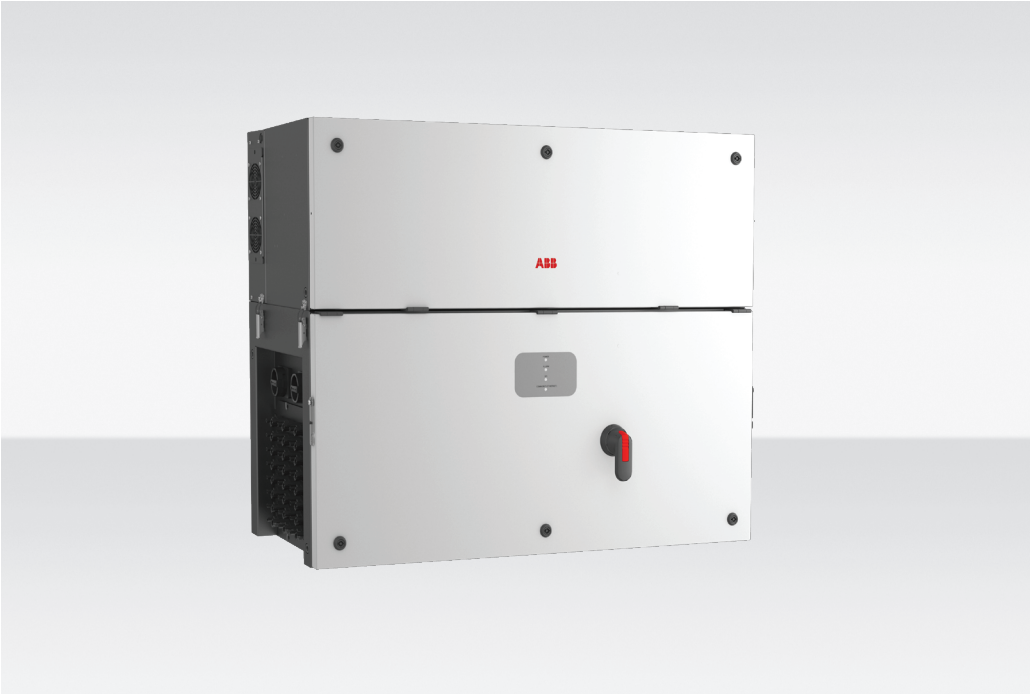
SOLAR INVERTERS

Quick Installation Guide

PVS-100/120-TL (100 to 120 kW, “B version”)



B **This document is valid for "B" product models. To identify the version of the product see the " Labels and Symbols" paragraph (page 5)**

In addition to what is explained below, the safety and installation information provided in the installation manual must be read and followed. The technical documentation and the interface and management software for the product are available at the website.
The device must be used in the manner described in the manual. If this is not the case the safety devices guaranteed by the inverter might be ineffective.

All pictures and illustrations shown in this document 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 ABB website.

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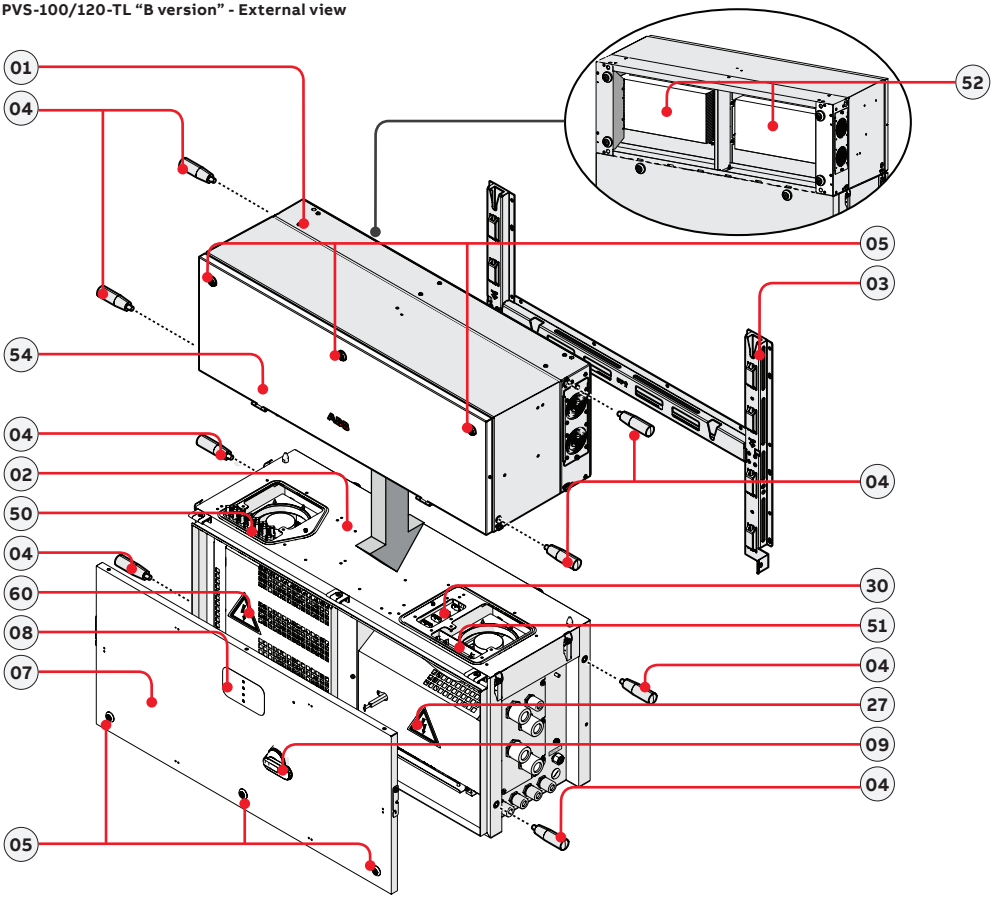
Reference number index

01	Power module	**19**	Positive string fuses plate	**41**	USB connector
02	Wiring box	**20**	Negative string fuses plate (-SX2, -SY2 only)	**42**	SD card slot
03	Mounting bracket	**21**	AC connection busbar	**43**	CR2032 coin battery
04	Handles	**22**	AC overvoltage surge arresters	**50**	DC interface connectors
05	Cover quarter cam locks	**25**	Protective earth point (int.)	**51**	AC interface cables
06	Side latch	**27**	AC protective shield	**52**	Removable rear panels
07	Wiring box front cover	**28**	Communication board	**53**	DC overvoltage surge arresters (board)
08	LEDs panel	**30**	Interface signal connectors	**54**	Power module front cover
09	AC disconnect switch (-SX2, -SY2 only)	**33**	Multifunction relay connector (ALARM)	**55**	Fan tray
10	Protective earth point (ext.)	**34**	RS-485 120Ohm resistance switch (service only)	**56**	Multi-core AC panel (opt.)
11	Single-core AC panel (default)	**35**	RS-485 120Ohm resistance switch	**57**	RS-485&Rem.ON/OFF connector (Service only)
12	Service cable glands	**36**	RS-485 connector (RJ45) (Service only)	**58**	AC interconnection board
13	Rear pins for bracket assembly	**37**	Remote ON/OFF terminal block	**59**	DC interconnection board
14	Cover support brackets	**38**	RS-485 line terminal block	**60**	DC protective shield
15	DC disconnect switches	**39**	Ethernet connector 2 (RJ45)	**61**	Anti-condensation valve
16	DC input quick fit connectors	**40**	Ethernet connector 1 (RJ45)		

PVS-100/120-TL “B version” - External view



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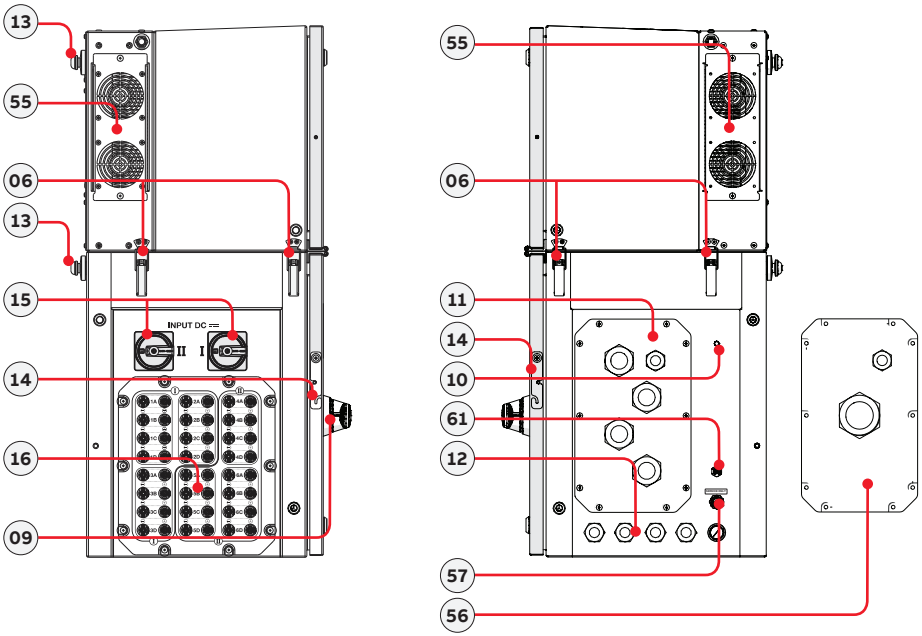
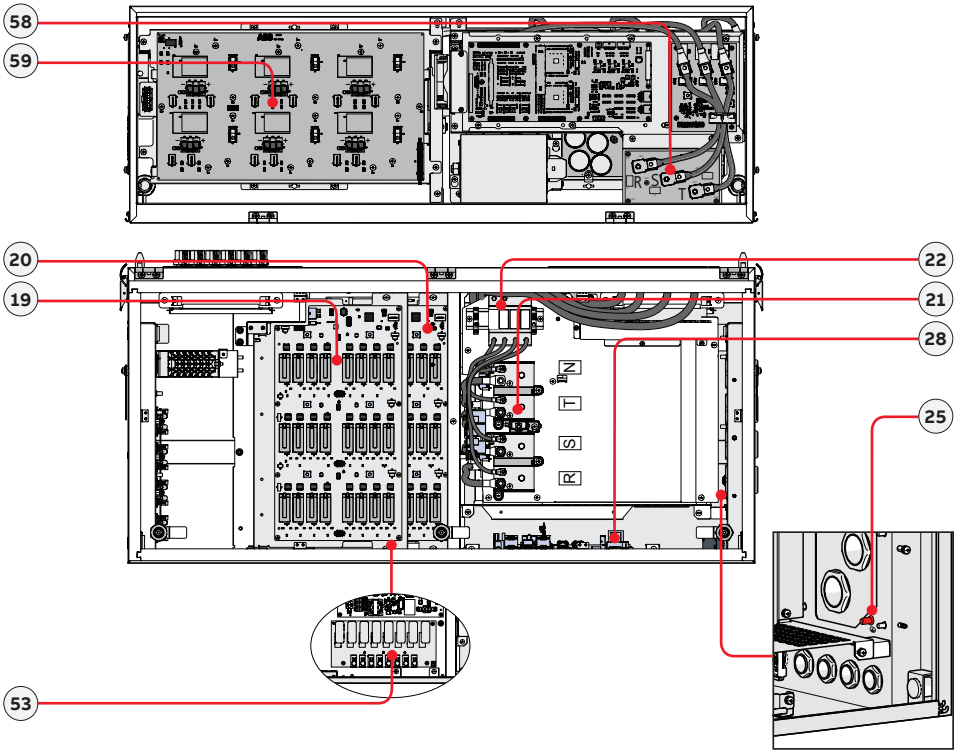
PVS-100/120-TL "B version" - External sedes view



PVS-100/120-TL "B version" - Internal view



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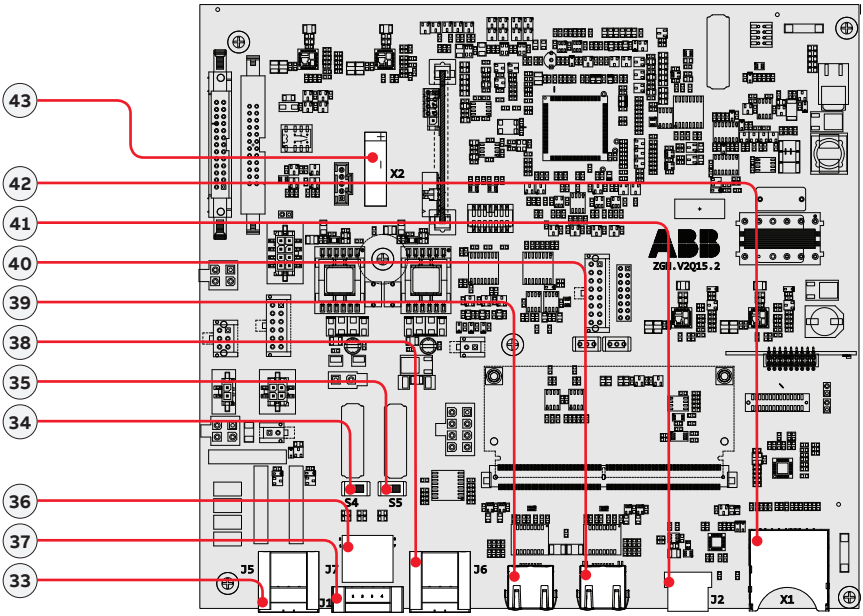
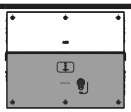
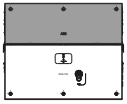
PVS-100/120-TL "B version" - Communication board (28)



Models and range of equipment

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 outside the inverter and possible integration with an existing system.

"Wiring box" Model Number 	**Description**
WB-SX-PVS-100-TL WB-SX-PVS-120-TL	Input with 24 quick fit connectors pairs + String fuses (positive pole) + DC disconnect switches + AC and DC overvoltage surge arresters (Type II) + MPPT level input current monitoring (6 ch.)
WB-SX2-PVS-100-TL WB-SX2-PVS-120-TL	Input with 24 quick fit connectors pairs + String fuses (both positive and negative pole) + DC disconnect switches + AC disconnect switch + AC and DC overvoltage surge arresters (Type II) + individual string monitoring (24 ch.)
WB-SY-PVS-100-TL WB-SY-PVS-120-TL	Input with 24 quick fit connectors pairs + String fuses (positive pole) + DC disconnect switches + AC and DC overvoltage surge arresters with replaceable cartridges (Type I+II for AC and Type I+II for DC) replaceable cartridges + MPPT level input current monitoring (6 ch.)
WB-SY2-PVS-100-TL WB-SY2-PVS-120-TL	Input with 24 quick fit connectors pairs + String fuses (both positive and negative pole) + DC disconnect switches + AC disconnect switch + AC and DC overvoltage surge arresters with replaceable cartridges (Type I+II for AC and Type I+II for DC) + individual string monitoring (24 ch.)

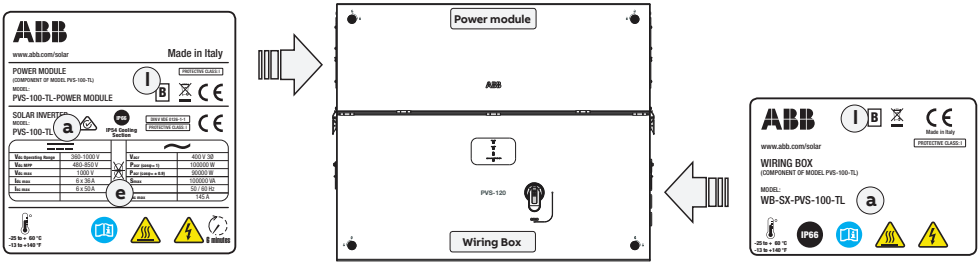
"Power module" Model Number 	**Description**
PVS-100-TL-POWER MODULE	Inverter section / power module with 100kW output power at 400Vac
PVS-120-TL-POWER MODULE	Inverter section / power module with 120kW output power at 480Vac

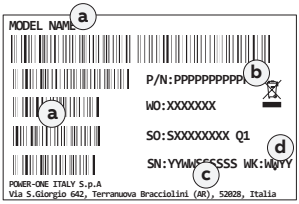
"Bracket" Model Number 	**Description**
PVS-100/120-TL-BRACKET	Bracket allowing both vertical and horizontal installation.

Labels and Symbols

The labels on the power module and on the wiring box have the Agency marking, main technical data and identification of the equipment and manufacture

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



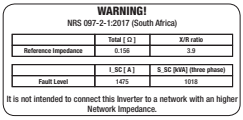


a	Power module/wiring box model
b	Power module/wiring box Part Number
c	Power module/wiring box Serial Number
d	Week/Year of manufacture
e	Main technical data
l	"B version" identification B

Communication Identification label:

The Communication Identification label (applied on the wiring box) is divided in two separate parts by a dashed line; take the bottom part and apply it on the plant documentation. (ABB recommend to create a plant map and apply the Communication Identification label on it).

f	WLAN embedded board Serial Number
g	WLAN embedded board Part Number
h	MAC address: - To be used to obtain the SSID of the wireless access point created by the inverter: ABB-XX-XX-XX-XX-XX-XX(where "X" is a hex digit of the MAC address). - To be used to obtain the "Host Name": http://ABB-XX-XX-XX-XX-XX-XX.local (where "X" is a hex digit of the MAC address). - MAC address is the only required information to register the inverter with Aurora Vision.
i	Product Key: to be used as wireless access point password, or to be used to access to the Web UI as username and password in case of lost credentials, and to commission inverter using ABB Installer for Solar Inverters.



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

The labels attached to the equipment must NOT be removed, damaged, dirtied, hidden,etc...
If the Admin Plus password is requested, the field to be used is the power module serial number -SN: YYWWSSSSSS-

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

	Always refer to instruction manual		General warning - Important safety information		Hazardous voltage
IP 66	Protection rating of equipment		Temperature range		Without isolation transformer
+ −	Positive pole and negative pole of the input voltage (DC)		Always use safety clothing and/ or personal safety devices		Point of connection for grounding protection
	Direct and alternating currents, respectively		Hot surfaces		Time need to discharge stored energy

Lifting and transport

Transport and handling

Transportation of the equipment, especially by road, must be carried out using appropriate vehicles and methods to protect the components (particularly electronic components) from violent shocks, humidity, vibration, etc.

Unpacking and checking

The components of the packaging must be disposed on in accordance with the regulations in force in the country of installation. When you open the package, check that the equipment is undamaged and make sure all the components are present. If you find any defects or damage, stop unpacking and consult the carrier, and also promptly inform the Service ABB.

Equipment weight

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

Lifting

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

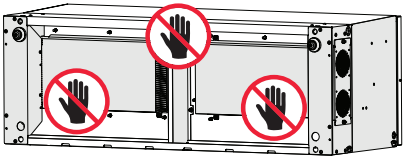
ABB usually stores and protects individual components by suitable means to make their transport and subsequent handling easier. Nonetheless, as a rule, it is necessary to turn to the experience of specialised staff to take charge of loading and unloading components. The power module and the wiring box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

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

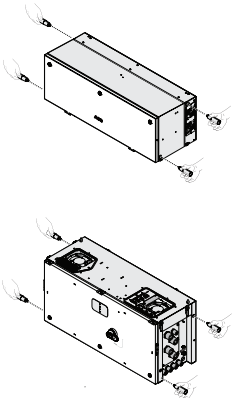
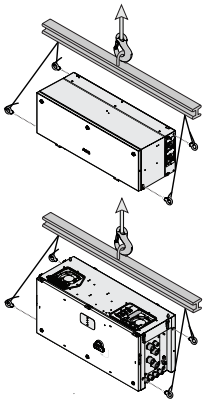
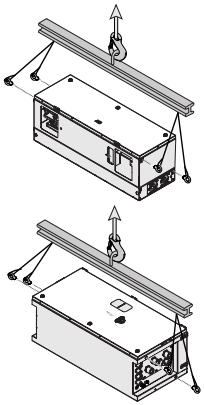
The handles **(04)** must be mounted into the designated holes located on the enclosures.
If lifting with ropes, M8 eyebolts can be mounted in the same holes.

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

DO NOT grab the equipment from the rear flange!
Risk of injury due to cutting surfaces and risk of equipment damange. Always use proper lifting equipment!



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

Manual lifting (handles)	Vertical lifting (eyebolts and lifting balancer)	Horizontal lifting (eyebolts and lifting balancer)
		
M8. Kit of handles **(04)** (to be ordered)	M8. Hole for Eyebolts UNI2947 (not supplied) *lifting balancer must be 20 cm longer (per side) than the lifted device.	M8. Hole for Eyebolts UNI2947 (not supplied) *lifting balancer must be 20 cm longer (per side) than the lifted device.

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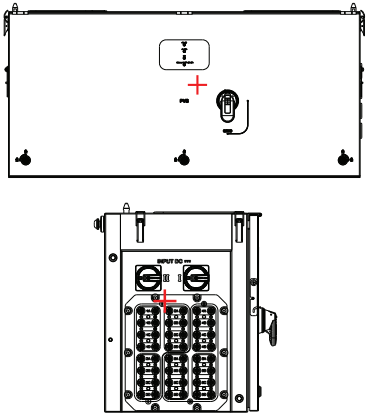
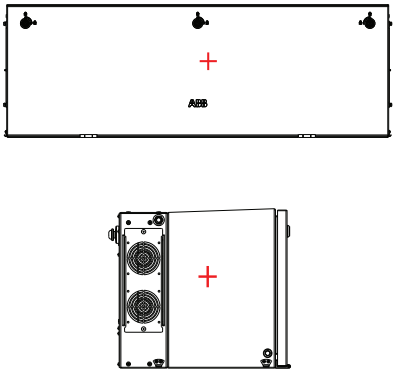
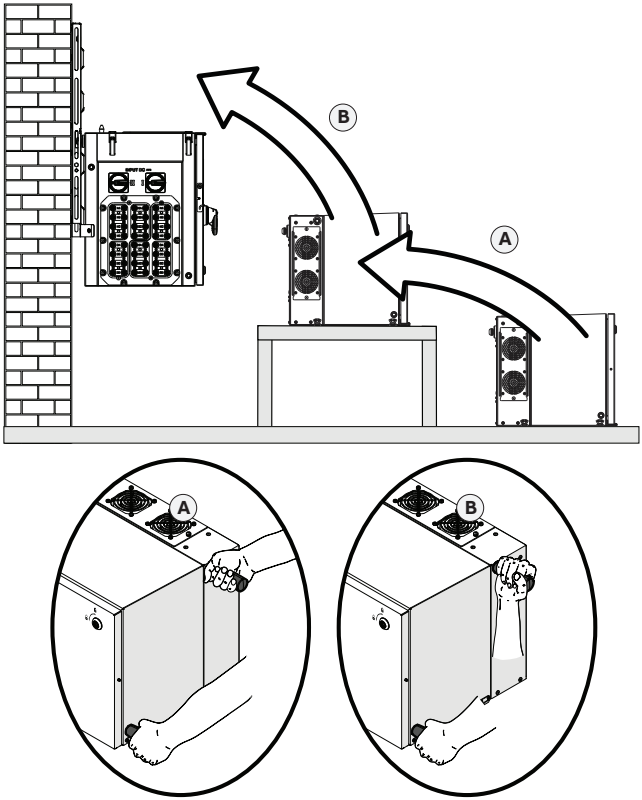
Always consider the center of gravity of the enclosures while lifting.

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

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



List of supplied components

Available components for wiring box (02)	Quantity
 Multifunction relay, aux relay and RS-485 connector (pre-installed on communication board **(28)**)	4
 Remote ON/OFF connector (pre-installed on communication board **(28)**)	1
 Two-hole gasket for M25 signal cable glands **(12)** and cap	1 + 1
 Fuse holder for positive string fuses **(19)**	24
 Positive string fuses **(19)** (gPV - 1000Vdc - 15A)	24
 South africa network standard label	1
 Key tool for front cover quarter cam-lock	1
 Technical documentation	-

Available components for power module (01)	Quantity
 Coupling screw between wiring box and power module	2
 M16 screws with washer to clamp internal AC cables on AC interconnection board **(58)**	3
 M5 hex nuts + M5 serrated lock washers to clamp internal earth cable to the power module	1 + 2
 Technical documentation	-

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

Choice of installation location

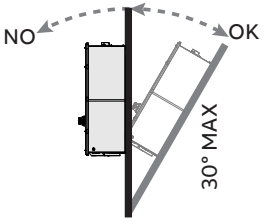
General recommendation on installation position

- See characteristics and 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.
- Never open the inverter in the case of rain (even light rain), snow or a level of humidity >95%. Always carefully seal all unused openings. In case of opening when the unit is wet, avoid any water infiltration inside the unit, either in WB or PM.
- All installations over 6500' (2,000 meters) must be assessed by ABB Technical Sales to determine the proper datasheet derating.

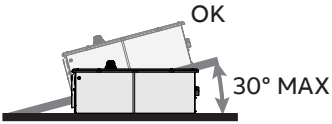
Tilting admittance

- The installation can be carried out vertically or horizontally, with a maximum inclination as indicated in the figures.

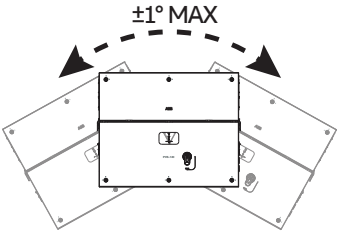
Vertical Tilting



Horizontal tilting



Side Tilting



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

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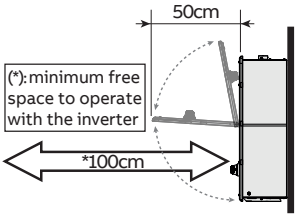
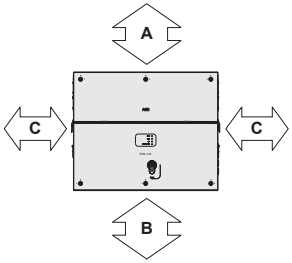
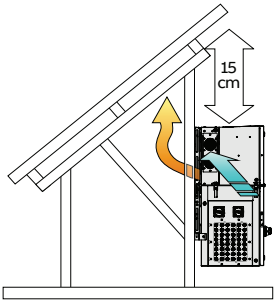
Distances

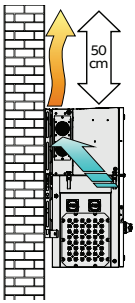
- Hardware and software maintenance on device entails opening the front cover. Check that the correct installation safety distances are observed in order to allow routine check and maintenance operations.
- Provide sufficient working space in front of the inverter that allows to open the front covers and to make the internal connections.
- Install at a height which takes into consideration the weight of the appliance and in a position which is suitable for servicing, unless suitable means are provided to carry out the operation.
- If possible, install at eye-level so that the status LEDS **(08)** can be seen easily.



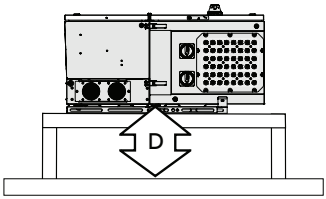
- Respect the minimum distances from objects around the inverter that could prevent the inverter installation and restrict or block the air flow.
  The minimum clearance distances depends from multiple factor:
  Ventilation flow on the rear side of the inverter. Depending of the support where the inverter is installed it changes the upper (A) required free space: if the inverter is installed on a support without any openings (e.g. a wall), the heat flow will be entirely directed to the top of the inverter; for this reason the upper (A) minimum required free space must be 50 cm.
  Otherwise in case of the inverter is installed on a support with openings (e.g. frame installation) the heat can freely flow on the rear side of the inverter; so the upper (A) minimum required free space can be reduced to 15 cm.



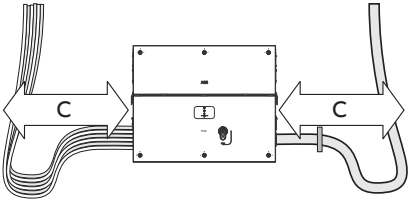




- Possible flooding or grass cutting evenience. It changes the bottom (B) or the rear (D - only in case of horizontal installation) required free space: If the inverter is installed in a place where there are concrete risk of flooding or grass cutting evenience, the bottom (B) or the rear (D - only in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



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



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

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 must remain available on the field for any subsequent operation.

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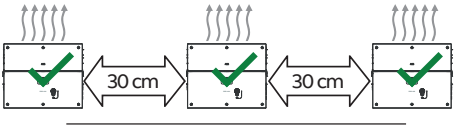
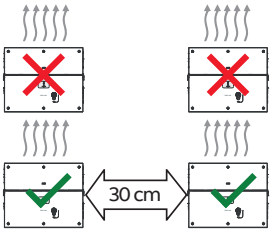
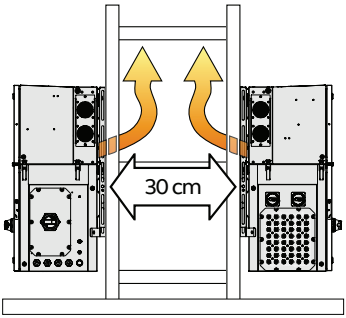
Installation of multiple units



- When installing multiple units position the inverters side by side paying attention to keep the minimum clearance distances (measured from the outer edge of the inverter) for each inverter specified in the following graph.



- The vertical installation of two inverters positioned back to back is also permitted on a structure which must be composed of a 2 or 3 frame supports (refer to “Mounting with a a support bracket” paragraph). In this case the minimum recommended distance between the units in order to avoid the use of an air deflector is 30cm.



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

Wireless signal environmental checks

The inverter can be commissioned and monitored using the wireless communication channel. The WLAN board of the inverter uses radio waves to transmit and receive data, it is therefore important to find a new position for the router considering the different materials which the radio signal will have to pass through:

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

Final installation of the inverter must not compromise access to any externally located disconnection devices.

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

Mounting Instruction

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.

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

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

Connection of the photovoltaic system to an electric installation connected to the distribution grid must be approved by the electricity provider.

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

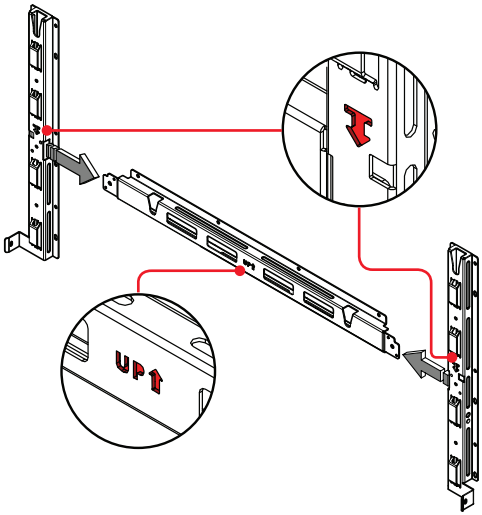
When the photovoltaic panels are exposed to sunlight they provide continuous DC voltage to the inverter.

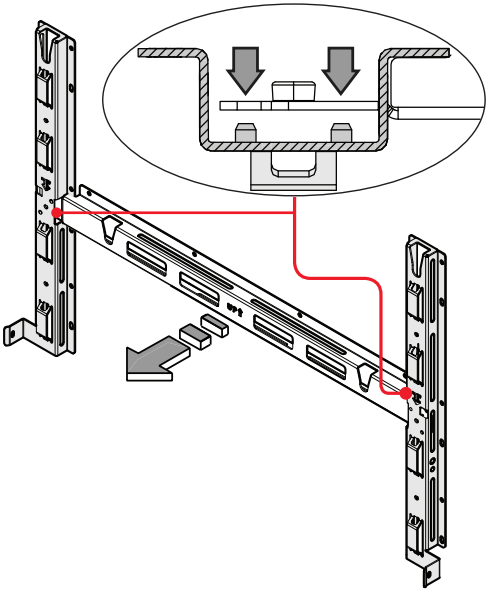
MOUNTING WITH A SUPPORT BRACKET

Independentely from the mounting on vertical supports (wall, profiles) or horizontal supports the assembly instruction are the same (the differences will be detailed on the procedure steps). The assembly instruction steps below are related to vertical mounting.

Bracket assembly:

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





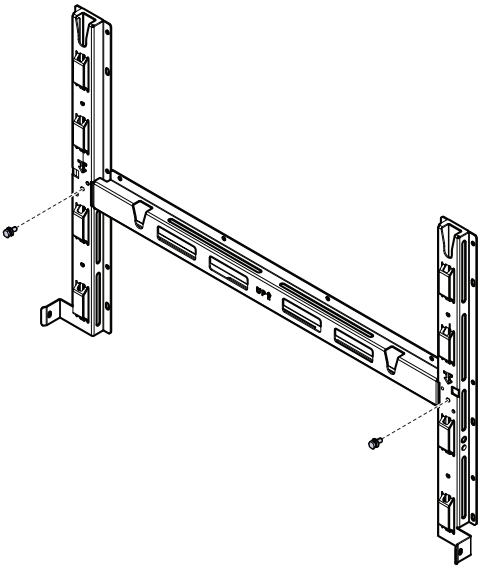
- Slide the central bracket in order to match the two holes with the centering pins of the side brackets.

(Continue to next page)

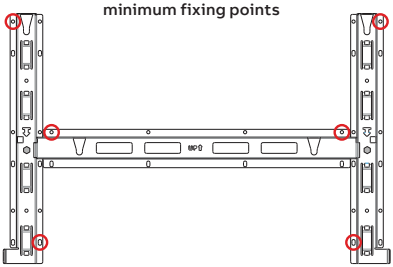
- Use the two M8 screws with flat and spring washers (supplied) to fix the pieces of the bracket together.

- Position the bracket **(03)** perfectly level on the support and use it as drilling template.

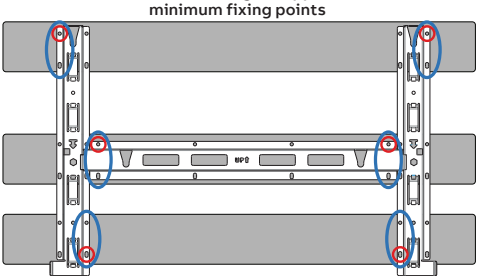
  Consider the overall dimensions of the power module and the wiring box.



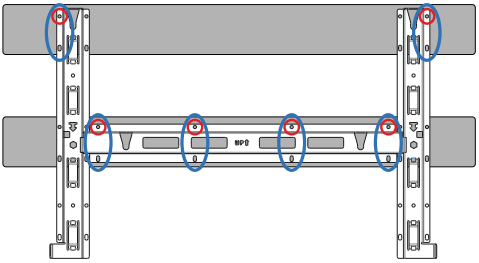
Wall/Floor mounting
minimum fixing points



Frame mounting (3 supports)
minimum fixing points



Frame mounting (2 supports)
minimum fixing points



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

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

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

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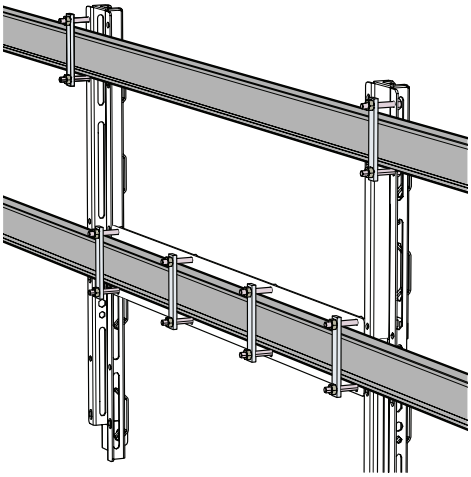
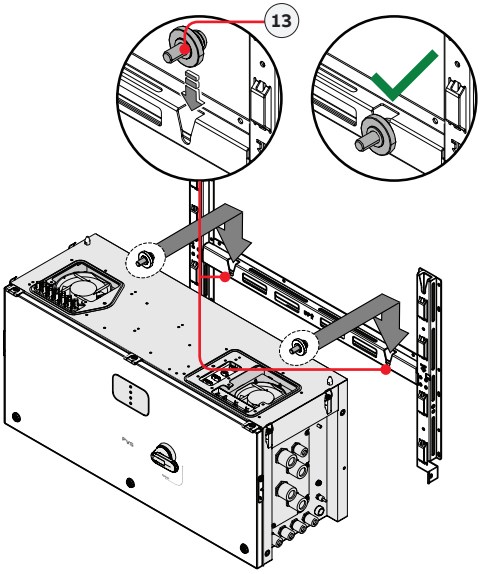
- In case of use of “frame fixing brackets” (see side picture as example) it will be possible to fix the bracket to the frame structure without drill any additional holes.



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



- Remove handle or other lifting device (if used)

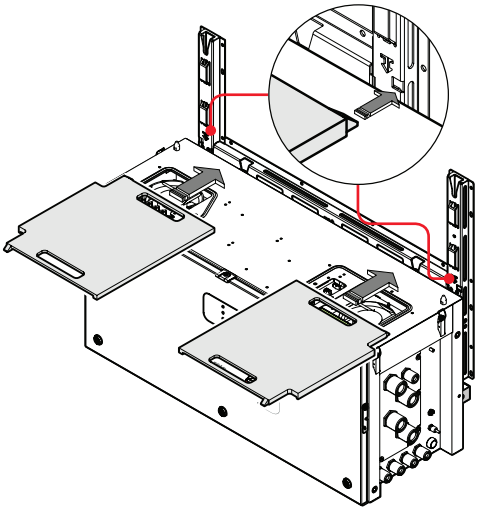
- Only for vertical mounting:
  Insert the two gasket protective covers (contained in the installation kit) and slide them till the positioning pins are into the proper bracket holes. If the mounting is correct the gasket protective cover will have a locked position.

Assembly the inverter to the bracket

- Lift the wiring box **(02)** up to the bracket using the optional handles **(04)** or another appropriate lifting device.

Risk of injury due to the heavy weight of the equipment.

- Insert the heads of the two rear attachment pins **(13)** (placed on the rear part of the wiring box) into the two slots on the bracket. Check that the pins **(13)** has been correctly inserted in the slots as shown in the picture before releasing the wiring box.



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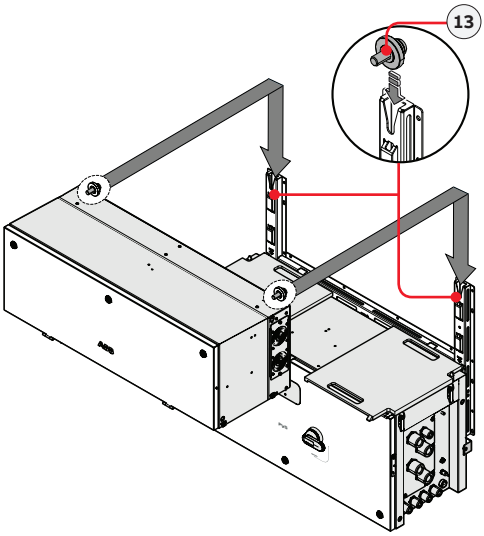
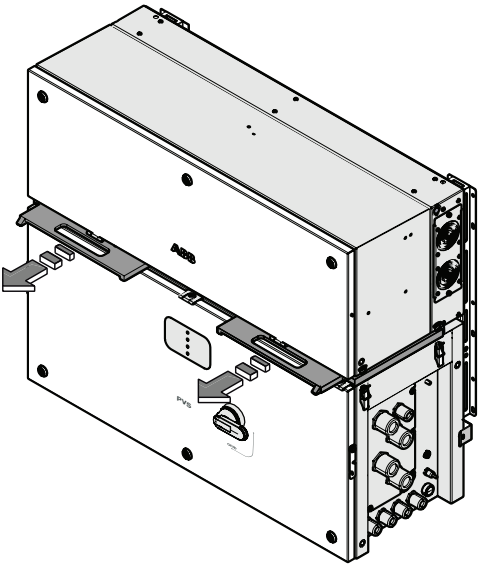
- Lift the power module **(01)** up to the bracket and over the wiring box **(02)**, using the handles **(04)** or another appropriate lifting device.

Risk of injury due to the heavy weight of the equipment.

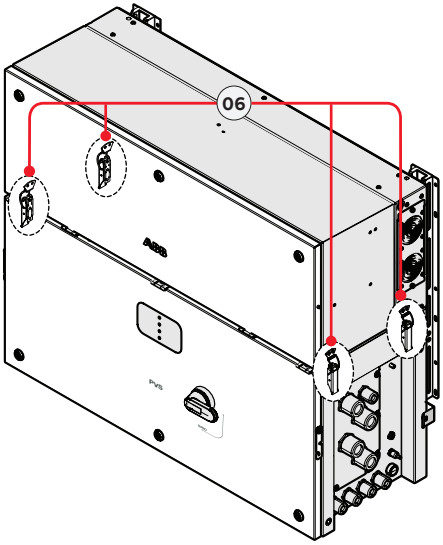
- Insert the heads of two rear attachment pins **(13)** (placed on the rear part of the power module) into the slots on the bracket. For horizontal mounting, the two markings on the bracket indicate the point where the edge of the power module have to be placed to allow the engagement of the rear attachment pins **(13)**.



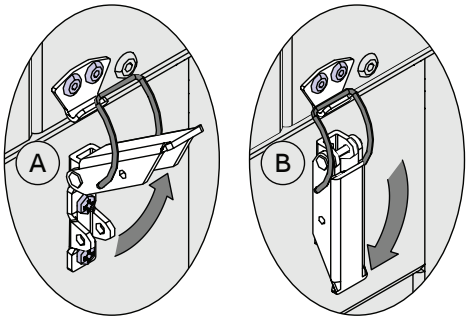


- Only for vertical mounting:
  Remove the previously installed gasket protective covers from the inverter by sliding it pulling from the handles.

Gasket protective covers and handles can be reused for a new installation



- Fasten all of the four side latches **(06)** as shown in the pictures.



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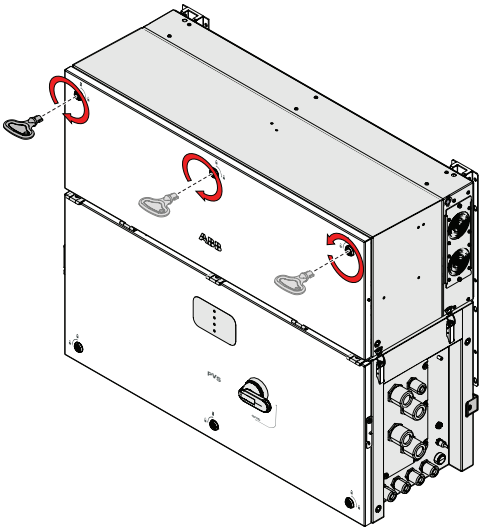
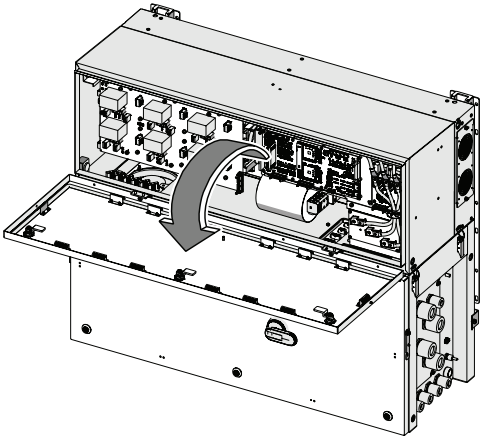


Opening the cover

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

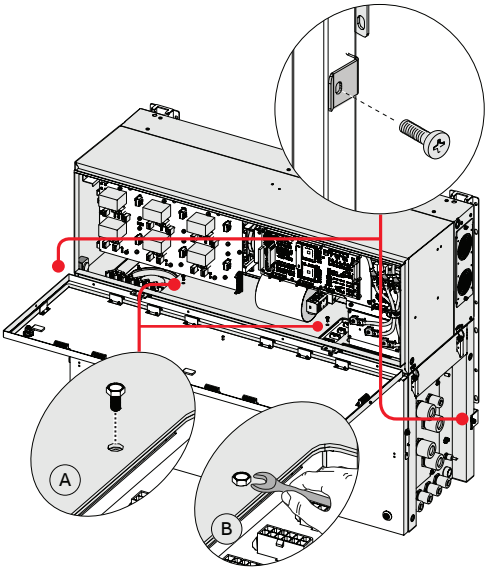


- Open the cover and use the cover support brackets **(14)** to lock the cover in open position.

Pay attention to properly secure the cover support brackets (14) in order to avoid damaging of the cover!

Final fastening operations

- To reach the two junction screws and complete the power module and the wiring box coupling, open the front panel of the power module and screw the two screws as shown in the figure
- Tighten the two hexagonal junction screws with a tightening torque of 10 Nm.
- Tighten the two side screws (supplied) with a tightening torque of 5 Nm, to avoid the tilting of the bottom part of the inverter.



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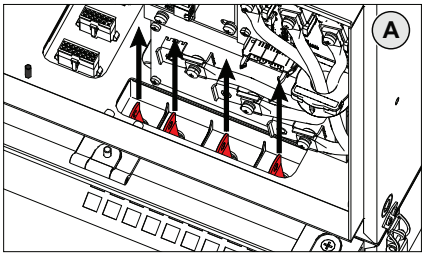
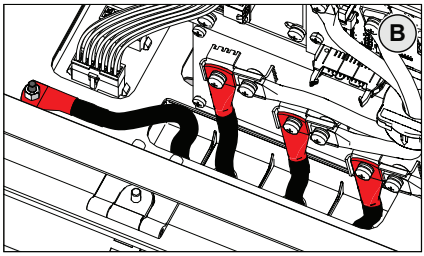
Interface connectors connection

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

Connection of the AC interface cables:

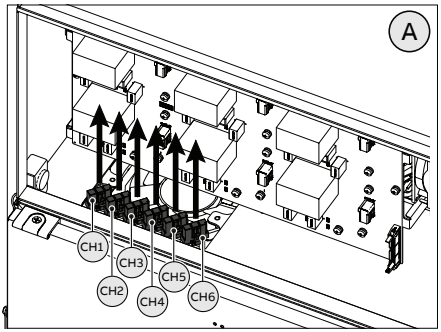
- Connect the R, S, T cables coming from the wiring box to the respective anchor points R, S, T in the AC interconnection board **(58)** using the screws supplied with the power module component kit (tightening torque 4Nm).
- Connect the earth cable to the dedicated point next to the AC interconnection board **(58)** (see the picture) using the M5 nut and the two serrated lock washers supplied with the power module component kit (tightening torque 2Nm).

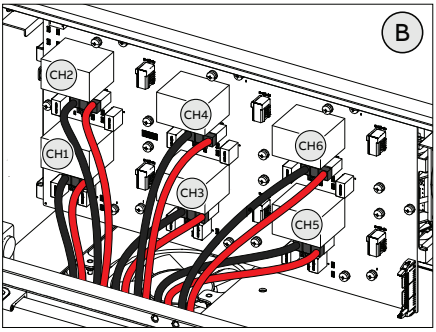




Connection of the DC interface cables:

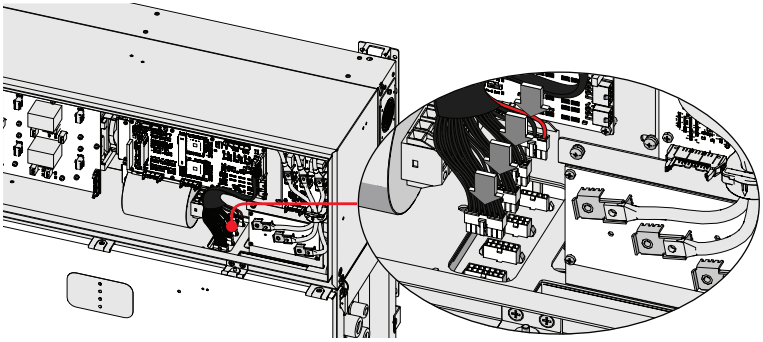
- Connect the 6 connectors coming from the wiring box in the dedicated connectors of the DC interconnection board **(59)**





Connection of the signal interface cables:

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



For connection to the network in South Africa.

According to NRS097-2-1 requirements, at the end of installation it is mandatory to apply the label at the left (supplied with the inverter) near the power module regulatory label.

WARNING!

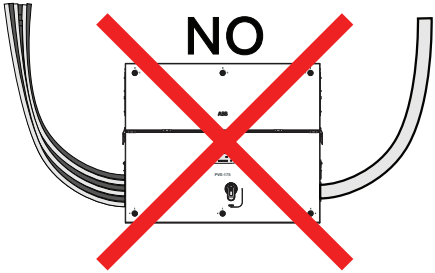
NRS 097-2-1:2017 (South Africa)

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

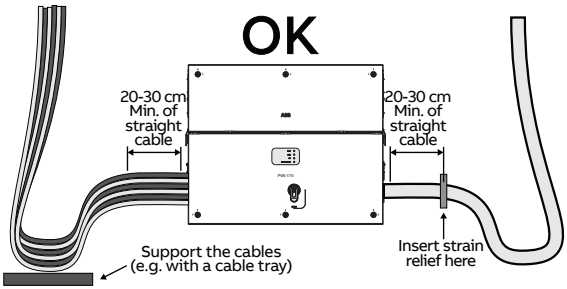
	I_SC [A]	S_SC [kVA] (three phase)
Fault Level	1475	1018

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

Routing the cables to the inverter

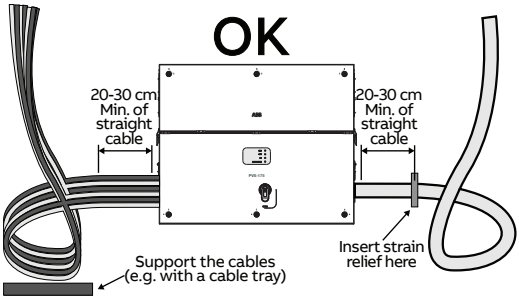


The cable routing have to be done in order to avoid water dripping to the AC panel cable glands **(11)**, DC input quick fit connectors **(16)** or to service cable glands **(12)**.

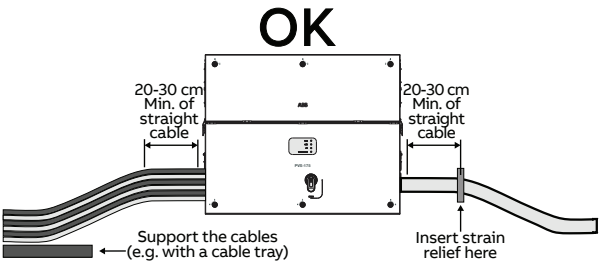


Expecially when coming from the top, the cables must be routed in order to create a loop: in this way the water that flows on the cables will be drained.

The AC and DC conductors must be anchored or supported in order to prevent loading and mechanical stress on the cable glands and quick fit connectors causing potential damage on the AC and the DC plates.



The side pictures are showing some example of incorrect and proper cable routing.

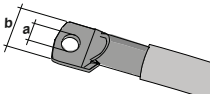


Characteristics of the protective grounding cable

ABB 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 earth fault current that the generating system might experience. **In any case the minimum cross sectional area of the protective earthing conductor must be at least 1/2 of phase conductors cross sectional area.**

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

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

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

Line cable and protection devices

Load protection breaker (AC disconnect switch) and differential protection downstream of the inverter

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

	PVS-100-TL	PVS-120-TL
Type	Automatic circuit breaker with differential thermal-magnetic protection	
Nominal Voltage /Current	400 Vac / min. 150 A (*)	480 Vac / min. 150 A (*)
Magnetic protection characteristic	Magnetic curve B/C	
Number of poles	3/4	

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

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

	PVS-100-TL	PVS-120-TL
Type	A / AC	
Sensitivity	1.0 A	1.2 A

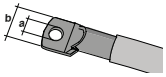
ABB declares that the ABB transformerless inverters, in terms of their construction, do not inject continuous earth fault currents and therefore there is no requirement that the differential protection installed downstream of the inverter be type B in accordance with IEC 60755 / A 2.

Characteristics and sizing of the line cable

Depending of the type of the AC panel it's possible to use single conductors cables or a multipolar cable:

- Single-core configuration have 4xM40 cable glands for the "N" neutral, "R", "S", "T" phases and a M25 cable gland for the earth cable.
- Multi-core configuration (optional) have a M63 cable gland for the "N" neutral, "R", "S", "T" phases and a M25 cable gland for the earth cable.

The cross-section of the AC line conductor 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 point.

	Single core cable	Multi-core cable
Cable diameter range	19 - 28 mm	37 - 53 mm
Min. conductor cross section	50 mm²	
Cable lug dimensioning 	for M10 Stud a = 10.5 mm (min) b = 40 mm (max)	

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

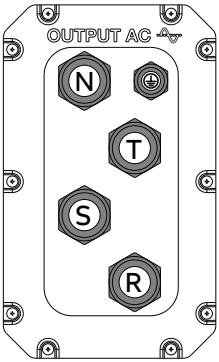
Grid output connection (AC side)

The inverter must be connected to a three-phase system with the center of the star connected to earth. To connect the inverter to the grid is possible to choose between the four-wire connection (3 phases + neutral) and the three-wire connection (3 phases).

In any case, the inverter's earth connection is mandatory.

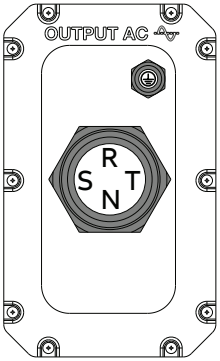
Depending of the type of the AC panel it's possible to use single conductors cables or a multipolar cable:
- Single-core configuration have 4xM40 cable glands for the "N" neutral, "R", "S", "T" phases and a M25 cable gland for the earth cable.
- Multi-core configuration (optional) have a M63 cable gland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

The connections can also be made with the wiring box **(02)** detached from the power module **(01)** which can be connected later for commissioning.



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

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



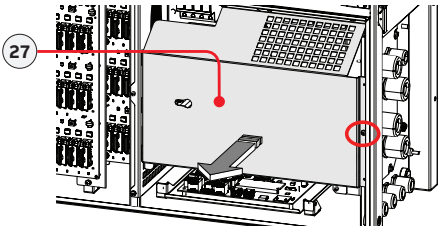
- **Multi-core configuration (optional):**

  This version of the AC panel **(11)** can be ordered separately.

FOLLOW THE PROCEDURE BELOW TO ROUTE ALL THE REQUESTED CABLES:

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.

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



- Open the wiring box front cover **(07)**.
- Remove the AC protective shield **(27)** by removing the M5 screw.

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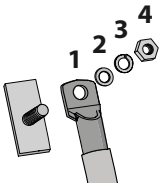
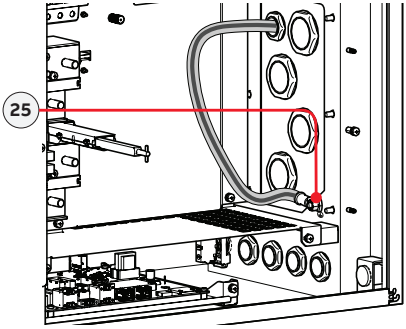
- Depending on the earth connection method (internal **(25)** or external **(10)**) follow the procedures described below:

INTERNAL EARTH CONNECTION:

- Pass the protective earth cable trought the proper cable gland on the AC panel.
- Fix the protective earth cable lug to the protection earth connection point (int.) **(25)** using the washers and bolt pre-installed on the M10 stud, as shown in the following diagram:

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

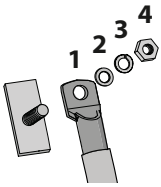


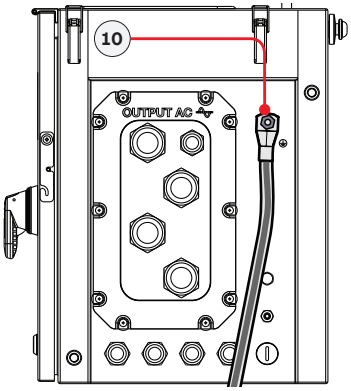


EXTERNAL EARTH CONNECTION:

- Fix the protective earth cable lug to the protection earth connection point (ext.) **(10)** using the washers and bolt pre-installed on the M8 stud, as shown in the following diagram:

1 = cable lug
2 = flat washer
3 = spring washer
4 = M8 nut





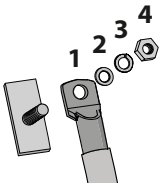
The cable lug must be installed with a minimum tightening torque of 21Nm.

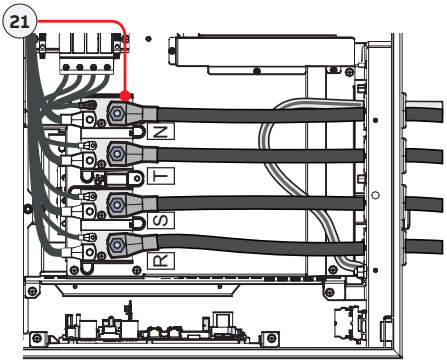
Before connecting the inverter to AC or DC sources use a suitable multimeter to test the conductivity of the earth connections between the protection earth connection point (ext.) (10) and a handles thread (04) on the housing of power module.

INTERNAL AC CONNECTION:

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

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





The minimum recommended cross section for the phases conductors is 70 mm².

The cable lugs must be installed with a tightening torque of 25Nm.

- Check the tightness of the AC cable glands at the end of the installation.

Make sure the cable glands are properly sealed to ensure to keep IP65 protection degree.

Checking the correct polarity of the strings and Input connection (DC)

Warning! The inverters to which this document relates to are WITHOUT ISOLATION TRANSFORMER (transformerless). This type involves the use of insulated photovoltaic panels (IEC61730 Class A Rating) and the need to maintain the photovoltaic generator floating with respect to earth: no pole of the generator must be connected to ground.

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

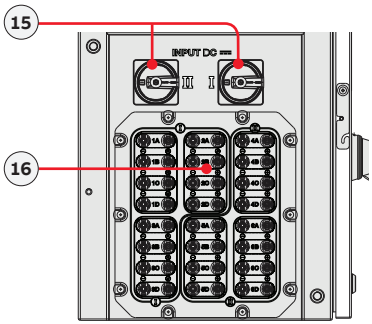
When exposed to sunlight, the PV panels supply DC direct voltage to the inverter. To avoid risks of electrical shock, all wiring operations must be carried out with the DC disconnect switches (15), any DC disconnect switches external to the inverter (if present, applying LOTO procedures on it), AC disconnect switch (09) and any AC disconnect switches external to the inverter (applying LOTO procedures on it) to OFF position.
If only the internal DC disconnect switches (15) is present, there will be live parts internal to the inverter with the conseguent risk of electrical shock. In this case these activities are only allowed by means of appropriate PPE (overall resistant to electric arc, dielectric helmet with visor, insulating gloves class 0, protective overglove in leather EN420 - EN399, safety shoes).

For the string connections it is necessary to use the quick fit connectors **(16)** (usually Weidmüller PV-Stick or WM4, MultiContact MC4 and Amphenol H4) located on the left side of the wiring box **(02)**.

Refer to the document "String inverter – Product Manual appendix" available at www.abb.com/solarinverters to know the brand and the model of the quick fit connector. Depending on the model of the connector of the own inverter, it is necessary to use the same model and the respective counterpart (check the compliant counterpart on the website of the manufacturer or in ABB)

Using corresponding 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.

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



For input connectors marked with "A" and "D" you must directly connect the individual strings coming into the inverter (do not make field switchboards for parallel strings). This is because the positive side (19) and negative side (20) string fuses, situated on each input, are not rated to take strings in parallel (array).
This operation could damage the fuses and consequently could cause malfunctioning of the inverter.
The connection in parallel of the strings (array composition) could be made upstream of the input connectors marked with "B" and/or "C" using a proper Y quick fit connector adapters: in this case the input fuses will have to be replaced with a suitable size for the paralleled strings.

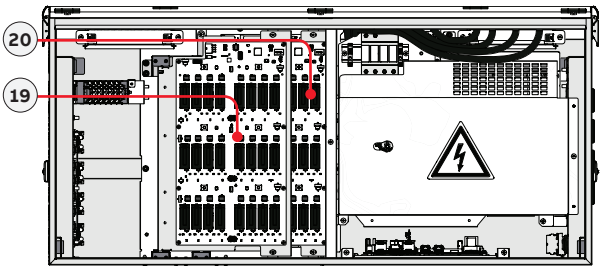
STRINGS POLARITY CHECK AND FUSES INSTALLATION

Check for correct polarity in the input strings and absence of any leakage to earth in the PV generator.
The inside of the inverter may only be accessed after the equipment has been disconnected from the grid and from the PV generator.

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.

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).
The reverse polarity can cause severe damage.

- Depending of the wiring box **(02)** version installed on the inverter there are one or two boards for the string fuses:
  - SX, SY version: contains only positive side string fuses board **(19)** and have 24 string fuses (1 for each strings) that are supplied and have to be installed.
  - SX2, SY2 version: contains both positive side string fuses board **(19)** and negative side string fuses board **(20)** that totally have 48 string fuses (2 for each strings). Fuses on the negative side string fuses board **(20)** are already fitted while the fuses on the positive side string fuses board **(19)** are supplied and have to be installed.



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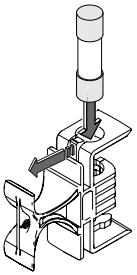
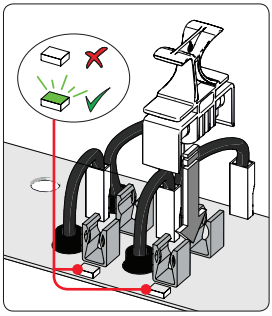


- The string fuses are installed inside special safety positioners that allow easy installation/removal, as well as providing protection from involuntary contact while the inverter is being installed. Each fuses are associated with a green LED that could be used to check the correct polarity of the strings.

PROCEDURE TO CHECK THE CORRECT POLARITY OF THE STRINGS

- Check for the absence of installed fuses on the positive side string fuses board **(19)** - if present remove it!.
- Turn the DC disconnect switches **(15)** to OFF.



- Connect the strings (refer to “Input connection to PV generator (DC side)” chapter) and check that the GREEN LED corresponding to each positive fuses activates. The string will turn out to be inverted if the green LED is OFF or, in some circumstances, faintly ON. Check the strings one by one so to safely check which strings are inverted.
- After all the input strings have been checked, remove all connected strings and check that all LEDs will switch OFF.

Warning! Pay attention to disconnect all connected input strings; otherwise high voltages will be present inside the inverter.

- Install the fuses (supplied) on the string fuses board **(19)** with the supplied fuse holders.

INPUT STRINGS CONNECTION

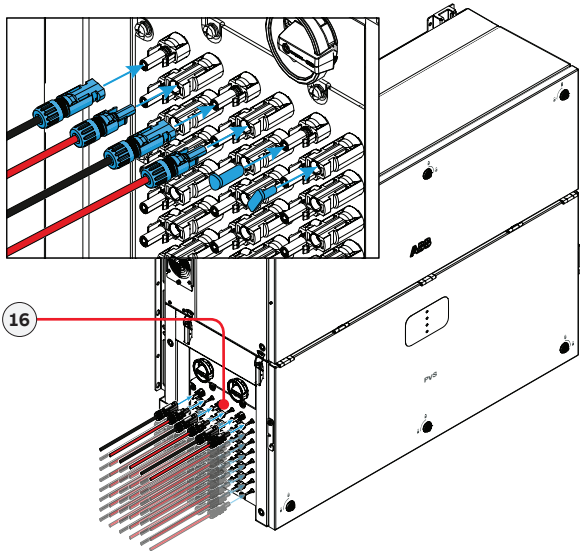
- Connect all the strings required by the system, always checking the seal of the connectors.

If any string inputs are not required, you must ensure that covers are installed to the connectors, and install any which are missing. This is necessary both for the inverter seal, and to avoid damage to the free connector which may be used at a later time.

The connections can also be made with the wiring box (02) detached from the power module (01) that can be connected later for commissioning. When working with the wiring box (02) detached, pay particular attention to:

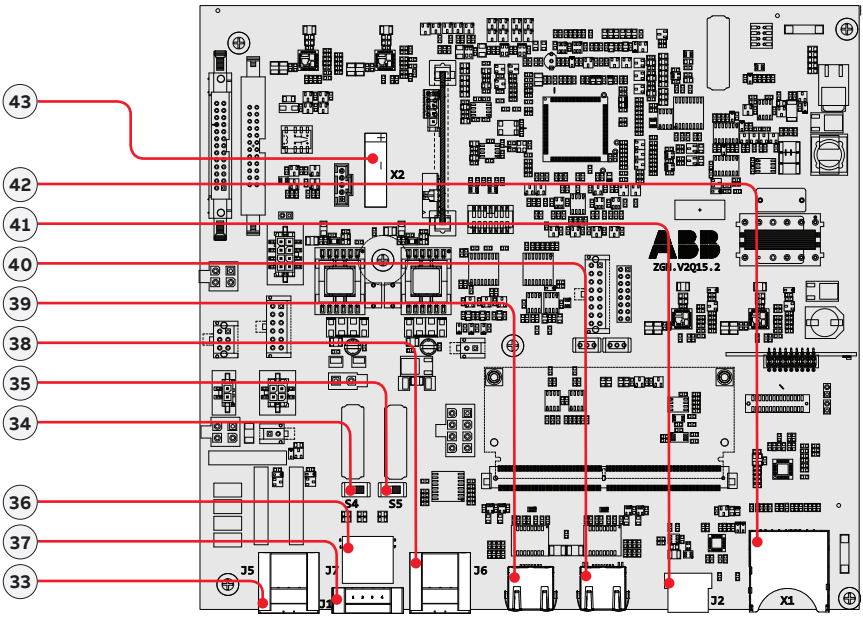
- presence of earth connection

- The top of wiring box must always be protected in outdoor installations with proper IP66 protection covers (optional accessory content in PVS Installation kit, to be ordered separately).



Connection of the communication and control signals

Communication and control board references

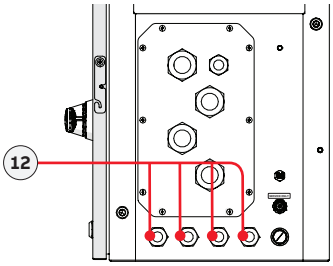


Terminal name	Terminal reference	Description of communication and control board (28)
J5	33	Multifunction relay connector (ALARM terminal block)
S4	34	RS-485 ABB service 120Ohm termination resistance switch (ABB service only)
S5	35	RS-485 line 120Ohm termination resistance switch
J7	36	RS-485 connector (RJ45) (ABB Service only) (*)
J1	37	Remote ON/OFF terminal block (*)
J6	38	RS-485 line terminal block
-	39	Ethernet connector 2 (RJ45)
-	40	Ethernet connector 1 (RJ45)
J2	41	USB connector
X1	42	SD card slot
X2	43	CR2032 Coin battery

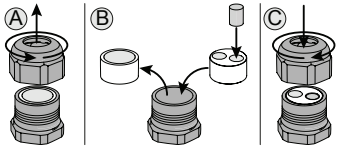
(*) The RS-485 connector (RJ45) (ABB Service only) **(36)** and the signal R1 on the Remote ON/OFF terminal block **(37)** are used to bring the signals on the external connector RS-485&Rem.ON/OFF **(57)**.

Connections to the communication and control board

The communication and control signals are connected to the communication and control board inside the DC wiring box or directly to the connectors on the external of the inverter. In particular, on the left side of the DC wiring box, there are 4xM25 cable glands **(12)** that can be used to reach the terminals / connectors on the communication and control board. Each cable gland accepts a cable (from 10 mm to 17 mm diameter).



As an alternative to each cable gland internal gasket the two-hole gasket (supplied) could be installed:
The two-hole gasket accepts two cables with a diameter of 6mm; if a seal hole is not to be used, it is necessary to install a plug (supplied plastic cylinder) to ensure the inverter's sealing.



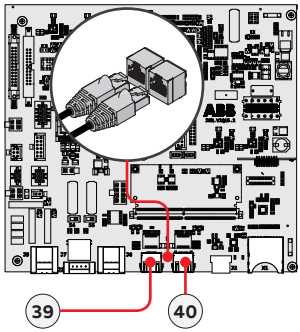
- Please ensure that all unused cable glands **(12)** are properly sealed by the IP65 plastic cap.
- Check the tightness of the signal cable glands **(12)** at the end of wiring operations.

Make sure the cable glands are properly sealed to ensure to keep IP65 protection degree.

(Continue to next page)

Ethernet connection

The ethernet connection allows a direct data transfer to the ABB server for monitoring purpose. When the inverter will be powered on, network parameters are automatically set and the inverter starts transmissing telemetry data to the Aurora Vision® CLOUD platform.



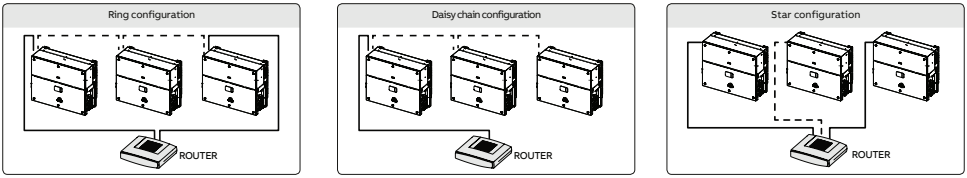
The connection of the ethernet communication cable must be made on the specific connectors **(39)(40)** located on the communication and control board **(28)**.
If the inverters of the plant need to be connected in daisy chain or ring configuration use both connectors.
The cable should be compliant to the following specification:

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

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

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

Three topologies of ethernet connection to the router are available:



The ring configuration is the preferred method to connect multiple units in order to allow reaching inverters also in case of single unit failures.
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).

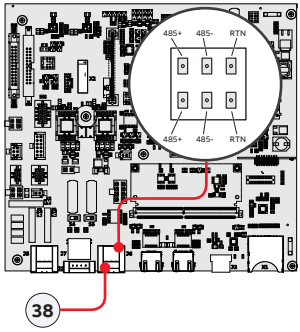
No initial setup is required to start data transmission to Aurora Vision.
Internet connection is required to use all the Aurora Vision remote functionalities.

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

Connection of RS-485 serial communication line

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

The use of the inverters over the RS-485 line is recommended in case of monitoring and controlling by using third party RS-485 control systems.



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

The RS-485 port **(38)** can either be used for connecting supported accessories (like weather station): in this case data from accessories will be logged and transferred to the cloud by inverter itself (master mode). This allow to use the inverter as logger also for ABB accessories.

For further information regarding the configuration and use of the RS-485 serial communication line, please refer to the user manual.

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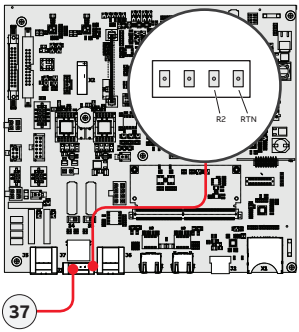
Remote control connection

The connection and disconnection of the inverter to and from the grid can be controlled through an external control.
The function must be enabled via web server user interface. If the remote control function is disabled, the switching on of the inverter is dictated by the presence of the normal parameters that allow the inverter to connect to the grid.
If the remote control function is on, besides being dictated by the presence of the normal parameters that allow the inverter to connect to the grid, switching on the inverter also depends on the state of the R2 terminal compared to the RTN terminal present on the **(37)** terminal block of the communication and control board **(28)**.
When the R2 signal is brought to the same potential as the RTN signal (i.e. by making a short circuit between the two terminals of the connector), this causes the inverter to disconnect from the grid.

Since this is a digital input, there are no requirements to be observed as regards cable cross-section (it only needs to comply with the sizing requirement for passing cables through the cable glands and the terminal connector).

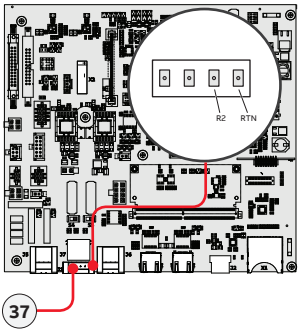
The external switch used for Remote ON/OFF should be rated for DC low voltage, low current application (the minimum switching current capability should be 1mA or lower).



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

Demand Response Mode 0 (AS/NZS 4777.2)

Where requested by the AS/NZS 4777.2 standard, it's possible to use the Remote terminal block **(38)** for the Demand Response Mode 0 (DRM0) functionality.



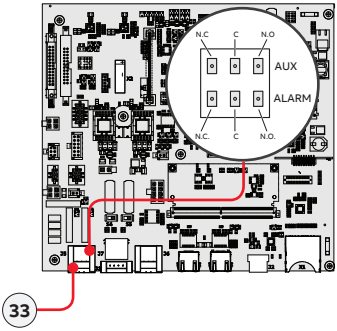
AS4777: If DRM0 support is specified, the inverter may only be used in conjunction with a the ABB DRM0 Interface.
Visit https://new.abb.com/power-converters-inverters/solar for more information on the DRM0 interface.

For further information regarding the DRM0 function refer to the AS/NZS 4777 standard.

Multifunction Relay connection (ALARM and AUX)

The inverter is equipped with 2 multifunction relays terminal blocks **(33)** with configurable activation. It can be connected with normally open contact (being connected between the NO terminal and the common contact C) and with normally closed contact (being connected between the NC terminal and the common contact C). This multifunction relays can be used in different operating configurations that can be selected by accessing the web server user interface.
Different types of devices (light, sound, etc.) can be connected to the relay, provided they comply with the following requirements:

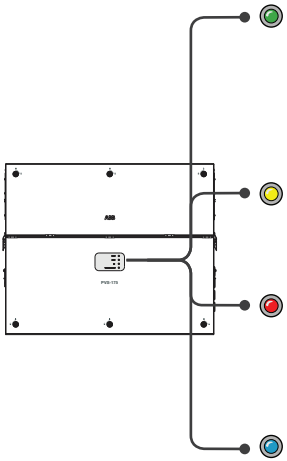
	Alarm terminal block requirements
Alternating current	Maximum Voltage: 160 Vac / Maximum Current: 6 A
Direct current	Maximum Voltage: 30 Vdc / Maximum Current: 3 A
Cable requirements	Conductor cross-section: from 0.08 to 1.3 mm^2



For further information regarding the configuration and use of the multifunction relay terminal blocks, please refer to the user manual.

Description of LED panel

Description of the LED function



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

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

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

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

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

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

LED status		Operating state
green: yellow: red:	⊗ ⊗ ⊗	**Firmware programming** The inverter firmware is being programmed (never turn off the inverter during this phase).
green: yellow: red:	○ ○ ○	**Night mode (inverter automatically switches off)** The inverter is in night time switch-off mode (input voltage less than 70% of the set start-up voltage and AC grid is missing).
green: yellow: red:	⊗ ○ ○	**Inverter initialization / Waiting Sun** This is a transitional state due to verification of the operating conditions. During this stage the inverter checks that the conditions for connecting to the grid are met.
green: yellow: red:	● ○ ○	**The inverter is connected and is feeding power into the grid** Normal operation. During this stage, the inverter automatically tracks and analyses the photovoltaic generator's maximum power point (MPP).
green: yellow: red:	⊗ ● ○	**Missing grid** Indicates lack of grid voltage. This condition does not allow the inverter to connect to the grid.
green: yellow: red:	✳ ● ○	**Warning indication: (W message codes) or Error: (E message codes)** - Indicates that the inverter control system has detected a warning (W) or error (E). It is possible to identify the type of problem generated in the dedicated section of integrated Web User Interface ("Inverter Log" section).
green: yellow: red:	○ ● ○	**Temperature protection trip** Indicates that the trip relating to internal temperatures (insufficient or excessive temperature) may have been activated.

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LED status	Operating state
green: ○ yellow: ○ red: ●	**Anomaly in the insulation system of the photovoltaic generator** Indicates that a leakage to earth from the PV generator has been detected, causing the inverter to disconnect from the grid.
green: ● yellow: ⊗ red: ○	**Ventilation anomaly** Indicates ananomaly in the operation of the internal ventilation system that could limit output power at high ambient temperatures.
	Overvoltage surge arresters triggered (where fitted) Indicates that any class II overvoltage surge arresters installed on the AC or DC side have been triggered
	Internal statistics memory anomaly Indicates an operating anomaly in the internal memory on which the inverter statistics are stored
	Buffer battery discharged The buffer battery is low and the inverter does not maintain the time setting
green: ○ yellow: ✳ red: ○	**Pre-commissioning phase (first start-up of inverter)** The commissioning of the inverter must be completed through the Installation wizard steps (Web User Interface) or using the ABB Installer for Solar Inverters mobile APP
	Initial configuration failure The inverter is in locked state due to a failure in the initial configuration of the equipment, such as the standard network setting for the country of installation
	Self-test not carried out (for Italian grid standards only) Self-test operation failure
	Incompatibility of the device firmware versions The firmware versions of the various devices comprising the equipment are incompatible and are being updated (this is an automatic operation)
	Temperature sensor anomaly detected
green: ✳ yellow: ✳ red: ✳	**Updating the firmware from an SD card** The equipment firmware is being updated from an SD card
green: ● yellow: ● red: ●	**Updating the firmware from an SD card has failed** The equipment firmware update from an SD card has failed
green: ✳ yellow: ✳ red: ✳	**Updating the firmware from an SD card completed** The equipment firmware ha-successfully updated from an SD card
green: ✳ yellow: ○ red: ○	**Remote OFF activated** The Remote Off command has been activated. The unit will not connect to the network until the remote ON command has been activated

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

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

Commissioning

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

Before proceeding with commissioning, make sure you have carried out all the following checks:

- **Check the correct connection and polarity of the DC inputs, and the correct connection of the AC output and earth cables.**
- **Check the sealing barrier of the cable ducts and installed quick-fit connectors to prevent accidental disconnections and/or avoid compromising the IP65 environmental protection rating.**

The inverter can be powered with DC sources only; make sure that irradiation is stable and adequate for the inverter commissioning procedure to be completed.

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

Commissioning could be carried out in two different ways:
- Via ABB Installer for Solar Inverters APP (mobile APP for commissioning a single inverter as well as a multi-inverter solar plant)
- Via Web UI (Integrated Web User Interface enabling setting parameters and performing commissioning of a single inverter).

ABB Installer for Solar Inverters APP is the recommended method to commission the inverters.

Commissioning via ABB Installer for Solar Inverters mobile APP

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

The requirements to complete the procedures are listed below:
- ABB Installer for Solar Inverters APP installed on mobile device.
- Enabled installer account for ABB Installer for Solar Inverters APP (The account could be created in the mobile app directly following the dedicated wizard procedure).
- Manual claiming of the inverters to be commissioned.

The claiming process consist of indicating which inverters are to be commissioned.

Claiming process can be performed by:
- taking pictures of the QR codes **(A)** of single inverter units (printed on the Communication identification label) (recommended).
- manual insertion of the MAC address **(B)** and related product keys **(C)** (printed on the Communication identification label) of all the inverters that shall be commissioned.

- scanning and selecting of SSIDs associated to the Wi-Fi networks generated by each inverter to commission.

Follow the procedure below to commission the inverter:
- Put the DC disconnect switch of the inverter **(15)** and any external DC switch in the "ON" position; if the voltage supplied to one of the input channels is greater than the minimum power-up voltage, the inverter will turn on. The inverter is powered ONLY by the voltage supplied by the PV array; the presence of grid voltage alone IS NOT SUFFICIENT to allow the inverter to power up.
- Perform the installation wizard steps with ABB Installer for Solar Inverters APP enabling the transfering the settings to all the claimed inverters.
- After the commissioning via ABB Installer for Solar Inverters APP is completed, the inverter changes the behaviour of the "Power" and "Alarm" LEDs **(08)**, in relation of the input voltage value:

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

- Supply the grid voltage to the inverter.
- Once the AC and DC disconnect switches are closed and the Configuration Wizard has completed the configuration procedure. When the input voltage is sufficient to allow the connection to the grid, the inverter will check the grid voltage, measure the isolation resistance of the photovoltaic field with respect to earth and performs other auto-diagnostic checks. During the preliminary checks on the parallel connection with the grid, the "Power" LED keeps flashing, the "Alarm" and "GFI" LEDs are OFF. The inverter will ONLY connect to the grid if all parameters fall within the ranges foreseen by current regulations.
- If the outcome of the preliminary checks to grid synchronization are positive, the inverter connects and starts to export power to the grid. The "Power" LED remains fixed on while the "Alarm" and "GFI" LEDs are OFF.

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 download area of the website www.abb.com/solarinverters or at https://registration.abbsolarinverters.com (instructions for registering on the website and updating the firmware are given on the product manual).

(Continue to next page)

Commissioning via Web User Interface

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

- Put the DC disconnect switch of the inverter **(15)** and any external DC switch in the "ON" position; if the voltage supplied to one of the input channels is greater than the minimum power-up voltage, the inverter will turn on. The inverter is powered ONLY by the voltage supplied by the PV array; the presence of grid voltage alone IS NOT SUFFICIENT to allow the inverter to power up.
- Once powered, the inverter will automatically create a wireless network (approx. 60 seconds after switching-on).
- Enable the wireless connection on the device which is being used for the board setup (tablet, smartphone or PC) and connect it to the Access Point created by the inverter system: the name of the wireless network created by the system that the connection should be established with, will be: ABB-XX-XX-XX-XX-XX-XX
  where "X" is a hex digit of the wireless MAC address **(B)** (MAC address can be found on the "Communication Identification Label" placed on the side of the inverter).
- When required enter the PRODUCT KEY **(C)** (printed on the "Communication Identification label" and applied during the commissioning phase to the plant documentation) as access point password (Note that 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.
- Follow the step-by-step commissioning wizard to complete the commission of the inverter.

For further information regarding the commissioning procedure via Web User Interface, please refer to the user manual.

- After the commissioning via Web User Interface is completed, the inverter changes the behaviour of the "Power" and "Alarm" LEDs **(08)**, in relation of the input voltage value:

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

- Supply the grid voltage to the inverter.
- Once the AC and DC disconnect switches are closed and the Configuration Wizard has completed the configuration procedure. When the input voltage is sufficient to allow the connection to the grid, the inverter will check the grid voltage, measure the isolation resistance of the photovoltaic field with respect to earth and performs other auto-diagnostic checks. During the preliminary checks on the parallel connection with the grid, the "Power" LED keeps flashing, the "Alarm" and "GFI" LEDs are OFF. The inverter will ONLY connect to the grid if all parameters fall within the ranges foreseen by current regulations.
- If the outcome of the preliminary checks to grid synchronization are positive, the inverter connects and starts to export power to the grid. The "Power" LED remains fixed on while the "Alarm" and "GFI" LEDs are OFF.

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 download area of the website www.abb.com/solarinverters or at https://registration.abbsolarinverters.com (instructions for registering on the website and updating the firmware are given on the user manual).

Characteristics and technical data

Inverter	PVS-100-TL	PVS-120-TL
Input side		
Absolute maximum DC input voltage (Vmax,abs)	1000V	
Start-up DC input voltage (Vstart)	420V (400…500 V)	
Operating DC input voltage range (Vdcmin...Vdcmax)	360…1000 V	
Rated DC input voltage (Vdcr)	620V	720V
Rated DC input power (Pdcr)	102 000W	123 000W
Number of independent MPPT	6	
MPPT input DC voltage range at (VMPPTmin...VMPPTmax) at Pacr	480…850V	570…850V
Maximum DC input power for each MPPT (PMPPT,max)	17500 W [480V≤VMPPT≤850V	20500 W [570V≤VMPPT≤850V
Maximum DC input current for each MPPT (Idcmax)	36 A	
Maximum input short circuit current (Iscmax) for each MPPT	50 A [1]	
Maximum Return current (AC side vs DC side)	Negligible in normal operating conditions [6]	
Number of DC input connection pairs for each MPPT	4	
DC connection type	PV quick fit connector [2]	
Type of photovoltaic panels that can be connected at input according to IEC 61730	Class A	
Input protection		
Reverse polarity protection	Yes, from current limited source	
Input over voltage protection for each MPPT - replaceable surge arrester board	Type II with monitoring only for SX and SX2 versions; Type I+II with monitoring only for SY and SY2 versions	
Photovoltaic array isolation control	as per IEC62109	
DC switch rating for each MPPT	50 A / 1000 V	
Fuse rating (versions with fuses)	15 A / 1000 V [3]	
String current monitoring	SX2, SY2: (24 input string) Individual string current monitoring; SX, SY: (6ch) Input current monitoring per MPPT	
Output side		
AC grid connection type	Three phase 3W+PE or 4W+PE	
Rated AC power (Pacr @cosϕ=1)	100 000 W	120 000 W
Maximum AC output power (Pacmax @cosϕ=1)	100 000 W	120 000 W
Maximum apparent power (Smax)	100 000 VA	120 000 VA
Rated AC grid voltage (Vac,r)	400 V	480 V
AC voltage range	320...480 V [4]	384...576 [4]
Maximum AC output current (Iac,max)	145 A	
Contributory fault current	155 A	
Inrush current	Negligible	
Rated output frequency (fr)	50 Hz / 60 Hz	
Output frequency range (fmin...fmax)	45...55 Hz / 55…65 Hz [5]	
Nominal power factor and adjustable range	> 0.995, adj. ± 0 - 1 (over/under exited)	
Total current harmonic distortion	<3%	
Maximum AC cable	185mm² Aluminum and copper	
AC connections type	Provided bar for lug connections M10, single core cable glands 4xM40 and M25, multi core cable gland M63 as option	
Output protection		
Anti-islanding protection	Active frequency drift combined with RoCoF techniques as per IEC 62116	
Maximum external AC overcurrent protection	225 A	
Output overvoltage protection - replaceable surge protection device	Type 2 with monitoring	
Operating performance		
Maximum efficiency (ηmax)	98.4%	98.9%
Weighted efficiency (EURO)	98.2%	98.6%
Communication		
Embedded communication interfaces	1x RS-485, 2x Ethernet (RJ45), WLAN (IEEE802.11 b/g/n @ 2,4 GHz)	
User interface	4 LEDs, Web User Interface, Mobile APP	
Communication protocol	Modbus RTU/TCP (Sunspec compliant)	
Commissioning tool	Web User Interface, Mobile APP/APP for plant level	
Remote monitoring services	Aurora Vision® monitoring portal	
Advanced features	Embedded logging, direct telemetry data transferring to ABB cloud	

Inverter	PVS-100-TL	PVS-120-TL
Environmental		
Ambient temperature range	-25...+60°C /-13...140°F with derating above 40°C / 104 °F	
Storage temperature	-40°C...+85°C / -40°F...185°F	
Relative humidity	4…100 % with condensation	
Sound pressure level, typical	68dB(A) @ 1m	
Maximum operating altitude without derating	2000 m / 6560 ft	
Environmental pollution degree classification for external environments	3	
Environmental class	Outdoor	
Climatic category according to IEC 60721-3-4	4K4H	
Physical		
Environmental protection rating	IP 66 (IP54 for cooling section)	
Cooling	Forced air	
Dimension (H x W x D)	869x1086x419 mm / 34.2" x 42.8" x 16.5"	
Weight	70kg / 154 lbs for power module ; ~55kg / 121 lbs for wiring box Overall max 125 kg / 276 lbs	
Mounting system	Mounting bracket vertical & horizontal support	
Overvoltage rating as per IEC 62109-1	II (DC input) III (AC output)	
Safety		
Safety class	I	
Isolation level	Transformerless	
Marking & EMC	CE conformity according to LV and EMC directives	
Safety	IEC/EN 62109-1, IEC/EN 62109-2	
Grid standard (check your sales channel for availability)	CEI 0-16, CEI 0-21, IEC 61727, IEC 62116, IEC 60068, IEC 61683, JORDAN IRR-DCC-MV, AS/NZS4777.2, VDE-AR-N 4105, VDE V 0-126-1-1, VFR 2014, Belg C10-C11, UK59/3, P.O. 12.3, ITC-BT-40, EN50438 Generic +Ireland, CLC-TS 50549-1/2	
Accessories		
Assembly accessories	- PVS Installation Kit - AC multicore cable gland plate (Supports M63 Ø 37…53mm + M25 Ø 10...17mm)	

1. Maximum number of opening 5 under overloading
2. Please refer to the document "String inverters – Product manual appendix" available at www.abb.com/solarinverters for information on the quick-fit connector brand and model used in the inverter
3. Maximum fuse size supported 20A. Additionally two strings input per MPPT supports 30A fuse size for connecting two strings per input.
4. The AC voltage range may vary depending on specific country grid standard
5. Frequency range may vary depending on specific country grid standard
6. In the event of a fault, limited by the external protection envisaged on the AC circuit

Remark. Features not specifically listed in the present data sheet are not included in the product

For further information

For more information on ABB solar products and services, visit www.abb.com/solarinverters

Contact us

www.abb.com/solarinverters

PVS-100_120-TL-B version-Quick Installation Guide EN-RevC
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