



# USE AND MAINTENANCE MANUAL

REV0 30/7/2023 PBCA0124GB

## AUXILIARY BATTERY

# *ePower* Box



### INDEX

#### 1. INTRODUCTION

- 1.1 Field of application
- 1.2 Consulting the manual
- 1.3 Warranty

#### 2. CAUTION

- 2.1 General recommendations

#### 3. USE OF THE PRODUCT

- 3.1 First Use
- 3.2 Charging the Battery
- 3.3 Resetting the Battery
- 3.4 Battery Monitoring
- 3.5 Powering External Devices
- 3.6 Transportation Instructions
- 3.7 LiFePO4 Battery

#### 4. MAINTENANCE

- 4.1 Cleaning Instructions
- 4.2 Routine Maintenance Instructions
- 4.3 Troubleshooting
- 4.4 Replacing the Protective Fuses

#### 5. DISPOSAL

- 5.1 Packaging
- 5.2 Disposal of the product in the territory of the European Union

#### 6. CERTIFICATIONS

## **1.INTRODUCTION**

### **1.1 Field of application**

The ePower Box auxiliary battery has been designed and developed with the aim of providing reliable power supply for electrical and electronic devices, with particular emphasis on its compatibility with refrigerated containers from MELFORM's Koala line. This device is equipped with a LiFePO4 lithium battery and its charger. Once the LiFePO4 battery is charged, the ePower Box can be used as an independent power source for electrical and electronic devices operating at 12Vdc or lower voltages.

#### **IMPORTANT:**

To ensure the proper functioning of the ePOWERBOX, it is essential to ensure that the ambient temperature in which it operates never exceeds 45°C. Beyond this limit, the product's electronics may suffer irreversible damage.

### **1.2 Consulting the manual**

This manual has been designed to provide the user with all the essential information regarding the use and maintenance of the product, in an easy and quick way. It is recommended that the manual be kept available at all times to the personnel responsible for maintenance operations and to the operators involved in the use of the product.

It is emphasized that it is important to read the operating instructions carefully before putting the product into service, in order to ensure correct use and optimal performance.

### **1.3 Warranty**

This product is covered by a warranty against manufacturing defects for a period of 2 years from the date of purchase, provided that:

- has been used in accordance with the manufacturer's instructions,
- has not been damaged due to improper use.

Accidental damage resulting from transportation, carelessness, misuse, or failure to follow the instructions in this manual are excluded from warranty coverage. The warranty will become void in the event that the product has been repaired or tampered with by unauthorized persons.

Please contact your local distributor or MELFORM customer service at [customercare@melform.com](mailto:customercare@melform.com) for any assistance and for the possible supply of original spare parts.

Please note that ePOWERBOX is an exclusive product of MELFORM. The manufacturer reserves the right to make changes to the characteristics of the models at any time without prior notice. In addition, it is possible that there may be variations in the color shades of the product.

## **2. CAUTION**

The product has been manufactured strictly following the latest technologies available. All the necessary requirements to ensure safe and proper operation of the appliance have been fully met.

The person in charge of the user company is advised to ensure that personnel receive adequate training, so that the container is used only for its intended purposes and correctly according to the instructions in the user manual provided. In this way, you will ensure proper handling and use of the product, optimizing performance and minimizing potential risks.

## **2.1 General recommendations**

Please use this product in accordance with the manufacturer's instructions. The main function of the ePower Box is to provide power to external electrical and electronic devices that require 12Vdc or less. Use in a mode other than that intended is not recommended.

This product is intended for use by properly trained adults only and should be kept out of the reach of children.

For any repairs, contact only a technical service center authorized by the manufacturer and ask for original spare parts.

The use of personal protective equipment is recommended during maintenance operations. Such interventions should only be carried out by personnel who are properly trained and informed about the electrical hazards of the device.

Please be careful when moving the appliance to avoid accidents due to it falling on the operator.

Avoid exceeding the ambient temperature of +45°C.

Carry out regular checks to ensure that the appliance is in good condition and do not use it if it is damaged or modified in its parts.

Do not operate the ePower Box if it has been subjected to shocks, falls, or has obvious damage.

Avoid smoking, creating sparks or flames in the vicinity of the battery and charger, as there is a risk of explosion.

Do not expose the appliance to splashing water, rain, adverse weather conditions, or corrosive atmospheres (fumes, gases).

Do not use steam jet or high-pressure appliances to wash the appliance.

Avoid prolonged direct exposure to sunlight.

Do not install the appliance near sinks or faucets.

Avoid placing the appliance near cookers, stoves or other sources of heat.

Do not store the appliance near flammable liquids.

Never wash or immerse the appliance in water or any other liquid.

Avoid exposing the battery to heat, flame, or microwave.

Do not remove the battery cover, drill holes, or cut the outer panel, as this may cause a short circuit.

Do not expose the battery to temperatures above 50°C, as there may be a danger of explosion. Be very careful when replacing the battery and when opening/closing the ePower Box and rely only on qualified personnel for these operations.

**IMPORTANT:**

The manufacturer would like to emphasize that it declines all responsibility in the event that the user company does not comply with the accident prevention regulations in force. Please scrupulously take all required safety measures while using the product, in order to ensure a safe working environment for the personnel involved. Compliance with accident prevention regulations is essential to prevent accidents and protect the health and well-being of all operators.

**3. USE OF THE PRODUCT**

**3.1 First Use**

Before using the *ePower Box*, fully charge the battery, checking its status using the specific indicator. A full charge of the battery is also necessary if the device is not used for a long time.

**ATTENTION**

**If the local mains voltage is too high or too low, the product may fail and be damaged.**

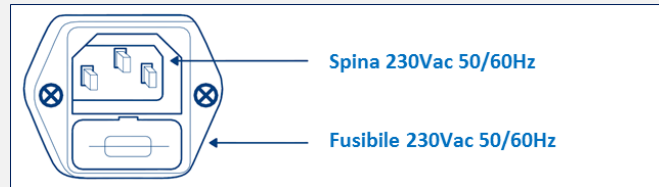
**3.2 Charging the Battery**

Before using the *ePower Box* to power electrical/electronic devices, make sure the battery is charged. The state of charge of the battery can be detected on the appropriate indicator, as described in paragraph The following table provides guidance on how to proceed depending on the state of charge of the battery.

N° LEDs	ACTIVATION VOLTAGE	CHARGING STATUS	DESCRIPTION
1	≤ 8.00 V	0%	Battery completely discharged. Replace battery. <b>DO NOT RECHARGE.</b>
2	8.00 V – 12.00 V	0% - 10%	Low battery. <b>RECHARGE AS SOON AS POSSIBLE.</b>
3	12.00 V – 12.50 V	10% - 30%	Partially discharged battery. <b>RECHARGE IF POSSIBLE.</b>
4	12.50 V – 12.80 V	30% - 60%	Partially discharged battery. <b>RECHARGE IF POSSIBLE.</b>
5	12.80 V – 13.20 V	60% - 100%	Battery charged. <b>RECHARGE IF POSSIBLE.</b>

To charge the *ePower Box* battery , proceed as follows:

- check that the plug of the power cable supplied with the *ePower Box* is suitable for the socket of the electrical system;
- Make sure that the socket is provided with an efficient earth contact and has an adequate flow rate. The electrical safety of the appliance is ensured only when properly connected to an efficient earthing system; systems that do not comply with current regulations could cause damage to property and people;
- insert the power cord socket into the plug of the appliance (Drawing 1);
- insert the mains plug into the 230Vac 50/60Hz socket;
- wait for the battery to recharge (about 8-10 hours depending on the battery);
- Check the battery charge status on the battery charge display.



Design 1: Connection plug in alternating voltage 230Vac 50/60Hz

### 3.3 Resetting the Battery

The device is equipped with a "RESET" button installed on the front wall of the crankcase. This button has the function of resetting the connection between the battery and the charger when the battery reaches a discharge percentage close to 8V. This phenomenon can be observed when the Victron display turns off and does not light up the moment you connect the ePower Box to the 230V ac power supply for charging.

For a proper reset procedure, keep the device connected to the 230V ac power supply and press the RESET button.

### 3.4 Battery Monitoring

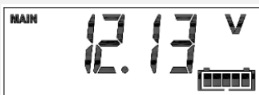
The ePower Box is equipped with an indicator that allows you to monitor the battery. The parameters are shown on the display.



Battery monitoring display

By repeatedly pressing the + and - buttons on the indicator display, the following parameters can be displayed:

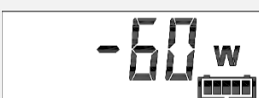
- Voltage (*expressed in Volts*);



- Current (*expressed in Amperes*) coming out of the battery. Negative sign "-" when powering external devices
- Current (*expressed in Amperes*) entering the battery. Positive "+" sign, when the battery is recharged;



- Power (*expressed in Watts*) coming out of the battery. Negative sign "-" when powering external devices
- Power (*expressed in Watts*) to the battery. Positive sign "+", in case of battery charging);



- Amount of Ampere-hours consumed by the battery (*expressed in Ah*);



- Battery charge percentage (*expressed in %*): A fully charged battery shows a value of 100%; a fully discharged battery shows a value of 0%;



- Remaining battery life (*expressed in h*): this is an estimate of the remaining time during which the battery can continue to power external devices, before having to proceed with charging.



The indicator instrument is equipped with a Bluetooth Smart electronic key. This also allows you to monitor the battery via apps on Apple or Android smartphones, tablets and other electronic devices.



**ATTENTION**

- Do not charge the battery beyond the maximum voltage value indicated.**
- Do not use chargers other than the one installed on the ePower Box. Using different chargers can cause dangerous overheating and even fire and explosion of the battery itself.**
- If the battery heats up significantly during charging, stop charging. Allow the battery to cool before recharging.**
- Do not, under any circumstances, cause a short circuit between the battery poles to check the charging progress: the battery may explode.**
- Do not charge the battery with current values higher than those indicated in the technical specifications: dangerous overheating may occur.**

**ATTENTION**

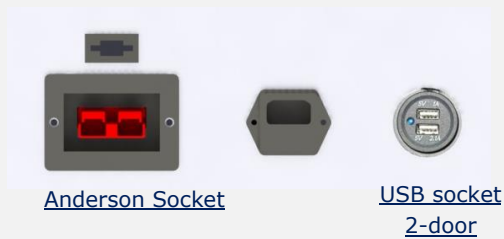
**The Victron display and regulator is set to increase the number of useful battery cycles. The relay inside the refrigeration unit is set by factory to deactivate the refrigeration unit when the battery charge percentage of 40% is reached. Charging is required up to at least 90% to keep the battery in good condition for as long as possible**

If the ePower Box is rarely used, it is recommended to recharge the battery every 15/20 days.

**3.5 Powering External Devices**

ePower Box is equipped with an Anderson SB50 socket for powering 12Vdc devices with absorption up to 30A and a 2-port QC3.0 USB socket with output from 3.6Vdc/3A to 12Vdc/1.5A, maximum power 18Wx2. The Anderson socket can be used to power the Koala line of portable refrigerators. USB sockets can be used to power devices such as tablets, mobile phones, etc.

Before connecting external devices, make sure the battery is charged.



### 3.6 Transportation Instructions

- Product handling operations must be carried out exclusively by appropriately trained personnel who are informed of the risks involved.
- Before handling the product, make sure that it is closed and the screws of the casings secured.
- To move the appliance for long distances, we recommend the use of a trolley, paying the utmost attention to avoid collisions with things or people.
- Lift/transport the product only by the appropriate handle.
- When handling the *ePower* Box, take the utmost care to avoid collisions with things or people.

### 3.7 LiFePO4 Battery

The *ePower* Box is equipped with a LiFePO4 battery. The table below shows the characteristics of the different battery options.

Code	PBAB4016	PBAB4013	PBAB4017
Capacity	65Ah	100Ah	120Ah
Continuous Discharge Current	65A	120A	135A
Rated charging current @25°C	12A	12A	12A
Max charging current @25°C	20A	20A	20A
Service life	About 5-7 years		
Charging Voltage	14.4V		
Max Charging Voltage	14.6V		
Weight	≈8.2 kg	≈13 kg	≈14.3 kg
Dimensions [mm]	260x158 H246		328x172 H212
Ambient Temp.	-20°C/+60°C (operating and storage)		

The batteries mounted on the *ePower* Box line are equipped with an internal electronic control board "BMS" (*Battery Management System*).

This card carries out continuous checks on the condition of the cells in the battery and protects the cells from any conditions of use that could constitute dangerous.

In particular, the following parameters are controlled:

#### - TEMPERATURE CONTROL

If the temperature exceeds the upper limit or falls below the lower limit specified in the data sheet, the battery protects itself by isolating the load from the cells.

#### - CONTROL OF THE MAXIMUM CURRENT DELIVERED

If the maximum current output exceeds the maximum permissible peak value or the maximum permissible continuous value, the battery protects itself by isolating the load from the cells.

- **MAX CHARGE CURRENT CONTROL**

If the maximum charged current exceeds the maximum permissible continuous value, the battery protects itself by isolating the load from the cells

- **CELL VOLTAGE CONTROL**

All internal cell strings are live monitored. If a cell goes to a voltage lower than the minimum allowed or higher than the maximum allowed, the battery protects itself by isolating the load from the cells

- **SHORT-CIRCUIT PROTECTION AND MOSFET FAILSAFE**

If the protection system does not intervene due to damage, in the presence of an external short circuit there is an Automotive-type protection fuse, the value of which is calibrated on the maximum direct current that can be delivered of the battery model in question.

**4. MAINTENANCE**

**4.1 Cleaning Instructions**

To ensure proper cleaning of the product, follow the following directions carefully:

- Before proceeding with the cleaning of the container, turn off the ePower Box. Be sure to disconnect the plug from the mains and unplug the socket connecting to the appliance. Store the power cord in a safe place and protected from moisture.
- Carefully check that water does not penetrate the 230Vac plug or the 12Vdc or USB sockets of the appliance.
- To clean the ePower Box, use a cloth dampened with lukewarm water. For hygienic purposes, it is essential to always dry the ePower Box using disposable cloths or paper, avoiding the use of reusable cloths.
- Avoid the use of metal or synthetic scouring pads, and use only brushes with plastic or natural bristles.
- Do not use abrasive powders, ammonia, acids or solvents when cleaning.
- The use of soapy cleaning solutions is permitted.
- Do not use steam or high-pressure devices to clean the appliance.

**4.2 Routine Maintenance Instructions**

Particular	Periodicity	Control Type
<b>Connection cables and mains plug</b>	6 months	Check that they are not damaged or aged. Otherwise, replace it.
<b>ePower Box Battery</b>	Every day	Check its status. DO NOT fully discharge the battery.



### 4.3 Troubleshooting

Below is a list of the main anomalies that can be found on the *ePower* Box, with an indication of the possible causes and the interventions for recovery. Do not work on the product if it is under warranty: the warranty is void if the product has been repaired or tampered with by an unauthorized third party.

It is recommended to contact qualified technicians to restore the functionality of the product and to contact your local distributor or Melform Sales Service ([customercare@melform.com](mailto:customercare@melform.com)) for any assistance and for the possible supply of original spare parts.

#### ANOMALY LIST AND TROUBLESHOOTING

##### **ePower Box does not supply power**

- a) There is an abnormality on the connection cable of the external device  
*Check the connection cable and replace it if necessary.*
- b) The battery is low  
*Recharge the battery.*

##### **ePower Box does not supply power after charging**

- a) The battery has failed  
*Replace the battery.*
- b) The fuse on the 12Vdc line is faulty  
*Replace the fuse.*
- c) There is an anomaly on the electrical connections inside the product  
*Contact Melform Support.*

##### **ePower Box does not charge the battery**

- a) *ePower* Box is not connected to 230Vac power supply  
*Connect the ePower Box to the 230Vac power supply. Check the power cord and replace it if necessary.*
- b) The battery has failed  
*Replace the battery.*
- c) The fuse on the 230Vac line is faulty  
*Replace the fuse.*
- d) There is an anomaly on the electrical connections inside the product  
*Contact Melform Support.*
- e) The battery is in a state of deep discharge  
*Perform the Reset (3.3).*

##### **The display gives incorrect information**

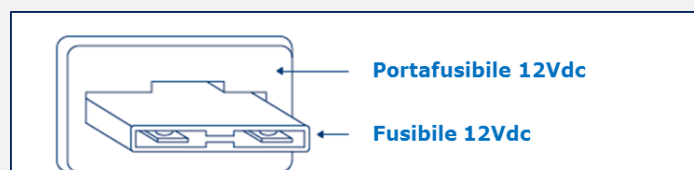
- a) The display may be overheated or not working  
*Cool the equipment. If the problem persists, contact support.*
- b) The Victron display is off  
*Perform the Reset (3.3). If that doesn't work, contact Melform support.*

### 4.4 Replacing the Protective Fuses

The product is equipped with two protection fuses: one of 4A on the 230Vac line and one of 30A on the 12Vdc line.

To replace the fuse on the 12Vdc line, proceed as follows (Drawing 2):

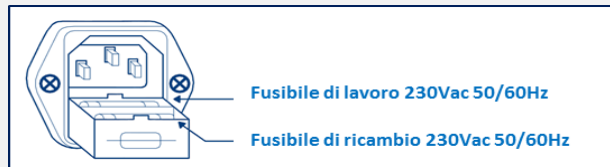
- disconnect all external devices;
- pull out the socket connecting the appliance to the 230Vdc line;
- remove the fuse with the help of a tool (e.g. the tip of a screwdriver);
- replace the fuse and insert it into the fuse holder;
- restore the connection to the 230Vdc line and external devices.



Drawing 2: 12Vdc direct voltage line fuse.

To replace the fuse on the 230Vac line, operate as follows (Drawing 3):

- disconnect all external devices;
- pull out the socket connecting the appliance to the 230Vdc line;
- open the fuse drawer with the help of a tool (e.g. the tip of a screwdriver);
- pull out the working fuse;
- replace the working fuse with the replacement fuse (possibly also provide for the replacement of the fuse);
- close the fuse drawer;
- restore the connection to the 230Vdc line and external devices.



Drawing 3: Alternating voltage line fuse 230Vac 50/60Hz

## 5. DISPOSAL

### 5.1 Packaging

The packaging material (cardboard, polyethylene film) is 100% recyclable. Disposal is the responsibility of the user and must be carried out in compliance with local regulations.

### 5.2 Product Disposal



The product is a piece of equipment that falls within the scope of application relating to the use of electrical and electronic substances and equipment subject to specific disposal.

The legislation stipulates that discarded equipment is not disposed of in the normal municipal solid waste stream.

The crossed-out wheeled bin symbol, present on the product or on its packaging, indicates that the equipment (refrigeration unit, temperature controller) must be collected separately, in order to optimize the recovery and recycling rate of the materials that compose it and prevent potential damage to health and the environment.

It is the user's responsibility to dispose of the product by handing it over to a designated collection point for the recycling and disposal of electrical and electronic equipment.

For more information on proper disposal, please contact your local waste disposal authority.

## 6. CERTIFICATIONS

The product has undergone rigorous certification processes that confirm its high quality and safety. The following certifications attest to the compliance of the ePOWERBOX product with the highest standards: CE declaration of conformity and data sheet.

These certifications confirm that the product is designed and manufactured in such a way as to guarantee the highest quality and safety in the transport and storage of perishable food products.

*Thank you for choosing a MELFORM product!*



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