SUNGROW

Quick User Manual

SH5K-20

Grid-Connected Hybrid Inverter

SH5K-20-QUEN-Ver13-201805 Version：1.3

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Notice

In no case shall this manual substitute for the user manual or related notes on the device.

Contents will be periodically updated or revised due to product development. The information in this manual is subject to change without advance notice!

Make sure to read over, fully understand and strictly follow the detailed instructions in the user manual and other regulations before installation. Any violation could result in personal death, injury or damage to the device.

The latest manual can be acquired at www.sungrowpower.com.

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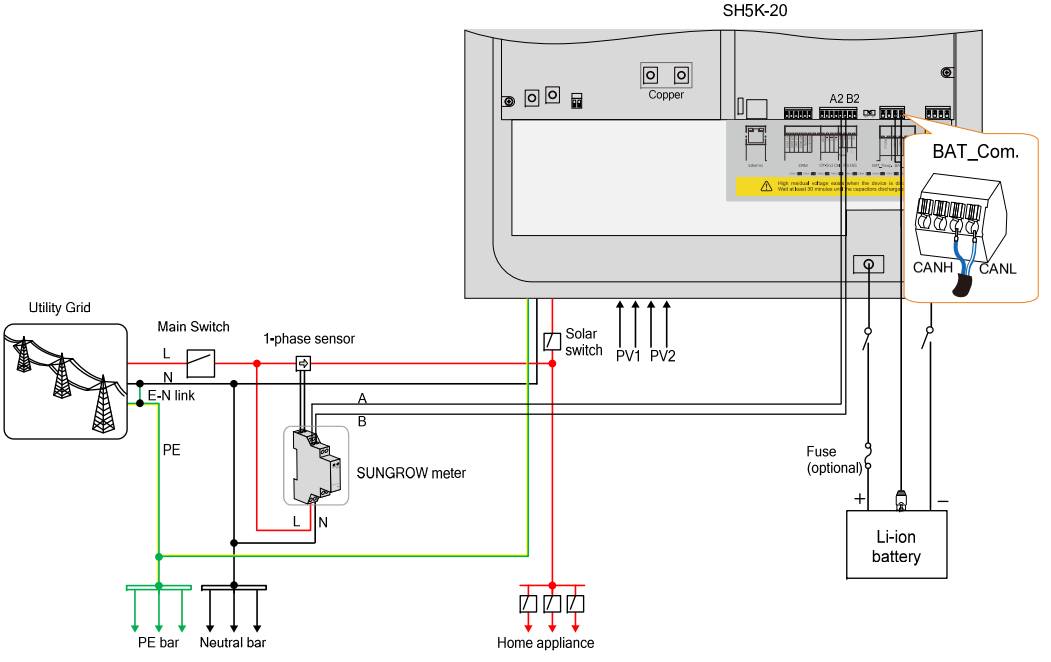
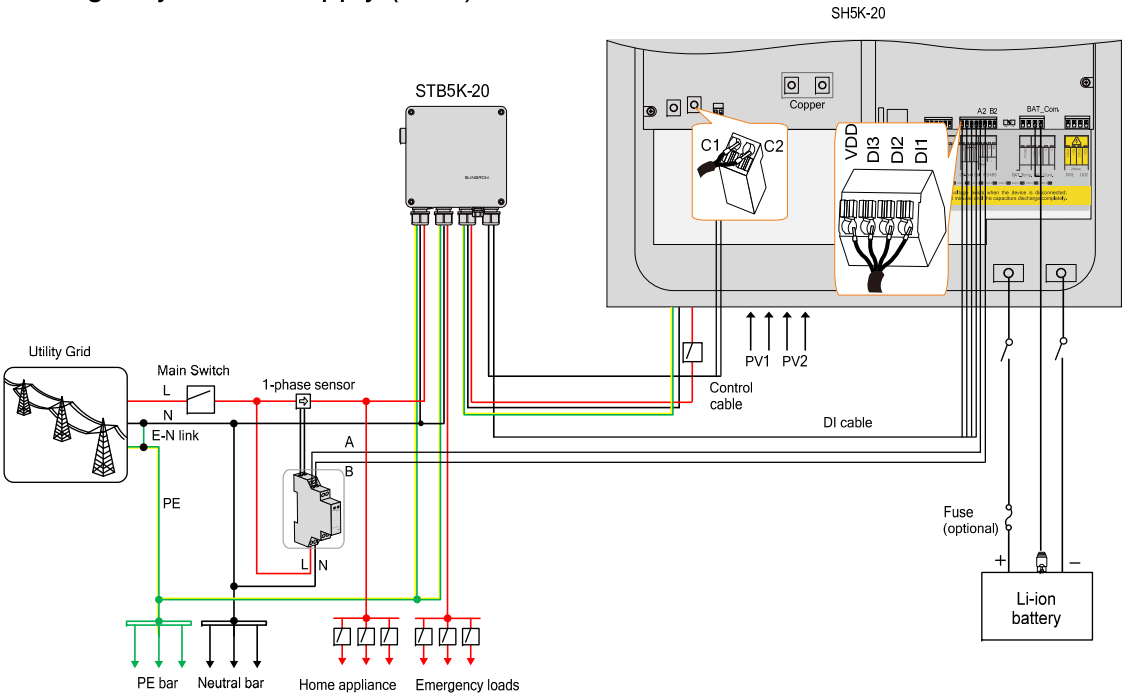
Sungrow/LG/GCL/Pylon (US2000B)/BlueSun/BYD Li-ion Battery



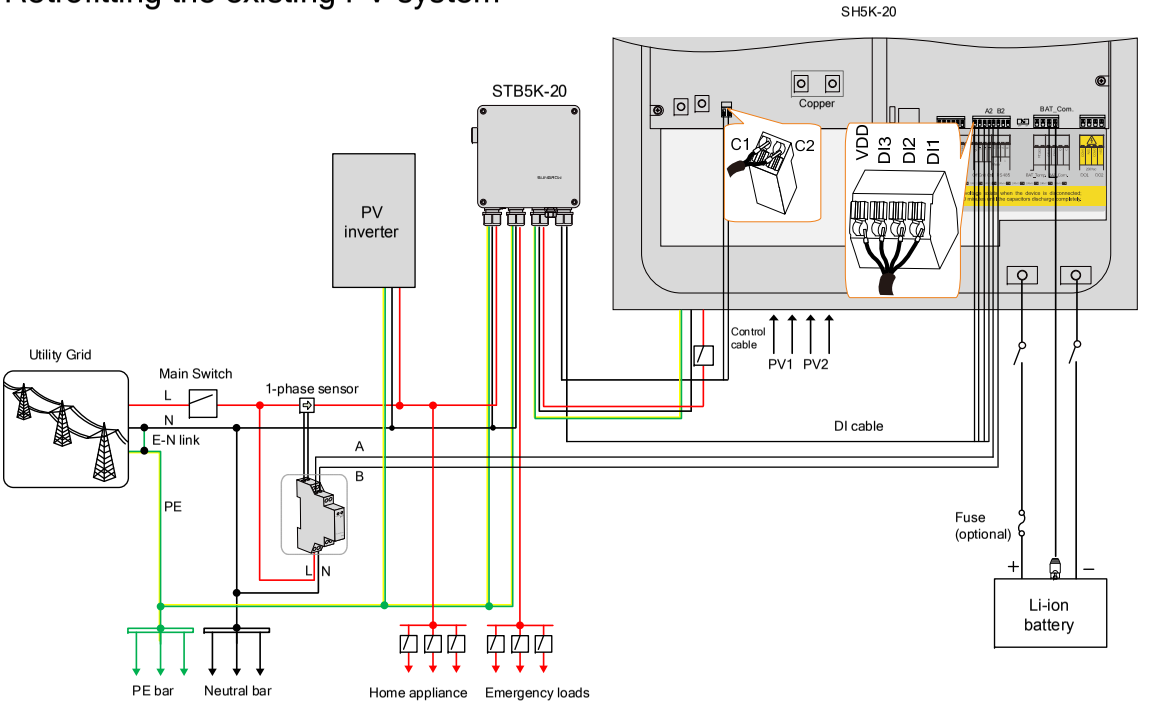
※ The E-N link connection only applies to Australia and New Zealand. Installation of the copper is required in case of parallel PV input.

Emergency Power Supply (EPS)



※ The E-N link connection only applies to Australia and New Zealand. Installation of the copper is required in case of parallel PV input.
The neutral lines for the grid, the EPS and the inverter AC terminals are all inter-connected inside the STB5K-20. And it is the same for the PE lines.

Retrofitting the existing PV system



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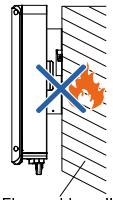
The neutral lines for the grid, the EPS and the inverter AC terminals are all inter-connected inside the STB5K-20. And it is the same for the PE lines.

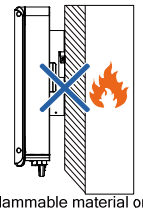
Contents

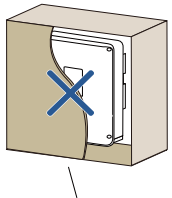
1 Installation

1.1 Location Requirements

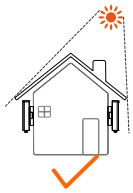
- The concrete wall should be suitable for the weight and the dimensions of the inverter.
- The location should be convenient for installation, cable connection and service.
- The location should be not accessible to children.
- The location should be away from flammable materials or gas, and the environment should not be enclosed.

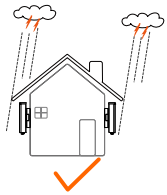

Flammable wall

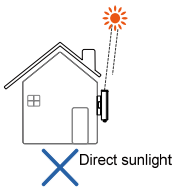

Flammable material or gas near the installation

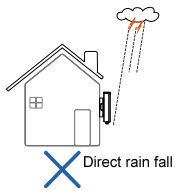

Closed Cabinet

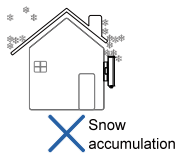
- The shaded side of the building would be better.



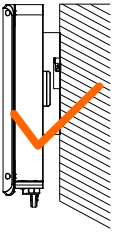


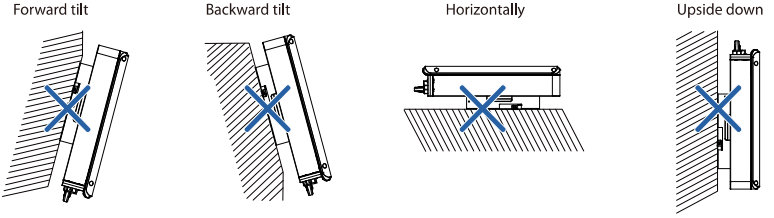

Direct sunlight


Direct rain fall

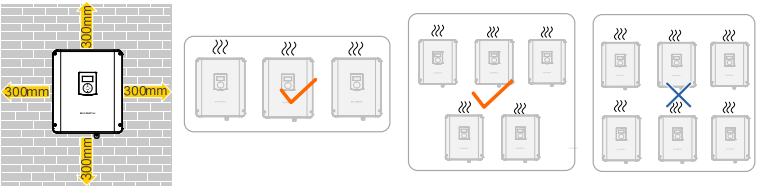

Snow accumulation

- Install vertically for sufficient heat dissipation.





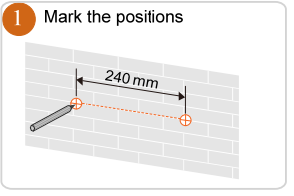
- Clearance requirements for single and multiple installation:

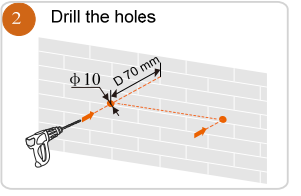


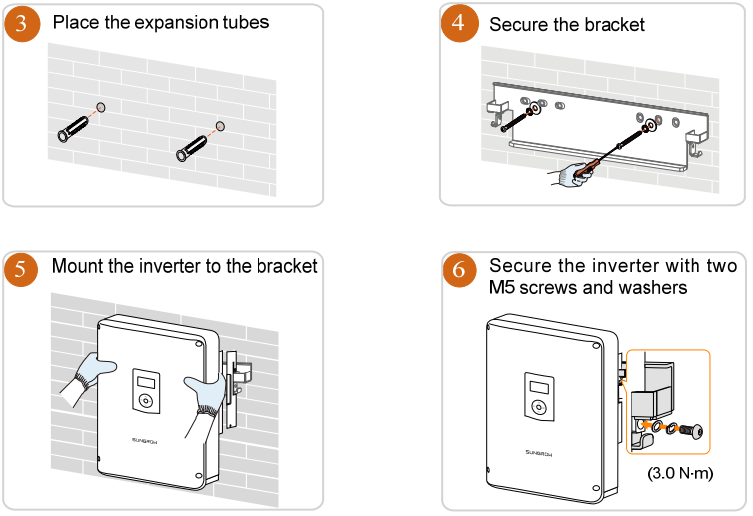
1.2 Installing the Inverter

Install the inverter on the wall by means of the wall-mounting bracket and the expansion plug sets.

The depth of the holes should be about 70 mm. Be sure to adhere to the following screw assembly sequence: self-tapping screw, spring washer, fender washer, wall-mounting bracket.







1.3 Installing the Energy Meter

The SUNGROW Energy Meter should be installed between the grid and the load. It supports a 35 mm DIN-rail installation, as shown in the following figure.

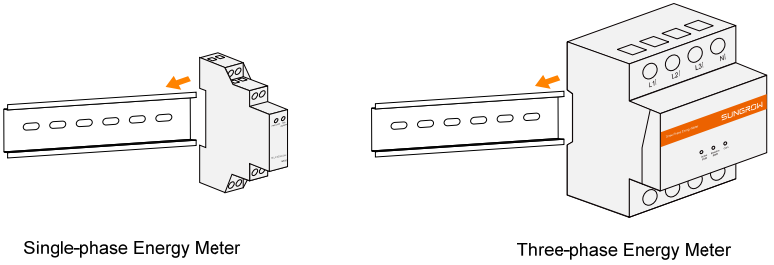


Fig. 1-1 Installing the Meter to the Rail

The single-phase Energy Meter and the three-phase Energy Meter are alternative in the delivery. The meter figures in this document have been created for the single-phase Energy Meter unless otherwise specified.

2 Electrical Connection

2.1 Terminal Description

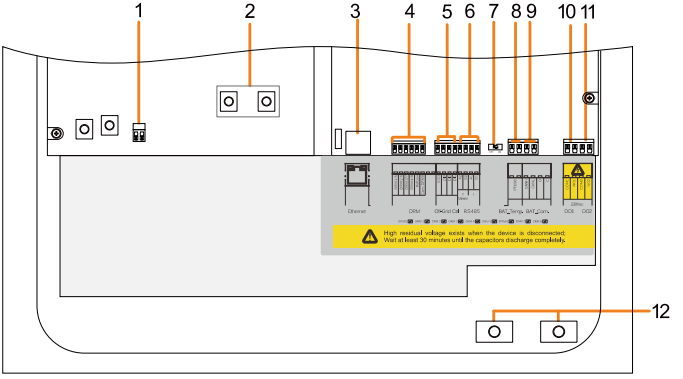


Fig. 2-1 Configuration Circuit Board Inside the Inverter

No.	Label	Connection	Tool Requirements
1	C1, C2	Backup box STB5K-20	Flat-head screwdriver with an open end of 3 mm
2	Copper	PV (for parallel mode)	Phillips screwdriver
3	Ethernet	Communication	-
4	DRM	Demand response enabling device (DRED)	Flat-head screwdriver with an open end of 2 mm
5	DI	Backup box STB5K-20	
6	RS485	A1, B1 reserved, A2, B2 for the meter	
7	120 Ohm	RS485	-
8	BAT_Temp.	Temperature sensor PT1000	Flat-head screwdriver with an open end of 3 mm
9	BAT_Com. (CANH, CANL)	Battery communication	
10	DO1	Power management	
11	DO2	Earth fault alarm	
12	BAT+, BAT-	Battery	Phillips screwdriver

2.2 Grounding the Inverter

A second protective earth (PE) terminal is equipped at the side of the inverter. Be sure to connect this PE terminal to the PE bar for reliable grounding and ensure that the grounding resistance should be less than 10 Ohm.

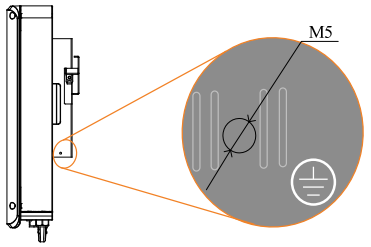
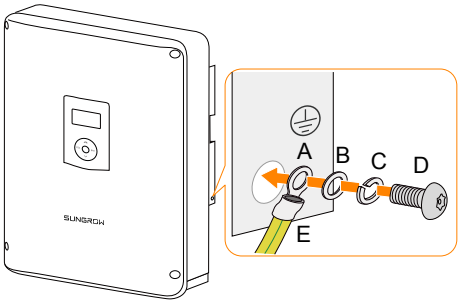


Fig. 2-2 Second PE Terminal

WARNING

In no case shall the second PE connection substitute for the PE connection on the terminal block of AC connector. Be sure to connect both PE terminals for reliable grounding. The loss of any or all the warranty rights may follow if otherwise.

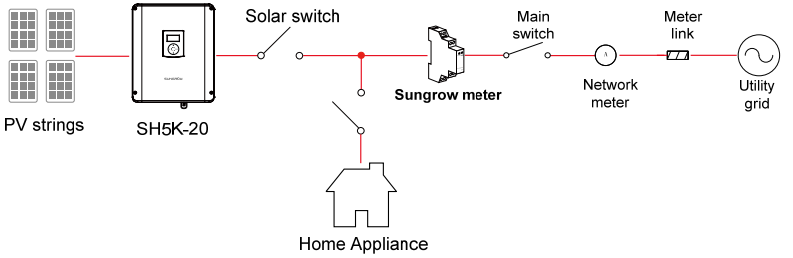
Second PE Connection



Item	Description	Specification
A	Cable socket	-
B	Washer	-
C	Spring washer	-
D	Screw	M5 x 12 mm (3.0 N·m)
E	Yellow-green cable	6 mm^2–10 mm^2 copper wire or 10 mm^2–16 mm^2 aluminum wire

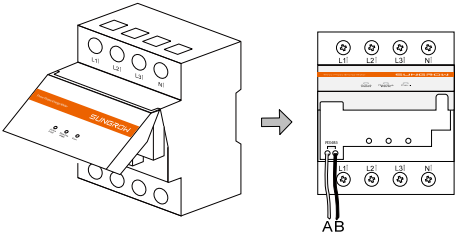
2.3 Meter Connection

The Sungrow energy meter is installed next to the main switch.

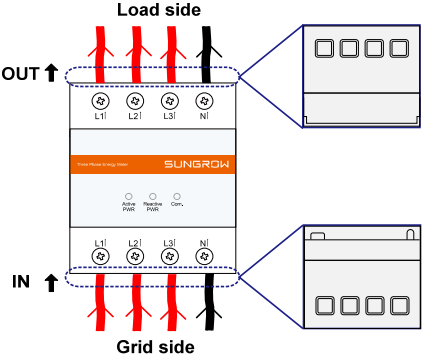


For Three-phase Energy Meter

1. Take out the RS485 cable from the packaging and connect the ends to terminals A and B on the Energy Meter, as shown below.



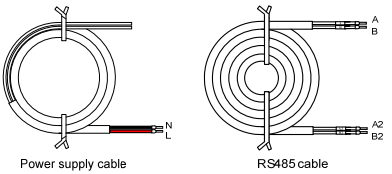
2. Strip the insulation from the power wires by 10 mm. Then connect the wires to the terminals on the Energy Meter, as shown below. (Cross-section: 10 mm^2 to 25 mm^2)



- The line conductor L1 supplies power to the Energy Meter. At least the line conductor L1 and the neutral conductor must be connected to switch on the Energy Meter.
- Just connect the line conductor L1 and the neutral conductor, then the three-phase Energy Meter can be used as a single-phase meter.

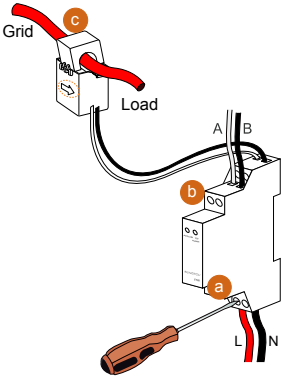
For Single-phase Energy Meter

1. Take out the meter (with 1-phase sensor) and the cables from the packaging.



2. Connect the cables to the meter.
   - (a) Tighten the power supply wires to terminal **3 (L)** and terminal **6 (N)**.
   - (b) Tighten the RS485 wires to terminal **2** and terminal **5**.
   - (c) Place the 1-phase sensor around the phase wire (**L**) from the main switch.

The CT clamp of 1-phase sensor can be placed before or after the main switch.

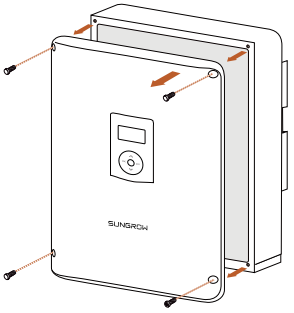


NOTICE

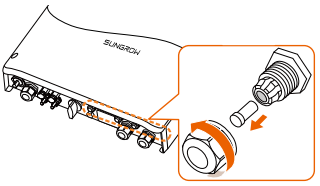
Make sure that the CT clamp of 1-phase sensor is installed in the right direction: the arrow on the sensor must point away from the grid towards the load.

Connecting to the Inverter

1. Unscrew four screws and remove the enclosure lid. Retain the screws for later use.



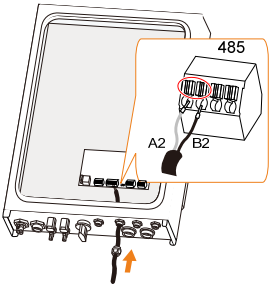
2. Unscrew the swivel nut from any **Com.** port.



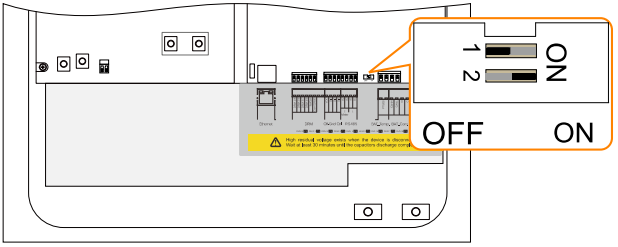
3. Lead the cable through the cable gland.
4. Plug the wires into terminals **A2** and **B2** on the inverter without tool tightening.

   Note:

   For reconnection, press the part as shown in the red circle so as to pull out the cable.



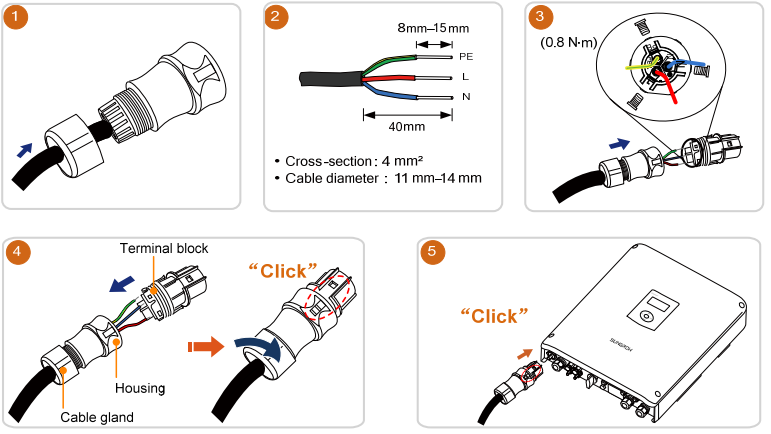
5. When the length of RS485 cable is longer than 100 m, push the 120 Ohm **(2)** switch to "**ON**" to ensure stable communication, as shown below.



2.4 Grid Connection

Install an AC circuit breaker (recommended specification 32 A) between the inverter and the loads.

Make sure to disconnect the AC circuit breaker and secure it against reconnection before cable connection.



2.5 PV Connection

The inverter has two PV inputs and can be configured in the independent mode or parallel mode. Refer to the user manual for mode selection.

⚠ WARNING

Before connecting the PV strings to the inverter, ensure that the impedances between the positive terminals of the PV string and Earth, and between the negative terminal of the PV string and Earth are larger than 200 kΩ.

NOTICE

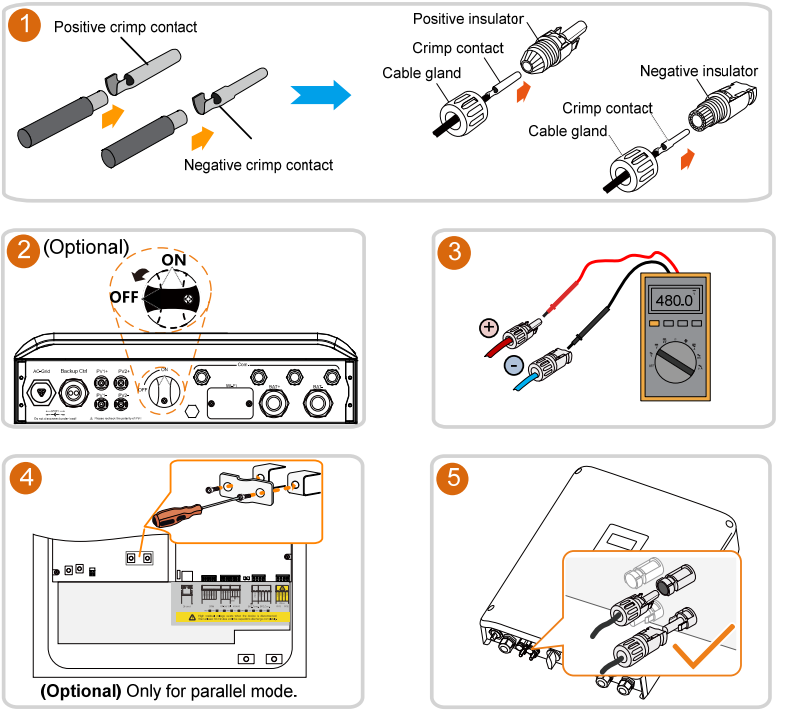
The inverter will not function properly if the DC polarities are reversed. Check the positive and negative polarities of the PV cells.

If the PV connectors are not assembled into place, it may cause an arc or overheat. The loss caused by this issue will void the warranty.

Cable Requirements

Cross-Section	Cable Diameter	Max. Withstand Voltage	Max. Withstand Current
4 mm²–6 mm² AWG12–AWG10	6 mm–9 mm	600 V	Same as short-circuit current

- Strip the insulation from the cables by 7 mm–8 mm.
- Tighten the cable gland with torque of 2.5 N·m–3.0 N·m.

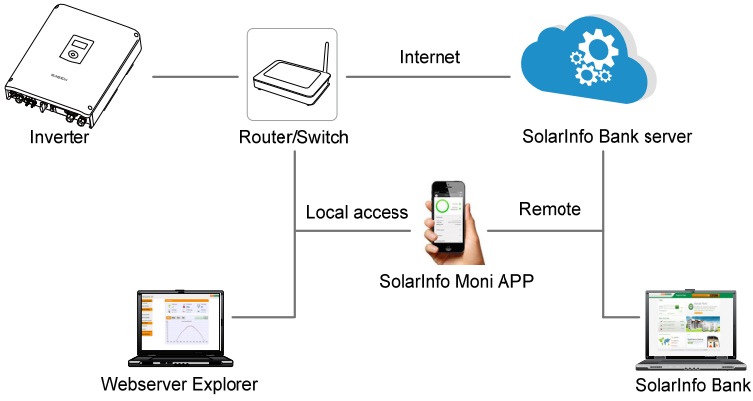


2.6 Communication Connection

2.6.1 Ethernet Connection

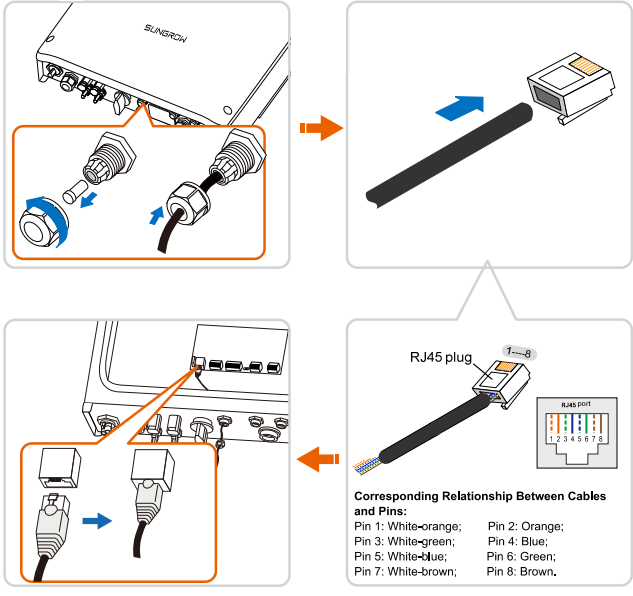
Connect the inverter to the PC through the **Ethernet** port to set up the Ethernet communication.

The Ethernet connection with a router is shown in the following figure.



Use a TIA/EIA 568B standard network cable with a diameter of 3 mm–5.3 mm.

Remove the cable jacket by 8 mm–15 mm, and use the Ethernet crimper to crimp the cable.



2.6.2 Wi-Fi Connection

1. Unscrew the waterproof lid from the Wi-Fi terminal.
2. Install the Wi-Fi module. Slightly shake it by hand to determine whether it is installed firmly.
3. Refer to the **Quick User Manual** delivered with the Wi-Fi module to configure the Wi-Fi.

2.7 Battery Connection

For the connections on the battery side, see the manuals supplied by the battery manufacturer.

WARNING

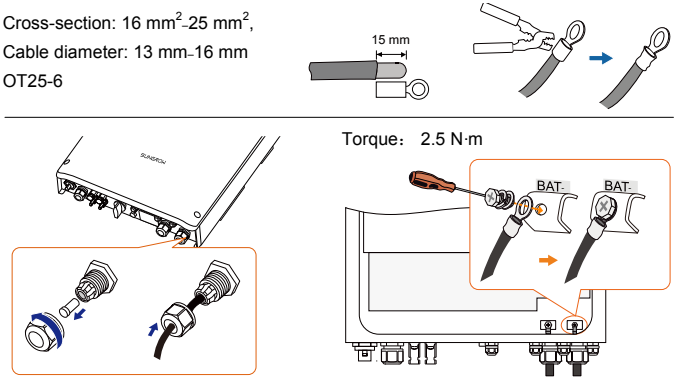
Only use properly insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, use electrical tape to cover the entire exposed metal surfaces of the available tools except their tips.

2.7.1 Connecting the Power Cable

NOTICE

A two-pole DC circuit breaker with over-current protection (voltage rating not less than 100 V and current rating not less than 100 A) should be installed between the inverter and the battery.

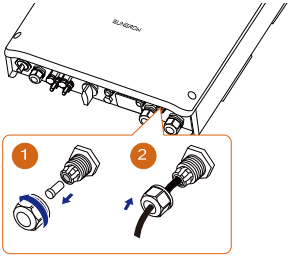
Be sure to adhere to the following screw assembly sequence: screw head, spring washer, fender washer, OT terminal.

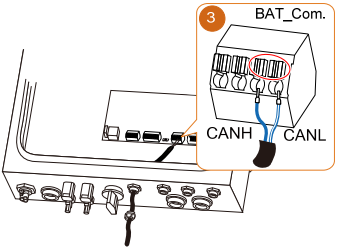


2.7.2 Connecting the CAN Cable

The CAN cable enables communication between the inverter and the Li-ion battery from LG, Sungrow, GCL, Pylon (US2000B) or BYD.

Take out the CAN cable from the packaging. Lead the cable through the cable gland and plug the wires into the corresponding terminals without tool tightening. For reconnection, press the part as shown in the red circle so as to pull out the cable.

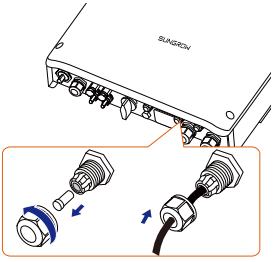


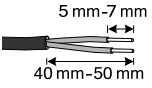


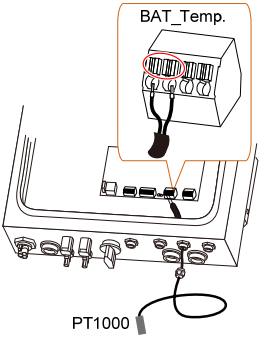
2.7.3 Connecting the Temperature Sensor

It is recommended that the PT1000 is connected to the inverter to sample the temperature of the lead-acid battery or the external environment of the battery. The temperature sensor is located next to the lead-acid battery.

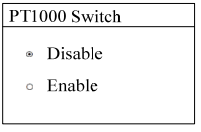
Cross-section: 1.0 mm^2, cable diameter: 3 mm–5.3 mm. For reconnection, press the part as shown in the red circle so as to pull out the cable.







The temperature sampling function of the sensor PT1000 for lead-acid batteries is disabled by default. You can set it to *Enable* via the settings in the LCD menu.



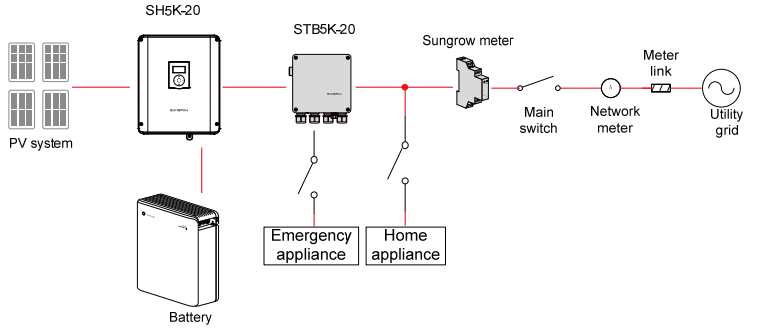
2.8 STB5K-20 Connection (EPS)

The backup box STB5K-20 is installed between the SUNGROW meter and the hybrid inverter. For the installation and the cable connection of STB5K-20, see the Quick Installation Guide delivered with the STB5K-20 module.

If the backup box STB5K-20 is installed, you should enable the EPS function and set the reserved capacity via the LCD. For details, see **step 6** in the section "**3.3 LCD Initial Settings**".

NOTICE

In an energy storage system with multiple hybrid inverters in parallel, the hybrid inverters cannot work in EPS mode.



Connecting the Power Cables

WARNING

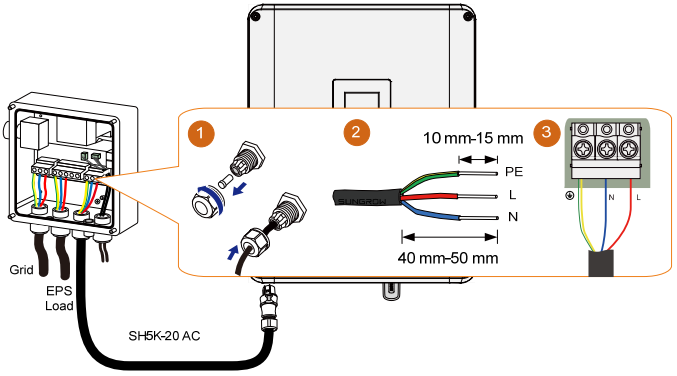
Risk of inverter damage due to incorrect cable connection. Do not connect the grid power wires to EPS LOAD terminals.

A residual current device (RCD) should be required on the EPS LOAD port of the backup box STB5K-20.

The neutral lines for the grid, the EPS and the inverter AC terminals are all inter-connected inside the STB5K-20. And it is the same for the PE lines.

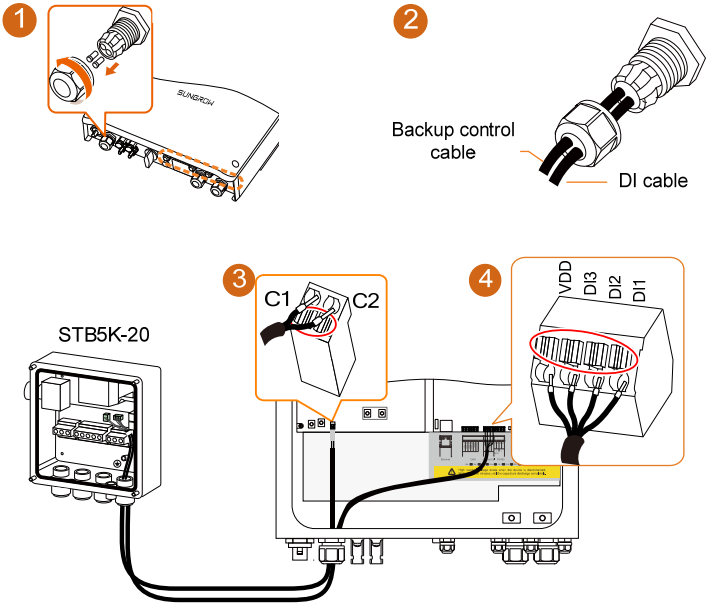
Connect terminals L1, N1 and PE to the grid, and connect terminals L4, N4 and PE to the AC connector and then to the AC terminal on SH5K-20.

Cross-section: 4 mm^2, cable diameter: 11 mm–14 mm



Connecting the Control Cable and DI Cable

The control cable (with end marks **C1** and **C2)** and the DI cable (with end marks **DI1**, **DI2**, **DI3** and **VDD)** are equipped in the backup box STB5K-20 before delivery.



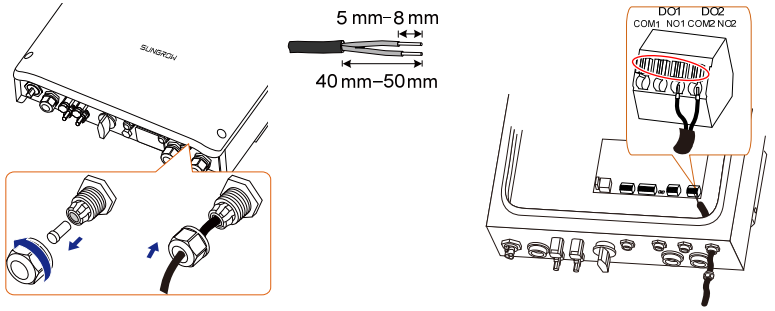
For reconnection, press the part as shown in the red circle so as to pull out the cable.

2.9 DO Connection

The inverter has two DO relays with different functions as follows:

- DO1: Consumer load control. Please choose the appropriate contactor according to the load power, e.g., the contactor types of the 3TF30 series from SIEMENS (3TF30 01-0X). The relay is activated once the conditions of the control mode are satisfied.
- DO2: Earth fault alarm. Once the inverter receives the earth fault signal, the relay closes the contact. The relay remains triggered until the fault is removed.

Cross-section: 1.0 mm^2, cable diameter: 3 mm–5.3 mm



For reconnection, press the part as shown in the red circle so as to pull out the cable.

2.10 DRED Connection

The inverter supports the DRM (Demand Response Mode) function as specified in AS/NZS 4777:2015. The terminal block inside the inverter is used for connecting to a demand response enabling device (DRED). The DRED asserts DRMs. The inverter detects and initiates a response to all supported demand response commands within 2s. The following table lists the DRMs supported by the inverter.

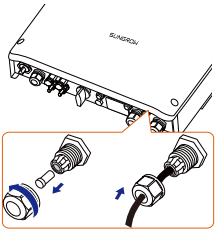
Tab. 2-1 DRMs Supported by the Inverter

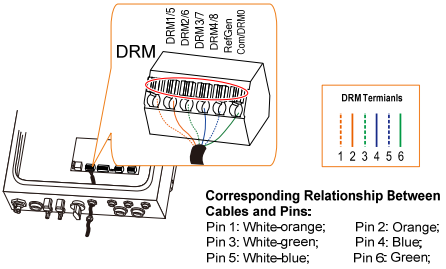
Mode	Explanation
DRM0	The inverter is in the state of "Turn off".
DRM1	The import power from the grid is 0.
DRM2	The import power from the grid is no more than 50 % of the rated power.
DRM3	The import power from the grid is no more than 75 % of the rated power.
DRM4	The import power from the grid is 100 % of the rated power, but subject to the constraints from other active DRMs.

Mode	Explanation
DRM5	The export power to the grid is 0.
DRM6	The export power to the grid is no more than 50 % of the rated power.
DRM7	The export power to the grid is no more than 75 % of the rated power.
DRM8	The export power to the grid is 100 % of the rated power, but subject to the constraints from other active DRMs.

The DRED may assert more than one DRM at a time. The following shows the priority order in response to multiple DRMs.

Multiple Modes	Priority Order
DRM1…DRM4	DRM1 > DRM2 > DRM3 > DRM4
DRM5…DRM8	DRM5 > DRM6 > DRM7 > DRM8





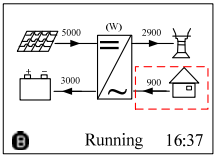
* The cable for connecting to the DRED is not included in the delivery. For reconnection, press the part as shown in the red circle so as to pull out the cable.

2.11 Retrofitting the Existing PV System

The SH5K-20 hybrid inverter is compatible with any single-phase PV grid-connected inverters. An existing PV system can be retrofitted to be a PV ESS with the addition of SH5K-20.

The power generation from the existing PV inverter will be firstly provided to the loads and then charge the battery. With the energy management function of the SH5K-20, the self-consumption of the new system will be greatly improved.

The existing PV inverter works as a load in the whole system but supply PV power to the PV ESS, as the power flow shown on the main screen.



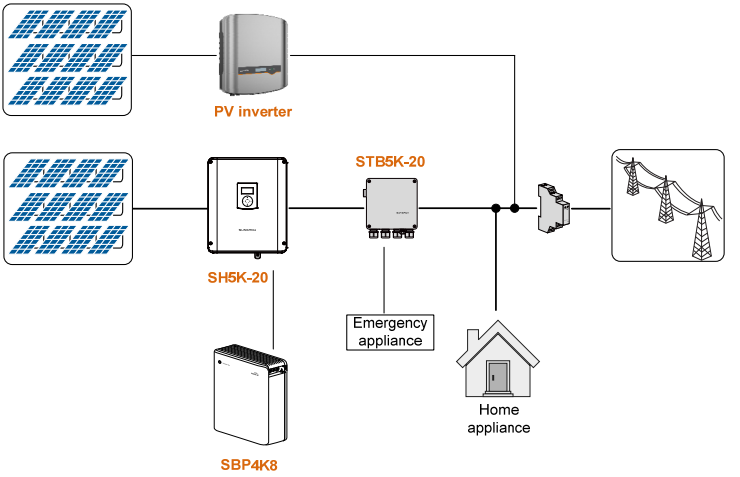


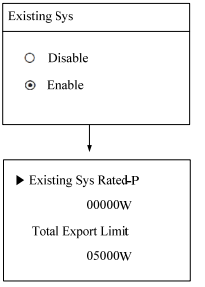
Fig. 2-3 Retrofitting the Existing PV System

The LCD settings for retrofitting an existing PV system are as follows. Refer to **Fig. 4-1 LCD Menu Tree** for the navigation.

Existing Sys Rated-P: rated power of the existing system.

Total Export Limit: export power upper limit of the new system

- The lower limit is the rated power of the existing PV system.
- The upper limit is ([rated power of the hybrid inverter] + [rated power of the existing PV system]).



For example, retrofit an existing PV system (rated power: 3000 W) with SH5K-20 hybrid inverter (rated power: 5000 W). The total export limit can be set from 3000 W to 8000 W.

The export power limit can also be set in the zero-export setting in commissioning. The settings in the two submenus are from the same source. If one is changed, the other will synchronize the value.

3 Commissioning

3.1 Button Function

The inverter offers four buttons for operation. Please refer to the following table before any operation of the inverter.

Tab. 3-1 Button Function

Button	Description
▲	For navigating up or increasing the setting value.
▼	For navigating down or decreasing the setting value.
ESC	For navigating to the left, quitting the menu or canceling the settings.
ENT	For navigating to the right or confirming a selection or settings.

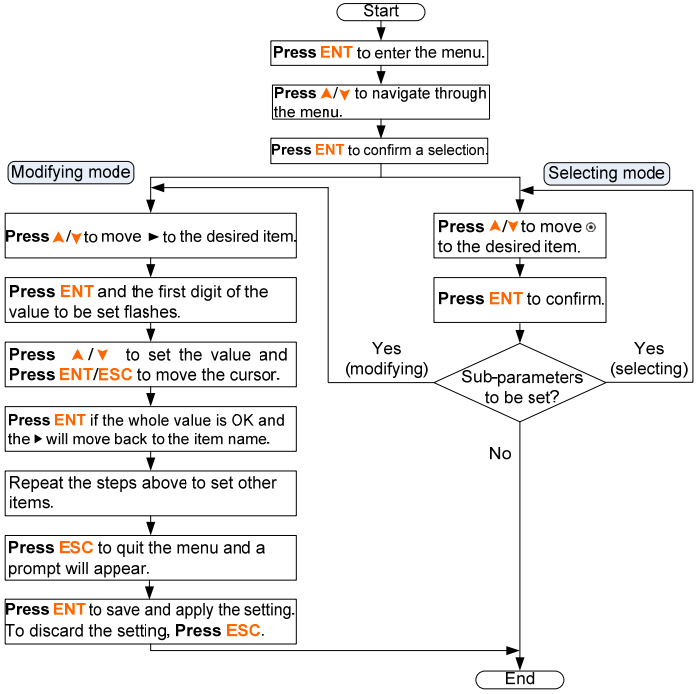
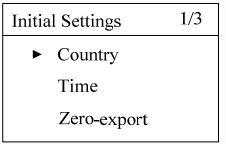


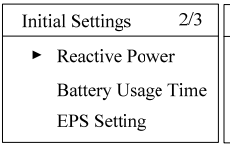
Fig. 3-1 Button Operations

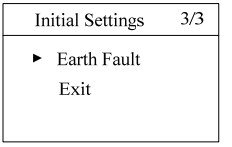
3.2 Powering on the System

Before starting the inverter, make sure that all the installation and connections are completed and verified. Proceed as follows to start the inverter for the first time.

1. Connect the AC circuit breaker.
2. Connect the DC circuit breaker between the inverter and the battery.
3. **(Optional)** Turn on the switch on the battery manually if the battery is equipped with a switch (such as LG Li-ion battery, Pylon Li-ion battery and lead-acid battery).
4. Rotate the DC switch to "ON". The DC switch may be integrated in SH5K-20 or installed by the customer.
5. The LCD screen will be activated 5s later and enter the initial settings.

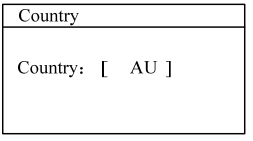


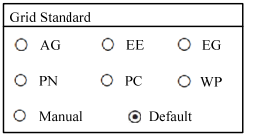




3.3 LCD Initial Settings

1. Set the country code. For the code "AU", select the grid standard as shown in the following figures.





Tab. 3-2 Grid Standard Description

Grid company Code	Company
AG	AusGrid, NSW
EE	Ergon Energy, QLD
EG	Energex, QLD
PN	SA Power Networks,SA
PC	Powercor,VIC
WP	Western Power,WA
Default	Company not mentioned above

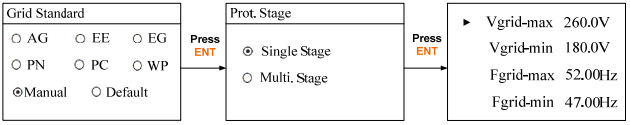
The values listed in the following table are for your reference only. Please follow the requirements of local grid standard.

Tab. 3-3 Parameters for the Grid Standards in Australia

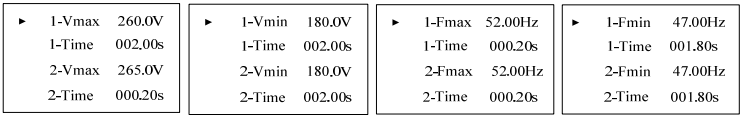
Parameter	Default	AG	EE	EG	PN	PC	WP
Over-voltage							
1-V_{max} (V)	260.0	260.0	260.0	260.0	260.0	260.0	260.0
1-Time (s)	2.0	1.80	1.80	1.80	1.80	1.80	1.80
2-V_{max} (V)	265.0	265.0	265.0	265.0	265.0	265.0	265.0
2-Time (s)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Under-voltage							
1-V_{min} (V)	180.0	200.0	180.0	180.0	180.0	180.0	180.0
1-Time (s)	2.0	1.80	1.80	1.80	1.80	1.80	1.80
2-V_{min} (V)	180.0	200.0	180.0	180.0	180.0	180.0	180.0
2-Time (s)	2.0	1.80	1.80	1.80	1.80	1.80	1.80
Over-frequency							
1-F_{max} (Hz)	52.00	52.00	52.00	52.00	52.00	52.00	51.50
1-Time (s)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2-F_{max}(Hz)	52.00	52.00	52.00	52.00	52.00	52.00	51.50
2-Time (s)	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Under-frequency *							
1-F_{min} (Hz)	47.00	48.00	47.00	47.00	47.00	47.00	47.00
1-Time (s)	1.50	1.50	1.50	1.50	1.50	1.50	1.50
2-F_{min}(Hz)	47.00	48.00	47.00	47.00	47.00	47.00	47.00
2-Time (s)	1.50	1.50	1.50	1.50	1.50	1.50	1.50
10-min voltage							
1-$V_{10\text{-}min}$ (V)	255.0	255.0	255.0	257.0	258.0	255.0	258.0

* In New Zealand, the default value for under-frequency protection is 45.00 Hz, the others are the same as that in Australia. Refer to **Tab. 4-3** for the parameter explanations.

Set the protective parameters if you choose "Manual" (single stage):



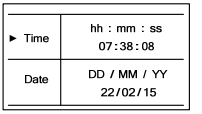
The multiple stage parameters are as follows.



2. Set the system time, which is very important and directly affects data logging.

DD, MM, and YY stand for day, month, and year respectively.

hh, mm, and ss stand for hour, minute, and second respectively.

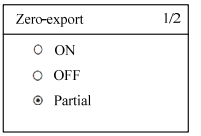


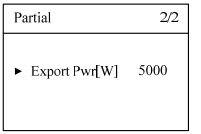
3. Zero-export setting

ON: no power could be exported to the grid.

OFF: all inverter output power could be exported to the grid.

Partial: partial of the output power could be exported to the grid.





Export power range:

When the existing system is disabled: 0–5000 W

When the existing system is enabled,

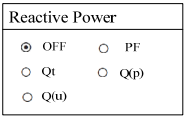
- the lower limit is the rated power of the existing system; and
- the upper limit is (5000 W + [rated power of the existing system]).
- the value will synchronize with the settings for retrofitting an existing system described in section "**2.11 Retrofitting the Existing PV System**".

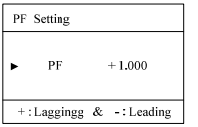
4. Reactive power regulation setting

OFF: The reactive power regulation function is disabled. The power factor (PF) is limited to +1.000.

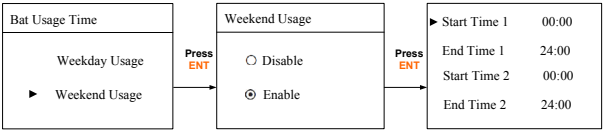
PF: The inverter is capable of operating with fixed power factor. The PF ranges from 0.8 leading to 0.8 lagging.

Leading means the inverter is sourcing reactive power to the grid and lagging means the inverter is sinking reactive power from the grid. For the explanations of other modes, see the section **12.2** in the user manual.





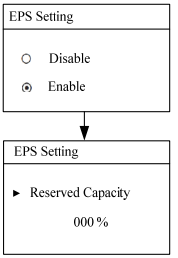
5. Battery usage time setting



6. EPS function setting

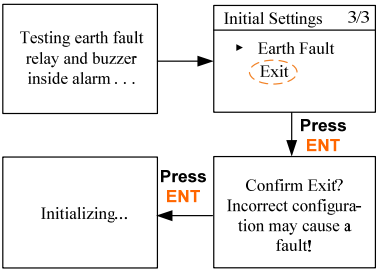
The emergency power supply (EPS) function is disabled by default. If the backup box STB5K-20 is installed, enable this function and set the reserved capacity.

The reserved capacity is the on-grid minimum battery discharge level. The reserved battery capacity will be supplied to the emergency loads in the off-grid system. If the battery type is set to "Other Battery", it is not need to set the reserved capacity.



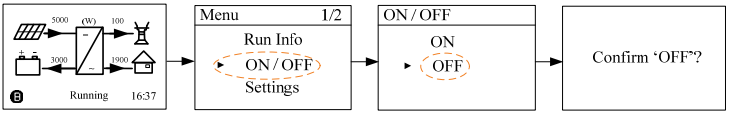
7. Test earth fault alarm and then automatically return to initial menu after 3 s.

After successful commissioning, the LCD screen will enter the main screen.

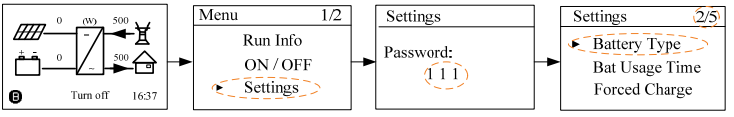


8. **(Optional)** For lead-acid batteries, you should manually set the battery type.

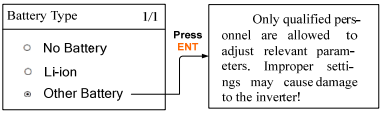
– Turn off the inverter via the LCD menu.



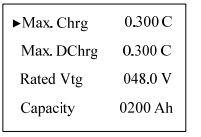
– Set the battery type to "Other Battery".

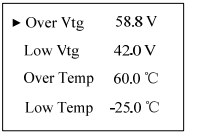


Press ▲ / ▼ to select "Other Battery" and **Press ENT** to confirm.

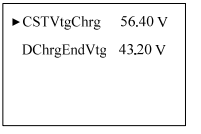


Max. Chrg / Max. DChrg:
Make sure that the charge or discharge current is not beyond the upper limit (65 A) to protect the battery from overcharging or deep discharging.
The unit ***C*** is the "capacity". If the max. charge or discharge is set to more than 65 A (e.g. C = 600 Ah, 0.3C = 180 A), then the inverter will limit the charge and discharge current to 65 A.
If the battery voltage or temperature is beyond the allowable range, the related error codes will be triggered and the protection function will be activated to stop charging or discharging.





***DChrgEndVtg*:**
Stop discharging at a voltage not lower than DChrgEndVtg, so as to protect the battery from deep discharging.
The ***DChrgEndVtg*** setting value should be higher than the ***Low Vtg*** setting value.



Tab. 3-4 Parameter Description for Other Battery

Parameter	Description	Range
Max. Chrg	The upper limit of the charging current	0.05 C to 2 C
Max. DChrg	The upper limit of the discharging current	0.1 C to 2 C
Rate Vtg	The rated voltage of the equipped battery	30 V to 60 V
Capacity	Capacity of the battery tray	10 Ah to1000 Ah
Over Vtg	The upper limit of battery voltage when charging	48 V to 70 V
Low Vtg	The lower limit of battery voltage when discharging	32 V to 48 V
Over Temp	The upper limit of battery temperature	20℃ to 70℃
Low Temp	The lower limit of battery temperature	-30℃ to 10℃
CSTVtgChar	The voltage of constant-voltage charging.	40 V to 63 V
DChrgEndVtg	The voltage at which the discharging is stopped	30 V to 53 V

*C is the "capacity", which refers to the maximum amount of charge that a battery can store. Refer to the manufacturer's specifications for details.

9. Check the icons on the main screen. Refer to **Tab. 4-1** for the explanations.
10. Check the state of the LED indicator.

Tab. 3-5 State Description for the LED Indicator

Color	Status	Description
Green	On	The inverter is running normally.
	Blinking	The inverter is in the process of starting.

Color	Status	Description
	Off	Other states except Running and Starting. (Refer to **Tab. 4-1** for state descriptions.)
Red	On	Permanent fault or upgrade failure.
	Blinking	Other system faults or main alarms.
	Off	No fault occurs.

11. Visit www.solarinfobank.com or SolarInfo Moni APP to view inverter information. Get the related manuals at www.sungrowpower.com.

If the inverter commissioning fails, **Press** ▼ to view the current faults. Remove the existing malfunctions and then repeat starting up the inverter according to the procedure detailed in this section.

NOTICE

In the case of commissioning failure, power off the system and wait 1 minute to commission the system again.

3.4 Result Verification

3.4.1 Meter Installation and Connection

For the single-phase meter, with the signal from the 1-phase sensor, the inverter determines the energy exchange with the utility grid on one phase. The CT clamp of 1-phase sensor can be placed before or after the main switch.

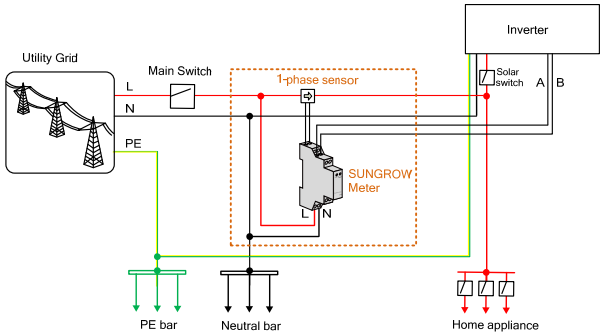


Fig. 3-2 Correct Installation and Connection of the Single-phase Meter

The following figure shows the correct installation and connection for the three-phase meter.

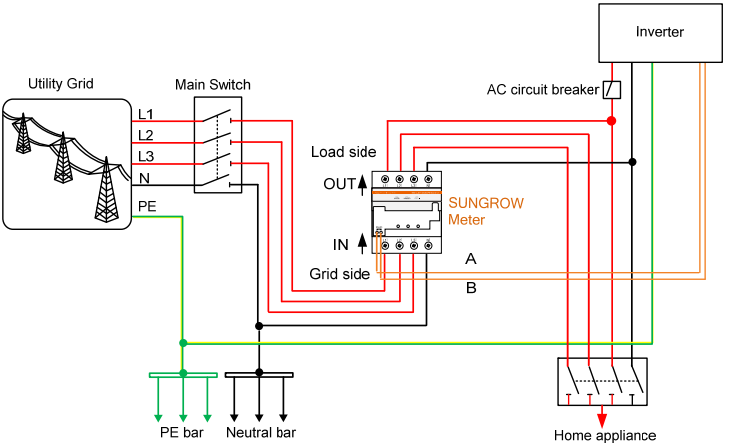
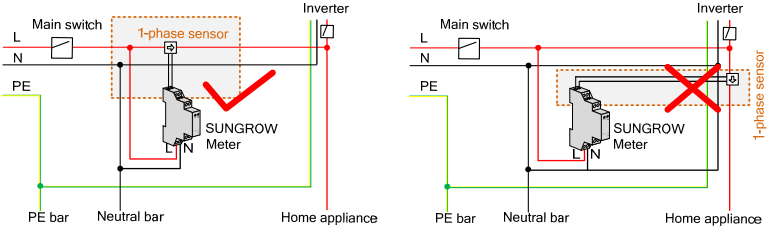


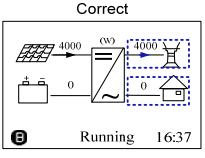
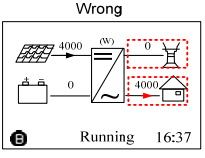
Fig. 3-3 Correct Installation and Connection of the Three-phase Meter

Make sure to disconnect the DC switch between the inverter and the battery before verification.

For Incorrect Installation Position

Make sure that the 1-phase sensor of the SUNGROW meter should be placed to the phase line (L) from the main switch. If otherwise, the energy flow indicated on the LCD will be wrong.



Action	LCD Display Explanation
Turn off all the household loads. All the PV power generation should be exported to the grid, as shown in the "Correct" figure.	Correct  Wrong 

For Reverse Sensor Connection

Make sure that the arrow on the 1-phase sensor must point away from the grid towards the load. If otherwise, the energy flow indicated on the LCD will be wrong.

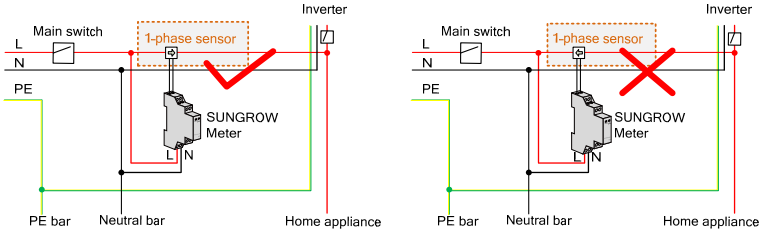


Fig. 3-4 Correct CT Installation for Single-phase Meter

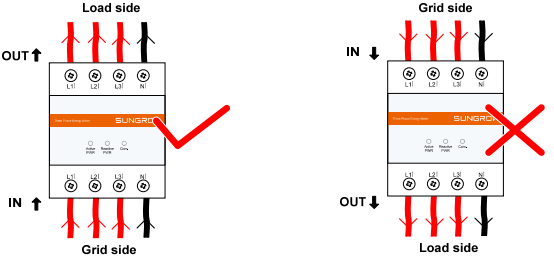
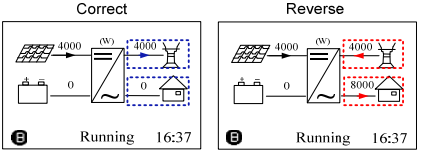
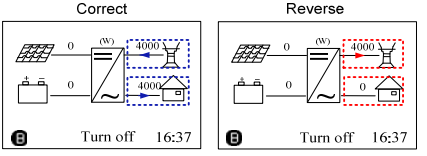


Fig. 3-5 Correct Power cable connection for Three-phase Meter

Action	LCD Display Explanation
Method 1: Turn off all the household loads. All the PV power generation should be exported to the grid, as shown in the "Correct" figure.	
Method 2: Stop the inverter via the LCD menu. Turn on the household loads. All the load power consumption should be imported from the grid, as shown in the "Correct" figure.	

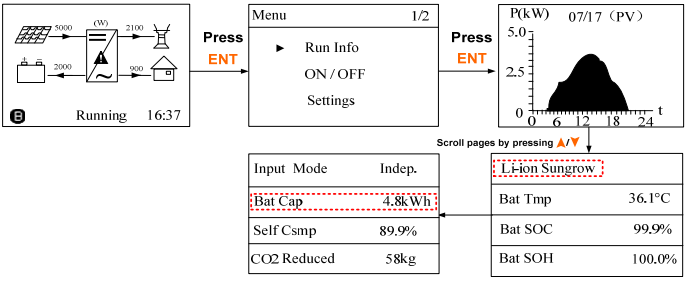
NOTICE

The reverse sensor connection will cause the communication fault 084.

To clear the fault 084, firstly place the sensor in correct direction, turn off the DC power sources and then restart the system.

3.4.2 Battery Information

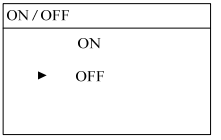
After initial settings, check the detailed battery information on the LCD display.



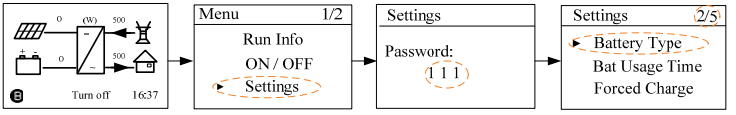
For Li-ion batteries, the type can be automatically identified and set to "Li-ion" on the LCD. Manually set the type to "Other Battery" for lead-acid batteries. Proceed as follows to modify.

1. Stop the inverter via the LCD menu.

   Confirm your choice by **pressing ENT**.



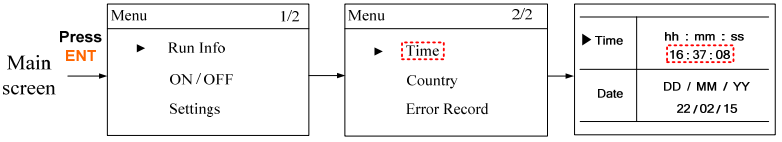
2. Reset the battery type and parameters. Proceed as follows to enter the submenu.



3. Start the inverter via the LCD menu.

3.4.3 System Time

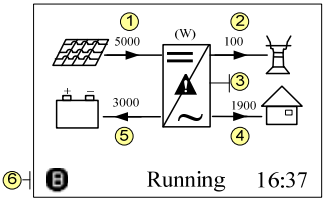
The correct system time is very important. If there is deviation between the system time and the local time, the inverter will not operate normally. The clock is in 24-hour format. Proceed as follows to set the correct time.


Main screen
Press ENT
Menu 1/2
Run Info
ON / OFF
Settings
Menu 2/2
Time
Country
Error Record
Time
hh : mm : ss
16 : 37 : 08
Date
DD / MM / YY
22 / 02 / 15

4 LCD Operation

4.1 Main Screen

Refer to **Tab. 3-1 Button Function** for the operation instructions. If the inverter succeeds in commissioning, the LCD screen will enter the main screen.



No.	Description
1	Current PV input power
2	Current export power
3	Warning information
4	Total load consumption
5	Battery charge/discharge power
6	System status bar

: The inverter and the SolarInfo Bank server are successfully connected.
Running: The inverter is in its normal running state.
16:37: Current system time.
Neither the grid power nor the load power will be displayed on the main screen in case of no SUNGROW meter installed.

Tab. 4-1 State Descriptions

State	Description
Running	After being energized, the inverter tracks the PV strings' maximum power point (MPP) and runs with the combination of the energy management system. This mode is the normal mode.
Maintain	The system is running normally, with the battery in maintenance process. (Only for lead-acid battery)
Forced	The system is running normally, with the EMS in forced mode.
Ext. EMS	The system is running normally with the control from external EMS.
Standby	The inverter waits for sufficient sunlight or battery level, then the DC voltage recovers. Refer to **Chapter 11** in the user manual for standby time setting via Webserver.
Turn off	The inverter will stop running by manual "OFF" through the LCD menu or with the DRM0 command from the DRED. Set to "ON" if you want to restart the inverter.
Startup	The inverter is initializing and synchronizing with the grid.

State	Description
Upgrade	The DSP or LCD software is in its upgrading process.
Error	If an error occurs, the inverter will automatically stop operation, trigger the AC relay and show "Error" on the LCD with the indicator lit. Once the error is removed in recovery time, the inverter will automatically resume running. Refer to **Chapter 11** in the user manual for recovery time setting via Webserver.
Off-grid	The system is disconnected from utility grid and runs as a stand-alone system.

NOTICE

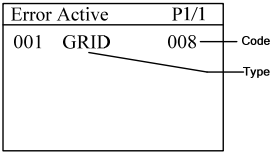
If the inverter is in standby mode for more than 10 minutes, please check:

- **Whether the insolation is sufficient and the PV connection is correct.**
- **Whether the battery level is sufficient and the cable connection is correct.**
- **If no anomaly is found, disconnect the DC switch and main switch to restart.**
- **If it still does not work, contact SUNGROW.**

4.2 Viewing the Error Codes

Viewing the Active Error

For the ⚠ icon or the "Error" state on the main screen, **press** ▼ to view the current faults. Refer to "**5.2 Troubleshooting of the Errors**" for error description and troubleshooting. Refer to the following table for error type explanations.



Error Type	Explanation
GRID	Grid faults (AC side)
PV	PV faults (DC side)
SYS	System errors (inverter)
PER	Permanent faults
WARN	Warnings
BDCF	Faults of battery charge/discharge circuit
BDCPF	Permanent faults of battery charge/discharge circuit
BATW	Battery warnings
BATP	Battery protection
BATF1	Battery faults
BATF2	

Viewing Error Record

Press ▲/▼ to turn pages and view all fault records.

Error Record		P1/1
001	15022708:55:27	010
002	15022707:11:21	501

4.3 LCD Menu

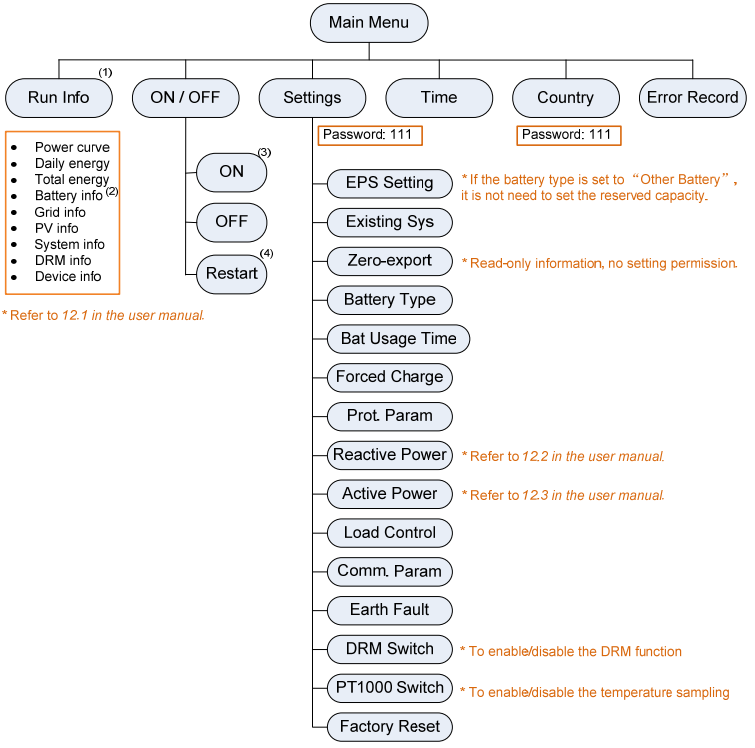


Fig. 4-1 LCD Menu Tree

(1) The power values indicated represent the average values during the time interval. The energy yields displayed are indicative only. For the actual yields, please refer to the electric energy meter.

(2) The SOH value of battery will be displayed as "--" for GCL batteries that do not have this parameter. The SOC value for lead-acid batteries is for reference only.

(3) The DRM0 state will prohibit the "ON".

(4) The "Restart" option will appear only if an unrecoverable fault occurs.

The demand response mode (DRM), reactive power settings about Qt, Q(p), Q(u), and power derating settings are valid only for Australia.

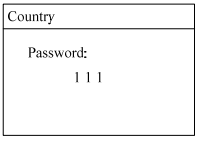
Abbreviations

Abbreviation	Complete	Abbreviation	Complete
Csmp	Consumption	Exp	Export
Chrg	Charge	Tot	Total
Bat	Battery	Tmp	Temperature
SOC	State of Charge	SOH	State of Health
Vtg	Voltage	Curr	Current
Stt	State	Inv	Inverter
Pwr	Power	Frq	Frequency
Cap	Capacity	DRM	Demand respond mode
Ver.	Version	Ref.	Reference
CSTVtgChrg	Constant charging voltage	MDCV	Max. discharging current value
DChrg	Discharge	MCCV	Max. charging current value
Prot.	Protection	Multi.	Multiple
Comm.	Communication	DChrgEndVtg	Final discharg voltage
Sys	System	En.	Enable

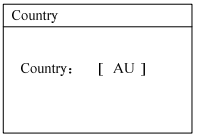
4.4 Setting the Country

The country setting is protected with a password.

Press ▲ and **Press ENT** to input the password **111**.
Press ENT to confirm the password.
Press ▲ to choose the correct country code.



Only the codes of GB, NL, BE, CN, SA, AU and NZ are supported.
Select the correct grid standard for the country code "AU". For grid standard and parameter descriptions, see **Tab. 3-2** and **Tab. 3-3**.



Tab. 4-2 Descriptions of the country codes

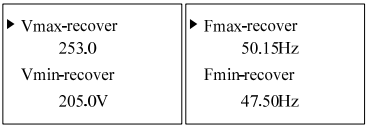
Country Code	Full Name	Language
GB	Great Britain	English
DE	Germany	German
FR	France	French
IT	Italy	Italian
ES	Spain	English
AT	Austria	German
AU	Australia	English
CZ	Czech	English
BE	Belgium	French
DK	Denmark	English
GR_L	Greece Land	English
GR_IS	Greece Island	English
NL	Netherlands	English
PT	Portugal	English
CN	China	Chinese
SE	Sweden	English
US	America	English
SA	South Africa	English
NZ	New Zealand	English
Other	Country not included above	English

Tab. 4-3 Description of Multi. Stage Protective Parameters

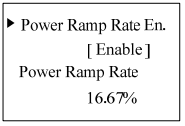
Parameter	Explanation
Max-V prot.	Over-voltage protection
1-V_{max}	Grid over-voltage 1 (V>)
1-Time	Grid over-voltage 1 (V>) tripping time
2-V_{max}	Grid over-voltage 2 (V>>)
2-Time	Grid over-voltage 2 (V>>) tripping time
Min-V prot.	Under-voltage protection
1-V_{min}	Grid under-voltage 1 (V<)
1-Time	Grid under-voltage 1 (V<) tripping time
2-V_{min}	Grid under–voltage 2 (V<<)
2-Time	Grid under–voltage 2 (V<<) tripping time
Max-F prot.	Over-frequency protection
1-F_{max}	Grid over-frequency 1 (F>)
1-Time	Grid over-frequency 1 (F>) tripping time
2-F_{max}	Grid over-frequency 2 (F>>)
2-Time	Grid over-frequency 2 (F>>) tripping time
Min-F prot.	Under-frequency protection
1-F_{min}	Grid under-frequency 1 (F<)
1-Time	Grid under-frequency 1 (F<) tripping time
2-F_{min}	Grid under-frequency 2 (F<<)
2-Time	Grid under-frequency 2 (F<<) tripping time

4.5 Setting the Protective Parameters

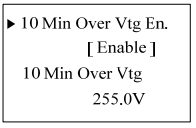
When the grid voltage or frequency reaches the recovery value, the corresponding error code displayed on the LCD will be cleared and the inverter can start operating.



Power Ramp Rate:
The ramp up/down rate of power variation.
The power rate limit mode is enabled by default with the default set-point of 16.67 % of rated power per minute and lies in the range 5 %–100 %.



The inverter will automatically disconnect from the grid within 3 s when the average voltage for a 10 min period exceeds the set-point of *10 Min Over Vtg*.
The protective function is enabled by default with the default set-point of 255.0 V and lies in range 244 V–258 V.



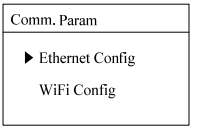
Tab. 4-4 Protective Parameter Explanations

Parameter	Explanation	Default	Range
Vmax-recover	Recovery value for over-voltage fault. Inverter can start operating only when the grid voltage is below this value.	253.0 V	230 V–264 V
Vmin-recover	Recovery value for under-voltage fault. Inverter can start operating only when the grid voltage is above this value.	205.0 V	184 V–230 V
Fmax-recover	Recovery value for over-frequency fault. Inverter can start operating only when the grid frequency is below this value.	50.15 Hz	50 Hz–53 Hz
Fmin-recover	Recovery value for under-frequency fault. Inverter can start operating only when the grid frequency is above this value.	47.50 Hz	47 Hz–50 Hz
Power Ramp Rate	The ramp rate of power variation.	16.67 %	5 %–100 %
10 Min Over Vtg	Over-voltage protection value of 10-min average voltage	255.0 V / 248.0 V *	244 V–258 V

* The default value of 10 Min Over Vtg is 255.0 V for Australia (code "AU") and 248.0 V for New Zealand (code "NZ").

4.6 Setting the Communication Parameters

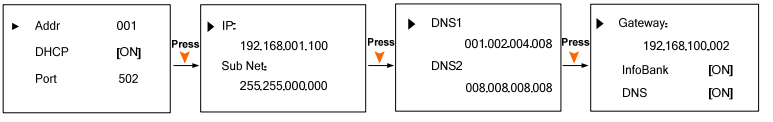
Ethernet:



The communication address ranges from 1 to 247.

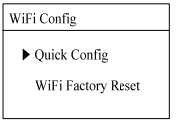
The IP, sub net, gateway, DNS1 and DNS2 can be modified only when the DHCP is set to OFF.

Acquire the IP, subnet mask, gateway, DNS1 and DNS2 from the network professional.



Wi-Fi:

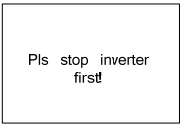
Quick Configuration: **Press ENT** to enable this function and then you can connect the inverter WiFi to your home router quickly with SolarInfo Moni App.



4.7 Setting the Battery Type

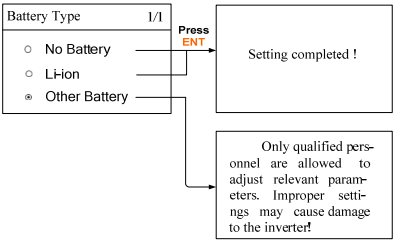
For Li-ion batteries, the type can be automatically identified and set to "Li-ion" on the LCD. Manually set the type to "Other Battery" for lead-acid batteries. Proceed as follows to modify the settings.

Stop the inverter via the LCD menu before modifying the battery type. Otherwise the warning screen will prompt.



Press ▲/▼ to select the battery type and **Press ENT** to confirm.

For the parameters explanations for lead-acid batteries, see **Tab. 3-4**.



5 Troubleshooting

5.1 Troubleshooting of LED Indicators

Refer to "**Tab. 3-5 State Description for the LED Indicator**" for the definition of indicator states.

Fault Type	Troubleshooting
The LED indicator and LCD screen cannot be lit.	1. Disconnect the AC circuit breaker. 2. Rotate the DC Switch to "OFF". 3. Check the polarities of the DC inputs.
The LED indicator goes out.	1. Disconnect the AC circuit breaker. 2. Rotate the DC Switch to "OFF". 3. Check the electrical connection. 4. Check whether the DC input voltage exceeds the start voltage of the inverter. 5. If all of the above are OK, please contact SUNGROW.
The LED indicator is lit red.	1. A fault is not resolved. 2. Perform troubleshooting according to the fault type on the LCD screen. 3. If it cannot be resolved, please contact SUNGROW.

5.2 Troubleshooting of the Errors

When an error occurs, the "Error" state will be shown on the main screen. **Press** ▼ to view all the detailed information.

- For the battery error codes, if all the conditions are OK but the error still occurs, contact the distributor or the battery manufacturer.
- The default ranges only apply to the grid standards in Australia. Refer to **Tab. 3-3** for the specified value.
- We need the following information to provide you with the best assistance: inverter type (e.g. string, central, grid-connected, hybrid, transformerless, single phase, triple phase, single MPPT, multiple MPPTs), or product name, serial number of the inverter, error code/name, and a brief description of the issue.

For Inverter Side

Code	Specification	Troubleshooting
002	Grid over-voltage. (default range: 257 V–270 V)	1. Check the grid voltage. 2. If the grid voltage exceeds the permissible range, consult the utility grid for a solution.
003	Temporary grid over-voltage in the on-grid mode. (default value: 440 V)	This is a short-term fault. Wait a moment for inverter recovery or restart the system.
004	Grid under-voltage. (default range: 180 V–210 V)	1. Check the grid voltage. 2. If the grid voltage exceeds the permissible range, consult the utility grid for a solution.
005	Grid under-voltage. (default value: 180 V)	
007	Temporary AC over-current. The transient AC current has exceeded the allowable upper limit.	Wait a moment for inverter recovery or restart the system.
008	Grid over-frequency. (default range: 51.5 Hz–52 Hz)	1. Check the grid frequency. 2. If the grid frequency exceeds the permissible range, consult the utility grid for a solution.
009	Grid under-frequency. (default range: 47.0 Hz–48.5 Hz)	
010	Islanding. Abnormal connection between the system and the grid.	1. Check whether the AC circuit breaker is triggered. 2. Check whether all the AC cables are firmly connected. 3. Check whether the grid is in service.
011	DC injection over-current. The DC injection of the AC current exceeds the upper limit.	Wait a moment for inverter recovery or restart the system.
012	Leakage current over-current. The leakage current exceeds the upper limit.	1. Check whether there is a grounding fault in the PV strings. 2. Wait a moment for inverter recovery or restart the system.
014	10-minute grid over-voltage. The average grid voltage in 10 minutes is outside the permissible range. (default range: 255 V–258 V)	1. Check whether the grid is operating normally. 2. Wait a moment for inverter recovery or restart the system.
015	Grid over-voltage. (default value: 265 V)	1. Check the grid voltage. 2. If the grid voltage exceeds the permissible range, consult the utility grid for a solution.
019	Bus over-voltage. The transient bus voltage exceeds the upper limit.	Wait a moment for inverter recovery or restart the system.

Code	Specification	Troubleshooting
021	PV1 over-current. The input current of PV1 exceeds the upper limit.	1. Check the PV input power and configuration. 2. Wait a moment for inverter recovery or restart the system.
022	PV2 over-current. The input current of PV2 exceeds the upper limit.	
024	Neutral point voltage imbalance. The deviation of the neutral point voltage exceeds the allowable limit.	1. The inverter will recover once the deviation falls below the protective limit. 2. Wait a moment for inverter recovery or restart the system.
028	Reverse polarity of the PV1 connection.	1. Disconnect the DC switch. 2. Check the polarity of the PV inputs. 3. Reconnect the PV strings if the polarity is incorrect.
029	Reverse polarity of the PV2 connection.	
037	Inner over-temperature fault. The ambient temperature inside the inverter exceeds the upper limit.	1. Check and clean the heat sink. 2. Check whether the inverter is installed in sunlight or the ambient temperature of the enclosure exceeds 45℃. If not, please contact SUNGROW for a solution.
038	Relay fault on the grid side.	Wait 5 minutes for inverter recovery or restart the system.
041, 622	Leakage current sampling fault.	Wait 5 minutes for inverter recovery or restart the system.
043	Inner under-temperature fault. The ambient temperature inside the inverter is too low	The inverter will recover once the ambient temperature rises above -25℃.
044	INV open-loop self-check fault.	Wait 5 minutes for inverter recovery or restart the system.
045	PV1 boost circuit fault.	
046	PV2 boost circuit fault.	
048	Phase current sampling fault.	
051	Load overpower fault in the off-grid mode.	If the fault persists, disconnect some non-key loads.
052	INV under-voltage fault in the off-grid mode.	Wait 5 minutes for inverter recovery or restart the system.
062	DI fault of the backup box STB5K-20.	1. Check whether the DI connection between the inverter and the backup box is correct. 2. If there is no backup box connected, ensure that the EPS setting on the LCD is set to “Disable”.

Code	Specification	Troubleshooting
		3. Wait 5 minutes for inverter recovery.
063	The version of CPLD (complex programmable logic device) cannot be detected.	Power off the system and program the CPLD
064	INV over-voltage fault in the off-grid mode.	Wait 5 minutes for inverter recovery or restart the system.
065	INV under-frequency fault in the off-grid mode. (default value: 47 Hz)	
066	INV over-frequency fault in the off-grid mode. (default value: 52 Hz)	
067	Temporary grid over-voltage in the off-grid mode. (default value: 500 V)	
083	Fan2 abnormal speed warning.	1. Check if the fan is blocked. 2. Restart the system.
084	Warning for reverse cable connection of the Sungrow Meter.	1. Check whether the power cable connections are correct. 2. For Sungrow single-phase meter, check whether the CT clamp of the 1-phase sensor is correctly placed. Refer to "**3.4.1 Meter Installation and Connection**".
100	INV hardware over-current fault. The AC current exceeds the protective value.	Wait 5 minutes for inverter recovery or restart the system.
101	Grid over-frequency. (default value: 52 Hz)	Check the grid frequency.
102	Grid under-frequency. (default value: 47 Hz)	
106	The inverter is not grounded. Neither the PE terminal on the AC connection block nor the second PE terminal on the enclosure is reliably connected.	1. Check whether there is a reliable grounding connection. 2. If there is access to the ground, and the fault still exists, please contact SUNGROW for a solution. 3. Check whether the L-line and N-line are connected correctly.
107	DC injection over-voltage fault in the off-grid mode. The DC injection of INV voltage exceeds the upper limit.	The inverter will recover once the DC injection voltage falls below the recovery value.
200	Bus hardware over-voltage fault. The bus voltage exceeds the protection value.	Wait 5 minutes for inverter recovery or restart the system.

Code	Specification	Troubleshooting
201	Bus under-voltage fault.	
202	PV hardware over-current fault. The PV1 or PV2 current exceeds the protective value.	
203	The PV input voltage exceeds the bus voltage.	Check the functionality of the PV connection terminals.
204	PV1 boost short-circuit fault	The inverter may be damaged. Contact SUNGROW for a solution.
205	PV2 boost short-circuit fault	
300	INV over-temperature fault.	1. Check and clean the heat sink. 2. Check whether the inverter is installed in sunlight or the ambient temperature of the enclosure exceeds 45℃-60℃. 3. Restart the system.
302	PV insulation resistance fault.	1. Check whether the PV cable connection is intact. 3. Wait for a sunny day to check whether the system can run well.
308	Slave DSP redundant fault.	Restart the system.
309	Phase voltage sampling fault.	
312	DC injection sampling fault.	
315	PV1 current sampling fault.	
316	PV2 current sampling fault.	
317	PV1 MPPT current sampling fault.	
318	PV2 MPPT current sampling fault.	
319	System power supply failure fault.	
320	Leakage current CT self-check fault.	
321	SPI communication failure. Communication faults between the master DSP and the slave DSP.	
322	Master DSP communication fault.	
401-408	Permanent faults.	
409	All temperature sensors failed fault.	Forced restart the system.
501	FRAM1 reading warning.	1. Inverter can normally be connected to the grid. 2. Restart the system.
503-506, 511	Temperature sensor warnings.	
507	Error alarm of DO power settings.	Modify the DO power according to the load power. Refer to "**Optimized Control**" in the User Manual.

Code	Specification	Troubleshooting
509	Clock reset fault.	Manually reset the clock or synchronize the clock with the network time. This will clear the fault.
510	PV over-voltage fault.	1. Check whether the configuration of the PV strings exceeds the permissible range of the inverter. 2. Wait a moment for inverter recovery or restart the system.
513	Fan1 abnormal speed warning.	1. Check if the fan is blocked. 2. Restart the system.
514	Abnormal communication warning of the Sungrow Meter. (Inverter can be normally connected to the grid.)	1. Check whether the power cable connections of the meter are correct. 2. Check whether the RS485 connection is correct. 3. Check if the 120 Ohm (2) resistor for RS485_2 is pushed to "ON" when the length of RS485 cable is longer than 100 m.
600	Temporary BDC charging over-current fault.	Wait a moment for system recovery or restart the system.
601	Temporary BDC discharging over-current fault.	
602	Clamping capacitor under-voltage fault.	1. Check the cable connection of the battery. 2. Wait a moment for system recovery or restart the system.
603	Temporary clamping capacitor over-voltage fault.	Wait a moment for system recovery or restart the system.
608	BDC circuit self-check fault.	
612	BDC over-temperature fault.	1. Check and clean the heat sink. 2. Check whether the inverter is installed in sunlight or the ambient temperature of the enclosure exceeds 45℃. 3. Restart the system.
616	BDC hardware over-current fault.	The system will resume once the battery charge/discharge current falls below the upper limit or restart the system.
620	BDC current sampling fault.	Wait a moment for system recovery or restart the system.
623	Slave DSP communication fault.	
624	BDC soft-start fault.	
800,802 804,807	BDC internal permanent faults.	Restart the system

Code	Specification	Troubleshooting
900,901	BDC temperature sensor warnings	1. Check and clean the heat sink. 2. Check whether the inverter is installed in sunlight or the ambient temperature of the enclosure exceeds 45℃. 3. Restart the system.
906	Transformer direction recognition error.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Wait a moment for system recovery or restart the system.
910	FRAM2 warning	Restart the inverter.

For Battery Side

For the battery faults, please consult the battery manufacturer for a solution.

Code	Specification	Troubleshooting
703	Battery average under-voltage fault.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Wait a moment for system recovery or restart the system.
707	Battery over-temperature fault.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Check the ambient temperature of the battery location. 3. Wait a moment for system recovery or restart the system.
708	Battery under-temperature fault.	
711	Instantaneous battery over-voltage.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Wait a moment for system recovery or restart the system.
712	Battery average over-voltage fault.	
714	Abnormal communication between battery and the hybrid inverter.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Check the battery type and communication connection. For lead-acid batteries, you should manually set the battery type. Refer to "**4.7 Setting the Battery Type**". 3. Wait a moment for system recovery or restart the system.
715	Battery hardware	1. The inverter can normally be

Code	Specification	Troubleshooting
	over-voltage fault.	connected to the grid but charge/discharge has stopped. 2. Wait a moment for system recovery or restart the system.
732	Battery over-voltage protection.	1. The inverter can normally be connected to the grid. Charge has stopped but discharge is allowed. 2. Wait a moment for system recovery.
733	Battery over-temperature protection.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Check the ambient temperature of the battery location. 3. Wait a moment for system recovery or restart the system.
734	Battery under-temperature protection.	
735	Battery charging/discharging over-current protection.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Wait a moment for system recovery or restart the system.
739	Battery under-voltage protection.	1. The inverter can normally be connected to the grid. Discharge has stopped but charge is allowed. 2. Wait a moment for system recovery or restart the system.
832	Battery FET fault or electrical switch failure.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Check the battery port voltage and the battery communication cable connection. 3. Force a shutdown and restart the inverter and battery system. 4. Wait a moment for system recovery or restart the system.
834	Battery charging/discharging over-current permanent fault.	
836	CAN ID competing failure.	Restart the system, if the fault persists, please contact SUNGROW for a solution.
839	Mismatched software version.	Contact SUNGROW for a solution.
844	Software self-verifying failure.	Restart the system, if the fault persists, please contact SUNGROW for a solution.
864	Battery cell over-voltage fault.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Wait a moment for system recovery or restart the system.

Code	Specification	Troubleshooting
866	Battery precharge voltage fault.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Check the battery port voltage and the communication cable connection. 3. Force a shutdown and restart the inverter and battery system. 4. Wait a moment for system recovery or restart the system.
867	Battery under-voltage fault.	
868	Battery cell voltage imbalance fault.	
870	Battery cable connection fault.	
909	Low SOH (State of Health) warning.	1. The inverter can normally be connected to the grid and the charge/discharge function is normal. 2. Batteries are beyond the scope of the warranty. It is recommended to contact the distributor for replacements.
932	Battery over-voltage warning.	1. The inverter can normally be connected to the grid. Charge has stopped but discharge is allowed. 2. The system will resume after a certain time of discharging.
933	Battery over-temperature warning.	1. The inverter can normally connected be to the grid but charge/discharge has stopped. 2. Check the ambient temperature of the battery location. 3. Wait a moment for system recovery or restart the system.
934	Battery under-temperature warning.	
935	Battery charging/discharging over-current warning.	1. The inverter can normally be connected to the grid but charge/discharge has stopped. 2. Wait a moment for system recovery or restart the system.
937	Battery tray voltage imbalance warning.	1. The inverter can normally be connected to the grid and the charge/discharge functions are normal. 2. Check whether the cable connection of the battery is correct.
939	Battery under-voltage warning.	1. The inverter can normally be connected to the grid. Discharge has stopped but charge is allowed. 2. The system will resume after a certain time of charging.
964	Battery internal warning.	Consult the battery manufacturer for a solution.

6 Appendices

6.1 Inverter Technical Data

PV Input Data	
Max. PV input power	6500 W
Max. PV input voltage	600 V
Startup voltage	125 V
Nominal input voltage	350 V
MPP voltage range	125 V–560 V
MPP voltage range for nominal power	240 V–520 V
No. of MPPTs	2
Max. number of PV strings per MPPT (DC1/DC2)	1/1
Max. PV input current (DC1/DC2)	22 A (11 A / 11A)
Max. current for input terminals	24 A (12 A / 12 A)
Short-circuit current of PV input	24 A (12 A / 12 A)
Max. inverter backfeed current to strings	0 A
Battery Data	
Battery type	Li-ion battery / Lead-acid battery
Battery voltage (rated voltage / range)	48 V (32 V–70 V)
Max. charging/discharging current	65 A / 65 A
AC Input and Output Data	
Nominal AC output power to grid	4990 W
Max. AC output apparent power to grid	5000 VA
Max. AC input power from grid	3000 W
Nominal AC output current	21.6 A
Max. AC output current	21.7 A
Max. inrush current (peak value / duration)	10 A / 12 ms
Max. output fault current (peak value / duration)	100 A / 3.2 ms
Max. output over-current protection	32 A
Nominal grid voltage	230 Vac
Grid voltage range	180 Vac–276 Vac (this may vary with grid standards)
Nominal grid frequency	50 Hz
Grid frequency range	45 Hz–55 Hz (this may vary with grid standards)

Total Harmonic Distortion (THD)	< 3 % (of nominal power)
DC current injection	< 0.5 % (of nominal current)
Power factor	> 0.99 at default value at nominal power (adj. 0.8 overexcited/leading–0.8 underexcited/lagging)
Protection	
Anti-islanding protection	Yes
AC short circuit protection	Yes
Leakage current protection	Yes
DC fuse (battery)	Yes
DC switch (solar)	Optional
Over-voltage protection	III [Main], II [PV] [Battery]
System Data	
Max. efficiency	> 97.7 %
Max. European efficiency	> 97.2 %
Max. charge / discharge efficiency	> 94.0 %
Isolation method (solar)	Transformerless
Isolation method (battery)	HF
Ingress protection (IP) rating	IP65
Pollution degree outside/inside the enclosure	3 / 2
Operating ambient temperature range	-25℃ to 60℃ (derating when > 45℃)
Allowable relative humidity range	0–100 %
Cooling method	Natural convection
Max. operating altitude	2000 m
Display	Graphic LCD
Communication	2 x RS485, Ethernet, Wi-Fi, CAN
Power management	1 x Digital output
Earth fault alarm	1 x Digital output, email, buzzer inside
Analogue input	PT1000
DC connection type	MC4
AC connection type	Clamping yoke connector
Certification	AS4777, IEC 62109-1, IEC 62109-2, IEC 62477-1, IEC 62040-1, EN 61000-6-1/-3
Mechanical Data	
Dimensions (W x H x D)	457 mm x 515 mm x 170 mm
Mounting method	Wall-mounting bracket
Weight	22 kg

Backup Data	
Nominal voltage	230 Vac (±2 %)
Total harmonic factor output	2 % (full resistive load)
Frequency range	50 Hz (±0.2 %)
Switch time to emergency mode	3 s
Power factor	0.8 overexcited/leading–0.8 underexcited/lagging
Max. output power	5000 W / 5000 VA
Max. output power (battery mode)	3000 W / 3000 VA

6.2 STB5K-20 (backup box) Technical Data

Max. EPS power	5000 W
Max. output current for EPS port	25 A
Nominal AC voltage	230 Vac
AC voltage range	180 Vac–276 Vac
Nominal AC frequency	50 Hz
Operating ambient temperature range	-25℃ to 60℃
Power consumption	< 3 VA / 2 W
Dimensions (W x H x D)	220 mm x 230 mm x 90 mm
Mounting method	Wall-mounting bracket
Weight	2.6 kg

6.3 Meter Technical Data

Item	**Single-phase**	**Three-phase**
Nominal voltage	240 Vac	230 Vac / 400 Vac
Input voltage range	180 Vac–286 Vac	180 Vac–276 Vac
Power consumption	< 2 W (10 VA)	< 2 W (10 VA)
Max. operating current	100 A	65 A
Grid frequency	50 Hz	
Measurement accuracy	Class I	
Interface and communication	RS485	
Ingress protection rating	IP20	
Operating ambient temperature	-25℃ to 75℃	-25℃ to 70℃
Relative humidity	0–95 %	
Mounting method	35 mm DIN-rail	
Dimensions (W x H x D)	18 x 117 x 65 (mm)	85 x 72 x 72 (mm)
Weight	0.2 kg	0.4 kg

Exclusion of Liability

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- inappropriate use or installation of the products;
- installing or operating the products in an unintended environment;
- ignoring relevant safety regulations in the deployment location when installing or operating the products;
- ignoring safety warnings and instructions contained in all documents relevant to the products;
- installing or operating the products under incorrect safety or protection conditions;
- altering the products or supplied software without authority;
- the product faults due to operating attached or neighboring devices beyond allowed limit values; and
- damage caused by the natural environment beyond the rated operating range of the inverter.

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About Us

SUNGROW is a China-leading manufacturer of various power electronic products for

renewable energy generation systems, supplying to a global customer base. Our products include converters, inverters, battery chargers and other power supplies for distributable generation systems in both grid-connected and stand-alone applications. The power rating of SUNGROW products covers from hundred watt to mega-watt systems.

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

Contact Information

Should you have any problems, please contact us through the following information. We will be more than happy to assist you!

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