



ALPN SOLAR PV INVERTER / WECHSELRICHTER / OMWÖCHNER

# A-VERTER® TL



INSTALLATION AND OPERATION MANUAL  
A-VERTER 1750 TL / A-VERTER 2330 TL / A-VERTER 3180 TL

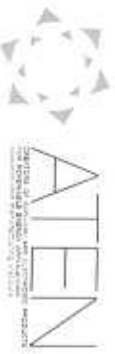


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**Before you start**

Congratulations on choosing Aten Grid PV Inverter, the products from Aten Grid PV Inverter are a highly reliable products due to their innovative design and perfect quality control. Such inverters are used in high demand, grid-tied PV systems. This manual contains important information regarding installation and safe operation of this unit. Be sure to read this manual carefully before using. If you encounter any problems during installation or operation of this unit, first check this manual before contacting your local dealer or representative. Instructions inside this manual will help you solve most installation and operation difficulties.

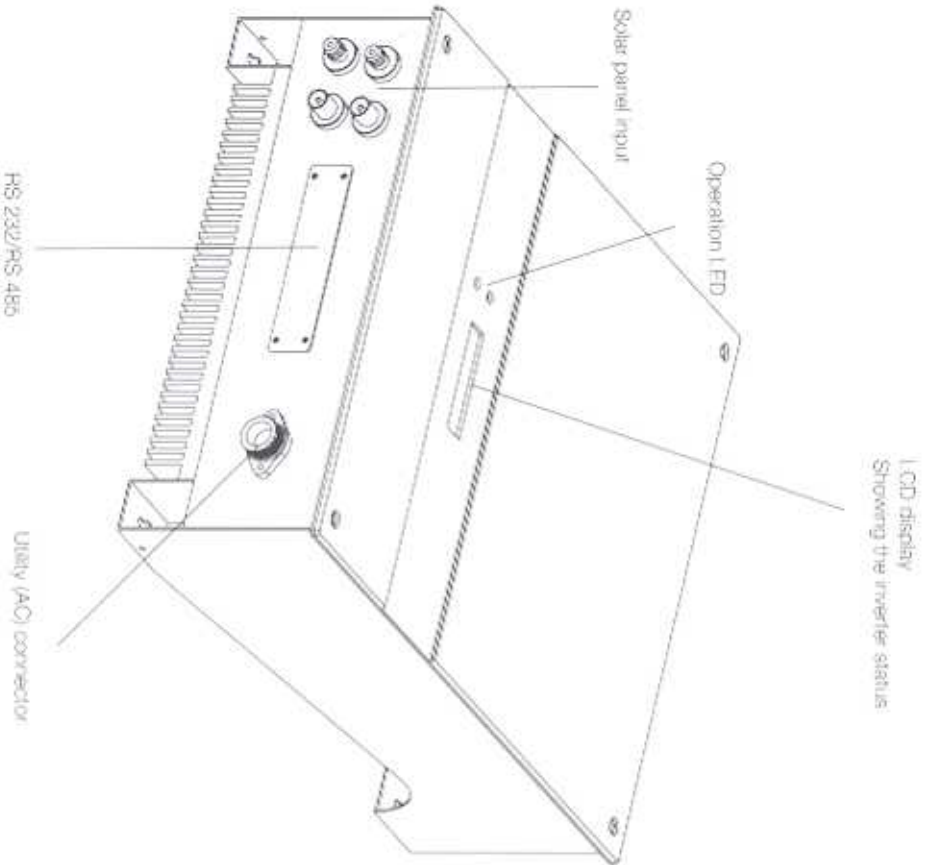
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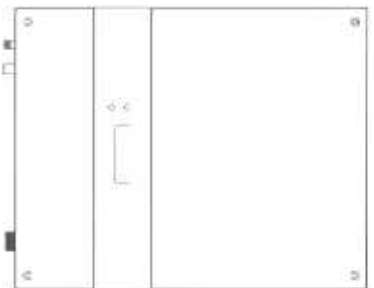
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**1. CONTENT**

**A-Verter 1750 TL, A-Verter 2330 TL and A-Verter 3180 TL Design Overview**



Front View



Bottom View

**Opening the package**

After opening the package, please check the contents of the box. It should contain the following:

Item	Name	Quantity
1.	A-Verter TL 1750/2330/3180	1
2.	Mounting frame	1
3.	Mounting screws	4
4.	Safety lock screws	2
5.	AC socket assembly	1 (Optional)
6.	Instruction manual	1
7.	Monitor software(disk)	1 (Optional)

**Before starting installation please consider the following items:**

This unit is designed for indoor usage. Do not expose the unit to wet, or moist conditions. Do not expose the PV-Inverter to direct sunlight. Direct sunlight increases the internal temperature that may reduce conversion efficiency.

- > Check the ambient temperature of installation is within specified range -20 ~ +55°C
- > The AC grid voltage is between 196 and 253VAC, 50/60Hz
- > Qualified personnel are performing the installation.
- > Adequate convection space surrounds the inverter.
- > Inverter is being installed away from explosive vapors.
- > No flammable items are near the inverter.

It is recommended that inverter is installed where the ambient temperature is between 0-40°C

## 2.1 Safety instructions



- A. Do not remove the casing. Inverter contains no user serviceable parts. Refer servicing to qualified service personnel.
- B. Both AC and DC voltage sources are terminated inside the PV Inverter. Please disconnect these circuits before servicing.
- C. When a photovoltaic panel is exposed to light, it generates a DC voltage. When connected to this equipment, a photovoltaic panel will charge the DC link capacitors.
- D. Energy stored in this equipment's DC link capacitors presents a risk of electric shock. Even after the unit is disconnected from the grid and photovoltaic panels, high voltages may still exist inside the PV-Inverter. Do not remove the casing until at least 10 minutes after disconnecting all power sources.
- E. This unit is designed to feed power to the public power grid (utility) only. Do not connect this unit to an AC source or generator. Connecting Inverter to external devices could result in serious damage to your equipment.
- F. Carefully remove the unit from its packaging and inspect for external damage. If you find any imperfections, please contact your local dealer.
- G. Although designed to meet all safety requirements, some parts and surfaces of inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while inverter is operating.

## 2.2 Fixed on the wall

- A. Select a wall or solid vertical surface that can support the PV Inverter.
- B. Inverter requires adequate cooling space. Allow at least 20cm space above and below the inverter.
- C. Using the mounting frame as a template, drill 4 holes as illustrated in image 1 - 2.

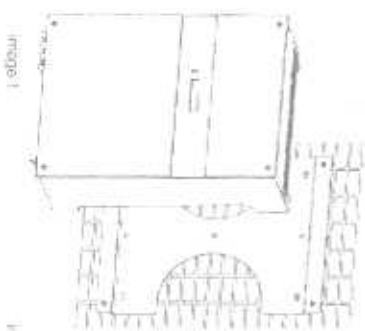


Image 1



Image 2

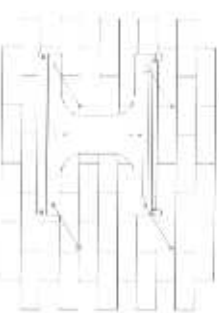


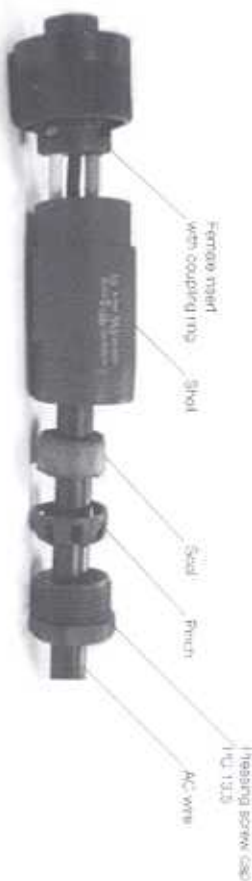
Image 3

- D. Fix the mounting frame as the figure shows. Do not make the screws to be flush to the wall. Instead, leave 2 to 4mm exposed.
- E. Hang the inverter on the mounting frame.
- F. Check the installation conditions.

- > Do not install the PV-Inverter on a slanted surface.
- > Check the upper straps of PV-Inverter and ensure it fits on to the bracket.
- > Insert safety-lock screws to the bottom leg to secure the inverter. (Image 3)
- > Check the secure mounting of the PV Inverter by trying to raise it from the bottom. The PV Inverter should remain firmly attached.
- > Select the installation location so that the status display can be easily viewed.
- > Choose a strong mounting wall to prevent vibrations while inverter is operating.

## 2.3 Connecting to the grid (AC utility)

- A. Measure grid (utility) voltage and frequency. It should be 230VAC (or 220VAC), 50/60Hz and single phase.
- B. Open the breaker or fuse between PV Inverter and utility.
- C. For Inverter (A-Verter 1750/2330/3180), connect AC wires as follows:



- > Insert utility wires through cable gland. Connect wires according to polarities indicated on terminal block. L<sup>1</sup> (NE (brown or black), N<sup>1</sup> (Neutral (blue) and "system ground (yellow-green)).
- > Fasten the gland plate with attached screws.
- > Twist the gland so that the cable is firmly fixed.
- > Refer to left figure.
- > Insert Live wire to Pin L, Neutral wire to Pin N and Ground wire to Pin G.
- > Suggested cable width for AC wire.



Model	(mm)	Area(mm <sup>2</sup> )	AWG no.
A-Verter 1750 TL	-1.29	-1.5	16
A-Verter 2330 TL	-1.29	-1.5	16
A-Verter 3180 TL	-1.63	-2.0	14

**2.4 Connect to PV Panel (DC Input)**

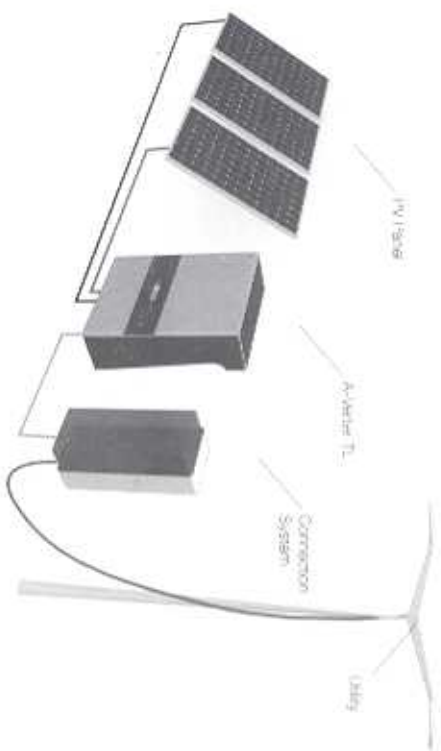
- A. **Under any condition!** Make sure the maximum open circuit voltage (Voc) of each PV string is less than 550VDC.
- B. Use MC (Multi-contact) connectors for PV array terminals.
- C. Connect the positive and negative terminals from the PV panel to positive (+) terminals and negative (-) terminals on the PV Inverter. Each DC terminal on Inverter can withstand 20ADC.
- D. Before connecting PV panels to DC terminals, please make sure the polarity is correct.  
**Incorrect polarity connection could permanently damage the unit.** Check short-circuit current of the PV string. The total short circuit current of the PV string should be less than the Inverter's maximum DC current.
- E. High voltages exist when the PV panel is exposed to the sun. To reduce risk of electric shock, avoid touching live components and treat connection terminals carefully.

**2.5 Checking**

- A. When the PV panels are connected and their output voltage is greater than 100VDC, but the AC grid is not yet connected, the message on the LCD display produce the following messages in order: "MCO-EL\_XkV" -> "Waiting" -> "No Utility". The display repeats "No Utility" and the RED "Fault LED" turns on.
- B. Close the AC breaker or fuse between PV/Inverter and grid. The normal operating sequence begins.
- C. Under normal operating conditions the LCD displays "Watt\_xxxx kW". That is the power fed to the grid. The green LED turns light-up.
- D. This completes the check.

**2.6 System Diagram**

- A. PV Panel: Provide DC power to Inverter.
- B. AEM: Converts DC (Direct Current) power from PV panels) to AC (Alternating Current) power. Because Inverter is grid-connected it controls the current amplitude according to the PV Panel power supply. Inverter always tries to convert the maximum power from your PV panels).
- C. Connection system: This "interface" between Utility and PV Inverter may consist of electrical breaker, fuses and connecting terminals. To comply with local safety standards and codes, the connection system should be designed and implemented by a qualified technician.
- D. Utility: Referred to as "grid" in this manual, is the way your electric power company provides power to your place. Please note that Inverter can only connect to low-voltage systems (namely, 220-230VAC, 50/60Hz).

**3. MODES OF OPERATION**

> There are 3 different modes of operation.

**3.1 Normal mode:**

In this mode, Inverter works normally. Whenever the supplied power from PV panel is sufficient (voltage>150VDC), Inverter converts power to the grid as generated by the PV panel. If the power is insufficient, (voltage<120VDC), Inverter enters a "waiting" state. Whilst "waiting" Inverter uses just enough power from the PV panel monitor internal system status. In normal mode the green LED is on.

**3.2 Fault mode**

The internal intelligent controller can continuously monitor and adjust the system status. If Inverter finds any unexpected conditions such as grid problems or internal failure, it will display the information on its LCD and light up the red "Fault" LED.

**3.3 Shutdown mode**

During periods of little or no sunlight, Inverter automatically stops running. In this mode, Inverter does not take any power from the grid. The display and LED's on the front panel do not work.

**Notes**

**Operating A-Verte is quite easy. During normal operation, Inverter runs automatically. However, to achieve maximum conversion efficiency of Inverter please read the following information:**

**a. Automatic ON-OFF:** Inverter starts up automatically when DC-power from the PV panel is sufficient.

Once the PV-Inverter starts it enters one of the following 3 states:

1. **Standby:** The PV string can only provide just enough voltage to minimum requirements of the controller
2. **Waiting:** When the PV string DC voltage is greater than 100V, Inverter enters a "waiting" state and attempts to connect to the grid.
3. **Normal operation:** When PV string DC voltage is greater than 150V, Inverter operates in the normal state.

**b. Starting-up display sequence:**

Once the PV power is sufficient, Inverter displays information as shown in the flow chart as follow:

```
"User: xxxx"
"Spec:xxxx"
"Model: x XkV"
"SW Version :xx.xx"
"Checking xxs"
"Normal State"
"PaC = xxx.x W"
```

**c. LCD backlight control:**

To save power, the LCD display's backlight automatically turns off after 30 seconds.

x LCD display

**THE FIRST LINE OF LCD**

STATE	DISPLAY CONTENT	REMARK
Wait State	Waiting	Initial waiting
	Checking x0x5	System checking
	Reconnected in 0x5	System opening
	Standby	PV voltage low
Normal State	P0c = xxxxx x W	Inverter wait at working
Auto Test State	Auto testing	Protection auto test
Fault State	Overload xx Fault	System fault
Shutdown State	Inverter xx Damaged	Inverter fault
Program State	Programming	Update software

**THE SECOND LINE OF LCD**

CYCLE DISPLAY	DISPLAY TIME /s	REMARK
User xxxxx	1	The user type
Spou: xxxxx	1	The inverter spoc type
Model: x Xxw	1	The inverter model
SW Version: xx xx	1	The software version
Protol: xxxkx/n	2	The energy total
Etoday: xx.kkx/n	2	The energy today
Ttoday: xdx.kkx/n	2	The work time today
PV: xxxV LBUS: xxxV	2	The PV and Bus voltage
AC: xxxV xx.kHz	2	The Grid voltage and frequency

**4. INVERTER STATUS**

Inverter is designed to be user-friendly; therefore, the status of the inverter can be easily understood by reading the information shown on the front panel display. All possible messages are shown in the following table:

DISPLAY	OPERATION
SYSTEM FAULT	
Disconnected Grid	disconnected grid
Grid V Fault	grid voltage out range
Grid f Fault	grid frequency out range
Low Isolation	low input isolation
High PV Voltage	pv input voltage high
High Ground f	GI (CI) active
High Temperature	temperature too high

INVERTER FAULT	
EEPROM Damaged	EEPROM has problem
Triase failure	System failed the inverter all the test time
GI/CI Damaged	GI/CI device damaged
Sensor Damaged	Output DC sensor damaged
SCI Damaged	The communication between the two MCU fault
Nut Consistent	The data set not the same of the two MCU
High DC IN	Output DC Injection Too High
Policy Damaged	Output Policy Failure
High User Voltage	DC Bus Voltage is Too High
Auto test failed	Auto test failed
2.5V Ref Fault	2.5V Reference Voltage inside has problem

**5. COMMUNICATIONS**

**5.1 Communications software instructions**

Connect PV Inverter and PC by RS232 wire. Open monitoring software "PV Inverter COM.exe". If you use "PV Inverter COM.exe", Open the "PV Inverter COM.txt" file in the path C:\WINDOWS. The file records the user's software and the main parameter settings, click on the main interface and the "Setting" button, enter the password "sadder" into the user settings interface, set the interface as follows based on actual field conditions.

Click the "Save" button and exit.

**5.2 Monitor**

After setting the software the user can monitoring the inverter. The right side of the main interface is the detailed information of inverter.

**5.3 Detailed Information**

Detailed setting method and other functions refer to "PV Inverter COM Manual" in the CD.

**6. TROUBLE SHOOTING**

In most situations, the inverter requires very little service. However, if inverter is not able to work perfectly, please refer to the following instructions before calling your local dealer.

> Should any problems arise, the red (Fault) LED on the front panel turns on and the LCD displays the relevant information. Please refer to the following table for a list of potential problems and their solutions:

**SYSTEM FAULT**

• **Ground Fault**

1. The ground current is too high.
2. Unplugging the inputs from the PV generator and check the peripheral AC system.
3. After the cause is cleared, re-plug the PV panel and check PV-Inverter status.
4. If the problem persists please call service.

• **Grid Fault**

1. Wait for 5 minutes; if the grid returns to normal, PV-Inverter automatically restarts.
2. Make sure grid voltage and frequency meet the specifications
3. If the problem persists please call service

• **No Utility**

1. Grid is not connected.
2. Check grid connection cables.
3. Check grid usability.

**INVERTER FAILURE**

• **PV over Voltage**

1. Check the open PV voltage, see if it is greater than or too close to 500VDC
2. If PV voltage is less than 500VDC, and the problem still occurs, please call local service.

• **Consistent Fault**

1. Disconnect PV (+) or PV (-) from the input, restart the PV-Inverter
2. If it does not work, call service.

> If there is no display on the panel, please check PV input connections. If the voltage is higher than 150V, call your local service.

> During periods of little or no sunlight, the PV-Inverter may continuously start up and shut down. This is due to insufficient power generated to operate the control circuits.

**7. SPECIFICATIONS**

**Model Specifications**

**A-Verter 1750 TL      A-Verter 2330 TL      A-Verter 3180 TL**

**Input data**

Max. DC power	1750W	2330W	3180W
Max. DC voltage	450V	500V	500V
PV voltage range MPPT	100V-450V	180V-500V	180V-500V
Max. input current	8.9A	10A	13A
DC voltage ripple	5%	5%	5%
Max. number of strings	1	2	2
Ground fault monitoring	yes	yes	yes
Diverse density protection	short-circuit diode	short circuit diode	short-circuit diode

**Output data**

Max. AC power	1800W	2200W	3000W
Normal AC output	1500W	2000W	2800W
THD of AC current	<3%	<3%	<3%
Normal AC voltage	220V-240V	220V-240V	220V-240V
Normal AC frequency	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz
Power factor	1	1	1
Short-circuit proofing	yes	yes	yes

**Efficiency**

Max. efficiency	95.50%	96.50%	96.50%
Low ELA	94.50%	95.50%	95.50%
Protection rating	IP43	IP43	IP43

**Mechanical**

Width/height/depth(mm)	350/280/100	400/315/120	400/315/120
Weight	12KG	13.1KG	13.1KG

## 8. ATEN Factory warranty

Applies solely to the following products: A-VERTER 1750 TL, A-VERTER 2300 TL, A-VERTER 3150 TL, A-VERTER 4800 TL, A-VERTER 5000 TL. The legal guarantor obligation of the seller of your device is not affected by this warranty and remains fully valid for 24 months from the date of delivery. For the above named products, you receive an **ATEN factory warranty valid for 20 years from the date of purchase**. The ATEN factory warranty covers any costs which you incur for repair or replacement parts during the agreed period beginning at the date of purchase of the device, subject to the conditions listed below. This is not associated with a durability warranty. You have the possibility of purchasing an extension of this ATEN factory warranty within the 20 year term of the ATEN factory warranty, this does not apply for the PV Official Box. The prices are based on the respective ATEN price list valid at the time the warranty extension was signed.

### Warranty conditions

If a device becomes defective during the specified ATEN factory warranty period, one of the following services, as selected by ATEN, will be performed at no charge for materials or labor costs as long as this is not impossible or inappropriate:

- repair at ATEN, or
- repair on-site, or
- exchange for a replacement device of equivalent value according to model and age.

In the latter case, the remainder of the warranty entitlement will be transferred to the replacement device. In such an event, you do not receive a new certificate, as your entitlement is documented at ATEN. Inappropriate in the above mentioned meaning is especially given in cases the action would result in costs for ATEN that would be unbearable

- with respect to the value that the device would have if it were not defective,
- with respect to the proportion of the cost and
- after consideration of alternative correction measures that could be conducted without severe trouble for the ATEN customer.

The factory warranty covers costs for ATEN for labour and material necessary to rectify a trouble free function at the ATEN factory or for repair work by ATEN personnel on site. All other costs, especially shipping costs, travel and boarding costs of ATEN service personnel for repairs on site as well as costs of non-employees of the customer and not covered by the ATEN factory warranty, in case of purchase of devices for private use within the EC and Switzerland the factory warranty additionally includes shipping costs or travel and boarding expenses of ATEN service personnel for repairs on site. These are proportionally covered for the distance between ATEN and the location where the place of sale of the official ATEN distributor within the EC / outside Switzerland no shipping, travel or boarding expenses are covered. For determination of the warranty entitlement, please submit a copy of the purchase receipt, or a copy of the warranty certificate, and if applicable, evidence of the warranty extension. The type plate on the device must be completely legible. Otherwise, ATEN is entitled to refuse to provide warranty devices. Report defective devices with a short description of the failure to the ATEN Service Line in case we intend to exchange with a replacement device with an equivalent exchange device within 2 working days in a suitable transport packaging. The defective device in this transport packaging is to be provided for reshipping to ATEN. All warranty services are only then free of charge in case the actions are performed outdoors together with ATEN.

### Scope of the factory warranty

- The factory warranty does not cover damages that occur due to:
- > transport damage,
  - > incorrect installation or commissioning,
  - > failure to observe the documentation and the maintenance regulations,
  - > modifications, changes, or alterations/repairs,
  - > incorrect use or inappropriate operation,
  - > insufficient ventilation of the device,
  - > failure to observe the applicable safety regulations (VDE standards, etc.),
  - > large malfunctions (e.g. lightning, overvoltage, storm, fire).

Neither does it cover cosmetic defects which do not influence the energy production.

Claims that go beyond the rights cited in the warranty conditions, in particular claims for compensation for direct or indirect damages arising from the defective device, for compensation for costs arising from disassembly and reinstallation, or loss of profits are not covered by the factory warranty. As for ATEN is not subject to statutory liability. In such cases, please contact the company that sold you the device. Events claims in accordance with the law on product liability remain unaffected.