



Sunsynk Maximus Split Phase Hybrid Inverter



User Manual

SSM-6-SPHYB-UL
SSM-7.6-SPHYB-UL
SSM-11.4-SPHYB-UL

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Preface

About This Manual

This manual describes the installation, connection, LCD setting, commissioning and maintenance etc. of Energy Storage System(ESS). 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 reach it at any time. The illustrations in this user manual are for reference only. This user manual is subject to change without prior notice. (Specific please in kind prevail.)

Target Group

Inverters must be installed by professional electrical engineers who have obtained relevant qualifications.

Scope

This manual is applicable to following inverter models:

- SSM-6-SPHYB-UL
- SSM-7.6-SPHYB-UL
- SSM-11.4-SPHYB-UL

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 split phase hybrid inverter to reduce the waste of you resource.

1 Safety

Before using the inverter, please read all instructions and cautionary markings on the unit and in this manual. Put this manual in a place where you can take it easily.

The inverter strictly conforms to related safety rules in design and test. Please follow the local laws and regulations during installation, operation and maintenance. Incorrect operation may cause injury or death to the operator or a third party, and damage to the inverter and other properties belonging to the operator or a third party.

1.1 Symbols Used

Safety Symbol	Description
	Danger of high voltage and electric shock! Only qualified personnel may perform work on the inverter.
	Residual voltage exists after the inverter is powered off. It takes 5 minutes for system to discharge to a safe voltage.
	Danger of hot surface
	Environmental Protection Use Period
	Refer to the operating instructions
	Product should not be disposed as household waste.
	Grounding terminal

1.2 Safety Precaution

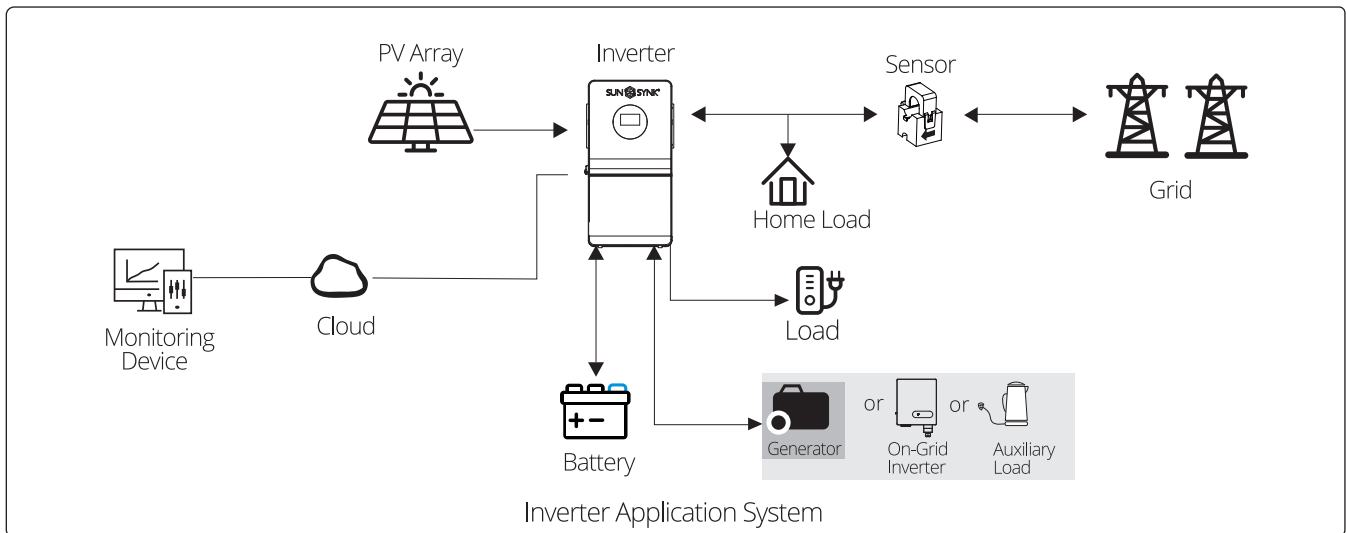
- Installation, maintenance and connection of inverters must be performed by qualified personnel, in compliance with local electrical standards, wiring rules and requirements of local power authorities and/or companies.
- The temperature of some parts of the inverter may exceed 60 °C during operation. Do not touch the inverter during operation to avoid being burnt.
- Ensure children are kept away from inverters.
- Don't open the front cover of the inverter. Apart 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 methods 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: turn off the PV switch and disconnect the PV terminal, battery terminal, and AC terminal.
- After the inverter is powered off, the remaining electricity and heat may still cause electric shock and body burns. Do not touch parts of inverter for 10 minutes after disconnection from the power sources.
- Prohibit inserting or pulling the AC and DC terminals when the inverter is running.
- In Australia, the inverter internal switching does not maintain the neutral neutral continuity. And neutral integrity must be addressed by external connection arrangements.
- The LOAD Port should not be connected to the grid.
- The BAT Port should not be connected to PV and AC voltage. The voltage connected to this port can not exceed 64 V DC.
- The GRID Port should not be connected to PV voltage.
- A single PV panel string should not be connected to two or more inverters.
- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
 - Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and receiver.
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
 - Consult the dealer or an experienced radio/TV technician for help.

2 Product Introduction

2.1 Overview

Energy Storage System(ESS)

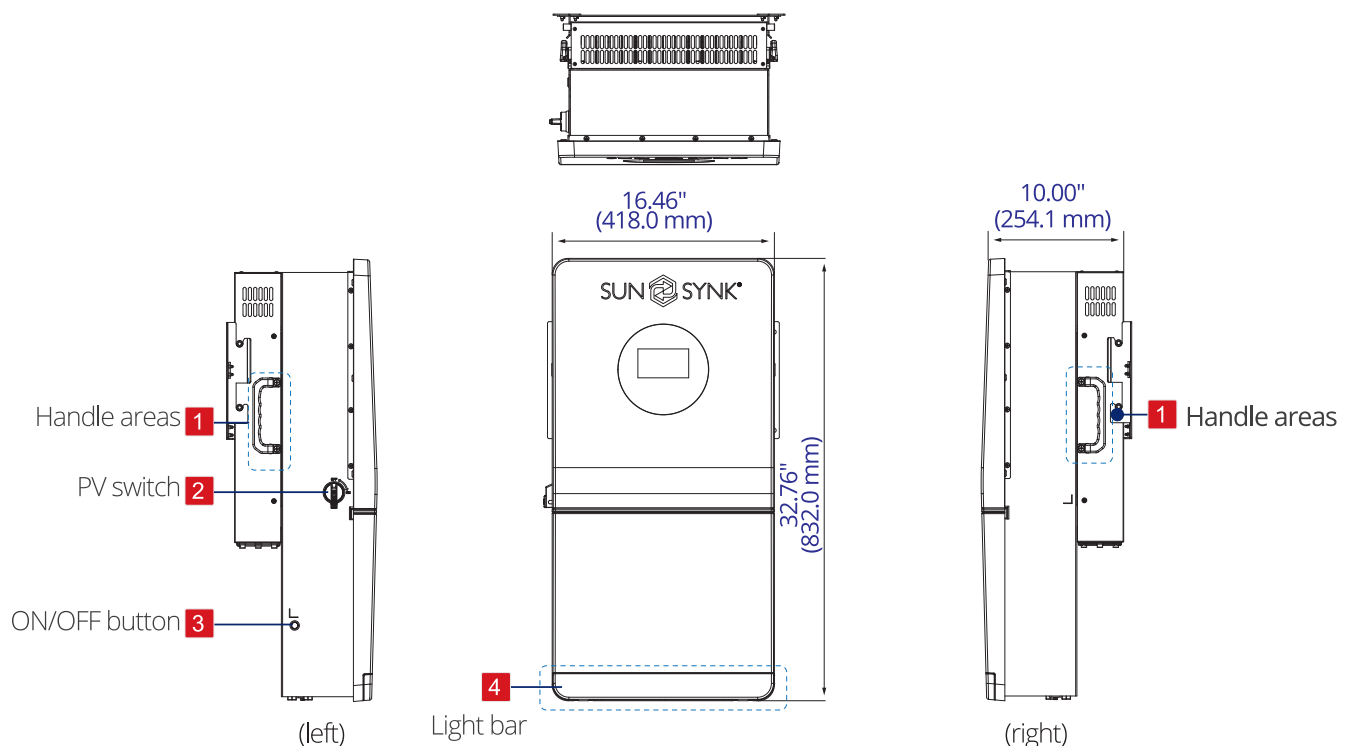
Typically, an ESS consists of PV array, inverter, battery, loads and electricity sensor. The inverter is a high-quality machine which can convert solar energy to AC energy and store energy into battery. The energy generated by inverter can be preferentially supplied to its self consumption, stored in the battery for future use or fed into public grid.



2.2 Product Appearance

2.2.1 Inverter Appearance

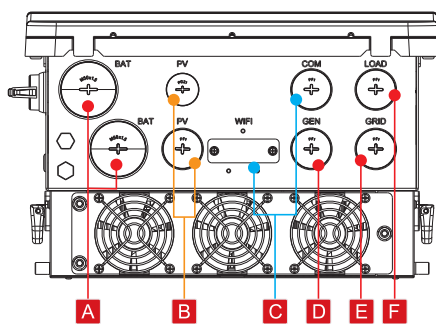
• The External View of Inverter



• Light Bar Details

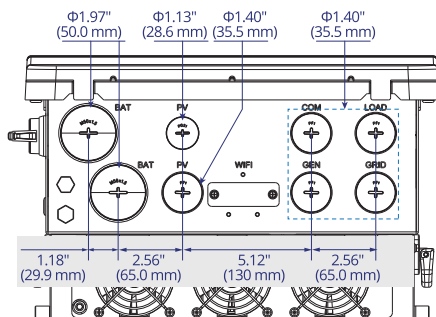
Battery Charge	UPS Mode	System Load	Fault Detect
Solid Green Charge > 90%	Solid Green UPS output disabled	Solid Green Load > 90% capacity	Pulsing Red Fault condition
Pulsing Green Charge > 50%	Pulsing Green UPS output enabled	Pulsing Green Load > 50% capacity	N/A
Pulsing Amber Charge < 50%	N/A	Pulsing Amber Load < 50% capacity	N/A
Solid Amber Charge < 20%	N/A	Solid Amber Load < 20% capacity	N/A

• The Bottom View of inverter

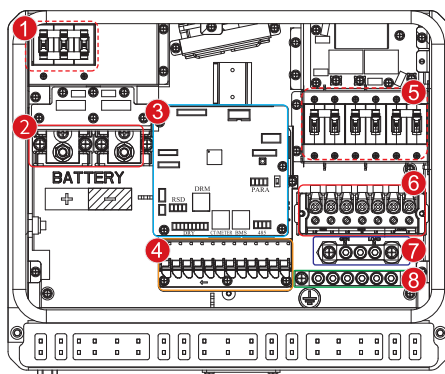


No.	Description
A	Battery connection ports
B	PV connection ports
C	Communication connection ports
D	GEN connection port
E	GRID connection port
F	LOAD connection port

• The Dimensions of Waterproof Holes



• The Internal Structure of Wiring Box



No.	Description
1	Battery breaker
2	Battery terminals
3	Communication connection ports
4	PV input connector
5	AC breakers
6	GEN/GRID/LOAD terminals
7	GEN/LOAD neutral terminals
8	Ground bus bar

2.3 Technical Specification

Model	SSM-6-SPHYB-UL		SSM-7.6-SPHYB-UL	SSM-11.4-SPHYB-UL
Battery Input Data				
Battery Type	Lithium-ion/Lead-acid			
Rated Battery Voltage	48V			
Battery Voltage Range	40V-64V			
Max. Charging Current	210A			
Max. Discharging Current	130A	180A	210A	
Max. Charging Power	10,000W			
Max. Discharging Power	6,000W	7,600W	10,000W	
PV String Input Data				
Max. DC Input Power	9,000W	12,000W	15,000W	
PV Input Voltage	450V (90V - 600V)			
Start-up Voltage	90V			
MPPT Range	70V - 540V			
PV Input Current	30A+22A	30A+22A+22A		
Max. PV Isc	40A+30A	40A+30A+30A		
Strings Per MPPT	2+2	2+2+2		
Nos. of MPPT	2	3		
AC Output Data				
Rated AC Output and UPS Power	6,000W	7,600W	10,000W	
Max. AC Output Apparent Power	6,600VA	7,600VA	11,400VA	
Max. AC Output Power	6,600W	7,600W	11,400W	
Peak Power (off-grid)	2 times of rated power, 1 S			
AC Output Rated Current	25A	31.7A	41.7A	
Max. AC Current	27.5A	34.8A	47.5A	
Rated Input/Output Voltage	120/240V (Split phase) , 120/208V (2/3 phase)			
Rated Input/Output Grid Frequency/Range	50Hz/45Hz-55Hz , 60Hz/55Hz-65Hz			
Power Factor Adjustment Range	0.8 leading to 0.8lagging(> 0.99 @rated power)			
Total Current Harmonic Distortion THDi	<3% (of nominal power)			
Transfer Time	<10ms (typical)			
THDV	<3% @100% R Load			
Efficiency				
Max. Efficiency (PV to AC)	98.0%			
Max. Efficiency (BAT to AC)	94.5%			
CEC. Efficiency	96.5%			

Protection	
Protection Category	Class I
DC Switch	Yes
Anti-islanding Protection	Yes
AC Overcurrent Protection	Yes
DC/AC Overvoltage Protection	DC Type II, AC Type IV
AC Short Circuit Protection	Yes
DC Reverse connection	Yes
Surge Arrester	DC Type II, AC Type II
Insulation Resistance Detection	Yes
Leakage Current Protection	Yes
AFCI/RSD Monitoring	Yes
Certification	
Safety	UL 1741/CSA C22.2/UL 1699B
EMC	FCC Part 15 Class B
Grid	UL1741SA, UL1741SB, UL 1741 PCS CRD, IEEE1547, HECO SRD 2.0, CSIP
HMI & COM	
Display	Wireless & APP + LED , Touch LCD
Communication Interface	CAN (for BMS), RS485 (for meter), RS485, CAN(for parallel), WiFi
General	
Max. Operation Altitude	2000m
Protection Degree	NEMA 3R/IP65
Operating Temperature Range	-25~60°C(>45°C derating)
Relative Humidity	0~100%
Cooling	Fan Cooling
Installation Style	Wall bracket
Warranty	5 Years

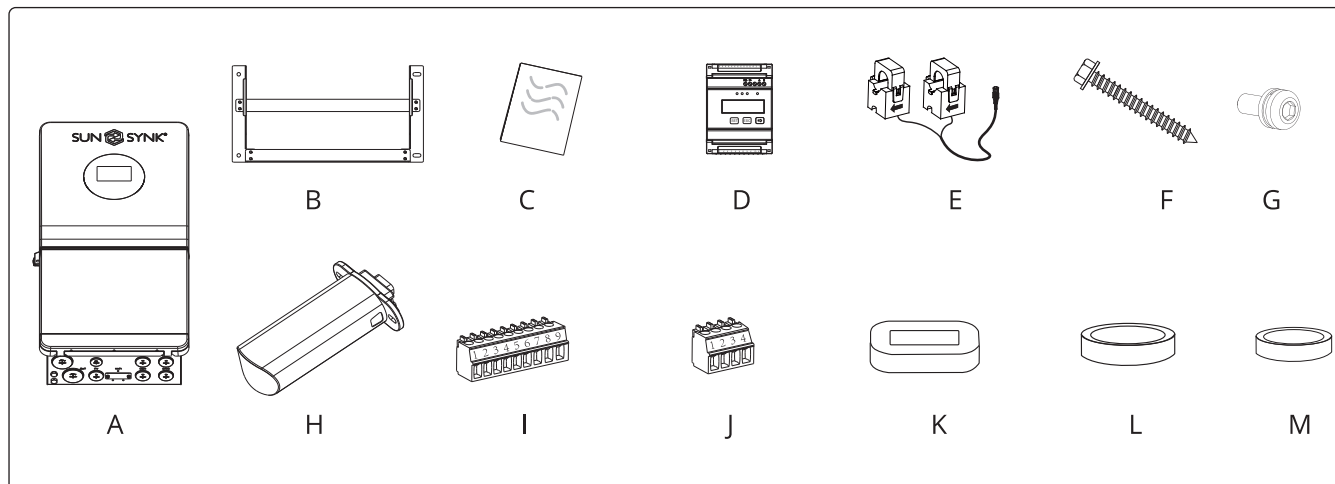
Remarks :

- The range of output voltage and frequency may vary depending on different grid codes.
- Specifications are subject to change without advanced notice.

3 Installation

3.1 Packing List

After unpacking, please check the following packing list carefully for any damages or missing parts. If there is any damage or missing parts, contact the supplier for help.

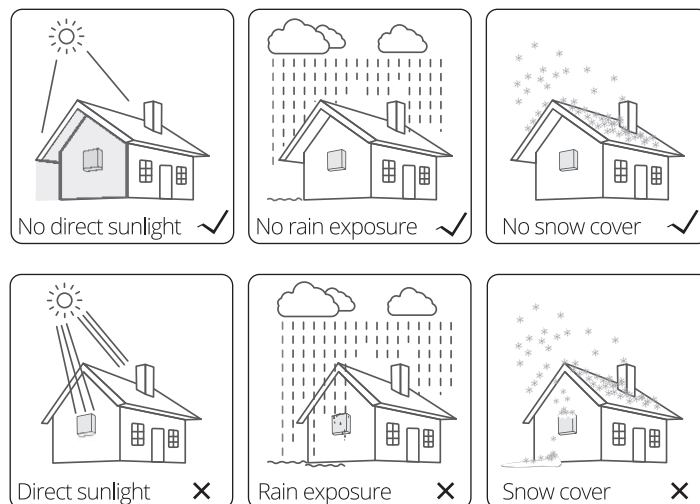


Position	Quantity	Description
A	1	Inverter
B	1	Mounting bracket
C	1	File package
D	1	Meter pack (Optional)
E	1	Current Transformer (CT) clamp
F	4	M6 self tapping screws
G	1	M6 security screw
H	1	WIFI module
I	1	9-Pin terminal
J	3	4-Pin terminal
K	1	AC toroid, for grid L1/L2/N cables
L	1	DC toroid, for battery cables
M	2	DC toroid, for PV cables

3.2 Selecting the Mounting Location

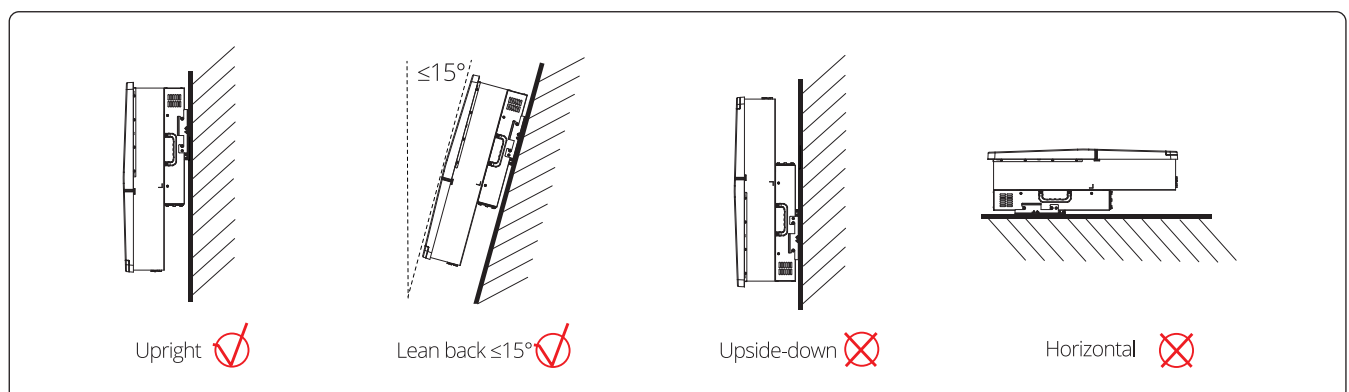
3.2.1 Installation Environment Requirements

- With a NEMA 3R protection rating, the inverter can be mounted indoors or outdoors.
- The inverter is suitable for use in residential non-habitable spaces.
- The mounting location must be inaccessible to unrelated personnel since the enclosure and heat sinks are extremely hot during operation.
- Do not install the inverter in areas containing highly flammable materials or gases.
- To ensure optimum operation and long service life, the ambient temperature must be below 50°C.
- The inverter must be mounted in a well-ventilated environment to ensure good heat dissipation.
- Identify the inverter location on a stub frame, a brick wall or a concrete wall. Ensure the carrier, where the inverter is mounted, can support the weight of the inverter.
- Do not install the inverter in a rest area since it will cause noise during operation.
- The installation height should be reasonable, and please make sure it is easy to operate and view the display.
- Product label and warning symbols shall be clear to read after installation.
- To ensure long service life, the inverter must not be exposed to direct solar irradiation, rain, or snow. It is recommended that the inverter be mounted in a sheltered place.



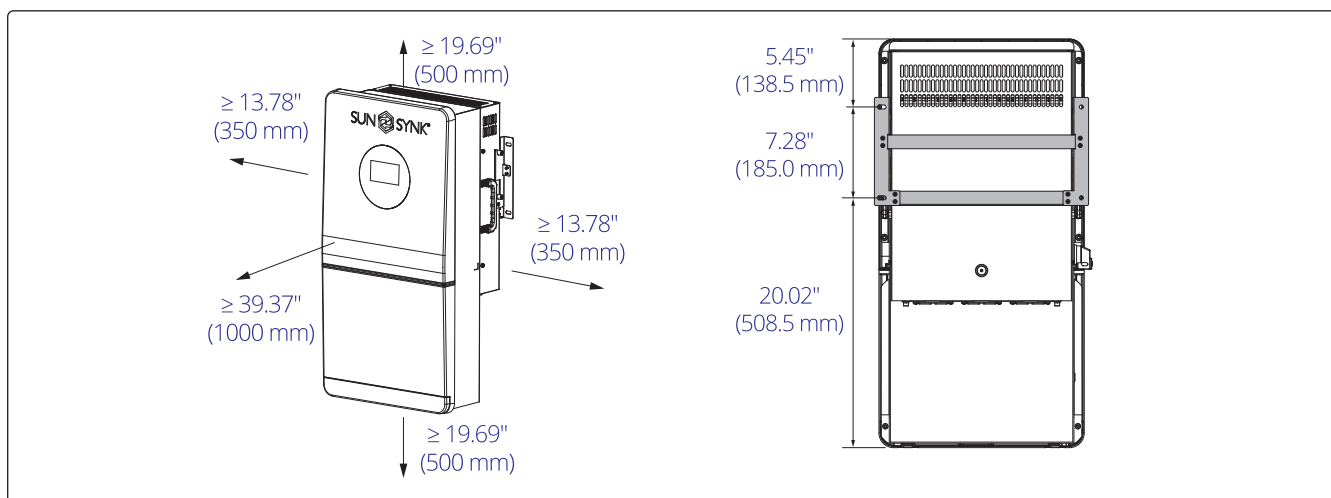
3.2.2 Mounting Requirements

Mount the inverter vertically or at a maximum back tilt of 15°. Do not install the inverter in a wrong direction. Always keep the connection area downward.



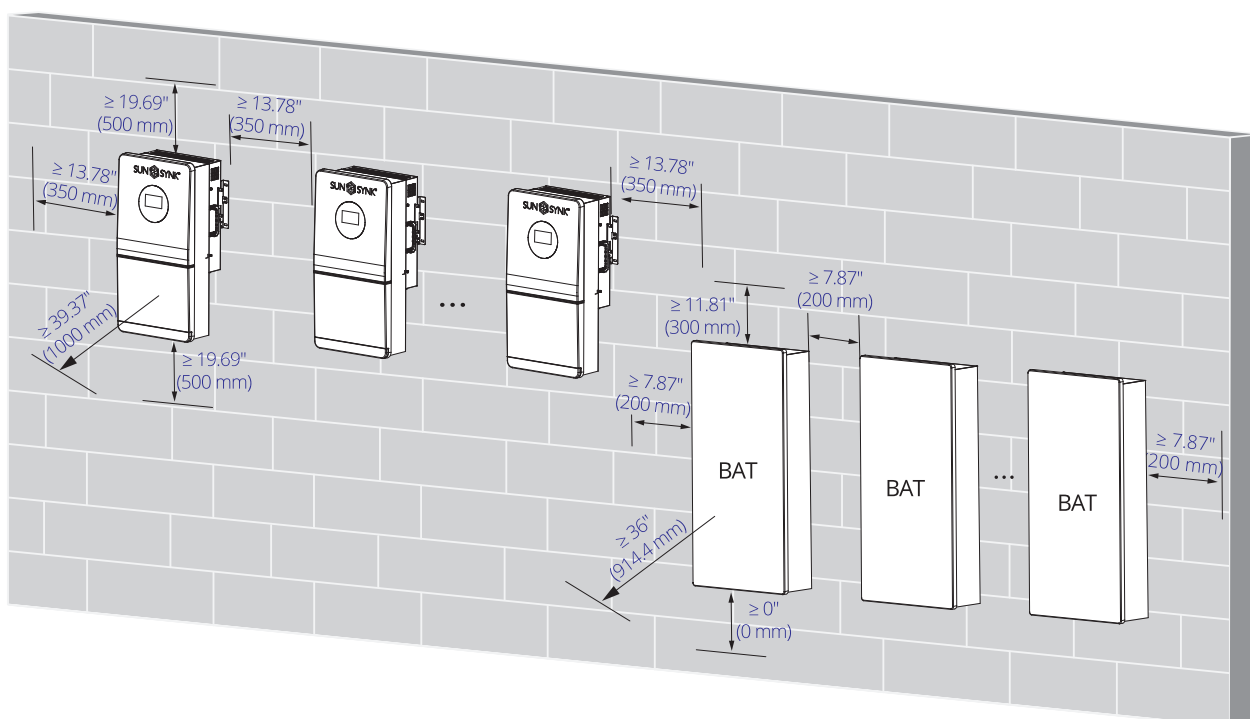
3.2.3 Installation Space Requirements

To guarantee optimal operation and adequate heat dissipation for the machine, the following requirements for clearances should be observed.



NOTE:
Ensure all related local laws and regulations have been complied.

The detailed clearance information below are general guidelines. There should be at least 39.37 in (1000 mm) of clearance from inverters or batteries to doors or windows.

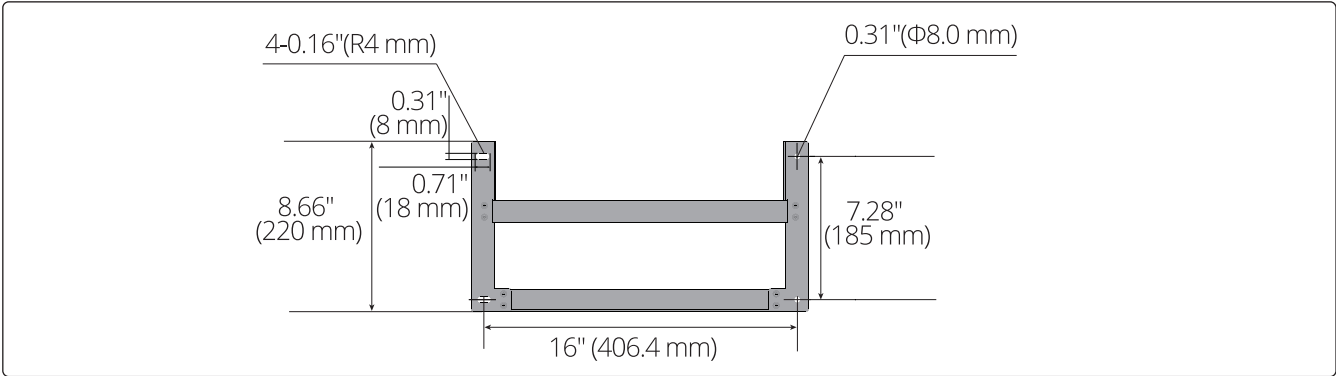


Installation space for ESS

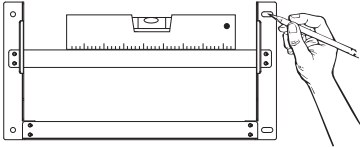
3.3 Mounting

 DANGER	Before drilling the hole on the wall, ensure no damage on the electric wire and/or water pipe inside the wall.
 CAUTION	The inverter is heavy! Two or three persons are recommended to install the inverter. To prevent potential damages and injuries from inverter falling down, please ensure that the inverter is well-mounted.

Before mounting the inverter, you have to prepare an electric screwdriver and a marker. You may need expansion plugs or anchors for concrete. The dimension of mounting bracket is shown as figure below.

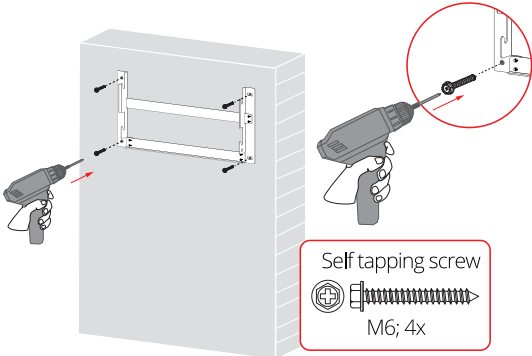


- Step 1.** Position the mounting bracket against the mounting surface, level it, and mark the mounting hole locations.
- Step 2.** Drive the screws through the mounting bracket into the mounting surface. Ensure the bracket is firmly attached.
- Step 3.** Hang the inverter onto the mounting bracket.
- Step 4.** Lock the inverter using the security screw.



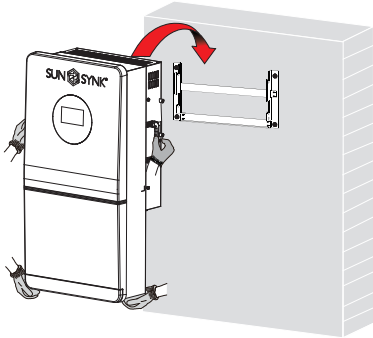
Set bracket horizontally.

1

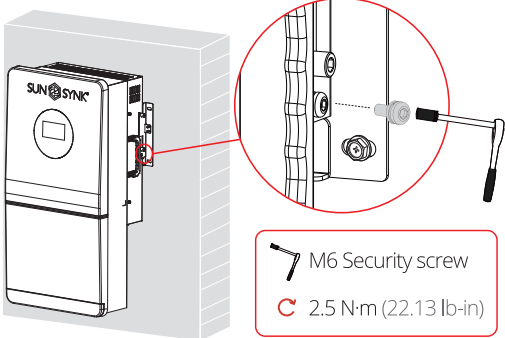


Self tapping screw
M6; 4x

2



3



M6 Security screw
2.5 N·m (22.13 lb-in)

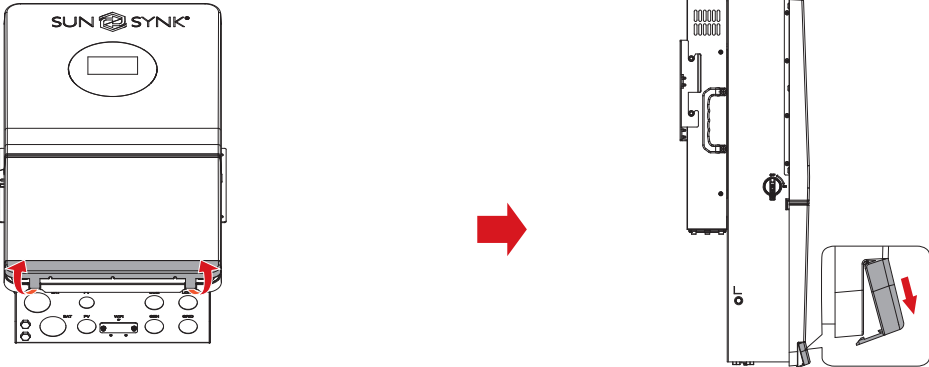
4

4 Electrical Connection

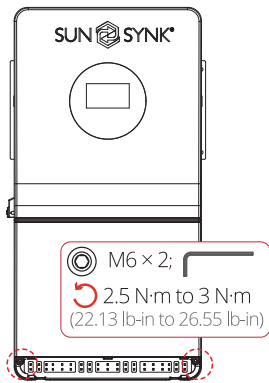
This chapter shows the detailed electrical connections of ESS inverter.

4.1 Removing Insulation Cover and Screw Plugs

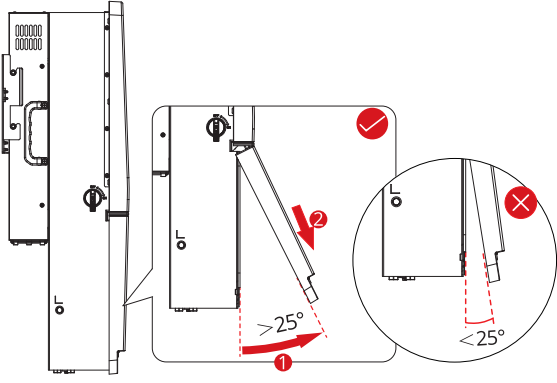
A shielding cover has been installed over the wiring box of the ESS inverter to protect users from potential electrical injuries. Before removing the cover and wiring, please ensure that the inverter and all cables to be installed have been completely powered off during the whole process of installation and connection.



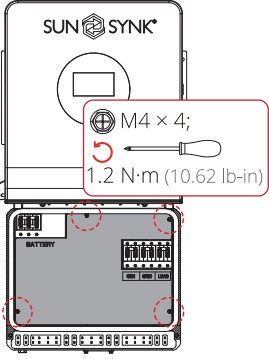
1 Open the cover of light bar and remove it.



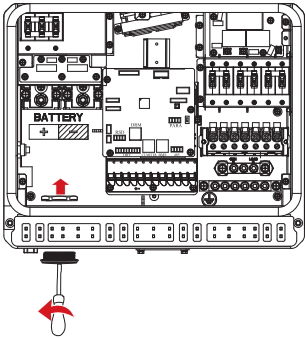
2 Unscrew two screws.



3 Remove the cover of wiring box.



4 Unscrew four screws and remove the insulation cover.



5 Hold the lock nut with your hand and loosen the screw plug with a flat-head screwdriver, then remove the lock nut and the screw plug as needed.



CAUTION

After the electrical connections are complete, if no other connections are made in the wiring area, replace the insulation cover.



DANGER

Ensure that the inverter and all cables to be installed have been completely powered off during the whole process of installation and connection. Otherwise, high voltage may result in fatal injury.

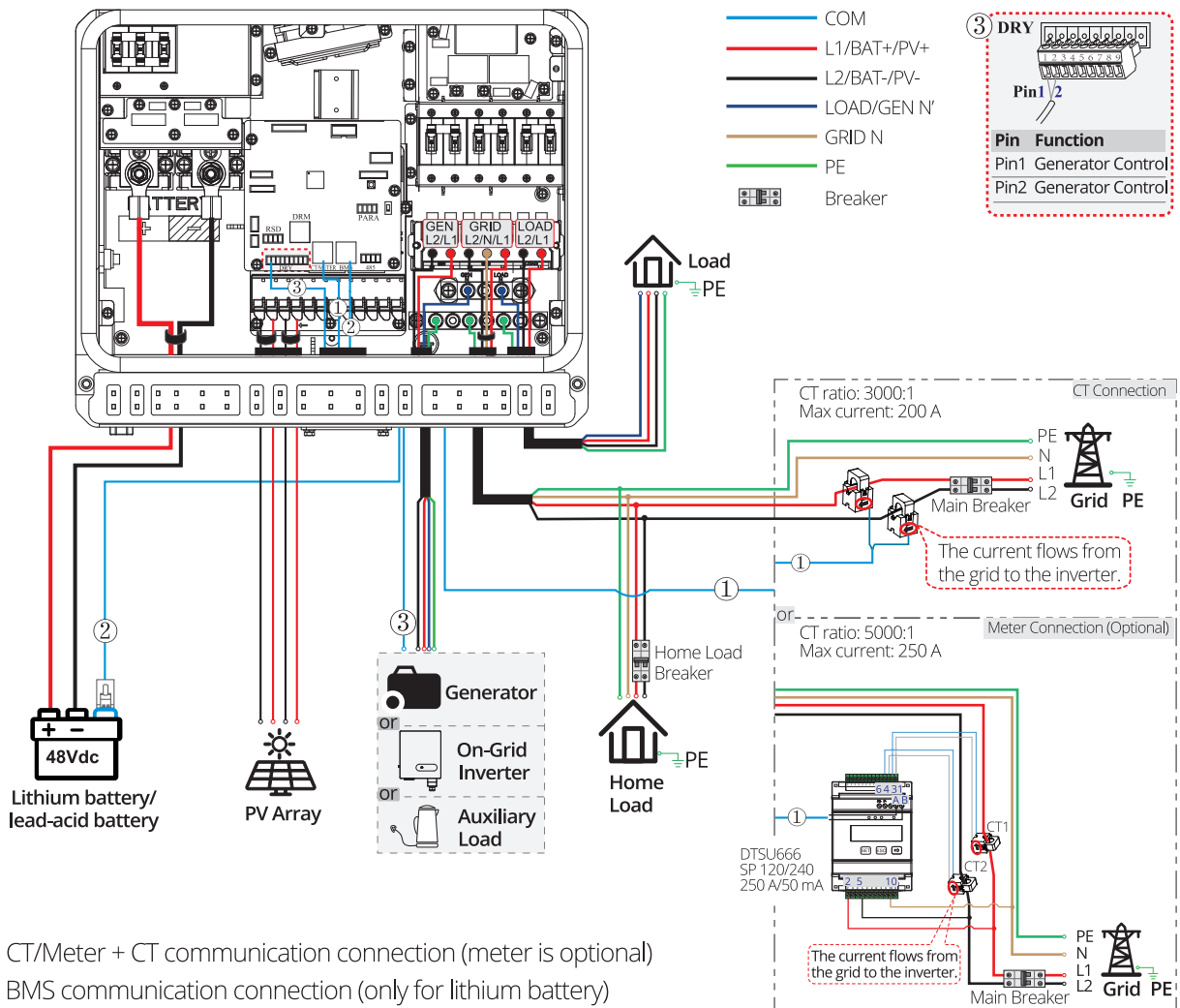
4.2 Wiring Diagram

Standard Non-parallel Wiring Diagram

Diagram 01

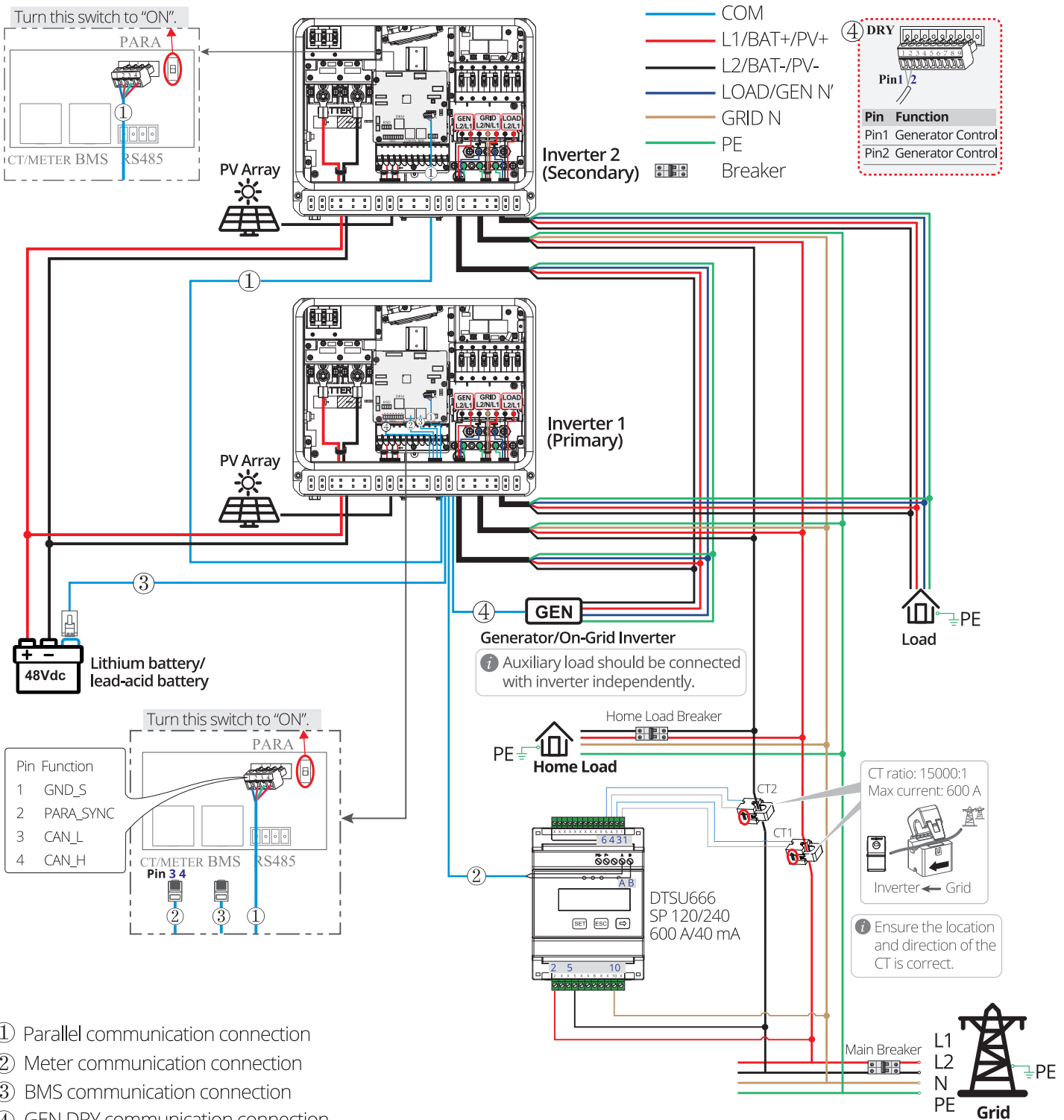
120/240Vac Split Phase

120/208Vac 2/3 Phase



120/240Vac Split Phase

120/208Vac 2/3 Phase



- ① Parallel communication connection
- ② Meter communication connection
- ③ BMS communication connection
- ④ GEN DRY communication connection

*Set one inverter as Primary and the others as Secondary (go to **Settings > Advance > Multi-Inverter > Parallel** to set it on LCD). The inverter set to Primary is designated as inverter 1, and the meter and BMS communication cables must be connected to inverter 1.

*The LOAD/GEN neutral and GRID neutral must connect to different terminals separately. Please refer to the section **GRID/LOAD/GEN Connection** for details.

*Ensure that the N and PE wires are connected correctly.

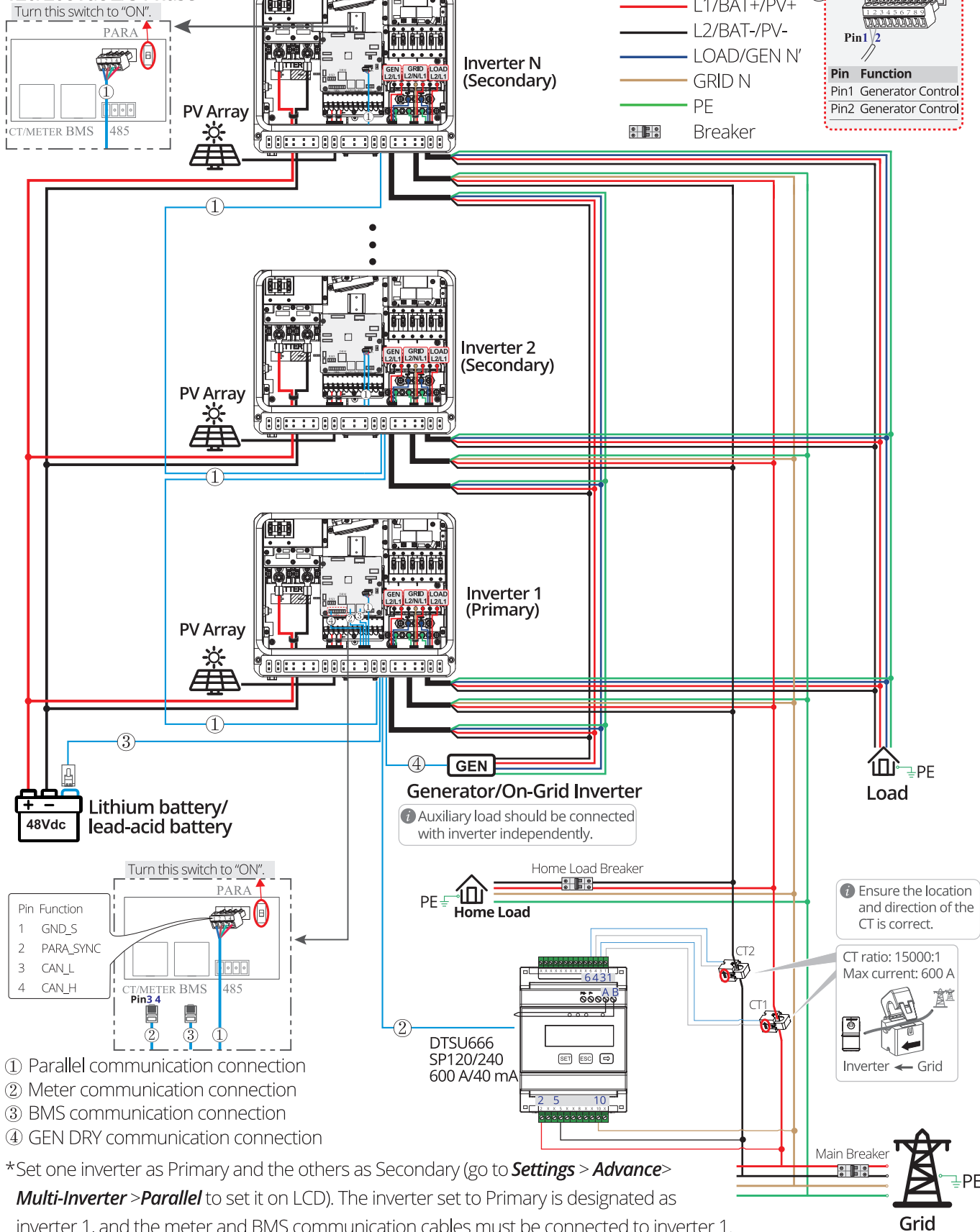
*PV (+) and PV (-) cables must go through the DC toroid in pairs.

*The specification of main breaker and home load breaker depend on household loads.

*Please refer to **Note for parallel wiring diagrams** to learn more information about this parallel diagram.

120/240Vac Split Phase

120/208Vac 2/3 Phase



*Set one inverter as Primary and the others as Secondary (go to **Settings > Advance > Multi-Inverter > Parallel** to set it on LCD). The inverter set to Primary is designated as inverter 1, and the meter and BMS communication cables must be connected to inverter 1.

*The LOAD/GEN neutral and GRID neutral must connect to different terminals separately. Please refer to the section **GRID/LOAD/GEN Connection** for details.

*PV (+) and PV (-) cables must go through the DC toroid in pairs.

*The specification of main breaker and home load breaker depend on household loads.

*Please refer to **Note for parallel wiring diagrams** to learn more information about this parallel diagram.

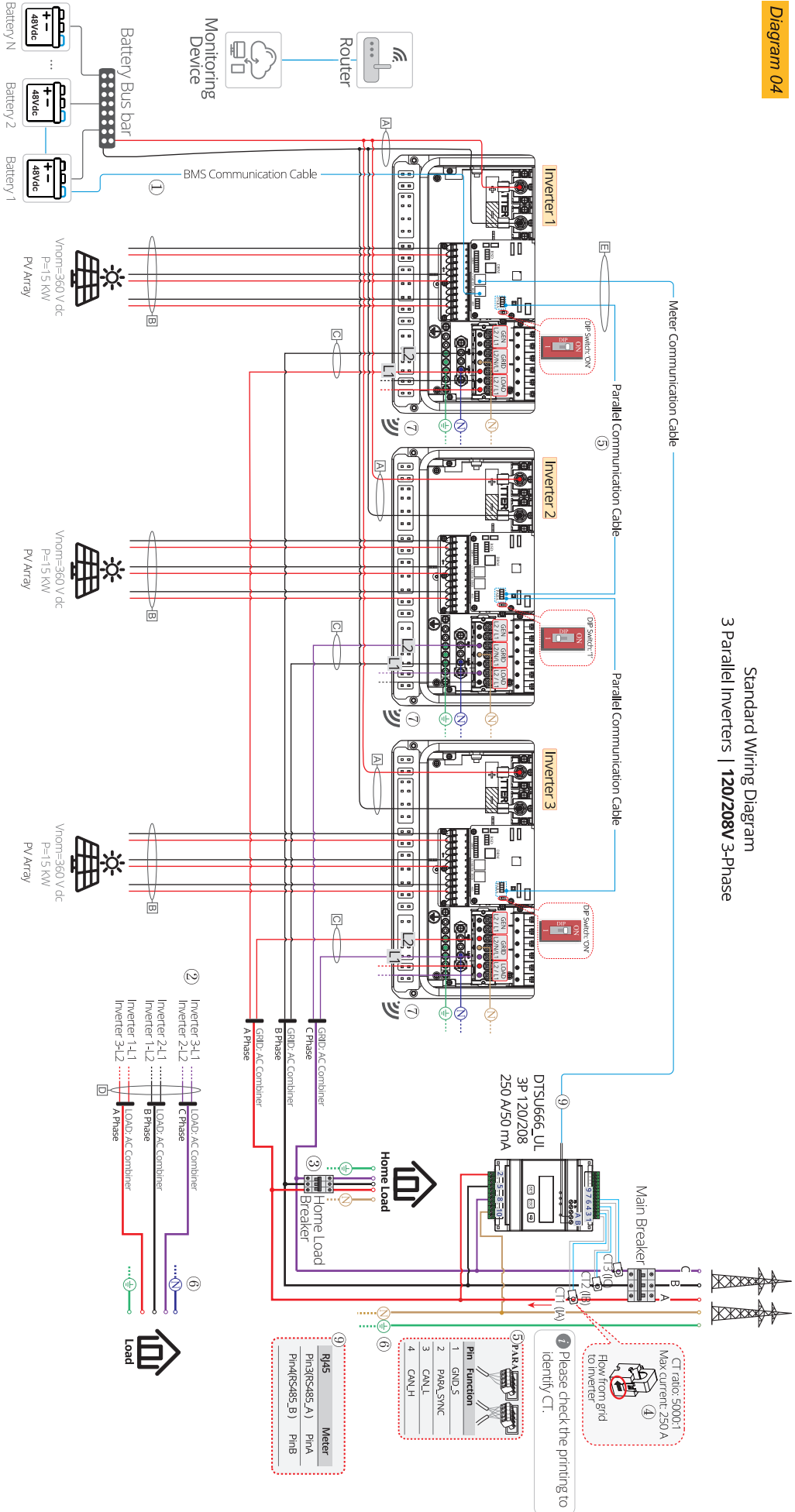
Note for parallel wiring diagrams

1. BMS communication connection is only for lithium battery.
2. It is necessary to turn the matched resistance switch (or DIP switch) of inverter 1 and inverter N to “ON” and others to “1” in parallel connection mode.
3. It is necessary to additionally purchase suitable CT and energy meter according to the specific requirements in parallel connection mode in which the CT ratio is 15000:1.
4. In parallel connection mode, it is required to go to **Settings > Advance > Multi-Inverter > Parallel** to enable parallel mode on LCD.
5. In one parallel system, the auxiliary load is only allowed to be connected to GEN port in a non-parallel way.
6. The external DC/AC breakers are not supplied with the inverter and must be purchased separately. Prepare the external parallel breakers with a nominal current $\geq 2 * N * I_{max}$. (N refers to the parallel inverter quantity; I_{max} refers to the maximum output current of the inverter.)
7. The GEN port supports connection to generators of two voltage types: Split Phase (120/240V) and 2/3 Phase (120/208V). When using the GEN port to connect a generator, ensure that the voltage type of the inverter's grid port is consistent with that of the generator port. Then, perform the following steps via the LCD (Check the Unlock Grid Setting):
 - First, select the Gen port type via **Settings > Aux Load > Gen Input**
 - Then, select correct grid voltage type via **Settings > Grid Setup > Type > Grid Type > 120/240V Split Phase or 120/208V 3 Phase**



Ensure that the inverter and all cables to be installed have been completely powered off during the whole process of installation and connection. Otherwise, high voltage may result in fatal injury.

Standard Wiring Diagram 3 Parallel Inverters | 120/208V 3-Phase



- ① BMS is only for Lithium battery.
 - ② The wiring method of load is as the same as that of the grid.
In Inverter 'N-1', 'N' represents inverter serial number; 'L' represents the phase of live wire in GRID/LOAD connection.
 - ③ If breakers are prepared by yourself, refer to TABLE 1 for breaker specification.
 - ④ The arrow indicates the current in CT flows from the grid to the inverter.
 - ⑤ Parallel communication cable connection details.
 - ⑥ These symbols represent a **grid neutral/common neutral (LOAD/GEN/ground)** connection respectively.
Do not confuse the grid neutral with other neutral. Failure to do so may damage the inverter.
 - ⑦ WLAN/Wi-Fi
 - ⑧ Meter and BMS communication cable must be connected to inverter 1 (master inverter) and CTs are required to connect in order of CT1, CT2, and CT3.
 - ⑨ Meter communication cable connection details.
- * Please refer to the section **Paralleling Inverters** for LCD setting guide for three-phase connection.

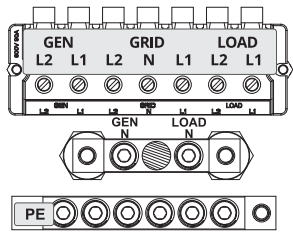
4.3 Internal Grounding

 WARNING	The inverter must be grounded; otherwise, there will be an electric shock risk.
 CAUTION	If the positive pole or negative pole of the PV array is required to be grounded, the inverter output (to AC grid) must be isolated by transformer in accordance with IEC62109-1, -2 standards.

A protective earth (PE) busbar is equipped inside of the inverter’s wiring box. Please be sure to connect the PE cable to the PE busbar for reliable grounding.

A minimum gauge size of AWG 8 green or green-yellow wire is recommended.

Terminals Overview

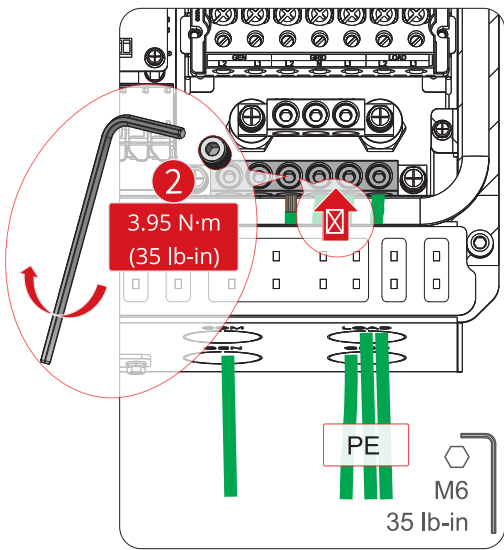




Items	Remark
PE cable size	Min. 8 AWG
Strip length	0.71" (18 mm)
Screw	M6
Torque	35 lb-in

Procedures:

- 1. Thread the wires into wiring box through AC connection ports, namely Grounding/ GRID/LOAD/GEN connection ports.
- 2. As shown in the illustrations, attach the PE cable to the busbar accordingly, and tighten terminal screws with a torque of 3.95 N·m or 35 lb-in.
- 3. Make sure that all cables are securely in place.



4.4 Battery Connection

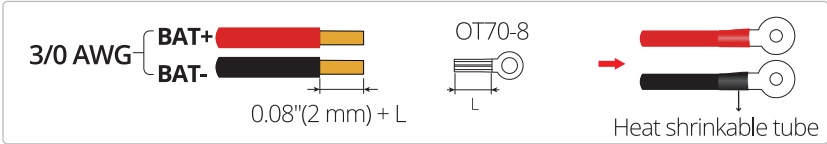
This section explains the requirements and procedures of battery connection. Read carefully before connecting.

**DANGER**

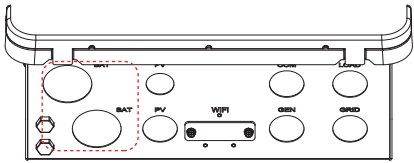
Before connecting the battery terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock

Procedures:

1.Prepare the proper cable and OT terminal we recommended as shown below, and strip an appropriate length of the cable insulation. It is recommended that the battery cable be less than or equal to 3 m.



2.Thread the wires into wiring box through BAT connection port.



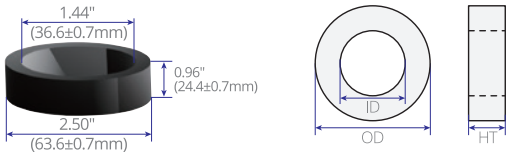
3.Insert the wires into battery terminals. A toroid is a must for our inverter to avoid interference.

**WARNING**

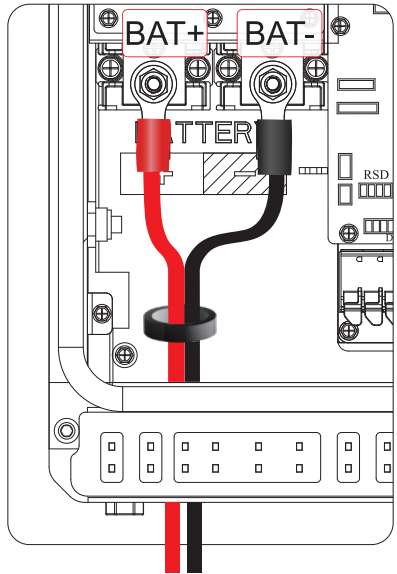
Reverse polarity will damage the inverter!

 M8
 Max. 20 N·m (177.01 lb-in)

DC Toroid Dimension:



OD (mm)	63.55	±0.7
ID (mm)	36.57	±0.7
HT (mm)	24.40	±0.7



4.5 GRID/LOAD/GEN Connection

This section explains the requirements and procedures of AC connection. Read carefully before connecting.



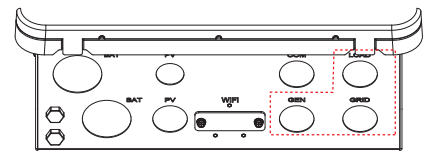
Before connecting the GRID/LOAD/GEN terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock.

Procedures:

1. Prepare the proper cable we recommended as shown below, and strip an appropriate length of the cable insulation. It is recommended to use outdoor dedicated cables.

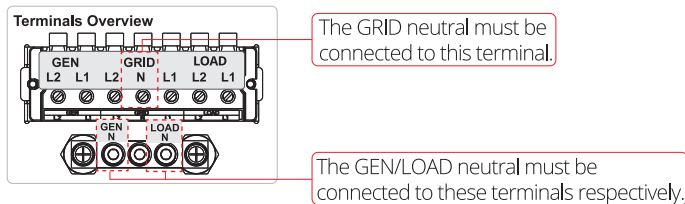
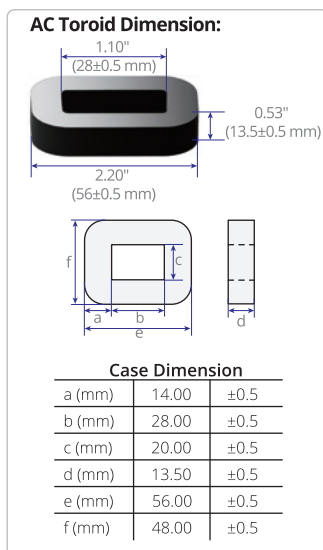
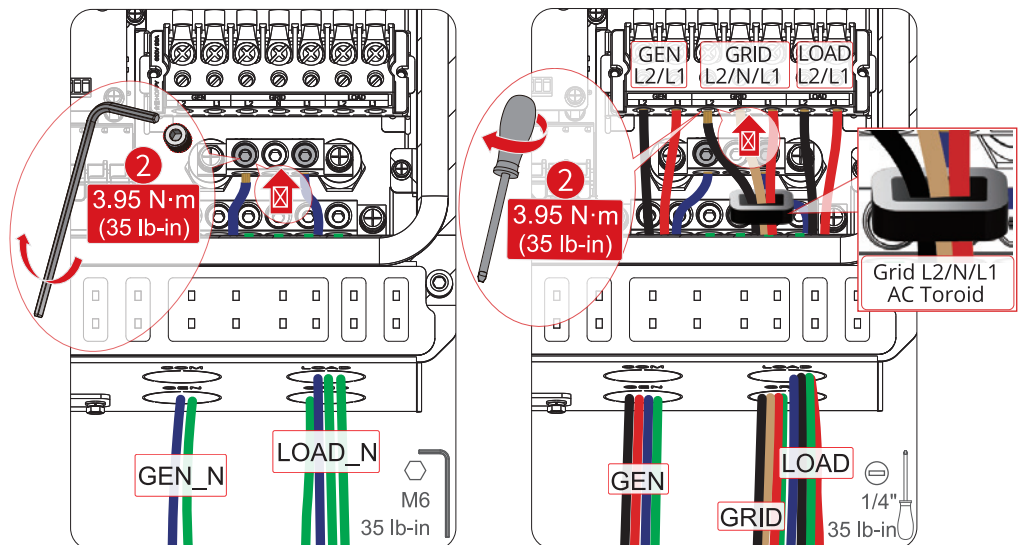


2. Thread the wires into wiring box through GRID/LOAD/GEN ports.



3. As shown in the figure below, insert the wire into the terminal according to the label on the terminal block, and then tighten the terminal screws with a torque of 3.95 N·m or 35 lb·in. Finally, ensure that all wires are securely in place.

* When connecting the L1/L2/N cables to the GRID terminals, thread these three cables through an AC toroid first.



4.6 PV Connection

This section explains the requirements and procedures of PV connection. Read carefully before connecting.

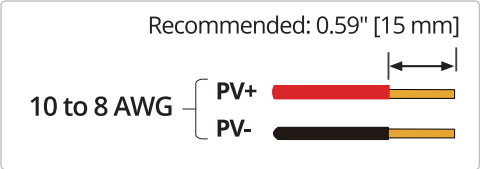
**DANGER**

1. Photovoltaic arrays exposed to sunlight will generate dangerous voltages!

2. Before connecting the PV terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock.

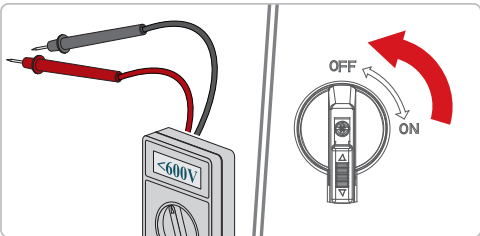
Procedures:

1.Prepare the proper cable we recommended as shown below, and strip an appropriate length of the cable insulation. It is recommended to use outdoor dedicated PV cables.

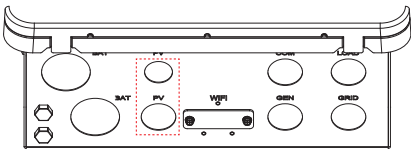


2. Inspection before connection.

- Check correct polarity of wire connection from PV modules and PV input connectors.
- The test voltage cannot exceed 600 V DC.
- Ensure that the PV switch is OFF.

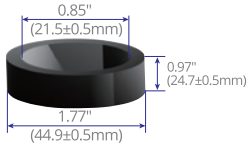


3.Thread the wires into wiring box through PV connection ports.

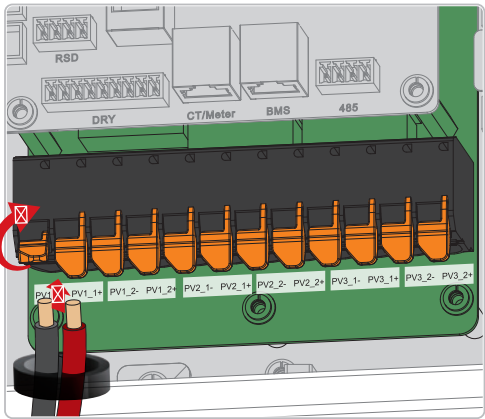


4. Open the switches of PV input connector. Insert the stripped cable into the PV input connector. When doing so, ensure that the stripped cable and the PV input connector are of the same polarity. Finally, close switches and ensure the wires are tightly fixed. Note that PV (+) and PV(-) cables must go through the DC toroid in pairs.

DC Toroid Dimension:

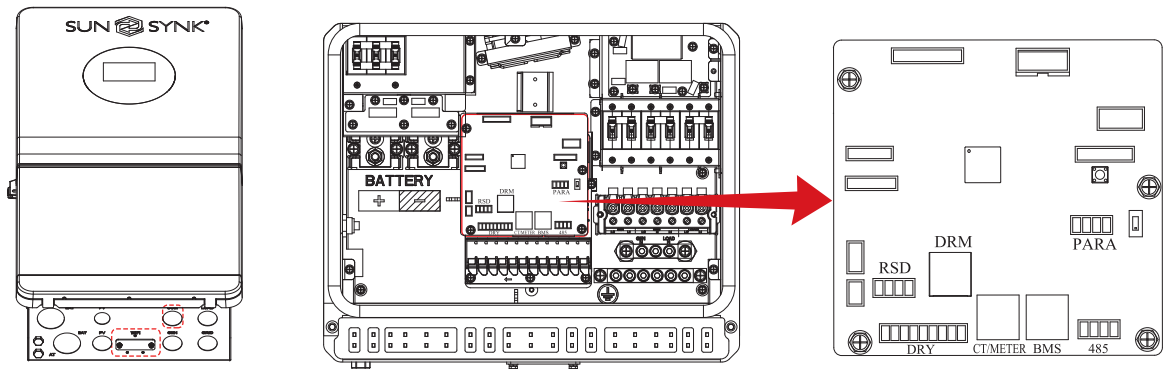


Case Dimension		
OD (mm)	44.9	±0.5
ID (mm)	21.5	±0.5
HT (mm)	24.7	±0.5



4.7 Communication Connection

There are communication interfaces in the communication port on the bottom of the inverter as show below:



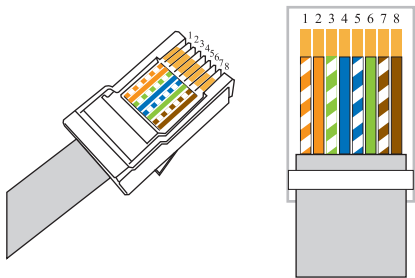
Interface		Descriptions
PARA		4-Pin interface for parallel communication
		A matched resistance switch for parallel communication
485		4-Pin interface for RS485 communication
DRM		Demand response mode for Australia application
CT/METER		For CT/Meter communication
BMS		Lithium battery communication interface
9-Pin	GEN	Generator control
	NTC	Temperature sensor terminal of lead-acid battery
	RMO	Remote off control
	DRY	DI/DO control
RSD		RSD control interface
WIFI		For WIFI communication

4.7.1 BMS Connection (Only for Lithium Battery)

 **NOTE**

This manual ONLY illustrates the pinout sequence of BMS at INVERTER SIDE. For details about the pinout sequence at battery side, see the user manual of the battery you use, and the following pinout diagram of battery side is only for illustration.

• Standard RJ45 Pinout



RJ45 Pin Configuration	
Pin	Color
1	White-Orange
2	Orange
3	White-Green
4	Blue
5	White-Blue
6	Green
7	White-Brown
8	Brown

Always face the flat side of the terminal, and count the pin slots from left to right from 1 to 8. Read the pin definitions of both the battery and inverter carefully.

• Pin definition of terminal

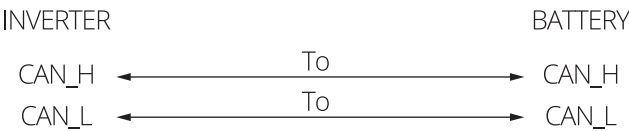
INVERTER

Inverter	
Pin	Definition
1	/
2	/
3	/
4	CAN_H
5	CAN_L
6	/
7	/
8	/

BATTERY (Taking one battery/s pin configuration as an example.)

Battery Example	
Pin	Definition
1	/
2	/
3	/
4	CAN_H
5	CAN_L
6	GND
7	/
8	/

• CAN BUS connection principle

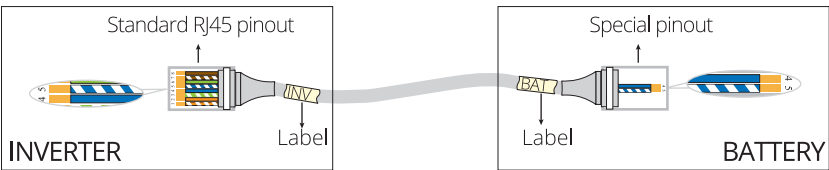


• BMS communication cable preparation:

- ① Prepare RJ45 terminals and strip appropriate length of COM cables.
- ② According to pin definitions and cable order, assemble the RJ45 terminals and crimp communication wires. There are two methods to assemble the RJ45 terminals.
- ③ Then label the RJ45 terminals (BAT or INV) to avoid confusion.
- ④ After finishing wire-making, use a multimeter or other specific tool to check if your cable is good, bad, or wired incorrectly.

Method 1:

Use the INVERTER RJ45 pinout as the standard pinout to crimp wires, then the battery side will be a non-standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the battery RJ45 terminal.



Method 2:

Use the BATTERY RJ45 pinout as the standard pinout to crimp wires, then the inverter side will be a non-standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the inverter RJ45 terminal.



• BMS communication cable connection steps:

a. Lead the BMS cable through the COM port.

Lithium Battery

BMS cable

RJ45 terminal

Inverter side

b. Insert the RJ45 terminal into BMS port.

BMS cable

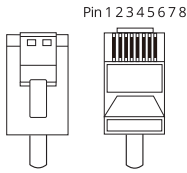
BMS

4.7.2 CT/Meter Connection

A CT/Meter is applied to monitor electricity usage of all loads.

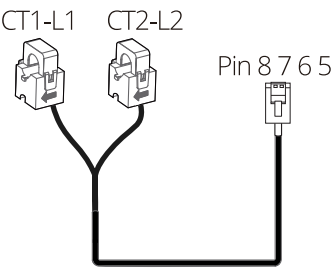
• RJ45 Terminal Configuration for CT and Meter Communication

Pin	1	2	3	4	5	6	7	8
Function Description	/	/	RS485_A	RS485_B	CT2-	CT2+	CT1+	CT1-

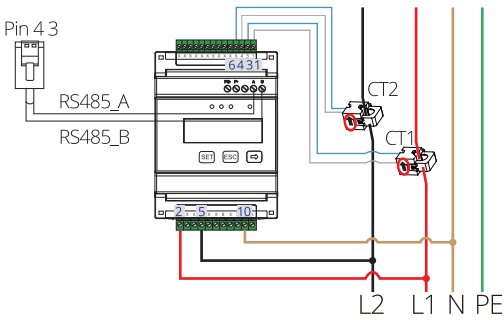


• Cable connection overview

CT:



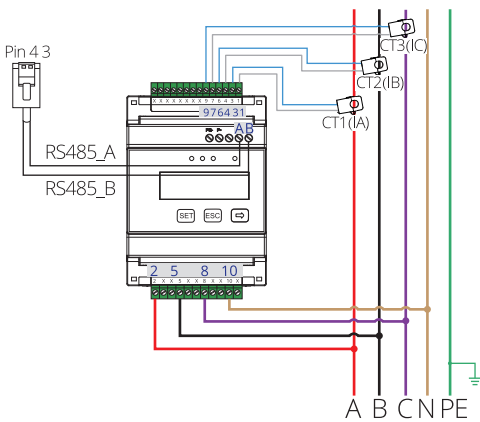
Meter+CT (split phase or 2/3 phase parallel connection):



RJ45	Meter
Pin3(RS485_A)	A
Pin4(RS485_B)	B

Meter+CT (3-phase parallel connection only):

Please check the printing to identify CT.



RJ45	Meter
Pin3(RS485_A)	A
Pin4(RS485_B)	B

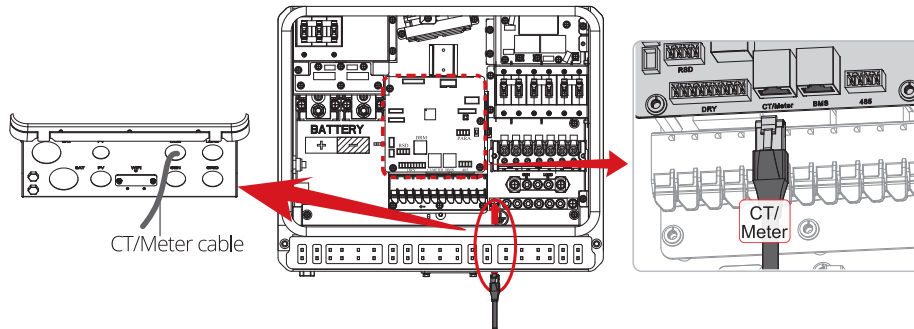
Meter	CT	Other Wiring
Pin1	CT1+	/
Pin3	CT1 -	
Pin4	CT2+	/
Pin6	CT2 -	
Pin7	CT3+	/
Pin9	CT3 -	
Pin2	/	A Phase
Pin5	/	B Phase
Pin8	/	C Phase
Pin10	/	N

• **CT/Meter communication cable connection steps:**

a. Make the RJ45 terminal according to above function description of each Pin definition.

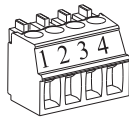


b. Lead the CT/Meter cable through the COM port. And insert the RJ45 terminal into CT/METER port.



4.7.3 RS485 Connection

• **4-Pin Terminal Configuration of RS485 Communication**



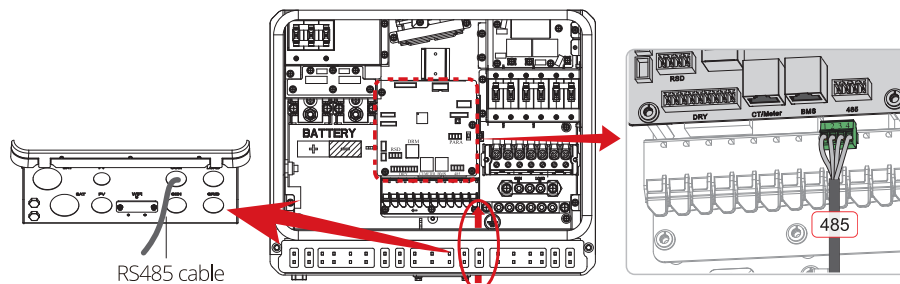
PIN	1	2	3	4
Function Description	RS485_A	RS485_B	PE	PE

• **RS485 communication cable connection steps:**

a. Make the 4-Pin terminal according to above function description of each Pin definition.

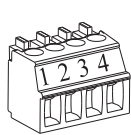


b. Lead the RS485 cable through one COM port. And insert the 4-Pin terminal into RS485 port on inverter panel.



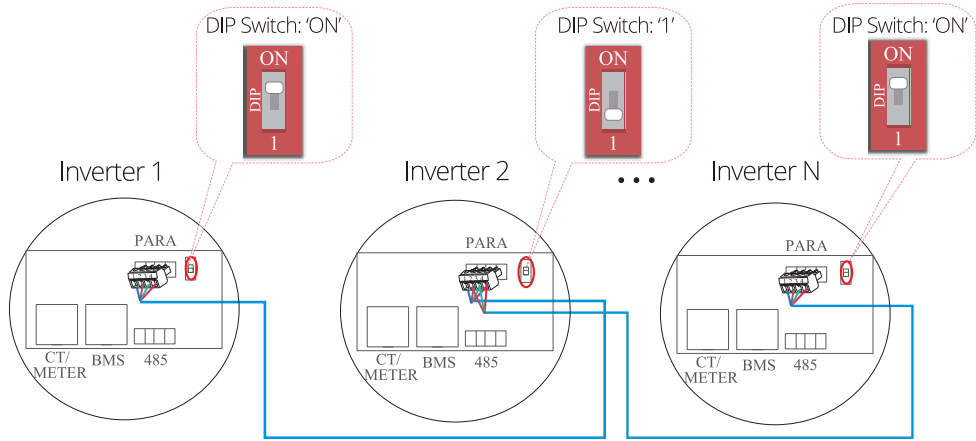
4.7.4 Parallel Communication Connection

• 4-Pin Terminal Configuration of parallel Communication



PIN	1	2	3	4
Function Description	GND_S	PARA_SYNC	CAN_L	CAN_H

• Parallel communication cable connection overview



It is necessary to turn the matched resistance switch of inverter 1 and inverter N to “ON” in parallel connection mode.

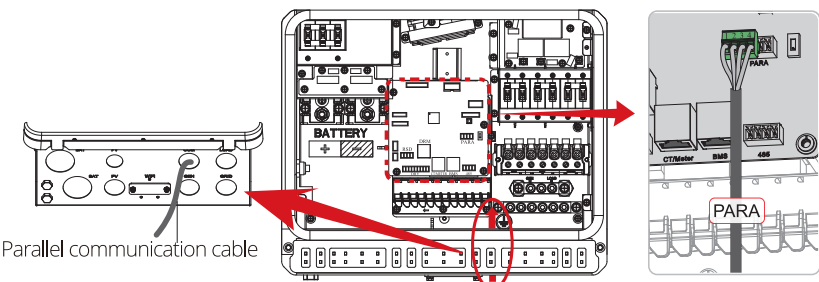
Inverter 1	Inverter 2	...	Inverter N
Pin4 (CAN_H)	Pin4 (CAN_H)		Pin4 (CAN_H)
Pin3 (CAN_L)	Pin3 (CAN_L)		Pin3 (CAN_L)
Pin2 (PARA_SYNC)	Pin2 (PARA_SYNC)		Pin2 (PARA_SYNC)
Pin1 (GND_S)	Pin1 (GND_S)		Pin1 (GND_S)

• Parallel communication cable connection steps:

a. Make the 4-Pin terminal according to above function description of each Pin definition.



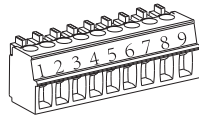
b. Lead the parallel communication cable through one COM port. And insert the 4-Pin terminal into PARA port.



4.7.5 NTC/RMO/DRY Connection(s)

• 9-Pin Terminal Configuration of Auxiliary Communication

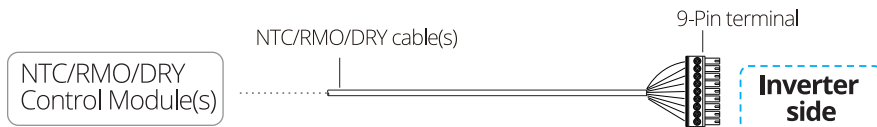
Pin 1 2 3 4 5 6 7 8 9



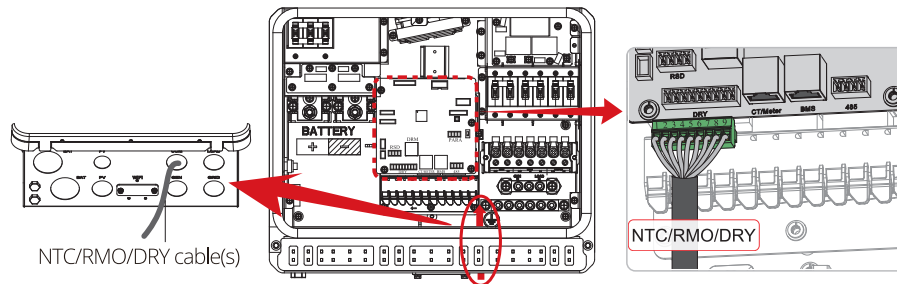
PIN	Function Description
1	GEN Control
2	GEN Control
3	NC1 (Normal Close)
4	NO2 (Normal Open)
5	N2
6	NC2 (Normal Close)
7	REMO OFF
8	GND S (NTC BAT)
9	NTC BAT+

• NTC/RMO/DRY communication cable connection steps:

a. Make the 9-Pin terminal according to above function description of each Pin definition for the auxiliary port you want to use.

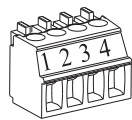


b. Lead the NTC/RMO/DRY cable(s) through one COM port. And insert the 9-Pin terminal into DRY port.

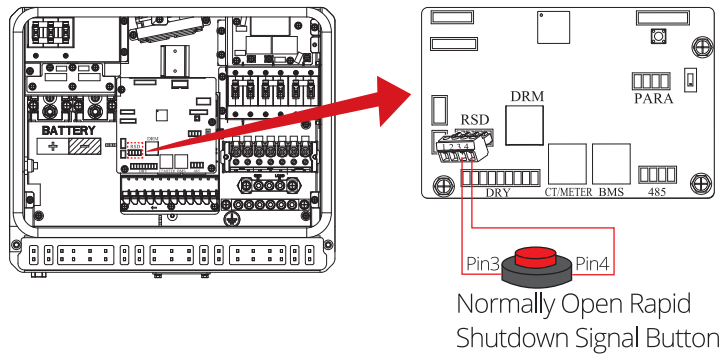


4.7.6 RSD Connection(s)

• 4-Pin Terminal Configuration of RSD

	PIN	3	4
	Function Description	Emergency Stop Signal Button	

• Emergency Stop Signal:

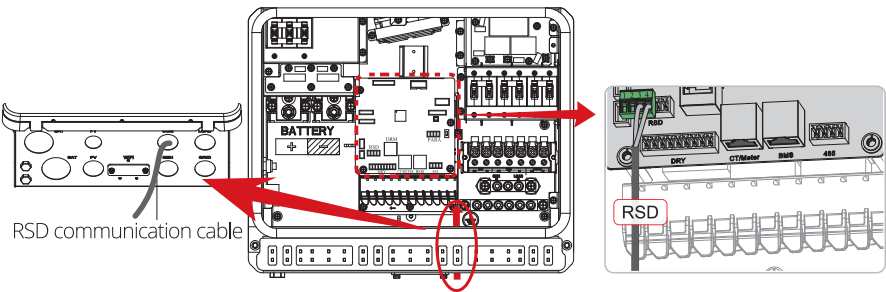


• RSD connection steps:

a. Make the 4-Pin terminal according to above function description of each Pin definition.

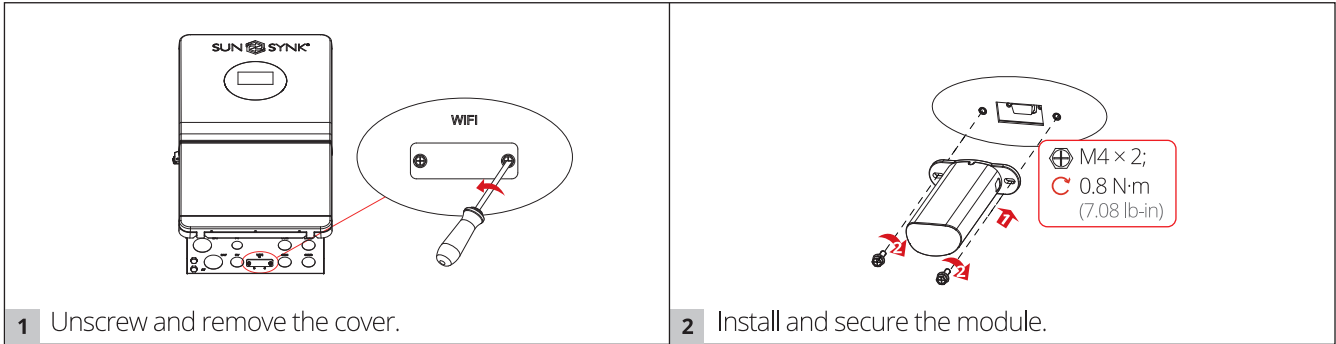


b. Lead the RSD communication cable through one COM port. And insert the 4-Pin terminal into RSD port.



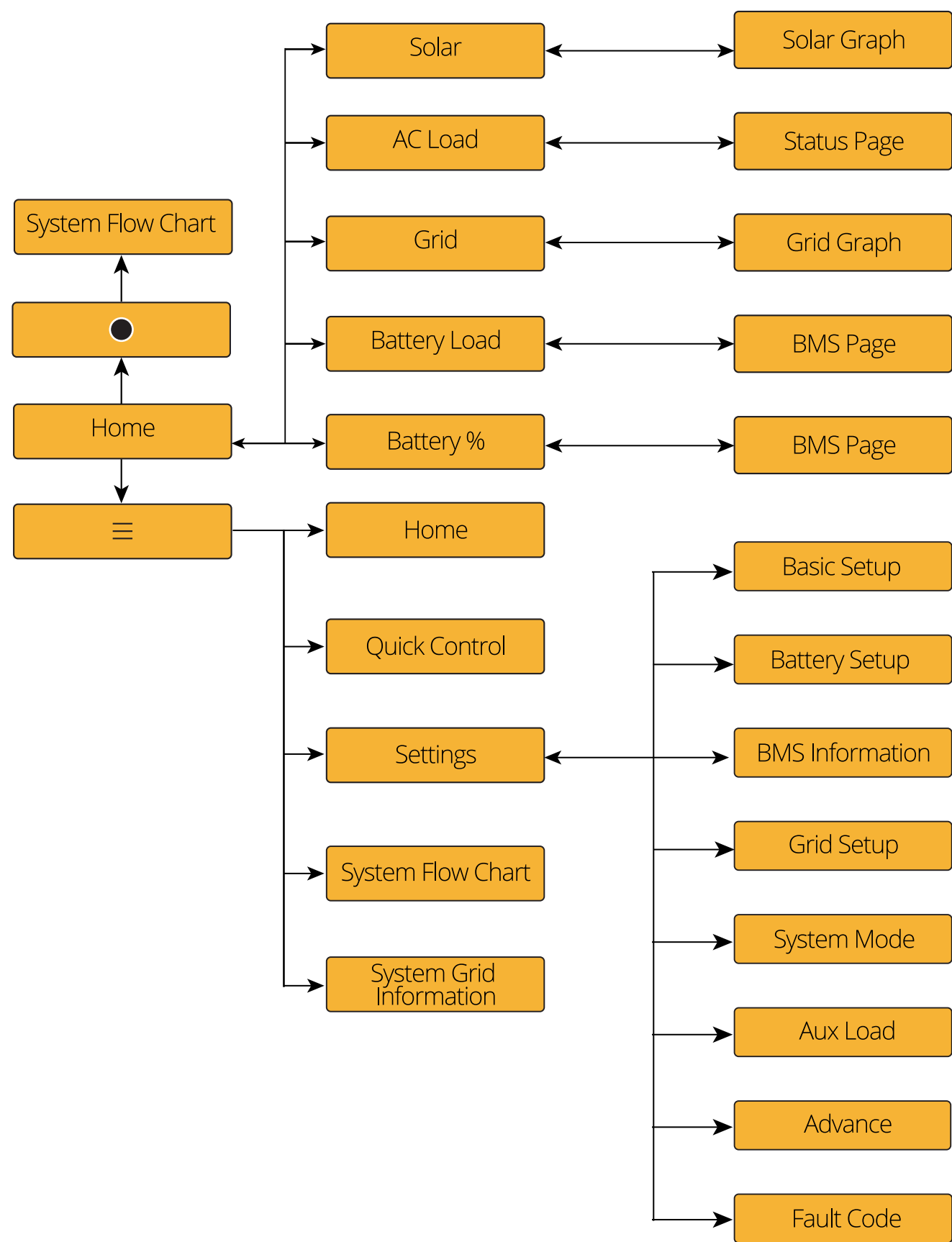
4.7.7 WIFI Module Connection

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

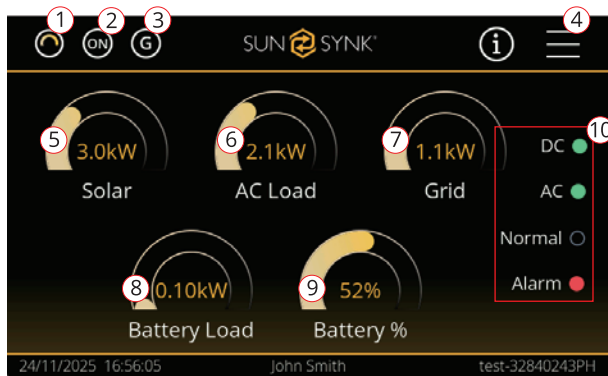


5 Operation

5.1 LCD Operation Flow Chart



5.2 Home Page



What you can do from this page:

1. Enter system flow chart page
2. Check On/Off status
3. Generator signal icon
4. Enter menu page
5. Enter solar page
6. Enter status page
7. Enter grid page
8. Enter battery information page
9. Enter battery information page
10. View virtual led indicators

NOTE:

The indicates that the system is in Normal operation.

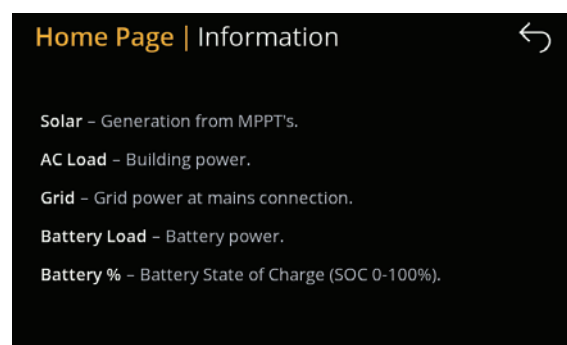
- Solar power (kW) and current power percentage
- AC load power (kW) and current power percentage
- Grid power (kW) and current power percentage
- Battery rated power (kW) and current charge/discharge power percentage
- Battery SOC (%) and current capacity percentage.
- Customer name
- Time and date.
- Serial number.

Virtual LED Indicators

Virtual LED Indicators		Meaning
DC	Green LED solid light	PV connection normal
AC	Green LED solid light	Grid connection normal
Normal	Green LED solid light	Inverter functioning normally
Alarm	Red LED solid light	Fault

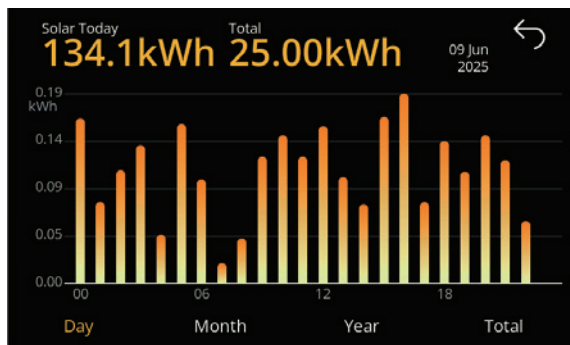
NOTE:

Click to enter the information page of the current parameter.

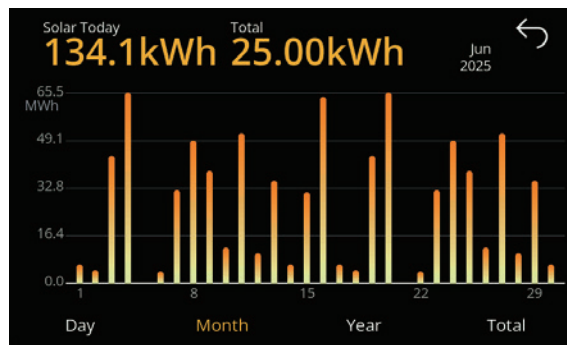


5.2.1 Solar Page

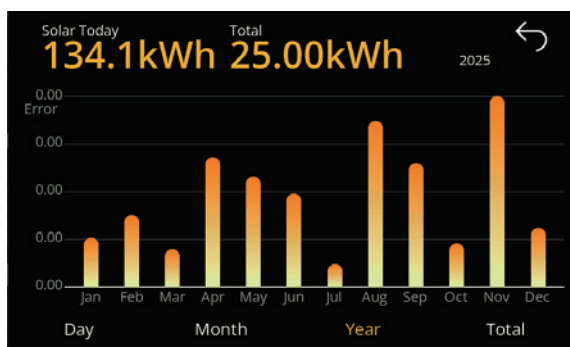
These pages show the daily, monthly, yearly, and total solar power produced. Enter this page by clicking on the **Solar icon** in the home page.



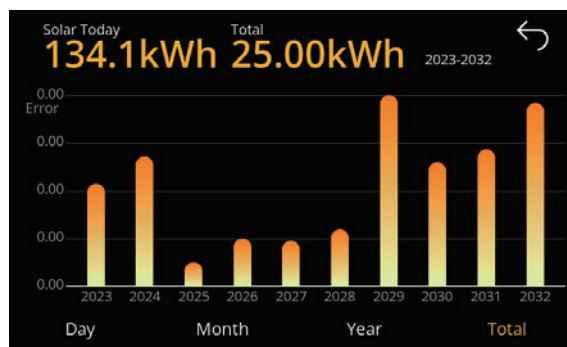
Daily power



Monthly power



Yearly power



Total power

5.2.2 Status Page

To enter the status page, click on the **AC Load icon** in the Home page.

Battery	Grid	Solar
102W 52% (SOC) 51.0V 2.00A 25°C	1090W / 51.0Hz L1: 110V / 8.90A L2: 111V / 5.11A LL: 0V CT: 0W LD: 660W	M1: 643W 69V / 2.15A M2: 1065W 300V / 3.55A M3: 2065W 400V / 5.55A
Inverter	Load	GEN
360W 50.1Hz L1:0V / 0.00A L2:0V / 0.00A	1400W L1:220V L2:220V	2472W 0V / 51.0Hz

Battery Column: Shows total power from the battery, battery SOC, battery voltage, battery current (negative means charge, positive means discharge) and battery temperature (shows zero if the battery temperature sensor is not connected).

Grid Column: Shows grid total power, frequency, voltage, and current.

Solar Column: Shows total PV (Solar) power, voltage and current for each of the three MPPT.

Inverter Column: Shows inverter total power, frequency, L1, L2, voltage and current.

Load Column: Shows total load power and load voltage for L1 and L2.

GEN Column: Shows GEN power, voltage and frequency.

5.2.3 Battery Information Page

These two pages show the battery information. You can enter this page by clicking on the **Battery Load icon** or **Battery % icon** in the home page. You can also get this information by going to **Menu > Settings > BMS**.

BMS	
Battery Voltage	51.0V
Battery Current	2.00A
Battery Temperature	25°C
Total SOC	52%
Total SOH	94%
Battery Charge Voltage	61.1V
Charge Current Limit	50.00A
Discharge Current Limit	50.00A

When battery type is Lithium-ion, this page displays:

- Battery Voltage
- Battery Current
- Battery Temperature
- Total SOC
- Total SOH
- Battery Charge Voltage
- Charge Current Limit
- Discharge Current Limit

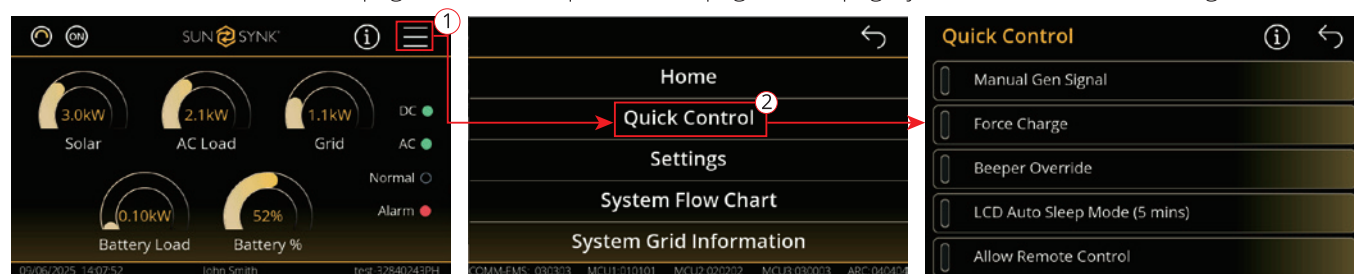
BMS	
Battery Voltage	51.0V
Battery Current	2.00A
Battery Temperature	25°C
Total SOC	52%

When battery type is AGM, this page displays:

- Battery Voltage
- Battery Current
- Battery Temperature
- Total SOC

5.3 Quick Control Page

Click **Quick Control** in the **menu** page to enter the quick control page. In this page, you can enable the following functions.



Manual Gen Signal: Normally open relay that closes when the Gen start signal state is active.

Force Charge: Once enabled, battery will be forced charged with grid (priority) or generator.

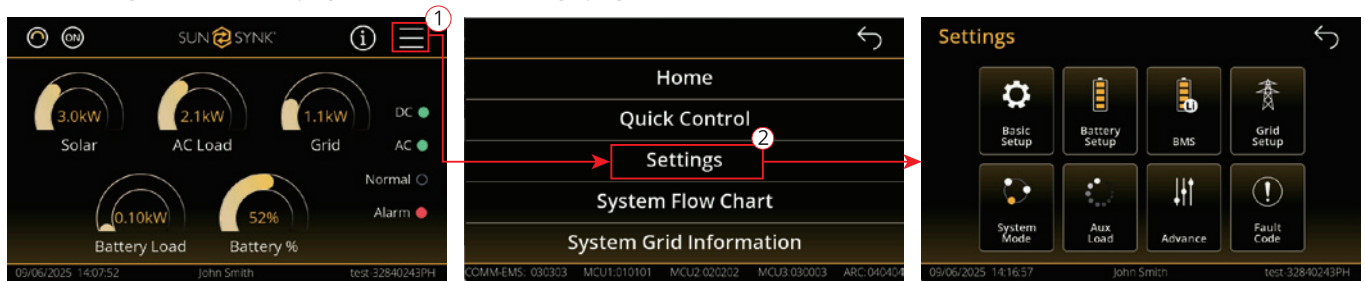
Beeper Override: Enable/disable the beeper.

LCD Auto Sleep Mode (5 mins): After enabling it, the screen lights for 5 minutes, then goes to sleep.

Allow Remote Control: Enable/disable remote control function.

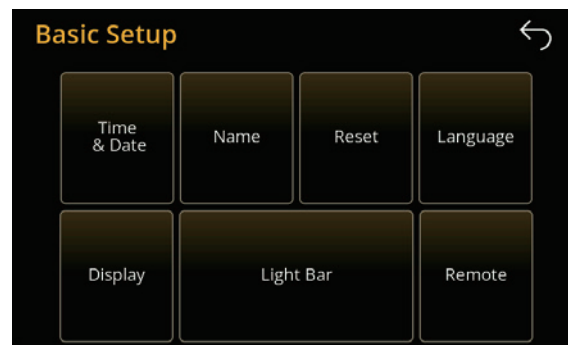
5.4 Settings Page

Click **Settings** in the menu page to enter the Settings page.



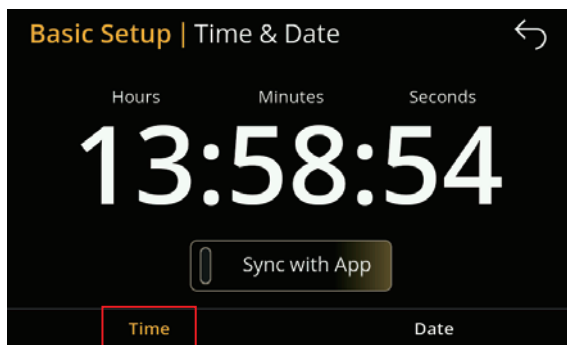
5.4.1 Basic Setup

In the Setting page, click the **Basic Setup**.

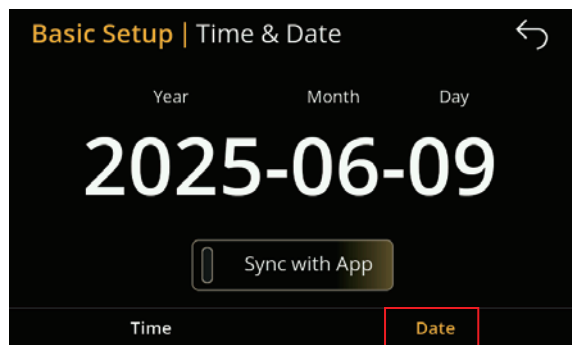


• Time & Date

Click the **Time & Date** to set the time, then click the **Date** to set date. In these pages, you can synchronize the time and date with App.



Time



Date

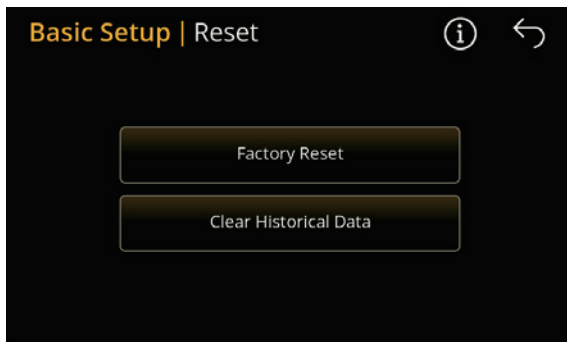
• Name

In the Basic Setup page, click the **name** to set the system name.



- **Reset**

To restore factory default settings or clear historical data, click the **Reset** in the Basic Setup page.



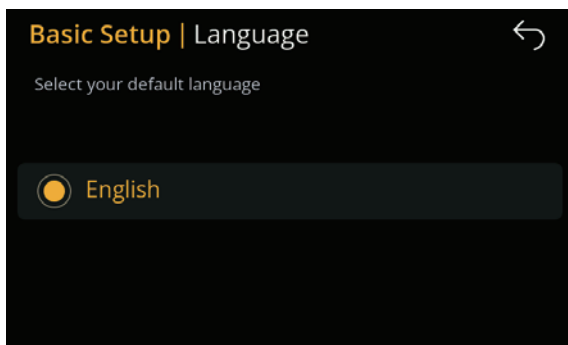
NOTE:

Factory Reset: If the machine is reset to factory settings, the customized parameters will be lost and cannot be restored.

Clear Historical Data: All energy statistics will be permanently deleted, and this action cannot be undone.

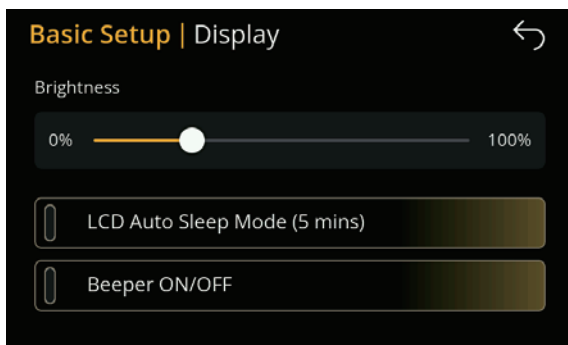
- **Language**

Click the **Language** in the Basic Setup page to select your default language.



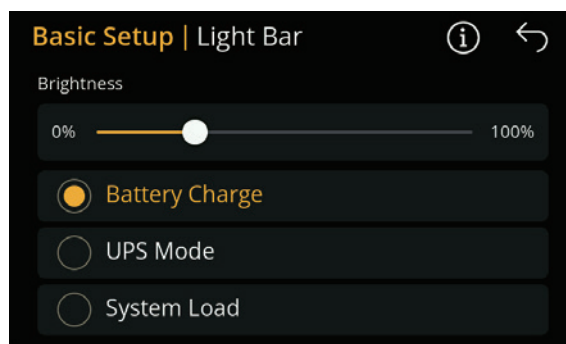
- **Display**

In the Basic Setup page, click the **Display** to enter the Display page. This page allows you to adjust the screen brightness, enable the LCD sleep mode and turn on the beeper.



▪ Light Bar

In the Basic Setup page, you can set the light bar.



Brightness: Adjust the brightness of the light bar (0% to 100%).

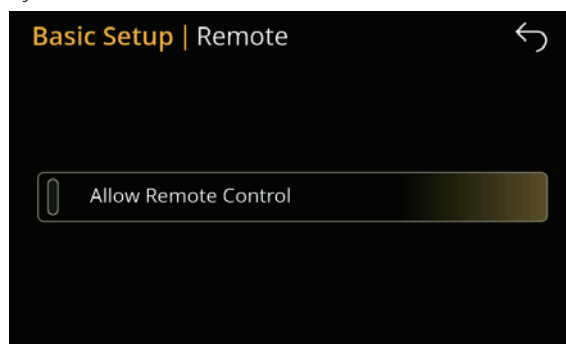
Battery Charge: It indicates that the status of light bar changes with battery capacity.

UPS Mode: It indicates that the status of the light bar changes with the amount of load power.

System Load: It indicates that the status of light bar changes with the amount of load and home load power.

▪ Remote

In the Basic Setup page, click **Remote** to enter the Remote page, you can enable the Allow Remote Control function, then you can set the parameters remotely.



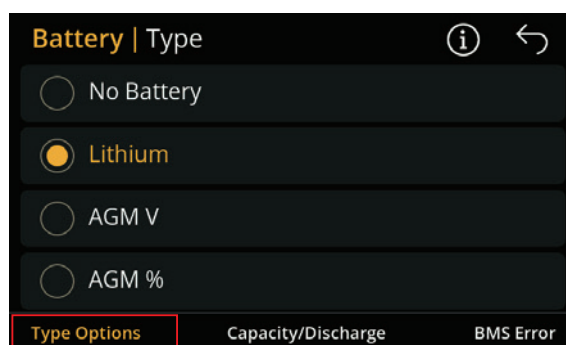
5.4.2 Battery Setup Page

To configure battery parameters, click the **Battery Setup** in the setting page.



▪ Battery Type

In Battery Setup page, click the box of **Battery Type** to enter Type Options page, in this page, you can set up battery type.



No battery: Check this option if no battery is connected to the system.

Lithium: This is the BMS protocol. Please refer to the document supplied by the battery.

AGM V: Use battery voltage for all settings (V).

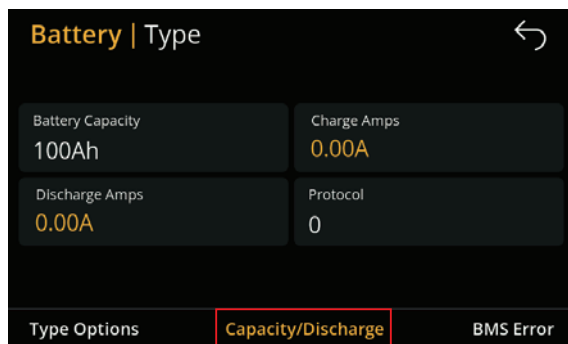
AGM %: Use battery SOC for all settings (%).

NOTE:

AGM and Flooded: Ah battery size x 20% = Charge / Discharge amps.

Lithium: Ah battery size x 50% = Charge / Discharge amps.

Capacity/Discharge Page



The screenshot shows the 'Battery | Type' page with a back arrow in the top right. The page contains four input fields: 'Battery Capacity' set to '100Ah', 'Charge Amps' set to '0.00A', 'Discharge Amps' set to '0.00A', and 'Protocol' set to '0'. At the bottom, there are three tabs: 'Type Options', 'Capacity/Discharge' (which is highlighted with a red border), and 'BMS Error'.

Battery capacity: Specifies the capacity of the battery bank. Value expressed in Amp Hour (Ah).

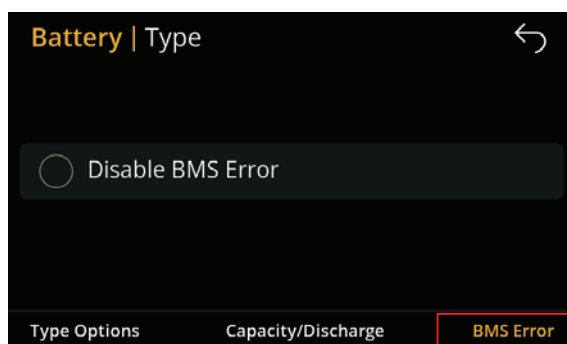
Charge Amps: Max battery charge current (0 A to 210 A for 6 kW to 11.4 kW model).

Discharge Amps: Max battery discharge current (0 A to 130 A for 6 kW model, 0 A to 180 A for 7.6 kW model, 0 A to 210 A for 11.4 kW model).

Protocol: This is BMS protocol, it cannot be changed.

BMS Error Page

In this page, check the **Disable BMS error**, so the inverter will not display BMS error.



The screenshot shows the 'Battery | Type' page with a back arrow in the top right. The page contains a single toggle switch labeled 'Disable BMS Error'. At the bottom, there are three tabs: 'Type Options', 'Capacity/Discharge', and 'BMS Error' (which is highlighted with a red border).

After installing a lithium battery, check the communication page by clicking on the **BMS icon** to see if the BMS information is visible.

If a communication error occurs:

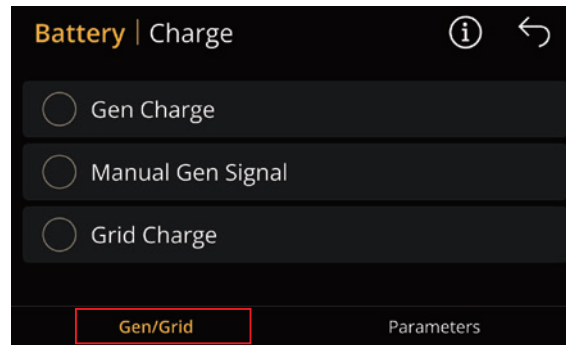
1. Check that your communication cable is the correct type.
2. Check that the communication cable is plugged into the correct terminal.

NOTE:

With some types of lithium batteries, the BMS cannot communicate with the Sunsynk inverter. In this case, take the battery as a lead-acid type and set the charging and discharging parameters following the battery manufacturer's specifications.

▪ Generator & Battery Charge

To configure battery charging parameters, click on the box of **Battery Setup** and then click on the **Battery Charge**.



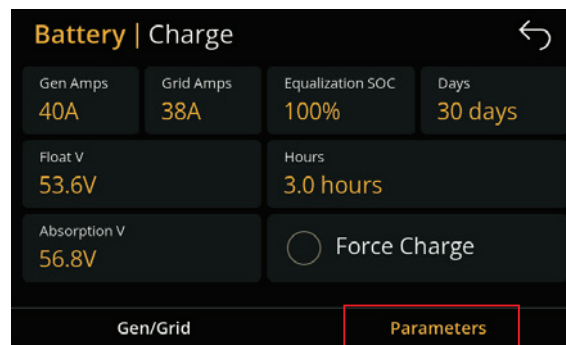
Gen Charge: It indicates that the generator will charge the battery.

Manual Gen Signal: Normally open relay that closes when the Gen start signal state is active.

Grid Charge: It indicates that the grid will charge the battery.

NOTE:

When you enable Manual Gen Signal, the 'G' icon will turn to red after approximately 1 minute, indicating that the generator can power the load.



Gen Amps: Maximum generator charging current.

Grid Amps: Maximum grid charging current.

Float V: The voltage at which the battery is maintained after being fully charged. Float V for an AGM battery is 53.60 V.

Absorption V: The voltage level that can be applied without overheating the battery. Absorption V for an AGM battery is 56.80 V.

Equalization V: Equalizing charge/overcharge to remove sulphate crystals that build up on the plates over time on lead-acid batteries. Equalization V for an AGM battery is 57.6V.

Days: The period between equalization cycles

Hours: The period taken to equalize batteries.

Force Charge: Once enabled, battery will be forced charged with grid (priority) or generator.

NOTE:

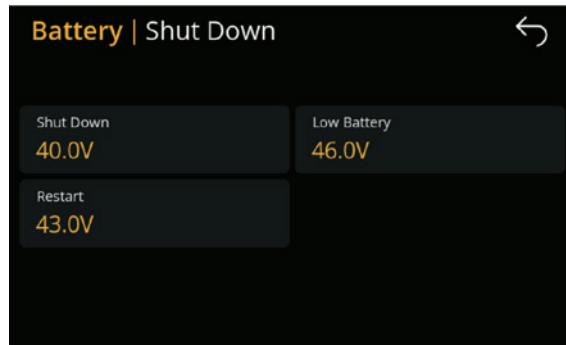
1. Do not alter these settings too often on the same battery, as it may damage the battery.
2. When you enable Force Charge, the 'G' icon will turn to red after approximately 1 minute, indicating that the generator can power the load and charge the battery.

Recommended battery settings:

Battery type	Absorption Stage	Float Stage	Equalization Voltage (every 30 day 3 hr)
AGM (or PCC)	14.2V (56.8V)	13.4V (53.6V)	14.4V (57.6V)
Lithium	Follow its BMS voltage parameters		

▪ Battery Discharge Page

To configure battery's shut-down settings, click on the box of **Battery Setup** and then on **Shut Down**.



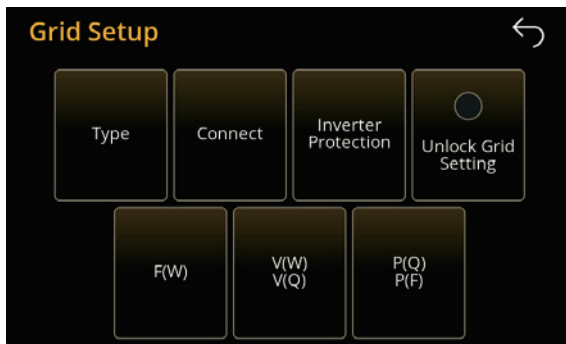
Shut Down: If the voltage is below this value, the inverter will shut down.

Low Battery: It indicates the inverter will alarm if the voltage below this value.

Restart: If the voltage is greater than this value, the battery will start discharging.

5.4.3 Grid Setup Page

In the Settings page, go to the Grid Setup page by clicking the **Grid Setup**, then set the grid-related parameters.



What you can do from this page:

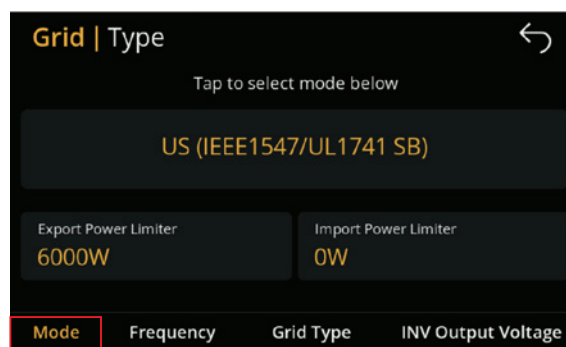
- Go to the Type page
- Go to the Connect page
- Go to the Inverter Protection page
- Unlock Grid Settings
- Go to F(W) page
- Go to the V(W)/V(Q) page
- Go to the P(Q)/P(F) page

NOTE:

Afer enabling Unlock Grid Settings, the grid parameters in this page can be set.

▪ Type

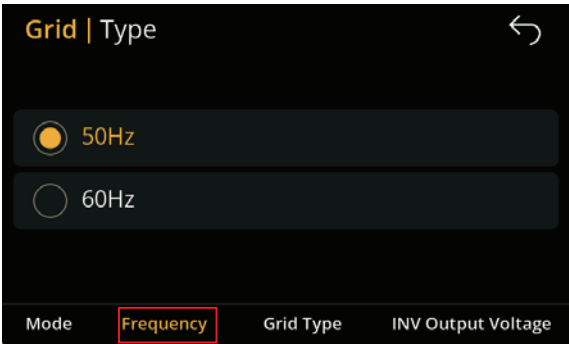
In the Grid Setup page, go to the type page by clicking on the **Type**. You can set the grid mode and limit the grid import/export power in the **Mode** page.



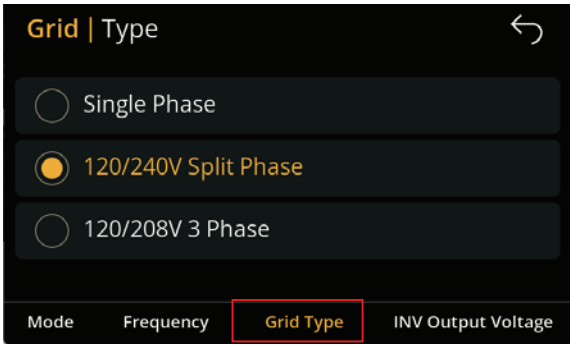
NOTE:

Please follow your local grid code and choose the corresponding grid standard from the drop-down menu.

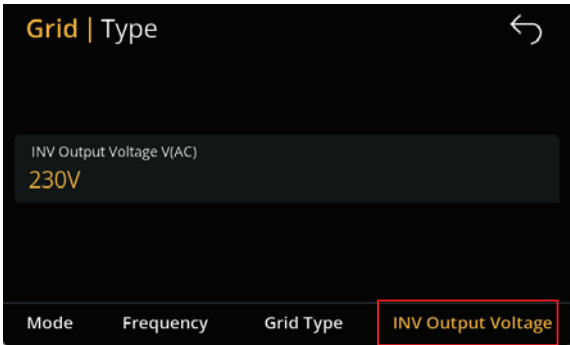
Click **Frequency** to set the grid frequency in the Type page, then select the appropriate frequency.



Click **Grid Type** to set grid type in the Type page.

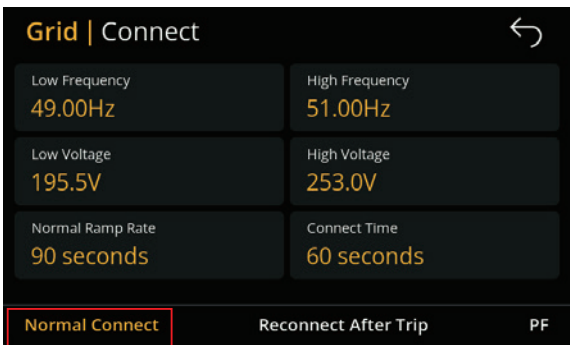


Click **Inv Outut Voltage** to set inverter’s output voltage in the Type page.



▪ **Connect**

In the Grid Setup page, go to the Connect page by clicking on the **Connect**.



Low/High Frequency: The allowable range of grid frequency when the inverter is first connected to the grid.

Low/High Voltage: The allowable range of grid voltage when the inverter is first connected to the grid.

Normal Ramp rate: Startup power ramp time in seconds.

Connection time: The time required for the first grid connection of the inverter.

Click the **Reconnect After Trip** to set the related parameters.

Grid | Connect

Low Frequency
49.50Hz

High Frequency
50.50Hz

Low Voltage
195.5V

High Voltage
253.0V

Reconnect Ramp Rate
90 seconds

Reconnect Time
60 seconds

Normal Connect

Reconnect After Trip

PF

Low/High Frequency: The allowable grid frequency range for the inverter to reconnect to the grid after tripping.

Low/High Voltage: The allowable grid voltage range for the inverter to reconnect to the grid after tripping.

Reconnect Ramp rate: Reconnection power ramp time in seconds.

Reconnection time: The time it takes for the inverter to reconnect to the grid.

In PF page,you can ajust the inverter’s reactive power.

Grid | Connect

Power Factor
1.000

Normal Connect

Reconnect After Trip

PF

▪ **Inverter Protection**

In the Grid Setup page, click the **Inverter Protection**.

Grid | Inverter Protection

Over Voltage U>(10 min, running mean)
264.0V

HV3
330.0V

HV2
310.5V

HV1
253.0V

LV1
195.5V

LV2
115.0V

LV3
48.0V

2.000s

0.100s

2.000s

Voltage

Frequency

Over Voltage U > (10 min, running mean): over voltage protection point;

HV1 / HV2 / HV3: over voltage protection point;

LV1 / LV2 / LV3: under voltage protection point.

Click the **Frequency** at the bottom of the screen.

Grid | Inverter Protection

HF3
53.00Hz

HF2
52.00Hz

HF1
51.00Hz

LF1
49.00Hz

LF2
48.00Hz

LF3
47.00Hz

0.100s

0.100s

0.100s

Voltage

Frequency

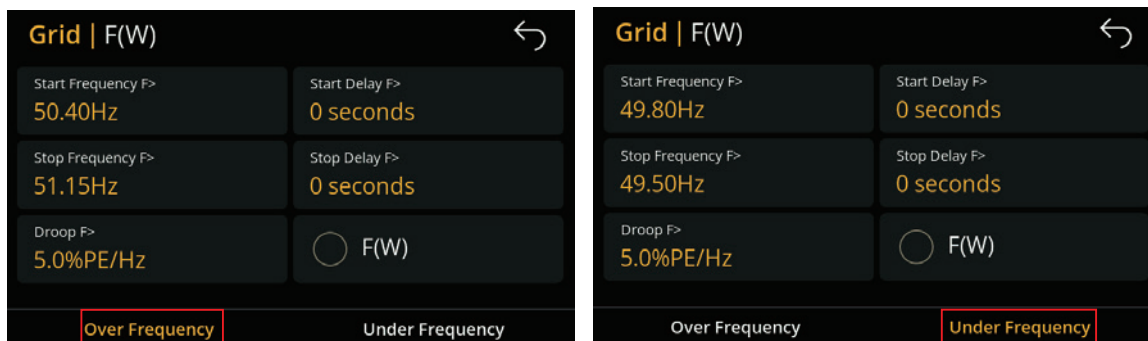
HF1/HF2/HF3: Over frequency protection point;

LF1/LF2/LF3: Under frequency protection point;

0.100s: Detection time.

▪ F(W)

Click the **F(W)** to enable this function. This series of inverters with F(W) enabled is able to adjust the inverter output power according to the grid frequency.



What this page displays:

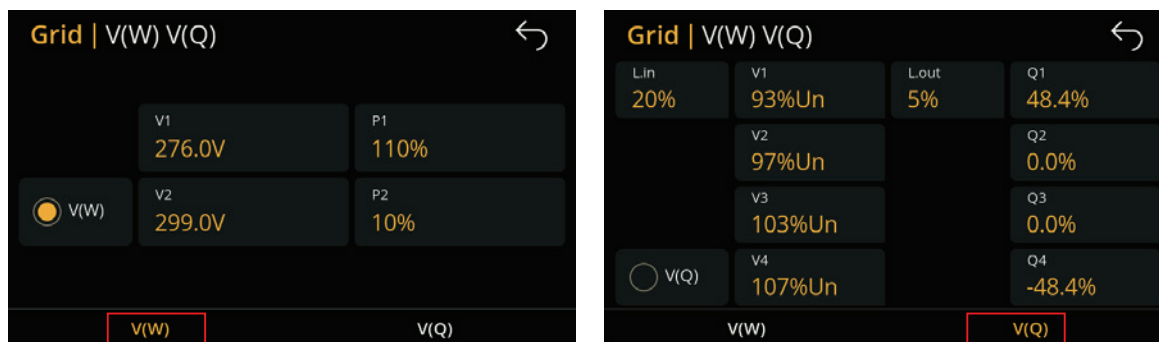
Droop F: The percentage of nominal power per Hz.

For example: “Start Frequency F > 50.40 Hz, Stop Frequency F < 51.15 Hz, Droop f=5%PE/Hz” when the grid frequency reaches 50.40Hz, the inverter will decrease its active power at Droop f of 5%. And then, when the grid system frequency is less than 51.15Hz, the inverter will stop decreasing output power.

NOTE:

For the detailed setup values, please follow the local grid code.

▪ V(W) V(Q)



V(W): It adjusts the inverter active power according to the set grid voltage.

V(Q): It adjusts the inverter reactive power according to the set grid voltage. This function adjusts inverter output (active and reactive) power when grid voltage changes.

L.in/Pn 20%: If the inverter active power increases from 5% to 20% rated power, the V(Q) mode will take effect again.

L.out/Pn 5%: When the inverter active power is less than 5% rated power, the V(Q) mode will not take effect.

For example: V2=299.0 V, P2=10%. When the grid voltage reaches 299.0 V, the inverter reduces its active output power to 10% of rated power.

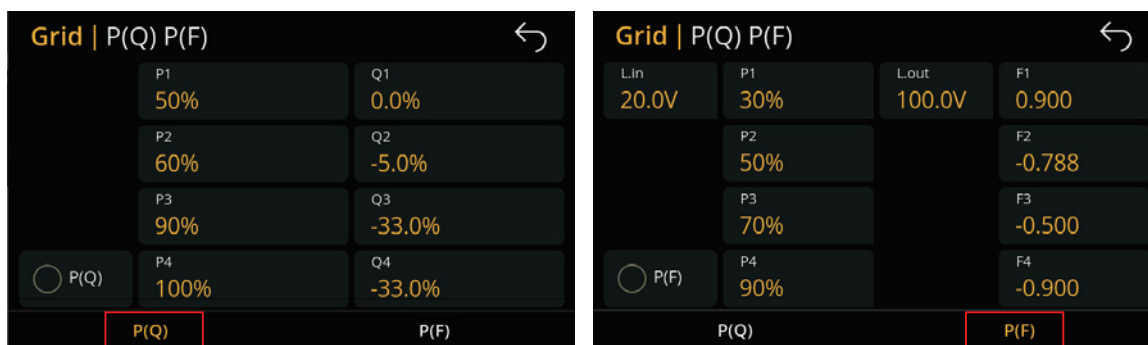
For example: V1=93 % Un, Q1=48.4 %. When the grid voltage reaches 93 % times of the rated grid voltage, the inverter will output 48.4% reactive power.

NOTE:

For the detailed setup values, please follow the local grid code.

▪ P(Q) P(F)

In the Grid Setup page, click on the **P(Q) P(F)**.



P(Q): It adjusts the inverter reactive power output according to the programable active power parameters.

P(PF): It adjusts the inverter PF according to the programable active power parameters.

L.in: When the grid voltage is greater than the setting value of L.in, it will enter the P(PF) mode.

L.out: When the grid voltage is less than the setting value of L.out, it won't enter the P(PF) mode.

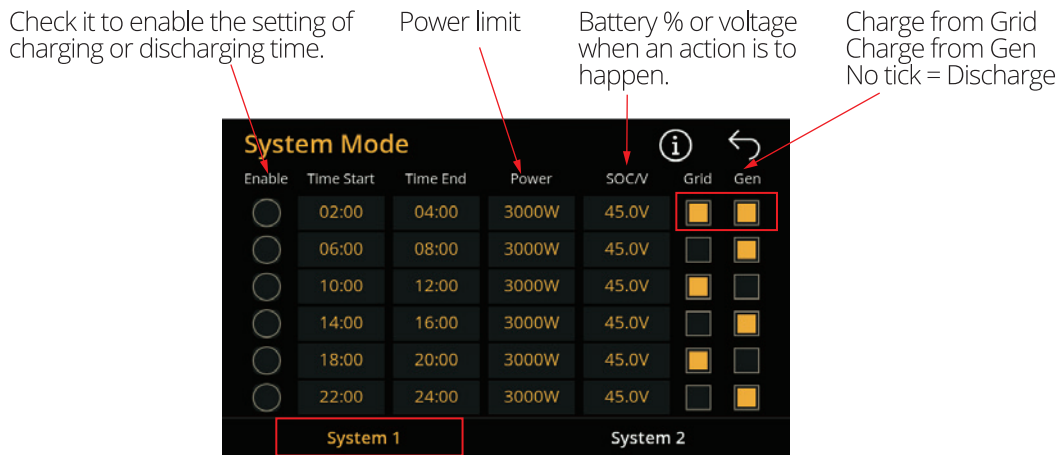
NOTE:

For the detailed setup values, please follow the local grid code.

5.4.4 Program Charge & Discharge Time

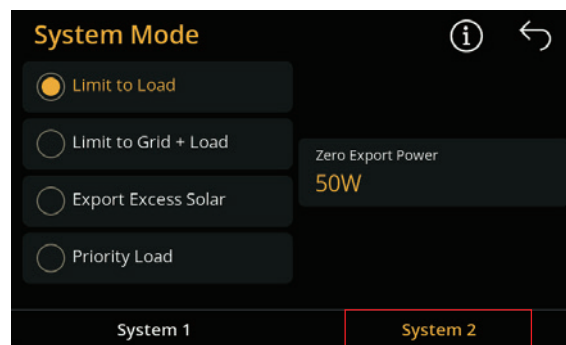
To set 'Charge' and 'Discharge' time, click the **System Mode** in Setting page.

This function is designed to control the time setting of charging and discharging the inverter. You can set the following parameters based on your requirements:



- Charge and discharge frequency: one time or daily
- Charging start time: 0 to 24 hours
- Charging end time: 0 to 24 hours
- Discharge start time: 0 to 24 hours
- Discharge end time: 0 to 24 hours

IMPORTANT - When charging the batteries from the grid or generator, please ensure you have set the correct battery charging parameters on the battery charge as shown in **Battery Setup Page**.



Zero Export Power: Maximum power consumption from the grid.

Export Excess Solar: Check this box if you want to export your PV energy back to the grid.

Limit to Load: Check this box if you only want to supply power to the load side of the inverter.

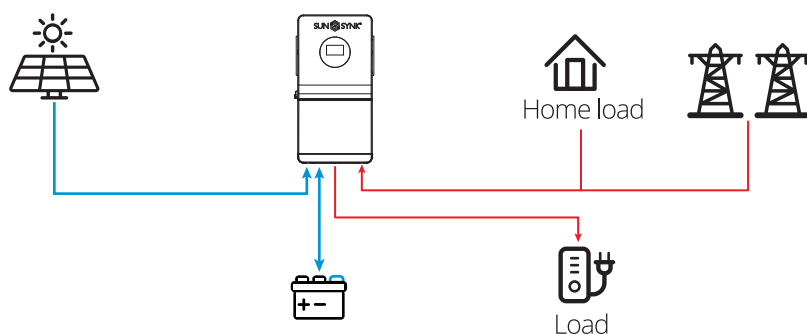
Limit to Grid + Load: This controls the maximum overall power, both to the 'Load' and 'Grid' ports combined. It is set to Low if an 'over-current' fault occurs.

Priority Load: Check this box if you want to send the PV energy to the load. If you uncheck this box, the PV energy will charge the batteries.

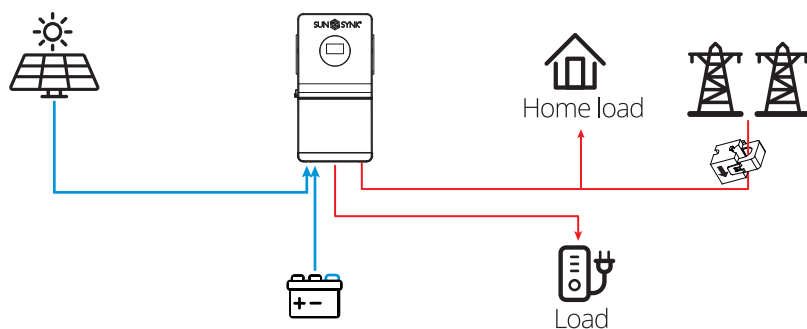
If nothing checked: The PV energy will be first consumed by loads, the excess energy will be used to charge the battery. Power source priority for the load is as follows:

1. Solar Panels.
2. Grid.
3. Batteries (until programmable % discharge is reached).

Limit To Load: The hybrid inverter will only provide power to the load connected. The hybrid inverter will neither provide power to the home load nor sell power to the grid. The built-in CT will detect power flowing back to the grid and will reduce inverter power only to supply the load and charge the battery.

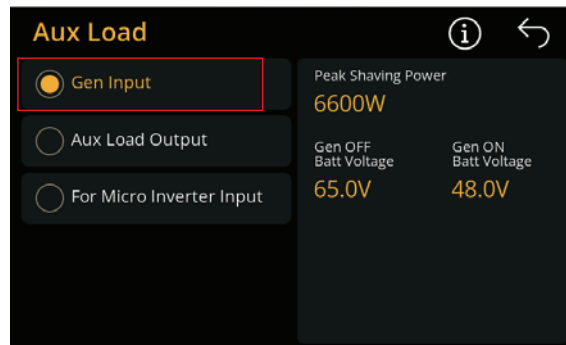


Limit to Grid + Load: The hybrid inverter will not only provide power to the load connected but also give power to the home load connected. If PV energy and battery energy are insufficient, it will take grid energy as supplement. In this mode, a CT is needed. For the installation method of the CT, please refer to the section of **CT/Meter Connection**. The external CT detects the power flowing back to the grid and reduces the inverter power only to supply the load, home load and charge the battery.



5.4.5 Advanced Settings for Auxiliary Load

To configure auxiliary load settings, click the **AUX LOAD** in settings page.



For Gen Input mode:

Gen Input: Check this box if the generator is used as the AC input.

Peak shaving power: Maximum generator input power.

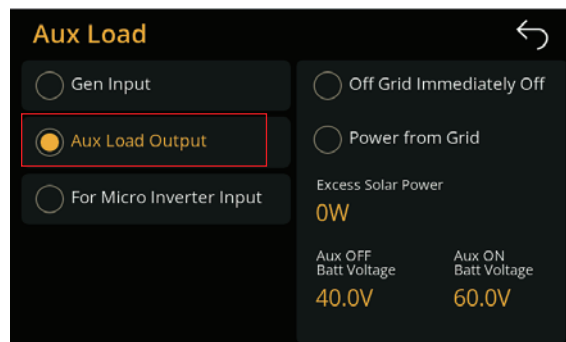
Gen OFF Batt Voltage: If battery voltage is greater than or equal to the set value, the generator will be switched off.

Gen ON Batt Voltage: If battery voltage is lower than or equal to the set value, the generator will be switched on.

NOTE:

1. If you enable the Gen Input function, the 'G' icon will appear at the top-left corner of the home page.
2. When the battery voltage is lower than or equal to the set value, the 'G' icon will turn to red after approximately 1 minute, indicating that the generator can power the load.

For Aux Load Output mode:



Aux Load Output: In this mode, the GEN port works as an output port for the auxiliary load connected to the GEN terminal.

Excess Solar Power: Minimum PV power required to start the auxiliary load.

Aux OFF Batt Voltage: If battery voltage below this value, the auxiliary load will be switched off.

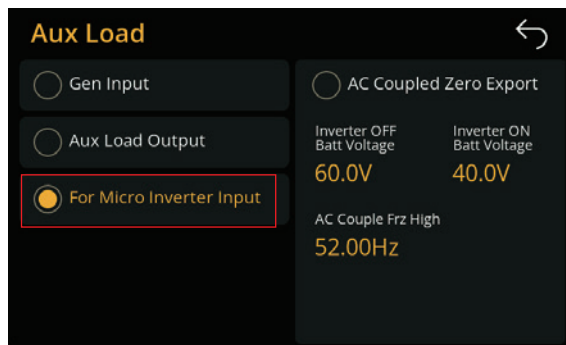
Aux ON Batt Voltage: If the battery voltage is greater than or equal to this value, and the PV power is greater than or equal to the set power simultaneously, the auxiliary load will be switched on.

Off Grid Immediately Off: If 'Off Grid Immediately Off' is enabled, the auxiliary load will be switched off when the grid is lost.

Power from Grid: If 'Power from Grid' is enabled, the auxiliary load will be on all the time when the grid is present.

For Example: Excess solar power = 500 W, ON: 60 V, OFF=40 V. When the PV power exceeds 500 W and battery voltage is equal to 60 V, Gen port will be switched on automatically and power the connected auxiliary load. When the battery voltage is less than 40 V or PV power is less than 500 W, the Gen port will be switched off automatically.

For Micro Inverter Input mode:



For Micro Inverter Input: In this mode, the GEN Port works as an input port for other grid-tied inverter or micro inverter whose rated power should be less than that of the hybrid inverter.

Inverter OFF Batt Voltage: If the battery voltage is greater than the set value, the micro inverter or grid-tied inverter will be switched off.

Gen ON Batt Voltage: If the battery voltage is less than the set value, the micro inverter or grid-tied inverter will be switched on.

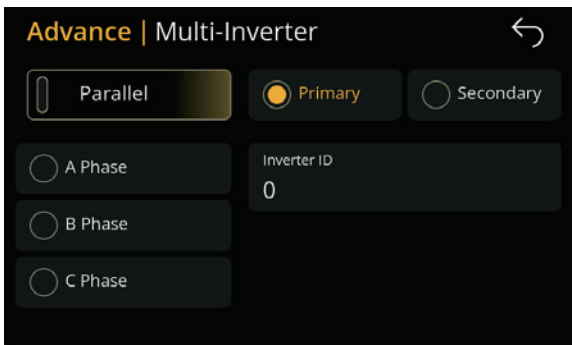
AC Coupled Zero Export: If this function is enabled, the energy produced by micro inverter or grid-tied inverter is forbidden to be sold to the grid.

AC Couple Frz High: This parameter is used to limit the output power of micro inverter when the hybrid inverter works in off-grid mode.

As the battery voltage gradually reaches to the setting value (Off), during the process, the grid-tied inverter output power will decrease linearly. When the battery voltage is equal to the setting value (Off), the system frequency will become the setting value (AC Couple Frz High) and the grid-tied inverter will stop working.

5.4.6 Paralleling Inverters

To configure the settings for multiple inverters, click on **Advance** in the settings page.



Inverter ID: 'Inverter ID' that must be unique for each inverter.

What you can do from this page:

- Set the inverter as a primary inverter or secondary inverter
- Set the phase in which the inverter is to be paralleled

NOTE:

1. Before parallel connection, please make sure all inverters in parallel have the same firmware version by verifying the 'COMM-EMS', 'MCU', and 'ARC' version numbers in the menu page, as shown in **Figure 5-1**. If the versions are not the same, it is recommended that all inverters are updated to the latest version.
2. It is recommended to reset all settings before the parallel connection to ensure the same parameter setting for each inverter, as shown in **Figure 5-2**.

Reset all settings: Ensure the inverter is in standby mode, then go to **Settings > Basic Setup > Reset**.

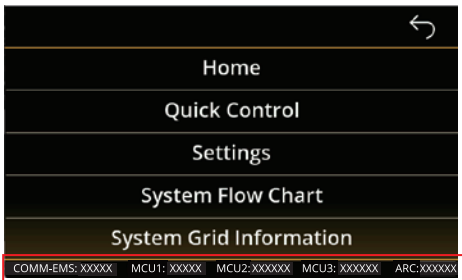


Figure 5-1



Figure 5-2

The Sunsynk hybrid inverter can be wired standalone or where more power is required it can be connected in parallel either 2 phase (split-phase or 2/3 phase) or 3 phase configuration.

To activate the function of three-phase connection, you should first standby the inverter to set parameters below to enable the function that you need, and finally power on the inverter to start.

1. Go to **Settings > Grid Setup**, in this page, check Unlock Grid Setting, as shown in **Figure 5-3**.
2. Go to **Settings > Grid Setup > Type > Grid Type** to select the correct phase type: **120/208 V 3 Phase**, as shown in **Figure 5-4**.
3. Go to **Settings > Advance > Multi-Inverter** to enable parallel mode, and then select phase position and inverter type. All inverters in the system should be configured with these parameters separately, as shown in **Figure 5-5**.

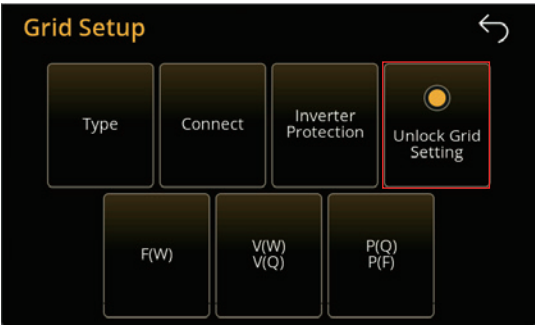


Figure 5-3

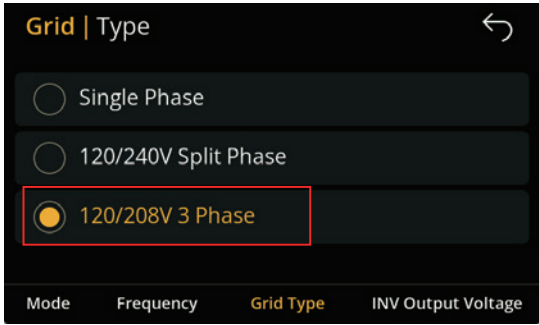
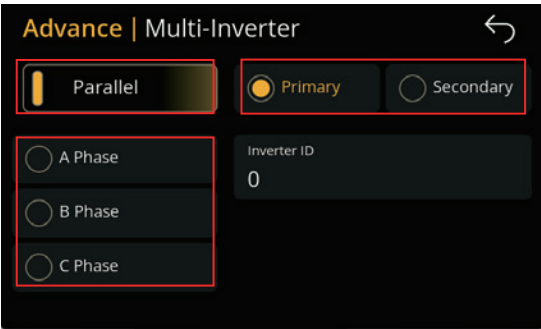


Figure 5-4



Inverter	Type	Phase
Inverter 1	Primary	A
Inverter 2	Secondary	B
Inverter 3	Secondary	C

Figure 5-5

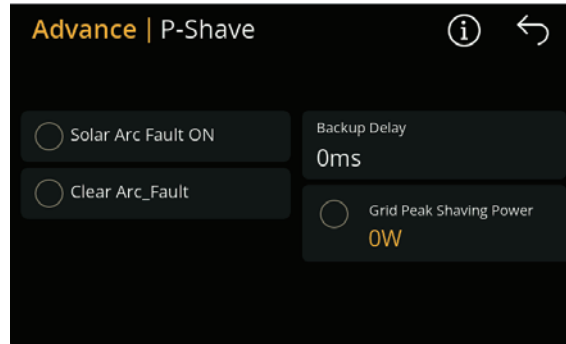
Click **others** in Advance page. In this page, you can select the corresponding meter type according to the meter installed in the system.



Ex_Meter for CT: Check this when using a meter and select the meter type. If unchecked, the default value is CT.

Low Power Mode < Low Batt: If checked and when battery SOC is less than the “Low Battery” value, the self-consumption power of the inverter will be from the grid and battery simultaneously. If unchecked, the self-consumption power of the inverter will be mainly from the grid.

Click **P-Shave** in Advance page.



Solar Arc Fault ON: Enable Arc fault detection algorithm on the MPPTs.

Clear Arc_Fault: Command to clear an Arc Fault.

Backup Delay: It is set at 0 ms and cannot be changed.

Grid peak shaving Power: When it is checked, the grid output power will be limited within the set value. If the load power exceeds the set value, it will need PV energy and battery energy to complement. If there is not enough PV energy or battery energy to meet the load requirement, grid power will increase to meet the load needs.

Each inverter will require a breaker with surge protection.

- The CT used to limit export power must only be connected to the Primary inverter.
- Connect a 4-Pin communication cable between each inverter; the order is not important since both terminals are the same, so there is no IN or OUT.
- Each inverter must have a unique Inverter ID.
- The maximum length of the communication cable is 2 meters (do not exceed this value).
- All batteries must be connected in parallel and the MPPTs must be kept separate.

IMPORTANT: All inverters in a parallel system must have their own isolating load breaker before going to the parallel breaker, to ensure during programming that the load outputs are isolated from each other.

Once it is confirmed that all inverters are programmed correctly in parallel or three-phase then only the isolating breakers can be switched on, which then feeds to the main load output breaker where the actual parallel or three-phase connection is made that feeds the loads.

If you need further help, please refer to the Sunsynk website where you will find training videos and Frequently Asked Questions on www.sunsynk.us. All inverters' firmware in parallel system must be the same.

Common questions that occur when paralleling inverters:

Q1: What are the indications that the communication and the system are abnormal?

Parallel errors will be shown as fault F29 and F41 on the display.

Q2: What are the consequences of not setting one inverter in a parallel mode?

It can damage the inverter.

Q3: What are the consequences of having more than one Master Inverter or having no inverter set as 'Master'?

The inverter will alarm or even damage the inverter.

Q4: What are the consequences for setting A, B, or C phases wrong while in parallel mode?

It can damage the inverter. Recommend checking the phase rotation with a meter before switching on.

Q5: What are the consequences of factory resetting, power cycling, or firmware updating one inverter in a parallel system?

It can damage the inverter. Prior to factory reset or firmware update, the inverters must be isolated from each other.

Q6: What consequences for changing ALL/ANY settings while operating in parallel mode?

It can damage the inverter.

5.4.7 Fault Code

To check the fault codes, click on the **Fault Code** icon in the settings page.



If any of the fault messages appear on your inverter and the fault has not been removed after re-starting, please contact your local vendor or service centre. The following information is required:

1. Inverter serial number.
2. Distributor or service centre of the inverter.
3. On-grid Power Generation Date.
4. The problem description (including the fault code and indicator status displayed on the LCD) with as much detail as possible.
5. Owner's contact information.

In order to give you a clearer understanding of the inverter's fault information, we will list all possible fault codes and their descriptions when the inverter is not working properly. Please refer to the section **Inverter Troubleshooting**.

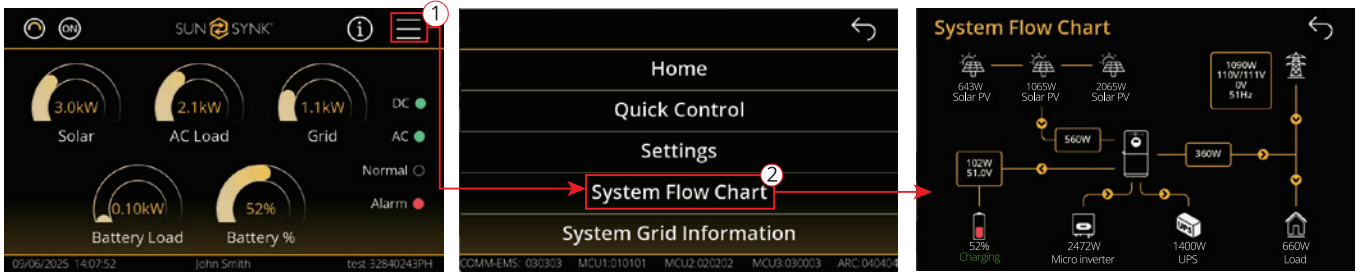
NOTE:

The inverters comply with the safety and electromagnetic compatibility standards. Before leaving the factory, all inverters are subjected to rigorous testing to ensure reliable operation, as described in the 'Technical Specifications' section.

If you need further help, please visit the Sunsynk website on www.sunsynk.us for training videos and frequently asked questions.

5.5 System Flow Chart Page

Enter this page by clicking on the **System Flow Chart** in the menu page. You can also enter it by clicking on the  in the home page.



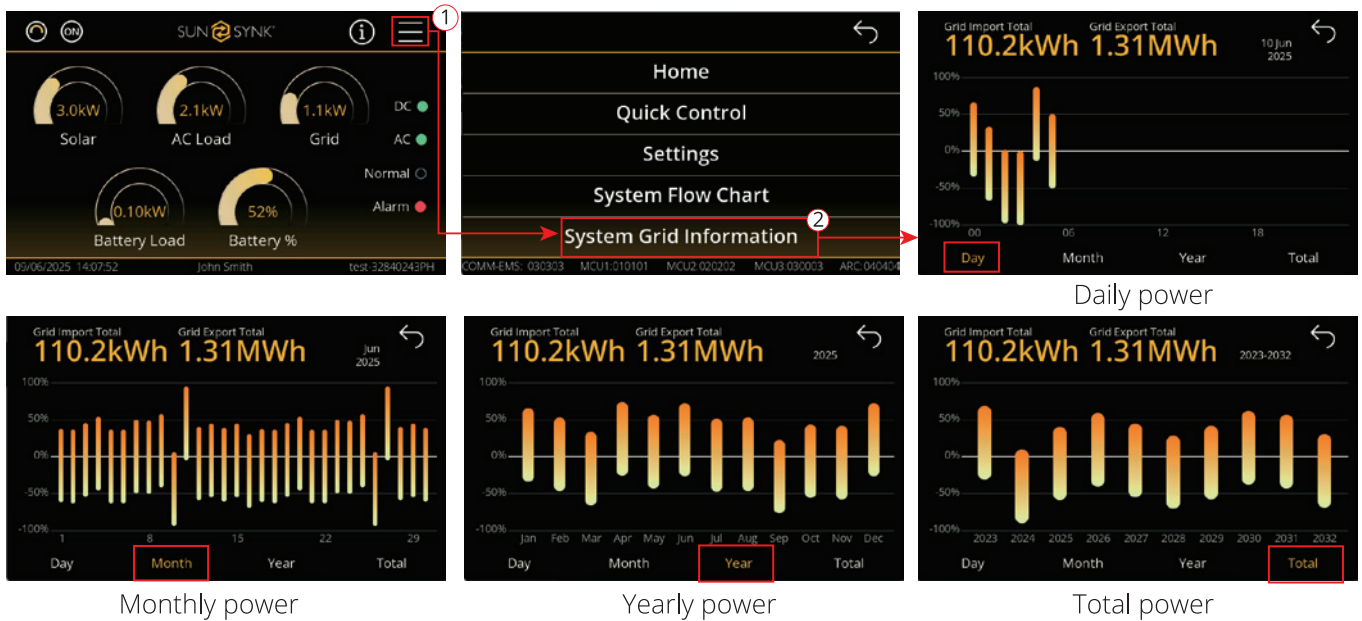
- The system flow
- MPPTs power
- Battery status
- Power distribution to load or grid

To better understand how the system works, see the figure above:

1. The PV modules charge the batteries.
2. When the batteries reach a specific level (programmable), the battery energy is fed into the inverter.
3. The inverter can then supply power to the grid (export or no export), to the load, and to the auxiliary load.
4. CT limits the export power.

5.6 System Grid Information

These pages show the daily, monthly, yearly, and total grid input/output power. Enter this page by clicking on the **System Grid Information** in the menu page. You can also enter this page by clicking on the **Grid icon** on the home page.



6 Commissioning

6.1 Startup/Shutdown Procedure

6.1.1 Startup Procedure

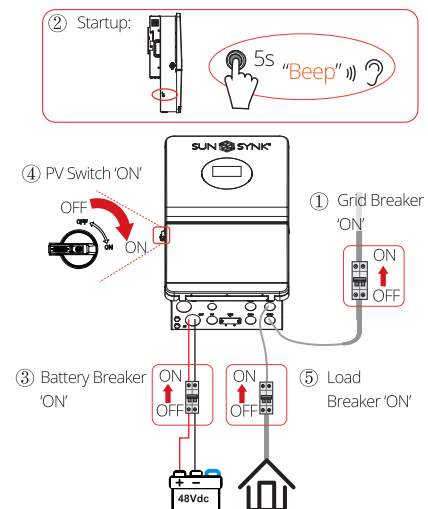
Before starting up, check whether the installation is secure and strong enough, and whether the system has been well grounded. Then make sure the connections of AC, battery, PV etc. are correct, and confirm the parameters and configurations conform to relevant requirements.

AC Frequency	50/60 Hz	PV Voltage	70 Vdc to 540 Vdc
Battery Voltage	40 Vdc to 64 Vdc	Grid AC Voltage	120/240 V (Split phase) or 120/208 V (2/3 phase)

Make sure all the above aspects are right, then follow the procedures below to start up the inverter.

- 1) Power on the AC breaker at GRID side.
- 2) You can hold the ON/OFF button on the side of the inverter for 5 s in this step when performing subsequent startup.
- 3) Power on the DC breaker at BATTERY side.
- 4) Power on the PV Switch.
- 5) Power on the AC breaker at LOAD side.

Startup Procedure

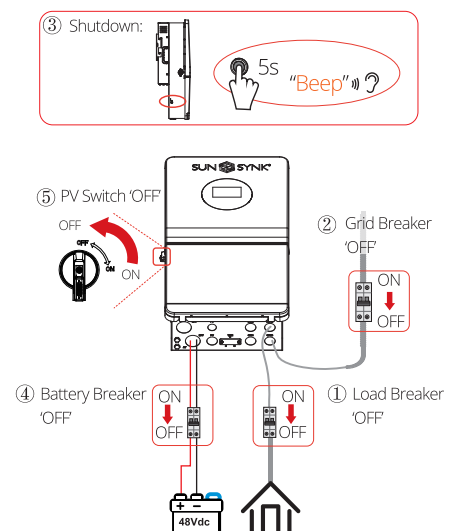


6.1.2 Shutdown Procedure

When it is necessary to shut down the running system, please follow the procedures below:

- 1) Power off the AC breaker at LOAD side.
- 2) Power off the AC breaker at GRID side.
- 3) You can hold the ON/OFF button on the side of the inverter for 5 s in this step when performing subsequent shutdown.
- 4) Power off the DC breaker at BATTERY side.
- 5) Power off the PV Switch.
- 6) To disconnect the inverter cables, please wait at least 5 minutes before touching them.

Shutdown Procedure



6.2 Commission

It is necessary to fully commission the inverter system for it is essential to protect the system from fire, electric shock, other damages, and personal injury.

6.2.1 Inspection

Before commissioning, the operator or installer (qualified personnel) must inspect the system carefully and ensure that:

- 1) The system is properly installed according to the contents and instructions in this manual, and there is sufficient space for operation, maintenance, and ventilation.
- 2) All terminals and cables are in good conditions.
- 3) No objects are left in/on the inverter or within the required clearance.
- 4) The PV and the battery pack are working normally, and the grid is normal.

6.2.2 Commissioning Procedure

When all items have been checked and the system is ready for use, start the commissioning procedure.

- 1) Power on the system by following the section **Startup Procedure**.
- 2) Set the parameters on the LCD screen according to user's needs.
- 3) Complete commissioning.

7 Maintenance



CAUTION

Before maintaining and commissioning inverter and its peripheral distribution unit, switch off all the charged terminals of the inverter and wait at least 10 minutes after the inverter is powered off.

7.1 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
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
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 cleaning	Check periodically that the heat sink is free from dust and blockage.	Clean periodically the heat sink.	Yearly

7.2 Inverter Troubleshooting

When the inverter has an exception, its basic common warning and handling methods are shown below.

Error Code	Description	Solutions
F01	DC inversed failure	Check and modify the positive and negative polarity of the input string.
F05	EEPROM failure	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center.
F10	Aux power board failure	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically restored, and no action is required. 2. If the alarm occurs repeatedly, please contact the customer service.
F14	Battery discharge over current	<ol style="list-style-type: none"> 1. Check whether the battery parameters are correctly set. 2. Battery undervoltage. 3. Check whether a separate battery is loaded and the discharge current exceeds the battery specifications. 4. The battery is abnormal. 5. If the alarm continues to occur, please contact the customer service center.
F16	GFCI abnormal	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, it could have been an occasional exception to the external wiring. The inverter can be automatically recovered. No action is required. 2. If it occurs repeatedly or cannot be recovered for a long time, please contact the customer service.
F22	Remote off	Please contact your installer for help.
F23	Leakage current abnormal	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered to the normal operating status after the fault is rectified. 2. If the alarm occurs repeatedly, contact your dealer for technical support.
F24	PV insulation abnormal	<ol style="list-style-type: none"> 1. Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault. 2. If the insulation resistance against the ground is less than the default value in a rainy environment, set insulation resistance protection on the App.
F26	The bus bar is unbalanced	<ol style="list-style-type: none"> 1. Please wait for a while and check whether it is normal; 2. When the hybrid is in split phase mode, and the load of L1 and load of L2 is big different, it will report the F26. 3. Restart the system 2~3 times. 4. Seek help from us, if can not go back to normal state.
F29	Parallel CANbus fault	It is Parallel ID alarm. Please check the parallel communication cable, and check whether any inverter joins or exits online. All inverters are powered off completely, check the line, and then power on the inverters again to ensure that the alarm is cleared.

Error Code	Description	Solutions
F30	Inverter relay abnormal	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, please refer to the suggestions or measures of Grid over voltage. 3. If the inverter fails to generate power, contact the customer service center. 4. If there is no abnormality on the grid side, the machine fault can be determined. (If you open the cover and find traces of damage to the relay, it can be concluded that the machine is faulty.) And please contact the customer service.
F33	LOAD short circuit	<ol style="list-style-type: none"> 1. Check whether the live line and neutral line of LOAD output are short-circuited. 2. If it is confirmed that the output is not short-circuited or an alarm, please contact customer service to report for repair. (After the trouble shooting of alarm problems, the LOAD switch needs to be manually turned on during normal use.)
F34	LOAD overload	<ol style="list-style-type: none"> 1. Disconnect the load and check whether the alarm is cleared. 2. If the load is disconnected and the alarm is generated, please contact the customer service. (After the alarm is cleared, the LOAD switch needs to be manually turned on for normal use.)
F35	No AC grid	Wait till power is restored.
F36	Grid abnormal	Check the Grid sequence, it need be same as Grid type setting.
F41	Parallel system stop	Parallel synchronization signal is abnormal. Check whether the parallel communication cable is properly connected.
F42	Grid under voltage	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, contact the local power station. After receiving approval of the local power bureau, revise the electrical protection parameter settings on the inverter through the LCD. 3. If the alarm persists for a long time, check whether the AC circuit breaker /AC terminals is disconnected, or if the grid has a power outage.
F43	Grid over voltage	
F45	Grid high average voltage	
F47	Grid over frequency	
F48	Grid under frequency	
F55	Battery over voltage	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. Check that the battery overvoltage protection value is improperly set. 3. The battery is abnormal. 4. if the alarm continues to occur, please contact the customer service center.

Error Code	Description	Solutions
F56	DC bus bar voltage is too low	<p>Battery low voltage</p> <ol style="list-style-type: none"> 1. Check if the battery voltage is too low. 2. If the battery voltage is too low use the PV or grid to charge the battery. 3. Check the battery BMS <p>Important: Especially with Lithium batteries, ensure that the batteries Max. discharge current or power specification is the same or higher than the inverter specification.</p>
F58	BMS communication fault	<ol style="list-style-type: none"> 1. Check whether the battery is disconnected. 2. Check whether the battery is well connected with the inverter. 3. Confirm that the battery is compatible with the inverter. It is recommended to use CAN communication. 4. Check whether the communication cable or port between the battery and the inverter is faulty. 5. If the alarm continues to occur, please contact the customer service center.
F63	ARC fault	<ol style="list-style-type: none"> 1. ARC fault detection is only for US market. 2. Check PV module cable connection and clear the fault. 3. Seek help from us, if can not go back to normal state.
F64	Heat sink high-temperature failure	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required. 2. If the alarm occurs repeatedly, please check whether the installation site has direct sunlight, bad ventilation, or high ambient temperature (such as installed on the parapet). Yet, if the ambient temperature is lower than 45° C and the heat dissipation and ventilation is good, please contact customer service.
F65	System type error	<ol style="list-style-type: none"> 1. Re-power on the system 2. If the fault still exists, please contact dealer for help.
F66	Fan abnormal	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, please restart the inverter. 2. If it occurs repeatedly or cannot be recovered for a long time, check whether the external fan is blocked by other objects. Otherwise, Please contact customer service.
F67	Internal communication error	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center.
F68	Software incompatibility	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center.

Error Code	Description	Solutions
F69	Data inconsistency	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center.
F70	Inverter abnormal	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center.
F71	Boost abnormal	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center.
F72	PV over voltage	Check whether the maximum input voltage of a single PV string exceeds the MPPT working voltage. If yes, modify the number of PV module connection strings.
F73	AFCI module lost	<ol style="list-style-type: none"> 1. Communication between AFCI model and EMS is lost. 2. Re-power on the system. 3. If the fault still exists, please contact us for help.
F74	Meter or CT lost	<ol style="list-style-type: none"> 1. Check the meter parameter settings. 2. Local APP checks that the communication address of the inverter is consistent with that of the electricity meter. 3. The communication line is connected incorrectly or in bad contact. 4. Electricity meter failure. 5. If the alarm continues to occur, please contact the customer service center.
F75	Parallel BAT abnormal	The parallel battery is abnormal. Whether the battery of the inverter is reported low voltage or the battery is not connected.
F76	Parallel GRID abnormal	The parallel grid is abnormal. Whether the grid of the inverter is abnormal.
F77	GEN voltage abnormal	<ol style="list-style-type: none"> 1. Check the generator status. 2. If the fault still exists, please contact us for help.
F78	Battery absent	<ol style="list-style-type: none"> 1. Check the battery connection 2. If the fault still exists, please contact us for help.
F79	Battery over temperature	<ol style="list-style-type: none"> 1. If the alarm occurs repeatedly, please check whether the installation site is in direct sunlight and whether the ambient temperature is too high (such as in a closed room).
F80	Battery under temperature	<ol style="list-style-type: none"> 2. If the battery is abnormal, replace it with a new one. 3. If the alarm continues to occur, please contact the customer service center.

Error Code	Description	Solutions
F81	LOAD output voltage abnormal	<ol style="list-style-type: none"> 1. Check whether the LOAD voltage and frequency settings are within the specified range. 2. Check whether the LOAD port is overloaded. 3. When not connected to the power grid, check whether LOAD output is normal. 4. if the alarm continues to occur, please contact the customer service center.
F82	Internal communication loss(E-M)	<ol style="list-style-type: none"> 1. Check whether the communication cables between LOAD, electricity meter and inverter are well connected and whether the wiring is correct. 2. Check whether the communication distance is within the specification range. 3. Disconnect the external communication and restart the electricity meter and inverter. 4. if the alarm continues to occur, please contact the customer service center.
F83	DCDC abnormal	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, please check: <ol style="list-style-type: none"> 1) Check whether the MC4 terminal on the PV side is securely connected. 2) Check whether the voltage at the PV side is open circuit, ground to ground, etc. 3. if the alarm continues to occur, please contact the customer service center.
F84	Inverter over dc-bias current	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, and the inverter fails to generate power, contact the customer service.
F85	DC bus over voltage	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact customer service.
F86	Internal communication loss(M-D)	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact customer service.
F87	Phase sequence abnormal	<p>Ensure that set phase position on LCD is consistent with the power grid phase. There are two ways to clear this alarm:</p> <ol style="list-style-type: none"> 1. Power off each inverter, change the phase sequence for each inverter and then power on inverter. 2. Standby each inverter, change the phase sequence for each inverter on APP, power off inverter, and then power on inverter. 3. if the alarm continues to occur, please contact the customer service center.



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