SOLARMG
designed in Italy

THREE PHASE GRID-TIED PV STRING INVERTER

100K/110K/125K

User Manual

About This Manual

This manual describes the installation, electrical connection, commissioning and maintenance, APP operation of Three-phase Grid-tied PV String Inverter. Please first read the manual and related documents carefully before using the product and store it in a place where installation, operation and maintenance personnel can access it at any time. The illustration in this user manual is for reference only. This user manual is subject to change without prior notice. (Specific please in kind prevail.)

Target Group

Three phase hybrid inverters must be installed by professional electrical engineers who have obtained relevant qualifications.

Scope

This manual is applicable to following inverters:

- 100K/110K/125K

Conventions

The following safety instructions and general information are used within this user manual.

DANGER	Indicates an imminently hazardous situation which, if not correctly followed, will result in serious injury or death.
WARNING	Indicates a potentially hazardous situation which, if not correctly followed, will result in serious injury or death.
CAUTION	Indicates a potentially hazardous situation which, if not correctly followed, could result in moderate or minor injury.
NOTICE	Indicates a potentially hazardous situation which, if not correctly followed, could result in equipment failure to run, or property damage.
NOTE	Call attention to important information, best practices and tips: supplement additional safety instructions for your better use of the Three phase hybrid inverter to reduce the waste of you resource.

Contents

1 Safety

Before using the inverter, please read all instructions and cautionary markings on the unit and manual. Put the instructions where you can take them easily. The Three-phase Grid-tied PV String Inverter of ours strictly conforms to related safety rules in design and test. Local safety regulation shall be followed during installation, operation and maintenance. Incorrect operation work may cause injury or death and damage to the inverter and other properties belonging to the operator or a third party.

1.1 Safety Instructions

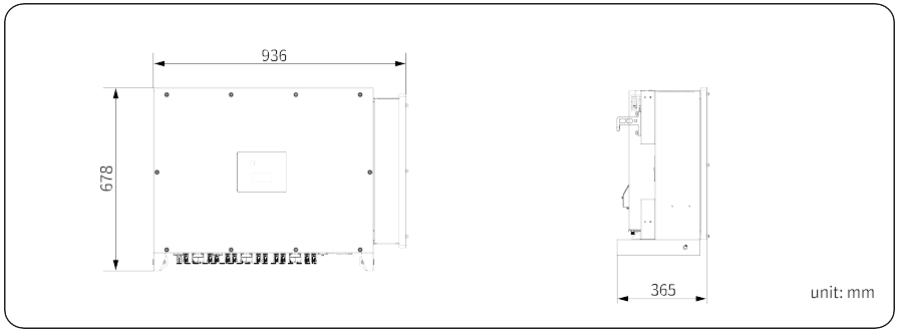
	**Risk of electric shock** The device contains high voltages, both alternating and direct, and high leakage currents may be generated during operation. To avoid risk of electric shock during maintenance or installation, make sure that all DC and AC connection terminals are disconnected. First connect the grounding wire to grounding and disconnect it for maintenance. Check proper phase and neutral connection. If the unit is used without following the specifications of the manufacture, the protection provided by the equipment may be impaired. Disconnect the inverter from the grid and from the photovoltaic generator before cleaning photovoltaic strings. An unexpected capacitive current from the surface of the strings may surprise operator and cause them to fall from the roof.
	**Hanging the PV inverter** The PV inverter must only be handled by qualified service personnel. When the photovoltaic generator is exposed to sufficient light intensity, it generates a DC voltage and, when connected to the device, it charges the bulk capacitor. After having disconnected the PV inverter from the grid and the PV generator, an electric charge may remain in the bulk capacitor. Please wait at least 10 minutes after disconnecting from the grid before handing.
	**Exclusively for the grid** The PV inverter is designed for the sole purpose of converting from PV strings and injecting it into the grid. This inverter is not designed to be powered by sources of primary energy other than PV strings or to be connected to different loads other than the public grid.
	**Hot surfaces** Although it has been designed in accordance with international safety standards, the PV inverter may become hot during operation.

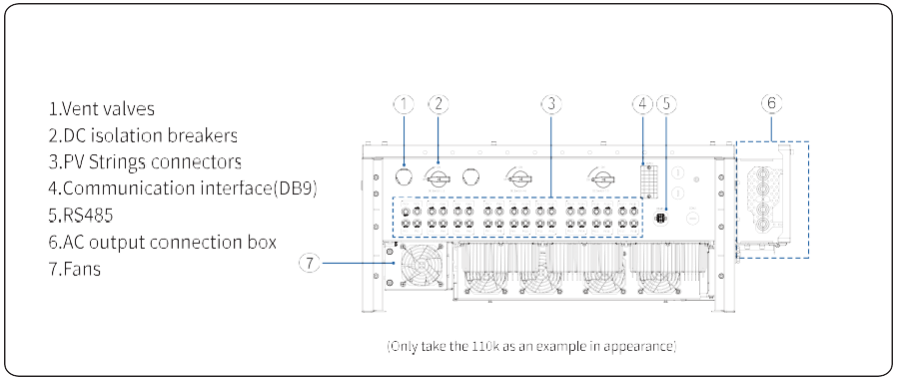
1.2 Safety Precaution

- Installation,maintenance and connection of inverters must be performed by qualified personnel, in compliance with local electrical standards, wiring rules and requirements of local power authorities and/or companies(for example: AS 4777 and AS/NZS 3000 IN Australia).
- To avoid electric shock, DC input and AC output of the inverter must be terminated at least 5 minutes before performing any installation or maintenance.
- The temperature of some parts of the inverter may exceed 60°C during operation. Do not touch the inverter during operation to avoid being burnt and let it cool before touching it.
- Ensure children are kept away from inverters.
- Don' t open the front cover of the inverter. A part from performing work at the wiring terminal (as instructed in this manual), touching or changing components without authorization may cause injury to people, damage to inverters and annulment of the warranty.
- Static electricity may damage electronic components. Appropriate method must be adopted to prevent such damage to the inverter; otherwise the inverter may be damaged and the warranty annulled.
- Ensure the output voltage of the proposed PV array is lower than the maximum rated input voltage of the inverter; otherwise the inverter may be damaged and the warranty annulled.
- When exposed to sunlight, the PV array generates dangerous high DC voltage. Please operate according to our instructions, or it will result in danger to life.
- PV modules should have an IEC61730 class A rating.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Completely isolate the inverter before maintaining. Completely isolate the inverter should: Switch off the PV switch, disconnect the PV terminal, disconnect the battery terminal, and disconnect the AC terminal.
- Don' t insert or pull the AC and DC terminals when the inverter is running.
- In Australia, the inverter internal switching does not maintain the neutral integrity, neutral integrity must be addressed by external connection arrangements.
- In Australia, the output of backup side in switchbox should be labeled main switch UPS supply, the output of normal load side in switchbox should be labeled mains switch inverter supply.

2 Product Introduction

2.1 Outline and Dimensions





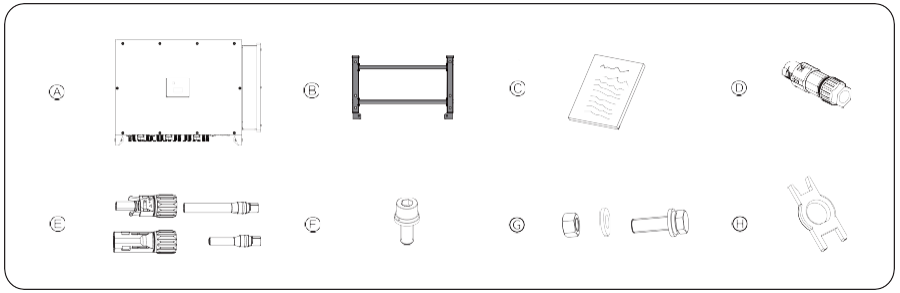
2.2 Route connection for PV strings installation

Route connecting for the installation of PV strings per inverter model is shown in below table:
100k totally 16 routes; 110k/125k totally 18 routes.

Model	MPPT1	MPPT2	MPPT3	MPPT4	MPPT5	MPPT6	MPPT7	MPPT8	MPPT9
100k	2routes	2routes	2routes	2routes	2routes	2routes	2routes	2routes	
110k/125k	2routes	2routes	2routes	2routes	2routes	2routes	2routes	2routes	2routes

3 Unpack and Storage

3.1 Packing list

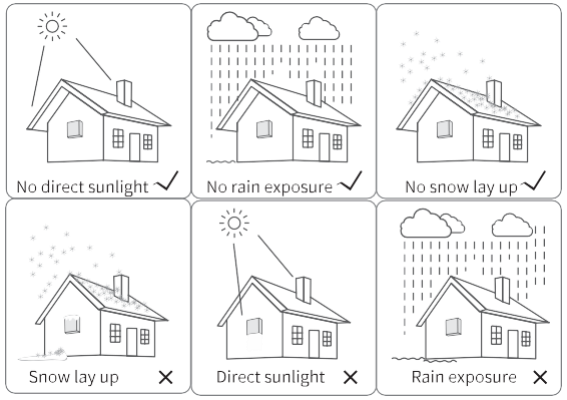


Items	Deliverables
A	The inverter
B	Rear panel
C	File package
D	RS485 connector
E	DC terminal connector group
F	M8 screws
G	M12 Bolt group (including screw, nut) *4 (reserved for tightening the support and rear panel)
H	Removal tool for DC connectors

3.2 Selecting the Mounting Location

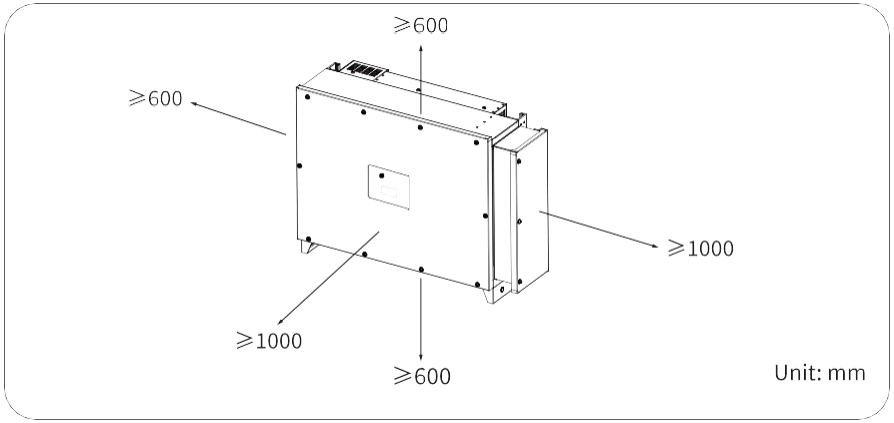
Installation Environment Requirements

a. The PV inverter protection class is IP66 and can be mounted indoors or outdoors.
b. The mounting location must be inaccessible to unrelated personnel since the bracket and heat sinks are extremely hot during operation.
c. Do not install the PV inverter in areas containing highly flammable materials or gases.
d. To ensure optimum operation and long operation life, the ambient temperature must be below 50°C.
e. The PV inverter must be mounted in a well-ventilated environment to ensure good heat dissipation.
f. To ensure long operation life, the storage of the inverter must not be exposed to direct sunlight, rain, or snow. It is recommended that the inverter be mounted in a sheltered place.
g. The carrier where the inverter is mounted must be fire-proof. Do not mount the inverter on flammable building materials.
h. Do not install the inverter in a rest area since it will cause noise during operation.
i. The installation height should be reasonable and make sure it is easy to operate and view the display.
j. Product label and warning symbols shall be clear to read after installation.
k. Please avoid direct sunlight, rain exposure, snow lay up.



Installation Space Requirements

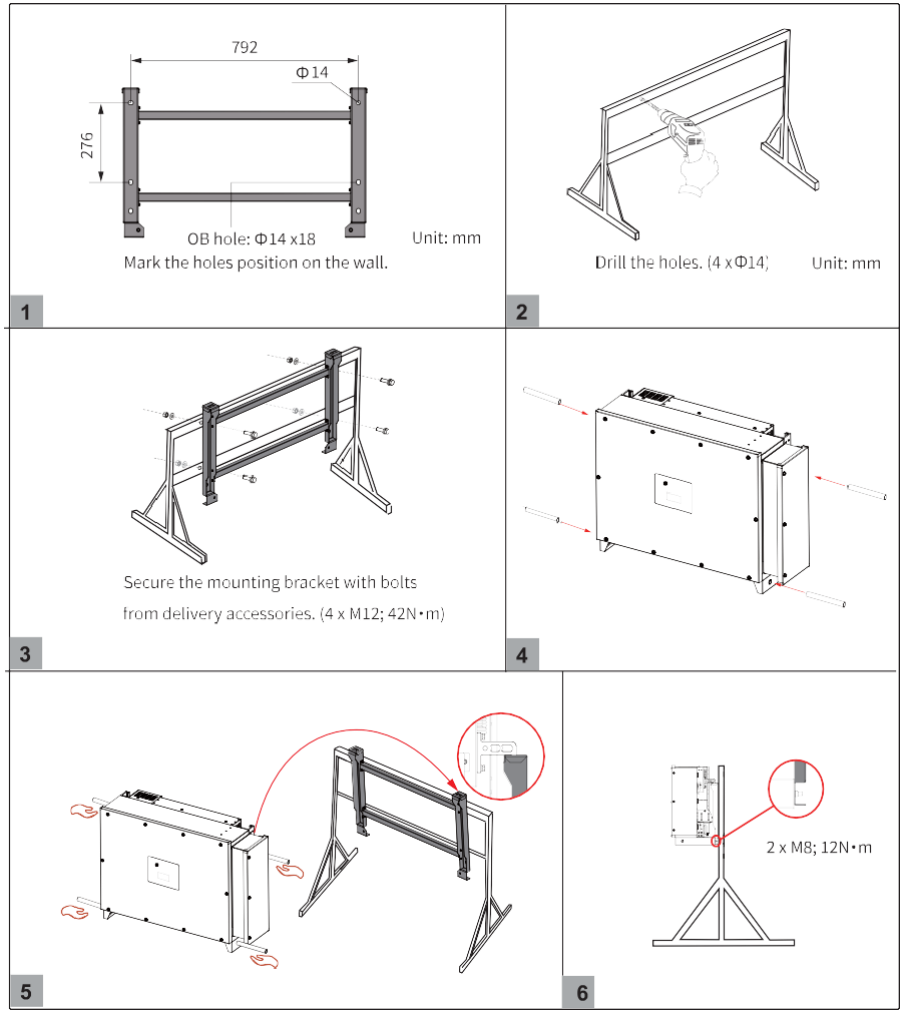
Reserve enough clearance around the inverter to ensure sufficient space for installation and heat dissipation, as shown in below image.



Support-mounting Inverter

DANGER	1.The walls must be fire-proof and non-flammable materials, otherwise there is a fire risk. 2.Before drilling holes, check whether there are electrical pipes or other pipes buried in the walls to avoid risks.

Inverter is installed on the wall or support by means of mounting bracket. The following steps are illustrated with only support-mounted installation. The load-bearing capacity of the wall must be greater than 10KN/㎡. M12 x 60mm stainless steel pressure-burst expansion bolts are recommended in wall- mounted installation.



Installation Self-check

1. Ensure that the inverter is well fixed.
2. Ensure that the inverter is locked on the support with an anti-theft lock installed.

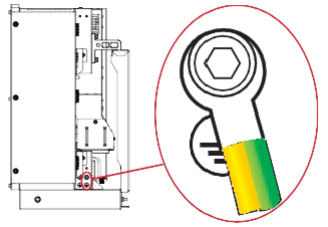
4 Electrical Connection

4.1 Safety Caution

DANGER	Before performing any electrical connections, ensure that both DC and AC switches are OFF. Otherwise, fatal injury can occur due to the high voltage generated from AC and DC cables.
CAUTION	Grounding the PV strings needs below prerequisites.
An isolation transformer must be installed on the AC side of each inverter. Ensure that the neutral wire of the isolation transformer must be disconnected from the PGND cable.	
One isolation transformer is with one PV inverter: do not install a single isolation transformer for multiple inverters. Otherwise, circulating current generated by the inverters will lead to operation failure.	

4.2 Electrical Connections

Connecting Extern PGND Cables



Items	Remark
Screw	M8; 7N·m
Yellow green lines	$S_p \geqslant S/2$

NOTE

S: cross-sectional area of AC cable
S_p: cross-sectional area of PE cable
The S_p value is valid only when the PE cable and the AC cable are of the same material.

NOTICE	Connecting External Protection Ground (PNGD) Cables can not substitute the PE of connecting the AC power cables. Ensure that both connecting are grounding well. Otherwise, warranty will be void if damage is caused by electrical connection faults.

AC circuit breaker

Connect the inverter with the power grid through installing one AC circuit breaker whose rated current is no less than 250A. Residual current protection function of square matrixes internally installed in the inverter and you can set leakage current protection value no less than the corresponding value in below table, if local utility department require leakage current protection function for AC circuit breaker. That set can save the inverter from its performance failure.

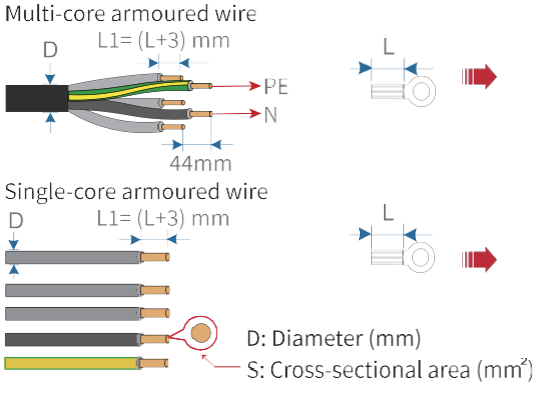
Inverter Model	Residual current
100k	⩾1110mA
110k	⩾1230mA
125k	⩾1390mA

Connecting AC Output Cables

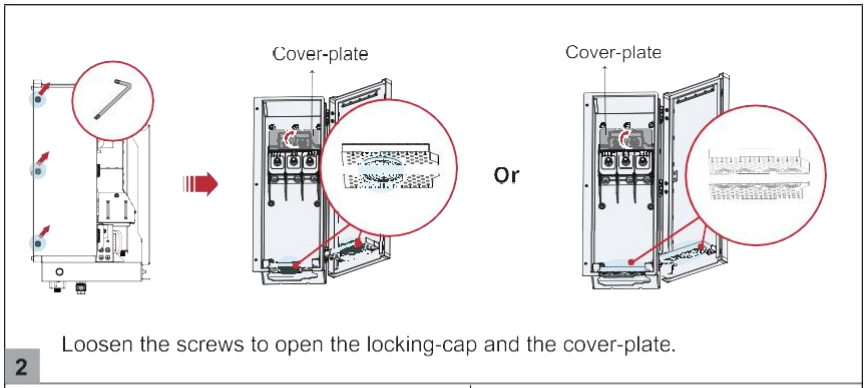
AC Cable Requirements:

AC cable (Multi-Core)	Outdoor triple-core cable (L1, L2, L3) Outdoor four-core cable (L1, L2, L3, PE) Outdoor five-core cable (L1, L2, L3, PE, N)	• Copper wire cable -S: 70mm²~240mm² -S_p⩾S/2 • Aluminum wire cable -S: 95mm²~240mm² -S_p⩾S/2	24mm~69mm
AC cable (Single-Core)	Five single-core outdoor cables	• Copper wire cable -S: 70mm²~240mm² -S_p⩾S/2 • Aluminum wire cable -S: 95mm²~240mm² -S_p⩾S/2	14mm~32mm

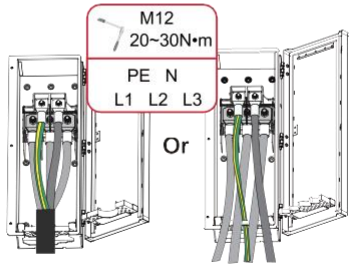
NOTICE For your operation and safety sake, please prepare multi-stranded wire, crimping terminals and a proper crimping tool before AC wiring.



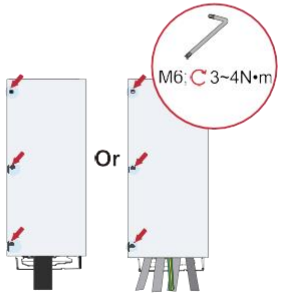
1 Wires making.



2 Loosen the screws to open the locking-cap and the cover-plate.



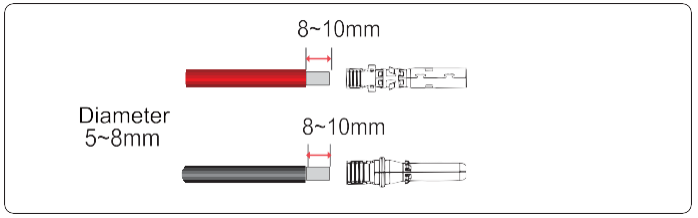
3 Lock the AC cable to the corresponding AC terminals.



4 Close and lock the AC locking-cap with 3 x M6 screws.

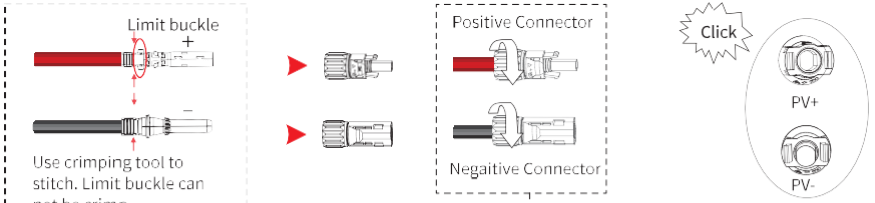
Connecting the PV Strings

Step 1 Remove an appropriate length of the insulation layer from the positive and negative power cables using a wire stripper, as shown in below Figure.

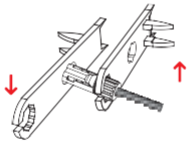


Step 2 Insert the exposed areas of the positive and negative cables into the metal terminals of the positive and negative connectors respectively and crimp them using a them using a crimping tool. Then insert the crimped positive and negative cables into the corresponding corresponding positive and negative connectors.

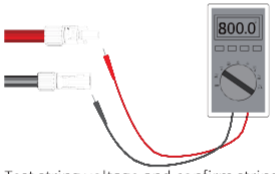
Step 3 Insert the positive and negative connectors into the PV+/PV-port until a “click” sound is heard.



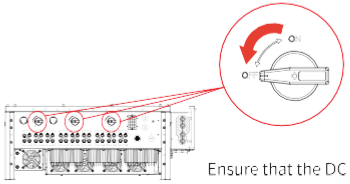
please do the following operations before step 3.



Tighten the waterproof nuts on each connector with a tool to avoid loosening.



Test string voltage and confirm string polarity.



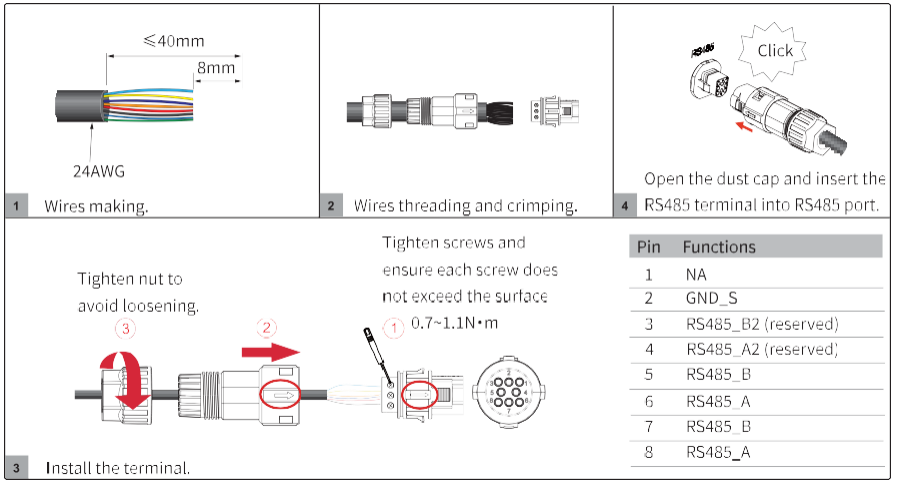
Ensure that the DC switch is OFF.

(Only take the SIRIO-ES 110 as an example in appearance)

⚠ WARNING	When taking out DC connectors, please ensure that PV Strings are disconnected. Otherwise, a fire can occur.

4.3 Connecting RS485 Communication Cables

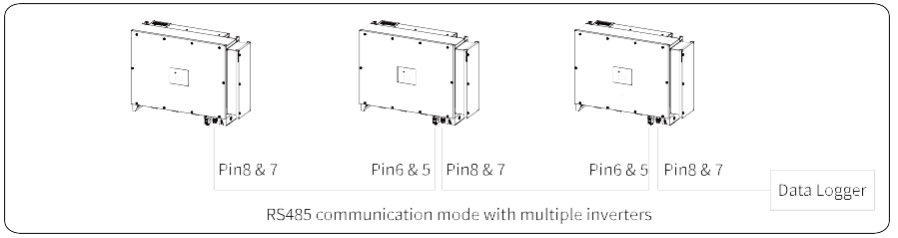
RS485 Terminal Installation



Pin	Functions
1	NA
2	GND_S
3	RS485_B2 (reserved)
4	RS485_A2 (reserved)
5	RS485_B
6	RS485_A
7	RS485_B
8	RS485_A

RS485 communication mode with multiple inverters

Connect the differential positive and negative signal wires of the first RS485 cable from the data logger to Pin8 and Pin7 of the 8-Pin terminal respectively. If there is more than one inverter, connect Pin6 and Pin5 to Pin8 and Pin7 of another inverter.



RS485 communication mode with multiple inverters

RS485 communication address setting.

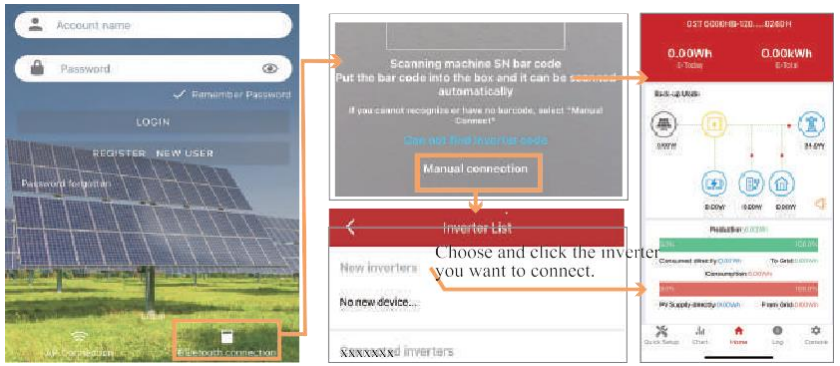
① Download the APP in either of the following ways

- Scan the QR code on the inverter to download the APP
- Download the APP from the App Store or Google Play.

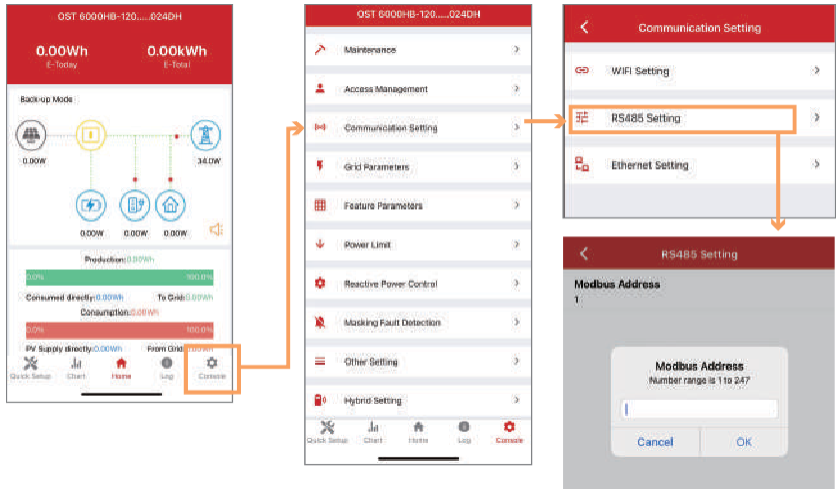
Note：APP should access some permissions such as inverter’ s location. You need to allow all permissions to be granted in all pop-up windows when installing the APP or in your own phone setting.

② Power on the inverter.

③ Connect the Inverter. Open the Bluetooth on your own phone, then open the APP. Then follow the instructions below.

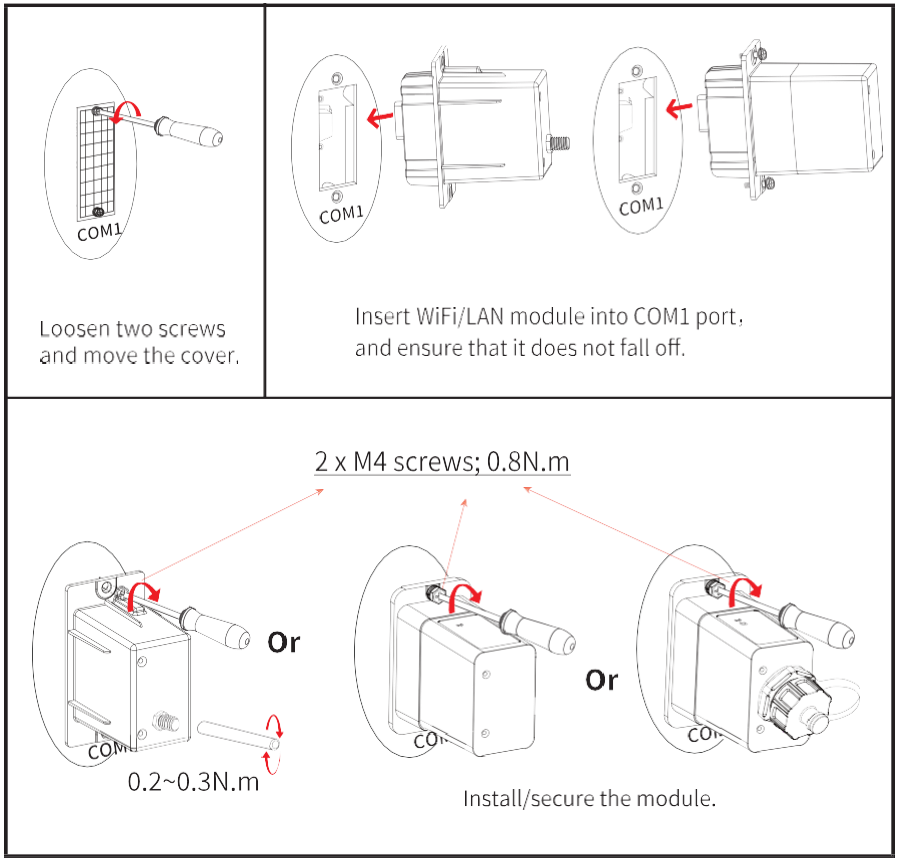


④ Go to **Console** > **Communication Setting** > **RS485 Setting** > **Modbus** Page, check the Modbus address (the default value is 1), and click to modify the address as required if necessary.



WIFI/ LAN MODULE INSTALLATION (OPTIONAL)

For details, please refer to the corresponding Module Installation Guide in the packing.The appearance of modules may be slightly different. The figure shown here is only for illustration.



5 System Operation

5.1 System Operation

Switch ON the AC circuit breaker and set the DC SWITCH of the inverter to ON. Observe statuses of grid-connecting light on the inverter for a while. If the lights display that the inverter has entered grid-connecting, it means the inverter is operating well. Any query during operating the PV inverter, call your dealer.

To power OFF the Inverter, switch off the circuit breaker at AC terminal, and set the DC SWITCH to OFF.

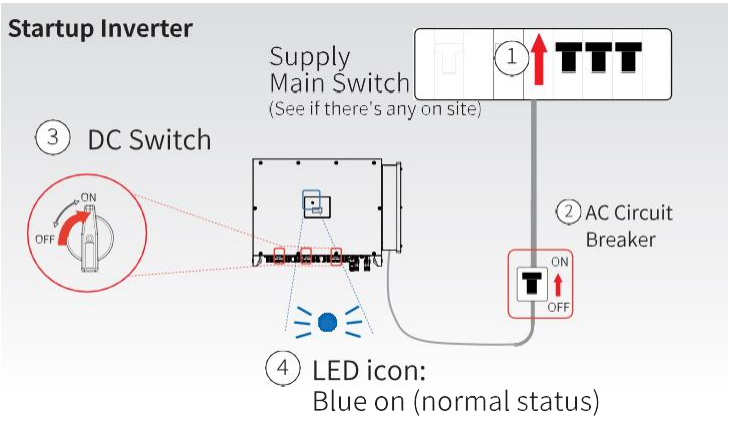
⚠ WARNING	After the inverter power is off, the remaining electricity and heat may still cause eletrical shock and burns. Please only begin servicing the inverter 10 minutes after the poweroff.

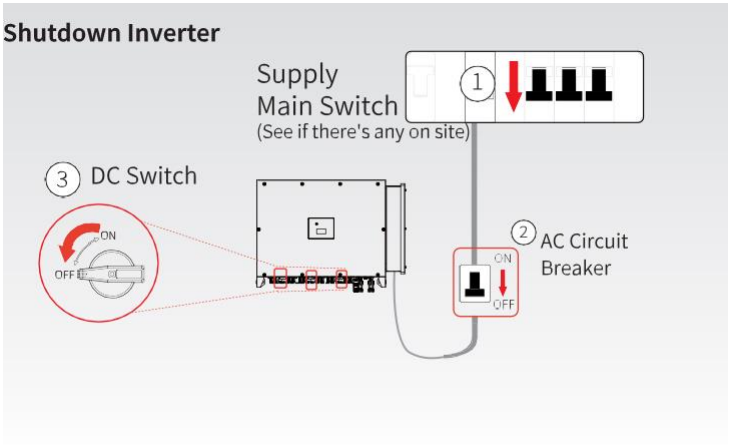
5.2 Startup/Shutdown the System

Inspection

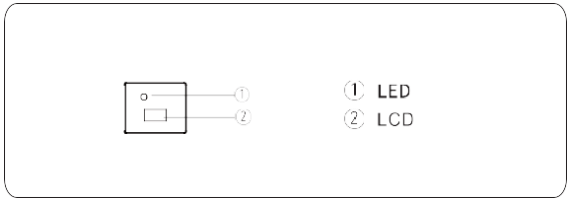
No.	Items
1	The inverter is firmly installed.
2	There is enough heat dissipation space, no external objects or parts left on the inverter.
3	It is convenient for operation and maintenance.
4	The wiring of the system is correct and firm.
5	Check whether the DC and AC connections are correct with a multimeter, and whether there is a short circuit, break, or wrong connection.
6	Check whether the waterproof nuts of each part are tightened.
7	The vacant port has been sealed.
8	All safety labels and warning labels on the inverter are complete and without occlusion or alteration.

⚠ After the inverter is powered off, the remaining electricity and heat may still cause electrical shock and body burns. If need to disconnect the inverter cables, please wait at least 10 minutes before touching these parts of inverter.





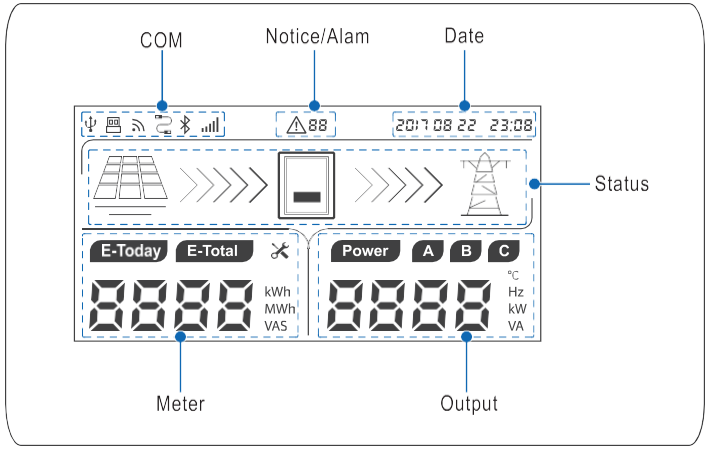
5.3 Interface



LED Indicator

LED Indicator	status	descriptions
PV Indicator	on	Voltage of PV strings meets the requirements for inverter grid-connecting to generate power.
	blink	Voltage of PV strings can not meet the requirements for inverter grid-connecting to generate power.
Grid Indicator	blink	Grid abnormal, can not meet the requirements for inverter grid-connecting to generate power.
	off	The inverter is connecting to the grid.
	on	The inverter has connected to the grid. The inverter is generating power.
COM Indicator	blink	Communications data transmission is underway.
	off	No external communications are connected or no communications data transmission.
Waring Indicator	on/blink	Refer LED status in warning table.
	off	No warning.

LCD Screen



LED status and Warning code

	Warning code	PV Indicator	Grid Indicator	COM Indicator	Warning Indicator
Normal status		●	●/★	◎	○
Starting up		●	○	◎	○
WLAN/WIFI/RS485 communication		◎	◎	★	○
PV normal		●	◎	◎	○
Grid over voltage	A0	◎	★	◎	○
Grid under voltage	A1				
Grid absent	A2				
Grid over frequency	A3				
Grid under frequency	A4				
Grid unbalance	A6				
Grid high average voltage	A7				
Grid N abnormal	A8	◎	◎	◎	★
PV over voltage	B0	★	◎	◎	○
PV under voltage	B4				
Weak radiation	B5				
Strings abnormal	B3	◎	◎	◎	★
Inverter over temperature	C5				
Fan abnormal	C8				
Insulation resistance abnormal	B1	●	○	○	●
Leakage current abnormal	B2	○	●	○	●
Strings reverse	B7	○	○	●	●
Control power abnormal	C0	○	★	○	●
DC bias current abnormal	C2	★	●	★	●
Inverter relay abnormal	C3	○	●	●	●
Leakage current HCT abnormal	C6	●	●	○	●
System fault	C7	★	★	★	●
DC link voltage unbalance	C9	●	○	●	●
DC link over voltage	CA	○	●	★	●
Internal communications fault	CB	○	○	★	●
Software version incompatibility	CG	★	●	○	●
EEPROM fault	CD	★	○	●	●
Sampling inconsistency	CE	★	●	●	●
Inverter circuit abnormal	CF	●	●	●	●
Boost circuit abnormal	CG	★	○	○	●
Remote off	CN	●	○	◎	○

Note: ● light on ○ light off ★ light blink ◎ keep original status

Remote off

6 Maintenance

6.1 Maintenance

Check periodically heat sink and the inlet/outlet of external FAN, clean them, and ensure that they are free dust and blockage. If any abnormal with the FAN, please replace it.

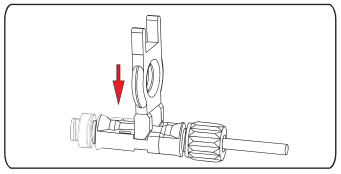
Routine Maintenance

Items	Check Content	Maintain Content	Maintenance Interval
Inverter output status	Statistically maintain the status of electrical yield, and remotely monitor its abnormal status.	N/A	Weekly
PV inverter cleaning	Check periodically that the heat sink is free from dust and blockage.	Clean periodically the heat sink.	Yearly
PV inverter running status	Check that the inverter is not damaged or deformed. Check for normal sound emitted during inverter operation. Check and ensure that all inverter communications are running well.	If there is any abnormal phenomenon, replace the relevant parts.	Monthly
PV inverter electrical connections	Check that all AC, DC and communication cables are securely connected; Check that PGND cables are securely connected; Check that all cables are intact and free from aging.	If there is any abnormal phenomenon, replace the cable or re-connect it.	Semiannually

Inverter Uninstall

Inverter uninstall requires below procedure:

Step 1 Disconnect all electric connections including these of communications cables, DC input cables, AC output cables and the PGND cables.



When uninstalling DC input connectors, insert removal wrench into the bayonet shown in Figure, press the wrench down, and take out the connector.

Step 2 Remove the inverter from its rear panel.

Step 3 Remove the rear panel.

⚠ WARNING	Before uninstalling DC input connector, please ensure that the DC SWITCH is set to OFF to avert equipment damage and/or personal injury.

The Inverter Troubleshooting

If any abnormal phenomena occur, refer to below table for trouble shooting. If failed, call your dealer for help.

Issue	Solution
No display	1. Check DC switch of inverter is on or off 2. If there is PV combiner box, check fuse, terminal,wires
No generation	1. Check AC breaker is on or off 2. Wait stronger sunshine 3. Check the number of PV panel 4. To operate according to inverter`s manual
Inverter abnormal	1. Disconnect both AC and DC breakers 2. Wait as less 10 minutes and switch on AC and DC breaker 3. Check whether inverter run normally or not
Power generation is less than expected	1. Ensure that inverter is free from direct sun exposure and good ventilation 2. Check that inverter isn`t dust clogging, fans run normally 3. Ensure enough installation distance between inverters

7 Technical Specification

Model	SG-100KWT	SG-110KWT	SG-125KWT
Efficiency			
Max.efficiency	98.5%	98.6%	98.8%
European Efficiency	98%	98.2%	98.4%
Input(PV)			
Max. Input Voltage	1100V		
Max. PV configuration	150%		
Rated Input Voltage	620V		
Max. Input Current	3*40A+5*32A	3*40A+6*32A	
Max.Short Circuit Current	3*50A+5*45A	3*50A+6*45A	
Start Input Voltage/ Min. Operating Voltage	250V/200V		
MPPT Operating Voltage Range	200V-1000V		
Max. Number of PV Strings	16(8*2)	18(9*2)	
No. of MPPTs	8	9	
Output (Grid)			
Rated AC Active Power	100,000W	110,000W	125,000W
Max. AC Apparent Power	110,000VA	121,000VA	137,500VA
Max. AC Active Power (PF=1)	110,000W	121,000W	137,500W
Max. AC Output Current	3*168.8A	3*187A	3*167.3A
Rated AC Voltage	400V, 3W+N+PE		480V, 3W+PE
AC Voltage Range*	277V-520V (Adjustable)		300V-550V (Adjustable)
Rated Grid Frequency	50Hz / 60Hz		
Grid Frequency Range**	45Hz-55Hz/55Hz-65Hz (Adjustable)		
THDI	<3% (Rated Power)		
DC Current Injection	<0.5%In		
Power Factor	> 0.99 Rated power (Adjustable 0.8 LD - 0.8 LG)		
Protection			
DC switch	Support		
Anti-islanding protection	Support		
AC overcurrent protection	Support		
AC short circuit protection	Support		
DC reverse connection	Support		
Surge Arrester	DC Type II/AC Type II		
Insulation detection	Support		
Leakage current protection	Support		
AFCI	Optional		
PID Recovery	Optional		
PV String monitoring	Optional		
Night load consumption monitoring	Optional		
General			
Topology	Transformerless		
IP Rating	IP66		
Night Self Consumption	<10W		
Cooling	Fan cooling		
Operating Temperature Range	-25℃-60℃		
Relative Humidity Range	0-100%		
Max. Operating Altitude	4000m		
Noise	<75dB		
Dimensions (W*H*D)	850mm*670mm *356mm		
Weight	85Kg		
HMI & COM			
Display	Wireless & APP+LED, LCD (Optional)		
Communication	RS 485, Optional: WiFi/GPRS/4G/LAN		
Warranty	5 Years		

Remarks:
- The range of output voltage and frequency may vary depending upon different grid codes.
- Specifications are subject to change without advance notice.

8 Technical Assistance

SolarMG offers a technical assistance and consultancy service.

To take advantage of this service, the following number is active: 055911077.

Or by writing to the email: support@solarmg.it