Installation, Operation and Maintenance Instructions

Polarium Battery System

Copyright

Disclaimer

The contents of this document are subject to change without notice due to continual updates to the product along with the methodology.

Reference online publications for the most updated iteration of this or any document produced by Polarium. Polarium and partners shall hold no liability for damages or errors due to the use of this document during its installation or operation.

Table of Content

1. Introduction

1.1. Purpose of this Document

This document describes how to install, operate, handle, maintain, and troubleshoot the Polarium Battery System in its intended environment.

This document is aimed at qualified electricians who install, troubleshoot, or perform maintenance on the product. The sections marked RESIDENTIAL USER are aimed at residential users.

1.2. Product Introduction

The Polarium battery system is a compact and modular battery energy storage system (BESS), designed for grid integration of high-voltage lithium batteries within the residential segment. It consists of 1-2 battery units, as well as an inverter unit, with an integrated controller and human machine interface (HMI).

The product is designed to support the following end-user applications:

- Load Shifting
  The battery is controlled based on energy tariff, with the objective to shift the load demand from peak hours to off-peak hours of the day, thereby reducing the cost of the energy.
- Solar Self-consumption
  The battery is charged with solar energy generated by grid-tied PV inverters. Instead of exporting excess solar energy to the grid at a low price, the energy is stored during the day. Subsequently, the battery is discharged to supply loads at night.
- Peak shaving
  The battery is discharged to supply energy at times of temporary high power demand, and rechargeed at times of lower demand. The purpose is to lower the maximum power drawn from the utility grid, thereby allowing savings related to peakpower tariffs.
- Ancillary Services
  The battery is setup to participate in grid stability support schemes such as Fast Frequency Response (FFR) and Frequency Containment Reserve (FCR). An aggregator entity coordinates multiple BESS into a virtual power plant (VPP), thereby achieving the power demand of the grid transmission system operator.

For detailed product-specific information, refer to the technical specifications or contact Polarium.

1.2.1. Main Uses

The Polarium Battery System is a modular, grid-connected Electrical Energy Storage System (EESS). It is designed for residential uses, and supports the following applications:

- Load Shifting (LS). The battery is controlled according to the energy tariff. The objective is to shift load demand from peak hours to off-peak hours of the day, thereby reducing energy costs.
- Solar self-consumption. For an external solar/photovoltaics (PV) setup the battery is charged with excess solar energy during the day, instead of selling energy to the grid at a low price. Subsequently, the battery is discharged to supply loads at night.
- Peak shaving (PS). The Polarium Battery System is used/discharged to supply energy at times of temporary high-power demand, and to recharge its batteries at times of lower demand. The purpose is to lower the maximum power drawn from the utility grid, to allow savings related to peak-power tariffs.
- Ancillary Services (AS). The battery is designed to participate in grid stability support schemes such as Fast Frequency Response (FFR) and Frequency Containment Reserve (FCR).

1.2.2. Contact and Support

For support, contact your local sales representative.

For inquiries and support regarding battery disposal through Polarium: Info@polarium.com

2. Safety Warnings and Precautions

For all electrical installation, service, and maintenance work refer to the requirements in EN 50110-1:2013 - Operation of electrical installations for qualified electricians.

2.1. Safety Messages used in this Manual

Symbol	Admonition	Meaning
	WARNING!	Used when there is a potentially dangerous situation. Death or serious injury may result if appropriate precautions are not taken.
	ELECTRICAL HAZARD!	Used when there is a potentially dangerous situation involving electricity. Death or serious injury may result if appropriate precautions are not taken.
	FIRE HAZARD!	Used when there is a potentially dangerous situation involving fire. Death or serious injury may result if appropriate precautions are not taken.
	FLAMMABLE GAS HAZARD!	Used when misuse of the battery modules can result in the release of flammable gases. Death or serious injury may result if appropriate precautions are not taken.
	TIP-OVER HAZARD!	Used when there is a potentially dangerous situation involving objects tipping and falling over, when not mechanically secured in location. Death or serious injury may result if appropriate precautions are not taken.
	MECHANICAL HAZARD!	Used when there is a risk of strains, crushing and injuries caused by lifting or dropping heavy parts, and minor cuts and injuries caused by packaging material or sharp edges.
	CAUTION!	Used when there is a situation where damage or injury could occur. Minor injury and/or damage to property may result if appropriate precautions are not taken.
	READ THE USER MANUAL	Important information referenced in the manuals.
	CAPACITOR DISCHARGE!	Indicates risk of death or serious injury caused by residual voltage if the indicated time for discharge is not applied.

2.2. Read the User and Installation Manual

Read the user guide in its entirety before installing, handling, or operating the product.

- The product must be handled, transported, stored, installed, and used in accordance with the instructions and specifications in this document. Handling and usage that is not in accordance with instructions and specifications will invalidate the warranties.
- The battery system is intended for installation in a location that meets the requirements for installation.
- The installation must be performed by a qualified electrician.
- Always follow the installation manual and referred documents when installing the product.
- For any questions about installation and operation, consult your local sales representative.
- Failure to read, understand and follow the safety precautions may lead to potential risks, such as hazardous situations involving death or serious injuries by fire, residual voltage, or explosion.

2.3. Qualified Electrician

Unpacking, assembly, installation, disassembly, troubleshooting, replacement, repairs, and service of this Electrical Energy Storage System (EESS) must only be performed by qualified and trained electricians.

2.4. Personal Protection

Use the Personal Protective Equipment (PPE) relevant for each installation and/or maintenance task as described in this manual. The main hazards during installation are related to Low Voltage (400VAC and up to 900VDC) electrical works and to crushing, pinching and cuts during lifting and fitting operations.

2.5. Battery Electrolyte

For warnings and instructions regarding the battery electrolyte, a copy of the Material. Safety Data Sheet (MSDS) can be supplied on request, please contact Polarium™ support.

2.6. Electrical Hazard

- Unpacking, assembly, installation, disassembly, troubleshooting, replacement, repairs, and service of this Electrical Energy Storage System (EESS) must only be performed by qualified and trained electricians.
- Do not touch the battery system. A qualified electrician must handle the system. Turn the AC main switch OFF and wait 5 minutes before handling the inverter after the system has been shut off. The inverter is still energized when switched off and disconnected. Disconnect the communication cable before handling battery connectors, there is a risk of death or serious injury caused by energized capacitors and residual voltage.
- Electrical installation works must follow the procedures and rules defined by local and national electrical safety standards.
- A qualified electrician must perform a full risk analysis of the installation site and make sure that the system is properly grounded. There is a risk of death or serious injuries, in case of insufficient grounding and exposed live parts.
- A qualified electrician must perform a full risk analysis of the site before any maintenance or replacement work. Make sure the system is properly grounded. There is a risk of death or serious injuries, in case of insufficient grounding and exposed live parts.
- All tools used for installing the battery should be insulated and rated to a minimum of 1000 V DC.
- Do not touch the battery terminals Normally Open (NO) or high voltage circuits. There is a

risk of death or serious burn injuries.

- The battery modules are supplied in a charged condition and are capable of extremely high short-circuit currents. Take care to avoid short-circuiting cables or to reverse the polarity of connections. Accidental shorting of cables can result in severe electrical arcing, causing burns and electric shock to nearby personnel.
- Ensure the inverter and each battery module are properly grounded to the base frame, and that the overall Protective Earthing (PE) system of the Electrical Energy Storage System (EESS) is connected and tested before starting the system, to prevent an electric shock.
- If the product is or appears damaged, do not touch any parts. Turn the AC main switch OFF and contact support. The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injuries, in case of damage to the product and exposed live parts.
- In case of a faulty battery module, a qualified electrician must perform a full risk analysis of the site before any maintenance or replacement work. Use Personal Protective Equipment (PPE) and handle the battery carefully. There is a risk of serious burn injuries, caused by short circuiting, thermal runaway, and explosion.
- Systems that are not in use must be switched off.
- Do not wire or attach the battery modules in any other way than that specified in the Installation Manual. Incorrect wiring may result in hazards such as damage to the module or explosion.
- Do not insert metal objects into the output terminals of the battery module or inverter.
- Do not crush or place heavy loads on the inverter module as damage may occur.
- Do not install or use battery modules or an inverter module which have been dropped due to the risk of internal damage.
- Do not use damaged, frayed, or non-approved electrical cables and connectors.
- There is a risk of electric shock. Do not remove the battery system cover/enclosure. There are no user serviceable parts inside. Contact a qualified authorized Polarium™ technician for service.
- Turn the AC main switch OFF In the event of:
  - Lost connectivity to the Installer App, or if the system cannot be shut off.
  - Incorrectly installed or lost protective earthing (PE).
  - Isolation fault in the system.
  - Offline system after reporting of faulty unit.

A qualified electrician must perform the following procedure. There is a risk of death or serious injuries caused by access to live parts, residual voltage and potential thermal runaway.

1. Ensure that the AC main switch is turned OFF.
2. Wait 5 minutes.
3. Turn the DC safety switch OFF on the inverter.
4. Disconnect the communication cable from the inverter before handling the battery.

2.7. Risk of Fire

- The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injury caused by residual voltage.

- Do not disassemble units.
- Do not short-circuit the battery module.
- Do not crush or place heavy loads on the battery module as damage may occur to the cells internally causing a short circuit.
- Check the charging date on the label. There is a risk of serious burn injuries caused by explosion and thermal runaway.
- Mount a fire protection board for installations on wooden walls.
- Do not install the product near a heat source, minimum 2 meters from the product. There is a risk of serious burn injuries caused by explosion and thermal runaway. Ensure no flammable materials are near the unit during installation or operation.
- Do not drop or hit the product. Carefully and firmly, handle the product. There is a risk of serious burn injuries caused by internal short circuiting or penetration from dropping the product.
- In case of a faulty battery module, a qualified electrician must perform a full risk analysis of the site before any maintenance or replacement work. Use Personal Protective Equipment (PPE) and handle the battery carefully. There is a risk of serious burn injuries, caused by short circuiting, thermal runaway, and explosion.
- Do not expose the battery module to fire or temperatures higher than 60 ℃. High temperatures may cause the battery to overheat or even self-ignite. High temperatures may also result in loss of performance and decreased life expectancy of the product.
- Immediately disconnect the battery if, during operation, the battery heats up rapidly or in any way feels abnormally hot, (60 ℃ or greater).
- Immediately disconnect the battery if, during operation, the battery appears abnormal in any way.
- Only use components and cables provided by Polarium within the product. External connection must comply with local wiring regulations.

2.8. Warning

- Use Personal Protective Equipment (PPE) and handle the battery carefully. There is a risk of death or serious injuries, in case of damaged goods or faulty parts from production.

TIP-OVER HAZARD!

- Ensure that the product is properly mounted and secured. There is a risk of injuries due to units tipping and falling over.

MECHANICAL HAZARD!

- Handle the product carefully and firmly and use Personal Protective Equipment (PPE). There is a risk of minor cuts and injuries caused by packaging material or sharp edges.
- Use ergonomic techniques according to best practice to unpack and lift the product into position. Use Personal Protective Equipment (PPE). There is a risk of strains and injuries caused by lifting or dropping heavy parts.

2.9. First Aid Measures

The following first aid measures are required only in case of exposure to interior battery components, and battery electrolyte in case of damage to the external battery casing. Undamaged, closed cells do not represent health risks.

In case of inhalation, ensure access to fresh air. Consult a physician immediately.

In case of battery electrolyte in contact with the skin, wash off immediately with plenty of water. Consult a physician immediately.

In case of contact with the eyes, rinse immediately with plenty of water, including under the eyelids, for at least 15 minutes. Seek immediate medical treatment from an eye specialist.

In case of ingestion, drink plenty of water. Call a physician immediately.

2.10. Caution

- Keep the battery connected to the grid. Batteries that are disconnected for an extended period of time can self-discharge to a level from which the battery does not permit recovery. Do not disconnect the battery for longer than a month
- Installing a product in an inappropriate environment can lead to product failure or malfunction. Do not attempt any installation work if the operating temperature range or operating non-condensing humidity range thresholds are exceeded. Do not install the product in a place where there is a risk of flooding.

2.11. Warranty

The warranty of the product may be invalid and any liability for damages may be rejected if installation and operation are not compliant with the Polarium warranty conditions. Polarium assumes no responsibility for any consequential damages. The following actions and events are considered a failure to comply with the warranty conditions:

- Damage to the product due to failure to observe the installation procedures, recommendations, warnings, and precautions specified in this document.
- Damage to the product during transport and storage.
- Damage to the product due to incorrect installation.
- Damage to the product due to improper storage and product operating environment.
- Damage to the product due to failure to comply with safety instructions.
- Damage to the product due to product installation or repair by those who are not qualified.
- Damage to the product due to natural disasters.

2.12. Packaging

- Batteries are delivered from the factory in packaging dedicated for transport and storage of the particular battery (UN Certified package for Transport of Dangerous Goods) – keep the battery in its packaging until it is time for installation.
- Keeping the battery in its original packaging helps to protect from pollution, moisture, and mechanical damage.
- Do not remove the battery from its packaging before arriving at the installation location.

2.13. Transportation

- Lithium batteries are classified as dangerous goods and transport restrictions apply – be sure to follow any global and local regulations concerning handling and transport of lithium batteries.
- Handle the battery in accordance with any specific marking on the packaging – for example concerning package position and stacking instructions.
- The battery in its packaging should be handled with care. It should not be exposed to the weather (rain, excessive heat, etc.), vibrations or sudden impacts, all of which could cause damage to or decrease performance of the battery.

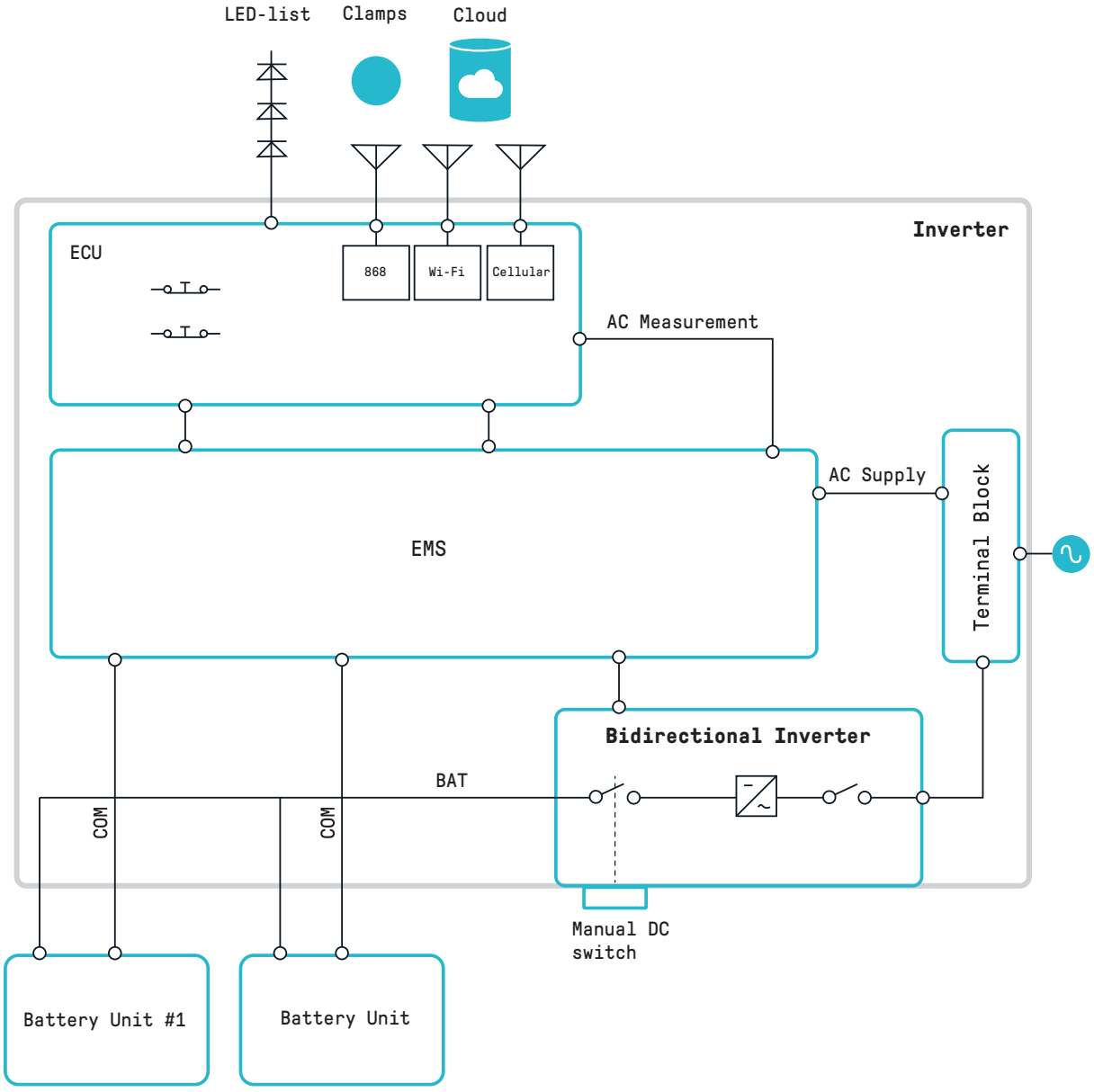
2.14. Storage

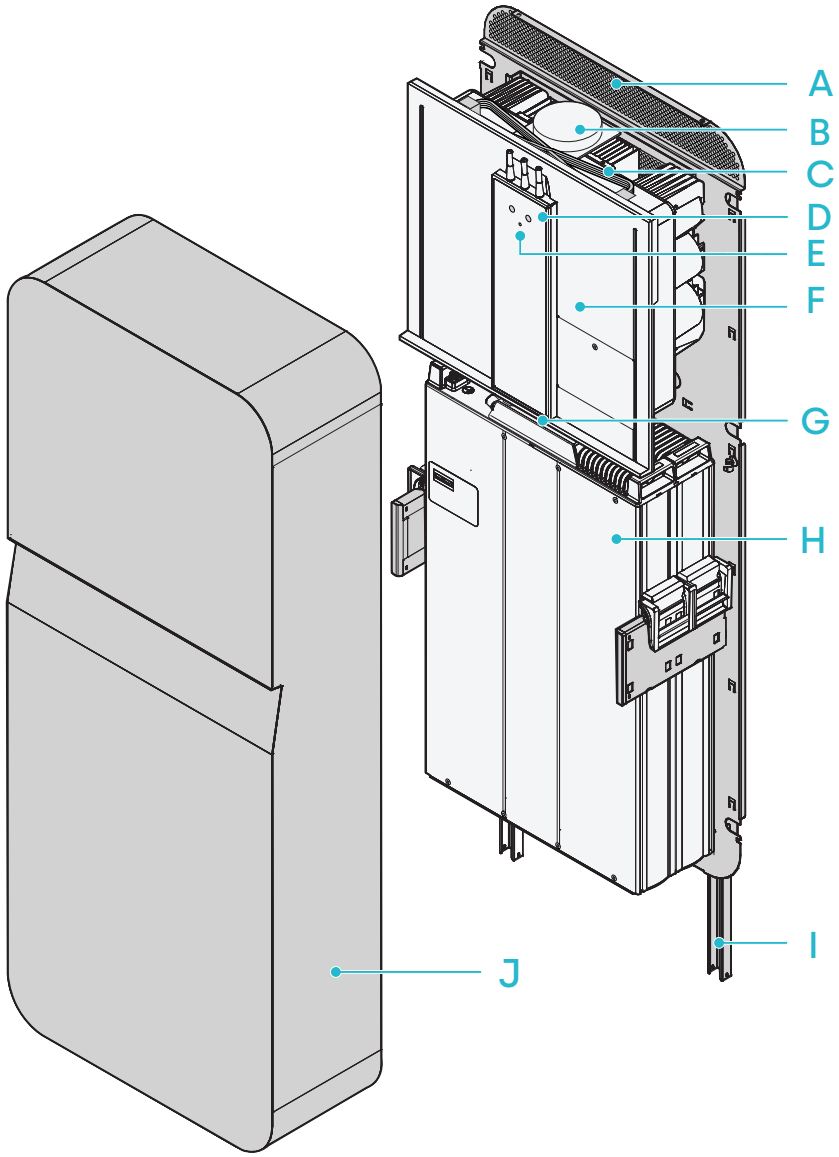
- Batteries are best stored in a dry, indoor storage in order to prevent degradation of performance.

- Batteries stored for an extended period of time can self-discharge to a level from which the battery does not permit recovery. To avoid this, make sure to charge the battery to 50% State of Charge no later than at the "charge by" date stated on the packaging, and thereafter check the State of Charge (SOC) at least once a year. Charge the battery to 50% if the SOC is less than 20%. Refer to the battery datasheet or contact your Polarium™ representative to obtain the correct charging voltages.
- Keep the battery connected to the grid. Batteries stored for an extended period of time can self-discharge to a level from which the battery does not permit recovery. Do not disconnect the battery for longer than a month.

3. Product Description

3.1. System Overview





A	Base Frame
B	Antenna
C	Antenna Bracket
D	Internal LED
E	Buttons
F	Inverter Module
G	External LED Strip
H	Battery Module (option 1-2)
I	Supports (optional)
J	Cover

NOTE! Pulse Clamps 1-2: Pulse grid clamps at the mains, pulse solar clamps at the solar inverter

3.2. Module Descriptions

3.2.1. Controller Module

Energy Management System (EMS)
The Energy Management System (EMS) controls the operating state of the system, via wired communication interfaces (RS485, Modbus RTE) to the inverter, battery management

system (BMS) and Electronic Control Unit (ECU). It controls the charging/discharging state of the battery, via controlling the active power set-point of the inverter.

It also includes an auxiliary Power Supply Unit (PSU), that powers the electronics in the system from the AC supply.

Electronic Control Unit (ECU)
The Electronic Control Unit (ECU) incorporates external interfaces for both human-machine (HMI) and machine-machine (MMI) interaction. This includes:

Wireless interfaces

- An LTE and Wi-Fi for IP connectivity, and connection to a Cloud service provider.
- An 868Mhz RF interface to pulse clamps, mounted at the facility metering point/points.

LED

- Internal indicator for troubleshooting.
- External LED strip for battery status monitoring and ambient lighting.

3.2.2. Battery Module

Each battery module consists of 14 cell-packs connected in series, distributed on 2 cell interconnect boards. Each cell-pack consists of 15S2P cells and a Battery Monitoring Module (BMM) that measures the cell voltages and temperatures.

The Battery Management System (BMS) is the brain of the battery and ensures that the battery remains within its safe operating envelope, based on measured current, voltages and temperatures measurements. In case of a fault, the BMS disconnects the battery from the DC-bus.

3.2.3. Inverter Module

The system connects to the (400V) AC grid via a three-phase, bi-directional inverter, based on a transformer-less topology. The battery is coupled to the DC-link of the inverter, via an internal pre-charge circuit, in order to prevent inrush currents while connecting to the battery.

The inverter also includes relays, which can disconnect the inverter from the AC grid in case of fault conditions, including islanding and ground faults. A manual (DC) safety switch is located on the underside of the inverter. There are two buttons in the front of the inverter module to be used during production, test, installation, and service modes.

The antenna is connected to the inverter module and is installed on top of the inverter or on a wall.

3.2.4. Pulse Clamps

The pulse-clamp current sensors, pulse clamps, are real time meters that measure net energy flow, and transmit information to the provider.

The pulse clamps are paired wirelessly with the The Electronic Control Unit (ECU) of the Battery during installation. The communication cable is connected to an 868 MHz band.

The units are powered through a 240/5V adapter and have an additional built-in battery backup.

The Pulse Grid Clamp installed at the mains, measures net energy flow in and out of the grid.

The Pulse Solar Clamp installed at the solar inverter, measures solar production, for users who have a solar setup.

3.2.5. Configurations and Options

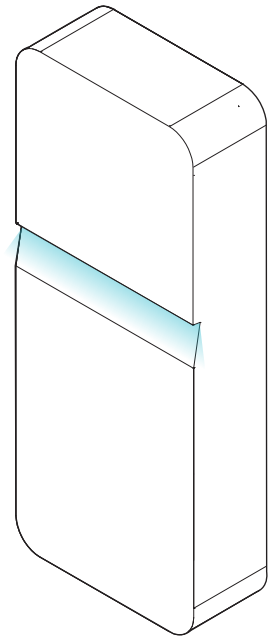
- Solar setup including pulse solar clamps
- Batteries: 1-2 Batteries
- Supports
- Colours:
  - Black
  - White
  - Red

3.3. Indicators and Buttons

The two buttons and internal LED are used during production, test, installation, and service modes by qualified electricians or technicians.

The external LED indicates State of Charge (SOC), charge and discharge status.

3.3.1. External LED Indicator/LED Strip



Number of LEDs that are solid from the middle	State of charge 0-100%
LED on only middle	0%
LED on all	100%

Color	Animation	Status
White	No animation	Battery is idle
Blue	LEDs animate from the edges towards the middle	Battery is charging
Green	LEDs animate from the middle out towards the edges	Battery is discharging

*Total brightness is natively adjusted based on ambient light readings.

3.3.2. Internal LED Indicator

The multicolored LED is used to diagnose the system state related to the current LTE connectivity:

Color	Description
Flashing Purple 	1 s on-off blink, LTE off
Flashing Purple 	250 ms on-off blink, LTE starting
Flashing Purple-orange 	500 ms color swap, LTE has no Service, searching for network
Steady Purple 	LTE ready to connect
Flashing Orange 	500 ms on-off blink, LTE connecting
Flashing Orange 	100 ms on-off blink, LTE disconnecting
Steady Orange 	LTE connected
Flashing Blue or green 	Toggles between the colors, MQTT connection to back-end up on every message

3.3.3. Buttons

- **Left button:** service mode that allows clamp pairing, registers with Cloud, enables local web server.
- **Right button:** reset, power cycles the controls.
- **Both buttons for 5 s:** Factory reset or stand-alone mode.

4. Residential User Preparations

WARNING!

- Do not handle the Polarium Battery System units. Unpacking, assembly, installation, troubleshooting, disassembly, replacements and repairs must only be performed by an electrician.
- A full risk analysis of the installation site must be performed by the electrician before installing the product.

ELECTRICAL HAZARD!

- The electrician must determine if a Residual Current Device (RCD) and/or Lightning protection system need(s) to be installed before the Polarium Battery System installation. Each installation site must be assessed, depending on the local environment and requirements.

FIRE HAZARD!

FLAMMABLE GAS HAZARD!

- A fire protection board is required for installations on wooden walls. The placement must be assessed and mounted by a qualified electrician.

CAUTION!

- Keep the battery connected to the grid. Batteries that are disconnected for an extended period of time can self-discharge to a level from which the battery does not permit recovery. Do not disconnect the battery for longer than a month.
- For any questions about installation and operation, consult your local sales representative.
- The warranty of the product may be invalid and any liability for damages may be rejected if installation and operation are not compliant with the Polarium warranty conditions. Polarium assumes no responsibility for any consequential damages.

Residential user instructions:

1. Follow the instructions via Installer App.
2. Fill in the requested customer data, options, and verify:
   - Supply and grounding system (TN/TT)
   - Main fuse, 3 phase
   - Type of mounting:
     - Wall mounting:
       - Visible or hidden cable installation
   - Solar setup/installation (including the pulse solar clamps)
3. Choose placement for the product to prepare for mounting and installation according to the requirements and customer information.

5. Installation

WARNING!

- The installation site must be in compliance with climate conditions according to IEC 60721-3-4/IEC 60721-3-3:2019.
- The installation must be performed by a qualified electrician.
- The battery system is intended for installation in a location that meets the requirements for installation.
- Electrical installation works must follow the procedures and rules defined by local and national electrical safety standards.
- A qualified electrician must perform a full risk analysis of the installation site and make sure that the system is properly grounded. There is a risk of death or serious injuries, in case of insufficient grounding and exposed live parts.
- Use the Personal Protective Equipment (PPE) relevant for each installation and/or maintenance task as described in this manual. The main hazards during installation are related to Low Voltage (400VAC and up to 900VDC) electrical works and to crushing, pinching and cuts during lifting and fitting operations.

ELECTRICAL HAZARD!

- The electrician must determine if a Residual Current Device (RCD) and/or Lightning protection system need to be installed before the Polarium Battery System installation.
- Handle the battery carefully. There is a risk of death or serious burn injuries, in case of damaged goods or faulty parts from production.
- The battery modules are supplied in a charged condition and are capable of extremely high short-circuit currents. Take care to avoid short-circuiting cables or to reverse the polarity of connections. Accidental shorting of cables can result in severe electrical arcing, causing burns and electric shock to nearby personnel.
- Ensure the inverter and each battery module are properly grounded to the base frame, and that the overall Protective Earthing (PE) system of the Electrical Energy Storage System (EESS) is connected and tested before starting the system, to prevent an electric shock.
- Do not touch the battery terminals Normally Open (NO) or high voltage circuits. There is a risk of death or serious burn injuries.
- Do not wire or attach the battery modules in any other way than that specified in the Installation Manual. Incorrect wiring may result in hazards such as damage to the module or explosion.
- Do not insert metal objects into the output terminals of the battery module or inverter.
- Do not crush or place heavy loads on the inverter module as damage may occur.
- Do not install or use battery modules or an inverter module which have been dropped due to the risk of internal damage.
- Do not use damaged, frayed, or non-approved electrical cables and connectors.

CAPACITOR DISCHARGE!

If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

FIRE HAZARD!

FLAMMABLE GAS HAZARD!

- A fire protection board is required for installations on wooden walls. The placement must be assessed and mounted by a qualified electrician.
- Do not expose the battery module to fire or temperatures higher than 60 °C. High temperatures may cause the battery to overheat or even self-ignite. High temperatures may also result in loss of performance and decreased life expectancy of the product.
- Do not drop or hit the product. Handle the product carefully and firmly. There is a risk of serious burn injuries caused by internal short circuiting or penetration from dropping the product.
- Do not expose the battery module to fire or temperatures higher than 60 °C. High temperatures may cause the battery to overheat or even self-ignite. High temperatures may also result in loss of performance and decreased life expectancy of the product.

TIP-OVER HAZARD!

- Ensure that the product is properly mounted and secured. There is a risk of injuries due to units tipping and falling over.

MECHANICAL HAZARD!

- Handle the product carefully and firmly and use Personal Protective Equipment (PPE). There is a risk of minor cuts and injuries caused by packaging material or sharp edges.
- Use ergonomic techniques according to best practice to unpack and lift the product into position. Use Personal Protective Equipment (PPE). There is a risk of strains and injuries caused by lifting or dropping heavy parts.

CAUTION!

- Installing a product in an inappropriate environment can lead to product failure or malfunction. Do not attempt any installation work if the operating temperature range or operating non-condensing humidity range thresholds are exceeded. Do not install the product in a place where there is a risk of flooding.

5.1. Prerequisites

Refer to the Technical specifications for installation data.

5.1.1. Requirements for Installation

General placement	▪ Outside wall ▪ Pump house, garage etc
Limitations	▪ Not in close proximity to residential spaces ▪ No obstructions to air flow by vegetation or objects
Wall material and properties	▪ Concrete, wood, brick ▪ Wooden wall requires fire protection board installation ▪ Load bearing capacity: 120 kg
Temperature	-20 to +50 °C
Main power supply	▪ Fuse: 3-phase fuse box ▪ AC cable routed downwards ▪ Supply and grounding system (TN/TT)
Altitude	Max 3 000 m

Minimum height	25 cm
Maximum height	According to ergonomic principles
Distance to surrounding objects	30 cm
Distance to heat source	2 m
Distance to another battery	30 cm
Connectivity, position, and signal of the LTE-connection and Wi-Fi	

5.1.2. Tools and Materials

WARNING!
All tools used for installing the battery should be insulated and rated to a minimum of 1000 V DC.

Required Tools and Materials
Sharp Knife (box cutter)
Electric screwdriver / drill: T20, T25
Spirit level
Water pump pliers
Hammer
Sheath stripper
Cable grips
End sleeves
Cable lug
Cable crimp
Crimp tool
Wire stripper / Wire cutter
DIN rail mount
Rubber sealing strip
Electrical insulating tape
Cable clamps
Industrial key

Personal Protective Equipment
Insulated gloves

```
Safety shoes
```

```
Non-flammable clothes
```

```
Eye protection
```

5.2. Preparations

WARNING!

- Unpacking, assembly, installation, troubleshooting, disassembly, replacements and repairs must only be performed by an electrician.
- The battery system is intended for installation in a location that meets the requirements for installation.
- A full risk analysis of the installation site must be performed by the electrician before installing the product.

5.2.1. RCD and Lightning Protection

WARNING!
A full risk analysis of the installation site must be performed by the electrician before installing the product.

The electrician must determine if a Residual Current Device (RCD) and/or Lightning protection system need to be installed before the Polarium Battery System installation. Each installation site must be assessed, depending on the local environment and requirements.

Residual Current Device (RCD)
If an RCD is installed the recommendation is to use a Type B and current level set to minimum 100mA.

Lightning protection
The Battery system is designed for OVC III. If the system is installed in an environment requiring OVC IV, an external surge protection is needed.

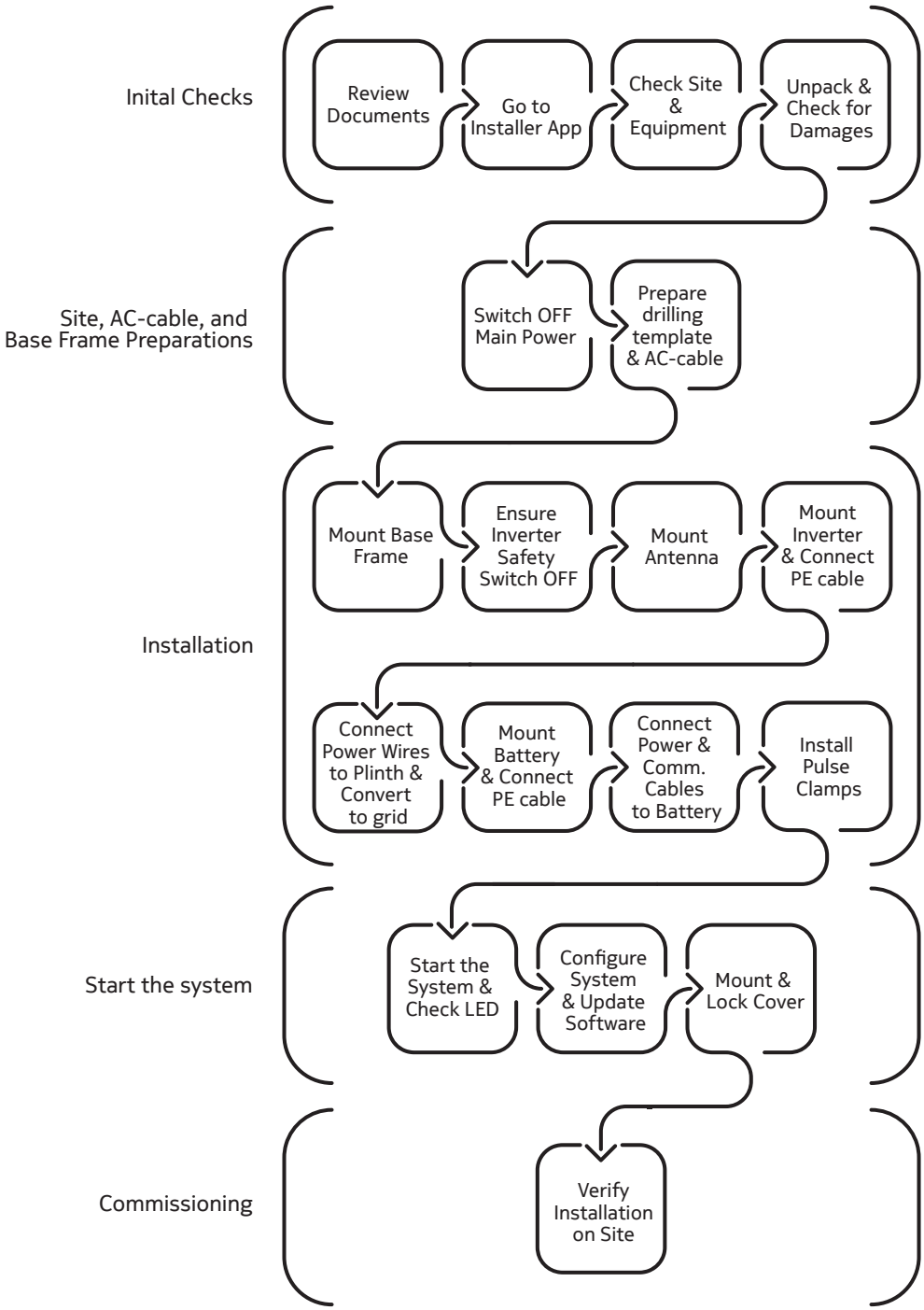
5.2.2. Pre-installation Checklist

WARNING!

- Unpacking, assembly, installation, troubleshooting, disassembly, replacements and repairs must only be performed by an electrician.
- A full risk analysis of the installation site must be performed by the electrician before installing the product.
- The battery system is intended for installation in a location that meets the requirements for installation.
- The site must be accessible for transport of the system components.
- Modifications to the existing installation must be completed.
- The site must be clear of foreign objects.
- Equipment and material to be installed must be available at the site and verified as complete and undamaged.
- All tools and materials required for installation must be available.
- The electrician must determine if a Residual Current Device (RCD) and/or Lightning protection system need to be installed before the Polarium Battery System installation.

Each installation site must be assessed, depending on the local environment and requirements.

5.3. Installation Sequence



5.4. Unpack and Check for Damages

WARNING!

- Unpack the battery on site. The battery is considered dangerous goods and must be transported in its original packaging to prevent risk of damage.
- Read the safety information and follow the instructions for disassembly to perform maintenance, troubleshooting, tests, relocation, reinstallation, unit replacement, service, and repairs.
- Use the Personal Protective Equipment (PPE) relevant for each installation as described in this manual. The main hazards during installation are related to Low Voltage (400 VAC

and up to 900 VDC) electrical works and to crushing, pinching and cuts during lifting and fitting operations.

1. Lifting must be carried out in compliance with local health and safety guidelines.
2. Inspect the packaging for damage. Document and report any damage to the product.
3. Lay the box flat on the ground to unpack. Do not unpack vertically.
4. Check that all required hardware is included. Check the Installer Web App for complete unbox list for each installation.
5. Check the shock detector on the battery module for indication of damages.
6. Inspect the battery, connectors, and seals between casing parts. Do not install a battery that you suspect is damaged.
7. If a battery module shows any sign of physical damage, please stop the installation and contact your local sales representative.
8. Save the packaging material if you need to use it again. Packaging is certified for shipment of the specific battery as batteries are considered dangerous goods. If there is no requirement for reuse, discard the material in accordance with local regulations. Please recycle all packaging responsibly.

5.5. Mount the Product to Wall

See: Requirements for Installation

5.5.1. Prepare the AC/Power Cable

The installation of the AC cable/main power supply may vary depending on the setup at the installation site.

1. Ensure that the AC cable meets the requirements for outdoor installation, including:

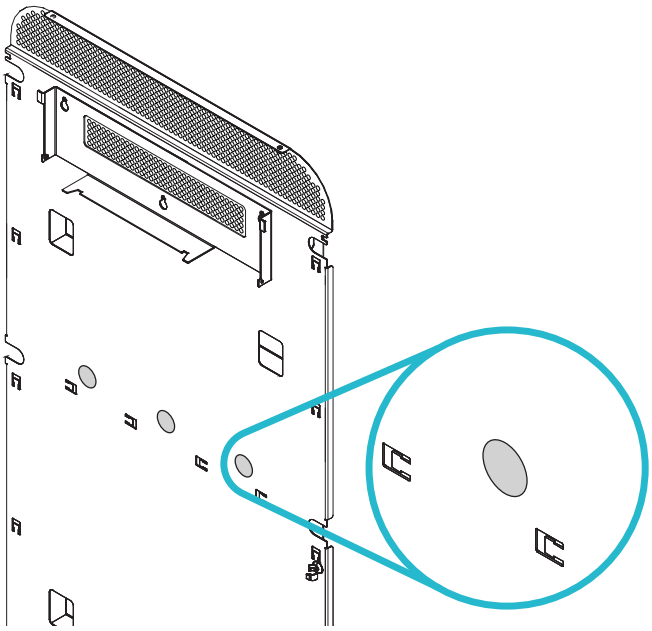
Cable routing and strapping	Downwards and according to best practice
Size of main cable outer jacket	8 to 13 mm
Cable for outdoor use	UV-resistance, temperature limit for each installation site

2. Ensure the power system voltage is set correctly for the application.
3. Test the AC cable/main power supply to exclude or confirm possible cable failure/faults before starting the installation.
4. Use a strain relief to secure the AC cable/main power cable if necessary and applicable to the installation site.

5.5.2. Prepare Wall Mounting

1. Ensure that the mounting location is in accordance with the requirements for the installation site. See: Requirements for Installation.
2. Use the base frame as a drilling template.
3. Choose one of the cableway alternatives hidden or visible cable for wall mounting.

5.5.3. Mount Base Frame to Wall - Hidden AC Cable



This mounting alternative depends on the wall requirements.

1. Choose one point of reference for mounting on the drilling template. Drill a hole and insert one screw according to best practice depending on the wall material, loadbearing capacity, and requirements on the installation site.
2. Choose one of the three points of reference for a hidden cableway on the drilling template for the AC cable/main power cable.
3. Drill a hole for the AC cable according to best practice and run the cable through the wall and drilling template.
4. Remove the corresponding knockout on the base frame.
5. Attach the rubber protection into the knockout hole.
6. Hang the base frame by the corresponding hole onto the screw.
7. Pull the AC cable through the base frame.
8. Place the spirit level on the inverter mounting bracket, align and drill the parallel hole for mounting.
9. Mount and secure the base frame to the wall using all the included screws.
10. Drop down one or two supports from the base frame (optional equipment) if necessary to support the product.

5.5.4. Mount Base Frame to Wall - Visible AC Cable

1. Choose a point of reference for the first screw on the drilling template. Drill a hole and insert the screw according to best practice depending on the wall material, loadbearing capacity, and requirements on the installation site.
2. Hang the base frame by the corresponding hole/point onto the screw.
3. Pull the AC cable through the base frame.
4. Place the spirit level on the inverter mounting bracket, align and drill the parallel hole and insert the screw for mounting.
5. Mount and secure the base frame to the wall using all the included screws.

6. Drop down one or two supports (optional equipment) if necessary to support the product.
7. Shape the cable to run it properly from the main power supply to the base frame. Attach a rubber sealing strip at the reference point to protect the cable, if necessary.
8. Run the AC cable through one of the 6 reference points on the base frame, according to best practice and safety standards. Consider: cableway distance, cable exposure, and cable bending radius.
9. Run and attach the AC cable with cable ties along the markings on the base frame with enough length to connect it to the inverter terminal.

5.5.5. Signal Strength and Options for Antenna Installation

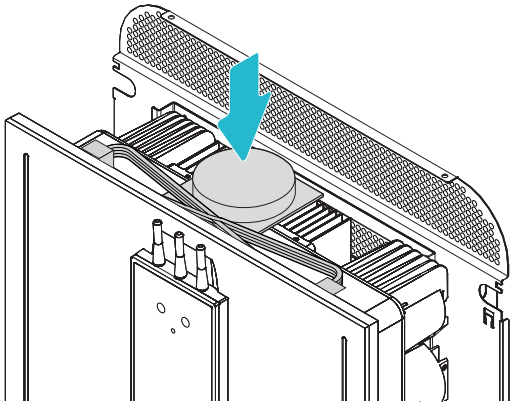
There are two options for installing the antenna, depending on the LTE- and Wi-Fi signal strength.

- Mount the Antenna on the Inverter
- Mount the Antenna on the Wall

5.5.6. Mount the Antenna on the Inverter

Capacitors inverter

1. Make sure the inverter safety switch is turned OFF.
2. Screw the antenna bracket onto the inverter. Use the prepared holes.
3. Wrap the antenna cable round the bracket with no excess length.

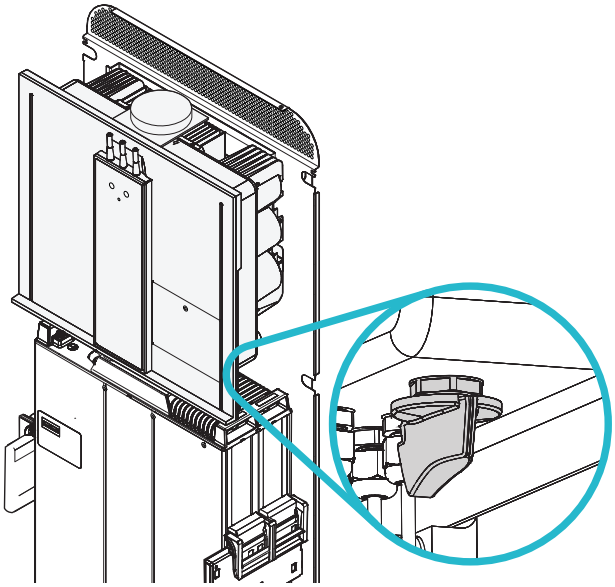


4. Slide the antenna into the bracket opening to secure it properly.
5. Hang the inverter unit onto the mounting bracket on the base frame.
6. Follow the instructions: Mount and Ground the Inverter to the Base Frame

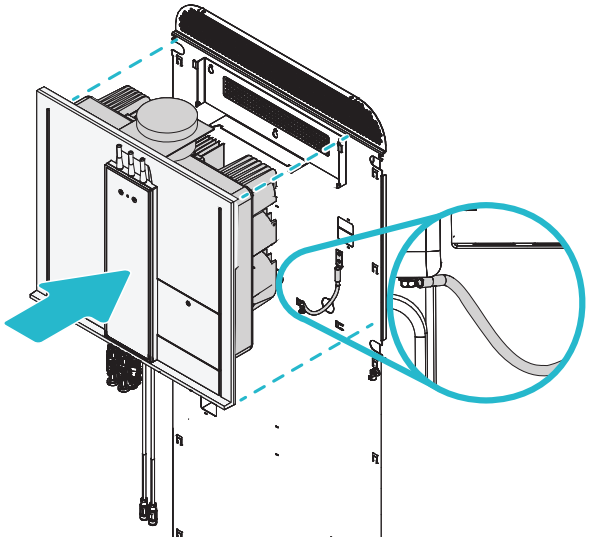
5.5.7. Mount and Ground the Inverter to the Base Frame

ELECTRICAL HAZARD!
The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injury caused by residual voltage.

1. Make sure the inverter safety switch is turned OFF.



2. Hang the inverter unit onto the mounting bracket on the base frame.
3. Connect the PE cable from the inverter chassis to the base frame with an electric screwdriver.



5.5.8. Mount the Antenna to Wall

ELECTRICAL HAZARD!
The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injury caused by residual voltage.

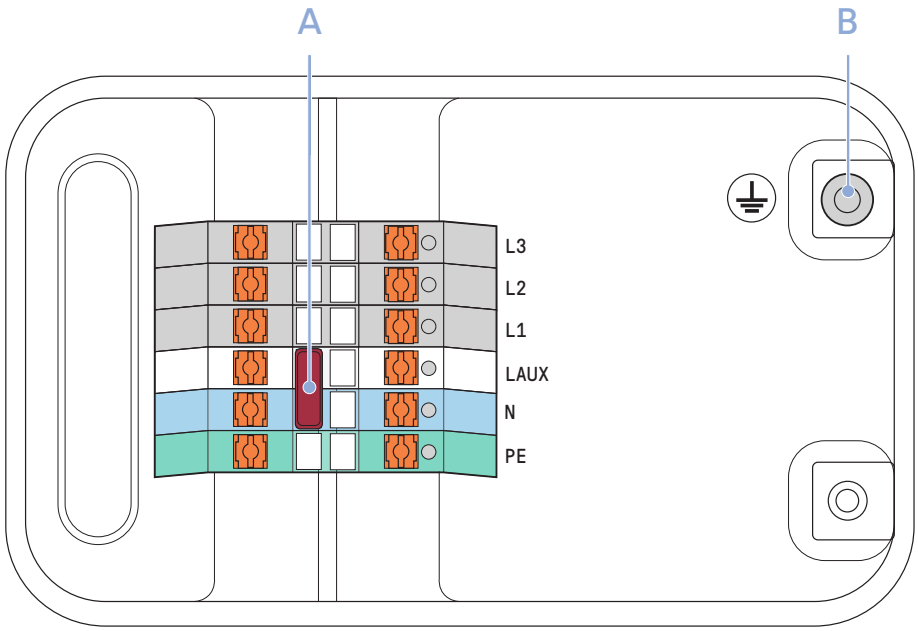
1. Make sure the inverter safety switch is turned OFF.
2. Unwrap a suitable length of the antenna cable for wall placement. If there is any excess cable, wrap it around the bracket.
3. Mount the inverter bracket to the wall according to best practice.
4. Slide the antenna into the bracket opening to secure it properly.
5. Follow the instructions: Mount and Ground the Inverter to the Base Frame.

5.5.9. Connect Power Wires to Terminal Block - TN/TT Systems

ELECTRICAL HAZARD!

- The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injury caused by residual voltage.
- A missing jumper will prevent the inverter from starting and functioning as intended.
- A jumper connected across the wrong terminals may trip the mains fuse and/or damage the electronics in the inverter.

1. Make sure the inverter safety switch is turned OFF.
2. Unscrew and remove the inverter cover of the AC terminal compartment (T20/25).
3. Remove the AC cable sheath using a sheath stripper to prepare the wires for the terminal block.
4. Insulate the power wires with electrical tape to protect them through the insertion to the terminal.
5. Insert the AC cable/power wires through the inverter terminal.
6. Connect and secure the AC cable to the terminal using water pump pliers.
7. Cut the wires to appropriate length and remove any electrical tape.
8. Remove the wire sheaths on the power wires with a wire stripper or wire cutter to prepare the wires for terminal connection. Twist each wire and attach end sleeves with a crimp tool if necessary.
9. Ensure that a jumper (A) is mounted across terminals marked N and LAUX. This is the factory default configuration.
10. Connect the PE wire to the corresponding terminal marked PE.
11. In case of a shielded cable, twist the cable shield and connect to the chassis via the screw terminal (B).
12. Connect the neutral wire to the corresponding terminal marked N.
13. Connect the phase 1, 2 and 3 wires to the corresponding terminals, marked L1, L2, L3.



14. Mount and screw the inverter cover on the terminal with 1 screw (T20/25).

5.5.10. Mount, Ground, and Connect the Battery Module

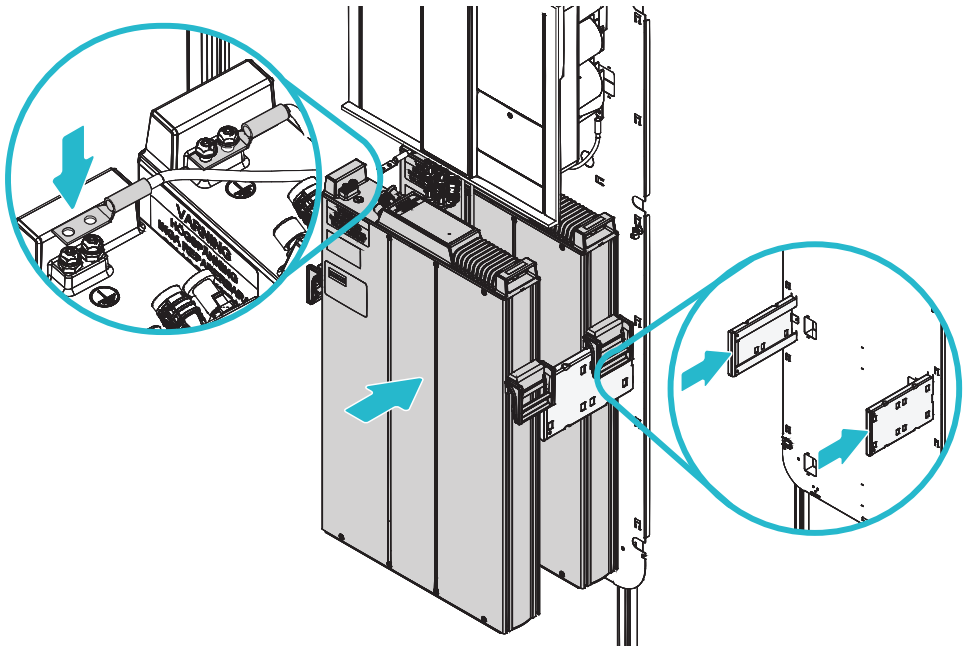
WARNING!
Use the Personal Protective Equipment (PPE) relevant for each installation and/or maintenance task as described in this manual. The main hazards during installation are related to Low Voltage (400VAC and up to 900VDC) electrical works and to crushing, pinching and cuts during lifting and fitting operations.

ELECTRICAL HAZARD!

- Handle the battery carefully. There is a risk of death or serious burn injuries, in case of damaged goods or faulty parts from production.
- The battery modules are supplied in a charged condition and are capable of extremely high short-circuit currents. Take care to avoid short-circuiting cables or to reverse the polarity of connections. Accidental shorting of cables can result in severe electrical arcing, causing burns and electric shock to nearby personnel.
- Ensure the inverter and each battery module are properly grounded to the base frame and that the overall Protective Earthing (PE) system of the Electrical Energy Storage. System (EESS) is connected and tested before starting the system, to prevent an electric shock.
- Do not touch the battery terminals Normally Open (NO) or high voltage circuits. There is a risk of death or serious burn injuries.
- Do not wire or attach the battery modules in any other way than that specified in the Installation Manual. Incorrect wiring may result in hazards such as damage to the module or explosion.
- Do not crush or place heavy loads on the inverter module as damage may occur.Do not use damaged, frayed, or non-approved electrical cables and connectors.
- Do not crush or place heavy loads on the inverter module as damage may occur.

Mechanical hazard!

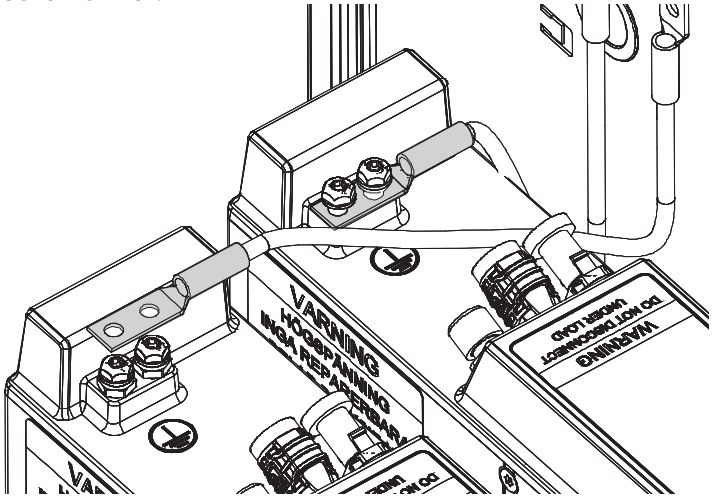
Use ergonomic techniques according to best practice to unpack and lift the product into position. Use Personal Protective Equipment (PPE). There is a risk of strains and injuries caused by lifting or dropping heavy parts.



1. Hang the battery brackets on the base frame and secure them with screws on each bracket.

Follow steps 2-8 for each battery:

2. Lift the battery onto the brackets. Ensure that the label is facing outwards.
3. Hook the battery module handles on the brackets and secure them by snapping them into position.
4. Connect the PE cable to the battery module and the base frame, with an electric screwdriver.



5. Connect the battery positive cable and battery negative cable from the inverter to the corresponding port on the battery unit. Connect communication cable:
6. Remove the cap of the communication port on the battery module.
7. Connect the communication cable to the port on the battery unit. Tighten the connection by hand.
8. In case of a single battery unit installation, cover unused cables and wires according to best practice.

5.6. Install the Pulse Clamps

ELECTRICAL HAZARD!
The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injury caused by residual voltage.

1. Unpack the pulse grid clamp, and pulse solar clamp, depending on customer setup.
2. Mount a DIN rail mount providing 240/5V adapter power to the pulse clamps if it is possible on the installation site or perform a custom installation according to best practice.
3. Attach the three clamps of the pulse grid clamp around each of the 3 phases at the mains fuse box.
4. Attach the three clamps of the pulse solar clamp around each of the 3 phases at the solar inverter.
5. Go to the Installation Web App and follow the instructions.
6. Scan the QR code on the pulse clamps packaging.
7. Press down the left button on the inverter module and hold it for 3 seconds to set Polarium Battery System in pairing mode. The Polarium Battery System detects available clamps and clamp connectivity. For solar setup, follow steps 8-12:

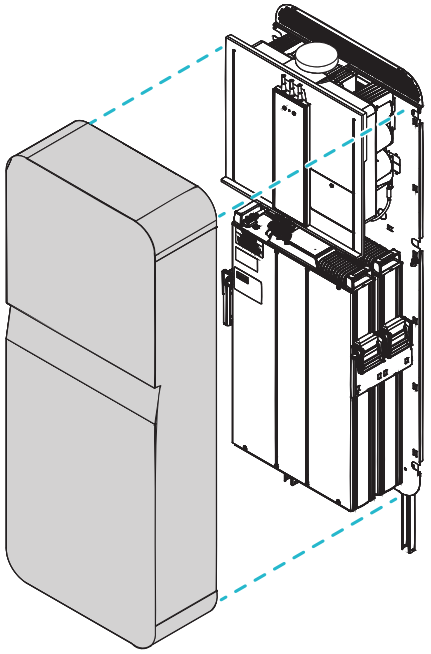
8. Turn off the solar production to identify the pulse grid clamp, if applicable to the site setup.
9. Accept and pair the pulse grid clamp.
10. Turn on the solar production.
11. Follow the instructions in the Installation Web App to accept and pair the pulse solar clamp.
12. Verify and confirm clamp setup using the built in diagnostics tool.

5.7. Configure System and Update Software

1. Follow the instructions and configure the system via Installer Web App.
2. Update the software and ensure that the updates are completed.

5.8. Verify the installation

1. Make sure the unit is grounded according to the instructions.
2. Ensure the power system voltage is set correctly for the application.
3. Refer to the product datasheet and documentation to ensure the installation.
4. Turn the inverter safety switch ON.
5. Turn the main switch ON (AC).
6. Check the LED internal indicator status.
7. Perform Functional test/Commissioning test via the user interface.
8. Mount the cover and lock it with the industrial key at the bottom.



5.8.1. Perform Functional/Commissioning Test

ELECTRICAL HAZARD!
The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injury caused by residual voltage.

1. Go to the Installer Web App/user interface and follow the instructions.

2. Run full charging via the user interface.
3. Run full discharging via the user interface.
4. Check the user interface for:
   - Temperature (via BMS – EMS – ECU)
   - AC current
   - DC current

Turn the AC main switch OFF In the event of:

- Lost connectivity to the Electronic Management System (EMS), or if the system cannot be shut off.
- Incorrectly installed or lost protective earthing (PE).
- Isolation fault in the system.
- Offline system after reporting of faulty unit.

5. Ensure that the AC main switch is turned OFF.
6. Wait 5 minutes.
7. Turn the DC safety switch OFF on the inverter.
8. Disconnect the communication cable from the inverter before handling the battery.

6. Residential User Operation

WARNING!

- Do not handle the Polarium Battery System. Do not disassemble units. Unpacking, assembly, installation, troubleshooting, disassembly, replacements and repairs must only be performed by an electrician.

READ THE USER MANUAL

- Failure to read, understand and follow the safety precautions may lead to potential risks, such as hazardous situations involving death or serious injuries by fire, resudual voltage, or explosion.
- Do not remove the battery cover/enclosure. There are no user serviceable parts inside. There is a risk of death or serious injuries.
- A full risk analysis of the installation site must be performed by the electrician before installing the product.

ELECTRICAL HAZARD!

- The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injury caused by residual voltage.
- If the product is or appears damaged, do not touch any parts. Turn the AC main switch OFF and contact support. The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injuries, in case of damage to the product and exposed live parts.

RISK OF FIRE!

FLAMMABLE GAS HAZARD!

- Do not expose the battery system to fire or temperatures higher than 60 °C. High temperatures may cause the battery to overheat or even self-ignite. High temperatures may also result in loss of performance and decreased life expectancy of the product.
- Follow the first aid measures in case of exposure to interior battery components, and battery electrolyte in case of damage to the external battery casing. Undamaged, closed battery cells do not represent health risks.

CAUTION!

- Keep the battery connected to the grid. Batteries that are disconnected for an extended period of time can self-discharge to a level from which the battery does not permit recovery. Do not disconnect the battery for longer than a month.
- The warranty of the product may be invalid and any liability for damages may be rejected if installation and operation are not compliant with the Polarium warranty conditions. Polarium assumes no responsibility for any consequential damages.
- Contact your local sales representative for support and service.

6.1. Start the Polarium Battery System

Log in:

1. Download the Customer App.
2. Log in to Customer App and follow the instructions.

6.2. Shut down the Polarium Battery System

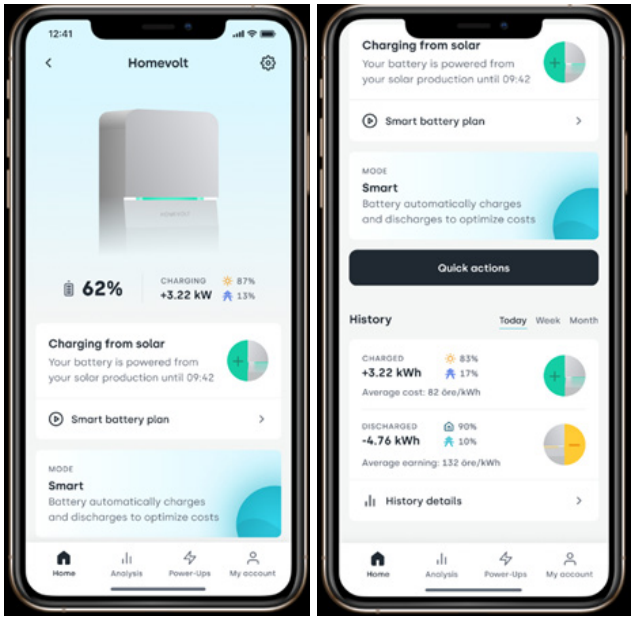
1. Log in to Customer App and follow the instructions.
2. Turn the main switch OFF.

6.3. Residential User Interface/App

6.3.1. Settings, Modes, and Configurations

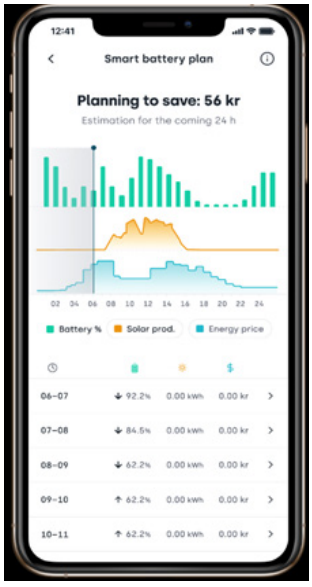
The user app/user interface main page for Polarium Battery System includes functions such as:

- View State of Charge (SOC)
- View Current Flux
- Select Battery Plan
- Select Quick Actions
- Select Settings: Smart Mode, Basic Mode, and Battery Data
- View History Overview and select History details



Battery Plan

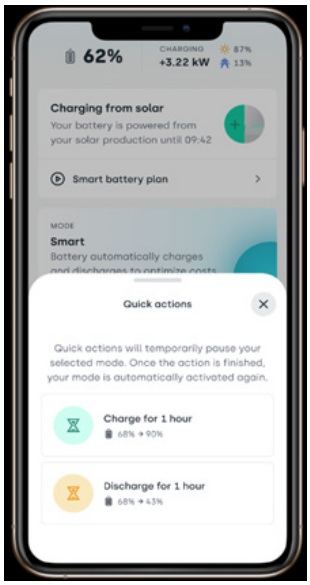
- Select Battery Plan to display projected savings



Quick Actions

- Select Quick Actions to manually control charge and discharge with the following options:

- Charge for 1 hour
- Discharge for 1 hour



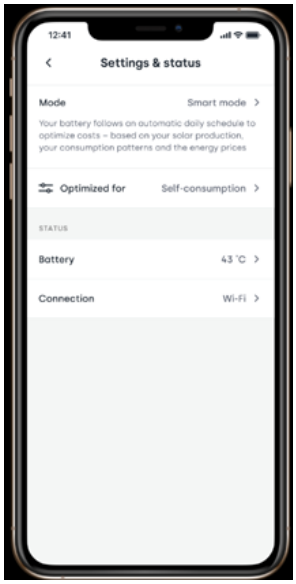
Settings

- Select mode via Settings:
  - Smart Mode to optimize of Self-consumption and/or earnings.
  - Basic Mode to charge only from solar and discharge to home, regardless of the current energy price.

Battery data

- View battery data such as:
  - Battery Temperature
  - Firmware versions

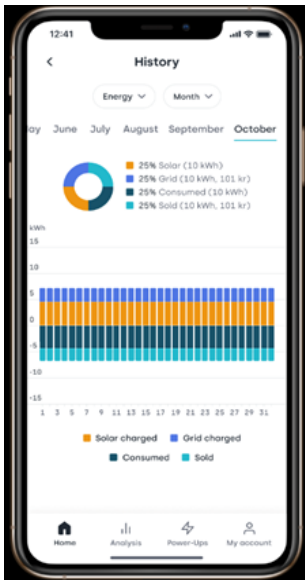
Serial number



History details

- View proportions of the following values over time:
  - Solar charging
  - Grid charging

- Sold energy
- Energy consumption



6.3.2. Notifications, Troubleshooting and Support

The battery charging- and discharging-optimizing algorithm takes many parameters into consideration.

Potential local issues are related to either connectivity with the Cloud, or connectivity to the pulse clamps.

In case of potential issues or malfunctions, error messages and notifications will be communicated via the Customer App.

Contact your local sales representative for support.

7. Maintenance

Read the safety information and follow the instructions for disassembly for to perform maintenance, troubleshooting, tests, relocation, reinstallation, unit replacement, service, and repairs.

The battery system is intended to be maintenance free. Perform the following maintenance tasks regularly.

 **MECHANICAL HAZARD!**

 **ELECTRICAL HAZARD!**

7.1. Residental User Maintenance Check

Regularly check the product for visible damage to the:

- Cover
- AC cable
- Antenna in case if a wall installation
- Pulse Clamps

Keep the area clean and remove any obstructions to air flow or risk of damages or malfunction, such as:

- Water
- Snow
- Vegetation
- Bird nests
- Ants and other insects

In case of any damage to the product or potential errors, contact your local sales representative for support.

7.2. Spare Parts

Contact support for spare parts and replacements.

7.3. Disassemble and Dismount the Product

 **WARNING!**

- Disassembly, maintenance, repairs, and service of this EESS must only be performed by qualified and trained electricians.
- Read the safety information and follow the instructions for disassembly to perform maintenance, troubleshooting, tests, relocation, reinstallation, unit replacement, service, and repairs.
- Use the Personal Protective Equipment (PPE) relevant for each installation and/or maintenance task as described in this manual. The main hazards during installation are related to Low Voltage (400VAC and up to 900VDC) electrical works and to crushing, pinching and cuts during lifting and fitting operations.
- All tools used for installing the battery should be insulated and rated to a minimum of 1000 V DC.
- If the product is or appears damaged, do not touch any parts. Turn the AC main switch OFF. The system must be treated as being live at all times, even when external power is

not applied. There is a risk of death or serious injuries, in case of damage to the product and exposed live parts.

- In case of a faulty battery module, a qualified electrician must perform a full risk analysis of the site before any maintenance or replacement work. Make sure that the system is properly grounded. There is a risk of serious burn injuries, caused by short circuiting, thermal runaway, and explosion.

 **CAPACITOR DISCHARGE!**

If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

 **ELECTRICAL HAZARD!**

- Handle the battery carefully. The battery system and inverter module presents an electric shock hazard. The system must be treated as being live at all times, even when external power is not applied. There is also a risk of death or serious burn injuries, in case of damaged goods or faulty parts.
- The battery modules are in a charged condition and are capable of short-circuit currents. Take care to avoid short-circuiting cables or to reverse the polarity of connections. Accidental shorting of cables can result in severe electrical arcing, causing burns and electric shock to nearby personnel.
- Do not touch the battery terminals Normally Open (NO) or high voltage circuits. There is a risk of death or serious burn injuries.

 **FIRE HAZARD!**

 **FLAMMABLE GAS HAZARD!**

- Check the shock detector on the battery module before disassembly.
- Do not drop or hit the product. Handle the product carefully and firmly. There is a risk of serious burn injuries caused by internal short circuiting or penetration from dropping the product.
- Do not expose the battery module to fire or temperatures higher than 60 °C. High temperatures may cause the battery to overheat or even self-ignite. High temperatures may also result in loss of performance and decreased life expectancy of the product.

 **TIP-OVER HAZARD!**

- Handle the product firmly and carefully when dismounting. There is a risk of injuries due to units tipping and falling over.

 **MECHANICAL HAZARD!**

- Use Personal Protective Equipment (PPE). There is a risk of minor cuts and injuries caused by packaging material or sharp edges.
- Use ergonomic techniques according to best practice to dismount and carry the product. There is a risk of strains and injuries caused by lifting or dropping heavy parts.

 **CAUTION!** !

- The product must be handled, transported, stored, installed, and used in accordance with the instructions and specifications in this document. Handling and usage that is not in accordance with instructions and specifications will invalidate the warranties.

7.3.1. Disconnect and Dismount the Battery Module

1. Discharge the system via the user interface.
2. Turn the main switch OFF (AC).
3. Unlock the cover at the bottom with an industrial key.

4. Lift the cover off the base frame.
5. Turn the inverter safety switch OFF. Follow steps 6-12 for each battery. Disconnect the communication cable:
6. Loosen the connection on the communication port by hand and disconnect the communication cable from on the battery module.
7. Put the cap on the communication port on the battery module.

Disconnect the power cables:

8. Disconnect the battery positive cable and battery negative cable from the corresponding ports on the battery module.
9. Unscrew the PE cable connection on the battery module and the base frame, with an electric screwdriver.
10. Unscrew (T20/25) and remove the brackets from the base frame.
11. Pull the handles from the brackets to release the battery module.
12. Lift off the battery module, carefully, and place it immediately in its designated packagaing.

7.3.2. Dismount the Antenna from the Wall

CAPACITOR DISCHARGE!

If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

1. Turn the main switch OFF (AC).
2. Make sure the inverter safety switch is turned OFF.
3. Carefully, pull the antenna from the bracket opening.
4. Unwrap the antenna cable from the bracket.
5. Unscrew the antenna bracket from the inverter, with an insulated tool.
6. Restore the wall according to best practice.

7.3.3. Disconnect and Dismount the Inverter Module

CAPACITOR DISCHARGE!

If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

1. Discharge the system via the user interface.
2. Turn the main switch OFF (AC).
3. Turn the solar production OFF before disconnecting the system, if applicable to the site setup.
4. Wait 5 minutes after the system has been shut off for the capacitors to discharge/de-energize.
5. Unlock the cover at the bottom with an industrial key.
6. Lift off the cover from the base frame.
7. Turn the inverter DC safety switch OFF.

Disconnect the communication cable:

8. Loosen the connection on the communication port by hand and disconnect the communication cable from on the battery module.
9. Put the cap on the communication port on the battery module.
   Disconnect the power cables:
10. Disconnect the battery positive cable and battery negative cable from the corresponding ports on the battery module.
11. Unscrew and remove the inverter cover from the inverter box/terminal (T20/25).
12. Disconnect phase 1, 2 and 3 wires marked L1, L2, L3 from the terminal.
13. In case of a shielded cable disconnect it from the chassis via the screw terminal (B).
14. Disconnect the neutral wire marked N from the terminal, in case of a TN/TT installation.
15. Disconnect the PE wire and the shielded wire from the terminal marked PE.
16. Insulate the power wires with electrical tape to protect them (through the pullout from the terminal).
17. Loosen the AC-cabel connection under the terminal by using water pump pliers and pull out the AC cable from the inverter.
18. Mount and screw the inverter cover on the terminal with 1 screw (T20/25).
19. Unscrew and disconnect the PE cable from the base frame with an electric screwdriver.
    Dismount the inverter:
20. Make sure the inverter safety switch is turned OFF.
21. Carefully, lift the inverter module off the mounting bracket on the base frame, and immediately place it designated packaging.

7.3.4. Dismount the Antenna from the Inverter Module

ELECTRICAL HAZARD!

CAPACITOR DISCHARGE!

If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

1. Make sure the main power supply/switch (AC) is turned OFF.
2. Make sure the inverter safety switch is turned OFF.
3. Carefully, pull the antenna from the bracket opening.
4. Unwrap the antenna cable from the bracket.
5. Unscrew the antenna bracket from the inverter, with an insulated tool.
6. Place the antenna in its designated packaging.

7.3.5. Dismount the Base Frame

1. Make sure the main power supply/switch (AC) is turned OFF. For installation with hidden cable route, follow step 2-7:
2. Cut the cable ties along the base frame. Detach the AC cable from the connection points.
3. Protect and secure the AC cable according to best practice.
4. Unscrew the screws and remove the base frame.

5. Pull up one or two supports/feet (optional equipment).
6. Remove the drilling template and save it for future reference.
7. If there is no requirement for re-use, discard of the material in accordance with local regulations. Please recycle all packaging responsibly.
8. Place the base frame in its designated packaging.
9. Restore the wall after dismounting according to best practice.

7.3.6. Disconnect the Pulse Clamps

1. Make sure the main power supply/switch (AC) is turned OFF.
2. Turn the solar production OFF before disconnecting the pulse clamps, if applicable to the site setup.
3. Remove the three clamps of the pulse grid clamp from each of the 3 phases at the mains fuse box.
4. Remove the three clamps of the pulse solar clamp from each of the 3 phases at the solar inverter, if applicable to the site setup.
5. Place the pulse clamps in their designated packaging.
6. Unscrew and remove the DIN rail and the 240/5V adapter, if applicable to the site setup.
7. Restore the surface after dismounting the DIN rail according to best practice.

7.4. Replace the Battery Module

CAPACITOR DISCHARGE!
Turn the main switch OFF (AC). If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

See:

- "5.5.10. Mount, Ground, and Connect the Battery Module" on page 28
- "7.3. Disassemble and Dismount the Product" on page 36
- "7.3.1. Disconnect and Dismount the Battery Module" on page 37

7.5. Replace the Inverter Module

CAPACITOR DISCHARGE!
Turn the main switch OFF (AC). If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

See:

- "5.5.6. Mount the Antenna on the Inverter" on page 25
- "5.5.7. Mount and Ground the Inverter to the Base Frame" on page 25
- "7.3.2. Dismount the Antenna from the Wall" on page 38
- "7.3.3. Disconnect and Dismount the Inverter Module" on page 38
- "7.3.4. Dismount the Antenna from the Inverter Module" on page 39

7.6. Replace the Antenna

Capacitor discharge!

Turn the main switch OFF (AC). If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

See:

- "5.5.6. Mount the Antenna on the Inverter" on page 25
- "5.5.7. Mount and Ground the Inverter to the Base Frame" on page 25
- "7.3.2. Dismount the Antenna from the Wall" on page 38
- "7.3.4. Dismount the Antenna from the Inverter Module" on page 39

7.7. Replace the Pulse Clamps

See:

- "7.3.6. Disconnect the Pulse Clamps" on page 40
- "5.6. Install the Pulse Clamps" on page 29

7.8. Replace the Cover

CAPACITOR DISCHARGE!

Turn the main switch OFF (AC). If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.

See:

- "5. Installation" on page 18
- "7.3. Disassemble and Dismount the Product" on page 36

1. Turn the main switch OFF (AC).
2. Unlock the cover at the bottom with an industrial key.
3. Lift the cover off the base frame.
4. Turn the inverter safety switch ON.
5. Mount the cover and lock it with the industrial key at the bottom.
6. Turn the main switch ON (AC).

7.9.  Disposal and Recycling

WARNING!

Handle the battery in accordance with any specific marking on the packaging – for example concerning package position and stacking instructions.

Dispose of the product in accordance with the disposal regulations for electronic waste. Contact a waste disposal operator authorized for handling electronic and lithium battery waste and recycling or contact the organization where you purchased the batteries for further assistance.

7.9.1. Handle and dispose of a non-functional Battery Module

When a battery reaches the end of its service life or becomes defective and cannot be repaired it will need to be disposed of and recycled. Batteries should be disposed

according to local (country) regulations for electronic waste. Battery disposal and recycling must be carried out by qualified personnel only.

Contact and support for battery disposal: Info@polarium.com

8. Troubleshooting

CAPACITOR DISCHARGE!

ELECTRICAL HAZARD!

- If the system has been in commission/energized recently, wait 5 minutes to discharge the capacitors to prevent death or serious injuries caused by residual voltage.
- If the product is or appears damaged, do not touch any parts. Turn the AC main switch OFF and contact support. The system must be treated as being live at all times, even when external power is not applied. There is a risk of death or serious injuries, in case of damage to the product and exposed live parts.
- In case of a faulty battery module, a qualified electrician must perform a full risk analysis of the site before any maintenance or replacement work. Use Personal Protective Equipment (PPE) and handle the battery carefully. There is a risk of serious burn injuries, caused by short circuiting, thermal runaway, and explosion.

Residential users: Please contact your local sales representative.

Use the Installer Web App for troubleshooting for most troubleshooting cases if there is internet connectivity. If there is no internet connectivity log on to a local web server of the battery and review metrics and states.

Problem	Possible Cause	Remedy electrician [Safety placeholder]
Connectivity		
Weak LTE signal	Connectivity, range issues	Reinstall the antenna outside of the enclosure.
		Extend the antenna to up to 3 meters and mount it on a wall.
	Incorrect Wi-Fi setup/access	Ensure or set up a proper Wi-Fi access. The system works best utilizing the home Wi-Fi system.
Weak Wi-Fi signal		Reinstall the antenna outside of the enclosure.
		Extend the antenna to up to 3 meters and mount it on a wall.
		Move the Wi-Fi access point closer to the battery or install a Wi-Fi extender.
No or partial connection to the pulse clamps		Reinstall the antenna outside of the enclosure.
		Extend the antenna to up to 3 meters and mount it on a wall.
		Check the signal path for obstructions such as dense walls or objects. Perform a reposition or reinstallation if necessary.

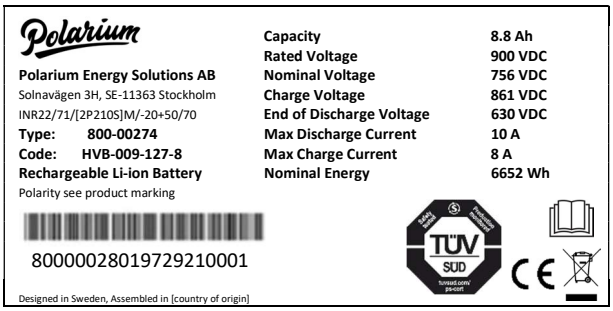
Solar clamp and grid clamp are mixed up	Virtually, switch places of the solar clamp and grid clamp via the user interface/ Installer Web App.

9. Technical Specifications

Battery Chemistry		
Inverter Topology	3-phase, Bi-directional, Transformer-less	
Battery Voltage (DC)	630-861 V (nominal 756 V)	
Supply Voltage (AC)	300-440 V (nominal 400 V)	
Supply Frequency	50-60 Hz	
Supply System	TN, TT, IT	
Rated Apparent Power	6 kVA	
Battery Modules	1	2
Rated Capacity	8.8 Ah	17.6 Ah
Rated Energy	6.6 kWh	13.3 kWh
Weight (Approx.)	75 kg (165 lbs)	120 kg (265 lbs)
Dimensions	W: 546 x D: 250 x H: 1350 mm (W: 21.5” x D: 9.8” x H: 53.1”)	
Operating Temperature	-20 to +50 °C	
Storage Temperature	-20 to +60 °C	
Cycle Life*	6000 cycles	
Efficiency**	>97 %	
User Interface	Android and iOS app, LED indicator	
Radio	LTE, Wi-Fi, 868 MHz	
IP Class	IP65	
Relative Humidity	4% - 100% (Condensing) According to IEC 60721-3-4	
Altitude	<3000 m	
Protection Class	Class I	
Overvoltage Category	OVC III	
Grid Code Compliance	SE, NO, DE, NL RfG 2016/631/EU, EN 50549-1, VDE-AR-N-4105	
Transport	UN 38.3	
EMC	IEC 61000-6-2, IEC 61000-6-3	
CE Mark	Yes, Radio 2014/53/EU	
TÜV Mark	Yes, IEC 62477-1, VDE-AR-E-2510-50, IEC 62619, IEC 63056	

* Nominal value at 80% Depth of Discharge, and operation at optimal temperature
** Nominal value at optimal output power, temperature, battery state-of-charge

9.1. Battery Module Label'



10. Appendix

10.1. Abbreviations / Acronyms

AC	Alternating Current
BMS	Battery Management System
CE	Conformité Européenne, Mandatory marking of compliance to norms for products marketed in the EU
DC	Direct Current
EESS	Electrical Energy Storage System. Generic standardized terminology.
ESS	Energy Storage System
LS	Load Shifting
LV	Low Voltage (<1000 VAC, <1500VDC)
MSD	Material Safety Data
MSDS	Material Safety Data Sheet
PE	Protective Earth
POC	Point of Connection
PPE	Personal Protective Equipment
PSU	Power Supply Unit
PS	Peak Shaving
SoC	State of Charge