FIMER



Solar Inverter
PVS-20/30/33-TL
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 – MA Solar Italy 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.
	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.
	Direct Current (DC)
	Alternate Current (AC)
	Without isolation transformer
	Positive pole of the input voltage (DC)
	Negative pole of the input voltage (DC)
IP 65	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"** paragraph on this manual to know all detailed necessary steps to safely operate on the inverter.

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

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 remove the connection boxes (AC and signals) 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"** 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.

⚠ **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 openings or cooling systems of the equipment.	Use suitable PPE. Wait for the parts to cool down before opening the inverter. Do not restrict cooling openings or cooling systems of the equipment (e.g. 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.
Installation of the equipment and/or mounting of the equipment components temporarily incomplete.	Prevent unauthorized access to the installation area. Use a sufficient number employees and PPE.
Accidental disconnections of the quick-fit connectors, with the equipment in operation, may generate electrical arcs.	Be careful about properly routing the DC inverter cables.
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 – MA Solar Italy 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

MA Solar Italy 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.

MA Solar Italy 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 – MA Solar Italy 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

MA Solar Italy 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.

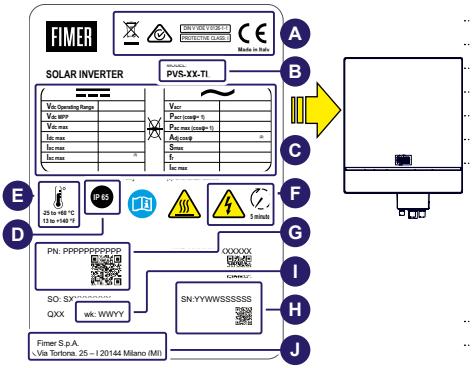
3.2 Identification of equipment and manufacturer

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 and identification Label

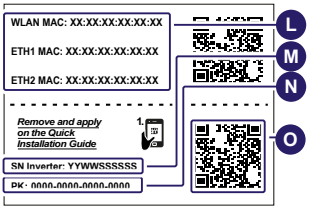


A	Certification marks
B	Inverter model
C	Main technical data
D	Environmental protection rating
E	Operating temperature range
F	Discharge time
G	Inverter Part Number
H	Serial Number (YYWWSSSSSS): YY = Year of manufacture WW = Week of manufacture SSSSSS = Progressive number - Inverter access point SSID: FIMER-YYWWSSSSSS - "Host Name": http://FIMER-YYWWSSSSSS.local - It is required to register the inverter in Aurora Vision.
I	Production date:WWYY where: WW (week) YY (year)
J	Manufacturer

3.2.2 Communication Identification label

The "communication identification label" 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.



L	WLAN (Wi-Fi) and ETH1/ETH2 (Ethernet) MAC addresses
M	Inverter Serial Number (YYWWSSSSSS): YY = Year of manufacture WW = Week of manufacture SSSSSS = Progressive number
N	Product Key: To be used as Wi-Fi 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.
O	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.

Inverter Model	MPPT	DC inputs pairs	DC connection type	Input string current monitoring	DC SPD type 2	DC SPD type 1 + 2	DC disconnect switch	AC detachable terminal block	AC SPD type 2	AC SPD type 2 for IT system
PVS-20-TL-SX	2	4	MC4	•	•		•	•	•	
PVS-20-TL-SY	2	4	MC4	•		•	•	•	•	
PVS-20-TL-SXD	4	8	MC4	•	•		•	•	•	
PVS-30-TL-SX	4	8	MC4	•	•		•	•	•	
PVS-30-TL-SY	4	8	MC4	•		•	•	•	•	
PVS-33-TL-SX	4	8	MC4	•	•		•	•	•	
PVS-33-TL-SY	4	8	MC4	•		•	•	•	•	
PVS-33-TL-SI	4	8	MC4	•	•		•	•		•

The above -SXD and -SX inverter model can be equipped with the following option:

Option	Description
;APD inverter model suffix	• Inverter equipped with PID recovery functionality
;AFD inverter model suffix	• Inverter equipped with Arc Fault Detection functionality
;DISPLAY inverter model suffix	• Inverter equipped with display on the front cover

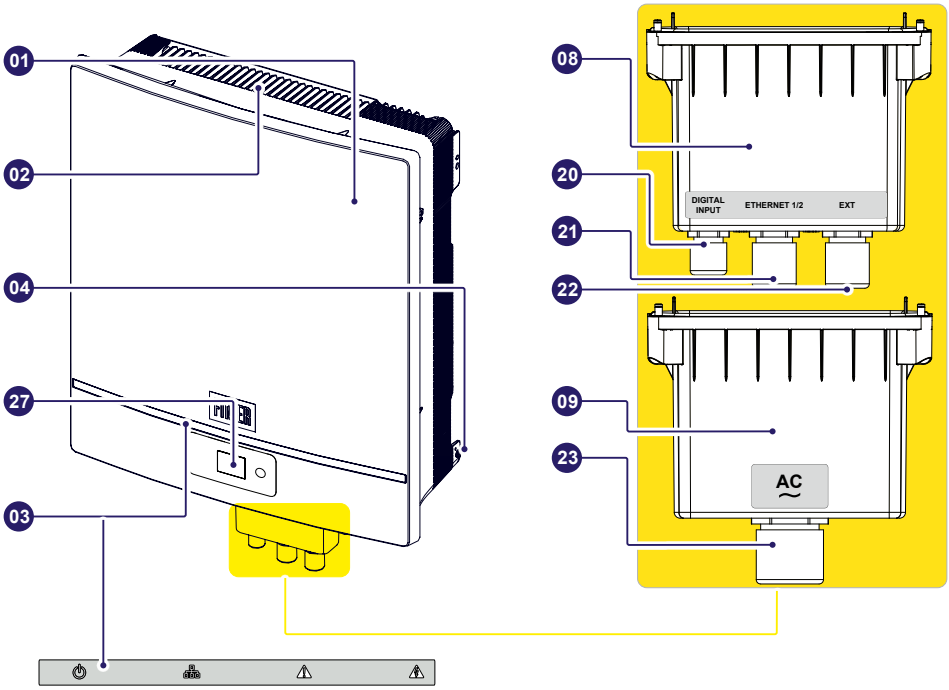
All inverter model can be equipped with the following accessories (to be ordered separately):

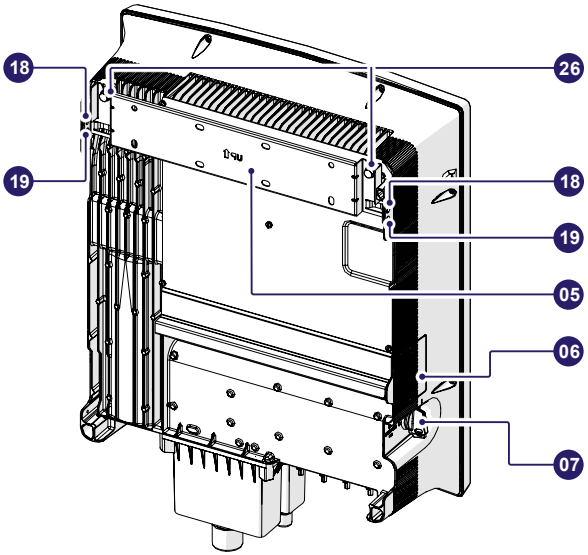
Accessory	Description
PVS-20/30/33-CCB	The PVS-20/30/33-CCB (communication and control board) is an an expansion accessory board for that adds the following capabilities to the inverter: • RS 485-1 main communication line (master or slave) • Active output power limitation via digital inputs (PMU mode) • Auxiliary power supply (24Vdc/80mA) to supply external devices (ex: VSN800 Weather Station).

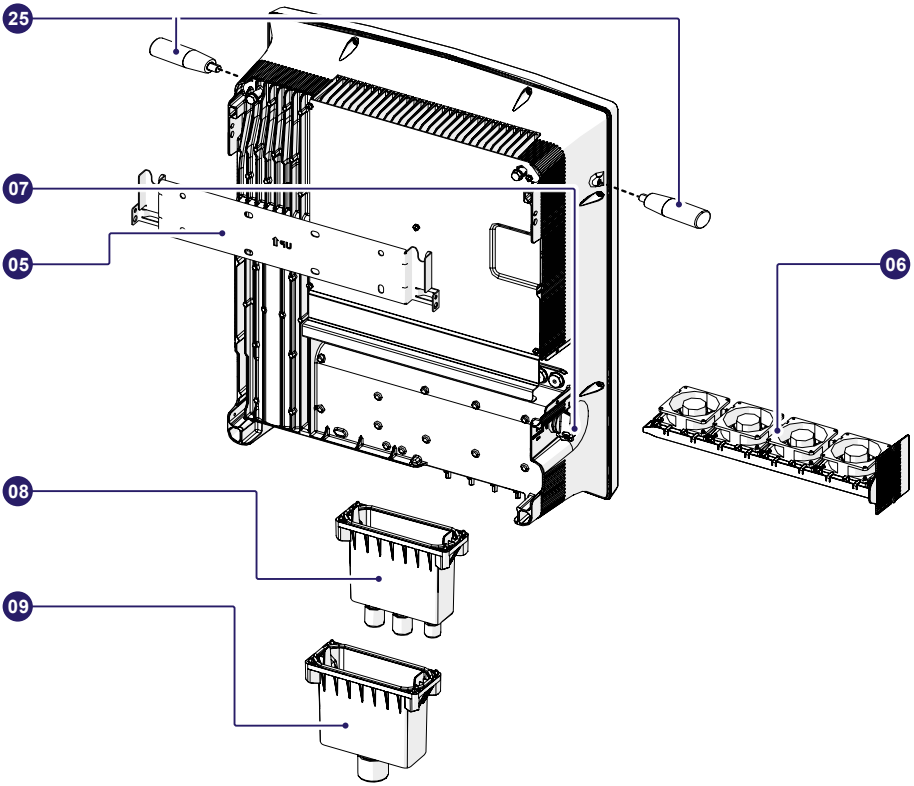
3.4 Component reference numbers

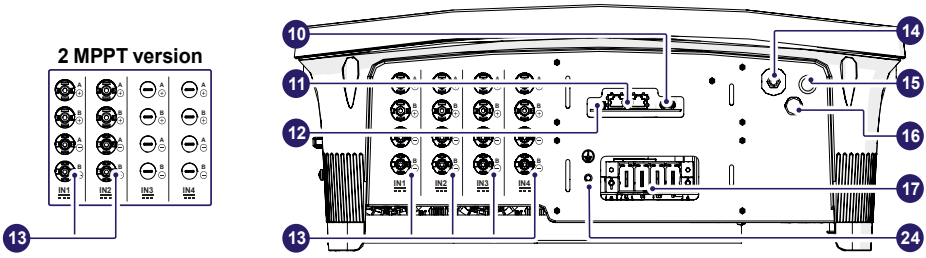
Inverter external view	
01	Inverter
02	Heatsink
03	Synoptic
04	Protective earth (PE) external connection point
05	Mounting bracket
06	Fan tray
07	DC disconnect switch
08	Signals connection box
09	AC connection box
10	USB connector for accessories board
11	Ethernet 1/2 connectors
12	Digital input connector
13	Quick fit input connectors
14	Wi-Fi antenna connector
15	Smart button
16	Anti-condensation valve
17	AC output connector
18	Side bracket screws (M5)
19	Padlock hole
20	Digital input cable gland (M20)
21	Ethernet 1/2 cable gland (M25)
22	EXT cable gland (M25)
23	AC cable gland (M40)
24	Protective earth (PE) internal connection point
25	Handles (optional)
26	Rear anchor point
27	Display (inverter models with ;DISPLAY suffix)

3.4.1 Inverter external view






25
07
05
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2 MPPT version
IN1
IN2
IN3
IN4
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3.5 Technical data

3.5.1 Technical data table

	PVS-20-TL (2MPPT)	PVS-20-TL (4MPPT)	PVS-30-TL	PVS-33-TL
Input side				
Absolute maximum DC input voltage (Vmax,abs)	1100 V			
Start-up DC input voltage (Vstart)	250...500V (default 430V)			
Operating DC input voltage range (Vdcmin...Vdcmax)	200...1000 V			
Rated DC input voltage (Vdcr)	620V			
Rated DC input power (Pdcr)	20500 W	20500 W	30600 W	33700 W
Number of independent MPPT	2	4	4	4
Recommended maximum PV array power (PPV, max)	30000 Wp	34000 Wp	44000 Wp	48000 Wp
Maximum DC input current (Idcmax) for each MPPT	26A,26A	22A, 26A, 22A, 26A		
Maximum DC input power for each MPPT (PMPPT,max)	IN1=12000W@26A, IN2=12000W@26A	IN1=10000W@22A, IN2=12000W@26A, IN3=10000W@22A, IN4=12000W@26A		
MPPT input DC voltage range (VMPPTmin ... VMPPTmax) at Pacr	460-850V			
Maximum input short circuit current for each MPPT	40 A [7]			
Maximum backfeed current (AC side vs DC side)	Negligible in normal operating conditions [8]			
Number of DC inputs pairs for each MPPT	2			
DC connection type	PV quick fit connector [3]			
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	SPD Type 2 / Type 1+2 (optional)			
Photovoltaic array isolation control	Yes, according to IEC 62109-2 or according to local regulation			
Residual current monitoring Unit (leakage current protection)	Yes, according to IEC 62109-2			
DC switch rating for each MPPT (version with DC switch)	Rating DC-PV1 ; 50A@600Vdc, 40A@800Vdc, 30A@1000Vdc			
String Fuse	Fuseless			
Input current monitoring	String level			
Output side				
AC Grid connection type	Three phase (3W+PE or 3W+N+PE)			
Earthing system	TN-S, TN-C, TN-CS, TT000/2	TN-S, TN-C, TN-CS, TT	TN-S, TN-C, TN-CS, TT	TN-S, TN-C, TN-CS, TT and IT [4]
Rated AC power (Pacr @cosf=1)	20000 W	20000 W	30000 W	33000 W
Maximum AC output power (Pacmax @cosf=1)	22000 W up to 30°C	22000 W up to 30°C	33000 W up to 30°C [1]	36300 W up to 30°C
Rated apparent power (Sr)	22000 [10]/20000 VA	22000 [10]/20000 VA	33000 [10] [11]/30000 VA	36300 [10] /33000 VA
Maximum apparent power (Smax) [9]	22000 VA up to 30°C	22000 VA up to 30°C	33000 VA up to 30°C [2]	36300 VA up to 30°C
Maximum reactive power (Qmax)	20000 VAR	20000 VAR	30000 VAR	33000 VAR
Nominal power factor and adjustable range	> 0.995; 0…1 inductive / capacitive			
Rated AC grid voltage (Vac,r)	380V, 400V			
Rated AC grid current (Iac,r)	31,9 A	31,9 A	47,8 A [12]	52,6 A
Maximum AC output current (Iac,max)	33,4 A	33,4 A	50,1 A	55,1 A
Output inrush current (peak and duration)	10% of Imax for 5msec.			
Contributory fault current	Iac,max x 1,15			
Rated output frequency (fr)	50 Hz / 60 Hz			
Output frequency range (fmin...fmax)	47...53 Hz / 57…63 Hz			
Total harmonic distortion of current	<3%			
Max DC Current Injection (% of In)	< 0.5%*In			
Maximum AC cable	35 mm^2 copper/aluminum			
AC connection type	Pluggable Terminal Block			
Output protection				
Anti-islanding Protection	According to local standard. Method: active frequency drift in combination with RoCoF techniques			
Maximum external AC overcurrent protection	63 A	63 A	80 A	80 A
Output overvoltage protection	SPD Type 2			

	PVS-20-TL (2MPPT)	PVS-20-TL (4MPPT)	PVS-30-TL	PVS-33-TL
Operating performance				
Maximum Efficiency (ηmax)	98.4%	98.4%	98.4%	98.4%
Weighted Efficiency (EURO)	98.2%	98.2%	98.2%	98.2%
Communication				
Embedded communication interfaces	Dual port Ethernet, WLAN, RS485 advanced port (optional)			
Local User Interface	Synoptic, Web User Interface, "Installer for solar inverters" mobile APP, Display (optional)			
Communication protocol	Modbus TCP Sunspec, Modbus RTU Sunspec (optional)			
Commissioning tool	Web User Interface, "Installer for solar inverters" mobile APP			
Cloud services	Aurora Vision® Plant Management Platform, Rest API			
Advanced features	Embedded export limitation control (in combination with external meter), 24h self consuption monitoring			
Environmental				
Operating ambient temperature range	-25...+60°C (-13...140 °F) with derating above 45 °C (113 °F)			
Storage temperature	-40°C...+85°C / -40°F...185°F			
Relative Humidity	4…100 % with condensation			
Sound pressure level, typical	75dB(A) @ 1m			
Maximum operating altitude	4000 m (13123 ft)	4000 m (13123 ft)	4000 m (13123 ft)	4000 m (13123 ft) with output power [Pout] derating above 3000m (9842 ft) (6)
Environmental pollution degree classification for external environments	3			
Environmental class	Outdoor			
Climatic category according to IEC 60721-3-4	4K26			
Physical				
Inverter typology	Grid connected, Double stage, Transformerless			
Environmental Protection Rating	IP65			
Cooling System	Forced air			
Dimension (H x W x D)	H = 675 mm / 26.57" (799,2mm / 31.46" with connection boxes) W = 591,8 mm / 23,3" D = 227,5 mm / 8,95"			
Weight	50 Kg / 110lb			
Mounting system	Single mounting bracket (vertical or horizontal installation)			
Night-time consumption (active power / reactive power)	<12W/ <120VAR			
Minimum inverter feed-in power	10W			
Overvoltage rating as per IEC 62109-1	II (DC input) III (AC output)			
Safety				
Safety class	I			
Insulation Level	Transformerless			
Marking	CE (5), RCM			
Safety, EMC and Radio Spectrum Standards	IEC/EN 62109-1, IEC/EN 62109-2, EN 61000-6-1, EN 61000-6-2, EN 61000-3-11, EN 61000-3-12, EN 62311, EN 301 489-1, EN 301 489-17, EN 300 328			
Grid standard (check the availability with your sales channel)	IEC 61683, EN 50530, IEC 62116, IEC 61727, AS/NZS 4777.2, VDE-AR-N 4105, VDE-AR-N 4110, VDE V 0124-100, DIN VDE V 0126-1-1, VFR 2019, UTE C15-712-1, CEI 0-21, CEI 0-16, PEA, MEA, EN 50438, EN 50549-1/-2, DRRG (DUBAI), CLC/TS 50549-1/-2, G99, Synergrid C10/11, RD 413, RD 1565, RD244, P.O. 12.3, NTS 631, UNE 206006 IN (ITC-BT-40), PPDS-priloha, Denmark Type A/B, IRR-DCC-MV, ABNT NBR 16149, ABNT NBR 16150, NRS 097-2-1, SII, ISO/IEC Guide 67, Netherlands Type A, EIFS Type A, Ireland			

1. Selecting the grid code "GERMANY (VDE 4105:2018 PNOM)" or "AUSTRALIA (AS/NZS 4777)" this value is limited to 30000W
2. Selecting the grid code "GERMANY (VDE 4105:2018 PNOM)" or "AUSTRALIA (AS/NZS 4777)" this value is limited to 30000VA
3. 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.
4. Available only with a dedicated version called "SI", with 33kW of power.
5. Hereby, MA Solar Italy. declares that the radio equipments (radio module combined with the inverter), to which this document 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
6. @ 4000m (45° C ambient temperature), the output power (Pout) is reduced by 10%.
7. 30A (each MPPT): for Australia and New Zealand only.
8. In the event of a fault, limited by the external protection envisaged on the AC circuit
9. Smax=Sr up to 30°C
10. Up to 30°C amb.
11. 30000 for "AUSTRALIA (AS/NZS 4777 PNOM)"
12. Selecting the grid code "GERMANY" (VDE 4105:2018 PNOM)" or "AUTRALIA (AS/NZS 4777 PNOM)" this value is limited to 43.5A

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

3.5.2 Specific information for the Australian market

The intended use for inverters PVS-20/30/33-TL for Australian market is also for residential.

3.5.2.1 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.

3.5.2.2 DC Switch (isolator) technical data

Isolating switching device	PVS-20/30/33-TL
Rated insulation voltage	1000V
Rated impulse withstand voltage	8000V
Suitability for isolation	1000V
Rated operational current	12A
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	48A

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

NOTE – For inverters not equipped with DC switch the external DC isolator shall comply with AS 60947.3 and relevant regulation requirement

3.5.3 Tightening torques

Component		Nm
Digital input cable gland **(20)** - M20 cable gland		7 Nm
Ethernet 1/2 cable gland **(21)** - M25 cable gland		7.5 Nm
EXT cable gland **(22)**- M25 cable gland		7.5 Nm
AC cable gland **(23)**- M40 cable gland		8 Nm
Signals connection box screws		3 Nm
AC connection box screws		3 Nm
Side bracket screws **(18)** - M5 screws		3,5 Nm
Protective earth (PE) external connection point **(04)** - M6 screw		4 Nm
Protective earth (PE) internal connection point **(24)** - M6 screw		4 Nm
AC terminal block screws		2.5 Nm if the wire ≤ 25 mm² 4.5 Nm if the wire > 25 mm²
Fan tray **(06)** fastening screws		3 Nm
Quick fit connectors couterpart; Stäubli; PV-KST4-EVO 2 and PV-KBT4-EVO 2		
Models	32.0087P0001-UR (Male) ; 32.0086P0001-UR (Female)	4.0 Nm
	32.0089P0001-UR (Male) ; 32.0088P0001-UR (Female)	3.5 Nm
	32.0093P0001-UR (Male) ; 32.0092P0001-UR (Female)	3.5 Nm

3.5.4 Cable gland clamping range

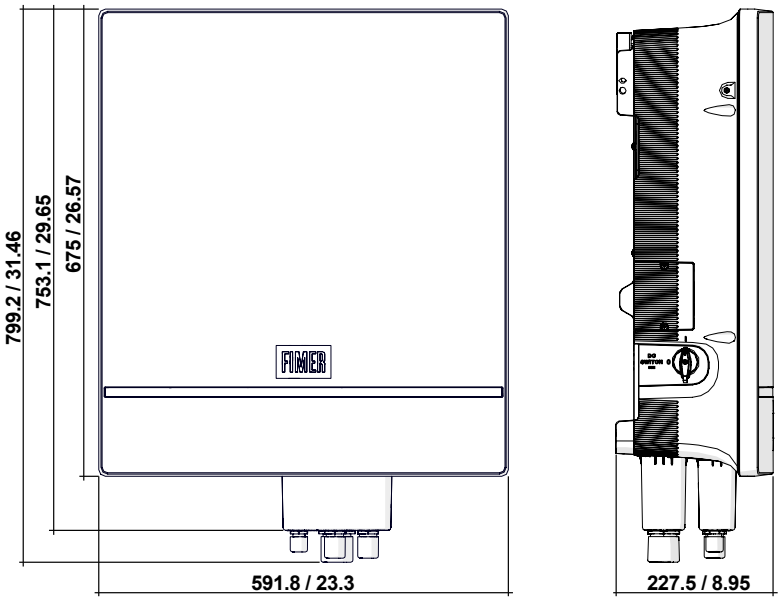
Component		mm
Digital input cable gland **(20)** - M20 cable gland		5...10 mm
Digital input cable gland **(20)** - M20 cable gland (equipped with two-hole gasket)		3...5 mm (each hole)
Ethernet 1/2 cable gland **(21)** - M25 cable gland		10...17 mm
Ethernet 1/2 cable gland **(21)** - M25 cable gland (equipped with 6mm with two-hole gasket)		4...6 mm (each hole)
EXT cable gland **(22)**- M25 cable gland		10...17 mm
EXT cable gland **(22)**- M25 cable gland (equipped with 7mm three-holes gasket)		5...7 mm (each hole)
AC cable gland **(23)**- M40 cable gland (with reducing seals for reducing the clamping ranges)		20...26 mm
AC cable gland **(23)**- M40 cable gland		22...32 mm
Quick fit connectors couterpart; Stäubli; PV-KST4-EVO 2; Male		
Models	32.0087P0001-UR	4.7...6.4 mm
	32.0089P0001-UR	6.4...8.4 mm
	32.0093P0001-UR	6.4...8.4 mm
Quick fit connectors couterpart; Stäubli; PV-KBT4-EVO 2; Female		
Models	32.0086P0001-UR	4.7...6.4 mm
	32.0088P0001-UR	6.4...8.4 mm
	32.0092P0001-UR	6.4...8.4 mm

3.5.5 Connectors cross section range

Component		mm²
AC screw terminal block		10...35mm²
Digital input screw terminal block		0.25...1.5mm² without plastic collar ferrule 0.25...0.5mm² with plastic collar ferrule
Quick fit connectors couterpart; Stäubli; PV-KST4-EVO 2; Male		
Models	32.0087P0001-UR	4...6 mm²
	32.0089P0001-UR	4...6 mm²
	32.0093P0001-UR	10 mm²
Quick fit connectors couterpart; Stäubli; PV-KBT4-EVO 2; Female		
Models	32.0086P0001-UR	4...6 mm²
	32.0088P0001-UR	4...6 mm²
	32.0092P0001-UR	10 mm²

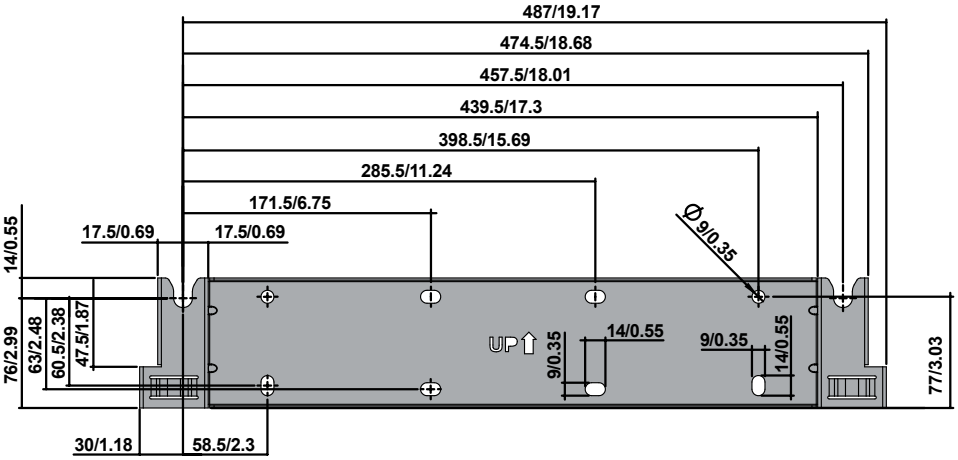
3.5.6 Overall dimensions of the inverter

The overall dimensions, including the mounting bracket **(05)**, are expressed in millimeters / inches.



3.5.7 Overall dimensions of the mounting bracket

The dimensions of the wall mounting bracket **(05)** are expressed in millimeters and inches.

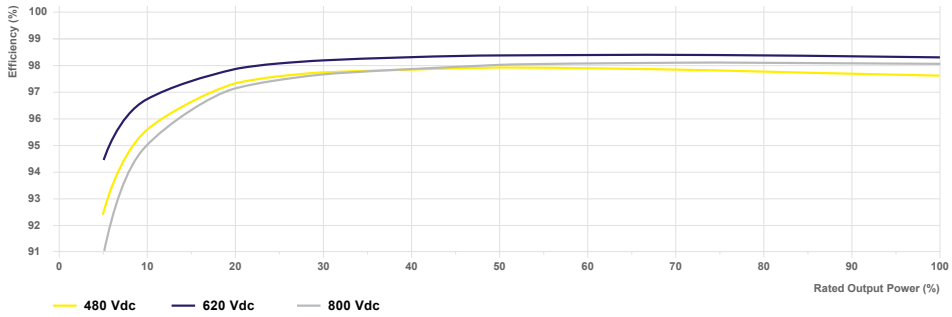


3.6 Efficiency curves

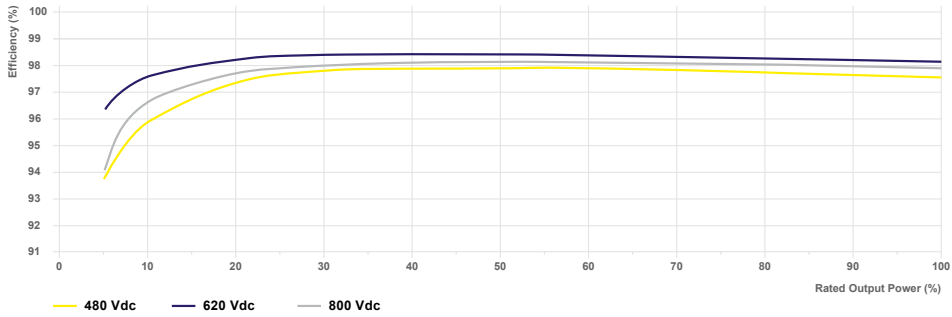
Graphs of the efficiency curves of all inverter models described in this manual are shown below.

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

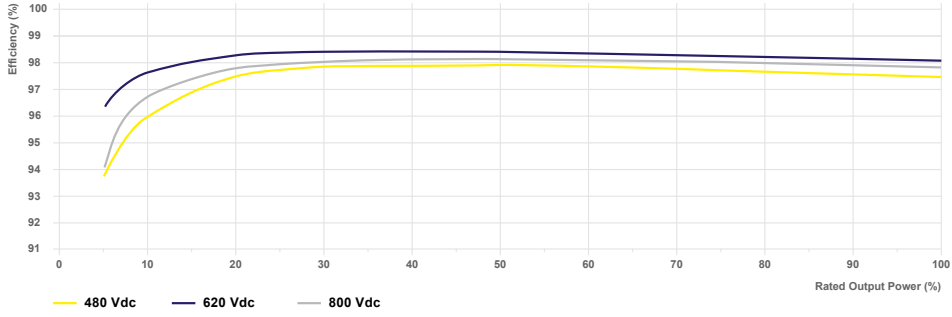
PVS-20-TL



PVS-30-TL



PVS-33-TL



3.7 Power derating

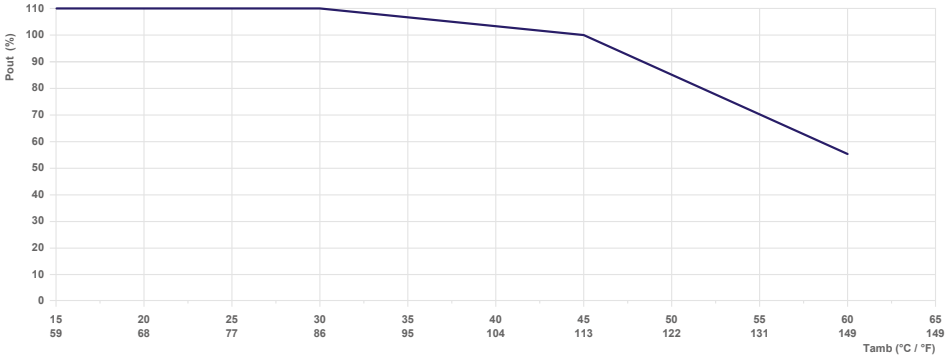
In order to allow inverter operation in safe thermal and electrical conditions, the unit automatically reduces the value of the power fed into the grid.

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.

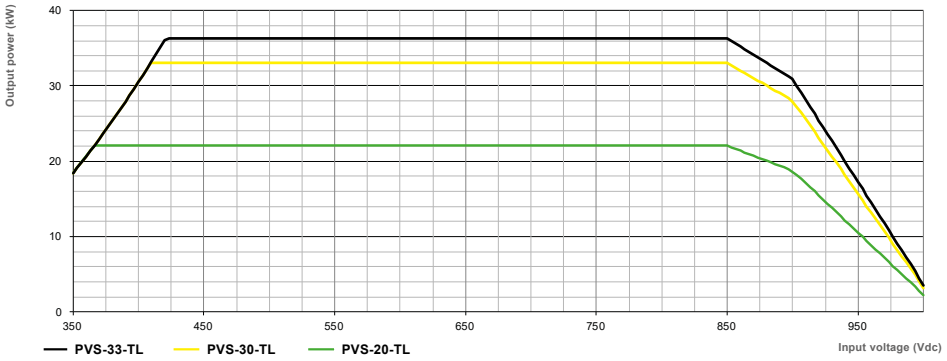
The inverter can therefore reduce the power during certain periods of the day according to the value of these parameters. The graph shown below the power reduction in relation to the ambient temperature at the nominal input voltage.



3.7.2 Power derating due to the input voltage

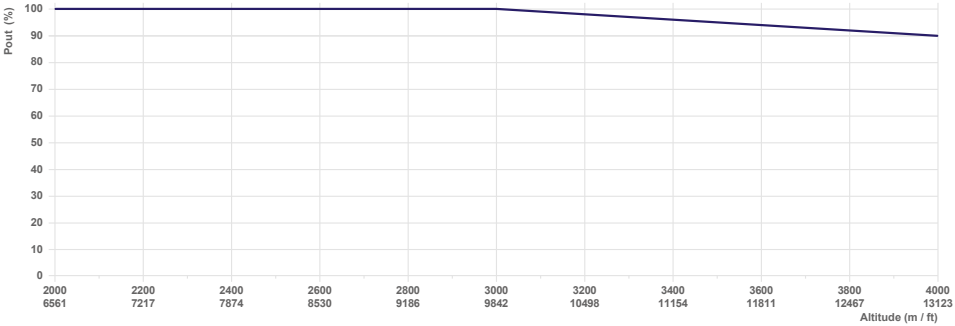
The power reduction occurred for too high or too low DC input voltage values is adjusted automatically.

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



3.7.3 Power derating due to altitude (PVS-33-TL)

The power reduction due to altitude can occour only on the PVS-33-TL model with temperature above 45°C.



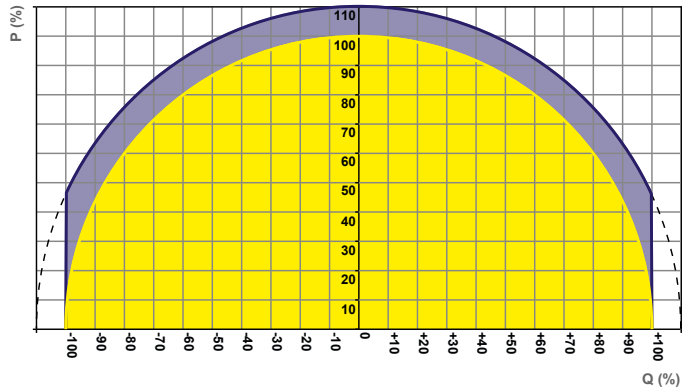
3.7.4 P-Q Capability

⚠ **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.

	PVS-20-TL	PVS-30-TL	PVS-33-TL
Ambient temperature	45 °C		
Rated output voltage (Un)	380/400 Vac		
Nominal Active Power (Pn)	20 kW	30 kW	33 kW
Rated Apparent Power (Sr)	22000 [1] / 20000 VA	33000 [1][2] / 30000 VA	36300 [1] / 33000 VA
Nominal Reactive Power (Qn)	20 kVAR	30 kVAR	33 kVAR
Cosphi @ Sn	-0 ... 1 ... 0+		
Capability with grid voltage	1.0 x Un		

1) Up to 30°C amb.
2) 30000 for "AUSTRALIA (AS/NZS 4777 PNOM)"

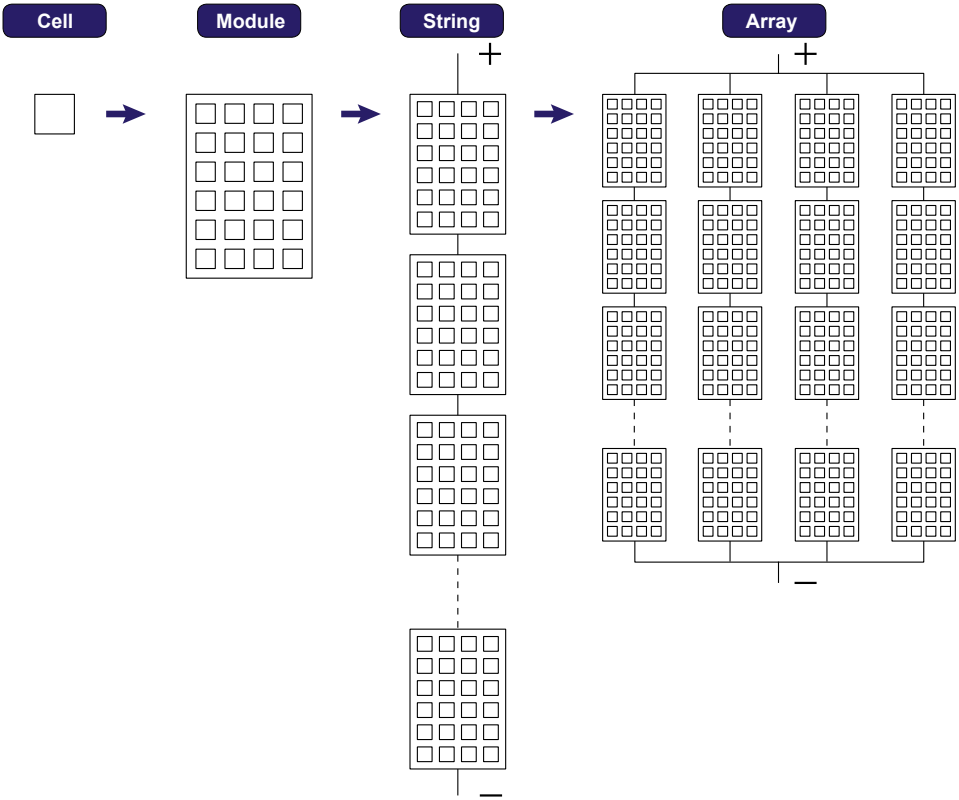


3.8 Characteristics of a photovoltaic generator

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.

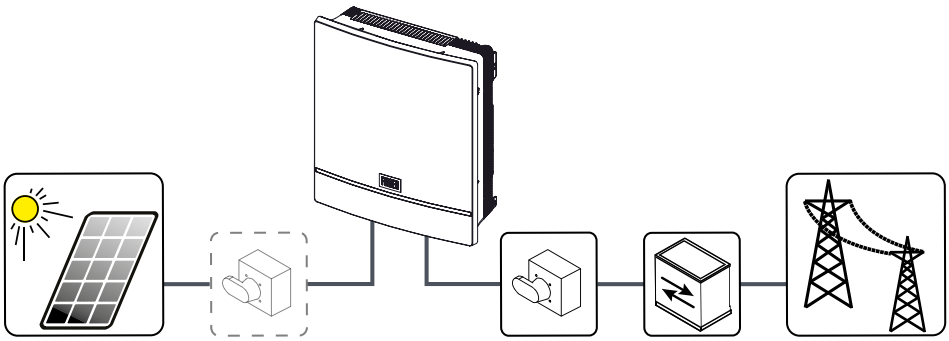
In order to allow inverter operation in safe thermal and electrical conditions, the unit automatically reduces the value of the power fed into the grid under adverse environmental conditions or unsuitable input voltage values.

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).

3.10 Functionality and components description

3.10.1 Highlights

- Compact inverter suitable for vertical and horizontal installation
- Fuse-free design
- Installation on new systems and retrofit applications
- Maximum string voltage 1100Vdc
- Compatible with double-sided photovoltaic modules
- Commissioning through the “Installer for Solar Inverters” mobile app and Web UI
- Built-in the distributed control algorithm enabling export limitation at plant level (no need of any dedicated controller)
- Single string current monitoring
- Availability of 10% more power in case of temperature up at 30 ° C
- PID recovery function (optional)

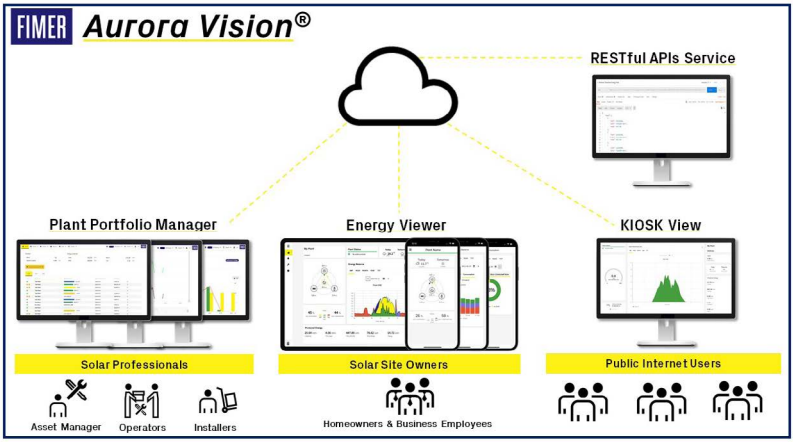
3.10.2 Improved commissioning and maintenance

FIMER Installer for Solar Inverters (App for mobile)
Improved multi inverter installation with FIMER Installer for Solar Inverters app compatible with both Android and iOS devices.
Integrated Web User Interface
Wi-Fi access to the integrated Web User Interface allows to access to single inverter’s parameter and setting via the most common Internet browser.
Remote firmware update function
The firmware of the inverter can be updated both locally (via Web User Interface or Installer for solar inverters mobile app) and remotely (Via Aurora Vision cloud products).

3.10.3 Aurora Vision®

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 consist of two different products, designed to meet different market needs, an APIs Service (RESTful architecture) to enabled third party data integration and a KIOSK view to show publicly solar plant benefits and performances:

- **Plant Portfolio Manager**. An advanced professional web-portal that allows stakeholders (such as installers/operators/managers) to monitor and control fleets of photovoltaic systems installed for final customers.
- **Energy Viewer**. A smart and easy-to-use mobile app for monitoring the main power generation and self-performances indicators, for owners of residential and commercial PV plants, in order to keep energy use and savings in check.
- **APIs Service**. Harness the power of data from FIMER’s photovoltaic systems to design solutions and provide opportunities.
- **KIOSK View**. A public and customizable web page based on HTML5 (self-updating and embeddable in external frames) to show the benefits and performances of a solar power plant.



NOTE – Please contact the FIMER technical support for getting your own Aurora Vision® account in order to access Plant Portfolio Manager (mainly for plant administrators). Download the Energy Viewer App (App Store or Google Play Store) or visit www.auroravision.net and click on “Sign-Up“ in order to get your Aurora Vision account and Self-Register your plant (mainly for site owners).

3.10.4 Remote ON/OFF or DRM0 functionality (AS/NZS 4777.2 standard).

This command can be used to remote ON/OFF or to DRM0 functionalities via an external command by means the digital input connector **(12)**.
The desired functionality (Remote ON/OFF or DRM0) must be enabled in the integrated web user interface.
Remote ON/OFF functionality:
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.
DRM0 functionality:
The AS/NZS 4777.2 standard contains requirements related to grid stability and remote system control by the utility.
One of these requirements is demand response mode for zero export (DRM 0), which reduces export to grid to zero upon command from the utility.

NOTE – Only one of the above feature can be connected to the digital input connector **(12)**.

3.10.5 Reactive power production

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.

3.10.6 Active power limitation

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

3.10.7 Overvoltage surge arrester monitoring

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

3.10.8 PID recovery functionality

PID recovery functionality is provided only for dedicated inverter models (;APD suffix).
This functionality is based on a recovery method and can effectively prevent the build-up of any PID (Potential Induced Degradation) phenomena for solar panels and associated efficiency degradation.

3.10.9 Arc Fault Detection functionality

Arc Fault Detection functionality is provided only for dedicated inverter models (;AFD suffix).
The Inverter equipped with AFD provides protection from arc faults. The dedicated circuitry detects arcing conditions on DC side and in case of such event allows the disconnection from AC grid.

3.10.10 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 Wi-Fi communication) of the inverter.

NOTE – Please consult (and download) the product documentation by visiting www.fimer.com

3.11 Communication interfaces

The integrated Ethernet and Wi-Fi board allows the local or remote connection to the inverter.
The inverter provide the following integrated communication interfaces:

3.11.1 Wi-Fi (IEEE 802.11 b/g/n@2.4GHz)

The use of Wi-Fi 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 Wi-Fi router.

3.11.2 Ethernet

- By default the two Ethernet ports **(11)** 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® 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.

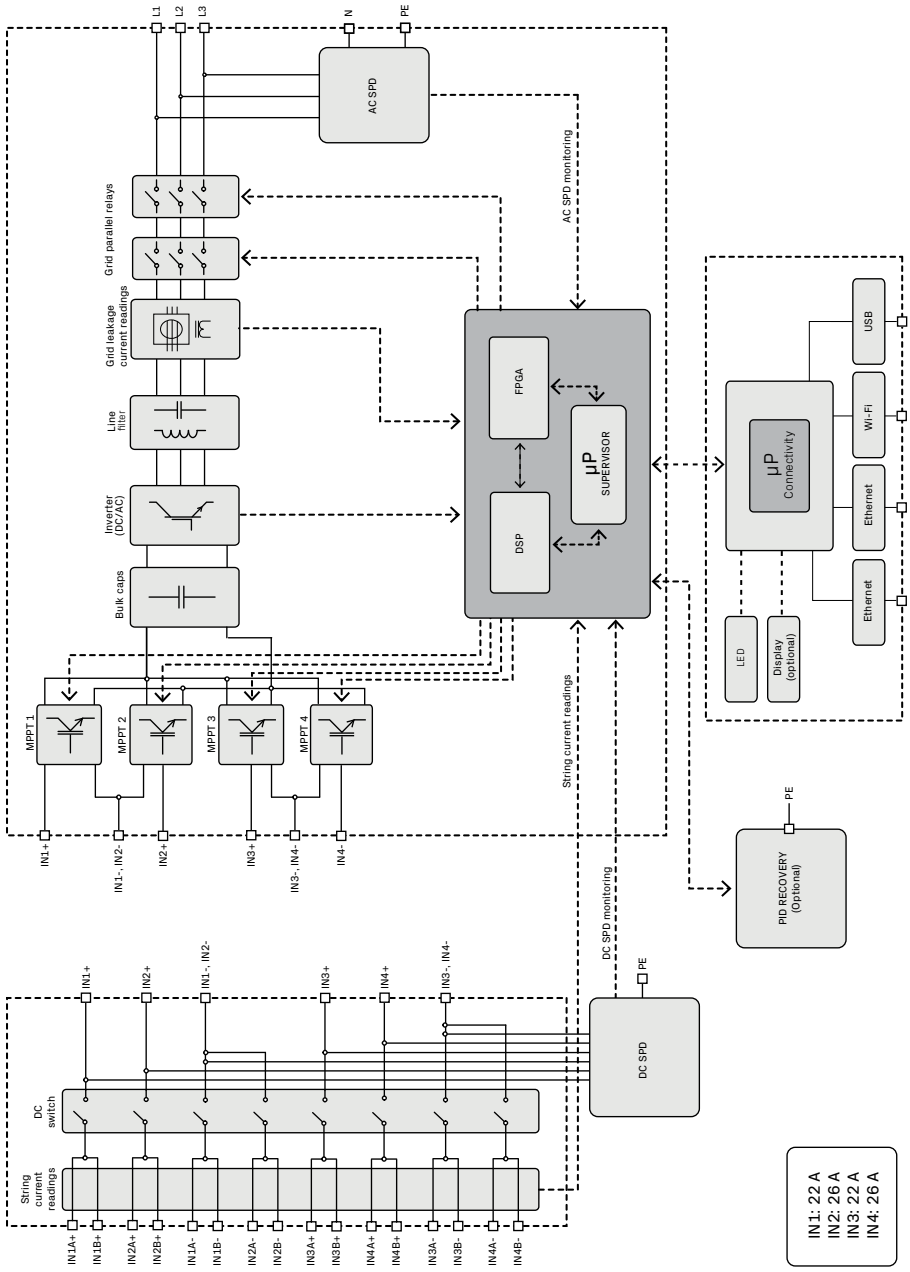
With the inverters connected over Ethernet daisy chain and with an available internet connection it will be always possible, via Aurora Vision Cloud, to upgrade remotely the firmware of the inverters.

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.

PVS-20/30/33-TL



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 Synoptic**(03)**.

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 and with AC over-voltage surge arresters.

3.13.4 String Fuses

WARNING – String fuses are not available inside the wiring box 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.

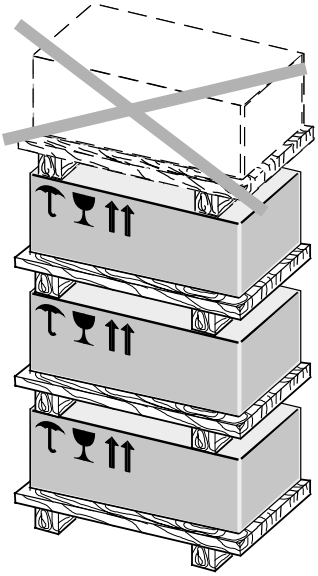
4.2 Equipment weight

Device	Weight (kg/lb)	Lifting points	Holes for handles (optional) or Eyebolts (not supplied)
PVS-20/30/33-TL	50 Kg / 110 lbs	2	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 is stored correctly, it can withstand a maximum load of 3 stacked units.



⚠ **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 Inverter must be lifted using the 2 handles **(25)** (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.

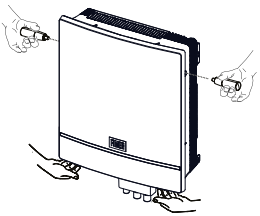
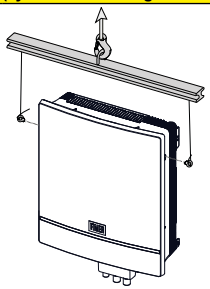
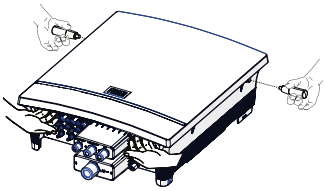
⚠ **ATTENTION –** Do not lift several units or parts of the equipment at the same time, unless otherwise indicated.

The handles **(25)** 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.

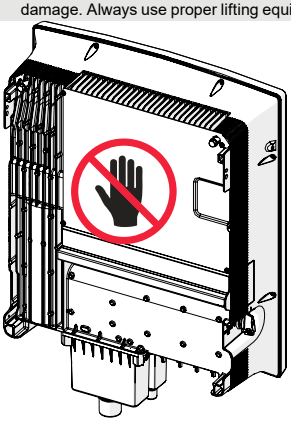
It is required to use one of the following lifting methods to move the equipment during installation or maintenance phases:

⚠ **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.

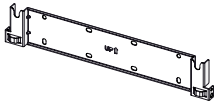
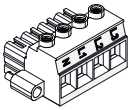
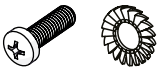
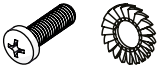
Vertical lifting (handles)	Vertical lifting (eyebolts and lifting balancer)	Horizontal lifting (handles)
		

⚠ **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!

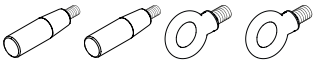
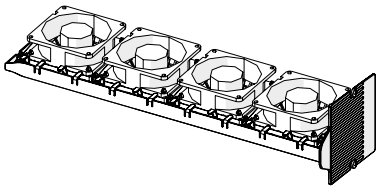


4.4 List of supplied components

The table below shown the available component in the inverter package (common for all models):

Component		Quantity
	Vertical or horizontal mounting bracket **(05)**	1
	AC connector counterpart **(17)**	1
	Reducing seals for reducing the clamping ranges of the AC cable gland (M40) **(23)**.	1
	Eyelet cable lug for Protective earth (PE) internal connection point **(24)**	1
	M6 screw + M6 serrated lock washers to clamp the earth cable on the Protective earth (PE) internal connection point **(24)**	1 + 2
	M6 screw + M6 serrated lock washers to clamp the earth cable on the Protective Earth (PE) external connection point **(04)**	1 + 2
	Digital input connector **(12)** counterpart	1
	Wi-Fi antenna **(14)**	1
	M5 screws (with washers) for mechanically securing the inverter to the bracket **(18)**	2
	Technical documentation	1

4.5 Kit of recommended spare parts

Code	Description		Quantity
Code: YVP.V3H00.0 **Handling kit for PVS-20/30/33kW**	Handles and eyebolt for lifting		2 + 2
Code: YVD.V3H03.0 **Kit External Fan drawer**	1 external fan set		1

5. Installation

5.1 Installation safety instruction

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

⚠ **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 –** The installation must be carried out with the equipment disconnected from any voltage sources. Refer to **"Inverter total de-energization"** 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 –** 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

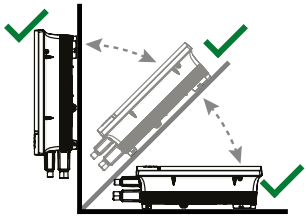
5.2.1 General recommendation on installation position

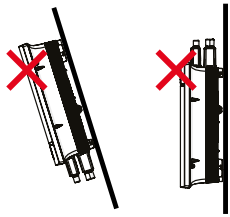
⚠ **ATTENTION –** Please refer to the warranty terms and conditions to evaluate any possible warranty exclusions due to improper installation.

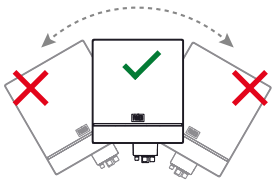
- Refer to **"Technical data"** paragraph to check the required environmental conditions (protection rating, temperature, humidity, altitude, etc.).
- The installation location shall be easily accessible.
- Installation of the unit in a location exposed to direct sunlight is NOT acceptable. (Add awning 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.
- Installations of PVS-33-TL over 3000 meters (9842 ft) must be valued taking in consideration the derating reported in the curve ("3.7.3 Power derating due to altitude (PVS-33-TL)").

5.2.2 Tilting admittance

The unit can be installed with an inclination between 0° (horizontal) and 90° (vertical) as indicated in the figures below.







5.2.3 Distances

- Maintenance operations from FIMER service could 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 removing the front cover (FIMER service only) and to allow wiring connections.

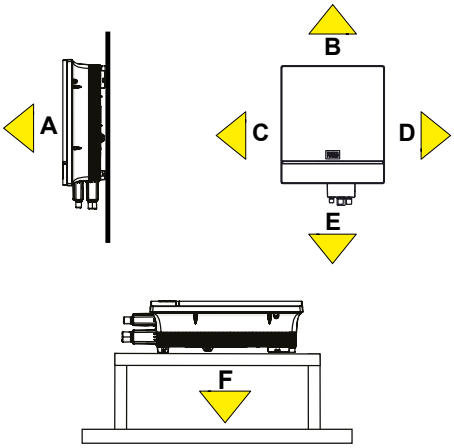
- Install at a height which takes into consideration the weight of the unit and in a position which is suitable for servicing, unless suitable means will be provided to carry out these mentioned operations.

- If possible, install at eye-level so to allow to easily check the synoptic **(03)**.

- Do not install any object (e.g. AC or DC cables) that could be damaged by overheating from outgoing hot air flow coming from top side (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.

- Respect the minimum distances from surrounding objects that could prevent the inverter installation and restrict or block the air flow:

A = 70cm (27")
B = 50cm (20")
C = 20cm (8") (60cm/24" for fan replacement)
D = 20cm (8")
E = 15cm (6")
F = 15cm (6")



Below are some particular scenarios that may vary the minimum clearance distances:

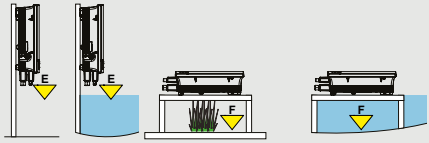
NOTE – The **E** minimum required free space may depends from cable type (cable dimension, bending radius, etc). This evaluation must be done by the installer during the plant design phase.

NOTE – In case of manual installation, using handles **(25)**, consider a free side space (**C** and **D**) to lift the inverter of 50cm/20" 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.

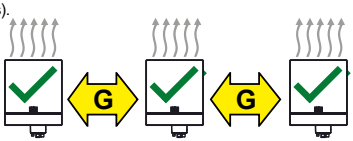
NOTE – In order to replace the fan tray **(06)** without disassemly the inverter from the mounting bracket consider a free side space **C** of 60cm/24" minimum.

NOTE – The **E** minimum clearance distances (**F** in case of horizontal installation) could depends from possibility of flooding or damage during grass cutting operation. If the inverter is installed in a place where there are concrete risk of flooding or grass cutting evenience, the minimum recommended free space is 50cm/20".

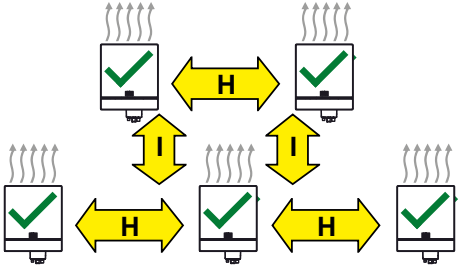


5.2.4 Installation of multiple units

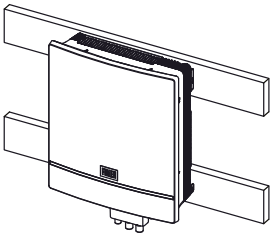
- In case of installation of multiple units in the same place, position the inverter side by side paying attention to keep the minimum clearance distance **G** of 30cm/12" (measured from the outer edge of units).



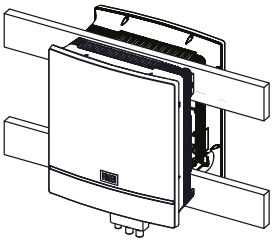
If the space available does not allow this arrangement, position the inverters in a staggered arrangement so that heat dissipation is not affected by other inverters below. Respect the following minimum clearance distances **H** of 100cm/39" and **I** of 30cm/12".



- The vertical installation is also permitted on a structure which must be composed of a support for the attachment of the bracket and one for the support of the rear lower part of the inverter.



- The vertical installation of two inverters positioned back to back is also permitted on a structure which must be composed of a support for the attachment of the brackets and one for the support of the rear pins.



5.2.5 Wi-Fi signal environmental checks

The inverter can be commissioned and monitored using the Wi-Fi 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 Wi-Fi signal by means a mobile device (smartphone, tablet or notebook) by connecting it to the Wi-Fi router from a position which is close to the intended installation position of the inverter.

The radio signal level between the inverter and the Wi-Fi router can be improved in different ways:

1. Change the direction of the antenna.
The antenna has a dead zone at its tip, which should not be positioned facing the Wi-Fi router.



2. 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 %

3. Install a Wi-Fi 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 at high altitudes

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 – Installations of PVS-33-TL over 3000m (9842 ft) must be valued taking in consideration the derating reported in the curve (“3.7.3 Power derating due to altitude (PVS-33-TL)”).

ATTENTION – Installation over 4000m (13123 ft) are not allowed.

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.

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 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"** paragraph on the product manual to know all the necessary step to safely operate on the inverter.

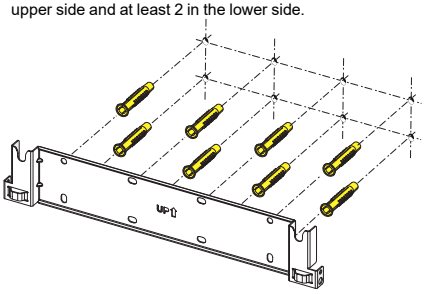
5.3.1 Bracket installation

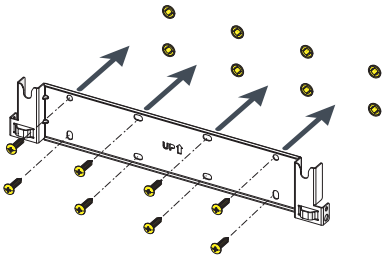
The mounting bracket can be used to install the inverter on a vertical or horizontal support.

- Position the mounting bracket **(05)** perfectly level on the support and use it as drilling template.

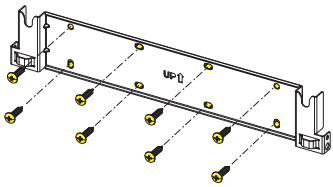
- It is the installer's responsibility to choose an appropriate number and distribution of attachment points. The choice must be based on the type of support (wall, frame or other support), the type of anchors to be used, and their ability to support 4 times the inverter's weight (4x50Kg/110lbs=200Kg/440lbs for all models).

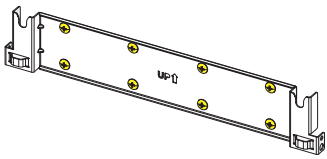
  Depending on the type of anchor chosen, drill the required holes (4 minimum) to mount the bracket. Put at least 2 screws in the upper side and at least 2 in the lower side.



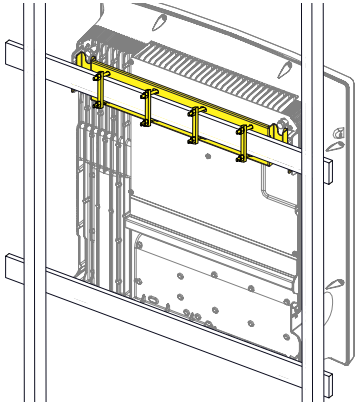


- Attach the bracket **(05)** to the support.



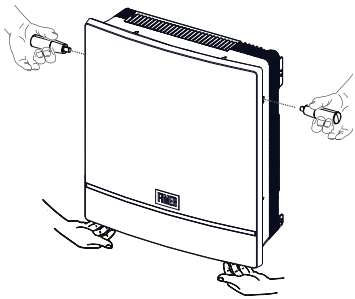


- In case of use of "frame fixing brackets" it will be possible to fix the bracket to the frame structure without drill any holes.



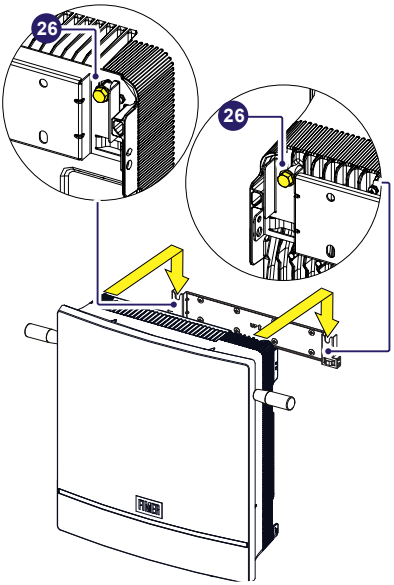
5.3.2 Assembly the Inverter to the bracket

⚠ **ATTENTION –** It is recommended to use the handles (that have to be ordered separately) to handle and safety install the inverter.

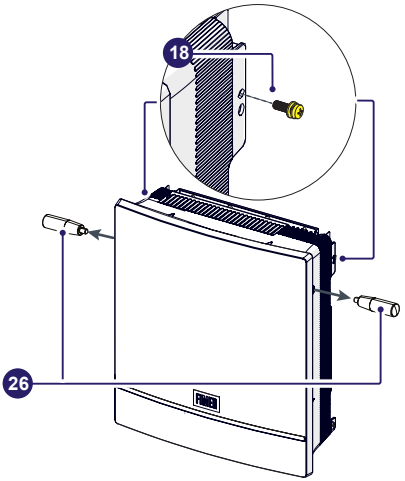


• Lift the inverter up to the bracket **(05)** (using the handles **(25)** or M8 eyebolts) and insert the heads of the two rear anchor points **(26)** (placed on the rear part of the inverter) into the two slots ⊽ on the bracket **(05)**. Check that the rear anchor points **(26)** has been correctly inserted in the slots before releasing the inverter.

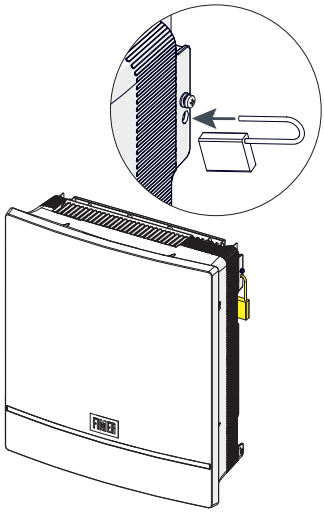
⚠ **ATTENTION –** Risk of injury due to the heavy weight of the equipment. Always consider the center of gravity of the enclosures while lifting.



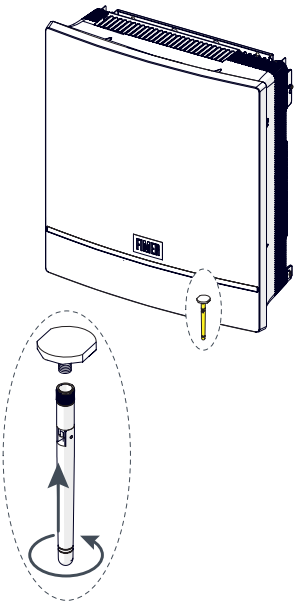
• Remove the handles **(25)** or eyebolts and tighten the supplied two side bracket screws **(18)** (see paragraph "3.5.3 Tightening torques") to avoid the tilting of the bottom part of the inverter.



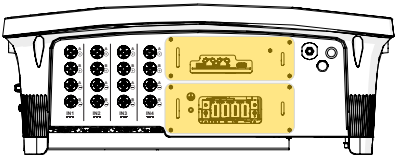
• A padlock can be installed to lock the inverter to the bracket so that it cannot be disassembled by outsiders.



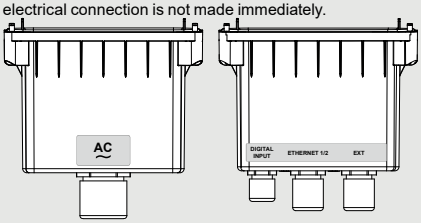
• Remove the protective cover from the connector of the Wi-Fi antenna located on the bottom side of the inverter. Install the Wi-Fi antenna by screwing it into the specific connector **(14)**.



• Remove the 2 protective adhesive films on the bottom side of the inverter.



⚠ **ATTENTION –** The protective adhesive films, positioned on the connection area, DO NOT guarantee the IP degree of the inverter. Do not perform incomplete installations. Install the Connection Box AC and signals also if the electrical connection is not made immediately.

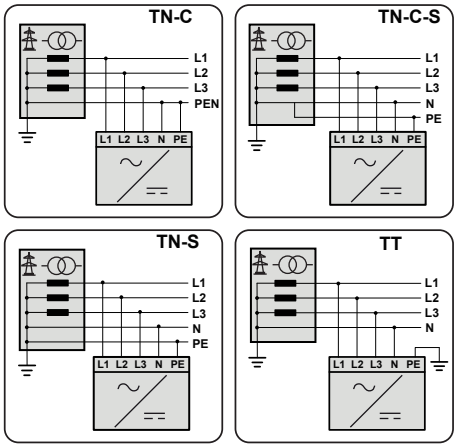


5.4 Grid output connection (AC side)

⚠ **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!

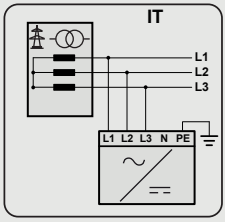
The inverter must be connected to a three-phase system with the center of the star connected to ground:

• TN-C
• TN-C-S
• TN-S
• TT



NOTE – The connection of the neutral (N) on the inverter is optional (dashed line on the above schematics); the inverter will automatically detect the presence or absence of the connection without any setting by the user.

NOTE – IT system is available only with the dedicated PVS-33-TL-SI version.



To connect the inverter to the grid could be use a connection cable:
• 3W + PE (3 phases without neutral wire)
• 4W + PE (3 phases with neutral wire).

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

5.4.1 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.

The earth connection can be made through the Protective Earth (PE) internal connection point **(04)**, Protective Earth (PE) external connection point **(24)** or both (this is required by regulations in force in certain countries of installation).

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

In compliance with standard IEC 62109 it is necessary to install a earthing cable in one of the protective earth terminal with a minimum section as indicated in the table below:

Cross-sectional area of phase conductors (S) (mm²)	Minimum cross-sectional area of the protective earthing conductor (mm²)
S ≤ 16	S
16 < S ≤ 35	16

⚠ **WARNING –** The minimum cross section of the protective earthing conductor must be:
- Copper wire = 10mm²
- Aluminum wire = 16mm²

⚠ **ATTENTION –** The value on this table are valid only if the protective earthing conductor is made of the same metal as the phase conductors. If this is not so, the cross-sectional area of the earthing conductor is to be determined in a manner which produces a conductance equivalent to that which results from the application of this table.

It is possible to install a second earthing cable (with the same section as the first one) positioning it in the protective earth terminal not used.
Installation of a second protective earth cable is also required by regulations in force in certain countries of installation.

5.4.2 Load protection breaker (AC disconnect switch)

To protect the AC connection line of the inverter, an external 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-20-TL	PVS-30-TL	PVS-33-TL
Type	Automatic circuit breaker with thermal-magnetic protection		
Voltage / Max. current rating	400Vac / 63A (*)	400Vac / 80A (*)	400Vac / 80A (*)
Magnetic protection characteristic	Magnetic curve B/C		
Number of poles	3W (3 phases without neutral wire) or 4W (3 phases with neutral wire).		

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

5.4.3 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.

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-20-TL	PVS-30-TL	PVS-33-TL
Type	A / AC		
Sensitivity	300mA		

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.

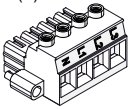
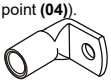
NOTE – In the case of systems which consist of several inverters connected to a single switch with differential protection, it is recommended to install a device which allows the adjustment of the tripping value and the tripping time.

NOTE – AC type RCD is not allowed to be installed in Australia.

5.4.4 Characteristics and sizing of the line 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 output connector **(17)** using the specific terminal block supplied.

	Single conductor cable
AC cable gland Cable diameter range	• 22 - 32 mm - size M40 • 20...26 mm - size M40 with reducing seals (supplied) installed
Conductor cross section	• max 35mm2 - accepted by the AC screw terminal block for L1(R), L2(S), L3(T) and neutral.  • max 25mm^2 - accepted by the cable lug supplied for PE connection on the Protective Earth (PE) internal connection point **(04)**).  **NOTE –** If is necessary to install a PE cable cross section greater than 25mm^2 can be used the Protective Earth (PE) external connection point **(24)**
Conductor material	copper or aluminum

The table shows the maximum line conductor length in relation to the section of the conductor itself:

Line conductor cross section (mm^2)	**Line conductor maximum length (m)**		
	PVS-20-TL	**PVS-30-TL**	**PVS-33-TL**
10	25	17	15
16	40	28	25
25	65	45	40
35	95	65	60

The values are calculated in nominal power conditions, considering:
- loss of power along the line no greater than 1%
- use of copper cable, with HEPR rubber isolation and positioned in open air.

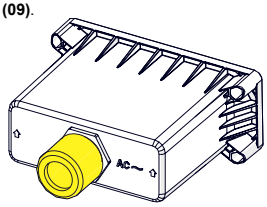
5.4.5 AC output cables connection

⚠ **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.

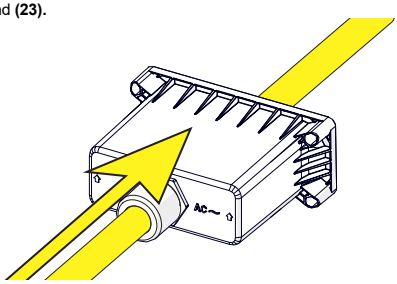
⚠ **ATTENTION –** Before carrying out any operation, check that any external AC switch downstream to the inverter (grid side) is in OFF position applying LOTO procedure on it.

The connection of the AC cable must be made on the AC output connector **(17)** located on the bottom side of the inverter by passing through the AC cable gland **(23)** installed on the AC connection box **(09)**.

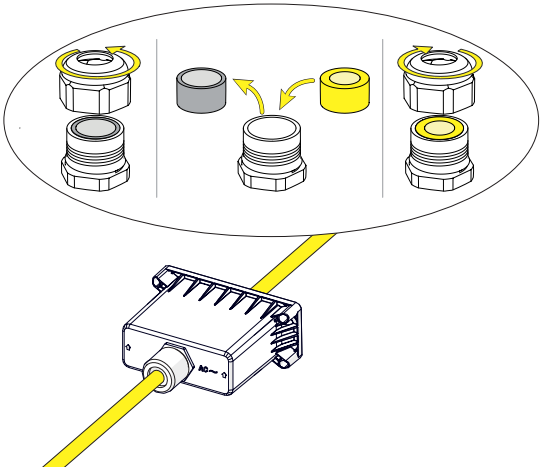
- Unscrew the AC cable gland **(23)** installed on the AC connection box **(09)**.



- Pass the AC cable (diameter 22...32 mm) through the AC cable gland **(23).**



- If the AC cable have a diameter between 20...26 mm should be installed the supplied reducing seal.



Based on the AC connection type could be possible 3 scenarious:

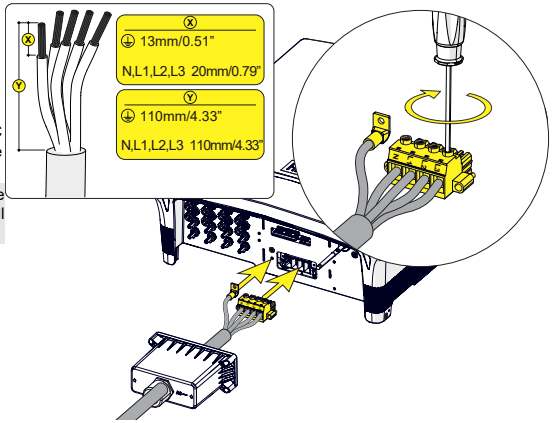
- **Connection to the AC connector with PE on the Protective earth (PE) internal connection point (24)**
- **Connection to the AC connector with PE on the Protective earth (PE) external connection point (04)**
- **Connection to the AC connector with 2xPE on the Protective earth (PE) internal connection point (24) and on Protective earth (PE) external connection point (04)**

5.4.5.1 Connection to the AC connector with PE on the Protective earth (PE) internal connection point (24)

- Strip the cable.
- Connect L1(R), L2(S), L3(T) and N (if provided) on the AC connector respecting the connections as indicated on the connector (see paragraph "3.5.3 Tightening torques").

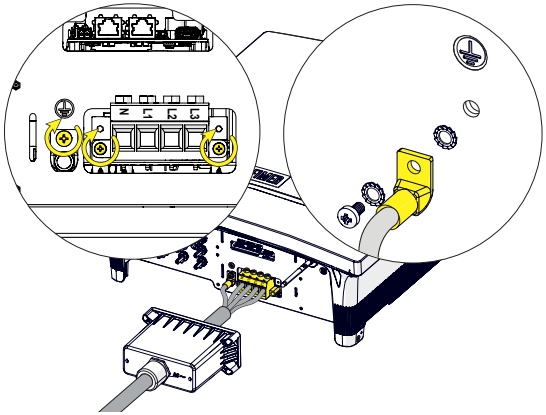
⚠ **ATTENTION –** In case of a wrong phase sequence the inverter will not connect to the grid and it will provide an error state.

- Install 90 ° bent eyelet cable lug (supplied) on the earth cable.



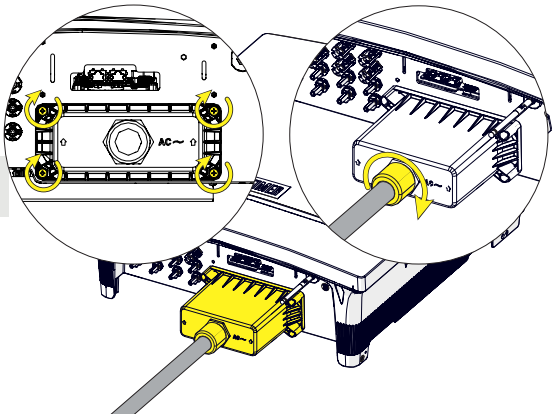
- Insert the AC connector and lock it in place by screwing the two lateral retaining screws.
- Install the earth wire on the Protective earth (PE) internal connection point **(24)** following the installation sequence (see paragraph "3.5.3 Tightening torques"):

- Serrated washer
- Earth cable
- Serrated washer
- M6 screw

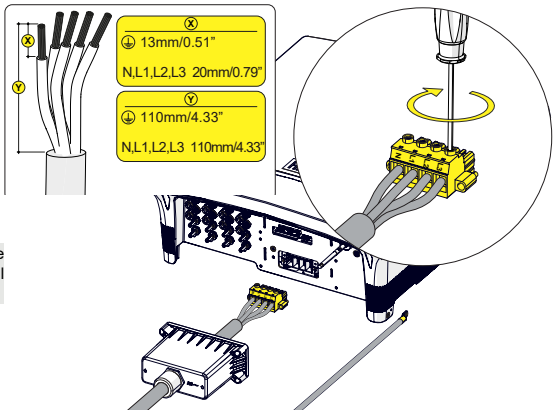


- Install the AC connection box **(09)** by tightening the 4 fixing screws (see paragraph "3.5.3 Tightening torques").
- Tighten the AC cable gland **(23)** (see paragraph "3.5.3 Tightening torques")

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



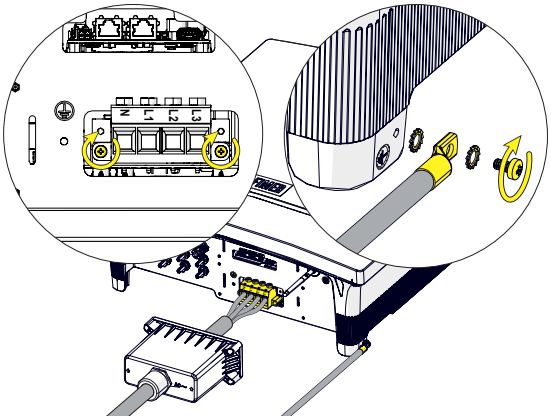
5.4.5.2 Connection to the AC connector with PE on the Protective earth (PE) external connection point (04)



- Strip the cable.
- Connect L1(R), L2(S), L3(T) and N (if provided) on the AC connector respecting the connections as indicated on the connector (see paragraph "3.5.3 Tightening torques").

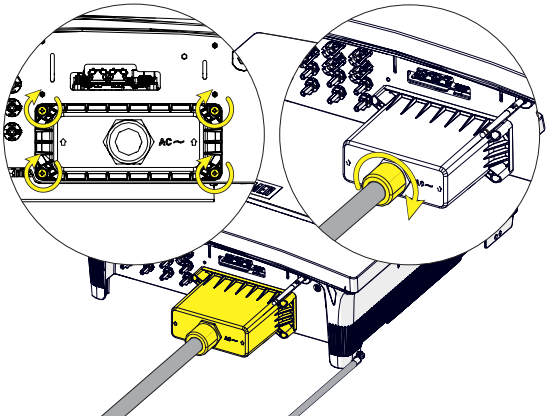
⚠ **ATTENTION –** In case of a wrong phase sequence the inverter will not connect to the grid and it will provide an error state.

- Install an eyelet cable lug (suitable for an M6 screw) on the external earth cable.



- Insert the AC connector and lock it in place by screwing the two lateral retaining screws.
- Install the earth wire on the Protective earth (PE) external connection point **(04)** following the installation sequence (see paragraph "3.5.3 Tightening torques"):

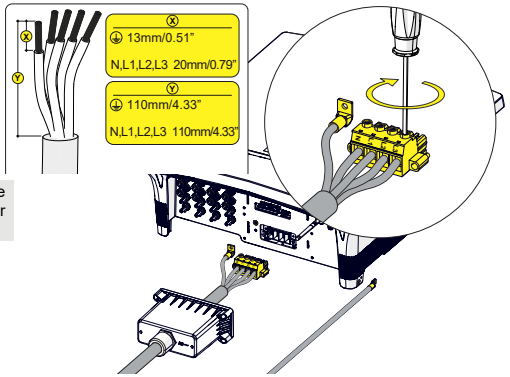
- Serrated washer
- Earth cable
- Serrated washer
- M6 screw



- Install the AC connection box **(09)** by tightening the 4 fixing screws (see paragraph "3.5.3 Tightening torques").
- Tighten the AC cable gland **(23)** (see paragraph "3.5.3 Tightening torques").

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

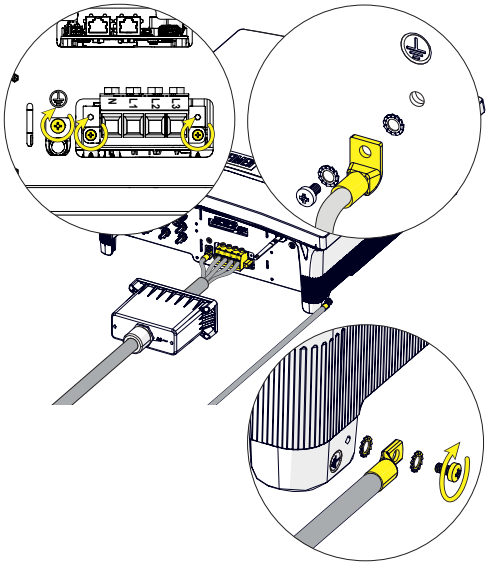
5.4.5.3 Connection to the AC connector with 2xPE on the Protective earth (PE) internal connection point (24) and on Protective earth (PE) external connection point (04)



- Strip the cable.
- Connect L1(R), L2(S), L3(T) and N (if provided) on the AC connector respecting the connections as indicated on the connector (see paragraph "3.5.3 Tightening torques").

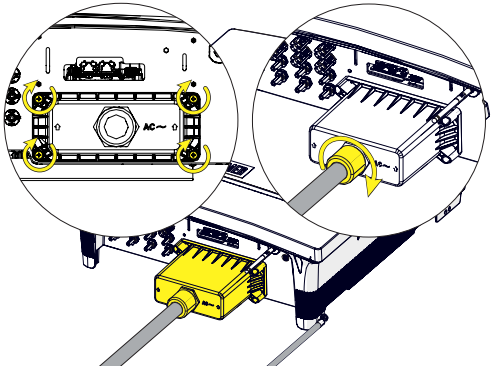
⚠ **ATTENTION –** In case of a wrong phase sequence the inverter will not connect to the grid and it will provide an error state.

- Install 90 ° bent eyelet cable lug (supplied) on the earth cable.
- Install an eyelet cable lug (suitable for an M6 screw) on the external earth cable.



- Insert the AC connector and lock it in place by screwing the two lateral retaining screws.
- Install the earth wire on the two connection point **(24) (04)** following the installation sequence (see paragraph "3.5.3 Tightening torques"):

- Serrated washer
- Earth cable
- Serrated washer
- M6 screw



- Install the AC connection box **(09)** by tightening the 4 fixing screws (see paragraph "3.5.3 Tightening torques").
- Tighten the AC cable gland **(23)** (see paragraph "3.5.3 Tightening torques").

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

5.5 Input connection (DC)

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

⚠ **WARNING –** The input strings connected to an input channell 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 **(07)** and external to the inverter) and external AC disconnect switches OFF.

⚠ **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.

⚠ **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 **(07)** to OFF position. Wait until input current are below 0.5A (when solar irradiance declines at night) and turn the DC disconnect switches **(07)** to OFF position, disconnect the DC input quick fit connectors **(13)** and correct the wrong polarity of the string.

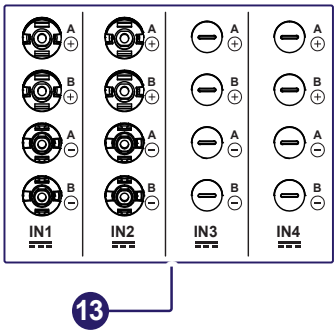
For the string connections it is necessary to use the DC input quick fit connectors **(13)**, located on the bottom side of the inverter.

The input connectors are divided into:
- 4 groups (one group for each input channel), for the models with 4MPPT.
- 2 groups (one group for each input channel), for the models with 2MPPT.

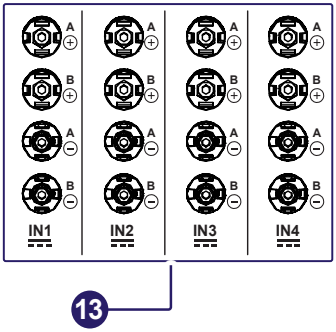
For each channell 2 pairs of quick fit connectors are available.
Respect the Maximum DC input power for each MPPT as follow:

	IN1	IN2	IN3	IN4
2MPPT version	26A/12kW	26A/12kW		
4MPPT version	22A / 10kW	26A / 12kW	22A / 10kW	26A / 12kW

2 MPPT version



4 MPPT version



5.5.5.1 Preliminary operations 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 to the inverter 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).

Checking the correct polarity of the strings
Using a voltmeter, check that the voltage of each string observes the correct polarity.

⚠ **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.

⚠ **WARNING –** 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.

5.5.5.2 Installation procedure for quick-fit connectors

The model of connectors installed on your inverter must be matched by the same model of the respective corresponding parts to be used.

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

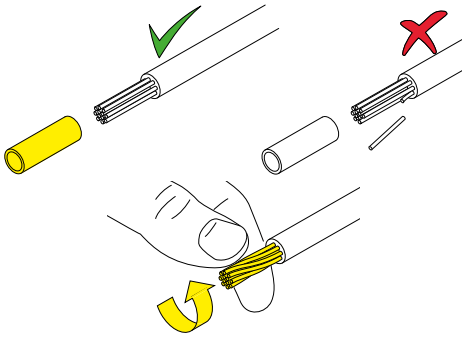
ATTENTION – According to IEC 62548 (Photovoltaic (PV) arrays – Design requirements), connectors mated together in a PV system shall be of the same type from the same manufacturer, i.e. a plug from one manufacturer and a socket from another manufacturer or vice versa shall not be used to make a connection. 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.

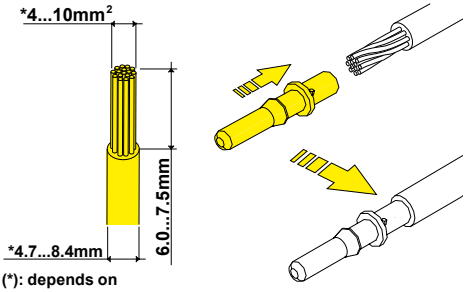
NOTE – Complete assembly instructions and specification of quick-fit connectors could be found on manufacturer website.

Input cables must meet the connector requirements and depends from connector models (see "3.5.4 Cable gland clamping range" and "3.5.5 Connectors cross section range").

- Strip the cable over a lenght of 6,0 to 7,5mm using suitable equipment.

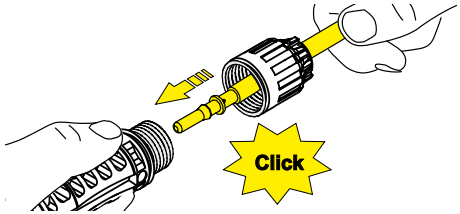


- Crimp the terminal to the conductor using the designated pliers.

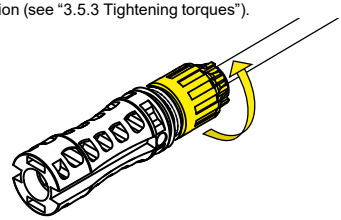


(*): depends on connector models

- Insert the crimped terminal contact into the insulator body of the connector, until you hear the click indicating that the terminal is engaged inside the connector.

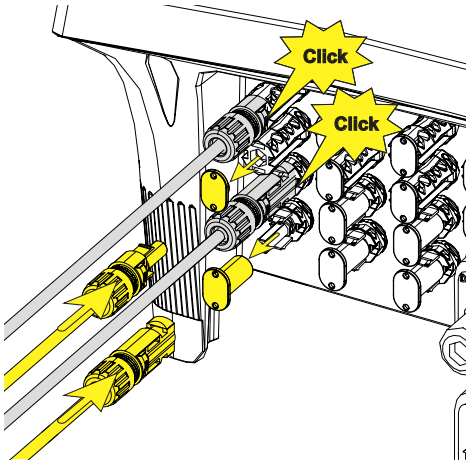


- Firmly tighten the cable gland using the relevant tool to finish the operation (see "3.5.3 Tightening torques").



5.5.5.3 Connection of inputs

Connect all the strings required by the system by pushing the quick fit connectors in the right position.



ATTENTION – Check that protective caps are installed on 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.

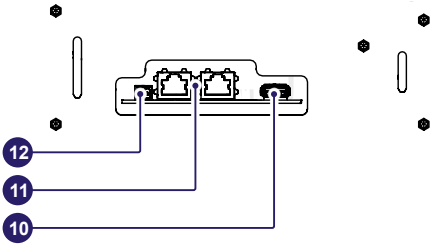
ATTENTION – The quick fit connectors must be properly installed. After the installation make sure the connectors are correctly locked through the clips.

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).

5.6 Connection of the communication and control signals

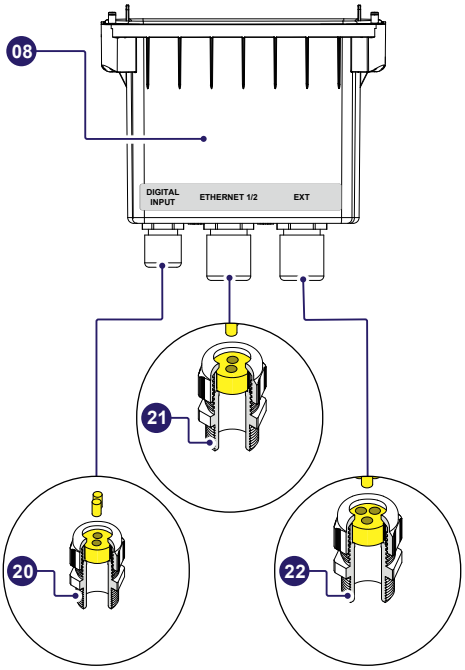
The communication and control signals cables must be connected to the dedicated connectors placed on the bottom side of the inverter:

- Digital input connector **(12)**.
- Ethernet 1/2 connectors **(11)**.
- USB connector for accessories board **(10)**.



Before being connected, the cables must be passed through the cable glands of the signals connection box **(08)**:

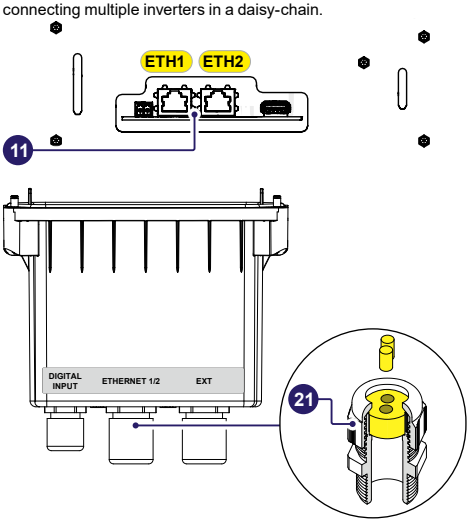
- Digital Input cable gland **(20)**. This M20 cable gland is equipped with a two-hole gasket. Each hole can accept a cable with a diameter of 5mm.
- Ethernet 1/2 cable gland **(21)**. This M25 cable gland is equipped with a two-holes gasket. Each hole can accept a cable with a diameter of 6mm.
- EXT cable gland **(22)** This M25 cable gland is equipped with a three-holes gasket. Each hole can accept a cable with a diameter of 7mm.



5.6.1 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 **(11)** located on the bottom side of the inverter. The two ethernet connectors 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.

5.6.1.1 Ethernet cable specification

The cable should be compliant to the following specification:

Ethernet cable specification		
Cable category	CAT5, CAT5e or CAT6 (or higher) (1)	
Cable shielding	- SF/UTP total braid and foil shield, no shielding of the twisted pair. - SF/FTP total braid and foil shield, with twisted pair shields (preferable)	
Type of plug	Metallic shielded RJ45 plug.	
Maximum cable length based on configuration	Inverter to switch:	Inverter to inverter:
RING w/ SPT	100m	100m
DAISY CHAIN	50m (2)	50m
STAR	100m	N/A
Shield Grounding	Proper grounding requires to connect the Ethernet cable's shield to inverter chassis on both side. This is done adopting shielded cables with metallic shielded RJ45 plugs. (3)	
Maximum inverters number	40	

1. Max line length between two network nodes, depends on what type of cable is used:
   • 100m using rigid cables.
   • 50m using patch cables.

2. In daisy chain configurations, single point of failure is avoided thanks to the passive LAN relays built into each inverter. The maximum distance of 50 meters between two successive elements of the daisy chain guarantees 100 meters between the inverters before and after the point of failure.
3. Ensuring a proper metallic continuity between cable and plug shields for the best perfomance.

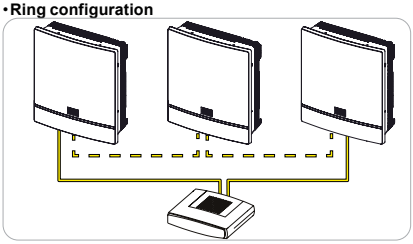
⚠ **ATTENTION –** It is always recommended not to let ethernet cables pass by the power cords to avoid interference with data transmission.

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

5.6.1.2 Ethernet system configuration and distances

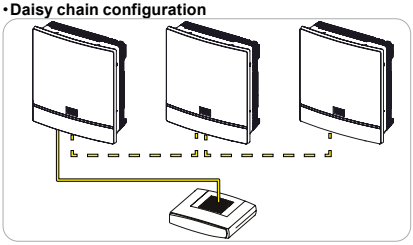
Three topologies of ethernet connection to the router are available:

- **Ring configuration**

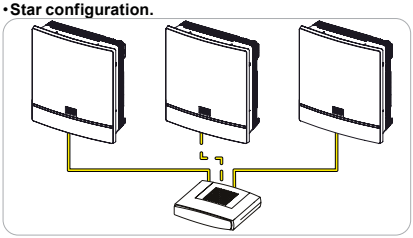


NOTE – In case inverters are connected to the networking switch with a ring topology is recommended to enable SPT protocol on the switch (Spanning Tree Protocol SPT (IEEE 802.1D) is enabled by default on inverters.

- **Daisy chain configuration**



- **Star configuration.**



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

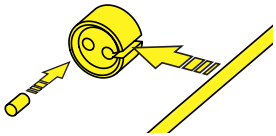
NOTE – No initial setup is required to start data transmission to Aurora Vision.

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

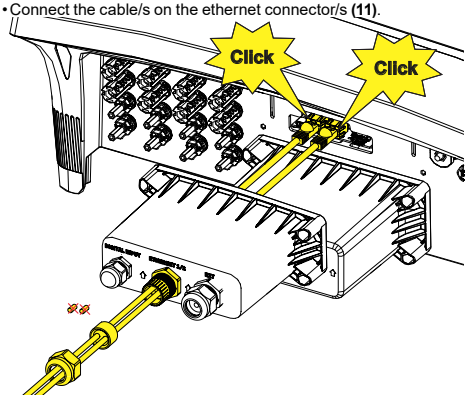
NOTE – Please refer to Aurora Vision documents available on FIMER website for further information how to get an Aurora Vision account for remotely monitoring and managing the installed solar assets.

5.6.1.3 Ethernet cable/s connection procedure:

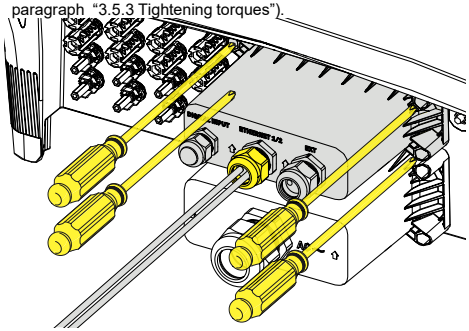
- Unscrew and remove the Ethernet 1/2 cable gland **(21)** ring.
- Remove the two-holes gasket from the Ethernet 1/2 cable gland **(21)**.
- Remove one or both the plugs (plastic cylinder) from the two-holes gasket based on the number of ethernet cable.
- Insert the cable/s through the Ethernet 1/2 cable gland **(21)** ring.
- Route the ethernet cable through the two-holes gasket opening and reinstall it inside the cable gland. Install suitable plastic plug/s (supplied) in any unused hole of the gasket.



- Reinstall the cable gland ring without firmly tighten it.
- Connect the cable/s on the ethernet connector/s **(11)**.



- Install the signals connection box **(08)** by screwing the 4 locking screws present on it (see paragraph “3.5.3 Tightening torques”).
- Firmly tighten the Ethernet 1/2 cable gland **(21)** ring (see paragraph “3.5.3 Tightening torques”).



5.6.2 Digital input connection

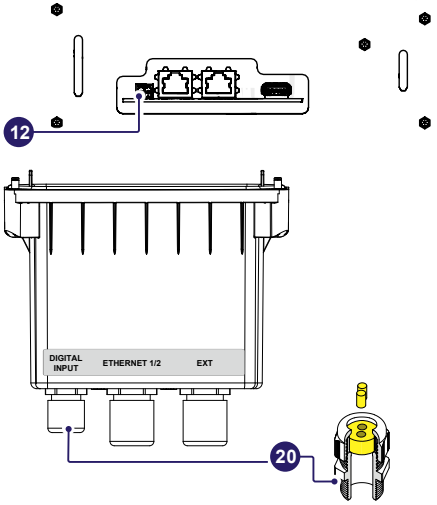
The Digital Input connector **(12)** can be used for the connection of Remote ON/OFF or DRM0 signals.

NOTE – The enabling or setting of the functionality connected must be set via Web User Interface.

NOTE – The Remote ON/OFF and DRM0 functionality are described in the following subparagraph

The connection of the cable must be made on the specific Digital Input connector **(12)** located on the bottom side of the inverter.

NOTE – The Digital Input connector **(12)** can be used to connect only one of the functionality available.



5.6.2.1 Digital input cable specification

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).

5.6.2.2 Remote ON/OFF connection

The remote ON/OFF functionality is useful to manage remotely the connection and disconnection of the inverter from the grid.
The function must be enabled via Web User Interface and:
- 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 two terminals present on the Digital Input connector **(12)**.

When the two terminals of the Digital Input connector of **(12)** are brought to the same potential (i.e. by using a switch to make a short circuit between the two terminals), this causes disconnection of the inverter from the grid.

READ THE MANUAL – 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).

5.6.2.3 Demand Response Mode 0 (AS/NZS 4777.2)

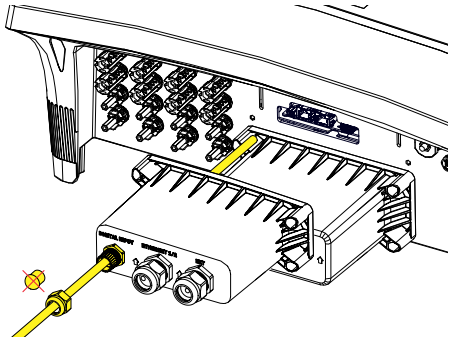
The Demand Response Mode 0 (DRM0) functionality could be requested by the AS/NZS 4777.2 standard.

The Digital Input connector **(12)** can be used to connect the DRED circuit which allows the grid connection to be remotely controlled by the electricity grid operator.

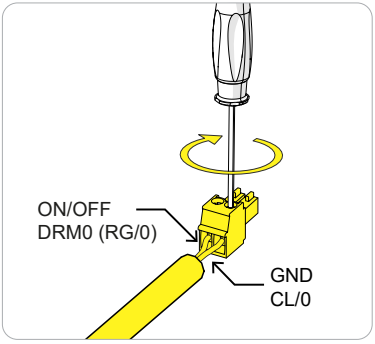
ATTENTION – In case of the DRM0 function is activated without the proper wiring of the Digital Input connector **(12)**, the inverter will no longer be able to connect to the grid. For further information regarding the DRM0 function refer to the AS/NZS 4777 standard.

5.6.2.4 Digital Input cable connection procedure:

- Unscrew the Digital Input cable gland **(20)** ring.
- Remove the two-holes gasket from the Digital Input cable gland **(20)**.
- Route the digital input cable through the two-holes gasket opening and reinstall it inside the cable gland **(20)**. Install suitable plastic plug/s (supplied) in any unused hole of the gasket.

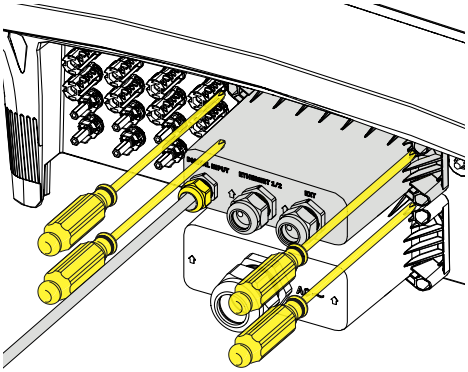


- Install the 2 poles screw terminal block (supplied) on the cable (see paragraph “3.5.3 Tightening torques”).



- Connect the wired screw terminal block to the Digital Input connector **(12).**

- Install the signals connection box **(08)** by screwing the 4 locking screws present on it (see paragraph “3.5.3 Tightening torques”).
- Firmly tighten the Digital Input cable gland **(20)** ring (see paragraph “3.5.3 Tightening torques”).



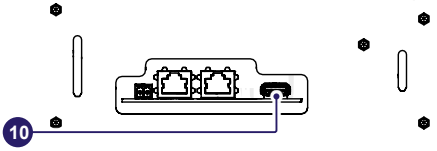
5.6.3 Accessory board (EXT) connection

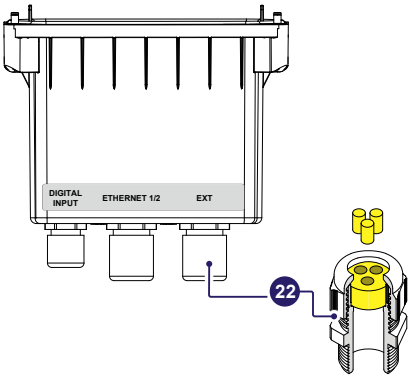
The USB connector **(10)** can be used for the connection of an accessory board.

NOTE – Visit www.fimer.com for availability for availability of accessory boards.

NOTE – The enabling or setting functionality of the accessory board connected must be done via Web User Interface.

The connection cable of the accessory board must be passed through the EXT cable gland **(22)** of the signals connection box **(08)**:





5.6.3.1 EXT cable specification

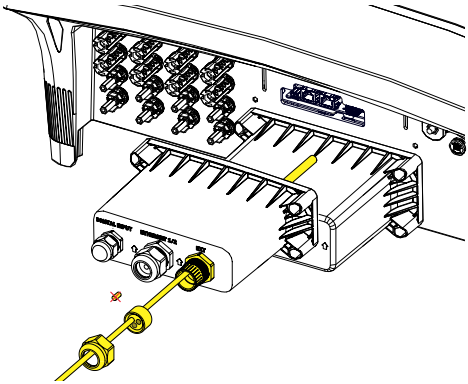
The type of wiring may vary according to the type of accessory board.

NOTE – Follow the instructions indicated in the quick installation guide of the accessory board.

5.6.3.2 EXT cable connection procedure:

- Unscrew and remove the EXT cable gland **(22)** ring.
- Remove the three-holes gasket from the EXT cable gland **(22)**.
- Remove the plug (plastic cylinder) from the gasket.
- Insert the cable through the EXT cable gland **(22)** ring.
- Route the cable/s through the three-holes gasket opening and reinstall it inside the cable gland. Install suitable plastic plug/s (supplied) in any unused hole of the gasket.
- Reinstall the cable gland ring without firmly tighten it.

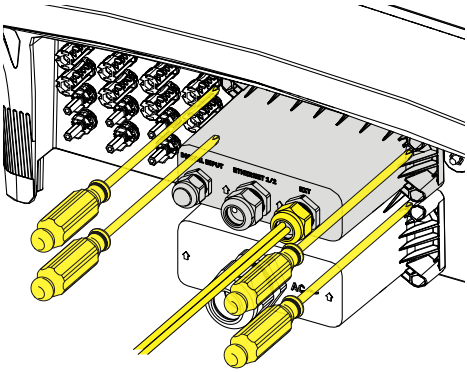
- Connect the cable/s to the accessory board (see paragraph “3.5.5 Connectors cross section range”).



NOTE – Follows the instruction on the Quick installation guide of the accessory board

- Install the signals connection box **(08)** by screwing the 4 locking screws present on it (see paragraph “3.5.3 Tightening torques”).

- Firmly tighten the EXT cable gland **(22)** ring (see paragraph “3.5.3 Tightening torques”).



6. Instruments

6.1 General conditions

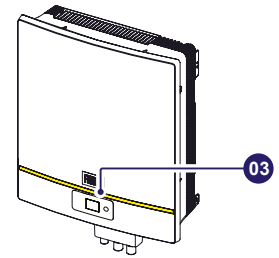
The first rule to prevent damage to the equipment and to the operator is to have a thorough knowledge of the instruments. We, therefore, advise that you carefully read this manual. If you are not sure about any information in this manual, please ask FIMER Service for more detailed information.

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

The synoptic is located on the front cover of the inverter and consists of 4 LED icons





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

WLAN/LAN
Indicates the status of the Wi-Fi or Ethernet communication lines.

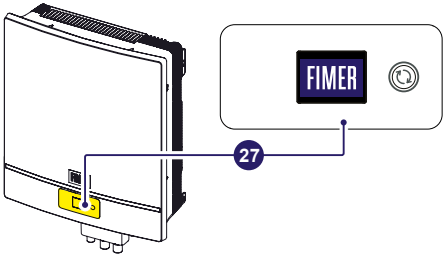
ALARM
Indicates that the inverter has detected an anomaly. This type of problem is highlighted in the Web User Interface and FIMER Installer for Solar Inverters APP.

GFI
The “GFI” (ground fault) 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.

NOTE – The icons, 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 Description of display

The display **(27)** is located on the front cover of the inverter and it allows to view the main parameters of the inverter.
The button ↻ switches the visualization to the next screen parameters.



NOTE – The display **(27)** is available only in dedicated inverter models (;DISPLAY suffix)

6.3.1 Parameters displayed

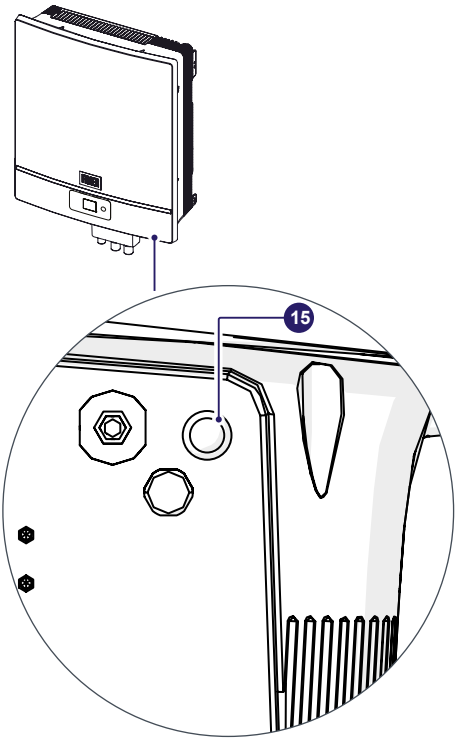
Inverter parameter and descripion:

Display screen	Description
Inverter status	Indicates the status of the inverter (Run / Alarm)
Pout ..... **Qout .....**	Active (kW) output power Reactive (KVar) output power
Cosphi ..... **.....**	Cophi value Indication over/under excited
Energy today **.....**	Energy produced during the day (kWh)
Vout ..... **Frequency .....**	Phase to phase grid voltage (Vac) Grid Frequency (Hz)
CH1 Power ..... **V ..... I .....**	Channel 1 output power (W) Voltage (Vdc) and current (A)
CH2 Power ..... **V ..... I .....**	Channel 2 output power (W) Voltage (Vdc) and current (A)
CH3 Power ..... **V ..... I .....**	Channel 3 output power (W) Voltage (Vdc) and current (A)
CH4 Power ..... **V ..... I .....**	Channel 4 output power (W) Voltage (Vdc) and current (A)
Riso: ..... **ILeak: .....**	Insulation resistance (MOhm) Leakage current (mA)
Ethernet **.....**	Not connected or IP address if connected
WLAN **.....**	Not connected or IP address if connected
Access Point (SSID) **.....**	WLAN SSID for commissioning or local monitoring

NOTE – The visualization of the parameters change every 15sec or every time the button ↻ is pressed.

6.4 Smart button

The smart push button is paced on the bottom side of the inverter.



This physical button allows to enable WiFi access point.
If the button is pressed, continuously for 5 seconds, the communication icon start blinking fast. After this temporary condition, WLAN/LAN icon on the synoptic will:

- Turn solid blue if inverter is already connected to a Wi-Fi router or via Ethernet to a switch.
- Blinking slow. This means that Access Point has been activated. WLAN/LAN icon blinks slow till the user disables AP or connects inverter to router/switch (in this case will become solid blue)

6.5 User interface

6.5.1 FIMER Installer for Solar Inverters

FIMER Installer for Solar Inverters APP allows to:
- Inverters commissioning and set the system parameters.
- Update the inverter firmware.

6.5.2 Integrated Web User Interface

The integrated Web UI is accessible via Wi-Fi channel by using any wireless device (PC, smartphone, tabled,….) and allow to:
- Commission a single inverter.
- Advanced settings of system parameters.
- Update the inverter firmware.

6.5.3 Aurora Vision®

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 consist of two different products, designed to meet different market needs, an APIs Service (RESTful architecture) to enabled third party data integration and a KIOSK view to show publicly solar plant benefits and performances:
- **Plant Portfolio Manager**. An advanced professional web-portal that allows stakeholders (such as installers/operators/managers) to monitor and control fleets of photovoltaic systems installed for final customers.
- **Energy Viewer**. A smart and easy-to-use mobile app for monitoring the main power generation and self-performances indicators, for owners of residential and commercial PV plants, in order to keep energy use and savings in check.
- **APIs Service**. Harness the power of data from FIMER's photovoltaic systems to design solutions and provide opportunities.
- **KIOSK View**. A public and customizable web page based on HTML5 (self-updating and embeddable in external frames) to show the benefits and performances of a solar power plant.

6.6 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.

⚠ **WARNING –** Do not place objects of any kind on the inverter during operation!
⚠ **WARNING –** 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
"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.

NOTE – "Installer for Solar Inverters" mobile APP is available for mobile devices with an Android version of 6.0.1.x or greather and iOS version 11.x or greather.

• Via Web UI (access point Wi-Fi network)
Commissioning could be carried out via Wi-Fi connection through the inverter's Web User Interface. Initial setup of the system should therefore be carried out via a tablet, notebook or smartphone with a Wi-Fi connection.
Web User Interface enabling the parameters settings and to perform commissioning of a single inverter (multi inverter support is not provided).

NOTE – Recommended as alternative method for performing single inverter commissioning.

7.2.1 Preliminary commissioning operation using “Installer for Solar Inverters” mobile APP

•Supply the inverter with DC input voltage from the photovoltaic generator and via AC grid voltage.

⚠ **ATTENTION –** The inverter configuration can be also performed with only one supply source (DC or AC).

⚠ **ATTENTION –** With DC supply, make sure that the irradiation is stable and adequate for the inverter commissioning procedure to be completed.

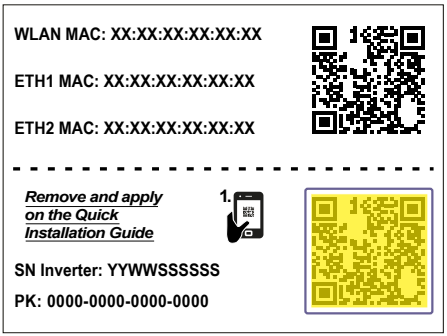
NOTE – In the pre-commissioning phase the “Alarm” LED keeps quickly flashing, “Power” and “GFI” LEDs are OFF.

•Open the “ Installer for solar inverters” mobile APP.

•Log-In (or Sign-Up) to Aurora Vision® account.

•Tap on “QR Code of Type”. A QR code scanner will be opened.

•Scan the QR code on the “Communication identification label” and connect to inverter network.

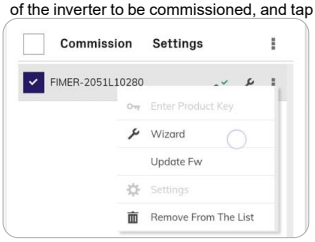


NOTE – The name of the Wi-Fi network created by the inverter will be: FIMER-YYWWSSSSSS (10 digit Inverter SN).

NOTE – After this step wait 10 seconds to allow the Wi-Fi connection

•Tap on “Add to list devices” and choose the inverter from the list.

•Once the connection is established, tap the 3-dot icon on the line of the inverter to be commissioned, and tap on “Wizard”



The commissioning wizard will start (see “7.2.3 Commissionig Wizard”)

7.2.2 Preliminary commissioning operation using Web UI

•Supply the inverter with DC input voltage (close the DC disconnect switches) from the photovoltaic generator and via AC grid voltage.

⚠ **ATTENTION –** The inverter configuration can be also performed with only one supply source (DC or AC).

⚠ **ATTENTION –** With DC supply, make sure that the irradiation is stable and adequate for the inverter commissioning procedure to be completed.

NOTE – In the pre-commissioning phase the “Alarm” LED keeps quickly flashing, “Power” and “GFI” LEDs are OFF.

• Once powered, the inverter will automatically create a Wi-Fi network access point (approx. 60 seconds after switching-on).

• Enable the Wi-Fi connection on the device which is being used for setup (tablet, smartphone or PC) and connect it to the Access Point created by the inverter system.
The SSID is FIMER-YYWWSSSSSS (Z=10 digit Inverter SN)

• When required enter the PRODUCT KEY (printed on the “Communication Identification label”) as password.

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

• 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.

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

Once connected, the commissioning wizard will start (see “7.2.3 Commissionig Wizard”)

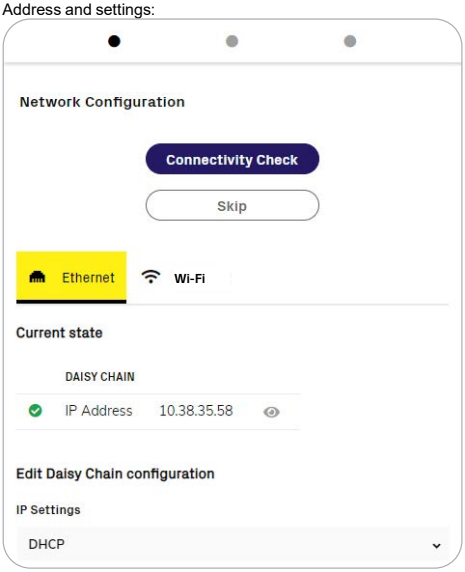
7.2.3 Commissionig Wizard

The commissioning wizard procedure is the same whether you use the “Installer for solar inverters” mobile app or the Web UI.

7.2.3.1 STEP 1 (Optional) - Network connection.

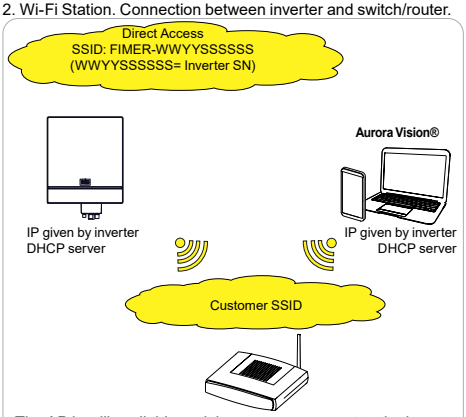
- Choose the connection type (Ethernet or Wi-Fi) and set the related parameters.

Ethernet connection:
If the Ethernet cable is connected will be showed the related IP Address and settings:

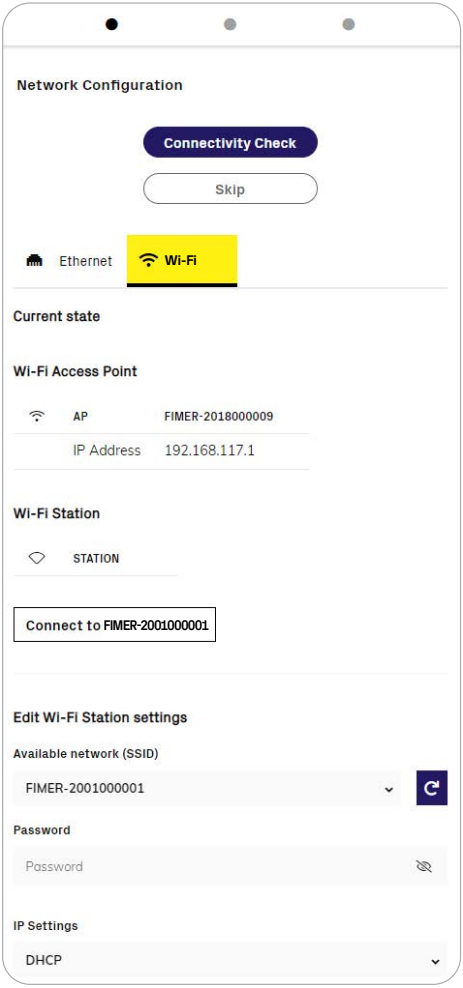


Wi-Fi connection:
Two Wi-Fi radio channels are enabled by the inverter and could be used simultaneously:

1. Wi-Fi Access Point. Connection between inverter and a mobile device (like Smartphone, Tablet, Notebook).
2. Wi-Fi Station. Connection between inverter and switch/router.



- 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



- Fill the field SSID, Password and IP Settings and click on “connect to (SSID)” on the Wi-Fi Station section to connect the inverter to the switch/router

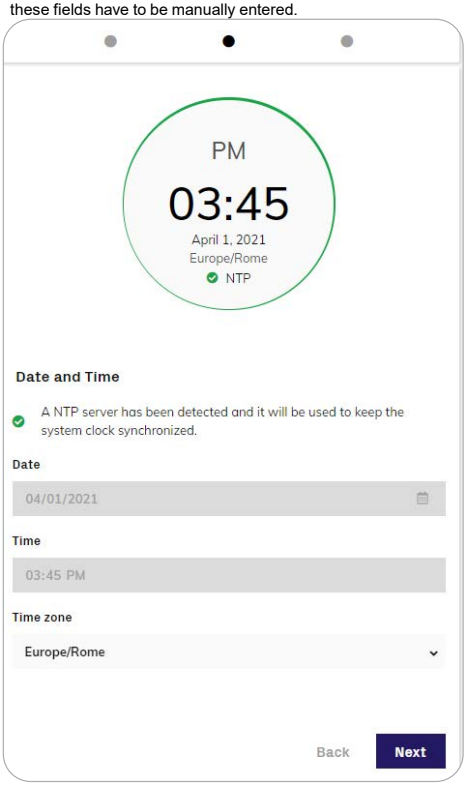
NOTE – This step can be skipped and performed later (via Web UI).

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 with Aurora Vision.

- Click on “Next” button to continue the configuration wizard.

7.2.3.2 STEP 2 - Date, Time and Time zone.

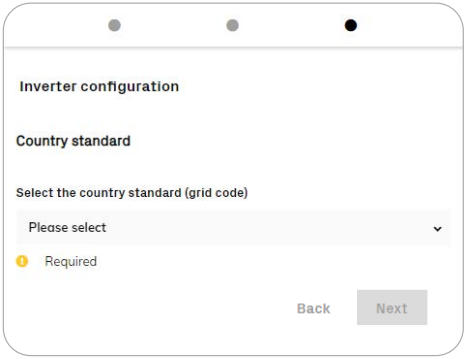
- Set the Date, Time and Time zone
  The inverter will automatically fill these fields when available; when it's not possible for the inverter to detect the time protocol, these fields have to be manually entered.



- Click on "Next" button to continue the configuration wizard.

7.2.3.3 STEP 3 - Inverter configuration

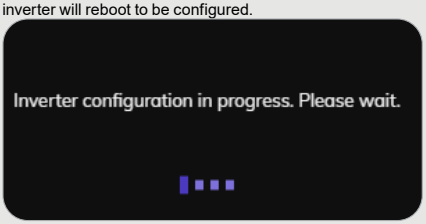
- Country standard (selection of grid standard):
  Set the grid standard of the country in which the inverter is installed.



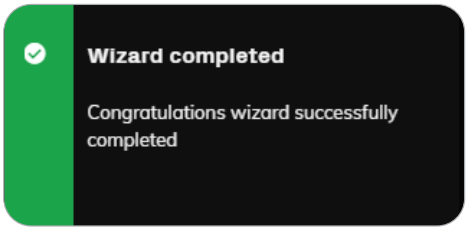
NOTE – For compliance with AS/NZS 4777.2:2020 please select from Australia Region A/B/C or New Zealand. Please contact your local grid operator on which region to select.

- Click on "Next" button to complete the configuration wizard.

ATTENTION – At the end of the configuration wizard the inverter will reboot to be configured.



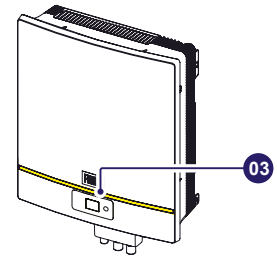
- A notification will confirm that the wizard is completed.



- Depending of the supply source used to complete the installation wizard steps, close the disconnect switch of any missing voltage sources.
- If the input voltage is sufficient to allow the connection to the grid, the inverter will perform preliminary checks of the AC and DC parameters and performs other auto-diagnostic checks.
- If the outcome of the preliminary checks to grid synchronization are positive, the inverter connects to the grid and starts to export power.

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) or via Installer for Solar Inverters mobile APP.

7.3 LEDs behaviour





POWER

Indicates that the inverter is functioning correctly.
When the unit is commissioned, while the grid is checked, this icon blinks. If a valid grid voltage is detected, the icon remains continuously lit, as long as there is sufficient sunlight to activate the unit. Otherwise, the icon 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) 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 Wi-Fi or Ethernet communication lines.

The following table shows the possible activation combinations of “Power” “Alarm” and “GFI” LED icons on the Sinoptic **(03)** according to the operating status of the inverter.

Each LED icon could behave in one of the following ways:
◯ = ON
⊗ = Flashing slow (2 seconds on / 2 seconds off)
✻ = Flashing fast (0.2 seconds on / 0.2 seconds off)
◯ = OFF
✻ = Any one of the conditions described above

LED icon Status		Operating state
POWER: **ALARM:** **GFI:**	⊗ ⊗ ⊗	**Firmware programming** The inverter firmware is being programmed (never turn off the inverter during this phase).
POWER: **ALARM:** **GFI:**	◯ ◯ ◯	**Night time** 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)
POWER: **ALARM:** **GFI:**	⊗ ◯ ◯	**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.
POWER: **ALARM:** **GFI:**	● ◯ ◯	**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).

LED icon Status	Operating state
POWER: ⊗ ALARM: ○ GFI: ○	**Missing grid** Indicates lack of grid voltage. This condition does not allow the inverter to connect to the grid.
POWER: ✳ ALARM: ● GFI: ○	**Alert or Alarm indication** • Indicates that the inverter control system has detected an alert or alarm. It is possible to identify the type of problem generated in the dedicated section of integrated Web User Interface (“Event” section). • Indicates missing of connections in case of external meter.
POWER: ○ ALARM: ● GFI: ○	**Temperature protection trip** Indicates that the trip relating to internal temperatures (insufficient or excessive temperature) may have been activated.
POWER: ● ALARM: ⊗ GFI: ○	**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
POWER: ○ ALARM: ✳ GFI: ○	**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
	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
POWER: ✳ ALARM: ○ GFI: ○	**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
POWER: ○ ALARM: ○ GFI: ●	**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.
POWER: ○ ALARM: ○ GFI: ⊗	**Arc fault Trip** During the reset procedure (via dedicated button or external command), the LED becomes fixed for 10 seconds. After this time, the LED switch OFF (which means reset done) or start to blink again.
POWER: ⊗ ALARM: ✳ GFI: ○	**PID recovery function is active** Inverter is providing PID recovery functionality.
POWER: ✳ ALARM: ⊗ GFI: ○	**PID recovery function is enabled but not active** Inverter is not providing PID recovery functionality also if it is enabled. More detail on Web UI and Installer for Solar Inverters App.

The following table shows all the possible status of “WLAN/LAN” LED on the Synoptic **(03)** according to the operating status of the Wi-Fi or ethernet communication lines.

Led icon Status	Operating state
WLAN/LAN: ○	**Wi-Fi not configured or/and ethernet cable not connected.**
WLAN/LAN: ⊗	**Scanning for available Wi-Fi networks.**
WLAN/LAN: ✳	**Trying to reconnect to the Wi-Fi network** (after pressing the smart button for 5 seconds).
WLAN/LAN: ●	**Wi-Fi or ethernet network is connected to the inverter and IP address is obtained.**

7.4 Inverter 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 Connection in “Wi-Fi Station Mode”

- Enable the Wi-Fi connection on the device (tablet, smartphone or laptop) and connect it to the same Wi-Fi 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 theIP Address assigned to the inverter or the “Host Name” http://FIMER-YYWWSSSSSS.local (where YYWWSSSSSS is the SN of the inverter).

NOTE – The IP address assigned may vary for reasons connected to the Wi-Fi 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 Wi-Fi router administration panel.

NOTE – In order to use the “Host Name” 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.

7.4.2 Connection in “AP Mode”

Enable the Wi-Fi connection on the device (tablet, smartphone or laptop) and connect it to the Access Point created by the inverter system: the name of the Wi-Fi network created by the inverter, will be: FIMER-WWYYSSSSSS (where YYWWSSSSSS is the SN of the inverter).

- 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.

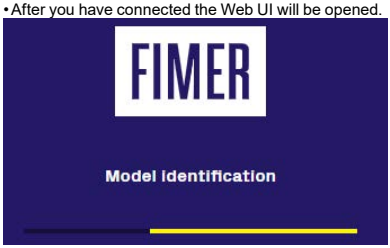
NOTE – It’s required to digit also the dash “-” characters of the Product Key in the password field.

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

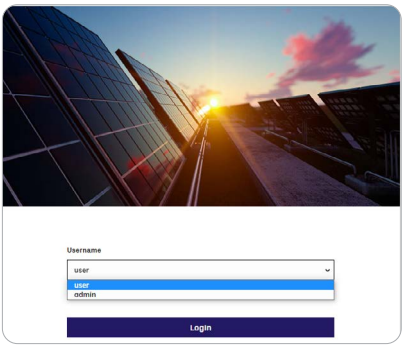
- Open an internet browser (reccomended browser: Chrome versions from v.55, Firefox versions from v.50) and enter the pre-set IP address 192.168.117.1 to access the login page.

7.4.3 Web UI login page

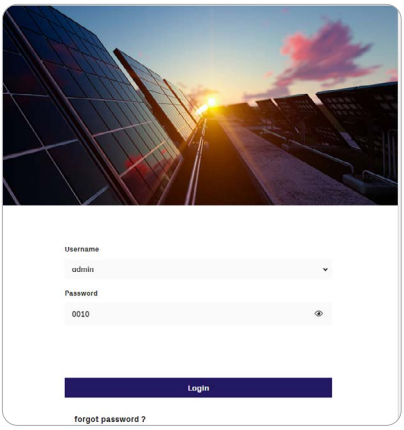
- After you have connected the Web UI will be opened.



Two type of access are availble:



- User (without password).
  Basic access to the settings and visualization of the webUI parameters.
- Admin (password for first access only: 0010. This password must be changed and duly protected after the first access to avoid unauthorized access)
- Installer access to the settings and visualization of the webUI parameters.

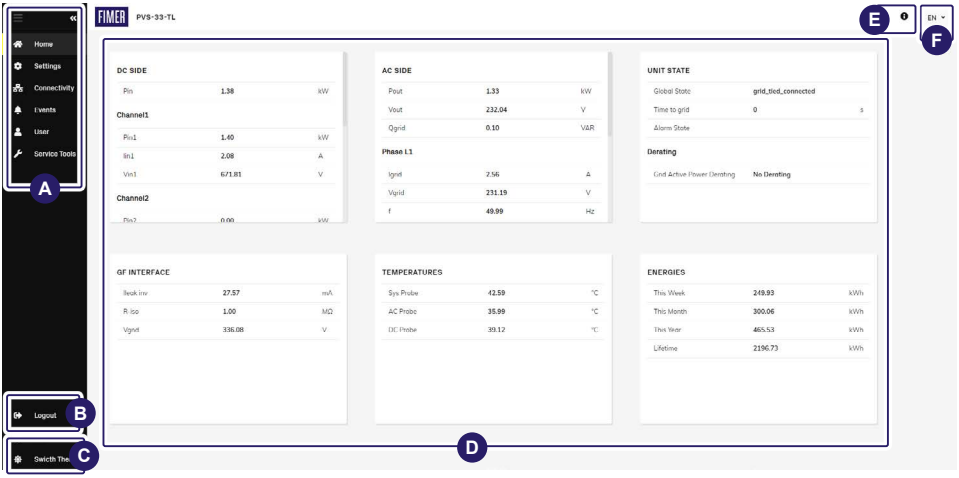


NOTE – By logging in as “Admin” and obtaining the token (on the https://registration.solar.fimer.com site and following the procedure “7.5.1 Admin Plus level access” in this document) it is possible to obtain the “Admin Plus” access level which allows advanced configuration of the inverter parameters.

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).

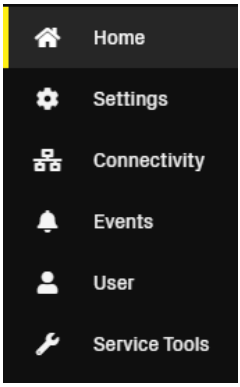
NOTE – The language of the wizard could be changed by clicking on the upper status bar.

7.4.4 Web User Interface Home page



A. Menus sidebar
B. Logout button
C. Switch theme button (dark/light)
D. Summary information
E. Info section (Identification data of the inverter)
F. Language selector

7.4.5 Web User Interface main menus



HOME: Visualization of information related of inverter status, production and inverter parameters.

SETTINGS: Section dedicated to inverter parameters configurations.

CONNECTIVITY: Section dedicated to inverter communication settings and configurations.

EVENTS: Section dedicated to event log.

USER: Section dedicated to Admin Plus privileges and Password management.

SERVICE TOOLS: Section dedicated to Inverter configuration and Update Firmware.

7.4.6 Web User Interface structure

The structure of the menus changes according to the type of access.
The table shows the structure of the Web UI and the permissions (U = User, A = Admin, AP = Admin Plus).

Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Home	Summary										
Settings	Inverter parameters	AC output ratings			Max Pac		•	•			•
					Max Sac		•	•			•
					Max Qac		•	•			
					Max Iac			•			
					Nominal Vgrid		•	•			•
					Nominal Fgrid		•	•			•
Settings	Inverter parameters	AC settings	Dynamic grid support		K LVRT sym. pos. seq.			•			•
					K LVRT asym. pos. seq.			•			•
					K HVRT sym. pos. seq.			•			•
					K HVRT asym. pos. seq.			•			•
					K LVRT asym. neg. seq.			•			•
					K HVRT asym. neg. seq.			•			•
			Grid connection		Max Vgrid connection (V)		•	•			
					Max Vgrid connection (pu)		•	•			•
					Min Vgrid connection (V)		•	•			
					Min Vgrid connection (pu)		•	•			•
					Max Fgrid connection (Hz)		•	•			
					Max Fgrid connection (pu)		•	•			•
					Min Fgrid connection (Hz)		•	•			
					Min Fgrid connection (pu)		•	•			•
					Grid connection timeout (no grid fault)		•	•			•
					Grid connection timout (grid fault)		•	•			•
			Grid protections VRT/FRT	OV1	OV1: Over voltage prot. en/dis		•	•			•
					OV1: Over voltage prot. (V)		•	•			
					OV1: Over voltage prot. (pu)		•	•			•
					OV1: Over voltage prot. trip time		•	•			•
					OV1_2: Over voltage profile step/linear		•	•			•
				OV2	OV2: Over voltage prot. en/dis		•	•			•
					OV2: Over voltage prot. (V)		•	•			
					OV2: Over voltage prot. (pu)		•	•			•
					OV2: Over voltage prot. trip time		•	•			•
					OV2_3: Over voltage profile step/linear		•	•			•
				OV3	OV3: Over voltage prot. en/dis		•	•			•
					OV3: Over voltage prot. (V)		•	•			•
					OV3: Over voltage prot. (pu)		•	•			•
					OV3: Over voltage prot. trip time		•	•			•
					OV3_4: Over voltage profile step/linear		•	•			•
				OV4	OV4: Over voltage prot. en/dis		•	•			•
					OV4: Over voltage prot. (V)		•	•			•
					OV4: Over voltage prot. (pu)		•	•			•
					OV4: Over voltage prot. trip time		•	•			•
					OV4_5: Over voltage profile step/linear		•	•			•
				OV5	OV5: Over voltage prot. en/dis		•	•			•
					OV5: Over voltage prot. (V)		•	•			•
					OV5: Over voltage prot. (pu)		•	•			•
					OV5: Over voltage prot. trip time		•	•			•
					OV5_6: Over voltage profile step/linear		•	•			•
				UV1	UV1: Under voltage prot. en/dis		•	•			•
					UV1: Under voltage prot. (V)		•	•			
					UV1: Under voltage prot. (pu)		•	•			•
					UV1: Under voltage prot. trip time		•	•			•
					UV1_2: Under voltage profile step/linear		•	•			•
				UV2	UV2: Under voltage prot. en/dis		•	•			•
					UV2: Under voltage prot. (V)		•	•			
					UV2: Under voltage prot. (pu)		•	•			•
					UV2: Under voltage prot. trip time		•	•			•
					UV2_3: Under voltage profile step/linear		•	•			•
				UV3	UV3: Under voltage prot. en/dis		•	•			•
					UV3: Under voltage prot. (V)		•	•			•
					UV3: Under voltage prot. (pu)		•	•			•
					UV3: Under voltage prot. trip time		•	•			•
					UV3_4: Under voltage profile step/linear		•	•			•

Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Settings	Inverter parameters	AC settings	Grid protections VRT/FRT	UV4	UV4: Under voltage prot. en/dis		•	•			•
					UV4: Under voltage prot. (V)		•	•			•
					UV4: Under voltage prot. (pu)		•	•			•
					UV4: Under voltage prot. trip time		•	•			•
					UV4_5: Under voltage profile step/linear		•	•			•
				UV5	UV5: Under voltage prot. en/dis		•	•			•
					UV5: Under voltage prot. (V)		•	•			•
					UV5: Under voltage prot. (pu)		•	•			•
					UV5: Under voltage prot. trip time		•	•			•
					UV5_6: Under voltage profile step/linear		•	•			•
				OF1	OF1: Over frequency prot. en/dis		•	•			•
					OF1: Over frequency prot. (Hz)		•	•			•
					OF1: Over frequency prot. (pu)		•	•			•
					OF1: Over frequency prot. trip time		•	•			•
				OF2	OF2: Over frequency prot. en/dis		•	•			•
					OF2: Over frequency prot. (V)		•	•			
					OF2: Over frequency prot. (pu)		•	•			•
					OF2: Over frequency prot. trip time		•	•			•
				UF1	UF1: Under frequency prot. en/dis		•	•			•
					UF1: Under frequency prot. (Hz)		•	•			•
					UF1: Under frequency prot. (pu)		•	•			•
					UF1: Under frequency prot. trip time		•	•			•
				UF2	UF2: Under frequency prot. en/dis		•	•			•
					UF2: Under frequency prot. (Hz)		•	•			•
					UF2: Under frequency prot. (pu)		•	•			•
					UF2: Under frequency prot. trip time		•	•			•
				LHVRT momentary cess.	L/HVRT momentary cess. en/dis			•			•
					HVRT momentary cess. (V)			•			
					HVRT momentary cess. (pu)			•			•
					LVRT momentary cess. (V)			•			
					LVRT momentary cess. (pu)			•			•
				LHFRT momentary cess.	L/HFRT momentary cess. en/dis			•			•
					HFRT momentary cess. (Hz)			•			
					HFRT momentary cess. (pu)			•			•
					LFRT momentary cess. (Hz)			•			
					LFRT momentary cess. (pu)			•			•
			Grid protections - RoCoF		RoCoF enable			•			•
					RoCoF go to error state enable			•			•
					RoCoF frequency change setting			•			•
					RoCoF frequency change trip time			•			•
					RoCoF measuring period (n° of cylces)			•			•
Settings	Inverter parameters	Active power control	Active power curtailment		P set point		•	•		•	•
					P set point en/dis		•	•		•	•
			Average VGrid protection		Avg Vgrid prot. en/dis		•	•		•	•
					Avg Vgrid power control en/dis		•	•		•	•
					Avg Vgrid protection (V)		•	•			
					Avg Vgrid protection (pu)		•	•		•	•
			Volt-Watt settings: P(V)		Volt-Watt en/dis			•			•
					Volt-Watt curve selection			•			•
					Volt-Watt output filter en/dis			•			•
					Volt-Watt input filter en/dis			•			•
					Volt-Watt reference power inst/max			•			•
				Curve 1	Number of curve active points			•			•
					Point1: V1			•			•
					Point1: W1			•			•
					Point2: V2			•			•
					Point2: W2			•			•
					Point3: V3			•			•
					Point3: W3			•			•
					Point4: V4			•			•
					Point4: W4			•			•
					Point5: V5			•			•
					Point5: W5			•			•
					Point6: V6			•			•
					Point6: W6			•			•
					Point7: V7			•			•

Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Settings	Inverter parameters	Active power control	Volt-Watt settings: P(V)	Curve 1	Point7: W7			•			•
					Point8: V8			•			•
					Point8: W8			•			•
					Point9: V9			•			•
					Point9: W9			•			•
					Point10: V10			•			•
					Point10: W10			•			•
				Curve 2	Number of curve active points			•			•
					Point1: V1			•			•
					Point1: W1			•			•
					Point2: V2			•			•
					Point2: W2			•			•
					Point3: V3			•			•
					Point3: W3			•			•
					Point4: V4			•			•
					Point4: W4			•			•
					Point5: V5			•			•
					Point5: W5			•			•
					Point6: V6			•			•
					Point6: W6			•			•
					Point7: V7			•			•
					Point7: W7			•			•
					Point8: V8			•			•
					Point8: W8			•			•
					Point9: V9			•			•
					Point9: W9			•			•
					Point10: V10			•			•
					Point10: W10			•			•
					Volt-Watt input filter time 3т (95%)			•			•
					Volt-Watt output filter time 3т (95%)			•			•
				Curve 3	Number of curve active points			•			•
					Point1: V1			•			•
					Point1: W1			•			•
					Point2: V2			•			•
					Point2: W2			•			•
					Point3: V3			•			•
					Point3: W3			•			•
					Point4: V4			•			•
					Point4: W4			•			•
					Point5: V5			•			•
					Point5: W5			•			•
					Point6: V6			•			•
					Point6: W6			•			•
					Point7: V7			•			•
					Point7: W7			•			•
					Point8: V8			•			•
					Point8: W8			•			•
					Point9: V9			•			•
					Point9: W9			•			•
					Point10: V10			•			•
					Point10: W10			•			•
					Volt-Watt input filter time 3т (95%)			•			•
					Volt-Watt output filter time 3т (95%)			•			•
				Curve 4	Number of curve active points			•			•
					Point1: V1			•			•
					Point1: W1			•			•
					Point2: V2			•			•
					Point2: W2			•			•
					Point3: V3			•			•
					Point3: W3			•			•
					Point4: V4			•			•
					Point4: W4			•			•
					Point5: V5			•			•
					Point5: W5			•			•
					Point6: V6			•			•
					Point6: W6			•			•

Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Settings	Inverter parameters	Active power control	Volt-Watt settings: P(V)	Curve 4	Point7: V7			•			•
					Point7: W7			•			•
					Point8: V8			•			•
					Point8: W8			•			•
					Point9: V9			•			•
					Point9: W9			•			•
					Point10: V10			•			•
					Point10: W10			•			•
					Volt-Watt input filter time 3τ (95%)			•			•
					Volt-Watt output filter time 3τ (95%)			•			•
			Frequency-Watt		Over freq. control en/dis			•			•
					Under freq. control en/dis			•			•
					Start over freq. control (Hz)			•			
					Start over freq. control (pu)			•			•
					Stop over freq. control (Hz)			•			
					Stop over freq. control (pu)			•			•
					Start under freq. control (Hz)			•			
					Start under freq. control (pu)			•			•
					Stop under freq. control (Hz)			•			
					Stop under freq. control (pu)			•			•
					Over freq. control input filter time 3τ (95%)			•			•
					Under freq. control input filter time 3τ (95%)			•			•
					Over freq. control intentional delay			•			•
					Under freq. control intentional delay			•			•
					Over freq. control hysteresis en/dis			•			•
					Under freq. control hysteresis en/dis			•			•
					Over freq. control input filter en/dis			•			•
					Under freq. control input filter en/dis			•			•
					Restore frequency upper limit (Hz)			•			
					Restore frequency upper limit (pu)			•			•
					Restore frequency lower limit (Hz)			•			
					Restore frequency lower limit (pu)			•			•
					Over freq. droop reference power inst/max			•			•
					Under freq. droop reference power inst/max			•			•
					Over freq. restore timeout			•			•
					Under freq. restore timeout			•			•
					Restore ramp en/dis			•			•
					Restore ramp mode			•			•
					Restore ramp slope			•			•
					Restore ramp slope min			•			•
			FSM		FSM Over freq. control en/dis			•			•
					FSM Under freq. control en/dis			•			•
					FSM Start over freq. control (Hz)			•			
					FSM Start over freq. control (pu)			•			•
					FSM Stop over freq. control (Hz)			•			
					FSM Stop over freq. control (pu)			•			•
					FSM Start under freq. control (Hz)			•			
					FSM Start under freq. control (pu)			•			•
					FSM Stop under freq. control (Hz)			•			
					FSM Stop under freq. control (pu)			•			•
					FSM Over freq. control input filter time 3τ (95%)			•			•
					FSM Under freq. control input filter time 3τ (95%)			•			•
					FSM Over freq. control intentional delay			•			•
					FSM Under freq. control intentional delay			•			•
					FSM Over freq. control hysteresis en/dis			•			•
					FSM Under freq. control hysteresis en/dis			•			•
					FSM Over freq. control input filter en/dis			•			•
					FSM Under freq. control input filter en/dis			•			•
					FSM Restore frequency upper limit (Hz)			•			
					FSM Restore frequency upper limit (pu)			•			•
					FSM Restore frequency lower limit (Hz)			•			•
					FSM Restore frequency lower limit (pu)			•			•
					FSM Over freq. droop reference power inst/max			•			•

Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Settings	Inverter parameters	Active power control	FSM		FSM Under freq. droop reference power inst/max			•			•
					FSM Over freq. restore timeout			•			•
					FSM Under freq. restore timeout			•			•
					FSM Restore ramp en/dis			•			•
					FSM Restore ramp mode			•			•
					FSM Restore ramp slope			•			•
					FSM Restore ramp slope min			•			•
			Ramp control		Normal ramp-up en/dis		•	•			•
					Soft start en/dis		•	•			•
					Soft start after fault config		•	•			•
					Soft start rate		•	•			•
					Normal ramp-up rate		•	•			•
Settings	Inverter parameters	DC settings			Channel X Vstart		•	•		•	•
					UV ac power supply timeout		•	•		•	•
					Multiple scan en/dis		•	•		•	•
					Multiple scan period		•	•		•	•
					Input mode config		•	•			
Settings	Inverter parameters	Digital inputs			Digital input 1 mode		•	•		•	•
					Digital input 1 steady state		•	•		•	•
					Digital input 2 mode		•	•		•	•
					Digital input 2 steady state		•	•		•	•
Settings	Inverter parameters	Reactive power control	Set point response tme		Output filter response time 3τ (95%)			•			•
					Output filter en/dis			•			•
			Cosφ set		Cosφ set-point en/dis		•	•		•	•
					Cosφ set-point		•	•		•	•
			Q set		Q set-point en/dis		•	•		•	•
					Q set-point		•	•		•	•
			Volt-Cosφ settings		Volt-Cosφ en/dis		•	•		•	•
			Volt-VAr settings		Watt-Cosφ en/dis		•	•		•	•
					Watt-Cosφ curve selection			•			•
					Watt-Cosφ input filter en/dis			•			•
					Watt-Cosφ output filter en/dis			•			•
					Watt-Cosφ lock in voltage			•			•
					Watt-Cosφ lock out voltage			•			•
				Curve 1	Number of curve active points			•			•
					Point1: V1			•			•
					Point1: Q1			•			•
					Point2: V2			•			•
					Point2: Q2			•			•
					Point3: V3			•			•
					Point3: Q3			•			•
					Point4: V4			•			•
					Point4: Q4			•			•
					Point5: V5			•			•
					Point5: Q5			•			•
					Point6: V6			•			•
					Point6: Q6			•			•
					Point7: V7			•			•
					Point7: Q7			•			•
					Point8: V8			•			•
					Point8: Q8			•			•
					Point9: V9			•			•
					Point9: Q9			•			•
					Point10: V10			•			•
					Point10: Q10			•			•
					Volt-VAr input filter time 3τ (95%)			•			•
					Volt-VAr output filter time 3τ (95%)			•			•
				Curve 2	Number of curve active points			•			•
					Point1: V1			•			•
					Point1: Q1			•			•
					Point2: V2			•			•
					Point2: Q2			•			•
					Point3: V3			•			•
					Point3: Q3			•			•

Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Settings	Inverter parameters	Reactive power control	Volt-VAr settings	Curve 2	Point4: V4			•			•
					Point4: Q4			•			•
					Point5: V5			•			•
					Point5: Q5			•			•
					Point6: V6			•			•
					Point6: Q6			•			•
					Point7: V7			•			•
					Point7: Q7			•			•
					Point8: V8			•			•
					Point8: Q8			•			•
					Point9: V9			•			•
					Point9: Q9			•			•
					Point10: V10			•			•
					Point10: Q10			•			•
					Volt-VAr input filter time 3τ (95%)			•			•
					Volt-VAr output filter time 3τ (95%)			•			•
				Curve 3	Number of curve active points			•			•
					Point1: V1			•			•
					Point1: Q1			•			•
					Point2: V2			•			•
					Point2: Q2			•			•
					Point3: V3			•			•
					Point3: Q3			•			•
					Point4: V4			•			•
					Point4: Q4			•			•
					Point5: V5			•			•
					Point5: Q5			•			•
					Point6: V6			•			•
					Point6: Q6			•			•
					Point7: V7			•			•
					Point7: Q7			•			•
					Point8: V8			•			•
					Point8: Q8			•			•
					Point9: V9			•			•
					Point9: Q9			•			•
					Point10: V10			•			•
					Point10: Q10			•			•
					Volt-VAr input filter time 3τ (95%)			•			•
					Volt-VAr output filter time 3τ (95%)			•			•
				Curve 4	Number of curve active points			•			•
					Point1: V1			•			•
					Point1: Q1			•			•
					Point2: V2			•			•
					Point2: Q2			•			•
					Point3: V3			•			•
					Point3: Q3			•			•
					Point4: V4			•			•
					Point4: Q4			•			•
					Point5: V5			•			•
					Point5: Q5			•			•
					Point6: V6			•			•
					Point6: Q6			•			•
					Point7: V7			•			•
					Point7: Q7			•			•
					Point8: V8			•			•
					Point8: Q8			•			•
					Point9: V9			•			•
					Point9: Q9			•			•
					Point10: V10			•			•
					Point10: Q10			•			•
					Volt-VAr input filter time 3τ (95%)			•			•
					Volt-VAr output filter time 3τ (95%)			•			•

Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Settings	Inverter parameters	Reactive power control	Watt-Cosφ settings		Watt-Cosφ en/dis		•	•		•	•
					Watt-Cosφ curve selection			•			•
					Watt-Cosφ input filter en/dis			•			•
					Watt-Cosφ output filter en/dis			•			•
					Watt-Cosφ lock in voltage			•			•
					Watt-Cosφ lock out voltage			•			•
				Curve 1	Number of curve active points			•			•
					Point1: W1			•			•
					Point1: Cosφ1			•			•
					Point2: W2			•			•
					Point2: Cosφ2			•			•
					Point3: W3			•			•
					Point3: Cosφ3			•			•
					Point4: W4			•			•
					Point4: Cosφ4			•			•
					Point5: W5			•			•
					Point5: Cosφ5			•			•
					Point6: W6			•			•
					Point6: Cosφ6			•			•
					Point7: W7			•			•
					Point7: Cosφ7			•			•
					Point8: W8			•			•
					Point8: Cosφ8			•			•
					Point9: W9			•			•
					Point9: Cosφ9			•			•
					Point10: W10			•			•
					Point10: Cosφ10			•			•
					Watt-Cosφ input filter time 3τ (95%)			•			•
					Watt-Cosφ output filter time 3τ (95%)			•			•
				Curve 2	Number of curve active points			•			•
					Point1: W1			•			•
					Point1: Cosφ1			•			•
					Point2: W2			•			•
					Point2: Cosφ2			•			•
					Point3: W3			•			•
					Point3: Cosφ3			•			•
					Point4: W4			•			•
					Point4: Cosφ4			•			•
					Point5: W5			•			•
					Point5: Cosφ5			•			•
					Point6: W6			•			•
					Point6: Cosφ6			•			•
					Point7: W7			•			•
					Point7: Cosφ7			•			•
					Point8: W8			•			•
					Point8: Cosφ8			•			•
					Point9: W9			•			•
					Point9: Cosφ9			•			•
					Point10: W10			•			•
					Point10: Cosφ10			•			•
					Watt-Cosφ input filter time 3τ (95%)			•			•
					Watt-Cosφ output filter time 3τ (95%)			•			•

Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Settings	Inverter parameters	Reactive power control	Watt-Cosφ settings	Curve 3	Number of curve active points			•			•
					Point1: W1			•			•
					Point1: Cosφ1			•			•
					Point2: W2			•			•
					Point2: Cosφ2			•			•
					Point3: W3			•			•
					Point3: Cosφ3			•			•
					Point4: W4			•			•
					Point4: Cosφ4			•			•
					Point5: W5			•			•
					Point5: Cosφ5			•			•
					Point6: W6			•			•
					Point6: Cosφ6			•			•
					Point7: W7			•			•
					Point7: Cosφ7			•			•
					Point8: W8			•			•
					Point8: Cosφ8			•			•
					Point9: W9			•			•
					Point9: Cosφ9			•			•
					Point10: W10			•			•
					Point10: Cosφ10			•			•
					Watt-Cosφ input filter time 3τ (95%)			•			•
					Watt-Cosφ output filter time 3τ (95%)			•			•
				Curve 4	Number of curve active points			•			•
					Point1: W1			•			•
					Point1: Cosφ1			•			•
					Point2: W2			•			•
					Point2: Cosφ2			•			•
					Point3: W3			•			•
					Point3: Cosφ3			•			•
					Point4: W4			•			•
					Point4: Cosφ4			•			•
					Point5: W5			•			•
					Point5: Cosφ5			•			•
					Point6: W6			•			•
					Point6: Cosφ6			•			•
					Point7: W7			•			•
					Point7: Cosφ7			•			•
					Point8: W8			•			•
					Point8: Cosφ8			•			•
					Point9: W9			•			•
					Point9: Cosφ9			•			•
					Point10: W10			•			•
					Point10: Cosφ10			•			•
					Watt-Cosφ input filter time 3τ (95%)			•			•
					Watt-Cosφ output filter time 3τ (95%)			•			•
Settings	PID recovery settings				Anti-PID Kit		•	•			•
					Anti-PID Mode			•			•
					Anti-PID Reference Voltage			•			•
					Anti-PID Lock-In Voltage (V)			•			
					Anti-PID Lock-In Voltage pu			•			•
					Anti-PID Lock-Out Voltage (V)			•			
					Anti-PID Lock-Out Voltage pu			•			•
					Anti-PID Starting Delay			•			•
	Night mode settings				Energy save mode		•	•		•	•
					Night reactive power mode			•			•
					Night Q fix set point			•			•
					Pre-charge kit		•	•			

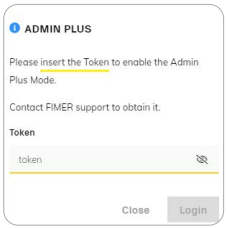
Main menu	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Parameter	Reading			Writing		
						U	A	AP	U	A	AP
Settings	Arc fault detection settings				Arc fault detection en/dis		•	•			•
	Special functions				Remote off cmd			•		•	•
					Remote off state			•		•	•
Service tool	Country standard				Country standard		•	•		•	•
Settings	Date/Time						•	•		•	•
Connectivity	Ethernet	Current state			IP Address		•	•			
		Edit daisy chain config.			DHCP/STATIC		•	•		•	•
Connectivity	WiFi	Current state	WiFi Access Point		AP		•	•		•	•
					IP Address		•	•			
			WiFi Station		Connect		•	•		•	•
			Edit WiFi Station settings		Available network (SSID)		•	•		•	•
					Password		•	•		•	•
					IP Settings		•	•		•	•
Connectivity	Additional Devices	Add Meter	Select device		ABB M4M Power Meter [1]		•	•		•	•
					ABB B23/B24 Power Meter [1]		•	•		•	•
					Satec EM133		•	•		•	•
					Eastron SDM630		•	•		•	•
		Add Envi-ronmental Sensor [1]	Select Device		VS800		•	•		•	•
					SM1-485 PRO		•	•		•	•
Connectivity	Connectivity Check				Ethernet	•	•	•			
					Wi-Fi	•	•	•			
					Aurora Vision	•	•	•			
					Upgrade Server	•	•	•			
Connectivity	Power Management [1]				Enable/Disable		•	•		•	•
Connectivity	Communication Protocol	Communication Protocol			Status		•	•			
		Modbus TCP			Enable/Disable		•	•		•	•
					Port		•	•			
		Modbus RTU (main RS485 port) [1]			RS485 address		•	•		•	•
					Baud Rate		•	•		•	•
					Parity		•	•		•	•
Events	Filter by Date				Start/End date	•	•	•	•	•	•
Events	Events List				DOWNLOAD PRODUCT LOG		•	•		•	•
					ALL	•	•	•	•	•	•
					SUPERVISED	•	•	•	•	•	•
					ALERT	•	•	•	•	•	•
					FW UPDATE	•	•	•	•	•	•
					SETTINGS	•	•	•	•	•	•
					INFO	•	•	•	•	•	•
User	Change Password				Password		•	•		•	•
					Confirm Password		•	•		•	•
User	Admin Plus				Token		•			•	
User	Revoke Admin Plus							•			•
Service Tools	Firmware	Current Firmware			Current Firmware		•	•			
		Remote Update			Authorize		•	•		•	•
		Local Update			Select the firmware		•	•		•	•
Service Tools	Country standard				Select the country standard (grid code)		•	•		•	•

1. Available only if the PVS-20/30/33-CCB accessory is installed.

7.5 Web User Interface function detail

7.5.1 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:

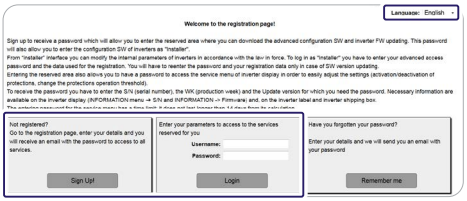


Stage 1 - Collection of information relating to the inverter.
Collect the SN and production week. This information can be found on the “Regulatory and identification Label”.
The serial number consists of 10 digits:
Serial Number (YYWWSSSSSS):
YY = Year of manufacture
WW = Week of manufacture
SSSSSS =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

Stage 2 - Registration on https://registration.solar.fimer.com

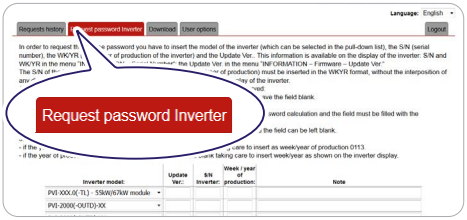
- Open registration site https://registration.solar.fimer.com
- Set the desired language
- Go to Sign Up or Log In and insert the personal data requested.

> **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.

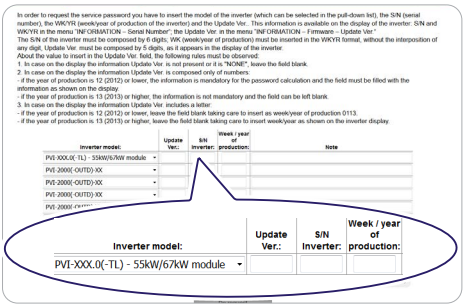


Stage 3 - Admin Plus token request

- Access the section dedicated to requesting the security token.

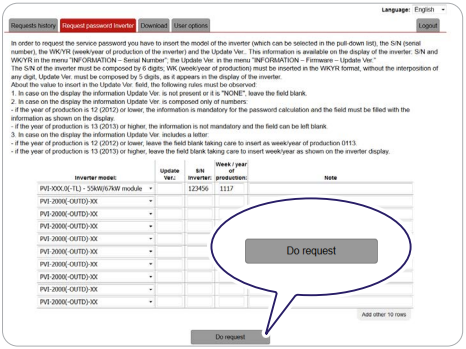


- Choose the inverter model from the drop-down list and insert Serial Number and Week of Production of the inverter (see Stage 1).



- 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.



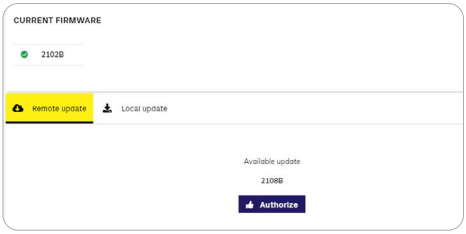
> **NOTE –** The security token enables the “Admin Plus” privileges which allows the inverter’s sensitive parameters to be changed. Proceed to changing the aforementioned parameters only if necessary.

7.5.2 Firmware update

Is recommended to check the availability of new firmware in the dedicated section Service Tools>Firmware.

NOTE – The inverter firmware can be updated remotely or locally.

Remote firmware update:
Inverter connected to Aurora Vision®. New firmwares availability are displayed in the section “Remote Updates” and is necessary to autorize it.

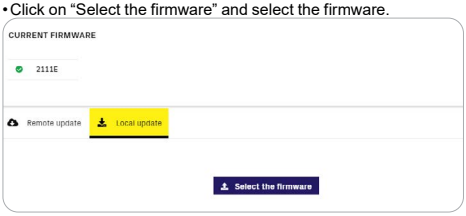


ATTENTION – Do not perform any action while the update of the firmware is running. An interruption of updating process could damage the inverter!

Local firmware update:
Inverter not connected to Aurora Vision®. The firmware have to be selected and uploaded from local folder of the used devices to access to the web server.

NOTE – The latest firmware version is available from the download area of the website www.fimer.com or from https://registration.solar.fimer.com

- Click on “Select the firmware” and select the firmware.



- Click on “UPDATE” button to start with the updating process.

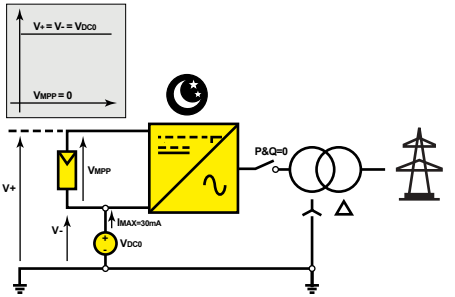
ATTENTION – Do not perform any action while the update of the firmware is running. An interruption of updating process could damage the inverter!

7.5.3 PID recovery

PID recovery functionality is provided only for dedicated inverter models (;APD suffix).

Scope:

Polarization of the negative PV array terminal to an adjustable and regulated positive potential with respect to ground when the inverter is off-line (not connected to the AC grid, ensuring that maximum system voltage is not exceeded on any part of the PV array.



Array terminal voltages with respect to ground during night-time PID recovery operation (inverter is off-line).

Main functions:

- String polarization through the application of a limited current source voltage bias (< 30mA).
- Continuous measurement of positive and negative terminal arrays with respect to ground.
- Run-time monitoring of all relevant parameters and PID recovery function operating status, including dedicated alarms.

Adjustable parameters (via WebUI and Installer for Solar Inverters App):

- Enabling and disabling the PID recovery function
- Reference voltage
  Settable on 3 pre-defined values: 500Vdc (default), 550Vdc and 600Vdc
- Lock-in and lock-out voltages.
  The PID recovery function starts operating when input open circuit voltage (Voc) drops below selected activation (lock-in) voltage, while it stops operating when Voc rise above selected de-activation (lock-out) voltage.
  The Lock-in and lock-out voltages can be regulated as %*Vstart.
  Lock-in/lock-out voltage:
  - 0.1/0.2*Vstart;
  - 0.2/0.3*Vstart;
  - 0.3/0.4*Vstart; (default setting)
  - 0.4/0.5*Vstart.
- Starting delay.
  Example with default setting 0.3/0.4*Vstart (Lock-in/lock-out voltage): the PID recovery is activated when the input open circuit voltage(Voc) drops below 0.3*Vstart for at least 5 minutes continuously, while de-activation is triggered immediately when input open circuit voltage(Voc) exceeds 0.4*Vstart.

ATTENTION – Not operate on the DC switch when PID recovery is operating (this condition is clearly identified by simultaneous blinking of green and yellow led).

ATTENTION – When the PID RECOVERY function is enabled, Hazardous Voltages are supplied to the Photovoltaic Array during the night.

7.5.4 Arc Fault Detection (AFD)

The AFD performs a self-test when the system is started. If the self-test results are OK, the inverter will continue to AC grid connection. If a potential problem on the AFD board is detected, the self-test will result in error E053.
During normal operation the input current is continually measured and analyzed.
If a DC arc fault is detected during operation, the inverter is disconnects from AC grid and generates an E050 error code (readable through
internal WebUI).
If Arc Fault Protection trips, the inverter is disconnected from AC grid and after 5 minutes it enters into recovery mode and try again to
reconnect. After 5 events of arc fault, the inverter is latched and, in order to clear the error, the Smart button must be pushed for 10 seconds.
The AFD self-test can be manually started anytime using the following procedure:

1. Turn off the inverter (switching off both DC switch and external AC switch),
2. Wait for unit's shut-down (LEDs stop blinking)
3. Turn on both the DC and AC switches and wait for self-test result.

7.5.5 Export limitation configuration

7.5.5.1 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.

7.5.5.2 Export limitation control setup

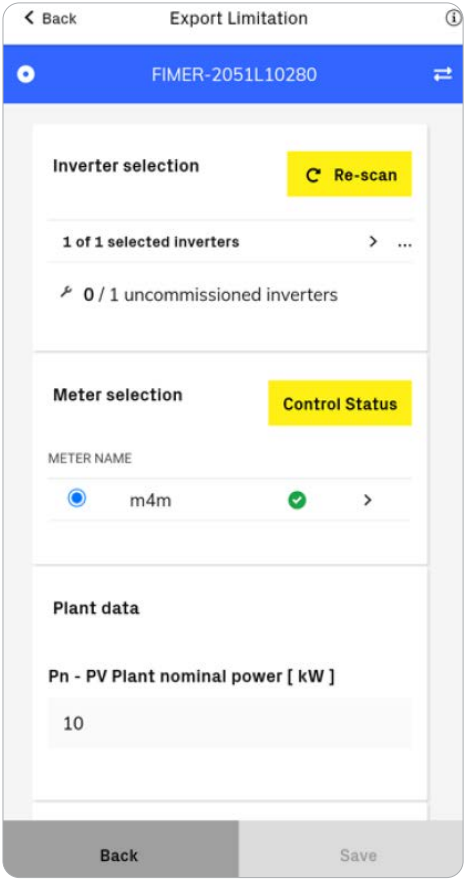
Export limitation can be configured and enabled only through the Installer for solar inverters APP.
Export limitation settings are accessible from the Device List, on the menu Power Management/Export Limitation

⚠ **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.

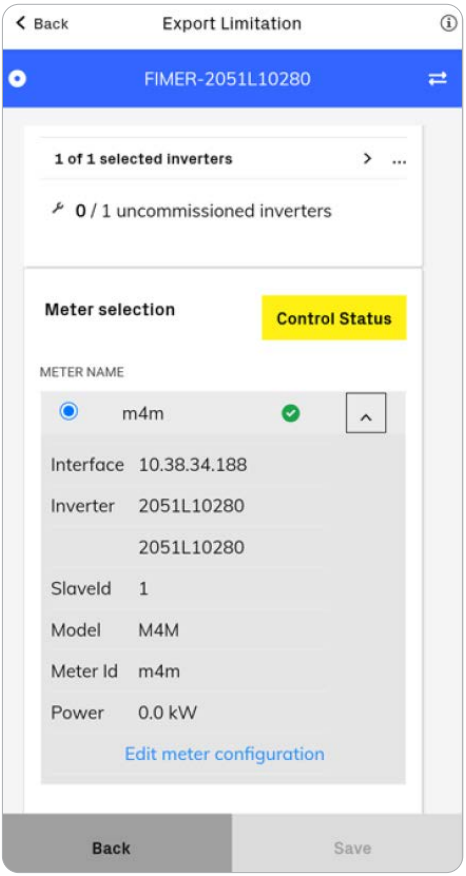


⚠ **ATTENTION –** It is suggested to check if the overall number of selected inverters match the number that shall be included on Export Limitation and if all the inverters are correctly recognized as commissioned

⚠ **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

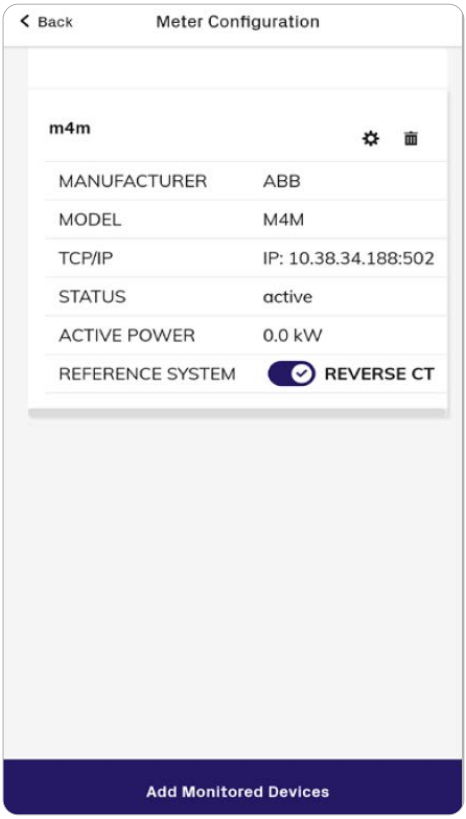
If the meter is installed with the consumer reference system, it is possible to revert the meter data acquisition to the correct generator reference system without the need to rework the installed meter.

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.

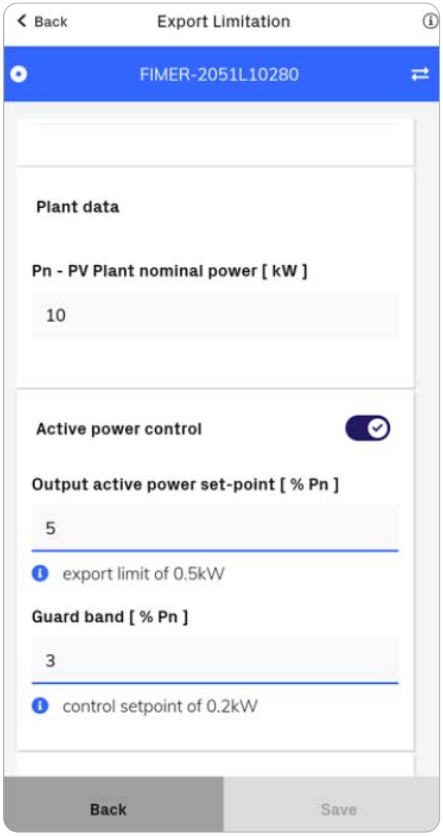
To check the reference system, select “edit meter configuration” under meter details and stop inverter productions using the AC disconnection or Remote OFF command.

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.

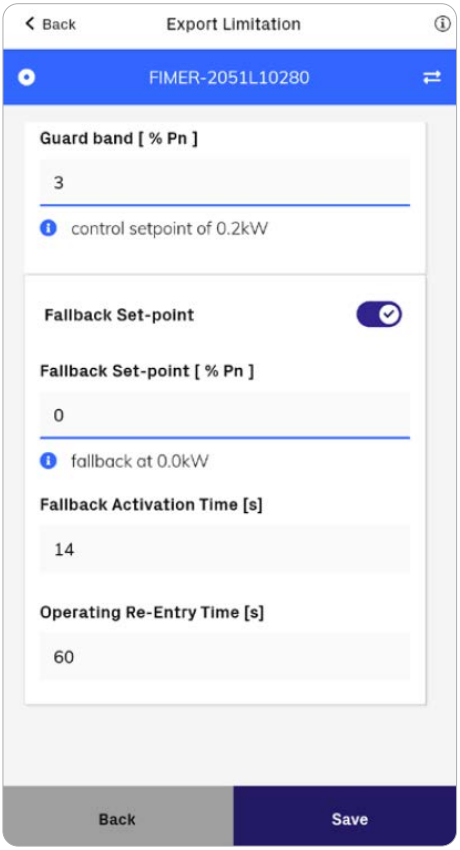
⚠ **ATTENTION –** The guard band shall not be configured at 0% in case fallback is enabled.

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"** 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

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.

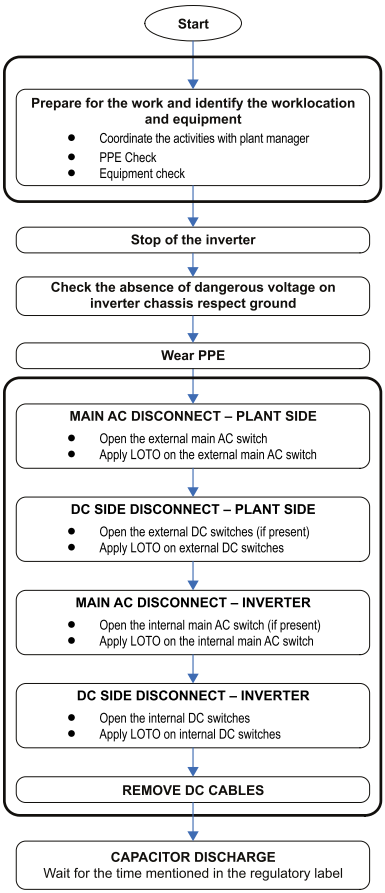
8.2.2 Clothing and protection of personnel

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:
- DC current clamp.
- Multimeter (only to test the absence of short circuits).
- Safety tags "work in progress, do not operate".
- Padlocks.

8.2.4 Inverter total de-energization 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.

⚠ **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.

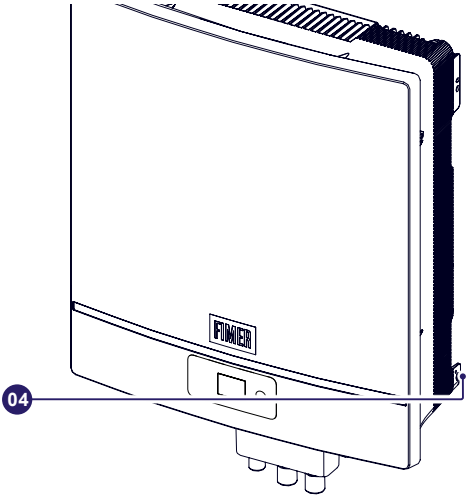
8.2.4.2 PPE

⚠ **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).

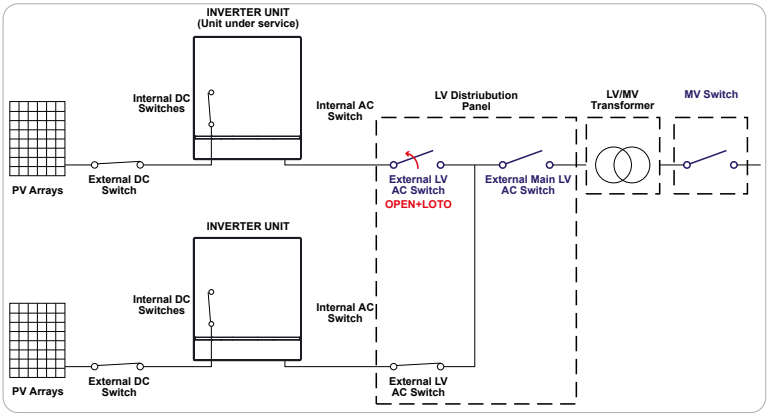
8.2.4.3 Check the absence of dangerous voltages on inverter enclosure respect ground

Check the absence of dangerous voltage on the inverter chassis. The measurement point are between inverter chassis not-painted part and the Protective earth (PE) external connection point **(04)** 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).

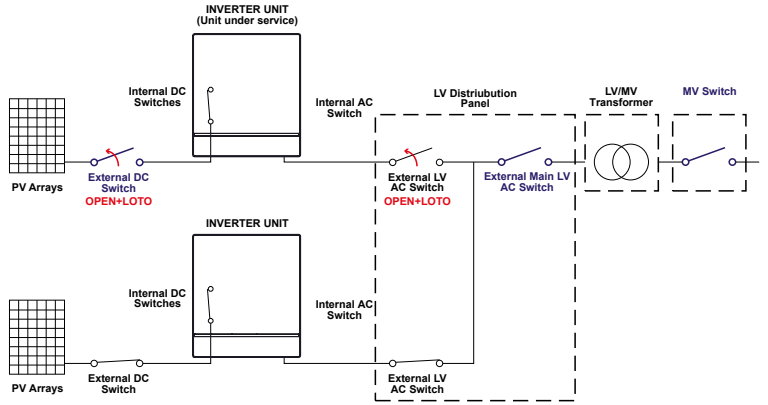
NOTE – Identification of the external switch may require the cooperation of the plant manager and it must be included in the switching plan defined during the preparation of the work.

- Check on the Synoptic **(03)** the shutdown command has been carried out (Missing Grid status):
  - Power Icon (Green): Flashing
  - Alarm Icon (Yellow): ON (solid)
  - GFI Icon (Red): OFF
  - WLAN/LAN Icon (Blue): Depends by the communication status.

8.2.4.5 Operations on External DC switches (if present)

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).

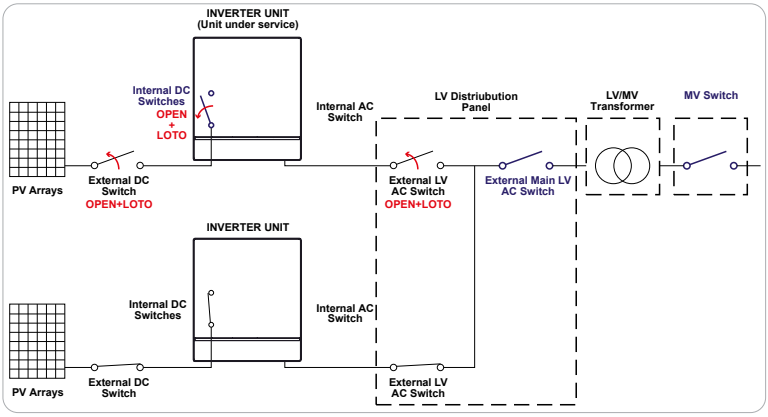
NOTE – Identification of the external switch may require the cooperation of the plant manager and it must be included in the switching plan defined during the preparation of the work.

- Check on the Synoptic **(03)** the shutdown command has been carried out (Missing DC voltage status): All icons 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 DC disconnect switches (15)

• Open the internal DC switches **(07)**.

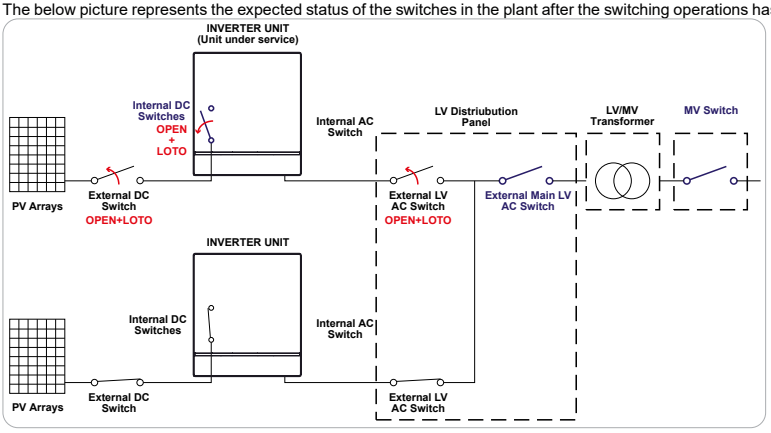


• Affix designated lock preventing operation onto all DC disconnect switches **(15)**, affixing designated tags (LOTO procedure).

• Check on the Synoptic **(03)** 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 LED icons may require some minutes (see **"Regulatory and identification Label"** on the inverter).

The below picture represents the expected status of the switches in the plant after the switching operations has been completed.



8.2.4.7 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.

8.2.4.8 DC quick fit connectors disconnection

• Check with the current probe the absence of current on the string cables.

• Remove all quick fit DC connector (PV Connector) from the Inverter using the proper tool. In order to avoid mechanical interferences, use a cable tie to collect the disconnected cables.

NOTE – It is highly recommended to put labels on the cables in order to easily reconnect them to the correct connectors once completed the service activities.

8.2.4.9 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	
Wait the discharge of the internal capacitor	
ISSUE WORK PERMIT	
Issue work permit and “Walk the permit” – Check list filling	
ONLY if all checks are POSITIVE (√) the ACCESS IS ALLOWED	

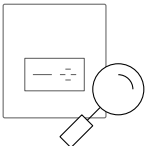
1. Identification of the external switch may require the cooperation of the plant manager and it must be included in the switching plan defined during the preparation of the work.

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.

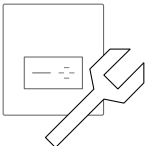
Routine maintenance

Annual visual inspections



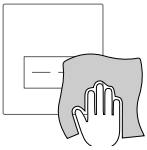
- Check that the inverter is operating properly, without any alarm signals.
- Ensure all labels and safety symbols are visible.
- Check the integrity of the cables, connectors and cable glands outside the inverter.
- Check that the environmental conditions have not changed dramatically from those on 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.
- 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.

Annual cleaning



- Clean the equipment; in particular, clean the side and top 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. In this case maintenance operations shall be performed only by FIMER personnel (or qualified personnel under a servicing contract). The maintenance schedule may vary depending on the environmental conditions of the installation.

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

ATTENTION – The replacement schedule may vary depending on the environmental conditions of the installation (e.g. high dust environment).

NOTE – Refer to this chapter to know how to replace each listed component.

8.4 Troubleshooting

⚠ **ATTENTION –** Operations on the inverter to identify and address any faults may only be performed by the installer or by qualified personnel.

8.4.1 Inverter troubleshooting

The events that could occur are classified by severity as follows:

- **Alarm**
  Alarm or “supervised alarm” is an event causing stop of product operation (i.e. disconnection of the power converter from electrical grid). Only one alarm condition can be pending at a time.

- **Alert**
  Alert is an event not causing stop of product operation but actually signaling an abnormal and potentially harmful condition (e.g. fault on auxiliary device like cooling fan). Multiple alert conditions can be pending at a time.

- **Info**
  Info is an event not associated to abnormal product condition but just signaling relevant status change (e.g. operating mode change for specific control). Info events could be furthermore used for helping failure analysis together with alarms/alerts.

NOTE – More details about the events can be found by accessing the Events menu of the Web UI.

8.4.2 Web User Interface and Wi-Fi communication troubleshooting

The following table gives a list of main and most common errors or problems relating to the Wi-Fi communication between inverter and user devices.

Problem	Possible causes	Solution
The Web User Interface cannot be accessed.	ADMIN 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 Wi-Fi network but is unable to connect to it.	The signal between the inverter and the Wi-Fi router to which the board wants to connect is too weak.	Modify the position of the Wi-Fi antenna, the inverter or the router.
		Make sure that the inverter has not been installed near obstacles which could affect the communication with the Wi-Fi 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 Wi-Fi signal repeater in order to extend the network to which the inverter is to be connected; then connect the inverter to the repeater.
	The Wi-Fi 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 Wi-Fi network or a hotel).	Unfortunately the inverter cannot be connected to these types of Wi-Fi networks. Connect the inverter to an alternative Wi-Fi network.
The Inverter has not identified the Wi-Fi network to which connection is required.	The Wi-Fi 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 Wi-Fi network to which the inverter is to be connected (visible network), then identify and connect the Inverter to the Wi-Fi network as normal.
	The signal between the inverter and the Wi-Fi router to which the board wants to connect is too weak.	Modify the position of the Wi-Fi antenna, the inverter or the router.
		Make sure that the inverter has not been installed near obstacles which could affect the communication with the Wi-Fi 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 Wi-Fi signal repeater in order to extend the network to which the inverter is to be connected; then connect the inverter to the repeater.

Problem	Possible causes	Solution
The Wi-Fi 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 Wi-Fi board of the inverter could be damaged.	Request a service intervention to check that the inverter Wi-Fi 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 Wi-Fi 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 Wi-Fi 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.
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 Wi-Fi 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 Wi-Fi router to which the inverter is connected.	Access the Web User Interface using via “AP Mode” (refer to **“Connection in “AP Mode””** paragraph to know how to connect via “AP Mode”) and read the current IP Address in “CONNECTIVITY > Wi-Fi” 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://FIMER-YYWWSSSSS.local (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 Wi-Fi router web server to which the inverter is connected and read the new dynamic IP address assigned to the Inverter.
	The Wi-Fi router doesn’t allow the connection to local IP address. Tipically this happen on company networks.	Contact the network administrator to allow the Wi-Fi 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 Wi-Fi 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”.

8.5 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).

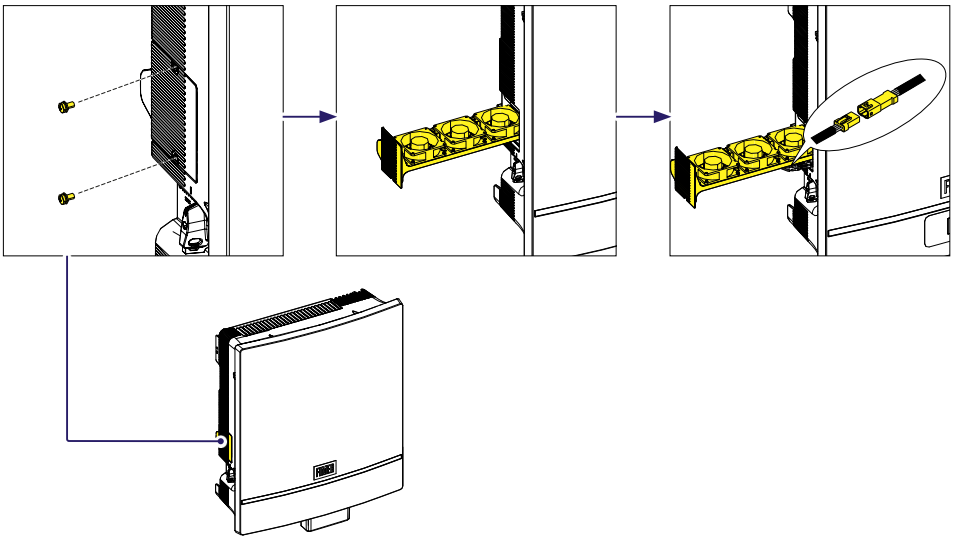
8.5.1 Replacing of the sides fan section

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 model).

⚠ **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.
- 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 inverter are applied labels that indicates the fans number.
- Place the new fan section following the previous steps in reverse way.
- Screw the 2 fastening screws previosly removed.

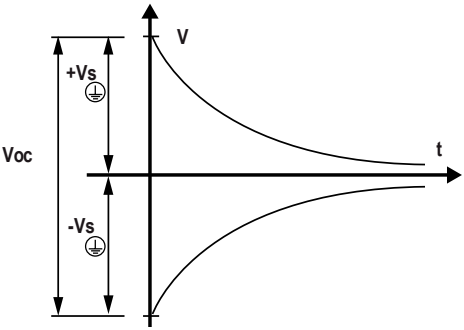
8.6 Verification of ground leakage

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.

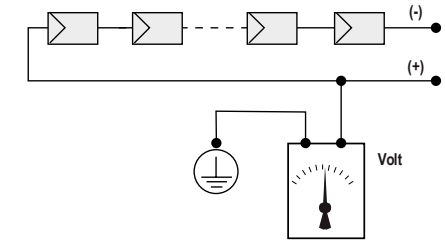
8.6.1 Behaviour of a system without leakage

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.

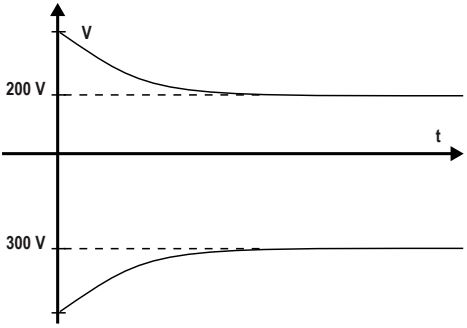
How to make the measurement:



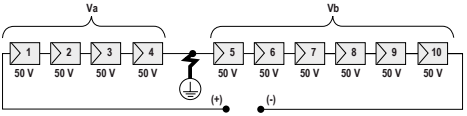
8.6.2 Behaviour of a system with leakage

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.



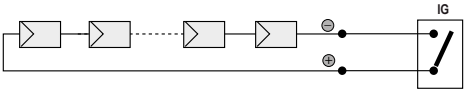
Va = voltage measured between + pole and ⏚ = 200V
Vb = voltage measured between - pole and ⏚ = 300V
In all measurements with ⏚, the ground of the inverter is indicated.

8.7 Measuring the isolation resistance of the PV generator

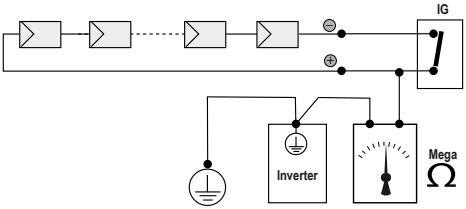
⚠ **WARNING –** The operator must always use the personal protective equipment (PPE) required by the laws of the country of destination and whatever is provided by their employer.

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 50kΩ, 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.

8.8 Storage and dismantling

8.8.1 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.

8.8.2 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

8.8.3 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"** paragraph on this manual to know all the necessary step to safely operate on the inverter.

⚠ **ATTENTION –** Never open the lower connection box 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.

To dismantling and disassemble the inverter **(01)** follow these steps:
- Isolate the equiment referring to the "Inverter total de-energization" paragraph.
- Disconnect any external voltage sources
- Lift and remove the inverter 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 **(05)** follow the indications for the mounting procedure in the "Bracket installation" paragraph in the reverse order.

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)
In	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
platform.auroravision.net auroravision.net static.auroravision.net	Data, configuration	TCP:443	FIMER
apt.fatspaniel.net	VSN700 Logger fw update	TCP:443	FIMER
update.auroravision.net	Inverter firmware update	TCP:443 (https)	FIMER
151.22.100.235	Inverter legacy fw 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 MA Solar Italy
representative or visit:

fimer.com

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