

SL-TL Grid-tied Inverter

Product Manual



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1 Notes on this Manual

1.1 Scope of Validity

This installation guide describes the assembly, installation, commissioning, maintenance and failure search of the following SL-TL Series inverters.

SL-TL1000	SL-TL1500	SL-TL2200	SL-TL2500	SL-TL2800
SL-TL3000	SL-TL3300T	SL-TL3600T	SL-TL4400T	SL-TL5000T

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

1.2 Targer Group

This manual is for qualified personnel. The tasks described in this manual may only be performed by qualified personnel.

1.3 Symbols Used

The following types of safety instructions and general information appear in this document described as below:



Danger!

Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Warning!

Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Caution!

Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Note!

Note provides tips that are valuable for the optimal operation of your product.

2 Safety

2.1 Appropriate Usage

The SL-TL Series are PV inverters which convert the DC current of a PV generator into AC current and feeds it into the public grid.

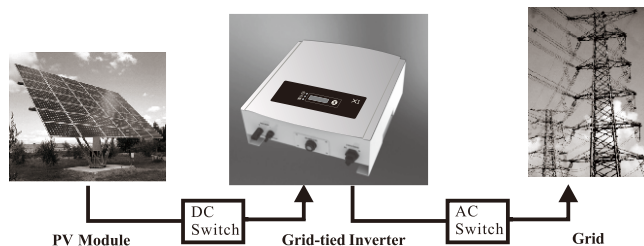


Figure 1 PV Grid-tied System

2.2 Important Safety Instructions



Danger!

Danger to life due to high voltages in the inverter!

- All work on the inverter may be carried out by qualified personnel only.
- The appliance is not to be used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children should be supervised to ensure that they do not play with the appliance.



Caution!

Danger of burn injuries due to hot enclosure parts!

- During operation, the upper lid of the enclosure and the enclosure body may become hot.
- Only touch the lower enclosure lid during operation.



Caution!

Possible damage to health as a result of the effects of radiation!

- Do not stay closer than 20 cm to the inverter for any length of time.



Note!

Grounding the PV generator.

Comply with the local requirements for grounding the PV modules and the PV generator. Hangzhou Zhejiang University Sunny Energy Science and Technology company recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of the system and personnel.

2.3 Explanation of Symbols

This section gives an explanation of all the symbols shown on the inverter and on the type label.

● Symbols on the Type Label

Symbol	Explanation
	CE mark. The inverter complies with the requirements of the applicable CE guidelines.
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Danger of high voltages Danger to life due to high voltages in the inverter!
	Danger to life due to high voltages in the inverter! There is residual voltage in the inverter. The inverter requires 5 minutes to discharge. • Wait 5 minutes before you open the upper lid or the DC lid.

● Important Safety Instructions

When using the product, please do remember the below information to avoid the fire, lightning or other personal injury:



Warning!

Ensure input DC voltage \leq Max. DC voltage .Over voltage may cause permanent damage to inverter or other losses, which will not be included in warranty! This chapter contains important safety and operating instructions. Read and keep this Operation Guide for future reference.



Warning!

Authorized service personnel must disconnect both AC and DC power from the SL-TL Series inverter before attempting any maintenance or cleaning or working on any circuits connected to the SL-TL Series inverter.

- Before using the SL-TL Series inverter, read all instructions and cautionary markings on the SL-TL Series inverter, and all appropriate sections of this manual.
- Use only attachments recommended or sold by Hangzhou Zhejiang University Sunny Energy Science and Technology company. otherwise may result in a risk of fire, electric shock, or injury to persons.
- To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and the wire is not undersized. Do not operate the SL-TL Series inverter with damaged or substandard wiring.
- Do not disassemble the SL-TL Series inverter. It contains no user-serviceable parts. See Warranty for instructions on obtaining service. Attempting to service the SL-TL Series inverter yourself may result in a risk of electric shock or fire and will void your warranty.
- To reduce the risk of electric shock, authorized service personnel must disconnect both AC and DC power from the SL-TL Series inverter before attempting any maintenance or cleaning or working on any circuits connected to the SL-TL Series inverter. Turning off controls will not reduce this risk.
- Keep away from flammable, explosive materials to avoid fire disaster.
- The installation place should be away from humid or corrosive substance.
- To avoid electric shock accident, please do not disassemble the inverter because there are high-voltage capacitances installed inside the inverter. Fatal High-voltage will remain in the inverter after its disconnection with grid after 5 minutes.
- To reduce the chance of short-circuits, authorized service personnel must use insulated tools when installing or working with this equipment.
- No adjustable protection settings in the inverters.
- No internal insulation transformer is provided.
- PV modules shall have an IEC 61730 Class A rating.
- Remote indication of faults will be showed in monitor.
- **For United Kingdom:**
 - The installation that connects the equipment to the supply terminals shall comply with the requirements of BS 7671.
 - Electrical installation of PV system shall comply with requirements of BS 7671 and IEC 60364-7-712.
 - No protection settings can be altered.
 - User shall ensure that the equipment is so installed, designed and operated to maintain at all times compliance with the requirements of ESQCR 22(1)(a).
- **For Australia and New Zealand:**
 - The installation of inverter must fulfill Australian national wiring rules AS/NZS3000 and AS/NZS4777.1.

3 Introduction

3.1 Basic Features

Congratulations on your purchase of a SL-TL Series inverter from Hangzhou Sunny Energy Science and Technology Company and Technology company. The SL-TL Series inverter is one of the finest inverter on the market today, incorporating state-of-the-art technology, high

reliability, and convenient control features.

- Advanced digital control technology.
- Optimal MPPT technology.
- Advanced anti-islanding solutions.
- Excellent protections.
- IP65 protection level.
- Efficiency up to 97.6%.
- THD < 3%.
- Current (inrush): < 60A.
- Maximum output fault current < 400A.
- Safe & Reliable: transformerless design with software and hardware protection.
- Friendly HMI.
 - ☆LED status indications.
 - ☆LCD display technical data, Human-Machine interaction through press key.
 - ☆RS485/RS232 communication interface.
 - ☆PC remote control.

3.2 Terminals of PV Inverter

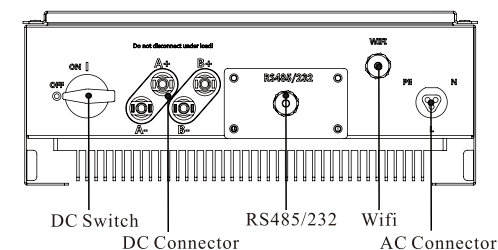


Figure2 SL-TL1000/SL-TL1500/SL-TL2200/SL-TL2500/SL-TL2800/SL-TL3000
SL-TL1000/SL-TL1500/SL-TL2200 with 1 string

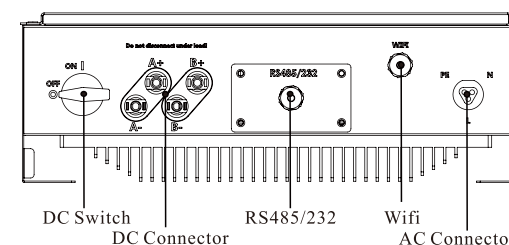


Figure 3 SL-TL3300T/SL-TL3600T/SL-TL4400T/SL-TL5000T



Caution!
Only authorized personnel is allowed to set the connection.

3.3 Dimension and Weight

• Dimension

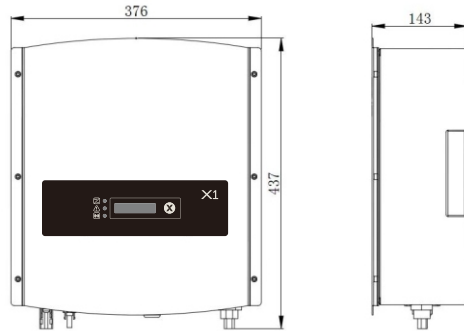


Figure4 SL-TL1000/SL-TL1500/SL-TL2200/SL-TL2500/SL-TL2800/SL-TL3000

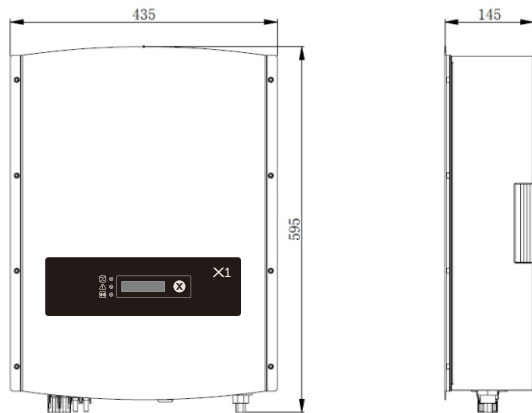


Figure 5 SL-TL3300T/SL-TL3600T/SL-TL4400T/SL-TL5000T

• Weight

Table 1 Weight

Model	SL-TL 1000	SL-TL 1500	SL-TL 2200	SL-TL 2500	SL-TL 2800	SL-TL 3000	SL-TL 3300T	SL-TL 3600T	SL-TL 4400T	SL-TL 5000T
Net Weight	16kg	16kg	16kg	16.5kg	16.5kg	16.5kg	21.5kg	22kg	22kg	22kg

4 Technical Data

4.1 DC Input (SL-TL1000~SL-TL3000)

Model	SL-TL 1000	SL-TL 1500	SL-TL 2200	SL-TL 2500	SL-TL 2800	SL-TL 3000
Max. PV Input Power	1200 W	1700 W	2300 W	2700 W	3000 W	3200 W
Max. PV Voltage	580 V					
Nominal Voltage	360 V					
MPPT Voltage Range	125 ~ 530 V					
Max. PV Current	10 A	10 A	12 A	13 A	13.8 A	15 A
Isc PV	11 A	11 A	13.2 A	14 A	15.2A	16.5 A
Max.inverter backfeed current to the array	0 A					
MPP Tracking No.	1					
No. of PV Inputs	1			2		
Switch on/off Voltage	100 V /70 V					

4.2 AC Output (SL-TL1000~SL-TL3000)

Model	SL-TL 1000	SL-TL 1500	SL-TL 2200	SL-TL 2500	SL-TL 2800	SL-TL 3000
Rated Output Power	1000VA	1500VA	2000 VA	2500 VA	2600 VA	3000 VA
Max. Output Power	1000VA	1650VA	2200 VA	2500 VA	2800 VA	3000 VA
On-grid Connection	Single-phase					
Voltage Range	comply with the local grid *					
Nominal Voltage	220/230/240Vrms typical					
Max. Output Current	5A	7.5A	10A	12 A	13A	13.2 A
Maximum Output Overcurrent Protection	5.5A	8.3A	11A	13 A	14.3A	14.3 A
Frequency Range	comply with the local grid*					
Nominal Frequency	50HZ/60HZ					
Power Factor	>0.99					
THD	<3%					

Note:*For detailed suitable country information please refer to page 32.

4.3 Efficiency, Safety and Protection (SL-TL1000~SL-TL3000)

Model	SL-TL 1000	SL-TL 1500	SL-TL 2200	SL-TL 2500	SL-TL 2800	SL-TL 3000
Euro-Efficiency	96.5%	96.5%	96.8%	96.9%	96.9%	96.9%
Max. Efficiency	97.4%	97.4%	97.5%	97.6%	97.6%	97.6%
MPPT Efficiency	99.9%					
Safety & Protection						
Over voltage Protection	Yes					
Over current Protection	Yes					
DC isolation Impedance Monitoring	Yes					
Ground Fault Protection	Yes					
Grid Monitoring	Yes					
Ground Fault Current monitoring	Yes					
DC Injection Monitoring	Yes					
Protective Class	Class I					

4.3 General Data (SL-TL1000~SL-TL3000)

Model	SL-TL 1000	SL-TL 1500	SL-TL 2200	SL-TL 2500	SL-TL 2800	SL-TL 3000
Gross Dimension (W/H/D)	560mm×490mm×260mm					
Gross Weight	19kg	19kg	19kg	19.5kg	19.5kg	19.5kg
Installation	Wall-mounted					
Operating Temperature Range	-20 °C ~ +60 °C (derating at 45 °C)					
Storage Temperature	-20 °C ~ +60 °C					
Storage /Operating Relative Humidity	0% ~ 95%, no condensation					
Altitude	<2000m					
Protection Level	IP 65					
Isolation Type	Transformerless					
Night-time Consumption	0 W					
Operating Loss	<3.5 W					
Cooling	Natural Cooling					
Noise Level	<30dBA					
Communication Interface	RS485/RS232/Wifi					
Standard Warranty	5 years(10 year option)					

4.5 DC Input (SL-TL3300~SL-TL5000T)

Model	SL-TL3300T	SL-TL3600T	SL-TL4400T	SL-TL5000T
Max. PV Input Power	3480 W	4000 W	4580 W	5200 W
Max. PV Voltage	580 V			
Nominal Voltage	360 V			
MPPT Voltage Range	125 ~ 530 V			
Max. PV Current	17 A *2	17 A *2	18 A *2	20 A *2
Isc PV	18.7 A	18.7 A	19.8 A	22 A
Max.inverter backfeed current to the array	18.7 A	18.7 A	19.8 A	22 A
MPP Tracking No.	2			
No. of PV Inputs	2			
Switch on/off Voltage	100 V /70 V			

4.6 AC Output (SL-TL3300~SL-TL5000T)

Model	SL-TL3300T	SL-TL3600T	SL-TL4400T	SL-TL5000T
Rated Output Power	3000 VA	3680 VA	4000 VA	4600 VA
Max. Output Power	3300 VA	3680 VA	4400 VA	5000 VA
On-grid Connection	Single-phase			
Voltage Range	comply with the local grid *			
Nominal Voltage	220/230/240Vrms typical			
Max. Output Current	15A	16A	20A	23A
Maximum Output Overcurrent Protection	16A	16A	22A	25.3A
Frequency Range	comply with the local grid *			
Nominal Frequency	50HZ/60HZ			
Power Factor	>0.99			
THD	<3%			

Note:* For detailed suitable country information please refer to page 32.

4.7 Efficiency,Safety and Protection (SL-TL3300T~SL-TL5000T)

Model	SL-TL3300T	SL-TL3600T	SL-TL4400T	SL-TL5000T
Euro-Efficiency	97.1%	97.1%	97.2%	97.2%
Max. Efficiency	97.6%	97.6%	97.6%	97.6%
MPPT Efficiency	99. 9%			
Safety & Protection				
Over voltage Protection	Yes			
Over current Protection	Yes			
DC isolation Impedance Monitoring	Yes			
Ground Fault Protection	Yes			
Grid Monitoring	Yes			
Ground Fault Current monitoring	Yes			
DC Injection Monitoring	Yes			
Protective Class	Class I			

4.8 General Data (SL-TL3300T~SL-TL5000T)

Model	SL-TL3300T	SL-TL3600T	SL-TL4400T	SL-TL5000T
Gross Dimension (W/H/D)	700mm×505mm×265mm			
Gross Weight	25.5kg	26kg	26kg	26kg
Installation	Wall-mounted			
Operating Temperature Range	-20 °C ~ +60 °C (derating at 45 °C)			
Storage Temperature	-20 °C ~ +60 °C			
Storage /Operating Relative Humidity	0% ~ 95%, no condensation			
Altitude	<2000m			
Protection Level	IP 65			
Isolation Type	Transformerless			
Night-time Consumption	0 W			
Operating Loss	<3.5 W			
Cooling	Natural Cooling			
Noise Level	< 30dBA			
Communication Interface	RS485/RS232/Wifi			
Standard Warranty	5 years(10 year option)			

5 Function

Operation Mode

【Waiting Mode】

The waiting mode means that the inverter is ready to but still not connect to the grid. Under this mode, it will continue check if PV array has enough power to feedback into grid. When the inverter passes dump load test after startup, it will change from waiting mode to Checking mode.

【Checking Mode】

If inverter passed dump load test and no error/fault occurs, starts checking to deliver power.

【On-Grid Mode】

Under this mode, SL-TL series inverters convert PV array's DC into AC and feedback into grid.



CAUTION!

The inverter decreases the output power is normal in the condition of thermal protection, but if this phenomenon occurs frequently, you need to check the heatsink, or consider putting the inverter in the place where have better air flow. If output power decreases caused by electrical, please ask for professional supports.

【Fault Mode】

If any fault/error occurs, the inverter will stop delivering power until the fault/error is cleared. Some fault/error will auto recover, and some may need manual restart.

【Setting Mode】

The user can get into the setting mode by press “Function” key for 5 seconds if DC exists. Please refer to operation method in chapter 7 for detailed information.

6 Installation

6.1 Packaging

Description	QTY	Remark
SL-TL series inverter	1	1K~3K: 6 M4 expansion screws and 6 φ6 expansion pipes; 3.3K~5K: 6 M5 expansion screws and 6 φ8 expansion pipes; 1K~2.2K with 2 DC connectors; 2.5K~5K with 4 DC connectors.
Bracket	1	
Screw package	1	
AC connector	1	
DC connector	2/4	
Product manual	1	
Warranty card	1	
Packing list	1	

6.2 Installation Precaution

Checking environment where system is installed.

Make sure the installation site does not fall into any of the following conditions:

- The ambient temperature is outside the range of tolerable ambient temperature (-20°C to $+60^{\circ}\text{C}$, -4°F to $+140^{\circ}\text{F}$).
- Higher than the altitude of about 2,000 m above sea level.
- Prone to be damaged by sea water.
- Close to corrosive gas or liquid (for example, locations where chemicals are processed or the location where feed lots of poultry).
- Exposed to direct sunlight.
- Prone to be flooded or high levels of snow pack.
- Little or no air flow and high humidity.
- Exposed to steam, vapor or water.
- Exposed to direct cool air.
- Near the television antenna or antenna cable.

Ventilation is not enough to cool the inverter, that is to say, outdoors, the inverter requires. At least 30 cm (see table 2) of clearance among the units is needed, it is recommended that the same clearance between the units and the ground be used. Installing the inverter in the place mentioned above may cause the malfunction of the system caused by water or high temperature inside the inverter. Please let users know that Hangzhou Zhejiang University Sunny Energy Science and Technology company will not compensate the fault caused by the above situation .

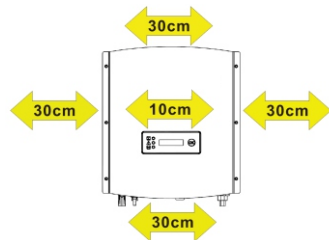


Table 2 Available Space Size

Position	Min. Size
Side	30cm
Top	30cm
Bottom	30cm
Front	10cm

6.3 Precaution

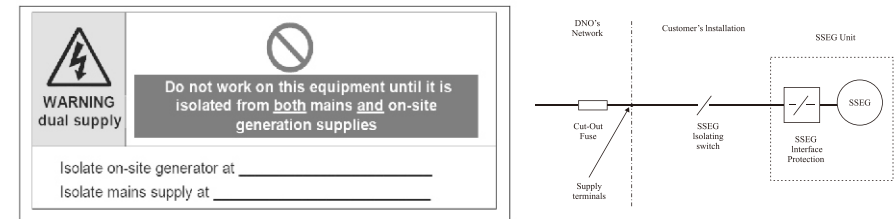
Below tools are needed before installation.



Figure 6 Installation Tools

Installation Tools: crimping pliers for binding post and RJ45, screw driver and manual wrench and ϕ 6 driller.

Pay attention to the dual supply.



6.4 Installation Steps

Step1: Drill holes in the wall with ϕ 5.5 (ϕ 7.5 for 3.3K-5K) driller according to the size of bracket. Keep drilling vertical to the wall, and don't shake when drilling to avoid damage to the wall. The depth of the holes should be about 30mm(40mm for 3.3k-5k). After removing the dust in the holes, measure the net depth of the holes. If the depth is deeper than 33mm(40mm for 3.3k-5k) or less than 27mm(37mm for 3.3k-5k), the expansion tubes wouldn't be installed and tightened.

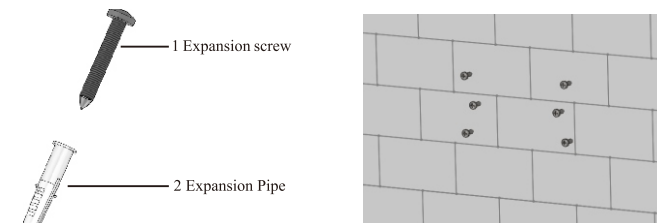


Figure 7 Installation of Expansion Pipe

Step2: Clean all dust outside/inside the hole and measure pitch-row before installation. It needs repositioning and drilling holes if the hole with much error. Then put expansion pipe into the hole vertically, use rubber hammer to tap the pipe into the wall completely. After with, twist 6 screws into 6 corresponding pipes .



1K~5K

Figure 8 Bracket Installation

Step3: Use the bracket to install the inverter onto the narrow vertical panel (or wall). Put all holes of the inverter onto the M6 screw of the bracket (See figure 8).

Step 4: Complete the installation process.

6.5 Connections of the PV Power System.

● PV String

1KW-2.2KW SL-TL inverters have 1 string PV connectors while 2.5KW-5KW have 2 PV connectors. 3.3K-5K has 2 MPP trackings. Please select PV modules with excellent function and reliable quality. Open circuit voltage of module arrays connected in series should be <Max.DC (table 3) input voltage:operating voltage should be within the MPPT voltage range.

Table 3 Max. DC Voltage Limitation

Model	SL-TL 1000	SL-TL 1500	SL-TL 2200	SL-TL 2500	SL-TL 2800	SL-TL 3000	SL-TL 3300T	SL-TL 3600T	SL-TL 4400T	SL-TL 5000T
Max.DC Voltage	580V									

Please use PV cable to connect modules to inverter. From junction box to inverter, voltage drop is about 1-2%. So we suggest the inverter install near PV module, in order to save cable and reduce DC loss.



Note!

Please do not make PV panel positive or negative ground.

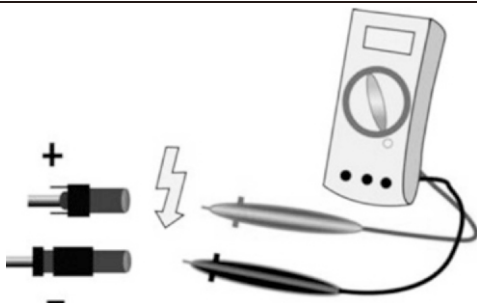


Figure 9 Use multimeter to measure module array voltage



Warning!

PV module voltage is very high which belongs to dangerous voltage range, please comply with electric safety rules when connecting.



Warning!

When there is something wrong with module arrays, modules can be connected with PV grid-tied inverter only after eliminating these problems.



Attention

All electrical installations must comply with local regulation. And make sure that the grid connection is permitted by local grid company.

● AC Output

SL-TL Series inverters are designed for single phase grid. Voltage range is 220/230/240V, frequency is 50/60HZ. Other technical requests should comply with the requirement of the Local public grid.

Table 4 Cable and Micro-breaker Requirement

Model	SL-TL 1000	SL-TL 1500	SL-TL 2200	SL-TL 2500	SL-TL 2800	SL-TL 3000	SL-TL 3300T	SL-TL 3600T	SL-TL 4400T	SL-TL 5000T
Cable	2mm ²	2mm ²	3mm ²	4mm ²	4mm ²	4mm ²	4mm ²	4mm ²	5mm ²	6mm ²
Micro-Breaker	16A	20 A	20 A	20 A	20 A	20 A	20 A	25A	25A	32A

Micro-breaker should be installed between inverter and grid, and its leakage current needs to be > 30mA. Any load should not be connected with inverter directly.

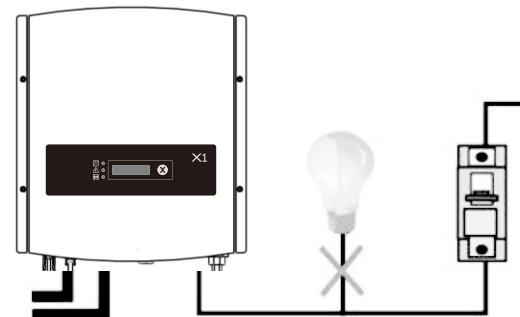


Figure 10 Incorrect Connections between Load and Inverter

Impedance of SL-TL inverter AC connecting dot should be less than 2Ω. To ensure reliable anti-islanding function, PV cable should be used to ensure wire loss < 1% than normal power. Moreover, length between AC side and grid connecting dot should be less than 150m. Below chart is cable length, section area and wire loss.

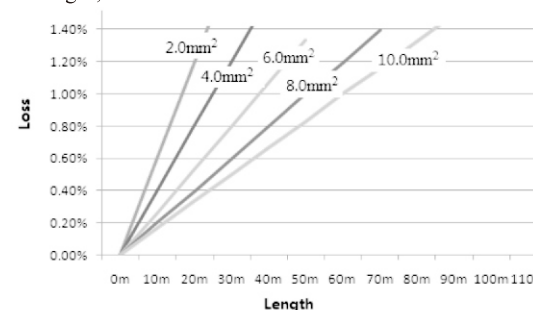
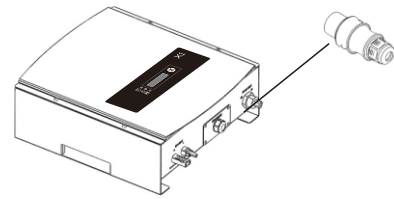
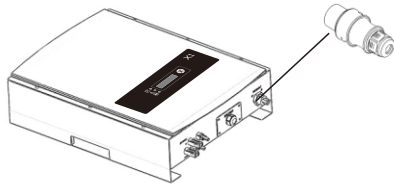


Figure 11 AC Cable Loss

This product has a professional IP66 AC waterproof connector. You have to wire AC by yourself. Please see figure 12 and 13 for AC connector disassembling guide.



(a)1-3KW



(b)3.3-5KW

Figure 12 Disassembling AC Connector from Inverter

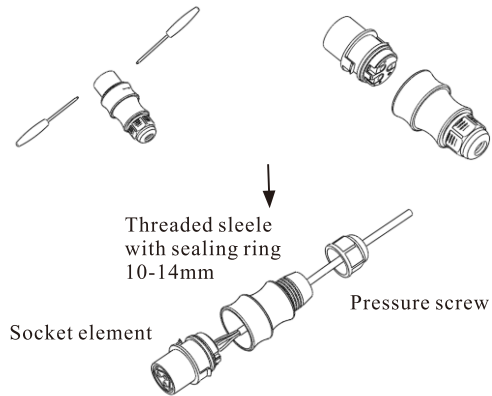


Figure 13 Disassembling AC Connector

Below shows the steps of wiring.

Step1: Put the threaded sleeve and pressure screw through the AC wire (See figure 14).

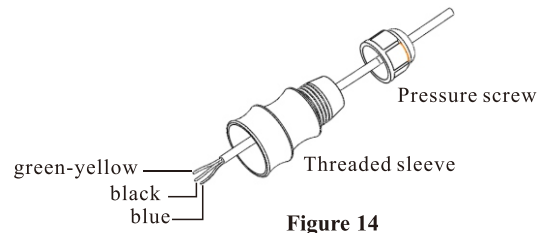


Figure 14

Step2: Wire the AC wire refer to below instructions.

- Screw the green-yellow wire to the ground terminator in the AC Connector (Figure 15).
- Screw the blue wire to the N(Neutral) terminator in the AC Connector.
- Screw the black or brown wire to the L(Line) terminator in the AC Connector.

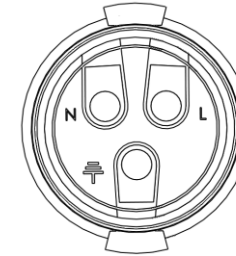


Figure 15 AC Connector

Step3: Confirm all the wires are screwed down(Figure 16).

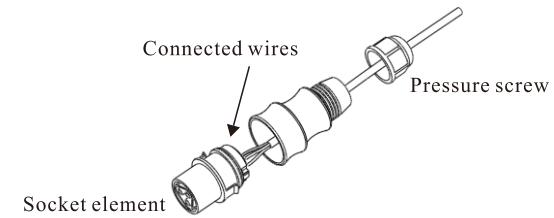


Figure 16

Step4: Screw down the threaded sleeve (Figure 17).

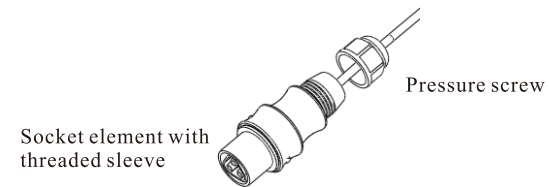


Figure 17

Step5: Screw down the pressure screw (Figure 18).

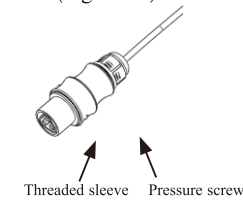


Figure 18

Step6: Connect AC connector to inverter (Figure 19).

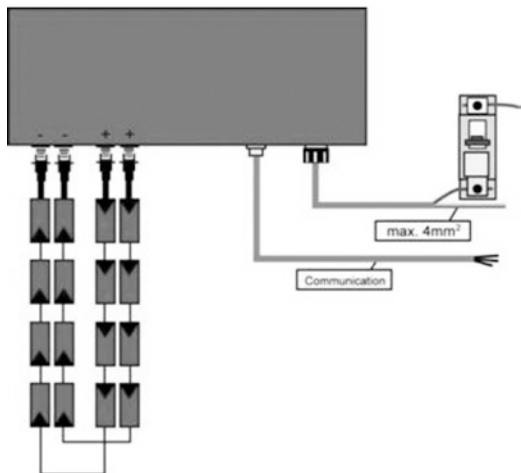


Figure 19

6.6 Run the inverter

• Start inverter after checking all below steps

- Make sure all the DC breaker and AC breaker are disconnect.
- AC cable is connected to grid correctly.
- All PV panels are connected to inverter correctly, DC connectors which are not used should be sealed by cover.

• Start inverter

- Turn on DC and AC side switches.
- Inverter will start up automatically when PV panels generate enough energy. Below is three different states when operating, which means inverter starting up successfully.

Waiting: Inverter is waiting to checking when output DC voltage from PV panels is greater than 100V (lowest start-up voltage) but less than 150V (lowest operating voltage).

Checking: Inverter will check output environment automatically when DC output voltage of PV panels exceeds 150V and PV panels have enough energy to start inverter.

Normal: Inverter begins to operate normally with green light on. Meanwhile, feedback energy to grid, LCD displays present output power.

Inverters will work in MPPT mode when PV voltage is in the MPPT voltage range, inverter will stop feedback power to grid when PV power is not enough.



Note!

If inverter shows “Fault” status, please refer to Part 9.

7 Operation Method

7.1 Control Panel

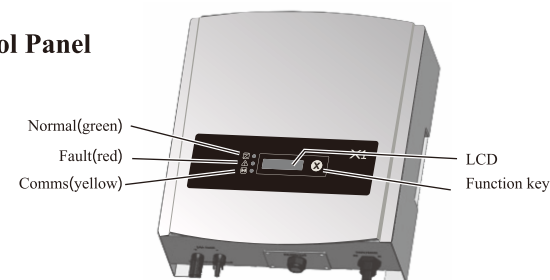


Figure 20 Control Panel

Normal (green): The inverter is working in normal state.

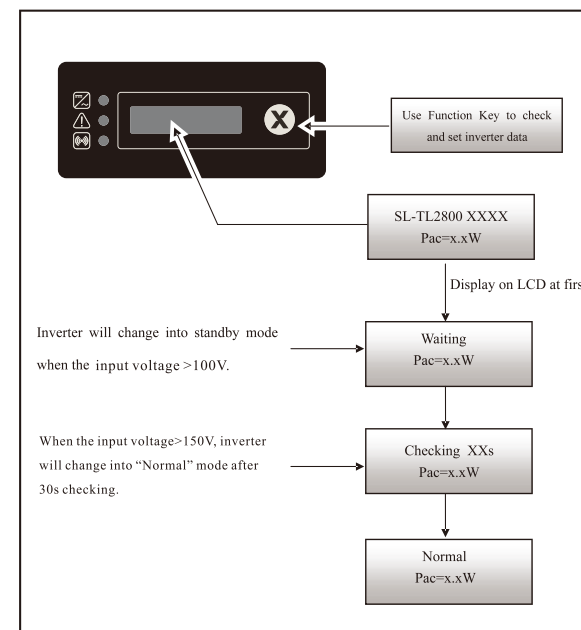
Fault (red): The inverter is in fault state.

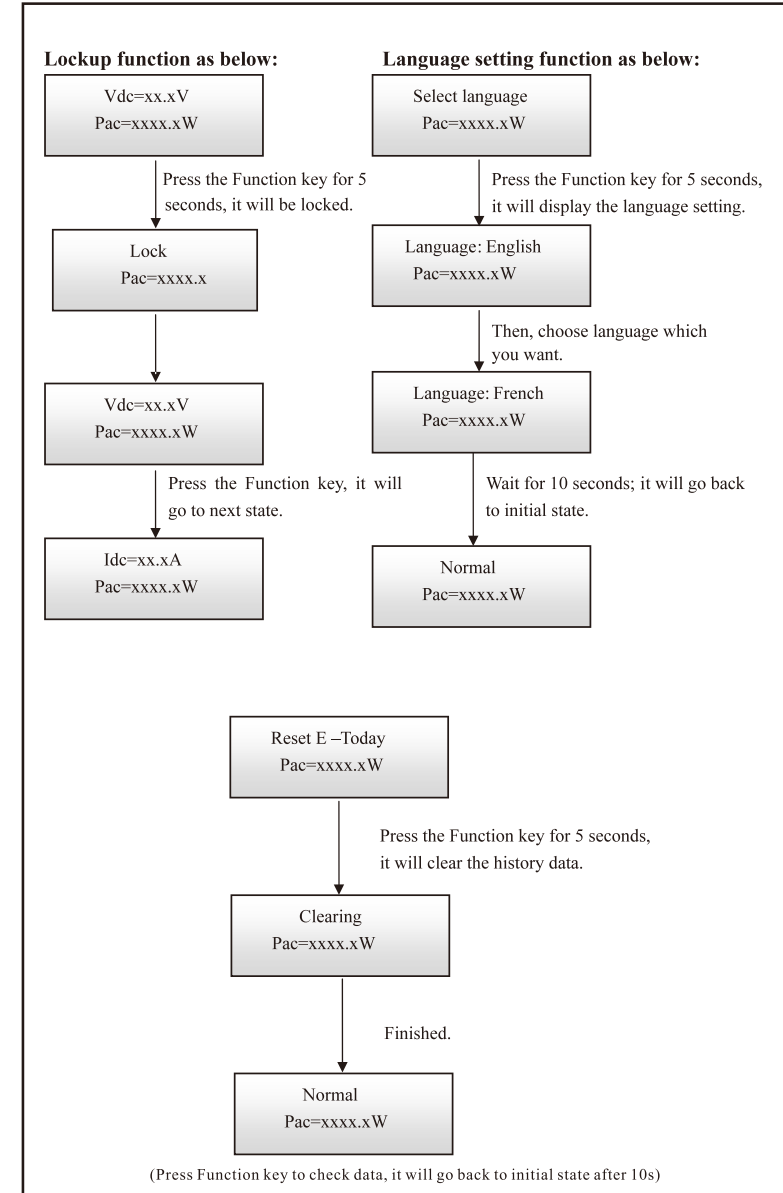
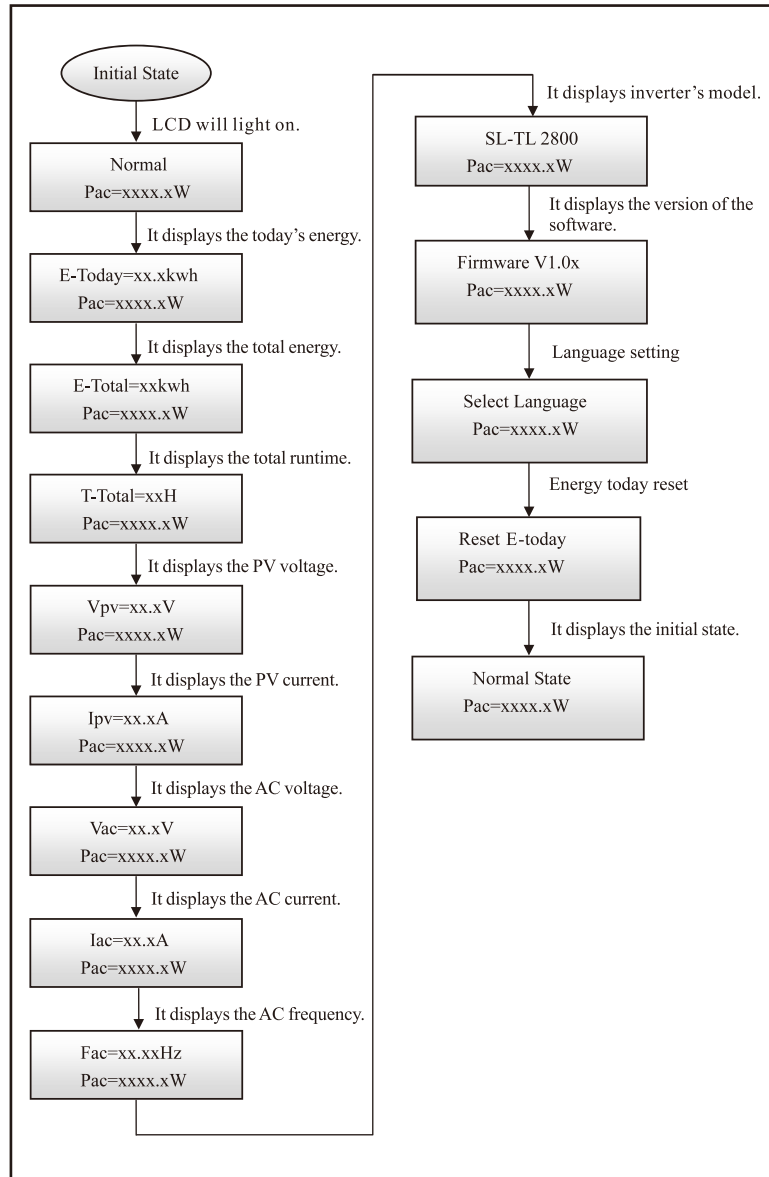
Comms (yellow): The inverter is in communication when blinking

Function key: To check the operating data, detailed usage see section 7.2.

7.2 LCD Function

The function key is used to set the LCD. It can alternate among different parameters and different languages.





7.3 LCD Information

Table 5 LCD Information

Operating State	Information Display	Description
Working Condition		
Power Off	No display	DC input voltage<70V, inverter will stop working
Initialization& Waiting	Waiting	100V< DC Input voltage≤150V is standby mode
Checking	Checking	Input voltage >150V is grid checking mode
Normal State	Normal	Inverter is working in grid-tied mode
Flash	Re-Flash	Upgrading software
Flash(50 seconds)	Flash	Data Update and LCD reset
Checking Parameters		
Real-time Power	Pac=xxxxW	Real-time output power
Calculate Energy Information	E-total=xxxxkwh	Total energy feedback to grid
Output Voltage	Vac=xxx.xV	Output voltage
Output Frequency	Fac=xx.xHz	Output frequency
Output Current	Iac=xx.xA	Output Current
PV Input Voltage	Vpv= xxxV	PV input voltage
PV Input Current	Idc= xxx A	PV input current
Fault Information		
Isolation Fault	Isolation Fault	Grounding fault or surge voltage protection Fault
Leakage Detecting	Ground I Fault	Leakage current over rating
Grid Fault	Vac Fault	AC Over voltage rating
	Vac Fault	AC Under voltage rating
	Fac Fault	AC Over frequency rating
	Fac Fault	AC Under frequency rating
No Utility	No Utility	No Utility
Ground I fault	Ground I Fault	Leakage current is over limitation
PV Over Voltage	PV Over Voltage	PV voltage ≥ Max.DC voltage
Consistent Fault	Consistent Fault	CPU or other circuitry Fault
Relay Fault	Relay Fault	Relay is failure between grid and inverters
DC INJ High	DC INJ Fault	DC component over rating in AC output
EEPROM Fault	EEPROM Fault	EEPROM Fault
SCI Fault	SCI Fault	MCU internal communication Failure
DC Bus High	DC Bus High	DC bus voltage is higher than the set value
AC Sensor Fault	AC CT Fault	AC CT Fault
GFCI Fault	GFCI Fault	Leakage current detecting circuit Fault
Others		
Lock	Lock	Froze the information
Reconnect	Reconnect	Reconnect to grid after relay Disconnect
Inverter's Version	Firmware V1.20	Version information

8. Communication and Monitoring

8.1 Communication Interface

This product has an optional communication interface RS485/RS232. Operating information like output voltage, current, frequency, fault information, etc., can be delivered to PC or other monitoring equipment via RS485/RS232.

8.2 Communication

When the user wants to know the information of the power station and manage the entire power system. We offer below two types of communications.

① RS232 Communication

RS232 is one standard communication interface. It transmits the data between PC and one single SL-TL series inverter (Figure 21), for example, software updating and serviceman's testing.

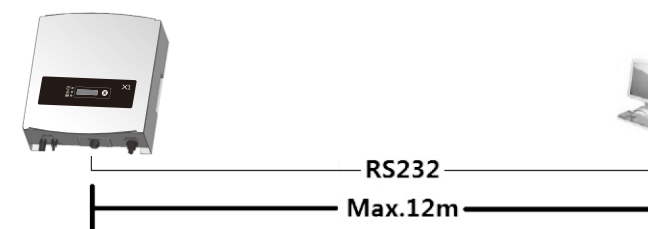


Figure 21 RS232 Communication Diagram



Figure 22 RS232 Communication Cable and Interface

Table 6 RS232 Pin Definition

Pin	1	2	3	4	5	6	7	8	9
Function	NC	TxD	RxD	NC	Common (GND)	NC	NC	NC	NC

② RS485 Communication (Several inverters)

• Communication

RS 485 is generally for multi inverter's communication. Up to 32 inverters could communicate at the same time, but the total wire length should be $\leq 1200\text{m}$. System monitor Sunny Logger should be configured to realize one PC communicates with multi inverters at the same time. Through PC Sunny Logger could get real time PV plants operating data. Please see Installation Guide of Sunny Logger for more information.

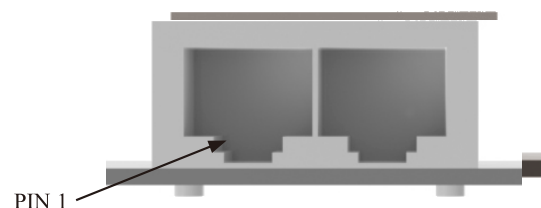


Figure 23 RS485 Interface of SL-TL Series Inverter

• Connections

✦ Directly connect two inverters through a network cable.

Select high-quality network cable, peel the isolation surface of the two ends. Follow T568B order with press pliers to push into the 8-wire RJ 45 crystal head.

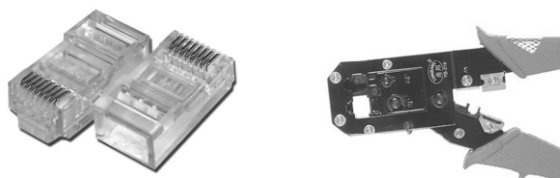


Figure 24 RJ 45 and press pliers

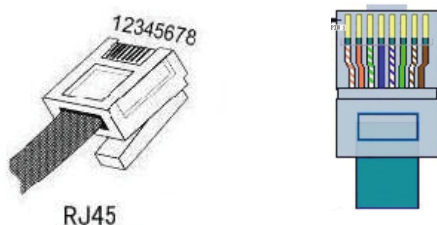


Figure 25 Line order

The correspond relationship of the pins of RJ 45 and network cable color is as Table 7:

Table 7 T568B connection order

RJ 45 Line NO.	Cable color
1	White orange
2	Orange
3	White Green
4	Blue
5	White blue
6	Green
7	White brown
8	Brown

✦ Connect PC and inverters through RS485/232 converter.

Select high-quality network cable, peel the isolation surface of the two ends. For the end used for the inverter, follow T568B order with press pliers to push into the 8-wire RJ 45 crystal head, for the other end, follow the 4-wire RJ 45 crystal head (as figure 26) to connect with the RS485/232 converter connector, the rest 4 lines can be impended or cut off.

Cable colour	RS485 Converter
4 Blue	A
5 White Blue	B

Figure 26 RS 485 converter connector

Connect the system as below (Figure 27), you can easily monitor the PV station.

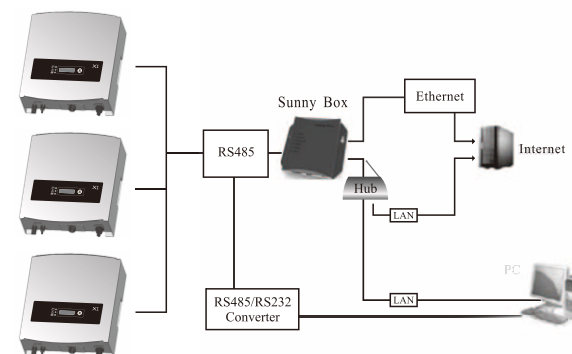


Figure 27 Sunny Logger Monitoring Diagram

9 Troubleshooting

9.1 Troubleshooting

This section contains information and procedures for solving possible problems with the SL-TLseries inverters, and provides you with troubleshooting tips to identify and solve most problems that could occur with the SL-TL series inverters.

This section will help you narrow down the source of any problems you may encounter. Please read the following troubleshooting steps.

- Check the warning or fault messages on the System Control Panel or Fault codes on the inverter information panel. If a message is displayed, record it before anything further solutions .
- Attempt the solution indicated in Table 8.
- If your inverter information panel is not displaying a Fault light, check the following list to make sure that the present state of the installation allows proper operation of the unit.
 - Is the inverter located in a clean, dry, adequately ventilated place?
 - Have the DC input breakers been opened?
 - Are the cables adequately sized and short enough?
 - Are the input and output connections and wirings in good condition?
 - Are the configuration settings correct for your particular installation?
 - Are the display panel and the communication cable properly connected and undamaged?

Contact Hangzhou Sunny Energy Science and Technology Company Customer Service for further assistance. Please be prepared to describe details of your system installation and provide the model and serial number of the unit.

Table 8 Troubleshooting list

Faults	Diagnosis and Solutions
Grid Faults	-Waiting for one minute, grid will go back to normal working state. -Making sure that grid voltage and frequency complies with standards. -Or, please seek for help from us.
No Utility	-Off to grid. -Please check grid-connection, like wire, interface, etc. -Checking grid usability. -Or seek for help from us.
PV Over Voltage	-Checking the panel's open-circuit voltage whether the value is similar or already >Max.DC voltage. -Please seek help from us when voltage \leq Max.DC voltage.
DC INJ High	-DC injection is higher than the set value. -Wait for one minute. -Please seek for help from us if it does not go back to normal state.
SCI Fault	-Disconnect PV (+) , PV (-) with DC input, and reconnect them. -Please seek for help from us if it can not go back to normal state.
AC Sensor Fault	-Disconnect PV (+) , PV (-) with DC input, and reconnect them. -Please seek for help from us if it can not go back to normal state.
Isolation Fault	-Check the impedance among PV (+), PV (-) and ground. SL-TL1000~SL-TL3000>1Moh. SL-TL3300T/SL-TL4400T/SL-TL3600T/SL-TL5000T>2Mohm. -Please seek for help from us if it can not be detected or the impedance value is not big enough.
Consistent Fault	-Disconnect the PV (+), PV (-) with DC input, then reconnect them. -Please seek for help from us if it can not go back to normal state.
Relay Fault	-Disconnect the PV (+), PV (-) with DC input, then reconnect them. -Please seek for help from us if it can not go back to normal state.
Ground I Fault	-Leakage current is too high. -Disconnect DC and AC connector, check the surrounding equipment on the AC side. -Reconnect the input connector and check the state of inverter after troubleshooting. -Please seek for help from us if it can not go back to normal state.
EEPROM Fault	-Disconnect the PV (+), PV (-) with DC input, then reconnect them. -Please seek for help from us if it can not go back to normal state.
High DC Bus	-Disconnect the PV (+), PV (-) with DC input, then reconnect them. -Check L line and N line to see whether it has connection faults. -Please seek for help from us when this fault happens.
GFCI Fault	-Disconnect the PV (+), PV (-) with DC input, then reconnect them. -Please seek for help from us if it can not go back to normal state.

9.2 Routine Maintenance

Inverters do not need any maintenance or correction in most condition, but if the inverter often loses power due to overheating, this can be the following reasons:

- The cooling fins on the rear of the housing are covered with dirt.
- The ventilation channels are covered with dirt.

Clean the cooling fins and ventilation channels with a soft dry cloth or brush if necessary.

10 Decommissioning

10.1 Dismantling the Inverter

- Disconnect the inverter from DC Input and AC output.
- Remove all connection cables from the inverter.
- Remove the inverter from the bracket.

If possible, please pack the inverter with the original packaging.

If it is no longer available, you can also use an equivalent carton that meets the following requirements.

- Suitable for loads more than 30 kg.
- With handle.
- Can be fully closed.

10.3 Storage and Transportation

Store the inverter in dry place where ambient temperatures are always between -20°C - $+60^{\circ}\text{C}$. Take care of the inverter during the storage and transportation, keep less than 4 cartoons in one stack.

10.4 Disposal

Please be sure to deliver wasted inverters and packing materials to certain site, where can assist relevant department to dispose and recycle.

10.5 Appendix

Multiple Choice

- SL-TL1000S/1500S/2200S/2500S/2800S/3000S

Safety Choice: with DC switch as standard



- SL-TL 3300TS/3600TS/4400TS/5000TS

Safety Choice: with DC switch as standard



11 Contact us

If you have any questions about SL-TL series inverter, please call service support hotline: +86 571 58509376. Please provide following information for better service.

- a. Inverter's Model.
- b. Inverter's Serial No.
- c. Communication Method.
- d. PV modules' Model.

The inverter is suitable for below country.

State	Voltage and Frequency range
Germany	Comply with the local grid
France	Comply with the local grid
Norway	Comply with the local grid
Denmark	Comply with the local grid
Netherlands	Comply with the local grid
Czech	Comply with the local grid, The reconnection time can be adjusted from 20s to 20min.
Greece(continent)	Comply with the local grid
Greece(island)	Comply with the local grid
England	Comply with the local grid
Australia	Comply with the local grid
Belgium	Comply with the local grid