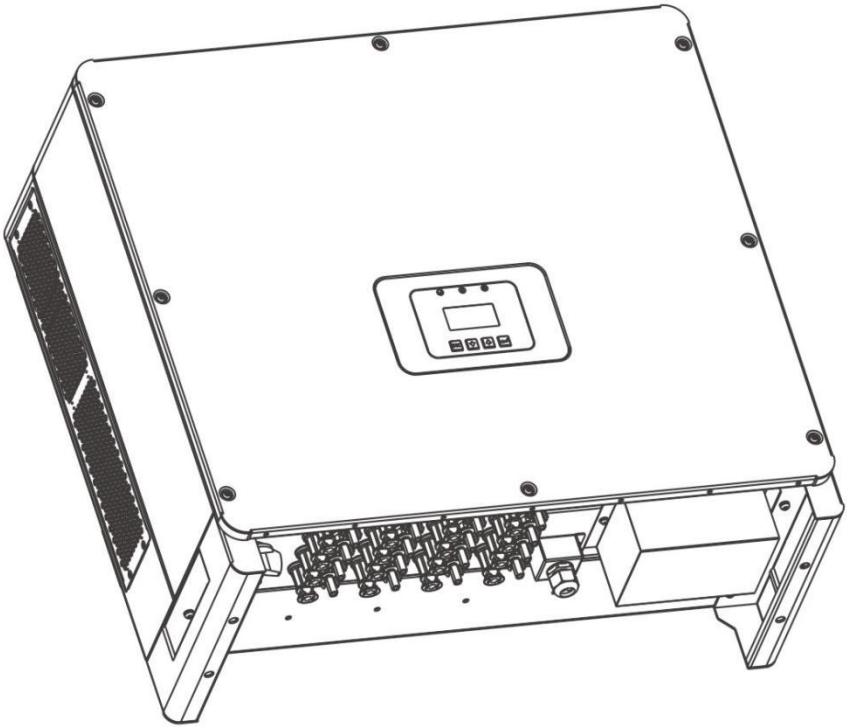
User Manual

SI 50K, SI 60K, SI 70K, SI 80K



INHENERGY CO., LTD.

CONTENTS

1 Notes on this manual

1.1 Validity

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

SI 50K

SI 60K

SI 70K

SI 80K

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.

Additional information

Find further information on special topics in the download area 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 Symbols in this document

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.
	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.

Markings on this product

Symbol	Explanation
	Caution，risk of electric shock
	Caution，hot surface
	Operation after 5 minutes
	Read the manual
	Point of connection for grounding protection
	CE mark. The inverter complies with the requirements of the applicable CE guidelines.
	The inverter must not be disposed of with the household waste.

2 Overview

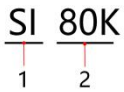
2.1 Product Introduction

Function

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

Models

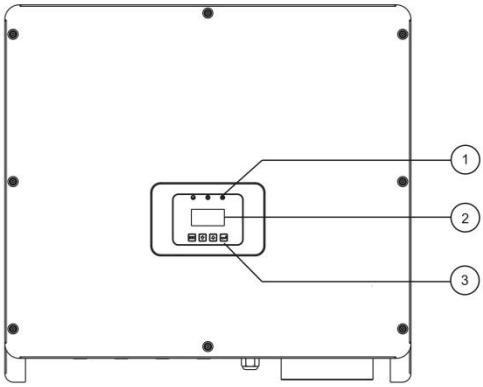
This document involves the following product models:
SI 50K,SI 60,SI 70K,SI 80K;
Model description (,SI 80K is used as an example)

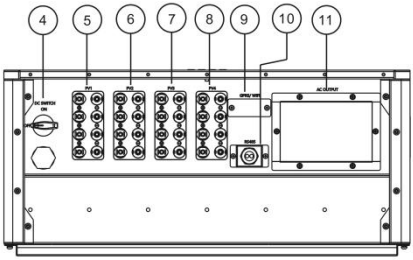


Model description

Icon	Meaning	Description
1	Product	the grid-tied PV string inverter
2	Power level	50K ： The rated power is 50 kW. 60K ： The rated power is 60 kW. 70K ： The rated power is 70 kW. 80K ： The rated power is 70 kW.

2.2 Appearance





1.LED indicator 2. LCD display 3. Function button 4. DC switch
5.DC input terminals (PV1) 6. DC input terminals (PV2) 7. DC input terminals (PV3)
8. DC input terminals (PV4) 9. GPRS/WIFI output port 10.Communication port (RS485)
11. AC output port

LED indicator description

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

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

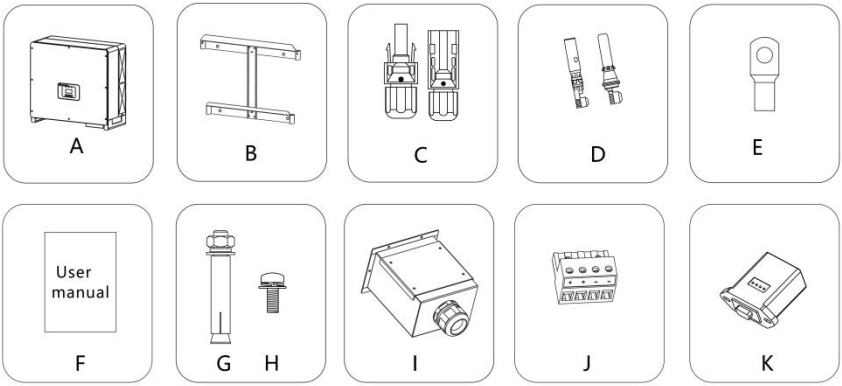
3.1 Check for Physical Damage

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.



Object	Description	Quantity
A	Inverter	1
B	Bracket	1
*C	PV connectors (16*positive,16*negative)	16/16
*D	PV pin connectors (16*positive, 16*negative)	16/16
E	Ring terminal	6
F	User manual	1
G	Expansion screws	5
H	Set screw(for mounting，external enclosure grounding)	3
I	Cable gland for AC connection	1
J	RS485 terminal (optional)	1
K	Wifi module (optional)	1

*C : SI 50K PV connectors (9*positive,9*negative);

SI 60K /70K PV connectors (12*positive,12*negative);

SI 80K PV connectors (16*positive,16*negative);

*D: SI 50K PV pin connectors (5*positive,5*negative);

SI 60K /70K PV pin connectors (12*positive,12*negative);

SI80K PV connectors (16*positive,16*negative);

3.3 Mounting

Installation Precaution

SI 80K series inverter is designed for outdoor installation (IP 65).

Make sure the installation site meets the following conditions:

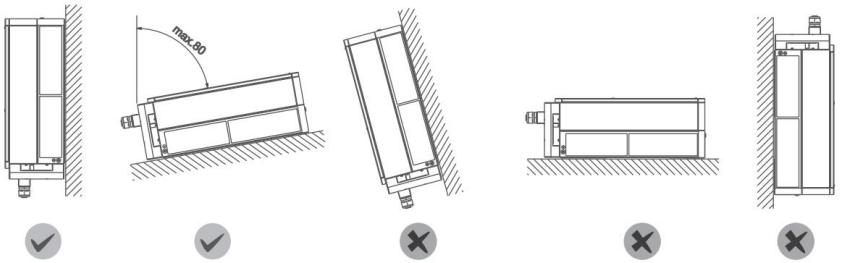
- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not in environment of precipitation or humidity (＞95%).
- Under good ventilation condition.
- The ambient temperature in the range of -20℃ to +60℃.
- The wall hanging the inverter should meet conditions below:

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

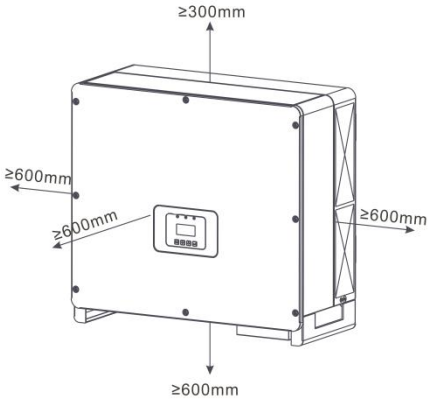
2.Inverter must be supported or strengthened if the wall’s strength isn’t enough(such as wooden wall, the wall covered by thick layer of decoration).

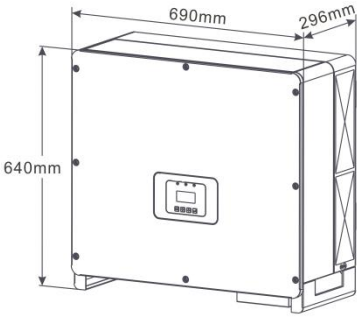
Please avoide direct sunlight, rain exposure, snow laying up during.

- The slope of the wall should be within 80°.



3.4 Space Requirement





3.5 Mounting Steps

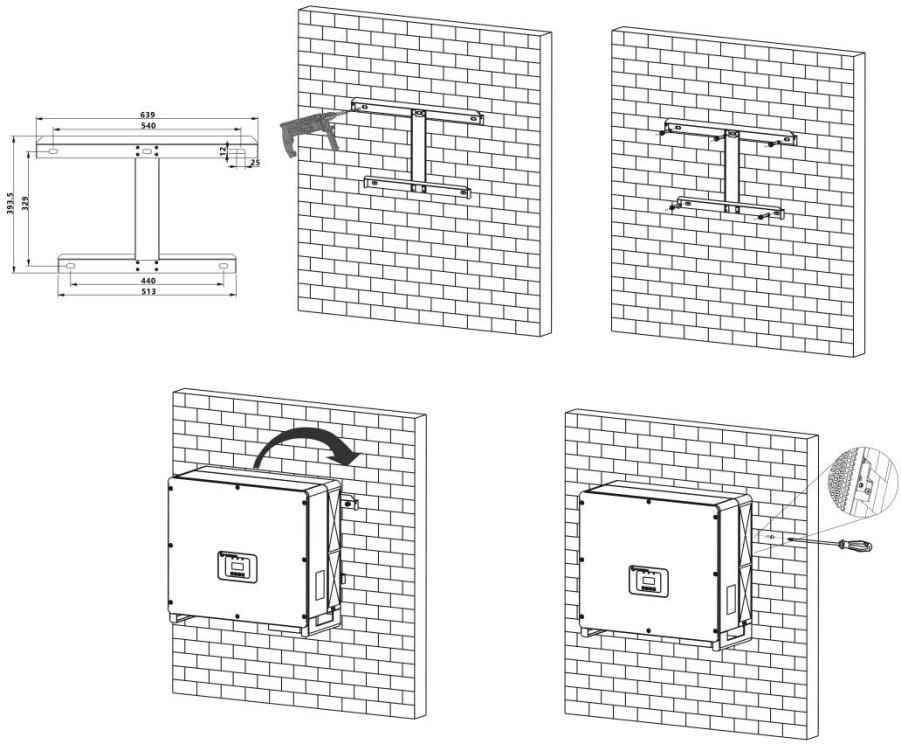
1.Use the wall bracket as a template to mark the position of the 5holes on the wall.

2.Drill holes with driller, make sure the holes are deep enough (at least 75mm) 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 4 mounting bars on the back are fixed well with the 4 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)



4 Electrical Connection

4.1Grid Connection

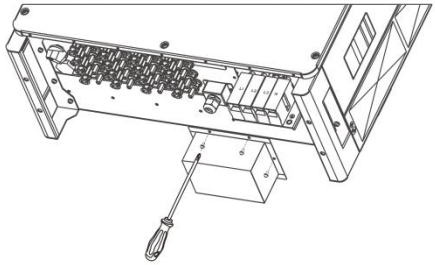
SI 80K series inverter are designed for three-phase grid. Voltage is 400V, frequency is 50/60Hz. Other technical requests should comply with the requirement of the local public grid.Micro-breaker should be installed between inverter and grid, any load should not be connected with inverter directly.

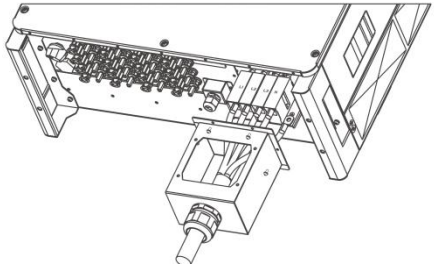
Table 3 Cable recommended

Model	Copper Cable	Conductor crosssection
SI 50K/SI 60K	Five-core cable (L/N/PE)	2 AWG
SI 70K/SI 80K	Five-core cable (L/N/PE)	1 AWG

Connection Steps

1. Choose the appropriate wire(Cable size: refer to Table3).
2.Remove 10mm 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.Compress the terminal head by using a crimping pliers .
4. Remove the protection shell onto the bottom of the inverter
5.Insert AC cable into port through screw cap and then tighten the screw cap.
6.Fasten the protection shell onto the bottom of the inverter, make sure the four screws aretightened





4.2 PV connection

- Conditions for DC Connection

The inverter has 4 independent input : PV1\PV2\ PV3\PV4. Notice that the connectors are in paired (male and female connectors). The connectors for PV arrays and inverters are H4 connectors;

<table>
<tr><td> 
DANGER</td><td colspan="5">The solar modules connected to the inverter must conform to the Class A requirements of the IEC 61730 standard.</td></tr>
<tr><td rowspan="2"> 
CAUTION</td><td colspan="5">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:</td></tr>
<tr><td>Model</td><td>Max current PV1</td><td>Max current PV2</td><td>Max current PV3</td><td>Max current PV4</td></tr>
</table>

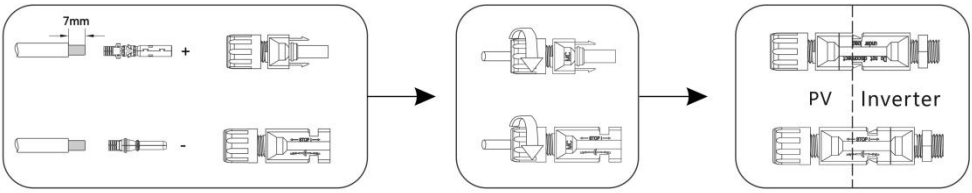
	SI 50K	33A	33A	33A	/
	SI 60K	44A	44A	44A	/
	SI 70K	33A	33A	33A	33A
	SI 80K	44A	44A	44A	44A

◆ Connecting the PV Array

	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.
	◆ 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 couldcause 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.



4.3 485 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.

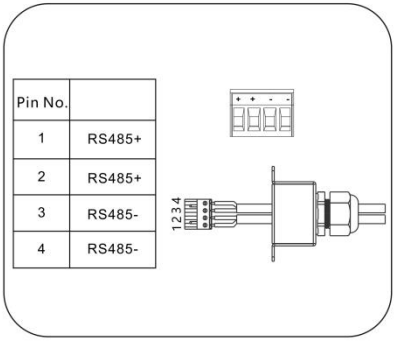
Connection Steps:

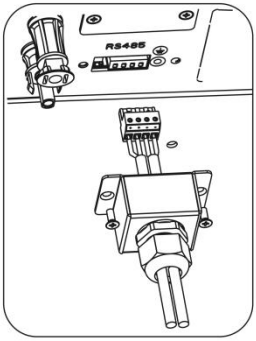
1.Uninstall the parts of the connection plug from the accessory bag.

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.Fasten the protection shell onto the bottom of the inverter, make sure the four screws are tightened, the completed appearance is like the below figure.





4.4 Turn-off the Inverter

	Do not disconnect the DC connectors under load.

Turn-off the inverter step:

1.Disconect 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

	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 AC switch between the inverter and the power grid.

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

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

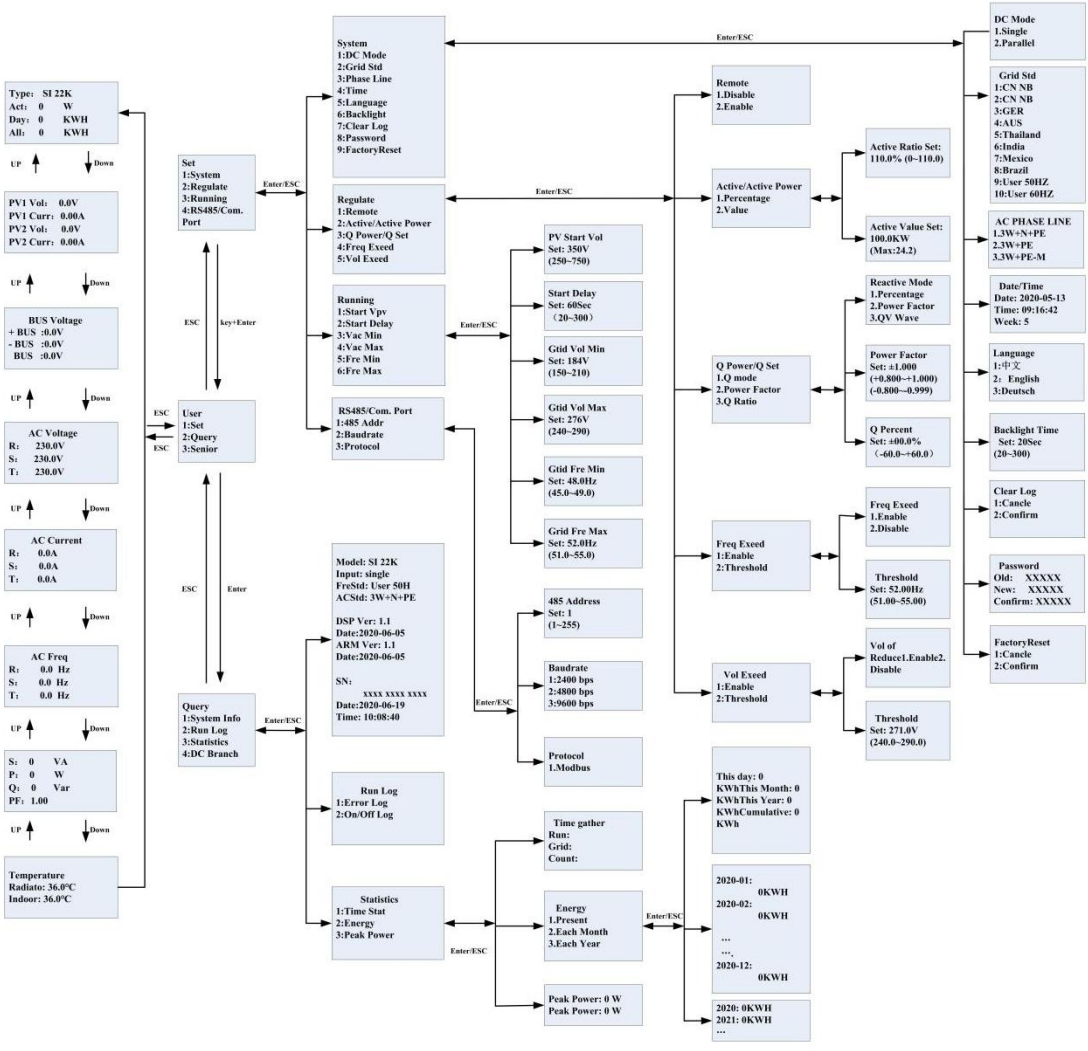
4. Observe the LEDs to check the operating status of the inverter.

5.2 First run time setting

6 LCD 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


Type: SI 22K
Act: 0 W
Day: 0 KWH
All: 0 KWH
UP
Down
PV1 Vol: 0.0V
PV1 Curr: 0.00A
PV2 Vol: 0.0V
PV2 Curr: 0.00A
BUS Voltage
+ BUS :0.0V
- BUS :0.0V
BUS :0.0V
AC Voltage
R: 230.0V
S: 230.0V
T: 230.0V
AC Current
R: 0.0A
S: 0.0A
T: 0.0A
AC Freq
R: 0.0 Hz
S: 0.0 Hz
T: 0.0 Hz
S: 0 VA
P: 0 W
Q: 0 Var
PF: 1.00
Temperature
Radiato: 36.0℃
Indoor: 36.0℃
ESC
key+Enter
Enter
Enter/ESC
Set
1:System
2:Regulate
3:Running
4:RS485/Com. Port
User
1:Set
2:Query
3:Senior
Query
1:System Info
2:Run Log
3:Statistics
4:DC Branch
System
1:DC Mode
2:Grid Std
3:Phase Line
4:Time
5:Language
6:Backlight
7:Clear Log
8:Password
9:FactoryReset
Regulate
1:Remote
2:Active/Active Power
3:Q Power/Q Set
4:Freq Exeed
5:Vol Exeed
Running
1:Start Vpv
2:Start Delay
3:Vac Min
4:Vac Max
5:Fre Min
6:Fre Max
RS485/Com. Port
1:485 Addr
2:Baudrate
3:Protocol
Model: SI 22K
Input: single
FreStd: User 50H
ACStd: 3W+N+PE
DSP Ver: 1.1
Date:2020-06-05
ARM Ver: 1.1
Date:2020-06-05
SN:
XXXX XXXX XXXX
Date:2020-06-19
Time: 10:08:40
Run Log
1:Error Log
2:On/Off Log
Statistics
1:Time Stat
2:Energy
3:Peak Power
PV Start Vol
Set: 350V
(250~750)
Start Delay
Set: 60Sec
（20~300）
Gtid Vol Min
Set: 184V
(150~210)
Gtid Vol Max
Set: 276V
(240~290)
Gtid Fre Min
Set: 48.0Hz
(45.0~49.0)
Grid Fre Max
Set: 52.0Hz
(51.0~55.0)
485 Address
Set: 1
(1~255)
Baudrate
1:2400 bps
2:4800 bps
3:9600 bps
Protocol
1.Modbus
Time gather
Run:
Grid:
Count:
Energy
1.Present
2.Each Month
3.Each Year
Peak Power: 0 W
Peak Power: 0 W
Remote
1.Disable
2.Enable
Active/Active Power
1.Percentage
2.Value
Q Power/Q Set
1.Q mode
2.Power Factor
3.Q Ratio
Freq Exeed
1:Enable
2:Threshold
Vol Exeed
1:Enable
2:Threshold
Active Ratio Set:
110.0% (0~110.0)
Active Value Set:
100.0KW
(Max:24.2)
Reactive Mode
1.Percentage
2.Power Factor
3.QV Wave
Power Factor
Set: ±1.000
(+0.800~+1.000)
(-0.800~-0.999)
Q Percent
Set: ±00.0%
（-60.0~+60.0）
Freq Exeed
1.Enable
2.Disable
Threshold
Set: 52.00Hz
(51.00~55.00)
Vol of
Reduce1.Enable2.
Disable
Threshold
Set: 271.0V
(240.0~290.0)
This day: 0
KWhThis Month: 0
KWhThis Year: 0
KWhCumulative: 0
KWh
2020-01:
0KWH
2020-02:
0KWH
...
...
2020-12:
0KWH
2020: 0KWH
2021: 0KWH
...
DC Mode
1.Single
2.Parallel
Grid Std
1:CN NB
2:CN NB
3:GER
4:AUS
5:Thailand
6:India
7:Mexico
8:Brazil
9:User 50HZ
10:User 60HZ
AC PHASE LINE
1.3W+N+PE
2.3W+PE
3.3W+PE-M
Date/Time
Date: 2020-05-13
Time: 09:16:42
Week: 5
Language
1:中文
2: English
3:Deutsch
Backlight Time
Set: 20Sec
(20~300)
Clear Log
1:Cancle
2:Confirm
Password
Old: XXXXX
New: XXXXX
Confirm: XXXXX
FactoryReset
1:Cancle
2:Confirm

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.

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>
</table>

E07	ISO Low	Check PV impedance to ground	E27	PV Voltage High	Check the PV panel configuration
E08	DC Curr High	Check the PV panel configuration	E32	DSP Comm. Error	Please switch off DC switch. Restart the invert
E09	Hw Invert High	Contact the manufacturer			
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.

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 Data

Model	SI 50K	SI 60K	SI 70K	SI 80K
Input Data				
Max. DC input power	60KW	75KW	85KW	100KW
Max. DC input voltage	1100V			
Operation voltage range	200V-1000V			
Number of independent MPPT/strings per MPPT	3/3	3/4	4/3	4/4
MPPT max. current	33A*3	44A*3	33A*4	44A*4

AC Output Data				
Rated output power	50KW	60KW	70KW	80KW
Max. output power	55KW	66KW	77KW	88KW
Rated output voltage	400V ±20%			
Rated output frequency	50 /60 Hz± 5 Hz			
Rated output current	72A	87A	101A	115A
Max. output current	80A	95A	111A	128A
Power factor	+-0.8			
THDi	<3%			
Grid system pattern	3W+N+PE			
Efficiency				
Max. efficiency	99%			
Europe efficiency	98.5%			
General Data				
Dimensions (W/L/H) in mm	690/640/296		690/640/296	
Weight	≤60kg		≤68kg	
Operation temperature range	–25 °C ... +60 °C			
Noise	≤60dB			
Heat dissipation mode	Smart cooling			
IP Class	IP65			
Features				
LCD display	yes			
Communication interface	WiFi/GPRS/RS485			

10 Manufacturer Warranty

Please refer to the warranty card

11 Contact

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

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

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