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**Inverter Models and** 

# Quick Installation Guide

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 B http://www.power-one.com

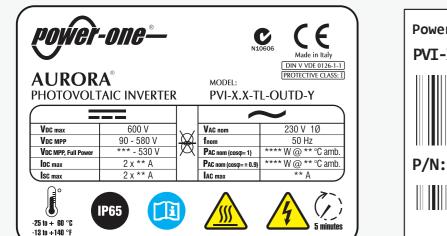
The device must be used in the manner described in the manual. If this is not the case the safety devices guaranteed by the inverter might be ineffective.

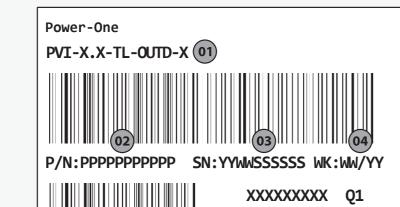
#### The most common residential inverter is the ideal size for an average-sized family home. This family of single-phase string inverter complements the typical number of rooftop solar panels, allowing home-owners to get the most efficient energy harvesting for the size of the property. This rugged outdoor inverter has been designed as a completely sealed unit to withstand the harshest environmental conditions. One of the key benefits of the Uno family of single-phase inverters is the dual input section to process two strings with independent MPPT especially useful for rooftop installations with two different orientations (ie East and West). The high speed MPPT offers real-time power tracking and improved energy harvesting. The transformerless operation gives the highest efficiency of up to 96.8%. The wide input voltage range makes the inverter suitable to low power installations with reduced string size.

## FEATURES

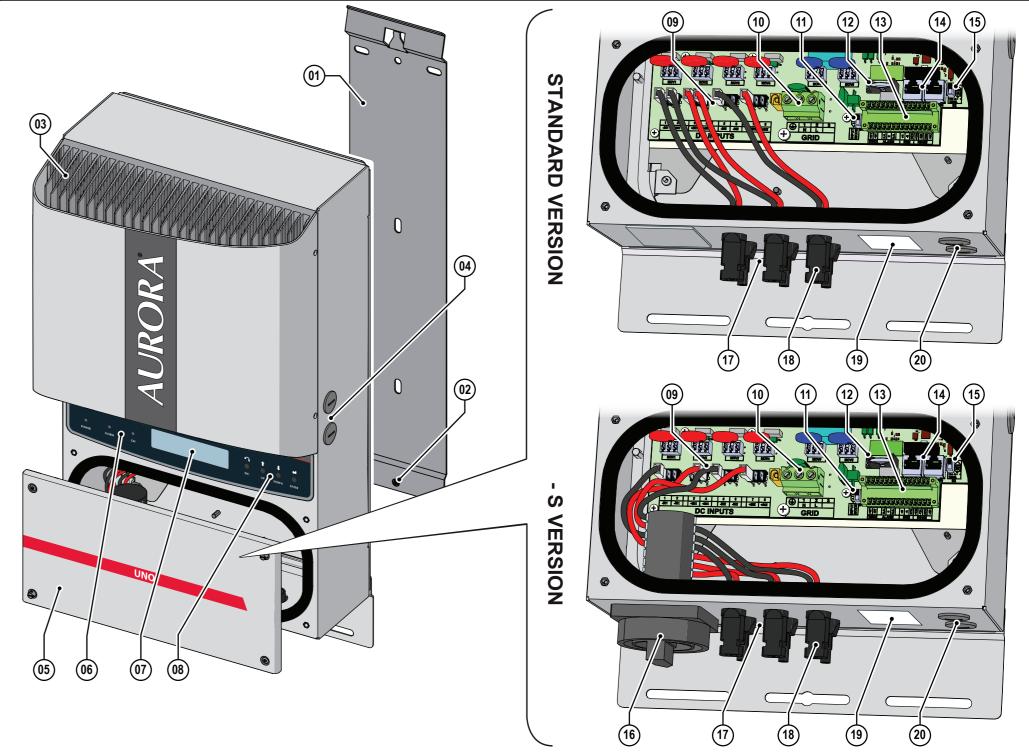
- Each inverter is set on specific grid codes which can be selected in the field.
- Dual input sections with independent MPP tracking, allows optimal energy harvesting from two subarrays oriented in different directions.
- Wide input range.
- High speed and precise MPPT algorithm for real time power tracking and improved energy harvesting. • Flat efficiency curves ensure high efficiency at all output levels ensuring consistent and stable
- performance across the entire input voltage and output power range. Outdoor enclosure for unrestricted use under any environmental conditions.
- Integrated DC disconnect switch in compliance with international Standards (-S Version).
- RS-485 communication interface (for connection to laptop or datalogger).
- Compatible with PVI-RADIOMODULE for wireless communication with Aurora PVI-DESKTOP.

## The labels on the inverter have the Agency marking, main technical data and identification of the equipment and manufacturer





(1) Inverter model Inverter Part Number Inverter Serial Number Week/Year of manufacturing The models of inverter to which this guide refers are available in 3 power ratings: 3.0 kW, 3.6 kW and 4.2 kW. The only difference in terms of components between the three power levels is the number of input connectors: 2 pairs in PVI-3.0/3.6-TL-OUTD models; 3 (2x MPPT1 and 1x MPPT2) pairs in PVI-4.2-TL-OUTD models. Two types are available for each model: Standard or with DC disconnect switch (Version -S).



Main components						
Bracket	65 Front cover	DC Input termina	l block	13 Signal terminal block	17 Input connector	rs (MPPT1)
Locking screw	66 LED Panel	AC Output termin	nal block	(14) RJ45 Connectors	(18) Input connector	rs (MPPT2)
Heat sink	Display	(1) Channel configur	ration switch	(15) RS485 line termination switch	(19) AC cable gland	
DSP Reprogramming connectors	Keyboard	12 Internal battery		16 DC Disconnect switch	Service cable glassical	ands
Available components		Quantity	Available	e components		Quantity
a o o			0	Two-hole gasket f glands and cap TG	or M20 signal cable M58	1 + 1
<sup>°</sup> Bracket for	wall mounting	1	$\bigcap$	Jumpers for config	juration of the paral-	2

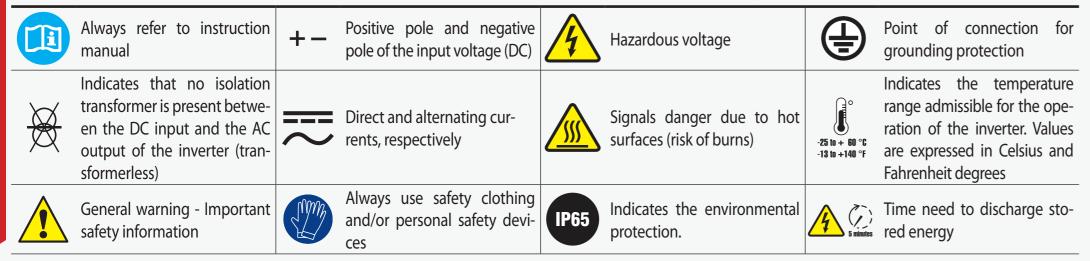
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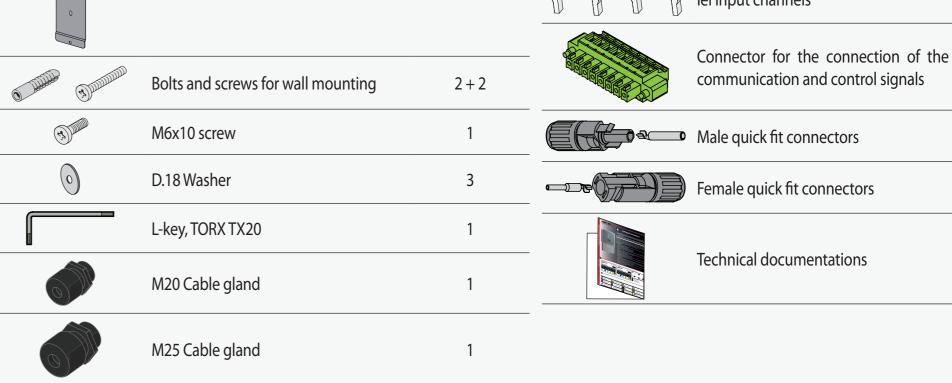
abels and Symbols



The labels attached to the equipment must NOT be removed, damaged, dirtied, hidden, etc... If the service password is requested, the field to be used is the serial number -SN: SSSSSS-

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





## Wall/Pole mounting

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Instruct

During installation, do not place the inverter with its front facing towards the ground.

mbly • Position the bracket (1) so that it is perfectly level on the wall and use it as a boring template.

• Make the 2 holes required, using a drill with a 10 mm diameter bit. The depth of the holes should be about 70 mm. On the bracket (1) there are 5 holes with which to secure it: just 2 are enough to support the inverter if installed on stable, robust supports.

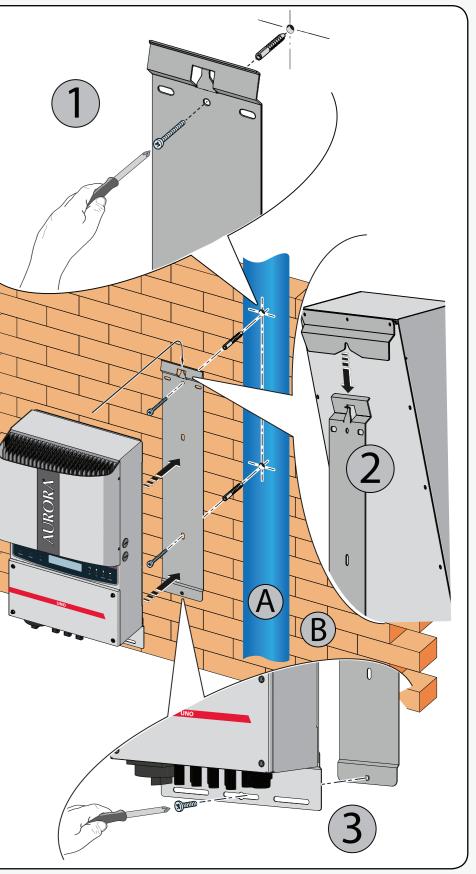
• Secure the bracket to the wall (B) or to the pole (A) with the no. 2 10 mm wall plugs supplied with it (Step 1). Check the stability of the bracket and if necessary use all the fixing points (5) there are on the bracket

• Hook the inverter to the bracket spring corresponding with the insertion point in the bracket on the back of the inverter (Step 2).

• Proceed to anchor the inverter to the bracket (1) by tightening the locking screw (2) located on the lower side (Step 3).

• Unscrew the 4 screws and open the front cover (05) in order to make all the necessary connections.

• Once the connections have been made, close the cover by tightening the 4 screws on the front to a minimum tightening torque of 1.5 Nm.



2 (3.0/3.6 kW)

3 (4.2 kW)

2 (3.0/3.6 kW)

3 (4.2 kW)

Transport of the equipment, especially by road, must be carried out with by suitable ways and means for protecting the components from violent shocks, humidity, vibration, etc.

**Transport and handling** 

Lifting

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The means used for lifting must be suitable to bear the weight of the equipment.

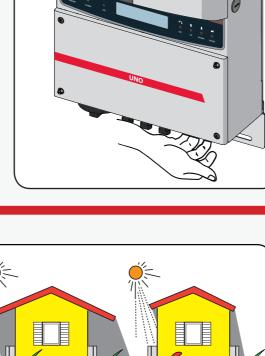
#### **Unpacking and checking**

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 Power-One.

## **Equipment weight**

Model			Mass weight	
PVI-3.0-TL-OUTD	PVI-3.6-TL-OUTD	PVI-4.2-TL-OUTD	17 E Ka	
PVI-3.0-TL-OUTD-S	PVI-3.6-TL-OUTD-S	PVI-4.2-TL-OUTD-S	17.5 Kg	



URORA

## **Environmental checks**

 Consult the technical data to check the environmental parameters to be observed Installation of the unit in a location exposed to direct sunlight must be avoided as it may cause: - power limitation phenomena in the inverter (with a resulting decreased energy production by the system) - premature wear of the electrical/electromechanical components premature wear of the mechanical components (gaskets) and of the user interface (display) Do not install in small closed rooms where air cannot circulate freely • To avoid overheating, always make sure the flow of air around the inverter is not blocked Do not install in places where gases or flammable substances may be present • Do not install in rooms where people live or where the prolonged presence of people or animals is expected, because of the noise (about 50dB(A) at 1 m) that the inverter makes during operation

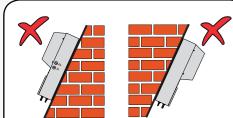
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## Installations above 2000 metres

On account of the rarefaction of the air (at high altitudes), particular conditions may occur: • Less efficient cooling and therefore a greater likelihood of the device going into derating because of high internal temperatures

• Reduction in the dielectric resistance of the air that, in the presence of high operating voltages (DC input), can create electric arcs (discharges) that can reach the point of damaging the inverter

All installations at altitudes of over 2000 metres must be assessed case by case with the Power-One Service department.

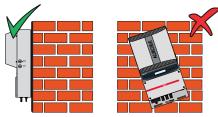


## Installation position

• Install on a wall or strong structure capable of bearing the weight of the equipment

• Install in safe, easy to reach places

• If possible, install at eye-level so that the display and status LEDs can be seen



cm 10cm 10cm **-**111 20 cm

easily

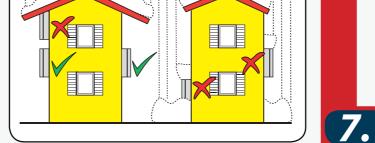
 Install at a height that considers the heaviness of the equipment Install vertically with a maximum inclination of +/- 5° • Choose a place with enough space around the unit to permit easy installation

and removal of the object from the mounting surfaces; comply with the indicated minimum distances

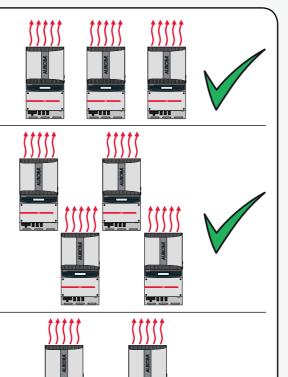
• For a multiple installation, position the inverters side by side; if the space available does not allow this arrangement, position the inverters in a staggered arrangement as shown in the figure so that heat dissipation is not affected by other inverters

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

Please refer to the warranty terms and conditions available on the www. power-one.com website and evaluate any possible exclusion due to improper installation.



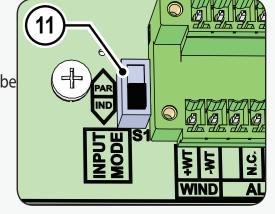
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All versions of the inverter are equipped with two input channels (therefore with double maximum power point tracker MPPT) independent of each other, which can however be connected in parallel using a single MPPT.

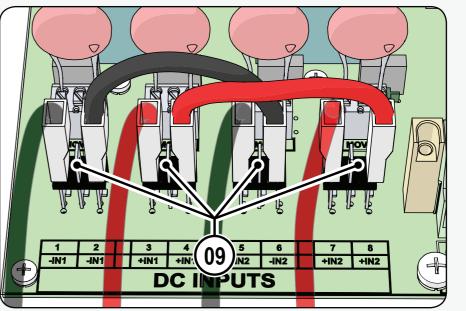
## Configuration of independent channels (default configuration)

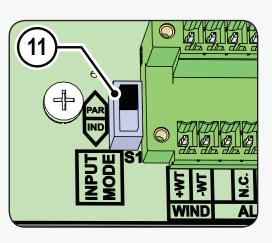
This configuration involves the use of the two input channels (MPPT) in independent mode. This means that the jumpers between the two channels (positive and negative) of the DC input terminal block (19) must not be installed and the switch (1) located on the main board must be set to "IND".



## **Configuration of parallel-connected channels**

This configuration uses the two input channels (MPPT) connected in parallel. This means that the jumpers between the two channels (positive and negative) of the DC input terminal block (9) must be installed and the switch (1) located on the main board must be set to "PAR".







Check for correct polarity in the input strings and absence of any leakage to ground in the PV generator. When exposed to sunlight, the PV panels supply DC direct voltage to the inverter. The inside of the inverter may only be accessed after the equipment has been disconnected from the grid and from the photovoltaic generator.

Input

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and protection device

Warning! The inverters to which this document relates to are WITHOUT ISOLATION TRANSFORMER (transformer-less). 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 earth.

For the string connections it is necessary to use the quick fit connectors (multicontact or weidmüller) located on the bottom of the mechanic (17) (18).

## The number of quick fit connectors changes based on the model of inverter.

	PVI-3.0-TL-OUTD	PVI-3.6-TL-OUTD	PVI-4.2-TL-OUTD	
No. of input channels	2	2	2	
No. of quick fit connectors	4 (2 p	pairs)	4 + 2 (2 pairs per MPPT1 (17) and 1 pairs per MPPT2 (18)	

• Crimp the Multicontact/Weidmüller MC4/WM4 quick fit connector counterparts (supplied) to the string cables or to the cables wired to the DC disconnect switches (external)

• Connect all the strings included in the design of the system and always check the tightness of the connectors

• If some of the string inputs should not be used you must proceed to verify the presence of covers on DC input connectors and then install them should they be absent: this operation is necessary for the tightness of the inverter and to avoid dama ging the free connector that could be used at a later date.

## Load protection breaker (AC disconnect switch) and line cable sizing

To protect the AC connection line of the inverter, we recommend installing a device for protection against over current and leakage with the following characteristics:

	PVI-3.0-TL-OUTD	PVI-3.6-TL-OUTD	PVI-4.2-TL-OUTD
Туре	Automatic circuit bre	aker with differential thermal	magnetic protection
Nominal Voltage		230 Vac	
Nominal Current	20	A	25 A
Magnetic protection characteristic		B/C	
Number of poles		2	
Type of differential protection		A/AC	
Differential sensitivity		300 mA	

Power-One Italy S.p.A. declares that the Power-One AURORA transformerless inverters, in terms of their construction, do not inject continuous ground 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

Three-pole cable required. 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.

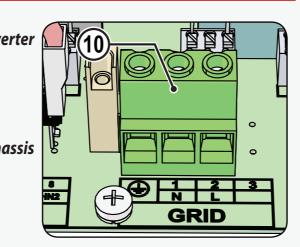
Cross-section of the line conductor (mm <sup>2</sup> )	Maximu	m length of the line condu	ictor (mt)
	PVI-3.0-TL-OUTD	PVI-3.6-TL-OUTD	PVI-4.2-TL-OUTD
4 mm <sup>2</sup>	19 m	16 m	14 m
6 mm <sup>2</sup>	29 m	24 m	21 m
10 mm <sup>2</sup>	48 m	41 m	35 m
16 mm <sup>2</sup>	77 m	65 m	56 m

The values are calculated in nominal power conditions, taking into account: 1. a power loss of not more than 1% along the line. 2. copper cable, with HEPR rubber insulation, laid in free air



Output connectior

Warning! Before performing any of the operations described below, ensure the AC line downstream the inverter has been correctly disconnected



Each cable which must be connected to the connectors of the communication and control signals must pass through one of the two service cable glands 20. An M20 cable gland (that takes cables from 7 mm to 13 mm in diameter) and a gasket with two holes to insert into the cable gland which enables two separate cables of a maximum diameter of 5 mm to be accommodated, are available.



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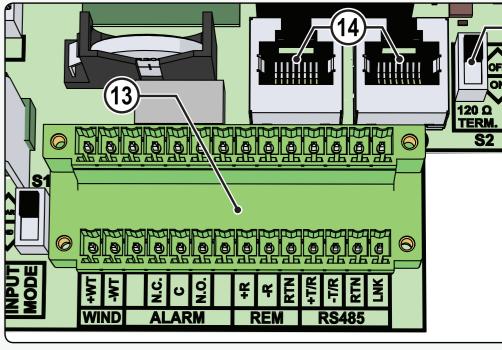
Warning! To ensure environmental protection IP65 it is necessary to fix the cable glands to the inverter chassis with a minimum tightening torque of 7 Nm

#### Connection to the RS485 communication line

The RS485 communication port is the inverter's communication port. The AU-RORA inverters use an RS485 HALF-DUPLEX communication line made up of two transmission and reception cables (+T/R and -T/R) and a communication reference cable (RTN): all three cables must be connected in daisy-chain configuration. The chain connection can be made without distinction by using the RJ45 connector couples (14) (one for in and one for out) or the terminal block 13. The last inverter in the daisy chain must be "terminated" or the 120 Ohm communication line termination resistance must be activated by switching the dip-switch (15).

## Using the alarm terminal block

Terminal block (1) connecting to the configurable relay that allows connection of external devices which, according to the mode selected in the menu "SETTINGS > Alarm" can, for example, signal malfunctions. The operating modes that can be set are: Production and Alarm.





The ALARM contact can be used only with systems that ensure a safety isolating additional at least (supplementary insulation in relation to the DC input voltage)

## Using the REM terminal block

The REM terminal block (1), if suitably configured, allows the "Remote ON/OFF" function to be used: this function allows remote disconnection of the inverter from the grid



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For further information regarding the configuration and use of the communication and control signals terminal block, please see the manual

## The inverter commissioning procedure is as follows:

• Switch the integrated switch 16 (version – S) to the ON position or close the external switches: If the input voltage applied to one of the two input channels is greater than the minimum starting voltage, the inverter will start up.

• When the inverter is turned on for the first time you will be asked to select the "Nation" of installation. This selection allows the inverter to automatically configure its parameters to ensure that compliance with local standards; the default language corresponding to the selected "Nation" will also be set.

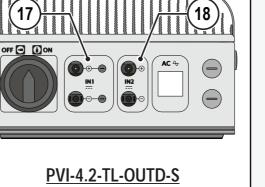


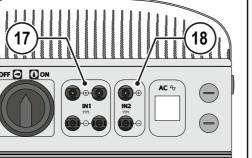


Warning! After the grid standard was set you have 24 hours to make any changes to the grid standard value; 24 hours later the "Nation Select." functionality will be blocked, and any subsequent changes can only be made using a password provided on request by Power-One

 After you have set the "Nation" value, the message "Inizializing...Please Wait" is displayed. Depending on the input voltage value, the inverter will show various message on the display and change the behaviour of the three LED (6):

|--|





PVI-3.0/3.6-TL-OUTD-S



• Remove the protective film located on the hole to be used for the AC cables (19) • Insert the M25 cable gland in the hole and secure it using the special M25 lock nut (supplied)

Warning! To ensure environmental protection IP65 it is necessary to fix the cable gland to the inverter chassis with a minimum tightening torque of 7.5 Nm

• Strip 10 mm of sheathing from the AC grid connection cables • Plug the AC line cable into the inverter, passing it through the previously installed cable gland • Connect the protective earth (yellow-green) cable to the contact labelled with the 🕀 symbol on the terminal block 🔞



Warning! Aurora inverters should be earthed (PE) via the terminal with the protective earth label 🕀, using a cable with an appropriate cross-section of the conductor for the maximum ground fault current that the generating system might experience

 Connect the neutral cable (normally blue) to the terminal labelled with the letter N Connect the phase cable to the terminal labelled with the letter L



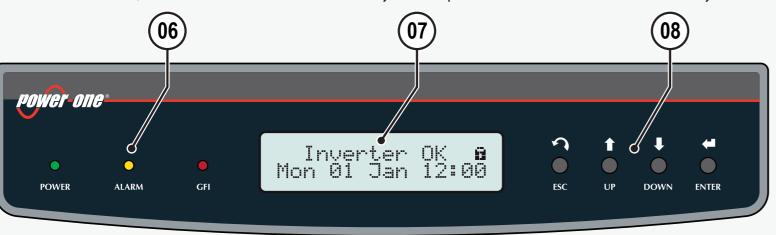
Warning! The AC cables must be tightened on the terminal block with a minimum torque of 1.5 Nm

Once the connection to the terminal board 10 is complete, screw in the cable gland firmly (tightening torque 5.0Nm) and check the tightness.



Instruments

LEDs and BUTTONS, in various combinations, can be used to view the status or carry out complex actions that are described more fully in the manual



LED	GREEN On if the inverter is working correctly. Flashes when che-	ESC	It is used to access the main menu, to go back to the previous menu or to	ha	-
POWER	cking the grid or if there is insufficient sunlight.		go back to the previous digit to be edited		
LED	YELLOW The inverter has detected an anomaly. The anomaly is	UP	It is used to scroll up the menu options or to shift the numerical scale in		
ALARM	shown on the display.		ascending order		-
LED	<b>RED</b> Ground fault on the DC side of the PV generator. The error is	DOWN	It is used to scroll down the menu options or to shift the numerical scale		-
GFI	shown on the display.		in descending order		_
		ENTER	It can be used to confirm an action, to access the submenu for the se-		-
			lected option (indicated by the > symbol) or to switch to the next digit to		

be edited

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he display menu

AURORA inverters are equipped with a graphic Display (1), consisting of 2 lines of 16 characters each, which can be used to:

- Display the operating state of the inverter and the statistical data
- Display the service messages for the operator
- Display the alarm and fault messages for the operator
- Changing the settings of the inverter

Tipo regolazione

During the normal operation of the inverter the display cycles through the **GENERAL INFORMATION**. This information relates to the input and output parameters and the inverter identification parameters. By pressing ENTER it is possible to lock scrolling on a screen to be constantly displayed.

Vin < Vstart	Waiting Sun	Green = FLASHING Yellow = OFF Red = OFF	The input voltage is not sufficient to permit connection to the grid.
Vin > Vstart	Missing Grid	Green = FLASHING Yellow = ON Red = OFF	There is sufficient input voltage to permit connection to the grid: the inverter waits until there is grid voltage to carry out the parallel connection.

The inverter is powered ONLY by the voltage coming from the photovoltaic generator: presence of grid voltage alone IS NOT SUFFICIENT to permit the inverter to start up.

• With the inverter in "Missing Grid" status, close the AC switch downstream the inverter so as to supply the grid voltage to the inverter: the inverter performs the grid voltage check, measures the photovoltaic generator insulation resistance against earth and carries out other self-diagnosis checks. During the checks before the parallel with the grid, the green LED keeps flashing, the others are off.

During the grid voltage check and measurement of the insulation resistance, the values for the grid voltage and frequency and the insulation resistance measured by the inverter are shown on the display. The inverter completes parallel connection with the grid SOLELY if the grid parameters meet the ranges provided for by the regulations in force and if the insulation resistance is greater than 1Mohm.

• If the preliminary checks for parallel connection to the grid are successful, the inverter connects to the grid and begins to export power to the grid. At this stage, the display shows the inverter's parameters in cycles. The green LED stays lit whereas the others are off.

Table: Technical Data	PVI-3.0-TL-OUTD	PVI-3.6-TL-OUTD	PVI-4.2-TL-OUTD
Absolute Maximum Input Voltage (V )		6001/	
Absolute Maximum Input Voltage (V <sub>max,abs</sub> ) Input Activation Voltage (V <sub>start</sub> )		600 V 200 V (adj. 120350 V)	
Input Activation Voltage (Vstar)		0.7 x Vstart580 V	
Rated DC Input Power (Pdr)	3120 Wp	3750 Wp	4375 Wp
Number of Independent MPPTs	5120 Wp	2	
Maximum Input Power for each MPPT (PMPPT max)	2000 W	3000 W	3000 W
MPPT Input DC Voltage Range (VMPPT min, f VMPPT max, f) at Pacr	160530 V	120530 V	140530 V
Maximum DC Input Current (Idc max) / for each MPPT (IMPPT max)	20.0 A / 10.0 A	32.0 A / 16.0 A	32.0 A / 16.0 A
Maximum Input Short Circuit Current for each MPPT	12.5 A	20.0 A	20.0 A
Maximum Backfeed current (from AC to DC side)		Negligible	
Number of DC Inputs Pairs for each MPPT	1	1	2 for MPPT1 and 1 for MPPT
DC Connection Type		Tool Free PV Connector WM / MC4	
Input protection			
Reverse Polarity Protection		Yes, from limited current source	
Input Overvoltage Protection for each MPPT - Varistor		2	
Photovoltaic Array Isolation Control		According to local standard	
DC Switch Rating (-S Version)		Max. 25.0 A / 600 V	
Output AC Grid Connection Type		Monophase	
Rated AC Power (Pac)	3000 W	3600 W	4200 W
Maximum AC Output Power (Pacmax)	3300 W <sup>(1)</sup>	4000 W <sup>(2)</sup>	4200 W (3)
Rated AC Grid Voltage (Vacr)	5500 W	230 V	4000 W
AC Voltage Range		180264 Vac <sup>(4)</sup>	
Maximum AC Output Current (I <sub>ac max</sub> )	14.5 A	17.2 A <sup>(5)</sup>	20.0 A
Inrush Current		Negligible	
Maximum Output Fault Current		<25 A rms (100mS)	
Rated Output Frequency (fr)		50 Hz / 60 Hz	
Output Frequency Range (fminfmax)		4753 / 5763 Hz <sup>(6)</sup>	
Nominal Power Factor (Cosphiacr)	>0.995 adj. ± 0.9 with Pacr= 3.0 kW	>0.995 adj. ± 0.9 with Pacr= 3.6 kW	>0.995 adj. ± 0.9 with Pacr= 4.2
Total Harmonic Distortion of Current		< 3.5%	
AC Connection Type		Screw terminal block	
Output protection			
Anti-Islanding Protection		According to local standard	
Maximum AC Overcurrent Protection	16.0 A	19.0 A	22.0 A
Output Overvoltage Protection - Varistor		2 (L - N / L - PE)	
Operating performance		06.00/	
Maximum Efficiency (η <sub>max</sub> ) Weighted Efficiency (EURO/CEC)		<u>96.8%</u> 96% / -	
Power Input Treshold		10.0 W	
Stand-by Consumption		< 8.0 W	
Communication			
Wired Local Monitoring	P\	/I-USB-RS232_485 (opt.), PVI-DESKTOP (op	t.)
Remote Monitoring		PVI-AEC-EVO (opt.), AURORA-LOGGER (opt.	
Wireless Local Monitoring		DESKTOP (opt.) with PVI-RADIOMODULE (	
User Interface		LCD Display with 16 characters x 2 line	
Environmental			
Ambient Temperature Range	-25+60°C /-13140°F with derating	-25+60°C /-13140°F with derating	-25+60°C /-13140°F with der
	above 50°C/122°F	above 55°C/131°F	above 50°C/122°F
Storage Temperature		-4080°C (-40+176°F)	
Relative Humidity		0100% condensing	
Environmental pollution classification for external environment		3	
Noise Emission Maximum Operating Altitude without Derating		< 50 dB(A) @ 1 m 2000 m / 6560 ft	
Environmental Category		External	
Physical			
Environmental Protection Rating		IP 65	
Cooling		Natural	
Dimension (H x W x D)	6	18 x 325 x 222 mm / 24.3 x 12.8 x 8.7 inc	:h
Weight		17.5 kg / 38.6 lb	
Mounting System		Wall bracket	
Overvoltage Category in accordance with IEC 62109-1		II (DC input) III (AC output)	
Safety			
Isolation Level		Transformerless (TL)	
Safety Class		I CE	
Marking			

	settings of the l e messages for <b>r details reaar</b>	the operator	ctions available	e in the menu	
INFORMAZIO (Visualizza)	ONI GENEI	RALI		STRUT	T
Inverter OK Lun 01 Gen 12:00	Riso Ileak	X.XM XXmA		STATISTICHE	
Tipo OUTD P/N -XXXX-	Pin			>Parziale	
SN XXXXXX Fw rel. X.X.X.X	Vin Iin	XXXU XX.XA	PREMERE TASTO ESC	>Ultimi 7 Giorni >Ultimo mese	
E-day XXX.XkWh \$-day XX.XEUR E-tot XXXXXkWh	Igrid Fgrid Varid	XX.XA XX.XXHz XX.XXU		>Ultimi 30 Giorni >Ultimi 365 Giorni	
E-par XXXXXXWh Pout XXXXXW	Vgrid F Ppk Ppk-Day	ive XXXV T XXXXXW		>Periodo Utente	

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	IMPOSTAZIONI	INFORMAZIONI
	>Indirizzo	>ID Prodotto
	>Imp. Display	>N. Serie
	)Servizio	>Firmware
ni	Nuova PW	>Country Code
	>Valuta	
rni	>Data/Ora	
orni	Mation	>Riduzione Pot.
e	Xingua	>Pot. Reattiva
	>VStart	>Msg Allarme
	* Autotest	>Scan Interval
	)Allarme	>MPPTScan En/Di:
	Contr. Remoto	>T Protez. UV

\* Disponibile solo per standard di rete CEI021 INT e CEI021 EXT

Service-Contact Details:

3. Limited to 4200 W for Germany

Service- Contact Details.		
Australia	+61 2 9735 3111	service.au@power-one.com
Benelux	+32 2 206 0338	service.bx@power-one.com
China	+8675529885888	service.cn@power-one.com
Eastern Europe	+49 7641 95520 32	service.ee@power-one.com
France	00 800 00 28 76 72	service.fr@power-one.com
Germany	0800 2200211	service.de@power-one.com
Greece	00 800 00 28 76 72	service.gr@power-one.com
India	+65 6896 3363	service.in@power-one.com
Italy	00 800 00 28 76 72	service.it@power-one.com
Middle East	00 800 00 28 76 72	
Singapore	+65 6896 3363	service.sg@power-one.com
Spain	00 800 00 28 76 72	service.es@power-one.com
South east Asia		service.sg@power-one.com
UK	0800 0232341	service.uk@power-one.com
USA	+1 877-261-1374	service.us@power-one.com

6. The Frequency range may vary depending on specific country grid standard

no	
	A MEMBER OF THE ABB GROUP

Italy Facility	Phoenix Facility	Camarillo Facility
Via S. Giorgio, 642	3201 East Harbour Drive	740 Calle Plano
52028 Terranuova B.ni	Phoenix, Arizona, 85034	Camarillo, California, 93012
Italy	United States	United States
+39 055 9195 1	480-643-1700	805-987-8741

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