MANUALE UTENTE

INVERTER MONOFASE

1PH 3000TLM-6000TLM-V3

AZZURRO ZCS

SISTEMI FOTOVOLTAICI INTELLIGENTI
PER LA TUA INDIPENDENZA ENERGETICA

Grid-connected inverter
1PH 3000TLM-6000TLM-V3
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.

Copyright statement

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Technical support

To request technical support and advice from ZCS, use the form available at www.zcsazzurro.com.
The following toll-free number is available for the Italian territory: 800 72 74 64.

Preface

General information

Read this manual carefully before installing, operating or maintaining the equipment. Observe the safety precautions specified for installation and maintenance.

- ## Scope

This manual describes the assembly, installation, electrical connections, commissioning, maintenance and troubleshooting of the following AZZURRO inverters:

1PH 3000TLM-V3 / 1PH 3680TLM-V3 / 1PH 4000TLM-V3 / 1PH 4600TLM-V3 / 1PH 5000TLM-V3 / 1PH 6000TLM-V3

Keep this manual so that it is accessible at all times.

1. PRELIMINARY SAFETY INSTRUCTIONS

1.1. Recipients

This manual is intended for qualified technical personnel responsible for installing and commissioning the inverter and for system operators. Technical work must be performed by installers, electricians and service personnel with the qualifications required to work on photovoltaic systems.

1.2. Symbols used

The symbols used in this manual draw attention to information needed to work safely, prevent personal injury and property damage, and use the equipment correctly.

Before proceeding, read and understand the meaning of the symbols described below.

 **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 the correct and optimal operation of the product.**
 **Note**	**If you have problems or questions regarding the reading and understanding of the following information, please contact Zucchetti Centro Sistemi S.p.A. through the appropriate channels.**

General information in this chapter

Safety instructions

It mainly highlights the safety instructions to be followed during installation and use of the equipment.

Symbols and icons

Introduces the main safety symbols on the inverter.

1.3. Safety instructions

Installation of 1PH 3000TLM-6000TLM-V3 on-grid inverter must conform with laws, regulations, codes and standards applicable in the jurisdiction.

Before installing or configuring the product, read all instructions and safety warnings in this manual.

Before connecting the inverter to the grid, contact the local electricity utility to submit the connection application. The connection must be carried out only by a qualified electrician.

If the failure persists, please contact the nearest authorized maintenance center. If you don't know which service center is closest to you, please contact your local distributor. Don't repair the product by yourself, which may lead serious injury or damage.

Qualified personnel

During operation, potentially lethal voltages are present inside the inverter and some parts can reach high temperatures. Incorrect installation or malfunction can cause injury and property damage. For safe work, transport, installation, commissioning and maintenance must be assigned only to qualified personnel. Zucchetti Centro Sistemi S.p.A. accepts no liability for property damage or injury resulting from improper use.

Label and Symbols

An identification label on the side of the 1PH 3000TLM-6000TLM-V3 inverter provides product information and technical specifications. The label must remain permanently attached to the equipment.

The 1PH 3000TLM-6000TLM-V3 inverter carries a warning symbol concerning safe operation. The symbol must remain permanently attached to the equipment.

Installation location requirement

Install the inverter as described in the Installation chapter. Secure it vertically to a structure with adequate load-bearing capacity, such as a solid brick wall or a surface of equivalent strength. Leave sufficient space to access the equipment for maintenance. Choose a ventilated location and ensure adequate cooling airflow. Relative humidity must be below 95%, without condensation.

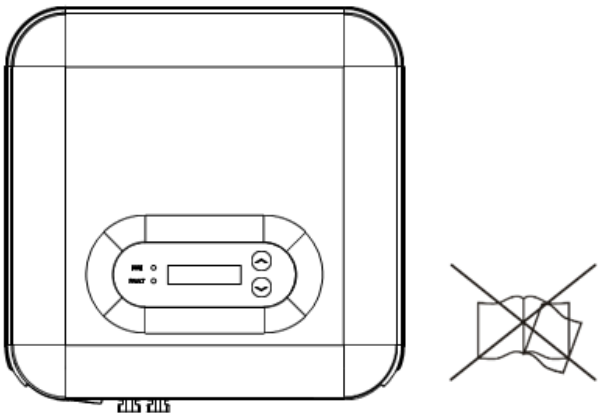


Figure 1 – Do not lose or damage this manual

Transportation Requirement

When dispatched from the factory, the inverter is intact and fully functional electrically and mechanically. Transport it in its original packaging or equivalent packaging that adequately protects the product. The carrier is responsible for any damage occurring during transport.

On delivery, check that the packaging and inverter are intact. If the packaging shows damage that may have affected the product, or if the inverter is visibly damaged, notify the carrier immediately.

If necessary, contact the installer or Zucchetti Centro Sistemi S.p.A. for assistance.

Electrical Connection

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

Danger	**Before making the inverter electrical connections, open all DC disconnect switches between the PV generator and the inverter. Warning: PV modules exposed to light generate potentially hazardous voltages. Opening the DC switches does not remove the voltage on the PV generator side.**
Warning	**All installation work must be performed by qualified technical personnel who must:** • **have the skills needed to perform the required work;** • **carefully read this manual and understand its contents.**

 **Attention**	**Before connecting the inverter to the grid, make sure that all the necessary permits have been obtained from the local grid operator and that all the electrical connections are made by a professional electrician.**
 **Note**	**Do not remove the information label or open the inverter.** **Otherwise, ZCS will not provide any warranty or maintenance.**

Operation

 **Danger**	**Contact with live electrical parts can cause electric shock. Incorrect connections can also cause a fire.** • **Do not touch the terminal or the conductor connected to the electrical grid.** • **Follow all the instructions and safety requirements relating to the mains connection.**
 **Attention**	**Some internal components reach very high temperatures when the inverter is in operation. Wear protective gloves!**

Maintenance and repair

 **Danger**	• **Before carrying out any repairs, disconnect the inverter from the mains network (AC side) and from the photovoltaic system (DC side).** • **After switching off the AC and DC switches, wait 5 minutes before carrying out any repairs or maintenance on the inverter!**
 **Attention**	• **Restart the inverter only after all faults have been rectified. Contact your local authorised service centre for repairs.** • **Do not disassemble the internal components of the inverter without permission. This will void the warranty. Zucchetti Centro Sistemi S.p.A. shall not be responsible for any damage or loss caused by these actions.**

Electromagnetic compatibility (EMC)

Electromagnetic compatibility (EMC) is the ability of equipment to operate correctly in its electromagnetic environment without causing unacceptable interference to other equipment. It includes immunity to interference and electromagnetic emissions.

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

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

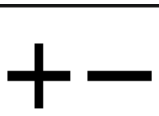
1.4. Symbols and icons

Safety signals

 **Caution**	**Pay attention to possible burns due to hot parts.** **Only touch the screen or press the keys while the inverter is in operation.**
 **Attention**	**To protect people and the installation, connect the inverter and all metal parts of the PV system requiring earthing to the earthing system, in accordance with the applicable local regulations.**
 **Warning**	**Ensure the correct DC input voltage; which must be below the maximum allowable DC voltage. Overvoltage can cause permanent damage to the inverter or other faults which are not covered by the warranty!**

Symbols on the inverter

The inverter carries safety symbols. Read and understand their meaning before installing the inverter.

	Residual voltage may remain inside the inverter after disconnection of the AC and DC supplies. Wait at least 5 minutes to allow the internal capacitors to discharge.
	Beware of high voltage
	Beware of high temperatures
	Complies with the European Standards (CE)
	Ground connection point
	Read this manual before installing the inverter.
	Indication of the allowable temperature range
	Positive and negative polarities of the input voltage (DC).

2. PRODUCT FEATURES

Chapter contents

Product description and dimensions:

This section describes the intended use and dimensions of 1PH 3000TLM-6000TLM-V3 inverters.

Description of functions

This section describes operation of the 1PH 3000TLM-6000TLM-V3 inverters and their internal modules.

Efficiency curve:

This section shows the inverter efficiency curves.

2.1. Product presentation

Field of use

The 1PH 3000TLM-6000TLM-V3 photovoltaic inverter is designed for grid-parallel operation and has no transformer. It converts the DC energy generated by the PV generator into single-phase AC energy and feeds it into the grid.

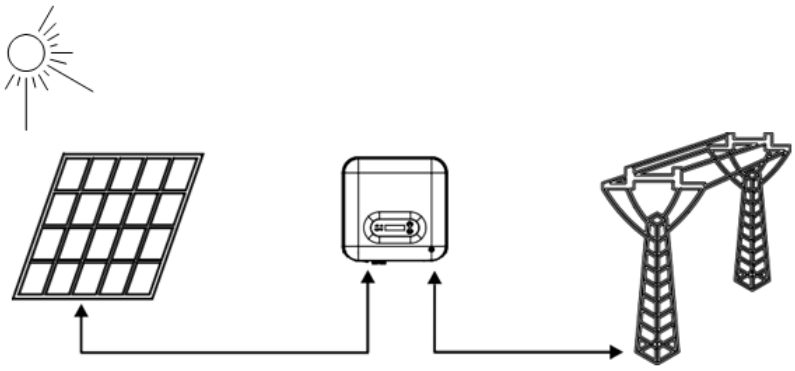


Figure 2 – Grid-connected photovoltaic system

The 1PH 3000TLM-6000TLM-V3 inverter is intended solely to convert energy generated by a PV generator and operate in parallel with the grid. Do not use it for purposes other than those described in this manual. Only PV generators comprising modules and their wiring may be connected to the DC inputs. Batteries and other DC power sources must not be connected.

Use for unintended purposes or connection to unapproved DC sources invalidates warranty coverage. Zucchetti Centro Sistemi S.p.A. accepts no liability for damage or material losses arising from such use.

Product Dimensions

The choice of optional parts of inverter should be made by a qualified technician who knows the installation conditions clearly.

Dimensions Description

H×W×D = 349×344×164 mm

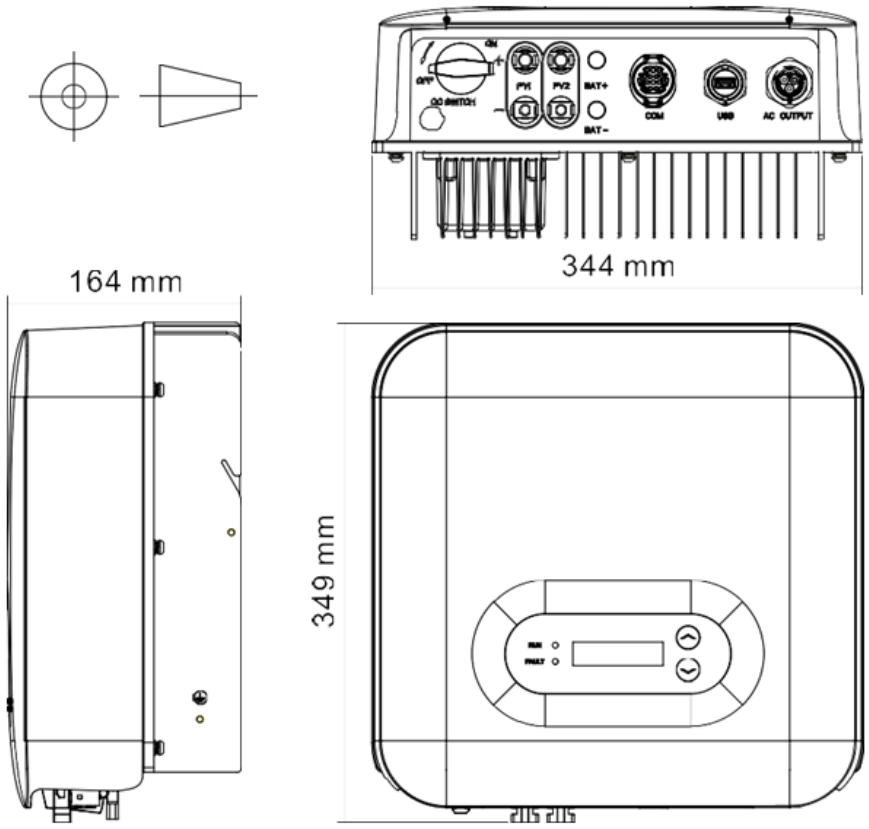


Figure 3 – Front and side view of the inverter

Note: the 1PH 3000TLM-6000TLM-V3 inverter has 2 MPPT input channels for PV strings.

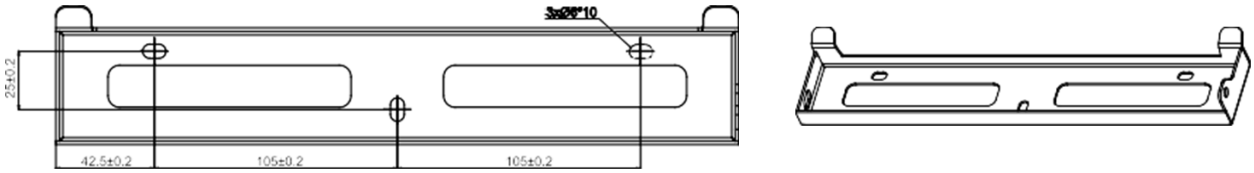


Figure 4 – Bracket dimensions

Labels on the equipment

Note: label must NOT be hidden with objects and extraneous parts (rags, boxes, equipment, etc.,); they must be cleaned regularly and kept visible at all times.

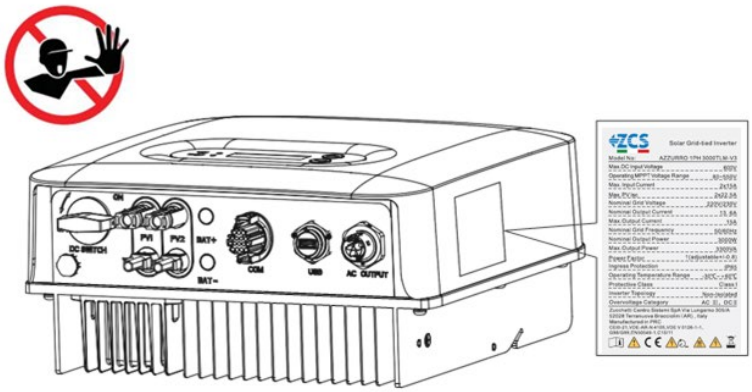


Figure 5 – Do not remove the label on the side of the inverter

2.2. Description of functions

DC energy generated by the PV array is filtered by the input board before reaching the power board. The input board also detects insulation impedance and measures DC input voltage and current.

The power board converts DC energy into AC energy. The AC output is then filtered by the output board before being fed into the grid. The output board also incorporates grid voltage and output current measurement, ground-fault current protection (GFCI) and the grid disconnection relay.

The control board supplies auxiliary power, manages inverter operation and communicates its status through the display board. In abnormal operating conditions, a fault code appears on the display. The control board can also operate the relay to protect internal components.

Operating functions

A. Energy management unit

Remote inverter start and stop via an external command.

B. Feeding reactive power into the grid

The inverter can supply reactive power to the grid by setting the displacement power factor. This function can be managed via the app or the RS485 interface.

C. Limited the active power fed into grid

When active power limitation is enabled, the maximum active power fed into the grid can be set as a percentage.

D. Automatic power reduction in the event of grid overfrequency

When the grid frequency exceeds the specified limit, the inverter reduces its output power to help maintain grid stability.

E. Data transmission

Inverter or a group of inverters can be monitored remotely through an advanced communication system based on RS485 interface or via USB port.

F. Software update

The firmware can be updated using the Azzurro Operators app or a USB flash drive.

In the event of faults or specific requirements, ZCS technical support can also update the inverter remotely, provided that a USB Wi-Fi, Ethernet or GPRS stick logger is installed, correctly configured and connected to the Internet.

2.3. Electrical block diagram

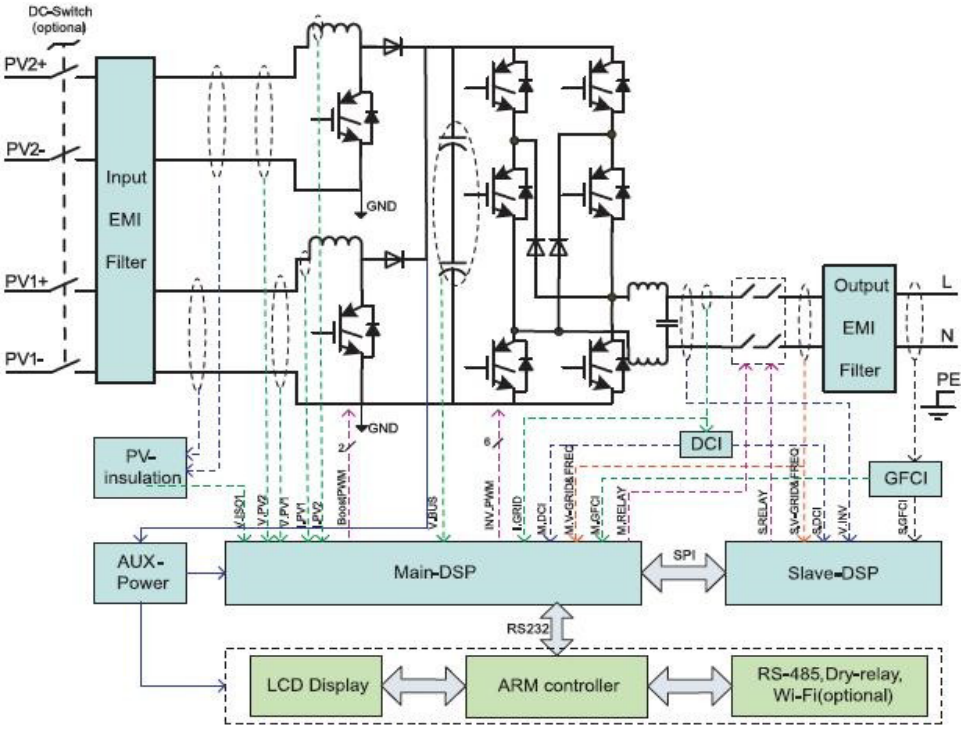


Figure 6 – Schematic diagram

2.4. Energy efficiency curve

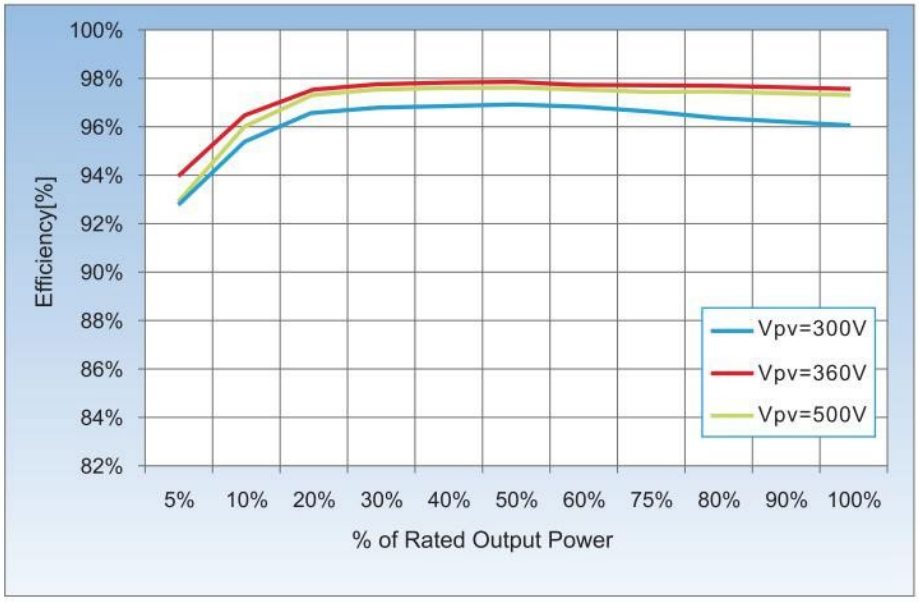


Figure 7 – Power efficiency curve

3. INVERTER STORAGE

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

4. INSTALLATION

General information in this chapter

This chapter describes how to install the 1PH 3000TLM-6000TLM-V3 inverter.

Installation notes:

Danger	• **DO NOT install 1PH 3000TLM-6000TLM-V3 inverters near flammable materials.** • **DO NOT install 1PH 3000TLM-6000TLM-V3 inverters in an area where flammable or explosive materials are stored.**
Warning	**The housing and heat sink may become very hot while the inverter is running, DO NOT install the inverter in places where they may be touched inadvertently.**
Attention	• **Consider the weight of the inverter when handling and transporting the inverter.** • **Choose an appropriate mounting position and surface.** • **Assign at least two people to install the inverter.**

4.1. Installation process

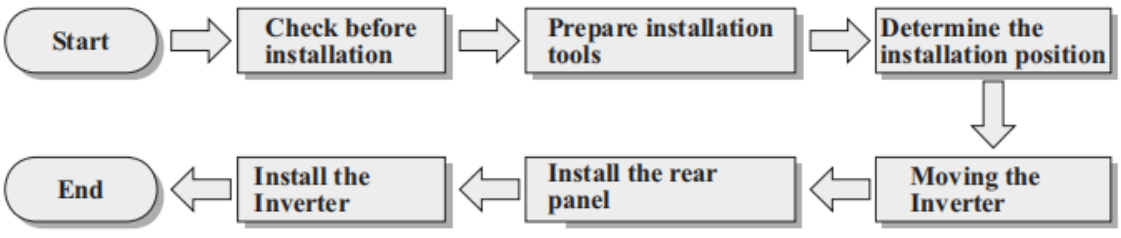


Figure 8 – Installation steps

4.2. Checks before installation

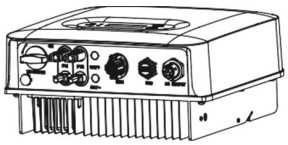
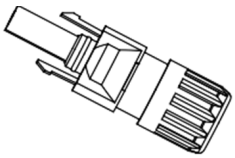
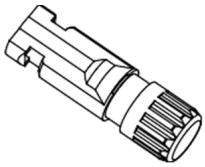
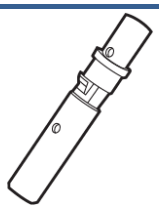
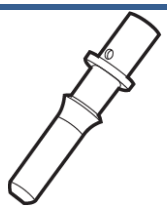
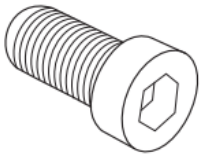
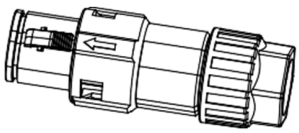
Checking the outer packagingPackaging materials and components may be damaged during transport. Therefore, please check the materials of the outer packaging before installing the inverter. Check the surface of the box for external damage such as holes or tears. If any kind of damage is found, do not open the box containing the inverter and contact the supplier and transport company as soon as possible.
It is recommended to remove the packaged materials from the box 24 hours before installing the inverter.

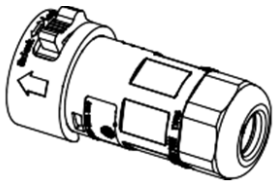
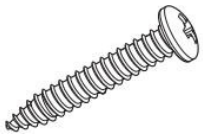
Product inspection. After unpacking the inverter, check that it is undamaged and complete. If any damage or missing components are found, contact the supplier and the transport company.

4.3. Package contents

Contents of the packagingCarefully check the contents of the packaging before installation, making sure that no element inside the packaging is missing or damaged.

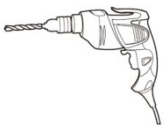
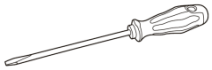
The package should contain the following components:

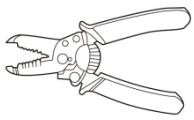
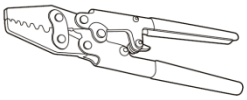
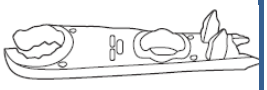
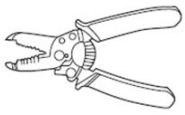
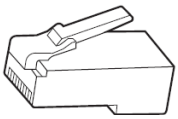
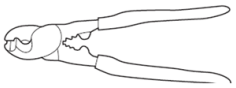
 1x Photovoltaic inverter	 1x mounting bracket	 2x PV+ Input terminals	 2x PV– Input terminals
 2x metal terminals for + DC power cables	 2x metal terminals for – DC power cables	 2x M6x12 hexagonal screws	 1x COM 16pin Communication Terminal

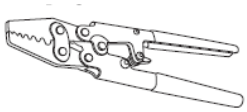
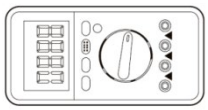
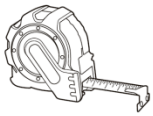
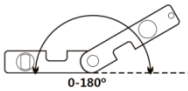
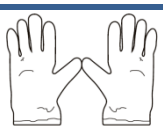
 1x AC output terminal	 3x Expansion bolts	 3x Self-tapping screw	 1× warranty registration
 1x user manual	 2x warranty card		

4.4. Installation tools

The following tools are required for installation of the inverter and electrical connections; therefore, they must be prepared before installation.

No.	Tool		Operation
1		Drill Recommended drill bit: 6mm	To drill holes in the wall for fixing the bracket
2		Screwdriver	To screw and unscrew screws for the various connections

No.	Tool		Operation
3		Wire stripper	To prepare the cables for wiring
4		5mm Allen Wrench	To screw the inverter to the wall-mounting bracket and to open the front cover of the inverter
5		RJ45 crimping tool	To crimp the RJ45 connectors for the communication cables
6		Rubber hammer	To insert the expansion plugs into the wall holes
7		MC4 removal tool	To remove the DC connectors from the inverter
8		Diagonal cutting pliers	To cut cable ends
9		Wire stripping tool	To remove the outer sheath of the cables
10		RJ45	2 pieces
11		Cable cutter	To cut the power cables

No.	Tool		Operation
12		Crimping pliers	To crimp the power cables
13		Multi-meter	To check the voltage and current values
14		Marker pen	To mark the drilling points on the wall
15		Measuring tape	To measure distances
16		Spirit level	To make sure the bracket is level
17		ESD gloves	Protective clothing
18		Safety goggles	Protective clothing
19		Protection mask	Protective clothing

4.5. Installation position

Select an appropriate location to install the product to make sure the inverter can work in a high efficiency condition. When selecting a location for the inverter, consider the following:

Note: install the inverter vertically or tilted backwards by 0° to 15°. Do not install °it tilted forwards or upside down.

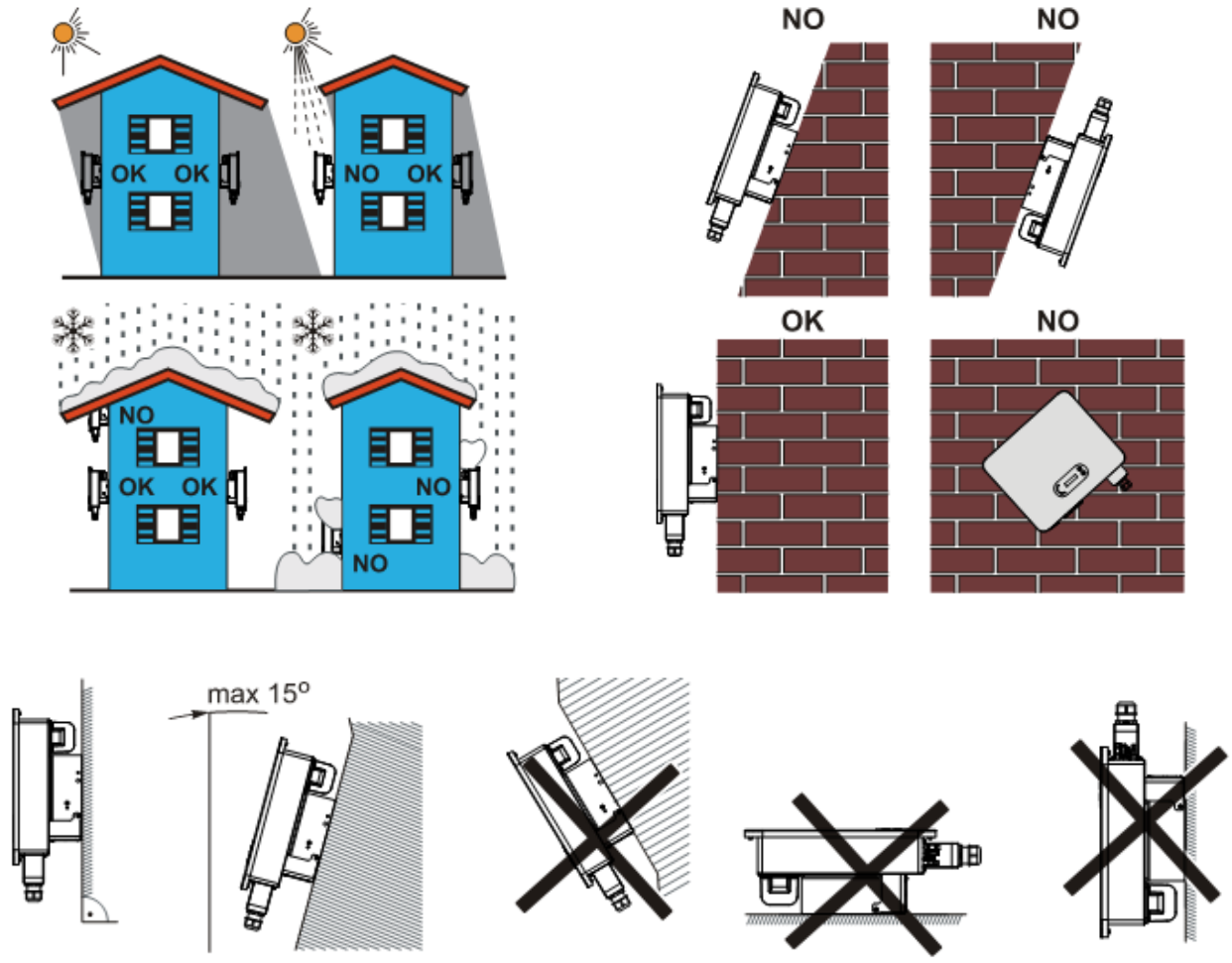


Figure 9 – Installation requirements for a single inverter

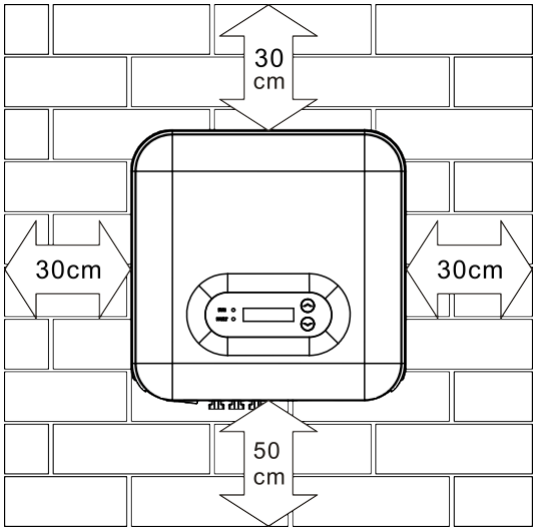


Figure 10 – Clearance for single inverter

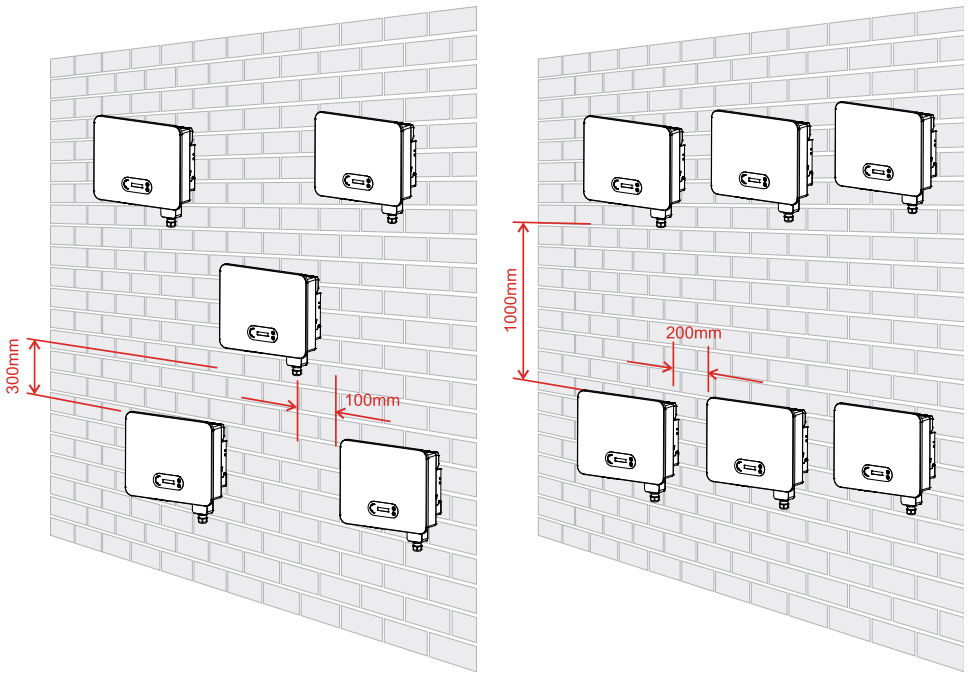


Figure 11 – Clearance for multiple inverters

Note: For safety reasons, Zucchetti Centro Sistemi Spa and/or its partners may not carry out any technical repairs or maintenance work, or move the inverter from and to the ground if it is installed at a height of more than 180 cm from the ground.

Inverters installed at higher heights must be moved to the ground before they can be repaired or serviced.

4.6. Unpacking and handling the inverter

Remove the inverter from its packaging and carry it horizontally to the installation location. At least two operators must perform this operation, gripping the equipment at the rear of the heat sink.

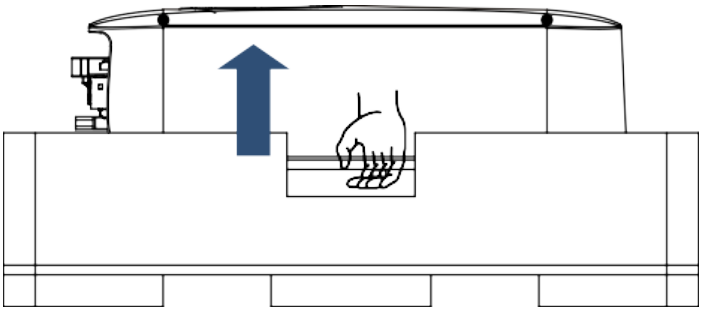


Figure 12 – Removing the polystyrene protections

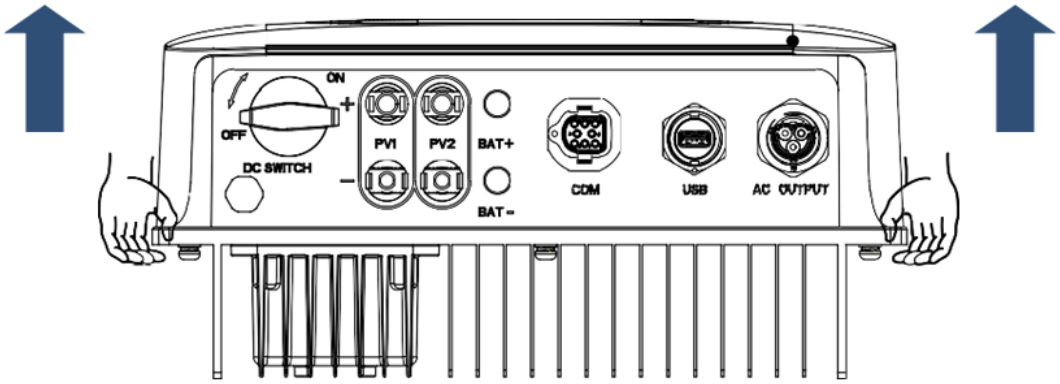


Figure 13 – Removing the inverter from its packaging

Attention	• **To prevent damage and personal injury, hold the inverter firmly when moving, as it is a heavy piece of equipment.** • **Do not position the inverter with the input/output terminals in contact with other surfaces, as these are not designed to support the weight of the inverter. Always position the inverter horizontally.** • **When placing the inverter on the floor, make sure to place a support under the unit to protect its front door.**

4.7. Installing the 1PH 3000TLM-6000TLM-V3 inverter

1) Place the rear panel against the wall, determine the mounting bracket height and mark the fixing points. Drill the holes with a hammer drill, keeping it perpendicular to the wall and positioning the holes to suit the expansion bolts.
2) Insert the expansion anchors into the holes, perpendicular to the wall.
3) Align the mounting bracket with the position of the holes and fix it to the wall using the most suitable screws and flat washers, tightening them properly.
4) Lift the inverter, hang it on the rear panel and secure it on both sides using the M6 screws supplied with the accessories.
5) A padlock can be fitted to prevent unauthorised removal of the inverter (optional).

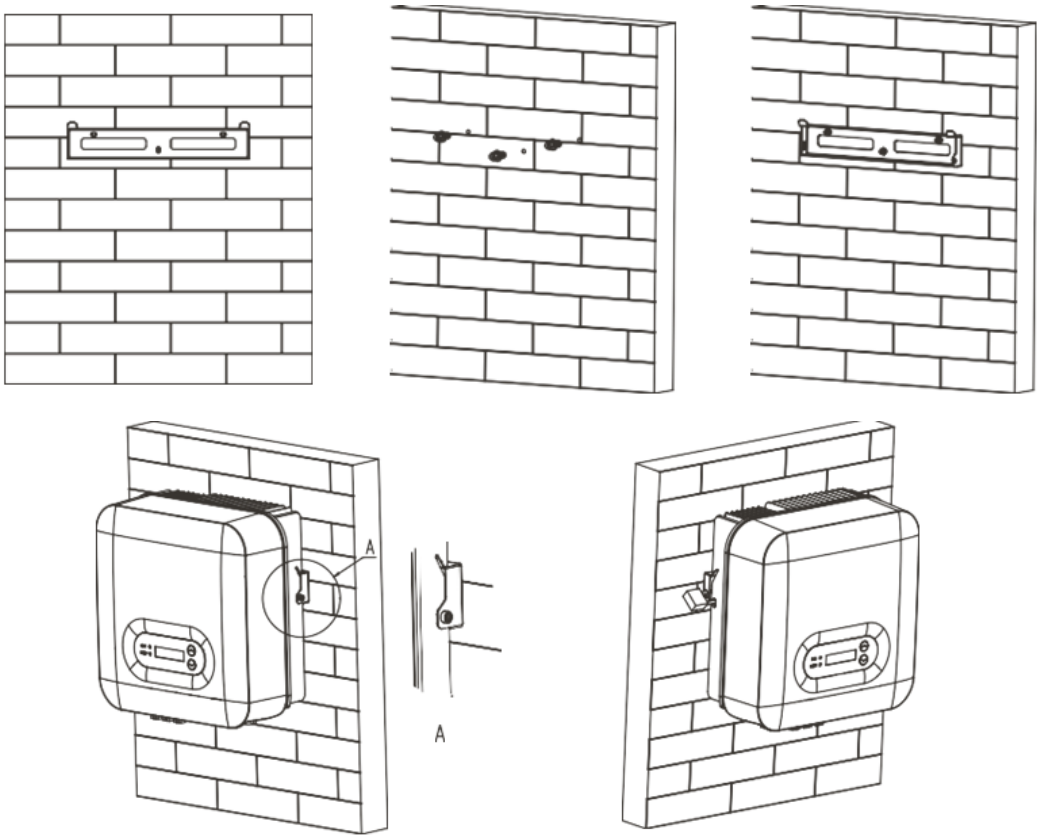


Figure 14 – Steps for mounting the inverter on the wall

5. ELECTRICAL CONNECTIONS

General information in this chapter

This chapter describes the electrical connections of the 1PH 3000TLM-6000TLM-V3 inverter. Carefully read this section before connecting the cables.

NOTE: Before making any electrical connections, ensure that the DC and AC circuit breakers are open. Remember that the accumulated electrical charge remains in the inverter capacitor after the DC and AC circuit breakers have been switched off. Therefore, it is necessary to wait at least 5 minutes to allow the capacitor to discharge completely.

 **Attention**	**The inverter must be installed and serviced by professional technicians or electricians.**
 **Danger**	**The PV modules generate electricity when exposed to sunlight, which can pose a risk of electric shock. Before connecting the DC input power cord, be sure to disconnect the strings via the appropriate circuit breakers.**
 **Note**	**The maximum open-circuit voltage of the PV string must not exceed 600 V.** **The 1PH 3000TLM-6000TLM-V3 inverter has 2 independent MPPT input channels;** **Single string connected to both MPPTs using a splitter: all modules in the string must be of the same make and model and have the same orientation and inclination.** **Two independent strings, each connected to its own MPPT: the modules in each string must be of the same make and model and have the same orientation and inclination. This uniformity is required within each individual string.**

The connected PV modules must have an IEC 61730 Class A ratin.

The connected panel must meet the standard IEC61730A		
String / Model	IscPV(max)	Maximum output current (A)
1PH 3000TLM-V3	22.5A/22.5A	15A
1PH 3680TLM-V3		16A
1PH 4000TLM-V3		20A
1PH 4600TLM-V3		23A
1PH 5000TLM-V3		25A
1PH 6000TLM-V3		29A

Note: In the above table, the first value of IscPV is for MPPT1, the second value of IscPV is for MPPT2.

5.1. Electrical connections

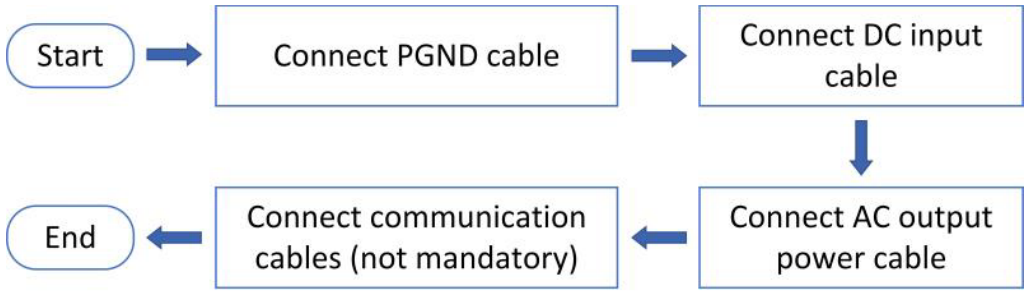


Figure 15 – Steps for connecting the cables

5.2. Connecting the PGND cables (protective earthing)

Connect the 1PH 3000TLM-6000TLM-V3 inverter to the ground electrode using ground protection cables (PGND).

⚠ **Attention**	**The inverter is transformerless: do not earth either the positive or negative pole of the PV string. Earthing either pole may damage the inverter. Connect to the earthing system the metal parts requiring protective earthing, including module frames, support structures, switchboard enclosures and the inverter enclosure, in accordance with the applicable requirements.**

Prerequisites:

Prepare the earthing cable. A yellow-green outdoor cable with a cross-sectional area greater than 4 mm^2 is recommended.

Procedure:

1) Remove the insulation layer with an appropriate length using a wire stripper.

Note: L2 is approximately 2-3 mm longer than L1.

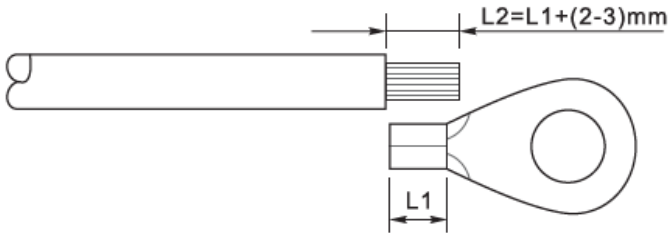


Figure 16 – Preparing the ground cable (1)

2) Insert the exposed wires in the OT terminal and crimp them using a crimping tool.

Note 1: L3 is the length between the insulation layer of the ground cable and the crimped part. L4 is the distance between the crimped part and the conductor wires protruding from the crimped part.

Note 2: The cavity formed after the conductor has been crimped must completely wrap the conductor wires. The core of the wire must be in close contact with the terminal.

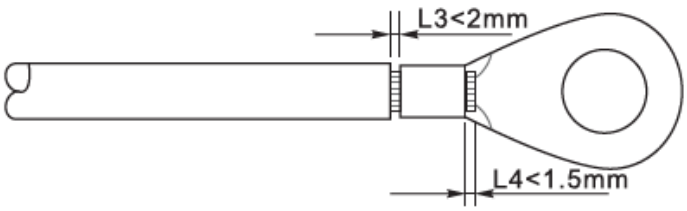


Figure 17 – Preparing the ground cable (2)

3) Install the crimped OT terminal and flat washer using the M6 screw in the hole located on the inverter heatsink, as shown in the figure; tighten the screw to a torque of 5 Nm using an Allen key.

Note: To ensure the anti-corrosion performances of the ground terminals, apply silica gel on them after connecting the ground cable.

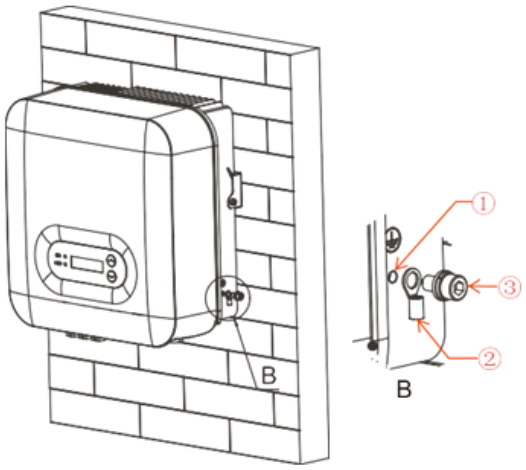


Figure 18 – Inverter external grounding instruction diagram

5.3. Connecting the DC input power cables

Connect the 1PH 3000TLM-6000TLM-V3 inverter to the PV strings using the DC input cables. The inverter has two MPPTs configurable for independent or parallel operation according to the system design. Select the input mode required by the system configuration.

Note: Select cables, fuse holders, fuses, circuit breakers and other accessories to suit the inverter model. The PV array open-circuit voltage must be lower than the maximum permitted DC input voltage of the inverter.

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

Note

Both inverter MPPT inputs must be used, even when the system has only one PV string. In parallel configuration, use a Y or T branch connector to connect the string to both inputs, as shown in the figure. In independent configuration, connect each string to its own MPPT input.



Figure 19 – Y-branch connection cable for solar panels

Note	• **Check the polarity of the PV string to ensure the correct connection of the cables to the string.** • **Do not connect the positive or negative polarities of the PV string to the ground.**

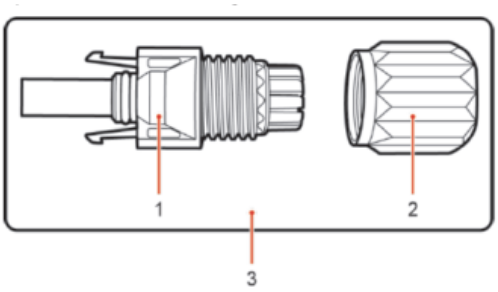
 **Attention**	**Make sure that the following information is observed. Otherwise, there is a risk of fire.** • **The modules connected in series in each string must have the same brand and model.** • **The open-circuit voltage of each string must be less than or equal to 600 V DC.** • **The short circuit current for each input must be less than or equal to 22.5 A DC** • **The output power for each PV string must be less than or equal to the maximum input power allowable for 1PH 3000TLM-6000TLM-V3 inverters.** • **The positive and negative terminals of the PV strings must be connected respectively to the positive and negative inputs of the input terminal block.**
 **Danger**	• **Before connecting the DC input cables, open the PV generator DC switch. Modules exposed to sunlight generate potentially hazardous voltages even when the switch is open.** • **Before connecting the DC input cables, check that the DC switch is open and the string voltage is within the inverter's permitted range and below 600 V DC. Exceeding the permitted voltage can cause serious damage.**
 **Note**	• **Do not earth either the positive or negative pole of the PV generator. This requirement does not apply to protective earthing of the inverter and metal parts of the system.** • **Before connecting the PV generator to the inverter, check that it is correctly insulated from earth. If an insulation fault is present, identify and eliminate its cause before making the connection.**

DC input cable specifications

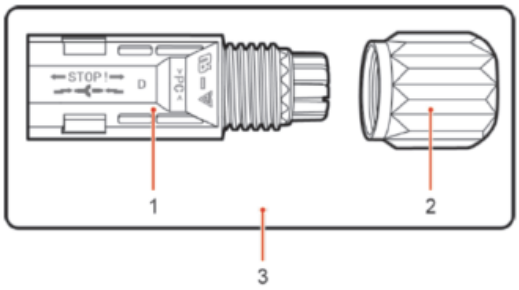
Cross section (mm2 / AWG)		Outer diameter of cable (mm)
Range	Recommended value	
4,0-6,0 / 11-9	4,0 / 11	4,5 – 7,8

Table 1 – Recommended specifications for DC input cables

The DC input connectors (MC4) are classified into positive and negative connectors, as shown in the figures below.



1. Housing 2. Cable gland 3. Positive connector



1. Housing 2. Cable gland 3. Negative connector

Figure 20 – Positive (1) and Negative (2) MC4 connectors

Note: The positive and negative metal terminals are supplied with their respective connectors. After unpacking, separate the components of the two polarities to avoid connection errors.

Procedure

1) Remove the cable glands from the positive and negative connectors.
2) Strip the positive and negative cable ends to the length shown in the figure using suitable wire strippers.

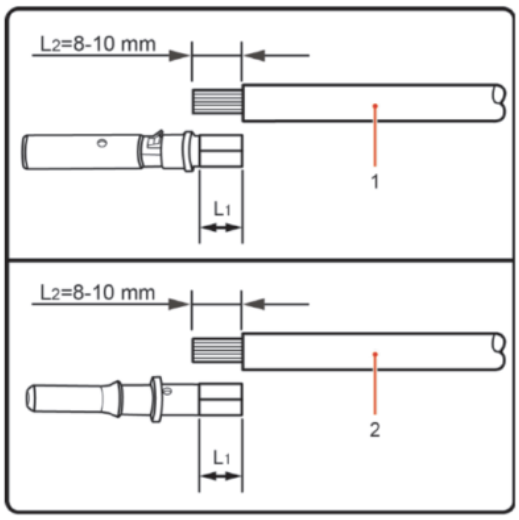


Figure 21 – Connecting the DC input power cables (1)

Note: L2 is approximately 2 or 3 mm longer than L1.

3) Insert the positive and negative power cables in the corresponding cable glands.

4) Insert the stripped positive and negative power cables in the positive and negative metal terminals respectively, and crimp them using a suitable tool. Make sure that the cables are secured so that they cannot be pulled out with a force of less than 400 N.

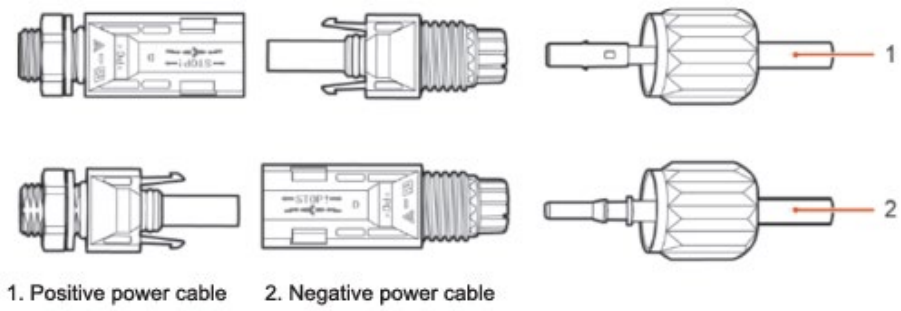


Figure 22 – Connecting the DC input power cables (2)

5) Insert the crimped power cables in the corresponding seats until you hear a “click” sound. At that point, the power cables will snap into place.

6) Replace the cable glands on the positive and negative connectors and rotate them against the insulation covers.

7) Insert the positive and negative connectors in the corresponding DC input terminals of the inverter until you hear a “click” sound, as shown in the figure.

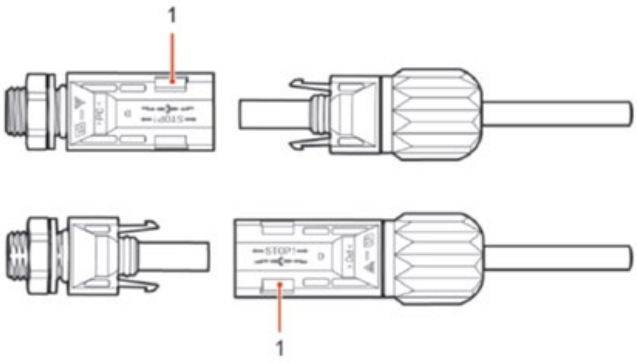


Figure 23 – Connecting the DC input power cables (3)

Note: Insert the caps into the unused DC connectors.

Removal procedure

To remove the positive and negative connectors from the inverter, insert a removal tool in the bayonet coupling and press the tool with adequate force, as shown in the figure below.

⚠ **Warning**	**Before removing the positive and negative connectors, make sure that the inverter's circuit breaker is switched off. If not, the direct current may cause an electric arc that could result in a fire**

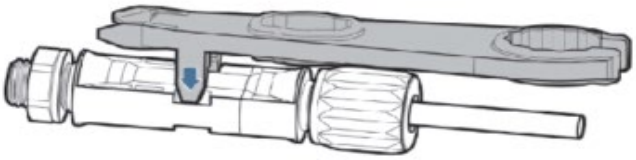


Figure 24 – Removing the DC connector

5.4. Connecting the AC output power cables

Connect the inverter to the AC power distribution network or power grid using AC power cables.

⚠ **Warning**	• **Do not connect multiple inverters to the same AC circuit breaker.** • **Do not install loads between the inverter and the AC circuit breaker.** • **The switch used for isolation must always be accessible and operable.** • **When selecting the residual current device, refer to "Declaration for the use of RCD devices", available at www.zcsazzurro.com in the Datasheets and manuals section for this inverter model.** • **In Italy, each grid-connected photovoltaic system with a power output exceeding 11.08 kW must be equipped with an external interface device (SPI/DDI).**

AC cable and circuit-breaker specifications

Use 3-core AC cables suitable for outdoor installation. Flexible cables are recommended for easier connection. The following table lists the recommended specifications for cables and circuit breakers.

Type	1PH 3000TLM-V3	1PH 3680TLM-V3	1PH 4000TLM-V3	1PH 4600TLM-V3	1PH 5000TLM-V3	1PH 6000TLM-V3
Maximum conductor cross-section accepted by the AC connector	6 mm^2	6 mm^2	6 mm^2	6 mm^2	6 mm^2	6 mm^2
Circuit breaker	20A	25A	25A	32A	32A	32A

Table 2 – Recommended specifications for AC output cables

Note: size the conductor cross-section for the current, protection devices, cable length and installation method.

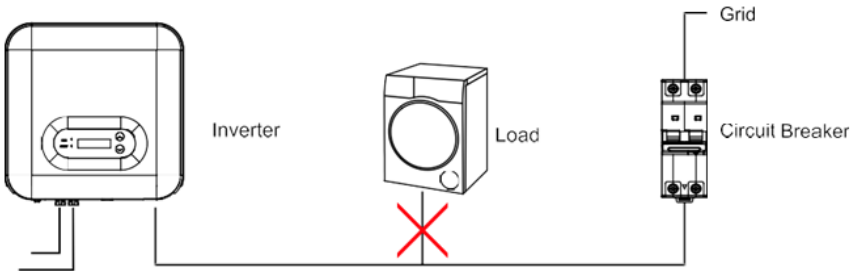
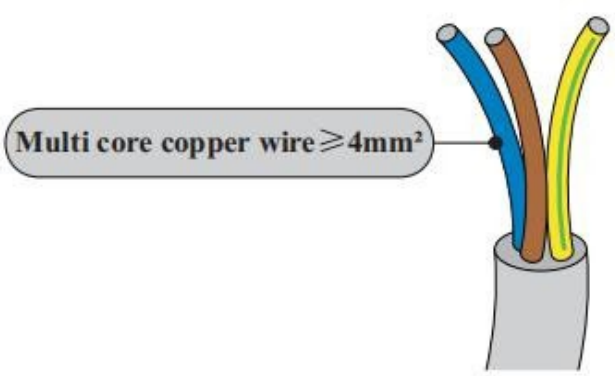


Figure 25 – Do not connect loads between the inverter and circuit breaker

Multi-core copper cables



Size the AC cable so its power losses are below 1% of the inverter rated power. Excessive cable resistance can raise the AC terminal voltage and cause the inverter to disconnect from the grid.

The figure below shows the relationship between the power loss in the cable, its length and the cross-section area.

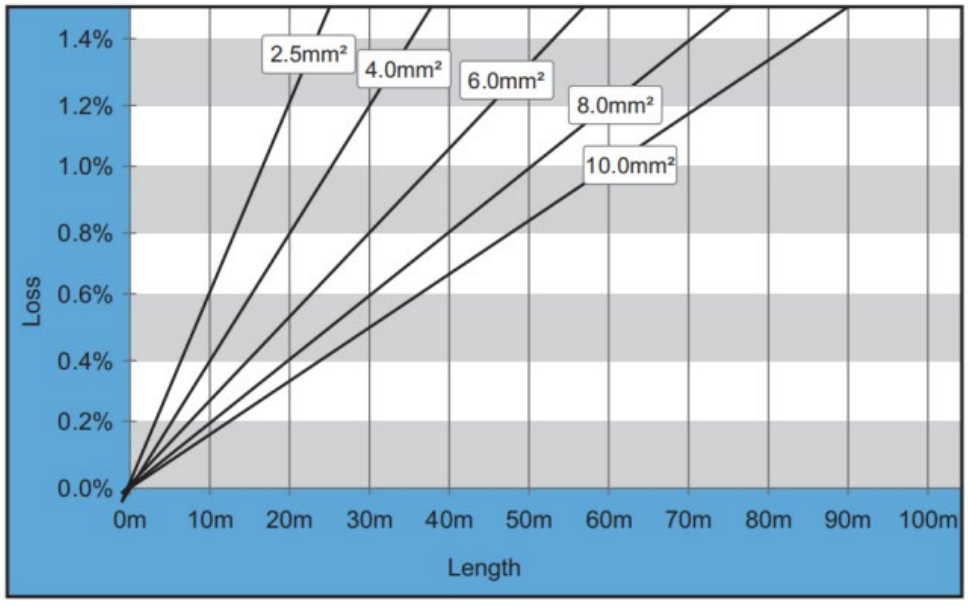


Figure 26 - Relation between cable length, cross section area and power loss

The 1PH 3000TLM-6000TLM-V3 inverters have a single-phase output and fully meet the local grid connection requirements and safety standards.

The inverters are fitted with IP66 AC output connectors for photovoltaic applications. The installer is responsible for wiring the AC output cable.

Cable connection procedure

1) Select a suitable cable according to Table 2 and strip the sheath and insulation to the lengths shown in the figure (A: 15–25 mm; B: 6–8 mm).

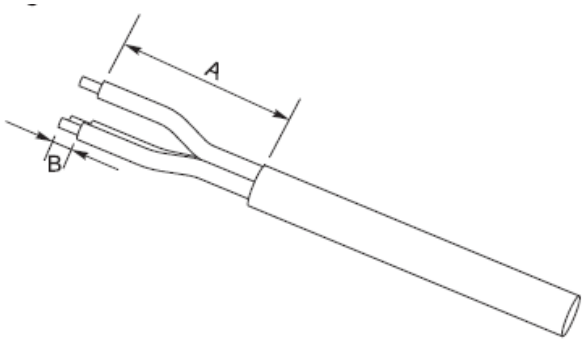


Figure 27 – Connecting the AC output cables (1)

2) Disassemble the AC connector as shown. Pass the cable prepared in the previous step through the watertight PG cable gland.

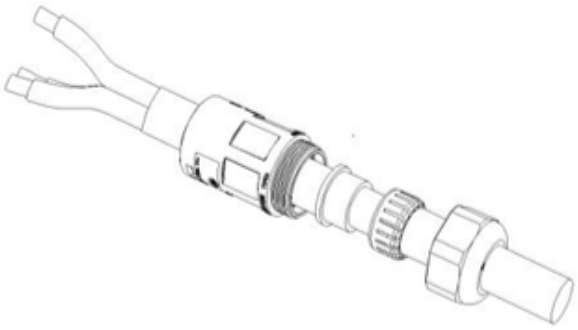


Figure 28 – Connecting the AC output cables (2)

3) Connect the AC power cable according to the following criteria:
   - Connect the yellow-green conductor to the terminal marked **"PE"**.
   - Connect the brown conductor to the terminal marked **"L"**.
   - Connect the blue conductor to the terminal marked **"N"**.

Tighten the terminal screws using a Phillips screwdriver.

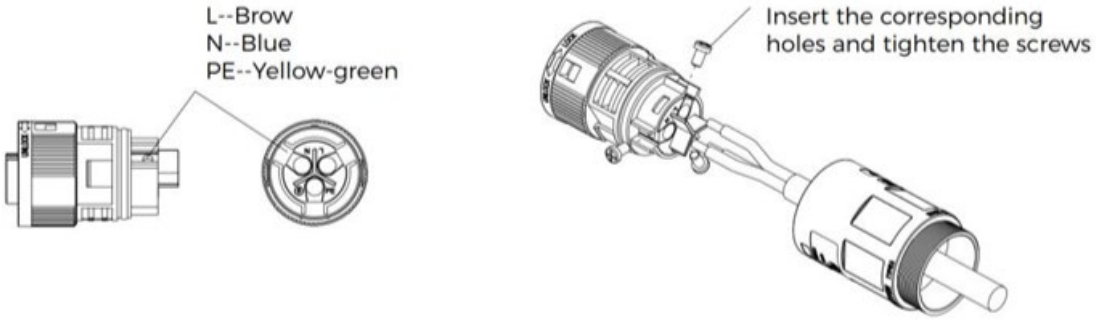


Figure 29 – Connecting the AC output cables (3)

4) Insert the AC connector until it clicks into place, then tighten the sealing nut to the torque shown in the following figure to ensure that the cable is securely fastened.

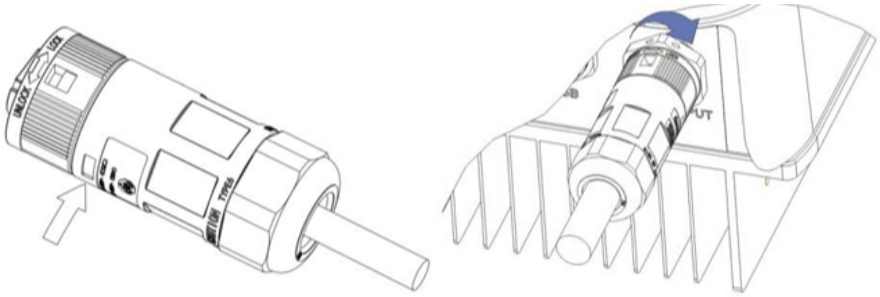


Figure 30 – Connecting the AC output cables (4)

Cable disconnect procedure

To disconnect the AC connector from the inverter, turn it anticlockwise until the fastening mechanism is released, as shown in the figure.

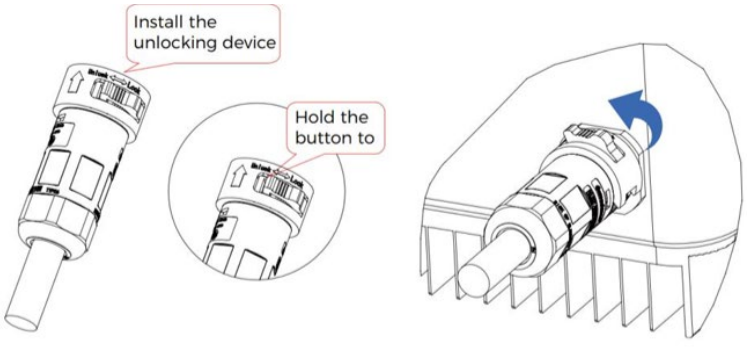


Figure 31 – Disconnecting the AC output cables

5.5. Connecting the communication cables

The 1PH 3000TLM-6000TLM-V3 inverters have two communication interfaces, the RS485 interface and Wi-Fi interface, as shown in the figure below.

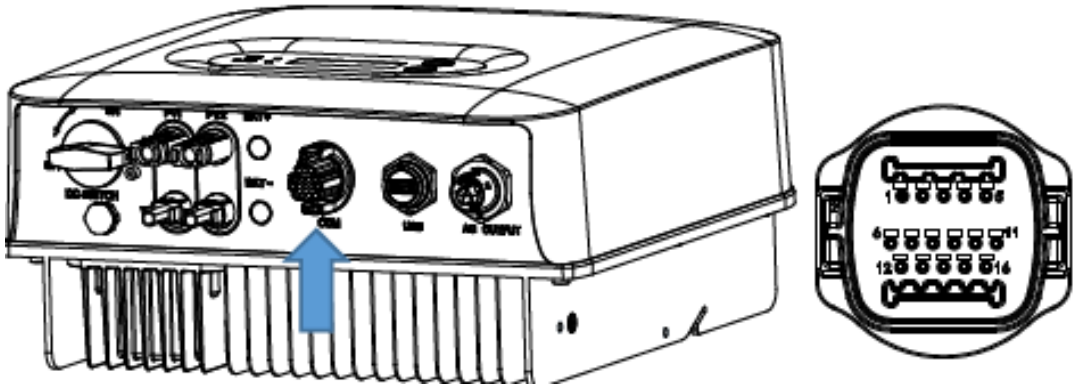


Figure 32 – Bottom view of the 1PH 3000TLM-6000TLM-V3 inverter

Connecting the RS485 communication cables

PIN	Definition	Operation	Note
1	RS485-2TX+	RS485 differential signal +	RS485 wired communication
2	RS485-2TX+	RS485 differential signal +	
3	RS485-1TX-	RS485 differential signal -	
4	RS485-1TX-	RS485 differential signal -	
5	RS485+	RS485 differential signal +	Communication with DDSU meter
6	RS485-	RS485 differential signal -	
7	GND.S	DRM port logic inputs/outputs	Logical interfaces (DRMS) apply to the following network standards: Australia (AS 4777), Europe (EN 50549), Germany (VDE-AR-N 4105)
8	DRM0		
9	DRM1/5		
10	DRM2/6		
11	DRM3/7		
12	DRM4/8		

13	N/A	N/A	N/A
14	N/A	N/A	N/A
15	CT+	Current sensor - posotive	Connection with CT sensor
16	CT-	Current sensor - negative	

Table 3 – Com port pin definitions

Logic interface

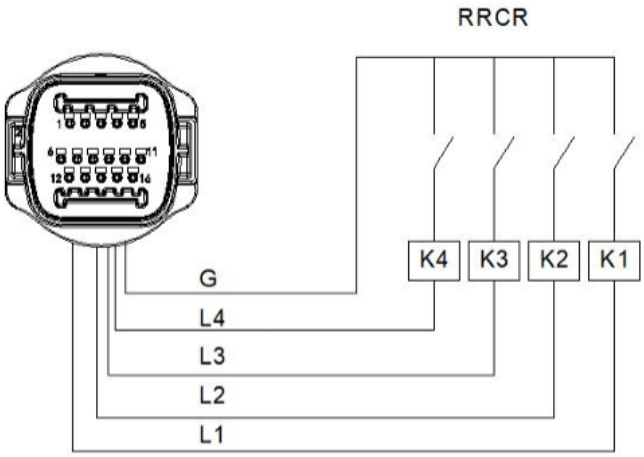
The logic interface for AS/NZS 4777.2:2020 is also known as inverter demand response mode (DRM). The inverter detects and responds to all supported demand response commands within 2 seconds. It continues responding while the mode remains active.

PIN	Definition
9	DRM1/5
10	DRM2/6
11	DRM3/7
12	DRM4/8
7	GND
8	DRM0

Table 4 – DRM terminal function description

NOTE: supported DRM commands: DRM0, DRM5, DRM6, DRM7 and DRM8.

(b) Logic interface compliant with VDE-AR-N 4105:2018-11, used to control and/or limit inverter output power. The inverter can be connected to a Radio Ripple Control Receiver (RRCR) to dynamically limit the output power of all inverters in the installation.



Pin no.	Pin name	Description	Connection to the RRCR receiver
9	L1	Relay contact 1 input	K1 – Relay 1 output
10	L2	Relay contact 2 input	K2 – Relay 2 output
11	L3	Relay contact 3 input	K3 – Relay 3 output
12	L4	Relay contact 4 input	K4 – Relay 4 output
7	G	GND	Common relay terminal

Table 5 – DRM terminal functional description

Relay status: contact closed = 1; contact open = 0.

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

Table 6 – The inverter is preconfigured with the following power levels for RRCR commands.

The logic interface specified by EN 50549-1:2019 stops active power output within five seconds of receiving a command at its input.

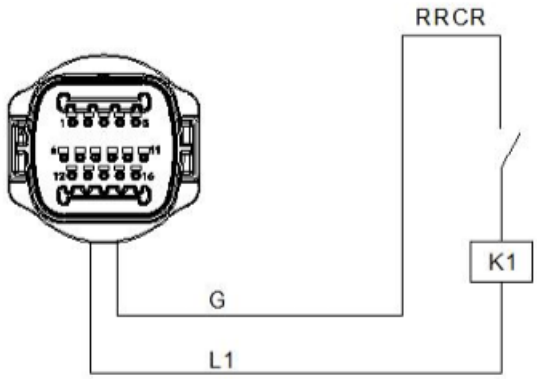


Figure 33 – Inverter–RRCR connection

Pin no.	Pin name	Description	Connection to the RRCR receiver
8	L1	Relay contact 1 input	K1 – Relay 1 output
7	G	GND	K1 – Relay 1 output

Table 7 – Terminal function description

Relay status: contact closed = 1; contact open = 0.

L1	Active power	Power reduction time	Cos(φ)
1	0%	〈 5 seconds	1
0	100%	/	1

Table 8 – The inverter is preconfigured with the following power levels for RRCR commands.

RS485 interface

The RS485 interface transmits inverter output power, alarm and operating-state data to a PC or local data acquisition device for subsequent upload to the server.

CT/Meter interface

There are two ways to get grid current information:

- Configuration A: CT (default).
- Diagram B: Meter.

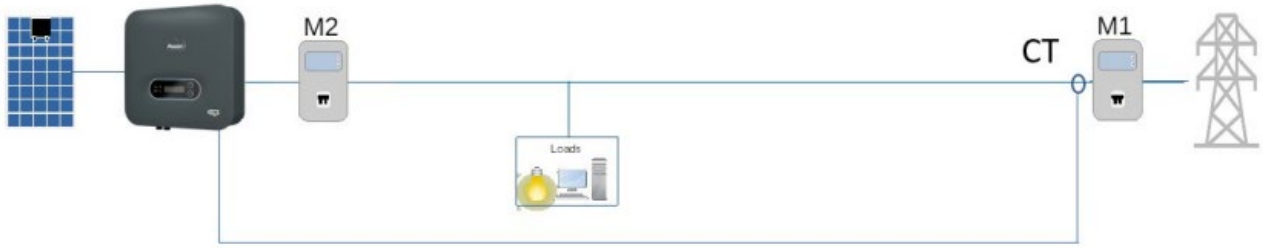


Figure 34 – Configuration A: CT (default)

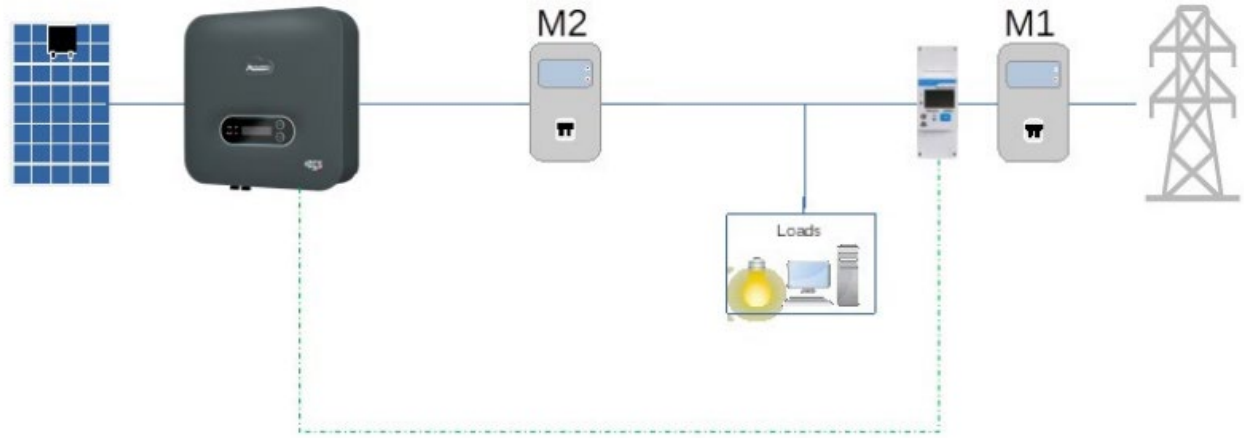


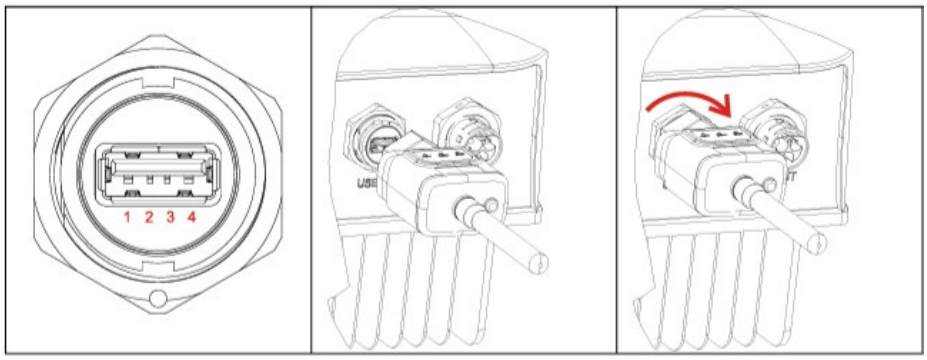
Figure 35 – Diagram B: Meter

USB Port

Port Description：

USB Port	USB flash disk access	Firmware and safety parameter update
	Connecting a USB stick logger (Wi-Fi/GPRS/Ethernet)	Remote data acquisition and inverter updates

Procedure:



6. COMMISSIONING

6.1. Safety inspection before commissioning

⚠ **Attention**	**Make sure that the DC and AC voltages fall within the range permitted by the inverter.**

- **PV strings. Before** switching on the inverter, inspect the PV strings. Check the open-circuit voltage of each module against its datasheet. Also check that the open-circuit voltage of each string matches the technical data and that the positive and negative polarities are correct.
- **DC connection.** Check that the inverter DC switch is off. Measure the DC voltage and check its polarity using a multimeter and test leads suitable for the system voltage and measurement category. Check the cables and ensure that the positive and negative poles correspond to those of the PV string: reversed polarity may irreparably damage the inverter. Compare the voltages of strings connected to the same MPPT; a difference greater than 3% may indicate a damaged string. The maximum DC voltage at the lowest permitted operating temperature must not exceed 600 V. Check that all strings are securely connected to the inverter inputs.
- Any DC current measurement must be performed while the inverter is operating, using a DC-capable clamp meter placed around a single conductor. Do not connect a multimeter set to current measurement directly across the positive and negative poles of the string, and do not disconnect PV connectors under load.
- **AC connection.** Check that the inverter AC switch is off and the grid connections (L, N, PE) are correct. Check that the distribution system is suitable for the inverter (TN-C, TN-S, TT) and that the voltage is within the permitted limits. If possible, measure total harmonic distortion (THD): excessive values may affect inverter operation.

6.2. Starting the inverter

1) Close the field/string DC switch, if fitted, and the inverter DC switch. Wait for the display to turn on.
2) Update the inverter to the latest firmware version available at www.zcsazzurro.com and
3) Set the Safety Code required for the country and grid connection.
4) Close the inverter AC circuit breaker. When the PV array supplies sufficient power, the inverter starts automatically. “Normal” on the display indicates normal operation.

Note: grid connection requirements vary by country and operator. Select the country code that meets the local authorities’ requirements.

If in doubt, consult the system engineer or a qualified electrician.

Zucchetti Centro Sistemi S.p.A. cannot be held liable for any consequences resulting from an incorrect country code/safety code selection.

If the inverter indicates the presence of any faults, refer to Troubleshooting and maintenance chapter of this manual or contact the Zucchetti Centro Sistemi S.p.A. technical support.

7. OPERATING INTERFACE

General information in this chapter

This section describes the display and its operation, as well as the buttons and LED indicators of the 1PH 3000TLM-6000TLM-V3 inverters.

7.1. Operating panel and display

Buttons and LED indicators



Figure 36 – LCD display with buttons and LED indicators

Main buttons:

- "^" Short press UP button = go up
- "^" Long press UP button = exit menu or current interface
- "v" Short press DOWN button = go down
- "v" Long press DOWN button = enter menu or current interface

Indicator lights:

- "RUN" Green light ON = "Normal state"
- "RUN" Green light flashing = Counting down or checking
- Red "FAULT" LED on: recoverable or unrecoverable fault.

7.2. Main interface

The LCD shows the inverter operating status, alarms, communication status, PV input voltage and current, grid voltage, current and frequency, as well as the energy generated today and the total energy generated.

During operation, the LCD display shows the inverter operating state and main electrical and energy parameters. Briefly press the up («Λ») and down («V») arrow buttons to scroll through the available screens and view:

- PV generator input voltage and current;
- generated power;
- energy generated during the current day and total generated energy;
- grid voltage, current and frequency;
- communication status through the USB port.

If a fault occurs, the display shows the corresponding message or error code. To interpret the indication and identify the checks to perform, refer to “Troubleshooting and maintenance”.

The displayed operating state identifies the inverter operating phase. The available states and their meaning are described in the following section.

Description of operating states:

Wait: the inverter waits until the reconnection time has elapsed, then enters Check State if the grid voltage and other monitored parameters are within their permitted limits. Otherwise it enters Fault State or Permanent State.

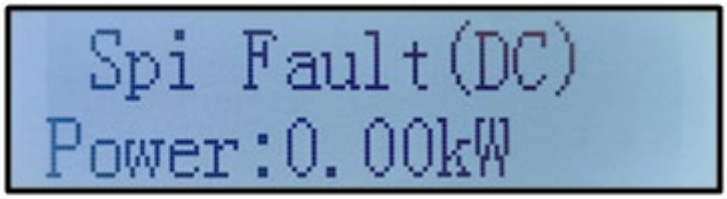
Check: The inverter checks insulation resistance, relays and other safety requirements and performs a software and hardware self-test. If an abnormal condition is detected, it switches to Fault or Permanent status.

Normal: the inverter feeds energy into the grid. If an error or fault occurs, it enters Fault or Permanent state.

Fault: the inverter has detected a recoverable fault. Once the fault clears, it automatically resumes normal operation. If the fault persists, check the displayed error code and follow the corresponding troubleshooting procedure.

Permanent: the inverter has detected a fault that cannot reset automatically. Qualified technical personnel must identify and rectify the fault using the displayed error code.

If communication between the control board and communication board fails, the LCD displays the following screen.



7.3. Main menu

From the standard screen, press and hold the down arrow button to open the main menu, which contains the items shown below.

Normal	---------Long press DOWN button
	1.Enter Setting
	2.Event List
	3.SystemInfo
	4.Display Time
	5.Software Update

(A) Accessing the settings

1.Enter Setting	--------Long press DOWN button
	1.Set time
	2.Clear Energy
	3.Clear Events
	4.Set Safety Para
	5.On-Off Control
	6.Set Energy
	7.Set Address
	8.Set Input mode
	9.Set Language
	10.Set Reflux P
	11.EnDRMs
	12.IV Curve Scan

	13.Autotest Fast
	14.Autotest STD

Press and hold «V» to access “1. Enter Setting”, then press and hold it again to open the settings menu. Briefly press «Λ» and «V» to scroll and select the required item.

Note: some settings require a password; the default is 0001. Briefly press «Λ» and «V» to change the selected digit and hold «V» to confirm it. After entering all digits, hold «V» again to confirm the password. If “password error, try again” appears, re-enter the password.

- **Date and time**

Set the system time for the inverter.

- **Clear Energy**

Reset the inverter’s total generated energy value to zero.

- **Clear Events**

Delete the event history stored in the inverter.

- **Safety Parameters**

Safety parameters can be configured using the Azzurro Operators app or a USB flash drive.

Before proceeding, compare the installed firmware with the version available for this model at www.zcsazzurro.com. If a newer version is available, update as described in section 7.4. Do not install an earlier version than the one already on the inverter. Then set the Safety Code required for the country and grid connection.

Code		Country	Code		Country
000	000	Germany VDE4105	018	000	EU EN50438
	001	Germany VDE4110		001	EU EN50549
	002	Germany VDE0126	019	000	IEC EN61727
001	000	Italia CEI-021 Internal	020	000	Korea
	001	Italia CEI-016 Italia	021	000	Sweden
	002	Italy CEI-021 External	022	000	Europe General
	003	Italia CEI0-21 In Areti	024	000	Cyprus
	000	Australia	025	000	India

002	001	Australia AU-WA	026	000	Philippines
	002	Australia AU-SA	027	000	New Zealand
	003	Australia AU-VIC	028	000	Brazil
	004	Australia AU-QLD		001	Brazil LV
	005	Australia AU-VAR		002	Brazil 230
	006	Australia AUSGRID		003	Brazil 254
	007	Australia Horizon	029	000	Slovakia VSD
003	000	Spain RD1699		001	Slovakia SSE
004	000	Turkey		002	Slovakia ZSD
005	000	Denmark	033	000	Ukraine
	001	Denmark TR322	035	000	Mexico LV
006	000	Greece Continent	038	000	Wide-Range-60Hz
	001	Greece island	039	000	Ireland EN50438
007	000	Netherlan d	040	000	Thailand PEA
008	000	Belgium		001	Thailand MEA
009	000	UK G59/G99	042	000	LV-Range-50Hz
	001	UK G83/G98	044	000	South Africa
010	000	China	046	000	Dubai DEWG
	001	China Taiwan		001	Dubai DEWG MV
011	000	France	107	000	Croatia
	001	France FAR Arrete23	108	000	Lithuania
012	000	Poland			

- **On-Off Control**

Inverter on-off local control.

- **Set Energy**

Set the total power generation. You can modify the total power generation through this option.

- **Set address**

Set the address (when you need to monitor multiple inverters simultaneously). Default 01.

The inverter uses its communication address to send data to the monitoring server. Use address 01 for one inverter; for multiple inverters, assign consecutive addresses.

Note: do not set address 00, as this may prevent Wi-Fi or RS485 communication.

- **Set Input mode**

The 1PH 3000TLM-6000TLM-V3 inverter has two MPPT circuits configurable for independent or parallel operation. Select the mode corresponding to the string wiring described in section 5.3.

- **Set Language**

Set the inverter display language.

- **Set Reflux P**

Enable or disable the inverter export limitation function and set the export power limit. This function requires an external CT/Meter.

- **EnDRMs**

Enable or disable logical interfaces.

- **IV Curve Scan**

Shadow scanning: when shading or a module fault produces multiple peaks in the power curve, this function locates and tracks the global maximum power point.

- **Autotest Fast**

“Autotest Fast” starts the automatic test of the inverter interface protection functions required by CEI 0-21.

Before starting the autotest, make sure the DC and AC switches are closed and the inverter is supplied by the PV generator and connected to the grid.

Select “Autotest Fast” and press and hold the down arrow («V») to start. The inverter automatically runs the test sequence. Wait for completion without interrupting the DC supply or AC grid connection.

When the autotest is complete, briefly press the up («Λ») and down («V») arrows to scroll through the individual test results. Photograph the screens, ensuring that the values and results are clearly legible, and retain the images for submission with the grid connection application as required by the grid operator.

- **Autotest STD**

The procedure is similar to the quick self-test but takes longer to complete.

(B) Event list

Event List shows active and historical events with their codes and detection times, ordered from most recent to oldest. From the main menu, select “2. Event List” and hold «V» to open the options below.

2.Event List	
1. Current event	**2. History event**
Fault information	001 ID04 06150825 (Display the event sequence number, event ID number, and event occurrence time)

(C) “SystemInfo” Interface as below

3.SystemInfo	------**Long** press DOWN button
	1.Inverter Type
	2.Serial Number
	3.Soft Version
	4.Hard Version
	5.Country
	6.Modbus Address
	7.Input Mode
	8.Remote State
	9.Reflux Power
	10.EnDRMs
	11.Power Ratio

The user enters the main menu by long pressing the DOWN button, short press and turns the page to select menu contents, then long press the button to enter "3. SystemInfo". Turning the page down can select the system information to view.

(D) Display time

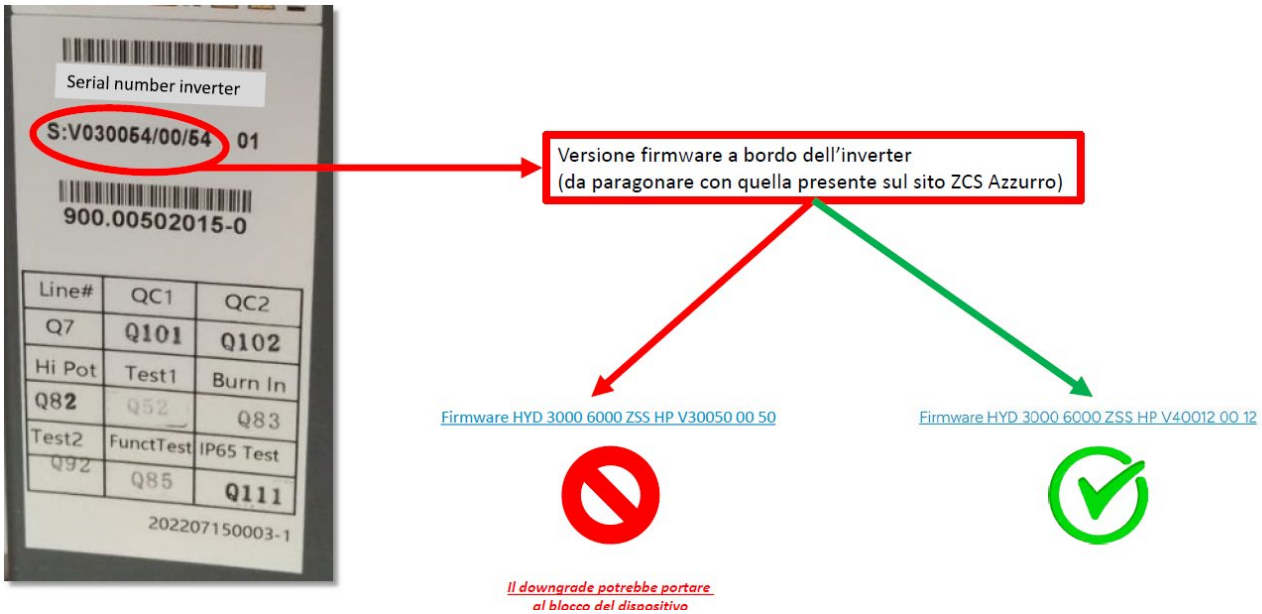
In the main menu, select “4. Display Time” and hold «V» to display the inverter’s current date and time.

(E) Software Update

The firmware can be updated via the Azzurro Operators app or a USB flash drive. Update files and instructions are available at www.zcsazzurro.com in the model’s Firmware section. See section 7.4 for the procedure.

7.4. Updating Inverter Software

At initial installation, compare the inverter firmware version with the version available for this model at www.zcsazzurro.com. If a newer version is available, update the inverter. If the installed version is the same as or newer than the published version, do not update.



Do not update the inverter if its installed firmware is the same as or newer than the version available on the ZCS Azzurro website.

WARNING: installing an earlier firmware version than the one on the inverter (downgrading) may cause device failure.

The firmware of 1PH 3000TLM-6000TLM-V3 inverters can be updated using either method described below.

Updating via the Azzurro Operators app

Downloading the app

Minimum operating system requirements: Android 7.0 or iOS 14.0.

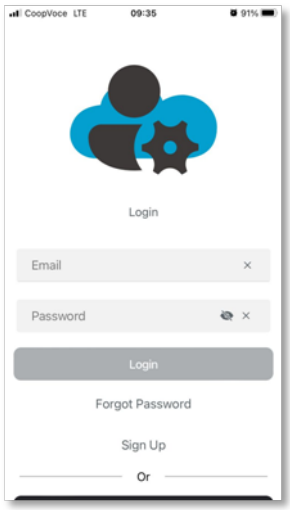
1. Search for "Azzurro Operators" in your device's app store, then download and install the app.
2. A lternatively, scan the QR code below to open the app download page.

QR code

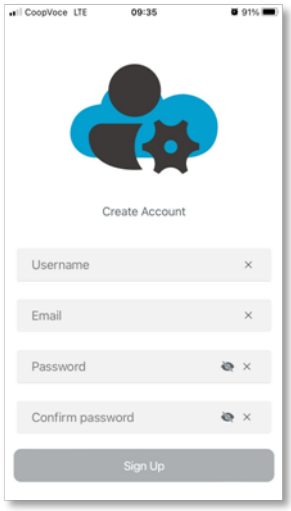
Account registration and login

You can log in to Azzurro Operators with an existing account or create a new account.

1. If you already have an Azzurro System or Azzurro Operators account, log in using its email address and password.



2. To create a new Azzurro Operators account, open the registration screen shown below.



3. Complete registration by entering the required details:
   - ✓ Username;
   - ✓ Email;
   - ✓ Password;
   - ✓ Confirm password.
4. After entering the details, select “Sign Up” to complete registration and access the account.

Bluetooth connection

Enable your smartphone’s Bluetooth before connecting to the inverter.

Attention	**Always remain less than 1 metre from the device to ensure a good Bluetooth connection.**

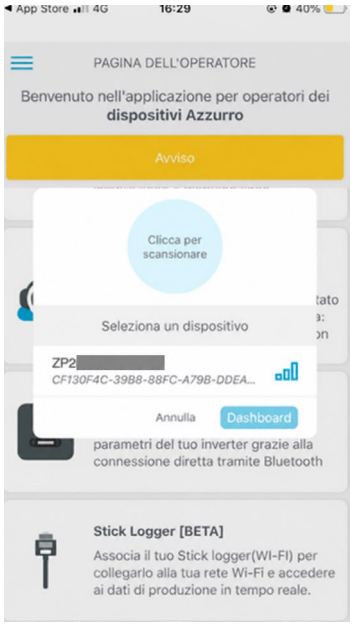
Step 1: enable Bluetooth on the smartphone and open “Connection to inverter”.



Step 2: select the command to scan for devices.



Step 3: in the detected-device list, select the serial number of the inverter to configure, as in the following example.



Step 4: select the gear icon to open settings.

Step 5: open “Firmware and Safety” and start the update. The app automatically selects the latest available firmware.

Step 6: after the update, open “Safety settings” and set the Safety Code required for the country and grid connection.

Updating via USB flash drive

Use an 8 GB USB flash drive.

Step 1: Open the AC and DC circuit breakers, then remove the communication compartment cover shown in the figure. If an RS485 cable is connected, first loosen the sealing nut and check that communication is inactive. Then remove the waterproof cover.

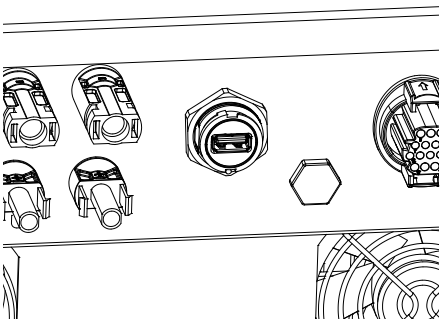


Figure 37 – Removing the communication board cover

Step 2 : Insert USB into computer.

Step 3: at www.zcsazzurro.com, select the inverter model under Products and download its update package from Firmware.

Step 4: save only the folder named “firmware” containing the .bin files on the USB drive.

Step 5: insert the USB flash drive into the inverter USB port.

Step 6: close the DC switch. A recoverable fault message appears because the AC switch is still open and the inverter cannot detect grid voltage.

Step 7: hold the DOWN button to access the menu. Briefly press it to select “5. Software Update”, then hold it to open password entry.

Step 8: enter the password required by the installed firmware version (0001 or 0715). If correct, the update starts.

Step 9: update the main DSP, slave DSP and ARM in sequence. The display shows “Update DSP1 Success” or “Update DSP1 Fail” for the main DSP. For the slave DSP it shows “Update DSP2 Success” or “Update DSP2 Fail”, respectively.

Step 10: after updating, open the DC switch and wait until the LCD turns off. Refit the cover, then close the DC and AC switches to restart the inverter. Check the installed firmware at SystemInfo > 3. Soft Version.

Note: If the display shows “Communication fail”, “Update DSP1 fail” or “Update DSP2 fail”, switch off the DC switch and wait for the LCD to turn off. Then switch the DC switch on again and resume the update from step 5.

8. TROUBLESHOOTING AND MAINTENANCE

8.1. Troubleshooting

This section contains information and procedures on how to troubleshoot any faults and errors that may occur during operation of the 1PH 3000TLM-6000TLM-V3 inverter.

If you have any problems with the inverter, please follow these steps.

- Check the warning messages and error codes on the information panel of the inverter. Record them before carrying out any further operation.
- If the inverter does not display any errors, perform the following checks:
  - Is the inverter located in a clean, dry and properly ventilated place?
  - Is the DC switch closed?
  - Are the cables correctly sized and as short as possible?
  - Are the input, output and communication connections and their cables intact?
  - Are the configuration settings correct for the type of installation?
  - Are the display panel and flat communication cable correctly connected and not damaged?

Earth Fault Alarm

The inverter meets IEC 62109-2 clause 13.9 requirements for earth fault alarm monitoring.

An earth fault alarm appears on the LCD and the red indicator lights up. The event is also recorded in the fault history.

With a Wi-Fi or GPRS communication device, alarm information is also available on the monitoring portal and mobile app.

Follow the steps below to display the recorded alarms:

Press “^” (Menu/Back) to access the main menu from the standard screen. Select “Event List”, then press “v” to open the list of alarms and errors.

Information on event list

Error code	Error name	Error description	Possible solution
ID01	GridOVP	The grid voltage is too high.	If the alarm occurs occasionally, the probable cause is that the electric grid is in an abnormal state. The inverter automatically resumes normal operation when grid parameters return to normal. If the alarm occurs frequently, check whether the grid voltage/frequency is within the correct range. If not, contact technical support. If so, check the AC circuit breaker and the AC wiring of the inverter. If the voltage/frequency is within the acceptable range and the AC wiring is correct while the alarm occurs repeatedly, contact Technical Support to change the grid overvoltage, undervoltage, over-frequency and under-frequency protection points after obtaining approval from the local grid operator.
ID02	GridUVP	The grid voltage is too low.	
ID03	GridOFP	The grid frequency is too high.	
ID04	GridUFP	The grid frequency is too low.	
ID05	GFCIFault	Faulty automatic differential circuit breaker.	If the error occurs occasionally, it may be caused by a temporary abnormal condition in the external circuits. Once this condition has been resolved, the inverter resumes normal operation. If the error occurs frequently and persists, check that the insulation resistance between the PV array and earth is not too low and inspect the insulation of the PV cables.

Error code	Error name	Error description	Possible solution
ID06	OVRT	OVRT faulty	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID07	LVRT	LVRT faulty	
ID08	IslandFault	Loss of insulation	
ID09	GridOVPInstant1	Grid instantaneous voltage too high 1	
ID10	GridOVPInstant2	Grid instantaneous voltage too high 2	
ID11	VGridLineFault	Grid Line voltage Faulty	
ID12	InvOVP	Inverter overvolatge	
ID17	HwADFaultIGrid	The grid current sampling error	
ID18	HwADFaultDCI	The DCI sampling error	
ID19	HwADFaultVGrid(DC)	Grid voltage sampling error (DC side)	

Error code	Error name	Error description	Possible solution
ID20	HwADFaultVGrid(AC)	Grid voltage sampling error (AC side)	
ID21	GFCIDeviceFault(DC)	Current leakage sampling (DC side)	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID22	GFCIDeviceFault(AC)	Current leakage sampling (AC side)	
ID23	HwADFaultIdcBranch	Branch current sampling error	
ID24	HwADFaultIdc	DC input current sampling error	
ID29	ConsistentFault_GFCI	The GFCI sampling value between the master DSP and salve DSP is not consistent	
ID30	ConsistentFault_Vgrid	The grid voltage sampling values of the master DSP and slave DSP are inconsistent.	
ID31	ConsistentFault_DCI	Inconsistent DCI measurement values	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID33	SpiCommFault(DC)	SPI Communication Faulty (DC side)	
ID34	SpiCommFault(AC)	SPI Communication Faulty (AC side)	

Error code	Error name	Error description	Possible solution
ID35	SChip_Fault	Chip Faulty (DC side)	
ID36	MChip_Fault	Chip Faulty (AC side)	
ID37	HwAuxPowerFault	Auxiliary power fault	
ID41	RelayFail	Relay faulty	Check that the insulation resistance between the PV generator and earth is not too low, and check the integrity of the PV cable insulation. If no, please contact technical support.
ID42	IsoFault	Insufficient insulation resistance	
ID43	PEConnectFault	Protective earth connection fault	
ID44	PvConfigError	Incorrect input mode configuration	Please check the wiring of PV string, whether each PV input is independent. If no, please contact technical support.
ID45	CT Disconnect	CT Fault	Check the input, output and communication connections against the instructions in this manual. If the connections are incorrect, contact technical support.
ID46	ReversalConnection	Input connection polarity reversed	
ID47	Reserved	Reserved	

Error code	Error name	Error description	Possible solution
ID48	SNTypeFault	SN doesn't match Type	It is internal fault of inverter.
ID49	Reserved	Reserved	Check that the installation location and method comply with this manual. Check that the ambient temperature does not exceed the maximum permitted value. If it is too high, improve ventilation. Check that dust or foreign objects are not obstructing the fan at the air inlet and improve ventilation and heat dissipation. Clean the inverter every six months as recommended.
ID50	TempFault_HeatSink1	Heat sink1 over-temperature protection	
ID51	Reserved	Reserved	
ID52	Reserved	Reserved	
ID53	Reserved	Reserved	
ID54	Reserved	Reserved	
ID55	Reserved	Reserved	
ID57	TempFault_Env1	environment temperature1 protection	
ID58	Reserved	Reserved	

Error code	Error name	Error description	Possible solution
ID59	TempFault_Inv1	Module 1 overtemperature protection	
ID60	Reserved	Reserved	
ID61	Reserved	Reserved	
ID65	VbusRmsUnbalance	Unbalanced RMS value of bus voltage	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID66	VbusInstantUnbalance	Unbalanced instantaneous value of bus voltage	
ID67	BusUVP	Bus undervoltage during grid connection	If the PV array configuration is correct, the abnormal condition may be due to insufficient solar irradiance. When irradiance returns to an adequate level, the inverter resumes normal operation.
ID68	BusZVP	Bus voltage is low	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID69	PVOVP	PV overvoltage	
ID70	Reserved	Reserved	

Error code	Error name	Error description	Possible solution
ID71	LLCBusOVP	LLCBUS overvoltage	
ID72	SwBusRmsOVP	Inverter bus software overvoltage protection	
ID73	SwBusInstantOVP	Inverter bus software instantaneous overvoltage protection	
ID81	Reserved	Reserved	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID82	DciOCP	Dci overcuurent faulty	
ID83	SwOCPInstant	Instantaneous output overcurrent protection	
ID84	SwBuckBoostOCP	BuckBoost software overcurrent	
ID85	SwAcRmsOCP	RMS output current overcurrent protection	
ID86	SwPvOCPInstant	PV overcurrent software protection	
ID87	IpvUnbalance	PV parallel unbalance	

Error code	Error name	Error description	Possible solution
ID88	IacUnbalance	Output current unbalance	
ID89	AFCIFault	Arc Fault	
ID97	HwLLCBusOVP	LLC hardware overvoltage	
ID98	HwBusOVP	Inverter bus hardware overvoltage	
ID99	HwBuckBoostOCP	BuckBoost hardware overcurrent	
ID100	Reserved	Reserved	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID102	HwPVOCP	PV hardware overcurrent	
ID103	HwACOCP	AC output hardware overcurrent	
ID110	Overload1	Overload Protection 1	
ID111	Overload2	Overload Protection 2	

Error code	Error name	Error description	Possible solution
ID112	Overload3	Overload Protection 3	
ID113	OverTempDerating	Power derating due to high temperature	Check that the installation location and method comply with this manual. Check that the ambient temperature does not exceed the maximum permitted value. If it is too high, improve ventilation. Check that dust or foreign objects are not obstructing the fan at the air inlet and improve ventilation and heat dissipation. Clean the inverter every six months as recommended.
ID114	FreqDerating	Power derating due to grid frequency	If it occurs frequently, please check whether the grid voltage and grid frequency are within the allowable range of the inverter; if not, please contact the customer service of Zucchetti Centro Sistemi S.p.a.; if yes, please check whether the connection between the circuit breaker at the AC side and the output cable is normal.
ID115	FreqLoading	Frequency loading	
ID116	VoltDerating	Power derating due to grid voltage	
ID117	VoltLoading	Volatge loading	
ID124	Reserved	Reserved	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID125	Reserved	Reserved	

Error code	Error name	Error description	Possible solution
ID129	unrecoverHwAcOCP	Output overcurrent hardwarepermanent fault	
ID130	unrecoverBusOVP	Permanent bus overvoltage fault	
ID131	unrecoverHwBusOVP	Permanent bus overvoltage hardware protection fault	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID132	unrecoverIpvUnbalance	Permanent fault due to PV current imbalance	
ID133	Reserved	Reserved	
ID134	unrecoverAcOCPInstant	Output transient overcurrent permanent fault	
ID135	unrecoverIacUnbalance	Output current imbalance permanent fault	
ID137	unrecoverPvConfigError	Input mode configuration permanent fault	
ID138	unrecoverPVOCPInstant	Input overcurrent permanent fault	
ID139	unrecoverHwPVOCP	Input hardware overcurrent permanent fault	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault

Error code	Error name	Error description	Possible solution
ID140	unrecoverRelayFail	Relay permanent fault	has cleared. If it persists, contact technical support.
ID141	unrecoverVbusUnbalance	Permanent fault due to bus voltage imbalance	
ID142	LightningProtectionFaultDC	DC SPD failure	
ID143	LightningProtectionFaultAC	AC SPD failure	
ID145	USBFault	USB Failure	
ID146	WiFiFault	WIFI failure	
ID147	BluetoothFault	Bluetooth failure	
ID148	RTCFault	Real-time clock (RTC) error	If an internal fault occurs, switch off the DC switch, wait 5 minutes and switch it on again. Check whether the fault has cleared. If it persists, contact technical support.
ID149	CommEEPROMFault	Communication BOARD EEPROM error	
ID150	CommEEPROMFault	Communication BOARD FLASH error	

Error code	Error name	Error description	Possible solution
ID151	Reserved	Reserved	
ID152	SafetyVerFault	Safety parameter version error	
ID153	SciCommLose(DC)	SCI communication lost (DC side)	
ID154	SciCommLose(AC)	SCI communication lost (AC side)	
ID155	SciCommLose(Fuse)	SCI communication (DC current combined side)	
ID156	SoftVerError	Inconsistent software version	
ID157	Reserved	Reserved	
ID158	Reserved	Reserved	
ID161	ForceShutdown	Forced shutdown	A remote shutdown command is active. If you did not issue this command, open the inverter DC switch, wait 5 minutes and close it again. After restarting, check whether the abnormal condition has cleared. If it
ID162	RemoteShutdown	Remote shutdown	

Error code	Error name	Error description	Possible solution
ID163	Drms0Shutdown	Drms0 shunt down	persists, contact Zucchetti Centro Sistemi S.p.A. technical support.
ID165	RemoteDerating	Remote power derating	Inverter shows ID83 when remote derating. If no one operate this function, please check the connection (I/O).
ID166	LogicInterfaceDerating	Logical interface derating	
ID167	AlarmAntiRefluxing	Anti Refluxing derating	
ID169	FanFault1	Fan 1 Alarm	Check that dust or foreign objects are not obstructing the fan at the air inlet. If necessary, improve ventilation and heat dissipation. Clean the inverter every six months as recommended.
ID170	FanFault2	Fan 2 Alarm	
ID171	FanFault3	Fan 3 Alarm	
ID172	FanFault4	Fan 4 Alarm	
ID173	FanFault5	Fan 5 Alarm	
ID174	FanFault6	Fan 6 Alarm	

Error code	Error name	Error description	Possible solution
ID177	Reserved	Reserved	
ID178	Reserved	Reserved	
ID179	Reserved	Reserved	
ID180	Reserved	Reserved	
ID181	Reserved	Reserved	
ID182	Reserved	Reserved	

8.2. Maintenance

Regularly check that the heat sink is free from dust, dirt and foreign objects. Before cleaning, open the AC and DC switches and wait at least 5 minutes.

Cleaning the inverter

Disconnect the AC and DC supplies before cleaning the inverter.

Clean the inverter with an air blower, a soft dry cloth or a soft-bristled brush. Do not use water, corrosive chemicals or detergents.

Cleaning the heatsink

For reliable long-term operation, keep the space around the heat sink clear for adequate ventilation. Check for dust, snow or other obstructions and remove any accumulation.

Clean the heat sink with an air blower, a soft dry cloth or a soft-bristled brush. Do not use water, corrosive chemicals or detergents.

9. UNINSTALLING

9.1. Uninstallation steps

- Disconnect the inverter from the AC grid by opening the AC circuit breaker.
- Disconnect the inverter from the photovoltaic strings by opening the DC circuit breaker.
- Wait 5 minutes
- Remove the DC connectors
- Remove the AC terminals.
- Unscrew the fixing bolt of the bracket and remove the inverter from the wall.

9.2. Packaging

If possible, pack the inverter in its original packaging.

9.3. Storage

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

9.4. Disposal

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



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

Take the product to an authorised recycling collection centre, in accordance with applicable local provisions.

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

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

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

10. TECHNICAL SPECIFICATIONS

TECHNICAL DATA	1PH 3000TLM-V3	1PH 3680TLM-V3	1PH 4000TLM-V3	1PH 4600TLM-V3	1PH 5000TLM-V3	1PH 6000TLM-V3
DC input data						
Typical DC power*	3300W	4048W	4400W	5060W	5500W	6600W
Maximum power per channel	3000W		3500W		3750W	4500W
Independent MPPTs / strings per MPPT	2/1					
Maximum DC input voltage	600V					
Start-up voltage	90V					
Rated DC input voltage	380V					
MPPT DC voltage range	80V–550V					
DC voltage range at full load	200V–500V					260V–500V
Maximum input current per MPPT	15A/15A					
Maximum absolute current per MPPT	22.5A/22.5A					
AC output data						
Rated AC power	3000W	3680W	4000W	4600W	5000W	6000W
Maximum AC power	3300VA	3680VA	4400VA	4600VA	5500VA	6600VA
Maximum AC current	15A	16A	20A	23A	25A	29A
Connection type / rated grid voltage	Single-phase L/N/PE / 220V/230V/240V					
Grid voltage range	180V–276V (according to local grid standards)					
Rated grid frequency	50Hz/60Hz					
Grid frequency range	45Hz–55Hz / 54Hz–66Hz (according to local grid standards)					
Total harmonic distortion	<3%					
Power factor	1 (programmable ±0.8)					
Active power adjustment range (settable)	0–100%					
Grid feed-in limitation	Feed-in adjustable from zero to rated power**					
Efficiency						
Maximum efficiency		98.2%			98.4%	
Weighted efficiency (EURO)		97.3%			97.5%	
MPPT efficiency	>99.9%					
Night-time consumption	<1W					
Protections						
Internal interface protection	Yes					
Safety protections	Anti-islanding, RCMU, ground fault monitoring					
DC reverse polarity protection	Yes					
DC disconnector	Integrated					
Overheating protection	Yes					
Overvoltage category / protection class	Overvoltage category III / protection class I					
Integrated surge protection	AC/DC MOV: Type 3 standard					
Standards						
EMC	EN IEC 61000-6-2/3, EN IEC 61000-3-2/3/11/12					
LVD	EN IEC 62109-1/2:2010					
Grid connection standards	Connection certificates and standards at www.zcsazzurro.com					
Communication						
Communication interfaces	Wi-Fi/4G/Ethernet (optional), RS485 (proprietary protocol), USB, Bluetooth					
Additional inputs or connections	Current sensor connection input					
General data						
Permitted ambient temperature range	−30°C…+60°C (power derating above 45°C)					
Topology	Transformerless					
Environmental protection rating	IP65					
Permitted relative humidity range	0%…95% non-condensing					
Maximum operating altitude	4000m					
Noise level	<25dB at 1m					
Weight		9.2 kg			10 kg	
Cooling	Natural convection					
Dimensions (H×W×D)	349mm×344mm×164mm					
Data monitoring	Display LCD + APP					
Warranty	10 years					

Registration on the WARRANTY EXTENSION page of zcsazzurro.com is required to obtain the warranty extension.

* Typical DC power is not the maximum applicable power limit. The online configurator at www.zcsazzurro.com provides the applicable configurations.

** Possible using a dedicated meter or Azzurro HUB.

11. MONITORING SYSTEMS

11.1. Wi-Fi stick logger adapter

11.1.1. Installing the Wi-Fi stick logger

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

Installation tools:

- External Wi-Fi adapter

1) Switch off the inverter following the procedure described in this manual.
2) Remove the cover from the Wi-Fi port on the bottom of the inverter, as shown.



Figure 38 – Wi-Fi adapter port

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

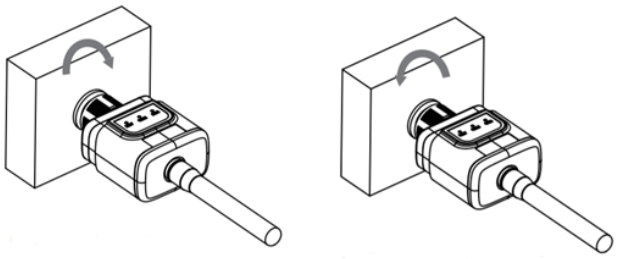


Figure 39 – Inserting and securing the Wi-Fi adapter

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

11.1.2. Configuring the Wi-Fi stick logger

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

Stand near the inverter and use a smartphone, PC or tablet to check that the home Wi-Fi signal reaches the installation location.

If the Wi-Fi signal is present at the location where the inverter is installed, the configuration procedure can begin.

If the signal does not reach the installation site, provide a Wi-Fi coverage extension system.

Configuration can be performed using either method described below.

Configuration via the Azzurro Operators app

1. Open the Azzurro Operators app and go to “Stick Logger”.
2. Scan the barcode on the Wi-Fi adapter label, or manually enter the serial number and password shown on the same label.
3. In the “List of available Wi-Fi networks” screen, select the network to which the adapter is to connect.
4. Enter the password for the selected Wi-Fi network and confirm.
5. When configuration is complete, the Wi-Fi adapter restarts. The NET indicator lights up to confirm connection to the selected Wi-Fi network.

Configuration via Wi-Fi access point

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 40 – Wi-Fi network search on iOS smartphone (left) and Android (right)

Note: disconnect the device from its current Wi-Fi network and disable automatic reconnection to that network.



Figure 41 – Disabling automatic reconnection to a network

2) Connect to the Wi-Fi network generated by the inverter adapter, which operates as an access point. The network name has the format AP_********; the numerical part corresponds to the adapter serial number shown on its label.

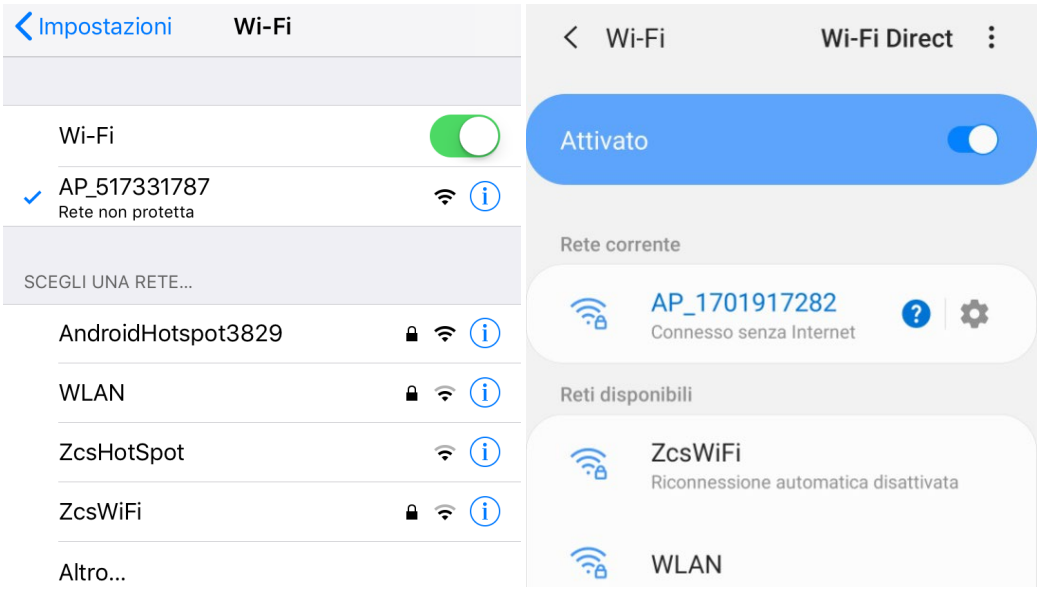


Figure 42 – Connecting to the Wi-Fi adapter access point on an iOS smartphone (left) and an Android smartphone (right)

3) Enter the password required to connect to the inverter network, as shown on the packaging or adapter.



Figure 43 – External Wi-Fi adapter password

Note: during configuration, enable automatic reconnection to AP_****** to maintain the connection between the adapter and the PC or smartphone.

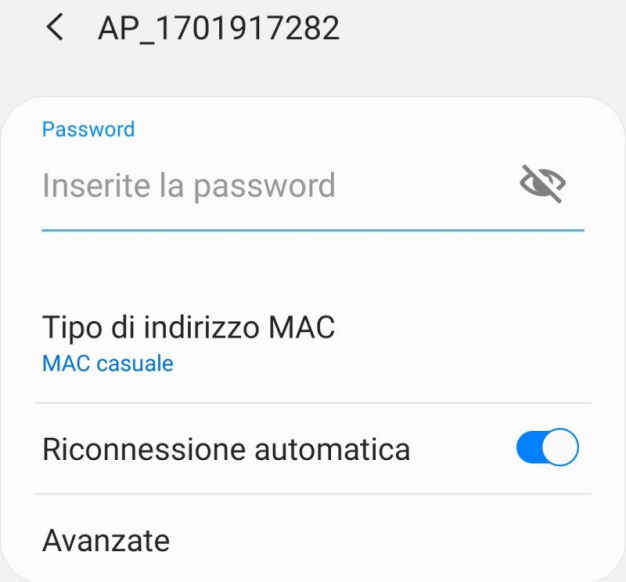


Figure 44 – Password entry prompt

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 45 – Screen indicating that Internet access is unavailable

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.

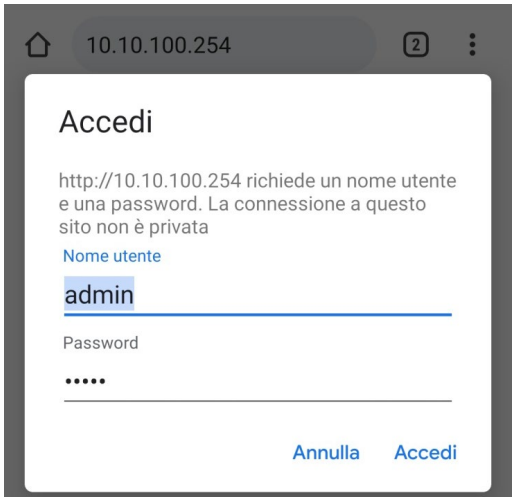


Figure 46 – Screen for accessing the web server to configure the Wi-Fi adapter

5) The status screen will open, showing the logger information such as the serial number and firmware version.
Check that the inverter information fields show the data of the connected equipment.
The language of the page can be changed using the command in the top right-hand corner.

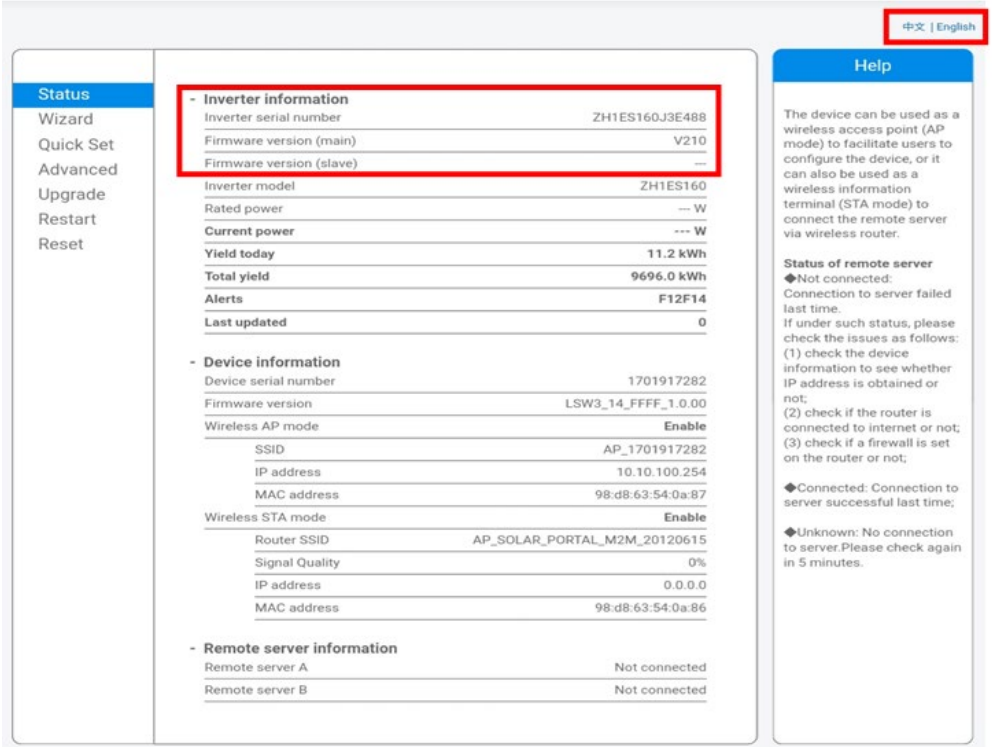


Figure 47 – Status Screen

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.

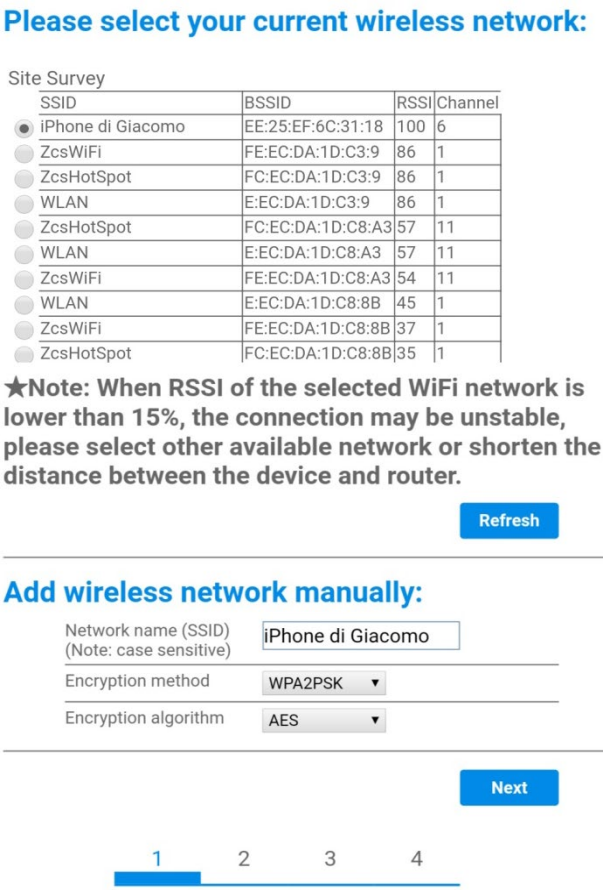


Figure 48 – Screen for selecting the available wireless network (1)

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

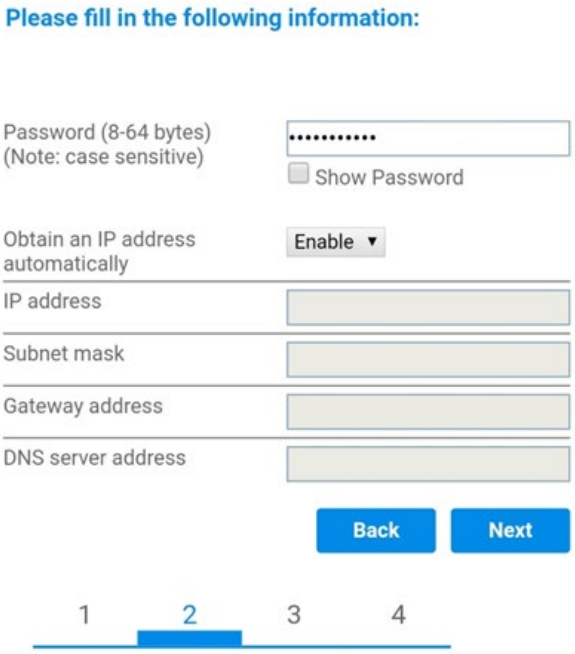


Figure 49 – Screen for entering the password of the wireless network (2)

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

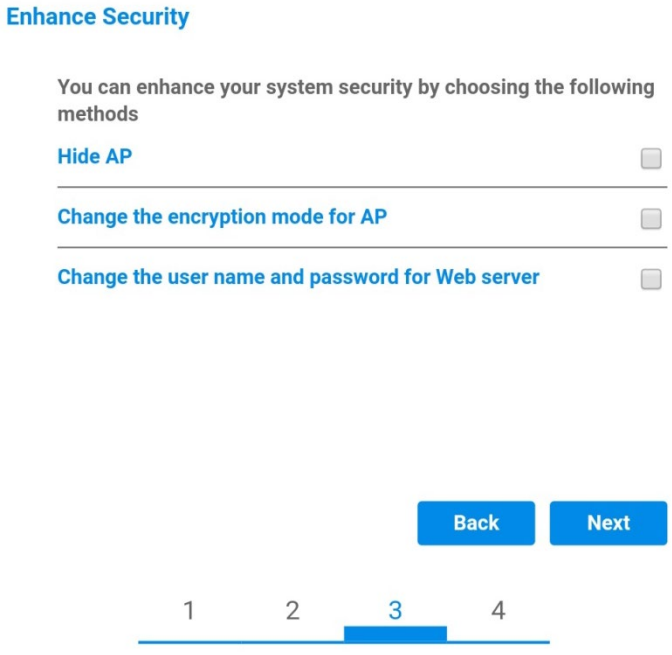


Figure 50 – Screen for setting the security options (3)

10) Click “OK”.

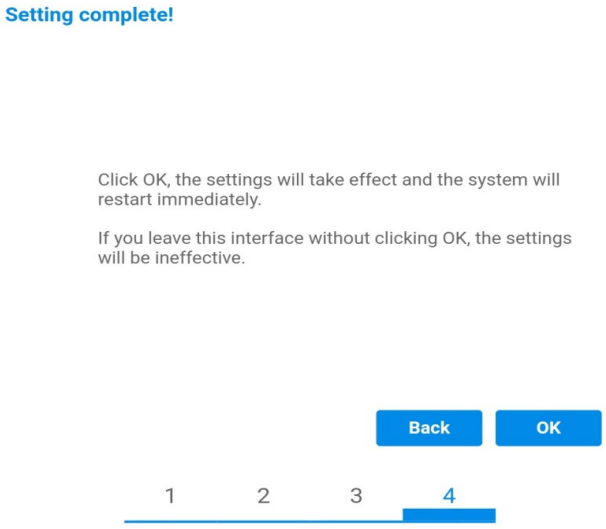


Figure 51 – Final configuration screen (4)

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

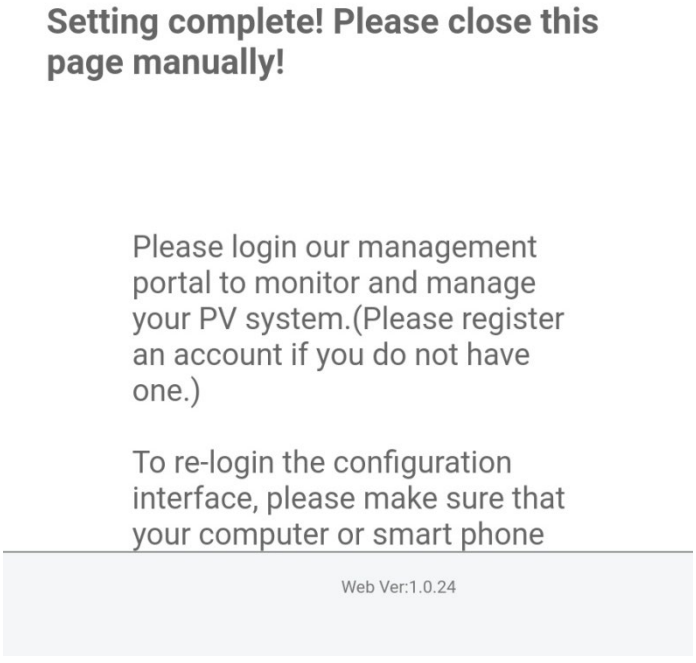


Figure 52 – Successful configuration screen

11.1.3. Checking the Wi-Fi stick logger

To check the configuration, reconnect to the adapter and open the Status page. Check the following information.

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



Figure 53 – 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.



Figure 54 – Initial status of LEDs

2) Final status:

NET (left LED): steadily lit.

COM (central LED): steady on

READY (right LED): flashing.



Figure 55 – 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 56 – Reset button on the Wi-Fi adapter

11.1.4. Troubleshooting the Wi-Fi stick logger

Status of LEDs present on the adapter

1) Irregular communication with inverter

- NET (left LED): steadily lit.
- COM (central LED): off
- READY (right LED): flashing on



Figure 57 – Irregular communication status between inverter and Wi-Fi

- Check the Modbus address set on the inverter:

Access the main menu with «^», go to System Info and press «v» (ENTER) to open the submenu. Scroll to Modbus address and check that it is set to 01 (or at least not 00).

If the value is not 01, go to “Enter Settings” (basic settings for hybrid inverters), open Modbus address and set 01.

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

- Restart the adapter:

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

2) Irregular communication with remote server

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



Figure 59 – Irregular communication status between Wi-Fi and remote server

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

If Remote Server A still shows “Not Connected” or the NET LED remains off after the checks and a new configuration, there may be a communication problem on the home network. Check that the router is not blocking transmission to the monitoring server.

To distinguish a home-router problem from an adapter problem, configure the adapter using a smartphone Wi-Fi hotspot as the reference network.

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

a) Check that the smartphone's 3G/LTE connection is active. Open the operating system settings (gear icon on the screen listing installed apps), select "More" under Wireless and networks and check 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.

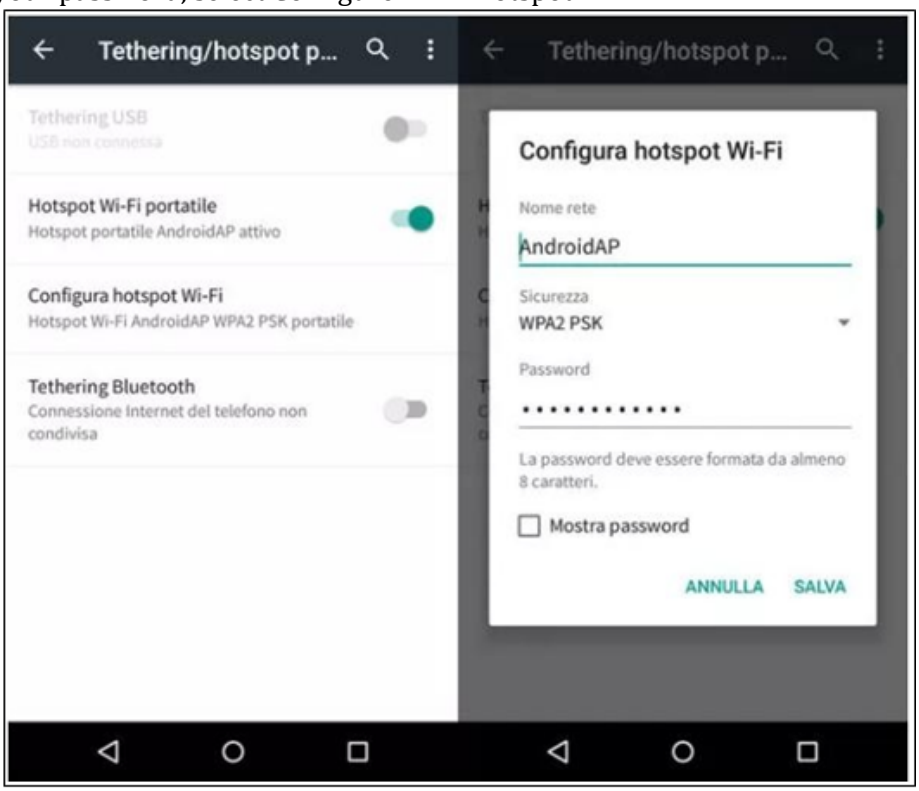


Figure 60 – Configuration of an Android smartphone as a hotspot router

- **Using an iPhone as a modem**

a) To share an iPhone connection, check that 3G/LTE is active under Settings > Cellular and that "Voice and Data" is set to 5G, 4G or 3G. Open iOS settings using the grey gear icon on the home screen.
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.

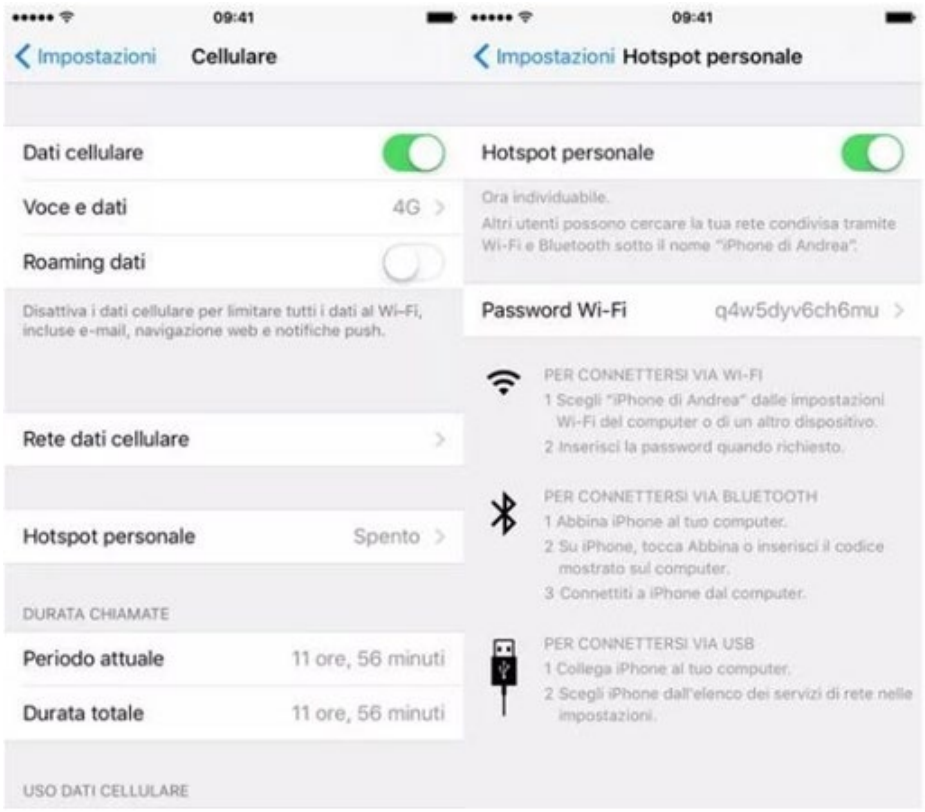


Figure 61 – Configuration of an iOS smartphone as a hotspot router

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

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

If the hotspot connection works, check the home-router configuration and any filters blocking data transmission. If necessary, contact the network administrator or the router manufacturer's support service.

11.2. Ethernet stick logger

11.2.1. Installing the Ethernet stick logger

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

Installation tools:

- 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 from the Wi-Fi/Eth port on the bottom of the inverter, as shown.



Figure 62 – Port of the Ethernet adapter

3) Remove the ring nut and waterproof cable gland from the adapter and pass the network cable through them. Insert the connector into the adapter internal port, then tighten the ring nut and cable gland to secure the connection.

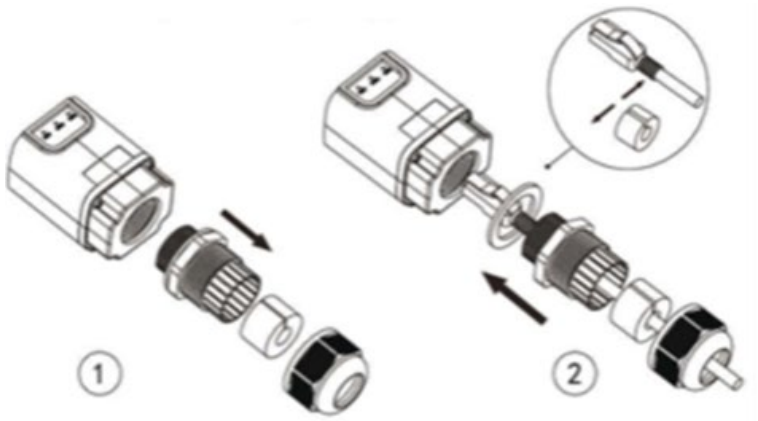


Figure 63 – Inserting the network cable inside the device

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

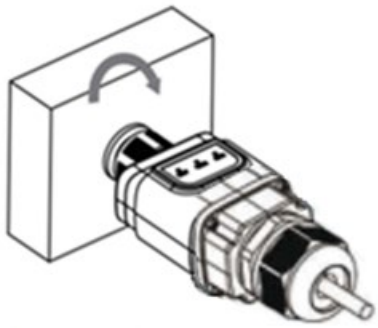


Figure 64 – Inserting and securing the ethernet adapter

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

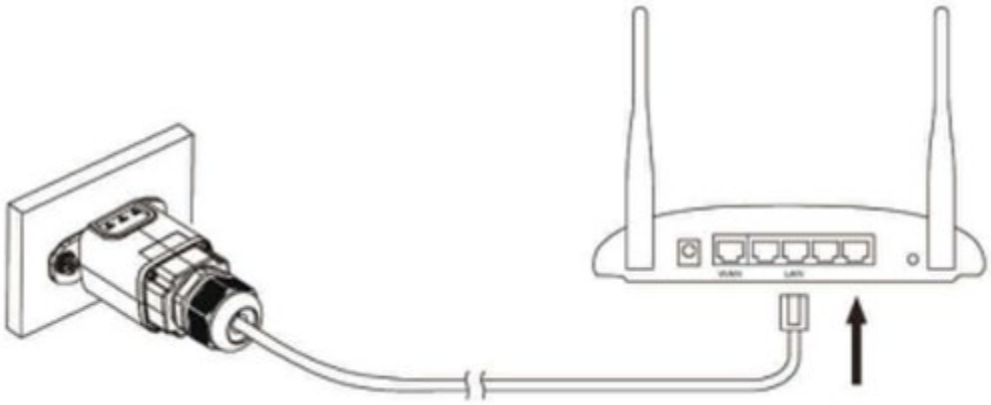


Figure 65 – Connecting the network cable to the modem

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

11.2.2. Checking the Ethernet stick logger

After installation, wait two minutes and check the LED status.

Status of LEDs present on the adapter

1) Initial status:
   NET (left LED): off

   COM (central LED): steady on

   SER (right LED): flashing.



Figure 66 – Initial status of LEDs

2) Final status:
   NET (left LED): steadily lit.

   COM (central LED): steady on

   SER (right LED): flashing.



Figure 67 – Final status of LEDs

11.2.3. Troubleshooting the Ethernet stick logger

Status of LEDs present on the adapter

1) Irregular communication with inverter

- NET (left LED): steadily lit.
- COM (central LED): off
- SER (right LED): flashing.



Figure 68 – Irregular communication status between inverter and adapter

- Access the main menu with «^», go to System Info and press «v» (ENTER) to open the submenu. Scroll to Modbus address and check that it is set to 01 (or at least not 00).
- If the value is not 01, go to “Enter Settings” (basic settings for hybrid inverters), open Modbus address and set 01.
- Check that the Ethernet adapter is securely connected to the inverter. Check that the network cable is properly inserted in the adapter and modem and the RJ45 connector is correctly crimped.

2) Irregular communication with remote server

- NET (left LED): off

- COM (central LED): on
- SER (right LED): flashing.



Figure 69 – Irregular communication status between the adapter and remote server

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

  Check that the router allows data transmission to the monitoring server on port 80. If necessary, check the network filters with the network administrator or the router manufacturer's support service.

11.3. 4G stick logger

ZCS 4G adapters have an integrated virtual SIM and a data service included for 10 years, intended for transmitting inverter monitoring data.

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

11.3.1. Installing the 4G stick logger

The 4G adapter is installed on compatible inverters without opening the front cover.

Installation tools:

- 4G adapter

1) Switch off the inverter following the procedure described in this manual.
2) Remove the cover from the Wi-Fi/GPRS port on the bottom of the inverter, as shown.

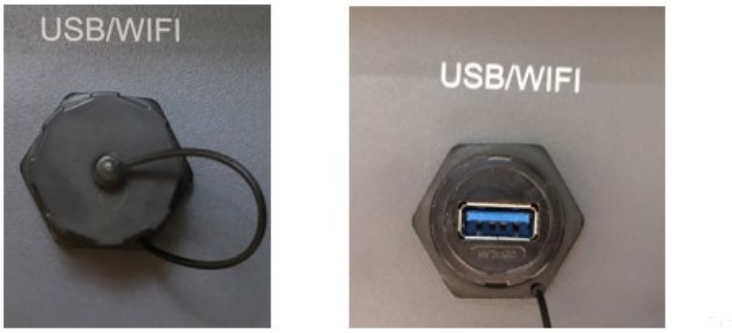


Figure 70 – Port of the 4G adapter

3) Insert the 4G adapter into its port, observing connector orientation and correct engagement. Secure it with the two screws supplied in the package.

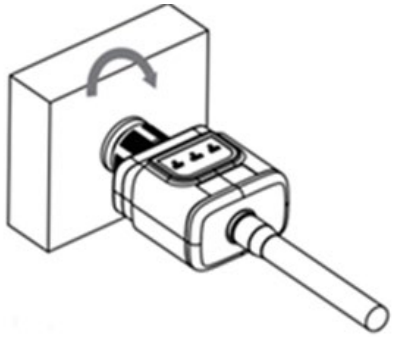


Figure 71 – Inserting and securing the 4G adapter

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

5) The 4G adapter does not require Wi-Fi configuration. Data transmission starts after the inverter is switched on.

11.3.2. Checking the 4G stick logger

After installation, check the device LEDs within 3 minutes to verify correct configuration.

Status of LEDs present on the adapter

1) Initial status:
   - NET (left LED): off
   - COM (centre LED): flashing.
   - SER (right LED): flashing.



Figure 72 – Initial status of LEDs

2) Registration:
   - NET (left LED): flashes rapidly for about 50 seconds; registration takes about 60 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, with equal on and off intervals.
   - COM (central LED): steady on
   - SER (right LED): steady on



Figure 73 – 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 74 – Irregular communication status between inverter and adapter

   - Check the Modbus address set on the inverter:
   - Access the main menu with «^», go to System Info and press «v» (ENTER) to open the submenu. Scroll to Modbus address and check that it is set to 01 (or at least not 00).
   - If the value is not 01, go to "Enter Settings" (basic settings for hybrid inverters), open Modbus address and set 01.
   - 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.
   - COM (central LED): on
   - SER (right LED): flashing.



Figure 75 – Irregular communication status between the adapter and remote server

   - Check that the 4G signal is present in the installation location (the adapter uses the Vodafone network for 4G transmission; if this network is not present or the signal is weak, the SIM will use a different network or will limit the data transmission speed). Ensure that the installation location is suitable for 4G signal transmission and that

there are no obstacles that could affect data transmission.

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

11.4. Azzurro HUB

Azzurro HUB is a data acquisition and monitoring device for ZCS Azzurro systems. For 1PH 3000TLM-6000TLM-V3 inverters, it provides an alternative to stick loggers and collects data over an RS485 serial line.

Connection to the monitoring system comprises the following elements:

- Inverter: *connect the* COM port to the RS485 line according to the pin assignment in section 5.5.
- Azzurro HUB: acquisition of inverter data and connection to the router via Ethernet or Wi-Fi to send data to the monitoring platforms.
- Configuration: access the Azzurro HUB web interface and complete the wizard as instructed in its manual.

For installation, power supply, HUB-side connections and full configuration, refer to the Azzurro HUB user manual at www.zcsazzurro.com under Monitoring systems > Azzurro HUB.

11.4.1. Preliminary information on Azzurro HUB

The inverter communicates with Azzurro HUB via RS485; sending data to the app and portal requires the HUB to have an Internet connection.
For multiple inverters, connect the RS485 line in a daisy chain (in/out). Refer to the Azzurro HUB manual for system limits and line configuration.

11.4.2. Azzurro HUB electrical connections and configuration

The inverter COM port provides the contacts for RS485 connection. Observe signal polarity and the pin assignment in section 5.5.
Use shielded twisted-pair cable suitable for RS485 communication, as specified in the Azzurro HUB manual.
To connect one inverter, use one RS485+ and one RS485− contact shown in the figure. In a daisy chain, use one pair for the incoming cable and the other for the cable to the next inverter: pins 1 (+) and 3 (−) for incoming; pins 2 (+) and 4 (−) for outgoing.

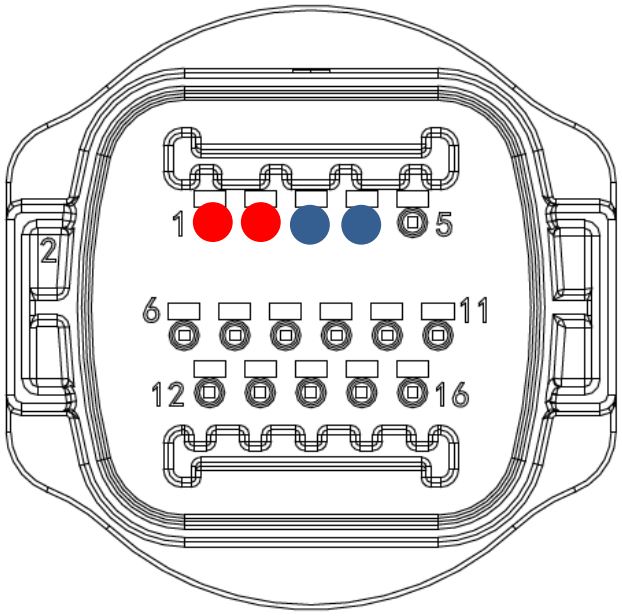


Figure 76 – RS485 connection through the inverter COM port 1PH 3000TLM-6000TLM-V3

1) Check that each inverter display shows the RS485 icon. If it is absent, check the wiring and communication settings according to the inverter and HUB manuals.

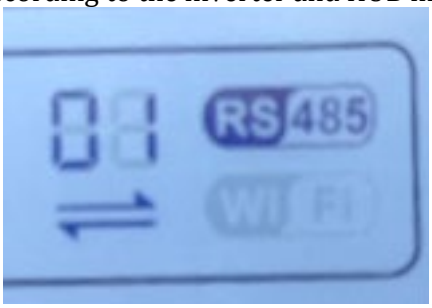


Figure 77 – RS485 symbol on the display of the inverter

2) Assign each inverter on the line a unique Modbus address:
   a. Enter the "Settings" menu.
   b. Scroll to the submenu "Modbus Address."
   c. Set consecutive addresses starting at 01, avoiding duplicates on the same line. The address appears on the display next to the RS485 symbol.

11.5. Monitoring via app and portal

ZCS Azzurro systems can be monitored using the Azzurro Systems app and the Azzurro Portal web platform. Remote monitoring requires the installed communication device to be configured and connected to the Internet, and the installation to be linked to the user's account.

The Azzurro Systems app provides an overview of system status, generation and energy flows. Azzurro Portal provides more detailed analysis of performance and events for technical monitoring.

11.5.1. Azzurro Systems

The Azzurro Systems app, available for smartphones and tablets, is primarily intended for end users to check their installation daily. It displays PV generation, system status and energy summaries in graphs. Installers can also use it for an initial assessment of overall system performance.

For installations with the necessary measuring equipment and devices, the app also displays consumption and energy exchanged with the grid. Battery charge and discharge data are available only for installations with a compatible storage system; these are not functions of the PV inverter described in this manual.

11.5.2. Azzurro Portal

Azzurro Portal is the web platform for viewing installation data in a browser. It is particularly useful for installers and technical personnel to examine device parameters, compare trends over time and consult events and alarms. Available functions depend on the platform and account permissions.

www.zcsazzurroportal.com provides multi-installation management, live data and energy summaries; notifications and reports depend on the enabled profile. Portal 2.0 at zcsazzurrosystemsweb.com adds configurable graphs, telemetry comparison, historical data and data export. Azzurro Systems app credentials can be used for Portal 2.0.

For registration, linking the installation and current instructions, refer to Apps and software at www.zcsazzurro.com. Access to the app or portal does not replace electrical and diagnostic checks on the installation.

Displayed information depends on installed devices, available measurements and access profile. The following screens are portal examples and may differ according to the installation configuration and platform version.

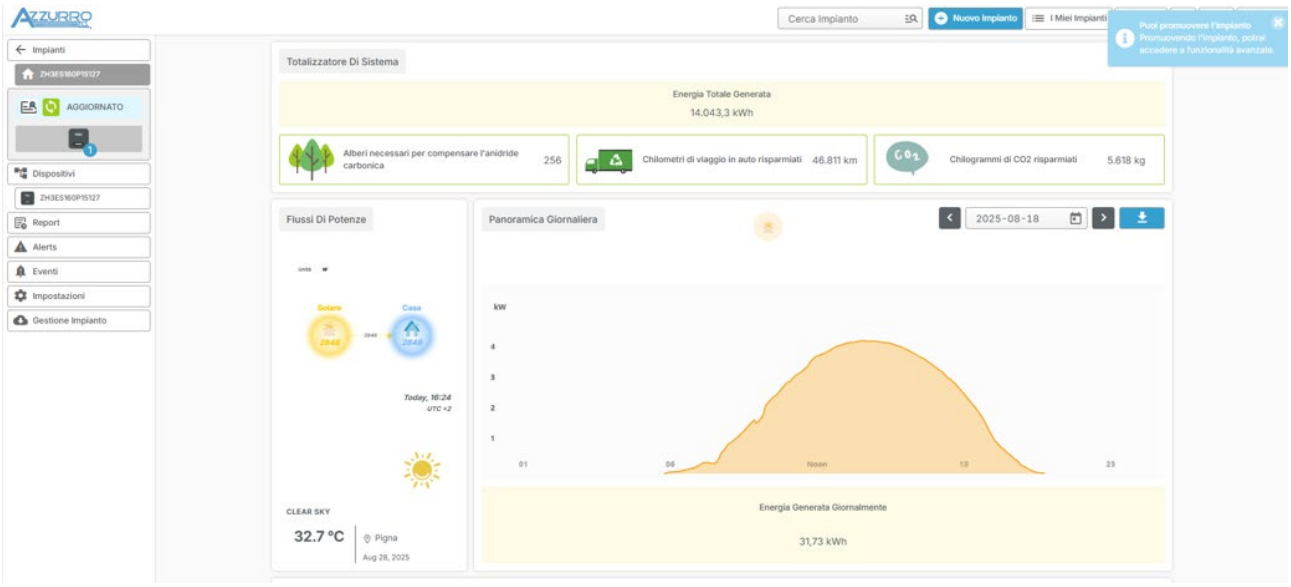


Figure 78 – Portal monitoring example: installation with PV inverter



Figure 79 – Portal monitoring example: installation with hybrid inverter and storage

12. WARRANTY TERMS AND CONDITIONS

For the ZCS Azzurro warranty terms and conditions, refer to the documentation supplied in the packaging and to www.zcsazzurro.com.

IMQ CERTIFIED
MANAGEMENT SYSTEM
QUALITY - ISO 9001
ENVIRONMENTAL - ISO 14001

IQNET
RECOGNIZED
CERTIFICATION

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