



PowerCase

Portable power station
Moduloo Ex range

User manual



Please read this user manual thoroughly before using the portable power station to ensure that you fully understand the product's functioning and be able to comply with its instructions. After reading this user manual, please keep it for later reference.

Summary

1. Presentation	2
2. Safety instructions	3
2.1. Transportation	3
2.2. Instructions	3
2.3. Storage and maintenance.....	4
2.4. End-of-life disposal.....	4
2.5. Recycling	4
3. Use	5
3.1. Unpacking	5
3.2. Package content	5
3.3. User interface	6
3.4. Starting up	7
4. Technical specifications.....	9
4.1. Electrical specifications	9
4.2. Mechanical specifications	9
4.3. Applications autonomy.....	9
4.3. Mechanical dimensions	10
5. Outlet recharge	11
6. TYVA Smart Dashboard app	12
6.1. Introduction.....	12
6.2. Access and connectivity.....	12
6.3. Functionalities	13
6.4. Warnings and errors	14
7. Status	18
8. Maintenance.....	19
8.1. Technical support	19
8.2. Warranty.....	19
9. Disclaimer	20

1. Presentation

The PowerCase from the Moduloo Ex range is a powerful, silent and ergonomic portable energy storage solution. Presented as a robust and IP54 waterproof solution, it is easy to carry thanks to its built-in handles.

Available in PowerCase E2 (2 kWh) version, it integrates Moduloo Ax technology.

The PowerCase is an effective alternative to power generators. It is more silent and ecological, since it doesn't require to use any fuel, in order to respond to specific uses: film sets, events, construction, offgrid, etc.

Advantages of the range



Power

Benefit from the energy of our lithium batteries through a solution offering an exclusive amount of power.



Silent

Opt for a quieter solution with a noise level below 60 dB at a distance of 1 meter.



Ergonomics

Bring your portable power station with you wherever you want thanks to its handy design and its light format.



Reconditioning

Increase the durability of your system thanks to TYVA Refill lithium batteries reconditioning technology.



Modular

Upgrade the energy capacity of your system according to your needs thanks to our Gateway CAN technology for batteries paralleling.



Smart monitoring

Remotely supervise your lithium batteries with our digital app TYVA Smart Dashboard available for Android and iOS devices.



Eco-responsible

Choose a clean alternative to power generators which is more environmentally friendly and doesn't require to use fuel.



Waterproof

Use a solution provided with IP54 protection against ingress of dust and liquids splashed from all directions.



Made in France

Encourage a local sourcing and a French manufacturing through our products elaborated in Ardèche, France.



Fire protection option

Add our TYVA Pyro Protection technology to your battery to protect it against fire hazards and thermal runaways.

2. Safety instructions

All the below mentioned instructions, as well as the ones regarding the starting up and recharge of the product in the dedicated sections, must be read carefully and followed upon reception of the portable power station.

2.1. Transportation

Transportation and shipping by road, sea and air of this portable power station including lithium batteries are subject to the legislation concerning dangerous goods (UN 34.81). Please refer to the material safety data sheet (MSDS) included with your product in order to know the precise conditions.



During transportation, please make sure the portable power station is well fixed to avoid vibrations and shocks.

2.2. Instructions

- Upon reception and before the first use, charge the power station to avoid deep discharging that can deteriorate its functioning.
- Don't use the portable power station near a source of ignition.
- Avoid any contact with liquids. Do not immerse the product in water and get it wet. Do not use the portable power station under the rain or in a wet environment. If the product accidentally falls in water, put it in a safe and clear place and stay away. Once dry, do not use it and call TYVA Energie's support.
- Do not use the portable power station near strong magnetic fields.
- Do not dismantle the product howsoever and do not perforate it with sharp objects. Keep out of reach of any external element likely to perforate it.
- Do not use any metal object likely to cause a short-circuit.
- Do not use with adapters or accessories not provided and/or not validated by TYVA Energie.
- When using the portable power station, strictly observe the operating temperature mentioned in this user manual. If the temperature is too high, this may cause a fire or an explosion. If the temperature is too low, the product may not perform as stated in the specifications or it may even stop working.
- Do not sit or stack heavy objects on the station.
- Take special care to avoid important shocks, falls and vibrations while using the product. In case of severe external shock, switch power off immediately, place the station in a clear place, away from any person or combustible materials and contact TYVA Energie's support.
- In order to prevent the portable power station from getting wet, it is recommended to use protective bags in wet environment.
- Should water enter the inside of the portable power station, it cannot be used anymore. Take precautionary measures against electrical shocks before touching the station's outlets. Then, place it in a safe, dry and secure place. Once done, contact immediately TYVA Energie's customer support.
- If the portable power station ignites, we recommend to keep any person or combustible material away and use preferably a chemical extinguisher for electric / battery fire or sand. Avoid breathing in fumes released by the product.

2.3. Storage and maintenance

- Store in a ventilated area, preferably clean, dry and sheltered.
- Use only a dry cloth to wipe away any dirt on the electrical connections of the portable station.
- Keep product at room temperature and away from any intense heat source to ensure longevity and avoid any deterioration.
- In case of long-term storage, ensure that the station is not fully charged or discharged. Its state of charge (SOC) should ideally be between 50 to 80% to guarantee a proper functioning.
- Please charge and discharge fully the power station at least once a year.
- Keep out of reach of children and pets.

2.4. End-of-life disposal

TYVA Energie's portable power stations incorporate lithium batteries and are thus subject to strict regulations in terms of disposal and recycling.

- According to EU directives concerning the handling of electrical and electronic equipment waste (including lithium batteries and accumulators and their transposition in national law), in no instance should TYVA Energie's portable power stations be thrown with the domestic or industrial waste. Please contact TYVA Energie or any authorized disposal company and observe the relevant regulations for an adequate disposal of the product. It is essential to be aware that these products can harm human health and the environment, cause important human and property damages if they are not stored or disposed adequately.
- Battery modules integrated to the PowerBox and PowerCase should under no circumstances be removed from the system or be analyzed or repaired by the user or a third party. They are subject to specific measures and should thus only be handled by TYVA Energie's teams.

2.5. Recycling

In terms of product's end-of-life, you can return the latter to TYVA Energie, which will be responsible for its recycling with an authorized disposal company.

You also have the possibility to return your portable power station to TYVA Energie, so that it can be reconditioned as part of our TYVA Refill process. Indeed, we commit ourselves to prolong your energy system's shelf life by replacing cells at end-of-life. We take care of refurbishing the product and conducting a system-wide review to replace any component requiring it. This approach guarantees the optimal collection and recycling of our products in an ecological way and ensure you of the correct disposal of your portable power station.

In case of doubt, please contact directly TYVA Energie's teams in order to obtain additional information.

3. Use

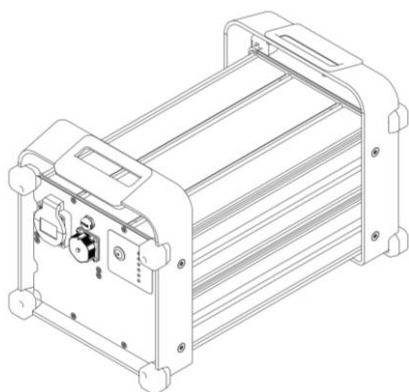
3.1. Unpacking

Before using your portable power station, please follow these steps:

1. Check that the exterior of the package is undamaged.
2. Open the top of the package.
3. Remove the PowerCase along with all elements included in the package.
4. Check that the portable power station is complete and undamaged.
5. Keep all packing material, in case of return to After-Sales Service, this package will be required.

3.2. Package content

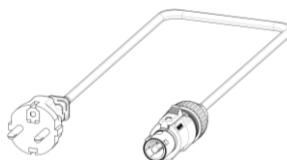
Included in delivery



Portable power station
PowerCase

x1

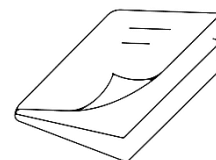
Ref: POWERCASE_E2



220 VAC 300 W
mains charger

x1

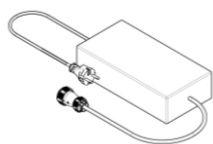
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Quick start guide

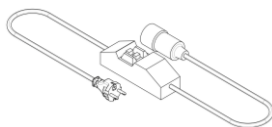
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Optional accessories



Fast mains charger

Ref: TYELE_4308



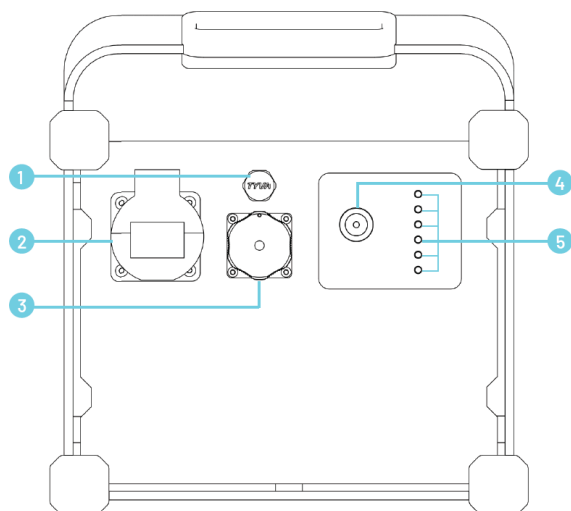
RCD module

Ref: TYELE_4309

These accessories are not included in the PowerCase delivery. Please contact TYVA Energie if you wish to order them. All cables listed above are two meters in length. You have the possibility to order longer cables by contacting TYVA Energie.

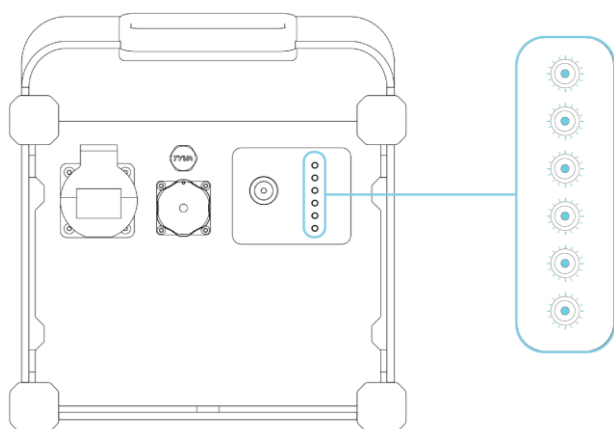
3.3. User interface

3.3.1 Overview



- 1 Safety vent
Prevents condensation and allows air exchange between the battery and the outside
- 2 Power outlet 220 VAC / 16 A / 50 Hz / 3 kW max
Power outlet compatible with type 2 devices
- 3 DC charge outlet 58.8 V / 5 – 15 A
Charge outlet compatible with type 2 devices
- 4 ON / OFF button
Starting or stopping the portable power station
- 5 LED display
Battery's state of charge (SOC) display

3.3.2. LED displays



A LED display is arranged on the front panel of the PowerCase. It is composed of 6 lights that indicates the system's charge level:

- 6 indicator lights: 100%
- 5 indicator lights: 80%
- 4 indicator lights: 60%
- 3 indicator lights: 40%
- 2 indicator lights: 20%
- 1 indicator light: 0 to 19%

When recharging, the indicator light charging blinks until complete and lit continuously, then passing to the below indicator light. Once there is only one indicator lit, the latter turns red to indicate that the PowerCase's charge level is too low.

3.4. Starting up

Please follow the following steps in order to start the PowerCase.

3.4.1. Power up / down

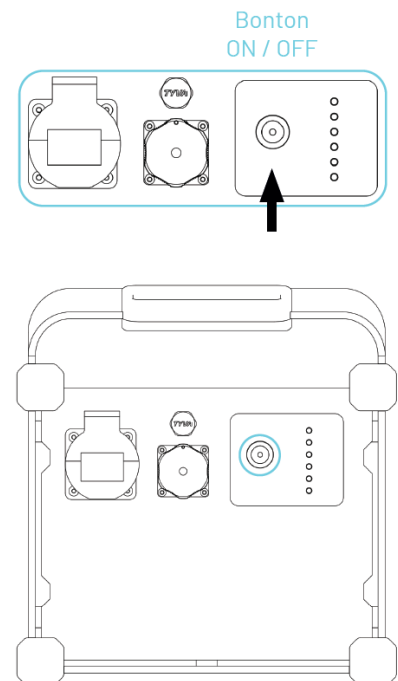
1. Press the ON / OFF button once to start the portable power station.
2. The indicator light on the button is blinking twice to indicate the system's switching on.
3. The indicator light stays lit once the PowerCase is ready for use. If nothing happens, it probably means that the portable power station is discharged. In this case, you will have to recharge it and refer to the Recharge chapter of this user manual in order to use it.
4. Turn off the station by pressing the ON / OFF button for at least 3 seconds. Then, the indicator light turns off. Make sure not to store the portable power station while fully discharged.

The indicator light located in the middle of the ON / OFF button of the PowerCase indicates also possible system alerts. Please refer to the Warnings and errors chapter of this user manual to find out more.

3.4.2. Use

1. Plug your device to the portable power station with a compatible type 2 outlet on the power outlet of the PowerCase.
2. You can now start using your application according to your needs and the remaining charge level of the station. It may take a few seconds between the moment you connect the cable and when the PowerCase starts powering your application. If nothing happens, that might probably mean the electrical station is discharged. You will need to charge it by referring to the Recharge chapter of this manual in order to use it.
3. Once you are done using it, you can unplug the cable and switch off the PowerCase.

Only one 220 VAC 63 A adapter is included in delivery when you order a PowerCase. You can get an additional cable by contacting TYVA Energie's support.



The PowerCase's specific operating temperatures must be respected. It can only be used in a - 10 °C to + 40 °C temperature range. It follows a specific security protocol that cannot be bent outside this range:

- Charge is impossible if you exceed the 0 to + 45 °C temperature range.
- Discharge is impossible if you exceed the - 20 °C to + 60 °C temperature range.

Please note that the more the PowerCase is used whether in charge or discharge mode, the more it will provide efforts. These efforts are characterized by a temperature increase of the electric station which can lead to a safety procedure making its charge or discharge impossible.

3.4.3. Performance

The PowerCase has a 60 °C temperature limit. The higher the current is, the higher the temperature of the power station will increase. Thus, it will impact its autonomy and performance. With a PowerCase with a 25 °C initial temperature, its nominal power will be 1.25 kW PowerCase.

Performances of the PowerCase depending on its use temperature are available in the table right below:

PowerBox E2	25 °C	35 °C
Nominal power	1.25 kW 1 hour and a half	750 W 3 hours
Peak power	3 kW 15 minutes	3 kW 10 minutes

4. Technical specifications

4.1. Electrical specifications

PowerCase	E2
Available energy /kWh	2
Output power /VAC	220
Frequency /Hz	50
16 A output	1
Maximum continuous discharge power /kW	3
DC charger input /W	300 - 1000
Recommended charge time /hours	5
Handles	2

4.2. Mechanical specifications

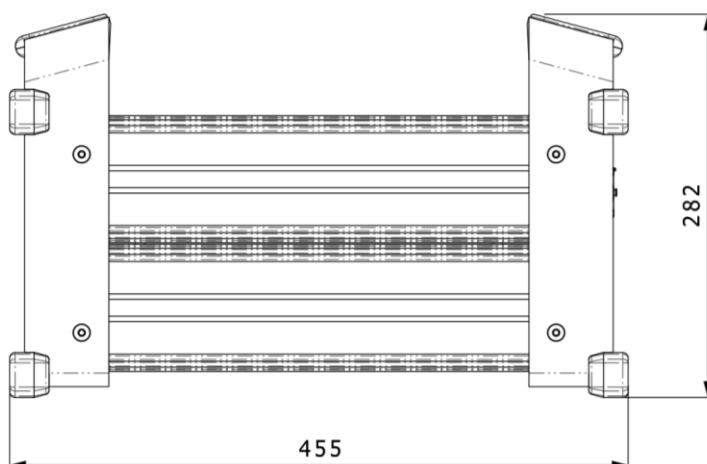
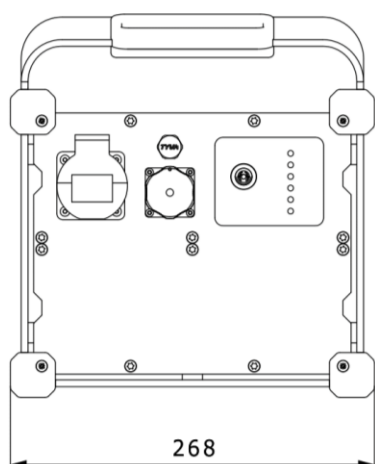
PowerCase	E2
Weight /kg	19.8
Dimensions /mm	455 x 268 x 282
Operating temperature /°C	- 10 to +40
Charge temperature /°C	0 to +40
Sealing	IP54
Chemistry	Li-ion NMC
Outer case	Aluminium

4.3. Applications autonomy

While using the PowerBox when it is 25 °C, the applications' operating time will vary depending on the power they require and the model of portable power station used. From these elements, we are able to estimate the operating time for each equipment powered by a product from the Moduloo Ex range. These estimates are determined on an indicative basis since there are other factors that may affect the autonomy, such as the internal temperature or the battery's state of charge. You can find the estimated use durations of various electrical applications powered by our products in this table:

Equipment	Power	Estimated duration E2
Tools charger	50 W	40h
Sander / Beer engine	300 W	6h40
LED lighting balloon	400 W	5h
Concrete mixer / LED SkyPanel X projector	800 W	2h30
Drill / Coffee machine / Mobile air conditioner	1 kW	2h
Grinder / Circular saw	1,5 kW	1h
Radiator / Chipping hammer	2 kW	30 minutes
Welding station	3 kW	15 minutes

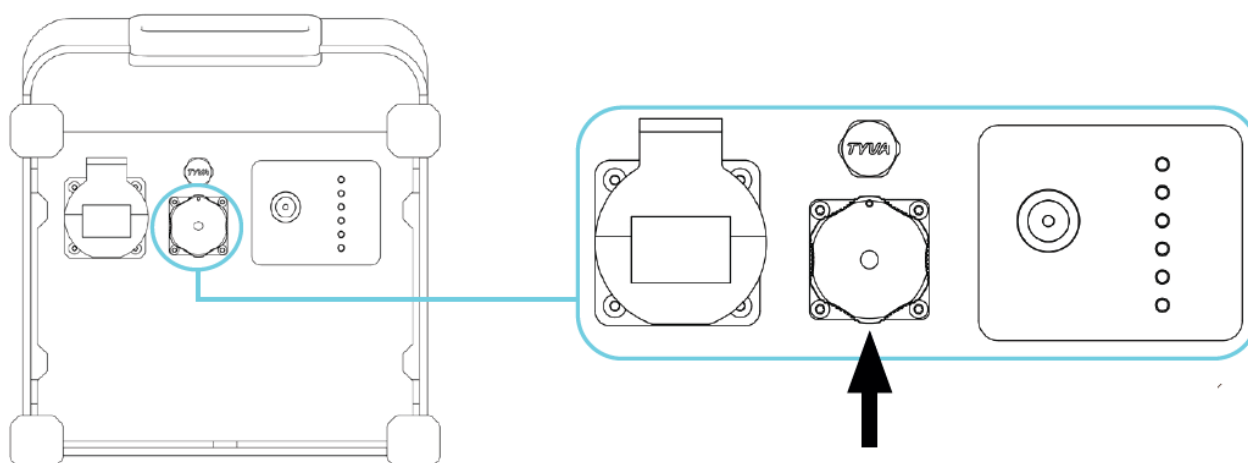
4.3. Mechanical dimensions



5. Outlet recharge

The PowerCase can be charged using the 220 VAC 300 W outlet power cable included in delivery. This cable needs to be connected directly on DC 58.8 V 5 – 15 A recharge outlet as mentioned in the User Interface chapter of this manual, by following these instructions:

1. Remove the protective cap from the recharge outlet.
2. Place the end of the charger in front of the PowerCase's charge outlet while ensuring that the two elements correctly fit together.
3. Plug the end of the charger in the PowerCase's outlet with a slight tilt to the right. Keep rotating until you hear a click indicating the end the charger is locked on the outlet.
4. Connect the opposite end on a power outlet.
5. Charge the PowerCase according to your needs and follow up the charge level thanks to the LED display on the front panel of the product. It is made up of 6 LEDs. All of them are lighted if the stations are 100% charged. If not, the charging LED blinks until it is fully charged and stays lighted, moving on to the next LED. When there is only a single LED lighted, it becomes red to indicate that the PowerCase's charge level is very low. It may take a few seconds between the moment you connect the cable and when the charging LED starts blinking.
6. Once the PowerCase is charged, repeat steps the other way round to unplug the charge cable.



It is not necessary to switch on the power station before charging it. It will automatically power up once the charge cable is plugged and power down once the cable is disconnected. The PowerCase will remain activated if it is already switched on when we plug the cable.

Power outlet	E2
Input power /VAC	220
Maximum continuous charge power /kW	1
Maximum continuous charge current /A	20

6. TYVA Smart Dashboard app

6.1. Introduction

Thanks to TYVA Smart Dashboard, you can monitor systems that embed TYVA Energie's lithium batteries such as PowerBox and PowerCase portable power stations. The app gives you the possibility to supervise the electric station using a Bluetooth connection with an Android or iOS smartphone or a tablet. Thus, you can easily access information regarding your energy system in real time, wherever and whenever you need it.

As a genuine mobile dashboard, the TYVA Smart Dashboard app was created by TYVA Energie to communicate with the built-in BMS (battery management system) to collect key data and make it accessible through a transparent transmission of information approach.

The language used on this app is English.

6.2. Access and connectivity

TYVA Smart Dashboard app is available for free download on the Google Play Store for Android devices and the Apple Store for iOS devices:



Android devices

Download the app on
the Google Play Store



iOS devices

Download the app on
the App Store



By downloading the TYVA Smart Dashboard app, you accept the terms and conditions of TYVA Energie's Privacy policy. Please consult the dedicated page on our website to learn more:

<https://tyva-energie.com/en/privacy-policy/>

After downloading the app, there are a few easy steps to follow in order to connect TYVA Smart Dashboard to your portable power station:

1. Launch the app,
2. Approve all following autorizations: use of the device's camera (allowing the QR code reading of the product) and access to the device's location (standard linked to the use of Bluetooth, the app cannot proceed to this location in any circumstances),
3. Let the app detect the portable power station: this step implies that Bluetooth is activated on the device used and the PowerCase is switched on,
4. Affiliate TYVA Energie's station to the app,
5. You can now use TYVA Smart Dashboard!

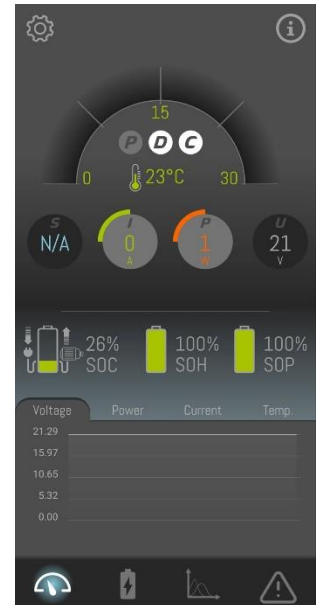
6.3. Functionalities

Once you have downloaded the app and connected your PowerCase, you can access to the app interface divided into 4 tabs you can navigate on:

Homepage

As the main app tab, it summarized all global information regarding the PowerCase to give you an overview of it at a glance. It is pictured by an icon corresponding to its name and it is the default tab that appears once the app is initiated. Thus, it gathers the following information:

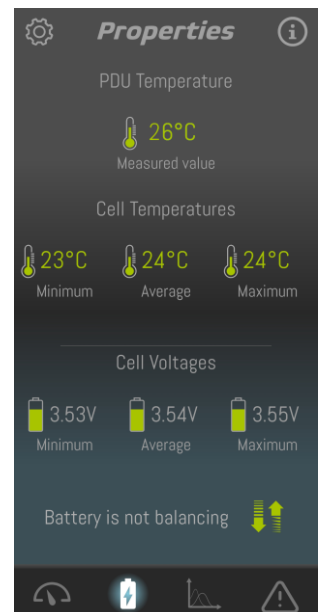
- Precharge, charge and discharge channels' status,
- Average battery temperature,
- Speed value (s),
- Current value (A),
- Power value (W),
- Voltage value (V),
- State of health (SOH), charge (SOC) and power (SOP) indicators,
- An overview of graphs summarizing data.



Properties

You can access to this tab by clicking on the icon represented by a battery. It gathers various data about cells' temperature and voltage, thus allowing a further understanding of the battery. Discover the following details:

- PDU temperature,
- Cells temperature,
- Cells voltage,
- Cells balancing.

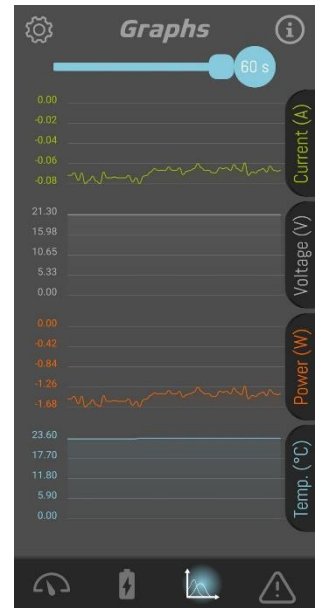


Graphs

This tab is pictured by the icon corresponding to its name and allows simultaneous viewing of all 4 graphs related to the battery's values including:

- Current,
- Voltage,
- Power,
- Temperature.

The blue gauge at the top of the display allows you to select the data display time from 0 to 60 seconds. It corresponds to the abscissa of these graphs. The graphs are automatically calibrated by the application.

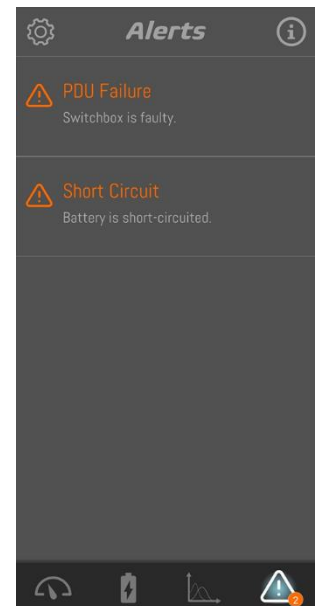


Alerts

The "Alerts" tab is pictured by a warning icon. It displays alerts brought up by the PowerCase for any error or warning detected by its protection system.

If an error occurs, an orange notification appears while it is blue in case of warning. Each alert comes with a short explanation. When alerts are detected, the tab's icon slightly evolves to indicate there is an unread notification waiting.

Every alert listed in the app are described in the Errors part of this manual.



There is another "**Settings**" tab illustrated by a star wheel, which allow the modification of some app's units but also the display of the portable power station's configuration. It also permits to refresh the connection with the PowerCase in case of communication or connection issue with a new system by clicking on the "Change Battery" button.



6.4. Warnings and errors

You can access to the detail of the errors' diagnosis detected by the PowerCase's protection system. This is possible using the TYVA Smart Dashboard app where notifications appear in the "Alerts" tab to signal a problem inside the system. Thus, there are two types of alerts: warnings (blue icon) and errors (orange icon) corresponding to the following events:

6.4.1. Warnings

Low Voltage

The “Low voltage” warning is sent as soon as a cell voltage is lower than the “cell_cutoff_voltage” setting. The discharge relay opens if the value of the “passive_sleep_delay” setting is reached. Then, after 20 seconds, the battery automatically switches off.

High Voltage

The “High voltage” warning is sent as soon as a cell voltage is higher than the “cell_charge_voltage” setting. If the battery is connected to a communicating charger, the warning appears when the end-of-charge voltage is reached.

NTC Issue

“NTC issue” indicates that the number of temperature sensors of the module is not correct. Charging or discharging, or closing the relays is not permitted.

Warning Bluetooth

The “Bluetooth warning” indicates that communication with Bluetooth is not working.

Data Log Issue

The “Data log issue” warning indicates that a problem has been detected on a component of the BMS board’s internal memory.

Information

An information frame is present. This is used for finding information about the configuration of the BMS on-board software, the configuration file version.

6.4.2. Errors

Under-temperature

The same behaviour is observed in discharge and charge. The “UnderTemperature” error means that the battery will not operate if one of the temperature sensor values is less than the “min_temperature_discharge” setting for discharging or the “min_temperature_charge” setting for charging.

Over-temperature

The same behaviour is observed in discharge and charge. The “OverTemperature” error means that the battery will not operate if one of the temperature sensor values is higher than the “max_temperature_discharge” setting for discharging and the “max_temperature_charge” setting for charging.

Under-voltage

The “UnderVoltage” error means that the battery will not discharge lower than the minimum voltage threshold defined by the “under_voltage_threshold” setting. This threshold is defined at cell level. If one of the cell voltages is below this threshold, the error is activated and the discharge relay then opens to

avoid damaging the cells with respect to deep discharging. If the cell voltage becomes higher than the voltage threshold, the relays close.

Caution: after an UnderVoltage error, the battery goes into standby mode after 20 seconds.

Over-voltage

The "OverVoltage" error means that the battery will not charge beyond the voltage threshold defined by the "overvoltage_threshold" setting. This threshold is defined at cell level. If one of the cell voltages is higher than this threshold, the error is activated, the charging relay then opens to avoid damaging the cells. If the cell voltage is below the threshold, the "voltage_hysteresis" setting must be taken into account to acknowledge the error. This hysteresis is present to allow the cells to relax and prevent the OverVoltage error from being triggered immediately after the relay is closed.

Over-current

The "OverCurrent" error is activated if the current measurement when discharging (or respectively when charging) is above the "overcurrent_discharge" (respectively "overcurrent_charge") setting multiplied by the "cell_count_P" setting.

PDU Lock

The "PDU lock" error is detected by the PDU if there is a hardware fault on the PDU. Precharging is not authorised during this sequence.

PDU Failure

The "PDU failure" error is detected by the BMS if there is an inconsistency between the relay statuses and the current value, for example if the relays are open and current is visible on the channels. The current must be greater than the value of the "threshold_current_detection" setting.

PDU Over-temperature

The "PduOverTemperature" error is activated if the measured PDU temperature is higher than the "threshold_max_temperature" setting. To acknowledge the error, the "hysteresis_max_temp" setting must be taken into account so that the PDU board can decrease in temperature and avoid triggering this error again.

Cellule Issue

The "CellIssue" error is activated if the number of cells detected does not match the following settings: "Master_cell_count_S" and "Slave_cell_count_S".

Short Circuit

The "ShortCircuit" error is activated if the maximum current allowed when discharging (or charging, respectively) exceeds the defined threshold.

AFE Issue

The "AfeIssue" error is a BMS internal error. This error is detected if the cell voltages or temperature values cannot be read. An error is detected between the AFE and the microcontroller.

Caution: after an AFE error, the battery goes into standby after 20 seconds.

Short Circuit on Precharge

The “Short circuit on pre-charge” error is detected during a pre-charging phase. At that point, the pre-charge relay must be reopened in order to protect the resistor and to prevent the discharge relay from closing. Two checks must be performed:

- During the pre-charging phase, the energy dissipated by the pre-charge resistor must always be less than the energy that can be dissipated to avoid burning the resistor,
- At the end of the pre-charging time (just before closing the discharge relay), the current must be less than a current defined by the “threshold_current_closing_discharge” setting in order to prevent overvoltage.

If the error is active, pre-charging is not authorised during the opening sequence. After this error, it is necessary to wait 10 seconds in order to perform an acknowledgement.






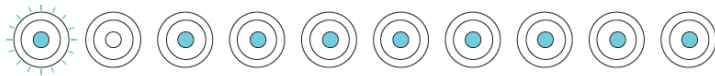
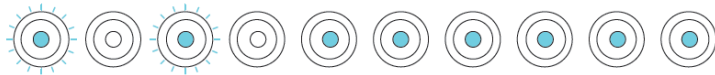


If you have any question concerning an error, please contact TYVA Energie’s support.

7. Status

The light located on the PowerCase's ON/OFF button is used as an indicator regarding its status. Indeed, it is switched off when the portable power station is shut down while it remains on when the PowerCase is activated and in standby mode.

This light can also blink according to the mode or if an error is detected inside the system. There are several types of pulses, each of them representing a specific status. Thus, the light repeatedly blinks depending on the information detected as described below:

Status	Type of pulse	Description
Idle		1 flash
PduCurrentError		2 flashes
VoltageError		3 flashes
TemperatureError		4 flashes
SystemError		5 flashes
Charge mode		Continuous light disrupted by 1 flash
Discharge mode		Continuous light disrupted by 2 flashes

If there is more than one fault, the priorities are organised as follows:

- PduCurrentError: OverCurrent, PduLock, PduFailure, ShortCircuit and ShortCircuitOnprecharge,
- VoltageError: UnderVoltage and OverVoltage,
- TemperatureError: UnderTemperatureCharge, OverTemperatureCharge, UnderTemperatureDischarge, OverTemperatureDischarge and PduOverTemperature,
- SystemError: CurrentCalibration, CellIssue, SlaveSilent, AfeIssue and ChargerError.

If you have any question regarding a status, please contact TYVA Energie's support.

8. Maintenance

8.1. Technical support

If you request any help or if you face challenges with your product, please contact TYVA Energie's technical service using our online form: <https://tyva-energie.com/en/support/>

8.2. Warranty

The warranty starts from the delivery of the PowerCase and lasts on a 12 months period.

To execute the warranty, you must alert TYVA Energie about the product's defects and provide a justification (proof of purchase, series number, etc.). The warranty request must be realized directly on TYVA Energie's website: <https://tyva-energie.com/en/support/>

TYVA Energie will confirm the reception of the warranty request and will transfer you safety instructions to respect regarding the transport and the packing of the product to send back. TYVA Energie will not accept any product return if no warranty request was constituted. Similarly, TYVA Energie needs to confirm the reception of the product return request before sending it.

From TYVA Energie's reception of the warranty request return receipt, you have a period of 15 business days to send us the product. You will be charged for the transport costs there and back and the packaging costs.

Please refer to the General Terms & Conditions of Sale and Service Provision for more information.

9. Disclaimer

If you don't use this portable power station correctly, you can seriously injure yourself or other persons. You may also harm the product and cause property damages. Starting to use this portable power station means you have understood, approved and agreed with every terms and contents of this document.

TYVA Energie cannot under any circumstances be held responsible for any damage caused by a force majeure case or consequences of an improper or non-compliant use regarding this user manual. Similarly, the company will not be liable concerning any damage resulting the product's handling, transport, storage or use with adapters or accessories that weren't supplied or approved by TYVA Energie.

This portable power station is not suitable for machines or equipments that require highly reliable power sources (medical, aerospace or atomic devices, etc.).

In accordance with laws and regulations, TYVA Energie reserves the right of the final interpretation of this document as well as every document related to the product. Some modifications (appearance, specificities, etc.) may not appear in this user manual following a product improvement. This document is likely to be modified (updates, revisions or termination) without notice.

Please visit TYVA Energie's official website to get the latest information about the product:

<https://tyva-energie.com/en/>