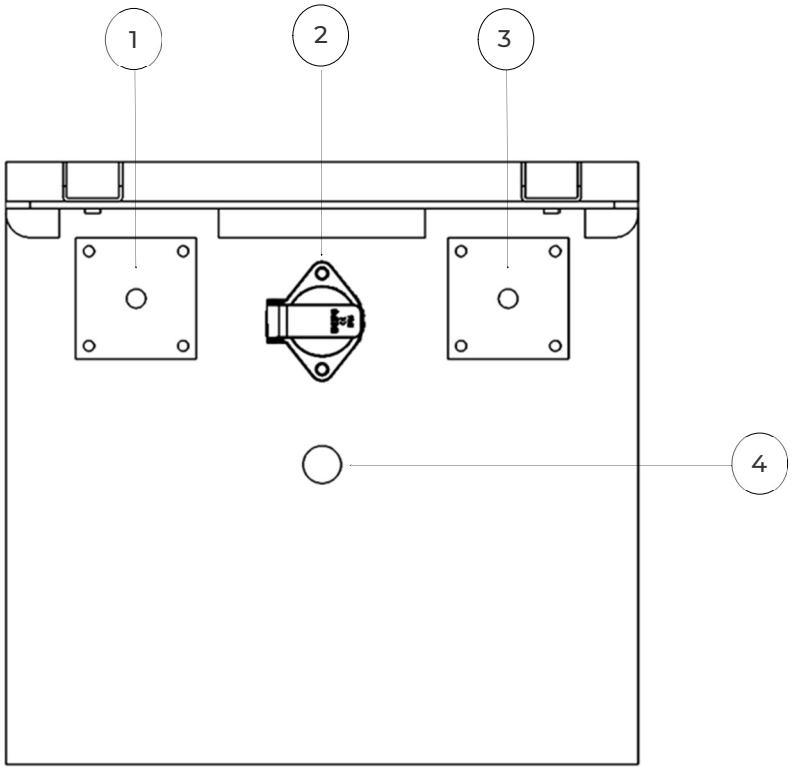
5 Dimensions





6 Product Interface

Exterior Connections



No.	PART
1	Negative Terminal (BLACK, M8 post)
2	Communication Port (12 pins)
3	Positive Terminal (RED, M8 post)
4	Breather

7 Using the Battery

7.1 Getting Started – Turning ON the batteries

Turn on the Travel Life lithium batteries with the Firefly screen. There are two batteries in the RV, and each battery will need to be turned on individually.

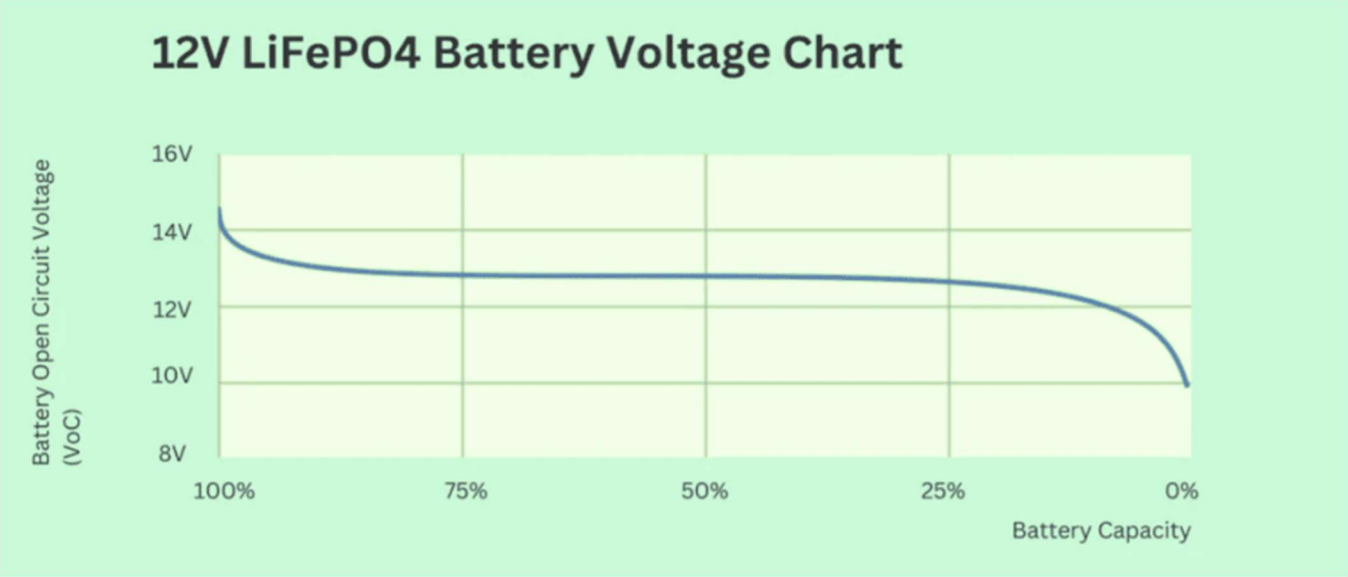
The Firefly screen will display **BATTERY 1** and **BATTERY 2** icons, which are used for turning each battery ON and OFF. Turn on each battery by tapping the icon on the screen.

NOTE: The RV comes with batteries charged to less than 100%. If you would like to operate heavy load appliances, such as air conditioning or heating, it is recommended to charge the batteries to at least 80% state of charge ("SOC").

7.2 Charge Levels

The Smart BMS app on your phone is the only way to monitor the state of charge of the batteries.

The voltage of the 12V batteries is an indicator of their SOC. As the battery charges, the voltage will increase and as the battery discharges, the voltage will decrease. However, the relationship is not linear. The full charge voltage is above 13.5V, and the discharge cutoff voltage is around 12V. Below is an illustration of the Travel Life battery's voltage in relation to its SOC.



7.3 Low Temperature Operation – Charging and Discharging

The Smart BMS app shows the battery temperatures.

Please be aware that in colder temperatures the battery runtime will be shorter. This is a natural characteristic inherent to all types of lithium batteries. Therefore, the batteries may need to be charged more often in cold days.

When battery temperature is lower than 2°C, the battery cannot be charged. If charging power is available, the charging will start automatically when the temperature rises. The real time battery temperature is shown in the Smart BMS app.

Each Travel Life lithium battery has an internal heater to maintain the battery temperature. The heater will be turned ON when the battery temperature goes below 5°C (41°F) and will be turned OFF when the temperature goes above 8°C (46°F). When the heater is ON, it consumes 50W from the battery.

7.4 Operation Mode: Normal Mode (Above 12V)

When the batteries are in the normal operation mode, they can be charged or discharged after turned on. When a charging source is available (shore power, solar power, or under-hood generator) the batteries will be charged. Charging time will vary depending on the state of charge in the batteries when charging begins, and the power of the charging source. You can continue to use the electrical appliances while the batteries are being charged.

The batteries will be discharged when powering the house loads. Battery runtime will vary depending on how much power is being used. High-power appliances like air conditioners or microwaves will drain the batteries faster.

The real time operating status and SOC of the batteries can be monitored using the Smart BMS app.

7.5 Operation Mode: Low Voltage Mode (5V-12V)

The battery will enter the low voltage mode when its voltage falls below a threshold level around 12V.

When a battery is restarted, the battery will enable the functions of charging, discharging, and communication for one minute regardless of the battery voltage.

After one minute, if battery voltage is below 12V, the discharging function will be disabled, but the charging and communication functions will still be enabled. Therefore, the battery can be charged, but cannot supply power to the RV. It can be charged by shore power, under-hood generator, or solar panels.

If the battery is not charged within one hour at this low voltage mode, the battery will also disable the communication function to reduce the self-consume power. Therefore, the app will not be able to communicate with the battery. However, the charging function is still enabled.

The user can restart the battery to enable the discharging and communication function temporarily. It is recommended to start charging the battery within one minute after the battery restart. It is also recommended to charge the batteries to at least 13V if possible.

If the battery is not charged and the voltage goes below 5V, the battery will enter the ultra-low voltage mode.

7.6 Operation Mode: Ultra-Low Voltage Mode (below 5V)

The scenario of the battery discharging to a voltage below 5V is exceptionally rare. However, when this happens, the battery operates in the Ultra-Low Voltage Mode where all the discharging, charging and communication functions are disabled. Therefore, the battery cannot be charged through the two terminals. To revive the battery, it should be charged with the Emergency Charging Cable.

To revive the battery from the Ultra Low Voltage Mode, please follow the following steps:

1. Connect the emergency charge cable. (Please see next section for locating and connecting the emergency charge cable.)
2. Charge the lithium battery to above 5V.
   Turn ON the RV engine. Reviving the battery using emergency charge cable is a process that uses the energy from the engine starter battery. Therefore, the RV engine should remain ON during the process. Otherwise, it will drain the starter battery and RV engine may not be started afterward. It will charge 2A to each lithium battery.
3. Stop the emergency charging.
   After 15 minutes of charging, restart the lithium battery and check the Smart BMS app. If the app cannot communicate with the battery, continue the charging. After the app communicates with the battery, stop the emergency charging process and disconnect the emergency charging cable.

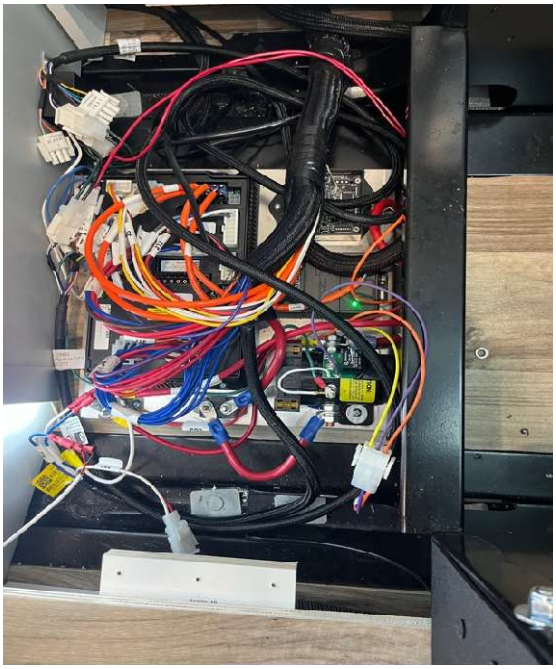
When the battery is charged to operate in the Low Voltage Mode, it can be charged by regular charging process.

7.7 Using the Emergency Charge Cable

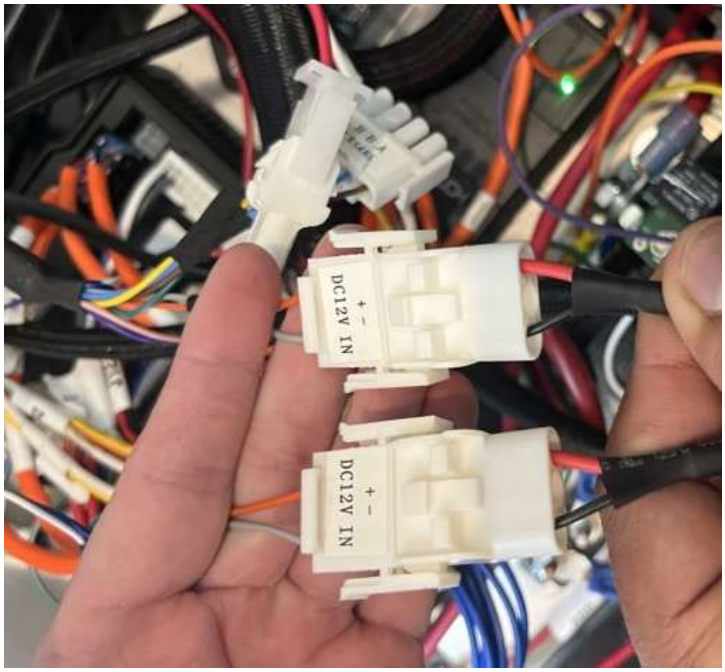
The 12V emergency charge cable is included in the spare parts box of the vehicle. This cable is used for charging the Travel Life lithium batteries ONLY when the battery voltages are below 5V, which is a very rare occurrence. The cable needs to be connected first to the battery and then to the 12V cigarette outlet in the vehicle dashboard.

Emergency Charge Cable

The battery connection point is found in an under-floor compartment behind the second-row passenger bench seat. Access to the electrical compartment is made by (i) raising/lifting the bench seat forward; and (ii) lifting the laminate floor compartment cover located just behind the bench seat.

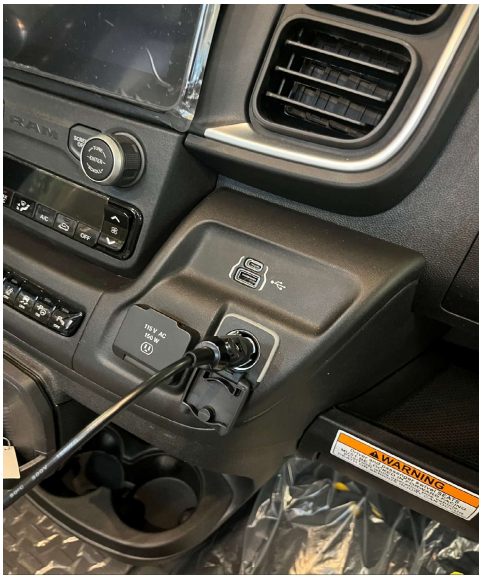


Identify 2 labelled DC 12V IN connectors in the electrical compartment



2-wire connection of DC emergency charge cable in the electrical compartment

First, connect the DC emergency charge cable to the battery via two connectors marked “DC 12V IN” per the illustrations above. Then, connect the car port plug to the 12V DC port in the RV.



After the connection, proceed with the charging steps outlined in Section 7.6.

After successfully completing the procedure of recovering the battery from ultra low voltage, immediately disconnect the Emergency Charge cable and keep it for future use.

8 Using the Smart BMS App to Monitor the Battery

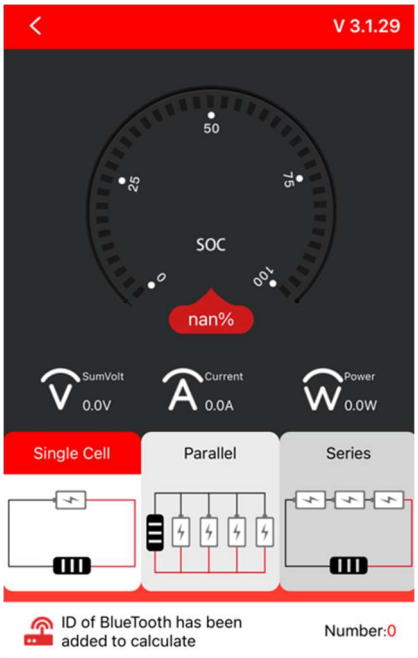
Travel Life lithium batteries come with a smartphone app that uses Bluetooth to monitor the voltage, current, temperature and state of charge of the batteries.

Please scan the applicable QR code below to download the SMART BMS app.

iOS Android

TIPS:

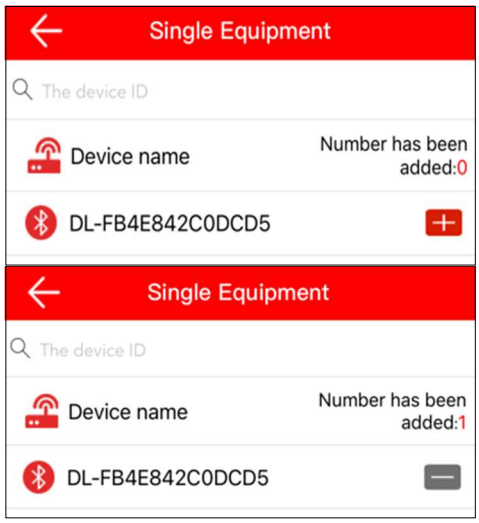
- Make sure the batteries are turned on before using the app.
- Keep the phone or tablet within 10 feet of the batteries.
- You may not get a strong enough signal inside the vehicle because the battery is installed in a weather-proof enclosure under the vehicle chassis. The signal is much stronger when standing beside the vehicle.



Start the Smart BMS app.

Turn on Bluetooth on the phone or tablet.

Choose **Parallel** for the type of battery connection.

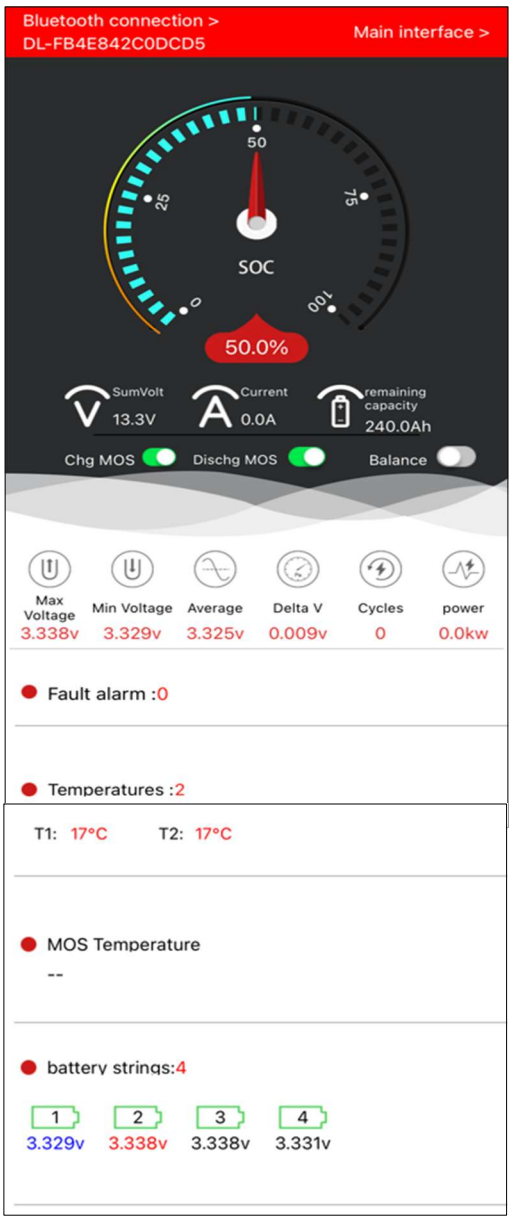


Look for the Bluetooth ID corresponding to the batteries. The Bluetooth ID is listed on the battery label, which can be found on the outside back cover of this manual and the outside back face of the battery case. Note that the vehicle has two batteries, and each has it's unique Bluetooth ID.

Tap the **(+)** icon to pair the battery with the phone or tablet. Once the battery is paired, the pair icon will turn gray and change to **(-)** as shown in the image.

Click on a battery's Bluetooth ID **(ᛒ)** to monitor that battery.

Only one smartphone can connect to the batteries at a time.



STATE OF CHARGE (SOC): Shows the battery state of charge in %. 0% = empty and 100% = full.

SumVolt: The voltage of the battery. Typical values are 12-14V.

Current: The battery current.
Discharging current is displayed as a negative value.
Charging current is displayed as a positive value.
The sign of the value indicates if the battery is being charged or discharged at the moment.

Remaining Capacity: The battery remaining capacity in Ah. The full capacity is 302AH.

Chg MOS: green means charging function is enabled.
Dischg MOS: green means discharging function is enabled.
Balance: green means the BMS is performing cell voltage balancing.

There are 4 battery cells in each battery. The **Max Voltage, Min Voltage, Average and Delta V** are referring to the corresponding cell voltages.

Cycles: Number of cycles the battery has been used.
Power: The battery power at the moment.

Fault Alarm: If there are alarms, they will be shown here.

Temperatures: There are two temperature sensors in each battery. Their values are displayed here.

Battery Strings: There are 4 battery cells in the battery and their values are displayed here.

9 Off-Season Storage

1. Use the Firefly system to turn OFF the Travel Life lithium batteries for long term storage (>1 week). This will avoid draining the batteries.
2. Recommended state of charge for long-term storage: 50%.
3. Recommended storage temperature: 15°C to 35°C (59°F to 95°F).
4. Warranty-approved storage temperature: -20°C to 50°C (-4°F to 122°F).
5. Recommended storage humidity: 45% to 75% relative humidity.
6. The battery should be charged at least once every six months, to maintain 50% SOC.
7. It is NOT necessary to disconnect the battery terminals or remove the battery from the vehicle for storage; turning the battery off in the Firefly screen disengages the battery from the terminals.

10 Emergency Situation Handling

If your health or safety is threatened, immediately contact the fire department or other first responders, and inform all people who may be affected to ensure that they can evacuate the area.

WARNING

Perform the suggested actions below only when safe to do so.

If there is odor or smoke:

1. Turn off the batteries using the Firefly system.
2. Shut down or disconnect any connected chargers or electrical loads.
3. Evacuate the vehicle and leave all windows and doors open to provide ventilation.
4. Monitor for flames inside and underneath the vehicle.
5. Do not turn the batteries ON again until they have been inspected by qualified service personnel.

In case of fire:

1. Turn off the batteries using the Firefly system.
2. Shut down or disconnect any connected chargers or electrical loads.
3. Evacuate the vehicle.
4. Use a fire extinguisher to extinguish the flames and prevent the fire from spreading. An ABC type fire extinguisher can be used for battery fires. Your RV comes with an ABC fire extinguisher located behind the passenger seat. Avoid using type D (flammable metal) fire extinguishers.
5. Do not turn the batteries ON again until they have been inspected by qualified service personnel.

11 Troubleshooting and Maintenance

ISSUES	REMEDIAL STEPS
1. Battery does not turn ON	How to check if a battery is ON? 1. Check the battery status in the Firefly display. Make sure the battery is switched ON. 2. Check the Smart BMS app. If the battery's corresponding Bluetooth ID does not show up in the app or show up in gray, the battery is not on. What can be done if a battery cannot be turn ON? 1. Restart the battery with the Firefly battery switch. 2. Check if the battery is physically damaged. If so, bring the vehicle to a qualified service center for inspection. Special equipment and safety procedures are needed to access and inspect the batteries. 3. The battery voltage may be too low. Charge the battery with the Emergency charge cable to revive the battery. See section 7.7. 4. If the above operation fails, contact us or bring the vehicle to a qualified service center for inspection.
2. Batteries not charging	How to check if a battery is being charged? 1. This can be checked with the Smart BMS app. In the app, check the value of **Current**. A positive value means it is being charged.  Why is the battery not being charged? 1. Check the **Dischg MOS** status: Green means it is ready to accept charges. Gray means the charging function is disabled. 2. The charging function will be disabled when: • The battery is fully charged: check the SumVolt and SOC. • The temperature is too low (<2°C) or too high (>55°C): check the temperatures. • Current is higher than 250A: check the alarms. 3. Check the charging source. Make sure that the charger is ON and functioning.

	4. Check if any high power appliances (air conditioner, water heater, microwave) is running. If so, turn them off and check the app again. In order the charge the battery, the charging power must be higher than the load power.
3. Batteries not powering your loads	How to check if a battery is supplying power? 1. This can be checked with the Smart BMS app. In the app, check the value of **Current**. A negative value means it is discharging and supplying power.  Why is the battery not supplying power? 1. Check the **Chg MOS** status: Green means it is ready to supply power. Gray means the discharging function is disabled. 2. The discharging function will be disabled when: • The battery is over-discharged: check the SumVolt and it should be above 12V. • The temperature is too low (<-20°C) or too high (>55°C): check the temperatures. • Current is higher than 250A: check the alarms. 3. Check the charging source and the load. When the charging power is higher than the load power, the load will not use the power from the battery.
4. Batteries are non-functional after being stored for a long time	**Restore from Storage:** after an extended period of storage, charge the batteries to full capacity before use. For detailed instructions on charging see Section 7: "Using the Battery". **Wake Up the Batteries** by tapping the battery icon twice on the Firefly screen. Each battery will need to be woken up/turned ON separately. See details in Section 7: "Using the Battery".
5. Battery runtime gets shorter	**Check the Current in the Smart BMS app:** the higher the current, the quicker the battery will be drained. When the battery SOC is low, avoid using high power appliances.  **Check the Delta V in the Smart BMS app:** the Delta V is the voltage difference between the highest and lowest voltage of the four battery cells in the battery. This should be maintained within 50mv. If Delta V

	is greater than 0.05V, the battery will perform voltage balancing and the Balance signal will become Green. If Delta V is greater than 0.05V when Average cell voltage is 3.2V, the capacity of the battery will be reduced. **Avoid Extreme Temperatures:** Ensure the batteries are kept within the recommended temperature range. Extreme temperatures can degrade battery performance and shorten their lifespan. **Physical Damage:** If you suspect the batteries may have been physically damaged, bring the vehicle to a dealership or a qualified service center for inspection. Special equipment and safety procedures are needed to access and inspect the batteries.
6. Overheating	**Check Operating Environment:** Avoid using the batteries in high-temperature environments. Note that hot pavement underneath the vehicle can radiate heat into the batteries. Parking in hot spots may impact battery performance. **Monitor Temperature:** when the batteries get too hot, you will notice a high temperature alarm in the Smart BMS App. Turn off your batteries immediately and allow them to cool down before further use. Ensure that the ambient air temperature is within the recommended range for operation.
7. Waking Up the Battery from Ultra Low voltage Mode	If the voltage is above 5V, charging should begin automatically whenever a charging source is available. If the battery voltage drops below 5V, it will enter Ultra Low Voltage mode and can't be charged by any regular charging process. In this case, you need to charge the battery using the emergency charge cable. See section 7.6 "Operation Mode: Ultra-Low Voltage Mode" and section 7.7 "Using the Emergency Charge Cable".

If you encounter any issues with Travel Life lithium batteries that cannot be resolved using these troubleshooting instructions, please contact your dealer or a qualified technician for further assistance. Do not attempt to disassemble or repair the battery yourself, as this can be potentially dangerous and will void the warranty.

12 Warranty

Each Travel Life lithium battery comes with a **2-year Limited Warranty**. This Limited Warranty does not cover the following cases:

- Water submersion. The battery cannot be submerged in water. The battery is installed under the chassis of the vehicle. Therefore, driving through a deep puddle (8" or 20cm) will void the warranty.
- Physical damage to the battery caused by impact, accident, collision, or dropping the battery.
- Improper connection of battery terminals to loads or to charging sources.
- Battery connected in reverse polarity.
- Any short circuit caused by accidental, intentional, or inadvertent connection of the positive and negative terminals of the battery.
- Any unauthorized changes to the factory settings.
- Failure to charge the battery at least once every six months. Batteries need to be charged periodically to maintain the health of the battery cells.
- Opening, modifying or tampering with the battery in any way by anyone other than a qualified service technician.
- Storing the battery below -30°C (-22°F) or in a completely discharged state.
- Short-term exposure to extreme ambient temperatures, defined as above 60°C (140°F) or below -40°C (-40°F).
- Exposure to fire.
- Improper installation, use, maintenance, or service.

13 Contact Information

If you have any questions, concerns, or need assistance with your battery, please don't hesitate to contact us. Our customer support team is available to help you.

SERVICE CONTACT:

Phone: +1-647-699-0460

Email: rtservice@microgreen.ca

Website: www.microgreen.ca

CORPORATE CONTACT:

Phone: +1-647-699-0420

Email: info@microgreen.ca

Website: www.microgreen.ca

Hours of Operation:

Monday to Friday

9:00 AM to 5:00 PM

Microgreen Solar Corporation
860 Denison Street, Unit 11
Markham, ON
Canada L3R 4H1

Battery Labels

Microgreen Solar www.microgreen.ca

Model:	**ET12302B**
Battery Type:	**LiFePO4**
Nominal Voltage:	**DC 12.8V**
Operating Voltage:	**DC 12V - 14V**
Capacity:	**302AH, 3.8KWH**
Max Cont. Current:	**200A**
Operating Temp:	
Discharging:	**-20°C to 50°C**
Charging:	**2°C to 50°C**
Dimension/Weight:	**15x9x13"/85 LB**

Assembled in Canada

Battery 1 ID label

Battery 2 ID label