FIMER



Solar Inverter
PVS-100/120-TL “B2 Version”

Product Manual

⚠ **ATTENTION – IMPORTANT SAFETY INSTRUCTIONS**
This manual contains important safety instructions that must be followed during the installation and maintenance of the equipment.

⚠ **ATTENTION – SAVE THESE INSTRUCTIONS**
Keep this document in a safe place near the inverter for easy access during installation, operation and maintenance.

The installer must read this document in its entirety and scrupulously follow the instructions given in it before installing this equipment, since Fimer cannot be held responsible for damage caused to people and/or things, or the equipment, if the conditions described below are not observed.
The purpose of this document is to support the qualified technician, who has received training and/or has demonstrated skills and knowledge in construction, to install, operate and maintain the inverter. This manual covers the inverter only, and NO other equipment (photovoltaic modules, external disconnects, etc) to which it is connected.
Warranty requirements are included in the Terms and Conditions of sale included with the inverter order.

NOTE – Any changes made to the product or to the installation conditions that hasn't been approved by Fimer will void the warranty.

NOTE – All pictures and illustrations shown in this user manual are indicatives and must be intended as support for installation instruction only. Actual product may vary due to product enhancement. Specifications subject to change without notice. The latest version of this document is available on the Fimer website.

The products are designed to be connected and communicate information and data via a network interface. It is the user's sole responsibility to provide and continuously ensure a secure connection between the product and the user's network or any other network (as the case may be). The user shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. Fimer and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information. The data, examples and diagrams in this manual are included solely for the concept or product description and are not to be deemed as a statement of guaranteed properties.
All persons responsible for applying the equipment addressed in this manual must satisfy themselves that each intended application is suitable and acceptable, including that any applicable safety or other operational requirements are complied with. In particular, any risks in applications where a system failure and/or product failure would create a risk for harm to property or persons (including but not limited to personal injuries or death) shall be the sole responsibility of the person or entity applying the equipment, and those so responsible are hereby requested to ensure that all measures are taken to exclude or mitigate such risks. This document has been carefully checked by Fimer but deviations cannot be completely ruled out. In case any errors are detected, the reader is kindly requested to notify the manufacturer. Other than under explicit contractual commitments, in no event shall Fimer be responsible or liable for any loss or damage resulting from the use of this manual or the application of the equipment.

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1. Safety and accident prevention

1.1 Safety information and instructions

This chapter contains the safety instructions which you must obey when you install and operate the inverter and perform maintenance operations on the inverter. Obey these safety instructions to prevent injury or death, or damage to the equipment.

NOTE – The instructions provided in the manual do not replace the safety devices and technical data for installation and operation labels on the product, and they do not replace the safety regulations in force in the country of installation.

READ THE MANUAL – The operators must read and comply with the technical information and instruction provided in the manual and in any additional attached documentation.

NOTE – Fimer accepts no liability for failure to comply with the instructions for a correct installation and cannot be held responsible for any other upstream or downstream equipments.

READ THE MANUAL – Specific safety information are provided during installation, commissioning and maintenance operation instructions. Always follow the reading order of instruction exactly as described in this manual.

1.2 Symbols and signs

In the manual and/or in some cases on the equipment, the danger or hazard zones/components are indicated with signs, labels, symbols or icons.

Symbol	Description
	Note - General information about product
	ATTENTION- Important safety information. Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	WARNING - Indicates a potentially hazardous situation, in particular a high voltage, which, if not avoided, could result in death or serious injury. The inverter has high voltages and high energy levels.
	HOT SURFACES - Indicates a potentially hazardous situation related to hot surface, which, if not avoided, could result in serious injury. Some surfaces in the inverter will become hot during operation and must not be touched until the parts have cooled down.
	Risk of injury due to the weight of the equipment. Take care during lifting and transport.
	Indicates that the area must not be accessed or that the operation described must not be carried out.
	Keep out of the reach of children.
	Indicates that it is mandatory to carry out the described operations using the clothing and/or personal protective equipment provided by the employer.
	Indicates the connection point for protective earth.
	Rated temperature range.
XX minutes	Risk of electric shock.The discharge time (quantified in the figure by the number XX) of the stored energy after de-energizing of the Inverter from both DC side and AC side. Warning! Refer to the dedicated procedures in the Instruction Manual before accessing to active parts inside the Inverter.
	Direct Current (DC)
	Alternate Current (AC)
	Without isolation transformer
	Positive pole of the input voltage (DC)
	Negative pole of the input voltage (DC)
IP 66	Protection rating of equipment
	Indicates the center of gravity of the equipment.
	Indicates the requirement to wear acoustic protection devices in order to prevent damage to hearing

1.3 Installation and maintenance safety

1.3.1 General safety information

WARNING – Do not do work on the photovoltaic generator, on the inverter, on its input or output cables, when the inverter is connected to an electrical power system, or to the photovoltaic generator.
Before perform any maintenance operation on the inverter, follow this steps:
- Prepare the work: Carry out an on-site Risk Assessment or Job Hazard Analysis (Check for proper tools and PPE for the job; Engage the person responsible for electrical equipment or system to review single-line, schematics, switching plans; Define the appropriate work methods and initiate the permit to work process).
- Clearly identify the work location and equipments.
- Disconnect all sources and secure against reconnection by means of the "Lockout/Tagout" procedure to ensure that any conductor cannot accidentally become live.
- Verify the absence of operating voltage (This must be carried out by means of a proper test instrument).
- Complete the permit to work and "Walk the Permit".

WARNING – Refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all detailed necessary steps to safely operate on the inverter.

FORBIDDEN – Do not proceed with installation if the integrity of the equipment is compromised. Do not use the equipment if you find any operating anomalies.

FORBIDDEN – Avoid temporary repairs. All repairs should be carried out using only genuine spare parts, which must be installed in accordance with their intended use.

FORBIDDEN – The labels affixed on the equipment must strictly NOT be removed, damaged, defaced, hidden, etc. The technical data provided in this manual does not in any case replace that shown on the labels affixed on the equipment.

1.3.2 Environmental conditions and risks

ATTENTION – This device can be installed outdoors, but only in environmental conditions that do not prevent its regular operation. These conditions are listed in the technical data and in the installation chapter.

ATTENTION – Do not open the front covers of the inverter when it is raining, or when sand or dust can blow into the unit. Infiltration of water or sand into the inverter can cause damage of the unit. It is of paramount importance to evaluate the weather conditions in the risk assessment prior any intervention on the equipment. Any intervention on the inverter can be carried out only in case of dry environment. Don't proceed in case of rain (even light) or high humidity.

ATTENTION – This device is not designed to operate in environments that are particularly inflammable or explosive.

ATTENTION – In the event of fire, use CO_2 extinguishers and auto-extraction systems to extinguish the fire in closed environments.

ATTENTION – The installer or maintenance technician must always pay attention to the work environment, ensuring that it is well-lit and there are enough escape routes.

1.3.3 Electrical and thermal safety

WARNING – Obey these instructions to prevent injury or death or damage to the equipment. If you are not a qualified electrician, do not perform any electrical installation or maintenance work.

WARNING – Obey all installation safety standards. This requires, among other things, the use of personal protection equipment (PPE) such as arc-proof clothing, arc-proof masks, protective footwear, insulating and protective gloves, eye protection and hearing protection. High power inverter installations have high fault currents.

WARNING – Before you operate on the inverter, isolate the AC line cables from the electrical power system with the AC disconnect switch of the power system transformer (downstream of inverter). Also, isolate the inverter from the photovoltaic generator with the DC disconnect switch of the generator or by other means (upstream of inverter). The internal AC disconnect switch (if present) do not isolate the AC output cables and terminals of the inverter from the electrical power system. The internal DC disconnect switches (if present) do not completely isolate the DC input cables or terminals from the DC voltage supplied by the photovoltaic generator. Refer to **"Inverter total de-energization and safe access"** paragraph on this manual for further details.

WARNING – Do not work on the communication and control signal cables when power is applied to the inverter or to the external control circuits.

WARNING – Do not perform insulation or voltage withstand tests on the inverter with exception for those indicated in this document.

WARNING – Fimer inverters must be earthed via the connection points marked with the protective earth symbol ⏚ and using a cable with an appropriate conductor cross-section for the maximum ground fault current that the generating system might experience.

WARNING – Do not switch-on the inverter with the front covers open, even during troubleshooting. The inverter front covers act as arc flash hazard protection. If a arc flash incident occurs when the inverter front covers are open, the arc-flash proof protection equipment might not provide sufficient protection for the operators.

HOT SURFACE – When the device has just been switched off, it may have hot parts as a result of overheating of the heated internal components (e.g.: transformers, accumulators, coils, etc.). Please pay attention to this.

1.4 Residual risks

⚠ **ATTENTION –** Despite the warnings and safety systems, there are still some residual risks that cannot be eliminated.

These risks are listed in the following table with some suggestions to prevent them:

Risk analysis and description	Suggested remedy
Noise pollution due to installation in unsuitable environments or where individuals routinely work and/or animals dwell most of the time.	Reassess the environment or the place of installation.
Adverse external weather conditions, water seepage, low temperatures, high humidity, etc.	Maintain ambient conditions suitable for the system.
Overheating of components (transformers, accumulators, coils, etc.) that could cause burns. Restricted cooling slits or systems of the equipment.	Use suitable PPE. Wait for the parts to cool down before opening the inverter. Do not restrict cooling openings or heatsinks.
Inadequate cleaning that could compromises cooling and does not allow the reading of safety labels.	Clean the equipment, labels and work environment.
Stored energy in components that could generate hazardous discharges.	Ensure that the components have discharged their energy before working on them.
Inadequate training of staff.	Ask for supplementary courses.
Incomplete installation, equipment or its components temporarily mounted.	Prevent unauthorized access to the installation area. Use a sufficient number employees and PPE.
Accidental disconnection of quick-fit connectors (if present) with the equipment in operation, or wrong connections that may generate electric arcs.	Prevent unauthorized access to the installation area and lock out/ tag out the inverter before working on it.
Mismatched brand of quick-fit connectors (if present) that may void the warranty and could cause potential damage.	Use the same brand for the counterparts of the quick-fit connectors installed on the inverter.

2. Introduction and general information

2.1 Warranty and supply conditions

The warranty conditions (available on the official Fimer website) are considered to be valid if the Customer adheres to all indications content in this manual; any condition deviating from those described herein must be expressly agreed in the purchase order.

NOTE – Fimer declares that the equipment complies with the provisions of law currently in force in the country of installation and has issued the corresponding declaration of conformity.

2.1.1 Not included in the supply conditions

Fimer will NOT be held liable for defects or malfunctions arising from:
- improper use of the equipment;
- deterioration resulting from transportation or particular environmental conditions;
- performing maintenance incorrectly or not at all;
- tampering or unsafe repairs;
- use or installation by unqualified persons.

Fimer is not responsible for disposal of the equipment, or part of it, which does not take place on the basis of the regulations and laws in force in the country of installation.

ATTENTION – Fimer accepts no liability for failure to comply with the instructions for a correct installation and will not be held responsible for systems upstream or downstream of the equipment it has supplied.

FORBIDDEN – It is absolutely forbidden to modify the equipment. Any modification, manipulation, or alteration not expressly agreed with the manufacturer, concerning either hardware or software, shall result in the immediate cancellation of the warranty.

NOTE – The customer is fully responsible for any changes made to the system.

2.2 Scope and target audience

2.2.1 Purpose and document structure

This operating and maintenance manual is a useful guide that will enable you to work safely and carry out the operations necessary for keeping the equipment in good working order.

ATTENTION – If the equipment is used in a manner not specified in this manual, the protections and the certifications provided by the equipment may be impaired with the consequent loss of warranty.

NOTE – The language in which the document was originally written is ENGLISH; therefore, in the event of inconsistencies or doubts please ask the manufacturer for the original document.

2.2.2 List of appendix documents

In addition to this product manual you can consult (and download) the product documentation by visiting www.fimer.com.

NOTE – Some component's information given in this manual is taken from the original supplier documents. Please refer to the supplier websites for the complete and updated documentation.

NOTE – In certain cases, there may be a need to separately document software functionality or attach supplementary documentation to this manual which is intended for more qualified professionals.

2.2.3 Operator and maintenance personnel skills/prerequisites

ATTENTION – Personnel in charge of using and maintaining the equipment must be skilled for the described tasks and must reliably demonstrate their capacity to correctly interpret what is described in the manual.

ATTENTION – For safety reasons, the installation must be performed by qualified installers and/or licensed electricians, with experience in photovoltaic systems. Installation must be in accordance with the existing regulations in the country of installation and any other local electrical codes. The local electrical utility (or authority having jurisdiction) must approve the equipment installation before it is connected to the electrical grid.

ATTENTION – The customer has civil liability for the qualification and mental or physical state of the personnel who interact with the equipment. They must always use the personal protective equipment (PPE) required by the laws of the country of destination and whatever provided by their employer.

FORBIDDEN – Inverter operation and maintenance performed by personnel that is NOT qualified, is intoxicated, or on narcotics, is strictly forbidden.

2.3 Application area, general conditions

Fimer shall not be liable for any damages whatsoever that may result from incorrect or careless operations.

FORBIDDEN – Please, do not use this equipment for any application not mentioned in the field of use.

2.3.1 Intended or allowed use

This equipment is an inverter designed for:
transforming a continuous electrical current (DC) supplied by a photovoltaic generator (PV)
in an alternating electrical current (AC) suitable for feeding power into the public distribution grid.

2.3.2 Limits in field of use

- This equipment can be used only with photovoltaic modules which have ground isolated input poles, unless there are accessories installed that enable earthing of the inputs. In this case you must install an insulating transformer on the AC side of the system.
- Only a photovoltaic generator can be connected to the input of the inverter (do not connect batteries or other sources of power supply).
- This equipment can be only connected to the electricity grid in countries for which it has been certified/approved.
- The inverter cannot be connected to the DC side in parallel to other inverters.
- This equipment may only be used in compliance with all its technical characteristics.

2.3.3 Improper or prohibited use

FORBIDDEN – It is forbidden to install the equipment in environments subject to particular conditions of flammability or in adverse or disallowed environmental conditions, (temperature and humidity).

FORBIDDEN – It is forbidden to use the equipment with safety devices which are faulty or disabled.

FORBIDDEN – It is forbidden to use the equipment or parts of the equipment by linking it to other machines or equipment, unless expressly provided for.

FORBIDDEN – It is forbidden to modify operating parameters that are not accessible to the operator and/or parts of the equipment to vary its performance or change its isolation.

FORBIDDEN – It is forbidden to clean with corrosive products that could corrode parts of the equipment or generate electrostatic charges.

FORBIDDEN – It is forbidden to use or install the appliance or parts of it without having read and understood the contents of the user and maintenance manual. The equipment MUST NOT be used by inexperienced staff, or even experienced staff if carrying out operations on the equipment that fail to comply with the indications in this manual and enclosed documentation.

FORBIDDEN – It is forbidden to place any heavy object, sit or stand up on the inverter.

FORBIDDEN – It is forbidden to heat or dry rags and clothing on the parts in temperature. In addition to being hazardous, doing so would compromise component ventilation and cooling.

3. Characteristics

3.1 General conditions

A description of the equipment characteristics is provided to identify its main components and specify the technical terminology used in the manual.

This chapter contains information about the models, details of the equipment, characteristics and technical data, overall dimensions and equipment identification.

⚠ **ATTENTION –** The customer/Installer takes full responsibility if, when reading this manual, the chronological order of its presentation provided is not observed. All information is provided considering occasional inclusion of information in previous chapters.

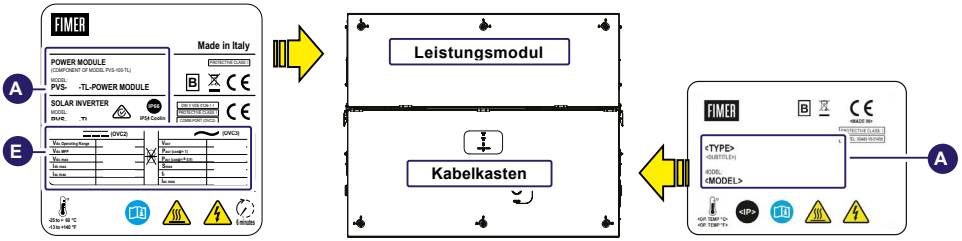
3.2 Identification of equipment and manufacturer

FORBIDDEN – The labels affixed to the equipment must NOT be removed, damaged, stained, hidden, etc., for any reason whatsoever. Do NOT hide the labels by foreign objects and parts (rags, boxes, equipment, etc.); they must be regularly cleaned and always kept in sight.

NOTE – The technical data provided in this manual does not substitute the data supplied on the labels affixed to the equipment.

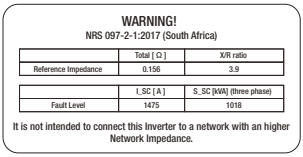
NOTE – The labels shown below have to be intended as example only.

3.2.1 Regulatory label



A. Power module/wiring box model
E. Main technical data
L. Certification marks

3.2.2 NRS097-2-1 label



WARNING!
NRS 097-2-1:2017 (South Africa)

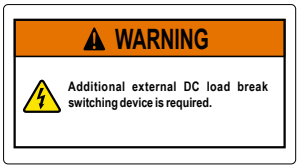
	Total [Ω]	X/R ratio
Reference Impedance	0.156	3.9

	I_SC [A]	S_SC [kVA] (three phase)
Fault Level	1475	1018

It is not intended to connect this Inverter to a network with an higher Network Impedance.

⚠ **ATTENTION –** For connection to the network in South Africa. According to NRS097-2-1 requirements, at the end of installation it is mandatory to apply the label at the left (supplied with the inverter) near the power module regulatory label.

3.2.3 AS/NZS 4777.2020 label



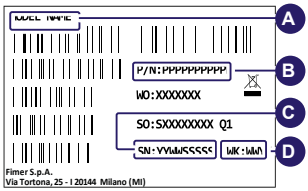
WARNING

Additional external DC load break switching device is required.

⚠ **ATTENTION –** For connection to the network in Australia and New Zealand. According to AS/NZS 4777.2020 requirements, it is necessary to apply the label and install an external DC Switch on the Standard and S2 inverter models.

3.2.4 Inverter identification label

The identification label is an accessory label (applied on both the power module **(01)** and the wiring box **(02)**) which shows the information necessary for the identification and characterization of the inverter.



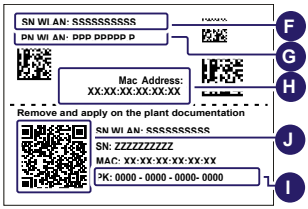
A. Power module/wiring box model
B. Inverter/wiring box Part Number
C. Inverter/wiring box Serial Number
D. Week/Year of manufacture

NOTE – If the Admin Plus password is requested (referring to "Admin Plus level access" paragraph), the information from identification label are mandatory.

3.2.5 Communication Identification label

The "communication identification label" (applied on the wiring box) is divided in two separate parts by a dashed line; take the bottom part and apply it on the plant documentation.

NOTE – It's recommend to create a plant map and apply the "communication identification label" on it.



F. WLAN embedded board Serial Number
G. WLAN embedded board Part Number
H. MAC address:
- To be used to obtain the SSID of the wireless access point created by the inverter: ABB-XX-XX-XX-XX-XX-XX (where "X" is a hex digit of the MAC address).
- To be used to obtain the "Host Name": http://ABB-XX-XX-XX-XX-XX-XX.local (where "X" is a hex digit of the MAC address).

I. Product Key:
To be used as wireless access point password, or to be used to access to the Web UI as username and password in case of lost credentials, and to commission inverter using FIMER Installer for Solar Inverters.

J. QR Code:
To be used to commission inverter using FIMER Installer for Solar Inverters for claiming process.

3.3 Models and range of equipment

NOTE – The choice of the inverter model must be made by a qualified technician who knows about the installation conditions, the devices that will be installed in addition to the inverter and possible integration with an existing system.

The parts of equipment which make up the inverter are:

Power Module Model	Description
PVS-100-TL-POWER MODULE	Inverter section / power module with 100kW output power at 400Vac
PVS-120-TL-POWER MODULE	Inverter section / power module with 120kW output power at 480Vac

Bracket Model	Description
PVS-100/120-TL-BRACKET	Bracket allowing both vertical and horizontal installation.

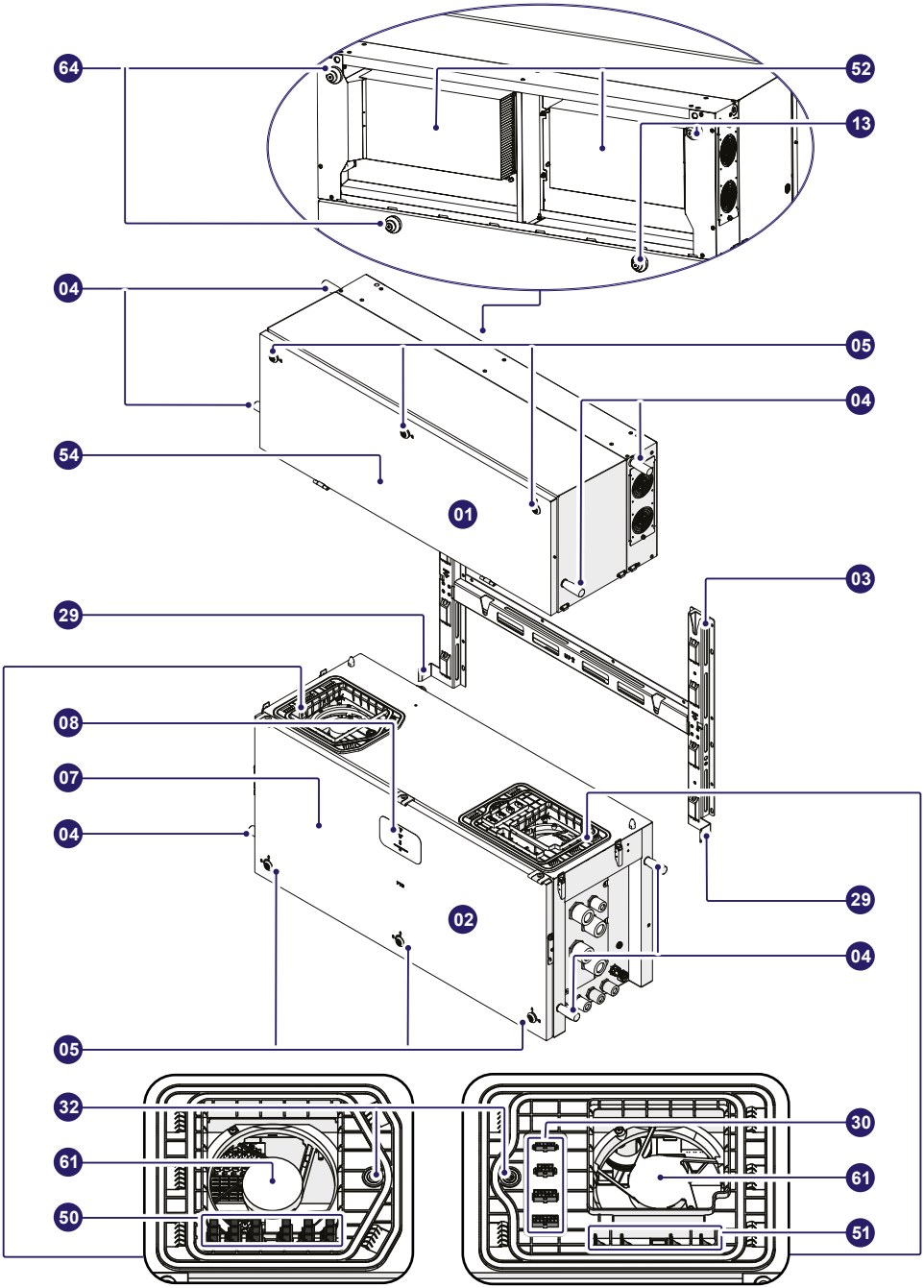
Wiring Box Model	Description
WB-PVS-100-TL WB-PVS-120-TL	• 1 or 2 MPPTs (settable on the field) • 4 DC cable glands (2xM40 cable glands for each MPPTs) • 4 DC connection bus bars (1 pair for each MPPT) • Input current monitoring (MPPT level) • DC SPD type II (monitored) • AC plate with 5 individual AC cable glands: 4 x M40 and 1 x M25 • 4 AC connection bus bars (3 Phases + Neutral) • AC SPD type II (replaceble)
WB-S2-PVS-100-TL WB-S2-PVS-120-TL	• 1 or 2 MPPTs (settable on the field) • 4 DC cable glands (2xM40 cable glands for each MPPTs) • 4 DC connection bus bars (1 pair for each MPPT) • Input current monitoring (MPPT level) • DC SPD type II (monitored) • DC disconnect switch • AC plate with 5 individual AC cable glands: 4 x M40 and 1 x M25 • 4 AC connection bus bars (3 Phases + Neutral) • AC SPD type II (replaceble) • AC disconnect switch
WB-SX-PVS-100-TL WB-SX-PVS-120-TL	• 6 MPPTs • Input with 24 quick fit connectors pairs (4 each MPPT) • Input current monitoring (MPPT level) • String fuses (positive pole) • DC SPD type II (monitored) • DC disconnect switch • AC plate with 5 individual AC cable glands: 4 x M40 and 1 x M25 • 4 AC connection bus bars (3 Phases + Neutral) • AC SPD type II (replaceble)
WB-SY-PVS-100-TL WB-SY-PVS-120-TL	• 6 MPPTs • Input with 24 quick fit connectors pairs (4 each MPPT) • Input current monitoring (MPPT level) • String fuses (positive pole) • DC SPD type I + II (monitored) • DC disconnect switch • AC plate with 5 individual AC cable glands: 4 x M40 and 1 x M25 • 4 AC connection bus bars (3 Phases + Neutral) • AC SPD type II (replaceble)
WB-SX2-PVS-100-TL WB-SX2-PVS-120-TL	• 6 MPPTs • Input with 24 quick fit connectors pairs (4 each MPPT) • Input current monitoring (string level) • String fuses (positive and negative pole) • DC SPD type II (monitored) • DC disconnect switch • AC plate with 5 individual AC cable glands: 4 x M40 and 1 x M25 • 4 AC connection bus bars (3 Phases + Neutral) • AC SPD type II (replaceble) • AC disconnect switch
WB-SY2-PVS-100-TL WB-SY2-PVS-120-TL	• 6 MPPTs • Input with 24 quick fit connectors pairs (4 each MPPT) • Input current monitoring (string level) • String fuses (positive and negative pole) • DC SPD type I + II (monitored) • DC disconnect switch • AC plate with 5 individual AC cable glands: 4 x M40 and 1 x M25 • 4 AC connection bus bars (3 Phases + Neutral) • AC SPD type II (replaceble) • AC disconnect switch

NOTE – All inverter models can be equipped with PVS-100/120 GROUNDING KIT and/or PVS-100/120 PRE-CHARGE BOARD KIT. Kits can be installed in the field by qualified installers and/or licensed electricians, with experience in photovoltaic systems. Kits may also be pre-installed in the factory on dedicated P/N's. Refer to instruction provided together with kits for a proper installation and/or configuration.

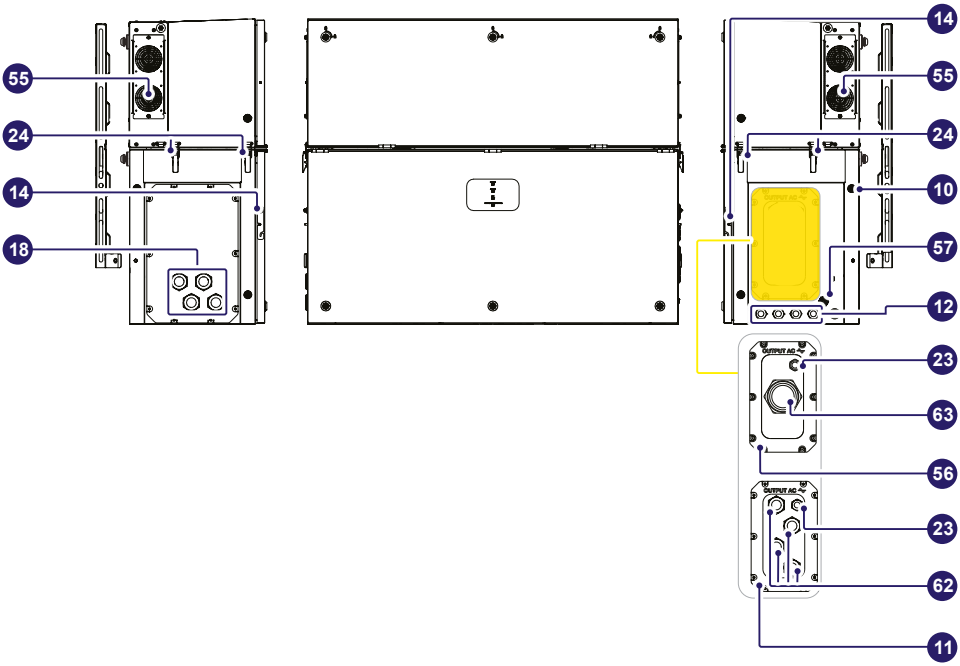
3.4 Component reference numbers

Inverter external view		Inverter external view	
01	Power module	**33**	Configurable relay connector (ALARM and AUX)
02	Wiring box	**34**	RS-485 120Ohm resistance switch (service only)
03	Mounting bracket	**35**	RS-485 120Ohm resistance switch
04	Handles	**36**	RS-485 connector (RJ45) (Service only)
05	Cover quarter cam locks	**37**	Remote ON/OFF terminal block
07	Wiring box front cover	**38**	RS-485 line terminal block
08	LEDs panel	**39**	Ethernet connector 2 (RJ45)
09	AC disconnect switch	**40**	Ethernet connector 1 (RJ45)
10	Protective earth point (ext.)	**41**	USB connector
11	Single-core AC panel (default)	**42**	SD card slot
12	Signals cable glands	**43**	CR2032 coin battery
13	Rear pins for bracket assembly	**44**	RS485 line communication board
14	Cover support brackets	**45**	RS485 line communication board (service only)
15	DC disconnect switches	**46**	MEMORY board
16	DC input quick fit connectors	**50**	DC interface cables
17	DC input connection busbar	**51**	AC interface cables
18	DC input cable glands	**52**	Removable rear panels
19	Positive string fuses and SPD board	**53**	DC overvoltage surge arresters (board)
20	Negative string fuses board	**54**	Power module front cover
21	AC connection busbar	**55**	Fan tray
22	AC overvoltage SPD	**56**	Multi-core AC panel (opt.)
23	PE cable gland	**57**	RS-485&Rem.ON/OFF connector (Service only)
24	Side latches	**58**	AC interconnection board
25	Protective earth point (int.)	**59**	DC interconnection board
27	AC protective shield	**60**	DC protective shield
28	Communication and control board	**61**	Internal fan
29	Side bracket screws	**62**	Single core AC cable gland
30	Interface signal cables	**63**	Multi-core AC cable gland
31	Parallel MPPT connection points	**64**	PE interconnection point
32	Junction screws	**65**	Interface signal connectors

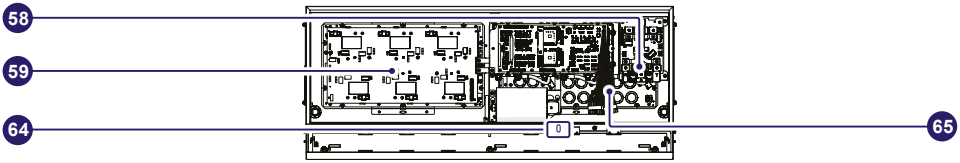
3.4.1 Inverter external view



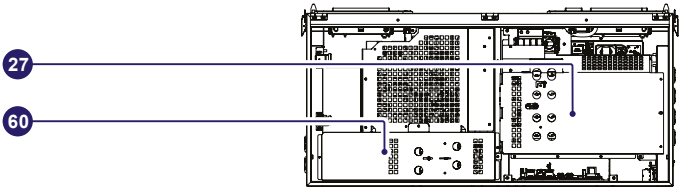
3.4.2 PVS-100/120-TL ; B2



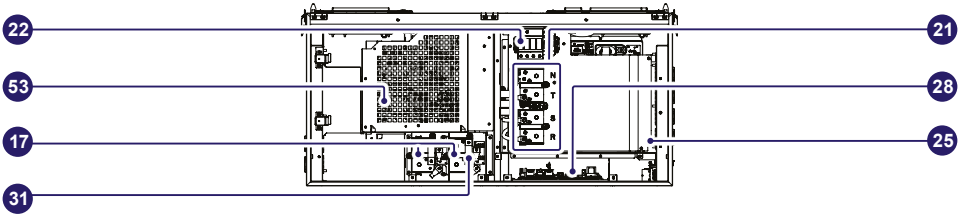
Power module PVS-100/120-TL ; B2



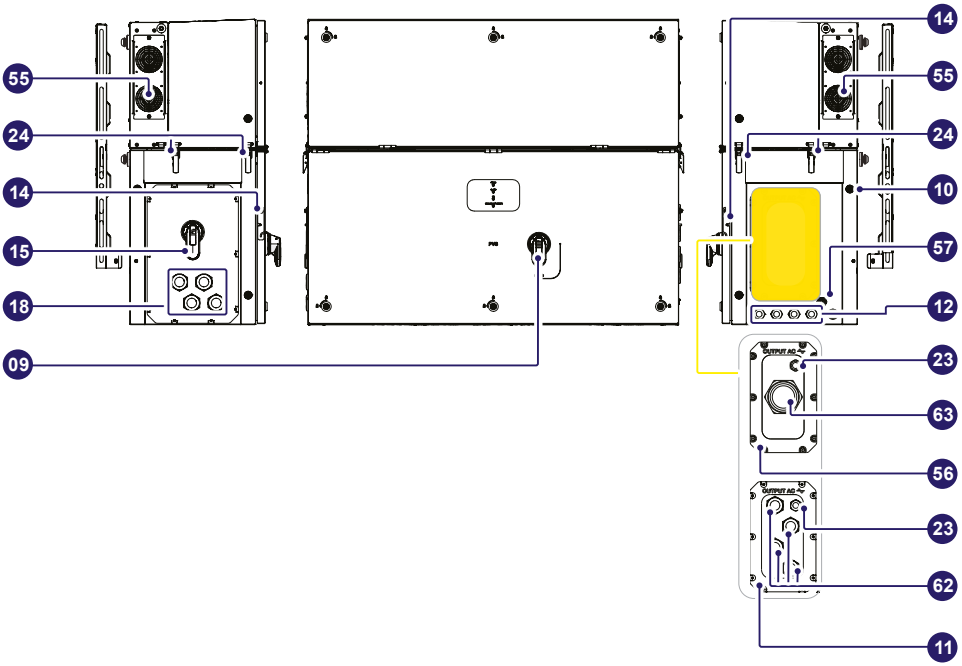
Wiring box with internal cover PVS-100/120-TL ; B2



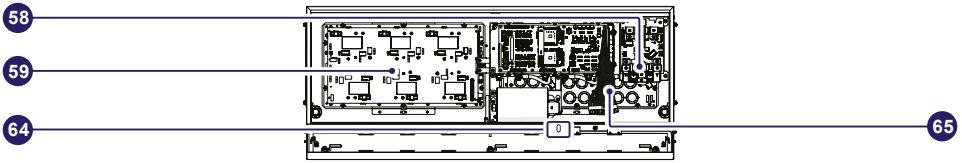
Wiring box without internal cover PVS-100/120-TL ; B2



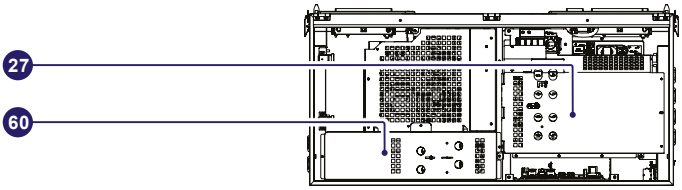
3.4.3 PVS-100/120-TL ; B2 ; S2



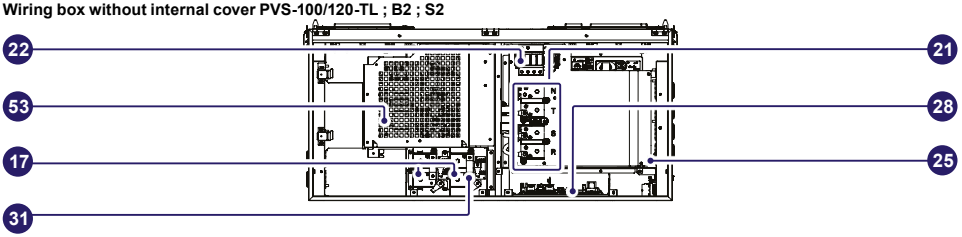
Power module PVS-100/120-TL ; B2 ; S2



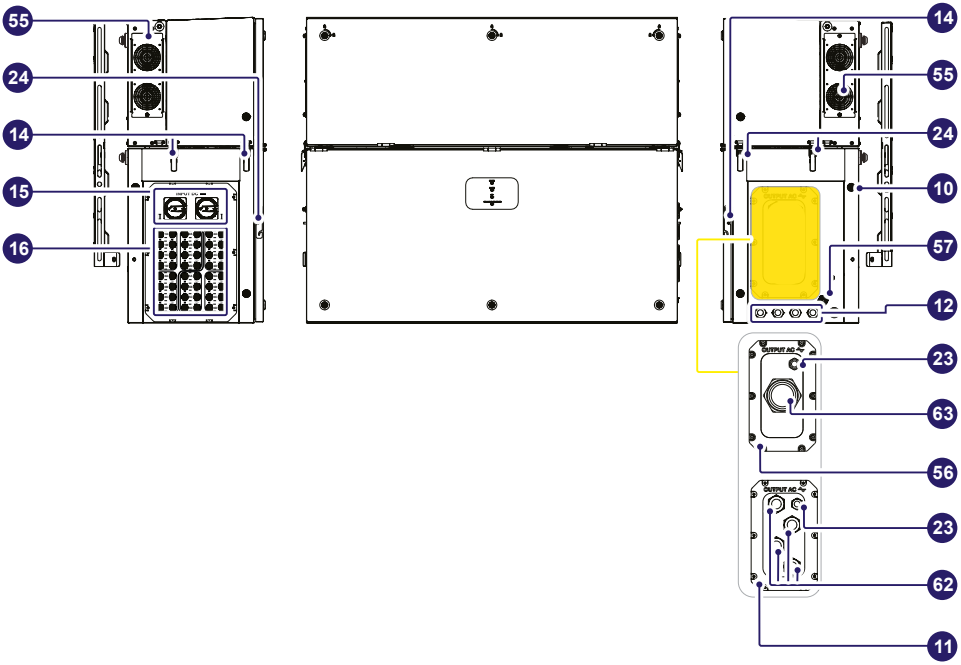
Wiring box with internal cover PVS-100/120-TL ; B2 ; S2



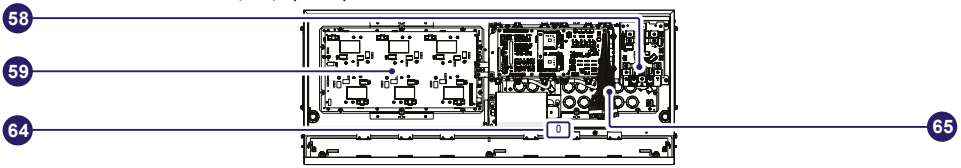
Wiring box without internal cover PVS-100/120-TL ; B2 ; S2



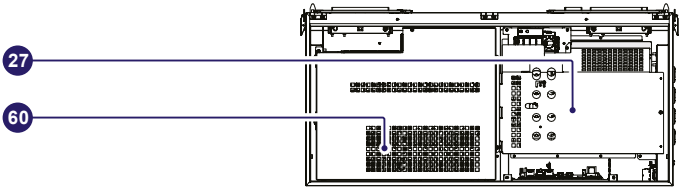
3.4.4 PVS-100/120-TL ; B2 ; S(X or Y)



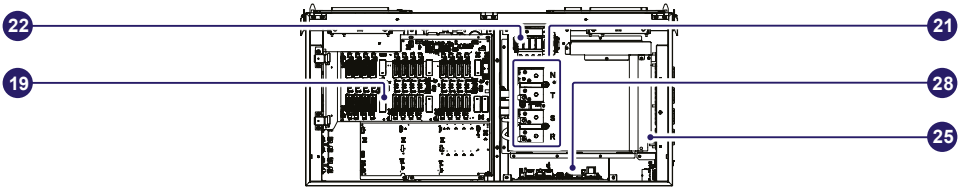
Power module PVS-100/120-TL ; B2 ; S(X or Y)



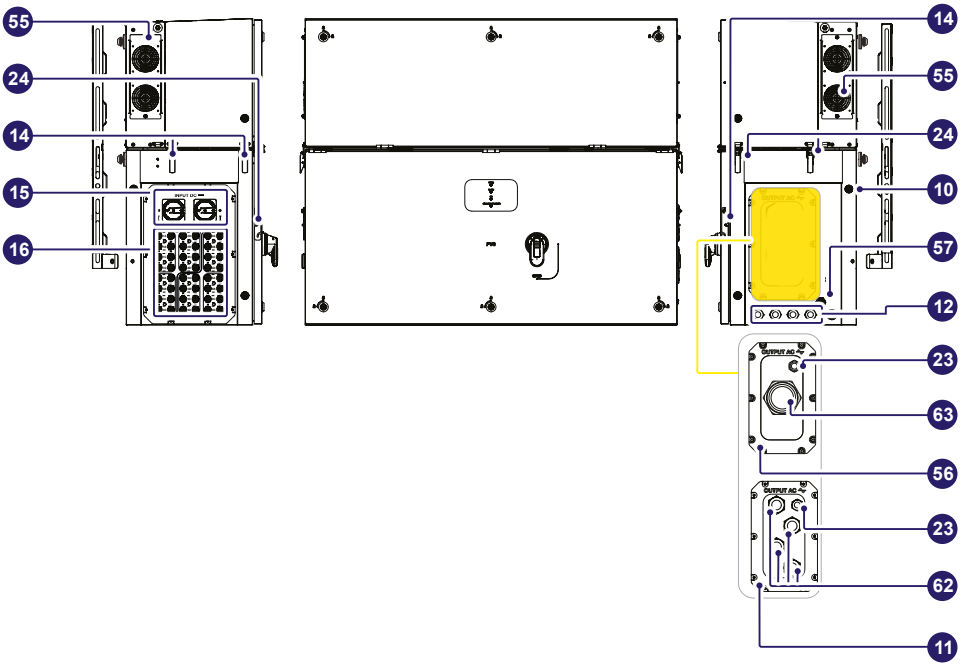
Wiring box with internal cover PVS-100/120-TL ; B2 ; S(X or Y)



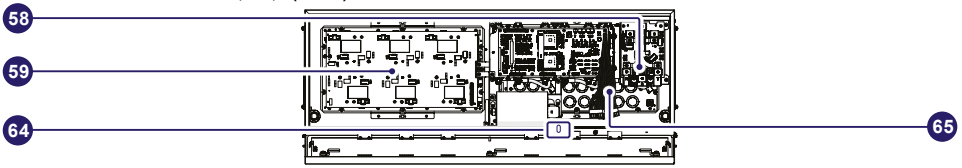
Wiring box without internal cover PVS-100/120-TL ; B2 ; S(X or Y)



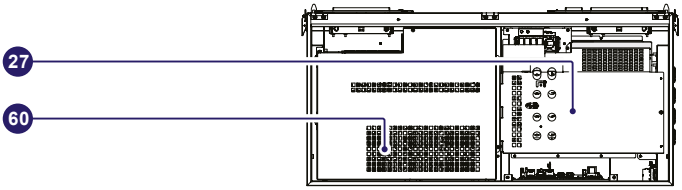
3.4.5 PVS-100/120-TL ; B2 ; S(X or Y)2



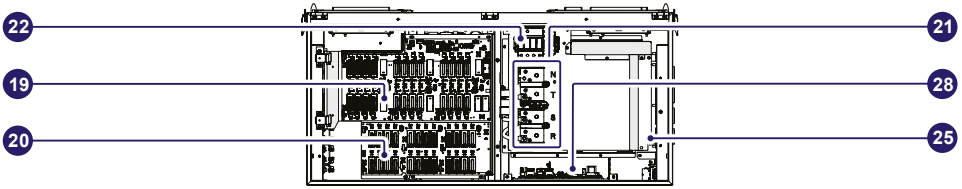
Power module PVS-100/120-TL ; B2 ; S(X or Y)



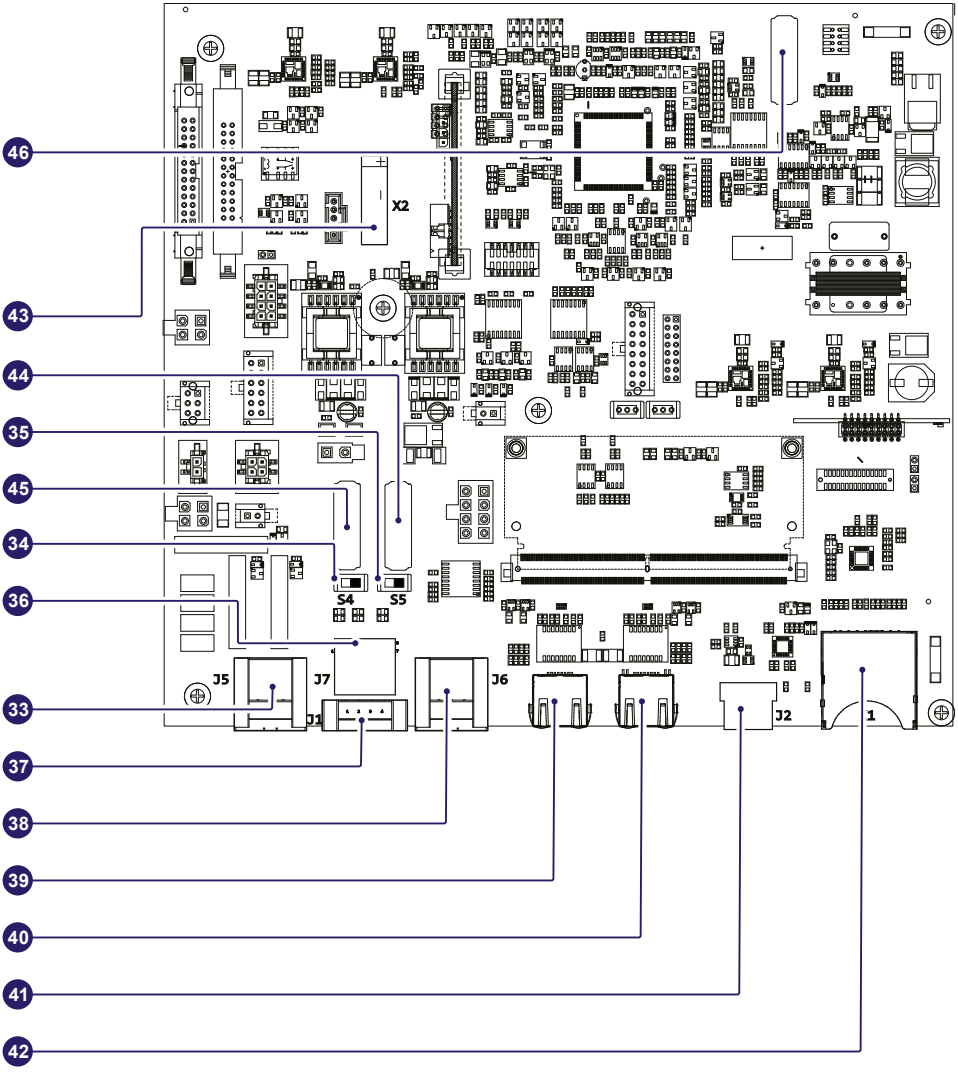
Wiring box with internal cover PVS-100/120-TL ; B2 ; S(X or Y)



Wiring box without internal cover PVS-100/120-TL ; B2 ; S(X or Y)



3.4.6 Communication and control board



3.5 Technical data

3.5.1 Technical data table PVS-100-TL (standard and S2 models)

PVS-100	
Wiring Box version	**Standard, S2**
Input side	
Absolute maximum input voltage (Vmax,abs)	1000 V
Start-up input voltage (Vstart)	420 V (400…500 V)
Operating input voltage range (Vdcmin...Vdcmax)	360…1000 V
Rated input voltage (Vdcr)	620 V
Rated input power (Pdcr)	102000 W
Number of independent MPPT	2 (Parallelable)
MPPT voltage range (VMPPTmin ... VMPPTmax) to Pacr	480…850 V (symmetrical load)
Maximum input power for each MPPT (Pmppt,max)	63000 W [585 V≤VMPPT≤850 V]
Maximum input current for each MPPT (Idcmax)	108 A
Maximum short circuit current for each MPPT (Iscmax) [1]	150 A
Maximum return current (AC side vs DC side)	Negligible in normal operating conditions [6]
Number of input pairs for each MPPT	1
Type of input connectors	4 x M40 cable glands with M10 Cable lugs
Type of photovoltaic panels that can be connected at input according to IEC 61730	Class A
Input protection	
Reverse polarity protection	Yes, from current limited source
Input over voltage protection for each MPPT-surge arrester (with monitoring)	Type II
Photovoltaic array isolation control	Yes, according to IEC 62109-2
Residual current monitoring Unit (leakage current protection)	Yes, according to IEC 62109-2
DC switch rating for each MPPT [11] (not available in standard version)	150A - 1000V
Input current monitoring	MPPT level: Standard, S2
Output side	
AC Grid connection type	Three phase 3W+PE or 4W+PE (TN system)
Rated Output Power (Pacr @cosφ=1)	100000 W
Maximum Output Power (Pacmax @cosφ=1)	100000 W
Rated Apparent Power (Sr)	100000 VA
Maximum apparent Output power (Smax)	100000 VA
Rated grid Voltage (Vacr)	400 V
Grid voltage range	320...480 V [4]
Rated Output Current (Iac,r)	145 A
Maximum output current (Iac,max)	145 A
Output inrush current (peak and duration)	10% of Imax for 5msec.
Rated Output Frequency (fr)	50 Hz / 60 Hz
Output Frequency Range (fmin...fmax)	45...55 Hz / 55…65 Hz [5]
Nominal power factor and adjustable range	> 0.995, 0...1 inductive/capacitive with maximum Smax
Total harmonic distortion of current	<3%
Max DC Current Injection (% of In)	< 0.5%*In
Maximum AC cable	185mm^2 Aluminum and copper
AC connection type	Provided bar for lug connections M10 Single core cable glands 4xM40 and 25 or Multi core cable gland M63 as option
Output protection	
Anti-islanding Protection	According to local standard Method: active frequency drift in combination with RoCoF techniques
Maximum external AC overcurrent protection	225 A
Output overvoltage protection - replaceable surge protection device	Type 2 with monitoring
Operating performance	
Maximum Efficiency (ηmax)	98.4%
Weighted Efficiency (EURO)	98.2%
Communication	
Embedded communication interfaces	1x RS485, 2x Ethernet (RJ45), WLAN (IEEE802.11 b/g/n @ 2,4 GHz)
User Interface	4 LEDs, Web User Interface
Communication protocol	Modbus RTU/TCP (Sunspec compliant)
Commissioning tool	Web User Interface, Mobile APP/APP for plant level
Remote monitoring services	Aurora Vision® monitoring portal
Advanced features	Embedded logging, direct telemetry data transferring to FIMER cloud

PVS-100	
Wiring Box version	**Standard, S2**
Environmental	
Operating ambient temperature range	-25...+60°C/-13...140°F with derating above 40°C/ 104°F
Storage temperature	-40°C...+85°C / -40°F...185°F
Relative Humidity	4…100 % with condensation
Sound pressure level, typical	68dB(A)@ 1m
Maximum operating altitude without derating	2000 m / 6560 ft
Environmental pollution degree classification for external environments	3
Environmental class	Outdoor
Climatic category according to IEC 60721-3-4	4K4H
Physical	
Environmental Protection Rating	IP 66 (IP54 for the cooling section)
Cooling System	Forced air
Dimensions (H x W x D)	869x1086x419 mm / 34.2" x 42.7" x 16.5"
Weight	70kg / 154 lbs for power module ; ~55kg / 121 lbs for wiring box; Overall max 125 kg / 276 lbs
Mounting system	Mounting bracket vertical & horizontal support
Overvoltage rating as per IEC 62109-1	II (DC input) III (AC output)
Safety	
Safety class	I
Insulation Level	Transformerless
Marking	CE [8]
Safety, EMC and Radio Spectrum Standards	IEC/EN 62109-1, IEC/EN 62109-2, EN 61000-6-2, EN 61000-6-4, EN55011:2017
Grid standard (check the availability with your sales channel)	CEI 0-16, CEI 0-21, IEC 61727, IEC 62116, IEC 60068, IEC 1683, JORDAN IRR-DCC-MV, DRRG/DEWA, Chile LV/MV, BDEW, Belg C10-C11, EN50438 Generic +Ireland, EN50549-1/2, LC-TS50549-1/2, AS/NZS4777.2, UK G59/3, EREC G99-1, MEA, PEA, ISO-IEC Guide 67 (system 5), NRS 097-2-1, P.O. 12.3, ITC-BT-40, UNE 206006 IN, VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120, VDE V 0-126-1-1, VFR 2019, UTE C15-712-1, Taiwan
Accessories	
Assembly accessories	PVS Installation Kit
AC Plate, Single Core Cables	Plate with 5 individual AC cable glands: 4 x M40: Ø 19...28mm, 1 x M25: Ø 10...17mm
AC Plate, Multi Core Cables	Plate with 2 individual AC cable glands: 1 x M63: Ø 37…53mm, 1 x M25: Ø 10...17mm
PVS-100/120 PRE-CHARGE BOARD KIT	Allow the monitoring of the inverter when DC source is not available and night time operation with restart capability [10]
PVS-100/120 GROUNDING KIT [9]	Allow to connect the negative input pole to ground [7]

1. Maximum number of opening 5 under overloading
4. The AC voltage range may vary depending on specific country grid standard
5. Frequency range may vary depending on specific country grid standard
6. In the event of a fault, limited by the external protection envisaged on the AC circuit
7. Only in IT-system (an AC SPD reconfiguration is needed)
8. Hereby, Power-One Italy S.p.A. (A Member of the FIMER Group) declares that the radio equipments (radio module combined with the inverter), to which this user manual refers, are in compliance with the Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following internet address: www.fimer.com
9. When PVS-100/120 GROUNDING KIT is installed, Residual Current Monitoring do not fully operate. Inverter must be installed and operate in "restricted areas (access limited to qualified personnel)" according to IEC 62109-2
10. In case PVS-100/120 PRE-CHARGE BOARD KIT is installed on the inverter, it is important to remark the presence of auxiliary power supply connected to the AC grid. In this case the inverter is supplied either by DC and AC power, so hazardous internal voltages are present even in case the DC switches are open.
11. For connection to the network in Australia and New Zealand. According to AS/NZS 4777.2020 requirements, it is necessary to apply the label and install an external DC Switch on the Standard and S2 inverter models.

Features not specifically mentioned in this data sheet are not included in the product.

3.5.2 Technical data table PVS-100-TL (SX, SX2, SY, SY2 Models)

PVS-100	
Wiring Box version	**SX, SX2, SY, SY2**
Input side	
Absolute maximum input voltage (Vmax,abs)	1000 V
Start-up input voltage (Vstart)	420 V (400…500 V)
Operating input voltage range (Vdcmin...Vdcmax)	360…1000 V
Rated input voltage (Vdcr)	620 V
Rated input power (Pdcr)	102000 W
Number of independent MPPT	6
MPPT voltage range (VMPPTmin ... VMPPTmax) to Pacr	480…850 V (symmetrical load)
Maximum input power for each MPPT (Pmppt,max)	21000 W [585 V≤VMPPT≤850 V]
Maximum input current for each MPPT (Idcmax)	36 A
Maximum short circuit current for each MPPT (Iscmax) (1)	50 A
Maximum return current (AC side vs DC side)	Negligible in normal operating conditions (6)
Number of input pairs for each MPPT	4
Type of input connectors	PV quick fit connector (2)
Type of photovoltaic panels that can be connected at input according to IEC 61730	Class A
Input protection	
Reverse polarity protection	Yes, from current limited source
Input over voltage protection for each MPPT-surge arrester (with monitoring)	Type II (SX, SX2 versions) Type I+II (SY, SY2 versions)
Photovoltaic array isolation control	Yes, according to IEC 62109-2
Residual current monitoring Unit (leakage current protection)	Yes, according to IEC 62109-2
DC switch rating for each MPPT (not available in standard version)	50A - 1000V
Fuse rating	20A / 1000V (3)
Input current monitoring	Single string level (24ch.): SX2, SY2 models MPPT level: SX, SY models
Output side	
AC Grid connection type	Three phase 3W+PE or 4W+PE (TN system)
Rated Output Power (Pacr @cosφ=1)	100000 W
Maximum Output Power (Pacmax @cosφ=1)	100000 W
Rated Apparent Power (Sr)	100000 VA
Maximum apparent Output power (Smax)	100000 VA
Rated grid Voltage (Vacr)	400 V
Grid voltage range	320...480 V (4)
Rated Output Current (Iac,r)	145 A
Maximum output current (Iac,max)	145 A
Output inrush current (peak and duration)	10% of Imax for 5msec.
Rated Output Frequency (fr)	50 Hz / 60 Hz
Output Frequency Range (fmin...fmax)	45...55 Hz / 55…65 Hz (5)
Nominal power factor and adjustable range	> 0.995, 0...1 inductive/capacitive with maximum Smax
Total harmonic distortion of current	<3%
Max DC Current Injection (% of In)	< 0.5%*In
Maximum AC cable	185mm^2 Aluminum and copper
AC connection type	Provided bar for lug connections M10 Single core cable glands 4xM40 and 25 or Multi core cable gland M63 as option
Output protection	
Anti-islanding Protection	According to local standard Method: active frequency drift in combination with RoCoF techniques
Maximum external AC overcurrent protection	225 A
Output overvoltage protection - replaceable surge protection device	Type 2 with monitoring
Operating performance	
Maximum Efficiency (ηmax)	98.4%
Weighted Efficiency (EURO)	98.2%
Communication	
Embedded communication interfaces	1x RS485, 2x Ethernet (RJ45), WLAN (IEEE802.11 b/g/n @ 2,4 GHz)
User Interface	4 LEDs, Web User Interface
Communication protocol	Modbus RTU/TCP (Sunspec compliant)
Commissioning tool	Web User Interface, Mobile APP/APP for plant level
Remote monitoring services	Aurora Vision® monitoring portal
Advanced features	Embedded logging, direct telemetry data transferring to FIMER cloud

PVS-100	
Wiring Box version	**SX, SX2, SY, SY2**
Environmental	
Operating ambient temperature range	-25...+60°C/-13...140°F with derating above 40°C/ 104°F
Storage temperature	-40°C...+85°C / -40°F...185°F
Relative Humidity	4…100 % with condensation
Sound pressure level, typical	68dB(A)@ 1m
Maximum operating altitude without derating	2000 m / 6560 ft
Environmental pollution degree classification for external environments	3
Environmental class	Outdoor
Climatic category according to IEC 60721-3-4	4K4H
Physical	
Environmental Protection Rating	IP 66 (IP54 for the cooling section)
Cooling System	Forced air
Dimensions (H x W x D)	869x1086x419 mm / 34.2" x 42.7" x 16.5"
Weight	70kg / 154 lbs for power module ; ~55kg / 121 lbs for wiring box; Overall max 125 kg / 276 lbs
Mounting system	Mounting bracket vertical & horizontal support
Overvoltage rating as per IEC 62109-1	II (DC input) III (AC output)
Safety	
Safety class	I
Insulation Level	Transformerless
Marking	CE [8]
Safety, EMC and Radio Spectrum Standards	IEC/EN 62109-1, IEC/EN 62109-2, EN 61000-6-2, EN 61000-6-4, EN55011:2017
Grid standard (check the availability with your sales channel)	CEI 0-16, CEI 0-21, IEC 61727, IEC 62116, IEC 60068, IEC 1683, JORDAN IRR-DCC-MV, DRRG/DEWA, Chile LV/MV, BDEW, Belg C10-C11, EN50438 Generic +Ireland, EN50549-1/2, LC-TS50549-1/2, AS/NZS4777.2, UK G59/3, EREC G99-1, MEA, PEA, ISO-IEC Guide 67 (system 5), NRS 097-2-1, P.O. 12.3,ITC-BT-40, UNE 206006 IN, VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120, VDE V 0-126-1-1, VFR 2019, UTE C15-712-1, Taiwan
Accessories	
Assembly accessories	PVS Installation Kit
AC Plate, Single Core Cables	Plate with 5 individual AC cable glands: 4 x M40: Ø 19...28mm, 1 x M25: Ø 10...17mm
AC Plate, Multi Core Cables	Plate with 2 individual AC cable glands: 1 x M63: Ø 37…53mm, 1 x M25: Ø 10...17mm
PVS-100/120 PRE-CHARGE BOARD KIT	Allow the monitoring of the inverter when DC source is not available and night time operation with restart capability [10]
PVS-100/120 GROUNDING KIT [9]	Allow to connect the negative input pole to ground [7]

1. Maximum number of opening 5 under overloading
2. Please refer to the document "String inverters – Product manual appendix" available at www.fimer.com for information on the quick-fit connector brand and model used in the inverter
3. Maximum fuse size supported 20A. Additionally two strings input per MPPT supports 30A fuse size for connecting two strings per input.
4. The AC voltage range may vary depending on specific country grid standard
5. Frequency range may vary depending on specific country grid standard
6. In the event of a fault, limited by the external protection envisaged on the AC circuit
7. Only in IT-system (an AC SPD reconfiguration is needed)
8. Hereby, Power-One Italy S.p.A. (A Member of the FIMER Group) declares that the radio equipments (radio module combined with the inverter), to which this user manual refers, are in compliance with the Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following internet address: www.fimer.com
9. When PVS-100/120 GROUNDING KIT is installed, Residual Current Monitoring do not fully operate. Inverter must be installed and operate in "restricted areas (access limited to qualified personnel)" according to IEC 62109-2
10. In case PVS-100/120 PRE-CHARGE BOARD KIT is installed on the inverter, it is important to remark the presence of auxiliary power supply connected to the AC grid. In this case the inverter is supplied either by DC and AC power, so hazardous internal voltages are present even in case the DC switches are open.

Features not specifically mentioned in this data sheet are not included in the product.

3.5.3 Technical data table PVS-120-TL (standard and S2 models)

PVS-120	
Wiring Box version	**Standard, S2**
Input side	
Absolute maximum input voltage (Vmax,abs)	1000 V
Start-up input voltage (Vstart)	420 V (400…500 V)
Operating input voltage range (Vdcmin...Vdcmax)	360…1000 V
Rated input voltage (Vdcr)	720 V
Rated input power (Pdcr)	123000 W
Number of independent MPPT	2 (Parallelable)
MPPT voltage range (VMPPTmin ... VMPPTmax) to Pacr	570…850 V (symmetrical load)
Maximum input power for each MPPT (Pmppt,max)	75000 W [685 V≤VMPPT≤850 V]
Maximum input current for each MPPT (Idcmax)	108 A
Maximum short circuit current for each MPPT (Iscmax) [1]	150 A
Maximum return current (AC side vs DC side)	Negligible in normal operating conditions [6]
Number of input pairs for each MPPT	1
Type of input connectors	4 x M40 cable glandswith M10 Cable lugs
Type of photovoltaic panels that can be connected at input according to IEC 61730	Class A
Input protection	
Reverse polarity protection	Yes, from current limited source
Input over voltage protection for each MPPT-surge arrester (with monitoring)	Type II
Photovoltaic array isolation control	Yes, according to IEC 62109-2
Residual current monitoring Unit (leakage current protection)	Yes, according to IEC 62109-2
DC switch rating for each MPPT [11] (not available in standard version)	150A - 1000V
Input current monitoring	MPPT level: Standard, S2
Output side	
AC Grid connection type	Three phase 3W+PE or 4W+PE (TN system)
Rated Output Power (Pacr @cosφ=1)	120000 W
Maximum Output Power (Pacmax @cosφ=1)	120000 W
Rated Apparent Power (Sr)	120000 VA
Maximum apparent Output power (Smax)	120000 VA
Rated grid Voltage (Vacr)	480 V
Grid voltage range	384...576 V [4]
Rated Output Current (Iac,r)	145 A
Maximum output current (Iac,max)	145 A
Output inrush current (peak and duration)	10% of Imax for 5msec.
Rated Output Frequency (fr)	50 Hz / 60 Hz
Output Frequency Range (fmin...fmax)	45...55 Hz / 55…65 Hz [5]
Nominal power factor and adjustable range	> 0.995, 0...1 inductive/capacitive with maximum Smax
Total harmonic distortion of current	<3%
Max DC Current Injection (% of In)	< 0.5%*In
Maximum AC cable	185mm^2 Aluminum and copper
AC connection type	Provided bar for lug connections M10 Single core cable glands 4xM40 and 25 Multi core cable gland M63 as option
Output protection	
Anti-islanding Protection	According to local standard Method: active frequency drift in combination with RoCoF techniques
Maximum external AC overcurrent protection	225 A
Output overvoltage protection - replaceable surge protection device	Type 2 with monitoring
Operating performance	
Maximum Efficiency (ηmax)	98.9%
Weighted Efficiency (EURO)	98.6%
Communication	
Embedded communication interfaces	1x RS485, 2x Ethernet (RJ45), WLAN (IEEE802.11 b/g/n @ 2,4 GHz)
User Interface	4 LEDs, Web User Interface
Communication protocol	Modbus RTU/TCP (Sunspec compliant)
Commissioning tool	Web User Interface, Mobile APP/APP for plant level
Remote monitoring services	Aurora Vision® monitoring portal
Advanced features	Embedded logging, direct telemetry data transferring to FIMER cloud

PVS-120	
Wiring Box version	**Standard, S2**
Environmental	
Operating ambient temperature range	-25...+60°C/-13...140°F with derating above 40°C/ 104°F
Storage temperature	-40°C...+85°C / -40°F...185°F
Relative Humidity	4…100 % with condensation
Sound pressure level, typical	68dB(A)@ 1m
Maximum operating altitude without derating	2000 m / 6560 ft
Environmental pollution degree classification for external environments	3
Environmental class	Outdoor
Climatic category according to IEC 60721-3-4	4K4H
Physical	
Environmental Protection Rating	IP 66 (IP54 for the cooling section)
Cooling System	Forced air
Dimensions (H x W x D)	869x1086x419 mm / 34.2" x 42.7" x 16.5"
Weight	70kg / 154 lbs for power module ; ~55kg / 121 lbs for wiring box; Overall max 125 kg / 276 lbs
Mounting system	Mounting bracket vertical & horizontal support
Overvoltage rating as per IEC 62109-1	II (DC input) III (AC output)
Safety	
Safety class	I
Insulation Level	Transformerless
Marking	CE [8]
Safety, EMC and Radio Spectrum Standards	IEC/EN 62109-1, IEC/EN 62109-2, EN 61000-6-2, EN 61000-6-4, EN55011:2017
Grid standard (check the availability with your sales channel)	CEI 0-16, IEC 61727, IEC 62116, IEC 60068, IEC 61683, JORDAN IRR-DCC-MV, DRRG/DEWA, Chile MV, BDEW, Belg C10-C11, EN50438 Generic +Ireland, EN50549-2, CLC-TS50549-2, UK G59/3, EREC G99-1, PEA, ISO-IEC Guide 67 (system 5), NRS 097-2-1, P.O. 12.3, ITC-BT-40, UNE 206006 IN, VDE-AR-N 4110, VDE-AR-N 4120, VDE V 0-126-1-1, VFR 2019, UTE C15-712-1, Taiwan
Accessories	
Assembly accessories	PVS Installation Kit
AC Plate, Single Core Cables	Plate with 5 individual AC cable glands: 4 x M40: Ø 19...28mm, 1 x M25: Ø 10...17mm
AC Plate, Multi Core Cables	Plate with 2 individual AC cable glands: 1 x M63: Ø 37…53mm, 1 x M25: Ø 10...17mm
PVS-100/120 PRE-CHARGE BOARD KIT	Allow the monitoring of the inverter when DC source is not available and night time operation with restart capability [10]
PVS-100/120 GROUNDING KIT [9]	Allow to connect the negative input pole to ground [7]

1. Maximum number of opening 5 under overloading
4. The AC voltage range may vary depending on specific country grid standard
5. Frequency range may vary depending on specific country grid standard
6. In the event of a fault, limited by the external protection envisaged on the AC circuit
7. Only in IT-system (an AC SPD reconfiguration is needed)
8. Hereby, Power-One Italy S.p.A. (A Member of the FIMER Group) declares that the radio equipments (radio module combined with the inverter), to which this user manual refers, are in compliance with the Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following internet address: www.fimer.com
9. When PVS-100/120 GROUNDING KIT is installed, Residual Current Monitoring do not fully operate. Inverter must be installed and operate in "restricted areas (access limited to qualified personnel)" according to IEC 62109-2
10. In case PVS-100/120 PRE-CHARGE BOARD KIT is installed on the inverter, it is important to remark the presence of auxiliary power supply connected to the AC grid. In this case the inverter is supplied either by DC and AC power, so hazardous internal voltages are present even in case the DC switches are open.
11. For connection to the network in Australia and New Zealand. According to AS/NZS 4777.2020 requirements, it is necessary to apply the label and install an external DC Switch on the Standard and S2 inverter models.

Features not specifically mentioned in this data sheet are not included in the product.

3.5.4 Technical data table PVS-120-TL (SX, SX2, SY, SY2 Models)

PVS-120	
Wiring Box version	**SX, SX2, SY, SY2**
Input side	
Absolute maximum input voltage (Vmax,abs)	1000 V
Start-up input voltage (Vstart)	420 V (400…500 V)
Operating input voltage range (Vdcmin...Vdcmax)	360…1000 V
Rated input voltage (Vdcr)	720 V
Rated input power (Pdcr)	123000 W
Number of independent MPPT	6
MPPT voltage range (VMPPTmin ... VMPPTmax) to Pacr	570…850 V (symmetrical load)
Maximum input power for each MPPT (Pmppt,max)	25000 W [695 V≤VMPPT≤850 V]
Maximum input current for each MPPT (Idcmax)	36 A
Maximum short circuit current for each MPPT (Iscmax) (1)	50 A
Maximum return current (AC side vs DC side)	Negligible in normal operating conditions (6)
Number of input pairs for each MPPT	4
Type of input connectors	PV quick fit connector (2)
Type of photovoltaic panels that can be connected at input according to IEC 61730	Class A
Input protection	
Reverse polarity protection	Yes, from current limited source
Input over voltage protection for each MPPT-surge arrester (with monitoring)	Type II (SX, SX2 versions) Type I+II (SY, SY2 versions)
Photovoltaic array isolation control	Yes, according to IEC 62109-2
Residual current monitoring Unit (leakage current protection)	Yes, according to IEC 62109-2
DC switch rating for each MPPT (not available in standard version)	50A - 1000V
Fuse rating	20A / 1000V (3)
Input current monitoring	Single string level (24ch.): SX2, SY2 models MPPT level: SX, SY models
Output side	
AC Grid connection type	Three phase 3W+PE or 4W+PE (TN system)
Rated Output Power (Pacr @cosφ=1)	120000 W
Maximum Output Power (Pacmax @cosφ=1)	120000 W
Rated Apparent Power (Sr)	120000 VA
Maximum apparent Output power (Smax)	120000 VA
Rated grid Voltage (Vacr)	480 V
Grid voltage range	384...576 V (4)
Rated Output Current (Iac,r)	145 A
Maximum output current (Iac,max)	145 A
Output inrush current (peak and duration)	10% of Imax for 5msec.
Rated Output Frequency (fr)	50 Hz / 60 Hz
Output Frequency Range (fmin...fmax)	45...55 Hz / 55…65 Hz (5)
Nominal power factor and adjustable range	> 0.995, 0..1 inductive/capacitive with maximum Smax
Total harmonic distortion of current	<3%
Max DC Current Injection (% of In)	< 0.5%*In
Maximum AC cable	185mm^2 Aluminum and copper
AC connection type	Provided bar for lug connections M10 Single core cable glands 4xM40 and 25 Multi core cable gland M63 as option
Output protection	
Anti-islanding Protection	According to local standard Method: active frequency drift in combination with RoCoF techniques
Maximum external AC overcurrent protection	225 A
Output overvoltage protection - replaceable surge protection device	Type 2 with monitoring
Operating performance	
Maximum Efficiency (ηmax)	98.9%
Weighted Efficiency (EURO)	98.6%
Communication	
Embedded communication interfaces	1x RS485, 2x Ethernet (RJ45), WLAN (IEEE802.11 b/g/n @ 2,4 GHz)
User Interface	4 LEDs, Web User Interface
Communication protocol	Modbus RTU/TCP (Sunspec compliant)
Commissioning tool	Web User Interface, Mobile APP/APP for plant level
Remote monitoring services	Aurora Vision® monitoring portal
Advanced features	Embedded logging, direct telemetry data transferring to FIMER cloud

PVS-120	
Wiring Box version	**SX, SX2, SY, SY2**
Environmental	
Operating ambient temperature range	-25...+60°C/-13...140°F with derating above 40°C/ 104°F
Storage temperature	-40°C...+85°C / -40°F...185°F
Relative Humidity	4…100 % with condensation
Sound pressure level, typical	68dB(A)@ 1m
Maximum operating altitude without derating	2000 m / 6560 ft
Environmental pollution degree classification for external environments	3
Environmental class	Outdoor
Climatic category according to IEC 60721-3-4	4K4H
Physical	
Environmental Protection Rating	IP 66 (IP54 for the cooling section)
Cooling System	Forced air
Dimensions (H x W x D)	869x1086x419 mm / 34.2" x 42.7" x 16.5"
Weight	70kg / 154 lbs for power module ; ~55kg / 121 lbs for wiring box; Overall max 125 kg / 276 lbs
Mounting system	Mounting bracket vertical & horizontal support
Overvoltage rating as per IEC 62109-1	II (DC input) III (AC output)
Safety	
Safety class	I
Insulation Level	Transformerless
Marking	CE [8]
Safety, EMC and Radio Spectrum Standards	IEC/EN 62109-1, IEC/EN 62109-2, EN 61000-6-2, EN 61000-6-4, EN55011:2017
Grid standard (check the availability with your sales channel)	CEI 0-16, IEC 61727, IEC 62116, IEC 60068, IEC 61683, JORDAN IRR-DCC-MV, DRRG/DEWA, Chile MV, BDEW, Belg C10-C11, EN50438 Generic +Ireland, EN50549-2, CLC-TS50549-2, UK G59/3, EREC G99-1, PEA, ISO-IEC Guide 67 (system 5), NRS 097-2-1, P.O. 12.3, ITC-BT-40, UNE 206006 IN, VDE-AR-N 4110, VDE-AR-N 4120, VDE V 0-126-1-1, VFR 2019, UTE C15-712-1, Taiwan
Accessories	
Assembly accessories	PVS Installation Kit
AC Plate, Single Core Cables	Plate with 5 individual AC cable glands: 4 x M40: Ø 19...28mm, 1 x M25: Ø 10...17mm
AC Plate, Multi Core Cables	Plate with 2 individual AC cable glands: 1 x M63: Ø 37…53mm, 1 x M25: Ø 10...17mm
PVS-100/120 PRE-CHARGE BOARD KIT	Allow the monitoring of the inverter when DC source is not available and night time operation with restart capability [10]
PVS-100/120 GROUNDING KIT [9]	Allow to connect the negative input pole to ground [7]

1. Maximum number of opening 5 under overloading
2. Please refer to the document "String inverters – Product manual appendix" available at www.fimer.com for information on the quick-fit connector brand and model used in the inverter
3. Maximum fuse size supported 20A. Additionally two strings input per MPPT supports 30A fuse size for connecting two strings per input.
4. The AC voltage range may vary depending on specific country grid standard
5. Frequency range may vary depending on specific country grid standard
6. In the event of a fault, limited by the external protection envisaged on the AC circuit
7. Only in IT-system (an AC SPD reconfiguration is needed)
8. Hereby, Power-One Italy S.p.A. (A Member of the FIMER Group) declares that the radio equipments (radio module combined with the inverter), to which this user manual refers, are in compliance with the Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following internet address: www.fimer.com
9. When PVS-100/120 GROUNDING KIT is installed, Residual Current Monitoring do not fully operate. Inverter must be installed and operate in "restricted areas (access limited to qualified personnel)" according to IEC 62109-2
10. In case PVS-100/120 PRE-CHARGE BOARD KIT is installed on the inverter, it is important to remark the presence of auxiliary power supply connected to the AC grid. In this case the inverter is supplied either by DC and AC power, so hazardous internal voltages are present even in case the DC switches are open.

Features not specifically mentioned in this data sheet are not included in the product.

3.5.5 Specific information for the Australian market

The intended use for inverters PVS-100/120-TL “B2 version” for Australian market is for commercial or industrial application

3.5.5.1 DCV class of each port

Port	DVC (Decisive Voltage Class)
DC	C
AC	C
RS485	A
Ethernet	A
Alarm output	C (1)
Antenna	A

1. Configurable relay N.O. or N.C., see specific section.

3.5.5.2 DC Switch (isolator) technical data

The technical data of the embedded DC switch are related to the following inverter model equipped with DC switch:
PVS-100/120-TL;B2;SX
PVS-100/120-TL;B2;SX2
PVS-100/120-TL;B2;SY
PVS-100/120-TL;B2;SY2

Isolating switching device	DVC (Decisive Voltage Class)
Rated insulation voltage	1500V
Rated impulse withstand voltage	8000V
Suitability for isolation	1000V
Rated operational current	25A
Utilization category and/or PV utilization category	DC-PV2
Rated short-time withstand current (Icw) (1)	700A, 1s
Rated short-circuit making capacity (Icm) (1)	1400A
Rated breaking capacity	100A

1. The definitions for Icw and Icm are the same as used in AS 60947.3.

3.5.6 Tightening torques

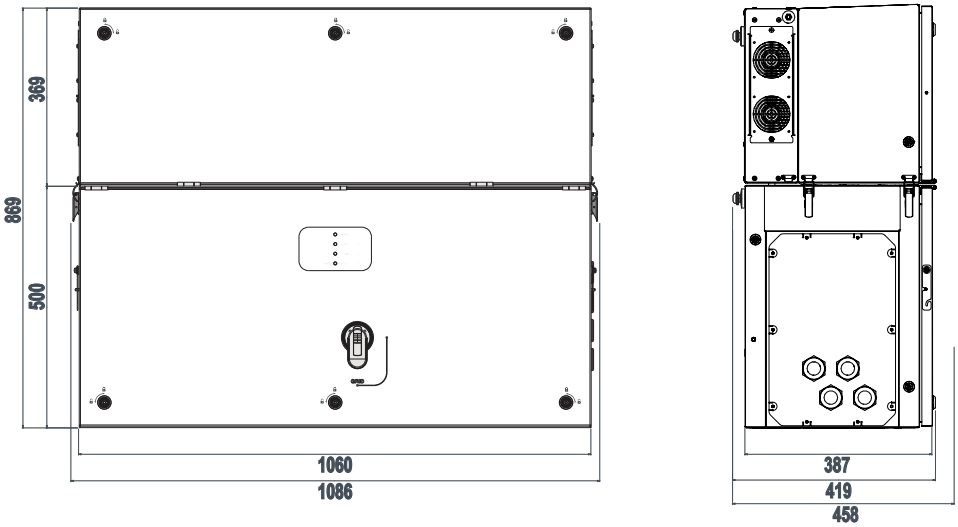
Component	Nm
Single core AC cable gland **(62)** M40	8 Nm
Multi core AC cable gland **(63)** M63	100 Nm
PE cable gland **(23)** M25	7.5 Nm
Signal cable gland **(12)** M25	7.5 Nm
AC connection busbar **(21)** M10 bolts	25 Nm
DC input connection busbar **(17)** M10 bolts	25 Nm
Parallel MPPT connection points **(31)**	8 Nm
Protective earth point (int.) **(25)** M10 nut	21 Nm
Protective earth point (ext.) **(10)** M8 bolt	15.2 Nm
Junction screws **(32)**	10 Nm
Side bracket screws **(29)**	5 Nm
R, S, T cables nuts on to the AC interconnection board **(58)**	8 Nm
PE interconnection point M5 nut **(64)**	4 Nm
DC protective shield M5 screws **(60)**	3 Nm
AC protective shield M5 screw **(27)**	3 Nm
Signals connector counterparts **(33)** **(37)** **(38)**	0.25 Nm

3.5.7 Cable gland clamping range

Component	mm
Single core AC cable gland **(62)** M40	19...28 mm
Multi core AC cable gland **(63)** M63	37...53 mm
DC input cable glands **(18)** M40	19...28 mm
PE cable gland **(23)** M25	10...17 mm
Signal cable glands **(12)** M25	10...17 mm

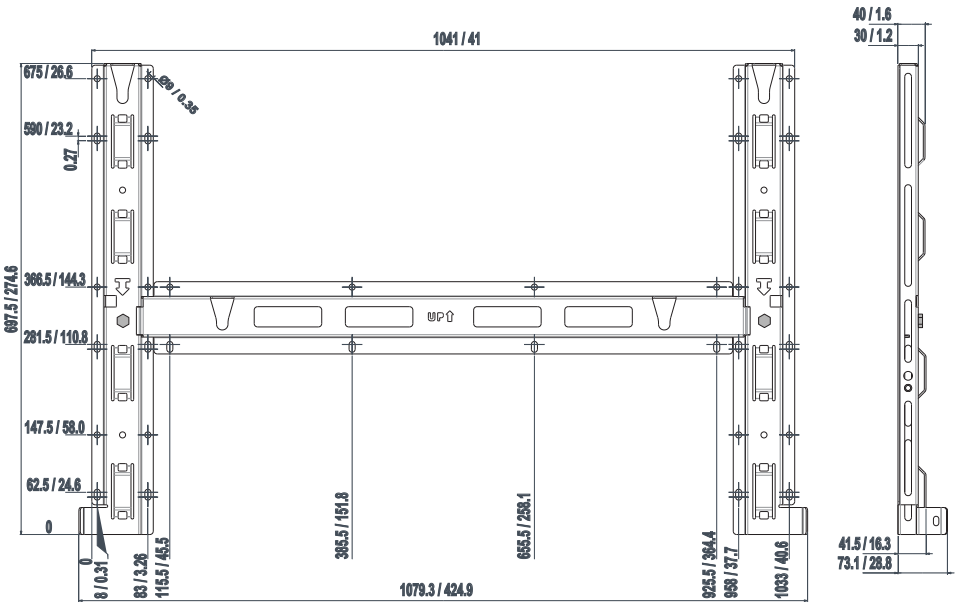
3.5.8 Overall dimensions of the inverter

The overall dimensions, not including the mounting bracket **(03)**, are expressed in millimeters.



3.5.9 Overall dimensions of the mounting bracket

The dimensions of the wall mounting bracket **(03)** are expressed in millimeters and inches.

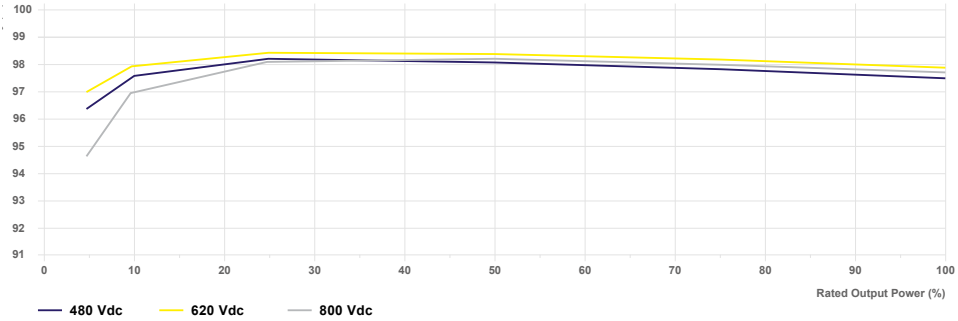


3.6 Efficiency curves

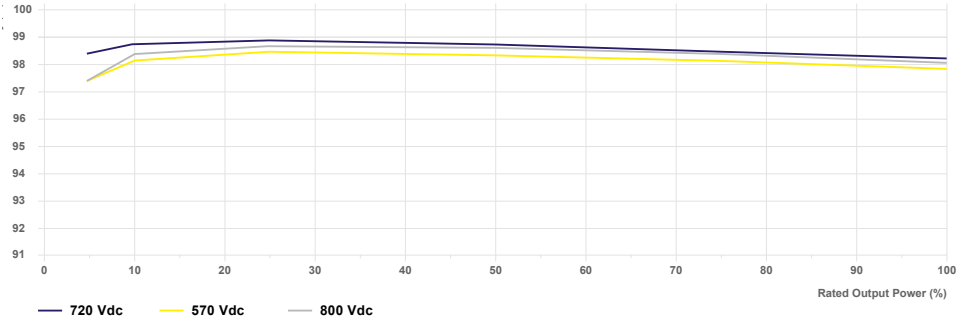
Graphs of the efficiency curves of all inverter models described in this manual are shown below.

NOTE – The efficiency curves are linked to technical parameters that are continually being developed and improved and should therefore be considered approximate.

PVS-100-TL



PVS-120-TL



3.7 Power derating

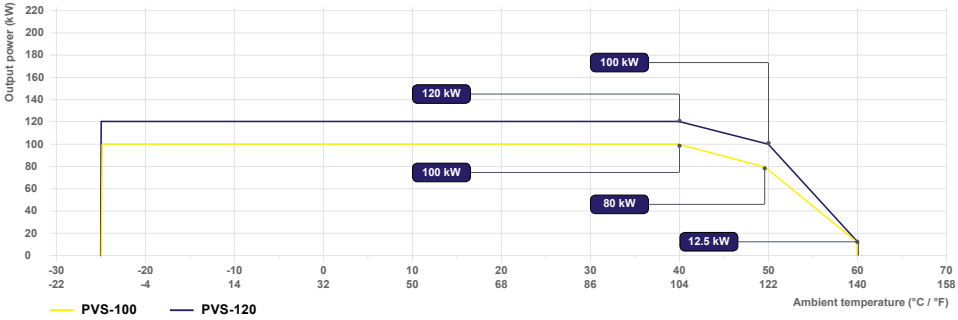
In order to allow inverter operation in safe thermal and electrical conditions, the unit automatically reduces the value of the power fed into the grid.

Power derating may occur due to:
- Adverse environmental conditions (thermal derating)
- Percentage of output power (value set by the user)
- Grid voltage over frequency (mode set by user)
- Grid overvoltage U>10min Der. (enabling carried out by user)
- Anti-islanding
- Grid under voltage
- Input voltage values too high.
- High input current values.

3.7.1 Power derating due to environmental conditions

The power reduction value and the inverter temperature at which it occurs depend on the ambient temperature and on many operating parameters. Example: input voltage, grid voltage and power available from the photovoltaic field.

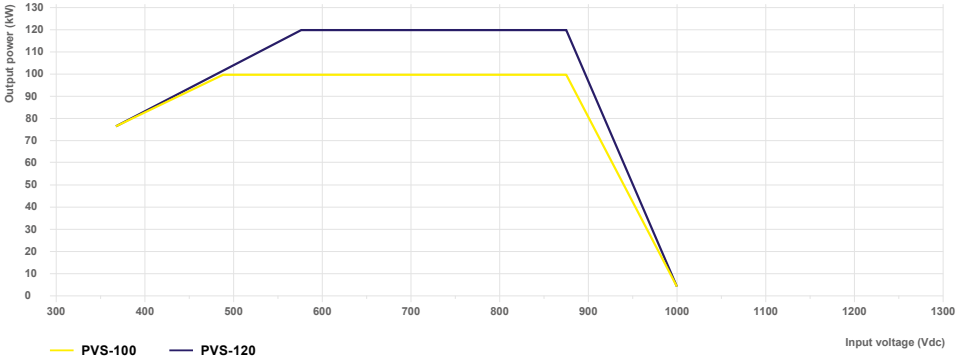
The inverter can therefore reduce the power during certain periods of the day according to the value of these parameters. The graph shown below the power reduction in relation to the ambient temperature at the nominal input voltage.



3.7.2 Power derating due to the input voltage

The power reduction occurred for too high or too low DC input voltage values is adjusted automatically.

NOTE – Power reduction behaviour is guaranteed only in case of balanced input channels.



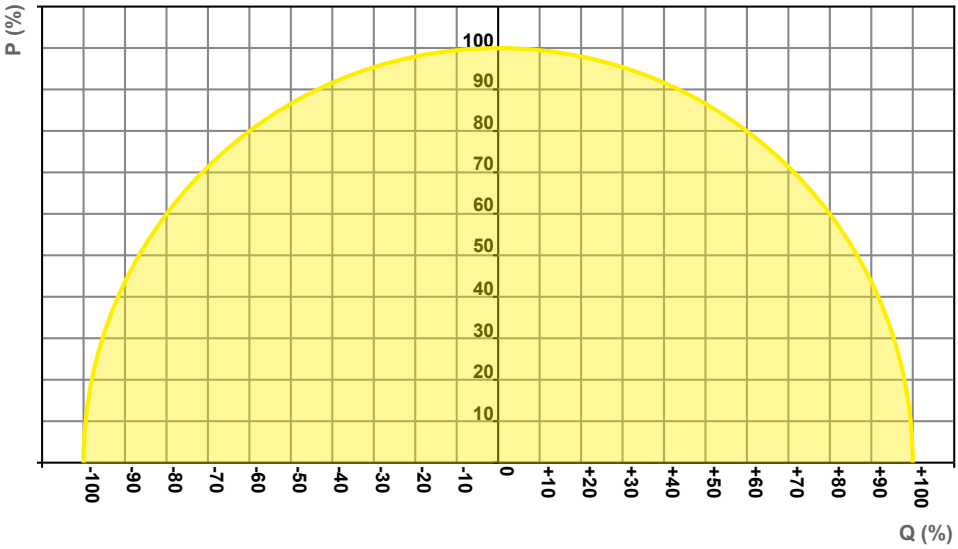
3.7.3 P-Q Capability

⚠ **ATTENTION –** P-Q capability may be reduced to match the specific grid code requirements applicable in your country.

The following represents the maximum P-Q capability of the unit under the specified operating conditions.

Component	Nm	
Ambient temperature	*40 °C	*40 °C
Rated output voltage (Un)	400 Vac	480 Vac
Nominal Active Power (Pn)	100 kW	120 kW
Nominal Apparent Power (Sn)	100 kVA	120 kVA
Nominal Reactive Power (Qn)	100 kVAR	120 kVAR
Cosphi @ Smax	-0 ... 1 ... 0+	-0 ... 1 ... 0+
Capability with grid voltage	1.0 x Un	1.0 x Un

(*): Thermal derating could be occured if input voltage is over 800V.

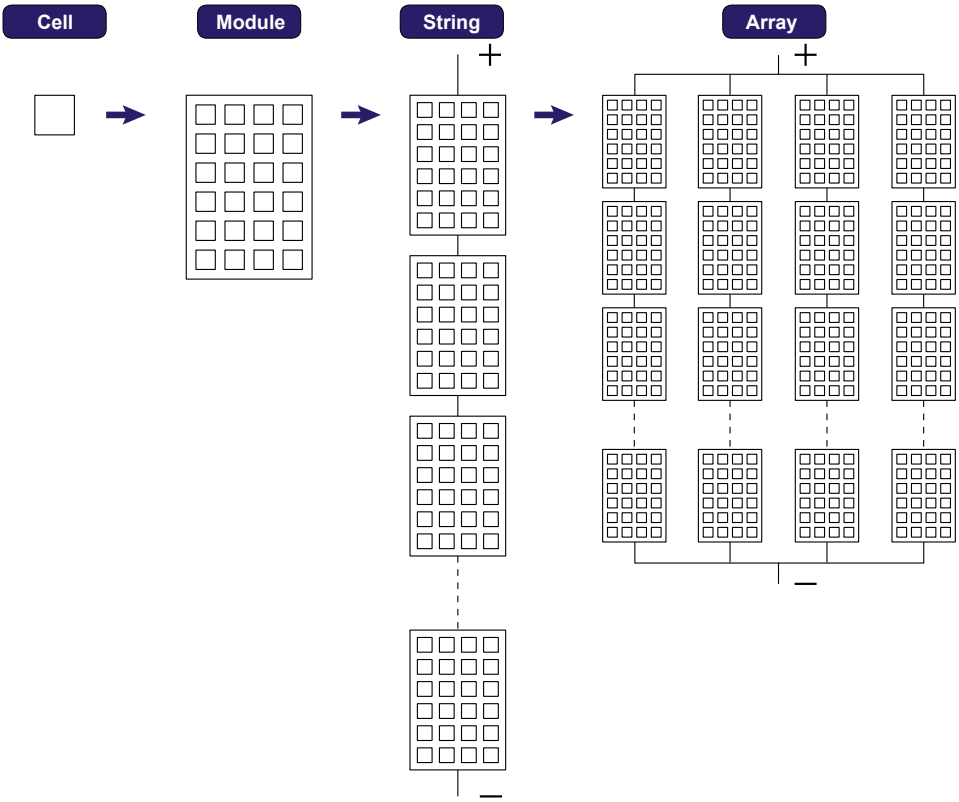


3.8 Characteristics of a photovoltaic generator

A PV generator consists of an assembly of photovoltaic modules that transform solar radiation into DC electrical energy and can be made up of:
- Strings: number (X) of PV modules connected in series
- Array: group of X strings connected in parallel.

The string technology was developed to significantly reduce the installation costs of a photovoltaic system that are mainly associated to wiring on the DC side of the inverter and subsequent distribution on the AC side.
A photovoltaic panel consists of many photovoltaic cells mounted on the same support.
A string consists of a certain number of panels connected in series;
An array consists of two or more strings connected in parallel.
Large photovoltaic systems can include multiple arrays connected to one or more inverters.

NOTE – The greater the number of panels in each string, the lower the cost and the less complex the wiring connections of the system.



ATTENTION – The current of each array must fall within the rating value limits of the inverter (see **"Technical data"**).

ATTENTION – The inverters referred to in this document are TRANSFORMERLESS. This type requires the use of insulated photovoltaic panels (IEC61730 Class A Rating) and the need to keep the photovoltaic generator floating with respect to ground: no terminal of the generator must be connected to ground, unless there are accessories installed that enable earthing of the inputs. In this case you must install an insulating transformer on the AC side of the system.

3.9 Description of the equipment

This equipment is a string inverter which converts the direct current of a photovoltaic generator into alternating current and feeds it into the public distribution grid.

Photovoltaic panels convert solar radiation into “DC” direct current electrical energy (via a photovoltaic field, also called PV generator); in order to be used from final user, it is transformed into “AC” alternate current. This conversion, known as inversion from DC to AC, is done in an efficient way by the Fimer inverters, without using any rotary elements, rather only via static electronic systems.

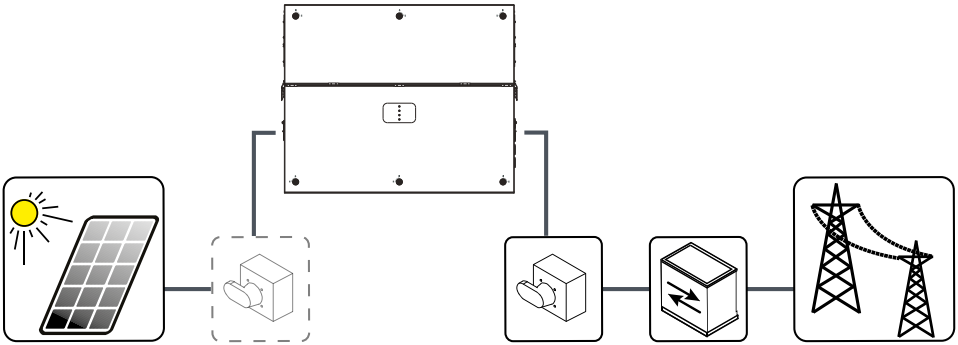
In order to allow inverter operation in safe thermal and electrical conditions, the unit automatically reduces the value of the power fed into the grid under adverse environmental conditions or unsuitable input voltage values.

When connected in parallel with the grid, the alternating current from the inverter flows directly into the domestic or industrial distribution circuit, which is in turn connected to the public distribution grid.
In this way the solar energy system compensates the energy drawn from the utilities connected to the grid to which the inverter is linked.

When the photovoltaic system is not generating enough energy to ensure proper operation of connected loads, the remaining required power is taken from the public distribution grid. While if too much energy is produced, it is directly fed into the grid, thus becoming available to other users.

According to national and local standards and regulations, the produced energy can be sold to the local grid owner or credited to the user against future consumption, thus granting a great saving of money.

3.9.1 Operating diagram (example)



3.9.2 Mutual connection of multiple inverters

If the photovoltaic system exceeds the capacity of a single inverter, it is possible to connect multiple inverters to the system, each of them in turn connected on the DC side to a separate section of the photovoltaic generator, and on the AC side to the distribution grid.
Each inverter will work independently of the others and its own photovoltaic module will supply the maximum power available to the grid.

3.9.3 Notes on the system sizing

Decisions on how to structure a photovoltaic system depend on a series of factors and considerations, such as type of panels, space availability, future location of the system, energy production goals over the long term, etc.

NOTE – A configuration program that can help to correctly size the photovoltaic system is available on the Fimer website (http://stringsizer.fimer.com).

NOTE – When configuring DC input and during the installation it’s needed to follow one basic rule to avoid possible output power derating: All MPPTs shall be populated connecting at least TWO string per each and configuration needs to be as much possible homogenous . Considering to connect 20 strings, proceed connecting same number of strings per MPPT and then connect the remaining strings in the selected MPPTs (4 MPPTs with 3 strings + 2 MPPT with 4 stings).

3.10 Functionality and components description

3.10.1 Highlights

- 6 independent MPPT for SX, SX2, SY, SY2 models; 2 independent MPPT (parallelable) for Standard and S2 models
- Two box configuration, separate power module and wiring box
- Transformerless inverter
- Maximum efficiency up to 98.9%.
- Double stage topology for a wide input range
- Large set of specific grid codes available which can be selected directly in the field
- Both vertical and horizontal installation
- 2 available sizes, 100 and 120 kW with 400 and 480 Vac of output voltage, respectively
- Wireless access to integrated Web User Interfaces
- Fimer Installer for Solar Inverters APP for commissioning of inverters
- Ethernet daisy chain enabled (supports both ethernet star/ring topology)
- One RS485 line acting as master or slave
- Modbus TPC/RTU Sunspec compliant
- Support to Fimer accessories directly connected to the inverter via RS485
- Remote monitoring and firmware update via Aurora Vision® (logger free)

3.10.2 Improved commissioning and maintenance

Fimer Installer for Solar Inverters APP
Improved multi inverter installation with Fimer Installer for Solar Inverters APP by using Android mobile devices (the app for iOS mobile devices will be implemented soon).

Integrated Web User Interface
The inverter is equipped with an ethernet and wireless (IEEE802.11 b/g/n) board and with an Integrated Web User Interface that allow a full access to all main configuration and parameters of the inverter. It can be accessed from any ethernet or wireless capable device like laptop, tablet or smartphone via a common internet browser.

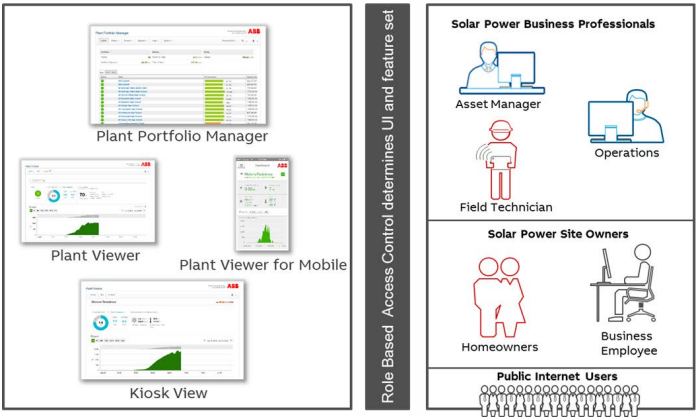
Remote firmware update function
The inverter firmware can be updated remotely using the Integrated Web User Interface dedicated section (**"SERVICE TOOLS menu"**) or via Aurora Vision® or via Fimer Installer for Solar Inverters APP.

3.10.3 Aurora Vision Plant Management Platform

Integrated logging capability allows remote monitoring of the plant without the needs of any additional external loggers.
Aurora Vision is a cloud based platform enabling remote monitoring and asset management of Fimer devices in range of solar power application.
Aurora Vision consists of different products:

- **Plant Portfolio Manager** is a full featured web based application used by solar power professionals to monitor and manage a portfolio of solar power plants using Fimer inverters.
- **Plant Viewer** is an easy to use web based serviced application used by non-solar power professionals (such as homeowners or small business owners) to monitor solar power plants they own.
- **Plant Viewer for Mobile** is the mobile version of Plant Viewer enabling non-solar power professionals to remotely monitor their own PV plants by using smart phones, tablets and iPod Touch with IOS and Android operating systems.
- **Fimer Energy Viewer** is an easy to use mobile application allowing solar plant owners to remotely monitor all the energy flows and the performance of their own solar power plants, with and without an energy storage system installed.

All products previously mentioned work together to allow solar power professional and site owners to collaboratively manage solar power plants.



NOTE – Please contact the Fimer tecnichal support for getting your own Plant Portfolio Manager account (mainly for installers and plant administrators). Please get your Plant Viewer, Plant Viewer for Mobile or Energy Viewer by accessing the website www.auroravision.net and click on "Register with Plant Viewer" button (mainly for site owners).

3.10.4 Configurable relays

This inverter is equipped with two configurable relays **(33)**, which can be used in different operating configurations that can be set through the integrated web user interface. A typical example of application is closing the contact when an alarm is triggered.

3.10.5 Remote switch-on/switch-off

This command can be used to switch off/switch on the inverter via an external (remote) command by means the Remote ON/OFF terminal block **(37)**.
This functionality must be enabled in the integrated web user interface.
When the functionality is active the switching on of the inverter, besides being dictated by the presence of normal parameters which allow the inverter to be connected to the grid, also depends on the external control for switching on/off.

3.10.6 Reactive power feed into the grid

This inverter is able to produce reactive power and can feed this power into the grid via the power factor setting.
Power feeding modes may vary according to the country of installation and the local grid companies.

3.10.7 Limiting the active power fed into the grid

This inverter is able to limit the amount of active power fed into the grid to a desired and adjustable value.

3.10.8 Overvoltage surge arrester monitoring

The inverter monitors the status of the overvoltage surge arresters **(19) (22) (53)** and generates a warning in the event of a fault (viewable via monitoring system, web user interface or Fimer Installer for Solar Inverters APP).

3.10.9 Data transmission and control

Embedded multi communication interfaces (WLAN, Ethernet, RS485) combined with a Sunspec compliant Modbus protocol (RTU/TCP) allow the inverter to be easily integrated with any third party monitoring and control systems that support the same Sunspec standard.

NOTE – The Modbus RTU/TCP register map is the same for all communication interfaces (Ethernet, RS-485 and Wireless communication) of the inverter.

NOTE – Please contact the Fimer technical support or get access to Sunspec alliance website for further information on Modbus Sunspec products.

3.10.10 PVS-100/120 GROUNDING KIT

Grounding of the negative input pole is provided as an additional function only for dedicated inverter models. Alternatively it can be added to other inverter models as an additional kit (PVS-100/120 GROUNDING KIT).
The grounding kit allows to connect the negative input pole of the PV array to ground (where is required by technical data of the PV modules).
To enable the GROUNDING KIT entering in the Web UI using the Admin plus privileges (see **"Connection to Web User Interface"**).
Enter the Menu "Setting/Additional Function" and:
- Set as ENABLED the Grounding Kit (if is installed as an accessory on the field) with the proper selector.
- Set the "Max Vneg-gnd for Grounding Kit" (range: 0...250V); recommended value: 200V.

This parameter identifies the threshold voltage between negative pole and ground, which triggers the inverter disconnection for Ground fault (E037).

WARNING – If this accessory is installed this inverter must be installed and operated in restricted areas (restricted area: Room or location for electrical equipment to which access is restricted to skilled or instructed persons by the opening of a door or the removal of a barrier by the use of a key or tool and which is clearly marked by appropriate warning signs). Access is limited to qualified personnel (qualified personnel: A person having appropriate technical training and experience necessary to be aware of hazards to which that person may be exposed in performing a task and of measures to minimize the risks to that person or other persons).

3.10.11 PVS-100/120 PRE-CHARGE BOARD KIT

Pre-charge board functionality is provided as an additional function only for dedicated inverter models. Alternatively it can be added to other inverter models as an additional kit (PVS-100/120 PRE-CHARGE BOARD KIT).
Pre-charge board allows to recharge PVS-100/120-TL (B2 version) internal bulk capacitors from AC grid side: so doing,inverter is able to connect to the grid even during night-time when no DC voltage is available from PV panels side. The main advantage related to this feature is the possibility to realize night reactive power production when it is desired, i.e. night-reactive power on-demand. Most common examples of nightreactive power on-demand are:
- Night-time reactive power demand after inverter disconnection;
- Recovery from AC grid disconnection during night-reactive power;
- Round scheme night-reactive power.

Inverters with pre-charge board are also able to satisfy immediately to request of night reactive power thatarrives during the night with the ac grid interface contactors opened, since this board provides the capability to restore the grid connection.
Pre-charge board can also provide the possibility to restablish normal operation when a grid fault provokes disconnection of the inverter. For example, during night time, when inverter is in night reactive power mode, if AC voltage dip occurs, inverter disconnects from the grid. For inverter with precharge board installed, night reactive power can be restablished also after grid dips.

⚠ **WARNING –** Risk of electric shock. Hazardous DC voltages are supplied to the photovoltaic array during the night.

By external commands or by dedicated Web User Interface (UI), night-time reactive (Q -fix Mode or Volt/Var Mode) power can be enabled or disabled and night-reactive power mode and set-point can be modified.
Thanks to smart microcontroller supervision, when night comes, i.e. input voltage falls below disconnection threshold, inverter enters automatically night mode seamlessly: thus ac disconnection doesn't occur in this case and inverter passes immediately from day to night operation.
To enable the pre-charge board functionality entering in the Web UI using the Admin plus privileges.

3.11 Communication interfaces

The integrated ethernet and wireless board allows the local or remote connection to the inverter.
The inverter provide the following integrated communication interfaces:

- **Wireless channel (IEEE 802.11 b/g/n@2.4GHz)**
  The use of wireless channel is recommended to access to the integrated Web User Interface by using any WLAN standard device (PC, tablet. smartphone) for commissioning and setting parameters. Additionally a second radio channel is available and can be used for connection to a wireless router.
- **2x Ethernet ports (39) (40) (10/100BaseTx - RJ45 plugs)**
  The ports are configured by default for enabling daisy chain connection of the inverters over the Ethernet bus. In order to improve the reliability of the communication with the inverters it is also allowed to create ring shape layout by using this Ethernet bus.
- **1x RS485 ports (38) (terminal block)**
  The port enables daisy chain connection of the inverters over the serial line (slave mode). The port can either be used for connecting supported accessories (like weather station, meter...): in this case data from accessories will be logged and transferred to the cloud by inverter itself (master mode).

3.11.1 Ethernet bus connection

By default the two Ethernet ports **(39) (40)** of the inverters are already configured for enabling communication over daisy chain layout.
Once the inverter is physically connected does not need specific settings: after the first turning on, the inverter automatically got all needed network parameters with or without the presence of a DHCP server.
If an internet connection is available on site, the inverters will be automatically configured to transmit telemetry data to Aurora Vision Cloud without the need of installing any additional device (logging capability are already integrated into the inverter by default).

NOTE – Aurora Vision Plant Management platform is the Fimer cloud solution allowing customer to remotely monitor and manage its own solar plants. Please refer to www.fimer.com or contact Fimer technical support for further information on how getting an Aurora Vision account.

With the inverters connected over Ethernet daisy chain and with an available internet connection it will be always possible, via Aurora Vision Cloud, to upgrade remotely the firmware of the inverters.

NOTE – Please refer to **"Connection of the communication and control signals"** paragraph for further information about the installation.

3.12 Topographic diagram of the equipment

The diagram summarises the internal structure of the inverter.

The internal circuitry is with double stage conversion and therefore consists of:
- DC/DC input converter (booster)
- DC/AC output inverter

The DC-DC converter and the DC-AC inverter both work at a high switching frequency and are therefore small and relatively light related to output power.
The input converter is dedicated to multiple PV arrays with a maximum power point tracking (MPPT) function in order to maximize the energy harvesting from the photovoltaic generator.

This inverter version is without insulation transformer, that it means that it do not have a galvanic insulation between the input and the output. This allows ultimately an increase in conversion efficiency. The inverter is already equipped with all the protections required for safe operation and to be in compliance with the norms, even without the insulation transformer.

The operation and the protection management of the inverter is controlled by two independent DSPs (Digital Signal Processors) and a central microprocessor.

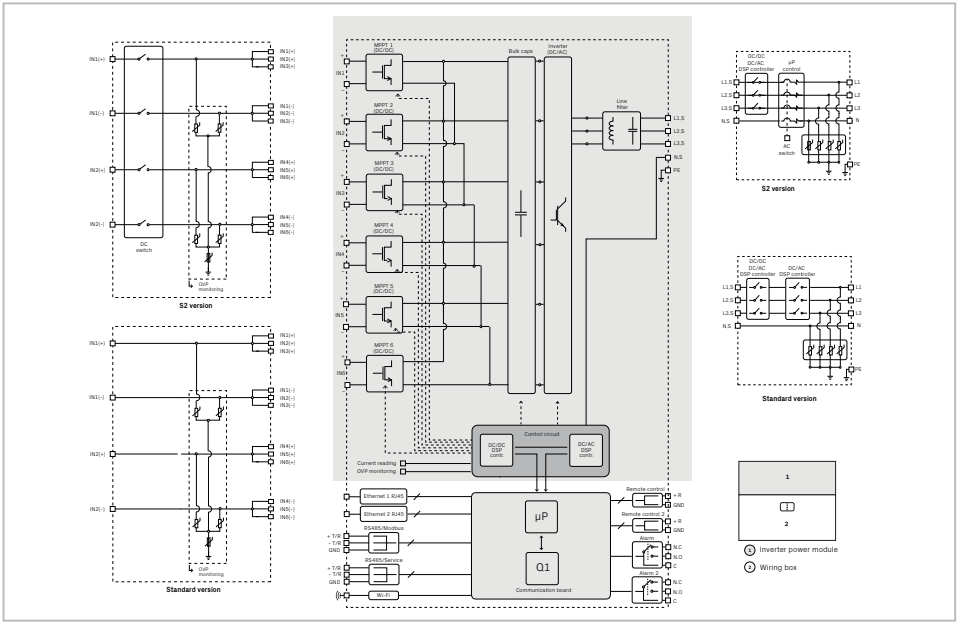
A dedicate microprocessor is used for user communication interfaces.

The connection to the distribution grid is thus kept under control by two independent DSPs, in full compliance with the electric field norms both for power supply to the systems as well as security.

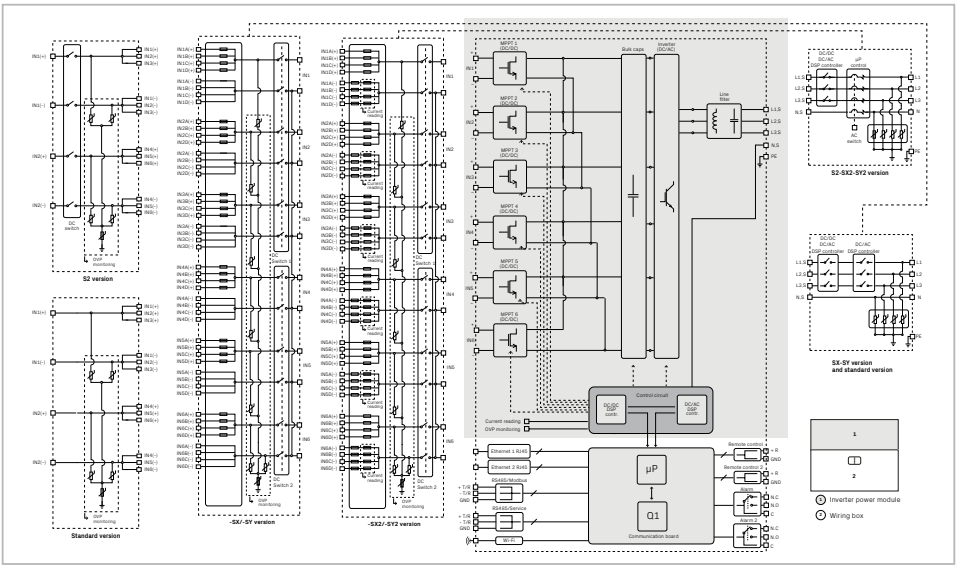
The operating system carries out the task of communicate with its components in order to carry out data analysis.

In doing all this, it's guaranteed the optimal operation of the whole assembly and a high performance in all irradiation conditions and it is always ensured a full compliance with the relevant directives, standards and regulations.

3.12.1 PVS-100/120-TL B2 version Standard and S2 models



3.12.2 PVS-100/120-TL B2 version SX, SX2, SY, SY2 models



3.13 Safety devices

3.13.1 Anti-Islanding

In the event of a local grid outage by the electricity company, or when the equipment is switched off for maintenance operations, the inverter must be physically disconnected to ensure the protection of the people working on the grid, in accordance with the relevant national laws and regulations. To prevent possible islanding, the inverter is equipped with an automatic safety disconnection system called “Anti-Islanding”.

NOTE – The method used to ensure an active anti-islanding protection is: active frequency drift in combination with RoCoF techniques.

NOTE – Anti-islanding protection mechanisms are different depending on the grid standards, even if they all have the same purpose.

3.13.2 Ground fault of the photovoltaic panels

ATTENTION – Use this inverter with panels connected in “floating” mode, i.e. with no earth connections on the positive and negative terminals.

An advanced ground fault protection circuit continuously monitors the ground connection and disconnects the inverter when a ground fault indicating the fault condition by means of the red “GFI” LED on the LEDs panel **(08)** on the front side of wiring box.

3.13.3 Overvoltage surge arresters

As an additional protection to prevent damage caused by the discharges from lightning and electrostatic induction phenomena, this inverter is equipped with DC over-voltage surge arresters **(19) (53)** and with AC over-voltage surge arresters **(22)**.

3.13.4 String Fuses

String fuses are available inside the wiring box (in the -SX, -SY wiring box version only on positive input side **(19)**; in the -SX2, -SY2 wiring box version on both positive **(19)** and negative **(20)** input side) and protect the appliance from currents exceeding the limit value independently for each string.

NOTE – The sizing of the fuses must therefore be carefully assessed during installation. Refer to the **“Sizing of fuses”** paragraph of this manual to know how to chose the proper size of fuses.

WARNING – Standard and S2 version of the Wiring Box doesn’t assemble fuses inside, and therefore fuses should be accordingly installed in the external string combiner box.

3.13.5 Other safeguards

This inverter is equipped with additional protective devices to ensure safe operation in any circumstance. These protections include:
Constant monitoring of the grid voltage to ensure that voltage and frequency values remain within operating limits;
Internal temperature control to automatically limit the power (if necessary) to prevent overheating of the unit (derating).

NOTE – The numerous control systems determine a redundant structure to ensure absolutely safe operations.

4. Lifting and transport

4.1 Transport and handling

Transport of the equipment, especially by road, must be carried out with means for protecting the components (in particular, the electronic components) from violent shocks, humidity, vibration, etc.
During handling, do not make any sudden or fast movements that could create dangerous swinging.

4.2 Equipment weight

Device	Weight (kg/lb)	Lifting points	Holes for handles (optional) or Eyebolts UNI2947 (not supplied)
Power module **(01)**	70 kg / 154 lbs	4	M8. Kit of handles **(04)** (to be ordered)
Wiring box **(02)**	~55 kg / 121 lbs	4	M8. Kit of handles **(04)** (to be ordered)

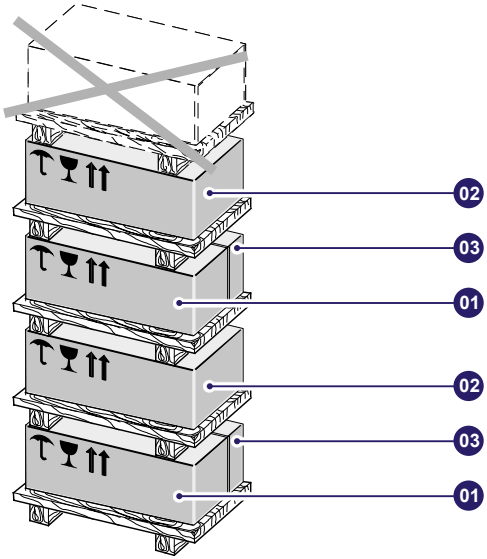
4.3 Storage

⚠ **ATTENTION –** DO NOT store the equipment (also valid for spare parts units) in a location exposed to severe weather conditions (e.g. rain, snow or a high level of humidity). Always comply with storage temperature indicated in **"Technical data"** paragraph in this manual.

If the package with the power module part is stored correctly, it can withstand a maximum load of 2 stacked units (power module+wiring box+bracket).

⚠ **ATTENTION –** DO NOT stack the package with equipment or products other than those indicated.

⚠ **ATTENTION –** Accessory components that are in separate packages can be piled separately.



4.3.1 Unpacking and checking

⚠ **ATTENTION –** Packaging elements (cardboard, cellophane, staples, adhesive tape, straps, etc.) may cause cuts and/or injuries if not handled with care. They should be removed with the proper equipment.

NOTE – The components of the packaging must be disposed on in accordance with the regulations in force in the country of installation.

When you open an equipment package, check that the equipment is undamaged and make sure all the components are present.

NOTE – If any defects or damage are found, stop unpacking and consult the carrier, and also promptly inform Fimer customer support.

4.3.2 Lifting

LIFTING – Risk of injury due to the heavy weight of the equipment!

Fimer usually stores and protects individual components by suitable means to make their transport and subsequent handling easier. Nonetheless, as a rule, it is necessary to turn to the experience of specialised staff to take charge of loading and unloading components. The power module **(01)** and the wiring box **(02)** must be lifted using the 4 handles **(04)** (to be ordered separately) or alternatively using suitable lifting equipment.

⚠ **ATTENTION –** The ropes and equipment used for lifting must be suitable for bearing the weight of the equipment.

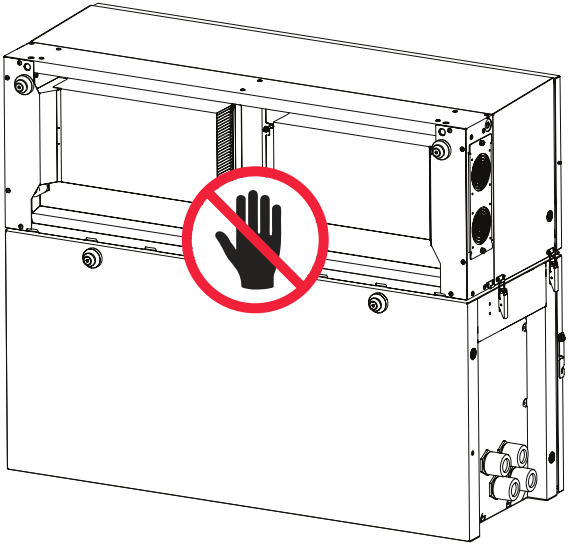
⚠ **ATTENTION –** In case of manual lifting the number of required operators necessary to lift the equipment must be in accordance to local regulations relating lifting limits per operator.

⚠ **ATTENTION –** Do not lift several units or parts of the equipment at the same time, unless otherwise indicated.

The handles **(04)** have to be mounted into the designated M8 threaded holes located on the enclosures.
If lifting with ropes, M8 eyebolts can be mounted in the same holes.

⚠ **ATTENTION –** Handling and installation operations shall be performed only by using the special tools and accessories provided with "PVS Installation Kit" that have to be ordered separately. The use of these equipment are mandatory to safely install the inverter. Refer to **"Kit of recommended spare parts"** paragraph for further information.

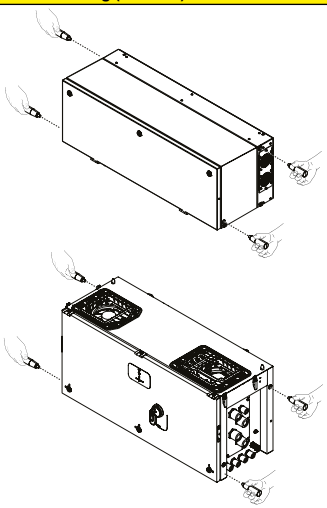
⚠ **ATTENTION –** DO NOT grab the equipment from the rear flange! Risk of injury due to cutting surfaces and risk of equipment damage. Always use proper lifting equipment!



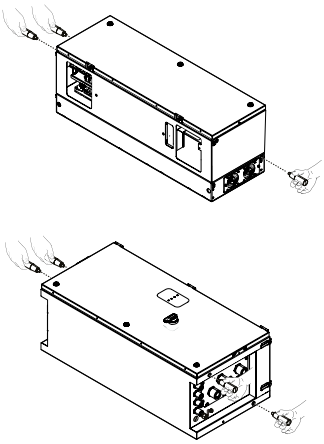
It is required to use one of the following lifting methods to move the equipment during installation or maintenance phases:

⚠ **ATTENTION –** Always consider the center of gravity of the enclosures while lifting.
⚠ **ATTENTION –** Always completely tight the thread of the handles or eye-bolt before lifting.

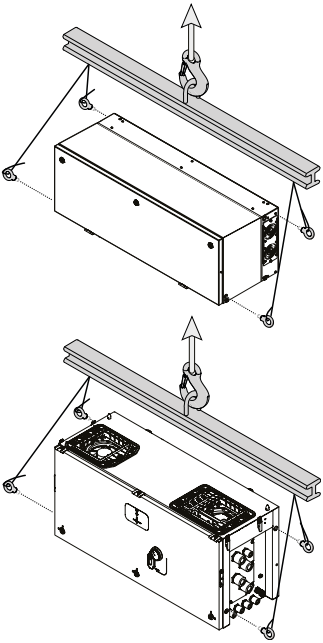
Vertical lifting (handles)



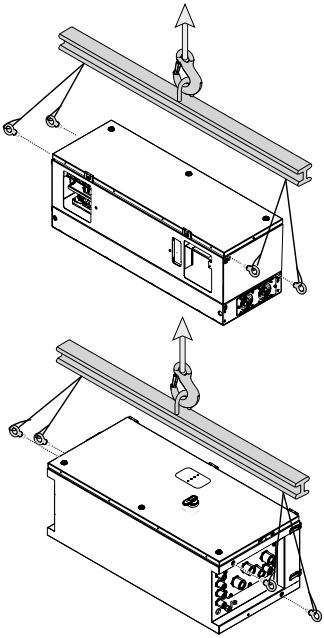
Horizontal lifting (handles)



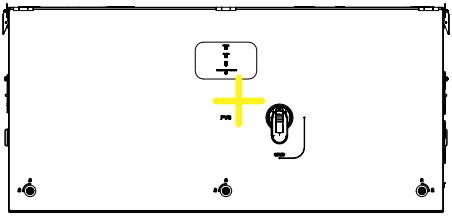
Vertical lifting (eyebolts and lifting balancer)

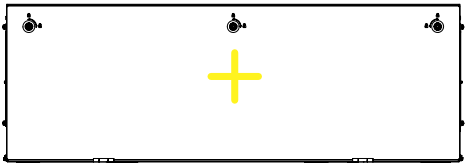


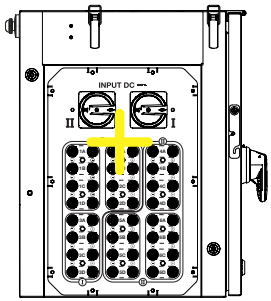
Horizontal lifting (eyebolts and lifting balancer)

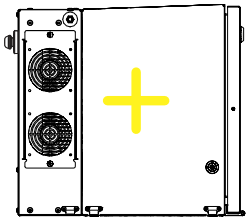


Center of gravity (wiring box)	Center of gravity (power module)

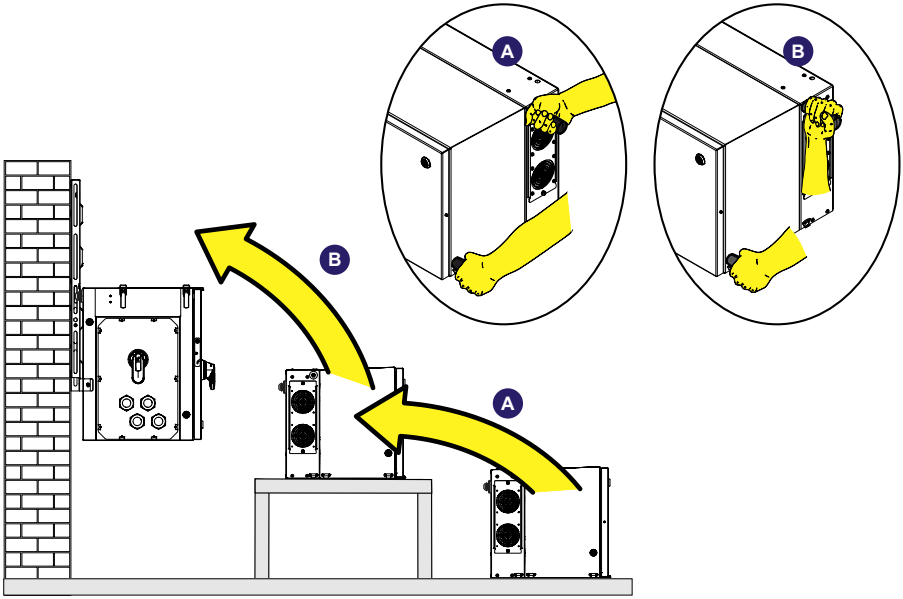






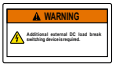


⚠ **ATTENTION –** In case of manual lifting it's suggested to use a support plan (e.g. a table) to place the equipment during the lifiting operation, in order to allow the change of hands position.

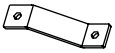


4.4 List of supplied components

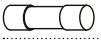
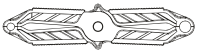
The table below shown the available component in the wiring box **(02)** package (common for all models):

Component		Quantity
	ALARM and AUX relay **(33)** and RS485 **(38)** connectors (pre-installed on communication and control board **(28)**)	4
	Remote ON/OFF **(37)** connector (pre-installed on communication and control board **(28)**)	1
	Two-hole gasket (6mm Ø) for PG21 signal cable glands **(12)** and cap	2 + 2
	M8x16 hex bolt + M8 serrated lock washers to clamp the earth cable on the protective earth point (ext.) **(10)**	1 + 2
	M10 hex nut + M10 serrated lock washers to clamp the earth cable on the protective earth point (int.) **(25)**	1 + 2
	Key tool for front cover quarter cam-lock **(05)**	1
	South africa network standard label	1
	Australia and New Zealand network standard label	1
	Technical documentation	1

The table below shown the available components for wiring box **(02)** Standard and -S2 version only:

Component		Quantity
	MPPT input parallel bar	1
	M6 screws with washer to clamp the MPPT input parallel bars	2

The table below shown the available components for wiring box **(02)** -SX, -SY, -SX2 and SY2 version only:

Component		Quantity
	Positive string fuses (gPV - 1000Vdc - 20A)	24
	Fuse puller (secure touch)	Optional (FIMER code XTC.00043)

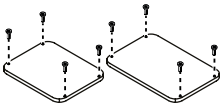
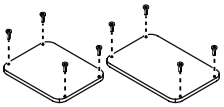
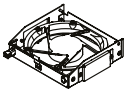
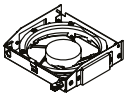
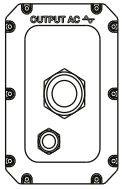
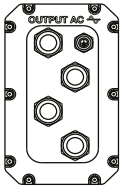
The table below shown the available component in the power module **(01)** package:

Component		Quantity
	M6x20 junction screws **(32)** between wiring box and power module	2
	M6 self-locking nut to clamp internal AC cables on AC interconnection board **(58)**	3
	M5 hex nut + M5 serrated lock washers to clamp the internal earth cable on PE interconnection point **(64)**	1 + 2

The table below shown the available component in the bracket **(03)** package:

Component		Quantity
	M8 bolts with washers for mechanically securing the half-brackets	2
	M6 screws for mechanically securing the wiring box to the bracket	2

4.5 Kit of recommended spare parts

Code	Description		Quantity
PVS INSTALLATION KIT	Kit of M8 handles **(04)**		4
	Key tool for front cover quarter cam-lock **(05)**		1
	IP66 protection covers with screws for wiring box AC and DC openings (for temporary installation of wiring box only)		1+1 (with 8 screws)
EYEBOLTS KIT	Eyebolts for lifting		4
PVS IP66 COVERS KIT	IP66 protection covers with screws for wiring box AC and DC openings (for temporary installation of wiring box only)		1+1 (with 8 screws)
KIT SURGE AC SIDE	Kit of spare cartridges for AC SPD type 2 **(22)** (Mersen P/N: 83020155 / SP2-40K320V)		4
KIT 24 FUSES 15A	Kit of 15A fuses (gPV - 1000Vdc according to the standard EN 60269-6)		24
KIT 24 FUSES 20A	Kit of 20A fuses (gPV - 1000Vdc according to the standard EN 60269-6)		24
KIT 24 FUSES 30A	Kit of 30A fuses (gPV - 1000Vdc according to the standard EN 60269-6)		24
EXTERNAL FAN KIT	1 external fan sets for power module (DC/DC side), 1 external fan sets for power module (DC/AC side)		1+1
FAN AC SIDE WBOX	1 internal air circulating fan (AC side)		1
FAN DC SIDE WBOX	1 internal air circulating fan (DC side)		1
AC MULTICORE CABLE GLAND PLATE	AC multicore cable gland plate (Supports M63 **(63)** Ø 37…53mm + M25 **(23)** Ø 10...17mm)		1
AC SINGLE CORE CABLE GLAND PLATE	AC single core cable gland plate (Supports 4 x M40 **(62)** Ø 19...28mm + M25 **(23)** Ø 10...17mm)		1

5. Installation

5.1 Installation safety instruction

⚠ **WARNING –** The inverter panels/covers can be removed from authorized service personnel only (the users are not authorized to remove inverter panels/covers).

⚠ **WARNING –** When the photovoltaic panels are exposed to sunlight they provide continuous DC voltage to the inverter. Before installation may begin, photovoltaic panels must be shaded or isolated.

⚠ **WARNING –** In case PVS-100/120 PRE-CHARGE BOARD KIT is installed on the inverter, it is important to remark the presence of auxiliary power supply connected to the AC grid. In this case the inverter is supplied either by DC and AC power, so hazardous internal voltages are present even in case the DC switches are open.

⚠ **WARNING –** The installation must be carried out with the equipment disconnected from any voltage sources. Refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

⚠ **ATTENTION –** This device is intended to be installed in a suitable plant for its use and its purpose. All the installation instruction described in this chapter must be followed considering the plant structure where the device is intended to be installed. Its performance therefore depends on the correctness of the installation.

⚠ **ATTENTION –** It is mandatory to adhere to the indications provided in this manual, the diagrams and the enclosed documentation, paying attention to follow the installation sequence exactly as described in this manual.

⚠ **ATTENTION –** Staff authorised to carry out the installation must be specialised and experienced in this job. They must also have received suitable training on equipment of this type. The installation must be performed by qualified installers and/or licensed electricians in accordance with the existing regulations in the country of installation.

⚠ **ATTENTION –** Handling and installation operations shall be performed only by using the special tools and accessories provided with "PVS Installation Kit" that have to be ordered separately. The use of these equipment are mandatory to safely install the inverter. Refer to **"Kit of recommended spare parts"** paragraph for further information.

⚠ **ATTENTION –** The local electrical utility (or authority having jurisdiction) must approve the equipment installation before it is connected to the electrical grid.

5.2 Installation site and position

5.2.1 General recommendation on installation position

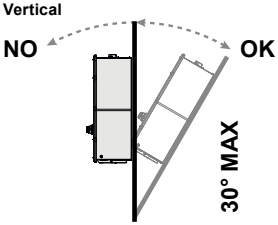
⚠ **ATTENTION –** Please refer to the warranty terms and conditions to evaluate any possible warranty exclusions due to improper installation.

- Refer to **"Technical data"** paragraph to check the required environmental conditions (protection rating, temperature, humidity, altitude, etc.).
- The installation location shall be easily accessible.
- Installation of the unit in a location exposed to direct sunlight is NOT acceptable. (Add awning in case of direct sunlight installation).
- Final installation of the device must not compromise access to any disconnection devices that may be located externally.
- Do not install in small closed rooms where air cannot circulate freely.
- Always ensure that the flow of air around the inverter is not blocked so as to prevent overheating.
- Do not install in locations where flammable substances or gases may be present (minimum distance 3 m).
- Do not install on wooden walls or other flammable supports.
- Install on a wall or strong structure suitable to bear the weight.
- Do not install in rooms where people live or where the prolonged presence of people or animals is expected, because of the high noise that the inverter produces during operation. The level of the sound emission is heavily influenced by where the appliance is installed (for example: the type of surface around the inverter, the general properties of the room, etc.) and the quality of the electricity supply.
- All installations over 6500' (2,000 meters) must be assessed by FIMER Technical Sales to determine the proper datasheet derating.
- If the GROUNDING KIT is installed, the inverter must be installed and operated in a restricted areas.

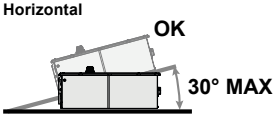
5.2.2 Tilting admittance

The unit can be installed with a maximum inclination as indicated in the figures below.

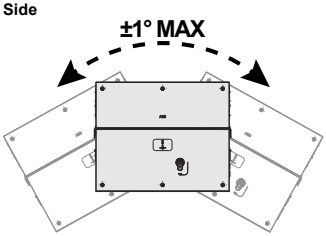
Vertical



Horizontal



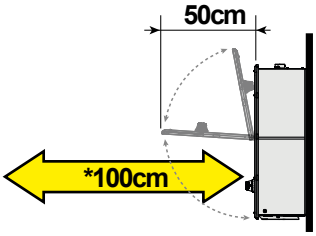
Side



⚠ **ATTENTION –** In case of horizontal installation in outdoor environment consider an installation with a minimum tilt of 3° to avoid any water stagnation.

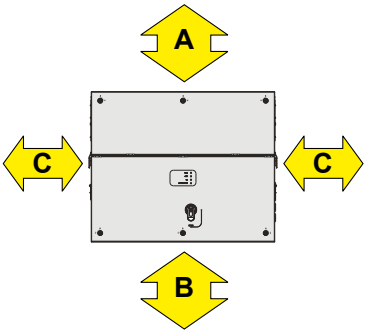
5.2.3 Distances

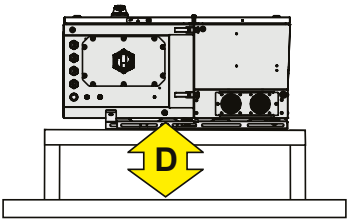
- Maintenance operations entails removing the front cover. Always observe the required installation safety distances in order to allow routine check and maintenance operations.
- Provide a sufficient working space in front of the inverter that allows to open the front covers **(07)(54)** and to allows wiring connections on the wiring box.
- Install at a height which takes into consideration the weight of the unit and in a position which is suitable for servicing, unless suitable means will be provided to carry out these mentioned operations.
- If possible, install at eye-level so to allow to easily check the status LEDs **(08)**.
- Respect the minimum distances from surrounding objects that could prevent the inverter installation and restrict or block the air flow.



(*) minimum free space to operate with the inverter

⚠ **ATTENTION –** Do not install any object (e.g. AC or DC cables) that could be damaged by overheating from outgoing hot air flow coming from side fan sections (ΔT= +15 °C compared to ambient temperature). In case of this kind of installation needs, please evaluate the installation of a proper air deflector. Always respect the minimum distances required.



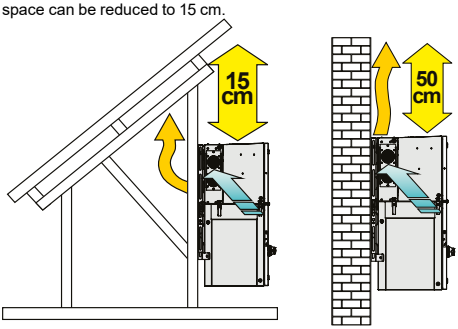


The minimum clearance distances depends from multiple factor:

1. Ventilation flow on the rear side of the inverter.

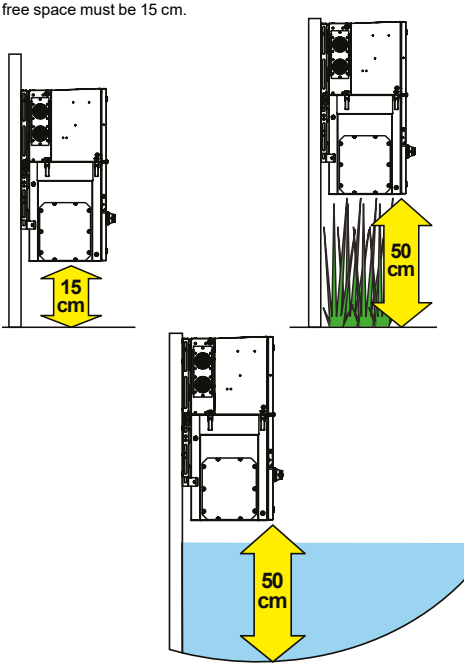
Depending of the support where the inverter is installed it changes the upper (A) required free space: if the inverter is installed on a support without any openings (e.g. a wall), the heat flow will be entirely directed to the top of the inverter; for this reason the upper (A) minimum required free space must be 50 cm.

Otherwise in case of the inverter is installed on a support with openings (e.g. frame installation) the heat can freely flow on the rear side of the inverter; so the upper (A) minimum required free space can be reduced to 15 cm.

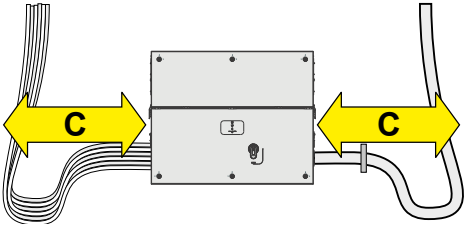


2. Possible flooding or damage during grass cutting operation.

It changes the bottom **(B)** or the rear (**(D)** - only in case of horizontal installation) required free space: If the inverter is installed in a place where there are concrete risk of flooding or grass cutting evenience, the bottom **(B)** or the rear (**(D)** - only in case of horizontal installation) minimum recommended free space is 50 cm; otherwise in case of the inverter is installed in a place where there aren't risk of flooding or grass cutting evenience, the bottom **(B)** and rear (**(D)** - only for horizontal installation) minimum required free space must be 15 cm.



3. Cables bending radius.
Sides **(C)** minimum required free space may depends from cable type (cable dimension, bending radius, etc..). This evaluation must be done by the installer during the plant design phase (refer to **"Routing the cable to the inverter"** paragraph for more information). In any case the minimum required free space useful for a proper ventilation of the unit (near side fans) cannot be under **15cm** on the right side and **30cm** on the left side.

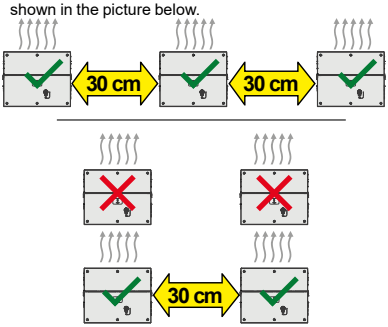


NOTE – In case of manual installation, using handles **(04)**, consider a free side space to lift the inverter of 60 cm minimum on both sides.

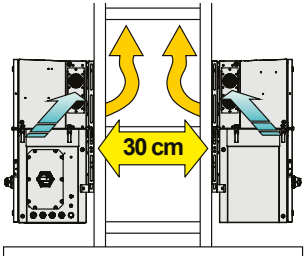
NOTE – In case of installation with lifting equipments (eyebolts and ropes) the side distances (C) could be reduced at the minimum required but a subsequent manual lifting it will no longer be possible: in this case the lifting equipments should remain available on the field for any subsequent operation.

5.2.4 Installation of multiple units

- In case of installation of multiple units in the same place, position the inverter side by side paying attention to keep the minimum clearance distances (measured from the outer edge of units) as shown in the picture below.



- The installation of two inverters positioned back to back is also permitted on a structure which must be composed of a 2 or 3 frame supports (refer to **"Bracket assembly"** paragraph). In this case the minimum recommended clearance distance between the units in order to avoid the use of an air deflector is 30cm.



5.2.5 Wireless signal environmental checks

The inverter can be commissioned and monitored using the wireless communication channel. The WLAN board of the inverter uses radio waves to transmit and receive data. It is therefore important to assess this factor in order to have an optimal installation.
Walls made in reinforced concrete and surfaces covered with metal (doors, shutters, etc.) might significantly reduce the reach of the device which, even in optimal conditions, is approximately 40 metres in free space.
Before installing the inverter it is therefore recommended to check the strength of wireless signal by means a mobile device (smartphone, tablet or notebook) by connecting it to the wireless router from a position which is close to the intended installation position of the inverter.

The radio signal level between the inverter and the wireless router can be improved in a two ways:
1. Find a new position for the router considering the different types of materials which the radio signal will have to pass through

Material	Relative signal reduction
Open field	0% (strength of approximately 40 metres)
Wood / Glass	From 0 to 10%
Stone / Plywood	From 10 to 40%
Reinforced concrete	From 60 to 90%
Metal	Up to 100 %

NOTE – The quality of the RF signal can be assessed during the installation stage where the signal is displayed in dBm.

2. Install a wireless signal repeater and place it in an area between the inverter and the router, trying in this way to skip the most critical obstacles.

5.2.6 Installations above 2000 metres

Due to the rarefaction of the air (at high altitudes), particular conditions may occur and it should be considered when choosing the place of installation:

Less efficient cooling and therefore a greater likelihood of a device power reduction (derating) occur due to high internal temperatures.
Reduction in the dielectric resistance of the air which, in the presence of high operating voltages (DC input), can create electric arcs (electrical discharges) that may damage the device.
When the altitude increases, the failure rate of some electronic components increases exponentially due to cosmic radiation.

NOTE – All installations at altitudes exceeding 2000 metres are not recommended on the basis of the criticalities indicated above.

5.2.7 Installations with a high level of humidity

ATTENTION – Never open the inverter in the case of rain, snow or a level of humidity >95%.

ATTENTION – Always carefully seal all unused openings

ATTENTION – Do not install on floating systems or where the inverter might be exposed to direct water splashes.

Even though the device is equipped with an anti-condensation valve, air with extremely high levels of humidity can lead to the creation of condensation inside the inverter.
As the inverter is almost completely insulated from the outside, condensation can also form after installation in certain weather conditions.

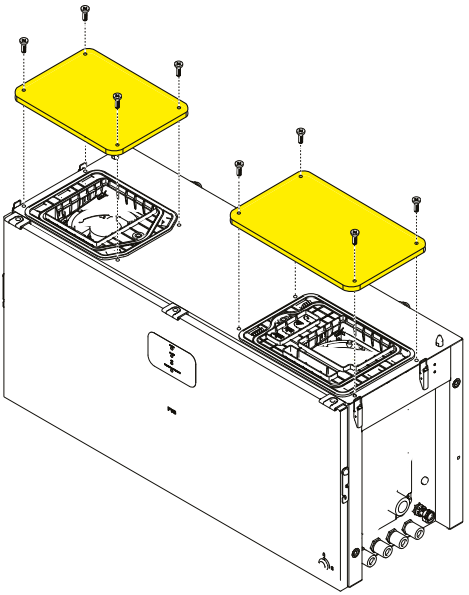
5.3 Installations of IP66 protection covers for wiring box openings

⚠ **WARNING –** Some wiring box parts may be subject to hazardous voltages for the operator. Before performing any work on the inverter, refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

⚠ **ATTENTION –** Never leave the power module **(01)** or the wiring box **(02)** disassembled on the field.

In case is necessary to install the wiring box **(02)** only, protection covers for wiring box openings kit is available as accessory options.

To install the protection covers place them over the wiring box openings and fix it using the 8 x M5 screws provided with the accessory kit.



5.4 Mounting Instructions

⚠ **ATTENTION –** The installation operations must be carried out by qualified personnel and it is mandatory to adhere to the indications provided in this manual, the diagrams and the enclosed documentation, paying attention to follow the installation sequence exactly as described in this manual.

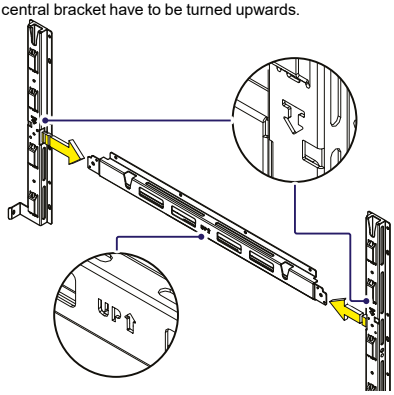
⚠ **ATTENTION –** Staff authorized to carry out the installation must be specialized and experienced in PV plant installation and specifically PV inverters installation. FIMER can provide training on the product to provide suitable knowledge for the installation.

⚠ **ATTENTION –** The installation must be performed by qualified installers and/or licensed electricians in accordance with the existing regulations in the country of installation.

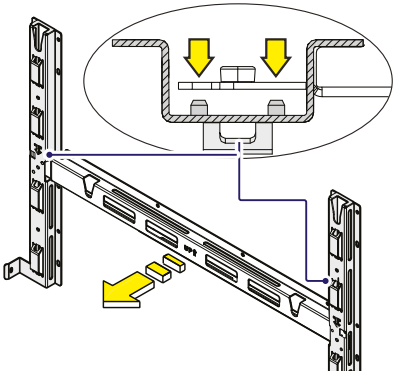
⚠ **ATTENTION –** The installation must be carried out with the equipment disconnected from any voltage sources. Refer to **"Inverter total de-energization and safe access"** paragraph on the product manual to know all the necessary step to safely operate on the inverter.

5.4.1 Bracket assembly

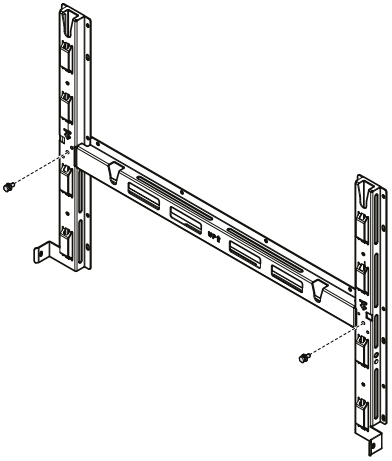
- Assembly the two side bracket pieces together with the central bracket, by sliding it as shown in the picture and paying attention to the orientation of the pieces (refer to arrow and "UP" markings on the brackets): side brackets arrow have to be turned downwards, central bracket have to be turned upwards.



- Slide the central bracket in order to match the two holes with the centering pins of the side brackets.



- Use the two M8 screws with flat and spring washers (supplied) to fix the pieces of the bracket together.



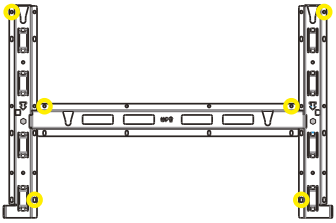
- Position the bracket **(03)** perfectly level on the support and use it as drilling template (consider the overall dimensions of the power module and the wiring box).

- It is the installer's responsibility to choose an appropriate number and distribution of attachment points. The choice must be based on the type of support (wall, frame or other support), the type of anchors to be used, and their ability to support 4 times the inverter's weight (4x125Kg/276lbs=500Kg/1104lbs for all models).

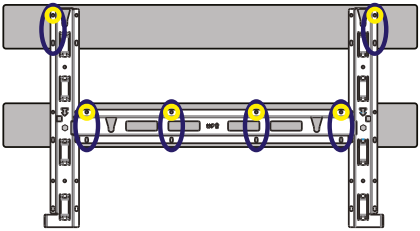
- Depending on the type of anchor chosen, drill the required holes to mount the bracket **(03)**. The pictures shown the recommended minimum fixing point depending to the type of support.

- Attach the bracket **(03)** to the support with at least 6 attachment screws (shown in **YELLOW**) or at least 6 frame fixing bracket for frame mounting (shown in **BLUE**).

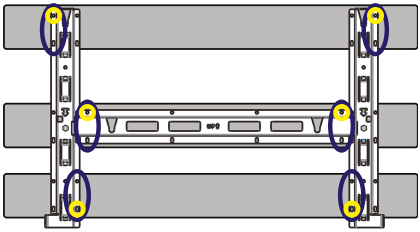
Wall mounting minimum fixing points



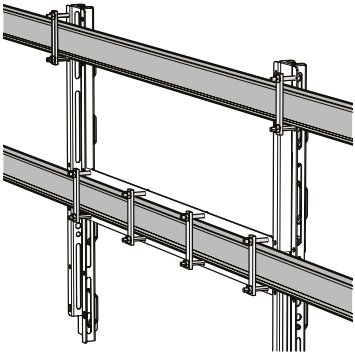
Frame mounting (2 supports) minimum fixing points



Frame mounting (3 supports) minimum fixing points



- In case of use of "frame fixing brackets" (see picture below as example) it will be possible to fix the bracket to the frame structure without drill any additional holes.



- Fix the bracket **(03)** to the support.

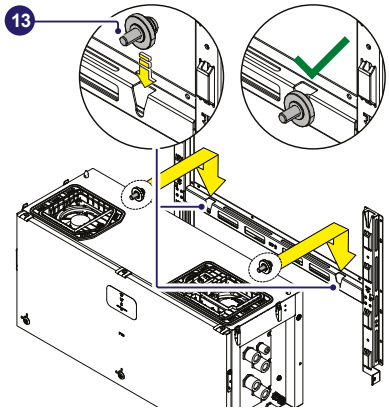
5.5 Assembly the Inverter to the bracket

⚠ **ATTENTION –** Handling and installation operations shall be performed only by using the special tools and accessories provided with "PVS Installation Kit" that have to be ordered separately. The use of these equipment are mandatory to safely install the inverter.

- Lift the wiring box up to the bracket **(03)** (using the handles **(04)** or M8 eyebolts) and insert the heads of the two rear pins for bracket assembly **(13)** (placed on the rear part of the wiring box **(02)**) into

the two slots ⊽ on the bracket **(03)**. Check that the pins **(13)** has been correctly inserted in the slots as shown in the picture before releasing the wiring box.

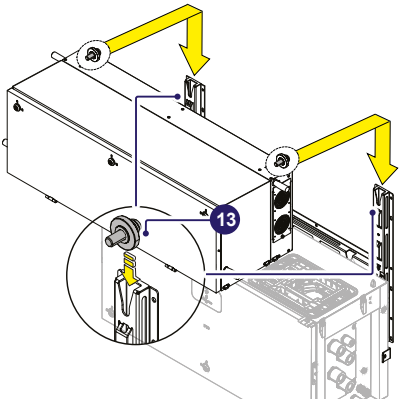
⚠ **ATTENTION –** Risk of injury due to the heavy weight of the equipment. Always consider the center of gravity of the enclosures while lifting.



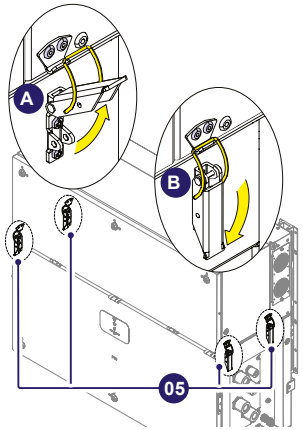
- Remove the handles **(04)** or eyebolts.

- Lift the power module up to the bracket **(03)** and over the wiring box (using the handles **(04)** or M8 eyebolts) and insert the heads of two rear attachment pins **(13)** (placed on the rear part of the power module) into the slots ⊽ on the bracket **(03)**.

⚠ **ATTENTION –** Risk of injury due to the heavy weight of the equipment. Always consider the center of gravity of the enclosures while lifting.



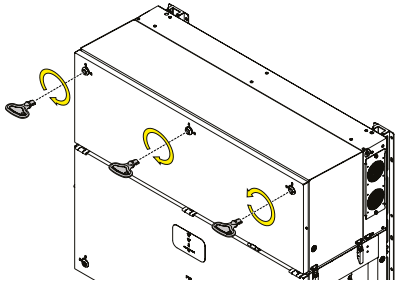
- Fasten all of the four side latches **(24)** as shown in the pictures.



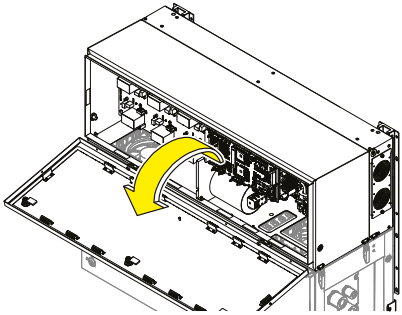
⚠ **ATTENTION –** Risk of injury due to the high strength of latches **(24)**. Use the proper protection gloves.

5.6 Opening the power module box cover

- Using the key tool provided with the PVS installation kit content in the wiring box package, open the three cover quarter cam locks **(05)** following the proper ways as shown in the related silkscreens on the power module front cover **(54)**.

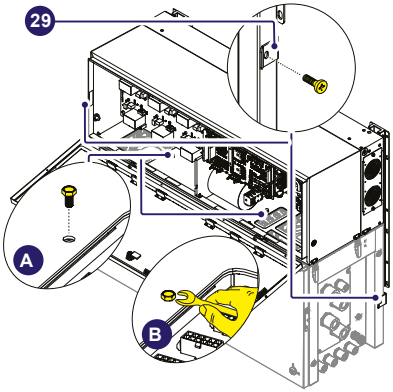


- Open the power module cover **(54)**.



5.6.1 Final fastening operations

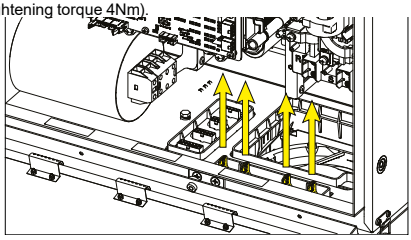
- Tighten the two hexagonal junction screws **(32)** with a tightening torque of 10 Nm.
- Tighten the two side bracket screws **(29)** (supplied) with a tightening torque of 5 Nm, to avoid the tilting of the bottom part of the inverter.

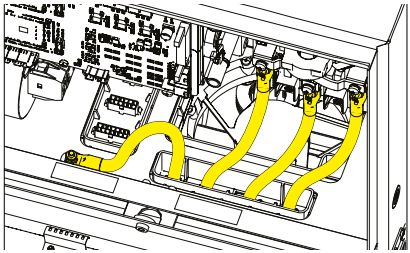


5.6.2 Interface cables connection

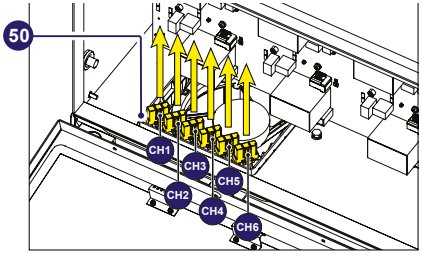
Last operation (before proceed with the wiring and connections of external AC and DC sources) is to connect the interface connectors that allow the power and the communication connection between the power module **(01)** and the wiring box **(02)**.

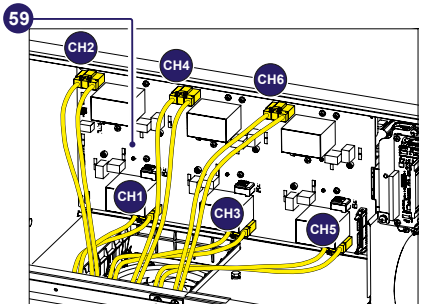
- Connect the AC interface cables **(51)** coming from the wiring box to the respective anchor points:
  - R, S, T cables should be connected to the AC interconnection board **(58)** using the nuts supplied with the power module component kit (tightening torque 8Nm).
  - Internal earth cable should be connected to the PE inteconnection point **(64)** using the nut and the two serrated lock washers supplied with the power module component kit (tightening torque 4Nm).



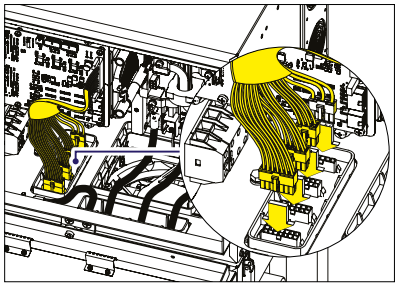


- Connect the 6 DC interface cables **(50)** coming from the wiring box in the dedicated connectors of the DC interconnection board **(59)**.





- Connect the interface signal cables **(30)** on the related interface signal connectors **(65)** starting from the back connector.



⚠ **ATTENTION –** For connection to the network in South Africa: according to NRS097-2-1 requirements, at the end of installation it is mandatory to apply the label at the left (supplied with the inverter) near the power module regulatory label.

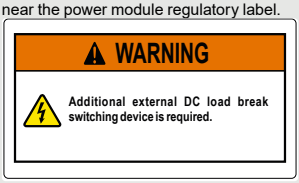
WARNING!
NRS 097-2-1:2017 (South Africa)

	Total [Ω]	X/R ratio
Reference Impedance	0.156	3.9

	I_SC [A]	S_SC [kVA] (three phase)
Fault Level	1475	1018

It is not intended to connect this Inverter to a network with an higher Network Impedance.

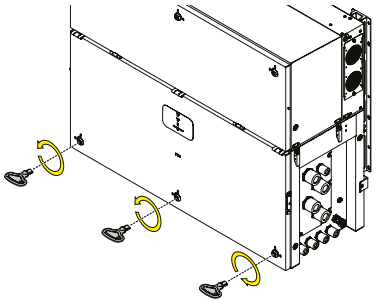
⚠ **ATTENTION –** For connection to the network in in Australia and New Zealand: according to AS/NZS 4777.2020 requirements, at the end of installation it is mandatory to apply the label at the left (supplied with the inverter) near the power module regulatory label.



5.7 Opening the wiring box cover

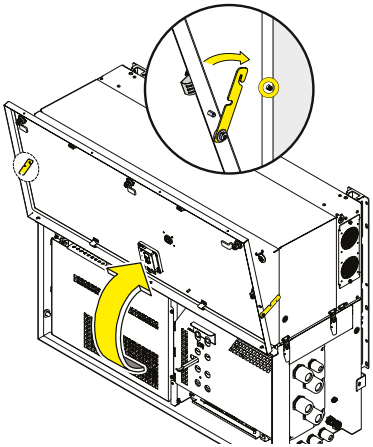
• Use the key tool (provided with the installation kit contained in the wiring box package) to open the three cover quarter cam locks **(05)** following the proper rotation as shown in the related silkscreens on the wiring box cover **(07)**.

NOTE – Only for -S2, -SX2, SY2 versions: Set the wiring box AC disconnect switch **(09)** to OFF position; otherwise it will not be possible to open the wiring box cover **(07)**.



• Open the wiring box cover **(07)** and use the cover support brackets **(14)** to lock the cover **(07)** in open position.

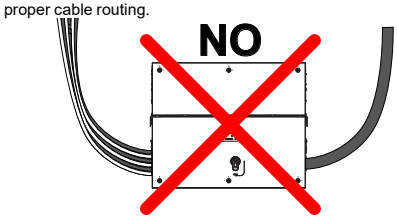
⚠ **ATTENTION –** Pay attention to properly secure the cover support brackets **(14)** in order to avoid falling of the cover!

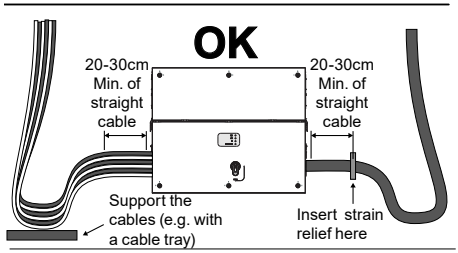


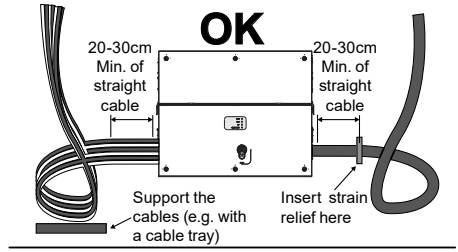
5.8 Routing the cable to the inverter

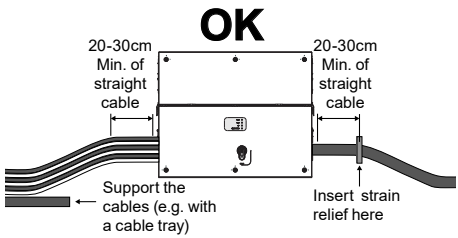
The cable routing have to be done in order to avoid water dripping to the:
- AC panel cable glands **(11) (56)**
- DC input quick fit connectors **(16)**
- DC input cable glands **(18)**
- Signal cable glands **(12)**.

Expecially when coming from the top, the cables must be routed in order to create a loop: in this way the water that flows on the cables will be drained.
The AC and DC conductors must be anchored or supported in order to prevent loading and mechanical stress on the cable glands and quick fit connectors causing potential damage on the AC and the DC plates.
The pictures below are showing some example of incorrect and proper cable routing.









⚠ **ATTENTION –** In case of the single core AC cable gland **(62)** was accidentally removed during the cable routing phase, it will needed to assure the correct tightness of the lock nut of the cable gland to the inverter chassis with a tightening torque of 8.0 Nm (for each cable gland).

5.9 Grid output connection (AC side)

⚠ **WARNING –** To avoid risks of electrical shock, all wiring operations must be carried out with the disconnect switch downstream of the inverter (grid side) opened and applying LOTO procedure on it. Be careful not to mistakenly exchange the phases with neutral!

The inverter must be connected to a three-phase TN system with the center of the star connected to ground. To connect the inverter to the grid is necessary to use a 3/4 wires connection (3 phases with or without neutral cable).

⚠ **ATTENTION –** In case of PVS-100/120 GROUNDING KIT is installed on the inverter, it is mandatory the use of IT system without connection of the center of the star to the ground.

⚠ **ATTENTION –** In any case, the inverter's earth connection is mandatory

The connections can also be made with the wiring box detached from the power module which can be connected later for commissioning.

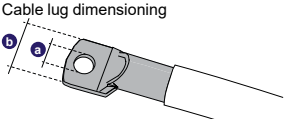
⚠ **ATTENTION –** When working with the wiring box detached, (pay particular attention to outdoor installations) always protect the top of wiring box with proper IP66 protection covers (optional accessory content in the "PVS Installation KIT", to be ordered separately) on the housing. Refer to the dedicated **"Installations of IP66 protection covers for wiring box openings"** paragraph for further information about the installation procedure.

5.9.1 Characteristics and sizing of the protective grounding cable

FIMER inverters must be earthed via the connection points marked with the protective earth symbol ⏚ and using a cable with an appropriate conductor cross-section for the maximum ground fault current that the generating system might experience.
According to IEC 62109-1:
If the external Protective earthing conductor cross-section area is S/2, where S is the cross-section of the phase conductor, no further calculation are needed to demonstrate that the cross-section is enough to sustain the fault current. Otherwise the protective earthing conductor cross-section shall be determined by calculation according to IEC 60364-5-54 or have to fulfill the requirement of local standard.

⚠ **ATTENTION –** Any failure of the inverter when it is not connected to earth through the appropriate connection point is not covered by the warranty.

The earth connection can be made through the Protective earth point (int.) **(25)**, Protective earth point (ext.) **(10)** or both (this is required by regulations in force in certain countries of installation).
The sizing of the ground cable depend on the choice of the protective earth point (internal **(25)** or external **(10)**) where it will be connected:

	Protective earth point (int.) (25)	Protective earth point (ext.) (10)
Cable diameter range	10 - 17 mm (M25 cable gland)	-
Conductor cross section	35...95 mm² (copper)	-
Cable lug dimensioning 	for M10 Stud a = 10.5 mm (min) b = 40 mm (max)	for M8 Bolt a = 8.4 mm (min) - 8.5 mm (max) b = all dimension accepted

5.9.2 Load protection breaker (AC disconnect switch)

To protect the AC connection line of the inverter, an overcurrent protection device with the following features must be installed (these are the caracteristic of a load protection switch referred to a single inverter installation):

Load protection breaker	PVS-100-TL	PVS-120-TL	PVS-100-TL	PVS-120-TL
Type	Automatic circuit breaker with thermal-magnetic protection		Fuses switch disconnector	
Voltage/current rating	400Vac min.150A (*)	480Vac min.150A (*)	400Vac 200A (*)	480Vac 200A (*)
Magnetic protection characteristic	Magnetic curve B/C		gG, gS	
Number of poles	3/4		3/4	

(*): please consider thermal and other derating when selecting the current rating of the protection equipment for your application.

5.9.3 Differential protection downstream of the inverter

All Fimer string inverters are equipped with a device for protection against ground faults in accordance with the safety standard IEC 62109-2 (please refer to sections 4.8.2 and 4.8.3 of the Standard). In particular, Fimer inverters are equipped with a reading redundance for the ground leakage current sensitive to all components of both direct and alternating current. Infact the measurement of the ground leakage current is carried out simultaneously and independently by 2 different processors: it is sufficient for one of the two to detect an anomaly to trip the protection, with consequent disconnection from the grid and to stop the conversion process.
There is an absolute threshold of 1.0 A for PVS-100-TL or 1.2 A for PVS-120-TL and of total leakage current AC+DC with protection tripping time at a max. of 300 msec.

Furthermore, there are other three tripping levels with limit set respectively at 30 mA, 60 mA and 150 mA to cover the “rapid” changes in fault current induced by accidental contact with leaking live parts. The max. tripping times are progressively shortened as the speed of change in the fault current increases and, starting from the 300 msec/max for the 30 mA change, they are reduced respectively to 150 msec and 40 msec for 60 mA and 150 mA changes.

In case of installation of a residual current protection device, this shall meet the following characteristics in order to prevent nuisance tripping due to capacitive leakage current of photovoltaic modules:

Residual current protection device requirements	PVS-100-TL	PVS-120-TL
Type	A / AC	
Sensitivity	1.0 A	1.2 A

NOTE – For protection of the AC line, on the basis of the information above with regard to the differential protection integrated in Fimer inverters, it is not necessary to install a type B ground fault switch.

NOTE – In accordance with article 712.413.1.1.1.2 of Section 712 of IEC Standard 64-8/7, we hereby declare that, because of their construction, Fimer inverters do not inject ground fault direct currents.

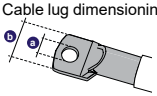
NOTE – In the case of systems which consist of several inverters connected to a single switch with differential protection, it is recommended to install a device which allows the adjustment of the tripping value and the tripping time.

5.9.4 Characteristics and sizing of the line cable

Depending of the type of the AC panel it’s possible to use single conductors cables or a multipolar cable:
- Single-core AC panel **(11)** configuration have 4xM40 cable glands **(62)** for the ”N” neutral, “R”, “S”, “T” phases and a M25 cable gland **(23)** for the earth cable.
- Multi-core AC panel **(56)** configuration (optional) have a M63 cable gland **(63)** for the ”N” neutral, “R”, “S”, “T” phases and a M25 cable gland **(23)** for the earth cable.

The cross-section of the AC line conductor cables must be sized in order to prevent unwanted disconnections of the inverter from the grid due to high impedance of the line that connects the inverter to the power supply; If the impedance is too high it causes an increase in the AC voltage which, on reaching the limit set by the standards in the country of installation, causes the inverter to switch off.

The AC cables must be connected to the AC connection busbar **(21)** using a cable lug (not supplied) of a suitable size for installation on the M10 threaded studs used for securing the cable.

	Single conductor cable	Multipolar cable
Cable diameter range	19 - 28 mm	37 - 53 mm
Conductor cross section	min. 70mm^2...max 185mm^2	
Cable lug dimensioning 	for M10 Stud a = 10.5 mm (min) b = 40 mm (max)	
Conductor material	copper or aluminum	

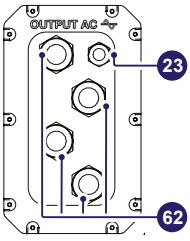
ATTENTION – The AC connection busbars **(21)** are in copper tin-plated; therefore if aluminum cables are used, the correct coupling with the copper bars must be guaranteed by using appropriate bi-metallic cable lug.

5.9.5 AC output cables connection

WARNING – Before carrying out any operation, check that any external AC switch downstream to the inverter (grid side) are in OFF position and check for voltage absence on the AC conductors!

Routing of the AC cables inside the inverter must be carried out from the right side of the inverter.
Depending of the version of the AC panel installed on the inverter it will be necessary to route the AC output and ground cables into different ways:

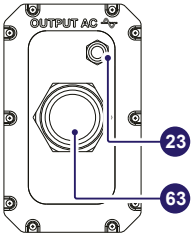
Single-core configuration (11) (default) :
4xM40 cable glands **(62)** for the ”N” neutral, “R”, “S”, “T” phases and a M25 cable gland **(23)** for the earth cable.
In this configuration the AC output and ground cables must be inserted into the proper cable glands, trying to follow a logical order based on the position of the internal connections:
- N = Neutral (indicated with a label near the AC connection busbar **(21)**)
- T = Phase T (indicated with a label near the AC connection busbar **(21)**)
- S = Phase S (indicated with a label near the AC connection busbar **(21)**)
- R = Phase R (indicated with a label near the AC connection busbar **(21)**)
- The earth connection can be made using the Protective earth point (int.) **(25)**, Protective earth point (ext.) **(10)** or both (this is required by regulations in force in certain countries of installation).



⏚ = Earth (indicated with the protective earth symbol ⏚ near the protection earth connection point (int.) **(25)** or protection earth connection point (ext.) **(10)**).

Multi-core configuration (56) (optional):

one M63 cable gland **(63)** for the ”N” neutral, “R”, “S”, “T” phases and a M25 cable gland **(23)** for the earth cable.
This version of the AC panel can be ordered separately.



Follow the procedure below to route all the requested cables:

⚠ **ATTENTION –** The installation must be performed by qualified installers and/or licensed electricians in accordance with the existing regulations in the country of installation and in accordance of all safety rules for performing electrical works. The customer has civil liability for the qualification and mental or physical state of the personnel who interact with the equipment. They must always use the personal protective equipment (PPE) required by the laws of the country of destination and whatever is provided by their employer.

⚠ **ATTENTION –** Before carrying out any operation, check that any external AC switch downstream to the inverter (grid side) are in OFF position applying LOTO procedure on it.

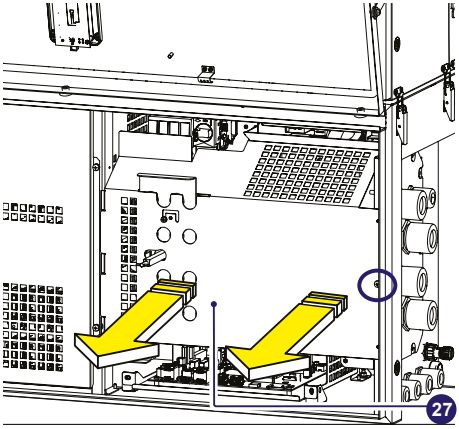
• Use the key tool (provided with the installation kit contained in the wiring box package) to open the three cover quarter cam-locks **(05)** following the proper rotation as shown in the related silkscreens on the Wiring box cover **(07)**.

NOTE – Only for -S2, -SX2, SY2 versions: Set the wiring box AC disconnect switch **(09)** to OFF position; otherwise it will not be possible to open the wiring box cover **(07)**.

• Open the wiring box cover **(07)** and use the cover support brackets **(14)** to lock the cover **(07)** in open position.

⚠ **ATTENTION –** Pay attention to properly secure the cover support brackets **(14)** in order to avoid falling of the cover!

• Remove the AC protective shield **(27)** by removing the M5 screw.

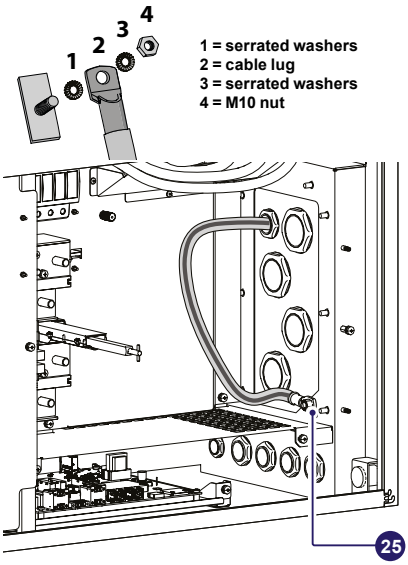


Depending on the ground connection method (internal **(25)** or external **(10)**) follow the procedures described below:

5.9.5.1 Internal ground connection

• Pass the protective earth cable through the proper cable gland **(23)** on the AC panel.

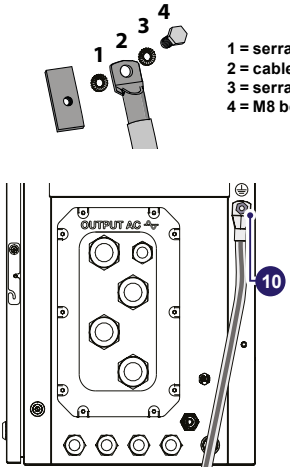
• Fix the protective earth cable lug to the protection earth connection point (int.) **(25)** using the washers and nut pre-installed on the M10 stud, as shown in the following diagram:



⚠ **ATTENTION –** The cable lug must be installed with a tightening torque of 21Nm.

5.9.5.2 External ground connection

• Fix the protective earth cable lug to the protection earth connection point (ext.) **(10)** (this is the same thread for handles) using the washers and M8 bolt provided in the wiring box component kit, as shown in the following diagram:



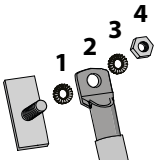
⚠ **ATTENTION –** The cable lug must be installed with a tightening torque of 15.2 Nm.

⚠ **ATTENTION –** Before connecting the inverter to AC or DC sources use a suitable multimeter to test the conductivity of the earth connections between the protection earth connection point (ext.) **(10)** and a handles thread on the housing of power module.

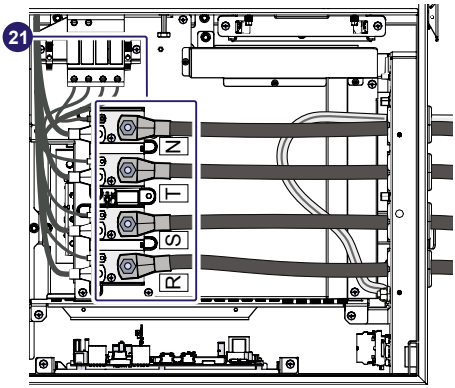
5.9.5.3 AC line connection

- Pass the AC cables through the single core cable glands **(62)** or multicore cable gland **(63)** on the AC panel. The lenght of phase cables on the internal side of wiring box need to be about 300 mm (cable lug included).

- Fix the phases and neutral (if required) cable lugs to the AC connection busbars **(21)**, paying attention to the corrispondence of the phases with the labels, using the washers and the M10 nuts pre-installed on the busbar as shown in the following diagram:



1 = cable lug
2 = flat washer
3 = spring washer
4 = M10 nut

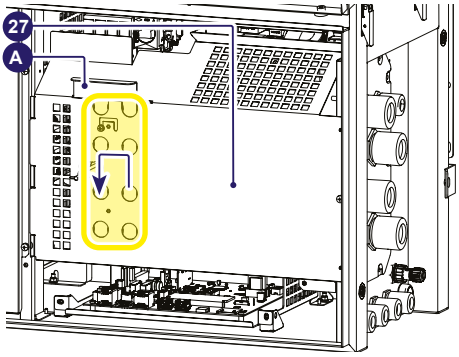


⚠ **ATTENTION –** In case of a wrong phase sequence the inverter will not connect to the grid and it will provide an error state.

⚠ **ATTENTION –** The cable lugs must be installed with a tightening torque of 25Nm.

- Re-install the AC protective shield **(27)** by using the M5 screw previously removed with a tightening torque of 3 Nm.

⚠ **ATTENTION –** During this phase check that the position of the sliding cover **(A)** is in the original position (see the arrow). This means that the hole (in the yellow circle) on the AC protective shield **(27)** must be closed.



- At the end of installation check the tightness of:
  -8Nm for single core AC cable gland **(62)** or 25Nm for multi core AC cable gland **(63)**
  - 7.5 Nm for Protective earth cable gland **(23)**

⚠ **ATTENTION –** Make sure the cable glands are properly sealed to ensure to keep IP65 protection degree.

⚠ **ATTENTION –** In case of the single core AC cable gland **(62)** was accidentally removed during the cable routing phase, it will needed to assure the correct tightness of the lock nut of the cable gland to the inverter chassis with a tightening torque of 8.0 Nm (for each cable gland).

5.10 Input connection (DC)

⚠ **WARNING –** Check absence of any leakage to ground in the PV generator.

⚠ **WARNING –** If input strings are paralleled, they must have the same installation conditions (number of panel sets, panel type, orientation and tilt).

⚠ **WARNING –** When the photovoltaic panels are exposed to sunlight they provide continuous DC voltage to the inverter. To avoid risks of electrical shock, all wiring operations must be carried out with the DC disconnect switches (internal **(15)** and external to the inverter) and AC disconnect switches (internal **(09)** or external to the inverter) OFF.

⚠ **WARNING –** In case presence of internal DC disconnect switch only, there will be live parts internal to the inverter with a consequent risk of electrical shock. In this case these activity is ONLY allowed with the use of appropriate PPE (overall resistant to electric arc, dielectric helmet with visor, insulating gloves class 0, Protective overglove in leather EN420 – EN388 , Safety shoes).

⚠ **WARNING –** The inverters referred to in this document are WITHOUT AN ISOLATION TRANSFORMER (transformerless). This topology implies the use of isolated PV panels (IEC61730 Class A Rating) and the need to keep the PV array floating with respect to ground: no terminal of the PV array must be connected to ground. For a different connection of PV strings, when a negative input grounding kit is installed, the use of an isolation transformer in mandatory. Refer to the “PVS-100/120 GROUNDING KIT“ Quick Installation Guide for further information

DC input connections may vary depending on the inverter model.

5.10.1 Input connection on standard and S2 models (single/double MPPT)

The connection of the DC input cables on the standard and -S2 models is made on the DC input connection busbar **(17)** after that the cables have been passed through the DC cable glands **(18)**.

⚠ **ATTENTION –** For connection to the network in Australia and New Zealand.
According to AS/NZS 4777.2020 requirements, it is necessary to apply the label and install an external DC Switch on the Standard and S2 inverter models.
External DC isolator shall comply with AS 60947.3 and relevant regulation requirement.

5.10.1.1 Operations preliminary to the connection of the PV generator

In order to safely perform the preliminary operations before the connection to the PV generator, the connection of the ground protection cable **(10)**/**(25)** to the wiring box is mandatory.

- **Checking of leakage to ground of the photovoltaic generator**
  Measure the voltage present between positive and negative pole of each string with respect to ground.
  If a voltage is measured between an input pole and ground, it may be that there is a low isolation resistance of the photovoltaic generator and the installer will have to carry out a check to solve the problem.

⚠ **WARNING –** Do not connect the strings if a leakage to ground has been detected, as the inverter might not connect to the grid.

- **Checking of strings voltage**
  Measure the voltage present between positive and negative pole of each string.
  If the open circuit voltage of the string is near the maximum value accepted by the inverter, consider that low ambient temperatures cause an increase in the string voltage (different according to the photovoltaic module used). In this case it is necessary to carry out a check of the sizing of the system and/or a check on the connections of the modules of the system (e.g.: number of modules in series higher than the design number).

⚠ **ATTENTION –** Input voltages higher than the maximum value accepted by the inverter (see technical data table) may occur the damage of the inverter.

- **Checking the correct polarity of the strings**
  Before wiring the strings, you must ensure that the voltage of each string complies with the correct polarity using a voltmeter.

5.10.1.2 Independent or parallel input channels configuration

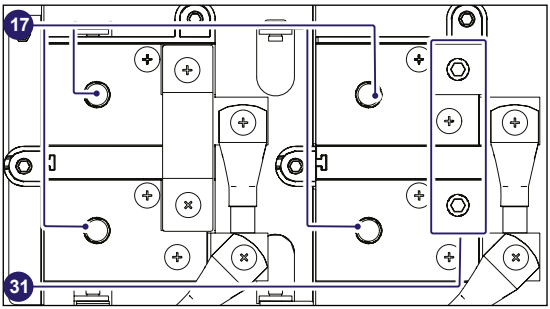
The inverter standard and -S2 versions have two input channels (thus benefiting from two trackers for MPPT maximum power point tracking) which work independently of one another but can be paralleled by leveraging a single MPPT.
Based on PV system configuration, inputs can be set as 2 independent MPPTs or as a single MPPT with the two paralleled input channels.

⚠ **ATTENTION –** An incorrect setting of the input channels can lead to loss of energy production.

Independent channel configuration (default configuration)

The independent configuration of the input channels (MPPT) is set by factory. This means that the parallel bar (supplied) must not be installed on the parallel MPPT connection points **(31)**, and that the software setting “Independent channel mode” should be performed on the inverter; this setting can be done by different way:

1. During the commissioning wizard phase (STEP 4)
2. In the dedicated section of the internal webserver “Setup section > Setup DC side > Input mode”

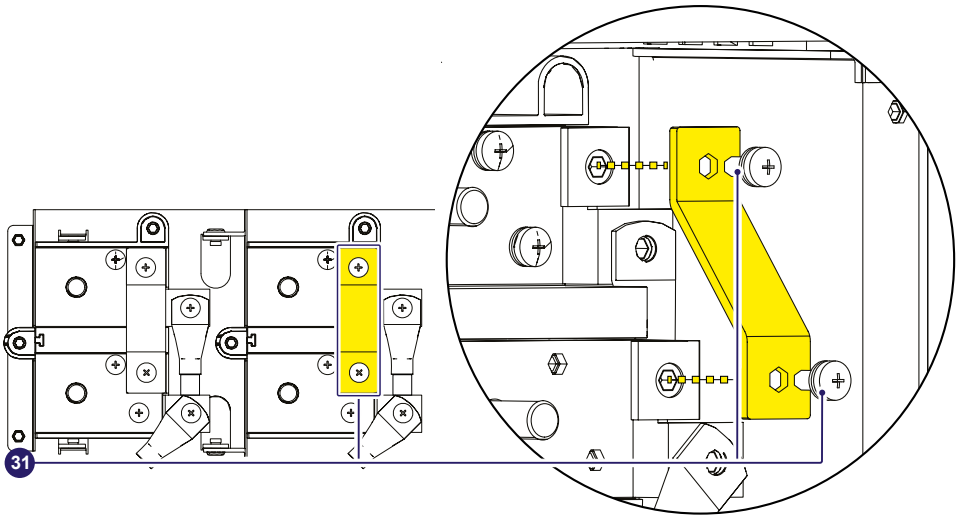


⚠ **ATTENTION –** Negative paralleling input busbar is pre-installed by factory and shall remain installed.

Parallel channel configuration

The configuration of the input channels (MPPT) can be set in parallel. This means that the parallel bar (supplied) must be installed on the parallel MPPT connection points **(31)** using the two M6 screws (supplied) with a tightening torque of 8Nm, and that the software setting “parallel channel mode” should be performed on the inverter; this setting can be done by different way:

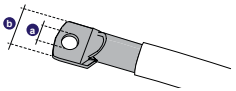
1. During the commissioning wizard phase (STEP 4)
2. In the dedicated section of the internal webserver “Setup section > Setup DC side > Input mode”



5.10.1.3 Connection of inputs

To carry out the connections, the cables must be passed through the DC cable glands **(18)**.
Connection of DC cables is made on the DC input connection busbar **(17)**.

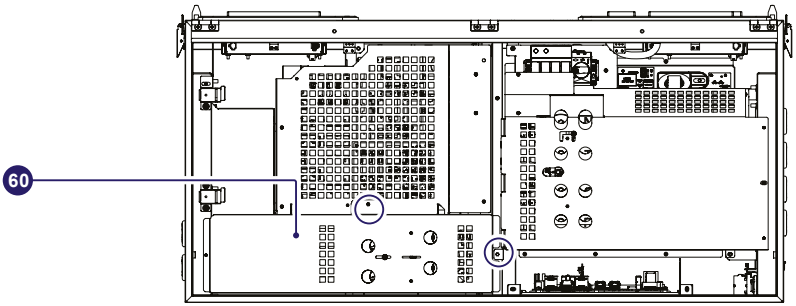
The bolts on the DC input connection busbar **(17)** accepts cable lugs as per the following table:

DC input cable	
Cable diameter range	19 - 28 mm
Conductor cross section	min. 50mm² (in case of 2 couples of DC cables)...max 185mm² min. 90mm² (in case of single couple of DC cables)...max 185mm²
Cable lug dimensioning	for M10 Stud a = 10.5 mm (min) b = 40 mm (max) 
Conductor material	copper or aluminum

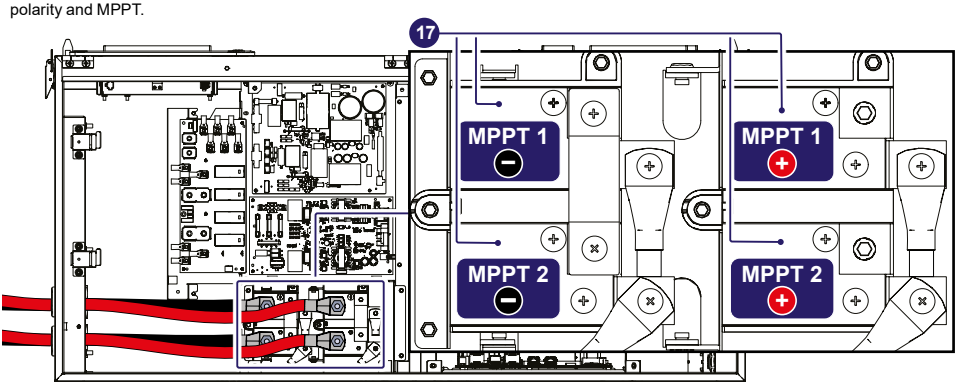
⚠ **ATTENTION –** The DC input connection busbars **(17)** are in copper tin-plated; therefore if aluminum cables are used, the correct coupling with the copper bars must be guaranteed by using appropriate bi-metallic cable lug.

In order to connect the DC input cables performs the procedure as follow:

- Open the wiring box front cover **(07)** (refer to paragraph **"Opening the wiring box cover"**)
- Remove the internal DC Protective shield **(60)** by removing the two M5 screws.



- Unscrew the DC cable glands **(18)**
- Introduce the cables
- Install the cable lugs on the cables
- Connect the DC cables to the busbars **(17)** with a tightening torque of 25 Nm. During this operation connect the cables with the right polarity and MPPT.



- Once connection to the DC input connection busbar **(17)** has been completed, retighten the cable gland firmly (8.0 Nm torque) and check seal.
- Re-install the DC protective shield **(60)** by using the M5 screws previously removed (torque of 3 Nm).

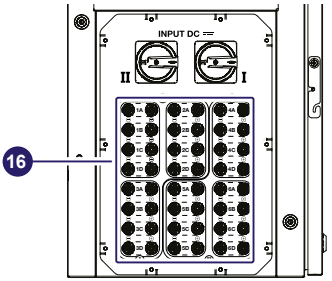
5.10.2 Input connection on -S(X or Y) and S(X or Y)2 models

⚠ **WARNING –** Comply with the maximum input current relating to the quick-fit connectors as indicated in the technical data.

⚠ **WARNING –** The reverse polarity can cause severe damage and electric arc hazards! In case of reverse input strings do not disconnect them while under load and do not turn the DC disconnect switches **(15)** to OFF position. Wait until input current are below 0.5A (when solar irradiance declines at night) and turn the DC disconnect switches **(15)** to OFF position, disconnect the DC input quick fit connectors **(16)** and correct the wrong polarity of the string.

For the string connections on the -S(X or Y) and S(X or Y)2 versions, it is necessary to use the DC input quick fit connectors **(16)**, located on the left side of the wiring box.

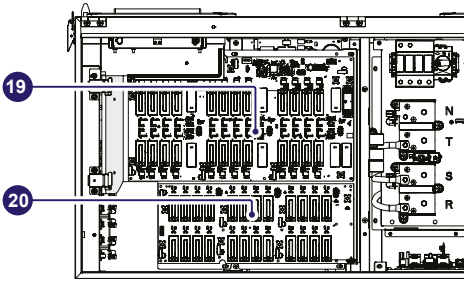
The input connectors are divided into 6 groups (one group for each input channel) consisting of 4 pairs of quick fit connectors.



These versions of inverter are equipped with 2 DC disconnect switches **(15)**:
- DC disconnect switches I → Groups 1, 2 and 3 of quick fit connectors
- DC disconnect switches II → Groups 4, 5 and 6 of quick fit connectors

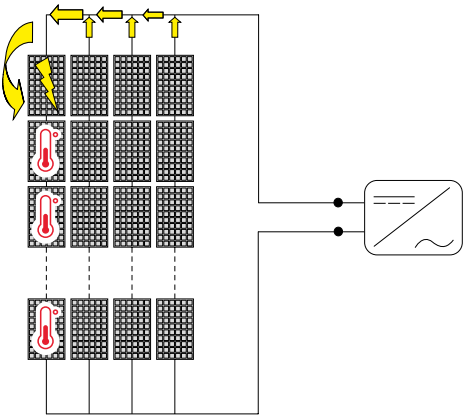
5.10.2.1 Sizing of fuses

Depending of the wiring box version installed on the inverter there are different configuration of string fuses:
- SX, SY versions: equipped with positive side string fuses board **(19)** and have 24 string fuses (1 for each strings) that are supplied and have to be installed.
- SX2, SY2 versions: equipped with both positive side string fuses board **(19)** and negative side string fuses board **(20)** that totally have 48 string fuses (2 for each strings). Fuses on the negative side string fuses board **(20)** are already fitted while the fuses on the positive side string fuses board **(19)** are supplied and have to be installed.



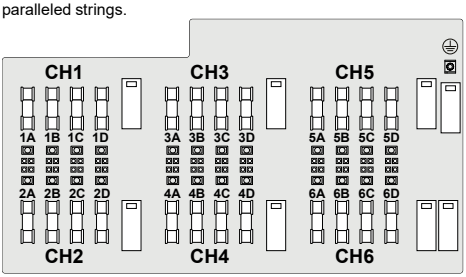
The correct sizing of the **(19)** positive side and **(20)** negative side (-SX2, SY2 wiring box model) string fuses to be used to protect from "return currents" is very important because it can considerably limit the risk of fire and damage to the PV generator.

A "return current" can be generated in the event of a fault and relevant short-circuit at the ends of one or more PV modules of the system; this condition can cause all the current supplied by the strings not involved in the fault, but connected to the same input channel, to pass through the faulty string.



For input connectors marked with "**A**" and "**D**" you must directly connect the individual strings coming into the inverter (do not make field switchboards for parallel strings). This is because the positive side **(19)** and negative side **(20)** string fuses, situated on each input, are not rated to take strings in parallel (array).
This operation could damage the fuses and consequently could cause malfunctioning of the inverter.

The connection in parallel of the strings (array composition) could be made upstream of the input connectors marked with "**B**" and/or "**C**" using a proper Y quick fit connector adapters: in this case the input fuses will have to be replaced with a suitable size for the paralleled strings.



The sizing of the string fuses must be made taking into account the 2 following conditions:

1. The nominal current of the fuse (Irated) must not exceed the maximum rating of the fuse to be used in series on the strings (maximum series fuse rating), indicated in the technical data of the PV modules in compliance with standard EC 61730-2:

Irated < Maximum series fuse rating

2. The fuse rating (Irated) must be determined based on the string current and on the sizing guidelines provided by the manufacturer to avoid untimely tripping. As a general guideline, based on the photovoltaic modules' short circuit current (Isc), it is possible to calculate the rating of the fuse with the following formula:

Irated > (1.4 ≈ 1.5)*Isc

Fuses must be chosen among the standard commercially available ratings, selecting the value that is closest to the obtained result.
The fuse selected with the calculation described previously takes into consideration derating factors and corrections such as:
- Increase in the effective irradiation of the installation area
- Increase in the Isc on the basis of the high temperature of the PV module
- Thermal derating of the fuse
- Maximum return current of the PV modules installed

Fimer can supply fuse kits of different values; these kits could be ordered separately.

NOTE – Refer to **"Kit of recommended spare parts"** paragraph for further information about fuses kit.

NOTE – For effective calculation taking real installation conditions into account, refer to the documents supplied by the protection fuse manufacturer.

5.10.2.2 Operations preliminary to the connection of the PV generator

WARNING – In order to safely perform the preliminary operations before the connection to the PV generator, the connection of the ground protection cable **(10)/(25)** to the wiring box is mandatory.

ATTENTION – The installation must be performed by qualified installers and/or licensed electricians in accordance with the existing regulations in the country of installation and in accordance of all safety rules for performing electrical works. These activity is allowed ONLY with the appropriate PPE for carrying out this check (overall resistant to electric arc, dielectric helmet with visor, insulating gloves class 0, Protective overglove in leather EN420 – EN388, Safety shoes).

ATTENTION – The reverse polarity can cause severe damage.

Checking of leakage to ground of the photovoltaic generator:
Measure the voltage present between positive and negative pole of each string with respect to ground.
If a voltage is measured between an input pole and ground, it may be that there is a low isolation resistance of the photovoltaic generator and the installer will have to carry out a check to solve the problem.
Do not connect the strings if a leakage to ground has been detected, as the inverter might not connect to the grid.
Refer to **"Verification of ground leakage"** paragraph on this manual to know how to verify the leakage to ground of the photovoltaic generator.

Checking of strings voltage:
Measure the voltage present between positive and negative pole of each string.
If the open circuit voltage of the string is near the maximum value accepted by the inverter, consider that low ambient temperatures cause an increase in the string voltage (different according to the photovoltaic module used). In this case it is necessary to carry out a check of the sizing of the system and/or a check on the connections of the modules of the system (e.g.: number of modules in series higher than the design number).

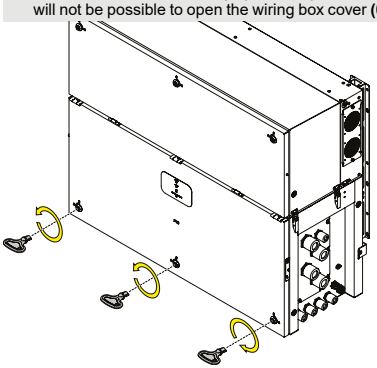
ATTENTION – Verify that the string voltage is the same in all the strings that are connecting to the same input channel. Voltage differences (of the strings connected in parallel) could reduce performance and unwanted opening of the fuses.

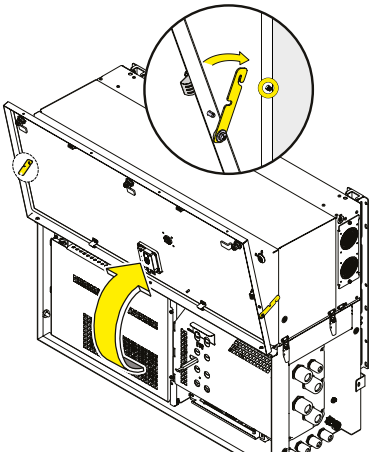
ATTENTION – Input voltages higher than the maximum value accepted by the inverter (see technical data table) may occur the damage of the inverter.

5.10.2.3 Checking the correct polarity of the strings:

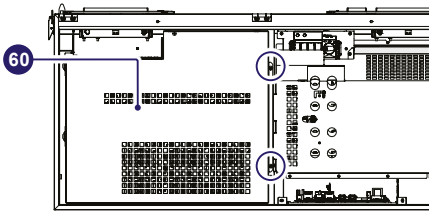
- Open the wiring box front cover **(07)**.

NOTE – Only for -S2, -SX2, SY2 versions: Set the wiring box AC disconnect switch **(09)** to OFF position; otherwise it will not be possible to open the wiring box cover **(07)**.

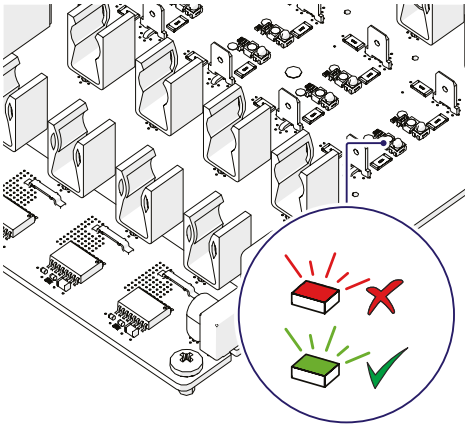




- Remove the internal DC Protective shield **(60)** by removing the two M5 screws.



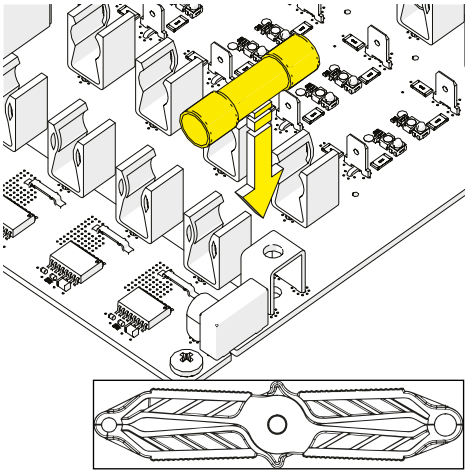
- Turn the DC disconnect switches **(15)** to OFF.
- Check for the absence of installed fuses on the positive side string fuses board **(19)** - **if present remove it!**
- Connect the strings and check that the GREEN LED corresponding to each positive fuses activates. The string will turn out to be inverted if the RED LED is ON. Check the strings one by one so to safely check which strings are inverted.



- After all the input strings have been checked, remove all connected strings and check that all LEDs will switch OFF.

⚠ **WARNING –** Pay attention to disconnect all connected input strings; otherwise high voltages will be present inside the inverter.

- Install the fuses (supplied) on the string fuses board **(19)** using the supplied fuse pliers (optional).



(Optional)

- Re-install the DC protective shield **(60)** by using the M5 screws previously removed (torque of 3 Nm).

5.10.2.4 Installation procedure for quick-fit connectors

In the inverter models, where the quick-fit connectors are used, is possible to find one of the following four types:

- Weidmüller PV-Stick
- Weidmüller WM4
- MultiContact MC4
- Amphenol H4.

The model of connectors installed on your inverter must be matched by the same model of the respective corresponding parts to be used (check the corresponding part on the manufacturer's website or with Fimer).

⚠ **WARNING –** To avoid damage to the equipment, when crimping cables to the connectors, pay particular attention to polarity.

⚠ **ATTENTION –** According to IEC 62548 (Photovoltaic (PV) arrays – Design requirements), connectors mated together in a PV system shall be of the same type from the same manufacturer, i.e. a plug from one manufacturer and a socket from another manufacturer or vice versa shall not be used to make a connection. Refer to document "String inverters - Product manual appendix" available on the website to find out the manufacturer and model of quick fit connector used on the inverter.

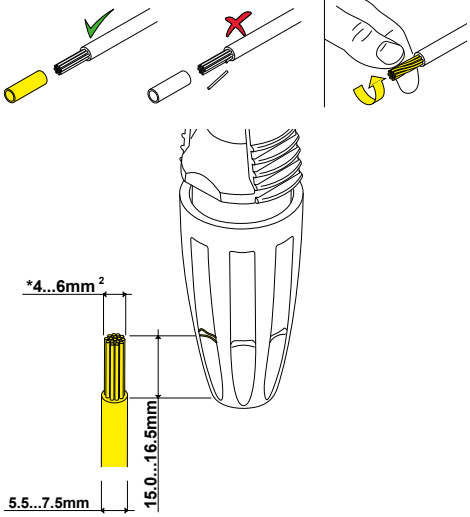
⚠ **ATTENTION –** Using mating parts that are not compliant with the quick fit connector models on the inverter could cause serious damage to the unit and lead to invalidation of the warranty.

NOTE – Complete assembly instructions and specification of quick-fit connectors could be found on manufacturer website.

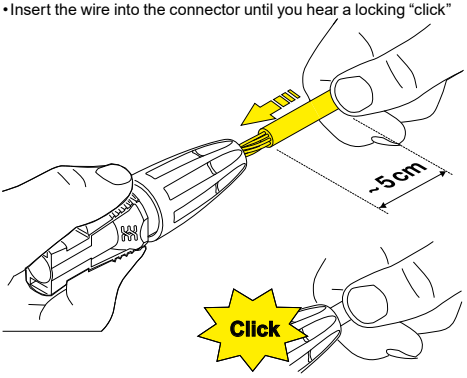
Installation of WEIDMÜLLER PV-Stick quick-fit connectors:

⚠ **ATTENTION –** Installation of Weidmüller PV-Stick connectors does not require any special tooling.

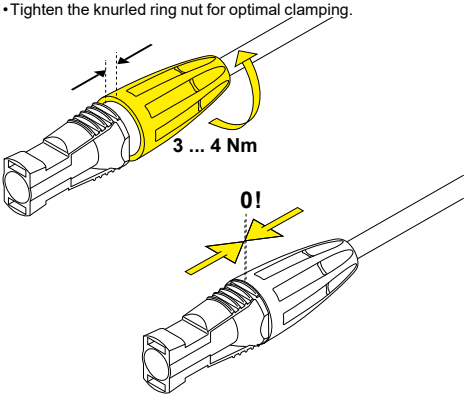
- Strip the cable to which you want to apply the connector (after verifying that it complies with the connector limits).



• Insert the wire into the connector until you hear a locking “click”



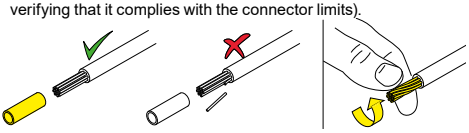
• Tighten the knurled ring nut for optimal clamping.

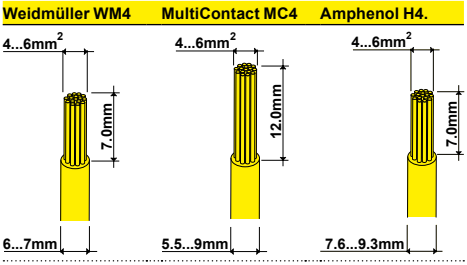


Installation of Weidmüller WM4, MultiContact MC4, Amphenol H4 quick-fit connectors:

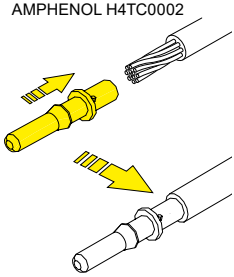
⚠ **ATTENTION –** Installation of WM4, MC4 and H4 connectors requires crimping to be carried out with suitable equipment.

• Strip the cable to which you want to apply the connector (after verifying that it complies with the connector limits).

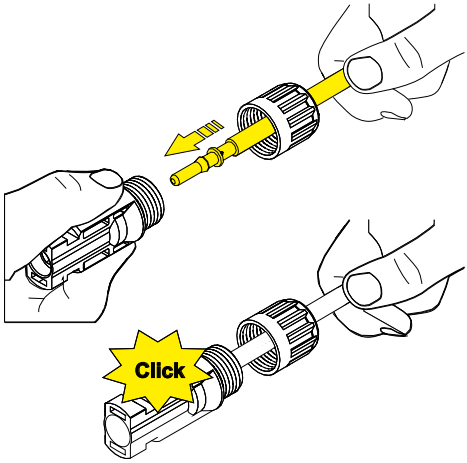




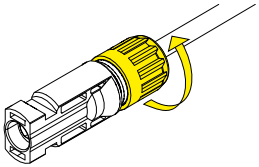
• Apply the terminal to the conductor using the designated pliers:
WEIDMÜLLER CTF PV WM4 - 1222870000
MULTI-CONTACT - 32.6020-19100
AMPHENOL H4TC0002



• Insert the cable with the terminal into the interior of the connector, until you hear the click indicating that the terminal is locked inside the connector

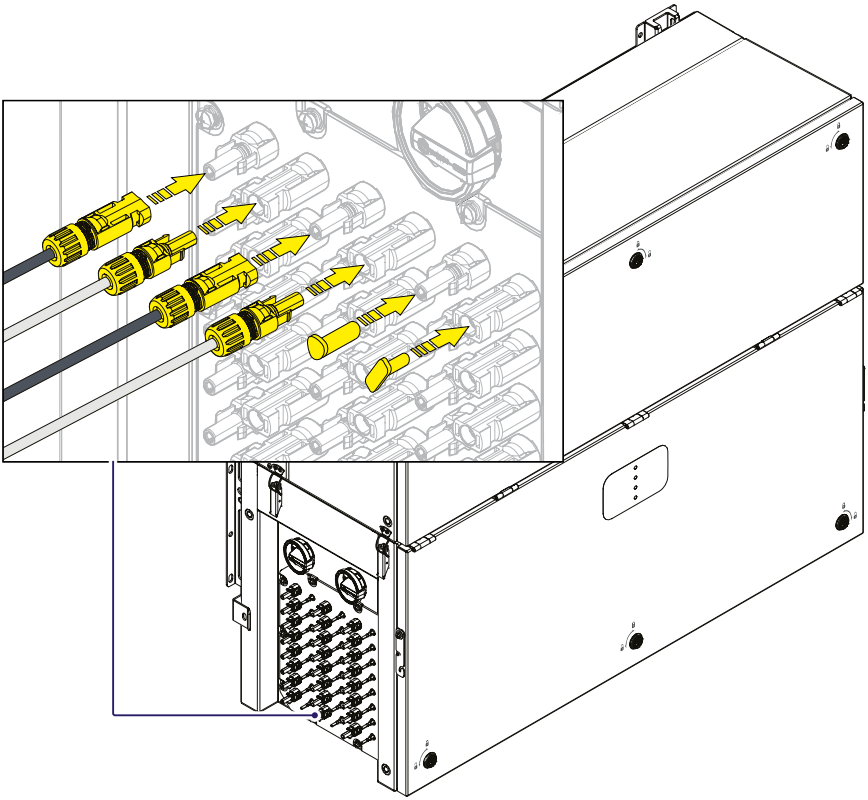


• Firmly tighten the cable gland with a torque of:
- 2.5Nm using the relevant tool WEIDMÜLLER - 1217280000
- 2.5Nm using the relevant tool MULTI-CONTACT - 32.6024
- 2.6-2.9Nm using the relevant tool AMPHENOL H4TW0001.



5.10.2.5 Connection of inputs

Connect all the strings required by the system, always checking the seal of the connectors.



⚠ **ATTENTION –** If any string inputs is not required check that protective caps are installed to the relative unused connectors. This is necessary for the inverter seal and to avoid any damage to the unused connectors which may be used at a later time.

⚠ **ATTENTION –** The quick fit connectors must be properly installed. After the installation make sure the connectors are correctly locked through the clips.

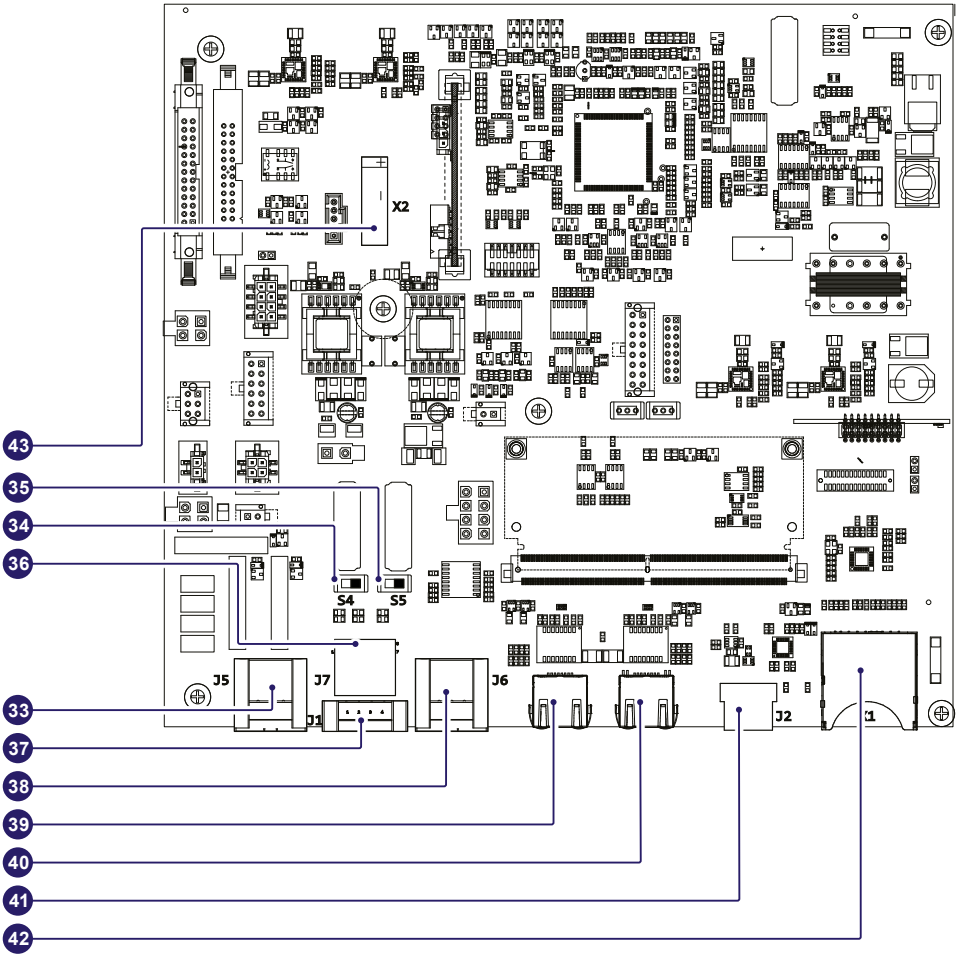
⚠ **ATTENTION –** The connections can also be made with the wiring box detached from the power module that can be connected later for commissioning. When working with the wiring box detached, pay particular attention to:
- presence of ground connection **(10)/(25)**
- the top of wiring box must always be protected in outdoor installations with proper IP66 protection covers (optional accessory content in "PVS Installation Kit", to be ordered separately). Refer to the dedicated **"Installations of IP66 protection covers for wiring box openings"** paragraph for further information about the installation procedure.

NOTE – Notes on the system sizing - Decisions on how to structure a photovoltaic system depend on a series of factors and considerations, such as the type of panels, the space availability, the future location of the system, energy production goals over the long term, etc. A configuration program that can help to correctly size the photovoltaic system is available on the Fimer website (http://stringsizer.fimer.com).

NOTE – When configuring DC input and during the installation it's needed to follow one basic rule to avoid possible output power derating: All MPPTs shall be populated connecting at least TWO string per each and configuration needs to be as much possible homogenous . Considering to connect 20 strings, proceed connecting same number of strings per MPPT and then connect the remaining strings in the selected MPPTs (4 MPPTs with 3 strings + 2 MPPT with 4 stings).

5.11 Connection of the communication and control signals

5.11.1 Communication and control board references

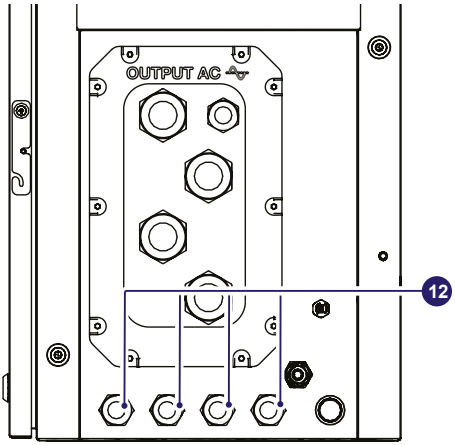


Terminal name	Terminal reference	Description
J5	33	Configurable relay connector (ALARM and AUX terminal block)
S4	34	RS485 Fimer service 120Ohm termination resistance selector switch (Fimer service only)
S5	35	RS-485 line 120Ohm termination resistance switch
J7	36	RS-485 connector (RJ45) (Fimer Service only) (*)
J1	37	Remote ON/OFF terminal block (*)
J6	38	RS-485 line terminal block
-	39	Ethernet connector 2 (RJ45)
-	40	Ethernet connector 1 (RJ45)
J2	41	USB connector
X1	42	SD card slot
X2	43	CR2032 Coin battery

(*) The RS-485 connector (RJ45) (Fimer Service only) **(36)** and the signal R1 on the Remote ON/OFF terminal block **(37)** are used to bring the signals on the external connector RS-485&Rem.ON/OFF (Service only) **(57)**.

5.11.2 Connections to the communication and control board

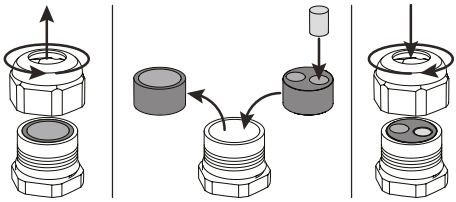
The communication and control signals cables must be connected to the communication and control board **(28)** inside the wiring box. To reach the board, on the right side of the wiring box, there are 4xM25 cable glands (cable range accepted 10-17mm) **(12)**.



⚠ **ATTENTION –** The connection of the communication and control signal cables should be done with no over-length of the above mentioned cables. Moreover the communication and control signal connection cables should not be in contact with live parts.

⚠ **ATTENTION –** Please ensure that all unused signal cable glands **(12)** are properly sealed by the IP66 plastic cap (pre-installed on cable glands).

As an alternative, the standard gasket of the M25 cable glands can be replaced with the two-hole gasket (supplied in the wiring box installation kit), that accepts two separate cables with a diameter of 6mm. If a hole is not used, it is necessary to install a plug (supplied plastic cylinder) to ensure the inverter's sealing.

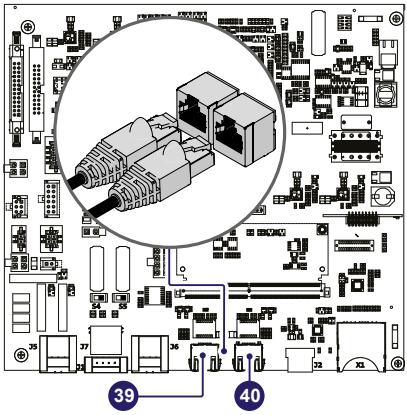


Check the tightness of the signal cable glands **(12)** (tightening torque 7.5 Nm) at the end of wiring operations.

5.11.3 Ethernet connection

The Ethernet connection allows a direct data transfer to the Fimer server for monitoring purpose. When the inverter will be powered on, network parameters are automatically set and the inverter starts the transmission of telemetry data to the Aurora Vision® CLOUD platform.
The connection of the ethernet communication cable must be made on the specific connectors **(39) (40)** located on the Communication and control board **(28)**. The two RJ45 connectors LAN1 and LAN2 are equivalent to each other and can be used for the input or for the output of the line connecting multiple inverters in a daisy-chain.

⚠ **ATTENTION –** If the inverters need to be connected in daisy chain or ring configuration use both connectors.

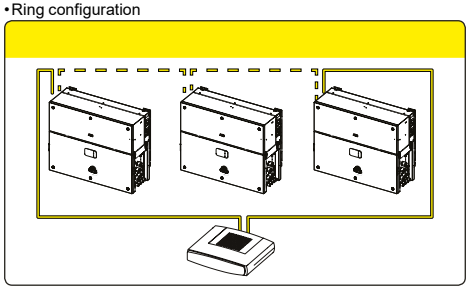


The cable should be compliant to the following specification:
- Cable type: Patch or Cross type, 100BaseTx, CAT5e (or higher). For outdoor application and/or in presence of strong electromagnetic sources it is advisable to use shielded cables with metallic shielded RJ-45 plug.
- UV-resistant if used outdoors
- Type of plug: metallic shielded RJ45.
- The maximum length that can reach these cables is 100 meters, and it is always advisable not to let them pass by the power cords to avoid interference with data transmission.
- Maximum inverters number connected over one single daisy chain is 40.

⚠ **ATTENTION –** For outdoor application and/or in presence of adverse weather/strong electromagnetic events it is advisable to use additional overvoltage protective devices.

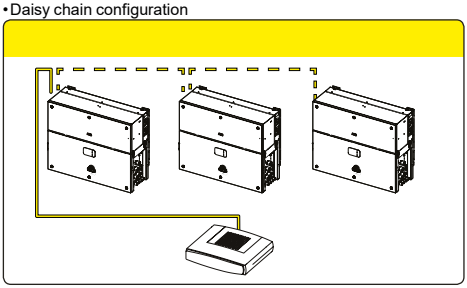
⚠ **ATTENTION –** In order to avoid earth loop (that could create communication issues) the shield of any Ethernet cable must be connected to the RJ45 plug in only one side, the other side of the shield should be leaved floating. This could be guaranteed by crimping the shield or the screen of the ethernet cable to the RJ45 connectors only at one end of each cables.

Three topologies of ethernet connection to the router are available:
- Ring configuration

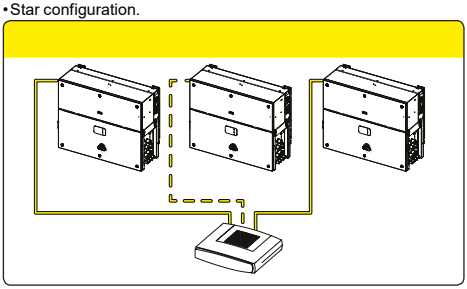


NOTE – In case inverters are connected to the networking switch with a ring topology is recommended to enable SPT protocol on the switch (Spanning Tree Protocol SPT (IEEE 802.1D) is enabled by default on inverters.

• Daisy chain configuration



• Star configuration.



ATTENTION – On each configuration the maximum length of the cable must be 100m between inverter – inverter and inverter – switch.

NOTE – For further information on the Ethernet connection refer to the Local Area Network standard IEEE802.3

NOTE – No initial setup is required to start data transmission to Aurora Vision.Internet connection is required to use all the Aurora Vision remote functionalities.

NOTE – Internet connection is required to use all the Aurora Vision remote functionalities.

NOTE – Please refer to Aurora Vision documents available on FIMER website for further information how to get an Aurora Vision account for remotely monitoring and managing the installed solar assets.

5.11.4 Serial communication connection (RS485-Slave mode)

NOTE – Please note that automatic settings of network parameters at turning on, embedded logging capability, automatic logger-free transferring of data to Aurora Vision Cloud and remote firmware update are provided over TCP/IP (Ethernet and/or Wi-fi) bus only.

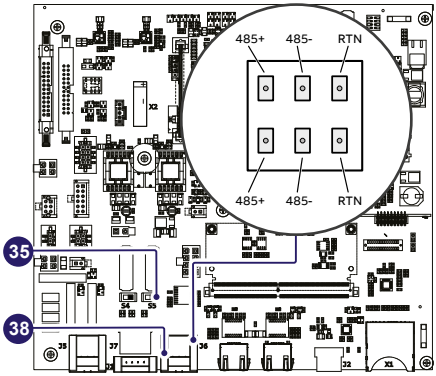
NOTE – The use of the inverters over the RS485 line is recommended in case of monitoring and controlling by using third party RS485 control systems.

NOTE – By default the RS485 port **(38)** is set as Slave mode. In case the port was set as "Master mode" it must configured through the Web User Interface (refer to **"CONNECTIVITY menu"** section) to use the RS485 as a serial communication line.

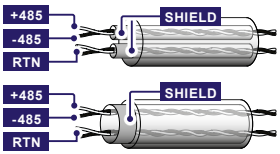
NOTE – RS485 line supports Modbus/RTU SUNSPEC compliant Modbus protocol.

The RS-485 port can be used to set up a line of communication which, when connected to a monitoring device, enables the operation of the photovoltaic system to be kept under control. Depending on the device used, monitoring can be local or remote.

The RS-485 serial communication line is available on the communication and control board **(28)** with two terminal blocks **(38)** for each serial line signal (+T/R, -T/R and RTN) so as to be able to make a daisy-chain connection ("in-out") of multiple inverters.

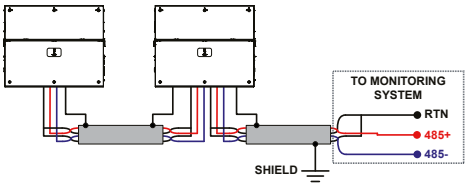


NOTE – For long distance connections is necessary to use a shielded twisted pair cable with characteristic impedance of Z0=120 Ohm as shown on the following table:



Signal	Symbol
Positive data	+ 485
Negative data	- 485
Reference	RTN
Shield	SHIELD

ATTENTION – Shield continuity must be provided along the communication line and must be grounded in a single point.

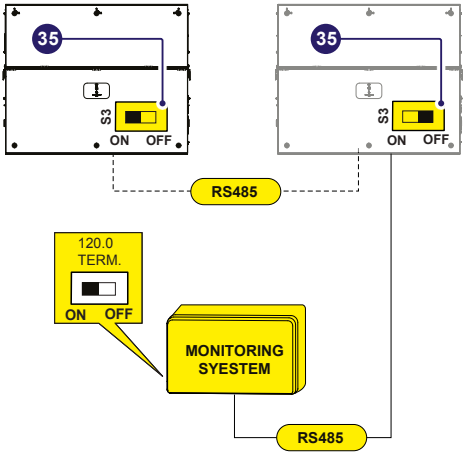


NOTE – It is the installer's responsibility to evaluate the use of an additional overvoltage protective devices on the communication line.

NOTE – For information on installation, compatibility and use of monitoring system, please refer to the specific documentation on the accessory components.

Connect all the units of the RS485 chain in accordance with the daisy-chain model observing the correspondence between the signals, and activate the termination resistance of the

communication line of the final element of the chain by switching the **(35)** switch to the ON position.



NOTE – The communication line must also be terminated on the first element of the chain which normally corresponds to the monitoring device.

NOTE – It is recommended not to exceed a length of 1000m for the communication line.

NOTE – The maximum number of inverters that can be connected to the same RS485 line is 62.

NOTE – In case of longer communication line and/or in case of a large number of connected inverters to the same line it could be necessary to add a RS485 amplifier to guarantee the performance of the communication line.

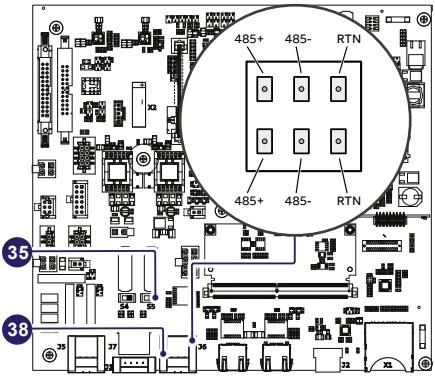
5.11.5 Serial communication connection (RS485-Master mode)

NOTE – By default the RS485 port **(38)** is set as Slave mode. In case the port was set as "Master mode" it must configured through the Web User Interface (refer to **"CONNECTIVITY menu"** section) to use the RS485 as a serial communication line.

The RS485 port can either be used for connecting supported accessories (like weather station): in this case data from accessories will be logged and transferred to the cloud by inverter itself (master mode).
This will allow the inverter to serve as a logger for Fimer accessories.

NOTE – For more information on connecting the accessories to the RS485 terminal block, refer to the accessory product manual or contact Fimer customer support.

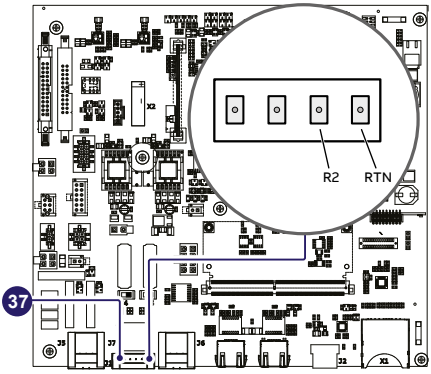
Connection of the R485 communication line is made using the terminal block connectors **(38)** (485+, 485-, RTN).
Set the switch of the termination resistance **(35)** to"ON" position.
When an accessory is connected it must be added and configured into the "Monitored device" list on the Web User Interface ("CONNECTIVITY > RS485" refer to **"CONNECTIVITY menu"** paragraph to further information).



5.11.6 Remote control connection

The connection and disconnection of the inverter to and from the grid can be controlled through an external control.

The function must be enabled via web server user interface. If the remote control function is disabled, the switching on of the inverter is dictated by the presence of the normal parameters that allow the inverter to connect to the grid.



If the remote control function is on, besides being dictated by the presence of the normal parameters that allow the inverter to connect to the grid, switching on the inverter also depends on the state of the R2 terminal compared to the RTN terminal present on the connector of the terminal block **(37)** of the communication and control board **(28)**.

When the R2 signal is brought to the same potential as the RTN signal (i.e. by making a short circuit between the two terminals of the connector), this causes the inverter to disconnect from the grid.

Since this is a digital input, there are no requirements to be

observed as regards cable cross-section (it only needs to comply with the sizing requirement for passing cables through the cable glands and the terminal connector).

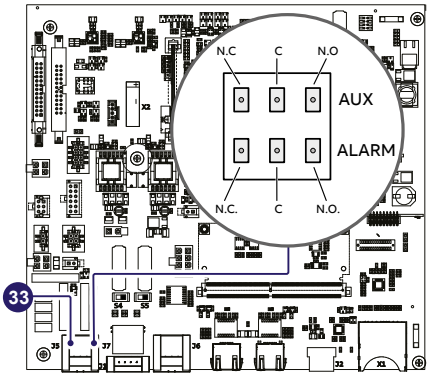
The external switch used for Remote ON/OFF should be rated for DC low voltage, low current application (the minimum switching current capability should be 1mA or lower).

READ THE MANUAL – For further information regarding the configuration and use of the Remote control terminal block, please refer to the user manual.

5.11.7 Configurable Relay connection (ALARM and AUX)

The inverter is equipped with 2 configurable relays terminal blocks **(33)** with configurable activation.

It can be connected with normally open contact (being connected between the NO terminal and the common contact C) and with normally closed contact (being connected between the NC terminal and the common contact C).



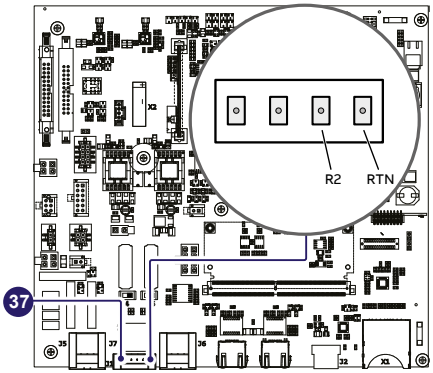
Different types of devices (light, sound, etc.) can be connected to the relay, provided they comply with the following requirements:

ALARM and AUX terminal block requirements	
Alternating current	Maximum Voltage: 160 Vac / Maximum Current: 6 A
Direct current	Maximum Voltage: 30 Vdc / Maximum Current: 3 A
Cable requirements	Conductor cross-section: from 0.08 to 1.3 mm²

5.11.8 Demand Response Mode 0 (AS/NZS 4777.2)

Where requested by the AS/NZS 4777.2 standard, it's possible to use the remote terminal block **(37)** for the Demand Response Mode 0 (DRM0) functionality.

The terminals to be used to connect the inverter to the distribution grid are R2 and RTN.



NOTE – AS4777: If DRM0 support is specified, the inverter may only be used in conjunction with a the FIMER DRM0 Interface.

NOTE – Visit www.fimer.com for more information on the DRM0 interface.

ATTENTION – In case of the DRM0 function is activated without the proper wiring of the remote terminal block **(37)**, the inverter will no longer be able to connect to the grid. For further information regarding the DRM0 function refer to the AS/NZS 4777 standard.

EN

6. Instruments

6.1 General conditions

The first rule to prevent damage to the equipment and to the operator is to have a thorough knowledge of the instruments. We, therefore, advise that you carefully read this manual. If you are not sure about any information in this manual, please ask Fimer Service for more detailed information.

FORBIDDEN – Do not use the equipment if:
- you do not have suitable qualifications to work on this equipment or similar products;
- you are unable to understand how it works;
- you are not sure what will happen when the buttons or switches are operated;
- you notice any operating anomalies;
- there are doubts or contradictions between your experience, the manual and/or other operators.

ATTENTION – Fimer cannot be held responsible for damage to the equipment or the operator if it is the result of lack of knowledge, insufficient qualifications or lack of training.

6.2 Description of LED panel



POWER
Indicates that the inverter is functioning correctly.
When the unit is commissioned, while the grid is checked, this LED blinks. If a valid grid voltage is detected, the LED remains continuously lit, as long as there is sufficient sunlight to activate the unit. Otherwise, the LED will continue to blink until the sunlight is sufficient for activation.

ALARM
Indicates that the inverter has detected an anomaly. This type of problem is highlighted in the Web User Interface and FIMER Installer for Solar Inverters APP.

GFI
The “GFI” (ground fault) LED indicates that the inverter has detected a ground fault in the DC side photovoltaic generator. When this fault is detected, the inverter immediately disconnects from the grid.

WLAN/LAN
Indicates the status of the Wireless or Ethernet communication lines.

NOTE – The LEDs, in various multiple available combinations, can signal multiple conditions other than the original single condition; see the various descriptions explained in the **“LEDs behaviour”** paragraphs on this manual.

6.3 User interface

6.3.1 Fimer Installer for Solar Inverters

Fimer Installer for Solar Inverters APP allows to:
Commission multiple inverters and set the system parameters.
• Update the inverter firmware.
• Compatible with Android devices only.

6.3.2 Integrated Web User Interface

The integrated Web UI is accessible via wireless channel by using any WLAN enabled standard device (PC, smartphone, tabled,….) and allow to:
• Commission a single inverter and to set the system parameters.
• Update the inverter firmware.

6.3.3 Aurora Vision Plant Management Platform

In addition to the local user interfaces, the inverter could be remote monitored and managed via Aurora Vision Plant Management Platform cloud. Aurora Vision offert includes:
- Plant Portfolio Manager: web portal for solar professional.
- Plant Viewer: single web page for casual user.
- Plant Viewer for Mobile: mobile application for plant monitoring.
- Fimer Energy Viewer: mobile application for plant monitoring.
- Kiosk view: single HTML5 page for public visualization of plant data.
- API: web based tool for enabling the sharing of the data with a third party data.

6.4 Measurement tolerance

The data supplied by the inverter may differ from measurements taken by certified measuring instruments (e.g. output meters, multimeters and grid analysers); since the inverter is not a measuring instrument it has wider tolerances for the measurements it makes.

The tolerances are generally:
- ±5% for real-time measurements with output power below 20%
- ±3% for real-time measurements with output power above 20%
- ±4% for all statistical data.

7. Operation

7.1 General conditions

Before carry out any operation on the equipment, it is necessary to have a thorough knowledge of the **"Instruments"** chapter and the functions that might have been enabled in the installation process.
The equipment operates automatically without the aid of an operator; the operating state should be controlled through the equipment's instrumentation.

⚠ **ATTENTION –** The interpretation or variation of some data is reserved exclusively for specialized and qualified staff.

During operation, make sure that environmental and storage conditions have not changed over time and that the equipment is not exposed to adverse weather conditions (see **"Installation"** chapter).

7.2 Commissioning

Before proceeding with commissioning, make sure that you have carried out all the checks and verifications indicated in the previous chapters.

This inverter can be powered both with DC or (only in case PVS-100/120 PRE-CHARGE BOARD KIT is installed) AC sources. In case of DC source is used, make sure that irradiation is stable and adequate for the inverter commissioning procedure to be completed.

At the first activation of the inverter the firmware version could be syncronized between power module and wiring box. During this phase the LEDs "Power" "Alarm" and "GFI" blinks together every 1 second. This process is absolutely normal and must be completed without interruption. A switch-off of the system during this process could cause serious damage to the inverter.

Do not place objects of any kind on the inverter during operation! Do not touch the heat sink while the inverter is operating! Some parts may be very hot and could cause burns.

Commissioning can be carried out in two different ways:

- Via Fimer Installer for Solar Inverters APP
  Recommended mobile APP for commissioning a single inverter as well as a multi-inverter solar plant.
- Via Web UI (access point wireless network)
  Web User Interface enabling the parameters settings and to perform commissioning of a single inverter (multi inverter support is not provided).
  Recommended as alternative method for performing single inverter commissioning.

7.2.1 Commissioning via Installer for Solar Inverters mobile APP

"Installer for Solar Inverters" is the new advanced Fimer mobile APP that allows to simplify commissioning, setting parameters and to make troubleshooting of Fimer string multi-inverters in large scale solar plants.

Even in case of single inverter installation it can be consider the most suitable professional tool to be used.

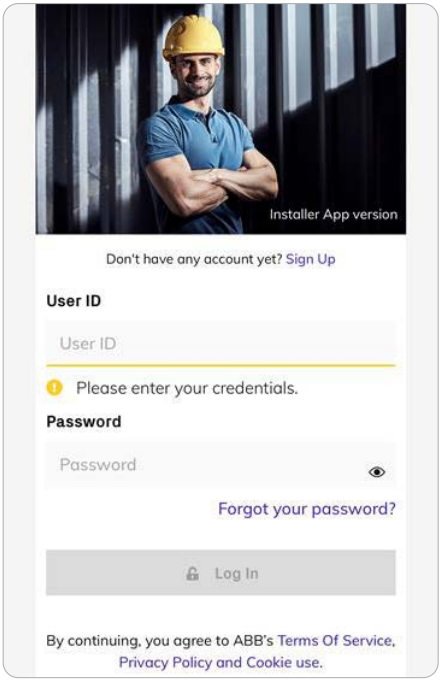
"Installer for Solar Inverters" mobile APP is available for mobile devices with an Android version of 6.0.1 or greather (iOS mobile devices support will come soon) and could be downloaded and installed from Play Store.

Commissioning procedure:

It's highly recommended to connect the inverters in ethernet daisy chain (with or without ring) before executing the commissioning procedure.
Make sure that all the inverter being commissioned features the last firmware version (the update can be executed via Installer for Solar Inverters mobile APP).

The main steps to complete the commissioning procedures are listed below:
- Install the "Installer for Solar Inverters mobile APP" on mobile device.
- Login to the Aurora Vision installer account.

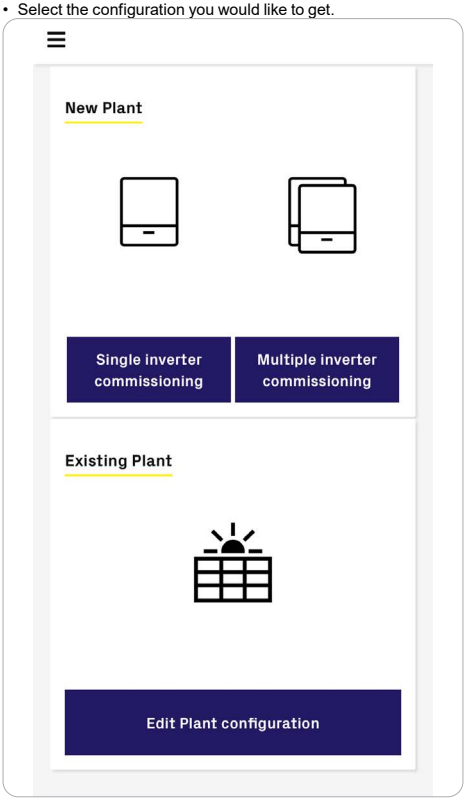
NOTE – The account can be created in the mobile APP by following the dedicated wizard procedure.



- Close the DC disconnect switches **(15)** to supply the inverter with input voltage from the photovoltaic generator or (only in case PVS-100/120 PRE-CHARGE BOARD KIT is installed) close the AC switch downstream of the inverter (and AC disconnect switch **(09)** for the -S2, -SX2, SY2 wiring box version) to supply the inverter with AC grid voltage. In the pre-commissioning phase the “Alarm” LED keeps quickly flashing, “Power” and “GFI” LEDs are OFF.

⚠ **ATTENTION –** This inverter can be powered both with DC or (only in case PVS-100/120 PRE-CHARGE BOARD KIT is installed) AC sources. In case of DC source is used, make sure that irradiation is stable and adequate for the inverter commissioning procedure to be completed.

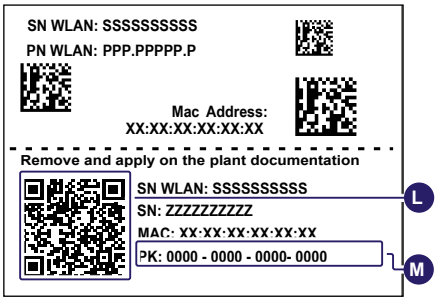
- Select the configuration you would like to get.



- **Manual claiming of the inverters:**

Single inverter:
The claiming process defines which inverter has to be commissioned and it can be executed by scanning the QR codes (L) (printed on the Communication identification label).
Multiple inverters: The claiming process of multiple inverters requires to select which inverters add into the working list. (Please insert no more than 40 inverters by time can be configured together.)

Multiple inverters:
The claiming process of multiple inverters requires to select which inverters add into the working list. (Please insert no more than 40 inverters by time can be configured together.)

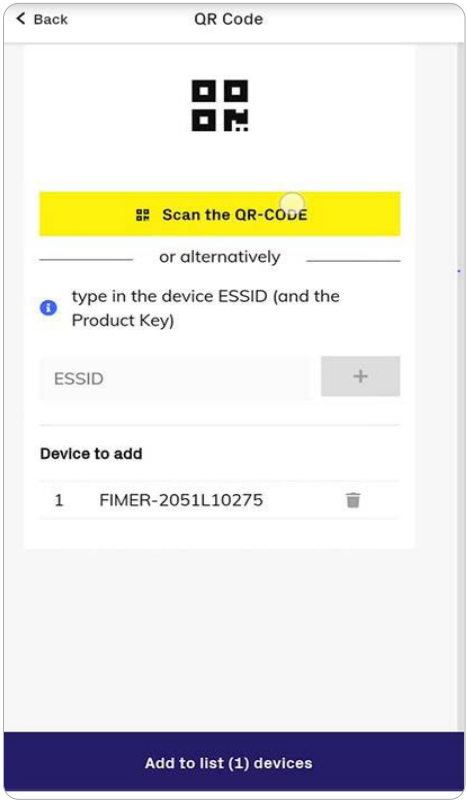


As an alternative of QR code scanning, claiming process can be executed by selecting manually the ESSIDs associated to the Wi-Fi networks generated by each inverter to commission and inserting Product key (M) when requested:

NOTE – It’s required to digit also the dash “-” characters of the Product Key in the password field.

NOTE – The steps below are valid for executing any other available funtionalities of the Installer for Solar Inverters mobile APP.

- Tap “Add to list (x) devices”.

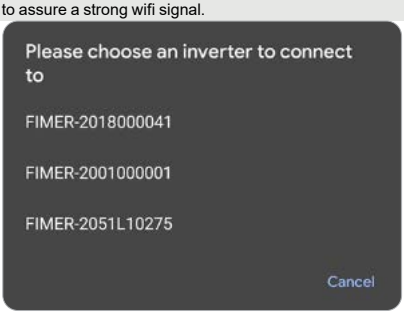


NOTE – Both QR code and Product key are provided on the Communication identification label applied onto each inverter or applied on the plant documentation (if this has been done during installation).

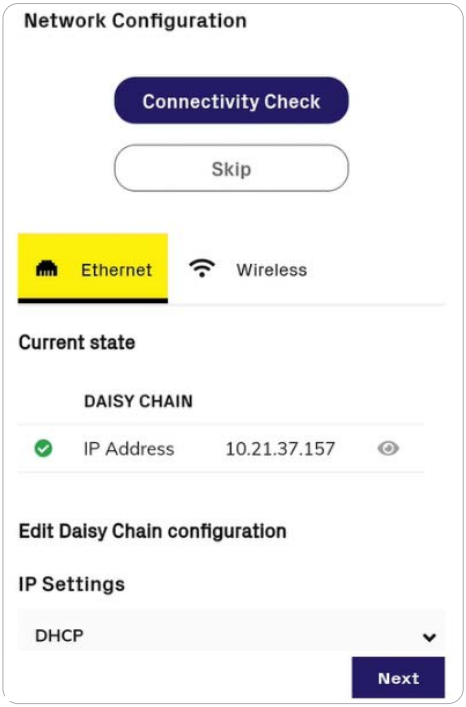
NOTE – It's required to digit also the dash "-" characters of the Product Key in the password field.

NOTE – It's recommend to create a plant map and apply the Communication Identification label (the Communication Identification label is divided in two separate parts by a dashed line) of each inverters in the right position of that map.

NOTE – In case of multi inverters commissioning is necessary to select which inverter the mobile APP should connect to. Be careful to stay in front of the selected inverter to assure a strong wifi signal.

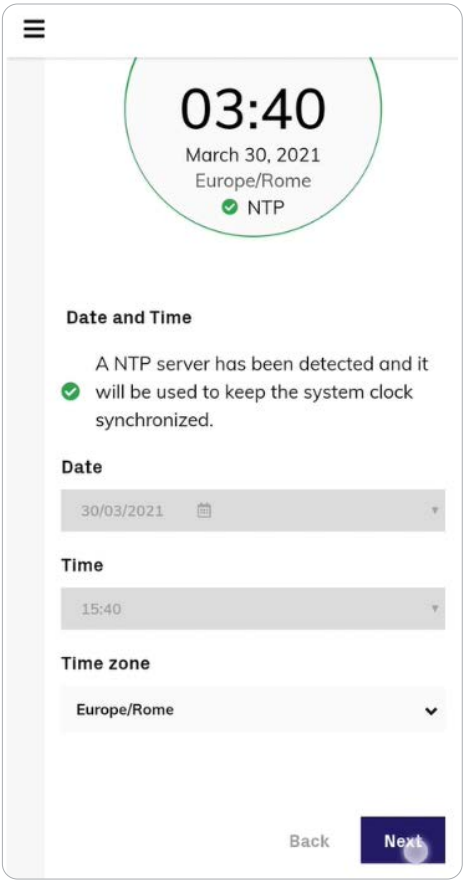


- Configure Ethernet or Wireless settings according to the newtorking parameters of the plant.
- For a further check of the correct inverter configuration click on "Connectivity Check"



NOTE – When the networking configuration is concluded, it is possibile test the inverter connectivity to internet and Aurora Vision cloud services.

- Time zone, date and time are automatically retrieved, please check if they are correctly filled before continuing with the next step.

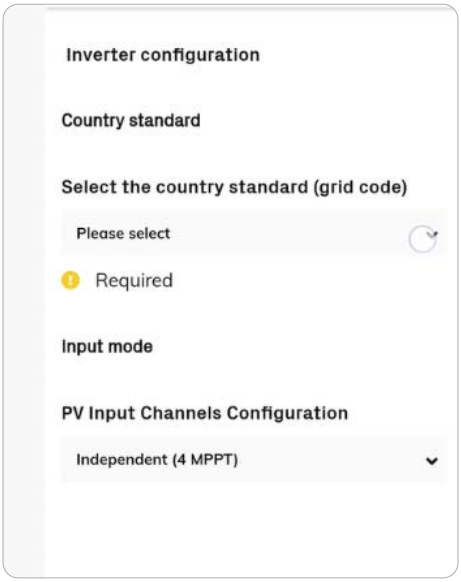


- Tap the "Commissioning" button.

- Enter the IP Settings (DHCP or Static), Network SSID and password.
  Tap on "Connect" button to connect the inverter to the local wireless network.

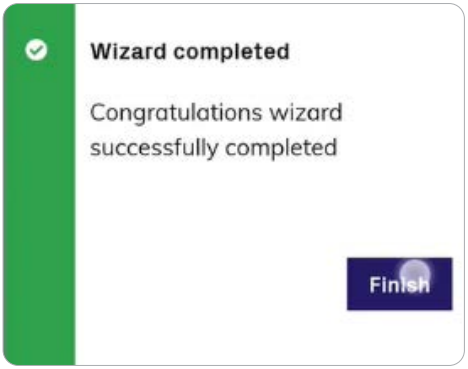
NOTE – If the inverter should not be connected to a Local wireless network tap on "Skip this step" button (the inverter connection remains point-to-point).

- Select the country standard and the configuration of the input channels and confirm the setting by clicking “DONE”.

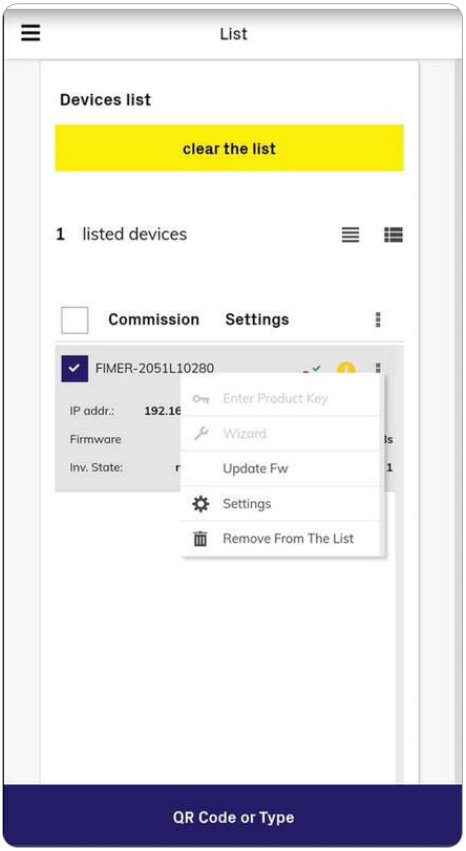


NOTE – For compliance with AS/NZS 4777.2:2020 please select from Australia Region A/B/C or New Zealand. Please contact your local grid operator on which region to select.

- The image shows the successful commissioning.



- Update firmware (if necessary). Tap on “Firmware update” for aligning the firmware of all the inverters in the list to the last version (internet connection is needed for inverters).



In the SETTINGS section it’s possible to access the following sub-menus:

RS485 (allows to set address, baud rate, parity mode and communication protocol.

LAN (it’s possible to view the status and change the daisy chain configuration of the two ethernet ports of the inverter).

WLAN (it’s possible to view the status of the two wireless channels of the inverter, and to disconnect the channel 2).

Monitored Devices (it’s possible to add and config the connected supported accessories to the RS485. In this case, modify the data on the rs485 tab according to the characteristics of the inserted device).

Country standard (It’s possible to modify the Country Standard)

NOTE – For any other specific settings of parameters of single inverters please refer to **“Web User Interface menu structure”** paragraph.

NOTE – In the Export Limitation section is possible to enable and configure the active power control

After the commissioning via the Fimer Installer for Solar Inverters APP is completed, the inverter changes the behaviour of the “Power” and “Alarm” LEDs **(08)** , in relation of the input voltage value:

Input voltage	LED Status	Description
Vin < Vstart	Power = Flashing Alarm = OFF	The input voltage is not sufficient to enable connection to the grid.
Vin > Vstart	Power = Flashing Alarm = ON	The input voltage is sufficient to enable connection to the grid: the inverter waits for the grid voltage to be present to make the connection to the grid.

- Depending of the supply source used to complete the installation wizard steps, close the disconnect switch of missing voltage sources: In case of missing AC source close the AC switch downstream of the inverter (and AC disconnect switch **(09)** for the -S2, -SX2, SY2 wiring box versions); In case of missing DC source close the DC disconnect switches **(15)**.

- When the input voltage is sufficient to allow the connection to the grid, the inverter will check the grid voltage, measure the isolation resistance of the photovoltaic field with respect to ground and performs other auto-diagnostic checks. During the preliminary checks on the parallel connection with the grid, the “Power” LED keeps flashing, the “Alarm” and “GFI” LEDs are OFF. The inverter will ONLY connect to the grid if all parameters fall within the ranges foreseen by current regulations.

- If the outcome of the preliminary checks to grid synchronization are positive, the inverter connects and starts to export power to the grid. The “Power” LED remains fixed on while the “Alarm” and “GFI” LEDs are OFF.

NOTE – To address any problems that may occur during the initial stages of operation of the system and to ensure the inverter remains fully functional, you are advised to check for any firmware updates in the dedicated section of web user interface (**“SERVICE TOOLS menu”**), via Installer for Solar Inverters APP or in the download area of the website www.fimer.com or at https://registration.solar.fimer.com (refer to **“Admin Plus level access”<** paragraph).

7.2.2 Commissioning Via Web User Interface - Wireless connection

CONNECTION TO THE INVERTER - WIRELESS

Commissioning could be carried out via wireless connection through the inverter's Web User Interface. Initial setup of the system must therefore be carried out via a tablet, notebook or smartphone with a wireless connection.

- Close the DC disconnect switches **(15)** to supply the inverter with input voltage from the photovoltaic generator or (only in case PVS-100/120 PRE-CHARGE BOARD KIT is installed) close the AC switch downstream of the inverter (and AC disconnect switch **(09)** for the -S2, -SX2, SY2 wiring box version) to supply the inverter with AC grid voltage. In the pre-commissioning phase the "Alarm" LED keeps quickly flashing, "Power" and "GFI" LEDs are OFF.

⚠ **ATTENTION –** This inverter can be powered both with DC or (only in case PVS-100/120 PRE-CHARGE BOARD KIT is installed) AC sources. In case of DC source is used, make sure that irradiation is stable and adequate for the inverter commissioning procedure to be completed.

- Once powered, the inverter will automatically create a wireless network (approx. 60 seconds after switching-on).

- Enable the wireless connection on the device which is being used for the board setup (tablet, smartphone or PC) and connect it to the Access Point created by the inverter system: the name of the wireless network created by the system that the connection should be established with, will be: ABB-XX-XX-XX-XX-XX-XX
where "X" is a hex digit of the wireless MAC address (MAC address can be found on the "Communication Identification Label" placed on the side of the inverter).

NOTE – The screens shown below pertain to a tablet with the Android operating system. Screens on other devices or operating systems may differ.



- When required enter the PRODUCT KEY (printed on the "Communication Identification label" and applied during the commissioning phase to the plant documentation) as access point password.

NOTE – It's required to digit also the dash "-" characters of the Product Key in the password field.

NOTE – In case of need, product key can be recovered by Aurora Vision Cloud or by calling Fimer technical support.

- Open an internet browser (recommended browser: Chrome versions from v.55, Firefox versions from v.50) and enter the pre-set IP address 192.168.117.1 to access the Web User Interface. Web User interface has easy wizard procedure to commission the inverter.

NOTE – The language of the wizard could be changed by clicking on the upper status bar

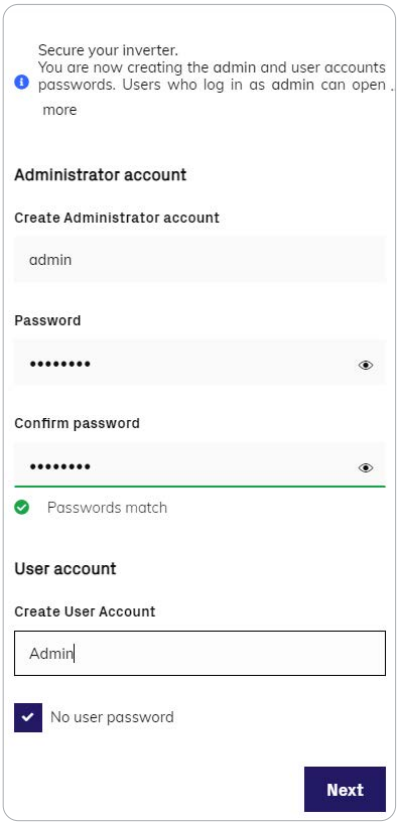


7.2.2.1 STEP 1 - Administrator/User login credentials

- Set the Administrator account user and password (minimum 8 character for password):
  Administrator account can open and view the contents of photovoltaic site. Additionally, they can change inverter settings.
  User and password are CASE SENSITIVE.

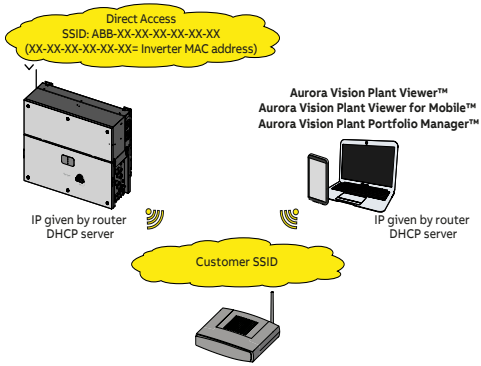
- Set the User account user and (optional) password (minimum 8 character for password):
  User account can only read data. It cannot make any changes.
  User and password are CASE SENSITIVE.

- Click on “NEXT” to go to next step.



7.2.2.2 STEP 2 (Optional) - Wireless network connection.

As described on **“Ethernet connection”** paragraph the recommended way to get all the installed inverters communicating to the internet and Aurora Vision Cloud is creating a wired Ethernet daisy chain bus. Anyway, in case of a few inverters installation in suitable environment, it is also possible to connect each inverter of the plant to a Wi-Fi router without using any cable.



- The AP is still available and the user can connect to the inverter.
- In this scenario the Router gives IPs according to its own rules.
- Inverter is reachable by IP.
- Domain name can be used only if the Router permits multicast

During the installation wizard, the installer will be asked to connect the inverter to a Wi-Fi router. By selecting connection to Wi-Fi router the inverter will turn on a second Wi-Fi radio channel in order to enable connection to the Wi-Fi router.

NOTE – By selecting “Skip this step” button the second radio channel will be kept off and you will need to use a wired Ethernet daisy chain bus to allow the inverters to communicate.

Two Wi-Fi radio channels enables simultaneous wireless connection; one static IP address connection between inverter and installer devices and one between inverter and switch/router.

NOTE – Whatever option is used to connect the inverter to the switch/router (Ethernet cable or Wi-Fi) it will be always possible to access to the Web User Interface by connecting its own device (Smartphone, tablet or laptop) to the same switch/router, and reaching the inverter by using the assigned IP address or inverter’s host name.

NOTE – The IP address assigned to the inverter may vary or may be unknown. Please contact the IT administrator for getting the assigned IP address.

NOTE – Differently from the assigned IP address, the «Host Name» of the inverter is does not change over time.

NOTE – In order to use the «Host Name» as an alternative to the assigned IP address, for accessing to the inverters Web User Interface from the router, the Domain Name System (DNS) service shall be available and activated.

NOTE – The Host Name associated to each Fimer inverter is structured as indicated below:
ABB-logger ID.LOCAL
where logger ID stands for the MAC address indicated on the “Communication identification lable” applied on the inverter.

The parameters related to the customer wireless network (setted on the router) that must be known and to be entered during this step are:

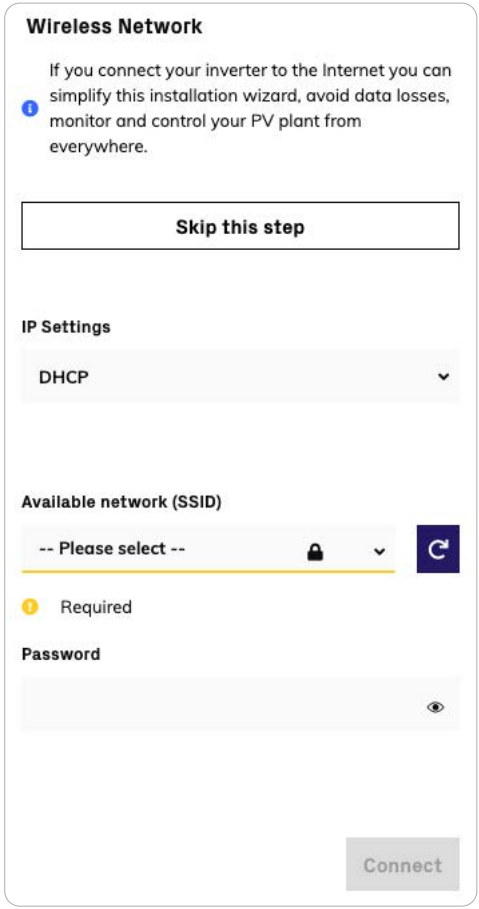
- IP Settings (DHCP or Static):
  If you select the DHCP function (default setup) the router will automatically assign a dynamic IP address to the inverter whenever it tries to connect to the user network.

With Static, the user can assign a fixed IP address to the system. The data which has to be entered in order for IP static address assigning to take place will appear. Complete the additional fields at the bottom of the screen (all the fields are mandatory with the exception of the secondary DNS server).

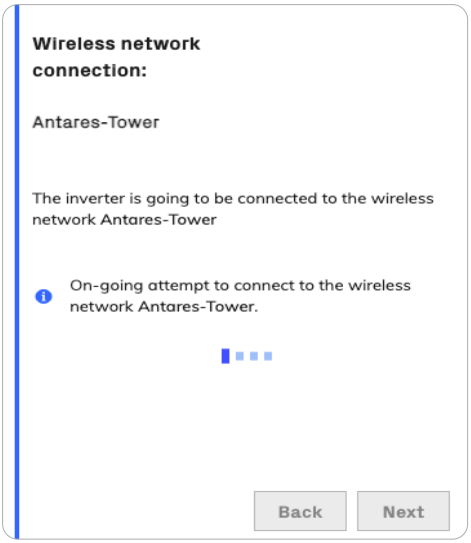
- Available networks (SSID):
  Identify and select your own (customer) wireless network from all those shown in the SSID field (you can carry out a new search of the networks that can be detected with the Update button).
  Once the network has been selected, confirm.

- Password (Wireless network password):
  Enter the password for the destination network (if necessary) and start the connection attempt (it will take a few seconds).

- Click on “Connect” button.



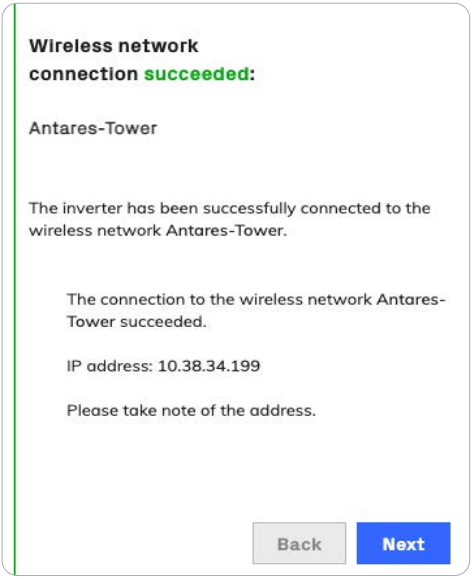
- A message will ask for confirmation. Click “Next” to connect the inverter to the wireless network.



Once the inverter is connected to the wireless network, a new message will confirm that the connection is acquired.

The message provides the IP Address assigned by the wireless network router to the inverter which can be used each time you want to access the Web User Interface.
Take note of it.

- Click on “Next” button to proceed to the next stage of the configuration wizard.

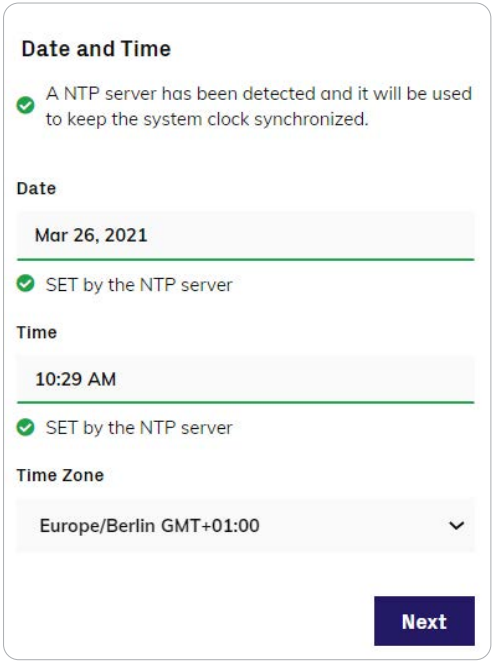


NOTE – The IP address assigned may vary for reasons related to the wireless router setup (for example, a very brief DHCP lease time). If verification of the address is required, it is usually possible to obtain the client list (and the corresponding IP addresses) from the wireless router administration panel.

If the inverter loses the connection with the wireless network (and therefore, loses the internet connection), it will once again enable its own access point.

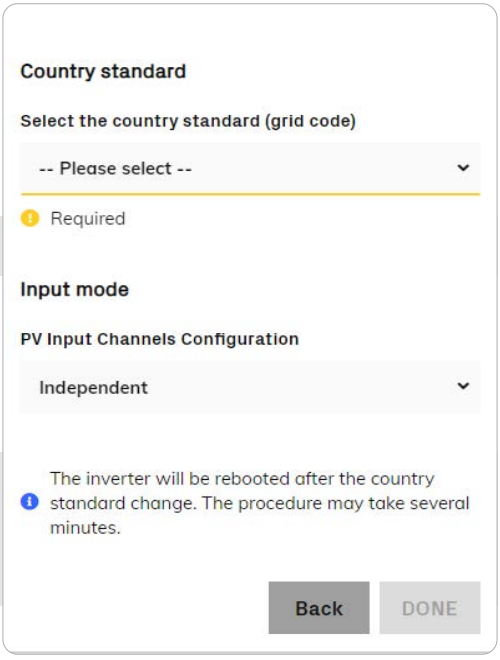
NOTE – The most common causes of losing connectivity might be: change of wireless network password, faulty or unreachable router, replacement of router (different SSID) without the necessary setting updates.

7.2.2.3 STEP 3 - Date, Time and Time zone.



- Set the Date, Time and Time zone (The inverter will propose these fields when available; when it's not possible for the inverter to detect the time protocol, these fields have to be manually entered).
- Click on "Next" button to proceed to the next stage of the configuration wizard.

7.2.2.4 STEP 4 - Inverter country standard and Input configuration



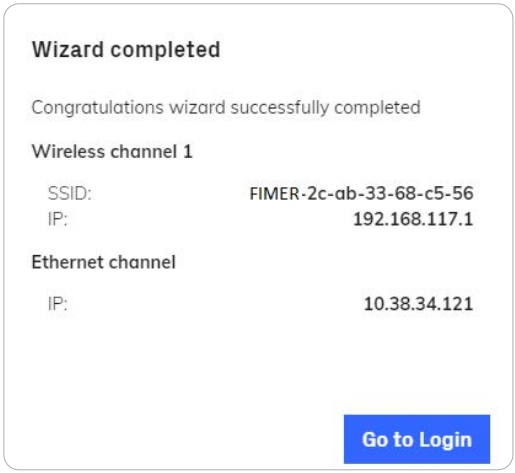
- Country standard (selection of grid standard):
  Set the grid standard of the country in which the inverter is installed.

NOTE – For compliance with AS/NZS 4777.2:2020 please select from Australia Region A/B/C or New Zealand. Please contact your local grid operator on which region to select.

- Input mode:
  Parallel or Indipendent mode (parallel mode is only available on standard and S2 models).
- Confirm the settings by clicking "END"; the inverter will reboot.

NOTE – After the grid standard is set you have 24 hours to make any changes to the grid standard value; 24 hours later the Country Standard will be locked. In case of subsequent needs of change of grid standard, the remaining time shall be reset in order to have the 24 hours of unlocked operation available again (refer to "USER menu" and "SERVICE TOOLS menu" sections of Web UI to know how to unlock the Country Standard).

• A notification will confirm that the wizard is completed.



• After the wizard procedure is completed, the inverter changes the behaviour of the “Power” and “Alarm” LEDs **(08)**, in relation of the input voltage value:

Input voltage	LED Status	Description
Vin < Vstart	Power = Flashing Alarm = OFF	The input voltage is not sufficient to enable connection to the grid.
Vin > Vstart	Power = Flashing Alarm = ON	The input voltage is sufficient to enable connection to the grid: the inverter waits for the grid voltage to be present to make the connection to the grid.

• Depending of the supply source used to complete the installation wizard steps, close the disconnect switch of missing voltage sources: In case of missing AC source close the AC switch downstream of the inverter (and AC disconnect switch **(09)** for the -S2, -SX2, SY2 wiring box version); In case of missing DC source close the DC disconnect switches **(15)**.

• When the input voltage is sufficient to allow the connection to the grid, the inverter will check the grid voltage, measure the isolation resistance of the photovoltaic field with respect to ground and performs other auto-diagnostic checks. During the preliminary checks on the parallel connection with the grid, the “Power” LED keeps flashing, the “Alarm” and “GFI” LEDs are OFF. The inverter will ONLY connect to the grid if all parameters fall within the ranges foreseen by current regulations.

• If the outcome of the preliminary checks to grid synchronization are positive, the inverter connects and starts to export power to the grid. The “Power” LED remains fixed on while the “Alarm” and “GFI” LEDs are OFF.

NOTE – To address any problems that may occur during the initial stages of operation of the system and to ensure the inverter remains fully functional, you are advised to check for any firmware updates in the dedicated section of web user interface (**“SERVICE TOOLS menu”**), via Installer for Solar Inverters APP or in the download area of the website www.fimer.com or at https://registration.solar.fimer.com (refer to **“Admin Plus level access”** paragraph).

7.3 LEDs behaviour



POWER
Indicates that the inverter is functioning correctly.
When the unit is commissioned, while the grid is checked, this LED blinks. If a valid grid voltage is detected, the LED remains continuously lit, as long as there is sufficient sunlight to activate the unit. Otherwise, the LED will continue to blink until the sunlight is sufficient for activation.

ALARM
Indicates that the inverter has detected an anomaly. This type of problem is highlighted in the Web User Interface and FIMER Installer for Solar Inverters APP.

GFI
The “GFI” (ground fault) LED indicates that the inverter has detected a ground fault in the DC side photovoltaic generator. When this fault is detected, the inverter immediately disconnects from the grid.

WLAN/LAN
Indicates the status of the Wireless or Ethernet communication lines.

All possible LED activation combinations are shown in the following table. In particular, each LED could behave in one of the following ways:
● = LED on
⊗ = LED flashing slow (2 seconds on / 2 seconds off)
✱ = LED flashing fast (0.2 seconds on / 0.2 seconds off)
○ = LED off
✱ = Any one of the conditions described above

The following table shows all the possible activation combinations of “Power” “Alarm” and “GFI” LEDs on the LEDs panel **(08)** according to the operating status of the inverter.

Led Status		Operating state
green: yellow: red:	⊗ ⊗ ⊗	**Firmware programming** The inverter firmware is being programmed (never turn off the inverter during this phase).
green: yellow: red:	○ ○ ○	**Night mode (inverter automatically switches off)** The inverter is in night time switch-off mode (input voltage less than 70% of the set start-up voltage and AC grid is missing).
green: yellow: red:	⊗ ○ ○	**Inverter initialization / Waiting Sun** This is a transitional state due to verification of the operating conditions. During this stage the inverter checks that the conditions for connecting to the grid are met.
green: yellow: red:	● ○ ○	**The inverter is connected and is feeding power into the grid** Normal operation. During this stage, the inverter automatically tracks and analyses the photovoltaic generator’s maximum power point (MPP).
green: yellow: red:	⊗ ● ○	**Missing grid** Indicates lack of grid voltage. This condition does not allow the inverter to connect to the grid.
green: yellow: red:	✱ ● ○	**Warning indication: (W message codes) or Error: (E message codes)** Indicates that the inverter control system has detected a warning **(W)** or error **(E)**. It is possible to identify the type of problem generated in the dedicated section of integrated Web User Interface (“Inverter Log” section).
green: yellow: red:	○ ● ○	**Temperature protection trip** Indicates that the trip relating to internal temperatures (insufficient or excessive temperature) may have been activated.
green: yellow: red:	● ⊗ ○	**Ventilation anomaly** Indicates ananomaly in the operation of the internal ventilation system that could limit output power at high ambient temperatures. **Overvoltage surge arresters triggered (where fitted)** Indicates that any class II overvoltage surge arresters installed on the AC or DC side have been triggered **Internal statistics memory anomaly** Indicates an operating anomaly in the internal memory on which the inverter statistics are stored **Buffer battery discharged** The buffer battery is low and the inverter does not maintain the time setting

Led Status	Operating state
green: ○ yellow: ✳ red: ○	**Pre-commissioning phase (first start-up of inverter)** The commissioning of the inverter must be completed through the Installation wizard steps (Web User Interface) or using the FIMER Installer for Solar Inverters mobile APP
	Initial configuration failure The inverter is in locked state due to a failure in the initial configuration of the equipment, such as the standard network setting for the country of installation
	Self-test not carried out (for Italian grid standards only) Self-test operation failure
	Incompatibility of the device firmware versions The firmware versions of the various devices comprising the equipment are incompatible and are being updated (this is an automatic operation)
	Temperature sensor anomaly detected
green: ✳ yellow: ✳ red: ✳	**Updating the firmware from SD card** The equipment firmware is being updated from an SD card
green: ● yellow: ● red: ●	**Updating the firmware from SD card has failed** The equipment firmware update from an SD card has failed
green: ✳ yellow: ✳ red: ✳	**Updating the firmware from SD card completed** The equipment firmware has successfully updated from an SD card
green: ✳ yellow: ○ red: ○	**Remote OFF activated** The Remote Off command has been activated. The unit will not connect to the network until the remote ON command has been activated
green: ○ yellow: ○ red: ●	**Anomaly in the insulation system of the photovoltaic generator** Indicates that a leakage to earth from the PV generator has been detected, causing the inverter to disconnect from the grid.

The following table shows all the possible status of “WLAN/LAN” LED on the LEDs panel **(08)** according to the operating status of the wireless or ethernet communication lines.

Led Status	Operating state
Blue: ○	Wireless not configured or/and ethernet cable not connected.
Blue: ✳	Scanning for available wireless networks.
Blue: ✳	Trying to connect to a wireless network.
Blue: ●	Wireless or ethernet network is connected to the inverter and IP address is obtained.

7.4 Connection to Web User Interface

The inverter is equipped with an advanced integrated Web User Interface that allow a full access to all configuration and comissioning parameters from any electronic device (laptop, tablet and smartphone).

7.4.1 Access to the Web User Interface

To access to the Web User Interface is required to connect a device equipped with wireless connection (such as tablet, laptop or smartphone).
Depending on the connection method choosen during the inverter commissioning phase (“Station Mode” or “AP Mode”) it’s required to follow one of the two procedures described below:

Connection to the inverter in “Station Mode”

- Enable the wireless connection on the device (tablet, smartphone or laptop) and connect it to the same wireless network to which the inverter is connected.

- Open an internet browser (recommended browser: Chrome versions from v.55, Firefox versions from v.50) and enter the links (corresponding to the IP Address assigned by the router to the inverter, or the “Host Name”) provided during the commissioning phase to access the login page.

NOTE – In order to use the “Host Name” as an alternative to the dynamic IP address, the Wi-Fi router to which the inverter is connected (when operating in “Station Mode”) must provide the Domain Name System (DNS) service (contact the network administrator for further information regarding the presence or absence of the DNS service in the Wi-Fi router or how to enable it). In this way, even if the IP address assigned to the inverter should change over time (dynamic IP), it will always be possible to use the same “Host Name” which will remain unchanged over time.

NOTE – The IP address assigned may vary for reasons connected to the wireless router setup (for example, a very brief DHCP lease time). If verification of the address is required, it is usually possible to obtain the client list (and the corresponding IP addresses) from the wireless router administration panel.

NOTE – If the “Host Name” was lost, it could be obtained writing this url:
http://ABB-XX-XX-XX-XX-XX-XX.local
replacing the “X” with the hex digits of the MAC address of the inverter (it can be found on the “Communication Identification label” placed on the side of the inverter or applied during the commissioning phase to the plant documentation).

Connection to the inverter in “AP Mode”

Enable the wireless connection on the device (tablet, smartphone or laptop) and connect it to the Access Point created by the inverter system: the name of the wireless network created by the inverter that the connection should be established with, will be:
ABB-XX-XX-XX-XX-XX-XX
where “X” is a hex digit of the MAC address (MAC address can be found on the “Communication Identification label” placed on the side of the inverter or applied during the commissioning phase to the plant documentation).

- When required digit the PRODUCT KEY (printed on the “Communication Identification label” and applied during the commissioning phase to the plant documentation) as access point password.

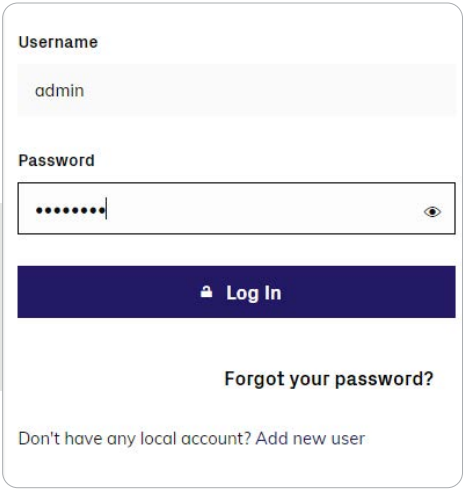
NOTE – It’s required to digit also the dash “-” characters of the Product Key in the password field.

NOTE – In case of need, product key can be recovered by Aurora Vision Cloud or by calling Fimer technical support.

- Open an internet browser (reccomended browser: Chrome versions from v.55, Firefox versions from v.50) and enter the pre-set IP address 192.168.117.1 to access the login page.

7.4.2 Web UI - Login page

- After you have connected the device to the inverter and you access to the login page, login with the username and password created during the commissioning phase.



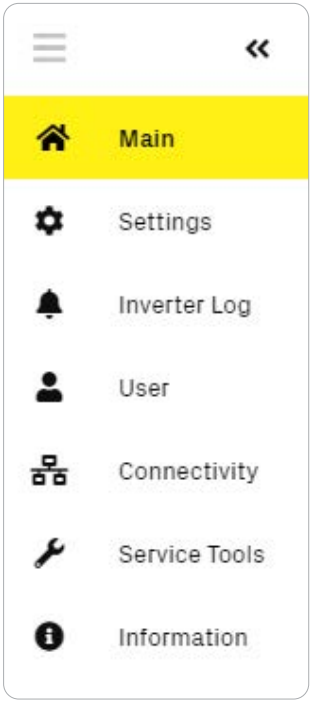
NOTE – User and password are CASE SENSITIVE.

NOTE – If the Password is lost click on "Forgot your password?" to obtain the access to the Web User Interface (and it will be possible to change the password) by entering the PRODUCT KEY (printed on the "Communication Identification label" and applied during the commissioning phase to the plant documentation).

NOTE – The language of the wizard could be changed by clicking on the upper status bar.

7.5 Web User Interface menu structure

NOTE – The following screenshots are related to a laptop visualization and may differ from smartphone or tablet visualization.



The Web User Interface is divided in sections, available on the left sidebar:

MAIN: Main section of Web User Interface dedicated to viewing the summary information related the status and the production information of the inverter and photovoltaic plant.

SETTINGS: Section dedicated to AC and DC line parameters configurations.

INVERTER LOG: Section dedicated to viewing Alarms and Warnings event log.

USER: Section dedicated to User management.

CONNECTIVITY: Section dedicated to inverter communication settings and configurations.

SERVICE TOOLS: Section dedicated to main service tools configurations.

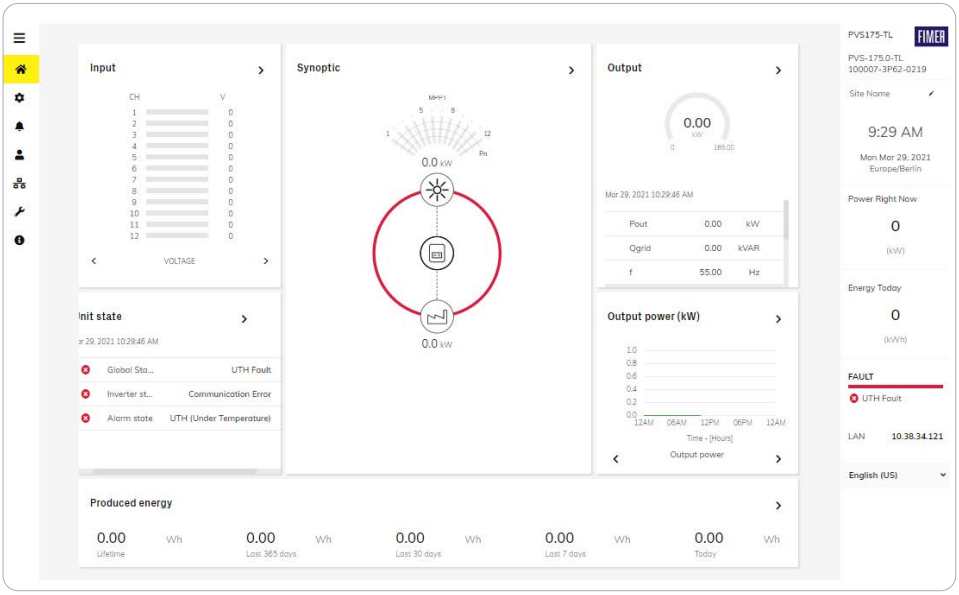
INFORMATION: Section dedicated for general information about the Web User Interface.

7.5.1 MAIN menu

In the MAIN section it's possible to access the following sub-menus:
DASHBOARD
STATUS SUMMARY

7.5.1.1 DASHBOARD

In the Dashboard sub-menu you can view the main information related the status the production data and alarm/warning active events of the inverter and photovoltaic plant.



7.5.1.2 STATUS SUMMARY

In the Status Summary sub-menu you can view the detailed information related the status and the production data of the system.

7.5.2 SETTINGS menu

In the SETTINGS section it's possible to access the following sub-menus:
INVERTER PARAMETERS
- AC output Rating (Only visible with Admin Plus privileges)
- AC Settings (Only visible with Admin Plus privileges)
- Active Power Control (Only visible with Admin Plus privileges)
- Additional Functions (Only visible with Admin Plus privileges)
- DC Settings
- Digital Inputs
- Frequency Control: P(f) (Only visible with Admin Plus privileges)
- Ramp Control (Only visible with Admin Plus privileges)
- Reactive Power Control (Only visible with Admin Plus privileges)

DIGITAL OUTPUTS
INVERTER PARAMETERS > AC output Rating (Only visible and editable with Admin Plus privileges)
In the AC output Rating sub-menu you can config the output power limitation by changing the Maximum AC output power and the maximum apparent output power parameters.

NOTE – Do not change these parameters if not requested by the grid operator.

INVERTER PARAMETERS > AC Settings (Only visible with Admin Plus privileges)
In the AC Settings sub-menu you can setup the parameter related to the Output AC side.

NOTE – Changing the above-mentioned parameters may prevent disconnection from the grid if the new values exceed those given in the standards of the country of installation. If these parameters are changed to values outside the standard range, an interface protection must be installed external to the inverter in accordance with the requirements of the country of installation.

- **Grid Connection**
  By editing these settings it's possible to change the grid connection thresholds parameters to which the inverter have to connect to the grid.

- **Grid Protections + VRT/FRT**
  By editing these settings it's possible to enable/disable and change the grid protection intervention thresholds parameters. In addition it is possible to change voltage ride through (HVRT, LVRT) and frequency ride through (HFRT, LFRT) settings.

INVERTER PARAMETERS > Active Power Control (Only visible and editable with Admin Plus privileges)
In the Active Power Control sub-menu you can config settings related to the active power derating parameters using the following parameters groups:
- Active Power Curtailment
- CEI Average VGrid Derating
- Volt/Watt settings: P(V)

NOTE – Do not change these parameters if not requested by the grid operator.

INVERTER PARAMETERS > DC Settings
In the DC Settings sub-menu you can setup the parameter related to the Input DC side.
- Multiple Max Scan Enable
  This settings allows you to Enables/disables the scan for identifying the maximum power point of the system.

- Multiple Max Scan Period - Value
  This settings allows you to sets the time between scans. Remember that the shorter the scan interval the greater the loss of production, due to the fact that energy is transferred to the grid during the scan but not at the maximum power point. Each scan takes roughly 2 seconds.

- UV Protection Time - Value
  This section of the menu allows you to sets the time for which the inverter stays connected to the grid after the input voltage has dropped below the Under Voltage limit (set at 70% of Vstart).

NOTE – 60 seconds is the default value for UV Protection Time.

- VStart 1...16 New Value
  These parameters are used to sets the Vstart activation voltage for the related input channel. This parameter imposes a minimum input voltage on the inverter above which connection to the grid will be attempted.

NOTE – Change the activation voltage only if really necessary and to set it to the correct value: the photovoltaic generator sizing tool available on the Fimer website will indicate whether Vstart needs to be changed and what value have to be set.

INVERTER PARAMETERS > Digital Inputs
In the Digital Inputs sub-menu you can disable or enable the Remote ON/OFF functionality related to the "Remote" terminal block **(38)**.

INVERTER PARAMETERS > Frequency Control: P(f) (Only visible and editable with Admin Plus privileges)
In the Frequency Control: P(f) sub-menu you can config settings related to the active power derating as function of grid frequency.

NOTE – Do not change these parameters if not requested by the grid operator.

INVERTER PARAMETERS > Ramp Control (Only visible and editable with Admin Plus privileges)
In the Ramp Control sub-menu you can config the parameter related to the active power ramp up at the start-up and after a grid fault event.

NOTE – Do not change these parameters if not requested by the grid operator.

INVERTER PARAMETERS > Reactive Power Control (Only visible and editable with Admin Plus privileges)
In the Reactive Power Control sub-menu you can configure settings related the reactive power parameters using the following parameters groups:
- Cosphi Set
- Q Set
- Volt/VAr Settings: Q(V)
- Watt/Cosphi Settings: Cosphi(P)

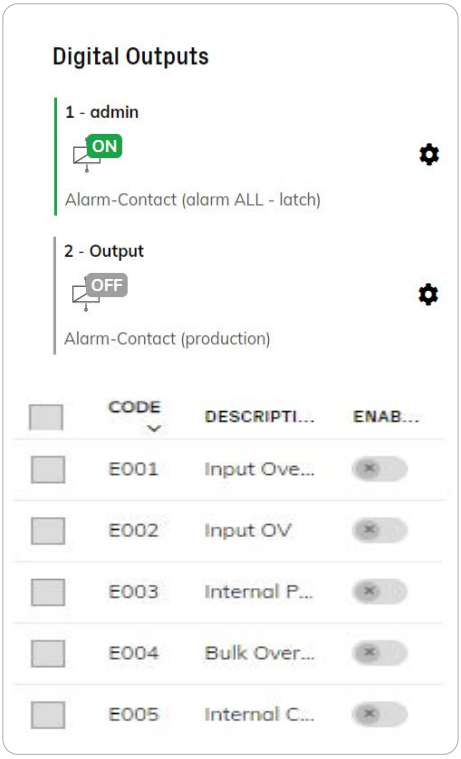
NOTE – Do not change these parameters if not requested by the grid operator.

DIGITAL OUTPUTS

In the Digital Outputs menu it's possible to set the activation status and to configure customized alarm conditions of the two configurable relays related to "ALARM and AUX" terminal block **(33)** (refer to "**Configurable Relay connection (ALARM and AUX)**" paragraph to know how to connect to these terminal block).

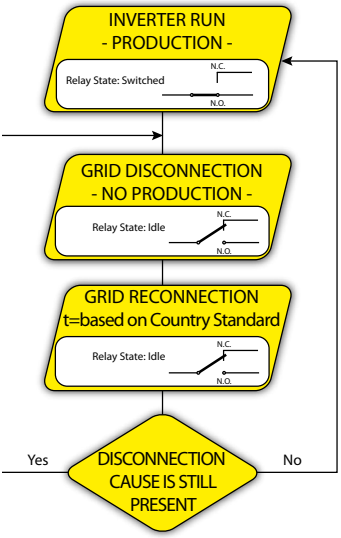
This

contact can be used, for example, to activate a siren or a visual alarm, control the disconnect device of an external transformer, or control an external device.
Relay switching can be set in different modes by clicking on the setting icon ⚙: With "Output active filter" you can select the list of events for which the relays switch.



The available operating mode are:

- **Production**
  The relay is activated (status: switched) whenever the inverter connects to the grid; as soon as the inverter is disconnected from the grid (for whatever reason that caused disconnection), the relay is in its resting position.

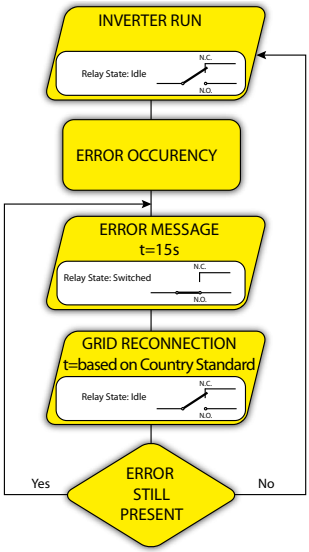


- **Alarm ALL - no-latch**

The relay is activated (status: switched) whenever an error (code Exxx) or warnings related to grid parameters out of range (Warning – codes W003, W004, W005, W006, W007) are present on the inverter. The alarm contact returns to its resting position when the alarm signal ends, i.e. before the inverter checks the grid parameters after the alarm state. This is because grid control state is not an alarm state but a state of normal operation.

Alarms for which the relay is activated

E001	E002	E003	E004	E005	E006
E007	E009	E010	E011	E012	E013
E014	E015	E016	E017	E018	E019
E020	E021	E022	E023	E024	E025
E026	E027	E028	E029	E030	E031
E032	E033	E034	E035	E036	E037
E046	E050	E053	E054	E055	E056
E057	E058	E077	E078	E081	E084
E089	W003	W004	W005	W006	W007



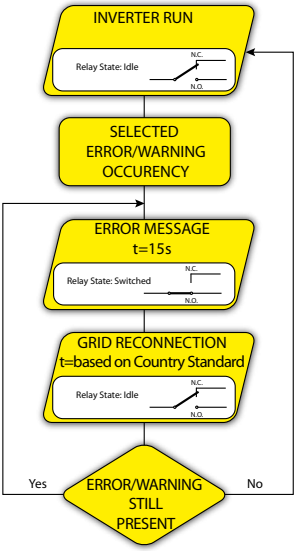
In the presence of W003, W004, W005, W006, W007 signalling, the alarm contact switches and then reset itself at the end of the alarm signal. This means that during the absence of grid voltage (display message “Missing Grid”) the alarm contact remains in its resting position.

- **Alarm Configurable - no-latch**

The relay is activated (status: switched) whenever an error (code Exxx) or a warning (code Wxxx) is among those selected from the list in the dedicated submenu Alarm Config. The contact returns to its resting position when the alarm signal ends, i.e. before the inverter checks the grid after the alarm state. This is because grid control state is not an alarm state but a state of normal operation.

Selectable alarms for which the relay is activated

E001	E002	E003	E004	E005	E006
E007	E009	E010	E011	E012	E013
E014	E015	E016	E017	E018	E019
E020	E021	E022	E023	E024	E025
E026	E027	E028	E029	E030	E031
E032	E033	E034	E035	E036	E037
E046	E050	E053	E054	E055	E056
E057	E058	E077	E078	E081	E084
E089	W001	W002	W003	W004	W005
W006	W007	W009	W011	W015	W046
W047	W048	W051	W058	W059	

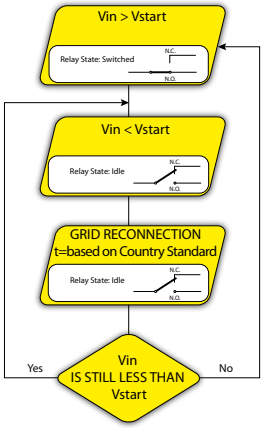


For the configurable relay operating mode “Alarm Conf.”, the following considerations are valid:

- If the alarm condition is persistent, the alarm contact cyclically switches from its resting state to its activated state.
- In the presence of W002 signalling (Input UV – input voltage below the limit of operation), the alarm contact switches to then reset itself at the end of the alarm signal. This means that during the reduced input voltage (display message “Waiting Sun”) the alarm contact remains in its resting position.
- In the presence of W003, W004, W005, W006, W007 signalling, the alarm contact switches and then reset itself at the end of the alarm signal. This means that during the absence of grid voltage (display message “Missing Grid”) the alarm contact remains in its resting position.

- **Crepuscular**

  The relay is activated (status: switched) as soon as the inverter input voltage exceeds the activation voltage set.
  The relay is in its rest position when the input voltage drops below 70% of the activation voltage set.
  This mode is useful for disconnecting any output transformers that could have unnecessary consumption during the night.



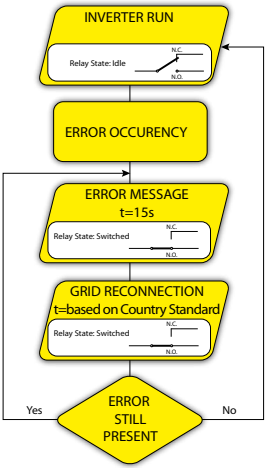
- **Alarm ALL - latch**

  The relay is activated (status: switched) whenever an error (code Exxx) or a warning (code Wxxx) is present (see the table below). The contact returns to its resting position when the inverter returns to its normal operating state and reconnects to the grid.

Alarms for which the relay is activated

E001	E002	E003	E004	E005	E006
E007	E009	E010	E011	E012	E013
E014	E015	E016	E017	E018	E019
E020	E021	E022	E023	E024	E025
E026	E027	E028	E029	E030	E031
E032	E033	E034	E035	E036	E037
E046	E050	E053	E054	E055	E056
E057	E058	E077	E078	E081	E084
E089	W003	W004	W005	W006	W007

If the alarm condition is persistent, the relay will remain activated (status:switched)



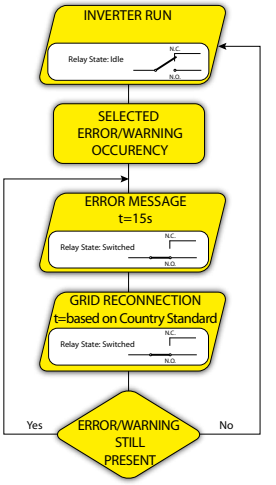
- **Alarm configurable - latch**

  The relay is activated (status: switched) whenever an error (code Exxx) or a warning (code Wxxx) is among those selected from the list in the dedicated submenu Alarm Config (see the table below). The contact returns to its resting position when the inverter returns to its normal operating state and reconnects to the grid.

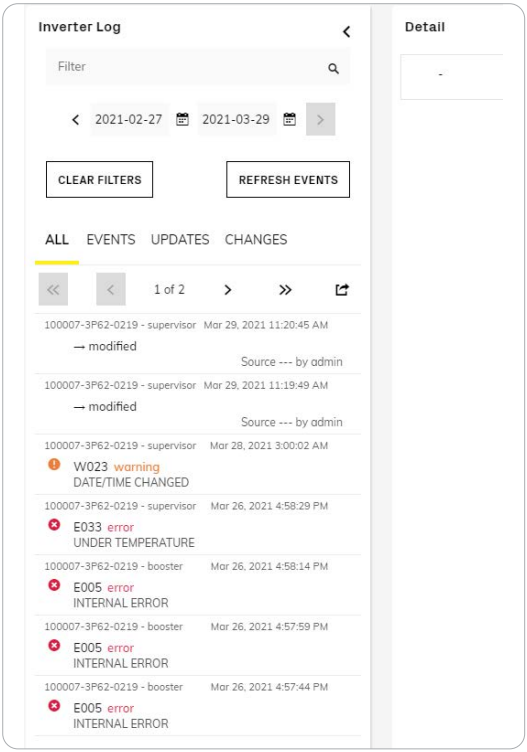
Selectable alarms for which the relay is activated

E001	E002	E003	E004	E005	E006
E007	E009	E010	E011	E012	E013
E014	E015	E016	E017	E018	E019
E020	E021	E022	E023	E024	E025
E026	E027	E028	E029	E030	E031
E032	E033	E034	E035	E036	E037
E046	E050	E053	E054	E055	E056
E057	E058	E077	E078	E081	E084
E089	W001	W002	W003	W004	W005
W006	W007	W009	W011	W015	W046
W047	W048	W051	W058	W059	

If the alarm condition is persistent, the relay will remain activated (status:switched).



7.5.3 INVERTER LOG menu



In the INVERTER LOG Section it's possible to view the Alarm and Warning events list that it can be custom filtered by type or by entering a matching word.

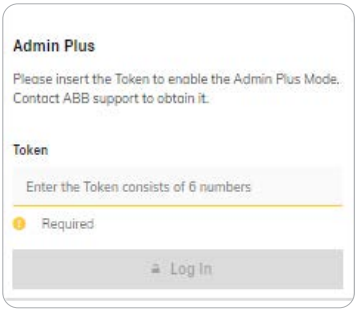
Clicking on any event to view its details.

7.5.4 USER menu

In the USER section it's possible to logout from Web User Interface and return to the login page, or to access the following sub-menus:
EDIT EMAIL AND PASSWORD
ADMIN PLUS
USER MANAGEMENT

EDIT EMAIL AND PASSWORD
In the Edit Email and Password sub-menu you can change the e-mail and password related to the user which is used to login to the Web User Interface.

ADMIN PLUS
By accessing to the Admin Plus sub-menu you can obtain the "Admin Plus" user privileges which allow you to:
- View and edit the AC Settings, Reactive Power Control, Ramp Control, Active Power Control and Frequency Control: P(f) sub-menus on SETTINGS section.
- Change the grid standard of the inverter, after 24 hours while the inverter is operating (so the Country Standard sub-menu on SERVICE TOOLS section was locked).
- Access the "Reset Manufacturing" sub-menu on SERVICE TOOLS section.

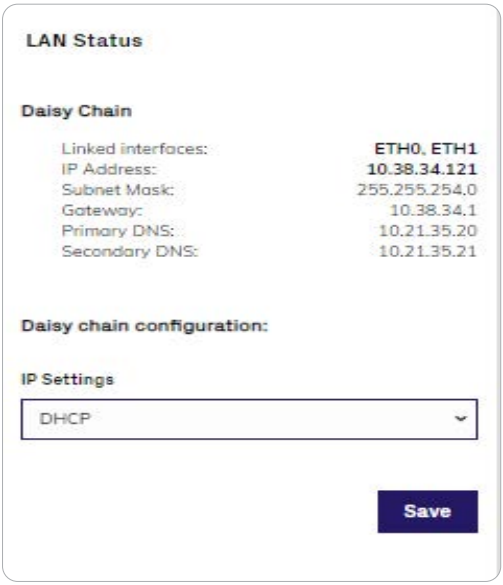


To access on the Web User Interface with the "Admin Plus" user privileges it's required to enter a security token that can be obtained by registering on the website https://registration.solar.fimer.com (Refer to **"In order to obtain the security token needed to have the "Admin Plus" privileges in the Web UI, it is necessary to go through the following stages:"** paragraph for further informations).

USER MANAGEMENT
By accessing to the User Management sub-menu it's possible to edit all the users already created and create new users (both with admin or User privileges).

7.5.5 CONNECTIVITY menu

In the CONNECTIVITY section it's possible to access the following sub-menus:
LAN
WLAN
RS485
DEBUG SETTINGS
MODBUS



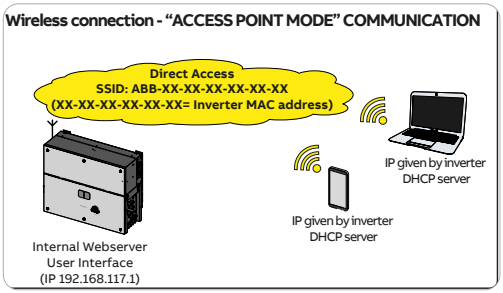
LAN
In the LAN sub-menu it's possible to view the status and change the daisy chain configuration of the two ethernet ports **(39) (40)** of the inverter.

- Daisy chain configuration: DHCP or Static:
  By selecting the DHCP function (default setup) the router will automatically assign a dynamic IP address to the inverter whenever it tries to connect to the user network.

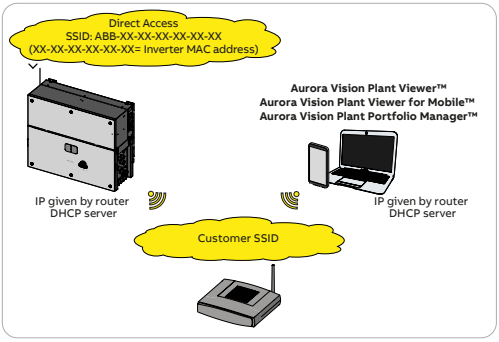
  With Static, the user can assign a fixed IP address to the system. The data which has to be entered in order for IP static address assigning to take place will appear. Complete the additional fields at the bottom of the screen (all the fields are mandatory with the exception of the secondary DNS server).

WLAN
In the WLAN sub-menu it's possible to view the status of the two wireless channels of the inverter, and to disconnect the channel 2.

Channel 1: "Access Point mode": Only local communication is enabled in this mode; In particular, the WLAN acts like an «access point» generating a wireless network to which the user can connect locally, configure the inverter/photovoltaic system, using the direct access to the Web User Interface.



Channel 2 "Station Mode": In this operating mode it is possible to connect the inverter to a WI-Fi router; in this condition remote monitoring is enabled by accessing to Aurora Vision® CLOUD platform.



In case of connection to channel 2 (“Station Mode”), it will be required to enter the wireless network parameters (set on the router) and follow the subsequent procedure:

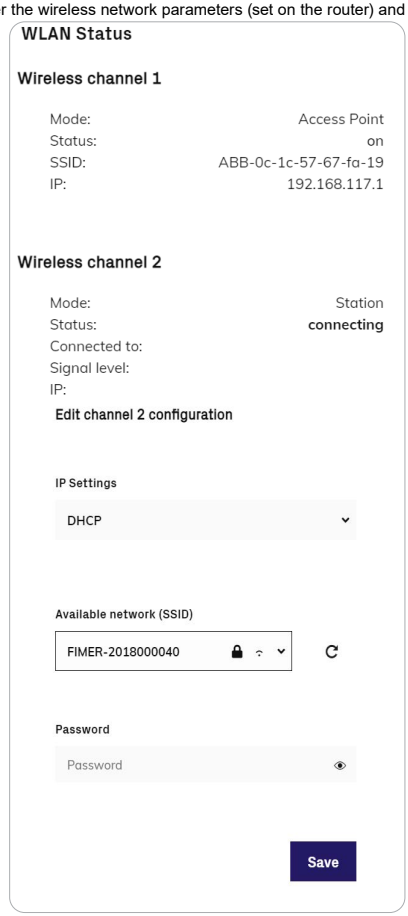
- IP Selection Mode: DHCP or Static:
  By selecting the DHCP function (default setup) the router will automatically assign a dynamic IP address to the inverter whenever it tries to connect to the user network.

  With Static, the user can assign a fixed IP address to the system. The data which has to be entered in order for IP static address assigning to take place will appear. Complete the additional fields at the bottom of the screen (all the fields are mandatory with the exception of the secondary DNS server).

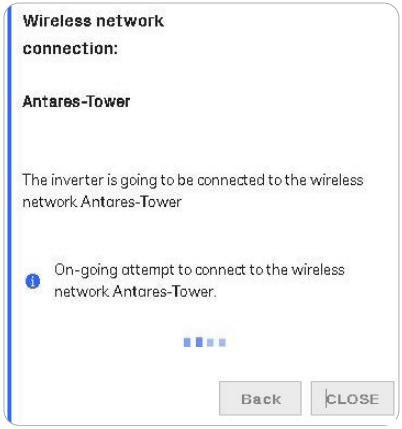
- SSID (name of wireless network):
  Identify and select your own wireless network from all those shown in the SSID field (you can carry out a new search of the networks that can be detected with the Update button).
  Once the network has been selected, confirm.

- Password (wireless network password):
  Enter the password for the destination network (if necessary) and start the connection attempt (it will take a few seconds).

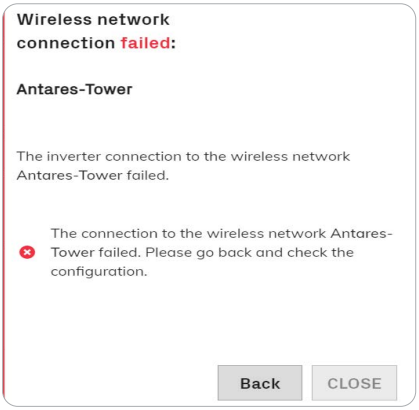
- Click on “Save”



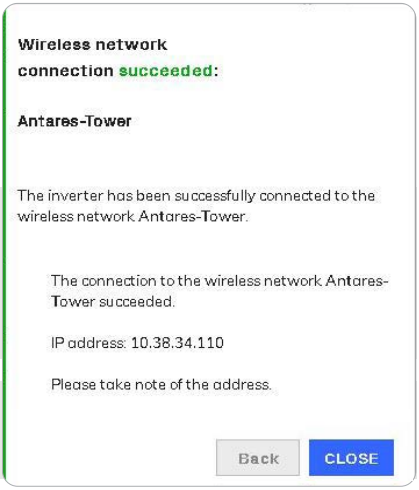
- Once the inverter is associated with a wireless network, the user must switch the tablet/smartphone/PC to the same wireless network which the inverter is connected.



- The connection can fail due to a wrong wi-fi network and/or a password. In this case click “Back”.



- Once the tablet/smartphone/PC device is switched to the local wireless network a new message will confirm that the connection is acquired.



- Click the “Close” button” to complete the setup of “Station Mode”

NOTE – In order to use the “Host Name” as an alternative to the dynamic IP address, the Wi-Fi router to which the inverter is connected (when operating in “Station Mode”) must provide the Domain Name System (DNS) service (contact the network administrator for further information regarding the presence or absence of the DNS service in the Wi-Fi router or how to enable it). In this way, even if the IP address assigned to the inverter should change over time, (dynamic IP), it will always be possible to use the same “Host Name” which will remain unchanged over time.

NOTE – The IP address assigned may vary for reasons connected to the wireless router setup (for example, a very brief DHCP lease time). If verification of the address is required, it is usually possible to obtain the client list (and the corresponding IP addresses) from the wireless router administration panel.

RS485

In the RS485 sub-menu it’s possible to adjust the settings relating to the RS485 main communication port **(38)** (refer to the **“Connection of the communication and control signals”** paragraph for further information about the port connection). In particular it is possible to set:

- RS485 Node address: It allows you to sets the address (any value from 2 to 63 is allowed).
- RS485 Baud Rate: It allows you to sets the Baud Rate (2400/4800/9600/19200/34800/57600/115200).
- RS485 Parity Mode: It allows you to set the Parity bit (No Parity, Even Parity, Odd Parity).
- RS485 Protocol Type: It allows you to sets the communication protocol to be used for the RS485 line when the port is set as SLAVE or to enable the port itself to work in MASTER mode (refer to the **“Serial communication connection (RS485-Slave mode)”** and **“Serial communication connection (RS485-Master mode)”** paragraphs for further information on SLAVE and MASTER operating modes).

In particular it is possible to select among the following values:

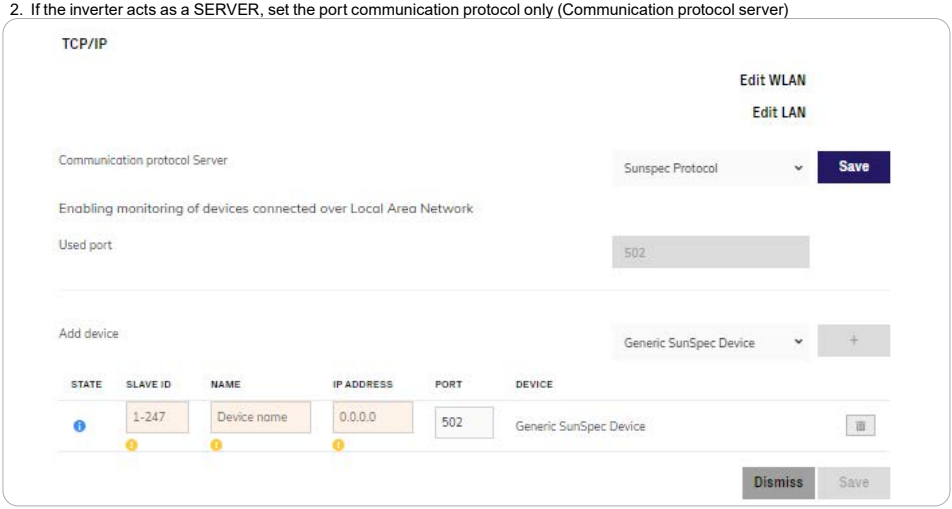
- “Modbus SunSpec Server”: SunSpec complaint Modbus RTU communication protocol enabling monitoring and controlling of the inverter by Fimer as well as third party systems (SLAVE operating mode).
- “Device Acquisition”: Enables polling and logging of data from Fimer supported accessories directly connected with the RS485 port like VSN800 Weather Station, digital environmental sensors, meters (MASTER operating mode).

NOTE – Please refer to official SunSpec Alliance documentation at https://sunspec.org, for details on SunSpec communication protocol.

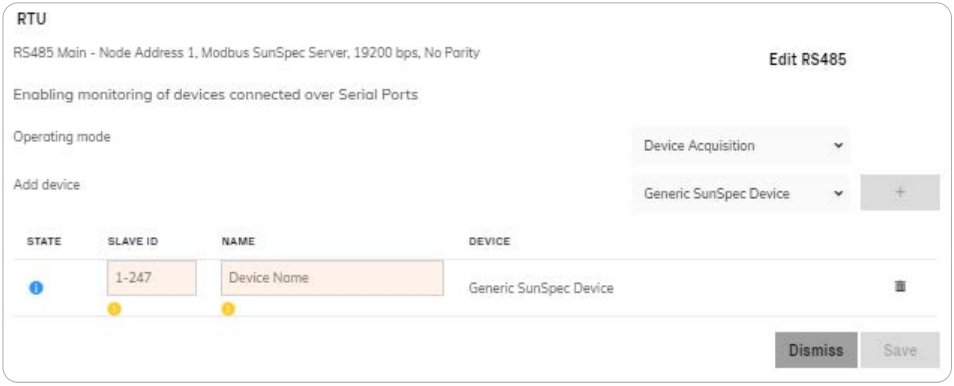
DEBUG SETTINGS
In the Debug Settings sub-menu it's possible to enable or disable the Debugging access for Fimer Service purposes.

MODBUS
In the Modbus sub-menu it's possible to enable and set parameters related to external monitoring and control systems over ethernet/ wireless channels ("TCP/IP" section) or over RS485 communication line ("RTU" section).

• TCP/IP
In the TCP / IP (WLAN / LAN) section there are different settings based on the type of external device connected to the inverter.
1. If the inverter acts as CLIENT and the external device as SERVER:
   - Click the "Edit" button and select the type of external device
   - According to the device, select the communication protocol
   - Click the [+] button and the added device is displayed
   - Change the SLAVE ID / NAME / IP ADDRESS / DEVICE settings and save them.
2. If the inverter acts as a SERVER, set the port communication protocol only (Communication protocol server)



RTU
Select one of the following Operating Modes: Modbus SunSpec, Device Acquisition.
1. Modubus SunSpec Server:
- Select "Edit RS485", - Select Protocol Type as "Modbus SunSpec Server".
- Configure Node Address, Baud Rate, Parity. - Please note that this will delete the previous configuration.
2. Device Acquisition:
- Select "Edit RS485" - Select Protocol Type as "Device Acquisition"
- Configure Baud Rate, Parity. - Please note that this will delete the previous configuration.
- Click "Edit" button
- Select device type in the "Add device" field. It's possible to choose between "Generic SunSpec Device", "ABB B23/24 Power Meter" or "Eastron SDM630", then click the [+] button to add the new device.
- Change the SLAVE ID / "NAME" if necessary and save



7.5.6 SERVICE TOOLS menu

In the SERVICE TOOLS section it's possible to access the following sub-menus:
FIRMWARE UPDATE
CONNECTIVITY CHECK
COUNTRY STANDARD
DATE/TIME
RESET MANUFACTURING (Only visible with Admin Plus privileges)

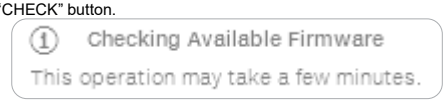
FIRMWARE UPDATE
By accessing to the Firmware Update sub-menu you can upgrade the firmware of the inverter and his components selecting the Remote firmware Update or the Local firmware Update.

NOTE – This inverter can be powered both with AC or DC sources. In case of DC source only is used, Perform the update during good irradiation conditions (avoid the dawn and dusk hours).

NOTE – An interruption of updating process could damage the inverter!

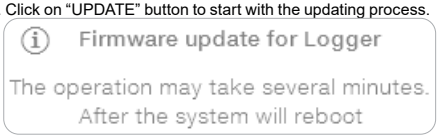
- Remote firmware Update:

In remote mode, the firmware will update automatically, searching the last available firmware on Fimer servers, by clicking the "CHECK" button.



1. At the end of the verification process the available release will be notified on the bottom part of the section.

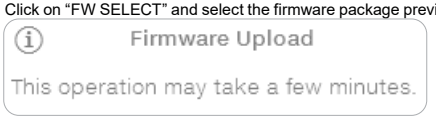
2. Click on "UPDATE" button to start with the updating process.



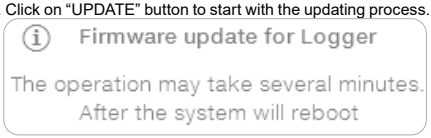
- Overnight update mode:
By selecting this mode, the firmware will be automatically updated during the night. In this way it's possible to avoid energy harvesting interuption due to update process.

- Local firmware Update:
By updating in local mode, the firmware have to be selected and uploaded from local folder of the devices used to access to the Web User Interface.
The latest firmware version is available from the download area of the website www.fimer.com or from https://registration.solar.fimer.com

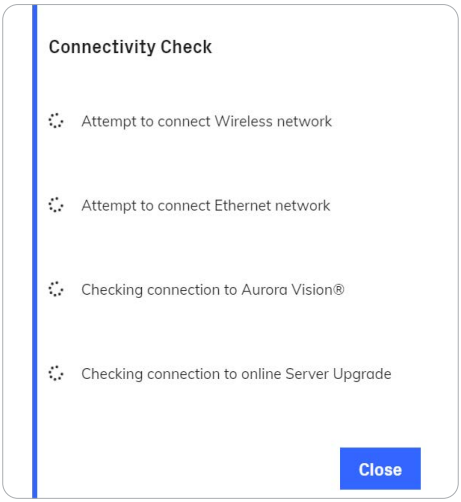
1. Click on "FW SELECT" and select the firmware package previously downloaded.

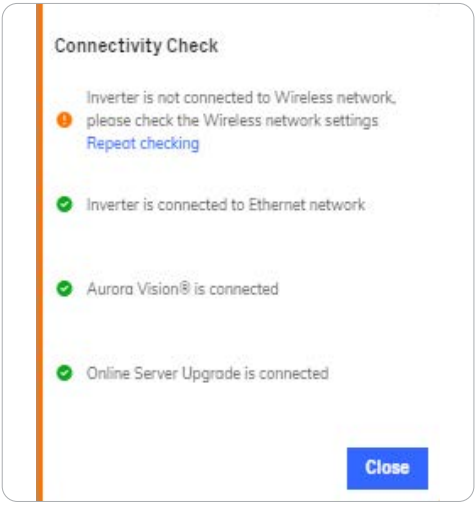


2. Click on "UPDATE" button to start with the updating process.

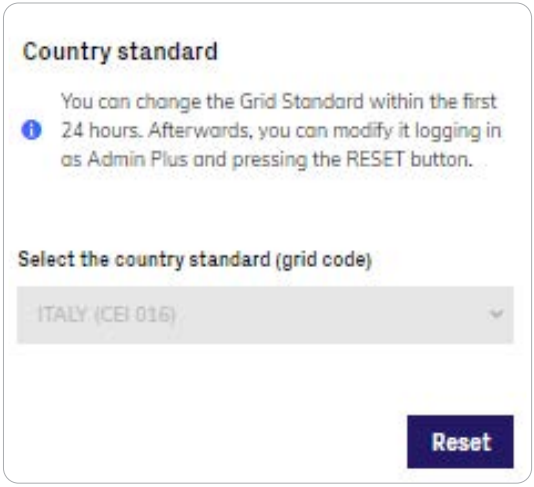


CONNECTIVITY CHECK
In the Connectivity Check sub-menu it's possible to carry out connectivity tests of the wireless network connection, ethernet connection, connection to Aurora Vision and firmware upgrade servers.
At the end of the test it will be reported the detail of the results.



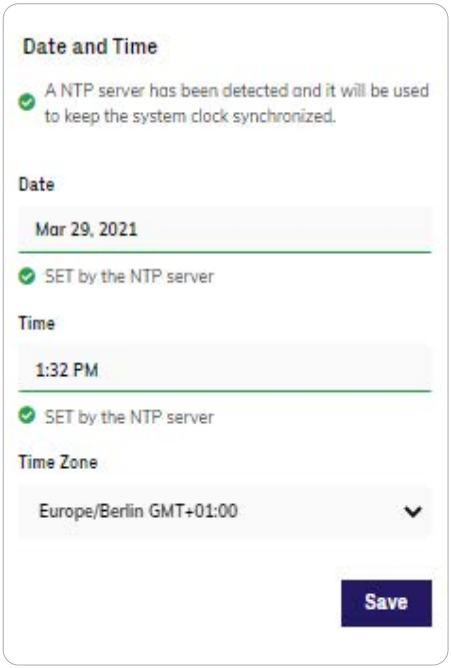


COUNTRY STANDARD
By accessing to the Country Standard sub-menu you can modify the grid standard within 24 hours while the inverter is operating.



NOTE – After the grid standard is set you have 24 hours to make any changes to the grid standard value; 24 hours later the Country Standard sub-menu will be locked, and any subsequent changes might only be made accessing with Admin Plus privileges. Refer to the dedicated section on "USER menu" and "SERVICE TOOLS menu" to know how to unlock the Country Standard sub-menu.

DATE AND TIME
In the Date and Time sub-menu it's possible to set the date, time and time zone.
The inverter will suggest these fields when the time protocol is available.
When it's not possible for the inverter to detect the time protocol, these fields have to be manually entered.



RESET MANUFACTURING (Only visible and editable with Admin Plus privileges)
In the Reset Manufacturing sub-menu it's possible to factory reset the settings related to country standard and related to communication parameters:
- Reset Country Std and Restore Default: Reset country standard and restore communication parameters to default. The inverter connectivity will be reboot after the operation.
- Reset Country Standard: Reset ONLY country standard. The inverter connectivity will be reboot after the operation.
- Reset to Default: Reset ONLY communication parameters (not country standard). The inverter connectivity will be reboot after the operation.
- Connectivity Reboot: Reboot of the inverter connectivity.

7.5.7 INFORMATION menu

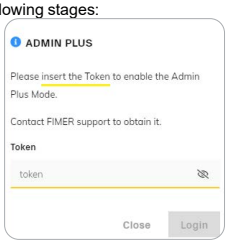
In the INFORMATION Section it's possible to view the general information about the Web User Interface.

it's possible to access the following sub-menus:
PRODUCT INFO
PRIVACY POLICY
PROVIDER INFORMATION/IMPRESSUM
ACKNOWLEDGMENTS
RELEASE NOTES

7.6 Web User Interface function detail

7.6.1 Admin Plus level access

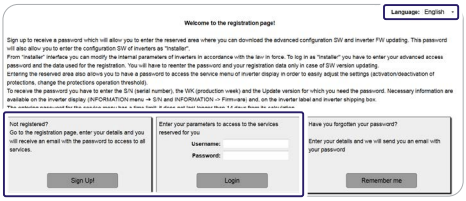
In order to obtain the security token needed to have the “Admin Plus” privileges in the Web UI, it is necessary to go through the following stages:



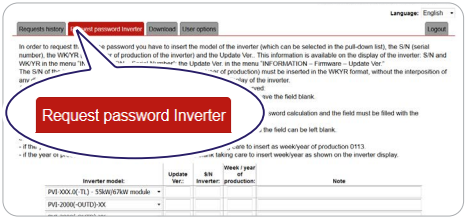
Stage 1 - Collection of information relating to the inverter.
Collect the SN and production week. This information can be found on the “Regulatory and identification Label”.
The serial number consists of 10 digits:
Serial Number (YYWWSSSSSS):
YY = Year of manufacture
WW = Week of manufacture
SSSSSS = Progressive number

Stage 2 - Registration on https://registration.solar.fimer.com
- Open registration site https://registration.solar.fimer.com
- Set the desired language
- Go to Sign Up or Log In and insert the personal data requested.

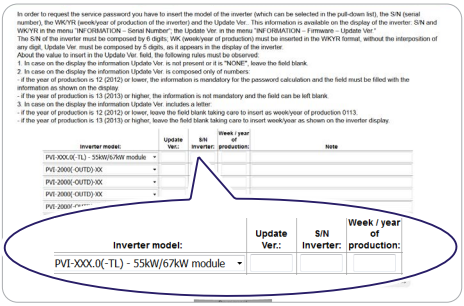
NOTE – In case of new user an email will be sent to the email address used with a link to complete the registration process. Once the registration process is over, a further email will be sent with the password to access the website.



Stage 3 - Admin Plus token request
- Access the section dedicated to requesting the security token.

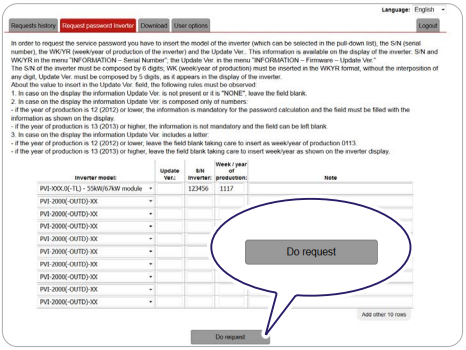


- Choose the inverter model from the drop-down list and insert Serial Number and Week of Production of the inverter (see Stage 1).



- Click on “Do request”.

NOTE – If there is an error in entering data, the fields containing the error will be highlighted in red. If, on the other hand, the data are correct, the passwords will be shown in a new window and at the same time sent to the email address used for registration.



NOTE – The security token enables the “Admin Plus” privileges which allows the inverter’s sensitive parameters to be changed. Proceed to changing the aforementioned parameters only if necessary.

7.6.2 Export limitation configuration

7.6.2.1 Preliminary operations

Before proceeding with the export limitation settings and start-up it is mandatory to complete the following steps:

Inverter commissioning
Any inverter included in the control needs to be commissioned and ready to be grid connected before starting the export limitation configuration.

⚠ **ATTENTION –** The Installer for solar inverters app will perform the commissioning process on all the inverters in the device list at the same time.

⚠ **ATTENTION –** The commissioning process through the web user interface must be repeated for each inverter included on the device list.

Firmware upgrade
All the inverters enabled for export limitation control need to support the control algorithm.
It is strongly suggested to keep the inverters upgraded to the latest firmware and aligned to the same control algorithm release. This functionality can be applied only if all the inverters involved in the control share the latest control algorithm release.

⚠ **ATTENTION –** The Installer for solar inverters app can perform the firmware upgrade process on all the inverters on the device list at the same time. The firmware upgrade process using the web user interface needs to be repeated for each inverter included on the device list.

⚠ **ATTENTION –** The Installer for solar inverters app can upgrade inverters only to the latest firmware released, while the web user interface can upgrade the inverter to any firmware, including a downgrade of the firmware.

Ethernet settings
Export limitation requires Ethernet connectivity and IP settings to be properly configured.
Inverters and meters must be on the same LAN and reachable, moreover the inverters are required to be configured for the same subnet mask.

⚠ **ATTENTION –** The Installer for solar inverters app can apply Ethernet settings to all the inverters in the device list at the same time. Ethernet settings applied by using the web user interface must be repeated for each inverter included on device list.

Meter installation and configuration
The meter must be properly configured according to the instructions for the meter manual for electrical connection and the instructions included in this guide for communication physical connection.
Once the meter is properly installed it is necessary to enable the data acquisition of the meter through the Installer for solar inverters. In case of a serial RS-485 connection between the meter and inverter, the meter must be assigned to the inverter physically connected to the meter, while in the case of an Ethernet connection, the meter can be assigned to any single inverter.

⚠ **ATTENTION –** The meter Ethernet settings must be written on the inverter. Consequently a fixed private IP address must be assigned. It is allowed to enable DHCP on the meter only if the DHCP server is configured to assign a fixed private IP address associated with the meter's Mac Address.

7.6.2.2 Export limitation control setup

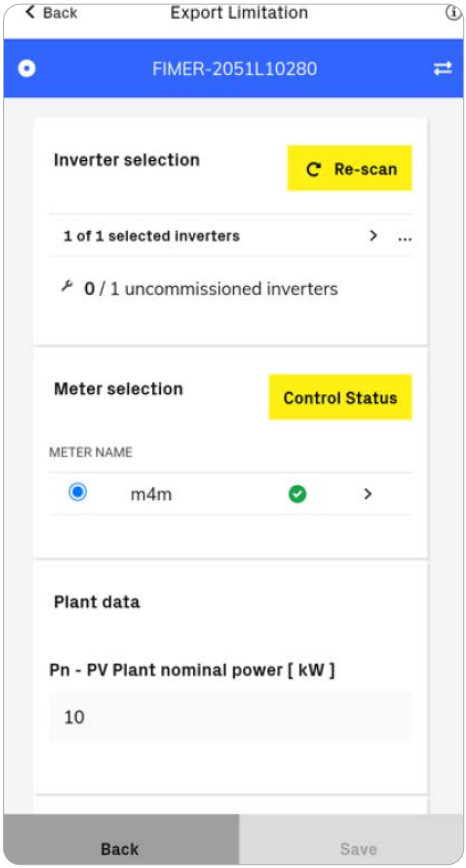
Export limitation can be configured and enabled only through the Installer for solar inverters APP.
Export limitation settings are accessible from the Device List, on the menu Power Management/Export Limitation

⚠ **ATTENTION –** A pop-up message will provide a reminder of the required action to be performed before activating the export limitation control.

The Installer for solar inverters APP will carry out a scanning process to retrieve all inverters and meters installed on the Local Area Network (LAN).

⚠ **ATTENTION –** When Export Limitation and PMU are both active, Export Limitation will be active applying the same configuration except for Export Limit that will be provided by the PMU analog or digital input.

Step 1: select the inverters
All inverters found during the scanning process that are compatible with the export limitation will be shown on the inverter selection list. Flag all the inverters to be included in the control.



⚠ **ATTENTION –** It is suggested to check if the overall number of selected inverters match the number that shall be included on Export Limitation and if all the inverters are correctly

recognized as commissioned

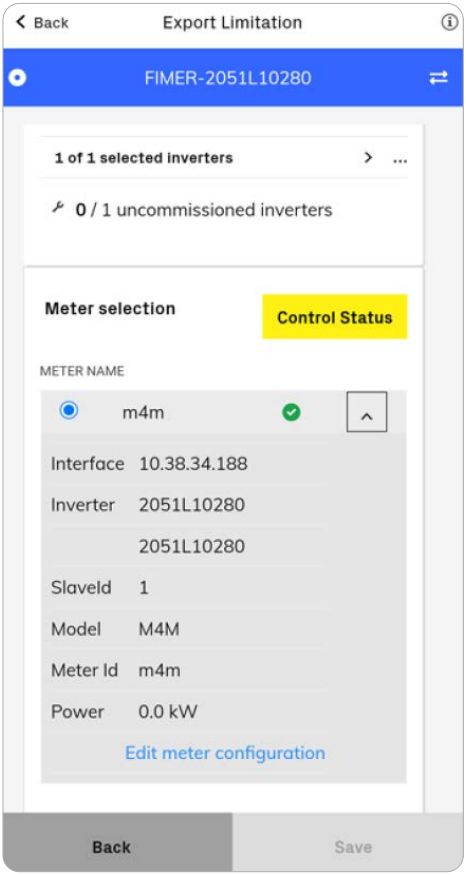
⚠ **ATTENTION –** Inverters are not automatically flagged, pay attention to flag all the inverters that should be included in the control.

⚠ **ATTENTION –** It is possible to repeat the scanning process with the re-scan button if one or more inverters are missing.

Step 2: select the meter

The scanning process automatically finds and lists all meters previously configured in the monitored device section and that are compatible with Export Limitation.

Only the meter installed at the Point of Connection should be selected as a reference meter for the export limitation control. In case more meters are available, it is possible to expand the selection to find out additional details of the meters.



⚠ **ATTENTION –** Meter must be configured with generator reference system. Use the edit configuration link and follow the procedure in the next step to manage the link reference system.

Step 3: verify the reference system and meter data acquisition

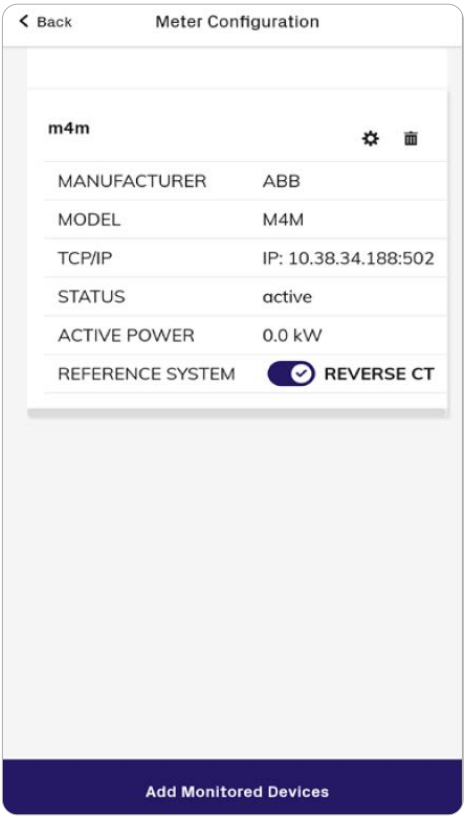
If the meter is installed with the consumer reference system, it is possible to revert the meter data acquisition to the correct generator reference system without the need to rework the installed meter.

The Installer for solar inverters app provides the possibility to change the reference system used for export limitation directly without the need to operate on the installed meter.

Through the “reverse CT” button, it is possible to apply a sign reversion to any current related measure acquired on the meter.

To check the reference system, select “edit meter configuration” under meter details and stop inverter productions using the AC disconnection or Remote OFF command.

In case the active power measured on the meter is positive when the inverter does not inject energy, for example during the night, the meter is installed with the consumer reference system and it is necessary to press the “reverse CT” button.

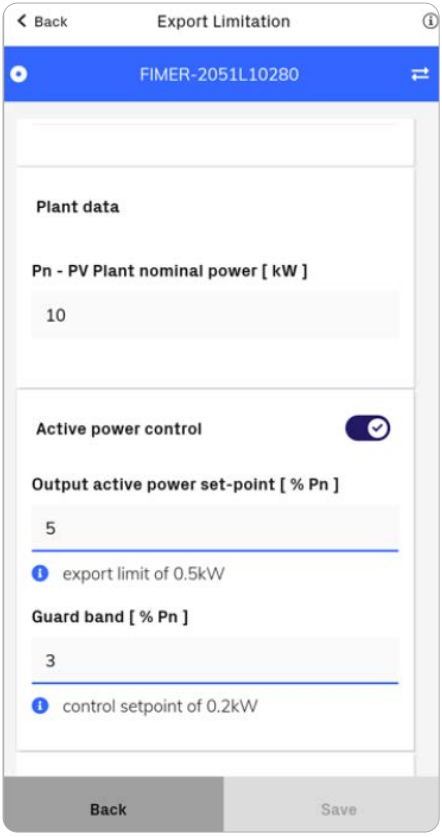


Step 4: configure export limitation

Since all the devices are already selected, it is possible to proceed with export limitation settings.

An export limit is expressed as a percentage value of the PV plant nominal power, which is used only as reference number.

The PV plant nominal power shall be intended as the reference nominal value used by a specific country to define the limit of exported power. Typically this value is represented by the sum of the nominal AC power of the inverters installed.
The export limitation control utilizes the export limit parameter as the threshold value for fail-safe operations. PV plant nominal power is not used in the control system.



The guard band is the control margin used to achieve the export limit and is expressed as a percentage of the PV plant nominal power.

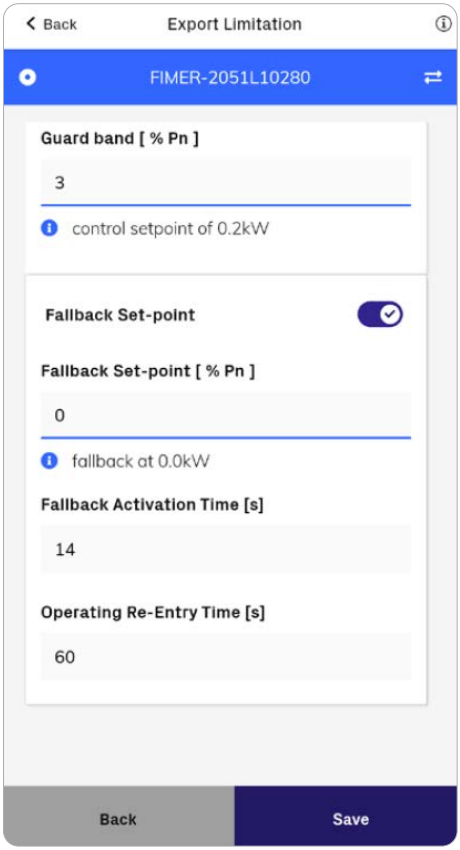
⚠ **ATTENTION –** The guard band shall not be configured at 0% in case fallback is enabled.

The export limitation will control the exported power at the Point of Connection to the control set point.
Check the Export limitation control overview section for further details.
Export limitation must be enabled by pressing the button next to the active power control. The configuration will become active when saved.

⚠ **ATTENTION –** The meter must be configured with generator reference system. Use the edit configuration link and follow the procedure in **Step 3: verify the reference system and meter data acquisition** to manage the reference system.

⚠ **ATTENTION –** Remember to switch on the right flag to enable export limitation.

Step 5: configure fallback
Enable the Fallback operation in case grid standard requires to apply a fallback plan as described on section Failsafe operations.
In case Fallback is enabled and a triggering condition is continuously satisfied for a time greater than Fallback Activation Time, the inverters will activate the fallback plan and immediately will curtail its output power to the Fallback Setpoint. Export Limitation control will come back to a normal operating condition when the triggering condition is continuously not satisfied for a time greater than Operating Re-entry Time.



Step 6: Control method
If supported by inverters, select the Control method required by grid standard:
- Power per phase: in case the control shall avoid to exceed the Export Limit for each phase.
- Total Power: in case the control shall avoid to exceed the Export Limit for the overall power across the three phases (Total Power is the default setting).

Step 7: apply setting
Press the save button to apply the new settings and start Export Limitation control on all selected inverters.

8. Maintenance

8.1 General conditions

Routine and periodic maintenance operations must only be only carried out by specialized staff with knowledge of how to perform these tasks.

⚠ **WARNING –** Some inverter parts may be subject to hazardous voltages for the operator. Before performing any work on the inverter, refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary steps to safely operate on the inverter.

⚠ **WARNING –** Avoid temporary repairs. All repairs should be carried out using only genuine spare parts.

⚠ **WARNING –** The maintenance technician is to promptly report any anomalies.

⚠ **WARNING –** Always use personal protective equipment (PPE) provided by the employer and comply with local safety regulations.

FORBIDDEN – For cleaning, DO NOT use rags made of filamentary material or corrosive products that may corrode the equipment or generate electrostatic charges.

FORBIDDEN – DO NOT allow the equipment to be used if problems of any kind are found.

8.2 Inverter total de-energization and safe access

The purpose of this paragraph is to provide instructions for de-energize the inverter in order to allow access to active parts inside the inverter. The procedure describes the steps to perform a total isolation and thus includes operations on devices that are located outside the inverter. The total isolation approach consider the disconnection of the inverter from any possible voltage source to which the inverter may be connected. The test of residual voltage potentially present inside the inverter is included in this procedure. This procedure is intended exclusively to be used by skilled or trained persons in accordance with safety standards EN 50110-1 and EN 50110-2 (CENELEC/CEN) or equivalent standards. Furthermore, only these skilled or trained persons are permitted to carry out the procedure.

8.2.1 Operator and maintenance personnel skills/prerequisites

⚠ **WARNING –** The customer has civil liability for the qualification and mental or physical state of the personnel who interact with the equipment. They must always use the personal protective equipment (PPE) required by the laws of the country of destination and whatever is provided by their employer.

⚠ **ATTENTION –** Personnel in charge of using and maintaining the equipment must be skilled for the described tasks and must reliably demonstrate their capacity to correctly interpret what is described in the manual.

⚠ **ATTENTION –** For safety reasons, the installation must be performed by qualified installers and/or licensed electricians in accordance with the existing regulations in the country of installation and in accordance of all safety rules for performing electrical works. The installers must have demonstrated skills and knowledge of the inverter's structure and operation.

FORBIDDEN – Maintenance operation carried out by a person who is NOT qualified, is intoxicated, or on narcotics, is strictly forbidden.

The following job requirements and qualifications are required to operate on the inverter:
- Compliance with all legal standard in force in the installation country to perform the electrical work described on this procedure.

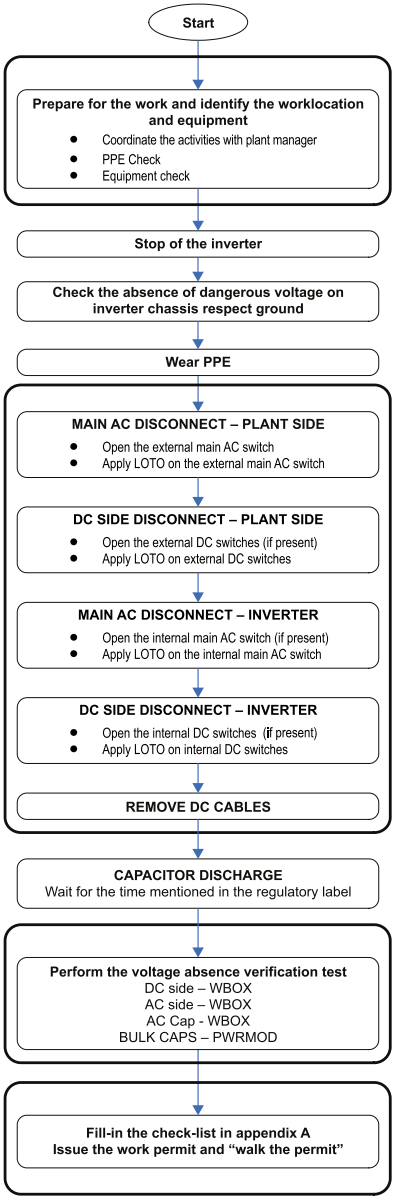
8.2.2 Clothing and protection of personnel

The following Personal Protective Equipment (PPE) are required to perform any intervention on the inverter:
- Arc-flash IEC Class 2 (40 cal/cm2) rated head protection (arc hood) with helmet included.
- Insulating composite gloves class 0 EN60903 (1000Vac-1500Vdc) resistant to electric arc class 2 (7kA) EN61482-1-2 in combination with protective overglove in leather EN420 – EN388.
- IEC Class 1 (8 cal/cm2) basic arc-flash protection wear, combined with IEC Class 2 (25 cal/cm2) overall arc-flash protection.
- Safety shoes ISO 20345:2011.

8.2.3 Safety equipment and tools

The following equipment and tools are required to perform any intervention on the inverter:
- Disconnect tool for DC side (PV) connectors (Not supplied - only needed for -S(X or Y) and S(X or Y)2 models).
- Voltage detector (EN 61243-2) capable of 3kVdc and up to 1kVac.
- DC current clamp.
- Safety tags "work in progress, do not operate".
- Padlocks.

8.2.4 Inverter total de-energization and safe access procedure



⚠ **WARNING –** Some inverter parts may be subject to hazardous voltages for the operator. Before performing any work on the inverter, follow this procedure for safely isolate the inverter.

⚠ **WARNING –** In case PVS-100/120 PRE-CHARGE BOARD KIT is installed on the inverter, it is important to remark the presence of auxiliary power supply connected to the AC grid. In this case the inverter is supplied either by DC and AC power, so hazardous internal voltages are present even in case the DC switches are open.

⚠ **HOT SURFACE –** When the device has just been switched off, it may have hot parts as a result of overheating of the heated components (e.g.: transformers, accumulators, coils, etc.) so be careful where you touch.

8.2.4.1 PRELIMINARY CHECKS

Weather conditions:
It is of paramount importance to evaluate the weather conditions in the risk assessment prior any intervention on the equipment. This procedure can be applied only in case of dry environment. Don't proceed in case of rain (even light) or high humidity.

PPE Check:
Verify the integrity of the PPE that is going to be used to perform the operations.

Equipment check:
- Check the voltage tester is working correctly:
  - Perform a general integrity check of the instrument; examine the test terminals, its integrity and make sure they are properly fixed; make sure the batteries level is enough high (don't use the instrument in case the message "LOW BATTERY" is present) or replace them.
  - Perform test of the instrument using an energized AC socket and a DC voltage source (example: battery in the service car) with known voltage level; in case the instrument is provided with a self-test feature, follow the instructions provided in the instrument manual to carry out the self-test.
- Check the voltage tester is working correctly:
- Check the DC current probe is properly working, make sure to perform the "ZERO-OFFSET" procedure and to select suitable DC measurement range.

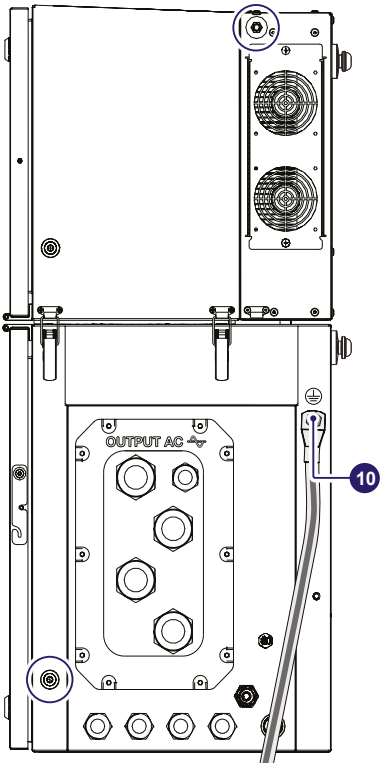
8.2.4.2 PPE

⚠ **WARNING –** All the following activities (till the completion of the procedure) must be performed wearing the PPE.

Wear the appropriate PPE for carrying out the operations (overall resistant to electric arc, dielectric helmet with visor, insulating gloves).

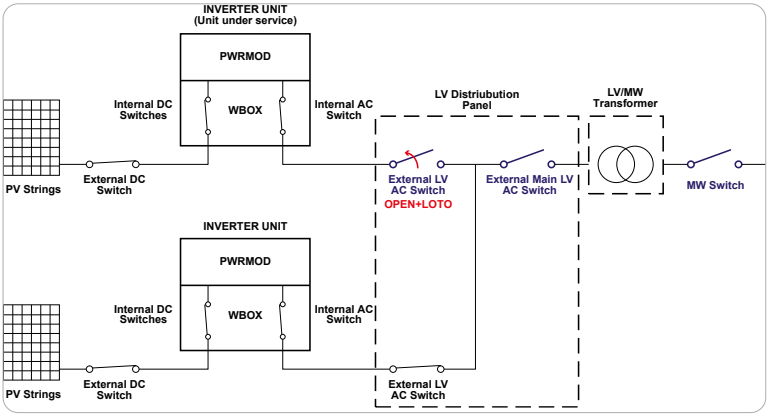
8.2.4.3 Check the absence of dangerous voltages on inverter enclosure respect ground

Check the absence of dangerous voltage on the inverter chassis. The measurement point are between inverter chassis not-painted part (both power module **(01)** and wiring box **(02)** - samples point circled in red) and the Protective earth point (ext.) **(10)** outside the inverter.



8.2.4.4 Operations on External AC switches

The diagram below represents a possible arrangement of the PV plant. Depending on the design choices made by the developer of the plant some of the devices could not be present. Identify the external AC switch(es) in the plant with the support of the plant manager.



- Open the external AC disconnect switch or the main external AC disconnect switch (blue in previous picture) outside the inverter (IEC 60364-7-712.536.2.2). In case none of the LV AC switches are present, the MV switch must be opened.
- Affix designated lock preventing operation onto any external AC disconnect device, affixing designated tags (LOTO procedure).

NOTE – Identification of the external switch may require the cooperation of the plant manager and it must be included in the switching plan defined during the preparation of the work.

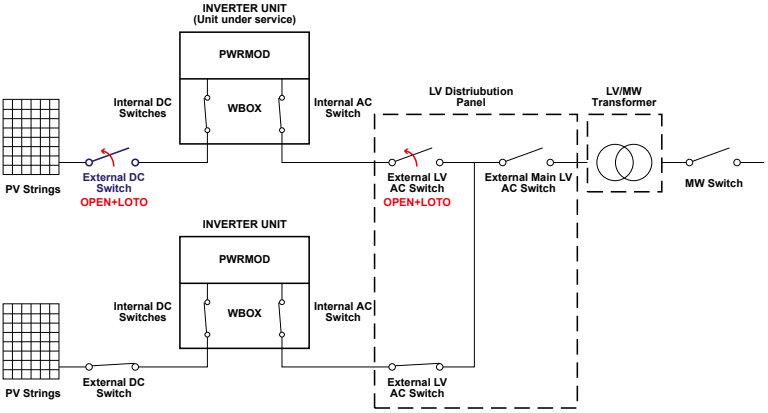
- Check on the status LEDs **(08)** the shutdown command has been carried out (Missing Grid status):
  - Power LED (Green): Flashing
  - Alarm LED (Yellow): ON (solid)
  - GFI LED (Red): OFF
  - WLAN/LAN LED (Blue): Depends by the communication status.

8.2.4.5 Operations on External DC switches (if present)

WARNING – For Standard and S2 models (single/double MPPT) the presence of external DC disconnect switch is mandatory.

NOTE – In case of absence of External DC disconnect device skip this step.

The diagram below represents a possible arrangement of the PV plant. Depending on the design choices made by the developer of the plant some of the devices could not be present. Identify the external DC switch(es) in the plant with the support of the plant manager.



- Open the external DC disconnect switch (blue in previous picture) outside the inverter (IEC 60364-7-712.536.2.2)
- Affix designated lock preventing operation onto any external DC disconnect device, affixing designated tags (LOTO procedure).

NOTE – Identification of the external switch may require the cooperation of the plant manager and it must be included in the switching plan defined during the preparation of the work.

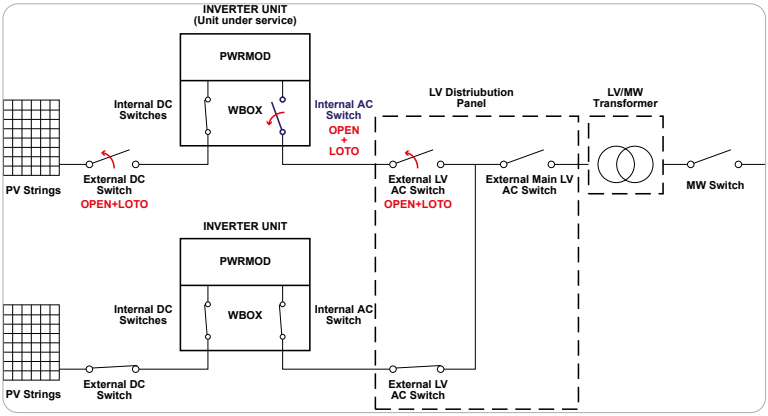
• Check on the status LEDs **(08)** the shutdown command has been carried out (Missing DC voltage status): All LEDs OFF.

NOTE – The time needed for the complete shut-down of the LEDs depends by the input voltage of the inverter. The complete shut-down of the LEDs may require some minutes.

8.2.4.6 Operations on internal AC disconnect Switch (09) (only -S2, -SX2, -SY2 models)

NOTE – This operation can be done only in case of wiring box -S2, -SX2, SY2 models. The wiring box Standard, -SX, SY models doesn't include the AC switch **(09)**.

• Open the main AC disconnect switch **(09)** (shown in blue in the picture below).

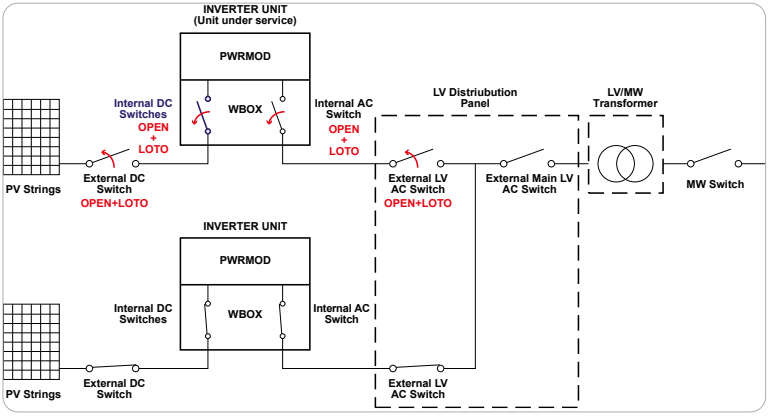


• Affix designated lock preventing operation onto AC disconnect switch **(09)**, affixing designated tags (LOTO procedure).

8.2.4.7 Operations on Internal DC disconnect switches (15)

NOTE – In case of absence of Internal DC disconnect switch (Standard Model) skip this step.

• Open all the internal DC switches **(15)** (1, 2 blue in the below picture).



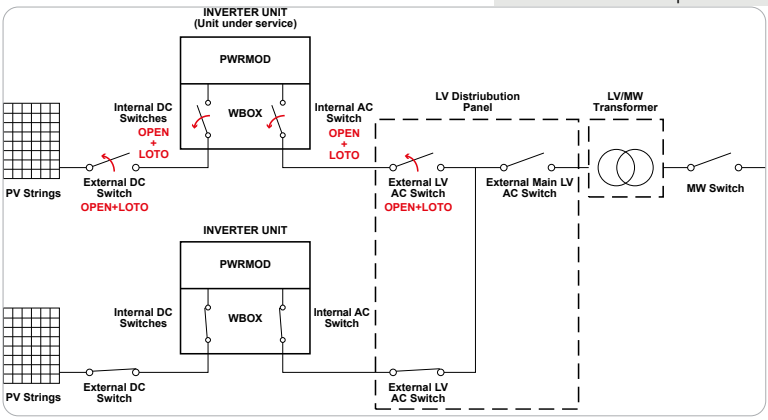
• Affix designated lock preventing operation onto all DC disconnect switches **(15)**, affixing designated tags (LOTO procedure).

• Check on the status LEDs **(08)** the shutdown command has been carried out (Missing DC voltage status): All LEDs OFF.

NOTE – The time needed for the complete shut-down of the LEDs depends by the input voltage of the inverter. The complete shut-down of the LEDs may require some minutes (see **"Regulatory label"** on the inverter).

The below picture represents the expected status of the switches in the plant after the switching operations has been completed.

NOTE – It is highly recommended to put labels on each cable in order to easily reconnect them to the correct connectors once completed the service activities.

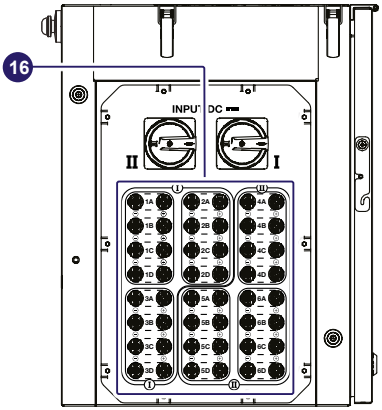


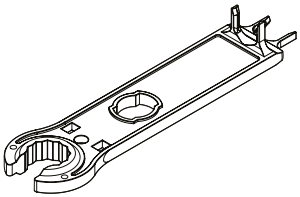
8.2.4.8 Remove the DC quick fit connectors (16) from wiring box (02)

NOTE – This operation can be done only in case of wiring box -SX, -SY, -SX2, SY2 models. The wiring box Standard, -S2 models doesn't include the DC quick fit connectors **(16)**. In this case the switch-off and LOTO of external DC disconnect switch is mandatory.

In order to disconnect the PV connectors **(16)** it is necessary to use the disconnection tool related to the quick-fit connector brand and model used in the inverter.

- Using the current clamp check the absence of current on DC side, measure each positive and negative DC input string cables (check the correct setting of the current sensor).
- Remove all quick fit DC connectors **(16)** from the wiring box **(02)**, using the dedicated disconnect tool. To avoid mechanical interferences, use a cable tie to collect the disconnected cables.





8.2.4.9 Discharge of the capacitor

Wait the internal capacitors to be discharged.

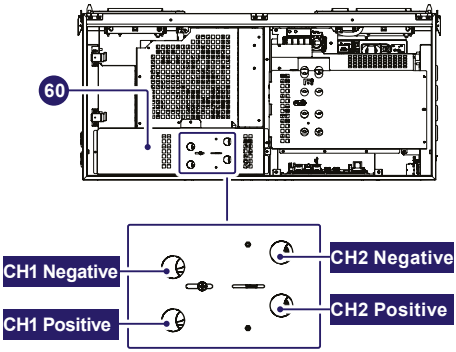
⚠ **WARNING –** The discharge time of the stored energy is indicated on the regulatory label.

8.2.4.10 Voltage absence test on DC side (wiring box)

⚠ **WARNING –** Before to approach the below operations all the steps from 1 to 9 included must be successfully completed.

STANDARD and -S2 MODELS (1/2 MPPTs):

- Open the wiring box front cover **(07)** (refer to paragraph **"Opening the wiring box cover"**)
- Visually inspect the components to identify the presence of any overheating, signs of electric arcs, failure of the insulating devices, loosen connections or cables not connected.
- Test the absence of voltage on the DC inputs using the voltage detector: the voltage absence test on DC side must be carried out through the openings on the DC protective shield **(60)**, as shown in the picture.



- For each input channel the measurement must be performed between: positive to ground, negative to ground, positive to negative.

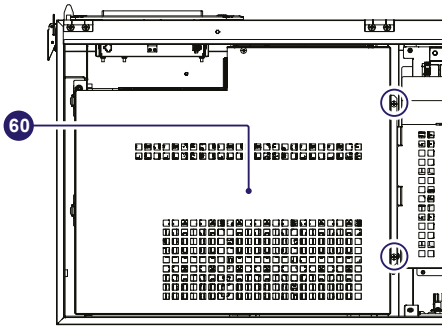
Check sequence: Positive to ground (PE)	
First point	Second point
CH1(+)	PE
CH2(+)	PE

Check sequence: Negative to ground (PE)	
First point	Second point
CH1(-)	PE
CH2(-)	PE

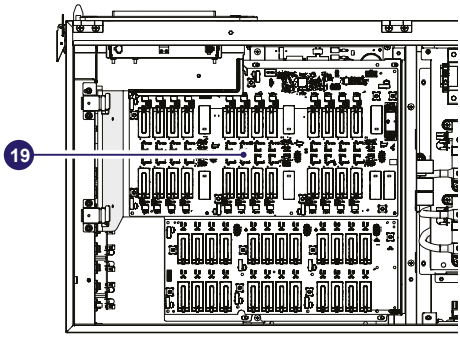
Check sequence: Positive to negative	
First point	Second point
CH1(+)	CH1(-)
CH2(+)	CH2(-)

-SX, SY, -SX2, -SY2 MODELS (6 MPPTs):

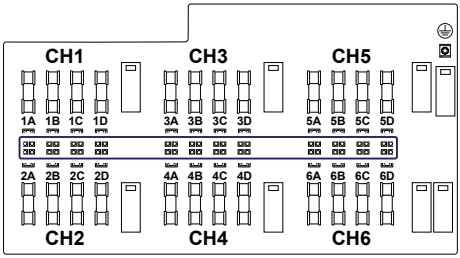
- Open the wiring box front cover **(07)** (refer to paragraph **"Opening the wiring box cover"**)
- Remove the internal DC Protective shield **(60)** by removing the two M5 screws.



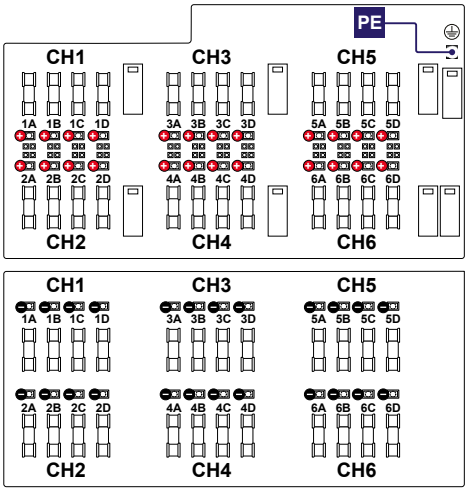
- Visually inspect the components to identify the presence of any overheating, signs of electric arcs, failure of the insulating devices, loosen connections or cables not connected.
- Check that all LEDs of positive side string fuses board **(19)** are OFF.



The layout of the positive side string fuses board **(19)** with related LEDs is provided below:



- Test the absence of voltage on the DC inputs using the voltage detector: the voltage absence test on DC side must be carried out on the positive side string fuses board **(19)** and on negative side string fuses board **(20)**. The layout of the two boards is provided below, with reference of the points where the input DC voltage absence test must be performed. The points are represented by the faston where the cables (coming from DC switches **(15)**) are connected.



For each input channel the measurement must be performed between: positive to ground, negative to ground, positive to negative.

Check sequence: Positive to ground (PE)

First point	Second point
1A (+)	PE
1B (+)	PE
1C (+)	PE
1D (+)	PE
2A (+)	PE
2B (+)	PE
2C (+)	PE
2D (+)	PE
3A (+)	PE
3B (+)	PE
3C (+)	PE
3D (+)	PE
4A (+)	PE
4B (+)	PE
4C (+)	PE
4D (+)	PE
5A (+)	PE
5B (+)	PE
5C (+)	PE
5D (+)	PE
6A (+)	PE
6B (+)	PE
6C (+)	PE
6D (+)	PE

Check sequence: Negative to ground (PE)

First point	Second point
1A (-)	PE
1B (-)	PE
1C (-)	PE

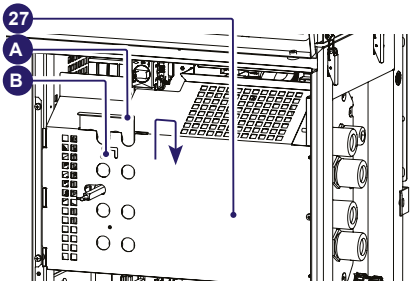
Check sequence: Negative to ground (PE)	
1D (-)	PE
2A (-)	PE
2B (-)	PE
2C (-)	PE
2D (-)	PE
3A (-)	PE
3B (-)	PE
3C (-)	PE
3D (-)	PE
4A (-)	PE
4B (-)	PE
4C (-)	PE
4D (-)	PE
5A (-)	PE
5B (-)	PE
5C (-)	PE
5D (-)	PE
6A (-)	PE
6B (-)	PE
6C (-)	PE
6D (-)	PE

Check sequence: Positive to negative	
First point	Second point
1A (+)	1A (-)
1B (+)	1B (-)
1C (+)	1C (-)
1D (+)	1D (-)
2A (+)	2A (-)
2B (+)	2B (-)
2C (+)	2C (-)
2D (+)	2D (-)
3A (+)	3A (-)
3B (+)	3B (-)
3C (+)	3C (-)
3D (+)	3D (-)
4A (+)	4A (-)
4B (+)	4B (-)
4C (+)	4C (-)
4D (+)	4D (-)
5A (+)	5A (-)
5B (+)	5B (-)
5C (+)	5C (-)
5D (+)	5D (-)
6A (+)	6A (-)
6B (+)	6B (-)
6C (+)	6C (-)
6D (+)	6D (-)

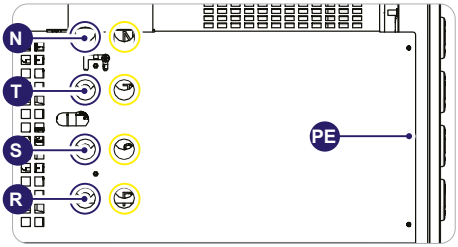
8.2.4.11 Voltage absence test on AC side (wiring box)

- Visually inspect the components to identify the presence of any overheating, signs of electric arcs, failure of the insulating devices, loosen connections or cables not connected.
- Using a Philip screwdriver, unscrew the blocking screw (B) on the AC protective shield **(27)**.

- Open the sliding cover (A) as shown in the picture and block it in open position using the blocking screw (B). The opening of the sliding cover will open the 6 holes that make accessible the VAT points on the AC connection busbar **(21)**.

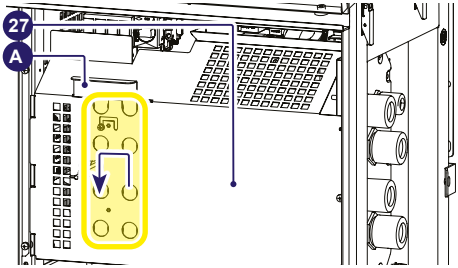


- Perform VAT by inserting the voltage detector in the holes. With reference to below picture, the right holes are designated for the insertion of the voltage detector (in YELLOW) while the left holes (in BLUE) are designated as visually inspection holes, to make sure the electrodes of the voltage detector are touching the main AC screws on the AC connection busbar **(21)**.



Check sequence	First point	Second point
Check #1	R (L1)	PE
Check #2	S (L2)	PE
Check #3	T (L3)	PE
Check #4	N	PE
Check #5	R (L1)	S (L2)
Check #6	S (L2)	T (L3)
Check #7	T (L3)	R (L1)
Check #8	R (L1)	N
Check #9	S (L2)	N
Check #10	T (L3)	N

- At the end of VAT close the sliding cover **(A)**. This means that the hole (in the yellow circle) on the AC protective shield **(27)** must be closed.

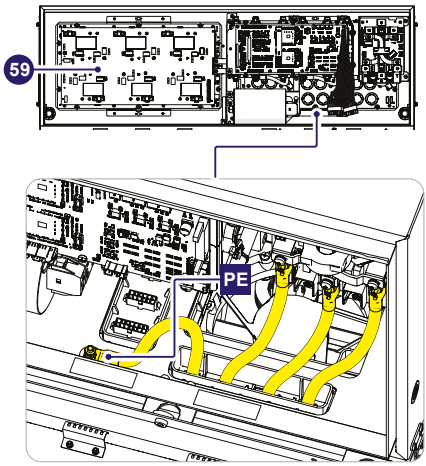


8.2.4.12 Voltage absence test on bulk capacitors (Power Module)

⚠ **WARNING –** Before to approach the below operations all the steps from 1 to 11 included must be successfully completed.

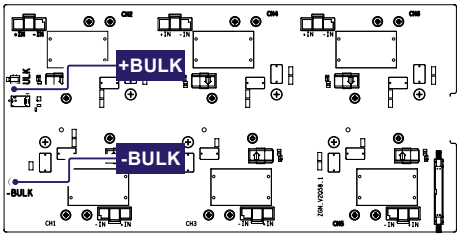
- Access to the power module box **(01)** by opening the power module front cover **(54)** (refer to paragraph **"Opening the power module box cover"**).

- Visually inspect the components to identify the presence of any overheating, signs of electric arcs, failure of the insulating devices, loosen connections or cables not connected.
- Check the absence of voltage on the bulk capacitors using the voltage detector. The voltage absence test on bulk capacitors must be carried out on the DC interconnection board **(59)**.



The layout of the DC interconnection board **(59)** is provided below, with reference of the points where the input DC voltage absence test must be performed.

Check sequence	First point	Second point
Check #1	+BULK	PE
Check #2	-BULK	PE
Check #3	+BULK	-BULK

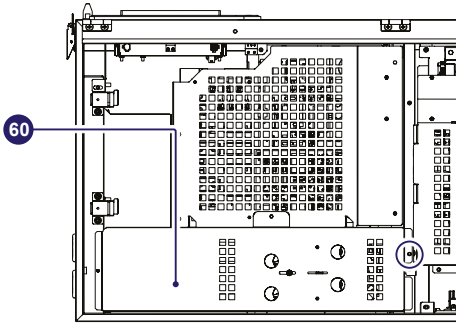


8.2.4.13 Grounding kit installation on DC side (only for Standard and -S2 models)

⚠ **WARNING –** Before to approach the below operations all the steps from 1 to 12 included must be successfully completed.

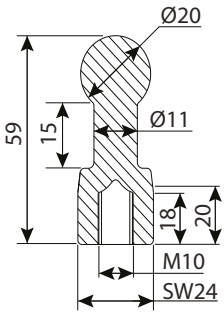
NOTE – This step is applicable only on Standard and -S2 models, single or double MPPTs.

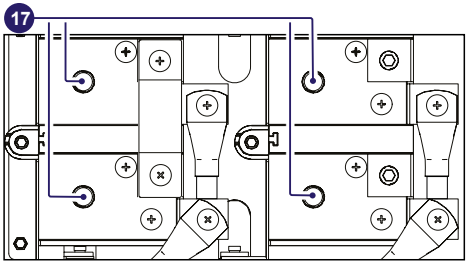
- Open the wiring box front cover **(07)** (refer to paragraph **"Opening the wiring box cover"**).
- Remove the internal DC Protective shield **(60)** by removing the M5 screw.



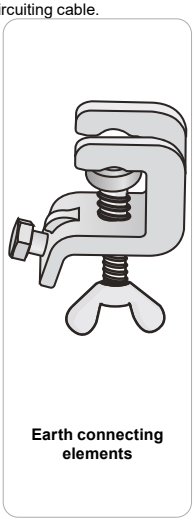
- Install 4 Fixed Ball Points in both positive and negative input channels on the DC input connection busbar **(17)**.







- Install the earth connecting elements to the earthing and short-circuiting cable.



Earth connecting elements



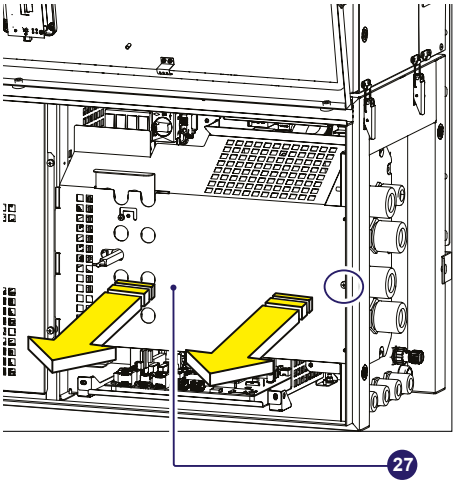
Earthing and short-circuiting cable

- Connect the earthing cable to the ground.
- Connect the earth connecting elements on the fixed ball points, to put in short circuit and to ground the DC input channels.

8.2.4.14 Grounding kit installation on AC side

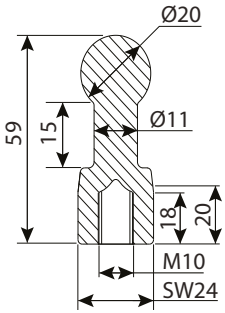
⚠ **WARNING –** Before to approach the below operations all the steps from 1 to 12 included must be successfully completed.

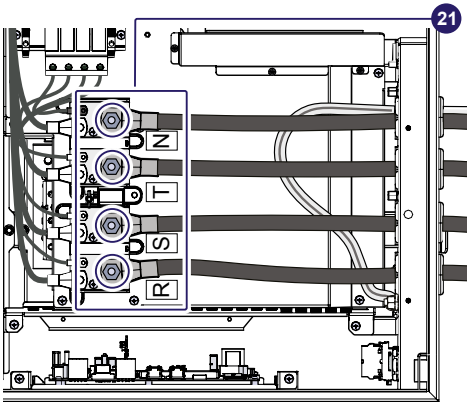
- Open the wiring box front cover **(07)** (refer to paragraph **"Opening the wiring box cover"**).
- Remove the internal DC Protective shield **(27)** by removing the M5 screw.



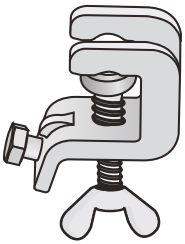
- Install 4 Fixed Ball Points in the AC phase R-S-T and neutral N on the AC connection busbars **(21)**.







- Install the earth connecting elements to the earthing and short-circuiting cable.



Earth connecting elements



Earthing and short-circuiting cable

- Connect the earthing cable to the ground.
- Connect the earth connecting elements on the fixed ball points, to put in short circuit and to ground the the phase R-S-T and N neutral.

8.2.4.15 Check list to be filled prior the access to the inverter

The purpose of checklist is to verify that all the operations mentioned in the procedure have been carried out. The checklist below must be attached to the intervention report.

Check	STATUS (√ or X)
Prepare for the work and identify the work location and equipment	
PPE and Equipment Check	
PPE wearing	
OPERATIONS AT PLANT LEVEL [1]	
Check the absence of dangerous voltages on inverter chassis respect ground	
Operations in External AC switch	
Operations in External DC Switch (If present)	
OPERATIONS AT INVERTER LEVEL	
Operations on internal AC switch (if present)	
Operations on internal DC switches	
Remove the DC quick fit connectors from wiring box [2]	
Wait the discharge of the internal capacitor	
VOLTAGE ABSENCE TEST	
Voltage absence check on DC side (wiring box)	
Voltage absence check on AC Side (wiring box)	
Voltage absence check on bulk capacitors (power module)	
SHORT-CIRCUIT AND EARTHING	
DC grounding Installation [3]	
AC grounding Installation	
ISSUE WORK PERMIT	
Issue work permit and “Walk the permit” – Check list filling	
ONLY if all checks are POSITIVE (√) the ACCESS IS ALLOWED	

(1) Identification of the external switch may require the cooperation of the plant manager and it must be included in the switching plan defined during the preparation of the work.
(2) Only applicable for -SX, -SY, -SX2, -SY2 models.
(3) Only applicable for Standard and -S2 models.

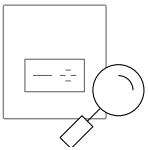
8.3 Routine maintenance

To preserve long term proper operation of the inverter, you are advised to perform the routine maintenance operations listed in this paragraph.

⚠ **ATTENTION –** Maintenance operations shall be performed only by qualified personnel or Fimer personnel (under a servicing contract). The maintenance schedule may vary depending on the environmental conditions of the installation.

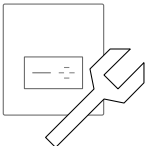
Routine maintenance

Annual visual inspections



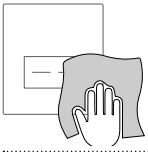
- Check that the inverter is operating properly, without any alarm signals.
- Ensure all labels and safety symbols are visible.
- Check the integrity of the cables, connectors and cable glands outside the inverter.
- Check that the environmental conditions have not changed dramatically from those on installation.
- Check there are no obstacles (animals, insects, leaves or anything which could reduce the heat exchanging capacity of the heat sink) at the top, at the bottom and on the external arrays of cooling fan.

Annual operations



- Check the tightening of the cable glands and the screw terminal blocks.
- Check the front covers is secured.
- If there is no monitoring system, check the record of alarms and errors using the indications provided in the manual in order to check recent notification of recent malfunctions.
- For the models with AC disconnect switch, it is recommended that once a year the disconnect switch is operated a number of times (at least 10) to keep the contacts clean and prevent oxidation. This operation must be carried out in periods with low input power or at night.

Annual cleaning



- Clean the equipment; in particular, clean the side and top arrays of the cooling fan assembly and the heat sink.

NOTE – For a complete maintenance procedure ask for “Preventive Maintenance -Life Cycle” to Fimer costumer service.

8.3.1 Recommended replacement intervals of components

To preserve long term proper operation of the inverter it’s advisable to follow the recommended replacement schedule specified below:

Component	Years from start-up							
	3	6	9	12	15	18	21	24
External Fan section		X		X		X		X
Internal Fan section				X				X

⚠ **ATTENTION –** The replacement schedule may vary depending on the environmental conditions of the installation (e.g. high dust environment).

NOTE – Refer to following paragraphs to know how to replace each listed component.

8.4 Replacing of fan sections

WARNING – The following operation must be carried out wearing the appropriate insulating composite gloves class 0 EN60903 (1000Vac-1500Vdc) resistant to electric arc class 2 (7kA) EN61482-1-2 in combination with protective overglove in leather EN420 – EN388.

NOTE – When replacing the external fan sections it's strictly recommended to clean the fins of internal heatsink using compressed air (blowing air from top and the side to the rear of the inverter).

8.4.1 Replacing of the sides fan section

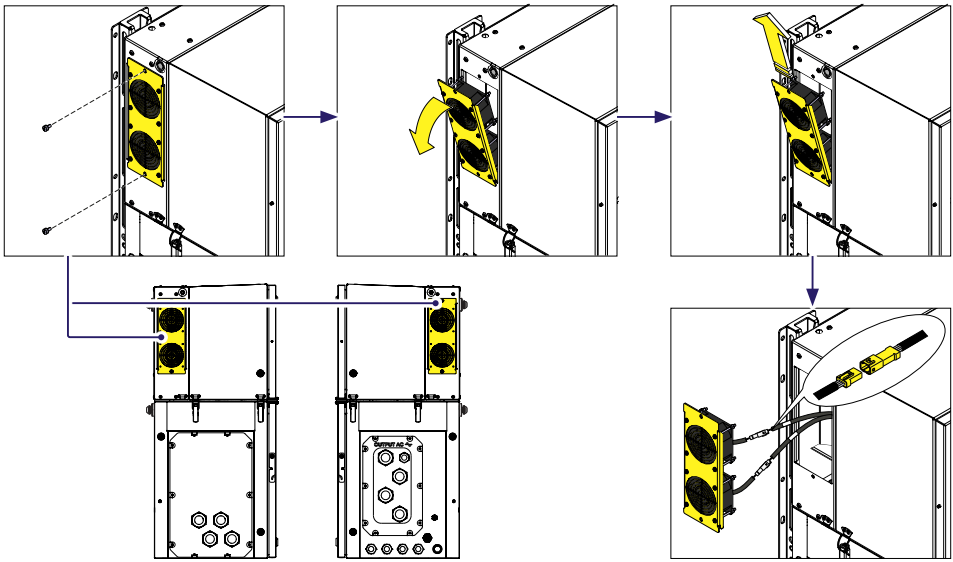
Procedure for replacing the sides fan sections:

- Open the DC disconnect switches **(15)**.
- Open any AC disconnect switch downstream of the inverter or the AC disconnect switch **(09)** (only on -S2, -SX2, -SY2 models).

WARNING – Do not open the front wiring box cover **(07)** or the front power module cover **(54)**.

WARNING – Wait the internal capacitors to be discharged (the discharge time of the stored energy is indicated on the regulatory label), and check that fans are completely stopped.

- Remove the 2 screws located on fan section.
- Tilt the fan section as shown in the picture.
- Pull out the fan section.
- Disconnect the 2 fan connectors.
- Take the new fan section and connect the 2 fan connectors. During this phase pay attenction to connect the fan to the correspondent cable; on each fan cable coming from the power module are applied labels that indicates the fans number (from FAN1 to FAN5).
- Place the new fan section following the previous steps in reverse way.
- Screw the 2 fastening screws previosly removed.



8.4.2 Replacing the internal fan section

⚠ **WARNING –** Some inverter parts may be subject to hazardous voltages for the operator. Before performing any work on the inverter, refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

Procedure for replacing one of the two fan sections:

⚠ **WARNING –** Perform the "Inverter total de-energization and safe access" procedure before operate on the inverter.

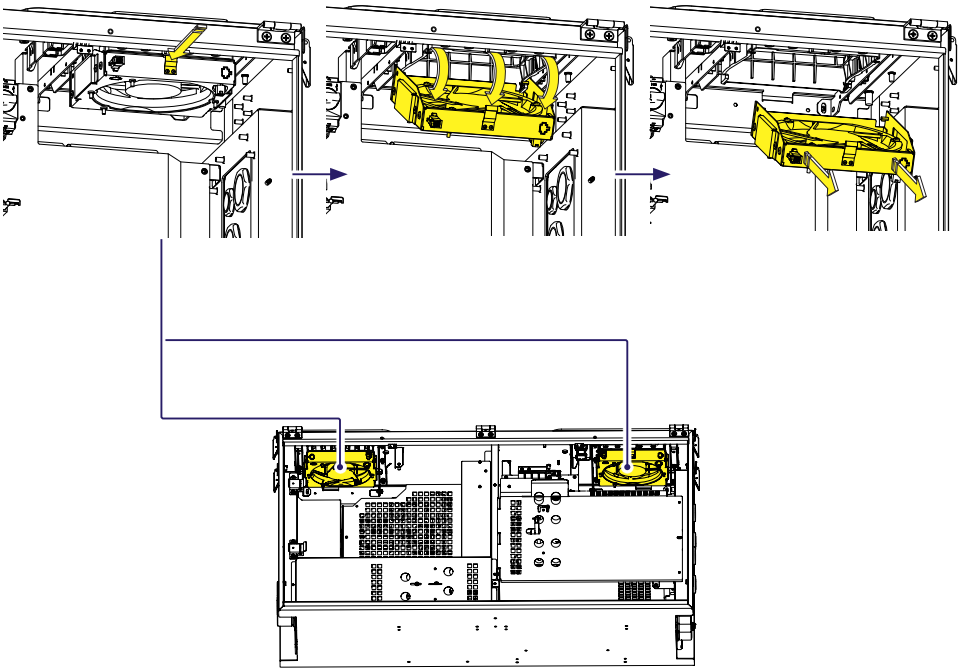
- Open the front wiring box cover **(07)**.

⚠ **WARNING –** Do not open the power module front cover **(54)**.

- Disconnect the fan connector.
- Push the retaining spring in order to unlock the fan chassis.
- Pull down the fan front side of the fan chassis.

⚠ **ATTENTION –** Pay special attention to don't damage the cables situated in front of fans during the replacement operation.

- Pull out the fan.
- Place the new fan section following the previous steps in reverse way.



8.5 Replacing the AC surge arrester cartridge

⚠ **WARNING –** Some inverter parts may be subject to hazardous voltages for the operator. Before performing any work on the inverter, refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

The AC overvoltage SPD **(22)** are installed inside the wiring box **(02)**.

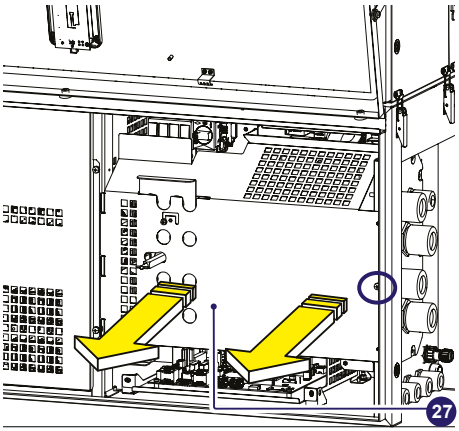
Procedure for replacing one of the AC surge arrester cartridges:

⚠ **WARNING –** Perform the "Inverter total de-energization and safe access" procedure before operate on the inverter.

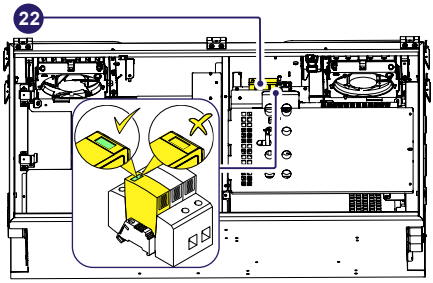
- Open the front wiring box cover **(07)**.

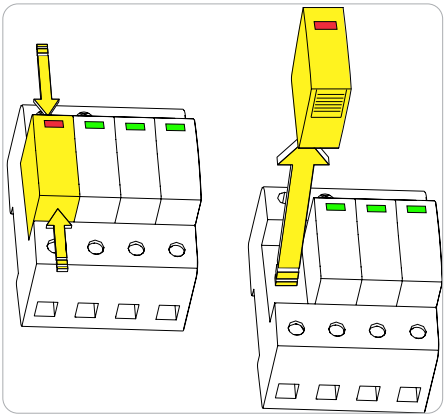
⚠ **WARNING –** Do not open the power module cover **(54)** during the replacement operation.

- Remove the AC protective shield **(27)** by removing the M5 screw.



- Push the side snaps and pull out the cartridges.



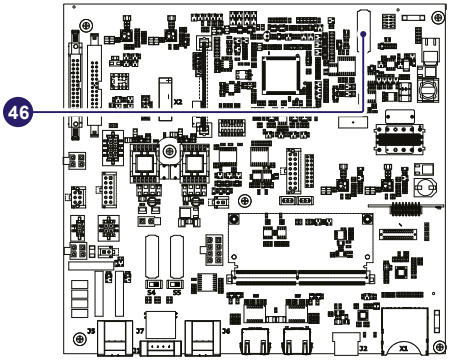


- Insert the new cartridge in the empty slot.

8.6 Replacement of the MEMORY board

⚠ **WARNING –** Some inverter parts may be subject to hazardous voltages for the operator. Before performing any work on the inverter, refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

Replacing the MEMORY board **(46)** is carried out on the wiring box **(02)** and may be necessary if "Inverter log Statistic" (e.g. power production) was lost after system shoutdown.



The MEMORY board **(46)** is installed on the communication and control board **(26)**.

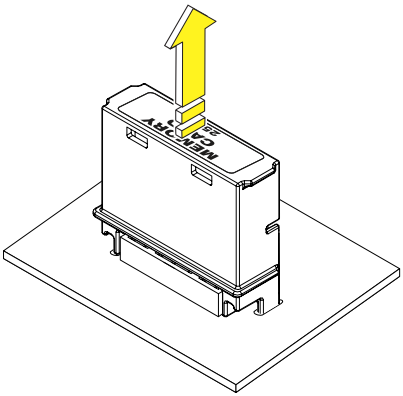
Procedure to replace the MEMORY board **(46)**:

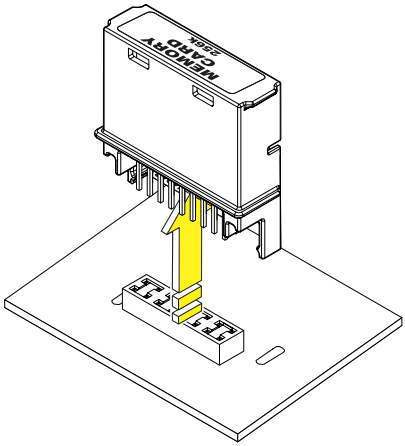
⚠ **WARNING –** Perform the "Inverter total de-energization and safe access" procedure before operate on the inverter.

- Open the front wiring box cover **(07)**.

⚠ **WARNING –** Do not open the power module cover **(54)** during the replacement operation.

- Remove the MEMORY board to be replaced.





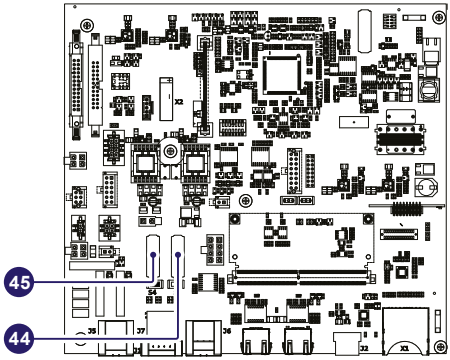
- Install the new MEMORY board .
- Reconnect all the input strings and restart the inverter.

8.7 Replacement of the COMM RS485 board

⚠ **WARNING –** Some inverter parts may be subject to hazardous voltages for the operator. Before performing any work on the inverter, refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

Replacing the RS485 line communication board **(44) (45)** is carried out on the wiring box **(02)** and may be necessary in case of communication issues on RS485 line.

The RS485 line communication board **(44) (45)** is installed on the communication and control board **(28)**.



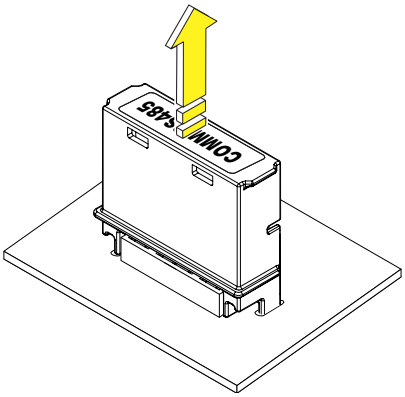
Procedure to replace the RS485 line communication board:

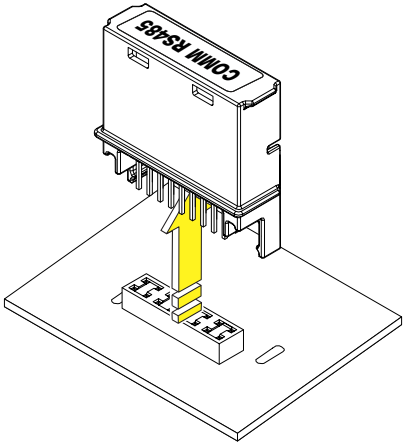
⚠ **WARNING –** Perform the "Inverter total de-energization and safe access" procedure before operate on the inverter.

- Open the front wiring box cover **(07)**.

⚠ **WARNING –** Do not open the power module cover **(54)** during the replacement operation.

- Remove the RS485 line communication board to be replaced.





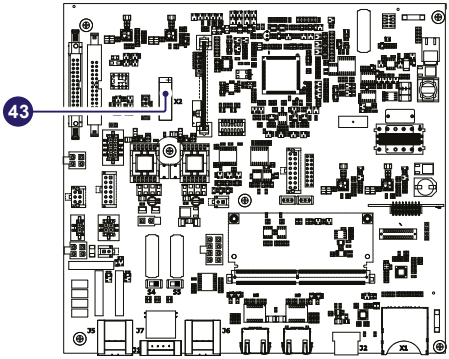
- Install the new RS485 line communication board.

- Reconnect all the input strings and restart the inverter.

8.8 Replacement of the buffer battery

⚠ **WARNING –** Some inverter parts may be subject to hazardous voltages for the operator. Before performing any work on the inverter, refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

Replacing the CR2032 coin battery **(43)** is carried out on the wiring box **(02)** and may be necessary in the following circumstances:
- LED error signal.
- Reset of the date and time settings.



The battery **(43)** is of the CR2032 type and is installed on the communication board **(28)**.

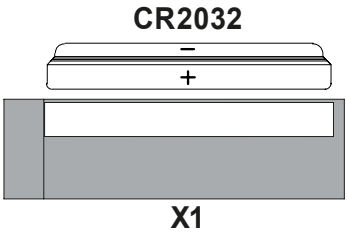
Procedure to replace the buffer battery **(43)**:

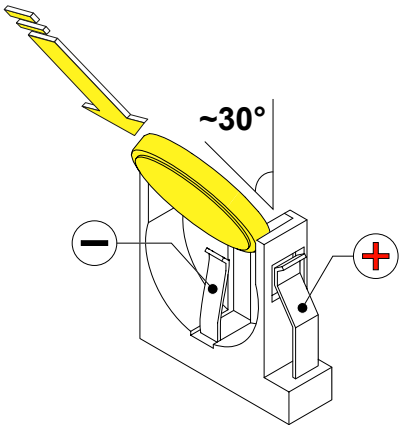
⚠ **WARNING –** Perform the "Inverter total de-energization and safe access" procedure before operate on the inverter.

- Open the front wiring box cover **(07)**.

⚠ **WARNING –** Do not open the power module cover **(54)** during the replacement operation.

- Remove the buffer battery **(43)** to be replaced.
- Install the new buffer battery, taking care to handle it with insulating gloves in order not to compromise the charge and respecting the polarity shown on the diagram on the communication and control board **(28)**.





- Reconnect all the input strings and restart the inverter.

8.9 Procedure for dismantling the equipment

⚠ **WARNING –** The dismantling operations must be carried out with the equipment disconnected from any voltage sources. Refer to **"Inverter total de-energization and safe access"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

⚠ **ATTENTION –** Never open the power module **(01)** or wiring box **(02)** in the case of rain, snow or a level of humidity >95%. Always carefully seal all unused openings.

Even though the device is equipped with an anti-condensation valve, air with extremely high levels of humidity can lead to the creation of condensation inside the inverter.

As the inverter is almost completely insulated from the outside, condensation can also form after maintenance interventions in certain weather conditions.

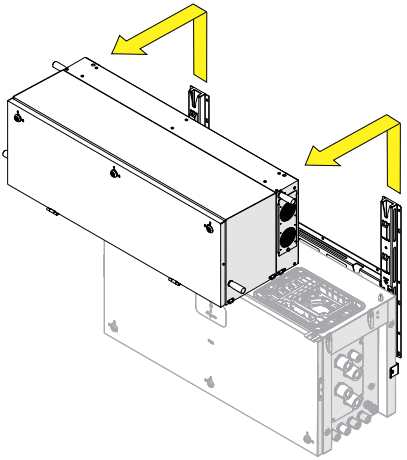
⚠ **ATTENTION –** During dismantling always protect the inverter parts that are installed and exposed to the weather elements!

⚠ **ATTENTION –** Staff authorised to carry out the dismantling operations must be specialised and experienced in this job. They must also have received suitable training on equipment of this type.

The inverter consists of an power module **(01)**, a wiring box **(02)** and a mounting bracket **(03)** which may be dismantled separately.

To dismantling and disassemble the power module (01) follow these steps:

- Disconnect any external voltage sources and isolate the equiment referring to the **"Inverter total de-energization and safe access"** paragraph.
- Disconnect all internal connectors between power module **(01)** and wiring box **(02)** reffering to **"Interface cables connection"** paragraph (Follow the indications for connection procedure but in the reverse order).
- Disjoint the power module **(01)** and wiring box **(02)** enclosures reffering to **"Final fastening operations"** paragraph (Follow the indications for the mounting procedure but in the reverse order).
- Lift and remove the power module **(01)** following the indications for the mounting procedure in the **"Assembly the Inverter to the bracket"** paragraph in the reverse order and the indication for lifting methods in **"Lifting"** paragraph.



⚠ **ATTENTION –** Never leave the power module **(01)** or the wiring box **(02)** disassembled on the field. In case is necessary to disassemble the power module **(01)** only, a IP65 protection covers for wiring box openings (for temporary installation of wiring box only) kit is available as accessory options.

To dismantling and disassemble the wiring box (02) follow these steps:

- Remove the power module **(01)** as previously described.
- Remove AC cables and protective earth clable.
- Remove any signal cables.
- Remove the wiring box **(02)** following the indications for the mounting procedure in the **"Assembly the Inverter to the bracket"** paragraph in the reverse order and the indication for lifting methods in **"Lifting"** paragraph.

To dismantling and disassemble the mounting bracket **(03)** follow the indications for the mounting procedure in the **"Bracket assembly"** paragraph in the reverse order.

8.10 Troubleshooting

⚠ **ATTENTION –** Operations on the inverter to identify and address any faults may only be performed by the installer or by qualified personnel.

8.10.1 Web User Interface and wireless communication troubleshooting

The following table gives a list of main and most common errors or problems relating to the wireless communication between inverter and user devices.

Problem	Possible causes	Solution
The Web User Interface cannot be accessed.	ADMIN or USER password forgotten.	Reset the passwords by clicking on “Forgot your password”; The passwords can be reset after having entered the “Product Key” code that can be found on the “Communication Identification Label”.
The inverter is able to identify a wireless network but is unable to connect to it.	The signal between the inverter and the wireless router to which the board wants to connect is too weak.	Modify the position of the wireless antenna, the inverter or the router.
		Make sure that the inverter has not been installed near obstacles which could affect the communication with the wireless router (for example: metal cages or walls, walls in reinforced concrete, electromagnetic fields).
		Move the router as close as possible to the inverter.
		Install a wireless signal repeater in order to extend the network to which the inverter is to be connected; then connect the inverter to the repeater.
	The wireless network to which the inverter is to be connected, could require the user to enter a username and password to allow navigation (for example, with a public wireless network or a hotel).	Unfortunately the inverter cannot be connected to these types of wireless networks. Connect the inverter to an alternative wireless network.
The Inverter has not identified the wireless network to which connection is required.	The wireless network to which the Inverter is to be connected, is set so as not to be identified (hidden network).	The Inverter is not able to connect to a hidden network. Set the wireless network to which the inverter is to be connected (visible network), then identify and connect the Inverter to the wireless network as normal.
	The signal between the inverter and the wireless router to which the board wants to connect is too weak.	Modify the position of the wireless antenna, the inverter or the router.
		Make sure that the inverter has not been installed near obstacles which could affect the communication with the wireless router (for example: metal cages or walls, walls in reinforced concrete, electromagnetic fields).
		Move the router as close as possible to the inverter.
		Install a wireless signal repeater in order to extend the network to which the inverter is to be connected; then connect the inverter to the repeater.
The wireless board does not communicate correctly with the inverter inside of which it is installed (inconsistency in the detected data read by the board), or when working in “Access Point Mode”, it’s not possible to access the Web User Interface.	The wireless board of the inverter could be damaged.	Request a service intervention to check that the inverter wireless board is working correctly.
	Wrong Inverter Date/Time settings.	Check if Date/Time has correctly set on the inverter; correct it if necessary.
Alternating difficulties in the local connection to the Web User Interface.	The inverter might not be correctly powered (for example, if the inverter is switched off at night, the Web User Interface cannot be accessed).	Access to the Web User Interface only when the inverter is correctly powered.
	The wireless connection signal between the device in use and the router or the Inverter, may not have sufficient power or it may be disturbed by obstacles which affect the communication.	Make sure that the signal between the wireless devices which interact with the inverter are sufficiently high and that any obstacles such as metal cages or walls, walls in reinforced concrete or strong electromagnetic fields do not affect communication.

Problem	Possible causes	Solution
Although the Inverter has been configured correctly in “Station Mode” and works correctly on the local network, no data has been transmitted to the Aurora Vision®.	The MAC address used to register the inverter on the Aurora Vision® platform is not the same as the actual address associated with the inverter.	Make sure that the MAC address registered on the Aurora Vision® platform is actually the one associated with the inverter. If it is not, modify the registered MAC address.
	The wireless network to which the Inverter is connected, could be protected by a Firewall which prevents the remote exchange of data with the Aurora Vision® platform.	Contact the network administrator in order to have the Firewall configured so that the remote exchange of data between the Inverter and the Aurora Vision® platform is allowed.
It is not possible to access the Web User Interface using the IP address when the inverter is operating in “Station Mode – DHCP”.	An incorrect dynamic IP address is being used to access the Web User Interface or the IP address could have been modified by the wireless router to which the inverter is connected.	Access the Web User Interface using via “AP Mode” (refer to **“Access to the Web User Interface”** paragraph to know how to connect via “AP Mode”) and read the current IP Address in “CONNECTIVITY > WLAN” section (**“CONNECTIVITY menu”**).
	The IP Address used to access the Web User Interface was lost.	Access the Web User Interface using the “Host Name” that could be obtained writing this url http://ABB-XX-XX-XX-XX-XX-XX.local replacing the “X” with the hex digits of the MAC address of the inverter (it can be found on the “Communication Identification Label” placed on the side of the inverter or applied during the commissioning phase to the plant documentation). The DNS or multicast service must be enabled on router. Note: This connection method doesn’t work on Android devices.
		If possible, access the pages of the wireless router web server to which the inverter is connected and read the new dynamic IP address assigned to the Inverter.
	The wireless router doesn’t allow the connection to local IP address. Tipically this happen on company networks.	Contact the network administrator to allow the wireless router to connect to local IP address.
	The device doesn’t allow the connection to local IP address. Tipically this happen with company devices.	Contact the system administrator to allow the device to connect to local IP address.
Using an Android devices, a notification advise that internet connection is missing when trying to connect to the Access Point wireless network created by the inverter and ask for connection confirmation.	Known behavior of Android devices. Android OS always check if internet connection are available and ask for confirmation if it’s not present.	Confirm the connection request in the notification of Android devices by clicking “Yes”.

8.10.2 Alarm Messages of the Inverter

In order to understand and resolve warning (Wxxx) or error (Exxx) signals that appear in the **"INVERTER LOG menu"** or **"MAIN menu"** sections of the Web User Interface follow the table given in the following paragraph.

The equipment can notify errors/warnings in the Event or Dashboard sections of the Web User Interface only if the input voltage is greater than the Vdcmin voltage (POWER Led flashing or lit; refer to **"LEDs behaviour"** paragraph).

NOTE – The following table gives the complete list of errors/warnings relating to string inverters. Some error/warning codes may not be used depending on the inverter model installed.

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- No code - Ground F - 🔴 Red LED	Ground fault of photovoltaic generator: The alarm is generated when a leakage current to ground is detected in the DC section of the system.	• Measure the isolation resistance using a megohmmeter positioned in the photovoltaic array (positive terminal short-circuited at the negative pole) compared to ground. The measurement is strongly influenced by the environmental conditions, so must be made under the same conditions in which the error occurred. - If the value measured is lower than 1 megaohm, a check must be carried out by a technician/installer on the photovoltaic generator to identify and eliminate the problem. - If the value measured is higher than 1 megaohm and the error signal persists, contact customer assistance.
- No code - Missing Grid - ⊗ Flashing green LED - 🟡 Yellow LED	Missing Grid: The inverter does not detect grid voltage (AC side).	• Check the grid voltage on the inverter's AC terminal block. - Should it be absent, check any protection work on the line and the presence of grid voltage on the supply point.
- No code - Memory fault - ⊗ Flashing yellow LED	Memory fault: The inverter has detected a communication problem with the memory board on which the inverter saves the daily value of energy produced.	• Remove the memory board and check the welding of all the connector's terminals. Subsequently reinsert the memory board and check that it is correctly inserted into the dedicated slot - If the signal persists also following the above checks, contact customer assistance.
- No code - Waiting Sun - ⊗ Flashing green LED	Waiting Sun: The inverter goes into the "Waiting Sun" stage when, following a W001 and/ or W002 warning, the voltage from the photovoltaic generator is less than the activation voltage (Vstart).	• Check the input voltage on the inverter. - If it does not exceed Vstart, check for the presence of sufficient irradiation and the correct composition of the system. - If it exceeds Vstart, contact customer assistance
- W001 - Sun Low - 🟡 Yellow LED	Insufficient irradiation (Low input voltage on switching on the inverter): Incorrect configuration of the PV generator or an "on the limit" configuration for the inverter's minimum input voltage.	• Check the input voltage on the inverter. - If it does not exceed Vstart, check for the presence of sufficient irradiation and the correct composition of the system. - If it exceeds Vstart, contact customer assistance
- W002 - Input UV - 🟡 Yellow LED	Insufficient irradiation (Low input voltage on switching off): Incorrect configuration of the photovoltaic generator or an "on the limit" configuration for the inverter's minimum input voltage.	• Check the input voltage on the inverter. - If it does not exceed Vstart, check for the presence of sufficient irradiation and the correct composition of the system. - If it exceeds Vstart, contact customer assistance
- W003 - Grid Fail - 🟡 Yellow LED	Parameters of grid voltage outside range: This error signal occurs when during the inverter's normal operation the grid parameters exceed the limits set by the operator: - Grid voltage absent (after the signal the inverter goes to "Missing Grid") - Unstable grid voltage (values too low or too high) - Unstable grid frequency	• Check the grid voltage on the inverter. - Should it be absent, check for absence of grid voltage on the supply point. - If, on the other hand, the voltage tends to rise (when the inverter is connected) there is high line or grid impedance. • Check the grid voltage also on the supply. - If it is high, it means that there is high grid impedance. In this case, ask the operator to adjust the grid voltage. If the operator authorises a change to the inverter's parameters, agree the new limits with customer assistance - If the voltage at the point of supply is much lower than that measured on the inverter, it is necessary to adjust the line (inverter-contactor). - If the voltage and the grid frequency come back within the limits (also when the inverter is connected to the grid), contact customer assistance

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- W004 - Grid OV - ○ Yellow LED	Grid overvoltage: This error signal occurs when during the inverter's normal operation the grid voltage exceeds the maximum limit set by the operator.	• Check the grid voltage on the inverter. If the voltage tends to rise (when the inverter is connected), there is a problem of high line or grid impedance. • Check the grid voltage also on the supply. - If it is high, it means that there is high grid impedance. In this case, ask the operator to adjust the grid voltage. If the operator authorises a change to the inverter's parameters, agree the new limits with customer assistance - If the voltage at the point of supply is much lower than that measured on the inverter, it is necessary to adjust the line (inverter-contactor). - If the voltage and the grid frequency come back within the limits (also when the inverter is connected to the grid), contact customer assistance
- W005 - Grid UV - ○ Yellow LED	Grid undervoltage: This error signal occurs when during the inverter's normal operation the grid voltage exceeds the minimum limit set by the operator.	• Check the grid voltage on the inverter. • Check the grid voltage also on the supply. - If it is high, it means that there is high grid impedance. In this case, ask the operator to adjust the grid voltage. If the operator authorises a change to the inverter's parameters, agree the new limits with customer assistance - If the voltage at the point of supply is much lower than that measured on the inverter, it is necessary to adjust the line (inverter-contactor). - If the voltage and the grid frequency come back within the limits (also when the inverter is connected to the grid), contact customer assistance
- W006 - Grid OF - ○ Yellow LED	Grid over-frequency: This error signal occurs when during the inverter's normal operation the grid frequency exceeds the maximum limit set by the operator.	• Check the grid frequency in the inverter. • Check the grid frequency also on the supply: - If the voltage and the grid frequency come back within the limits (also when the inverter is connected to the grid), contact customer assistance
- W007 - Grid UF - ○ Yellow LED	Grid under-frequency: This error signal occurs when during the inverter's normal operation the grid frequency exceeds the minimum limit set by the operator.	• Check the grid frequency in the inverter. • Check the grid frequency also on the supply: - If the voltage and the grid frequency come back within the limits (also when the inverter is connected to the grid), contact customer assistance
- W011 - Bulk UV - ○ Yellow LED	Low “Bulk” voltage (DC-DC circuit): The alarm (which is a warning and not an error) is generated when the voltage at the heads of the bulk capacitors does not reach the threshold for the operation of the inverter (internal unchangeable threshold).	• Raise the value of the activation voltage (Vstart) so as to have sufficient power from the PV generator at the time of the inverter's grid connection. • Check the input voltage on the inverter. - If it does not exceed Vstart, check for the presence of sufficient irradiation and the correct composition of the system. - If it exceeds Vstart, contact customer assistance.
- W012 - Batt. Low - ⊗ Flashing yellow LED	Battery Low: The inverter has detected a backup battery voltage that is too low.	• Check that the date/time are set correctly and, if they are not, set them. Subsequently arrange to completely switch off the inverter (on both AC and DC) and wait a few minutes. Finally, restart the inverter and check whether the date/time are now correctly set or whether they have reset to 01/01/2000. In this case replace the battery with the inverter completely switched off (isolate AC and DC side) being careful to maintain the polarity.
- W013 - Clock Fail - ⊗ Flashing yellow LED	Clock Fail: The alarm occurs when there is a difference of more than 1 minute in the time shown on the Web User Interface compared to the internal time of the microprocessors and indicates a malfunction of the clock circuit.	• Error inside the inverter and cannot be checked externally. - If the alarm repeats persistently, contact customer assistance.
- W015 - Island Detect. - ○ Yellow LED	Disconnection due to Anti-Islanding: The inverter has been improperly connected to an island grid.	• Check that the grid to which the inverter is connected is not an island grid. - If the grid to which the inverter is connected is an island grid, switch the inverter off and then on again: if the problem persists, contact customer assistance.

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- W018 * - DC SPD tripped - ⊗ Flashing yellow LED * (only for models with monitored SPD)	Intervention of overvoltage surge arresters on DC side: Overvoltage surge arresters situated on the DC side are damaged.	• Observe the inspection window on each surge arrester (DC side). If it is red, the surge arrester is damaged and the cartridge must be replaced. - If the alarm status persists, even if all the surge arresters have a green inspection window, contact customer assistance.
- W019 * - AC SPD tripped - ⊗ Flashing yellow LED * (only for models with monitored SPD)	Intervention of overvoltage surge arresters on AC side: Overvoltage surge arresters situated on the AC side are damaged.	• Observe the inspection window on each surge arrester (AC side). If it is red, the surge arrester is damaged and the cartridge must be replaced. - If the alarm status persists, even if all the surge arresters have a green inspection window, contact customer assistance.
- W021 - P-reduction Start - ⊗ No LED	Activation of reduction in power: Indicates that one of the power limitations has been triggered.	• Check which power limitation code is active and, on the basis of that, carry out the necessary checks that might relate to various factors including: - settings by the user - high grid frequency - high grid voltage - anti-islanding - low grid voltage - high internal temperature - high input voltage
- W022 - Q-mode Change - ⊗ No LED	Variation in means of managing reactive power: Variation in the means of managing reactive power; this change can be made through the Web User Interface.	The variation in the means of managing reactive power is done directly by the customer/installer and is not an error. The information is only saved on the historic record of the events memorised by the inverter.
- W023 * - Date/time mod. - ⊗ No LED	Variation in the inverter's date and time: Variation of the inverter's date and time; this change can be made through the Web User Interface.	• The variation in the inverter's date and time is done directly by the customer/installer and is not an error. The information is only saved on the historic record of the events memorised by the inverter.
- W024 - Energy data rst - ⊗ No LED	Zeroing of the statistical energy data memorised in the EEPROM: Reset of the energy data saved in the inverter; this operation can be handled through the Web User Interface.	The zeroing of the partial energy values memorised by the inverter is done directly by the customer/installer and is not an error. The information is only saved on the historic record of the events memorised by the inverter • The warning may also occur when the Memory Card on which the production statistics are saved is replaced
- W025 - P-reduction End - ⊗ No LED	Deactivation of reduction in power: Indicates that the inverter has come out of one of the power limitation states.	This type of warning does not need any check
- W026 - AFDD user reset - ⊗ No LED	Reset of the Arc Fault error: Manual reset of the Arc Fault error; this operation can be made through the internal webserver.	• The reset of the Arc Fault error is done directly by the customer/installer and is not an error. The information is only saved on the historic record of the events memorised by the inverter
- W046 - Grid conn. fault - ● Yellow LED	Connection to the grid unsuccessful The alarm is logged when a Missing grid or Input UV error occurs or due to the manual disconnection of the inverter during the grid connection sequence.	• Once the error occurs, the inverter tries to return to normal operation. If the problem persists after a number of attempts to connect the inverter, switch the inverter off and then on again. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- W047 - Update Incomplete - ● Yellow LED	FW update method unsuccessful The alarm occurs when a firmware update has not been completed.	• Complete any pending firmware updates. - If the problem persists once the firmware updates have been completed, switch the inverter off and on again. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- W048 - Periodic GridOff - ● Yellow LED	Automatic disconnection from the grid due to time limit: If the inverter exceeds the set grid connection time limit set by the grid standard, it will automatically have to carry out a disconnection and reconnection to the grid to carry out the Riso test.	• The presence of this alarm is not an error as the automatic disconnection is prescribed by safety regulations. - If the inverter disconnects in a shorter time than expected, contact customer assistance.

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- W049 * - Global-Settings Event - ⊗ No LED	Variation of the grid standard Variation of the inverter's grid standard; this change can be made through the Web User Interface.	• The variation in the inverter's grid standard is done directly by the customer/installer and is not an error. The information is only saved on the historic record of the events memorised by the inverter
- W058 - System Frozen - ◯ Yellow LED	Converter in locked state: The converter lock state is connected to an installation phase in which the starts-up and grid connection conditions are not yet present.	• Complete the commissioning phase of the inverter. - If the problem persists (once the commissioning phase has been completed and the inverter has been switched off and back on again), contact customer assistance.
- E001 - Input OC - ◯ Yellow LED	Input over-current (photovoltaic generator): The alarm occurs when the inverter's input current exceeds the inverter's threshold for maximum input current.	• Check whether the composition of the PV generator enables input current which exceeds the maximum threshold allowed by the inverter and that the configuration of the inputs (independent or in parallel) is carried out correctly. - If both checks are positive, contact customer assistance.
- E002 - Input OV - ◯ Yellow LED	Input overvoltage (photovoltaic generator): The alarm is generated when the input voltage (from the PV generator) exceeds the inverter's threshold of maximum input voltage. The alarm is triggered before reaching the absolute threshold beyond which the inverter will be damaged. When the inverter's input voltage exceeds the Over Voltage threshold, the inverter will not start up due to the generation of the alarm.	• It is necessary to measure the input voltage inside the inverter with a voltmeter. - If it is higher than the maximum voltage of the operating range, the alarm is genuine and it is necessary to check the configuration of the PV generator. If the voltage has also exceeded the maximum input threshold the inverter could be damaged. - If it is lower than the maximum voltage of the operating range, the alarm is caused by an internal malfunction and it is necessary to contact customer assistance.
- E003 - No pars (DSP) - ◯ Yellow LED	DSP initialisation error: The main microcontroller is unable to correctly initialize the two DSPs (booster stage and inverter stage). The error is caused by communication problems on the inverter's internal bus.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E004 - Bulk OV - ◯ Yellow LED	“Bulk” over-voltage (DC-DC circuit): Error inside the inverter. The alarm is raised when the voltage at the heads of the bulk capacitors exceeds the Over Voltage threshold (internal unchangeable threshold).	• The alarm may be triggered by causes external to the inverter: - An excessive input voltage can be recorded as a condition for bulk over voltage. In this case it is advisable to check the inverter's input voltage and should this value be close to the input OV threshold, review the configuration of the photovoltaic generator. - Excessive grid voltage could cause the bulk voltage to rise in uncontrolled fashion with a consequent protection intervention and hence generation of the alarm. In these cases the alarm is transitory and the inverter automatically restarts - The alarm may be triggered by causes inside the inverter and in this case it is necessary to contact customer assistance.
- E005 - Internal error - ◯ Yellow LED	Communication error inside the inverter: The alarm occurs when there are communication problems between the control devices inside the inverter.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E006 - Output OC - ◯ Yellow LED	Output overcurrent: The alarm occurs when the inverter's output current exceeds the inverter's threshold for maximum output current.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E007 - IGBT Sat - ◯ Yellow LED	Saturation recorded on the IGBT components: The alarm appears when one of the active devices of the inverter is in saturation state.	Once the error appears, the inverter attempts to resume normal operation. - Should the error occur sporadically, it may be caused by a brusque transition of the grid voltage or of the input voltage, but is not due to a malfunction by the inverter. - If the error is connected to an internal fault, it will continue to appear and so it is necessary to contact customer assistance.

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- E009 - Internal error - Yellow LED	Error inside the inverter: Error inside the inverter	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E010 - Bulk UV - Yellow LED	Low “Bulk” voltage (DC-DC circuit): The alarm can be caused by causes external to the inverter: a reduced input voltage on the inverter (just above the activation voltage) but which is not accompanied by a sufficient availability of power from the photovoltaic generator (typical condition of the stages with limited irradiation)	- If the error signal occurs sporadically, it may be due to causes external to the inverter (limited irradiation and so limited power availability from the PV generator). - If the problem occurs systematically even in conditions of high irradiation and with input voltage which is significantly higher than the activation voltage, contact customer assistance.
- E011 - Ramp Fault - Yellow LED	Long wait for “Booster” regime to start: Error internal to inverter relating to start up time for DC-DC circuit regime (Booster)	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E012 - Internal error - Yellow LED	Error in the “Booster” circuit (DC-DC side) recorded by the “Inverter” circuit (DC-AC side): Error inside the inverter regarding the operation of the DC-DC circuit part (Booster).	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E014 - Over temp. - Yellow LED	Excessive temperature inside the inverter: External temperature over 60°C. This parameter also depends on the power which the inverter must supply since the measurement of temperatures is done internally and is influenced by the heat dissipated by the components of the inverter itself	• Check that the inverter is not exposed to direct sunlight. Wait for the temperatures to which the inverter is exposed to return to the operating range and for the inverter to cool down. - If the problem persists (once the ambient temperature has returned to within the range), contact customer assistance. You must remember to wait for the time necessary to allow the inverter to cool down.
- E015 - Cap. Fault - Yellow LED	Breakdown recorded on the “Bulk” capacitor: Error inside the inverter regarding a problem in the bulk capacitors.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E016 - Internal error - Yellow LED	Error in the “Inverter” circuit (DC-AC side) recorded by the “Booster” circuit (DC-DC side): The alarm is generated when a problem is detected in the inverter circuit part (DC/AC).	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E017 - Internal error - Yellow LED	Long wait for “Inverter” regime to start up: Error internal to inverter relating to start-up time for the DC-AC circuit regime (Inverter) The alarm can be caused by causes external to the inverter: a reduced input voltage on the inverter (just above the activation voltage) but which is not accompanied by a sufficient availability of power from the photovoltaic generator (typical condition of the stages with limited irradiation)	- If the error signal occurs sporadically, it may be due to causes external to the inverter (limited irradiation and so limited power availability from the PV generator). - If the problem occurs systematically even in conditions of high irradiation and with input voltage which is significantly higher than the activation voltage, contact customer assistance.
- E018 - Leak fault - Red LED	High leakage current measured on the DC side (photovoltaic generator): The alarm is generated when, during normal operation of the inverter, a leakage current to ground is detected in the DC section of the system. It is also possible that the inverter generates the alarm E018 message also due to AC leakage currents connected to the capacitive nature of the photovoltaic generator compared to ground.	• Measure the isolation resistance using a megohmmeter positioned in the photovoltaic array (positive terminal short-circuited at the negative pole) compared to ground. The measurement is strongly influenced by the environmental conditions, so must be made under the same conditions in which the error occurred. - If the value measured is lower than 75kOhm, a check must be carried out by a technician/installer on the photovoltaic generator to identify and eliminate the problem. - If the value measured is higher than 75kOhm and the error signal persists, contact customer assistance.

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- E019 - Internal error - ◯ Yellow LED	Failure of test on sensor to measure the leakage current (DC side): Before connecting to the grid the inverter runs a self-test regarding the sensor for the leakage current. The test is carried out by “forcing", in the sensor of the leakage current, a current with a known value: the microprocessor compares the value read with the known value. The error is generated if the comparison between the read value and the known value during the test does not fall within the allowed tolerance.	• Error inside the inverter and cannot be checked externally. By its nature, the alarm only occurs prior to connection to the grid - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E020 - Internal error - ◯ Yellow LED	Failure of the test on the relay of the “Booster” (DC-DC circuit): Before connecting to the grid, the inverter carries out some internal tests. One of these tests concerns the correct operation of the booster relay. The test is carried out by “forcing” the switching of the relay and checking its operation. The error is generated if a problem is found in actioning the relay.	• Error inside the inverter and cannot be checked externally. By its nature, the alarm only occurs prior to connection to the grid - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E021 - Internal error - ◯ Yellow LED	Failure of the test on the inverter's relay (DC-AC circuit): Before connecting to the grid, the inverter carries out some internal tests. One of these tests concerns the correct operation of the inverter relay. The test is carried out by “forcing” the switching of the relay and checking its operation. The error is generated if a problem is found in actioning the relay.	• Error inside the inverter and cannot be checked externally. By its nature, the alarm only occurs prior to connection to the grid - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E022 - Internal error - ◯ Yellow LED	Timeout of the tests undertaken on the relays inside the inverter: Execution time for the self-test carried out on the relay of the DC_AC (inverter) circuit too high. It may indicate a problem connected to the aforementioned relays	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E023 - DC injection - ◯ Yellow LED	Feeding of direct current to grid outside of range: The error is generated if the direct component of the current supplied to the grid exceeds the threshold of 0.5% of the rated operating current. In any case, the inverter does not stop because of the E023 error, but tries to connect to the grid again. The sporadic repetition of the error is a sign of serious grid distortions or sharp irradiation changes, while systematic repetition of the error signal will indicate a breakdown on the inverter	Once the error appears, the inverter attempts to resume normal operation. - Should the error occur sporadically, it may be caused by a brusque transition of the grid voltage or of the input voltage, but is not due to a malfunction by the inverter. - If the error is connected to an internal fault, it will continue to appear and so it is necessary to contact customer assistance.
- E024 - Internal error - ◯ Yellow LED	Error inside the inverter: Error inside the inverter	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- E025 - Riso Low - 🔴 Red LED	Low value of isolation resistance: Before connecting to the grid the inverter measures the isolation resistance of the PV generator compared to ground. Should the measurement of the isolation resistance be below 75kOhm, the inverter does not connect to the grid and shows the “Riso Low” error. The causes may be: - Damaged PV panel(s). - Junction box(es) of the panels not correctly sealed, so as to permit infiltration by water and/or humidity; - Problems in connections between panels (not perfectly fit); - Poor quality of cable joints; - Presence in the DC section of unsuitable or damaged overvoltage surge arresters outside the inverter (reduced ignition voltage compared to the characteristics of the strings of the PV generator); - Presence of humidity inside any junction box	• Measure the isolation resistance using a megohmmeter positioned in the photovoltaic array (positive terminal short-circuited at the negative pole) compared to ground. The measurement is strongly influenced by the environmental conditions, so must be made under the same conditions in which the error occurred. - If the value measured is lower than 75kOhm, a check must be carried out by a technician/installer on the photovoltaic generator to identify and eliminate the problem. - If the value measured is higher than 75kOhm and the error signal persists, contact customer assistance.
- E026 - Internal error - 🟡 Yellow LED	Internal reference voltage outside of range: Wrong measurement of reference voltage inside inverter	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E027 - Internal error - 🟡 Yellow LED	Grid voltage outside of range: Error in the internal measurement of grid voltage (set by law) to have a redundant measurement (2 measurements on the same parameter made by two different circuits)	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E028 - Internal error - 🟡 Yellow LED	Grid frequency outside of range: Error in the internal measurement of the grid frequency (imposed by regulations) to have a measurement redundancy (2 measurements on the same parameter carried out by two different circuits).	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E029 - Mid Bulk OV - 🟡 Yellow LED	Internal overvoltage on the measurement of the “Mid bulk”: Error inside the inverter (only triphase models)	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E030 - Internal error - 🟡 Yellow LED	High leakage current (DC side): - Error on the internal measurement (performed when the inverter is connected to the grid) of the DC side (PV generator) leakage current with respect to ground (required by regulations) to have a measurement redundancy (2 measurements of the same parameter carried out by two independent circuits)	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E031 - Internal error - 🟡 Yellow LED	Output relay damaged: Measurement of internal voltage on heads of the output relay outside of range. There is too great a difference in voltage between the input and output of the grid connection relay.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E032 - Internal error - 🟡 Yellow LED	Imbalanced output currents: Measurement of the unbalance in the output voltage (made across the three phases) outside of range (only in three-phase models)	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- E033 - Undertemper. - ◯ Yellow LED	Low ambient temperature: Temperature outside the inverter below -25°C	• Wait for the temperatures to which the inverter is exposed to return to the operating range. - If the problem persists, contact customer assistance. You must remember to wait for the time necessary to allow the inverter to warm up.
- E034 - IGBT not ready - ◯ Yellow LED	“IGBT” circuitry not ready: Error inside the inverter	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E035 - Remote Off - ◯ Yellow LED	Inverter awaiting “remote ON” command: The inverter has been switched off remotely (remote OFF) and remains in waiting state for the signal that will switch it on again (remote ON).	• Switch the inverter back on remotely. If the unit does not switch on, disable the remote on/off function and switch the equipment off completely and then switch it on again. - If the problem persists (once the Remote ON/OFF function has been reactivated), contact customer assistance.
- E036 - Internal error - ◯ Yellow LED	Average of the measurements of grid voltage outside of range: The average value of the grid voltage (sampled every 10 minutes) does not fall within the permitted ranges. The grid voltage in the point connected to the inverter is too high. This may be caused by a grid impedance that is too high. In the final stage of the timeout, the inverter limits the power to check whether the grid voltage has stabilised into regular parameters. If this does not happen, the inverter disconnects from the grid	• Check the grid voltage in the connection point to the inverter. - If the grid voltage differs from the range due to the conditions of the distribution grid, ask the operator to adjust the grid voltage. If the operator authorises a change to the inverter's parameters, agree the new limits with customer assistance.
- E046 - Str. test failed - ⊗ No LED	Error during the automatic check of the string voltages (only in models with the “fuse-control” board): In some inverter models it is possible to carry out the check test of the polarity of the strings connected to the input. This error signal occurs when, during the test stage, an inverted string is recorded	• Section the inverter and check the polarity of the string(s) which the inverter has recorded as inverted. - Once all the strings have been correctly connected, activate the system once again; the inverter will once again check the correct polarity of the string inputs at the end of which it will carry out the checks for the grid connection. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E049 - Internal error - ◯ Yellow LED	Error in the “AC feed-forward” circuit: Error inside the inverter	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E050 - AFDD Activated - ◯ Yellow LED	Arc Fault protection activated: Possible photovoltaic arc detected on the DC side.	• If it is the first time this problem has occurred, press the ESC button for 5 seconds and wait for the unit to restart. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E051 - Safety mem. Fault - ◯ Yellow LED	Error inside the inverter.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E053 - AFDD Fault - ◯ Yellow LED	Arc Fault board autotest failed: Problem detected during the AFDD board autotest phase.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E054 - AFDD comm. Fault - ◯ Yellow LED	Arc Fault board communication error: Error on the RS485 serial communication detected between the inverter and the AFDD board.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E055 - AFDD wrong conf. - ◯ Yellow LED	Arc Fault board parameter reading error: Error in the parameter reading by the system.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E057 - Vbulk reading - ◯ Yellow LED	Input voltage (Vin) higher than booster voltage (Vbulk): The error occurs if the input voltage exceeds the Bulk voltage (voltage on the DC-DC circuit inside the inverter)	• It is necessary to measure the input voltage inside the inverter with a voltmeter. - If it is higher than the maximum voltage of the operating range, the alarm is genuine and it is necessary to check the configuration of the PV generator. If the voltage has also exceeded the maximum input threshold the inverter could be damaged. - If it is lower than the maximum voltage of the operating range, the alarm is caused by an internal malfunction and it is necessary to contact customer assistance.

- Error code - Error message - LED status	Name of Alarm and Cause	Solution
- E058 - Internal error - Yellow LED	Error in the check of Pin vs Pout: The error occurs if the difference between the measured value of input power and that of output power is greater than the limit imposed internally to the inverter.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E074 - Internal error - Yellow LED	Communication error inside the inverter: The alarm occurs when there are communication problems between the control devices inside the inverter.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E077 - Internal Error - Yellow LED	Error in the system configuration: Error inside the inverter	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E078 - Riso Test fail - Yellow LED	Riso test error: Problem detected during the Riso test phase.	• Error inside the inverter and cannot be checked externally. - If the problem persists (once the inverter has been switched off and back on again), contact customer assistance.
- E079 - Wrong Sequence - Yellow LED	Incorrect Phases connection (Only triphase models) The phases have not been connected correctly to the AC output	• Invert two of the phases of the network wiring to the AC terminal block of the inverter.
- E084 - BackFeed OC - Yellow LED	Return current to photovoltaic field: The error occurs if the input voltage is particularly low (typically in the evening in conditions of low irradiation) and indicates a return current from the inverter to the photovoltaic panels).	If the error occurs in the evening or in conditions of low irradiation, it must not be considered a problem but a protection intervention for the photovoltaic field. - If the error occurs with good irradiation conditions, switch the inverter off and back on again; if the error persists, contact customer assistance.

8.10.3 Power limitation messages

The equipment can signal possible output power limitations which may occur on the basis of:
- settings made by the user
- settings required by the grid standard of the country of installation
- protective devices inside the inverter

The limitation messages can only be verified on the Web User Interface on “Status Summary” section (**“MAIN menu”**).

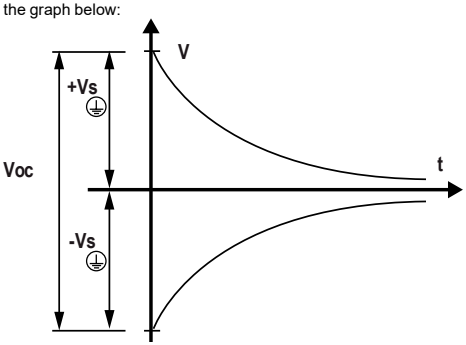
8.11 Verification of ground leakage

In the presence of anomalies or report of ground fault (where provided), there may be a ground leakage from the PV generator (DC side).

To check this, measure the voltage between the positive pole and ground and between the negative pole (of the PV generator) and ground using a voltmeter whose input accepts a voltage sufficient for the dimensions of the photovoltaic generator.

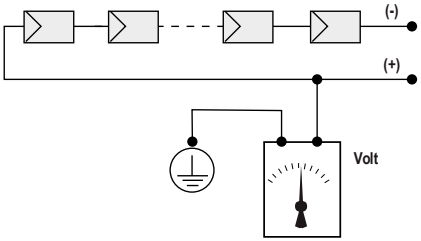
8.11.1 Behaviour of a system without leakage

Due to the capacitive effect of the PV generator, during the first moments that the voltmeter is connected between one of the two poles and ground, it will measure a voltage of about Voc/2, which will tend to stabilize to around 0V if there is no ground leakage, as shown in the graph below:



NOTE – The internal resistance of the voltmeter tends to zero the voltage present on the PV generator due to the capacitive effect.

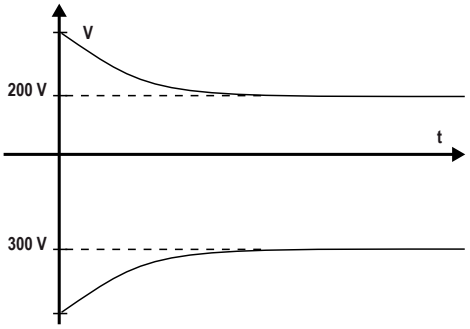
How to make the measurement:



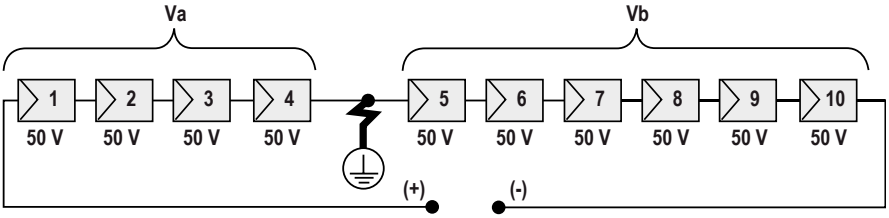
8.11.2 Behaviour of a system with leakage

If the voltage measured between one of the two poles and ground does not tend to 0V and stabilizes on a value, there is a ground leakage from the PV generator.

Example: When the measurement is made between positive pole and ground, a voltage of 200V is measured.



This means that if the system is made up of 10 modules in series and each one supplies 50V, the leakage can be located between the 4th and 5th PV module.



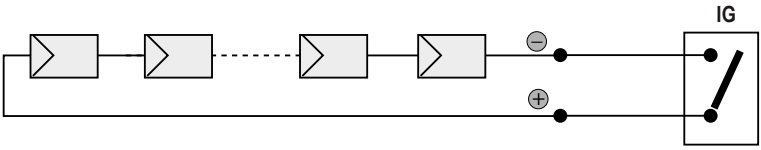
Va = voltage measured between + pole and ⏚ = 200V
Vb = voltage measured between - pole and ⏚ = 300V
In all measurements with ⏚, the ground of the inverter is indicated.

8.12 Measuring the isolation resistance of the PV generator

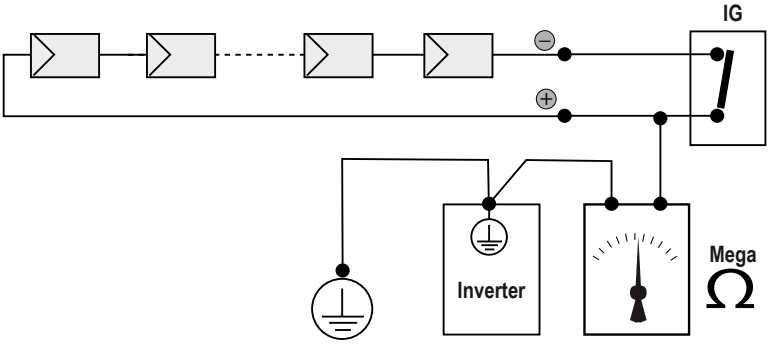
⚠ **WARNING –** The operator must always use the personal protective equipment (PPE) required by the laws of the country of destination and whatever is provided by their employer.

To measure the isolation resistance of the PV generator compared to ground ⏚, the two poles of the PV generator must be short-circuited (using a suitable sized switch).

⚠ **WARNING –** Use of unappropriate sized switch could cause risk of fire or electric arc! Use only 1500V rated switch!



Once the short-circuit has been made, measure the isolation resistance (Riso) using a megohmmeter positioned between the two shorted poles and ground (of the inverter).



If the measured isolation resistance (Riso) is less than 75 kOhm, the inverter may not connect to the grid because of low isolation of the PV generator to ground.

⚠ **ATTENTION –** The isolation resistance can be affected by the environmental conditions the PV generator is in (E.g.: PV modules wet from damp or rain), and therefore the measurement must be made immediately after the anomaly is detected.

8.13 Storage and dismantling

8.13.1 Storage of the equipment or prolonged stop

If the equipment is not used immediately or is stored for long periods, check that it is correctly packed and contact Fimer for storage instructions.
The equipment must be stored in well-ventilated indoor areas having no characteristics that could damage the components of the equipment.

Restarting after a long or prolonged stop requires a check and, in some cases, the removal of oxidation and dust that will also have settled inside the equipment if not suitably protected.

8.13.2 Dismantling, decommissioning and disposal

Fimer is not responsible for disposal of the equipment, or part of it, which does not take place on the basis of the regulations and laws in force in the country of installation.



The symbol of the cancelled bin (where present) indicates that the product must not be disposed with domestic waste at the end of its useful life.
This product must be delivered to the waste collection point of the local community for recycling.
For further information, refer to the public body responsible for waste disposal in the country.

Inappropriate disposal of waste can have a negative impact on the environment and human health owing to potentially dangerous substances.
By cooperating in the correct disposal of this product, you contribute to the reuse, recycling and recovery of the product, and the protection of our environment.

Dispose of the various types of materials that the parts of the equipment consist of in dumps that are suitable for the purpose.

COMPONENT	MATERIAL OF CONSTRUCTION
Frame, brackets, supports	Arc-welded steel FE37, aluminium
Casing or covers	ABS, plastic
Paint	RAL
Gaskets and seals	Rubber / Teflon / Viton
Electrical cables	Copper / Rubber
Cable trays	Polyethylene / Nylon
Batteries	Nickel / Lead/ Lithium

9. Attachments

9.1 Port and network services used by the inverter

9.1.1 IP Network Services

Any network connected to the inverter must allow traffic to pass on the following ports. Network firewall rules (if present) must allow responses to the inverter over existing TCP connections.

Direction	Service/Port	Protocol	Description
In	ssh/22	Tcp	For local debugging by Fimer service personnel, the inverter utilizes encrypted SSH. To allow service personnel local access to the inverter.
Out	domain/53	Tcp/udp	The inverter must be able to resolve domain names, to ensure scalability and dynamic changes on the Internet (DNS). (required)
Out	https/443	Tcp	As an HTTP client, the inverter uses SSL/TLS protocol connections to Aurora Vision® servers for secure communication. The inverter uses this port for all services, including data transmission, firmware upgrade, configuration management, and remote command transmission. (required)
Out	dhcp/67, dhcp/68	Udp	If DHCP service is not available, static network information must be assigned to the inverter (preferred)
Out	ntp/123	Udp	The inverter uses this port for network time services (NTP). (preferred)
Out	modbus/502	Tcp	The inverter offer a Modbus TCP server connection on this port.
Out	dns-sd/5353	Udp	The inverter uses this protocol to resolve the local IP address.
Out	http/80	Tcp	As an HTTP client, the inverter uses this protocol to offer local connection.

9.1.2 Network Hosts

The inverter will connect to the following hosts. Some servers owned by Fimer, and others are customer or ISP servers. Servers listed as owned by “Customer IT/ISP” must be configured in the inverter using either DHCP or as static network information.

Host	Purpose	Port	Owner/Manager
firmware.auroravision.net	Inverter firmware update	TCP:443 (https)	Fimer
platform.auroravision.net auroravision.net static.auroravision.net	Data, configuration	TCP:443	Fimer
apt.fatspaniel.net	VSN700 Logger firmware update	TCP:443	Fimer
update.auroravision.net	Inverter firmware update	TCP:443 (https)	Fimer
151.22.100.235	Inverter legacy firmware update	TCP:80 (http)	Fimer
remote-tunnel.auroravision.net	Remote Service	TCP:8022, TCP:8043, TCP:8044	Fimer
Site dependent	DHCP (optional)	UDP:67, UDP:68	Customer IT/ISP
Site dependent	DNS	UDP:53, TCP:53	Customer IT/ISP

9.1.3 Inverter network configuration

The inverter requires a valid network configuration in order to operate. This information can either be provided by a DHCP server provided by the customers network (the default), or the inverter can be configured with static network information. Regardless of how the inverter is configured, the following information is required.

Configuration	Purpose
IP Address	Allows the inverter to take part in the local network. This does not need to be a public IP address. In most cases this is a private IP address.
Subnet mask	Used to determine if two computers are on the same network.
Gateway	The IP address of the computer which will forward network traffic from the local network to an external network
DNS Server	The IP address(es) of the computer(s) which resolve domain names.

FIMER

For more information
please contact
your local FIMER
representative or visit:

fimer.com

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