THREE PHASES ON-GRID PV INVERTER

PV-60000T-U/PV-75000T-U

Installation & Operation Manual

Contents

Foreword

Thank you for choosing the latest generation of the on-grid photovoltaic (PV) string inverter (hereinafter referred to as the inverter) designed and developed by PrimeVOLT.

This user manual introduces the inverter in terms of its installation, electrical connections, operation, commissioning, maintenance, and troubleshooting. Please read through the manual carefully before installing and using the inverter, and keep the manual well for future reference.

Models

- PV-60000T-U
- PV-75000T-U

Intended Audience

This user manual is intended for the inverter operating personnel and qualified electrical technicians.

Notes

This user manual is subject to change (specific please in kind prevail) without prior notice. The latest version of user manual and other more information about the product are available from www.primevolt.com, and/or by consulting your dealer.

For more product information, please visit PrimeVOLT website or contact with our sales representatives.

Symbol Conventions

Safety symbols used in this manual, which highlight potential safety risks and important safety information, are listed as follows:

Symbol	Description
⚠ DANGER	Indicates an imminently hazardous situation which, if not correctly followed, will result in serious injury or death.
⚠ WARNING	Indicates a potentially hazardous situation which, if not correctly followed, could result in serious injury or death.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not correctly followed, could result in moderate or minor injury.
⚠ NOTICE	Indicates a potentially hazardous situation which, if not correctly followed, could result in equipment failure to run, or property damage.
📄 NOTE	Calls attention to important information, best practices and tips: supplement additional safety instructions for your better use of the inverter to reduce the waste of your resource.

1   Safety Precautions

Before beginning your journey, please read these safety precautions in User Manual carefully.

1.1 Safety of Personnel

- ◉   The inverter must be installed, electronically connected, operated and maintained through specially trained technician;
- ◉   The qualified technician must be familiar with the safety regulations of electrical system, working process of PV power generation system, and standards of local power grid;
- ◉   The technician must read through this User Manual carefully and master it before any operation.

⚠ NOTICE	As soon as receiving the inverter, please check if it is damaged during its transportation, If yes, please contact your dealer immediately.

1.2 To Protect the Inverter

- ◉   Do not on the inverter enclosure because these signs contain important information about safe operation.
- ◉   Do not remove or damage the product label on the inverter's enclosure because it contains important product information.
- ◉   Do not remove the anti-dismantle label on the inverter's enclosure because it is the basis for product warranty.

⚠ NOTICE	Please read the User Manual carefully before installing the inverter. Warranty or liability will be void from PrimeVOLT if damage is caused by installation faults.

1.3 Safety During Installation

- ◉   Ensure there is no electronical connections around ports of the PV inverter before installing;
- ◉   Adequate ventilation must be provided for inverter installation location. Mount the inverter in vertical direction, and ensure that no object is put on the heat sink affecting the cooling. (For details, refer to Chapter 4 Installation)

1.4 Electrical Connections

⚠ DANGER	Before installing the inverter, check all electrical ports to ensure no damage and no short circuit. Otherwise personal casualty and /or fire will occur.

- Input terminals of the inverter apply only to input terminals of PV string; do not connect any other DC source to the input terminals.
- Before connecting PV modules, ensure that is its voltages is within the safe range; when exposed to any sunlight, PV modules can generate high voltage.
- All electrical connections must meet the electrical standards of the country or region.
- Cables used in electrical connections must be well fixed, good insulation, and with appropriate specification.

⚠ DANGER	While the inverter operating, high voltage can lead to an electrical shock hazard, and even cause personal casualties. Therefore, operate the inverter strictly according to the safety precautions in the user manual.

1.5 Operating and Commissioning

- Before getting the permission of electrical power sector in the country / region, the inverter cannot start generating power.
- Follow the procedures of commissioning described in the user manual when commissioning the inverter.
- Do not touch any other part's surface except the DC switch when the inverter is operating; its partial parts will be extremely hot and can cause burns.

⚠ DANGER	Power OFF all electrical terminals before the inverter maintenance; strictly comply with the safety precautions in this document when operating the inverter.

1.6 Maintenance

- For personal safety, maintenance personnel must wear appropriate personal protective equipment (like insulation gloves and protective shoes) for the inverter maintenance.
- Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.
- Follow the procedures of maintenance stipulated in the manual strictly.
- Check the relevant safety and performance of the inverter; rectify any faults that may compromise the inverter security performance before restarting the inverter.

1.7 Additional Information

⚠ NOTICE	To avoid any other unforeseeable risk, contact PrimeVOLT immediately, if there is any issue found during operation.

2 Product Overview

This chapter introduces the inverters and describes their function, network application, appearance, dimensions, and working process etc.Function of the Product

PV-60000T-U and PV-75000T-U are three-phase on-grid PV string inverter (transformer less) that converts the DC power generated by PV strings into AC power and feeds the power into power grid.

⚠ WARNING	The inverter is transformerless. Add an isolation transformer before grounding the positive/negative terminal of PV modules (like Thin Film module) for operation.
⚠ WARNING	Do not connect PV modules in parallel to several inverters for operation.

2.2 Network Application

【On-Grid PV Power System】

PV-60000T-U and PV-75000T-U apply to on-grid PV power systems for outdoor power stations. Typically, an on-grid PV power system consists of PV modules, DC switchboard, on-grid PV inverters, AC switchboard, and low-voltage power grid, as shown in Figure 2.1.
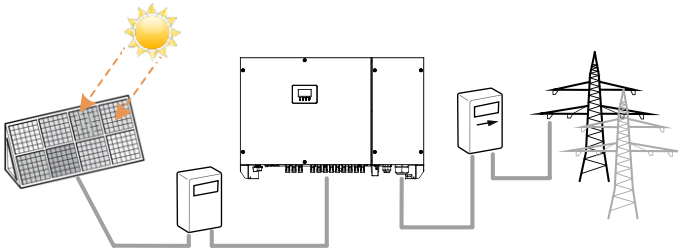
Figure 2.1 On-grid PV power system

This series of inverter supports TN-S, TN-C, TN-C-S, and TT systems, as shown in Figure 2.2
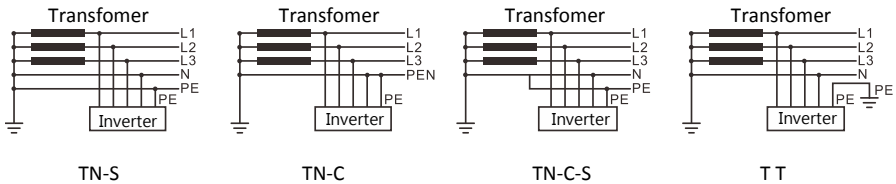
Figure 2.2 Power grids supported by PV-60000T-U/PV-75000T-U

2.3　Outline and Dimensions

【**Dimensions**】

855

275

500

565
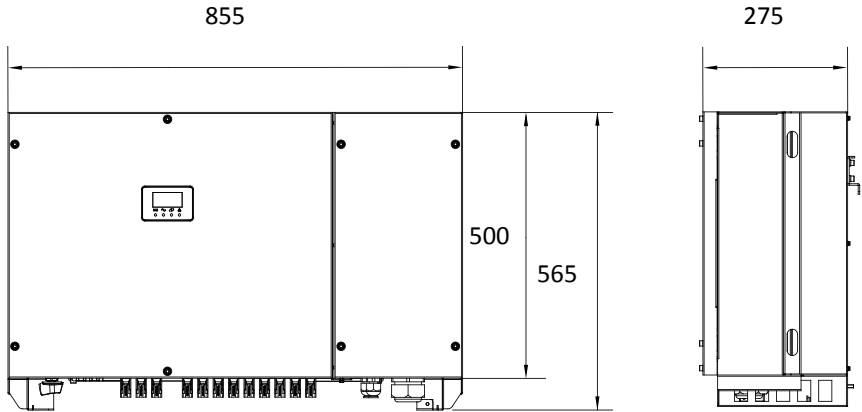
Figure 2.3 Dimensions of PV-60000T-U/PV-75000T-U (unit: mm)

【**Outline**】

1. PV Indicator
2. Grid Indicator
3. COM Indicator
4. Warning Indicator
5. LCD
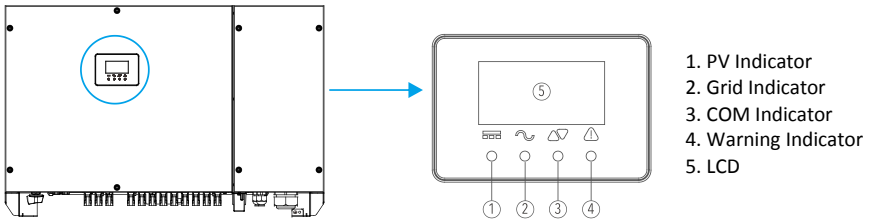
Figure 2.4 Display area of PV-60000T-U/PV-75000T-U

Bracket for mounting
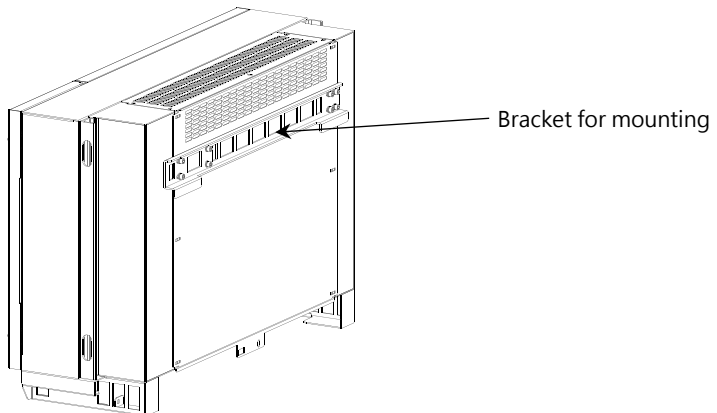
Figure 2.5 Back view of PV-60000T-U/PV-75000T-U

1. DC switch
2. Vent valve
3. DC (PV) input connector
4. Communication interface (optional)
5. Cable gland for signal wires (RS485)
6. Cable gland for AC (grid) cable
7. Fan
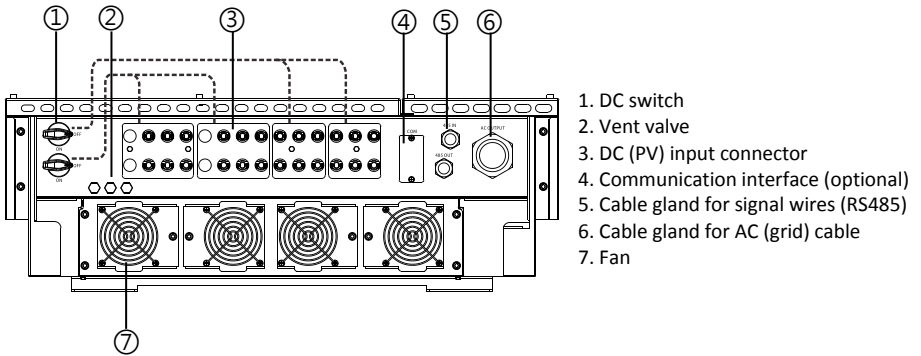
(Dashed lines show the internal links between DC switches and DC (PV) input connectors)

Figure 2.6 Bottom view of PV-60000T-U/PV-75000T-U

2.4   Working Modes

Three working modes of the inverter are shown as follows: standby, operating, and shutdown. Table 2.1 shows the conditions for the inverter to switch between working modes.

Table 2.1 Working modes description

Modes	Description
Standby	The inverter enters the standby mode when (1) the input voltage of PV strings can enable auxiliary power supply to run, but cannot meet the inverter operation requirements. (2) the input voltage of PV strings can meet the inverter to-start requirements, but cannot meet its minimum power requirements.
Operating	When the inverter is on-grid and generates electricity, it (1) tracks the maximum power point to maximize the PV string output. (2) converts DC power from PV strings into AC power and feeds the power to the power grid. The inverter will enter to the shutdown mode if detecting a fault or a shutdown command)
Shutdown	The inverter switches from standby or operating mode to shutdown mode if detecting a fault or a shutdown command. The inverter switches from shutdown mode to standby mode if receiving a Startup command or detecting that a fault is rectified.

3 Storage

The following storage instructions apply if the inverter will not be deployed immediately:

- ⊙ Do not unpack the inverter (put desiccant in the original box if the inverter is unpacked).
- ⊙ Store the inverter at a temperature range from -40°C to +70°C and with the relative humidity from 0% to 100% (no condensation).
- ⊙ Do not tilt the box or flip the box to upside-down condition.
- ⊙ Ensure that qualified personnel inspect and test the inverter before use if it has been stored for a long time.

4 Installation

⚠️	DANGER	Do not install the inverter on flammable building materials or in an area that stores flammable or explosive materials.
⚠️	CAUTION	Do not install the inverter in a place where personnel are likely to come into contact with its enclosure and heat sinks to avoid electrical shock / burn.

【**Checking the Outer Packing**】

- ⊙ When receiving the inverter, check that the packing materials are intact.
- ⊙ After unpacking, check that the deliverables are complete, intact, and consistent with your order list.
- ⊙ Examine the inverter and its fittings for damage such as scraps and cracks.

Ⓐ	Inverter
Ⓑ	Mounting bracket
Ⓒ	User manual
Ⓓ	3 sets of M12*40 SEMS screw, washer, and nut (used to install the mounting bracket onto the supporting structure)
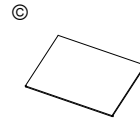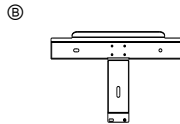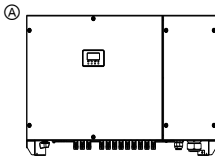
⚠️	NOTICE	If any damage mentioned above is found, contact the dealer immediately.

【**Moving the inverter**】

After checking the outer packing, move the inverter out of the box to the designated installation location. Hold the handles on both sides of the inverter as shown in Figure 4.1.
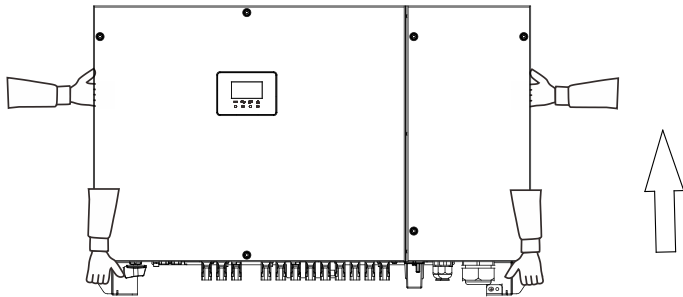
Figure 4.1 Moving the inverter

⚠ CAUTION	The inverter is relatively heavy! To prevent device damage and injury of personnel, arrange two persons to move the inverter and handle with care.
⚠ CAUTION	Do not place the inverter with its wiring terminals contacting the floor because the power ports and signal ports at the bottom of the device are not designed to support the weight of the inverter. When placing the inverter on the floor horizontally, put foam sheets or corrugated fiberboards under the inverter to protect its enclosure.

【**Identify the inverter**】

- ⊙ Identify following information from the label on the side of the inverter: the model number, technical specifications, and compliance symbols.
- ⊙ Compliance and safety symbols:

Safety symbol	Description
5 mins	There are residual voltages in the inverter. It needs 5 minutes to finish discharge.
⚠ (hot surface)	The inverter must not be touched when in operation. Its enclosure and heat sinks are extremely hot.
⚠ (electrical shock)	Electrical shock! This part is charged. Only qualified and / or trained electrical technicians are allowed to perform operations on the inverter.
📖 (read manual)	Please read the User Manual carefully before installing the inverter.

4.1   Determining the Installation Position

【**Basic Requirements**】

- ◉   The inverter is protected to IP66 and can be installed indoors or outdoors.
- ◉   The weight and dimensions of PV-60000T-U/PV-75000T-U are as shown in Table 4.1. The installation method and position must be appropriate for the weight and dimensions of the inverter.
- ◉   Do not install the inverter in a place where personnel are likely to come into contact with its enclosure and heat sinks because these parts are extremely hot during operation.
- ◉   Do not install the inverter in an area that stores flammable or explosive materials.

Table 4.1 Table of the weight and dimensions of each model

Inverter model	PV-60000T-U	PV-75000T-U
Weight (kg)	73	
Dimensions (W x H x D)(mm)	855*565*275	

【**Installation Environment Requirements**】

- ◉   The ambient temperature lower than $50\,^{o}C$ ensures the inverter's optimal operation and extends its service life.
- ◉   The inverter must be installed in a well ventilated environment to ensure good heat dissipation.
- ◉   The inverter must be free from direct exposure to sunlight, rain, and snow to extend its service life. It is recommended that the inverter be installed in a sheltered place. If no shelter is available, build an awning, as shown in Figure 4.2
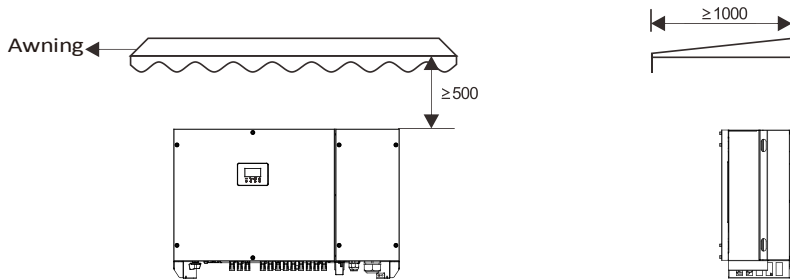
Figure 4.2 Installation environment with awning (unit: mm)

【**Requirements for the Supporting Structure**】

- ◉   The supporting structure must be solid enough to bear the weight of the inverter.
- ◉   The material of the supporting structure must be nonflammable.

【**Installation Space Requirements**】

- ⊙ It is recommended that the inverter be installed at eye level to facilitate operation and maintenance.
- ⊙ Reserve enough clearance around the inverter to ensure sufficient space for installation and heat dissipation, as shown in Figure 4.3.
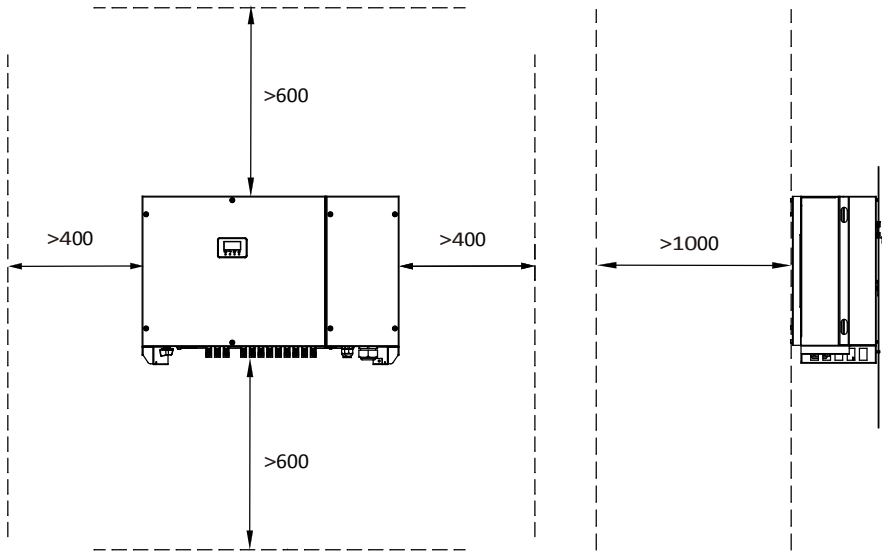
Figure 4.3 Installation space requirements (unit: mm)

- ⊙ When installing multiple inverters, install them along the same line (as shown in Figure 4.4) if sufficient space is available , or install them in stacked arrangement (as shown in Figure 4.5) if no sufficient space is available. These arrangements ensure sufficient space for installation and heat dissipation.
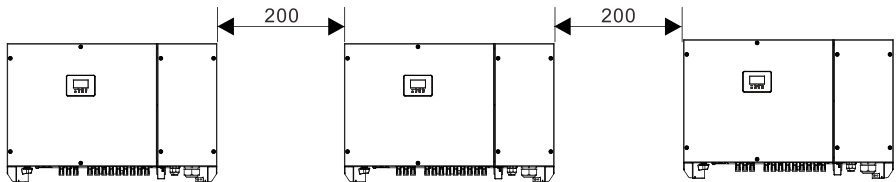
Figure 4.4 Installation along the same line (unit: mm)
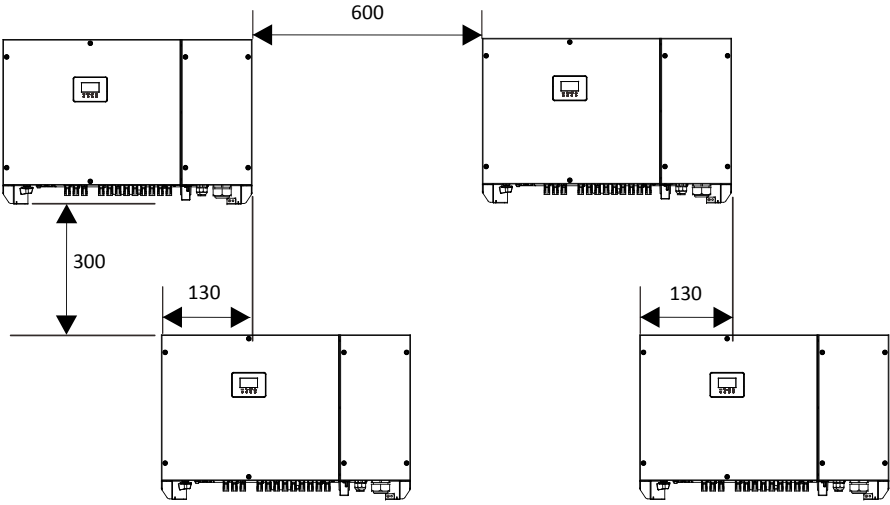
Figure 4.5 Installation in stacked arrangement (unit: mm)

| ⚠ | NOTICE | The clearance between inverters must be increased to ensure proper heat dissipation when they are installed in a hot area. |

【**Upright Installation**】

Install the inverter upright or at a maximum backward tilt of 15 degrees to facilitate heat dissipation. Below are some correct / wrong installations, as shown in Figures 4.6 & 4.7
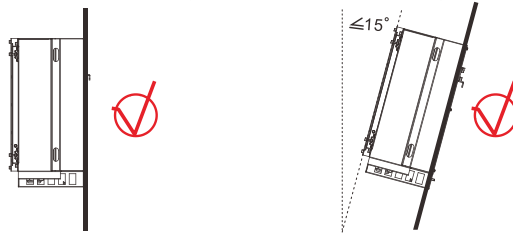
Figure 4.6 Examples of correct installations
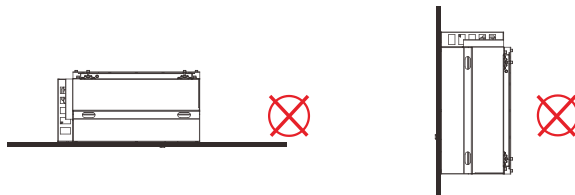
Figure 4.7 Examples of wrong installations

⚠️	NOTICE	Wrong installations will lead to failure of the inverter operation.

4.2 Installing the Inverter

◉ Step 1：Position the mounting bracket onto the supporting structure. Dimensions of the mounting bracket can be seen in Figure 4.8.
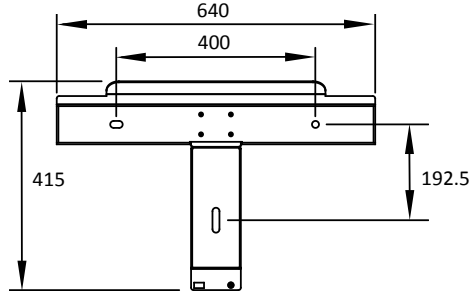
Figure 4.8 Dimensions of the mounting bracket (unit: mm)

◉ Step 2 : Fasten the mounting bracket onto the supporting structure with 3 sets of M12*40 SEMS screw, washer, and nut as shown in Figure 4.9. Torque: 42N•m,
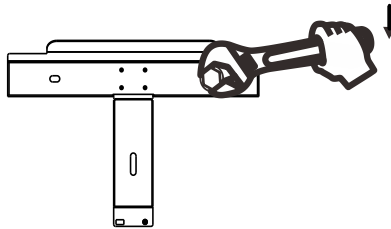
Figure 4.9 Fastening the mounting bracket onto the supporting structure

◉ Step 3：Install the inverter onto the mounting bracket. Ensure that the three supporting points (on the rear side of the inverter) contact the mounting bracket correctly, as shown in Figure 4.10
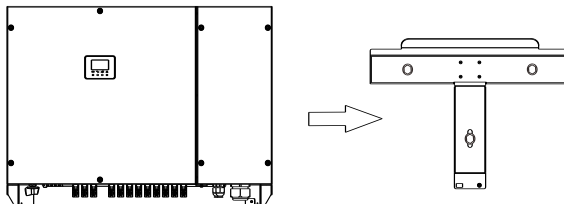
Figure 4.10 Install the inverter onto the mounting bracket

	DANGER	Before drilling any hole on the supporting structure, ensure no damage will appear on any electric wire and/or any water pipe inside the supporting structure.

5 Electrical Connections

⚠ DANGER	Before performing any electrical connections, ensure that both DC and AC Switches are OFF. Otherwise, fatal injury can occur due to the high voltage caused from AC and DC cables.

【Electrical block diagram】
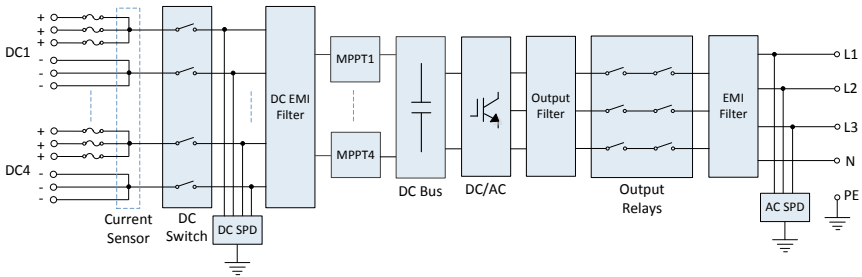
5.1 Connecting The Protection Ground (PGND) Cable

【Preparation】

Please prepare the ground cable and the ring terminal as recommended below:

⊙ Ground cable : The outdoor stranded cable with conductive cross-sectional area ≥ $30mm^2$ is recommended.

⊙ Ring terminal : For M6 screw.

NOTE	Good grounding for the inverter helps resist the impact of surge voltage and improve the EMI performance. Connect the PGND cable before connecting the AC power cables, DC power cables, and communications cables.
NOTE	It is recommended that the ground cable be connected to a nearby ground position. For a system with multiple inverters connected in parallel, connect the ground points of all inverters to ensure equipotential connections.

【**Wiring Procedures**】

◉ Step1：Strip an appropriate length of the insulation from the PGND cable using a wire stripper; the length is a little bit longer than that of ring terminal's crimping end by 2mm~3mm, as shown in Figure 5.1
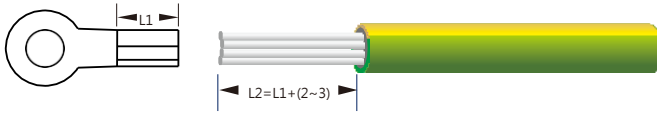
Figure 5.1 Stripped length (unit: mm)

◉ Step 2：Insert the exposed core wires into the crimping areas of the ring terminal and crimp them using hydraulic pliers, as shown in Figure 5.2
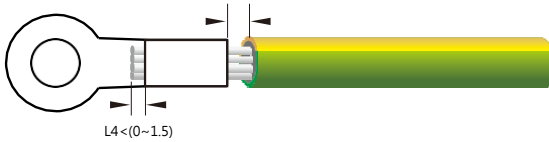
Figure 5.2 Crimping a cable (unit: mm)

◉ Step 3： Remove the ground screw from the ground point, secure the PGND cable (from step 1 & 2) using the ground screw with a torque of 5 N•m, as shown in Figure 5.3. The PE (ground) wire must be well grounded to ensure that impedance between Neutral wire and Earth wire be less than 10Ω.
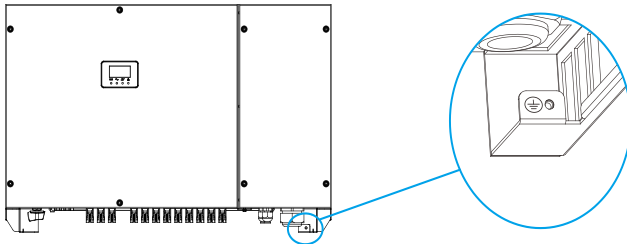
Figure 5.3 Securing the PGND cable to the ground point

5.2　Connecting AC Output Cables

【Preparation】

The AC power cable and AC terminals have been prepared. Outdoor stranded copper cables are recommended for AC power cable. Solid cables and aluminum cables should not be used. Table 5.1 describes the specifications.

Table 5.1　Cable Specifications (recommended)

	Cable type (≥ 90°C)	Conductor cross section per core (mm^2)	Screw	Notes
AC terminal	5-core stranded outdoor cable	≥30	M8	Terminal connection
	4-core stranded outdoor cable			
Protection Ground (PGND) Cables	Single-core stranded outdoor cable	≥30	M6	Terminal connection

AC wiring terminals: An independent three-phase circuit breaker must be installed on the AC side of each inverter to ensure that the inverter can be safely disconnected from the power grid. Do not install leakage current protection switch in the inverter system, and if for special reasons leakage current protection switch is a must between inverter output terminal and power grid, please install a model B leakage current protection switch with no less 600 mA current. Do not share neutral wire when B leakage current protection switch is installed, or else a power grid trip may occur.

	WARNING	An independent three-phase circuit breaker must be installed on the AC side of each inverter; Do not install one circuit breaker for multiple inverters
	WARNING	Do not connect loads between the AC output terminals of the inverter and the circuit breaker.

【AC (Grid) Wiring】

- ⊙　AC output wiring is operated within the wiring chamber on the right-hand side of the inverter. Before connecting AC cables, you need to loosen the four screws on the cover of the wiring chamber using a hex key and then remove the cover. Please follow below steps to connect AC wires for the sake of your personal and property safety:
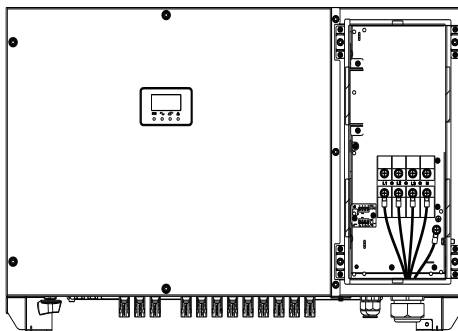
Figure 5.4 The wiring chamber on the right-hand side of the inverter

⊙ Step 1：Strip an appropriate length of the jacket and insulation from the AC output cable. Insert the exposed core wires into the crimping area of the ring terminals and then crimp them using hydraulic crimping tools (the crimping area must be wrapped by heat shrink tubing or insulation tape).

⊙ Step 2：Loosen the nut on the AC OUTPUT cable gland at the bottom of the inverter.

⊙ Step 3：Route the AC cable through the nut of the cable gland, penetrate the rubber film in the cable gland, connect the AC wires to the AC terminal block and the ground location in the wiring chamber, and then tighten the screws on the AC terminal block and the ground location to fasten those wires with 12 N•m torque.

⊙ Step 4：Tighten the nut on the AC OUTPUT cable gland with 12 N•m torque and add proper waterproof measure (ex: add silicone). To prevent the inverter from being damaged by small animals or moisture, gaps in the cable gland must be sealed with silicone as illustrated.

⊙ Step 5：Put the cover onto the wiring chamber (oval-shape holes on the short side of the cover must face the floor) and then tighten the four screws on the cover with 3 N•m torque.

Heat shrink tubing
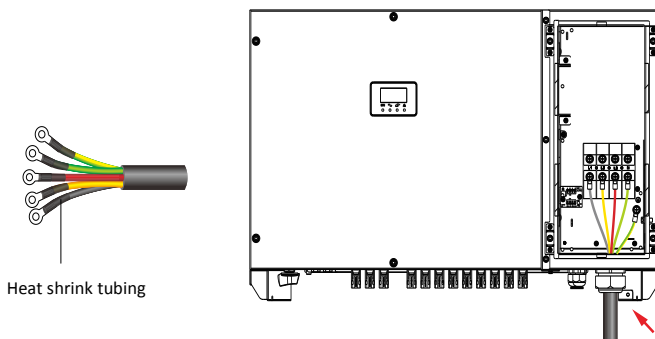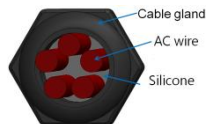
Figure 5.5 Connecting AC Wires

20

	NOTE	For the operation and the safety, please prepare multi-stranded wires, crimping terminals and a proper crimping tool before AC wiring

5.3   Connecting PV Strings

⚠ DANGER	PV-string connections need below prerequisites; otherwise, an electrical shock can occur.

Before connecting DC input power cables, ensure that all DC switches on the inverter are OFF.

When the inverter is on-grid, it is not allowed to maintain DC input power cables, such as connect or disconnect a string or a module in a string. Only after the inverter enters in shutdown mode, it is allowable for preceding DC input power cables maintenance.

⚠ WARNING	Grounding PV strings needs below prerequisites; otherwise, a fire can occur.

PV modules connected in series in each PV string must be of the same specifications.

The maximum open circuit voltage of each PV string must be always lower than or equal to its permitted range.

The maximum short circuit current of each PV string must be always lower than or equal to its permitted range.

The positive and negative terminals of PV modules must be connected to the positive and negative DC input terminals of the inverter respectively. Do not short-circuit the positive and negative terminals of PV modules.

The total power from all PV strings must be lower than or equal to the maximum input power of the inverter.

Only non-grounding PV module is applicable. Require PV modules that have IEC 61730 class A rating.

⚠ NOTICE	**Notice！** In order to avoid fuse broken, please do not parallel multiple DC strings prior to connect DC input if you choose the models with DC fuse built-in.

【**Preparation**】

◉   The maximum number of PV strings to meet input pairs of the inverter can be seen below:

Model	Max. Number of PV Strings
PV-60000T-U/PV-75000T-U	12

- ⊚ Do not connect more than one PV string to single DC input pair of the inverter, or the fuse in the inverter might be blown.
- ⊚ Please prepare outdoor copper-core DC input cables as recommended in Table 5.2:

Table 5.2   Recommended specification of DC input cables

Inverter Model	Cable Type	Cross Section (mm^2)
PV-60000T-U/ PV-75000T-U	Dedicated wire for photovoltaic system	3.5 ~ 5.5

- ⊚ Connectors of PV strings : Positive and negative DC input connectors are used, as shown in Figure 5.6 and 5.7.
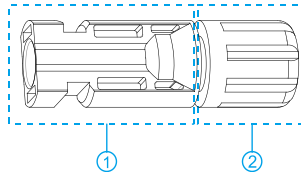
① The insulation layer   ② Locking nut
Figure 5.6 Positive connector compositions
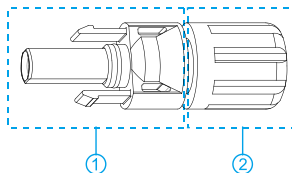
① The insulation layer   ② Locking nut
Figure 5.7 Negative connector compositions

【DC (PV) Wiring】

- ⊚ Step 1：Strip an appropriate length of the insulation from the positive and negative DC cables using a wire stripper, as shown in Figure 5.8.

Positive metal terminal

8~10

Negative metal terminal
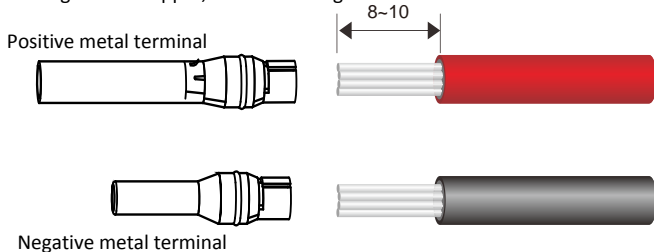
Figure 5.8 Stripping insulation from DC cables (unit：mm)

- ⊚ Step 2：Insert the exposed areas of the positive and negative DC cables into the metal terminals of the positive and negative connectors respectively and then crimp them, as shown in Figure 5.9.
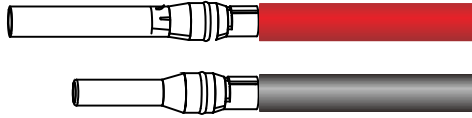
Figure 5.9 Crimping metal terminals

◉　Step 3：Insert the crimped positive and negative metal terminals into the plastic housings of the corresponding positive and negative connectors until a "click" sound is heard, as shown in Figure 5.10
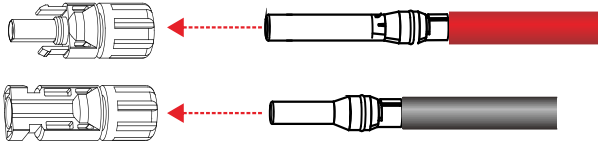
Figure 5.10 Inserting crimped metal terminals into plastic housings of the connectors

◉　Step 4：Tighten nuts on the positive and negative connectors with 2 wrenches of the connector, as shown in Figure 5.11
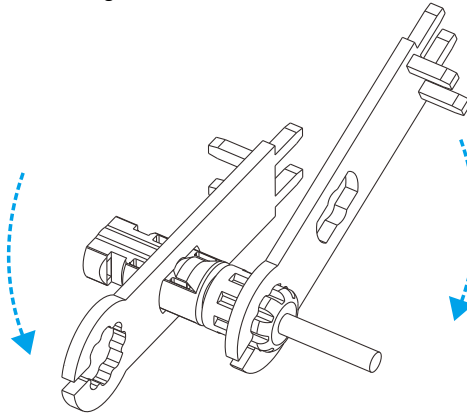
Figure 5.11 Tightening the nut on the connector

◉　Step 5：Measure the voltage of each input pair using a multimeter. For PV-60000T-U/PV-75000T-U the voltage should not be over 1100 VDC. Ensure that the polarities of the DC input power cables are correct, as shown in Figure 5.12
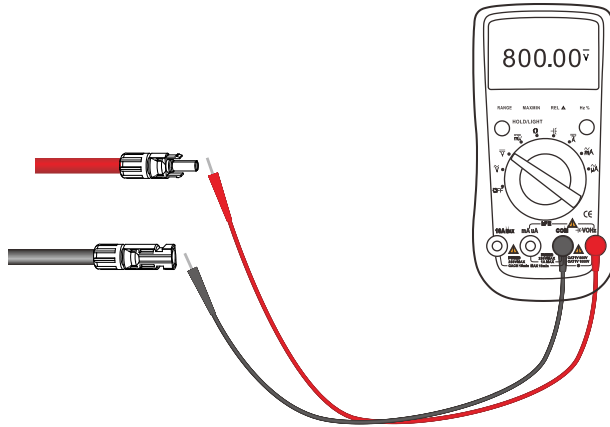
Figure 5.12 Checking the voltage of each input pair

◉ Step 6 : Insert the positive and negative connectors into their corresponding terminals on the inverter until a "click" sound is heard, as shown in Figure 5.13
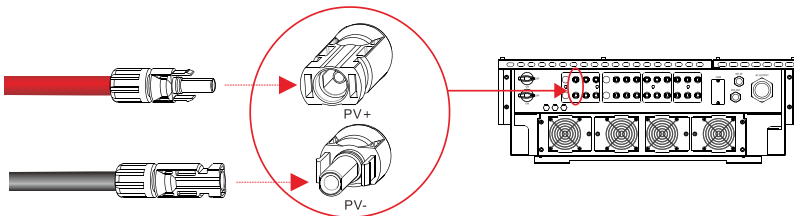
Figure 5.13 Connecting to the inverter

◉ Step 7：After connecting the PV strings, ensure that all connectors are in position by checking for resistance when a slight pull is applied.

5.4   Connecting Communıcations Cables

【About WIFI】(Optional)

The WIFI module is connected to the inverter through DE-9 (commonly known as DB-9) port. The WIFI module communicates with cloud server through wired or wireless network to monitor inverters' data status.

【About RS485】

The external data logger collects data from inverters through RS485 connections and then upload data to the cloud server to monitor inverters' data status.

Standard RS485 connection, as shown in Figure 5.14
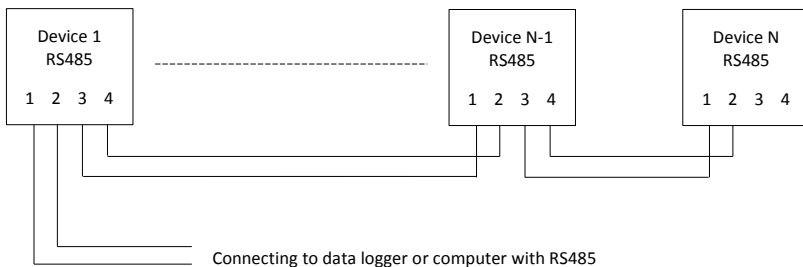
Figure5.14 Standard RS485 connection

【Terminal resistance setting】

Turn RS485 Resistance to ON from the dial switch of the inverters on the end of the chain.

NOTE	Ensure that the appropriate length of communications cable between every two inverters is less than 200m and communications cable must be separated from other power cables to avoid communications interference.

【Connecting RS485】

RS485 wiring is operated within the wiring chamber on the right-hand side of the inverter, as shown in Figure 5.15.
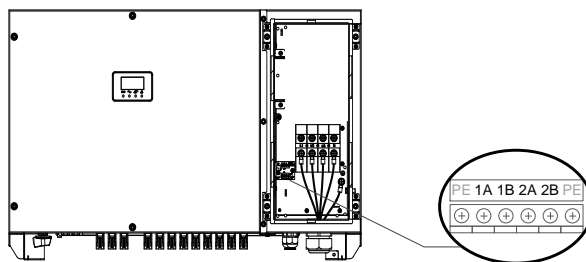
Figure 5.15 The location of the terminal block for RS485 wiring

- ⊙ Step 1 : Loosen the four screws on the cover of the wiring chamber using a hex key and then remove the cover. Loosen nuts on "RS485 IN" and "RS485 OUT" cable glands at the bottom of the inverter.
- ⊙ Step 2 : Strip an appropriate length of the jacket and insulation from RS485 cables. Route the RS485 cables through the nuts of RS485 cable glands, and then route the RS485 cable from the data logger to penetrate the rubber film in "RS485 IN" cable gland and route the RS485 cable for connecting another inverter to penetrate the

25

rubber film in "RS485 OUT" cable gland.

◉ Step 3 : Connect the positive and negative signal wires from the data logger to 1A and 1B on the terminal block respectively, and connect 2A and 2B on the terminal block of this inverter to 1A and 1B on the terminal block of another inverter respectively (as shown in Figure 5.16). Tighten all screws on all terminal blocks. Tighten the nuts on "RS485 IN" and "RS485 OUT" cable glands and add proper waterproof measure (ex: add silicone). To prevent the inverter from being damaged by small animals or moisture, gaps in the cable gland must be sealed with silicone as illustrated. Put the cover onto the wiring chamber (oval-shape holes on the short side of the cover must face the floor) and then tighten the four screws on the cover with 3 N•m torque.
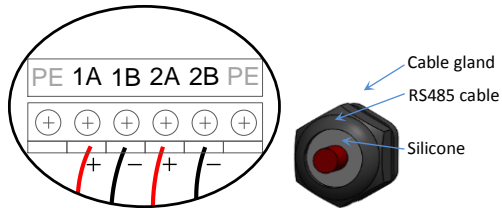
Figure 5.16 Connecting RS485 wires to the terminal block

	NOTE	To prevent corrosion, apply silicone to the terminals or interface after connecting PGND cables, AC cables, RS485 port, and Ethernet port.

【Modbus Address setting】

For Android, please go to the Google Play Store to download the PrimeVOLT APP,
For iOS, please go to the Apple Store to download the PrimeVOLT APP
Further instructions, please refer to
https://www.apd.com.tw/our-products/pv-inverter/download-center/user-manual/
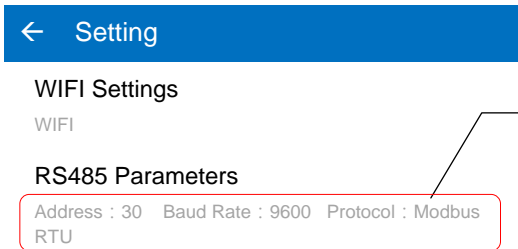
The default Modbus address is 1, and if needed, you can revise the address (the recommended address is 1-247).

Modbus address can't be identical when one RS485 is wired with multiple inverters

6 Installation Verification

Check the following items after the inverter is installed according to Table 6.1.

Table 6.1 Self-check items after installation

1. No other objects put on the inverter.
2. All screws, especially the screws used for electrical connections, are tightened.
3. The inverter is installed correctly and securely.
4. Ground, AC, DC, and communications cables are connected tightly/correctly and securely.
5. Check the protected earth wire PGND is correctly connected and reliable.
6. Check there is no open or short circuits at AC and DC terminals using multimeter..
7. Waterproof connectors at AC terminals and RS485 ports are plugged with waterproof plugs tightly.
8. Covers at AC terminals are tightened.
9. Idle terminals are sealed.
10. All safety warning symbols are intact and complete on the inverter.

7　System Operation

⚠ WARNING	To avoid the electrical shock! Only trained electrical technicians are allowed to perform operations on the inverter.

【**Powering ON the Inverter**】

- ⊙　Step 1 : Switch ON the AC circuit breaker.
- ⊙　Step 2 : Set the DC SWITCH of the inverter to ON.
- ⊙　Step 3 : Observe statuses of LED indicator lights on the inverter according to Table 7.1.

📄 NOTE	When LED status lights display the inverter has entered grid-connecting, it means the inverter is operating well. Any query during operating the inverter, call your dealer.

【**Powering OFF the Inverter**】

- ⊙　Step 1 : Switch off the circuit breaker at AC terminal.
- ⊙　Step 2 : Set the DC SWITCH to OFF.

⚠ WARNING	After the inverter powers off, the remaining electricity and heat may still cause electrical shock and body burns. Please only begin servicing the inverter 5 minutes after the power-off.

8 User Interface

The display area of the inverter is composed of LED indicators and a LCD (LCD is optional for some models of inverter). LED indicators includes PV Indicator, Grid Indicator, COM Indicator, and Warning Indicator.

①	PV indicator
②	Grid indicator
③	COM indicator
④	Warning indicator
⑤	LCD
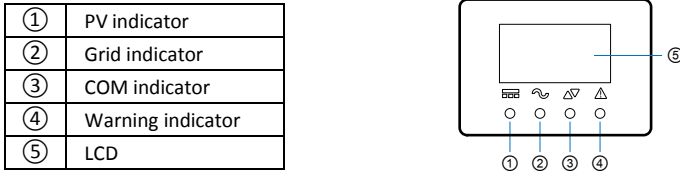
Figure 8.1 Composition of the display area

Table8.1 Information from LED indicators

LED Indicator	Status	Description
PV Indicator	on	Voltage of PV strings meets the requirements for inverter grid-connecting to generate power.
	blink	Voltage of PV strings can't meet the requirements for inverter grid-connecting to generate power.
Grid Indicator	blink	Power grid abnormal, and can't meet the requirements for inverter grid-connecting to generate power.
	on	When grid-on, the blink (every cycle last 30s) of Grid Indicator means loading amounts: quantity of blink means power size, and after that the Indicator keeps ON. When less than 20% rated power, blink one time; 20%-40% rated power, blink twice every 30s; 40%-60% rated power, blink three times every 30s; 60%-80% rated power, blink four times every 30s; 80%-100% rated power, blink five times every 30s.
COM Indicator	blink	Communications data transmission is underway.
	Off	No external communications is connected or no communications data transmission.
Warning Indicator	on/blink	Refer LED status in warning table
	off	No warning

Figure 8.2 LCD Screen

(1) COM

When WIFI / Bluetooth is transferring data, icon 🔊 / 🕸 will be ON, while no data transmission, the icon will be off after 10s. When RS485 is transferring data, icon ⇄ will be ON, while no data transmission, the icon will be off after 10s.

(2) Notice/ Alarm

Whenwarning is triggered, icon ⚠88 will be illuminated: from left to right the firstbit could be 웃(A)/ᄂ(B)/ᄃ(C) , it stands for warning type, and the second bit iswarning code, please visit PrimeVOLT official website for more information.

(3) Date

When external communications is normal and time zone is set correctly, thebuilt-inclock of inverter will be synchronized with server's time.

(4) Status

Icon ⊞ stands for PV strings; when inverter is standby status, MPPT voltage of the PVstring will be displayed in Meter zone.

Icon ⊼ stands for grid; when voltage and frequency of power grid is in normal range, the icon keeps on, or else, it blinks; when there is no voltage, the icon will be off.

Icon 》》》 stands for energy flow; when inverter is in normal status, the icon will be on, or else it will be off.

(5) Meter

Normal status: today and total energy, MPPT voltage and current are showed in turn.	
Standby status: counter down value before inverter start up.	
Standby status: counter down value before inverter start up	

30

(6)　Output

Normal status: output power, grid voltage and current are showed in turn.	

Table 8.2 LED status for common fault of the inverter

	Warning code	PV indicator	Grid indicator	COM indicator	Warning indicator
Normal status		●	●/★	◎	○
Starting up		●	○	◎	○
WLAN/ WIFI/ RS485 communication		◎	◎	★	○
PV normal		●	◎	◎	○
Grid over voltage	A0	◎	★	◎	○
Grid under voltage	A1				
Grid absent	A2				
Grid over frequency	A3				
Grid under frequency	A4				
Grid unbalance	A6				
PV over voltage	B0	★	◎	◎	○
PV under voltage	B4				
Weak radiation	B5				
Strings abnormal	B3	◎	◎	◎	★
Inverter over temperature	C5				
Fan abnormal	C8				
Insulation resistance abnormal	B1	●	○	○	●
Leakage current abnormal	B2	○	●	○	●
Strings reverse	B7	○	○	●	●
Control power abnormal	C0	○	★	○	●
DC bias current abnormal	C2	★	●	★	●
Inverter relay abnormal	C3	○	●	●	●
Leakage current HCT abnormal	C6	●	●	○	●
System fault	C7	★	★	★	●
Fan fault	C8	★	○	★	●
DC link voltage unbalance	C9	●	○	●	●
DC link over voltage	CA	○	★	★	●
Internal Communications Fault	CB	○	○	★	●
Software version incompatibility	CC	★	●	○	●
EEPROM fault	CD	★	○	●	●
Sampling inconsistency	CE	★	●	●	●
Invert circuit abnormal	CF	●	●	●	●
Boost circuit abnormal	CG	★	○	○	●

Note means: ● LED light ON, ○ LED light Off, ★ LED blink, ◎ Keep original status

	NOTE	The inverter operation data can be obtained from mobile phone APP downloaded through Bluetooth communications. Details can be found in the user manual of the APP in our official webpage: https://www.apd.com.tw/our-products/pv-inverter/download-center/user-manual/

9 Maintenance

⚠ WARNING	Before maintaining and commissioning inverter and its peripheral distribution unit, switch off all the charged terminals of the inverter and wait at least 5 minutes after the inverter is powered off.

【Routine Maintenance】

Please reference the Table 9.1 maintain content and maintenance interval.

Table 9.1 Maintenance checklist and interval

Check Item	Check Content	Maintain Content	Maintenance Interval
Inverter output status	Statistically maintain the status of electrical yield, and remotely monitor its abnormal status.	NA	weekly
Inverter cleaning	Check periodically that the heat sink is free from dust and blockage.	Clean periodically the heat sink.	monthly
Inverter running status	Check that the inverter is not damaged or deformed. Check for normal sound emitted during inverter operation. Check and ensure that all inverter communications is running well.	If there is any abnormal phenomenon, replace the relevant part.	monthly
Inverter Electrical Connections	Check that AD, DC, and communications cables are securely connected. Check that PGND cables are securely connected. Check that cables are intact and there are not wire aging.	If there is any abnormal phenomenon, replace the cable or re-connect it.	semiannually

【Inverter warning and exception handling】

When the inverter has an exception, its basic common warning and exception handling methods are shown in the Table 9.2.

Table 9.2 Command troubleshooting measures

Alarm Name	Causes	Measures Recommended
Grid Over Voltage Grid Under Voltage AC Absent Grid Over Frequency Grid Under Frequency	The grid voltage exceeds its allowable range.	1. If the alarm occurs accidentally, possibly the power grid is abnormal accidentally. No extra action is needed. 2. If the alarm occurs repeatedly, contact the local power station. After receiving approval of the local power bureau, revise the electrical protection parameters setting on the inverter through RS485. 3. If the alarm persists for a long time, check whether the AC circuit breaker / AC terminals is disconnected or not, or if the grid has a power outage.
PV Over Voltage	PV modules input voltage exceeds the inverter's allowable range.	Check the number of PV modules and adjust it if need.
PV Under Voltage	PV modules input voltage is under the inverter's defaulted protection value.	1. When sunlight intensity weakens, PV modules voltage decreases. No action is needed. 2. Id such phenomena occur when sunlight intensity does not weaken, check if there is short circuit, open circuit etc. in the PV strings.
Insulation Resistance Abnormal	A short circuit exists between PV strings and protection ground. PV strings are installed in a long-term moist environment.	Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault.
Residual Current Abnormal	The insulation resistance against the ground at the input side decreases during the inverter operation, which causes excessively high residual current.	1. If the alarm occurs accidentally, possibly the external circuits are abnormal accidentally. The inverter automatically recovers to the normal operating status after the fault is rectified. 2. If the alarm occurs repeatedly or lasts a long time, check whether the insulation resistance against the ground of PV strings is too low.

PV Strings Abnormal	PV strings have been shielded for a long time. PV strings are deteriorating.	1. Check whether the PV string is shielded. 2. If the PV string is clean and not shielded, check whether the PV modules are aging or deteriorated.
PV Strings Reverse	The cables of PV strings are connected reversely during the inverter installation.	Check whether the cables of PV strings are correctly connected. If they are connected reversely, reconnect the cables.

	NOTE	If you cannot clear the preceding alarm according the measures recommended, contact your dealer timely.

【**Removing the Inverter**】

Perform the procedure below to remove the inverter:

⊙ Step 1：Disconnect all cables from the inverter, including communication cables, DC input power cables, AC output power cables, and PGND cables.
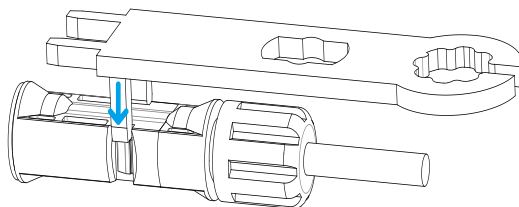
Figure 9.1 Disconnecting a DC input connector

	NOTE	When disconnecting a DC input connector, insert 2 forks on the wrench into 2 slots on the connector, press the wrench down, and then pull out the connector carefully as shown in Figure 9.1.

⊙ Step2：Remove the inverter from the mounting bracket.
⊙ Step 3：Remove the mounting bracket.

	WARNING	Before disconnecting any DC input connector, make sure that DC input switches have been turned to OFF to avoid inverter damage and injury of personnel.

10 Warranty Information

Warranty or liability will be void if damage caused by, but not limited to the following:

- ◉ Unauthorized opening of unit.
- ◉ Installation faults such as improper environment, wiring and applications.
- ◉ Working conditions beyond specified.
- ◉ Improper operation of unit.
- ◉ Violation of safety instructions in this manual.
- ◉ Damage during transportation.
- ◉ Any internal modifications.
- ◉ Replacing or installation of unauthorized software.
- ◉ Unforeseen calamity or force majeure.

11 Disposal of the Inverter

The inverter and its packing case are made from environmental protection material. If the inverter service life has expired, do NOT cut it away with household garbage; dispose the inverter in accordance with local rules for disposal of electrical equipment waste.

12 Technical Specifications

Function	Unit	PV-60000T-U	PV-75000T-U
Input (DC)			
Maximum Power	W	71500	89700
Maximum Voltage	V	1100	
Maximum Current	A	33/33/33/33	
Max. Short Circuit Current	A	42/42/42/42	
Feed-In Voltage	V	250	
MPPT Working Range	V	200～1000	
Input Pairs		12 (3/3/3/3)	
No. of MPP Trackers		4	
Maximum backfeed current to array	mA	1.0	
Fuse *	A	20 (Optional)	
Output (AC)			
Nominal Power	W	60000	75000
Max. Apparent Power	VA	61000	76500
Maximum Current	A	92	
Nominal Voltage	V	220/380 ; 230/400	277/480
Nominal Frequency	Hz	50/60	
Total Harmonic Current	%	<3	
DC Current Injection		<0.5%In	
Power Factor		-0.8～+0.8	
Maximum Output Over-Current Protection	A	170	
Inrush Current	A/ms	170/0.2	
Max. Output Fault Current	A/ms	260/0.5	
General			
Maximum Efficiency	%	98.6	98.6
Euro-eta	%	98.3	98.4
Topology		Transformerless	
Ingress Protection		IP66	
Protection Class		I	
Overvoltage Category		DC input：II、AC input：III	
Cooling		Fan	
Display & Communication			
Display		LED Indicator、LCD	
RS485		Standard	
WIFI		Optional	
Environment			

Operating temperature	°C	-25～60
Humidity	%	0～100
Altitude	m	4000
Noise	dB	60 (typical)

Mechanical		
Dimension (W x H x D)	mm	855*565*275
Weight	kg	73
DC switch		Built-in

Compliances		
Grid Monitoring		VDE-AR-N 4105、CNS 15382
Safety		IEC 62109-1/-2、CNS 15426-1/-2
EMC		IEC/EN 61000-6-2/-4、CNS 14674-2/-4、AS/NZS 61000.6.4

Protection		
System Protection		DC switch, AC/DC over current/load, Ground fault circuit interrupter, Output DC injection, Input reverse connection, Over temperature, Residual current detection, PV array string fault detection, Insulation resistance detection, Output short circuit, AC over/under frequency, Anti-islanding, AC/DC over/under voltage
AC/DC Surge Protection		Standard‧TypeⅡ‧Max.25kA

Note1: In order to avoid fuse broken, please do not parallel multiple DC strings prior to connect DC input if you choose the models with DC fuse built-in.

Note2: Specifications are subject to change without prior notice.

PrimeVOLT Co., Ltd.

ADD：12F., No.97, Sec. I, Xintai 5th Rd., Xizhi Dist., New Taipei City 22175, TAIWAN

TEL：+886-2-2697-5559

FAX：+886-2-2697-3359

E-Mail：contact_pv@apd.com.tw
www .primevolt.com