USER'S MANUAL

AZZURRO ZCS

THREE-PHASE HYBRID STORAGE INVERTERS

3PH HYD5000-HYD12000-ZP3

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.zcsazzur.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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Hybrid Inverter
3PH HYD5000-HYD12000-ZP3
User Manual

Identificazione: GID-GE-MD-00
Rev. 04 del 19.06.24 - Applicazione: GID

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

This manual describes the assembly, installation, electrical connections, commissioning, maintenance and troubleshooting of the 3PH HYD5000-HYD12000-ZP3 hybrid inverter.
Keep this manual so that it is accessible at all times.

Recipients

This manual is intended for qualified technical personnel (installers, technicians, electricians, technical support personnel or anyone who is qualified and certified to operate a photovoltaic system), who are responsible for installing and starting up the inverter in the photovoltaic and storage energy system and for operators of photovoltaic and storage systems.

Symbols Used

The following types of safety instruction and general information appear in this document as described 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. Introduction

The AZZURRO 3PH HYD 5000-HYD12000 ZP3 is a grid-coupled PV and energy storing inverter which can also supply energy in stand-alone operation.

The AZZURRO 3PH HYD 5000-HYD12000 ZP3 has integrated energy management functions which cover a wide range of application scenarios.

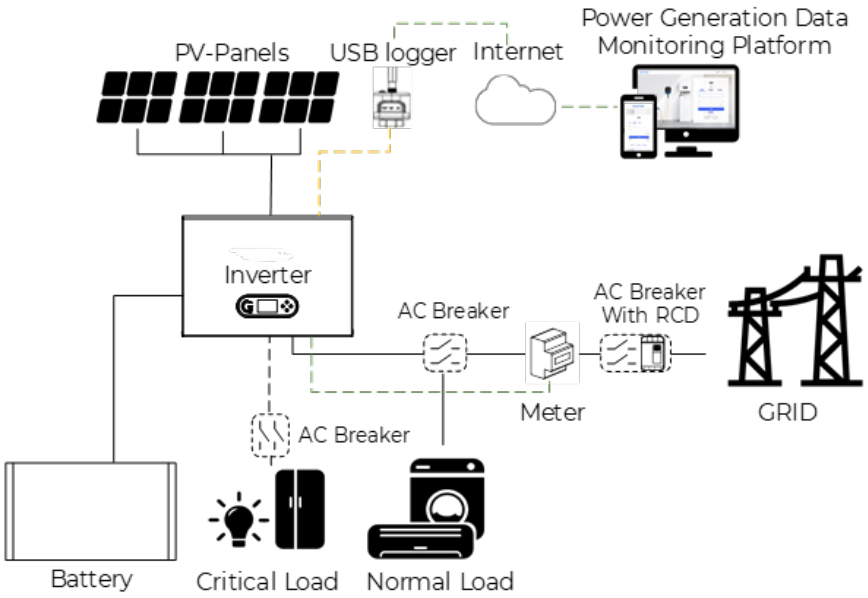


Figure 1 - Diagram of a system on which an 3PH HYD5000-12000-ZP3 hybrid is installed

The AZZURRO 3PH HYD 5000-HYD12000 ZP3 inverters may only be used with photovoltaic modules which do not require one of the poles to be earthed. In normal operation, the operating current must not exceed the limits specified within the technical data.

The selection of the optional inverter parts must be determined by a qualified technician who has good knowledge of the installation conditions.

1.1. Product Model Description

3PH HYD5000-12000-ZP3 series inverter model:

ZZT-HYD12.0K-3PH-ZP3
① ② ③

Figure 2 – Inverter model identifiers

Identifiers	Meaning	Specification
①	Product Model	Stacked optical storage all in one machine
②	Power Grade	12.0K: The power grade of inverter is 12kW Power grade list:5kW/6kW/8kW/10kW/12kW
③	Inverter Model	Three-phase hybrid energy storage inverter

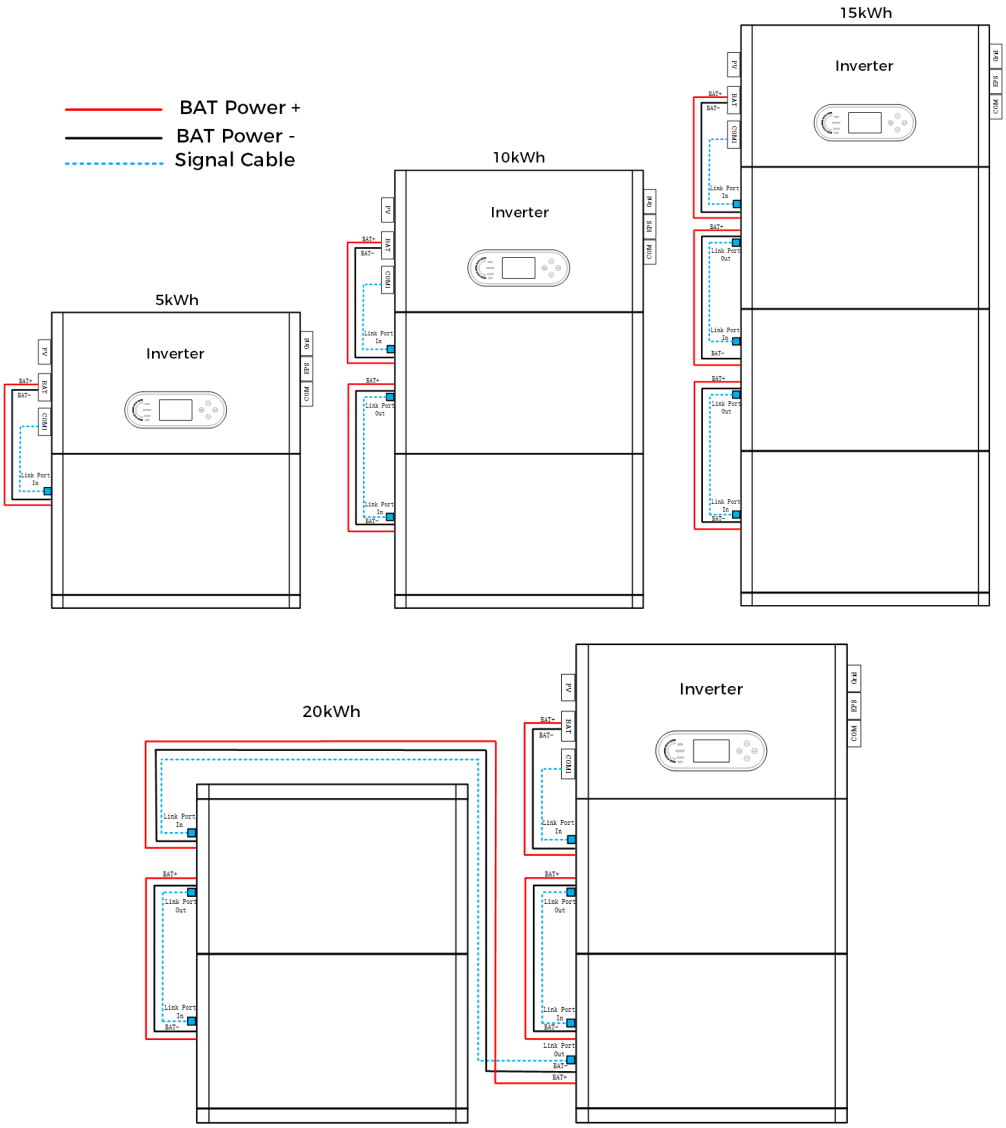
ZZT-BAT-ZBT5K
① ②

Figure 3 – Model identifiers

Identifiers	Meaning	Specification
①	Product series name	AZZURRO ZCS series battery module name
②	Battery module energy grade	5K: Battery module energy is 5kWh

1.2. Product capacity description

The 3PH HYD5000-HYD12000-ZP3 series energy storage system supports power and capacity expansion and supports up to six inverter modules in parallel.
The AZZURRO HV ZBT 5K battery system has a nominal capacity of 5.12 kWh and an AZZURRO 3PH HYD 5000...12000 ZP3 system is available in configurations from 5.12 kWh to 30.72 kWh.



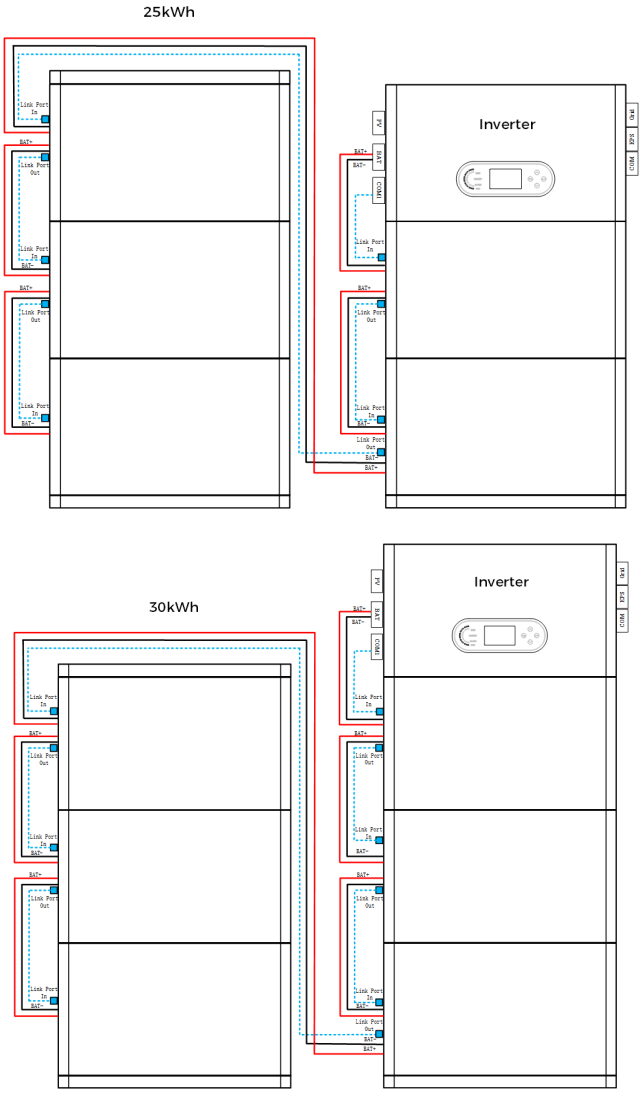


Figure 4 – Storage capacity descrition

1.3. Product dimensions

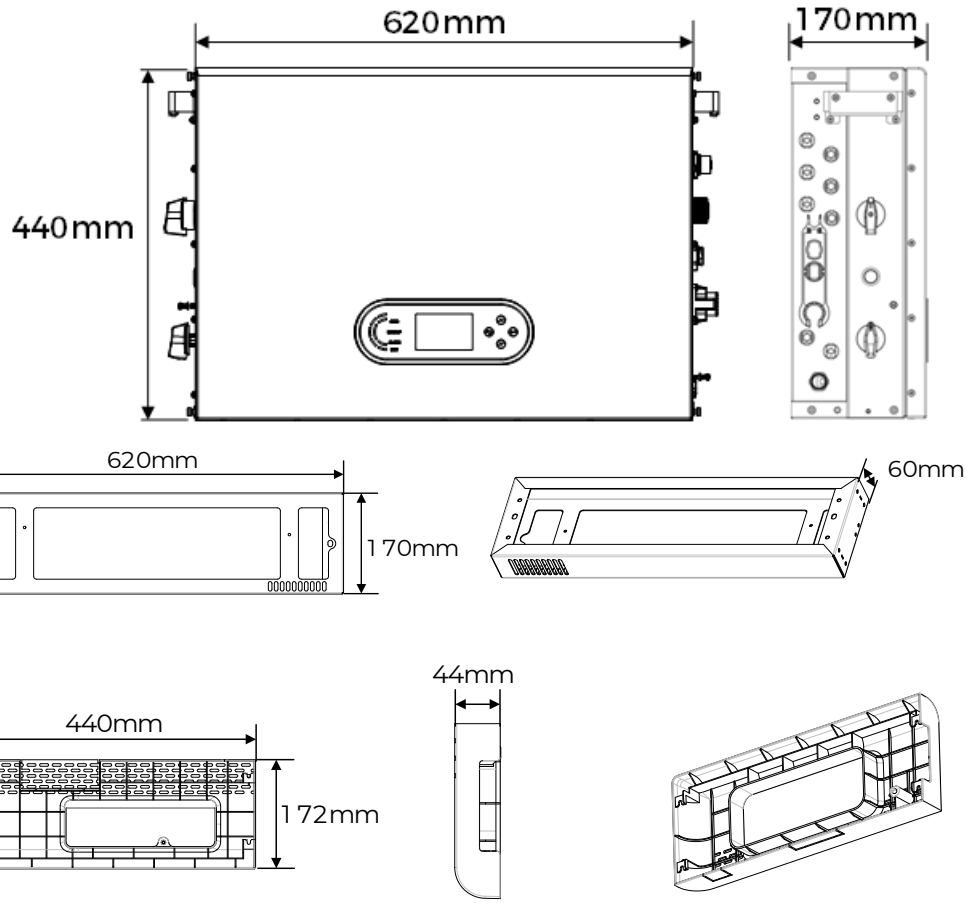
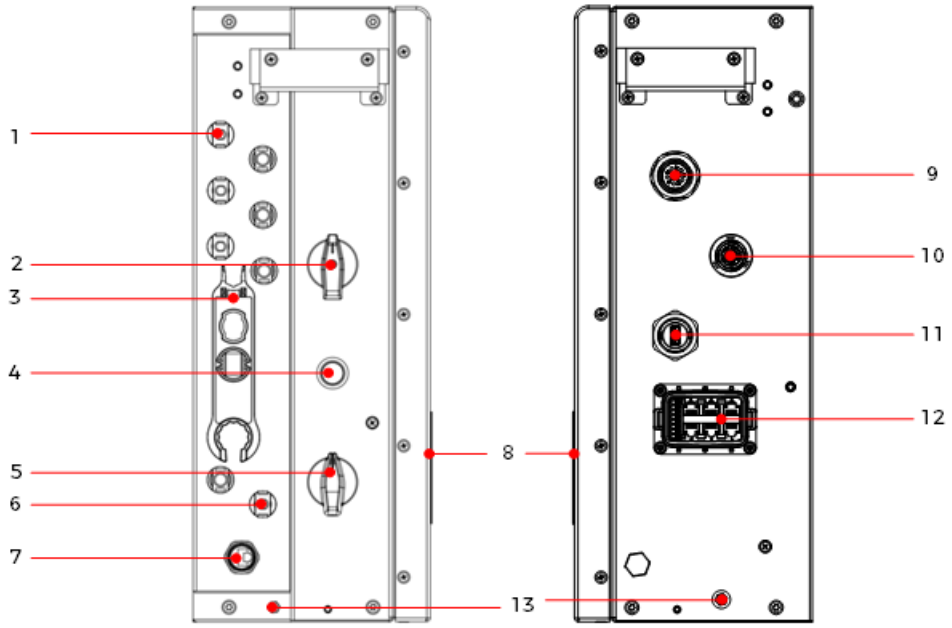


Figure 5 - Dimensions

1.3.1. Inverter Port

Caution	Damage during transportation ▶ Please check the product packaging and connections carefully prior to installation



Right side port Left side port

Figure 6 - AZZURRO 3PH HYD 5000-HYD 12000 ZP3 Inverter overview

1	PV input terminals	8	LCD display
2	PV switch	9	AC grid connection
3	Terminal remover	10	AC backup connection
4	Battery power button	11	Wi-Fi /4G
5	BAT switch	12	Communication connection
6	BAT input terminals	13	PE port
7	BAT communication port		

1.3.2. Labelling on the device

Labelling must not be covered or removed!

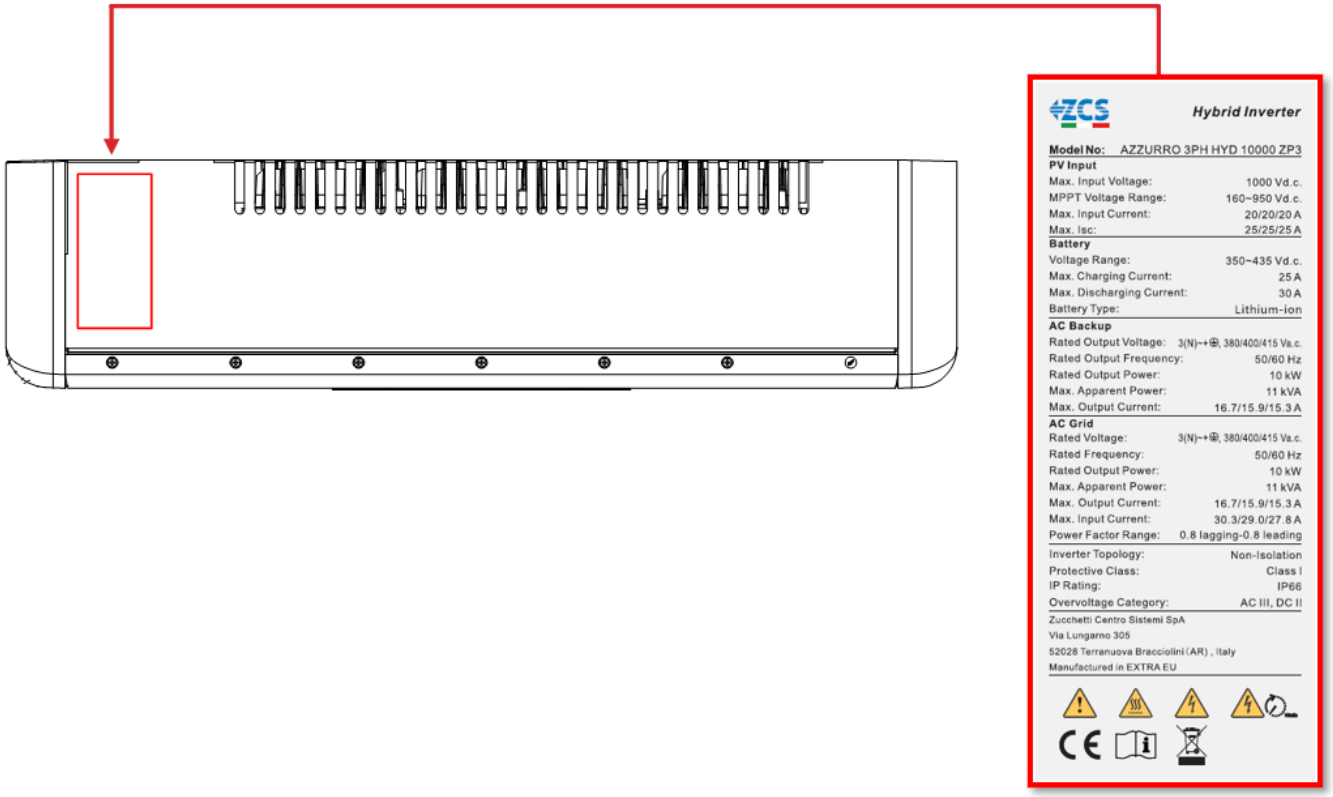


Figure 7 - AZZURRO 3PH HYD 5000...12000 ZP3 appearance and label

Note: The picture is only for reference, please make the object as the standard

1.4. Functional features

The DC output generated by the PV generator can be used for both grid feed-in and battery charging.
The battery can supply the energy to the grid or the consumer. The emergency current supply mode (EPS) can provide inductive loads such as air conditioning systems or refrigerators with an automatic switchover time of less than 10 milliseconds (default).

1.4.1. Functions

- Three MPPT trackers.
- Flexible switching between on-grid operation and energy storage operation.
- AZZURRO 3PH HYD 5000/6000/8000 ZP3 has a maximum charge/discharge efficiency of 97.6% and AZZURRO 3PH HYD 10000/12000 ZP3 has a maximum charge/discharge efficiency of 97.8%.
- In the off-grid mode, a maximum of 3 inverters can be connected in parallel. If the BACKUP port of all devices in the system is connected,
- The AZZURRO 3PH HYD 5000...12000 ZP3 all have a maximum charge current of 25 A. The AZZURRO 3PH HYD 5000 ZP3 has a maximum discharge current of 15 A, the AZZURRO 3PH HYD 6000 ZP3 has a maximum discharge current of 18 A, the AZZURRO 3PH HYD 8000 ZP3 has a maximum discharge current of 24 A, the AZZURRO 3PH HYD 10000 ZP3 has a maximum discharge current of 30 A, the AZZURRO 3PH HYD 12000 ZP3 maximum discharge current is 30A.
- Battery input voltage range (350-435 V).
- The EPS output can be connected to unbalanced loads (supports 100% three-phase unbalanced load).
- Up to 6 Inverters can be connected in parallel in master / slave mode via the link cable if used on-grid mode.
- Up to 3 inverters with Storage System can operate in parallel in master/slave when the EPS Mode (off-Grid) is used. Up to 36 kVA(according to the power of the model) of power can be used.
- EPS Mode always needs to be connected to a battery or PV system, otherwise it will not be operated.
- If there is more than one hybrid inverter in the system, they must be connected in parallel (Master-Slave mode). For maximum system performance and to prevent in future imbalances between the towers, the hybrid inverters must be identical to each other (i.e., same size, number and models of batteries). This mode makes it possible to synchronise the charging and discharging power of multiple interconnected hybrid inverters in order to minimize self-consumption.
- Additional PV string inverter can be integrated in the system using CHINT direct connected electric meter DTSU 666 energy meters. Up to 3 external PV meters can be connected, meter ID can be used 2,3,4.
- Monitoring via Wi-Fi/4G, optionally via Bluetooth.

1.4.2. Electrical block diagram

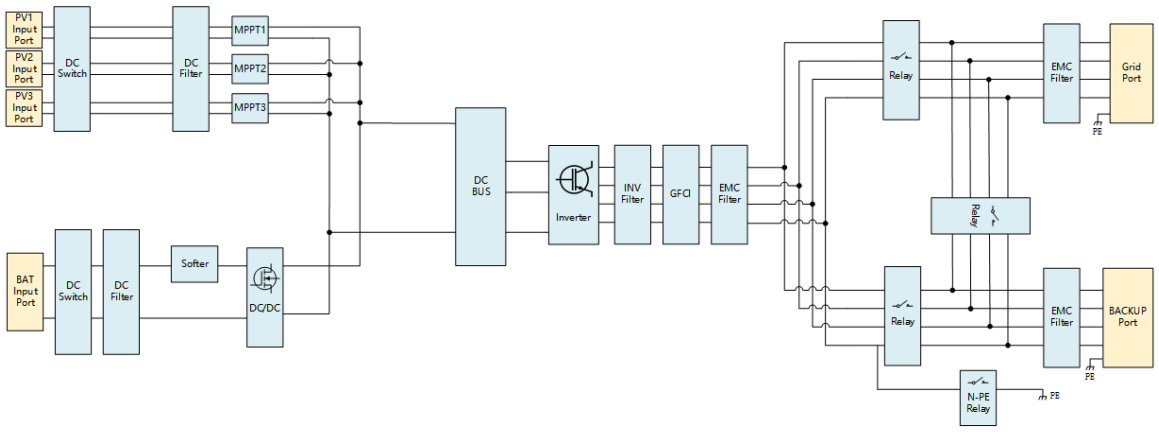


Figure 8 –Electrical schematic diagram

2. Requirement for installation and maintenance

Before installation, please read this manual carefully and make sure you fully understand its contents. The 3PH HYD5000-12000-ZP3 inverter strictly complies with the safety, design and testing regulations provided for by the national standards.
During installation, operation and maintenance, operators must carefully observe the local safety standards.

Improper use may result in electrical shock and harm and damage to persons, the equipment and its components. Contact the nearest authorised service centre for any repairs or maintenance. Contact your distributor for information on the nearest authorised service centre. DO NOT carry out repairs yourself, as this may result in injury or damage.
Ensure that the operator has the necessary skills and training to operate the equipment. Personnel responsible for the use and maintenance of the equipment must be qualified and capable of performing the activities described, and must also have appropriate knowledge on how to correctly interpret the contents of this manual. For safety reasons, this inverter can only be installed by a qualified electrician with the necessary training and/or skills and knowledge. Zucchetti Centro Sistemi S.p.A. declines all responsibility for damage to property or personal injury caused by incorrect use of the device.
Install and start the inverter according to the following instructions. Place the inverter on suitable load-bearing supports with sufficient load capacity (such as walls or racks) and make sure that the inverter is positioned vertically. Choose a suitable location for the installation of the electrical equipment. Make sure there is sufficient space for heat dispersion and to accommodate future maintenance. Maintain adequate ventilation and ensure that there is enough air circulation for cooling.
If you have problems with the packaging that could damage the inverter or if you find any visible damage, immediately notify the transport company. If necessary, request assistance from an installer of photovoltaic systems or from Zucchetti Centro Sistemi SpA. Transport of the equipment, especially by road, must be carried out with vehicles suitable to protect the components (in particular, electronic components) against violent knocks, humidity, vibrations, etc.

3. Basic safety information

If you have any questions or problems after reading the following information, please contact Zucchetti Centro Sistemi Spa.
This chapter details the safety information pertaining to the installation and operation of the device.

3.1. Safety Information

Read and understand the instructions within this manual and familiarise yourself with the relevant safety symbols in this chapter before beginning with the installation of the device and eliminating any faults.
Before connecting to the power grid, you must obtain official authorisation from the local power grid operator in accordance with the corresponding national and state requirements. Furthermore, operation may only be carried out by qualified electricians.
Please contact the nearest authorised service centre if any maintenance or repairs are required. Please contact your dealer to obtain information about your nearest authorised service centre. Do NOT carry out repairs on the device yourself; this may lead to injury or property damage.
Before installing the device or carrying out maintenance on it, you must open the DC switch in order to interrupt the DC voltage of the PV generator. You can also switch off the DC voltage by opening the DC switch in the generation junction box. Not doing this may result in serious injury.

- Electrical installation and maintenance of the system must be carried out by qualified and certified electricians in compliance with national regulations.
- The 3PH HYD5000-12000-ZP3 inverter may only be installed by qualified PERSONNEL and by those who have the appropriate certification, as required by the local authorities.
- DO NOT place materials explosives or flammable (e.g. gasoline, kerosene, oil, wood, cotton or similar) near the batteries or the 3PH HYD5000-12000-ZP3 inverter.
- Before maintenance, disconnect the AC connection, then the batteries and the photovoltaic system (PV1, PV2&PV3), wait at least 5 minutes (capacitor discharge time) so as to prevent electric shock.
- The 3PH HYD5000-12000-ZP3 inverter must be completely disconnected (BAT, PV & AC) during maintenance.
- The 3PH HYD5000-12000-ZP3 inverter may reach high temperatures and have rotating parts inside during operation. Switch off the 3PH HYD5000-12000-ZP3 inverter and wait for it to cool down before performing any maintenance.
- Keep children away from the batteries and from the 3PH HYD5000-12000-ZP3 inverter.
- Do not open the front cover of the 3PH HYD5000-12000-ZP3 inverter. Opening the front cover will void the product warranty.
- Damage caused by improper installation/operation is NOT covered by the product warranty.

3.2. Qualified personnel

Personnel tasked with the operation and maintenance of the device must have the qualifications, competence and experience required to perform the described tasks, while also being capable of fully understanding all instructions contained within the manual. For safety reasons, this inverter may only be installed by a qualified electrician who:

- has received training on occupational safety, as well as the installation and commissioning of electrical systems
- is familiar with the local laws, standards and regulations of the grid operator.
- Zucchetti Centro Sistemi Spa assumes no responsibility for the destruction of property or any injuries to personnel caused by improper usage

3.3. Installation requirements

Please install the inverter according to the information contained in the following section. Mount the inverter to a suitable object with a sufficient load-bearing capacity (e.g. walls, PV frames etc.) and ensure that the inverter is upright. Choose a suitable place for the installation of electrical devices. Ensure that there is sufficient space for an emergency exit which is suitable for maintenance. Ensure sufficient ventilation in order to guarantee an air circulation for the cooling of the inverter.

3.4. Assembly and maintenance diagram

- The battery must be protected against short circuits during transport and installation.
- The inverter 3PH HYD5000-12000-ZP3/batteries must be located in well-ventilated areas. Do not place the 3PH HYD5000-12000-ZP3 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 3PH HYD5000-12000-ZP3 inverter and batteries away from direct sunlight. Do not bring the 3PH HYD5000-12000-ZP3 inverter and batteries near ovens, flames or other heat sources as the battery may catch fire and cause an explosion.
- Use a multimeter to check the battery polarity and voltage before turning on the power. Make sure that the connections are made according to the instructions in this manual.
- Use the multimeter to check the PV voltage and polarity before closing the PV switch. Make sure that the connections are made according to the instructions in this manual.
- If you want to store the batteries without using them, disconnect them from the 3PH HYD5000-12000-ZP3 inverter and store them in a cool, dry and well-ventilated area.
- Battery maintenance workers must have the skills and knowledge required to carry out this activity.
- The 3PH HYD5000-12000-ZP3 inverter does not have an isolation transformer so the positive and negative polarities of the PV string do NOT have to be grounded, otherwise the inverter may be damaged. All non-current-carrying metal parts (such as the PV module frame, PV rack, housing of the combiner box, and housing of the inverter) in the photovoltaic power system must be connected to the ground.
- 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 3PH HYD5000-12000-ZP3 inverter and batteries before connecting/disconnecting the battery terminals.
  f) Both the positive and negative polarities must be isolated from the ground.

- 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%.

3.5. Transportation Requirement

Inverter is in the good electrical and physical condition when it ship out from factory. During transport, inverter must be placed in its original package or other proper package. Transportation company should responsible for any damage during transport period.
If you find any packing problems that may cause the damage of inverter or any visible damage, please notice the responsible transportation company immediately. You can ask your installer or Zucchetti Centro Sistemi S.p.a. for help is necessary.

- This product contains battery module through UN38.3, belongs to the ninth category of dangerous goods. Therefore, loading and unloading must comply with local laws and regulations and industry standards during transportation. Rough loading and unloading may cause short circuit or damage to batteries in containers, which may result in battery leakage, breakage, explosion, or fire. Shipping complies with the IMDG CODE and the International Maritime Dangerous Goods CODE.

- For land transportation, comply with ADR or JT T617 shipping requirements

- Meet the regulatory requirements of the transport regulatory authorities of the country of origin, route and destination.

Comply with international regulations for the transport of dangerous goods and the supervision requirements of the corresponding national transport regulatory authorities.

3.6. Application modes

3.6.1. Typical energy storage system

A typical energy storage system with PV panels and battery unit(s), connected to the grid.

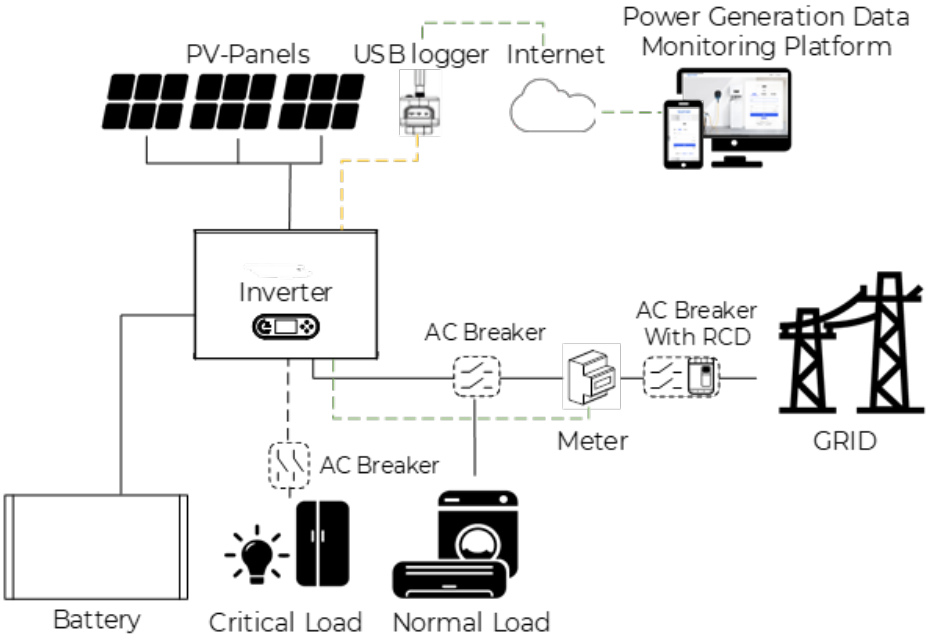


Figure 9 –Typical energy storage system

3.6.2. System without PV connection

In this configuration, there are no PV panels connected and the battery is charged through the grid connection.

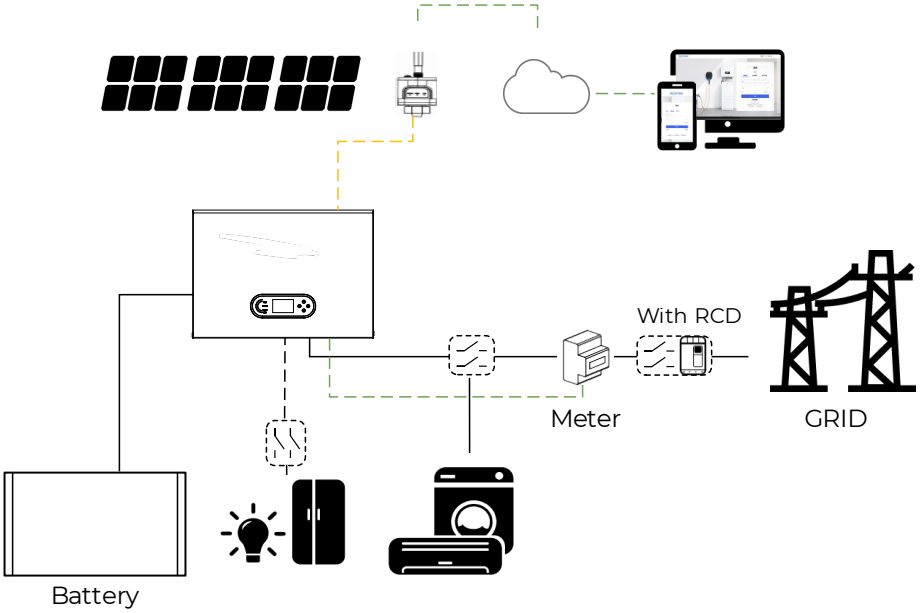


Figure 10 – System without PV connection

3.6.3. System without battery

In this configuration, the battery unit(s) can be added later.

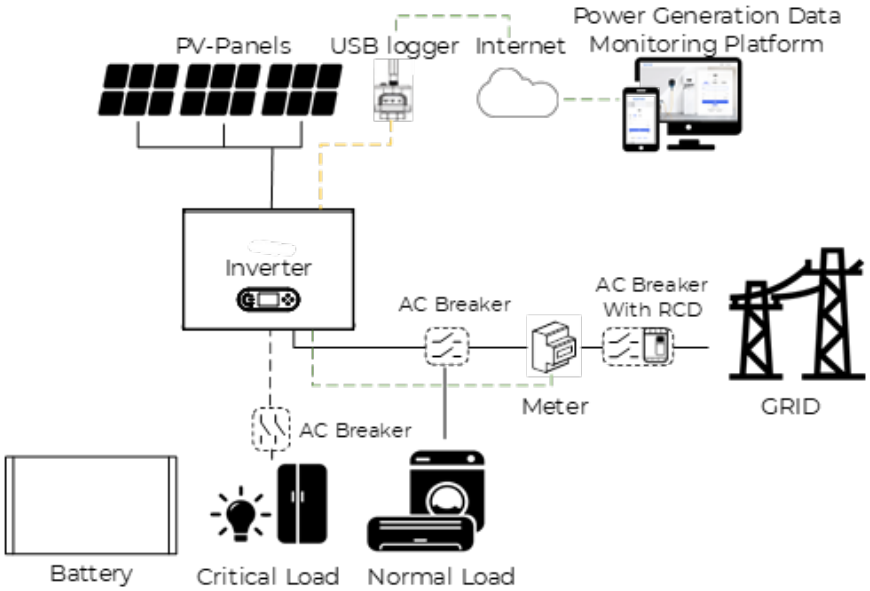


Figure 11 –System without battery

3.6.4. Back-up mode (off-grid)

When there is no grid connection, the PV panels and the battery will provide electricity to the critical load.

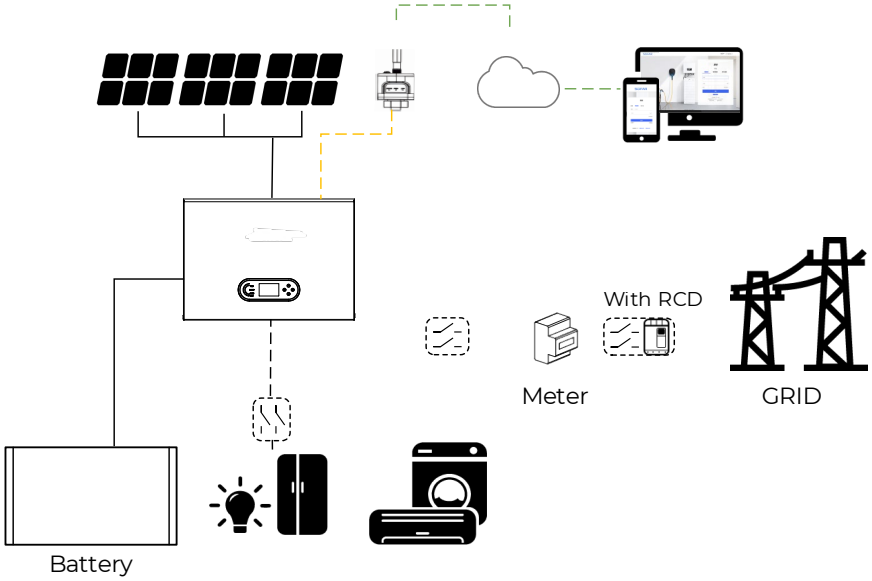


Figure 12 –Back-up mode (Off- Grid)

3.6.5. System with multiple inverters

Up to 6 Inverters can be connected in parallel in master / slave mode via the link cable if used on-grid mode.

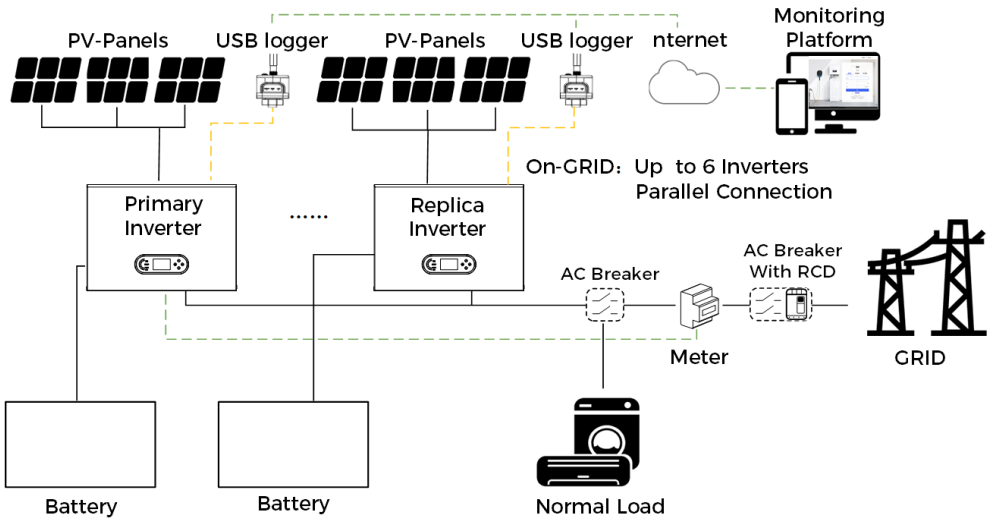


Figure 13 –System with multiple inverter

Up to 3 inverters with Storage System can operate in parallel in master/slave when the EPS Mode (off- Grid) is used.

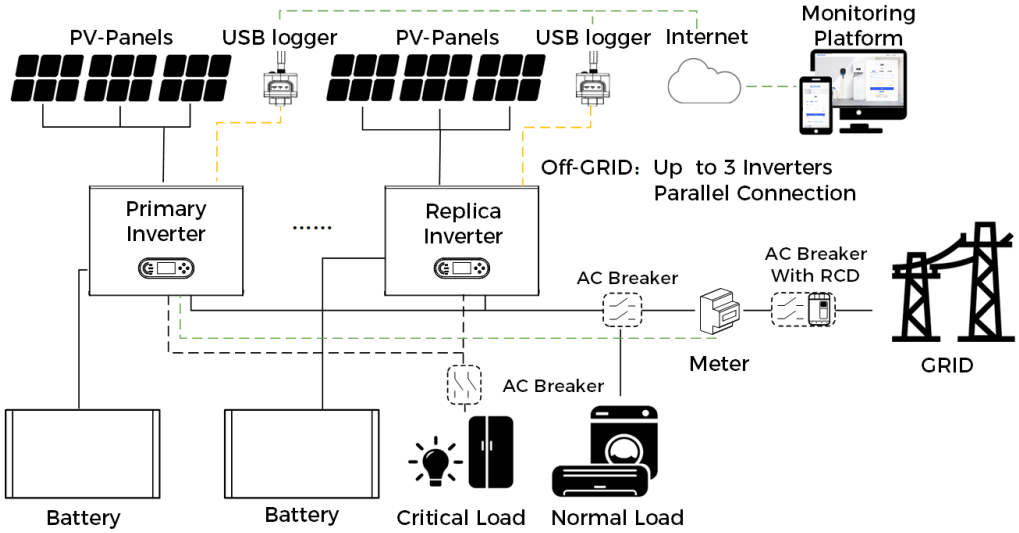


Figure 14 –System with multiple inverter

Multiple inverters connected in parallel shall be of the same power model with the same power and battery configuration.
The energy meter are connected to the Master inverter. Control of all inverters takes place via the link cable.
For the parallel switching of several devices, it is recommended to use a joint BACKUP break switch for the connected loads at the LOAD connection.
For the parallel switching of several devices, it is recommended to use a joint BACKUP break switch for the connected loads at the GRID connection.
In order to evenly distribute the loads among the inverters, the cable length between each output and the load

must be the same.
If the maximum apparent power of a load is greater than 110% of the inverter' s rated output, the device must not be connected via the BACKUP terminal, but rather directly to the grid.

3.6.6. AC retrofit system

In this system configuration, the hybrid system for an already existing PV system is supplemented with a solar inverter of any brand. By installing a second smart meter, the PV production can be taken into account and used for charging the battery.

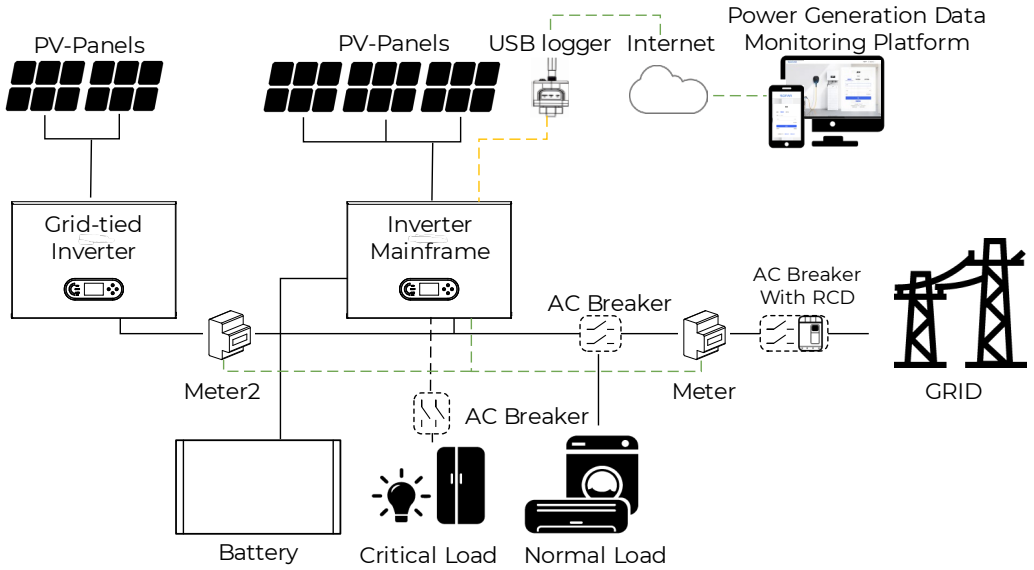


Figure 15 –AC retrofit system

The communication address of the PCC meter should be set to 1. Similarly, the communication address of the PV inverter meter 2...4 should be set to 2...4.

3.6.7. Unbalanced load

By enabling the "Unbalanced load" option, the inverter compensates unbalanced loads either in EPS mode.

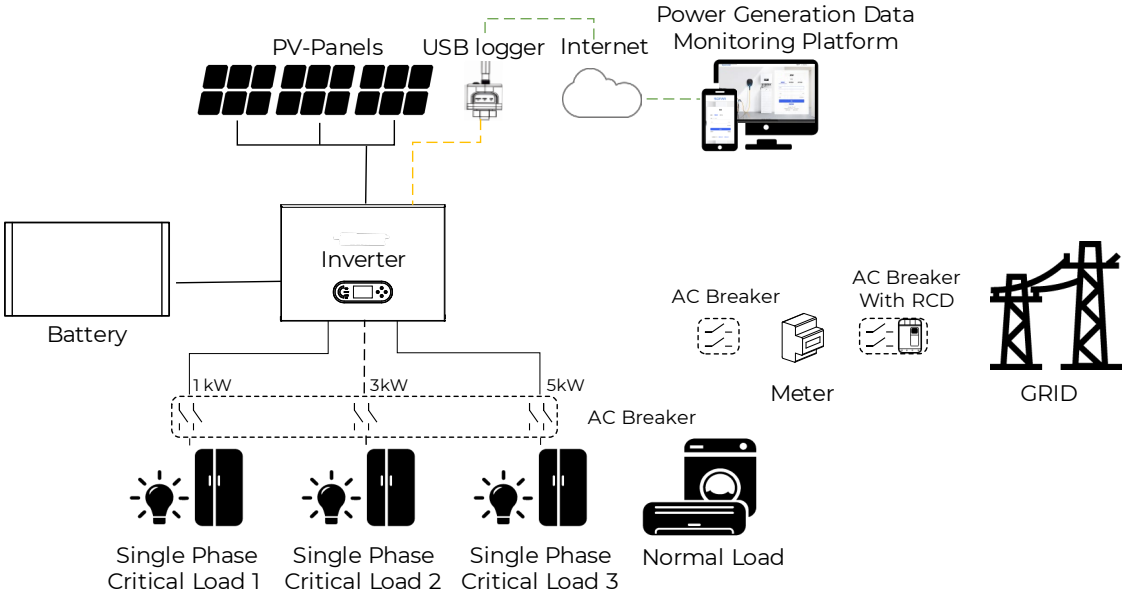


Figure 16 –Unbalanced load (EPS mode)

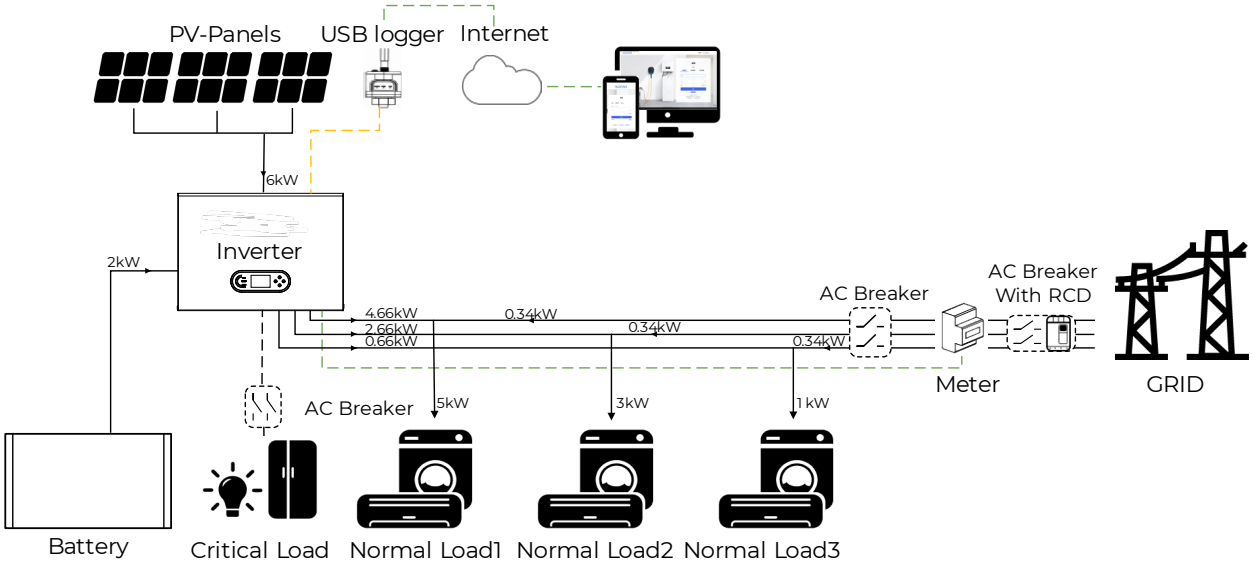


Figure 17 –Unbalanced load (On Grid)

3.7. Labelling on the device

The labels must NOT be concealed by items and foreign objects (rags, boxes, devices, etc.); they must be regularly cleaned and kept clearly visible at all times.

3.7.1. Electrical Connection

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

 Danger	**Dangerous DC voltage** Before establishing the electrical connection, cover the PV modules using opaque material or disconnect the PV generator from the inverter. Solar radiation will cause dangerous voltage to be generated by the PV generator! **Danger through electric shock!** All installations and electrical connections may only be carried out by trained electricians!
 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. **Authorisation for grid feed-in** Obtain authorisation from the local power grid operator before connecting the inverter to the public power grid.

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

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. **Electric shock** Contact with the electrical grid or the device's terminals may result in an electric shock or fire! Do not touch the terminal or the conductor which is connected to the electrical grid. Follow all instructions and observe all safety documents that refer to the grid connection.

 Attention	**Burning due to hot housing** While the inverter is being operated, several internal components will become very hot. Please wear protective gloves! Keep children away from the device!

Maintenance and Repair Cautions

 Danger	**Dangerous voltage!** Before carrying out any repair work, first switch off the AC circuit breaker between the inverter and power grid, and then the DC switch. After switching off the AC circuit breaker and the DC switch, wait a minimum of 15 minutes before starting any maintenance or repair work.
 Attention	**Unauthorised repairs!** Following the elimination of any faults, the inverter should be fully functional once more. Should any repairs be required, please contact a local authorised service centre. The internal components of the inverter must NOT be opened without the relevant authorisation. Zucchetti Centro Sistemi Spa assumes no responsibility for any resulting losses or defects.

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

3.8. Symbols and signs

 Danger	High voltage of inverter may be harmful to health! Only certified engineer can operate the product; Juveniles, Disable, should not use this product; Keep this product out of the reach of children;
 Caution	**Beware of burning hazards due to the hot housing!** While the inverter is in operation, only touch the display and the buttons, as the housing can become hot.
 Attention	**Implement earthing!** The PV generator must be earthed in accordance with the requirements of the local power grid operator! For reasons of personal safety, we recommend that all PV module frames and inverters of the PV system are reliably earthed.
 Warning	**Damage due to overvoltage** Ensure that the input voltage does not exceed the maximum permissible voltage. Overvoltage may cause long-term damage to the inverter, as well as other damage that is not covered by the warranty!

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ISO 9001 - Certificato n. 9151 - CNS0 - IT-17778
ISO14001 - Certificato n.1425 - CNSQ - IT-134812
EPD Italy - Certificati al link **epditaly.it**

3.9. Sings on the inverter

Several symbols pertaining to safety can be found on the inverter. Please read and understand the content of these symbols before starting the installation.

Symbol	Symbol name	Symbol meaning
	Indicate there is a danger of residual voltage in the battery	There is residual voltage in the inverter. Before opening the inverter, wait 15 minutes to ensure that the capacitor is fully discharged.
	Be careful of high voltage and electric shock	The inverter has a high voltage during operation, so be careful of electric shock.
	Beware of high surface temperatures	The shell temperature of the inverter 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 inverter.
IP	Equipment protection level	The equipment protection level complies with EN 60529.
+−	Terminal wiring prompt	Positive and negative poles of the DC input voltage
	Arrow pointing up	When transporting and storing the inverter, the arrow must be facing upwards
	WEEE designation	Do not dispose of the equipment with household garbage at its end of life Dispose of it according to local laws and regulations or send it to the manufacturer.

4. Installation

4.1. Installation information

 **Danger**	**Fire hazard** • DO NOT install the inverter on flammable material. • DO NOT install the inverter in an area in which flammable or explosive material is stored.
 Caution	**Burning hazard** • Do NOT install the inverter in places where it can be accidentally touched. The housing and heat sink may become very hot while the inverter is being operated.
 Attention	**Weight of the device** • Take into account the weight of the inverter when transporting and moving it. • Choose a suitable installation location and surface. • Commission a minimum of two persons for the installation of the inverter.

4.2. Installation procedure

Mechanical installation is performed as follows:

1. Transport the inverter
2. Selection of mounting location and mounting method
3. Examine the inverter before installation
4. Install the inverter

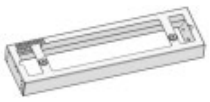
4.3. Checking before installation

Before opening the battery and inverter package, check whether the outer package is damaged, such as holes and cracks, and check the inverter and battery model. If any damage is found or the inverter and battery model does not match your requirements, please do not open the product package and contact your distributor as soon as possible.

4.4. Contents of the packaging

Carefully inspect the packaging and accessories before installation. The packaging should contain the following accessories:

No	Pictures	Description	Quantity/PCS
1		Inverter	1
2		PV- input terminal	3
3		PV+ input terminal	3
4		MC4 connector contact PV+	3
5		MC4 connector contact PV-	3
6		GRID wire end female connector	1
7		LOAD wire end male connector	1
8		M6*60 expansion screws	4
9		M4*12 screws	6
10		M6*14 screws	4

11		PE wire	1
12		COM connector cable end	1
13		Connection plate	2
14		Retainer plate(left)	1
15		Retainer plate(right)	1
16		Decorative cover with screw(left side)	1
17		Decorative cover with screw(right side)	1
18		Foundation	1
19		Foundation decorative cover	2
20		Outgoing inspection report	1
21		Quick Installation guide	1
22		User Manual	1

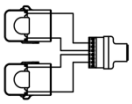
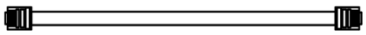
23		Matching Resistance	1
24		120A:40mA CT(with connector)	3
25		RJ45 wire（5m）	1

Figure 18 – Inverter components and accessories inside in the packaging

4.5. Installation environment

- Choose a dry, clean, and tidy place, convenient for installation.
- Ambient temperature range: -30°C ~ +60°C.
- Relative humidity: 5 ~ 95% (non-condensing).
- The inverter must be installed in a well-ventilated place.
- Do not place flammable or explosive materials near the inverter.
- The AC overvoltage category of the inverter is category III.
- Maximum altitude: 4000 m.

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.

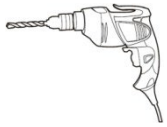
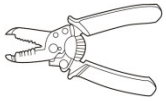
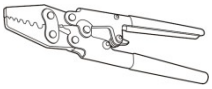
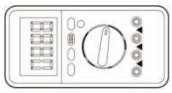
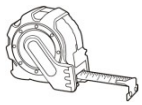
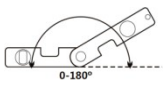
For this product, specifically results:

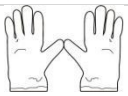
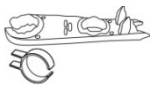
- ✓ Completely airtight with dust and fumes.
- ✓ Protected against strong water jets coming from any direction.

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

4.6. Installation tools

Prepare the following tools before installation:

Number	Tool	Model	Function
1		Percussion drill Recommended diameter: 8 mm	Used to make holes in the wall
2		Phillips screwdriver	Used to remove and install the screws of the AC terminal
3		Cable stripper	Used for stripping the wires
4		Crimping tools	Use to crimp power cable
5		Multi-meter	Check whether the cable connection is correct, the positive and negative terminals of the battery are correct, and the grounding is reliable
6		Marker	Used for marking
7		Tape measure	Used for measuring distances
8		Level	Used for making sure that the rear panel is installed correctly
9		ESD gloves	Must be worn by operators

			
10		Safety goggles	Must be worn by operators
11		Dust mask	Must be worn by operators
12		Removal Tool	Remove the output terminal of the PV, battery module

4.7. Installation position

The 3PH HYD5000-HYD12000-ZP3 inverter must be mounted vertically (to ensure rapid heat dissipation). Install the 3PH HYD5000-HYD12000-ZP3 inverter in a location protected from direct sunlight and from possible snow accumulation. Ensure that the installation position is well ventilated.
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

4.8. Installation space

To ensure sufficient space for installation and heat dissipation, reserve sufficient space around the 3PH HYD5000-HYD12000-ZP3 inverter household energy storage system.
The requirements are as follows:
Minimum distances for individual 3PH HYD5000-HYD12000-ZP3 inverters: 30 cm

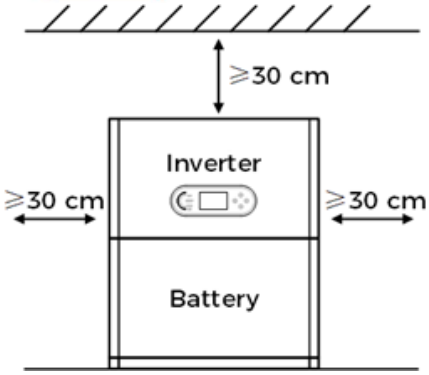


Figure 19 –Minimum distances for individual inverter

Minimum distances for several AZZURRO 3PH HYD5000-HYD12000-ZP3 inverters:

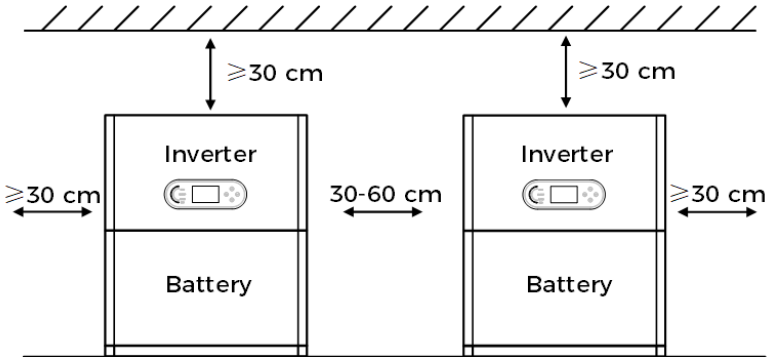


Figure 20 –Minimum distances for several inverter

4.9. Unpacking the inverter

Open the package and hold the handles above the inverter on both sides with both hands.

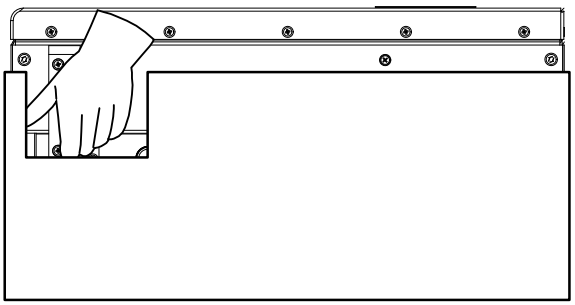


Figure 21 –Moving the inverter

Lift the inverter out of the packaging and move it to its installation position.

 Attention	**Mechanical damage** • In order to prevent injuries and damage to the device, ensure that the inverter is kept balanced while it is being moved - it is very heavy. • Do not place the inverter on its connections, as these are not designed to bear its weight. Place the inverter horizontally on the ground. • When you place the inverter on the ground, place foamed material or paper underneath it in order to protect its housing.

4.10. Safety instructions

This topic describes the electrical connections of the inverter AZZURRO 3PH HYD5000-HYD12000-ZP3. Read this section thoroughly and carefully before connecting the cables.

 Danger	**Electrical voltage at the DC connections** • Ensure that the DC switch is OFF before establishing the electrical connection. The reason is that the electrical charge remains in the capacitor after the DC switch has been switched off. Therefore, at least 15 minutes must lapse before the capacitor has been electrically discharged.

 Danger	**Electrical voltage** • PV modules generate electrical energy when exposed to sunlight, and this may present an electrical shock hazard. Therefore, cover the PV modules with an opaque sheet before connecting to the DC input power cable.

 Danger	**Electrical voltage at the DC connections** • Wear rubber gloves and protective clothing (safety goggles and boots) when working on high voltage/high current systems such as inverter and battery systems.

 Attention	• **Qualification** • The installation and maintenance of the inverter must be carried out by an electrician. • Consumers must not remove the EPS plug from the inverter.

 Attention	• **On-grid operation** • After connecting the external terminals of the inverter, the recommended power-up sequence is: first turn on the battery, then turn on PV, then connect to the grid, and finally connect the load. • After connecting the external terminals of the inverter, the recommended de-energizing sequence is: first disconnect the load, then disconnect PV, then disconnect the battery, and finally disconnect the grid. • The open-circuit voltage of the modules connected in series must be lower than or equal to 1000 V. • The connected PV modules must be compliant with IEC 61730 class.

The DVC (decisive voltage classification) is the circuit voltage which constantly occurs between two arbitrary live parts during proper use in a worst-case scenario:

DVC	Operating voltage limit(V)		
	AC voltage (RMS)	AC voltage (PK)	DC voltage (AVG)
A	25 (16)	35.4 (22.6)	60 (35)
B	50 (33)	71 (46.7)	120 (70)
C	1000	4500	1500

Tabella 1 –Description of limits for DVC

The values in brackets apply when the inverter is installed in a humid environment.

Interface	DVC
PV input connection	DVCC
GRID connection	DVCC
BAT connection	DVCC
BACKUP connection	DVCC
WiFi/4G interface	DVCA
COM interface	DVCA
LCD interface	DVCA

Tabella 2 – The decisive voltage class (DVC)

4.11. Wiring overview

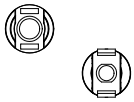
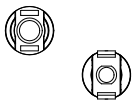
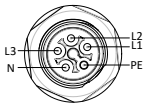
Component	Description		Recommended cable type
	BAT+ : Connect the positive cable of the lithium battery		Outdoor multicore copper cable (4...6mm²)
	BAT- : Connect the negative cable of the lithium battery		
	PV+ : Connect the positive cable of the PV array		PV cable (4...6mm²)
	PV- : Connect the negative cable of the PV array		
 Backup	Connection method: male and female terminals are inserted into each other.	L1	Outdoor multicore copper cable 4...6mm²
		L2	
		L3	
		N	
		PE	
 Grid	Connection method: male and female terminals are inserted into each other.	L1	Outdoor multicore copper cable 4...6mm²
		L2	
		L3	
		N	
		PE	

Tabella 3 –Cable description

The selection of the cable cross-section must take into account the length of the cable used and the circuit breaker according to the national standard.

4.12. Confirmation of mounting position

AZZURRO 3PH HYD 5000...12000 ZP3 series products can be stacked and installed with batteries to form a photovoltaic storage system. The location of the inverters and batteries needs to be evaluated at the beginning of the installation, as shown in the following diagram:

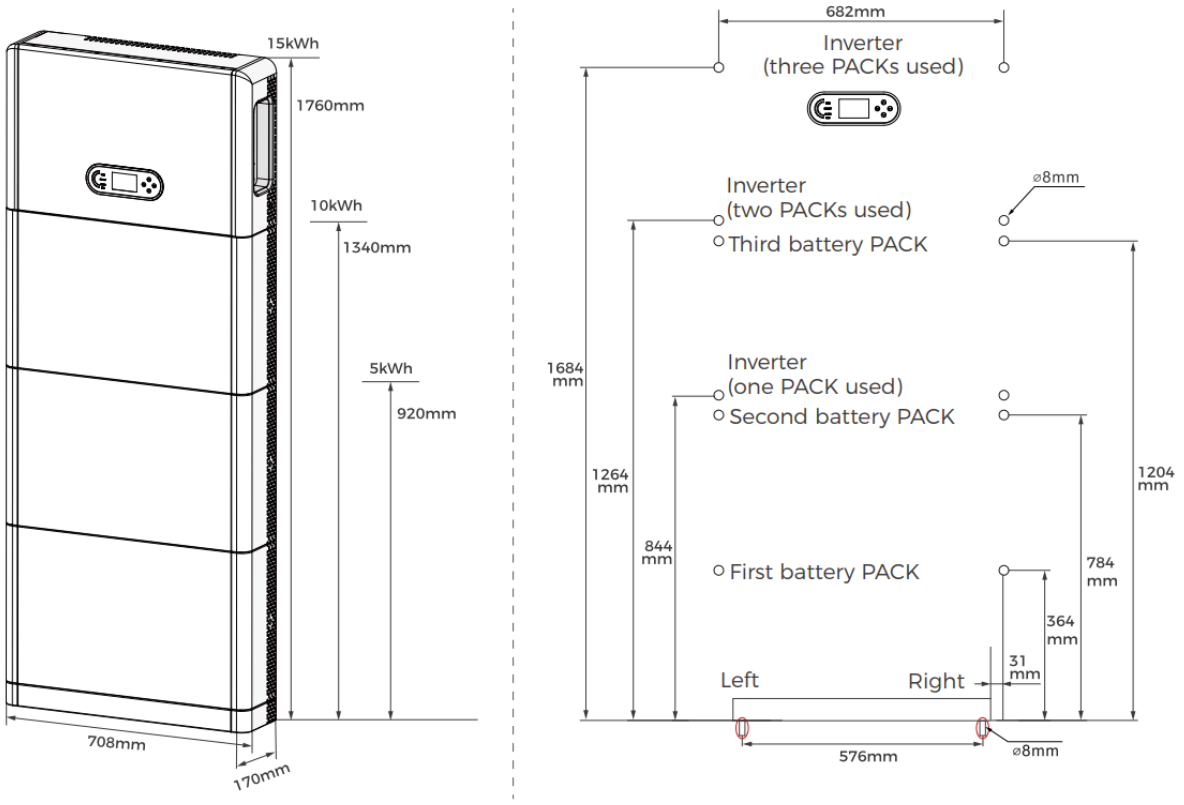


Figure 22 –Installation dimension diagram

Stack the battery modules according to the battery installation manual and fasten the inverter according to the holes at the top.

4.13. Mounting battery base

Step 1: Place the pedestal against a wall and keep it 10 to 25mm away from the wall. Adjust the hole positions using a level, and mark the hole positions using a marker.

Step 2: To install the pedestal, remove the pedestal, drill holes using a hammer drill (φ 8mm, depth range 60-65 mm), and tighten expansion screws to ensure that the base is securely installed.

Step 3: Use a marker to mark the holes for securing the battery module and inverter according to the dimensions shown in the figure below.

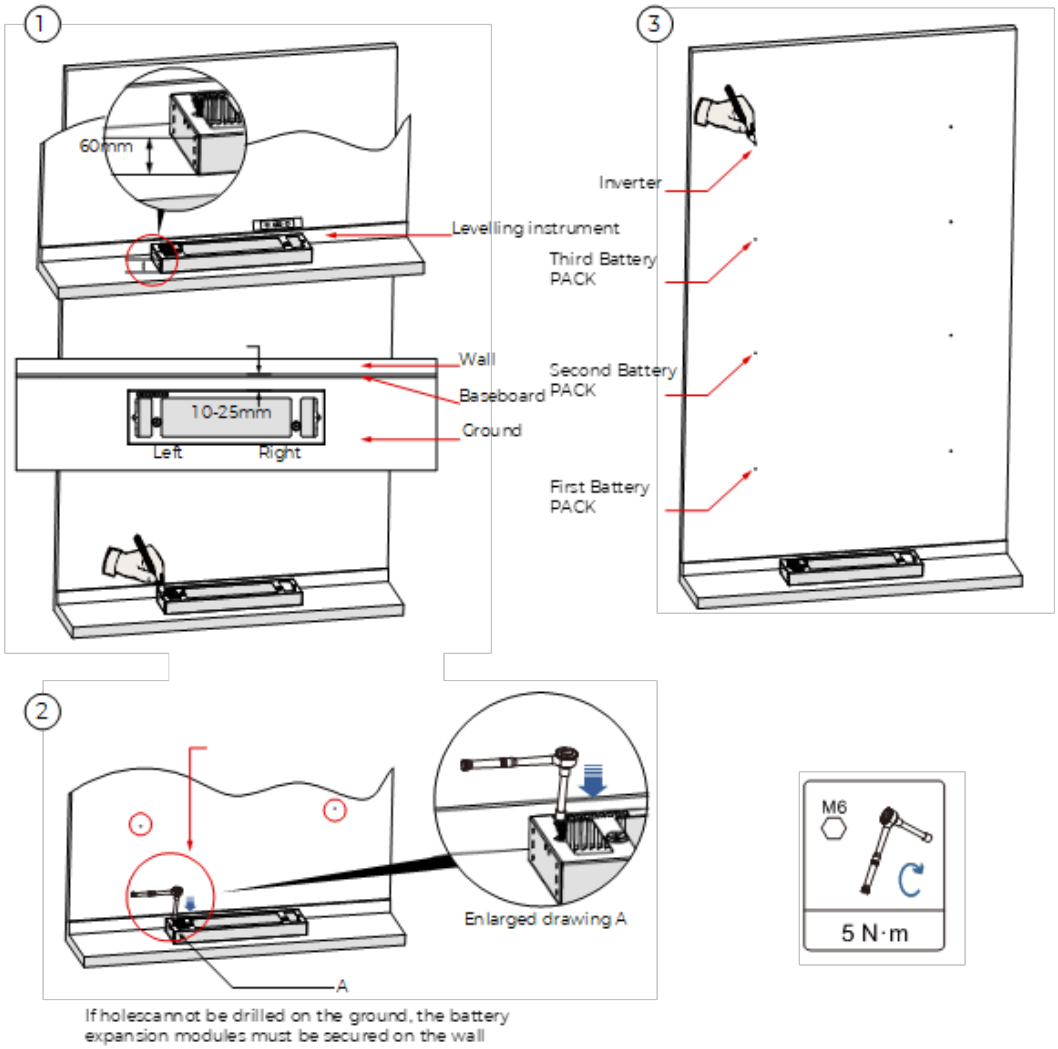


Figure 23 – Podestal installation

4.14. Stacked Batteries & Inverters

Step 1: Place the first battery module on the base.

Step 2: Install connectors on both sides and tighten the six screws with a cross screwdriver.

Step 3: Install the remaining battery modules and BDU from bottom to top. (Before installing the next module, ensure that the screws on the side connectors of the previous module are firmly installed.)

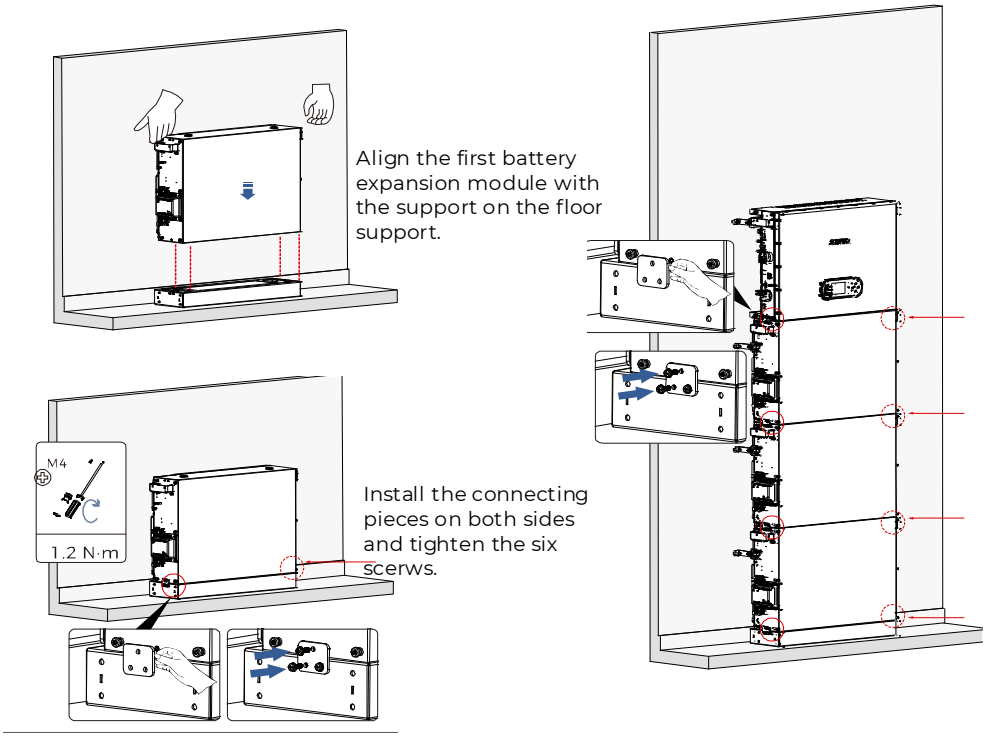


Figure 24 – Battery module and inverter installation diagram

4.15. Anti-tip bracket installation

Step 1: Drill holes with a hammer drill (φ 8mm, depth range 60-65 mm).

Step 2: Reposition and drill the holes, if the original one has a large deviation. Install the anti-tip bracket B on the wall, and fasten expansion bolt.

Step 3: Adjust the anti-tip bracket A, make sure the holes are matched between anti-tip bracket A and anti-tip bracket B.

Step 4: Connect and fix the anti-tip bracket A and anti-tip bracket B with M6*16 screws.

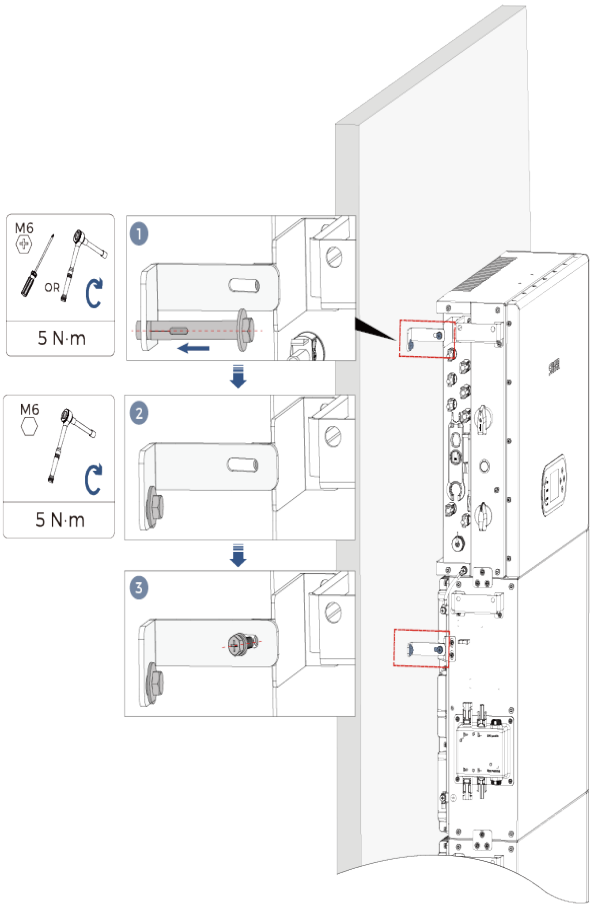


Figure 25 –Schematic diagram of wall fixing installation

5. Electrical connections

The electrical connection is established as follows:

- Connect PE cable
- Connect DC input cable
- Connect battery cable
- Connect AC output power cable
- Connect communication cable (optional)
- Carefully assess the risks deriving from electric shocks and chemical hazards!
- Use a multi-metre to check the DC polarity of the battery and cables before connecting the power supply between the batteries and inverter.
  NOTE: an inverted polarity connection may cause irreparable damage to the inverter and batteries.
- A 30A(Power grade 5kW/6kW/8kW) or 40A(Power grade 10kW/12kW) AC disconnecting device (circuit breaker,) must be installed between the 3PH HYD5000-HYD12000-ZP3 inverter and the power grid. It is also recommended to use a differential with a trip threshold of 300 mA between the 3PH HYD5000-HYD12000-ZP3 inverter and power grid.
- For safety and proper functioning of the system, it is important to use a cable of the appropriate type and size for the electrical connections.

  - Battery connection: DC cable with cross-section of AWG12 or AWG10 (supplied).

  - PV connection: DC cable with cross-section of AWG12 or AWG10.

  - Grid or load connection: AC cable with cross-section of AWG12(Power grade:5kW/6kW/8kW) or AWG10(Power grade:10kW/12kW).

!!!PLEASE NOTE!!!

If the storage capacity needs to be increased by adding one or more batteries to an existing system, make sure that all the batteries (installed and to be installed) are fully charged.

To check the charge status of each battery, connect them one at a time to the inverter and view the charge level on the display (all the instantaneous information can be accessed by pressing the “Down” key from the main menu).

The batteries can be recharged from the excess photovoltaic production or by using the forced charge mode indicated in the “% charge mode” section of this manual.

5.1. Attentions Before Connection

 Attention	The voltage in the power conversion circuit of this product is very high. Fatal danger of electric shock or severe burns. All electrical connections of photovoltaic modules, inverters and battery systems must be carried out by qualified personnel. Wear rubber gloves and protective clothing (protective glasses and boots) when operating high voltage/current systems such as inverters and battery systems.
 Attention	This product is mainly applied to photovoltaic energy storage systems for household use. If not used according to the instructions, the protection provided by the equipment may be damaged.

6. Electrical Connection for the internal system

6.1. Internal protection grounding cable connection batteries

Install the crimped ring terminal and the washer with the M6 screws and tighten these with a torque of 5 N·m using an Allen key. All inverter and battery enclosures must be connected to an PE cables.

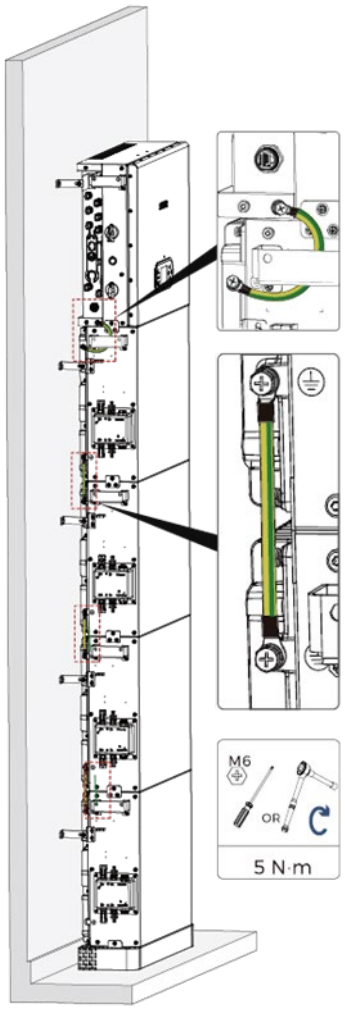


Figure 26– Internal grounding connection

Attention	**Be sure to ground for safety** • The protective grounding of the chassis shell cannot replace the PGND cable of the BACKUP Port. Ensure that the two PGND cables are reliably connected; • When multiple inverters are deployed, ensure that the protection ground points of all inverters are equipotential connected.

6.2. Power cables connection batteries

As shown in below Figure, connect the power ports (BAT+, BAT-) of the inverter to the cascading positive and negative power cables (B+,B -) of the battery module. Connect the remaining battery modules from top to bottom, and secure the cables with cable ties. Ensure that the cables are securely connected.
In detail:
- **(BAT +, BAT -) inverter** connected in parallel to **(B+, B-) battery module 1.**
- **(B+, B-) battery module 1** connected in parallel to **(B+, B-) battery module 2.**
- **(B+, B-) battery module 2** connected in parallel to **(B+, B-) battery module 3.**

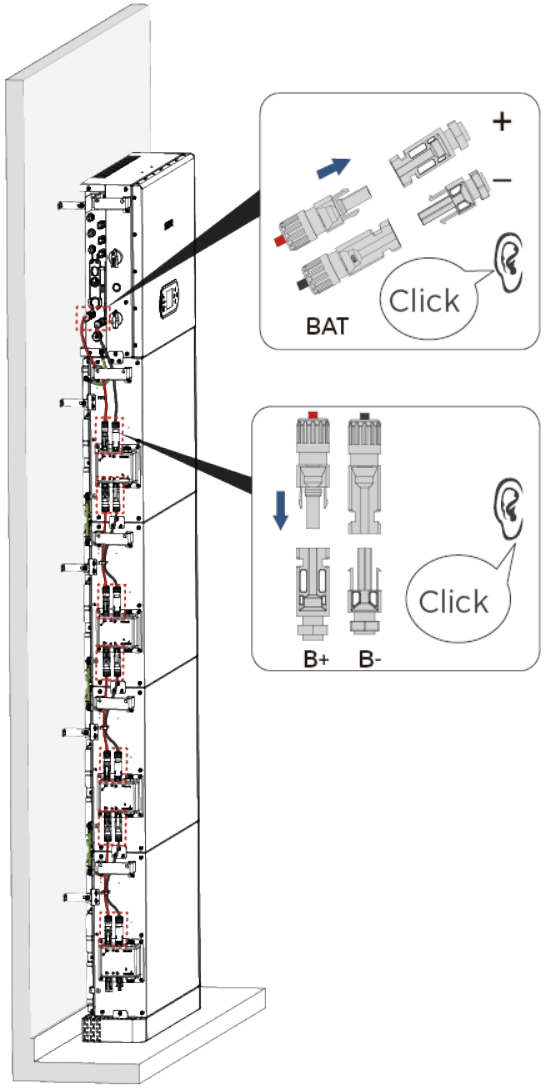


Figure 27 – Connection of battery internal DC terminal

6.3. Internal communication cable connection batteries

Connect the inverter LinkPort2 to the battery module Link Port in. Connect the communication terminals of the inverter and the battery module from top to bottom according to the diagram below and secure them with cable ties. For the communication cables, tighten the large nut first, then the small nut. In addition, install a matching termination resistor on the communication port of the last battery module in the system.
In detail:
- **LinkPort2** of the Inverter → **Link Port IN** of the **battery module 1**.
- **Link Port OUT** of the **battery module 1** → **Link Port IN** of the **battery module 2.**
- **Link Port OUT** of **battery module 2** → **Link Port IN** of **battery module 3.**
- Insert the termination resistor on **Link Port OUT** of the **battery module 3.**

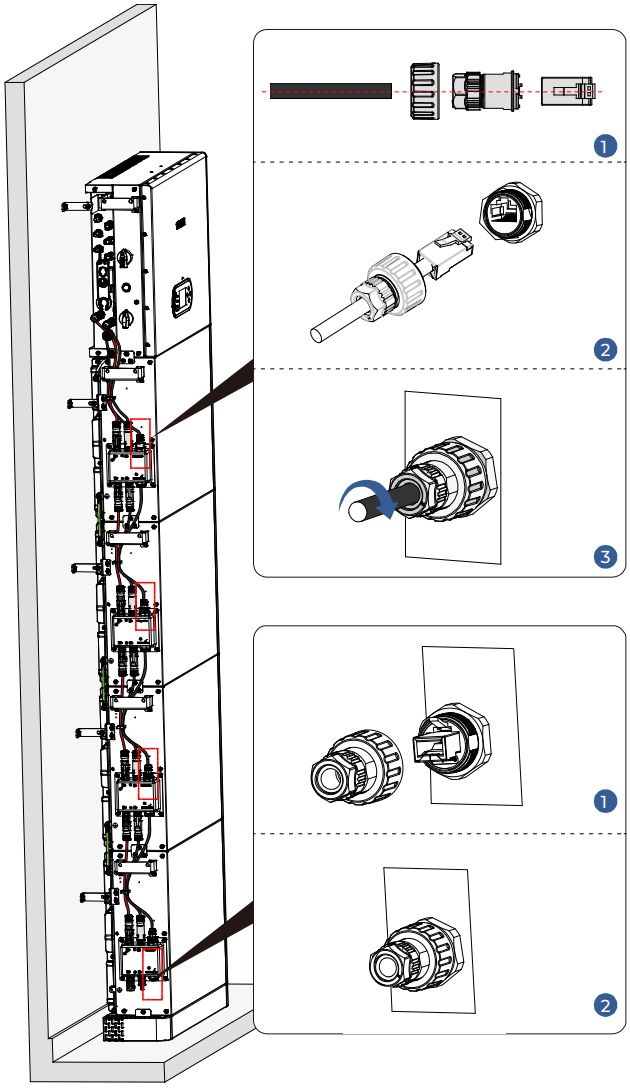


Figure 28 – Internal signal cable connection

Attention	The battery inputs of different inverters should not be connected in parallel.

6.4. Install the cover

After electrical connections are complete and cable connections are correct and reliable, install the external protective cover and secure it using screws.

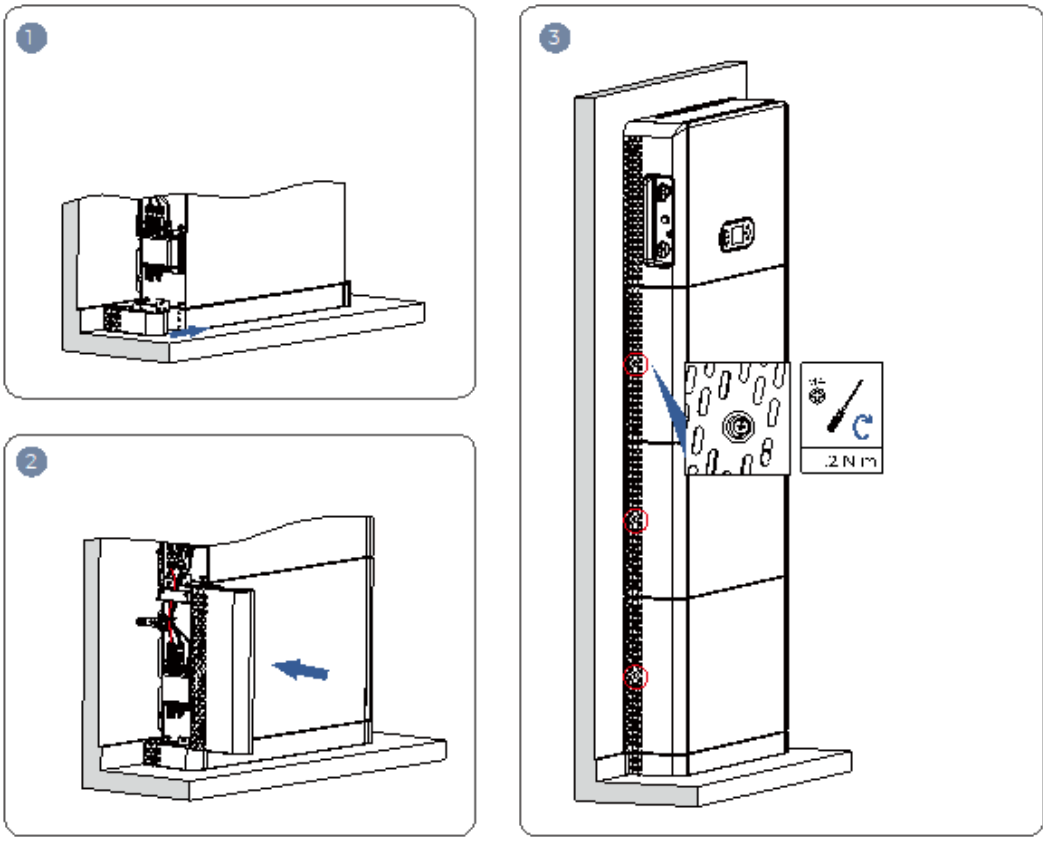


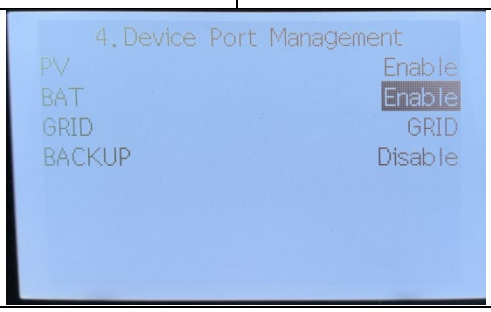
Figure 29 – Install the cover

6.5. Configuration batteries

To properly configure the inverter channels:

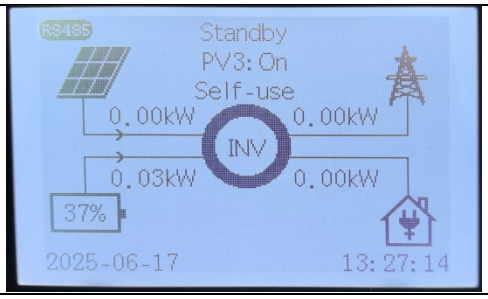
A.Settings can be made when powered on for the first time

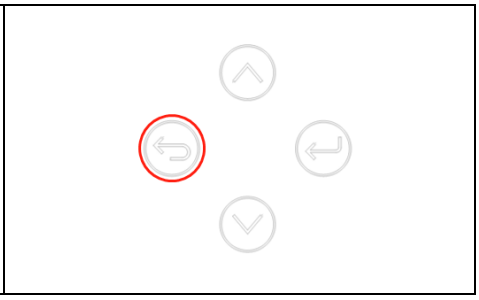
4.Device Port Management	Choose Enable/Disable
PV	
BAT	
GRID	
BACKUP	



B.Change the relevant Settings for subsequent use

1. Press the first button on the left of the display:





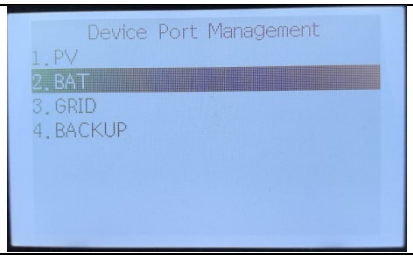
2. Press the last right arrow (enter) to access the System Settings:

Main Menu	
1. System Information	
2. Real-time Information	
3. Event List	
4. Energy Statistic	
5. System Settings	
6. Advanced Settings	
7. Firmware Update	

3. Access the Device Port Management by pressing the last button on the right of the inverter:

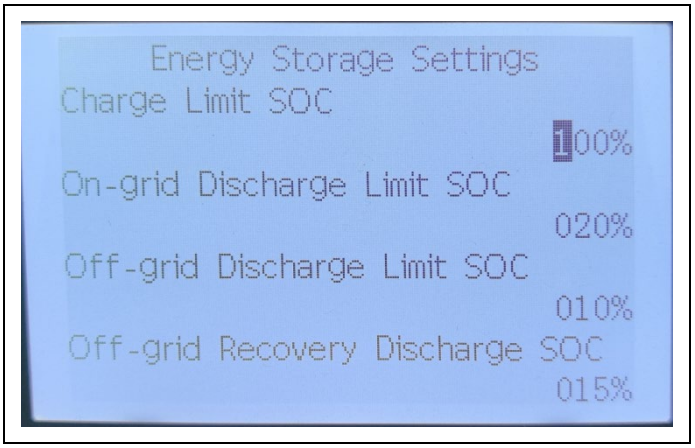
System Settings	
1. Language	
2. Date & Code	
3. Grid Code	
4. Device Port Management	
5. Work Mode	
6. Auto test	
7. RS485 Communication	
8. Wallbox	

4. Access the BAT and choose ZBT 5K or Disable:

Device Port Management	
PV	
BAT	
GRID	
BACKUP	

Set the Charge/Discharge SOC in Energy Storage Settings:

Main Menu→5.System Settings→2.Work Mode→2.Energy Storage Settings



For example,
If the **Charge Limit SOC** = 90%, the inverter does not charge the battery when the SOC is more than 90%.
If the **On-grid Discharge Limit SOC** = 20%, the inverter does not discharge the battery when the SOC is less than 20% during On-grid Mode.
If the **Off-grid Discharge Limit SOC** = 10% and **Off-grid Recovery Discharge SOC** = 15%, the inverter does not discharge the battery when the SOC is less than 10%. And the inverter does not discharge the battery until SOC is more than 15% during Off-grid Mode.

6.6. Data collector connection

Remove the protective cap from the USB interface.
Connect the standard WIFI/Ethernet/4G collector in the inverter package according to electrical connection in the following figure.

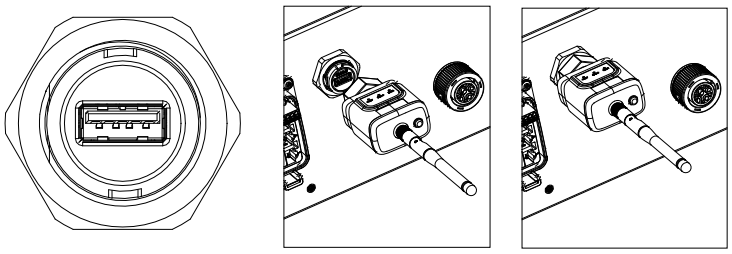


Figure 30 – WIFI/4G connection

7. External electrical connection

7.1. External ground connection of the PGND cable

Connect the inverter to the equipotential bonding bar by using the protective earth cable (PE) for grounding.

Attention	**Pole earthing not permissible!** • As the inverter is transformerless, the plus and minus poles of the PV generator must NOT be earthed. Otherwise, the inverter will malfunction. • The protective grounding of the chassis shell cannot replace the PGND cable of the BACKUP Port. Ensure that the two PGND cables are reliably connected. • When multiple inverters are deployed, ensure that the protection ground points of all inverters are equipotential connected.

Step 1: Remove the insulation of the cable. For outside use, the PE cable recommended for use in EU depends on the protection breakers used and the length of cable, it is recommended to use: $4mm^2 \leq$ PE cable $\leq 10mm^2$.

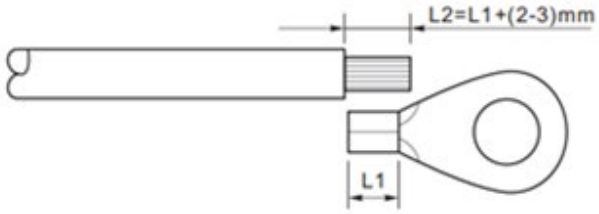


Figure 31 –Connecting PGND cable(a)

L2 is 2 to 3 mm longer than L1.

Step 2: Crimp the cable to the ring terminal:

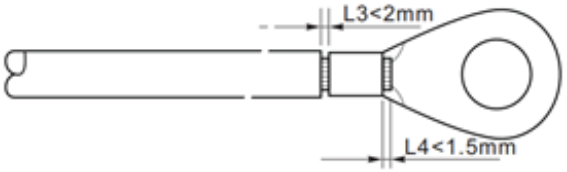


Figure 32 – Connecting PGND cable(b)

7.2. Connecting the AC power cables

The AC power cables are used to connect the inverter to the critical loads (through the BACKUP port), and the AC power distributor or the power grid.

Caution	**AC connection** • Each inverter must have its own circuit breaker. • The AC disconnecting device must be easily accessible.

The inverter AZZURRO 3PH HYD 5000...12000 ZP3 has a built-in AFI (univ. sensitive residual current protection). If an external AFI is required, we recommend an AFI type A featuring a residual current of 100 mA or higher.
Please follow the national rules and regulations for the installation of external relais or circuit breakers!

The AC cable should be correctly dimensioned in order to ensure that the loss of power in the AC cable is less than 1% of the rated output. If the AC cable resistance is too high, then the AC voltage will increase; this may cause the inverter to become disconnected from the power grid. The relationship between the leakage power in the AC cable and the cable length, the cable cross-section, is displayed in the following illustration:

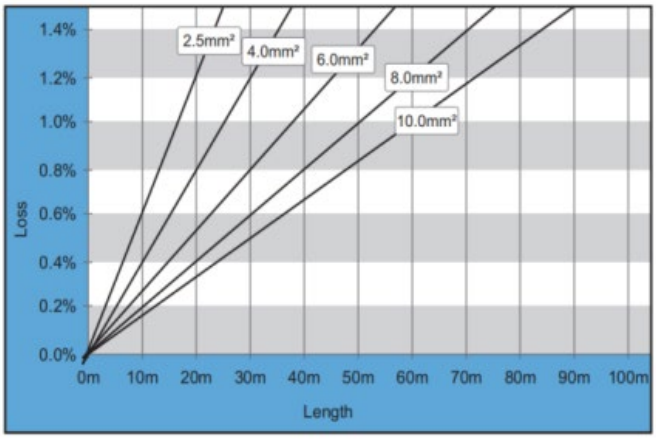


Figure 33 – The relationship between the leakage power and cable length

7.3. AC connector installation

Caution	**Electrical voltage** • Ensure that the grid has been switched off before removing the AC connector

Please follow below steps to install the AC connector.

Step 1: Select the suitable cable in accordance with above diagram. Remove the insulating layer of the AC output cable using a wire stripper and in accordance with the following illustration:

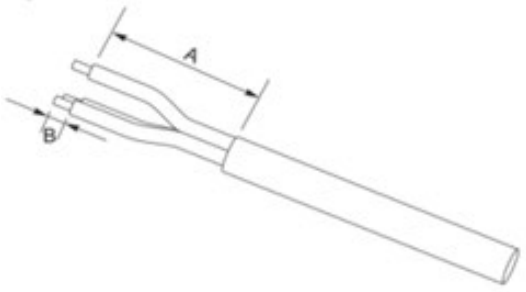


Figure 34 – AC connection

A	**30~50 mm**	**B**	**3~5 mm**

Step 2: Disassemble the connector in accordance with the following illustration. Guide the AC output cable through the cable gland.

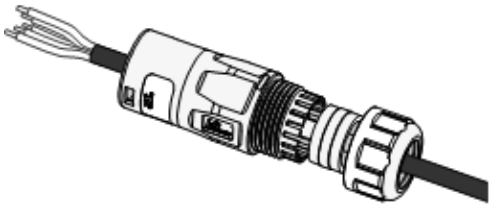


Figure 35 – AC connection

Step 3: Connect the AC cable in accordance with the following requirements and tighten the terminal using the Allen key.

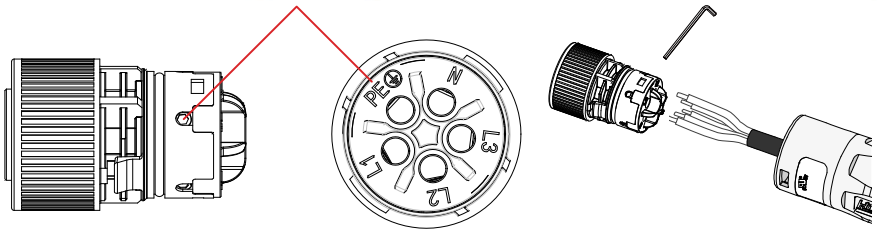


Figure 36 – AC connection

Connection	Cable
L1	Phase 1 (brown)
L2	Phase 2 (black)
L3	Phase 3 (grey)
N	Neutral conductor (blue)
PE	Earthing cable (yellow-green)

Step 4: Plug the connector into the port and end when you hear a click.

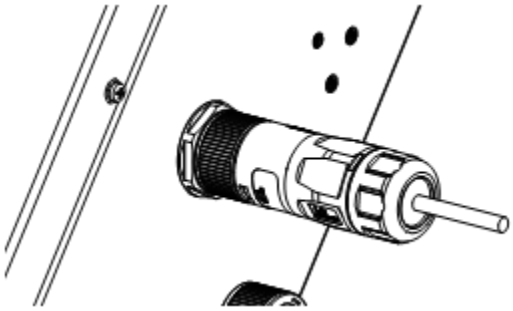


Figure 37 – AC connection

Use the removal tool to unlock and then rotate counterclockwise to remove the connector.
When you use the meter connection function, make sure that the AC terminal cable corresponds to the meter cable one by one(L1, L2, L3, N, and PE cables)
Corresponding to the grid identification of different regions, L1, L2, L3 correspond to A, B, C or R, S, T or U, V, W respectively.

7.4. Connecting a Critical Load (EPS function)

Critical Load (LOAD): in the event of a power failure (or operation in Off-Grid mode), if the EPS function is enabled, the 3PH HYD5000-12000-ZP3 inverter will work in Emergency Power Supply (EPS) mode, using the energy stored in the battery to supply energy to the critical load via the LOAD connection port.
The LOAD connection port is only for connecting critical loads. The power of critical loads must not exceed 5000/6000/8000/10000/12000VA according to the inverter model.
The procedure for connecting the LOAD port is the same as that for connecting the grid.
A change-over switch must be inserted between the EPS output of the inverter and the critical loads.

Change-over positions

⚠ **Caution**	The change-over switch is necessary. When checking/repairing critical loads, make sure that the change-over switch is in the 0 position. When checking/repairing the 3PH HYD5000-12000-ZP3 inverter, make sure that the change-over switch is in the 0 position, and that the 3PH HYD5000-12000-ZP3 inverter is disconnected from the grid.

- Under normal conditions: change-over switch is in position 1. The 3PH HYD5000-12000-ZP3 inverter can supply power to critical loads in the event of a power failure.
- If the 3PH HYD5000-12000-ZP3 inverter is faulty, manually move the switch to position 2. The grid will supply energy to the critical load.

Note: If the system is equipped with a production metre, take into account that the energy for the critical load is drawn before the meter and therefore this energy, even if produced by photovoltaic panels, is not counted as energy produced. If necessary, the system designer can use appropriate external switch contactors to ensure that the energy for the critical load is drawn downstream of the production meter during normal grid operation and that it only changes over to the EPS output of the inverter in the event of a power failure.

According to the cable specifications given in below table peel the cable according to the following below figure. Then install the EPS connector according to the in accordance with the previous chapters. Finally, insert the installed EPS connector into the corresponding position of the inverter according to the figures below

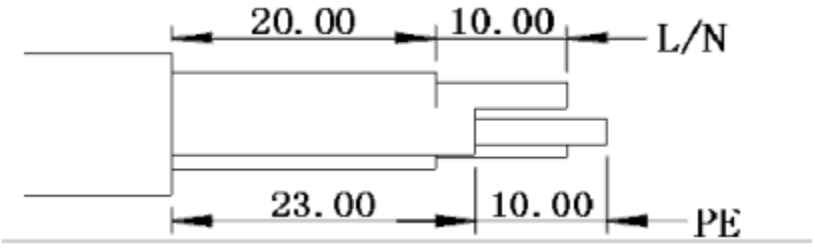
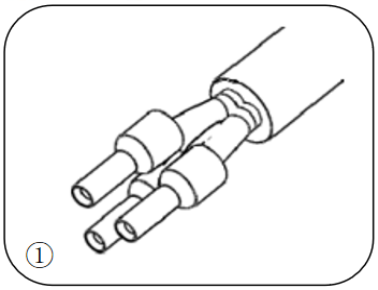


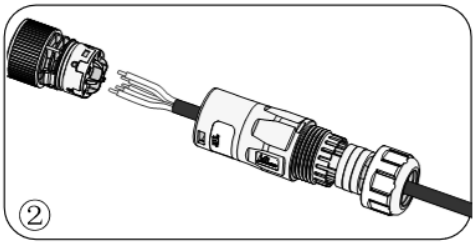
Figure 38 – Stripping diagram

Install procedure

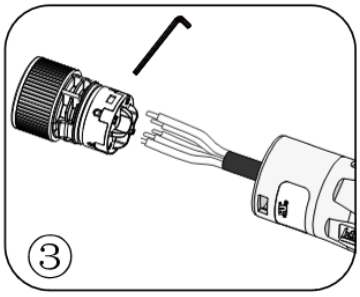
Step 1: Crimp terminal



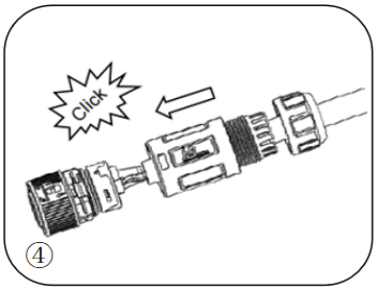
Step 2: Insert the cable into the butt terminal



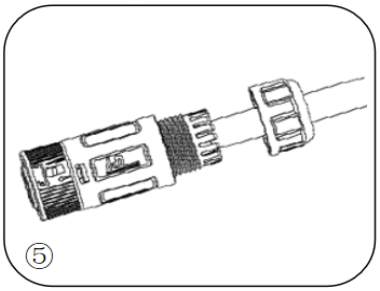
Step 3: Crimp the wire with an inner hexagon screwdriver with a screw torque of 1.2± 0.1n.m



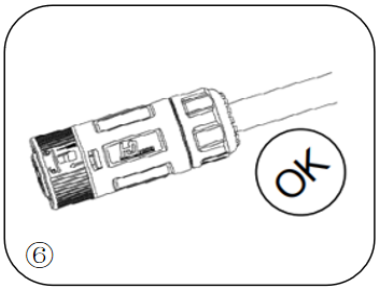
Step 4: Insert the subject into the corresponding clasp and hear a "click"



Step 5: Screw locking nut into main body, torque 2.5± 0.5n.m



Step 6: Installation complete



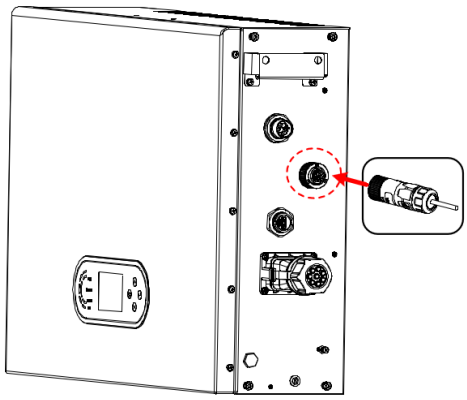


Figure 39 – EPS connection

7.5. Connecting the DC lines for the PV modules and battery

The connection steps of the battery and PV are the same, only the terminal specifications are different. The colour of the battery terminal is blue, the colour of PV terminal is black.

Please observe the recommended cable dimensions:

Cross-sectional area (mm²/ AWG)		Outer diameter of cable (mm²)
Range	Recommended value	
4.0-6.0 / 11-9	4.0 / 11	4.5~7.8

Procedure:

Step 1: Remove the crimp contacts from the positive and negative connections.

Step 2: Remove the insulation of the cables:

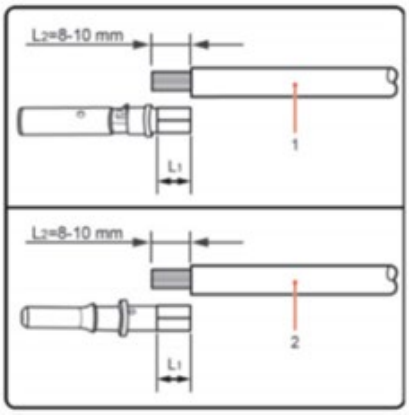


Figure 40 –Connecting PV

1	Positive PV cable	2	Negative PV cable

L2 is 2 to 3 mm longer than L1

Step 3: Insert the positive and negative PV cables into the corresponding cable glands.

Step 4: Crimp the PV cables. The crimped cable must be able to withstand a tractive force of 400 Nm.

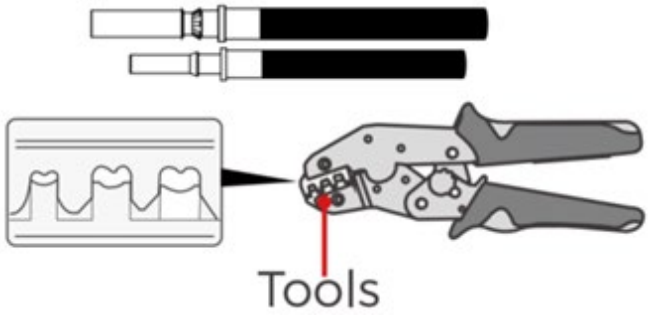


Figure 41 –Connecting PV

Caution	**Danger of reverse polarity!** • Ensure that the polarity is correct before plugging into the PV connections!

Step 5: Insert the crimped PV cables into the corresponding connector housing until you hear a “clicking” sound.

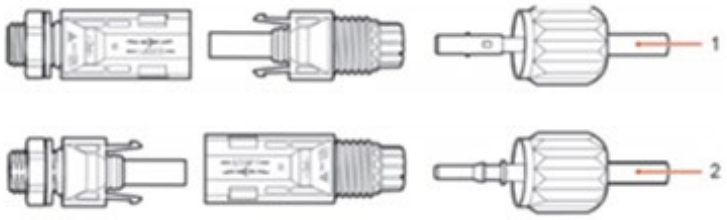


Figure 42 – Connecting PV

1	**Positive power cable**	**2**	**Negative power cable**

Step 6: Re-screw the cable glands to the connector housing.

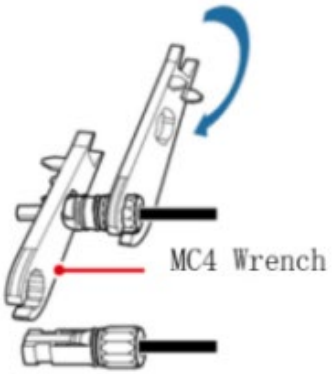


Figure 43 – Connecting PV

Step 7: Insert the positive and negative connectors into the corresponding DC input terminals of the inverter until you hear a "clicking" sound.

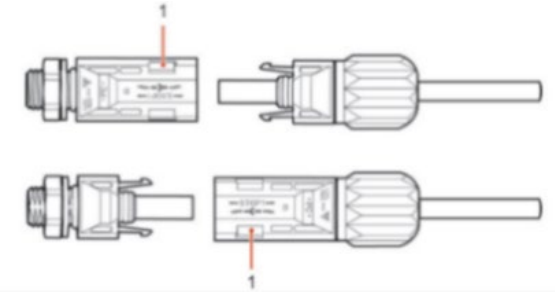


Figure 44 – Connecting PV

1	**Locking**

Insert the protective caps into the unused PV connections.

Caution	**Danger of DC arcing** • Before removing the plus and minus connector, ensure that the DC switch has been set to OFF.

In order to remove the plus and minus connection from the inverter, insert a removal key into the locking and press on the key with the adequate force as shown in the following illustration:

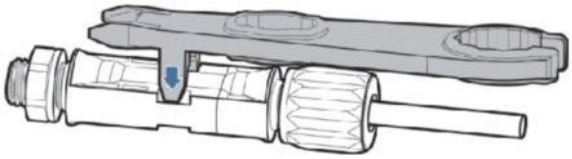


Figure 45 – Disconnecting the photovoltaic connectors

Connect the 3PH HYD5000–HYD12000-ZP3 inverter to the photovoltaic strings using the DC input power cables. The 3PH HYD5000–12000-ZP3 inverter is equipped with three MPPT inputs.
To ensure the correct configuration of the photovoltaic array, it is recommended to use the ZCS Configurator, available at the following link:
https://www.insun.cloud/ZCS/Account/Login

Note:

Depending on the type of inverter, select the appropriate inverter accessories (cables, fuse holders, fuses, switches, etc). The open-circuit voltage of the photovoltaic system must be lower than the maximum DC input voltage of the inverter. The output voltage of the strings must be compatible with the MPPT voltage range.

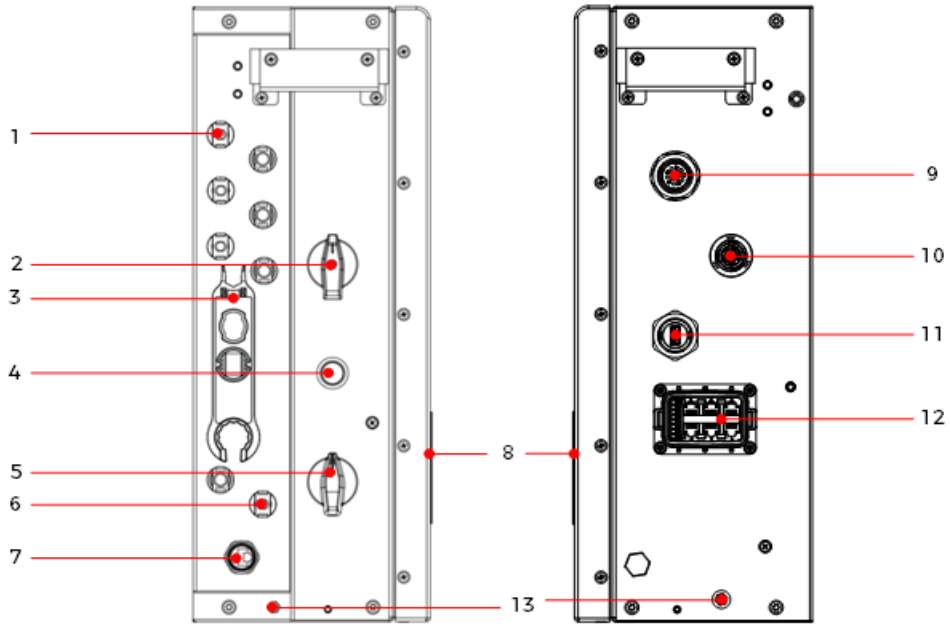
The positive and negative polarities of the panel on the inverter must be connected separately. The power cable must be suitable for photovoltaic applications.

Note:

To correctly configure the inverter channels according to the photovoltaic array, use the ZCS Configurator: https://www.insun.cloud/ZCS/Account/Login

7.6. Communication interfaces

The positions of the communications interfaces of the AZZURRO 3PH HYD 5000...12000 ZP3 are displayed below:



Right side port Left side port

Figure 46 - AZZURRO 3PH HYD 5000-HYD 12000 ZP3 Interfeces

No.	Connection	Function
7	BAT communication port	Connect the battery to read battery information or assist with battery software upgrades.
11	Wi-Fi /Etehernet/4G	USB port for firmware update and safety parameter import; Port to connect Stick Logger (Wi-Fi).
12	Communication connection	Multi-functional communication ports, including parallel, meter, Ethernet, CT, DRM, Wallbox, dry contact, etc.

7.7. Multifunctional Communication Port Definition

Please refer to the following table for the specific PIN assignments.

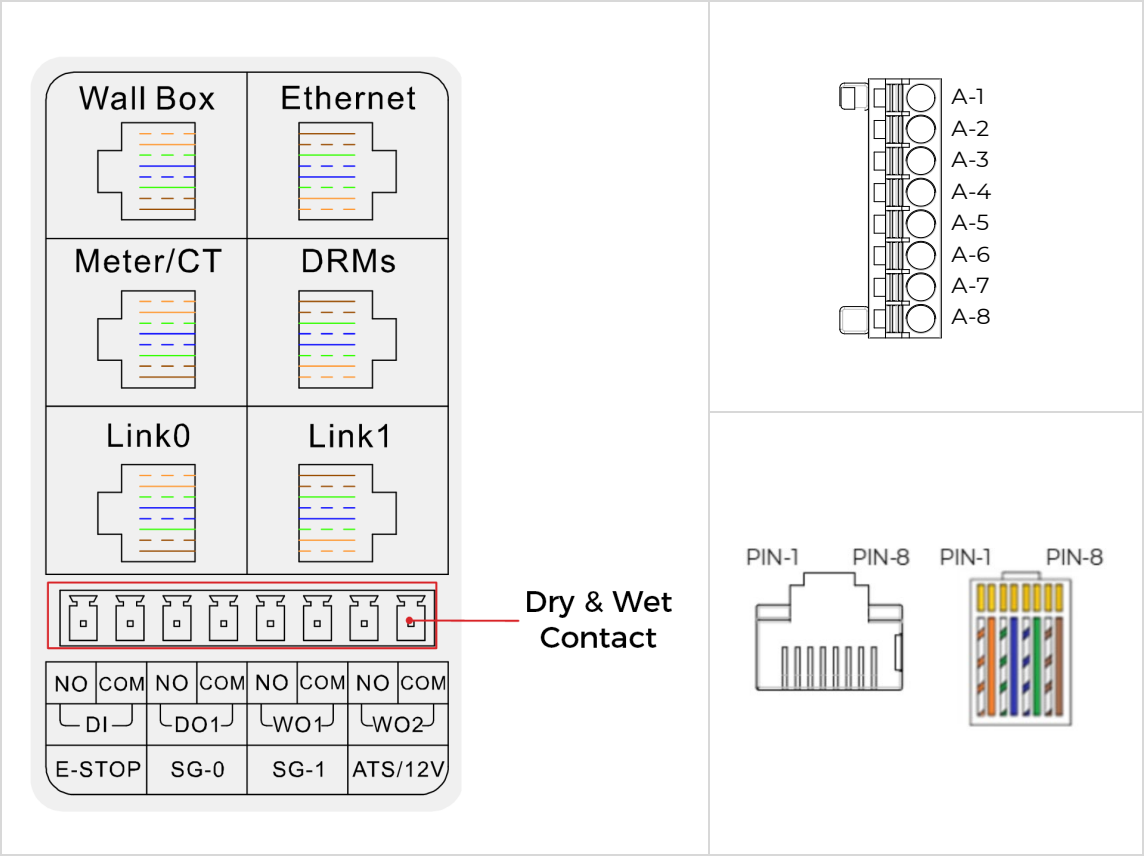


Figure 47 – COM interfaces

Wallbox			
PIN	**Colour**	**Connection**	**Function**
1	Orange White	Wallbox-RS485 A	Wallbox-RS485 differential signal+
2	Orange	Wallbox-RS485 B	Wallbox-RS485 differential signal-

Meter & CT			
PIN	**Colour**	**Connection**	**Function**
1	Orange White	Meter-RS485 A	Meter-RS485 differential signal+
2	Orange	Meter-RS485 B	Meter-RS485 differential signal-
3	Green White	CT A+	CT A differential signal+
4	Blue	CT B+	CT B differential signal+

5	Blue White	CT B-	CT B differential signal-
6	Green	CT A-	CT A differential signal-
7	Brown White	CT C+	CT C differential signal+
8	Brown	CT C-	CT C differential signal-

DRMs			
PIN	**Colour**	**Connection**	**Function**
1	Orange White	DRM1/5	DRM1/5
2	Orange	DRM2/6	DRM2/6
3	Green White	DRM3/7	DRM3/7
4	Blue	DRM4/8	DRM4/8
5	Blue White	GND_S	GND_S
6	Green	DRM0	DRM0
7	Brown White	/	Internally shorted
8	Brown	/	

Link0 and Link1 for Parallel.

Dry & Wet Contact			
PIN	**Colour**	**Connection**	**Function**
1	A-1	DI IN	Dry contact input signal
2	A-2	DI GND	Dry contact ground signal
3	A-3	DO NO	Dry contact normal high signal
4	A-4	DO COM	Dry contact communication signals
5	A-5	WO1 NO	Wet contact normal high signal 1
6	A-6	WO1 GND	Wet contact ground signal 1
7	A-7	WO2 NO	Wet contact ground signal 2
8	A-8	WO2 GND	Wet contact ground signal 2

7.8. Multifunctional Communication Cable Production

Step 1: Prepare a RJ45 cable, according to the length of the connector appropriate to open one end of the cable:

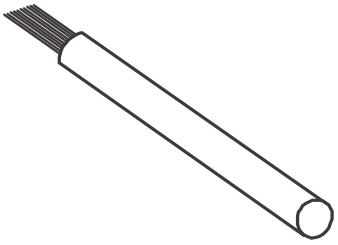


Figure 48 - COM connector production

Step 2: Remove the rubber plugs from the COM connector and pull out the appropriate number of plugs according to the desired function:

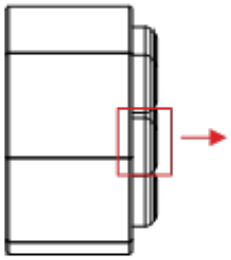


Figure 49 - COM connector production

Step 3: After removing the stopper, pass the cable through the connector gland, connector clip and connector through-hole. Crimp the cable to the terminal connector in the colours shown below:

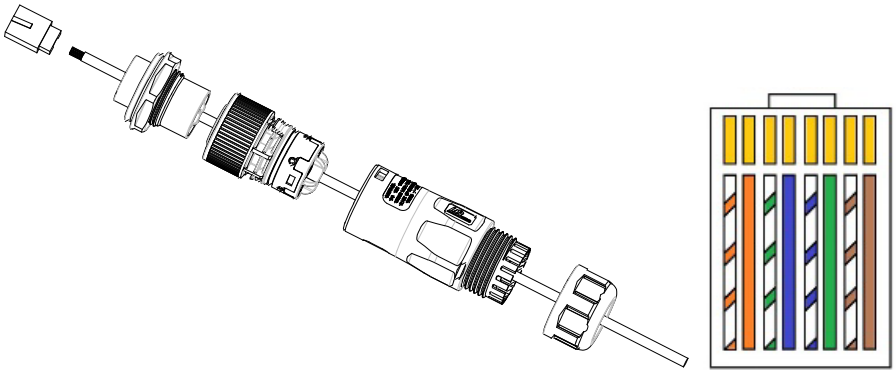


Figure 50 - COM connector production

Step 4: After assembling the connectors in order, insert the RJ45 connector into the corresponding terminal of the COM port:

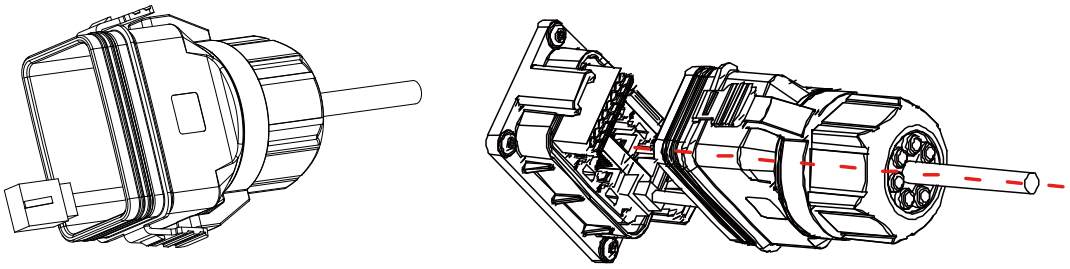


Figure 51 - COM connector production

Step 5: Locking the connector housing to the inverter COM port:

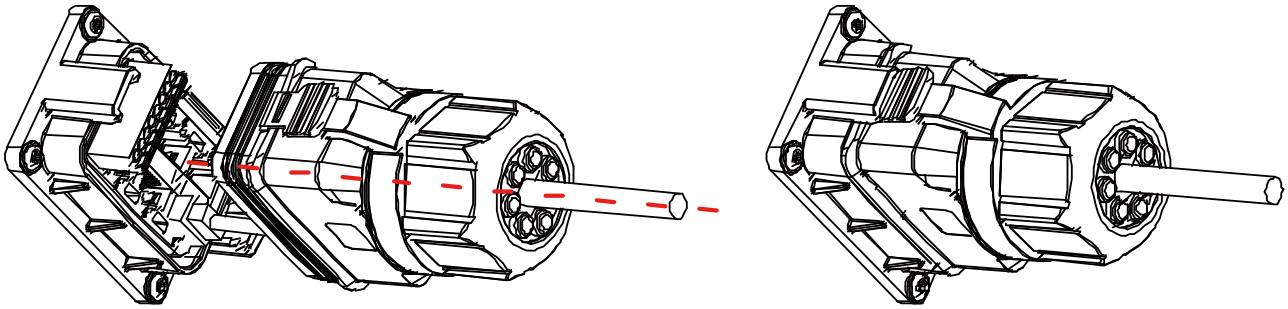


Figure 52 - COM connector production

7.9. Meter three-phase DTSU

The integrated energy management functions integrated of the AZZURRO 3PH HYD 5000...12000 ZP3 require to measure the power flow at the point of grid interconnection. It can be measured using smart meter with CTs.

The PIN assignment for the RS485 connection between inverter and smart meter can be found in the table below.

Inverter COM Port Pin	Function	Meter Pin
Meter/CT PIN1	Meter-RS485 A	Pin 24
Meter/CT PIN2	Meter-RS485 B	Pin 25

- The Smart meter shows a positive power value for feed-in to the grid, and a negative value for energy purchase from the grid.
- Use the shielded twisted pair cable.
- The copper outer diameter should be more than 0.5 mm^2.
- Keep away from power cables or other electric fields.
- Use termination resistors at the ends of the RS485 line to improve signal quality

Connect the grid phases to the Smart Meter Pins according to below drawing for correct functionality of the inverter.

The connection method in the case of reading at the exchange is shown in “Figure 2”.

In the case of external production reading, the connection method is shown in “Figure 4.”

Figure1

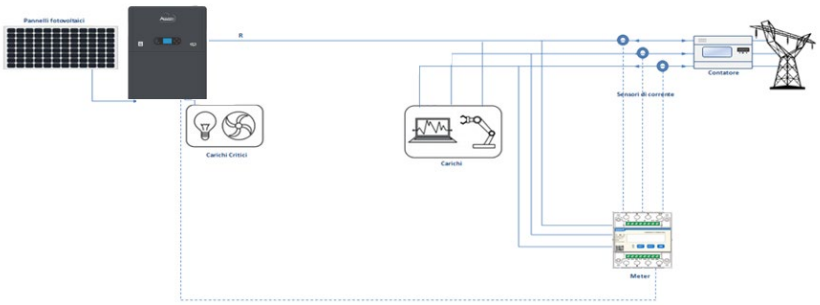


Figure 2

Inverter COM Port Pin	Function	Meter Pin
Meter/CT PIN1	Meter-RS485 A	Pin 24
Meter/CT PIN2	Meter-RS485 B	Pin 25

Figure 3

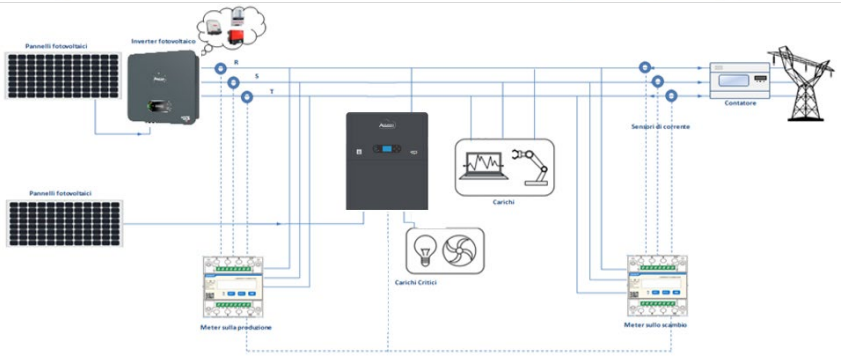


Figure 4

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

In case of installation of inverter 3PH HYD5000-12000-ZP3 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.

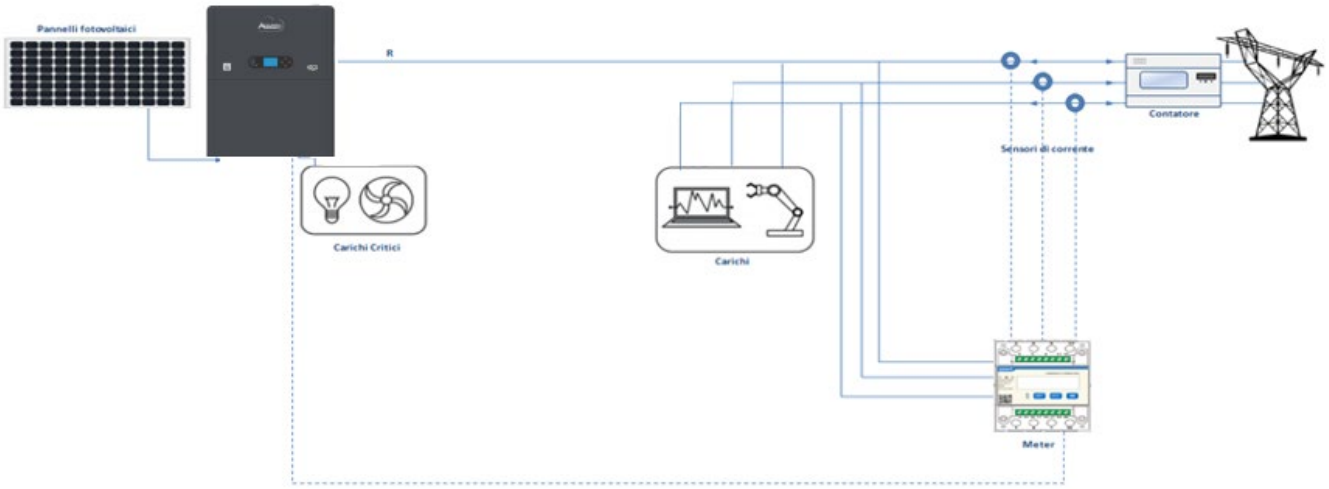


Figure 53 - Hybrid installation scheme with meter on the exchange

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

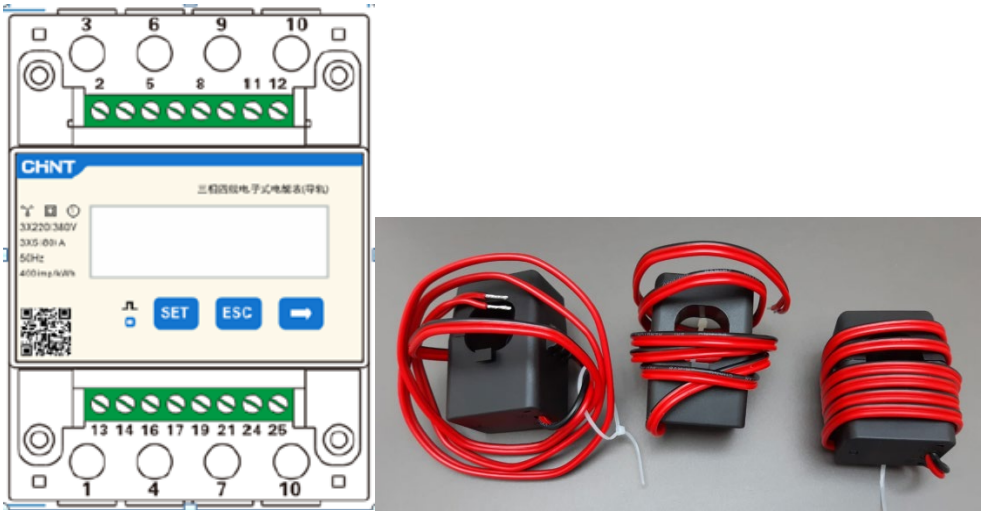


Figure 54 - Meter (left), CT sensors (right)

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.

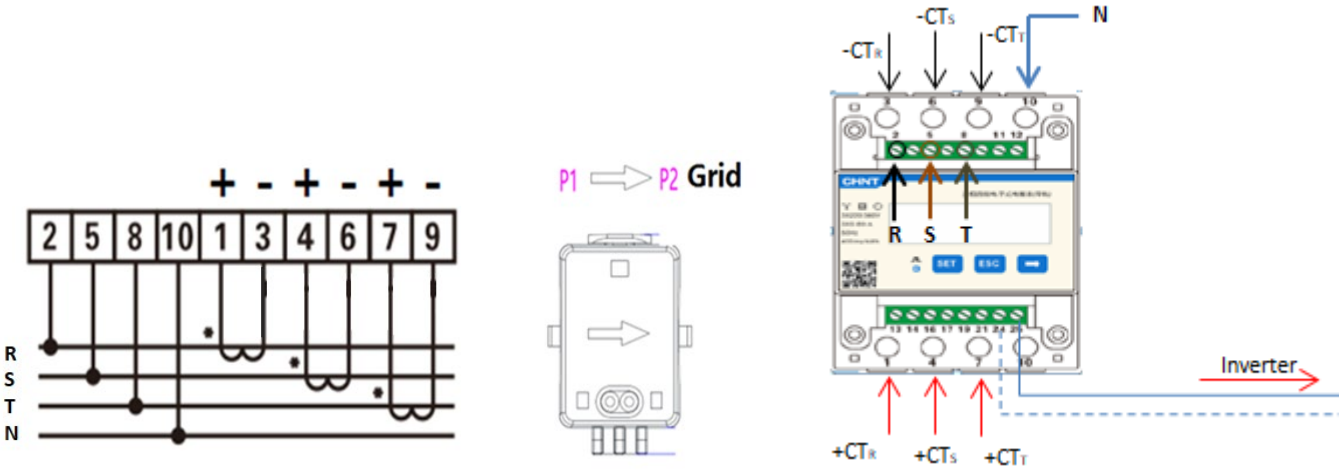


Figure 55 – Meter connection and sensors CT

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 "COM" is used by connecting PIN 6 and 7 as indicated in the figures and tables below.

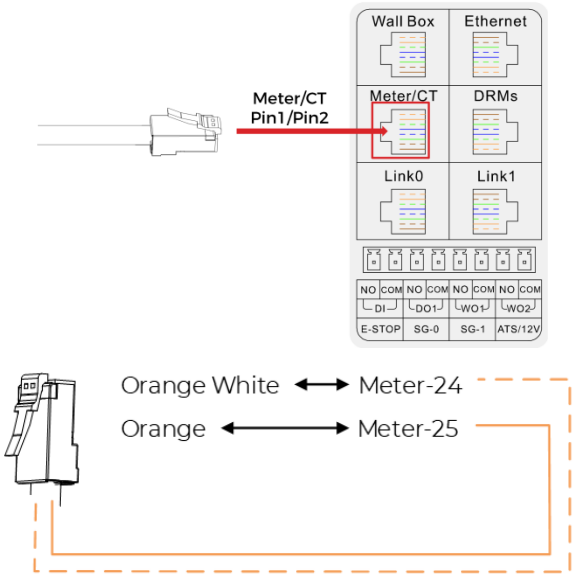
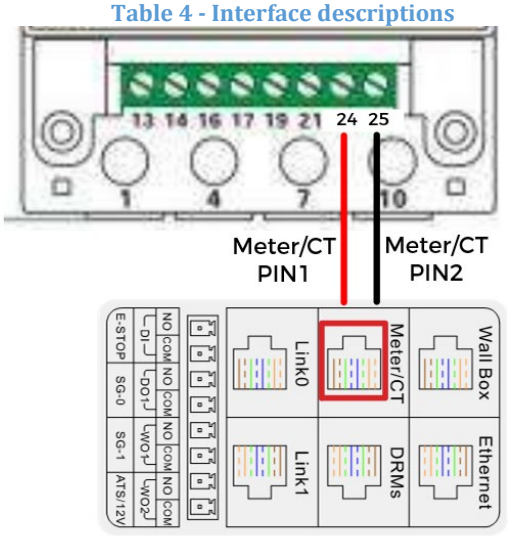


Figure 56 – COM interface

PIN Inverter	Definizione	Meter PIN	Note
Meter/CT PIN1	RS485 differential signal +	24	Meter communication
Meter/CT PIN2	RS485 differential signal -	25	

Table 4 - Interface descriptions



NOTE: For distances between meter and hybrid inverter over 100 meters it is recommended to connect along the 485 dasy chain one 120 Ohm resistors directly to the Meter (PIN 24 and 25).

To configure the Meter reading on the inverter:

Main Menu→6.Advanced Settings(Password: 0715)→16.PCC Meter/CT→Disable/Enabe

NOTE: The baud rate of the RS485 of the electricity meter is fixed at 9600bps.

7.11. 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 (except that of the Hybrid itself).
As for the RS485 (Meter - HYD) communication, all the Meters present must be connected to the COM port of the inverter in the inputs Meter/CT PIN1 and Meter/CT PIN2 of the COM port)

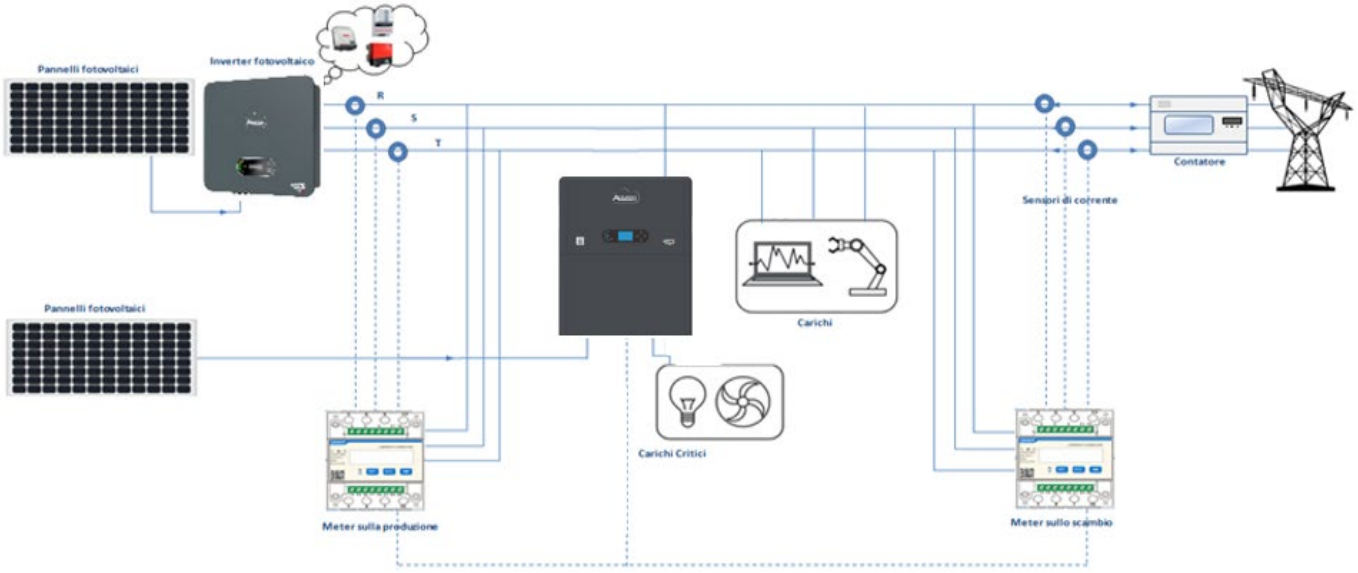
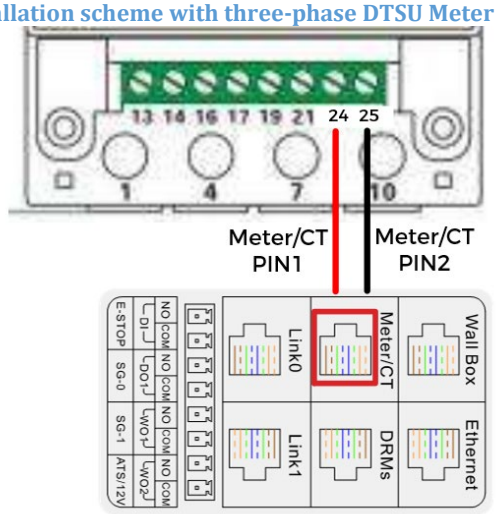


Figure 57 - Hybrid installation scheme with three-phase DTSU Meter on exchange and production



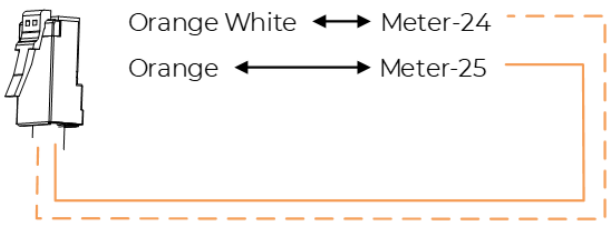


Figure 58 - COM serial port connection with more than one DTSU Meter

7.12. 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 59 – 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**

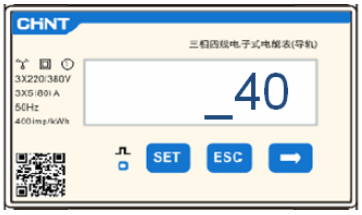
2. Press **SET**, the inscription will appear "600":

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

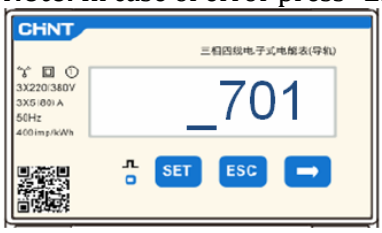
To view the device in read mode on the exchange you need to enter the settings menu, as indicated below:

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.

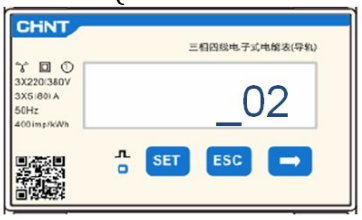


3. Confirm by pressing **SET** until you enter the settings menu.
4. Enter the following menus and set the parameters indicated:
    d. **CT**:
        i. Press **SET** to enter the menu
        ii. Write“40”:
            1. From the first screen where the number "1" appears, press" " repeatedly until 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.

7.13. Correct installation verification DTSU three-phase meter

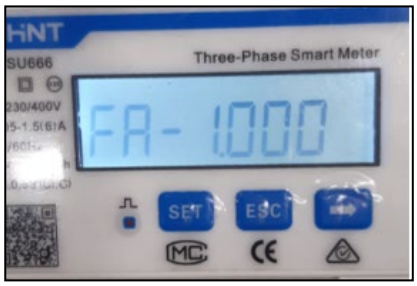
Three-phase DTSU meter verification at exchange

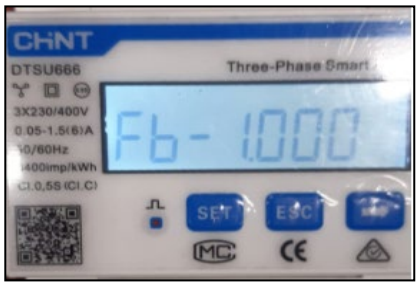
To carry out such verification it is necessary:

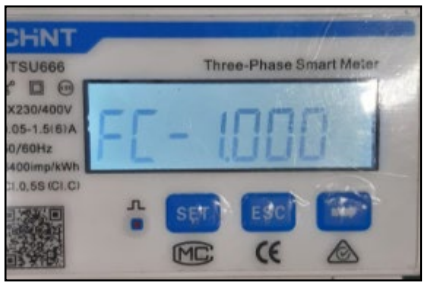
- Turn on the hybrid inverter only in alternation and turn off any other source of photovoltaic production (if any);
- Turn on carchi greater than 1kw for each of the three phases of the plant;

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:

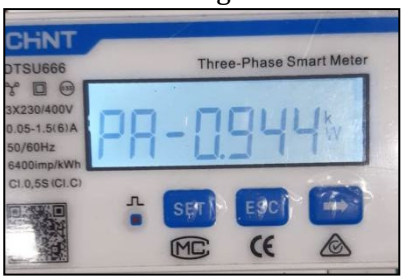
1. The Power Factor values for each phase Fa, Fb, and Fc (voltage to current offset), are between 0.8-1.0. In case of a lower value, the sensor must be moved in one of the other two phases until that value is between 0.8-1.0.

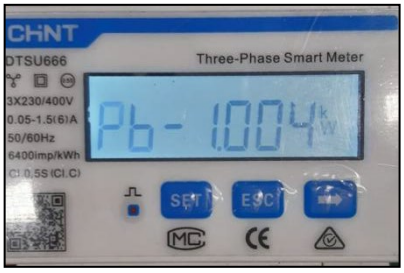




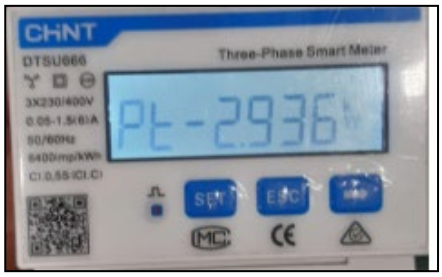


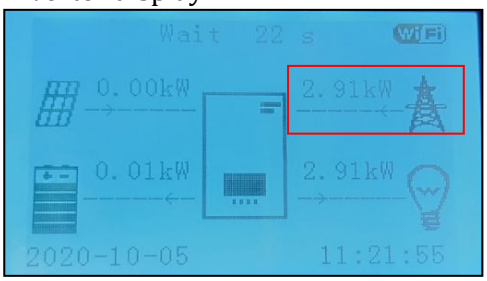
2. The Power Pa, Pb and Pc must be:
    - Greater than 1 kW.
    - In line with household consumption.
    - The sign in front of each negative value (-).





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



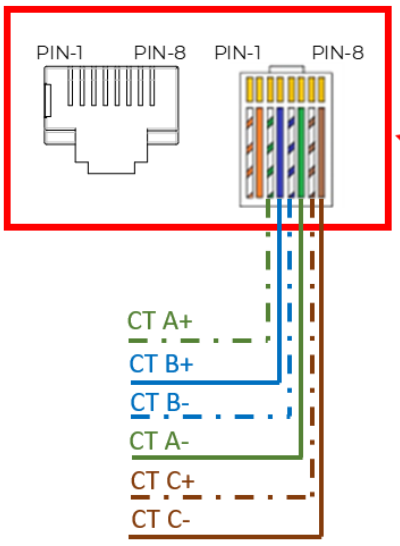


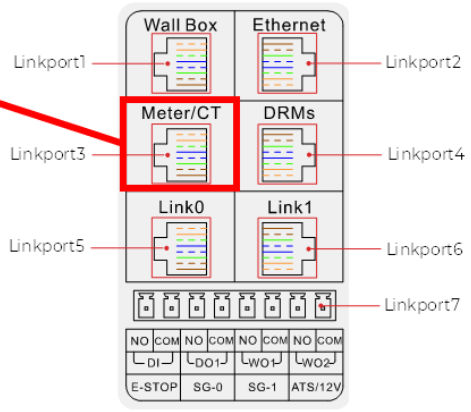
Three-phase DTSU Meter Verification on Production

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.

7.14. Measurement of exchange through current sensor





LinkPort3 (Link port for Meter & CT)			
PIN	Colour	Connection	Function
1	Orange White	Meter-RS485 A	Meter-RS485 differential signal+
2	Orange	Meter-RS485 B	Meter-RS485 differential signal-
3	Green White	CT A+	CT A differential signal+
4	Blue	CT B+	CT B differential signal+
5	Blue White	CT B-	CT B differential signal-
6	Green	CT A-	CT A differential signal-
7	Brown White	CT C+	CT C differential signal+
8	Brown	CT C-	CT C differential signal-

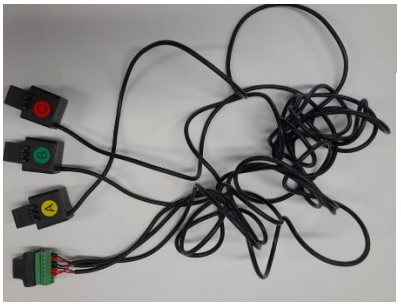
Utilizzare solamente per distanza fra inverter e sensori CT inferiore a 50m

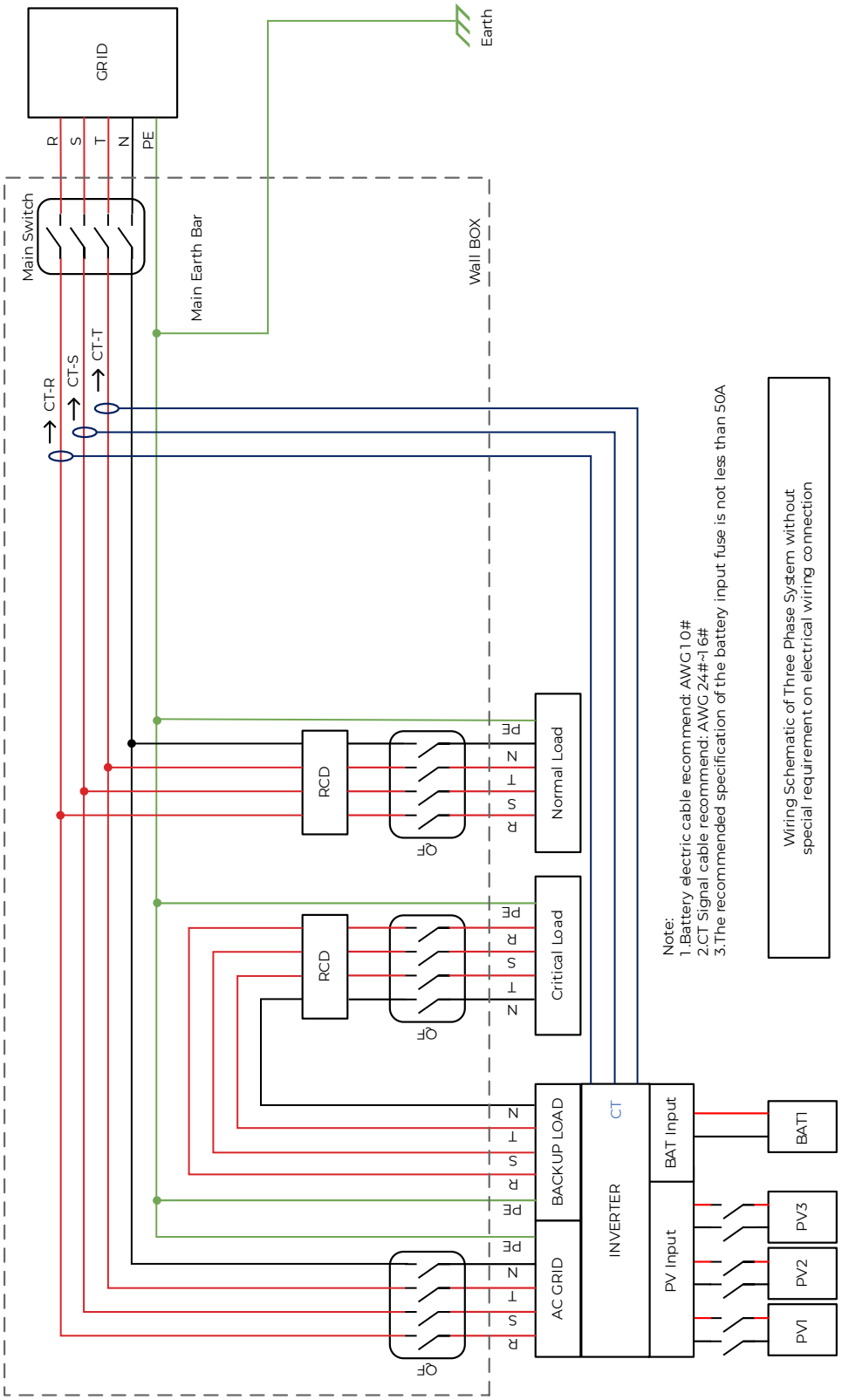
Connect the positive of the sensor CTA to PIN3 of the Meter/CT connector
Connect the negative of the sensor CTA to PIN6 of the Meter/CT connector
Connect the positive of the sensor CTB to PIN4 of the Meter/CT connector
Connect the negative of the sensor CTB to PIN5 of the Meter/CT connector
Connect the positive of the sensor CTC to PIN7 of the Meter/CT connector
Connect the negative of the sensor CTC to PIN8 of the Meter/CT 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.

Use an 8-pin, STP category 6 cable as an EXTENSION CABLE.
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.




GRID
R
S
T
N
PE
Earth
Main Switch
Main Earth Bar
Wall BOX
CT-R
CT-S
CT-T
RCD
QF
Normal Load
Critical Load
BACKUP LOAD
AC GRID
INVERTER
CT
BAT Input
PV Input
BAT1
PV3
PV2
PV1
Note:
1.Battery electric cable recommend: AWG10#
2.CT Signal cable recommend: AWG 24#~16#
3.The recommended specification of the battery input fuse is not less than 50A
Wiring Schematic of Three Phase System without special requirement on electrical wiring connection

8. Buttons and indicator lights

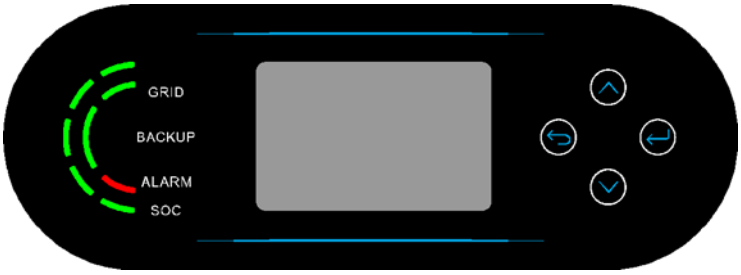


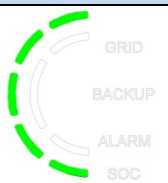
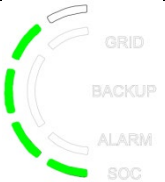
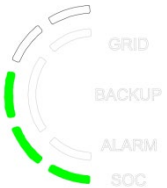
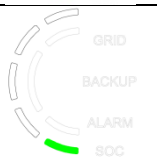
Figure 60– Buttons and indicator lights

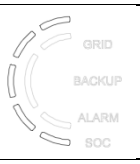
Button	Name	Description
	Back	Previous screen, enter menu
	Up	Select previous menu item, increase setting value
	Down	Select next menu item, decrease setting value
	Enter	Enter Menu item, select next digit, confirm setting

8.1. System status indicator

State	Colour	State
On-grid	Green	Normal
	Green (flashing)	Standby
Off-grid	Green	Normal
	Green (flashing)	Standby
Alarm	Red	Error

8.2. Battery capacity indicator

Icon	Battery capacity	Capacity explanation
	80%-100%	The battery capacity is full
	60%-80%	
	40%-60%	
	20%-40%	
	5-20%	

	0-5%	The battery capacity is insufficient, and the battery generates a low voltage alarm.

9. Parallel Port

In systems with multiple inverters, you can connect the devices in a Master/Slave configuration. In this configuration, only one energy meter is connected to the Master inverter for the system control.

- In the **off-grid mode**, a maximum of **3** inverters can be connected in parallel.
- In the **on-grid mode**, a maximum of **6** inverters can be connected in parallel.

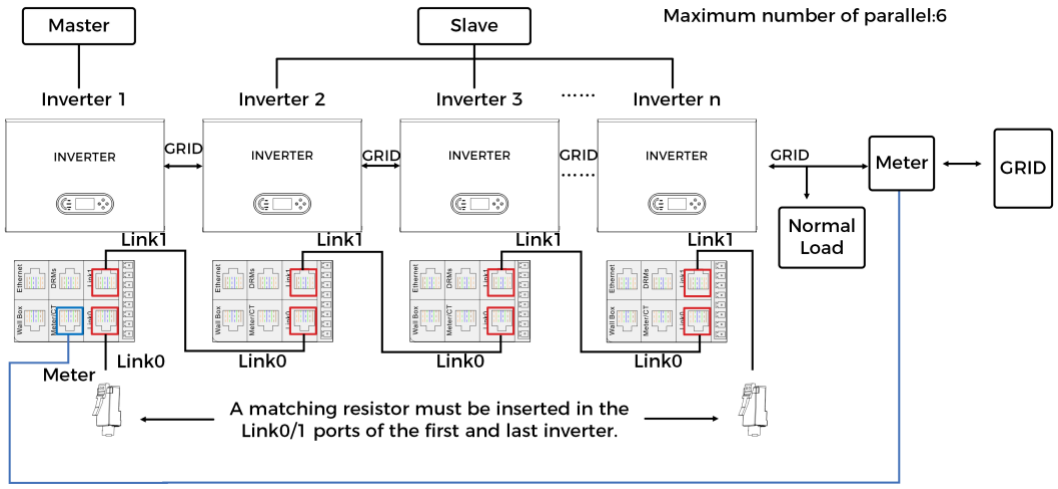


Figure 61– parallel system(on-grid mode)

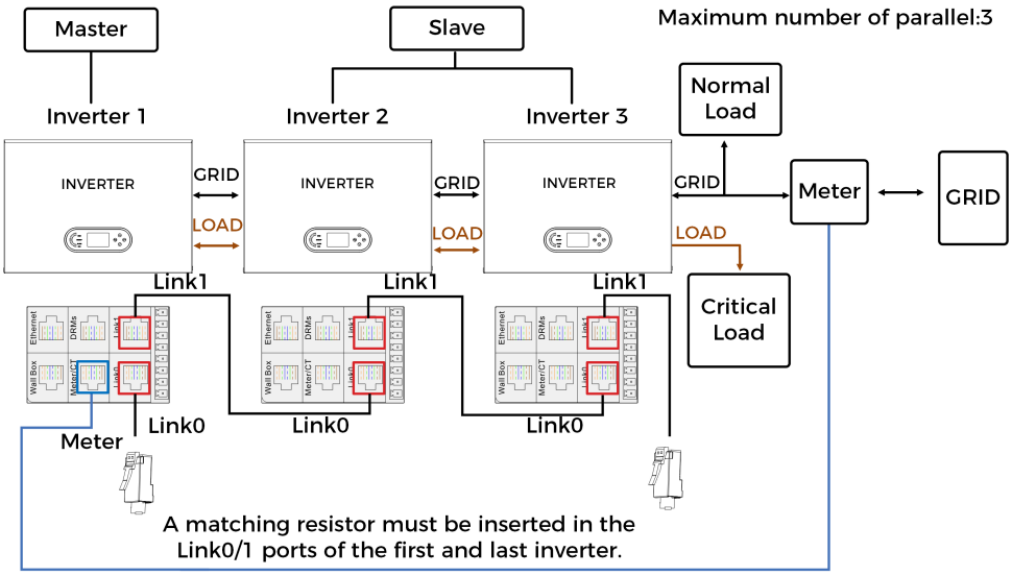
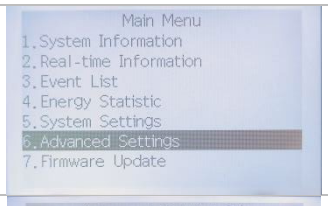


Figure 62– parallel system(off-grid mode)

NOTE: The first and last inverter need to be connected with the Matching Resistance!

Parallel setting

	Select Advanced Settings
	Select Parallel Settings
	Enter the password 0715.
	**Master inverter** Select Inverter 1. Switch the parallel control from disabled to enabled. The default state of inverter 1 is that it is in the Master mode.
	**Slave inverters** Configure inverters 2 to n in sequence based on the number of parallel units. The maximum number of parallel units for three phase ESI inverter is six. Setting parallel address from 2 to 6 for slave inverter.

▸In the parallel operation mode, emergency power supply, generator mode and unbalanced support need to be turned off remotely first. The settings for the slave units must be made on the master machine after the remote shutdown.

▸Be careful when the parallel inverters are connected, then the communication cable should not be bundled with the power cable (GRID - BACKUP) in one cable channel or to be very close, it may cause abnormal faults in the parallel system. it is preferable to pass the communications cables in a separate cable channel.

10. DRMs/Logic interface

The DRMs/Logic interface is used to control the inverters feed-in or purchases power by external signals, usually provided from grid operators with ripple control receivers or other means. The DRM0 can be used for a switch off signal from external grid protection devices.
The logical interface pins are defined according to the requirements of different standards. Please connect according to the safety requirements of your country (see below for a brief description of the safety requirements).
First, connect the DRMs port cable in the COM port cable set to the control unit in accordance with the wire sequence required by the safety regulations:

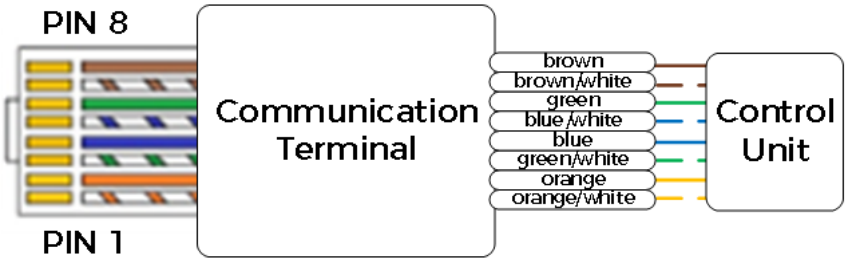


Figure 63– DRM connection

Connect the RJ45 terminal on the other end of the COM connector to the Linkport4 port:

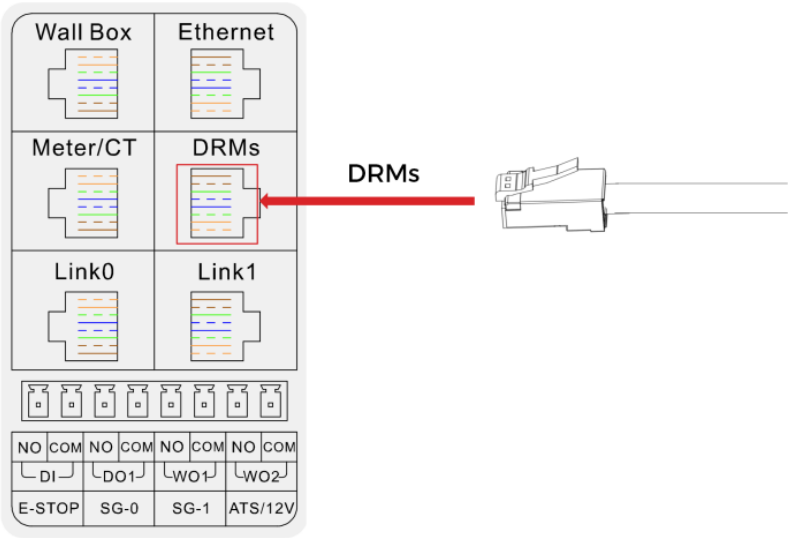


Figure 64– DRM connection

DRMs for AS/NZS 4777.2:2015 and AS/NZS 4777.2:2020

Also known as Inverter Demand Response Modes (DRMs).
The inverter recognises all supported Demand Response commands and initiates the reaction within two seconds. The inverter will continue to respond while the mode remains asserted.

Pin	Colour	Function
1	orange/white	DRM1/5
2	orange	DRM2/6
3	green/white	DRM3/7
4	blue	DRM4/8
5	blue/white	RefGen
6	green	DRM0
7	brown/white	Internally shorted
8	brown	

Method of asserting demand response modes：

Mode	RJ45 socket Asserted by shorting pins:		Real current limit (referenced to inverter rated per phase current)
DRM0	5	6	0
DRM1	1	6	Import=0
DRM2	2	6	Import<50%
DRM3	3	6	Import<75%
DRM4	4	6	Not limited
DRM5	1	5	Generate=0
DRM6	2	5	Generate<50%
DRM7	3	5	Generate<75%
DRM8	4	5	Not limited

Logic interface for VDE-AR-N 4105:2018-11

This function serves to control and/or limit the output power of the inverter.
The inverter can be connected to a radio ripple control receiver in order to dynamically limit the output power of all inverters within the system.
RCR: Ripple control receiver (RCR) is an interface between a PV system and power grid company.

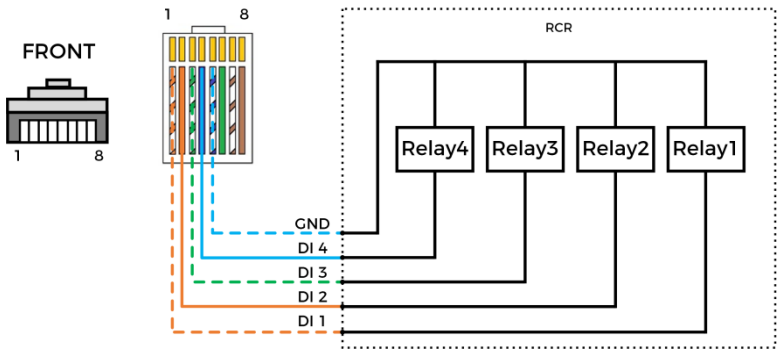


Figure 65– DRM connection

The inverter is preconfigured on the following power levels:

Pin	Name	Parameter	Preset Power Value*
1	DI 1	Relay1 engaged	0%
2	DI 2	Relay2 engaged	30%
3	DI 3	Relay3 engaged	60%
4	DI 4	Relay4 engaged	100%
5	G	Internal signal	/

*) When using this function on your own, make sure that the normally open relay is disconnected before use, and provide the drive signal for the relay on your own.

*) Priority: DI 1> DI 2> DI 3> DI 4

Logic interface for EN50549-1:2019

The active power output can be ended within five seconds following a command to the input interface.

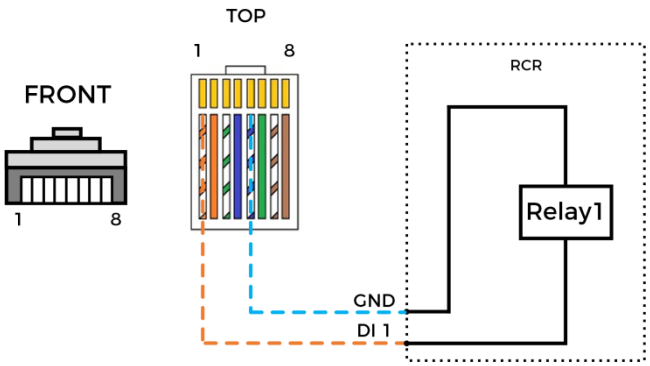


Figure 66– DRM connection

Functional description of the terminal

Pin	Name	Inverter	Preset Power Value
1	DI 1	Relay1 engaged	0%
5	G	Internal signal	/

11. System Electrical Topology

The inverters GRID and BACKUP are wired with different N and PE wires depending on the regulatory requirements in different regions. For users in Australia, South Africa and New Zealand, please use the System Electrical Topology in System2.

System 1: Internal relay controls N-PE grounding

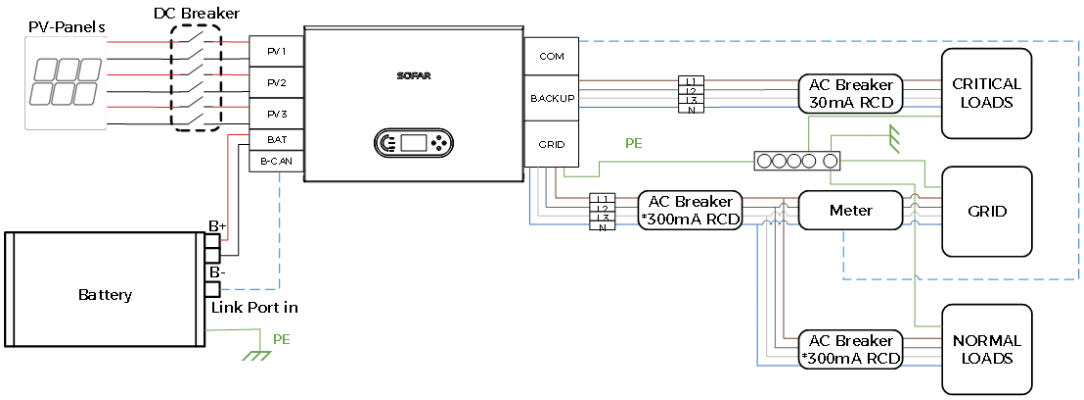


Figure 67 - System Electrical Topology (a)

Ensure that both the BACKUP and GRID PE wires are grounded at the same time, as shown in the diagram. Otherwise, the inverter may be abnormal in off-grid mode.

In system 2, Neutral Point Grounding is disabled by default. Check whether Neutral Point Grounding is enabled, if not, enable it manually: Advanced Settings –> Input 0715 -> NeutralPointGrounding->Enable

System 2: N and PE wires are connected together

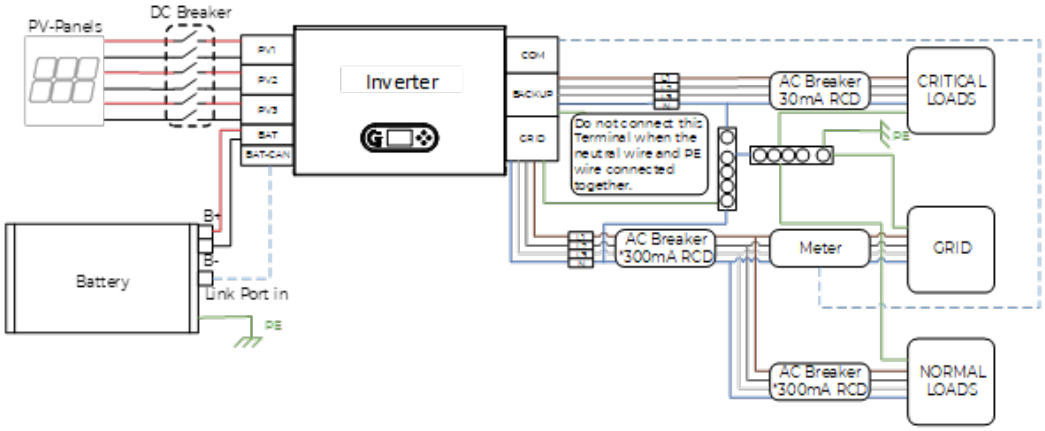


Figure 68 - System Electrical Topology (b)

 **Danger**	**Install Residual current device (RCD) in front of the load** • RCD is necessary for critical load, but optional for normal load. • In off-grid mode, the EPS switch is unprotected and load leakage could lead to shock danger. • The Entry master switch installed in the house must have earth leakage protection and its rated earth leakage action current > number of inverters * 100mA. **Be sure to ensure that the output is grounded** • In system 1, the PE line of the inverter's GRID Port and BACKUP Port must be grounded through the PE-Bar, otherwise there may be a risk of leakage.

According to the Australian safety regulations, the neutral cables on the grid-connected side and EPS side must be connected together. Otherwise, the EPS cannot be used.

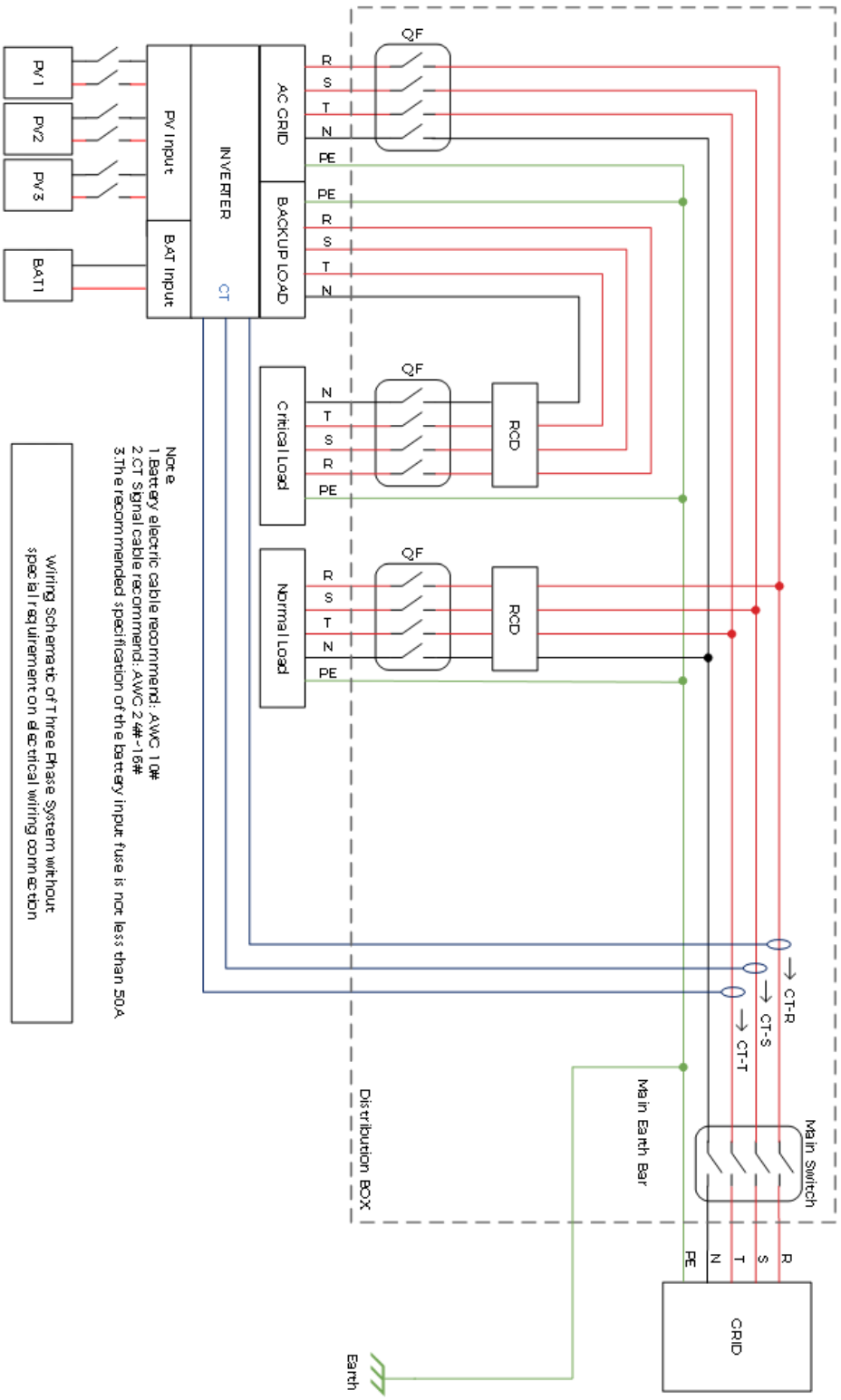
12. Smart Meter / CT

There are different system configurations possible depending on the user's requirements, existing electrical infrastructure and local regulations. The distribution box must be configured to comply to the grid operator requirements.
The inverter has an integrated AC relay to disconnect all phases and Neutral from the grid in case of grid fault or grid outage.
The inverter's power generation and feed-in limiting functions require the use of an external direct-connected meter to obtain grid information.
There are 3 system configurations:

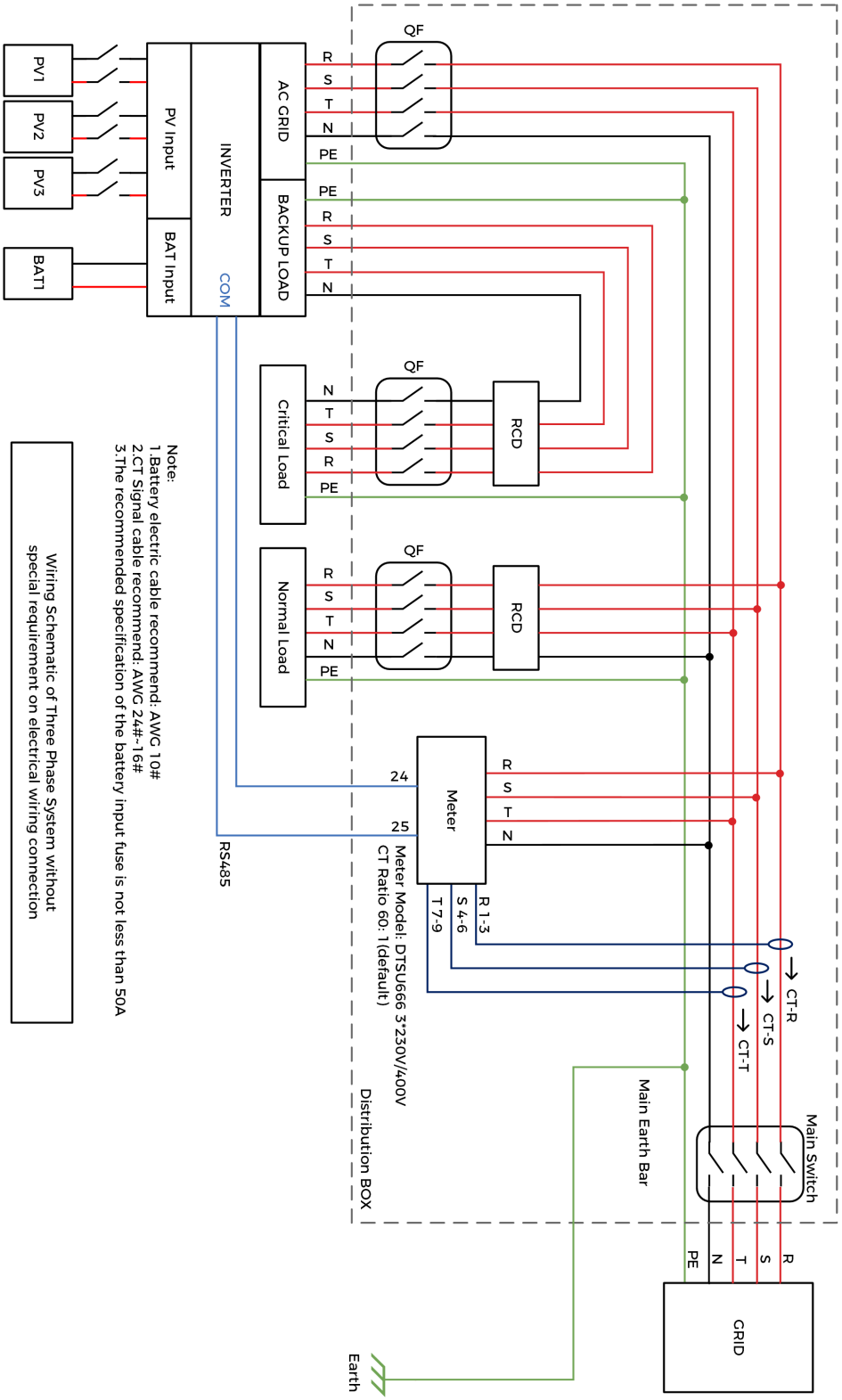
- System A: measurement of energy with directly connected smart meter.
- System B: direct measurement of energy with CTs (3000:1).
- System C: measurement of energy with smart meter and CTs.

The secondary side current of Scheme B is less than 100mA. The length of the lead of CT cannot exceed 1 km(too long will result in poor accuracy).

12.1. System A: direct measurement of energy with CTs



12.2. System B: measurement of energy with smart meter and CTs



13. Commissioning the inverter

13.1. Safety test before commissioning

 Attention	**Check the voltage range** • Ensure that the DC and AC voltages are within the permissible range of the inverter

13.2. Double Check

Please ensure that the inverter and all the wiring are installed correctly, securely, and reliably, and that all environment requirements are met.

1. The Inverter is firmly fastened to the wall.
2. The 3PH HYD5000-HYD12000-ZP3 inverter is securely fixed to the mounting bracket and the connection with the wall should be tight and firm;
3. The PV+/PV- cables are securely connected, and the polarity and voltage are correct, and the voltage is in line with the accessible range;
4. The BAT+/BAT- cables are securely connected, and the polarity and voltage are correct, and the voltage meets the accessible range;
5. DC isolator is correctly connected between battery & inverter, DC isolator: OFF.
6. The GRID/LOAD cables are securely/correctly connected;
7. An AC switch is correctly connected between the GRID port of the 3PH HYD5000-12000-ZP3 inverter and the grid, and the switch is OFF.
8. An AC switch is correctly connected between the LOAD port of the 3PH HYD5000-12000-ZP3 inverter and the critical load, and the switch is OFF.
9. The communication cable for lithium batteries has been correctly connected.

13.3. First start-up of the inverter

Please follow below steps to switch the inverter ON.

1. Make sure that the AC-side switch of the inverter is lowered so that no power is supplied to the device
2. Make sure that the rotating disconnection switch is in the OFF position

Figure 69 - Photovoltaic disconnecting switch

3. Make sure that the utility has a consumption of at least 200 W. Recommended loads for this operation are hair dryers (800W < P < 1600W), electric heaters (1000W < P < 2000W) and ovens (P > 1500W). Other types of loads, such as washing machines or heat pumps, although characterised by high energy consumption, may take some time to reach this level of absorption after starting.

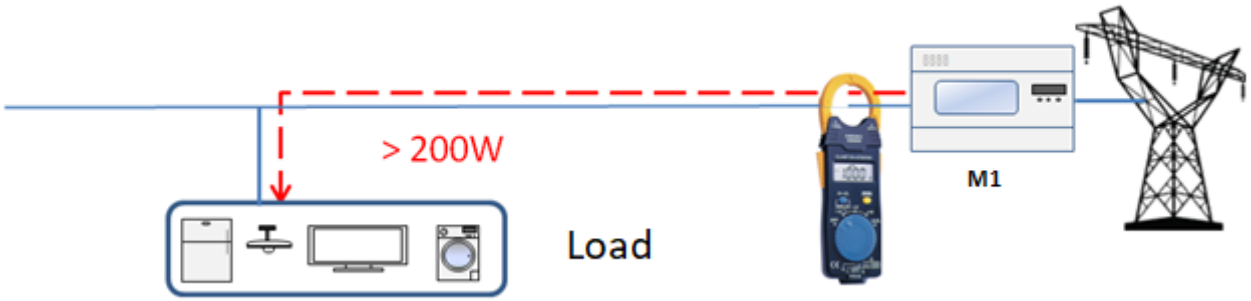


Figure 70 – Checking that the power consumption is above 200W

4. Supply DC power to the inverter by correctly switching on the batteries.

5. Supply AC power through the dedicated protection switch of the storage inverter. If there is more than one switch protecting the inverter (e.g. a circuit breaker and differential switch), they must all be set to ON to allow the inverter to be connected to the grid.

Figure 71 – Example of AC switch protecting the inverter

The following parameters must be configured before the 3PH HYD5000-12000-ZP3 inverter starts working.

13.4. Initial Setup

You need to set the following parameters before inverter starts to operate.

Parameter	Comment
1. Language setting	The default is English
2. System time setting	If you are connected to the server or using the App, the time is set to the local time automatically
3. Safety parameter import	Refer to the country code table below and select country and code.
4. Application scenario setting	According to the user application scenario configuration, set the parameters of PV port, BAT port, GRID port and BACKUP port
5. Work mode setting	Set different working modes, and configure parameters for different working modes (Self-use, Feed-in Priority, Peak Shaving, Time-of-use, Passive), and set battery energy storage parameters (Charge Cut-off SOC, On-grid Discharge Cut-off SOC,Off-grid Discharge Cut-off SOC,Off-grid Discharge Recovery SOC).

The default operating mode is the Self-use Mode.

13.5. Safety parameter

- Different distribution network operators in various countries have differing requirements for the grid connection of grid-coupled PV inverters.
- Ensure that you have selected the correct country code according to regional authority requirements, and consult a qualified electrician or employees of electrical safety authorities.
- Zucchetti Centro Sistemi Spa is not responsible for the consequences of selecting the incorrect country code.
- The selected country code influences the device grid monitoring. The inverter continuously checks the set limits and, if required, disconnects the device from the grid.
- For an updated list of country codes according to the Firmware version, just you can check the document under this link: **https://www.zcsazzurro.com/it/**

Code		Region		Code		Region	
000	000	Germany	VDE4105	018	000	EU	EN50438
	001		BDEW		001		EN50549
	002		VDE0126	019	000	IEC EN61727	IEC EN61727
				020	000	Korea	Korea
001	000	Italy	CEI-021 Internal	021	000	Sweden	Sweden
	001		CEI-016 Italy	022	000	Europe General	EU General
	002		CEI-021 External	023			
	003		CEI-021 In Areti	024	000	Cyprus	Cyprus
	004		CEI-021In--HV	025	000	India	India
	005		CEI-016--HV				
002	000	Australia	Australia-A				
	008		Australia-B	026	000	Philippines	PHI
	009		Australia-C	027	000	New Zealand	New Zealand
003	000	Spain	ESP-RD1699				
	002		NTS	028	000	Brazil	Brazil
	003		UNE217002+RD647		001		Brazil-LV
	004		Spian Island		002		Brazil-230
004	000	Turkey	Turkey		003		Brazil-254
005	000	Denmark	Denmark	029	000	Slovakia	SK-VDS
	001		DK-TR322				
	002		Western Denmark				
	003		Eastern Denmark				
006	000	Greece	GR-Continent		001		SK-SSE
	001		GR-Island		002		SK-ZSD
007	000	Netherlands	Netherlands	030	000	Czech	Czech
					001		Czech-MV
				031-032			
				033	000	Ukraine	Ukraine
008	000	Belgium	Belgium	034	001	Norway	Norway-LV
009	000	UK	UK-G99	035	000	Mexico	Mexico-LV
	001		UK-G98	036-037			
				038	000	60Hz wide range	Wide-Range-60Hz
010	000	China	China-B	039	000	EN50549-1	Ireland
					001	EN50549-1	
					002	Nor Ireland G99	Nor Ireland
					003	Nor Ireland G98	
	001		Taiwan	040	000	Thailand	Thai-PEA
	002		TrinaHome		001		Thai-MEA
	003		HongKong	041-043			
	004		SKYWORTH				

	005		CSISolar				
	006		CHINT	044	000	South Africa	SA
	009		China-A	045			
				046	000	Dubai	DEWG
011	000	France	France		001		DEWG-MV
	001		FAR Arrete23	047-106			
	003		France VFR 2019	107	000	Croatia	Croatia
				108	000	Lithuania	Lithuania
012	000	Poland	Poland	109-110			
	003		Poland-ABCD	111	000	Columbia	Columbia
					001		Columbia-LV
013	000	Austria	Tor Erzeuger	112-120			
014				121	000	Saudi Arabia	IEC62116
				122	000	Latvia	
015	000	Switzerland	Switzerland-A	123	000	Romania	
	001		Switzerland-B				
16-17							

Caution

It is essential to make sure that you have selected the correct country code according to the requirements of the local authority.

For this purpose, consult a professional electrician or qualified personnel from the electrical safety authorities.

ZCS accepts no responsibility for consequences deriving from the selection of an incorrect country code.

Default values for other Settings

Item	Default status
Energy Storage Mode	Self-use Mode
EPS Mode	Disable
Anti Reflux	Disable
IV Curve Scan	Disable
Logic Interface	Disable

13.6. Configuration the battery setup

The AZZURRO 3PH HYD 5000...12000 ZP3 models have one battery input (max. charge current 25 A).

13.7. Configuring Parallel Inverter System

To increase the system's EPS and grid power, the AZZURRO 3PH HYD 5000...12000 ZP3 can be parallelly connected at the Grid port and the EPS port.

For the communication setup, please follow the **9.Parallel Port**
NOTE: Each inverter must have a unique parallel address.

13.8. Standard display

Main interface:

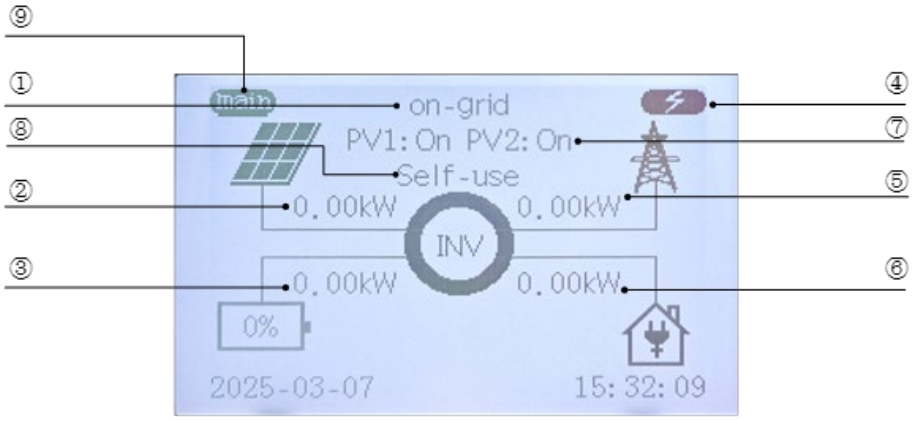


Figure 72 – Main interface

① Current state of the inverter	Used to display the current working status of the inverter, including grid-connected, off-grid and standby.	
② PV Power	For displaying photovoltaic power.	
③ Battery Power	For displaying BAT charge or discharge power. No battery marking here if no battery is connected	
④ Accessory		This is used to display the accessories currently connected to the inverter, including the capture stick, USB, and smart meter.
		
		
⑤ Grid Power	Power flowing into or out of the grid	
⑥ Home Consumption	Energy consumed by household loads	
⑦ PV channel enable state	Used to display the current number of PV input channels open	
⑧ Work Mode	Displays the current operating mode of the inverter, the specific operating mode is described in previously	
⑨ Master-slave state		

	slave	Used to connect multiple inverters in parallel, indicating whether the current inverter is in the master or slave position.

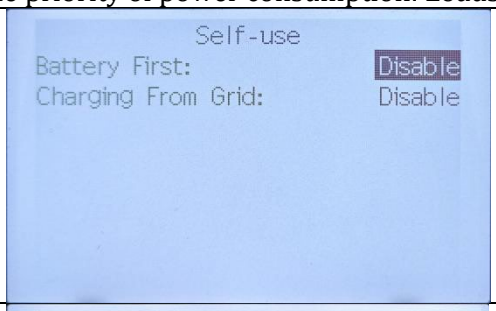
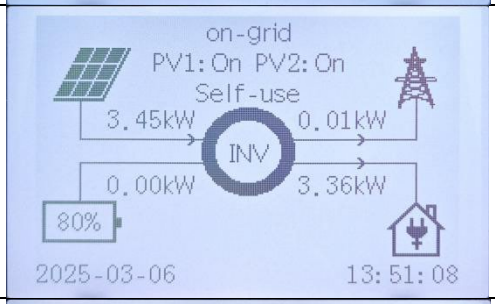
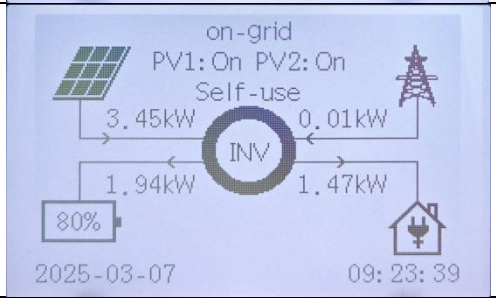
13.9. Work modes

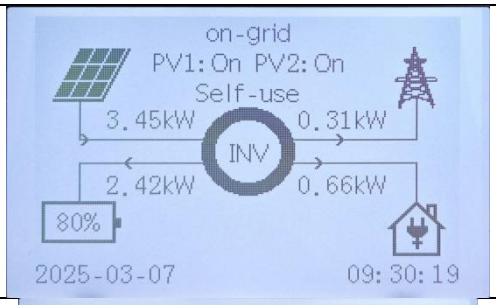
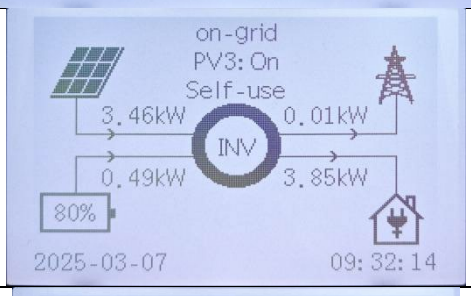
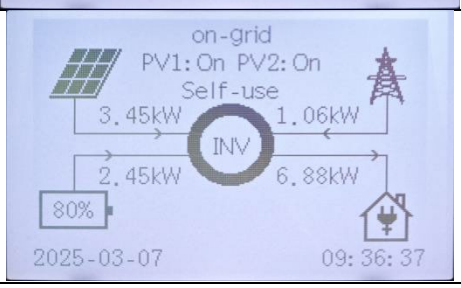
The AZZURRO 3PH HYD 5000...12000 ZP3 comes with several integrated energy management modes.

13.10. Self-use Mode

In the Self-use mode, the inverter will automatically charge and discharge the battery according to the following rules:

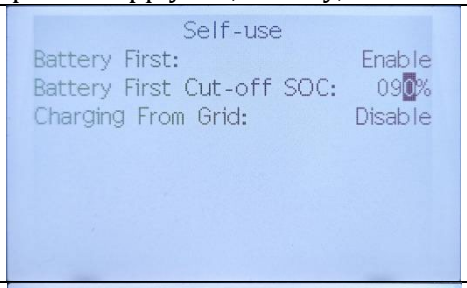
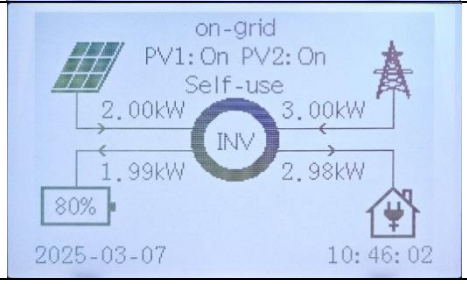
Setting Method 1: Battery First: Disabled; Charging From Grid: Disabled. The priority of power supply: PV, Battery, Grid. The priority of power consumption: Loads, Battery, Grid.

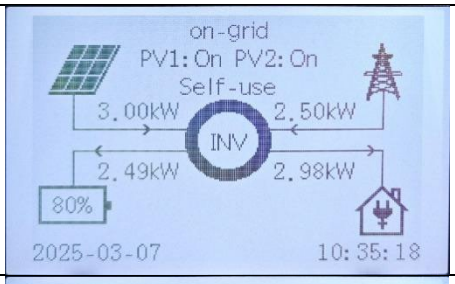
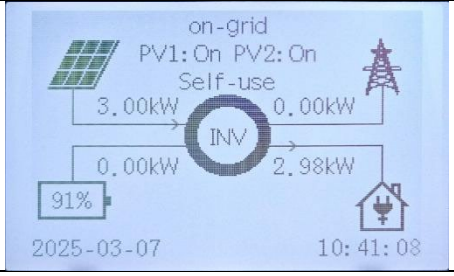
		**Set Self-use Mode 1**
		If PV generation equals the load consumption (ΔP < 100 W), the inverter won't charge or discharge the battery
		If PV generation is larger than the load consumption, the surplus power is stored in the battery

		If the battery is full or at maximum charging power, the excess power will be exported to the grid
		If the PV generation is less than the load consumption, it will discharge the battery to supply power to the load.
		If PV generation plus Battery discharge power is less than the load, the inverter will import power from the grid.

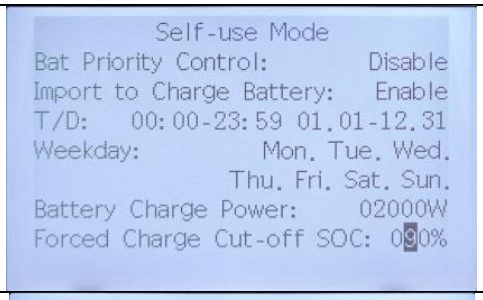
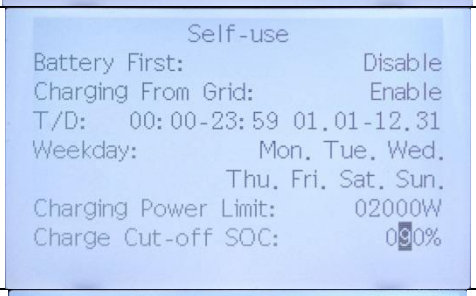
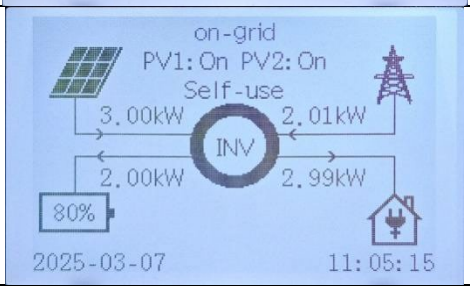
If it is not allowed to export power to the grid, an energy meter and/or CT needs to be installed, and the "feed-in limitation" function needs to be enabled.

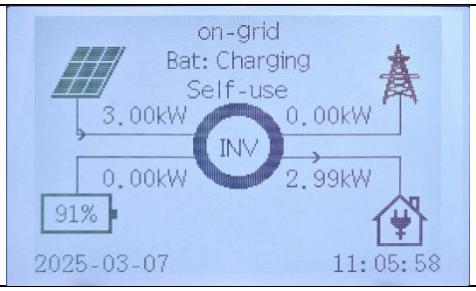
Setting Method 2: Battery First : Enabled, Battery First Cut-off SOC : 90%; Charging From Grid: Disabled. The priority of power supply: PV, Battery, Grid. The priority of power consumption: Loads, Battery, Grid.

		**Set Self-use Mode 2**
		If the PV power is less than or equal to the battery charging power and the battery SOC is less than 90%, the inverter prioritizes charging the battery and the grid supplies power to the household loads.

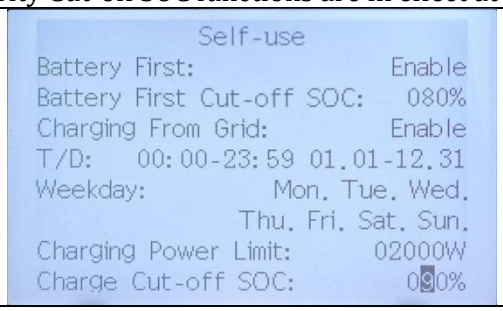
		If the PV generation power is greater than the battery charging power and the battery SOC is less than 90%, the inverter prioritizes charging the batteries, and the remaining energy generated by the PV power is used with the grid to power the household loads.
		If the batteries continue to charge and and the battery SOC reaches 90%, the inverter stops charging the batteries and all of the energy generated by the PV power is supplied to the household loads.

Setting Method 3: Battery First : Disabled; Charging From Grid : Enabled. When the inlet battery charging enable is turned on, the user can set the amount of specific charging time range, the maximum battery charging power, and the maximum cut-off SOC for charging through the LCD.

		**Setting Method 3**
		If the PV power is less than the battery charging power and the battery SOC is less than 90%, the inverter gives priority to charging the battery while taking power from the grid to charge the battery, and the load power is provided by the grid.
		If the PV generation power is greater than the battery charging power and the battery SOC is less than 90%, the inverter prioritizes charging the batteries, and the remaining energy generated by the PV power is used with the grid to power the household loads.

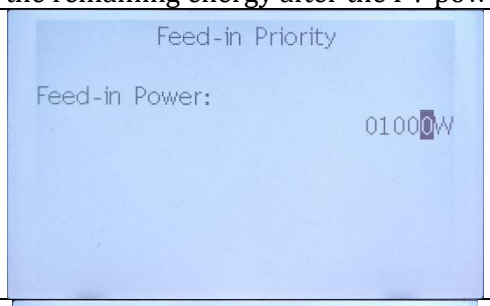
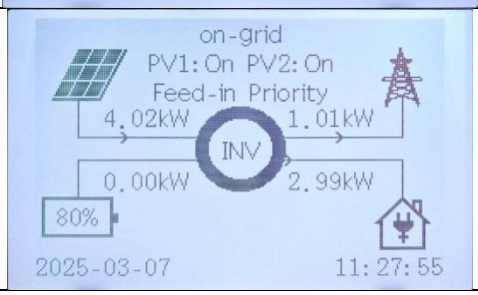
		If the batteries continue to charge and the battery SOC reaches 90%, the inverter stops charging the batteries and all of the energy generated by the PV power is supplied to the household loads.

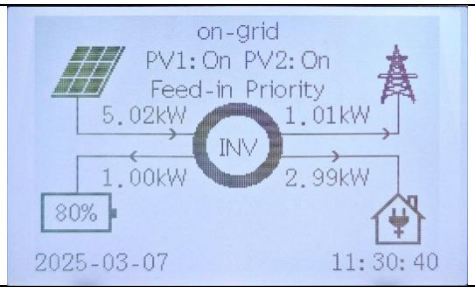
Setting Method 4: Battery First: Enabled; Charging From Grid: Enabled. In this mode, the Bat Priority Control and Bat Priority Cut-off SOC functions are in effect at the same time, see Setting Method2, 3 for details.

		**Setting Method 4**

13.11. Feed-in Priority Mode

With the Priority Feed-in Mode, In this mode, the user can set the maximum feeder power, which is used to generate the remaining energy after the PV power meets the load consumption.

		**Feed-in Priority**
		In this mode, the user can set the maximum feeder power, when the PV power minus the load consumption power is less than or equal to the feeder power (for example, 1KW), the excess energy generated by the PV power generation is delivered to the grid.

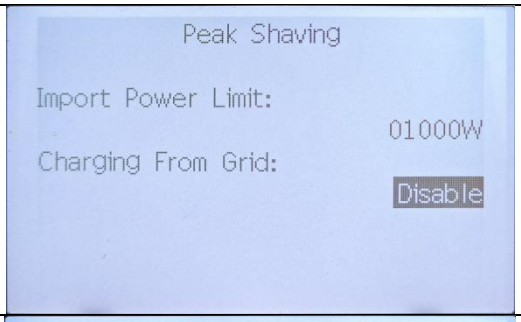
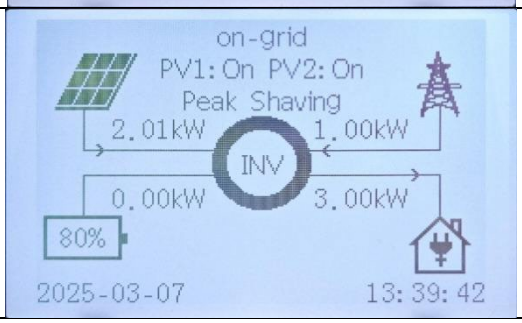
		In this mode, the user can set the maximum feeder power, when the PV power minus the load consumption power is greater than the feeder power (for example, 1KW), the extra energy will be used to charge the battery.

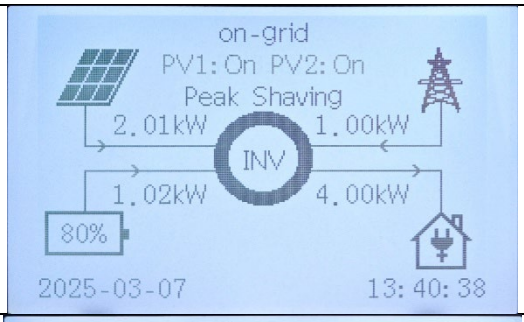
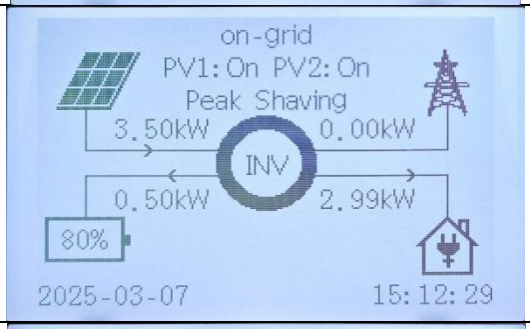
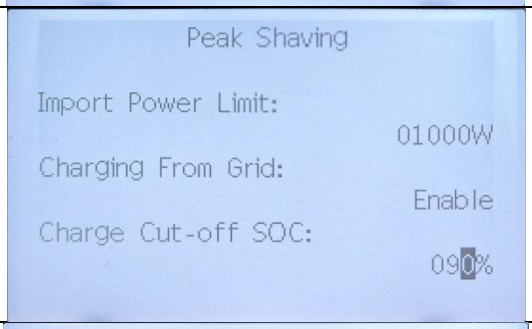
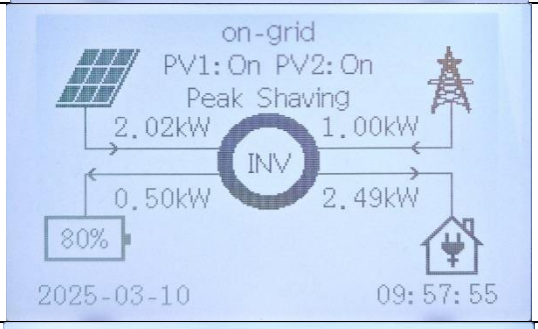
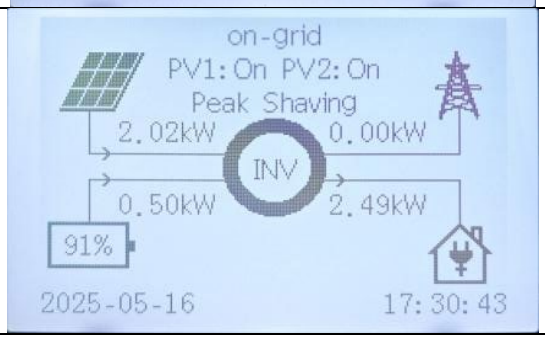
13.12. Peak Shaving Mode

Used to limit the maximum power priority purchased from the grid. The maximum purchasing power can be set in this mode. When the system preferentially buys more power from the grid than the set value, the battery starts discharging and stabilizes the system power at the set value.

Application:

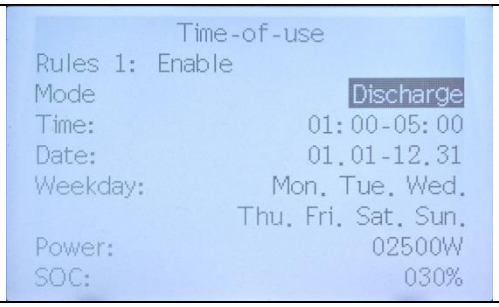
Peak Shaving Mode allows the grid to supply power to the load first. Applicable to the occasions where electricity price is charged according to electricity consumption and the occasions where the power grid is weak. In the weak grid situation, batteries start only when the load power exceeds a certain value, which reduces the maximum power of the connecting point and prolongs the battery life.

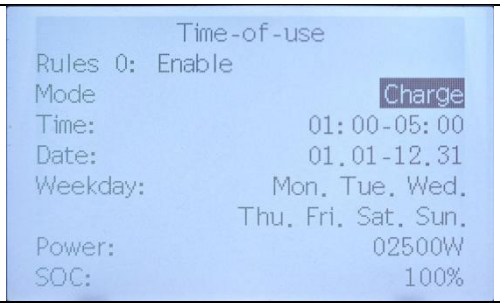
		**Charging From Grid：Disable**
		When the PV power is not enough to supply the load consumption, the grid starts to supply power to the load, and the maximum power taken from the grid does not exceed the Priority Import Power.

		When the PV power and Priority Import Power are also insufficient to supply the load consumption, the battery starts discharging to supply the load consumption at the same time.
		When the photovoltaic power generation is greater than the load consumption, the excess energy to charge the battery, when the battery SOC is greater than the set value, the excess energy flows to the power grid.
		**Charging From Grid : Enable**
		When "**Charging From Grid**" is enabled and there is not enough PV power to supply the load and the load consumes less than the Import Power Limit, the grid starts to supply power, which is less than then Import Power Limit setting.
		When the battery SOC is greater than the set value, the battery and the PV supply power to the load at the same time.

13.13. Time-of-use Mode

With the Timing Mode you can define fixed times of the day to charge or discharge the battery with a certain power.





Up to 4 rules (rule 0, 1, 2 and 3) can be set. If more than one rule is valid for any given time, the rule with the lower number is active. Each rule can be enabled or disabled, also charging and discharging period for a rule can be enabled separately.

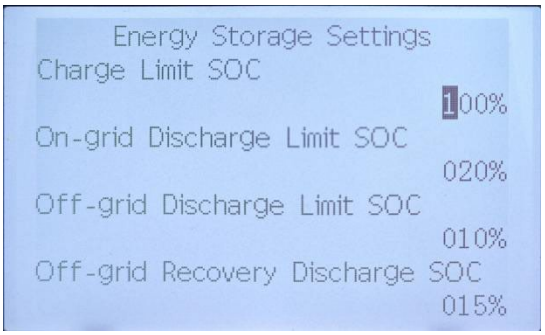
In the above example, Rule 0 :the battery will be charged with 2.5 kW between 1 and 5 o'clock at night, and Rule1: discharged with 2.5 kW between 1 and 5 o'clock . In case of conflict between Rule 0 and Rule 1, Rule 0 takes precedence.

13.14. Passive Mode

The passive mode is used in systems with external energy management systems. The inverter's operation will be controlled by the external controller using the Modbus RTU protocol. Please contact Zucchetti Centro Sistemi Spa if you need the Modbus protocol definition for this device. The LCD screen can only be set to turn on and off in passive mode.

13.15. Energy Storage Setting

In this interface the user can set four battery charging and discharging states, Charge Limit SOC, On-grid Discharge Limit SOC, Off-grid Discharge Limit SOC, Off-grid Recovery Discharge SOC.



13.16. Menu structure

Press the button to bring up the main menu.

13.17. Main menu

In the main interface, press “Back” to enter the main menu. The main menu has the following five options:

Main Menu	Press “ ”
“Up” ↑	1.System Information
	2.Real-time Information
	3.Event List
	4.Energy Statistic
“Down” ↓	5.System Settings

	6.Advanced Settings
	7.Firmware Update

The menu layout may vary according to different firmware versions.

13.18. "System Information" menu

1. Inverter Information	
Inverter **Information** (1)	Serial number, Rated Power, Firmware Version, Grid Code
Inverter **Information** (2)	Bat Channel, PV Channel 1, PV Channel 2, PV Channel 3
Inverter **Information** (3)	Work Mode, RS485 Address, Backup, IV Curve Scan
Inverter **Information** (4)	Logic Interface, Power Factor, Feed-in Limit, Insulation Resistance
Inverter **Information** (5)	Parallel, Automatic Battery Active, Unbalanced Support
Inverter **Information** (6)	Safety Parameter
Inverter **Information** (7)	Safety Parameter
2. Battery Information	
Battery Information(1)	Battery Type, Max. Charge Current, Max. Discharge Curr.
Battery Information(2)	Charge Limit SOC, On-grid Discharge Limit SOC, Off-grid Discharge Limit SOC, Off-grid Recovery Discharge SOC
Battery Information(3)	Serial number
Battery Information(4)	Firmware Version

13.19. "Real-time Information" menu

1. PV	
1.1 PV	PV1 Voltage、PV1 Current、PV1 Power、PV2 Voltage、PV2 Current、PV2 Power
1.2 PV	PV3 Voltage、PV3 Current、PV3 Power、External PV Power
2. Battery	
2.1Battery Port Info	Battery Type, Max. Charge Current, Max. Discharge Curr.
2.2Battery real info	Charge Limit SOC, On-grid Discharge Limit SOC, Off-grid Discharge Limit SOC, Off-grid Recovery Discharge SOC
3.Grid	Voltage R、Voltage S、Voltage T、Power R、Power S、Power T、Frequency
4.Backup	Voltage R、Voltage S、Voltage T、Power R、Power S、Power T
5.Normal Load	Power
6.Total Load	Power
7.EV Charger Info	
7.1 EV Charger Info1	Charger Status、Power、Total Energy、Error Code

7.2 EV Charger Info2	Voltage R、Voltage S、Voltage T、Current R、Current S、Current T

13.20. “Event List” menu

The event list is used to display the real time event recordings, including the total number of events and each specific ID no. and event time. The most recent events are listed at the top.

Event list	
1、Current EventList	Show latest event
2、History EventList	Show event history
Fault information	001 ID04 (Display of the event sequence number, event ID number and time that the event takes place. Press <Enter> to toggle between event name and trigger time.)

13.21. “Energy Statistics” menu

In this menu, you can view the PV, battery, load, and grid energy usage status of different channels in real time and different years, months and days.

Today	Press Down button to move between items Shows PV, Load, Export, Import, Charge, Discharge Energy (kWh) for the selected period
Month	
Year	
Lifetime	

13.22. “System Settings” menu

In this menu you can do the basic settings which are needed to operate the device.

1. Language	Sets the display language
2. Date & Time	Sets the date and time of the inverter
3. Grid Code	Sets the country and grid code
4. Device Port Management	Sets the parameters about PV port, Battery port, Grid port, Backup port.
4.1 PV	Set PV port.
4.1.1 PV1	Set PV input: Select 'PV' for photovoltaic scenarios, otherwise set to disabled.
4.1.2 PV2	
4.1.3 PV3	

4.2 Bat	Set battery port: Select 'BTS 5K' for battery operation scenarios, otherwise set to disabled.
4.3 Grid	Set grid port mode to grid connection or generator connection
4.3.1 Grid	Set grid port mode to grid-connected.
4.3.2 Gen	Set grid port mode to generator.
4.3.2.1 Manual	Set the generator to manual mode, then configure its rated power.
4.3.2.1 Auto	Set generator to auto mode with start/stop SOC and rated power.
4.4 Backup	Enable / disable the off-grid mode. It is only available if a battery is connected
5. Work Mode	Sets the work mode and energy storage setting
5.1 Work Mode	Select between Self-use(Standard), Feed-in Priority, Peak Shaving, Time-of-use, Passive. See “Storage Modes” chapter for details.
5.2 Energy Storage Settings	Sets Charge Limit SOC, On-grid Discharge Limit SOC, Off-grid Discharge Limit SOC, Off-grid Recovery Discharge SOC.
6. Auto test	Selection of Italian rapid and standardized tests for functional verification.
7. RS485 Communication	Enter the Modbus address (when several inverters require simultaneous monitoring), standard: 01 Baud Rate: The default baud rate is 9600
8. EV Charger	Setting up the different operating modes of the EV Charger.
8.1 Charge Now	Sets EV Charger Control, Charging Current, Charging From Battery.
8.2 Scheduled	Sets different rules, Charing Start Time, Charing End Time, Charging Current, Charging From Battery.
8.3 ECO Mode	Sets Charging From Battery.

13.23. “Advanced Settings” menu

Password: Several settings require a password to be entered (the standard password is 0715/0001).

In this menu you can do advanced settings.

1. Battery	
1.1 SOC Calibration	Enable / Disable. When the ZBT-5K battery is connected, if "SOC Calibration" is enabled, the inverter will forcibly charge until it is fully charged once a month.
1.2 Battery Active	Sets Auto Active Control and Force Active. (Only available for ZBT battery type.)

1.2.1 Auto Active	Enable / Disable. If Automatic activation is enabled, the inverter will activate the battery when the inverter need to discharge or charge the battery according to the operational mode settings. If automatic activation is disabled, the battery has to be activated manually by selection the "Manual Active" menu item.
1.2.2 Manual Active	Select "Manual Active" to activate a battery from standby mode.
2. Feed-in Limit Control	Activates or deactivates the feed-in power function of the inverter and sets the maximum feed-in power. This function must be used together with an external current transformer or the smart meter. Details regarding this can be found in the "Communications interfaces" chapter of this manual.
2.1Feed-in Limitation Mode	Disable: Do not use this function Three phase Sum limit: the sum of all phases is regulated (balancing counting as is common in Germany). Feed-in Limitation: the power of the feeding-in phases is limited.
2.2Feed-in Limit Power	Set the power size of the inverter flowing to the grid, when detecting a current flowing to the grid (reverse current), reduce the output power of the inverter, so that the power flowing from the inverter to the grid is always connected to a state smaller than the set value, so as to realize the anti-reverse current and not to send the excess power to the grid.
3. IV Curve Scan	(Only set with PV channel.) Cyclical scanning of the IV curve in order to find the global point of the maximum output. Advisable in the case of shaded solar generators
3.1 Scan Control	Enable / disable IV curve scan function
3.2 Scan Period	Set scan period in minutes
3.3 Manual Scan	Manually start IV curve scanning
4. Logic interface	Activates or deactivates logical interfaces. Details regarding this can be found in the "Communications interfaces" chapter of this manual
5. Restore Factory Settings	Resets stored data in the inverter
5.1 Clear energy Data	Clears total power production
5.2 Clear Events	Clears historical events
5.3 Reset Settings	Restore parameters to factory default settings.
6. Parallel setting	Defines configuration for parallel inverter operation (Master/Slave)
6.1 Parallel Control	For inverters connected with Link port to each other, you set Parallel Control to "Enable"
6.2 Master-Slave	One Inverter need to be set as Master, all other inverters need to be set to Slave.

6.3 Parallel Address	Set each inverter with an individual parallel address. (It is an independent number from Modbus ID)
7. Switch On / Off	The inverter can be switched on, switched off, set to standby or set to normal operating mode, which can be useful for installation or maintenance work
8. Unbalanced Support	Default setting: disabled In situations where the customer only wants to support the local loads or has a zero-export limit across all three phases. When used in conjunction with the supplied three-phase energy meter and with this option set to "enable", the per phase output current of the inverter will respond independently. Important: for this function to operate properly, the phase on the energy meter must correlate to the corresponding phase when it is wired into the inverter.
9. PCC Import Limit	PCC Import Limit Control: Control whether the PCC power control function is enabled. PCC Import Limit Power: Power upper limit, that is, the maximum power that can be purchased from the PCC. (When the load is greater than the maximum power purchased from the PCC, the load power priority is higher to meet the load power priority.)
10. Set PCC Power Offset	Calibration for PCC power calculation.
11. Backup GFCI	Activates RCD type B monitoring in off-grid mode (300 mA)
12. Neutral Point Grounding	When using off-grid mode, ensure that neutral ground is enabled. For Australia, South Africa, and New Zealand, neutral ground is turned off by default, refer to 5.3 System Overview
13. E-STOP	Enable / disable Emergency Power Off function
14. SG Ready	Timed control mode: set the start time and stop time, turn on the smart load within the start time range and turn off the smart load outside the start time range. Intelligent control mode: set the start time and stop time in the start time range, generating power - ordinary load power > 500W (hysteresis loop parameter reservation can be set), after 1 minute to turn on the intelligent load; generating power - ordinary load power < 0W, after 5 seconds to turn off the intelligent load.
15. ATS/12V Control	(The inverter is not allowed to set for the slave machine.)
15.1 Disable	No use this function
15.2 Generator Control	Can start and stop a generator
15.3 Off-grid: 12V Turn On	In off-grid mode, the dry contact interface will output a 12V signal; otherwise, the output is disabled.
15.4 Off-grid: 12V Turn Off	In off-grid mode, the output is disabled; otherwise, the dry contact interface will output a 12V signal.
16. PCC Meter/CT	Enable / disable PCC Meter/CT function

The inverter (Available from hardware version V003) has built-in relays to control the short circuit of the load N line to ground when off-grid.

When the inverter is off-grid and the load N line and PE line are short-connected, if the power grid is restored and the load N line and PE line are still short-connected, leakage protection will be triggered and explosion hazard will not be caused.

13.24. Feed-in limitation function

The feed-in limitation function can be used to limit the power feed back into the grid. For this function, a power measurement device must be installed according to system A, B, or C.

Feed-in limitation: The sum of the feeding-in phases must not exceed the set power limitation value. The power of phases drawing power from the grid is disregarded here.

3-phase limit: The sum of the feed-in power of all three phases must not exceed the set power limit value. This setting is suitable for balancing metering, as is common in Germany, for example.

For the 3-phase limit setting, the current sensors must be correctly assigned to phases L1, L2 and L3 on the electricity meter!

If communication with the smart meter is interrupted, the inverter limits its output power to the set power limit value.

13.25. Safety Parameter.

User can modify the Safety Parameter. of the machine through the USB flash disk, and the user needs to copy the parameter information that needs to be modified into the USB flash disk card in advance.

13.26. BACKUP Output

Enable the BACKUP to ensure that the backup can output normally.

4. Device Port Management	4. BACKUP	Disable
		Enable

When the BACKUP is enabled and Grid is abnormal, the BACKUP port will activate emergency power supply.

13.27. Self-test

Select “7. Self-test”, press “OK” to enter the self-test interface.

Self-test	
“Up” ↑	1. Fast self-test
	2. STD Self-test
“Down” ↓	3. Set QF time
	3. Set QV time
	5. Control 81.S1

1) Fast self-test

Select “1. Fast self-test,” then press “OK” to start the fast self-test.

Start Self-Test	
↓	Press “OK” to start
Testing 59.S1...	
↓	Wait
Test 59.S1 OK!	
↓	Wait
Testing 59.S2...	
↓	Wait
Test 59.S2 OK!	
↓	Wait
Testing 27.S1...	
↓	Wait
Test 27.S1 OK!	
↓	Wait
Testing 27.S2...	
↓	Wait
Test 27.S2 OK!	
↓	Wait
Testing 81>S1...	
↓	Wait
Test 81>S1 OK!	
↓	Wait
Testing 81>S2...	
↓	Wait
Test 81>S2 OK!	
↓	Wait
Testing 81<S1...	
↓	Wait
Test 81<S1 OK!	
↓	Wait
Testing 81<S2...	
↓	Wait
Test 81<S2 OK!	
↓	Press “OK”
OK self-test!	

↓	Press “Down”
59.S1 threshold 253V 900ms	
↓	Press “Down”
59.S1: 228V 902ms	
↓	Press “Down”
59.S2 threshold 264.5V 200ms	
↓	Press “Down”
59.S2: 229V 204ms	
↓	Press “Down”
27.S1 threshold 195.5V 400ms	

2) STD self-test

Select “2. STD self-test,” then press “OK” to start the STD self-test. The test procedure is the same as the Fast Self-Test, but much longer.

3) PF Time Setting

Select “3. PF Time Setting”, then press “OK”. The following will appear on the screen:

Set: ***.** *** s

Press “Up” or “Down” to change the first digit, press “OK” to move to the next digit. After changing all the digits, press “OK”.

4) QV Time Setting

Select “4. QV Time Setting”, then press “OK”. The following will appear on the screen:

Set: ** s

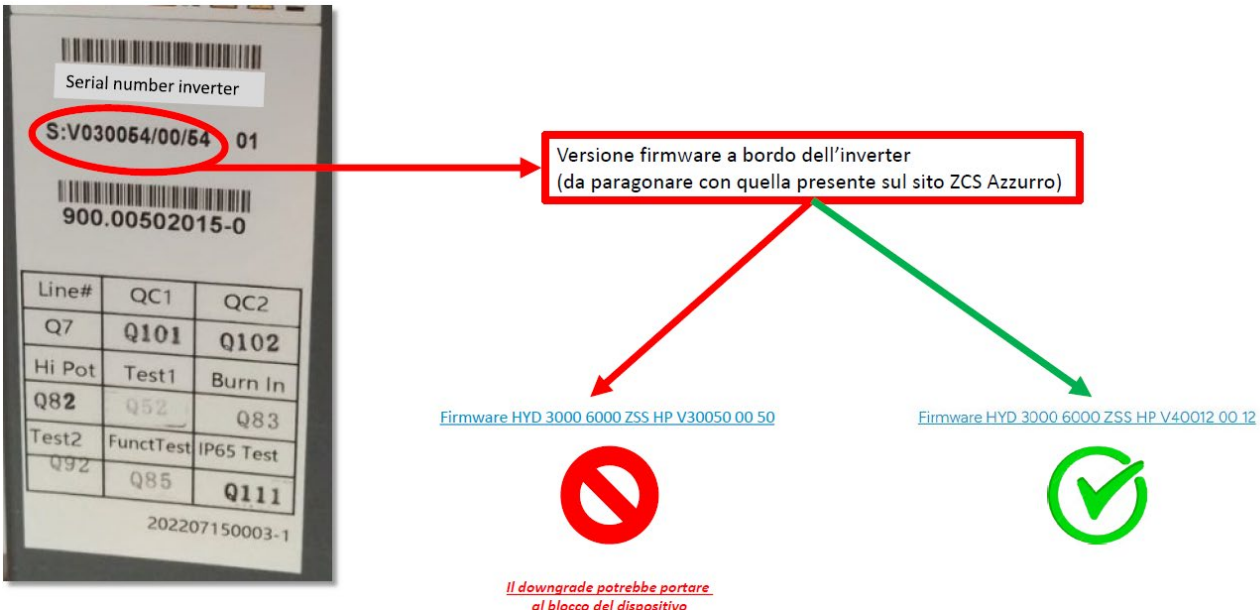
Press “Up” or “Down” to change the first digit, press “OK” to move to the next digit. After changing all the digits, press “OK”.

5) Control 81.S1

Select “5. Control 81.S1” and press “OK.” Press “Up” or “Down” to “Enable 81.S1” or “Disable 81.S1”, press “OK.”

13.28. “Firmware Update” menu

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.
3PH HYD5000-12000-ZP3 inverters must be upgraded using an 8 GB USB stick.
3PH HYD5000-12000-ZP3 inverters offer software upgrade via USB flash drive to maximize inverter performance and avoid inverter operation error caused by software bugs.
When you do a firmware update, please upgrade with PV input or grid status, the update will fail if only the battery is connected.

Step 1: Insert the USB flash drive into the computer.

Step 2: Inside the website www.zcsazzurro.com you will find the latest version of the software to carry out the update. Unzip the file and copy the original file to a USB stick. Attention: The firmware update file must be in the “firmware” sub-folder!

Step 3: Press the "Back" on the main interface to enter the main menu page, and select "6.Advanced Settings - Switch On/Off -Switch Off". Make the inverter shut down safely.

Step 4: Insert the USB flash drive into the USB interface of the inverter.

Step 5: Go to menu item "7.Software update" on the LCD display.

Step 6: Enter the password (the standard password is 0715) and then select "Inverter" or "Battery".

Step 7: The system will then sequentially update all parts.

Step 8: If the following errors occur, please upgrade again. If this continues many times, contact technical support for help.

USB Fault	Copy File Failed	Failed

Step 9: After the update is complete, Go to menu item "Advanced Settings - Switch On/Off - Switch On" to make the inverter start up and run.

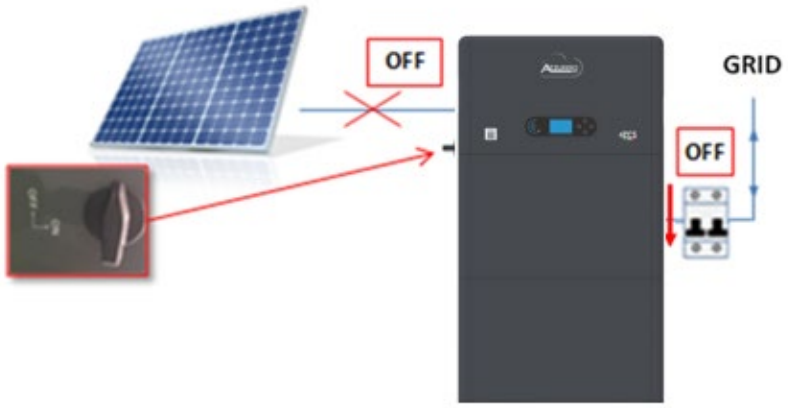
Step 10: You can check the current firmware version in item "1.Inverter Information" of the System Information menu.

13.29. Verification of proper functioning

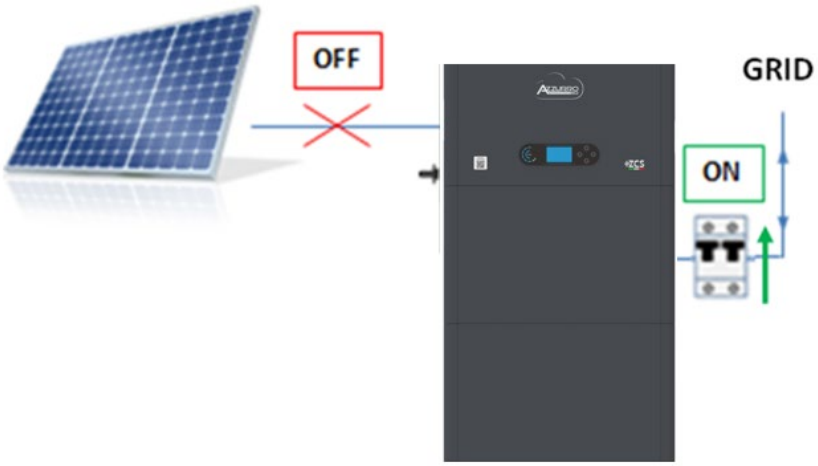
To check the proper functioning of the inverter, follow these steps:

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

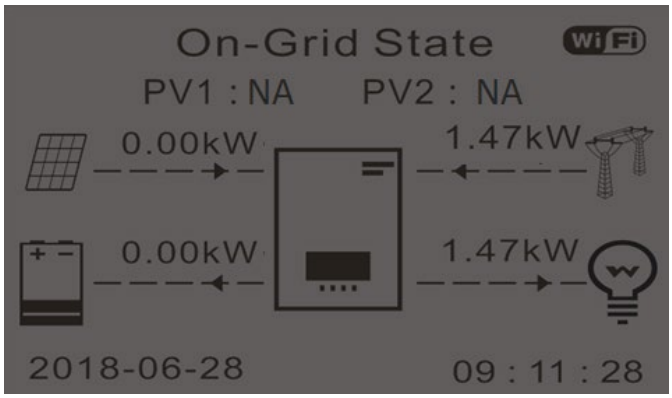
b) Lower the protection switch of the 3PH HYD5000-12000-ZP3 inverter. The inverter will remain switched on but will go into error due to a lack of AC power (if the EPS function is enabled, it will feed the priority loads).



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



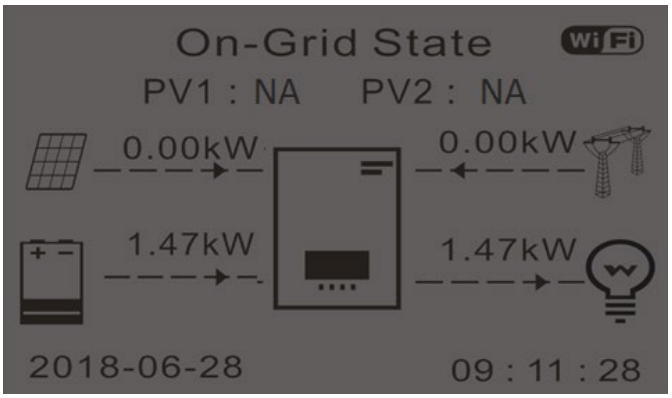
2. After pulling up the AC switch, the countdown will start according to the country code set (for CEI021-Internal, it will be 300s) to reconnect to the grid. During this period, check that the household loads are only powered by the grid and that there are no other power flows from either the photovoltaic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



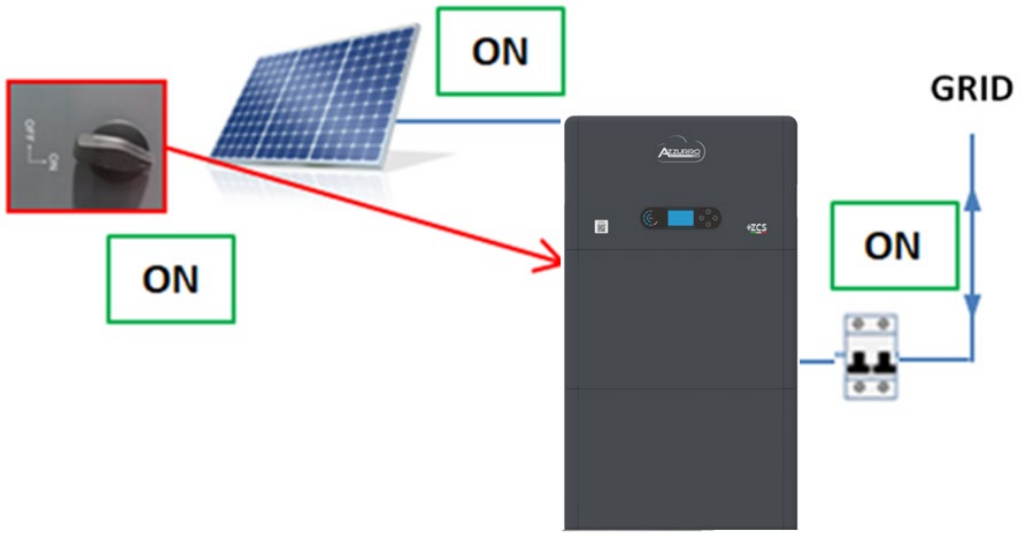
2. Once the countdown is over, the batteries will start to deliver power according to the availability towards the utility, trying to reset the consumption from the grid. During this period, check that the

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 photovoltaic system by turning the switch to the ON position.

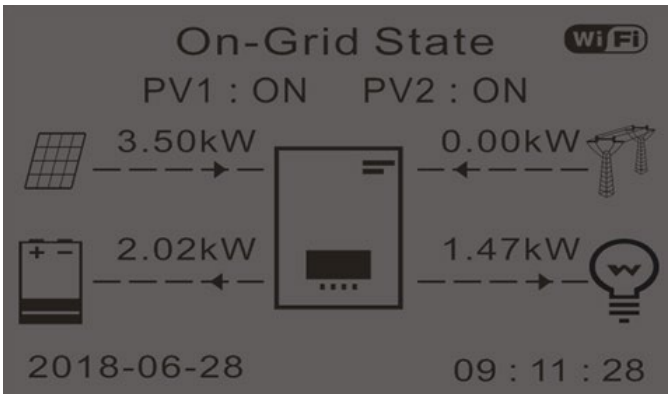


6. Once the photovoltaic system has been activated, check that:

   a. The value of consumption shown on the screen remains <u>constant</u> 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 and the direction by consulting the correct installation and initial start-up procedures.

14. Technical specifications

The following parameters may change without notice, please refer to the user manual and Datasheet on our website.

14.1. AZZURRO 3PH HYD 5000- 8000 ZP3

Model	AZZURRO 3PH HYD 5000 ZP3	AZZURRO 3PH HYD 6000 ZP3	AZZURRO 3PH HYD 6500 ZP3	AZZURRO 3PH HYD 8000 ZP3
PV Input				
Recommended Max. PV Power	10 kWp	12kWp	13kWp	16 kWp
Max. Input Voltage	1000 Vd.c.			
Start-up Voltage[1]	200 Vd.c.			
Rated Input Voltage	600 Vd.c.			
MPP Voltage Range	160-950 Vd.c.			
Number of MPPT	3			
Max. Number of Input Strings per MPPT	1/1/1			
Max. Input Current	20/20/20 A			
Max. Isc	25/25/25 A			
Battery				
Voltage Range	350-435 Vd.c.			
Number of Battery Input Channels	1			
Max. Charging Power[3]	10 kW			
Max. Discharging Power	5 kW	6 kW	6.5 kW	8 kW
Max. Charging Current	25 A			
Max. Discharging Current	15 A	18A	19.5A	24 A
Battery Type[2]	Lithium-ion			
BMS Communication	CAN			
AC Backup				
Rated Output Voltage	3N~+PE,380/400/415 Va.c.			
Rated Output Frequency	50/60 Hz			
Rated Output Power	5 kW	6 kW	6.5 kW	8 kW
Rated Output Current	7.6/7.2/6.9 A	9.1/8.7/8.3 A	9.9/9.4/9.0 A	12.1/11.6/11.1 A
Rated Apparent Power	5 kVA	6 kVA	6.5 kVA	8 kVA
Max. Apparent Power	5.5 kVA	6.6 kVA	7.15 kVA	8.8 kVA
Max. Output Current	8.3/8.0/7.6 A	10.0/9.6/9.2 A	10.9/10.3/9.9 A	13.3/12.8/12.2 A
Peak Output Apparent Power[3]	2 times of rated power, 10s			
THDv(@ linear load)	<3%			
Switching Time	10 ms default			
Asymmetric load	Yes, Supports 100% three-phase unbalanced load			
AC Grid				
Rated Voltage	3(N)~+PE,380/400/415 Va.c.			
Rated Frequency	50/60 Hz			
Rated Output Power	5 kW	6 kW	6.5 kW	8 kW

Model	AZZURRO 3PH HYD 5000 ZP3	AZZURRO 3PH HYD 6000 ZP3	AZZURRO 3PH HYD 6500 ZP3	AZZURRO 3PH HYD 8000 ZP3
Rated Output Current	7.6/7.2/6.9 A	9.1/8.7/8.3 A	9.9/9.4/9.0 A	12.1/11.6/11.1 A
Rated Apparent Power	5 kVA	6 kVA	6.5 kVA	8 kVA
Max. Apparent Power	5.5 kVA	6.6 kVA	7.15 kVA	8.8 kVA
Max. Output Current	8.3/8.0/7.6 A	10.0/9.6/9.2 A	10.9/10.3/9.9 A	13.3/12.8/12.2 A
Max. Input Current	15.2/14.5/13.9 A	18.2/17.4/16.7 A	19.8/18.8/18.1 A	24.2/23.2/22.2 A
THDi	<3%			
Power Factor Range	0.8 lagging-0.8 leading			
Efficiency				
Max. MPPT Efficiency	99.9%			
Max. Efficiency	98.0%	98.0%	98.0%	98.0%
European Efficiency	97.0%	97.0%	97.0%	97.0%
Max. Efficiency of Charging/Discharging[4]	97.6%	97.6%	97.6%	97.6%
Protection				
DC Switch	Yes			
PV Reverse Connection Protection	Yes			
Battery Reverse Connection Protection	Yes			
Output Short Circuit Protection	Yes			
Output Overcurrent Protection	Yes			
Output Overvoltage Protection	Yes			
Insulation Impedance Detection	Yes			
Residual Current Detection	Yes			
Anti-island Protection	Yes			
Surge Protection[5]	PV:Type II, AC:Type II			
General Parameter				
Inverter Topology	Non-Isolation			
Protective Class	Class I			
IP Rating	IP66			
Overvoltage Category	AC III, DC II			
Operating Temperature Range	-30°C to +60°C (derating above +45°C)			
Relative Humidity Range	5%-95%			
Max. Operating Altitude	4000 m (derating above 2000 m)			
Standby Self-consumption[6]	<10 W			
Installation Method	Wall Mounted			
Dimensions(W*H*D)	708*440*170 mm			
Cooling Mode	Natural			
Weight	30 kg			
Communication	RS485,Optional:WiFi/4G/LAN			
Display	LCD & APP			

14.2. AZZURRO 3PH HYD 9900-12000 ZP3

Model	AZZURRO 3PH HYD 9900 ZP3	AZZURRO 3PH HYD 10000 ZP3	AZZURRO 3PH HYD 12000 ZP3
PV Input			
Recommended Max. PV Power	20 kWp	20 kWp	24 kWp
Max. Input Voltage	1000 Vd.c.		
Start-up Voltage[1]	200 Vd.c.		
Rated Input Voltage	600 Vd.c.		
MPP Voltage Range	160-950 Vd.c.		
Number of MPPT	3		
Max. Number of Input Strings per MPPT	1/1/1		
Max. Input Current	20/20/20 A		
Max. Isc	25/25/25 A		
Battery			
Voltage Range	350-435 Vd.c.		
Number of Battery Input Channels	1		
Max. Charging Power[3]	10 kW		
Max. Discharging Power	9.9 kW	10 kW	10 kW
Max. Charging Current	25 A		
Max. Discharging Current	29.7 A	30 A	30 A
Battery Type[2]	Lithium-ion		
BMS Communication	CAN		
AC Backup			
Rated Output Voltage	3N~+PE,380/400/415 Va.c.		
Rated Output Frequency	50/60 Hz		
Rated Output Power	9.9 kW	10 kW	12 kW
Rated Output Current	15.0/14.3/13.8 A	15.2/14.5/13.9 A	18.2/17.4/16.7 A
Rated Apparent Power	9.9 kVA	10 kVA	12 kVA
Max. Apparent Power	9.9 kVA	11 kVA	13.2 kVA
Max. Output Current	15.0/14.3/13.8 A	16.7/15.9/15.3 A	20.0/19.1/18.3 A
Peak Output Apparent Power[3]	2 times of rated power, 10s		
THDv(@ linear load)	<3%		
Switching Time	10 ms default		
Asymmetric load	Yes, Supports 100% three-phase unbalanced load		
AC Grid			
Rated Voltage	3(N)~+PE,380/400/415 Va.c.		
Rated Frequency	50/60 Hz		
Rated Output Power	9.9 kW	10 kW	12 kW
Rated Output Current	15.0/14.3/13.8 A	15.2/14.5/13.9 A	18.2/17.4/16.7 A
Rated Apparent Power	9.9 kVA	10 kVA	12 kVA
Max. Apparent Power	9.9 kVA	11 kVA	13.2 kVA
Max. Output Current	15.0/14.3/13.8 A	16.7/15.9/15.3 A	20.0/19.1/18.3 A

Model	AZZURRO 3PH HYD 9900 ZP3	AZZURRO 3PH HYD 10000 ZP3	AZZURRO 3PH HYD 12000 ZP3
Max. Input Current	30.3/29.0/27.8 A	30.3/29.0/27.8 A	33.3/31.9/30.6 A
THDi	<3%		
Power Factor Range	0.8 lagging-0.8 leading		
Efficiency			
Max. MPPT Efficiency	99.9%		
Max. Efficiency	98.2%	98.2%	98.2%
European Efficiency	97.5%	97.5%	97.5%
Max. Efficiency of Charging/Discharging[4]	97.8%	97.8%	97.8%
Protection			
DC Switch	Yes		
PV Reverse Connection Protection	Yes		
Battery Reverse Connection Protection	Yes		
Output Short Circuit Protection	Yes		
Output Overcurrent Protection	Yes		
Output Overvoltage Protection	Yes		
Insulation Impedance Detection	Yes		
Residual Current Detection	Yes		
Anti-island Protection	Yes		
Surge Protection[5]	PV:Type II, AC:Type II		
General Parameter			
Inverter Topology	Non-Isolation		
Protective Class	Class I		
IP Rating	IP66		
Overvoltage Category	AC III, DC II		
Operating Temperature Range	-30°C to +60°C (derating above +45°C)		
Relative Humidity Range	5%-95%		
Max. Operating Altitude	4000 m (derating above 2000 m)		
Standby Self-consumption[6]	<10 W		
Installation Method	Wall Mounted		
Dimensions(W*H*D)	708*440*170 mm		
Cooling Mode	Natural		
Weight	30 kg		
Communication	RS485,Optional:WiFi/4G/LAN		
Display	LCD & APP		

[1] Minimum PV voltage to start MPPT operation.
[2] Please refer to document “Zucchetti Centro Sistemi Spa inverter Model compatible battery list”.
[3] Full battery and sun.
[4] Battery-AC maximum efficiency of battery charge and discharge.
[5] According to EN/IEC 61643-11.
[6] Standby loss at rated input voltage.

15. 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.**

This section contains information and procedures pertaining to the remedying of potential problems with the inverter.

To carry out troubleshooting, proceed as follows:

—Check the warnings, error messages or error codes displayed on the screen of the inverter.
—If no error information is displayed on the screen, check whether the following requirements have been fulfilled:
—Has the inverter been set up in a clean, dry, well-ventilated area?
—Is the DC switch set to ON?
—Are the cables sufficiently dimensioned and short enough?
—Are the input connections, output connections and the wiring all in good condition?
—Are the configuration settings for the relevant installation correct?
—Are the display field and the communication cables correctly connected and undamaged?

Follow the steps below to view recorded problems: Press “Back” to enter the main menu in the normal interface. In the interface screen select "Event List", then press “OK” to enter events.

To view the recorded fault information, perform the following steps: On the home screen, press "XXX" to enter the main menu. Select "Events" and press "XXXX" to enter.

15.1. Shutdown procedure

If the inverter needs to be shut down for electrical inspection, please follow the following steps:

1. Press the "Back" on the main interface to enter the main menu page, and select Advanced Settings - Switch On/Off - Switch Off. Make the inverter shut down safely.

After using the menu setting to shut down the inverter, the inverter should be checked and reenergising, it still needs to be on the main menu page. Select advanced Settings - Switch On/Off- Switch On. start up to enable the inverter to start up and run.

2. Disconnect the AC circuit breaker connecting the inverter power grid port to the power grid.
3. Disconnect the AC circuit breaker connecting the inverter power grid port to the power grid.
4. Disconnect the AC breaker connecting the inverter load port to the emergency load.
5. Disconnect the PV side DC switch.
6. Turn off the battery and disconnect the DC switch between the battery and the inverter.
7. Wait for 5 minutes before checking the inverter.

15.2. Earth fault alarm

This inverter is compliant with IEC 62109-2 Clause 13.9 and AS/NZS 5033 for earth fault protection.
If an earth fault alarm occurs, the error is displayed on the LCD screen, the red light illuminates and the error can be found in the error history log.
When the inverter is connected to the battery system, when the battery system has ground fault/leak alarm in accordance with AS/NZS 5139, the inverter will also alarm. The alarm method is the same as above.
In the case of devices equipped with a stick logger, the alarm information can be viewed on the monitoring portal and retrieved via the smartphone app.

15.3. Inverter error list

ID	Code Name	Description	Solution
001	GridOVP	The voltage of the power grid is too high	If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. Inverter will automatically return 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 yes, please check the AC circuit breaker and AC wiring of the inverter. If the grid voltage/frequency is NOT within the acceptable range and AC wiring is correct, but the alarm occurs repeatedly, contact 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.
002	GridUVP	The voltage of the mains is too low	
003	GridOFP	The mains frequency is too high	
004	GridUFP	The mains frequency is too low	
005	GFCI	Charge Leakage Fault	Check for inverter and wiring.
008	IslandFault	Island protection fault	If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. Inverter will automatically return 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 yes, please check the AC circuit breaker and AC wiring of the inverter. If the grid voltage/frequency is NOT within the acceptable range and AC wiring is correct, but the alarm occurs repeatedly, contact 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.
009 - 010	GridOVPInstant1/2	Transient overvoltage of mains voltage 1/2	
011	VGridLineFault	Power grid line voltage error	
012	InvVoltFault	Inverter overvoltage	Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved. If no, please contact technical support.
013	RefluxFault	Feed-in Limit function is faulty	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
032	N-PE fault	Neutral ground fault	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support. Internal faults of inverter. Switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved. If no, please contact technical support.
033	SpiCommFault(DC)	SPI communication is fault (DC)	
034	SpiCommFault(AC)	SPI communication is fault (AC)	
038	InvSoftStartFail	Inverter failed to output	

ID	Code Name	Description	Solution
039	ArcShutdownAlarm	Arc shutdown protection	
040	LowLightChkFail	Low light detection failed	
041	RelayFail	Relay detection failure	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
042	IsoFault	Insulation resistance is too low	Check the insulation resistance between the photovoltaic array and ground (ground), if there is a short circuit, the fault should be repaired in time.
043	PEConnectFault	Earth fault	Check the PE conductor for function
044	InputConfigError	Incorrect input mode configuration	Check the input mode (parallel/independent mode) Settings for the inverter. If not, change the input mode.
045	CTDisconnect	CT error	Check that the wiring of the current transformer is correct.
046	ReversalConnect	The PV is connected reversedly	Check whether the PV wiring is correct.
047	ParallelFault	Master does not exist or is duplicate	Check the parallel mode settings for the inverter. Check whether the wiring is correct.
049	TempErrBat	Battery temperature error	For Inner BMS battery, make sure that the battery NTC cable is properly connected. Make sure the inverter is installed where there is no direct sunlight. Please ensure that the inverter is installed in a cool/ well-ventilated place. Ensure the inverter is installed vertically and the ambient temperature is below the inverter temperature limit.
050 - 055	TempErrHeatSink1-6	Temperature error heat sink 1-6	For AC inverter, make sure that the inverter NTC cable is properly connected. Make sure the inverter is installed where there is no direct sunlight or other heat source Please ensure that the inverter is installed in a cool/ well-ventilated place. Ensure the inverter is installed vertically and the ambient temperature is below the inverter temperature limit.
057 - 058	TempErrEnv1/2	Temperature error ambient temperature 1/2	
059 - 061	TempErrInv1-3	Module 1-3 Temperature protection	
065	BusRmsUnbalance	Asymmetrical bus voltage RMS	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
066	BusInstUnbalance	The transient value of the bus voltage is unbalanced	
067	BusUVP	The DC bus voltage is too low during mains connection	
068	BusZVP	The DC bus voltage is too low	
069	PVOVP	The PV input voltage is too high	Check whether the PV series voltage (Voc) is higher than the maximum input voltage of the inverter. If this is the case, adjust the number of PV modules in series. After the correction, the inverter automatically returns to its normal state.
070	BatOVP	Battery overvoltage	Check whether the voltage of the battery is higher than the maximum input voltage of the inverter. If this is the case, adjust the number of battery modules in series.

ID	Code Name	Description	Solution
071	LLCBusOVP	LLC Bus overvoltage protection	
072	SwBusRmsOVP	Inverter bus voltage RMS Software overvoltage	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
073	SwBusIOVP	Inverter bus voltage instantaneous Software overvoltage	
081	SwBatOCP	Software overcurrent protection of the battery	
082	DciOCP	Dci overcurrent protection	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
083	SwIOCP	Instantaneous output current protection	
085	SwAcRmsOCP	Output RMS current protection	
086	SwPvOCPInstant	PV overcurrent software protection	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
087	IpvUnbalance	PV flows in uneven parallelism	
088	IacUnbalance	Unbalanced output current	
089	SwPvOCP	PV software overcurrent protection	
090	IbalanceOCP	Balanced current protection	
098	HwBusOVP	Inverter bus hardware overvoltage	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
100	HwBatOCP	Battery hardware overflow	
102	HwPVOCP	PV hardware overflows	
103	HwACOCP	Mains current is too high and has triggered hardware protection	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
105	MeterCommFault	Communication fault with meter unit	Check whether the meter is connected correctly.
110 - 112	Overload1-3	Overload protection 1-3	Please check whether the inverter is operating under overload.
113	OverTempDerating	The inverter has throttled due to too high a temperature	Make sure that the inverter has been installed in a cool and well-ventilated place without direct sunlight. Make sure the inverter is installed vertically and the ambient temperature is below the temperature limit of the inverter.
114	FreqDerating	AC frequency is too high	Make sure that the mains frequency and voltage are within the permissible range.
124	BatDchgProhibit	The battery is low	Please check if the battery soc of the inverter is too low.
125	BatLowVoltShut	No battery protection	Please check if the battery voltage of the inverter is too low.
128	BatReversalConnect	The battery is connected reversedly	Check whether the battery wiring is correct.
129	PermHwAcOCP	Mains current is too high and has caused an unrecoverable hardware fault	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact technical support.
145	USBFault	Device cannot read data from USB stick.The USB stick has been damaged. Or the format of the USB stick is not compatible with the	Switch off the inverter, wait 5 minutes and then switch the unit on again.If the error persists, contact technical support.

ID	Code Name	Description	Solution
		device.	
147	BluetoothFault	The device's Bluetooth communication has failed	Switch off the inverter, wait 5 minutes and then switch the unit on again.If the error persists, contact technical support.
151	BatPartOffline	A portion of the battery's communication is lost	Switch off the inverter, wait 5 minutes and then switch the unit on again.If the error persists, check the communication line or the connection of the battery and the inverter for errors.
152	SafetyVerFault	The safety version is inconsistent with the internal safety version	Check whether safety regulations comply with local standards and import correct safety parameters.
153	SCILose(DC)	SCI communication error (DC)	Upgrade software
154	SCILose(AC)	SCI communication error (AC)	Upgrade software
156	SoftVerError	Inconsistent software versions	Download the latest firmware from the website and launch the software update. If the error persists, contact technical support.
157 - 158	BMS1-2CommFault	Lithium battery 1-2communication error	Make sure your battery is compatible with the inverter. CAN communication is recommended. Check the communication line or the connection of the battery and the inverter for errors.
162	RemoteShutdown	Remote shutdown	The inverter is shut down remotely.
163	Drms0Shutdown	DRM 0 shutdown	The inverter is running with a Drms0 shutdown.
169	FanFault1	Fan 1	Check if the corresponding fan of the inverter is running normally.
177	BMS OVP	BMS overvoltage alarm	Internal error in the connected lithium battery. Switch off the inverter and the lithium battery, wait 5 minutes and then switch the components on again. If the error persists, contact technical support.
178	BMS UVP	BMS Undervoltage alarm	
179	BMS OTP	BMS High temperature warning	
180	BMS UTP	BMS low temperature warning	
181	BMS OCP	BMS overload warning during charging and discharging	
182	BMS Short	BMS Short circuit alarm	Please contact technical support.
183	BMS VerFault	Inconsistent software versions	Download the latest firmware from the website and launch the software update. If the error persists, contact technical support.
184	BMS CAN VerFault	Inconsistent software versions	
185	BMS CAN VerLow	Inconsistent software versions	

15.4. Battery error list

ID	Name	Description	Solution
808	HS1HighTempWarning	Radiator 1 high temperature alarm	Check whether the number of batteries is set correctly. If the setting is correct, please contact technical support to upgrade software.
809	EnvHighTempWarning	Ambient high temperature alarm	Please make sure the battery is installed in a cool wel-ventilated place.
813	StopChgWarning	Charging prohibition alarm	If the battery is almost fully, no action is required. Otherwise, please contact technical support.

ID	Name	Description	Solution
814	StopDchgWarning	Discharging prohibition alarm	If the battery is almost empty, no action is required. Otherwise, please contact technical support.
864	HS1OverTempFault	Over temperature protection of radiator 1	Power off and wait for 2 hours. If the problem is not solved, please contact technical support.
865	OverTempFault_Env	Over temperature protection of ambient temperature	
866	SciCommFault	Internal communication failure of battery	If this fault occurs occasionally, wait a few minutes to see whether the problem is solved. If this fault occurs frequently, please contact technical support.
867	Can1CommFault	Can1 communication failure	If this fault occurs occasionally, wait a few minutes to see whether the problem is solved. If this fault occurs frequently, please contact technical support.
872	SwBusInstantOVP	Bus software overvoltage	If this fault occurs occasionally, wait a few minutes to see whether the problem is solved. If this fault occurs frequently, please contact technical support.
873	SwBusInstantUVP	Bus software undervoltage	
874	SwBatInstantOVP	Battery software overvoltage	
875	SwBatInstantUVP	Battery software undervoltage	
879	HwOCP	Hardware overcurrent	
880	unrecoverBusAvgOV	Permanent bus overvoltage	Restart the battery and wait for minutes. If the problem is not resolved, please contact technical support.
883	unrecoverHwOCP	Permanent hardware overcurrent	
893	unrecoverBusSCP	Permanent short-circuit protection	Restart the battery and wait for minutes. If the problem is not resolved, please contact technical support.
894	unrecoverBatActFail	Permanent battery activation failed	
895	unrecoverBusRPP	Permanent bus reverse connection	Check whether the wiring is correct and restart the battery. If the problem is not resolved, please contact technical support.
899	BMSOVOCP	BMS overvoltage and overcurrent fault	If this fault occurs occasionally, wait a few minutes to see whether the problem is solved. If this fault occurs frequently, please contact technical support.
900	SwBatAvgOCP	Battery average overcurrent protection	
901	SwAvgOverloadP	Average overload protection	
902	SwBusInstantOCP	Bus software overcurrent	
903	SwCBCOCP	Software CBC overcurrent protection	
905	StartupBusSCP	Start up short circuit protection	Restart the battery and wait for minutes, Check if the power line is short circuited ,If the problem is not resolved, please contact technical support.
906	SwBusAvgUVP	Bus average undervoltage	Restart the battery and wait for minutes. If the problem is not resolved, please contact technical support.

ID	Name	Description	Solution
907	ChipClockFault	Clock failure of the chip	Restart the battery and wait for minutes. If the problem is not resolved, please contact technical support.
908	PCSCanCommFault	Faulty CAN communication between battery and inverter	Make sure your battery is compatible with the inverter. CAN communication is recommended. Check the communication line or the connection of the battery and the inverter for errors.
909	HeatsinkLowTempFault	Heatsink low temperature fault	Please make sure that the heatsink temperature is not lower than the temperature limit of the battery.
910	EnyLowTempFault	Low ambient temperature, battery failure	Please make sure that the ambient temperature is not lower than the temperature limit of the battery.
911	ADOffsetCalibrateFault	Sample Offset Calibration Failure	Restart the battery and wait for minutes. If the problem is not resolved, please contact technical support.

16. Maintenance

Inverters do not generally require daily or routine maintenance. Before carrying out cleaning, ensure that the DC switch and AC circuit breaker between the inverter and power grid have been switched off. Wait at least 5 minutes before carrying out cleaning.

Cleaning the inverter and battery module
Please clean the inverter with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the inverter with water, corrosive chemicals, detergent, etc.

Cleaning the heatsink
In order to ensure the normal function and long service life of the product, it is necessary to ensure that there is enough air flow space around the radiator at the rear of the product, and there is no material around the radiator that obstructs the air flow, such as dust or snow, must be removed. Clean the radiator with compressed air, a soft cloth, or a soft brush. Do not use water, corrosive chemicals, cleaning agents, or strong detergents to clean the heat sink.

16.1. Store and charge the battery module

Battery module storage requirements:

1. Environment temperature：-10℃~50℃, Recommended storage temperature：25℃~35℃.
2. Storage relative humidity range：5%~70%.
3. Store in a dry, clean, and ventilated environment, away from direct sunlight.
4. If the battery module is stored for a long time, replenish the power supply periodically. Battery module power supply requirements: the charging current is less than or equal to 7A, and the battery module needs to be charged to 50%SOC.

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	/

17. Uninstalling

17.1. 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.

17.2. Packaging

If possible, pack the product in its original packaging.

17.3. Storage

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

17.4. 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.

18. 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		✓	✓	✓

18.1. External Wi-Fi adapter

18.1.1. 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)

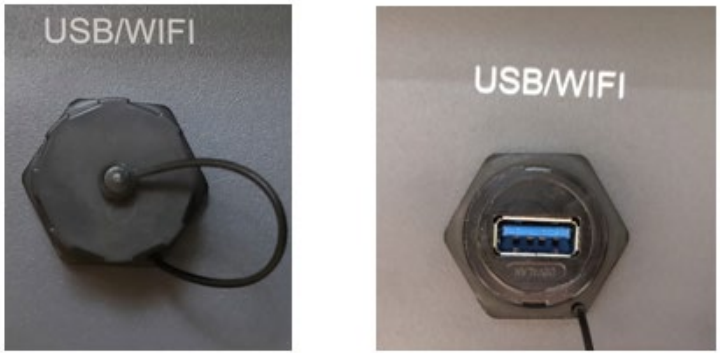
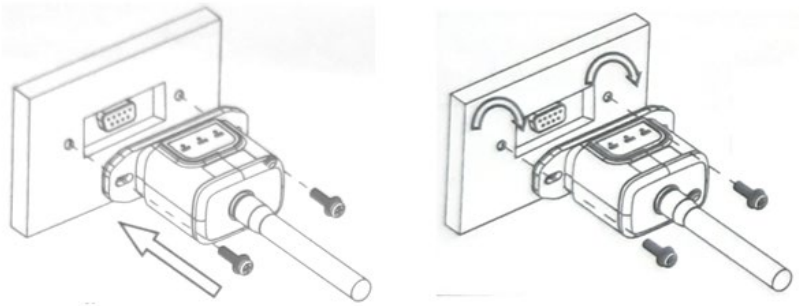


Figure 73– Port for external Wi-Fi adapter

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)

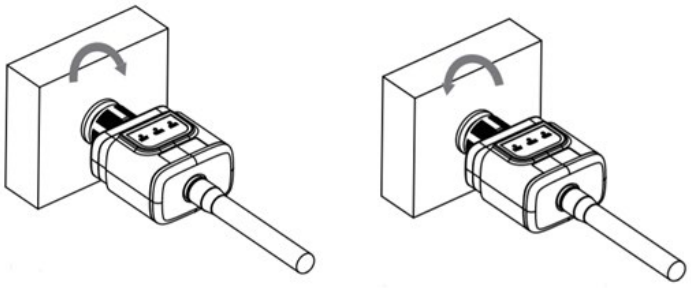


Figure 74– Inserting and securing the external Wi-Fi adapter

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

18.1.2. 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 75 - 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 76 – 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.

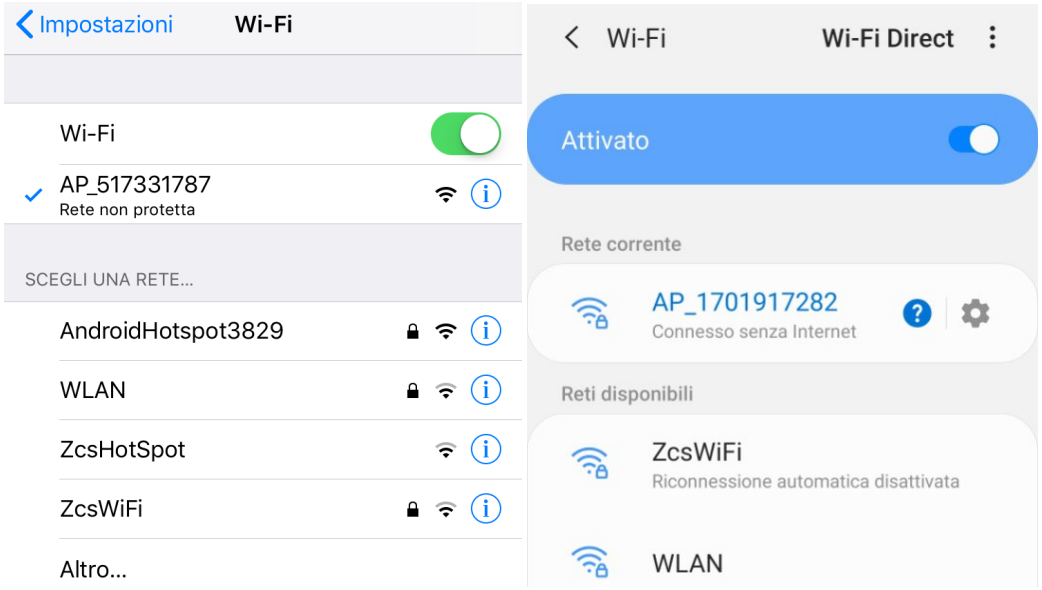


Figure 77 - Connection to Access Point for Wi-Fi adapter on iOS smartphone (left) and Android smartphone (right)

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 78 – 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.

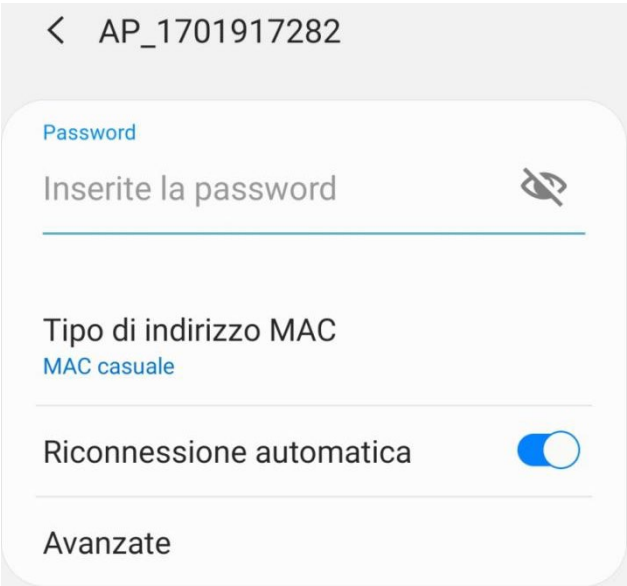


Figure 79 – Password entry prompt

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 80 – 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 81 – 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.

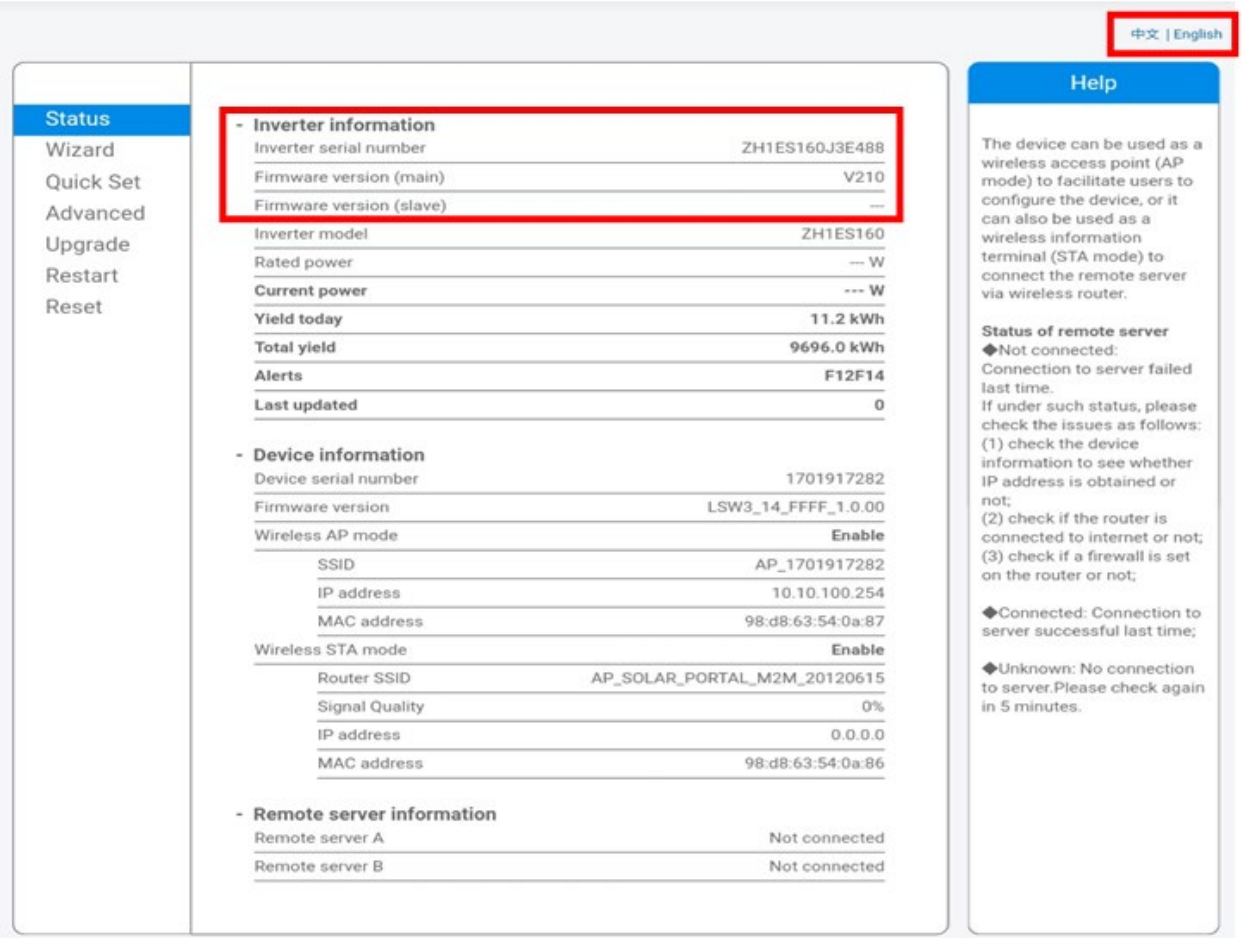


Figure 82 – Status screen

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.

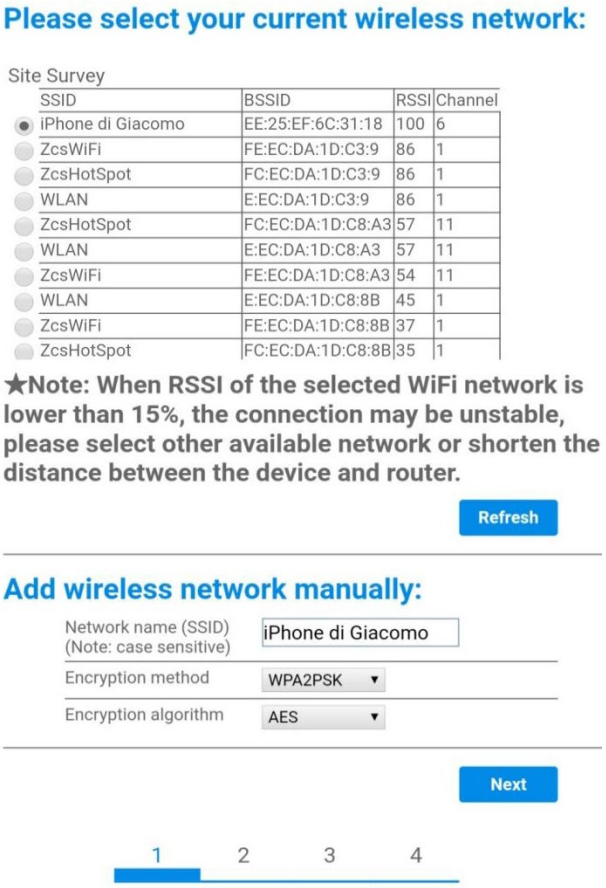


Figure 83 – Screen for selecting the available wireless network (1)

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.

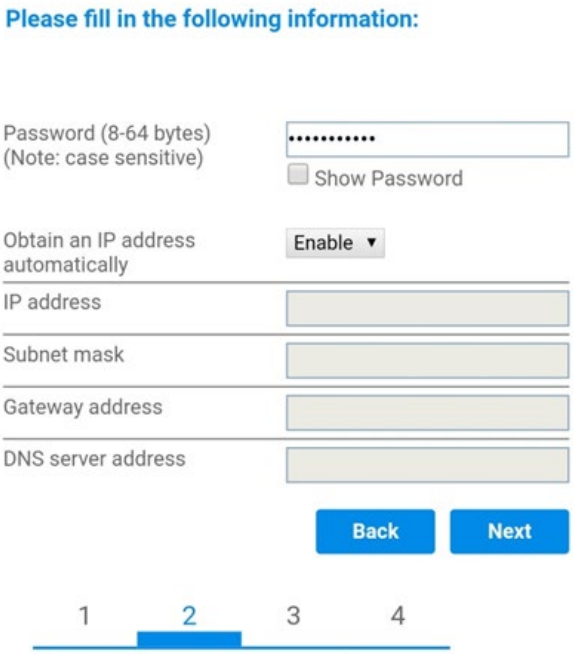


Figure 84 – Screen for entering the password of the wireless network (2)

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

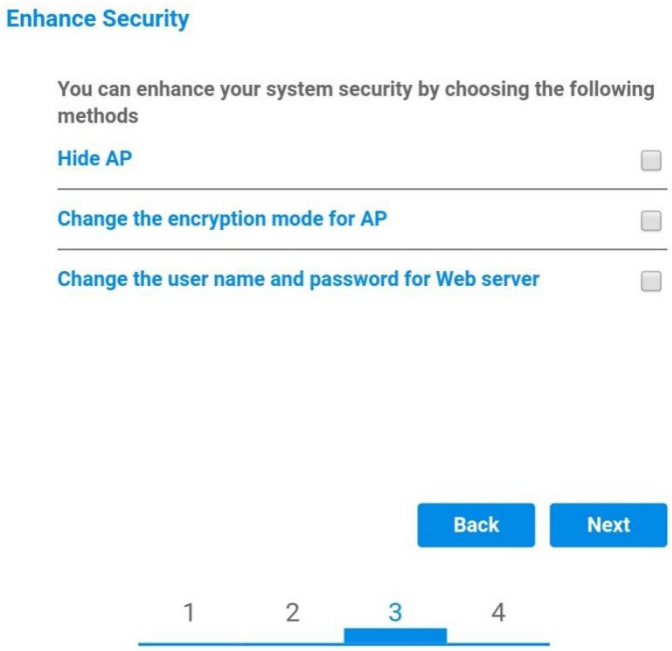


Figure 85 - Screen for setting the security options (3)

10) Click “OK”.

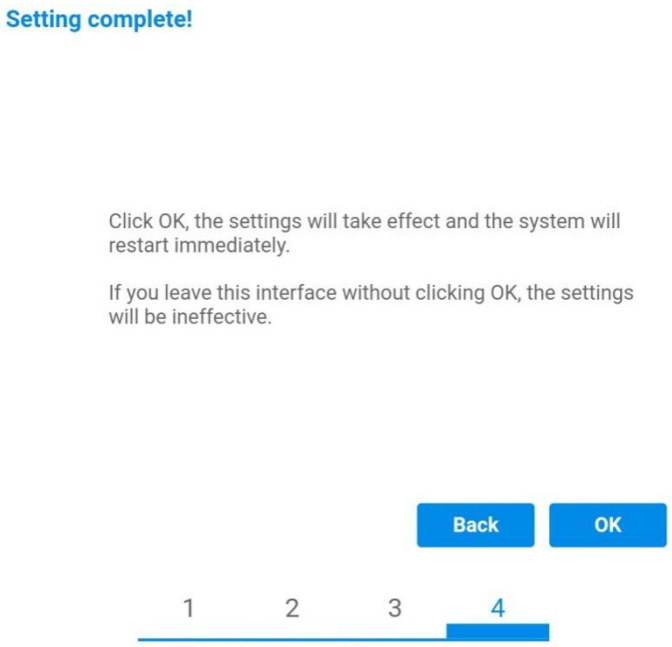


Figure 86 – Final configuration screen (4)

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.

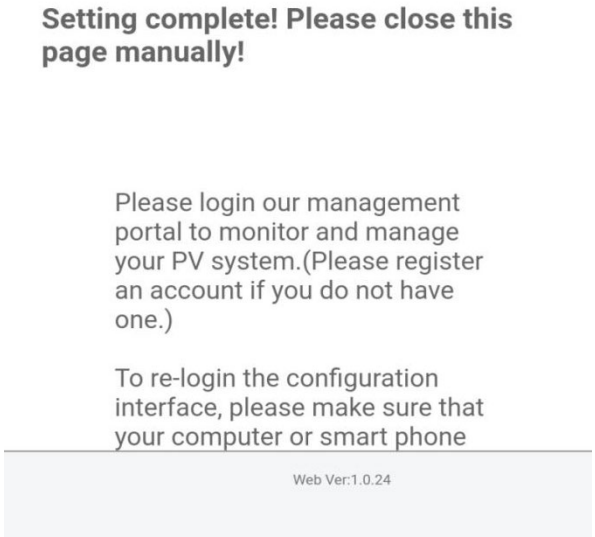


Figure 87 - Successful configuration screen

18.1.3. 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 88 – 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 89 - Initial status of LEDs

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

Figure 90 - 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 91 – Reset button on the Wi-Fi adapter

18.1.4. 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 92 - 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 93 – 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 94 - 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.

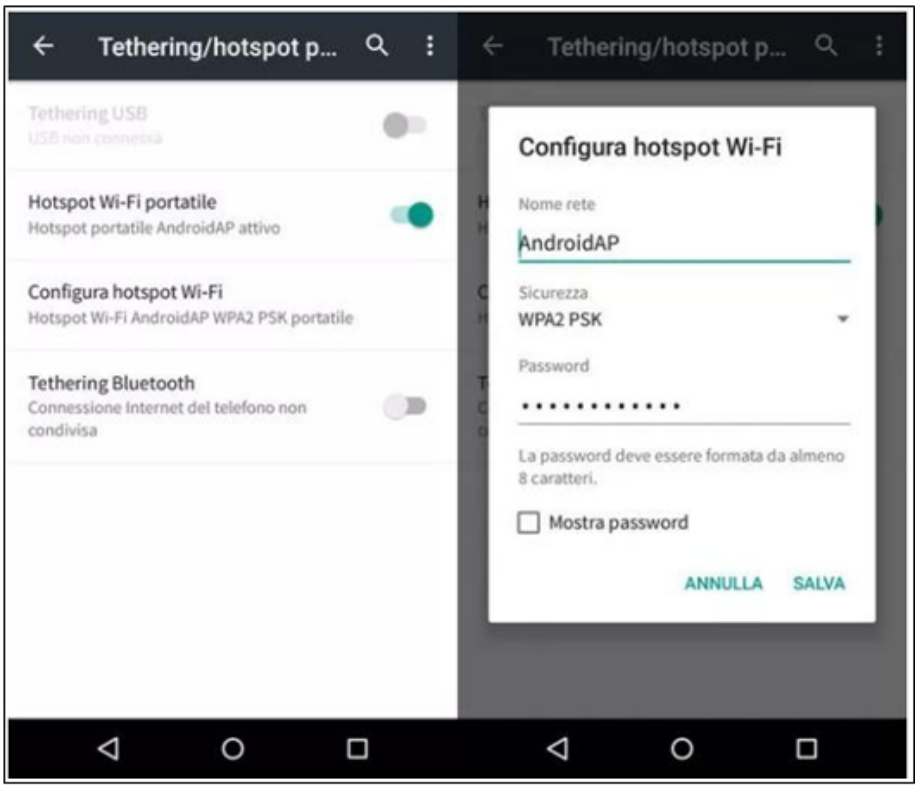


Figure 95 – Configuration of an Android smartphone as a hotspot router

- **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.

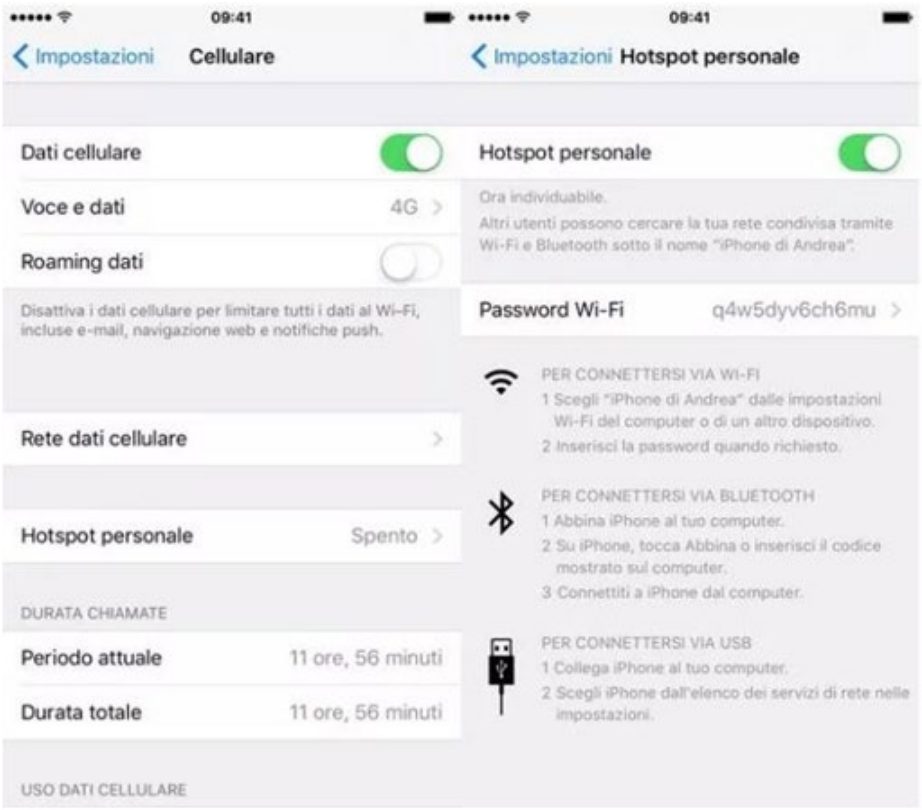


Figure 96 - Configuration of an iOS smartphone as a hotspot router

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).

18.2. Ethernet adapter

18.2.1. 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 97 – 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.

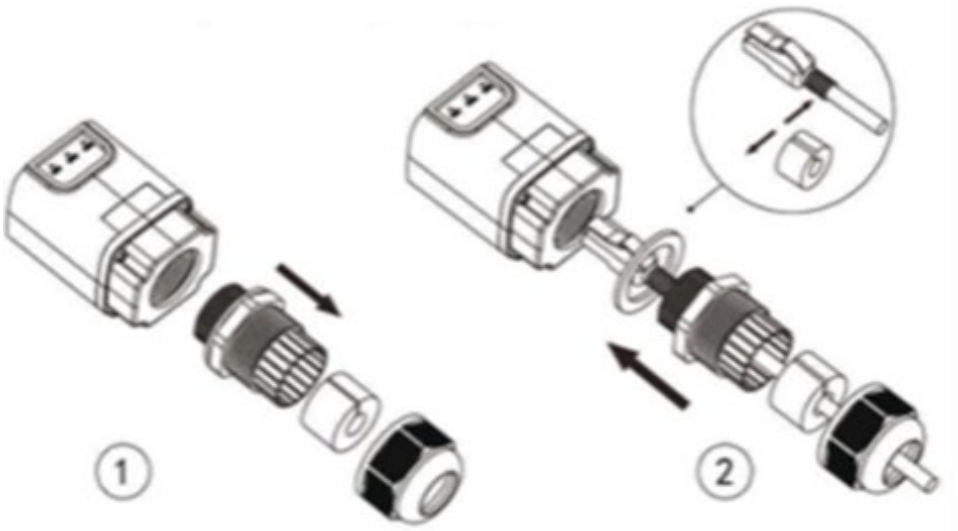


Figure 98 – Inserting the network cable inside the device

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)

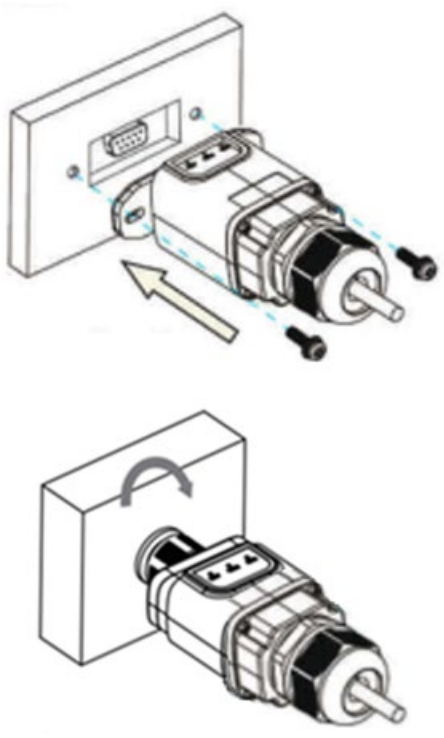


Figure 99 – Inserting and securing the ethernet adapter

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

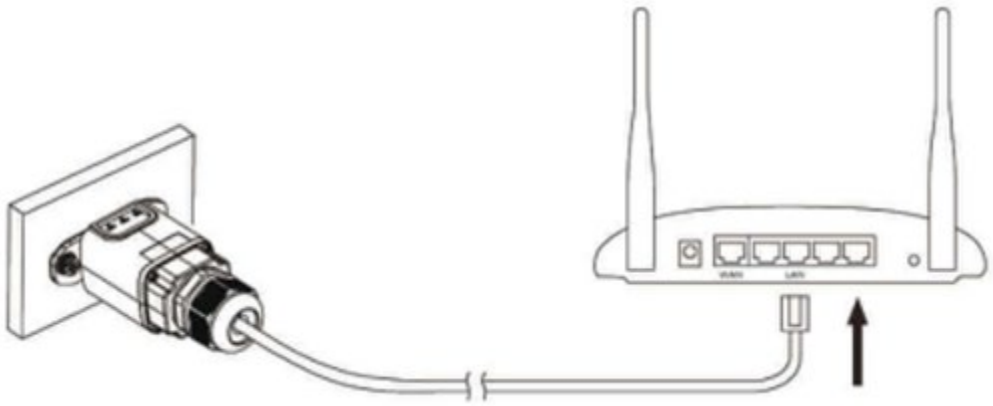


Figure 100 – Connecting the network cable to the modem

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.

18.2.2. 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 101 - Initial status of LEDs

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

Figure 102 - Final status of LEDs

18.2.3. 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 103 - 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 104 - 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).

18.3. 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.**Installation**

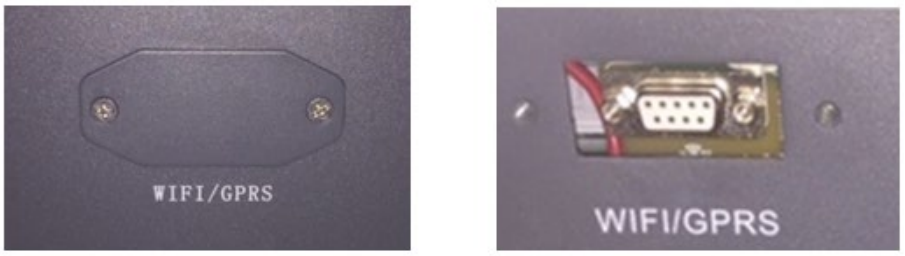
Installation must be carried out for all inverters compatible with the adapter. However, the procedure is quicker and easier as there is no need to open the front cover of the inverter.

Installation tools:

- Cross screwdriver
- 4G adapter

1) Switch off the inverter following the procedure described in this manual.
2) 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)

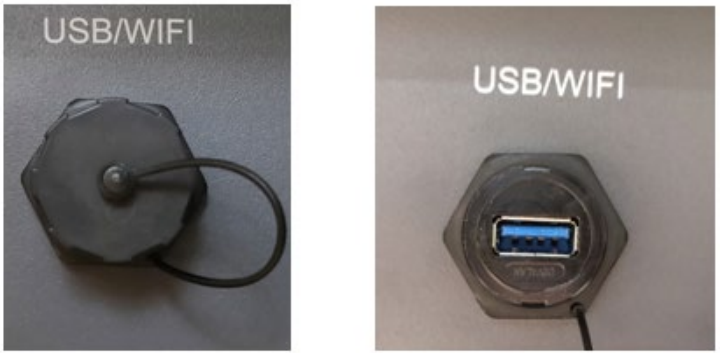
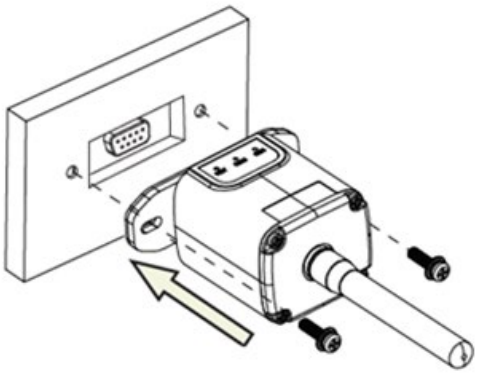


Figure 105 – Port of the 4G adapter

3) 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)

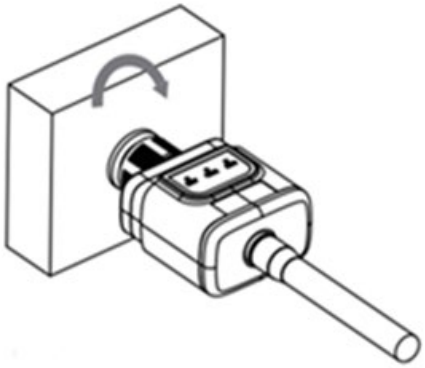


Figure 106 – Inserting and securing the 4G adapter

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

5) Unlike Wi-Fi cards, the 4G adapter does not need to be configured and starts transmitting data shortly after the inverter is switched on.

18.3.2. 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 107 - 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 108 - 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 109 - 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 110 - 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.

19. 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.
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

AZZURRO ZCS

THE INVERTER THAT LOOKS AT THE FUTURE

zcsazzurro.com

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