Solar Inverter

Operation Manual

Model: SI-4/6K-T2, SI-8/12K-T2, SI-13/20K-T2, SI -22/33K-T2

INHENERGY CO., LTD.

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1 Notes on this manual

1.1 Validity

This manual describes the assembly, installation, commissioning and maintenance of the following Inhenergy Inverter model:

- **SI-4/6K-T2**
- **SI-8/12K-T2**
- **SI-13/20K-T2**
- **SI-22/30K-T2**

Operator Requirements

This manual is for qualified electrical engineers who have received proper training and have demonstrated skills and knowledge in the construction and operation of this equipment. Operators must be trained to deal with the possible dangers and hazards involved in installing electrical devices.

Additional information

Further information on special topics can be found in the download section at www.inhenergy.com

The manual and other documents must be stored in a convenient place and be available at all times. We assume no liability for any damage caused by failure to observe these instructions. For possible changes in this manual, Inhenergy Co., Ltd. accepts no responsibilities to inform the users.

1.2 Symbol Description

Please pay close attention to all the symbols for the purpose of avoiding possible personal injury or equipment break down.

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

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NOTICE	NOTICE is used to address practices not related to personal injury
Information	Information refers tow what the operator must read and understand to ensure optimal operation of the system.

Markings on this product

Symbol	Description
	Caution，risk of electric shock
	Caution，hot surface
5min	Operate after 5 minutes
	Read the manual
	Point of connection for grounding protection
CE	CE mark. The inverter complies with the requirements of the applicable CE guidelines.
	The inverter must not be disposed of with the household waste.
Warning: High Temperature!高温危险！ Never touch the enclosure of an operating inverter. 逆变器工作时严禁触摸外壳。	Burn warning Do not touch an operating inverter because it generates high temperatures on the shell.

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2 Overview

2.1 Product Introduction

Main Function

The Inverter is a three-phase grid-tied PV string inverter that converts the DC power generated by PV strings into AC power and feeds into the power grid.

Models

This document is applicable for the following models:

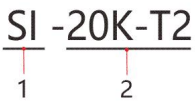
SI-4K-T2, SI-4K-T2, SI-6K-T2;

SI-8K-T2, SI-10K-T2, SI-12K-T2;

SI-13K-T2, SI-15K-T2, SI-17K-T2, SI-20K-T2;

SI-22K-T2, SI-25K-T2, SI-27K-T2, SI-30K-T2;

Model description (Model SI-20K-T2 as an example):



Model description

Item	Meaning	Description
1	Product	Abbreviation for Solar Inverter
2	Power Level	4K-T2 ： The rated power is 4 kW. 8K-T2 ： The rated power is 8 kW. 13K-T2： The rated power is 13 kW. 20K-T2： The rated power is 20kW. 30K-T2： The rated power is 30 kW. T2: Second generation product of three phase inverter

2.2 Appearance

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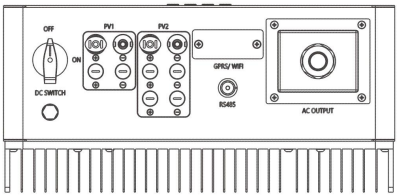
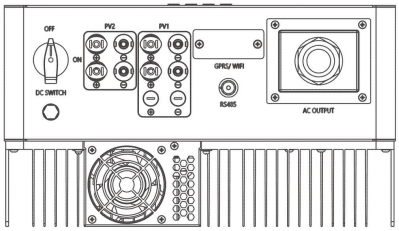
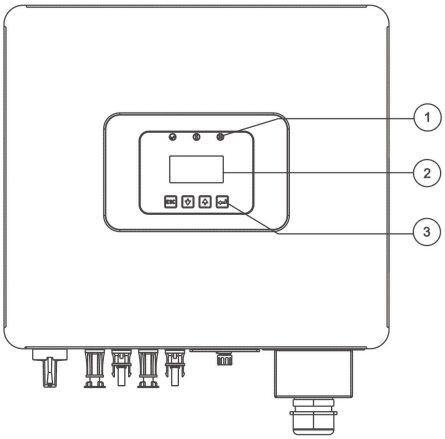
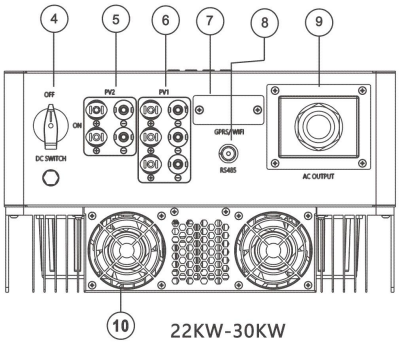


4KW-12KW



13KW-20KW





22KW-30KW

① LED indicator ② LCD display ③ Function button ④ DC switch

⑤ DC input terminals (PV1) ⑥ DC input terminals (PV2) ⑦ GPRS/WIFI output port

⑧ Communication port (RS485) ⑨ AC output port ⑩ Cooling fan

LED indicator description

Category	Status	Meaning
LED 1	Blinking green at short intervals	waiting status
	Blinking green at long intervals	Self-check
	Steady green	normal status
LED 2	Steady yellow	Alarm
	Off	No alarm
LED 3	Blinking red at short intervals	Fault
	Off	faultless

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Function button description

Category	Description
	ESC button: Return from current interface or function.
	Down button: Move cursor to downside or decrease value
	Up button: Move cursor to upside or increase value.
	OK button: Confirm the selection.

3 Installation

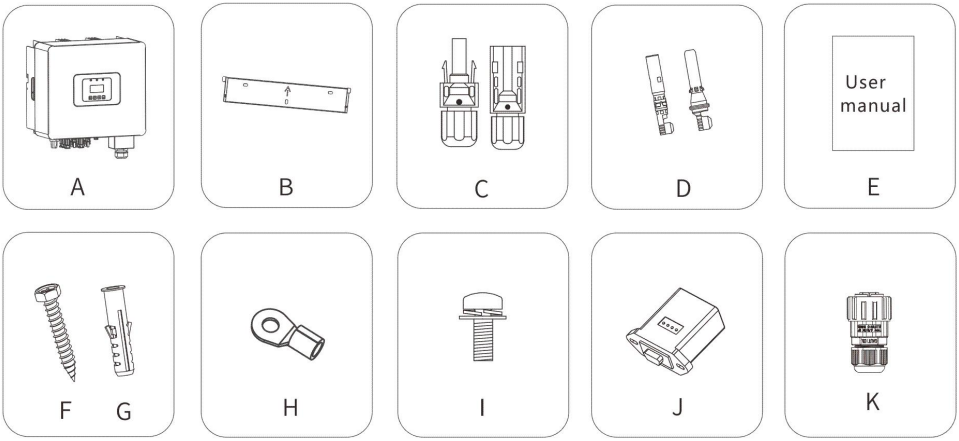
3.1 Visual Check

Make sure the inverter is intact during transportation. If there is any visible damage, such as cracks, please contact your dealer immediately.

3.2 Packing List

Open the package and take out the product, please check the accessories first.

The packing list shown as below.



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Object	Description	Quantity
A	Solar Inverter	1
B	Bracket	1
*C	PV connectors (4*positive,4*negative)	4/4
*D	PV pin connectors (4*positive, 4*negative)	4/4
E	User manual	1
F	Expansion tubes	3
G	Expansion screws	3
H	Ring terminal	6
I	Set screw(for mounting，external enclosure grounding)	2
J	Wifi module (optional)	1
K	RS485 connector (optional)	1

*C： 4-12K PV connectors (2*positive,2*negative);

13-17K PV connectors (3*positive,3*negative);

20-25K PV connectors (4*positive,4*negative);

27-30K PV connectors (5*positive,5*negative);

*D： 4-12K PV pin connectors (2*positive,2*negative);

13-17K PV pin connectors (3*positive,3*negative);

20-25K PV pin connectors (4*positive,4*negative);

27-30K PV pin connectors (5*positive,5*negative);

3.3 Mounting

Installation Precaution

4-30KW series inverter is designed for outdoor installation (IP 65).

Make sure the installation site meets the following conditions:

◆ Not in direct sunlight.

◆ Not in areas where highly flammable materials are stored.

◆ Not in potential explosive areas.

◆ Not in the cool air directly.

◆ Not in environment of precipitation or humidity (> 95%).

◆ Under good ventilation condition.

◆ The ambient temperature is between the range of -20℃ to +60℃.

◆ The wall hanging the inverter should meet conditions below:

1.Solid brick/concrete, or strength equivalent mounting surface;

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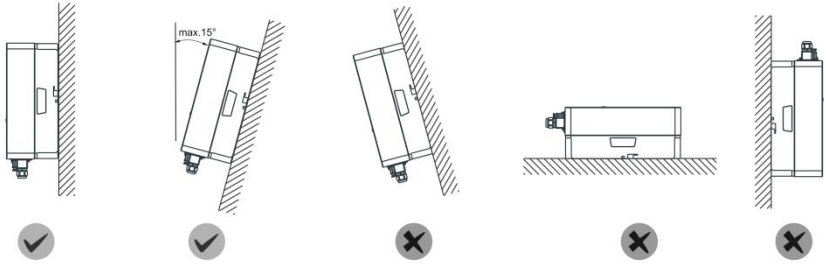
2.Inverter must be supported or strengthened if the wall's strength isn't enough(such as wooden wall, the wall covered by thick layer of decoration).

Please avoid direct sunlight, rain exposure, snow laying up during winter.

◆ The slope of the wall should be within 15°.



3.4 Space Requirement

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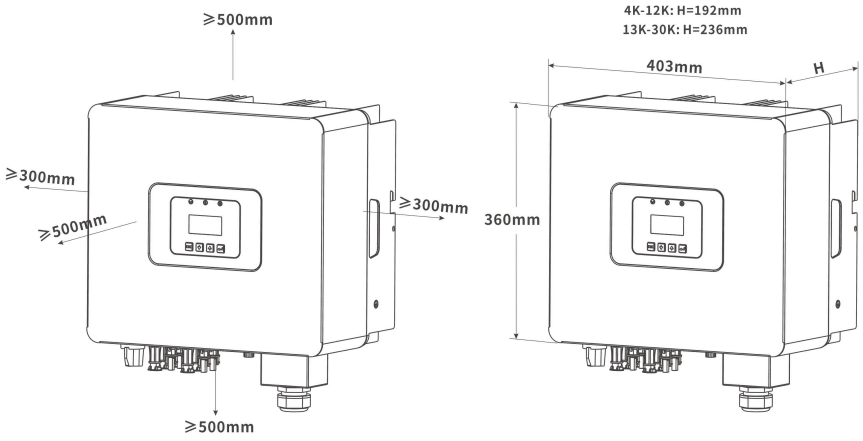


3.5 Mounting Steps

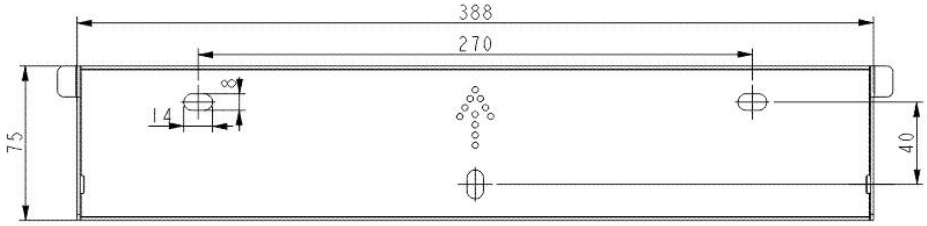
1.Use the wall bracket as a template to mark the position of 3 holes on the wall.

2.Drill holes with driller, make sure the holes are deep enough (at least 60mm) for installation, and then tighten the expansion tubes.

3. Install the expansion tubes in the holes, and tighten them. Then install the wall bracket by using the expansion screws.(Φ10 driller, torque: 2.5±0.2Nm)

4. Hang the inverter over the bracket, move the inverter close to it, slightly lay down the inverter, and make sure the 2 mounting bars on the back are fixed well with the 2 grooves on the bracket.

5.After confirming the inverter is fixed reliably, fasten two M5 safety-lock sockets head cap screws on the right or left side firmly to prevent the inverter from being lifted off the bracket (torque: 2.0±0.2Nm)



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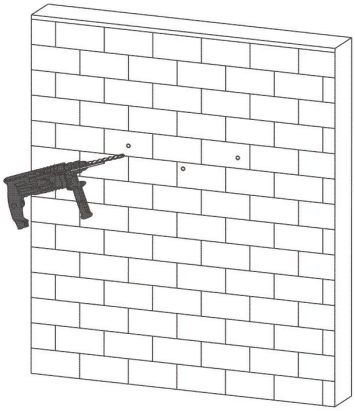

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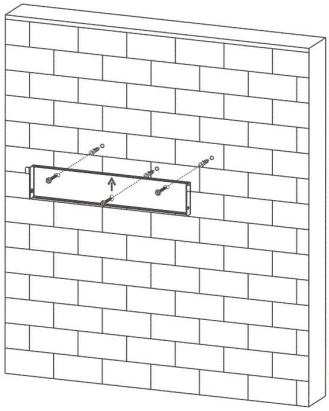

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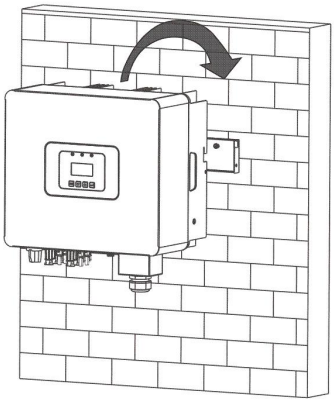

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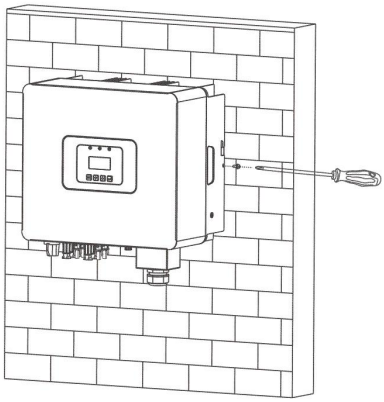

④

4 Electrical Connection

4.1Grid Connection

4-30KW series inverters are designed for three-phase grid. Voltage is 400V, frequency is 50/60Hz. Other technical requests should comply with the requirement of the local public grid. Micro-breaker should be installed between inverter and grid, any load should not be connected with inverter directly.

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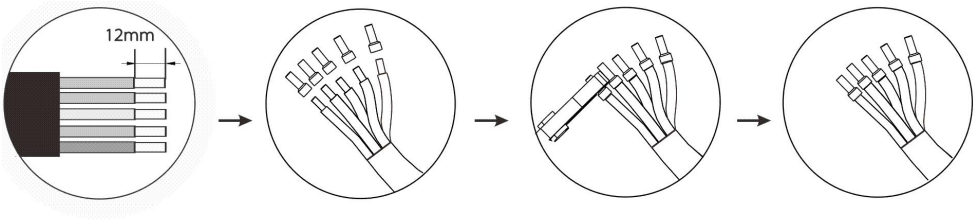
Table 3: Cable recommended

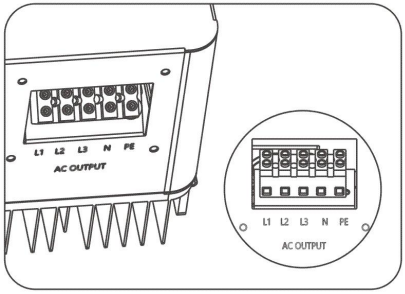
Model	Copper Cable	Conductor cross-section
4K-12K	Five-core cable（L/N/PE）	4mm²
13K-17K		6mm²
20K-22K		10mm²
25K-30K		16mm²

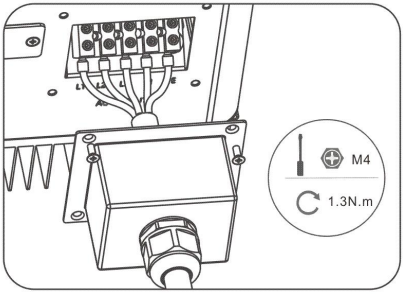
Connection Steps

1. Choose the appropriate wire(Cable size:please refer to Table3).
2. Remove 12mm of insulation from the end of wire.
3. Insert stripped wires into AC terminal and ensure that all conductor strands are captured in the AC terminal.
4. Compress the terminal head by using a crimping pliers .
5. Insert AC cable into port through screw cap and then tighten the screw cap.

4K-12K:







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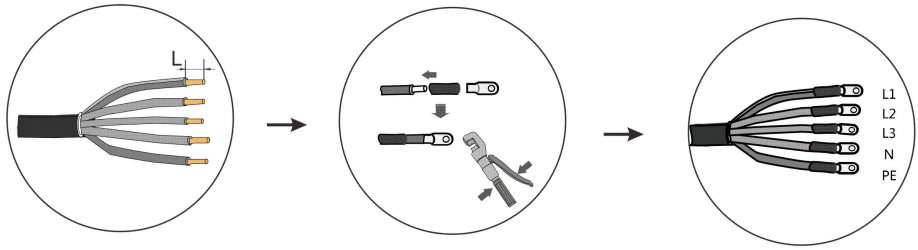
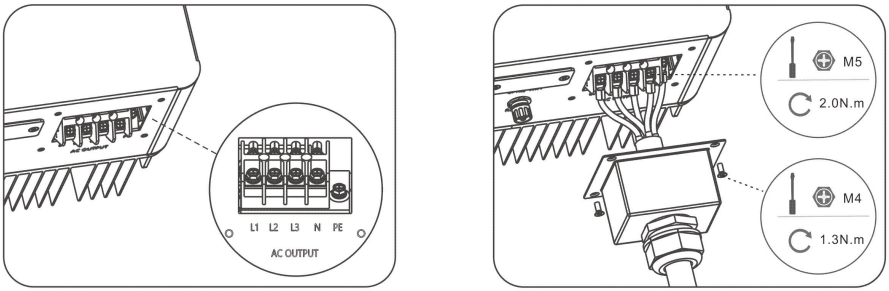
13W-30KW:





4.2 PV connection

◆ Conditions for DC Connection

The inverter has 2 independent input : PV1 & PV2 Notice that the connectors are in paired (male and female connectors). The connectors for PV arrays and inverters are H4 connectors;

DANGER	The solar modules connected to the inverter must conform to the Class A requirements of the IEC 61730 standard.
CAUTION	If the inverter is not equipped with a DC switch but this is mandatory in the country of installation, install an external DC switch.The following limit values at the DC input of the inverter must not be exceeded:

Model	Max current PV1	Max current PV2
4K-12K	13A	13A
13K-17K	26A	13A
20K-25K	26A	26A
27K-30K	39A	26A

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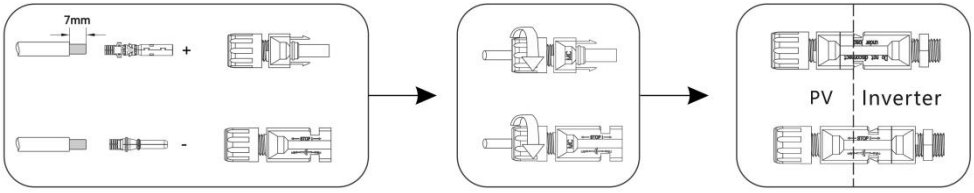
◆ Connecting the PV Array

DANGER	Danger to life due to lethal voltages! ◆ PV array supplies d.c voltage to inverter when exposed to light,before connecting the PV array, cover some light screens above PV arrays,ensure that the DC switch and AC breaker are disconnect from the inverter. NEVER connect or disconnect the DC connectors under load. ◆ Make sure the maximum open circuit voltage(Voc) of each PV string is less than the maximum input voltage of the inverter. ◆ Check the design of the PV plant. The Max. open circuit voltage, which can occur at solar panels temperature of -10℃, must not exceed the Max. input voltage of the inverter.
CAUTION	◆ Improper operation during the wiring process can cause fatal injury to operator or unrecoverable damage to the inverter. Only qualified personnel can perform the wiring work. ◆ Please don't connect PV array positive or negative pole to the ground, it can cause serious damages to the inverter ◆ Check the connection cables of the PV modules for correct polarity and make sure that the maximum input voltage of the inverter is not exceeded

Connection Steps:

1. Choose the 12 AWG wire to connect with the cold-pressed terminal.
2. Remove 7mm of insulation from the end of wire.
3. Insert the insulation into pin contact and use crimping plier to clamp it.
4. Insert pin contact through the cable nut to assemble into back of the male or female plug. When you feel or heard a "click" sound the pin contact assembly is seated correctly.
5. Plug the PV conntector into the corresponding PV connector on inverter.



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4.3 RS 485 Cable Connection (Optional)

◆ 485 is provided the function of remote control that allows external control device to make the inverters remote cluster control through 485 port on the inverter.

NOTICE	◆ When routing the signal cable, ensure that it is separate from the power cable and away from interfering sources to prevent communication from being affected. ◆ The protection layer of the cable is in the connector. Cut off surplus core wires from the protection layer. Ensure that the core wires are completely inserted into the cable holes, and that the cable is securely connected.

Connection Steps:

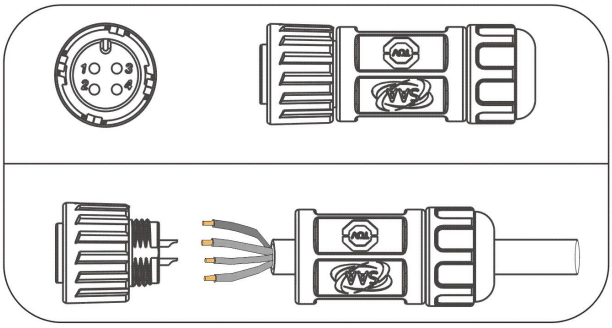
1.Uninstall the parts of the connection plug from the accessory bag.

2.Prepare communication cable,trip the insulation from the communication cable.

3.Let the communication cable pass though the waterproof connector , then insert it into the connector following the PIN definition rule.

4.Plug communication conntector into the corresponding conntector on inverter, the completed appearance is like the below figure.

NO.	
1	RS485+
2	RS485+
3	RS485-
4	RS485-



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4.4 Turn-off the Inverter

 CAUTION	Do not disconnect the DC connectors under load.

Turn-off the inverter step:

1.Disconnect the line circuit breaker from single-phases grid and prevent it from being reactivated.

2.Turn off the dc switch.

3.Check the inverter operating status.

4.Waiting until LED, OLED have go out, the inverter is shut down.

5 Powering On the System

 CAUTION	Before turning on the AC switch between the inverter and the power grid, use a multimeter set to the AC position to check that the AC voltage is within the specified range.

5.1 Start-Up the inverter

1.Turn on the DC switch at the bottom of the inverter.

2. If there is a DC switch between the PV string and the inverter, turn on the DC switch.

3. Turn on the AC switch between the inverter and the power grid.

4. Observe the LEDs to check the operating status of the inverter.

5.2 Time Setting for The First Run

6 LCD Screen Operation

The main interface is the default interface, the inverter will automatically jump to this interface when the system started up successfully or not operated for a period of time.

Menu interface

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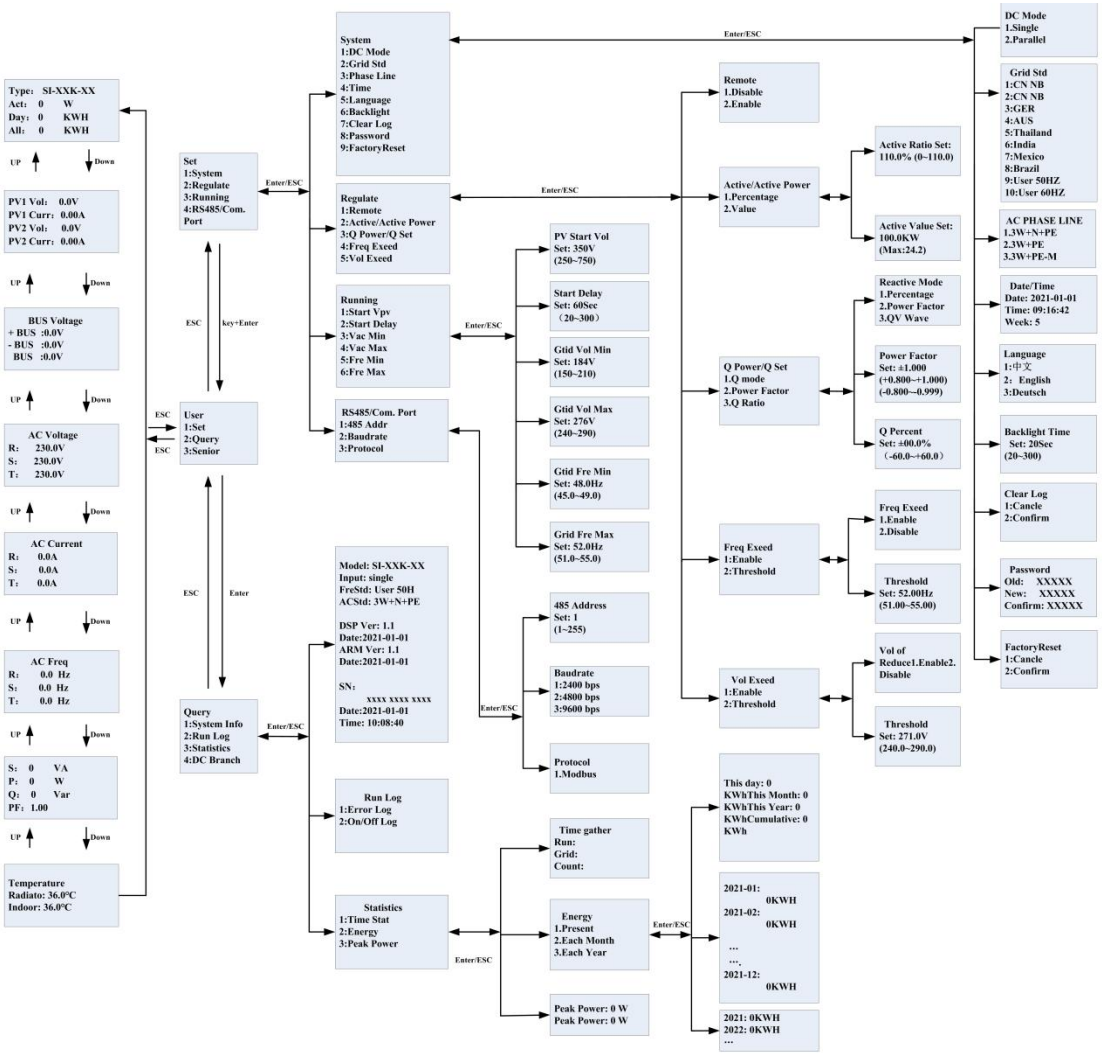

7 Maintenance and Cleaning

7.1 Maintain Periodically

1.Checking Heat Dissipation

If the inverter regularly reduces its output power due to high temperature, please improve the heat dissipation condition. Maybe you need to clean the heat sink.

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2. Cleaning the Inverter

If the inverter is dirty, turn-off the AC breaker and DC switch ,waiting the inverter shut down ,then clean the enclosure lid, the display, and the LEDs using only a wet cloth. Do not use any cleaning agents (e.g. solvents or abrasives)

3. Checking the DC switch

Check for externally visible damage and discoloration of the DC switch and the cables at regular intervals.If there is any visible damage to the DC switch, or visible discoloration or damage to the cables, contact the installer.

7.2 Trouble shooting

Our quality control program assures that every inverter is manufactured to accurate specifications and is thoroughly tested before leaving our factory. If you have difficulty in the operation of your inverter, please read through the following information to correct the problem.

<table>
<tr><th>Alarm ID</th><th>Alarm Name</th><th>Suggestion</th><th>Alarm ID</th><th>Alarm Name</th><th>Suggestion</th></tr>
<tr><td>E00</td><td>Grid Volt Low</td><td rowspan="3">Check the AC voltage range</td><td>E16</td><td>Remote Off</td><td>Check background instructions</td></tr>
<tr><td>E01</td><td>Grid Volt High</td><td>E18</td><td>SPI Error</td><td rowspan="6">Contact the manufacturer</td></tr>
<tr><td>E02</td><td>Grid Freq Low</td><td>E20</td><td>GFCI High</td></tr>
<tr><td>E03</td><td>Grid Freq High</td><td>E21</td><td>GFCI Chk Error</td></tr>
<tr><td>E04</td><td>Bus Volt Low</td><td rowspan="3">Please switch off DC switch. Restart the invert</td><td>E22</td><td>Vol Not Same</td></tr>
<tr><td>E05</td><td>Bus Volt High</td><td>E23</td><td>Curr Not Same</td></tr>
<tr><td>E06</td><td>Bus Imbalance</td><td>E26</td><td>Soft start erro</td></tr>
<tr><td>E07</td><td>ISO Low</td><td>Check PV impedance to ground</td><td>E27</td><td>PV Voltage High</td><td>Check the PV panel configuration</td></tr>
<tr><td>E08</td><td>DC Curr High</td><td>Check the PV panel configuration</td><td>E32</td><td>DSP Comm. Error</td><td>Please switch off DC switch. Restart the inverter</td></tr>
<tr><td>E09</td><td>Hw Invert High</td><td>Contact the manufacturer</td><td></td><td></td><td></td></tr>
</table>

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E10	Invert I High				
E11	Invert DCI High				
E12	Env T High				
E13	Radiator Heat				
E14	AC Contactor				
E15	PV Voltage Low	Check the PV panel configuration			

Alarm ID	Alarm Name	Suggestion	Alarm ID	Alarm Name	Suggestion
W16	Clock Warn	Replace the internal button pool	W05	Fan 1 Speed Low	Check the external fan
W03	Active 0 Warn	Normal shutdown at low power	W06	Fan2 Speed Low	
W04	Array Warn	Check the PV panel	W07	Fan 3 Speed Low	
W21	Arrester Warn	Check the lightning arresters	W08	Fan 4 Speed Low	

8 Decommissioning

8.1 Remove the Inverter

- ◆ Disconnect the inverter from DC Input and AC output.
- ◆ Wait for 5 minutes for de-energizing.
- ◆ Disconnect communication and optional connection wirings.
- ◆ Remove the inverter from the bracket.
- ◆ Remove the bracket if necessary.

8.2 Packaging

- ◆ Please pack the inverter with the original packaging.
- ◆ If the original package is no longer available, you can also use an equivalent carton that meets the following requirements.

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8.3 Storage and Transportation

◆ Store the inverter in a dry environment where ambient temperature keep always between -20 °C - +60 °C. Take care of the inverter during the storage and transportation,keep less than 4 cartons in one stack.

◆ When the inverter or other related components need to be disposed. Have it carried out according to local waste handling regulations. Please be sure to deliver wasted inverters and packing materials to certain site, where can assist relevant department to dispose and recycle.

9 Technical Parameters

Model	SI-4K-T2	SI-5K-T2	SI-6K-T2	SI-8K-T2	SI-10K-T2	SI-12K-T2
Input Data						
Max. DC input power	5.2KW	6.5KW	7.8KW	10.4KW	13KW	15.6KW
Max. DC input voltage	1100V					
Operation voltage range	200V-1000V					
Number of independent MPPT/strings per MPPT	2/1+1	2/1+1	2/1+1	2/1+1	2/1+1	2/1+1
MPPT max. current	14A/14A	14A/14A	14A/14A	14A/14A	14A/14A	14A/14A
AC Output Data						
Rated output power	4KW	5KW	6KW	8KW	10KW	13.2KW
Max. output power	4.4KW	5.5KW	6.6KW	8.8KW	11KW	13.2KW
Rated output voltage	400V ±20%					
Rated output frequency	50 /60 Hz± 5 Hz					
Rated output current	5.7A	7.2A	8.7A	11.6A	14.5A	17.5A
Max. output current	6.5A	8A	10A	13A	16A	19A
Power factor	+-0.8					
THDi	<3%					

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Grid system pattern	3W+N+PE	
Efficiency		
Max. efficiency	98.8%	
Europe efficiency	98%	
General Data		
Dimensions (W/L/H) in mm	403/360/192	
Weight	<14kg	<15kg
Operation temperature range	–25 °C ... +60 °C	
Noise	≤30dB	
Heat dissipation mode	Natural	
IP Class	IP65	
Features		
LCD display	yes	
Communication interface	WiFi/GPRS/RS485	

Model	**SI-13K-T2**	**SI-15K-T2**	**SI-17K-T2**	**SI-20K-T2**
Input Data				
Max. DC input power	17KW	19.5KW	22KW	26KW
Max. DC input voltage	1100V			
Operationvoltage range	250V-1000V			
Number of independent MPPT/strings per MPPT	2/1+2	2/1+2	2/1+2	2/2+2
MPPT max. current	14A/28A	18A/28A	18A/28A	14A/28A

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AC Output Data				
Rated output power	13KW	15KW	17KW	20KW
Max. output power	14.3KW	16.5KW	18.7KW	22KW
Rated output voltage	400V ±20%			
Rated output frequency	50 /60 Hz± 5 Hz			
Rated output current	19A	22A	25A	29A
Max. output current	21A	24A	27A	32A
Power factor	+-0.8			
THDi	<3%			
Grid system pattern	3W+N+PE			
Efficiency				
Max. efficiency	98.8%			
Europe efficiency	98.2%			
General Data				
Dimensions (W/L/H) in mm	403/360/236			
Weight	<18.5kg			
Operation temperature range	–25 °C ... +60 °C			
Noise	≤55dB			
Heat dissipation mode	Smart cooling			
IP Class	IP65			
Features				
LCD display	yes			
Communication interface	WiFi/GPRS/RS485			

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Model	SI-22K-T2	SI-25K-T2	SI-27K-T2	SI-30K-T2
Input Data				
Max. DC input power	28.6KW	32.5KW	28.6KW	32.5KW
Max. DC input voltage	1100V			
Operation voltage range	250V-1000V			
Number of independent MPPT/strings per MPPT	2/2+2	2/2+2	2/3+2	2/3+2
MPPT max. current	28A/28A	28A/28A	42A/28A	42A/28A
AC Output Data				
Rated output power	22KW	25KW	27KW	30KW
Max. output power	24KW	27.5KW	29.7KW	33KW
Rated output voltage	400V ±20%			
Rated output frequency	50 /60 Hz± 5 Hz			
Rated output current	32A	36A	40A	43.5A
Max. output current	35A	40A	43A	48A
Power factor	+-0.8			
THDi	<3%			
Grid system pattern	3W+N+PE			
Efficiency				
Max. efficiency	98.8%			
Europe efficiency	98.2%			
General Data				
Dimensions (W/L/H) in mm	403/360/236			
Weight	<21kg		<22kg	
Operation temperature	–25 °C ... +60 °C			

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range	
Noise	≤55dB
Heat dissipation mode	Smart cooling
IP Class	IP65
Features	
LCD display	yes
Communication interface	WiFi/GPRS/RS485

10 Manufacturer's Warranty

Please refer to the warranty card.

11 Contact

If you have technical problems concerning our products, please contact your installer or manufacturer. During inquiring, please provide below information:

1. Inverter model
2. Module information
3. Communication method
4. Serial number of Inverters
5. Error code of Inverters
6. Display of inverter LCD

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