SG50K3

PV Grid-Connected Inverter

User Manual

SG50K3-UEN-Ver31-201012 Version:3.1

About This Manual

Thank you for purchasing the SG50K3 from Sungrow Power Supply Co., Ltd.. We hope that the device will meet with your satisfaction when you use it with your PV plant system.

Aim

The purpose of this manual is to provide users with detailed product information and instructions for the use of the SG50K3 PV grid-connected inverter.

Target Readers

The manual is provided to people who need to install and operate the SG50K3 grid connected inverter.

How to Use this Manual

Read this manual and the other documents, before installation and operation on the SG50K3.

The document must be stored carefully and available at all times.

The contents of this manual will be periodically updated or revised if necessary. However discrepancies cannot be excluded. Please make the object as the standard or download the latest version of this manual via www.sungrowpower.com.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

Symbols Explanation

Please note the following explanation of the symbols used in this manual.

⚠ DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ NOTICE

NOTICE indicates a situation which, if not avoided, could result in equipment abnormal or property damage.

NOTE

NOTE indicates additional information, emphasized contents or tips to help you solve problems or save time.

Contents

1 Safety Instructions

About This Chapter

This chapter provides some important safety instructions about SG50K3.

Pay attention to the following safety instructions:

⚠DANGER

Shock Hazard!

Death results from burning and electric shock upon touching the SG50K3 live components.

- **Do not touch the live components of the SG50K3.**
- **Observe all safety regulations.**

⚠DANGER

Shock Hazard!

The enclosure of SG50K3 inverter may contain high voltage conductors. The enclosure doors should be kept locked during operation, except for maintenance or testing.

To avoid the risk of electric shock, do not perform any action or operation which is not included in the operating instructions unless you are qualified to do so.

⚠DANGER

Shock Hazard!

The SG50K3 Inverter will immediately shutdown if users want to open the front door during operation.

Please check the unit is thoroughly shut down and isolated from the public grid and PV arrays before open the front door.

To avoid the risk of electric shock, a minimum 5 minutes is needed for any stored potentials that still left in the inverter after shut-down to be discharged before opening the door.

⚠ DANGER

Lethal Voltage!

Damage to the SG50K3 may result death by electric shock or fire!

- **Only operate SG50K3 when it is safe to do so!**
- **Only operate SG50K3 when no damage is visibly apparent!**

⚠ DANGER

DC Voltage!

The PV array will provide DC voltage to the inverter when exposed to light, which may cause an electrical shock during installation, wiring or maintenance if not covered.

⚠ WARNING

Limitation of Use!

The SG50K3 Grid-Connect Photovoltaic Inverter is not intended for use in connection with life support systems or other medical equipment or devices.

⚠ CAUTION

ESD Protection!

The SG50K3 may be damaged irreversibly by electrostatic discharge (ESD) at its components.

- **During the operation of SG50K3, please observe all the ESD related safety regulations!**
- **Discharge any ESD by touching the grounded SG50K3 conductor before contacting any electronic components!**

CAUTION

Service Safety!

Thoroughly inspect the equipment prior to energizing. Verify that no tools or equipment have inadvertently been left behind.

CAUTION

Never work alone when servicing this equipment. Two persons are required until the equipment is properly de-energized, locked out and verified de-energized with a meter.

NOTE

Please keep this installation manual and other related document in the handy place of the SG50K3.

These documents must be available to operators and maintenance personnel at all times.

2 Introduction

About This Chapter

This chapter provides basic information about SG50K3.

2.1 Grid-Connected PV Inverter

A SG50K3 grid-connected PV system is shown in Fig 2-1. SG50K3 transforms the direct current generated by the PV array into stable alternating current and output to the utility grid.

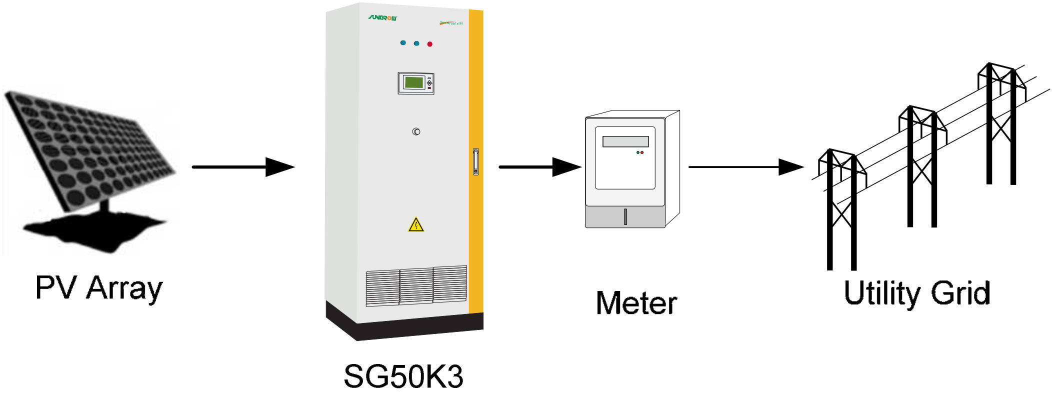


Fig 2-1 Grid-connected Inverter for PV power application

Table 2-1 System Devices Type

Device	Type
PV Arrays	Monocrystalline Silicon, Polycrystalline Silicon, Amorphous Silicon, Thin Film Cells
Utility Grid	TT, TN-C, TN-S, TN-C-S, IT
Optional Devices	SunInfo EM Environment Monitoring Device SunBox PVS PV Array Combiner Box SunBox PMD-D DC Power Distribution Cabinet SunBox PMD-A AC Power Distribution Cabinet SunInfo Logger Inverter Data Acquisition and Transmission Device

2.2 Circuit Description

Fig 2-2 shows the main circuit of SG50K3 -a transformer grid-connected inverter. An IGBT full-bridge converts the DC power to AC voltage and current. The AC power is then fed to the grid after being processed by a filter and a transformer.

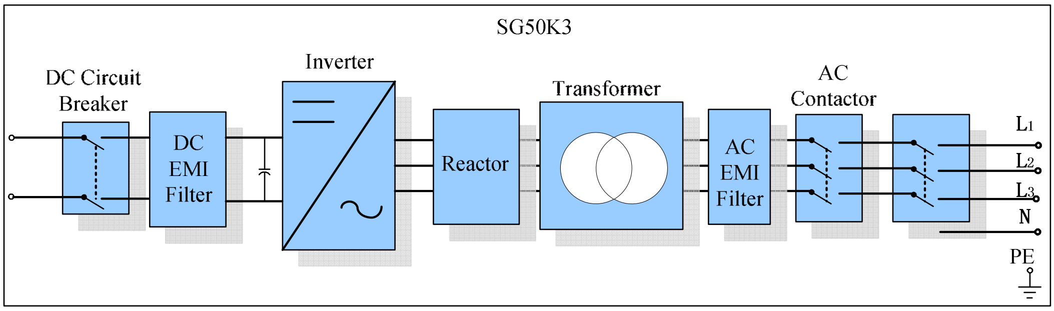


Fig 2-2 circuit diagram of SG50K3

2.3 Scope of Delivery

The following materials in Table 2-2 should including in the crate.

Table 2-2 Scope of Delivery

No.	Name	Note
1	SG50K3 PV Grid-Connected Inverter	Including keys
2	SG50K3 User Manual	-
3	Warranty Card	-
4	Certificate of Quality	-
5	Product Test Report	-

2.4 The Wiring Interface

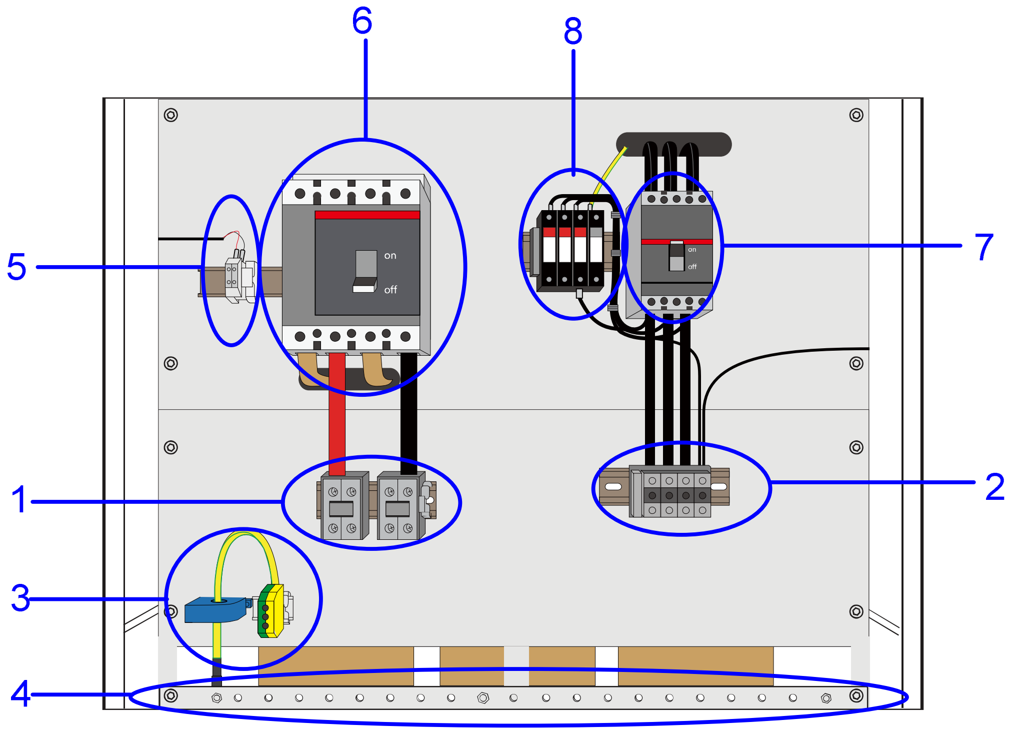


Fig 2-3 The wiring interface of SG50K3

Table 2-3 Terminal descriptions

Terminal No.	Description
1	DC INPUT: Connected to the PV array
2	AC OUTPUT: L1,L2,L3,and N
3	Ground Terminal: Leaking current detector
4	GND: ground copper bar
5	RS485 A/B serial communication port
6	DC Circuit Breaker
7	AC Circuit Breaker
8	Lightning Protector

3

Operation Description

About This Chapter

SG50K3 inverter is a fully automated grid-connected solar inverter with friendly user interface. This chapter provides instructions about how to operate the SG50K3.

3.1 Operation Modes

The modes displayed in the LCD interface include: “**Start-up**”, “**Stand-by**”, “**Run**”, “**Fault**” and “**Stop**”. Their explanations are given below.

- **Start-up**

  Once the AC and DC connections are OK, all the parameters meet requirements, the AC and DC breaks are closed, The inverter will auto start.

  If the input voltage is below the start voltage **470V**, the inverter keeps in “**Start-up**” state.

  If the input voltage exceeds **470V**, and holds the value for **5 minute**, the inverter is ready for operation; it begins feeding power to the grid and the state changes from “**Startup**” to “**Run**”.

- **Stand-by**

  Standby-mode is entered for insufficient input power (Ppv≈0 for 1 minute), at stand-by mode the inverter will wait until the DC voltage recovers to 470V for 3 minutes.

- **Run**

  After being energized, the inverter tracks the PV arrays’ maximum power point (MPP) and converts the DC power to AC power.

- **Fault**

  If a fault occurs during operation, the SG50K3 will automatically stop operation, disconnect the AC contactor and the display the fault type in the LCD panel with the “Fault” LED burns.

  Once the fault is removed for 5 minutes, the SG50K3 will automatically resume running.

- **Stop**

  The SG50K3 will stop operation by manually stopping the inverter through LCD menu or pressing down the “Emergency Stop Button”, this condition needs manual restart through LCD menu.

  During the “Stop” mode, the SG50K3 will block the driving signals that control the switching IGBT and disconnect the SG50K3 from the grid by switching off the AC contactor.

3.2 Modes Transition

When energized, the inverter switches states from different modes as pictured below. When deactivated, the inverter return to the operating mode “**Stop**”.

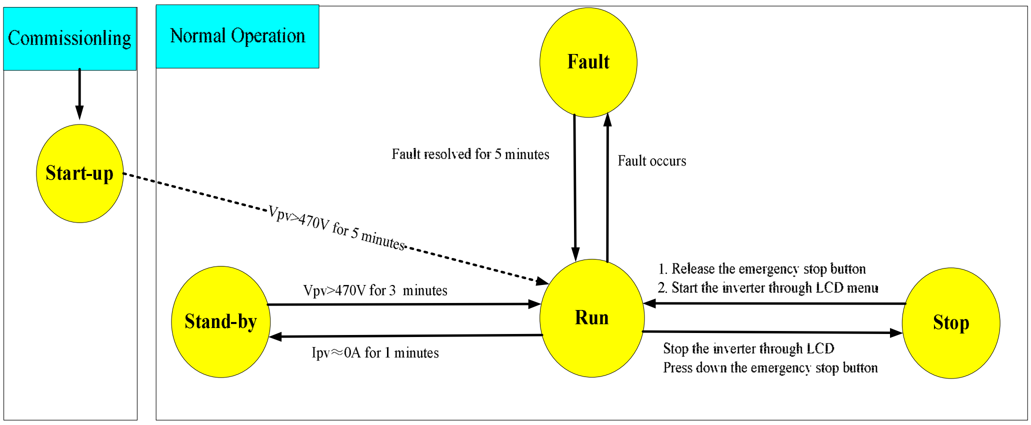

Commissionling
Normal Operation
Fault
Start-up
Fault resolved for 5 minutes
Fault occurs
Vpv>470V for 5 minutes
1. Release the emergency stop button
2. Start the inverter through LCD menu
Stand-by
Vpv>470V for 3 minutes
Run
Stop
Ipv≈0A for 1 minutes
Stop the inverter through LCD
Press down the emergency stop button

Fig 3-1 Transition of operation states

*VPV is the DC input voltage; Ppv is the DC input power

The states displayed in the LCD menu are explained in the table below.

Table 3-1 State explanations of inverter

Possible displayed State	Explanation
RUN	The inverter is in operation and output power to the grid
STOP	The operation is stopped by stop command
Start-up	The inverter is under activation
Stand-by	The operation is ceased by insufficient PV power
*Fault type	A fault is occurred and not solved

The characters “Fault type” itself will not be displayed during a fault condition, but the real fault type will be displayed like “**Vdc-high**” or “**Vac-low**” etc.

The “**Com-flt**” shows that there is a fault between LCD and DSP, which also means that users cannot check or set parameters through LCD control menu during this fault. But this fault will not stop the inverter, which is different from Fault condition.

3.3 Emergency Stop Button

The Emergency stop button will shutdown the inverter (disconnect the AC contactor) immediately when it is punched (pressed down).

The inverter must be started up manually through LCD control menu if users want to recover the operation after the button is punched.

How to Restart the Inverter after Using the Emergency Stop Button:

Users must manually restart the inverter according to the following procedure when the operation of the SG50K3 is stopped by punching the emergency stop button:

1. **Turn the emergency stop button clockwise** to release the inverter from the stop state.
2. Perform the **stop command** in the LCD menu.
3. Perform the **start command** in the LCD menu.
4. Then the inverter will restart.

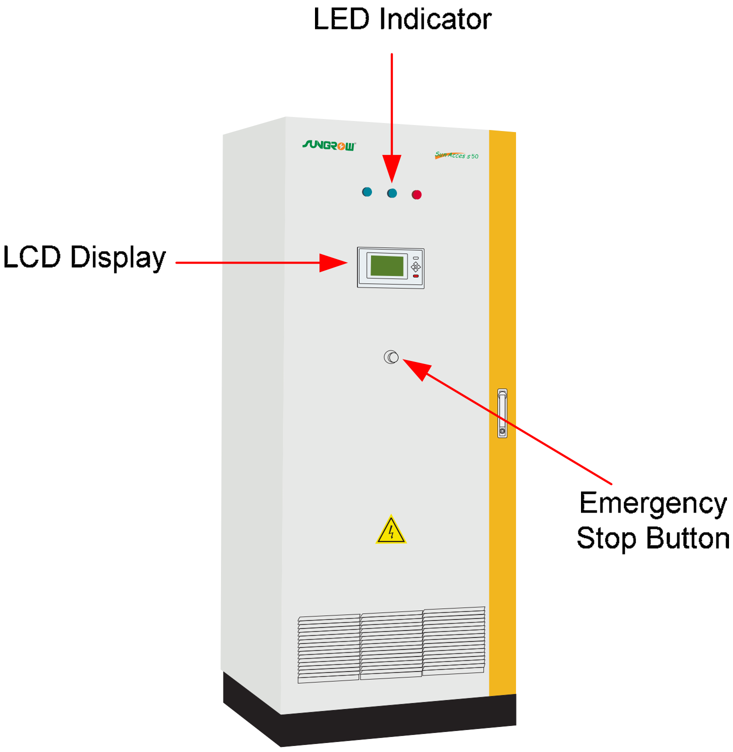


Fig 3-2 Emergency stop button

4 Monitoring and Data Interface

About This Chapter

This chapter provides instructions about monitoring and data Interface of the SG50K3.

4.1 Basic Communications

To enable our customers to gain a thorough comprehension about the operation of the inverter, we have provided various data-collection approaches to monitor system data.

Data logger

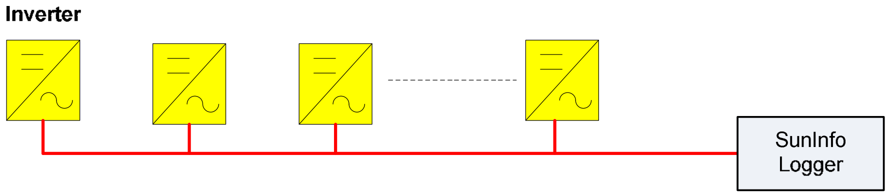


Fig 4-1 Data Logger Collects Data through RS485 Bus

PC

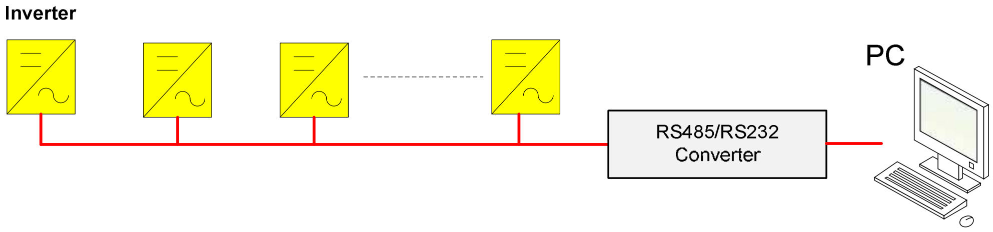


Fig 4-2 PC Collects Data through RS485 Bus

Data logger + PC

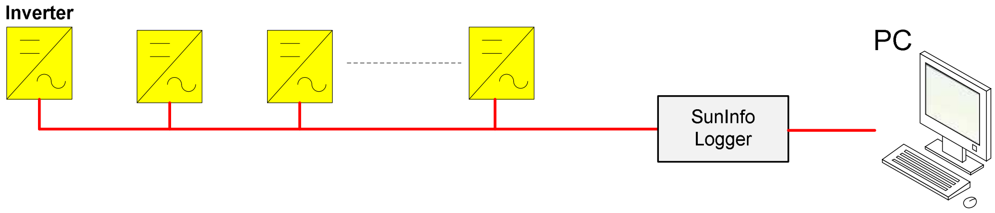


Fig 4-3 Data Logger & PC Collects Data through RS485 Bus

4.2 LED Indicators

Users can get the running data and set parameters of SG50K3 from the LED indicators and LCD control panel, see Fig 4-4.

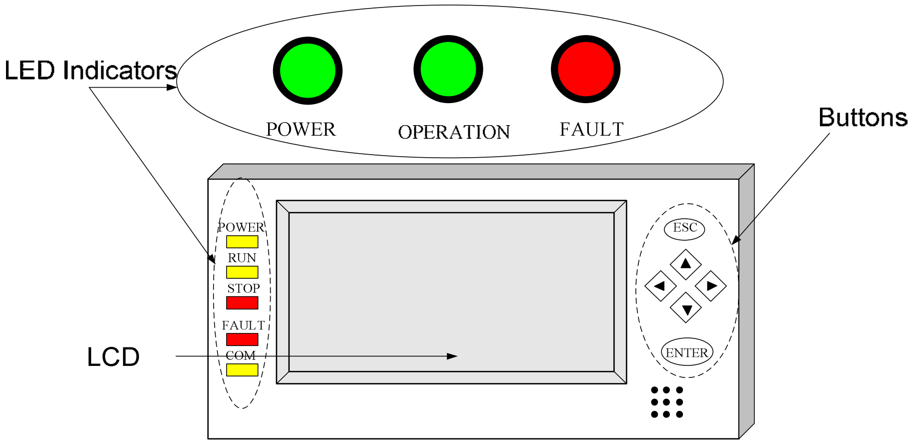


Fig 4-4 SG50K3 data interface

3 big LED indicators are located in the front door of SG50K3 and 5 smaller LED indicators in the LCD panel.

These LED indicators help the users to quickly learn about the states of the SG50K3 inverter. Check Table 4-1 for their definitions.

Note that the big “POWER” ,”OPERATION” and “FAULT” LED indicators share the same meaning with small “POWER”,”RUN” and “FAULT” indicators.

Table 4-1 Meaning of LED indicators

LED Name	Meaning
POWER	The indication of control board’s power supply
RUN	Inverter is in grid mode and working normally
STOP	When the SG50K3 stops operation
FAULT	There is a fault in the power system
COM	Communication indication between inverter and PC

4.3 LCD Control Panel

The LCD control panel is mounted on the SG50K3 enclosure at eye level.

6 buttons right next to the LCD are used to check or set parameters in the LCD control menu, see Fig 4-5.

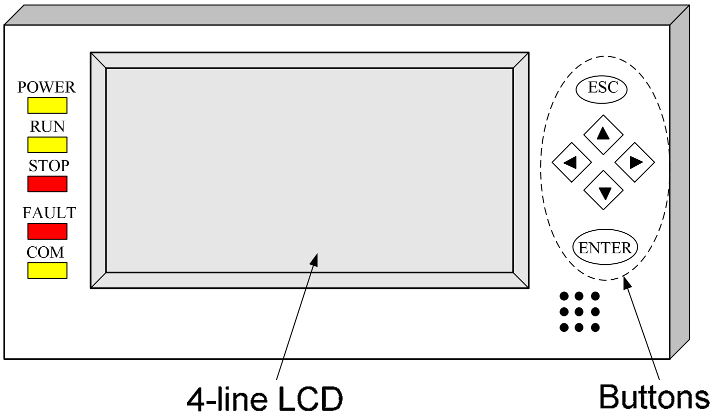


Fig 4-5 LCD panel

Table 4-2 Definitions of buttons

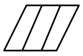
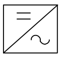
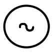
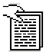
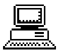
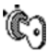
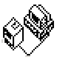
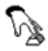
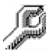
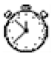
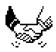
Button	Function
ESC	cancels / ends the present function answers questions with “No” returns to the previous menu
▲	moves up to the previous line increases the present value
▼	moves down to the next line decreases the present value
►	moves to the right value
◄	moves to the left value
ENTER	selects a function from the menu selects a value/confirms changes/answers questions with "Yes"

The background illumination of the LCD is activated by pressing any button on the panel and will automatically be deactivated 2 minutes later to save power.

4.3.1 Explanation of the Display Symbols

The SG50K3 display has four lines. Multiple display symbols are used, which are explained in the following Table 4-3.

Table 4-3 Explanations of symbols used in the control menu

Symbol	Explanations
General Symbols	
☞	There is sub-level menu. Press “Enter” to move to next menu
↓	There are more display menus below. Press “ ↓ ” to move to next menu
⚠	This menu indicates some information needed to be care about
Specific Symbols	
	The PV array
	The Inverter
	One phase of the grid
	This menu displays data
	General control menu.
	Control the start/stop of the inverter.
	Communication parameters setting menu
	Energy adjustment menu
	General parameter menu
	Time setting menu
	Language setting menu

4.3.2 The Total Display Menu

The total display menu is given in the Fig 4-6 below.

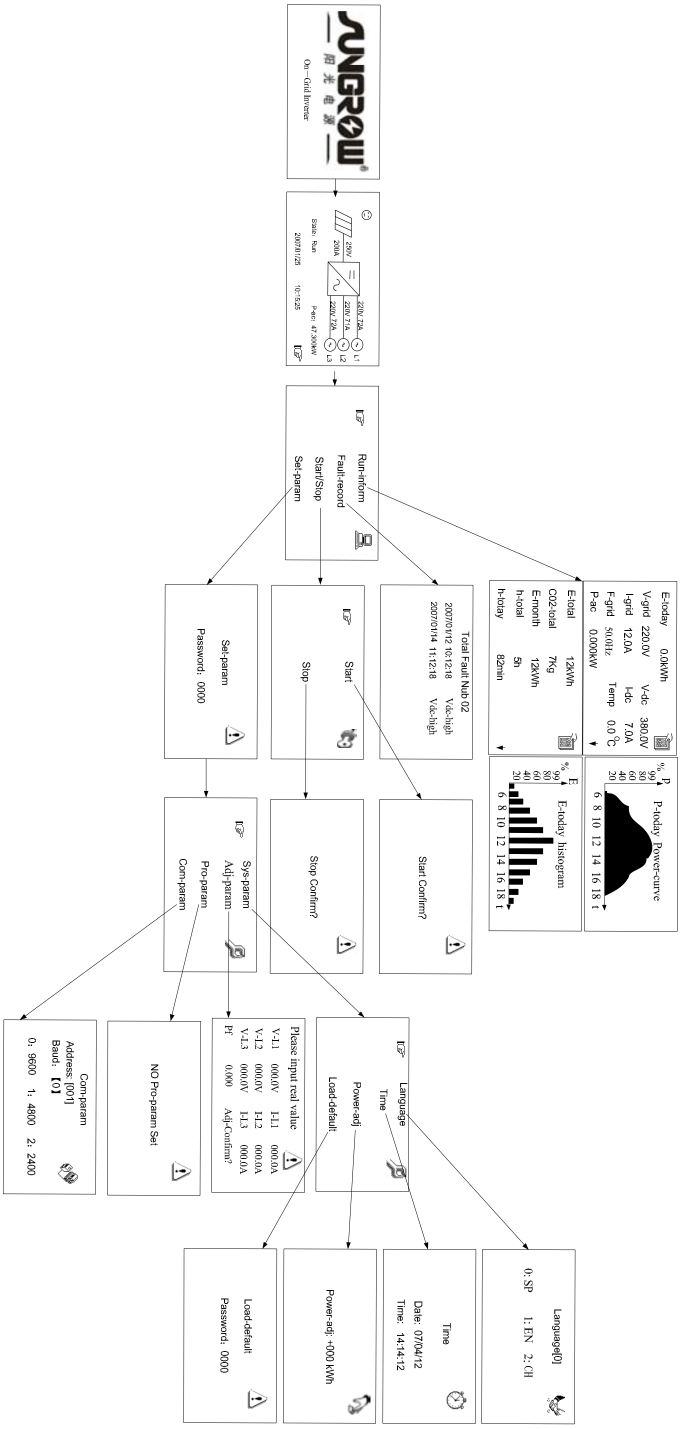
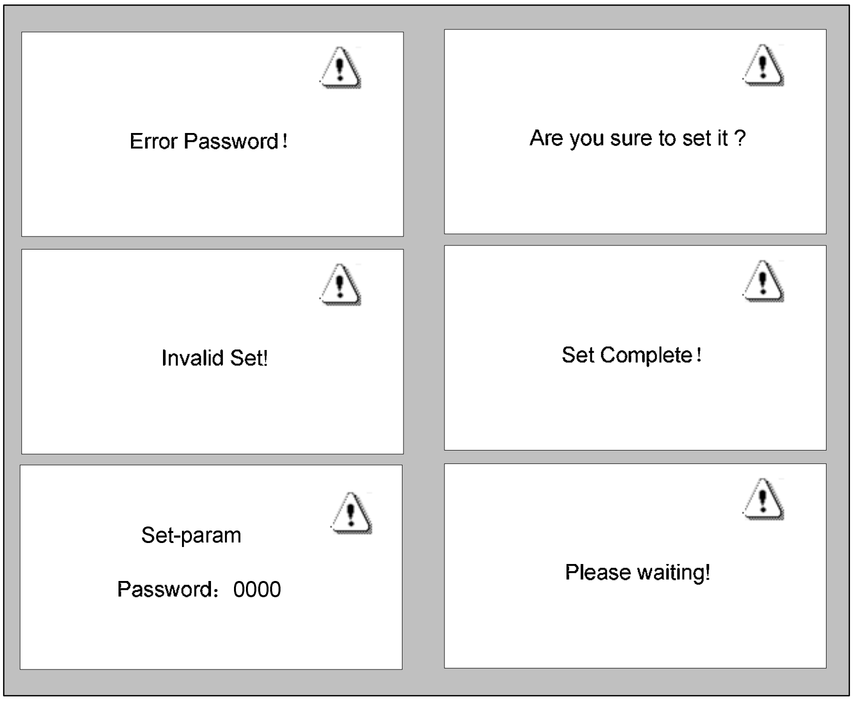


Fig 4-6 Total display menu tree

4.3.3 Additional Explanation of the LCD Menu



Error Password!

Are you sure to set it ?

Invalid Set!

Set Complete!

Set-param

Password：0000

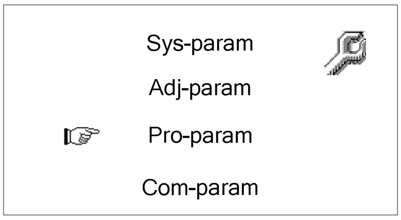
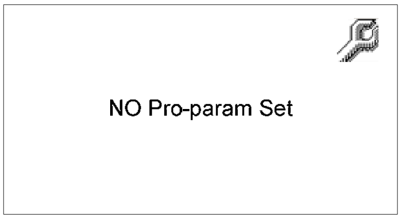
Please waiting!

Fig 4-7 Prompting message menu

Fig 4-7 shows all the prompting messages not included in the total display menu but will be displayed in the LCD.

NOTE

“**Pro-param**” menu contains no valid setting; it is kept for future protection parameters adjustment.

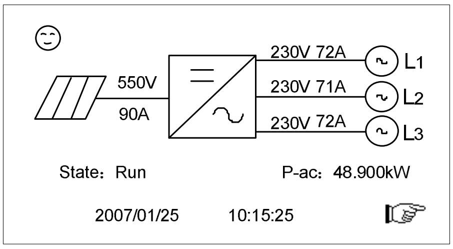
 Sys-param Adj-param ☞ Pro-param Com-param	1. Select “**Pro-param**” 2. Press “ENTER”
 NO Pro-param Set	3. No **protection** parameters can be set or adjusted

4.3.4 The Default Display Menu

The LCD is initializes upon energized of the SG50K3. A starting menu will be displayed during initialization, which shows the manufacture name and the type of the inverter.

1. The initialization menu

Only appear once after activation



State：Run
P-ac：48.900kW
2007/01/25 10:15:25

2. The **Default** menu

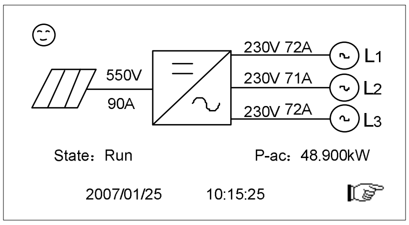
Display basic running parameters

Once the LCD is initialized for about 2-3 minutes, it will automatically changes to the default menu. In the default menu, the basic real-time running values are displayed, which includes **DC current** and **DC voltage**, the **AC phase current** and **AC line-to-neutral voltage**, the **operation state**, the output **AC power** and the system **time and date**.

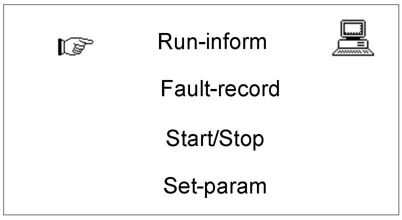
NOTE

Fault type will be displayed in the “State” of the default menu when a fault occurs.

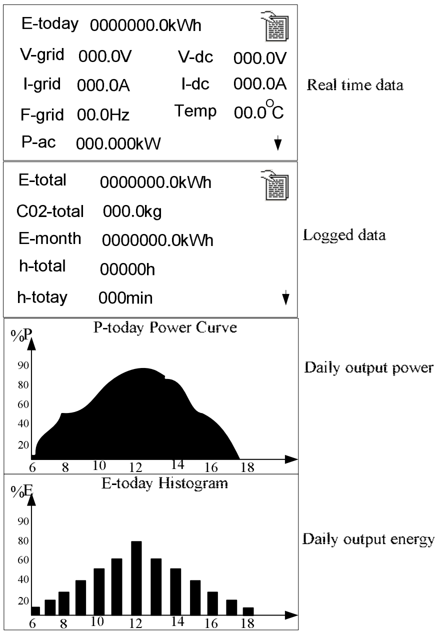
4.3.5 Check Running Parameters



1. In the **default** menu
2. Press “ENTER” or “►” to enter the general control menu



3. Navigate the hand-pointer to the “**Run-inform**”
4. Press “**ENTER**” button to access the sub-menus of running parameters



5. Use “▼” **to** move among these 4 menus to check parameters.

This level menus contains 4 separate menus:

1).the real-time data

2).the logged data

3).Daily output power diagram

4).Daily output energy diagram

Please refer to Table 4-4 and Table 4-5 for the explanations of displayed running data.

Table 4-4 Explanation of electrical parameters

Data name	Explanation	Unit
V-grid	Grid voltage	V
I-grid	Output AC current	A
F-grid	Grid frequency	Hz
V-dc	DC Voltage (of PV array)	V

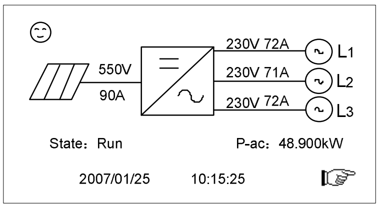
Data name	Explanation	Unit
I-dc	DC Current (of PV array)	A
P-ac	Output ac power	W
E-today	Energy generated today	kWh
E-month	Energy generated this month	kWh
E-total	The total generated Energy	kWh

Table 4-5 Explanation of non-electrical parameters

Data name	Explanation	Unit
Temp	Temperature within the enclosure	℃
h-today	The Operation time of today	Min
h-total	Total hours of Operation time	H
CO2-total	Reduced CO2 weight	kg

- The internal logged data includes: total energy generated since the first start-**”E-total”**, energy generated within the current month-**”E-month”**, total running time in hour-**”h-total”,** the total running time within today**- “h-today”,** and the weight of the CO2 which can be avoided by using the green PV plant-**”CO2-total”**.
- The **real time data includes**: daily generated energy **“E-today”**, the grid voltage “**V-grid**”, the grid frequency “**F-grid**”, the grid current “**I-grid**”, the DC voltage “**V-grid**”, DC current “**I-grid**”, the inverter’s inside temperature “**Temp**” and today’s running minutes “**h-today**”.
- The “**P-today power curve**” diagram shows the power generated from 6.am to 18.pm in a single day, the data are updated every 3.75 seconds and the total diagram data will be cleared at the beginning of a new day. The P axis is marked by the percentage of the rated power 50kW.
- The “**E-today histogram**” diagram shows the energy generated from 6.am to 18.pm in a single day, the data is updated every second and the length of the block is 1 hour. The total diagram data will be cleared at the beginning of a new day. The E axis is marked by the percentage of the 50kWh.

4.3.6 Check Fault Records

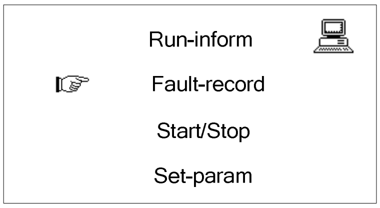


State: Run

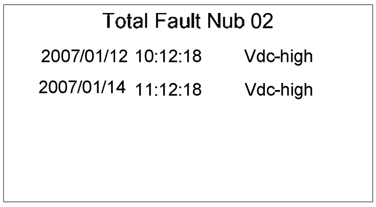
P-ac: 48.900kW

2007/01/25 10:15:25

1. In the **default** menu
2. Press “**ENTER**” or “►” to enter the general control menu



3. Navigate the **hand**-pointer to the “**Fault-record**” and press “ENTER” button.



Total Fault Nub 02

2007/01/12 10:12:18 Vdc-high

2007/01/14 11:12:18 Vdc-high

4. Press “▼” button to move to left fault records.

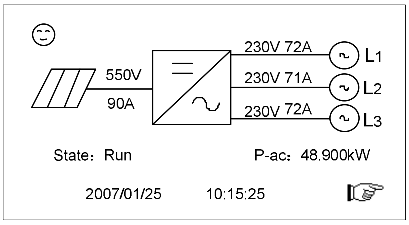
The “**Fault-record**” can log the latest 20 fault records, which includes the fault name and occurred time.

Note that one screen can only display 7 fault records, press “▼” button to move to next fault records if necessary.

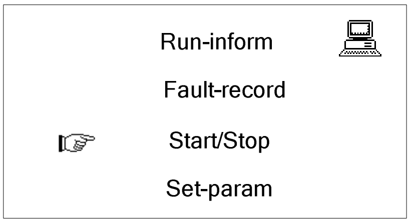
Table 4-6 Explanations of faults

Fault type	Explanations
Vdc-high	DC voltage is too high
Vac-high	Grid voltage is too high
Vac-low	Grid voltage is too low
F-fault	Grid frequency is abnormal
Island	Island(grid in unavailable)
Dsp-flt	The control DSP malfunctions
Ipm-flt	The IPM power module malfunctions
Cntr-flt	AC side contactor malfunctions
Ttp-high	Temperature of the main transformer is too high
Temp-flt	Temperature inside the enclosure is too high
Gnd-flt	A ground fault is occurred

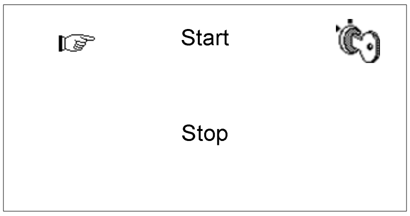
4.3.7 Start the Inverter



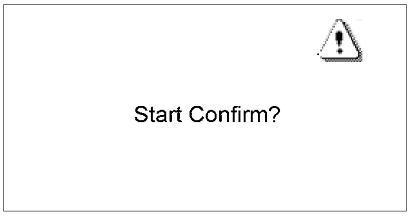
1. In the **default** menu
2. Press “**ENTER**” or “►” to enter the general control menu



3. Navigate **the** hand-pointer to the “**Start/Stop**” and press “ENTER” button.



4. Navigate the hand-pointer to the “**Start**” and press “ENTER” button.



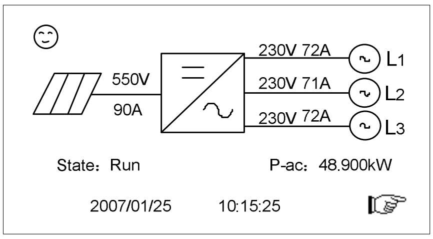
5. Press “**ENTER**” button to confirm the start command.

NOTE

Normally the inverter will auto start when specifications are met or faults are removed.

The start function of the control menu is provided in case the inverter needs a restart after being stopped by pressing down the emergency stop button or perform manual stop in the LCD menu.

4.3.8 Stop the Inverter

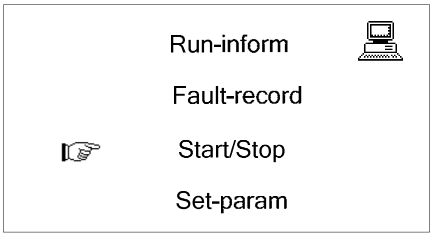


State：Run

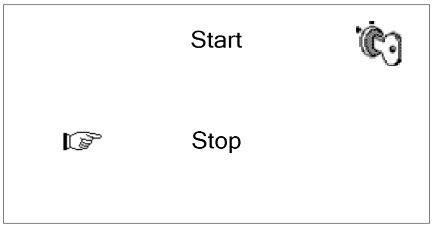
P-ac：48.900kW

2007/01/25 10:15:25

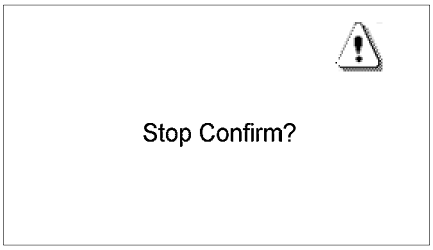
1. In the **default** menu
2. Press “**ENTER**” or “►” to enter the general control menu



3. Navigate **the** hand-pointer to the “**Start/Stop**” and press “ENTER” button.



4. Navigate the hand-pointer to the “**Stop**” and press “ENTER” button.



Stop Confirm?

5. Press “**ENTER**” button to confirm the stop command.

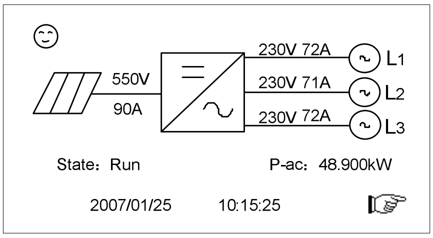
NOTE

To the inverter, the emergency stop button has the same effect as the manual stop function.

They both disconnect the AC contactor and need manual Start in the LCD menu.

4.3.9 Entering the Password

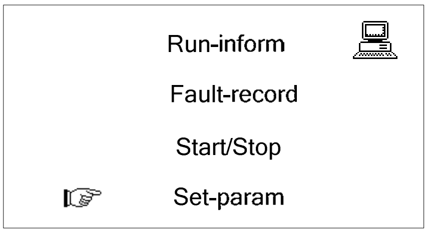
SG50K3 parameters are password protected, which means they can only be adjusted upon entry of a password. To enter the password, proceed as follows:



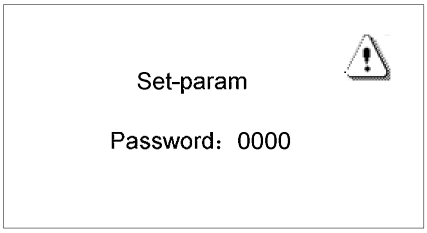
State：Run P-ac：48.900kW

2007/01/25 10:15:25

1. In the default menu
2. Press “**ENTER**” or “►” to enter the general control menu

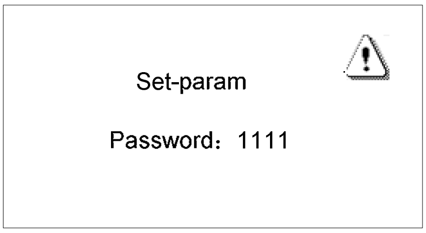


3. **Navigate** the hand-pointer to the “**Set-param**” and press “ENTER” button.



Password：0000

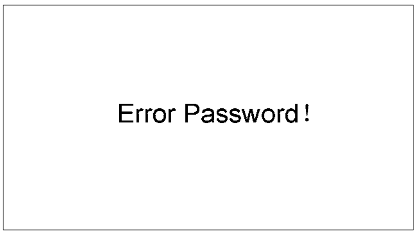
4. Use “◄”**and** “►”to choose digits, employ “▲”and “▼” to increase or decrease number.



Password：1111

5. Press “**ENTER**” button to confirm the password input.

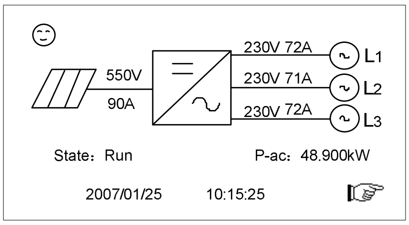
   Note that the default password is 1111.



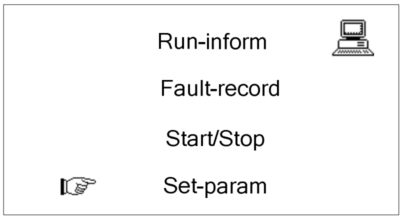
Error Password！

6. NOTE! If the password is not correct, the hint information “Error Password!” will display on the LCD.

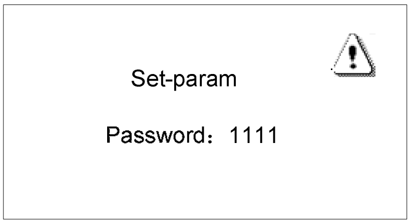
4.3.10 Change Display Language



1. In the **default** menu
2. Press “**ENTER**” or “►” to enter the general control menu



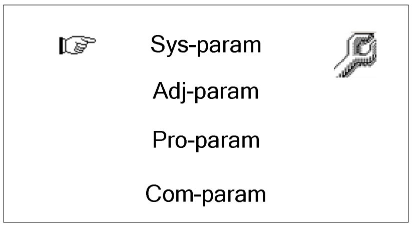
3. Navigate the hand-pointer to the “**Set-param**” and press “ENTER” button.



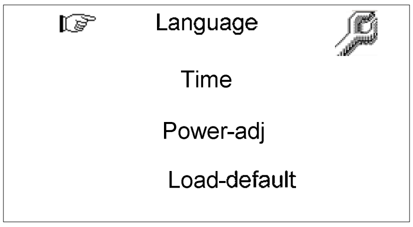
Password：1111

4. Press “**ENTER**” button to confirm the password input.

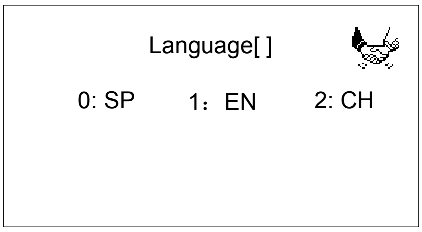
   Note that the default password is 1111.



5. Navigate the hand-pointer to the “**Sys-param**” and press “ENTER” button.



6. Move **the** hand-pointer to the “**Language**” and press “ENTER” button.

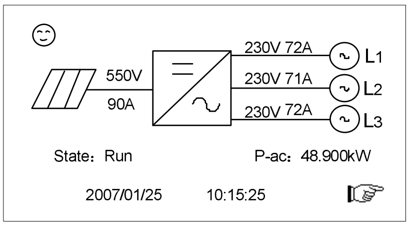


7. Use “▲”or “▼” to change number between 0, 1 and 2.

   0 represents Spanish and 1 means English and 2 for Chinese.

   Choose the number you want and press “Enter” to confirm your choice.

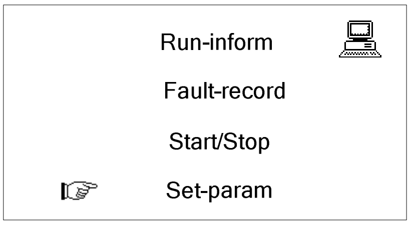
4.3.11 Change Date and Time



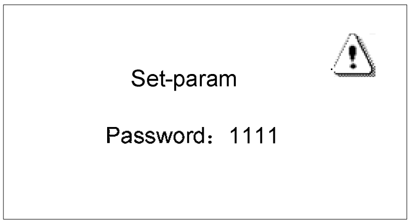
State：Run P-ac：48.900kW

2007/01/25 10:15:25

1. In the **default** menu
2. Press “ENTER” or “►” to enter the general control menu



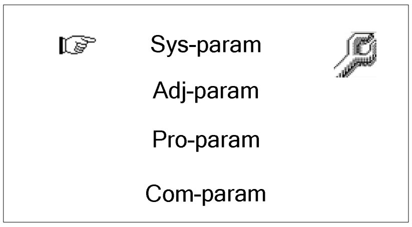
3. Navigate the hand-pointer to the “**Set-param**” and press “ENTER” button.



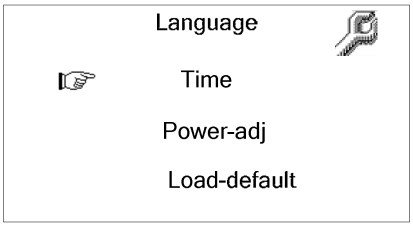
Password：1111

4. Press “**ENTER**” button to confirm the password input.

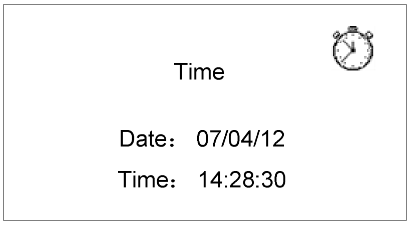
Note that the default password is 1111.



5. Navigate **the** hand-pointer to the “**Sys-param**” and press “ENTER” button.



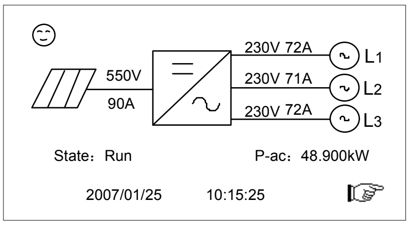
6. Move the **hand**-pointer to the “**Time**” and press “ENTER” button.



Date：07/04/12
Time：14:28:30

7. Use “◄”and “►”to choose digits, employ “▲”and “▼” to increase or decrease number.
8. Input the number you want according to your local time and press “Enter” to confirm them.

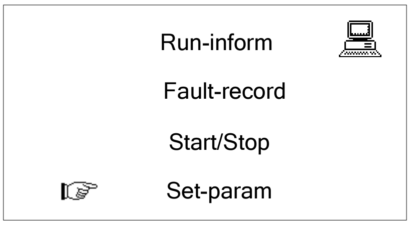
4.3.12 Output Energy Value Adjustment



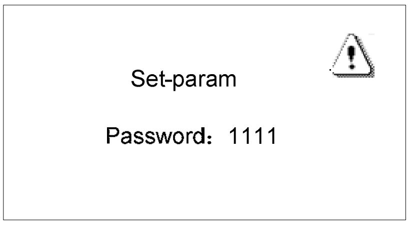
State：Run P-ac：48.900kW

2007/01/25 10:15:25

1. In the **default** menu
2. Press “**ENTER**” or “►” to enter the general control menu



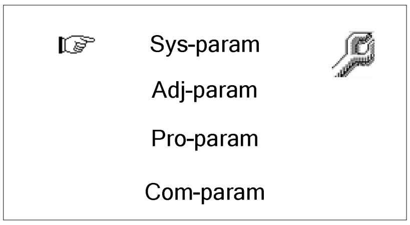
3. Navigate the hand-pointer to the “**Set-param**” and press “ENTER” button.



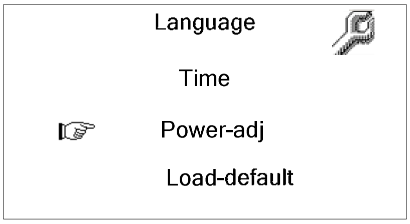
Password：1111

4. Press “**ENTER**” button to confirm the password input.

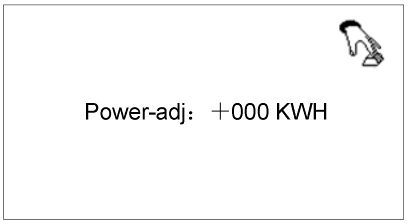
Note that the default password is 1111.



5. Navigate **the** hand-pointer to the “**Sys-param**” and press “ENTER” button.



6. Move the **hand**-pointer to the “**Power-adj**” and press “ENTER” button.



Power-adj：＋000 KWH

7. Use “◄”**and** “►”to choose digits, employ “▲”and “▼” to increase or decrease number.
8. Input real **value** you read from your electric meter and press “Enter” to confirm them.

Note that the positive symbol “+” can also be changed to negative symbol “-”.

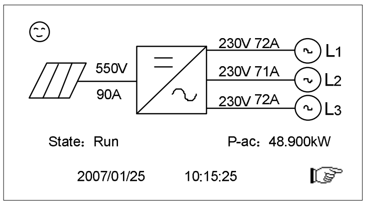
This generated power adjustment screen is useful in case the total-power displayed by LCD (**E-total**) has difference with reading value from the external power measuring device (like an electrical meter).

The adjustable range is from **-999-+999 kWh**.

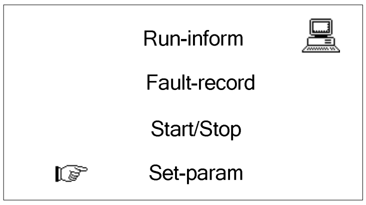
(Power-adj value)= (Real measured value)-(E-total reading value)

4.3.13 Load Default Setting

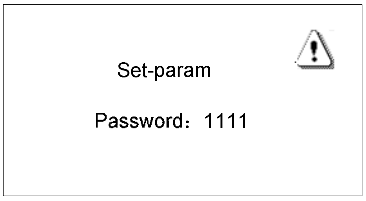
After load default, all the logged data and fault will be cleared.



1. In the **default** menu
2. Press “**ENTER**” or “►” to enter the general control menu



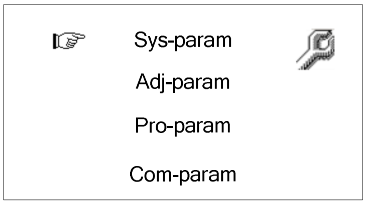
3. Navigate the hand-pointer to the “**Set-param**” and press “**ENTER**” button.


Set-param

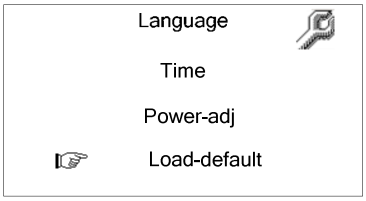
Password：1111

4. Press “**ENTER**” button to confirm the password input.

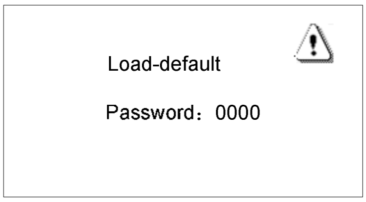
Note that the default password is 1111.



5. Navigate **the** hand-pointer to the “**Sys-param**” and press “ENTER” button.

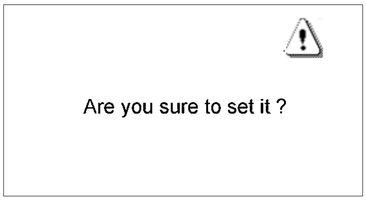


6. Move the hand-pointer to the “**Load-default**” and press “**ENTER**” button.


Load-default

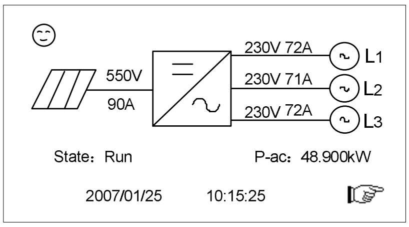
Password：0000

7. Input **correct** password 1111 and press “**Enter**”.


Are you sure to set it ?

8. Press “**Enter**” to re-confirm your load default command.

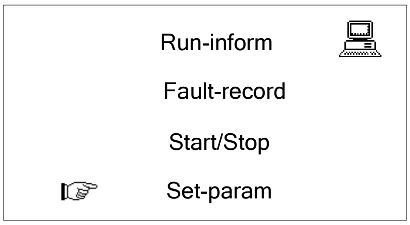
4.3.14 Displayed Real-time Parameters Adjustment



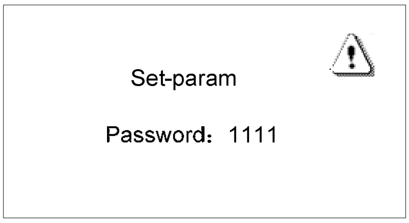
State: Run P-ac: 48.900kW

2007/01/25 10:15:25

1. In the **default** menu
2. Press “**ENTER**” or “►” to enter the general control menu.



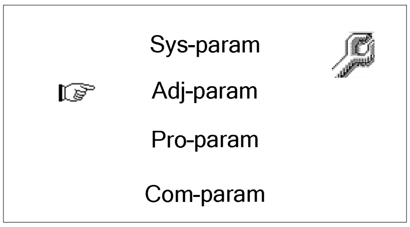
3. Navigate **the** hand-pointer to the “**Set-param**” and press “ENTER” button.



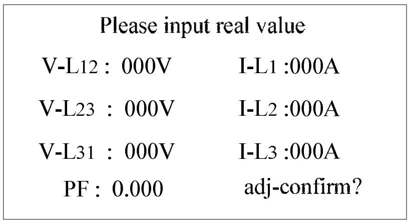
Password: 1111

4. Press “**ENTER**” button to confirm the password input.

Note that the default password is 1111.



5. Navigate the hand-pointer to the “**Adj-param**” and press “ENTER” button.



Please input real value

V-L12 : 000V I-L1 :000A

V-L23 : 000V I-L2 :000A

V-L31 : 000V I-L3 :000A

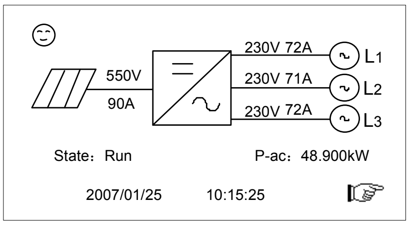
PF : 0.000 adj-confirm?

6. Use “◄”and “►”to choose digits, employ “▲”and “▼” to increase or decrease number.
7. Input real value you read from your electric meter and press “Enter” to confirm them.

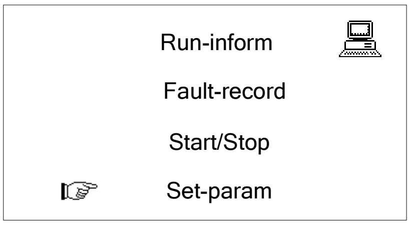
The “**Adj-param**” menu is designed to adjust the difference between the LCD displayed value and the users measured real value and perform the adjustment of displayed real data.

“V-L12”, “V-L23”, “V-L31” are the user measured three phase line to line voltage, “I-L1”, “I-L2”, “I-L3” are the user measured three phase current. PF is measured power factor.

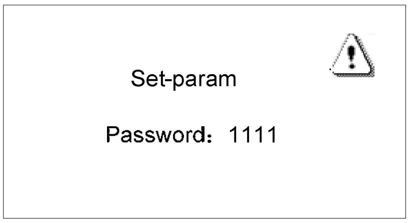
4.3.15 Communication Parameters Setting



1. In the **default** menu
2. Press “**ENTER**” or “►” to enter the general control menu



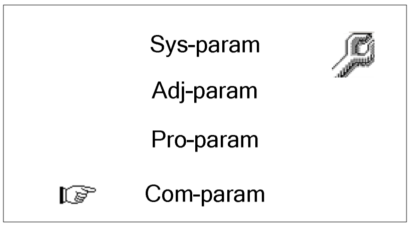
3. Navigate **the** hand-pointer to the “**Set-param**” and press “ENTER” button.



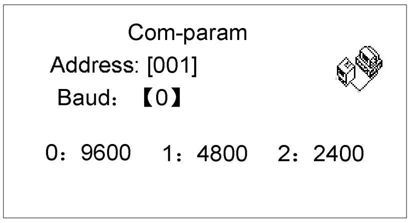
Password：1111

4. Press “**ENTER**” button to confirm the password input.

Note that the default password is 1111.



5. Navigate the hand-pointer to the “**Com-param**” and press “ENTER” button.



Address: [001]
Baud：【0】
0：9600 1：4800 2：2400

6. Use “◄”and “►”to choose digits, employ “▲”and “▼” to increase or decrease number.
7. Input the **address** and **baud rate** you want.

“**Com-param**” menu contains some basic communication parameters of the inverter when connected to external monitoring device through RS485 serial communication protocol. The inverter communication address can be in the first line. The range of the address is 1-247.The serial communication baud rate can be adjusted through entering 0, 1 and 2 in the second line.0 represents 9600 Baud, 1 means 4800 Baud and 2 for 2400 Baud.

NOTE

The address parameter is very important when your solar generation application contains many inverters and each inverter should have a unique address for serial communication.

5 Installation

About This Chapter

This chapter gives installation instructions for SG50K3.

5.1 Safety Mounting Instructions

As with any electrical system, touching live components can be hazardous to life and limb. This device contains DC voltage of up to 900V and the grid voltage up to 450V.

⚠ **WARNING**

Only a qualified person can work on SG50K3.

This work is only permissible if the AC and DC power supplies are safely disconnected from the SG50K3.

⚠ **WARNING**

Before any maintenance, always wait for approx.10 minutes so that the capacitors in the SG50K3 can discharge. Only then may the cover be opened.

⚠ **WARNING**

Hot surface!

SG50K3 contains some parts, such as heatsinks of power semiconductors, remain hot for a while after disconnection from electrical supply.

5.2 Checking for Shipping Damage

The SG50K3 inverters are thoroughly checked and tested rigorously before they are shipped. Even though they are delivered in a rugged, heavy cardboard box, the inverters can be damaged in shipping which typically is the shipping company's fault. So you should check the inverter before installation.

Please inspect the inverter thoroughly after it is delivered. If any damage is seen please immediately notify the shipping company. If there is any question about potential shipping damage, contact Sungrow Power Supply. A photo of the damage may be helpful.

Do not accept unit if visibly damaged or note visible damage when signing shipping company receipt. Please report the damage immediately to the shipping company. Do not remove the unit from packaging.

5.3 Basic Installation Requirements

The IP level of SG50K3 is **IP20**, so it can only be installed **indoors**. A list of these requirements is shown below:

- It is advised not to install the inverter in living quarters, since the inverter may produce some operating noise.
- Avoid installing the inverter in a location subject to vibrations.
- The LED and display should always be legible for users.
- The ambient temperature should remain from –25℃ to 55℃.
- Maintain a minimum of 100 mm clearance in back, 1000mm in front and 600mm on top of the SG50K3 for proper ventilation and installation operation.
- The inverter should be mounted in a well-ventilated area.
- Avoid mounting the inverter in a dusty area

⚠ WARNING

Never install the SG50K3 in areas that contain explosive atmospheres (battery rooms, fuel storage rooms etc).

⚠ CAUTION

Some parts of the SG50K3 can reach temperature of over 80℃.

Keep a suitable distance from flammable materials!

5.4 Mechanical Mounting

5.4.1 Device Dimensions and Weight

The external dimensions and weight of the SG50K3 is in Fig 5-1.

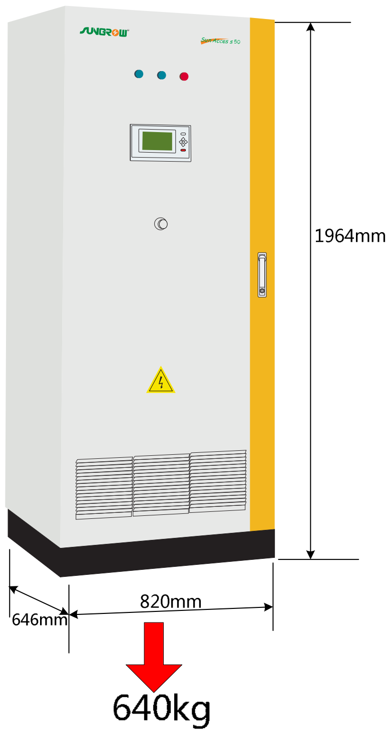


Fig 5-1 Dimensions of SG50K3

5.4.2 Moving SG50K3

Moving the Wrapped Unit

Crane, fork-lift or pallet truck can be used to move the wrapped unit.

⚠CAUTION

Always remember the weigh of unit.

Pay attention to “CENTER OF BALANCE” and “HEAVE HERE” marking on the wooden crate.

Unpacking the Unit

To unpack the SG50K3 from the Shipping crate:

1. Remove the crate’s wood side and top panels.

2. Remove the barrier bag material from the inverter.
3. Remove the inverter’s anchor hardware that bolts the inverter to the pallet.

Moving SG50K3 after Unpacking

There are 3 ways to move unpacked SG50K3 to the final position.

- Using fork-lift or pallet truck to move the SG50K3:
  - Take down the front and rear cover of pedestal.
  - Place the two forks below the unit with the gravity center in between,
  - Lift the SG50K3 from beneath the enclosure.
- Move the SG50K3 on the steel slideway.
- If you need to move the SG50K3 using crane, contact SUNGROW to claim lifting rings for free.

⚠ CAUTION

Always keep the SG50K3 upright!

Avoid sudden force!

5.4.3 Fastening the Unit to the Floor

SG50K3 must be fastened to the floor as follows:

1. Remove the front and rear base covers.
2. Fasten the cabinet to the channel steels or roof using M12 bolts and nuts.
3. Reassemble the front and rear cover (or after the electrical connection finished).

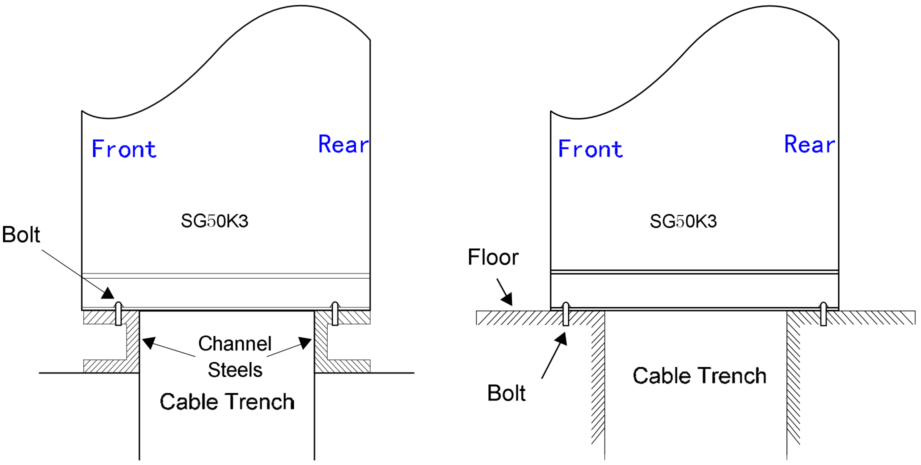


Fig 5-2 Fasten SG50K3

5.5 Electrical Connection

5.5.1 Electrical Connection Requirements

- Grid 230V AC

  The SG50K3 is designed for 400V grid (three phase).The voltage should be within 310V to 450V and the frequency should be the frequency should be 47-51.5/57-61.5Hz.

Table 5-1 Grid request

Parameter	Specification
Grid Voltage Range	310V~450V
Grid Frequency Range	47Hz~51.5Hz/57Hz~61.5Hz

- PV array limit

Table 5-2 PV array limit

Parameter	Specification
Max. PV Power	55kWp
Max. PV Voltage	900V

- Ground

  The inverter must be grounded in compliance with local safety codes using appropriately sized protective conductors.

⚠ WARNING

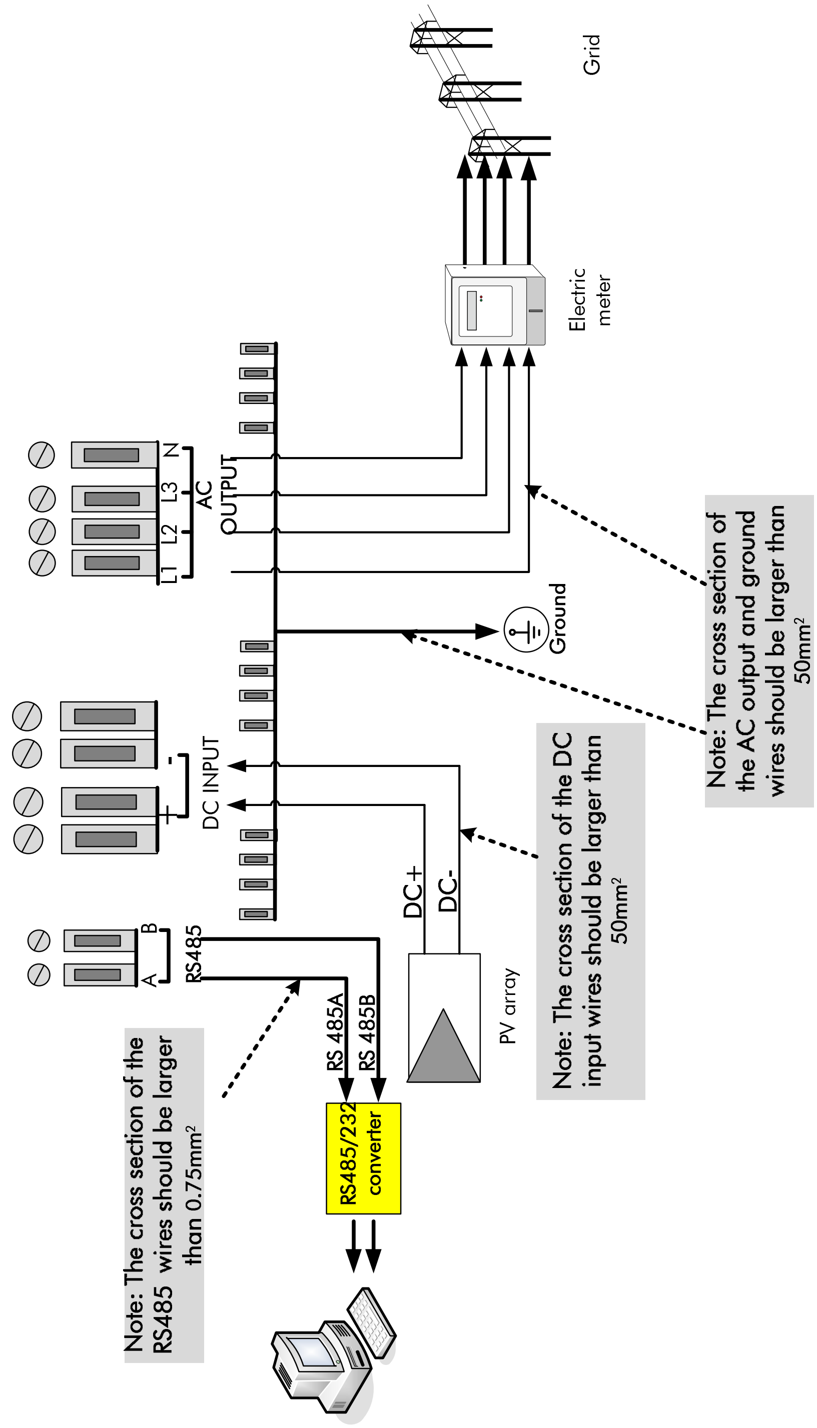
Make sure that the DC input voltage never exceeds 900V.Higher input voltages will damage the SG50K3.

⚠ CAUTION

All electrical installations must comply with all local and national electrical codes.

5.5.2 Wires connection

The complete wiring for a SG50K3 is shown schematically in the Fig 5-3.



Note: The cross section of the AC output and ground wires should be larger than 50mm²

Note: The cross section of the DC input wires should be larger than 50mm²

Note: The cross section of the RS485 wires should be larger than 0.75mm²

Fig 5-3 Simplified electrical connection diagram

Connect the AC Terminals

NOTE

SG50K3 is designed to be installed in Three-phase Three-wire or Three-phase Four-wire AC Voltage system.

- Isolate the grid (switch off the circuit breaker), and secure it against accidental reactivation.
- Connect the wires of the AC cable as follows(through circuit breaker):
  - Grid L1 wire to the terminal marked “L1”.
  - Grid L2 wire to the terminal marked “L2”.
  - Grid L3 wire to the terminal marked “L3”.
  - Grid Neutral wire to the terminal marked “N” or leave the terminal vacant

Connect the DC Terminals

- Isolate the PV array and secure it against accidental reactivation.
- Use a multimeter to check DC open circuit voltage less than 900V and confirm the positive and negative poles.
- Connect the wires of the DC cable as follows(through circuit breaker):
  - PV array DC + wire to the inverter DC+.
  - PV array DC - wire to the inverter DC -.

CAUTION

Please make sure that all wires are firmly connected.

Grounding

CAUTION

Grounding is required for each SG50K3.

Connect the factory ground to the ground terminal with leaking current detector, to realize the leaking current detect function.

If PV array DC input grounding is required, please connect DC+ or DC- terminal to ground copper bar by 16mm^2 ground wire as Fig 5-4.

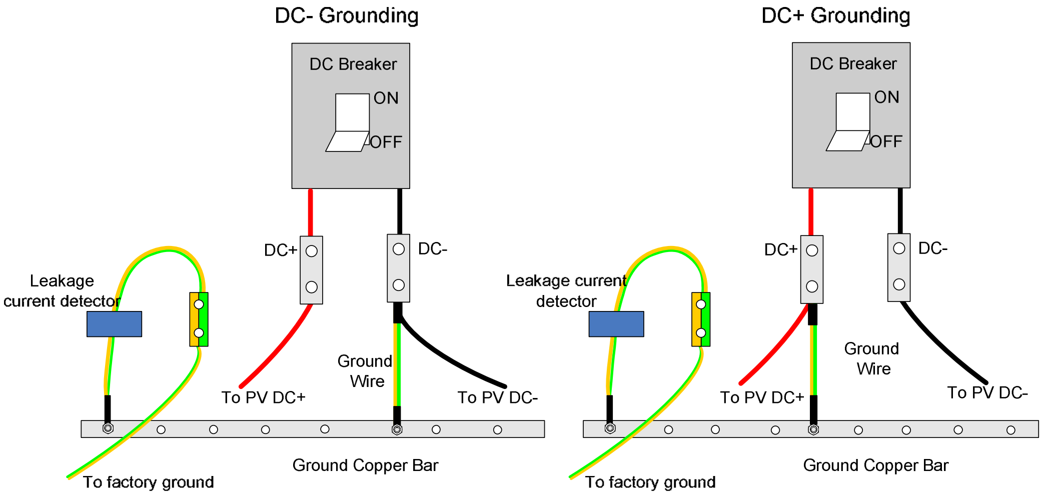


Fig 5-4 DC input connection diagram

5.6 Communication Installation

Fig 5-5 shows the communication installation of the SG50K3 with the PC by RS485 serial communication port, the wires and converter are optional for additional purchase.

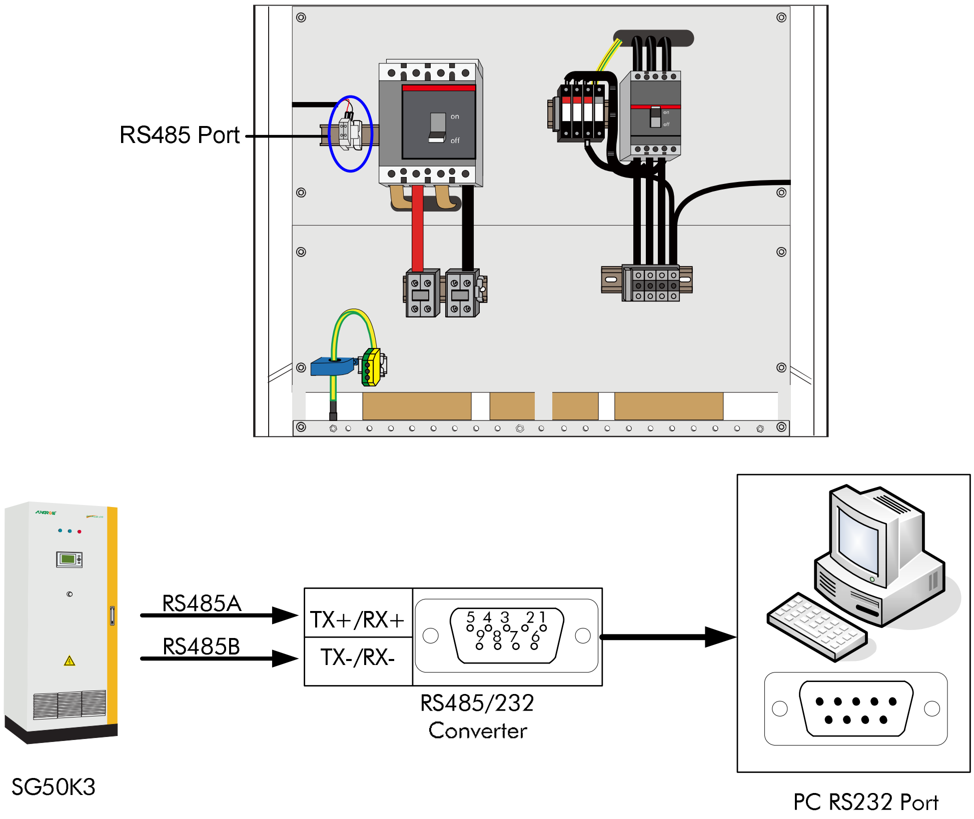


Fig 5-5 Communication port configuration

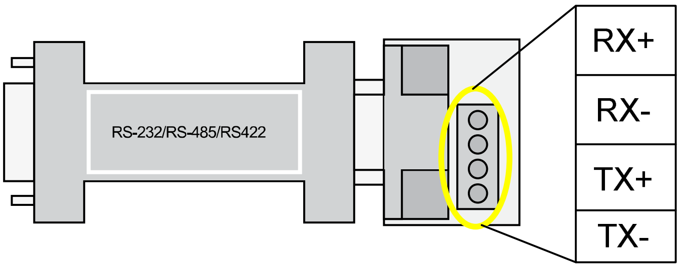


Fig 5-6 RS485/RS232 converter

NOTE

RS485/RS232 converter is optional for additional purchase.

If there are two or more inverters to be monitored, install communication system in series.

6

Installation Checklist

About This Chapter

This chapter describes the items needed to verify whether your installation of the SG50K3 is correct.

Check the mechanical and electrical installation of the inverter before commissioning. Go through the checklist below with another person together.

Mechanical Installation	
☐	Check all the mechanical connections and make sure there is no damage, scratch or abnormal parts
☐	The inverter has been fixed properly to floor.
☐	The clearance spaces around the inverter are proper.
☐	The ambient operating conditions are within the allowed limits.
☐	Cooling air circulates smoothly.
☐	Protective enclosure seal is of integrity and reliability
Electrical Installation	
☐	The inverter is grounded properly.
☐	The polarity of PV input connections are correct.
☐	The grid voltage matches the nominal input voltage of the inverter.
☐	The grid connection to the output terminals is OK.
☐	The communication cable connections are correct.
☐	The communication cables are routed away from power cables.
☐	Marks on the cables are correct, clear and distinguishable
☐	Insulation shields are integrated and firm.
☐	Warning labels are clear and distinguishable.
☐	Make sure all the bolts that fix the cables are tightened and secured.
Other	
☐	There are no tools, foreign objects or dust from drilling inside the inverter.
☐	No condensing or icing in the cabinet.

7 Commissioning

About This Chapter

This chapter describes how to start the SG50K3 for the first time, including requirements of commissioning, Inspection before start-up, start-up procedures and completing the commissioning.

7.1 Requirements of Commissioning

⚠CAUTION

Before starting the device for the first time, all work performed on the device should be checked thoroughly.

⚠CAUTION

Check the voltages in both AC and DC sides meet the requirements of SG50K3.

7.2 Inspection before Start-up

7.2.1 PV Array Check

Before start-up check the PV array:

1. Check open-circuit voltage of each PV string matches the nominal input voltage.
2. Record the U-I curve if possible.
3. Record the environmental parameters(temperature, radiation intensity)
4. Measure and record the resistance of cables if possible.

7.2.2 SG50K3 Check

Before start-up check the SG50K3:

1. Ensure that the mechanical and electrical installation of the inverter has been checked according to ***6 Installation Checklist***.
2. Ensure that the DC and AC breaks are in "OFF" position.
3. Ensure that the Emergency Stop Button is released and functional.

7.2.3 Ground Connection Check

Make sure the ground cable goes through the hole of the ground fault detection device and is connected to the factory ground securely.

7.2.4 Serial Communication Check (Optional)

For external communication monitoring, the data cables must be connected. Make sure that the RS485 A and B cables are connected correctly and tightened to the RS485/232 converter.

Make sure the RS485/232 converter terminal is correctly connected to the PC serial port.

7.2.5 Voltages Check

AC Grid Voltage Check

It must be verified that the inverter is connected to the correct grid type and that a right-hand rotary field exists on L1, L2, L3 and Neutral. The value of the AC line to line voltage should be about 400 V.

DC Voltage Check

The DC connections are from the DC combiner boxes to the inverter.

The voltage on the individual DC cables should be almost the same value and must never exceed the allowable maximum DC voltage.

Besides the voltage values, the polarity of the DC inputs must also be verified. All DC connections should be checked to ensure that they are mechanically tight.

⚠ WARNING

The DC cables to be connected must be rates for minimum of 900V.

7.3 Start the Inverter

If all tests and measurements have been performed, and all measured values lie within the acceptable range, then the device can be switched on for the first time.

⚠ DANGER

Before start up the SG50K3, ensure that nobody is working on the inverter.

To start the SG50K3:

1. Verify 400 VAC voltage of the grid line to line voltage.
2. Turn the AC break to the "ON" position.

3. Turn the DC break to the "ON" position.
4. It will take about 10 seconds for the auto-initialization of the power conversion circuit and the LCD panel. The "**POWER**" LED indicators will burn.
5. If the DC voltage is below the DC voltage start point (Vpv<240V), then the "state" of the LCD interface will always show "**Start-up**";
6. If the DC voltage exceeds the DC voltage start point (Vpv >240V) for 3 minutes, the SG50K3 will automatically change to "**Run**" state, the "**OPERATION**" LED will light, with the state of the LCD menu will change to "**Run**".

7.4 Complete the Commissioning

If all the start procedures have been performed, check the operating condition of the SG50K3.

1. Check whether the following items normal: noise, heat generation, no smoke or unusual odor.
2. Measure the grid-connected voltage, current and THD.
3. Check the earthing of cabinet.
4. Check the LCD display and external communication.

So far, the commissioning of the SG50K3 is completed.

⚠CAUTION

SG50K3 don't need manual control in daily operation.

- **Keep the door closed and locked.**
- **Key to the door must be stored by appointed personnel.**

---

8 Operation

About This Chapter

This chapter describes the operation of the SG50K3, exclusion of liability and the way to contact us.

SG50K3 inverter is a fully automated grid-connected solar inverter. Most of the functions and modes transition are performed automatically.

8.1 Start the Inverter

To turn on the inverter, please follow the steps below.

1. Switch on the DC side circuit breaker
2. Switch on the AC side breaker
3. The inverter will to check whether that voltage, impedance and frequency parameters are within operating range.
4. If the parameters check is correct, then the LCD will display the normal working screen.
5. Then the inverter will export to the grid and the green Power LED will continuously lit (provided there is enough PV power).

8.2 Stop the Inverter

1. If users want to shut down the inverter, please refer to stop command in the LCD menu.
2. If users want to shut down the inverter immediately in an emergency, please press down the emergency stop button.

9 Maintenance

About This Chapter

This chapter describes the maintenance instructions needed to keep SG50K3 at its optimum performance.

Due to the effect of the ambient temperature, humidity, dust and vibration, the inner components of the inverter will be aged and worn out. It is necessary to implement routine and periodic maintenance to the inverter. This section introduces maintenance items and intervals.

⚠ WARNING

Only qualified personnel can service the inverter!

Before any maintenance work, please do as follows:

- Shut off the inverter or disconnect the DC/AC connections
- Cut off auxiliary power supply
- Wait at least 15 minutes until the inner capacitors to discharge
- Open the door and measure the voltage of the terminals and intermediate circuit terminals. Make sure that there is no lethal voltage.

Implement the maintenance work periodically and record the maintenance work in the maintenance report, specified in the following table.

Items	Methods	Period
Save data	Save the running data, parameters and log to a disk or a file. Update software.	Once a month
General state of system	Visual check any damage or deformation of the inverter. Check any abnormal noise during the running of the inverter. Check each parameter of inverter operation. Check the important component. Check if the temperature of the housing is normal. Monitor the system using the thermal imager. Check the humidity and dust of the environment. Meanwhile check whether the filter function of the air inlet is ok. Check the warning labels, and replace if necessary.	Twice every year
System clean	Check whether the circuit board and the component are clean. Check the temperature and dust of the inverter. Dismantle the fan and clean the module if necessary.	Six months to a year（it depends on the dust contents in air.）

Items	Methods	Period
Power circuits connection	Check whether power cable connections are loose. Re-tighten them with the torque specified in the manual. Check whether there are damages in the power cables and control cables, especially the surface in contact with the metal. Check whether the wrap belts of the connection terminals is strip-off.	First 6 months after commissioning and then once or twice a year.
Terminals and cables	Check whether the screws of control terminals are loose. Re-fasten by screwdriver, wherever necessary. Check whether the terminals of the main circuit are poor contact and whether the screws are burnt. Visual check all connections and cable distributions.	Once every year
Fan	Check whether there is crack on fan blades. Check whether there is any abnormal noise during the fan rotating.	Once a year
Circuit breaker	Routine check the corrosion state of metal components (once every half a year). Check contactors every year (auxiliary switches and micro switches included). Check the running parameters (voltage and insulation especially).	Once or twice a year
Safety function	Check the LCD stop and emergency stop circuit. Analog shutdown and check stop signal communication.	Once or twice a year
Software	Software optimization. Check the setting of every parameter.	Once or twice a year

10 Troubleshooting

About This Chapter

This chapter gives the basic troubleshooting methods to the customer as a reference.

10.1 LED Indicated Fault Troubleshooting

Table 10-1 LED states during normal working

LED Name	State	Explanation
POWER	light	The power supply of the inner circuit is OK
OPERATION	light	The inverter is in correct grid connection working state
FAULT	shut	No fault occurs

Table 10-2 LED fault and simple troubleshooting

LED state	Explanation
No LED flashes and LCD screen no display	Disconnect the AC and DC voltage and keep disconnected for 5 min. Afterwards, reconnect the DC voltage and then the AC voltage. If the device does still not run it needs to be exchanged or repaired.
POWER shut	Power supply of the inverter is not working. First make sure that the grid is available and grid connection wires are OK. Disconnect the AC and DC voltage and keep disconnected for 5 min. Afterwards, reconnect the DC voltage and then the AC voltage. If the power LED never light after restart, please contact Sungrow.
Operation shut	The inverter is not in the grid connection state. First check all the AC and DC wires are correctly connected. Use multimeter to measure the DC input voltage and make sure the DC input voltage exceeds the start threshold of the inverter operation. Make sure the grid is available and parameters are within the inverter specification. If all the conditions above are checked OK and this light still not light, Please contact Sungrow.
FAULT light	A fault has occurred and is not solved. Please refer to the LCD screen fault message for the detailed fault information and accordingly take troubleshooting. This LED will shut when the fault disappears. Please contact Sungrow if this LED keeps light all the time.

10.2 LCD Displayed Fault Troubleshooting

If a fault occurs, the SG50K3 will generate a message and display the message in the “state:” position.

Table 10-3 Displayed Fault description and troubleshooting

Fault Name	Description	Troubleshooting
Vdc-high	Over voltage on DC input (>450V)	Disconnect the DC input of the SG50K3. Otherwise the inverter could be severely damaged! Check the configuration of your system and measure the DC voltage before reconnecting the inverter to the DC source.
Vac-high	The grid voltage has exceeded the permissible range.	Check the grid voltage and grid connections of SG50K3. If the grid voltage lies outside the range because of local conditions, ask the electricity provider if the voltage can be adjusted at the feed-in point or if they agree to changes in the values of the monitored operational limits. If the grid voltage lies within an acceptable range and “ Vac-high “ or “ Vac-low “ faults are still being displayed, please contact the Sungrow.
Vac-low		
F-fault	The grid frequency has exceeded the permissible range.	Check the grid frequency and grid connections of SG50K3. If the grid frequency lies outside the acceptable range because of local conditions, ask the electricity provider if the voltage can be adjusted at the feed-in point or if they agree to changes in the values of the monitored operational limits. If the grid frequency lies within an acceptable range and “F-fault” is still being displayed, please contact the Sungrow.
DSP-flt	The DSP malfunction	Stop the inverter and restart the inverter from LCD, if this fault happens frequently, Please contact Sungrow.
Ipm-flt	The IPM power module malfunction	
Cntr-flt	AC side contactor fault	This fault is un-recoverable. Please contact Sungrow if this fault happens.
Ttp-flt	The transformer is over-heat	Check the grid parameters .If all the parameters are OK and this fault happens frequently, Please contact Sungrow.

Fault Name	Description	Troubleshooting
Temp-flt	The heatsink of the IPM is overheat	Check whether the output power is too large Check the cooling fan works OK
Com-flt	The communication between the LCD screen and the DSP	An internal communication fault occurs. Wait for a moment to check whether this fault will disappear. Restart the inverter to see whether this fault happens again. Please contact Sungrow if this fault happens frequently.
Gnd-flt	Ground fault	Check the ground wire. Check the ground fault detection device. Normally the system will recover operation after this fault is removed for 5 minutes.

NOTE

If you have any problems in operating on the SG50K3, please contact us via service hotline: +86 551 532 7834/532 7845 or e-mail: service@sungrow.cn.

We need the following information to provide you the best assistance:

- Type of the inverter
- Serial number of the inverter
- Fault name
- Simple description of the fault phenomenon

11 Appendix

About This Chapter

This chapter gives technical data of the SG50K3, exclusion of liability and the way to contact us.

11.1 Technical Data

11.1.1 Electrical Specifications

- Input Data

Parameter	Specification
Maximum DC Voltage	900V
Start Voltage	470V
MPP Voltage Range	450V~820V
Min. DC Voltage	450V
Max. PV Power	55kWp
Max. Input Current	130A
Number of MPP Trackers/Strings Per MPP Tracker	1/2

- Output Data

Parameter	Specification
Rated Output Power	50kW
Max. AC Output Power	80A
Rated Grid Voltage	400Vac
Grid Voltage Range	310V~ 450 V ac
Rated Grid Frequency	50Hz/60Hz
AC Frequency Range	47-51.5 Hz /57-61.5Hz
THD of Output Current	< 3 % at nominal power
Power Factor	0.95(lagging)~0.95(leading)
DC Current Injection	<0.5% of rated inverter output current

11.1.2 Mechanical Specifications

Parameter	Specification
Dimensions(W x H x D)	820x1964x646 mm
Weight	640 kg

11.1.3 System

Parameter	Specification
Peak Efficiency	96.3 %(with transformer)
European Efficiency	95.3 %(with transformer)
Ingress Class	IP20（indoor）
Power Consumption at Night	20W
Operating Temperature	-25℃~55℃
Cooling	controlled forced-air cooling
Relative Humidity	0~95%, non-condensing
Max. Working Altitude	2000m

11.1.4 Display and Communication

Parameter	Specification
Display	LCD
Communication(Standard)	RS485
Communication(Optional)	Ethernet/GPRS

11.2 Exclusion of Liability

The content of these documents is periodically checked and revised, when necessary, please call us or check our website www.sungrowpower.com for the latest information. However discrepancies cannot be excluded. No guarantee is made for the completeness of these documents. Please contact our company or distributors to get the latest version.

Guarantee or liability claims for damages of any kind are excluded if they are caused by one or more of the following:

- Improper or inappropriate use or install of the product
- Installing or operating the product in an unintended environment
- Installing or operating the product when ignoring relevant safety regulations in the deployment location
- Ignoring safety warnings and instructions contained in all documents relevant to the product
- Installing or operating the product under incorrect safety or protection conditions
- Altering the product or supplied software without authority
- The product malfunctions due to operating attached or neighboring devices beyond allowed limit values.
- In case of unforeseen calamity or force majeure.

The use of supplied software produced by Sungrow Power Supply Co., Ltd.. is subject to the following conditions:

- Sungrow Power Supply Co., Ltd. rejects any liability for direct or indirect damages arising from the use of the SunInfo software. This also applies to the provision or non-provision of support activities.
- Using the SunInfo software for commercial purposes is prohibited.
- Decompiling, decoding or destroying the original program, including SunInfo software and the embedded software, is prohibited.

11.3 About Us

Sungrow power supply is a china-leading manufacturer of various power electronics products for renewable energy generation systems. Our products include converters, inverters, battery chargers, and other power supplies for distributable generation system in both grid-connected and stand-alone applications. The power rating of Sungrow products covers from several hundred watt to large mega-watt systems.

The pursuit of Sungrow is to help our customers acquire stable and clean power with minimum cost, maximum reliability and enhanced safety.

Trademarks

SUNGROW® is the registered trademark of Sungrow Power Supply Co., Ltd..

Contact Information

If you have any questions about this product, our hotline will be happy to assist you. Please keep the following data when contacting Sungrow.

Company:	Sungrow Power Supply Co., Ltd.
Website:	www.sungrowpower.com
Contact:	Mr. Henry (Director of International Trade)
Email:	info@sungrow.cn, service@sungrow.cn
Address:	No.2 Tianhu Rd., New & High Technology Industrial Development Zone, Hefei, P.R.China.
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