MANUALE UTENTE

BOX DI COMUNICAZIONE

PSC100

AZZURRO ZCS

SISTEMI FOTOVOLTAICI INTELLIGENTI
PER LA TUA INDIPENDENZA ENERGETICA

Communication box
PSC100
User manual



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General instructions

This manual contains important safety precautions 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 anyone working with it. The manual must always accompany the equipment, including when it is transferred to another user or installed at another site.

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Technical support

ZCS provides technical support through requests submitted directly at www.zcsazzurro.com.
The following freephone number is available within Italy: 800 72 74 64.

Preface

General information

Read this manual carefully before installing, operating or maintaining the PSC100. Observe the safety precautions provided for installation and maintenance.

Scope

This manual describes mounting, installation, electrical connections, commissioning, maintenance and troubleshooting of the PSC100 communication box.

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

Highlighting key

Yellow: corrections and additions. Blue: content moved relative to the original PSC100 manual. Word comments and the final log list the technical points requiring confirmation.

1. PRELIMINARY SAFETY INSTRUCTIONS

1.1. Intended readers and qualified personnel

This manual is intended for qualified technical personnel responsible for installing and commissioning the PSC100 communication cabinet.

1.2. General safety instructions

Before installation, read this manual carefully and make sure you understand its contents.

During installation, operation and maintenance, operators must strictly comply with local safety standards.

Improper use may cause electric shock, personal injury and damage to the equipment and its components.

For repairs or maintenance, contact the nearest authorised service centre. Contact your distributor for information on the nearest authorised service centre. DO NOT attempt repairs yourself, as this could cause accidents or damage.

Installation must be carried out by a qualified electrician with the necessary skills and training. Operating and maintenance personnel must also be qualified for their tasks and must understand the instructions in this manual. Zucchetti Centro Sistemi S.p.A. accepts no liability for damage to property or personal injury caused by improper use of the device.

Install and start the device in accordance with the following instructions. Place it on suitable supports with sufficient load-bearing capacity (e.g. walls or racks) and ensure that it is positioned as specified. Choose a location suitable for electrical equipment. Ensure sufficient space for heat dissipation and future maintenance. Maintain adequate ventilation and sufficient airflow for cooling.

If packaging defects could damage the device, or visible damage is found, notify the transport company promptly. If necessary, seek assistance from a photovoltaic installer or Zucchetti Centro Sistemi S.p.A. Transport, particularly by road, must use vehicles suitable for protecting the components (especially electronic components) against severe impacts, moisture, vibration, etc.

Electrical installation and maintenance of the system must be carried out by qualified and certified personnel.

The PSC100 must only be installed by qualified personnel holding any certifications required by local authorities.

DO NOT place explosive or flammable materials (e.g. petrol, kerosene, oil, wood, cotton or similar) near the system.

Before installing or maintaining the PSC100, disconnect both the auxiliary AC supply and the three-phase line connected to the PBUS module.

Keep children away from the system.

Damage caused by improper installation or use is NOT covered by the product warranty.

1.3. Precautions for installation and maintenance

Notice: follow the rules below during product installation and maintenance.

Remove watches, rings and other metal objects.

Only use tools with insulated handles.

Use personal protective equipment appropriate to the risks of the task. The ESD gloves listed among the tools do not replace protective equipment against electrical hazards.

Do not place tools or metal objects on the device.

Before connecting or disconnecting the power terminals, disconnect both PSC100 power supplies as specified in the safety instructions.

1.4. Transport requirements

The PSC100 series Communication Box leaves the factory intact and operational. During transport, the device must be kept in its original packaging or other suitable packaging. The transport company is responsible for any damage during transport.

Report packaging defects that could damage the product, or any visible damage, promptly to the transport company. Contact your installer or Zucchetti Centro Sistemi S.p.A. for support if necessary.

For road transport, comply with the requirements applicable to the product and planned route (ADR or JT T617).

Comply with the regulatory requirements of the transport authorities in the countries of origin, transit and destination.

Whether dangerous goods transport requirements apply must be verified on the basis of the actual classification of the product and shipment.

1.5. Symbols and signs

The following types of safety instructions and general information are used in this document:

 **Danger**	“Danger” indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.
 **Warning**	“Warning” indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.
 **Caution**	“Caution” indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 **Notice**	“Notice” indicates potential risks which, without appropriate measures, may cause equipment malfunction or property damage.
 **Note**	“Note” provides additional information and tips for optimum product operation which may help solve a problem or save time.

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

	This symbol indicates a hazardous situation which, if not avoided, could result in personal injury.

	Beware of high voltage and the risk of electric shock.
	CE marking. Compliance must be verified in the EU declaration for the product.
	Earth terminal.
	Read this manual before installing the PSC100 series Communication Box.
	Indicates the permitted temperature range.
	This way up; do not invert.
	Fragile items; handle with care.

2. PRODUCT FEATURES

2.1. Product overview and components

The PSC100 is a monitoring device for large-scale plants, enabling the control, checking and parameter setting of one or more compatible ZCS inverters. It communicates with the inverters via PBUS over the power lines. The internal industrial switch provides fibre-optic or Ethernet connections. The ring configuration uses fibre optics only.

Several PSC100 units can be installed in the same plant. The device can act as a bridge for read/write commands sent by CCI (central plant controllers).

Before using this function, contact ZCS support to verify compatibility.

The PSC100 is a communication cabinet that can be wall-mounted using the designated fixings. It contains the following components:

- ✓ Industrial switch for a fibre-optic ring network and Ethernet connections
- ✓ Communication Manager
- ✓ CCO module for PBUS communication
- ✓ Circuit breakers, fuses and surge protective devices

Bidirectional communication between the inverters and the control system uses an Ethernet network over copper or fibre optics. The ring topology uses fibre optics only.

In plants with one or more PSC100 units, provide a ZSM-HUB for monitoring through ZCS systems. The ZSM-HUB must be on the same subnet as the PSC100 units.

This manual applies exclusively to the models listed below:

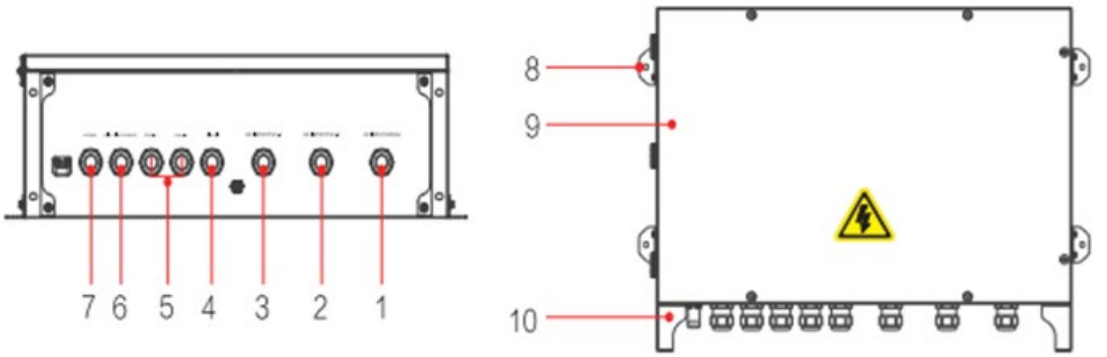
Model	PSC100
Model description	Communication Manager + industrial ring switch + CCO

2.2. Inverter compatibility

Revision 1.8 of this manual lists compatibility with the following inverter models:

250KTL-HV Z0, 330KTL-HV Z0, 350KTL-HV Z0.

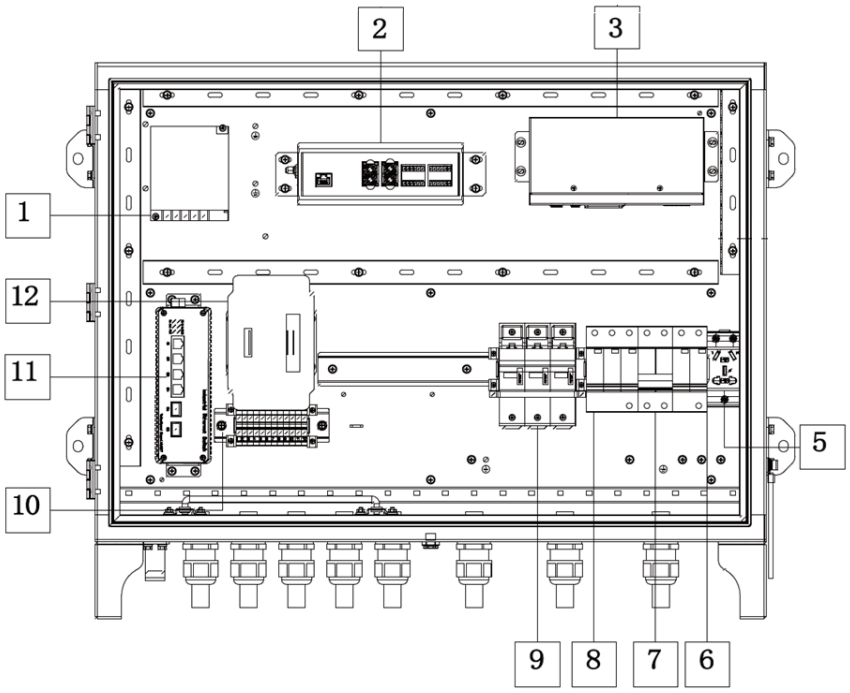
2.3. Enclosure and identification of parts



No.	Name	Description
1	AC INPUT 220 Vac	AC supply L/N port
2	AC/PBUS INPUT	PBUS communication module, three-phase AC communication line L1/L2/L3.
3		
4		
5		
6	FIBRE OPTICS/ETHERNET	Fibre-optic/Ethernet connection ports
7		
8	Mounting plate	--
9	Cabinet door	--
10	Mounting bracket	--

2.4. Internal structure

The internal structure of the PSC100 is shown in the following figure.



No.	Name
1	Power supply module
2	Communication manager
3	CCO module for PBUS communication
4	
5	Auxiliary socket
6	2P AC surge protective device
7	Communication Box auxiliary supply circuit breaker
8	3P AC surge protective device
9	Fuse holder
10	
11	Industrial ring switch
12	Fibre-optic splice tray

Dimensions and other declared data are given in chapter 10 “TECHNICAL SPECIFICATIONS”.

Communication network diagrams are provided in chapter 4 “INSTALLATION”; connections are described in chapter 5 “ELECTRICAL CONNECTIONS”.

3. PSC100 STORAGE

Storage and transport temperature: −40 °C to +85 °C. Use the original or other suitable packaging for transport.

4. INSTALLATION

Installation includes mounting the cabinet and preparing the communication network. After mechanical mounting, connect the earth conductor and data cables, then the three-phase PBUS line and auxiliary supply, in the order described in chapter 5 “ELECTRICAL CONNECTIONS”.

4.1. Safety and installation environment

Danger	Do not install the PSC100 near flammable materials. Do not install the PSC100 where flammable or explosive materials are stored. Do not install the PSC100 where accidental contact with it is possible. Take the weight of the PSC100 into account during transport and handling.

Choose an installation height that allows indications to be read easily and provides easy access for maintenance.

The installation site must be free of explosive materials and gases or dust that could corrode metals or damage insulation.

After installation, all indications and warnings must remain clearly visible. Avoid direct sunlight and snow accumulation.

4.2. Preliminary checks and unpacking

Notice	After opening the packaging, check the product to ensure that it matches the specifications of the model purchased.

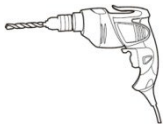
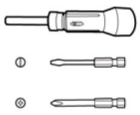
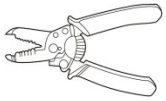
4.3. Package contents

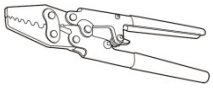
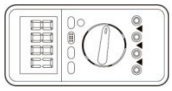
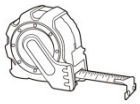
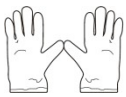
No.	Image	Description	Quantity
1		Communication Box	1

No.	Image	Description	Quantity
2		Expansion bolt	4
3		Quick installation guide	1
4		Shipment inspection report	1
5		Warranty card	1
6		Desiccant	1

4.4. Tools and protective equipment

Prepare the following tools before installation:

Number	Tool	Model	Function
1		Hammer drill Diameter to be confirmed: the mounting procedure specifies 8 mm.	Used to drill holes in the wall
2		Screwdriver	Used for wiring
3		Torque screwdriver	For securing terminal blocks
4		Wire stripper	Used to strip insulation from conductors

Number	Tool	Model	Function
5		M5 hex key	For tightening or loosening hex socket screws
6		Crimping tool	For crimping terminals
7		Multimeter	To check correct cable connections and reliable earthing
8		Marker pen	Used for marking where required
9		Tape measure	Used to measure distances
10		ESD gloves	Must be worn by operators
11		Safety goggles	Must be worn by operators
12		Dust mask	Must be worn by operators
13		Adjustable spanner	For tightening expansion bolts
14		Laptop computer (with network port)	For database updates, on-site commissioning, etc.

4.5. Location and clearance requirements

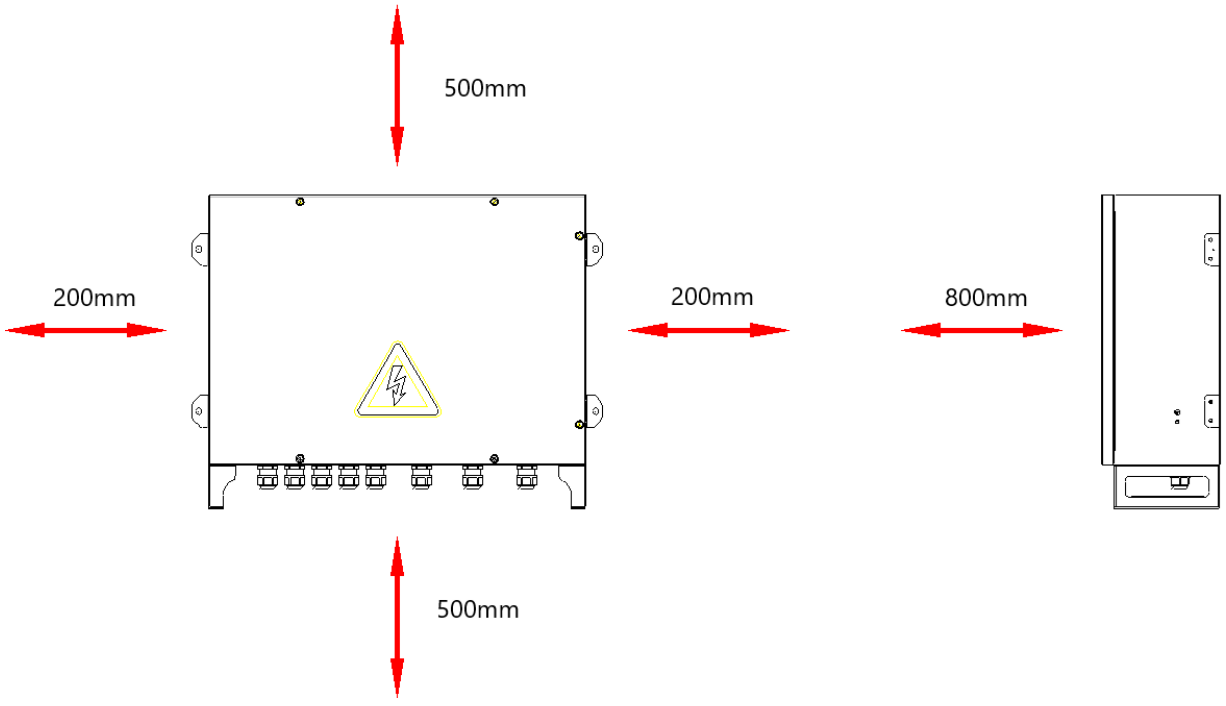
Take the following factors into account when selecting the installation site:

- ✓ The installation method and location must be suitable for the weight and dimensions of the PSC100. Install the device on a solid surface.
- ✓ The installation site must be well ventilated.
- ✓ The PSC100 can be positioned horizontally or installed vertically.
- ✓ Do not install the device upside down or on its side. In the vertical configuration, the connection area must face downwards, as shown in the following figure.

Installation area:

To ensure adequate heat dissipation and easy removal, maintain at least the following clearances around the PSC100, as shown in the following figure.

Above: 500 mm; below: 500 mm; in front: 800 mm; on both sides: 200 mm.



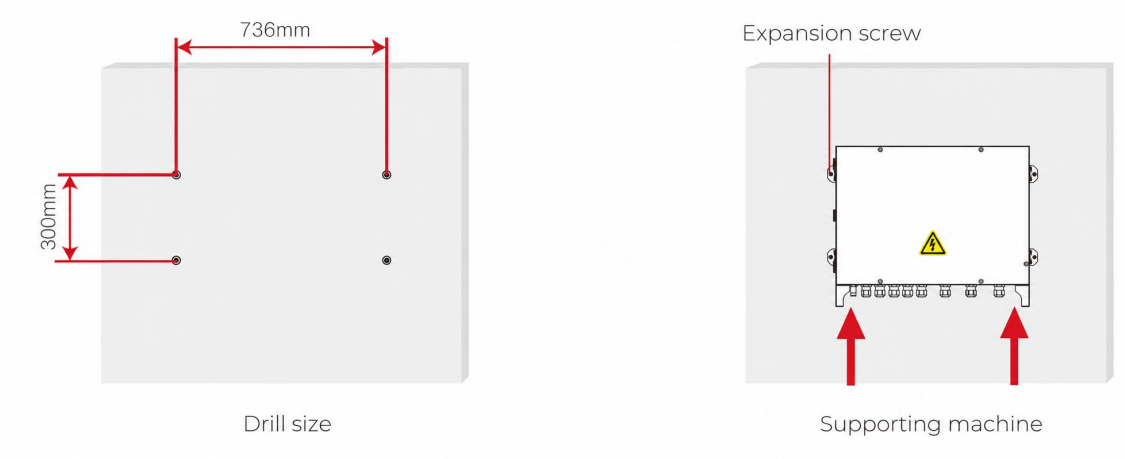
4.6. Vertical mounting and horizontal positioning

The PSC100 supports two installation methods: vertical wall mounting and horizontal positioning. Choose the method according to the conditions at the installation site.

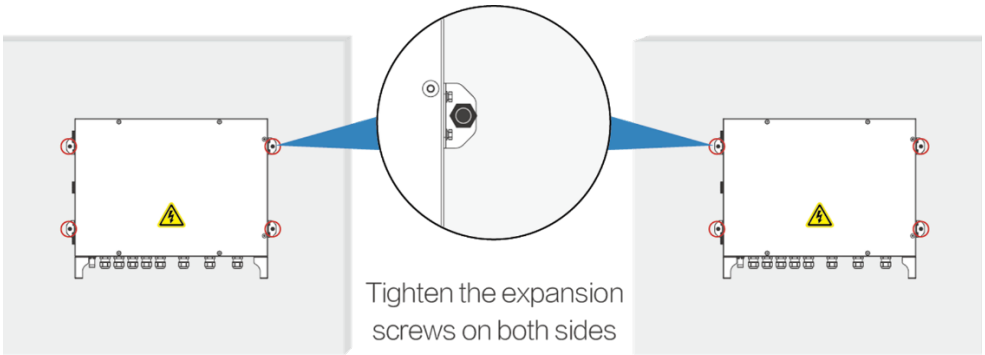
1. Vertical wall mounting

A. For wall mounting, drill holes 8 mm in diameter and 80 mm deep; also refer to the dimensions in the following figure.

B. Place the fixings in the corresponding holes and use the supplied expansion bolts. Support the device before and during tightening to prevent it from falling.



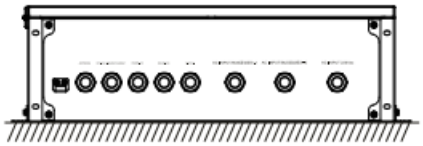
C. Hang the device on the wall fixings and tighten the expansion bolts, keeping it adequately supported throughout the operation.

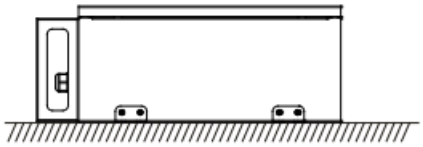


2. Horizontal positioning

A. The PSC100 can be positioned horizontally for operation as shown in the figure below on the left.

B. Place the PSC100 on a suitable support and secure it safely, as shown in the following figure.





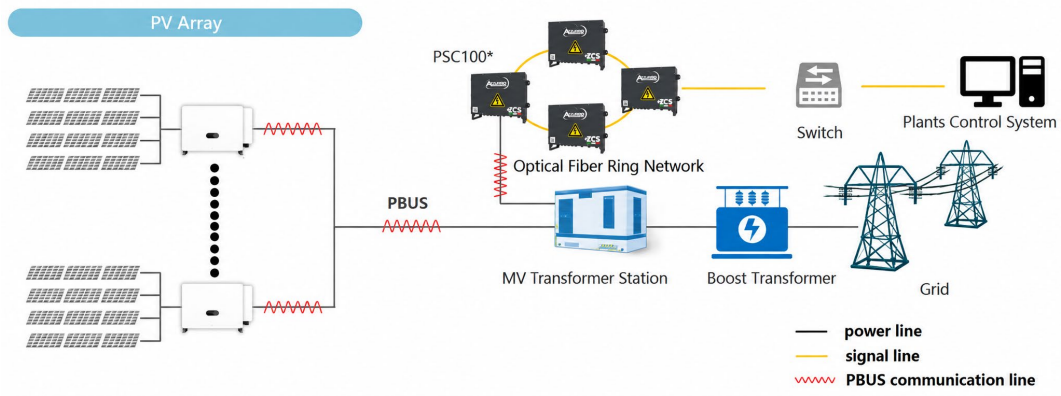
4.7. Communication network architecture and configurations

Before making connections, define the plant network topology and the arrangement of the PSC100 units. Ring and star configurations are illustrated in sections 4.9 “Fibre-optic ring network”, 4.10 “Fibre-optic star network” and 4.11 “Ethernet star network”; wiring must be carried out with the power disconnected, in accordance with chapter 5 “ELECTRICAL CONNECTIONS”.

In plants with several PSC100 units, the communication network can use the architectures described below.

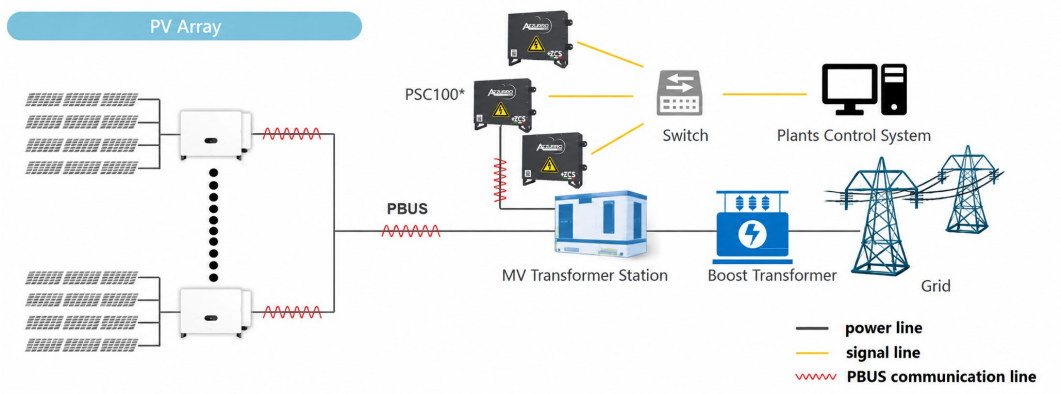
In the ring architecture, PSC100 units are interconnected by fibre optics. Each unit communicates with its associated inverters through PBUS, which transmits data over the power lines, as shown in the following figure.

PBUS communication:



PSC100 units can also be connected in a star configuration, as shown in the following figure.

PBUS communication:



Note	When using the PBUS connection, pay attention to the routing of power cables. Refer to the relevant literature for the precautions to be observed.

4.8. Communication architecture

The system communication structure is as follows:

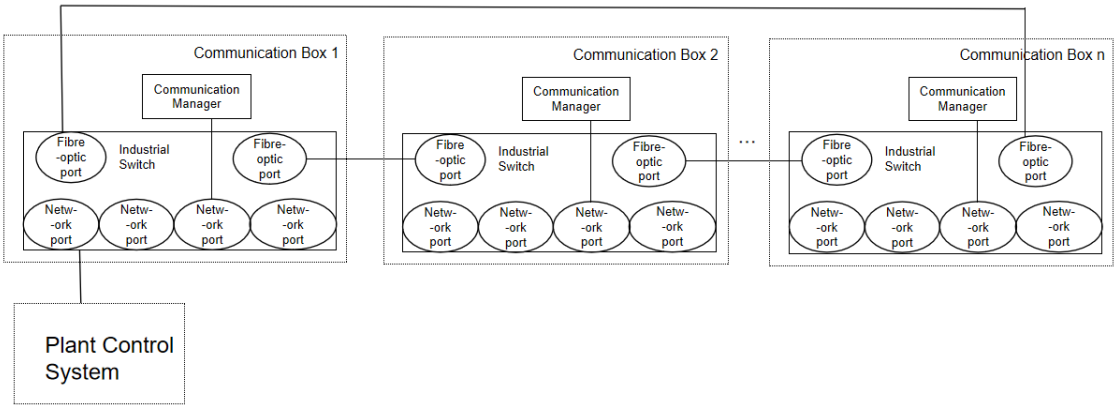
High-level communication	Fibre-optic ring or star
	Ethernet star
Low-level communication	PBUS communication modules

4.9. Fibre-optic ring network

1. Fibre-optic ring network configuration

The following figure shows a fibre-optic ring network.

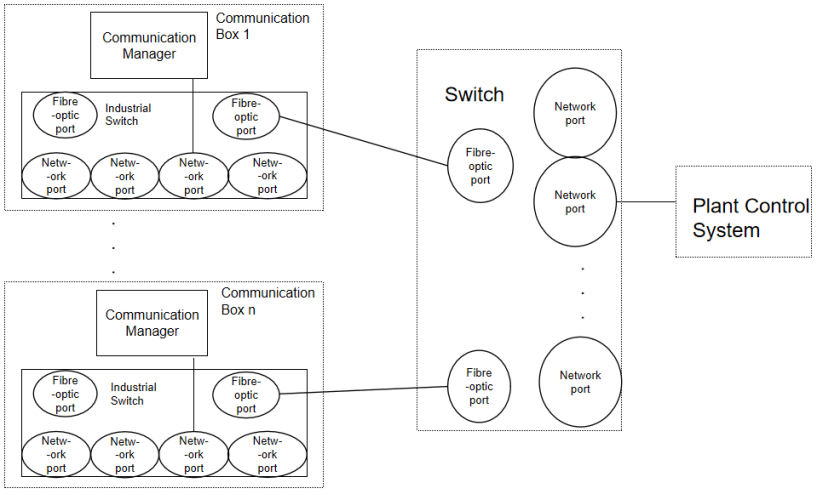
Each PSC100 can manage a maximum of 15 inverters. To optimise monitoring performance on Plant Control, no more than 10 inverters per PSC100 are recommended.



4.10. Fibre-optic star network

Fibre-optic star network configuration

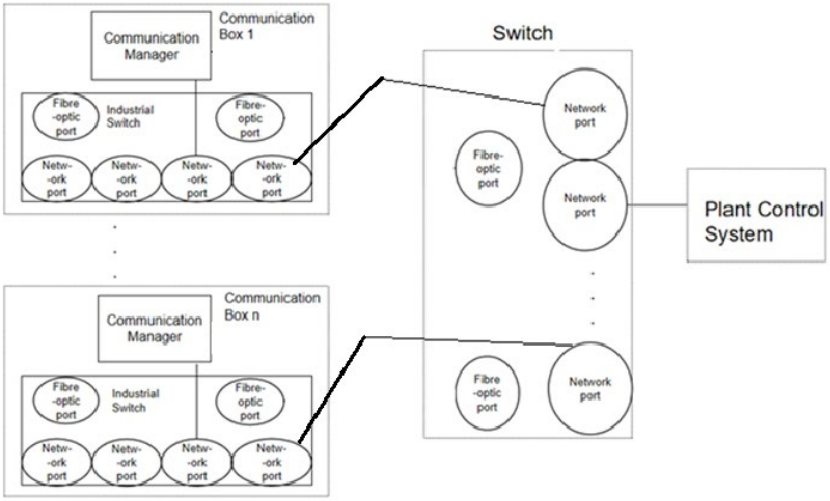
The fibre-optic star network configuration is shown in the following figure.



4.11. Ethernet star network

Ethernet cable star network configuration

The Ethernet cable star network configuration is shown in the following figure.



For PBUS, Ethernet and G5/G6 port wiring, see chapter 5 “ELECTRICAL CONNECTIONS”. The ZSM-HUB is described in section 2.1 “Product overview and components”.

5. ELECTRICAL CONNECTIONS

PSC100 connections comprise earthing, communication interfaces, the three-phase PBUS line and the auxiliary AC supply. Make them in the order given below.

5.1. Connection sequence and safety

Before starting and throughout all wiring operations, keep both the auxiliary AC supply and the three-phase line connected to the PBUS module disconnected. Connections must be made by qualified personnel in accordance with the safety instructions in chapter 1 “PRELIMINARY SAFETY INSTRUCTIONS”.

1. Connect the earth conductor to the enclosure.

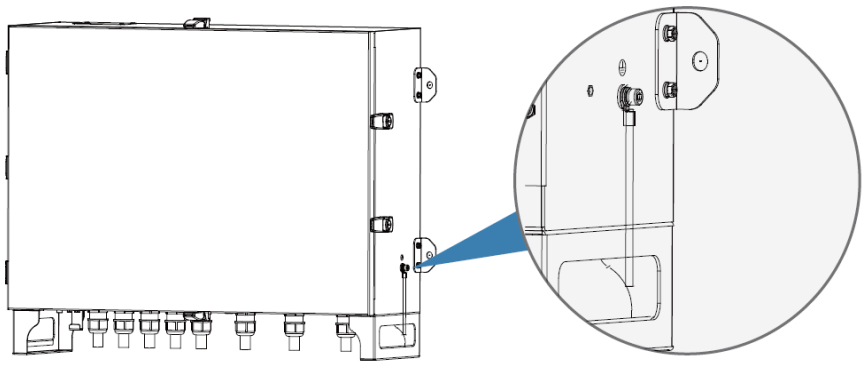
2. Install the Ethernet and fibre-optic cables required by the network configuration and prepare the PC connection for commissioning.

3. Connect the three-phase PBUS line, keeping it disconnected from its power source.

4. Connect the single-phase auxiliary supply L/N/PE, keeping it disconnected from its power source.

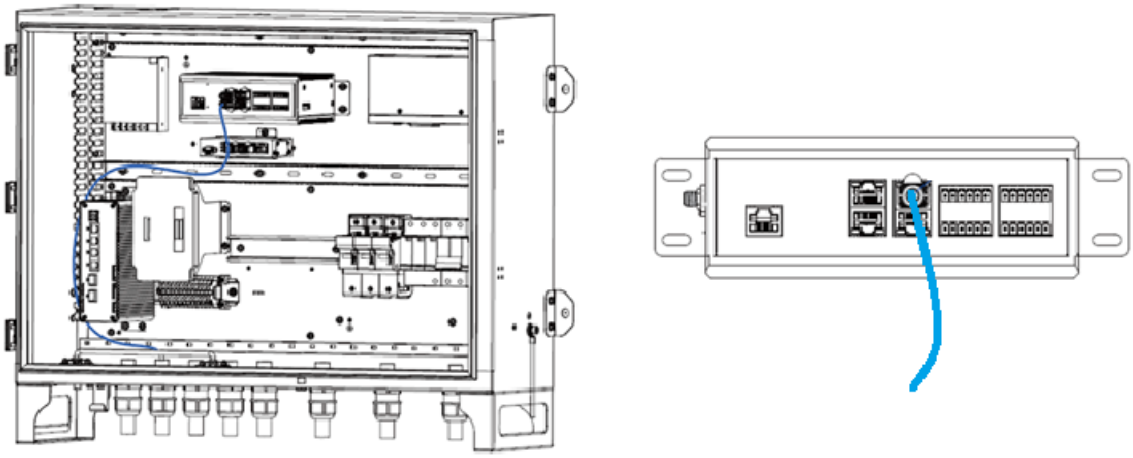
PBUS uses the three-phase AC line: its wiring is therefore power wiring and must be carried out with the power disconnected. Energise the PSC100 only after completing the connections and checks required in chapter 6 “COMMISSIONING”.

5.2. Earth connection

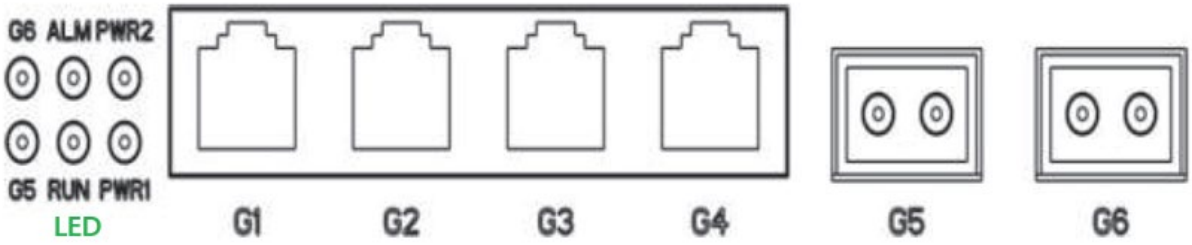


5.3. Ethernet and fibre-optic connections

Connect the Communication Manager LAN4 port to the external switch, or use a port on the internal industrial switch, according to the planned network diagram.

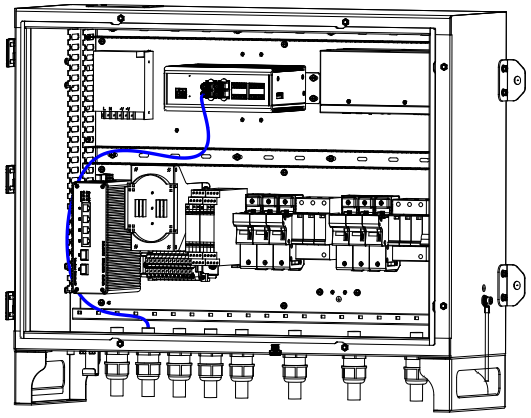


Using the industrial ring switch, several PSC100 units can be interconnected by fibre optics through ports G5/G6 in ring or star configurations, which then communicate with an external switch.



PC connection for commissioning

Connect the PC to the Communication Manager LAN4 port using an Ethernet cable.

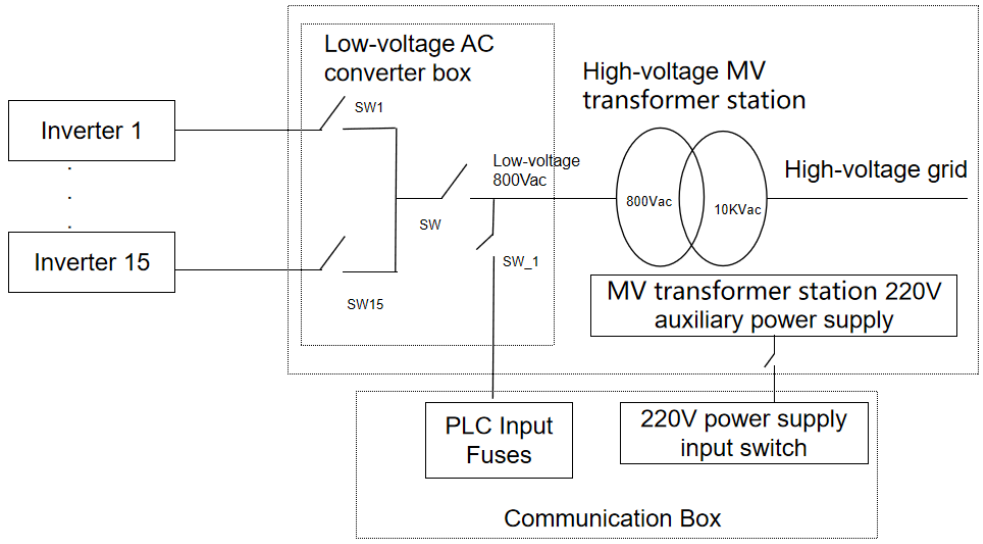


5.4. Three-phase PBUS line connection

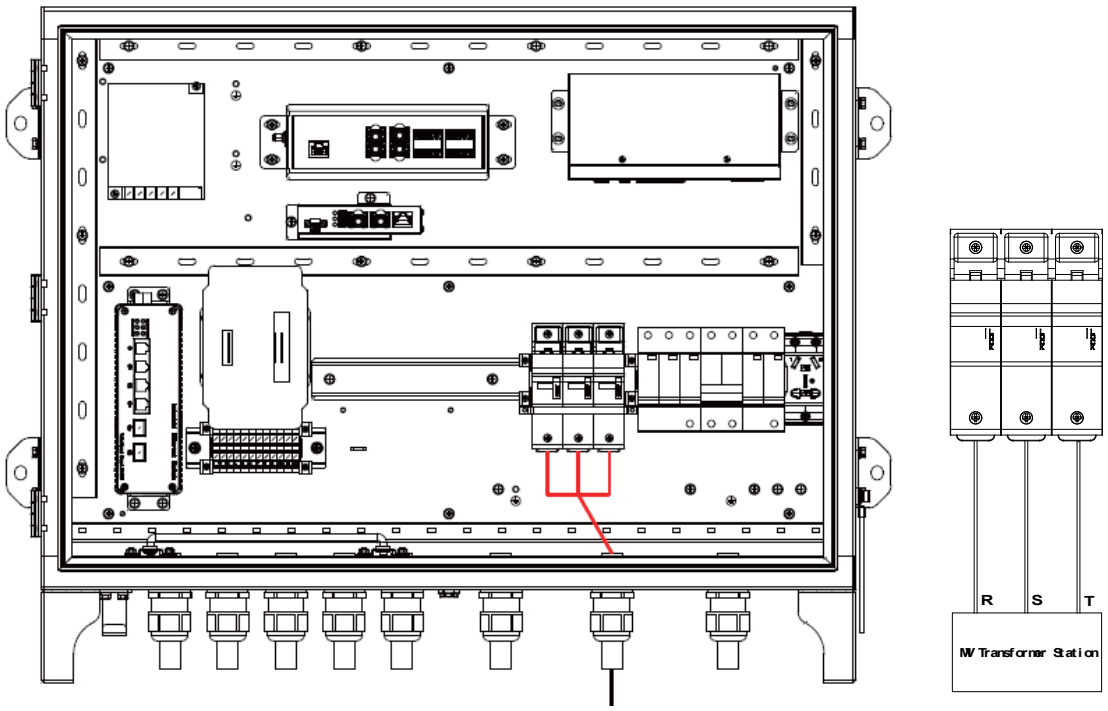
Up to 15 inverters can be connected to each PSC100; no more than 10 units are recommended.

1. PBUS

PBUS communication configurations are shown in the following figure. The PSC100 PBUS communication line is connected to the main circuit breaker SW on the transformer side. Add the additional disconnecting device SW_1 for maintenance or repairs. A 3P 32A device is recommended.



Three-phase PBUS line connection

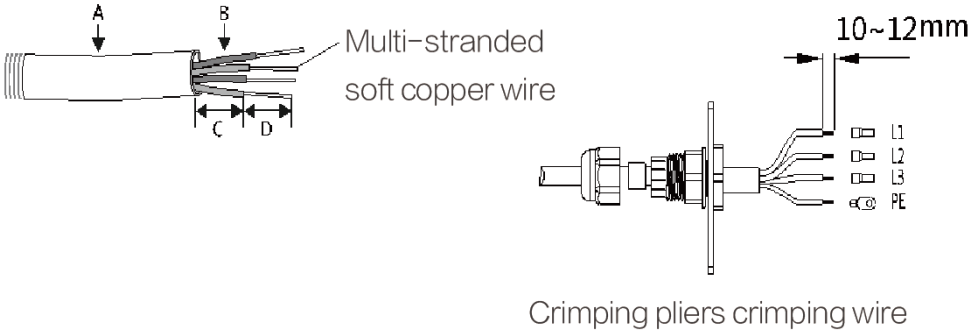


For the conductors of the three-phase supply lines R, S and T, a cable of 12 AWG or larger cross-section (3 mm2) is recommended.

5.5. Single-phase auxiliary supply (L/N/PE)

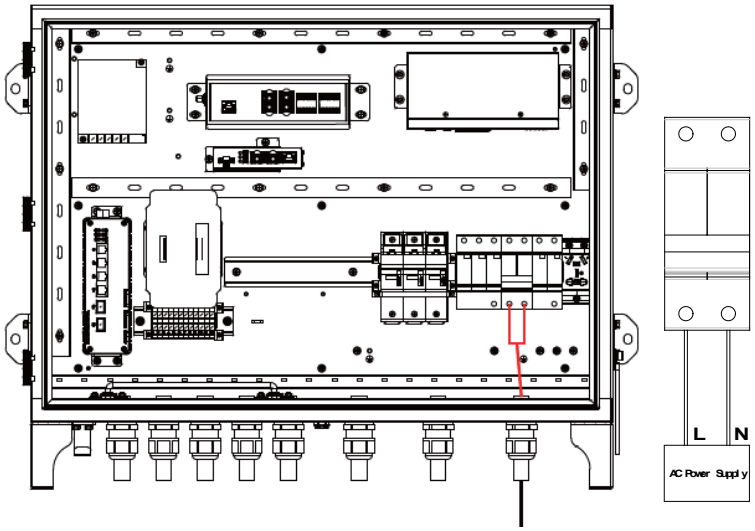
The single-phase auxiliary supply must be between 100 and 240 V AC, at a frequency of 50–60 Hz.

Cable and crimping requirements:



Ref.	Description	Value
A	Cable outer diameter	18 mm or less

Ref.	Description	Value
B	Copper conductor cross-sectional area	Recommended: 2.5~4 mm2
C	Cable length	60 mm
D	Stripped copper conductor length	10~12 mm (PE conductor 6~8 mm)



Ensure the cable gland is sealed. Any use of sealant must be checked against the cable gland manufacturer's instructions.

6. COMMISSIONING

6.1. Checks before energising

- ✓ Check that the wiring is correct before switching on.
- ✓ Check that the supply voltage is within the range specified for the PSC100.
- ✓ Check that no debris or foreign objects are present inside the cabinet.

6.2. PSC100 configuration

Before commissioning, check that all PSC100 connections have been completed and inspected.

The physical connection of the PC to the Communication Manager LAN4 port is described in section 5.3 “Ethernet and fibre-optic connections”. Carry out configuration after completing the preliminary checks.

For configuration, refer to “Nota tecnica Commissioning Azzurro PSC100”, available in the Documentation section of the ZCS Azzurro website.

Check with ZCS that the procedure applies to the installed hardware and firmware configuration.

7. OPERATING INTERFACE

Local PC access uses the Communication Manager LAN4 port, as described in section 5.3 “Ethernet and fibre-optic connections”. Configuration operations are given in chapter 6 “COMMISSIONING” and in the commissioning note cited above.

8. TROUBLESHOOTING AND MAINTENANCE

- ✓ Before maintaining the PSC100, completely disconnect the Communication Box power supplies, including the PBUS communication module supply and the auxiliary supply.
- ✓ The PSC100 location must be free of potentially conductive pollutants, corrosive acids and heat sources.
- ✓ No electrical devices generating strong interference may be located near the PSC100.
- ✓ Periodically check PSC100 cable fixings with the device disconnected from both power supplies.

Fault name	Description	Possible causes	Solution
No power supply	Supply circuit breaker closed, no power to the PSC100 system	External 220 Vac supply cable incorrectly connected	Recheck that the wiring is correctly connected
		Supply circuit breaker open	Close the circuit breaker
		Power supply module damaged	Check whether the power indicator remains steadily lit. If not, replace the power supply module.
PBUS communication	The monitoring platform receives no data when the PBUS communication module is used	CCO communication module fault	Check that the indicator is lit; if it is, the power supply is normal. Then check whether the CCO module indicator flashes. If not, replace the CCO module.
		Strong external interference source	Remove the loads causing PBUS signal interference or provide them with an alternative power supply
Fibre-optic communication	The monitoring platform receives no data when fibre-optic communication is used	Wiring error	Check the design drawings and redo the wiring
		Fibre damage	Check that the fibre is not damaged. If it is damaged, have it replaced by a competent person.
		Switch damage	Ask ZCS support for the G5 and G6 port test procedure and its acceptance criteria.
		Optical module damaged	Check whether the fibre-optic module is operating correctly. If not, contact a competent person to replace it.

9. PSC100 REMOVAL

9.1. Dismantling

Only authorised, qualified electricians may dismantle the product.

Switch off the PSC100 before dismantling it.

Remove the device in the reverse order of installation.

9.2. Disposal/scrapping

Dispose of the product at electronic equipment recycling collection points. Dispose of it correctly and in an environmentally responsible manner, in accordance with local laws and regulations.

Electronic devices must not be disposed of as household waste.



10. TECHNICAL SPECIFICATIONS

Model	PSC100
Auxiliary supply input	Voltage range: 100–240 V AC; frequency range: 50–60 Hz
Communication method	ETH/PBUS/SFP
PBUS	1
Fibre-optic port	2
Operating temperature	-30°C ~ +60°C
Storage and transport temperature	-40°C ~ +85°C
Altitude	≤ 4 000 m
Relative humidity	≤ 95%, non-condensing
Cooling method	Natural cooling
H × W × D	580 × 760 × 220 mm
Weight	17,5 kg
Degree of protection	IP65

Note	✓ The PBUS communication module has a maximum transmission distance of 1000 metres with a multicore cable; line voltage 320~920VAC/50/60HZ. ✓ When single-core cables are used, the distance is reduced to 800 m; the cables must run together and be tied at 1-metre intervals. ✓ Fibre-optic ports: SFP, single-mode dual fibre, maximum transmission distance 20 km, LC connector, wavelength 1310 nm.

11. MONITORING SYSTEMS

An Azzurro HUB device must be installed in the same plant to enable system monitoring and management.

Device communication and system configuration are carried out as follows:

- PSC100: as described in section 5.3 *"Ethernet and fibre-optic* connections", the device has Ethernet and fibre-optic ports for connection to a network switch or router, using a cable appropriate to the interface used. The PSC100 has a static IP address to be set in the ports section of the web page;
- Azzurro HUB: connect the device to the same network switch or router using its dedicated Ethernet port. The Azzurro HUB must also be assigned a static IP address; assignment through a DHCP reservation (IP reservation) on the router or DHCP server is recommended.

For further information on Azzurro HUB installation, connection and configuration, refer to its user manual at www.zcsazzurro.com, under Monitoring systems – Azzurro HUB.

11.1. Azzurro Systems app

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

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

11.2. Azzurro Portal

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

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

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

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

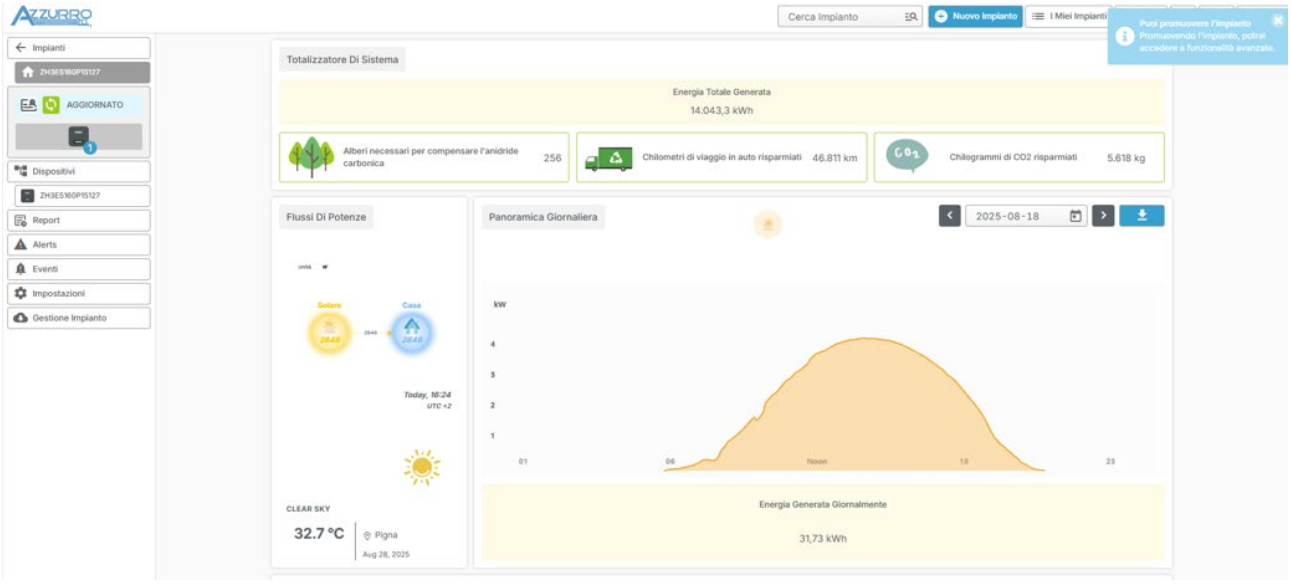


Figure 1 – Portal monitoring example: installation with PV inverter



Figure 2 – Portal monitoring example: installation with hybrid inverter and storage

12. WARRANTY TERMS AND CONDITIONS

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

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

IQNET
RECOGNIZED
CERTIFICATION

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