



USER'S MANUAL



THREE-PHASE STRING INVERTER

3PH 60KTL-80KTL-V3



ZUCCHETTI
Centro Sistemi



Grid-connected inverter 3PH 60KTL-80KTL-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 www.zcsazzurro.com

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

Preface

General information

Please read this manual carefully before installation, use 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:

3PH 60KTL-V3 / 3PH 80KTL-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 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.

	<p>Danger: indicates a hazardous situation which, if not resolved or avoided, could result in serious personal injury or death</p>
<p>Danger</p>	
	<p>Warning: indicates a hazardous situation which, if not resolved or avoided, could result in serious personal injury or death.</p>
<p>Warning</p>	

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

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

Symbols and icons

Introduces the main safety symbols on the inverter.

1.1. Safety instructions

Installation of 3PH 60KTL-80KTL-V3 on-grid inverter must conform with laws, regulations, codes and standards applicable in the jurisdiction.

Before installing and adjusting the produce, please read all of instructions, cautions and warnings in this manual

Before connecting the product to the electrical utility grid, contact the local utility company for allowance. Also, this connection must be made only by qualified electrician.

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

Qualified personnel

When inverter is working, it contains lethal voltages and went hot in some area. Improper installation or maloperation could cause serial damage and injury. To reduce the risk of personal injury and to ensure the safe installation and operation of the product, only a qualified electrician is allowed to execute transportation, installation, commissioning and maintenance. Zucchetti Centro Sistemi S.p.A. does not take any responsibility for the property destruction and personal injury because of any incorrect use.

Label and Symbols

3PH 60KTL-80KTL-V3 has type label attach the side of product which contact important information and technical data, the type label must permanent attached to the product.

3PH 60KTL-80KTL-V3 has warning symbol attached the product which contact information of safety operation. The warning symbol must permanent attached to the product.

Installation location requirement

Please install the inverter according to the following section. Place inverter in an appropriate bearing capacity objects (such as solid brick wall, or strength equivalent mounting surface, etc.) and make sure inverter vertical placed. A proper installation location must have enough space for fire engine access in order for maintenance if faulty occur. Ensure the inverter is installed in a wall ventilated environment and have enough air-cooling cycle. Air humidity should less than 90%.

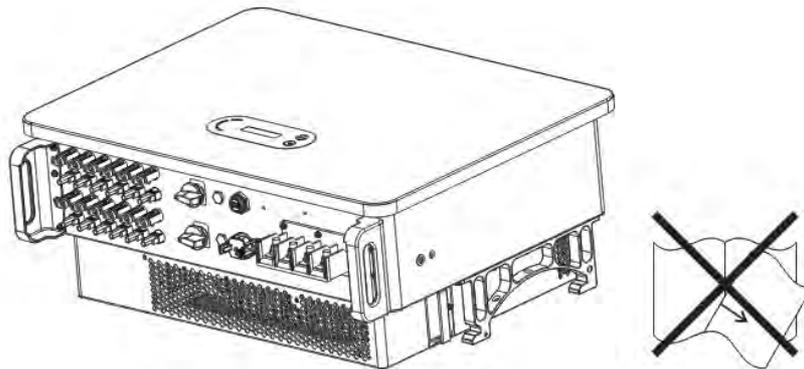


Figure 1 - Do not lose or damage this manual

Transportation Requirement

Inverter is in the good electrical and physical condition when it ship out from factory. During transport, inverter must be placed in its original package or other proper package. Transportation company should responsible for any damage during transport period.

If you find any packing problems that may cause the damage of inverter or any visible damage, please notice the responsible transportation company immediately. You can ask your installer or Zucchetti Centro Sistemi S.p.A. for help is necessary.

Electrical Connection

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

	<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>
Danger	
	<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 these actions.
Attention	

EMC/Noise Level

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

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

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

1.2. Symbols and icons

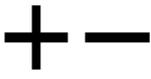
Safety signals

	<p>Pay attention to possible burns due to hot parts.</p> <p>Only touch the screen or press the keys while the inverter is in operation.</p>
<p>Caution</p>	
	<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>
<p>Attention</p>	
	<p>Ensure the correct DC input voltage; which must be below the maximum allowable DC voltage. Overvoltage can cause permanent damage to the inverter or other faults which are not covered by the warranty!</p>
<p>Warning</p>	

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>After disconnect with the DC side, there is a residual voltage in the inverter, operator should wait for 5 minutes to ensure the capacitor is completely discharged.</p>
	<p>Beware of high voltage</p>

	Beware of high temperatures
	Complies with the European Standards (CE)
	Ground connection point
	Read this manual before installing the inverter.
	Indication of the allowable temperature range
	Positive and negative polarities of the input voltage (DC).



2. Product features

General information in this chapter

Product description and dimensions

The field of use and overall dimensions of the 3PH 60KTL-80KTL-V3 inverters are indicated in this section.

Description of functions

Describes how the 3PH 60KTL-80KTL-V3 inverters and their internal operating modules work.

Efficiency curve

Describes the efficiency curves of the inverter.

2.1. Product presentation

Field of use

3PH 60KTL-80KTL-V3 is a transformer-less on grid PV inverter, that converts the direct current of the PV panels to the grid-compliant, three-phase current and feeds into the utility grid.

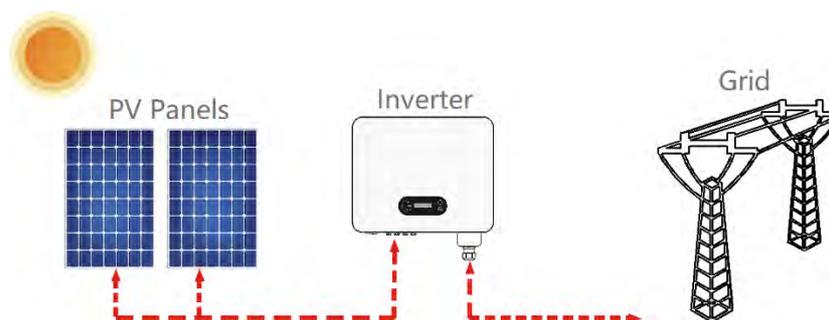


Figure 2 – Grid-connected photovoltaic system

3PH 60KTL-800KTL-V3 may only be operated with PV arrays (photovoltaic module and cabling) for on grid condition. Do not use this product for any other or additional purposes. Any damage or property loss due to any use of the product other than described in this section, Zucchetti Centro Sistemi S.p.A. will not take the responsibility. DC input of the product must be PV module, other source such like DC sources, batteries will against the warranty condition and Zucchetti Centro Sistemi S.p.A. will not take the responsibility.

Intended networks

3PH 60KTL-80KTL-V3 configurations. For the TT type of electricity grid, the voltage between neutral and earth should be less than 30V. inverters are compatible with TN-S, TN-C, TN-C-S, TT, IT grid.

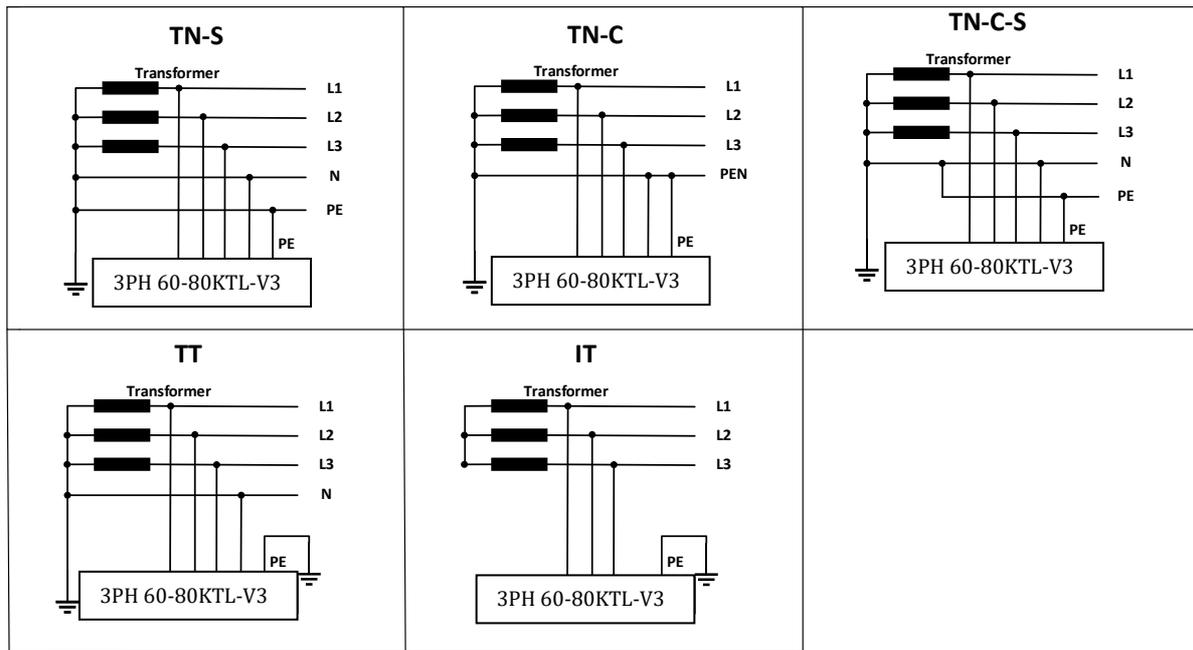


Figure 3 - Wiring diagrams of grid types on which the 3PH 60KTL-80KTL-V3 inverter can be installed

Product Dimensions

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

Dimensions Description

LxWxH=687*561*275mm

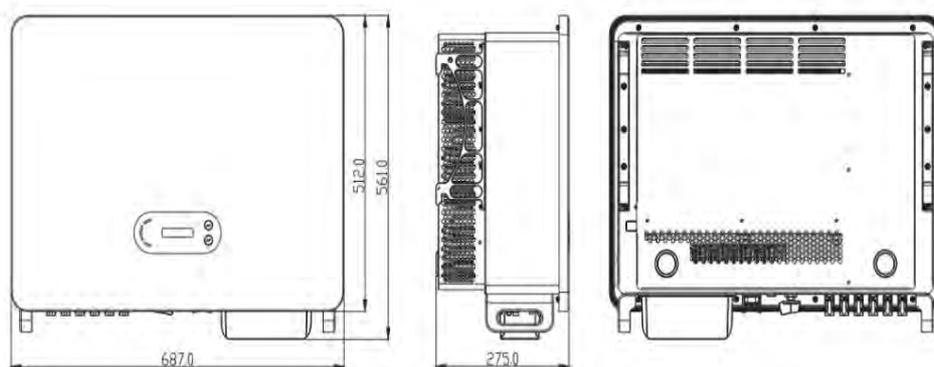


Figure 4 - Front, side and back of the inverter (3PH 80KTL-V3)

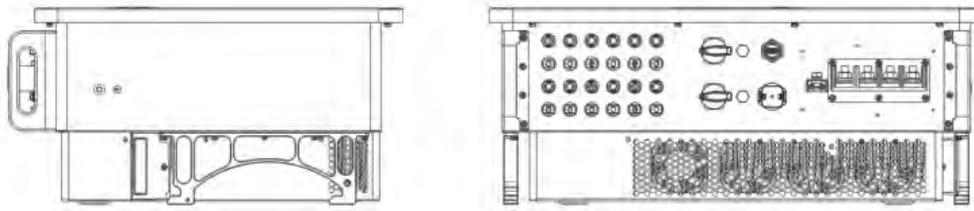


Figure 5 - Bottom view (3PH 80KTL-V3)

Function description of inverter box bottom

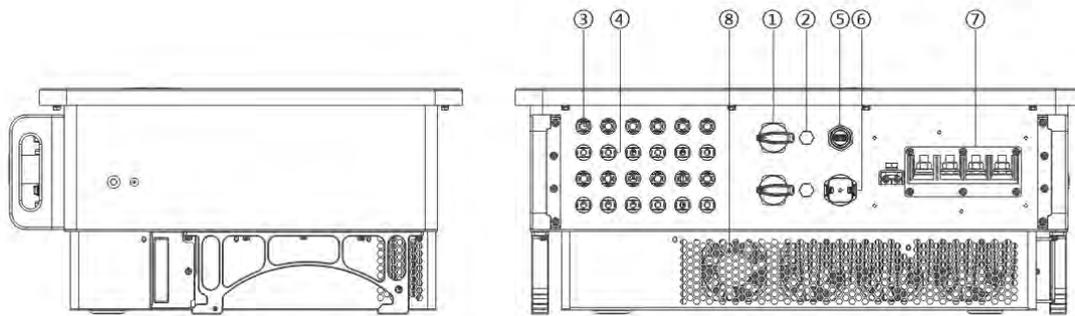
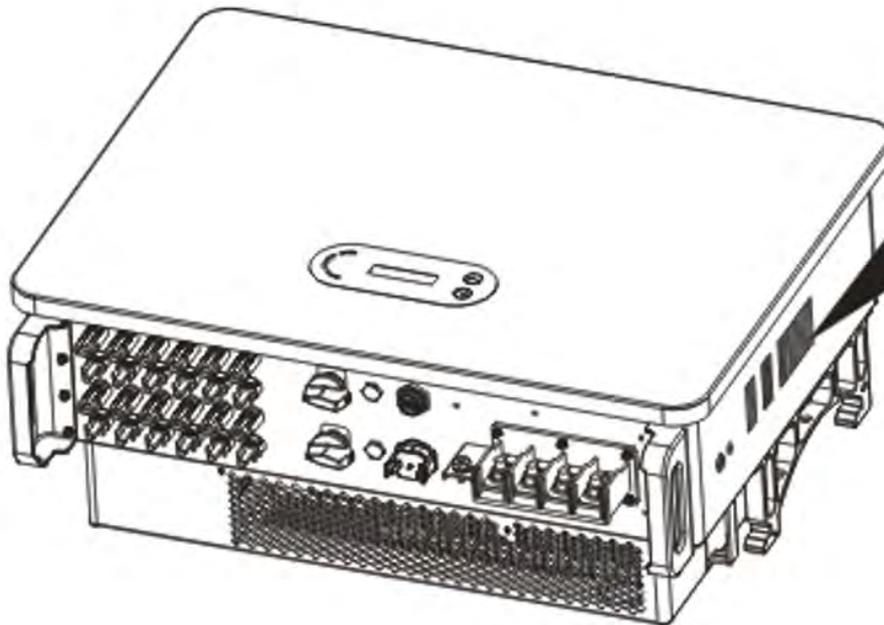


Figure 6 - Bottom view of the inverter

1. DC switch
2. Breather valve
3. DC positive poles connectors
4. DC negative poles connectors
5. USB Port (for WIFI or Ethernet communication)
6. COM Port (for RS485 communication)
7. AC output
8. Fans

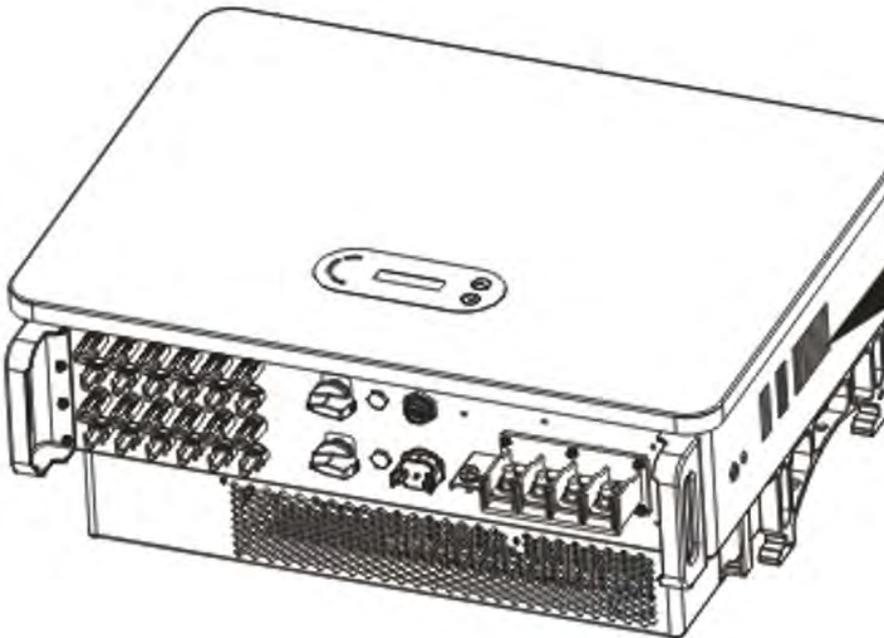
Labels on the equipment

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



ZCS Solar Grid-tied Inverter	
Model No:	AZZURRO 3PH 60KTL-V3
Max.DC Input Voltage	1100V
Operating MPPT Voltage Range	180-1000V
Max. Input Current	6*32A
Max. PV Isc	6*50A
Rated Grid Voltage	3/N/PE,230/400Vac
Max. Output Current	100A
Rated Grid Frequency	50/60Hz
Rated Output Power	60KW
Max. Output Power	66KVA
Power Factor	1 (adjustable +/-0.8)
Ingress Protection	IP66
Operating Temperature Range	-30°C ~ +60°C
Protective Class	Class I
Inverter Topology	Non-Isolated
Overvoltage Category	AC III, DC II
Zucchetti Centro Sistemi SpA Via Lungarno 305/A 52028 Terranuova Bracciolini (AR), Italy Manufactured in EXTRA EU VDE0126-1-1,VDE-AR-N4105,G99,IEC61727 IEC62116	
	

Figure 7 – Do not remove the label on the side of the inverter (3PH 60KTL-V3)



ZCS Solar Grid-tied Inverter	
Model No:	AZZURRO 3PH 80KTL-V3
Max.DC Input Voltage	1100V
Operating MPPT Voltage Range	180-1000V
Max. Input Current	6*40A
Max. PV Isc	6*60A
Rated Grid Voltage	3/N/PE,230/400Vac
Max. Output Current	133.3A
Rated Grid Frequency	50/60Hz
Rated Output Power	80KW
Max. Output Power	88KVA
Power Factor	1 (adjustable +/-0.8)
Ingress Protection	IP66
Operating Temperature Range	-30°C ~ +60°C
Protective Class	Class I
Inverter Topology	Non-Isolated
Overvoltage Category	AC III, DC II
Zucchetti Centro Sistemi SpA Via Lungarno 305/A 52028 Terranuova Bracciolini (AR), Italy Manufactured in EXTRA EU VDE0126-1-1,VDE-AR-N4105,G99,IEC61727 IEC62116	
	

Figure 8 – Do not remove the label on the side of the inverter (3PH 80KTL-V3)

2.2. Description of functions

DC power generated by PV arrays is filtered through Input Board then enter Power Board. Input Board also offer functions such as insulation impedance detection and input DC voltage/ current detection. DC power is converted to AC power by Power Board. AC power is filtered through Output Board then AC power is fed into the grid. Output Board also offer functions such as grid voltage/ output current detection, GFCI and output isolation relay. Control Board provides the auxiliary power, controls the operation state of inverter and shows the operation status by Display Board. Display Board displays fault code when inverter is abnormal operation conditions. At the same time, Control Board can trigger the replay to protect the internal components.

Function Module

A. Energy management unit

Remote control to start/ shunt down inverter through an external control.

B. Feeding reactive power into the grid

The inverter is able to produce reactive power thus to feed it into the grid through the setting of the phase shift factor. Feed-in management can be controlled directly by APP or through a RS485 interface.

C. Limited the active power fed into grid

If enable the limited of active power function, inverter can limit the amount of active power fed into the grid to the desired value (expressed as percentage).

D. Self-power reduction when grid is over frequency

If grid frequency is higher than the limited value, inverter will reduce the output power to ensure the grid stability.

E. Data transmission

Inverter can be monitored remotely through an USB stick logger (WIFI/Ethernet/GPRS) or software Storage Monitor(optional) which is based on RS485 interface.

F. Software update

USB interface for uploading the firmware, remotely uploading by using USB acquisition stick (WIFI/Ethernet/GPRS) is also available.

2.3. Electrical block diagram

3PH 60KTL-800KTL-V3 has 12 DC input strings, 6 MPPT trackers to tracking the maximum power point, then converts the direct current of PV array to grid-compliant, three phase current and feeds in into the utility grid. Both DC and AC side has Surge Protection Device (SPD).

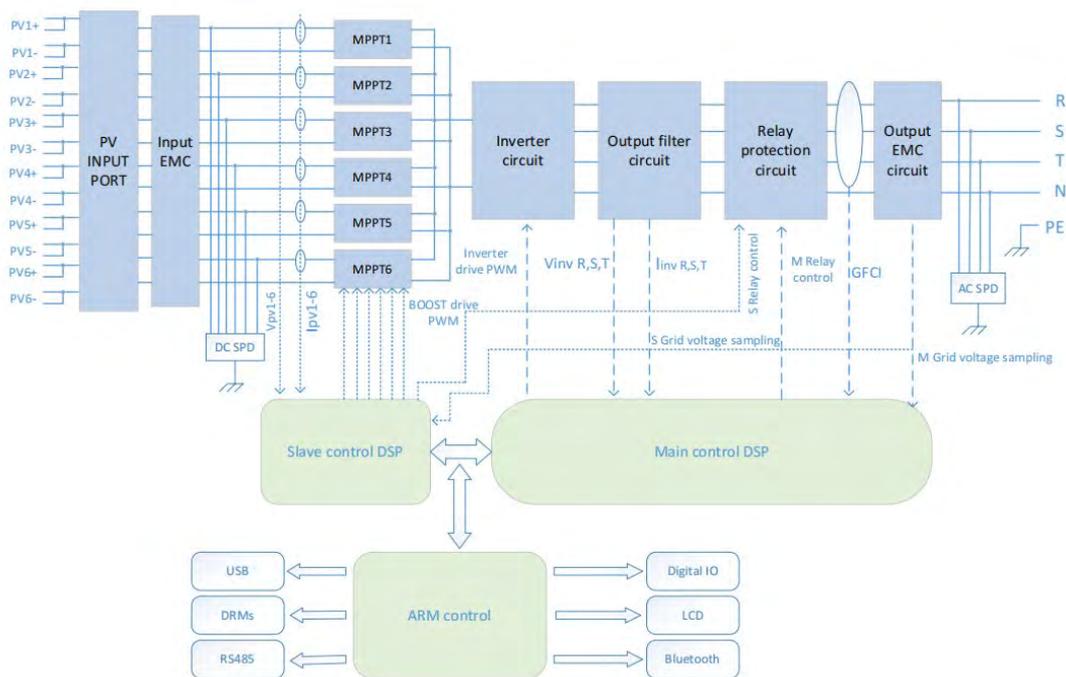


Figure 9 - Main circuit structure

2.4. Efficiency and derating curve



Figure 10 - Power efficiency curve (take 80KW for example)

3. Installation

General information in this chapter

This chapter describes how to install the 3PH 60KTL-80KTL-V3 inverter.

Installation notes:

 Danger	<ul style="list-style-type: none"> DO NOT install 3PH 60KTL-80KTL-V3 inverters near flammable materials. DO NOT install 3PH 60KTL-80KTL-V3 inverters in an area where flammable or explosive materials are stored.
 Warning	<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>
 Attention	<ul style="list-style-type: none"> Consider the weight of the inverter when handling and transporting the inverter. Choose an appropriate mounting position and surface. Assign at least two people to install the inverter.

3.1. Installation process

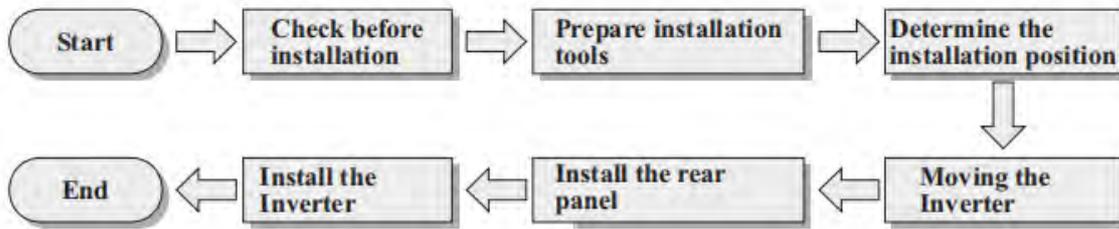


Figure 4 - Installation steps

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 kind of damage is found, do not open the box containing the inverter and contact the supplier and transport company as soon as possible.

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

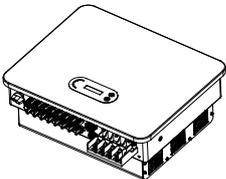
Checking the product

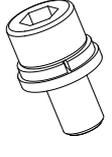
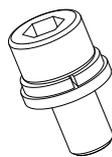
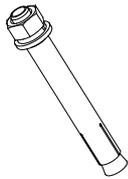
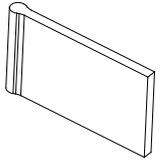
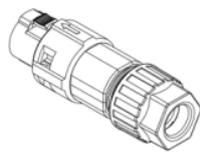
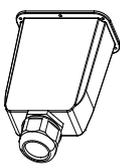
After removing the inverter from its packaging, check that the product is intact and complete. If any damage is found or components are missing, contact the supplier and transport company.

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.

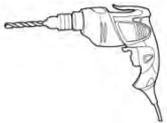
The package should contain the following components:

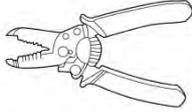
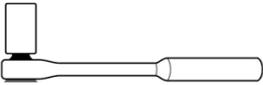
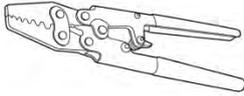
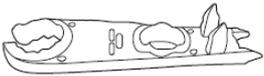
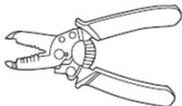
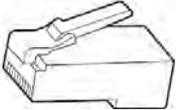
 <p>1x Photovoltaic inverter</p>	 <p>1x rear panel</p>	 <p>PV+ metal pin (12 pcs)</p>	 <p>PV- metal pin (12 pcs)</p>
---	--	--	---

 6x M4 cross screw (For locking the waterproof cover)	 2x M6*30 Hexagon screws (For locking the rear panel)	 1x M6*12 Hexagon screws (For Grounding)	 4x M8x80 expansion bolt
 5x AC terminal insulation partition	 1x Communication Terminal	 1x AC waterproof cover	 1x user manual
 2x warranty card	 1x Warranty Registration	 1x Warranty Certificate	

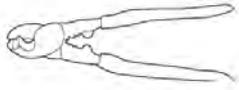
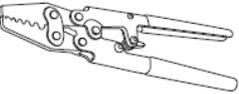
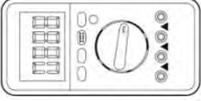
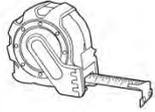
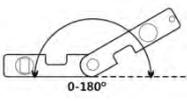
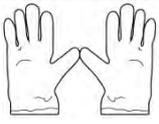
3.3. Installation tools

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: 60mm	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		M6 hexagonal wrench	To screw the inverter to the wall-mounting bracket and to open the front cover of the inverter
5		Socket wrench	To tighten the bolts
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		Removal tool	To remove the DC connectors from the inverter
9		Diagonal pliers	To cut and tighten the cable ends
10		Wire stripping tool	To remove the outer sheath of the cables
11		RJ45	2 pieces



12		Cable cutter	To cut the power cables
13		Crimping tool	To crimp the power cables
14		Multi-meter	To check the voltage and current values
15		Marker pen	To mark the wall for better fixing precision
16		Measuring tape	To measure distances
17		Level	To make sure the bracket is level
18		ESD gloves	Protective clothing
19		Safety goggles	Protective clothing
20		Protection mask	Protective clothing



3.4. Installation position

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

Note: install vertical or backward tilt within 0-15°, Do not install forward or upside down!

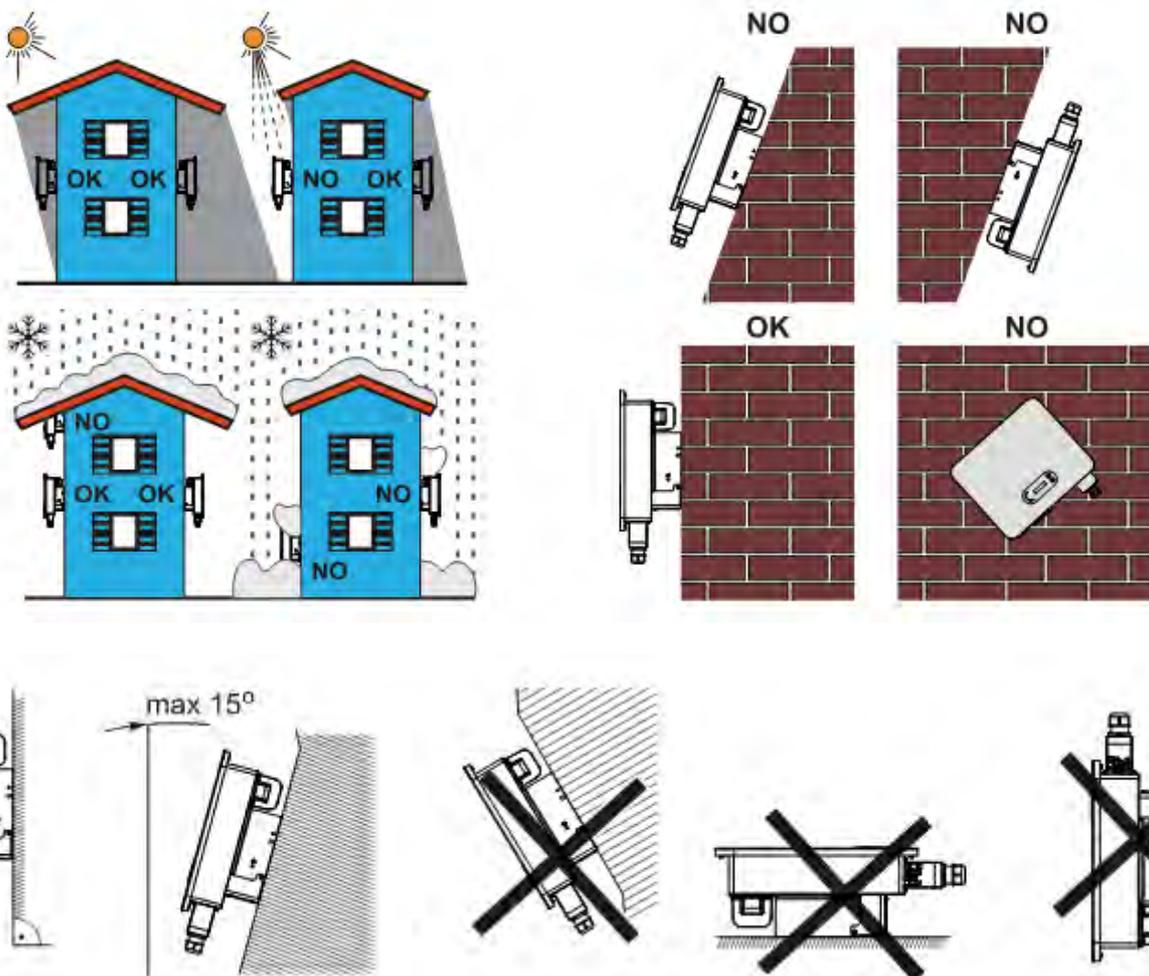


Figure 5 - Requirements for installing a single inverter

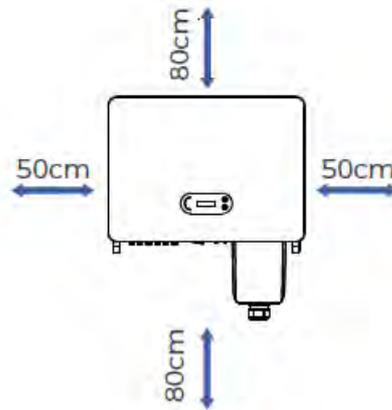


Figure 14 - Clearance for single inverter

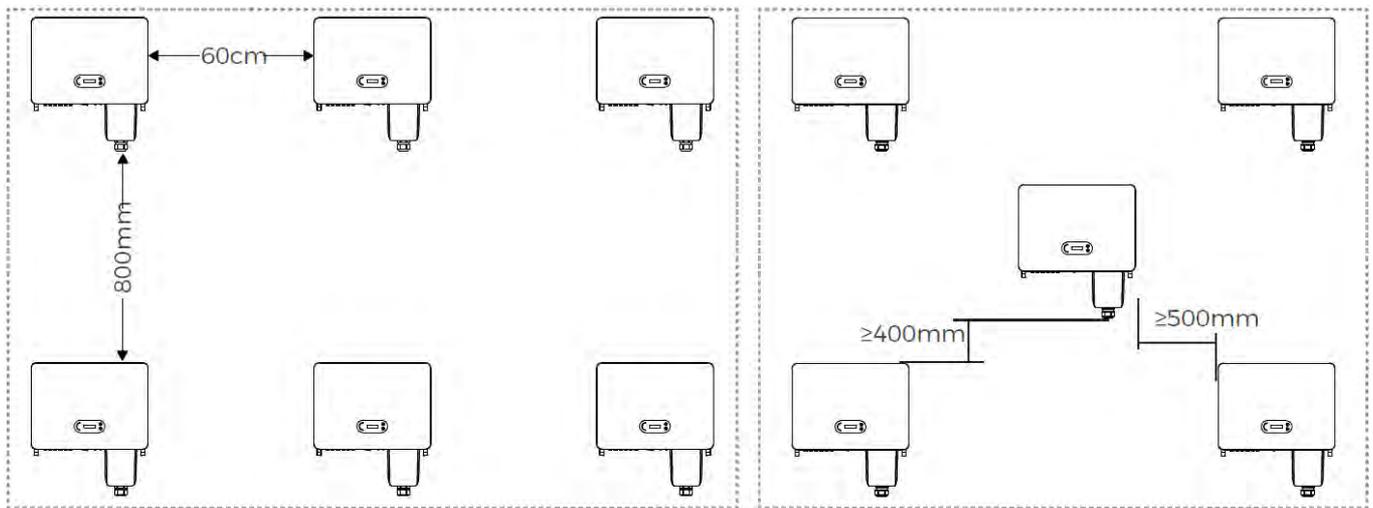


Figure 15 - Clearance for multiple inverters

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

Inverters installed at higher heights must be moved to the ground before they can be repaired or serviced. 3

3.5. Moving the 3PH 60KTL-80KTL-V3 inverter

Unload the inverter from package, horizontally move to the install position. When open the package, at least two operators insert the hands to the back of heat sink part.

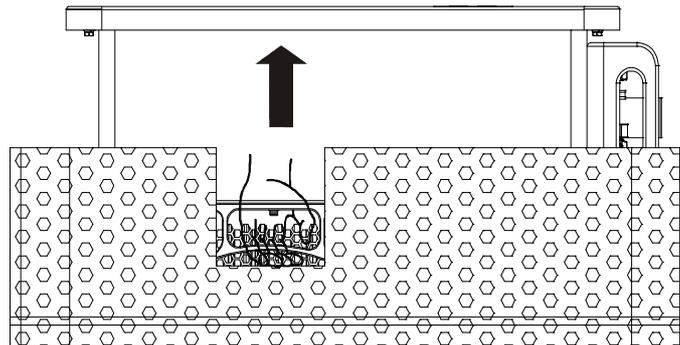


Figure 6 - Removing the polystyrene protections

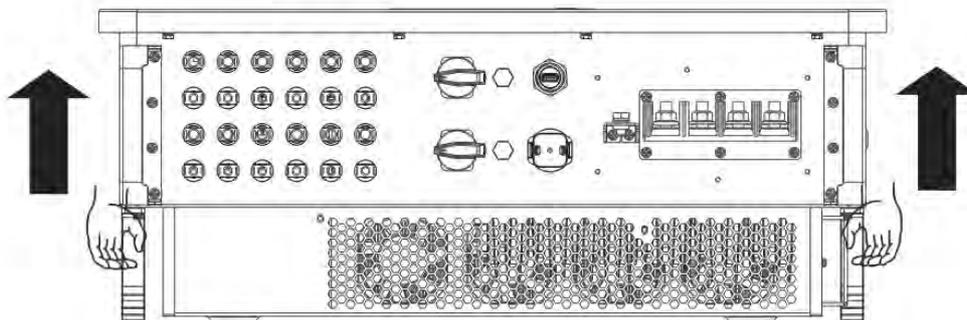


Figure 7 - Removing the inverter from its packaging



Attention

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

3.6. Installing the 3PH 60KTL-80KTL-V3 inverter

- 1) Placed the rear panel on the mounting wall, determine the mounting height of the bracket and mark the mounting poles accordingly. Drilling holes by using Hammer Drill, keep the hammer drill perpendicular to the wall and make sure the position of the holes should be suitable for the expansion bolts (Note: Please find M8*80 expansion bolt in the package).

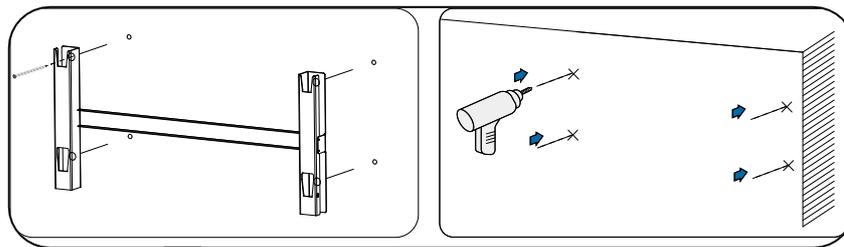


Figure 8 - Drilling holes on the mounting wall

- 2) Insert the expansion bolt vertically into the hole.

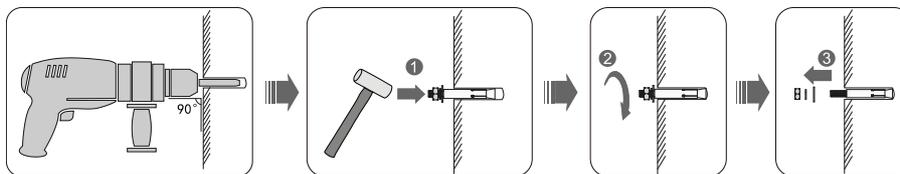


Figure 99 - Screws into the holes

- 3) Align the mounting bracket with the position of the holes and fix it to the wall using the most suitable screws and flat washers, tightening them properly.

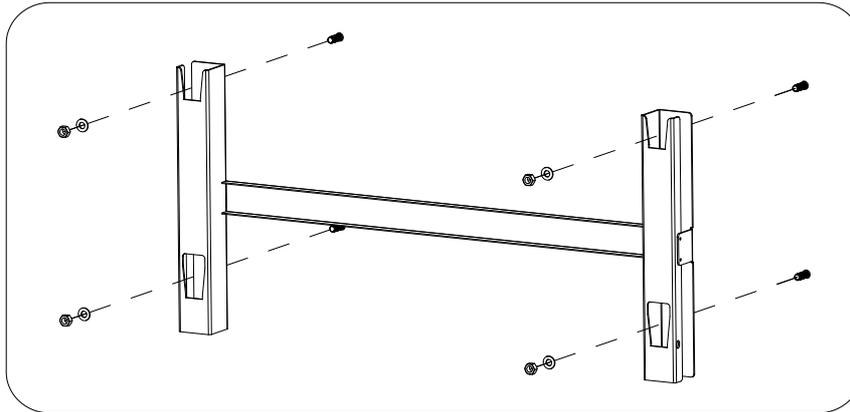


Figure 20 - Install rear panel

- 4) Lift the inverter and hang it on the rear panel, and fixing both side of inverter with M6 screw (accessories).
- 5) User can use a lock to block the inverter in case of stealing (Optional).

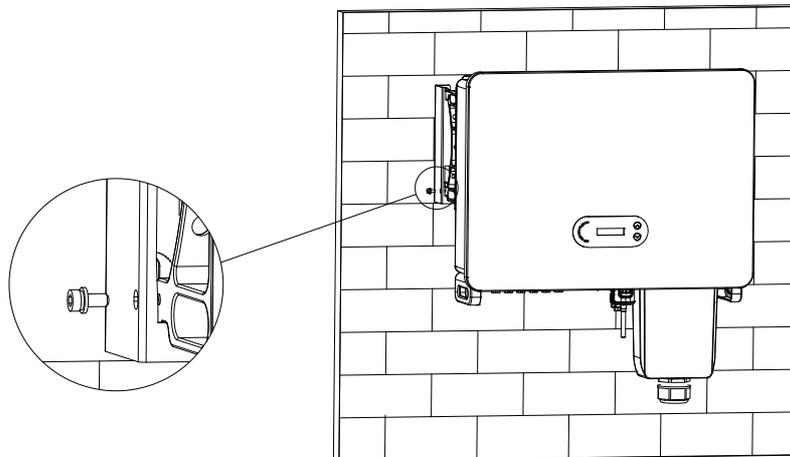


Figure 21 - Fix inverter

4. Electrical connections

General information in this chapter

This chapter describes the electrical connections of the 3PH 60KTL-80KTL-V3 inverter. Carefully read this section before connecting the cables.

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

	<p>The inverter must be installed and serviced by professional technicians or electricians.</p>
Attention	
	<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>
Danger	
	<p>The maximum open-circuit voltage of the photovoltaic string must be less than 1100 V.</p> <p>The 3PH 60KTL-80KTL-V3 has 2 two independent input channels (MPPT); all the photovoltaic modules connected to them must be of the same model and brand, and must be positioned with the same orientation (solar azimuth and inclination angle).</p>
Note	

The connected panel must meet the standard IEC61730A		
String Model	IscPV(maximum)	Maximum current (A)
3PH 60KTL-V3	6*50A	6*32A
3PH 70KTL-V3	6*60A	6*40A
3PH 75KTL-V3	6*60A	6*40A
3PH 80KTL-V3	6*60A	6*40A

4.1. Electrical connections

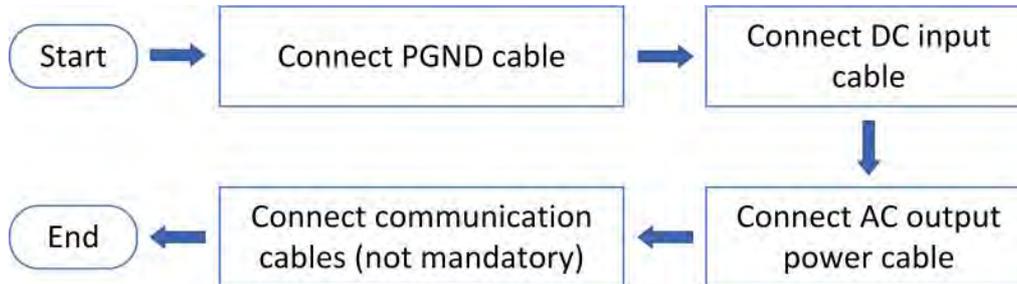


Figure 10 – Steps for connecting the cables

4.2. Connecting PNGD cables (grounding)

Connect the 3PH 60KTL-580KTL-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 grounding cable (The CSA of the cable at least 10mm² for copper wire or at least 16mm² for aluminium wire, recommend at least 16mm² yellow-green outdoor cable).

Procedure:

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

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

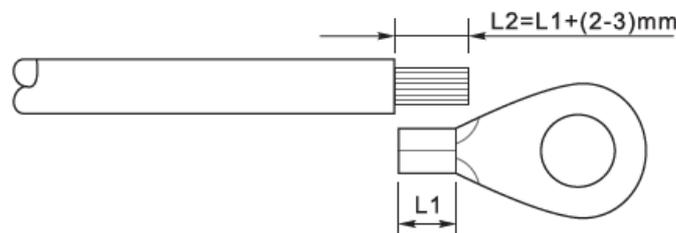


Figure 11 - Preparing the ground cable (1)

- 2) Insert the exposed core wires into the OT terminal and crimp them by using a crimping tool, as shown as figure 5.3. Recommend using OT terminal: OT M6, Cable: ≥6mm².

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.

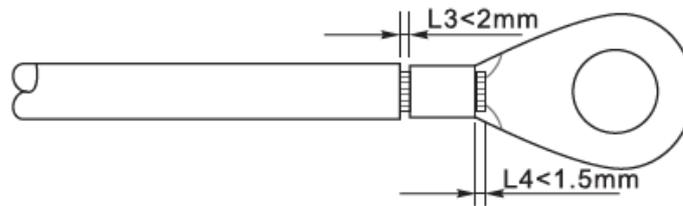


Figure 12 - Preparing the ground cable (2)

- 3) Install the crimped OT terminal and flat washer using the M6 screw in the hole located on the inverter heatsink, as shown in the figure; tighten the screw to a torque of 5-7 Nm using an Allen key.

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

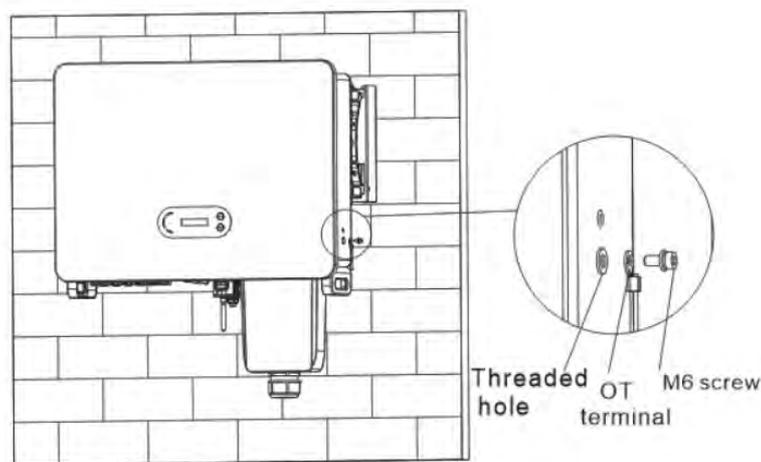


Figure 22 - Inverter external grounding instruction diagram

4.3. Connecting the DC input power cables

Connect the 3PH 60KTL-80KTL-V3 inverter to the photovoltaic strings using DC input power cables. Select the input mode: the 3PH 60KTL-80KTL-V3 inverter has two MPPTs, which can function either independently or in parallel, depending on how the system was designed. The user can choose the appropriate MPPT operating mode.

Independent mode (default):

If the strings are independent (e.g. installed on two separate flaps), the input model must be set to “independent mode.”

Parallel mode:

If the strings are connected in parallel, the input mode must be set to “parallel mode.”

Note

Depending on the type of inverter, select the appropriate accessories (cables, fuse holder, fuse, switch, etc.). The open-circuit voltage of the photovoltaic system must be lower than the maximum allowable DC input voltage of the inverter.

Model	3PH 60KTL-V3	3PH 70KTL-V3	3PH 75KTL-V3	3PH 80KTL-V3
Voltage range per MPPT	180-1000 V DC	180-1000 V DC	180-1000 V DC	180-1000 V DC
Maximum input voltage	1100 V DC			

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

Note

The MPPT inputs of the inverter must be populated. If the strings are arranged in parallel, it is recommended to use a Y or T connection cable to double the input currents from the photovoltaic array and populate all the inverter’s MPPT inputs as shown in the figure. If the string arrangement is independent, it is sufficient to connect the strings to the MPPT of the inverter.





Figure 13 – Y-branch connection cable for solar panels

	<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.
<p>Note</p>	
	<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 or equal to 1100 V DC. • The short circuit current for each input must be less than or equal to 50A DC
<p>Attention</p>	<ul style="list-style-type: none"> • The output power for each PV string must be less than or equal to the maximum input power allowable for 3PH 60KTL-80KTL-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.
	<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, below 60 V DC, and that the DC circuit breaker switch is open. Otherwise, the high voltage may cause serious damage.
<p>Danger</p>	

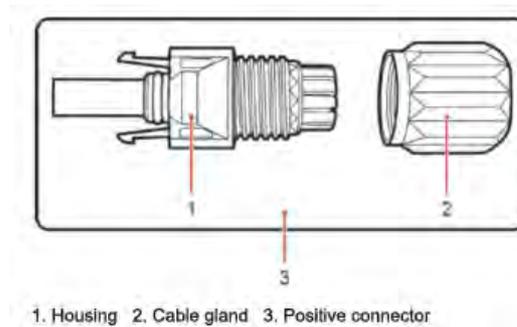
	<ul style="list-style-type: none"> • If the 3PH 60KTL-80KTL-V3 inverter is connected directly to the grid, make sure that the PV strings are not grounded. • If the DC voltage has a non-zero value between the positive terminal of the PV strings and the ground, the PV strings are subject to insulation faults. Fix the fault before connecting the cables. • If the photovoltaic string is to be grounded, installed a three-phase four-wire insulation transformer on the output side and disable the ISO detection function. In the event of grounding of the string, if an isolation transformer is not installed, the inverter will be damaged.
Note	

Context

Cross section (mm ² / AWG)	Outer diameter of cable (mm)
Range	
2.5-6.0 / 13-9	6.0 – 9.0

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.



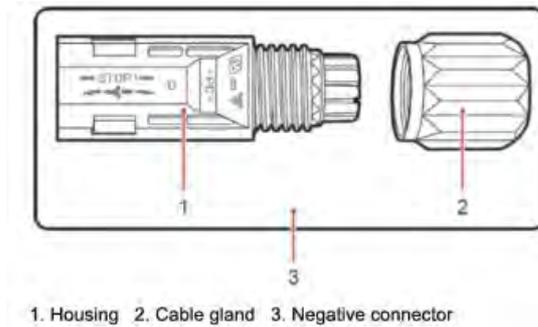


Figure 14 - Positive (1) and Negative (2) MC4 connectors

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.

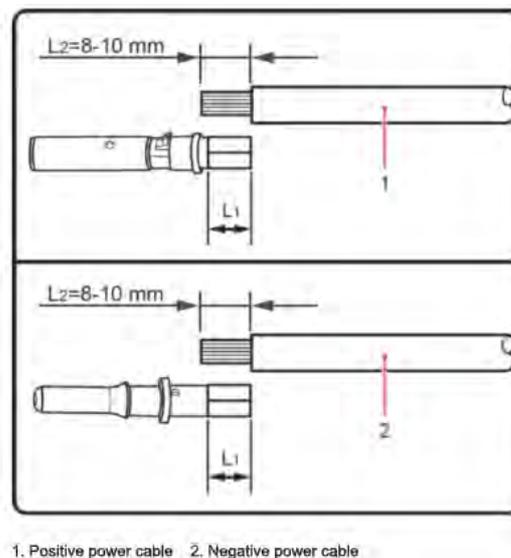


Figure 15 - Connecting the DC input power cables (1)

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

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

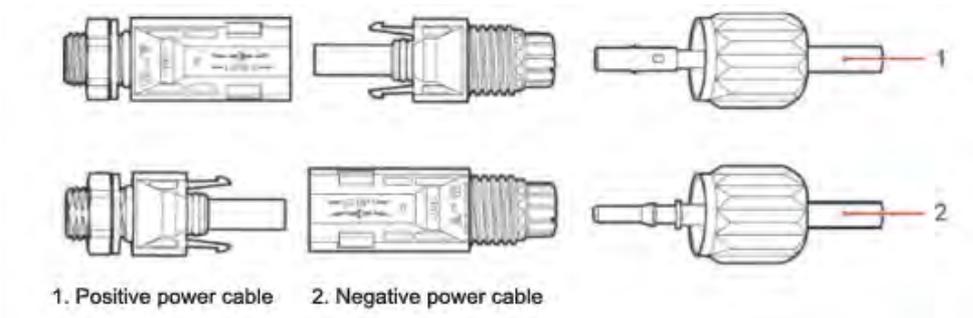


Figure 16 - Connecting the DC input power cables (2)

- 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.

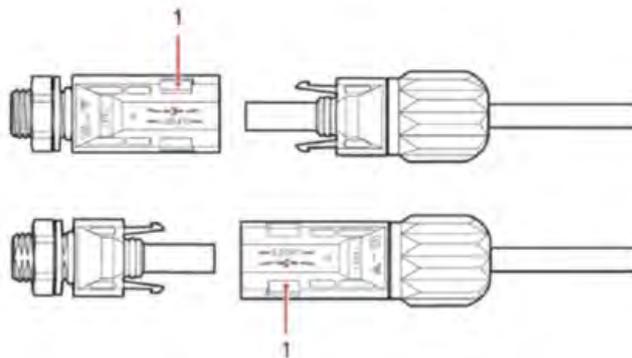
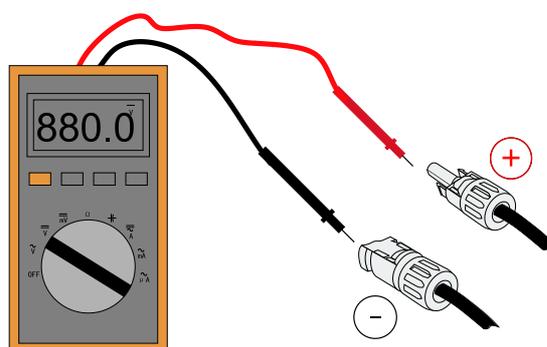


Figure 17 - Connecting the DC input power cables (3)

Note: Insert the caps into the unused DC connectors.



Note : Please use multimeter to make sure the PV array positive pole and negative pole!

Dealing : If need to remove the PV connector from inverter side, please use the Removal Tool as below diagram, move the connector gently.

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.

	<p>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</p>
Warning	

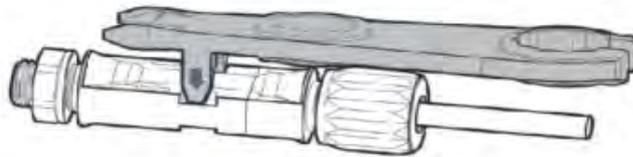


Figure 18 - Removing the DC connector

Recommended Wiring Method

The inverter has a total of 20 DC input terminals, of which the MPPT1 branch path is ... MPPT4 is controlled by DC SWITCH 1, the branch path of MPPT5... MPPT7 is controlled by DC SWITCH 2 and the branch path of MPPT8... MPPT10 is controlled by the DC SWITCH 3. It is recommended that all PV input terminals be evenly distributed over the MPPT1... MPPT10 branches, and the maximum current of each MPPT is controlled at 40A, and the maximum current of each MPPT branch is 20A. When the maximum current of each MPPT branch is 20A, in order to give full play to the power generation capacity of the PV string and extend the service life of the inverter, when the number of input strings is 12... The recommended method of connection of DC input terminals is as follows:

Enter the number of strings	Terminal selection
Six	MPPT1/MPPT2/MPPT3/MPPT4/MPPT5/MPPT6 are each connected to a string
Seven	MPPT1 is connected to two strings MPPT2/MPPT3/MPPT4/MPPT5/MPPT6 are each connected to one string
Eight	MPPT1/MPPT2 are connected to two strings MPPT3/MPPT4/MPPT5/MPPT6 are each connected to one string
Nine	MPPT1/MPPT2/MPPT3 are connected to two strings MPPT4/MPPT5/MPPT6 are each connected to one string
Ten	MPPT1/MPPT2/MPPT3/MPPT4 are connected to two strings MPPT5/MPPT6 are each connected to one string
Eleven	MPPT1/MPPT2/MPPT3/MPPT4/MPPT5 are connected to two strings MPPT6 is connected to one string
Twelve	MPPT1/MPPT2/MPPT3/MPPT4/MPPT5/MPPT6 are connected to two strings

Note: PV1/PV2 two string voltages should be as consistent as possible, same thing applies to PV3/PV4 PV5/PV6 PV7/PV8 PV9/PV10 PV11/PV12 PV13/PV14 PV15/PV16 PV17/PV18/PV19/PV20.

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. • In Italy, each grid-connected photovoltaic system with a power output of more than 11.08 kW must be equipped with an external interface device (SPI)
Warning	

Context

All the AC power cables used for the inverter must be 5-pole outdoor cables. For easier installation, use flexible cables. The table lists the recommended specifications for cables and circuit breakers.

Type	3PH 60KTL-V3	3PH 70KTL-V3	3PH 75KTL-V3	3PH 80KTL-V3
L/N Cross section area of Cu cable (mm ²)	50-70	70-95	70-95	70-95
PE Cross section area of Cu cable (mm ²)	16-25	16-25	16-25	16-25
Muti-core outdoor cable diameter (mm)	<63	<63	<63	<63
AC Circuit Breaker specification	120A/380V/3P IΔN=0.3A	150A/380V/3P IΔN=0.3A	150A/380V/3P IΔN=0.3A	150A/380V/3P IΔN=0.3A

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.

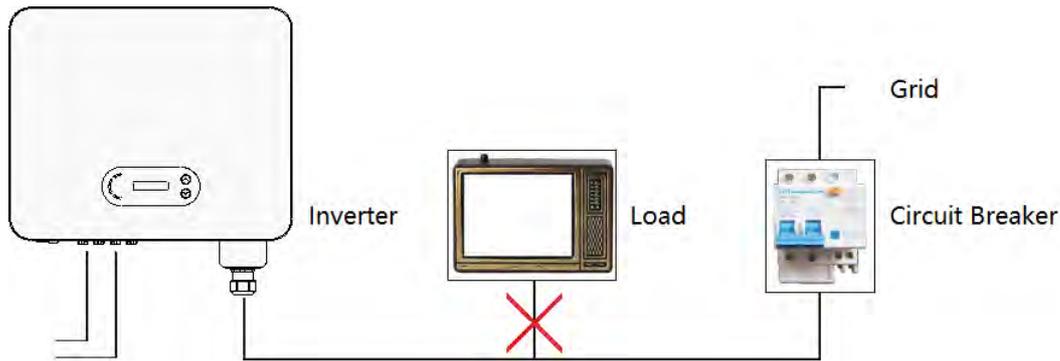
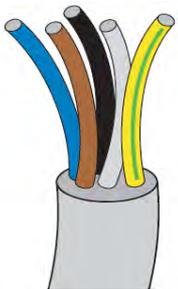


Figure 19 - Do not connect loads between the inverter and circuit breaker

Multi-core copper cables



The resistance at connection point must be less than 2Ω . 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 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 100 metres.

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

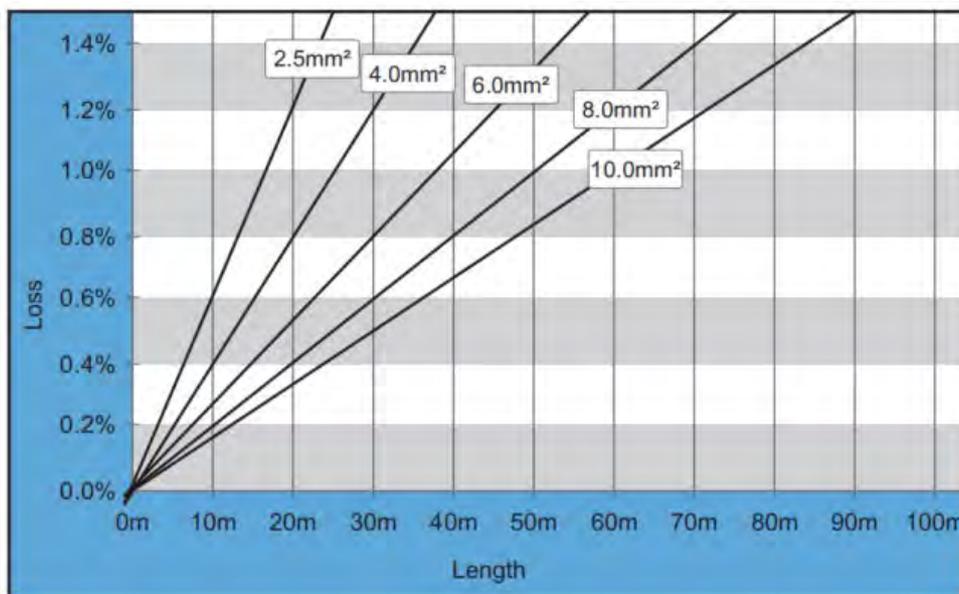


Figure 30 - Relation between cable length, cross section area and power loss

The 3PH 60KTL-80KTL-V3 inverters are three-phase output inverters that fully comply with the local grid connection requirements and safety standards.

The inverters are equipped with AC output connectors with IP65 protection suitable for photovoltaic use; customers must provide their own AC output cable connections.

Cable connection procedure

- 1) Remove the AC waterproof cover screw with a screwdriver, and take out the stopper in the PG waterproof joint.

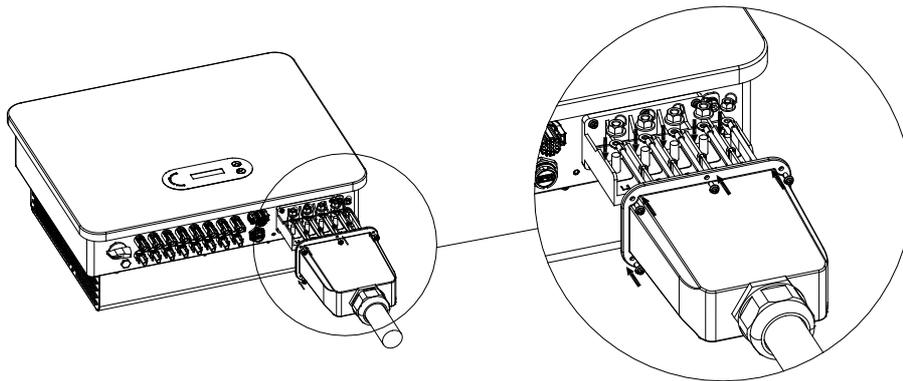
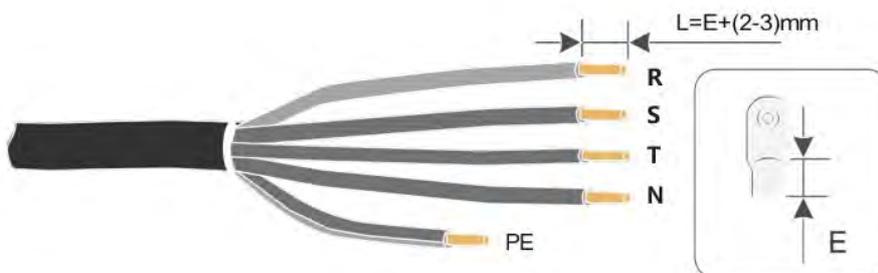


Figure 20 - Connecting the AC output cables (1)

- 2) Select the appropriate cable diameter, process the cable according to the following picture size requirements, and then pass through PG waterproof joint. The PE wire is connected to the grounding position of the container. External PE refer to fFigure Inverter external grounding instruction diagram.



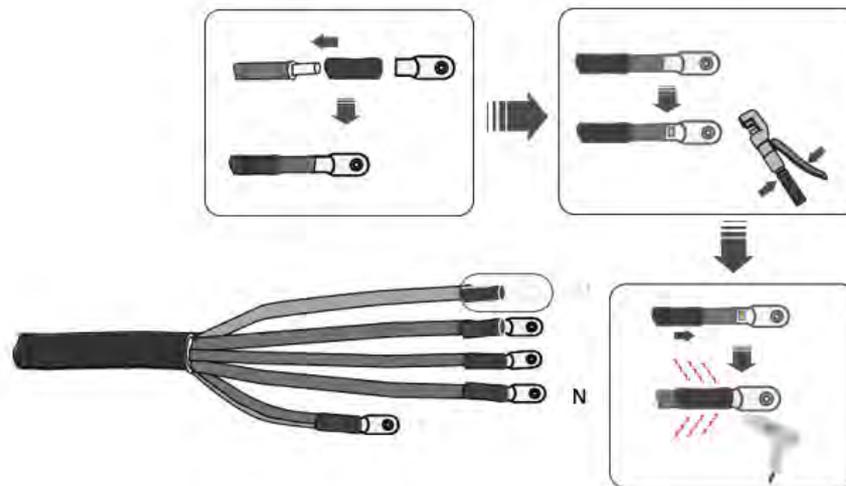


Figure 21 - Connecting the AC output cables (2)

3) Connect the AC power cable according to the following criteria and as shown in the figure:

- Connect the yellow-green (ground) cable to the terminal labelled “PE”, tighten the wire using a screwdriver;
- Connect the phase R cable to the terminal labelled “R”, tighten the wire using a screwdriver;
- Connect the phase S cable to the terminal labelled “S”, tighten the wire using a screwdriver;
- Connect the phase T cable to the terminal labelled “T”, tighten the wire using a screwdriver;
- Connect the blue (neutral) cable to the terminal labelled “N”, tighten the wire using a screwdriver.

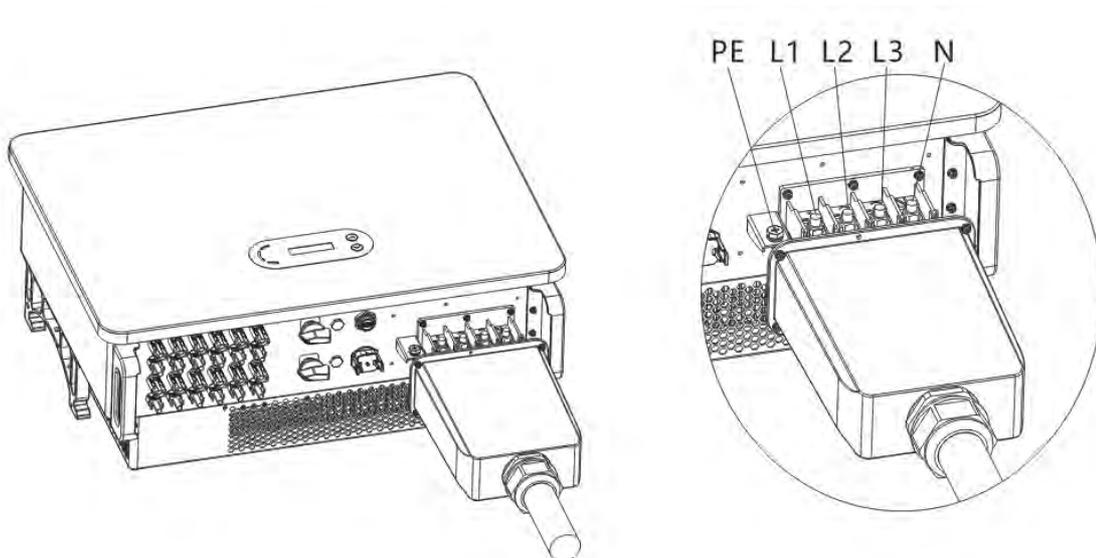


Figure 22a - Connecting the AC output cables (3)

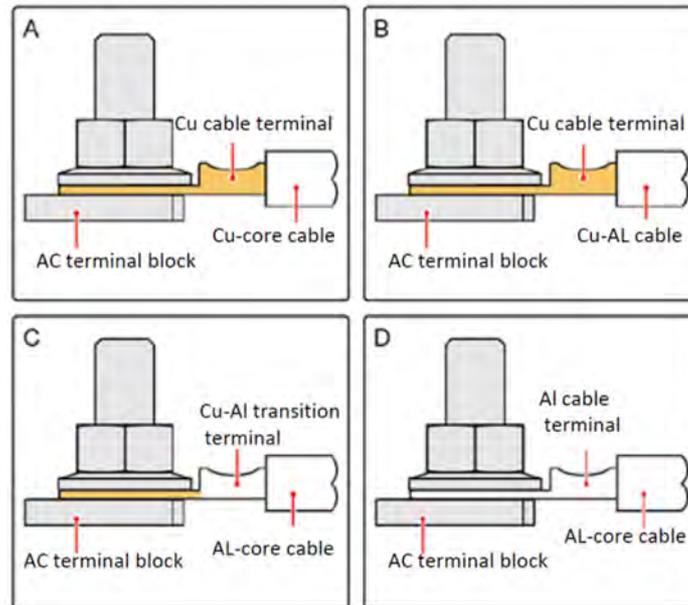


Figure 23b – OT/DT Requirement for terminal connection

- 4) Secure the clamping cable gland by turning it clockwise; make sure that all the wires are securely connected

4.5. Connecting the communication cables

The 3PH 60KTL-80KTL-V3 inverters have two communication interfaces, the RS485 interface and Wi-Fi interface, as shown in the figure below.

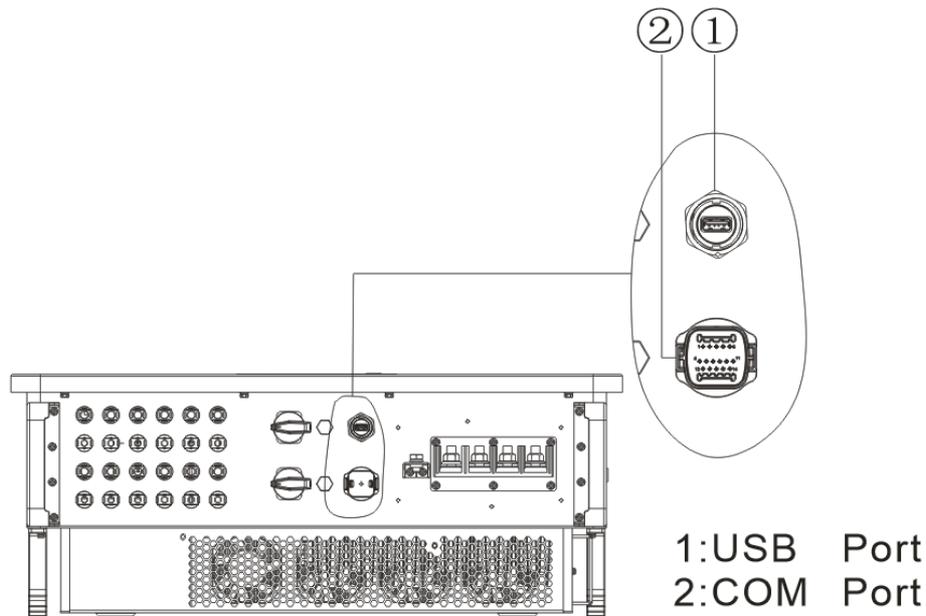


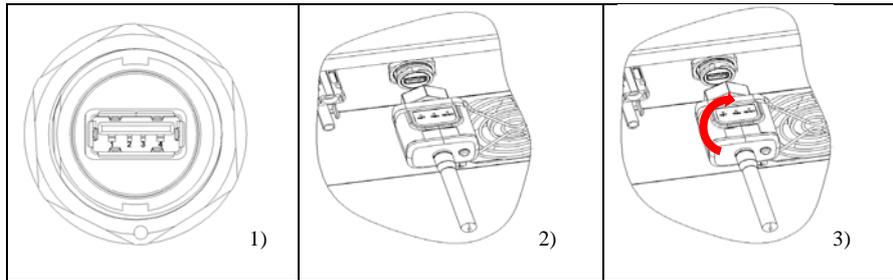
Figure 24 – Bottom view of the 3PH 60KTL-80KTL-V3 inverter

USB Port

Port Description :

USB port	USB flash disk access	Use for updating the software
	USB acquisition stick (WIFI / GPRS / Ethernet) access	Use for remote data acquisition and upgrading of inverter

Procedure :



COM–Multi function communication port

Recommend COM cable size:

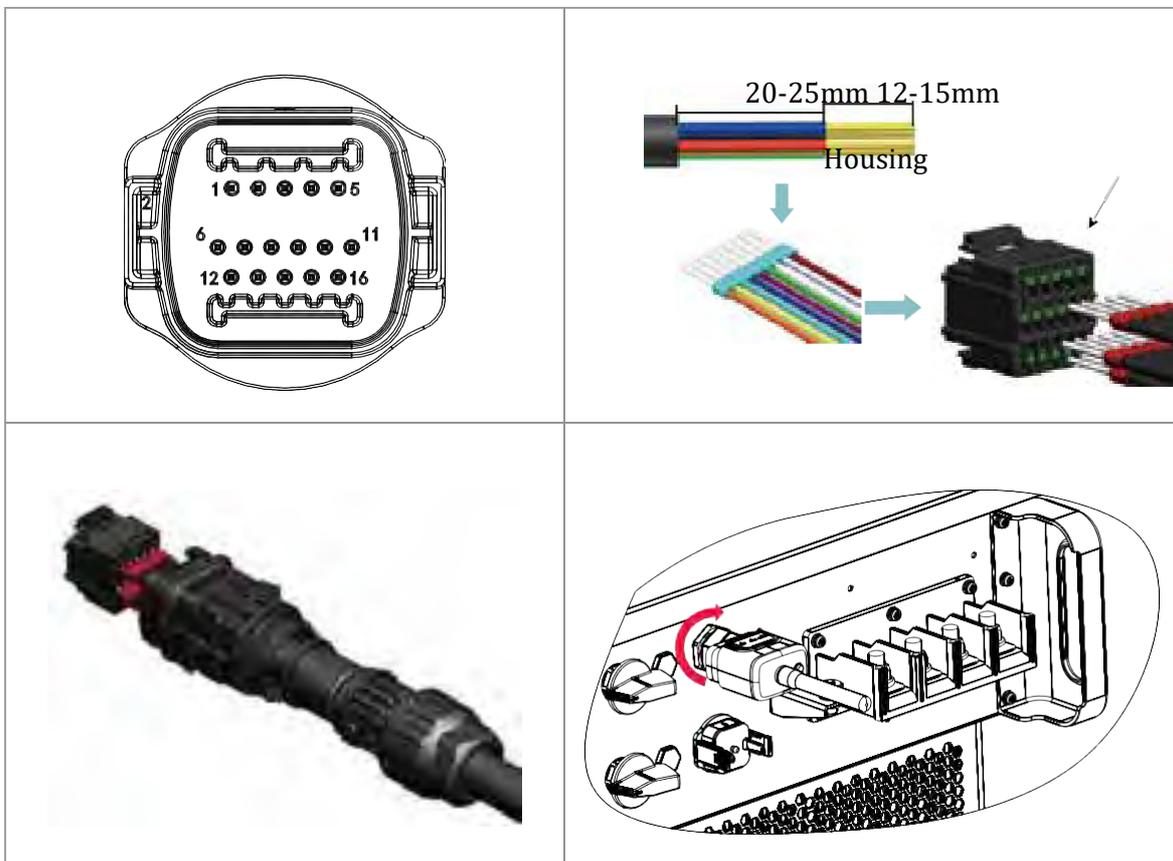
Name	Type	Outer diameter (mm)	Area (mm ²)
RS485 Communication Wire	Outdoor shielded twisted pair meets local standards	2 or 3core: 4~8	0.25~1

Port Description :

PIN	Define	Function	Note
1	RS485A	RS485 signal+	Wire connection monitoring or multiple inverter monitoring
2	RS485A	RS485 signal+	
3	RS485B	RS485 signal-	
4	RS485B	RS485 signal-	
5	Electric Meter RS485A	Electric meter RS485 signal+	Wire connection Electric meter
6	Electric Meter RS485B	Electric meter RS485 signal-	
7	GND.S	Communication ground	As RS485 signal ground or DRMS port ground

8	DRM0	Remote shunt down	DRMS port
9	DRM1/5	DRMS port logical IO	
10	DRM2/6		
11	DRM3/7		
12	DRM4/8		
13-16	Blank PIN	N/A	N/A

Procedure :



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>
Attention	

- **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;
 - Make sure that the positive and negative polarities are correct.

- **DC Connection**
 Make sure that the DC switch of the inverter is off. Use the multi-meter to check the voltage and current on the DC side; check the DC cable, make sure that the positive and negative poles are not inverted, and are consistent with the positive and negative poles of the photovoltaic string; otherwise, the inverter may suffer irreparable damage. Compare the voltage of each string connected to the same MPPT; if the difference is more than 3%, the PV string may be damaged. The maximum DC voltage (if the minimum operating temperature allowable is reached) should be less than 1100 V. Make sure that all the photovoltaic strings are securely connected to the input of the inverter.

- **AC Connection**
 Make sure that the AC switch of the inverter is off. Check that the phases of the inverter are correctly connected to the grid (R, S, T, N, PE). Check that the type of AC grid in which the inverter is installed is correct (TN-C, TN-S, TT). Check that the voltage of each phase is within the correct range. If possible, measure the THD; if there is too much distortion, the inverter may not operate properly.

- **Installing the front cover and the clamping screws**

5.2. Starting the inverter

- 1) Turn ON the DC switch both on the field panel and on the photovoltaic inverter (if present); wait for the screen to turn on.
- 2) Set the correct country code.
- 3) 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 indicates the correct functioning of the inverter.

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 Troubleshooting and maintenance chapter 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 3PH 60KTL-80KTL-V3 inverters.

6.1. Operating panel and display

Buttons and LED indicators



Figure 38 - LCD display with buttons and LED indicators

Main buttons:

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

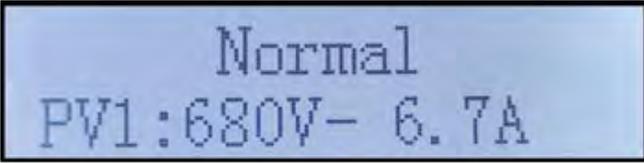
Indicator lights:

- “GFI” Red light ON = GFCI faulty
- “Normal” Green light flashing = counting down or checking
- “Normal” Green light ON = Normal
- “Alarm” Red light ON= recoverable or unrecoverable faulty

6.2. Main interface

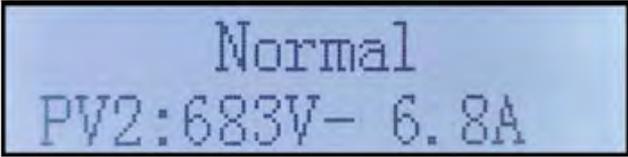
LCD interface indicated inverter status, alarm information, communication connection, PV input current and voltage, grid voltage, current and frequency, today generation, total generation.

Inverter working status, PV 1 input voltage and current.



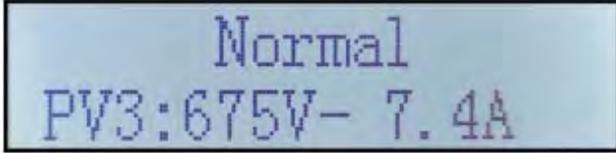
Normal
PV1: 680V - 6.7A

Inverter working status, PV 2 input voltage and current.



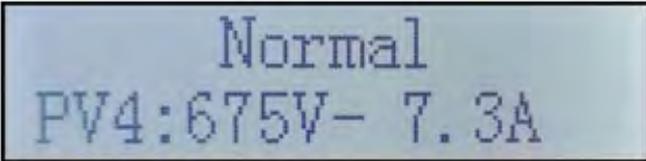
Normal
PV2: 683V - 6.8A

Inverter working status, PV 3 input voltage and current



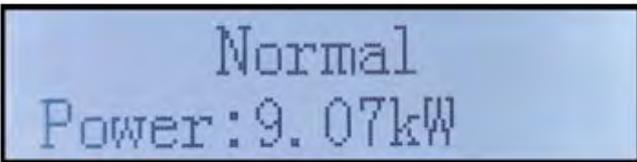
Normal
PV3: 675V - 7.4A

Inverter working status, PV 4 input voltage and current



Normal
PV4: 675V - 7.3A

Inverter working status, PV generated power.



Normal
Power: 9.07kW



Inverter working status, today generated electricity.

Normal
Today: 25.594kWh

Inverter working status, total generated electricity.

Normal
Total: 25.4kWh

Inverter working status, grid voltage and current.

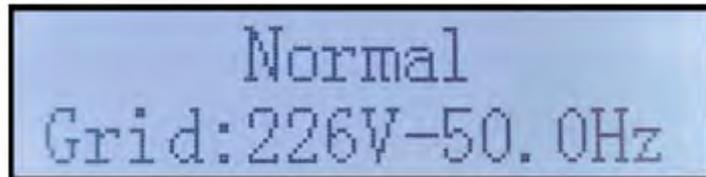
Normal
Grid R: 225V-13.5A

Normal
Grid S: 228V-13.4A

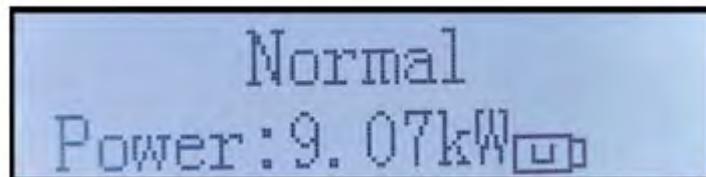
Normal
Grid T: 224V-13.4A



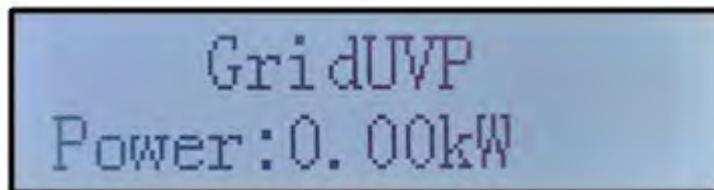
Inverter working status, grid voltage and frequency.



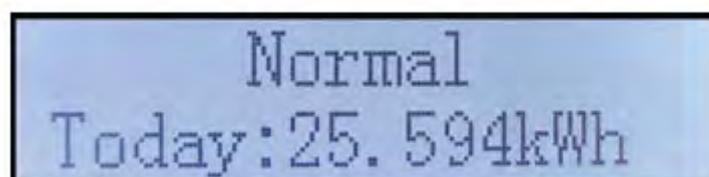
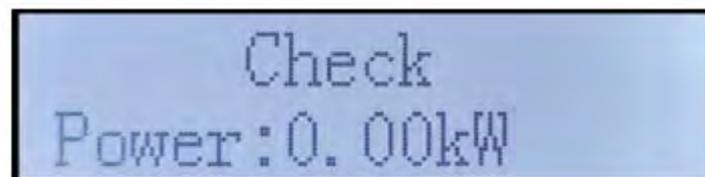
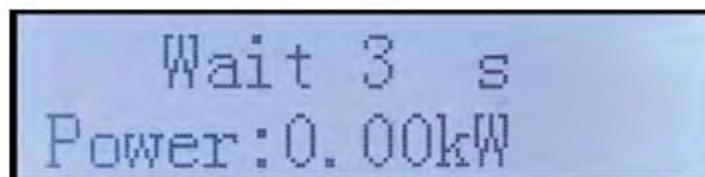
Inverter working status, USB status.

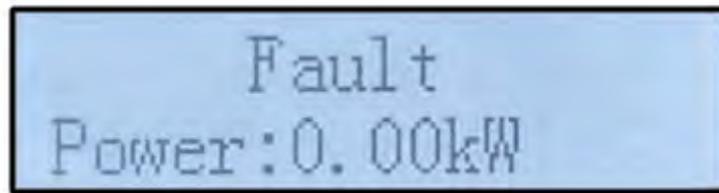


Inverter faulty alarm.



When control board successfully connected with communication board, the LCD display the current state of the inverter, display as shown in the figure below.





Inverter states includes: wait, check, normal and fault.

Inverter statuses include:

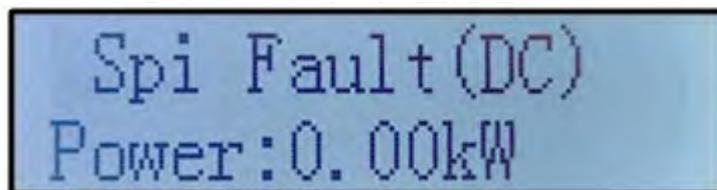
Wait: the inverter is waiting for the control status at the end of the reconnection time. In this state, the PV voltage must be higher than 200 V, the grid voltage value must be between the minimum and maximum permissible limits, as should the other grid parameters; otherwise, the inverter will go into an error state.

Check: the inverter is checking the insulation resistance, relays and other safety requirements. It also runs a self-test to ensure that the software and hardware of the inverter are functioning properly. The inverter switches to the error state or permanent error state if an errors occur.

Normal: The inverter is functioning normally and is feeding power into the grid; the inverter will go into a permanent error state if any faults are found.

Fault: Fault State: Inverter has encountered recoverable error. It should recover if the errors disappear. If Fault State continues; please check the inverter according error code.

When the control board and communication board connection fail, the LCD display interface as shown in the figure below.



6.3. Main menu

Long press the down button under standard interface to enter into main interface, Main interface including below information:

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

(A) Enter setting Interface as below

1.Enter Setting	-----Long press DOWN button
	1.Set time
	2.Clear Energy
	3.Clear Events
	4.Country Code
	5.On-Off Control
	6.Set Energy
	7.Set Address
	8.Set Input mode
	9.Set Language
	10.Set AntiReflux
	11.Logic Interface
	12.IV Curve Scan
	13.Set Power Derate

	14.PCC Select
	15.Reflux Mode

Long press the button to Enter the main interface of "1. Enter Setting" and long press to enter the setting menu. You can select the content you want to set by short pressing the button.

Note1: Some settings need to enter the password (the default password is 0001), when entering the password, short press to change the number, long press to confirm the current number, and long press after entering the correct password. If "password error, try again" appears, you will need to re-enter the correct password.

- **Date and time**

Set the system time for the inverter.

- **Clear Energy**

Clean the inverter of the total power generation.

- **Clear Events**

Clean up the historical events recorded in the inverter.

- **Country code**

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

Code	Country	Code	Country
000	000 Germany VDE4105	018	000 EU EN50438
	001 Germania VDE4110		001 EU EN50549
	002 Germany VDE0126	019	000 IEC EN61727
001	000 Italia CEI-021 Internal	020	000 Korea
	001 Italia CEI-016 Italia	021	000 Sweden
	002 Italia CEI-021 External	022	000 Europe General
	003 Italia CEI0-21 In Areti	024	000 Cyprus
002	000 Australia	025	000 India
	001 Australia AU-WA	026	000 Philippines
	002 Australia AU-SA	027	000 New Zealand
	003 Australia AU-VIC	028	000 Brazil
	004 Australia AU-QLD		001 Brazil LV
	005 Australia AU-VAR		002 Brazil 230
	006 Australia AUSGRID		003 Brazil 254
007 Australia Horizon	029	000 Slovakia VSD	
003 000 Spain RD1699		001 Slovakia SSE	
004 000 Turkey		002 Slovakia ZSD	
005	000 Denmark	033	000 Ukraine
	001 Denmark TR322	035	000 Mexico LV
006	000 Greece Continent	038	000 Wide-Range-60Hz
	001 Greece island	039	000 Ireland EN50438
007 000	Netherlan	040	000 Thailand PEA

		d			
008	000	Belgium		001	Thailand MEA
009	000	UK G59/G99	042	000	LV-Range-50Hz
	001	UK G83/G98	044	000	South Africa
010	000	China	046	000	Dubai DEWG
	001	China Taiwan		001	Dubai DEWG MV
011	000	France	107	000	Croatia
	001	France FAR Arrete23	108	000	Lithuania
012	000	Poland			

- **On-Off Control**

Inverter on-off local control.

- **Set Energy**

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

- **Set address**

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

The 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 the Wi-Fi network or RS485 port.

- **Set Input mode**

3PH 60KTL-80KTL-has 6 MPPTs, these MPPTs can work interdependently, or divided into parallel mode. User can change the setting according to the configuration.

- **Set Language**

Set the inverter display language.

- **Set AntiReflux**

Enable or disable Reflux. If disabled, the output will be the rated power. If enable, continue to set the Reflux power, the maximum power is the rated power. And continue to select PCC sampling points.

The reflux power value set by the anti-reflux function is the maximum power value allowed to be transmitted to the grid.

- **Logic interface**

Enable or disable logical interfaces. It is use for below standard Australia (AS4777), Europe General (50549), German(4105).

- **IV Curve Scan**

Shadow scanning, when the component is blocked or abnormal, causing multiple power peaks, by enabling this function, the peak point of maximum power can be tracked.

- **Set Power Derate**

Enable or disable the power derate function of the inverter, and set the derate ratio.

- **PCC Select**

Select which way to sample power at the on-grid point.

- **Reflux Mode**

Select reflux mode.

(B) Event list

Event List is used to display the real-time event records, including the total number of events and each specific ID No. and happening time. User can enter Event List interface through main interface to check details of real-time event records, Event will be listed by the happening time, and recent events will be listed in the front. Please refer to below picture. Long press the button and short press the button to turn the page in standard interface, then enter into “2. Event List” interface.

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

(C) “SystemInfo” Interface as below

3.SystemInfo	-----Long press DOWN button
	1.Inverter Type
	2.Serial Number
	3.General Soft Version
	4.General Hard Version
	5.Country Code
	6.Safety Software Version
	7.Safety Hardware Version
	8.Modbus Address
	9.Input Mode
	10.Remote State
	11.Reflux Enable
	12.Reflux Power
	13.DRM0
	14.DRMn
	15.MPPT Scan
	16.Force Control
	17.Power Derate
	18.PCC Select
	19.Reflux Mode

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

- **Inverter type**

Use the “Up” and “Down” keys in the “System Info” menu to move, and the “OK” key to enter menu “1. Inverter type.” Here you can see the power of the inverter model

- **Serial number**

Use the “Up” and “Down” keys in the “System Info” menu to move, and the “OK” key to enter menu “2. Serial number.” Here you can see the serial number of the inverter.

- **SW version**

Use the “Up” and “Down” keys in the “System Info” menu to move, and the “OK” key to enter menu “3. SW version.” Here you can see the software version.

- **HW version**

Use the “Up” and “Down” keys in the “System Info” menu to move, and the “OK” key to enter menu “4. HW version.” Here you can see the hardware version.

- **Country**

Use the “Up” and “Down” keys in the “System Info” menu to move, and the “OK” key to enter menu “5. Country.” Here you can see the country code that has been set.

- **Modbus Address**

Use the “Up” and “Down” keys in the “System Info” menu to move, and the “OK” key to enter menu “6. Modbus Address.” Here you can see the Modbus Address that has been set.

- **Input**

Use the “Up” and “Down” keys in the “System Info” menu to move, and the “OK” key to enter menu “7. Input.” Here you can see the type of input of the photovoltaic strings.

(D) Display time

Long press the button and short press the button to turn the page in the standard user interface to enter into “4. Display Time”, then long press the button to display the current system time.

(E) Software Update

User can update software by USB flash disk, Zucchetti Centro Sistemi S.p.a. will provide the new update software called firmware for user if it is necessary, the user needs to copy the upgrade file to the USB flash disk.

6.4. Updating Inverter Software

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

Do not update the inverter if the firmware version on board it is equal to or higher than that on the ZCS Azzurro website



ATTENTION!! Downgrading the inverter firmware version could lead to device failure.

The 3PH 60KTL-80KTL inverters require the use of an 8GB USB stick in order to be upgraded.

3PH 60KTL-80KTL-V3 inverter offer software upgrade via USB flash drive to maximize inverter performance and avoid inverter operation error caused by software bugs.

Step 1 : turn off AC circuit breaker and DC switch, remove the communication board cover as below figure. If the RS485 line has been connected, please release the waterproof nut first and make sure the communication line is no longer the force. Then remove the waterproof cover.

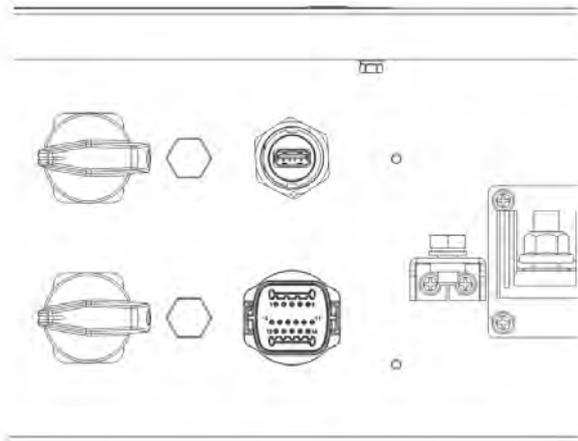


Figure 39 - Remove communication board cover

Step 2 : Insert USB into computer.

Step 3: Download from the www.zcsazzurro.com website <http://www.zcsazzurro.com/> in the products section, three-phase inverter, selecting the inverter model you have, under the firmware section the firmware of the inverter you have

Step 4: Save only the firmware folder with the .bin files inside the USB flash drive

Step 5: Via Safe Removal, Remove the Thumb Drive from Your Computer

Step 6 : Insert USB flash disk into the USB port of inverter.

Step 7 : Then turn on DC switch, screen show “recoverable fault” (as AC circuit breaker still open, inverter cannot detect grid power, so it may show “recoverable fault”)

Step 8 : Long press “DOWN” button to enter the menu, then short press “DOWN” button to find “5. Software Update” in the LCD display, long press “DOWN” button to enter input password interface.

Step 9 : Input the password, if password is correct, and then begin the update process, the original password is 0715.

Step 10 : System update main DSP, slave DSP and ARM in turns. If main DSP update success, the LCD will display “Update DSP1 Success”, otherwise display "Update DSP1 Fail"; If slave DSP update success, the LCD will display"Update DSP2 Success", otherwise display "UpdateDSP2 Fail".

Step 11 : After the update is completed, turn off the DC breaker, wait for the LCD screen extinguish, then recover the communication waterproof and then turn on the DC breaker and AC breaker again, the inverter will enter the running state. User can check the current software version in SystemInfo>>3.SoftVersion.

Note: If screen shows “Communication fail” , “Update DSP1 fail” , “Update DSP2 fail” please turn off the DC switch, wait for the LCD screen turn off, then turn on the DC switch again, then Continue to update from step 5.

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 3PH 60KTL-80KTL-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 panel and flat communication cable correctly connected and not damaged?

Follow the steps below to display the recorded alarms:

Press “Menu/Back” to enter the main menu from the standard interface. Select “Event List” in the menu screen, then press “OK” 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 alarm 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 its normal state. If the alarm occurs frequently, check whether the grid voltage/frequency is within the
ID02	GridUVP	The grid voltage is too low.	
ID03	GridOFP	The grid frequency is too high.	

ID04	GridUFP	The grid frequency is too low.	<p>correct range. If not, contact technical support. If so, check the AC circuit breaker and the AC wiring of the inverter.</p> <p>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.</p>
ID05	GFCIFault	Faulty automatic differential circuit breaker.	<p>If the fault occurs occasionally, the possible cause is that the external circuits are abnormal occasionally. inverter automatically returns to normal operating status after the fault is rectified. If the fault occurs frequently and lasts a long time, check whether the insulation resistance between the PV array and earth(ground) is too low, then check the insulation conditions of PV cable.</p>
ID06	OVRT	OVRT faulty	<p>There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.</p>
ID07	LVRT	LVRT faulty	
ID08	IslandFault	Islanding faulty	
ID09	GridOVPIstant1	Grid instantaneous voltage too high 1	



ID10	GridOVPIstant2	Grid instantaneous voltage too high 2		
ID11	VGridLineFault	Grid Line voltage Faulty		
ID12	InvOVP	Inverter overvoltage		
ID17	HwADFaultIGrid	The grid current sampling error		
ID18	HwADFaultDCI	The DCI sampling error		
ID19	HwADFaultVGrid(DC)	Grid voltage sampling faulty (DC side)		
ID20	HwADFaultVGrid(AC)	Grid voltage sampling faulty (AC side)		
ID21	GFCIDeviceFault(DC)	Current leakage sampling (DC side)		<p>There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.</p>
ID22	GFCIDeviceFault(AC)	Current leakage sampling (AC side)		
ID23	HwADFaultIdcBranch	Current Branch sampling faulty		
ID24	HwADFaultIdc	DC input current sampling faulty		

ID29	ConsistentFault_GFCI	The GFCI sampling value between the master DSP and salve DSP is not consistent	<p>There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.</p>
ID30	ConsistentFault_Vgrid	The Grid voltage sampling value between the master and salve is not consistent	
ID31	ConsistentFault_DCI	DCI consistency error	
ID33	SpiCommFault(DC)	SPI Communication Faulty (DC side)	
ID34	SpiCommFault(AC)	SPI Communication Faulty (AC side)	
ID35	SChip_Fault	Chip Faulty (DC side)	
ID36	MChip_Fault	Chip Faulty (AC side)	
ID37	HwAuxPowerFault	Auxiliary power fault	
ID38	InvSoftStartFail	Inverter failed to output	
ID41	RelayFail	Relay faulty	
ID42	IsoFault	Low isolation faulty	



ID43	PEConnectFault	Ground faulty	
ID44	PvConfigError	Input mode incorrect	Please check the wiring of PV string, whether each PV input is independent. If no, please contact technical support.
ID45	CDTisconnect	CT Fault	Please check the wiring of input, output and communication according to the user's manual. If the use method is not ruled out, please contact ZCS technical support..
ID46	ReversalCon nection	Input reverse connection error	
ID47	ParallelFault	Paralle lFault	
ID48	SNTypeFault	SN doesn't match Type	It is internal fault of inverter.
ID49	Reserved	Reserved	<p>Ensure the installation position and installation method meet the requirements of this user manual.</p> <p>Check whether the ambient temperature of the installation position exceeds the upper limit.</p> <p>If yes, improve ventilation to decrease the temperature.</p> <p>Check whether the inverter has dust and dust, whether there are foreign matters blocking the fan at the air inlet. If so, please improve the ventilation and heat dissipation of the environment. It is recommended that the inverter should be cleaned once every half a year.</p>
ID50	TempFault_HeatSink1	Heat sink1 over-temperature protection	
ID51	Reserved	Reserved	
ID52	Reserved	Reserved	
ID53	Reserved	Reserved	
ID54	Reserved	Reserved	

ID55	Reserved	Reserved	
ID57	TempFault_Env1	environment temperature1 protection	
ID58	Reserved	Reserved	
ID59	TempFault_Inv1	Model 1 over-temperature protection	
ID60	Reserved	Reserved	
ID61	Reserved	Reserved	
ID65	VbusRmsUnbalance	Unbalanced RMS value of bus voltage	There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.
ID66	VbusInstantUnbalance	Unbalanced instantaneous value of bus voltage	
ID67	BusUVP	Bus undervoltage during grid connection	If the configuration of the PV array is correct, could be the sun irradiation is too low. Once sun irradiation back to normal, inverter will work back normal.
ID68	BusZVP	Bus voltage is low	There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.
ID69	PVOVP	PV overvoltage	



ID70	Reserved	Reserved	
ID71	LLCBusOVP	LLCBUS overvoltage protection	
ID72	SwBusRmsOVP	Inverter bus voltage overvoltage software	
ID73	SwBusInstantOVP	Inverter bus voltage instantaneous value overvoltagesoftware	
ID81	Reserved	Reserved	
ID82	DciOCP	Dci overcurrent faulty	
ID83	SwOCPInstant	Output instantaneous current protection	<p>There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.</p>
ID84	SwBuckBoostOCP	BuckBoost software overcurrent	
ID85	SwAcRmsOCP	Output RMS current protection	
ID86	SwPvOCPInstant	PV overcurrent software protection	
ID87	IpvUnbalance	PV parallel unbalance	

ID88	IacUnbalance	Output current unbalance	
ID89	AFCIFault	Arc Fault	
ID97	HwLLCBusOVP	LLC hardware overvoltage	
ID98	HwBusOVP	Inverter bus hardware overvoltage	
ID99	HwBuckBoostOCP	BuckBoost hardware overcurrent	
ID100	Reserved	Reserved	
ID102	HwPVOCP	PV hardware overcurrent	<p>There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.</p>
ID103	HwACOCP	AC output hardware overcurrent	
ID105	MeterCommFault	Meters communication fault	
ID106	SNMachineFault	Serial number model error	
ID110	Overload1	Reserved	



ID111	Overload2	Reserved	
ID112	Overload3	Reserved	
ID113	OverTempDerating	Overtemperature derating	<p>Ensure the installation position and installation method meet the requirements of this user manual.</p> <p>Check whether the ambient temperature of the installation position exceeds the upper limit.</p> <p>If yes, improve ventilation to decrease the temperature.</p> <p>Check whether the inverter has dust and dust, whether there are foreign matters blocking the fan at the air inlet. If so, please improve the ventilation and heat dissipation of the environment. It is recommended that the inverter should be cleaned once every half a year.</p>
ID114	FreqDerating	Frequency derating	<p>If it occurs frequently, please check whether the grid voltage and grid frequency are within the allowable range of the inverter; if not, please contact the customer service of Zucchetti Centro Sistemi S.p.a.; if yes, please check whether the connection between the circuit breaker at the AC side and the output cable is normal.</p>
ID115	FreqLoading	Frequency loading	
ID116	VoltDerating	Voltage derating	
ID117	VoltLoading	Voltage loading	
ID124	Reserved	Reserved	<p>There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check</p>

ID125	Reserved	Reserved	whether the fault is rectified. If no, please contact technical support.
ID129	unrecoverHwAcOCP	Output overcurrent hardware permanent fault	
ID130	unrecoverBusOVP	Bus overvoltage permanent fault	
ID131	unrecoverHwBusOVP	Bus overvoltage hardware permanent fault	There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.
ID132	unrecoverIpvUnbalance	PV unbalance current permanent fault	
ID133	Reserved	Reserved	
ID134	unrecoverAcOCPIinstant	Output transient overcurrent permanent fault	
ID135	unrecoverIacUnbalance	Output current imbalance permanent fault	
ID137	unrecoverPvConfigError	Input mode configuration permanent fault	
ID138	unrecoverPVOCPIinstant	Input overcurrent permanent fault	
ID139	unrecoverHwPVOCPI	Input hardware overcurrent permanent fault	There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check

ID140	unrecoverRelayFail	Relay permanent fault	whether the fault is rectified. If no, please contact technical support.
ID141	unrecoverVbusUnbalance	Bus Unbalanced permanent fault	
ID142	LightningProtectionFaultDC	DC SPD failure	
ID143	LightningProtectionFaultAC	AC SPD failure	
ID145	USBFault	USB Failure	
ID146	WiFiFault	WIFI failure	
ID147	BluetoothFault	Bluetooth failure	
ID148	RTCFault	RTCClock failure	There are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support.
ID149	CommEEPROMFault	Communication BOARD EEPROM error	
ID150	FlashFault	Communication BOARD FLASH error	
ID151	Reserved	Reserved	



ID152	SafetyVerFault	Safety Version is Fault	
ID153	SciCommLose(DC)	SCI communication (DC side)	
ID154	SciCommLose(AC)	SCI communication (AC side)	
ID155	SciCommLose(Fuse)	SCI communication (DC current combined side)	
ID156	SoftVerError	Inconsistent software version	
ID157	Reserved	Reserved	
ID158	Reserved	Reserved	
ID161	ForceShutdown	ForceShutdown	<p>Remote control enables. If it is not controlled by yourself, please disconnect the DC switch of the inverter, wait for 5 minutes, and then turn on the DC switch.</p> <p>Observe whether the fault has been eliminated after the inverter is restarted. If not, please contact the customer service of Zucchetti Centro Sistemi S.p.a.</p>
ID162	RemoteShutdown	RemoteShutdown	
ID163	Drms0Shutdown	Drms0 shunt down	
ID165	RemoteDerating	RemoteDerating	Inverter shows ID83 when remote derating. If no one operate this function, please

ID166	LogicInterfaceDerating	Logical interface derating	check the connection (I/O).
ID167	AlarmAntiRefluxing	Anti Refluxing derating	
ID169	FanFault1	Fan 1 Alarm	<p>Check whether the inverter has dust and dust, whether there are foreign matters blocking the fan at the air inlet. If so, please improve the ventilation and heat dissipation of the environment. It is recommended that the inverter should be cleaned once every half a year.</p>
ID170	FanFault2	Fan 2 Alarm	
ID171	FanFault3	Fan 3 Alarm	
ID172	FanFault4	Fan 4 Alarm	
ID173	FanFault5	Fan 5 Alarm	
ID174	FanFault6	Fan 6 Alarm	
ID175	FanFault7	Fan7 Alarm	
ID177	Reserved	Reserved	
ID178	Reserved	Reserved	



ID179	Reserved	Reserved	
ID180	Reserved	Reserved	
ID181	Reserved	Reserved	
ID182	Reserved	Reserved	
ID193 – ID224	StringFuse_Fault0-31	String fuse open circuit alarm	Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved. If not, please contact ZCS technical support.
ID225 – ID240	Reserved	Reserved	

7.2. Maintenance

Inverters generally do not need any daily or routine maintenance. But ensure heat sink should not be blocked by dust, dirt or any other items. Before the cleaning, make sure that the DC SWITCH is turned OFF and the circuit breaker between inverter and electrical grid is turned OFF. Wait at least for 5 minutes before the Cleaning.

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.

Fan cleaning

For inverter 3PH 60KTL-80KTL-V3 with fans, please check if inverter have abnormal sound when inverter is operating. Check if fan on cracks, replace a new fan when necessary. Refers to below section.

7.3. Fan Maintenance and Replacement

Inverters generally do not require daily or routine maintenance. But make sure that the heatsink must not be blocked by dust, dirt, or other elements. Before cleaning, make sure that the DC switch is off and the switch between the inverter and the power grid is off. Wait at least 5 minutes before cleaning.

Inverter cleaning

Clean the inverter with a blower and a soft dry cloth or soft bristle brush. DO NOT clean the inverter with water, corrosive chemicals, cleaning agents etc.

Cleaning the Heat Sink

To ensure proper long-term operation of the inverter, ensure that there is sufficient space for ventilation around the heat sink. Check the heat sink for clogging (dust, snow, etc.) and remove it if present. Clean the heat sink with a blower and a soft dry cloth or soft bristle brush. DO NOT clean the heat sink with water, corrosive chemicals, cleaning agents etc.

7.3.1.Fan Maintenance

Fans should be cleaned and maintained regularly for performance and safety reasons.

	<p>Faulty or dirty fans can reduce inverter performance Broken or faulty fans can cause cooling problems, which can lead to limited Broken or faulty fans can cause cooling problems, which can lead to limited.</p> <p>Lead to regular limited ~ Clean fan.</p>
<p>Note</p>	

For 3PH 60KTL-80KTL-V3 series inverters with fans, if a fan is broken or malfunctioning, it may cause inverter heat dissipation issues and affect inverter efficiency. Therefore the fans should be regularly cleaned and well maintained as described below.

Step 1: With the inverter closed, check the wiring side to make sure all electrical connections are turned off.

Step 2: Unscrew the four screws at the corners of the fan base and remove the screw on the fan tray and save it, take out the fan holder about 5-10cm.

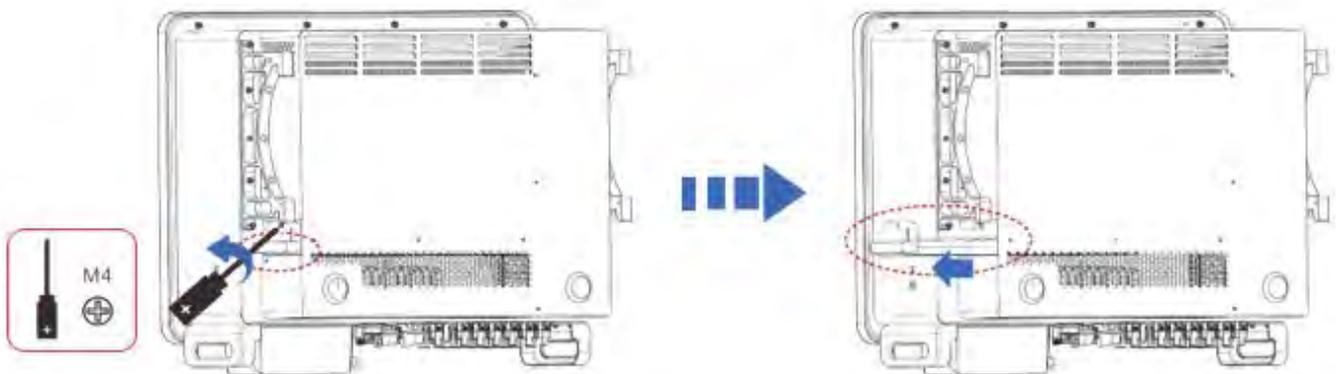


Figure 40 – Unscrew the four screws from the fan base plate

Step 3 Remove the shared cable ties from the cables, disconnect the connection terminals, and pull out the fan tray.

Note: You cannot use brute force to pull out the terminal, it is recommended to use a small screwdriver to press on the movable buckle, and then do the pulling and to insert.

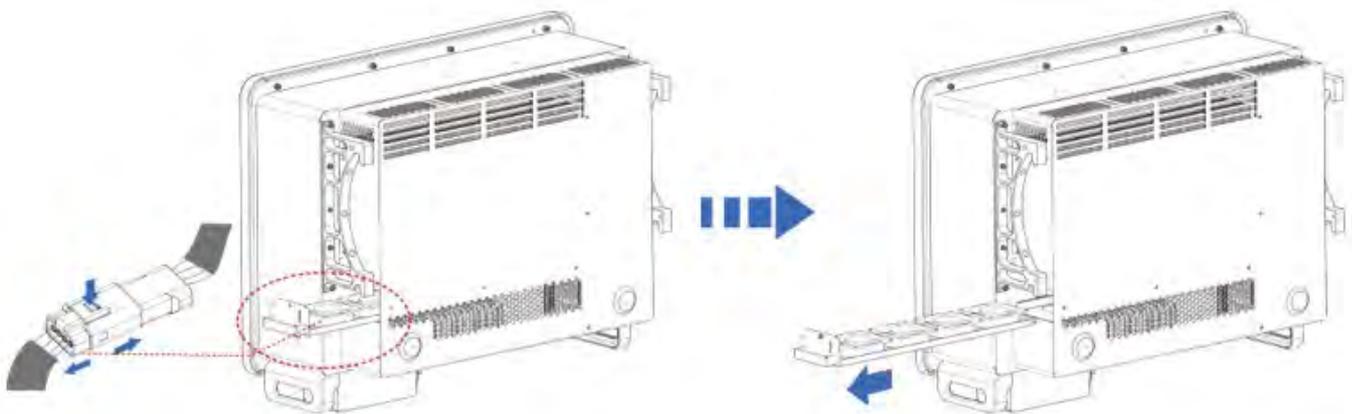


Figure 41 – Remove the connector and pull out the fan tray

Step 4: Use a soft-bristled brush or vacuum cleaner to clean dust and debris from the fan surface.

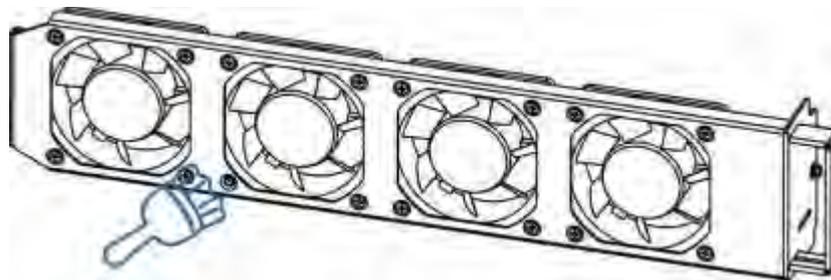


Figure 41 – Cleaning Fans

Step 5: Align the fan tray with the mounting location according to step 2, push the fan tray, and connect the connection terminals. Then tighten the screws on the fan tray according to step 2.

7.1.1 Replacement of the failed fan

Step 1: With the inverter closed, check the wiring side to make sure all electrical connections are turned off.

Step 2: Unscrew the four screws at the corners of the fan base and remove the screw on the fan tray and save it, take out the fan holder about 5-10cm.

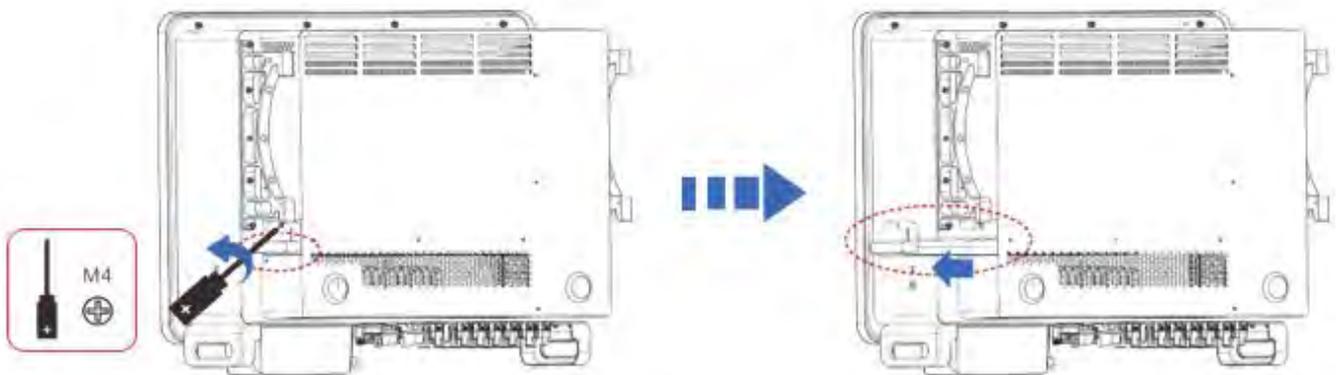


Figure 40 – Unscrew the four screws from the fan base plate

Step 3 Remove the shared cable ties from the cables, disconnect the connection terminals, and pull out the fan tray.

Note: You cannot use brute force to pull out the terminal, it is recommended to use a small screwdriver to press on the movable buckle, and then do the pulling and to insert.

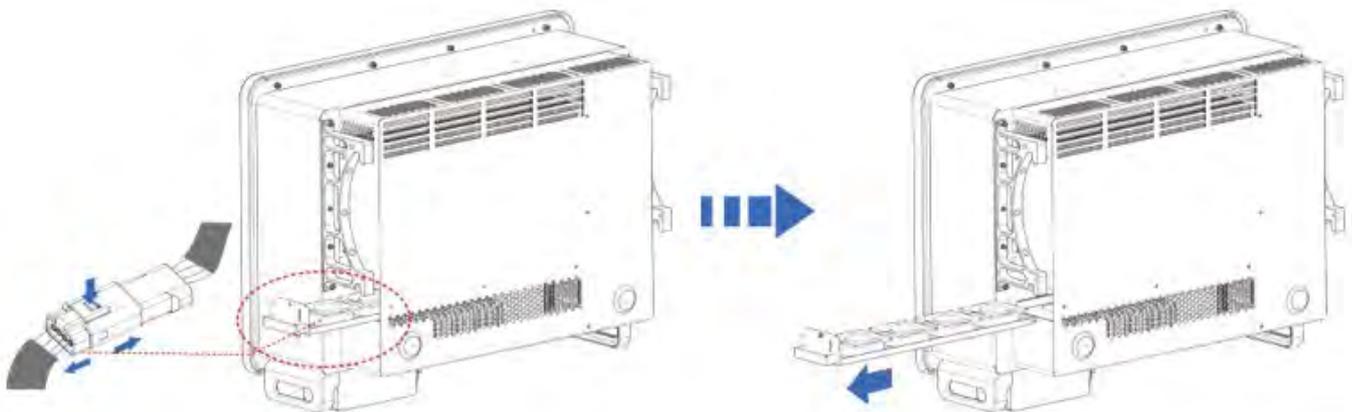


Figure 41 – Remove the connector and pull out the fan tray

Step 4: Remove the cable tie from the faulty fan (fan 3 is used as an example as an example).

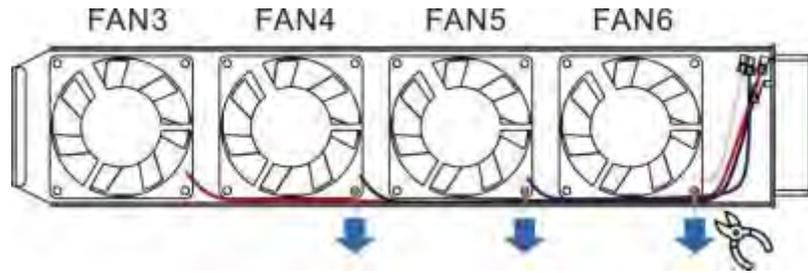
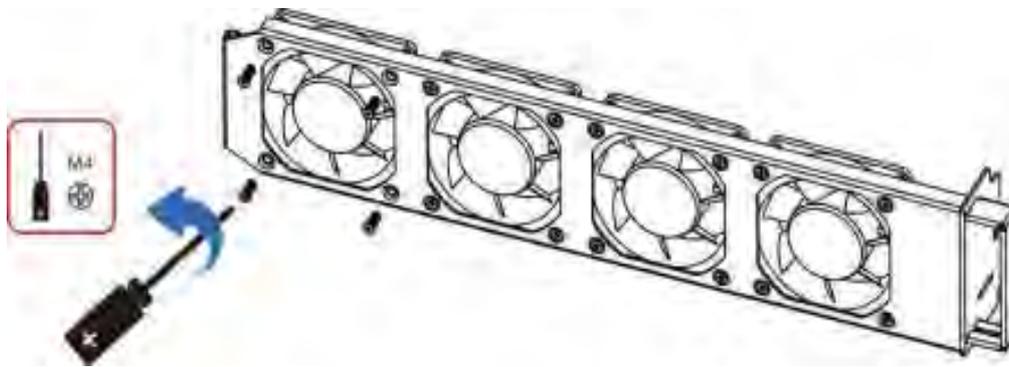


Figure 41 - Cleaning Fans

Step 5: Remove the faulty fan (fan 3 is used as an example as an example).



Step 6 Install the new fan, following the order of steps 4,3.

Step 7 Clean the fan tray to make sure there are no foreign objects left.

Step 8 Align the fan tray with the mounting location according to step 2, push the fan tray, and connect the connection terminals. Then tighten the screws on the fan tray according to step 2.

Note:

- Before replacing the fan, you must perform a shutdown of all power to the inverter.
- When replacing the fan, insulated tools should be used and personal protective equipment should be worn.
- Replacing the fan, loosen the screws, take out the fixed bracket of the fan 5-10cm, then take out the connecting terminals, pull the terminals without using brute force, mastering the method, pinch the movable buckle with your fingernails, for pulling and inserting, check the direction of the fan, check the engagement of the terminal with the corresponding color.

Fan Color and Error Code Matching Table:

Fan Name	FAN 3	FAN 4	FAN 5	FAN 6
Color	 Red	Black 	Blue 	White 
Matching PCBA Port	CN7	CN8	CN9	CN4
Corresponding error code	Fan Error3	Fan Error4	Fan error5	Fan error6

8. Uninstalling

8.1. Uninstallation steps

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

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	3PH 60KTL-V3	3PH 80KTL-V3
DC Input data		
Typical DC power*	72000W	96000W
Maximum DC power for each MPPT	18000W (550V-850V)	24000W (550V-850V)
No. of independent MPPTs/N.o of strings per MPPT	6/2	
Maximum DC input voltage	1100V	
Start-up voltage	200V	
Nominal DC input voltage	620V	
MPPT DC voltage range	180V-1000V	
DC voltage range at full load	550V-850V	
Maximum input current for each MPPT	32A	40A
Maximum absolute current for each MPPT	50A	60A
AC Output data		
Rated AC power	60kW	80kW
Maximum AC power	66kVA	88kVA
Maximum AC current per phase	100A	133.3A
Connection type/Rated grid voltage	Three-phase 3PH/N/PE 220V/230V/240V (PH-N); 380V/400V/415V (PH-PH) o Three-phase 3PH/PE 380V/400V/415V (PH-PH)	
Grid voltage range	184V~276V (PH-N); 320V~480V (PH-PH) (according to the local grid standards)	
Rated grid frequency	50Hz/60Hz	
Grid frequency range	45Hz~55Hz / 54Hz~66Hz (according to the local grid standards)	
Total harmonic distortion	<3%	
Power factor	1 (programmable +/-0.8)	
Active power adjustment range (settable)	0~100%	
Grid feed-in limit	Feed adjustable from zero to nominal power value**	
Efficiency		
Maximum efficiency	98.7%	
Weighted efficiency (EURO)	98.2%	
MPPT efficiency	>99.9%	
Consumption at night	<2W	
Protection		
Internal interface protection	No	
Safety protections	Anti-islanding, RCMU, Ground Fault Monitoring	
Reverse polarity protection DC	Yes	
DC circuit breaker	Integrated	
Overheating protection	Yes	
Overvoltage category/Protection class	Overvoltage category III / Protection class I	
Integrated dischargers	AC/DC: Type 2 standard	
Standard		
EMC	EN 61000-6-2/4, EN 61000-3-11/12	
Safety standard	IEC 62109-1/2, IEC62116, IEC61727, IEC61683, IEC60068(1,2,14,30)	
Grid connectio standard	Connection certificates and standards available at www.zcsazzurro.com	
Communication		
Communication interfaces	Wi-Fi/4G/Ethernet (optional), RS485 (proprietary protocol), USB, Bluetooth	
General data		
Allowable ambient temperature range	-30°C...+60°C (power limit above 45°C)	
Topology	Transformerless	
Environmental protection class	IP66	
Allowable relative humidity range	0%...95% non-condensing	
Maximum operating altitude	4000m	
Noise level	< 60dB @ 1mt	
Weight	50 kg	
Cooling	Forced fan convection	
Dimensions (H x L x D)	561mmx687mmx275mm	
Data monitoring	LCD Display + APP	
Warranty	5 or 10 years (NB: the extended warranty can be obtained by registering on the EXTENDED WARRANTY section of the zcsazzurro.com website)	

* The typical DC power does not represent a maximum applicable power limit. The online configurator available at www.zcsazzurro.com will provide any applicable configurations

** Possible using specific meter

10. Monitoring system

Monitoring ZCS				
Product code	Product Photos	APP Monitoring	Portal Monitoring	Ability to send commands and remotely update the inverter in case of assistance
ZSM-WIFI				
ZSM-ETH				
ZSM-4G				
Datalogger 4-10 Inverter				
Datalogger up to 31 Inverters				

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 42 – 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.

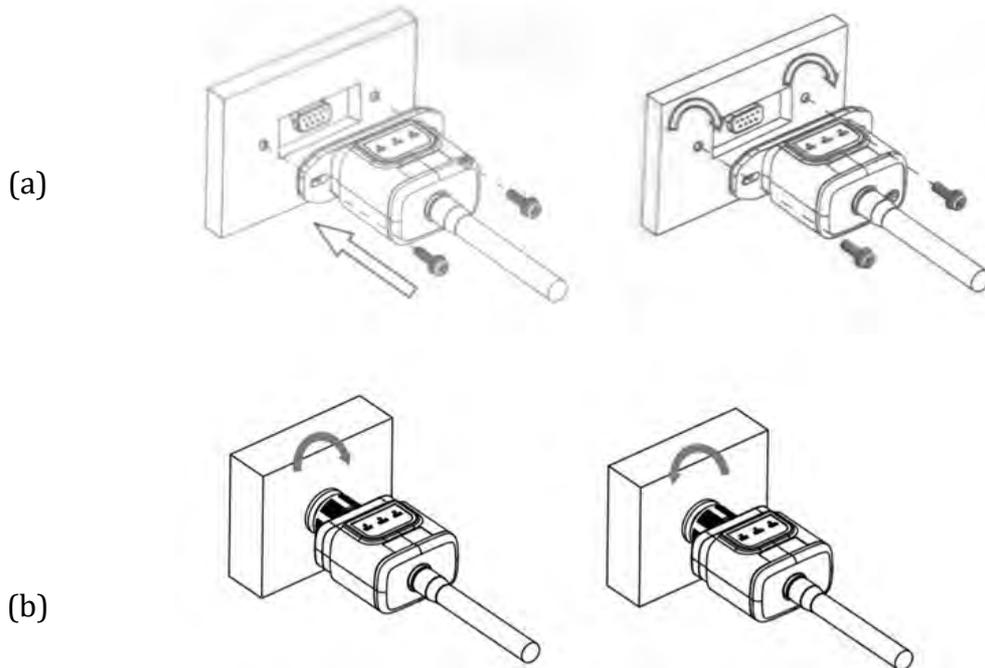


Figure 43 – Inserting and securing the external Wi-Fi adapter

- 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 44 - 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 45 - 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.

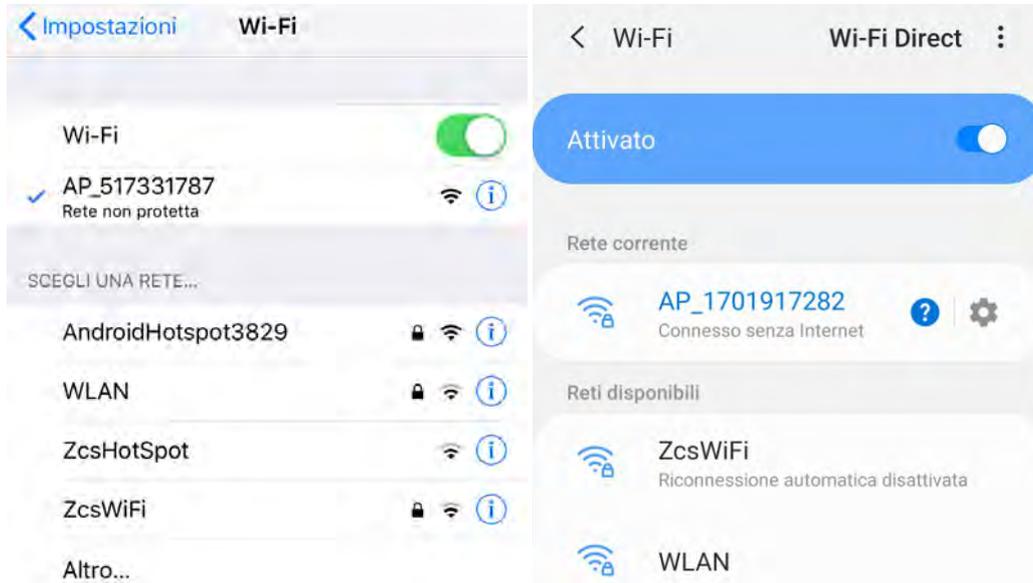


Figure 46 - Connection to Access Point for Wi-Fi adapter on iOS smartphone (left) and Android smartphone (right)

- 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 47 - 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.

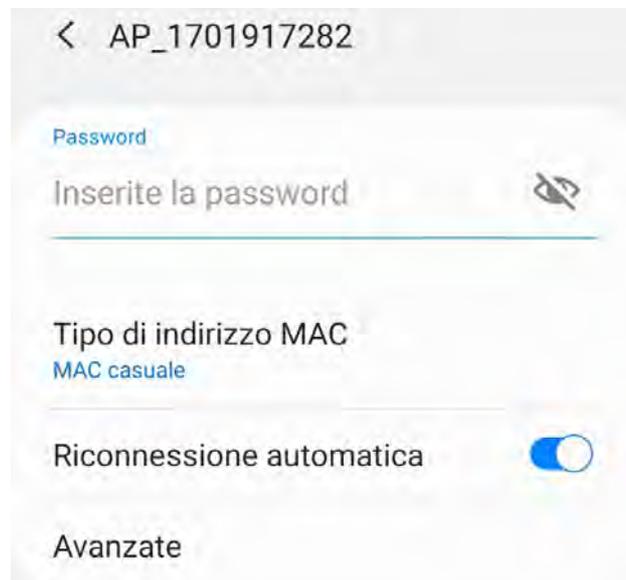


Figure 48 - Password entry prompt

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 49 – 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.

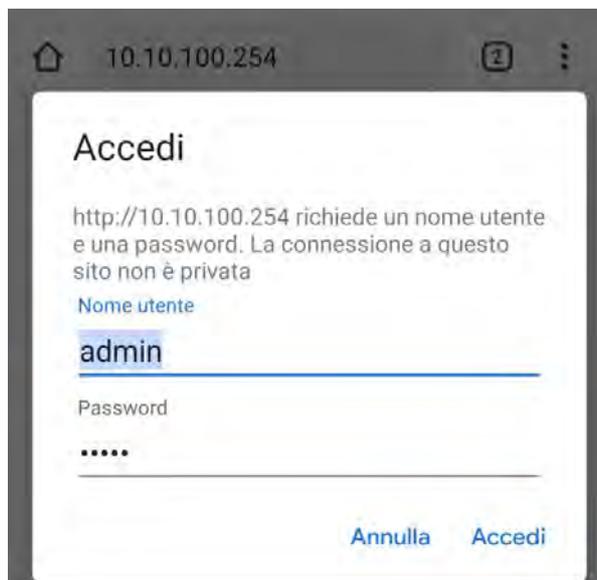


Figure 50 – Screen for accessing the web server to configure the Wi-Fi adapter



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

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

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

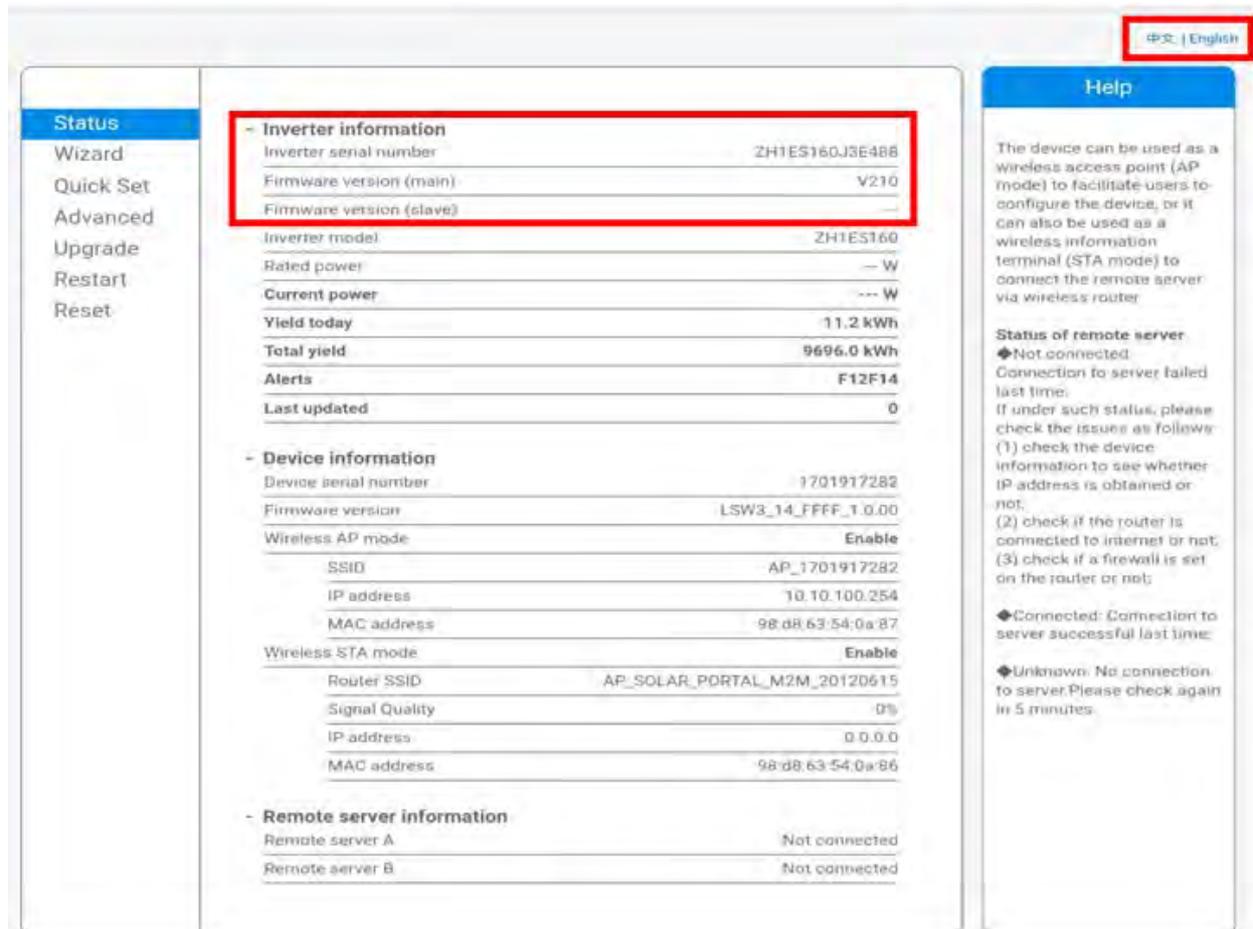


Figure 51 – Status screen

- Click on the Wizard setup button in the left-hand column.
- 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 52 – Screen for selecting the available wireless network (1)

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

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 53 – 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 54 - 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 55 – 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 56 - Successful configuration screen

10.1.3. Verification

To verify the correct configuration, connect to it again and access the status page. Here 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 58 - Status screen

Status of LEDs present on the adapter

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



Figure 59 - Initial status of LEDs

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



Figure 60 - 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 61 – 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 62 - 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 63 – 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 64 - 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.

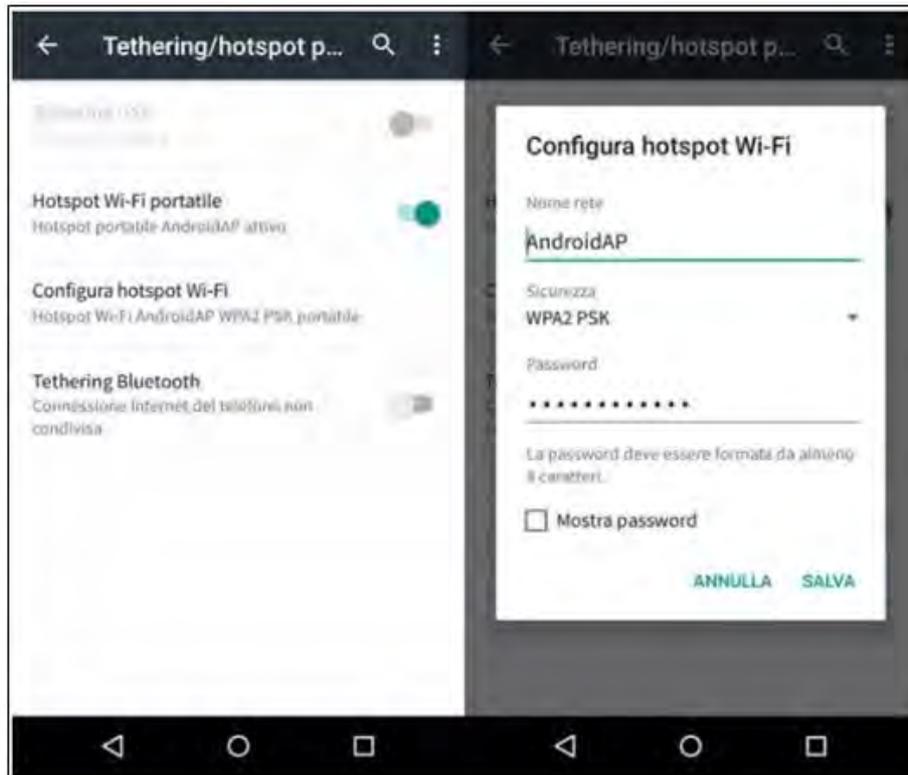


Figure 65 – Configuration of an Android smartphone as a hotspot router

- **Using an iPhone as a modem**

- 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.
- 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.

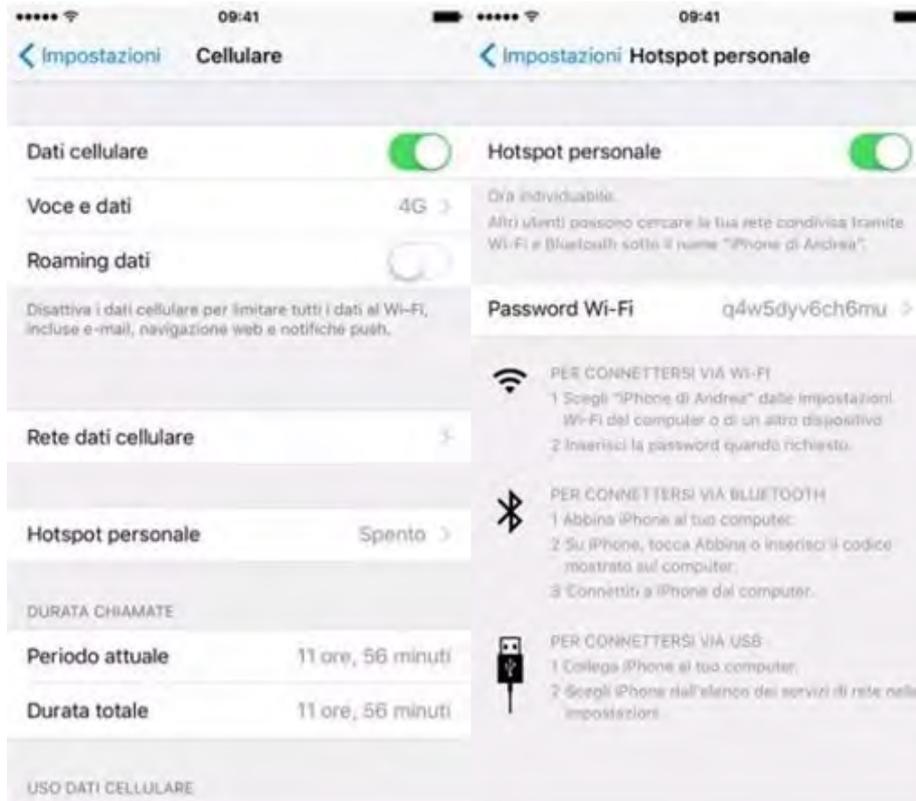


Figure 66 - Configuration of an iOS smartphone as a hotspot router

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 67 – 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.

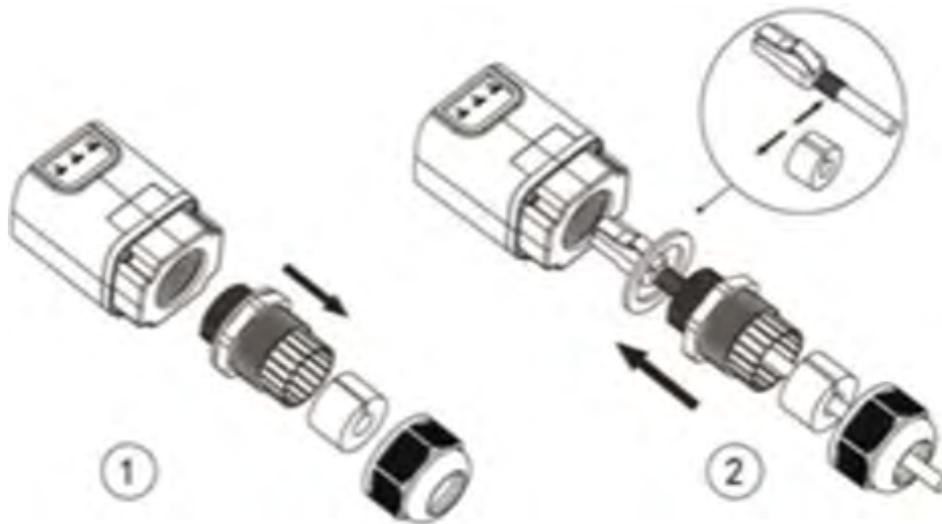


Figure 68 - Inserting the network cable inside the device

- 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.

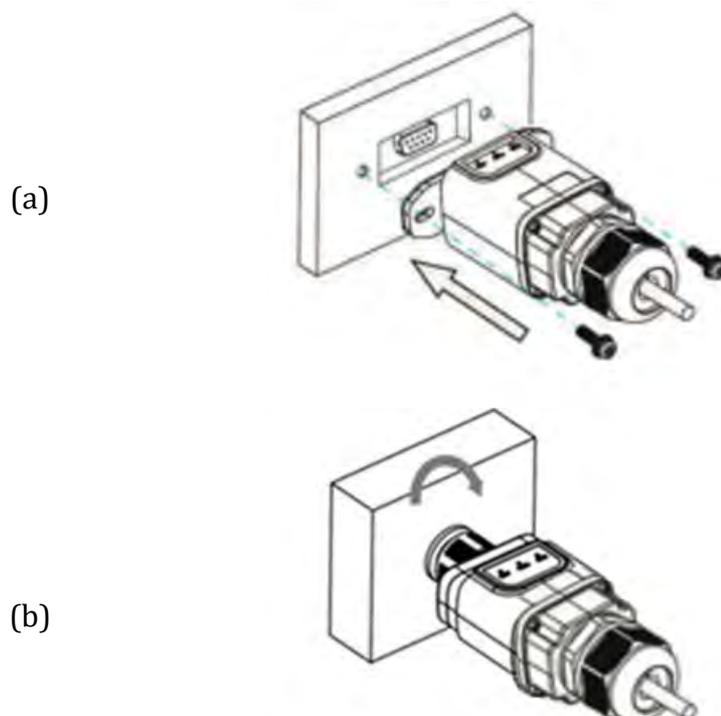


Figure 69 - Inserting and securing the ethernet adapter

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

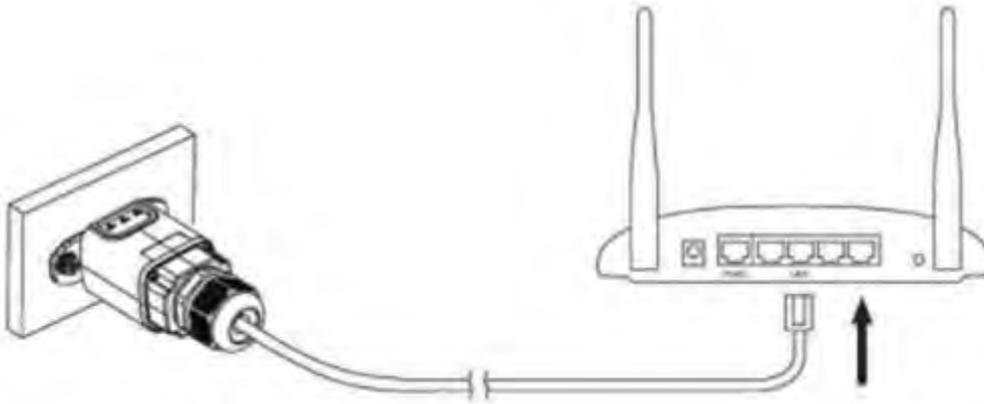


Figure 70 - Connecting the network cable to the modem

- 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 71 - Initial status of LEDs

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



Figure 72 - 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 73 - 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 74 - 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 75 – 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.

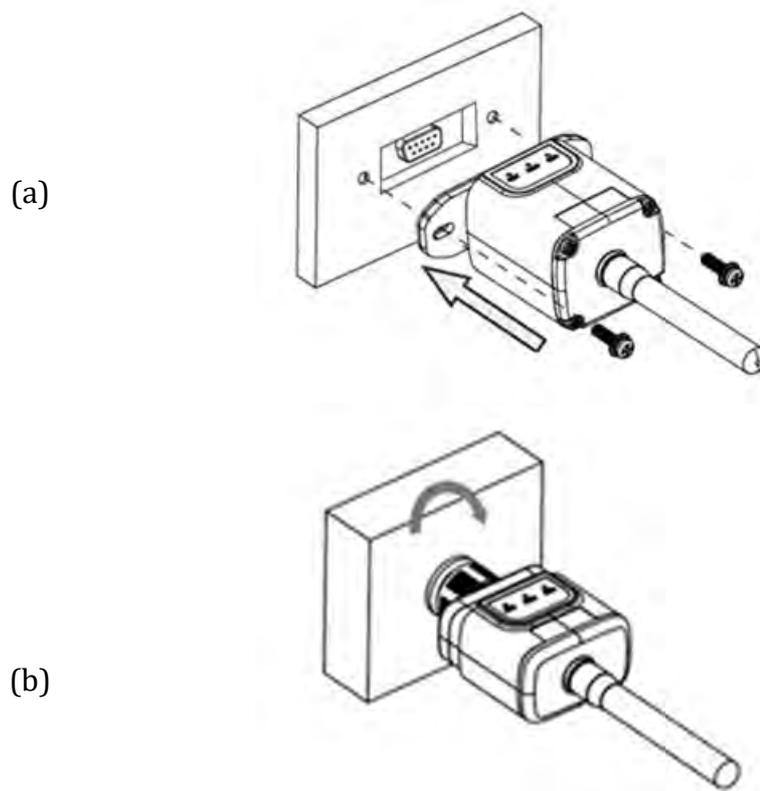


Figure 76 - Inserting and securing the 4G adapter

- 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 77 - 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 78 - 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 79 - 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 80 - 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.

10.4. Datalogger

Monitoring ZCS				
Product code	Product Photos	APP Monitoring	Portal Monitoring	Ability to send commands and remotely update the inverter in case of assistance
ZSM-WIFI				
ZSM-ETH				
ZSM-4G				
Datalogger 4-10 Inverter				
Datalogger up to 31 Inverters				

10.4.1. Preliminary notes on how to configure the datalogger

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

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

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



Figure 81 – Diagram for connecting the ZSM-DATALOG-04 / ZSM-DATALOG-10 datalogger

- Datalogger up to 31 inverters (code ZSM-RMS001/M200): allows to monitor up to 31 inverters or a system with a maximum installed power of 200kW. It can be connected to the network via an Ethernet cable.
- Datalogger up to 31 inverters (code ZSM-RMS001/M1000): allows to monitor a maximum of 31 inverters or a system with a maximum installed power of 1000kW. It can be connected to the network via an Ethernet cable.



Figure 82 – Diagram showing the operation of the ZSM-RMS001/M200 / ZSM-RMS001/M1000 datalogger

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

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

10.4.2. Electrical connections and configuration

All the Azzurro ZCS inverters have at least one RS485 connection point.

The connections can be made via the green terminal block or via the RJ45 plug inside the inverter.

Use positive and negative conductors. There is no need to use a conductor for the GND. This applies to both the terminal block and the plug.

To create the serial line, use a shielded cable certified for RS485 2x0.5mm². Connect the shield to ground only on 1 of the 2 sides (preferably inverter side).

In the case of more than one inverter, continue shielding between sections of cables (COM Inverter port in-exit).

- 1) In the case of three-phase inverters, a suitably crimped network cable with a RJ45 connector can also be used:
 - a. Place the blue cable in position 4 of the RJ45 connector and the white-blue cable in position 5 of the RJ45 connector, as shown in the figure below.
 - b. Insert the connector into the 485-OUT terminal.
 - c. If there is more than one three-phase inverter, insert another connector in the 485-IN terminal to connect to the 485-OUT input of the next inverter.

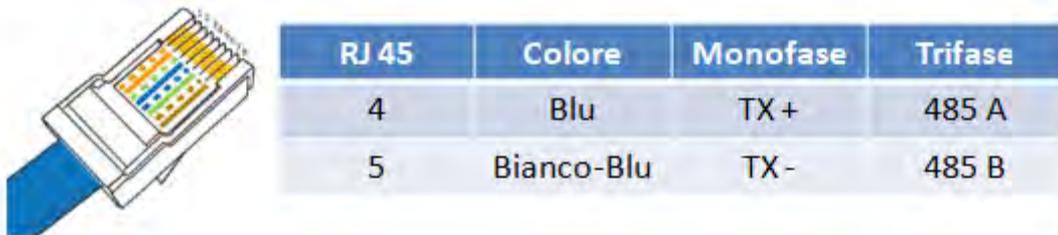


Figure 83 - Pin out for connecting the RJ45 connector

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

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

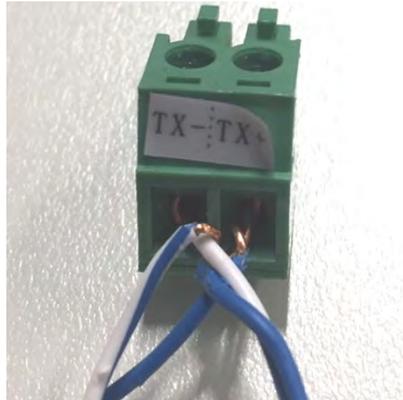


Figure 84 - Tightening the network cable to the RS485 terminal block

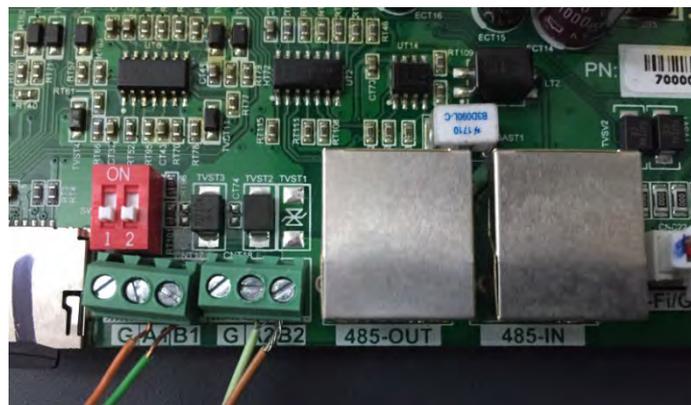


Figure 85 - Connecting the serial line via the RS485 terminal block and via the RJ45 plug

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

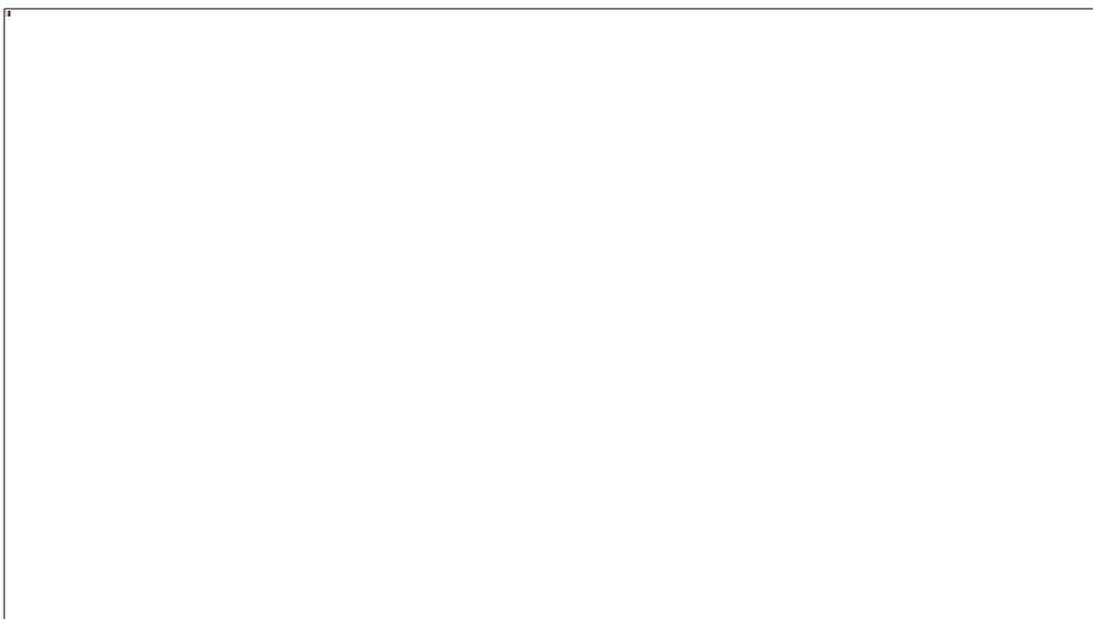


Figure 86a - Connecting the serial line via the communication connector for 3PH HYD5000-HYD20000-ZSS



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

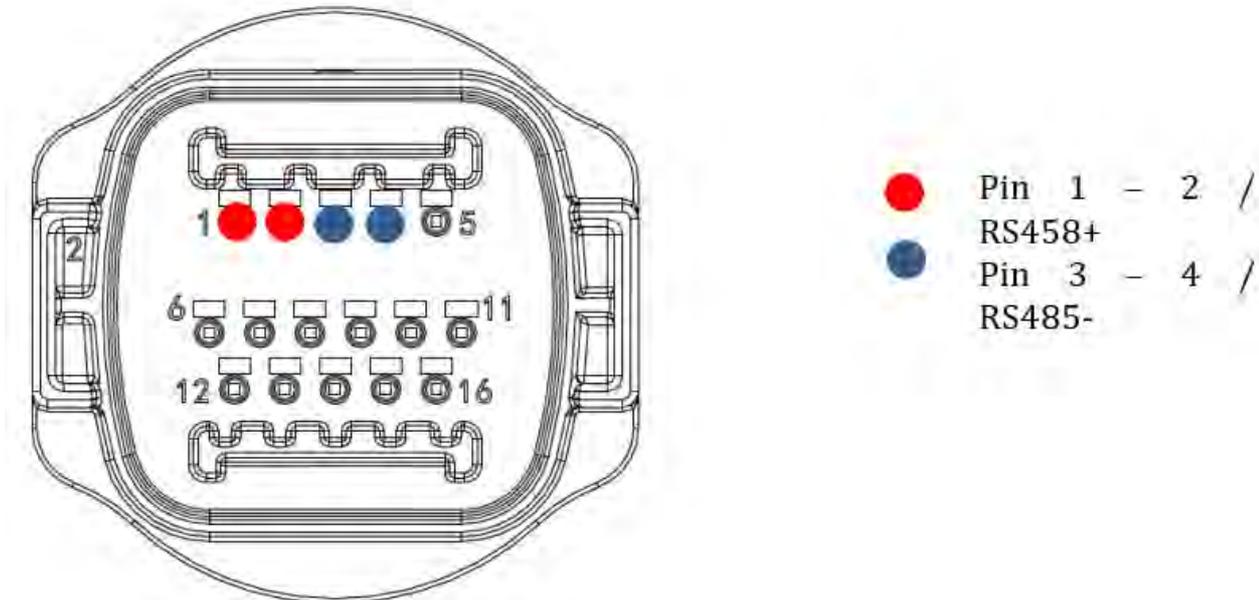


Figure 86b – Connecting the serial line via the communication connector for 1PH 3000-6000 TLM-V3, 3PH HYD5000-HYD20000-ZSS, 3PH 60KTL-80KTL-V3

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

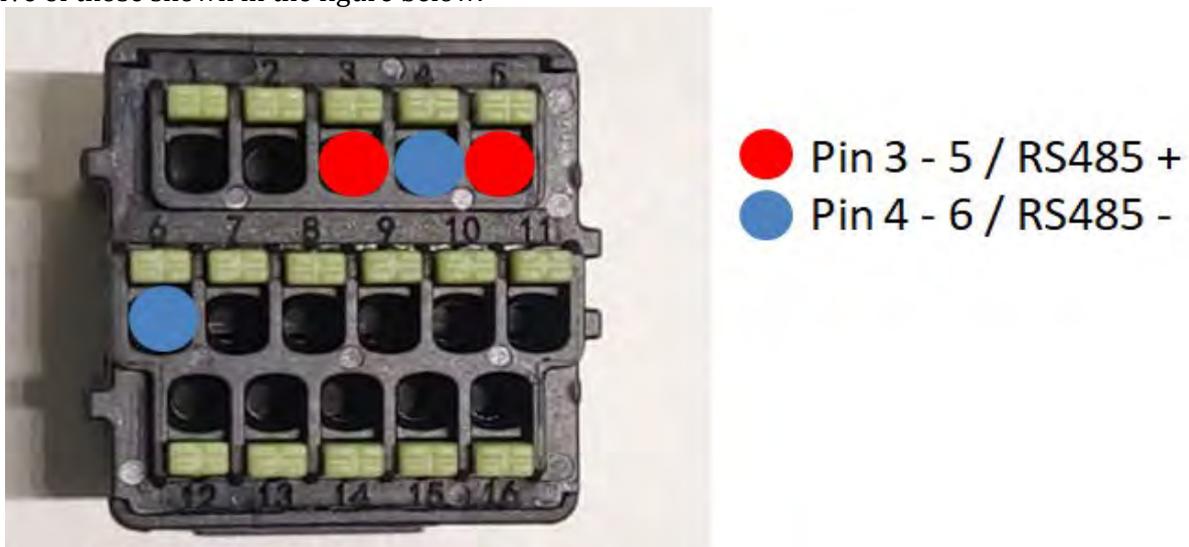


Figure 86c – Connecting the serial line via the communication connector for 1PH HYD3000-HYD6000-HP

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

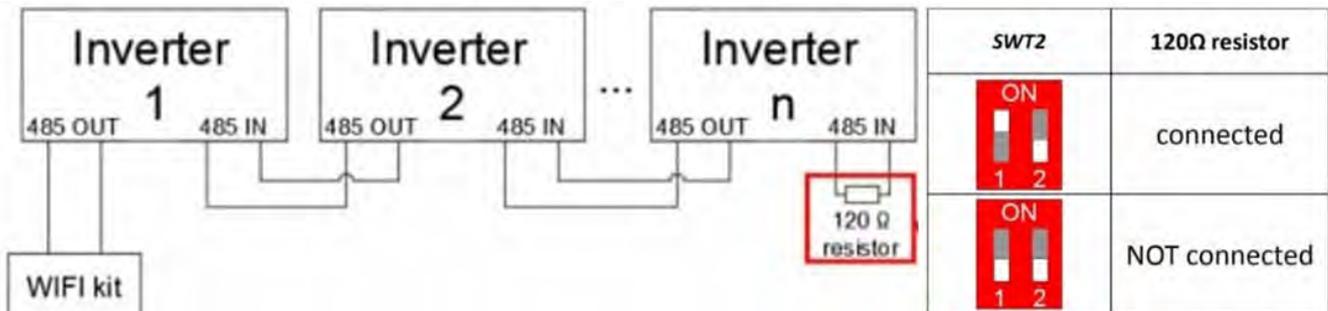


Figure 87 – Positioning of dip switches to connect the isolation resistor

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

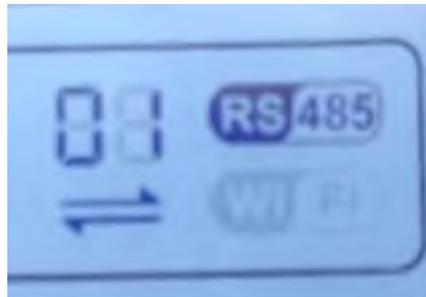


Figure 88 – RS485 symbol on the display of the inverter

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

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

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

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

10.4.4. WI-FI CONFIGURATION

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

10.4.5. Ethernet configuration

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



Figure 89 – Ethernet cable connected to the datalogger

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



Figure 90 - Wi-Fi network search on iOS smartphone (left) and Android (right)

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



Figure 91 - Disabling automatic reconnection to a network

- 4) Connect to a Wi-Fi network generated by the datalogger (i.e. AP_*****, where ***** indicates the serial number of the datalogger shown on the label of the device), which operates as an Access Point.
- 5) Note: To ensure that the datalogger is connected to the PC or smartphone during the configuration procedure, enable automatic reconnection of the AP_***** network.

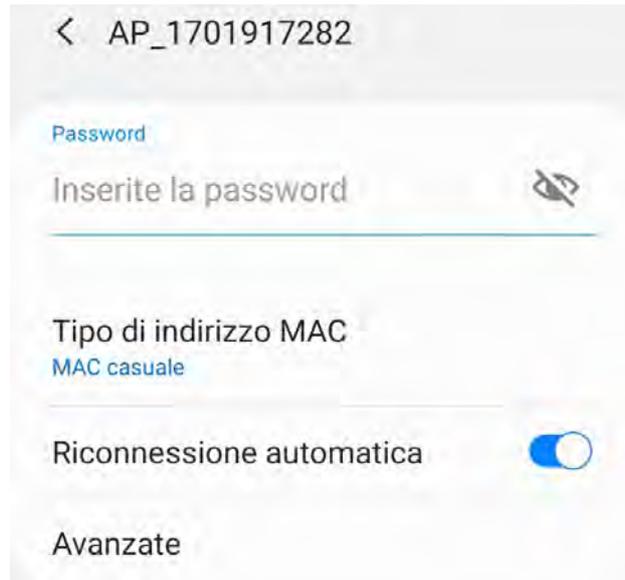


Figure 92 - Password entry prompt

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



Figure 93 - Screen showing that the Internet cannot be accessed

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

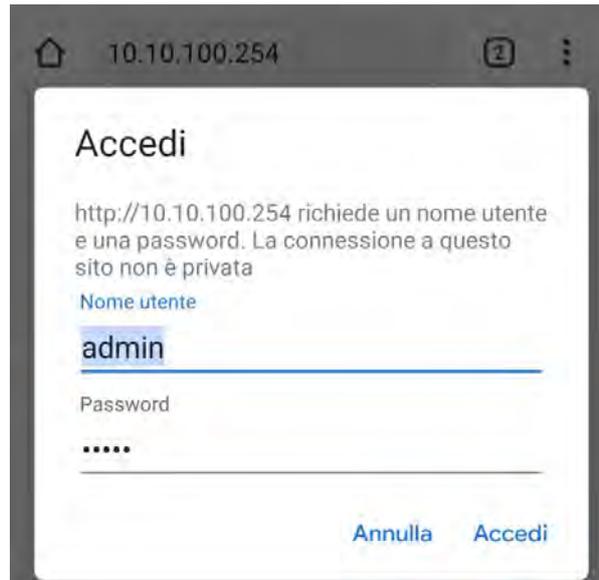


Figure 94 - Screen for logging into the web server to configure the datalogger

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

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

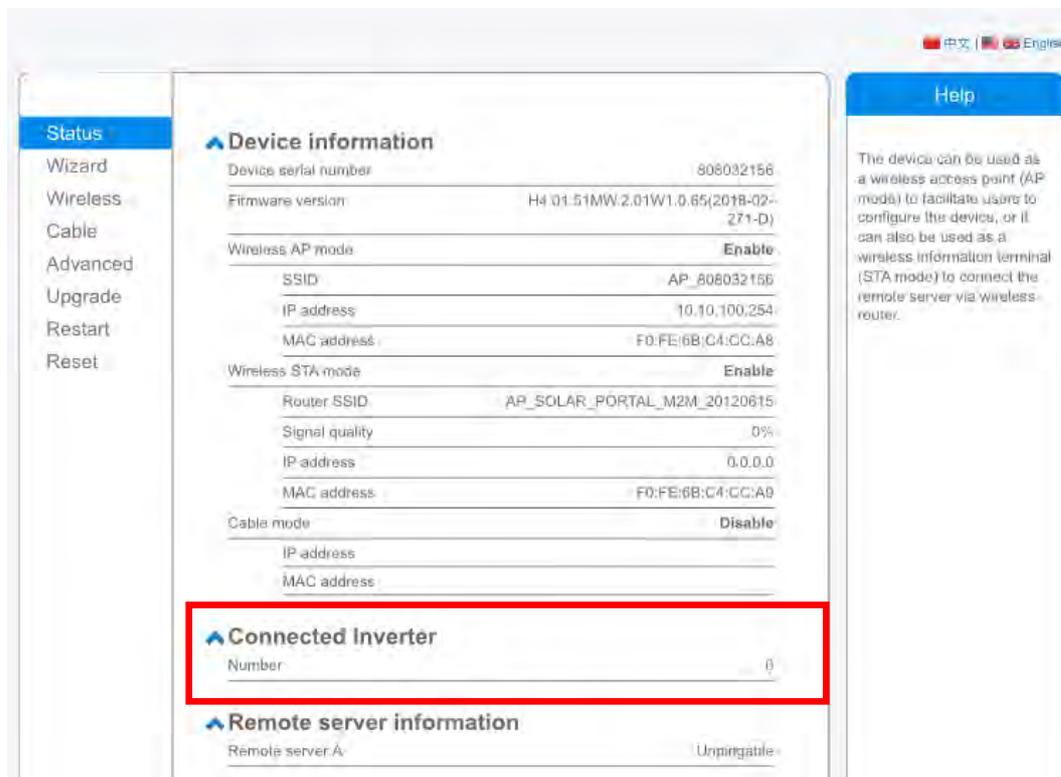


Figure 95 – Status Screen

- 8) Click on the Wizard setup button in the left-hand column.
- 9) Now click on the Start button to start the configuration wizard.

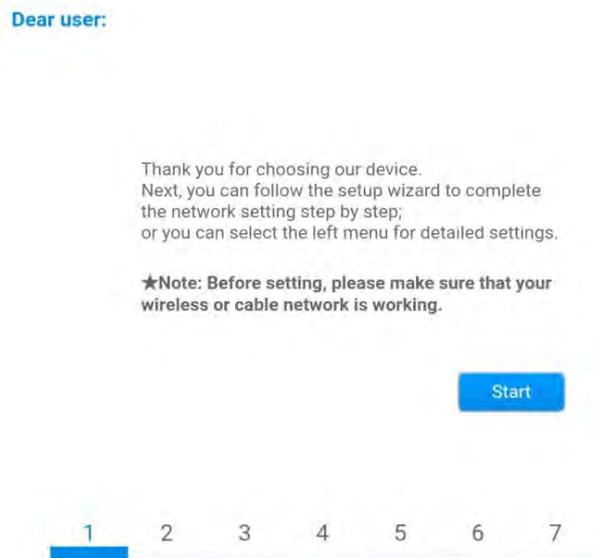


Figure 96 – Screen for starting (1) the Setup Wizard

- 10) Check the “Cable Connection” option and then click “Next.”

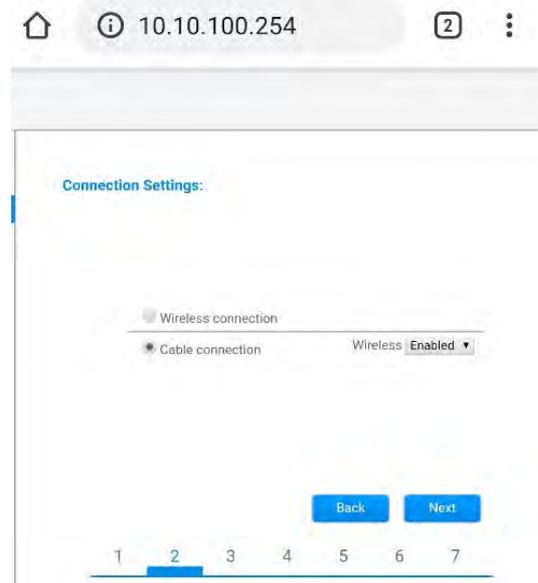


Figure 97 - Screen for the selection of “Cable connection”

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

Please fill in the following information:

Obtain an IP address automatically	Enable ▾
IP address	0.0.0.0
Subnet mask	0.0.0.0
Gateway address	0.0.0.0
DNS server address	

Back Next

1 2 3 4 5 6 7

Figure 98 - Screen for automatically obtaining the IP address (5)

12) Click on Next without making any changes.

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

Back Next

1 2 3 4 5 6 7

Figure 99 - Screen for setting the security options (6)

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

Configuration completed!

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 100 – Final configuration screen (7)

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

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

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

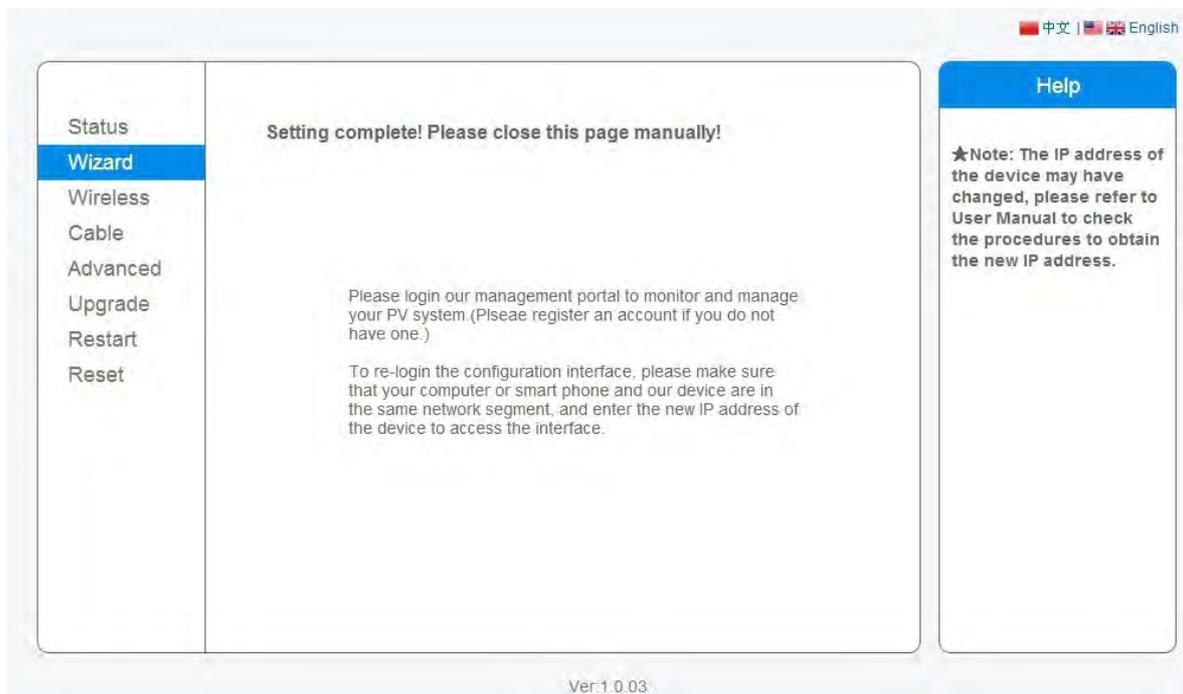


Figure 101 – Successful configuration screen

10.4.6. Checking that the datalogger has been configured correctly

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



Figure 102 - LED indicating the correct configuration of the datalogger

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

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

Device information	
Device serial number	508263482
Firmware version	H4.01.51MW/2.01W1.0.74(2019-03-143-D)
Wireless AP mode	Enable
SSID	AP_508263482
IP address	10.10.100.254
MAC address	BC:54:F9:F6:B9:74
Wireless STA mode	Enable
Router SSID	iPhone di Giacomo
Signal quality	100%
IP address	172.20.10.10
MAC address	BC:54:F9:F6:B9:75
Cable mode	Disable
IP address	
MAC address	

Connected Inverter	
Type	ZCS
Number	1
Inverter serial number	ZA1ES111G8R273 ▼
Firmware version (main)	V550
Firmware version (slave)	—
Inverter model	ZA1ES111
Rated power	1 00 W
Current power	0 W
Yield today	0 kWh
Total yield	0 kWh
Alerts	F12F14
Last updated	0 min ago

Remote server information	
Remote server A	Pingable

Figure 103 – Main status screen and checking of correct configuration

Cable mode	Enable
IP address	192.168.0.177
MAC address	BC:54:F9:F6:B9:77

Figure 104 - Main status screen and checking of correct configuration

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

It is necessary to reset the device:

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

- Status
- Wizard
- Wireless
- Cable
- Advanced
- Upgrade
- Restart
- Reset**

Restore factory setting

★Important:

After restoring factory settings, all users' configuration will be deleted. You can reconfigure it on <http://10.10.100.2>. Account and password are both "admin".

Are you sure to reset now?

OK

Back

Figure 105 - Reset Screen



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

10.4.7.1. Mechanical description and Datalogger interface

Mechanical Dimensions: 127mm x 134 x 52 mm

Protection rating: IP20

The usable ports are indicated below.

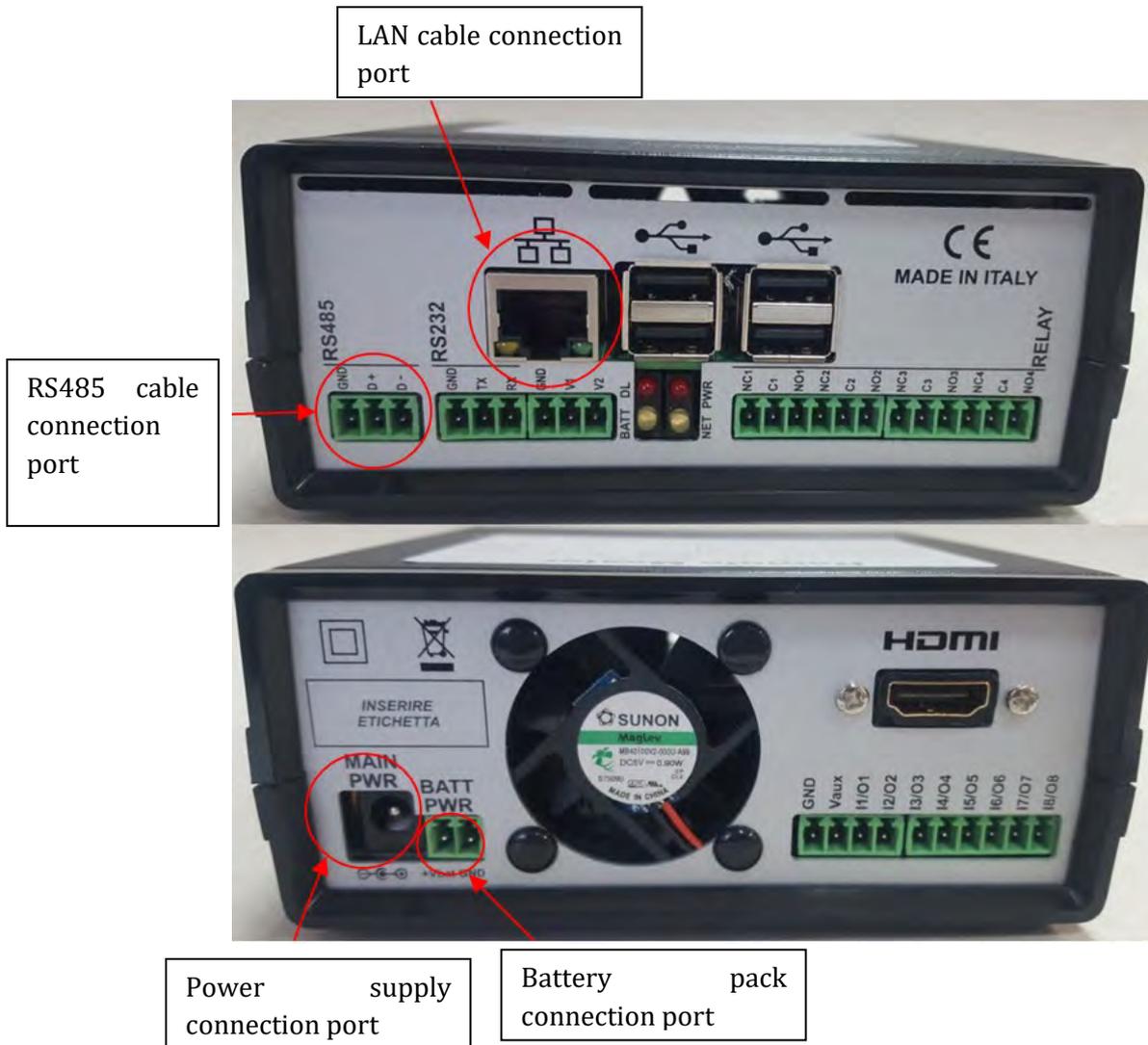


Figure 106 - Datalogger rear panel

10.4.7.2. Connecting the Datalogger to the inverters

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

Datalogger SIDE	BUS Signal	SENSOR SIDE (ZSM-IRR-TEMP-LM2)	Inverter SIDE
<i>D+</i> terminal	+	RS485- <i>IB</i> terminal	<i>+Tx</i> terminal
<i>D-</i> terminal	-	RS485- <i>IA</i> terminal	<i>-Tx</i> terminal

Table 3 - Connecting the Datalogger to the inverters

10.4.7.3. Internet connection via Ethernet cable

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

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

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

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

Once the RS485 Half Duplex cable has been connected, power the Datalogger by connecting the power supply unit (supplied with the datalogger) to the MAIN PWR input (12V DC - 1A).

In order to prevent possible voltage drops and/or power failures, it is recommended to also connect the battery pack, which is supplied with the datalogger. The battery pack should be connected to the +V_{bat} and GND inputs of the BATT PWR connector, positive and negative respectively (i.e. red to the +V_{bat} input and black to the GND input).

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

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

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



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

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

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

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

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

A stable communication in terms of signal and power supply, up to 200m, is guaranteed by using the RS485 cable, type Te.Co. 15166 (2x2x0,22+1x0,22)st/pu.

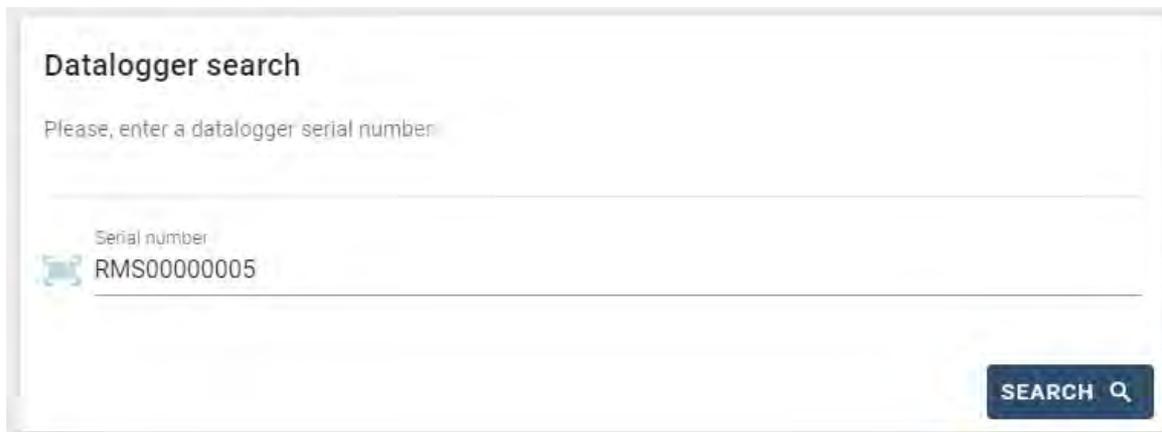
For longer distances, a connection to the signal side of the datalogger is recommended, and a connection to the +12V power supply via an external power supply unit.

10.4.8. Configuring the Datalogger

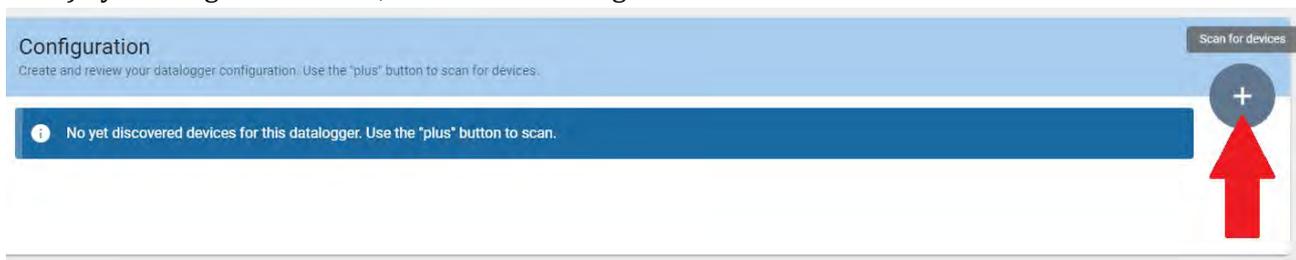
Connect to the website dlconfig.it and login by entering the temporary credentials: Username = admin and Password = admin.



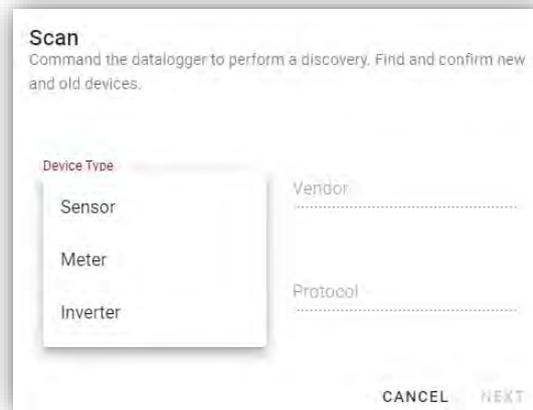
In the screen that opens, enter the serial number(S/N) of the datalogger to be configured and click "SEARCH".



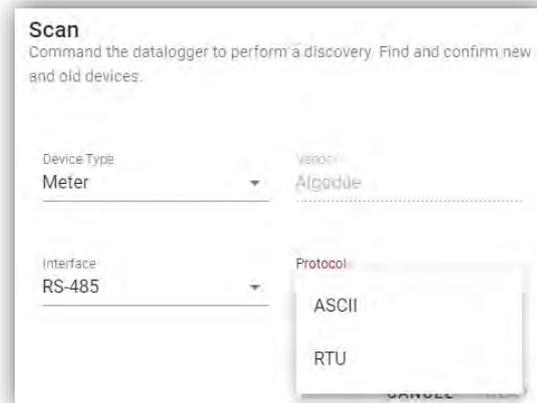
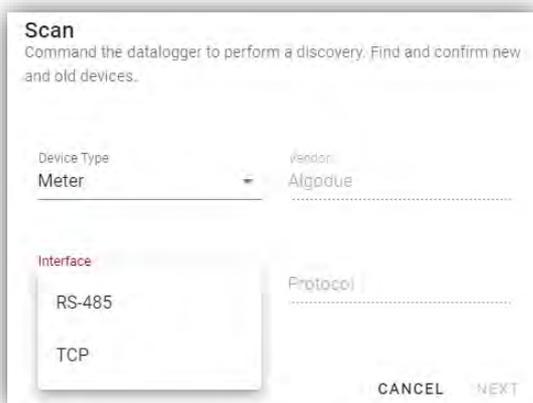
In the configuration page, you can search for any devices connected to the datalogger (inverter, meter or sensors) by clicking the + button, as shown in the figure.



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

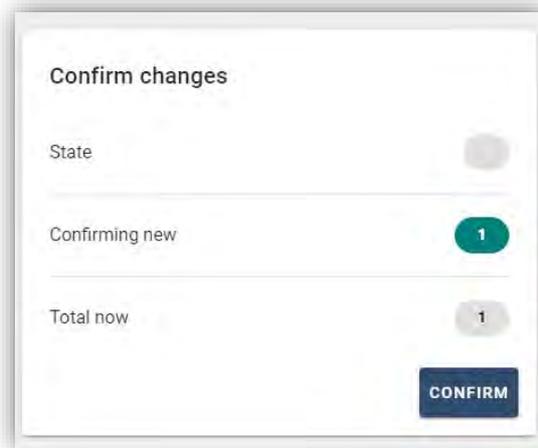


If a meter is one of the devices connected to the Datalogger, select the type of Meter/Datalogger communication interface and the relative communication protocol.



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





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

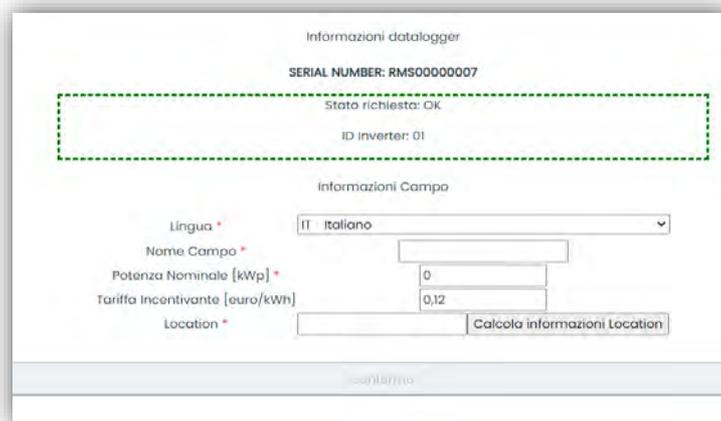
Configuration								Scan for devices
Create and review your datalogger configuration. Use the "plus" button to scan for devices.								+
Device Type	Direction	Vendor	Interface	Protocol	Serial number	Slave Id	Status	
Inverter		ZCS	RS-485	RTU	ZM1ES030JC4258	1	Saved	?

10.4.8.1. Configuring the Datalogger on the ZCS Azzurro portal

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



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

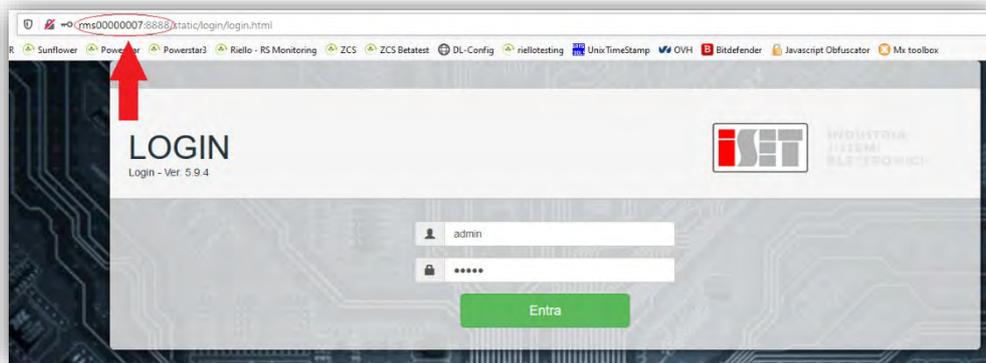


Once the “location” of the field has been entered, click “Calculate Location Information” to allow the system to obtain the latitude, longitude and time zone of the installation. Click “Confirm” to complete the configuration of the field. You only need to wait a few minutes to view the data flow on the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

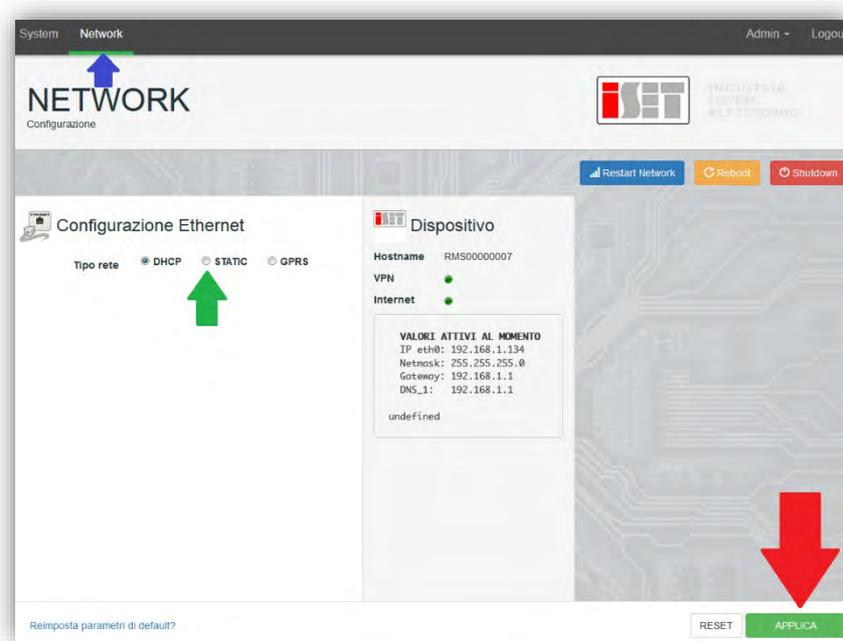
ATTENTION: The location data is essential for the correct operation of the datalogger in the ZCS system. It is important to define it very carefully.

10.4.8.2. Network configuration

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



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



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

10.4.9. Local monitoring

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

10.4.9.1. Requirements for installation of local monitoring

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

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

10.4.9.2. Features of local monitoring

After installation and configuration, local monitoring makes it possible to monitor the fundamental parameters of the photovoltaic system, even without an internet connection, from any device connected to the same local network.

In particular, it is possible to monitor the power and energy of the inverters and the storage systems over the last 7 days. It is also possible to view alarms, and other information such as temperature, peak daily power, CO₂ gains and savings.

Below is an example of a local monitoring page.



Figure 107 - Example of local monitoring page

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.



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