



Growatt 33000 TL3-US  
Growatt 36000 TL3-US  
Growatt 40000 TL3-US

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Installation & Operation Manual ►

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# Introduction 1

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### 1.1 Validity

This manual describes the assembly, installation, commissioning and maintenance of the following series GROWATT inverters:

Growatt 33000 TL3-US

Growatt 36000 TL3-US

Growatt 40000 TL3-US

### 1.2 Target Group

This manual is for qualified personnel. Qualified personnel have received training and have demonstrated skills and knowledge in the construction and operation of this device. Qualified personnel are trained to deal with the dangers and hazards involved in installing electric devices.

### 1.3 Storage of the manuals

Keep all Growatt manuals in a safe place for future reference.

### 1.4 Additional information

You can find further information on special topics in the download area at  
[Http://www.growatt-america.com](http://www.growatt-america.com)

### 1.5 Symbols in this document

#### 1.5.1 Warnings

A warning describes a hazard to equipment or personnel.

It calls attention to a procedure or practice, which if not correctly performed or adhered to, could result in damage to or destruction of part or all of Growatt equipment and/or other equipment connected to the Growatt equipment or personal injury.

| Symbol  | Description   |
|---|---|
| <br>DANGER | DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury. |

| Symbol | Description  |
|--------|--|
|        | WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.  |
|        | CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |
|        | NOTICE is used to address practices not related to personal injury.                                      |
|        | INFORMATION that you must read and know to ensure optimal operation of the system.                       |

### 1.5.2 Markings on this product

|  |   |
|--|---|
|  | <p>Warning regarding dangerous voltage</p> <p>The product works with high voltage. All work on the product must only be performed as described in its documentation.</p>                  |
|  | <p>Beware of hot surface</p> <p>The product can become hot during operation. Do not touch the product during operation.</p>   |
|  | <p>Observe the operating instructions</p> <p>Read the product's documentation before working on it. Follow all safety precautions and instructions as described in the documentation.</p> |
|  | AC current  |

|  |  |
|--|--|
|  | DC current   |
|  | Transformerless  |
|  | Earth Ground   |
|  | FCC certificate  |
|  | UL1741 Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources. CSA C22.2 No.107.1,CSA C22.2 NO.14 - General Use Power Supplies. |

### 1.5.3 Glossary

AC

Abbreviation for "Alternating Current"

DC

Abbreviation for "Direct Current"

Energy

Energy is measured in Wh (watt hours), kWh (kilowatt hours) or MWh (megawatt hours). The energy is the power calculated over time. If, for example, your inverter operates at a constant power of 20,000 W for half an hour and then at a constant power of 10,000 W for another half an hour, it has fed 15,000Wh of energy into the power distribution grid within that hour.

# Safety 2

## Power

Power is measured in W (watts), kW (kilowatts) or MW (megawatts). Power is an instantaneous value. It displays the power your inverter is currently feeding into the power distribution grid.

## Power rate

Power rate is the ratio of current power feeding into the power distribution grid and the maximum power of the inverter that can feed into the power distribution grid.

## Power Factor

Power factor is the ratio of true power or watts to apparent power or volt amps. They are identical only when current and voltage are in phase than the power factor is 1.0. The power in an ac circuit is very seldom equal to the direct product of the volts and amperes. In order to find the power of a single phase ac circuit the product of volts and amperes must be multiplied by the power factor.

## PV

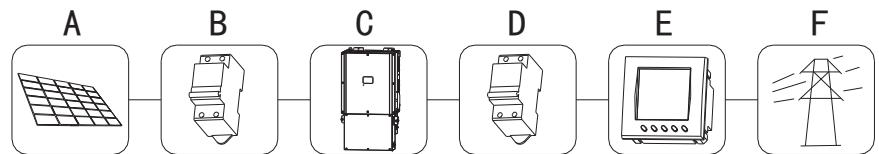
Abbreviation for photovoltaic

## Wireless communication

The external wireless communication technology is a radio technology that allows the inverter and other communication products to communicate with each other. The external wireless communication does not require line of sight between the devices.

## 2.1 Intended Use

The Growatt TL3-US is a PV inverter which converts the direct current (DC) of the PV array to alternating current (AC) and feeds it into the power distribution grid.



| Symbol | Description             |
|--------|-------------------------|
| A      | PV modules              |
| B      | DC load circuit breaker |
| C      | Growatt TL3-US Inverter |
| D      | AC load circuit breaker |
| E      | Energy meter            |
| F      | Utility grid            |

The Growatt TL3-US takes current from PV array and converts it to alternating current for the power distribution grid (F). Energy surplus may even result in the energy meter (E) of your plant running backwards. The Growatt TL3-US is suitable for indoor and outdoor use.

## AC circuit breaker

Each inverter with an independent circuit breaker (three or four pole AC circuit breaker) can securely disconnect from the grid safely.

|  |   |
|--|---|
| <br>CAUTION | <ul style="list-style-type: none"><li>• Do not share a single circuit breaker with more than one inverter.</li><li>• Do not connect the any local load between the inverter and the AC circuit breaker.</li></ul> |
|--|---|

## PV modules

The PV modules used must be suitable for use with the Growatt TL3-US and must be approved by the module manufacturer.

The PV modules must be Monocrystalline silicon PV modules, Polysilicon PV modules and thin-film PV modules with levels of protection and must not be grounded (can not have anode or cathode lead from array going to ground)



CAUTION

- PV modules with large capacities relative to earth, such as thin-film PV modules with cells on a metallic substrate, may only be used if their coupling capacity does not exceed 500 nF.
- Do not connect to any PV Modules that require the anode or the cathode to be connected directly to Ground.
- Do not connect any energy sources other than PV modules to the Growatt TL3-US.
- Do not connect the any local load between the inverter and the AC circuit breaker.
- The Growatt TL3-US is only used in the Grid-connected system.

## 2.2 Qualification of skilled person

This grid-tied inverter will only operate when properly connected to an AC distribution network. Before connecting the Growatt TL3-US to the power distribution grid, you must contact the local power distribution grid company. This connection must be made only by qualified technical personnel, and only after receiving appropriate approvals, as required by the local authority having jurisdiction.

## 2.3 Safety instruction

The GROWATT TL3-US Inverters is designed and tested according to international safety requirements (UL 1741/IEEE 1547); however, certain safety precautions must be observed when installing and operating this inverter. Read and follow all instructions, cautions and warnings in this installation manual. If questions arise, please contact Growatt's technical services at +86 (0)755 2747 1900.

### 2.3.1 Assembly Warnings



WARNING

- Prior to installation, inspect the unit to ensure absence of any transport or handling damage, which could affect insulation integrity or safety clearances; failure to do so could result in safety hazards.
- Assemble the inverter per the instructions in this manual. Use care when choosing installation location and adhere to specified cooling requirements.
- Unauthorized removal of necessary protections, improper use, incorrect installation and operation may lead to serious safety and shock hazards and/or equipment damage.
- In order to minimize the potential of a shock hazard due to hazardous voltages, cover the entire solar array with dark material prior to connecting the array to any equipment.

## 2.3.2 Electrical Connection Warnings



WARNING

- Make all electrical connections (e.g. conductor termination, fuses, PE connection, etc.) in accordance with prevailing regulations. When working with the inverter powered on, adhere to all prevailing safety regulations to minimize risk of accidents.
- Systems with inverters typically require additional control (e.g., switches, disconnects) or protective devices (e.g., fusing circuit breakers) depending upon the prevailing safety rules.



DANGER

- The components in the inverter are live. Touching live components can result in serious injury or death
  - Do not open the inverter with the exception of the wire box by qualified persons.
  - Electrical installation, repairs and conversions may only be carried out by electrically qualified persons.
  - Do not touch damaged inverters.
- Danger to life due to high voltages in the inverter
  - There is residual voltage in the inverter. The inverter takes 20 minutes to discharge.
  - Wait 20 minutes before you open the wire box.

## 2.4 Operation Warnings

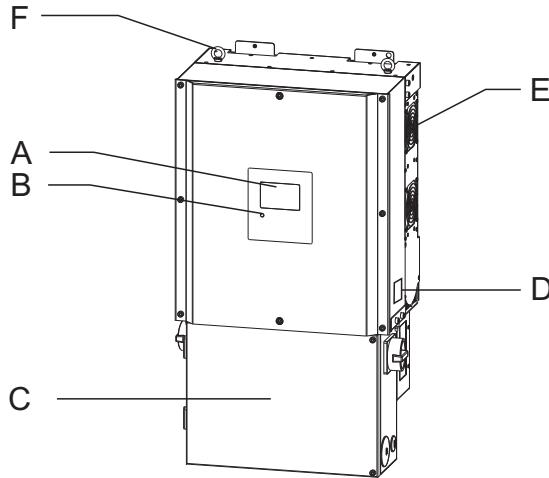


WARNING

- Anytime the inverter has been disconnected from the power network, use extreme caution as some components can retain charge sufficient to create a shock hazard; to minimize occurrence of such conditions, comply with all corresponding safety symbols and markings present on the unit and in this manual.
- Ensure all covers and doors are closed and secure during operation.
- All operations regarding transport, installation and start-up, including maintenance must be operated by qualified, trained personnel and in compliance with all superseding codes and regulations.
- Although designed to meet all safety requirements, some parts and surfaces of Inverter are still hot during operation. To reduce the risk of injury, do not touch the heat sink at the back of the PV-Inverter or nearby surfaces while Inverter is operating.
- Incorrect sizing of the PV plant may result in voltages being present which could destroy the inverter. The inverter display will read the error message "PV-Oversupply!"
  - Turn the rotary switch of the DC Disconnect to the Off position immediately.
  - Contact installer.

# 3 Product Description

## 3.1 Growatt TL3-US



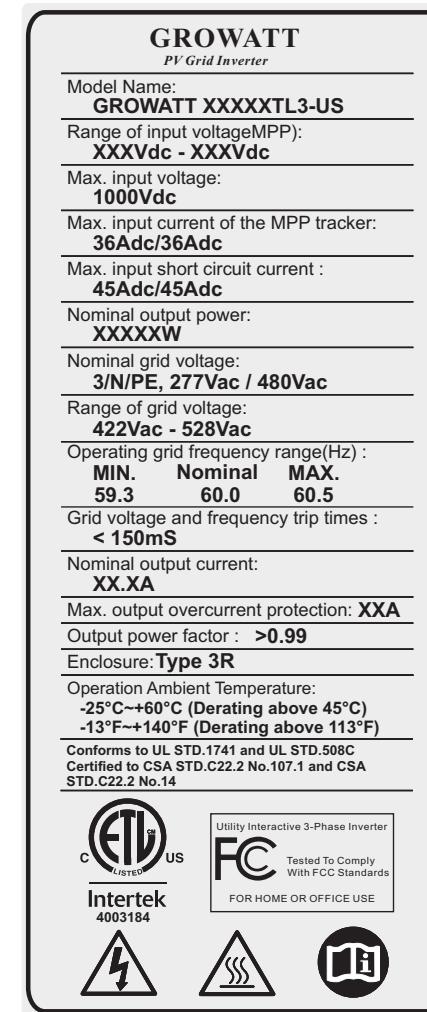
| Symbol | Description    |
|--------|----------------|
| A      | LCD            |
| B      | LED            |
| C      | Wire Box       |
| D      | Label          |
| E      | Fan air outlet |
| F      | Flying rings   |

Inverter display

| Symbol | Description            | Explanation                                  |
|--------|------------------------|--|
|        | Tap symbol             | Indicates display operation (see Section 8). |
|        | Inverter status symbol | Indicates inverter operation status          |

## 3.2 Inverter Type Label

The type labels provide a unique identification of the inverter (type of product, device-specific characteristics, certificates and approvals). The type labels are on the right-hand side of the enclosure.



More detail about the inverter type label as the chart below:

| Label symbol                          | Growatt 33000TL3-US  | Growatt 36000 TL3-US          | Growatt 40000 TL3-US          |
|---------------------------------------|--|-------------------------------|-------------------------------|
| Range of input voltage(MPP)           | 480V-800V  | 520V-800V                     | 570V-800V                     |
| Max input voltage                     | 1000V  | 1000V                         | 1000V                         |
| Max input current of MPP tracker      | 36A/36A  | 36A/36A                       | 36A/36A                       |
| Max input short circuit current       | 45A/45A  | 45A/45A                       | 45A/45A                       |
| Nominal output power                  | 33000W/36660VA   | 36000W/40000VA                | 40000W/40000VA                |
| Nominal grid voltage                  | 277Vac/480Vac<br>3/N/PE  | 277Vac/480Vac<br>3/N/PE       | 277Vac/480Vac<br>3/N/PE       |
| Range of grid voltage range           | 422Vac~528Vac  | 422Vac~528Vac                 | 422Vac~528Vac                 |
| operating grid frequency range(HZ)    | Min 59.3 Normal 60.0 Max 60.5  | Min 59.3 Normal 60.0 Max 60.5 | Min 59.3 Normal 60.0 Max 60.5 |
| Grid voltage and frequency trip times | <150ms   | <150ms                        | <150ms                        |
| Nominal output current                | 40A  | 44A                           | 48A                           |
| Max output current                    | 44A  | 48A                           | 48A                           |
| Max output overcurrent protection     | 55A  | 60A                           | 60A                           |
| Output power factor                   | >0.99  | >0.99                         | >0.99                         |
| Enclosure                             | Type 3R  | Type 3R                       | Type 3R                       |
| Operation Ambient temperature         | -25°C~+60°C (Derating above 45°C)<br>-13°F~+140°F (Derating above 113°F) |                               |                               |

### 3.3 Size and weight

Growatt 33000TL3-US/ 36000TL3-US /40000TL3-US

| Inverter Only           |           |          |         |
|-------------------------|-----------|----------|---------|
| Dimension               |           | Weight   |         |
| Height                  | Width     |          |         |
| 435 mm                  | 790mm     | 265mm    | 50kg    |
| 17.1 inch               | 31.1 inch | 10.4inch | 110.2lb |
| Inverter with Packaging |           |          |         |
| Dimension               |           | Weight   |         |
| Length                  | Width     |          |         |
| 950mm                   | 550mm     | 430mm    | 56Kg    |
| 37.4inch                | 21.7inch  | 16.9inch | 123.4lb |

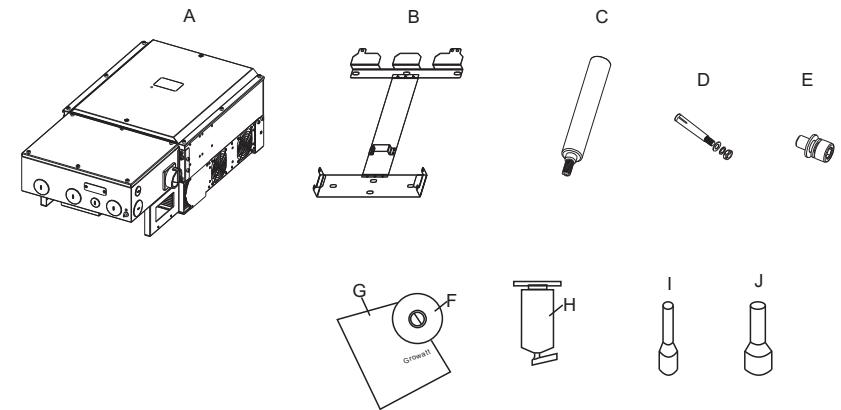
### 3.4 The advantage of the Growatt TL3-US inverters

Functional features:

|                    |   |
|--------------------|---|
| High efficiency    | The CEC efficiency 98.5% , Max efficiency 98.8%.  |
| High power density | Smaller and lighter inverter , can be installed more easily.  |
| 2 MPPTs            | Dual independent MPP trackers and advanced MPPT algorithms lead to optimal energy harvesting . Adapt to different installations of strings or illumination variation. |
| Wide working range | Operating PV voltage range 200V~1000V.Wide range of output power allows a variety of site designs, with an emphasis on design flexibility and project yield.          |
| ECO mode           | Gets higher MPP precision and efficiency especially under weak illumination.  |
| AC Power Supply    | Inverter can still be monitored and updated when PV power turned off.   |

# Unpacking 4

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



| Item | Name                   | Quantity |
|------|------------------------|----------|
| A    | Solar inverter         | 1        |
| B    | Mounting bracket       | 1        |
| C    | Hand shank             | 4(Opt.)  |
| D    | Expansion bolt         | 5        |
| E    | Safety-lock screws     | 6        |
| F    | Monitor software(disk) | Opt.     |
| G    | Manual                 | 1        |
| H    | External wireless      | Opt.     |
| I    | PV cable Terminal      | 16       |
| J    | AC cable Terminal      | 5        |

|                          |   |
|--------------------------|---|
| Intelligent Integration  | Integrated DC/AC Switch, DC/AC SPD (Class II ),DC Fuse in wire-box. Reduce space and save cost of installation.         |
| Independent Wire-box     | Support wire-box disassembly and assembly easily.   |
| Flexible Communication   | RS485/RS232/WiFi (OPT)/GPRS (OPT)/ETHERNET (OPT).   |
| Comprehensive Protection | For overvoltage, anti-island, DC insulation resistance low, ground fault ,output short-circuit, overload, overheat, etc |
| AFCI                     | Arc fault circuit interruption.   |
| PID                      | Eliminate the power loss of PV modules caused by PID effect.  |
| String Monitor           | Monitor the working status of each PV string.   |

## Technical Characteristics:

|                      |  |
|----------------------|--|
| Anti-corrosion paint | Anti-corrosion paint protection, to achieve a higher reliability and life expectancy in complex application field. |
| Patented inductor    | Patented inductor design ensure lower-noise and perfect performance.   |
| AC switch            | Intelligent management of output power.  |
| DC link              | Full film capacitor design on DC link, longer lifetime for inverter.   |
| LCL topology         | LCL topology, higher quality of output power, adapt to multiple parallel connection.                               |
| Inverter topology    | New 3 levels invert topology, gets higher efficiency.  |
| IGBT driver          | Advanced IGBT drivers, effectively achieve short-circuit and over-voltage protection for IGBTs.                    |

# 5 Installation

## 5.1 Safety instructions



WARNING

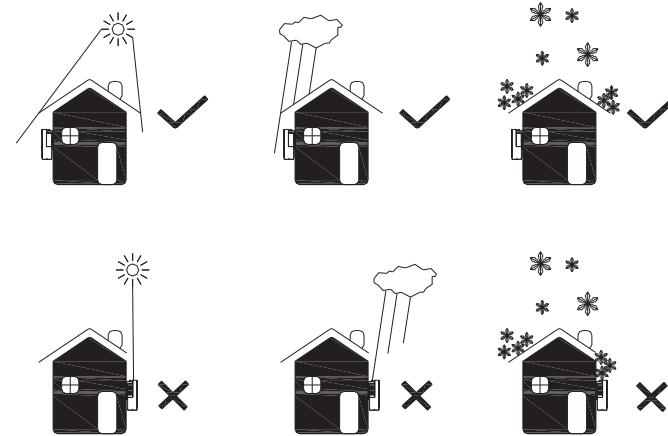
- Before instructions, anyone includes qualified, trained personnel, must make sure you have read the section 2.1, about the General installation warnings.

## 5.2 Selecting the Installation Location

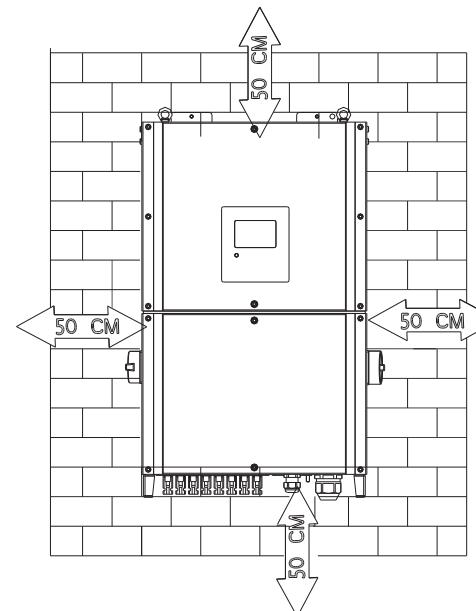
Select the installation location based on the following considerations:

- 1) Select a well-ventilated location sheltered from direct sunlight and rain.
- 2) Choose a location that allows unobstructed airflow around the inverter.
- 3) Allow sufficient room around the inverter to enable easy installation and removal from the mounting surface.
- 4) Height from ground level should be at least 3 feet.
- 5) Access panels on the front surface of the inverter allow inspection and maintenance of hardware; and must not be blocked. See Figure on pg. 18 for recommended minimum clearances around the inverter.
- 6) Mount the Growatt TL3-US Inverter vertically as possible. For other mounting orientations, please consult with Growatt.
- 7) Tilted mounting ( $\pm 15^\circ$  from vertical) is acceptable for the Growatt33000TL3-US/36000TL3-US/40000TL3-US.
- 8) The inverter requires adequate cooling space, allowing at least 19.5" inches (50cm) space above and below the inverter while 19.5" inch (50cm) space of right and left.
- 9) The installation method and mounting location must be suitable for the weight and dimensions of the inverter. Select a wall or solid vertical surface that can support the PV-Inverter.
- 10) The location shall be away from strong electromagnetic interference.
- 11) The location shall not exceed Type3R standard according to ANSI/IEC\_60529-2004.

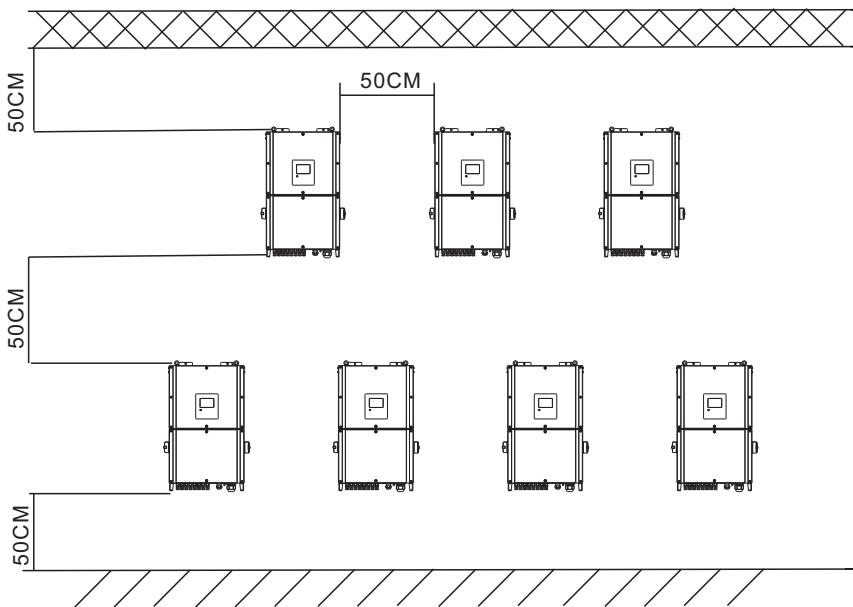
Possible location for inverter under the ceiling:



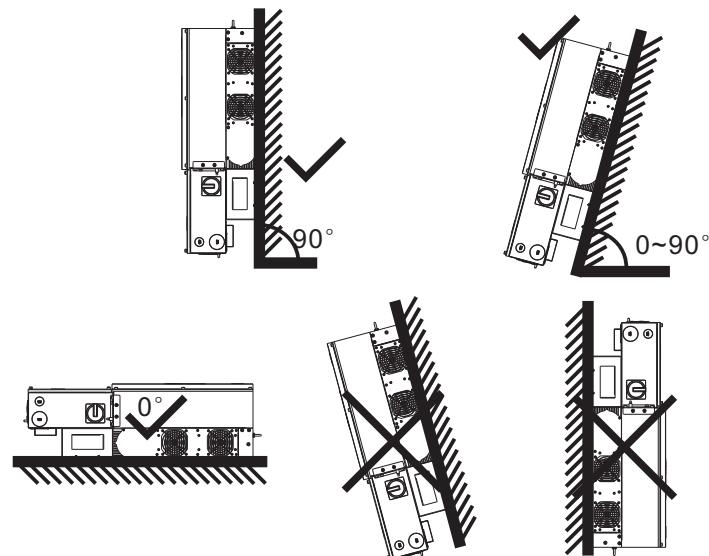
Minimum clearances around the inverter:



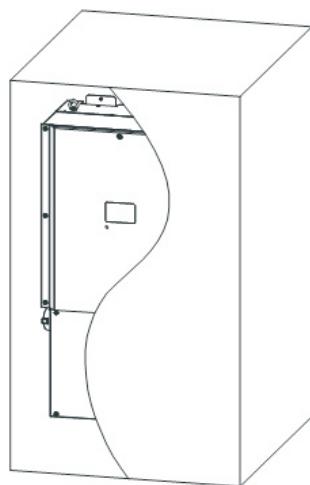
Clearances for multi inverters



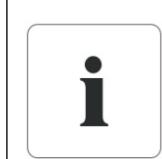
Tilted mounting(+15° from vertical)is acceptable for the Growatt 33000TL3-US/36000TL3-US/40000TL3-US following the picture blow.



DO NOT install the Growatt TL3- US into a small enclosure



### 5.3 Mounting the Growatt TL3-US



#### INFORMATION

##### > General tools

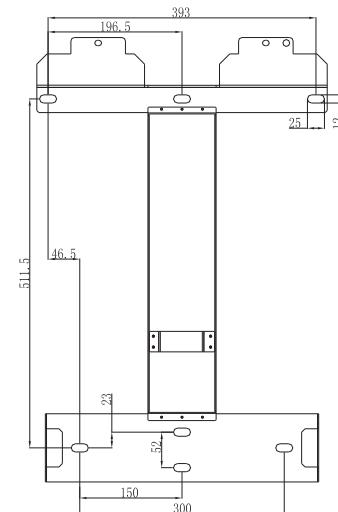
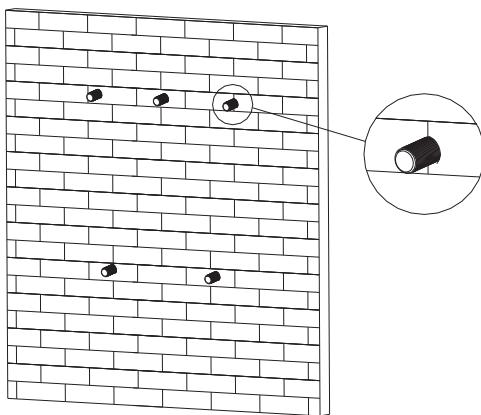
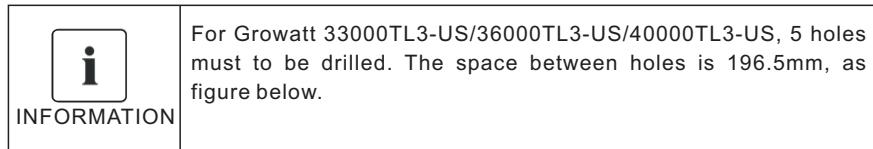
- Personal safety equipment such as gloves, helmet, goggles, ear plugs, safety harness etc.
- Step ladders.
- Knife.

##### > Tools for mechanical installation

- Equipment for transporting and lifting the inverter.
- Electric (hammer) drill.
  - Hammer.
  - Set of drill bits, wrenches, sockets and screw bits.
  - Socket driver, screwdriver.
  - Tape measure.
  - Spirit level.
  - Pencil or other marker.
  - Fastening screws, plugs, etc

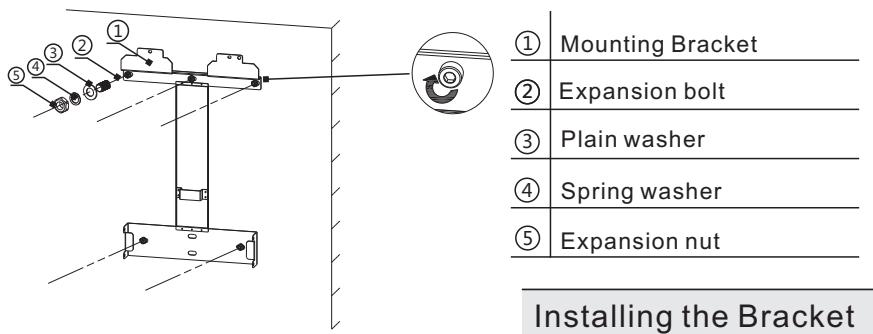
## Step 1:Drilling mounting holes for bracket

Use the mounting bracket as a template and drill 5 holes as illustrated in image below, hole size: 10mm (diameter), 85mm (min. depth). Then insert the 4 expansion bolts provided into the holes, make sure the bolts are paralleled with the outer surface of the bracket.



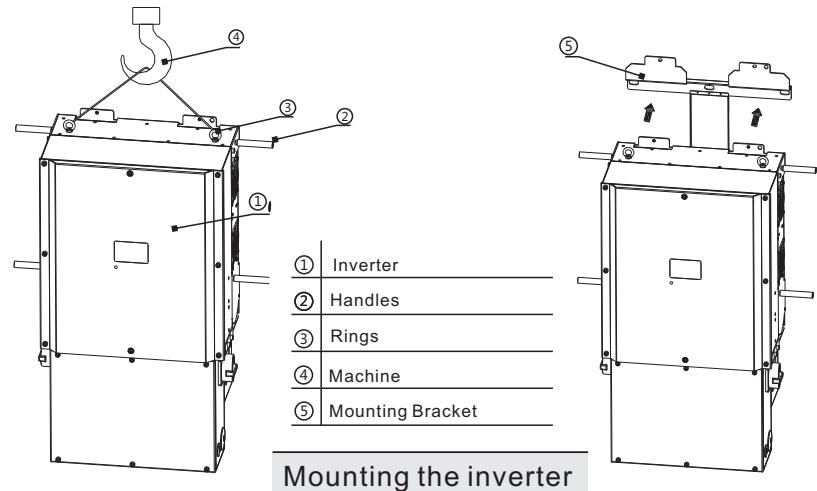
## Step 2: Installing the bracket

Place and hold the bracket onto the wall and screw on the nuts to fasten the bracket, as the figure below.



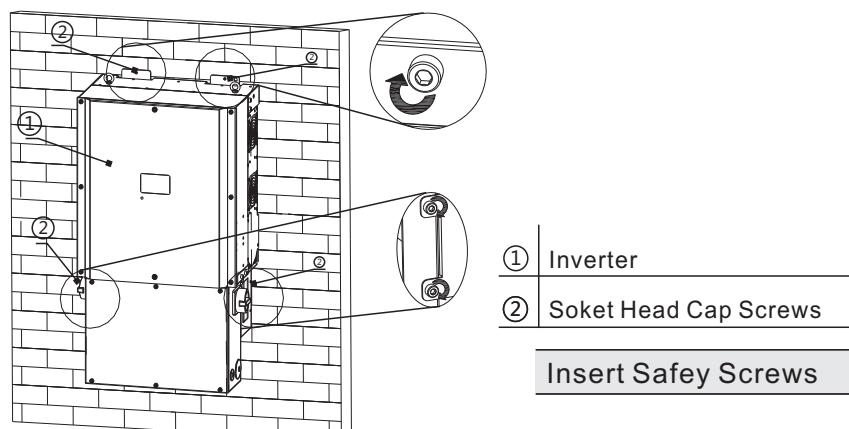
## Step 3:Mounting the inverter on the wall

Raise the Growatt TL3-US a little higher than the bracket. Due to the weight of the inverter, additional tools may be required to hang the inverter using the right and left fly rings on the top of the inverter. Make sure to maintain the balance of the Growatt TL3-US during the process, as shown on figure below.



## Step 4: Insert safety-lock screws

Insert the safety-lock screws into the two side holes of the mounting bracket to fasten the inverter, as shown on figure below



## Step 5 : Check

Check the upper straps of PV Inverter and ensure it is secured on to the bracket.

Check for secure mounting of the PV inverter by trying to raise it from the bottom. The PV Inverter should remain firmly attached.

## 5.4 Electrical Connection

### 5.4.1 Safety



#### WARNING

- Before instructions, anyone including qualified, trained personnel, must make sure you have read the section 2.3, General Installation Warnings.

#### Electrical installations



#### INFORMATION

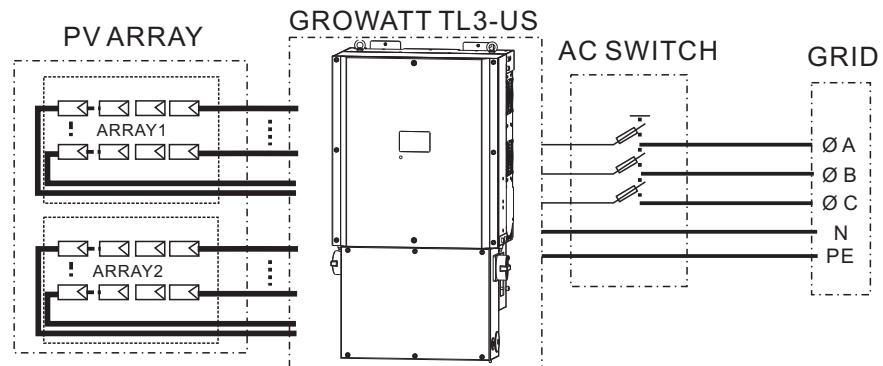
- All electrical installations must be done in accordance with all local electrical codes and the NATIONAL Electrical Code®, ANSI/NFPA 70. For installation in Canada the installations must be done in accordance with applicable Canadian standards.
- Before connecting the inverter to the power distribution grid, contact your local electric utility company. This connection may be made only by electrically qualified persons.



#### INFORMATION

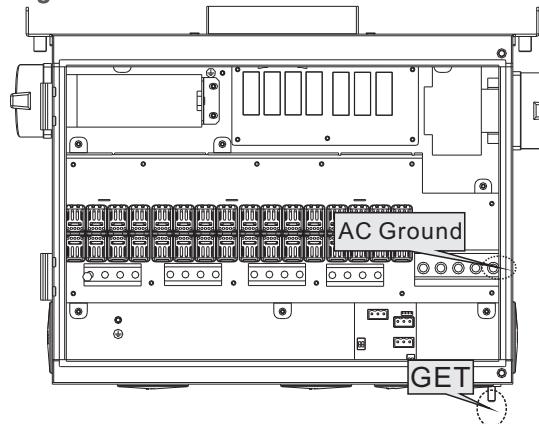
- Tools for electrical installation
- Hexagonal driver 3mm for securing the front cover and AC connector.
  - Flat screwdriver 3mm for releasing spring terminals.
  - Cable and wire strippers.
  - Side cutters.
  - Crimping tool and cable lugs.
  - Cable marking equipment.
  - Digital multimeter (insulation tester) with DC and AC sensitive current clamp, voltage measurement (max. 1000 VDC) and continuity testing functions.

### 5.4.2 Wiring Diagram with Over-Current Protection Device and AC Disconnect



► AC disconnect switch: 3-pole, with or without neutral block depending upon chosen grid connection (3wire or 4Wire). Voltage and current rating depends on the grid connection voltage and output power of the inverter being installed. The fuse size or breaker is depending on the rating of output current.

## 5.5 Grounding



#### AC Grounding

The Growatt TL3-US must be connected to the AC grounding conductor of the power distribution grid via the ground terminal (PE).

The AC input and AC output circuits are isolated from the enclosure and system grounding, if required by Section 250 of the National Electrical Code, ANSI/NFPA 70.

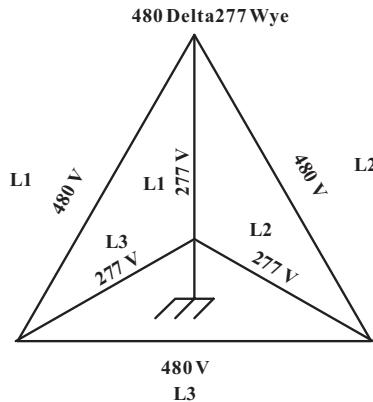
#### Grounding Electrode Terminal (GET)

A grounding electrode terminal may be required to local regulations.

## 5.6 Grid type

### GRID standards:

Based on the local GRID standards, one may select different connection types. The available configurations are shown as below:



When using the 480Delta, the Neutral of the Growatt TL3-US must connect to the Earth of the grid. Contact Growatt if you want further information.

|             |  |
|-------------|--|
|             | <ul style="list-style-type: none"> <li>Policies vary from one utility company to another. Consult with a representative of the local utility company before designing and installing a PV system.</li> </ul> |
| INFORMATION |  |

### Grid type :

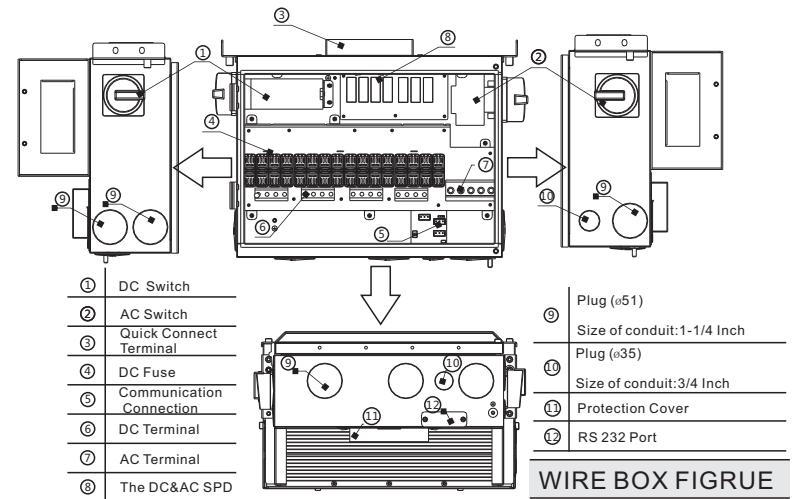
The Growatt TL3-US may only be used in TN-C/TN-C-S/TT/TN-S grid types, not available for IT and Split phase types.

## 5.7 Growatt TL3-US WIRE BOX

|             |  |
|-------------|--|
|             | <ul style="list-style-type: none"> <li>This chapter shows installation positions on attachment specific-ations and standards.</li> </ul> |
| INFORMATION |  |

- Internal integrated DC & AC Disconnect
- Integrated in the inverter and convenient for installation
- Listed to UL 1741 for the United States and Canada
- Simplified input wiring
- Compact, low-cost design

✓ Growatt 33000TL3-US/36000TL3-US/40000TL3-US



### Note : Fuse Sizing

> In any electrical system, fuses are used to protect wiring and equipment from excessive currents that can cause damage, heating or in extreme cases even fire. If the fuse rating is too small it could be blown during normal operation. If the fuse rating is too large, it cannot provide the needed protection. In PV systems, the minimum and maximum size of the series fuse is determined by the electrical ratings of the PV module as well as by UL and National Electrical Code (NEC) requirements. Be sure to consult with your PV module manufacturer for appropriate fuse ratings.

> The minimum size of fuses and conductors are calculated using the Short Circuit Current Rating (Isc) of the PV module. The NEC requires that all fuses and conductors be sized for a minimum of 1.56 times the Isc of the PV module used in the system. The proper size PV string fuse is determined by calculating  $1.56 \times \text{Isc}$  (of the PV module) and then rounding up to the next standard fuse size.

> Example DC fuse rating: If the Isc of the PV module equals 9.6 Adc, then the fuse size is determined by  $1.56 \times 9.6 = 14.98\text{Adc}$ . The next standard fuse size would be a 15A, 1000Vdc fuse.

## 5.7.2 AC Cable Requirements

The cable must be rated in accordance with the local and national codes. The requirements for the minimum conductor cross-section derive from these directives. Influencing factors for cable dimension are the following: nominal AC current, type of cable, cable length, routing method, cable bundling, ambient temperature and maximum desired line losses.

|   |   |
|---|---|
|  | <ul style="list-style-type: none"> <li>• Use only solid or stranded wire but not fine stranded wire.</li> </ul> |
| INFORMATION   |   |

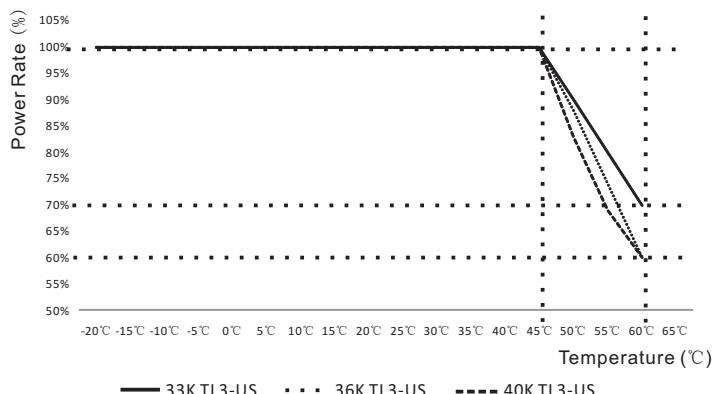
### Ambient temperature

- The higher ambient temperature, the higher power losses; Use cables with large cable cross-sections in installation sites with high ambient temperatures.
- The inverter will monitor its internal temperature, once the temperature exceeds 85°C, the system will reduce the output power until the temperature drops under the critical value. If this occasion happens often, it is necessary to check whether the inverter is mounted at an appropriate place with good ventilation and not directly exposure to the sunshine.

### Temperature derating characteristics

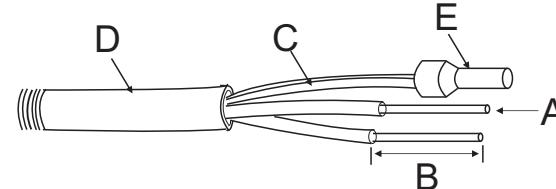
- Definition of Temperature derating characteristics in accordance to BS EN 50524:2009 For the purpose of self-protection routines can be implemented into the inverter, which prevent a damage (current – power – temperature derating). Any self-protection routine that causes derating must be described in tabular or graphical form over the entire permitted operation range.

#### ➢ Figure:



### Routing method

- The higher the ambient temperature, the higher the power losses; this will cause the conductor cables to heat up during operation. If there are several cables in a conduit, the temperature of all cables increases.
- Use cables with a large cross section if there are several cables in one conduit.



| code | Name                    | Detail   |
|------|-------------------------|--|
| A    | Conductor cross-section | See the Conductor cross section in the flowing chart |
| B    | Stripping insulation    | 12mm(0.47inch.)                                      |
| C    | insulation              | --   |
| D    | containment             | --   |
| E    | AC cable terminal       | --   |

- For growatt TL3-US, the grid impedance of the AC conductor cable must not exceed 0.5 Ohm. Otherwise, the GROWATT TL3-US will disconnect at full feed capacity due to excessive voltage at the feed-in point. AC conductor cable losses should always remain under 1%. The details of conductor cross-section and the maximum conductor cable lengths relative to GROWATT TL3-US are shown in the following table.

REMARK: The figure of AC cable with terminal is shown in the figure above.

### Maximum cable lengths between the three phase inverter and the sub panel:

| Model                                     | Conductor cross section                               | Maximum cable length                            |
|---|---|---|
| Growatt 33000TL3-US<br>(AC connect cable) | #8~#4AWG(8.37~21.15mm <sup>2</sup> ),<br>221°F(105°C) | 25m(82ft) for #8AWG<br>65m(213.2ft) for #4AWG   |
| Growatt 36000TL3-US<br>(AC connect cable) | #8~#4AWG(8.37~21.15mm <sup>2</sup> ),<br>221°F(105°C) | 23m(75.4ft) for #8AWG<br>60m(196.8ft) for #4AWG |
| Growatt 40000TL3-US<br>(AC connect cable) | #8~#4AWG(8.37~21.15mm <sup>2</sup> ),<br>221°F(105°C) | 20m(65.6ft) for #8AWG<br>53m(173.8ft) for #4AWG |

### 5.7.3 Connecting the AC cable in the Wire box



INFORMATION

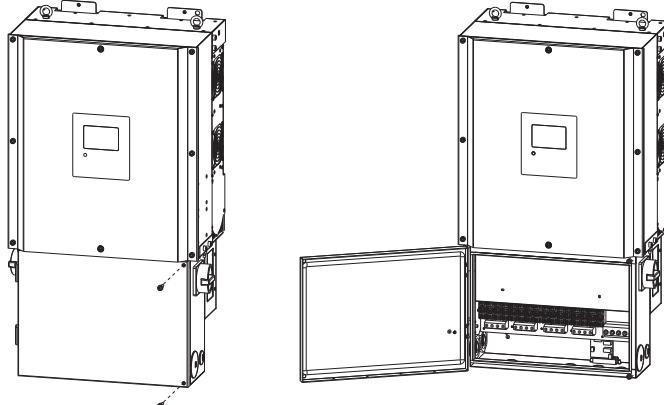
- Open terminals fully before insertion of the conductor cables.



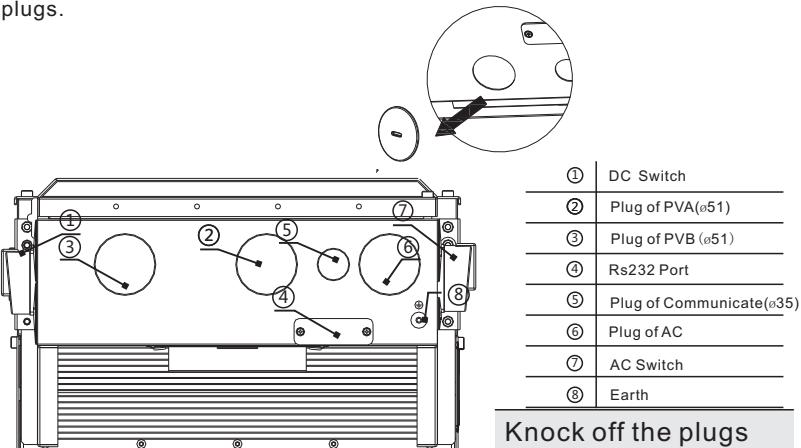
DANGER

- Before connecting, make sure the AC conductor cables are disconnected from the AC breaker. Do not power while connecting!

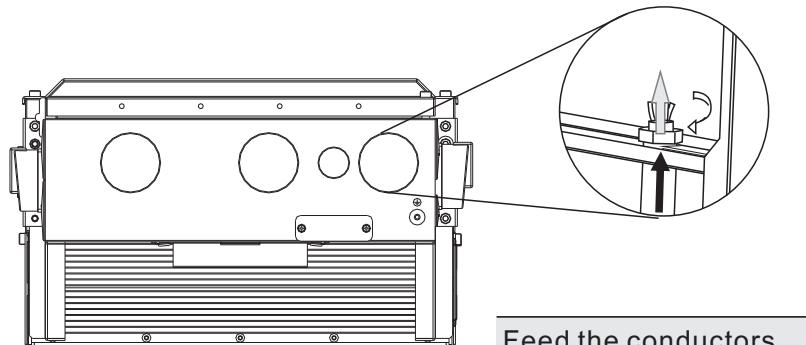
1. Open the wire box of the Growatt TL3-US.



2. Knock off the plugs on the wire box and install rubber grommets instead of the plugs.

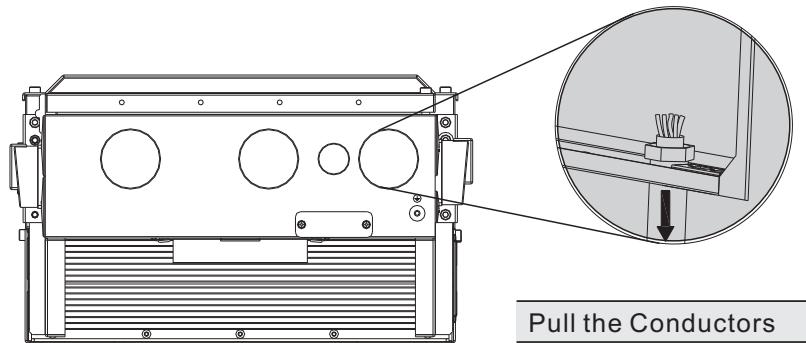


3. Feed the conductors through the rubber grommet into the wire box.



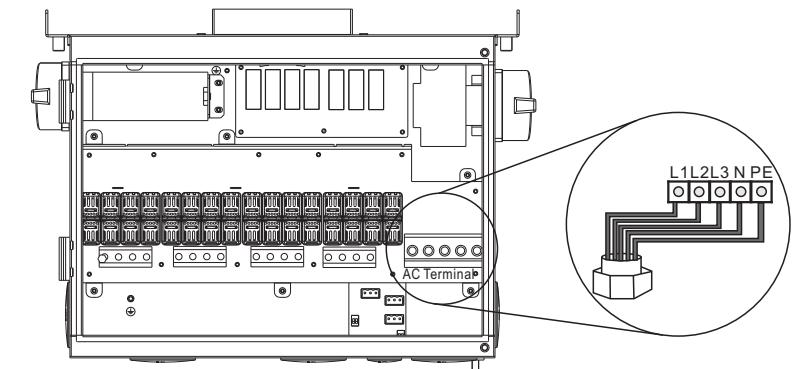
Feed the conductors

4. Pull the conductors back slightly so as to seal the rubber grommet.



Pull the Conductors

5. Connect the AC device grounding green-yellow conductor to the PE terminal, black conductor to the terminal labeled N and the red wire conductors to the terminals labeled L1(AC conductor A), L2(AC conductor B), L3(AC conductor C) separately.



- Tighten the cables with a torque of 2.0N.m (17.7lbf.in).
- Check that all terminals have the correct wiring and that the cables are secure.
- The AC cables are connected in the wire box.

#### 5.7.4 DC cable requirements

|   |  |
|---|--|
|  | <ul style="list-style-type: none"> <li>Only use solid wire or stranded wire</li> </ul> |
| INFORMATION   |  |

The DC Cable design refers to the conductors from the solar module to the input terminal of the inverter. When carrying out the cabling for the DC side, a few rules should be observed for optimal and fault-free operation, both with roof-mounted and free-standing devices.

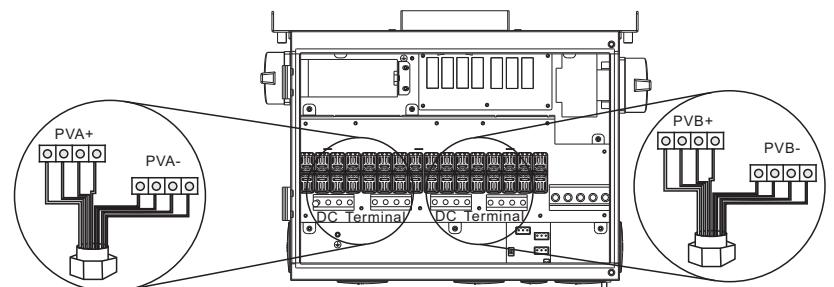
- > Use cables with connectors which are contact-proof and designed to avoid connection confusion.
- > Cables should run through protective tubes or mounting frames to protect them from weathering and UV radiation. Cables which are hanging freely or which lie on stone or in water (> flat roof) are not allowed.
- > It is recommended to carry out insulation and resistance measurements after every cable installation in order to locate any possible faults in this partial string, which becomes more difficult to do later on the entire system.
- > The connection cables for all strings should be numbered to facilitate later fault location.
- > In a large PV array the cross-section variants of the cables must be as few as possible in order to facilitate mounting and to avoid faulty installations due to confusion of cables. Here, cable losses should always remain under 1%.

The details of conductor cross-section relative to GROWATT TL3-US are shown in the following table.

| Model                                     | Conductor cross section                    | Maximum cable length                            |
|---|--|---|
| Growatt 33000TL3-US<br>(DC connect cable) | #12(3.31mm <sup>2</sup> ),<br>221°F(105°C) | 10m(32.8ft) for #12AWG<br>26m(85.3ft) for #8AWG |
| Growatt 36000TL3-US<br>(DC connect cable) | #12(3.31mm <sup>2</sup> ),<br>221°F(105°C) | 9m(29.5ft) for #12AWG<br>24m(78.7ft) for #8AWG  |
| Growatt 40000TL3-US<br>(DC connect cable) | #12(3.31mm <sup>2</sup> ),<br>221°F(105°C) | 8m(26.2ft) for #12AWG<br>20m(65.6ft) for #8AWG  |

#### 5.7.5 Connecting the DC cable in the Wire box

|   |  |
|---|--|
|  | <p>High voltages on PV modules that are exposed to light<br/>       &gt; Risk of death due to electric shock from touching a DC conductor.<br/>       &gt; Do not touch the DC conductor.</p> <ul style="list-style-type: none"> <li>• High voltages in the DC cables</li> <li>• Risk of death or serious injury from touching a DC cable.</li> <li>• Only connect the DC cable from the PV module to the inverter as described in this manual.</li> </ul> |
|  | <p>Before connecting, make sure the DC switch in the wire box is turned off and measure the voltage to ensure the array output is non-hazardous.</p> <p>Danger of burning due to overheating</p> <ul style="list-style-type: none"> <li>• Observe the National Electrical Code® 2008, Section 690.35</li> </ul>  |



##### REMARK:

The figure of conduit is shown in the right picture. Please press the cable into the PV cable terminal before you connect the PV cables .



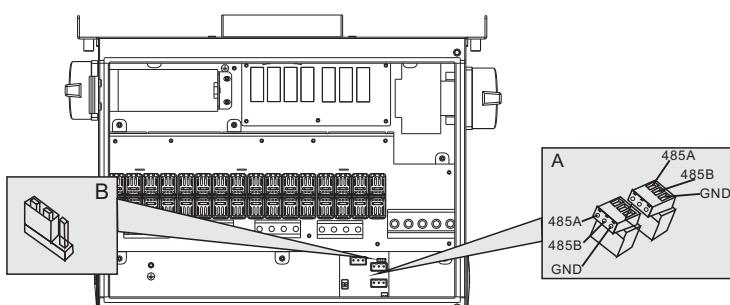
- About the Wirebox DC connection of the Growatt TL3-US, please refer to section 6 for more detail.

#### INFORMATION

1. Knock off plugs on the wire box and Install rubber grommets instead of the plugs.
2. Push the DC conductors through the grommet in the wire box in order to pierce the rubber grommet. Do not use sharp tools to pierce the rubber grommet.
3. Pull the conductors slightly back in order to seal the grommet.
4. Open the screw terminals completely by turning them counterclockwise using a flat-head screwdriver.
5. Connect the DC conductors to the MPPT1 and MPPT2 array terminals shown in inverter per the specific array design.
6. Tighten all conductor cables in the terminal blocks in the wire box with a torque of 1.2Nm (10.6lbf.in) for Growatt TL3-US PV strings.
7. Verify that all connections are correctly terminated and tightened to the correct torque. Pull on the conductor cables in order to make sure that it is attached tightly enough in the terminal.
8. Close the wirebox; the DC cables are now connected in the wire box.

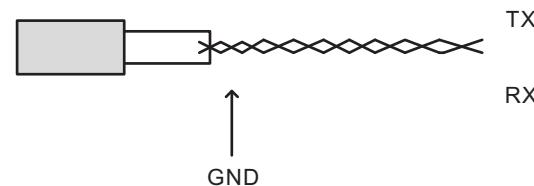
## 5.8 RS485 Signal Wiring Connections

| code | Details                   |
|------|---------------------------|
| A    | RS 485 stander connector  |
| B    | RS 485 BUS balance jumper |

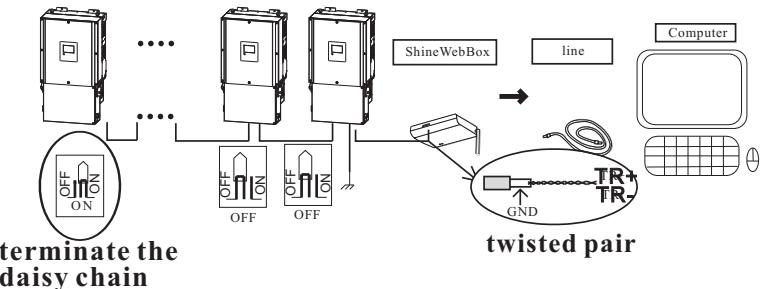


### RS485 BUS balance jumper:

In RS485 communication circuit, when the T/R+ and T/R- lines reach a certain length (>328 feet), the line itself has impedance. In order to balance the impedance of the RS485 bus line, you must install the jumper to the "ON" state in RS485 BUS balance jumper of the remote inverter (last inverter before monitoring). So that the last inverter connects to the RS485 bus line while others stay in "ON" state. The RS485 bus line is recommended not exceed 2,624ft when using the #20AWG RS485 communication standard line. Shielded twisted pair cable (STP), impedance 100...150 ohm is recommended.



- In order to improve the Anti-jamming capability of RS485 communication, it is recommended that the GND terminal of the inverter which connects to the ShineWebBox must be connected to the EARTH.
- Adopting shielded twisted-pair cable and effectively grounded.
- In strong electric field location one must use galvanized tube shielding the twisted pair.
- The twisted pair should be away from the high tension line, high voltage power line and other signal line.



Rs485 Bus Connection via RS485 standard connector: connect three RS-485 leads : T/R+, T/R-, GND into position shown.

## 6 PV Module setting

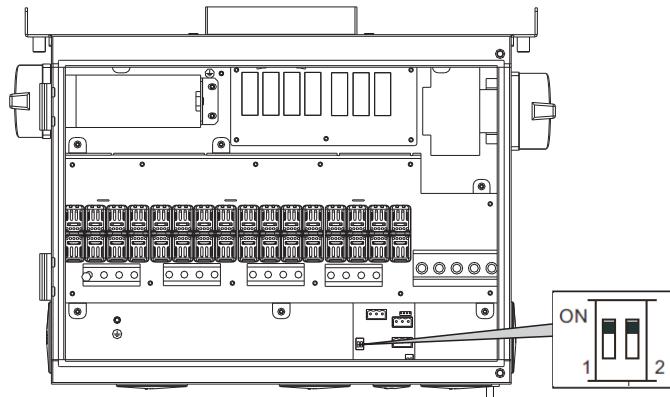
A 2 bit switch is in the wire box of Growatt TL3-US which is used to set the PV module.

Since the Growatt TL3-US has two independent MPPTs, the solar panels can be connected in two MPPT channels independent or just connected to MPPTA channel.

In order to identify which channel is taken, you have to set the PV module by the 2 bit switch.

You have to refer to the following information:

The location of the 2bit switch as follow:



Default PV Module setting chart:

| Switch state                                    | Wiring diagram   |
|---|--|
| S1      S2<br>ON      (Default)<br>1          2 |  |
| OFF     OFF                                     |  |
| STATE 1   |  |
| S1      S2<br>ON      ON<br>1          2        |  |
| ON      OFF                                     |  |
| STATE 2   |  |
| S1      S2<br>ON      OFF<br>1          2       |  |
| OFF      ON                                     |  |
| STATE 3   |  |
| S1      S2<br>ON      (Default)<br>1          2 |  |
| ON      ON                                      |  |
| STATE 4   | <p>When set the Growatt TL3-US in parallel mode, you must using the standard line to connect PVA+to PVB+, and PVA - to PVB -.</p> <p>The inverter has double MPPT's, it is recommended for each MPPT to work independently, do not use parallel wiring at DC side (Parallel wiring can make 2 MPPT's become 1 MPPT, this can improve the efficiency in some cases). If the MPPT's are parallel wired at inverter it may cause the AFCI trigger mistakenly.</p> |

# 7 Electric arc hazards

## 7.1 Arc-Fault Circuit Interrupter (AFCI)

In accordance with the National Electrical Code R, Article 690.11, the inverter has a system for the recognition of electric arc detection and interruption. An electric arc with a power of 300 W or greater must be interrupted by the AFCI within the time specified by UL 1699B. A tripped AFCI can only be reset manually. You can deactivate the automatic arc fault detection and interruption (AFCI) via a communication product in "Installer" mode if you do not require the function. The 2011 edition of the National Electrical Code R, Section 690.11 stipulates that newly installed PV systems attached to a building must be fitted with a means of detecting and disconnecting serial electric arcs (AFCI) on the PV side.

## 7.2 Danger information

|   |   |
|---|---|
|  | <p>Danger of fire from electric arc<br/>Only test the AFCI for false tripping in the order described below.<br/>Do not deactivate the AFCI permanently.</p> |
|---|---|

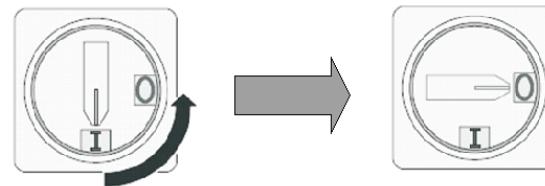
The inverter has double MPPT's, it is recommended for each MPPT to work independently, do not use parallel wiring at DC side (Parallel wiring can make 2 MPPT's become 1 MPPT, this can improve the efficiency in some cases). If the MPPT's are parallel wired at inverter it may cause the AFCI trigger mistakenly. If an "Error 112" message is displayed, the red LED is permanently lit and the buzzer alarms, an electric arc occurred in the PV system. The AFCI has tripped and the inverter is in permanent shutdown.

The inverter has large electrical potential differences between its conductors. Arc flashes can occur through air when high-voltage current flows. Do not work on the product during operation.

When the inverter error 112, please follow the steps:

### 7.3 Operation step

7.3.1 Turn the DC & AC Disconnect to position "O".



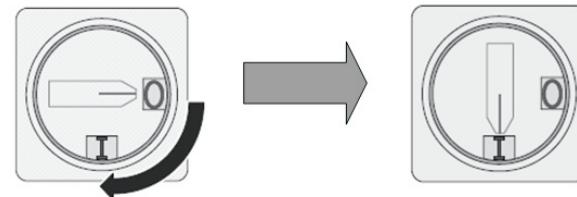
Wait for the display to go out.

7.3.2 Perform troubleshooting on the PV system:

Check all PV strings for the correct open-circuit voltage.

7.3.3 After the fault is rectified, restart the inverter:

Turn the DC & AC Disconnect to position "I".



7.3.4 If the AFCI self-test is successful:

The PV inverter switches into the "nominal" mode and the green LED is permanently lit.

7.3.5 If the AFCI self-test is failed:

The following message appears on the display: "Error 114". Please restart the system, repeat step 1 to step 3.

7.3.6 If the AFCI self-test continues to fail:

Turn the DC Disconnect to position "0" and switch off the AC disconnect switch to the inverter; contact Growatt to solve this problem.

# 8 Commissioning

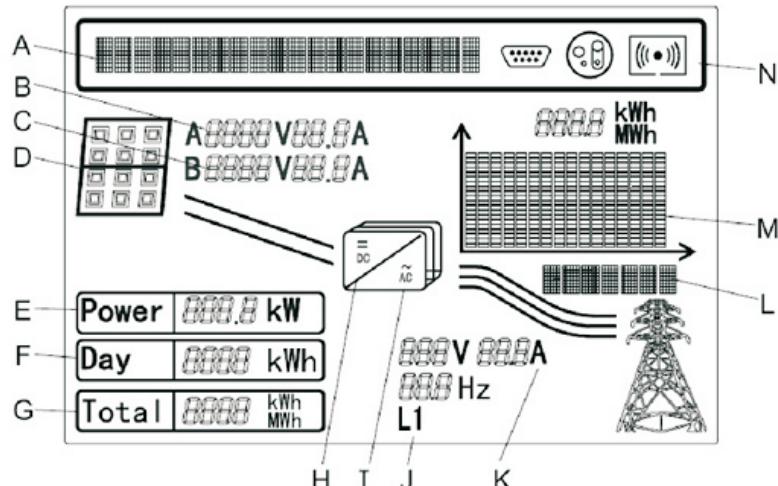
|   |  |
|---|--|
|  | <ul style="list-style-type: none"> <li>High voltages in the PV system Risk of death or serious injury due to electric shock.</li> <li>Only electrically skilled persons may perform work on the PV array.</li> </ul> |
|  | <ul style="list-style-type: none"> <li>Under any condition! Make sure the maximum open circuit voltage (Voc) of each PV string is less than 1000VDC.</li> </ul>  |

## Requirements :

- The AC conductor cable is correctly connected.
- The DC conductor cable is correctly connected.

### 8.1 Display and message

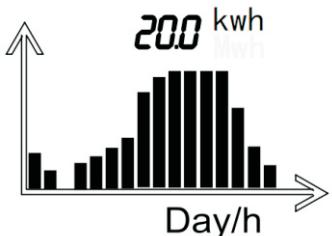
#### 8.1.1 Graphic display



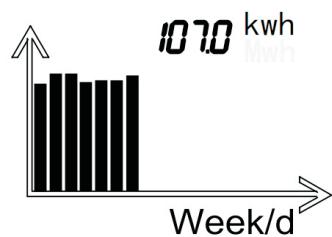
| Position | Detail  |
|----------|---|
| A        | Text line for displaying an event   |
| B        | Input voltage and current of MPPT A   |
| C        | Input voltage and current of MPPT B   |
| D        | PV array A and B, lighted when the array voltage is above the start voltage(120V)                                     |
| E        | Current power   |
| F        | Daily energy  |
| G        | Total energy generated since the inverter was installed   |
| H        | Light when the array voltage is above the start voltage(120V)   |
| I        | Lighted when "H" is lighted and feed-in   |
| J        | Output phase of the line conductor, switch every 5 seconds.   |
| K        | Output voltage /current /frequency of the line conductor  |
| L        | Graphical display of the inverter energy/power  |
| M        |   |
| N        |  RS232 communication               |
|          |  RS485 communication               |
|          |  Internal wireless communication   |
|          |  External wireless communication |

#### 8.1.1.1 Graph

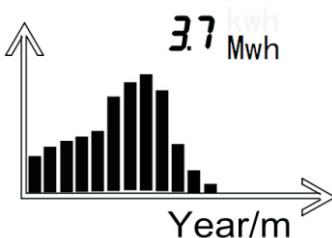
The inverter energy and/or power is shown as a graph on the display. The lower right-hand bar of the graph represents the current unit of time: Day/h, week/day, Year/y, Year/Y. The top bar of the graph represents the maximum value of the graph values. The daily graph is displayed by default. You can knock the enclosure lid three times to switch the current unit of time and the generation information.



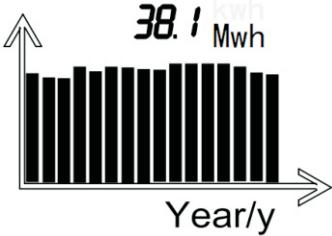
The graph shows recent 16 hours of power generation and the maximum value power of the 16 values.



The graph shows recent 7 days of power generation and the maximum value power of the 7 values.



The graph shows recent 12 months of power generation and the maximum value power of the 12 values.



The graph shows recent 16 years of power generation and the maximum value power of the 16 values.

### 8.1.1.2 Text line

The Text line is used for displaying an event. Include the information of setting language, models, communication address and time. The "Power Rate" and "Power Factor" will cycle through display by default setting.

You can operate the settings as follows:

#### a) Input setting code

Before setting the language, COM Address and time, you have to input the setting code:

- 1) Knock on the enclosure lid once at a time until the text line cycles to the text

Setting ...



- 2) Knock on the enclosure lid twice and the text will display

Input123 : 000



- 3) Knock on the enclosure lid twice to let the higher number text "000" flash. Then knock on the enclosure lid once to change it from "000" to "100". For every knock the highest number text will add 1, the range of number text is 0~9. Then knock the lid twice to verify it.

Input 123 : 100



- 4) Then the middle number text will flash:

Input 123 : 110



- 5) Knock the enclosure lid once to change it from "100" to "110" and then again to change it from "110" to "120". Then knock the lid twice to verify it.

Input 123 : 120



✓ Then you can set the language, COM address and time.

b) Setting language

1) Knock on the enclosure lid once at a time until the text line cycles to the text.

2) Knock on the enclosure lid twice and the text will show the language.

3) You can choose the language by knocking the enclosure once; the language includes English, Dutch, Spanish, French, and Italian.

4) Then you can knock the enclosure three times to confirm the language you have chosen. And the text line change.

The language is setting!

You can knock the lid four times to quit the setting menu.

Set language



Language:English



Setting ...



Set OK!



4) You can knock on the enclosure three times to confirm the COM Address you have chosen.

Setting ...



Set OK!



The Com Address is set!

You can knock the lid four times to quit the setting menu.

d) Switching the RS232 and the External wireless communication



INFORMATION

As the Serial communication with the computer and the external wireless communication using the same serial port, we have to choose one.

The RS232 is communicating to computer so that the computer can be connected to the inverter using our software tools.

Knock on the enclosure lid once every time until the text line cycles to the text as shown below: The RS232 is chose by default in the inverter.

c) Setting Com Address



For the communicating, the inverter needs a communication address. In multi system, the addresses of inverters must be different from one to another.

1) Knock on the enclosure lid once at a time until the text line cycles to the text.

Com Address : 001



2) Knock on the enclosure lid twice and the lower number text "1" will flash: 001.

If you want to change it, knock on the enclosure lid once at a time to change it form: 0~9.

3) If you want to set the address using more digits, knock on the enclosure lid twice to let the higher number text "002" flashing. And knock the enclosure lid once every time to change it form: 0~9. So as the highest number text. Usually, the inverter COM address is within 0~32.

Com Address : 005



Com Address : 015



1) Knock on the enclosure lid once at a time until the text line cycles to the text as the right.

RS232



2) Knock on the enclosure lid twice to cycles to external wireless communication.

Exter wireless



3) Then knock on the enclosure three times to confirm it. And the text line change as shown below:

Setting ...



The External wireless communication is set!

You can knock the lid four times to quit the setting menu.

e) Setting date and time

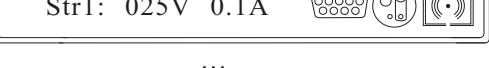
1) Knock on the enclosure lid once at a time until the text line cycles to the text shown as the right (time displayed can differ depending on the inverter).

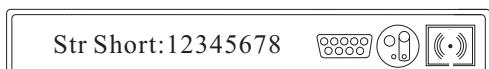
2012/01/01 00:12

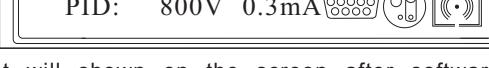
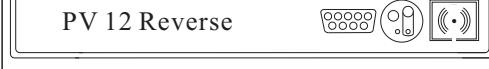


|  |   |
|--|---|
| 2) Knock on the enclosure lid twice and cycles to the year "2015", and the two lower number "2015" will flash, then you can knock once at a time to change it. | 2015/01/01 00:12<br>   |
| 3) Knock on the enclosure lid twice and cycles to the month "01", and it will flash. Then you can knock once at a time to change it.                           | 2015/12/01 10:12<br>   |
| 4) Repeat to set the day and the time.   | 2015/12/25 10:12<br>   |
| 5) Then knock on the enclosure three times to confirm.   | Setting...<br><br>Set OK!<br> |
| ✓ The date and the time is set!<br>You can knock the lid four times to quit the setting menu.  |   |

|   |   |
|---|---|
|  INFORMATION | • You can set all above changes with Growatt software "ShineTool" using a computer. More information please go to the site: <a href="http://www.growatt.com">Http://www.growatt.com</a> . |
|---|---|

|   |   |
|---|---|
| f) check the string information   |   |
| 1) Knock on the enclosure lid once at a time until the text line cycles to the text as the right.   | String Info<br>  |
| 2) Knock twice to enter, and the string information, shown as the right on cycle;<br>Knock once to quit.  | FW:NCAa0001<br><br>Str1: 025V 0.1A<br><br>...<br>Str8: 021V 0.5A<br> |
| If there is error information, it will be shown after software version one by one, and shown with the string information on cycle; knock once to quit; the following situation is the fault status that might happen. |   |

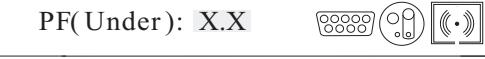
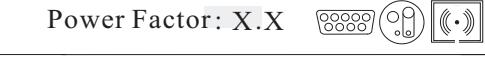
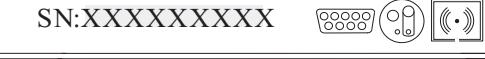
|   |  |
|---|--|
| Indicate which strings are reverse connected. For example, "PV12 Reverse" represents the 1st and 2nd strings are reverse. | Reverse:12345678<br>        |
| Indicate which fuses are open. For example, "Fuse Open12" represents the 1st and 2nd fuse are open.                       | Fuse Open:12345678<br>      |
| Indicate which strings are unusual. For example, "String Unusual 12" represents the 1st and 2nd currents are unusual.     | String Unusual:12345678<br> |
| Indicate which strings are short. For example, "Str Short12" represents the 1st and 2nd strings are abnormal.             | Str Short:12345678<br>      |
| Indicate which strings are break. For example, "Str Break 12" represents the 1st and 2nd strings are break.               | Str Break:12345678<br>      |

|  |   |
|--|---|
| g) check the PID information   |   |
| 1) Knock on the enclosure lid once at a time until the text line cycles to the text as the right.                          | PID Info<br>   |
| 2) Knock twice to enter, and the soft version and PID information are shown on the screen; knock once to quit.             | FW:NCAa0001<br><br>PID: 800V 0.3mA<br> |
| If there is error information, it will be shown on the screen after software version, cyclicly;                            |   |
| Knock once to quit.(The following is the probable status shown on the screen)  |   |
| Indicate which strings are reverse connected. For example, "PV12 Reverse" represents the 1st and 2nd strings are reverse.  | PV 12 Reverse<br>  |
| Indicate which strings are disconnected. For example, "PV12 Disconnect" represents the 1st and 2nd strings are disconnect. | PV 12 Disconnect<br>   |
| Insulation resistance between the DC input with respect to ground is lower than limit.                                     | ISO Error<br>  |

|                                 |   |
|---------------------------------|---|
| BUS voltage of PID is abnormal. | BUS Volt Abnormal  |
| Output of PID over voltage.     | Output Over Volt   |

#### h) Other display

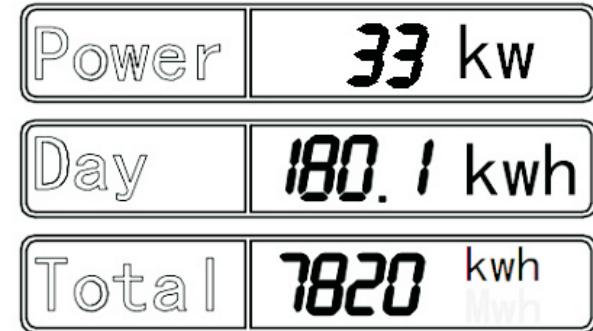
Knock on the enclosure lid once at a time and the text line cycles to information about of the Growatt TL3-US:

|  |  |
|--|--|
| Displaying the internal bus+ and bus- voltage    | BUS+/-:XXXV/XXXV    |
| Displaying the PF value:                         | PF(Over): +X.X <br>PF(Under): X.X  |
| Displaying the power factor:                     | Power Factor: X.X   |
| Displaying the serial number of the inverter:    | SN:XXXXXXXXXX   |
| Displaying the module of the inverter:           | Model: GT00X0XXXX    |
| Displaying the power type of the inverter:       | 33000 TL3-US    |
| Displaying the software version of the inverter: | FW:XXX.X-XX.X   |

#### 8.1.1.3 Power display

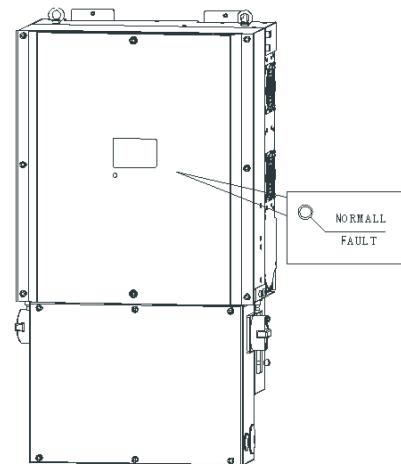
The power and energy of the inverter are displayed in three fields:

➢ Power, Day and Total. The display is updated every five seconds.



|                      |  |
|----------------------|--|
| Power                | The real-time power that has been feeding into the grid from the inverter  |
| Day                  | The energy fed into the electricity grid on this particular day. This equals the energy generated from the inverter's start-up in the morning to the current time.   |
| Total                | The total energy that the inverter has fed into the electricity grid during its entire operating time.   |
| Measurement accuracy | The display values may be a little different from the actual values and must not be used for billing purposes. The inverter's measured values are required for the operational control and to control the current to be fed into the electrical grid. The inverter does not have a calibrated meter. |

#### 8.1.2 LED



The LED also represents the status of the inverter.

| LED color /status | Inverter status   |
|-------------------|---|
| Green/constant    | Operation   |
| Red/constant      | <ul style="list-style-type: none"> <li>Fault– contact installer</li> <li>Standby module</li> </ul>        |
| Red/flashing      | <ul style="list-style-type: none"> <li>Fans Fault-- contact installer</li> <li>Software update</li> </ul> |

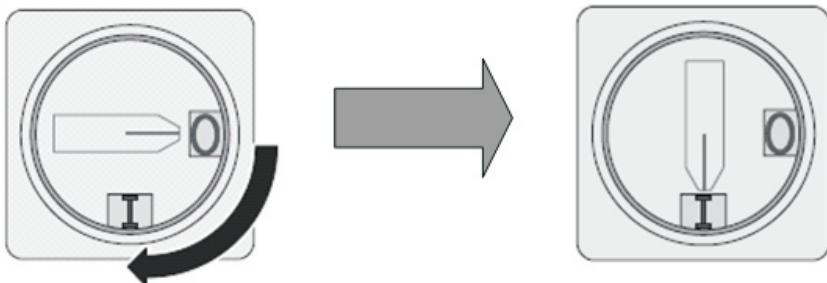
## 8.2 Operation checking on the Growatt TL3-US

|  |   |
|--|---|
| <br>INFORMATION | <ul style="list-style-type: none"> <li>About the LCD and LED, you can refer to the next section 6.2 for details.</li> </ul> |
|--|---|

1. Remove all covers from the PV array.

2. Switch on the AC breaker.

3. Turn the DC Disconnect to position "I".



4. If the PV voltage input is above 120V, Growatt TL3-US should operate. And text line of the LCD display as shown below:



| Item    | Growatt 33000 TL3-US  | Growatt 36000 TL3-US | Growatt 40000 TL3-US |
|---------|---|----------------------|----------------------|
| Module: | PFU8M9S1  | PFU8MAS1             | PFU8MBS1             |
| PV:     | 33000TL3-US   | 36000TL3-US          | 40000TL3-US          |
| SN:     | SN is the serial number of the inverter; every machine has its own serial number, SN: 1234567890 for example. |                      |                      |
| FW:     | FW is the software version of the inverter, FW:CT1.0-AT1.0 for example.                                       |                      |                      |

5. If the PV voltage input is between 200-250V, the Growatt TL3-US will work in a standby status.

If the PV voltage is between 250V~1000V, the Growatt TL3-US will work in a normal status. So you can check the input and output information as well as the status of the Growatt TL3-US on the LCD.

6. Once the Growatt TL3-US is working in a normal status, before connected to the grid.

It will take 60 seconds to check the inverter including the GFCI automatically.

The LCD text line's information as shown below:



7. When it counts to 0s, the inverter begins to connect to the grid.

Once it feeds to the grid successfully, the text line in the LCD text line's information will show as shown below:

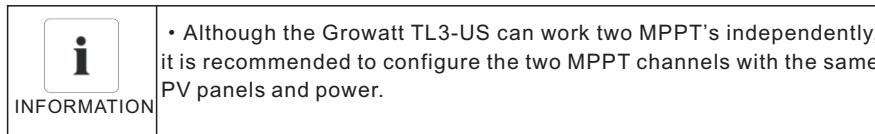


And the LED will turn to green.

> The Growatt TL3-US feeds to the grid successfully!

### 8.3 Two independent MPPT

The Growatt TL3-US includes dual input with independent MPPT, high speed and precise MPPT algorithm for real-time power tracking and energy harvesting, as well as transformerless operation for high performance efficiencies. The two MPPT channel can track the maximum power point independently when inverter receives two separate inputs from solar panel and the two independent MPPT have no impact with each other.



## 8.4 Communication

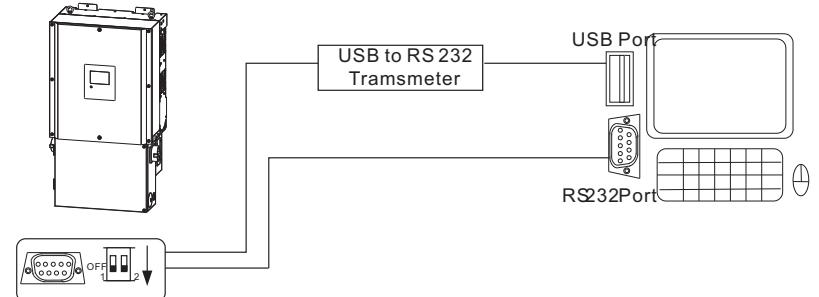
This section is about the setting information of the inverter and the monitoring of the inverters.

### 8.4.1 Using ShineTool to set the information of the inverter

About the software of ShineTool and the usage of it please download from the web:  
[www.growatt.com](http://www.growatt.com)

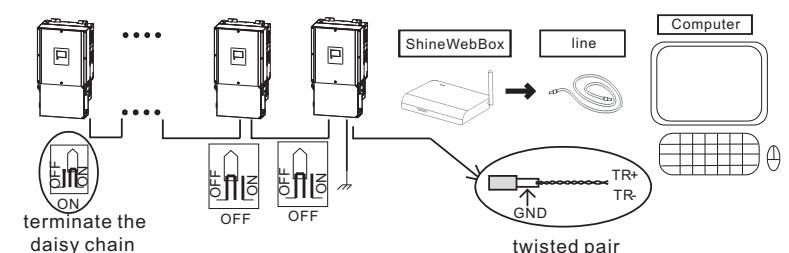
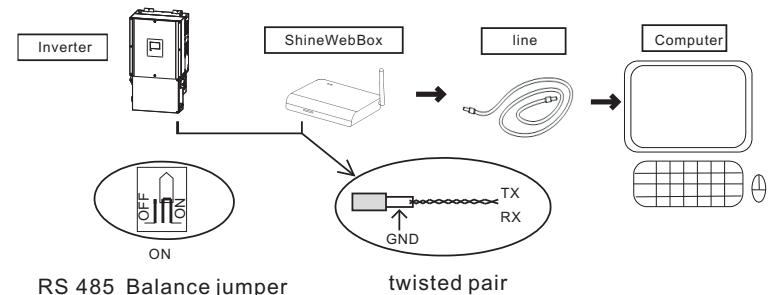


The connecting diagram as follows:



### 8.4.2 Monitor the inverters

#### 1) Monitor the inverters with RS485



Monitor 2~26 inverter wire diagram

# Booting and shutdown of the inverter 9

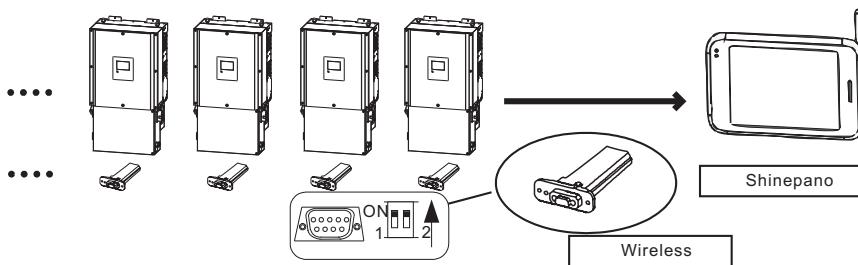
About the RS485 connector and the connection, you can go back to the section 5.8 for details. The above figure shows the diagram of monitoring inverters with ShineWeBox. Generally, the maximum number of the inverter is 26.

**i**

- In general, when using the RS485, every inverter must have different com address. You can go back to the section 8.1.1.2 b for details.

More information about the ShineWeBox go to the web:  
[Http://www.growatt.com](http://www.growatt.com)

2) Monitor the inverters with External wireless.



The figure shows the wiring schematic of monitoring inverters with Zigbee and ShinePano. Generally, the maximum number of the inverters is 15. The communication distance between the Zigbee and the ShinePano is 984 feet in the open space.

**i**

- About the External Wireless section, you can go back to the section 6.1.1.2 c for details.

More information about the Zigbee and ShinePano go to the web:  
[Http://www.growatt.com](http://www.growatt.com)

## 9.1 Display and message



WARNING

- Make sure the Growatt TL3-US has connected DC and AC conductor cables correctly according to the wiring diagram of section 5.7.2.

- Under any condition! Make sure the maximum open circuit voltage (Voc) of each PV string is less than 1000VDC;the AC string is less than 300Vac.

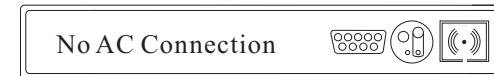
When the PV input voltage is above 200V, the Growatt TL3-US can be powered on.

➢ Turn the DC rotary switch from the off position "O" to the on position "I" as shown in 8.2.

➢ The text line of the LCD must display the information as shown below in proper sequence:



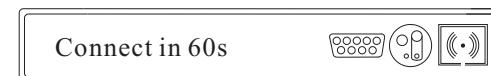
➢ The display will then cycle and the text line will display the information below the LED will turn to red:



In order to connect to AC grid you must turn on AC disconnect.

Once the Growatt TL3-US is operating in a normal status, before it's connected to the grid, it will take 60 seconds to check the inverter including the GFCI automatically.

➢ The LCD text line's information display as below:



# Cleaning and maintenance 10

- When it counts to 0s, the inverter attempts to connect to the grid. Once it outputs power to the grid successfully, the text line in the LCD will display as shown below:

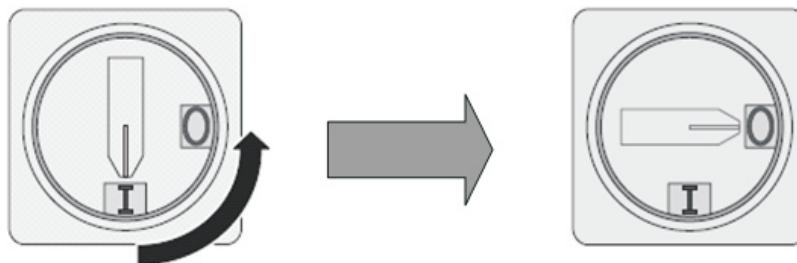


The LED will light green.

- Booting the Growatt TL3-US successfully!

## 9.2 Turn off the Growatt TL3-US

- Turn the DC rotary switch from the ON position "I" to the OFF position "O" as shown below.



- Wait until the text line of the LCD displays as shown below:



The LED will light red.

In this state, it is working in a standby, isolated from the DC power.

- Turn off the AC connector until the LCD and the LED are powered off (NO DISPLAY).  
✓ Shutdown the Growatt TL3-US successfully!



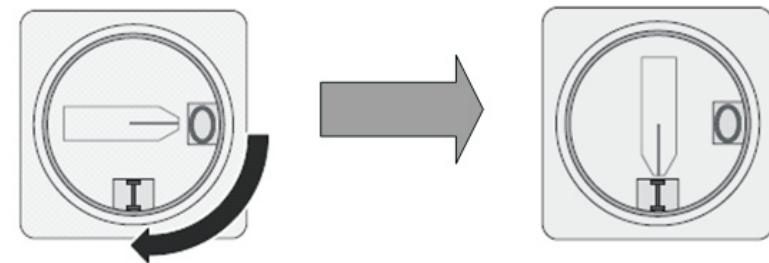
- For safety, do not open wire box until 20 minutes passed.

## 10.1 Checking the inverter

- Ask the installer to check for correct inverter operation at regular intervals.
- Check whether there is any externally visible damage to the inverter.
- If there is any externally visible damage to the inverter, contact the installer.

## 10.2 Checking the DC & AC disconnect switch

- Once a year, turn the rotary switch from the "ON" position to the "OFF" position 5 times in succession. This cleans the contacts of the rotary switch and prolongs the electrical lifespan of the DC & AC Disconnect.



## 10.3 Cleaning the Inverter

If the inverter is dirty, clean the enclosure lid, the display, and the LEDs using only clean water and a cloth. Do not use any cleaning agents (e.g. solvents or abrasives).



- Before any operation, please disconnect the DC switch and AC switch, and wait for at least 10 min until the internal bus capacitance discharge completely.

## 10.4 Cleaning the Fan Guards

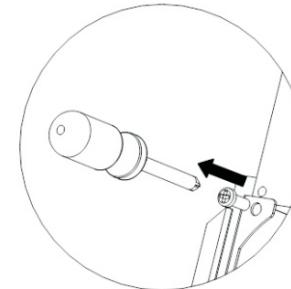
- Check the fan guards are to ensure they are not dusty or dirt-clogged.
- If the fan guards are dusty, clean them using a vacuum cleaner.



DANGER

- Before any operation, please disconnect the DC switch and AC switch, and wait for at least 10 min until the internal bus capacitance discharge completely.

- > Remove the screws inside the fan guards as shown below.



## 10.5 Fan Replacement



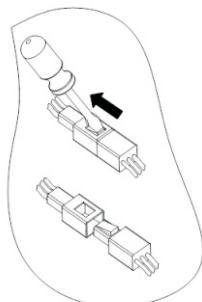
DANGER

- It must be carried out by qualified, trained personnel and in compliance with all prevailing local codes and regulations.
- Before any operation, please disconnect the DC switch and AC switch, and wait for at least 10 min until the internal bus capacitance discharge completely.

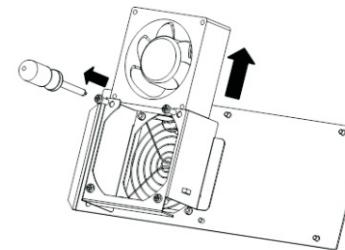
- > Remove the screws on the fan guards as shown below.



- > Disconnect the wire connector of the fans using a flat head screwdriver as shown below.



- > Remove the fans from the fan guards.



- ✓ Replace a new fan.

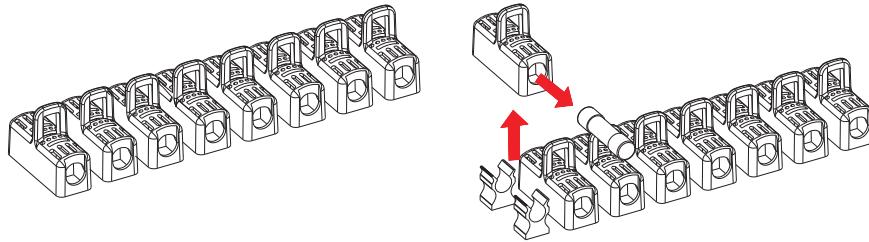
## 10.6 Fuse replacement



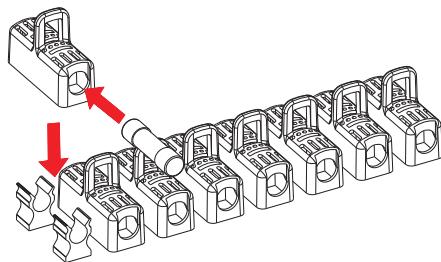
- It must be carried out by qualified, trained personnel and in compliance with all prevailing local codes and regulations.
- Before any operation, please disconnect the DC switch and AC switch, and waiting for at least 10 min until the internal bus capacitance discharge completely.

- > Open the wire box carefully.
- > Disconnect the DC switch and AC switch, and waiting for at least 10 min.
- > Check the broken fuse and remove it carefully.

# Decommissioning 11



- > Replace a new one.



- > Close the wire box.  
> Replace new fuse.

## 10.7 Inverter replacement

Inverter has major irreversible damage or failure. For replacement of the host, the operation is as follows; the inverter can be the host and can be removed from terminal wire box when replacing the inverter to avoid having to disconnect and reconnect all DC conductors.

|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>Before any operation, please disconnect the DC switch and AC switch, and wait for at least 10 min until the internal bus capacitance discharge completely.</li> </ul> |
|  | <ul style="list-style-type: none"> <li>About the wire box and the Growatt TL3-US and how to separate, please refer to section 11.1 for more details.</li> </ul>  |

When the new inverter "host" replacement has been received, remove the protection cover, the new inverter "host" docking with the wirebox.

### 11.1 Dismantling the Growatt TL3-US

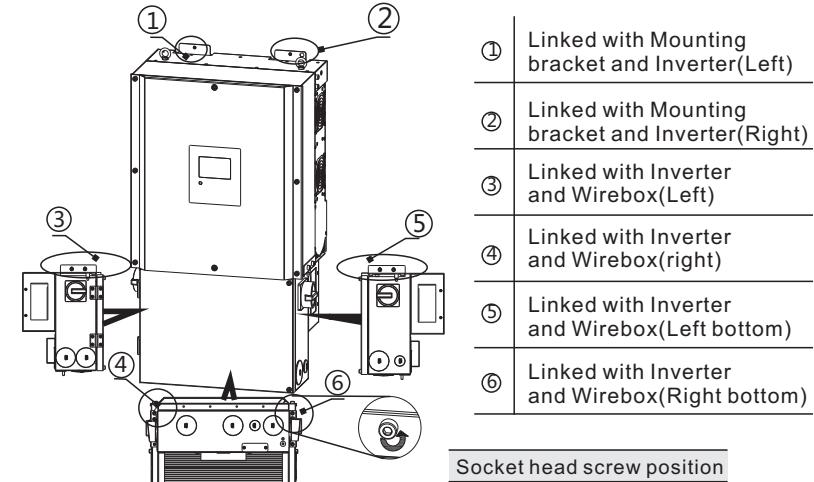
- 1) Disconnect the DC switch and AC switch;
- 2) Pull down the screws between the Growatt TL3-US and the wire box;
- 3) Taking the Growatt TL3-US, change a new one;
- 4) lock the screw between the Growatt TL3-US and the wire box;
- 5) Restart the DC Switch and the AC Swtich;

The Growatt TL3-US may fall down due if inappropriately disassembled. Contusions or bone fractures due to the heavy weight of the Growatt TL3-US.

|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>Prior to disassembling the Growatt TL3-US, take its weight of 110.2 lb. (50 kg) into account of the Growatt 33000TL3-US.</li> <li>Use suitable lifting technique when disassembling.</li> </ul> |
|--|--|

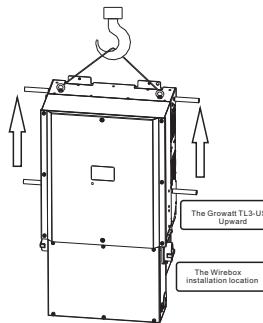
|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>Before any operation, please disconnect the DC switch and AC switch, and wait for at least 10 min until the internal bus capacitance discharge completely.</li> </ul> |
|--|--|

- 6) It is recommended to use a drill with hex bit for installation ease.

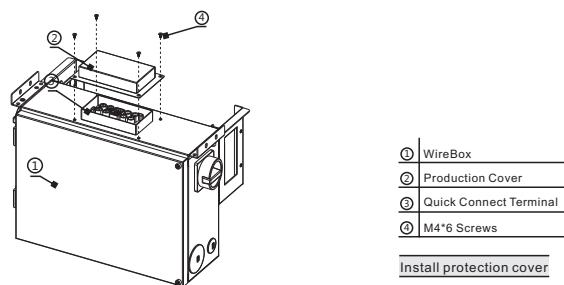


- 7) Using a crane to hold up the Growatt TL3-US carefully by the rings, to assist in separating the Growatt TL3-US and the wire box.

# Trouble Shooting 12



8) The wire box after removal of the Growatt TL3-US "host" will require the protective cover to be installed for protection from harsh elements, please install protection cover using lock screw as shown below.



## 11.2 Packaging the Growatt TL3-US

Pack the Growatt TL3-US. Use the original packaging or packaging that is suitable for the weight and dimensions of the inverter for safe return shipping.

## 11.3 storage of inverter.

- If you want to store the inverter in your warehouse, you should choose an appropriate location to store the inverter.
- The unit must be stored in original package and desiccant must be left in the package to absorb any excess moisture. The storage temperature should be always between -40°F (-40°C) and +140°F (+60°C). And the storage relative humidity should be always between 0 and 95%.
- If there are a batch of inverters that require storage, the maximum stack height for original carton is four.
- After long term storage, local installer or service department of GROWATT should perform a comprehensive test before installation.

## 11.4 Disposal

Dispose of the Growatt TL3-US in accordance with the disposal regulations for electronic waste that apply at the installation site.

|  |   |
|--|---|
| <br><b>DANGER</b> | Normally grounded conductors may be ungrounded and energized when a PV Isolation Low is indicated. <ul style="list-style-type: none"> <li>• Risk of electric shock.</li> <li>• Test before touching.</li> <li>• Work on the Growatt TL3-US must be carried out by qualified personnel.</li> </ul> |
|--|---|

The system status is identified through warning or error signals displayed on the LCD display and the LED. The following tables briefly describe the two types of signals which may be displayed.

### 12.1 Warnings(W)

Warnings (W) identify the current status of the Growatt TL3-US. Warnings do not relate to a fault and it does not affect the normal running of the Growatt TL3-US. When a (W) with a number after it appears in the display, it indicates a Warning Code and is usually cleared through an orderly shutdown/re-set or a self-corrective action performed by the inverter.

See the (W) codes in the following table.

| Warning message     | Description                                       | Suggestion                |
|---------------------|---|---------------------------|
| Warning 100         | The problem of fan(s)                             | See Note1 below the chart |
| Warning 101         | Not choose the PID model                          | Contact Growatt           |
| Warning 102         | Not choose the string model                       | Contact Growatt           |
| Warning 103         | Reading EEPROM fail                               | Restart inverter          |
| Warning 104         | DSP and COM firmware version unmatch              | Contact Growatt           |
| Warning 105         | Writing EEPROM fail                               | Restart inverter          |
| Warning 106         | The problem of SPD                                | Contact Growatt           |
| Warning 108         | PV is short                                       | Contact Growatt           |
| Warning 109         | BOOST drive abnormal                              | Contact Growatt           |
| StrUnusaul/Warning  | String current is not even/Solar panel is unmatch | Contact Growatt           |
| StrFuseOpen Warning | Fuse is damage                                    | Contact Growatt           |
| PID Warning         | PID Warning                                       | Contact Growatt           |

If the suggestions do not work, please contact to the Growatt.

Note 1: The Growatt TL3-US has three fans (one internal and two outside).

| Growatt 33000TL3-US/36000TL3-US/40000TL3-US |                    |                  |                  |
|---|--------------------|------------------|------------------|
| Fan   | Internal           | Outside A        | Outside B        |
| Fault Message<br>of LCD show                | WARNING: FAN 3     | WARNING: FAN 1   | WARNING: FAN 2   |
|   | WARNING: FAN 1,3   |                  | /                |
|   | /                  | WARNING: FAN 1,2 |                  |
|   | WARNING: FAN 2,3   | /                | WARNING: FAN 2,3 |
|   | WARNING: FAN 1,2,3 |                  |                  |

Once the internal fan of Growatt TL3-US has Error, the inverter can still operate; if the outside fan(s) has Error(s), the inverter can still operate, but the power it feeds back to the grid is limited to the temperature itself.

So, if the internal fan has Error, you should contact Growatt to replace the internal fan, do not replace it by yourself!

If the outside fan(s) has problems, connect to the supplier or Growatt to replace by qualified personnel.

## 12.2 Errors(E)

Errors (E) codes identify a possible equipment failure, fault or incorrect inverter setting or configuration.

Any and all attempts to correct or clear a fault must be performed by qualified personnel.

Typically, the (E) code can be cleared once the cause or fault is removed.

Some of the (E) code Error as table shows below, may indicate a fatal error and require you to contact the supplier or Growatt for replacement.

| Error code | Meanings  | Suggestion      |
|------------|---|-----------------|
| Error 101  | Internal communication with host failed                     | Contact Growatt |
| Error 106  | Redundant sample circuit of Insulation values are different | Contact Growatt |
| Error 107  | Redundant sample circuit of GFCI values are different       | Contact Growatt |
| Error 108  | Internal power test fail                                    | Contact Growatt |
| Error 111  | IGBT drive fault  | Contact Growatt |

|                  |   |  |
|------------------|---|--|
| Error 112        | AFCI test fail, System PV circuitry exist Arc | Contact Growatt  |
| Error 114        | AFCI self-checking fail                       | Contact Growatt  |
| Error 117        | Inverter relay fault                          | Contact Growatt  |
| Error 121        | Internal communication with slave failed      | Contact Growatt  |
| Error 122        | Internal bus over/under voltage.              | Contact Growatt  |
| StrReverse Error | The grid is not connected to the inverter     | Check the grid break                                   |
| StrShort Error   | PV Insulation value is outrange               | Contact Growatt  |
| No AC Connection | The grid is not connected to the inverter     | Check the grid break                                   |
| PV Isolation Low | PV Insulation value is outrange               | Contact Growatt  |
| Residual I High  | Redundant current is outrange                 | Contact Growatt  |
| Output high DCI  | Output current DC bias is high                | Contact Growatt  |
| PV Voltage High  | PV input voltage is above 1000V               | Check the solar panel configuration and wiring         |
| AC V Outrange    | The grid voltage is outrange                  | Check the grid voltage by the LCD                      |
| AC F Outrange    | The grid frequency is outrange                | Check the grid frequency by the LCD                    |
| PV SW Set Error  | PV module set wrong                           | Check PV wiring and refer to chart6: PV MODULE SETTING |

# 13 Specification

## Specification of the Growatt TL3-US

|   |  |
|---|--|
|  | <ul style="list-style-type: none"> <li>If the input current supplied by the photovoltaic field connected to the inverter is above the maximum usable value and the input voltage is within the allowed range, the inverter will not be damaged and still work normally.</li> </ul> |
|---|--|

| Model<br>Specifications                           | 33000TL3-US | 36000TL3-US | 40000TL3-US |
|---|-------------|-------------|-------------|
| Input data(DC)                                    |             |             |             |
| Max. recommend PV power                           | 41250W      | 45000 W     | 50000 W     |
| Max. DC power                                     | 33700W      | 367500W     | 40800W      |
| Max. DC voltage                                   | 1000V       | 1000V       | 1000V       |
| Start voltage                                     | 250V        | 250V        | 250V        |
| DC nominal voltage                                | 695V        | 695V        | 695V        |
| PV voltage range                                  | 200V-1000V  | 200V-1000V  | 200V-1000V  |
| MPP voltage range (Full load)                     | 480-800V    | 520-800V    | 570-800V    |
| Max. input current of the MPP tracker A/tracker B | 36A/36A     | 36A/36A     | 36A/36A     |
| Max. input short circuit current                  | 45A/45A     | 45A/45A     | 45A/45A     |
| Number of MPP trackers                            | 2           | 2           | 2           |
| Max. number of parallel strings                   | 4           | 4           | 4           |

| Model<br>Specifications                  | 33000TL3-US  | 36000TL3-US  | 40000TL3-US            |
|--|--|--|------------------------|
| Output data(AC)                          |  |  |                        |
| Nominal output power                     | 33000W/366 60VA                                      | 36000W/40000 VA                                      | 40000W/40000 VA        |
| Nominal AC voltage                       | 480V   | 480V   | 480V                   |
| AC voltage range                         | 422-528VAC   | 422-528VAC   | 422-528VAC             |
| Nominal AC grid frequency                | 60 Hz  | 60 Hz  | 60 Hz                  |
| AC grid frequency range                  | 59.3-60.5 Hz   | 59.3-60.5 Hz   | 59.3-60.5 Hz           |
| Max. output current ( $\cos \varphi=1$ ) | 44A  | 48A  | 48A                    |
| Power factor ( $\cos \varphi$ )          | >0.99<br>0.8LG - 0.8LD (0.9LG - 0.9LD at full power) | >0.99<br>0.8LG - 0.8LD (0.9LG - 0.9LD at full power) | >0.99<br>0.8LG - 0.8LD |
| Harmonics                                | <3%  | <3%  | <3%                    |
| Grid connection type                     | 3/N/E  | 3/N/E  | 3/N/E                  |
| Efficiency                               |  |  |                        |
| Max efficiency                           | 98.80%   | 98.80%   | 98.80%                 |
| CEC-Weighted Efficiency                  | 98.50%   | 98.50%   | 98.50%                 |
| MPPT efficiency                          | 99.50%   | 99.50%   | 99.50%                 |
| Protection devices                       |  |  |                        |
| DC reverse-polarity protection           | Yes  | Yes  | Yes                    |
| Input over voltage protection            | Class II   | Class II   | Class II               |
| DC switch for each MPP tracker           | Yes  | Yes  | Yes                    |

| Model<br>Specifications   | 33000TL3-US  | 36000TL3-US  | 40000TL3-US  |
|---|--|--|--|
| Protection devices  |  |  |  |
| AC switch   | Yes  | Yes  | Yes  |
| Arc detection(AFCI)   | Yes  | Yes  | Yes  |
| DC insulation measure   | Yes  | Yes  | Yes  |
| AC short circuit protection                                     | Yes  | Yes  | Yes  |
| Output over voltage protection                                  | Class II   | Class II   | Class II   |
| String fuse type/size   | 15A/1000VDC<br>10*38mm   | 15A/1000VDC<br>10*38mm   | 15A/1000VDC<br>10*38mm   |
| General Data  |  |  |  |
| Dimensions(W*H*D)   | 435*790*265mm<br>17.1/31.1/10.4inch                                | 435*790*265mm<br>17.1/31.1/10.4inch                                | 435*790*265mm<br>17.1/31.1/10.4inch                                |
| Weight  | 50kg/110.2lb   | 50kg/110.2lb   | 50kg/110.2lb   |
| Operation ambient Temperature range (Derating above 45°C/113°F) | -25°C ... +60°C<br>-13°F ... +140°F<br>(Derating above 45°C/113°F) | -25°C ... +60°C<br>-13°F ... +140°F<br>(Derating above 45°C/113°F) | -25°C ... +60°C<br>-13°F ... +140°F<br>(Derating above 45°C/113°F) |
| Noise emission  | ≤50dB(A)   | ≤50dB(A)   | ≤50dB(A)   |
| Relative Humidity   | 0~100%   | 0~100%   | 0~100%   |
| Altitude  | ≤2000m/6560ft  | ≤2000m/6560ft  | ≤2000m/6560ft  |
| Self-Consumption night  | < 6 W(AC Power Supply)   | < 6 W(AC Power Supply)   | < 6 W(AC Power Supply)   |
| Topology  | Transformerless  | Transformerless  | Transformerless  |

| Model<br>Specifications                            | 33000TL3-US   | 36000TL3-US             | 40000TL3-US             |
|--|---|-------------------------|-------------------------|
| General Data                                       |   |                         |                         |
| Cooling concept                                    | Fan Cool  | Fan Cool                | Fan Cool                |
| Enclosure rating                                   | TYPE 3R   | TYPE 3R                 | TYPE 3R                 |
| Features   |   |                         |                         |
| Display  | Graphic   | Graphic                 | Graphic                 |
| InterfaceRS232/RS485/<br>Bluetooth/RF/Zigbee/Wi-Fi | yes/yes/opt/opt<br>/opt   | yes/yes/opt/opt<br>/opt | yes/yes/opt/opt<br>/opt |
| Warranty:5years/<br>10years                        | yes/opt   | yes/opt                 | yes/opt                 |
| Certificates and approvals                         | UL1741,UL1998,UL508C,IEEE1547,FCC part 15(class B),<br>CSA C22.2 No.107.1,CSA C22.2 NO.14 |                         |                         |
| DC Switch information                              |   |                         |                         |
| DC operating voltage range                         | 1000V   | 1000V                   | 1000V                   |
| Maximum DC operating current                       | 36A per MPPT  | 36A per MPPT            | 36A per MPPT            |
| Maximum DC short-circuit current                   | 36A per MPPT  | 36A per MPPT            | 36A per MPPT            |
| AC Switch Information                              |   |                         |                         |
| AC operating voltage range                         | 690V  | 690V                    | 690V                    |
| Maximum AC operating current                       | 80A   | 80A                     | 80A                     |
| Short-circuit rating Max. fuse                     | 100A  | 100A                    | 100A                    |

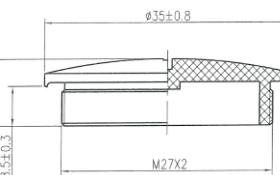
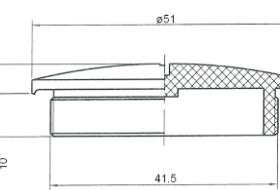
# Spare Parts and Accessories 14

If needed, you can order these from Growatt specialty retailer.

| Specifications \ Model             | 33000TL3-US          | 36000TL3-US  | 40000TL3-US |
|------------------------------------|----------------------|--|-------------|
| Tripping Limits and Tripping Times |                      |  |             |
| Nominal frequency<br>60 Hz         | Tripping limit       | >60.5Hz / <59.3 Hz   |             |
|                                    | Tripping frequencies | 60.45 Hz to 60.55 Hz / 59.28 Hz to 59.40 Hz  |             |
|                                    | Tripping times       | Max. 0.150 s / Max. 0.150 s  |             |
| Nominal Voltage<br>277 V           | Tripping limit       | 50% / 88% / 110% / 120%  |             |
|                                    | Tripping times       | Max.0.16s / Max.2.00s / Max.1.00s / Max.0.16s  |             |
| Accuracy                           |                      | Tripping limit: ±2 % of nominal grid voltage<br>Tripping times: ±0.1 % of nominal trip time<br>Tripping frequencies: ±0.1 % of nominal frequency |             |

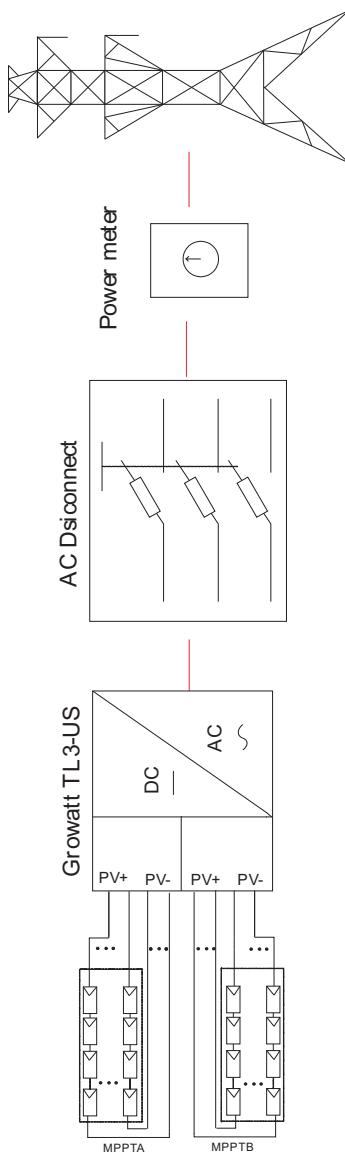
| Specifications \ Model                  | 33000TL3-US   | 36000TL3-US     | 40000TL3-US     |
|---|---|-----------------|-----------------|
| Torque Values and Conductor Sizes       |   |                 |                 |
| DC terminal                             | 1.2Nm (10.6lbf.in)<br>#12~#8AWG(3.31~8.37mm <sup>2</sup> )<br>221°F(105°C) for each pole  |                 |                 |
| AC terminal                             | 2.0N.m (17.7lbf.in)<br>#8~#4AWG(8.37~21.15mm <sup>2</sup> )<br>221°F(105°C) for each pole |                 |                 |
| Attachment to the wall mounting bracket | 44 in-lb.(5 Nm)   |                 |                 |
| safety-lock screws                      | 53 in-lb.(6 Nm)   | 53 in-lb.(6 Nm) | 53 in-lb.(6 Nm) |
| Wire box enclosure lid                  | 53 in-lb.(6 Nm)   | 53 in-lb.(6 Nm) | 53 in-lb.(6 Nm) |

\*see National Electrical Code®, 310.16

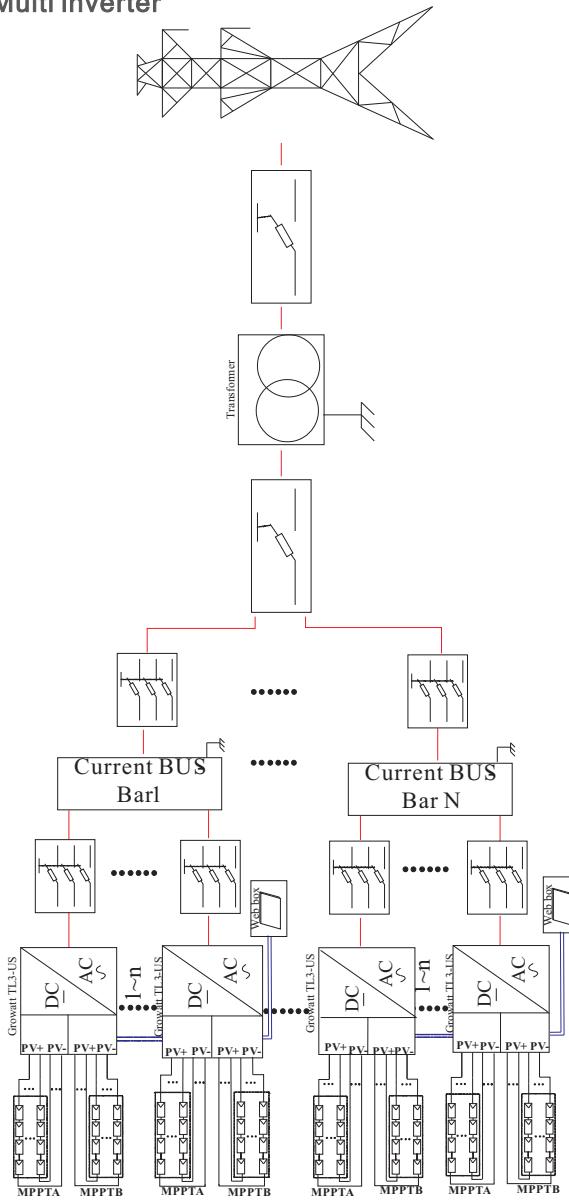
| Name          | Description  | Growatt order number |
|---------------|--|----------------------|
| Fans          | Internal or External fans of the Growatt TL-US   | Growatt TL-US Fan    |
| ShineWebox    | Communication data logger  | ShineWebox           |
| ShinePano     | Communication data logger  | ShinePano            |
| Zigbee        | Communication interface  | Zigbee               |
| Wire box Plug | <br> | Growatt TL3-US Plug  |
| Fuse          | DC input fuse of Growatt TL3-US  | Growatt TL3-US Fuse  |
| SPD           | SPD of Growatt TL3-US  | Growatt TL3-US SPD   |

# 15 Inverter installation plan

## 15.1 Single inverter



## 15.2 Multi inverter

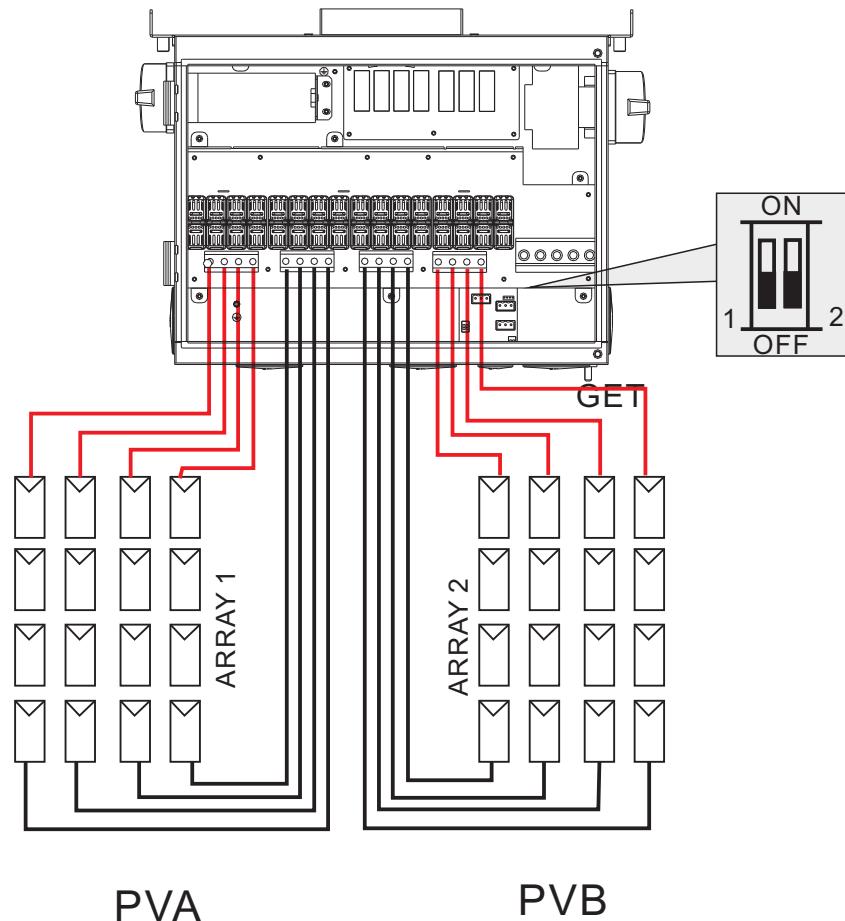


Note: The schematic only showed the Growatt TL3-US

Note: The schematic only showed the Growatt TL3-US

# Contact 16

Growatt 33000 TL3-US default mode DC connection



If you have technical problems concerning our products, contact your installer or Growatt. In order for better support, please provide information below:

- Inverter type
- Serial number of Inverters
- Error code of Inverters
- Display of inverters
- Modules information
- Communication method

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