# USER'S MANUAL

AZZURRO ZCS

## THREE-PHASE HYBRID STORAGE INVERTERS

3PH HYD5000-HYD20000-ZSS

ZUCCHETTI Centro Sistemi

GREEN INNOVATION

# 3PH HYD5000-HYD20000-ZSS
# hybrid inverter
# User Manual

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## 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.

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## Technical support

ZCS offers full technical support and advice which can be accessed by making a direct request through the website www.zcsazzurro.com.
The toll-free number for Italy is: 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.
This manual describes the installation, electrical connections, maintenance and troubleshooting of the following inverters:

**3PH HYD5000 ZSS / 3PH HYD6000 ZSS / 3PH HYD8000 ZSS**

**3PH HYD10000 ZSS / 3PH HYD15000 ZSS / 3PH HYD20000 ZSS**

- ### Scope

This manual describes the assembly, installation, electrical connections, commissioning, maintenance and troubleshooting of the HYD 5-20KTL-3PH range of inverters.
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 plant and for operators of photovoltaic and storage systems.

- ### Symbols used

| | |
|---|---|
| **Danger** | **Danger: indicates a hazardous situation which, if not resolved or avoided, could result in serious personal injury or death** |
| **Warning** | **Warning: indicates a hazardous situation which, if not resolved or avoided, could result in serious personal injury or death** |
| **Caution** | **Caution: indicates a hazardous situation which, if not resolved or avoided, could result in minor or moderate personal injury** |
| **Attention** | **Attention: indicates a potentially hazardous situation which, if not resolved or avoided, could result in damage to the system or other property** |
| **Note** | **Note: provides important tips on correct and optimal operation of the product** |

# 1. Introduction

The 3PH HYD5000-HYD20000-ZSS hybrid inverter is used in photovoltaic systems with battery storage. The system can be combined with WeCo , Pylontech and Azzurro batteries supplied in kit form by ZCS Azzurro.
The basic operating scheme is shown in figure below, the inverter has direct access to the photovoltaic production and to the management of the batteries, so that they can be charged and discharged according to the current production needs and conditions and to the actual consumption.
It can also be connected to the Emergency Power Supply (EPS) and used to charge the battery as the main power source in case of off-grid operation or blackout.

**Figure 1 - Diagram of a system with 3PH HYD5000-HYD20000-ZSS hybrid inverter**

# 2. Preliminary safety instructions

Before installation, please read this manual carefully and make sure you fully understand its contents. The 3PH HYD5000-HYD20000-ZSS inverter strictly complies with the safety regulations if it is installed, connected and serviced according to the instructions in this manual. During installation, operation and maintenance, all operators must follow the local safety guidelines. Improper operation may result in electric discharges and/or damage to people and property, and will also void the Zucchetti Centro Sistemi S.p.A. warranty.

## 2.1. Safety Notes

Electrical installation and maintenance of the 3PH HYD5000-HYD20000-ZSS inverter must be carried out by competent persons in accordance with the local guidelines; qualified electricians and professionals must be duly certified and authorised.
According to national requirements, before connecting to the electricity grid, permission must be obtained from the local energy provider. All connections must be carried out by a qualified electrician.
DO NOT place explosive or flammable materials (e.g. gasoline, kerosene, diesel fuel, oil, wood, cotton or rags, etc.) near the batteries or the 3PH HYD5000-HYD20000-ZSS inverter.
Keep the inverter and batteries away from direct sunlight. Do not place the inverter and batteries near ovens, flames and other heat sources as they may catch fire and cause an explosion.
Keep children away from both the batteries and the 3PH HYD5000-HYD20000-ZSS inverter.
Do not open the front cover of the 3PH HYD5000-HYD20000-ZSS inverter. Opening the front cover will void the product warranty. Damage caused by improper installation/operation is NOT covered by the product warranty.
If you have any problems with the packaging that could damage the inverter or if you discover any visible damage, please notify the transport company immediately. If necessary, request assistance from an installer 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, the electronic components) against violent knocks, humidity, vibrations, etc. Zucchetti Centro Sistemi S.p.A. shall NOT be responsible for any damage or loss caused by improper installation.

## 2.2. Assembly and maintenance notes

In case of maintenance or repair, contact your service centre. Contact your nearest distributor for information or assistance. DO NOT repair the device yourself, as this may cause injury or damage to property.
The inverter must be completely disconnected (BAT, PV and AC) during maintenance. Before maintenance, disconnect the AC connection first, then the battery and DC photovoltaic system (PV1 and PV2), and wait at least 5 minutes (capacitor discharge time) to avoid electric shock.
The inverter may reach high temperatures and have rotating parts inside during operation. Switch off the 3PH HYD5000-HYD20000-ZSS inverter and wait for it to cool down before performing any maintenance.
The inverter and batteries must be located in well-ventilated areas. Do not place the inverter in a cabinet or in an airtight or poorly ventilated location. This could be extremely hazardous to the performance and life of the system.
Use a multimeter to check the polarity and voltage of the battery before turning on the power, and to also check the PV voltage and polarity before closing the PV switch. Make sure that the connections are carried out according to the instructions in this manual and refer to the detailed installation notes available at www.zcsazzurro.com.

If you want to store the batteries without using them, disconnect them from the 3PH HYD5000-HYD20000-ZSS inverters and store in a cool, dry and well-ventilated area.
Secure the inverter to appropriate objects with sufficient load capacity (walls, PV brackets, etc.) and ensure that it is positioned vertically.

**Attention:** follow the rules below during installation/maintenance of the battery:

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 inverter and batteries before connecting/disconnecting the battery terminals;
f) Both the positive and negative polarities must be isolated from the ground.

| | |
|---|---|
| **Danger** | **Electromagnetic radiation from the inverter can be harmful to health!** Do not stay closer than 20 cm to the inverter while it is on or operating. |

**Maintenance**
The inverters do not require daily maintenance. The heat exchangers and cooling fans must not be obstructed or clogged by dust, dirt or other objects. Before cleaning, ensure that the DC switch is OFF, the battery is switched OFF and the switch between the inverter and mains grid is OFF; wait at least 5 minutes before cleaning.
To ensure good long-term functioning, check that there is enough space around the heat exchangers for air to pass through and that no dust, dirt, etc. accumulates.
Clean the inverter and heat exchangers with air, a soft dry cloth or soft-bristled brush. DO NOT clean the inverter and heat exchangers with water, corrosive substances, detergents, etc.

## 2.3. Symbols on the inverter

Labels must NOT be hidden by foreign objects and/or parts (rags, boxes, equipment, etc.); they must be clean to ensure legibility.

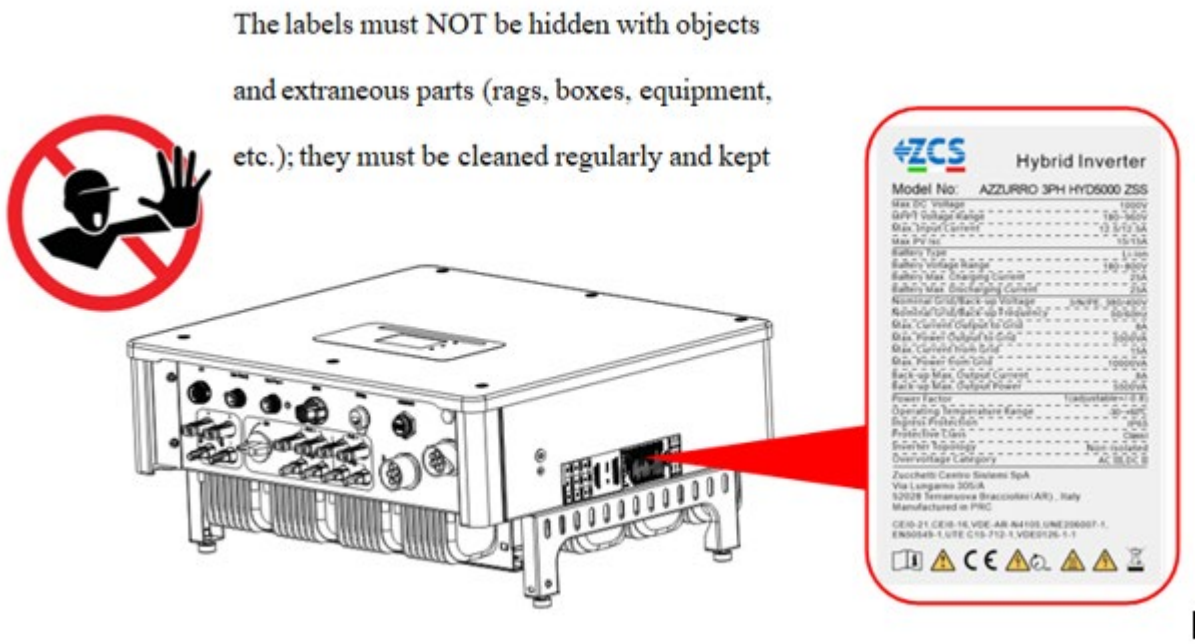



Figure 2 - Labels on the device

Some safety symbols are located on the inverter. Read and understand the content of the symbols before installing the inverter.

| | |
|---|---|
| | This symbol indicates a hazardous situation which, if not avoided, will result in injury |
| | Risk of electric shock; wait at least 5 minutes before opening the cover of the 3PH HYD5000-HYD20000-ZSS inverter. |
| | Beware of high voltage and electric shocks |
| | Beware of hot surfaces |
| | Complies with the European (EC) Conformity certification. |

| | |
|---|---|
| | Ground terminal |
| | Read this manual before installing the 3PH HYD5000-HYD20000-ZSS inverter |
| | This value indicates the degree of protection of the equipment in accordance with the IEC 70-1 (EN 60529 June 1997) standard. |
| | Positive and negative polarities of DC voltage (Photovoltaic and Battery) |
| | This side up. The 3PH HYD5000-HYD20000-ZSS inverter must always be transported, handled and stored in such a way that the arrows are always pointing upwards. |

**Table 1 – Symbols on the device**

# 3. Installation

The 3PH HYD5000-HYD20000-ZSS inverters are subjected to strict controls and inspection before packaging and delivery. Do not turn the inverter upside down during delivery.

| | |
|---|---|
| ⚠ Caution | **Carefully check the packaging and product fittings before installation.** |

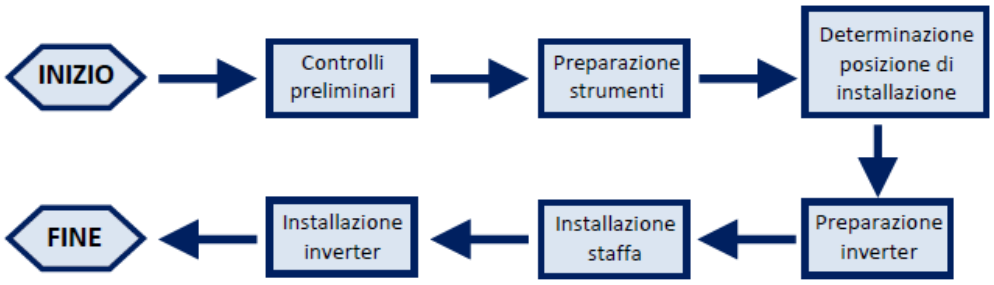



Figure 3 - Installation process

The 3PH HYD5000-HYD20000-ZSS inverter can operate in automatic mode and in time-of-use charge, charge/discharge mode. In automatic mode, when the energy produced by the PV field is greater than that required by the utilities, the 3PH HYD5000-HYD20000-ZSS inverter charges the battery using the photovoltaic energy in excess, and when the photovoltaic energy is lower than that required, the inverter uses the energy stored in the battery to supply current to the local load.

## 3.1. Product overview

The 3PH HYD5000-HYD20000-ZSS storage inverters allow up to 10% overload to maximum power output and the Emergency Power Supply (EPS) mode can support inductive loads, such as air conditioners or refrigerators with an automatic switching time of less than 20 milliseconds.

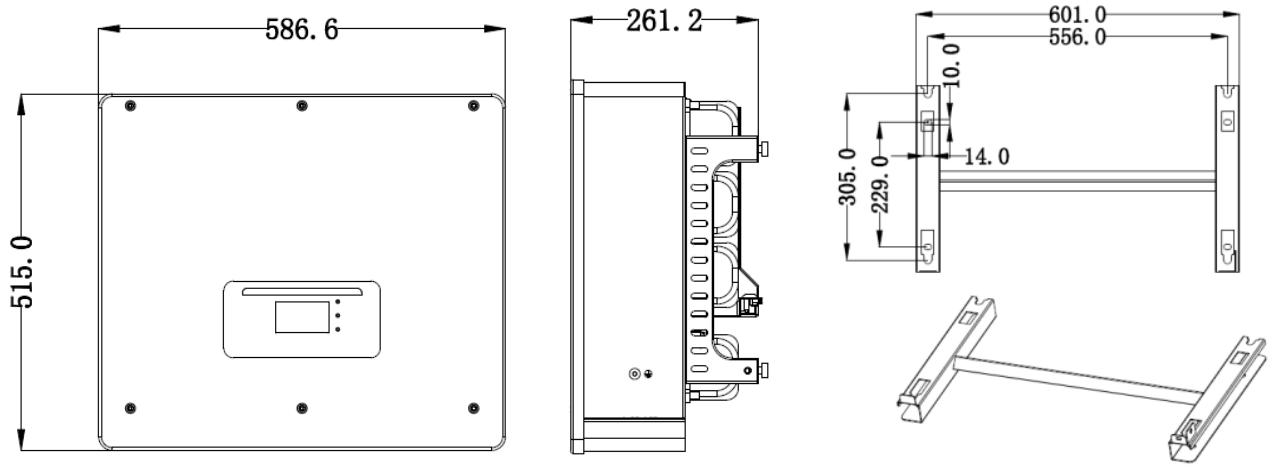



Figure 4 - Inverter dimensions and accessories

Main product features:

a. Double MPPT tracker with allowable DC overload of up to 1.5 times.
b. Flexible and fast switching between on-grid and off-grid modes.
c. Maximum efficiency of battery charging and discharging of 97.7%
d. 2 battery input strings with maximum charge and discharge of 25A per string.
e. Wide battery voltage range (200-700V).
f. Off-grid output can be connected to an unbalanced load.
g. Multi-parallel AC function, more flexible solution.
h. Intelligent monitoring, RS485/Wi-Fi/Bluetooth/GPRS (optional).

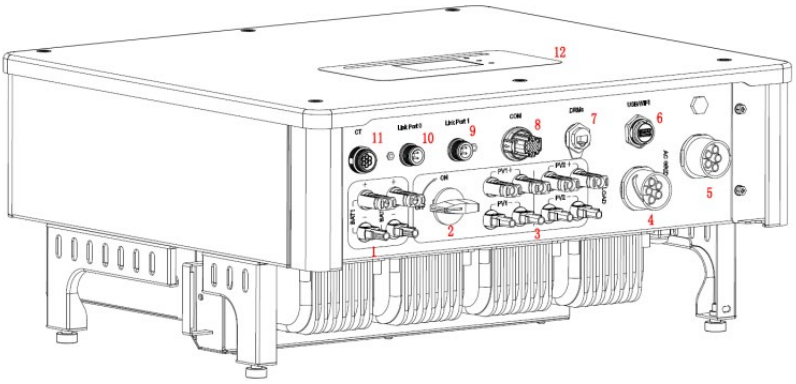


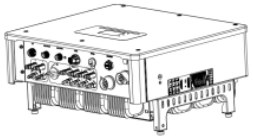
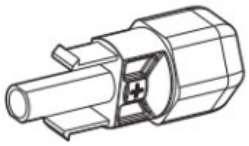
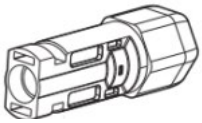
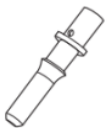
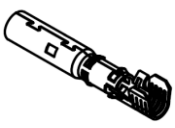
Figure 5 - Inverter overview

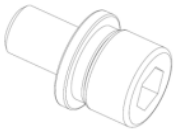
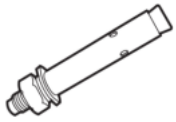
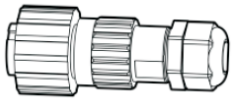
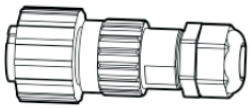
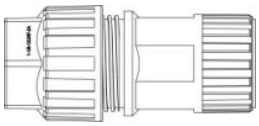
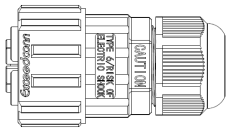
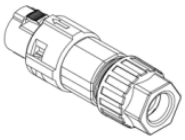
| | | | |
|---|---|---|---|
| 1 | Battery input terminals | 7 | DRMs (active management of limitations)* |
| 2 | DC Switch | 8 | COM |
| 3 | PV input terminals | 9 | Port 1 for parallel connection |
| 4 | Privileged load connection port | 10 | Port 0 for parallel connection |
| 5 | Grid connection port | 11 | CT (current sensors) |
| 6 | USB/Wi-Fi | 12 | LCD |

* depends on national regulations

Table 2 - Inverter overview

## 3.2. Package contents

| No. | Component | | Qty |
|---|---|---|---|
| 1 |  | Inverter | 1 |
| 2 | | Bracket | 1 |
| 3 |  | PV+ clamp terminals | 4 |
| 4 |  | PV- clamp terminals | 4 |
| 5 | | Metal clamp terminals fixed to PV+ input power cables | 4 |
| 6 |  | Metal clamp terminals fixed to PV- input power cables | 4 |
| 7 | | Metal clamp terminals fixed to BAT+ input power cables | 2 |
| 8 |  | Metal clamp terminals fixed to BAT- input power cables | 2 |

| | | | |
|---|---|---|---|
| 9 |  | 2 M6 hexagonal screws | 2 |
| 10 |  | M8x80 expansion plugs to secure the bracket to the wall | 4 |
| 11 |  | AC Grid Connector | 1 |
| 12 |  | Critical load connector | 1 |
| 13 | | Connection port connector (for parallel function) | 2 |
| 14 |  | DRMs connector | 1 |
| 15 |  | 6-pin CT connector | 1 |
| 16 | | Current sensor | 3 |
| 17 |  | 16-pin COM connector | 1 |

| | | | |
|---|---|---|---|
| 18 | | Manual | 1 |
| 19 | | Warranty | 1 |
| 20 | | Registration form | 1 |

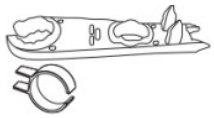
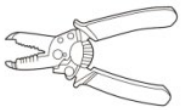
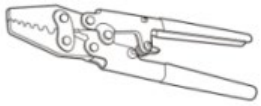
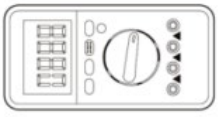
Table 3- Package contents

## 3.3. Requirements for the installation environment

| | |
|---|---|
| **Danger** | **DO NOT install the 3PH HYD5000-HYD20000-ZSS on flammable material.**<br>**DO NOT install the 3PH HYD5000-HYD20000-ZSS in an area used for the storage of flammable or explosive materials** |
| **Caution** | **The casing and heat sink are very hot while the inverter is running, therefore DO NOT install the 3PH HYD5000-HYD20000-ZSS in places where it can be accidentally touched** |
| **Attention** | **Consider the weight of the 3PH HYD5000-HYD20000-ZSS when transporting and moving the inverters. Choose an appropriate mounting position and surface. Assign at least two people to install the inverter** |

The packaging materials and components can be damaged during transport. Therefore, check the outer packaging before installation; check that the materials are not damaged. In case of damage, contact the dealer as soon as possible.
It is recommended to remove the packing materials within 24 hours before installing the inverter.

## 3.4. Installation tools

| No. | Tool | Model | Function |
|---|---|---|---|
| 1 | | Drill (recommended: 6mm drill bit) | To make a hole in the wall |
| 2 | | Screwdriver | To screw in the electrical circuits |
| 3 | | Star screwdriver | To remove the AC terminal screws |
| 4 |  | Removal wrench | To remove the PV terminals |
| 5 |  | Wire stripper | To strip the wires |
| 6 | | 4mm hex key | To connect the bracket with the inverter |
| 7 |  | Crimping tool | To crimp the power cables |
| 8 |  | Multi-meter | To meter the ground protection |

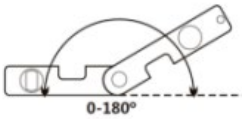
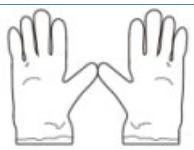
| | | | |
|---|---|---|---|
| 9 | | Marker | To mark the references |
| 10 | | Tape measure | To measure distances |
| 11 |  | Level | To make sure the support is level and aligned correctly |
| 12 |  | ESD gloves | For the operator's protection |
| 13 | | Safety goggles | For the operator's protection |
| 14 | | Dust mask | For the operator's protection |

**Table 4 – Installation tools**

## 3.5. Wall installation position

The inverter must be placed in a dry and clean place for proper functioning. The area must be tidy and convenient for installation, and well-ventilated to prevent overheating. DO NOT place it near flammable or explosive materials.
The AC overvoltage of the 3PH HYD5000-HYD20000-ZSS inverter belongs to Category III.
Maximum operating altitude: 2000 m.
Ambient temperature range: -25°C ~ 60°C.
Relative humidity: 0 ~ 100% (non-condensing).

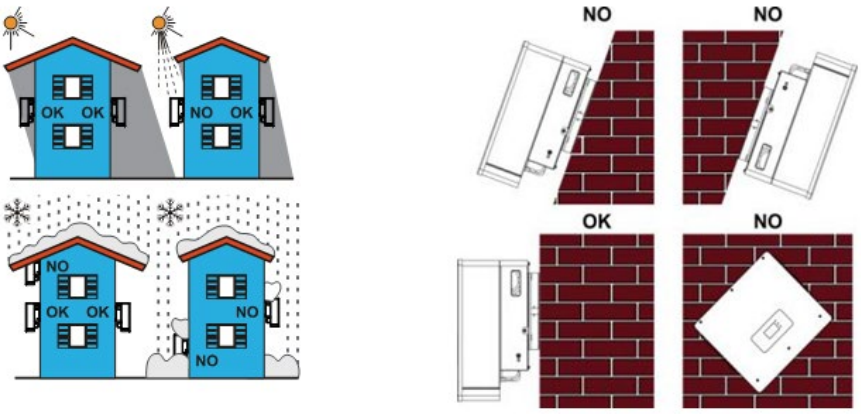



Figure 6 - Correct positioning of the inverter (1)

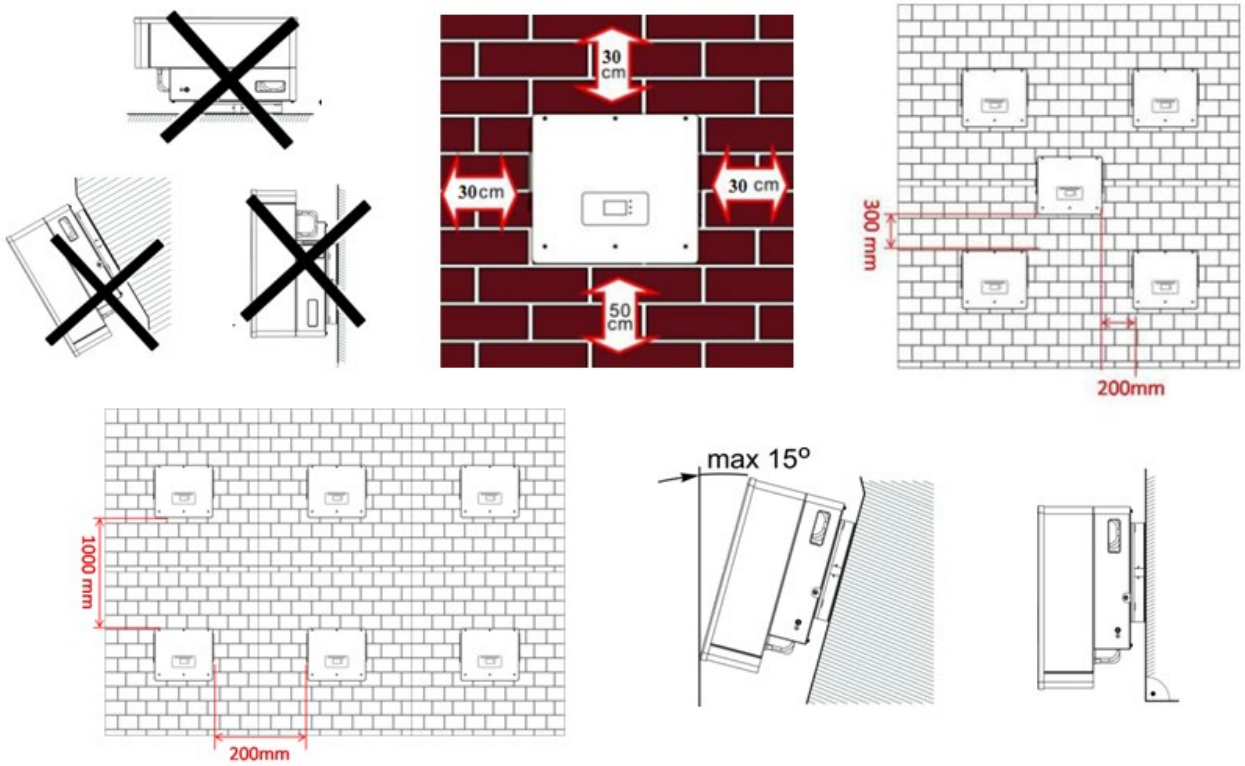



Figure 7 - Correct positioning of the inverter (2)

## 3.6. Assembly instructions

To remove the inverter, open the packaging, insert your hands into the slots on both sides of the inverter and grasp the handles, lift the inverter out of the packaging and move it to the installation position.

| | |
|---|---|
| Danger | **The inverter is quite heavy, so make sure to keep your balance while moving it. Two or more people are needed to move the packaging and inverter.** |
| Attention | **When placing the inverter on the floor, place foam or paper under it to protect the housing.** |

1. Determine the position of the holes, make sure the positions of the holes are level, then mark them with a marker pen. Use the drill to make the holes on the wall. The drill must remain perpendicular to the wall. Try not shake it while drilling the holes so as not to damage the wall. If the holes are not level, they must be repositioned and drilled again.
2. Insert the expansion screws vertically into the hole, making sure that the insertion depth is neither too shallow nor too deep.
3. Align the bracket with the hole, and secure it by tightening the expansion bolts with nuts.
4. Position and fix the inverter to the rear panel.
5. (OPTIONAL) install an anti-theft lock.

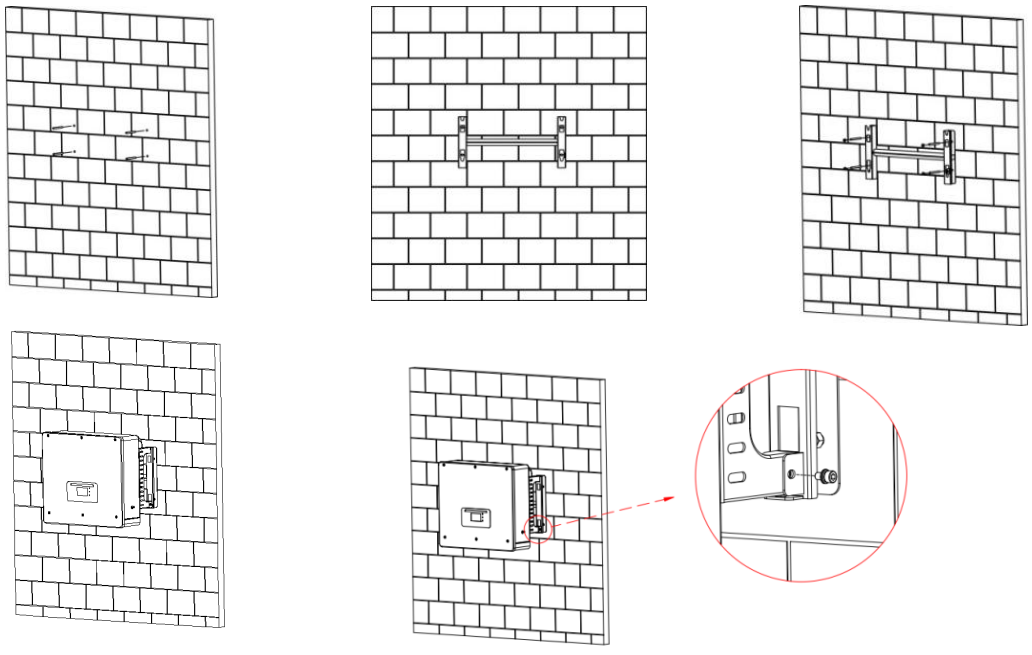


Figure 8 - Positioning of the inverter on the wall

# 4. Electrical connections

Before making any electrical connections, make sure that the DC circuit breaker is switched off. The stored electrical charge remains in the capacitor after the DC circuit breaker has been switched off, for safety reasons, wait 5 minutes for the capacitor to discharge completely.

| | |
|---|---|
| **Danger** | **The PV modules generate electricity when exposed to sunlight, and can create electric shocks. Therefore, before connecting the DC power cord, cover the PV modules with a dark covering.** |
| **Attention** | **The inverter must be installed and serviced by a professional electrician. Wear protection equipment when working on high voltage/high current systems such as inverters and battery systems.** |
| **Note** | **For the 3PH HYD5000-HYD20000-ZSS inverter, the open-circuit voltage (Voc) of the strings related to the modules connected in series must be ≤ 1000V** |

The PV modules must have an IEC 61730 classification of Class A.

| Model | Isc PV (absolute maximum) | Maximum output overcurrent protection |
|---|---|---|
| 3PH HYD5000 ZSS | 15A/15A | 8A*3 |
| 3PH HYD6000 ZSS | | 10A*3 |
| 3PH HYD8000 ZSS | | 13A*3 |
| 3PH HYD10000 ZSS | 30A/30A | 20A*3 |
| 3PH HYD15000 ZSS | | 25A*3 |
| 3PH HYD20000 ZSS | | 32A*3 |

**Table 5 - Models of three-phase hybrid models**

There are two ways to measure the currents exchanged with the grid; refer to the technical notes in the website www.zcsazzurro.com for more details.

1. Direct-insertion current sensors

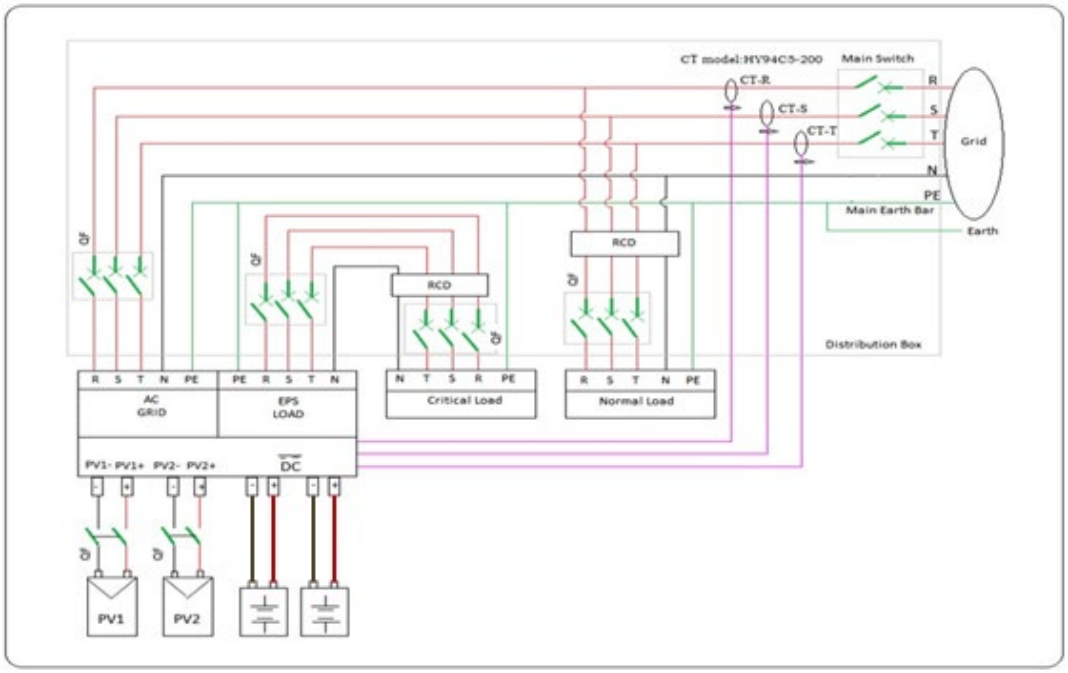



Figure 9 – Configuration with CT current sensor

2. Meter + CT sensor

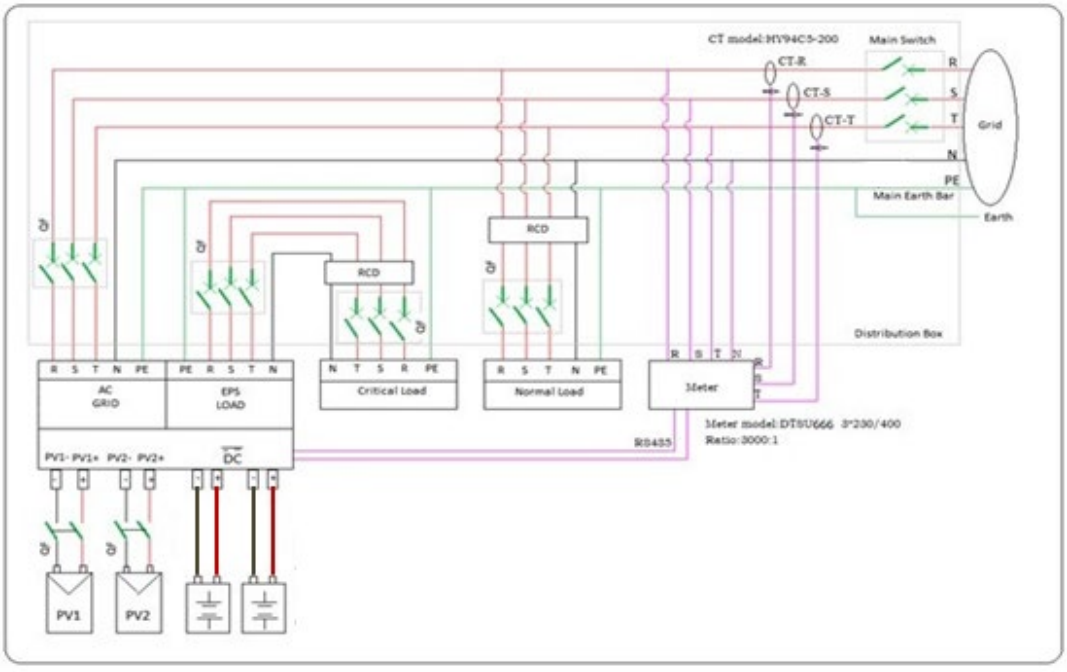
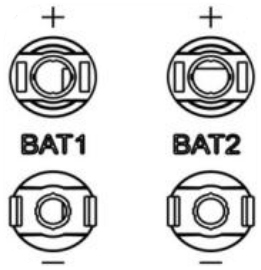
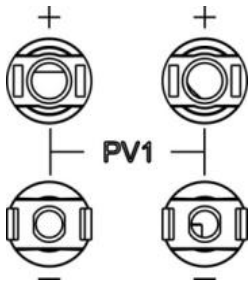
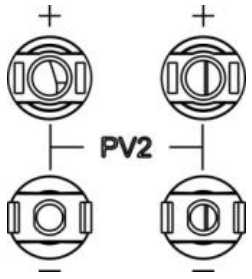
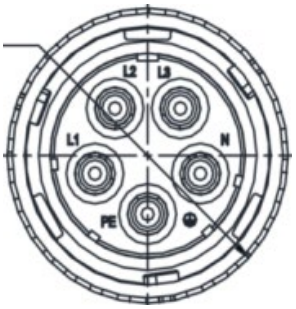



Figure 10 – Configuration with meter + CT sensor

| Component | Description | | Recommended cable type | Recommended cable specifications |
|---|---|---|---|---|
|  | **+** : connection of the positive electrode to the lithium battery | | Multi-core copper cable for outdoor use | Conductor with cross-section: **6mm²** |
| | **-** : connection of the negative electrode to the lithium battery | | | |
|  | **+** : connection of the positive electrode to the photovoltaic system | | Outdoor industrial cable for photovoltaic systems | Conductor with cross-section: **6mm²** |
| | **-** : connection of the negative electrode to the photovoltaic system | | | |
|  | **+** : connection of the positive electrode to the photovoltaic system | | Outdoor industrial cable for photovoltaic systems | Conductor with cross-section: **6mm²** |
| | **-** : connection of the negative electrode to the photovoltaic system | | | |
|  | Load | L1 | Multi-core copper cable for outdoor use | Conductor with cross-section: **6mm²～10mm²** |
| | | L2 | | |
| | | L3 | | |
| | | N | | |
| | | PE | | |

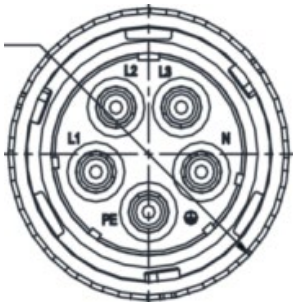
| | | | | |
|---|---|---|---|---|
|  | AC | L1 | Multi-core copper cable for outdoor use | Conductor with cross-section: **10mm²～16mm²** |
| | | L2 | | |
| | | L3 | | |
| | | N | | |
| | | PE | | |

Table 6 - Cable specifications

## 4.1. Connection of protective ground cables (PGND)

Connect the inverter and the batteries to the grounding electrode using protective ground cables (PGND).

| | |
|---|---|
| ⚠ **Attention** | **The inverter does not have a transformer, therefore the positive and negative polarities of the PV array do NOT have to be grounded.**<br>**All the metal parts in the photovoltaic supply system that do not carry current must be grounded (e.g. PV module frame, PV bracket, dialler housing, inverter housing).** |

The PGND cables are pre-set cables (external power supply cables ≥ 4mm² are recommended for grounding purposes), the cable must be a yellow-green colour.

**Procedure:**

1. Remove a suitable length of the insulating layer using a wire stripper, **NB:** L2 is 3mm longer than L1.

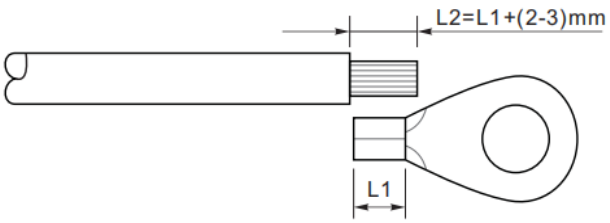



Figure 11 - Removal of insulating layer

2. Insert the exposed core wires into the OT terminal and crimp them using a crimping tool.

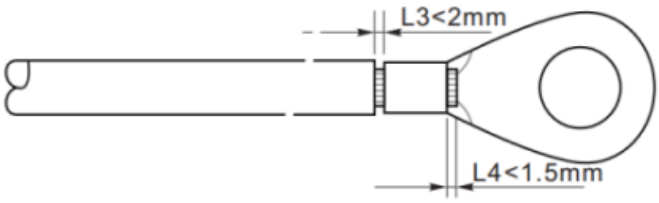
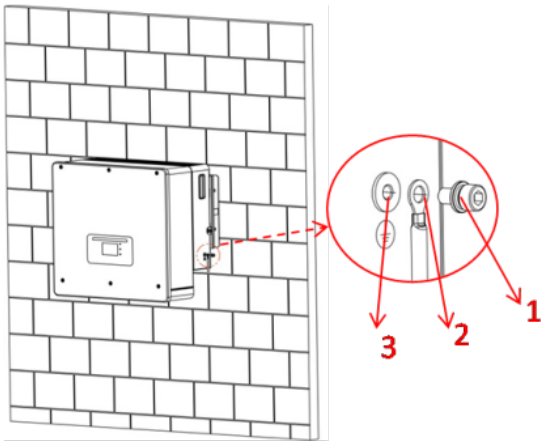



Figure 12 - Crimping of the exposed core

3. Install the crimped OT terminal, insert the M5 screw and tighten the screw at a torque of 3Nm using the hex key.

   **NB:** L3 is the length between the insulating layer of the ground cable, the L4 curved part and the core wires protruding from the secured part.

   **NB:** The cavity formed on the conductor just below the crimping strip must completely wrap the core wires, which must be in contact with the terminal.




1) M5 screw
2) OT Terminal
3) Threaded hole

Figure 13 - Installation of crimped terminal

## 4.2. Connecting to grid

The inverter is equipped with an integrated unit for monitoring the residual current; when the inverter detects that the residual current exceeds 300mA, the connection to the grid will be quickly disconnected.

**Procedure:**

1. Select the type of cable and the appropriate specifications according to
2. Table 6.
3. Pass the cable through the terminal.

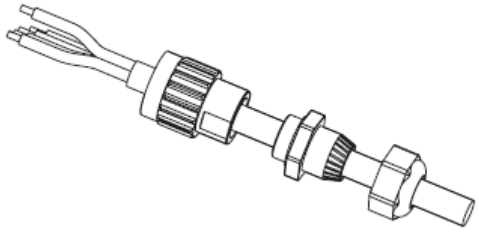


Figure 14 - Passing the wire through the terminal

4. Connect the cable to the terminal, according to the identification on the terminal.

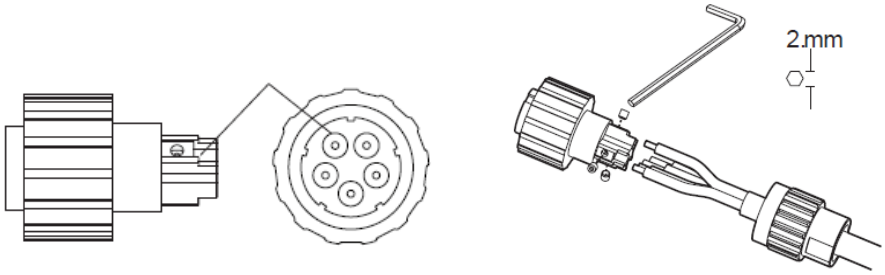



Figure 15 - Connecting the wire to the terminal

5. Connect the terminal to the inverter port and turn the clamp in a clockwise direction.

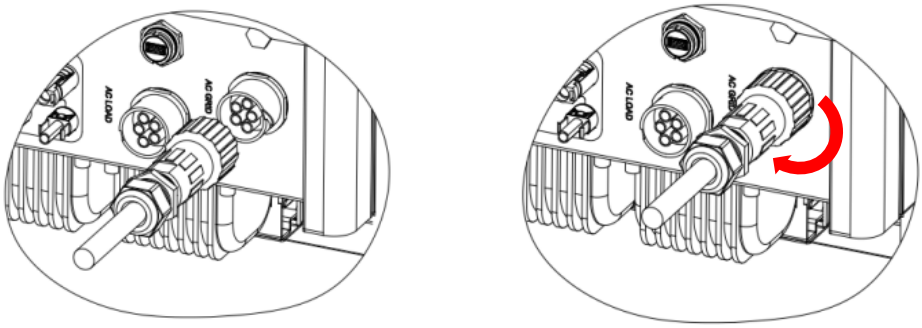


Figure 16 - Connecting the terminal to the machine

## 4.3. Connecting to the load circuit

**Procedure:**

1. Select the type of cable and the appropriate specifications according to
2. Table 6.
3. Pass the wire through the terminal.

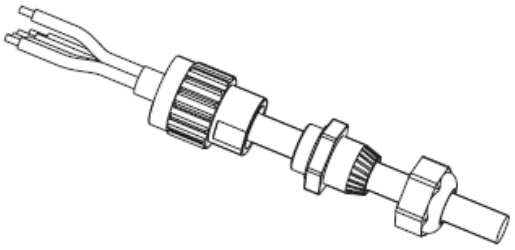


Figure 17 - Passing the wire through the terminal

4. Connect the cable to the terminal, according to the identification on the terminal.

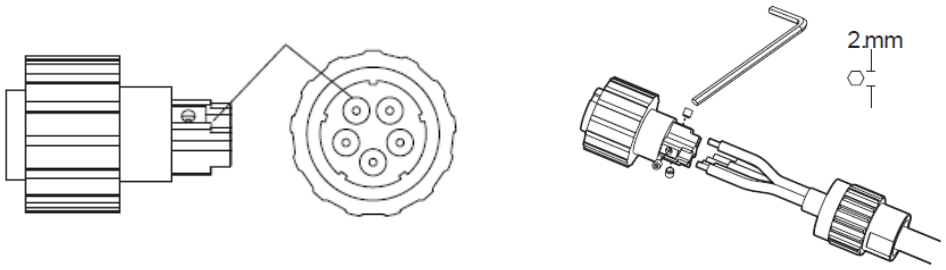



Figure 18 - Connecting the cable to the terminal

5. Connect the terminal to the machine port and turn the clamp in a clockwise direction.

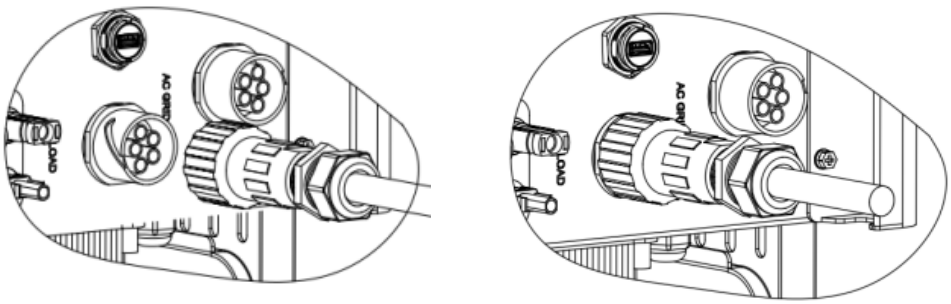


Figure 19 - Terminal clamping

## 4.4. Photovoltaic connection

Recommended specifications for DC input cables

| Cross section ($mm^2$ / AWG) | | Outer diameter of cable ($mm^2$) |
|---|---|---|
| Range | Recommended value | |
| 4.0-6.0 / 11-9 | 4.0 / 11 | 4.5~7.8 |

**Procedure:**

**Step 1:** Prepare the positive and negative photovoltaic cables.

Figure 20 – Preparing the positive and negative photovoltaic cables

**Step 2:** Insert the crimped positive and negative cables into the corresponding photovoltaic connectors.

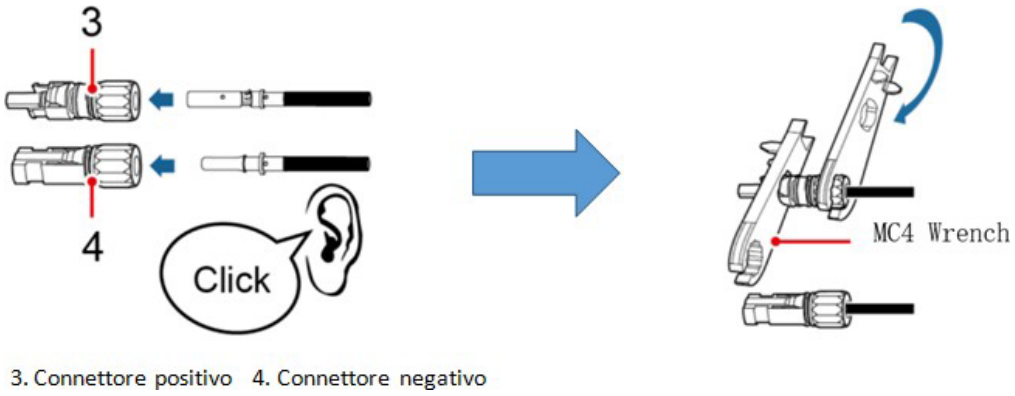



Figure 21 – Preparing the positive and negative photovoltaic connectors

**Step 3:** Make sure that the DC voltage of each photovoltaic string is less than 1000 VDC and that the polarities of the photovoltaic cables are correct. Insert the positive and negative connectors into the inverter until you hear a "click" sound.

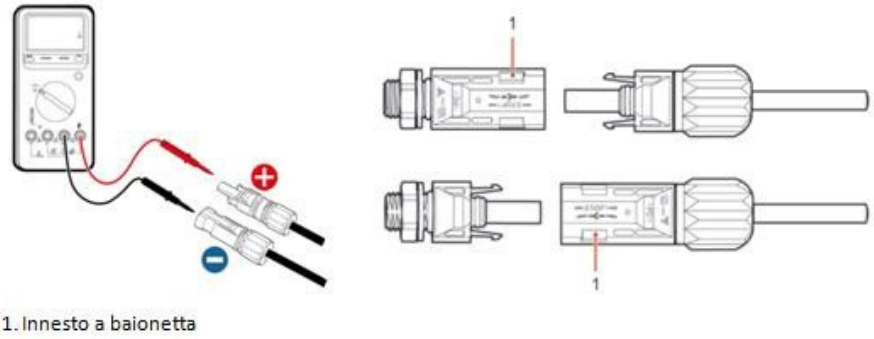



Figure 22 – Connecting the photovoltaic connectors

| | |
|---|---|
| **Caution** | Before removing the positive and negative connectors, make sure that the DC circuit breaker is OPEN (OFF position). |

### Removal procedure

Use a MC4 wrench to disconnect the photovoltaic connectors.

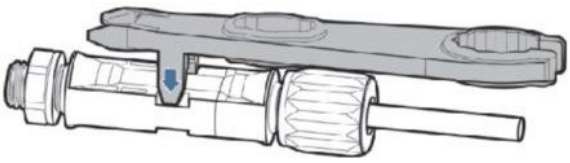
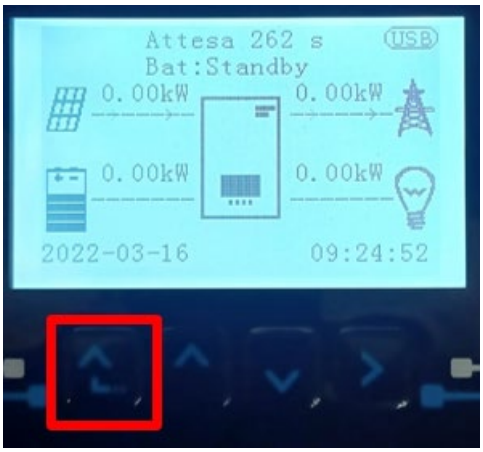


Figure 23 – Disconnecting the photovoltaic connectors

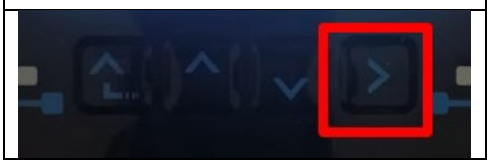
Connect the inverter to the photovoltaic strings using DC input power cables.

To configure the inverter channels correctly:

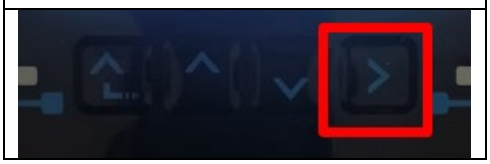
1. Press the first button on the left of the display:



2. Press the last arrow on the right (enter) to access the basic settings:

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
|  |

3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| |
|---|
| 1. Language |
| 2. Date and Time |
| 3. Safety parameters |
| 4. Working mode |
| 5. Self-Test |
| 6. Channel configuration |
| 7. EPS Mode |
| 8. Communication address |
| |
|  |

4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input<br>(only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

For photovoltaic systems, set the inputs according to the string configuration, specifically:

- For independent strings, set:
  - Channel 3 input – PV input 1;
  - Channel 4 input – PV input 2.

- For parallel strings, set:
  - Channel 3 input – PV input 1;
  - Channel 4 input – PV input 1.

The inverter has two MPPTs, which can operate independently or in parallel. The user can choose the appropriate MPPT operating mode depending on how the system is designed.

**Independent mode (default):**

If the strings are different (e.g. installed on two separate flaps or consisting of a different number of panels), the input channels must be set to “independent mode.”

**Parallel mode:**

If the strings are connected in parallel, the channels must be configured in parallel.

**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 supply cable must be suitable for photovoltaic applications.

**Note:**

Both MPPT inputs of the inverter must be populated, even if the system only has one string. If the strings are arranged in parallel, it is recommended to use a Y or T connection cable to double the input currents from the PV array and to populate both MPPT inputs of the inverter, as shown in the figure. If the string arrangement is independent, simply connect the two strings to the two MPPTs of the inverter.

Figure 24 – Y connection cable for solar panels

## 4.5. Connecting the battery

**!!!PLEASE NOTE!!!**

If the storage capacity of an existing system needs to be increased by adding one or more batteries, contact the Zucchetti pre-sales department in order to determine what charge percentage to bring all the batteries (installed and to be installed).

Connect the existing batteries one at a time to the inverter in order to check the charge status on the display (all the instantaneous information can be accessed by pressing the “Down” key from the main menu).

If the charge level and the voltage of the existing batteries are lower than the new one, they can be charged from excess photovoltaic production or by using the forced charge mode indicated in the “% charge mode” section of this manual.

### 4.2.1.Installing Pylontech batteries

#### 4.2.1.1. Connecting a single battery tower

Figure 25 - Single battery tower

Each tower of battery modules consists of a BMS connected in series to multiple battery modules.

The devices to be used are:

1. The external BMS with 4 to 8 battery modules (ZST-BMS-SC500-H)

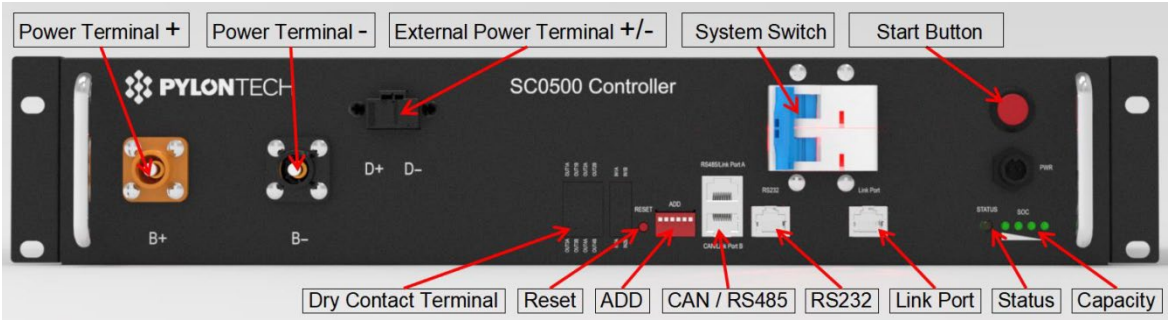



Figure 26 - SC500 BMS

2. The external BMS with 4 to 12 battery modules (ZST-BMS-SC1000-H)

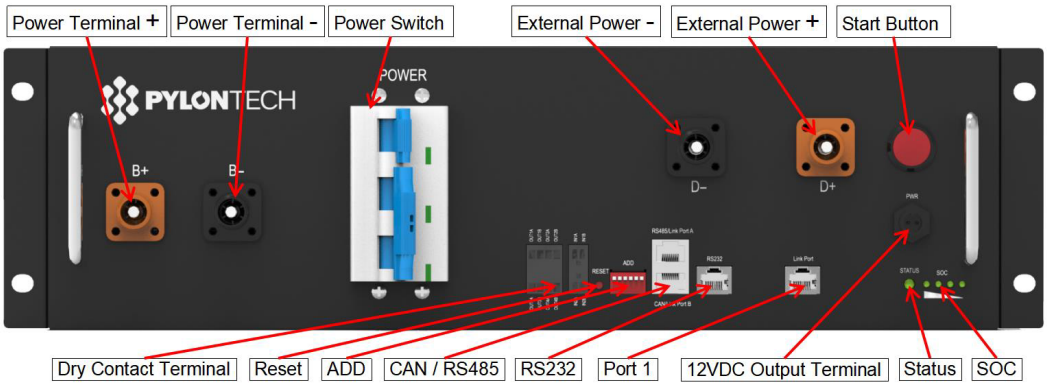



Figure 27 - SC1000 BMS

3. The external Wi-Fi/USB BMS with 4 to 8 battery modules (ZST-BMS-SC500-H)

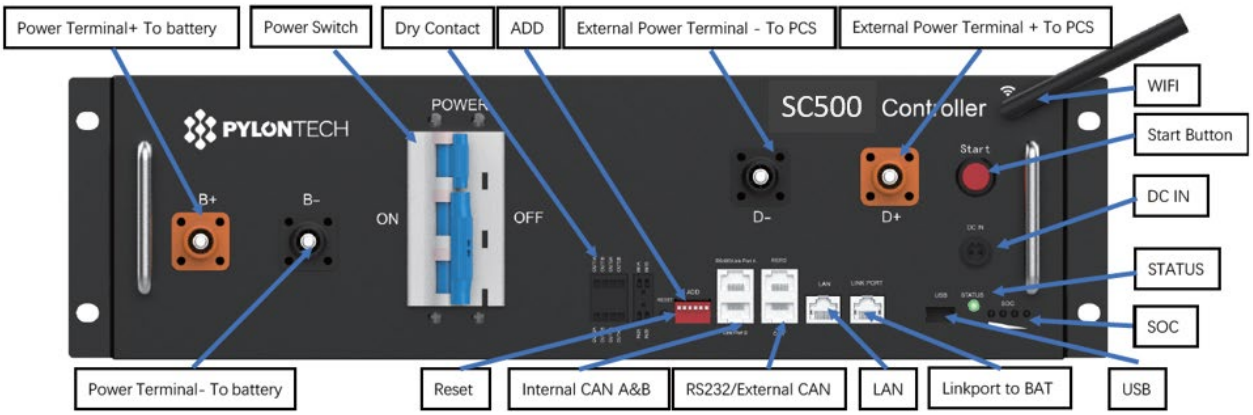



Figure 28 – Wi-Fi/USB SC500 BMS

4. The external Wi-Fi/USB BMS with 5 to 12 battery modules (ZST-BMS-SC1000-H)

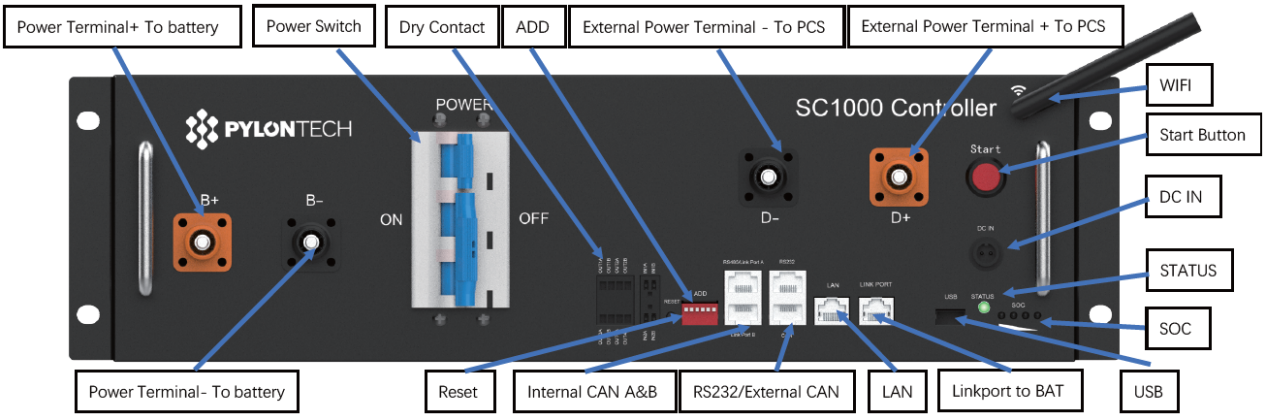



Figure 29 – Wi-Fi/USB SC1000 BMS

5. Battery modules (ZST-BAT-2.4KWH-H)

Figure 30 - Battery module to be connected in series

### 4.2.1.2. Communication between the BMS and Battery Modules

The communication connections must be arranged as follows, using the communication cables between battery modules:

- Link port 1 of the BMS to link port 0 of the first battery
- Link port 1 of the first battery must be connected to link port 0 of the second
  …
- Link port 1 of the second-last battery must be connected to link port 0 of the last battery.

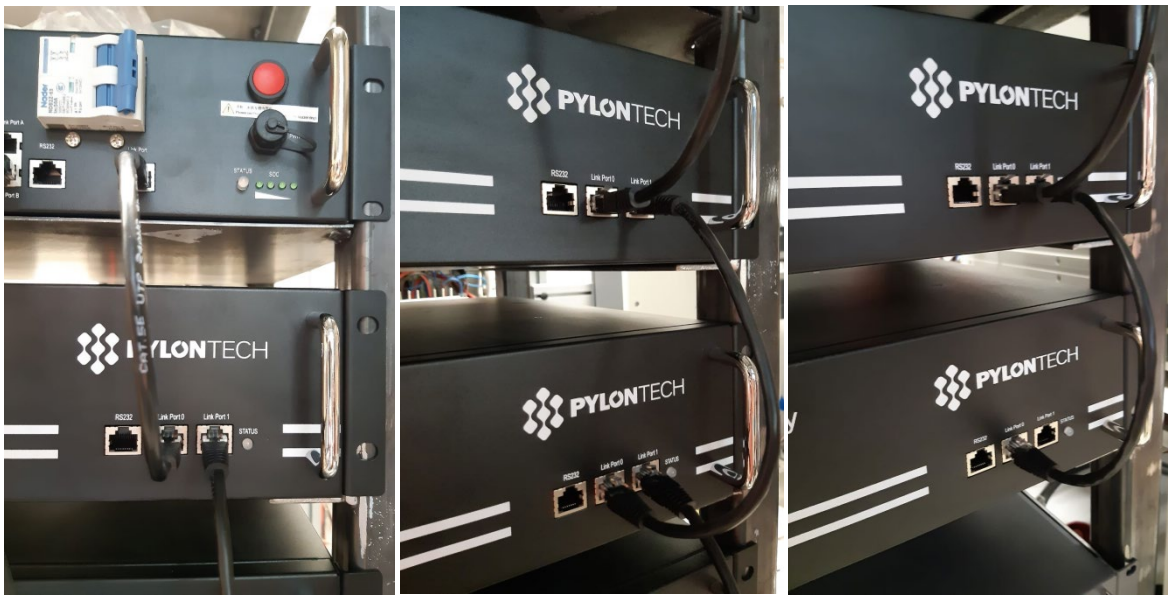



**Figure 31 - Communication connections: The BMS and the first battery module (left), connection between the battery modules (centre), connection between the second-last and last battery module in the series (right)**

### 4.2.1.3. BMS and Inverter communication

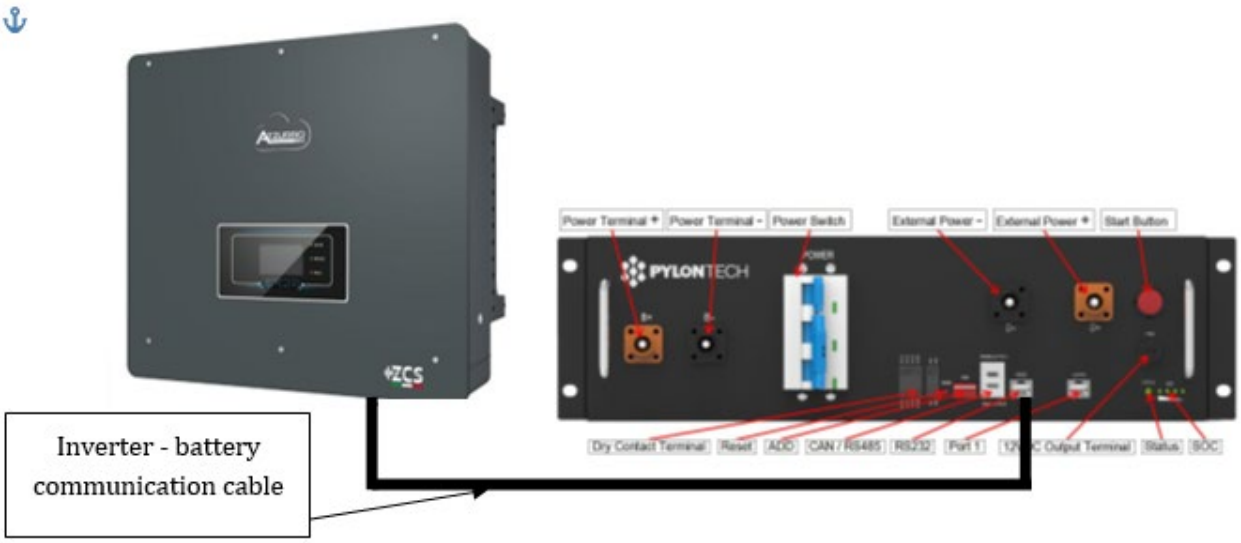



Figure 32 - Hybrid inverter and BMS communication connection

The position of the dip switches in case of a single tower requires moving all the pins down, this means the address equals 000000.

Figure 33 – 000000 battery address

For communication between the battery and inverter, use the black communication cable supplied, which has the BAT and INV labels on the RJ45 end. On the BMS side, the end labelled BAT must be inserted into link port B. The other end, labelled INV, must be cut leaving only the wires connected to pins 2 (orange wire), 4 (blue wire) and 5 (white-blue wire) in the appropriate communication counterpart of the hybrid inverter.

Figure 34 - CAN input of the SC500 and SC1000 BMS

Figure 35 - CAN input of the Wi-Fi/USB SC500 and Wi-Fi/USB SC1000 BMS

**Definition of RJ45 Port Pin**

| No. | CAN | RS485 | RS232 Pin |
|---|---|---|---|
| 1 | --- | --- | --- |
| 2 | GND | --- | --- |
| 3 | --- | --- | TX |
| 4 | CANH | --- | --- |
| 5 | CANL | --- | --- |
| 6 | --- | GND | RX |
| 7 | --- | RS485A | --- |
| 8 | --- | RS485B | GND |

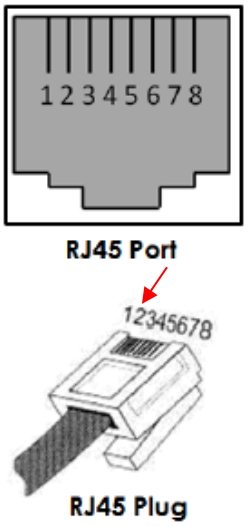



Figure 36 - Pin Out CAN BMS input

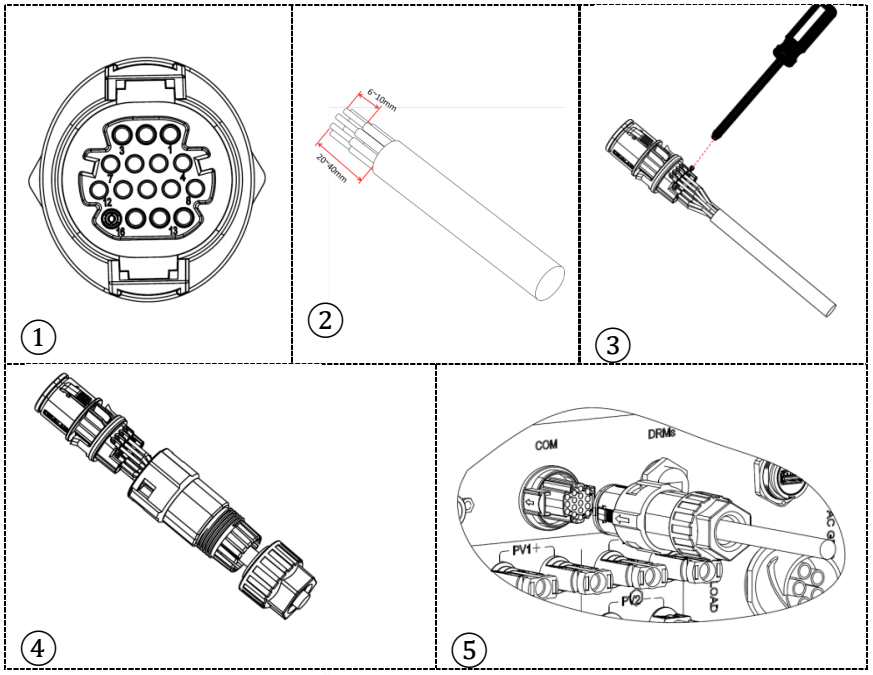



Figure 37 - "Screw-in" COM port connection

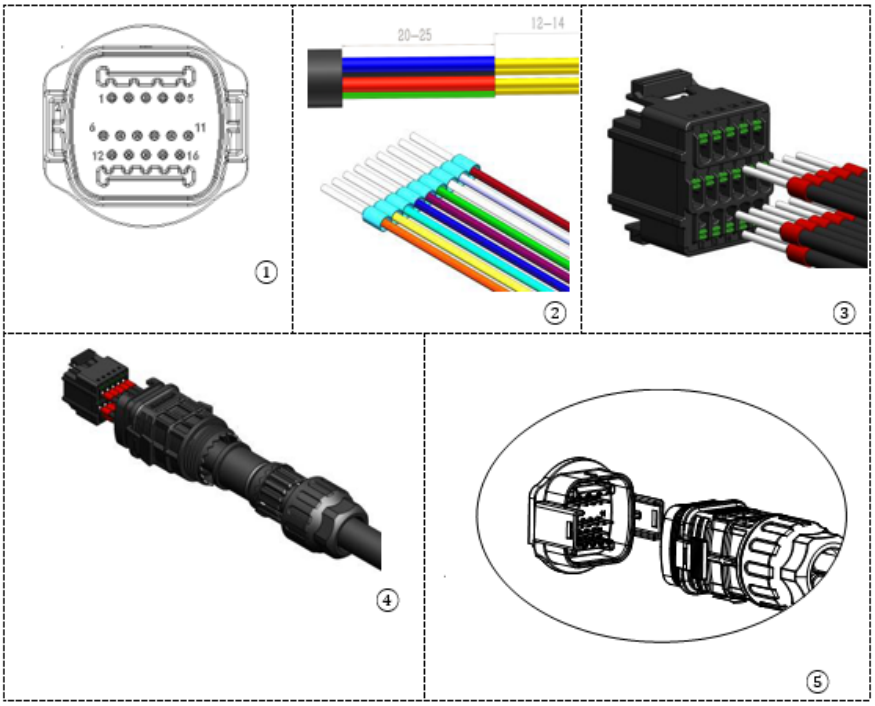



Figure 38 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (blue wire) | Communication with the BMS of the lithium battery, the CAN of the inverter adapts to the BMS of the lithium battery. |
| 8 | CAN L (white-blue wire) | |
| 9 | GND.S (orange wire) | |

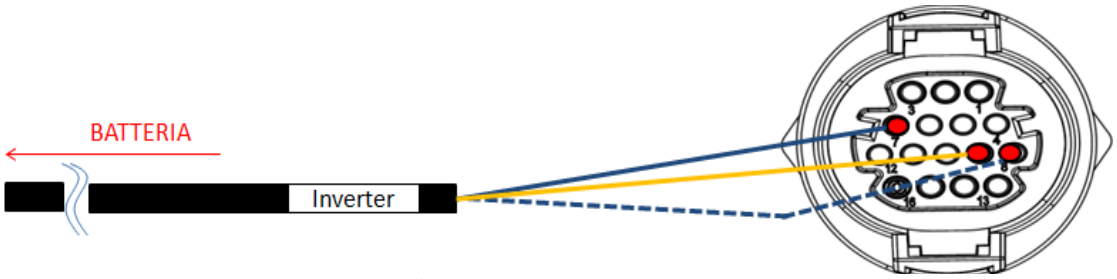



Figure 39 - "Screw-in" COM connection diagram

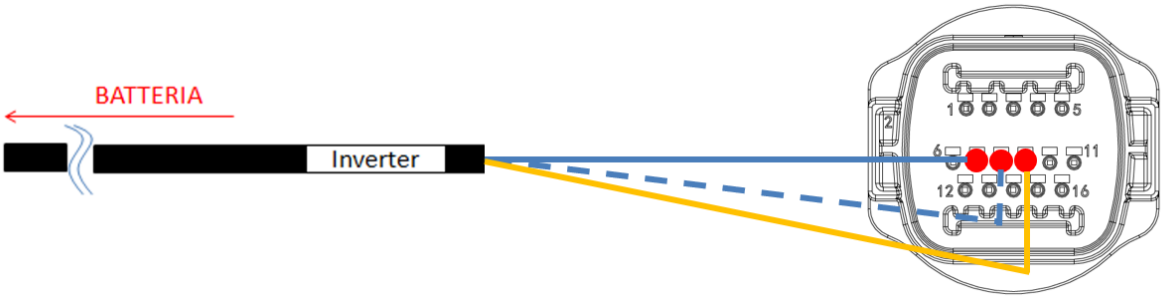



Figure 40 - "Snap-in" COM connection diagram

### 4.2.1.4. Power connections

The battery modules must be connected to each other in series via the cables shown in the figure below The connection cables are supplied with the battery.

Figure 41 - Power connector between battery modules

The connector must be connected from the negative input of the first battery module to the positive input of the second one. The negative input of the second battery module must then be connected to the positive input of the third module, continuing the series until the negative input of the second-last module is connected to the positive input of the last module.
In this configuration, the positive input of the first module and the negative input of the last battery module will remain free (use the colour of the connector as a reference).

Figure 42 - Power cable between battery modules

Subsequently, the external BMS must be connected to the series of battery modules. Therefore the positive of the BMS must be connected to the positive of the first battery, and the negative of the BMS to the negative of the last battery module (the cables for this connection are supplied with the BMS).

Figure 43 - Connection cables between the BMS and battery modules

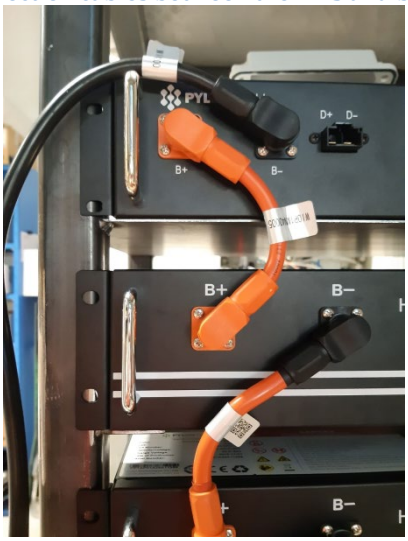



Figure 44 - Power connection (positive) between the BMS and first battery module

Figure 45 – Power connection (negative) between the BMS and the last battery module

Finally, the BMS must be connected to the inverter via the power cables provided in the kit (ZST-CABLE-KIT-H) as shown in the figure.

Figure 46 - BMS Inverter power cables (left), inverter-side power terminals (centre), battery-side power terminals (left)

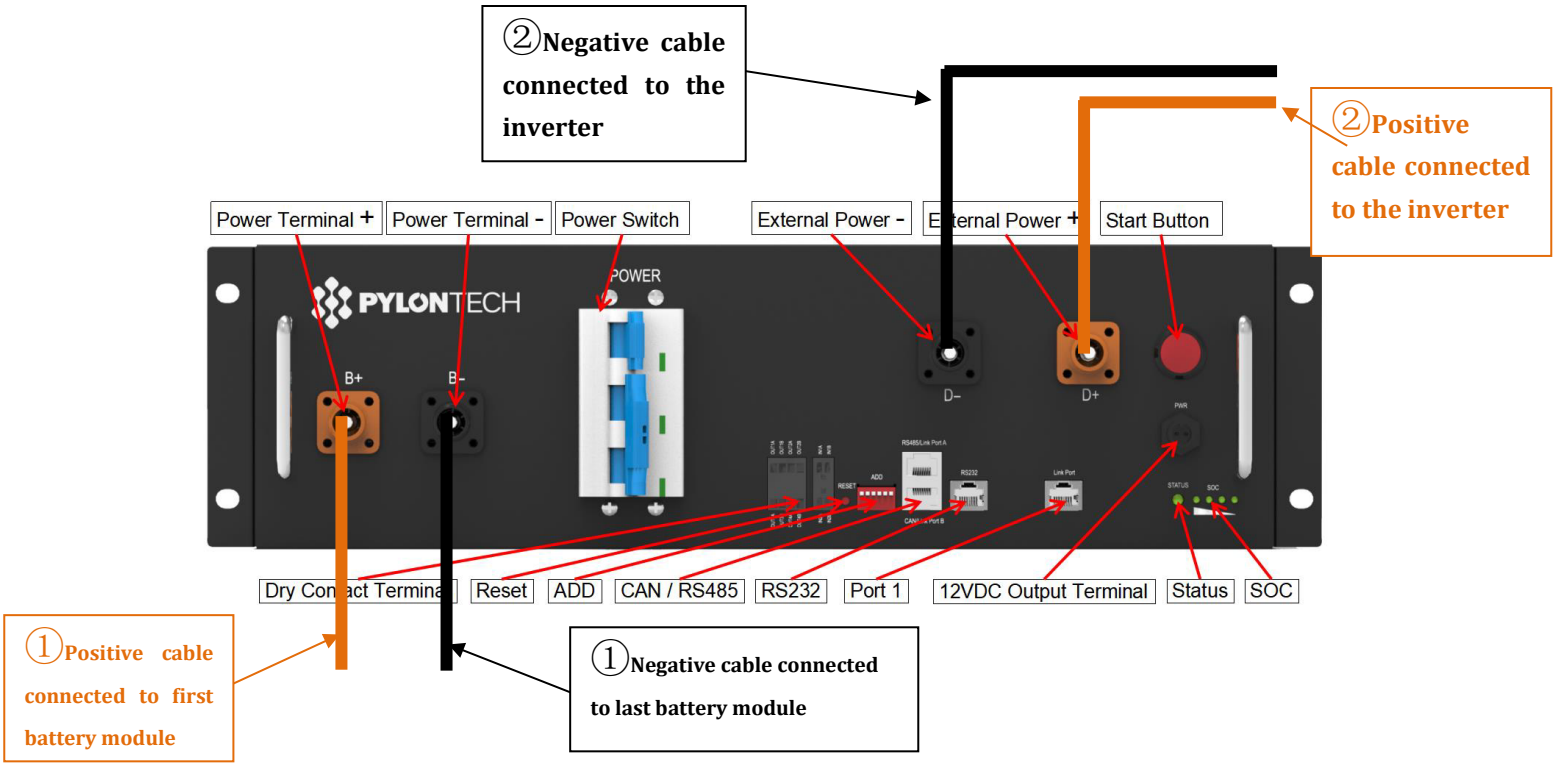


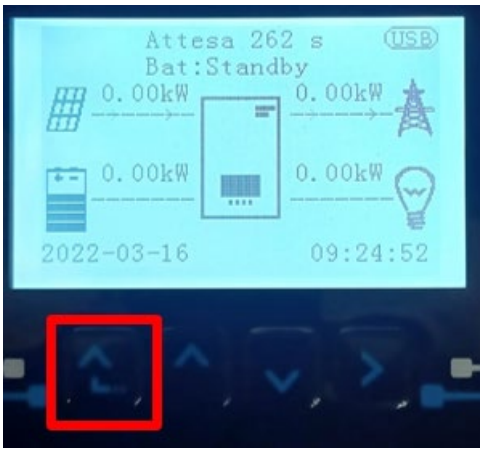

Figure 47 - BMS power connection

**Figure 48 - Inverter-side DC power connection with a single battery input populated**

### 4.2.1.5. Channel configuration (single Pylontech tower)

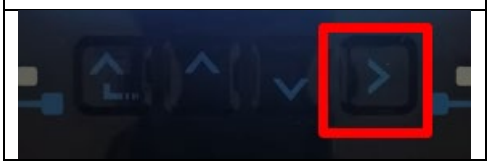
To configure the inverter channels correctly:

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




6. Press the last arrow on the right (enter) to access the basic settings:

| | |
|---|---|
| 1. | Basic settings |
| 2. | Advanced settings |
| 3. | Production statistics |
| 4. | System Info |
| 5. | Event list |
| 6. | SW Update |



7. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| | |
|---|---|
| 1. | Language |
| 2. | Date and Time |
| 3. | Safety parameters |
| 4. | Working mode |
| 5. | Self-Test |
| 6. | Channel configuration |
| 7. | EPS Mode |
| 8. | Communication address |

8. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

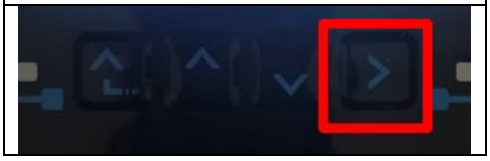
Set the battery inputs according to the configuration of the towers, specifically, with only one Pylontech BMS connected to the inverter:

- Input channel 1 – BAT input 1;
- Input channel 2 – Not used.

9. Once the channels have been correctly configured, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
| |

10. Enter the battery settings by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery parameters |
| 2. Feed-in limit |
| 3. IV Curve Scan |
| 4. Logic interface |
| 5. Factory reset |
| 6. Parallel settings |
| 7. Reset Bluetooth |
| 8. CT Calibration |
| 9. On-Off switch |
|  |

11. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| 1. Battery 1 |
| --- |
| |
| |
| |
| |
| |
| |
| |

12. Set the parameters as follows:

| BATTERY 1 | |
| --- | --- |
| 1.Battery type | Pylon |
| 2.Battery address | 00 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |
| 6.Save | |

#### 4.2.1.6. Installation with two battery towers (with SC500 and SC1000 BMS)

Figure 49 - Two battery towers

#### 4.2.1.7. Communication between the BMS (SC500 and SC1000) and Battery Modules

The communication connections must be arranged for each tower as shown in the previous sections, using the communication cables between the battery modules:

- Link port 1 of the BMS to link port 0 of the first battery
- Link port 1 of the first battery must be connected to link port 0 of the second
  …
- Link port 1 of the second-last connected to the last.

## BMS (SC500 and SC1000) – Inverter communication

The two BMS must be set with a different address by changing the position of the dip switches, as shown below:

- Address 000000 = address 0 (to be assigned to tower 1)
- Address 100001 = address 1 (to be assigned to tower 2)

The RJ45 cable of the BMS with Address=1 (tower 2) will depart from the link port B of the CAN/RS485 input and connect to the link port A of the CAN/RS485 input of the BMS with Address=0 (tower 1); finally, another cable must be inserted in link port B of the same BMS and must be connected to the COM of the inverter, in the same way as indicated in the previous section.

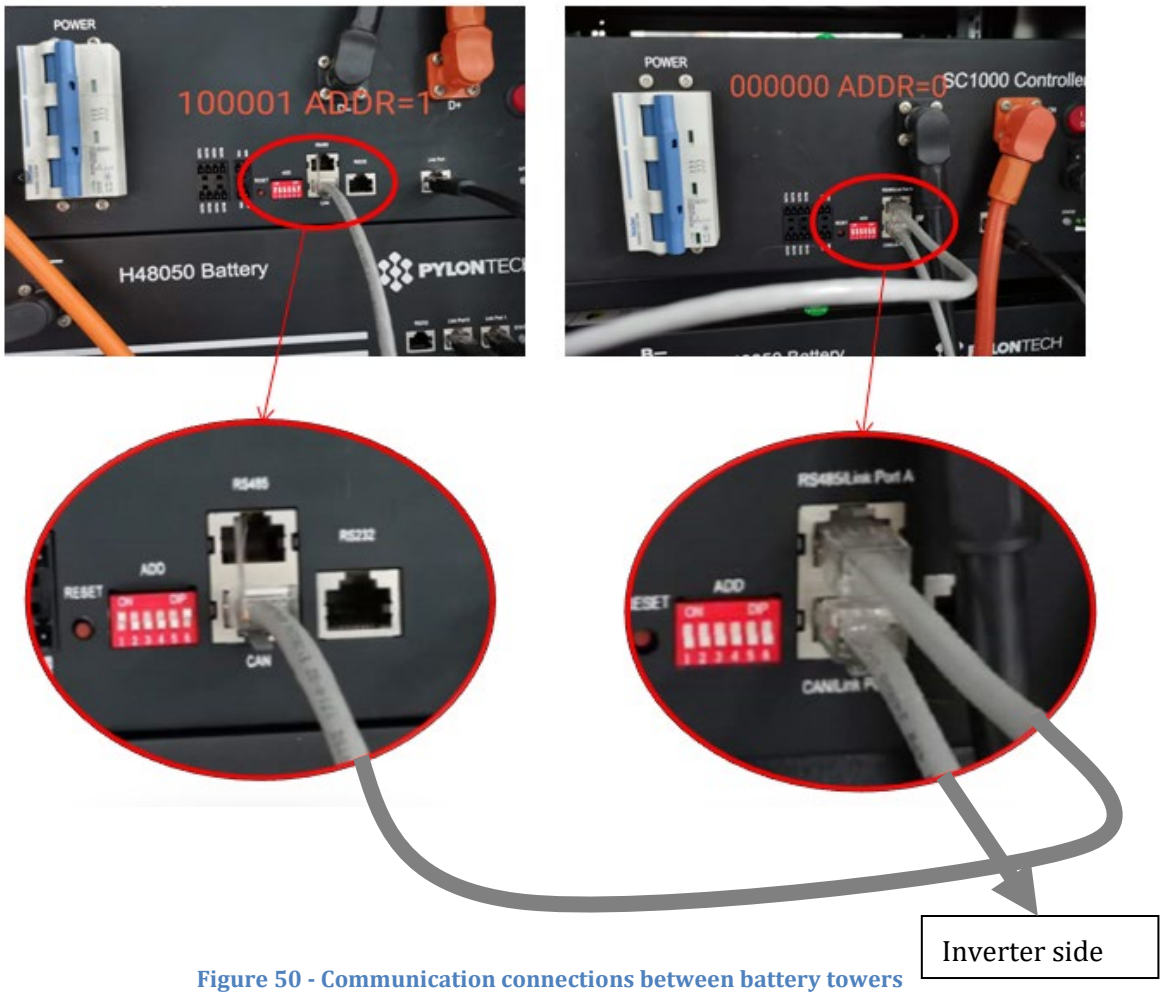



Figure 50 - Communication connections between battery towers

Connect the cable in position 4 (blue wire) to position 7 of the communication connector supplied with the inverter (see figure below).
Connect the cable in position 5 (white-blue wire) to position 8 of the communication connector supplied with the inverter (see figure below).
Connect the cable in position 2 (orange wire) to position 9 of the communication connector supplied with the inverter (see figure below).

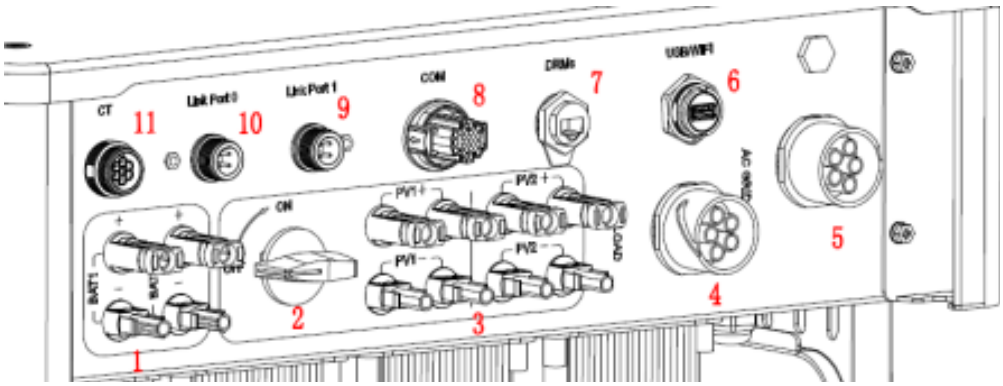



Figure 51 - Section of inverter connections

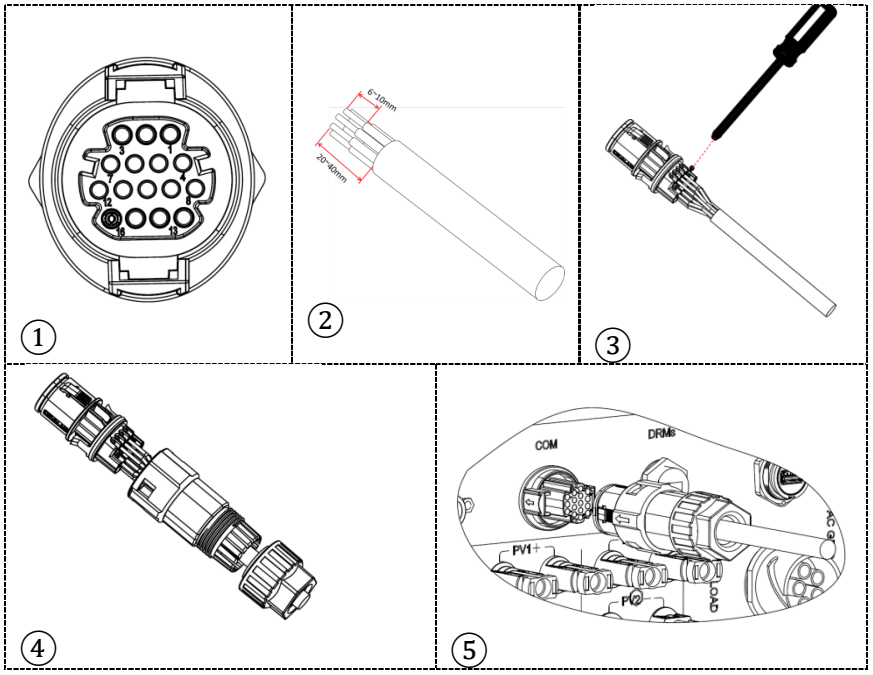



Figure 52 - "Screw-in" COM port connection

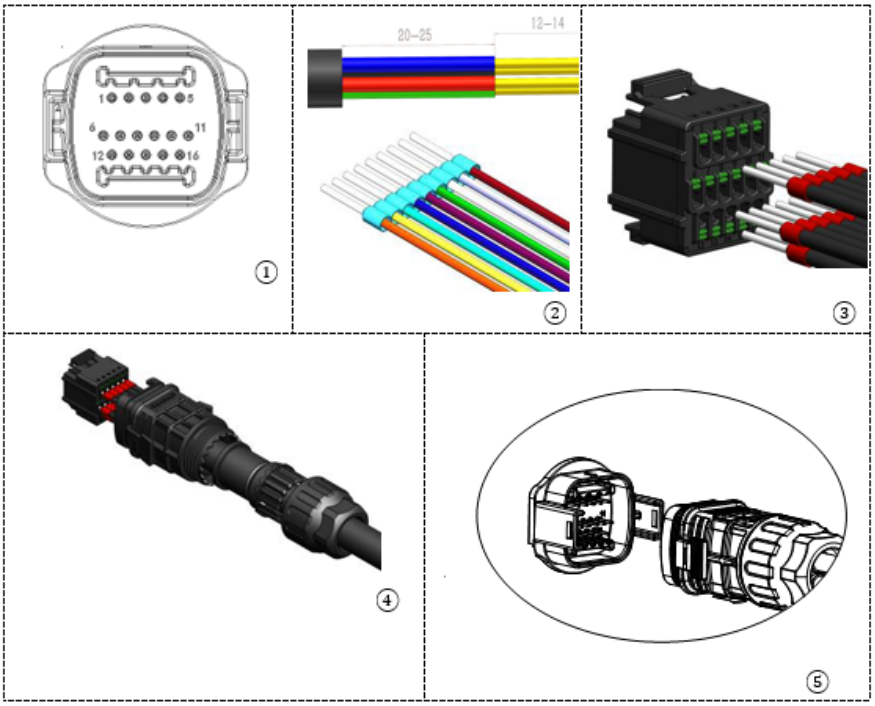



Figure 53 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (blue wire) | Communication with the BMS of the lithium battery, the CAN of the inverter adapts to the BMS of the lithium battery. |
| 8 | CAN L (white-blue wire) | |
| 9 | GND.S (orange wire) | |

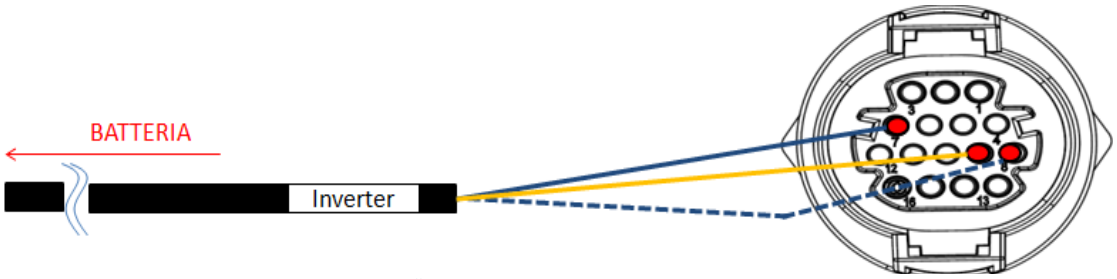



Figure 54 - "Screw-in" COM connection diagram

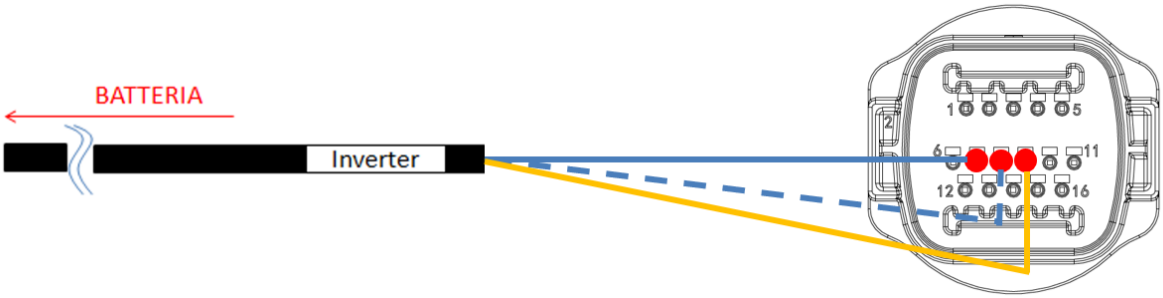



Figure 55 - "Snap-in" COM connection diagram

### 4.2.1.8. Power connections (SC500 and SC1000 BMS)

The power cables in each tower between the battery modules and the BMS must be connected as indicated in the previous section.
As for the connection between each tower and the inverter, the two power cables (+ and -) coming from each BMS will be connected to the two inputs of the inverter: BAT1 and BAT2

Figure 56 - Inverter-side DC power connection with two battery inputs populated

Identify the two battery towers by assigning the number 1 to the tower connected to channel 1 and number 2 to the tower connected to channel 2.

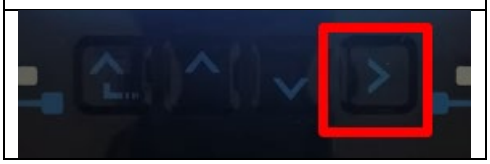
### 4.2.1.9. Channel configuration of Pylontech dual tower (SC500 and SC1000)

To configure the inverter channels correctly:

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

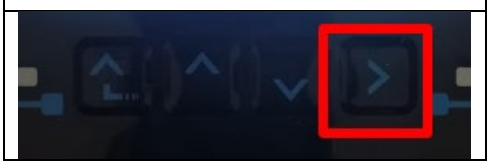
2. Press the last arrow on the right (enter) to access the basic settings:

| | |
|---|---|
| 1. | Basic settings |
| 2. | Advanced settings |
| 3. | Production statistics |
| 4. | System Info |
| 5. | Event list |
| 6. | SW Update |



3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| | |
|---|---|
| 1. | Language |
| 2. | Date and Time |
| 3. | Safety parameters |
| 4. | Working mode |
| 5. | Self-Test |
| 6. | Channel configuration |
| 7. | EPS Mode |
| 8. | Communication address |



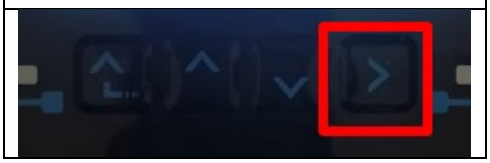
4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

Set the battery inputs according to the configuration of the towers, specifically, with two Pylontech Battery Management Systems connected to the inverter:

- Input channel 1 – BAT input 1;
- Input channel 2 – BAT input 2.

5. Once the channels have been configured correctly, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
|  |

6. Enter the battery settings by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery parameters |
| 2. Feed-in limit |
| 3. IV Curve Scan |
| 4. Logic interface |
| 5. Factory reset |
| 6. Parallel settings |
| 7. Reset Bluetooth |
| 8. CT Calibration |
| 9. On-Off switch |
| |

7. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Battery 2 |
| |
| |
| |
| |
| |
| |

8. Set the parameters as follows:

| BATTERY 1 | |
|---|---|
| 1.Battery type | Pylon |
| 2.Battery address | 00 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |
| 6.Save | |

9. Enter the Battery 2 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Battery 2 |
| |
| |
| |
| |
| |
| |

10. Set the parameters as follows:

| BATTERY 2 | |
|---|---|
| 1.Battery type | Pylon |
| 2.Battery address | 01 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |
| 6.Save | |

### 4.2.1.10. Installation with two battery towers (with Wi-Fi/USB SC500 and Wi-Fi/USB SC1000 BMS)

Figure 57 - Two battery towers

### 4.2.1.11. Communication between BMS (Wi-Fi/USB SC500 and Wi-Fi/USB SC1000) and Battery Modules

The communication connections must be arranged for each tower as shown previously, using the communication cables between the battery modules:

- Link port 1 of the BMS to link port 0 of the first battery
- Link port 1 of the first battery must be connected to link port 0 of the second
  …
- Link port 1 of the second-last battery must be connected to link port 0 of the last battery.

## BMS (Wi-Fi/USB SC500 and Wi-Fi/USB SC1000) Communication - Inverter

The two BMSs must be set with a different address by changing the position of the dip switches, as shown below:

- Address 100001 = address 1 (to be assigned to tower 1)
- Address 010001 = address 1 (to be assigned to tower 2)

The RJ45 cable of the BMS with Address=010001 (tower 2) will run from the Link Port B input and connect to the Link Port A input of the BMS with Address=100001 (tower 1); finally, another cable must be inserted into Link Port B of the same BMS and must be connected to the COM of the inverter in the same way as indicated above.

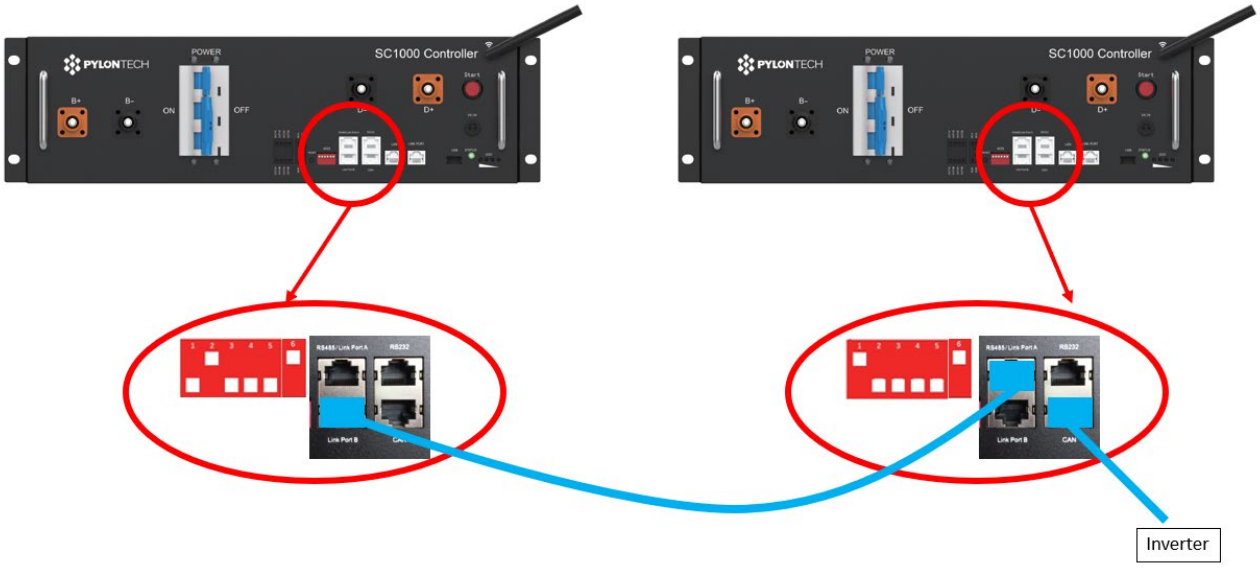



Figure 58 - Communication connections between battery towers

Connect the cable in position 4 (blue wire) to position 7 of the communication connector supplied with the inverter (see figure below).
Connect the cable in position 5 (white-blue wire) to position 8 of the communication connector supplied with the inverter (see figure below).
Connect the cable in position 2 (orange wire) to position 9 of the communication connector supplied with the inverter (see figure below).

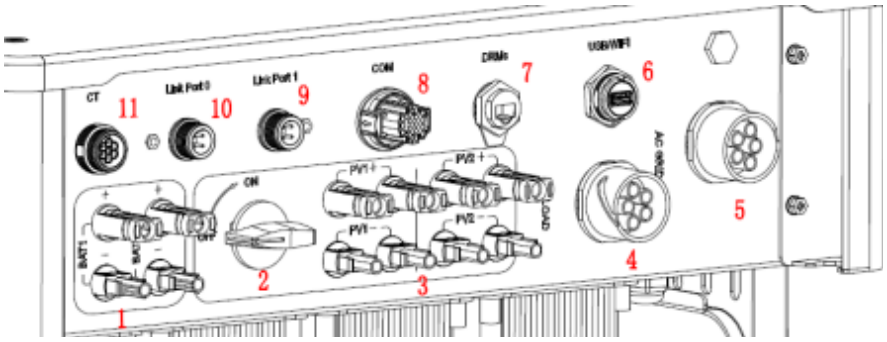



Figure 59 - Section of inverter connections

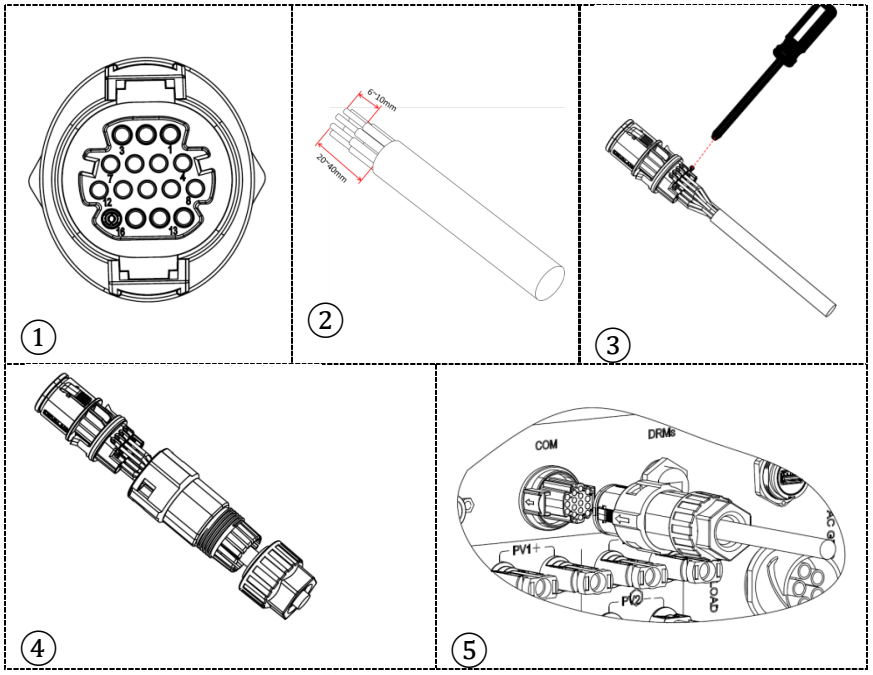



Figure 60 - "Screw-in" COM port connection

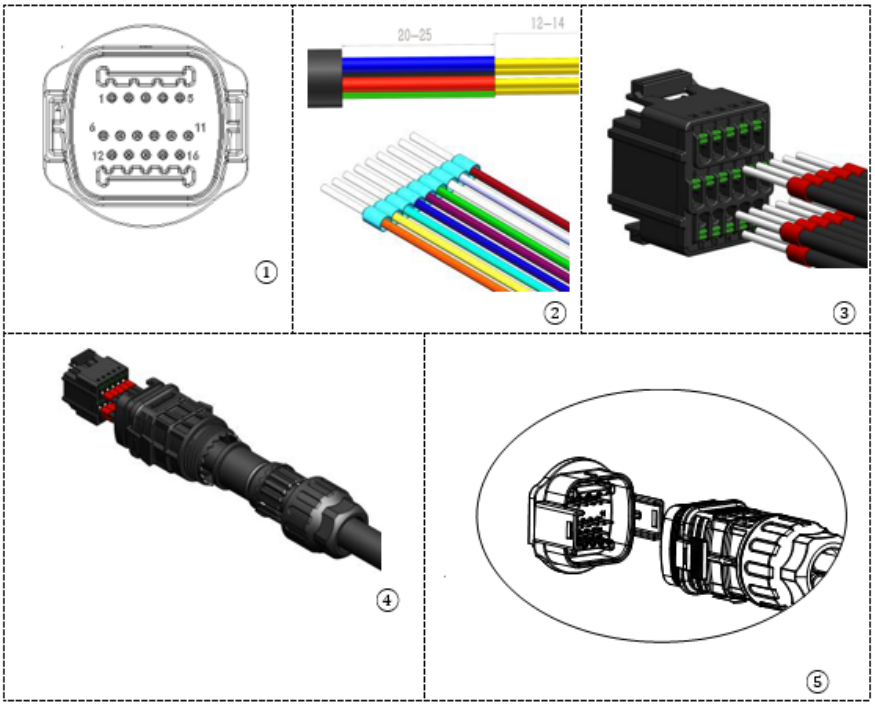



Figure 61 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (blue wire) | Communication with the BMS of the lithium battery, the CAN of the inverter adapts to the BMS of the lithium battery. |
| 8 | CAN L (white-blue wire) | |
| 9 | GND.S (orange wire) | |

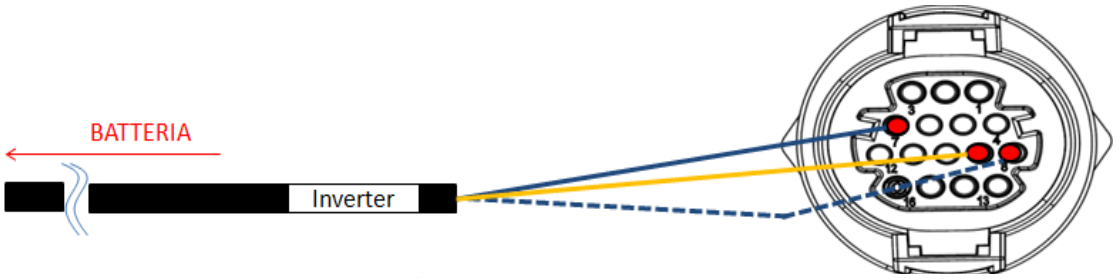



Figure 62 - "Screw-in" COM connection diagram

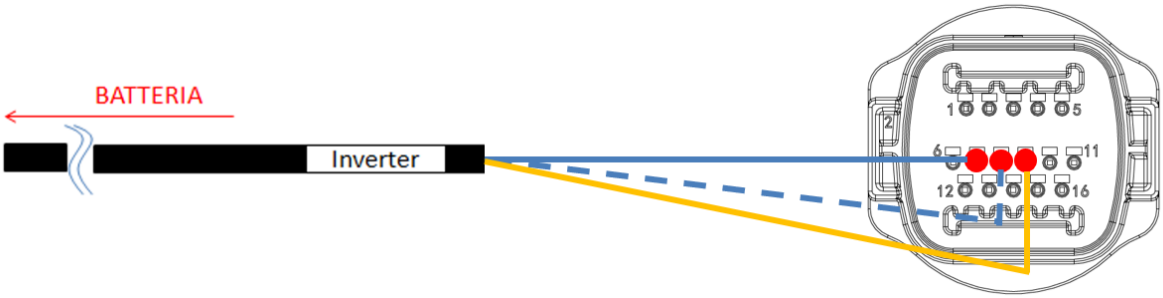



Figure 63 - "Snap-in" COM connection diagram

#### 4.2.1.12. Power connections (Wi-Fi/USB SC500 and Wi-Fi/USB SC1000 BMS)

The power cables in each tower between the battery modules and the BMS must be connected as indicated above.
As for the connection between each tower and the inverter, the two power cables (+ and -) coming from each BMS will be connected to the two inputs of the inverter: BAT1 and BAT2

Figure 64 - Inverter-side DC power connection with two battery inputs populated

Identify the two battery towers by assigning the number 1 to the tower connected to channel 1 and number 2 to the tower connected to channel 2.

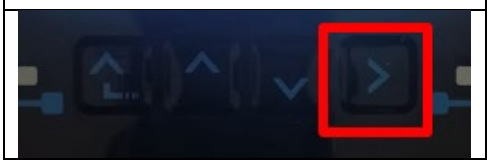
### 4.2.1.13. Channel configuration (two Pylontech towers - Wi-Fi/USB SC500 and Wi-Fi/USB SC1000))

To configure the inverter channels correctly:

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

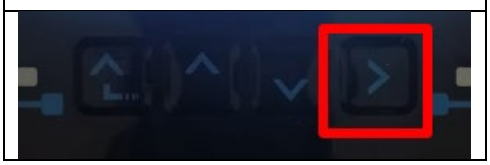
2. Press the last arrow on the right (enter) to access the basic settings:

| | |
|---|---|
| 1. | Basic settings |
| 2. | Advanced settings |
| 3. | Production statistics |
| 4. | System Info |
| 5. | Event list |
| 6. | SW Update |



3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| | |
|---|---|
| 1. | Language |
| 2. | Date and Time |
| 3. | Safety parameters |
| 4. | Working mode |
| 5. | Self-Test |
| 6. | Channel configuration |
| 7. | EPS Mode |
| 8. | Communication address |



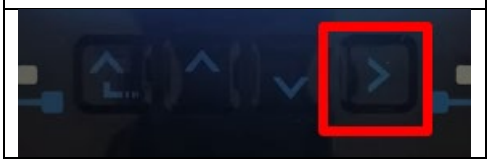
4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

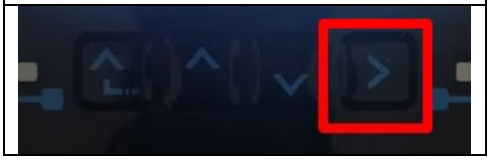
Set the battery inputs according to the configuration of the towers, specifically, with two Pylontech Wi-Fi/USB Battery Management Systems connected to the inverter:

- Input channel 1 – BAT input 1;
- Input channel 2 – BAT input 1.

5. Once the channels have been configured correctly, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
|  |

6. Enter the battery settings by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery parameters |
| 2. Feed-in limit |
| 3. IV Curve Scan |
| 4. Logic interface |
| 5. Factory reset |
| 6. Parallel settings |
| 7. Reset Bluetooth |
| 8. CT Calibration |
| 9. On-Off switch |
|  |

7. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| 1. Battery 1 |
| --- |
| |
| |
| |
| |
| |
| |
| |

8. Set the parameters as follows:

| BATTERY 1 | |
| --- | --- |
| 1.Battery type | Pylon |
| 2.Battery address | 01 |
| 3.Maximum charge (A) | 50.00A |
| 4.Maximum discharge (A) | 50.00A |
| 5.Depth of Discharge | 80% |
| 6.Save | |

The first time the inverter is switched on, error code ID044 (PvConfigError) may appear in the current event list for about 5/10 minutes. Do not switch off or restart the inverter as this behaviour is caused by the BMS configuration. After this waiting period, the system will start operating normally.

### 4.2.2.WeCo 5K3 battery installation

#### 4.2.2.1. Only one 5K3 battery tower connected

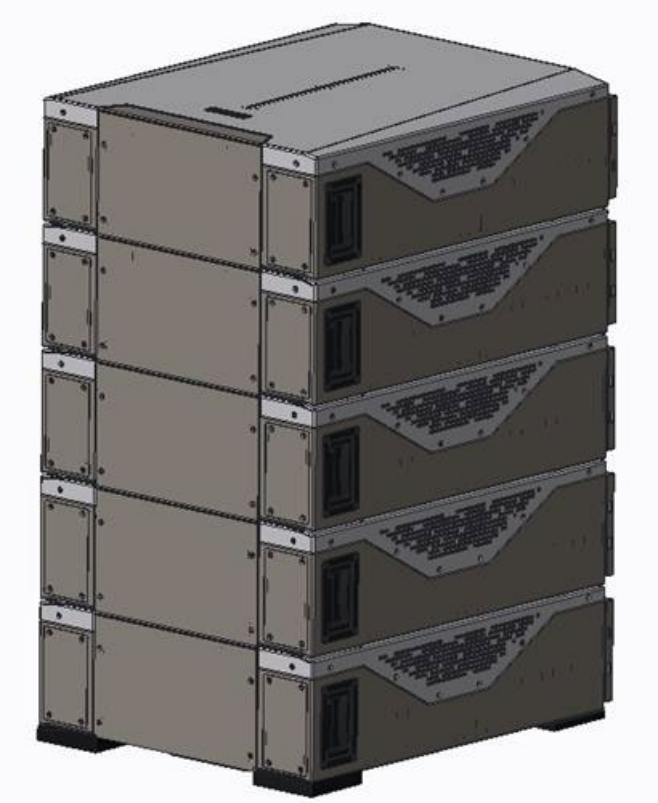


Figure 65 - Single battery tower

Each tower consists of an HV-BOX connected in series to multiple battery modules.
The devices to be used are:

1. external HV BOX

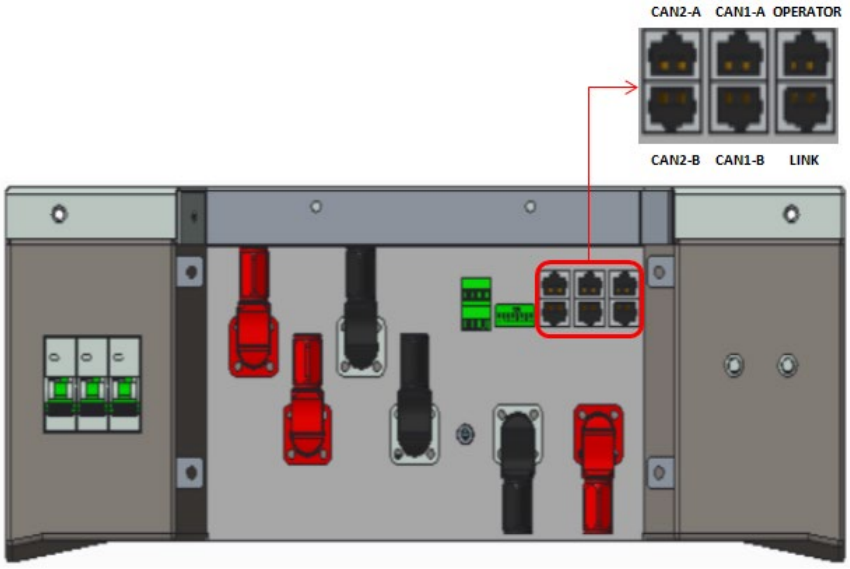



Figure 66 - HV BOX

2. Battery module

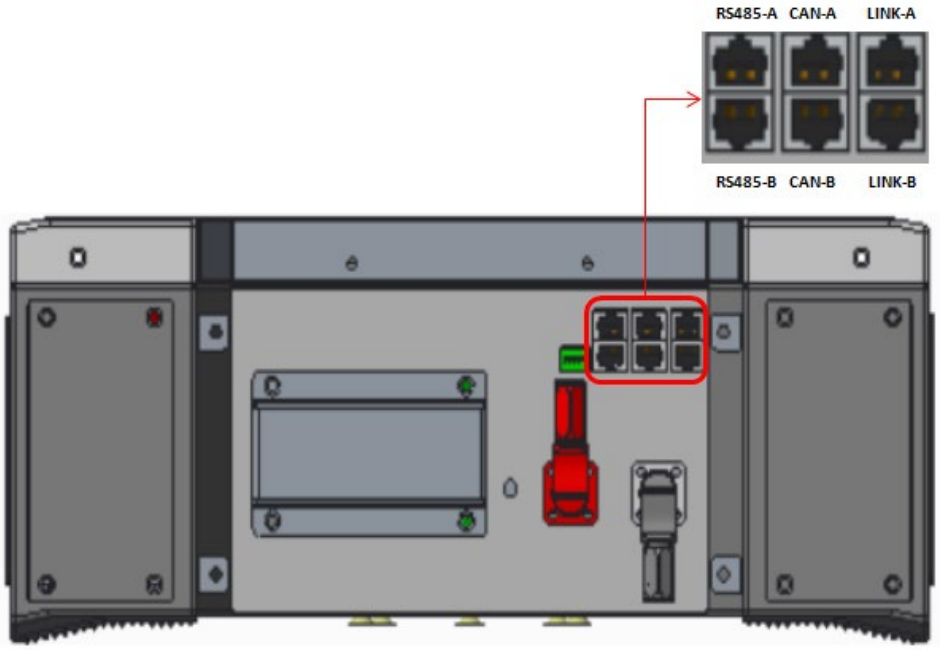



Figure 67 - Battery module to be connected in series

### 4.2.2.2. Communication between HV BOX and 5K3 Battery Modules

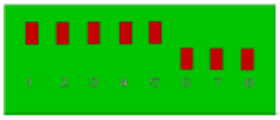
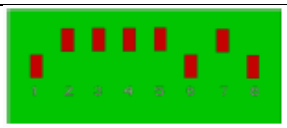
The communication connections must be arranged as follows, using the communication cables between the battery modules:

- CAN1-B of the HV BOX to CAN-A of the first battery
- LINK of the HV BOX to LINK-A of the first battery
- CAN-B of the first battery to CAN-A of the second battery
- LINK-B of the first battery to LINK-A of the second battery

  …
- CAN-B of the second-last battery to CAN-A of the last battery
- LINK-B of the second-last battery to LINK-A of the last battery.

As regards the positioning of the dip switches of the battery tower, it is necessary to first check the serial number of the HV BOX module and select the address according to the following indications:

- The DIP switches of all the battery modules except for the last one must be set so that the addresses from 1 to 5 are in the ON position, while those from 6 to 8 are in the OFF position (ADD=111111000).
- The last module in the series must have all pins set to ON, except for pins 1, 6, and 8 which must be set to OFF (ADD=01111010)

| | |
|---|---|
| Battery modules from first to second-last battery |  |
| Last battery in the series |  |

Connect all battery and HV-BOX grounds to the ground system via appropriate terminals.

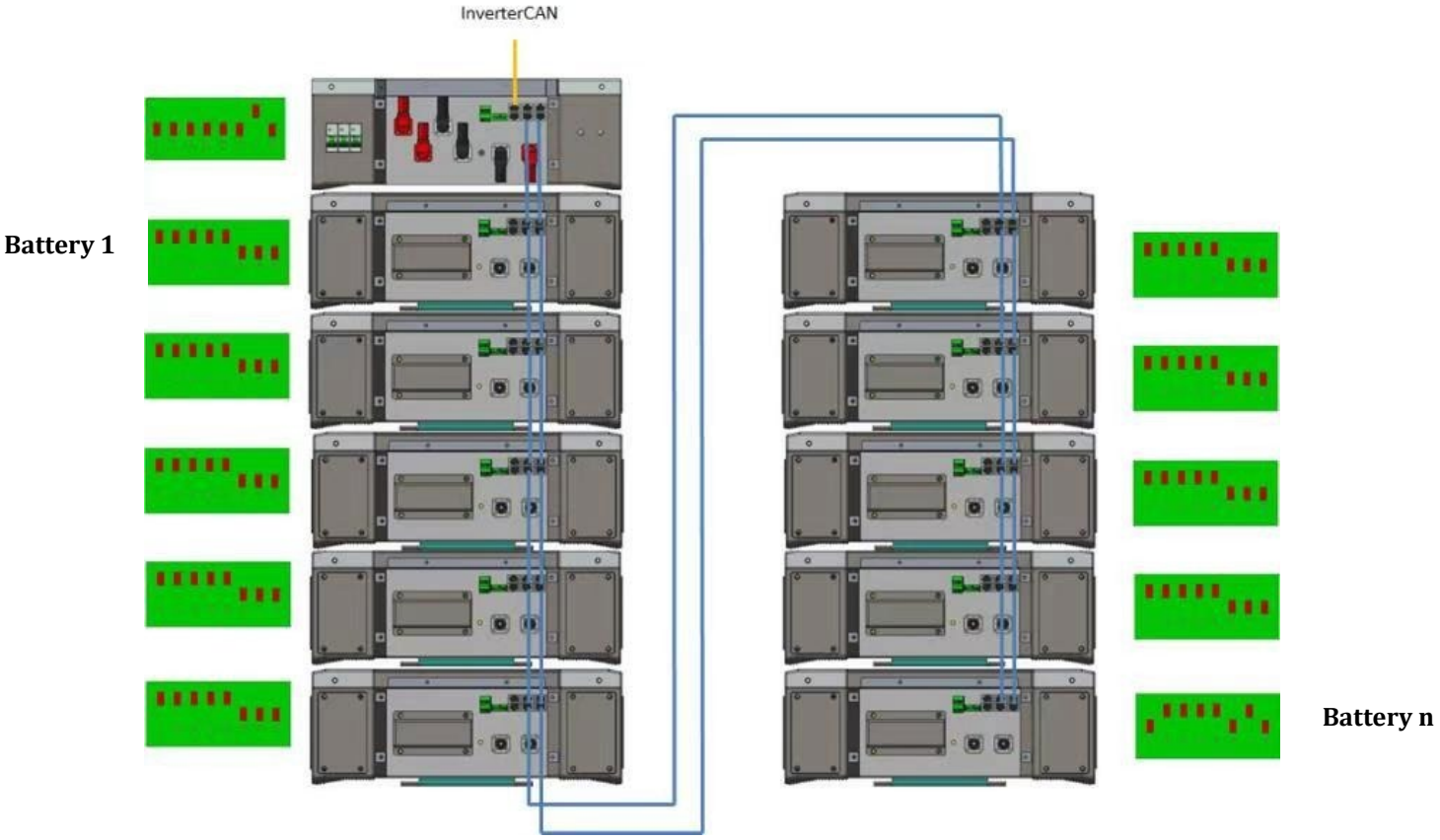



**Figure 68 - Communication connections: HV BOX and first battery module, connection between battery modules, connection between second-last and last battery module in the series**

### 4.2.2.3. 5K3 HV BOX and Inverter communication

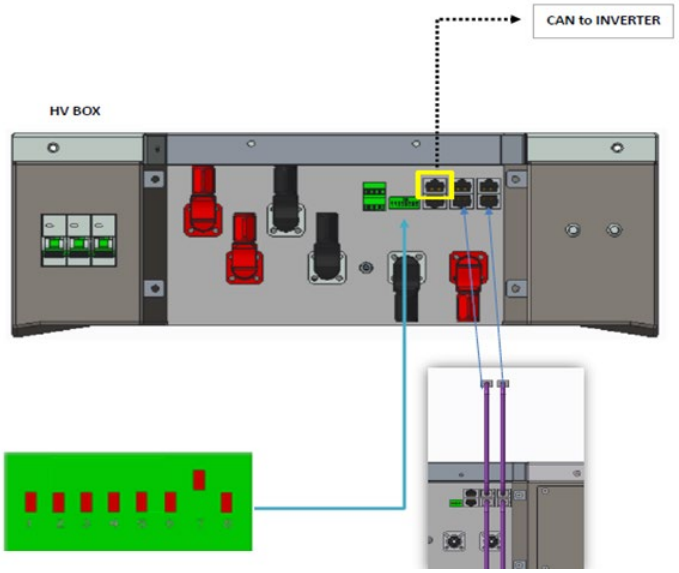



Figure 69 - HV BOX configuration

In the case of a single battery tower, the address must be set with all pins in the OFF position, except for pin 7, which must be in the ON position.

The inverter and the HV BOX must be connected by populating the CAN2-A input with the Inverter-HV BOX communication cable. The other end, in which only the “orange” and “white-orange” wires are present, must be wired to the quick-connect COM connector of the hybrid inverter, as shown in the figures below.
The HV BOX must be grounded using the M5 screw terminals supplied.

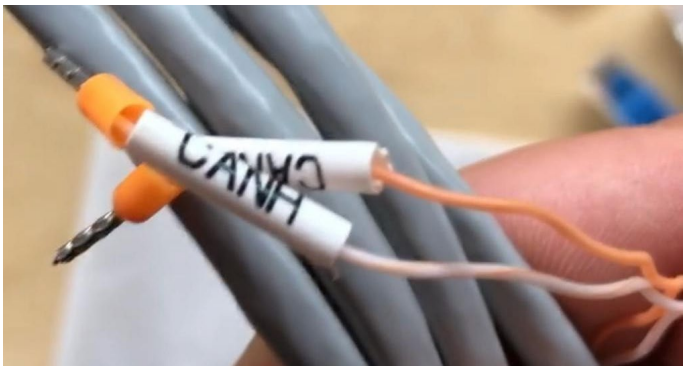



Figure 70 - Inverter/HV BOX communication cable

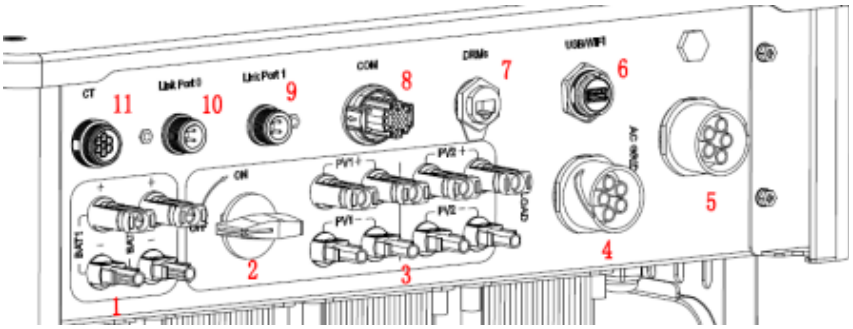



Figure 71 - Section of inverter connections

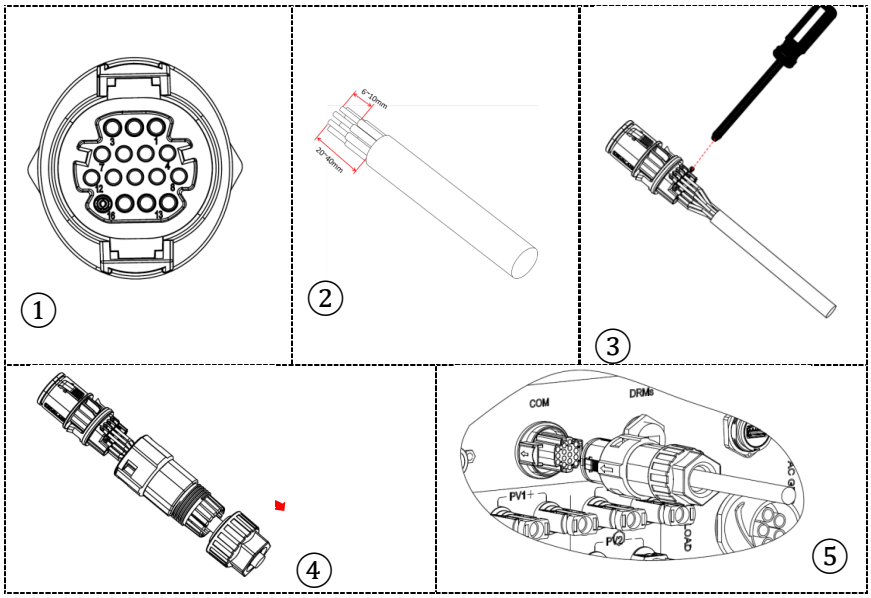



Figure 72 - "Screw-in" COM port connection

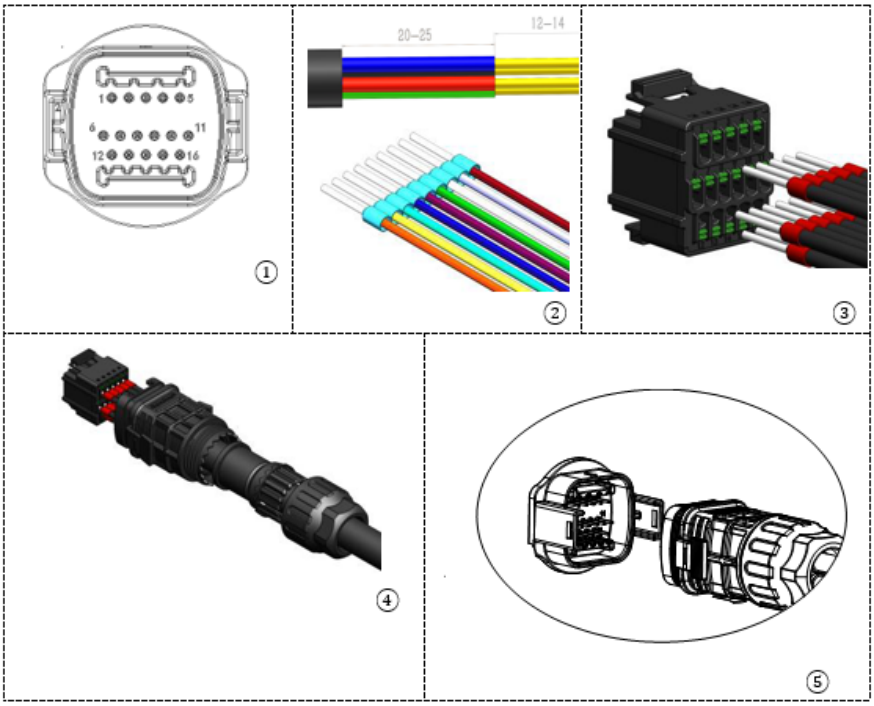



Figure 73 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (white-orange wire) | Communication with thee HV BOX of the lithium battery, the CAN of the inverter adapts to the HV BOX of the lithium battery. |
| 8 | CAN L (orange wire) | |

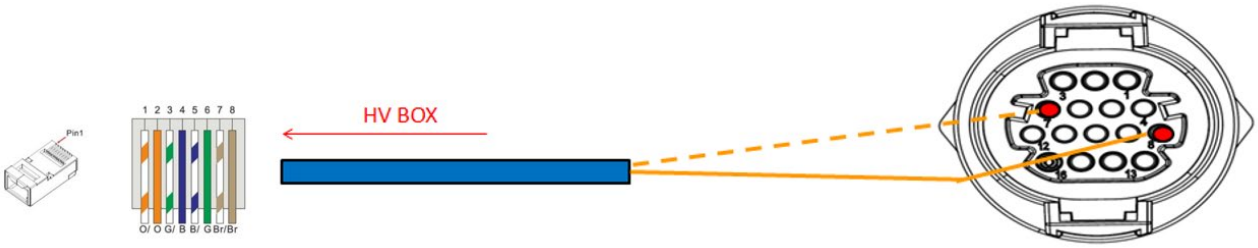



Figure 74 - "Screw-in" COM interface description

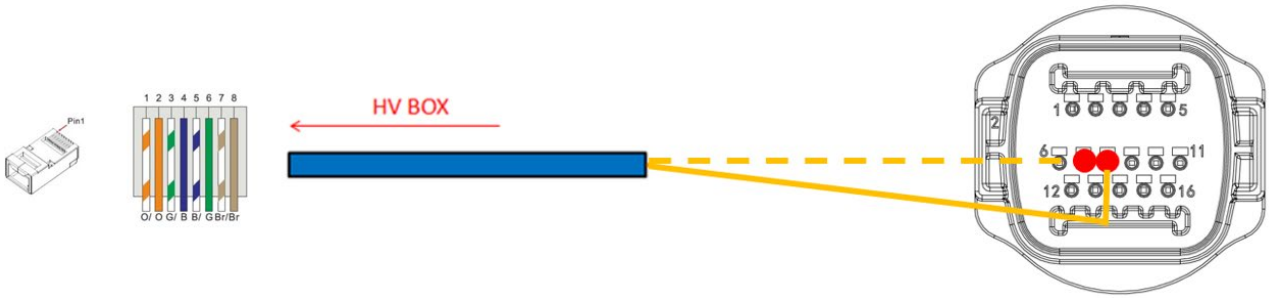



Figure 75 - "Snap-in" COM connection diagram

### 4.2.2.4. 5K3 power connections

The battery modules must be connected in series via the cables supplied.
The connector must be connected from the negative input of the first battery to the positive input of the second one. From here, the negative input must be connected to the positive input of the third module, continuing the series until the negative input of the second-last module is connected to the positive input of the last module.
In this configuration, the positive input of the first module and the negative input of the last battery will remain free (use the colour of the connector as a reference).

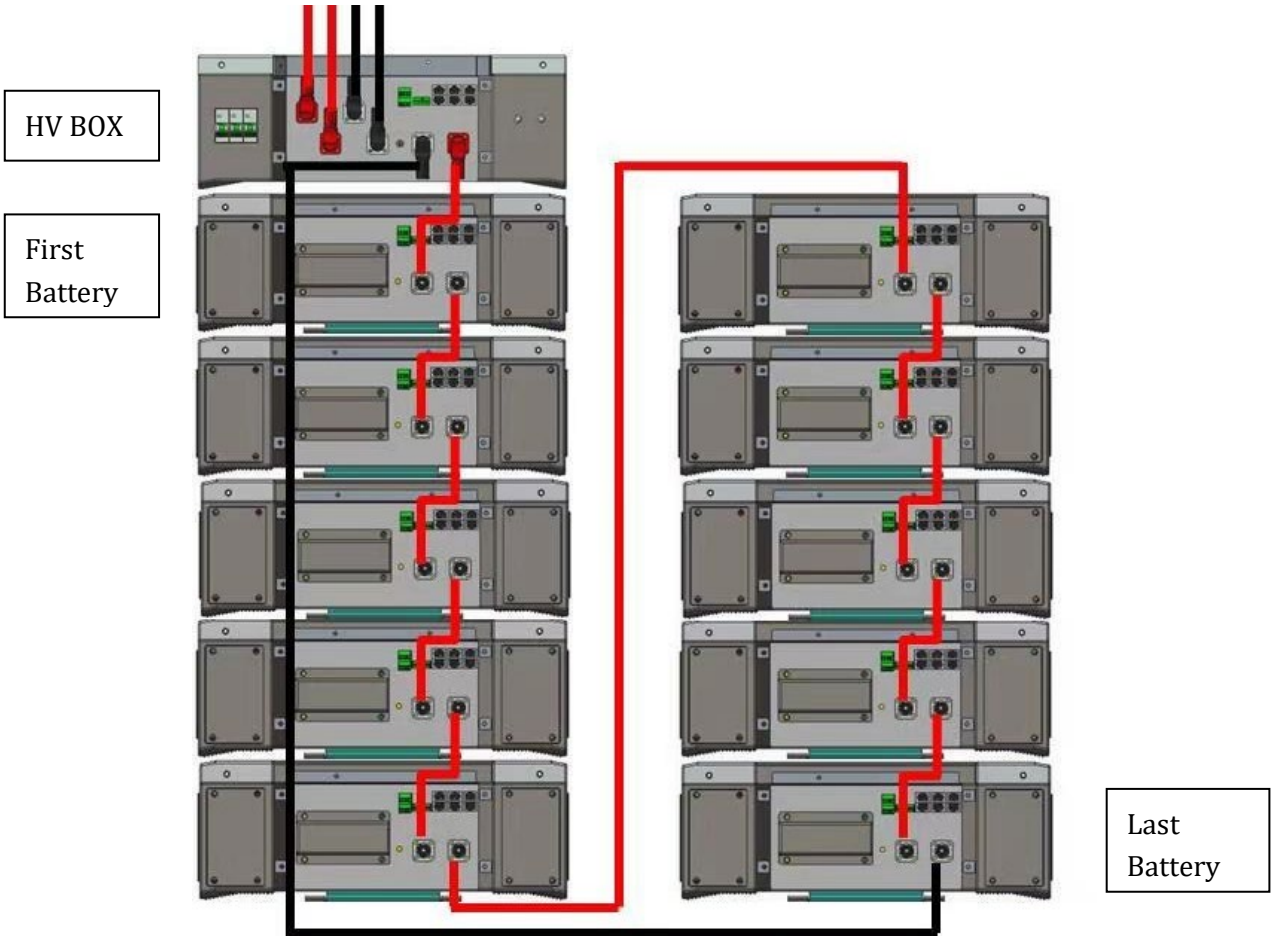



Figure 76 - Power wiring between battery modules in series

Subsequently, the HV BOX must be connected respecting the + and – polarity as it is powered by the batteries themselves. Therefore, the positive of the HV BOX must be connected to the positive of the first battery, and the negative of the HV BOX to the negative of the last battery module.
The HV BOX must be grounded using the M5 screw terminals supplied.
Connect all the grounds to the ground system using the appropriate connector.

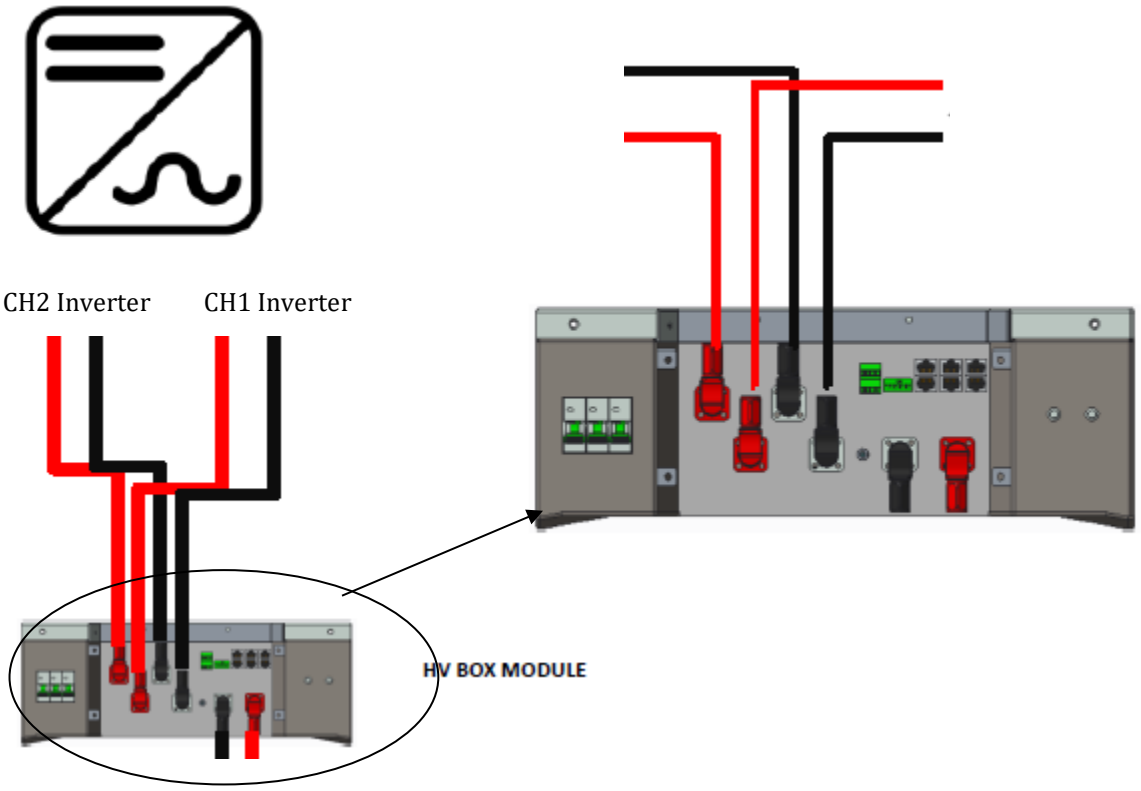



Figure 77 - HV BOX power connection

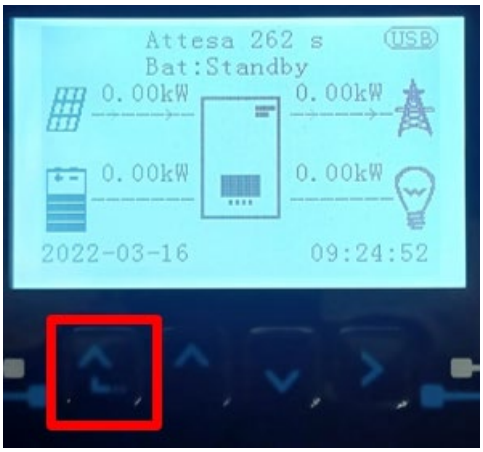
As for the power connections between the HV BOX and the inverter, the HV BOX module allows the connection of both channels coming from the inverter (if properly set, the battery column will be able to manage the maximum power of the inverter, both when charging and discharging).

Figure 78 - Inverter-side DC power connection with two battery inputs populated

### 4.2.2.5. Channel configuration (single WeCo 5K3 tower)

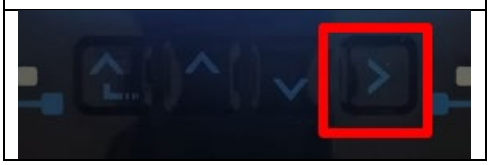
To configure the inverter channels correctly:

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




2. Press the last arrow on the right (enter) to access the basic settings:

| | |
|---|---|
| 1. | Basic settings |
| 2. | Advanced settings |
| 3. | Production statistics |
| 4. | System Info |
| 5. | Event list |
| 6. | SW Update |



3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| | |
|---|---|
| 1. | Language |
| 2. | Date and Time |
| 3. | Safety parameters |
| 4. | Working mode |
| 5. | Self-Test |
| 6. | Channel configuration |
| 7. | EPS Mode |
| 8. | Communication address |

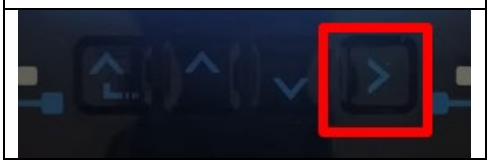
4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

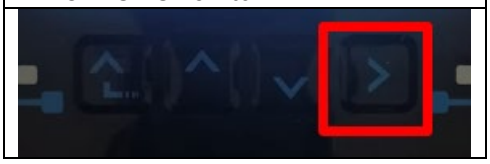
As for the batteries, setting the inputs according to the configuration of the towers, specifically, with only one WeCo HVBOX connected to the inverter, it is possible:

1. For HYD 5000 ZSS/HYD 8000 ZSS inverter (single battery input):
   - Input channel 1 – BAT input 1;
   - Input channel 2 – Not used.
2. For HYD 10000 ZSS/HYD 20000 ZSS inverter (dual battery input):
   - Input channel 1 – BAT input 1;
   - Input channel 2 – BAT input 1.

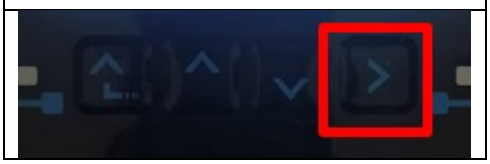
5. Once the channels have been configured correctly, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
|  |

6. Enter the battery settings by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery parameters |
| 2. Feed-in limit |
| 3. IV Curve Scan |
| 4. Logic interface |
| 5. Factory reset |
| 6. Parallel settings |
| 7. Reset Bluetooth |
| 8. CT Calibration |
| 9. On-Off switch |
|  |

7. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| |
| |
| |
| |
| |
| |
|  |

8. Set the parameters as follows:

| HYD 5000 ZSS/HYD 8000 ZSS | |
|---|---|
| BATTERY 1 | |
| 1.Battery type | WeCo |
| 2.Battery address | 00 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |

| HYD 10000 ZSS/HYD 20000 ZSS | |
|---|---|
| BATTERY 1 | |
| 1.Battery type | WeCo |
| 2.Battery address | 00 |
| 3.Maximum charge (A) | 50.00A |
| 4.Maximum discharge (A) | 50.00A |
| 5.Depth of Discharge | 80% |

### 4.2.2.6. Installation with two battery towers 5K3

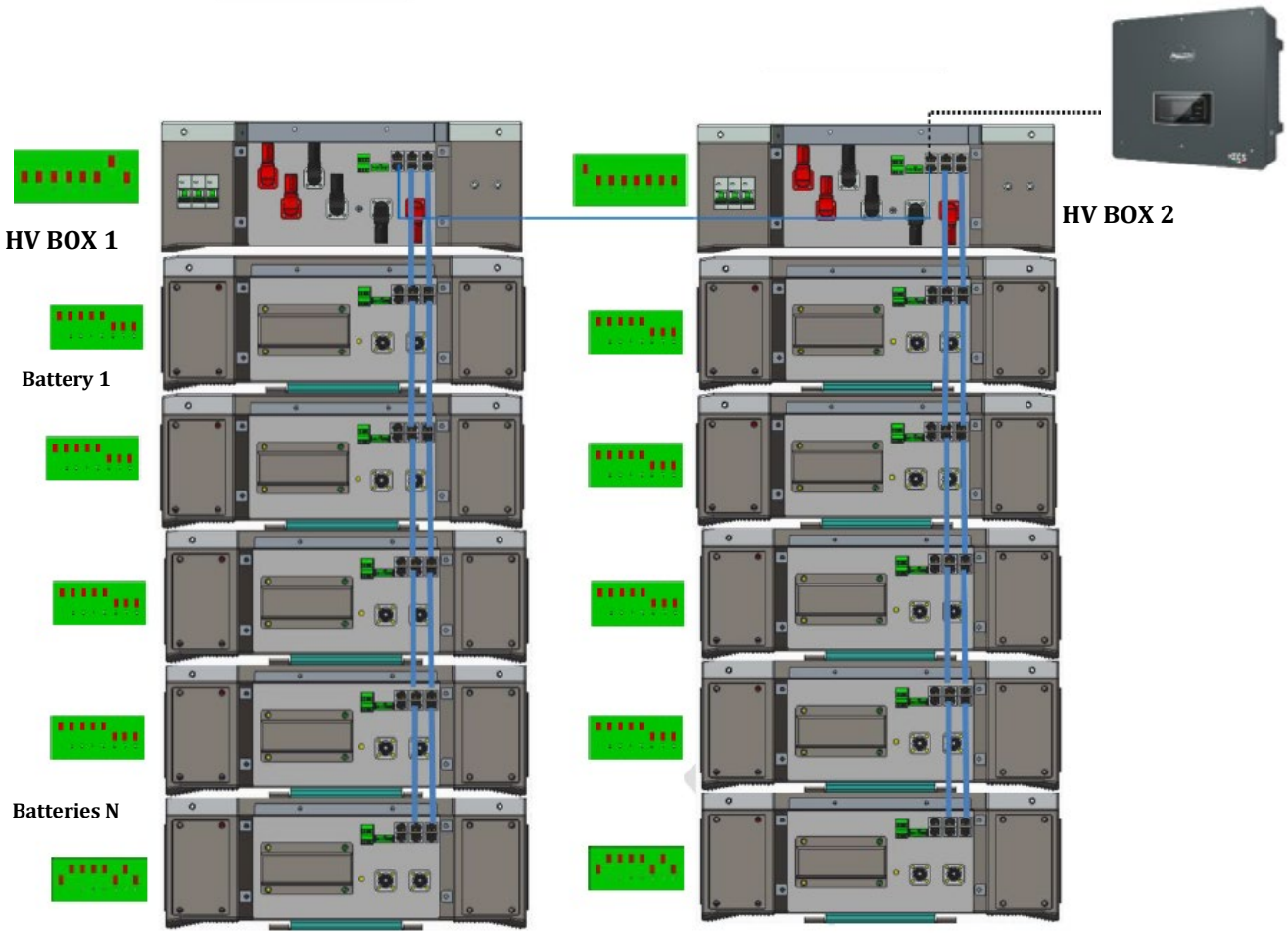



Figure 79 - Two battery towers

### 4.2.2.7. Communication between HV BOX and 5K3 Battery Modules

The communication connections must be arranged for each tower as shown in the previous sections, using the communication cables between the battery modules:

- CAN1-B of the HV BOX to CAN-A of the first battery
- LINK of the HV BOX to LINK-A of the first battery
- CAN-B of the first battery to CAN-A of the second battery
- LINK-B of the first battery to LINK-A of the second battery
  …
- CAN-B of the second-last battery to CAN-A of the last battery
- LINK-B of the second-last battery to LINK-A of the last battery.
-

Connect all battery and HV-BOX grounds to the ground system via appropriate terminals.

### 4.2.2.8. 5K3 HV BOX – Inverter communication

In the case of two battery towers:

1. Battery Tower 1
   a. All pins in the OFF position, except pin 1, which must be in the ON position (ADD=00000010).
2. Battery Tower 2
   a. All pins in the OFF position, except pin 7, which must be in the ON position (ADD=10000000).

A cable from the CAN2-B input of the HV BOX of tower 1 must be connected to the CAN2-B input of the HV BOX of tower 2; finally, the Inverter/HV BOX communication cable must be inserted in the CAN2-A port of the HV BOX.

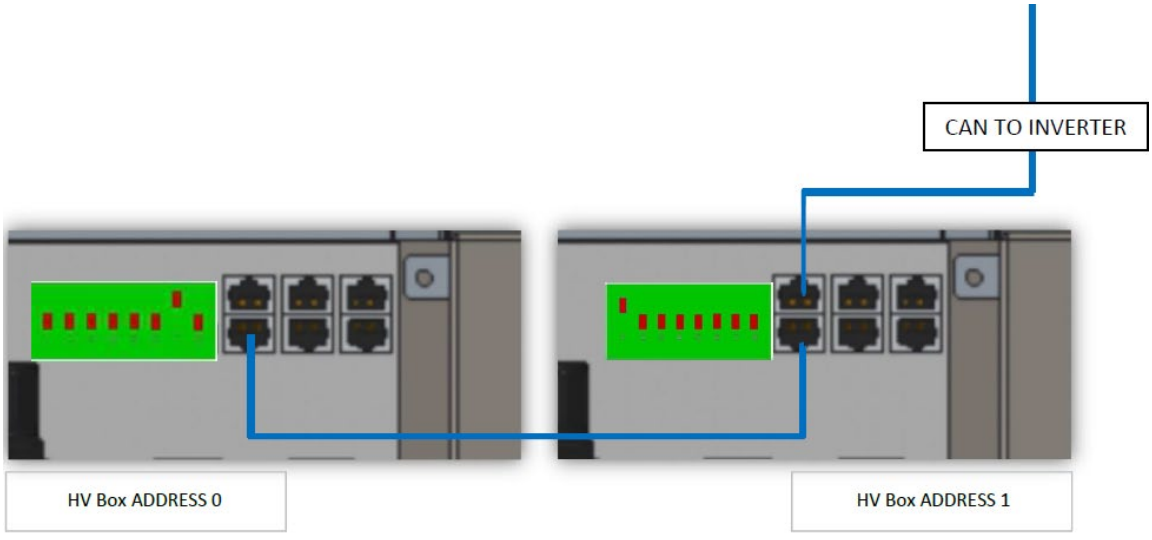



Figure 80 - Communication connections between battery towers

The inverter and the HV BOX must be connected by populating the CAN2-A input with the Inverter-HV BOX communication cable. The other end, in which only the “orange” and “white-orange” wires are present, must be wired to the quick-connect COM connector of the hybrid inverter, as shown in the figures below.
The HV BOX must be grounded using the M5 screw terminals supplied.

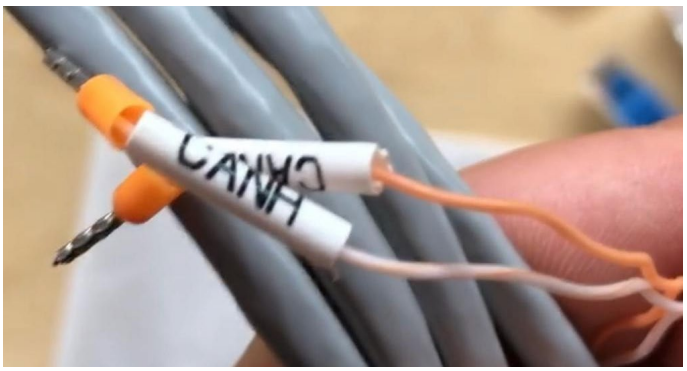



Figure 81 - Inverter/HV BOX communication cable

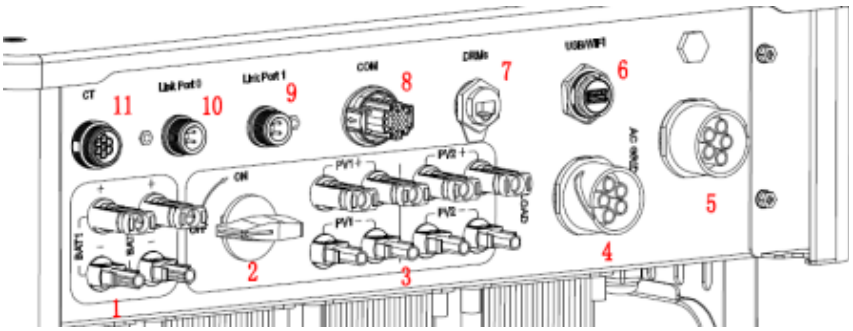



Figure 82 - Section of inverter connections

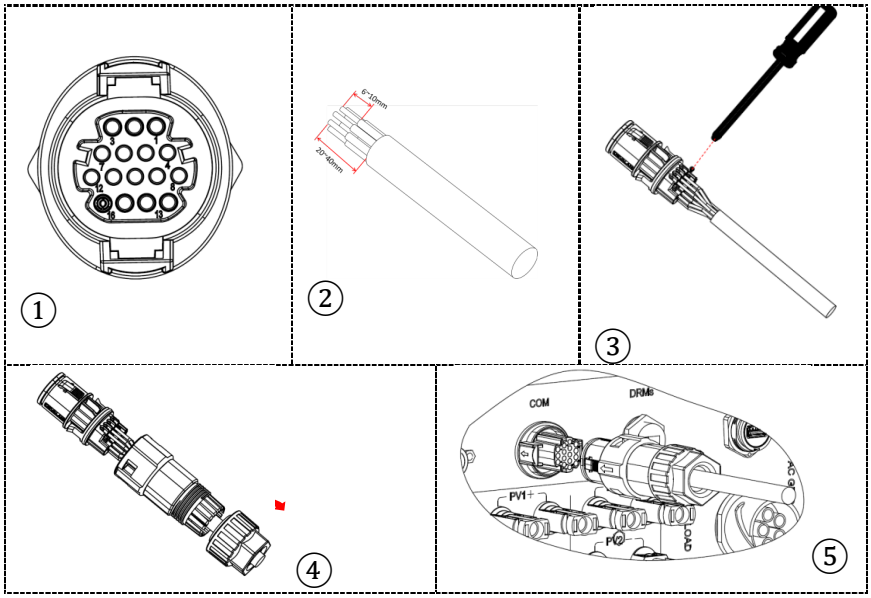



Figure 83 - "Screw-in" COM port connection

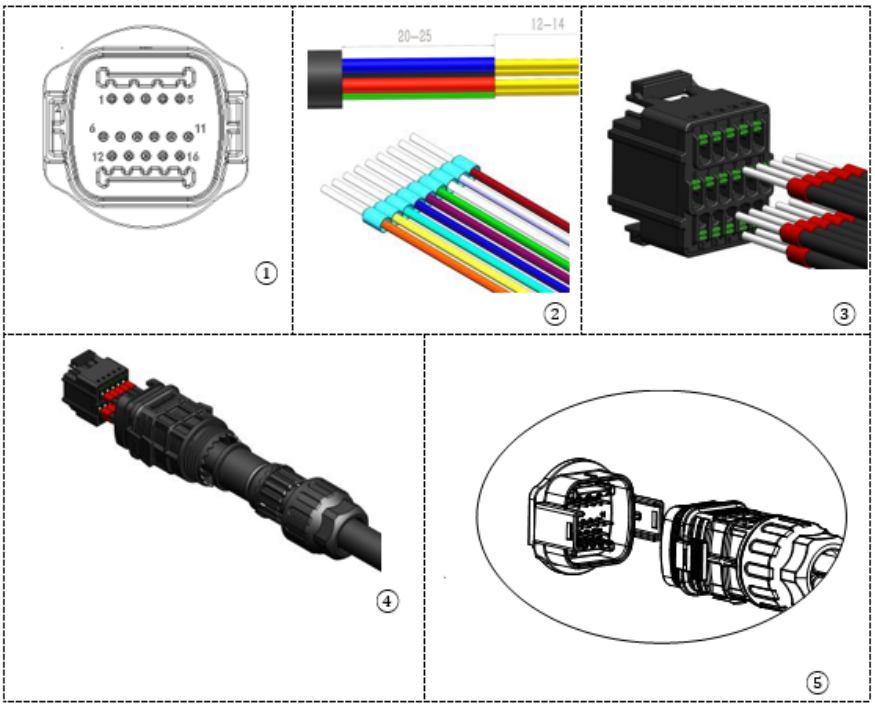



Figure 84 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (white-orange wire) | Communication with the HV BOX of the lithium battery, the CAN of the inverter adapts to the HV BOX of the lithium battery. |
| 8 | CAN L (orange wire) | |

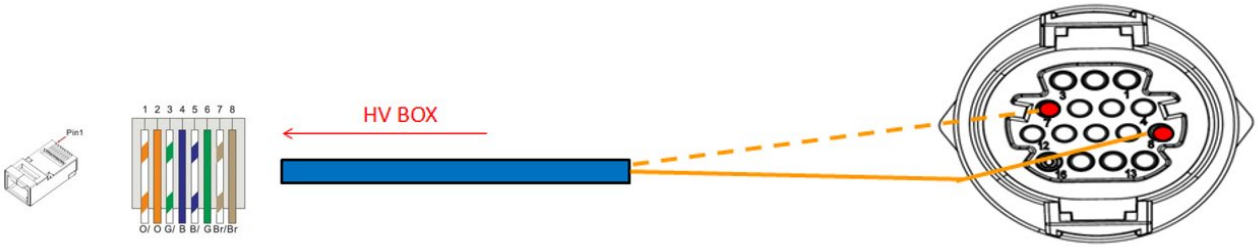



Figure 85 - "Screw-in" COM interface description

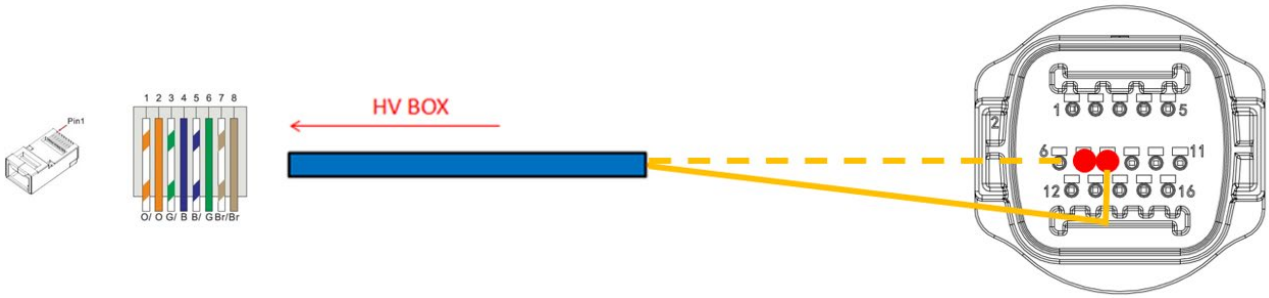



Figure 86 - "Snap-in" COM connection diagram

### 4.2.2.9. Power connections with two 5K3 battery towers

The power cables in each tower between the battery modules and the HV BOX must be connected as indicated above.
As for the connection between each tower and the inverter, the two power cables (+ and -) coming from the HV BOX will be connected to the two inputs of the inverter: BAT1 and BAT2.
Connect all the grounds to the ground system using the appropriate connector.

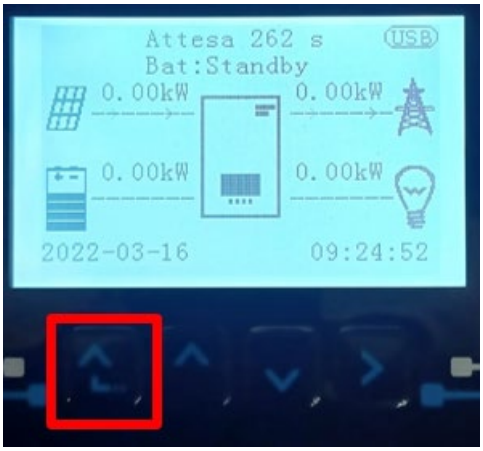
**Figure 87 - Inverter-side DC power connection with two battery inputs populated**

Identify the two battery towers by assigning the number 1 to the tower connected to channel 1 and number 2 to the tower connected to channel 2.

### 4.2.2.10. Channel configuration (dual WeCo 5K3 tower)

To configure the inverter channels correctly:

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




2. Press the last arrow on the right (enter) to access the basic settings:

| | |
|---|---|
| 1. | Basic settings |
| 2. | Advanced settings |
| 3. | Production statistics |
| 4. | System Info |
| 5. | Event list |
| 6. | SW Update |

3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| | |
|---|---|
| 1. | Language |
| 2. | Date and Time |
| 3. | Safety parameters |
| 4. | Working mode |
| 5. | Self-Test |
| 6. | Channel configuration |
| 7. | EPS Mode |
| 8. | Communication address |

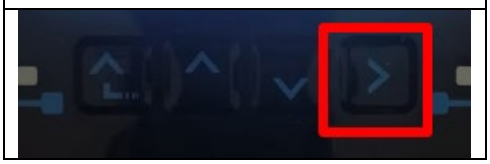
4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

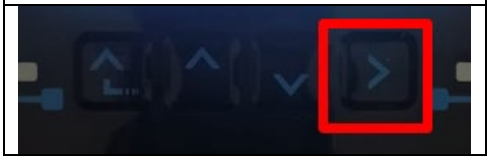
Set the battery inputs according to the configuration of the towers, specifically, with two WeCo HV BOXES connected to the inverter:

- Input channel 1 – BAT input 1;
- Input channel 2 – BAT input 2.

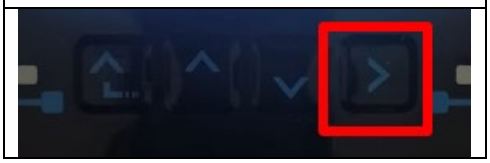
5. Once the channels have been configured correctly, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
|  |

6. Enter the battery settings by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery parameters |
| 2. Feed-in limit |
| 3. IV Curve Scan |
| 4. Logic interface |
| 5. Factory reset |
| 6. Parallel settings |
| 7. Reset Bluetooth |
| 8. CT Calibration |
| 9. On-Off switch |
|  |

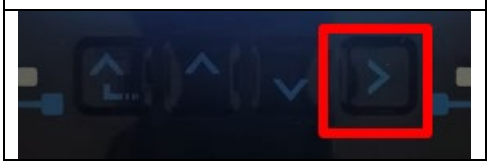
7. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Battery 2 |
| |
| |
| |
| |
| |
|  |

8. Set the parameters as follows:

| BATTERY 1 | |
|---|---|
| 1.Battery type | WeCo |
| 2.Battery address | 00 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |
| 6.Save | |

9. Enter the Battery 2 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Battery 2 |
| |
| |
| |
| |
| |
|  |

10. Set the parameters as follows:

| BATTERY 2 | |
|---|---|
| 1.Battery type | WeCo |
| 2.Battery address | 01 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |
| 6.Save | |

### 4.2.3.WeCo 5K3XP battery installation

#### 4.2.3.1. Only one 5K3XP battery tower connected

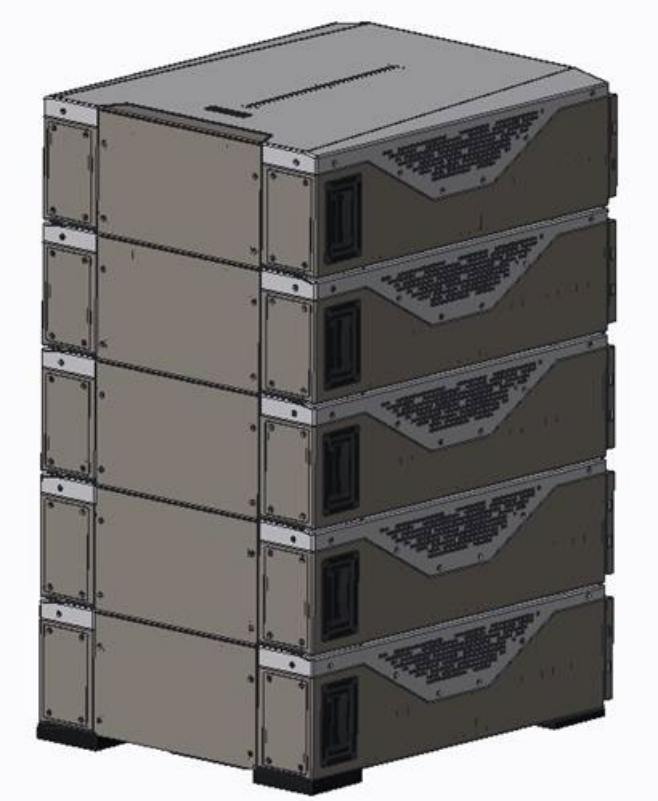


Figure 88 - Single battery tower

Each tower consists of a HV-BOX connected in series to multiple battery modules.
The devices to be used are:

3. external HV BOX

Figure 89 - HV BOX

4. Battery module

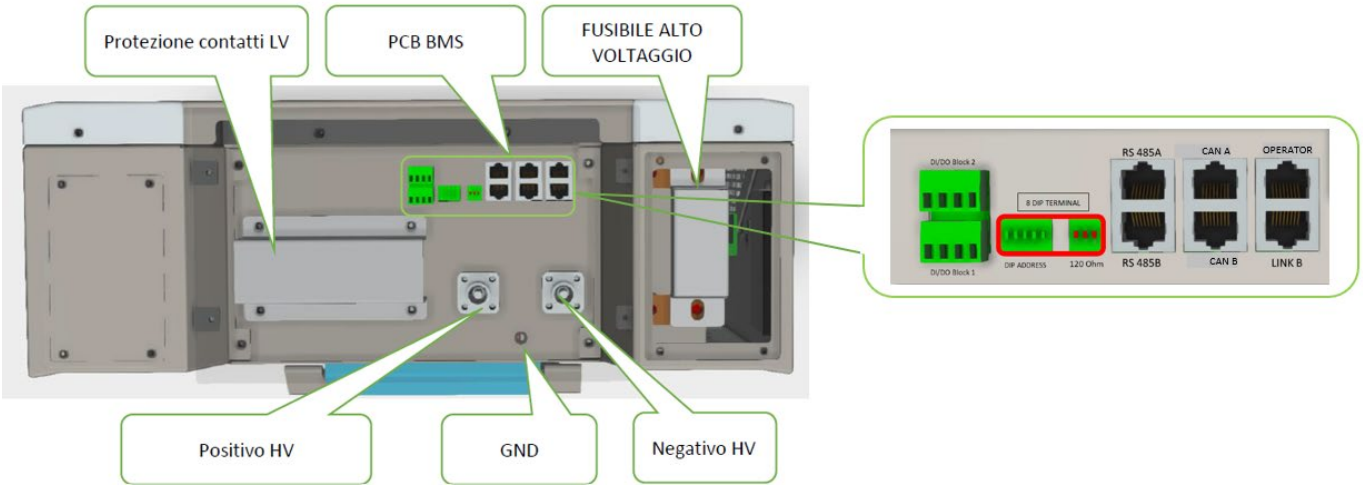



Figure 90 - Battery module to be connected in series

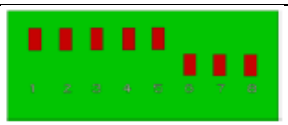
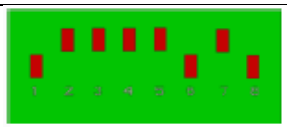
### 4.2.3.2. 5K3XP HV BOX and 5K3XP Battery Modules communication

The communication connections must be arranged as follows, using the communication cables between the battery modules:

- CAN1-B of the HV BOX to CAN-A of the first battery
- CAN-B of the first battery to CAN-A of the second battery
  …
- CAN-B of the second-last battery to CAN-A of the last battery

As regards the positioning of the dip switches of the battery tower, first check the serial number of the HV BOX module and select the address according to the following indications:

- The DIP switches of all the battery modules except for the last one must be set so that the addresses from 1 to 5 are in the ON position, while those from 6 to 8 are in the OFF position (ADD=111111000).
- The last module in the series must have all pins set to ON, except for pins 1, 6, and 8 which must be set to OFF (ADD=01111010)

| | |
|---|---|
| Battery modules from first to second-last battery |  |
| Last battery in the series |  |

Connect all the ground masses of the batteries and HV-BOX to the ground system via appropriate terminals.

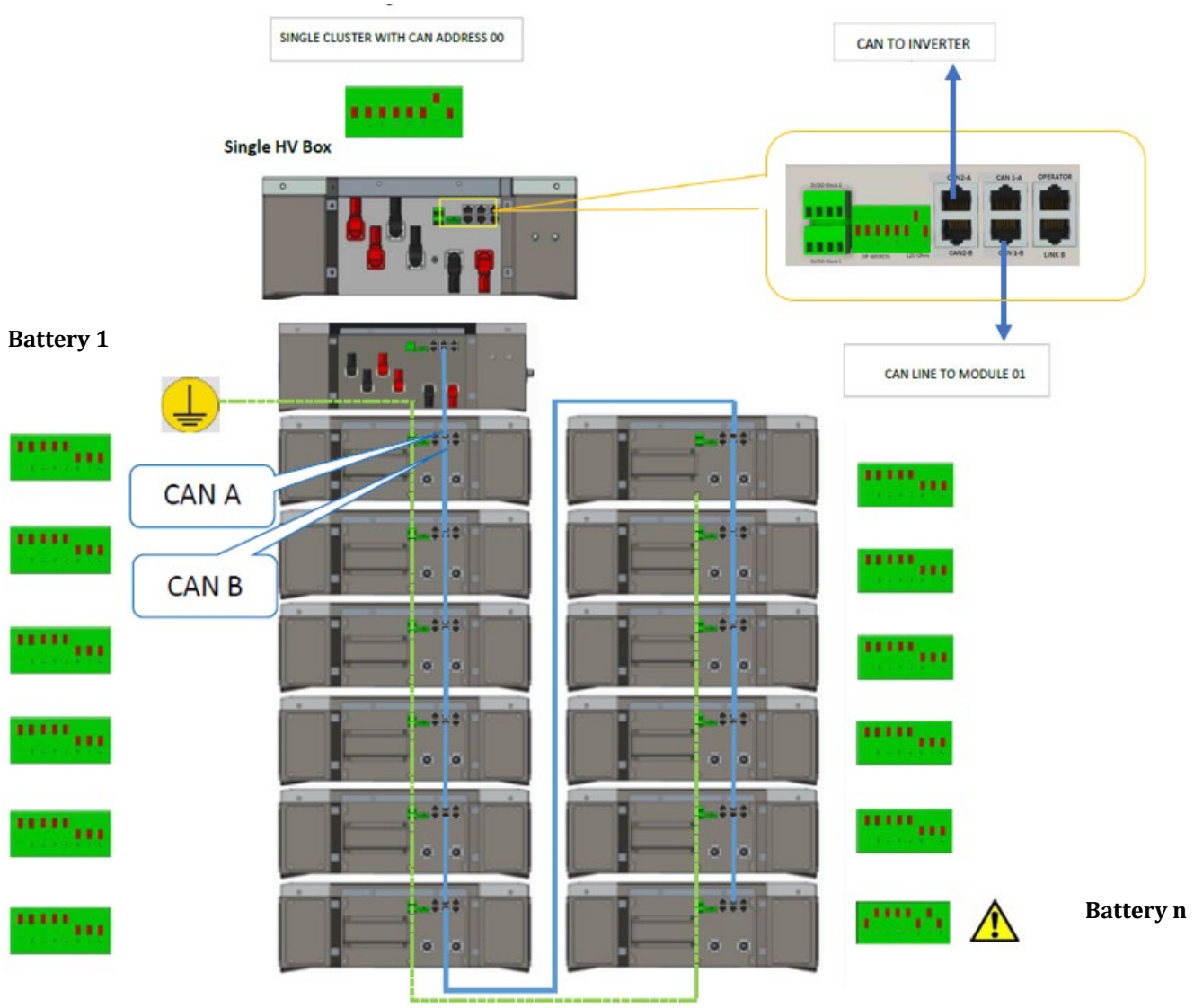



**Figure 91 - Communication connections: HV BOX and first battery module, connection between battery modules, connection between second-last and last battery module in the series**

### 4.2.3.3. 5K3XP HV BOX and Inverter communication

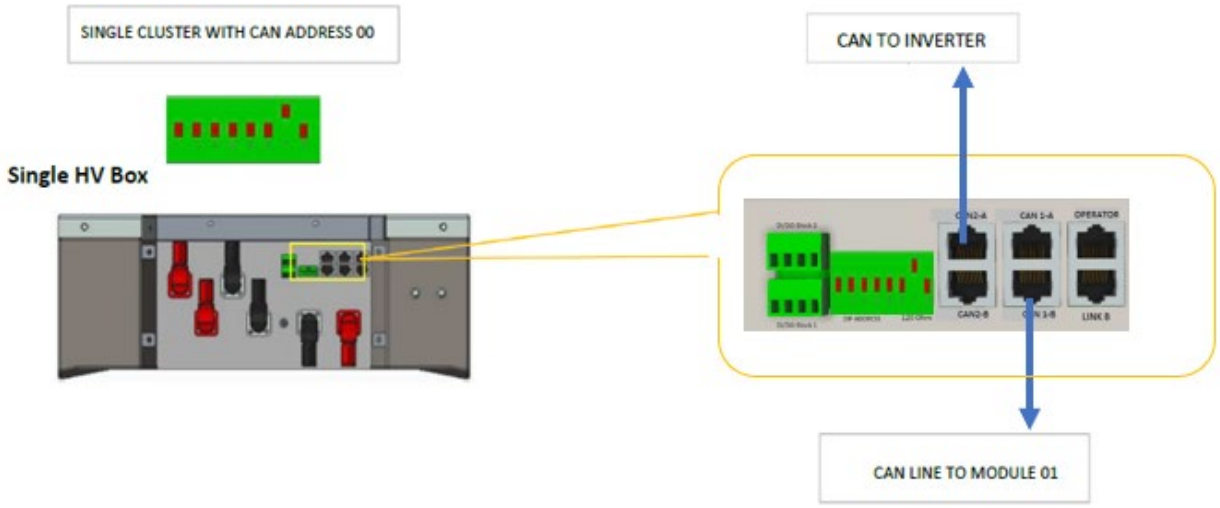



Figure 92 - HV BOX configuration

In the case of a single battery tower, the address must be set with all pins in the OFF position, except for pin 7, which must be in the ON position.

The inverter and the HV BOX must be connected by populating the CAN2-A input with the Inverter-HV BOX communication cable. The other end, in which only the “orange” and “white-orange” wires are present, must be wired to the quick-connect COM connector of the hybrid inverter, as shown in the figures below.
The HV BOX must be grounded using the M5 screw terminals supplied.

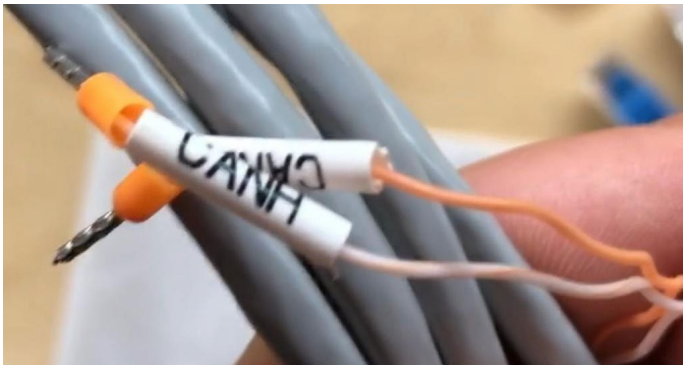



Figure 93 - Inverter/HV BOX communication cable

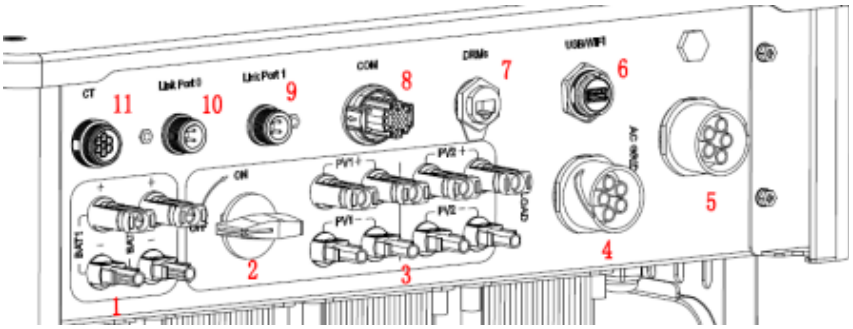



Figure 94 - Section of inverter connections

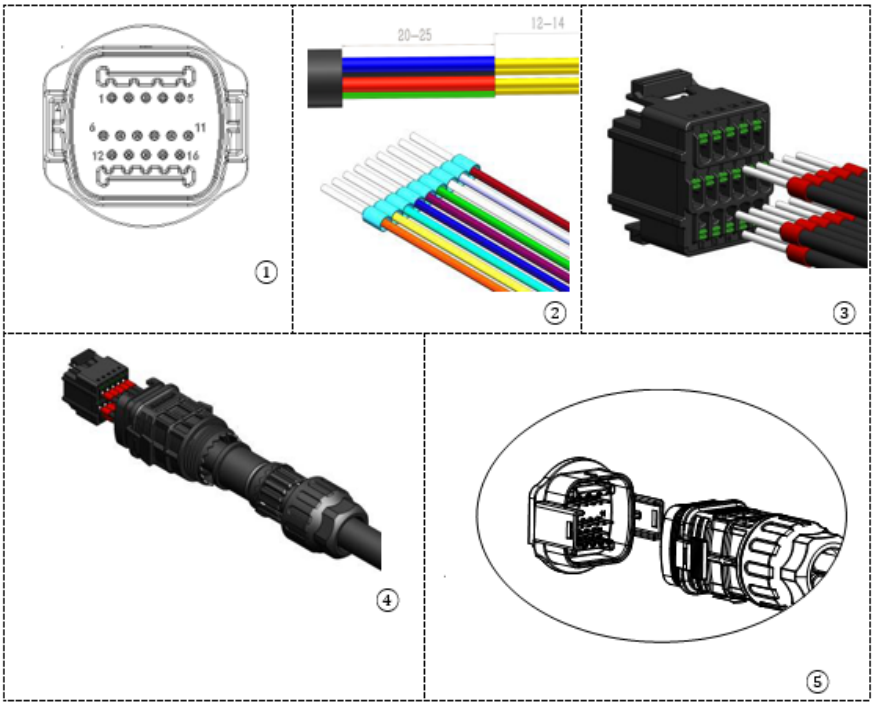



Figure 95 - "Screw-in" COM port connection

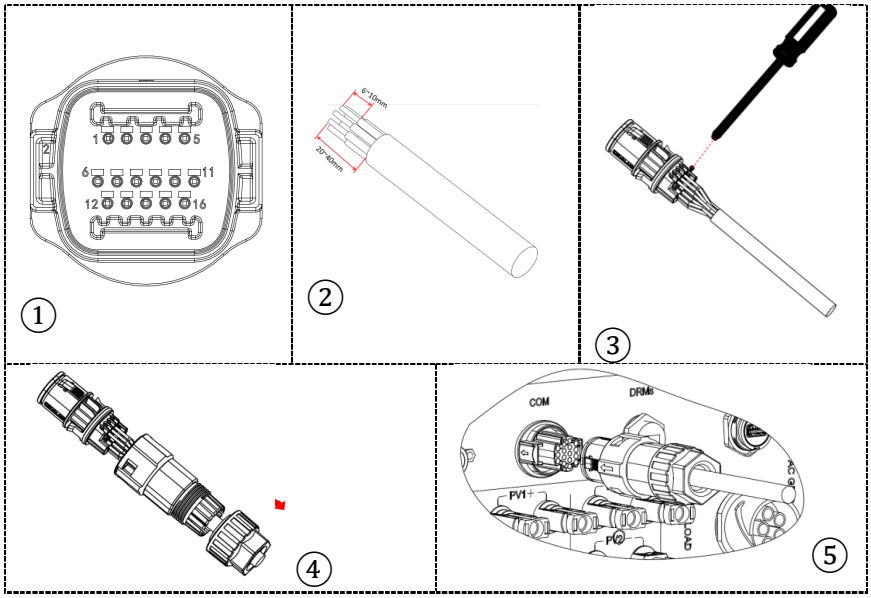



Figure 96 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (white-orange wire) | Communication with the HV BOX of the lithium battery, the CAN of the inverter adapts to the HV BOX of the lithium battery. |
| 8 | CAN L (orange wire) | |

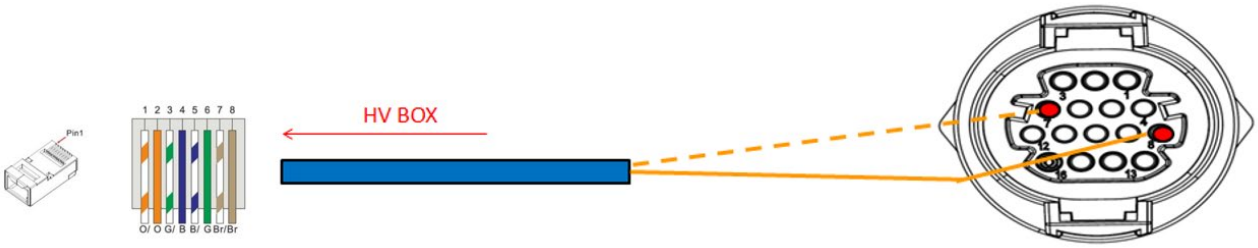



Figure 97 - "Screw-in" COM interface description

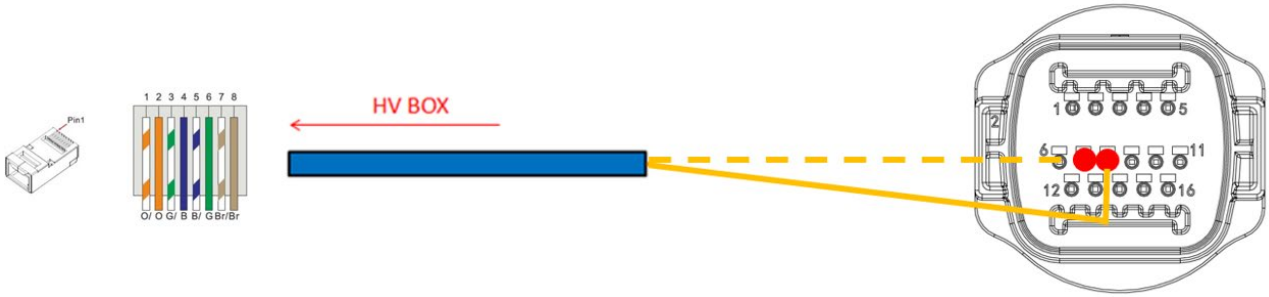



Figure 98 - "Snap-in" COM connection diagram

### 4.2.3.4. 5K3XP power connections

The battery modules must be connected in series via the cables supplied.
The connector must be connected from the negative input of the first battery to the positive input of the second one. From here, the negative input must be connected to the positive input of the third module, continuing the series until the negative input of the second-last module is connected to the positive input of the last module.
In this configuration, the positive input of the first module and the negative input of the last battery will remain free (use the colour of the connector as a reference).

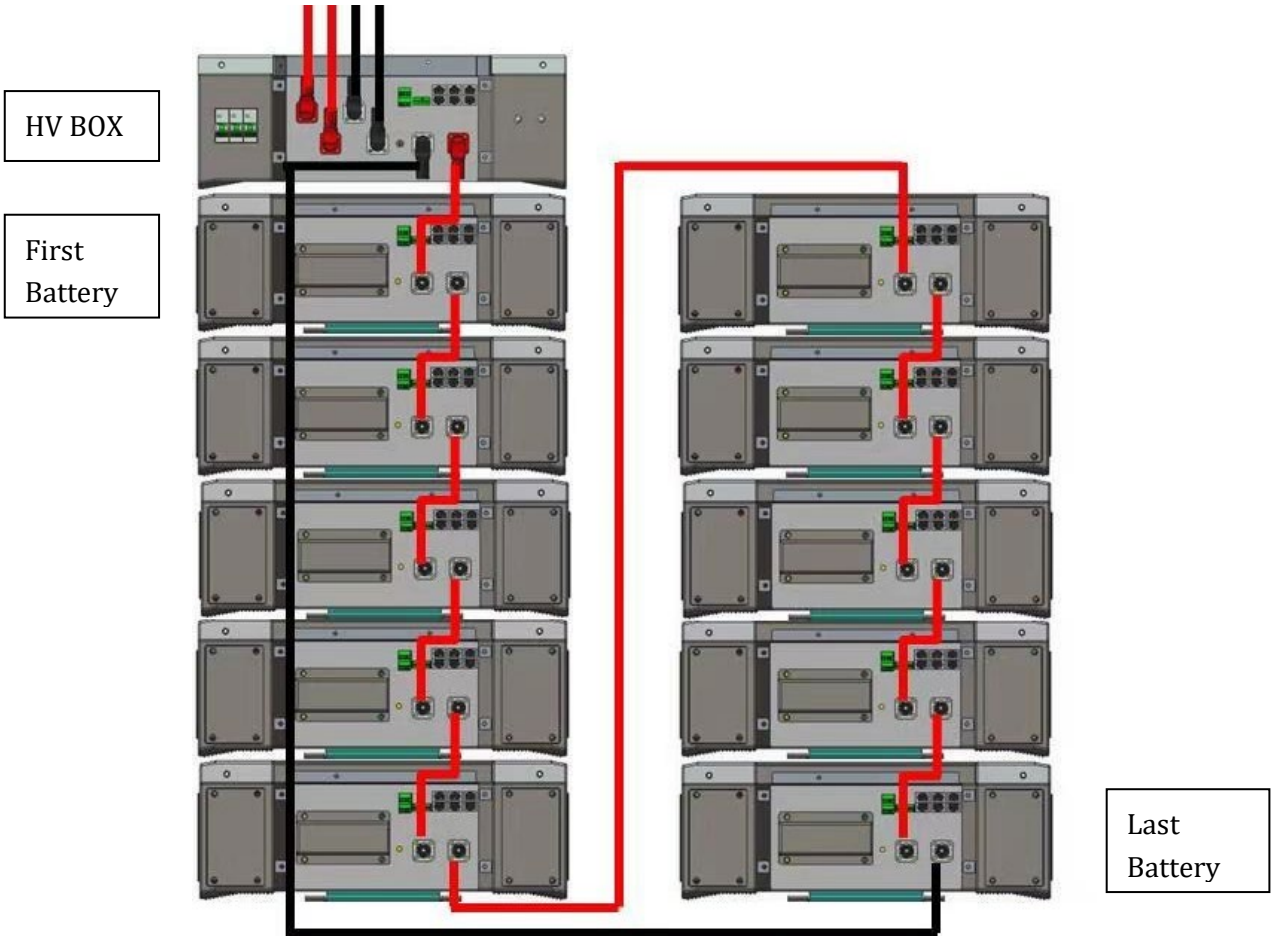



Figure 99 - Power wiring between battery modules in series

Subsequently, the HV BOX must be connected respecting the + and – polarity as it is powered by the batteries themselves. Therefore, the positive of the HV BOX must be connected to the positive of the first battery, and the negative of the HV BOX to the negative of the last battery module.
The HV BOX must be grounded using the M5 screw terminals supplied.
Connect all the grounds to the ground system using the appropriate connector.

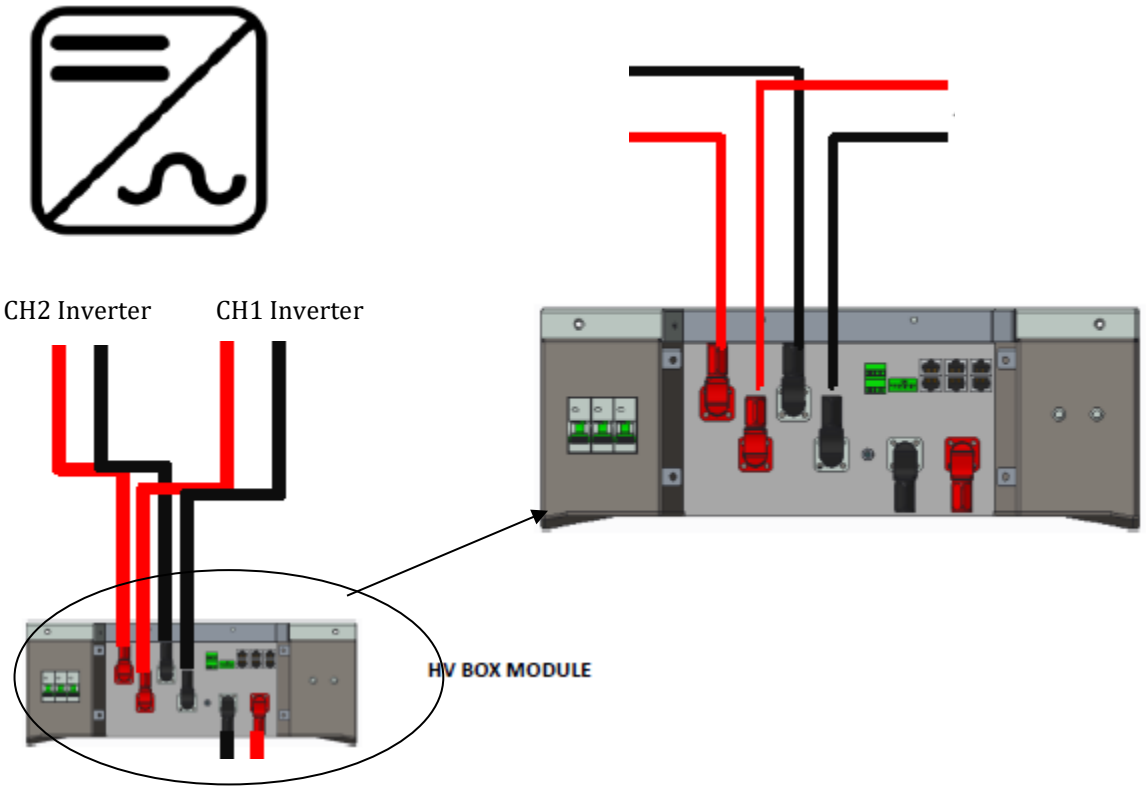



Figure 100 - HV BOX power connection

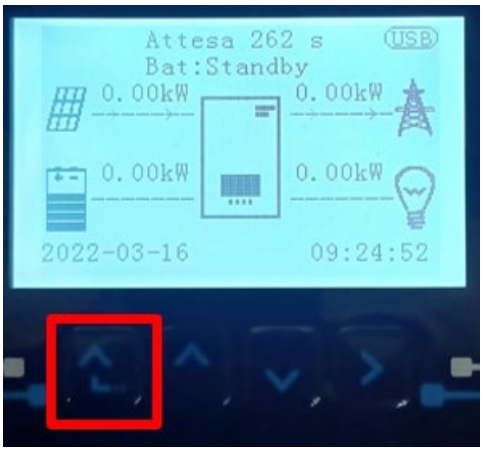
As for the power connections between the HV BOX and the inverter, the HV BOX module allows the connection of both channels coming from the inverter (if properly set from the inverter LCD, the battery column will be able to manage the maximum power of the inverter, both when charging and discharging).

Figure 101 - Inverter-side DC power connection with two battery inputs populated

## 4.2.3.5. Channel configuration (single WeCo 5K3XP tower)

To configure the inverter channels correctly:

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




2. Press the last arrow on the right (enter) to access the basic settings:

| | |
|---|---|
| 1. | Basic settings |
| 2. | Advanced settings |
| 3. | Production statistics |
| 4. | System Info |
| 5. | Event list |
| 6. | SW Update |

3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| | |
|---|---|
| 1. | Language |
| 2. | Date and Time |
| 3. | Safety parameters |
| 4. | Working mode |
| 5. | Self-Test |
| 6. | Channel configuration |
| 7. | EPS Mode |
| 8. | Communication address |

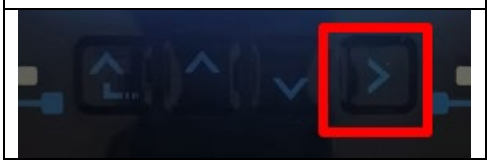
4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

As for the batteries, setting the inputs according to the configuration of the towers, specifically, with only one 5K3XP WeCo HVBOX connected to the inverter, it is possible:

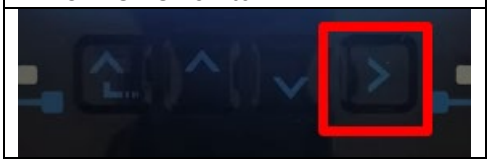
3. For HYD 5000 ZSS/HYD 8000 ZSS inverter (single battery input):
   - Input channel 1 – BAT input 1;
   - Input channel 2 – Not used.
4. For HYD 10000 ZSS/HYD 20000 ZSS inverter (dual battery input):
   - Input channel 1 – BAT input 1;
   - Input channel 2 – BAT input 1.

5. Once the channels have been configured correctly, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
|  |

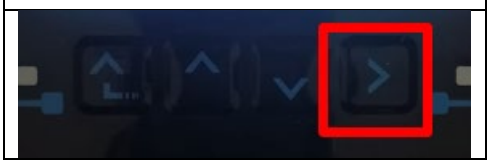
6. Enter the battery settings by pressing the last button on the right of the inverter:

| | |
|---|---|
| 1. | Battery parameters |
| 2. | Feed-in limit |
| 3. | IV Curve Scan |
| 4. | Logic interface |
| 5. | Factory reset |
| 6. | Parallel settings |
| 7. | Reset Bluetooth |
| 8. | CT Calibration |
| 9. | On-Off switch |



7. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| | |
|---|---|
| 1. | Battery 1 |
| | |
| | |
| | |
| | |
| | |
| | |



8. Set the parameters as follows:

| HYD 5000 ZSS/HYD 8000 ZSS | |
|---|---|
| BATTERY 1 | |
| 1.Battery type | WeCo |
| 2.Battery address | 00 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |

| HYD 10000 ZSS/HYD 20000 ZSS | |
|---|---|
| BATTERY 1 | |
| 1.Battery type | WeCo |
| 2.Battery address | 00 |
| 3.Maximum charge (A) | 50.00A |
| 4.Maximum discharge (A) | 50.00A |
| 5.Depth of Discharge | 80% |

### 4.2.3.6. 5K3XP battery tower start-up

In order to carry out the correct start-up procedure:

1. The HV-BOX must be switched off:
2. The batteries must all be switched off (side switch to 0);

3. Inverter DC rotary switch set to OFF;

4. Set all batteries, via the side switch, to 1 without switching them on (**do not** press the round metal button);

5. Switch on the HV BOX via its switch;
6. The batteries will automatically switch on in succession (each module will turn on independently and the side switch will flash for 3 seconds; then a steady GREEN light will confirm that each module is powered on);
7. The HV BOX will end the start-up procedure within 90 seconds by closing the input circuit (the

RED and GREEN lights will turn on to confirm its operation);

If communication between the inverter and the HV BOX is lost for more than 60 seconds during or after the start-up phase, the HV BOX will enable the safety procedure by opening the POWER CONTACTOR. During the commissioning phase, the installer must ensure that the communication between the HV BOX and the inverter is connected properly. Do not leave the system powered when there is no communication between the HV BOX and the inverter, as prolonged standby of the system could result in an imbalance from natural self-discharge.

## 4.2.3.7. Installation with two 5K3XP battery towers

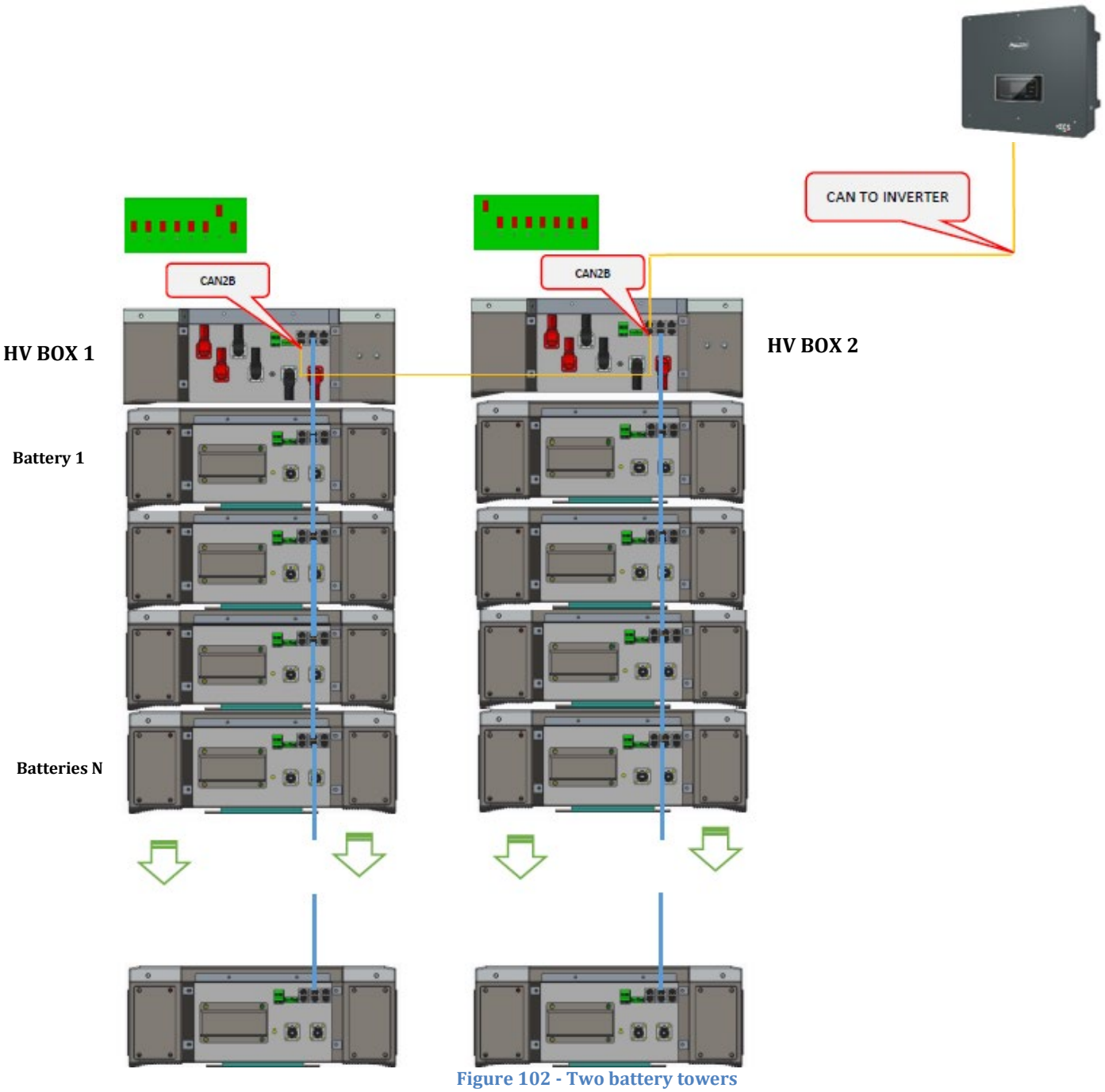



Figure 102 - Two battery towers

### 4.2.3.8. Communication between HV BOX and 5K3XP Battery Modules

The communication connections must be arranged for each tower as shown in the previous sections, using the communication cables between the battery modules:

- CAN1-B of the HV BOX to CAN-A of the first battery
- CAN-B of the first battery to CAN-A of the second battery
  …
- CAN-B of the second-last battery to CAN-A of the last battery.

Connect all the ground masses of the batteries and HV-BOX to the ground system via appropriate terminals.

### 4.2.3.9. 5K3XP HV BOX – Inverter communication

In the case of two battery towers:

3. Battery Tower 1
   a. All pins in the OFF position, except pin 1, which must be in the ON position (ADD=00000010).
4. Battery Tower 2
   a. All pins in the OFF position, except pin 1, which must be in the ON position (ADD=10000000).

A cable from the CAN2-B input of the HV BOX of tower 1 must be connected to the CAN2-B input of the HV BOX of tower 2; finally, the Inverter/HV BOX communication cable must be inserted in the CAN2-A port of the HV BOX.

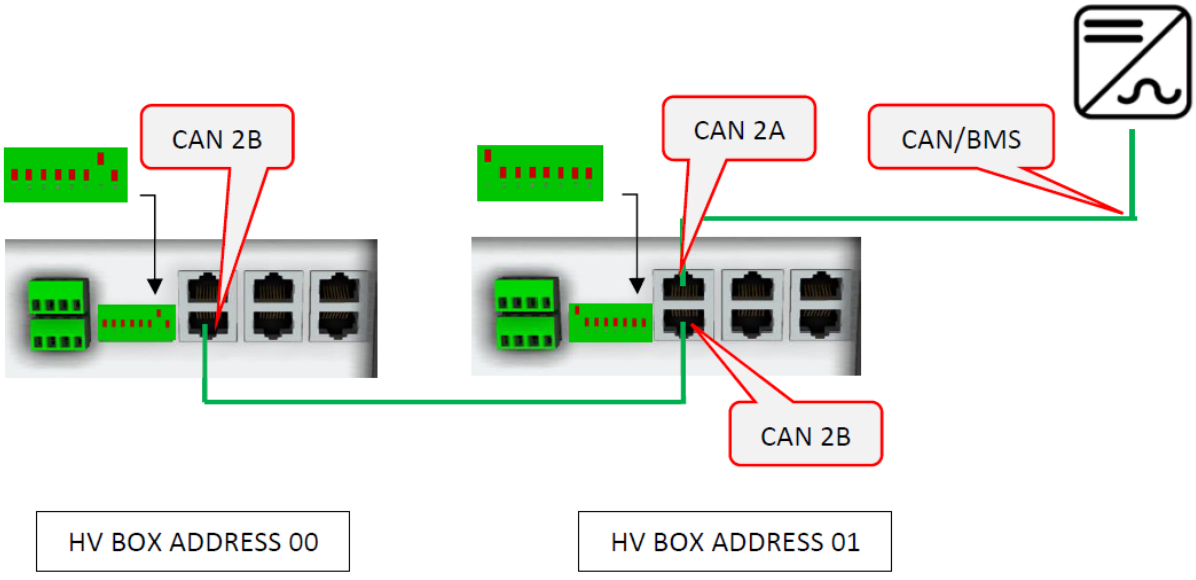



Figure 103 - Communication connections between battery towers

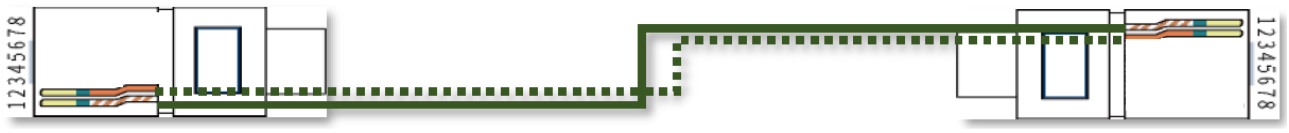



Figura 104 - HV BOX connection cable

The inverter and the HV BOX must be connected by populating the CAN2-A input with the Inverter-HV BOX communication cable. The other end, in which only the “orange” and “white-orange” wires are present, must be wired to the quick-connect COM connector of the hybrid inverter, as shown in the figures below.
The HV BOX must be grounded using the M5 screw terminals supplied.

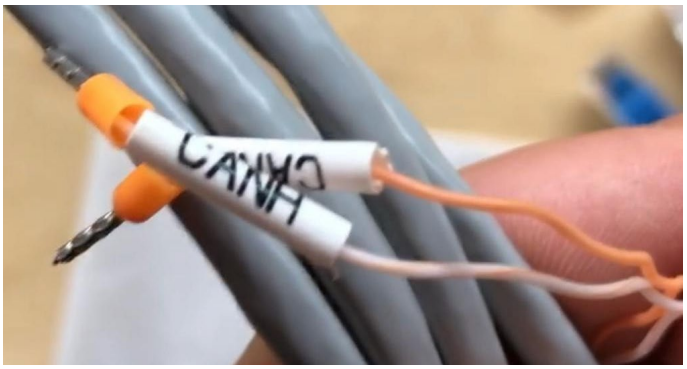



Figure 105 - Inverter/HV BOX communication cable

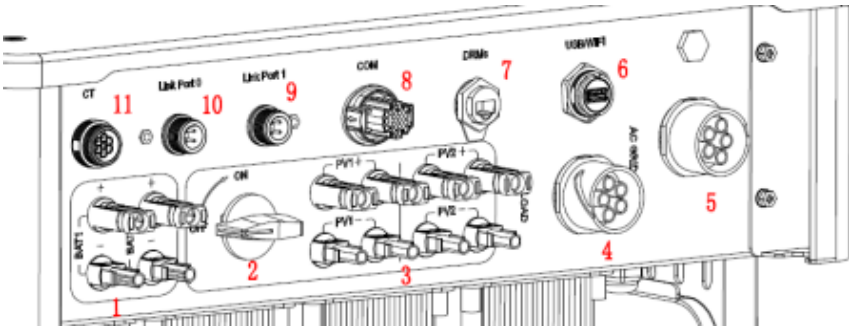



Figure 106 - Section of inverter connections

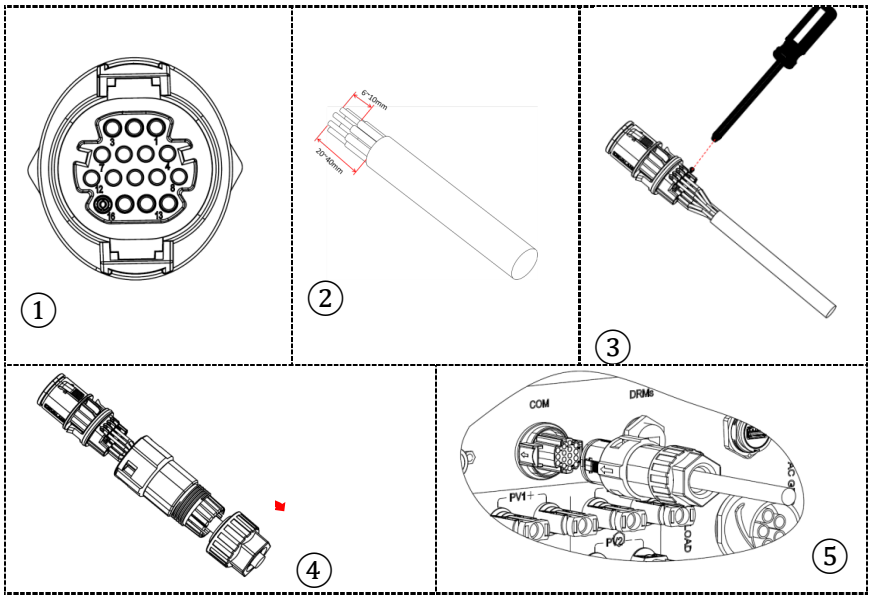



Figure 107- "Screw-in" COM port connection

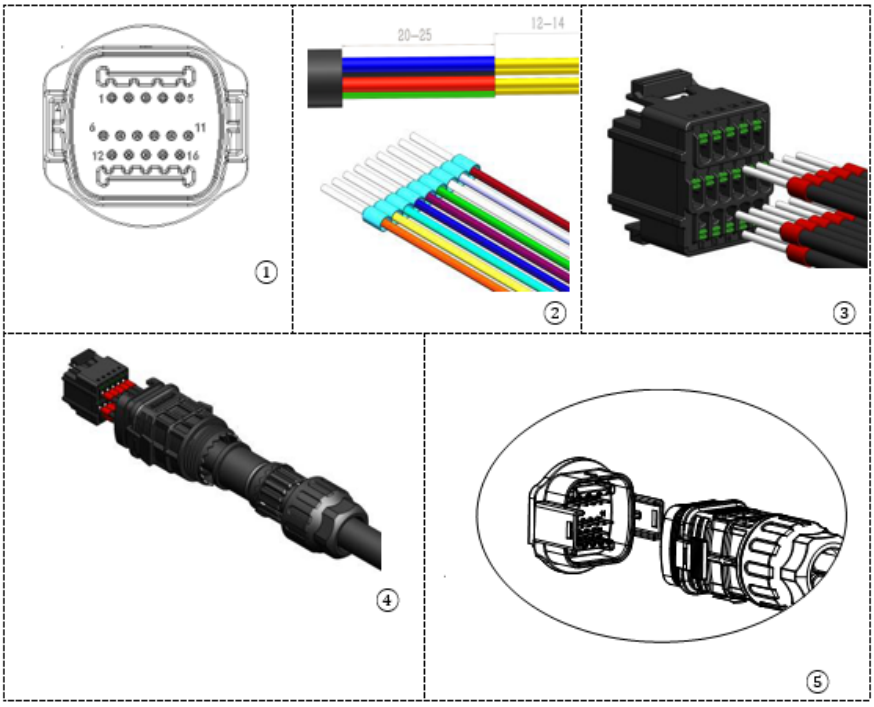



Figure 108 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (white-orange wire) | Communication with thee HV BOX of the lithium battery, the CAN of the inverter adapts to the HV BOX of the lithium battery. |
| 8 | CAN L (orange wire) | |

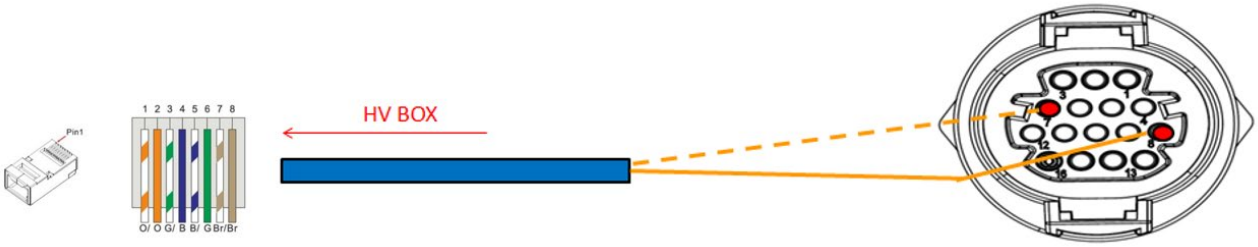



Figure 109 - COM interface description

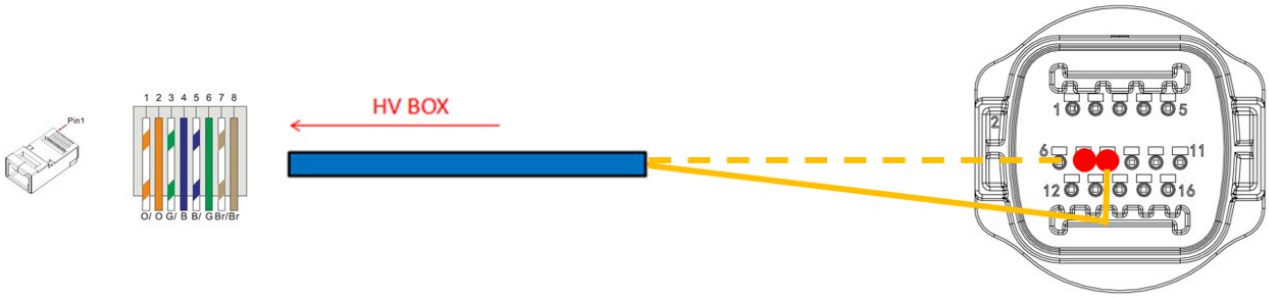



Figure 110 - COM connection diagram

### 4.2.3.10. 5K3XP power connections

The power cables in each tower between the battery modules and HV BOX must be connected as indicated in the previous section.
As for the connection between each tower and the inverter, the two power cables (+ and -) coming from the HV BOX will be connected to the two inputs of the inverter: BAT1 and BAT2.
Connect all the ground masses to the ground system using the appropriate connector.

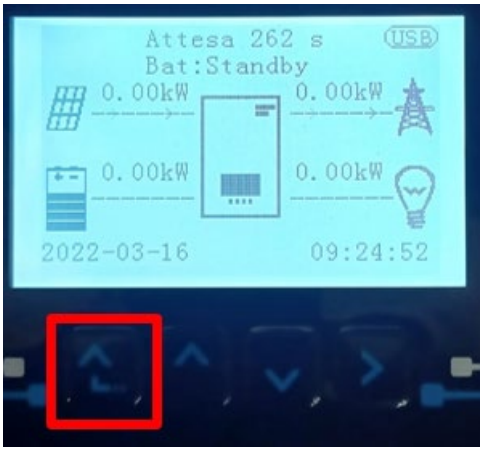
**Figure 111 - Inverter-side DC power connection with two battery inputs populated**

Identify the two battery towers by assigning the number 1 to the tower connected to channel 1 and number 2 to the tower connected to channel 2.

### 4.2.3.11. Channel configuration (dual 5K3XP WeCo tower)

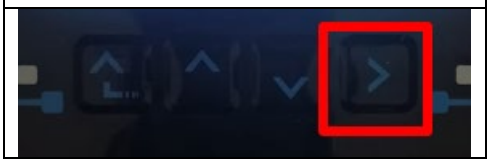
To configure the inverter channels correctly:

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



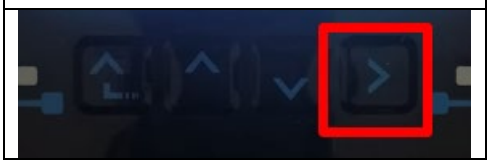

2. Press the last arrow on the right (enter) to access the basic settings:

| | |
|---|---|
| 1. | Basic settings |
| 2. | Advanced settings |
| 3. | Production statistics |
| 4. | System Info |
| 5. | Event list |
| 6. | SW Update |
| | |



3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| | |
|---|---|
| 1. | Language |
| 2. | Date and Time |
| 3. | Safety parameters |
| 4. | Working mode |
| 5. | Self-Test |
| 6. | Channel configuration |
| 7. | EPS Mode |
| 8. | Communication address |
| | |



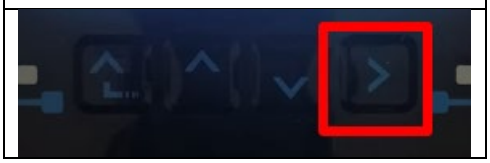
4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

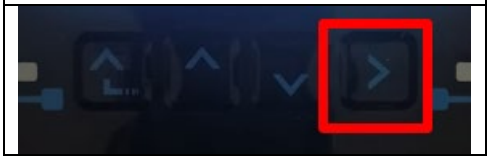
Set the battery inputs according to the configuration of the towers, specifically, with two 5K3XP WeCo HV BOXES connected to the inverter:

- Input channel 1 – BAT input 1;
- Input channel 2 – BAT input 2.

5. Once the channels have been configured correctly, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
|  |

6. Enter the battery settings by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery parameters |
| 2. Feed-in limit |
| 3. IV Curve Scan |
| 4. Logic interface |
| 5. Factory reset |
| 6. Parallel settings |
| 7. Reset Bluetooth |
| 8. CT Calibration |
| 9. On-Off switch |
|  |

7. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Battery 2 |
| |
| |
| |
| |
| |
| |

8. Set the parameters as follows:

| BATTERY 1 | |
|---|---|
| 1.Battery type | WeCo |
| 2.Battery address | 00 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |
| 6.Save | |

9. Enter the Battery 2 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Battery 2 |
| |
| |
| |
| |
| |
| |

10. Set the parameters as follows:

| BATTERY 2 | |
|---|---|
| 1.Battery type | WeCo |
| 2.Battery address | 01 |
| 3.Maximum charge (A) | 25.00A |
| 4.Maximum discharge (A) | 25.00A |
| 5.Depth of Discharge | 80% |
| 6.Save | |

### 4.2.3.12. Start-up of dual 5K3XP battery tower

In order to carry out the correct start-up procedure:

1. The HV-BOX must be switched off:
2. The batteries must all be switched off (side switch to 0);

3. Inverter DC rotary switch set to OFF;

4. Set all batteries, via the side switch, to 1 without switching them on (**do not** press the round metal button);

5. Switch on the HV BOX via its switch;
6. The batteries will automatically switch on in succession (each module will turn on independently and the side switch will flash for 3 seconds; then a steady GREEN light will confirm that each module is powered on);
7. The HV BOX will end the start-up procedure within 90 seconds by closing the input circuit (the

RED and GREEN lights will turn on to confirm its operation);

If communication between the inverter and the HV BOX is lost for more than 60 seconds during or after the start-up phase, the HV BOX will enable the safety procedure by opening the POWER CONTACTOR. During the commissioning phase, the installer must ensure that the communication between the HV BOX and the inverter is connected properly. Do not leave the system powered when there is no communication between the HV BOX and the inverter, as prolonged standby of the system could result in an imbalance from natural self-discharge.

### 4.2.4.5K3 and 5K3XP WeCo mixed installation

For a new system, we do not recommend installing a mixed solution with mixed 5K3 and 5K3XP batteries. When using 5K3 and 5K3XP batteries, it is mandatory to:

- Install a XP HV BOX;
- Install at least one 5K3XP battery (the XP batteries must be installed just below the XP HV BOX, while the 5k3 batteries must be inserted last).

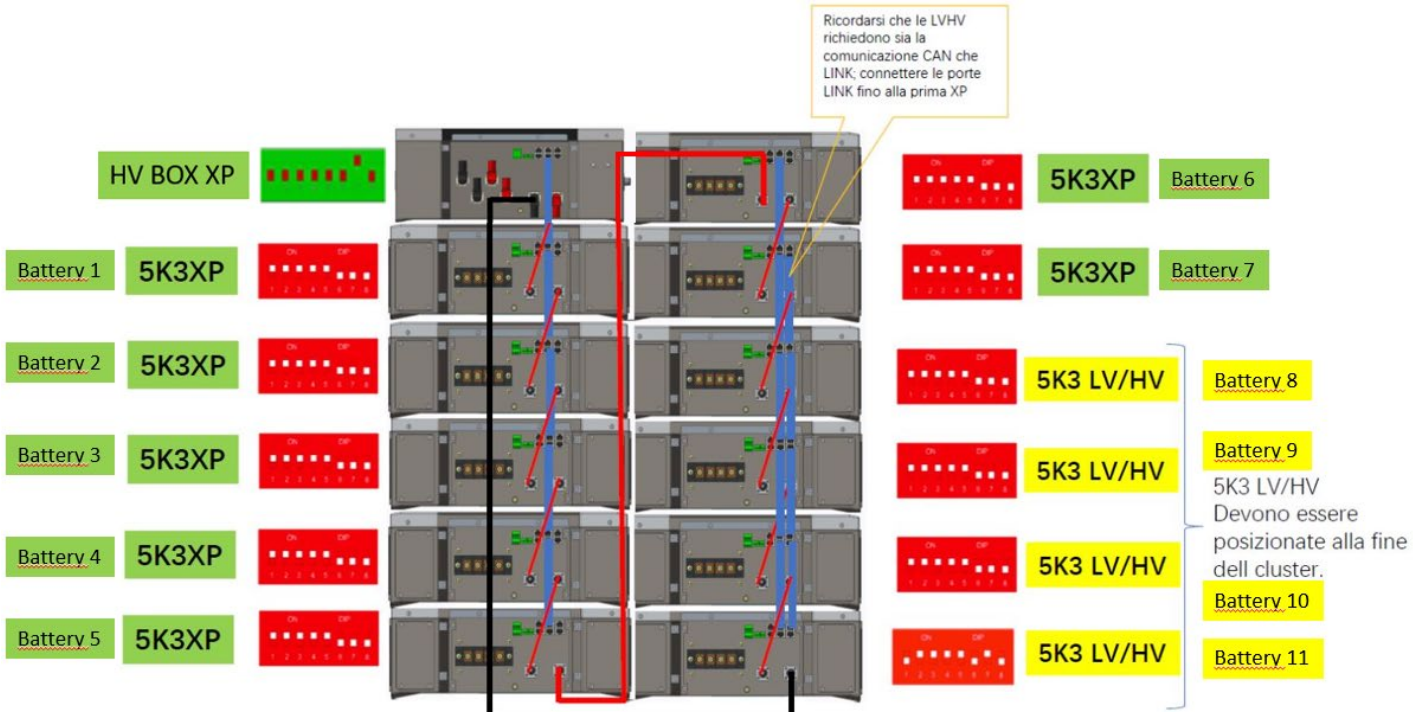



Figure 112 - Power connection and 5K3 and 5K3XP battery communication

**Communication:**
The communication connections must be arranged as shown in the figure above, using the battery-to-battery communication cables, in detail:

- CAN1-B of the XP HV BOX to CAN-A of the first 5K3XP battery
- CAN-B of the first 5K3XP battery to CAN-A of the second 5K3XP battery
  …
- CAN-B of the sixth 5K3XP battery to CAN-A of the seventh 5K3XP battery
- CAN-B of the seventh 5K3XP battery to CAN-A of the eighth 5K3 battery
- LINK-B of the seventh 5K3XP battery to LINK-A of the eighth 5K3 battery
- CAN-B of the eighth 5K3 battery to CAN-A of the ninth 5K3 battery
- LINK-B of the eighth 5K3 battery to LINK-A of the ninth 5K3 battery
- …
- CAN-B of the second-last 5K3 battery to CAN-A of the last 5K3 battery
- LINK-B of the second-last 5K3 battery to LINK-A of the last 5K3 battery.

Connect all ground masses of the batteries and HV-BOX to the ground system via appropriate terminals.

**Power:**
The battery modules must be connected in series via the cables supplied.
The connector must be connected from the negative input of the first battery to the positive input of the second one. From here, the negative input must be connected to the positive input of the third module, continuing the series until the negative input of the second-last module is connected to the positive input of the last module.
In this configuration, the positive input of the first module and the negative input of the last battery will remain free (use the colour of the connector as a reference).
Subsequently, the XP HV BOX must be connected respecting the + and – polarity as it is powered by the batteries themselves. Therefore, the positive of the XP HV BOX must be connected to the positive of the first battery, and the negative of the XP HV BOX to the negative of the last battery module.
The XP HV BOX must be grounded using the M5 screw terminals supplied.
Connect all the ground masses to the ground system using the appropriate connector.

**Channel configuration:**
Configure the inverter channels according to the number of HV BOXES connected to the inverter (see previous paragraphs).

### 4.2.4.1. Start-up of mixed 5K3XP and 5K3 battery towers

In order to carry out the correct start-up procedure:

1. The HV-BOX must be switched off:
2. The batteries must all be switched off (side switch to 0);

3. Inverter DC rotary switch set to OFF;

4. Set all batteries, via the side switch, to 1 without switching them on (**do not** press the round metal button);

5. Switch on the HV BOX via its switch;
6. The batteries will automatically switch on in succession (each module will turn on independently and the side switch will flash for 3 seconds; then a steady GREEN light will confirm that each module is powered on);
7. The HV BOX will end the start-up procedure within 90 seconds by closing the input circuit (the RED and GREEN lights will turn on to confirm its operation);

If communication between the inverter and the HV BOX is lost for more than 60 seconds during or after the start-up phase, the HV BOX will enable the safety procedure by opening the POWER CONTACTOR. During the commissioning phase, the installer must ensure that the communication between the HV BOX and the inverter is connected properly. Do not leave the system powered when there is no communication between the HV BOX and the inverter, as prolonged standby of the system could result in an imbalance from natural self-discharge.

### 4.2.5.Installation of Azzurro HV battery

#### 4.2.5.1. Connecting a single battery tower

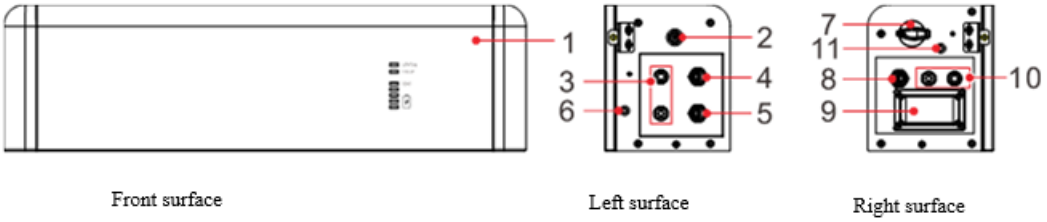
Figure 113 - Single battery tower

The Azzurro HV batteries are batteries with 400VDC output, therefore, unlike the WeCo and Pylontech batteries they must not be installed in series but in parallel.
Each tower of battery modules consists of a BDU connected in parallel to multiple battery modules.

The devices to be used are:

1. The external BDU with 1 to 4 battery modules (ZZT-ZBT5K-BDU)

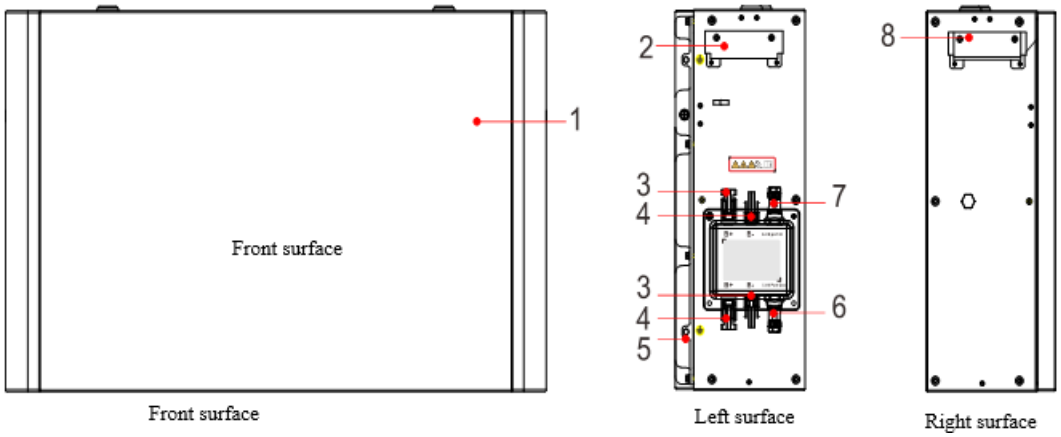
Figure 114 – BDU




| | | | |
|---|---|---|---|
| 1 | Battery distribution unit | 7 | DC switch |
| 2 | Black START switch | 8 | BDU communication output（COM-OUT） |
| 3 | Battery input（BAT IN） | 9 | Fuse |
| 4 | BDU cascade communication port (Link) | 10 | Battery output（BAT Out） |
| 5 | BDU communication input（COM-IN） | 11 | Grounding hole |
| 6 | Grounding hole | | |

2. Battery modules (ZZT-BAT-ZBT5K)

Figure 115 - Battery module to be connected in parallel




| | | | |
|---|---|---|---|
| 1 | Battery distribution unit | 5 | Grounding hole |
| 2 | Left-side handle | 6 | Communication output (Link Port Out) |
| 3 | Output terminal B+ | 7 | Communication input (Link Port In) |
| 4 | Output terminal B- | 8 | Right-side handle |

### 4.2.5.2. Communication between the BDU and Battery Modules

The communication connections must be arranged as follows, using the communication cables between battery modules:

- COM-IN of the BDU to LINK PORT IN of the first battery
- LINK PORT OUT of the first battery must be connected to LINK PORT IN of the second battery …
- LINK PORT OUT of the second-last battery must be connected to LINK PORT IN of the last battery;
- The terminating resistor must be connected to LINK PORT OUT of the last battery.

Connect all the ground masses of the batteries and BDU to the ground system via appropriate terminals.

Figure 116 - Communication connections: BDU and first battery module

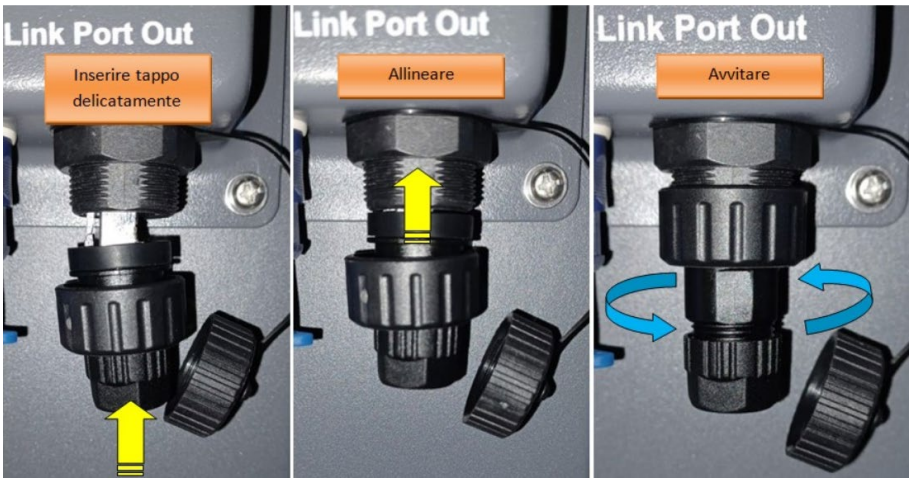



Figure 117 – Terminating resistor of the last battery

### 4.2.5.3. BDU Inverter communication

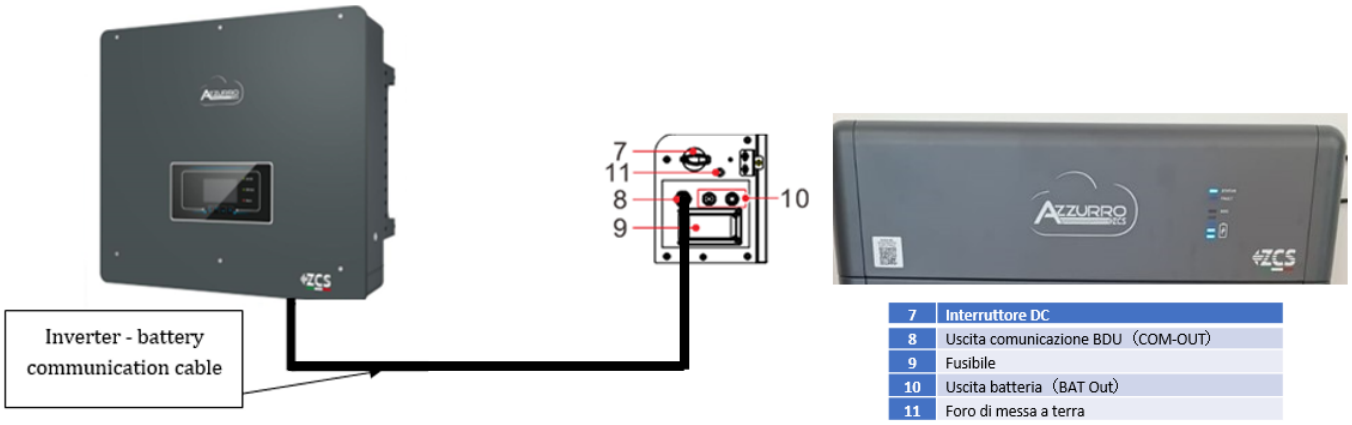



Figure 118 - Hybrid inverter and BDU communication connection

For communication between the BDU and inverter, use the black communication cable provided. The BDU side must be plugged into the COM-OUT port of the Inverter. PIN 7 (white blue) and PIN 8 (blue) COM port.

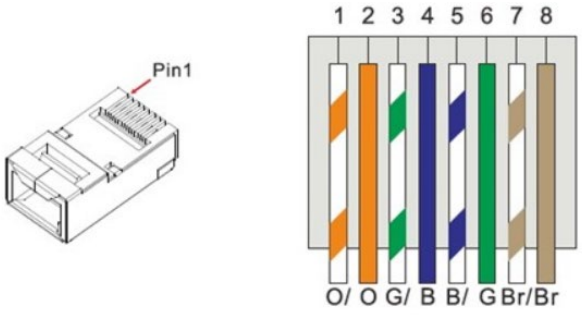



Figure 119 – PIN Out RJ45 communication cable

| PIN | Wire colour | Definition | COM Port |
|---|---|---|---|
| PIN 1 | White Orange | | |
| PIN 2 | Orange | | |
| PIN 3 | White Green | | |
| PIN 4 | Blue | CAN-H | PIN 7 |
| PIN 5 | White Blue | CAN-L | PIN 8 |
| PIN 6 | Green | | |
| PIN 7 | White Brown | | |
| PIN 8 | Brown | | |

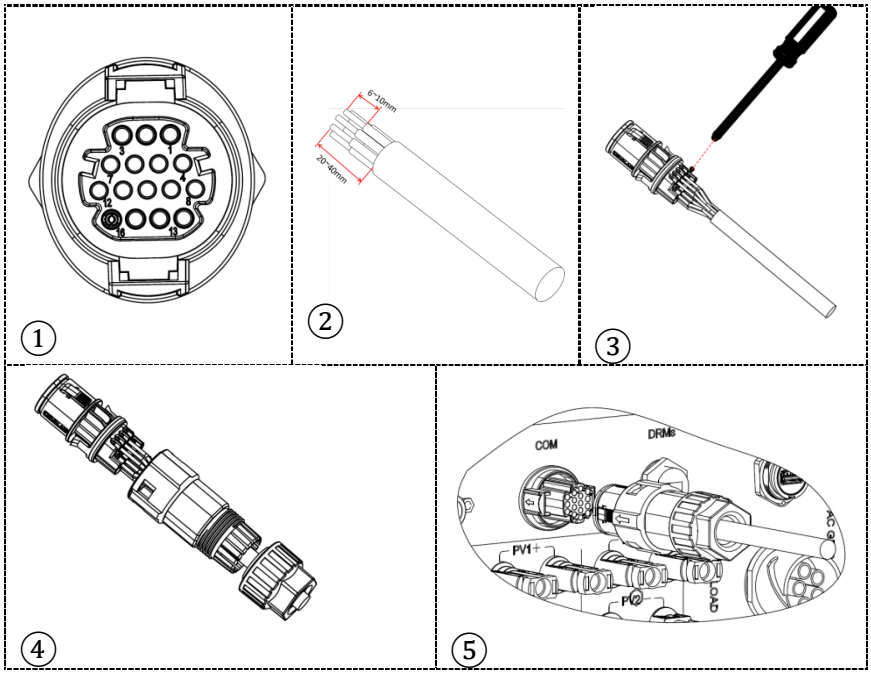



Figure 120 - "Screw-in" COM port connection

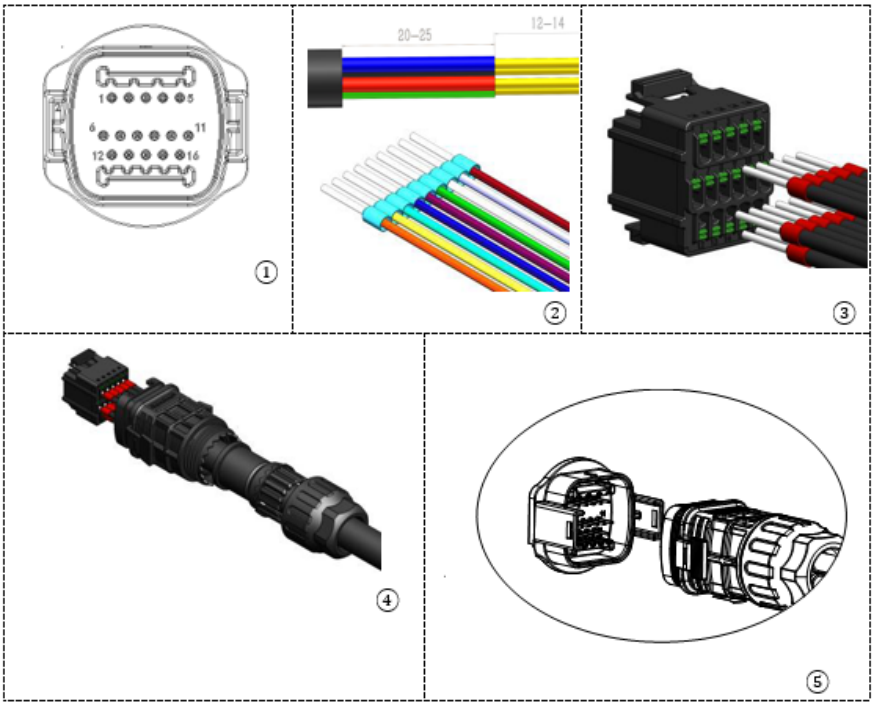



Figure 121 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (blue wire) | Communication with the BMS of the lithium battery, the CAN of the inverter adapts to the BMS of the lithium battery. |
| 8 | CAN L (white-blue wire) | |

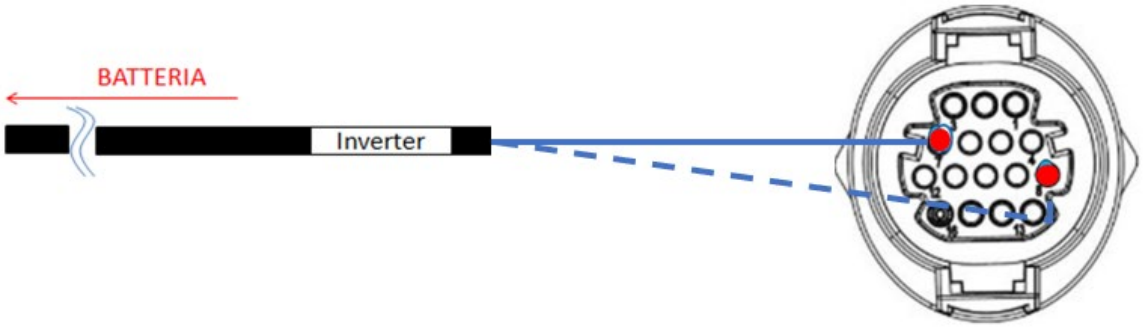



Figure 122 - "Screw-in" COM connection diagram

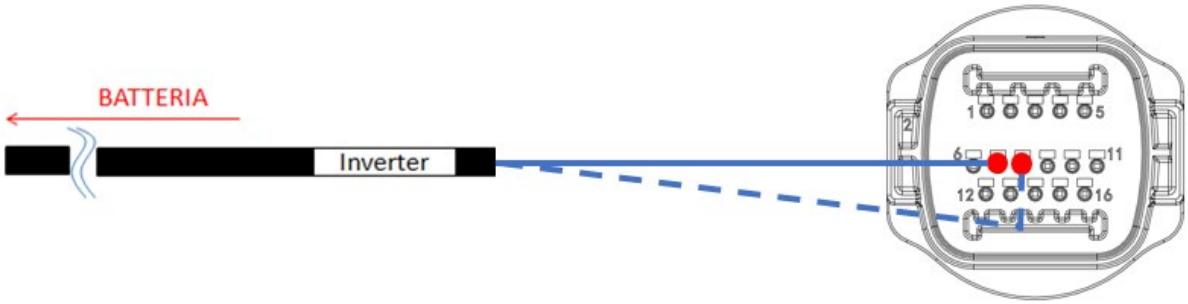



Figure 123 - "Snap-in" COM connection diagram

### 4.2.5.4. Power connections

The battery modules must be connected to each other in parallel via the cables shown in the figure below. The connection cables are supplied with the battery.

Figure 124 - Power connector between battery modules

The connector must be connected from the positive input of the first battery module to the positive input of the second battery, the negative input of the first module must be connected to the negative input of the second module, continuing in this way until the positive input of the second-last battery module is connected to the positive input of the last battery module and the negative input of the second-last battery module is connected to the negative input of the last battery module.
In this configuration, the positive of the first module and the negative of the first module and the positive and negative of the last battery module will remain free.

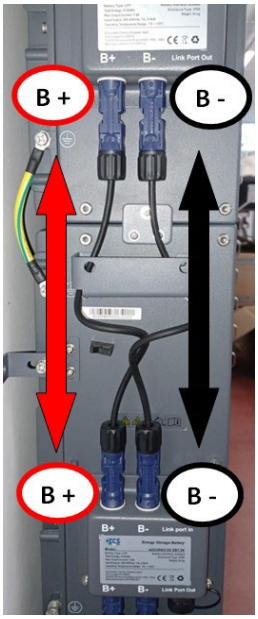



Figure 125 - Power wiring between battery modules

Subsequently, the external BDU must be connected to the first battery module. Therefore, the positive of the BDU must be connected to the positive of the first battery, and the negative of the BDU to the negative of the first battery (the cables for this connection are supplied with the BDU).

Figure 126 - Connection cables between BDU and first battery module

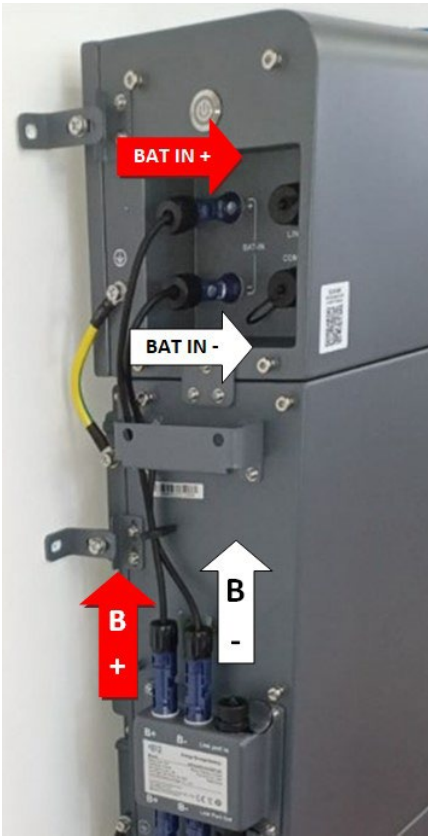



Figure 127 - Power connection (positive and negative) between BDU and first battery module

Finally, the BDU must be connected to the inverter via the power cables provided, as shown in the figure.

Figure 128 - BDU Inverter power cables

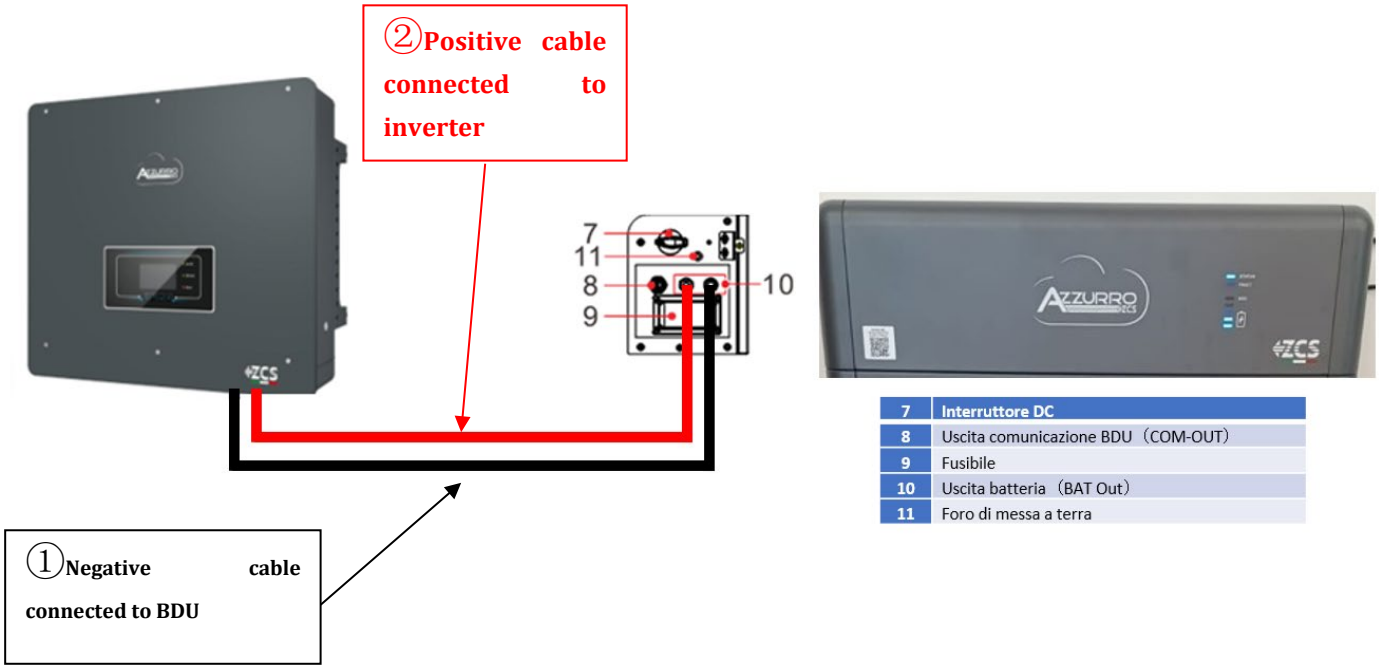


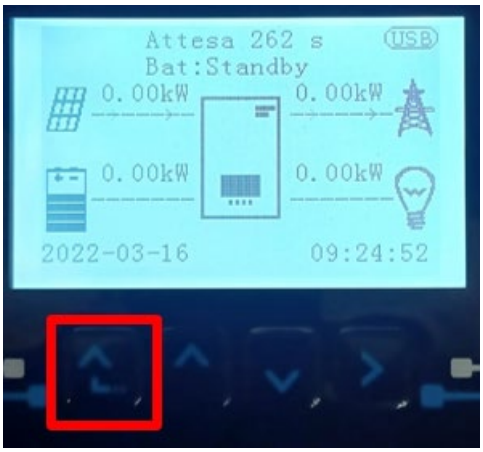

Figure 129 - BMS power connection

Figure 130 - Inverter-side DC power connection with a single battery input populated

### 4.2.5.5. Channel configuration (single Azzurro tower)

To configure the inverter channels correctly:

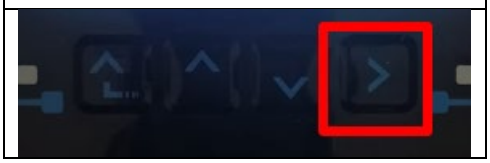
1. Press the first button on the left of the display:




2. Press the last arrow on the right (enter) to access the basic settings:

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
| |

3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| |
|---|
| 1. Language |
| 2. Date and Time |
| 3. Safety parameters |
| 4. Working mode |
| 5. Self-Test |
| 6. Channel configuration |
| 7. EPS Mode |
| 8. Communication address |
| |
|  |

4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

Set the battery inputs according to the configuration of the towers, specifically, with only one Pylontech BMS connected to the inverter:

- Input channel 1 – BAT input 1;
- Input channel 2 – Not used.

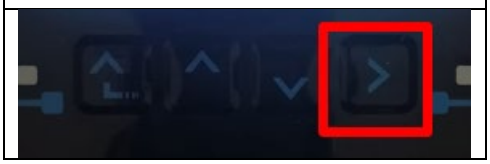
5. Once the channels have been configured correctly, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
| |

6. Enter the battery settings by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery parameters |
| 2. Feed-in limit |
| 3. IV Curve Scan |
| 4. Logic interface |
| 5. Factory reset |
| 6. Parallel settings |
| 7. Reset Bluetooth |
| 8. CT Calibration |
| 9. On-Off switch |
| |

7. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| |
| |
| |
| |
| |
| |
|  |

8. Set the parameters as follows:

| | |
|---|---|
| BATTERY 1 | |
| 1.Battery type | HV ZBT |
| 5.Depth of Discharge | 80% |
| 6.Save | |

9. Access the Automatic Addr. cfg item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Automatic addr. cfg |
| |
| |
| |
| |
| |
| |

3. The total number of batteries in the tower will appear

| |
|---|
| HV ZBT Automatic Address |
| |
| Number of batteries |
| X |
| |
| |
| |

4. The configuration will take about 30 seconds, after which the OK message appears.

### 4.2.5.6. Installation of dual battery tower

Figure 131 - Dual battery tower

### 4.2.5.7. Communication between the BDU and Battery Modules

The communication connections must be arranged as follows, using the communication cables between battery modules:

- COM-IN of the BDU to LINK PORT IN of the first battery
- LINK PORT OUT of the first battery must be connected to LINK PORT IN of the second battery
  …
- LINK PORT OUT of the second-last battery must be connected to LINK PORT IN of the last battery;
- The terminating resistor must be connected to LINK PORT OUT of the last battery.

Connect all battery and BDU grounds to the ground system via appropriate terminals.

Figure 132 - Communication connections: BDU and first battery module

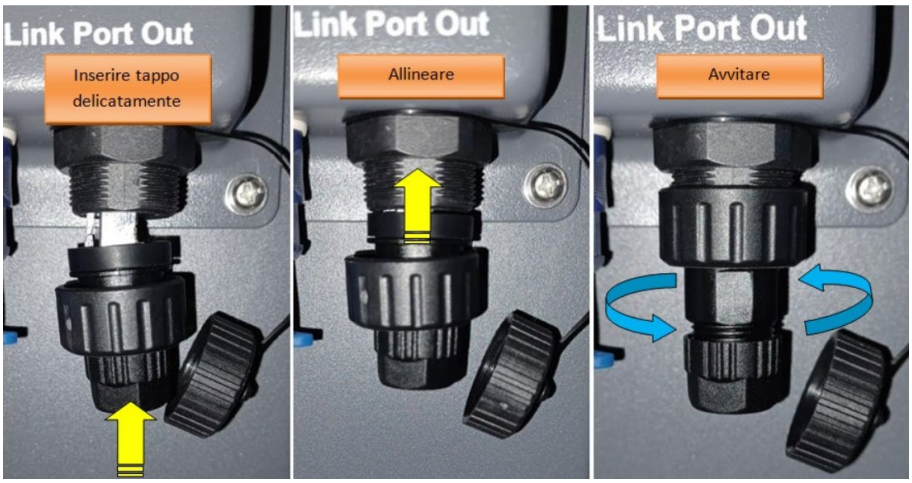



Figure 133 – Terminating resistor of the last battery

### 4.2.5.8. Communication between BDU 1 and BDU 2

Figure 134 – Communication cable between BDU1 and BDU2

Connect the two BDUs from COM-OUT BDU1 to LINK BDU2, as shown in the figure below.
The inverter must be connected from BDU2 via the COM-OUT port.

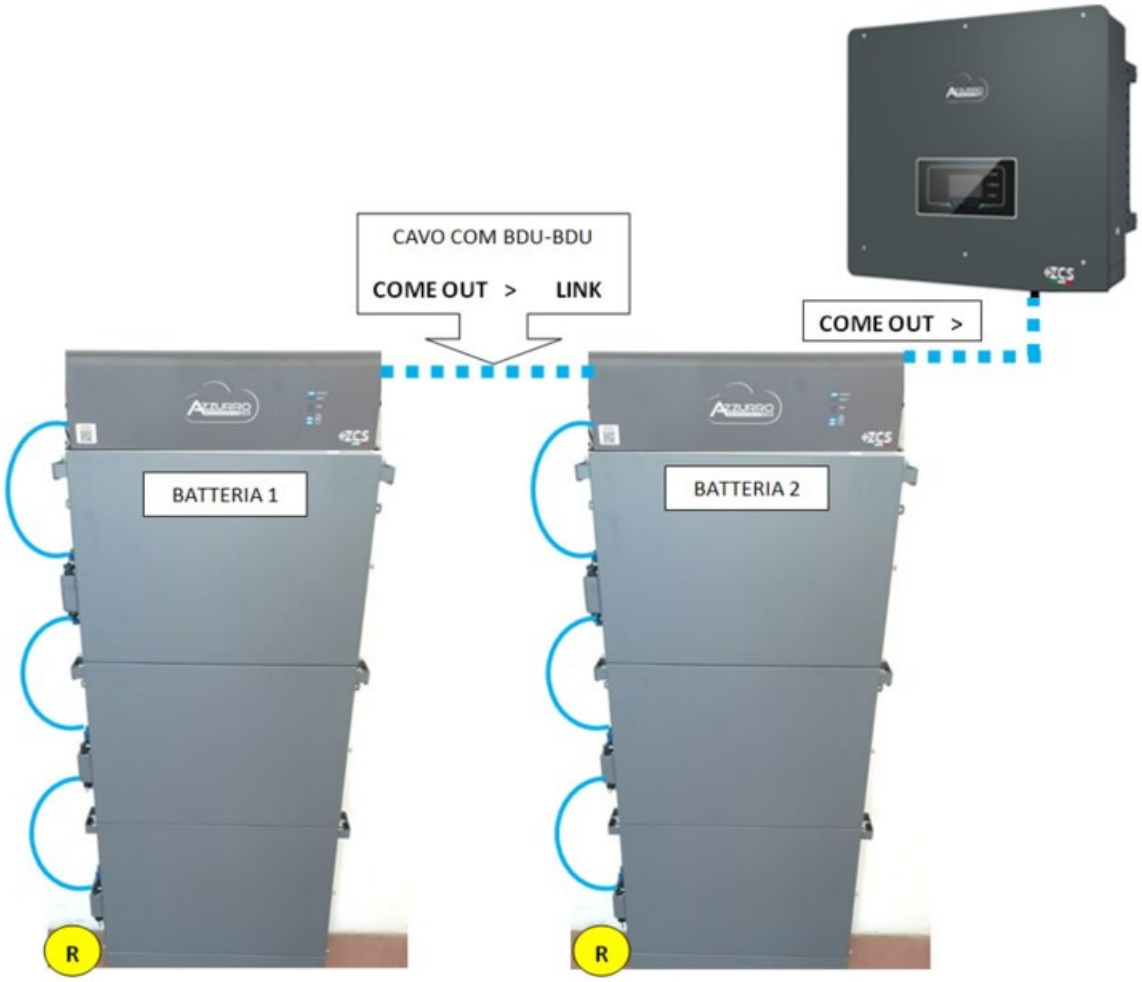



Figure 135 – Communication connections between the Azzurro towers

### 1.1.1.1. BDU2 Inverter communication

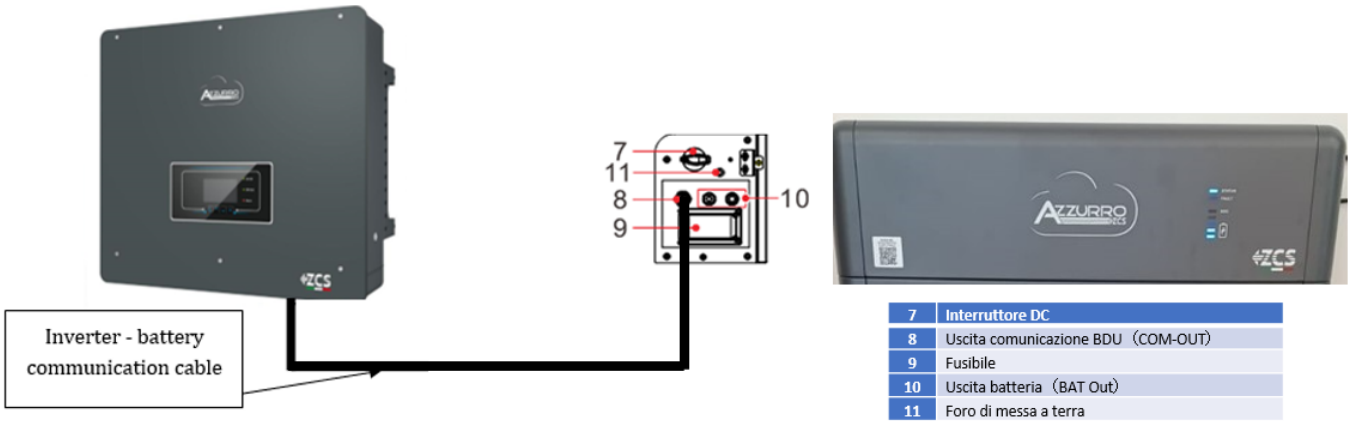



Figure 136 -Hybrid inverter and BDU communication connection

For communication between the BDU and inverter, use the black communication cable provided. The BDU side must be plugged into the COM-OUT port of the Inverter. PIN 7 (white blue) and PIN 8 (blue) COM port.

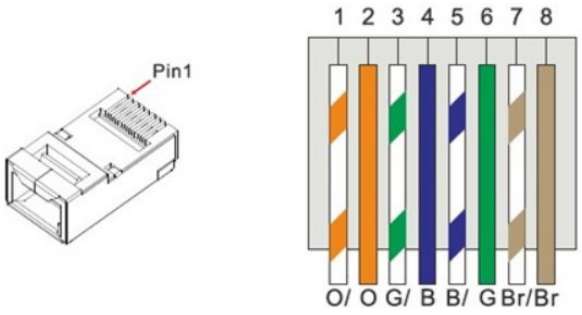



Figure 137 – PIN Out RJ45 communication cable

| PIN | Wire colour | Definition | COM Port |
|---|---|---|---|
| PIN 1 | White Orange | | |
| PIN 2 | Orange | | |
| PIN 3 | White Green | | |
| PIN 4 | Blue | CAN-H | PIN 7 |
| PIN 5 | White Blue | CAN-L | PIN 8 |
| PIN 6 | Green | | |
| PIN 7 | White Brown | | |
| PIN 8 | Brown | | |

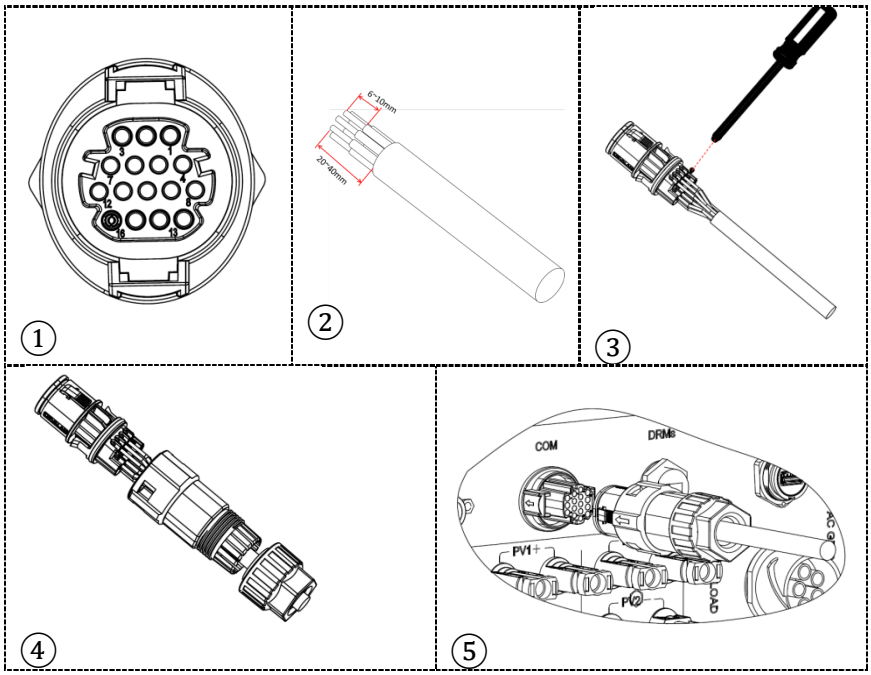



Figure 138 - "Screw-in" COM port connection

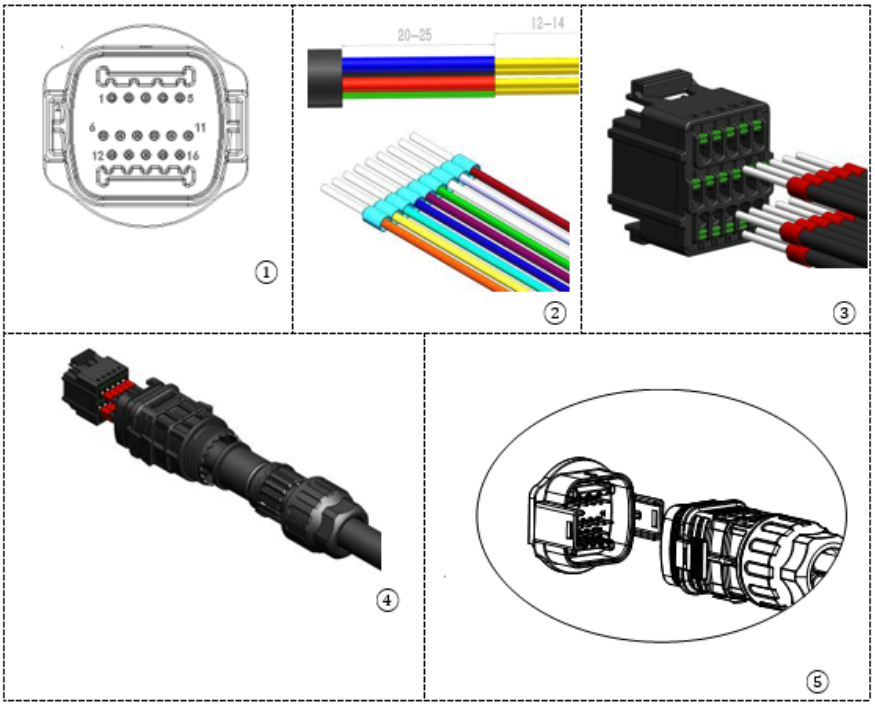



Figure 139 - "Snap-in" COM port connection

| Inverter PIN | Battery communication | Notes |
|---|---|---|
| 7 | CAN H (blue wire) | Communication with the BMS of the lithium battery, the CAN of the inverter adapts to the BMS of the lithium battery. |
| 8 | CAN L (white-blue wire) | |

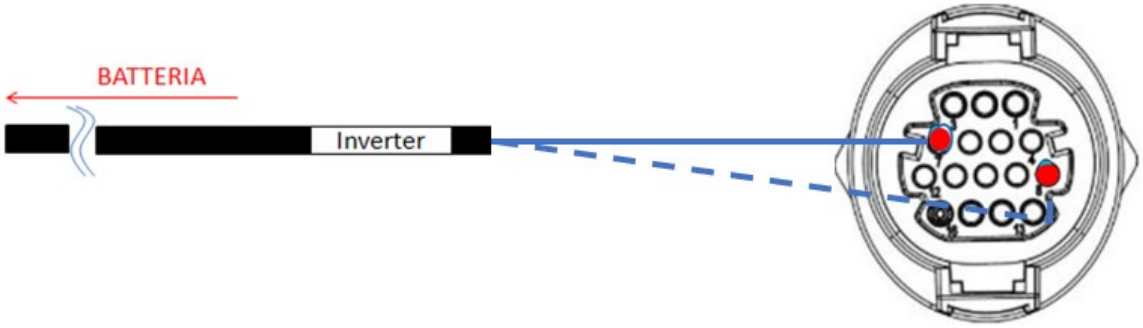



Figure 140 - "Screw-in" COM connection diagram

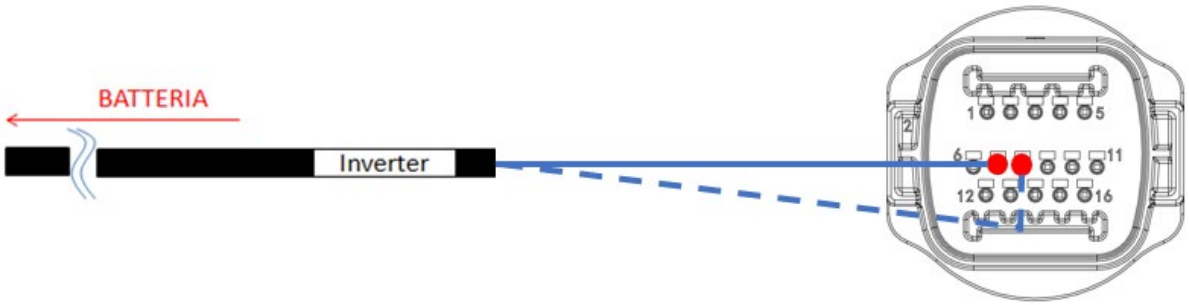



Figure 141 - "Snap-in" COM connection diagram

### 1.1.1.2. Power connections

The battery modules must be connected to each other in parallel via the cables shown in the figure below. The connection cables are supplied with the battery.

Figure 142 - Power connector between battery modules

The connector must be connected from the positive input of the first battery module to the positive input of the second battery, the negative input of the first module must be connected to the negative input of the second module, continuing in this way until the positive input of the second-last battery module is connected to the positive input of the last battery module and the negative input of the second-last battery module is connected to the negative input of the last battery module.
In this configuration, the positive of the first module and the negative of the first module and the positive and negative of the last battery module will remain free.

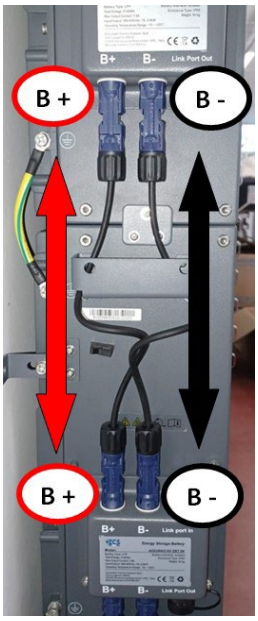



Figure 143 - Power wiring between battery modules

Subsequently, the external BDU must be connected to the first battery module. Therefore , the positive of the BDU must be connected to the positive of the first battery, and the negative of the BDU to the negative of the first battery (the cables for this connection are supplied with the BDU).

Figure 144 - Connection cables between BDU and first battery module

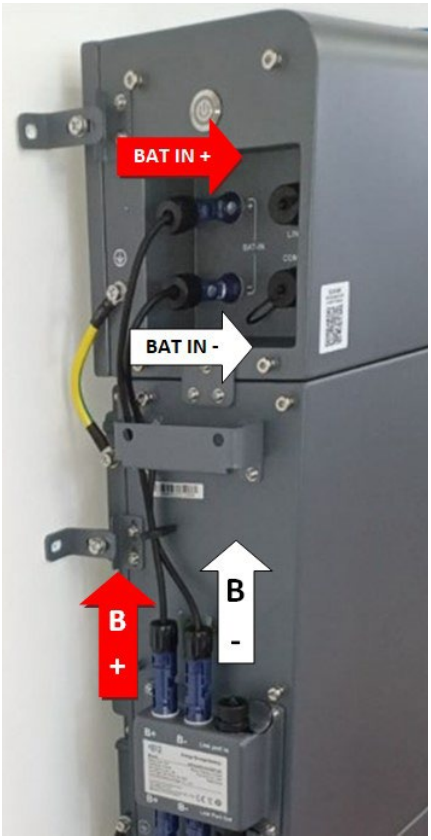



Figure 145 - Power connection (positive and negative) between BDU and first battery module

Finally, the BDU must be connected to the inverter via the power cables provided, as shown in the figure.

Figure 146 - BDU Inverter power cables

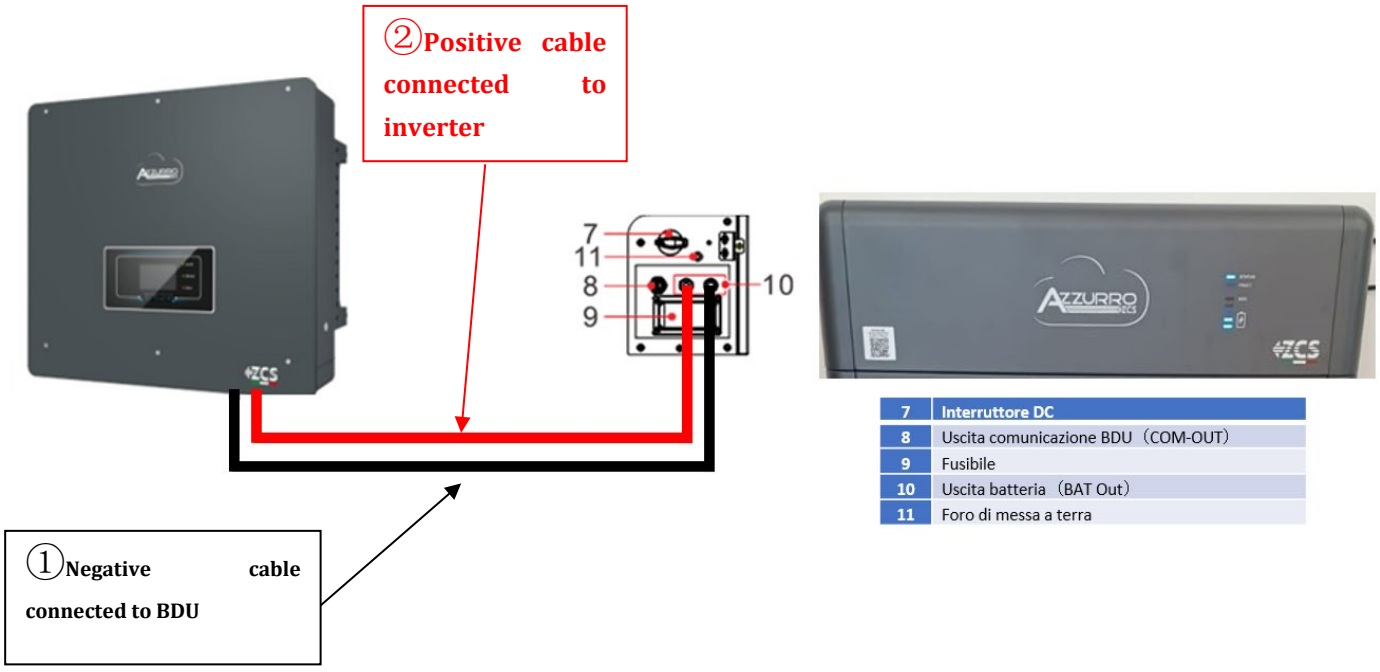



Figure 147 - BMS power connection

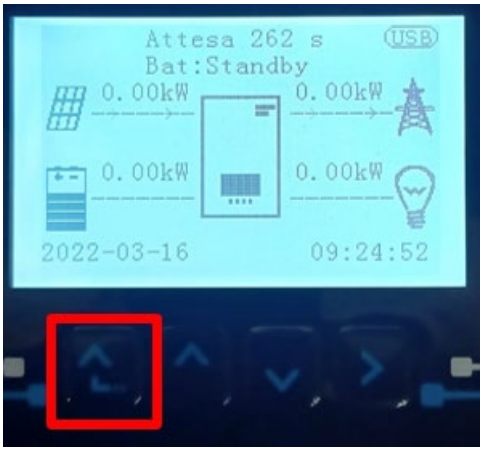
As for the connection between each tower and the inverter, the two power cables (+ and -) coming from each BDU will be connected to the two inputs of the inverter: BAT1 and BAT2
Identify the two battery towers by assigning the number 1 to the tower connected to channel 1 and number 2 to the tower connected to channel 2.

**Figure 148 - Inverter-side DC power connection with two battery inputs populated**

### 4.2.5.9. Channel configuration (dual Azzurro tower)

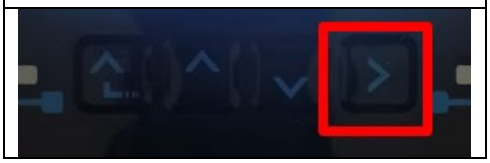
To configure the inverter channels correctly:

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




2. Press the last arrow on the right (enter) to access the basic settings:

| | |
|---|---|
| 1. | Basic settings |
| 2. | Advanced settings |
| 3. | Production statistics |
| 4. | System Info |
| 5. | Event list |
| 6. | SW Update |



3. Basic settings, press the down arrow until the channel configuration item is highlighted. Now press the last arrow to the right to access the channel configuration:

| | |
|---|---|
| 1. | Language |
| 2. | Date and Time |
| 3. | Safety parameters |
| 4. | Working mode |
| 5. | Self-Test |
| 6. | Channel configuration |
| 7. | EPS Mode |
| 8. | Communication address |

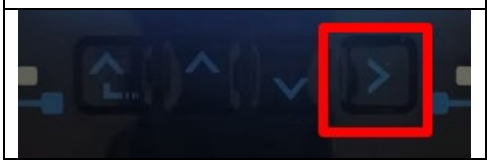
4. Configure channels as described below:

| Inverter channels | Inverter channel configurations |
|---|---|
| Channel 1 input | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 2 input (only for inverters larger than 8kW) | Bat input 1 |
| | Bat input 2 |
| | Not used |
| Channel 3 input | PV input 1 |
| | PV input 2 |
| | Not used |
| Channel 4 input | PV input 1 |
| | PV input 2 |
| | Not used |

Set the battery inputs according to the configuration of the towers, specifically, with two Pylontech Battery Management Systems connected to the inverter:

- Input channel 1 – BAT input 1;
- Input channel 2 – BAT input 2.

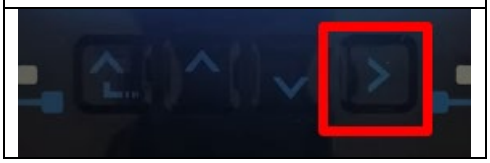
5. Once the channels have been configured correctly, enter the advanced settings by pressing the last button on the right of the inverter (enter password: 0715):

| |
|---|
| 1. Basic settings |
| 2. Advanced settings |
| 3. Production statistics |
| 4. System Info |
| 5. Event list |
| 6. SW Update |
| |
|  |

6. Enter the battery settings by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery parameters |
| 2. Feed-in limit |
| 3. IV Curve Scan |
| 4. Logic interface |
| 5. Factory reset |
| 6. Parallel settings |
| 7. Reset Bluetooth |
| 8. CT Calibration |
| 9. On-Off switch |
| |

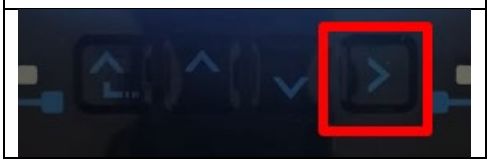
7. Enter the Battery 1 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Battery 2 |
| |
| |
| |
| |
| |
|  |

5. Set the parameters as follows:

| BATTERY 1 | |
|---|---|
| 1.Battery type | HV ZBT |
| 5.Depth of Discharge | 80% |
| 6.Save | |

8. Enter the Battery 2 item by pressing the last button on the right of the inverter:

| |
|---|
| 1. Battery 1 |
| 2. Battery 2 |
| |
| |
| |
| |
| |
|  |

6. Set the parameters as follows:

| BATTERY 2 | |
|---|---|
| 1.Battery type | HV ZBT |
| 5.Depth of Discharge | 80% |
| 6.Save | |

7. Access the Automatic. Addr. cfg item by pressing the last button on the right of the inverter:

| 1. Battery 1 |
|---|
| 2. Battery 2 |
| 3. Automatic addr. cfg |
| |
| |
| |
| |
| |
| |

8. The total number of batteries in the tower will appear

| HV ZBT Automatic Address |
|---|
| |
| Number of batteries |
| X |
| |
| |
| |

9. The configuration will take about 30 seconds, after which the OK message appears.

# 2. External communication

## 2.1. USB/Wi-Fi

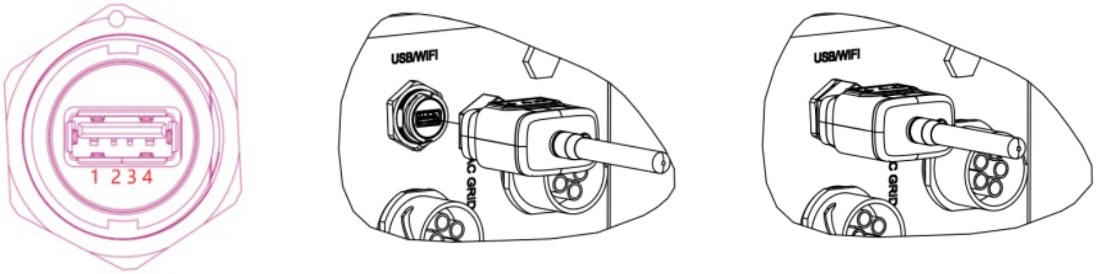



Figure 149 - External Wi-Fi connection

| PIN | Definition | Function | Notes |
|---|---|---|---|
| 1 | GND.S | Power Supply - USB | The USB power supply is 5V/1A; It cannot be used to charge external devices |
| 2 | DP | Data + USB | |
| 3 | DM | Data - USB | |
| 4 | VBUS | Power Supply - USB | |

Table 7 – Interface description

## 2.2. DRMs Interface - Logical Interface

**Procedure:**

1) Position the wire terminals according to the colour sequence shown in Figure150.

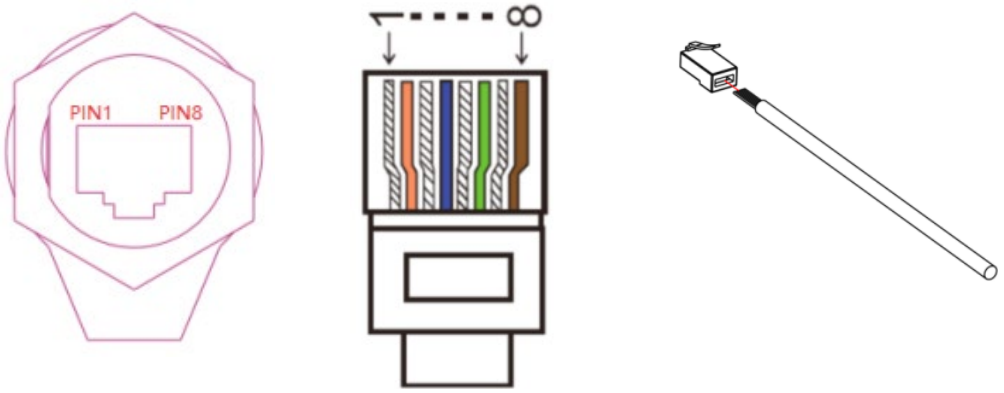



Figure150 – Connecting the DRMs interface (1)

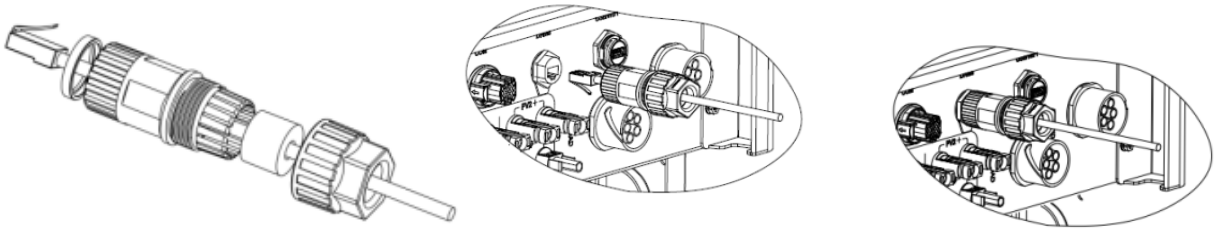


Figure 151 – Connecting the DRMs interface (2)

2) Pass the cable terminal through the cable gland, insert the communication cable into the RJ45 connector. The pins of the logical interface are defined according to the different standard requirements:

   a) Logical interface according to the VDE-AR-N 4105 standard: 2018-11, necessary for controlling and/or limiting the output power of the inverter. The inverter can be connected to a RRCR (Radio Control Receiver), together with all the other inverters in the installation, so as to dynamically limit the output power.

   b) Logical interface in accordance with the EN50549-1:2019 standard, necessary for interrupting the output power supply within 5 seconds following an instruction received from the interface.

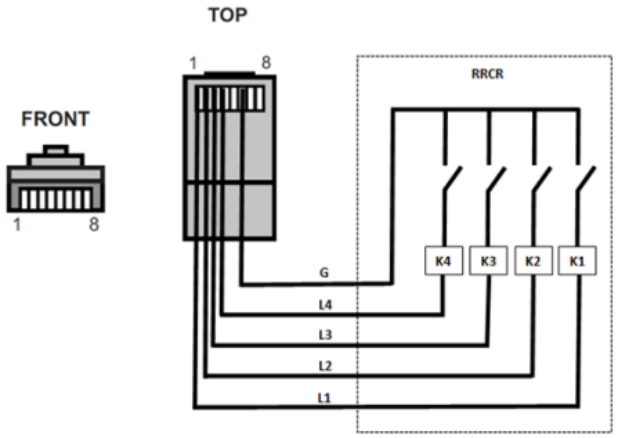



Figure 152 - RRCR connection

| Pin | Name | Description | Connected to (RRCR) |
|---|---|---|---|
| 1 | L1 | Input contact relay 1 | K1 – Output relay 1 |
| 2 | L2 | Input contact relay 2 | K2 – Output relay 2 |
| 3 | L3 | Input contact relay 3 | K3 – Output relay 3 |
| 4 | L4 | Input contact relay 4 | K4 – Output relay 4 |
| 5 | NC | Not connected | Not connected |
| 6 | G | GND | Relay common node |
| 7 | NC | Not connected | Not connected |
| 8 | NC | Not connected | Not connected |

Table 8 – Terminal description

| L1 | L2 | L3 | L4 | Active power | Cos(φ) |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0% | 1 |
| 0 | 1 | 0 | 0 | 30% | 1 |
| 0 | 0 | 1 | 0 | 60% | 1 |
| 0 | 0 | 0 | 1 | 100% | 1 |

Table 9 – Inverter preconfigured for the RRCR power levels (1 closed, 0 open)

| No. | PIN name | Description | Connected to (RRCR) |
|---|---|---|---|
| 1 | L1 | Input contact relay 1 | K1 – Output relay 1 |
| 2 | NC | Not connected | Not connected |
| 3 | NC | Not connected | Not connected |
| 4 | NC | Not connected | Not connected |
| 5 | NC | Not connected | Not connected |
| 6 | G | GND | K1 – Output relay 1 |
| 7 | NC | Not connected | Not connected |
| 8 | NC | Not connected | Not connected |

**Table 10- Terminal description**

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

**Table 11 - Inverter preconfigured for the RRCR power levels (1 closed, 0 open)**

## 2.3. COM communication - Multifunction

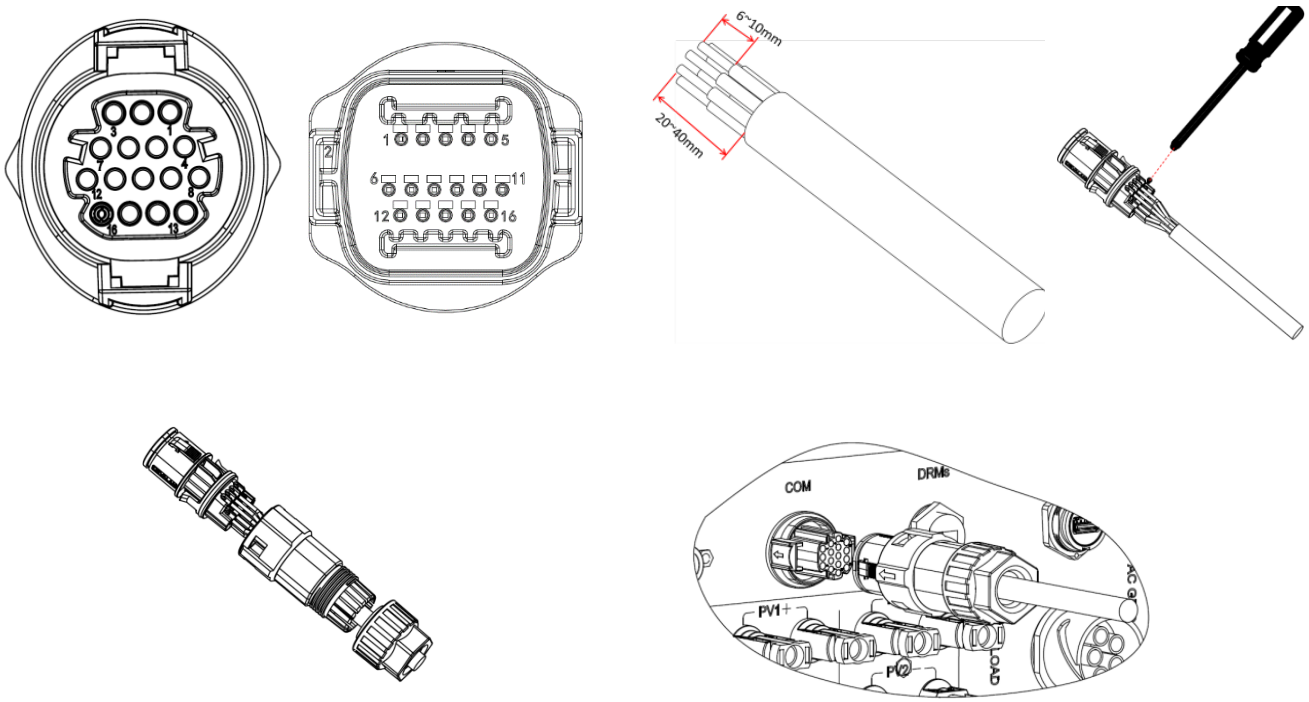



Figure 153 – COM interface

Refer to the figure below for the RS485 connection, if you want "cascade" monitoring of the inverters.

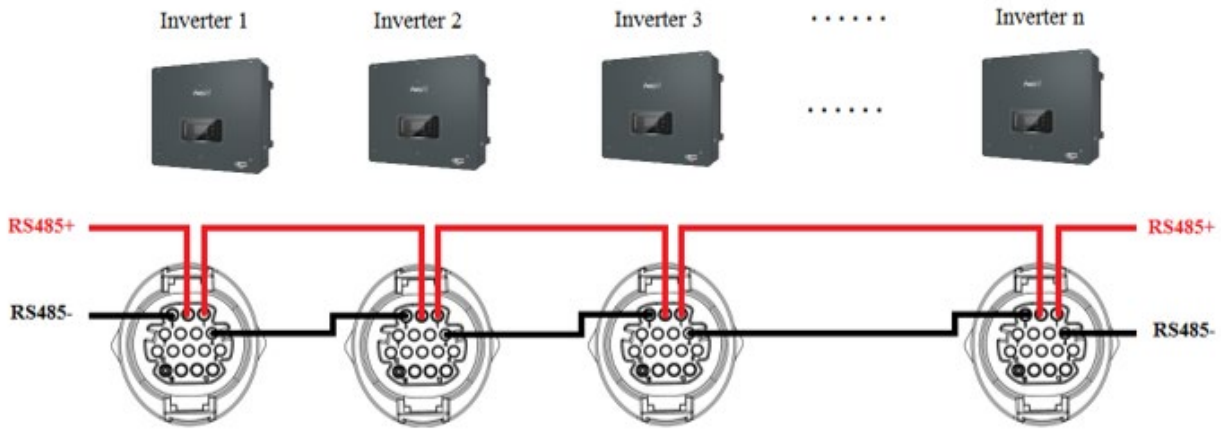



Figure 154 - RS485 connection (monitoring between inverters)

| PIN | Definition | Function | Notes |
|---|---|---|---|
| 1 | RS485A1-1 | RS485 differential signal + | Wired or cascade monitoring of the inverter |
| 2 | RS485A1-2 | RS485 differential signal + | |
| 3 | RS485B1-1 | RS485 differential signal – | |
| 4 | RS485B1-2 | RS485 differential signal – | |
| 5 | RS485A2 | RS485 differential signal + | Communication with three-phase meters |
| 6 | RS485B2 | RS485 differential signal – | |
| 7 | CAN0_H | CAN positive polarity | Communication with BMS of the lithium battery |
| 8 | CAN0_L | CAN negative polarity | |
| 9 | GND.S | GND communication BMS | |
| 10 | 485TX0+ | RS485 differential signal + | |
| 11 | 485TX0- | RS485 differential signal - | |
| 12 | GND.S | GND signal | Lead-acid battery temperature measurement |
| 13 | BAT Temp | Lead-acid battery temperature probe | |
| 14 | DCT1 | Dry Contact1 | Option of the electric switch function |
| 15 | DCT2 | Dry Contact2 | |
| 16 | VCC | VCC communication | 12V power supply |

**Table 12 - Interface description**

## 2.4. Measurement of currents exchanged with the grid

Measurement of the currents exchanged with the grid is fundamental for the correct functioning of the energy storage in the battery.
There are two ways to take this measurement correctly:

1. Direct use of CT sensors (ZST-ACC-TA model).
2. Use of meter and CT sensors. In this case, both the current probes offered by ZCS and other types of probes can be connected to the meter, which must be correctly set on the meter.

The first method can be applied in all cases where the distance between the hybrid inverter and the sensor insertion point is less than 50 meters. To extend the + and – cables of the CT, use a Category-6 8-pin STP cable and connect the shield to the ground on one of the two sides.
If the distance is greater than 50 meters, then the second method must be used.
The correct insertion point of the sensors or the Meter + CT sensors for measuring the currents exchanged with the grid is shown in the figure below.

### 2.4.1. Direct connection of CT sensors

In the case of direct connection of the CT sensors, use the dedicated connections supplied with the inverter as shown in the figure.
These sensors must be connected directly to the CT input of the inverter shown in the figure, according to the indications in the table.

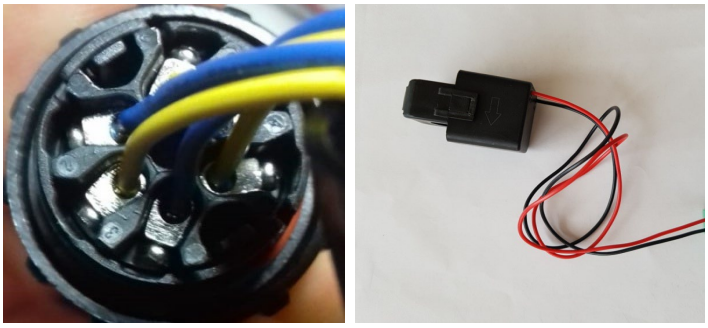


Figure 155 - Numbered connections of the CT connector

| PIN | Definition | Function | Notes |
|---|---|---|---|
| 1 | Ict_R- | Negative R-phase sensor (L1) | Used to connect the R-phase current sensor (L1) |
| 2 | Ict_R+ | Positive R-phase sensor (L1) | |
| 3 | Ict_S- | Negative S-phase sensor (L2) | Used to connect the S-phase current sensor (L2) |
| 4 | Ict_S+ | Positive S-phase sensor (L2) | |
| 5 | Ict_T- | Negative T-phase sensor (L3) | Used to connect the T-phase current sensor (L3) |
| 6 | Ict_T+ | Positive T-phase sensor (L3) | |

Table 13 - Interface Description

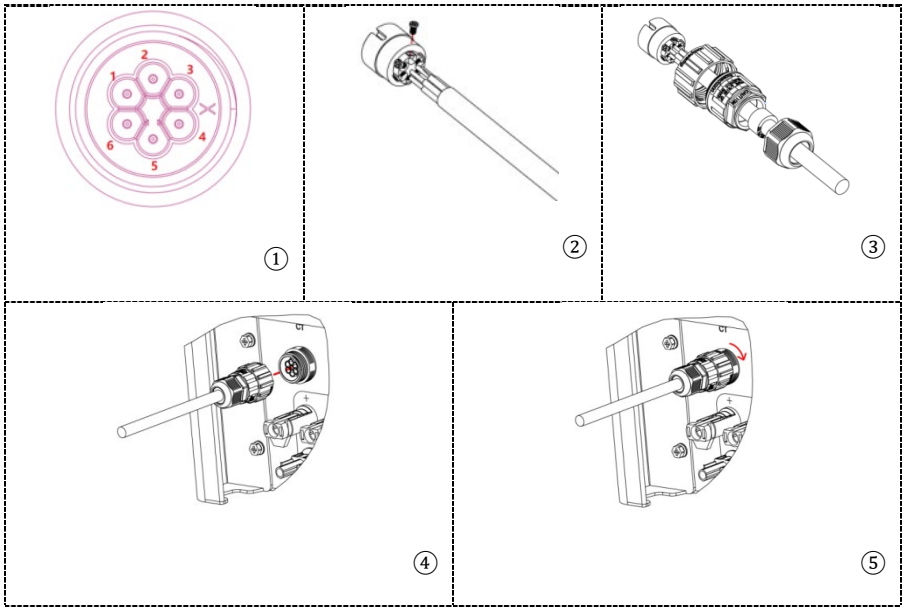



Figure 156 - CT Interface

Take care to correctly identify the three phases as they are connected to the inverter on the grid connector. The sensors of each phase must match.
Position the sensors according to the direction on the sensor (arrow).

Figure 157 - Reference to sensor direction

If it is necessary to extend the sensor connection cables, use STP network cables and connect the shield to the ground on one of the two sides.
This cable can be extended only up to a maximum of 50 metres, otherwise a meter must be used.
Make sure to properly insulate the extension connections so as to prevent any problems with low insulation and/or COM port failure.

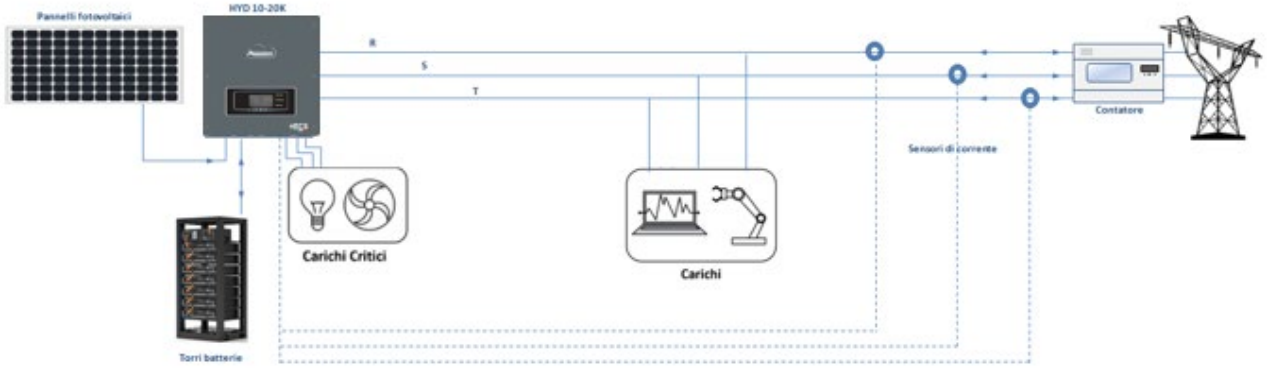



**Figure 158 - Installation diagram of hybrid three-phase inverter with CT**

## 2.4.2.Connecting the Meter

Due to the stability of the RS485 signal, for distances greater than 50 meters between the inverter and measuring point, it is necessary to use the Meter in addition to the sensors, as shown in the figure.
Make sure to position the probes so that each toroid reads only the current flows relating to the exchange. To do this, it is recommended to position them at the output of the exchange meter.

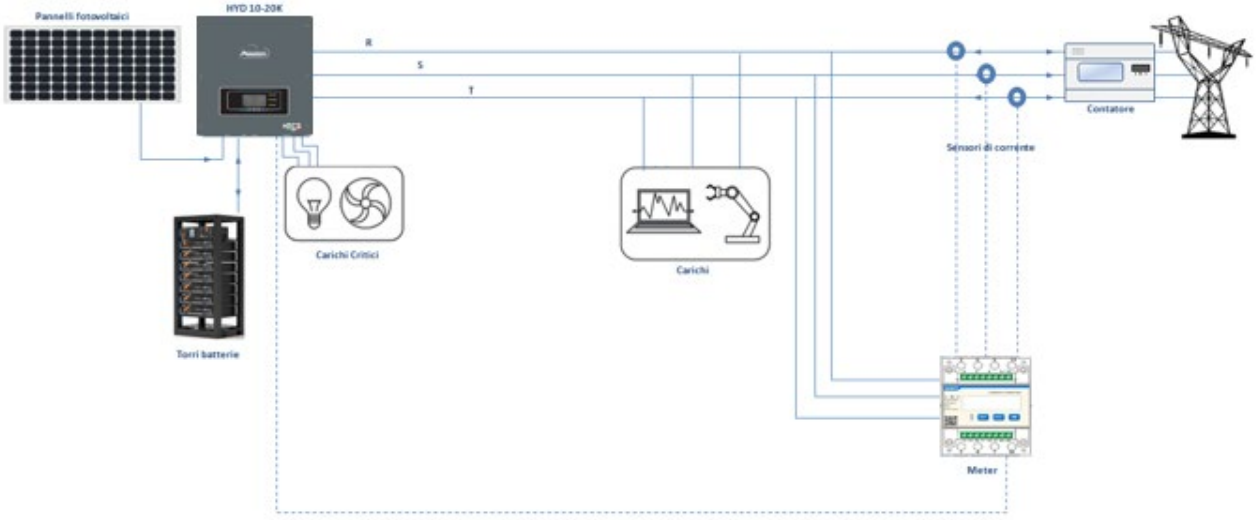



Figure 159 - Installation diagram of hybrid inverter with Meter on the exchange

This involves connecting the sensors to the Meter, and then connecting the Meter to the inverter via a serial port.
The sensors connected to the Meter must **never** be extended (use the cables supplied).

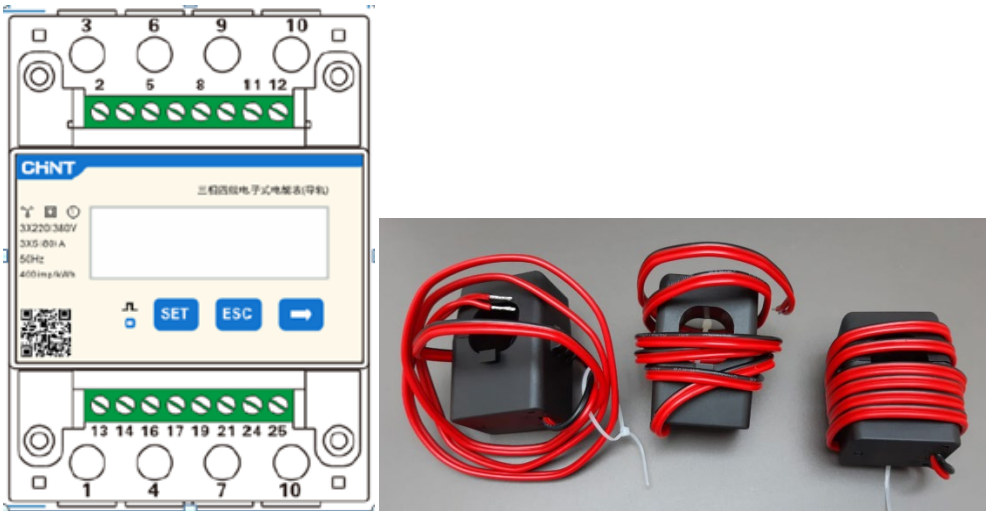



Figure 160 - Meter (left), CT sensors (right)

Connect the Meter and sensors according to the diagram shown in the figure below.
Connect PIN 10 of the Meter to the neutral wire (N), connect PINs 2, 5 and 8 to phases R, S and T respectively.
As regards the connections with the CT sensors, the terminals of the R-phase sensor must be connected to PIN 1 (red wire) and PIN 3 (black wire).
The terminals of the S-phase sensor must be connected to PIN 4 (red wire) and PIN 6 (black wire).
The terminals of the T-phase sensor must be connected to PIN 7 (red wire) and PIN 9 (black wire).
Position the sensors according to the direction on the sensor (arrow).

ATTENTION: attach the CT sensors to the phases only after they have been connected to the Meter.

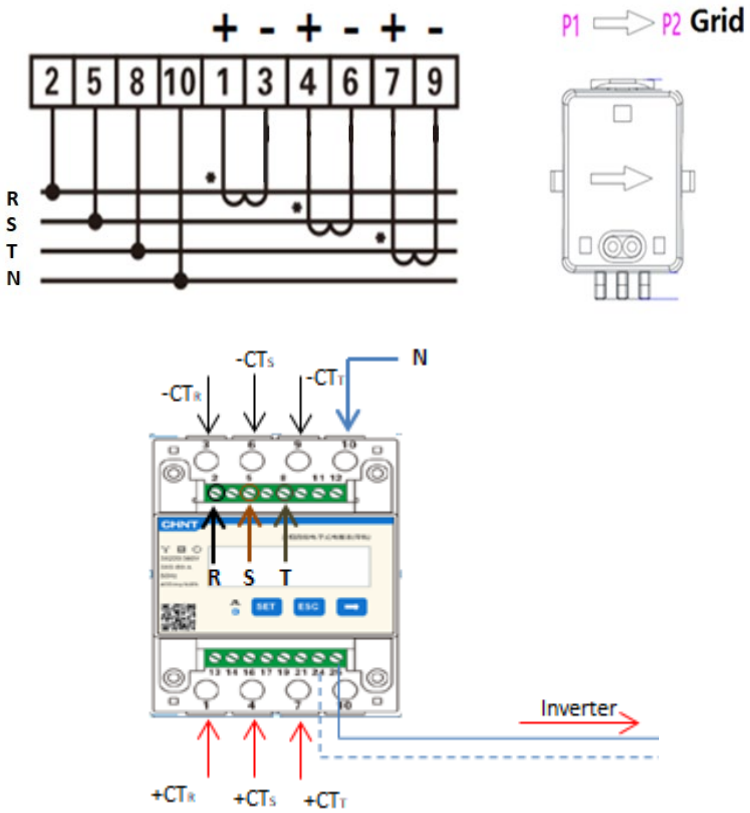



Figure 161 - Meter and sensor connections

Connect the Meter and inverter via the RS485 serial port.
On the Meter side, this port is identified by PINs 24 and 25.
On the inverter side, use the connection port identified as “COM” by connecting PINs 5 and 6 as shown in the figures and tables below.

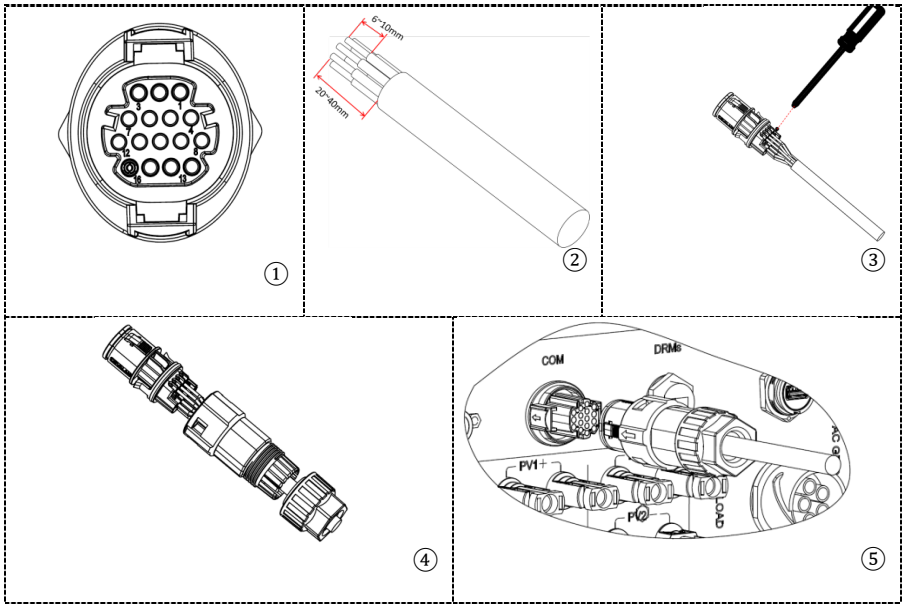
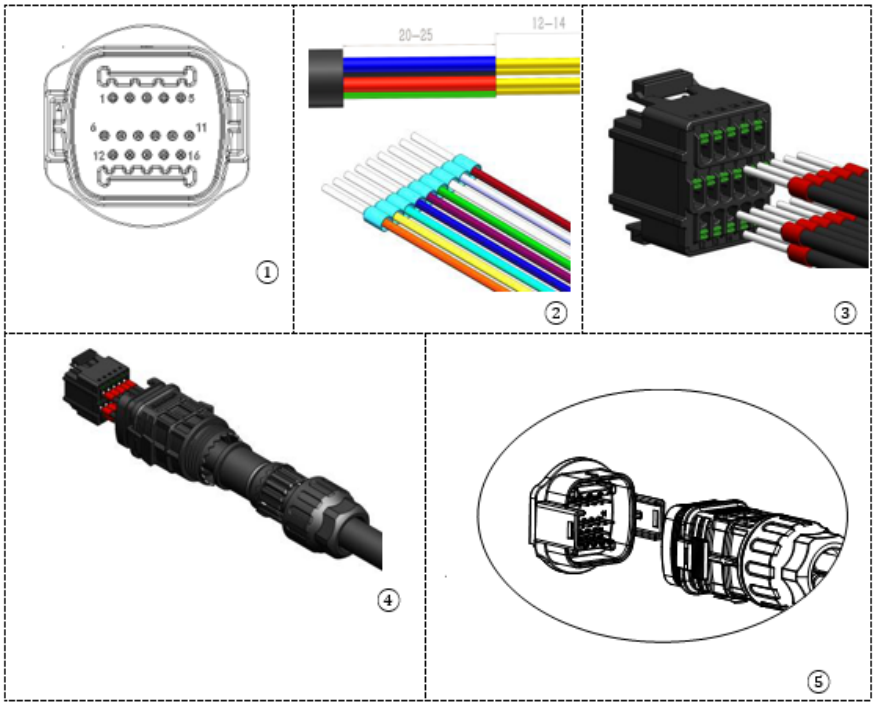



Figure 162 – "Screw-in" COM interface




F

Figure 163 – "Snap-in" COM interface

| Inverter PIN | Definition | PIN Meter | Notes |
|---|---|---|---|
| 5 | RS485 differential signal + | 24 | Communication with Meters |
| 6 | RS485 differential signal – | 25 | |

Table 14 - Interface description

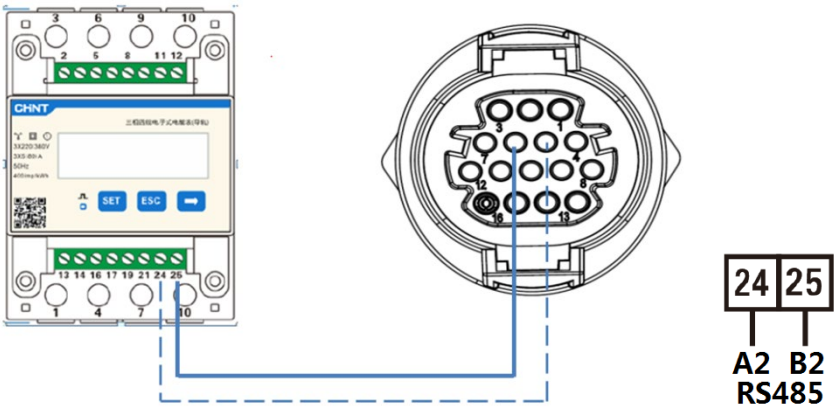



Figure 164 - Connection of "screw-in" Meter serial port

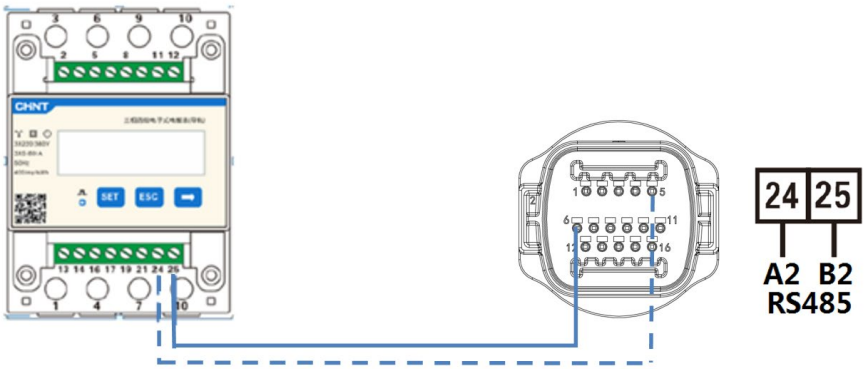



Figure 165 - Connection of "snap-in" Meter serial port

**NOTE**: For distances greater than 100 meters between the Meter and hybrid inverter it is recommended to connect two 120 Ohm resistors along the 485 daisy chain: the first to the inverter (between PINs 5 and 6 of the interface), and the second directly to the Meter (PINs 24 and 25).

### 2.4.3.Measuring the photovoltaic production

If one or more photovoltaic inverters are already in the system, the hybrid system must not only show the photovoltaic contribution of the panels connected to its inputs, but also the power produced by external photovoltaic panels, in order to make the storage system work properly.
All this must be achieved by connecting a second Meter (or up to a maximum of 3 to read an external production) in a suitable position that allows reading the entire production of the pure photovoltaic system (excluding that of the hybrid three-phase inverter).
As for the RS485 communication (Meter - HYD), all the Meters present must be connected to the COM port of the inverter in inputs 5 and 6 of the interface.

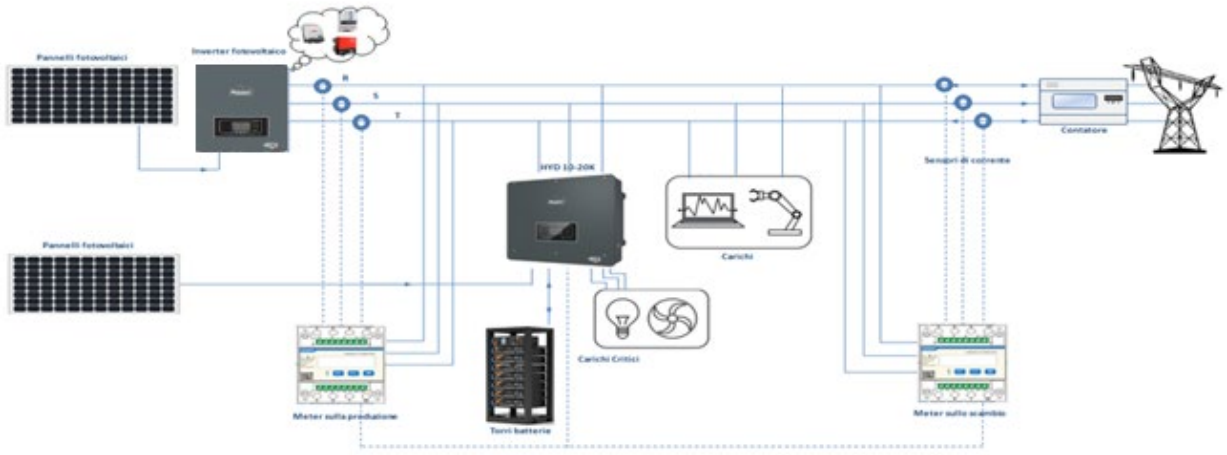


Figure 166 - Installation diagram of Hybrid inverter with Meter on exchange and production

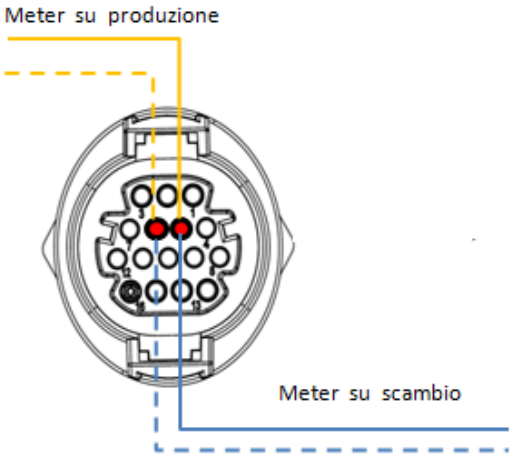



Figure 167 - Connection of "screw-in" COM serial port with more than one Meter

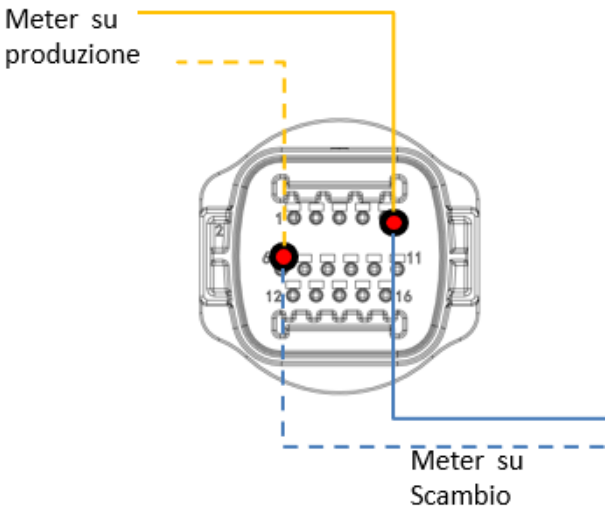



Figure 168 - Connection of "snap-in" COM serial port with more than one Meter

### 2.4.3.1. Configuring the Meter parameters

After connecting the cables correctly, it is necessary to set the correct parameters from the Meter display.

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

   (to enter digit)
2. Press to "go back"
3. Press to "add"

Figure 169 - Meter Legend

**Exchange Meter configuration**

To configure the device in read mode on the **exchange**, enter the settings menu as shown below:

1. Press **SET** and the word **CODE** will appear

2. Press **SET** again and "600" will appear:

3. Enter the number "701":
   a. From the first screen where the number "600" appears, press the "→" key once to write the number "601".
   b. Press "**SET**" twice to move the cursor left, highlighting "601";
   c. Press the"→" key several times until the number "701" is written (701 is the code for accessing the settings).

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

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

**Note**: In case of error, press "SET" until the digit for 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 and “→” to scroll to the next setting.

b. **ADDRESS:**
   i. Leave address 01 (default setting) so that the inverter assigns the data sent by the meter as the power relating to the exchange.

## Configuring Meter on exchange and production

To configure the device in read mode on the **exchange**, refer to the instructions in the previous section Configuring Meter on exchange).

To configure the device in read mode on **production**, enter the settings menu, as shown below:

1. Press **SET** and the word **CODE** will appear

2. Press **SET** again and “600” will appear:

3. Enter the number “701”:
   a. From the first screen where the number “600” appears, press the “→” key once to write the number “601”.
   b. Press “**SET**” twice to move the cursor left, highlighting “601”;
   c. Press the”→” key several times until the number “701” is written (701 is the code for accessing the settings).

**Note**: In case of error, press “ESC” and then “SET” again to reset the required code.

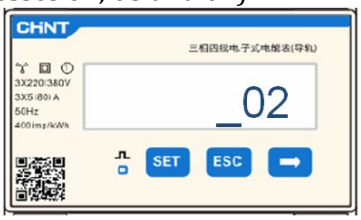
4. Confirm by pressing **SET** until you enter the settings menu.
5. Enter into the following menus and set the parameters indicated:
   a. **CT**:
      i. Press **SET** to enter the menu
      ii. Write “40”:

1. From the first screen where the number "1" appears, press the "→" key several times until the number "10" is written.
2. Press "**SET**" once to move the cursor left, highlighting "10"
3. Press the "→" key several times until the number "40" is written

**Note**: In case of error, press "SET" until the digit for 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 and "→" to scroll to the next setting.

b. **ADDRESS**:
   i. Press **SET** to enter the menu:
   ii. Write "02" (by pressing "→" once from screen "01"). With address 02, the inverter assigns the data sent by the meter as production power. A maximum of 3 meters can be set for the production (Addresses 02, 03 and 04).




iii. Press "ESC" to confirm.

## 2.4.3.2. Checking the correct installation of the Meter

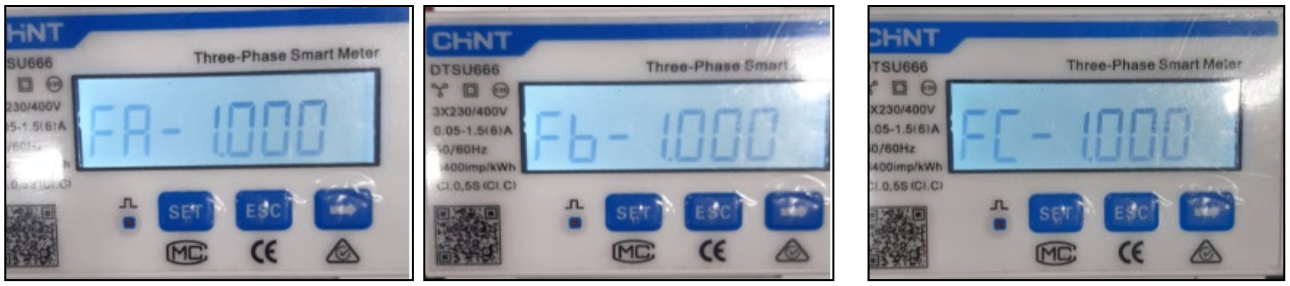
### Check the Meter on Exchange

To carry out this check, it is necessary to:

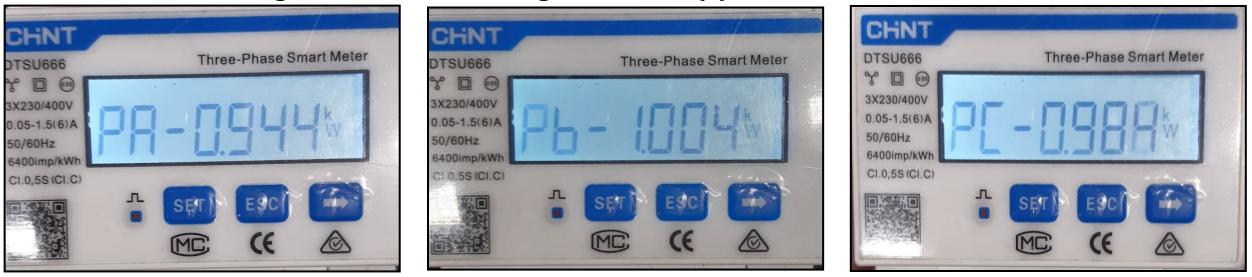
- Switch on only the hybrid inverter in alternating mode and switch off any other source of photovoltaic production (if present);
- Switch on loads of more than 1 kW for each of the three phases of the system;

Stand in front of the Meter and use the "→" keys to scroll through the items, and "ESC" to go back, checking that:

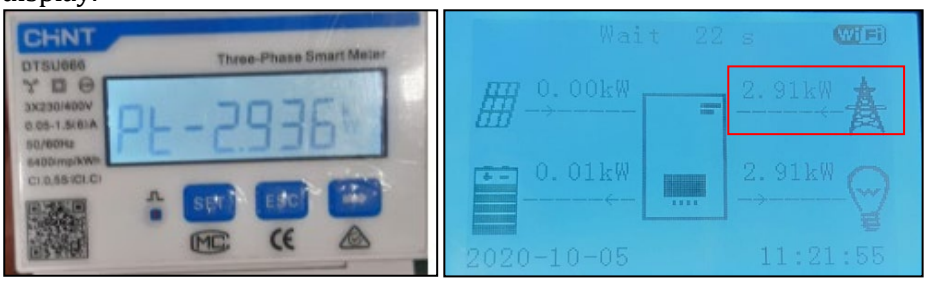
1. The Power Factor values for each phase Fa, Fb and Fc (phase shift between voltage and current) are between 0.8-1.0. If the value is lower, move the sensor to one of the other two phases until the value is between 0.8-1.0.




2. The Pa, Pb and Pc Powers are:
   - Greater than 1 kW.
   - In line with the home consumption.
   - The sign in front of each negative value (–).




3. Switch on the photovoltaic system of the inverter by turning the switch to ON and the batteries, check that the total power value (Pt) is in line with the value shown on the inverter's display.




## Checking the Meter on Production

In case of **meter on production**, repeat the above steps:

1. Switch off the hybrid inverter and only leave the pure photovoltaic system on;
2. Operate the pure photovoltaic system in production mode;
3. Check the Power Factor as described in the previous case;
4. The sign of the Pa, Pb, and Pc powers must match;
5. Switch on the Hybrid Inverter, check that the total PV power value (Pt) is in line with the value shown on the inverter's display.

## 2.5. Inverter Mode in parallel

If there is more than one hybrid inverter in a system, they must be connected in parallel (Master-Slave mode).
For maximum performance of the system and to have future imbalances between the towers, the hybrid inverters must be the same as 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 maximise self-consumption.

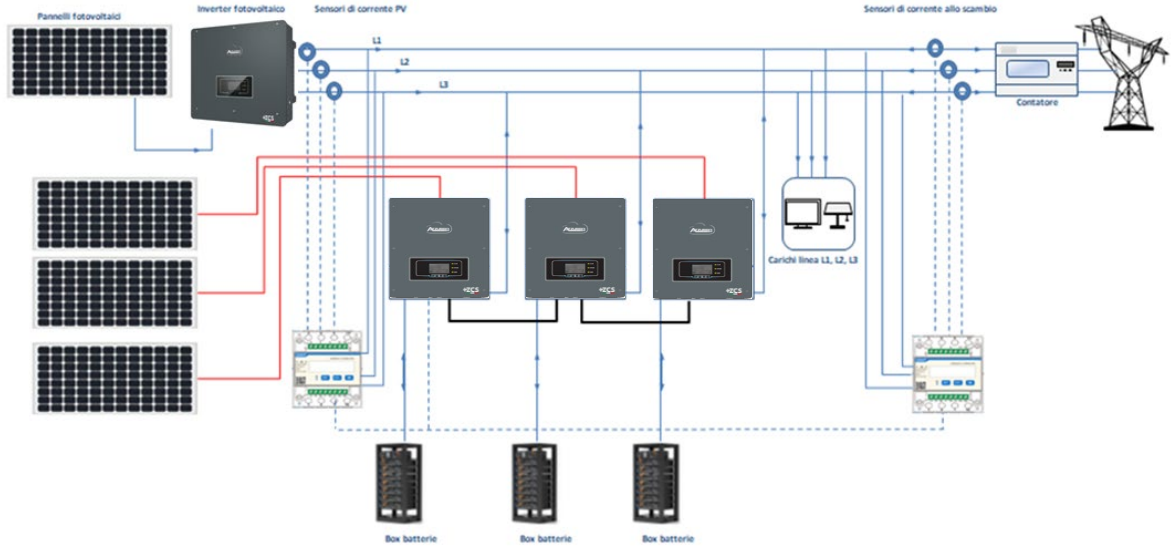



Figure 170 - Single-line diagram of parallel inverter connection

### 2.5.1. Connections between inverters

2. The inverters must be interconnected using the cable supplied, making sure to populate the inputs as follows:
   - Link port 1 of Master Inverter → Link port 0 of Slave 1 Inverter
   - Link port 1 of Slave 1 Inverter → Link port 0 of Slave 2 Inverter
   - Link port 1 of Slave 2 Inverter → Link port 0 of Slave 3 Inverter
   - ...
   - Link port 1 of Slave n-1 Inverter → Link port 0 of Slave n Inverter

   **NOTE: the inverter parallel cable supplied is 3 meters long and cannot be extended.**

3. If the inverters connected are of the same size, the LOAD outputs can be connected in parallel in order to supply power to the same group of priority loads. To do this, a parallel switchboard must be used and all hybrid inverters must be equipped with batteries (if even one inverter in the parallel setup lacks a battery, the EPS cannot be enabled). Make sure that the connections between each inverter and the parallel switchboard have the same length and cross-section, and have the lowest possible impedance. It is recommended to install suitable protection on each connection line between the inverter and switchboard.

4. The total load connected to the LOAD outputs must be less than the total sum of the power outputs of the inverters in EPS mode.

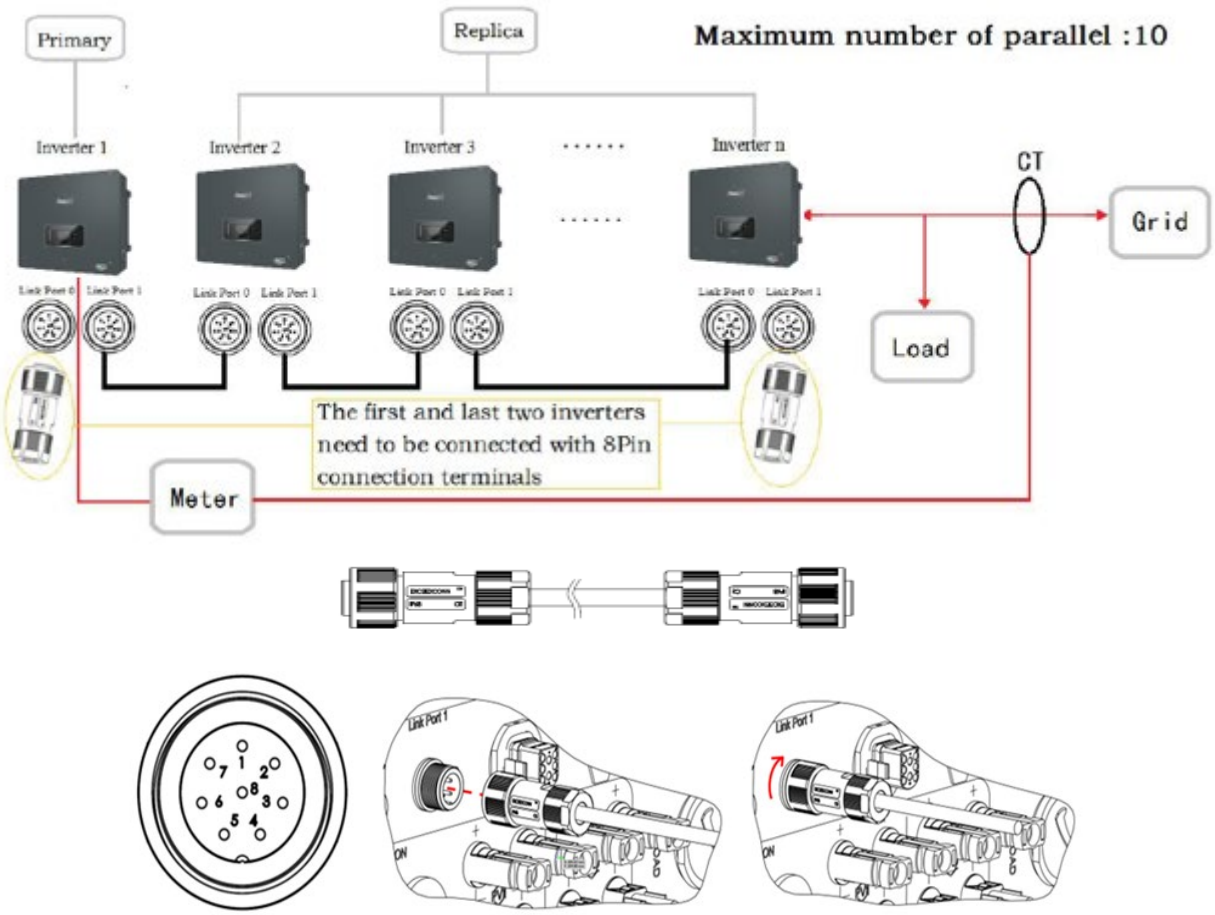



Figure 171 - Parallel connections between inverters

| PIN | Definition | Function | Notes |
|---|---|---|---|
| 1 | IN_SYN0 | Signal synchronisation 0 | The high signal level is 12 V |
| 2 | CANL | CAN negative polarity | |
| 3 | SYN_GND0 | Signal synchronisation GND0 | |
| 4 | CANH | CAN positive polarity | |
| 5 | IN_SYN1 | Signal synchronisation 1 | |
| 6 | SYN_GND1 | Signal synchronisation GND1 | |
| 7 | SYN_GND2 | Signal synchronisation GND2 | |
| 8 | IN_SYN2 | Signal synchronisation 2 | |

Table 15 - Interface description

# 3. Buttons and indicator lights

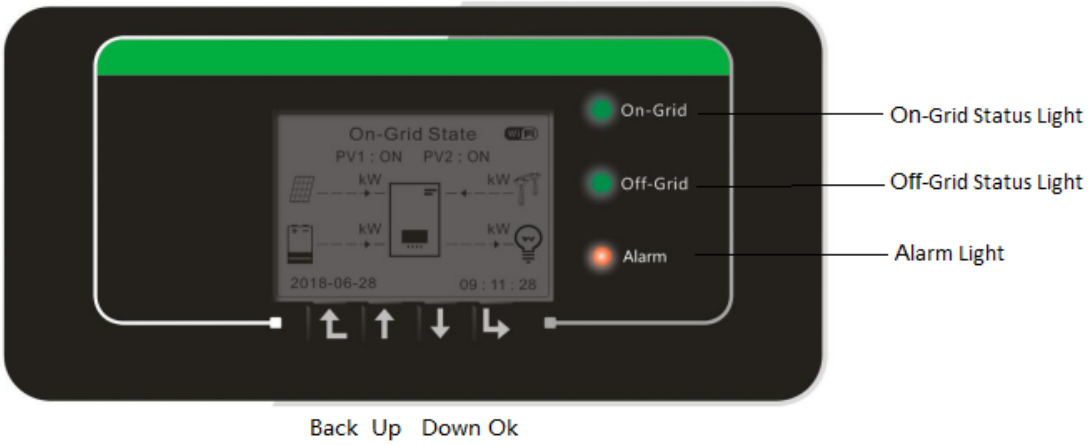



Figure 172 – Screen

The buttons on the screen have the following functions:

- “Back” - to go back to the previous screen or enter the main page;
- "Up" - to move up the menu or for the +1 function;
- “Down" - to move down the menu or for the -1 function;
- “OK” - to select the current option of the menu, or to move.

| Status | Connected to the grid<br>Green light | Off-Grid<br>Green light | Alarm<br>Red light |
|---|---|---|---|
| Connected to the grid | ON | | |
| Standby (connected to the grid) | Flashing | | |
| Off-Grid | | ON | |
| Standby (Off-Grid) | | Flashing | |
| Alarm | | | ON |

Table 16 - Meaning of lights

# 4. Operation

Check the following points and make sure the connections have been made before starting the inverter.

1. The inverter must be securely fixed to the wall bracket.
2. The PV+/PV- wires are securely connected with the correct polarity and voltage.
3. The BAT+/BAT- wires are securely connected with the correct polarity and voltage.
4. The GRID/LOAD cables are connected securely/correctly.
5. The AC switch is correctly connected between the inverter's GRID port and the GRID, with the automatic switch: OFF.
6. The AC switch is correctly connected between the inverter's LOAD port and the critical load, with the automatic switch: OFF.
7. The communication cable of the lithium battery must be correctly connected.

## 4.1. Before configuration (follow carefully)

**IMPORTANT:** Carefully follow the procedure to activate the inverter

1. Ensure that there is no power generation on the phases of the inverter
2. Turn on the batteries:
    a. Pylontech Battery
        i. Set the DC switch of the inverter to ON
        ii. Set the Power Switch (DC disconnect switch) on the front of the BMS to ON
        iii. Press the red START button of the BMS for one second
    b. WeCo batteries
        i. Arm the GENERAL BREAKER present on the front of HV BOX.
        ii. Once the HV BOX has closed the contactor, set the Inverter DC switch to ON.
    c. Azzurro Battery
        i. Arm the rotary switch on the BDU
        ii. Set the DC switch of the inverter to ON
3. Set the AC differential switch between the inverter's GRID input and the grid to ON
4. Set the AC differential switch between the inverter's LOAD input and the critical load to ON
5. The inverter should turn on and start running (if all steps have been performed correctly)

## 4.2. Commissioning

Before starting the actual operation of the inverter, some parameters will need to be set, as shown in the table below.

| Parameters | Notes |
|---|---|
| 1. OSD language options | Default English |
| 2. Setting of date and time, confirmation | If the inverter is connected to a PC or mobile app, the time should be set to the local time |
| *3. Importing of safety parameters | Find the file with the safety parameters (renamed according to the country selected) on the website, download them to a USB stick and import them |
| 4. Setting the input channels | Default order: BAT1, BAT2, PV1, PV2 |
| *5. Setting battery parameters | Default values are shown according to the input channel configured |
| 6. Set-up is complete | |

**Table 17 - Parameters to be set for first start-up**

| | |
|---|---|
| ⚠ **Caution** | **It is very important to make sure that the right country code has been selected in accordance with the requirements of the local energy authorities.**<br>**Consult with qualified and authorised personnel to ensure the correct choice** |

**NB:** Zucchetti Centro Sistemi S.p.A. shall not be held responsible for any harmful consequences resulting from the incorrect setting of the country code.

### 4.2.1.OSD language options

| | |
|---|---|
| 1.中文 | |
| 2.English | |
| 3.Italian | OK |
| 4. | |
| ..... | |

### 4.2.2.Setting of date and time, confirmation

| |
|---|
| Time<br>YYYY-MM-DD hh:mm:ss |

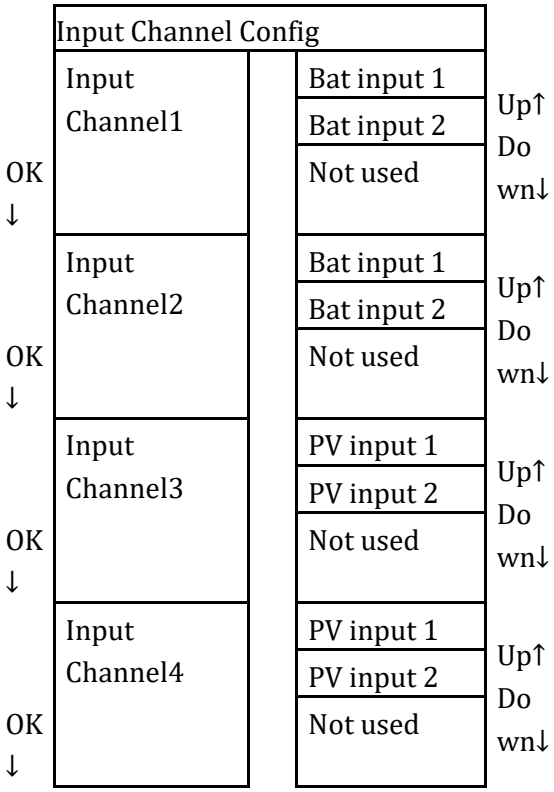
### 4.2.3.Importing of safety parameters

The user can modify the safety parameters of the machine via a USB stick, and must copy and modify the values on the USB stick beforehand. To enable this option, contact Zucchetti Centro Sistemi S.p.A.

| Code | | Region | | Code | | Region | |
|---|---|---|---|---|---|---|---|
| 000 | 000 | Germany | VDE4105 | 018 | 000 | EU | EN50438 |
| | 001 | | BDEW | | 001 | | EN50549 |
| | 002 | | VDE0126 | | 002 | | EU-EN50549-HV |
| | | | | 019 | 000 | IEC EN61727 | |
| | 003 | | VDE4105-HV | 020 | 000 | Korea | Korea |
| | 004 | | BDEW-HV | | 001 | | Korea-DASS |
| 001 | 000 | Italy | CEI-021 Internal | 021 | 000 | Sweden | |
| | 001 | | CEI-016 Italy | 022 | 000 | Europe General | EU General |
| | | | | | 001 | | EU General-MV |
| | 002 | | CEI-021 External | | 002 | | EU General-HV |
| | 003 | | CEI-021 In Areti | 024 | 000 | Cyprus | Cyprus |
| | 004 | | CEI-021In--HV | 025 | 000 | India | India |
| | | | | | 001 | | India-MV |
| 002 | 000 | Australia | Australia | | 002 | | India-HV |
| | 008 | | Australia-B | 026 | 000 | Philippines | PHI |
| | | | | | 001 | | PHI-MV |
| | 009 | | Australia-C | 027 | 000 | New Zealand | New Zealand |
| 003 | 000 | Spain | ESP-RD1699 | | 001 | | New Zealand-MV |
| | 001 | | RD1699-HV | | 002 | | New Zealand-HV |
| | 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 | | 004 | | Brazil-288 |
| | 001 | | DK-TR322 | 029 | 000 | Slovakia | SK-VDS |
| 006 | 000 | Greece | GR-Continent | | 001 | | SK-SSE |
| | 001 | | GR-Island | | 002 | | SK-ZSD |
| 007 | 000 | Netherlands | Netherlands | 030 | 000 | | |
| | 001 | | Netherland-MV | 031-032 | | | |
| | 002 | | Netherland-HV | 033 | 000 | Ukraine | |
| 008 | 000 | Belgium | Belgium | 034 | 000 | Norway | Norway |
| | 001 | | Belgium-HV | | 001 | | Norway-LV |
| 009 | 000 | UK | G99 | 035 | 000 | Mexico | Mexico-LV |
| | 001 | | G98 | 036-037 | | | |
| | 002 | | G99-HV | 038 | 000 | 60Hz | |
| 010 | 000 | China | China-B | 039 | 000 | Ireland EN50438 | Ireland |
| | 001 | | Taiwan | 040 | 000 | Thailand | Thai-PEA |
| | 002 | | TrinaHome | | 001 | | Thai-MEA |
| | 003 | | HongKong | 041 | | | |
| | 004 | | SKYWORTH | 042 | 000 | 50Hz | LV-50Hz |
| | 005 | | CSISolar | 043 | | | |
| | 006 | | CHINT | 044 | 000 | South Africa | SA |
| | 007 | | China-MV | | 001 | | SA-HV |
| | 008 | | China-HV | 045 | | | |
| | 009 | | China-A | 046 | 000 | Dubai | DEWG |
| 011 | 000 | France | France | | 001 | | DEWG-MV |
| | 001 | | FAR Arrete23 | 047-106 | | | |
| | 002 | | FR VDE0126-HV | 107 | 000 | Croatia | Croatia |
| | 003 | | France VFR 2019 | 108 | 000 | Lithuania | Lithuania |
| 012 | 000 | Poland | Poland | 109 | 000 | | |
| | 001 | | Poland-MV | 110 | | | |
| | 002 | | Poland-HV | 111 | 000 | Columbia | Columbia |
| | 003 | | Poland-ABCD | | 001 | | Columbia-LV |
| 013 | 000 | Austria | Tor Erzeuger | 112-120 | | | |
| 014 | 000 | Japan | | 121 | 000 | Saudi Arabia | IEC62116 |
| | 001 | | | 122 | 000 | Latvia | |
| 015 | 003 | Switzerland | | 123 | 000 | Romania | |
| 16-17 | | | | | | | |

**Table 18 - List of country codes**

### 4.2.4.Setting the input channels




In the case of a **single Pylontech or Azzurro battery tower**, set the inputs according to the channel populated:

- Input channel 1 → BAT input 1 (if the channel populated is no. 1)
- Input channel 2 → Not Used

In the case of a **single WeCo battery tower or double Pylontech tower (Wi-Fi/USB SC500 or Wi-FI/USB SC1000 BMS),** set the inputs by populating both channels:

- Input channel 1 → BAT input 1
- Input channel 2 → BAT input 2

In the case of **dual battery tower (Pylontech SC500 or SC1000 BMS, WeCo, Azzurro)** set the inputs:

- Input channel 1 → BAT input 1
- Input channel 2 → BAT input 2

For independent strings, set:

- Input channel 3 → PV input 1
- Input channel 4 → PV input 2

For parallel strings, set:

- Input channel 3 → PV input 1
- Input channel 4 → PV input 1

### 4.2.5.Setting battery parameters

| | Single Azzurro battery tower | Single Pylontech battery tower | Single WeCo battery tower | Dual battery tower PYLON SC500 or SC1000/WECO/AZZURRO BMS | | Dual battery tower PYLON Wi-Fi/USB SC500 or Wi-Fi/USB SC1000 BMS |
|---|---|---|---|---|---|---|
| Battery identification | Battery 1 | Battery 1 | Battery 1 | Battery 1 | Battery 2 | Battery 1 |
| 1.Battery Type | HV ZBT | PYLON | WECO | PYLON/WECO/ HV ZBT | PYLON/WECO/ HV ZBT | PYLON |
| 2.Battery Address | 00 | 00 | 00 | 00 | 01 | 01 |
| 3.Max Charge (A) | 25.00 | 25.00 | 50.00 | 25.00 | 25.00 | 50.00 |
| 4.Max Discharge (A) | 25.00 | 25.00 | 50.00 | 25.00 | 25.00 | 50.00 |
| 5.Discharge Depth | max 90% | max 80% | max 90% | max 90% | max 90% | max 80% |
| 6.Save | ok | ok | ok | ok | ok | ok |

| Item | Default state |
|---|---|
| Energy Storage Mode | Self-use mode |
| EPS Mode | Disable |
| Anti Reflux | Disable |
| IV Curve Scan | Disable |
| Logic interface | Disable |

**Table 19 - Default values for other settings**

## 4.3. Main menu

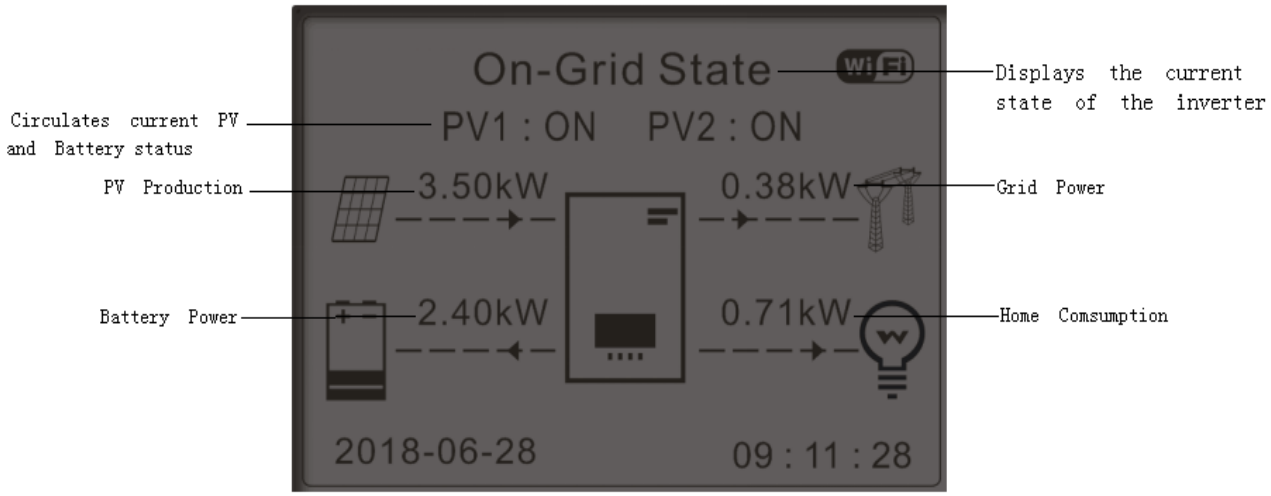



Figure 173 - Main menu interface

From the main interface, press the "Down" key to enter the page with the grid/battery settings.

| Main interface | | Grid Output Information |
|---|---|---|
| | Down↓ | Grid(V) R.....***.*V |
| | | Grid(V) S.....***.*V |
| | | Grid(V) T.....***.*V |
| | | AC Current R.....**.**A |
| | | AC Current S..... **.**A |
| | | AC Current T.....**.**A |
| | Down ↓ | Frequency.....**.**Hz |
| | | Battery Information (1) |
| | | Batt1 (V).....****.*V |
| | | Batt1 Curr.....**.**A |

| |
|---|
| Batt1 Power.....**.*KW |
| Batt1 Temp.....*°C |
| Batt1 SOC.....**% |
| Batt1 SOH.....**% |
| Batt1 Cycles.....*T |
| Battery Information (2) |
| Batt2 (V).....****.*V |
| Batt2 Curr.....**.**A |
| Batt2 Power.....**.*KW |
| Batt2 Temp.....*°C |
| Batt2 SOC.....**% |
| Batt2 SOH.....**% |
| Batt2 Cycles.....*T |

Down↓

From the main interface, press the “Up” key to enter the page with the photovoltaic settings.

| Main interface | Up↑ | PV Information |
|---|---|---|
| | | PV1 Voltage.....****.*V |
| | | PV1 Current.....**.**A |
| | | PV1 Power.....**.**KW |
| | | PV2 Voltage.....****.*V |
| | | PV2 Current.....**.**A |
| | | PV2 Power.....**.**KW |

| |
|---|
| Inverter Temp.....*°C |

From the main interface, press the “Back” key to enter the main menu, which has the following 5 options.

| | | |
|---|---|---|
| Main menu | | 1.Basic settings |
| | Back | 2.Advanced settings |
| | | 3.Production Statistics |
| | | 4.System Info |
| | | 5.Event list |
| | | 6.Software Update |

### 4.3.1.Basic settings

| 1. Basic settings | OK | 1.Language Settings |
|---|---|---|
| | | 2.Time |
| | | 3.Safety Param. |
| | | 4.Working Mode |
| | | 5.Self-test |
| | | 6.Channel configuration |
| | | 7.EPS mode |
| | | 8.Communication address |
| | | 9.Set ForceChargeTime |

**1. Language settings**

| 1.Language Settings | OK | 1.中文 | OK |
|---|---|---|---|
| | | 2.English | |
| | | 3.Italian | |
| | | 4. | |
| | | ..... | |

**2. Time**

Set the system time for the inverter

| 2.Time | OK | Time<br>YYYY-MM-DD hh:mm:ss |
|---|---|---|

**3. Safety parameters**

The user can modify the safety parameters of the machine via a USB stick, and must copy and modify the values on the USB stick beforehand.

For more information and/or clarification, contact Zucchetti Centro Sistemi S.p.A.

## 4. Working mode

| 4.Working Mode | OK |
|---|---|

| 1.Automatic mode | OK |
|---|---|
| 5.% Charge mode | |
| 3.Hourly mode | |
| 4.Passive mode | |

*Automatic mode*

The inverter automatically charges and discharges the battery.

If the PV generation (kW) = consumption (kW), with ΔP < 200W, the inverter does not charge or discharge the battery (Figure a).

If the PV generation (kW) > consumption (kW), the power surplus is stored in the battery (Figure b).

a) b)

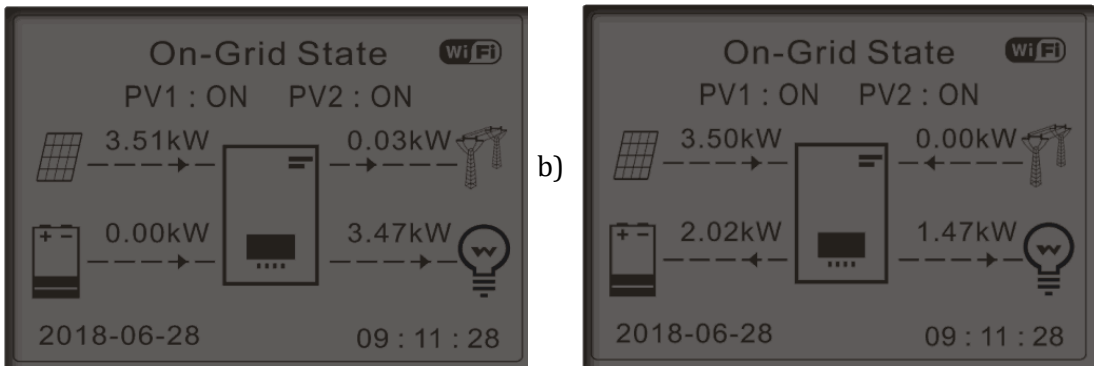
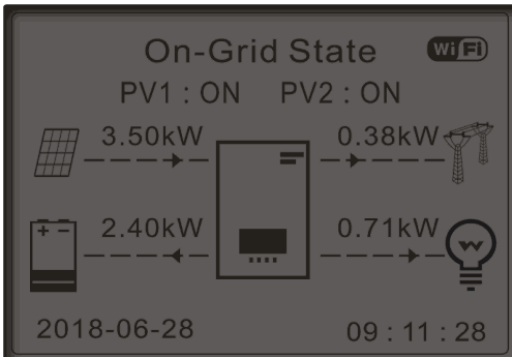



**Figure 174 - Inverter display in automatic mode**

If the PV generation (kW) < consumption (kW), the battery is discharged to provide the necessary power, until it is completely discharged (Figure a).
If the battery is fully charged (or at maximum charging power), the surplus power is transferred to the grid (Figure b).

a)




b)

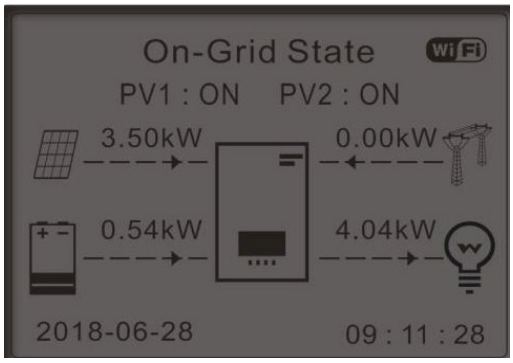



Figure 175 - Inverter display in automatic mode

If the PV generation + battery (kW) < consumption (kW), the inverter draws power from the grid.

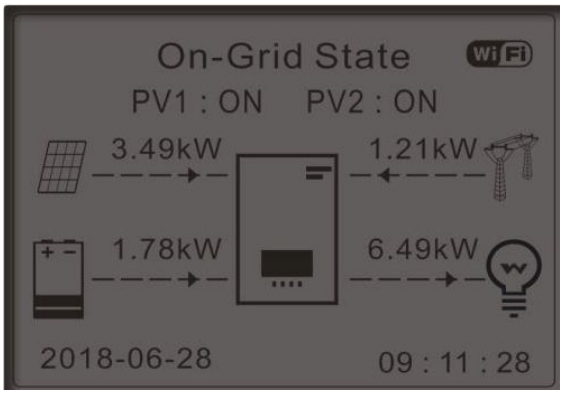



Figure 176 - Inverter display in self-consumption mode

Times of use

For a more rational management of the energy (especially in winter, where the photovoltaic system cannot effectively charge the battery), it may be necessary to set a date range for recharging the battery from the grid; once this range has been set, the inverter will operate in automatic mode for the remaining time.

Dates, days and times can be set in which to force charge the batteries up to the set SOC %.

| 2.% charge mode | OK |
|---|---|

| % charge mode | | | |
|---|---|---|---|
| Rules. 0: | Enabled/Disabled | | |
| From | To | SOC | Charge |
| 02h00m - | 04h00m | 070% | 01000 W |
| Effective | date | | |
| Dec. 22 | - | Mar. 21 | |
| Weekday | select | | |
| Mon. Tue. Wed. Thu. Fri. Sat. Sun. | | | |

Timed Use

The time range in which to charge and discharge the battery can be set manually.

| 3.Hourly mode | OK |
|---|---|

| Hourly mode | |
|---|---|
| Rules. 0:Enabled/Disabled | |
| Charge Start | 22 h 00 m |
| Charge End | 05 h 00 m |
| Charge Power | 02000 W |
| Discharge Start | 14 h 00 m |
| Discharge End | 16 h 00 m |
| Discharge Power | 02500 W |

Passive Use

Passive mode allows the inverter to see the batteries but not to charge or discharge them. This setting is useful for the initial testing of the inverter. For more detailed information on passive operation, please contact Zucchetti Centro Sistemi S.p.A.

## 5. Self-test

| | | |
|---|---|---|
| 5.Self-test | OK | 1.Fast self-test |
| | | 2.STD self-test |

The fast self-test gives the same results as the STD (standard) self-test, but takes less time.

| | | | |
|---|---|---|---|
| 1. Fast self-test | OK | 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 | |
| ↓ | Press “Down” |
| 27.S1: 228V 408ms | |
| ↓ | Press “Down” |
| 27.S2 threshold 92V 200ms | |
| ↓ | Press “Down” |
| 27.S2: 227V 205ms | |
| ↓ | Press “Down” |
| 81>.S1 threshold 50.5Hz 100ms | |
| ↓ | Press “Down” |
| 81>.S1 49.9Hz 103ms | |
| ↓ | Press “Down” |
| 81>.S2 threshold 51.5Hz 100ms | |
| ↓ | Press “Down” |
| 81>.S2 49.9Hz 107ms | |
| ↓ | Press “Down” |
| 81<.S1 threshold 49.5Hz 100ms | |
| ↓ | Press “Down” |
| 81<.S1 50.0Hz 105ms | |
| ↓ | Press “Down” |

| | |
|---|---|
| 81<.S2 threshold 47.5Hz 100ms | |
| ↓ | Press “Down” |
| 81<.S2 50.1Hz 107ms | |

## 6. Configuration of input channel

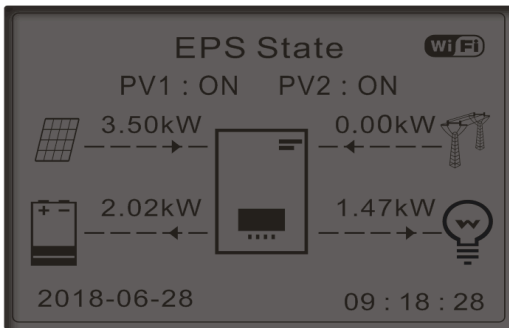
| | | | | | |
|---|---|---|---|---|---|
| 6.Channel configuration | OK | Input Channel Config | | | |
| | | Input Channel1 | Battery input 1 | Down | OK |
| | | | Battery input 1 | | |
| | | | Disable | | |
| | | Input Channel2 | Battery input 2 | Down | |
| | | | Battery input 2 | | |
| | | | Disable | | |
| | | Input Channel3 | PV input 1 | Down | |
| | | | PV input 1 | | |
| | | | Disable | | |
| | | Input Channel4 | PV input 2 | Down | |
| | | | PV input 2 | | |
| | | | Disable | | |

## 7. EPS Mode

| | | | | | |
|---|---|---|---|---|---|
| 7.EPS mode | OK | 1. EPS Mode Control | OK | 1.Enable EPS Mode<br>2. Disable EPS Mode | OK |

If the PV generation (kW) > consumption (kW), with ΔP < 200W, the inverter charges the battery (Figure a).
If the PV generation (kW) = consumption (kW), the inverter does not charge or discharge the battery (Figure b).

a)




b)

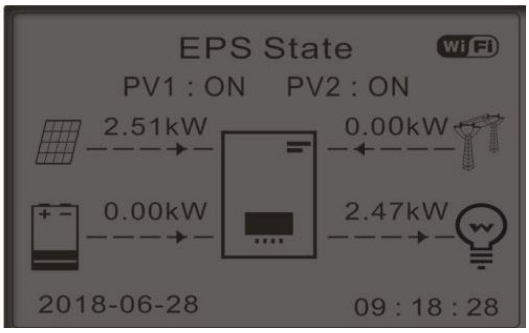
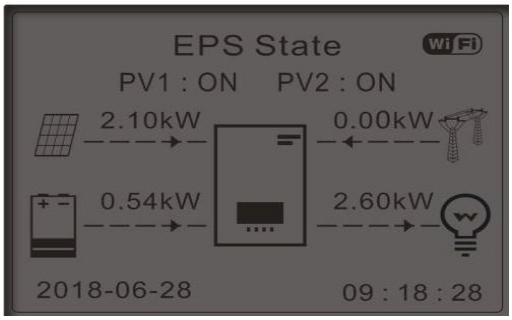



Figure 177 - Display with EPS in operation

If the PV generation (kW) < consumption (kW), with ΔP < 200W, the inverter discharges the battery (Figure a).
If the PV generation (kW) is normal, but consumption (kW) is lower or zero, the power surplus is stored in the battery (Figure b).

a)




b)

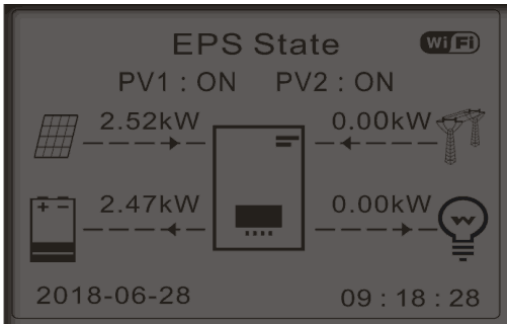



Figure 178 - Display with EPS in operation

**8. Communication address**

| | | | |
|---|---|---|---|
| 8.Communication address | OK | 1.Communication Addr | OK |
| | | 2.Baud Rate | OK |

**9. Setting of forced charge time**

| | | | |
|---|---|---|---|
| 9.Set ForceChargeTime | OK | Charge Start | OK |
| | | Charge End | OK |

## 4.3.2.Advanced settings

| | | |
|---|---|---|
| 2.Advanced settings | OK | **Password 0715** |

| |
|---|
| 1.Battery parameters |
| 2.Zero feed-in mode |
| 3.IV Curve Scan |
| 4.Logic interface |
| 5.Factory reset |
| 6. Parallel settings |
| 7. Bluetooth Reset |
| 8. CT Calibration |
| 9. On-Off switch |
| 10.Unbalanced support |
| 11.PV priority charging |

| |
|---|
| 12. EPS GFCI |
| 13. Auxiliary contact |
| 14.Active battery |

**1. Battery parameters**

| | | | |
|---|---|---|---|
| 1. Battery parameters | OK | 1.Battery type | 4.Maximum discharge (A) |
| | | 2.Battery address | 5.Depth of Discharge |
| | | 3.Maximum charge (A) | 6.Save |

OK

Depth of Discharge (DOD)

e.g. DOD = 50% and EPS = 80%

While the grid is connected, the inverter will not discharge the battery as long as the SOC is less than 50%.

In the event of a blackout, the inverter operates in EPS mode (if EPS is enabled) and continues to discharge the battery until it reaches a battery SOC of 20%.

| | | |
|---|---|---|
| 5.Depth of Discharge | OK | Depth of discharge<br>50%<br>EPS depth of discharge<br>80%<br>EPS Safety Buffer<br>20% |

**2. Zero feed-in mode**

Depending on the software version of the inverter, this function may be called **Anti-Reflux** or **Feed-in.** "Zero feed-in" mode can be enabled to limit the maximum power exported to the grid. The power set is the maximum power to be fed into the grid.

| | | | | |
|---|---|---|---|---|
| 2.Zero feed-in | OK | 2.Zero feed-in control | OK | Enable |
| | | | | Disable |
| | | 2.Feed-in power | OK | ***KW |

**3. IV Curve Scan**

The IV curve scan (MPPT scan) can be enabled to find the maximum overall power by adjusting the value during operation in order to obtain maximum output from the panels even in suboptimal conditions.
A scan period can be set or an instant scan can be performed.

| | | | | |
|---|---|---|---|---|
| 3.IV Curve Scan | OK | 1.Scan control | OK | Enable |
| | | | | Disable |
| | | 2.Scan period | OK | ***min |
| | | 3.Force Scan | OK | |

**4. Logic Interface Control**

To enable or disable logic interfaces, refer to the chapter on connections between logic interfaces (Section 2, page 145).

**<u>This setting must always be disabled for systems installed in Italy.</u>**

| | | | |
|---|---|---|---|
| 4.Logic interface control | OK | Enable | OK |
| | | Disable | OK |

**5. Reset factory settings**

| | | | |
|---|---|---|---|
| 5.Factory reset | OK | 1.Reset Energy Data | OK |
| | | 2.Clear events | OK |

Delete the history of total power generated by the inverter.

| | | | |
|---|---|---|---|
| 1.Reset Energy Data | OK | Enter password | OK Password **0715** |

Delete history of errors recorded on the inverter.

| | | | |
|---|---|---|---|
| 2.Reset events | OK | Clear Events? | OK |

**6. Parallel inverter settings**

This setting is to be enabled for systems that have multiple hybrid inverters connected in parallel (Master – Slave)

| | | | |
|---|---|---|---|
| 6.Parallel settings | OK | 1.Parallel settings | Enable/disable |
| | | 2.Master-Slave Parallel | Primary / Replica |
| | | 1.Parallel address | 00 (Primary)<br>01 (replica 1)<br>...<br>0n (Replica n) |
| | | 4.Save | ok |

**7. Reset Bluetooth**

Function to be implemented.

**8. CT Calibration**

In a three-phase hybrid system, the R, S and T phases of the inverter must correspond to the R, S and T phases embraced by the CT sensors.
If you are not sure whether this is the case, you can enable the CT calibration function.
For the inverter to perform this operation, it is necessary that:

- The system is connected to the grid
- The load output is not powered
- The batteries are present and switched on and at a maximum SOC of 40% to 80% (with depth of discharge ≤ 20%)
- The loads in the system are switched off
- Photovoltaic production is switched off
- Any other external production sources are switched off

In this way, the system will automatically set internally both the position of each sensor in the correct phase and the direction in line with the system's current flows.

**ATTENTION!!!!: CT calibration may take several minutes, do not switch off the inverter while it is performing this operation**
We recommend that you consult with ZCS technicians before enabling this function.

**9. On-Off switch**

This function enables a forced standby of the system (do not enable this function).

**10. Unbalanced support**

To enable this function, it is necessary that:

1. Zero feed-in mode is enabled;
2. In the case of toroids at the exchange reading (CT) connected directly to the inverter, make sure that the R, S and T phases of the inverter are the same as the R, S and T phases embraced by the sensors;
3. In the case of a Meter at the exchange reading (DTSU), make sure that R, S and T phases of the inverter are the same as the A, B and C phases of the Meter;
4. There are batteries connected to the inverter.

This function allows the zero feed-in function to be used even with unbalanced phases (the unbalancing limit depends on the power of the inverter, e.g. a 10 kW inverter can unbalance the phases up to a maximum of 3.33kW per phase).

**10. PV priority charging**

When the batteries have reached the DoD, this setting allows the PV power to give priority to the batteries by supplying 200W until the Safety Buffer is reached.

**11. EPS GFCI**

In EPS mode, this function allows the system to detect ground leakage currents even if it is an IT system.

**12. Auxiliary contact**

This function allows the dry contacts in the COM port to be managed.

**14. Active battery**

This function must always be enabled.

### 4.3.3.Event list

The event list shows the events in real time, with a progressive number, date and time and type of error. The list of errors can be checked through the main menu to monitor the details of the event history in real.

| | | | | |
|---|---|---|---|---|
| 3.Event list | OK | 1.List of current events | OK | ID042 IsoFault |
| | | 2.List of historical events | | |

| | | | | |
|---|---|---|---|---|
| 2.List of historical events | OK | 1.ID001 2020-4-3 14:11:45 | OK | 1.ID001 GridOVP |
| | | 2.ID005 2020-4-3 11:26:38 | | 2.ID005 GFCI |

### 4.3.4.System interface information

The system information allows you to check the settings that have been assigned to the inverter and batteries. After installation, it is recommended to check that all the settings have been set correctly.

| | | |
|---|---|---|
| 4.System Information | OK | 1.Inverter Info |
| | | 2.Battery Info |
| | | 3.Safety Parameters |
| | | 4.Debug info |

| | | |
|---|---|---|
| 1.Inverter Info | OK | Inverter Info (1) |
| | | Serial number |
| | | Power level |
| | | Safety Firmware version |

| | |
|---|---|
| Down↓ | Inverter Info (2) |
| | SW Version: press enter (password 0715) to display the firmware version of the inverter |
| | Country |
| | Country code version |
| Down↓ | Inverter Info (3) |
| | Input Channel1 |
| | Input Channel2 |
| | Input Channel3 |
| | Input Channel4 |
| Down↓ | Inverter Info (4) |
| | Working mode |
| | RS485 Modbus Address |
| | EPS Mode |
| | IV Curve Scan |
| Down↓ | Inverter Info (5) |
| | Logic interface |
| | Default PV time |
| | Default QV time |
| | Power factor |
| Down↓ | Inverter Info (6) |
| | Zero feed-in limitation |
| | Insulation resistance |

| |
|---|
| Parallel control |
| Unbalanced support |
| Inverter Info (7) |
| Active battery |

| | | |
|---|---|---|
| 2.Battery info | OK | Batt Info (1) |
| | | Battery type |
| | | Battery address |
| | | Battery capacity |
| | | Depth of discharge |
| | Down↓ | Batt Info (2) |
| | | Max charge current (A) |
| | | Max charge threshold (V) |
| | | Max discharge current (A) |
| | | Min discharge voltage (V) |

| | | |
|---|---|---|
| 3.Safety Parameters | OK | Safety parameters (1) |
| | | OVP 1 |
| | | OVP 2 |
| | | UVP 1 |
| | | UVP 2 |
| | Down ↓ | Safety parameters (2) |
| | | OFP 1 |

| | | |
|---|---|---|
| | | OFP 2 |
| | | UFP 1 |
| | | UFP 2 |
| | Down ↓ | Safety parameters (3) |
| | | OVP 10mins |

### 4.3.5.Energy statistics

| | | |
|---|---|---|
| 6.Energy Statistics | OK | Today |
| | | PV .....***KWH |
| | | Load .....***KWH |
| | | Export .....***KWH |
| | | Import.....***KWH |
| | | Charge.....***KWH |
| | | Discharge.....***KWH |
| | Down ↓ | Month |
| | | PV .....***KWH |
| | | Load .....***KWH |
| | | Export .....***KWH |
| | | Import.....***KWH |
| | | Charge.....***KWH |
| | | Discharge.....***KWH |
| | Down ↓ | Year |

| | |
|---|---|
| | PV .....***KWH |
| | Load .....***KWH |
| | Export .....***KWH |
| | Import.....***KWH |
| | Charge.....***KWH |
| | Discharge.....***KWH |
| Down ↓ | Life |
| | PV .....***KWH |
| | Load .....***KWH |
| | Export .....***KWH |
| | Import.....***KWH |
| | Charge.....***KWH |
| | Discharge.....***KWH |

### 4.3.6.Software Update

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

**Do not update the inverter if its firmware version is the same or higher than the one found in the ZCS Azzurro website**

**ATTENTION!!! Downgrading the firmware version of the inverter could lead to a malfunction.**
3PH HYD5000-HYD20000-ZSS inverters must be upgraded using an 8 GB USB stick.

**Procedure:**

1. Insert the USB stick into the computer
2. Download the firmware of your inverter from the products section (storage inverters) of the www.zcsazzurro.com website, selecting the inverter model you own
3. Save only the firmware folder containing the .bin files on the USB stick.
4. Safely remove the USB stick from the computer
5. Make sure the inverter is switched off
6. Insert the USB stick in the appropriate USB port of the inverter
7. Switch on the inverter by turning the inverter's DC rotary switch to ON

8.

| | | | |
|---|---|---|---|
| 6.Software Update | OK | Enter password | OK **Enter 0715** |
| | | | Start Update |
| | | | Updating DSP1… |
| | | | Updating DSP2… |
| | | | Updating ARM… |

9. If any of the errors listed below appear, repeat the operation. If this happens several times, contact the support service.

| | | |
|---|---|---|
| USB Fault | MDSP File Error | SDSP File Error |
| ARM File Error | Update DSP1 Fail | Update DSP2 Fail |
| Update ARM Fail | | |

**Table 20 - Software update errors**

10. After updating the inverter, use the same procedure as above to load the safety files onto the USB stick and set the correct safety parameters.
11. After completing the update and setting the correct safety parameters, close the DC switch, wait for the LCD screen to turn off; then restore the Wi-Fi connection and open both the DC and AC switches, wait a few seconds for the inverter to switch on again. To check the current version of the system update, go to System Info > Software Version.

# 5. Technical data

## 5.1. 3PH HYD5000-HYD8000-ZSS technical data

| DATI TECNICI | 3PH HYD5000 ZSS | 3PH HYD6000 ZSS | 3PH HYD8000 ZSS |
|---|---|---|---|
| **Dati tecnici ingresso DC (fotovoltaico)** | | | |
| Potenza DC Tipica* | 7500W | 9000W | 12000W |
| Massima Potenza DC per ogni MPPT | 6000W (480V-850V) | 6600W (530V-850V) | 6600W (530V-850V) |
| N. MPPT indipendenti/ N. stringhe per MPPT | 2/1 | | |
| Tensione massima di ingresso | 1000V | | |
| Tensione di attivazione | 250V | | |
| Tensione nominale di ingresso | 600V | | |
| Intervallo MPPT di tensione DC | 180V-960V | | |
| Intervallo di tensione DC a pieno carico | 250V-850V | 320V-850V | 360V-850V |
| Massima corrente in ingresso per ogni MPPT | 12.5A/12.5A | | |
| Massima corrente assoluta per ogni MPPT | 15A/15A | | |
| **Dati tecnici collegamento batterie** | | | |
| Tipo di batteria compatibile | Ioni di litio (fornite da Zucchetti) | | |
| Intervallo di tensione ammessa | 180V-750V | | |
| Numero di canali batteria indipendenti | 1 | | |
| Massima potenza di carica/scarica | 5000W | 6000W | 8000W |
| Range di temperatura ammesso** | -10°C/+50°C | | |
| Massima corrente di carica per canale batteria | 25A (40A di picco per 60s) | | |
| Massima corrente di scarica per canale batteria | 25A (40A di picco per 60s) | | |
| Curva di carica | Gestita da BMS batteria | | |
| Profondità di scarica (DoD) | 0%-90% (programmabile) | | |
| **Uscita AC (lato rete)** | | | |
| Potenza nominale | 5000W | 6000W | 8000W |
| Potenza massima | 5500VA | 6600VA | 8800VA |
| Massima corrente | 8A | 10A | 13A |
| Tipologia connessione/Tensione nominale | Trifase 3/N/PE, 220/380, 230/400 | | |
| Intervallo di tensione AC | 184V~276V (in accordo con gli standard locali) | | |
| Frequenza nominale | 50Hz/60Hz | | |
| Intervallo di frequenza AC | 45Hz~55Hz / 55Hz~65Hz (in accordo con gli standard locali) | | |
| Distorsione armonica totale | <3% | | |
| Fattore di potenza | 1 default (programmabile +/- 0.8) | | |
| Limitazione immissione in rete | Programmabile da display | | |
| **Uscita EPS (Emergency Power Supply)** | | | |
| Potenza erogata in EPS*** | 5000W | 6000W | 8000W |
| Potenza apparente di picco in EPS*** | 10000VA per 60s | 12000VA per 60s | 16000VA per 60s |
| Tensione e frequenza uscita EPS | Trifase 230V/400V 50Hz | | |
| Corrente erogabile in EPS (di picco) | 8A (15A per 60s) | 10A (18A per 60s) | 13A (24A per 60s) |
| Distorsione armonica totale | 3% | | |
| Switch time | <20ms | | |
| **Efficienza** | | | |
| Efficienza massima | 98.0% | | |
| Efficienza peseta (EURO) | 97.5% | | |
| Efficienza MPPT | 99.9% | | |
| Massima efficienza di carica/scarica delle batterie | 97.6% | | |
| Consumo in stand-by | <15W | | |
| **Protezioni** | | | |
| Protezione di interfaccia interna | si | | |
| Protezioni di sicurezza | Anti islanding, RCMU, Ground Fault monitoring | | |
| Protezione da inversione di polarità DC | si | | |
| Sezionatore DC | integrato | | |
| Protezione da surriscaldamento | si | | |
| Categoria Sovratensione/Tipo di protezione | Overvoltage Category III / Protective class I | | |
| Scaricatori integrati | AC/DC MOV: Tipo 2 standard | | |
| Protezione da sovracorrenti in uscita | si | | |
| Soft Start Batteria | si | | |
| **Standard** | | | |
| EMC | EN61000-1, EN61000-3 | | |
| Safety standard | IEC62109-1, IEC62109-2, NB-T32004/IEC62040-1 | | |
| Standard di connessione alla rete | Certificati e standard di connessione disponibili su www.zcsazzurro.com | | |
| **Comunicazione** | | | |
| Interfacce di comunicazione | Wi-Fi/4G/Ethernet (opzionali), RS485 (protocollo proprietario), USB, CAN 2.0 (per collegamento con batterie), Bluetooth | | |
| Altri ingressi | Linea RS485 per Meter esterni (fino a 4 meter collegabili), 6 input digitali (5V TTL), connessione per sensori diretti (CT) | | |
| **Dati Generali** | | | |
| Intervallo di temperatura ambiente ammesso | -30~60 °C | | |
| Topologia | Transformerless | | |
| Grado di protezione ambientale | IP65 | | |
| Intervallo di umidità relativa ammesso | 0~100% | | |
| Massima altitudine operativa | 4000m | | |
| Rumorosità | <45 dB @ 1m | | |
| Peso | 33Kg | | |
| Raffreddamento | Convezione naturale | | |
| Dimensioni (H*L*P) | 515mm*571mm*264mm | | |
| Display | LED display e APP | | |
| Garanzia | 10 anni | | |

* La potenza DC tipica non rappresenta un limite massimo di potenza applicabile. Il configuratore online disponibile sul sito www.zcsazzurro.com fornirà le possibili configurazioni applicabili
** Valore standard per batterie al litio; massima operatività tra +10°C/+40°C
*** La potenza erogata in EPS dipende dal numero e dal tipo di batterie nonché dallo stato del sistema (capacità residua, temperatura)

## 5.2. 3PH HYD10000-HYD20000-ZSS technical data

| DATI TECNICI | 3PH HYD10000 ZSS | 3PH HYD15000 ZSS | 3PH HYD20000 ZSS |
|---|---|---|---|
| **Dati tecnici ingresso DC (fotovoltaico)** | | | |
| Potenza DC Tipica* | 15000W | 22500W | 30000W |
| Massima Potenza DC per ogni MPPT | 7500W (300V-850V) | 11250W (450V-850V) | 15000W (600V-850V) |
| N. MPPT indipendenti/ N. stringhe per MPPT | 2/2 | | |
| Tensione massima di ingresso | 1000V | | |
| Tensione di attivazione | 250V | | |
| Tensione nominale di ingresso | 600V | | |
| Intervallo MPPT di tensione DC | 180V-960V | | |
| Intervallo di tensione DC a pieno carico | 220V-850V | 350V-850V | 450V-850V |
| Massima corrente in ingresso per ogni MPPT | 25A/25A | | |
| Massima corrente assoluta per ogni MPPT | 30A/30A | | |
| **Dati tecnici collegamento batterie** | | | |
| Tipo di batteria compatibile | Ioni di litio (fornite da Zucchetti) | | |
| Intervallo di tensione ammessa | 180V-750V | | |
| Numero di canali batteria indipendenti | 2 canali batteria HV (configurabili come indipendenti o in parallelo) | | |
| Massima potenza di carica/scarica | 10000W | 15000W | 20000W |
| Range di temperatura ammesso** | -10°C/+50°C | | |
| Massima corrente di carica per canale batteria | 25A (35A di picco per 60s) | | |
| Massima corrente di scarica per canale batteria | 25A (35A di picco per 60s) | | |
| Curva di carica | Gestita da BMS batteria | | |
| Profondità di scarica (DoD) | 0%-90% (programmabile) | | |
| **Uscita AC (lato rete)** | | | |
| Potenza nominale | 10000W | 15000W | 20000W |
| Potenza massima | 11000VA | 16500VA | 22000VA |
| Massima corrente | 16A | 24A | 32A |
| Tipologia connessione/Tensione nominale | Trifase 3/N/PE, 220/380, 230/400 | | |
| Intervallo di tensione AC | 184V~276V (in accordo con gli standard locali) | | |
| Frequenza nominale | 50Hz/60Hz | | |
| Intervallo di frequenza AC | 45Hz~55Hz / 55Hz~65Hz (in accordo con gli standard locali) | | |
| Distorsione armonica totale | <3% | | |
| Fattore di potenza | 1 default (programmabile +/- 0.8) | | |
| Limitazione immissione in rete | Programmabile da display | | |
| **Uscita EPS (Emergency Power Supply)** | | | |
| Potenza erogata in EPS*** | 10000W | 15000W | 20000W |
| Potenza apparente di picco in EPS*** | 20000VA per 60s | 22000VA per 60s | 22000VA per 60s |
| Tensione e frequenza uscita EPS | Trifase 230V/400V 50Hz | | |
| Corrente erogabile in EPS (di picco) | 16A (30A per 60s) | 24A (32A per 60s) | 32A (33A per 60s) |
| Distorsione armonica totale | 3% | | |
| Switch time | <20ms | | |
| **Efficienza** | | | |
| Efficienza massima | 98.2% | | |
| Efficienza peseta (EURO) | 97.7% | | |
| Efficienza MPPT | 99.9% | | |
| Massima efficienza di carica/scarica delle batterie | 97.8% | | |
| Consumo in stand-by | <15W | | |
| **Protezioni** | | | |
| Protezione di interfaccia interna | si | no | |
| Protezioni di sicurezza | Anti islanding, RCMU, Ground Fault monitoring | | |
| Protezione da inversione di polarità DC | si | | |
| Sezionatore DC | integrato | | |
| Protezione da surriscaldamento | si | | |
| Categoria Sovratensione/Tipo di protezione | Overvoltage Category III / Protective class I | | |
| Scaricatori integrati | AC/DC MOV: Tipo 2 standard | | |
| Protezione da sovracorrenti in uscita | si | | |
| Soft Start Batteria | si | | |
| **Standard** | | | |
| EMC | EN61000-1, EN61000-3 | | |
| Safety standard | IEC62109-1, IEC62109-2, NB-T32004/IEC62040-1 | | |
| Standard di connessione alla rete | Certificati e standard di connessione disponibili su www.zcsazzurro.com | | |
| **Comunicazione** | | | |
| Interfacce di comunicazione | Wi-Fi/4G/Ethernet (opzionali), RS485 (protocollo proprietario), USB , CAN 2.0 (per collegamento con batterie), Bluetooth | | |
| Altri ingressi | Linea RS485 per Meter esterni (fino a 4 meter collegabili), 6 input digitali (5V TTL), connessione per sensori diretti (CT) | | |
| **Dati Generali** | | | |
| Intervallo di temperatura ambiente ammesso | -30~60 °C | | |
| Topologia | Transformerless | | |
| Grado di protezione ambientale | IP65 | | |
| Intervallo di umidità relativa ammesso | 0~100% | | |
| Massima altitudine operativa | 4000m | | |
| Rumorosità | <45 dB @ 1m | | |
| Peso | 37Kg | | |
| Raffreddamento | Convezione forzata | | |
| Dimensioni (H*L*P) | 515mm*571mm*264mm | | |
| Display | LED display e APP | | |
| Garanzia | 10 anni | | |

* La potenza DC tipica non rappresenta un limite massimo di potenza applicabile. Il configuratore online disponibile sul sito www.zcsazzurro.com fornirà le possibili configurazioni applicabili
** Valore standard per batterie al litio; massima operatività tra +10°C/+40°C
*** La potenza erogata in EPS dipende dal numero e dal tipo di batterie nonché dallo stato del sistema (capacità residua, temperatura)

# 6. Troubleshooting

This section contains information and procedures for troubleshooting any problems and errors signalled by the inverter.

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

If no errors are found, check that certain basic conditions are met before proceeding. **Any type of check must be carried out safely according to the specific procedure.**

- Is the inverter located in a clean, dry place with good ventilation?
- Is the DC circuit breaker ON?
- Do the cables have the appropriate cross-section and length?
- Are the input and output connections in good condition?
- Are the configuration and settings correct for this type of installation?
- Are the communication system and display free of damage?

If all these requirements are met, proceed with the steps for viewing any errors.

**Ground connection error**

The 3PH HYD5000-HYD20000-ZSS inverters comply with the IEC 62109-2 standard for earth alarm fault monitoring.

If the ground connection error appears, it will be displayed on the LCD screen, the red light will turn on and the error will appear in the event list. For devices fitted with Wi-Fi/GPS, the alarm can also be displayed on the monitoring site and also notified on the mobile app.

| Code | Name | Description | Solution |
|---|---|---|---|
| **ID001** | GridOVP | The grid voltage is too high. | If the error occurs occasionally, there may be abnormal fluctuations in the grid, the inverter returns to normal operation as soon as the grid returns to normal conditions.<br>If the alarm occurs frequently, check whether the grid voltage and frequency are within acceptable ranges. If so, check the AC switch and the AC connection to the inverter. If the grid voltage and frequency are within acceptable ranges and the AC connection is correct, but the alarm persists, contact technical support to change the values of overvoltage, undervoltage, maximum frequency, minimum frequency, after obtaining the approval of the local grid operator. |
| **ID002** | GridUVP | The grid voltage is too low. | |
| **ID003** | GridOFP | The grid frequency is too high. | |
| **ID004** | GridUFP | The grid frequency is too low. | |
| **ID005** | GFCI | Loss of charge | Internal inverter errors. Check whether the inverter is updated to the latest version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support |
| **ID006** | OVRT fault | OVRT function in error | |
| **ID007** | LVRT fault | LVRT function in error | |
| **ID008** | IslandFault | Isolation error | |
| **ID009** | GridOVPInstant1 | Transient overvoltage of grid 1 | |
| **ID010** | GridOVPInstant2 | Transient overvoltage of grid 2 | |
| **ID011** | VGridLineFault | Grid voltage error | |
| **ID012** | InvOVP | Inverter overvoltage | |
| **ID017** | HwADFaultIGrid | Error in the measurement of the grid current | |

| | | | |
|---|---|---|---|
| **ID018** | HwADFaultDCI | Measurement error of the DC component of the grid current | |
| **ID019** | HwADFaultVGrid(DC) | Grid voltage (DC) measurement error | |
| **ID020** | HwADFaultVGrid(AC) | Grid voltage (AC) measurement error | |
| **ID021** | GFCIDeviceFault(DC) | Current (DC) leakage measurement error | |
| **ID022** | GFCIDeviceFault(AC) | Current (AC) leakage measurement error | |
| **ID023** | HwADFaultDCV | Measurement error of the DCI component of the charge voltage | |
| **ID024** | HwADFaultIdc | Input current measurement error | Check that the polarity on the DC side has not been inverted. |
| **ID029** | ConsistentFault_GFCI | Leakage current reading error | Internal inverter errors. Check whether the inverter is updated to the latest version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support |
| **ID030** | ConsistentFault_Vgrid | Grid voltage reading error | |
| **ID033** | SpiCommFault(DC) | SPI communication error (DC) | |
| **ID034** | SpiCommFault(AC) | SPI communication error (AC) | |
| **ID035** | SChip_Fault | Chip error (DC) | |
| **ID036** | MChip_Fault | Chip error (AC) | |
| **ID037** | HwAuxPowerFault | Auxiliary power error | |
| **ID038** | InvSoftStartFail | Internal error | |
| **ID041** | RelayFail | Relay detection error | |
| **ID042** | IsoFault | Low impedance isolation | Check the isolation resistance between the photovoltaic panels and the ground, if there is a short circuit, the error can be fixed immediately. |
| **ID043** | PEConnectFault | Ground fault | Check the AC-side of the PE output for grounding |

| | | | |
|---|---|---|---|
| **ID044** | PvConfigError | Error in input mode setting. | Check the mode of the PV input (parallel/independent); if they are not correct, change them. |
| **ID045** | CTDisconnect | CT error | Check whether the CT connection is correct. |
| **ID047** | ParallelFault | Parallel settings error | Check whether the connection between the inverters is correct and whether the terminating resistors have been connected at the beginning and end of the parallel. Check that the parameters have been set to advanced settings, check that the parallel connection is correct. Check that all the inverters in parallel are updated to the same firmware version. |
| **ID049** | TempFault_Bat | Battery temperature protection | Make sure that the inverter is installed in a cool, well-ventilated place, below the temperature limits and away from direct sunlight. Check that the inverter has been installed according to the instructions in the manual. |
| **ID050** | TempFault_HeatSink1 | Radiator temperature protection 1 | |
| **ID051** | TempFault_HeatSink2 | Radiator temperature protection 2 | |
| **ID052** | TempFault_HeatSin3 | Radiator temperature protection 3 | |
| **ID053** | TempFault_HeatSink4 | Radiator temperature protection 4 | |
| **ID054** | TempFault_HeatSin5 | Radiator temperature protection 5 | |
| **ID055** | TempFault_HeatSin6 | Radiator temperature protection 6 | |
| **ID057** | TempFault_Env1 | Ambient temperature protection 1 | |
| **ID058** | TempFault_Env2 | Ambient temperature protection 2 | |
| **ID059** | TempFault_Inv1 | Module temperature protection 1 | |
| **ID060** | TempFault_Inv2 | Module 2 temperature protection | |
| **ID061** | TempFault_Inv3 | Module temperature protection 3 | |
| **ID065** | VbusRmsUnbalance | RMS bus voltage is not balanced | Internal inverter errors. Check whether the inverter is updated to the latest |

| | | | |
|---|---|---|---|
| **ID066** | VbusInstantUnbalance | Transient voltage value of the BUS is not balanced | version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support |
| **ID067** | BusUVP | Busbar undervoltage during grid connection | |
| **ID068** | BusZVP | Low BUS voltage | |
| **ID069** | PVOVP | PV overvoltage | Check whether the voltage of the PV modules in series (Voc) is higher than the maximum input voltage. If so, adjust the number of PV modules in series to reduce the voltage of the PV modules in series, adapting them to the input voltage range of the inverter. After changing the voltage, the inverter returns to normal operation on its own. |
| **ID070** | BatOVP | Batter overvoltage | Check that the battery overvoltage settings are compatible with the battery specifications. |
| **ID071** | LLCBusOVP | LLC Bus overvoltage protection | Internal inverter errors. Switch it off, wait 5 minutes and switch it on again. If the errors still occur, contact technical support. |
| **ID072** | SwBusRmsOVP | Software RMS overvoltage protection of the DC bus | |
| **ID073** | SwBusInstantOVP | Software instantaneous overvoltage protection of the DC bus | Check that the Load input and the Grid output have not been inverted. |
| **ID081** | SwBatOCP | Battery software overcurrent protection | Check that the zero feed-in has not been disabled without also having disabled the unbalance support. If so, also disable the latter, otherwise check whether the inverter is updated to the latest version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support. |
| **ID082** | DciOCP | Dci overcurrent protection | |
| **ID083** | SwOCPInstant | Instantaneous output current protection | |
| **ID084** | SwBuckBoostOCP | BuckBoost software flow | |

| | | | |
|---|---|---|---|
| **ID085** | SwAcRmsOCP | Current actual value protection | |
| **ID086** | SwPvOCPInstant | Software PV overcurrent protection | |
| **ID087** | IpvUnbalance | Parallel PV flows not balanced | |
| **ID088** | IacUnbalance | Output current not balanced | |
| **ID097** | HwLLCBusOVP | LLC bus hardware overvoltage | |
| **ID098** | HwBusOVP | Bus hardware overvoltage | |
| **ID099** | HwBuckBoostOCP | Excessive BuckBoost hardware flows | |
| **ID100** | HwBatOCP | Excessive battery hardware flows | |
| **ID102** | HwPVOCP | Excessive PV hardware flows | |
| **ID103** | HwACOCP | Excessive AC hardware output flows | |
| **ID110** | Overload1 | Overload protection 1 | Check whether the inverter is running in overload |
| **ID111** | Overload2 | Overload protection 2 | |
| **ID112** | Overload3 | Overload protection 3 | |
| **ID113** | OverTempDerating | Internal temperature too high. | Make sure that the inverter is installed in a cool, well-ventilated place, below the temperature limits and away from direct sunlight. Check that the inverter has been installed according to the instructions in the manual. |
| **ID114** | FreqDerating | AC frequency is too high. | Make sure that the grid frequency and voltage are within the acceptable range |

| | | | |
|---|---|---|---|
| **ID115** | FreqLoading | AC frequency is too low | |
| **ID116** | VoltDerating | AC voltage is too high | |
| **ID117** | VoltLoading | AC voltage is too low | |
| **ID124** | BatLowVoltageAlarm | Low battery voltage protection | Check that the battery voltage on the inverter side is not too low (this alarm is normal if the battery has reached the set depth-of-discharge threshold). |
| **ID125** | BatLowVoltageShut | Battery shutdown due to low voltage | |
| **ID129** | unrecoverHwAcOCP | Permanent hardware error due to output overcurrent | Internal inverter errors. Check whether the inverter is updated to the latest version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support |
| **ID130** | unrecoverBusOVP | Fixed bus overvoltage error | |
| **ID131** | unrecoverHwBusOVP | Bus hardware overvoltage error | |
| **ID132** | unrecoverIpvUnbalance | Permanent unbalanced PV flow error | |
| **ID133** | unrecoverEPSBatOCP | Permanent battery overcurrent error in EPS mode | |
| **ID134** | unrecoverAcOCPInstant | Transient battery output overcurrent error | |
| **ID135** | unrecoverIacUnbalance | Permanent unbalanced output current error | |
| **ID137** | unrecoverPvConfigError | Permanent error in input mode settings | Check the mode of the PV input (parallel/independent); if they are not correct, change them. |
| **ID138** | unrecoverPVOCPInstant | Permanent input overcurrent error | |
| **ID139** | unrecoverHwPVOCP | Permanent hardware overcurrent error | Internal inverter errors. Check whether the inverter is updated to the latest version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support |
| **ID140** | unrecoverRelayFail | Permanent relay error | |
| **ID141** | unrecoverVbusUnbalance | Permanent unbalanced bus voltage error | |
| **ID145** | USBFault | USB error | Check the USB input of the inverter. Switch it off, wait 5 minutes and switch it on again. If the errors still occur, contact technical support |
| **ID146** | WifiFault | WiFi error | Check the Wi-Fi input of the inverter. Switch it off, wait 5 minutes and switch |

| | | | |
|---|---|---|---|
| | | | it on again. If the errors still occur, contact technical support |
| **ID147** | BluetoothFault | Bluetooth error | Check whether the inverter is updated to the latest version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support |
| **ID148** | RTCFault | RTC clock error | Internal inverter errors. Check whether the inverter is updated to the latest version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support |
| **ID149** | CommEEPROMFault | EEPROM communication board error | |
| **ID150** | FlashFault | FLASH communication board error | |
| **ID153** | SciCommLose(DC) | SCI communication error (DC) | |
| **ID154** | SciCommLose(AC) | SCI communication error (AC) | |
| **ID155** | SciCommLose(Fuse) | SCI communication error (fuse) | |
| **ID156** | SoftVerError | Incorrect software version | Check whether the inverter is updated to the latest version found on www.zcsazzurro.com. If it isn't, update to the latest version. If the errors still occur, contact technical support |
| **ID157** | BMSCommunicatonFault Channel1 | Lithium battery communication error channel 1 | Make sure that the battery is compatible with the inverter. Check that the inverter channels are configured correctly, that the correct battery parameters have been set, and that both the power and communication cables have been connected correctly. |
| **ID158** | BMSCommunicatonFault Channel 2 | Lithium battery communication error channel 2 | Make sure that the battery is compatible with the inverter. Check that the inverter channels are configured correctly, that the correct battery parameters have been set, and that both the power and communication cables have been connected correctly. |
| **ID161** | ForceShutdown | Forced shutdown | The inverter has undergone a forced shutdown, check that the ON/OFF |

| | | | |
|---|---|---|---|
| | | | switch has not been enabled in the advanced settings |
| **ID162** | RemoteShutdown | Remote shutdown | The inverter has undergone a forced remote shutdown |
| **ID163** | Drms0Shutdown | DRMs0 shutdown | The inverter has undergone a forced DRMs0 shutdown |
| **ID165** | RemoteDerating | Remote derating | The inverter has undergone a remote load derating |
| **ID166** | LogicInterfaceDerating | Logic interface derating | The inverter is loaded by running the logic interface. |
| **ID167** | AlarmAntiRefluxing | Anti-reflux derating | The inverter is programmed to prevent counter-current load sagging. |
| **ID169** | FanFault1 | Fan1 error | Check whether fan 1 of the inverter is working properly |
| **ID170** | FanFault2 | Fan2 error | Check whether fan 2 of the inverter is working properly |
| **ID171** | FanFault3 | Fan3 error | Check whether fan 3 of the inverter is working properly |
| **ID172** | FanFault4 | Fan4 error | Check whether fan 4 of the inverter is working properly |
| **ID173** | FanFault5 | Fan5 error | Check whether fan 5 of the inverter is working properly |
| **ID174** | FanFault6 | Fan6 error | Check whether fan 6 of the inverter is working properly |
| **ID177** | BMS OVP | BMS overvoltage alarm | Internal lithium battery error; turn off the inverter and battery, wait 5 minutes and then turn them on again. If the errors still occur, contact technical support |
| **ID178** | BMS UVP | BMS undervoltage alarm | |
| **ID179** | BMS OTP | BMS high temperature alarm | |
| **ID180** | BMS UTP | BMS low temperature alarm | |
| **ID181** | BMS OCP | BMS overload warning when charging and discharging | |
| **ID182** | BMS Short | BMS short-circuit alarm | |

# 7. Uninstalling

## 7.1. 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.
- Remove the DC connectors from the inverter.
- Remove the connectors for communication with the batteries and current sensors.
- Remove the AC terminals.
- Unscrew the fixing bolt of the bracket and remove the inverter from the wall.

## 7.2. Packaging

If possible, pack the product in its original packaging.

## 7.3. Storage

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

## 7.4. Disposal

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

Where present, 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.

By cooperating in the proper disposal of this product, you contribute to the reuse, recycling and recovery of the product, and to the protection of our environment.

# 8. Monitoring systems

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

## 8.1. External Wi-Fi adapter

### 8.1.1. 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.

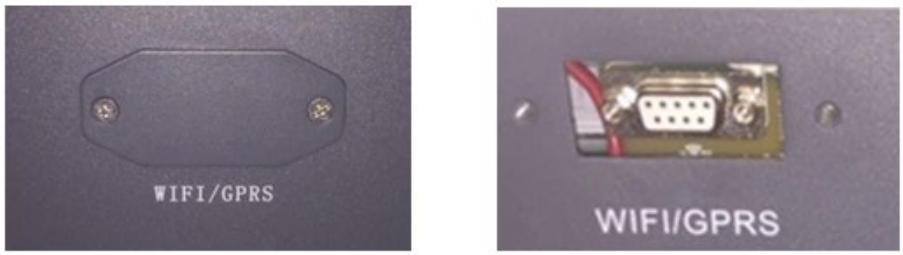
In order to monitor the inverter, the RS485 communication address must be set to 01 directly from the display.

**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)

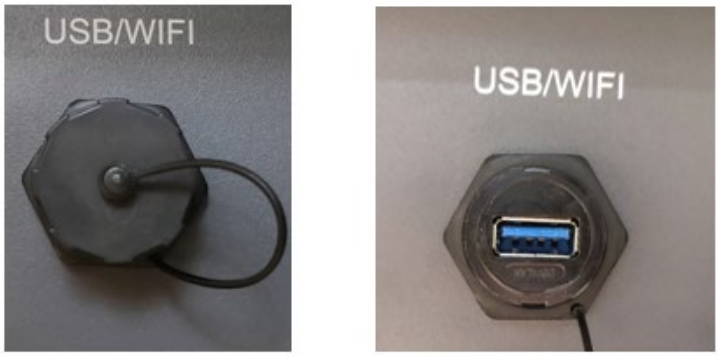
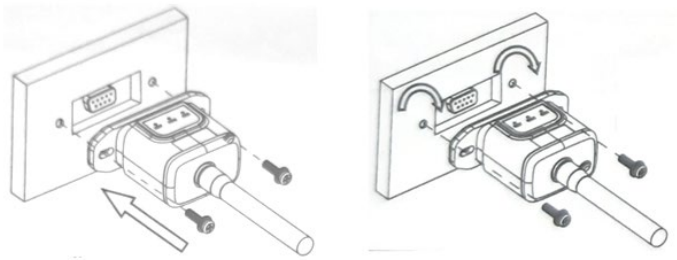



Figure 179 - Pot for external Wi-Fi adapter

3) Insert the Wi-Fi adapter into the appropriate port, taking care to follow the direction of the connection and ensure correct contact between the two parts.

(a)



(b)

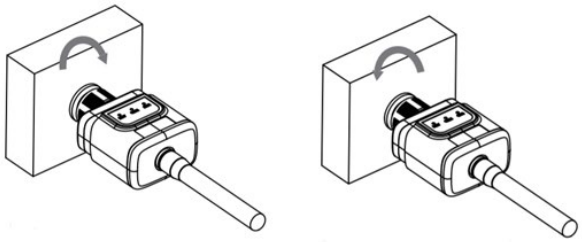


Figure 180 – Inserting and securing the external Wi-Fi adapter

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

### 8.1.2.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 Wi-Fi networks on your phone or PC in order to display all the networks visible from your device.

Figure 181 – Wi-Fi network search on iOs smartphone (left) and Android (right)

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

Figure 182 – 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.

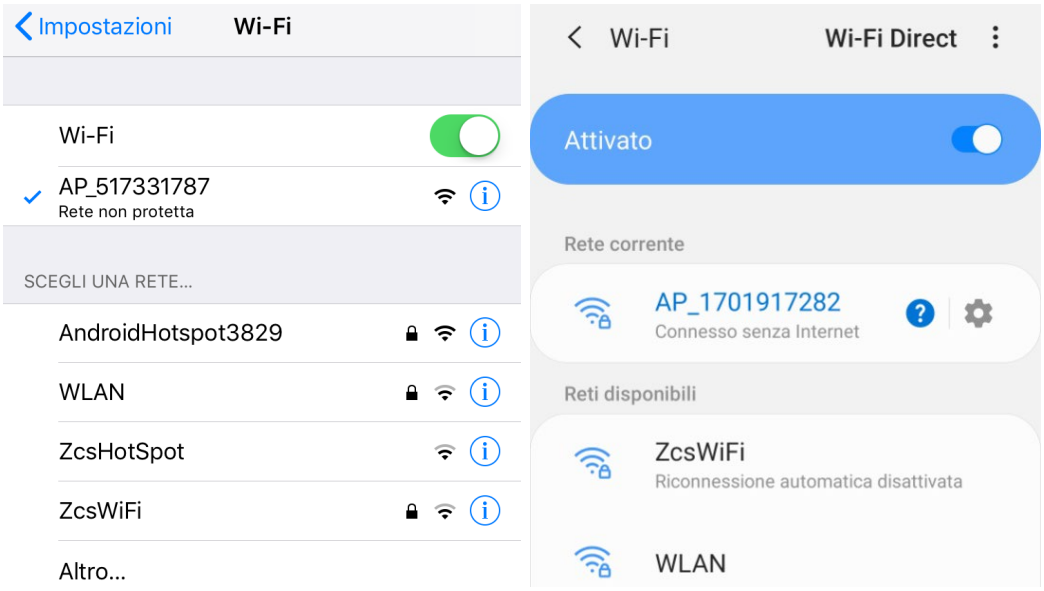



Figure 183 – Connection to Access Point of the Wi-Fi adapter on iOS smartphone (left) and Android smartphone (right)

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 184 – 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.

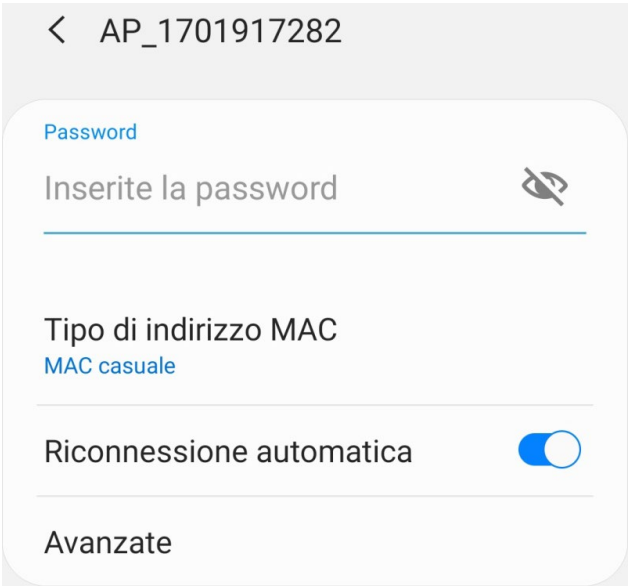



Figure 185 – Password entry prompt

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

**Figure 186 – Screen showing 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 Username and Password.

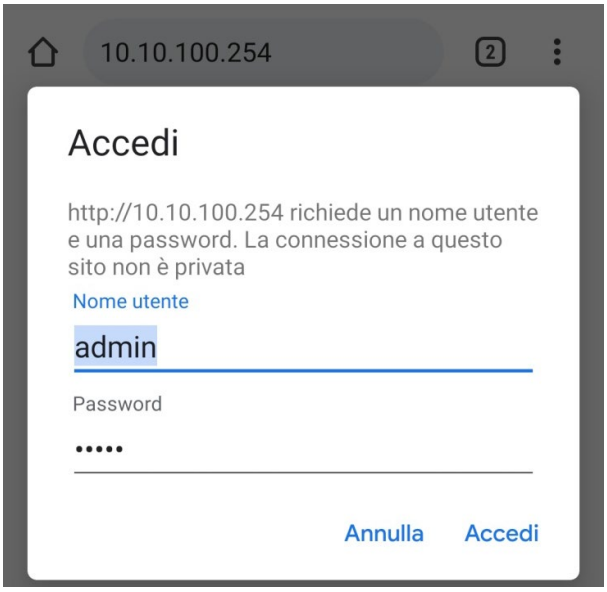



**Figure 187 – Screen for accessing the web server to configure the Wi-Fi adapter**

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.

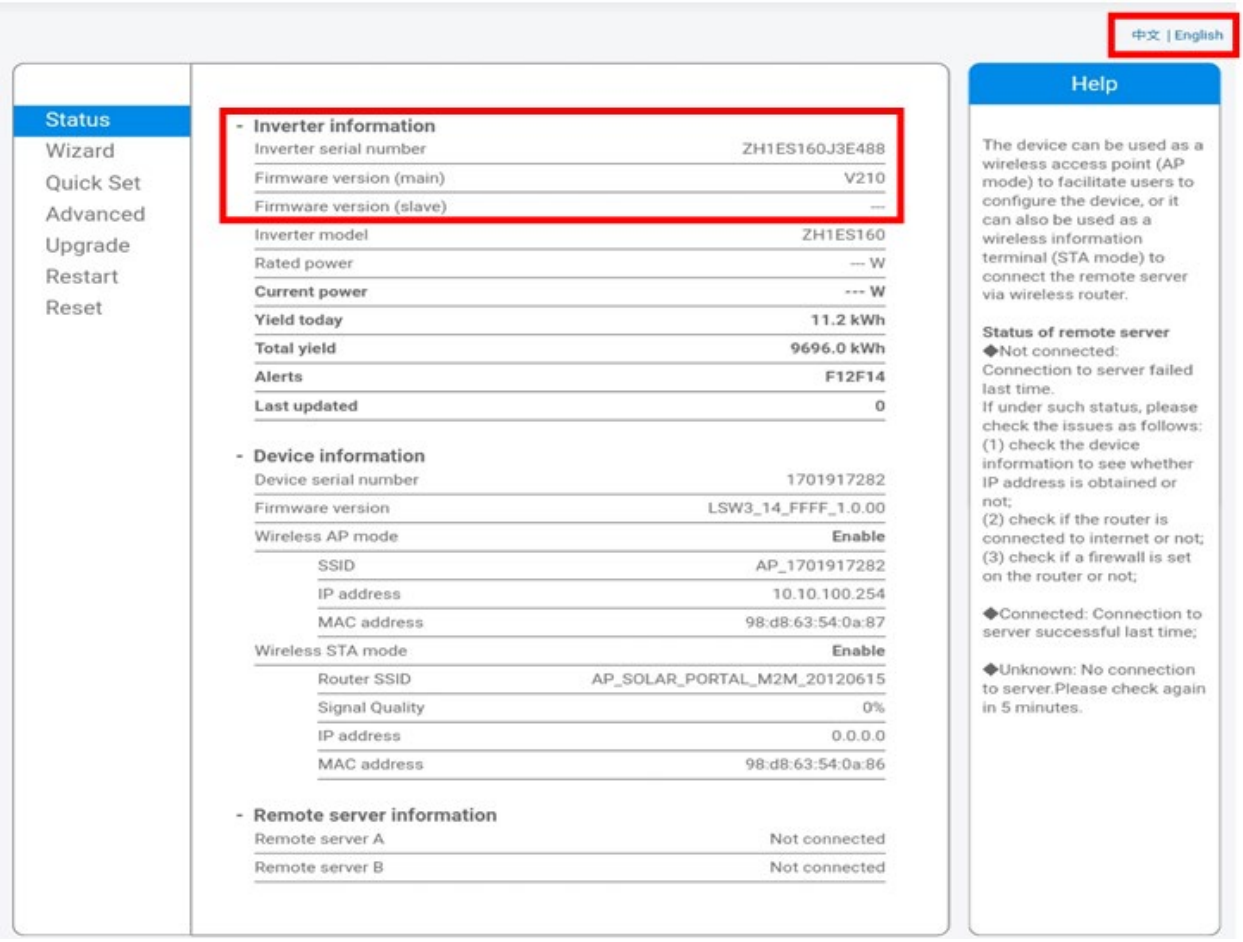



**Figure 188 – Status Screen**

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.

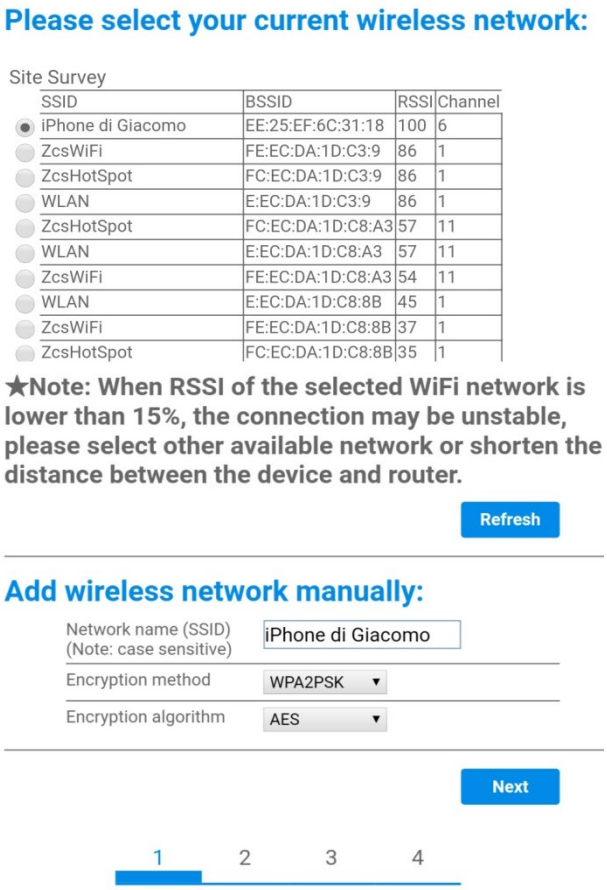



**Figure 189 – Screen for selecting the available wireless network (1)**

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, make sure you enter the correct password. Also check that the box below the password is set to Enable.

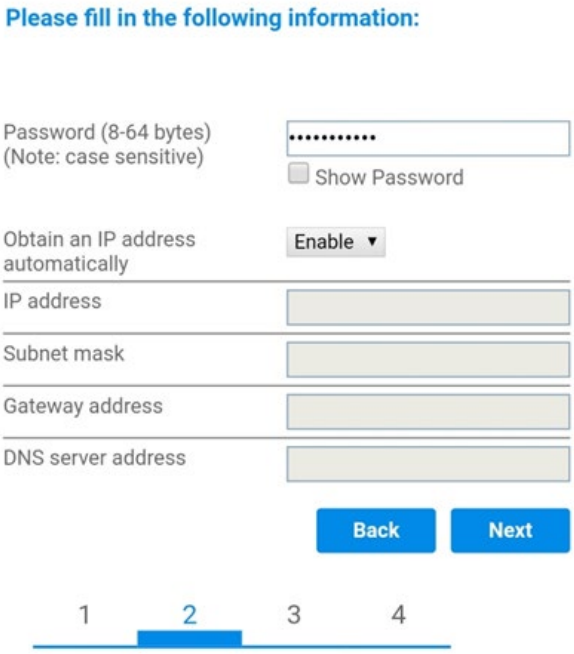



Figure 190 - Screen for entering the password of the wireless network (2)

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

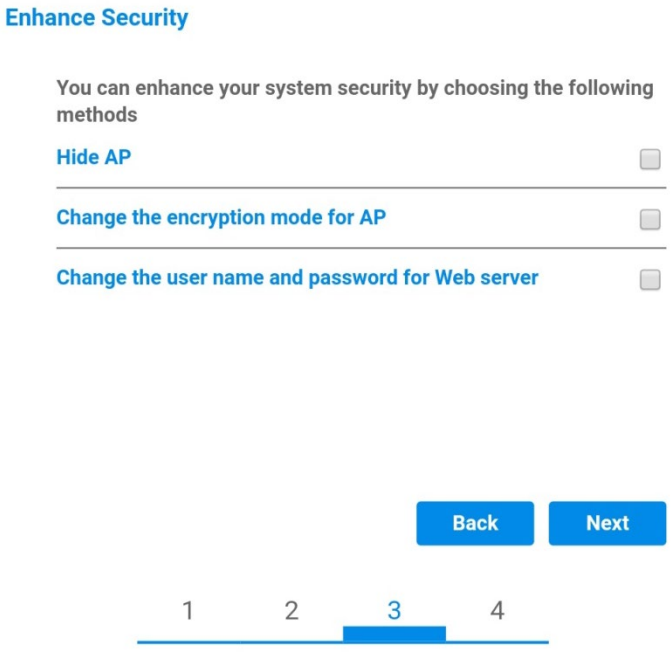



Figure 191 - Screen for setting the security options (3)

10) Click “OK”.

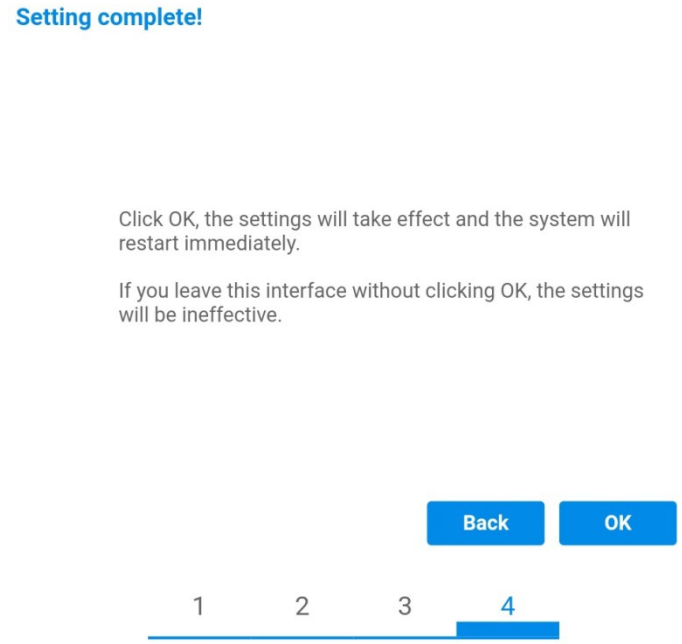



Figure 192 - Final configuration screen (4)

11) At this point, if the adapter configuration was 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 or remove it from the background of the telephone.

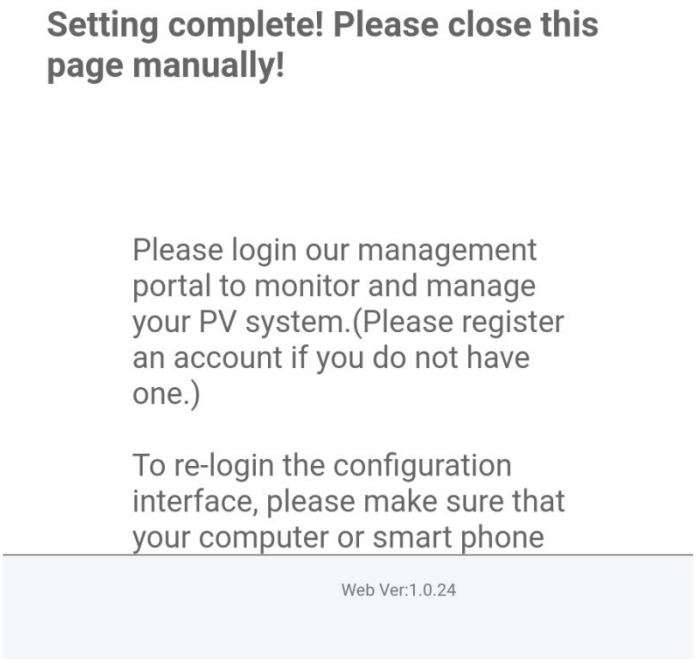



Figure 193 - Successful configuration screen

### 8.1.3.Check

To check that the network has been configured correctly, connect to it again and enter 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. Check Remote server information
   i. Remote server A > Connected

Figure 194 – 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 195 – Initial status of LEDs

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

Figure 196 - 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 197 – Reset button on the Wi-Fi adapter

### 8.1.4.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 198 - 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 199 – 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 losing 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 200 – 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; use a PC or smartphone to check that it is possible to 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.

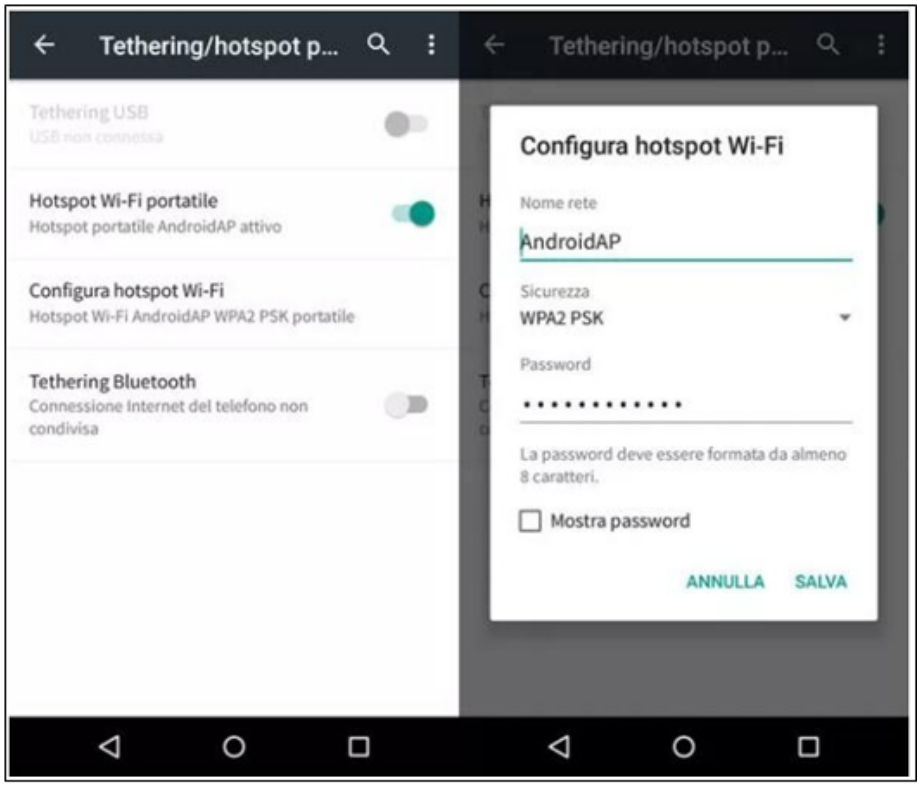



Figure 201 – Configuration of an Android smartphone as a hotspot router

- **Using an iPhone as a modem**

a) In order to share the iPhone connection, check 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.

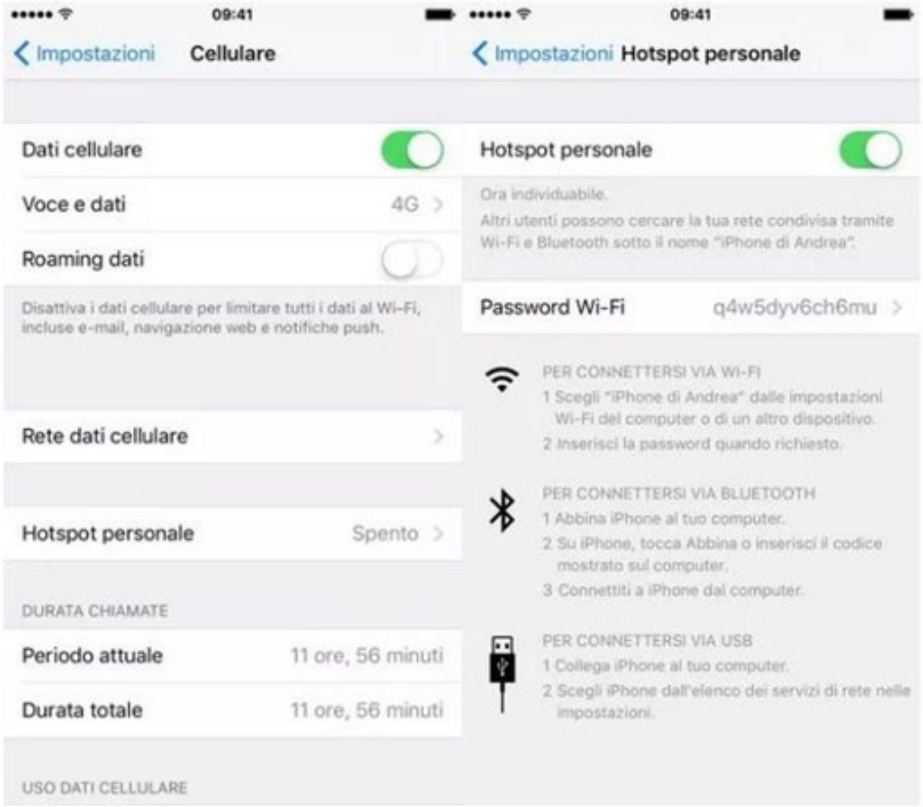



**Figure 202 - Configuration of an iOS smartphone as a hotspot router**

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 the word "Connected" appears next to "Remote Server A" at the end of configuration, then the problem is with the home router.
It is therefore advisable to check the brand and model of the home router that 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).

## 8.2. Ethernet adapter

### 8.2.1. Installation

All inverters compatible with the adapter must be installed. However, the procedure is quicker and easier as there is no need to open the front cover of the inverter. Correct operation of the device requires a modem to be correctly connected to the network and operational in order to achieve stable data transmission from the inverter to the server.

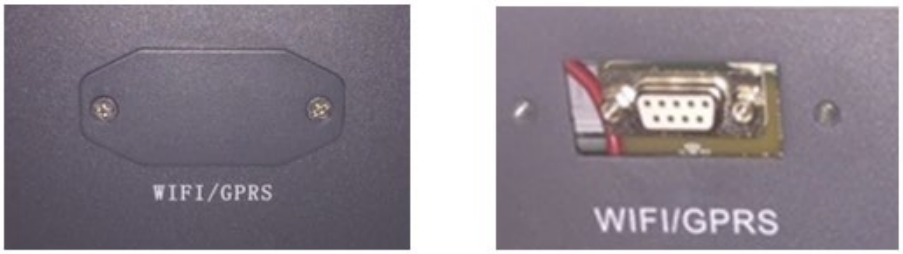
In order to monitor the inverter, the RS485 communication address must be set to 01 directly from the display.

**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)

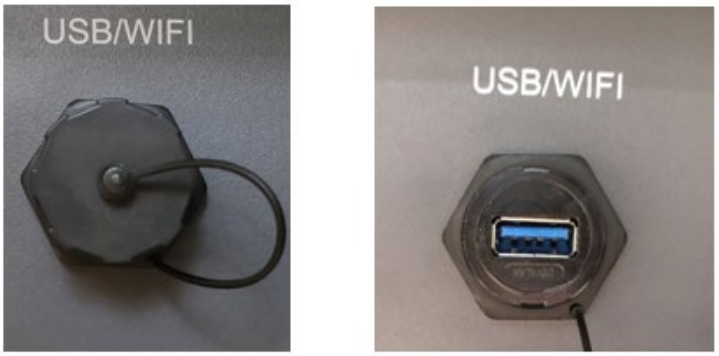



Figure 203 - Slot for the Ethernet adapter

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 slot inside the card and tighten the ring nut and cable gland to ensure a stable connection.

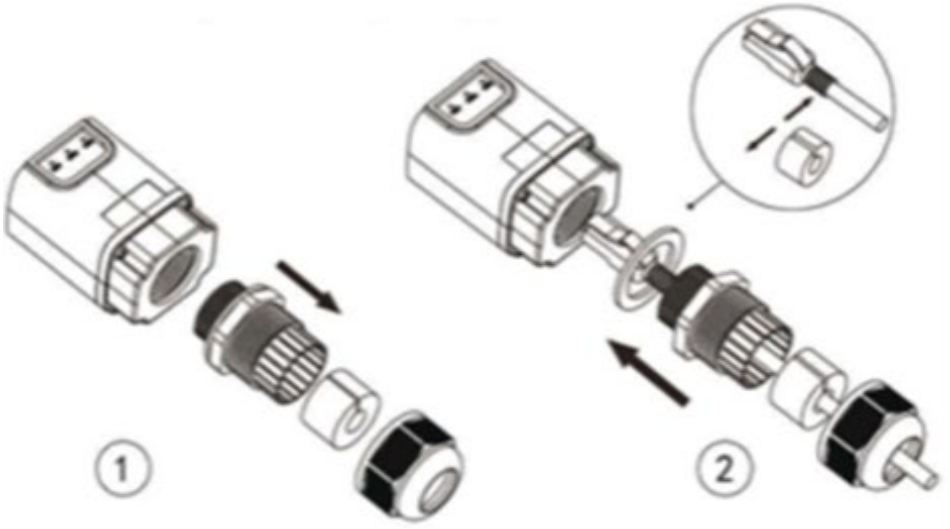



Figure 204 – Inserting the network cable inside the device

4) Insert the Ethernet adapter into the appropriate slot, taking care to follow the direction of the insertion and ensure correct contact between the two parts.

(a)

(b)

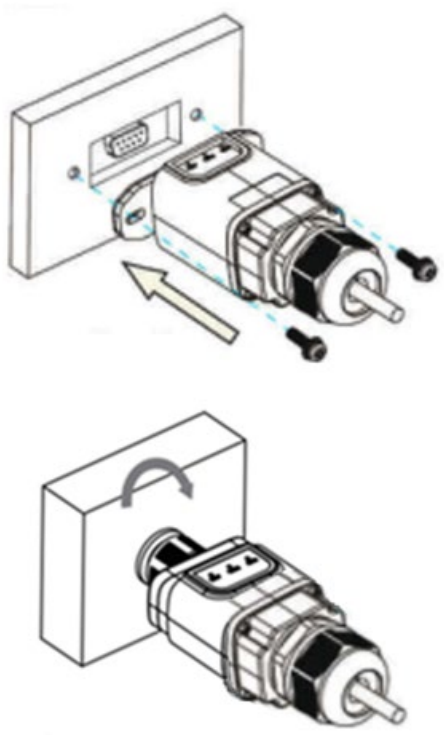


Figure 205 – Inserting and securing the Ethernet adapter

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

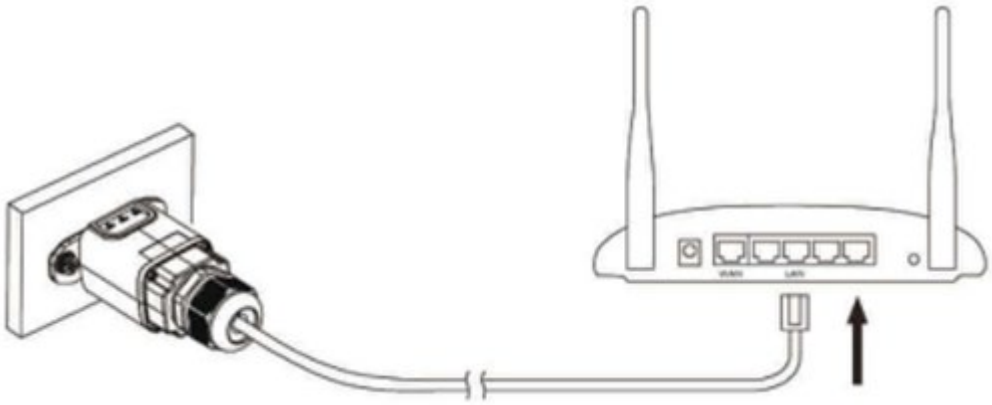


Figure 206 – Connecting the network cable to the modem

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

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

### 8.2.2.Check

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 207 – Initial status of LEDs

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

Figure 208 - Final status of LEDs

### 8.2.3. 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 209 - 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 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 210 – Irregular communication status between adapter and remote server

- Check that the router has access to the network and that the connection is stable; use a PC to check that it is possible to 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).

## 8.3. 4G adapter

The ZCS 4G adapters are sold with a virtual SIM integrated into the device with data traffic fee included for 10 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.

### 8.3.1. Installation

All inverters compatible with the adapter must be installed. 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 211 - Slot for the 4G adapter**

3) Insert the 4G adapter into the appropriate slot, taking care to follow the direction of the insertion and ensure correct contact between the two parts. Secure the 4G adapter by tightening the two screws inside the package.

(a)

(b)

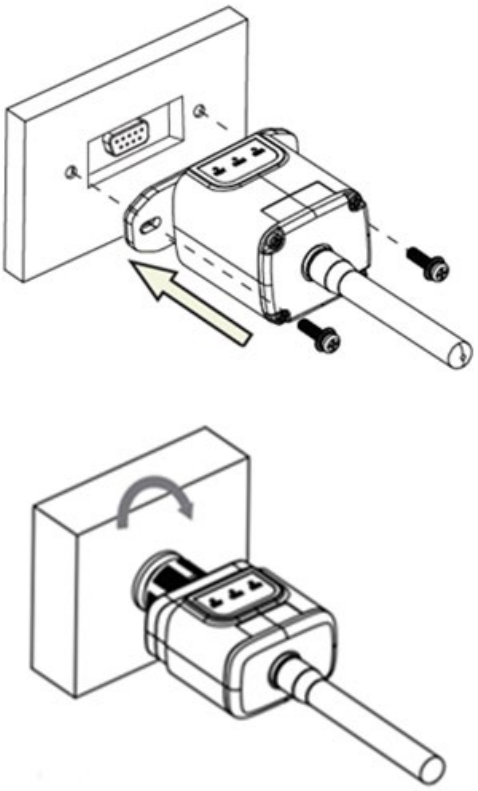


Figure 212 – Inserting and securing the 4G adapter

4) Switch on the inverter by following the procedure described in the manual.
5) Unlike Wi-Fi monitoring cards, the 4G device does not need to be configured and starts transmitting data shortly after the inverter has been switched on.

### 8.3.2.Check

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 213 – 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 214 - 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 215 - 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 216 – Irregular communication status between 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.

## 8.4. Datalogger

### 8.4.1. Preliminary notes on how to configure the datalogger

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

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

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

- Datalogger up to 4 inverters (code ZSM-DATALOG-04): allows to monitor up to 4 inverters.
  It can be connected to the network via an Ethernet or Wi-Fi network.
- Datalogger up to 10 inverters (code ZSM-DATALOG-10): allows to monitor up to 10 inverters.
  It can be connected to the network via an Ethernet or Wi-Fi network.

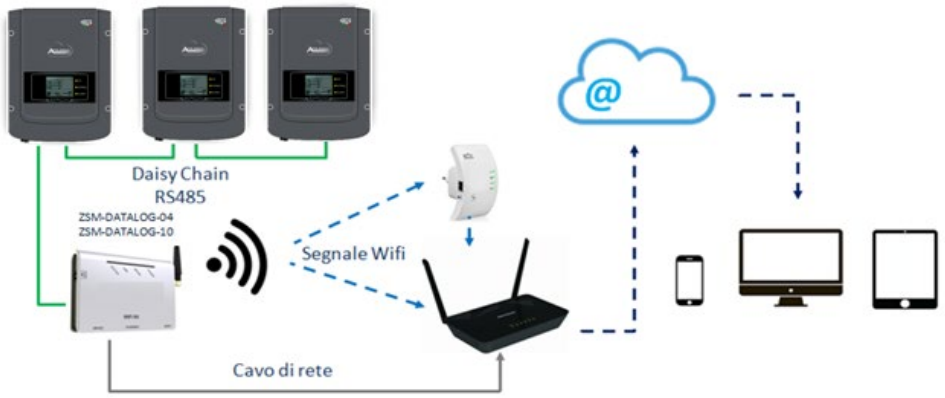



**Figure 217 – Diagram for connecting the ZSM-DATALOG-04 / ZSM-DATALOG-10 datalogger**

- Datalogger up to 31 inverters (code ZSM-RMS001/M200): allows to monitor up to 31 inverters or a system with a maximum installed power of 200kW.
  It can be connected to the network via an Ethernet cable.

- Datalogger up to 31 inverters (code ZSM-RMS001/M1000): allows to monitor a maximum of 31 inverters or a system with a maximum installed power of 1000kW.
  It can be connected to the network via an Ethernet cable.

**Figure 218 – Diagram for the functioning of the ZSM-RMS001/ M200 / ZSM-RMS001/M1000 datalogger**

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

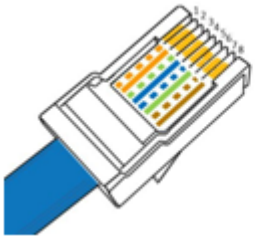
All the Azzurro ZCS inverters can be monitored using the datalogger; different models or families of inverters can also be monitored.

### 8.4.2.Electrical connections and configuration

All the Azzurro ZCS inverters have at least one RS485 connection point.
The connections can be made via the green terminal block or via the RJ45 plug inside the inverter.
Use positive and negative conductors. There is no need to use a conductor for the GND. This applies to both the terminal block and the plug.
The serial line can be created using a Cat. 5 or Cat. 6 network cable, or a classic RS485 2x0.5mm$^2$ cable.

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

    a. Place the blue cable in position 4 of the RJ45 connector and the white-blue cable in position 5 of the RJ45 connector, as shown in the figure below.
    b. Insert the connector into the 485-OUT terminal.
    c. If there is more than one three-phase inverter, insert another connector in the 485-IN terminal to connect to the 485-OUT input of the next inverter.



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

Figure 219 – Pin out for connecting the RJ45 connector

2) Daisy chain

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

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

Figure 220 - Tightening the network cable to the RS485 terminal block

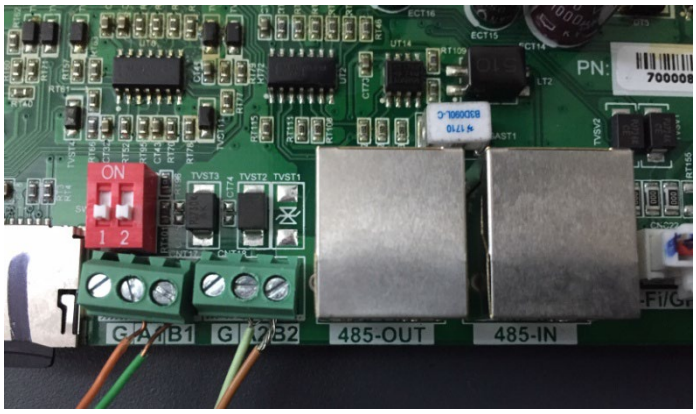



Figure 221 – Connecting the serial line via the RS485 terminal block and via the RJ45 plug

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

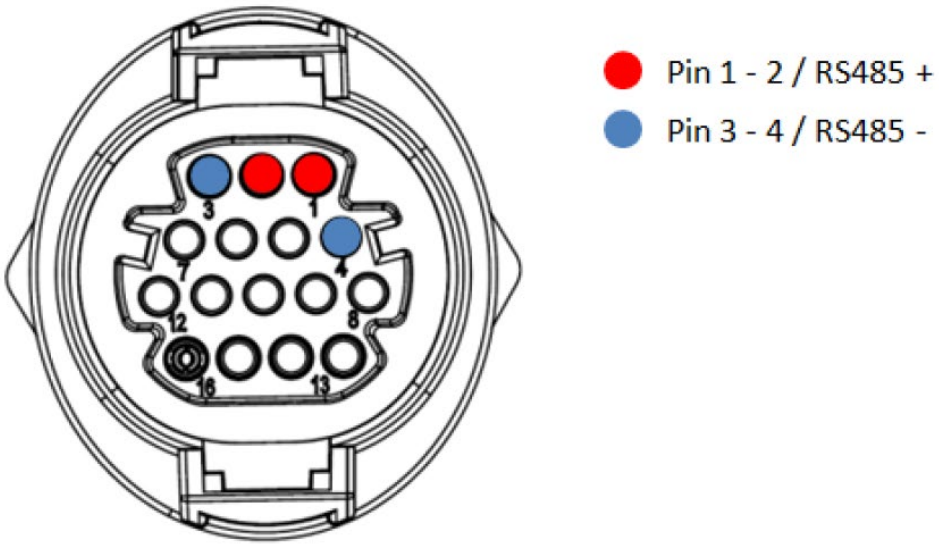



Figure 222 – Connecting the serial line via the communication connector for 3PH HYD5000-HYD20000-ZSS inverters

For 3000-6000 TLM-V3 photovoltaic inverters and HYD 3PH 5000-20000 ZSS three-phase hybrid inverters, use only one positive and one negative of those shown in the figure below.

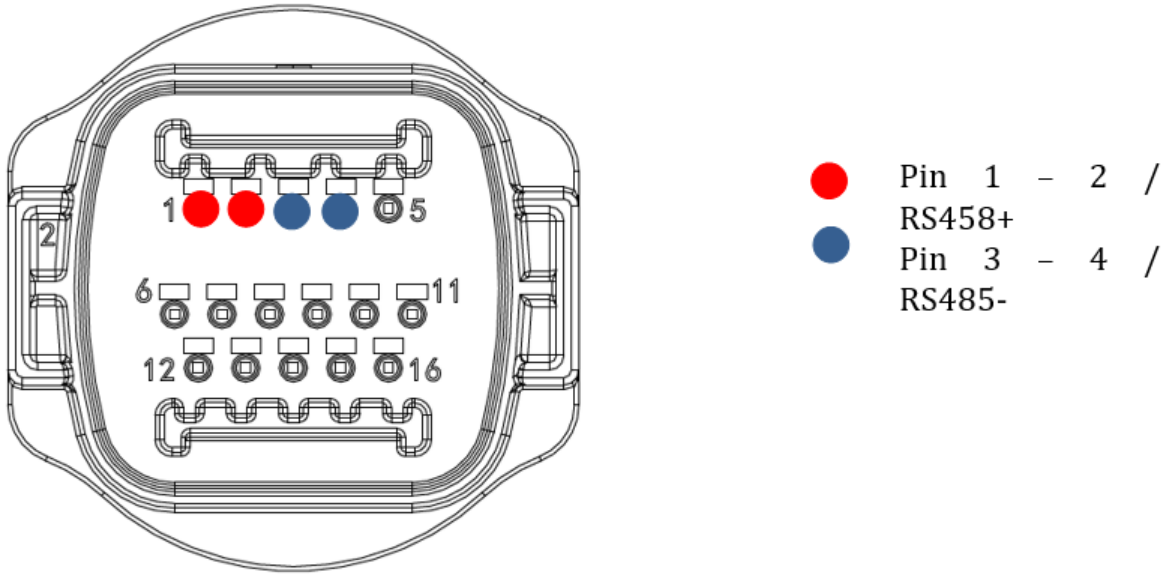



**Figure 223 – Connecting the serial line via the communication connector for 1PH 3000- 6000 TLM-V3 inverters**

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

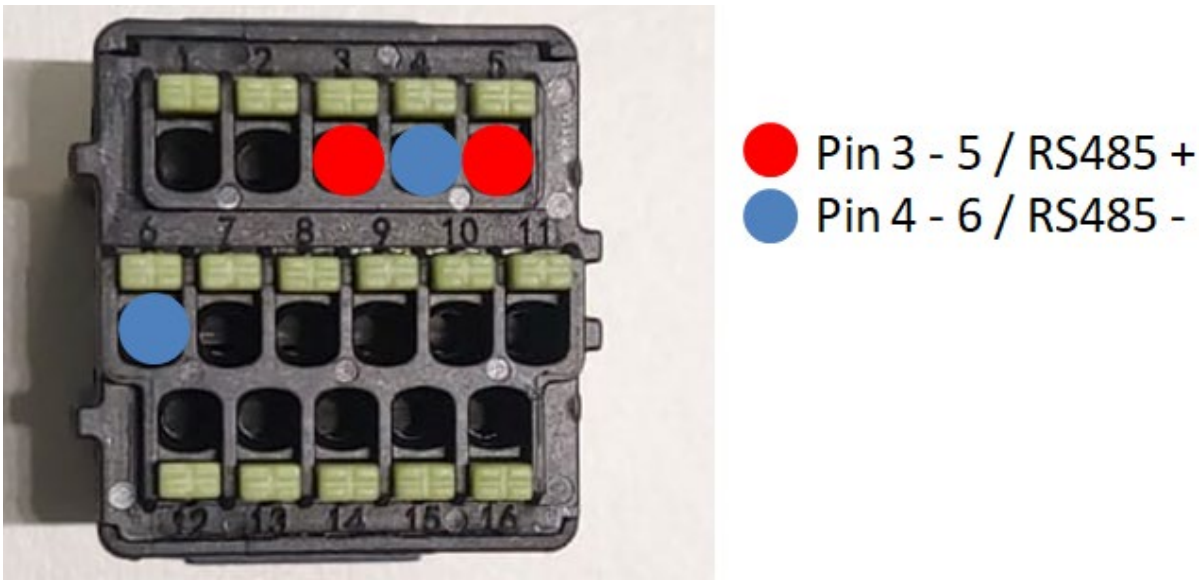



**Figure 224 – Connecting the serial line via the communication connector for 3PH HYD5000-HYD20000-ZSS inverters**

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

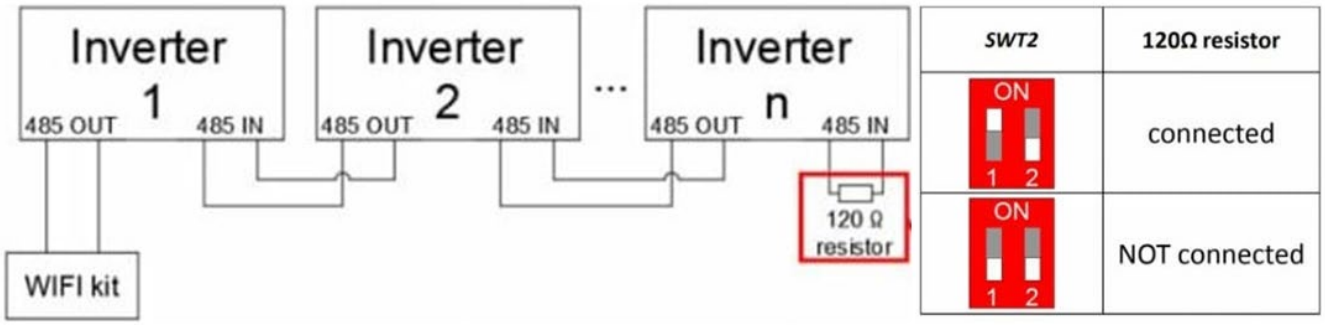



Figure 225 – Positioning of the dip switches to connect the isolation resistor

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

Figure 226 – RS485 symbol on the inverter display

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

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

### 8.4.3.ZSM-DATALOG-04 AND ZSM-DATALOG-10 Devices

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

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

### 8.4.4.WI-FI CONFIGURATION

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

### 8.4.5.Ethernet configuration

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

Figure 227 – Ethernet cable connected to the datalogger

2) Connect the other end of the Ethernet cable to the ETH output (or equivalent) of the modem or a suitable data transmission device.
3) Activate the search for Wi-Fi networks on your phone or PC in order to display all the networks visible from your device.

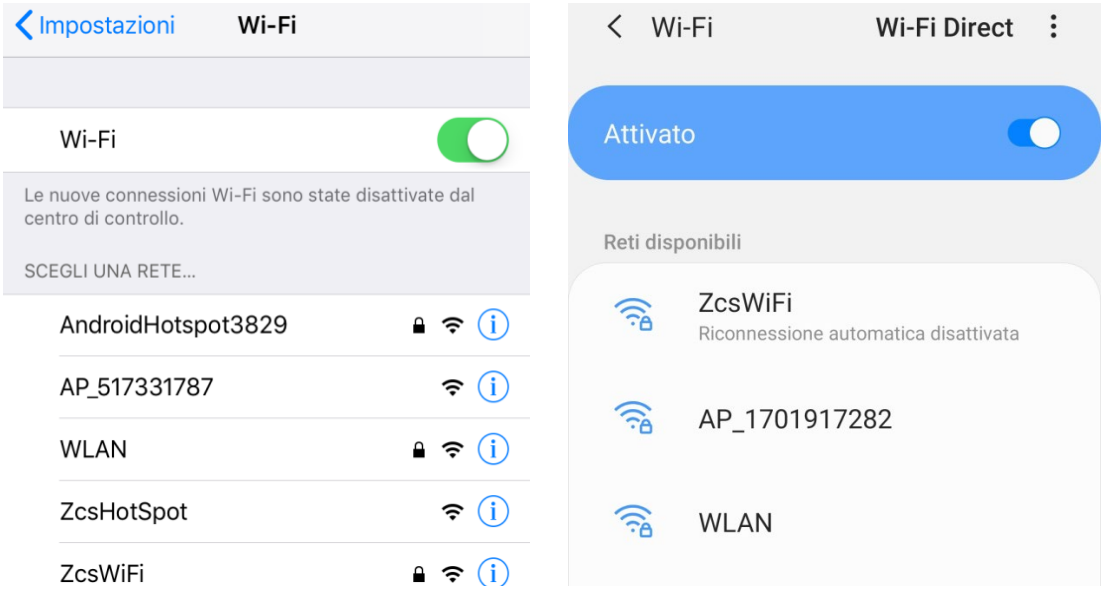



Figure 228 - Wi-Fi network search on iOs (left) and Android (right) smartphone

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

Figure 229 - Disabling automatic reconnection to a network

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

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

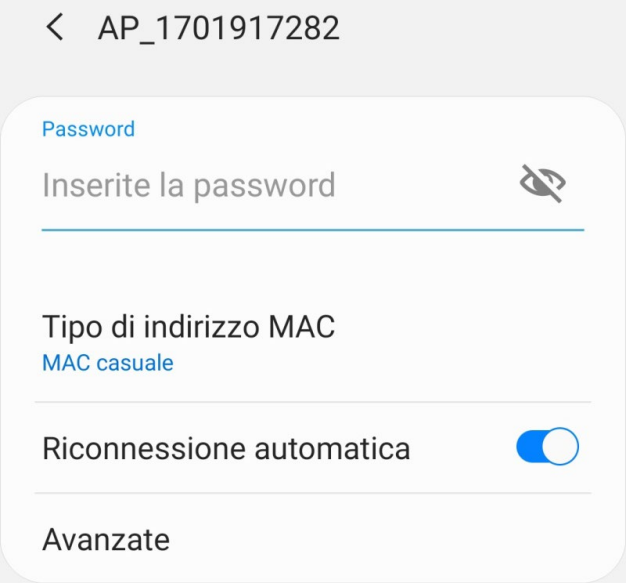



Figure 230- Password entry prompt

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

Figure 231- Screen showing that the Internet cannot be accessed

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

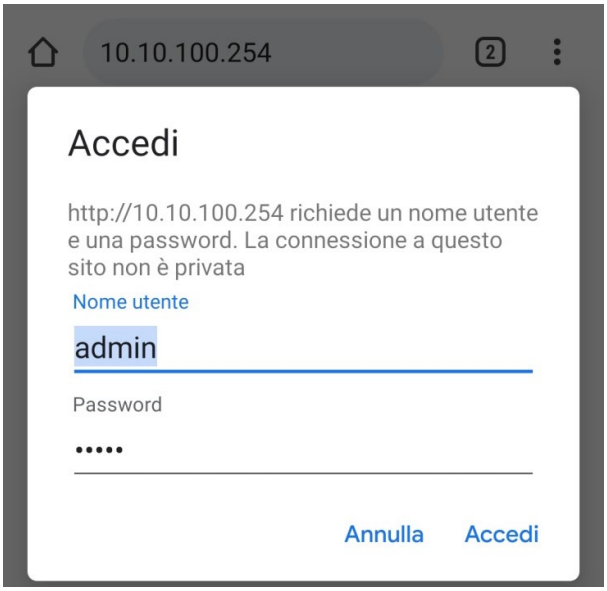



Figure 232 - Screen for accessing the web server to configure the datalogger

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

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

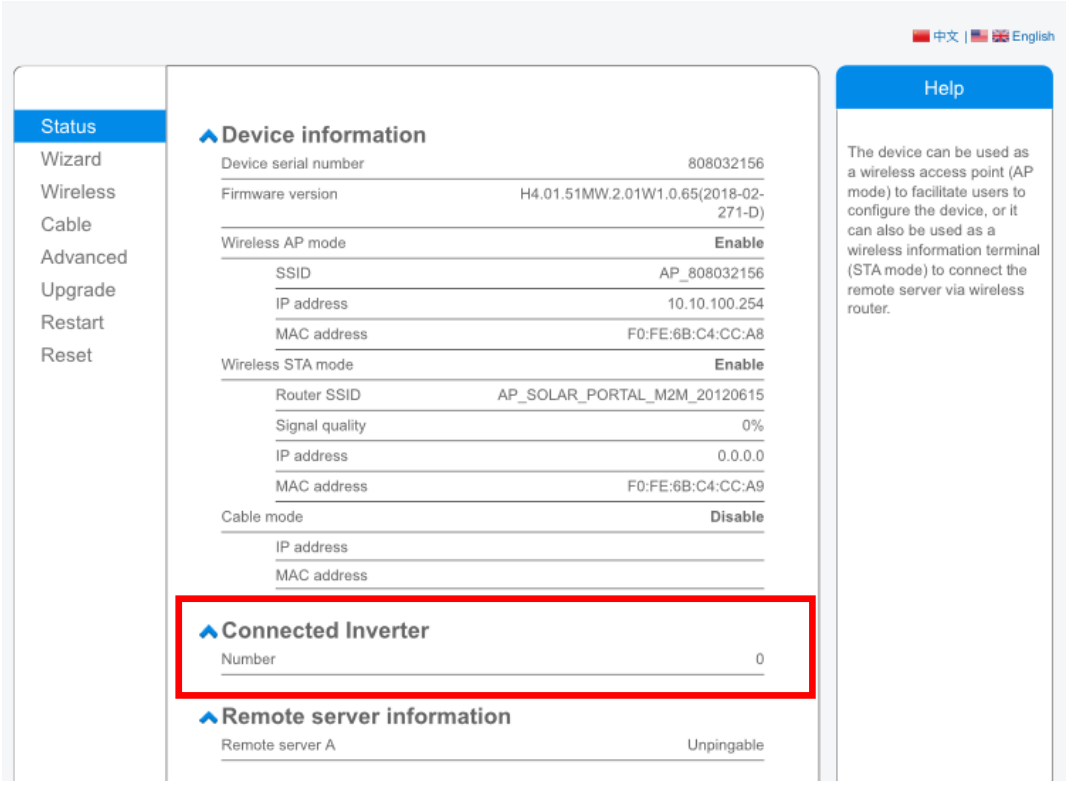



Figure 233 – Status Screen

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

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

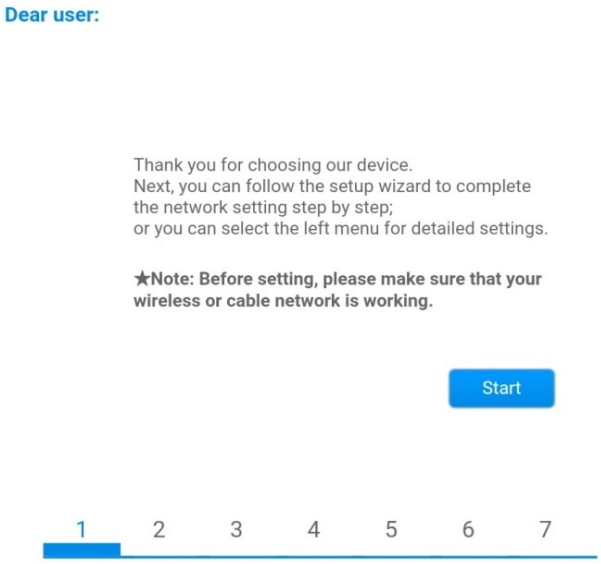



Figure 234 – Screen for starting (1) the Setup Wizard

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

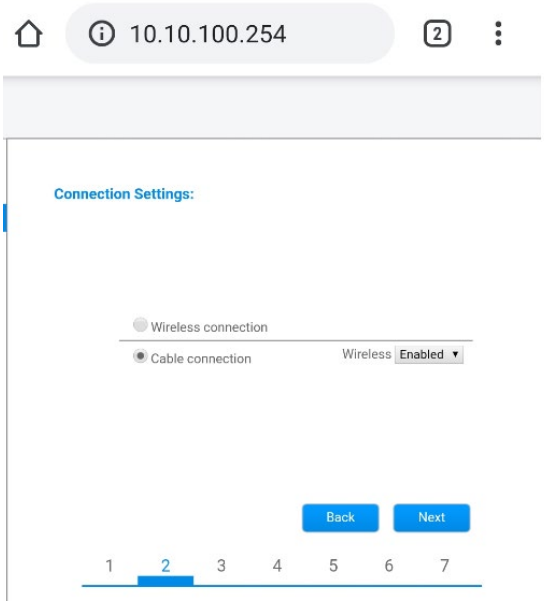



Figure 235 - Screen for selecting connection via network cable

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

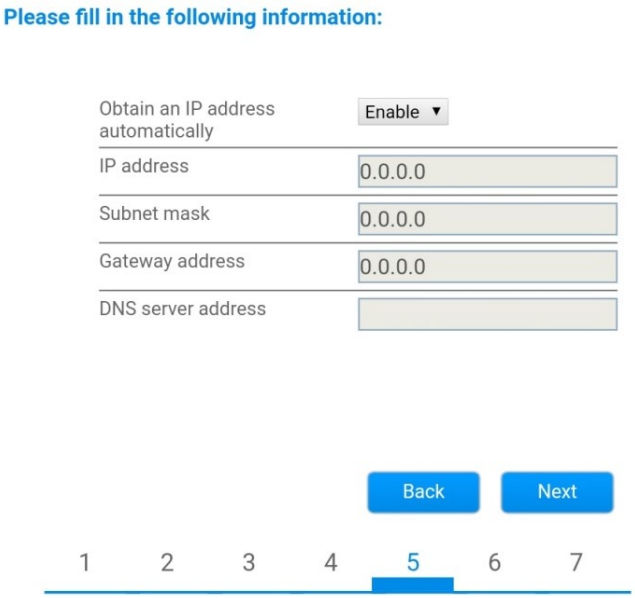



Figure 236 – Screen for automatically obtaining the IP address (5)

12) Click on Next without making any changes.

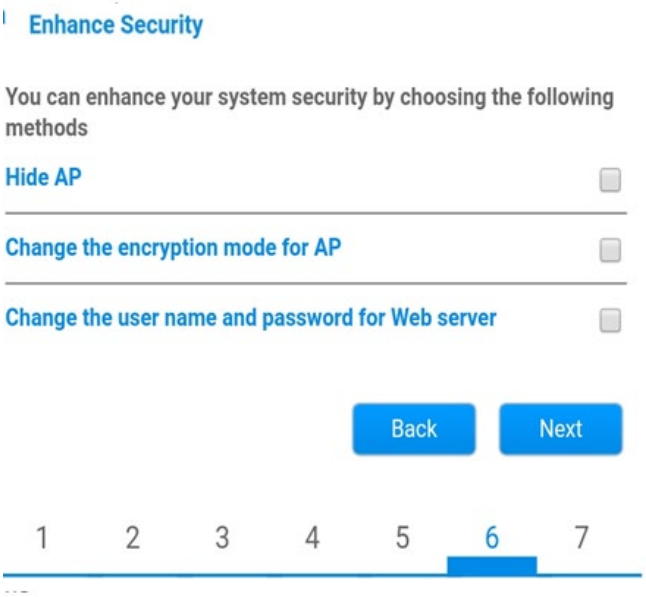



Figure 237 - Screen for setting the security options (6)

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

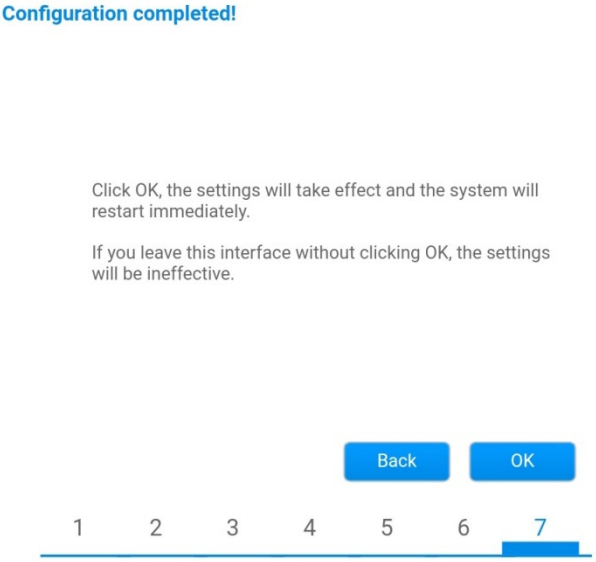



Figure 238 – Final configuration screen (7)

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

If this screen does not appear, try refreshing the browser page.

The screen will prompt you to manually close the page; close the page from the background of your phone or from the close button on your PC.

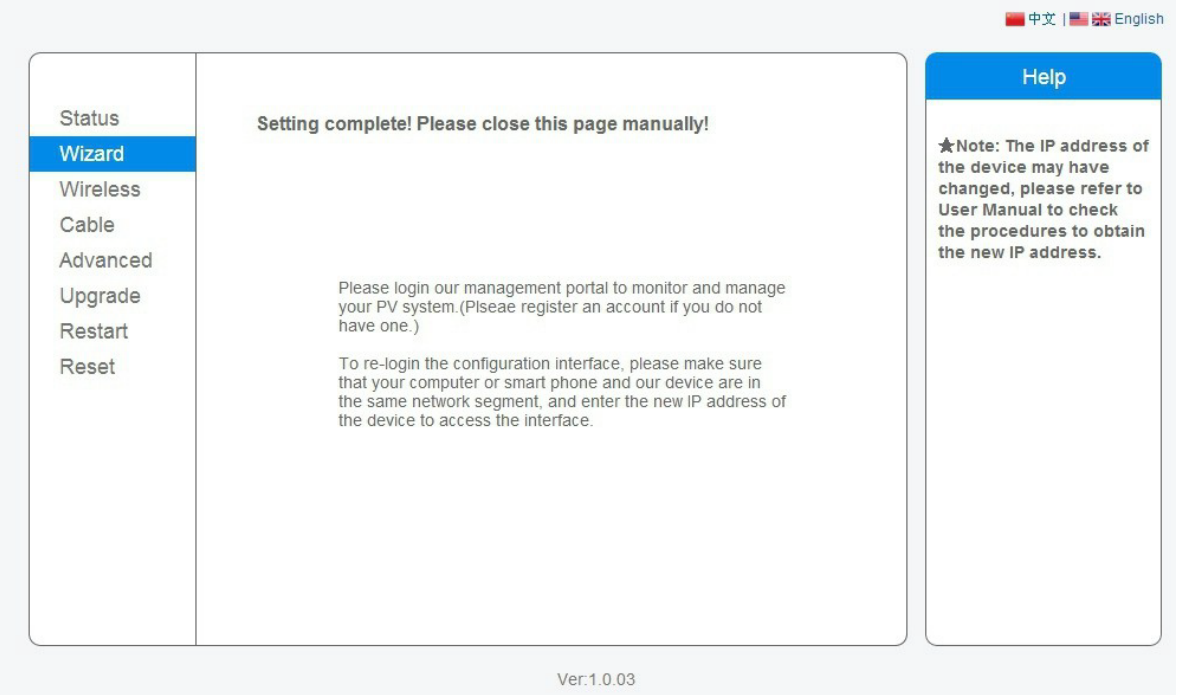



Figure 239 – Successful configuration screen

## 8.4.6.Checking that the datalogger has been configured correctly

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

Figure 240 – LED indicating the correct configuration of the datalogger

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

- Check Wireless STA mode (if the datalogger has been configured via Wi-Fi)
  - Router SSID > Router name

- Signal Quality > other than 0%
- IP address > other than 0.0.0.0

- Check Cable mode (if the datalogger has been configured via Ethernet cable)
  - IP address > other than 0.0.0.0
- Check Remote server information
  - Remote server A > Pingable

**Figure 241 – Main screen of status and checking of correct configuration**

**Figure 242 - Main screen of status and checking of correct configuration**

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

- Select the Reset button in the left-hand column
- Press the OK button to confirm
- Close the web page and enter the Status page again. At this point, the configuration procedure can be repeated again.

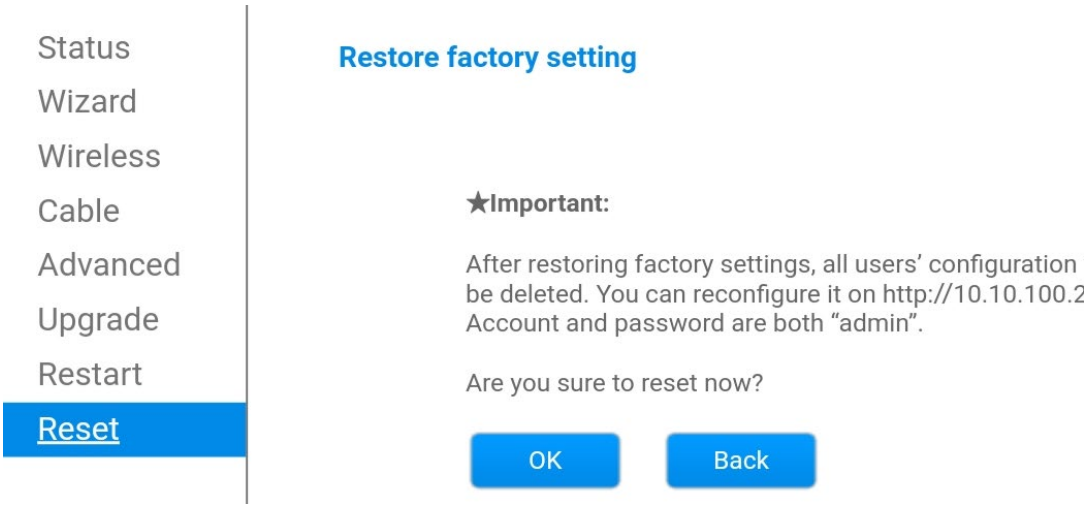



Figure 243 – Reset screen

## 8.4.7.ZSM-RMS001/M200 and ZSM-RMS001/M1000 Devices

### 8.4.7.1. Mechanical description and Datalogger interface

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

The usable ports are indicated below.

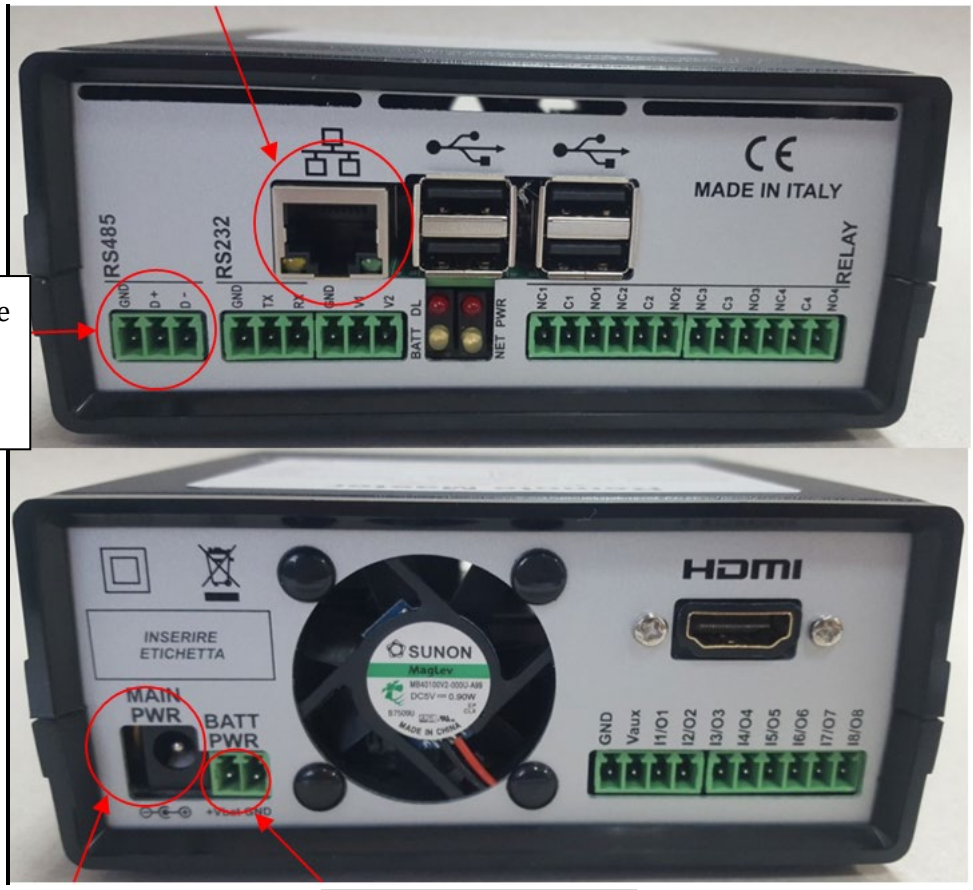



Figure 244: Back of Datalogger

### 8.4.7.2. Connecting the Datalogger to the inverters

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

| Datalogger SIDE | BUS Signal | SENSOR SIDE (ZSM-IRR-TEMP-LM2) | Inverter SIDE |
|---|---|---|---|
| Terminal ***D+*** | + | Terminal RS485***+/B*** | Terminal ***+Tx*** |
| Terminal ***D–*** | - | Terminal RS485***-/A*** | Terminal ***-Tx*** |

Table 21: Connecting the Datalogger to the inverters

### 8.4.7.3. Internet connection via Ethernet cable

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

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

The local network of the device is configured for DHCP, and there is no need to activate any communication port on the router. If you want to set a fixed network address, this must be provided at the time of ordering together with the gateway address.

### 8.4.7.4. Connecting the power supply and battery pack to the Datalogger

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

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

### 8.4.7.5. Connecting the LM2-485 PRO cell irradiation and temperature sensor to the datalogger

For proper installation, both the sensor signal and power cables must be connected.

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

| Datalogger SIDE | BUS Signal | SENSOR SIDE (ZSM-IRR-TEMP-LM2) | Inverter SIDE |
|---|---|---|---|
| Terminal ***D+*** | + | Terminal RS485***+/B*** | Terminal ***+Tx*** |
| Terminal ***D–*** | - | Terminal RS485***-/A*** | Terminal ***-Tx*** |

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

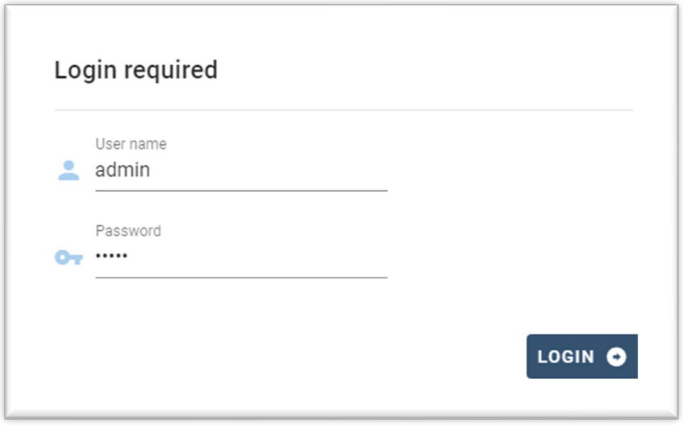
| Datalogger SIDE | SENSOR SIDE |
|---|---|
| Terminal ***V1*** (12Vdc output voltage) | Terminal **RED +12V** |
| Terminal ***GND*** (GND/RTN) | Terminal **BLACK 0V** |
| Terminal ***V2*** (12Vdc driveable voltage) | |

**Table 22: Electrical connection of the sensor to the datalogger (power supply)**

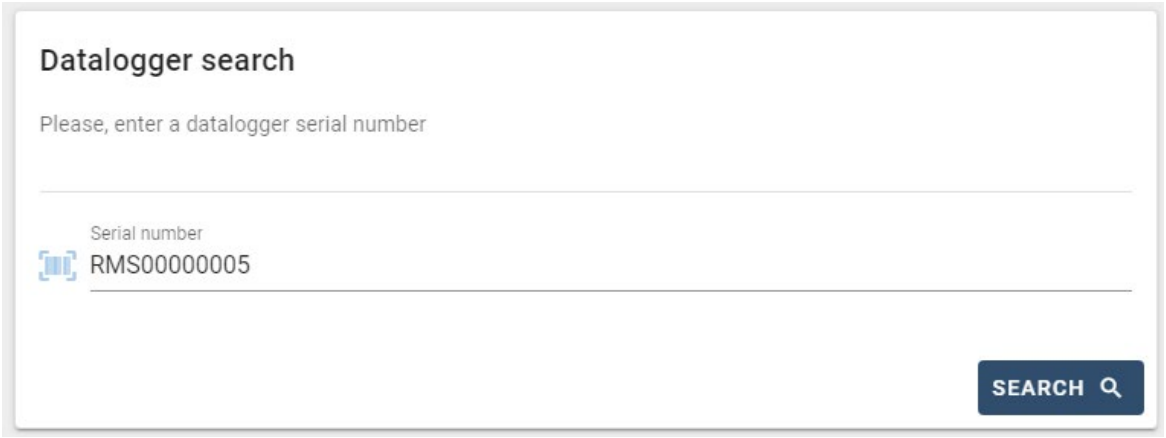
A stable communication in terms of signal and power supply, up to 200m, is guaranteed by using the RS485 cable, type Te.Co G83/15166, 2x2x0/22, 1x0/22,/.
For longer distances, a connection to the signal side of the datalogger is recommended, and a connection to the +12V power supply via an external power supply unit.

### 8.4.8.Configuring the Datalogger

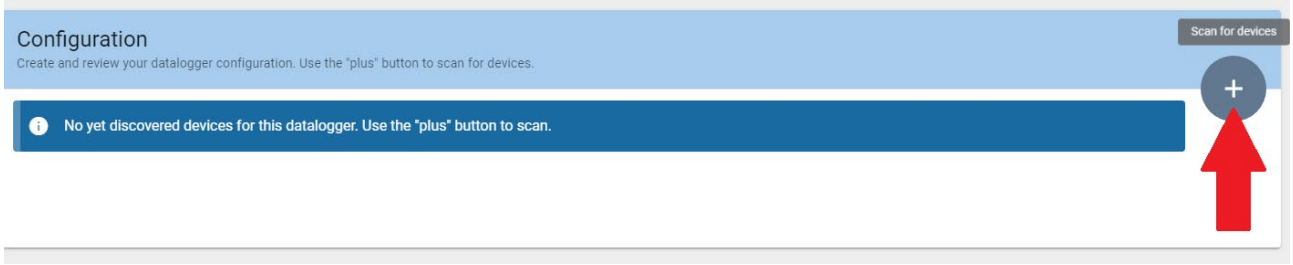
Connect to the website dlconfig.it and login by entering the temporary credentials: Username = admin and Password = admin.



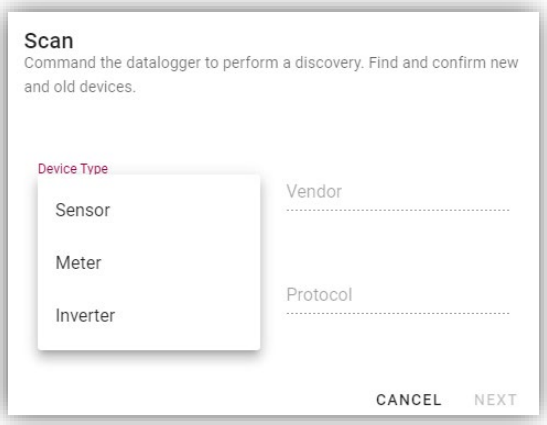

In the screen that opens, enter the serial number (S/N) of the datalogger to be configured and click "SEARCH".



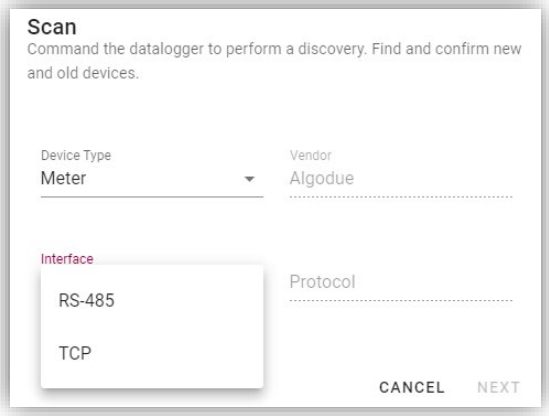

In the configuration page, you can search for any devices connected to the datalogger (inverter, meter or sensors) by clicking the + button, as shown in the figure.

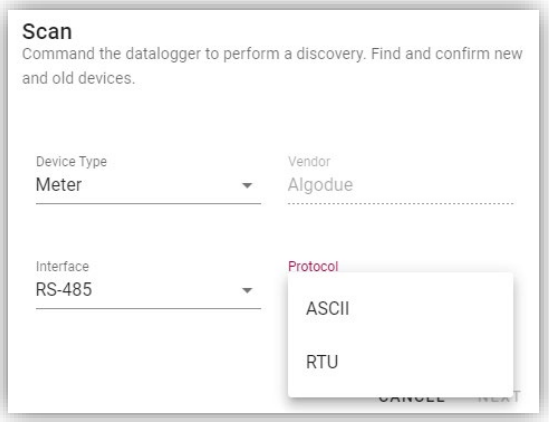



A window will open where you can search for each type of device connected to the Datalogger, after indicating the range of addresses associated with the relative devices.

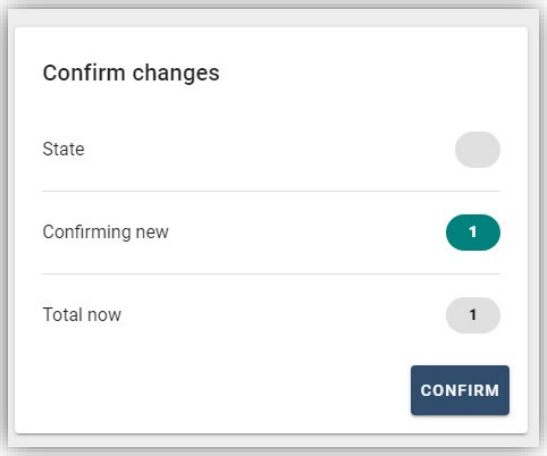



If a meter is one of the devices connected to the Datalogger, select the type of Meter/Datalogger communication interface and the relative communication protocol.

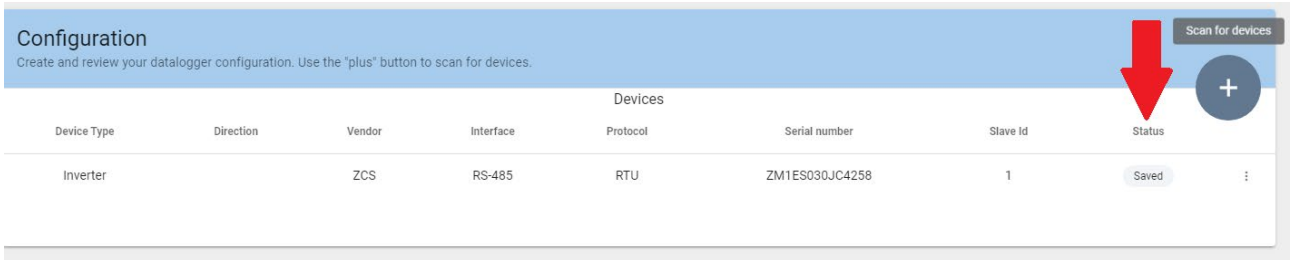



Once this operation has been completed, update the new configuration by clicking “Confirm,” which will allow you to register the devices associated with the datalogger.

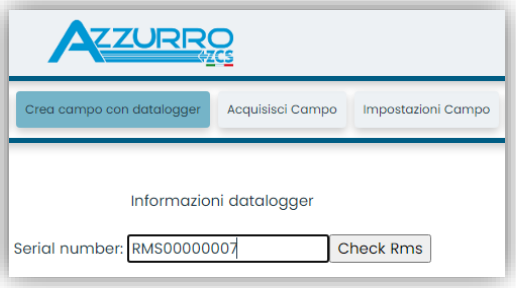


From this moment, the datalogger is correctly configured (all devices must be in the "saved" status) and therefore a new installation can be created on the ZCS Azzurro portal for associating the datalogger and the devices connected to it.

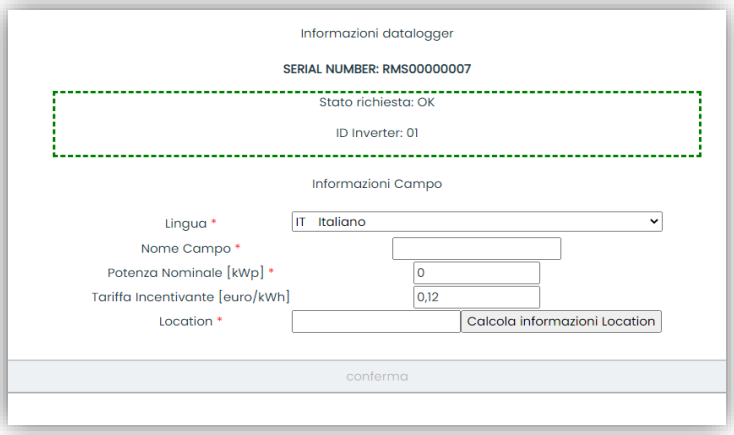



## 8.4.8.1. Configuring the Datalogger on the ZCS Azzurro portal

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




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

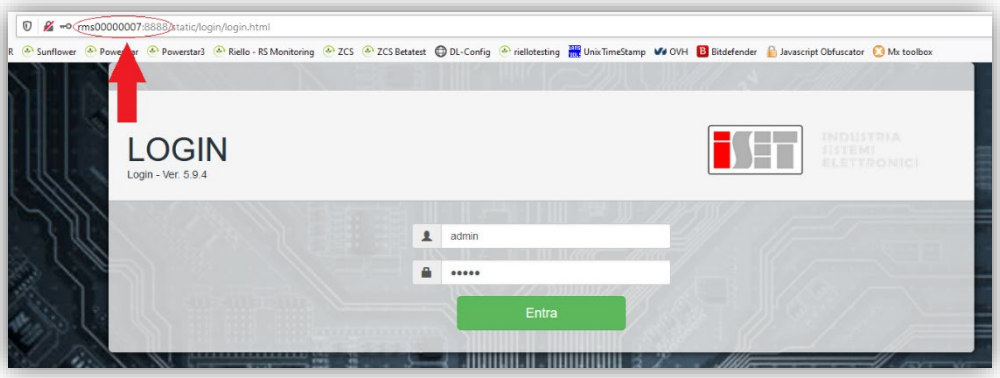


Once the “location” of the field has been entered, click “Calculate Location Information” to allow the system to obtain the latitude, longitude and time zone of the installation. Click “Confirm” to complete the configuration of the field. You only need to wait a few minutes to view the data flow on the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

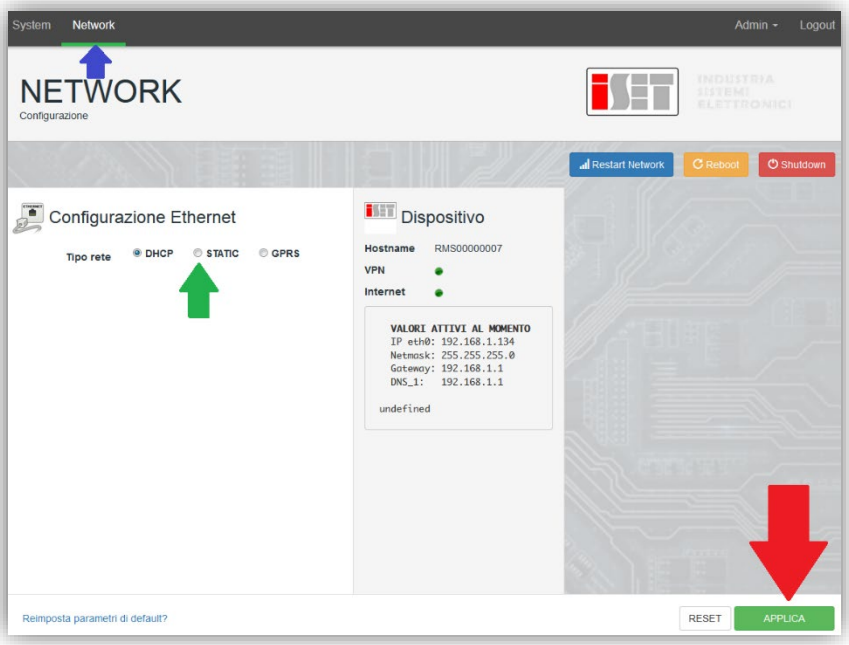
**CAUTION: The location data is essential for the correct operation of the datalogger in the ZCS system. It is important to define it very carefully.**

### 8.4.8.2. Network configuration

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




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




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

### 8.4.9.Local monitoring

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

#### 8.4.9.1. Requirements for installation of local monitoring

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

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

#### 8.4.9.2. Features of local monitoring

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

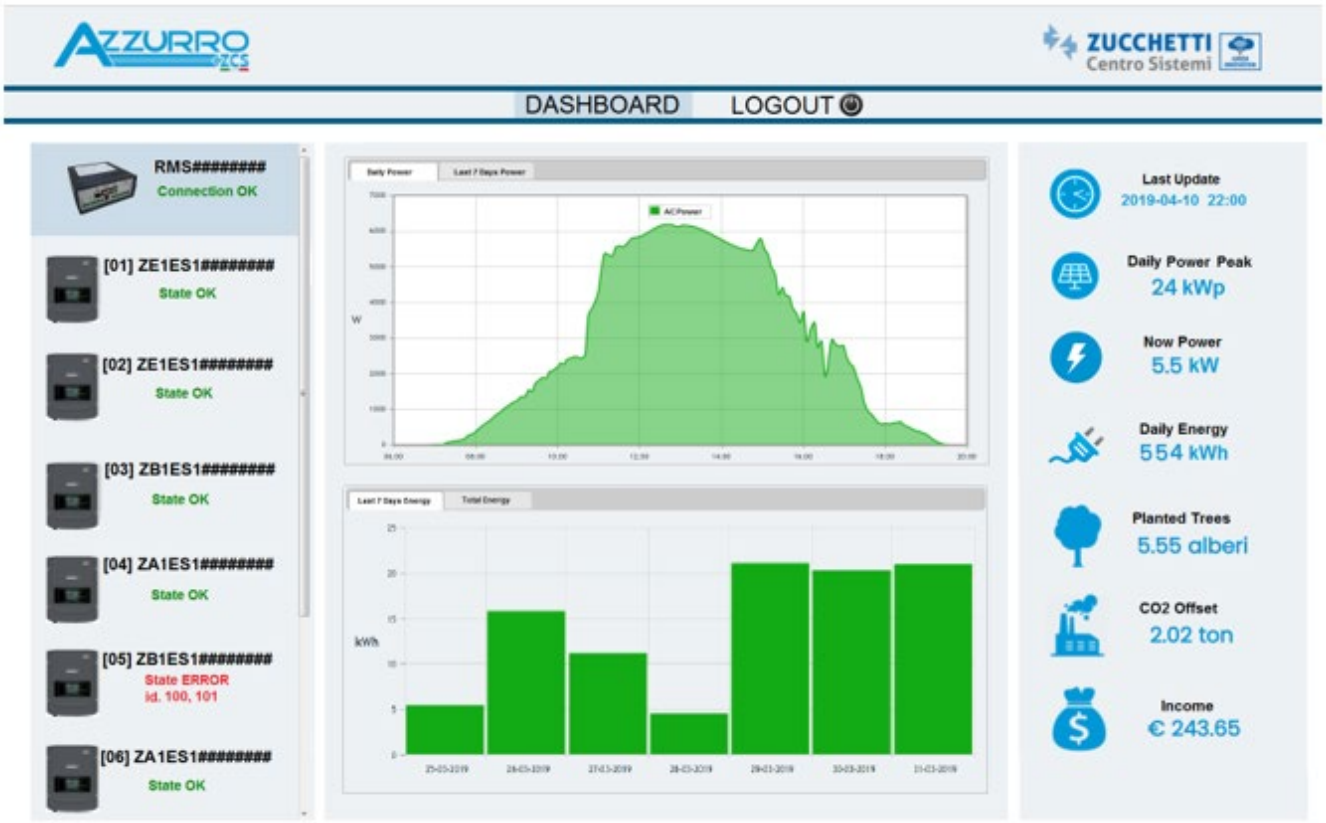



**Figure 245: Example of local monitoring page**

# 9. Warranty terms and conditions

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

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**zcsazzurro.com**

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