



User manual
PV Grid-Connected Inverter
Product Model: 1.1K~3.3KTL-G3 (2019.12.24)

Zucchetti Centro Sistemi S.p.A.

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Notice

This manual contains important safety instructions that must be followed during installation and maintenance of the equipment.

Save these instructions!

This manual must be considered as an integral part of the equipment. The manual must always accompany the equipment, even when it is transferred to another user or field.

Copyright Declaration

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Preface

Outline

Please read the product manual carefully before installation, operation or maintenance. This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

Scope

This product manual describes the installation, electrical connections, commissioning, maintenance and troubleshooting of 1.1K~3.3KTL-G3 inverters:

1100TL-G3 1600TL-G3 2200TL-G3

2700TL-G3 3000TL-G3 3300TL-G3

Keep this manual where it will be accessible at all times.

Target Group

This manual is intended for qualified electrical technical personnel who are responsible for inverter installation and commissioning in the PV power system and PV plant operator.

Symbols Used

This manual provides safety operation information and uses the symbol in order to ensure personal and property security and property security and use inverter efficiently when operating the inverter. You must understand these emphasized information to avoid the personal injury and property loss. Please read the following symbols used in this manual carefully.

| | |
|---|--|
|  Danger | Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
|  Warning | Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
|  Caution | Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |
|  Attention | Attention indicates potential risks which, if not avoided, may lead to equipment fault or property damage. |
|  Note | Note provides tips that are valuable for the optimal operation of the product. |

1. Basic safety information



Note

If you have any question or problem when you read the following information, please contact us.

Outlines of this chapter

Safety instruction

It mainly introduce the safety instruction when install and operate the equipment.

Symbols and signs

It mainly introduce the safety symbols on the inverter.

1.1. Safety instructions

Read and understand the instructions of this manual, and be familiar with relevant safety symbols in this chapter, then start to install and troubleshoot the equipment.

According to the national and state requirements, before connecting to the electrical grid, you must get permission from the local electrical grid operation can only be performed by qualified electrical engineer.

Please contact the nearest authorized service center if any maintenance or repair is needed. Contact your distributor for the information of the nearest authorized service center. Do NOT repair it by yourself, it may cause injury or property damage.

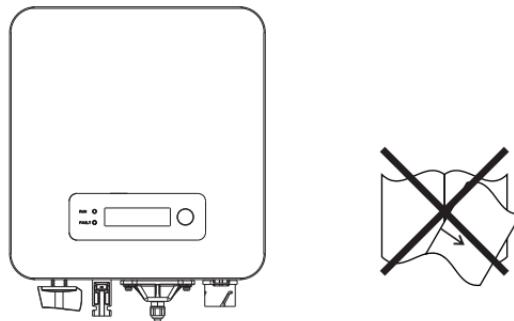
Before installing and maintaining the equipment, you should turn the DC switch OFF to cut off the high voltage DC of the PV array. You can also turn the switch in the PV combiner box OFF to cut off the high voltage DC. Otherwise, serious injury may be caused.

Qualified persons

The customer must make sure the operator has the necessary skill and training to do his/her job. Staff in charge of using and maintaining the equipment must be skilled, aware and mature for the described tasks and must have the reliability to correctly interpret what is described in the manual. For safety reason only a qualified electrician, who has received training and / or has demonstrated skills and knowledge in construction and in operation of this unit, can install this inverter. Zucchetti Centro Sistemi S.p.A. does not take any responsibility for the property destruction and personal injury because of any incorrect use.

Installation requirements

Please install inverter according to the following section. Fix the inverter on an appropriate objects with enough load bearing capacity (such as walls, PV racks etc.), and ensure that inverter is vertical placed. Choose a place suitable for installing electrical devices. And assure there is enough fire exit space, convenient for maintenance. Maintain proper ventilation to ensure enough air cycle to cool the inverter.



Transport requirements

If you find packing problems that may cause the damage of the inverter, or find any visible damage, please immediately notice the responsible transportation company. You can ask solar equipment installation contractor or Zucchetti Centro

Sistemi S.p.A. for help if necessary.

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

Electric connection

Please comply with all the current electrical regulations about accident prevention in dealing with the solar invert.

| | |
|--|---|
|  Danger | Before the electrical connection, make sure to use opaque material to cover the PV modules or to disconnect PV array DC switch. Exposure to the sun, PV array will produce a dangerous voltage! |
|  Warning | All installation accomplished only by professional electrical engineer! Must be trained; Completely read the manual operation and understand relevant matter. |
|  Attention | Get permission from the local electrical grid operator, complete all electrical connections by professional electrical engineer, then connect inverter to electrical grid. |
|  Note | It's forbidden to remove the tamper evident label, or open the inverter. Otherwise our company will not provide warranty or maintenance! |

Operation

| | |
|--|--|
|  Danger | Touching the electrical grid or the terminal of the equipment may lead to electrocution or fire! Don't touch the terminal or conductor connected to the electrical grid. Pay attention to any instructions or safety documents related to grid connection. |
|  Attention | Some internal components will be very hot when inverter is working. Please wear protective gloves! |

Maintenance and repair

| | |
|---|---|
|  | <p>Before any repair work, turn OFF the AC circuit breaker between the inverter and electrical grid first, then turn OFF the DC switch.</p> <p>After turning OFF the AC circuit breaker and DC switch, wait for 5 minutes at least before carrying out any maintenance or repair work.</p> |
|  | <p>Inverter should work again after removing any faults. If you need any repair work, please contact with the local authorized service center.</p> <p>Can't open the internal components of inverter without authorized. Our company does not take any responsibility for the losses from that.</p> |

EMC / noise level of inverter

Electromagnetic compatibility (EMC) refers to that one electrical equipment functions in a given electromagnetic environment without any trouble or error, and impose no unacceptable effect upon the environment. Therefore, EMC represents the quality characters of an electrical equipment.

- The inherent noise-immune character: immunity to internal electrical noise.
- External noise immunity: immunity to electromagnetic noise of external system.
- Noise emission level: influence of electromagnetic emission upon environment.

| | |
|--|--|
|  | <p>Electromagnetic radiation from inverter may be harmful to health!</p> <p>Please do not continue to stay around the inverter in less than 20 cm when inverter is working.</p> |
|--|--|

1.2. Symbols and signs

| | |
|---|---|
|  | <p>Caution of burn injuries due to hot enclosure!</p> <p>You can only touch the screen and pressing key of the inverter while it's working.</p> |
|  | <p>PV array should be grounded in accordance to the requirements of the local electrical grid operator!</p> <p>We suggest that all PV module frames and inverter are reliably grounded to protect the PV system and personnel security.</p> |

| | |
|---|---|
|  | Ensure input DC voltage < Max. DC voltage .Over voltage may cause permanent damage to inverter or other losses, which will not be included in warranty! |
| Warning | |

Signs on the inverter

There are some symbols which are related to security on the inverter. Please read and understand the content of the symbols, and then start the installation.

| | |
|---|--|
|  | There is a residual voltage in the inverter! Before opening the equipment, operator should wait for five minutes to ensure the capacitor is discharged completely. |
|  | Caution, risk of electric shock. |
|  | Caution hot surface. |
|  | Comply with the Conformite Europeenne (CE) certification. |
|  | Grounding point. |
|  | Please read this manual before install 1.1K~3.3KTL-G3. |
|  | This indicates the degree of protection of the equipment according to IEC standard 70-1 (EN 60529 June 1997). |
|  | Positive pole and negative pole of the input voltage (DC). |

2. Product characteristics

Outlines of this chapter

Product dimensions

It introduces the field of use, and the overall dimensions of 1.1K~3.3KTL-G3 inverters.

Function description

It introduces how 1.1K~3.3KTL-G3 inverters work and the function modules inside.

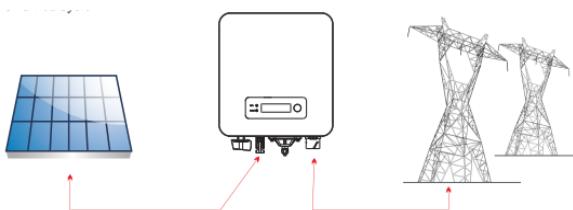
Efficiency curves

It introduces the efficiency curves of in the inverter.

2.1. Product dimensions

1.1K~3.3KTL-G3 is a single MPPT grid-tied PV inverter which converts the DC power generated by PV arrays into sine wave single-phase AC power and feeds it to the public electrical grid, AC circuit breaker (refer to Section 4.4) and DC switch used as disconnect device, and the disconnect device shall be easily accessible.

Figure2-1 PV Grid-tied System



1.1K~3.3KTL-G3 inverters can only be used with photovoltaic modules that do not require one of the poles to be grounded. The operating current during normal

operation must not exceed the limits specified in the technical specifications. Only the photovoltaic modules can be connected to the input of the inverter (do not connect batteries or other sources of power supply).

The choice of optional parts of inverter should be made by a qualified technician who knows the installation conditions clearly.

1100TL-G3 1600TL G3 2200TL G3:

L × W × H=303mm × 260.5mm × 118mm

2700TL-G3 3000TL-G3 3300TL-G3:

L × W × H=321mm × 260.5mm × 131.5mm

Figure 2-2 Front view and left view dimensions of 1100TL-G3, 1600TL-G3 and 2200TL-G3

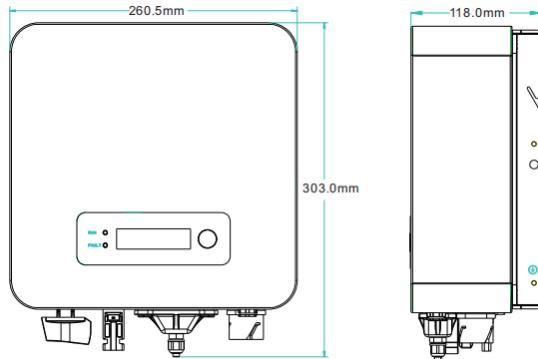


Figure 2-3 Front view and left view dimensions of 2700TL-G3, 3000TL-G3 and 3300TL-G3

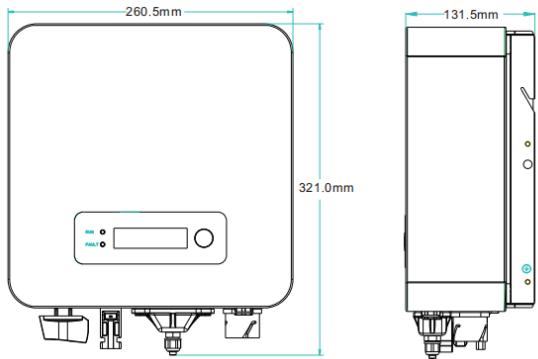
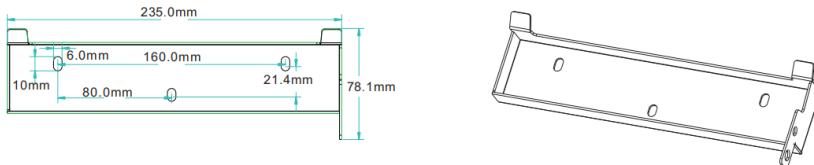
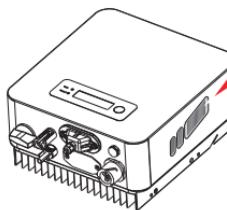


Figure 2-4 Bracket dimensions of 1.1K~3.3KTL-G3



◆ Labels on the equipment

The labels must
NOT be hidden with
objects and extraneous parts
(rags, boxes, equipment, etc.); they
must be cleaned regularly and
kept visible at all times.



2.2. Function description

DC power generated by PV array is filtered through Input Board before entering into Power Board. Input Board also offer functions such as insulation impedance detection and input DC voltage / current detection. DC power is converted to AC power by Power Board. AC power is filtered through Output Board then AC power is fed into the grid. Output Board also offer functions such as grid voltage / output current detection, GFCI and output isolation relay. Control Board provides the auxiliary power, controls the operation state of inverter and shows the operation status by Display Board. Display Board displays fault code when inverter is in abnormal operation conditions. At the same time, Control Board can trigger the relay so as to protect the internal components.

Function module

A. Energy management unit

This control can be used to switch the inverter on/off through an external

(remote) control.

B. Feeding reactive power into the grid

The inverter is able to produce reactive power and can therefore feed it into the grid through the setting of the phase shift factor. Feed-in management can be controlled directly by the grid company through a dedicated RS485 serial interface.

C. Limiting the active power fed into the grid

The inverter, if enabled can limit the amount of active power fed into the grid by the inverter to the desired value (Expressed as a percentage).

D. Self power reduction when grid is over frequency

When the grid frequency is higher than the limited value, inverter will reduce output power which is necessary for the grid stability.

E. Data transmission

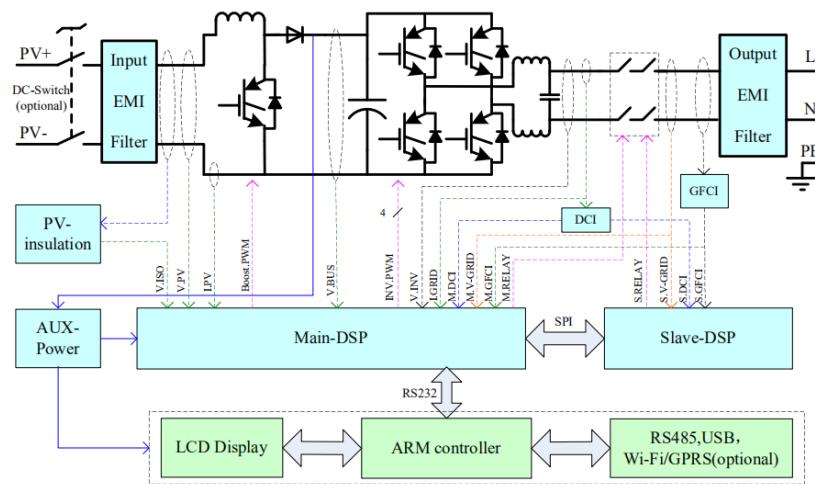
The inverter or a group of inverters may be monitored remotely through an advanced communication system based on RS-485 serial interface, or remotely via the WIFI/GPRS.

F. Software update

Support usb flash drive local upgrade software and WIFI/GPRS remote upgrade software.

Electrical block diagram

Figure2-5 Electrical block diagram



2.3. Efficiency curve



3. Installation

Outlines of this chapter

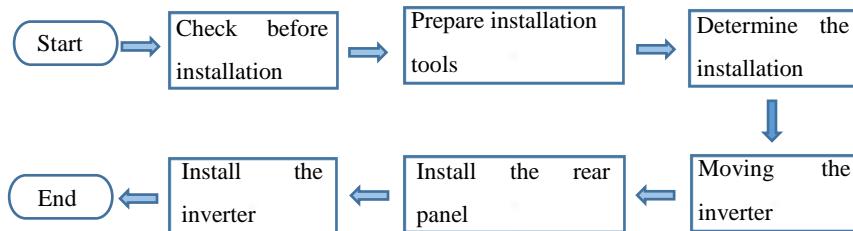
This topic describes how to install the 1.1K~3.3KTL-G3 .

Installation notes

| | |
|--|---|
|  Danger | Do NOT install the 1.1K~3.3KTL-G3 on flammable material. Do NOT install the 1.1K~3.3KTL-G3 in an area used to store Flammable or explosive material. |
|  Caution | The enclosure and heat sink are very hot while the inverter is working, therefore do NOT install the 1.1K~3.3KTL-G3 in places where you might touch them inadvertently. |
|  Attention | Consider the weight of 1.1K~3.3KTL-G3 when transporting and moving the inverters. Choose an appropriate mounting position and surface. Assign at least two persons to install the inverter. |

3.1. Installation Process

Figure3-1 Installation flowchart



3.2. Checking Before Installation

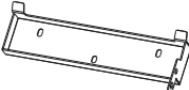
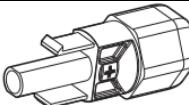
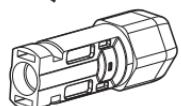
Checking Outer Packing Materials

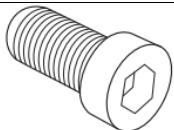
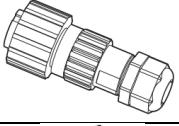
Packing materials and components may be damaged during transportation.

Therefore, check the outer packing materials before installing the inverter. Check the outer packing materials for damage, such as holes and cracks. If any damage is found, do not unpack the 1.1K~3.3KTL-G3 and contact the dealer as soon as possible. You are advised to remove the packing materials within 24 hours before installing the 1.1K~3.3KTL-G3 inverter.

Checking Deliverables

After unpacking the inverter, check whether deliverables are intact and complete. If any damage is found or any component is missing, contact the dealer. Table3-1 shows the components and mechanical parts that should be delivered.

| NO. | Picture | Description | Quantity |
|-----|---|---|----------|
| 1 |  | 1.1-3.3KTL-G3 | 1pcs |
| 2 |  | Rear panel | 1pcs |
| 3 |  | PV+ input terminal | 1pcs |
| 4 |  | PV- input terminal | 1pcs |
| 5 |  | Metal terminals secured to PV+ input power cables | 1pcs |
| 6 |  | Metal terminals secured to PV- input power cables | 1pcs |

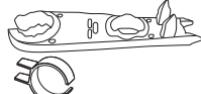
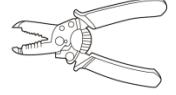
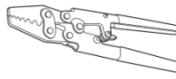
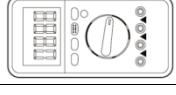
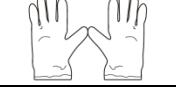
| | | | |
|----|---|---------------------|------|
| 7 |  | M5Hexagon screws | 2pcs |
| 8 |  | Expansion bolts | 3pcs |
| 9 |  | Self-tapping screw | 5pcs |
| 10 |  | Manual | 1pcs |
| 11 |  | The warranty card | 1pcs |
| 12 |  | Registration Form | 1pcs |
| 13 |  | AC output terminal | 1pcs |
| 14 |  | 485 terminal (2pin) | 1pcs |

3.3. Tools

Prepare tools required for installation and electrical connections.

Table 3-2 shows the tools required for installation and electrical connections.

| NO. | Tool | Model | Function |
|-----|------|-------|----------|
| | | | |

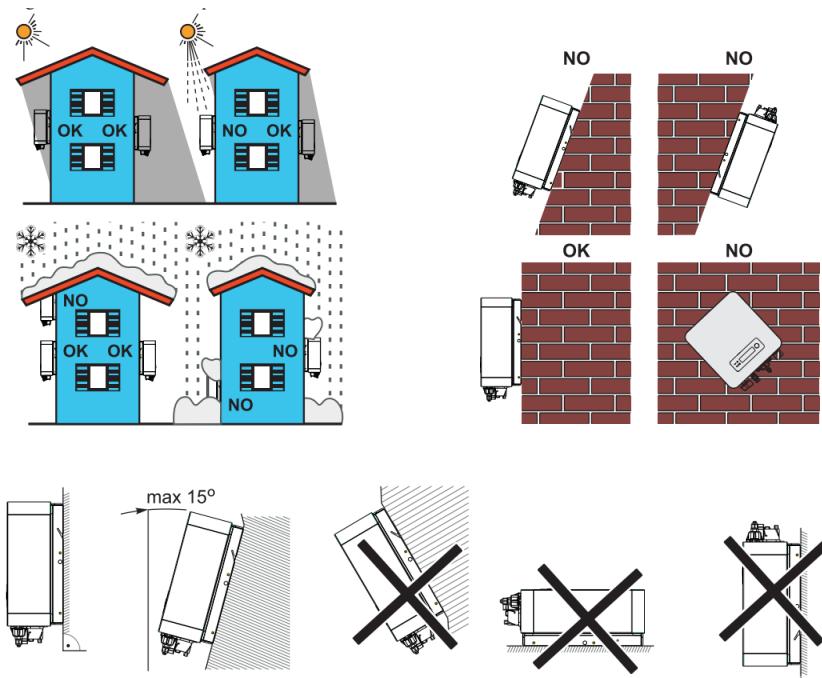
| | | | |
|----|---|--|--|
| 1 |  | Hammer drill Recommend drill dia. 6mm | Used to drill holes on the wall. |
| 2 |  | Screwdriver | wiring |
| 3 |  | Cross screwdriver | Remove and install AC terminal screws |
| 4 |  | Removal tool | Remove PV terminal |
| 5 |  | Wire stripper | Strip wire |
| 6 |  | 4mm Allen Wrench | Turn the screw to connect rear panel with inverter. |
| 7 |  | Crimping tool | Used to crimp power cables |
| 8 |  | Multi-meter | Used to check grounding |
| 9 |  | Marker | Used to mark signs |
| 10 |  | Measuring tape | Used to measure distances |
| 11 |  | Level | Used to ensure that the rear panel is properly installed |
| 12 |  | ESD gloves | Operators wear |

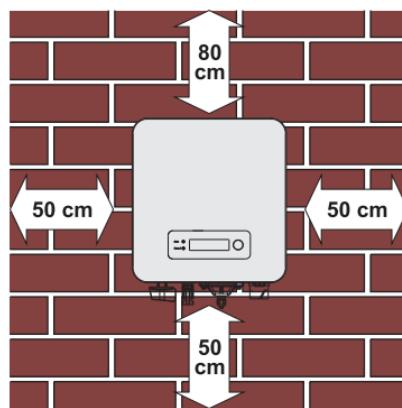
| | | | |
|----|---|----------------------|----------------|
| 13 |  | Safety goggles | Operators wear |
| 14 |  | Anti-dust respirator | Operators wear |

3.4. Determining the Installation Position

Determine an appropriate position for installing the 1.1K~3.3KTL-G3 inverter. Comply with the following requirements when determining the installation position:

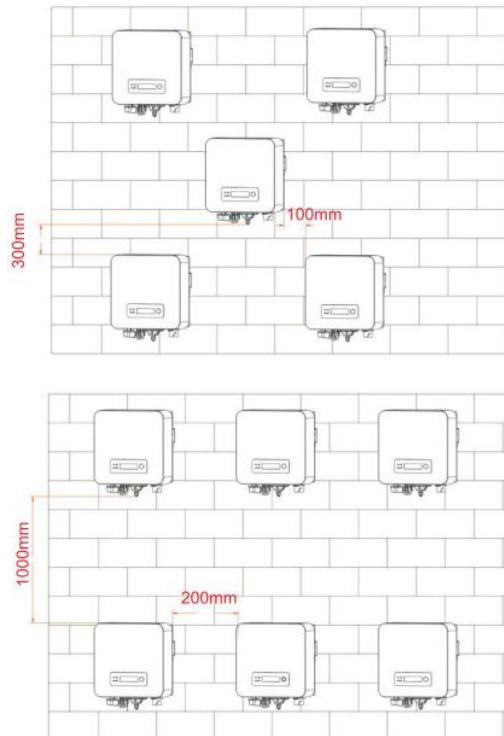
Figure3-2 Installation Requirements





clearance for single 1.1K~3.3KTL-G3 Inverter

Installation of multiple 1.1K~3.3KTL-G3 inverter



3.5. Moving the 1.1K~3.3KTL-G3

This topic describes how to move the to the installation position Horizontally 1.1K~3.3KTL-G3.

Step 1 Open the packaging, insert hands into the slots on both sides of the inverter and hold the handles, as shown in Figure 3-3 and Figure 3-4.

Figure 3-3 Moving the inverter (1)

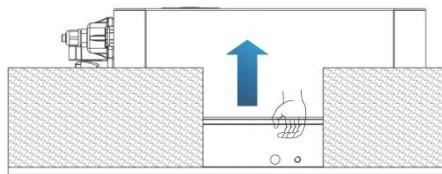
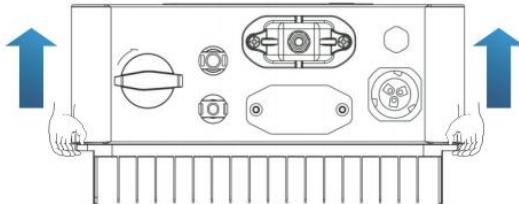


Figure 3-4 Moving the inverter (2)



Step 2 Lift the 1.1K~3.3KTL-G3 from the packing case and move it to the installation position.

| | |
|---|--|
|  | To prevent device damage and personal injury, keep balance when moving the inverter because the inverter is heavy. Do not put the inverter with its wiring terminals contacting the floor because the power ports and signal ports are not designed to support the weight of the inverter. Place the inverter horizontally. When placing the inverter on the floor, put foam or paper under the inverter to protect its shell. |
| Attention | |

3.6. Installing 1.1K~3.3KTL-G3

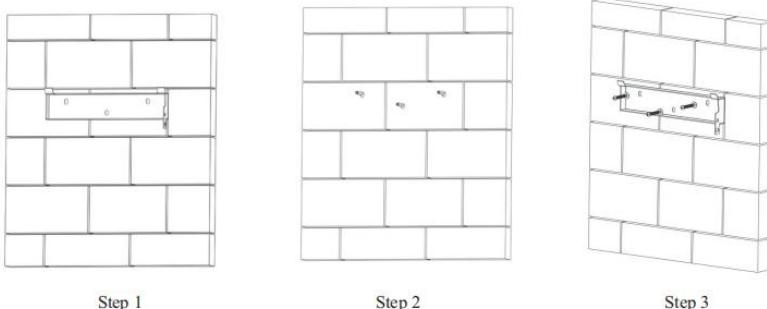
Step 1 Determine the positions for drilling holes, ensure the hole positions are level, then mark the hole positions using a marker pen, use the hammer drill to drill

holes on the wall. Keep the hammer drill perpendicular to the wall, do not shake when drilling, so as not to damage the wall. If the error of the hole positions is too big, you need to reposition.

Step 2 Insert the expansion bolt vertically into the hole, pay attention to the insertion depth of the expanding bolt (should be deep enough).

Step 3 Align the rear panel with hole positions, fix the rear panel on the wall by tightening the expansion bolt with the nuts.

Figure 3-5



Step 1

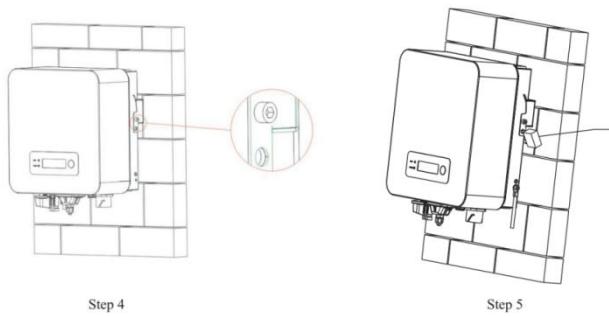
Step 2

Step 3

Step 4 Hook the inverter to the rear panel. Using an M5 screw to secure the inverter to the rear panel to ensure safety.

Step 5 You can secure the inverter to the rear panel and protect it from stealing by installing an anti-theft lock (this action is optional).

Figure 3-6



Step 4

Step 5

4. Electrical Connections

Outlines of this chapter

This topic describes the 1.1K~3.3KTL-G3 inverter electrical connections.
Read this part carefully before connecting cables.

NOTE: Before performing electrical connections, ensure that the DC switch is OFF. Since the stored electrical charge remains in a capacitor after the DC switch is turned OFF. So it's necessary to wait for at least 5 minutes for the capacitor to be electrically discharged.

| | |
|---|--|
|  Attention | Installation and maintenance of inverter, must be operated by professional electrical engineer. |
|  Danger | PV modules generate electric energy when exposed to sunlight and can create an electrical shock hazard. Therefore, before connecting DC input power cable, cover PV modules using opaque cloth |
|  Note | For 1.1K~2.2KTL-G3, open-circuit voltage(Voc) of module arrays connected in series must be $\leq 500V$; For 2.2K~3.3KTL-G3, it must be $\leq 550V$. The power of PV grid-tied system which contain by several the 1.1K~3.3KTL-G3 inverters must be $< 3.68kw$ in Germany. |

| The connected PV modules must have an IEC 61730 Class A rating | | |
|--|-----------|-------|
| IscPV (absolute maximum) | 15A | |
| Maximum output over current protection | 1100TL-G3 | 5.3A |
| | 1600TL-G3 | 7.7A |
| | 2200TL-G3 | 10.6A |
| | 2700TL-G3 | 13A |
| | 3000TL-G3 | 14.5A |
| | 3300TL-G3 | 16A |

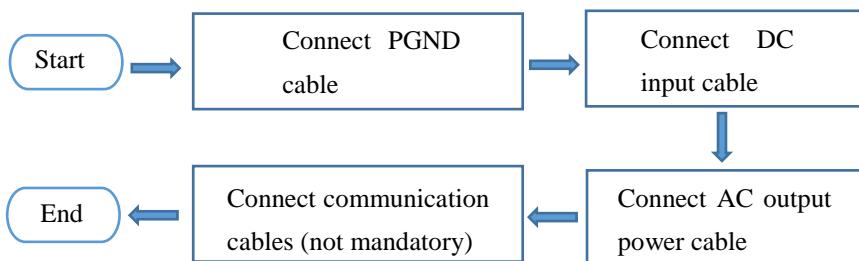
The decisive voltage class(DVC)

NOTE: The DVC is the voltage of a circuit which occurs continuously between any two live parts in the worst-case rated operating condition when used as intended.

| Interface | DVC |
|------------------------------|------|
| PV input interface | DVCC |
| AC output interface | DVCC |
| USB interface | DVCA |
| RS485 interface | DVCA |
| CT interface | DVCA |
| Logic interface | DVCA |
| WiFi/GPRS/Ethernet interface | DVCA |

4.1. Electrical connection

Figure4-1 Shows the flowchart for connecting cables to the inverter.



4.2. Connecting PGND Cables

Connect the inverter to the grounding electrode using protection ground (PGND) cables for grounding purpose.



Attention

The inverter is transformer-less, requires the positive pole and negative pole of the PV array are NOT grounded. Otherwise it will cause inverter failure. In the PV power system, all non current carrying metal parts (such as: PV module frame, PV rack, combiner box enclosure, inverter enclosure) should be connected to earth.

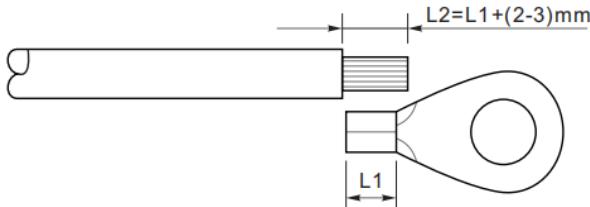
Prerequisites:

The PGND cables are prepared ($\geq 4\text{mm}^2$ outdoor power cables are recommended for grounding purposes), the color of cable should be yellow-green.

Procedure:

Step 1 Remove the insulation layer with an appropriate length using a wire stripper, as shown in Figure 4-2.

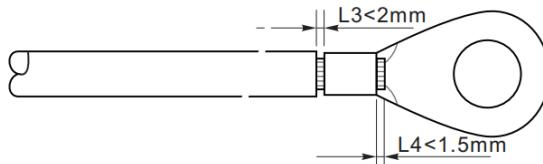
Figure4-2 Preparing a ground cable (1)



Note: L2 is 2 to 3mm longer than L1

Step 2 Insert the exposed core wires into the OT terminal and crimp them by using a crimping tool, as shown in Figure 4-3.

Figure4-3 Preparing a ground cable (2)

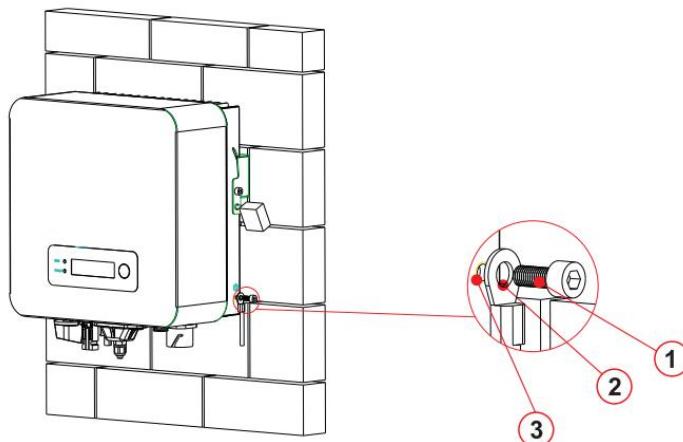


Note 1: L3 is the length between the insulation layer of the ground cable and the crimped part. L4 is the distance between the crimped part and core wires protruding from the crimped part.

Note 2: The cavity formed after crimping the conductor crimp strip shall wrap the core wires completely. The core wires shall contact the terminal closely.

Step 3 Install the crimped OT terminal, flat washer using M5 screw, and tighten the screw to a torque of 3 N.m using an Allen wrench.

Figure4-4 Ground terminal composition



1.M5 screw、2.OT Terminal、3.Tapped hole

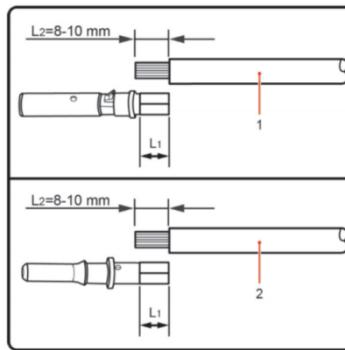
4.3. Connecting DC Input Power Cables

Table 4-1 Recommended DC input cable specifications

| Cross-Sectional Area (mm ²) | | External Cable Diameter(mm) |
|---|-------------------|-----------------------------|
| Range | Recommended Value | |
| 4.0~6.0 | 4.0 | 4.5~7.8 |

Step 1 Remove cable glands from the positive and negative connectors.

Step 2 Remove the insulation layer with an appropriate length from the positive and negative power cables by using a wire stripper as show in Figure 4-5.
Figure 4-5 Connecting DC input power cables



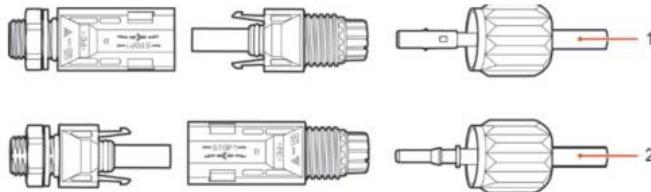
1.Positive power cable 2.Negative power cable

Note: L2 is 2 to 3 mm longer than L1.

Step 3 Insert the positive and negative power cables into corresponding cable glands.

Step 4 Insert the stripped positive and negative power cables into the positive and negative metal terminals respectively and crimp them using a clamping tool. Ensure that the cables are crimped until they cannot be pulled out by force less than 400 N, as shown in Figure 4-6.

Figure 4-6 Connecting DC input power cables



1.Positive power cable 2.Negative power cable

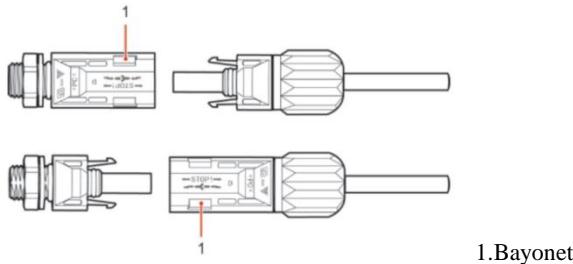
Step 5 Insert crimped power cables into corresponding housings until you hear a "click" sound. The power cables snap into place.

Step 6 Reinstall cable glands on positive and negative connectors and rotate them against the insulation covers.

Step 7 Insert the positive and negative connectors into corresponding DC

input terminals of the inverter until you hear a "click" sound, as shown in Figure 4-7.

Figure 4-7 Connecting DC input power cables



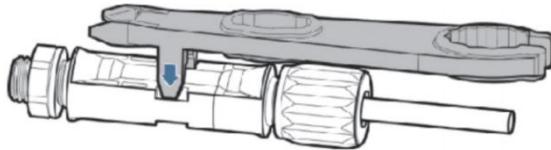
Note: Insert the stoppers into the unused DC connectors.

Follow-up Procedure

To remove the positive and negative connectors from the inverter, insert a removal wrench into the bayonet and press the wrench with an appropriate strength, as shown in Figure 4-8.

| | |
|---|---|
|  | Before removing the positive and negative connectors, ensure that the DC SWITCH is OFF. |
|---|---|

Figure 4-8 Removing a DC input connector



4.4. Connecting AC Output Power Cables

Connect the 1.1K~3.3KTL-G3 to the AC power distribution frame (PDF) or power grid using AC output power cables.

| | |
|---|---|
|  Caution | <p>It is not allowed for several inverters to use the same circuit breaker.</p> <p>It is not allowed to connect loads between inverter and circuit breaker.</p> <p>AC breaker used as disconnect device, and the disconnect device shall remain readily operable.</p> |
|---|---|

Context

All the AC output cables used for the inverters are outdoor three-core cables. To facilitate the installation, use flexible cables. Table 4-2 lists the recommended specifications for the cables.

Figure 4-9 NOT allowed: connect loads between inverter and circuit breaker

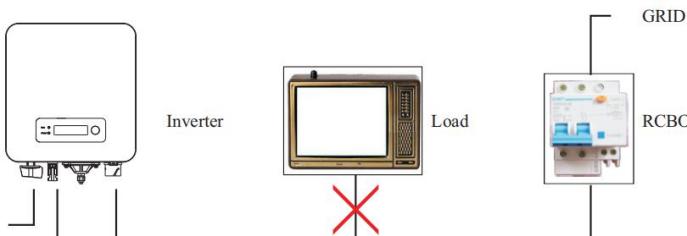


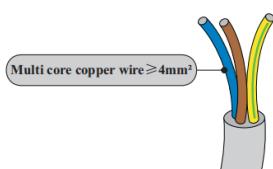
Table4-2 Recommended AC output cable specifications

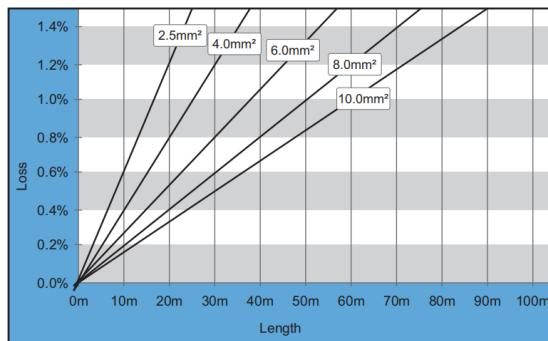
| Model | 1100TL-G3 | 1600TL-G3 | 2200TL-G3 | 2700TL-G3 | 3000TL-G3 | 3300TL-G3 |
|---------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Cable(Copper) | $\geq 4\text{mm}^2$ | $\geq 4\text{mm}^2$ | $\geq 4\text{mm}^2$ | $\geq 6\text{mm}^2$ | $\geq 6\text{mm}^2$ | $\geq 6\text{mm}^2$ |
| Breaker | 16A/400V | 16A/400V | 25A/400V | 25A/400V | 25A/400V | 25A/400V |

Multi core copper wire

AC cable should be correctly sized to ensure the power loss in AC cable is less than 1% of the rated power. If the resistance of the AC cable is too high, it will cause a huge increase in the AC voltage, which may lead to a disconnection of the inverter from the electrical grid. The relationship between power loss in AC cable and wire length, wire cross sectional area is shown in the following figure:

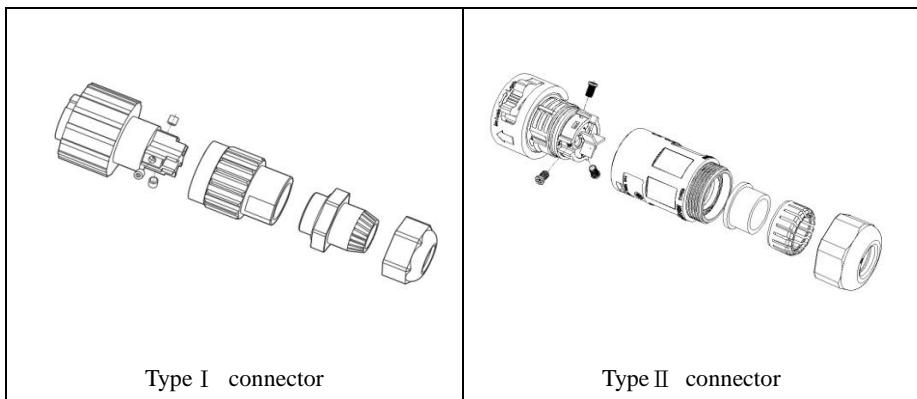
Figure 4-10 wire length, wire cross sectional area and wire power loss





Inverter is equipped with two types of IP66 AC connector (Type I connector or Type II connector are randomly equipped with one), and the AC output cable needs to be wired by the customer. The appearance of AC connector is shown in figure 4-11.

AC connector type:

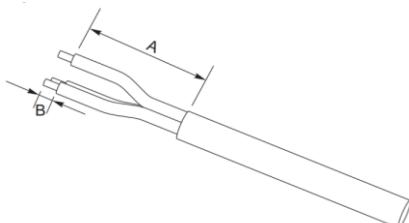


Type I connector installation instructions

Step 1 Select appropriate cables according to Table 4-2, Remove the insulation layer of the AC output cable using a wire stripper according to the figure shown below:

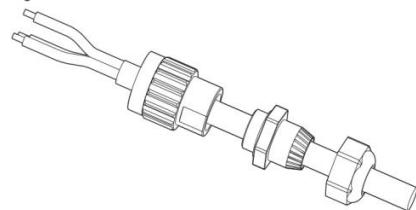
A: 30~50mm B:6~8mm;

Figure 4-12



Step2 Disassemble the AC connector according to the figure shown below: insert the AC output cable (with its insulation layer stripped according to step 1) through the waterproof locking cable gland;

Figure 4-13



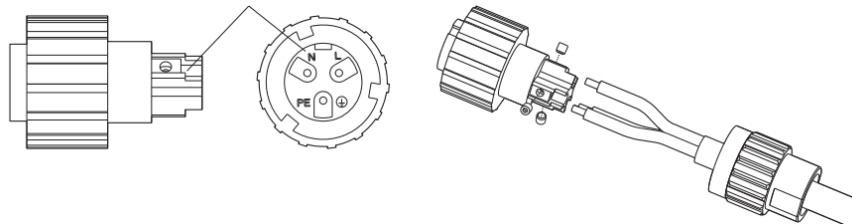
Step 3 Connect AC output cable as per the following requirements:

Connect the yellow-green wire to the hole labeled "PE", fasten the wire using an Allen wrench;

Connect the brown wire to the hole labeled "L", fasten the wire using an Allen wrench;

Connect the blue wire to the hole labeled "N", fasten the wire using an Allen wrench;

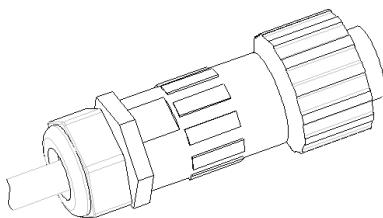
Figure 4-14



L--Brown, N--Blue, PE--Yellow-green

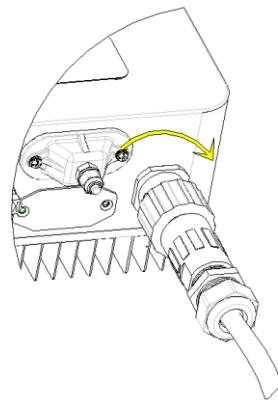
Step 4 Secure the locking cable gland clockwise, shown as below: make sure that all the wires are securely connected.

Figure 4-15



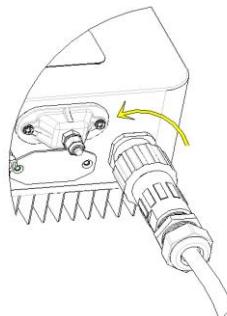
Step 5 Connect the AC connector to the output wiring connector of inverter, rotate the AC connector clockwise until the fastener reaches its designated position, as shown below.

Figure 4-16



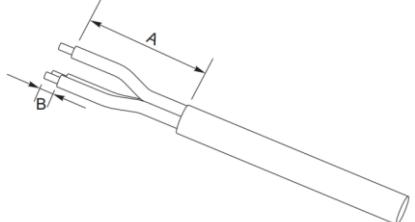
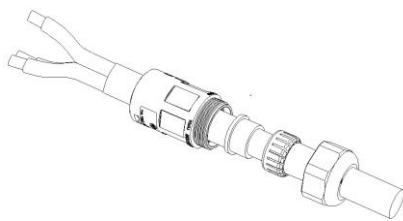
Removing the AC connector Pull out the AC connector by rotating the knob counterclockwise.

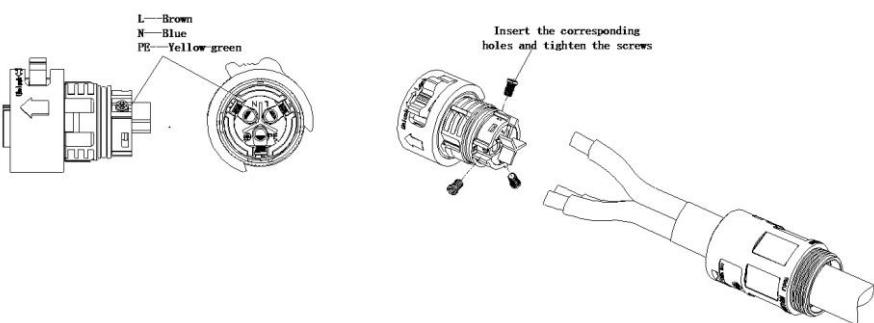
Figure 4-17



| | |
|--|---|
|  Caution | Make sure the grid is disconnected before removing the AC connector |
|--|---|

Mode II connector installation instructions

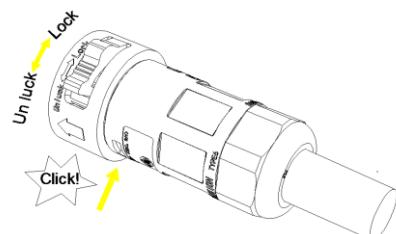
| | |
|--|---|
| <p>Step 1 Select appropriate cables according to Table 4-2, Remove the insulation layer of the AC output cable using a wire stripper according to the figure shown below: A:15-25mm B:6~8mm</p> <p>Figure 4-18</p>  | <p>Step 2 Disassemble the AC connector according to the figure shown below: insert the AC output cable (with its insulation layer stripped according to step 1) through the waterproof locking cable gland.</p> <p>Figure 4-19</p>  |
| <p>Step 3 Connect AC output cable as per the following requirements:</p> <p>Connect the yellow-green wire to the hole labeled "PE", fasten the wire using an Cross screwdriver;</p> <p>Connect the brown wire to the hole labeled "L", fasten the wire using an Cross screwdriver;</p> <p>Connect the blue wire to the hole labeled "N", fasten the wire using an Cross screwdriver.</p> <p>Figure 4-20</p> | |



L--Brown, N--Blue, PE--Yellow-green

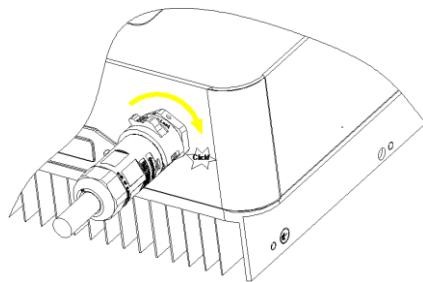
Step 4 Insert the AC connector and hear "click", then tighten the waterproof nut at the instantaneous value, as shown in the figure below, to ensure that the cable is firmly connected.

Figure 4-21

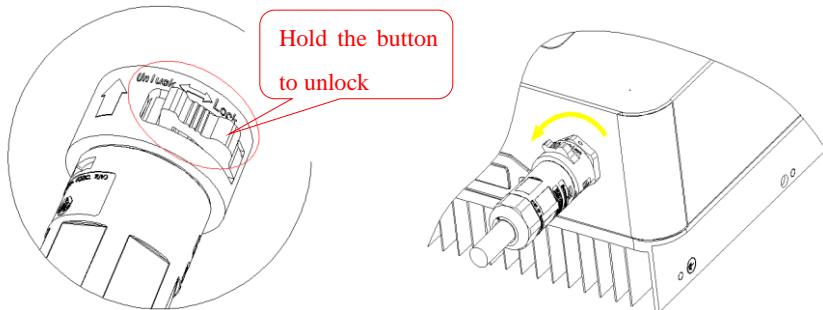


Step 5 Connect the connected AC connector to the AC connector of the inverter. Turn the ac connector knob to lock until you hear a "click" and the clasp is in place.

Figure 4-22



Removing the AC connector Hold the button to unlock and rotate the knob counterclockwise to the unlock position, then pull out the AC connector. Figure 4-23



Caution

Make sure the grid is disconnected before removing the AC connector

4.5. RS485,CT,inverter logic interface connection

The communication interface location of the 1.1K~3.3KTL-G3 is shown in the figure below.

Figure 4-24

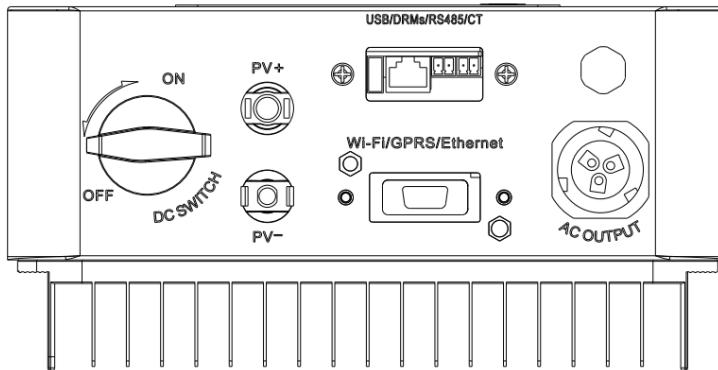
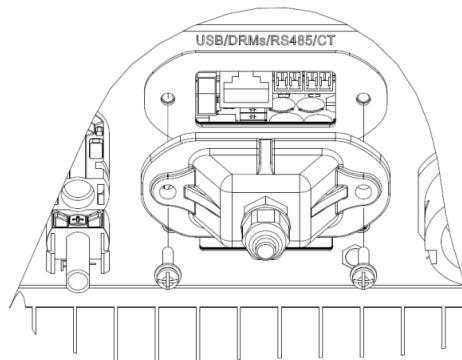


Table 4-3 Recommended communication cable size are shown below,The wiring methods are the same for RS485 and CT,this part describes their wiring methods and logic interface wiring method.

| Communication function | RS485 | CT |
|------------------------|------------------------|------------------------|
| Cable size | 0.5~1.5mm ² | 0.5~1.5mm ² |
| Outside diameter | 2.5~6mm | 2.5~6mm |

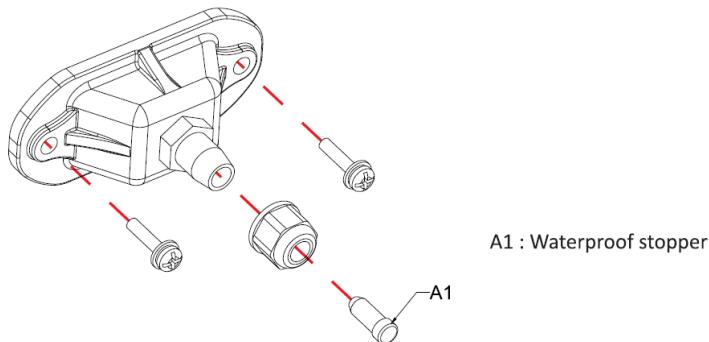
Step1 Remove the communication waterproof cover using a screwdriver;

Figure 4-25



Step2 Unlock the waterproof cable gland, remove the stopper in the waterproof connector;

Figure 4-26



Step3 Select appropriate cable according Table4-2,remove the insulation layer using a wire stripper, the length of the wire core is about 6mm,insert the cable through the cable gland and waterproof cover, according to Table4-4,connect the wires as per the labels, and secure the wire using a slotted screwdriver.as shown in the figure below:

Table 4-4 Function description of the communication terminals

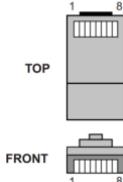
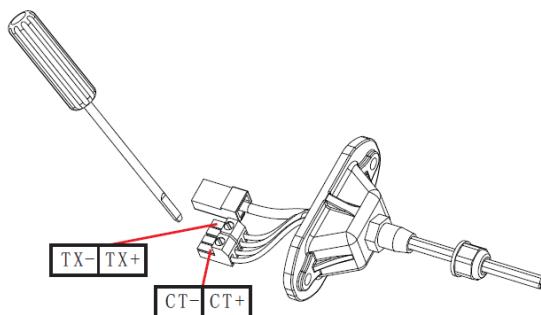
| Type | RS485 | | CT | | Logic interface |
|-----------|---|----------------------------|---|-----|--|
| Connector |  | |  | |  TOP FRONT 1 8 |
| Label | TX- | TX+ | CT- | CT+ | |
| Function | RS485 differential signal- | RS485 differential signal+ | CT- | CT+ | The following table |

Figure 4-27



The logic interface pin definitions and circuit connections are as follows:

The function of logical interface needs to be set on the display screen, please refer to the operation steps in section 6.3 .

Logic interface pin are defined according to different standard requirements.

- (a) Logic interface for AS/NZS 4777.2:2015, also known as inverter demand response modes (DRMs).

The inverter will detect and initiate a response to all supported demand response commands within 2 s. The inverter will continue to respond while the mode remains asserted.

Table 4-5 Function description of the DRMs terminal

| Pin NO. | Color | Function |
|---------|------------------|--------------------------|
| 1 | White and orange | DRM1/5 |
| 2 | Orange | DRM2/6 |
| 3 | White and green | DRM3/7 |
| 4 | Blue | DRM4/8 |
| 5 | White and blue | RefGen |
| 6 | Green | DRM0 |
| 7 | White and brown | Pin7&Pin8 short internal |
| 8 | Brown | |

NOTE: Supported DRM command: DRM0, DRM5, DRM6, DRM7, DRM8.

- (b) Logic interface for VDE-AR-N 4105:2018-11, is in order to control and/or limit the inverter's output power.

The inverter can be connected to a RRCR (Radio Ripple Control Receiver) in order to dynamically limit the output power of all the inverters in the installation.

Figure 4-28 Inverter – RRCR Connection

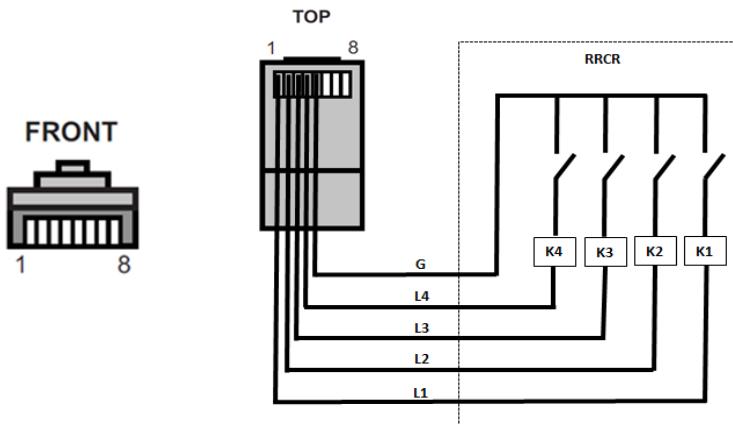


Table 4-6 Function description of the terminal

| Pin NO. | Pin name | Description | Connected to (RRCR) |
|---------|----------|-----------------------|---------------------|
| 1 | L1 | Relay contact 1 input | K1 - Relay 1 output |
| 2 | L2 | Relay contact 2 input | K2 - Relay 2 output |
| 3 | L3 | Relay contact 3 input | K3 - Relay 3 output |
| 4 | L4 | Relay contact 4 input | K4 - Relay 4 output |
| 5 | G | GND | Relays common node |
| 6 | NC | Not Connected | Not Connected |
| 7 | NC | Not Connected | Not Connected |
| 8 | NC | Not Connected | Not Connected |

Table 4-7 The inverter is preconfigured to the following RRCR power levels

Relay status: close is 1, open is 0

| L1 | L2 | L3 | L4 | Active Power | Cos(φ) |
|----|----|----|----|--------------|------------------|
| 1 | 0 | 0 | 0 | 0% | 1 |
| 0 | 1 | 0 | 0 | 30% | 1 |
| 0 | 0 | 1 | 0 | 60% | 1 |
| 0 | 0 | 0 | 1 | 100% | 1 |

(c) Logic interface for EN50549-1:2019, is in order to cease active power output within five seconds following an instruction being received at the input interface.

Figure 4-29 Inverter – RRCR Connection

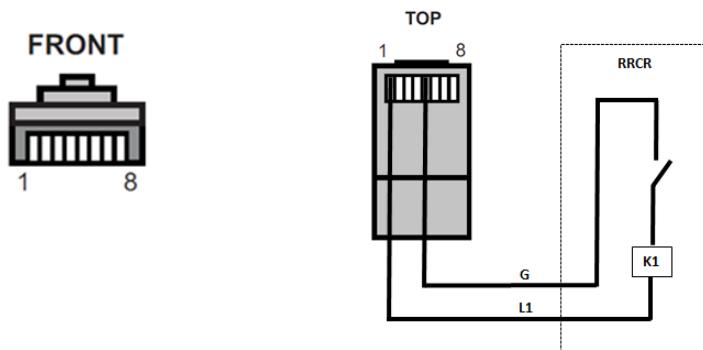


Table 4-8 Function description of the terminal

| Pin NO. | Pin name | Description | Connected to (RRCR) |
|---------|----------|-----------------------|---------------------|
| 1 | L1 | Relay contact 1 input | K1 - Relay 1 output |
| 2 | NC | Not Connected | Not Connected |
| 3 | NC | Not Connected | Not Connected |
| 4 | NC | Not Connected | Not Connected |
| 5 | G | GND | K1 - Relay 1 output |
| 6 | NC | Not Connected | Not Connected |
| 7 | NC | Not Connected | Not Connected |
| 8 | NC | Not Connected | Not Connected |

Table 4-9 The inverter is preconfigured to the following RRCR power levels.

Relay status: close is 1, open is 0

| L1 | Active Power | Power drop rate | Cos(ϕ) |
|----|--------------|-----------------|---------------|
| 1 | 0% | <5 seconds | 1 |
| 0 | 100% | / | 1 |

Step4 Insert the terminal as per the printed label, and then tighten the screws to fix the waterproof cover, rotate the cable gland clockwise to fasten it securely.

Figure 4-30

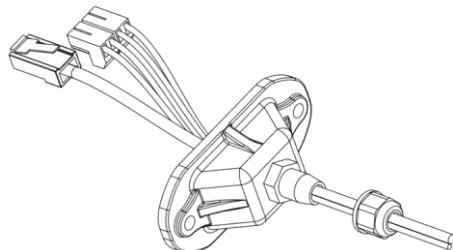
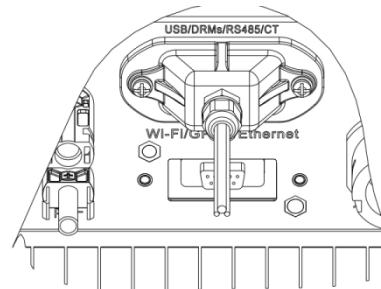


Figure 4-31



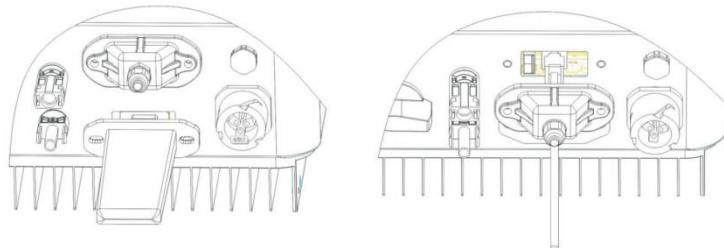
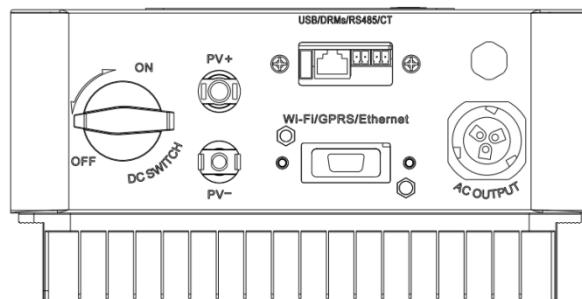
4.6. WIFI/GPRS module installation procedure

Step1: Remove wifi/GPRS waterproof cover using screw driver.

Step2: Install WIFI/GPRS module.

Step3: Fasten WIFI/GPRS module using screws.

Figure 4-32



4.7. Communication method

1.1K~3.3KTL-G3 grid-connected inverters offer RS485 (standard) and Wi-Fi (optional) communication modes:

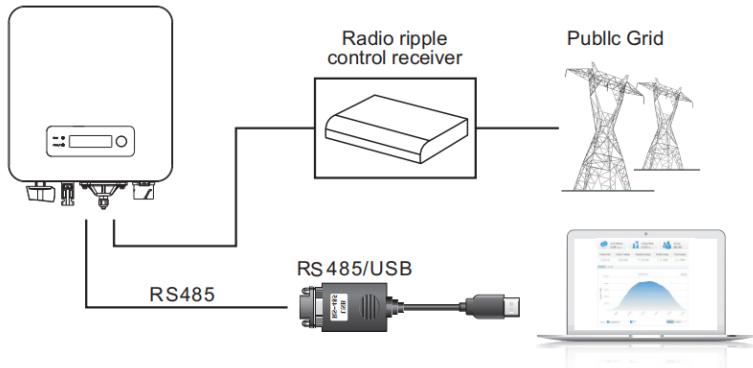
A. Communication between one inverter and one PC:

1. RS485

Refer to the figure shown below, connect the TX+ and TX- of the inverter to

the TX+ and TX- of the RS485→ USB adapter, and connect the USB port of the adapter to the computer.(NOTE1)

Figure 4-33



2. WI-FI

Refer to the figure shown below: (wireless function required for the PC).(NOTE4)

Figure 4-34



The operation information (generated energy, alert, operation status) of the inverter can be transferred to PC or uploaded to the server via Wi-Fi. You can register on the website.

http://www.solarmanpv.com/portal/Register/Regi_Pub.aspx

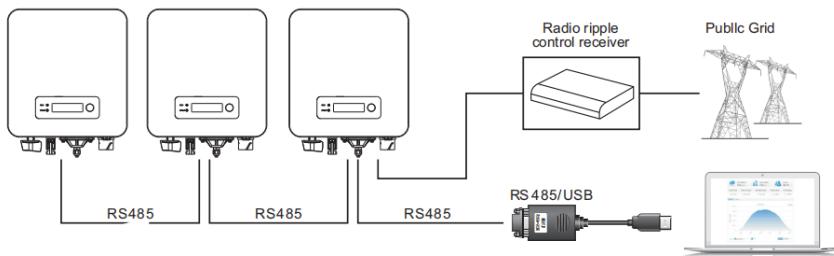
Using the Wi-Fi S/N number(NOTE3), then you can login the website:
<http://www.solarmanpv.com/portal/LoginPage.aspx> to remote monitors the inverter.

B. Communication between multiple inverters and one PC:

1. RS485

Refer to the following figure: RS485 wires are connected in parallel between inverters, refer to section 4.5 of this manual for wire connection methods. Connect the TX+ and TX- of the inverter to the TX+ and TX- of the RS485→USB adapter; connect the USB port of the adapter to the computer. A maximum of 31 inverters can be connected in one daisy chain.(NOTE2)

Figure 4-35



2. WI-FI

Refer to the figure shown below: (wireless function required for the PC).(NOTE4)

Figure 4-36



The operation information (generated energy, alert, operation status) of the inverter can be transferred to PC or uploaded to the server via Wi-Fi. You can register on the website.

http://www.solarmanpv.com/portal/Register/Regi_Pub.aspx

Using the Wi-Fi S/N number(NOTE3), then you can login the website:

<http://www.solarmanpv.com/portal/LoginPage.aspx> to remote monitors the inverter.

**Note1:**

The length of the RS485 communication cable should be less than 1000 m.

**Note2:**

When multiple inverters are connected via RS485 wires, set mod-bus address to differentiate the inverters.

**Note3:**

S/N number of the Wi-Fi module is located on the side.

5. Commissioning of inverter

5.1. Safety inspection before commissioning

| | |
|---|---|
|  | Ensure that DC and AC voltages are within the acceptable range of the inverter. |
| Attention | |

5.2. Start inverter

Step 1: Turn ON the DC switch.(optional)

Step 2: Turn ON the AC circuit breaker.

When the DC power generated by the solar array is adequate, the 1.1K~3.3KTL-G3 inverter will start automatically. Screen showing “normal” indicates correct operation.

NOTE: Choose the correct country code. (refer to section 6.3 of this manual)

Notice: Different distribution network operators in different countries have different requirements regarding grid connections of PV grid connected inverters.

Therefore, it's very important to make sure that you have selected the correct country code according to requirements of local authority. Please consult qualified electrical engineer or personnel from electrical safety authorities about this.

Zucchetti Centro Sistemi S.p.A. is not responsible for any consequences arising out of incorrect country code selection.

If the inverter indicates any fault, please refer to Section 7.1 of this manual — trouble shooting for help.

6. Operation interface

Outlines of this chapter

This section introduces the display, operation, buttons and LED indicator lights of 1.1K~3.3KTL-G3 Inverter.

6.1. Operation and Display Panel

Buttons and Indicator lights



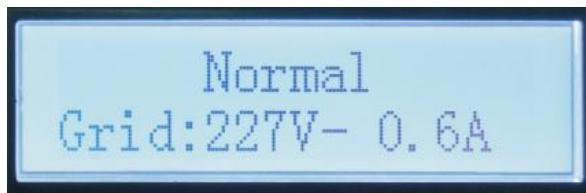
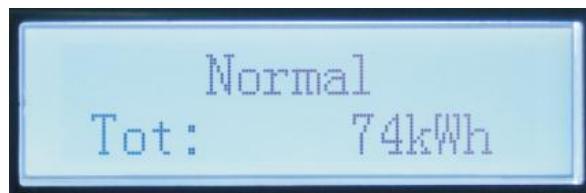
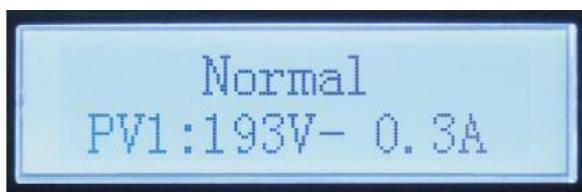
Button:

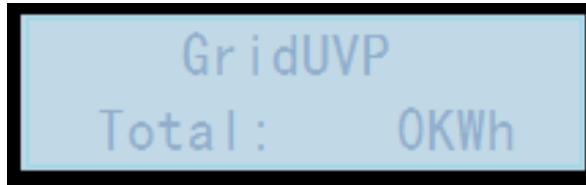
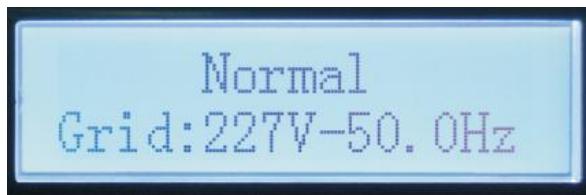
- ◊ Long press the button to enter the next menu or confirm the selection
- ◊ Short press the button to achieve the next page turning function
- ◊ Turn down the loop once to exit

Indicator Lights:

- ◊ RUN (Green)
 - ON: “ Normal ” state
 - Flash: “ Wait ” or “ Check ” state
- ◊ FAULT (Red)
 - ON: “ Fault ” or “ Permanent ” state

6.2. Standard Interface





When power-on, LCD interface displays INITIALIZING, refer below picture.



Initializing...

when control board successfully connected with communication board, the LCD display the current state of the inverter, display as shown in the figure below.

Wait 10s

- Waiting States, Countdown 10S
(depends country code, some are 60s)

Check

- Checking

Normal

- Normal Power Generation

Fault

• Regular error state

Permanent

• Unrecoverable error state

Inverter states includes: wait、check、normal、fault and permanent

Wait: Inverter is waiting to Check State at the end of reconnection time. In this state, grid voltage value is between the max and min limits and so on; If not, Inverter will go to Fault State or Permanent State.

Check: Inverter is checking isolation resistor, relays, and other safety requirements. It also does self-test to ensure inverter software and hardware are functional. Inverter will go to Fault State or Permanent State if any error or fault occurs.

Normal: Inverter enter to Normal State, it is feeding power to the grid; inverter will go to Fault State or Permanent state if any error or fault occurs.

Fault: Fault State: Inverter has encountered recoverable error. It should recover if the errors disappear. If Fault State continues; please check the inverter according error code.

Permanent: Inverter has encountered unrecoverable error, we need maintainer debug this kind of error according to error code.

When the control board and communication board connection fails, the LCD display interface as shown in the figure below.

DSP communicate fail

6.3. Main Interface

Long press the button under standard interface to enter into main interface, including:

| | |
|---------------|----------------------------|
| Normal | -----Long press the button |
| | 1.Enter Setting |
| | 2.Event List |
| | 3.SystemInfo |
| | 4.Display Time |
| | 5.Software Update |

(A) “Enter Setting” Interface as below:

| | |
|------------------------|---------------------------------|
| 1.Enter Setting | -----Long press the button |
| | 1.Set time |
| | 12.Set Safety Voltage |
| | 2.Clear Energy |
| | 13.Set Safety Frequency |
| | 3.Clear Events |
| | 14.Insulation Resistance |
| | 4.Set Country |
| | 15.Set Reactive |
| | 5.On-Off Control |
| | 16.Set Power Derate |
| | 6.Enable Set Country |
| | 17.Reflux Power |
| | 7.Set Energy |
| | 18.MPPT Scan |
| | 8.Set Address |
| | 19.Logic Interface |
| | 9.Set Input mode |
| | 20.Set Power Ratio |
| | 10.Set Language |
| | |
| | 11.Set Start Parameter |

Long press the button to Enter the main interface of "1.Enter Setting" and long press to enter the setting menu. You can select the content you want to set by short pressing the button.

Note1: Some settings need to enter the password (the default password is 0001), when entering the password, short press to change the number, long press to confirm the current number, and long press after entering the correct password. If "password error, try again" appears, you will need to re-enter the correct password.

1. Set Time

Set the system time for the inverter.

2. Clear Energy

Clean the inverter of the total power generation.

3. Clear Events

Clean up the historical events recorded in the inverter.

4. Set Country

Set up the safety regulation country that meets the current use conditions and requirements. Before setting this item, ensure that the “Enable Set Country” option are enabled . Please refer to “7.Enable Set Country” for details.

Table6-1 country code setting

| code | country | code | country | code | country |
|------|----------------------|------|------------------|-------|------------------|
| 00 | Germany VDE AR-N4105 | 16 | UK-G83 | 32 | CEI0-21 In Areti |
| 01 | CEI0-21 Internal | 17 | Greece island | 33 | Ukraine |
| 02 | Australia | 18 | EU EN50438 | 34 | Brazil |
| 03 | Spain RD1699 | 19 | IEC EN61727 | 35 | Mexico |
| 04 | Turkey | 20 | Korea | 36 | FAR Arrete23 |
| 05 | Denmark | 21 | Sweden | 37 | Denmark Tr322 |
| 06 | Greece Continent | 22 | Europe General | 38 | Wide-Range-60HZ |
| 07 | Netherlands | 23 | CEI0-21 External | 39 | Ireland EN504 |
| 08 | Belgium | 24 | Cyprus | 40 | Thailand PEA |
| 09 | UK-G59t | 25 | India | 41 | Thailand MEA |
| 10 | China | 26 | Philippines | 42 | LV-Range-50HZ |
| 11 | France | 27 | New Zealand | 43 | EU EN50549 |
| 12 | Poland | 28 | Brazil | 44 | South Africa |
| 13 | Germany BDEW | 29 | Slovakia VSD | 45-49 | Reserved |
| 14 | Germany VDE 0126 | 30 | Slovakia SSE | | |
| 15 | Italy CEI0-16 | 31 | Slovakia ZSD | | |

5. On-Off Control

Inverter on-off local control.

6. Enable Set Country

Enable this option before setting the country.

Attention: when inverter working for power generation over 24h, country

setting is forbidden, it can only be set after LCD setting. Key in passwords for country setting through LCD (default: 0001), country setting can be set in 24h after keying in the correct passwords, over 24h, set through LCD again.

7. Set Energy

Set the total power generation. You can modify the total power generation through this option.

8. Set address

Set the address (when you need to monitor multiple inverters simultaneously), Default 01.

9. Set Input mode

The input modes of the inverter are divided into parallel mode and independent mode (when multi-channel MPPT is input). Since 1.1k ~ 3.3KTL-G3 has only one group of MPPT input, the input modes are not distinguished.

10. Set Language

Set the inverter display language.

11. Set Start Parameter

12. Set Safety Voltage

13. Set Safety Frequency

14. Insulation Resistance

User can modify the above 4 parameters of the machine through the SD card, and the user needs to copy the parameter information that needs to be modified into the SD card in advance.

Note:To enable this feature, please contact the our company technical support .

15. Set Reactive

Enable or disable reactive functions.

16. Set Power Derate

Enable or disable the power derate function of the inverter, and set the derate ratio.

17. Reflux Power

Enable or disable the anti-reflux function of the inverter, and set the reflux power. This function need to be used with external CT, please refer to this manual 4.5 RS485, CT, inverter logic interface connection for details.

18. MPPT Scan

Shadow scanning, when the component is blocked or abnormal, causing multiple power peaks, by enabling this function, the peak point of maximum power can be tracked.

19. Logic interface

Enable or disable logical interfaces. Please refer to this manual 4.5 RS485, CT, inverter logic interface connection for details.

20. Set Power Ratio (The country is set at 10)

Set generation ratio.

(B) “Event List” Interface as below:

Event List is used to display the real-time event records, including the total number of events and each specific ID No. and happening time. User can enter Event List interface through main interface to check details of real-time event records, Event will be listed by the happening time, and recent events will be listed in the front. Please refer to below picture. Long press the button and short press the button to turn the page in standard interface, then enter into “2.Event List” interface.

| 2. Event List | |
|-------------------|--|
| 1. Current event | 2. History event |
| Fault information | 001 ID04 06150825 (Display the event sequence number, event ID number, and event occurrence time) |

(C) “SystemInfo” Interface as below

3.SystemInfo

-----Long press the button

| | | |
|--|-----------------|----------------|
| | 1.Inverter Type | 8.Power Factor |
| | 2.Serial Number | 9.Reflux Power |

| | |
|-------------------------|------------------------|
| 3.Soft Version | 10.Safety Paras |
| 4.Hard Version | 11.MPPT Scan |
| 5.Country | 12.Power Ratio |
| 6.Modbus Address | |
| 7.Input Mode | |

The user enters the main menu by long pressing the button, short press and turns the page to select menu contents, then long press the button to enter "3. SystemInfo". Turning the page down can select the system information to view.

(D) Display Time

Long press the button and short press the button to turn the page in the standard user interface to enter into "4.Display Time",then long press the button to display the current system time.

(E) Software Update

User can update software by USB flash drive , Our company will provide the new update software called firmware for user if it is necessary,The user needs to copy the upgrade file to the USB flash drive.

6.4. Update Software online

1.1K~3.3KTL-G3 inverters offer software upgrade via usb flash drive to maximize inverter performance and avoid inverter operation error caused by software bugs.

Procedure:

Step 1 First,turn off the DC and AC breaker, and then remove the communication waterproof cover as the following picture.If the RS485 line has been connected,Be sure to release the waterproof nut,Make sure the communication line is no longer the force. Then remove the waterproof cover,In order to avoid loosening the communication plug which has been connected.

Figure 6-1

Step 2 Insert the usb flash drive into the compute.

Step 3 Zucchetti Centro Sistemi S.p.A. will send the Software code to the user who needs to update. After user receive the file,please decompressing file and cover the original file in usb flash drive.

Step 4 Insert the usb flash drive into the USB interface.

Step 5 Then turn on DC switch and enter into the online upgrade to the main menu "5.Software Update" in the LCD display program[6.3(E)].The method to enter the menu can refer to operation interface of LCD.

Step 6 Input the password,if password is correct, and then begin the update process, the original password is 0715.

Step 7 System update main DSP, slave DSP and ARM in turns.If main DSP update success,the LCD will display "Update DSP1 Success", otherwise display "Update DSP1 Fail";If slave DSP update success,the LCD will display "Update DSP2 Success",otherwise display "UpdateDSP2 Fail".

Step 8 If Fail,please turn off the DC breaker,wait for the LCD screen extinguish,then turn on the DC breaker again,then Continue to update from step 5.

Step 9 After the update is completed,turn off the DC breaker, wait for the LCD screen extinguish,then recover the communication waterproof and then turn on the DC breaker and AC breaker again, the inverter will enters the running state. User can check the current software version in SystemInfo>>3.SoftVersion.

7. Trouble shooting and maintenance

Outlines of this chapter

This topic describes how to perform daily maintenance and troubleshooting to ensure long term proper operation of the inverter.

7.1. Trouble shooting

This section contains information and procedures for solving possible problems with the inverter.

- This section help users to identify the inverter fault. Please read the following procedures carefully:
- ❖ Check the warning, fault messages or fault codes shown on the inverter screen, record all the fault information.
- ❖ If there is no fault information shown on the screen, check whether the following requirements are met:
 - Is the inverter mounted in a clean, dry place with good ventilation?
 - Is the DC switch turned ON?
 - Are the cables adequately sized and short enough?
 - Are the input and output connections and wiring in good condition?
 - Are the configuration settings correct for the particular installation?
 - Are the display panel and the communication cables properly connected and undamaged?

Follow the steps below to view recorded problems: Long press the button to enter the main menu from the standard interface. Select “ 2. Event List ” then long press the button to enter event list.

➤ Event List information

Table 7-1 Event list

| Event List NO. | Event List Name | Event List description | Solution |
|----------------|------------------|--------------------------------------|--|
| ID01 | GridOVP | The power grid voltage is too high | If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. inverter automatically returns to normal operating status when the electric grid's back to normal. |
| ID02 | GridUVP | The power grid voltage is too low | If the alarm occurs frequently, check whether the grid voltage/frequency is within the acceptable range. If no, contact technical support. If yes, check the AC circuit breaker and AC wiring of the inverter. |
| ID03 | GridOPF | The power grid frequency is too high | If the grid voltage/frequency is within the acceptable range and AC wiring is correct, while the alarm occurs repeatedly, contact technical support to change the grid over-voltage, under-voltage, overfrequency, under-frequency protection points after obtaining approval from the local electrical grid operator. |
| ID04 | GridUFP | The power grid frequency is too low | If the grid voltage/frequency is within the acceptable range and AC wiring is correct, while the alarm occurs repeatedly, contact technical support to change the grid over-voltage, under-voltage, overfrequency, under-frequency protection points after obtaining approval from the local electrical grid operator. |
| ID05 | PVUVP | The input voltage is too low | Check whether too few PV modules are series connected in a PV string, thus the voltage(Vmp) of the PV string is lower than the minimum operating voltage of inverter. If yes, adjust the number of series connected PV modules to increase the voltage of the PV string to fit the input voltage range of inverter. inverter automatically returns to normal operating status after correct adjustments. |
| ID09 | PVOVP | The input voltage is too high | Check whether too many PV modules are series connected in a PV string, thus the voltage(Voc) of the PV string is higher than the maximum input voltage of inverter. If yes, adjust the number of series connected PV modules to decrease the voltage of the PV string to fit the input voltage range of inverter. inverter automatically returns to normal operating status after correct adjustments. |
| ID10 | IpvUnbalance | Input current is not balanced | Check the input mode(parallel mode/independent mode) setting of inverter according to Section 6.3 (C) 6.Input Mode of this user manual, If it's incorrect, change it according to Section 6.3 (A) 10.Set Input mode of this manual. |
| ID11 | PvConfigSetWrong | Incorrect input mode | If the fault occurs occasionally, the possible cause is that the external circuits are abnormal occasionally. inverter automatically returns to normal operating status after the fault is rectified.If the fault occurs frequently and lasts a |
| ID12 | GFCIFault | GFCI Fault | |

| | | | |
|------|------------------|--|---|
| | | | long time,check whether the insulation resistance between the PV array and earth(ground) is too low, then check the insulation conditions of PV cable. |
| ID14 | HwBoostOCP | The input current is too high , and has happen hardware protection | Check whether the input current is higher than the maximum input current of inverters, then check the input wiring, if both are correct, please contact technical support. |
| ID15 | HwAcOCP | The grid current is too high , and has happen hardware protection | |
| ID16 | AcRmsOCP | The grid current is too high | |
| ID17 | HwADFaultIGrid | The grid current sampling error | |
| ID18 | HwADFaultDCI | The DCI sampling error | |
| ID19 | HwADFaultVGried | The grid voltage sampling error | |
| ID20 | GFCIDeviceFault | The GFCI sampling error | ID15-ID24 are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support. |
| ID21 | MChip_Fault | The master chip fault | |
| ID22 | HwAuxPowerFault | The auxiliary voltage error | |
| ID23 | BusVoltZeroFault | The bus voltage sampling error | |
| ID24 | IacRmsUnbalance | The Output current is not balanced | |
| ID25 | BusUVP | The bus voltage Is too low | If the PV array configuration is correct (no ID05 fault), the possible cause is that the solar irradiance is too low. inverter automatically returns to normal operating status after the solar irradiance returns to normal level. |
| ID26 | BusOVP | The bus voltage Is too high | |
| ID27 | VbusUnbalan | The bus voltage is not balanced | ID26-ID27 are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support. |
| ID28 | DciOCP | The Dci is too high | Check the input mode(parallel mode/independent mode) setting of inverter according to Section 6.3 (C) 6.Input Mode of this user manual, If it's incorrect, change it according to Section 6.3 (A) 10.Set Input mode of this manual. If the input mode is correct, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support, |

| | | | |
|------|------------------------|--|---|
| | | | If it's incorrect, change it according to Section 6.3 (A) 10. Set Input mode of this manual. |
| ID29 | SwOCPInstan | The grid current is too high | Internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support. |
| ID30 | SwBOCPIstant | The input current is too high | Check whether the input current is higher than the maximum input current of inverters, then check the input wiring, if both are correct, please contact technical support. |
| ID49 | ConsistentFault_VGrid | The grid voltage sampling value between the master DSP and slave DSP is not consistent | |
| ID50 | ConsistentFault_F Grid | The grid frequency sampling value between the master DSP and slave DSP is not consistent | |
| ID51 | ConsistentFault_DCI | The DCI sampling value between the master DSP and slave DSP is not consistent | |
| ID52 | ConsistentFault_GFCI | The GFCI sampling value between the master DSP and slave DSP is not consistent | ID49-ID55 are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support. |
| ID53 | SpiCommLose | The spi communication between the master DSP and slave DSP is fault | |
| ID54 | SciCommLose | The Sci communication between the control board communication board is fault | |
| ID55 | RelayTestFail | The relays fault | |
| ID56 | PvIsoFault | The insulation resistance is too low | Check the insulation resistance between the PV array and earth(ground), if a short circuit occurs, rectify the fault. |
| ID57 | OverTempFault_Inv | The inverter temp is too high | Ensure the installation position and installation method meet the requirements of Section 3.4 of this user manual. |
| ID58 | OverTempFault_Boost | The Boost temp is too high | Check whether the ambient temperature of the installation position exceeds the upper limit. If yes, improve ventilation to decrease the |
| ID59 | OverTempFault_ | The environment | |

| | | | |
|------|-------------------------------|--|---|
| | Env | temp is too high | temperature. |
| ID65 | UnrecoverHwAc OCP | The grid current is too high, and has cause unrecoverable hardware fault | |
| ID66 | UnrecoverBusOV P | The bus voltage is too high, and has cause unrecoverable fault | |
| ID67 | UnrecoverIacRms Unbalance | The grid current is unbalance, and has cause unrecoverable fault | |
| ID68 | UnrecoverIpvUnb alance | The input current is unbalance, and has cause unrecoverable fault | ID65-ID70 are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support. |
| ID69 | UnrecoverVbusU nbalance | The bus voltage is unbalance, and has cause unrecoverable fault | |
| ID70 | Unrecover OCP Instant | The grid current is too high, and has cause unrecoverable fault | |
| ID71 | UnrecoverPvConf igSetWrong | Incorrect input mode | Check the input mode(parallel mode/independent mode) setting of inverter according to Section 6.3 (C) 6. Input Mode of this user manual, If it's incorrect, change it according to Section 6.3 (A) 10. Set Input mode of this manual |
| ID74 | UnrecoverIPVInst ant | The input current is too high, and has cause unrecoverable fault | |
| ID75 | UnrecoverWRIT EEPROM | The EEPROM is unrecoverable | |
| ID76 | UnrecoverREAD EEPROM | The EEPROM is unrecoverable | ID74-ID77 are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support. |
| ID77 | Unrecover Relay Fail | Relay has happen permanent fault | |
| ID81 | Over Temp Derating | The inverter has derated because of the temperature is too high | Ensure the installation position and installation method meet the requirements of Section 3.4 of this user manual. Check whether the ambient temperature of the installation position exceeds the upper limit. If yes, improve ventilation to decrease the temperature. |
| ID82 | Over Freq Derating | The inverter has derated because of the grid frequency | Inverter automatically reduce the output power when the frequency of electrical grid is too high. |

| | | | |
|------|------------------------------------|--|--|
| | | is too high | |
| ID83 | Remote Derating | The inverter has derated by the Remote control | Inverter records ID83 in case of remote power derating operation. Check the wiring of remote input and output control signal port on the communication board according to Section 4.5 of this user manual. |
| ID84 | Remote Off | The inverter has shut down because by the Remote control | Inverter records ID84 in case of remote shutdown operation. Check the wiring of remote input and output control signal port on the communication board according to Section 4.5 of this user manual. |
| ID94 | Software version is not consistent | The software between the control board and the communication board is not consistent | Contact technical support to upgrade software. |
| ID95 | Communication board EEPROM fault | The communication board EEPROM is fault | ID95~ID96 are internal faults of inverter, turn OFF the “DC switch”, wait for 5 minutes, then turn ON the “DC switch”. Check whether the fault is rectified. If no, please contact technical support. |
| ID96 | RTC clock chip anomaly | RTC clock chip is fault | |
| ID97 | Invalid Country | The country is invalid | Check the country setting according to Section 6.3 (C) 5.Country of this user manual, If it's incorrect, change it according to Section 6.3 (A) 4.Set Country Code of this manual. |
| ID98 | SD fault | The SD card is fault | Please replace the SD card. |

7.2. Maintenance

Inverters generally do not need any daily or routine maintenance. Heat sink should not be blocked by dust, dirt or any other items. Before the cleaning, make sure that the DC SWITCH is turned OFF and the circuit breaker between inverter and electrical grid is turned OFF. Wait at least for 5 minutes before the Cleaning.

❖ Inverter cleaning

Please clean the inverter with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the inverter with water, corrosive chemicals, detergent, etc.

❖ Heat sink cleaning

For the long-term proper operation of inverters, ensure there is enough space

around the heat sink for ventilation, check the heat sink for blockage (dust, snow, etc.) and clean them if they exist. Please clean the heat sink with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the heat sink with water, corrosive chemicals, detergent, etc.

8. Technical data

Outlines of this chapter

This topic lists the technical specifications for all 1.1K~3.3KTL-G3 inverters.

8.1. Input parameters (DC)

| Technical Data | 1100TL-G3 | 1600TL-G3 | 2200TL-G3 | 2700TL-G3 | 3000TL-G3 | 3300TL-G3 | | | |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|--|--|--|
| Max.DC power | 1500W | 2200W | 3000W | 3700W | 4100W | 4500W | | | |
| Max.Input voltage | 500V | | | 550V | | | | | |
| Aux Start-up voltage | 60V | | | | | | | | |
| Start-up input voltage | 70V | | | | | | | | |
| MPPT voltage range | 50-500V | | | 50-550V | | | | | |
| Rated input voltage | 360V | | | | | | | | |
| Full load DC voltage range | 110-450V | 150-450V | 200-450V | 250-500V | 275-500V | 300-500V | | | |
| Max. Input current | 12A | | | | | | | | |
| Input short circuit current | 15A | | | | | | | | |
| Number of MPPT/ Number of DC input | 1/1 | | | | | | | | |
| Input terminal type | MC4/H4 | | | | | | | | |

8.2. Output parameters (AC)

| Technical Data | 1100TL-G3 | 1600TL-G3 | 2200TL-G3 | 2700TL-G3 | 3000TL-G3 | 3300TL-G3 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Rated Output power | 1100W | 1600W | 2200W | 2700W | 3000W | 3300W |
| Max.Output power | 1100VA | 1600VA | 2200VA | 2700VA | 3000VA | 3300VA |

| | | | | | | |
|------------------------|---|------|-------|-------|-------|-------|
| Rated Output current | 4.8A | 7A | 9.6A | 11.8A | 13A | 14.3A |
| Max.Output current | 5.3A | 7.7A | 10.6A | 13A | 14.5A | 16A |
| Nominal grid voltage | L/N/PE,220Vac 230Vac 240Vac | | | | | |
| Grid voltage range | 180~276Vac (According to local grid standard) | | | | | |
| Nominal grid frequency | 50Hz/60Hz | | | | | |
| Grid frequency range | 45~55Hz/54~66Hz (According to local grid standard) | | | | | |
| THDi | <3% | | | | | |
| Power factor | 1default(+/-0.8 adjustable) | | | | | |

8.3. Efficiency,Protection and Communication

| Technical Data | 1100TL-G3 | 1600TL-G3 | 2200TL-G3 | 2700TL-G3 | 3000TL-G3 | 3300TL-G3 |
|---|--|-----------------------------|---|-----------|-----------|-----------|
| Max.Efficiency | | 97.5% | | | 97.7% | |
| Euro Efficiency | | 96.9% | | | 97.2% | |
| MPPT Efficiency | | | >99.9% | | | |
| Self-consumption at night | | | <1W | | | |
| Safety protection | | | Anti islanding,RCMU,Ground fault monitoring | | | |
| Certification | AS 4777, VDE V 124-100,VDE V 0126-1-1,VDE-AR-N 4105,EN 50438,G83/2,C10/11,RD1699 | | | | | |
| Protective class | | | Class I | | | |
| External environment | | | Degree 3 | | | |
| pollution degree | | | | | | |
| Overvoltage category | | PV:OVC II, AC mains:OVC III | | | | |
| Max inverter Back-feed current to the array | | | 0A | | | |
| Output short circuit current to the array | | | 200A/1us | | | |
| Output inrush current and duration | | | 0.8A/2us | | | |

8.4. General Date

| Technical Data | 1100TL-G3 | 1600TL-G3 | 2200TL-G3 | 2700TL-G3 | 3000TL-G3 | 3300TL-G3 | |
|----------------------------|-------------------------------|-----------|-------------------|-----------|-----------|-----------|--|
| Topology | Transformerless | | | | | | |
| Ambient temperature range | -30~60°C | | | | | | |
| Permissible humidity range | 0~100% | | | | | | |
| Noise figure | <25dB | | | | | | |
| DC Switch | Optional | | | | | | |
| Cooling | Natural convection | | | | | | |
| Max.Operating altitude | 2000m | | | | | | |
| Outline Dimension | 303*260.5*118mm | | 321*260.5*131.5mm | | | | |
| Bracket | Wall-mounted | | | | | | |
| Weight | 5.5kg | | 6.3kg | | | | |
| Display | LCD+LED | | | | | | |
| Communication mode | RS485,WiFi/GPRS(optional),USB | | | | | | |
| Degree of protection | IP65 | | | | | | |

9. Quality Assurance

Standard warranty period

The standard warranty period of inverter is 120 months (10 years).There are two calculation methods for the warranty period:

1. Purchase invoice provided by the customer: the first flight provides a standard warranty period of 120 months (10 years) from the invoice date;
2. The customer fails to provide the invoice: from the production date (according to the SN number of the machine), Zucchetti Centro Sistemi S.p.A. provides a warranty period of 126 months (10.5 years).
3. In case of any special warranty agreement, the purchase agreement shall prevail.

Extended warranty period

Within 12 months of the purchase of the inverter (based on the purchase invoice) or within 24 months of the production of the inverter(SN number of machine, based on the first date of arrival),Customers can apply to buy extended warranty products from the company's sales team by providing the product serial number, Zucchetti Centro Sistemi S.p.A. may refuse to do not conform to the time limit extended warranty purchase application.Customers can buy an extended warranty of 15 years.

If the customer wants to apply for the extended warranty service, please contact the sales team of Zucchetti Centro Sistemi S.p.A.. to purchase the products that are beyond the purchase period of extended warranty but have not yet passed the standard quality warranty period. Customers shall bear different extended premium.

During the extended warranty period, pv components GPRS, WIFI and

lightning protection devices are not included in the extended warranty period. If they fail during the extended warranty period, customers need to purchase and replace them from our company.

Once the extended warranty service is purchased, our company will issue the extended warranty card to the customer to confirm the extended warranty period.

Invalid warranty clause

Equipment failure caused by the following reasons is not covered by the warranty:

- 1) The "warranty card" has not been sent to the distributor or our company;
- 2) Without the consent of our company to change equipment or replace parts;
- 3) Use unqualified materials to support our company's products, resulting in product failure;
- 4) Technicians of non-company modify or attempt to repair and erase the product serial number or silk screen;
- 5) Incorrect installation, debugging and use methods;
- 6) Failure to comply with safety regulations (certification standards, etc.);
- 7) Damage caused by improper storage by dealers or end users;
- 8) Transportation damage (including scratches caused by internal packaging during transportation).Please claim directly from the transportation company or insurance company as soon as possible and obtain damage identification such as container/package unloading;
- 9) Failure to follow the product user manual, installation manual and maintenance guidelines;
- 10) Improper use or misuse of the device;
- 11) Poor ventilation of the device;
- 12) The product maintenance process does not follow relevant standards;
- 13) Failure or damage caused by natural disasters or other force majeure (such as earthquake, lightning strike, fire, etc.)



Product Name: PV Grid-Connected Inverter
Company Name: Zucchetti Centro Sistemi S.p.A.
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