

Grid-connected inverter

1PH 1100TL-3300TL-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.

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Technical support

ZCS offers a support and technical consultancy service accessible by sending a request directly from the website <https://www.zcsazzurro.com/it/support>.

The following toll-free number is available for the Italian territory: 800 72 74 64.

Preface

General information

Please read this manual carefully before installation, operation or maintenance.

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

- **Scope**

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

1PH 1100TL-V3 / 1PH 1600TL-V3 / 1PH 2200TL-V3 / 1PH 2700TL-V3 / 1PH 3000TL-V3 /

1PH 3300TL-V3

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

- **Recipients**

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

- **Symbols used**

This manual provides information for safe operation and uses certain symbols to ensure the safety of personnel and materials, and for efficient use of the equipment during normal operation. It is important to understand this information to avoid accidents and damage to property. Please take note of the following symbols used in this manual.

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

1. Preliminary safety instructions



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

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.

1.1. Safety instructions

Before installing and using the equipment, make sure you read and understand the instructions in this manual and familiarise yourself with the relative safety symbols shown in this chapter.

Depending on national and local requirements, permission must be obtained from your local provider before connecting to the electrical grid, making sure that the connections are carried out by a qualified electrician.

Contact the nearest authorised service centre for any repairs or maintenance. Contact your distributor for information on the nearest authorised service centre. **DO NOT** carry out repairs yourself, as this may result in injury or damage.

Qualified personnel

Ensure that the operator has the necessary skills and training to operate the equipment. Personnel responsible for use and maintenance of the equipment must be qualified and capable of performing the activities described, and must also have appropriate knowledge on how to correctly interpret the contents of this manual. For safety reasons, this inverter can only be installed by a qualified electrician with the necessary training and/or skills and knowledge. Zucchetti Centro Sistemi S.p.A. declines all responsibility for damage to property or personal injury caused by incorrect use of the device.

Installation requirements

Install and start the inverter according to the following instructions. Place the inverter on suitable load-bearing supports with sufficient load capacity (such as walls or photovoltaic racks) and make sure that the inverter is positioned vertically. Choose a suitable location for the installation of the electrical equipment. Make sure there is sufficient space for heat dispersion and to accommodate future maintenance. Maintain adequate ventilation and ensure that there is enough air circulation for cooling.

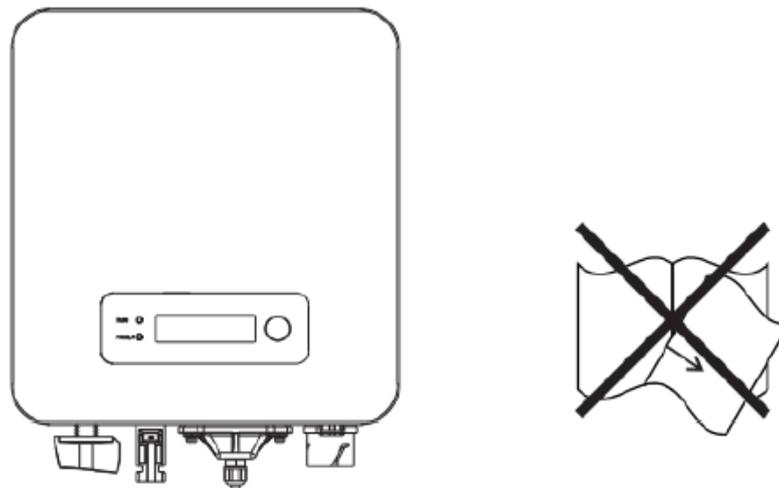


Figure 1 - Do not lose or damage this manual

Transport requirements

If you have problems with the packaging that could damage the inverter or if you find any visible damage, immediately notify the transport company. If necessary, request assistance from an installer of photovoltaic systems or from Zucchetti Centro Sistemi SpA. Transport of the equipment, especially by road, must be carried out with vehicles suitable to protect the components (in particular, electronic components) against violent knocks, humidity, vibrations, etc.

Electrical connections

Please pay attention to the electrical regulations on accident prevention when dealing with photovoltaic inverters.

	<p>Before connecting the mains power, be sure to disconnect the photovoltaic modules by disconnecting all the DC switches of the generator. When exposed to the sun, the photovoltaic panels produce a voltage that can be dangerous!</p>
<p>Danger</p>	

	<p>All installation operations must be carried out by a professional electrician, who must:</p> <ul style="list-style-type: none"> • be prepared. • carefully read this manual and understand its contents.
Warning	
	<p>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.</p>
Attention	
	<p>Do not remove the information label or open the inverter. Otherwise, ZCS will not provide any warranty or maintenance.</p>
Note	

Operation

	<p>Contact with the electrical grid or the terminal of the equipment may cause electrocution or fire!</p> <ul style="list-style-type: none"> • 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.
Danger	
	<p>Some internal components reach very high temperatures when the inverter is in operation. Wear protective gloves!</p>
Attention	

Maintenance and repair

	<ul style="list-style-type: none"> • 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!
Danger	
	<ul style="list-style-type: none"> • The inverter should start working again after any faults have been fixed. For any repairs, contact your local authorised service centre; • 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 improper use or maintenance.
Attention	

1.2. Symbols and icons

Safety signals

	<p>Pay attention to possible burns due to hot parts. Only touch the screen or press the keys while the inverter is in operation.</p>
Caution	
	<p>The PV strings should be connected to the ground in accordance with the local regulations.</p> <p>To ensure the safety of the system and people, the inverter and photovoltaic strings must be securely connected to the ground.</p>
Attention	
	<p>Ensure the correct DC input voltage; this must be below the maximum allowable DC voltage. Overvoltage can cause permanent damage to the inverter that is not covered by the warranty!</p>
Warning	

Symbols on the inverter

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

	<p>Residual voltage may be present on the inverter! Before opening the inverter, wait 5 minutes to ensure that the capacitors are completely discharged.</p>
	<p>Beware of high voltage</p>
	<p>Beware of high temperatures</p>
	<p>Complies with the European Standards (CE)</p>
	<p>Ground connection point</p>
	<p>Read this manual before installing the inverter.</p>
	<p>Indication of the allowable temperature range</p>
	<p>Degree of protection of the equipment according to the IEC 70-1 standard (EN 60529 June 1997).</p>
	<p>Positive and negative polarities of the input voltage (DC).</p>

2. Product features

General information in this chapter

Product dimensions

The field of use and overall dimensions of the 1PH 1100TL-3300TL-V3 inverters are indicated in this section.

Description of functions

Describes how the 1PH 1100TL-3300TL-V3 inverters and their internal operating modules work.

Efficiency curve

Describes the efficiency curves of the inverter.

2.1. Product presentation

Field of use

The 1PH 1100TL-3300TL-V3 inverters are grid-connected photovoltaic inverters with a single MPPT channel, capable of converting the direct current generated by the photovoltaic strings into single-phase sine wave alternating current and feeding the energy to the public electricity grid. An AC circuit breaker (see chapter 4.4) must be used as a disconnecting device and must always be easily accessible.

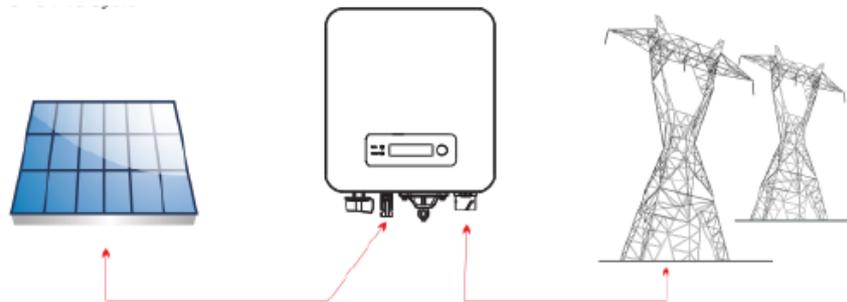


Figure 2 – Grid-connected photovoltaic system

The 1PH 1100TL-3300TL-V3 inverters can only be used with photovoltaic modules that do not require one of the polarities to be grounded. The input current and voltage of the PV strings must not exceed the limits specified in the technical specifications. Only photovoltaic modules can be connected to the input of the inverter (do not connect batteries or other power supply sources).

- Accessories and optional components of the inverter should be chosen by a qualified technician who is familiar with the installation conditions.
- Overall dimensions 1PH 1100TL-3300TL-V3 : LxWxH = 303 mm x 260.5 mm x 118 mm

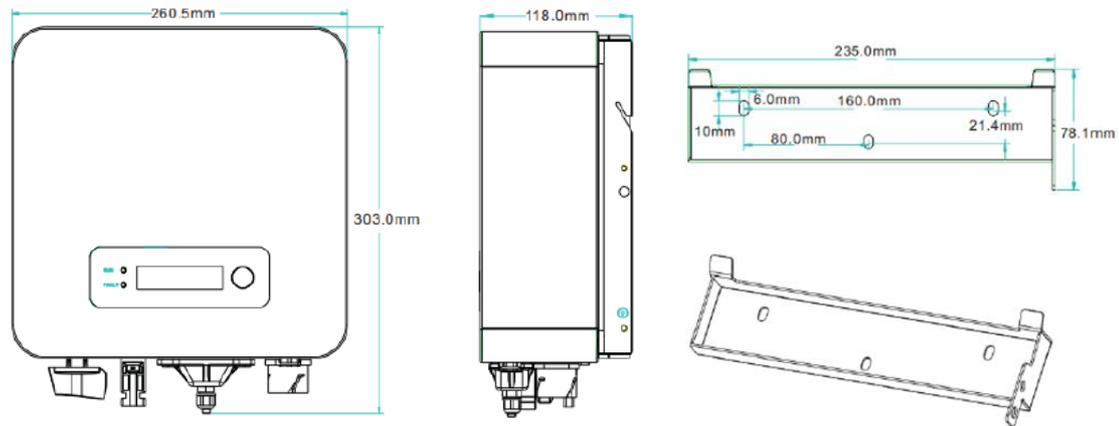


Figure 3 – Front, side and back view of the inverter and bracket

- Overall dimensions 1PH 2700TL-3300TL-V3 : LxWxH = 321 mm x 260.5 mm x 131.5 mm

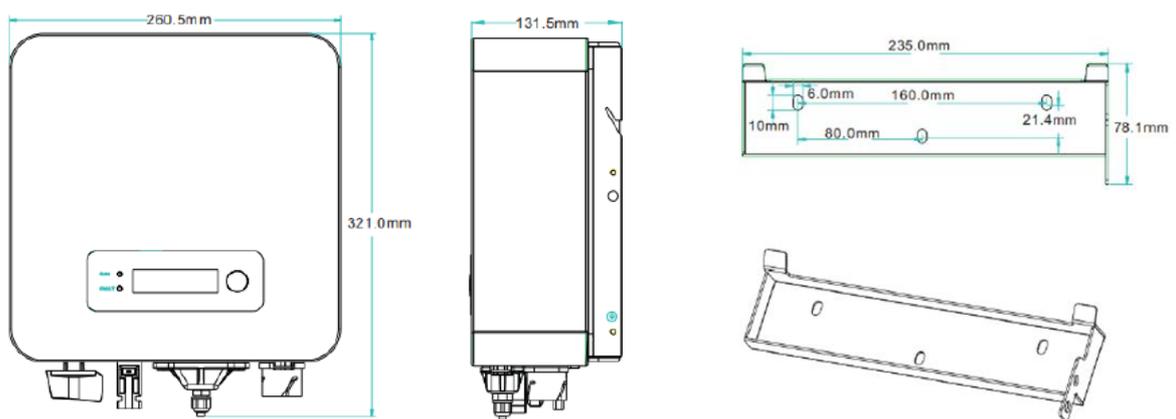
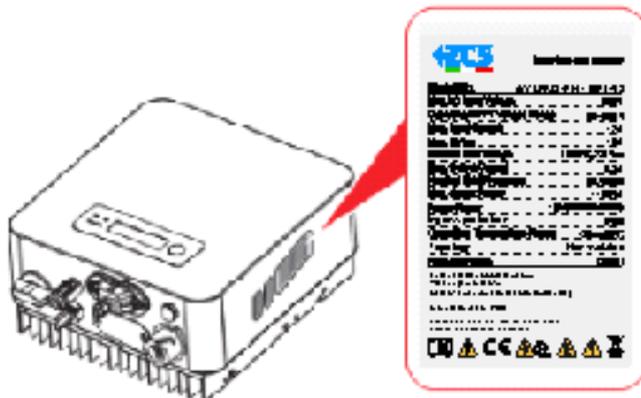


Figure 4 – Front, side and back view of the inverter and bracket

- Labels on the inverter



Le etichette non devono essere nascoste con oggetti o corpi estranei (stracci, scatole, attrezzature, ecc.) e devono essere pulite regolarmente e mantenute sempre visibili

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

2.2. Description of functions

The DC power generated by the PV modules is filtered through the input board before entering the power board. The input board also has the function of detecting the insulation impedance and the DC input voltage/current. The power board converts the DC power into AC power. The current converted into AC is filtered through the output board and is then fed into the grid. The output board also has the function of measuring the grid voltage/current, GFCI and acts as an output isolation relay. The control board provides the auxiliary power supply, controls the operating status of the inverter and shows it on the display. The display also shows the error codes when the inverter is not functioning properly. At the same time, the control board can activate the protection relay in order to disconnect the inverter from the grid and protect the internal components.

Inverter functions

A. Feeding reactive power into the grid

The inverter is able to produce reactive power and feed it into the grid through the setting of the Power Factor. The feed-in management can be controlled directly by the grid company through a dedicated RS485 interface.

B. Limiting the active power fed into the grid

If enabled, the inverter can limit the amount of active power fed into the grid at the desired value (expressed as a percentage).

C. Automatic power reduction when grid is over frequency

When the grid frequency is higher than the limit set, the inverter reduces the output power in order to ensure the stability of the grid.

D. Data transmission

The inverter (or a group of inverters) can be monitored remotely via an advanced communication system based on a RS485 interface or via Wi-Fi.

E. Software update

A microSD card is used to update the firmware.

- **Wiring diagram**

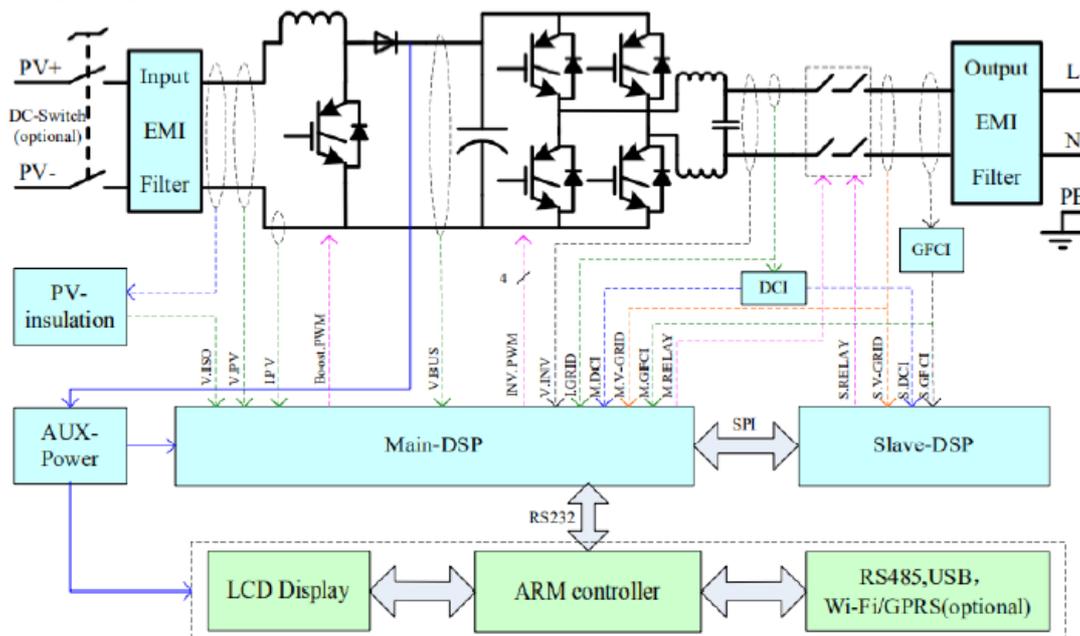


Figure 6 - Block diagram of the 1PH 1100TL-3300TL-V3-L inverter

2.3. Efficiency curve

Efficiency curve for an Azzurro ZCS 1PH 3300 TL-V3 model

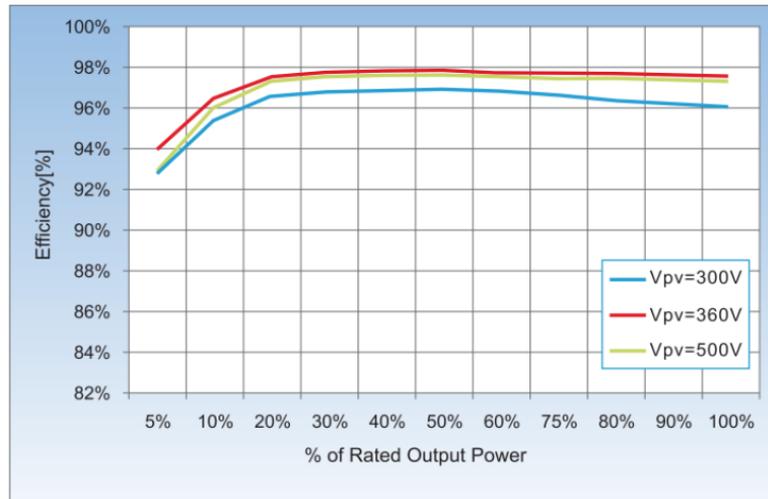


Figure 7 - Efficiency curve for an Azzurro ZCS 1PH 3300TL-V3 inverter

3. Installation

General information in this chapter

This chapter describes how to install the 1PH 1100TL- 3300TL-V3 inverter.

Installation notes:

	<ul style="list-style-type: none"> DO NOT install 1PH 1100TL-3300TL-V3 inverters near flammable materials. DO NOT install 1PH 1100TL-3300TL-V3 inverters in an area where flammable or explosive materials are stored.
Danger	
	<p>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.</p>
Warning	
	<ul style="list-style-type: none"> Consider the weight of the inverter during transportation and installation. Choose an appropriate mounting position and surface.
Attention	

3.1. Installation process



Figure 8 - Installation steps

3.2. Checks before installation

Checking the outer packaging

Packaging 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 form of damage is detected, do not open the box containing the inverter and contact the supplier and the courier as soon as possible.

It is recommended to remove the packaged materials from the box 24 hours before installing the inverter.

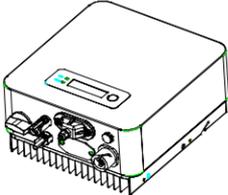
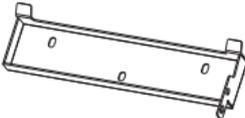
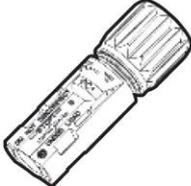
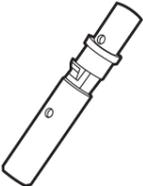
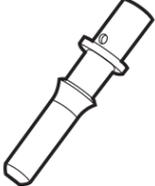
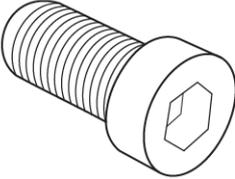
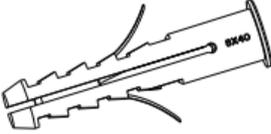
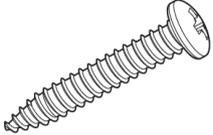
Checking the product

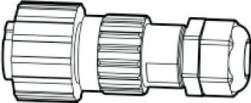
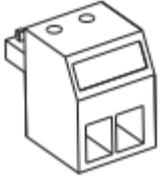
After removing the inverter from its packaging, check that the product is intact and complete. If any damage is found or components are missing, contact the supplier and transport company.

Contents of the packaging

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

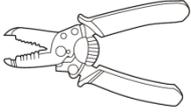
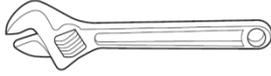
The package should contain the following components:

			
1 Photovoltaic inverter	1 mounting bracket	1 + input terminal	1 - input terminal
			
1 metal terminal for + DC power cables	1 metal terminal for - DC power cables	2 M5 hexagonal screws	10 M6 flat washers
			
3 expansion plugs (1 spares)	5 self-tapping screws	1 user manual	2 warranty

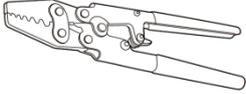
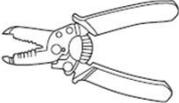
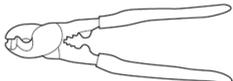
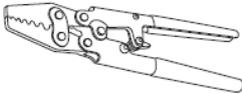
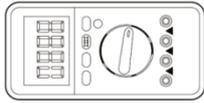
 1 Warranty Registration	 1 Outgoing inspection report	 1 AC output connector	 1 485 terminal
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3.3. Installation tools

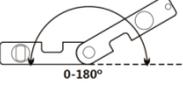
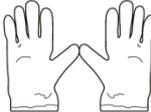
The following tools are required for installation of the inverter and electrical connections; therefore, they must be prepared before installation.

No.	Tool	Function
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
3	 Wire stripper	To prepare the cables for wiring
4	 Adjustable spanner (opening greater than 32 mm)	To tighten the bolts



5		4 mm Allen key	To screw the inverter to the wall-mounting bracket and to open the front cover of the inverter
6		RJ45 crimping tool	To crimp the RJ45 connectors for the communication cables
7		Rubber hammer	To insert the expansion plugs into the wall holes
8		MC4 removal tool	To remove the DC connectors from the inverter
9		Diagonal pliers	To cut and tighten the cable ends
10		Wire stripper	To remove the outer sheath of the cables
11		Cable cutter	To cut the power cables
12		Crimping tool	To crimp the power cables
13		Multi-meter	To check the voltage and current values
14		Marker pen	To mark the wall for better fixing precision

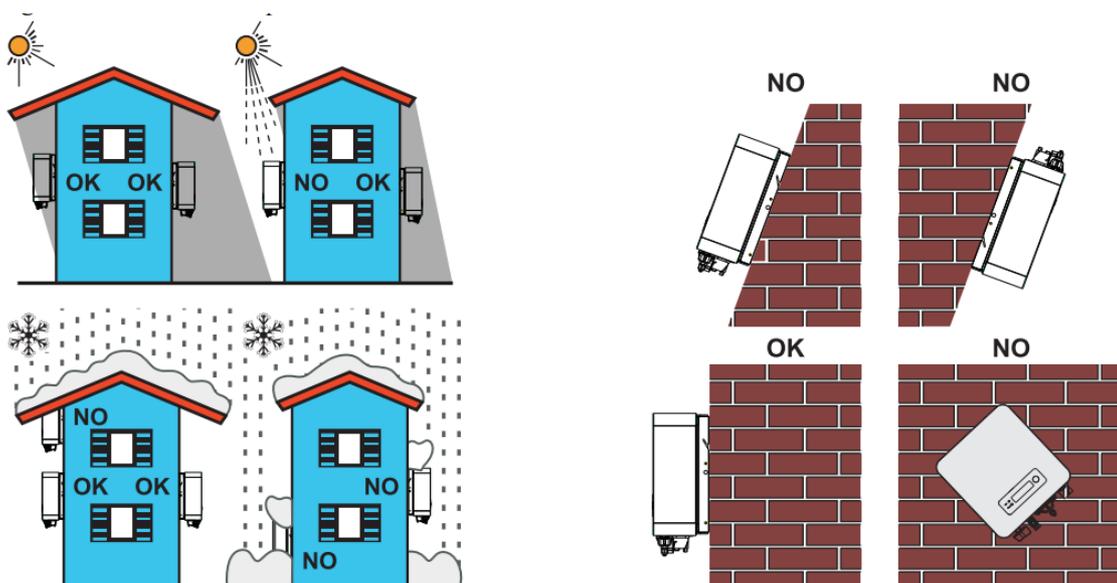


15		Measuring tape	To measure distances
16		Level	To make sure the bracket is level
17		ESD gloves	Protective clothing
18		Safety goggles	Protective clothing
19		Protection mask	Protective clothing

3.4. Installation position

Choose an appropriate installation location for the inverter.

Follow the requirements below to determine the installation position.



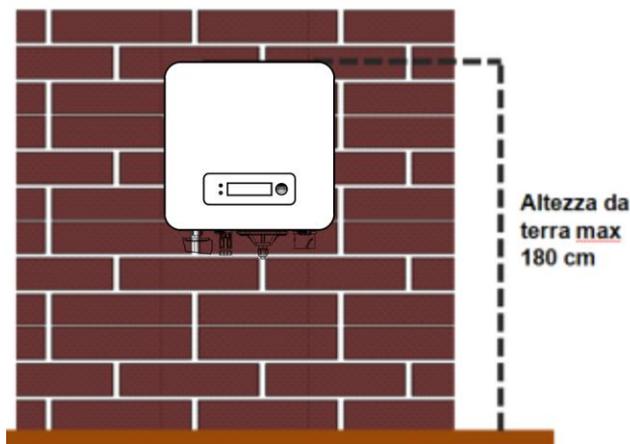
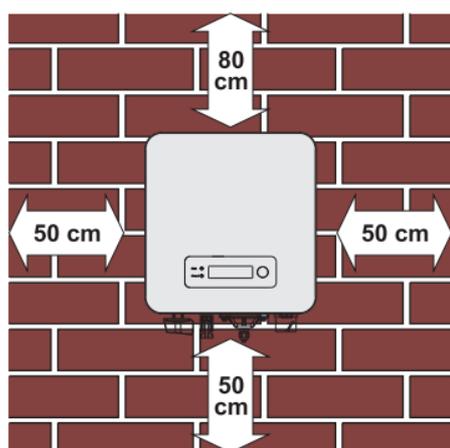
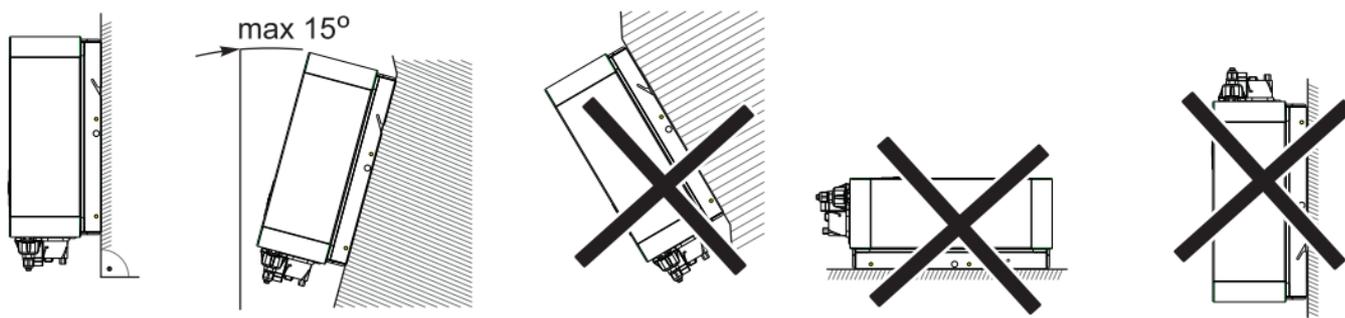


Figure 9 - Requirements or installing a single inverter

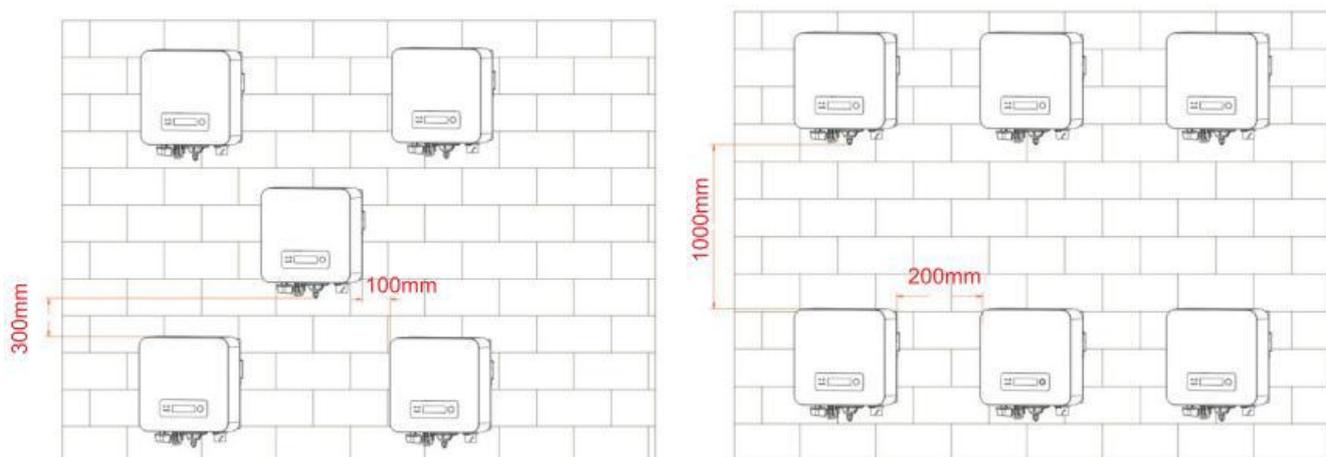


Figure 10 - Requirements for installing multiple inverters

For safety reasons, ZCS 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.

3.5. Moving the 1PH 1100TL-3300TL-V3 inverter

This section describes how to move the inverter correctly

Open the packaging and remove the protective cover in polystyrene, insert your hands into the slots on both sides of the inverter and take a hold of it, as shown in figures 11 and 12.

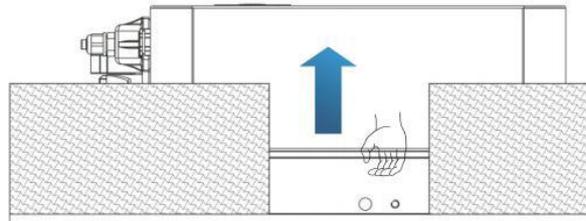


Figure 11 - Removing the polystyrene protections

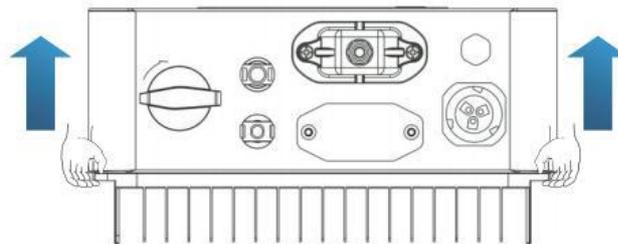


Figure 12 - Removing the inverter from its packaging

Lift the inverter from its packing box and move it to the installation position, then remove the polystyrene protections.

	<ul style="list-style-type: none"> • 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.
Attention	

3.6. Installing the 1PH 1100TL-3300TL-V3 inverter

1) Correctly position the mounting bracket on the wall using a level to ensure that it is straight; mark the 3

holes using a suitable marker pen. Keeping the hammer drill perpendicular to the wall and avoiding any sudden movements when drilling, drill the 3 holes at the points marked on the wall using a 6 mm drill bit. In case of errors during drilling, it is necessary to reposition the holes.

- 2) Insert the plugs horizontally into the holes made, paying attention to the force and depth with which they are inserted (make sure the plug completely enters the hole).
- 3) Align the mounting bracket with the position of the holes and fix it to the wall using the screws and flat washers supplied, tightening them properly.
- 4) Place the inverter on the mounting bracket
- 5) Secure the inverter to the mounting bracket with the M5 bolt to ensure stability.
- 6) (OPTIONAL) Depending on the customer's requirements, the inverter can be locked to the mounting bracket with a safety lock (not supplied with the kit).

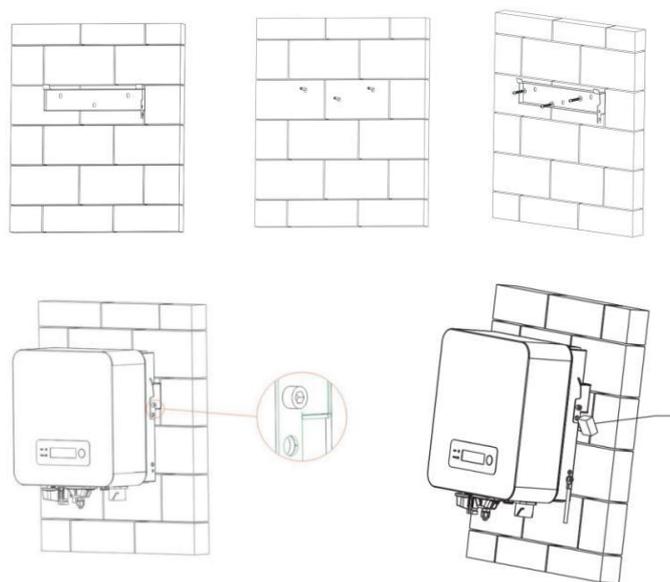


Figure 13 - Steps for mounting the inverter on the wall

4. Electrical connections

General information in this chapter

This chapter describes the electrical connections of the 1PH 1100TL-3300TL-V3 inverter. Carefully read this section before connecting the cables.

NOTE:

Before making any electrical connections, ensure that the DC circuit breaker is switched off. Please note that the capacitors in the inverter may remain electrically charged after the DC circuit breaker has been switched off. Therefore, it is necessary to wait at least 5 minutes to allow the capacitor to discharge completely.

	<p>The inverter must be installed and serviced by professional technicians or electricians.</p>
<p>Attention</p>	
	<p>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.</p>
<p>Danger</p>	
	<p>The maximum open-circuit voltage of the photovoltaic string must be less than 500 V for each 1PH 1100TL-2200TL-V3 inverter and less than 550V for each 1PH 2700TL-3300TL-V3 inverter.</p> <p>The 1PH 2700TL-3300TL-V3 series has only one independent input channel (MPPT); all the photovoltaic modules connected to it must be of the same model and brand. They must be connected in series and have the same orientation (solar azimuth and inclination angle).</p>
<p>Note</p>	

4.1. Electrical connections



Figure 14 – Steps for connecting the cables

4.2. Ground cable connections (PGND)

Connect the 1PH 1100TL-3300TL-V3 inverter to the ground electrode using ground protection cables (PGND).

	<p>The inverter does not have a transformer, therefore the positive and negative polarities of the photovoltaic string do NOT need to be grounded. Otherwise, the inverter may fail. All non-current-carrying metal parts (such as the PV module frame, PV rack, housing of the combiner box, and housing of the inverter) in the PV power system must be connected to the ground.</p>
Attention	

Prerequisites:

Prepare the PGND cables to be connected (it is recommended to use outdoor power cables with a cross-section of 4 mm² suitable for grounding). It is recommended to use yellow-green cables for better identification.

Procedure:

Remove an adequate length of the external insulation layer using a wire stripper, as shown in Figure 15.

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

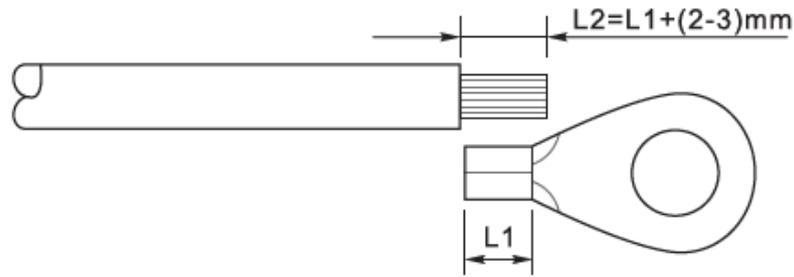


Figure 15 - Preparing the ground cable (1)

1. Insert the exposed wires in the OT terminal and crimp them using a crimping tool, as shown in Figure 16.

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.

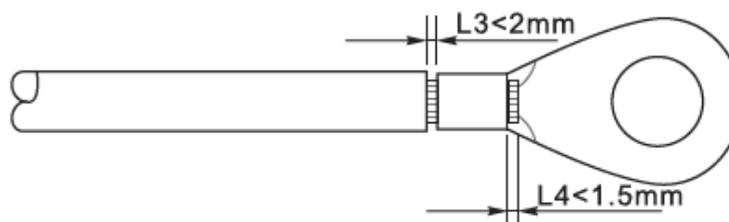


Figure 16 - Preparing the ground cable (2)

2. Install the crimped OT terminal and flat washer using the M5 screw in the hole located on the inverter heatsink, as shown in the figure; tighten the screw to a torque of 3 Nm using an Allen key.

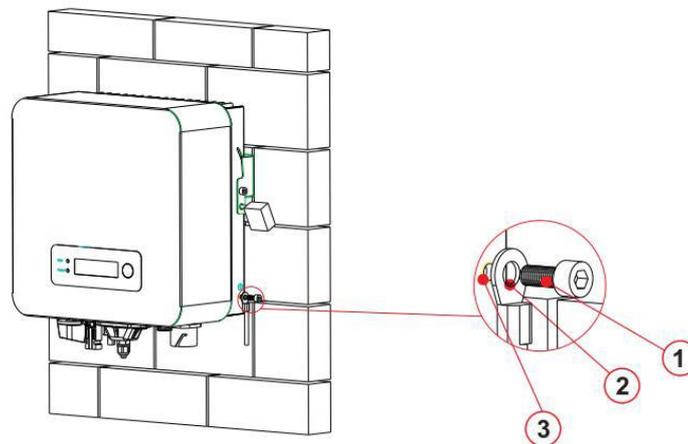


Figure 17 - Connecting the ground terminal

4.3. Connecting the DC input power cables

Connect the 1PH 2700TL-3300TL-V3 inverter to the photovoltaic strings using DC input power cables.

Note

Depending on the type of inverter, select the appropriate inverter accessories (cables, fuse holder, fuse, switch, etc). The inverter associated with the PV array must offer excellent performance and reliable quality. The open-circuit voltage of the photovoltaic system must be lower than the maximum DC input voltage of the inverter. The output voltage of the strings must be compatible with the MPPT voltage range.

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

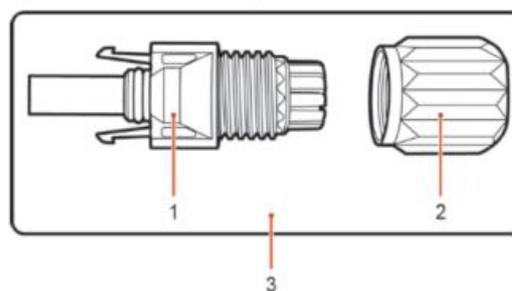
	<p>Make sure that the following information is observed. Otherwise, there is a risk of fire.</p> <ul style="list-style-type: none"> • The modules connected in series in each string must have the same brand and model. • The open-circuit voltage for each string must be less than 1000 VDC. • The output power for each PV string must be less than or equal to the maximum input power allowable for 1PH 2700TL-3300TL-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.
<p>Attention</p>	

	<ul style="list-style-type: none"> • Before connecting the power supply, be sure to disconnect the generator's DC switch. When exposed to the sun, the photovoltaic generator produces a voltage that can be dangerous! • Before connecting the power supply, make sure that the voltage of the DC cables is within the permissible operating range and that the DC circuit breaker switch is open. Otherwise, the high voltage may cause serious damage.
Danger	
	<ul style="list-style-type: none"> • 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.
Note	

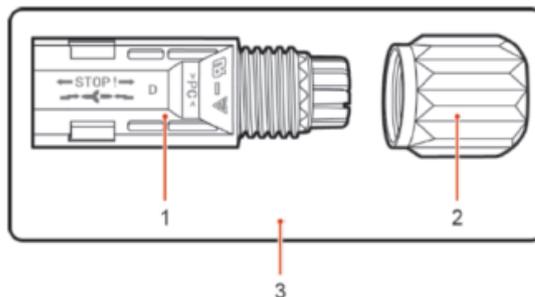
Cross section (mm ² / AWG)		Outer diameter of cable (mm)
Range	Recommended value	
4.0-6.0 / 11-9	4.0 / 11	4.5 - 7.8

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



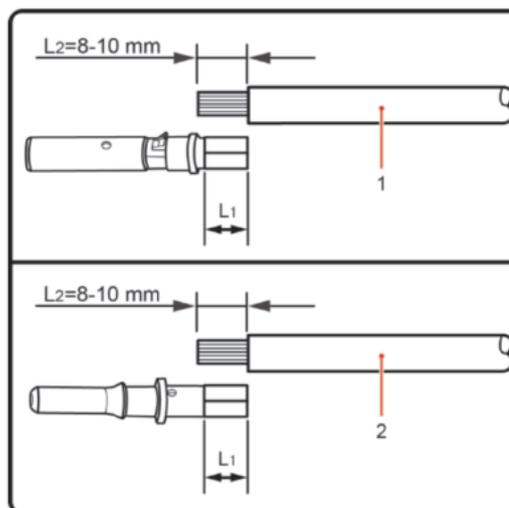
1. Housing 2. Cable gland 3. Negative connector

Figure 18 - Positive (1) and Negative (2) MC4 connectors

Note: The positive and negative metal terminals are packed together with the positive and negative connectors respectively. Separate the positive and negative metal terminals after unpacking the inverter so as to avoid confusing the polarities.

Procedure

- 1) Remove the cable glands from the positive and negative connectors.
- 2) Remove an appropriate length of the insulation layer from the positive and negative power cables by using a wire stripper, as shown in the figure.



1. Positive power cable 2. Negative power cable

Figure 19 - 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, as shown in Figure 20

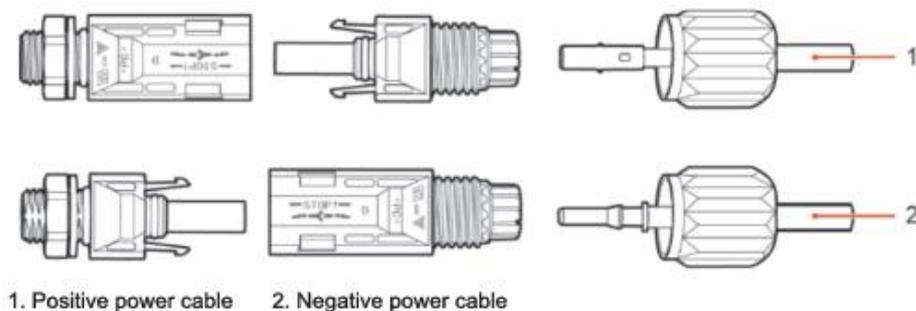


Figure 20 - Connecting the DC input power cables (2)

- 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.

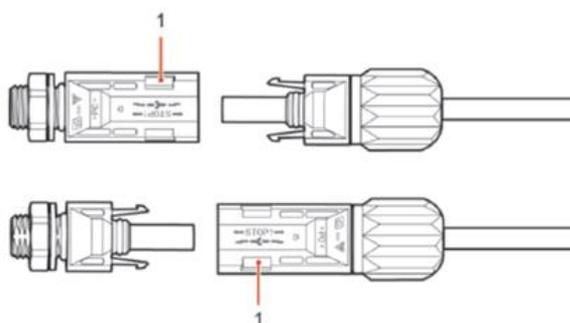


Figure 21 - Connecting the DC input power cables (3)

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

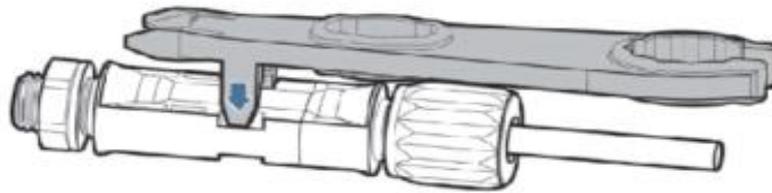


Figure 22 – Removing the DC connector

4.4. Connecting the AC output power cables

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

	<ul style="list-style-type: none"> • Do not use the same AC circuit breaker for multiple inverters. • Do not install loads between the inverter and the AC circuit breaker. • The switch used as a disconnection device should always be operational and ready to operate.
Warning	

Context

The AC power cables used for the inverter must be three-pole outdoor cables. For easier installation, use flexible cables. The table lists the recommended specifications for cables and circuit breakers.

Type	1100TL-V3	1600TL-V3	2200TL-V3	2700TL-V3	3000TL-V3	3300TL-V3
Cable (mm ²)	>4	>4	>4	>6	>6	>6
Switch	16A/400V	16A/400V	25A/400V	25A/400V	25A/400V	25A/400V

Table 2 – Recommended specifications for AC output cables

Note: For safety reasons, make sure to use suitably sized cables, otherwise the current may cause overheating or overloading, which could result in a fire.

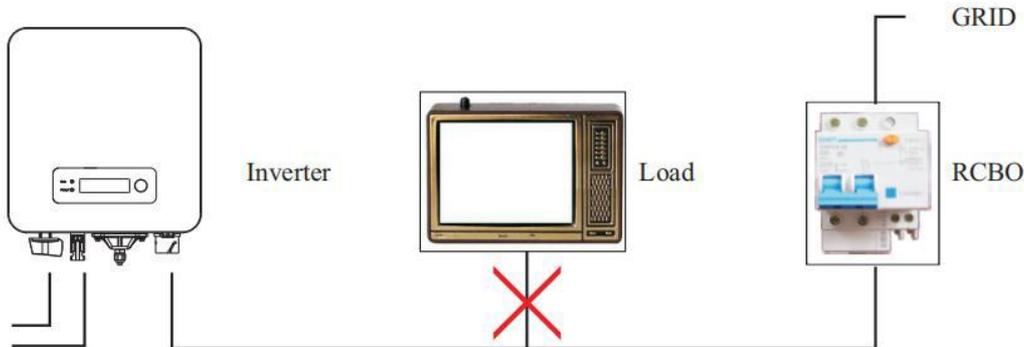
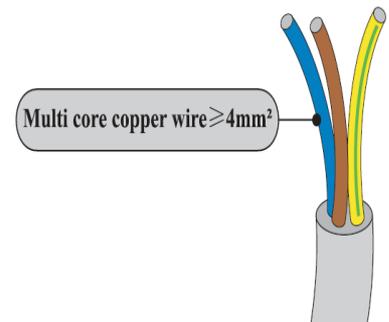


Figure 23 – Do not connect loads between the inverter and circuit breaker

Multi-core copper cables

The cross-section of the power line must be sized in order to prevent unwanted disconnections of the inverter from the grid due to high impedance of the cable connecting the inverter to the point of supply. In fact, excessive impedance could cause an increase in the AC voltage, which in turn may cause the inverter to disconnect from the grid. In addition, the AC cable must be correctly sized to ensure that the loss of power on the cable is less than 1% of the rated power and to ensure the proper functioning of the anti-islanding protection. The cable length from the inverter to the grid should not exceed 150 meters.



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

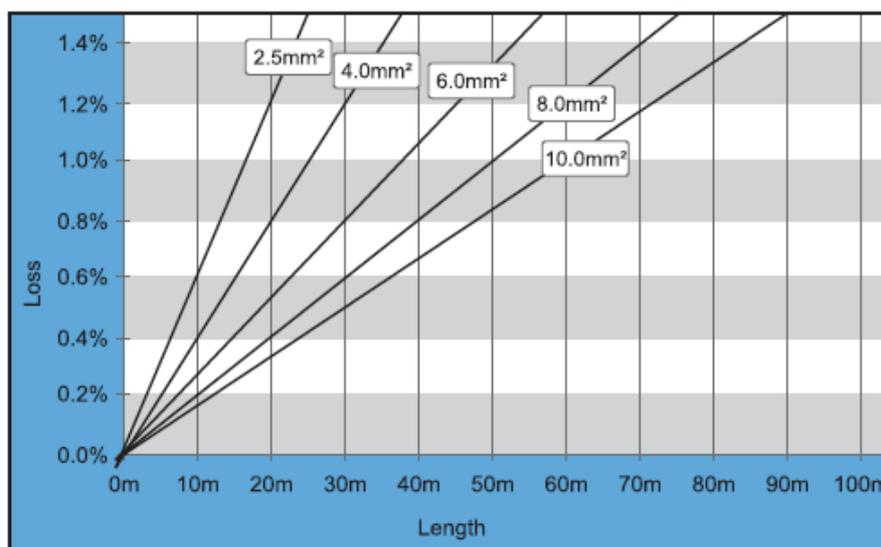


Figure 24 - Relationship between power loss, length and cable cross-section

The 1PH 11100TL- 3300TL-V3 inverters are single-phase output inverters that fully comply with the local grid connection requirements and safety standards.

The inverters are equipped with AC output connectors with IP66 protection suitable for photovoltaic use; the installer of the system is responsible for connecting the AC output cable; the figure of the AC connector is shown below.

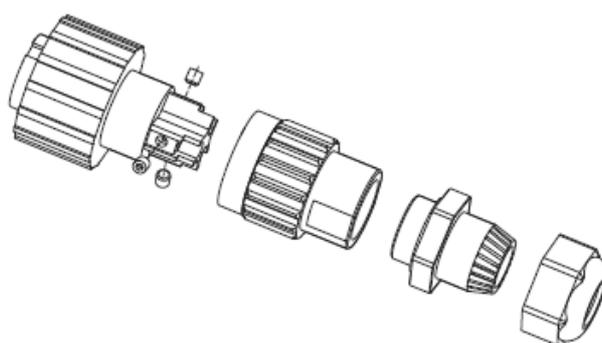


Figure 25 - AC Output Connector

Cable connection procedure

- 1) Identify the suitable cables as shown in table 2 and remove an appropriate length of the protective sheath, as shown in the figure (A: 30~50 mm B: 6~8 m).

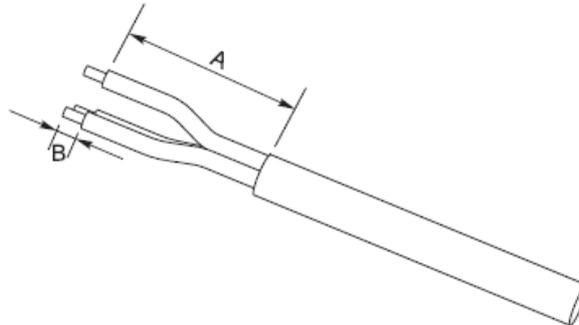


Figure 26 - Connecting the AC output cables (1)

- 2) Disassemble the AC connector as shown in the figure below; insert the AC output cable (with its stripped insulation layer as shown in step 1) through the PG waterproof cable gland.

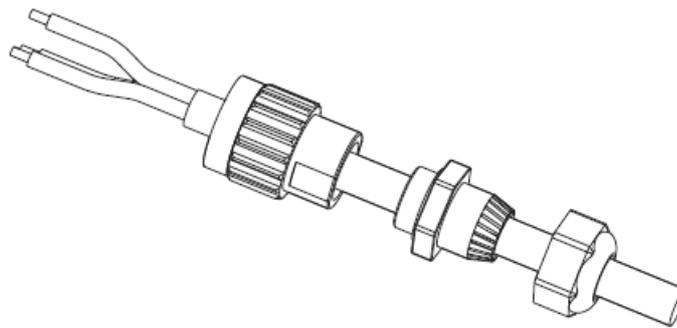


Figure 27 - Connecting the AC output cables (2)

- 3) Connect the AC power cable according to the following criteria:
 - Connect the ground wire (yellow-green) to the hole labelled “PE”, and tighten the cable with an Allen key;
 - Connect the line wire (brown) to the hole labelled “L”, and tighten the cable with an Allen key;
 - Connect the neutral wire (blue) to the hole labelled “N”, and tighten the cable with an Allen key;

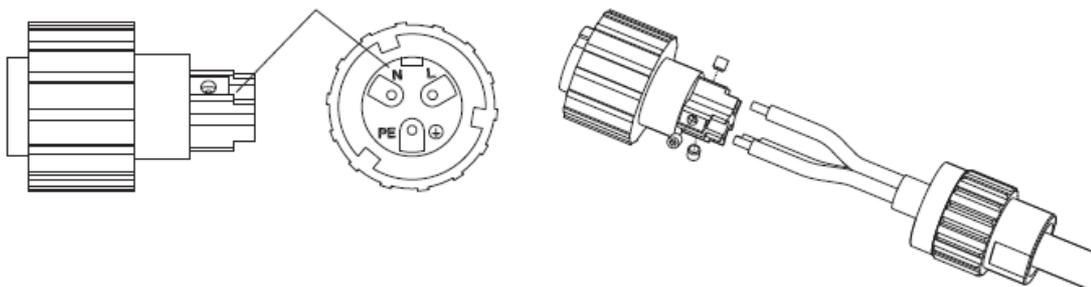


Figure 28 - Connecting the AC output cables (3)

- 4) Secure the clamping cable gland by rotating it in a clockwise direction, as shown below; make sure that all the wires are securely connected
- 5) Connect the AC output connector to the output terminal of the inverter; turn the AC connector in a clockwise direction until the fixing device reaches its intended position, as shown below:

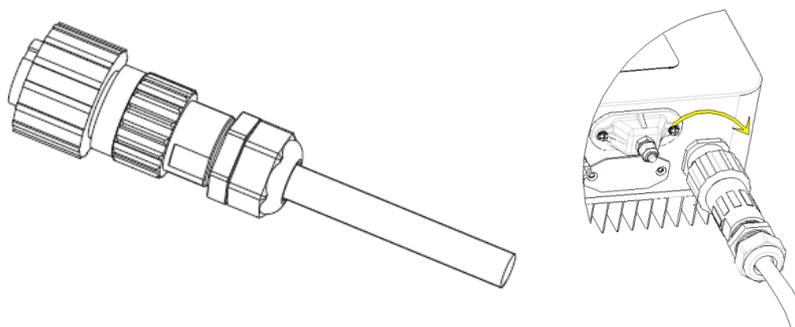


Figure 29 - Connecting the AC output cables (4)

Cable disconnect procedure

Disconnect the AC connector from the output terminal of the inverter, turning it in an anti-clockwise direction until the fixing device reaches its intended position, as shown below:

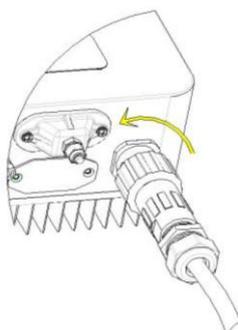


Figure 30 - Disconnecting the AC output cables

	<ul style="list-style-type: none"> • Make sure the grid is correctly disconnected before removing the AC connector.
Warning	

4.5. Connecting the communication cables

The figure below shows the arrangement of the communication ports on the inverters

1PH 1100TL - 3300TL-V3.

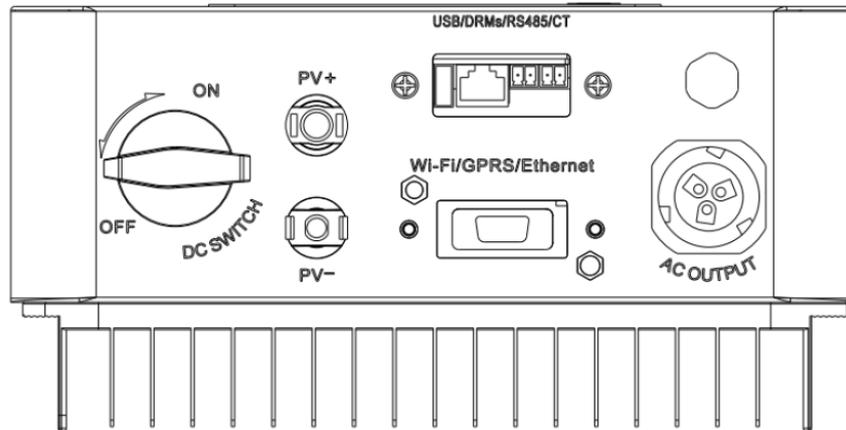


Figure 31 - Arrangement of communication ports

Connecting the communication port

Note: The wiring procedure is the same for the RS485 input, I/O input and CT input. This chapter describes the procedure for connecting the communication cables.

Communication ports	RS485	CT
Cable cross-section	0.5 - 1.5 mm ²	0.5 - 1.5 mm ²
Outer diameter	2.5~6 mm	2.5~6 mm

Table 3 - Recommended specifications for communication cables

- 1) Remove the central waterproof cover of the communication terminal block using a star screwdriver;

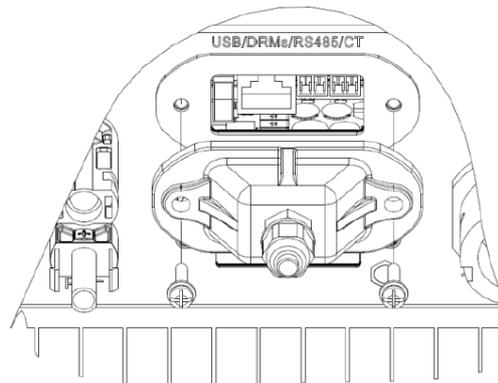


Figure 32 – Removing the central cover

- 2) Turn the waterproof cable gland; remove the cap in the waterproof cable gland;

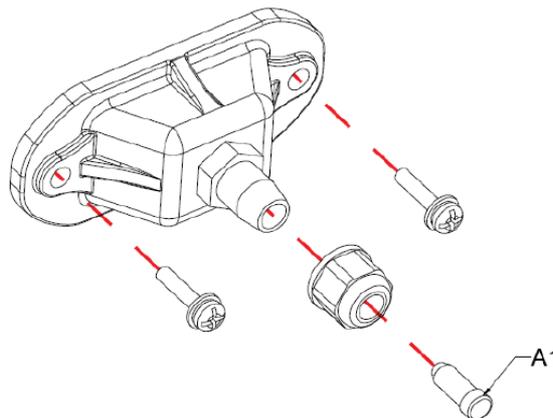


Figure 33 – Removing the cable glands and stoppers

Note: The waterproof connectors refer respectively to (from left to right): RS485 and CT. Remove the waterproof connectors according to the communication functions to be used. DO NOT remove the unused connectors.

- 3) Choose a suitable cable according to Table 3 and remove the outer insulation part using a cable stripping tool (6 mm); thread the cable through the cable gland and the waterproof cable glands.
- 4) Choose the terminal according to Table 4, connect the cables as shown in the labels and secure them using a flat screwdriver.

Note: keep the unused terminals for future use.

Type	RS485		CT	
Connector				
Label	TX-	TX+	CT+	CT-
Function	RS485 differential signal -	RS485 differential signal +	CT+	CT-

Table 4 - Description of the communication terminals and their function

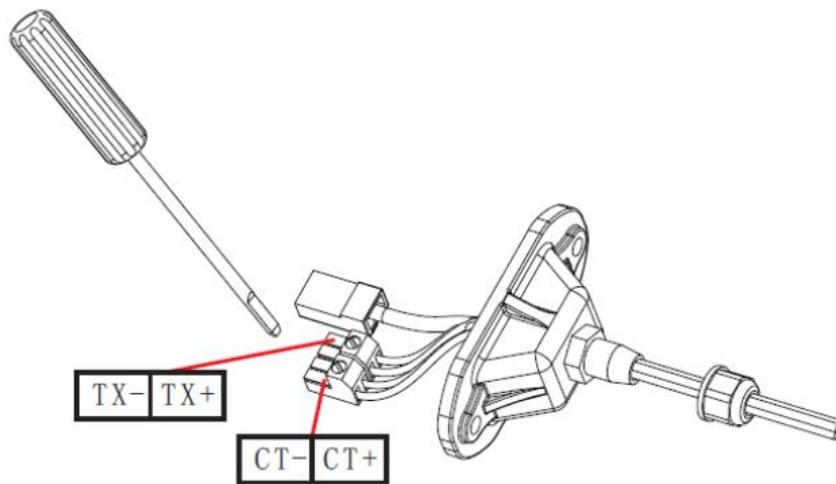


Figure 34 - Tightening the terminals on the cables

- 5) Insert the terminal according to the printed label, then tighten the screws to secure the waterproof cover; turn the cable glands clockwise to tighten.

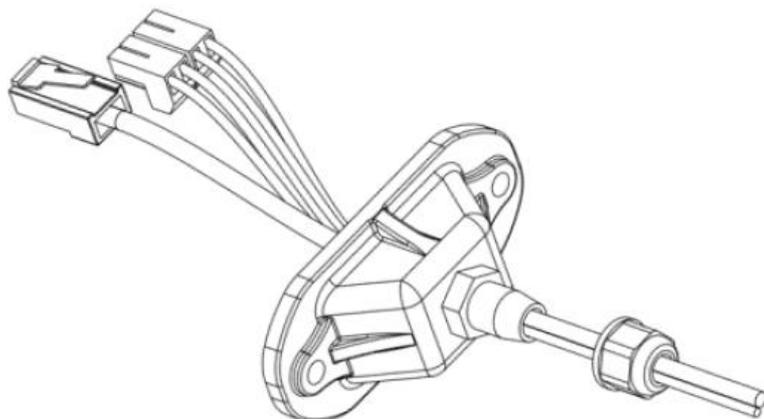


Figure 35 - Closing the central door

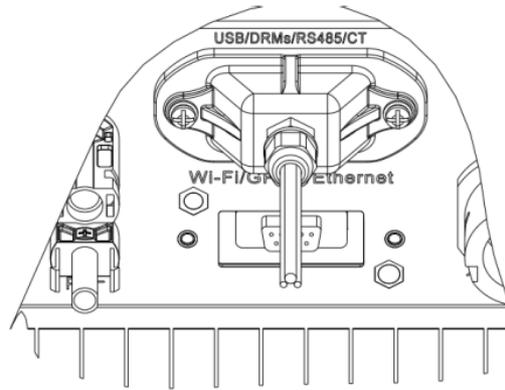


Figure 36 - Closing the central door



5. Commissioning the inverter

5.1. Safety inspection before commissioning

	<p>Make sure that the DC and AC voltages fall within the range permitted by the inverter.</p>
<p>Attention</p>	

- **Photovoltaic strings**

Before turning on the inverter, it is necessary to examine the photovoltaic string. Check the open-circuit voltage of each photovoltaic panel and compare it with the data in the technical datasheet.

- Make sure that the open-circuit voltage of each PV string corresponds to the technical data and that it is lower than the maximum input voltage permitted by the inverter
- Make sure that the positive and negative polarities are correct.

- **DC Connection**

Use the multi-meter to check the voltage on the DC side; check the DC cable, make sure that the positive and negative polarities are not inverted, and are consistent with the positive and negative polarities of the photovoltaic string.

- **AC Connection**

Make sure that the AC switch of the inverter is off. Check that the inverter is connected to the grid properly. Check that the phase voltage is within the correct range. If possible, measure the THD; if there is too much distortion, the inverter may not operate.

5.2. Starting the inverter

- 1) Turn ON the DC switch both on the field panel and on the photovoltaic inverter; wait for the screen to turn on.
- 2) Turn ON the AC switch installed on the wall.

When the photovoltaic string generates enough direct current, the inverter will start automatically. The word “normal” shown on the screen will indicate the correct functioning of the inverter.

- 3) Set the correct country code (refer to chapter 6.3 of this manual).

Note: Different grid operators in different countries require different specifications regarding the grid connections of PV inverters. Therefore, it is very important to select the correct country code according to the requirements of the local authorities.

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

Zucchetti Centro Sistemi S.p.A. shall not be held responsible for any consequences resulting from the incorrect selection of the country code.

If the inverter indicates the presence of any faults, refer to chapter 7.1 of this manual or contact the Zucchetti Centro Sistemi S.p.A. technical support.

6. 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 1.1K-3.3K TL inverters.

6.1. Operating panel and display

Buttons and LED indicators



Figure 37 – LCD display with buttons and LED indicators

Single button:

- Long press the button to enter the menu and confirm the selection
- Short press the button to move to the next section
- Scroll through all the menus to return to the homepage

Indicator lights:

- Status light (GREEN)
 - Flashing: wait or status check
 - Steady: normal operation
 - Off: temporary or permanent error

- Warning light (RED)
 - Steady: temporary or permanent error
 - Off: normal operation

6.2. Main interface

Below are some examples of the main screen, obtained by short pressing the key.

- Voltage and current present on the channel
- Power produced by the inverter
- Energy produced during the day (depending on the time setting)
- Total energy produced by the inverter
- AC grid voltage and AC current produced
- AC grid voltage and frequency of the grid
- Wi-Fi network connection icon or RS485 cable
- AC grid disconnection error

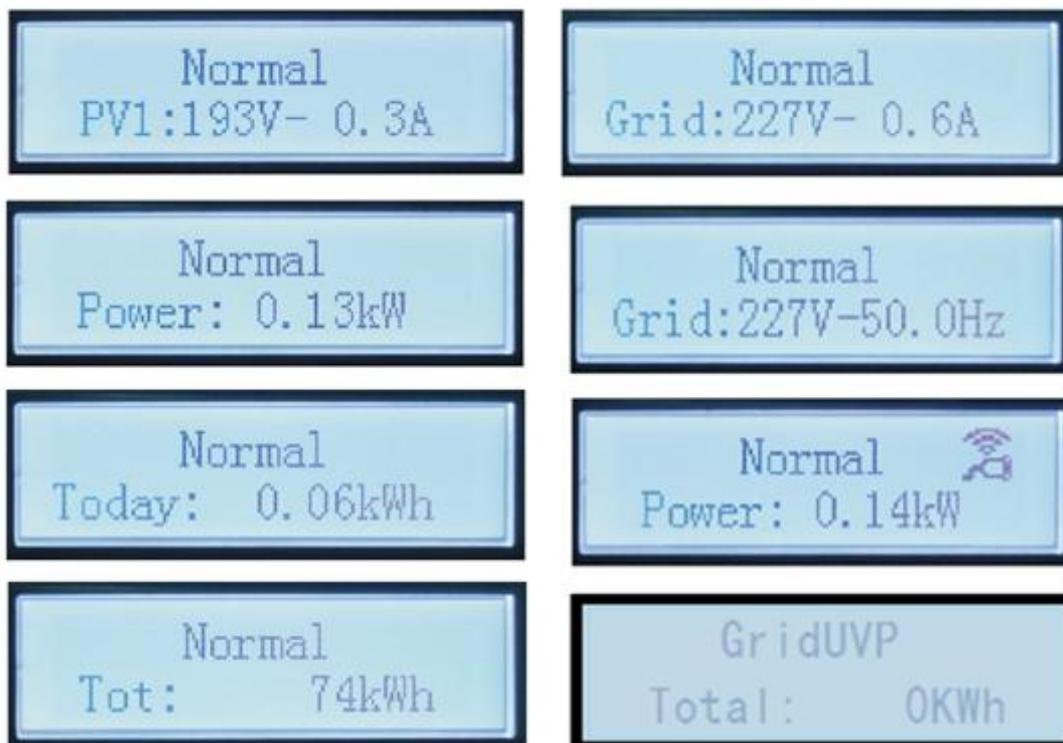
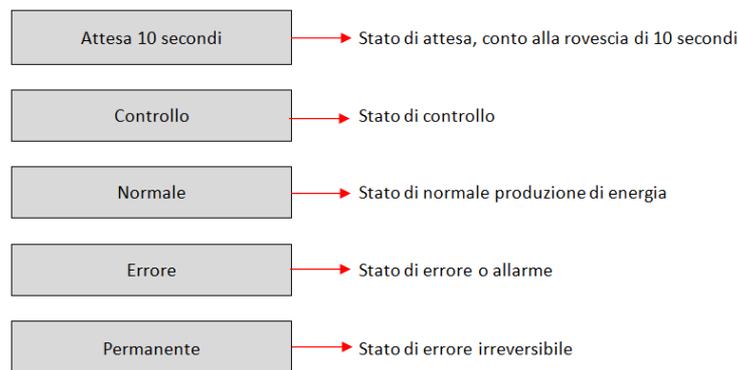


Figure 38 - Example of main screens on the display

At start up, the LCD screen displays “ZCS INNOVATION...,” as shown in the figure below, when the control board is correctly connected to the communication board, the LCD display will show the current status of



the inverter, as shown in the figure below.



Inverter statuses include:

Wait: the inverter is waiting for the control status at the end of the reconnection time. In this status, the PV voltage must be higher than 100 V, the grid voltage value must be between the minimum and maximum permissible limits, as should the other grid parameters; otherwise, the inverter will go into an error state.

Control: the inverter is checking the insulation resistance, relays and other safety parameters. It also runs a self-test to ensure that the software and hardware of the inverter are functioning properly. The inverter will go to an error state if any faults or anomalies are found.

Normal: the inverter is functioning properly and is feeding power into the grid. If any faults are found, the inverter will go into an error state.

Error: the inverter has encountered a non-permanent error. If the error disappears on its own, the inverter will return to its normal state. If the error continues, please check the error code.

Permanent error: the inverter has encountered a permanent error. The installer must debug this type of error according to the code found in order to bring the inverter back to its proper functioning.

If the control board and communication board are not connected, the interface of the LCD display appears as shown in the figure below.



6.3. Main menu

Long press (3 seconds) the button when you are in the main interface screen to enter the main menu, which will appear as follows:



(A) Press the key for 3 seconds to enter the “Settings” menu.

When the country code is set at 01 (CEIO-21 Internal), the “Settings” menu shows the following sub-menu:

1. Impostazioni		
	1. Data e Ora	13. HZ Sicurezza
	2. Azzera Energia	14. Isolamento
	3. Elimina Eventi	15. Test Relay
	4. Imposta Paese	16. Imp Reattiva
	5. Contr Remoto	17. Derating P(W)
	6. Comando Relay	18. Contr P(rete)
	7. Abilita Paese	19. Autotest Fast
	8. ImpostaEnergia	20. Autotest STD
	9. Indiriz Modubs	21. Imposta P(f)
	10. Lingua	22. Imposta Q(v)
	11. Parametrilniz	23. Control 81.S1
	12. V Sicurezza	

Short press the key to go to the next item of the menu.

1. Date and time

Select “1. Date and time” and long press the key to enter the menu for setting the date/time. First set the date and then the time by short pressing the key to change the number in a progressive manner. Long press the key to move to the next digit. The date and time are expressed in the format: 20YY – MM - DD HH:MM:SS.

The display will show “OK” if the setting is correct and “Error” in case of an error. The date and time are visible in the submenu “4. Time” in the main menu.

2. Clear Energy

Select “2. Reset Energy” and long press the key to enter the menu for deleting the energy data and in particular the daily and total energy produced, which is shown in the main interface. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, the inverter will delete the data relating to the energy produced and the display will show “OK” if the setting is successful.

3. Clear Events

Select “3. Clear Events” and long press the key to enter the menu for clearing historical events, i.e. to delete all error warnings present in the “List of historical events” submenu. Long press the key to start the procedure; the display will show “OK” if the operation is successful.

4. Set Country

Select “4. Set Country” and long press the key to enter the menu for setting the national grid regulations. If “Setting disabled” appears, go to point “7. Enable Country” to enable this function. Once the function has been enabled, repeat the above steps and set the code relating to the desired national regulations. Short press the key to increase the selected digit and long press the key to move to the next one and confirm. The display will show “OK” if the setting is successful. The current country code can be checked from the “System Info” menu.

Note: The change of the country code will take effect after the next start-up of the inverter.

For more information and to know the country regulations on board the inverter, refer to the following table.

Code	Country
00	Germany VDE AR-N4105
01	CEI 0-21 Internal
02	Australia
03	Spain RD1699
04	Turkey
05	Denmark
06	Greece - mainland
07	Netherlands
08	Belgium
09	UK-G59
10	China
11	France
12	Poland
13	Germany BDEW
14	Germany VDE 0126

Code	Country
17	Greece - islands
18	EUEN50438
19	IEC EN61727
20	Korea
21	Sweden
22	General Europe
23	CEI 0-21 External
24	Cyprus
25	India
26	Philippines
27	New Zealand
28	Brazil
29	Slovakia
30	Slovakia SSE
31	Slovakia ZSD

Code	Country
34	Brazil LV
35*	Mexico LV
36*	FAR Arrete23
37*	Denmark Tr322
38	Wide-Range-60HZ
39	Ireland EN504
40*	Thailand PEA
41*	Thailand MEA
42*	LV-Range-50HZ
43	EU EN50549
44	South Africa
45	AU-WA
46	Dubai DEWG
47	Dubai DEWG MV
48*	Taiwan

15	Italy CEI 0-16
16	UK-G83

32	CEI 0-21 Areti
33	Ukraine

49*	AU-VIC

Table 5 – Country Codes

5. Enable country

Select “7. Enable country” and long press the key to enter the menu for enabling this country code. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu.

This operation must be carried out if you want to change the Country code and it has not been changed during the last 24 hours of operation of the inverter.

6. Set Energy

Select “8. SetEnergy” and long press the key to enter the menu for setting the energy already produced by the photovoltaic system. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu. You can now set the amount of energy already produced by the system before installing the current inverter, which is visible from the main interface.

7. Modbus address

Select “9. ModBusAddress” and long press the key to enter the menu for selecting the communication address. Short press the key to increase the selected digit and long press the key to move to the next one and confirm. The display will show “OK” if the setting is successful.

The Modbus address indicates the address used by the inverter to send its data to the monitoring server. Address 01 is used for single inverters; to extend the monitoring to multiple inverters, use progressive communication addresses.

Note: make sure that the address entered is never 00, because this setting would exclude the possibility of communication between the inverter and Wi-Fi network.

8. Language

Select “10. Language” and long press the key to enter the menu for selecting the Language. Select the language by short pressing the key, then long press the key to confirm.

If the operation is successful, “OK” will be displayed; otherwise, “Error” will be displayed.

In the current firmware version (V1.00), the languages available are: Chinese, English, Italian, German, French and Portuguese; future firmware updates may add new languages.

9. Initial parameters

The user can change the start parameters directly from the LCD display. The user must first copy the TXT files to the SD card. These files can be requested from Zucchetti Centro Sistemi Spa technical support.

Select “11. InitParameters” and long press the key to enter the menu for setting the start parameters. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu. The new start parameters will now be loaded onto the inverter automatically.

If the setting is successful, “OK” will be displayed; otherwise, “Error” will be displayed.

Attention: do not enter this menu if the microSD card is not inserted in the appropriate slot of the inverter or if the correct TXT files have not been copied to it.

10. Safety Voltage

The user can change the value of the protection voltage directly from the LCD display. The user must first copy the TXT files to the SD card. These files can be requested from ZCS technical support.

Select “12. Safety Voltage” and long press the key to enter the menu for setting the protection voltage. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu. The new protection voltage will now be loaded on the inverter automatically.

If the setting is successful, “OK” will be displayed; otherwise, “Error” will be displayed.

Attention: do not enter this menu if the microSD card is not inserted in the appropriate slot of the inverter or if the correct TXT files have not been copied to it.

11. Safety Hz

The user can change the value of the protection frequency directly from the LCD display. The user must first copy the TXT files to the SD card. These files can be requested from ZCS technical support.

Select “13. Safety Hz” and long press the key to enter the menu for setting the protection frequency. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu. The new protection frequency will now be loaded on the inverter automatically.

If the setting is successful, “OK” will be displayed; otherwise, “Error” will be displayed.

Attention: do not enter this menu if the microSD card is not inserted in the appropriate slot of the inverter or if the correct TXT files have not been copied to it.

12. Insulation

The user can change the value of the insulation resistance directly from the LCD display. The user must first copy the TXT files to the SD card. These files can be requested from ZCS technical support.

Select “14. Insulation” and long press the key to enter the menu for setting the insulation resistance. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu. The new insulation resistance will now be loaded on the inverter automatically.

If the setting is successful, “OK” will be displayed; otherwise, “Error” will be displayed.

Attention: do not enter this menu if the microSD card is not inserted in the appropriate slot of the inverter or if the correct TXT files have not been copied to it.

13. Reactive Power Setting

Select “16. Reactive Set” and long press the key to enter the menu for setting the reactive power component produced. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu. At this point, short press the key to select the option “1.Enable” or “2.Disable” and confirm the selection by long pressing the key. If the “1.Enable” option is selected, short press the key to choose from “Under-excited”, “Grid Manager”, or “Over-excited.” You will be able to indicate the value of reactive power produced for each of them. If the setting is successful, “OK” will be displayed; otherwise, “Error” will be displayed.

14. Power derating

Select “17. Derating P(W)” and long press the key to enter the relative menu, from which you can enable the “Derating” function, i.e. the possibility to set the power produced by the inverter. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu. At this point, short press the key to select the option “1.Enable” or “2.Disable” and confirm the selection by long pressing the key. If the “1.Enable” option is selected, short press the key to select the percentage value (between 0 and 100) of the maximum power that the inverter will produce; if the solar radiation allows a greater amount of energy to be produced, the inverter will carry out the necessary operations to limit the output power to the set value. If the setting is successful, “OK” will be displayed; otherwise, “Error” will be displayed.

15. P(grid) Check

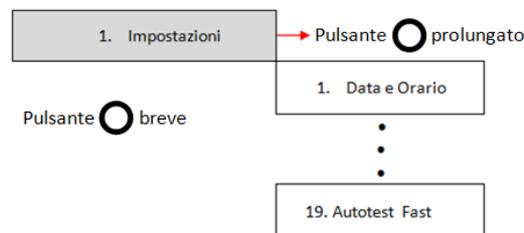
Select “18. P(grid) Check” and long press the key to enter the relative menu, from which you can enable the “Reflux Power” function, i.e. the possibility to set the maximum power fed into the grid. The display will show “Enter PWD!”; enter the password “0001” by short pressing the key to increase the selected digit. Long press the key to move to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password entered is correct, you can enter the menu. At this

point, short press the key to select the option “1.Enable” or “2.Disable” and confirm the selection by long pressing the key. If the “1.Enable” option is selected, short press the key to select the value (expressed in kW, up to two decimal places) of the maximum power that the inverter will feed into the grid. In this way the inverter can feed a maximum power of between 0 kW and the rated power of the inverter into the national grid, based on the solar radiation available and the domestic consumption. If the setting is successful, “OK” will be displayed; otherwise, “Error” will be displayed.

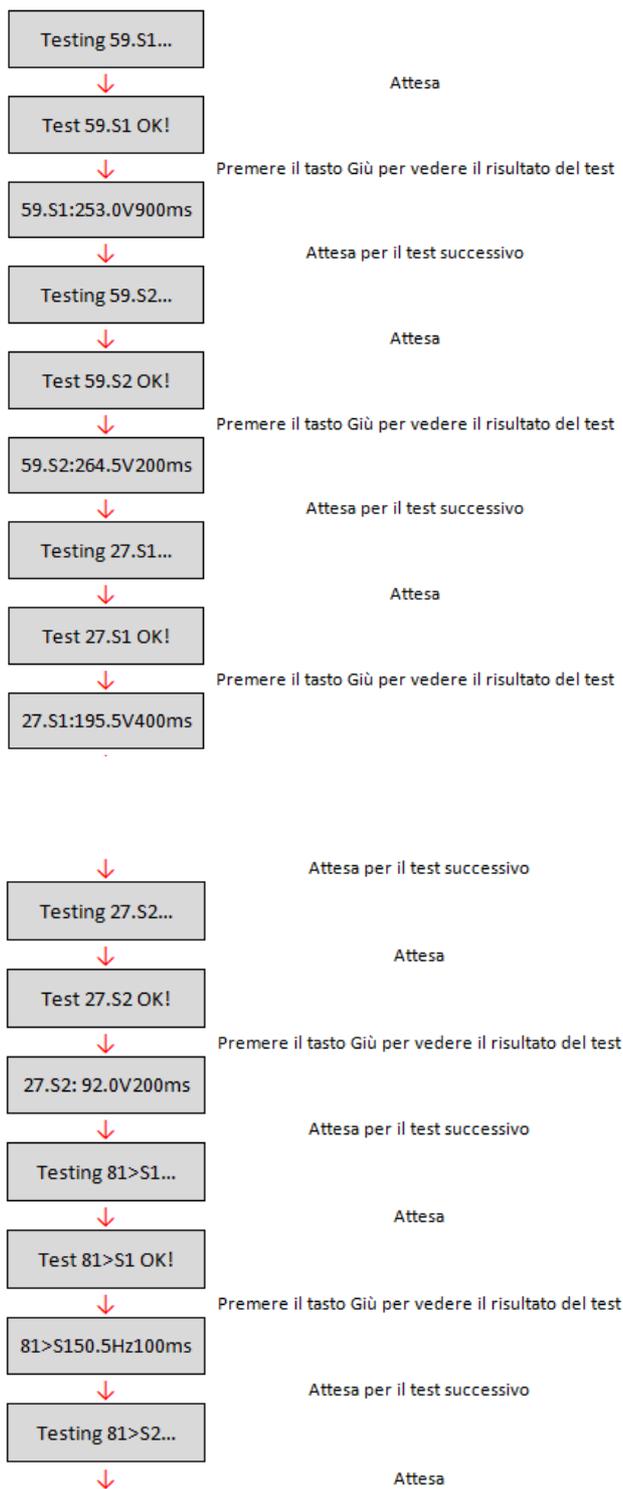
Note: To activate the Reflux Power mode in single-phase inverters, it is necessary to install a CT current sensor, as described in the appropriate procedure.

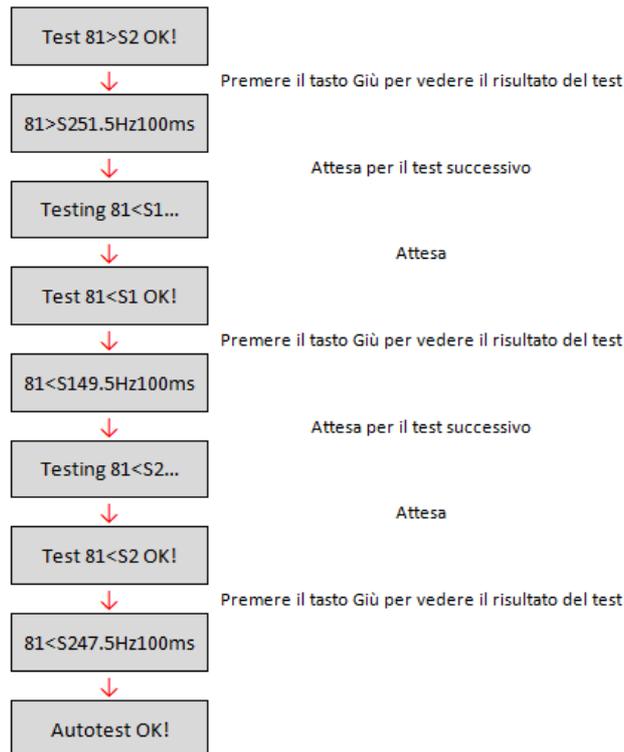
16. Fast self-test

- 1) During normal operation of the inverter, long press the key to enter the main menu.
- 2) Long press the key again to enter the “Settings” menu.
- 3) Short press the key several times until “19. Fast self-test” is displayed on the screen.



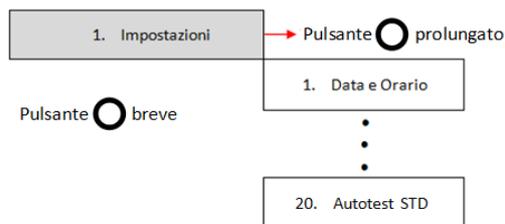
- 4) Long press the key to start the self-test.
- 5) The self-test will now start automatically; once completed, short press the key to display the self-test results, as shown in the figure.



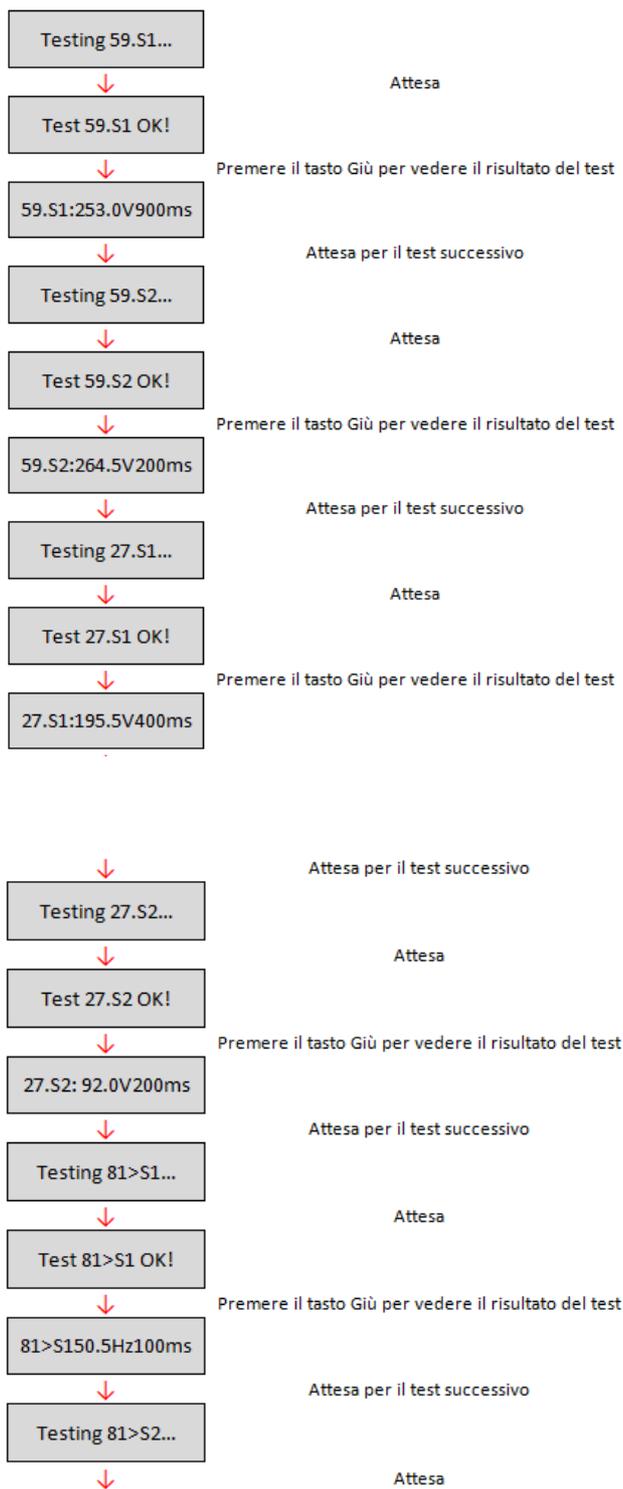


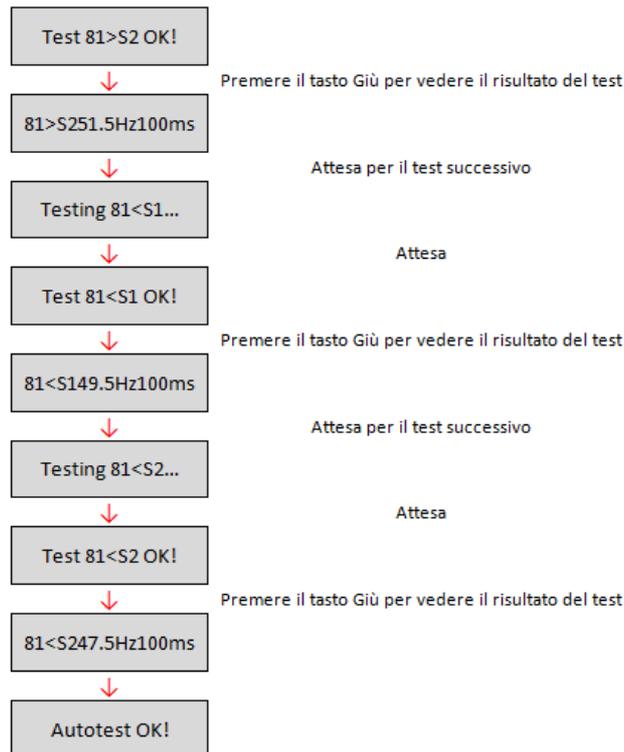
17. Standard Self-test

- 1) During normal operation of the inverter, long press the key to enter the main menu.
- 2) Long press the key again to enter the “Settings” menu.
- 3) Short press the key several times until “20. STD self-test” is displayed on the screen.



- 4) Long press the key to start the self-test.
- 5) The self-test will now start automatically; once completed, short press the key to display the self-test results, as shown in the figure.





18. P(f) Setting

Select “21. Set P(f)” and long press the key to enter the relative menu, from which you can change the active power according to the grid frequency required by the local regulations. This function may be required by various regulations for grid-connected inverters. Short press the key to change the selected value and long press the key to go to the next digit; it will be possible to set the time delay expressed in seconds (*.***s) before the modified P active power will intervene.

19. Q(v) Setting

Select “22. Set Q(V)” and long press the key to enter the relative menu, from which you can change the reactive power according to the grid voltage required by the local regulations. This function may be required by various regulations for grid-connected inverters. Short press the key to change the selected value and long press the key to go to the next digit; it will be possible to set the time delay expressed in seconds (*.***s) before the modified Q reactive power will intervene.

20. Control 81.S1

Select “23. 81.S1Check” and long press the key to enter the relative menu, from which it will be possible to enable the frequency restriction thresholds required in special cases by the local regulations. Short press the key to set the option “1. Enable 81.S1” and “2. Disable 81.S1” and select it by long pressing the key. The display will show “OK” if the setting is successful.

21. Disabled settings

The following functions:

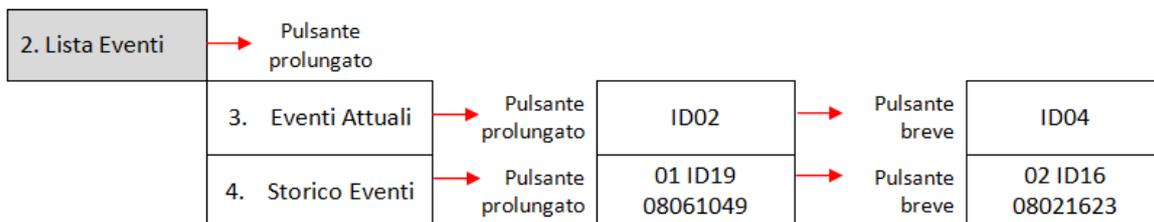
- Remote Control, relating to item “5. Remote Control”
- Relay Command, relating to item “6. Relay Command”
- Relay test, relating to item “15. Relay Test”

they cannot be used on this model of inverter; access to these submenus is not permitted either by the installer or by the end user. ZCS S.p.A. accepts no responsibility deriving from the activation of one of the settings described above.

(B) Long press the key to enter the “Event List” menu.

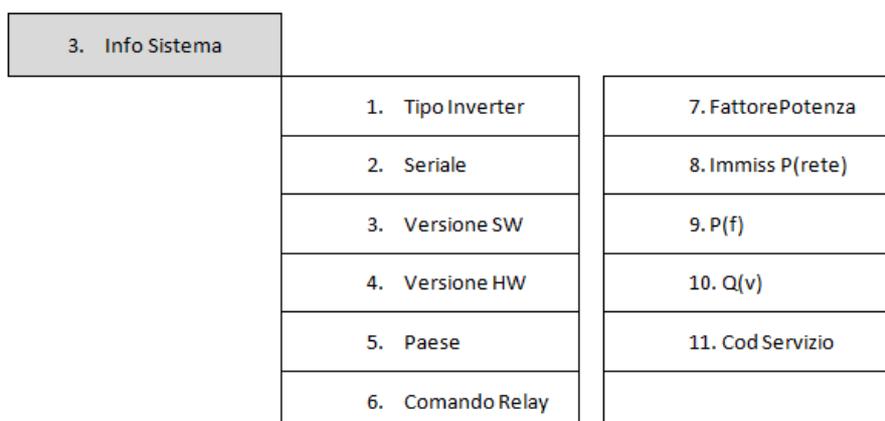
The “Event List” menu is used to display the events recorded by the inverter, both historical and in real time, showing the progressive number of the event, the identification code, the date and time of its occurrence. The user can access this interface from the LCD display to check the details of the alarms and alerts. Errors will be listed according to the date and time they occurred, so the most recent events will be listed first. For more information, refer to the figure below.

Long press the key in the main interface and then short press the key, then enter the menu “2. Event list.” From here you can select the “1. Current Events” menu for the list of current events or “2. Historical Events” for the list of historical events.



(C) Long press the key to enter the “System Info” menu.

The “System Info” menu contains the following submenus:



- Inverter type

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “1. Inverter type.” Here you can see the power of the inverter model

- **Serial number**

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “2. Serial number.” Here you can see the serial number of the inverter.

- **SW version**

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “3. SW version.” Here you can see the software version.

- **HW version**

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “4. HW version.” Here you can see the hardware version.

- **Country**

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “5. Country.” Here you can see the country code that has been set.

- **Power factor**

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “7. Power factor.” Here you can see the value of the power factor.

- **P(Grid) Feed-in**

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “8. P(Grid) Feed-in.” Here you can see the value of the set value of the power fed into the grid.

- **P(f)**

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “9. P(f).” Here you can see the P(f) value that has been set.

- **Q(v)**

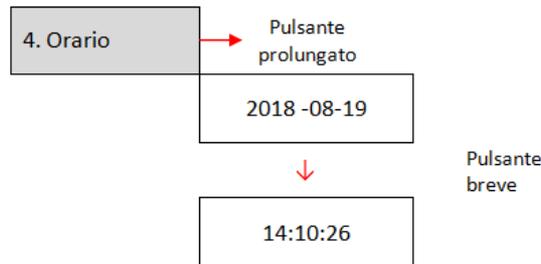
From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “10. Q(v).” Here you can see the Q(v) value that has been set.

- **Service Code**

From the “System Info” menu, short press the key to move it, and hold it down for a few seconds to enter the menu “11. Service Code.” Here you can see the currently installed firmware version.

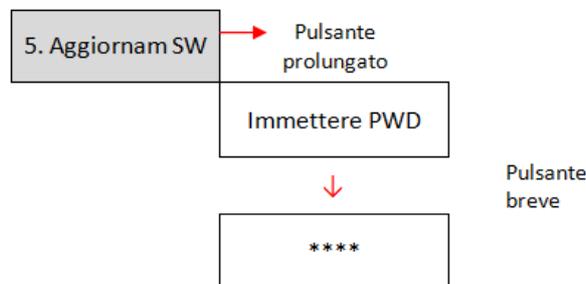
(D) Long press the key to enter the “Date and time” menu.

Long press the key in the main interface and then short press to enter the submenu “4. Date and Time”, then press the key again to display the current date and time set on the inverter.



(E) Long press the key to enter the “Update Software” menu.

Long press the key in the main interface and then short press to enter the submenu “5. Software Update”, then use the key again to access it. The display will show “Enter PWD!”; short press the key to increase the selected digit, and long press the key to go to the next one and confirm. If the display shows, “Error, try again!” press the key again and enter the password again. When the password has been entered correctly, you can enter the menu and start updating the firmware.



Note: You can check the firmware version currently installed on the inverter from the “Service Code” submenu found in the “System Info” menu.

IMPORTANT: Do not update the firmware unless you have first inserted the USB device into the appropriate port, or if the appropriate update files are not found in the USB device. Always make sure that the correct update files are loaded on the USB device and that the device is correctly inserted in the appropriate port.

Note: the USB device is not supplied with the inverter and must be procured by the installer or customer.

The complete and detailed procedure for updating the firmware is described below.

Update requirements

USB device (stick) at least 2 GB

PC with USB port

Firmware update procedure

1. Switch off the ZCS inverter by first disconnecting the AC power supply via the switch installed on the system, and then disconnecting the DC power supply via the switch located on the side of the inverter or switch off the system's disconnecting switch. Wait for the display to turn off completely.
2. Remove the central cover at the bottom of the inverter by unscrewing the two star screws, making sure to have first loosened the four cable glands.

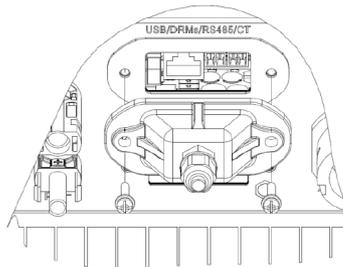


Figure 37 - Removing the central cover

3. Insert the USB device in the appropriate port of the PC, open the drive and create a new folder with the name *firmware*, making sure to match the lowercase and uppercase letters as indicated, and checking that there are no spaces. Now copy the files provided by ZCS to the *firmware* folder.
4. Extract the USB device from the PC using the “safely remove hardware” process.
5. Insert the USB device in the appropriate port of the inverter.
6. Only supply DC power to the inverter through the appropriate switch and wait a few seconds for the display to come on.
7. Long press the key from the display to enter menu, go to SOFTWARE UPDATE by short pressing the key. Enter the password *0715* and press “OK” again to start the update.
8. The update process will take about 3 minutes and will run automatically. The following indications will be followed:

DSP1 Update

DSP2 Update

ARM Update

9. Check that the inverter completes the update correctly and that “ZCS INNOVATION” appears on the display; the inverter will then start normally. If the update was not successful, one of the following messages will appear on the display: “Commun Err”, “UPDATE DSP1 FAIL” or “UPDATE DSP2 FAIL”; in this case, switch off the inverter, wait one minute and then restart the procedure from step 6.
10. Once the update has been completed successfully, it is necessary to change the country code: enter the “Settings” menu by long pressing the key, then short press the key to scroll down to the “Set Country” item and enter the country code 22.
11. Note: if the inverter has been running for more than 24 hours, this function must first be enabled from the “Enable Country” menu, which corresponds to item 6 of the “Settings” menu. Enter the password 0001.
12. Switch off the inverter via the disconnecting switch on the DC line.
13. Restart the inverter by supplying DC power and enter the “set country” menu again. Set the country code according to the appropriate grid standard (e.g. for Italy: CEI-021 INT, CEI-021 EXT, CEI-016).
14. Switch off the system and restart it after waiting a few minutes, as indicated in step 12.
15. The update procedure has now been completed, and the inverter can now be connected to the AC line by connecting it to the grid; The new firmware version can be checked from the “Service Code” submenu located inside the “System Info” menu.

7. Troubleshooting and maintenance

7.1. Troubleshooting

This section contains information and procedures on how to troubleshoot any faults and errors that may occur during operation of the 1PH 2700TL-3300TL-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 connections and the cables in good condition?
 - Are the configuration settings correct for the type of installation?
 - Are the display and flat cable correctly connected and not damaged?

Follow the steps below to display the recorded alarms:

Long press the key to enter the main menu from the standard interface. Select “Event List” in the menu screen, then long press the key to access 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 alarms occurs occasionally, the probable cause is that the electric grid is in an abnormal state. The inverter will automatically return to its normal operating state when the electrical grid is restored to
ID02	GridUVP	The grid voltage is too low.	

ID03	GridOFP	The grid frequency is too high.	its normal state. 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.
ID04	GridUFP	The grid frequency is too low.	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.
ID05	PvUVP	The input voltage is too low.	Check whether too many PV modules have been connected in series per string: therefore, the voltage (Voc) of the photovoltaic string is higher than the minimum input voltage of the inverter. In this case, increase the voltage of the PV string by adjusting the number of photovoltaic modules mounted in series, making sure that it matches the input voltage range of the inverter. The inverter automatically returns to its normal operating state after the string has been corrected.
ID06	Vlvrtlow	LVRT function error	Contact Technical Support
ID07	Vovrthigh	OVRT function error	
ID09	PvOVP	The input voltage is too high.	Check whether too many PV modules have been connected in series per string: therefore, the voltage (Voc) of the photovoltaic string is higher than the maximum input voltage of the inverter. In this case, decrease the voltage of the PV string by adjusting the number of photovoltaic modules mounted in series, making sure that it falls within the input voltage range

			of the inverter. The inverter automatically returns to its normal operating state after the string has been corrected.
ID10	IpvUnbalance	The input current is unbalanced.	Check the configuration of the input mode (parallel mode / independent mode) of the inverter, as indicated in Section 6.3 (C).
ID11	PvConfigSetWrong	Incorrect input mode	“6. Input Mode” of this user manual; if this setting is not correct, change it according to Section 6.3 (A) “10. Configuration of input mode” of this manual. If the input mode is correct, turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical Support.
ID12	GFCIFault	Faulty automatic differential circuit breaker.	If the fault occurs occasionally, the probable cause is that the external circuits have temporary faults. The inverter automatically returns to its normal operating state after the error has been fixed. If the fault repeats itself often and lasts for a long time, check whether the insulation resistance between the PV string and the ground is too low, then check the insulation conditions of the PV cables.
ID14	HwBoostOCP	The input current is too high and has caused the hardware protection to be activated.	Check if the input current is higher than the maximum input current allowed by the inverter, then check the input wiring; if both are correct, contact Technical Support.
ID15	HwAcOCP	The grid current is too high and has caused the hardware protection to be activated.	ID15-ID24 are internal faults of the inverter; turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check

ID16	AcRmsOCP	The grid current is too high.	that the fault is no longer present. If this is not the case, contact Technical Support.
ID17	HwADFaultIGrid	Sampling error of the grid current	
ID18	HwADFaultDCI	DCI sampling error	
ID19	HwADFaultVGrid	Sampling error of the grid voltage	
ID20	GFCIDeviceFault	GFCI sampling error.	
ID21	MChip_Fault	The Master Chip is faulty	
ID22	HwAuxPowerFault	Auxiliary voltage error	
ID23	BusVoltZeroFault	Sampling error of the bus voltage	
ID24	IacRmsUnbalance	The output current is unbalanced	If the configuration of the PV string is correct (no ID05 error is present), the possible cause is that the solar radiation is too low. The inverter resumes normal operation as soon as the solar radiation returns to levels compatible with the machine's functioning
ID25	BusUVP	The bus voltage is too low.	
ID26	BusOVP	The bus voltage is too high.	
ID27	VbusUnbalan	Bus voltage is unbalanced	Internal fault of the inverter; turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical Support.
ID28	DciOCP	The DCI is too high.	Check the configuration of the input mode (parallel mode / independent mode) of the inverter, as indicated in Section 6.3 (C). "6. Input Mode" of this user manual; if this setting is not correct, change it

			according to Section 6.3 (A) “10. Configuration of input mode” of this manual. If the input mode is correct, turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical Support.
ID29	SwOCPIstant	The grid current is too high.	Internal fault of the inverter; turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical Support.
ID30	SwBOCPIstant	The input current is too high.	Check whether the input current is higher than the maximum input current allowed by the inverter, then check the input wiring; if both are correct, contact Technical Support.
ID33	Reserved	Reserved	Reserved
ID49	ConsistentFault_VGrid	The grid voltage sampling value between the master DSP and slave DSP is not the same.	ID49-ID55 are internal faults of the inverter; turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical Support.
ID50	ConsistentFault_FGrid	The grid frequency sampling value between the master DSP and slave DSP is not the same.	
ID51	ConsistentFault_DCI	The current sampling value of the automatic differential circuit breaker (DCI) between the master DSP and the slave DSP is not the same.	

ID52	ConsistentFault_GFCI	The current sampling value of the automatic differential circuit breaker (GFCI) between the master DSP and the slave DSP is not the same.	
ID53	SpiCommLose	SPI communication error between the master DSP and the slave DSP.	
ID54	SciCommLose	SCI communication error between the master DSP and the slave DSP.	
ID55	RelayTestFail	Relay fault.	
ID56	PvIsoFault	The insulation resistance is too low.	Check the insulation resistance between the photovoltaic string and the ground, if the insulation is low, rectify the fault.
ID57	OverTempFault_Inv	The temperature of the inverter is too high.	<p>Make sure that the installation position and the installation method meet the requirements of Section 3.4 of this manual.</p> <p>Check if the ambient temperature in the installation location exceeds the allowed limit. If so, improve the ventilation to reduce the temperature.</p>
ID58	OverTempFault_Boost	The boost temperature is too high.	
ID59	OverTempFaultEnv	The ambient temperature is too high.	
ID65	UnrecoverHwAcOCP	The grid current is too high and has caused irreparable hardware failure.	<p>ID65-ID70 are internal faults of the inverter; turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical</p>
ID66	UnrecoverBusOVP	The bus voltage is too high and has caused an irreparable fault.	

ID67	UnrecoverIacRmsUnbalance	The grid current is not balanced and has caused an irreparable fault.	Support.
ID68	UnrecoverIpvUnbalance	The input current is not balanced and has caused an irreparable fault.	
ID69	UnrecoverVbusUnbalance	The bus voltage is not balanced and has caused an irreparable fault.	
ID70	UnrecoverOCPIstant	The grid current is too high and has caused an irreparable fault.	
ID71	UnrecoverPvConfigSetWrong	Incorrect input mode	<p>Check the configuration of the input mode (parallel mode / independent mode) of the inverter, as indicated in Section 6.3 (C).</p> <p>“6. Input Mode” of this user manual; if this setting is not correct, change it according to Section 6.3 (A) “10. Configuration of input mode” of this manual. If the input mode is correct, turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical Support.</p>
ID74	UnrecoverIPVInstant	The input current is too high and has caused an irreparable fault.	<p>ID74-ID77 are internal faults of the inverter; turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical Support.</p>
ID75	UnrecoverWRITEEEPROM	The EEPROM is unrecoverable.	
ID76	UnrecoverREADEEPROM	The EEPROM is unrecoverable.	

ID77	UnrecoverRelayFail	The relay has generated a permanent fault.	
ID81	OverTempDerating	The inverter has been derated because the temperature is too high.	<p>Make sure that the installation position and the installation method meet the requirements of Section 3.4 of this manual.</p> <p>Check if the ambient temperature in the installation location exceeds the allowed limit. If so, improve the ventilation to reduce the temperature.</p>
ID82	OverFreqDerating	The inverter has been derated because the grid frequency is too high.	The inverter automatically reduces the output power when the frequency of the electrical grid is too high.
ID83	RemoteDerating	The inverter has been derated by remote control	The inverter reports ID83 when the power derating is activated via remote control. Check the functionality of the control in section 4.5 of this manual.
ID84	RemoteOff	The inverter has been switched off via remote control	The inverter reports ID84 when the power derating is activated via remote control. Check the functionality of the control in section 4.5 of this manual.
ID85	UnderFreqDerating	The inverter has been derated because the grid current is too low.	The inverter automatically reduces the output power when the frequency of the electrical grid is too low.
ID89	Reserved	Reserved	Reserved
ID93	Lightning protection alarm	Activation of lightning overvoltage protection	Please check if the machine is damaged, and if so, contact Technical Support.
ID94	The software version is unsuitable	The software of the control board and communication board	Contact Technical Support to update the software.

		do not match.	
ID95	Faulty EEPROM communication board.	The EEPROM communication board is faulty.	ID95-ID96 are internal faults of the inverter; turn off the DC disconnecting switch and wait 5 minutes, then turn on the DC disconnecting switch again. Check that the fault is no longer present. If this is not the case, contact Technical Support.
ID96	Faulty RTC clock chip	The RTC clock chip is faulty.	
ID97	Invalid country	The country selected is not valid.	Check the configuration of the country, as indicated in Section 6.3 (C) 5 Country of this user manual; if it is not correct, change it according to Section 6.3(A) "4 Configuration of country code" of this manual.
ID98	Faulty SD	The SD card is faulty.	Replace the microSD card.
ID99 - ID100	Reserved		Reserved

7.2. Maintenance

Inverters generally do not require daily or routine maintenance. In any case, for proper long-term operation of the inverter, make sure that the heatsink for cooling the inverter has enough space to ensure adequate ventilation and that it is not obstructed by dust or other items.

Cleaning the inverter

Use an air compressor, a soft dry cloth or soft-bristled brush to clean the inverter. Do not use water, corrosive chemical substances or aggressive detergents to clean the inverter. Disconnect the AC and DC power to the inverter before performing any cleaning operations.

Cleaning the heatsink

Use an air compressor, a soft dry cloth or soft-bristled brush to clean the heatsink. Do not use water, corrosive chemical substances or aggressive detergents to clean the heatsink. Disconnect the AC and DC power to the inverter before performing any cleaning operations.

8. Uninstalling

8.1. Uninstallation steps

- Disconnect the inverter from the AC grid.
- Switch off the DC switch.
- 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.

8.2. Packaging

If possible, pack the inverter in its original packaging.

8.3. Storage

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

8.4. Disposal

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



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

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

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

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

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

9. Technical specifications

TECHNICAL DATA	1100TL-V3	1600TL-V3	2200TL-V3	2700TL-V3	3000TL-V3	3300TL-V3
DC Input data						
Maximum DC Power	1500W	2200W	3000W	3700W	4100W	4500W
No. of independent MPPTs / No. of strings per MPPT	1/1					
Maximum DC input voltage	500V			550V		
Start-up voltage	70V					
Nominal DC input voltage	360V					
MPPT DC voltage range	50V-500V					
DC voltage range at full load	90V-450V	110V-450V	150V-450V	200V-500V	250V-500V	250V-500V
Maximum input current for each MPPT	12A					
Maximum absolute current for each MPPT	15A					
AC Output data						
Rated AC power	1100W	1600W	2200W	2700W	3000W	3300W
Maximum AC power	1100VA	1600VA	2200VA	2700VA	3000VA	3300VA
Maximum AC current	5.3A	7.7A	10.6A	13A	14.5A	16A
Connection type/Nominal grid voltage	Single-phase L/N/PE / 220V, 230V, 240V					
Grid voltage range	180V~270V (according to the local grid standards)					
Rated grid frequency	50Hz/60Hz					
Grid frequency range	45Hz~53Hz / 57Hz~63Hz (according to the local grid standards)					
Total harmonic distortion	<3%					
Power factor	1 (Programmable +/-0.8)					
Active power adjustable range	0~100%					
Grid feed limit	No					
Efficiency						
Maximum efficiency	97.5%			97.7%		
Weighted efficiency (EURO)	96.9%			97.2%		
MPPT efficiency	>99.9%					
Consumption at night	<1W					
Protections						
Internal interface protection	Yes					
Safety protections	Anti-islanding, RCMU, Ground Fault Monitoring					
Reverse polarity protection DC	Yes					
DC circuit breaker	Integrated					
Overheating protection	Yes					
Overvoltage category/Protective class	Overvoltage Category III / Protective class I					
Integrated dischargers	AC/DC MOV: Type 3 Standard					
Standard						
EMC	EN 61000-6-1/2/3/4,					
Safety standard	IEC 62116, IEC 61727, IEC 61683, IEC 60068-1/2/14/30, IEC 62109-1/2					
Grid connection standard	AS 4777, VDE V 0124-100, VDE V 0126-1-1, VDE-AR-N 4105, EN50438, G83/2, C10/11, RD1699, CEI 0-21					
Communication						
Communication interfaces	Wi-Fi or Ethernet or 4G (optional), RS485 (proprietary protocol), USB					
Additional inputs or connections	Input for current sensor connection					
Data storage on SD	25 years					
General data						
Allowable ambient temperature range	-30°C...+60°C (power limit above 45°C)					
Topology	Transformerless					
Environmental protection class	IP65					
Allowable relative humidity range	0%.....95% non-condensing					
Maximum operating altitude	2000m					
Noise level	< 25dB @ 1mt					
Weight	5.5 Kg			6.3 Kg		
Cooling	Natural convection					
Dimensions (H x W x D)	303mm x 260mm x 118mm			321mm x 260mm x 131.5mm		
Display	LCD					
Warranty	5 or 10 years					

10. Monitoring systems

10.1. External Wi-Fi adapter

10.1.1. Installation

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

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

Installation tools:

- Cross screwdriver
- External Wi-Fi adapter

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



Figure 39 – Port for external Wi-Fi adapter

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

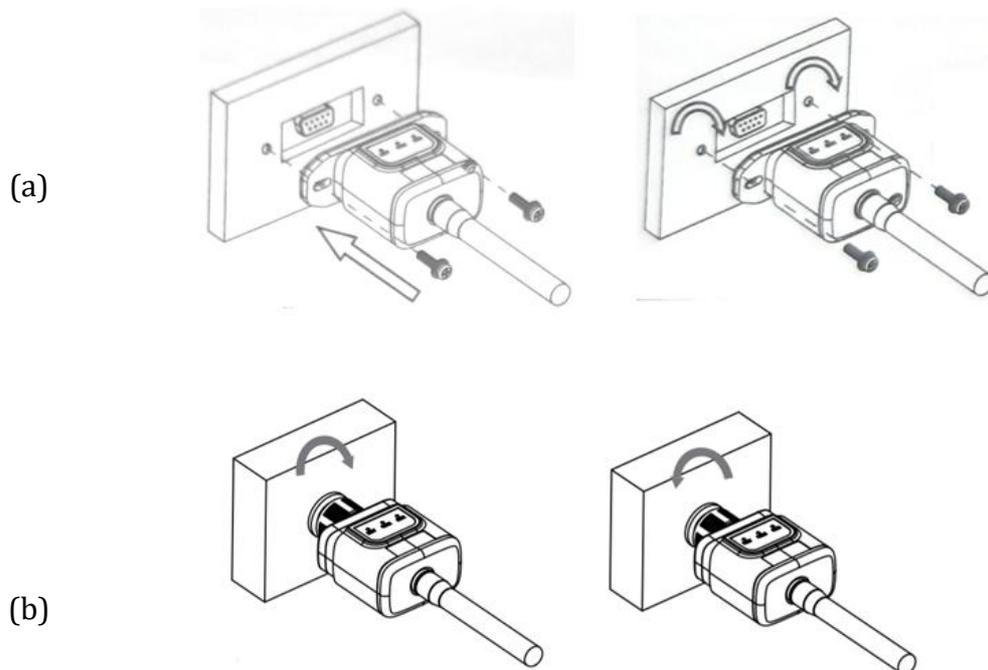


Figure 40 - Inserting and securing the external Wi-Fi adapter

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

10.1.2. Configuration

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

Tools required for configuration:

- Smartphone, PC or tablet

Go to front of the inverter and search for the Wi-Fi network using a smartphone, PC or tablet, making sure that the signal from the home Wi-Fi network reaches the place where the inverter is installed.

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

If the Wi-Fi signal does not reach the inverter, a system must be installed to amplify the signal and bring it to the installation location.

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



Figure 41 - Search for Wi-Fi networks on iOS smartphone (left) and Android smartphone (right)

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



Figure 42 - Disabling automatic reconnection to a network

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

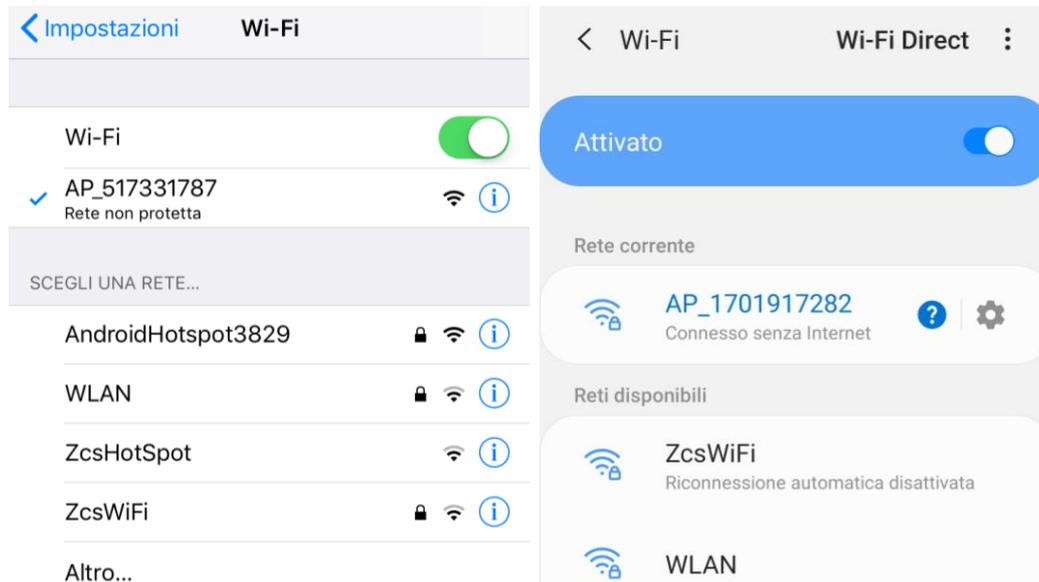


Figure 43 - Connection to Access Point for Wi-Fi adapter on iOS smartphone (left) and Android smartphone (right)

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



Figure 44 - Password of external Wi-Fi adapter

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

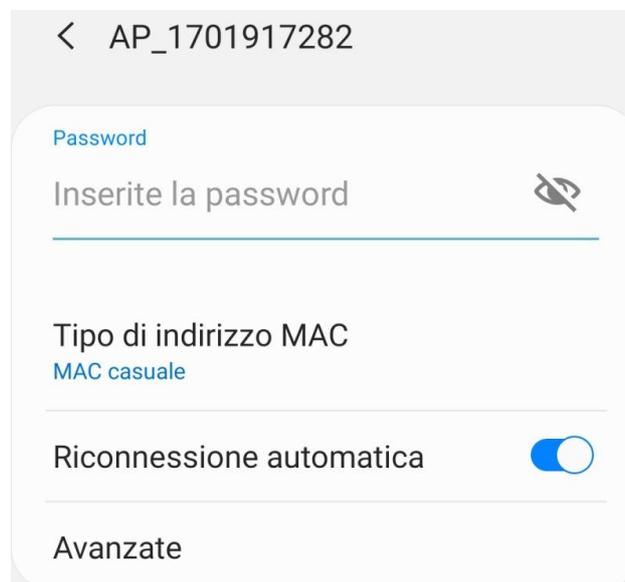


Figure 45 - Password entry prompt

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

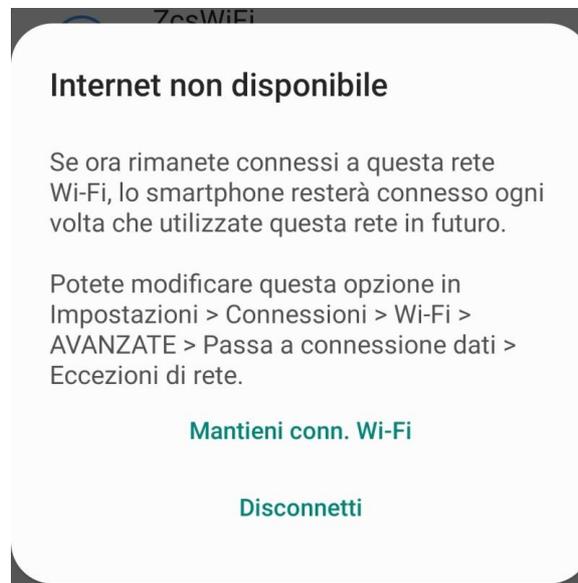


Figure 46 – Screen indicating that the Internet cannot be accessed

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

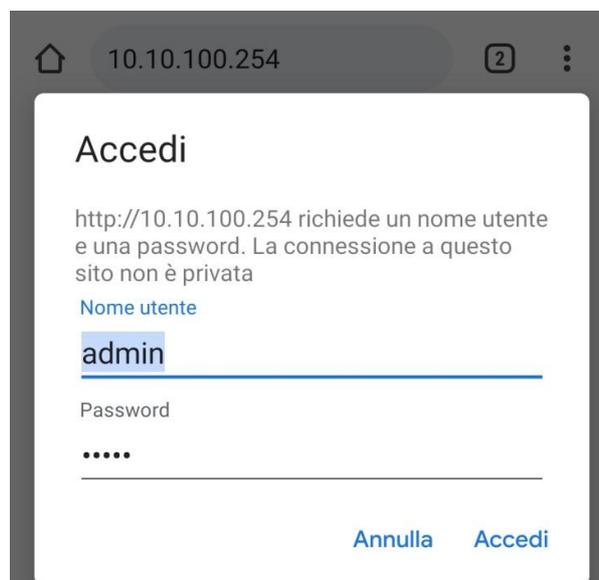
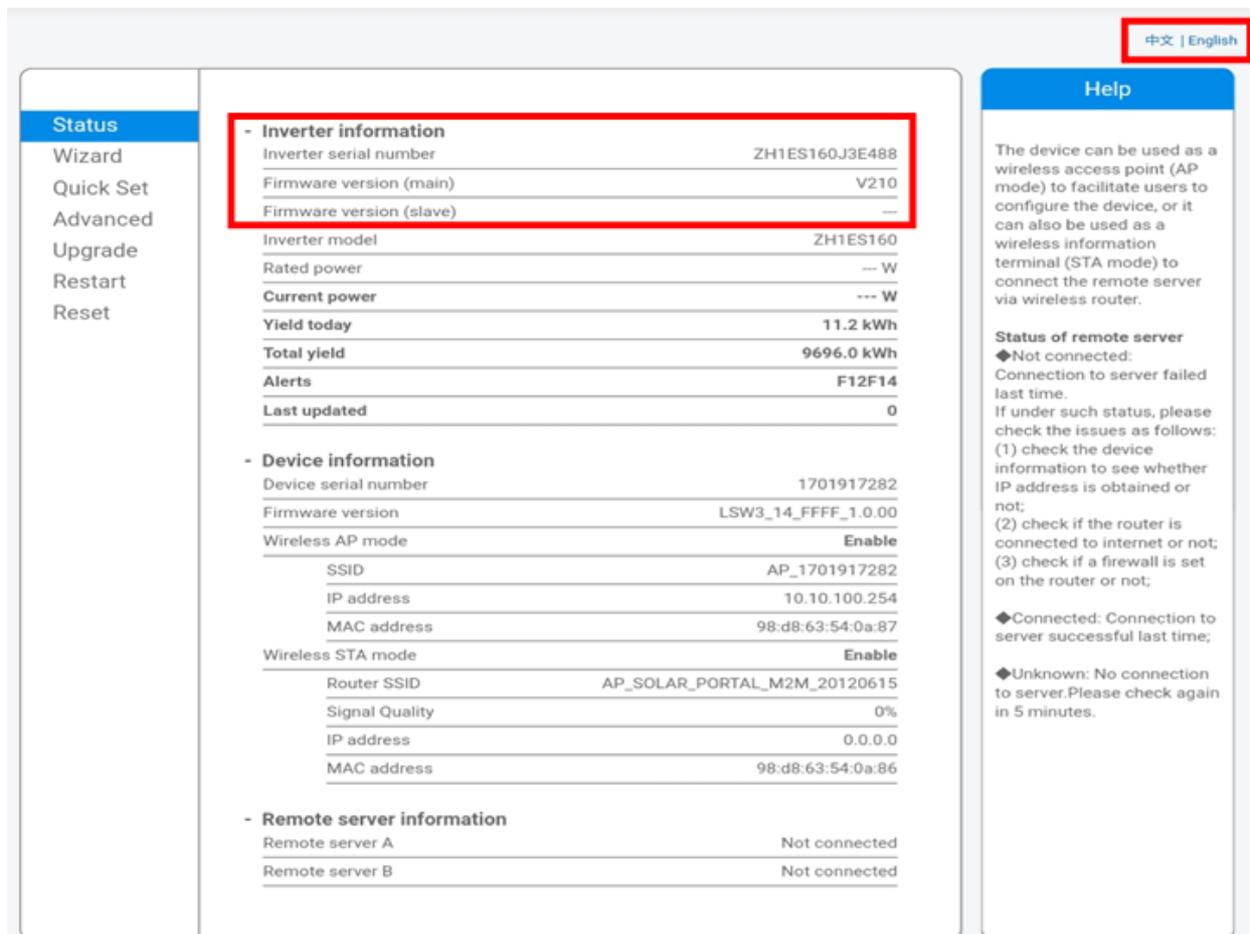


Figure 47 – Screen for accessing the web server to configure the Wi-Fi adapter

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

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

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



The screenshot shows the 'Status' screen of a device. The language is set to 'English' (indicated by a red box around '中文 | English' in the top right). The 'Inverter information' section is highlighted with a red box. The 'Device information' section includes details for both Wireless AP mode and Wireless STA mode. The 'Remote server information' section shows two servers that are not connected.

- Inverter information	
Inverter serial number	ZH1ES160J3E488
Firmware version (main)	V210
Firmware version (slave)	---
Inverter model	ZH1ES160
Rated power	--- W
Current power	--- W
Yield today	11.2 kWh
Total yield	9696.0 kWh
Alerts	F12F14
Last updated	0

- Device information	
Device serial number	1701917282
Firmware version	LSW3_14_FFFF_1.0.00
Wireless AP mode	Enable
SSID	AP_1701917282
IP address	10.10.100.254
MAC address	98:d8:63:54:0a:87
Wireless STA mode	Enable
Router SSID	AP_SOLAR_PORTAL_M2M_20120615
Signal Quality	0%
IP address	0.0.0.0
MAC address	98:d8:63:54:0a:86

- Remote server information	
Remote server A	Not connected
Remote server B	Not connected

Figure 48 – 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.

Please select your current wireless network:

Site Survey

SSID	BSSID	RSSI	Channel
<input checked="" type="radio"/> iPhone di Giacomo	EE:25:EF:6C:31:18	100	6
<input type="radio"/> ZcsWiFi	FE:EC:DA:1D:C3:9	86	1
<input type="radio"/> ZcsHotSpot	FC:EC:DA:1D:C3:9	86	1
<input type="radio"/> WLAN	E:EC:DA:1D:C3:9	86	1
<input type="radio"/> ZcsHotSpot	FC:EC:DA:1D:C8:A3	57	11
<input type="radio"/> WLAN	E:EC:DA:1D:C8:A3	57	11
<input type="radio"/> ZcsWiFi	FE:EC:DA:1D:C8:A3	54	11
<input type="radio"/> WLAN	E:EC:DA:1D:C8:8B	45	1
<input type="radio"/> ZcsWiFi	FE:EC:DA:1D:C8:8B	37	1
<input type="radio"/> ZcsHotSpot	FC:EC:DA:1D:C8:8B	35	1

★Note: When RSSI of the selected WiFi network is lower than 15%, the connection may be unstable, please select other available network or shorten the distance between the device and router.

Refresh

Add wireless network manually:

Network name (SSID)
(Note: case sensitive)

Encryption method

Encryption algorithm

Next

1 2 3 4

Figure 49 – Screen for selecting the available wireless network (1)

- 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.

Please fill in the following information:

Password (8-64 bytes)
(Note: case sensitive)
 Show Password

Obtain an IP address automatically

IP address

Subnet mask

Gateway address

DNS server address

1 2 3 4

Figure 50 – 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.

Enhance Security

You can enhance your system security by choosing the following methods

Hide AP

Change the encryption mode for AP

Change the user name and password for Web server

1 2 3 4

Figure 51 - Screen for setting the security options (3)

10) Click “OK”.

Setting complete!

Click OK, the settings will take effect and the system will restart immediately.

If you leave this interface without clicking OK, the settings will be ineffective.

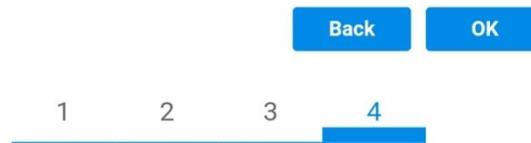


Figure 52 - Final configuration screen (4)

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



Setting complete! Please close this page manually!

Please login our management portal to monitor and manage your PV system.(Please register an account if you do not have one.)

To re-login the configuration interface, please make sure that your computer or smart phone

Web Ver:1.0.24

Figure 53 - Successful configuration screen

10.1.3. Verification

Wait two minutes after configuring the adapter and then go back to the Wi-Fi network selection screen to verify that the AP_***** network is no longer present. The absence of the Wi-Fi network in the list will confirm the successful configuration of the Wi-Fi adapter.



Figure 54 – Wi-Fi network search on Smartphone (iOS and Android); Access point of the Wi-Fi adapter is no longer visible

If the Wi-Fi network is still present in the list, connect to it again and enter the status page. Check the following information:

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

Wireless STA mode	Enable
Router SSID	iPhone di Giacomo
Signal Quality	0%
IP address	0.0.0.0
MAC address	98:d8:63:54:0a:86
Remote server information	
Remote server A	Not connected

Figure 55 – Status screen

Status of LEDs present on the adapter

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



Figure 56 - Initial status of LEDs

2) Final status:

NET (left LED): steady on

COM (central LED): steady on

READY (right LED): flashing on



Figure 57 - 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 58 – Reset button on the Wi-Fi adapter

10.1.4. Troubleshooting

Status of LEDs present on the adapter

1) Irregular communication with inverter

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



Figure 59 - Irregular communication status between inverter and Wi-Fi

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

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

- Check that the Wi-Fi adapter is correctly and securely connected to the inverter, making sure to tighten the two cross-head screws provided.
- Check that the Wi-Fi symbol is present in the top right-hand corner of the inverter's display (steady or flashing).



Figure 60 – 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 61 - Irregular communication status between Wi-Fi and remote server

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

If, at the end of the previous checks and subsequent configuration, Remote server A is still “Not Connected” or the NET LED is off, there may be a transmission problem at the home network level and, more specifically, that data between the router and server is not being transmitted correctly. In this case, it is advisable to carry out checks at the router level in order to ensure that there are no obstructions on the output of data packets to our server.

To make sure that the problem lies in the home router and to exclude problems with the Wi-Fi adapter, configure the adapter using the Wi-Fi hotspot function on your smartphone as a reference wireless network.

• Using an Android mobile phone as a modem

- a) Check that the 3G/LTE connection is active on your smartphone. Go to the Settings menu of the operating system (the gear icon on the screen with a list of all the apps installed on the phone),

select “Other” from the Wireless and networks menu and make sure that the Network type is set to 3G/4G/5G.

- b) In the Android settings menu, go to Wireless & networks > Other. Select Mobile Hotspot/Tethering, and then enable the Wi-Fi mobile hotspot option; wait a few seconds for the wireless network to be created. To change the name of the wireless network (SSID) or your password, select Configure Wi-Fi hotspot.

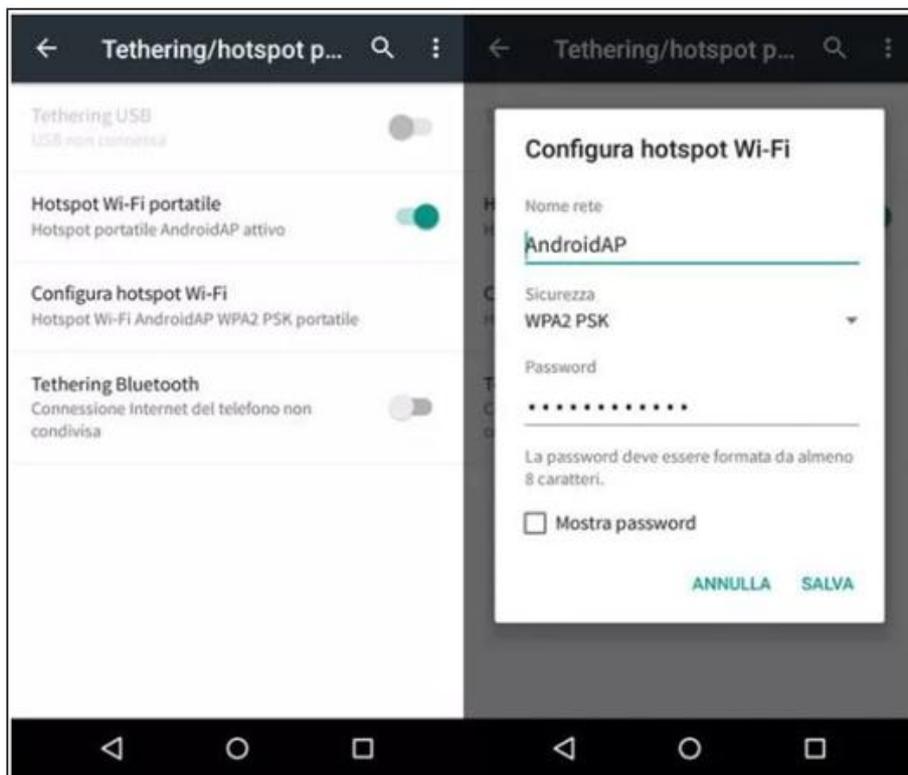


Figure 62 – Configuration of an Android smartphone as a hotspot router

• Using an iPhone as a modem

- a) In order to share the iPhone connection, verify that the 3G/LTE network is active by going to Settings > Mobile Phone, and making sure that the “Voice and data” option is set to 5G, 4G or 3G. To enter the iOS settings menu, click the grey gear icon on the home screen of your phone.
- b) Go to the Settings menu > Personal Hotspot and turn on the Personal Hotspot option. The hotspot is now enabled. To change the password of the Wi-Fi network, select Wi-Fi password from the personal hotspot menu.



Figure 63 - Configuration of an iOS smartphone as a hotspot router

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

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

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

10.2. Ethernet adapter

10.2.1. Installation

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

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

Installation tools:

- Cross screwdriver
 - Ethernet adapter
 - Shielded network (Cat. 5 or Cat. 6) crimped with RJ45 connectors
- 1) Switch off the inverter following the procedure described in this manual.
 - 2) Remove the cover for accessing the Wi-Fi/Eth connector on the bottom of the inverter by unscrewing the two cross-head screws (a), or by unscrewing the cover (b), depending on the inverter model, as shown in the figure.



Figure 64 – Port of the Ethernet adapter



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

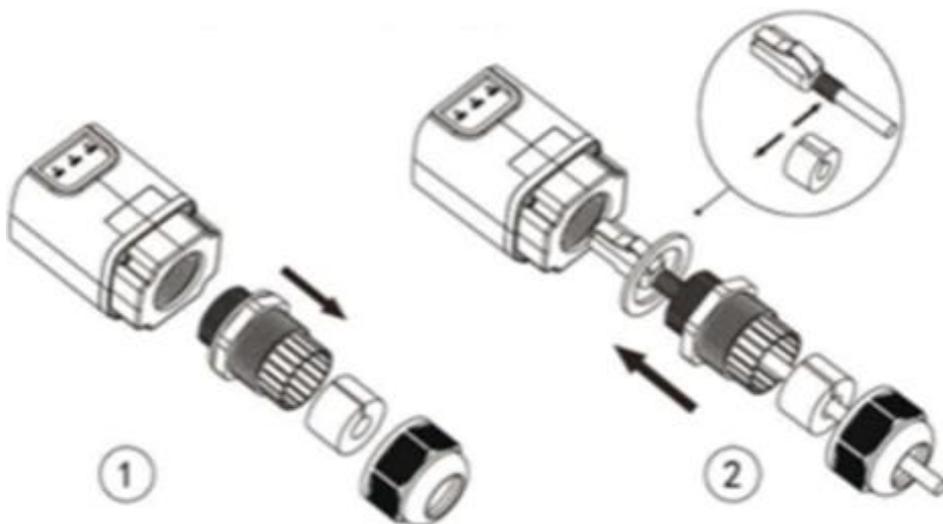


Figure 65 - Inserting the network cable inside the device

- 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.

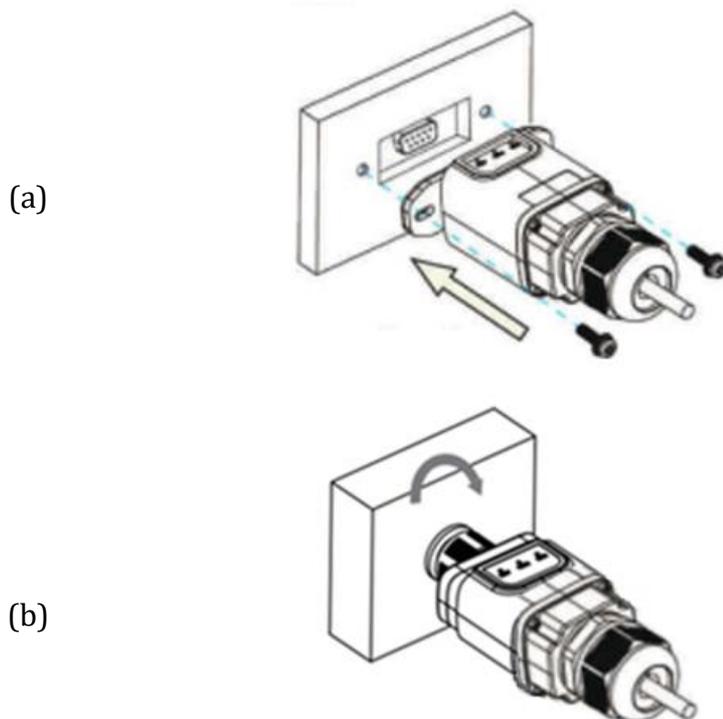


Figure 66 - Inserting and securing the ethernet adapter

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

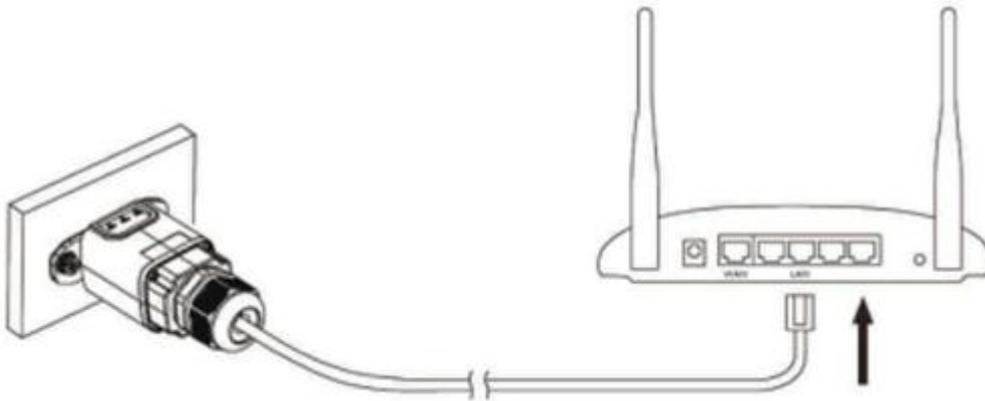


Figure 67 – Connecting the network cable to the modem

- 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.

10.2.2. Verification

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

Status of LEDs present on the adapter

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



Figure 68 - Initial status of LEDs

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



Figure 69 - Final status of LEDs

10.2.3. Troubleshooting

Status of LEDs present on the adapter

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



Figure 70 - Irregular communication status between the inverter and adapter

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



Figure 71 - Irregular communication status between the adapter and remote server

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

Check that port 80 of the router is open and enabled to send data.

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

10.3. 4G adapter

The ZCS 4G adapters are sold with a virtual SIM integrated into the device with data traffic fee included for 10 years, which is adequate for the proper transmission of data to monitor the inverter.

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

10.3.1. Installation

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

Installation tools:

- Cross screwdriver
- 4G adapter

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



Figure 72 - Port of the 4G adapter

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

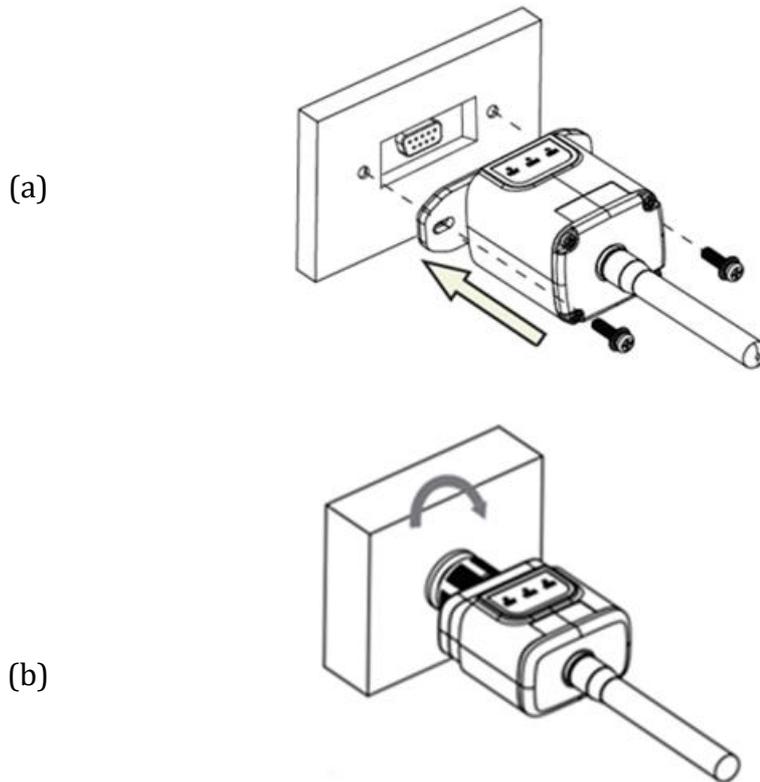


Figure 73 - Inserting and securing the 4G adapter

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

10.3.2. Verification

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

Status of LEDs present on the adapter

1) Initial status:

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



Figure 74 - Initial status of LEDs

2) Registration:

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

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

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



Figure 75 - 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 76 - Irregular communication status between inverter and adapter

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

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

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

2) Irregular communication with remote server:

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



Figure 77 - 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. Warranty terms and conditions

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