USER'S MANUAL

AZZURRO ZCS

RETROFIT
STORAGE INVERTER

1PH-BZT5000

ZUCCHETTI
Centro Sistemi

GREEN INNOVATION

IMPORTANT COMMUNICATION

Inside the box of this product is available the manual in English. Please note that more up-to-date revisions of the supplied manual may be available. Therefore, in order to ensure the correct installation and maintenance procedure it is necessary to verify the manuals, available in all languages, within the documentation or products section of the www.zcsazzuro.com website, the same documentation is also available by scanning the qrcode on the front of the product or directly within the app Azzurro Operators. Datasheets, technical notes, certifications and warranty terms and conditions are also available on the above platforms.

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Rev. 0.0 of 14/06/2024 - Application: GID

Rechargeable LFP Battery System (AC Battery)
AZZURRO 1PH BZT500
User Manual

Table of Contents

General instructions
This manual contains important safety instructions that must be followed during installation and maintenance of the equipment.

Please keep these instructions!
This manual must be considered an integral part of the equipment, and must be available at all times to everyone who interacts with the equipment. The manual must always accompany the equipment, even when it is transferred to another user or plant.

Copyright statement

Technical support
ZCS offers a support and technical consultancy service accessible by sending a request directly from the website www.zcsazzurro.com
The following toll-free number is available for the Italian territory: 800 72 74 64.

Preface

General information

Please read this manual carefully before installation, operation or maintenance.
This manual contains important safety instructions that must be followed during installation and maintenance of the system.

Scope

The rechargeable lithium-ion battery system is a power conversion system (PCS) integrated, AC-coupled lithium-ion battery system, and the manual will subsequently simplify to refer to the system as either "the AC battery" or "the battery".
This product manual describes the installation, electrical connections, commissioning, maintenance and troubleshooting procedures of the AC battery.

Recipients

This manual is intended for professional electrical engineers who install, operate, and maintain the AC battery.

Symbols Used

To ensure your personal and property safety when using the AC battery, the manual provides relevant safety information and uses corresponding symbols to highlight it. Please fully understand and absolutely abide by these emphasized messages to avoid personal injury and property damage. The symbols used in this manual are listed below.

 Danger	"Danger"indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 Warning	"Warning"indicates a hazardous situation which, if not avoided, could result in death or serious injury
 Caution	"Caution"indicates a hazardous situation which, if not avoided, could result in minor or moderate injury
 Attention	"Attention"indicates there are potential risks, if fail to prevent, may lead to equipment cannot normally or property damage.
 Note	"Note"provides additional information and tips that are valuable for the optimal operation of the product, will help you to solve a problem or save your time.

1. Basic safety information

Please read the safety precautions in this manual carefully. If ignored, it may result in serious injury or death.

 Note	If you have problems reading the following information, please contact Zucchetti Centro Sistemi Spa

1.1. Safety instructions

The installation of AC battery must fully comply with national and local grid standards and regulations.
Read and understand all instructions in this manual and familiarise yourself with the relevant safety symbols before starting to install and commission the AC battery.
In accordance with relevant national and state/provincial regulations, the power grid can only relate to permission from the local power department, and this operation can only be performed by qualified electricians.
If maintenance or repair are needed, please contact the nearest authorized service center. To find the nearest authorized service center, please contact your dealer. Do not attempt to repair the AC battery yourself as it may result in personal injury or property damage.

1.2. Requirement for installation and maintenance

Personnel responsible for operating and maintaining the AC battery must have the necessary qualifications and experience to perform the tasks described as well as comprehend all instructions contained in the manual.
For safety reasons, the AC battery can only be installed by a qualified electrician, including:
Received training in occupational safety, as well as installation and commissioning of electrical systems.
Be familiar with local grid operator laws, standards, and regulations.
Zucchetti Centro Sistemi assumes no responsibility for property damage or personal injury caused by improper use.

1.3. Equipment labelling protection

There is a nameplate on the AC battery, which contains important parameter information related to the product. Artificial damage is strictly prohibited.
The warning mark on the AC battery contains important information for safety operation. Artificial damage is strictly prohibited.

1.4. Installation requirements

Secure the AC battery on a suitable object with sufficient load bearing capacity, and ensure that the battery is placed vertically. Choose a suitable position for installing electrical equipment. Ensure there is enough space for fire exits and equipment maintenance. And maintain proper ventilation to cool the battery.

1.5. Caveat

1.5.1. Shipping requirements

Factory packaging is specifically designed to protect against shipping damage, such as severe shock, moisture, and vibration. If the equipment is visibly damaged, do not install it. Instead, notify the responsible transport company immediately.

1.5.2. Electrical connection

When using the AC battery, please observe all relevant electrical codes.

 Danger	Dangerous AC voltage Before making electrical connections, make sure the AC battery is powered off or in shutdown mode.
 Danger	Danger through electric shock All installation and electrical connections should only be performed by trained electricians.
 Attention	Feed-in authorization for grid. Obtain authorization from the local power grid department before connecting the AC battery to the power grid.
 Note	Voiding of guarantee Do not open the AC battery or remove any of the labels. Otherwise, SOFAR shall assume no guarantee.

1.5.3. Operation

 Danger	1.Do not connect or disconnect power cables with power-on. Transient contact between the core of the power cable and the conductor will generate electric arcs or sparks, which may cause fire or personal injury. 2.Follow all instructions and observe all safety documents that refer to the grid connection.
 Attention	1.While the inverter is operating, several internal components will become very hot. 2.Please wear protective gloves! 3.Keep children away from the device.

1.5.4. Maintenance and repair

 Danger	1.High voltage generated by the equipment during operation may cause an electric shock, which could result in death, serious injury, or serious property damage. 2.Prior to maintenance, switch off the breaker between the AC battery and grid, and turn off the AC battery. 3.After turning off the AC battery, wait a minimum of 15 minutes before any maintenance or repair work.
 Attention	Unauthorized repairs! 1.Following the elimination of any faults, the AC battery should be fully functional once more. Should any repairs be required, please contact a local authorized service center. 1.The internal components of the AC battery must NOT be opened without the relevant authorization. Zucchetti Centro Sistemi Spa assumes no responsibility for any resulting losses or defects.

1.5.5. Signs on the AC Battery

The AC battery comes with some safety-related labels. Please make sure to read and fully understand these labels before installing the device.

Symbol	Symbol name	Symbol meaning
	Indicate there is a danger of residual voltage in the battery	There is residual voltage in the battery. Before opening the AC battery, wait 15 minutes to ensure that the capacitor is fully discharged.
	Be careful of high voltage and electric shock	The AC battery has a high voltage during operation, so be careful of electric shock.
	Beware of high surface temperatures	The shell temperature of the AC battery is relatively high when it is working. It is strictly forbidden to touch it.
CE	Comply with European standards (CE) certification	This product complies with CE certification standards

	Grounding point	This point is grounded
	Read the instructions	Please read this manual before installing the AC battery.
IP	Equipment protection level	The equipment protection level complies with EN 60529.
	Arrow pointing up	When transporting and storing the AC battery, the arrow must be facing upwards

2. Introduction

2.1. Description

The AC battery is an AC-coupled integrated energy storage battery system, with a built-in lithium iron phosphate battery module, a battery management system (BMS) and a power conversion system (PCS). It is used in various photovoltaic grid-connected power generation systems to provide energy storage or grid auxiliary service scenarios. It contains various operation modes and functions, such as self-use mode, timing mode, peak shaving mode, and other modes, and it also supports local and remote control, on-grid and off-grid mode switching and virtual power station functions.

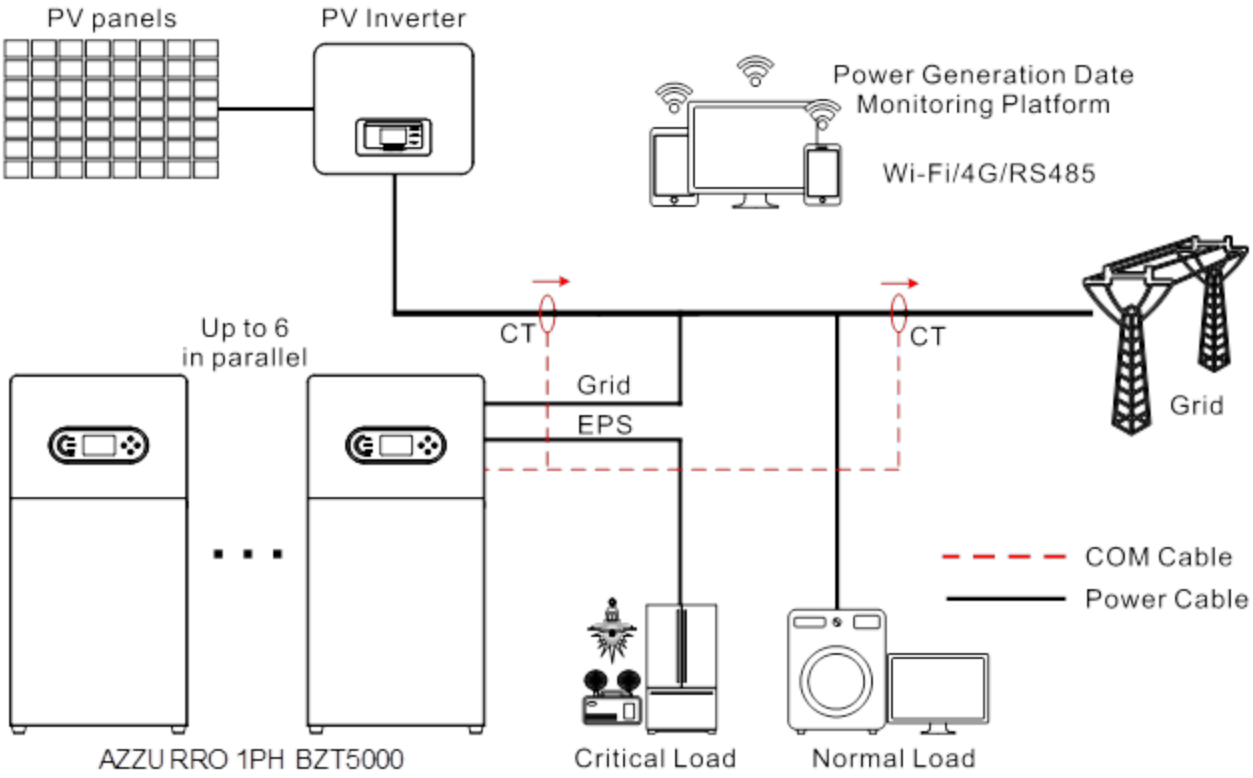
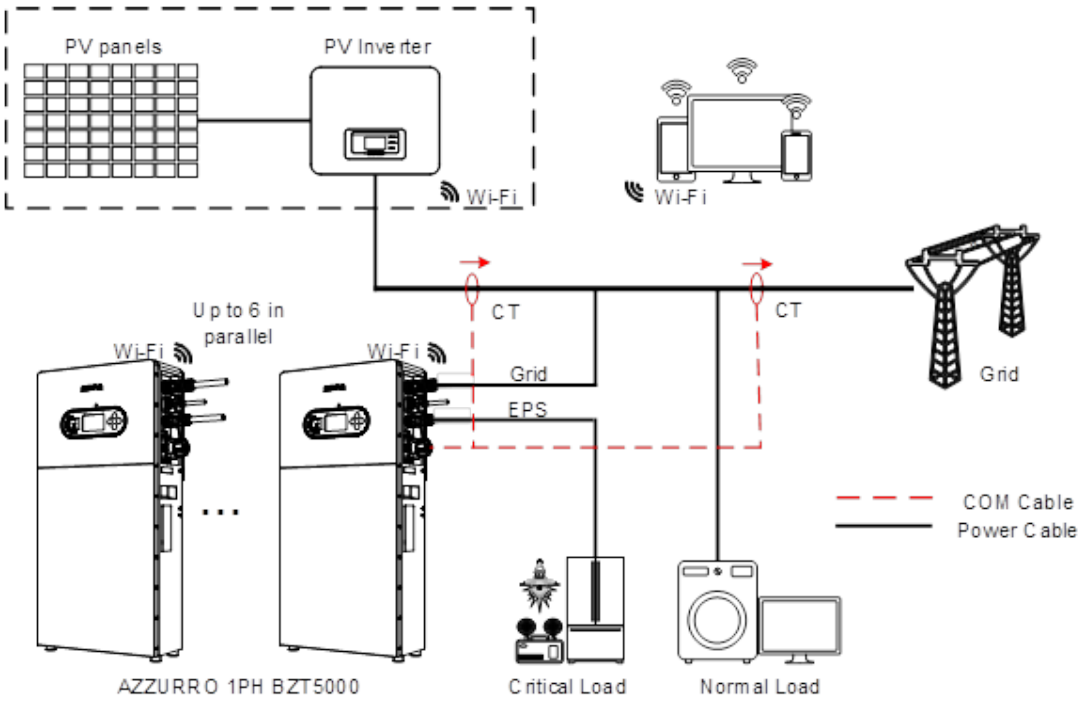


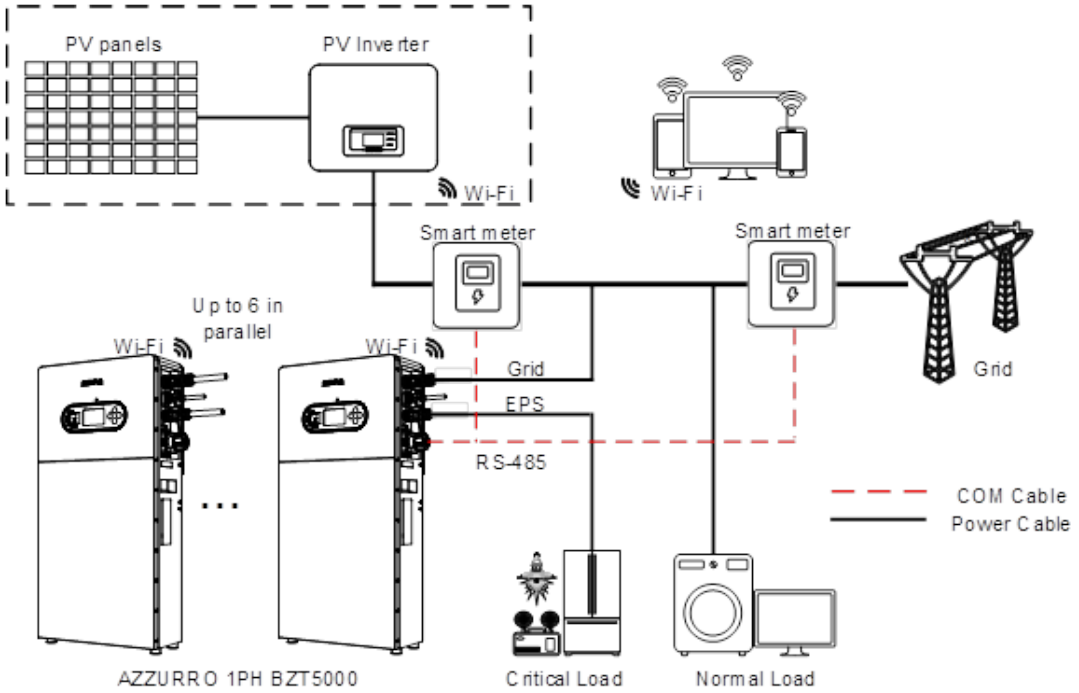
Figure 1 - Diagram of a system on which an AZZURRO 1PH BZT5000 is installed

2.2. Typical application scenario

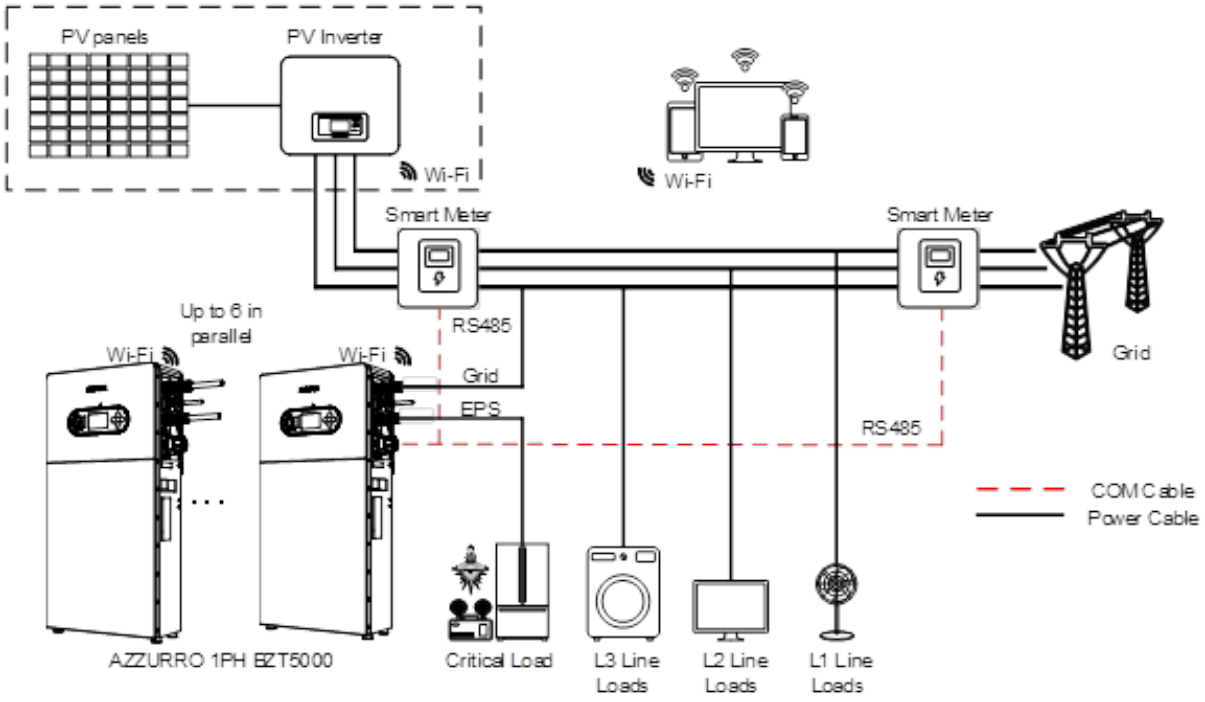
2.2.1. Single-phase application with CT sensor



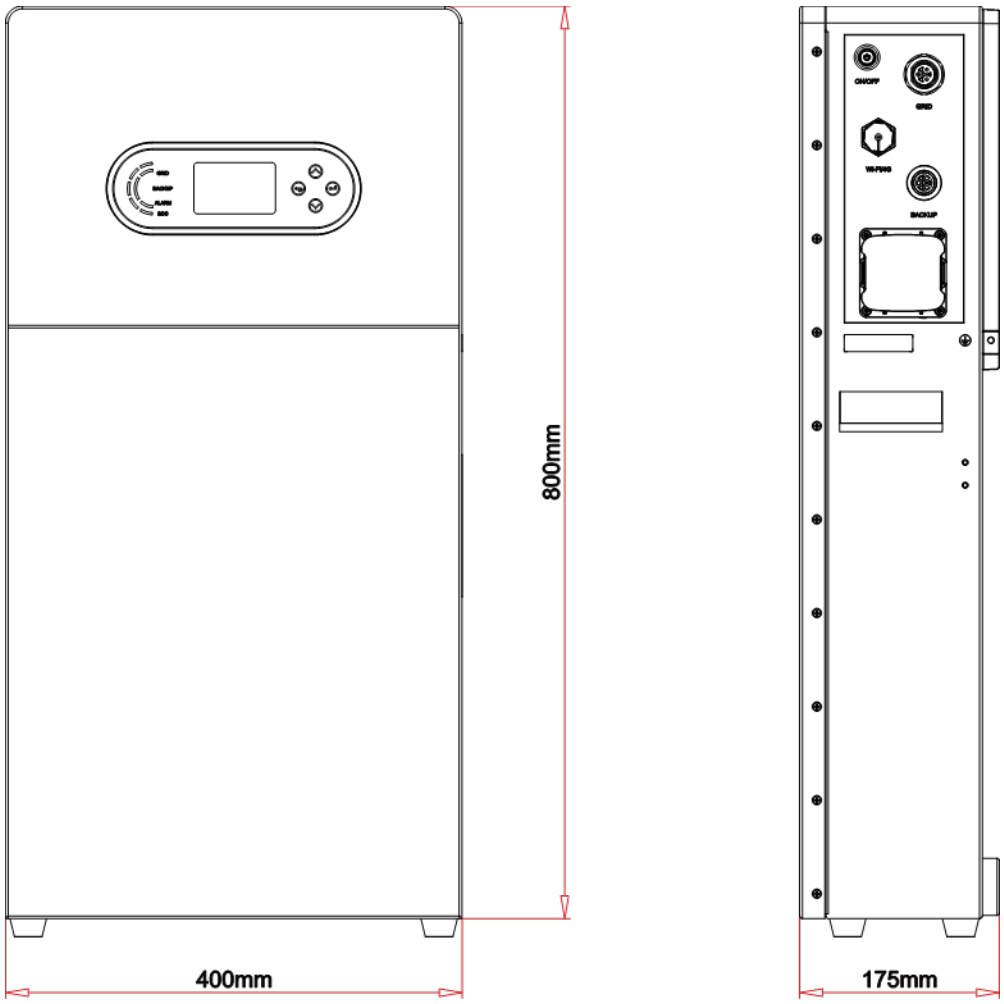
2.2.2. Single-phase application with smart meter



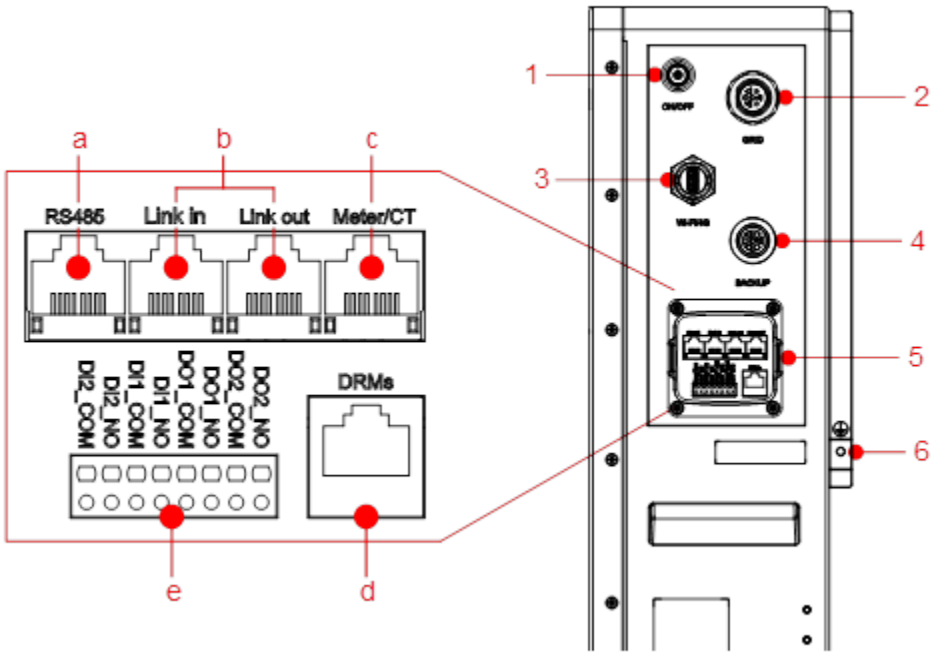
2.2.3. Three-phase application with smart meter



2.2.4. Product size



2.2.5. Interface



Interface Definition

1	On/Off Button (Silkscreen: ON/OFF)	2	On-Grid Interface (Silkscreen: GRID)
3	Data Logger Interface (Silkscreen: Wi-Fi/4G)	4	Emergency Power Supply (EPS) Interface (Silkscreen: BACKUP)
5	Communication Interface	6	Grounding point

Communication Interface Definition

a	RS-485 Interface	b	Link Ports (For multiple batteries in parallel application)
c	Meter/CT Interface	d	Demand Response Modes (DRMs) Interface
e	DI/DO Port (Normal open contact)		

⚠ Caution	Please ensure that the cables are correctly connected to their respective sockets. Incorrect connections may result in the AC battery not functioning properly or even causing irreversible damage.

⚠ Caution	Damaged during transportation. Please check product packaging and interfaces carefully before installation

2.2.6. Product label:

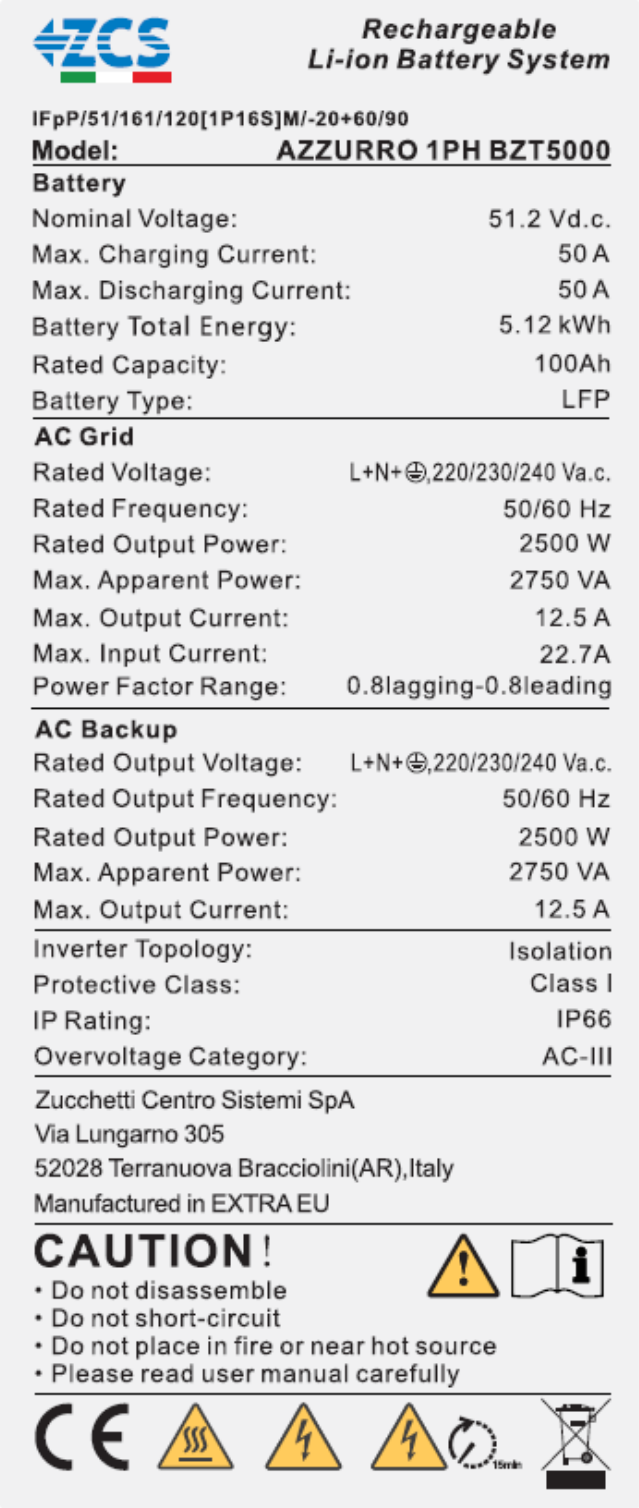
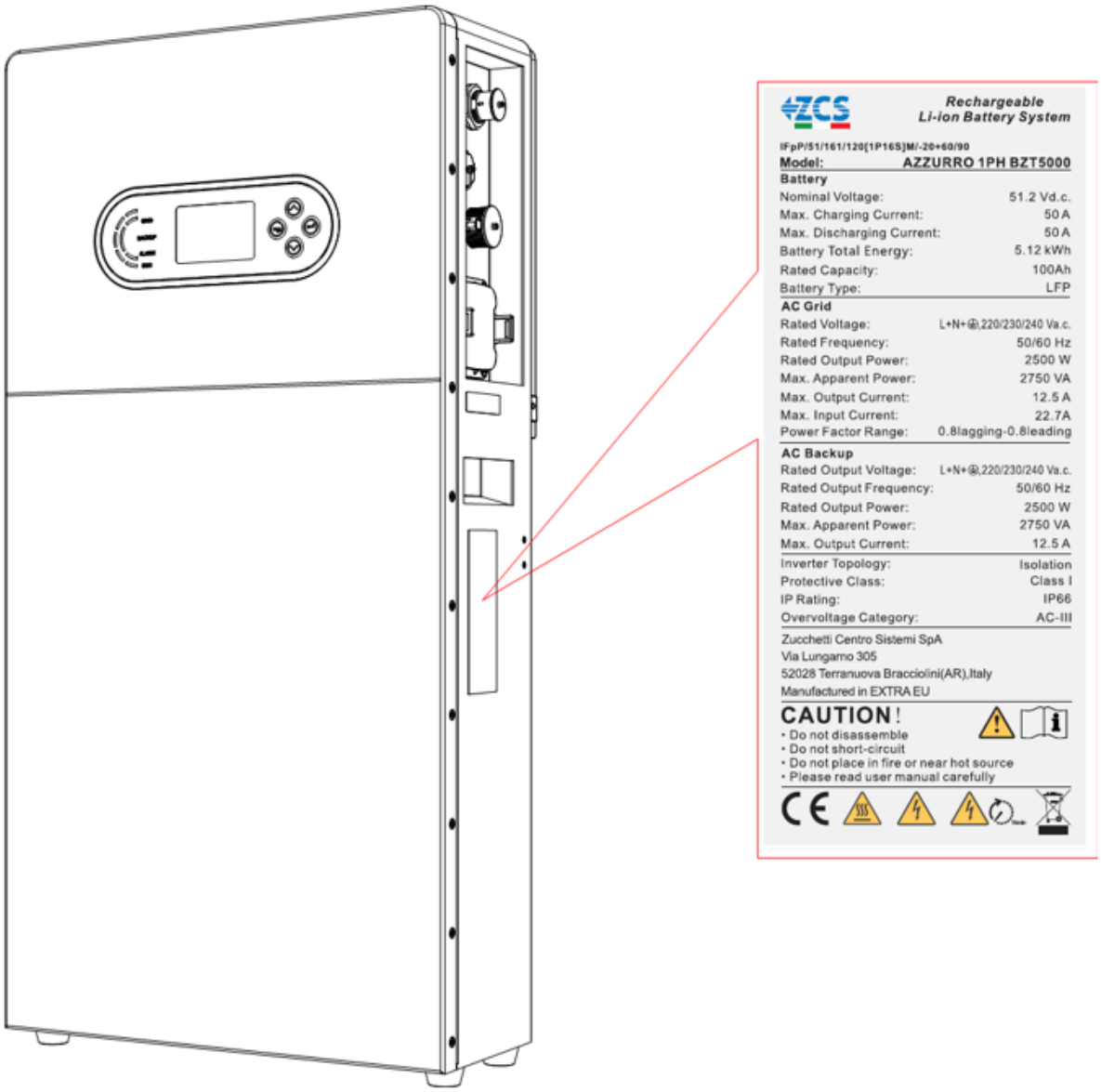


Figure 2 – Label

Labels must not be covered or removed.



Note	Voiding of guarantee Do not open the AC battery or remove any of the labels. Otherwise, Zucchetti Centro Sistemi Spa shall assume no guarantee.

2.2.7. Features

Integrated design of battery module, BMS, and PCS with prefabricated wiring, featuring small size, light weight, and easy installation.
Cell-level passive balancing + Pack-level active balancing, intelligent operation and maintenance, and flexible expansion.
Supports up to 200% discharge overload.
Supports the maximum operating ambient temperature of 50℃, IP66 protection level.
Supports current transformer (CT) or electricity meter connection and has anti-backflow function.
Supports on-grid and off-grid switching.
Supports intelligent load management. When the battery is full, excess photovoltaic energy is supplied to the heater or other intelligent loads.
Supports the diesel generator to be connected to the residential energy management system, automatically starts the diesel generator to charge the battery when the battery power is low.

2.3. Assembly and maintenance diagram

- The battery must be protected against short circuits during transport and installation.
- The inverter 1PH BTZ5000/batteries must be located in well-ventilated areas. Do not place the 1PH BTZ5000 inverter/batteries in a cabinet or in an airtight or poorly ventilated location. This could be extremely hazardous to the performance and life of the system.
- Keep the 1PH BTZ5000 inverter and batteries away from direct sunlight. Do not bring the 1PH BTZ50001 inverter and batteries near ovens, flames or other heat sources as the battery may catch fire and cause an explosion.
- Battery maintenance workers must have the skills and knowledge required to carry out this activity.
- Attention: Do not disassemble or break the battery. The electrolytes in the battery may be toxic and cause damage to skin and eyes.
- Attention: during installation and maintenance of the product, please follow the rules below.
  a) Remove watches, rings and other metal objects.
  b) Only use tools with insulated handles.
  c) Wear rubber gloves and shoes.
  d) Do not place tools or metal objects on top of the battery.
  e) Turn off the 1PH BTZ5000 inverter during the maintenance
- Please install the product according to the following section. Place inverter in an appropriate bearing capacity objects (such as solid brick wall, or strength equivalent mounting surface, etc.) and make sure inverter vertical placed. A proper installation location must have enough space for fire engine access in order for maintenance if faulty occur. Ensure the inverter is installed in a wall ventilated environment and have enough air cooling cycle. Air humidity should less than 90%.

2.4. Transportation Requirement

Factory packaging is specifically designed to protect against shipping damage, such as severe shock, moisture, and vibration. If the equipment is visibly damaged, do not install it. Instead, notify the responsible transport company immediately.

2.5. Electrical Connection

Please comply with all the current electrical regulations about accident prevention in dealing with the current inverter.

 Warming	All operation must accomplish by certified electrical engineer • Must be trained; • Completely read the manual operation and understand all information.
 Attention	Must get permission by local utility company before connecting to grid and the connection must be done by certified electrical engineers.

Operation Cautions

 Danger	Touching the utility grid or the terminal conductors can lead to lethal electric shock or fire! Do not touch non-insulated cable ends, DC conductors and any live components. Attention to any electrical relevant instruction and document.
 Attention	Enclosure or internal components may get hot during operation. Please wear insulated gloves.

Maintenance and Repair Cautions

 Danger	Before any repair work, turn OFF the AC circuit breaker between the product and electrical grid first, then turn OFF the battery After turning OFF the AC circuit breaker and battery wait for at least 5 minutes before carry any maintenance or repair work.
 **Attention**	Product should not work again until removing all faults. If any repair work is required, please contact local authorized service centre. Should not open the product cover without authorized permit, Zucchetti Centro Sistemi S.p.a. does not take any responsibility for that.

EMC/Noise Level

Electromagnetic compatibility (EMC) refers to that on electrical equipment functions in a given electromagnetic environment without any trouble or error, and impose no unacceptable effect upon the environment. Therefore,

EMC represents the quality characters of an electrical equipment.

- The inherent noise-immune character: immunity to internal electrical noise
- External noise immunity: immunity to electromagnetic noise of external system
- Noise emission level: influence of electromagnetic emission upon environment

 Danger	Electromagnetic radiation from the product may be harmful to health! Please do not continue to stay away from the product in less than 20 cm when it is working

3. Installation

3.1. Installation information

 Danger	Fire hazard. 1.Do NOT install the AC battery on flammable materials. 2.Do NOT install the AC battery in areas where flammable or explosive materials are stored.
 Warming	Burning hazard. Do NOT install the AC battery in places where it can be accidentally touched. The housing and heat sink may become very hot while the AC battery is operating.
 Attention	Weight of the device. 1.Consider the weight of the AC battery when transporting and moving it. 2.Choose a suitable position and surface for installation. 3.Commission a minimum of two persons for the installation of the AC battery. 4.Do not set down the AC battery overhead.

3.2. Installation process

The installation procedures are as follows:

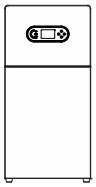
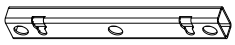
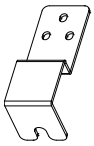
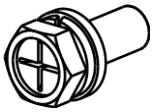
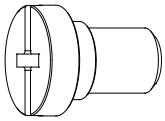
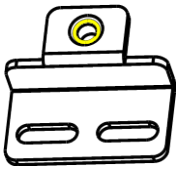
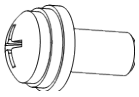
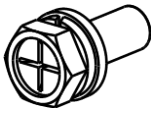
- ✓ Check the AC battery before installation (see section “Pre-installation inspection” for details).
- ✓ Prepare installation tools (see section “Installation tools” for details).
- ✓ Select the installation position (see section “Installation environment requirements” and “Installation spacing requirements” for details).
- ✓ Install the AC battery (see section “Unpack the AC battery” and “AC battery installation” for details).

3.3. Checking before installation

Before unpacking the AC battery, please check the outer packaging for any damage that may have occurred during transport, such as holes, cracks, or other signs of possible internal damage. If you find any packaging abnormality, please do not open it and contact your dealer immediately.
If the installation is not carried out immediately after the inspection, the packaging must be restored to its original state before storage, and only remove it within 24 hours prior to installation.

3.4. Contents of the packaging

After unpacking the AC battery, please check whether the delivery is complete and whether there is any damage. If any component is missing or damaged, please contact your dealer.

Product and accompanying documents			
 Battery module ×1	 Manual ×1	 Quick installation guide ×1	 Outgoing inspection report ×1
 Declaration document ×1			
Wall bracket components			
 Wall bracket ×1	 Support bracket ×1	 M5*12 Hexagon screw ×3	 M10*15 Step bolt ×2
Installation and fixing components			
 Anti-tip bracket A ×2	 M4*10 SEMS screw ×4	 Anti-tip bracket B ×2	 M6*14 Hexagon screw ×3

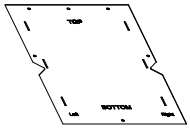
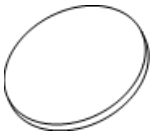
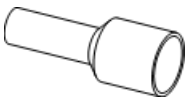
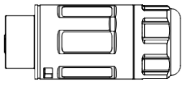
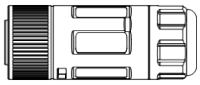
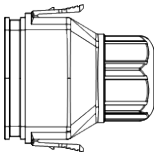
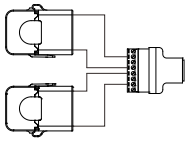
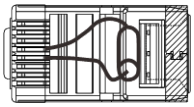
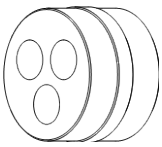
 M8*80 Expansion bolt ×4	 Positioning plate ×1	 Rubber pad ×4	
Electrical connection components			
 Power cable terminal ×8	 EPS/Backup connector ×1 (With Hex key:2mm)	 Grid connector ×1 (With Hex key:2mm)	 Waterproof cover ×1
 CT kit ×2	 CT kit communication cable (20cm) ×1	 Parallel operating communication cable (1.5m) ×1	 Terminal resistance for parallel operating ×1
 3 hole seal ring ×2			

Figure 3 – Inverter components and accessories inside in the packaging

3.4.1. Appearance and interface inspection

Before installing the AC battery, please carefully check the appearance and the interfaces of the AC battery. If you find any abnormality in the appearance or the interfaces, do not install it and contact your dealer immediately.

 Attention	Damage during transport. Please check the product packaging and connections carefully prior to installation.

3.4.2. Appearance and interface inspection

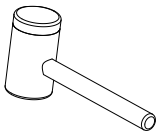
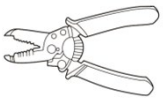
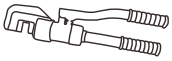
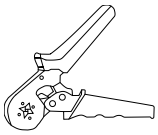
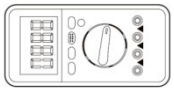
Before installing the AC battery, please carefully check the appearance and the interfaces of the AC battery. If you

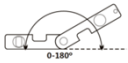
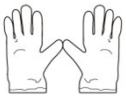
find any abnormality in the appearance or the interfaces, do not install it and contact your dealer immediately.

Warming	Damage during transport. Please check the product packaging and connections carefully prior to installation

3.5. Installation tools

To install the AC battery, the installation tools that customers need to prepare are shown in the table below:

Serial number	Tool	Name	Function
01		Hammer drill Recommended drill diameter: 8mm	Used to drill holes in walls.
02		Slotted screwdriver Recommended size: 3mm	For Wiring
03		Phillips screwdriver	For mounting brackets and wiring
04		Rubber hammer	For installation of expansion bolt.
05		Wire stripper	For stripping wires
06		Sleeve	For mounting bracket
07		Crimping tool	For crimping OT connectors
08		Crimping tool	For crimping AC cable terminal
09		Heat gun	For coating
10		Multimeter	For checking wiring and grounding

Serial number	Tool	Name	Function
11		Marker	For marking
12		Tape measure	For measuring distance
13		Spirit level	For aligning wall brackets
14		Anti-static gloves	For installation
15		Protection goggle	For installation
16		Dust respirator mask	For installation

3.6. Installation environment requirements

- ✓ Ambient temperature range: -20℃~+50℃.
- ✓ Relative humidity: 5%~95% (non-condensing).
- ✓ Maximum height: 4000m (IEC).
- ✓ Pollution level: 3.

The AC battery should be installed in a dry and well-ventilated area to ensure good heat dissipation.
The installation position must be far away from water sources such as taps, sewer pipes, and sprinklers.
Install the AC battery in a clean environment that is free from sources of strong infrared radiation, organic solvents, and corrosive gases. Avoid exposing the AC battery to direct sunlight or water.
The installation position must be far away from fire sources.
Do not install the AC battery near flammable and explosive materials.
Install the AC battery in a sheltered place or install an awning over it.
The AC battery must be installed on a solid and flat supporting surface.
The product has an IP66 degree of protection, a parameter defined by the international standard IEC 60529. This standard assesses the effectiveness of electrical enclosures in protecting against intrusion of objects, water, dust and accidental contacts.

For this product, specifically results:

- ✓ Completely airtight with dust and fumes.
- ✓ Protected against strong water jets coming from any direction.

To ensure consistent performance over time, avoid exposing the product to extreme temperatures and adverse weather conditions. Always ensure that the installation environment meets the technical specifications set out in this manual

 Warming	1.To prevent fire due to high temperature, ensure that the ventilation vents or heat dissipation system are not blocked when the battery is running. 2.Do not expose the battery to flammable or explosive gas or smoke. Do not perform any operation on the battery in such environments.
 Attention	1.The battery system site must be equipped with qualified fire extinguishing facilities, such as fire extinguishing sands and powder fire extinguishers.

3.7. Installation space

To ensure sufficient space for installation and heat dissipation, reserve sufficient space around the AZZURRO 1PH BZT5000 inverter household energy storage system. The requirements are as follows:

⚠ Attention	Installation distance Please strictly follow the installation spacing requirements.

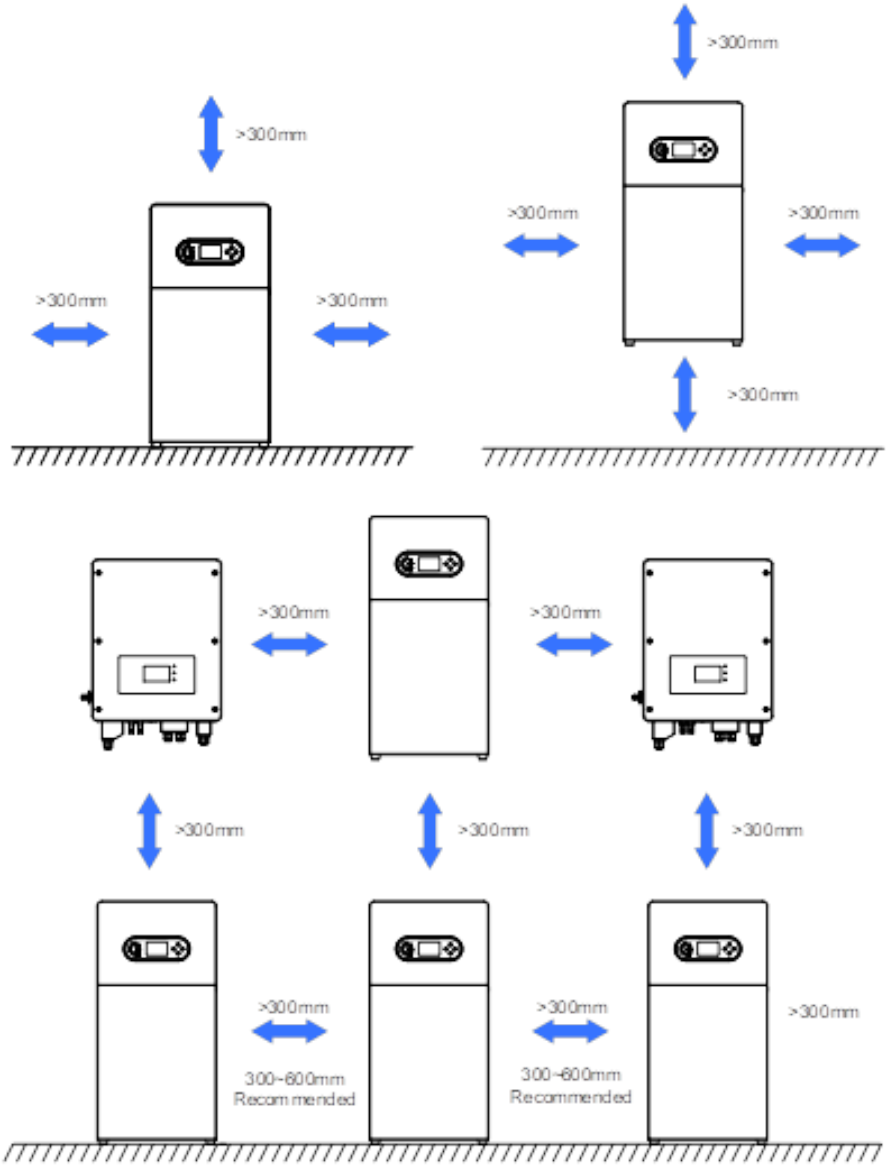
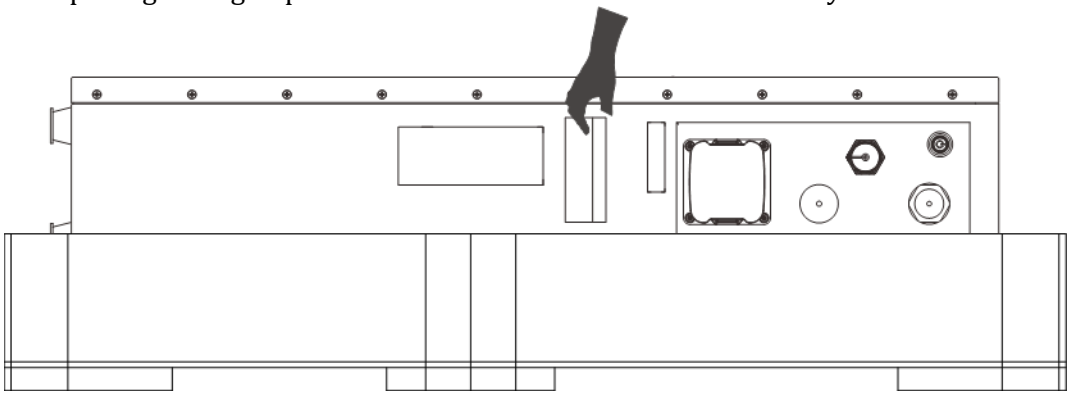


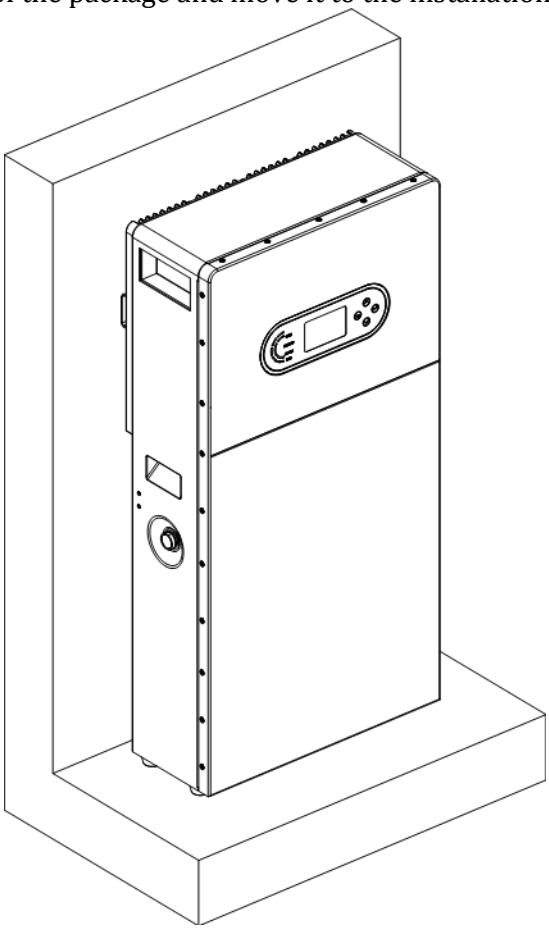
Figure 4 – Installation space diagram

3.8. Unpack the AC battery

Step 1: Open the package and grasp the handles on both sides of the AC battery.



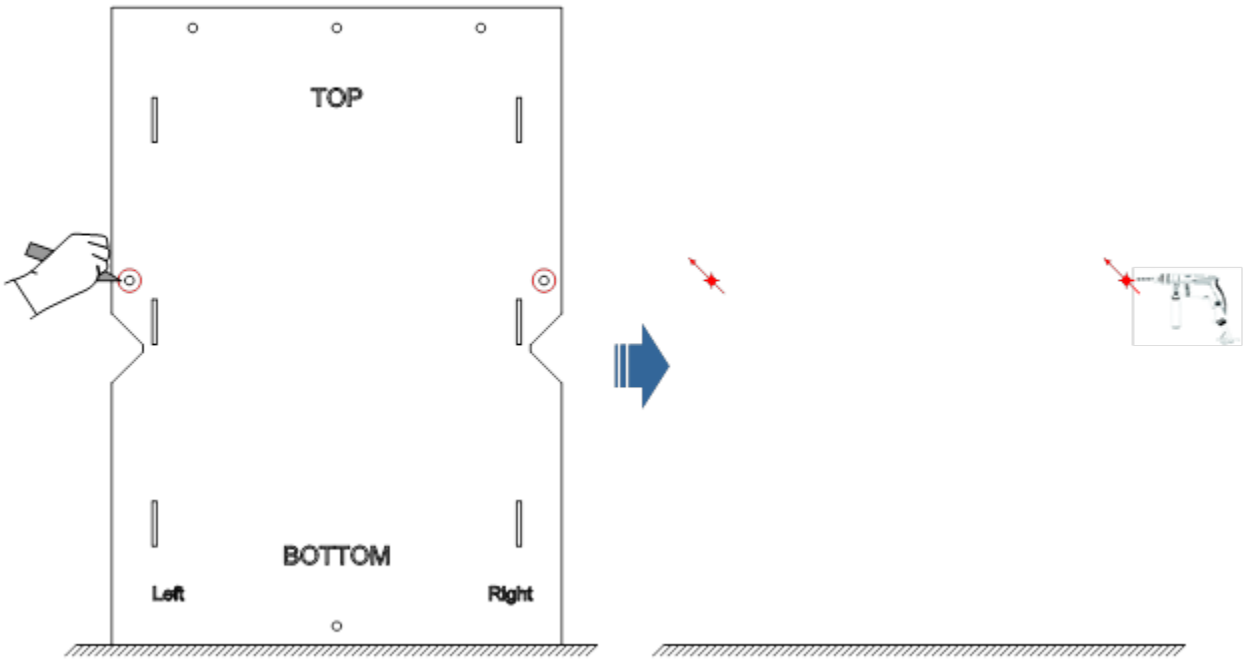
Step 2: Take the AC battery out of the package and move it to the installation position.



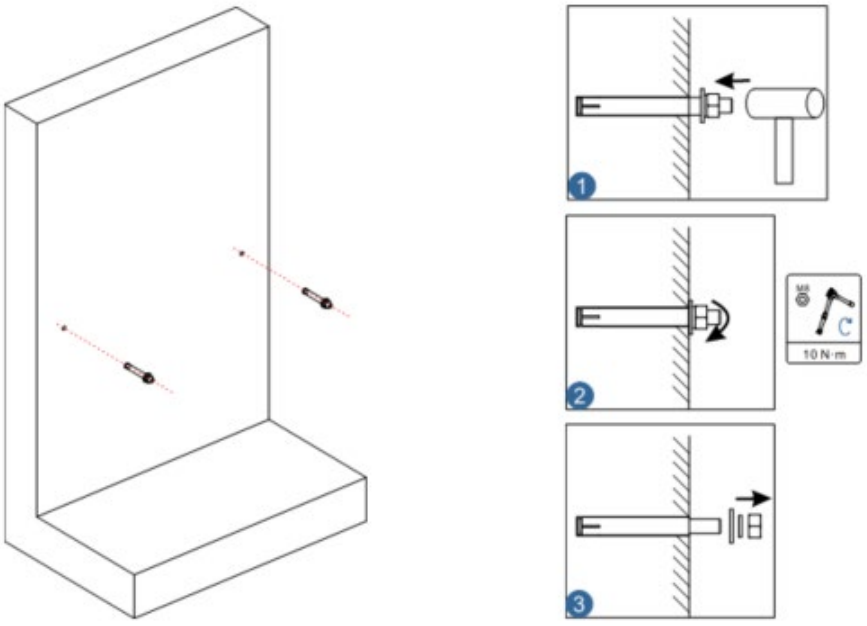
Attention	Mechanical damage To prevent injury and damage to the device, ensure that the AC battery is kept balanced while it is being moved - it is very heavy.

3.7.2. Floor installation

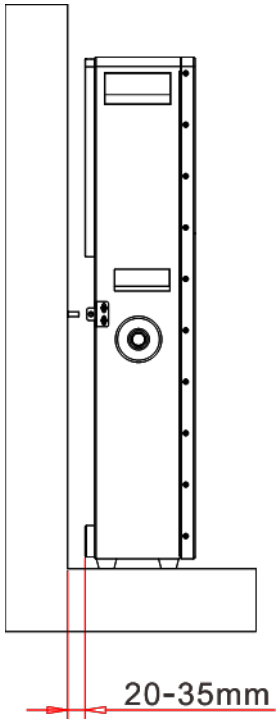
Step 1: Determine the drilling position (size: ø10, depth: 80-85mm) by the positioning plate, then mark the hole position with a marker, and drill the hole in the wall with a hammer drill. When drilling, the drill bit should be perpendicular to the wall and should not shake it to avoid damaging the wall. If the marking point is wrong, it needs to be repositioned.



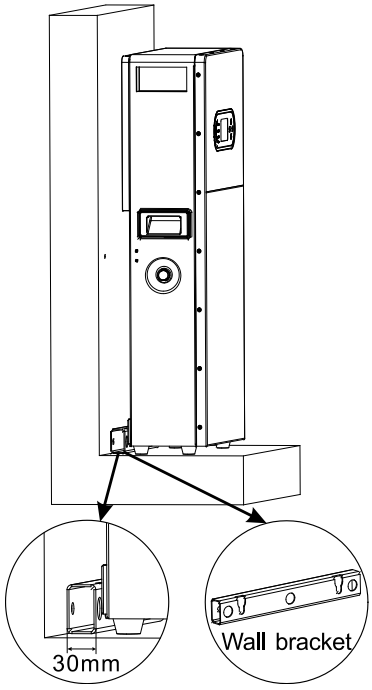
Step 2: Knock in the expansion bolts, as shown in the diagram below.



Step 3: Place the AC battery at the designated installation position and keep the back of the AC battery 25-35mm away from the wall.

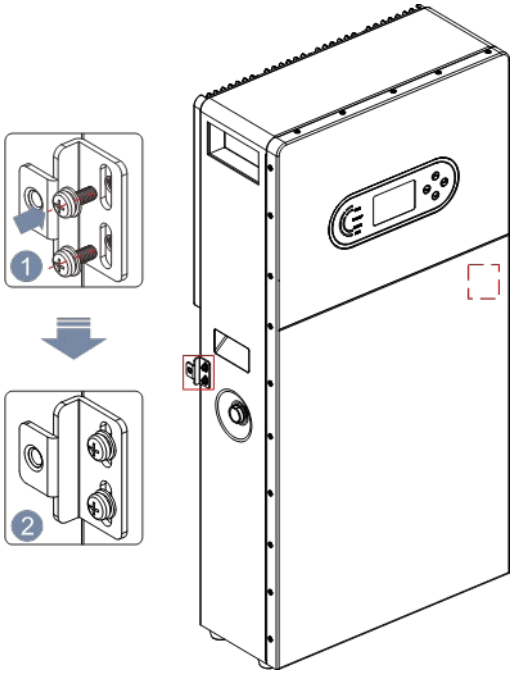


There is a simple way to do it:
Place the wall bracket at the corner of the wall where you intend to install the AC battery and move the battery to ensure the bottom of it is snug against the wall bracket, so that the distance between the battery and the wall is strictly 30mm and its back is parallel to the wall surface.

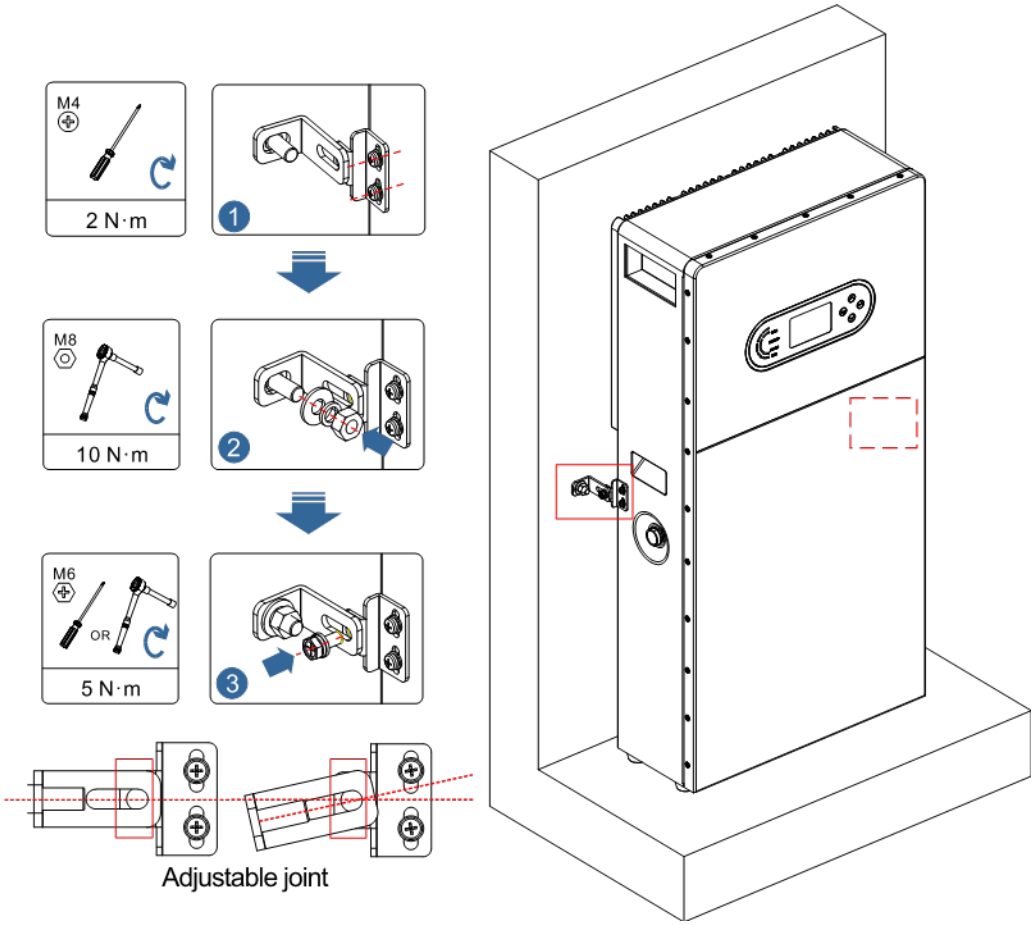


Step 4: Install the anti-tip bracket.

1. Install anti-tip bracket A to the AC battery (Screw the M4 screws to the screw holes but do NOT lock them).



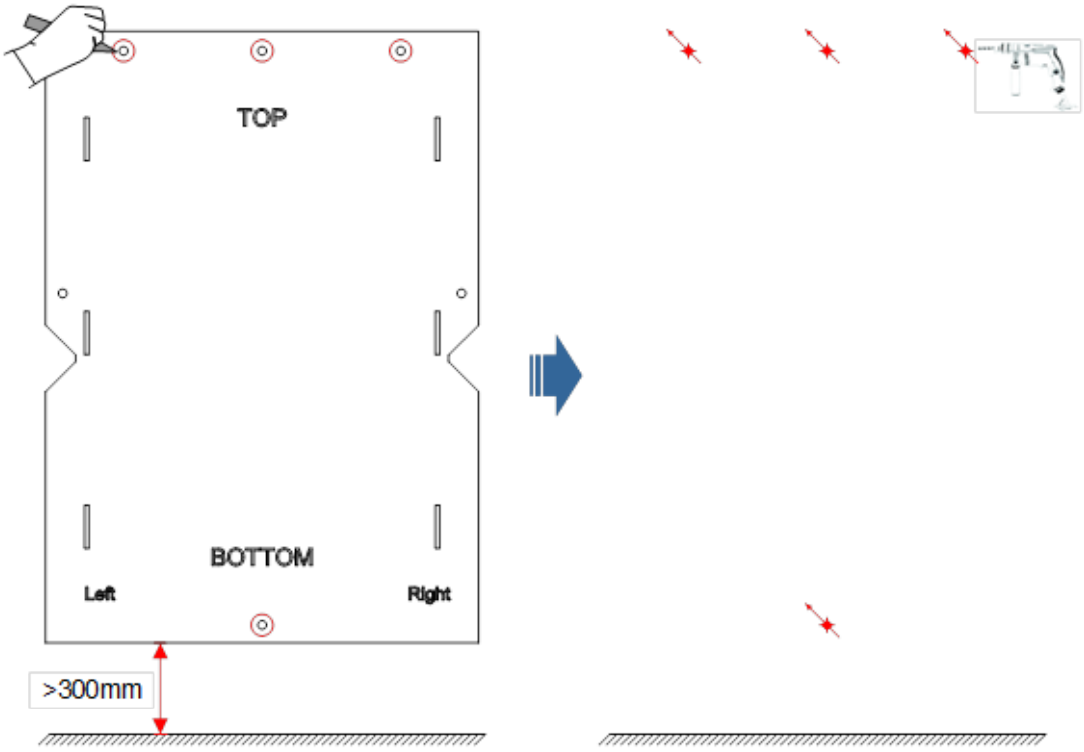
2. Adjust the height of bracket A to ensure that bracket A and bracket B are at the same height when the bolts are perpendicular to the wall. Tighten the M4 screw on bracket A, and then tighten the nut on the bolt, finally tighten the M6 screw at the joint between bracket A and bracket B.



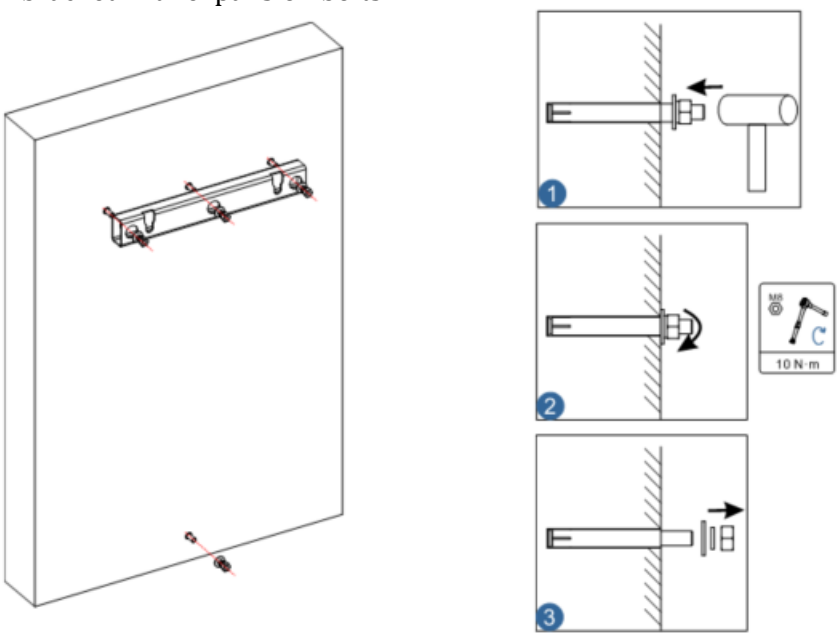
When the bolt is not strictly perpendicular to the wall surface, the back surface of the AC battery can still be parallel to the wall surface by adjusting the adjustable joint of the bracket A and the bracket B.

3.7.3. Wall mounting

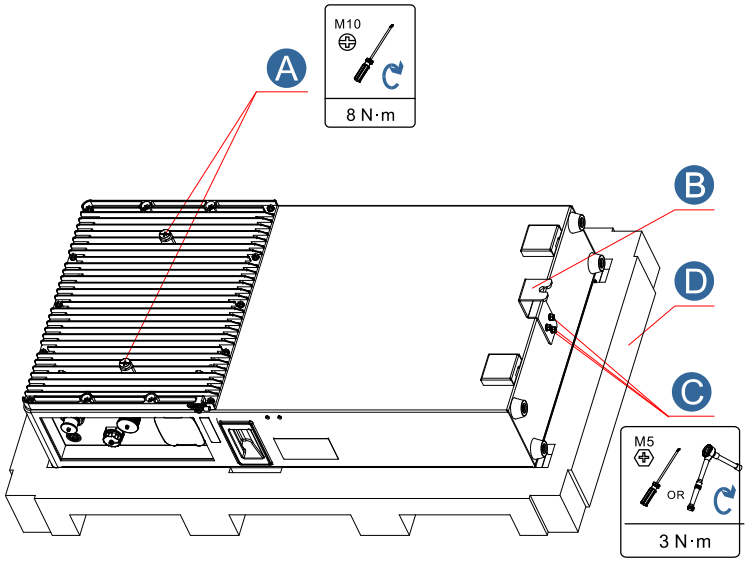
Step 1: Determine the drilling position (size: ø10, depth: 80-85mm) by the positioning plate, then mark the hole position with a marker, and drill the hole in the wall with a hammer drill. When drilling, the drill bit should be perpendicular to the wall and should not shake to avoid damaging the wall. If the marking point is wrong, it needs to be repositioned.



Step 2: Secure the wall bracket with expansion bolts.



Step 3: Install the step screws on the radiator and secure the support bracket with external hexagonal screws.



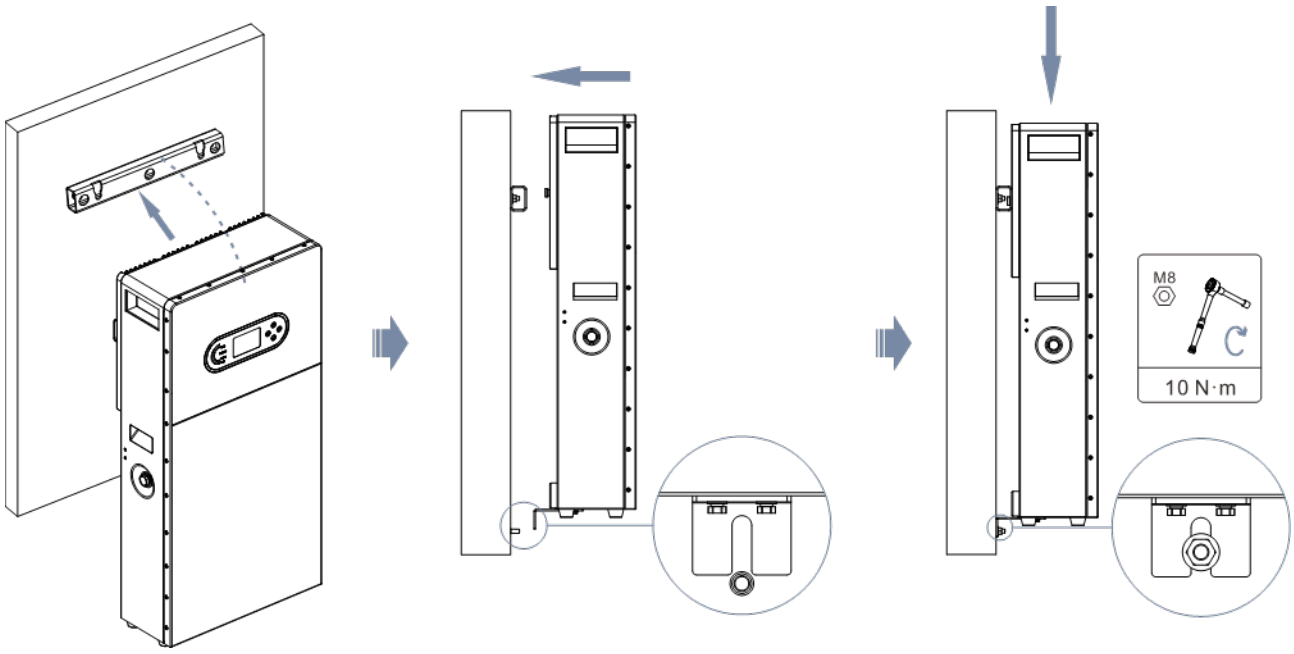
A M10 stepped screw

B Support bracket

C M5*12 hex screw

D Lower buffer material

Step 4: Place the step screws of the AC battery on the wall mount and tighten the fixing screws to ensure safety.



4. Electrical connections

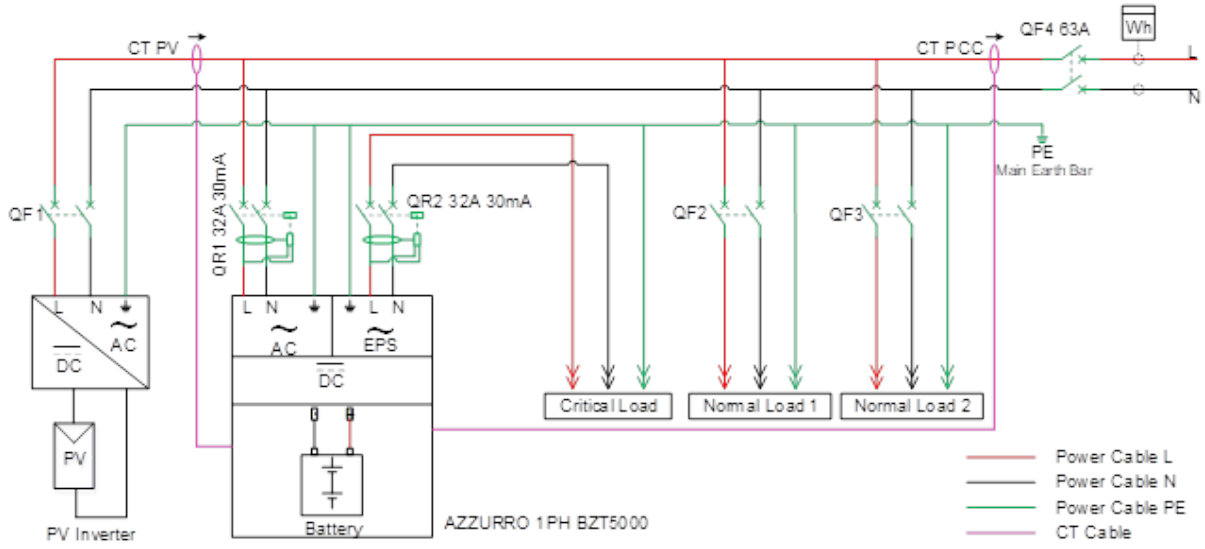
4.1. Safety instructions

Danger	Dangerous AC voltage Before making electrical connections, make sure the AC battery is powered off or in shutdown mode.
Attention	Qualification The installation and maintenance of the AC battery must be performed by trained electrician.
Note	Voiding of guarantee Product damage caused by operator wiring errors is not covered by the product guarantee.

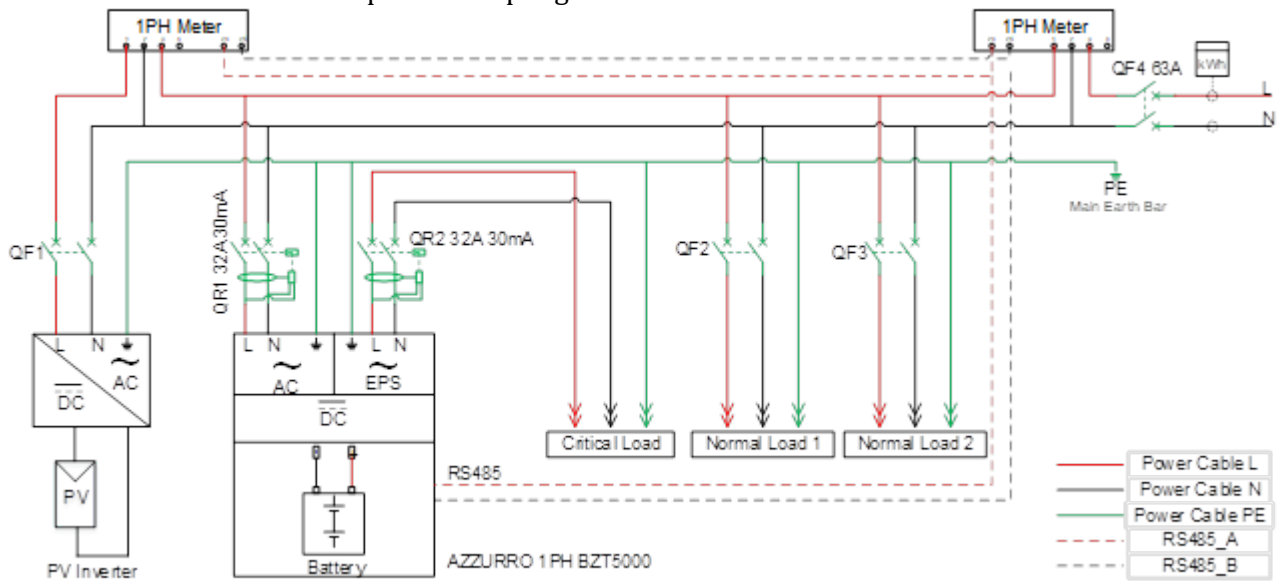
4.2. Overview

- ✓ The electrical connections are made as follows:
- ✓ Connect the PE cable (see section “Connect the PE cable” for details);
- ✓ Connect the AC cable (see section “Connect the AC cable” for details);
- ✓ Connect the signal cable (see section “Connect the signal cable” for details);
- ✓ Connect to ZCS Cloud/APP.

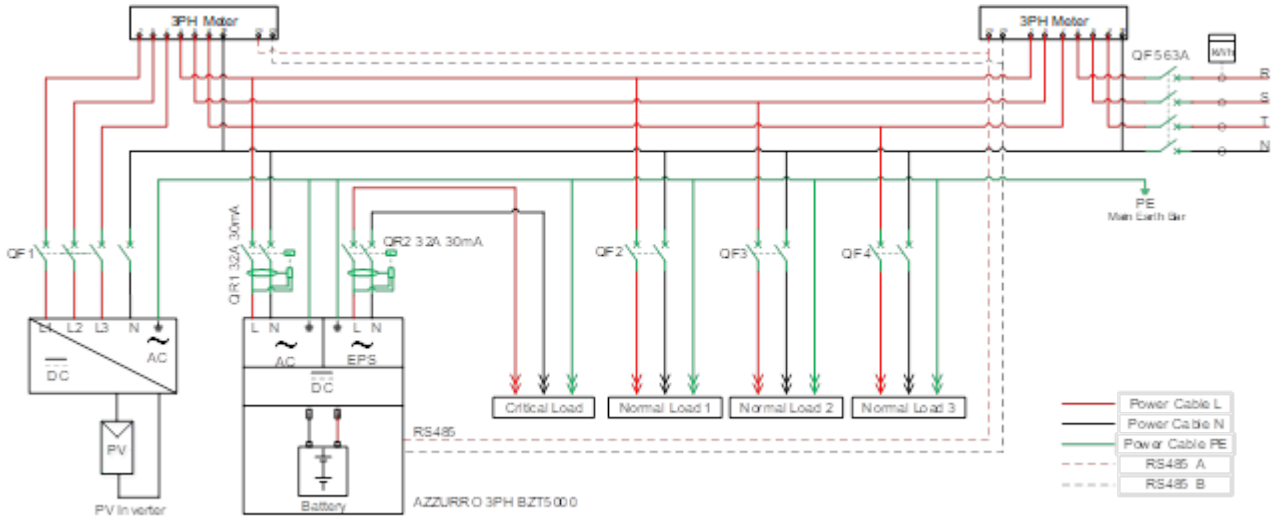
Here are several commonly used distribution wiring diagrams with EPS mode enabled. Differences exist due to variations in the power distribution system and sampling equipment.
The diagram below shows the wiring diagram for a single-phase power distribution system using current transformer (CT) for current sampling.



The diagram below shows the wiring diagram for a single-phase power distribution system using single-phase electric meter for current and power sampling.



The diagram below shows the wiring diagram for a three-phase power distribution system using three-phase electric meter for current and power sampling.



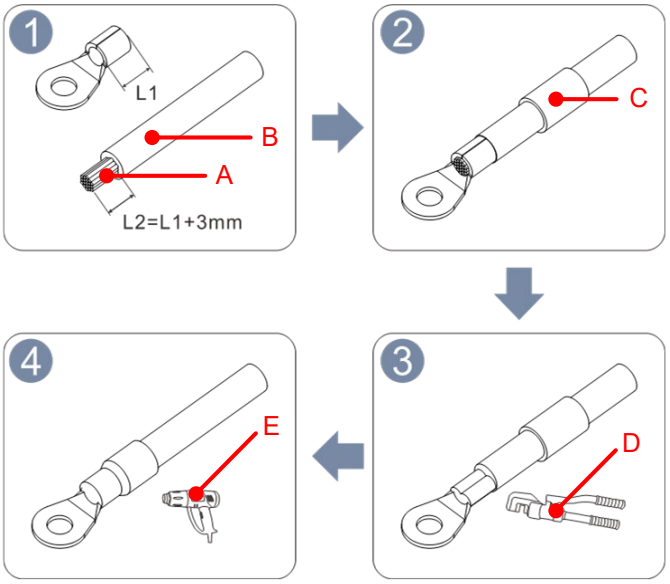
The output port of the AC battery must be connected to a residual current protection device (RCD) with an operating current of at least 30mA.

Attention	The On-Grid port and Backup/EPS port of the AC battery must be connected to at least a breaker and a residual current device (RCD) with an operating current of at least 30mA before it can be connected to the power grid.

4.3. Connect the PE cable

Danger	Dangerous AC voltage Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.

Please follow the steps and diagram below:
Step 1: Crimp the OT terminal as shown below



(A) Core wire

(B) Insulation layer

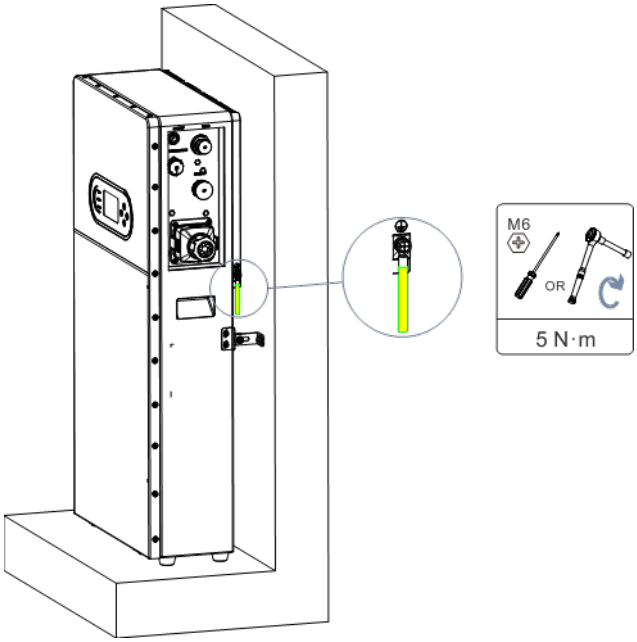
(C) Heat-shrinkable Tubing

(D) Hydraulic pliers

(E) Heat gun

Attention	1.Avoid scratching the cable core when stripping. 2.The grounding wire length requirement is 4mm2 ~ 6mm2 to meet the requirements for outdoor use. 3.The cavity created by crimping the terminal should be completely covered by the wire core, and the wire core should be tightly bonded to the terminal without any looseness. 4.The tensile force after crimping should comply with the requirements of UL486A and UL310.

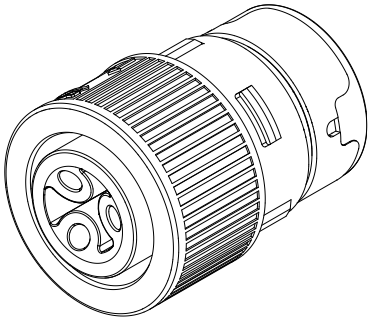
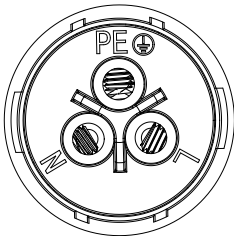
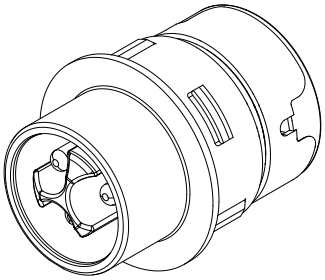
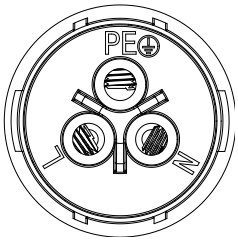
Step 2: Connect the grounding wire from the left side of the AC battery to the system ground, as shown in the diagram below.



4.4. Connect the AC cable

The AC cable is used to connect the AC battery to the load (through the EPS interface) or the grid. Please follow the instructions in the following sections for the assembly and connection of the AC cable.

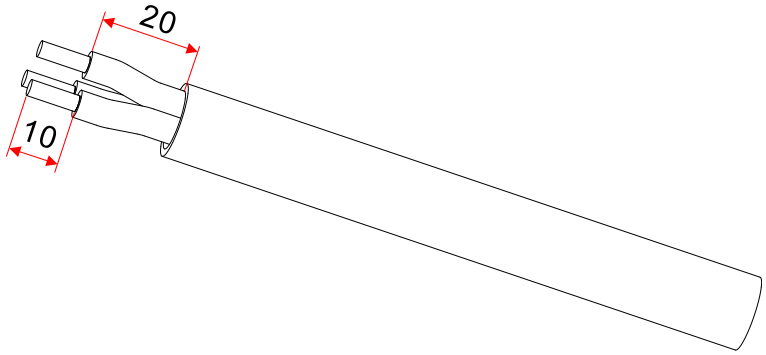
4.4.1. Connectors overview

Components		Cable types
		Outdoor multi-core copper cable. Recommended: 4mm² (12AWG) Min-Max: 2.5-6mm² (14-10AWG)
On-Grid connector (Female Connector)		
		Outdoor multi-core copper cable. Recommended: 4mm² (12AWG) Min-Max: 2.5-6mm² (14-10AWG)
EPS/Backup connector (Male Connector)		

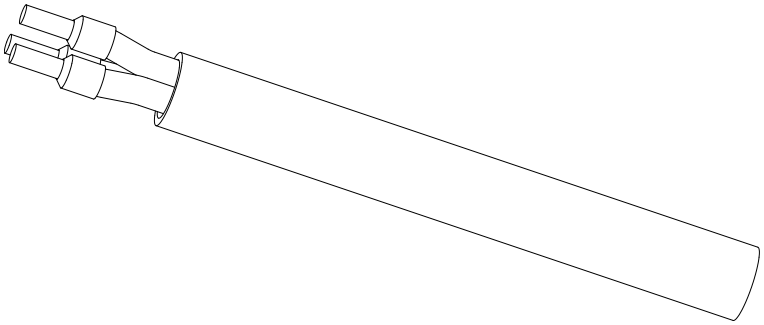
Danger	When connecting the cable, be sure to connect the live wire, neutral wire, and earth wire to L, N, and PE respectively
Attention	AC connection 1.Each AC battery must have its own breaker. 2.AC disconnect devices must be easily accessible.
Attention	The On-Grid port and Backup/EPS port of the AC battery must be connected to at least a breaker and a residual current device (RCD) with an operating current of at least 30mA before it can be connected to the power grid.
Note	Please install external breakers in accordance with relevant national regulations! The cross-sectional area of a 4mm2 cable is sufficient for general applications. But if the cable is too long (>80 meter), it is recommended to use a thicker one to reduce voltage drops and power losses.

4.4.2. Assemble the AC connector

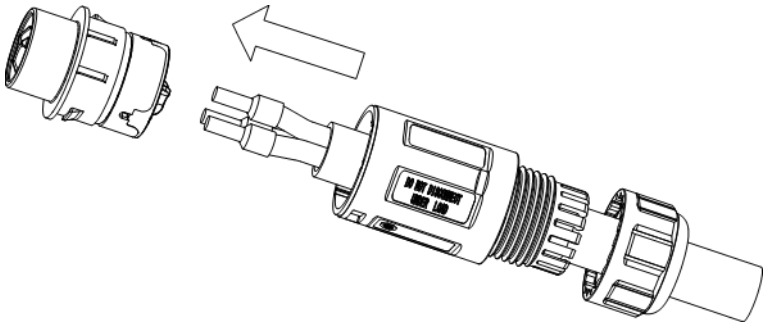
Please follow the steps and diagrams below:
Step 1: Choose the appropriate cable based on the diagram above. Use wire strippers to remove the insulation layer of the AC output cable as shown below:



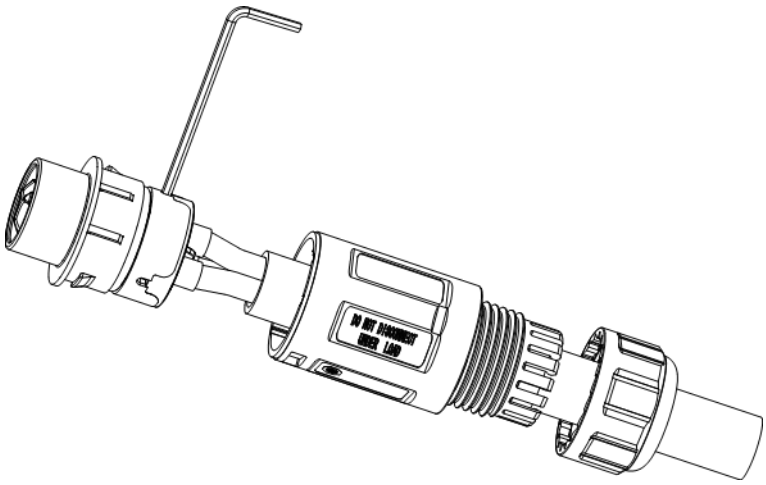
Step 2: Crimp terminals.



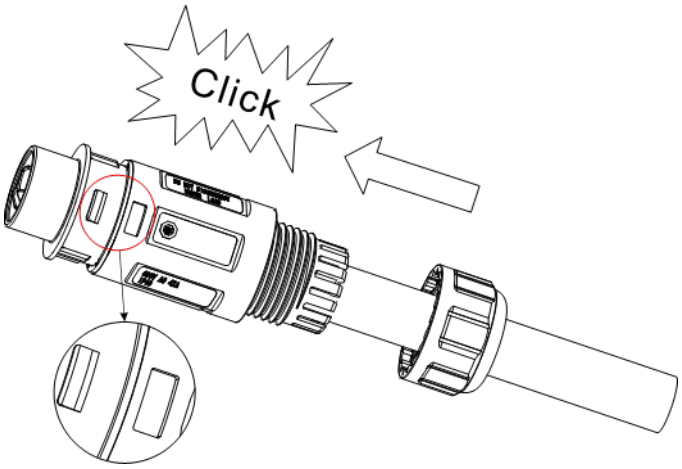
Step 3: Plug the cable into the corresponding terminal.



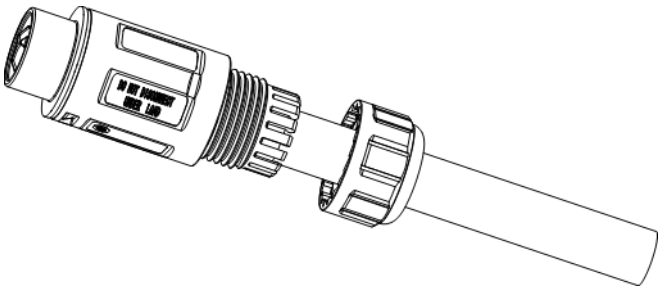
Step 4: Use a hex key to crimp the cable and tighten the screw (1.1-1.3N·m).



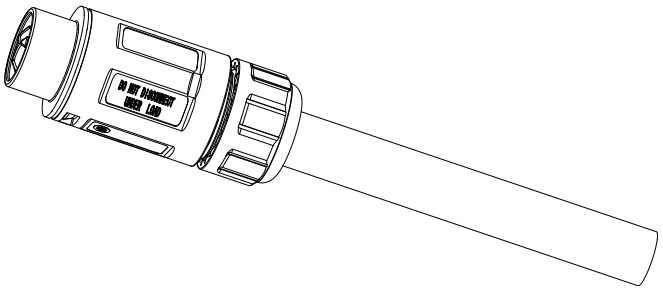
Step 5: Insert the main body into the corresponding clip and hear a "click" sound.



Step 6: Screw the locking nut into the main body (2-3N·m).



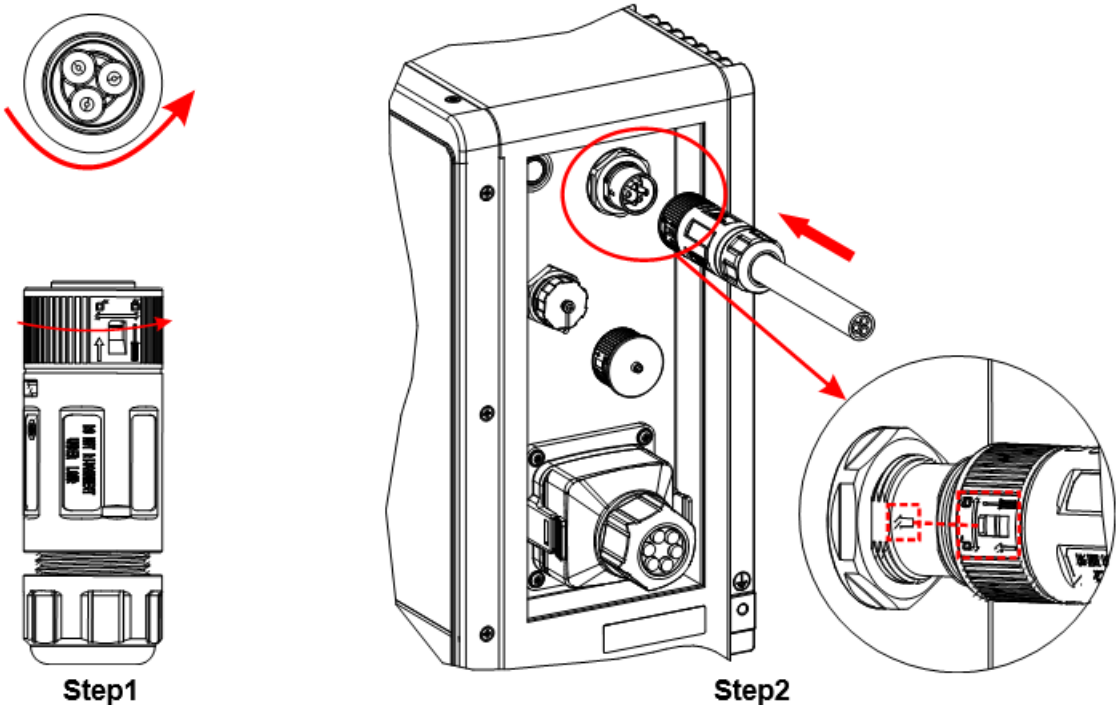
Step 7: Complete the installation.



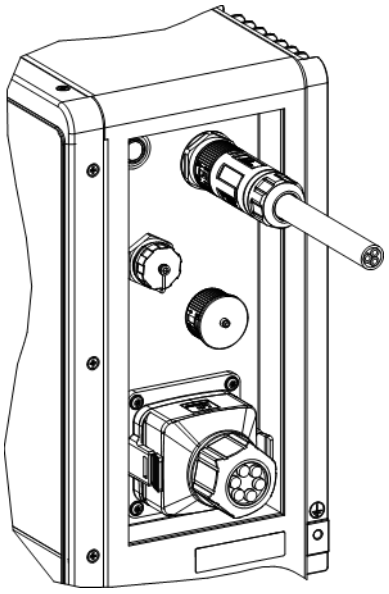
4.4.3. AC grid connection

⚠ Attention	The On-Grid port and Backup/EPS port of the AC battery must be connected to at least a breaker and a residual current device (RCD) with an operating current of at least 30mA before it can be connected to the power grid.

Step 1: Turn the latch of AC connector made in section 5.4.2 counterclockwise to locking state.



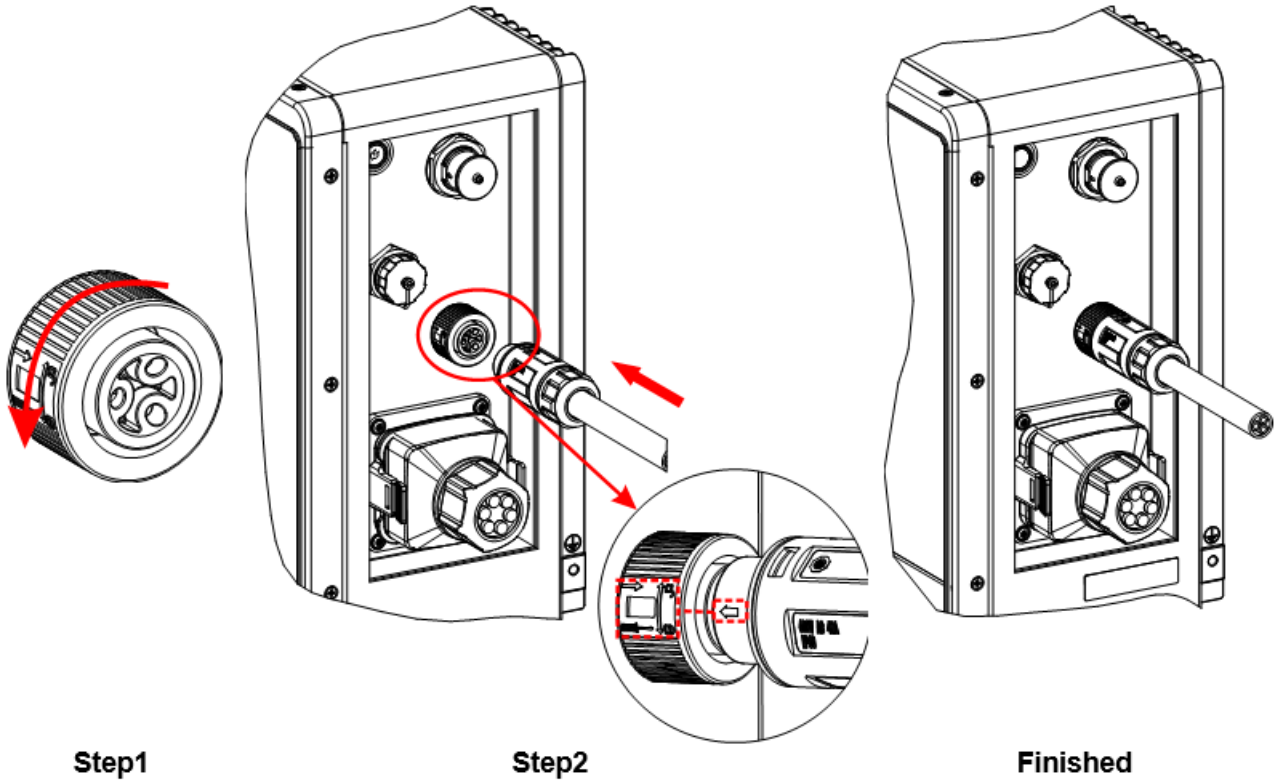
Step 2: Insert the AC connector made in section 5.4.2 into the On-Grid interface of the AC battery (make sure that the arrows shown in the two red boxes in STEP2 in the following figure are aligned).



4.4.4. EPS connection

⚠ Attention	The On-Grid port and Backup/EPS port of the AC battery must be connected to at least a breaker and a residual current device (RCD) with an operating current of at least 30mA before it can be connected to the power grid.

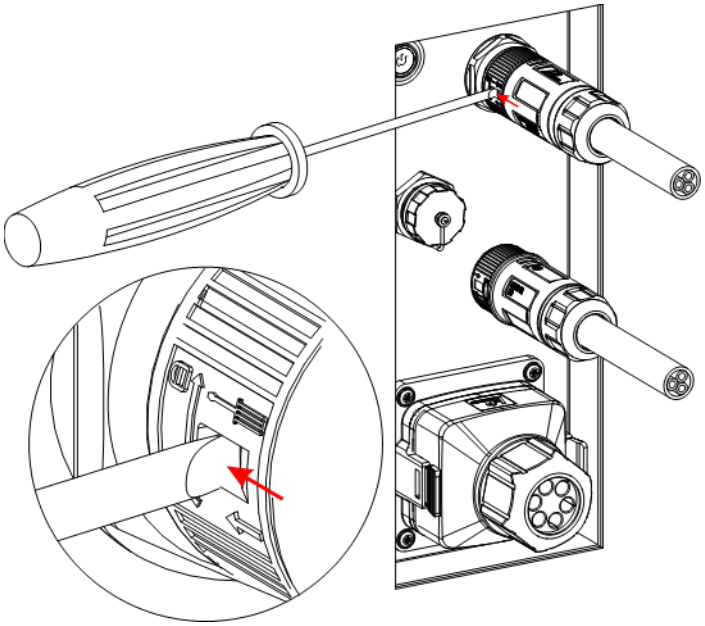
Step 1: Turn the latch of EPS interface counterclockwise to locking state.
Step 2: Insert the AC connector made in section into the EPS interface of the AC battery (make sure that the arrows shown in the two red boxes in Step2 in the following figure are aligned).



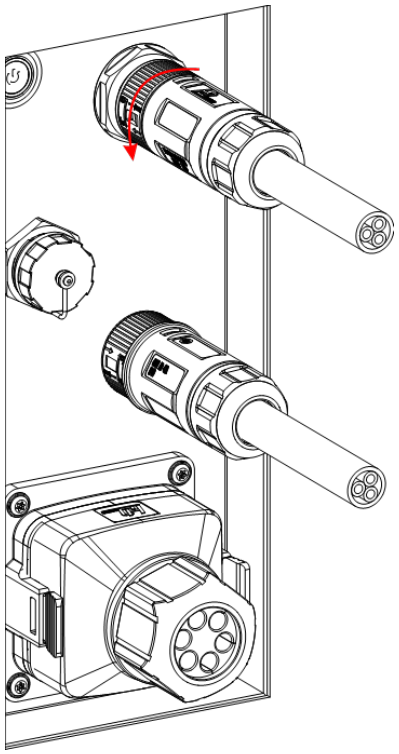
4.4.5. Unlock instruction

On-grid interface

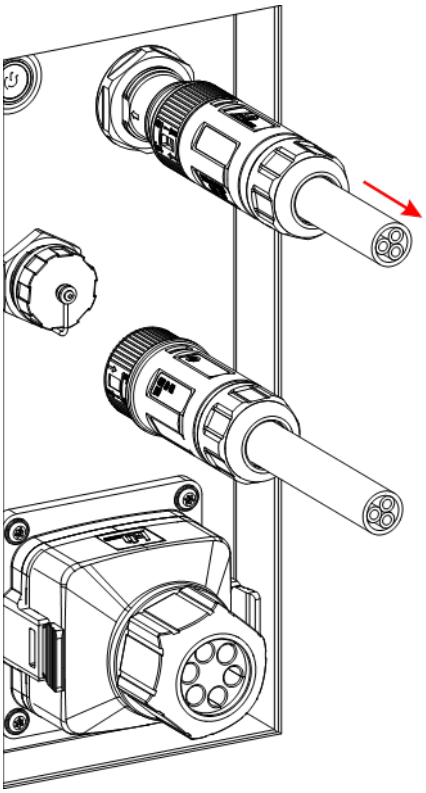
Step 1: Use the flat head screwdriver to turn the locking mechanism in the direction indicated in the diagram.



Step 2: Rotate the latch counterclockwise to unlock state.

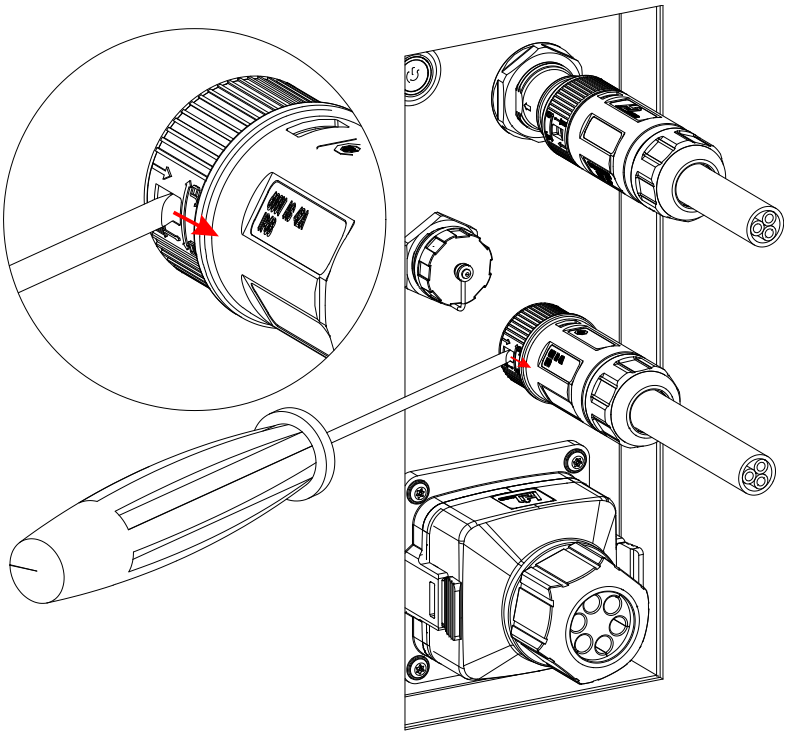


Step 3: Unplug the on-grid cable.

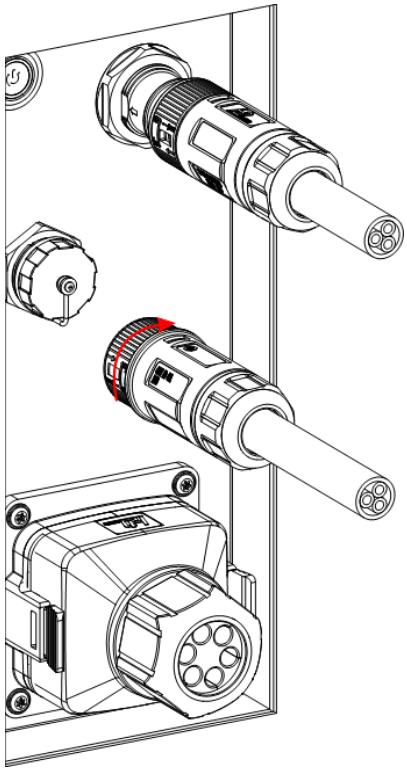


EPS interface

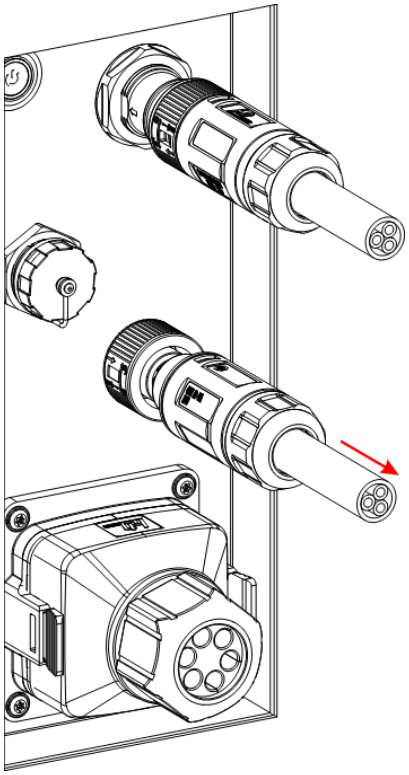
Step 1: Use the flat head screwdriver to turn the locking mechanism in the direction indicated in the diagram.



Step 2: Rotate the latch clockwise to unlock state.



Step 3: Unplug the EPS cable.

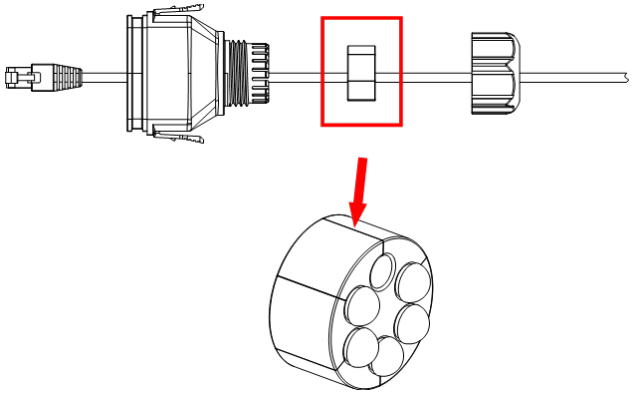


5. Connect the signal cable

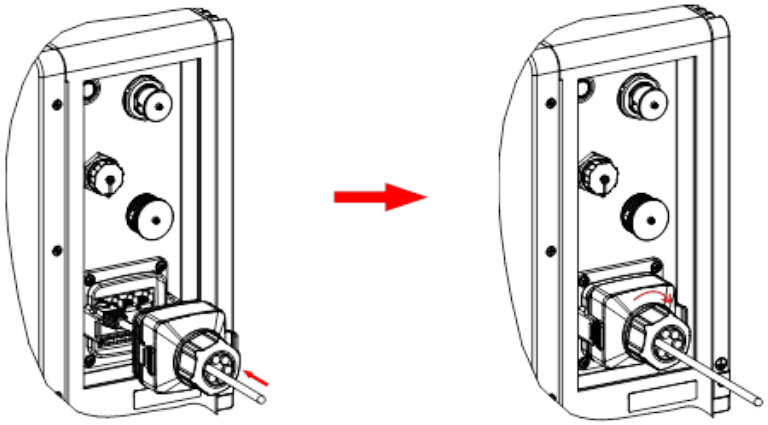
⚠ Attention	Please ensure that the cables are correctly connected to their respective sockets. Incorrect connections may result in the AC battery not functioning properly or even causing irreversible damage.

5.1. Installation guide on battery side

Step 1: Disassemble the waterproof cover as shown below. Pass the cable through the waterproof cover.
Each hole in the waterproof plug is preset with a plug. When installing, the plug needs to be taken out first and then the cable is inserted into the waterproof plug from the position indicated by the red arrow as shown in the figure below.
Please tighten the waterproof cover after the cable is successfully plugged in, otherwise tightening the waterproof cover first will cause difficulties in plugging



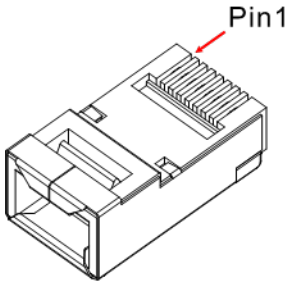
Step 2: Insert the RJ45 plug or the DI/DO terminal into the corresponding socket and turn the locking connector of the waterproof cover clockwise.

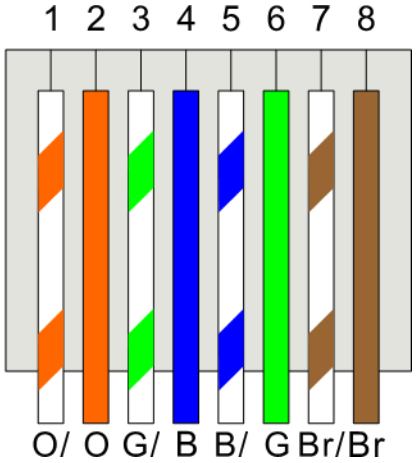


5.2. RS-485

5.2.1. Description

Users can remotely monitor the battery via RS-485 communication. It is recommended to connect a 120-ohm terminal resistor at the host side of the communication bus to improve communication quality and resistance to interference. The pin definitions of the connector are shown in the diagram and table below.



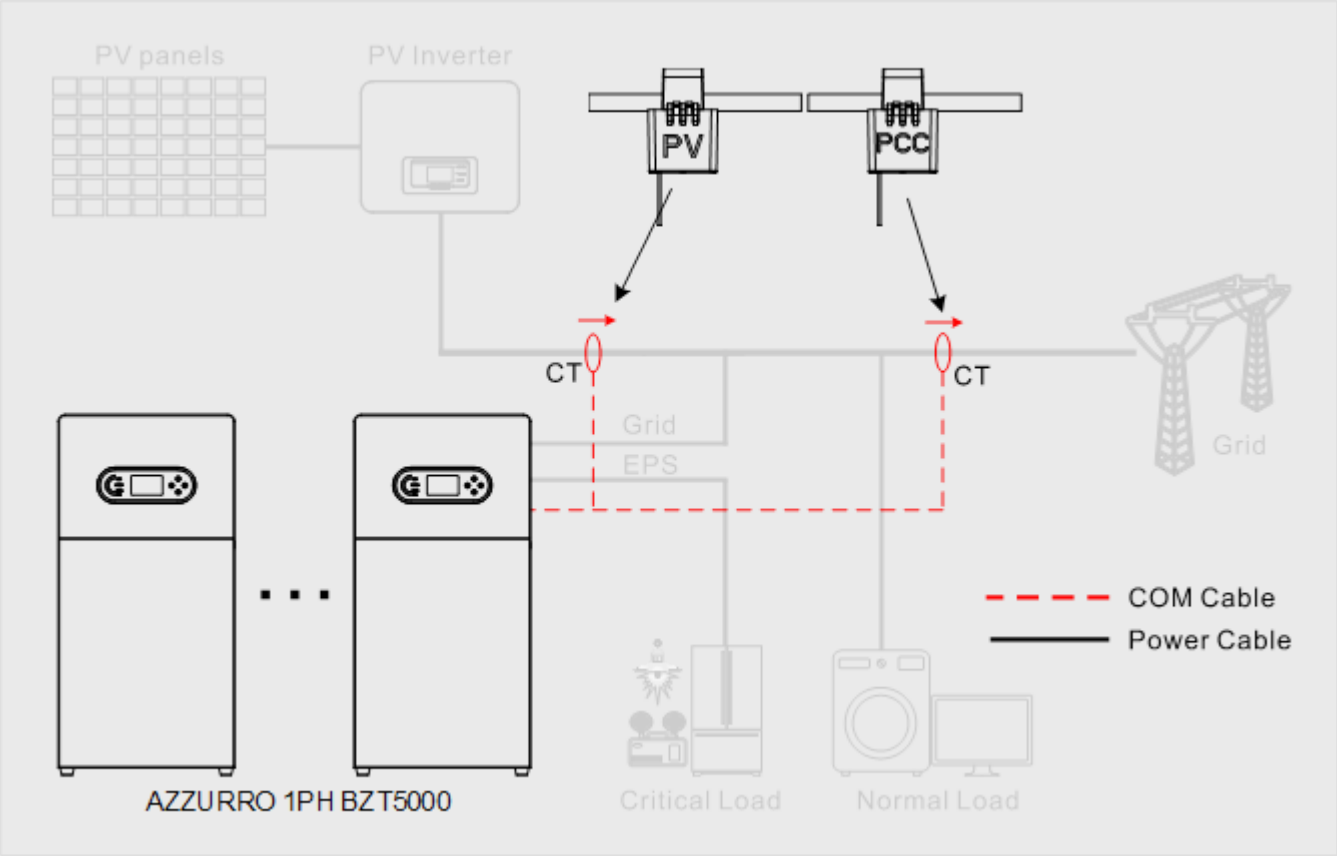


Pin	Wire color	definition
1	Orange and White	RS485_A1
2	Orange	RS485_B1
3	Green and White	\
4	Blue	Reserved
5	Blue and White	Reserved
6	Green	\
7	Brown and White	\
8	Brown	\

5.3. Meter/CT

5.3.1. Description

It is essential to configure current detection at the output of the photovoltaic inverter and at the grid access point to achieve the full functionality of the AC battery. And if you don't have any photovoltaic inverter installed, you only need one current detection for the connection to the grid access point.



Correctly position the current sensor, in detail:

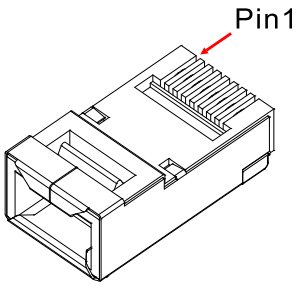
- ✓ CT (measures the current exchanged with the grid). Positioned at the output of the exchange meter so that all incoming and outgoing power flows can be read, it must include all phase cables entering or leaving the exchange meter.
- ✓ The direction of the CT is independent of the installation, and is recognised by the system during the first start-up, always verify by means of tests that the readings are correct.

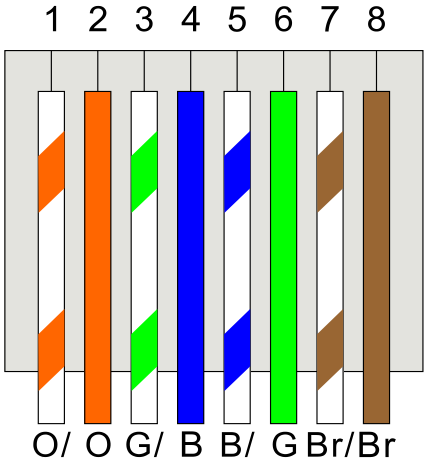
Use an 8-pin, STP category 6 cable as an EXTENSION CABLE; use all the coloured pins (blue-orange-green-brown) to extend the positive cable of the CT and all the white/coloured pins (white/blue-white/orange-white/green/brown) to extend the negative cable of the CT.
The shield must be grounded on one of the two sides. To prevent the cables from breaking, it is recommended to use a cable with flexible and non-rigid conductors.

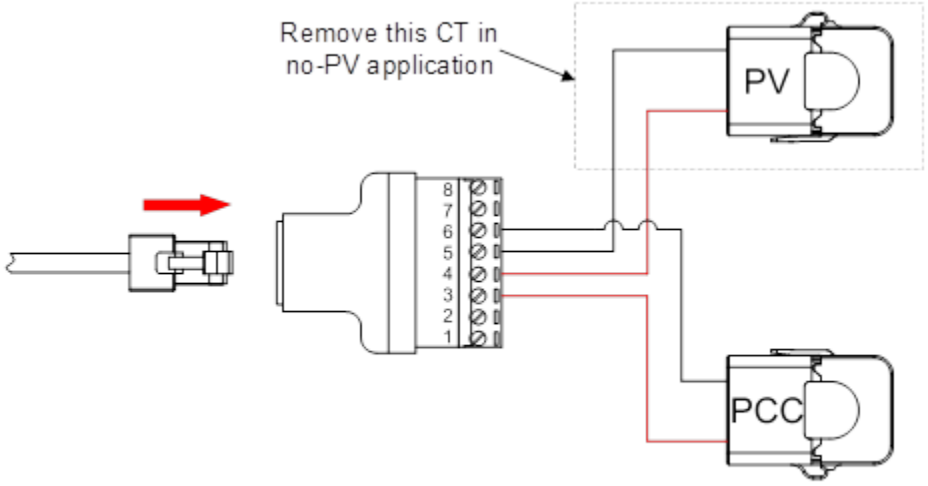
⚠ Caution	Users can choose different CTs based on the installation, but the secondary current shall not exceed 40mA.

Attention	The CTs must be installed in specified positions, otherwise, the AC battery will either fail to operate or operate abnormally.

Please see the table below for specific pin connections.







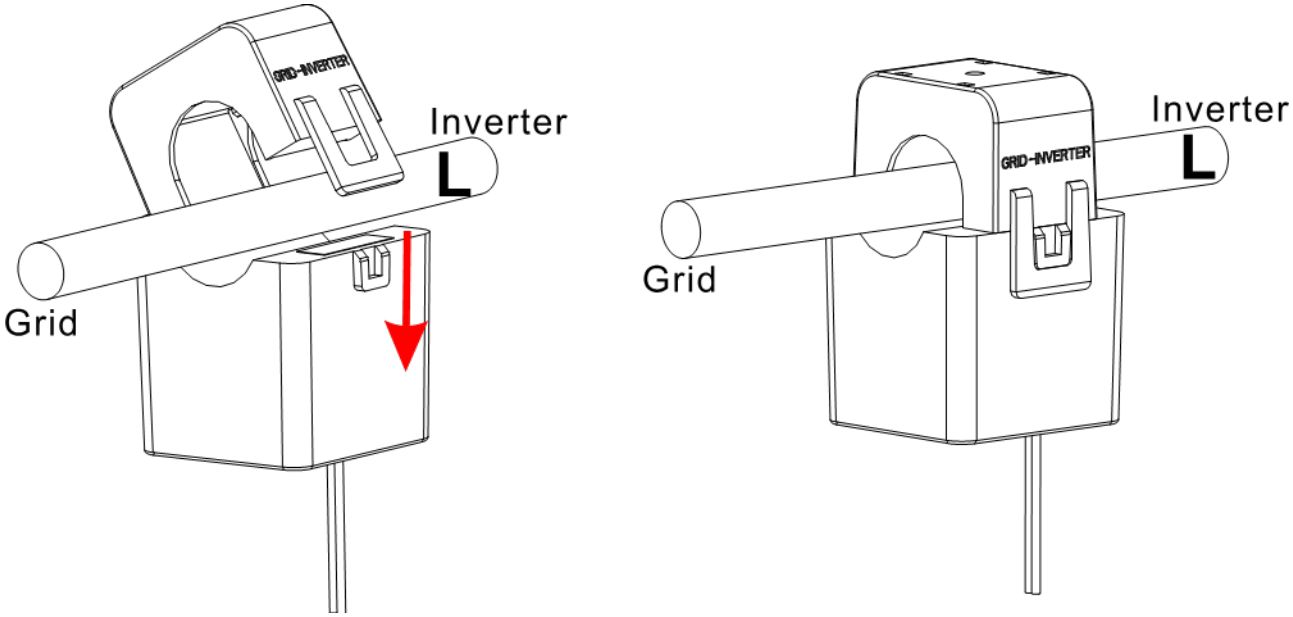
Pin	Wire color	Definition
1	Orange and White	METER_RS485_A
2	Orange	METER_RS485_B
3	Green and White	CT_PCC+
4	Blue	CT_PV+
5	Blue and White	CT_PV-
6	Green	CT_PCC-
7	Brown and White	\
8	Brown	\

If you use electricity meters, you need to purchase them separately. The AC battery communicates with the electricity meters via RS-485 to obtain data, and you need to connect the RS-485 communication interface of the electricity meter to pins #1 and #2 of the AC battery's RS-485 interface.

5.3.2. Installation guide

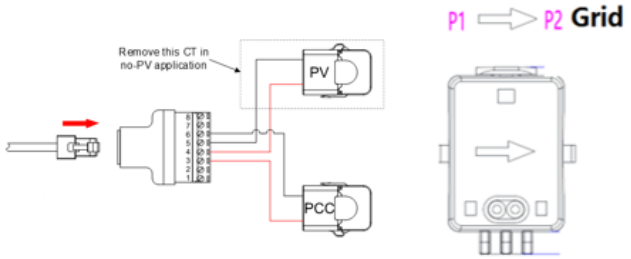
Step 1: Open the CT clamp, place the live or phase wire into it, and then close the clamp again. However, it is important to pay attention to the direction of the CT and ensure that it aligns with the direction indicated on the label:

- ✓ For the CT at PCC, the side with "INVERTER" printed on it should face towards the indoor distribution, while the side with "GRID" printed on it should face towards the external grid, with the arrow pointing from indoor equipment towards the external grid.
- ✓ For the CT at the PV, the side with " INVERTER" printed on it should face towards the photovoltaic inverter, while the side with " GRID" printed on it should face towards the indoor distribution, with the arrow pointing towards the output direction of the photovoltaic inverter.

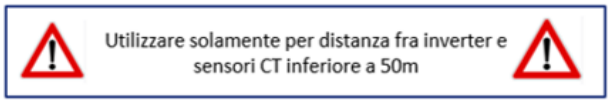


Step 2: Connect the CT kit communication cable of the battery side by referring section “Installation guide on battery side”

5.3.3. Measurement of exchange through current sensor



PIN	Definizione
6	CT-
3	CT+

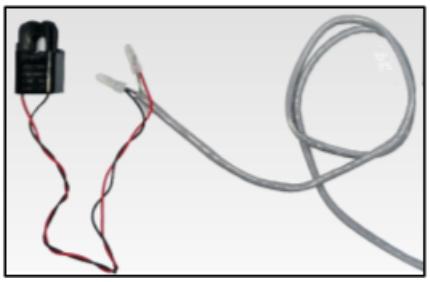


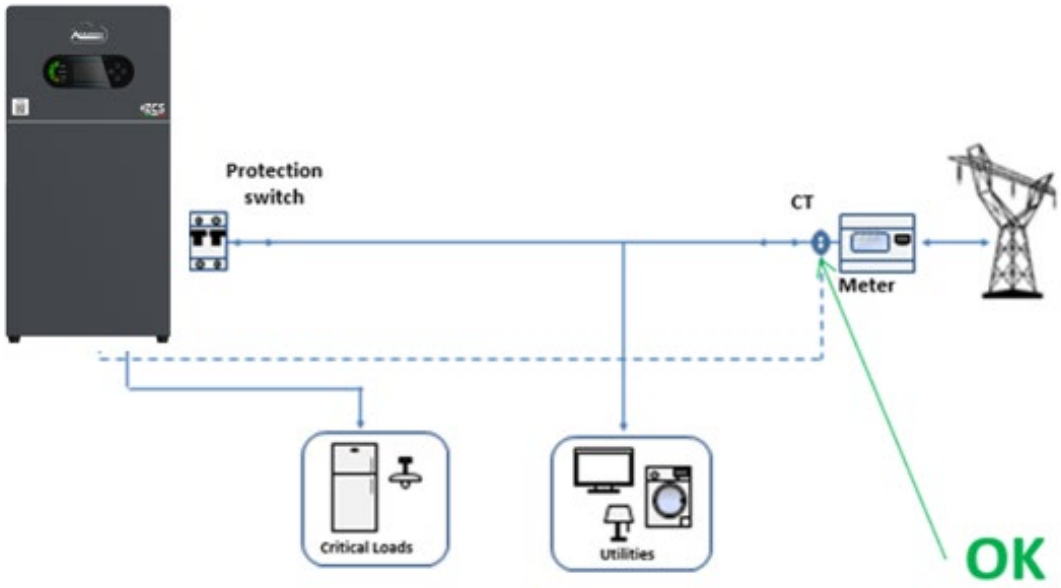
Connect the negative of the sensor to input 6 of the CT Kit connector
Connect the positive of the sensor to input 3 of the CT Kit connector

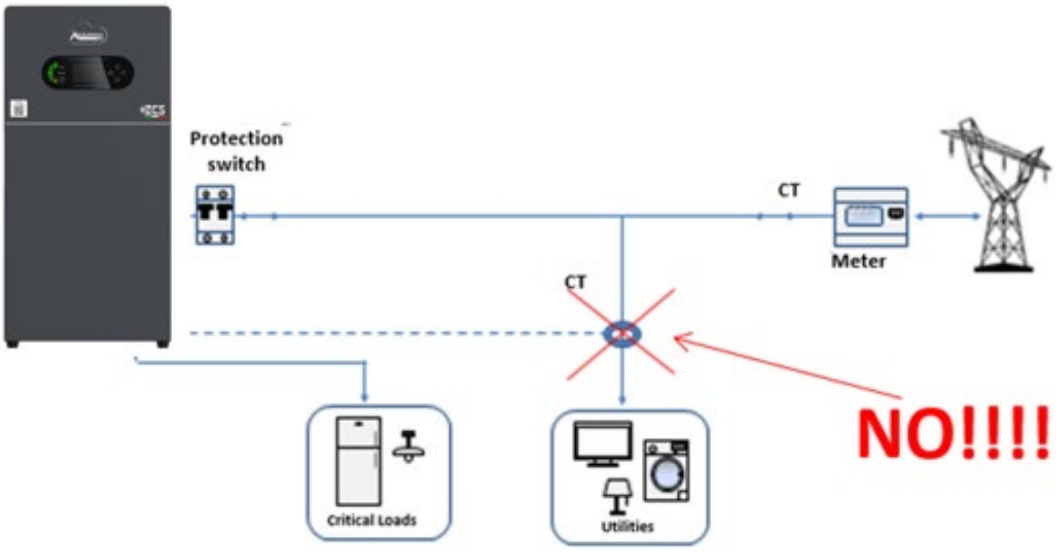
Correctly position the current sensor, in detail:

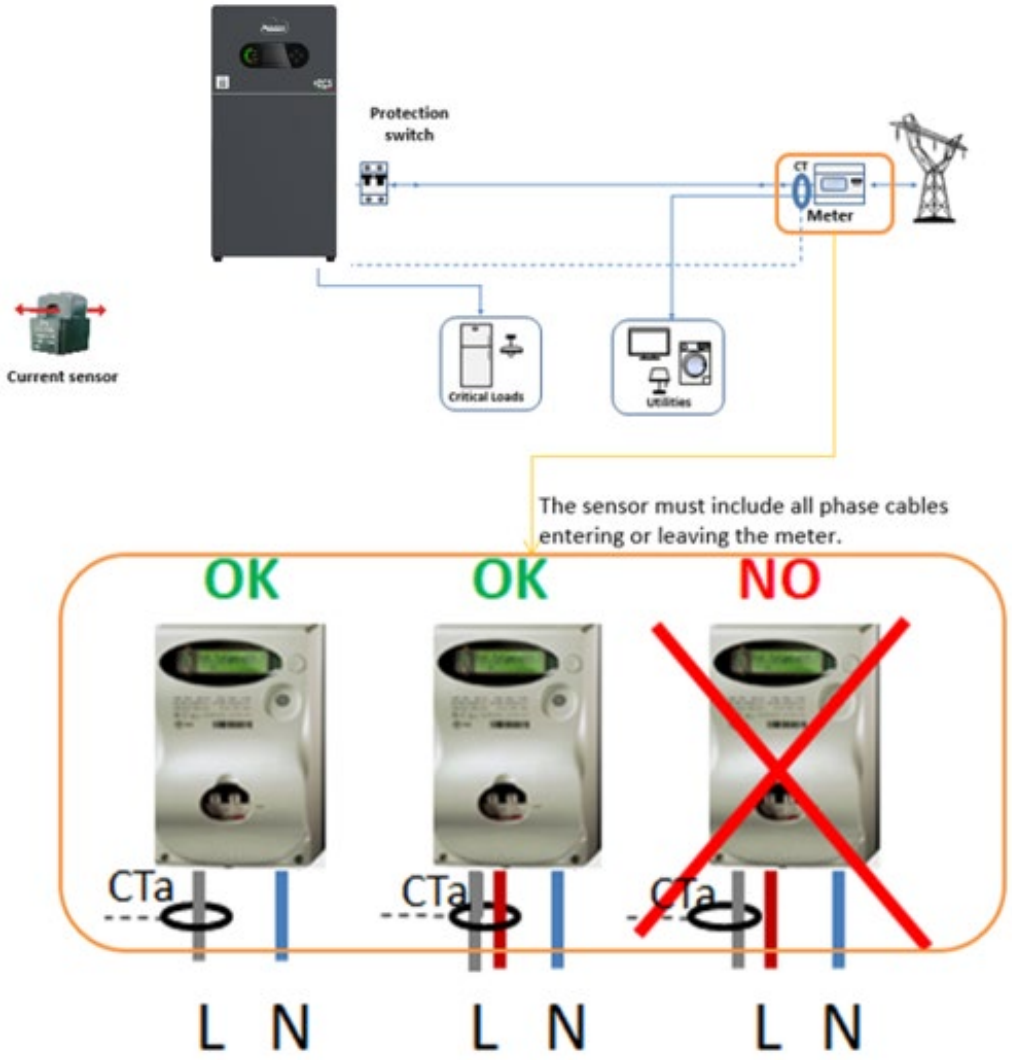
- ✓ CT (measures the current exchanged with the grid). Positioned at the output of the exchange meter so that all incoming and outgoing power flows can be read, it must include all phase cables entering or leaving the exchange meter.
- ✓ The direction of the CT is independent of the installation, and is recognised by the system during the first start-up, always verify by means of tests that the readings are correct.

Use an 8-pin, STP category 6 cable as an EXTENSION CABLE; use all the coloured pins (blue-orange-green-brown) to extend the positive cable of the CT and all the white/coloured pins (white/blue-white/orange-white/green/brown) to extend the negative cable of the CT.
The shield must be grounded on one of the two sides. To prevent the cables from breaking, it is recommended to use a cable with flexible and non-rigid conductors.

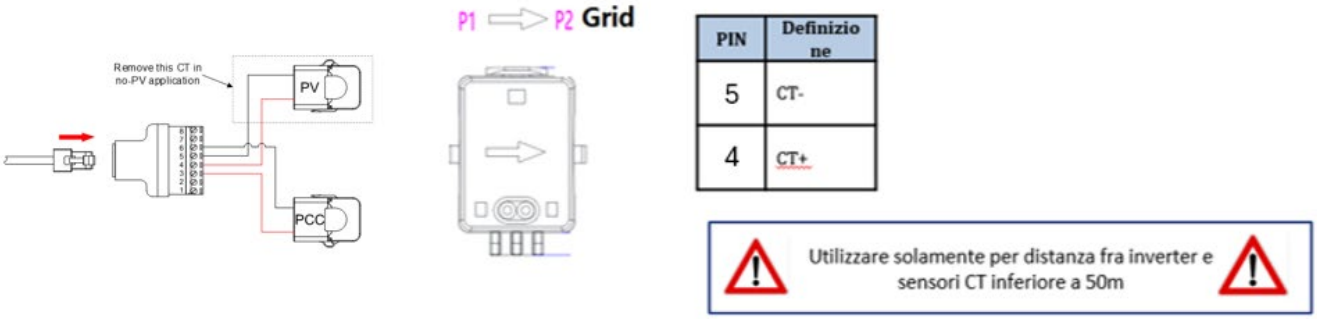



Protection switch
CT
Meter
Critical Loads
Utilities
OK


Protection switch
CT
Meter
CT
Critical Loads
Utilities
NO!!!!


Protection switch
CT
Meter
Current sensor
Critical Loads
Utilities
The sensor must include all phase cables entering or leaving the meter.
OK
OK
NO
CTa
CTa
CTa
L N
L N
L N

5.3.4. Measurement of the external production through current sensor

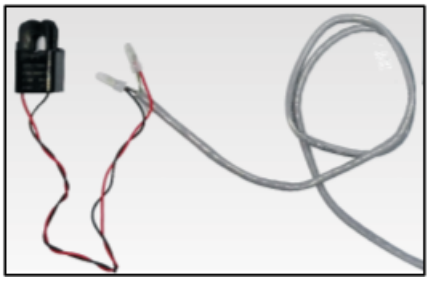


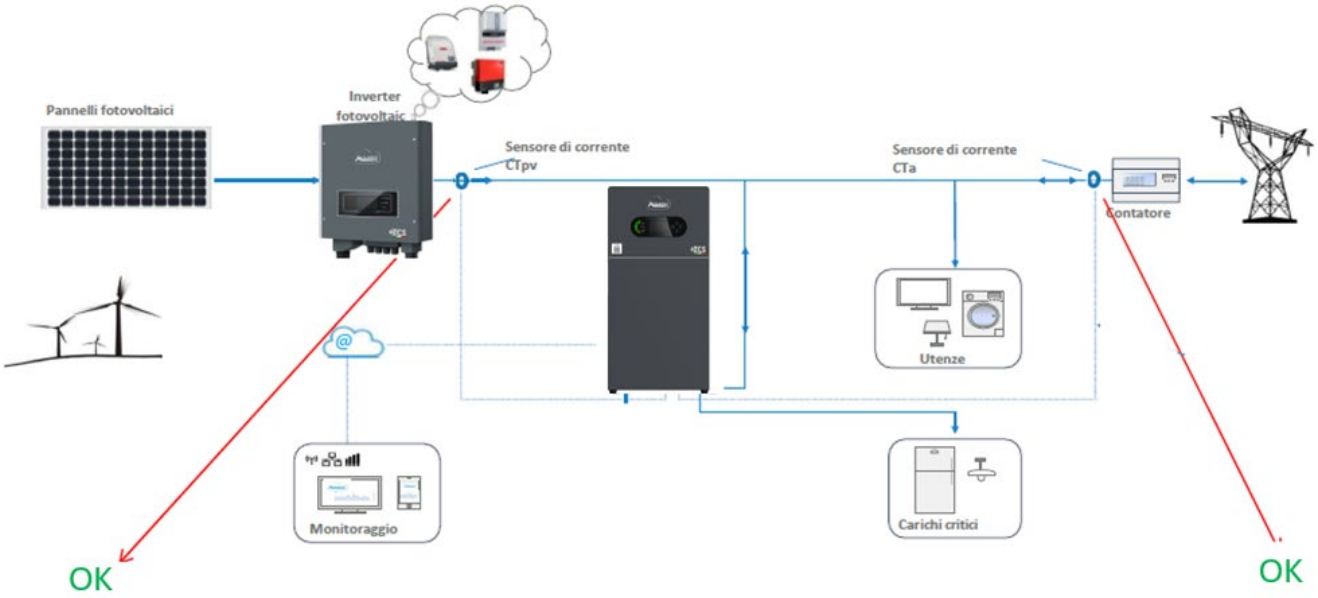
Connect the negative of the sensor to input 5 of the CT Kit connector
Connect the positive of the sensor to input 4 of the CT Kit connector

Correctly position the current sensor, in detail:

- ✓ For the CT at the PV, the side with " INVERTER" printed on it should face towards the photovoltaic inverter, while the side with " GRID" printed on it should face towards the indoor distribution, with the arrow pointing towards the output direction of the photovoltaic inverter
- ✓ The direction of the CT is independent of the installation, and is recognised by the system during the first start-up, always verify by means of tests that the readings are correct.

Use an 8-pin, STP category 6 cable as an EXTENSION CABLE; use all the coloured pins (blue-orange-green-brown) to extend the positive cable of the CT and all the white/coloured pins (white/blue-white/orange-white/green/brown) to extend the negative cable of the CT.
The shield must be grounded on one of the two sides. To prevent the cables from breaking, it is recommended to use a cable with flexible and non-rigid conductors.

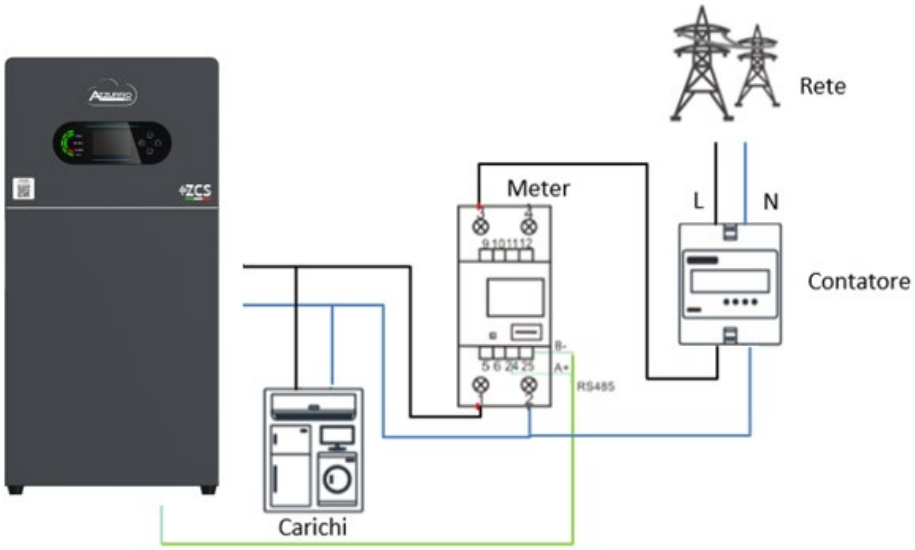



Pannelli fotovoltaici
Inverter fotovoltaic
Sensore di corrente CTpv
Sensore di corrente CTa
Contatore
Utenze
Monitoraggio
Carichi critici
OK
OK

5.3.5. Measurement of exchange with the single-phase DDSU Meter

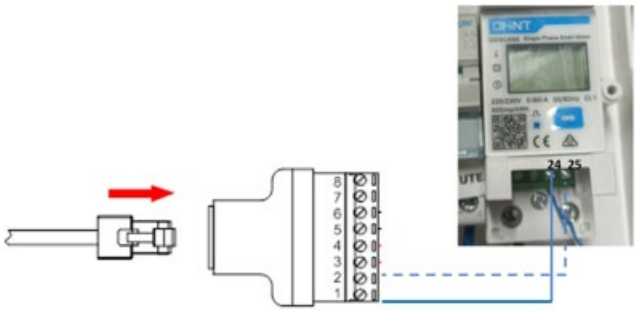
In order to be able to read the exchange via the meter, it is necessary to purchase a CHINT DDSU single-phase direct connect meter.

PIN INVERTER	PIN METER	Nota
1	24	Meter communication
2	25	

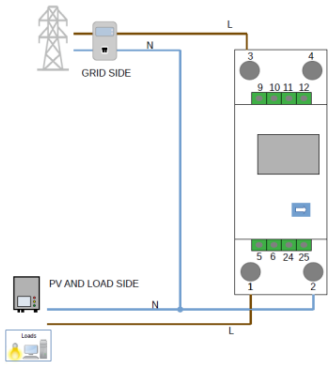


Meter connections:

1. Connect the Meter and inverter with the Inverter Kit port. On the Meter side, connect to PINs 24 and 25 (as shown in the table) On the inverter side, use the connection port identified as “Kit port,” connecting to PINs 1 and 2 (as shown in the figure).



2. Connect the Meter in “direct connection” mode, specifically:
   - ✓ Connect PIN 2 of the Meter to the neutral cable (N);
   - ✓ Connect PIN 3 respectively to the exchange meter direction phase;
   - ✓ Connect PIN 1 to the photovoltaic system and loads direction phase.



NOTE: For distances between the Meter and inverter **greater than 100 meters**, it is recommended to connect one 120 Ohm resistors along the 485 daisy chain directly to the Meter (PINs 24 and 25).

Setting Meter on exchange

1. Press the button to check that the Meter address is set to **001** and that the protocol is set to **8n1**. In addition to what is described above, the display shows the values of:
   - ✓ Current;
   - ✓ Voltage;
   - ✓ Power factor;
   - ✓ Power.

Protocol


Indirizzo


Corrente

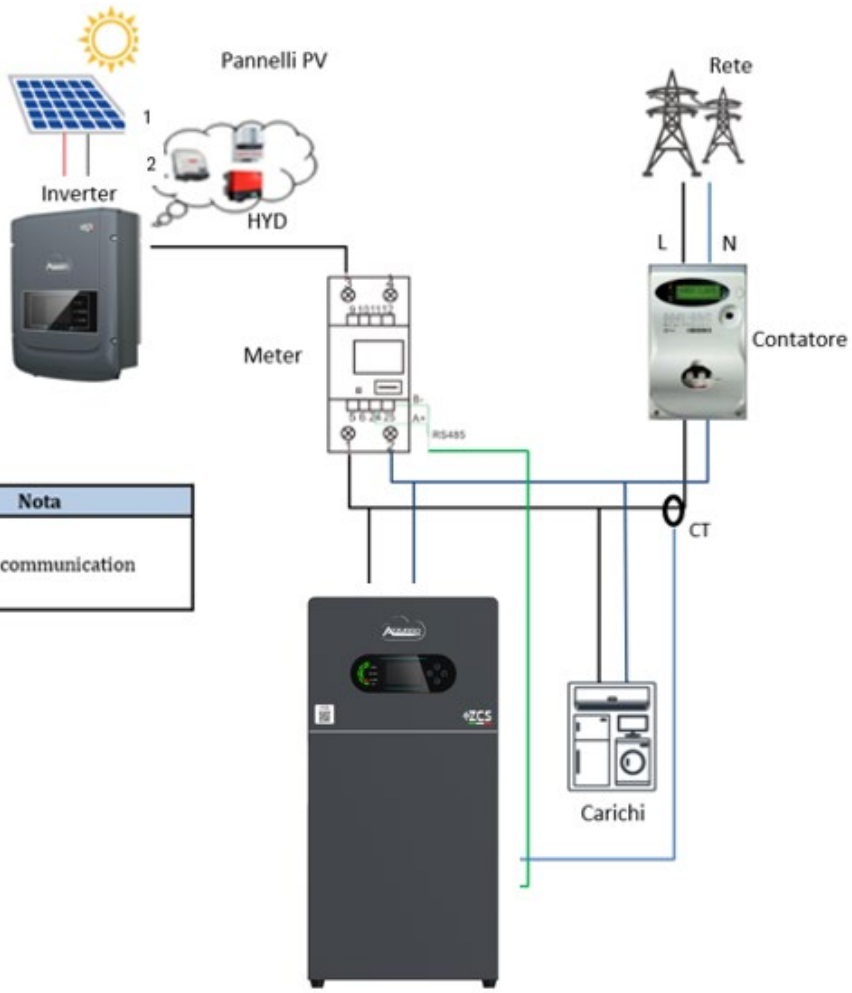

Potenza


Tensione


Power factor

5.4. Measuring external production through the DDSU single-phase Meter

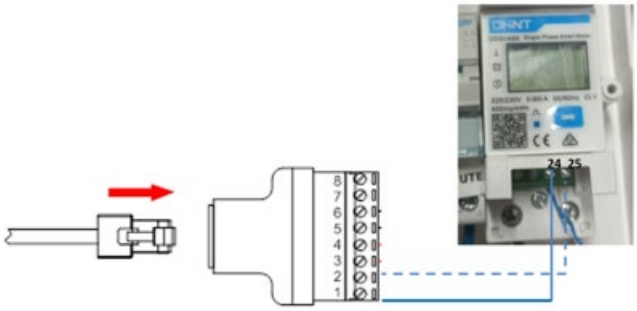
In order to be able to read the external production via the meter, it is necessary to purchase a CHINT DDSU single-phase direct connect meter.



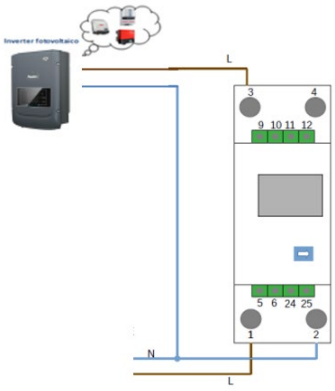
PIN INVERTER	PIN METER	Nota
1	24	Meter communication
2	25	

Meter connections:

1. Connect the Meter and inverter with the Inverter Kit port. On the Meter side, connect to PINs 24 and 25 (as shown in the table) On the inverter side, use the connection port identified as “Kit port,” connecting to PINs 1 and 2 (as shown in the figure).



2. Connect the Meter in “direct connection” mode, specifically:
   - ✓ Connect PIN 2 of the Meter to the neutral cable (N);
   - ✓ Connect PIN 3 respectively to the exchange meter direction phase;
   - ✓ Connect PIN 1 to the photovoltaic system and loads direction phase.



NOTE: For distances between the Meter and inverter **greater than 100 meters**, it is recommended to connect one 120 Ohm resistors along the 485 daisy chain directly to the Meter (PINs 24 and 25).

Setting Meter on external production

2. Press the → button to check that the Meter address is set to **002** and that the protocol is set to **8n1**. In addition to what is described above, the display shows the values of:
   - ✓ Current;
   - ✓ Voltage;
   - ✓ Power factor;
   - ✓ Power.

Protocol

Indirizzo

Corrente

Potenza

Tensione

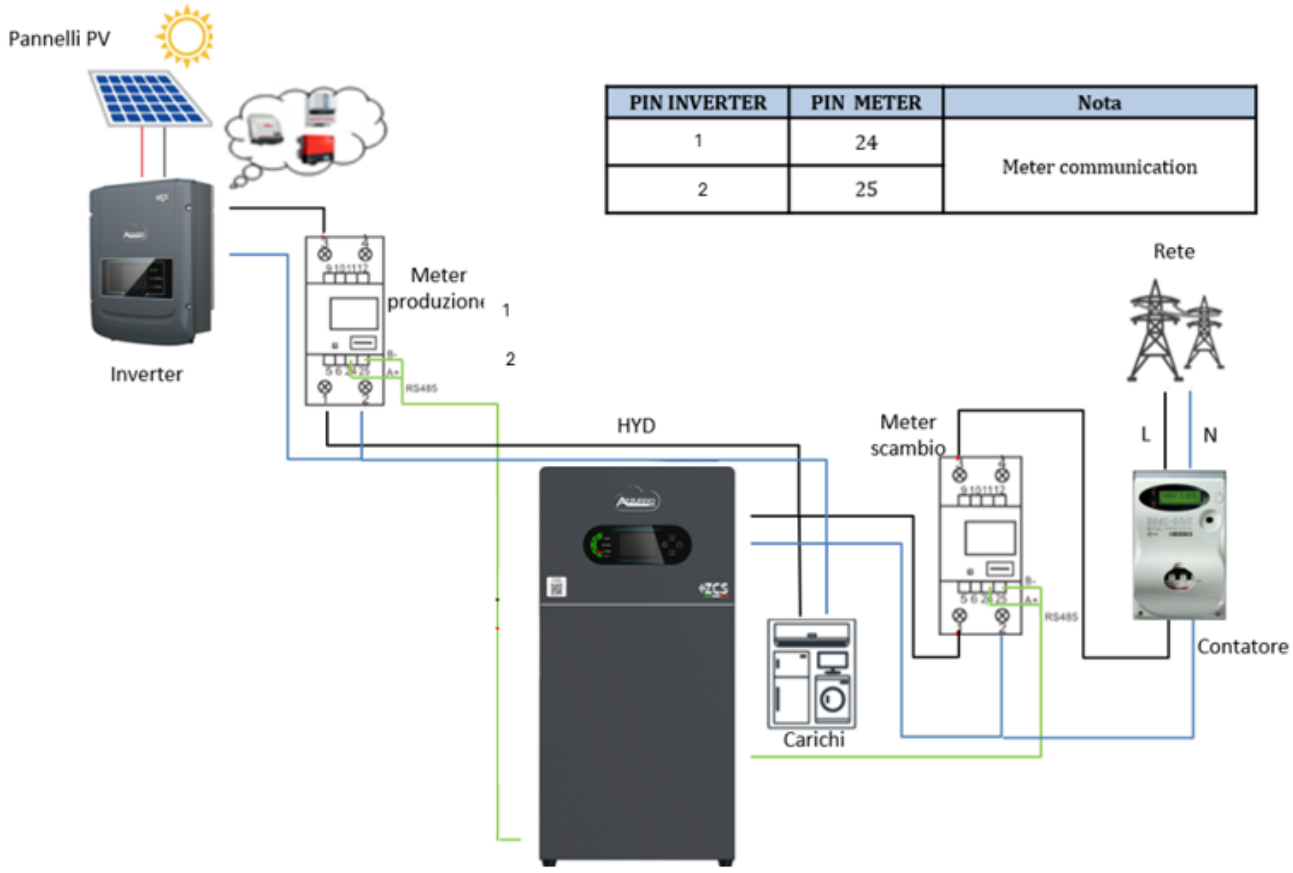
Power factor

To change the parameters of the Meter and set it to external production:

Pressione prolungata per 5 sec → per entrare nel menù settaggi		Si alterneranno il tipo di protocollo e il numero di indirizzo modbus	
Appena si presenterà la schermata con il numero di indirizzo modbus premere la freccia → per incrementare la cifra			

5.5. Setting up exchange meter and production DDSU single-phase Meter

In order to be able to read the exchange and external production via the Meter, it is necessary to purchase two CHINT DDSU single-phase direct connect meters.



PIN INVERTER	PIN METER	Nota
1	24	Meter communication
2	25	

5.6. Checking correct reading of the DDSU single-phase Meter

In order to verify the correct reading of the meter on exchange, make sure that the hybrid inverter and any other PV production sources are switched off. Switch on loads greater than 1 kW. Stand in front of the meter and, using the ➡ button to scroll through the items, check that P is:

1. Greater than 1 kW;
2. In line with household consumption;
3. The sign in front of each negative value (–).

In the case of a meter for reading the production of existing photovoltaic systems, repeat the previous steps:

1. The sign of the powers must be positive for P;
2. Switch on the Hybrid Inverter, leaving the DC-side PV switch in the OFF position, check that the total external PV power value (Pt) is in line with the value shown on the inverter's display.

5.7. Connection of the three-phase DTSU Meter to the exchange

In case of installation of inverter 1PH BZT5000 on three-phase system it is possible to install the three-phase Meter DTSU in addition to the sensors as shown in the figure.
Be sure to position the probes so that each toroid only reads the current flows related to the exchange. To do this it is advisable to place them at the output of the exchange counter.

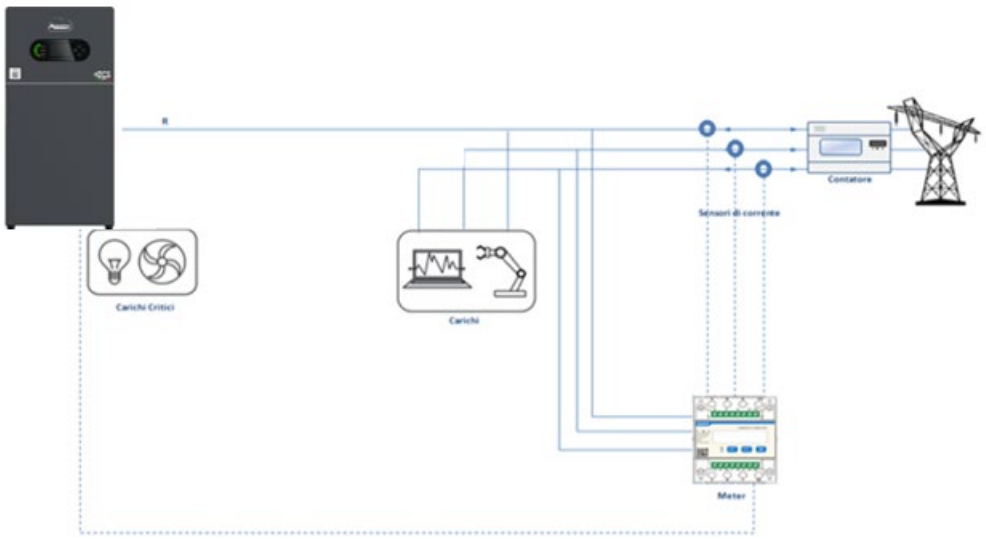


Figure 5 - Hybrid installation scheme with meter on the exchange

The use involves the connection of the sensors to the DTSU Meter and the connection of the latter to the inverter through the Inverter Kit port.
The sensors connected to the Meter must not be stretched for any reason (use the supplied wiring).

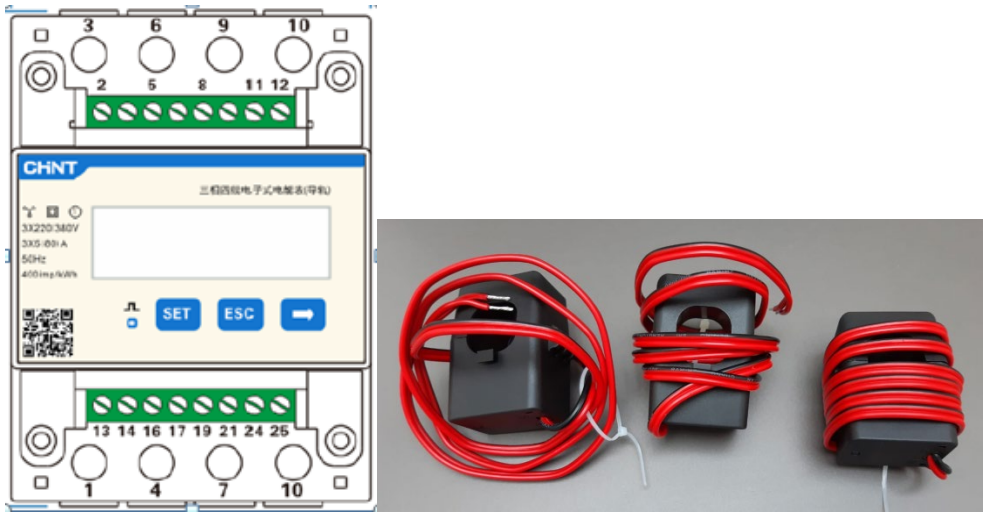


Figure 6 - Meter (left), CT sensors (right)

The connection between Meter and sensors is made by applying the diagram shown in the figure below.
Connect the PIN 10 of the Meter with the neutral cable (N), connect the PIN 2, 5 and 8 respectively to the R, S and T phases.
As for the connections with the CT, the sensor positioned on the R phase must have the terminals connected on PIN 1 (red wire) and PIN 3 (black wire).
The sensor located on the S phase must have the terminals connected on PIN 4 (red wire) and PIN 6 (black wire).
The sensor located on the T phase must have the terminals connected on PIN 7 (red wire) and PIN 9 (black wire).
Place the sensors carefully on the sensor (arrow).

WARNING: Attach the CT to the phases only after connecting them to the Meter.

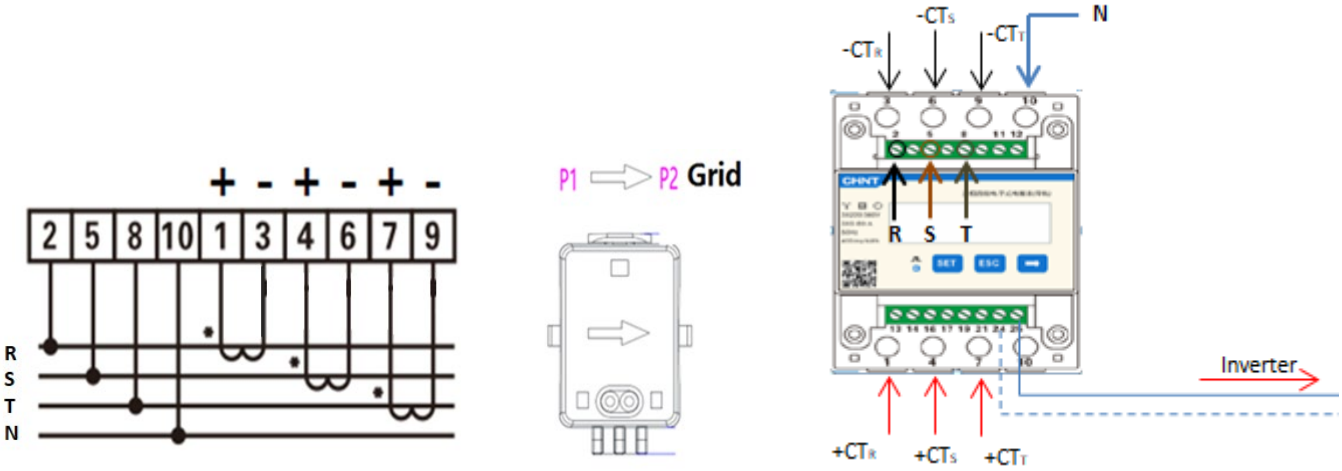


Figure 7 – Meter connection and sensors CT

The connection between Meter and inverter is through the RS485 serial port.
Meter side this port is identified by PIN 24 and 25.
On the inverter side, the connection port identified as Inverter Kit port is used by connecting PIN 1 and 2 as indicated in the figures and tables below.

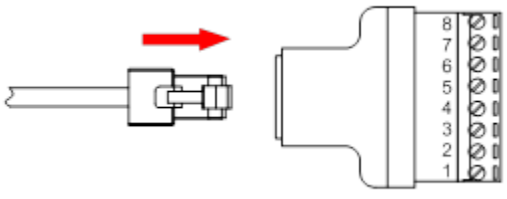


Figure 8 – COM interface

PIN Inverter	Definizione	PIN Meter	Note
1	RS485 differential signal +	24	Meter communication
2	RS485 differential signal -	25	

Table 1 - Interface descriptions

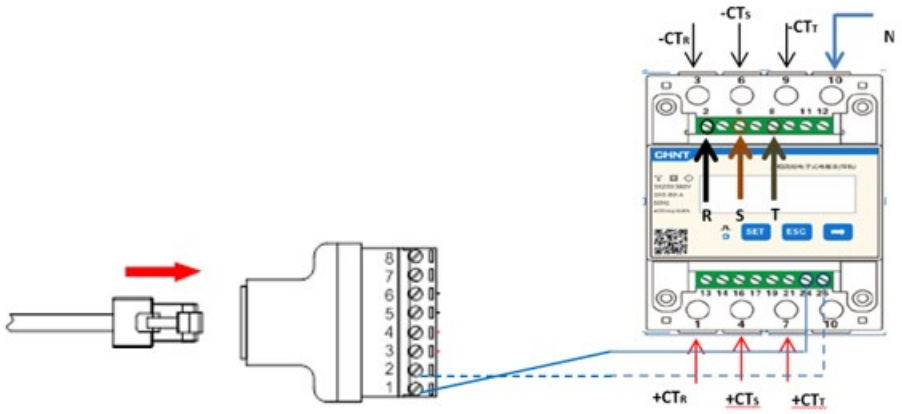


Figure 9 - Serial port connection Meter

NOTE: For distances between the Meter and inverter **greater than 100 meters**, it is recommended to connect one 120 Ohm resistors along the 485 daisy chain directly to the Meter (PINs 24 and 25).

5.8. Measurement of photovoltaic production via three-phase meter DTSU

In the event that one or more three-phase photovoltaic inverters are already present in the system, it is mandatory for the Hybrid system to show the display not only the photovoltaic contribution of the panels connected to its entrances but also the power produced by three-phase photovoltaic external, in order to make the system work for accumulation in a correct way.
All this must be achieved thanks to the connection of a second three-phase DTSU Meter (or more up to a maximum of 3 at the reading of an external production) positioned in an appropriate way to read all the production of the pure photovoltaic system.
As for the RS485 (Meter - HYD) communication, all the Meters present must be connected to the COM port of the inverter in the inputs 1 and 2 of the Inverter Kit port)

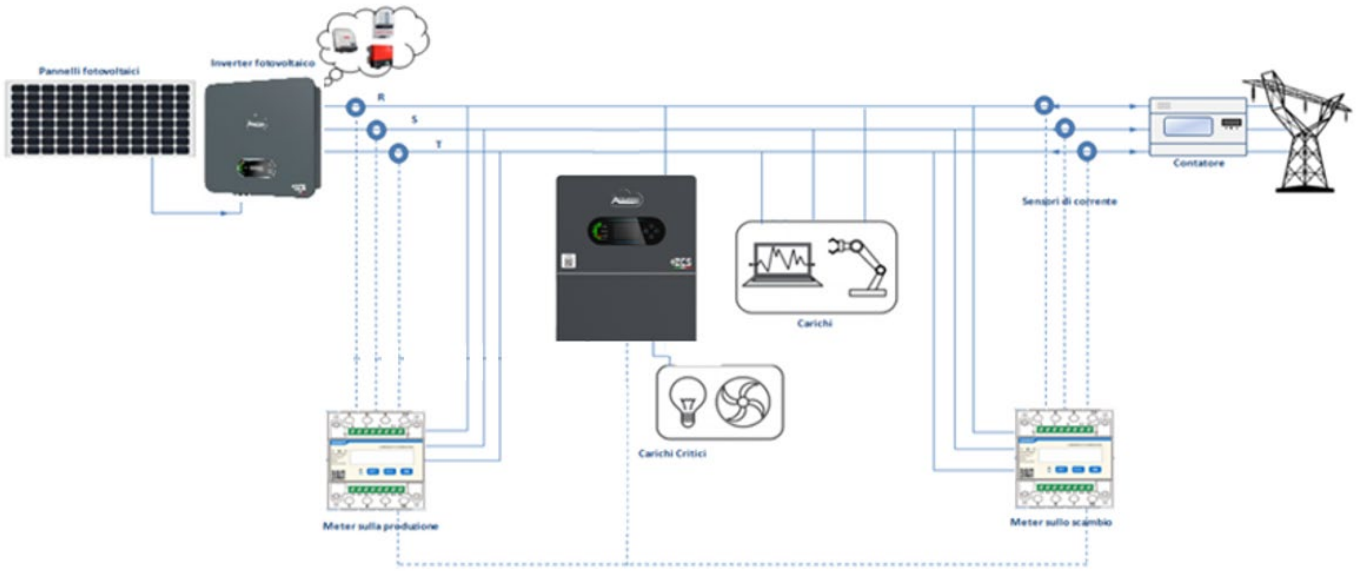


Figure 10 - Hybrid installation scheme with three-phase DTSU Meter on exchange and production

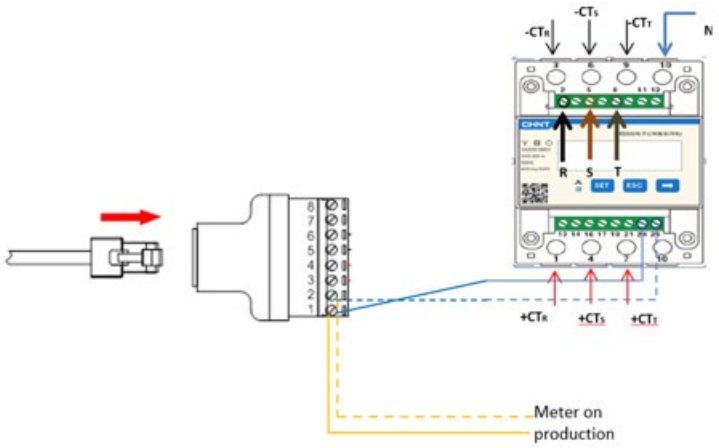


Figure 11 - COM serial port connection with more than one DTSU Meter

5.9. Three-phase DTSU Meter parameter configuration

After you have successfully connected the wiring, you need to set the correct parameters from the Meter display.

1. Press to:
   - "Confirm"
   - "Move the cursor"

   (for entering values)
2. Presso to "go back"
3. Press to "slide"

Figure 12 – Meter legend

Three-phase DTSU Meter configuration to exchange

To view the device in read mode on the exchange you need to enter the settings menu, as indicated below:

1. Press **SET** the inscription will appear **CODE**

2. Press **SET**, the inscription will appear "600":

3. Write the figure "701":
   a. From the first screen where the number "600" appears, press the " key once to enter the number "601".
   b. Press "SET" twice to move the cursor to the left to highlight "601";
   c. Press the"→" key once more until you enter the number "701" (701 is the access code to the settings).

   Note: In case of error press "ESC" and then again "SET" to reset the required code.

1. Confirm by pressing **SET** until you enter the settings menu.
2. Enter the following menus and set the parameters indicated:
   d. **CT**:
      i. Press **SET** to enter the menu
      ii. Write“40”:
         1. From the first screen where the number "1" appears, press"→" repeatedly until the number "10" appears.
         2. Press **"SET"** once to move the cursor to the left to highlight "10”
         3. Press the button ”→” several times until you enter the number "40"

         Note: In the event of an error, press "SET" until the number of thousands is highlighted and then press " " until only the number "1" appears;
         at this point repeat the procedure described above.

      iii. Press “ESC” to confirm “→” to scroll to the next setting

   e. **ADDRESS:**
      i. Leave the address 01 (set by default) in this way the inverter will assign as power relative to the exchange the data sent by the meter.

Three-phase DTSU meter configuration on exchange and production

To view the device in read mode on the exchange you need to enter the settings menu, as indicated below:

4. Press **SET** the inscription will appear **CODE**

5. Press **SET**, the inscription will appear “600”:

6. Write the figure “701”:
   a. From the first screen where the number "600" appears, press the " key once to enter the number "601".
   b. Press "SET" twice to move the cursor to the left to highlight "601";
   c. Press the"→" key once more until you enter the number "701" (701 is the access code to the settings).

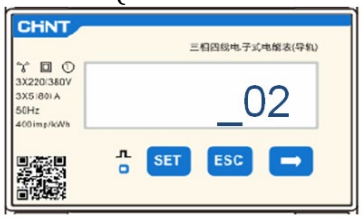
Note: In case of error press "ESC" and then again "SET" to reset the required code.

3. Confirm by pressing **SET** until you enter the settings menu.
4. Enter the following menus and set the parameters indicated:
   d. **CT**:
      i. Press **SET** to enter the menu
      ii. Write“40”:
         1. From the first screen where the number "1" appears, press"→" repeatedly until the number "10" appears.
         2. Press **"SET"** once to move the cursor to the left to highlight "10”
         3. Press the button ”→” several times until you enter the number "40"

Note: In the event of an error, press "SET" until the number of thousands is highlighted and then press " " until only the number "1" appears;
at this point repeat the procedure described above.

iii. Press “ESC” to confirm “→” to scroll to the next setting

a. **ADDRESS**:
   i. Press **SET** for enter Menù:
   ii. Write “02” (press one time ”→” from the screen “01”). With address 02 the inverter will assign the data sent by the meter as relative power to the production. They can be set up to a maximum of 3 Meters for production (Addresses 02 03 04).



iii. Press “ESC” to confirm.

5.10. Correct installation verification DTSU three-phase meter

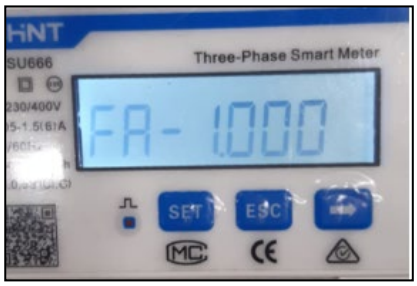
Three-phase DTSU meter verification at exchange

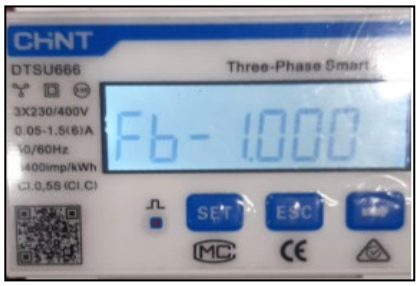
To carry out such verification it is necessary:

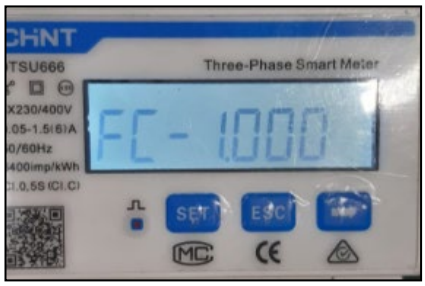
- Turn on the hybrid inverter only in alternation and turn off any other source of photovoltaic production (if any);
- Turn on carchi greater than 1kw for each of the three phases of the plant;

Bring yourself in front of the Meter and using the keys "→" to scroll between the entries and "ESC" to go back, it must be verified that:

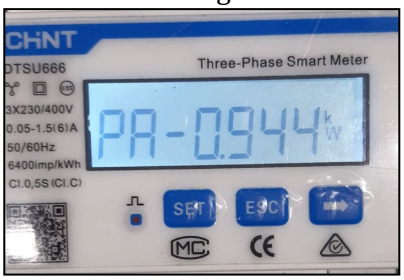
1. The Power Factor values for each phase Fa, Fb, and Fc (voltage to current offset), are between 0.8-1.0. In case of a lower value, the sensor must be moved in one of the other two phases until that value is between 0.8-1.0.

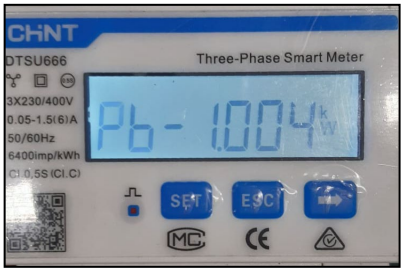


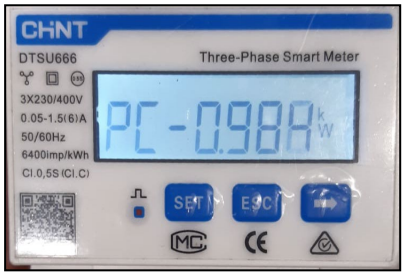




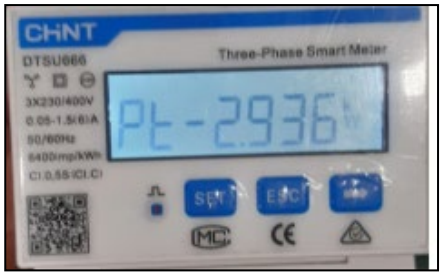
2. The Power Pa, Pb and Pc must be:
    - Greater than 1 kW.
    - In line with household consumption.
    - The sign in front of each negative value (-).

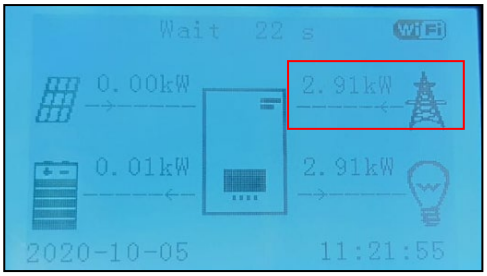






3. Turn on the PV inverter via rotary switch on ON and batteries, verify that the total power value Pt is in line with the value shown on the inverter display





Three-phase DTSU Meter Verification on Production

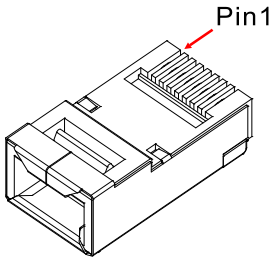
In case of meter on the production it is necessary to repeat the previous operations:

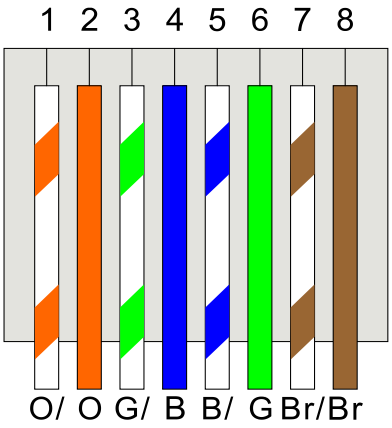
1. Switch off the hybrid inverter and leave on only the pure photovoltaic;
2. Making pure photovoltaic go into production;
3. Power factor verification as described in the previous case;
4. The power sign Pa, Pb, and Pc must be in agreement;
5. Turn on Hybrid Inverter, verify that the total power value Pt photovoltaic is in line with the value shown on the inverter display.

5.11. Link Port

5.11.1. Description

In a system with multiple AC batteries in parallel, you should configure the AC batteries in master or slave mode. Only one battery can be configured as the master in one system, and the CTs or the meters must be connected to master battery for system control.
The parallel AC batteries communicate with each other for data and commands via RS-485 and CAN, and the link cable provided with the AC battery is used specifically for this application. Connect the LP-OUT port of the master battery to the LP-IN port of the first slave battery using the link cable. Then, connect the LP-OUT port of the first slave battery to the LP-IN port of the second slave battery, and so on. Only up to six batteries are allowed to be connected in parallel.





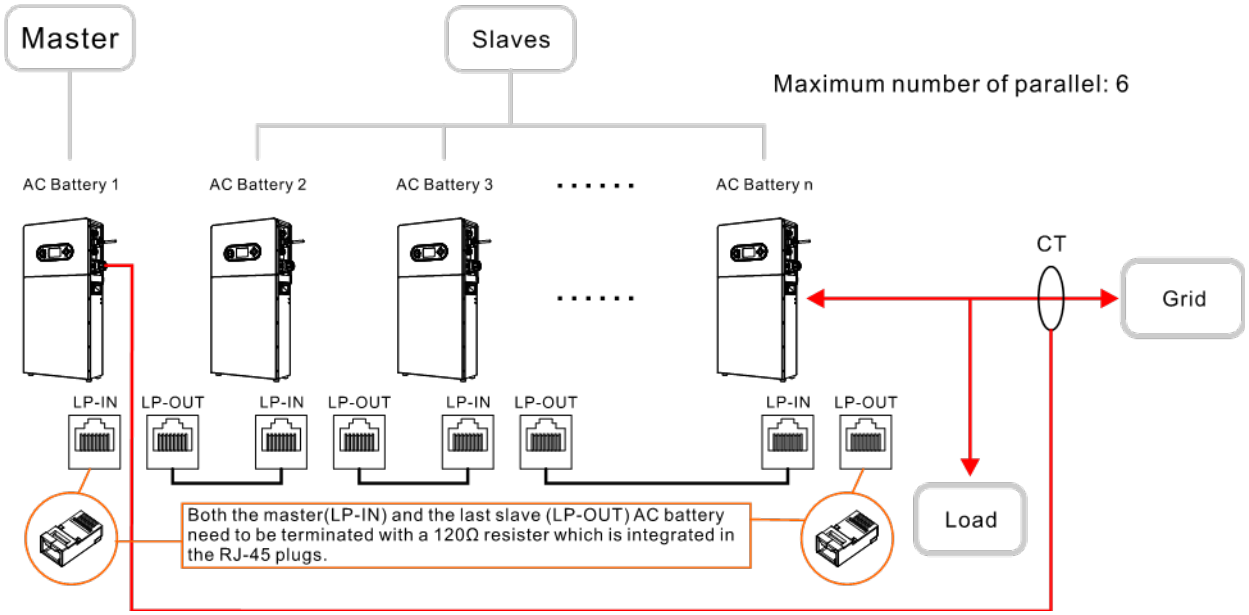
LP-IN

Pin	Wire color	definition
1	Orange and White	RS485_A1
2	Orange	RS485_B1
3	Green and White	Reserved
4	Blue	CAN_H
5	Blue and White	CAN_L
6	Green	Reserved
7	Brown and White	Reserved
8	Brown	Reserved

LP-OUT

Pin	Wire color	definition
1	Orange and White	RS485_A1
2	Orange	RS485_B1
3	Green and White	Reserved
4	Blue	CAN_H
5	Blue and White	CAN_L
6	Green	Reserved
7	Brown and White	Reserved
8	Brown	Reserved

Note	1.Both the master and the last slave AC battery need to be terminated with a 120Ω resister which is integrated in the RJ-45 plugs. 2.Multiple AC batteries connected in parallel should use the same power model.



5.11.2. Installation guide

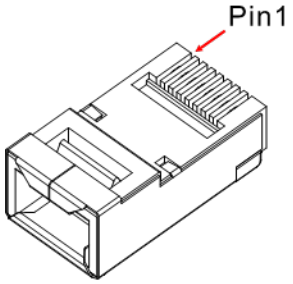
For specific installation steps, refer to the installation steps in section “Installation guide battery side".

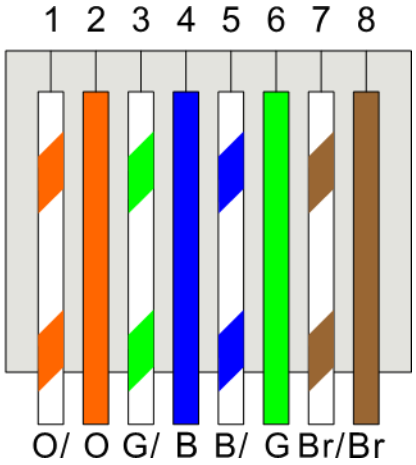
5.12. Inverter logic inerface

Inverter logic interfaces are used to control the AC battery via external signals, typically provided by grid operators via ripple control receivers or other means. Logic interface pins are defined according to different standard requirements.

5.12.1. AS/NZS 4777.2

Logic interface for AS/NZS 4777.2, also known as inverter demand response modes (DRMs). The inverter will detect and initiate a response to all supported demand response commands within 2 s. The inverter will continue to respond while the mode remains asserted.
The specific pin’s definition is shown below.



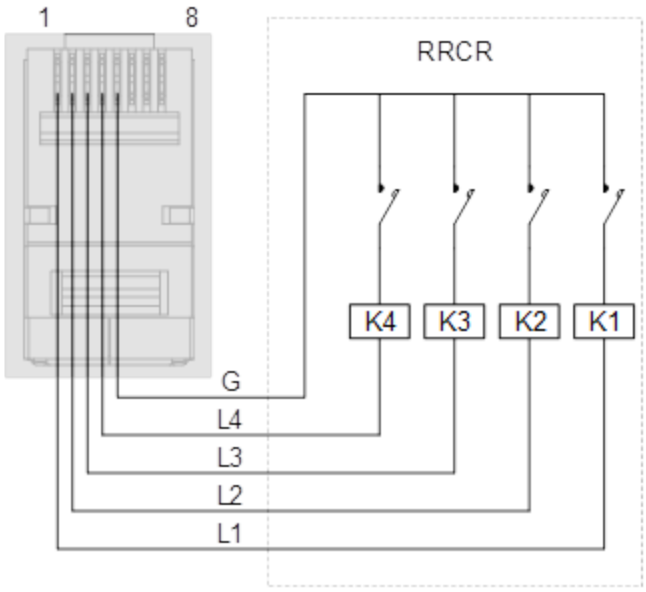


Pin	Wire color	definition
1	Orange and White	DRM1/5
2	Orange	DRM2/6
3	Green and White	DRM3/7
4	Blue	DRM4/8
5	Blue and White	RefGen
6	Green	DRM0
7	Brown and White	\
8	Brown	\

5.12.2. VDE-AR-N 4105

Logic interface for VDE-AR-N 4105, is to control and/or limit the inverter's output power.
The inverter can be connected to a RRCR (Radio Ripple Control Receiver) to dynamically limit the output power of all the inverters in the installation.
The specific pin's description is shown below.

Pin	Name	Description	Connected to (RRCR)
1	L1	Relay contact 1 input	K1 - Relay 1 output
2	L2	Relay contact 2 input	K2 - Relay 2 output
3	L3	Relay contact 3 input	K3 - Relay 3 output
4	L4	Relay contact 4 input	K4 - Relay 4 output
5	G	GND	Relays common node
6	NC	Not Connected	Not Connected
7	NC	Not Connected	Not Connected
8	NC	Not Connected	Not Connected

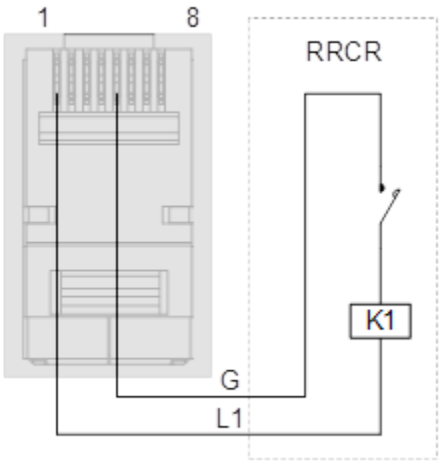


The inverter is pre-configured to the following RRCR power levels, where the relay status is closed as 1, and open as 0.

L1	L2	L3	L4	Active Power	Cos(φ)
1	0	0	0	0%	1
0	1	0	0	30%	1
0	0	1	0	60%	1
0	0	0	1	100%	1

5.12.3. EN50549-1

Logic interface for EN50549-1, is to cease active power output within five seconds following an instruction being received at the input interface.



The specific pin's description is shown below.

Pin	Name	Description	Connected to (RRCR)
1	L1	Relay contact 1 input	K1 - Relay 1 output
2	NC	Not Connected	Not Connected
3	NC	Not Connected	Not Connected
4	NC	Not Connected	Not Connected
5	G	GND	Relays common node
6	NC	Not Connected	Not Connected
7	NC	Not Connected	Not Connected
8	NC	Not Connected	Not Connected

The inverter is pre-configured to the following RRCR power levels, where the relay status is closed as 1, and open as 0.

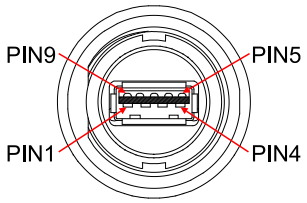
L1	Active Power	Power drop rate	Cos(φ)
1	0%	< 5 seconds	1
0	100%	/	1

5.12.4. Installation guide

For specific installation steps, refer to the installation steps in section "Installation guide battery side".

5.12.5. Data logger link port

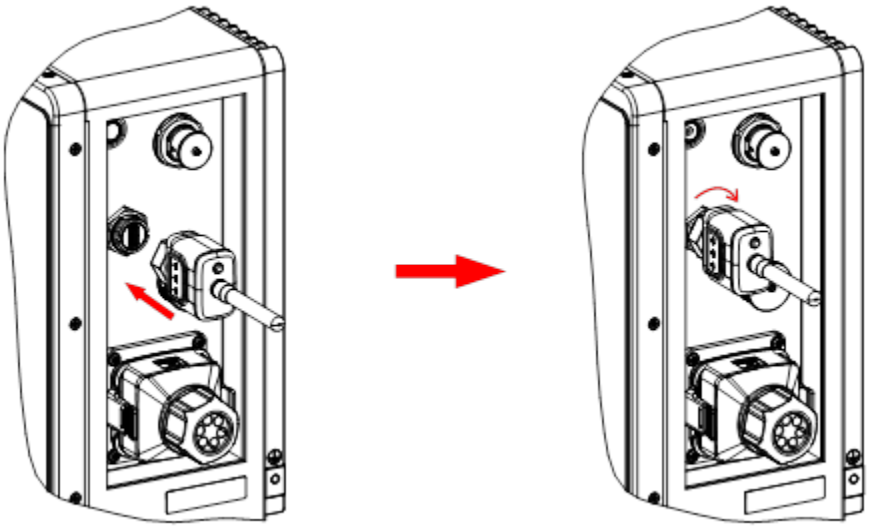
Through the USB interface, you can power on and connect the data logger.



Pin	definition
1	V+
2	D-
3	D+
4	GND
5	Reserved
6	Reserved
7	NC
8	NC
9	NC

5.12.6. Install data logger

Please follow the steps and diagram below:
Step 1: Remove the protective cap on the USB interface.
Step 2: Insert the Wi-Fi/4G data logger into the USB interface.
Step 3: Tighten the connecting nut.

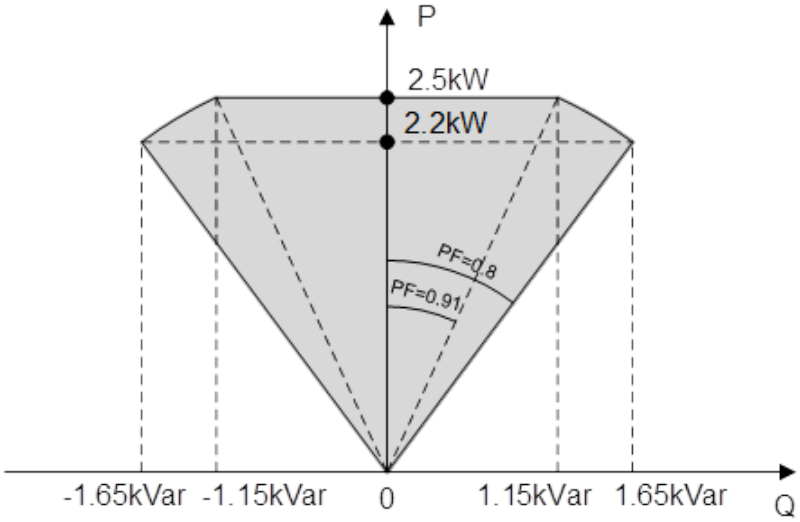


5.12.7. Introductions of reactive power modes

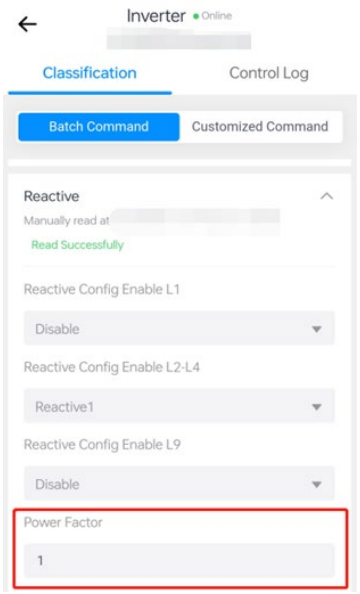
The AC battery can support the grid by providing reactive power in 6 different modes. The MODE1 to MODE4 are for installation personnel, MODE5 and MODE6 are only shown for professionals or engineers.
NOTE:

1) Reactive power control methods are considered only in the discharge state.
2) All parameters related to power and voltage are expressed as percentages.

MODE1: Reactive power regulation through fixed power factor
The adjustable range of power factor PF is 0.8 leading-0.8 lagging. After the fixed power factor is set, the reactive power is calculated according to the current active power. The shaded part of the figure below shows the reactive power calculated from the fixed power factor and active power.



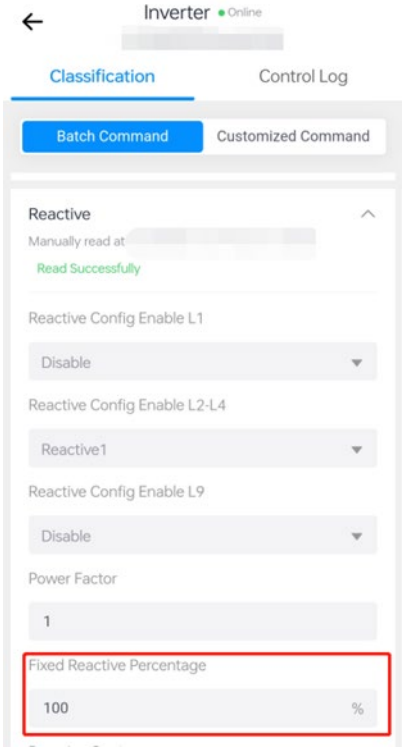
The interface of the APP is shown below.



MODE2*: Reactive power regulation through a fixed value*

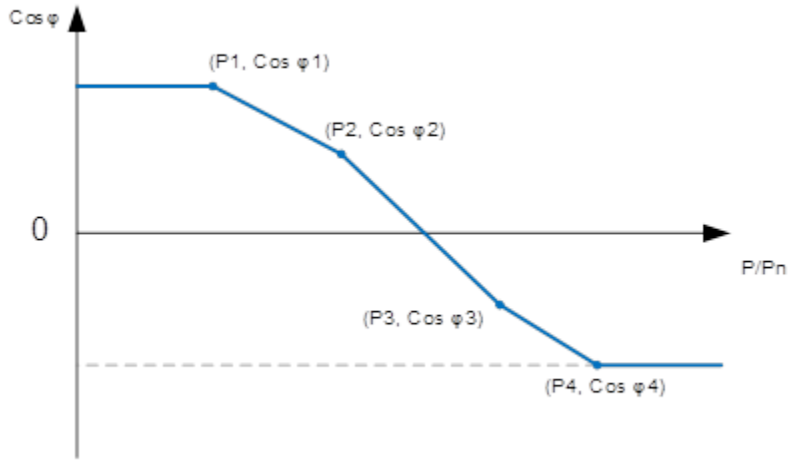
The adjustable range of reactive power percentage is -60% to 60% Pn. In this mode, set a fixed percentage of the rated power, the system will output a fixed reactive power.

For example, the rated active power of AC battery is 2.5kW. If the reactive power percentage is set to 40%, the reactive power output is 2.5*40%= 1kVar.



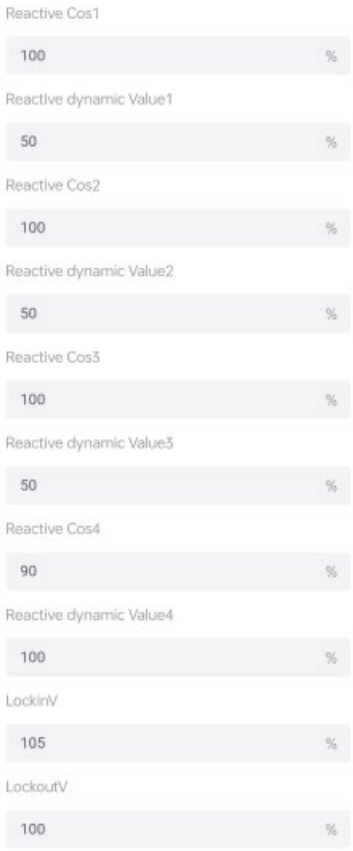
MODE3: Reactive power regulation changing with the active power

In this mode, we can set four active power levels along with their corresponding power factors as the system operating points. The system will follow the curve formed by these four operating points, outputting the corresponding reactive power at different active power levels. The curve of active power and power factor is shown in the figure:



Parameter	Description	Range
Cosφ1	Power factor Cosφ1 at active power P1 on the PF vs P curve, and it corresponds to the Reactive Cos1 of the APP	±0.8~±1
P1	Output active power point P1 on the PF vs P curve, and it corresponds to the Reactive Dynamic Value1 of the APP	0~100%
Cosφ2	Power factor Cosφ2 at active power P2 on the PF vs P curve, and it corresponds to the Reactive Cos2 of the APP	±0.8~±1
P2	Output active power point P2 on the PF vs P curve, and it corresponds to the Reactive Dynamic Value2 of the APP	0~100%
Cosφ3	Power factor Cosφ2 at active power P3 on the PF vs P curve, and it corresponds to the Reactive Cos3 of the APP	±0.8~±1
P3	Output active power point P3 on the PF vs P curve, and it corresponds to the Reactive Dynamic Value3 of the APP	0~100%
Cosφ4	Power factor Cosφ2 at active power P4 on the PF vs P curve, and it corresponds to the Reactive Cos4 of the APP	±0.8~±1
P4	Output active power point P4 on the PF vs P curve, and it corresponds to the Reactive Dynamic Value4 of the APP	0~100%

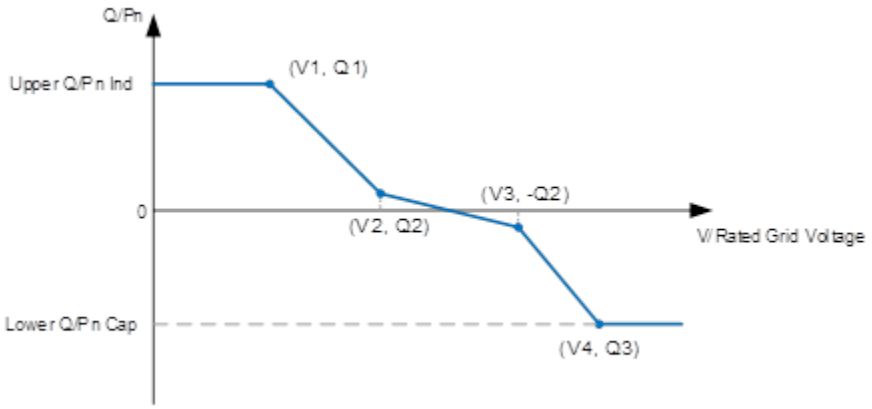
The interface of the APP is shown below.



In this mode, there is also a configurable voltage activation function.
If this function is enabled, it is necessary to set a voltage percentage threshold value LockinV for activating MODE3 and a voltage percentage threshold value LockoutV for deactivating MODE3.
When the grid voltage percentage is greater than the threshold value LockinV, reactive power MODE3 operates

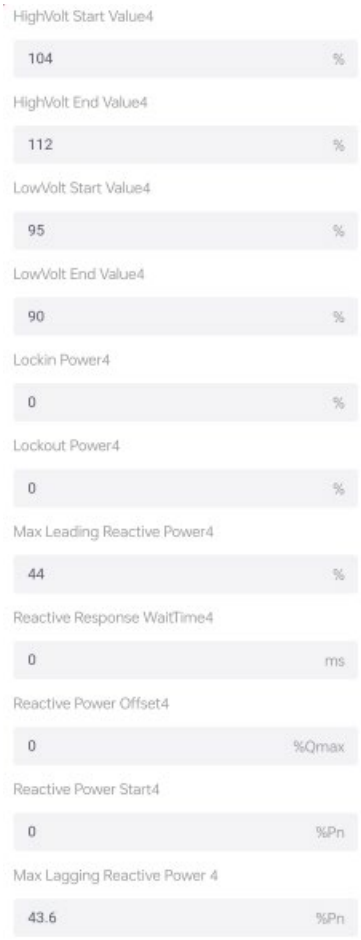
normally.
When the grid voltage percentage is lower than the threshold value LockoutV, the system does not output reactive power.
The value between LockoutV and LockinV is the hysteresis area, designed to prevent reactive power output fluctuations when the voltage is near the threshold.
If this function is disabled, the system output reactive power in MODE3 without voltage judgment.

MODE4: Reactive power continuously changes with grid voltage
In this mode, we can set four voltage levels along with their corresponding reactive power as the system operating points. The system will follow the curve formed by these four operating points, outputting the corresponding reactive power at different voltage levels. The curve of voltage and reactive power is shown in the figure:



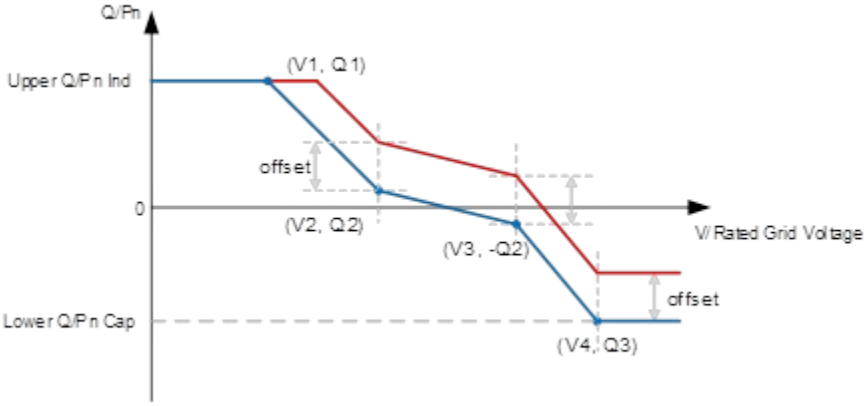
Parameter	Description	Range
V1	Ending voltage point V1 of low voltage of the Q vs Grid voltage curve, and it corresponds to the LowVolt End Value4 of the APP	0~200%
V2	Starting voltage point V2 of low voltage of the Q vs Grid voltage curve, and it corresponds to the LowVolt Start Value4 of the APP	0~200%
V3	Starting voltage point V3 of high voltage of the Q vs Grid voltage curve, and it corresponds to the HighVolt Start Value4 of the APP	0~200%
V4	Ending voltage point V4 of high voltage of the Q vs Grid voltage curve, and it corresponds to the HighVolt End Value4 of the APP	0~200%
Q1	The maximum lagging reactive power Q1 on the Q vs Grid voltage curve, and it corresponds to the Max Lagging Reactive Power4 of the APP	0~60%
Q2	The reactive power Q2 between the low voltage starting point V2 and the high voltage starting point V3 on the Q vs Grid voltage curve. It corresponds to the Reactive Power Start4 of the APP.	0~60%
Q3	The maximum leading reactive power Q3 on the Q vs Grid voltage curve, and it corresponds to the Max Leading Reactive Power4 of the APP	0~60%

The interface of the APP is shown below.



There are some additional parameters that need to be configured in MODE4, the description of these parameters is shown in the table below.

Parameter	Description	Range
Lockin Power4	Active power threshold value for activating MODE4. When the active power exceeds this threshold, the system will output the reactive power as set.	0~100%
Lockout Power4	Active power threshold value for deactivating MODE4. When the active power below this threshold, the system will stop outputting reactive power.	0~100%
Reactive Power WaitTime4	The delay time from the active power reach Lockin Power4 to the start of reactive power output.	0~65535ms
Reactive Power Offset4	The reactive power offset setting. It causes the entire power curve to shift based on the set offset value.	-60%~60%

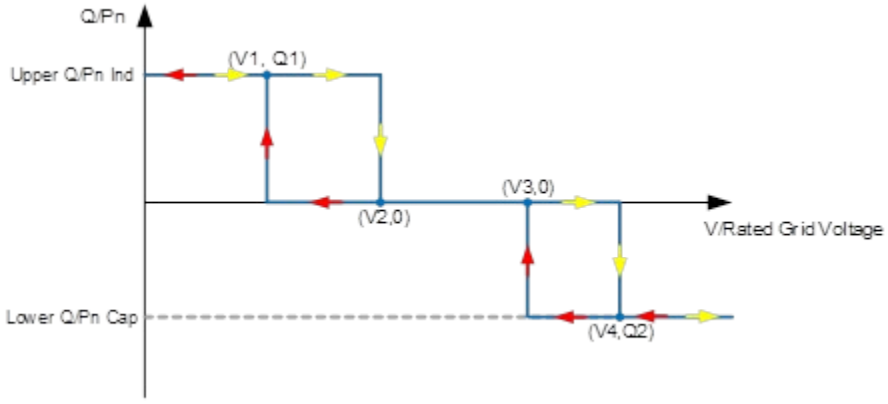


MODE5: Reactive power discontinuously changes with grid voltage

In this mode, we can set four voltage levels along with their corresponding reactive power as the system operating points. The system will follow the curve formed by these four operating points, outputting the corresponding reactive power at different voltage levels.

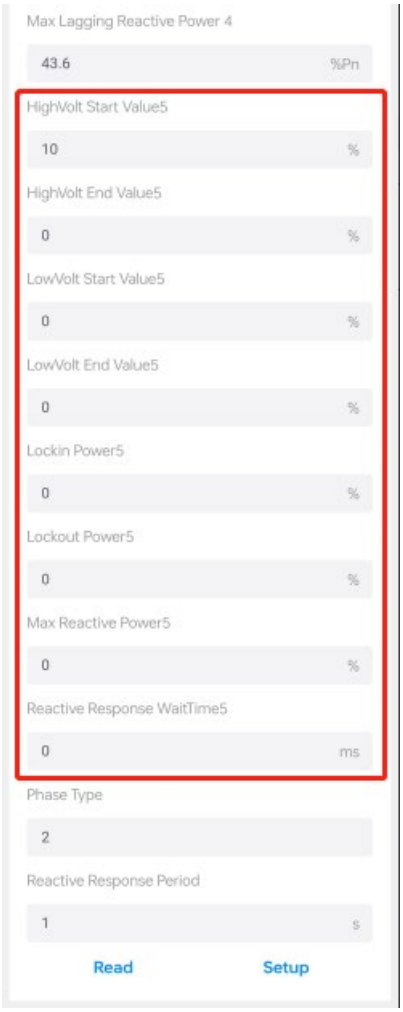
Unlike MODE4, the change in reactive power in this mode is discontinuous.

The curve of voltage and reactive power is shown in the figure:



Parameter	Description	Range
V1	Starting voltage point V1 of low voltage on the Q vs Grid voltage curve, and it corresponds to the LowVolt Start Value5 of the APP	0~200%
V2	Ending voltage point V2 of low voltage on the Q vs Grid voltage curve, and it corresponds to the LowVolt End Value5 of the APP	0~200%
V3	Ending voltage point V3 of high voltage on the Q vs Grid voltage curve, and it corresponds to the HighVolt End Value5 of the APP	0~200%
V4	Starting voltage point V4 of high voltage on the Q vs Grid voltage curve, and it corresponds to the HighVolt Start Value5 of the APP	0~200%
Q1	The maximum lagging/leading reactive power on the Q vs Grid voltage curve, and it corresponds to the Max Reactive Power5 of the APP	0~60%
Q2		

The interface of the APP is shown below.



There are some additional parameters that need to be configured in MODE5, the description of these parameters is shown in the table below.

Parameter	Description	Range
Lockin Power5	Active power threshold value for activating MODE5. When the active power exceeds this threshold, the system will output the reactive power as set.	0~100%
Lockout Power5	Active power threshold value for deactivating MODE5. When the active power below this threshold, the system will stop outputting reactive power.	0~100%
Reactive Power WaitTime5	The delay time from the active power reach Lockin Power5 to the start of reactive power output.	0~65535ms

MODE6: Reactive power regulation with maximum apparent power

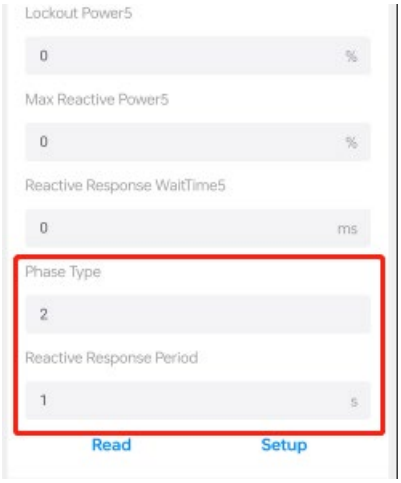
In this mode, the system adjusts the reactive power to ensure that it always operates at maximum apparent power output.

There are 2 limitations:

1) The maximum apparent power is 110% of the rated power
2) The maximum reactive power is 60% of the rated power

If the active power does not reach 92% of the rated active power, the system will output the reactive power at 60% of the rated active power.

The interface of the APP is shown below.



There are some additional parameters that need to be configured in MODE5, the description of these parameters is shown in the table below.

Parameter	Description	Range
Phase Type	Phase Type defines the operation mode of the system: 0: Output no reactive power 1: Output lagging reactive power 2: Output leading reactive power	0,1,2
Reactive Response Period	The time from the start of reactive power adjustment to the end of the adjustment.	0~30s

6. Buttons and indicator lights

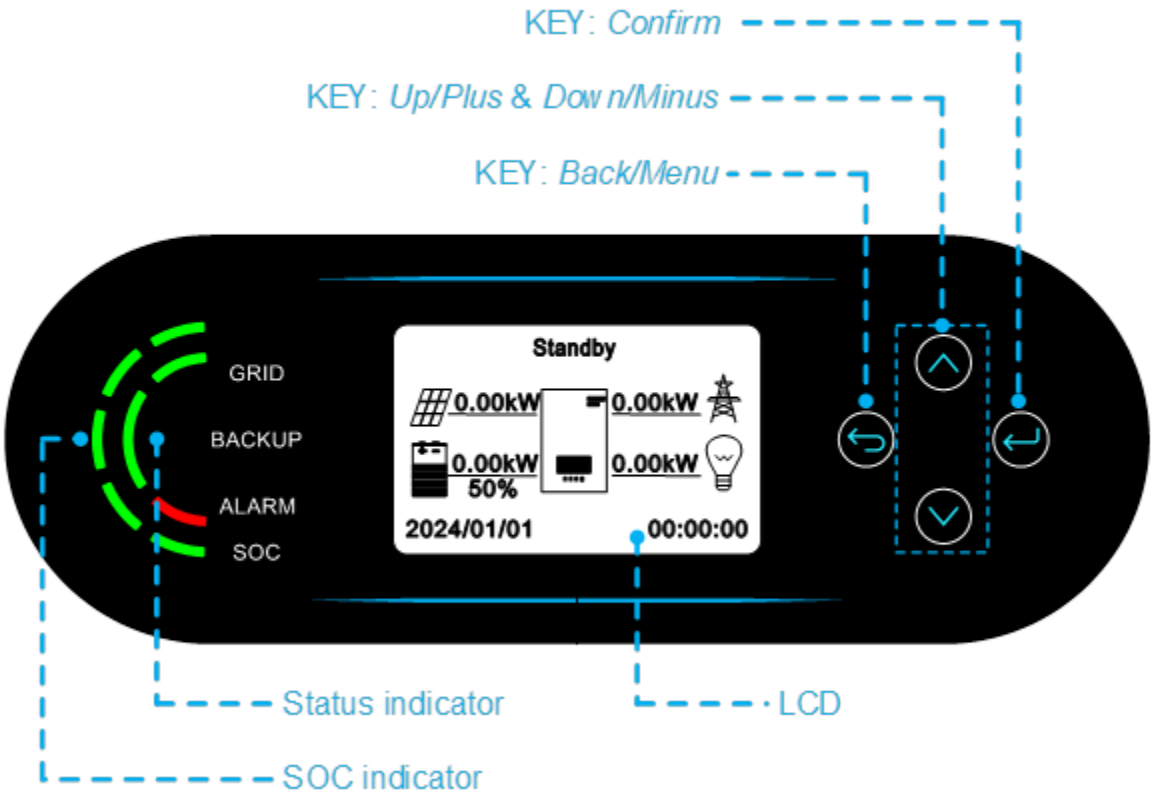


Figure 13– Buttons and indicator lights

6.1. Buttons:

The LCD shows the energy flow of the photovoltaic energy storage system and can also be used with keys to enter the menu page for a series of settings.

- Press "back" to the previous screen or enter the main interface.
- Press "up" to the upper menu option or value plus 1.
- Press "down" to the lower menu option or value minus 1.
- Press "ok" to select the current menu option or switch to the next digit.

6.2. LED indicators

There are two types of indicator LEDs on this product: system status LEDs and battery State of Charge (SOC)

indicator LEDs.
The relevant indicator LED display instructions are shown in the table below.

LED / System status	Grid	Backup	Alarm
Standby detection	Flashing	Off	Off
On-Grid operation	On	Off	Off
Off-Grid operation	Off	On	Off
fault status	Off	Off	On
software upgrade	On	On	On

Table 1-Table System status indicator display description

Discharge status battery indicator					
LED / Definition	L1	L2	L3	L4	L5
SOC<5%	OFF	OFF	OFF	OFF	OFF
5% ≤ SOC<20%	ON	OFF	OFF	OFF	OFF
20% ≤ SOC<40%	ON	ON	OFF	OFF	OFF
40% ≤ SOC<60%	ON	ON	ON	OFF	OFF
60% ≤ SOC<80%	ON	ON	ON	ON	OFF
80% ≤ SOC	ON	ON	ON	ON	ON

Table 2- Table battery indicator display description

Charge status battery indicator					
LED / Definition	L1	L2	L3	L4	L5
SOC<20%	0.5s Flashing	OFF	OFF	OFF	OFF
20% ≤ SOC<40%	ON	0.5s Flashing	OFF	OFF	OFF
40% ≤ SOC<60%	ON	ON	0.5s Flashing	OFF	OFF
60% ≤ SOC<80%	ON	ON	ON	0.5s Flashing	OFF
80% ≤ SOC	ON	ON	ON	ON	0.5s Flashing

Table 3- Table battery indicator display description

7. System commissioning

7.1. Safety inspection before commissioning

Caution	Check voltage range The AC voltage should be within the allowed voltage range of the AC battery.

7.2. Checks carefully

Please ensure that the AC battery and all wiring are installed correctly, safely, securely, and meet all environmental requirements.
Please check the following items carefully before running:

- ✓ The AC battery module must be secured to the wall.
- ✓ The grid voltage is within specifications.
- ✓ All LED indicators and LCD of the AC battery are off.
- ✓ The terminal resistor of communication should be connected correctly.
- ✓ Unused interfaces should be covered with sealing plugs.
- ✓ The cable is reasonably arranged, neat and not damaged.

7.3. Power on and shutdown

7.3.1. Button activation

Press and hold the On/Off button for more than 5 seconds or release the button after hearing the power-on beep (two short beeps).
Check the operating status of the AC battery by observing the LCD and the LED indicators on the front panel.

7.3.2. Grid activation

Close the switch/breaker connecting the AC battery to the grid, and then you can hear the power-on beep (two short beeps).
Check the operating status of the AC battery by observing the LCD and the LED indicators on the front panel.

7.3.3. Battery shutdown

Open the switch/breaker connecting the AC battery to the grid.
Press and hold the On/Off button for more than 3 seconds or release the button after hearing the power-off prompt (three long beeps).

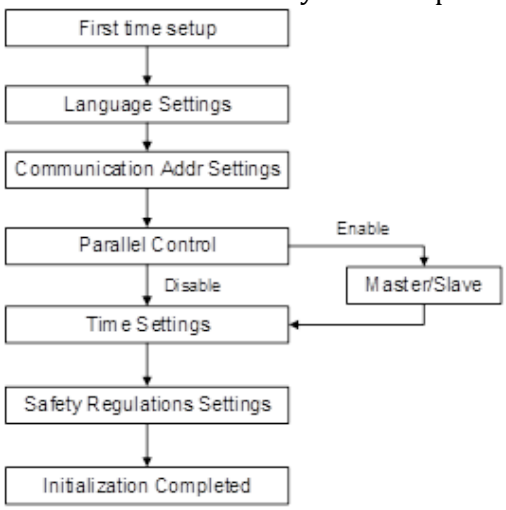
7.4. Operations of keys and LCD

7.4.1. First start-up of the inverter

IMPORTANT: PLEASE FOLLOW THE FOLLOWING PROCEDURE TO TURN ON THE AC BATTERY.

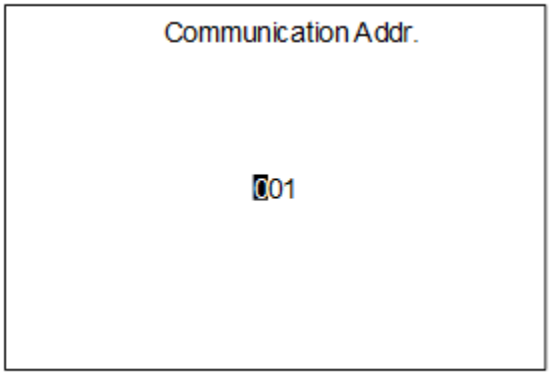
1. Close the AC circuit breaker between the AC battery ON-GRID port and the grid.
2. The AC battery should start to operate now (see section “Grid activation”).

You need to set the following parameters before the battery start to operate.

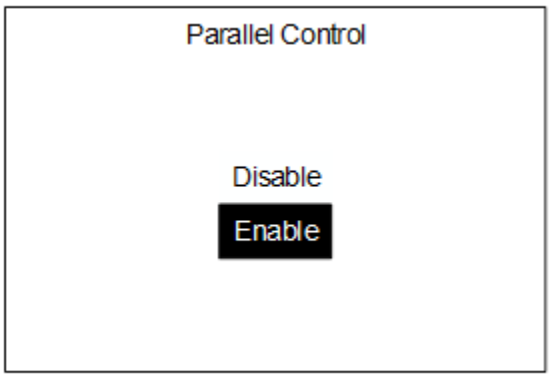


1. Select Language: Select the Language for the AC battery.

2. Set Communication Addr: Set the communication address for the AC battery.

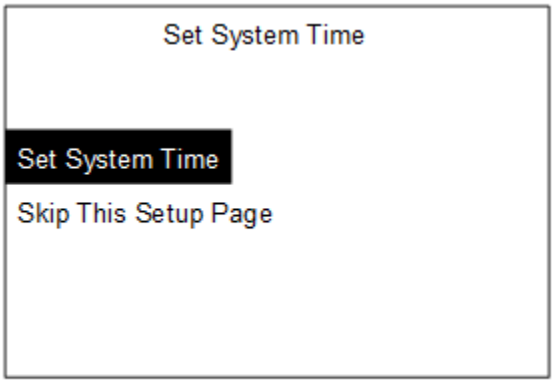


3. Set Parallel Control: Set the parallel control for the AC battery.

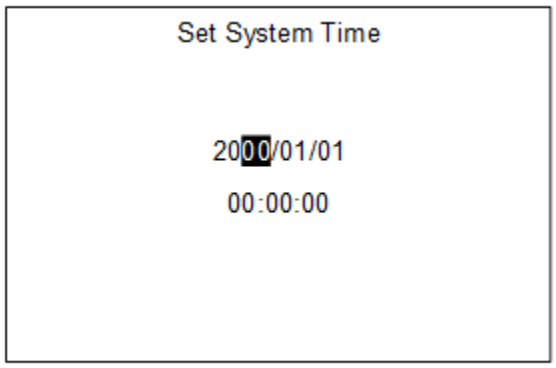


If you select “Disable”, you will direct enter the system time setting interface. And if you select “Enable”, you will enter the Master/Slave setting interface.

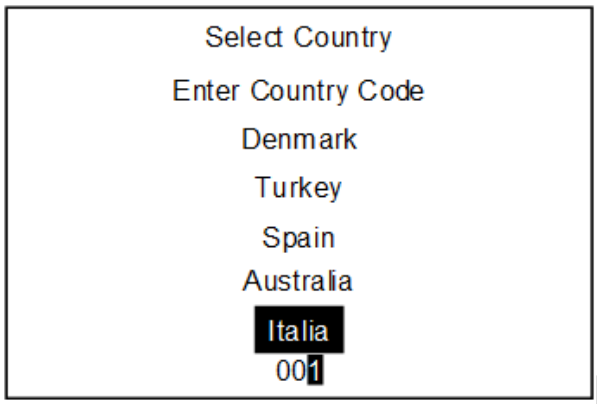
4. Set system time: Set the system time for the AC battery.

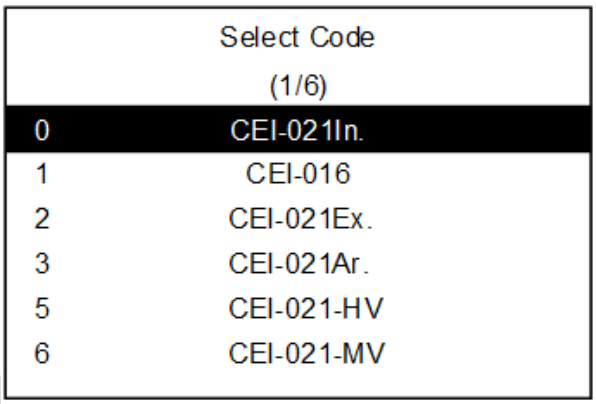


If you select “Skip This Setup Page”, you will direct enter the language setting interface. And if you select “Set System Time”, you will enter the system time setting interface.



5. Set country: Set up the safety regulation country that meets the current use conditions and requirements.





Code	Country	Code	Country	Code	Country
000	Germany	019	EN61727	039	Ireland
001	Italia	020	Korea	040	Thailand
002	Australia	021	Sweden	044	South Africa
003	Spain	022	Europe General	046	Dubai
004	Turkey	024	Cyprus	107	Croatia
005	Denmark	025	India	108	Lithuania
006	Greece	026	Philippines	109	Estonia
007	Netherland	027	New Zealand	111	Columbia
008	Belgium	028	Brazil	112	Chile
009	UK	029	Slovakia	121	Saudi Arabia
010	China	030	Czech	122	Latvia
011	France	031	Slovenia	123	Romania
012	Poland	033	Ukraine	124	Tunisia
013	Austria	034	Norway	125	Finland
015	Switzerland	035	Mexico	126	Hungary
018	EU	038	60Hz Wide Range		

NOTE: Different distribution network operators in different countries have different requirements regarding

grid connections of the AC battery.
Therefore, it's very important to make sure that you have selected the correct country code according to requirements of local authority.
Please consult qualified electrical engineer or personnel from electrical safety authorities about this.
Zucchetti Centro Sistemi assumes no responsibility for any consequences arising out of incorrect country code selection.

7.4.2. Main menu

In the main interface, press the "back/menu" button to enter the main menu. The main menu has the following 6 items, which will be introduced in the following sections.

Main Screen	------Press "Back"
	1.System Settings
	2.Advanced Settings
	3.Energy Statistic
	4.System Information
	5.Event List
	6.Software Upgrade

7.4.3. Basic settings

Select "1. System Settings", press "Confirm" to enter system setting interface.

1.System Settings	------Press "Confirm"
2.Advanced Settings	1.Language Settings
3.Energy Statistic	2.Time
4.System Information	3.Safety Param.
5.Event List	4.Energy Storage Mode
6.Software Upgrade	5.Auto test
	6.EPS Mode
	7.Communication Addr.
	8.Generators Control

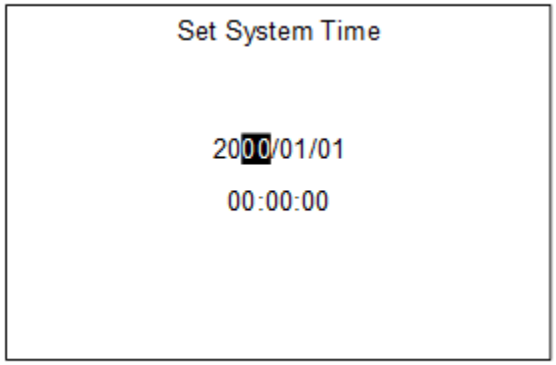
7.4.3.1. Set language

Select "1. Language Settings", press "Confirm" to enter language setting interface.

Set the AC battery display language.
Easier Way: press “Back” and “Confirm” at the same time to change system language.

7.4.3.2. Set Time

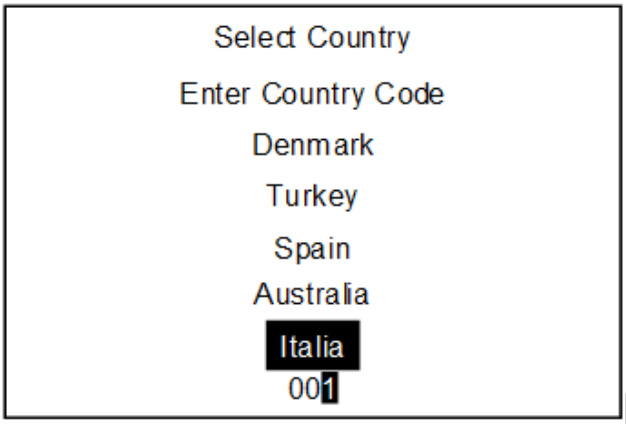
Select “2. Time”, press “Confirm” to enter system time setting interface.

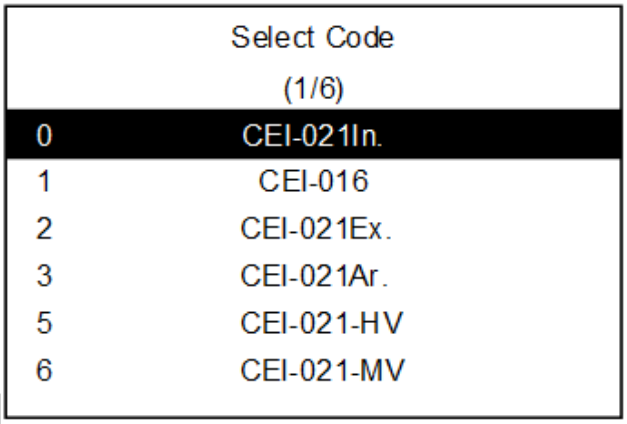


Set the system time for the AC battery.

7.4.3.3. Safety Parameter.

Select “3. Safety Param.”, press “Confirm”, select “1. Select Country”, press “Confirm” to enter the safety regulation country setting interface.





Set up the safety regulation country that meets the current use conditions and requirements.

7.4.3.4. Energy Storage Mode

Select “4. Energy Storage Mode”, press “Confirm” to enter energy storage mode setting interface.

1.Language Setting	
2.Time	
3.Safety Param.	
4.Energy Storage Mode	------Press “Confirm”
5.Auto test	1.Self-use Mode
6.EPS Mode	2.Time-of-use Mode
7.Communication Addr.	3.Timing Mode
8.Generators Control	4.Passive Mode

Please refer to section “Energy storage mode” for more details.

7.4.3.5. Autotest

Select “5. Auto test”, press “Confirm” to enter auto test setting interface.

1.Language Setting	
2.Time	
3.Safety Param.	
4.Energy Storage Mode	
5.Auto test	------Press “Confirm”
6.EPS Mode	1.Autotest Fast
7.Communication Addr.	2.Autotest STD
8.Generators Control	3.PF Time Setting
	4.QV Time Setting
	5.Set Freq Protection

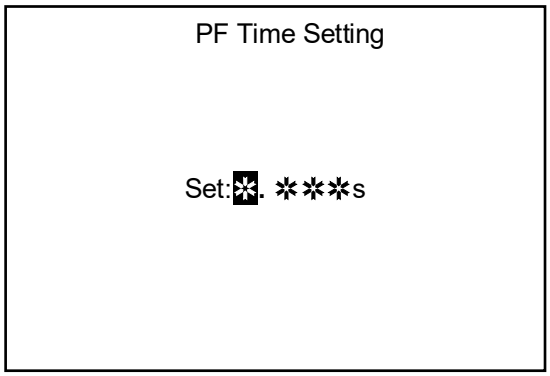
1) Select “1. Autotest Fast”, press “Confirm” to enter fast test interface.

Autotest Fast	
Test 59.S1...	
↓	Wait
pass	
↓	Wait
Test 59.S2...	
↓	Wait
pass	
↓	Wait
Test 27.S1...	
↓	Wait
pass	
↓	Wait

Test 27.S2...	
↓	Wait
pass	
↓	Wait
Test 81>S1...	
↓	Wait
pass	
↓	Wait
Test 81>S2...	
↓	Wait
pass	
↓	Wait
Test 81>S2...	
↓	Wait
pass	
↓	Wait
Test 81<S1...	
↓	Wait
pass	
↓	Wait
Test 81<S2...	
↓	Wait
pass	
↓	Wait
Test 81<S2...	
↓	Wait
pass	

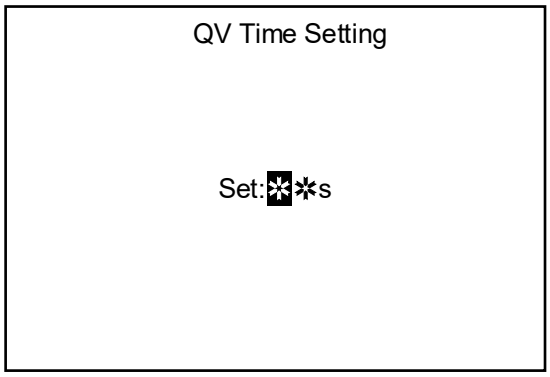
2) Select “2. Autotest STD”, press “Confirm” to enter standard test interface. The test procedure is the same as the Autotest Fast but takes much longer.

3) Select “3.PF Time Setting”, press “Confirm” to enter PF time setting interface.

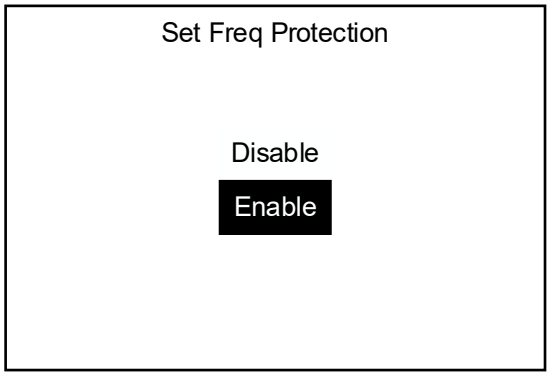


4) Press "Up" or "Down" to change the first number, press "Confirm" to move to the next number. After changing all the numbers, press “Confirm.”

5) Select “4.QV Time Setting”, press “Confirm” to enter QV time setting interface.



6) Press "Up" or "Down" to change the first number, press "Confirm" to move to the next number. After changing all the numbers, press “Confirm.”
7) Select “5.Set Freq Protection”, press “Confirm” to enter Over or Under Frequency Protection setting interface.

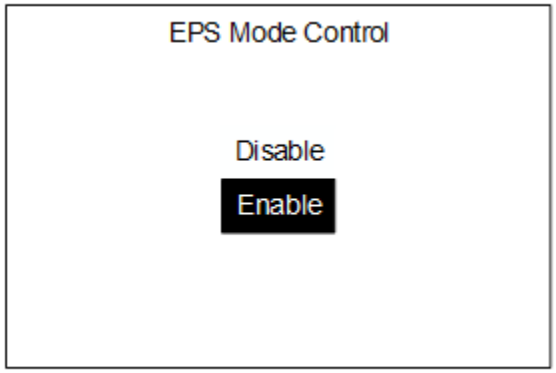


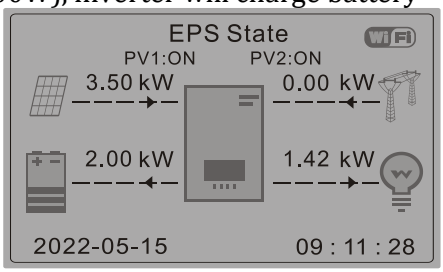
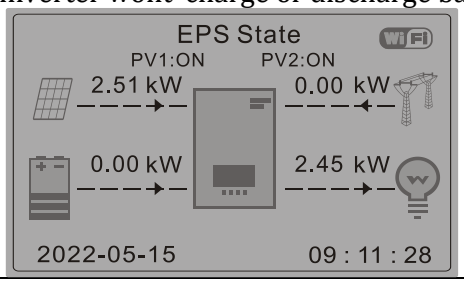
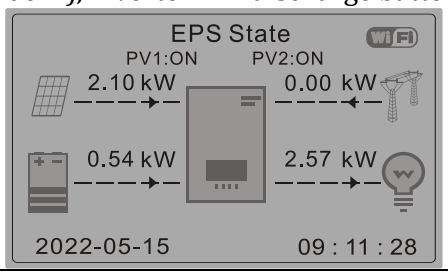
NOTE: The auto test should be conducted when the AC battery is On-Grid.

7.4.3.6. EPS mode

Select “5.EPS Mode”, press “Confirm”, select “1.EPS Mode Control”, press “Confirm” to enter EPS mode control interface. And then enable or disable EPS mode control.

1.Language Setting	
2.Time	
3.Safety Param.	
4.Energy Storage Mode	
5.Auto test	
6.EPS Mode	------Press “Confirm”
7.Communication Addr.	1.EPS Mode Control
8.Generators Control	



1） If PV generation > LOAD consumption (ΔP > 100W), inverter will charge battery 	2） If PV generation = LOAD consumption(ΔP > 100W), inverter wont' charge or discharge battery. 
3） If PV generation < LOAD consumption (ΔP ＞ 100W), inverter will discharge battery. 	

7.4.3.7. Communication address

Select "6. Communication Addr.", press "Confirm" to enter communication address setting interface.

1.Language Setting	
2.Time	
3.Safety Param.	
4.Energy Storage Mode	
5.Auto test	
6.EPS Mode	
7.Communication Addr.	------Press "Confirm"
8.Generators Control	1.Communication Addr.
	2.Baud Rate

1) Communication Address.
Select "1. Communication Addr.", press "Confirm" to enter communication address setting interface.
Set the communication address (when you need to monitor multiple AC batteries simultaneously), default 001.
2) Baud rate
Select "2. Baud Rate", press "Confirm" to enter Baud Rate setting interface.
Set the baud rate, default 9600.

7.4.3.8. Generators control

Select "7. Generators Control", press "Confirm" to enter generators control setting interface.

Control Mode	Manual
Manual Switch:	Shutdown
Peak Power:	05.00kW

Control Mode	Auto
Startup of SOC:	040%
Stop SOC:	100%
Peak Power:	05.00kW

If you select "Manual" mode, you can control the turning on or off the generator and its power by yourself. And if you select "Auto" mode, the generator will charge the AC battery at Peak Power which from Startup of SOC to Stop SOC.

7.4.4. Advanced settings

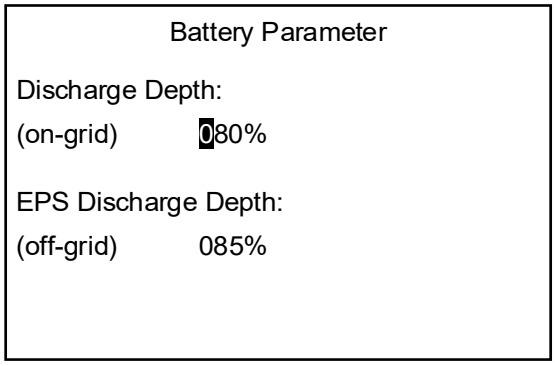
Select "2. Advanced Settings" and press "OK", "Enter password" appears. Enter the password "0715", press "Up" or "Down" to change the first digit, press "OK" to move to the next digit, when "0715" appears on the screen press "OK" to enter the "Advanced Settings" interface.

1.System Settings	
2.Advanced Settings	------Password "0001" or "0715"
3.Energy Statistic	1.Battery Parameter
4.System Information	2.Set Feed-in Limit
5.Event List	3.Logic Interface
6.Software Upgrade	4.Factory Reset
	5.Parallel Settings
	6.CT Calibration
	7.Set Electricity Meter
	8.Battery Heater

If "Wrong, Try Again" appears on the screen, press "Back" and enter the password again.

7.4.4.1. Battery parameters

Select “1. Battery Parameter”, press “Confirm” to enter battery parameter setting interface.



Input the value of Discharge Depth & EPS Discharge Depth per battery specification.
For example: if Discharge Depth = 80% & EPS Discharge Depth = 85%. While electric grid is connected: The AC battery won’t discharge the battery when its SOC is less than 20%.
In case of blackout: The AC battery will work in EPS mode (if EPS mode is enabled) & keep discharging the battery till battery SOC is less than 15%.
NOTE: EPS Discharge Depth should be greater than Discharge Depth.

7.4.4.2. Feed-in limit

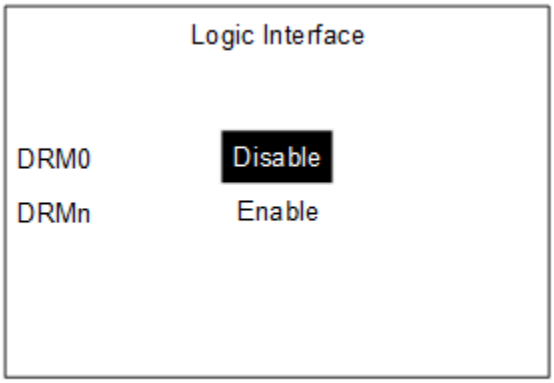
Select “2. Set Feed-in Limit”, press “Confirm” to enter feed-in limit setting interface.

1.Battery Parameter	
2.Set Feed-in Limit	------Press “Confirm”
3.Logic Interface	1.Feed-in Limitation
4.Factory Reset	2.Power Limit
5.Parallel Settings	
6.CT Calibration	
7.Set Electricity Meter	
8.Battery Heater	

The user can enable the “Feed-in limit” to limit the maximum energy exported to the grid.
Select “2. Set Feed-in Limit” to enter the maximum amount of energy exported to the grid.

7.4.4.3. Logical Interface Control

Select “3. Logic Interface”, press “Confirm” to enter logic interface setting interface.



Enable or disable logical interfaces, where DRM0 and DRMn (DRM1-8) can be independently enabled or disabled. If DRM0 is enabled, the AC battery can respond to the DRM0 command to shut down and disconnect from the grid. And if DRMn is enabled, the AC battery will output the corresponding power based on the selected hardware interface (DRM1-8).

7.4.4.4. Factory Reset

Select "4. Factory Reset", press "Confirm" to enter factory reset setting interface.

1.Battery Parameter	
2.Set Feed-in Limit	
3.Logic Interface	
4.Factory Reset	------Press "Confirm"
5.Parallel Settings	1.Clear Energy Data
6.CT Calibration	2.Clear Events
7.Set Electricity Meter	3.Factory Reset
8.Battery Heater	

Clear the AC battery of the total power generation and events.

- ✓ "1. Clear Energy Data" will clear all energy data in "Energy Statistic".
- ✓ "2. Clear Events" will clear all events in "Event list".
- ✓ "3. Factory Reset" will reset all user settings to the default state.

7.4.4.5. Parallel Setting

Select "5. Parallel Settings", press "Confirm" to enter parallel mode setting interface.

1.Battery Parameter	
2.Set Feed-in Limit	
3.Logic Interface	
4.Factory Reset	
5.Parallel Settings	------Press "Confirm"
6.CT Calibration	1.Parallel Control
7.Set Electricity Meter	2.Set Master/Slave

8.Battery Heater	3.Save

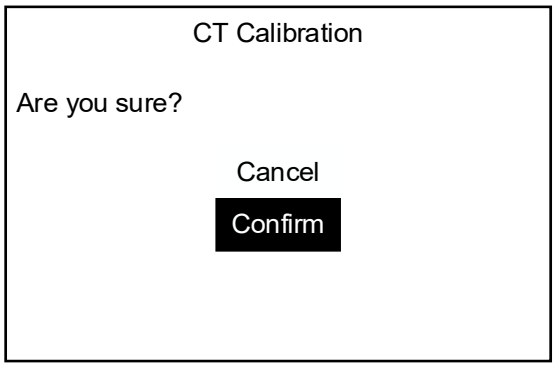
Enable or disable parallel mode and set the AC battery is master or slave.
NOTE: The slave needs to set an additional communication address, which must be unique.
Please refer to section “System setting” for the setting method.

7.4.4.6. Bluetooth Reset

7.Bluetooth Reset	Please Confirm !	Succeed

7.4.4.7. CT Calibration

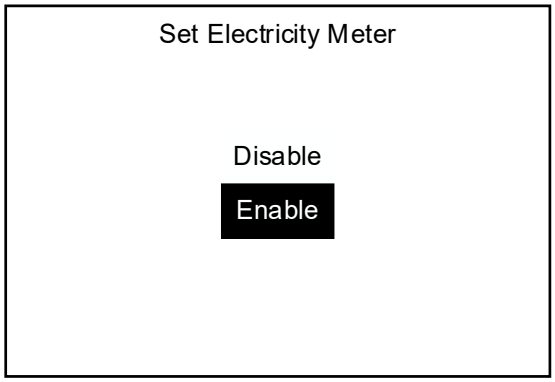
Select “6. CT Calibration”, press “Confirm” to enter CT calibration setting interface.



Used to calibrate the orientation and phase of the CT.

7.4.4.8. Set ElectricityMeter

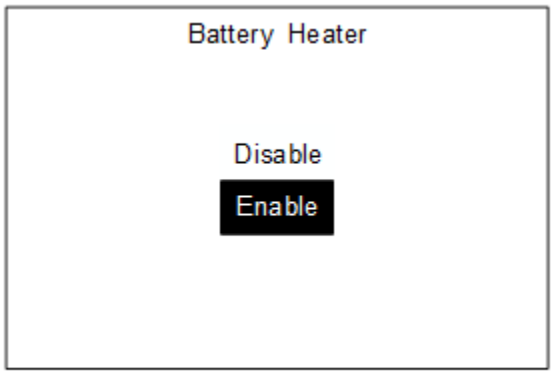
Select “7. Set Electricity Meter”, press “Confirm” to enter electricity meter setting interface.



Enable or disable electricity meter interface. If you need to use a meter instead of the CT, please enable it.

7.4.4.9. Battery heater

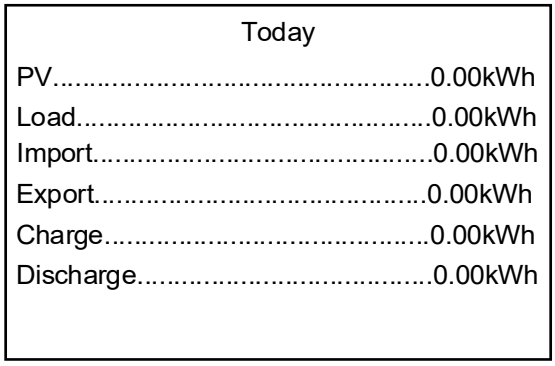
Select “8. Battery Heater”, press “Confirm” to enter battery heater setting interface.



Enable or disable battery low-temperature heating interface.

7.5. Energy statistics

8. Select “3. Energy Statistic”, press “Confirm” to enter energy statistic interface.



It shows the energy generation and consumption within a certain range of time. Press “Up” or “Down” to check the daily / monthly / yearly / lifetime energy statistics.

8.1. System interface information

Select “4. System Information”, press “Confirm” to enter system information interface.

1.System Settings		
2.Advanced Settings		
3.Energy Statistic		
4.System Information	------Press “Confirm”	
5.Event List	Inverter Info(1)	Product SN
6.Software Upgrade		Power Level
		Safety Firmware Version
	Inverter Info(2)	Firmware Version
		Country
		Safety Lib Version
	Inverter Info(3)	Energy Storage Mode
		RS485 Address
		EPS Mode
	Inverter Info(4)	Logic Interface
	Inverter Info(5)	Power Factor
		Feed-in Limitation
		Insulation Resistance
	Battery Info (1)	Battery Type
		Battery Cell Type
		Battery Capacity
		Discharge Depth
	Battery Info (2)	Max Charge (A)

	Max Charge (V)
	Max Discharge (A)
	Min Discharge (V)
Safety Param.(1)	OVP1
	OVP2
	UVP1
	UVP2
Safety Param.(2)	OFP1
	OFP2
	UFP1
	UFP2
Safety Param.(3)	OVP 10mins
BMS Info	Certificated SW Version
	Certificated HW Version

In addition, “Firmware Version” includes ARM, DSPM, and DSPS version information. You can follow the prompts to press "Confirm" and input the password “0715” to access it.

8.2. Event list

Select “5. Event List”, press “Confirm” to enter event list interface.

1.System Settings	
2.Advanced Settings	
3.Energy Statistic	
4.System Information	
5.Event List	------Press “Confirm”
6.Software Upgrade	1.Current Event List
	2.History Event List

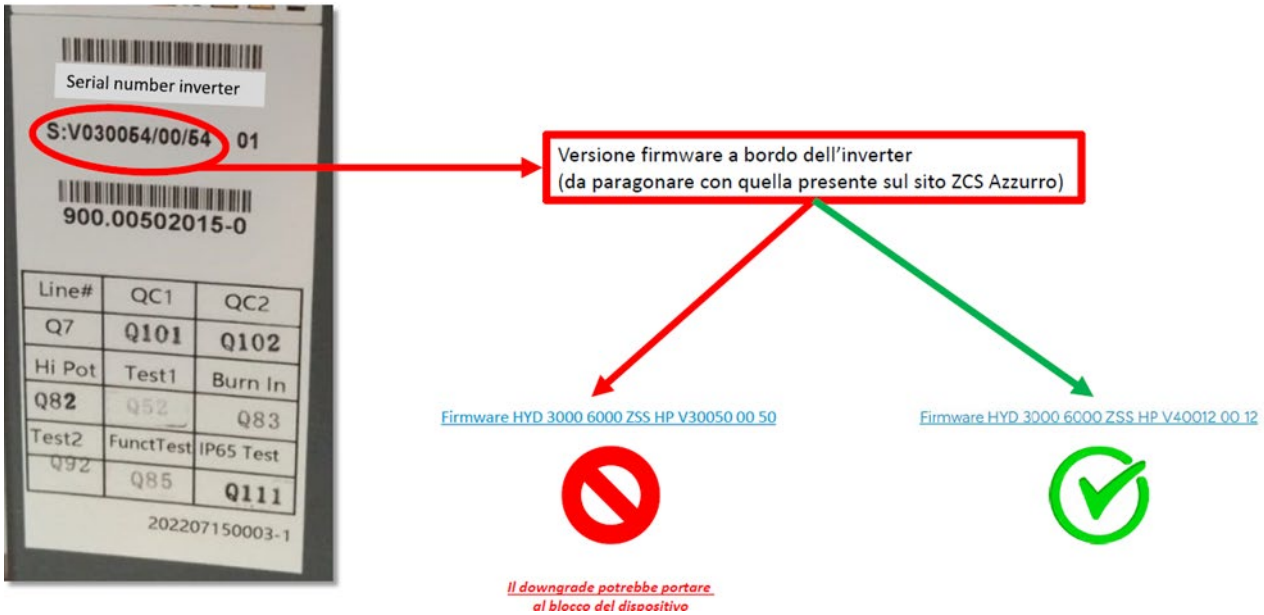
Event list of the AC battery, including current event list and history event list.

Current Event List
Select “1. Current Event List”, press “Confirm” to check the current events.

History Event List
Select “2. History Event List”, press “Confirm” to check the history events. And continue press “Confirm”, it will switch to the time or detailed name of the events that occurred. Press “up” or “down” to check all history events if there’re more than 1 page of events.

8.3. Software Update

On first installation, all Zucchetti hybrid inverters must be updated to the latest firmware version found in the www.zcsazzurro.com website, unless the inverter is already updated to the version on the website or to a later version (see image below).



ATTENTION!!! Downgrading the firmware version of the inverter could lead to a malfunction.
1PH BZT5000 inverters must be upgraded using an 8 GB USB stick.

1PH BZT5000 inverters offer software upgrade via USB flash drive to maximize inverter performance and avoid inverter operation error caused by software bugs.

Step 1: Format the USB drive. Copy the "firmware" folder to the USB drive. In addition, a configuration file for the ".bin" format upgrade package is also required

Step 2: Inside the website https:///www.zcsazzurro.com/it/ you will find the latest version of the software to carry out the update.. After user receive the file, please decompressing file and cover the original file in USB flash drive.

Step 3: Insert the USB drive back to the USB drive interface.

Step 4: Select and confirm "6. Software Upgrade"- "1. One-click Upgrade" to start software upgrade.

Step 5: After finishing software upgrade, the AC battery will start to operate automatically.

Select "6. Software Upgrade", press "Confirm", and a password input interface will appear, enter the password "0715" to enter the next level menu. Then select and confirm "1. One-click Upgrade", the AC battery will start to upgrade the software automatically.

1.System Settings	

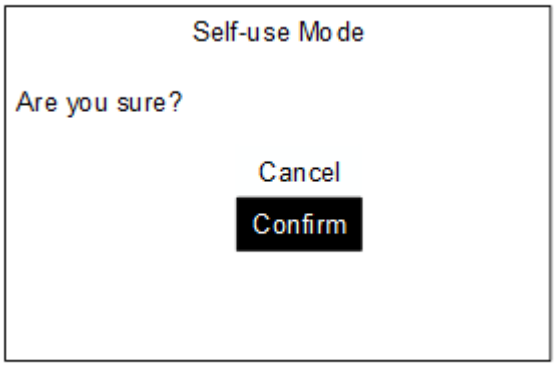
2.Advanced Settings	
3.Energy Statistic	
4.System Information	
5.Event List	
6.Software Upgrade	------Password “0715”
	1. One-click Upgrade

NOTE: If the program version does not match the upgraded version when checked from the system information (see section “System information”, which means the software upgrade is unsuccessful, please open the AC circuit breaker (grid) and turn off the AC battery, wait 5 minutes, then close the AC circuit breaker and turn on the AC battery. And then start again from “Step 3”.

8.4. Energy storage mode

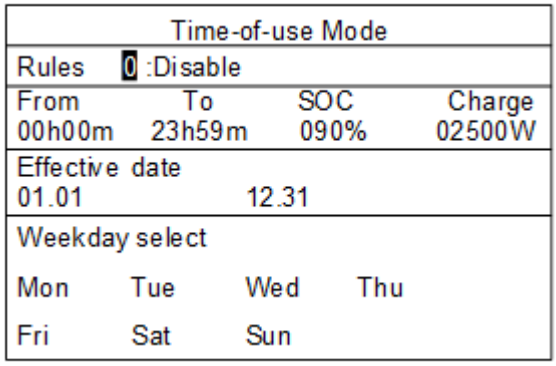
1) Select self-use mode

Select “1. Self-use Mode”, press “Confirm” to enter the Self-use mode setting interface.



2) Time-of-use Mode

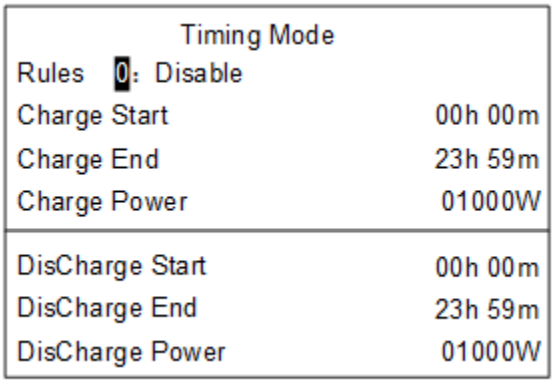
Select “2. Time-of-use Mode”, and then press “Confirm” to enter Time-of-use mode setting interface.



If electricity is more expensive in high demand time (peak rate) & electricity is much cheaper in low demand time (off-peak rate).
You can select an off-peak period to charge your battery. Outside the off-peak charge period, the AC battery is working in Self-use Mode.
If your family normally go to work/school on weekdays & stay at home on weekends, which means the home electricity consumption is much higher on weekends. Thus, you need to store some cheap electricity on weekdays only. This is possible using our Time-of-use mode.
In summer, if your PV system can produce more electricity than your home electricity consumption. Then you don't need to set an off-peak charge period to charge your battery in summer at all. You can select an effective date (normally winter) for Time-of-use mode in this case. Outside the effective date, the AC battery is working in Self-use Mode.
You can set multiple Time-of-use rules to meet your more complex requirement. Right now we support 4 rules maximum (rule 0/1/2/3).

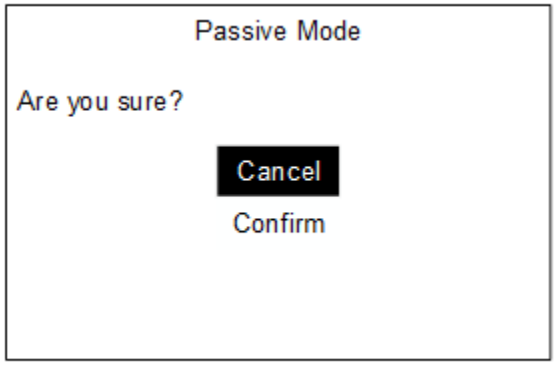
2) Timing Mode

Select "3. Timing Mode", and then press "Confirm" to enter Timing mode setting interface.
The interface of Timing Mode is shown as below. You can select a charge time/power & discharge time/power in this mode.



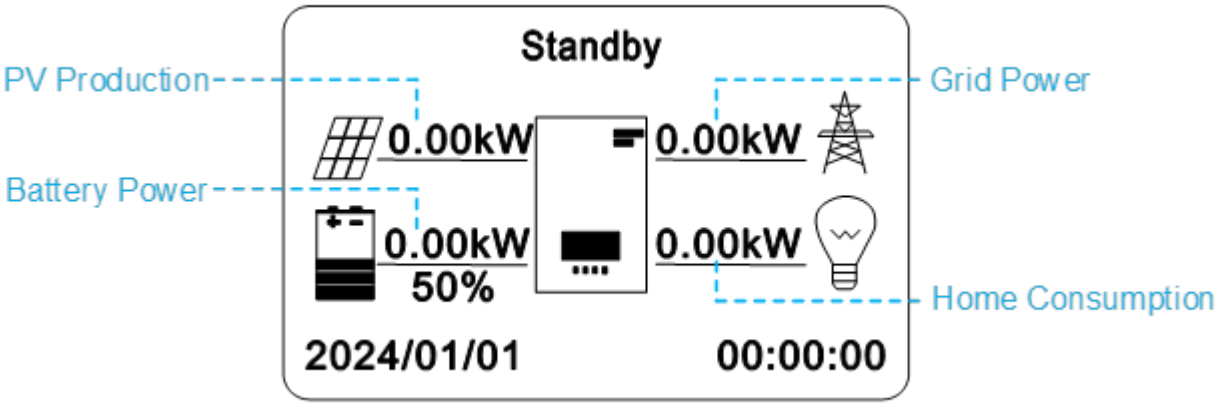
3) Passive Mode

Select "4. Passive Mode", and then press "Confirm" to enter Passive mode setting interface.



8.5. Common operations

The main screen:



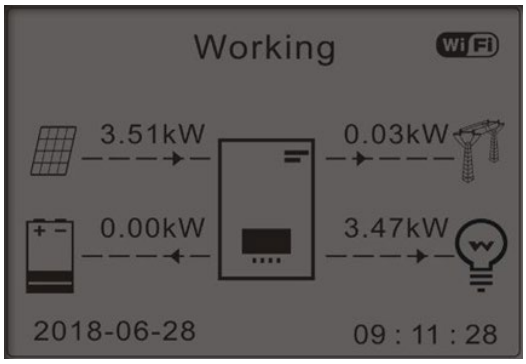
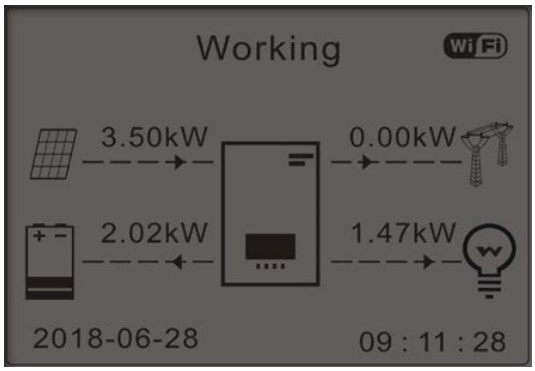
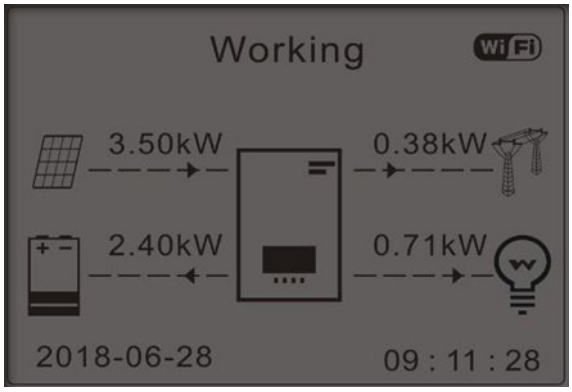
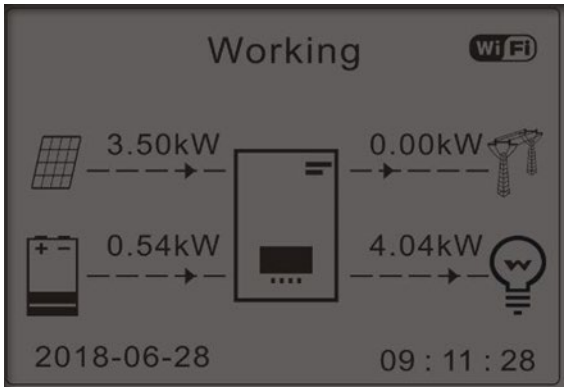
If you didn't change the work mode of the AC battery, which means it is working in "Self-use Mode":
While "PV Production" > "Home Consumption"
If the battery is not full. The AC battery will charge the battery.
While "PV Production" < "Home Consumption"
If the battery is not flat. The AC battery will discharge the battery.
Below are some commonly used settings:

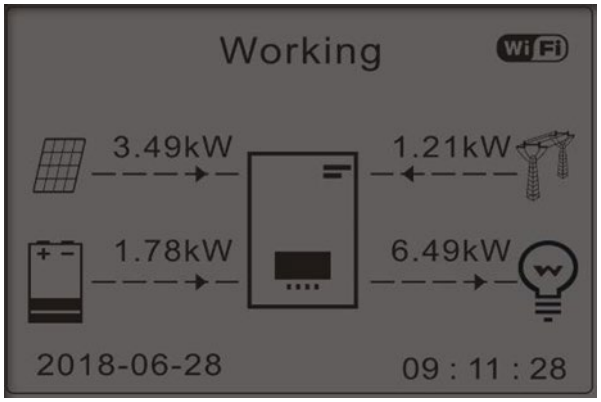
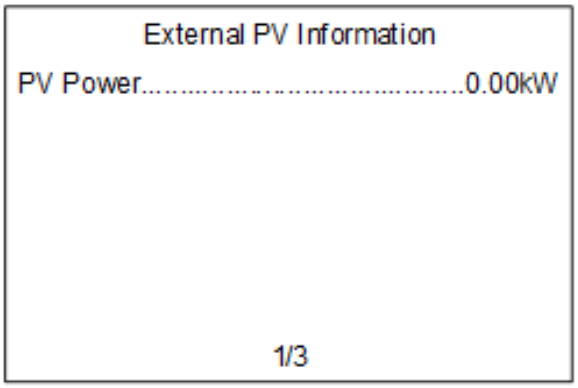
8.5.1. Set Self-use Mode

In the main interface, press "back" button to enter main menu. Select "1. System Settings", press "Confirm", then select "4. Energy Storage Mode", press "Confirm", final select "1. Self-use Mode", press "Confirm" to enter self-use mode setting interface.

Main Screen	------Press "Back"		
	1.System Settings	------Press "Confirm"	
	2.Advanced Settings	1.Language Settings	
	3.Energy Statistic	2.Time	
	4.System Information	3.Safety Param.	
	5.Event List	4.Energy Storage Mode	------Press "Confirm"
	6.Software Upgrade	5.Auto test	1.Self-use Mode
		6.EPS Mode	2.Time-of-use Mode
		7.Communication Addr.	3.Timing Mode
		8.Generators Control	4.Passive Mode

In Self-use Mode, the AC battery will automatically charge & discharge the battery.

<table>
<tr>
<td>1) If PV production = LOAD consumption (ΔP < 100W) the 1PH BZT5000 will not charge or discharge the battery.
 
</td>
<td>2) If PV production > LOAD consumption, the surplus power will be stored in the battery.
 
</td>
</tr>
<tr>
<td>3) If the battery is fully charged (or already at max charge power), the surplus energy will be exported to the grid.
 
</td>
<td>4) If PV production < LOAD consumption, then it will discharge the battery to supply power to the load.
 
</td>
</tr>
</table>

5) If PV production + battery < LOAD consumption, the missing energy to feed the loads will be imported from the grid. 	6) Press "DOWN" to display the current grid/battery parameters, press "UP" to go back to the main interface. 

8.5.2. Set Timing Mode

In the main screen, press "back" button to enter main menu. Select "1. System Settings", press "Confirm", then select "4. Energy Storage Mode", press "Confirm", final select "3. Timing Mode", press "Confirm" to enter self-use mode setting interface.

Main Screen	------Press "Back"		
	1.System Settings	------Press "Confirm"	
	2.Advanced Settings	1.Language Settings	
	3.Energy Statistic	2.Time	
	4.System Information	3.Safety Param.	
	5.Event List	4.Energy Storage Mode	------Press "Confirm"
	6.Software Upgrade	5.Auto test	1.Self-use Mode
		6.EPS Mode	2.Time-of-use Mode
		7.Communication Addr.	3.Timing Mode
		8.Generators Control	4.Passive Mode

The interface of Timing Mode is shown as below. You can select a charge time/power & discharge time/power in this mode.

Timing Mode	
Rules [0] :Enabled	
Charge Start	01h 00m
Charge End	01h 59m
Charge Power	01500W
DisCharge Start	05h 00m
DisCharge End	06h 59m
DisCharge Power	01000W

You can set multiple Timing rules to meet your more complex requirement by enable corresponding rules. Right now, we support 4 rules maximum (rule 0/1/2/3).
As shown in the above figure, it means enable rule 0, and the AC battery will charge at 1500W power from 1:00 to 1:59am, discharge at 1000W power from 5:00 to 6:59am.
NOTE: The time between any charging and discharging operations cannot overlap.

8.5.3. Parallel setting

In the main interface, press "back" button to enter main menu. Select "2. Advanced Settings", press "Confirm", then input the password "0001" or "0715", final select "5. Parallel Settings", press "Confirm" to enter parallel mode setting interface.

Main Screen	------Press "Back"		
	1.System Settings	------Password "0001" or "0715"	
	2.Advanced Settings	1.Battery Parameter	
	3.Energy Statistic	2.Set Feed-in Limit	
	4.System Information	3.Logic Interface	
	5.Event List	4.Factory Reset	
	6.Software Upgrade	5.Parallel Settings	------Press "Confirm"
		6.CT Calibration	1.Parallel Control
		7.Set Electricity Meter	2.Set Master/Slave
		8.Battery Heater	3.Save

You can select "1. Parallel Control", press "Confirm" to set enable parallel, then select "2. Set Master/Slave", press "Confirm" to set master or slave, final select "3. Save", press "Confirm" to save your setting.

NOTE:
1) The master can only have one, while the slave can have multiple.
2) Before enable the parallel operation, all AC batteries need to set communication addresses, and ensure that their communication addresses are different from each other.

8.5.4. Depth of Discharge

For example: if Discharge Depth = 50% & EPS Discharge Depth = 80%.
While grid is connected: Inverter won't discharge the battery when its SOC is less than 50%.
In case of blackout: Inverter will work in EPS mode (if EPS mode is enabled) & keep discharging the battery till battery SOC is less than 20%.

3.Depth of Discharge	Discharge Depth 50% EPS Discharge Depth 80% EPS Safety Buffer 20%

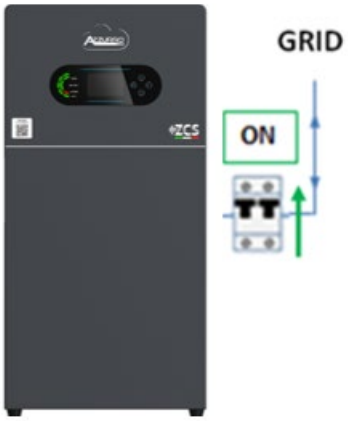
8.6. Verification of proper functioning

To check the proper functioning of the inverter, follow these steps:

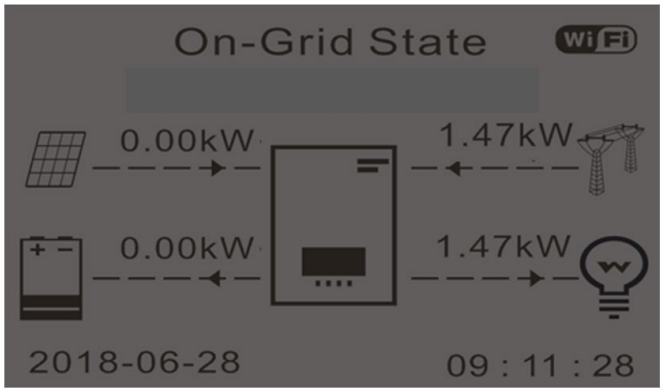
a) Switch off any source of photovoltaic generation by turning the circuit breaker to the OFF position.

b) Lower the protection switch of the 1PH BZT5000 inverter. The inverter will remain switched on but will go into error due to a lack of AC power (if the EPS function is enabled, it will feed the priority loads).

1. Power up the inverter by pulling up the AC switch.



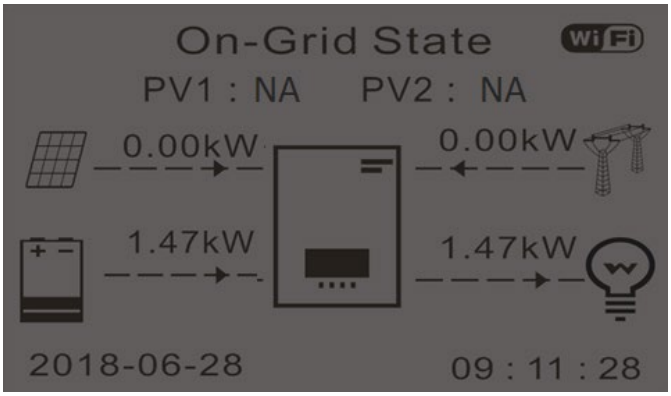
2. After pulling up the AC switch, the countdown will start according to the country code set (for CEI021-Internal, it will be 300s) to reconnect to the grid. During this period, check that the household loads are only powered by the grid and that there are no other power flows from either the photovoltaic system or the battery.



2. Once the countdown is over, the batteries will start to deliver power according to the availability towards the utility, trying to reset the consumption from the grid. During this period, check that the

3. value of the consumption remains constant* as the power supplied by the battery increases during discharge.

4. The power taken from the grid should decrease by an amount equal to the power supplied by the battery.



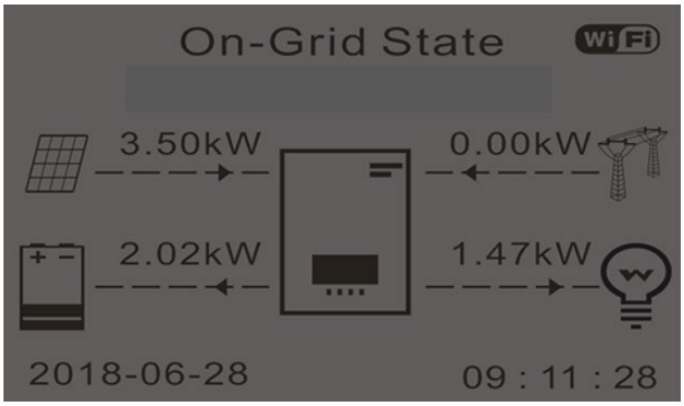
5. Switch on the external photovoltaic inverter.

6. Once the photovoltaic system has been activated, check that:

   a. The value of consumption shown on the screen remains constant as the photovoltaic power increases.

   b. Depending on the photovoltaic production, the system will operate according to its working mode.

   c. The value of PV production shown on the display is in line with the real photovoltaic production visible on the photovoltaic inverter.



7. If the above are not verified, check the positioning of the CTs ore Meter and the direction by consulting the correct installation and initial start-up procedures.

9. Technical specifications

TECHNICAL DATA	AZZURRO 1PH BZT5000
Battery technical data	
Type of compatible battery	Lithium Iron Phosphate
Rated voltage	51.2V
Rated battery capacity	5.12 kWh
Useful battery capacity	4.6 kWh
Depth of Discharge (DoD)	90%
AC output (grid side)	
Rated power	2500 W
Rated apparent power	2750 W
Rated current	11.4A/10.9 A/10.4A
Maximum current	12.5A/12A/11.5A
Connection type/Rated voltage	Single-phase L/N/PE / 220V, 230V, 240V
AC voltage range	176-288V (according to the local standards)
Rated frequency	50Hz/60Hz
AC frequency range	45Hz-55Hz /54Hz-66Hz (according to local standards)
Total harmonic distortion	≤3%
Power factor	1 default (Programmable +/- 0.8)
EPS Output (Emergency Power Supply)	
Rated power*	2500 W
Rated current	11.4A/10.9 A/10.4A
Connection type/Rated voltage	Single-phase L/N/PE / 220V, 230V, 240V
Rated frequency	50Hz/60Hz
Total harmonic distortion	≤3%
Standard	
EMC	EN 61000-6-1/-3
Safety standard	IEC 62109-1/2, IEC62477
Grid connection standard	Connection certificates and standards available on www.zcsazzurro.com
General data	
Allowable ambient temperature range**	-20°C/+50°C
Topology	Transformerless / High-frequency isolation battery output
Environmental protection class	IP65
Allowable relative humidity range	5%-95% non-condensing
Maximum operating altitude	4000m
Weight	50 kg
Cooling	Natural convection
Dimensions (H x L x D)	800mm x 400mm x 175mm
Data monitoring	LED and APP
Warranty	10 years

* Power output in EPS mode depends on the type of batteries and the status of the system (e.g. residual capacity, temperature)
** Standard value for lithium batteries; to ensure maximum performance, it is recommended to install the system in an environment with controlled temperature between 15°C and 40°C (below 15°C the batteries protect themselves by limiting the charging current)

10. Troubleshooting

This section describes the potential errors for this product. Please read carefully for the following tips when doing the troubleshooting:

⚠ **Attention**	**Read the following section carefully. Check the warnings, messages and error codes shown on the screen.**

For detailed information about the warning or error messages displayed by the AC battery status indicator, see the "Event List Information" table for details.
When the AC battery occurs alarm or error messages, the alarm reports are uploaded to the cloud. By checking the APP or monitoring platform, you can determine the cause of the AC battery alarm or failure.
Follow the steps below to check whether the current installation status meets the AC battery operation requirements:
Is the AC battery installed in a clean, dry, well-ventilated position?
Do the cable cross-section and length meet the requirements?
Are the input and output connections and cabling good connection?
Are the communication cables connected correctly and not damaged?
Are the configuration settings correct for the user's specific installation?

Event List Information

ID No.	Name	description	solution
ID001	GridOVP	The power grid voltage is too high	If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. The AC battery automatically returns to normal operating status when the electric grid's back to normal. If the alarm occurs frequently, check whether the grid voltage/frequency is within the acceptable range. If no, contact Zucchetti Centro Sistemi
ID002	GridUVP	The power grid voltage is too low	
ID003	GridOFP	The power grid frequency is too high	
ID004	GridUFP	The power grid frequency is too low	
ID006	OVRT	The time of over voltage ride-through (OVRT) is out of standard	
ID007	LVRT	The time of low voltage ride-through (LVRT) is out of standard	
ID008	IslandFault	Island protection fault	
ID009	GridOVPInstant1	Transient overvoltage 1 of Grid voltage	

ID010	GridOVPInstant2	Transient overvoltage 2 of Grid voltage	technical support. If yes, check the AC circuit breaker and AC wiring of the AC battery. If the grid voltage/frequency is within the acceptable range and AC wiring is correct, while the alarm occurs repeatedly, contact Zucchetti Centro Sistemi technical support to change the grid over-voltage, under-voltage, over-frequency, under-frequency protection points after obtaining approval from the local electrical grid operator.
ID012	InvVoltFault	Inverter overvoltage or undervoltage	Internal faults of the AC battery, open the AC circuit breaker and turn off the AC battery, wait for 5 minutes, then close the AC circuit breaker and turn on the AC battery. Check whether the problem is solved. If no, please contact Zucchetti Centro Sistemi technical support.
ID013	RefluxFault	PCC reverse power and time exceeds safety requirements	
ID017	HwADErrIGrid	The grid current sampling error	
ID018	HwADErrDCI(AC)	The DCI sampling error	
ID020	HwADErrVGrid(AC)	The grid voltage sampling error	
ID023	HwADErrDCV	The DCV sampling error	
ID032	N-PE fault	N-PE relay detected as open circuit	
ID033	SpiCommFault(DC)	SPI communication is fault (DC)	
ID034	SpiCommFault(AC)	SPI communication is fault (AC)	
ID037	HwAuxPowerFault	Auxiliary power error	
ID038	InvSoftStartFail	Inverter failed to output	
ID041	RelayFail	Relay detection sticky	
ID047	ParallelFault	Master does not exist or is duplicate	Check the parallel mode settings for the inverter. Check whether the wiring is correct.

ID056	NTCFault	Env NTC Fault	Internal faults of the AC battery, open the AC circuit breaker and turn off the AC battery, wait for 5 minutes, then close the AC circuit breaker and turn on the AC battery. Check whether the problem is solved. If no, please contact Zucchetti Centro Sistemi technical support.
ID057	TempErrEnv1	The environment temperature is too high	Please make sure the AC battery is installed in a place without direct sunlight/other heat source. Please make sure the AC battery is installed in a well-ventilated place. Please make sure the inverter is vertically installed & the ambient temperature is less than the temperature upper limit of the AC battery.
ID059	TempErrInv1	The internal componentA temperature is too high	
ID060	TempErrInv2	The internal componentB temperature is too high	
ID067	BusUVP	Internal DC bus voltage is too low	Internal faults of the AC battery, open the AC circuit breaker and turn off the AC battery, wait for 5 minutes, then close the AC circuit breaker and turn on the AC battery. Check whether the problem is solved. If no, please contact Zucchetti Centro Sistemi technical support.
ID071	LLCBusOVP	Internal DC bus voltage is too high	
ID072	SwBusRmsOVP	The rms value of bus voltage is too high and has triggered software protection	
ID073	SwBusIOVP	The instantaneous value of bus voltage is too high and has triggered software protection	
ID082	DciOCP	The DC component of grid current is too high	
ID083	SwIOCP	Instantaneous output overcurrent protection	
ID092	SwAcCBCFault	Long-time output overcurrent protection	
ID094	PriDCChgDischgOCP	Primary charge/discharge current is too high and has triggered hardware protection	
ID095	SwBUSOCP	BUS current is too high and has triggered software protection	

ID100	HwBatOCP	Battery current is too high and has triggered hardware protection	
ID101	HwPriDCGaNFault	Primary GaN tube is faulty	
ID103	HwACOCP	Mains current is too high and has triggered hardware protection	
ID105	MeterCommFault	Communication fault with meter unit	Check whether the meter is connected correctly.
ID106	SNMachineFault	The serial number is error	Internal faults of the AC battery, open the AC circuit breaker and turn off the AC battery, wait for 5 minutes, then close the AC circuit breaker and turn on the AC battery. Check whether the problem is solved. If no, please contact Zucchetti Centro Sistemi technical support.
ID107	HwVerError	The hardware version does not match	
ID108	GeneratorStartupFail	The ac voltage is not reached after starting the generator	Check whether the output voltage of the generator is correct. Check whether the wiring is correct.
ID109	GeneratorOverload	The generator is overload	Check whether the generator works in overload state.
ID110	Overload1	Mild overload	Check whether the inverter works in overload state.
ID111	Overload2	Moderate overload	
ID112	Overload3	Severe overload	
ID140	PermRelayFail	Permanent error of the mains relay	Internal faults of the AC battery, open the AC circuit breaker and turn off the AC battery, wait for 5 minutes, then close the AC circuit breaker and turn on the AC battery. Check whether the problem is solved. If no, please
ID149	CommEEPROMFault	The EEPROM of the communication board is faulty	
ID150	FlashFault	The Flash of the communication board is faulty	
ID152	SafetyVerFault	The version of the safety regulation is error	
ID153	SCILose(DC)	SCI communication is fault(DC)	
ID154	SCILose(AC)	SCI communication is fault(AC)	
ID176	HwBatHeatingFault	Control switch of battery heater is failed	

ID177	BMS OVP	The battery voltage is too high	contact Zucchetti Centro Sistemi technical support.
ID178	BMS UVP	The battery voltage is too low	
ID181	BMS OCP	Battery over-current protection	If this fault occurs occasionally, wait few minutes to see whether the problem is solved. If this fault occurs frequently, please contact Zucchetti Centro Sistemi technical support.
ID182	BMS Short	BMS Short circuit protection	
ID186	BatDischargeHTP	The battery temperature is too high during discharge	Make sure battery is in a well-ventilated place. Try to decrease the discharging power to see if the problem is solved.
ID187	BatDischargeLTP	The battery temperature is too low during discharge	Try to increase the ambient temperature of the battery.
ID188	BatChargeHTP	The battery temperature is too high during charge	Make sure battery is in a well-ventilated place. Try to decrease the charging power to see if the problem is solved.
ID190	BatChargeLTP	The battery temperature is too low during charge	Try to increase the ambient temperature of the battery.
ID274	ARMDSPProVerFault	The version of communication protocol between ARM and DSP is not consistent	Internal faults of the AC battery, open the AC circuit breaker and turn off the AC battery, wait for 5 minutes, then close the AC circuit breaker and turn on the AC battery. Check whether the problem is solved. If no, please contact Zucchetti Centro Sistemi technical support.
ID455	HwADFaultVInv	The inverter voltage sampling error	
ID456	HwADInvalidVInvEPS	The inverter voltage and the EPS voltage sampling invalid	
ID457	ConsistentFaultVbus	The internal bus voltage sampling error.	
ID458	HwADErrIBus	The internal bus current sampling error	
ID460	HwPriDCOCP	Primary current is too high and has triggered hardware protection	
ID473	DischgMosFault	There is an issue with the power control for battery discharging.	

ID474	ChgMosFault	There is an issue with the power control for battery charging.	
ID475	NTC Fault	Battery cell temperature sampling error	
ID476	Cell Fault	Excessive voltage difference between cells	
ID477	Cell Voltage Sample Fault	Excessive voltage difference between the total voltage and the sum of the cell voltages	

11. Routine Maintenance

⚠ Danger	After turn off the AC battery, wait a minimum of 15 minutes before starting any maintenance or repair work.

The AC battery generally does not require maintenance or calibration, but you should ensure that their heat sinks are not covered with dust, dirt, or other debris.
To clean the AC battery:
Please use a blow dryer, dry soft cloth, or soft brush to clean the AC battery. Do not use water, corrosive chemicals, cleaning agents, or strong detergents to clean the AC battery.

11.1. Store and charge the battery module

Battery module storage requirements:

1. Environment temperature：-10℃~+45℃.
2. Storage relative humidity range：5%~95%.
3. Store in a dry, clean, and ventilated environment, away from direct sunlight.
4. When storing the battery module, place it in the correct orientation. Do not store the battery module upside down or on its side. If the AC battery is not used for a long time, please recharge it regularly.
5. The optimal storage temperature is +25℃~+35℃℃, and the recommended storage time is no more than 6 months. Exceeding this temperature and time range may cause product damage.

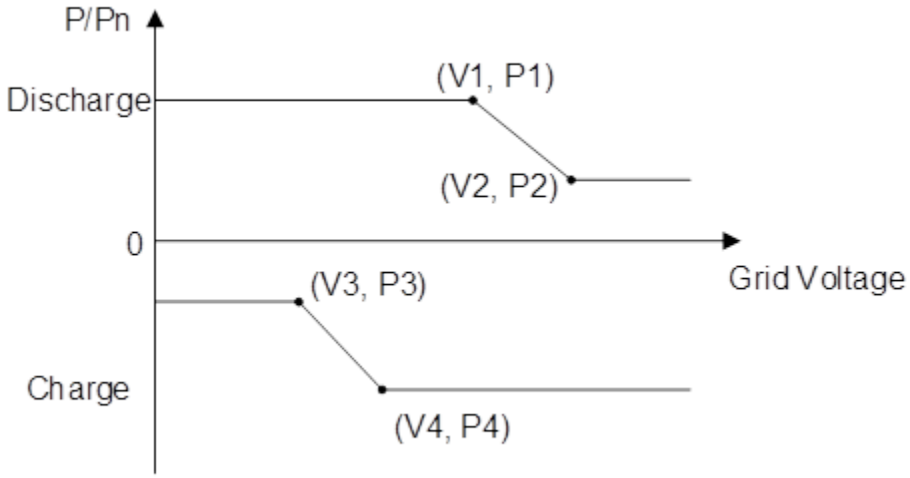
11.2. Description of power reduction caused by overvoltage or undervoltage.

Under the following operating conditions, the AC battery will linearly reduce power and trigger an alarm message with ID 009 OvUvDerating.

i) When the grid voltage exceeds the overvoltage threshold in discharge mode.

ii) When the grid voltage falls below the undervoltage threshold in charge mode.

NOTE: Power parameters are expressed as percentages.



Parameter	Explain	Range
V1	Starting voltage point V1 of overvoltage on the P vs Grid voltage curve. In discharge mode, the AC battery starts reducing load at voltage point V1.	According to safety regulations
V2	Ending voltage point V2 of overvoltage on the P vs Grid voltage curve. In discharge mode, the AC battery stops reducing load at voltage point V2.	
V3	Ending voltage point V3 of undervoltage on the P vs Grid voltage curve. In charge mode, the AC battery stops reducing load at voltage point V3.	
V4	Starting voltage point V4 of undervoltage on the P vs Grid voltage curve. In charge mode, the AC battery starts reducing load at voltage point V4.	
P1	The active power P1 at the overvoltage starting point V1 on the P vs Grid voltage curve	
P2	The active power P2 at the overvoltage ending point V2 on the P vs Grid voltage curve	
P3	The active power P3 at the undervoltage ending point V3 on the P vs Grid voltage curve	
P4	The active power P4 at the undervoltage starting point V4 on the P vs Grid voltage curve	

Recharge Requirements During Normal Storage

When the battery is stored for a long time, you need to perform regular maintenance. If the storage time is close to that shown in the following table, arrange supplementary power supply in time.
Recharge conditions when in storage

Storage Environment Temperature	Relative Humidity of Storage Environment	Storage Time	SOC
＜ -10℃	/	Prohibit	/
-10℃～25℃	5%~70%	≤12 months	30%≤SOC≤60%
25℃～35℃	5%~70%	≤6 months	30%≤SOC≤60%
35℃～45℃	5%~70%	≤3 months	30%≤SOC≤60%
＞ 45℃	/	Prohibit	/

Recharge Requirements When Over Discharged
Recharge the battery within the time range specified in the following table (90%DOD). Otherwise, the overdischarged battery module will be damaged.

Recharge conditions when battery is over discharged

Storage Environment Temperature	Storage Time	Note
-10℃～25℃	≤15 days	/
25℃～45℃	≤7 days	30%≤SOC≤60%
-10℃～45℃	≤12 hours	/

12. Uninstalling

12.1. Uninstallation steps

- Disconnect the inverter from the AC grid.
- Disconnect the DC switch (located on the battery or installed on the wall)
- Wait 5 minutes
- To remove the DC connectors from the inverter
- Remove the connectors for communication with the batteries, current sensors and NTC temperature probe.
- Remove the AC terminals.
- Unscrew the fixing bolt of the bracket and remove the inverter from the wall.

12.2. Packaging

If possible, pack the product in its original packaging.

12.3. Storage

Store the inverter in a dry place where the ambient temperature is between -25 and +60°C.

12.4. Disposal

Zucchetti Centro Sistemi S.p.a. is not liable for the disposal of the equipment, or parts thereof, that does not take place according to the regulations and standards in force in the country of installation.

The symbol of the crossed-out wheeled bin indicates that the equipment, at the end of its useful life, must be disposed of separately from household waste.

This product must be handed over to the waste collection point in your local community for recycling.

For more information, please contact the waste collection authority in your country.

Inappropriate waste disposal could have negative effects on the environment and on human health due to potentially hazardous substances.

With your cooperation in the correct disposal of this product, you contribute to the reuse, recycling and recovery of the product, and to the protection of our environment.

13. Monitoring systems

ZCS monitoring				
Product code	Product photo	APP monitoring	Portal monitoring	Possibility to send commands and to update the inverter remotely in case of technical support
ZSM-WIFI		✓	✓	✓
ZSM-ETH		✓	✓	✓
ZSM-4G		✓	✓	✓
Datalogger 4-10 Inverters		✓	✓	⊘
Datalogger up to 31 Inverters		✓	✓	⊘

13.1. External Wi-Fi adapter

13.1.1. Installation

Unlike the internal Wi-Fi card, the external adapter must be installed for all compatible inverters. However, the procedure is quicker and easier as there is no need to open the front cover of the inverter.

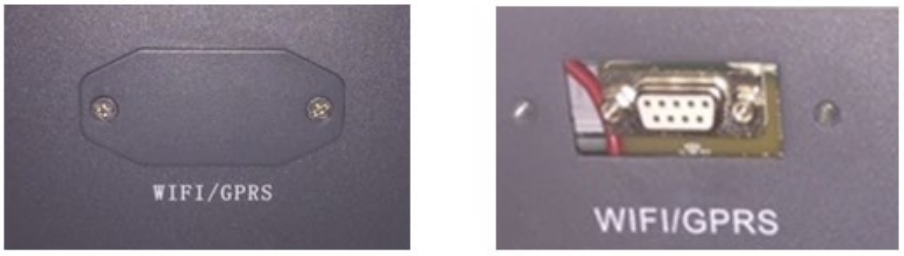
In order to monitor the inverter, the RS485 communication address must be set to 01 directly from the display.

Installation tools:

- Cross screwdriver
- External Wi-Fi adapter

1) Switch off the inverter following the procedure described in this manual.
2) Remove the cover for accessing the Wi-Fi connector on the bottom of the inverter by unscrewing the two cross-head screws (a), or by unscrewing the cover (b), as shown in the figure.

(a)



(b)

Figure 14– Port for external Wi-Fi adapter

3) Connect the Wi-Fi adapter to the appropriate port, making sure to follow the direction of the connection and ensure correct contact between the two parts.

(a)

(b)

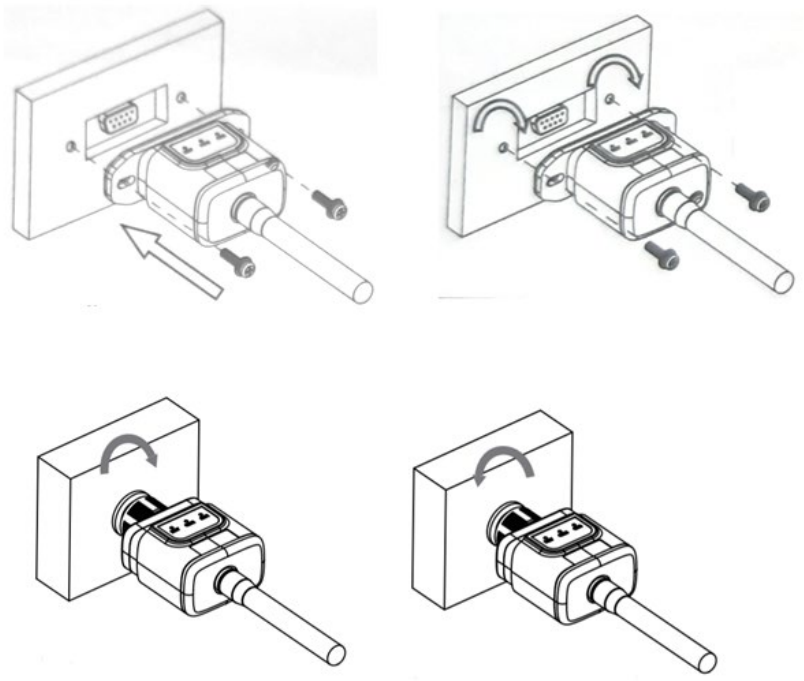


Figure 15– Inserting and securing the external Wi-Fi adapter

4) Switch on the inverter by following the procedure described in the manual.

13.1.2. Configuration

Configuration of the Wi-Fi adapter requires the presence of a Wi-Fi network near the inverter in order to achieve stable transmission of data from the inverter adapter to the Wi-Fi modem.

Tools required for configuration:

- Smartphone, PC or tablet

Go to front of the inverter and search for the Wi-Fi network using a smartphone, PC or tablet, making sure that the signal from the home Wi-Fi network reaches the place where the inverter is installed.
If the Wi-Fi signal is present at the location where the inverter is installed, the configuration procedure can begin.
If the Wi-Fi signal does not reach the inverter, a system must be installed to amplify the signal and bring it to the installation location.

1) Activate the search for the Wi-Fi networks on your telephone or PC so that all the networks visible by your device are displayed.

Figure 16 - Search for Wi-Fi networks on iOS smartphone (left) and Android smartphone (right)

Note: Disconnect from any Wi-Fi networks to which you are connected by removing automatic access.

Figure 17 – Disabling automatic reconnection to a network

2) Connect to a Wi-Fi network generated by the inverter's Wi-Fi adapter (i.e. AP_*******, where ******* indicates the serial number of the Wi-Fi adapter shown on the label of the device), which operates as an access point.

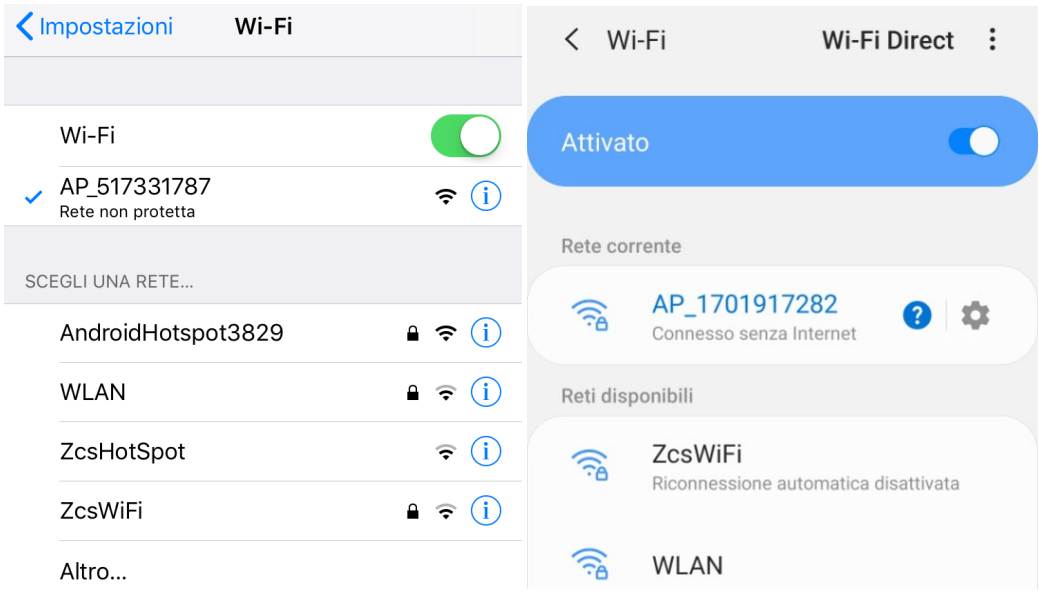


Figure 18 - Connection to Access Point for Wi-Fi adapter on iOS smartphone (left) and Android smartphone (right)

3) If you are using a second-generation Wi-Fi adapter, you will be prompted for a password to connect to the inverter's Wi-Fi network. Use the password found on the box or on the Wi-Fi adapter.

Figure 19 – Password of external Wi-Fi adapter

Note: To ensure that the adapter is connected to the PC or smartphone during the configuration procedure, enable automatic reconnection of the AP_******* network.

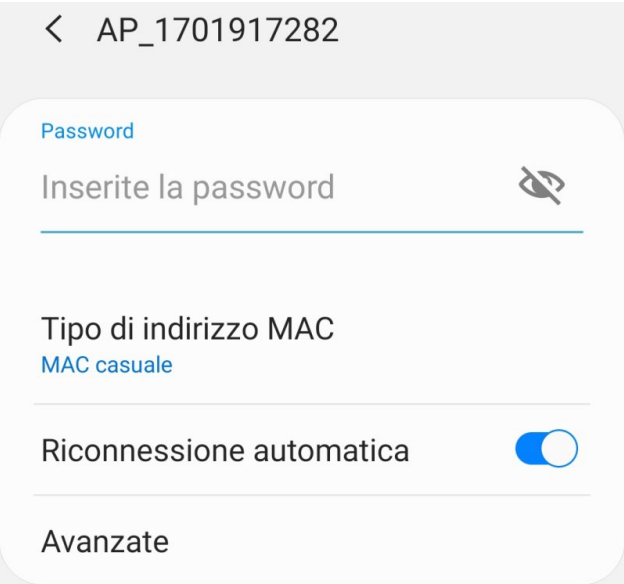


Figure 20 – Password entry prompt

Note: the Access Point is not able to provide internet access; confirm to maintain the Wi-Fi connection, even if the internet is not available

Figure 21 – Screen indicating that the Internet cannot be accessed

4) Open a browser (Google Chrome, Safari, Firefox) and enter the IP address 10.10.100.254 in the address bar at the top of the screen.
In the box that appears, enter “admin” as both the Username and Password.

Figure 22 – Screen for accessing the web server to configure the Wi-Fi adapter

5) The status screen will open, showing the logger information such as the serial number and firmware version.

   Check that the Inverter Information fields are filled in with the inverter information.

   The language of the page can be changed using the command in the top right-hand corner.

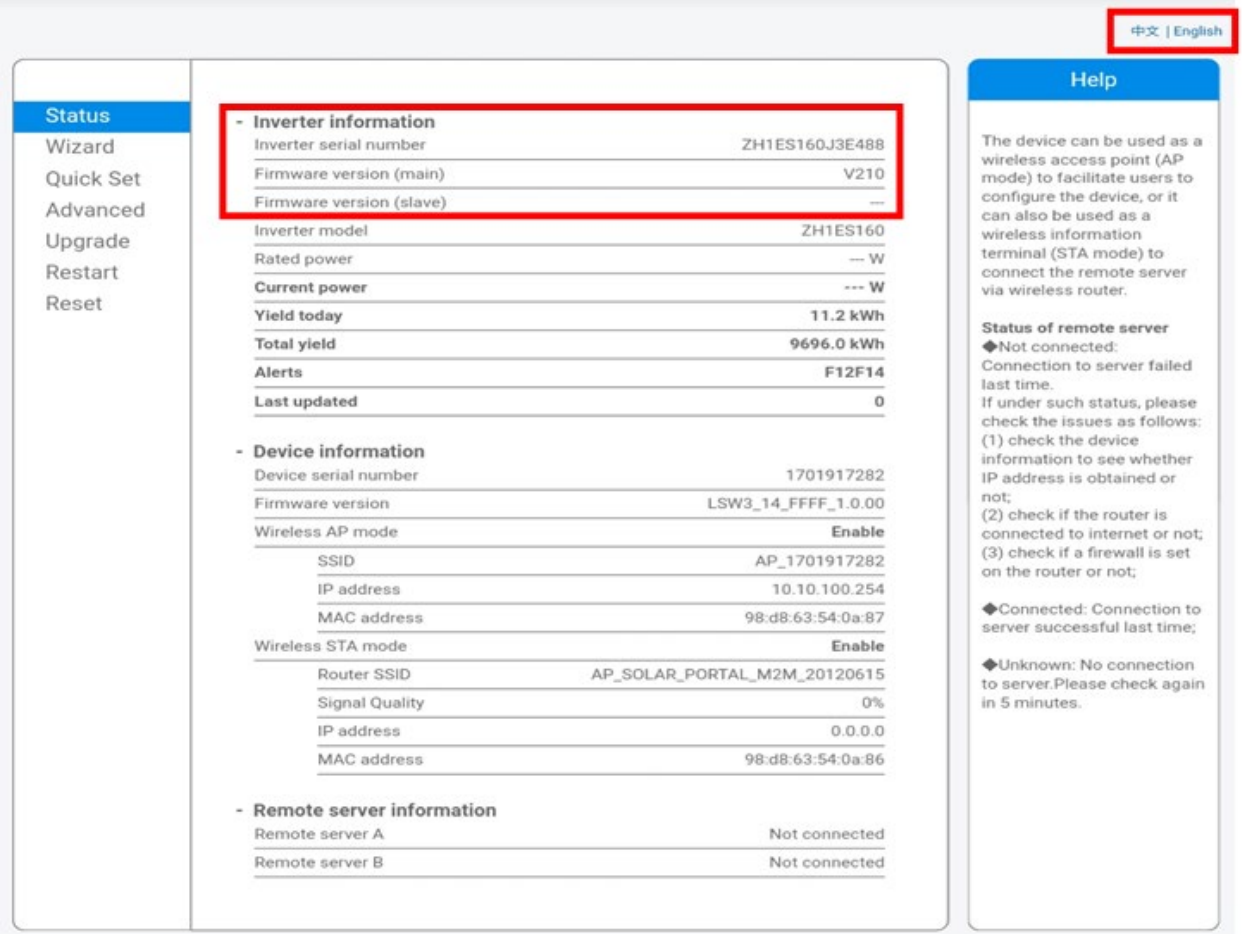


Figure 23 – Status screen

6) Click on the Wizard setup button in the left-hand column.

7) In the new screen that opens, select the Wi-Fi network to which you want to connect the Wi-Fi adapter, making sure that the Received Signal Strength Indicator (RSSI) is greater than 30%. If the network is not visible, press the Refresh button.
Note: check that the signal strength is greater than 30%, if not, bring the router closer or install a repeater or signal amplifier.
Click Next.

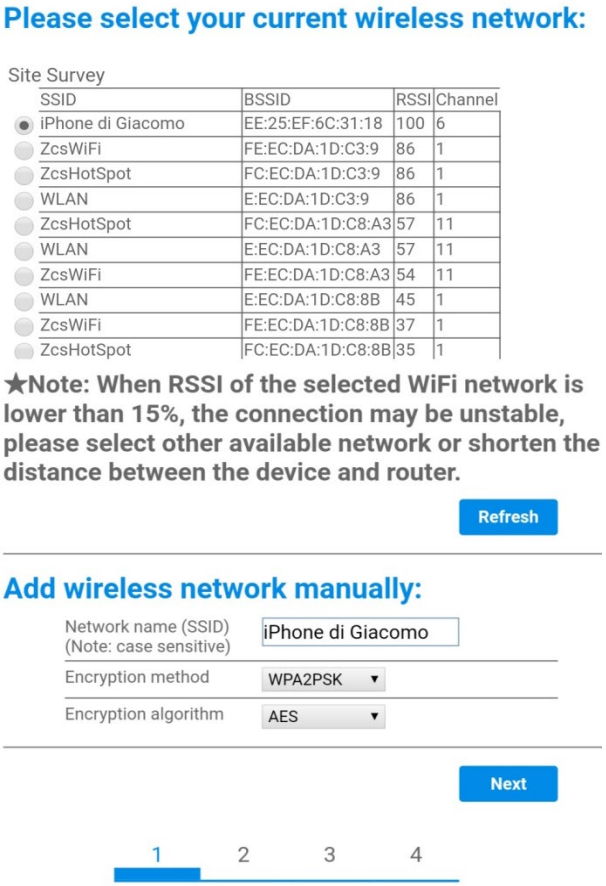


Figure 24 – Screen for selecting the available wireless network (1)

8) Enter the password of the Wi-Fi network (Wi-Fi modem), clicking on Show Password to make sure it is correct; the password should not contain special characters (&, #, %) and spaces.
Note: During this step, the system is not able to ensure that the password entered is the one actually requested by the modem, therefore please make sure you enter the correct password.
Also check that the box below is set to Enable.
Then click “Next” and wait a few seconds for verification.

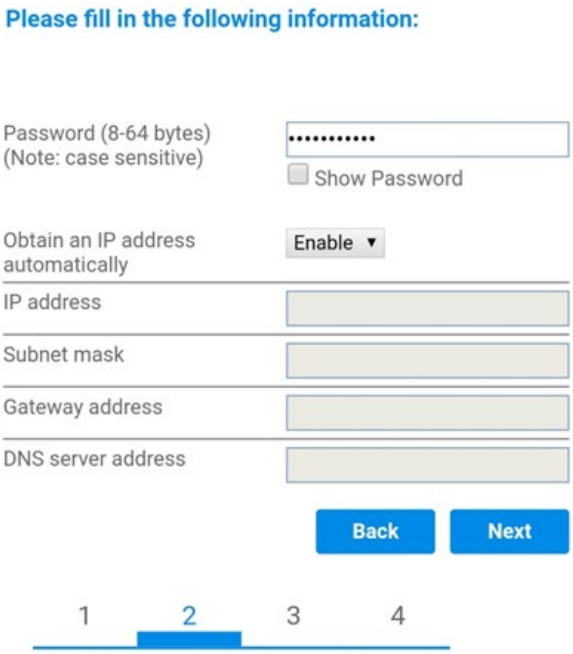


Figure 25 – Screen for entering the password of the wireless network (2)

9) Click "Next" again without ticking any of the options relating to the system security.

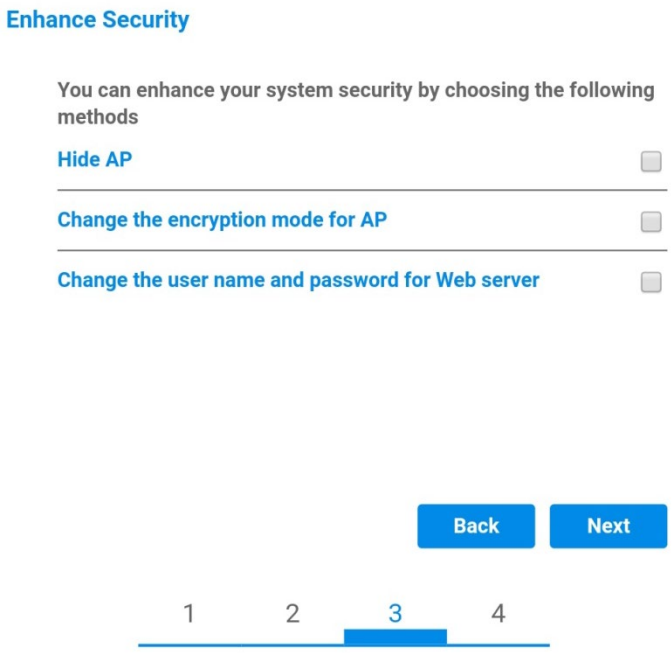


Figure 26 - Screen for setting the security options (3)

10) Click “OK”.

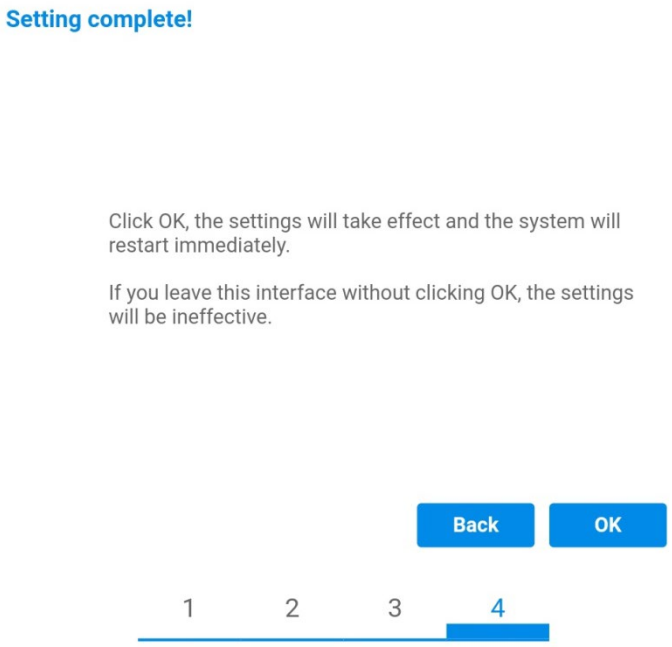


Figure 27 – Final configuration screen (4)

11) At this point, if the configuration of the adapter is successful, the last configuration screen will appear, and the telephone or PC will unpair from the inverter’s Wi-Fi network.
12) Manually close the web page with the Close key on the PC por remove it from the background of the telephone.

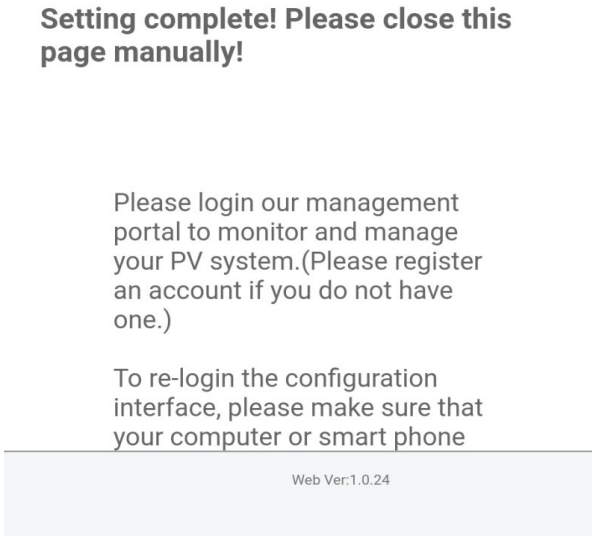


Figure 28 - Successful configuration screen

13.1.3. Verification

To verify the correct configuration, connect to it again and access the status page. Check the following information:

a. Wireless STA mode
   i. Router SSID > Router name
   ii. Signal Quality > other than 0%
   iii. IP address > other than 0.0.0.0
b. Remote server information
   i. Remote server A > Connected

Figure 29 – Status screen

Status of LEDs present on the adapter

1) Initial status:
   NET (left LED): off
   COM (central LED): steady on
   READY (right LED): flashing on

Figure 30 - Initial status of LEDs

2) Final status:
   NET (left LED): steady on
   COM (central LED): steady on
   READY (right LED): flashing on

Figure 31 - Final status of LEDs

If the NET LED does not light up or if the Remote Server A option in the Status page still shows “Not Connected”, the configuration was not successful, i.e. the wrong router password was entered or the device was disconnected during connection.

It is necessary to reset the adapter:

- Press the Reset button for 10 seconds and release
- After a few seconds, the LEDs will turn off and READY will start to flash quickly
- The adapter has now returned to its initial state. At this point, the configuration procedure can be repeated again.

The adapter can only be reset when the inverter is switched on.

Figure 32 – Reset button on the Wi-Fi adapter

13.1.4. Troubleshooting

Status of LEDs present on the adapter

1) Irregular communication with inverter
   - NET (left LED): steady on
   - COM (central LED): off
   - READY (right LED): flashing on

Figure 33 - Irregular communication status between inverter and Wi-Fi

- Check the Modbus address set on the inverter:

Enter the main menu with the ESC key (first key on the left), go to System Info and press ENTER to enter the submenu. Scroll down to the Modbus address parameter and make sure it is set to 01 (and in any case, other than 00).
If the value is not 01, go to "Settings" (basic settings for hybrid inverters) and enter the Modbus Address menu where the 01 value can be set.

- Check that the Wi-Fi adapter is correctly and securely connected to the inverter, making sure to tighten the two cross-head screws provided.

- Check that the Wi-Fi symbol is present in the top right-hand corner of the inverter's display (steady or flashing).

Figure 34 – Icons on the display of LITE single-phase inverters (left) and three-phase or hybrid inverters (right)

- Restart the adapter:
  - Press the reset button for 5 seconds and release
  - After a few seconds, the LEDs will turn off and will start to flash quickly
  - The adapter will now be reset without having lost the configuration with the router

2) Irregular communication with remote server
- NET (left LED): off
- COM (central LED): on
- READY (right LED): flashing on

Figure 35 - Irregular communication status between Wi-Fi and remote server

- Check that the configuration procedure has been carried out correctly and that the correct network password has been entered.
- When searching for the Wi-Fi network using a smartphone or PC, make sure that the Wi-Fi signal is strong enough (a minimum RSSI signal strength of 30% is required during configuration). If necessary, increase it by using a network extender or a router dedicated to inverter monitoring.
- Check that the router has access to the network and that the connection is stable; check that a PC or smartphone can access the Internet
- Check that port 80 of the router is open and enabled to send data
- Reset the adapter as described in the previous section

If, at the end of the previous checks and subsequent configuration, Remote server A is still "Not Connected" or the NET LED is off, there may be a transmission problem at the home network level and, more specifically, that data between the router and server is not being transmitted correctly. In this case, it is advisable to carry out checks at the router level in order to ensure that there are no obstructions on the output of data packets to our server.
To make sure that the problem lies in the home router and to exclude problems with the Wi-Fi adapter, configure the adapter using the Wi-Fi hotspot function on your smartphone as a reference wireless network.

- **Using an Android mobile phone as a modem**

a) Check that the 3G/LTE connection is active on your smartphone. Go to the Settings menu of the operating system (the gear icon on the screen with a list of all the apps installed on the phone), select "Other" from the Wireless and networks menu and make sure that the Network type is set to 3G/4G/5G.
b) In the Android settings menu, go to Wireless & networks > Other. Select Mobile Hotspot/Tethering, and then enable the Wi-Fi mobile hotspot option; wait a few seconds for the wireless network to be created. To change the name of the wireless network (SSID) or your password, select Configure Wi-Fi hotspot.

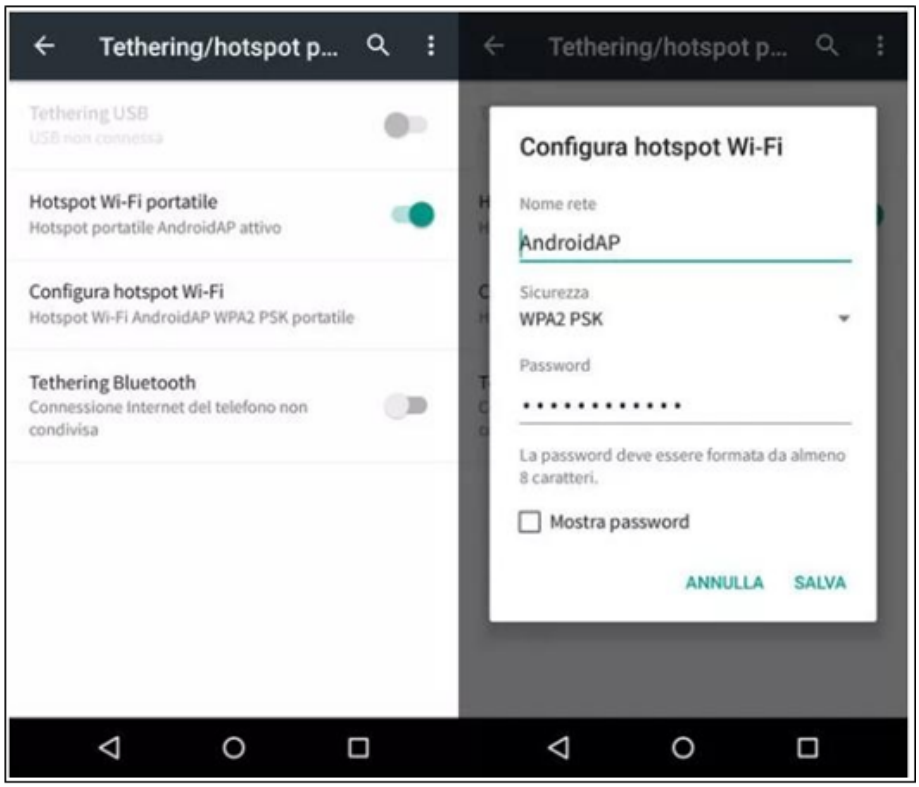


Figure 36 – Configuration of an Android smartphone as a hotspot router

- **Using an iPhone as a modem**

a) In order to share the iPhone connection, verify that the 3G/LTE network is active by going to Settings > Mobile Phone, and making sure that the "Voice and data" option is set to 5G, 4G or 3G. To enter the iOS settings menu, click the grey gear icon on the home screen of your phone.

b) Go to the Settings menu > Personal Hotspot and turn on the Personal Hotspot option. The hotspot is now enabled. To change the password of the Wi-Fi network, select Wi-Fi password from the personal hotspot menu.

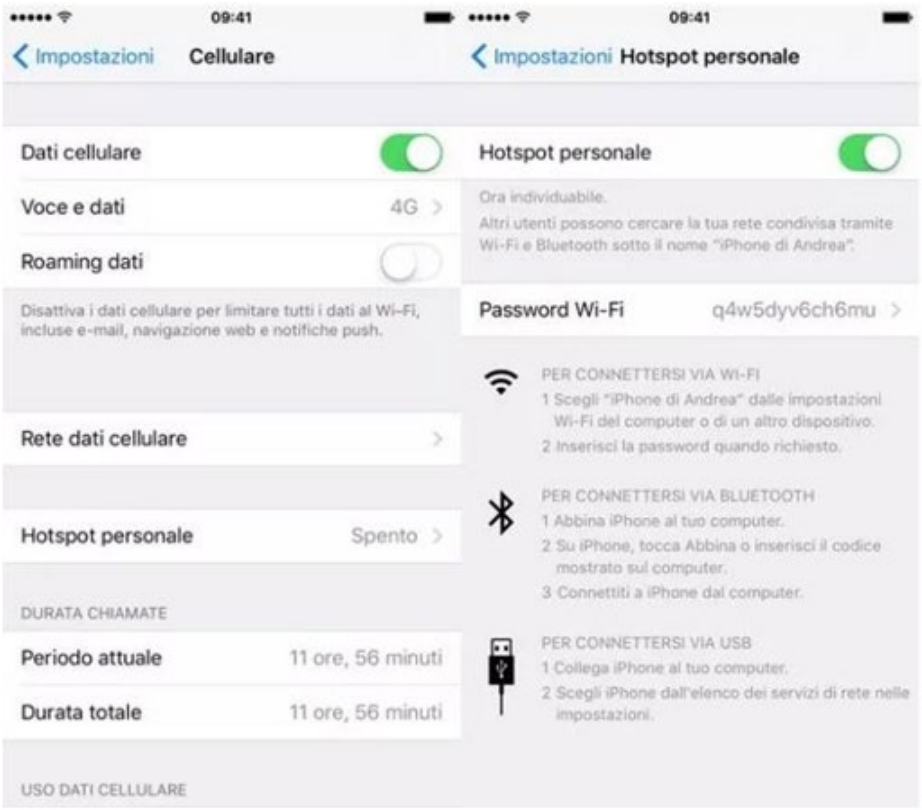


Figure 37 - Configuration of an iOS smartphone as a hotspot router

At this point, it is necessary to re-configure the Wi-Fi adapter using a PC or smartphone other than the one used as a modem.

During this procedure, when asked to select the Wi-Fi network, choose the one activated by the smartphone and then enter the password associated with it (which can be changed from the personal hotspot settings). If at the end of configuration, "Connected" appears next to "Remote Server A", then the problem is with the home router.

It is therefore advisable to check the brand and model of the home router you are trying to connect to the Wi-Fi adapter; some router brands may have closed communication ports. In this case, contact the customer service of the router's manufacturer and ask them to open port 80 (direct from the network to external users).

13.2. Ethernet adapter

13.2.1. Installation

Installation must be carried out for all inverters compatible with the adapter. However, the procedure is quicker and easier as there is no need to open the front cover of the inverter. Proper operation of the device requires the presence of a modem correctly connected to the network and in operation in order to achieve stable data transmission from the inverter to the server.

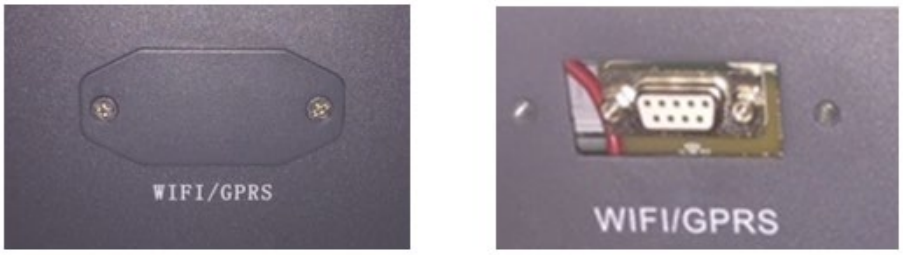
In order to monitor the inverter, the RS485 communication address must be set to 01 directly from the display.

Installation tools:

- Cross screwdriver
- Ethernet adapter
- Shielded network (Cat. 5 or Cat. 6) crimped with RJ45 connectors

1) Switch off the inverter following the procedure described in this manual.
2) Remove the cover for accessing the Wi-Fi/Eth connector on the bottom of the inverter by unscrewing the two cross-head screws (a), or by unscrewing the cover (b), depending on the inverter model, as shown in the figure.

(a)



(b)

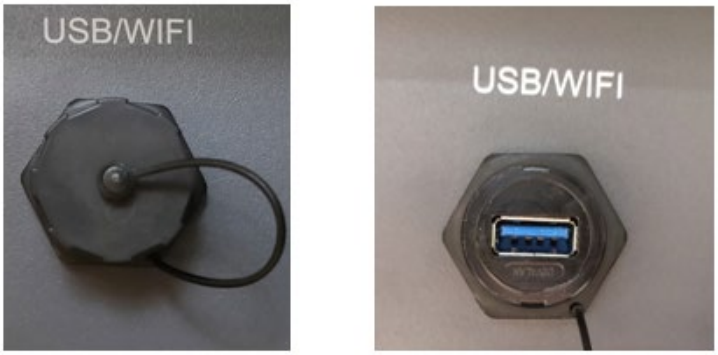


Figure 38 – Port of the Ethernet adapter

3) Remove the ring nut and the waterproof cable gland from the adapter to allow the network cable to pass through; then insert the network cable network into the appropriate port on the inside of the adapter and tighten the ring nut and cable gland to ensure a stable connection.

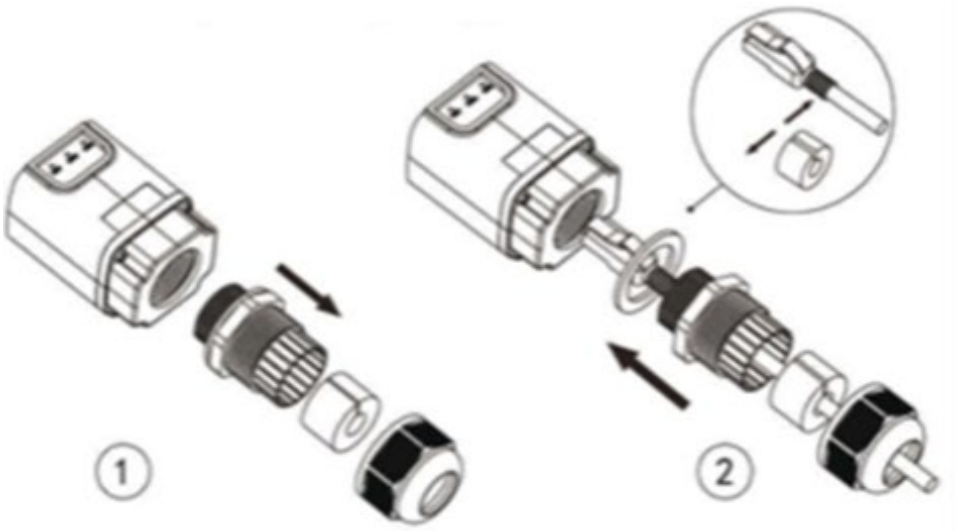


Figure 39 – Inserting the network cable inside the device

4) Connect the Ethernet adapter to the appropriate port, making sure to follow the direction of the connection and ensure correct contact between the two parts.

(a)

(b)

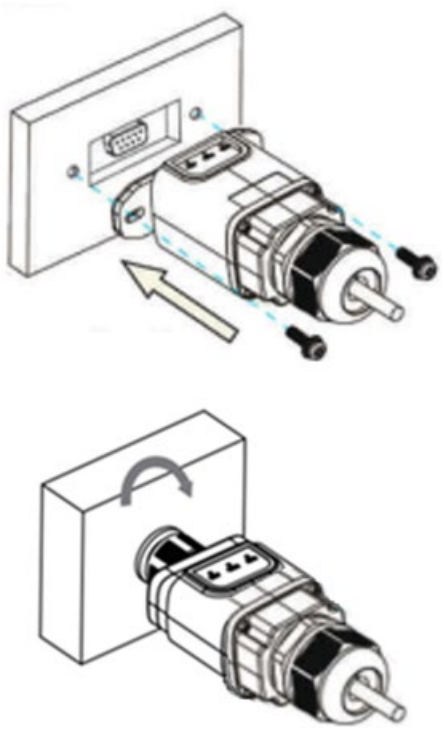


Figure 40 – Inserting and securing the ethernet adapter

5) Connect the other end of the network cable to the ETH output (or equivalent) of the modem or a suitable data transmission device.

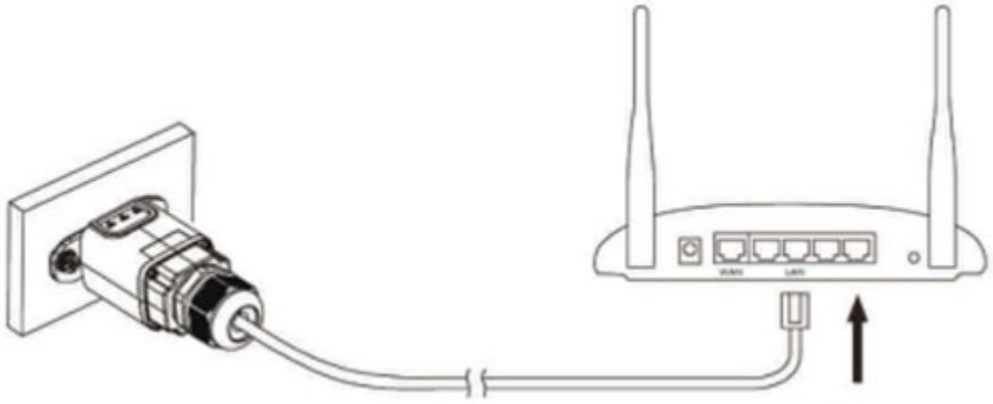


Figure 41 – Connecting the network cable to the modem

6) Switch on the inverter by following the procedure described in the manual.

7) Unlike Wi-Fi cards, the Ethernet adapter does not need to be configured and starts transmitting data shortly after the inverter is switched on.

13.2.2. Verification

Wait two minutes after installing the adapter, and check the status of the LEDs on the device.

Status of LEDs present on the adapter

1) Initial status:
   NET (left LED): off
   COM (central LED): steady on
   SER (right LED): flashing on

Figure 42 - Initial status of LEDs

2) Final status:
NET (left LED): steady on
COM (central LED): steady on
SER (right LED): flashing on

Figure 43 - Final status of LEDs

13.2.3. Troubleshooting

Status of LEDs present on the adapter

1) Irregular communication with inverter

- NET (left LED): steady on
- COM (central LED): off
- SER (right LED): flashing on

Figure 44 - Irregular communication status between the inverter and adapter

- Check the Modbus address set on the inverter:
  Enter the main menu with the ESC key (first key on the left), go to System Info and press ENTER to enter the submenu. Scroll down to the Modbus address parameter and make sure it is set to 01 (and in any case, other than 00).
  If the value is not 01, go to "Settings" (basic settings for hybrid inverters) and enter the Modbus Address menu where the 01 value can be set.
- Check that the Ethernet adapter is correctly and securely connected to the inverter, making sure to tighten the two cross-head screws provided. Check that the network cable is correctly inserted into the device and modem, and that the RJ45 connector is correctly crimped.

2) Irregular communication with remote server

- NET (left LED): off
- COM (central LED): on
- SER (right LED): flashing on

Figure 45 - Irregular communication status between the adapter and remote server

- Check that the router has access to the network and that the connection is stable; check that a PC can access the Internet

  Check that port 80 of the router is open and enabled to send data.
  It is advisable to check the brand and model of the home router you are trying to connect to the Ethernet adapter; some router brands may have closed communication ports. In this case, contact the customer service of the router's manufacturer and ask them to open port 80 (direct from the network to external users).

13.3. 4G adapter

The ZCS 4G adapters are sold with a virtual SIM integrated into the device with data traffic fee included for10 years, which is adequate for the proper transmission of data to monitor the inverter.

In order to monitor the inverter, the RS485 communication address must be set to 01 directly from the display.

13.3.1. Installation

Installation must be carried out for all inverters compatible with the adapter. However, the procedure is quicker and easier as there is no need to open the front cover of the inverter.

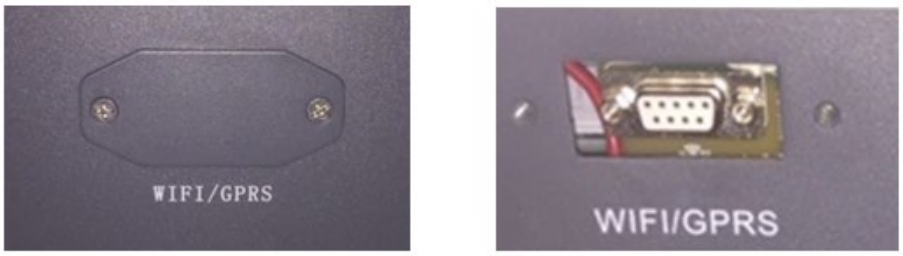
Installation tools:

- Cross screwdriver
- 4G adapter

4) Switch off the inverter following the procedure described in this manual.

5) Remove the cover for accessing the Wi-Fi/ GPRS connector on the bottom of the inverter by unscrewing the two cross-head screws (a), or by unscrewing the cover (b), depending on the inverter model, as shown in the figure.

(a)



(b)

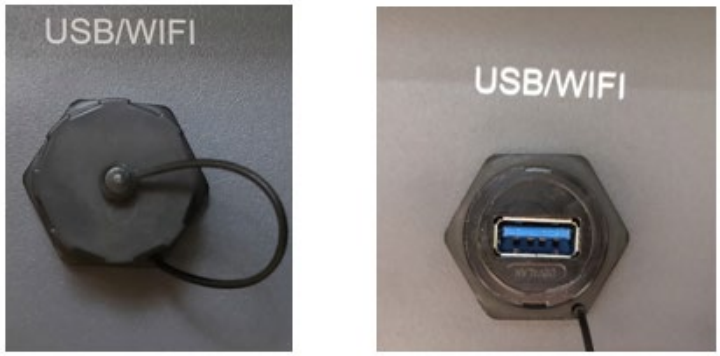


Figure 46 – Port of the 4G adapter

6) Insert the 4G adapter into the appropriate port, making sure to follow the direction of the connection and ensure correct contact between the two parts. Secure the 4G adapter by tightening the two screws inside the package.

(a)

(b)

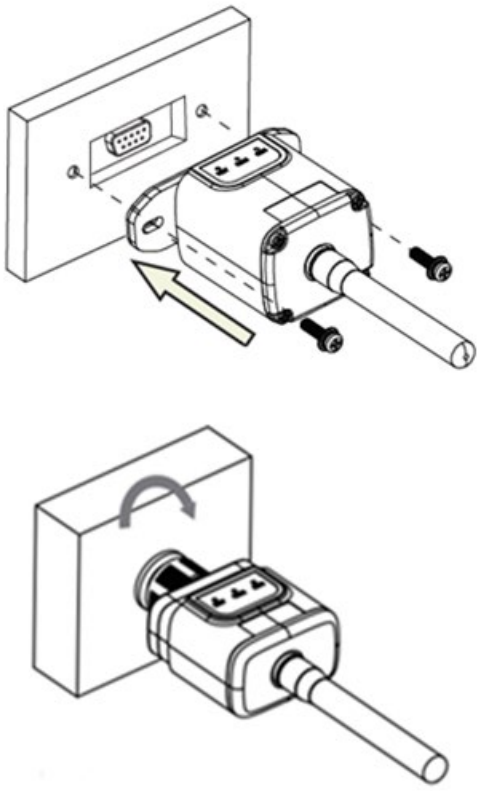


Figure 47 – Inserting and securing the 4G adapter

7) Switch on the inverter by following the procedure described in the manual.
8) Unlike Wi-Fi cards, the 4G adapter does not need to be configured and starts transmitting data shortly after the inverter is switched on.

13.3.2. Verification

After installing the adapter, within the next 3 minutes check the status of the LEDs on the device to ensure that the device is configured correctly.

Status of LEDs present on the adapter

1) Initial status:
   - NET (left LED): off
   - COM (central LED): flashing on
   - SER (right LED): flashing on

Figure 48 - Initial status of LEDs

2) Registration:

- NET (left LED): flashes rapidly for about 50 seconds; the registration process takes about 30 seconds
- COM (central LED): flashes rapidly 3 times after 50 seconds

3) Final status (approx. 150 seconds after the inverter has started):

- NET (left LED): flashing on (off and on at equal intervals)
- COM (central LED): steady on
- SER (right LED): steady on

Figure 49 - Final status of LEDs

Status of LEDs present on the adapter

1) Irregular communication with inverter

- NET (left LED): on
- COM (central LED): off
- SER (right LED): on

Figure 50 - Irregular communication status between inverter and adapter

- Check the Modbus address set on the inverter:
  Enter the main menu with the ESC key (first key on the left), go to System Info and press ENTER to enter the submenu. Scroll down to the Modbus address parameter and make sure it is set to 01 (and in any case, other than 00).

  If the value is not 01, go to "Settings" (basic settings for hybrid inverters) and enter the Modbus Address menu where the 01 value can be set.

- Check that the 4G adapter is correctly and securely connected to the inverter, making sure to tighten the two cross-head screws provided.

2) Irregular communication with remote server:

   - NET (left LED): flashing on
   - COM (central LED): on
   - SER (right LED): flashing on

Figure 51 - Irregular communication status between the adapter and remote server

- Check that the 4G signal is present in the installation location (the adapter uses the Vodafone

network for 4G transmission; if this network is not present or the signal is weak, the SIM will use a different network or will limit the data transmission speed). Ensure that the installation location is suitable for 4G signal transmission and that there are no obstacles that could affect data transmission.

- Check the status of the 4G adapter and that there are no external signs of wear or damage.

13.4. Datalogger

13.4.1. Preliminary notes on how to configure the datalogger

The AzzurroZCS inverters can be monitored via a datalogger connected to a Wi-Fi network present at the place of installation or via an ethernet cable connected to a modem.

ZCS monitoring				
Product code	Product photo	APP monitoring	Portal monitoring	Possibility to send commands and to update the inverter remotely in case of technical support
ZSM-WIFI		✓	✓	✓
ZSM-ETH		✓	✓	✓
ZSM-4G		✓	✓	✓
Datalogger 4-10 Inverters		✓	✓	⊘
Datalogger up to 31 Inverters		✓	✓	⊘

The inverters are connected in a daisy chain to the datalogger via a RS485 serial line.

- Datalogger up to 4 inverters (code ZSM-DATALOG-04): allows to monitor up to 4 inverters.

  It can be connected to the network via an Ethernet or Wi-Fi network.
- Datalogger up to 10 inverters (code ZSM-DATALOG-10): allows to monitor up to 10 inverters.

  It can be connected to the network via an Ethernet or Wi-Fi network.

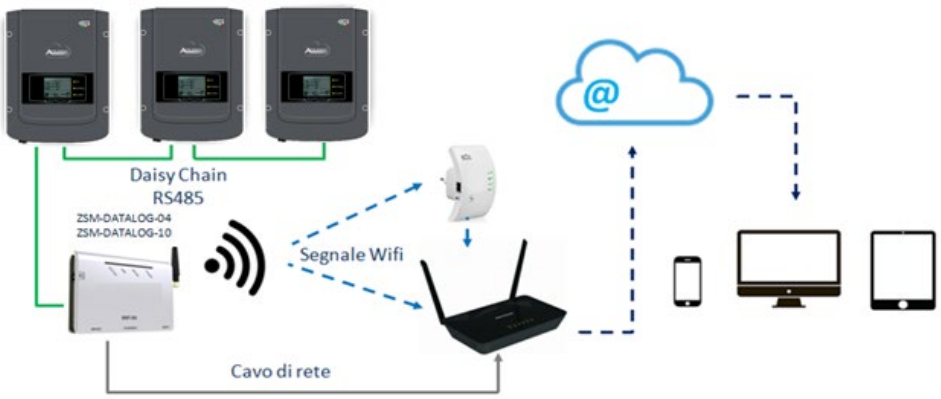


Figure 52 – Diagram for connecting the ZSM-DATALOG-04 / ZSM-DATALOG-10 datalogger

- Datalogger up to 31 inverters (code ZSM-RMS001/M200): allows to monitor up to 31 inverters or a system with a maximum installed power of 200kW.

It can be connected to the network via an Ethernet cable.

- Datalogger up to 31 inverters (code ZSM-RMS001/M1000): allows to monitor a maximum of 31 inverters or a system with a maximum installed power of 1000kW.

It can be connected to the network via an Ethernet cable.

Figure 53 – Diagram showing the operation of the ZSM-RMS001/M200 / ZSM-RMS001/M1000 datalogger

All these devices carry out the same function, i.e. they transmit data from the inverters to a web server to allow remote monitoring of the system either through the "Azzurro System" app or through the "www.zcsazzurroportal.com" website.

All the Azzurro ZCS inverters can be monitored using the datalogger; different models or families of inverters can also be monitored.

13.4.2. Electrical connections and configuration

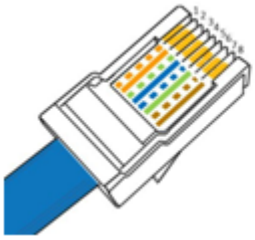
All the Azzurro ZCS inverters have at least one RS485 connection point.
The connections can be made via the green terminal block or via the RJ45 plug inside the inverter.
Use positive and negative conductors. There is no need to use a conductor for the GND. This applies to both the terminal block and the plug.
The serial line can be created using a shielded RS485 certificated cable.
In case of monitoring of multiple inverters, continue the shielding of the cables when entering the exit under the COM port of the inverter. Connect the shield to the ground on one side (inverter side).

1) In the case of three-phase inverters, a suitably crimped network cable with a RJ45 connector can also be used:

   a. Place the blue cable in position 4 of the RJ45 connector and the white-blue cable in position 5 of the RJ45 connector, as shown in the figure below.

   b. Insert the connector into the 485-OUT terminal.

   c. If there is more than one three-phase inverter, insert another connector in the 485-IN terminal to connect to the 485-OUT input of the next inverter.



RJ 45	Colore	Monofase	Trifase
4	Blu	TX +	485 A
5	Bianco-Blu	TX -	485 B

Figure 54 – Pin out for connecting the RJ45 connector

2) Daisy chain

   a. Insert the blue cable into input A1 and the white-blue cable into input B1.

   b. If there is more than one three-phase inverter, insert a blue cable into input A2 and a white-blue cable into input B2 and connect them to the respective A1 and B1 inputs of the next inverter.

Some inverters have both an RS485 terminal block and RJ45 plugs. This is shown in detail in the figure below.

Figure 55– Tightening the network cable to the RS485 terminal block

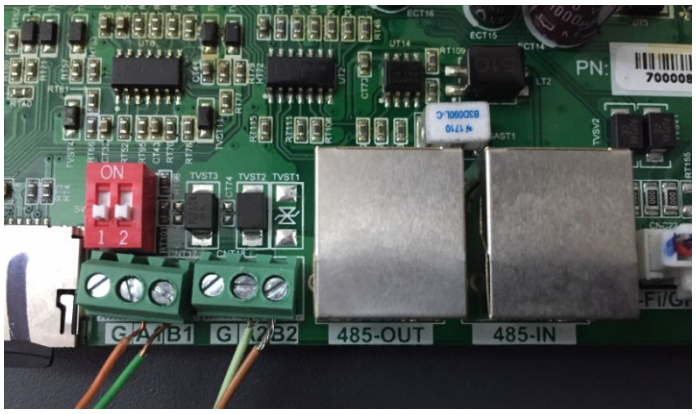


Figure 56– Connecting the serial line via the RS485 terminal block and via the RJ45 plug

For the 3PH HYD5000-HYD20000-ZSS three-phase hybrid inverter, use only one positive and one negative of those shown in the figure below.

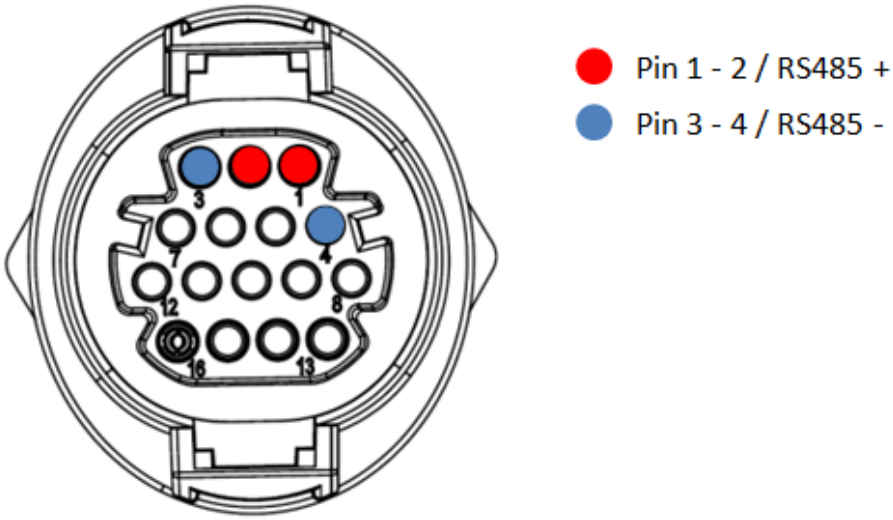


Figure 57a– Connecting the serial line via the communication connector for 3PH HYD5000-HYD20000-ZSS

For the 3PH HYD5000-HYD20000-ZSS three-phase hybrid inverter and the 3000-6000 TLM-V3 photovoltaic inverter, use only one positive and one negative of those shown in the figure below.

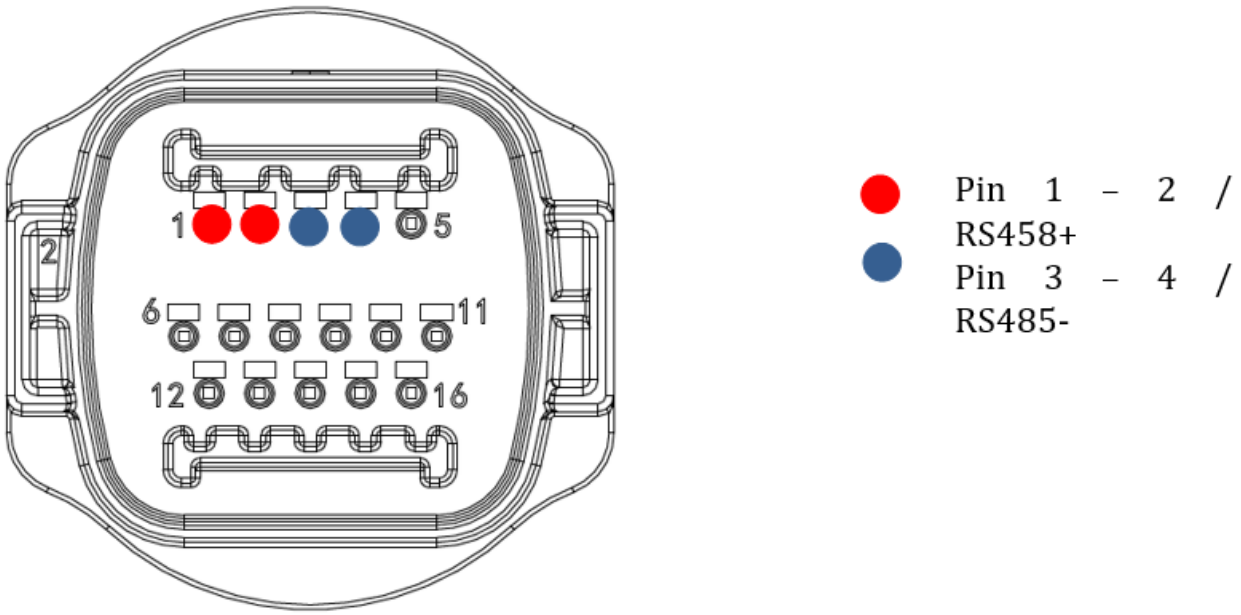


Figure 58b– Connecting the serial line via the communication connector for 1PH 3000-6000 TLM-V3, 3PH HYD5000-HYD20000-ZSS

For the 1PH HYD3000-HYD6000-ZSS-single-phase hybrid inverter, use only one positive and one negative of those shown in the figure below.

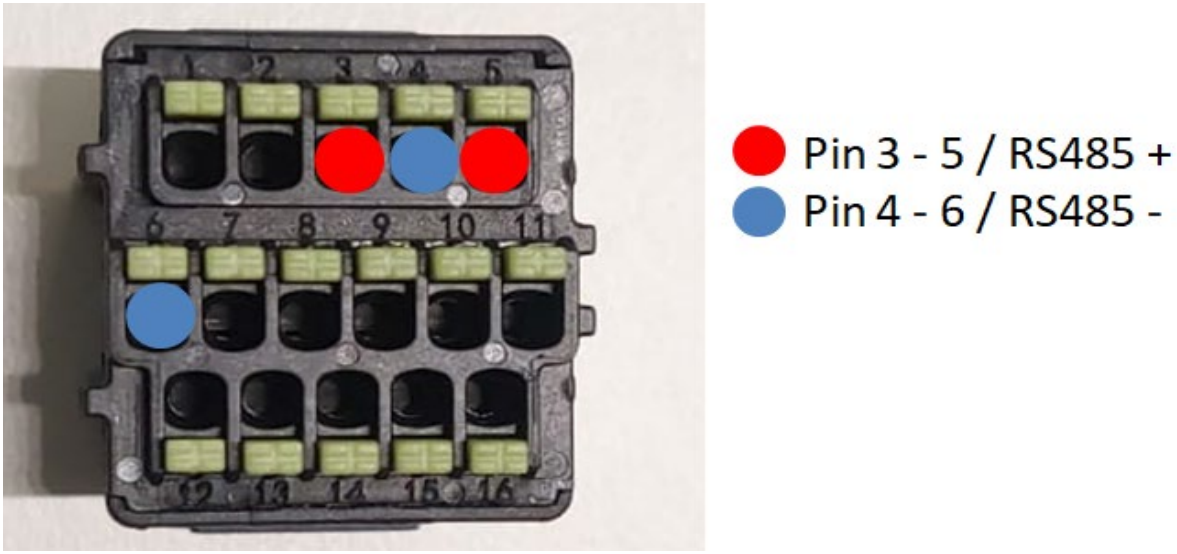


Figure 59c – Connecting the serial line via the communication connector for 1PH HYD3000-HYD6000-HP

For the 1PH HYD3000-HYD6000-ZP1-single-phase hybrid inverter, use only one positive and one negative of those shown in the figure below.

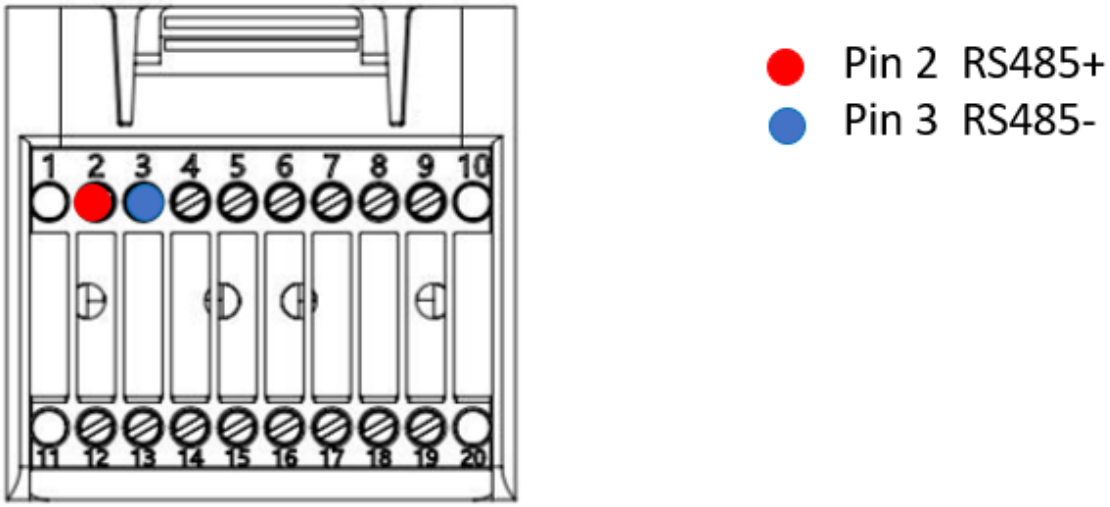


Figure 60d – Connecting the serial line via the communication connector for 1PH HYD3000-HYD6000-HP

c. Position the dip switches of the last inverter of the daisy chain as shown in the figure below for activating the 120 Ohm resistor and closing the communication chain. If there are no switches, physically connect a 120 Ohm resistor to terminate the bus.

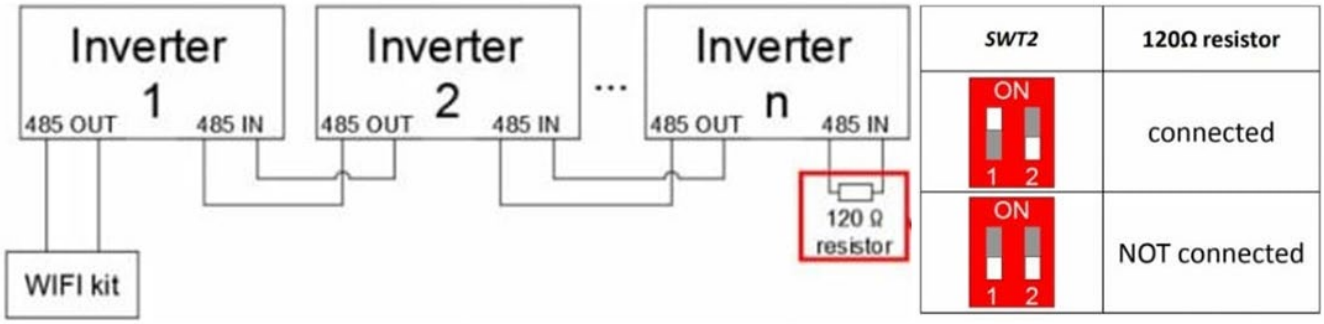


Figure 61 – Positioning of dip switches to connect the isolation resistor

3) Check that the RS485 icon is shown on the display of all the inverters. This indicates that the inverters are actually connected via the serial line. If this symbol does not appear, check that the connection is correct, as indicated in this guide.

Figure 62 – RS485 symbol on the display of the inverter

4) Set a sequential Modbus address on each inverter connected:

   a. Enter the “Settings” menu.
   b. Scroll to the submenu “Modbus Address.”
   c. Change the digits and set an increasing address on each inverter, starting from 01 (first inverter) to the last inverter connected. The Modbus address will be shown on the display of the inverter alongside the RS485 symbol. There should be no inverters with the same Modbus address.

13.5. ZSM-DATALOG-04 AND ZSM-DATALOG-10 DEVICES

The initial status of the LEDs on the datalogger will be:

- POWER steady on
- 485 steady on
- LINK off
- STATUS steady on

13.5.1. WI-FI CONFIGURATION

To configure the datalogger via Wi-Fi, please refer to the chapter on monitoring systems, as the configuration is similar to that of any type of Wi-Fi adapter.

13.5.2. Ethernet configuration

1) Insert the RJ45 connector of the Ethernet cable in the ETHERNET input of the datalogger.

Figure 92 – Ethernet cable connected to the datalogger

2) Connect the other end of the Ethernet cable to the ETH output (or equivalent) of the modem or a suitable data transmission device.

3) Activate the search for Wi-Fi networks on your phone or PC in order to display all the networks visible from your device.

Figure 63 - Wi-Fi network search on iOS smartphone (left) and Android (right)

Note: Disconnect from any Wi-Fi networks to which you are connected by removing automatic access.

Figure 64 - Disabling automatic reconnection to a network

4) Connect to a Wi-Fi network generated by the datalogger (i.e. AP_*******, where ******* indicates the serial number of the datalogger shown on the label of the device), which operates as an Access Point.

5) Note: To ensure that the datalogger is connected to the PC or smartphone during the configuration procedure, enable automatic reconnection of the AP_******* network.

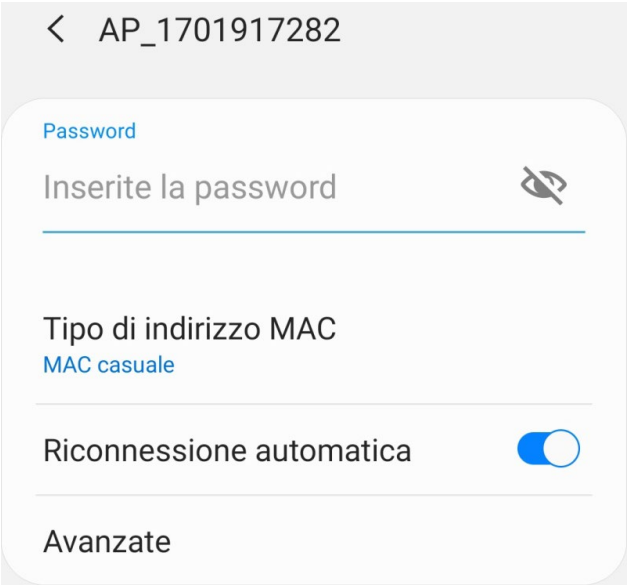


Figure 65 - Password entry prompt

Note: the Access Point is not able to provide internet access; confirm to maintain the Wi-Fi connection, even if internet is not available.

Figure 66 - Screen showing that the Internet cannot be accessed

6) Open a browser (Google Chrome, Safari, Firefox) and enter the IP address 10.10.100.254 in the address bar at the top of the screen.
In the box that appears, enter "admin" as both Username and Password.

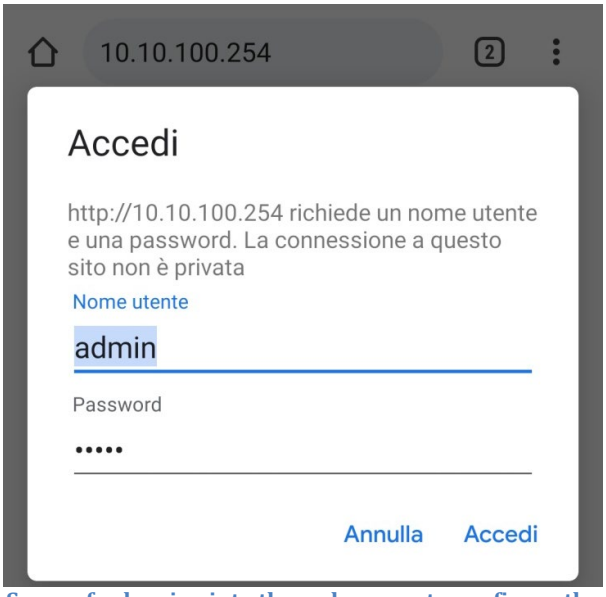


Figure 67 - Screen for logging into the web server to configure the datalogger

7) The status screen will open, showing the datalogger information such as serial number and firmware version.

Check that the fields relating to the Inverter Information are filled in with the information of all the inverters connected.

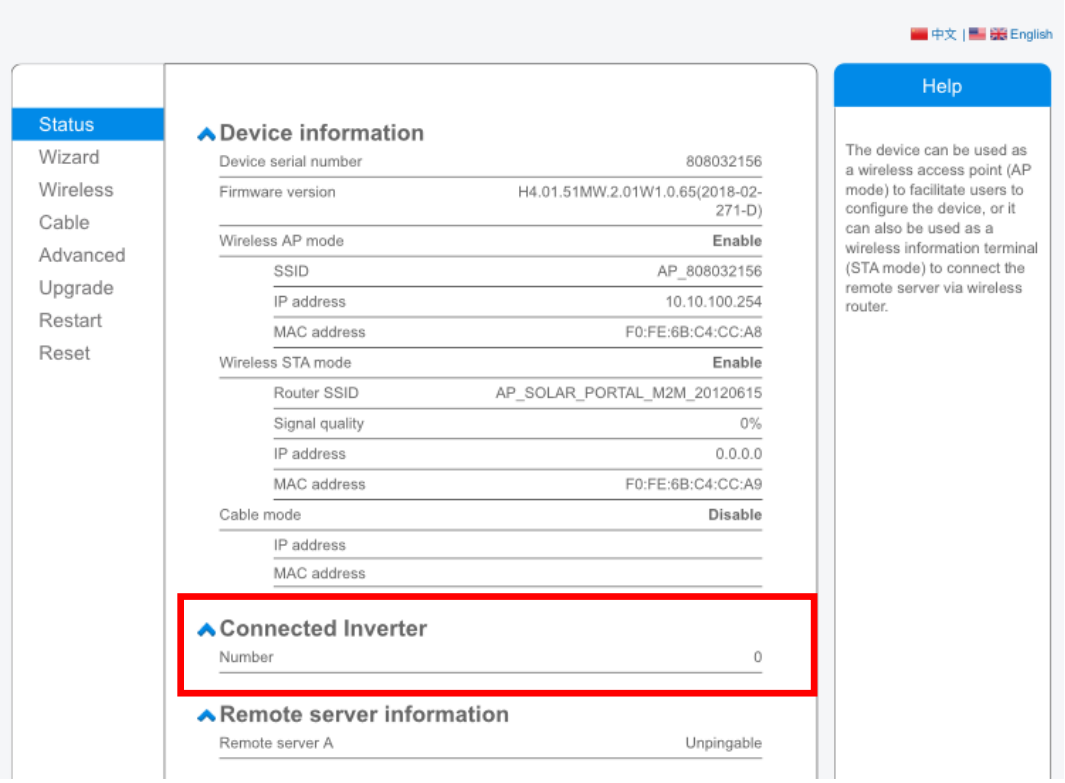


Figure 68 – Status Screen

8) Click on the Wizard setup button in the left-hand column.

9) Now click on the Start button to start the configuration wizard.

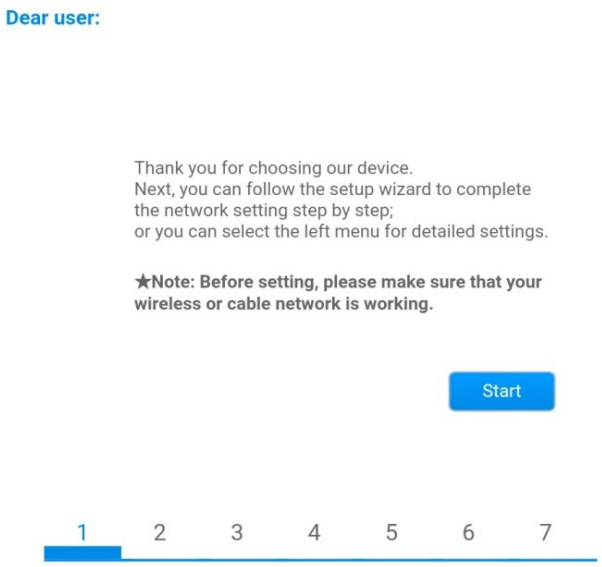


Figure 69 – Screen for starting (1) the Setup Wizard

10) Check the "Cable Connection" option and then click "Next."

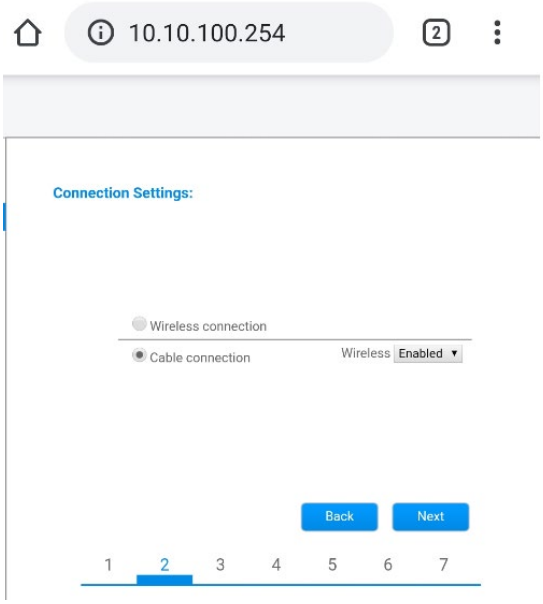


Figure 70 - Network cable connection selection screen

11) Make sure that the "Enable" option is selected to automatically obtain the IP address from your router, then click Next.

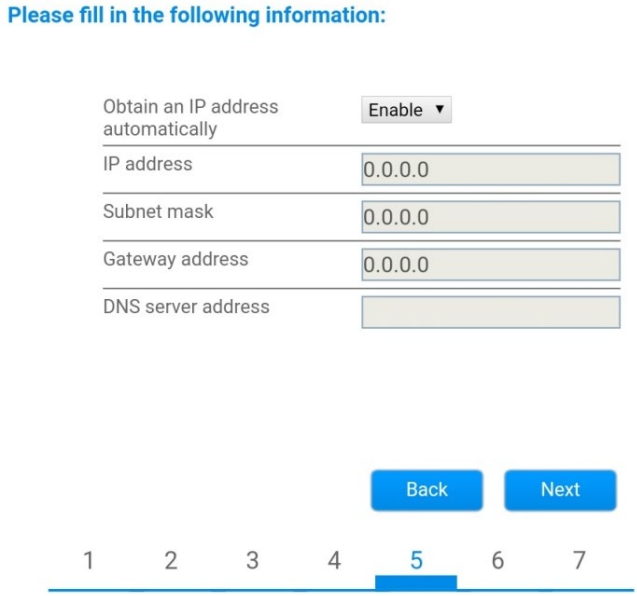


Figure 71 – Screen for automatically obtaining the IP address (5)

12) Click on Next without making any changes.

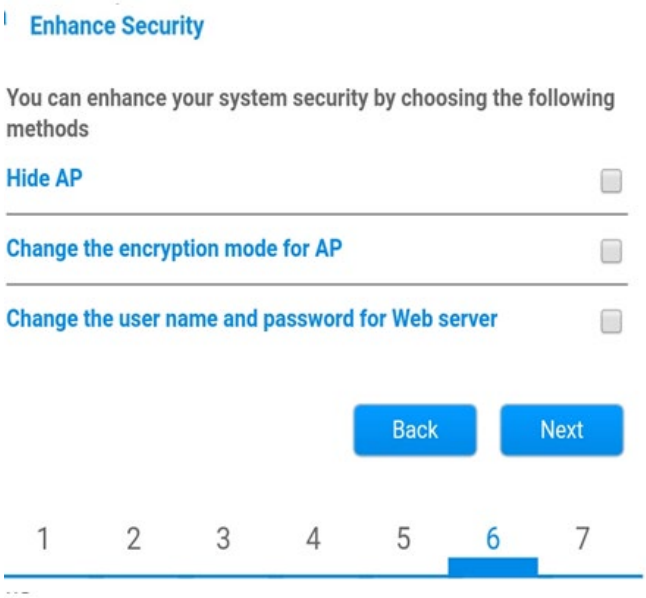


Figure 72 - Screen for setting the security options (6)

13) Complete the configuration procedure by clicking OK, as shown in the following screen.

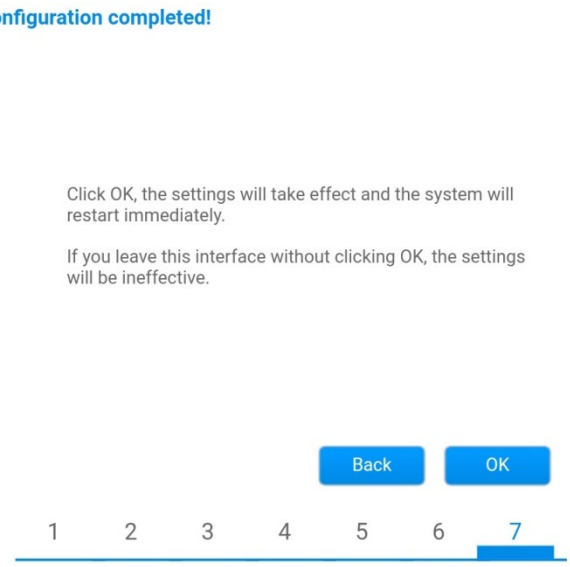


Figure 73 – Final configuration screen (7)

14) If the configuration procedure is successful, the following screen will appear.

If this screen does not appear, try refreshing the browser page.
The screen will prompt you to manually close the page; close the page from the background of your phone or from the close button on your PC.

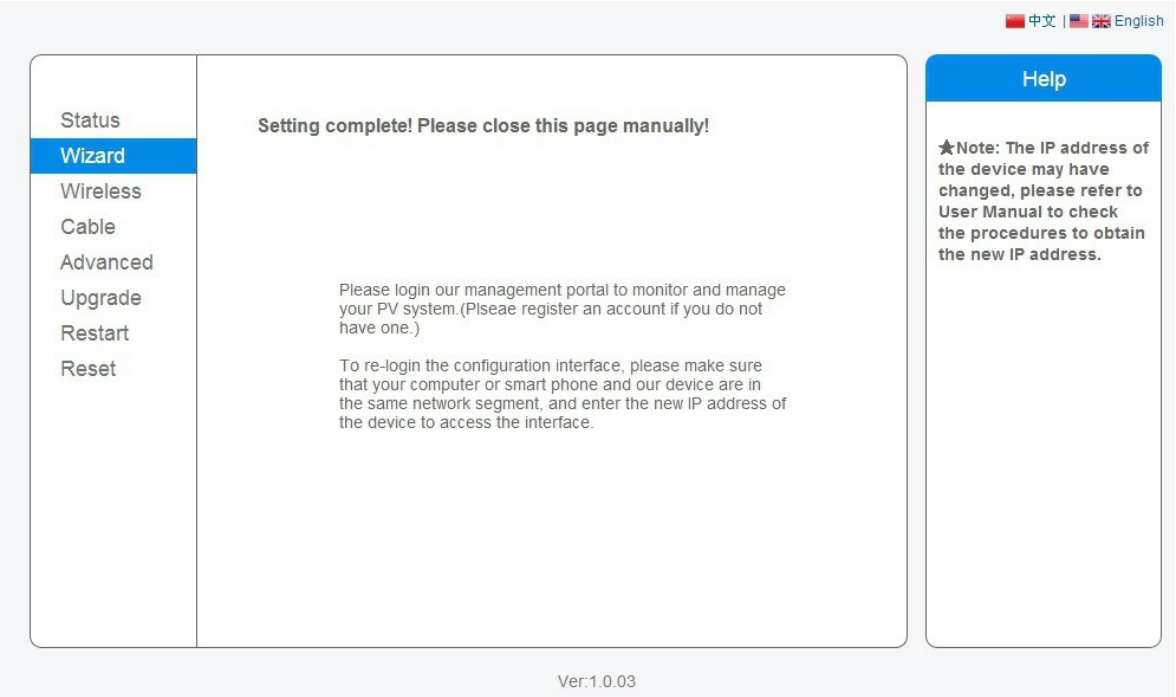


Figure 74 – Successful configuration screen

13.5.3. Checking that the datalogger has been configured correctly

Wait two minutes after completing the configuration of the device.
First of all, check that the LINK LED on the device is on and steady.

Figure 75 – LED indicating the correct configuration of the datalogger

Enter the IP address 10.10.100.254 again, and the login credentials ("admin" for both username and password). Once logged in, the Status screen will appear, where the following information can be checked:

- Check Wireless STA mode (if the datalogger has been configured via Wi-Fi)
  - Router SSID > Router name
  - Signal Quality > other than 0%
  - IP address > other than 0.0.0.0
- Check Cable mode (if the datalogger has been configured via Ethernet cable)
  - IP address > other than 0.0.0.0
- Check Remote server information
  - Remote server A > Pingable

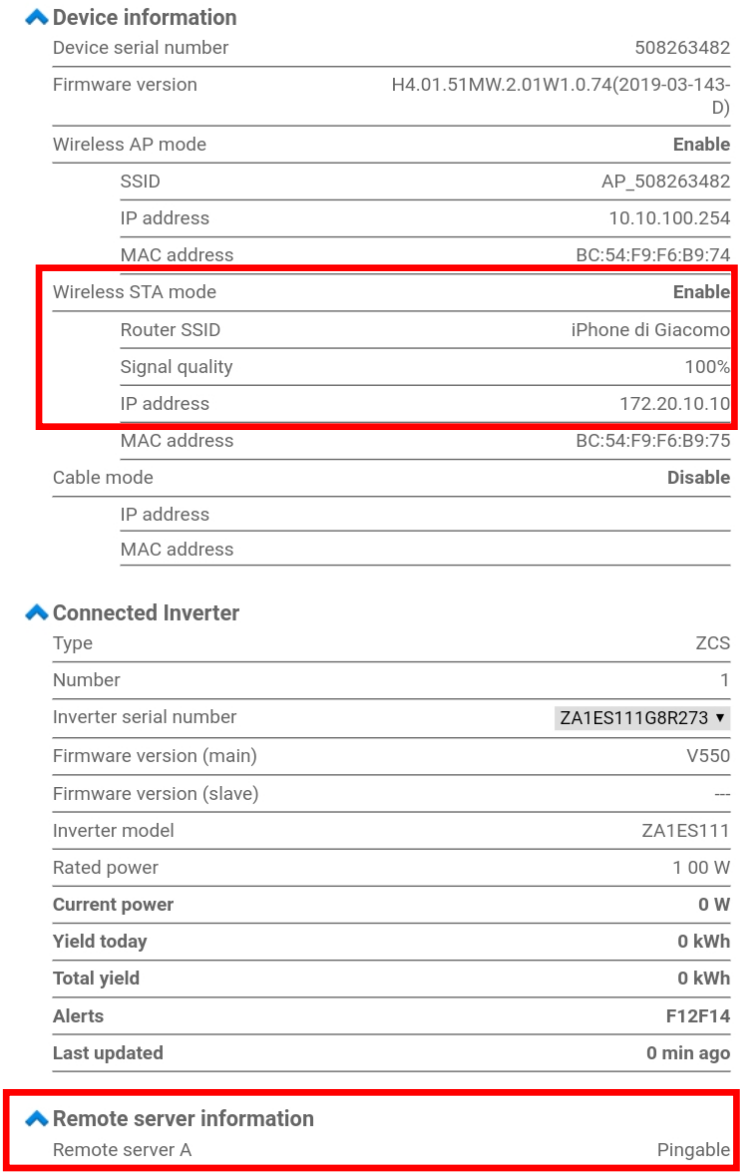


Figure 76 – Main status screen and checking of correct configuration

Figure 77 - main status screen and checking of correct configuration

If the Remote Server A item in the Status page is still “Unpingable”, the configuration was not successful, i.e. the incorrect router password was entered or the device was disconnected during connection.
It is necessary to reset the device:

- Select the Reset button in the left-hand column

- Press the OK button to confirm

- Close the web page and enter the Status page again. At this point, the configuration procedure can be repeated again.

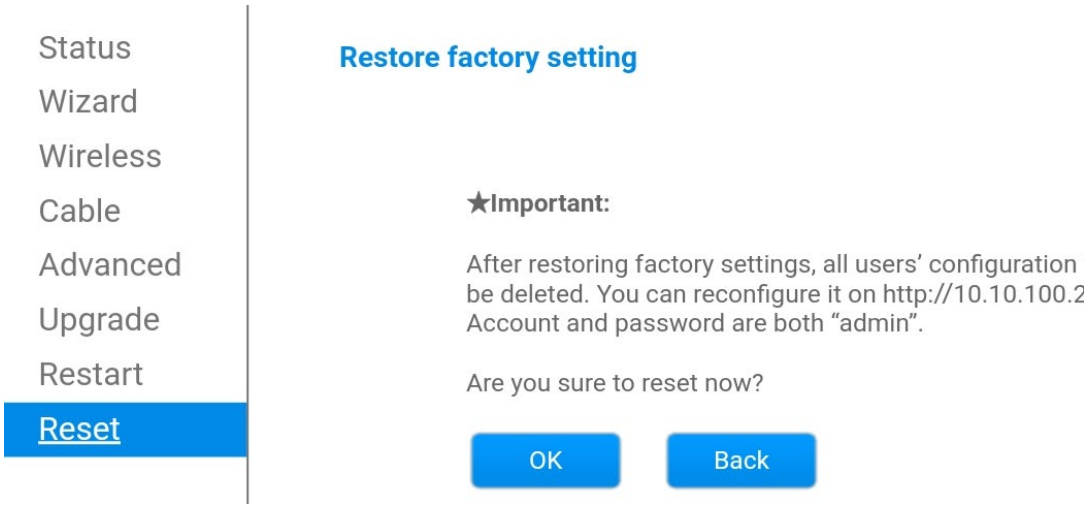


Figure 78 – Reset Screen

13.6. ZSM-RMS001/M200 and ZSM-RMS001/M1000 Devices

13.6.1. Mechanical description and Datalogger interface

Mechanical Dimensions: 127mm x 134 x 52 mm
Protection rating: IP20

The usable ports are indicated below.

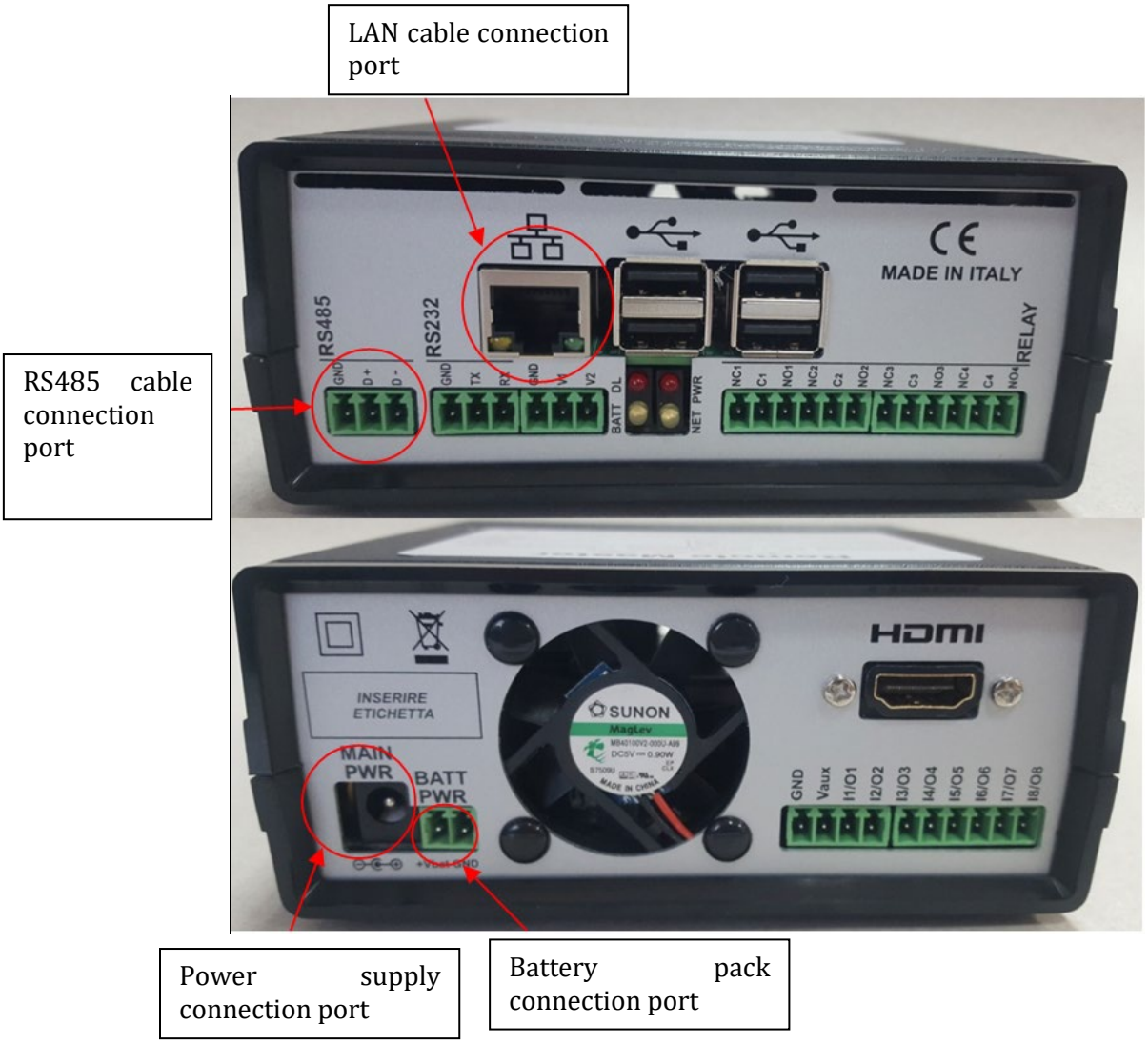


Figure 79: Datalogger rear panel

13.6.2. Connecting the Datalogger to the inverters

A serial communication via RS485 cable is provided for connecting to the inverters.
The GND cable does not need to be connected to the inverters. Follow the connections as shown in the table below.

Datalogger SIDE	BUS Signal	SENSOR SIDE (ZSM-IRR-TEMP-LM2)	Inverter SIDE
D+ terminal	+	RS485***+IB*** terminal	***+Tx*** terminal
D– terminal	-	RS485***-IA*** terminal	***-Tx*** terminal

Table 3: Connecting the Datalogger to the inverters

13.6.3. Internet connection via Ethernet cable

In order to display the data measured and processed by the Datalogger in the portal, it is necessary to connect to the internet via LAN cable and open the following router ports:

- VPN ports: 22 and 1194
- HTTP ports: 80
- DB ports: 3050
- FTP ports: 20 and 21

The local network of the device is configured for DHCP, and it is not necessary to activate any communication port on the router. If you want to set a fixed network address, this must be provided at the time of ordering together with the gateway address.

13.6.4. Connecting the power supply and battery pack to the Datalogger

Once the RS485 Half Duplex cable has been connected, power the Datalogger by connecting the power supply unit (supplied with the datalogger) to the MAIN PWR input (12V DC - 1A).
In order to prevent possible voltage drops and/or power failures, it is recommended to also connect the battery pack, which is supplied with the datalogger. The battery pack should be connected to the $+V_{bat}$ and GND inputs of the BATT PWR connector, positive and negative respectively (i.e. red to the $+V_{bat}$ input and black to the GND input).

The battery pack (ZSM-UPS-001) can be purchased separately.

13.6.5. Connecting the LM2-485 PRO cell irradiance and temperature sensor to the datalogger

For proper installation, make sure to connect the sensor signal cable and the power cable.

In particular, the sensor of the signal cables must be connected in a daisy chain configuration to the remaining devices on the RS485 bus, as shown in the table below.

Datalogger SIDE	BUS Signal	SENSOR SIDE (ZSM-IRR-TEMP-LM2)	Inverter SIDE
D+ terminal	+	RS485***+IB*** terminal	***+Tx*** terminal
D– terminal	-	RS485***-IA*** terminal	***-Tx*** terminal

To supply power to the sensor, the datalogger can be directly connected to the mains power, as shown in the table below, or connected to an external +12Vdc power supply.

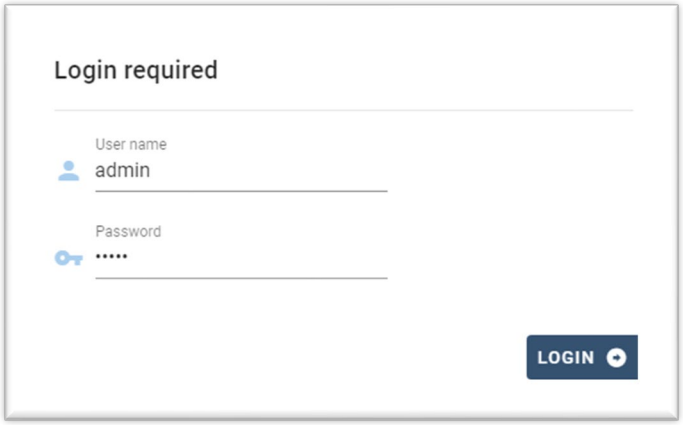
Datalogger SIDE	SENSOR SIDE
V1 terminal (12Vdc output voltage)	**RED +12V** Terminal
GND terminal (GND/RTN)	**BLACK 0V** Terminal
V2 terminal (12Vdc driveable voltage)	

Table 4: Electrical connection of the sensor to the datalogger (power supply)

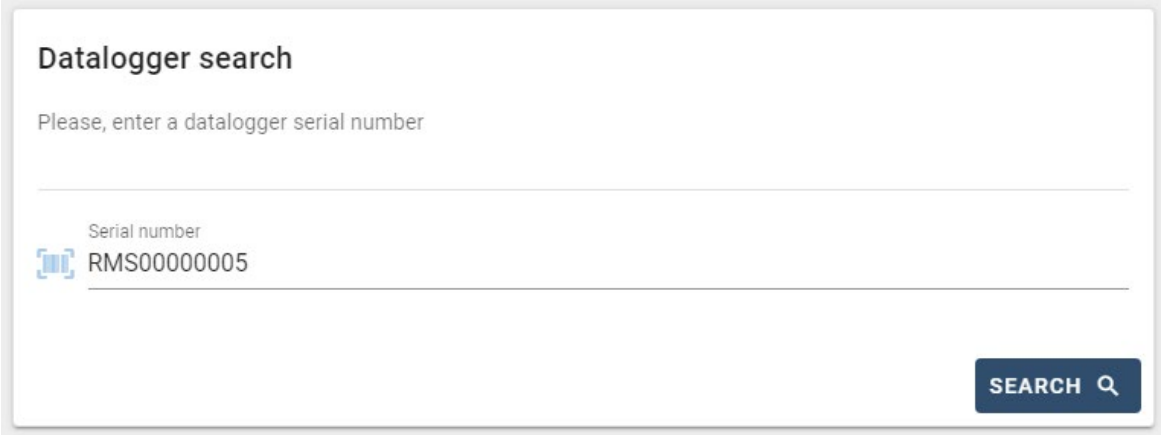
A stable communication in terms of signal and power supply, up to 200m, is guaranteed by using the RS485 cable, type Te.Co. 15166 (2x2x0,22+1x0,22)st/pu.
For longer distances, a connection to the signal side of the datalogger is recommended, and a connection to the +12V power supply via an external power supply unit.

13.6.6. Configuring the Datalogger

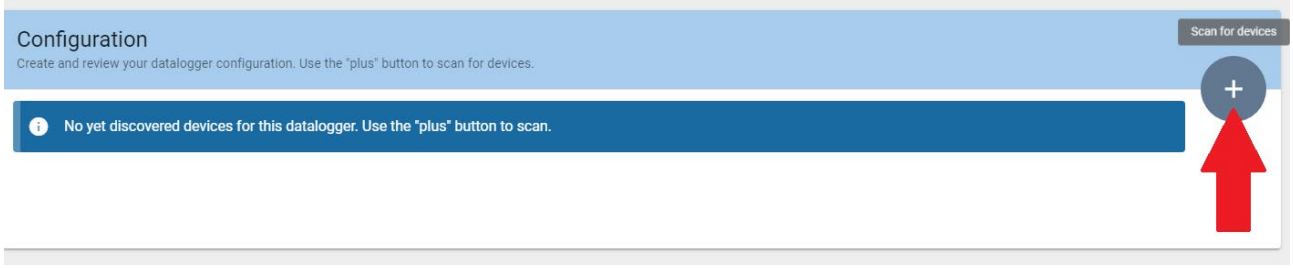
Connect to the website dlconfig.it and login by entering the temporary credentials: Username = admin and Password = admin.



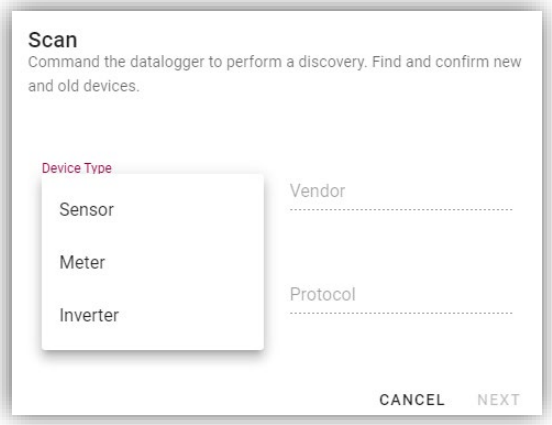
In the screen that opens, enter the serial number(S/N) of the datalogger to be configured and click “SEARCH”.



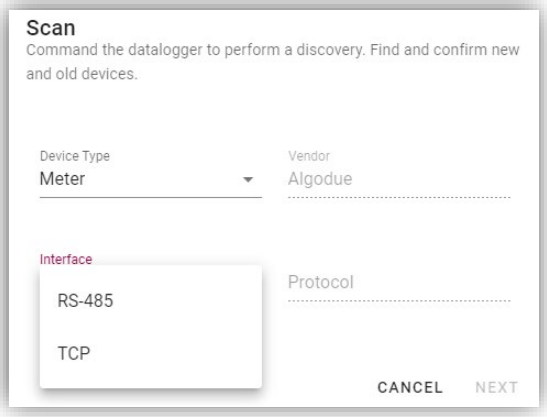
In the configuration page, you can search for any devices connected to the datalogger (inverter, meter or sensors) by clicking the + button, as shown in the figure.

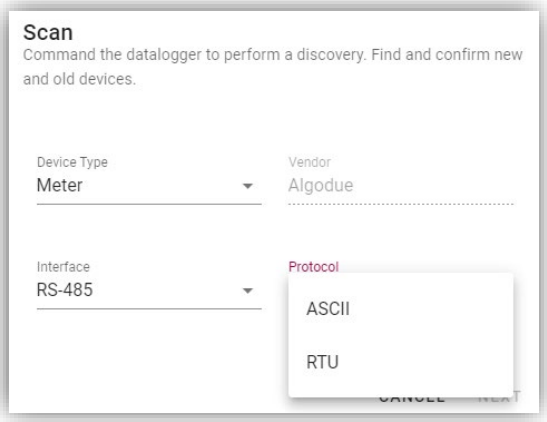


A window will open where you can search for each type of device connected to the Datalogger, after indicating the range of addresses associated with the relative devices.

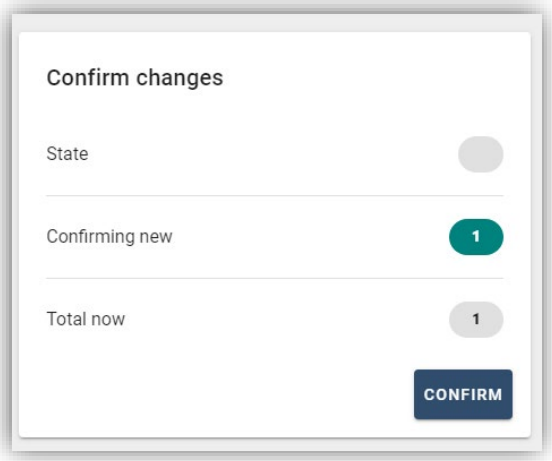


If a meter is one of the devices connected to the Datalogger, select the type of Meter/Datalogger communication interface and the relative communication protocol.

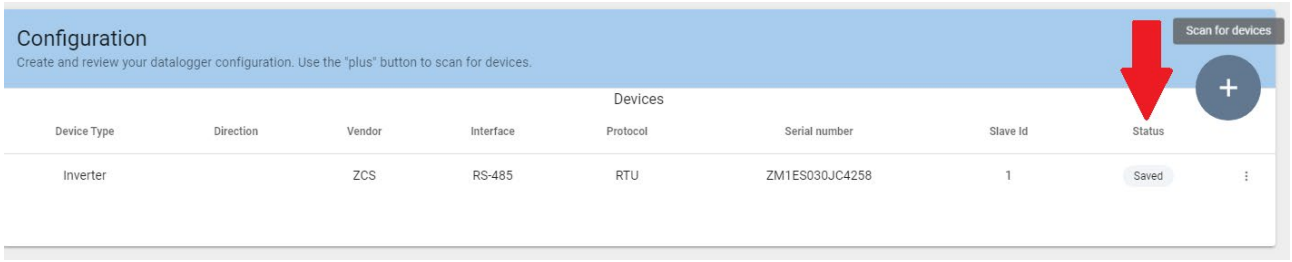




Once this operation has been completed, update the new configuration by clicking “Confirm,” which will allow you to register the devices associated with the datalogger.

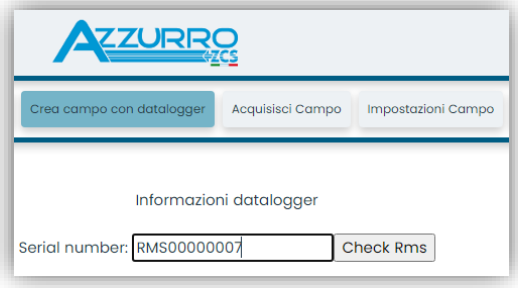


From this moment, the datalogger is correctly configured (all devices must be in the "saved" status) and therefore a new installation can be created on the ZCS Azzurro portal for associating the datalogger and the devices connected to it.

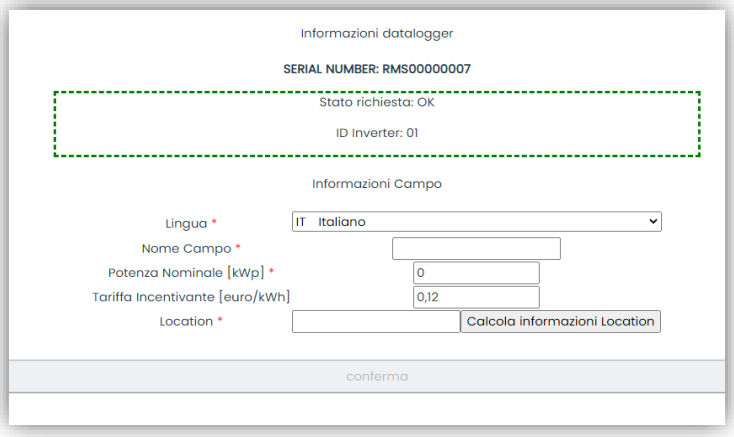


13.6.7. Configuring the Datalogger on the ZCS Azzurro portal

Access the ZCS Azzurro portal (https://www.zcsazzurroportal.com). For new users, click "Sign up now" to register on the portal by entering your email, username and password. After logging into the portal, click "Configuration Panel", and then select the option "Create field with Datalogger." The "Create New Field" operation will be possible only if the user's privileges allow acquiring new fields (at the time of registration the limit will be equal to 1, an upgrade is required to increase the limit).



Enter the serial number (S/N) of the datalogger and click “Check RMS”. If the datalogger has been configured correctly, a screen will open where you can enter the required information relating to the field to be installed.

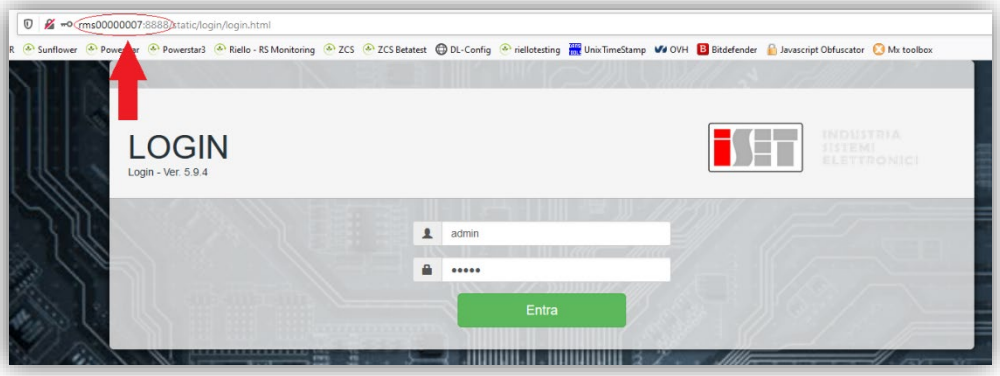


Once the “location” of the field has been entered, click “Calculate Location Information” to allow the system to obtain the latitude, longitude and time zone of the installation. Click “Confirm” to complete the configuration of the field. You only need to wait a few minutes to view the data flow on the ZCS Azzurro portal.

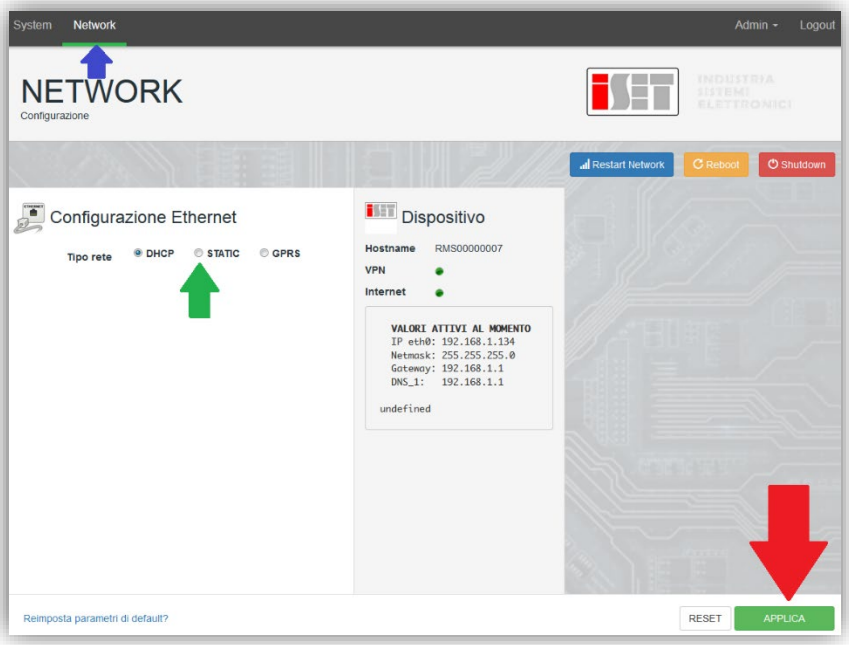
ATTENTION: The location data is essential for the correct operation of the datalogger in the ZCS system. It is important to define it very carefully.

13.6.8. Network configuration

At the time of purchase, the Datalogger is configured in DHCP, i.e. dynamic configuration.
However, if you want to set up a static configuration for your Datalogger, you can access the internet page via the link RMSxxxxxxxx: 8888, as shown in the figure (e.g. RMS00000007).



By entering the credentials: username = admin and password = admin, you can change the configuration from dynamic to static by selecting the network window (see blue arrow) and then the “STATIC” option (see green arrow).



To complete the operation, click “Apply” (see red arrow).

13.7. Local monitoring

The datalogger makes it possible to obtain an additional monitoring system (***local monitoring***), which can be used locally on a web page (therefore, also without an internet connection) and accessed from any device present in the same local network as the datalogger.

13.7.1. Requirements for installation of local monitoring

In order to install the local monitoring system on the datalogger, the customer must ensure that:

- The datalogger is connected to the local network and to the internet (the internet connection is only required during installation and configuration of the local monitoring system).
- A static address (to be provided by the customer) with gateway and subnet mask is available for viewing the page locally.

13.7.2. Features of local monitoring

After installation and configuration, local monitoring makes it possible to monitor the fundamental parameters of the photovoltaic system, even without an internet connection, from any device connected to the same local network.
In particular, it is possible to monitor the power and energy of the inverters and the storage systems over the last 7 days. It is also possible to view alarms, and other information such as temperature, peak daily power, CO_2 gains and savings.
Below is an example of a local monitoring page.

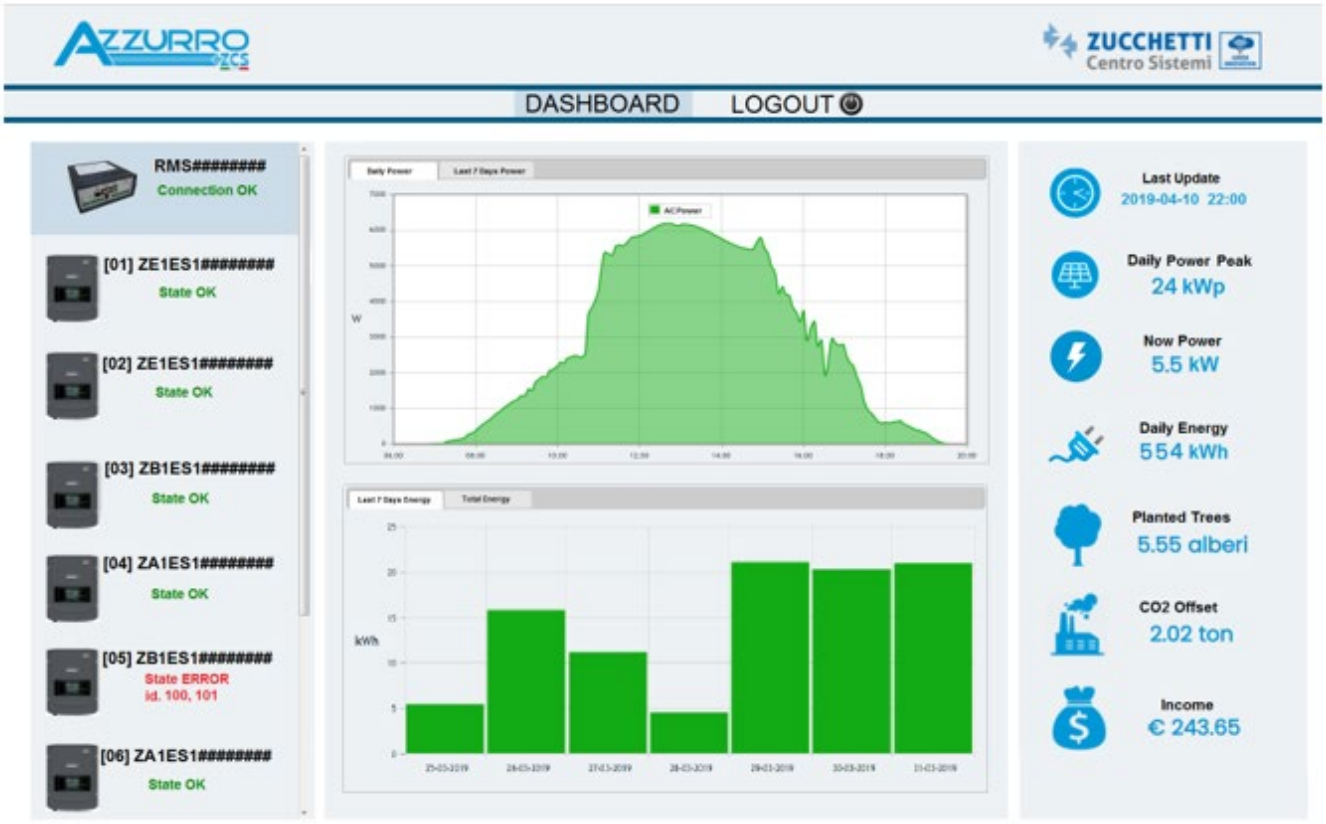


Figure 80: Example of local monitoring page

14. Warranty terms and conditions

To view the Warranty Terms and Conditions" offered by ZCS Azzurro, please refer to the documentation inside the product box and on the website www.zcsazzurro.com.

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