



INSTALLER PACK

If You Need More Help

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COMMISSIONING PROCEDURE

- 1. If using more than one battery, check that the batteries communicate with each other.** The Master battery can automatically identify the Slaves batteries connected in parallel using its internal software control. The communication terminals Port In and Port Out (RJ45 port) are integrated with the signal for automatic coding function. The parallel system supports an operation with up to 4 parallel connections.
- 2. Switch on the battery/batteries.**
- 3. Check if there is communication between the batteries and the inverter.** In the inverter display, go to Settings and select LI BMS. You should see a screen with the LI BMS information on the next screen. If some information is not displayed correctly on the screen, a communication error has occurred.
- 4. Wait for the normal light to appear on the inverter** before doing anything else. This can take up to 5 minutes.
- 5. Check all system settings, AC, Battery Charge, and Export.**
- 6. After the normal LED is turned on, switch on the DC array.**
- 7. Go to the system flow and verify if the solar panels are sending power into the inverter.**
- 8. Please wait 10 minutes to be sure everything is running fine before turning on the AC.**
- 9. Check all system settings, AC, Battery Charge, and Export.**
- 10. Activate the AC breaker.**
- 11. Check if the CT coil is connected correctly.** You can do that by accessing the status page through the inverter display and checking if the CT value in the Grid Power area has positive values
- 12. Finally, re-check all system settings.**



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NOTICE

Don't forget sign up your warranty on our website: www.sunsynk.org/warranty.

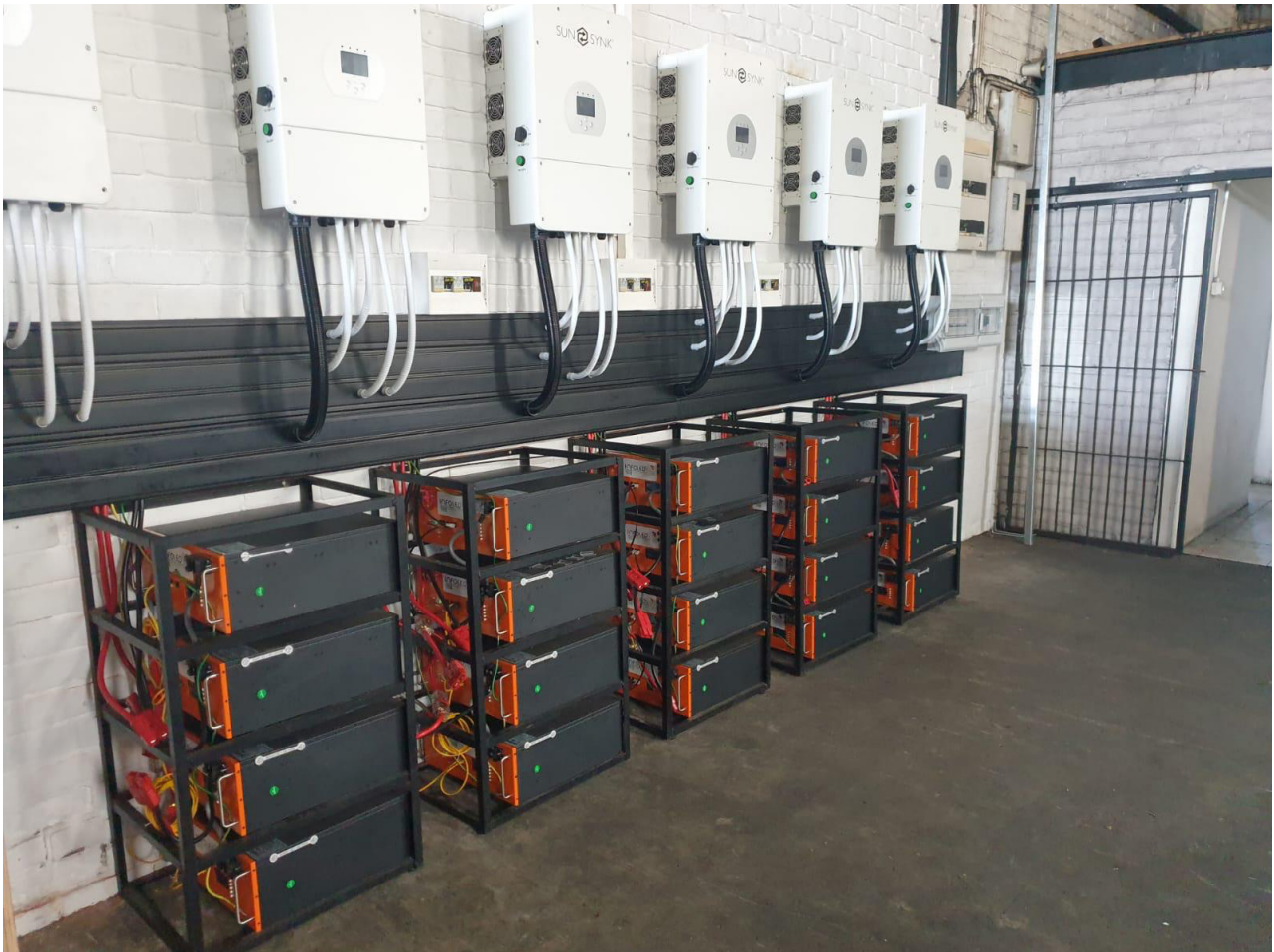
1. SETTING UP THE BATTERY

1.1. Installation Location Environment

The location of the battery should be in accordance with operating temperature range and IP rating specified in the Battery manual. Although the batteries run at a low temperature, proper airflow around the batteries is recommended.

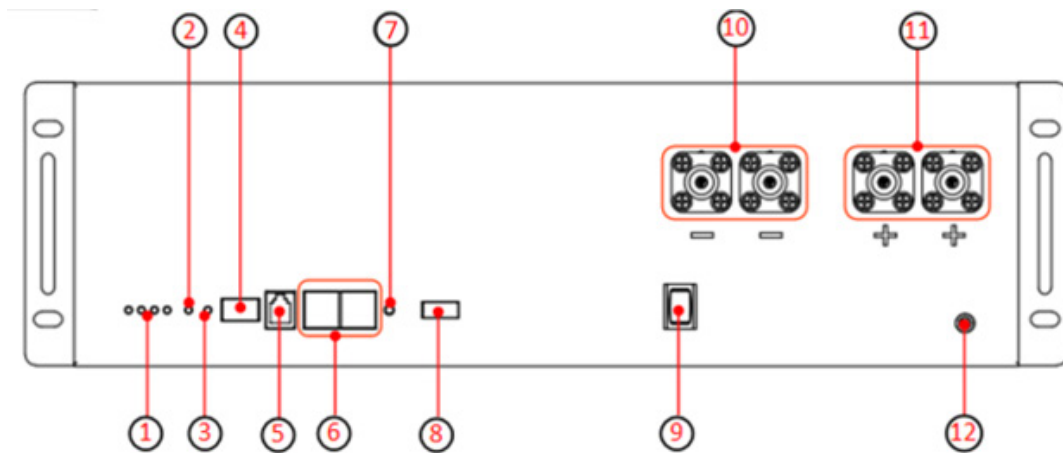
When installing the set, the following conditions should be met:

- DO NOT install the product in a completely closed area with no air-conditioning, it can over-heat and cause a fire.
- DO NOT place in direct sunlight or near a source of heat. This can cause deformation, a breakdown, or a fire. Pay extra attention when you place the system near windows.
- The battery must not be set where excessive oil smoke, steam, moisture or dust is contained in the air.
- Ensure that the batteries are installed in a clean environment with minimal dust.
- Avoid installing the set near the ocean. If unavoidable, appropriate air filtration should be used to prevent salt air in contact with the batteries.
- For proper air circulation to dissipate heat, allow a clearance of approximately 30 cm to the sides of the battery.
- DO NOT install the set near heat sources.



1.2. CATL Battery SSLB1

1.2.1. Front View



Item	Name	Model	Remarks
1	SOC LED x4		
2	Alarm LED		
3	RUN LED		
4	Dialer		
5	Communication port	RJ11	RS232 To upper machine
6	Communication port *2	RJ45	CAN To PCS RS485 Internal Connection
7	Reset		Waken system from malfunction status
8	Dry Contact		
9	Power On/Off Switch		
10	Port Negative x2	PSR6XAB	Black 5.7, 25mm2
11	Port Positive x2	PSR6XBB	Orange 5.7, 25mm2
12	GND	M6	Yellow-Green, 10AWG

1.2.2. Recommended DC Breaker

An overcurrent protection and isolation device between battery and inverter. The following circuit breaker models (purchased separately) are supported:

Circuit Breaker Model	Rating	Certificate
Nader NDB1-125	100 A	CCC, CE, CB, TUV, UL1077

NOTE: The circuit breaker should operate positive and negative conductors simultaneously.

1.2.3. DC Cable Requirements

Size	Outer Diameter	Max. Voltage	Max. Current
21-33 mm ²	10-12 mm	1000 V	120 A



CAUTION

DC cable must be a multicore wire.

1.2.4. Master-Slave Configurations

The Master Pack and The Slave Pack, both with the same model (SSLB1), can be used as single unit as well as multi-units (in parallel) mode. The customers must inform supplier if they intend to connect more batteries (multi-units mode), so one can double-check master-slave settings, because DIP address configuration is different if the number of batteries in parallel changes. The Master Pack can be used individually, but Slave Pack cannot be used individually. Each battery can be set as the master or the slave by changing DIP address configuration. Please refer to the attached best practice guide document.

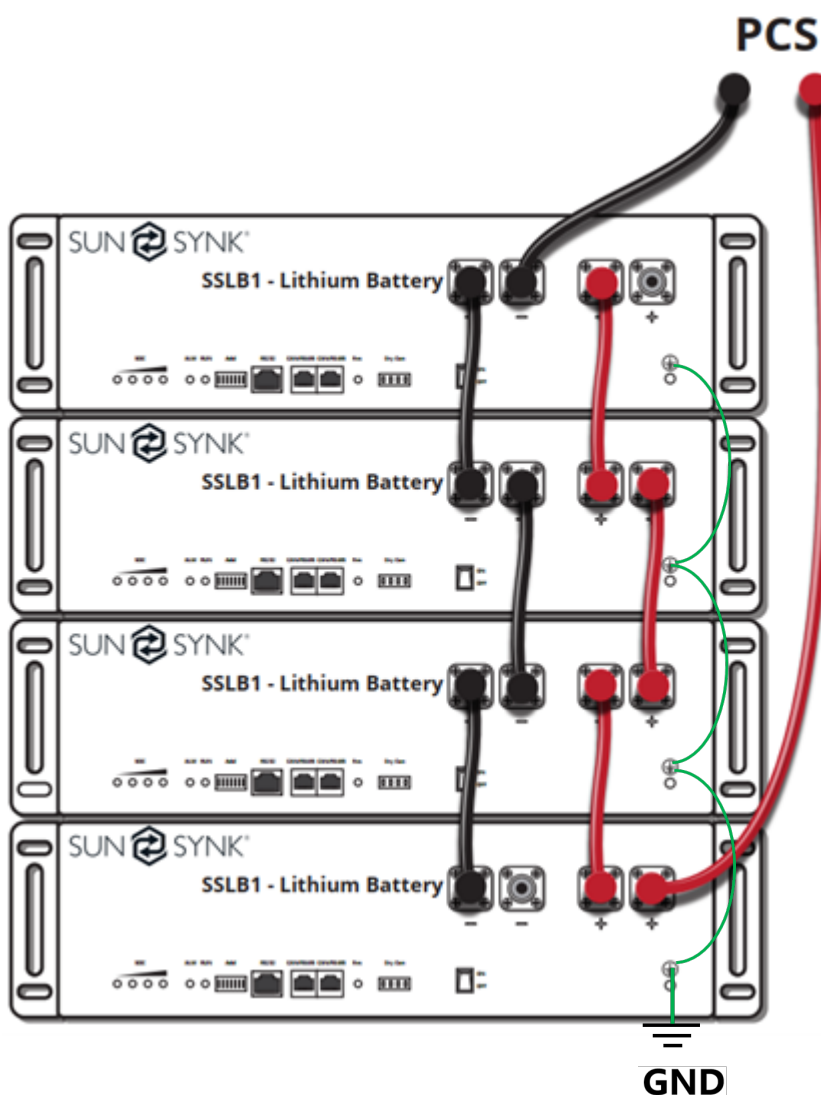
If you are going to use only a single battery, it is only necessary to connect the positive and negative cables.



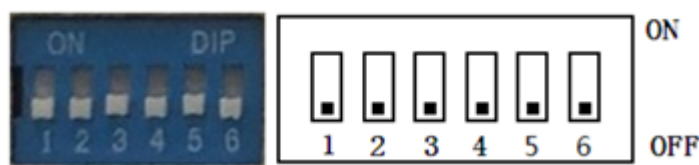
You can add more batteries in parallel to increase the storage capacity. However, no cabinets or racks are supplied with the battery.

In order to connect multi-units, some steps need to be followed. In this example, it is considered that the user will connect up to four batteries.

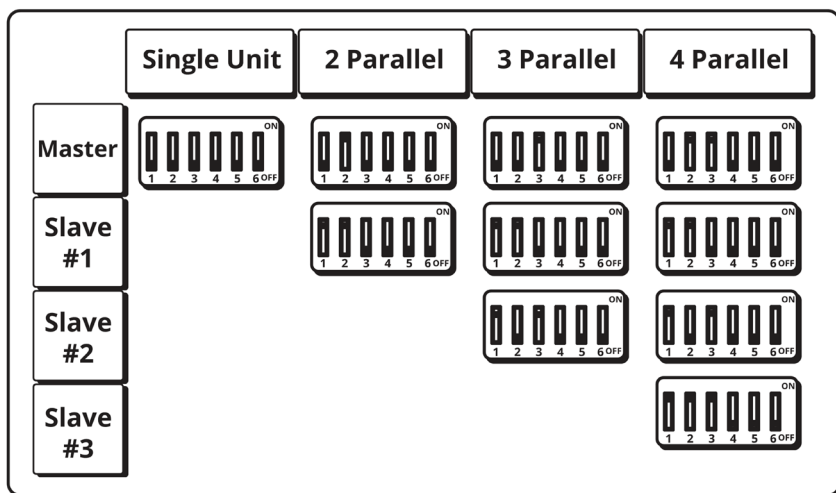
1. Connect all positive terminals;
2. Connect all negative terminals;
3. Connect all the batteries to the same grounding point;



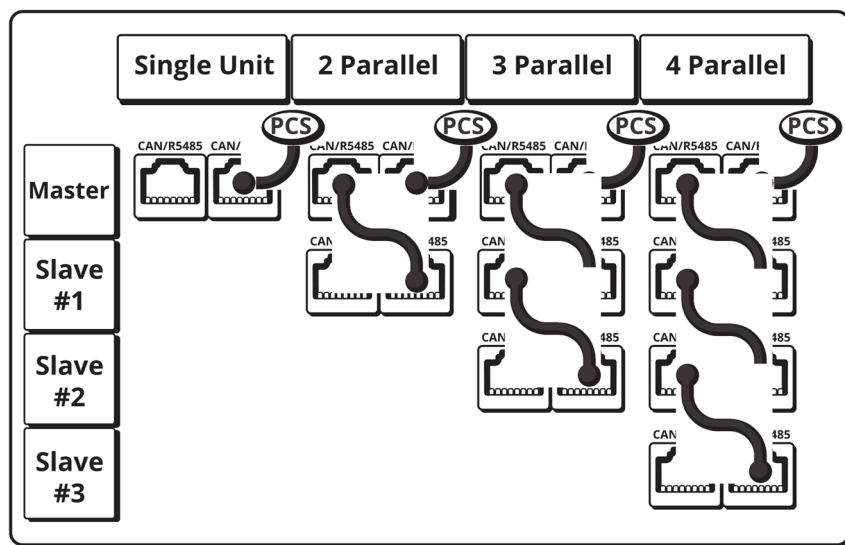
4. In order to set the master and slaves, it is necessary to set up the DIP switches (ON or OFF).



5. Follow the settings presented below to set the desired configuration.

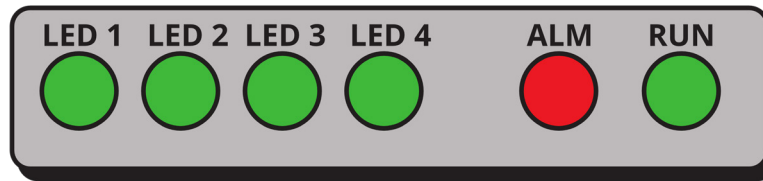








6. It is also necessary to connect the CAN/RS485 cables between the units.



1.2.5. System Status Instruction

There are 6 LED indicator, 4 green LED gives status of SoC, 1 red Alarm LED and 1 green Running Status LED (indicating charging, discharging etc.).







Status	Normal/Warning/Protection	RUN	ALM	SoC				Remarks
								
Power Off	Hibernate	no	no	no	no	no	no	ALL No
Standby	Normal	Twinkle 1	no	Real SoC				Standby
	Warning	Twinkle 1	no					
Charging	Normal	Twinkle 2	no					
	Warning	Twinkle 2	no					
	Overcharging	Twinkle 1	no					Overcharging ALM no
	Overheat, Over-current, Low Temp.	Twinkle 1	Twinkle 2					
Discharging	Normal	Continuous	no					
	Warning	Continuous	no					Over-current, ALM no
	Over-discharging	Twinkle 1	no					
	Overheat, Low Temp., Over-current, Shortcut	Twinkle 1	Twinkle 2					
Charging/ Discharging/ Standby	Abnormal	Twinkle at current state	Twinkle 3					If the slave is disconnected or disconnected, the slave ALM light Twinkle;
	Fault	no	Continuous	no	no	no	no	Fault refers to the hardware fault of BMS voltage calibration device, charging MOS damage, temperature sensor disconnection, etc

1.2.6. LED Twinkle Status

Status	On	Off
Twinkle 1	0.25S	3.75S
Twinkle 2	0.5S	0.5S
Twinkle 3	0.5S	1.5S

1.2.7. SoC Indicator

SoC	LED			
				
	LED1	LED2	LED3	LED4
0~25%	On	Off	Off	Off
25%~50%	On	On	Off	Off
50%~75%	On	On	On	Off
75%~100%	On	On	On	On

1.3. BYD Battery

1.3.1. Brief Introduction

BYD is a lithium battery with an operating voltage range between 45.6~56.16V. It is designed for residential energy storage applications and works together with a 48v battery hybrid inverter. BYD is not suitable for supporting life-sustaining medical devices.

BYD has built-in BMS (Battery Management System), which can manage and monitor cells information including voltage, current and temperature. Besides that, BMS can balance cells charging to extend cycle life. BMS has protection functions including over-dis-charge, over-charge, over-current and high/low temperature; the system can automatically manage charge state, discharge state and balance state.









Multiple BYD can be connected in parallel to expand capacity and power, 8 BYT can be connected in parallel at most.











1.3.2. LED Indicator Definition

Note:









- flash 1 - 0.25s light / 3.75s off
- flash 2 - 0.5s light / 0.5s off
- flash 3 - 0.5s light / 1.5s off

		RUN	ALM	Battery Level Indicator						
Status		L8	L7	L6	L5	L4	L3	L2	L1	Discriptions
										
Shut down		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All OFF
Standby		Flash 1	OFF	According to the battery level						Indicates Standby
Charging	Normal	Light	OFF	According to the battery level						The highest capacity indicator LED flashes (flash 2),others lighting
	Full Charged	Light	OFF	Light	Light	Light	Light	Light	Light	Turn to standby status when charger off
	Protection	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging
Discharge	Normal	Flash 3	OFF	According to the battery level						
	UVP	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging
	Protection	OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	Stop discharge
Fault		OFF	Light	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging and Discharge

Charging Battery Level Indicators Instructions:

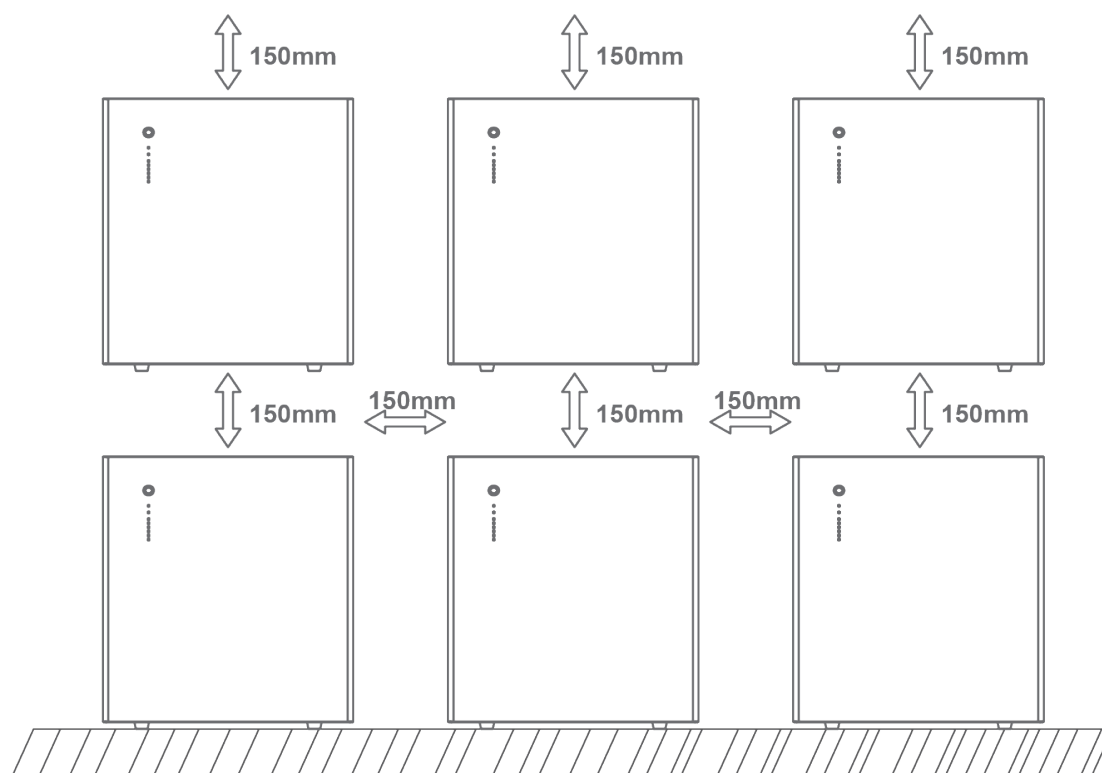
Status		Charging							
Battery Level Indicator		L8	L7	L6	L5	L4	L3	L2	L1
									
Battery Level (%)	0 ~ 17%	Light	OFF	OFF	OFF	OFF	OFF	OFF	Flash 2
	18~ 33%			OFF	OFF	OFF	OFF	Flash 2	Light
	34 ~ 50%			OFF	OFF	OFF	Flash 2	Light	Light
	51 ~ 66%			OFF	OFF	Flash 2	Light	Light	Light
	67 ~ 83%			OFF	Flash 2	Light	Light	Light	Light
	84 ~ 100%			Flash 2	Light	Light	Light	Light	Light
	Full Charged			Light	Light	Light	Light	Light	Light

Discharging Battery Level Indicators Instructions:

Status		Discharge							
Battery Level Indicator		L8	L7	L6	L5	L4	L3	L2	L1
									
Battery Level (%)	0 ~ 17%	Flash 3	OFF	OFF	OFF	OFF	OFF	OFF	Light
	18 ~ 33%			OFF	OFF	OFF	OFF	Light	Light
	34 ~ 50%			OFF	OFF	OFF	Light	Light	Light
	51 ~ 66%			OFF	OFF	Light	Light	Light	Light
	67 ~ 83%			OFF	Light	Light	Light	Light	Light
	84 ~ 100%			Light	Light	Light	Light	Light	Light
	Full Charged			Light	Light	Light	Light	Light	Light

1.3.3. Installation Procedure

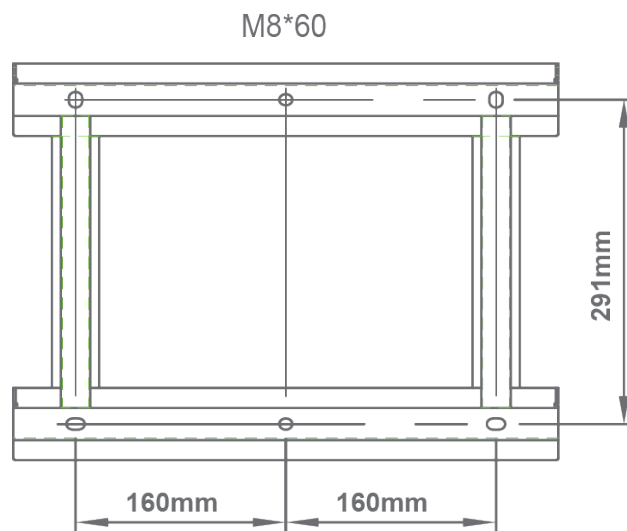
Before starting the installation of BYD batteries, ensure the existence of a minimum mounting distance between the battery pack and equipment:



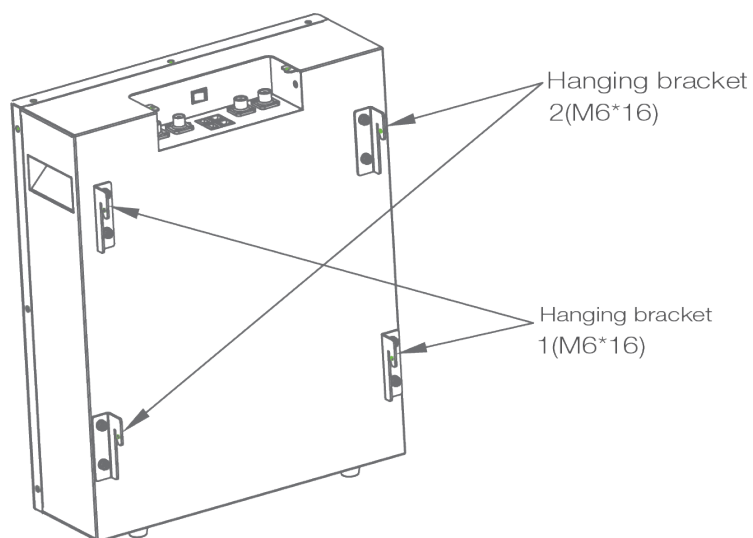
After ensuring that there is adequate space, follow these steps to perform the installation:

STEP 1

Drill the hole with an 10mm drill bit as follows and fix the wall bracket to the wall.

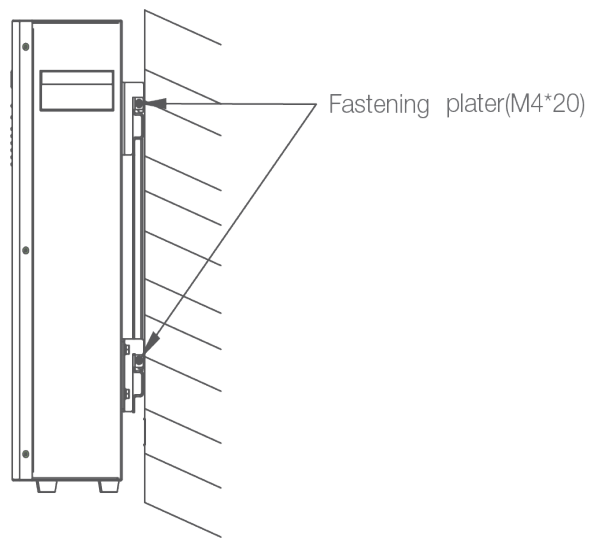
**STEP 2**

Install the hanging bracket.

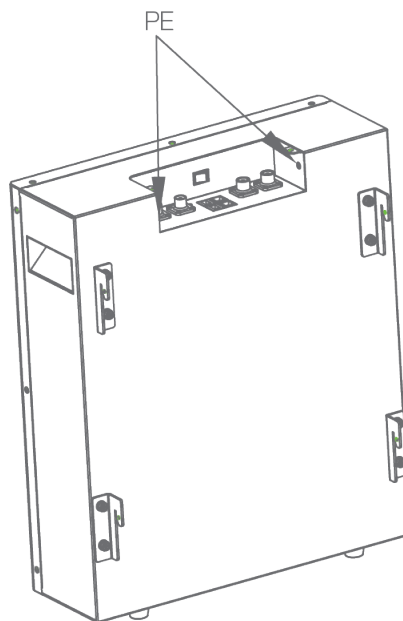


STEP 3

Hang SUN-BATT-5.12 on the wall bracket and tighten it.

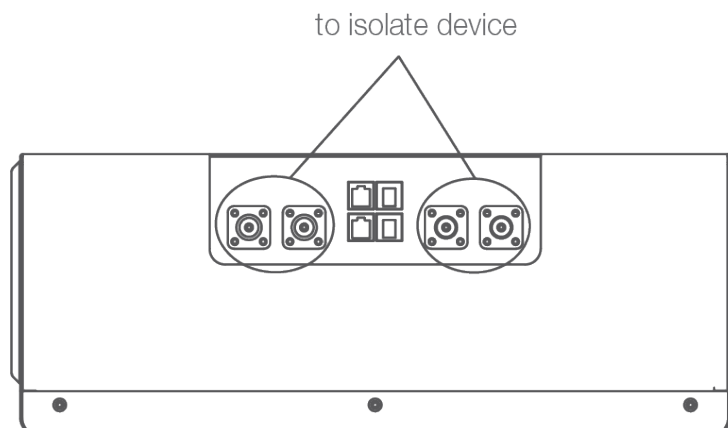
**STEP 4**

Connect to ground.



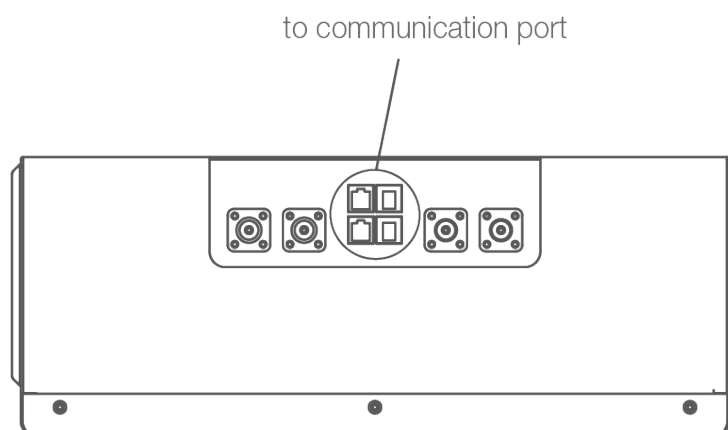
STEP 5

Connect power cable.



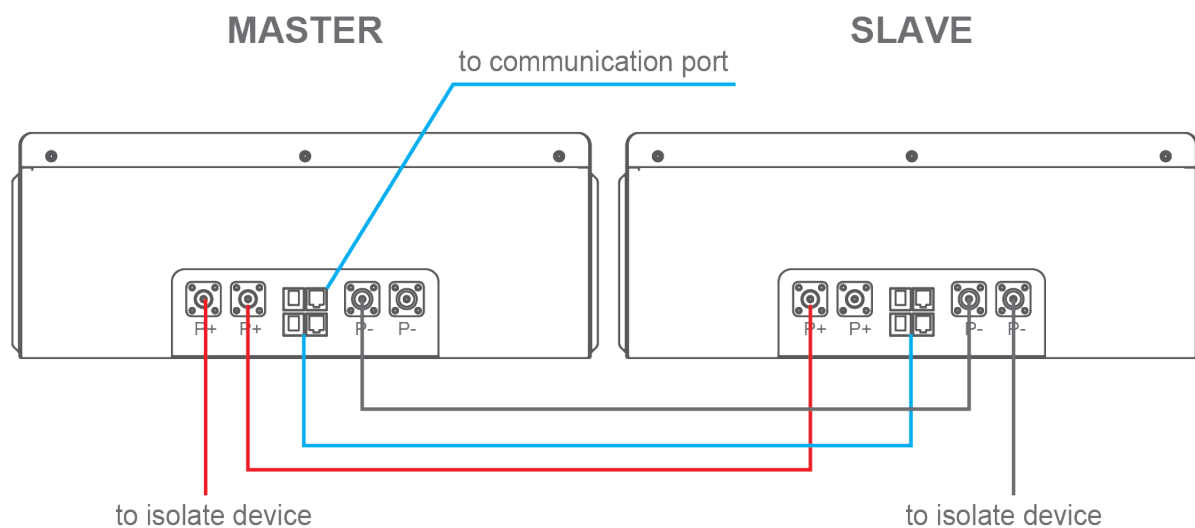
STEP 6

Connect communication cable.



STEP 7

Connect communication cable.



1.3.4. Battery Power and Communication Connections

Parallel Cascade Connection

Applicable scenario: PCS with 100A charge/discharge current connect to BYD battery.

Following, the power cable wiring instructions are presented. Each BYD battery has two pairs of power cable terminals, two P+, and two P-. The connection terminals of each pair have the same function.

Single Module

In a single module application, any of the terminals of each pair can be used.

Parallel System

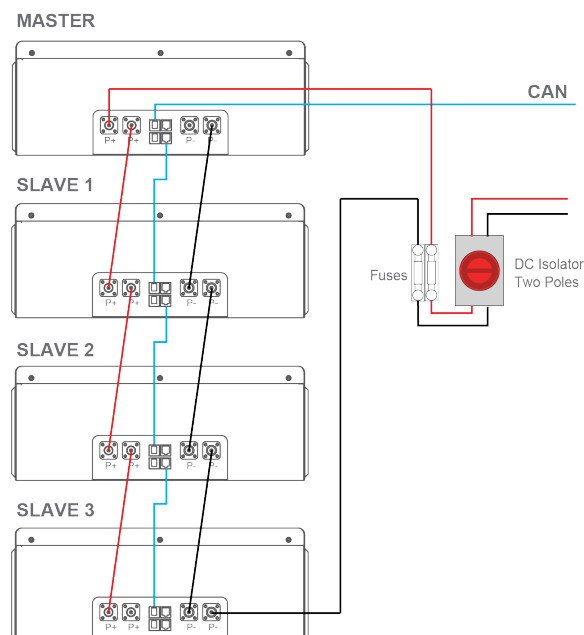
Multiple batteries can be connected in parallel to expand the capacity and power. When using multiple batteries in parallel, one will operate as a master and the others as slaves. One of the Master pack P+ terminals should connect to the PCS, and the other should connect to another battery for capacity expansion.

One of the P- terminals of the last Slave pack should connect to PCS, and the other should connect to another battery for capacity expansion.

For the other Slave packs, each P terminal should be connected to another battery's terminal.

NOTICE

The connection to the protection devices should use the P+ terminal from the Master pack and the P- terminal from the last Slave pack.

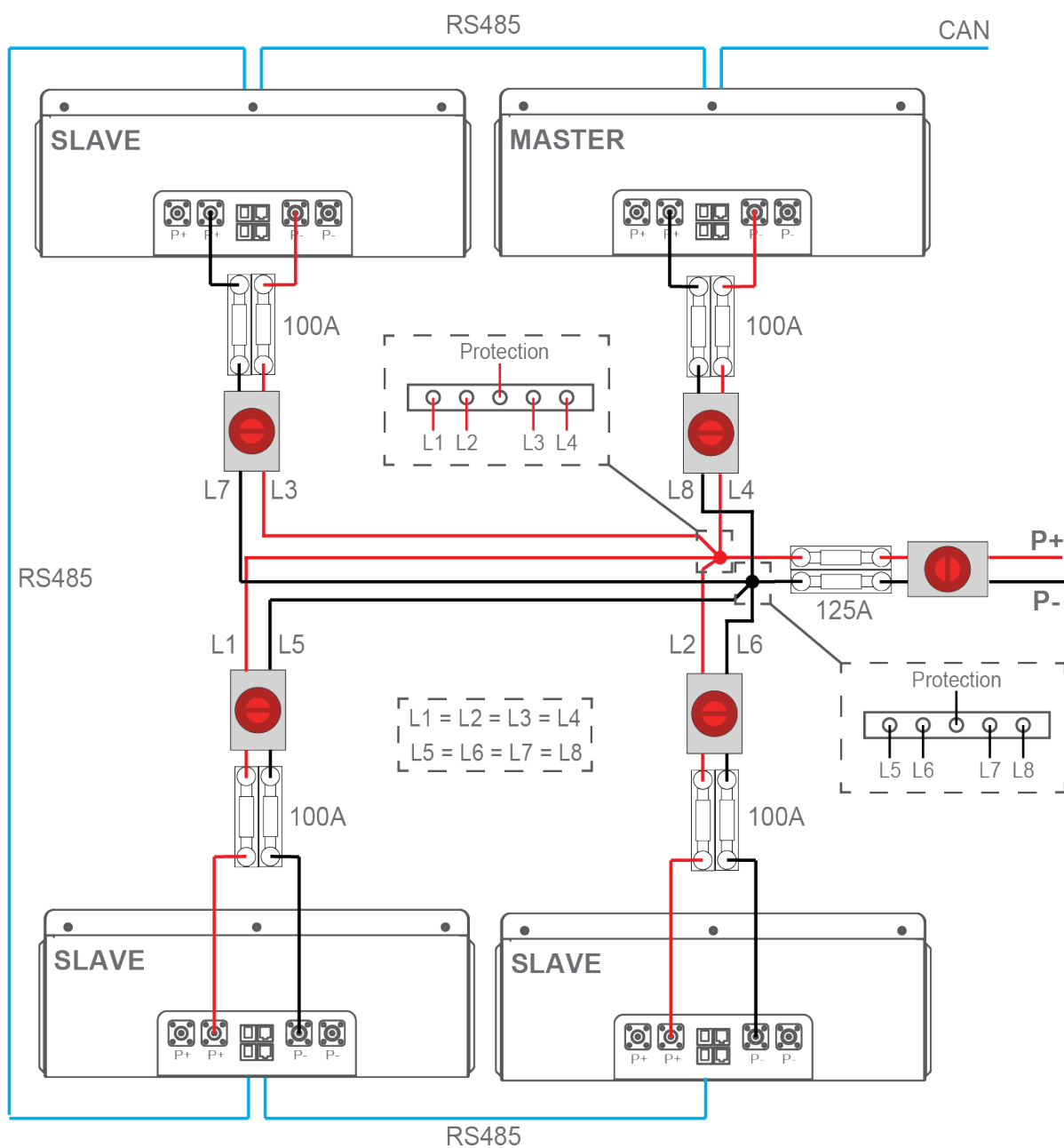




Busbar Connection

Applicable scenario:

- PCS with 200A charge/discharge current connect to BYD battery.



NOTICE

All parallel power cables should be of the same length:
(L1 = L2 = L3 = L4 = L5 = L6 = L7 = L8)

Parallel Cascade Connection

The Master battery can automatically identify the Slaves batteries connected in parallel using its internal software control. The communication terminals Port In and Port Out (RJ45 port) are integrated with the signal for automatic coding function.

NOTICE

All parallel power cables should be of the same length:

The parallel system supports an operation with up to 4 parallel connections. The following describes the connections of a system with four batteries packs, one Master, and three Slaves.

- The **CAN** communication port of the **Master pack should connect to PCS**;
- Port In from the Master pack should not be connected;
- The Port Out from the master PACK should connect the Port In of the first slave PACK using a parallel communication wire;
- The Port Out of the first Slave pack should connect to the Port In of the second Slave PACK;
- Following the same pattern, the Port Out of the second Slave pack should connect to the Port In of the third Slave PACK;
- The Port Out of the third and last slave PACK should not be connected.



1.4. Connecting the Battery to the Inverter

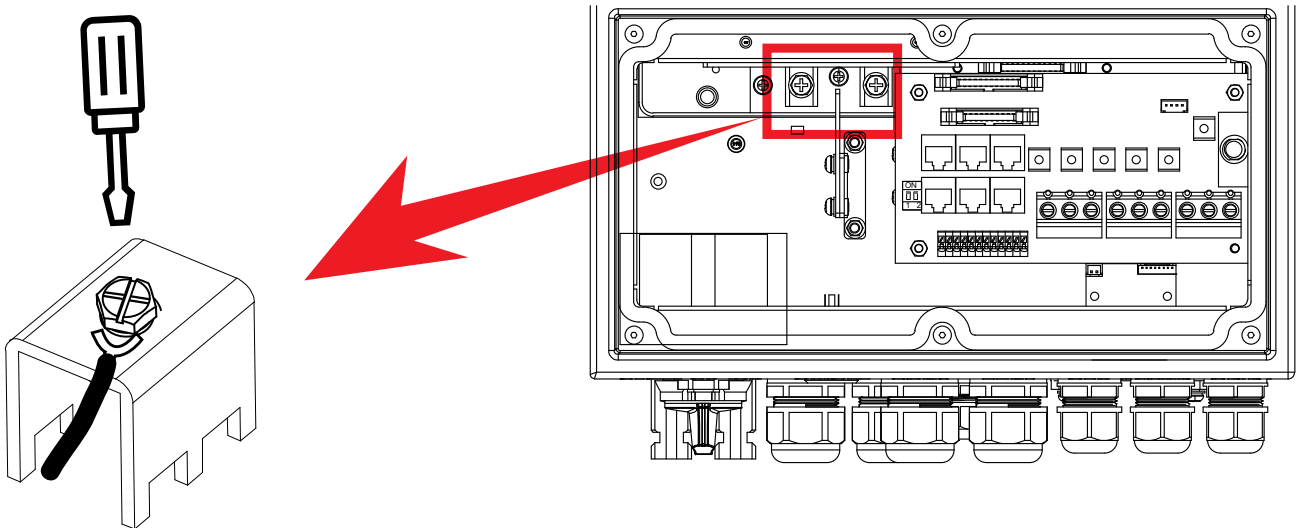
1.4.1. Battery Connection

For safe operation and compliance, a separate DC over-current protector or disconnect device is required between the battery and the inverter. In some applications, switching devices may not be required but over-current protectors are still required. Refer to the typical amperage in the table below for the required fuse or circuit breaker size.

Model	Wire Size	Cable(mm ²)	Torque value (max.)
3.6kW / 5kW	3AWG	25	5.2N.m

Please follow below steps to implement battery connection:

1. Please choose a suitable battery cable with correct connector which can well fit into the battery terminals.
2. Use a suitable screwdriver to unscrew the bolts and fit the battery connectors in, then fasten the bolt by the screwdriver, make sure the bolts are lightened with torque of 5.2 N.M in clockwise direction.
3. Make sure polarity at both the battery and inverter is correctly connected.
4. In case of children touch or insects go into the inverter, Please make sure the inverter connector is fasten to waterproof position by twist it clockwise.



CAUTION

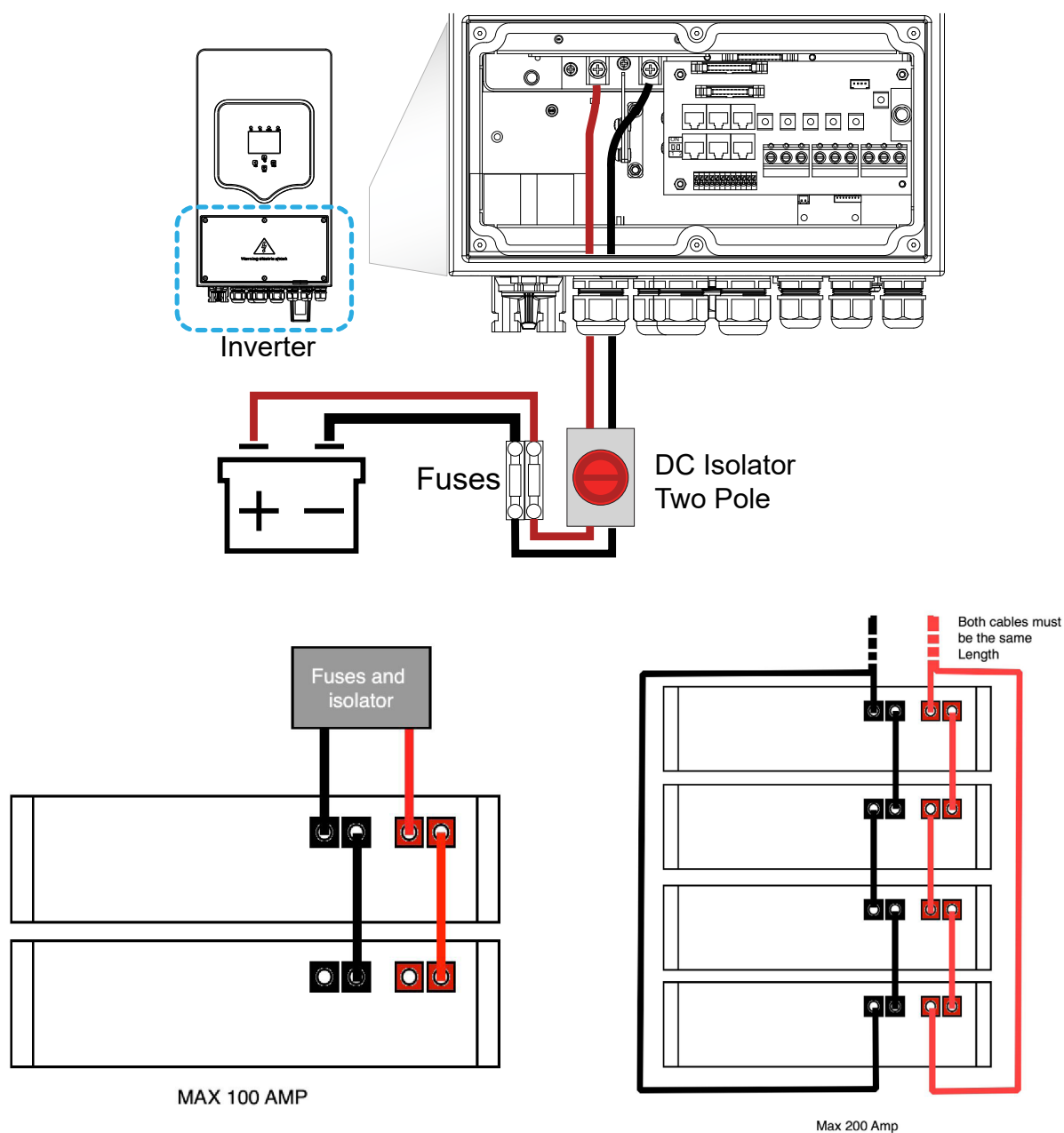
Reverse Polarity

Before making the final DC connection or closing DC breaker/disconnect, be sure positive(+) must be connect to positive(+) and negative(-) must be connected to negative(-). Reverse polarity connection on battery will damage the inverter.

CAUTION

All wiring/connecting must be performed by qualified personnel. Before making the final DC connection or closing the DC Breaker/disconnection device, ensure the inverter unit is wired correctly. A reverse-polarity connection on the battery will damage the inverter.

1.4.2. Recommended DC Battery Protection



1.4.3. Connecting a Lithium Battery

When connecting a Lithium battery, follow the connection steps below and check 'Setting up a Lithium Battery' to connect with an inverter.

1. Connect the correct diameter of cable in accordance with the battery manufacture specifications along with recommended safety devices.
2. Connect a communication cable from the batteries to the inverter in compliance with the battery manufacturer guidelines. The cables have two ends, one to be specifically connected to the BMS and another to be connected to the inverter, do not connect them incorrectly.
3. Connect the power and communication cables to the inverter correctly.

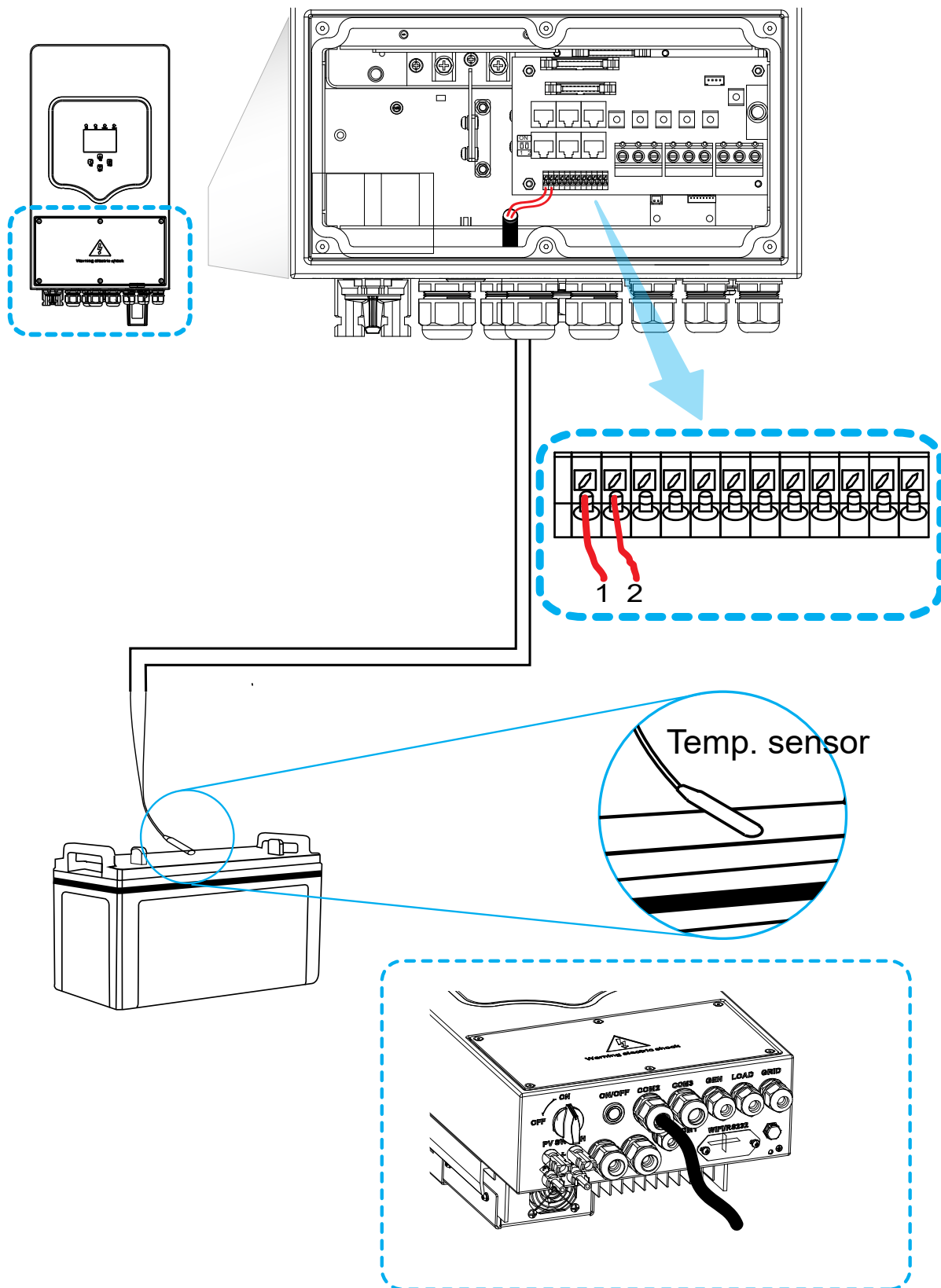


NOTICE

When connecting more than one battery, ensure they are set in the configuration of 'master and slave'.

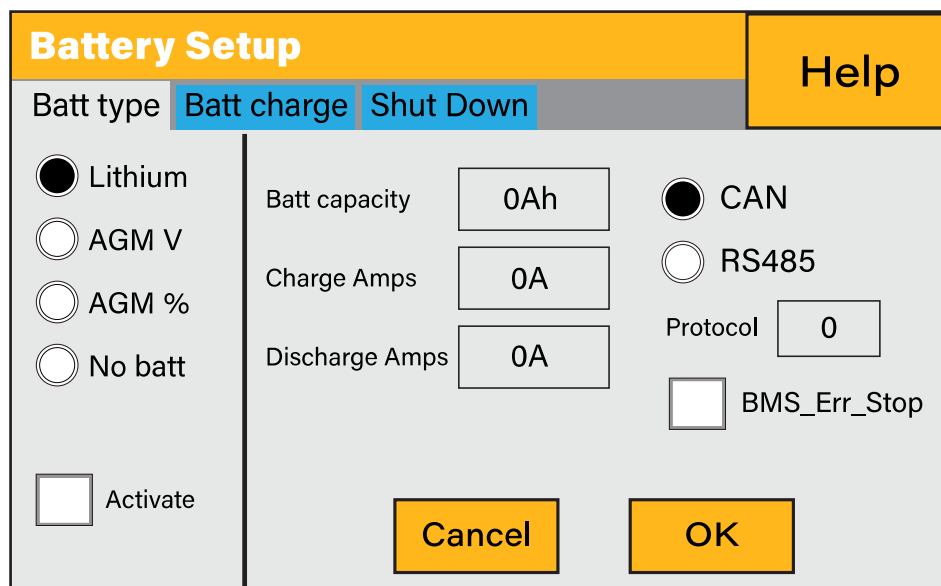
1.4.4. Battery Temperature Sensor Connection

Without a remote temperature sensor, lead-acid batteries may undercharge or overcharge depending on the ambient temperature of the installation environment. This may result in a fire hazard.



1.4.5. Setting Up a Lithium Battery on Sunsynk Inverters

To set up a lithium-ion battery on one of the Sunsynk inverters, click on the BATTERY icon and visit the 'Batt Type' column.



Battery Setup

Batt type | **Batt charge** | Shut Down

☒ Lithium
☐ AGM V
☐ AGM %
☐ No batt

☐ Activate

Batt capacity: 0Ah
 Charge Amps: 0A
 Discharge Amps: 0A

☒ CAN
☐ RS485
 Protocol: 0
☐ BMS_Err_Stop

Cancel OK

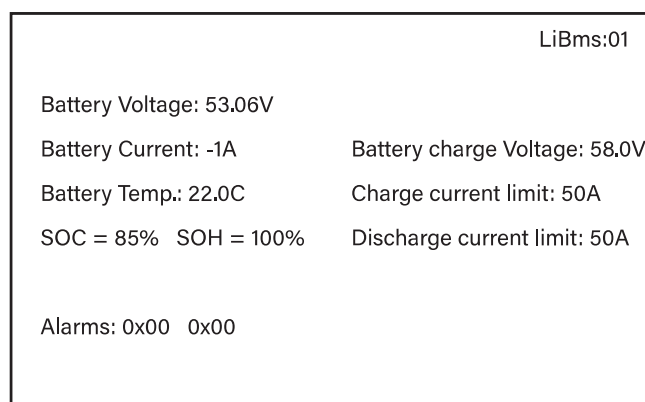
What this page displays:

- This information will only display if the 'Lithium' option is selected under 'Batt Type'.
- The type of communion protocol.
- Approved batteries.

What you can do from this page:

- Set up you Lithium-ion battery.

After installing a lithium battery, check on the communications page by clicking on the 'Li BMS' icon to see if the BMS information is visible. If some information is not displayed correctly (it should look like the diagram below) then there will be a communication error.



LiBms:01

Battery Voltage: 53.06V
 Battery Current: -1A
 Battery Temp.: 22.0C
 SOC = 85% SOH = 100%
 Alarms: 0x00 0x00

Battery charge Voltage: 58.0V
 Charge current limit: 50A
 Discharge current limit: 50A

Therefore, if a communication error occurs:

1. Check that your data cable is the correct type.
2. Check that the data cable is plugged into the correct sockets. Usually, RS485 is employed, but some battery manufacturers use others.

1.5. Battery Commissioning

Before turning on the batteries, please check the installation:

- Check the polarities of the batteries.
- Check if there are no damaged cables.
- Check for local installation compliance.
- Check if appropriate air flow is provided to the set.

1.5.1. System Power ON

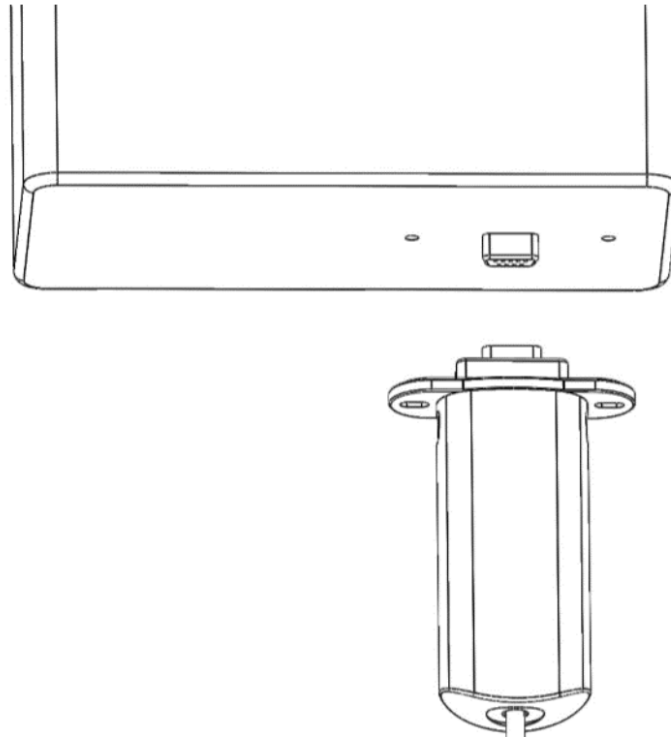
- Installation (including DC cable, communication wire connection, dialer switch, and circuit breaker) is properly down.
- Press Power Switch button and then the external circuit breaker, the green LED should be twinkling and then turn into function mode. (system status can be red from LED signal, as shown below).



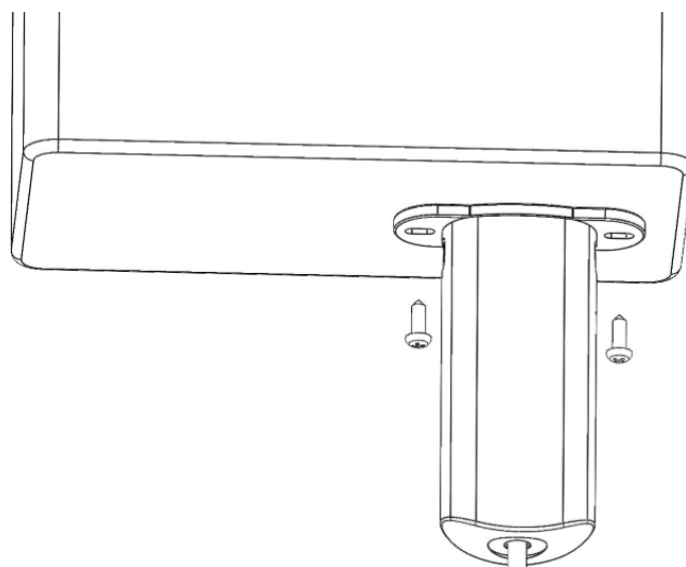
2. SETTING UP THE DATA LOGGER

2.1. Data Logger Installation

Insert the Data Logger into the DB9 interface of the inverter, as shown in the following figure.

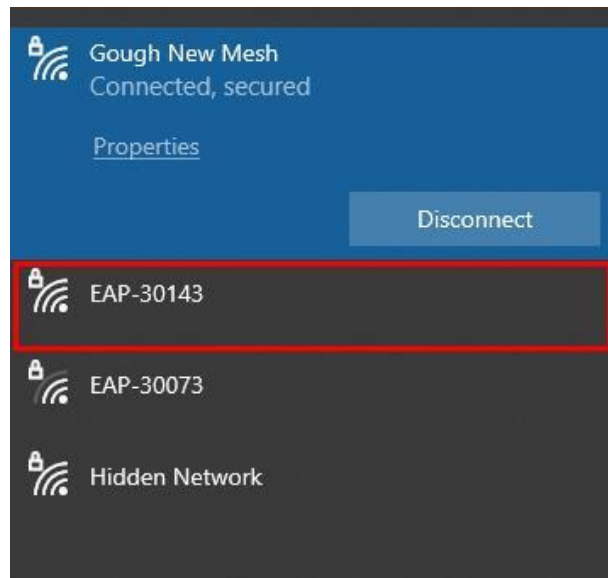


Insert the two screws that come with the Data Logger through the holes, and then tighten them with a Phillips screwdriver, as shown in the figure below.

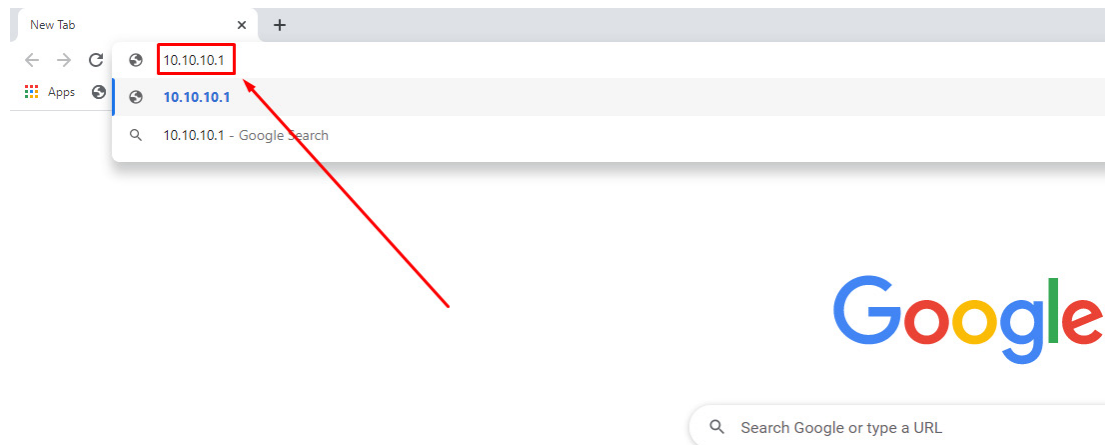


2.2. Connecting to Wi-Fi

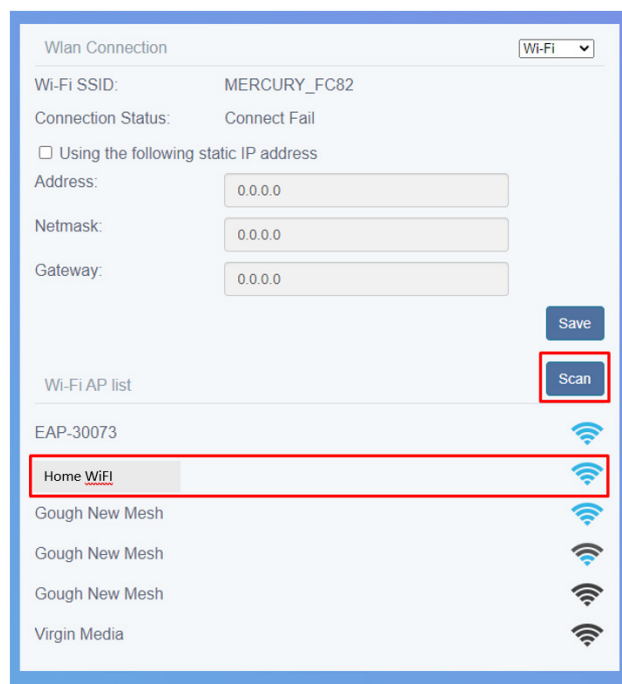
To connect the data logger to the Wi-Fi you need to go to the Wi-Fi setting on your device and search for it. You will see an available connection with the SSID 'EAP-*****' ('*****' are the last 5 digits of the serial number on the data logger).



1. Select the correct connection and then enter the password **12345678**.
2. 2) Once you have connected to the EAP connection, you need to connect it to your own Wi-Fi. To do this, open the Internet browser and search the IP address **10.10.10.1**.



3. Once connected, click 'Scan' to search the Wi-Fi List and you should then see your Wi-Fi connection.



Wlan Connection Wi-Fi

Wi-Fi SSID: MERCURY_FC82

Connection Status: Connect Fail

☐ Using the following static IP address


Address: 0.0.0.0


Netmask: 0.0.0.0


Gateway: 0.0.0.0


Save Scan


Wi-Fi AP list


EAP-30073 

Home WiFi 

Gough New Mesh 

Gough New Mesh 

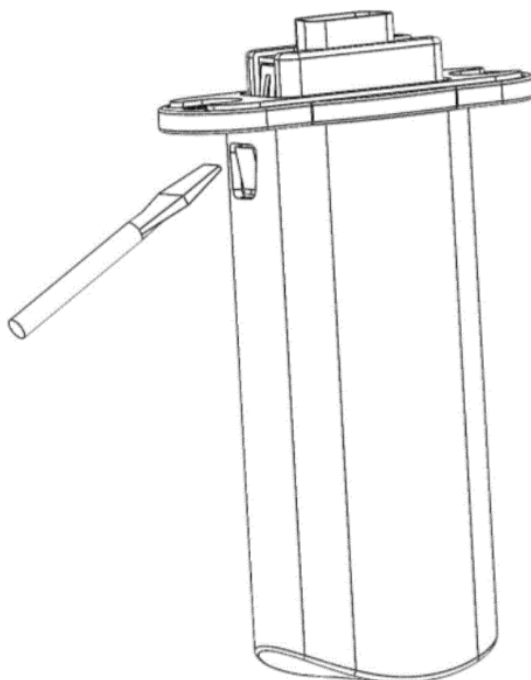
Gough New Mesh 

Virgin Media 

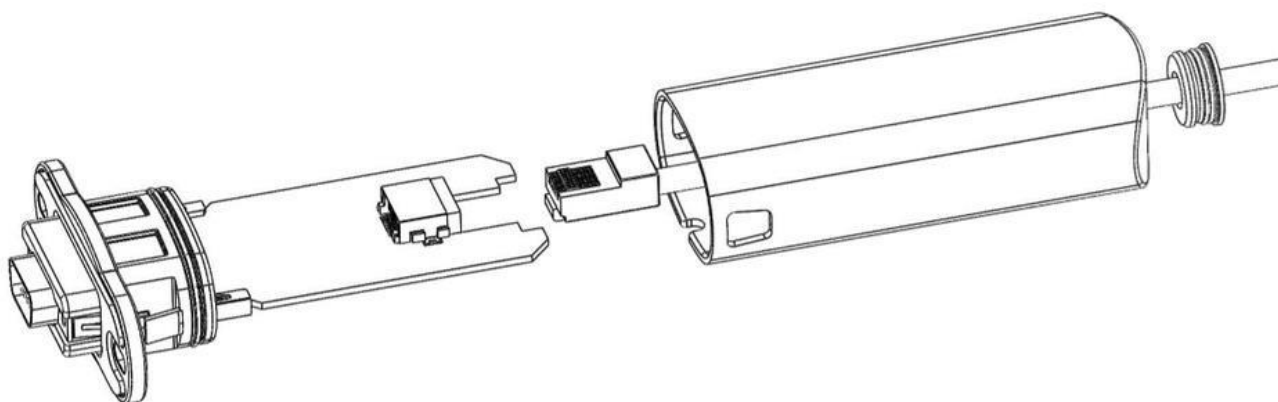
4. Select your Internet / Wi-Fi connection, enter your password, and click 'Connect'.
5. Once your data logger is connected to your Wi-Fi, you can then disconnect from the data loggers EAP connection and connect back to your usual wi-fi connection.

2.3. Network Cable

Use a flat-blade screwdriver to press the buckles on the left and right sides of the shell, as shown in the following figure. Then extract the DB9 interface part manually.



Pass the network cable through its specific hole at the bottom of the shell. Then, insert the RJ45 plug into the RJ45 socket, and place the sealing plug with the hole on the network cable, as shown in the figure below.



2.4. Data Logger Configurations

The Data Logger enables you to perform plant, equipment, and enterprise management. To make the most of the equipment's features, you need to perform additional configurations. All instructions for the setup and use of the Data Logger are available on the Data Logger User Guide at <https://www.sunsynk.org/manuals>.

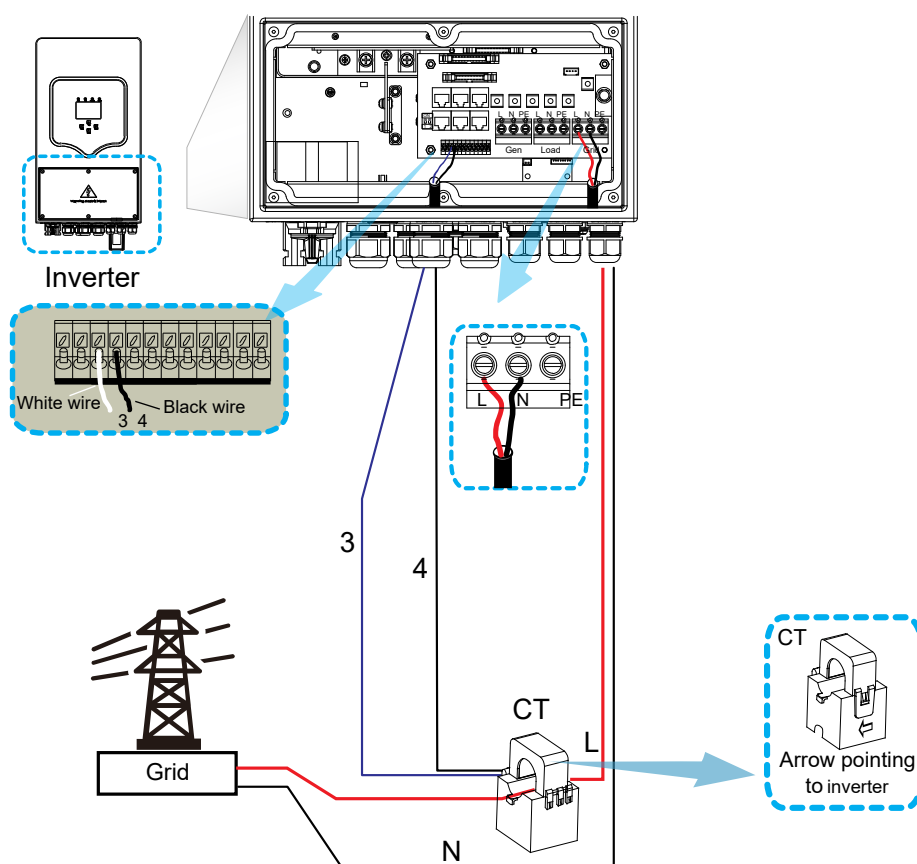


3. SETTING UP CT COIL & RCD

3.1. Installing the CT Coil

The CT coil is one of the most important parts of the Sunsynk Inverters. This device reduces the power of the inverter to prevent feeding power to the grid. This feature is also known as “Zero Export”. To instal the CT Coil follow the steps:

1. Fit the coil (sensor) around the live cable on the main fuse feeding the building and run the cable back to the inverter. This cable can be extended up to an extra 10m using a similar cable.
2. Connect the other end of the CT coil into the inverter terminals marked as CT coil.



0 Watts 0% (SOC) 0.00 Volts 0.00 Amps 0.0 C	0 Watts 0 Hz 0 Volts 0.0 Amps CT: 0 Watts LD: 0 Watts	0 Watts 0 Volts 0.0 Amps
Battery	Grid Power	Solar Power 1
0 Watts 50.0 Hz 0 Volts 0.00 Amps	0 Watts 0 Volts	0 Watts 0 Volts 0.0 Amps
Inverter Power	Load Power	Solar Power 2

If the CT coil is fitted in the wrong way then this variable will have negative instead of positive values when the power is flowing into the house/inverter. Also, the inverter export limiting function will not work properly.

3.2. RCD

If an external Residual Current Device (RCD) is used it should be of Type A/AC with a tripping current of 30mA or higher.

Use of RCDs

Residual Current Devices (RCDs): An RCD dedicated for an Inverter Energy System (IES) may be used to meet the mechanical cable protection requirements of AS/NZS3000 for the cable from the switchboard to the IES. If an RCD is installed the engineer must:

1. Disconnect all live conductors (including both active and neutral conductors) and
2. Be of the type specified in the inverter manufacturer's instructions or as labelled on the inverter.

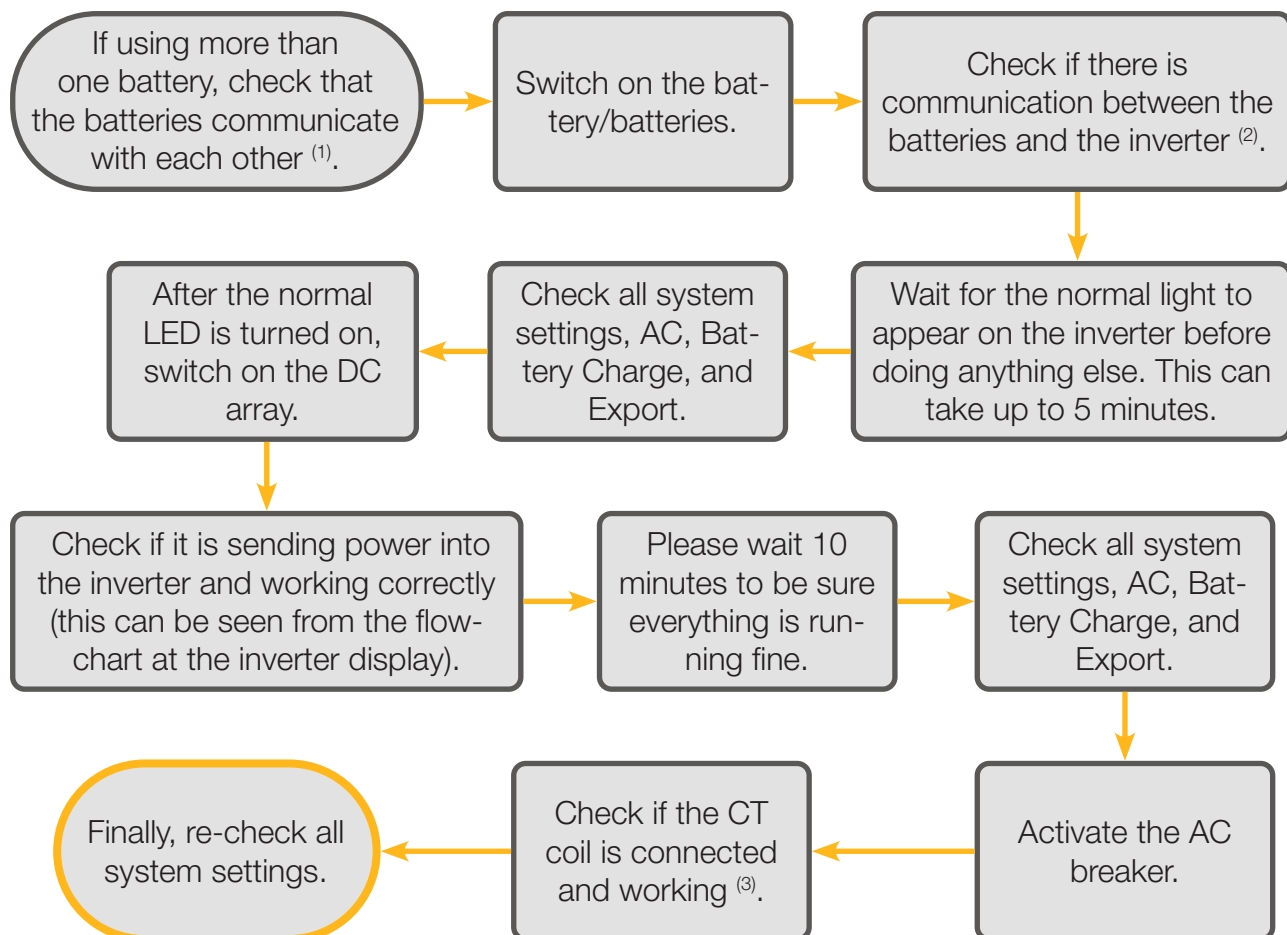
We recommend the use of an RCD on all circuits and sub-circuits connected to the Sunsynk Inverter. Below is the specifications for a Residual Current Breaker with Overcurrent Protection (RCBO)

Earth-leakage protection class	Type A
Earth-leakage sensitivity	30mA
Curve code	C
Network type	AC
Poles description	2P
Earth-leakage protection time delay	Instantaneous

4. COMMISSIONING

Before switching on, the installation engineer must have completed the Earth Bond, RCD and earth leakage tests, checked that the solar panel Voc voltage does not exceed 480V and checked the battery voltage.

Whether it's a parallel system or a single inverter, please follow the simple routine:



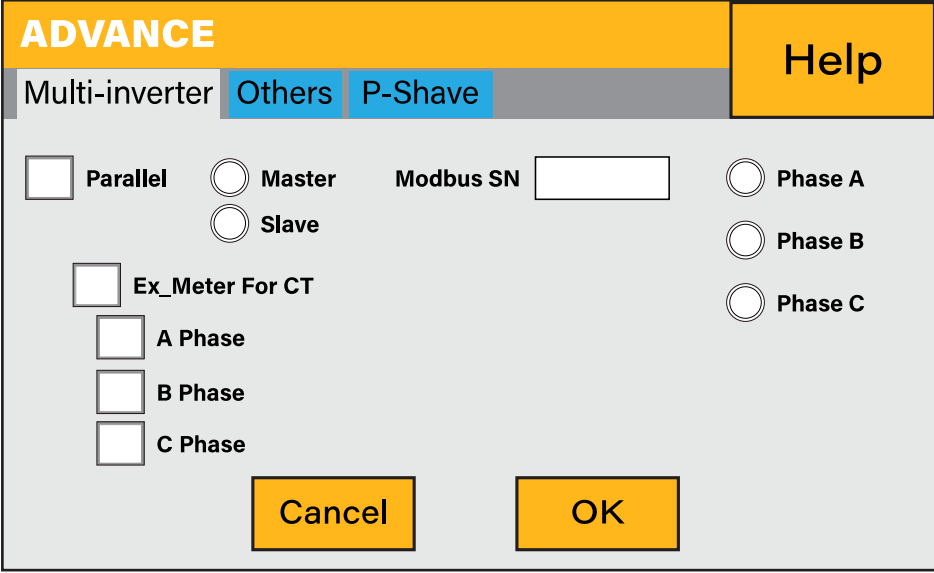
(1) The Master battery can automatically identify the Slaves batteries connected in parallel using its internal software control. The communication terminals Port In and Port Out (RJ45 port) are integrated with the signal for automatic coding function. The parallel system supports an operation with up to 4 parallel connections.

(2) After performing the storage system configuration through the inverter display at Settings (Gear symbol) -> Battery Setup, you should return to the Settings and select LI BMS. You should see a screen with the LI BMS information on the next screen. If some information is not displayed correctly on the screen, a communication error has occurred.

(3) Access the status page through the inverter display. Check if the CT value in the Grid Power area has positive values. If it is the case, the CT Coil was installed and connected correctly. If the Grid Power shows a negative value for CT, then the CT Coil is fitted in the wrong way.

5. PARALLELING INVERTERS

To configure multi-inverter settings, click on the ADVANCE icon on the inverter interface.



The screenshot shows the 'ADVANCE' configuration window with a yellow header. Below the header are three tabs: 'Multi-inverter' (selected), 'Others', and 'P-Shave'. A 'Help' button is in the top right corner. The main area contains the following settings:

- ☐ Parallel
- ☐ Master
- ☐ Slave
- Modbus SN:
- ☐ Phase A
- ☐ Phase B
- ☐ Phase C
- ☐ Ex_Meter For CT
- ☐ A Phase
- ☐ B Phase
- ☐ C Phase

At the bottom are two buttons: 'Cancel' and 'OK'.

What this page displays:

- If the inverter operates as a master or a slave.
- Modbus Device ID – 'Modbus SN' that must be unique for each inverter connected to the bus/wire.

What you can do from this page:

- Set the inverter as a master or slave per bus/wire.
- Set the phase in which the inverter will be paralleled.
- Set the Modbus SN for paralleling.

The Sunsynk parity inverter can be wired standalone or where more power is required it can be connected in parallel either single or 3 phase configuration. The maximum number of inverters that can be paralleled in a single phase utility grid is three and the maximum number that can be paralleled in a three phase utility grid is fifteen.

To parallel six inverters in a three phase utility grid is necessary to set three inverters as master and three as slaves:

- Phase A: Master A and Slave A
- Phase B: Master B and Slave B
- Phase C: Master C and Slave C

For stability, all the batteries need to be connected in parallel. It is recommended a minimum cable size of 50mm² diameter with fuse isolators to each inverter.

Each invert will require a fuse isolator with surge protection and each group circuit will require an RCD. If the batteries as supplying power to the main load during the outage then a change over switch will also be required or a split load can be used.

- The CT coils used to limit export power must only be connected to the master. Therefore, if six inverters are paralleled, three CT coils will be required.
- Connect a RJ45 communication cable between each inverter; the order is not important since both sockets are the same, so there is no IN or OUT.
- Each phase must only have one master and the others set to slave.
- Each inverter must have a unique Modbus number.
- The maximum length of the communication cables is 2 meters (do not exceed this value)
- All batteries must be connected in parallel and the MPPTs must be kept separate.
- **IMPORTANT: When configuring inverters in parallel for a single or three-phase, it is important to first check firmware versions to be all the same on all inverters. It is strongly recommended to request firmware update on all inverters to the latest and the exact same firmware version.**
- **IMPORTANT: All inverters in a parallel system must have their own isolating load breaker before it goes to the parallel breaker to ensure while programming that the load outputs are isolated from each other.**
- Only once confirmed 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.
- When configuring a three-phase system using three single-phase inverters, one per phase. It is extremely important to check phase rotation to be clockwise feeding the inverters and to confirm the output is also clockwise on phase rotation.

NOTICE

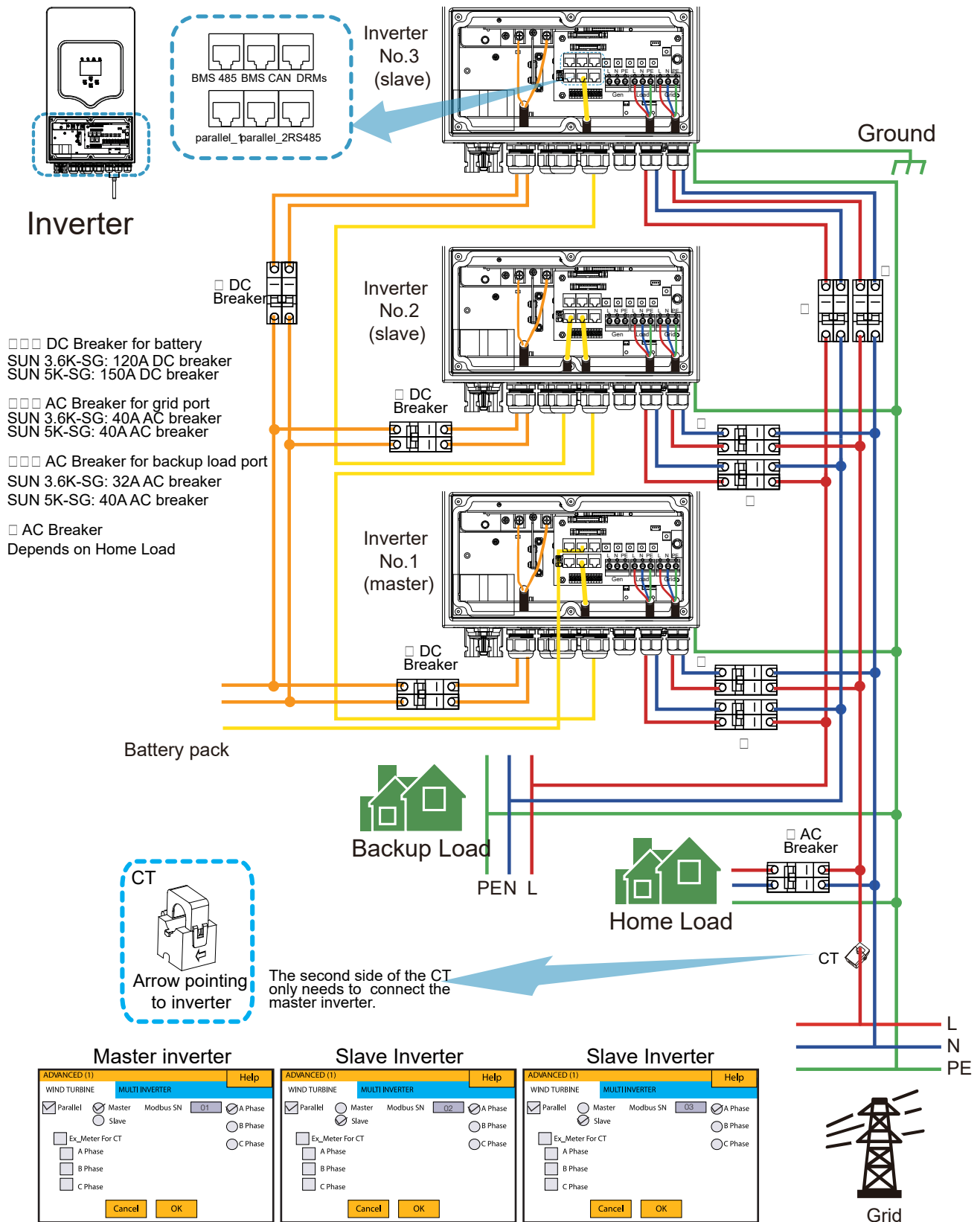
- **All inverters in a parallel system must have its own isolating load breaker before it goes to the parallel breaker to ensure while programming that the load outputs is isolated from each other.**
- **The grid input can also be connected in parallel.**
- **You cannot connect the Aux/Gen port in parallel, because this causes a conflict between the frequency of the generator and the frequency of the grid.**

NOTICE

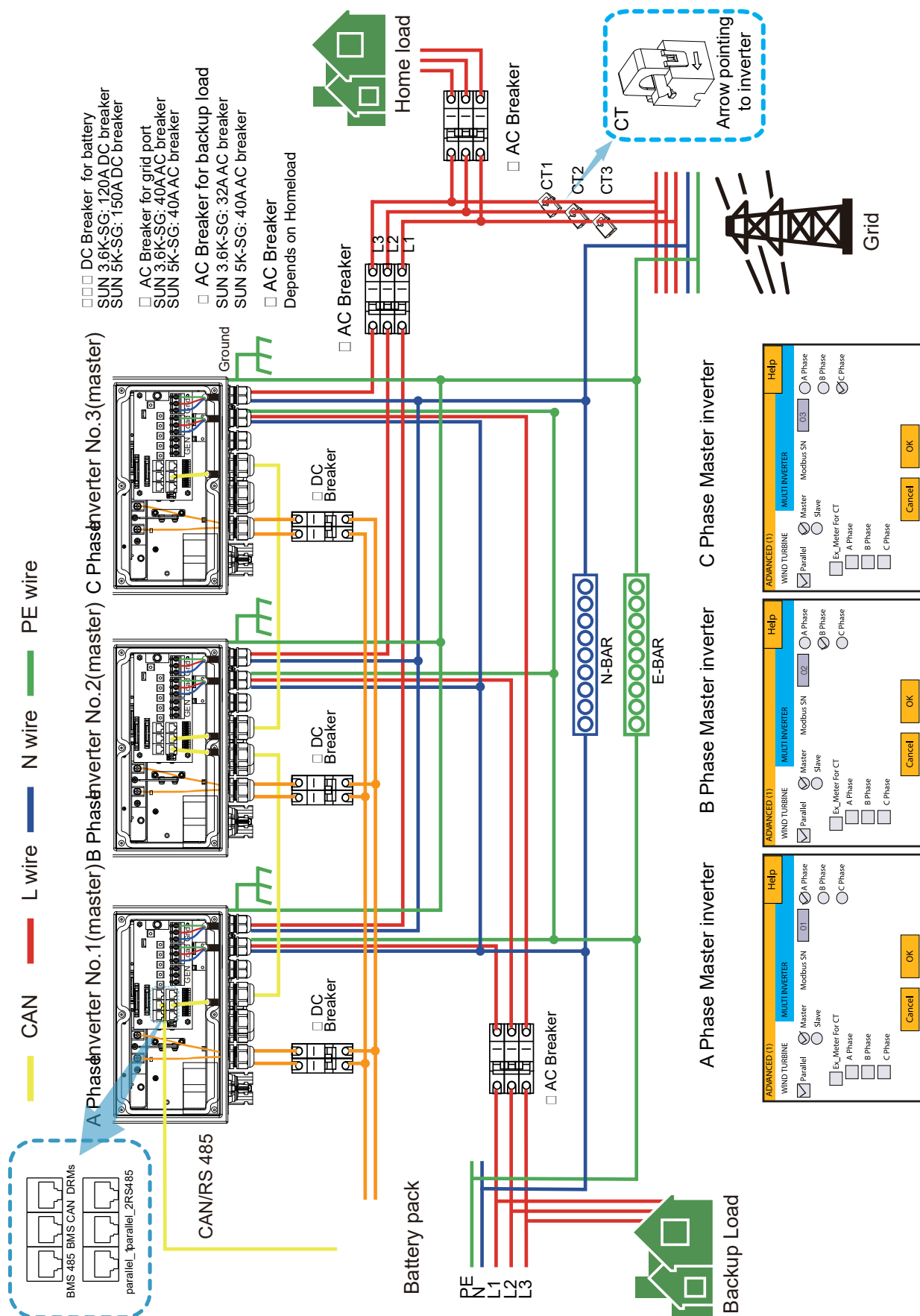
The cables have two ends, one to be specifically connected to the BMS and the another one to be connected to the inverter, do not change it. If the communication is not working correctly between inverters then errors will show up on the display. In this case, please check all settings and data cable.

5.1. Single-Phase Parallel Connection Diagram

— CAN — L wire — N wire — PE wire



5.2. Three-Phase Parallel Connection Diagram



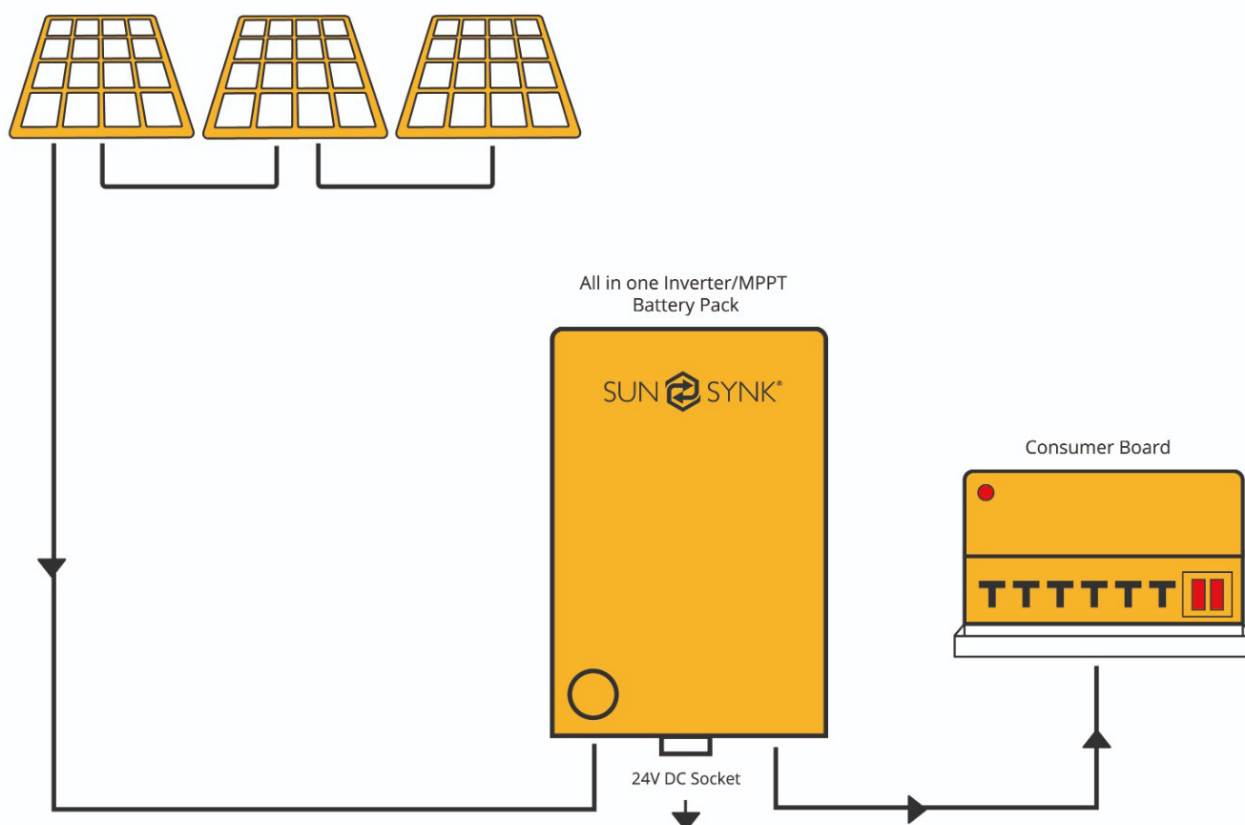
6. OPERATION MODES

6.1. Power Bank System

The figure below shows a power bank system connected to a small solar array, and then connected to the grid. This is an entry-level system that provides power at a low cost with simple installation. It is perfect for garden sheds, garden bars, remote buildings, and small houses.

The system consists of the following components:

1. Solar array;
2. Power Bank with lithium-ion batteries and an all-in-one inverter;
3. Consumer unit.



6.2. Microinverter System

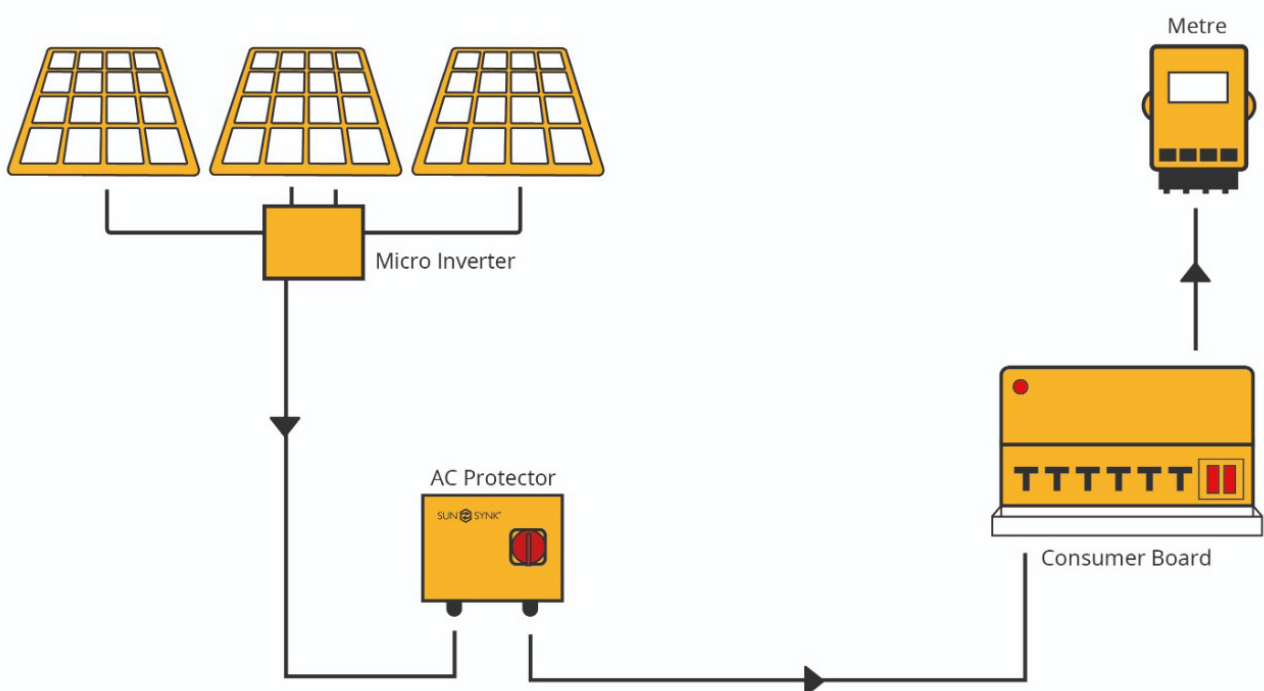
The figure below shows the simplest configuration for an on-grid / grid-tied system utilising a micro-inverter system. This is an entry-level system for low power applications, in which you may or may not export power to the grid. Microinverters ensure peak performance from the array since each module is connected to a Maximum Power Point Tracking (MPPT). Therefore, if one panel is affected by shade, dust, orientation, or any situation in which it underperforms compared to the others, this will not affect the whole array.

An important point regarding safety is that in microinverters, the highest voltage you have on the roof is the voltage of a panel. On the other hand, string grid-tied inverters have a large number of panels interconnected. Thus, their DC voltage is high, and they become dangerous, especially in cases of fire.

In addition, microinverters do not require long DC strings and have a typical output of 220VAC, having a straightforward installation.

The system is composed of the following components:

1. Solar array where each module is connected to an MPPT of micro inverter
2. Multi-channel Sunslynk Micro Inverter.
3. Power isolator and protection circuit;
4. Consumer unit connected with or without a CT coil.

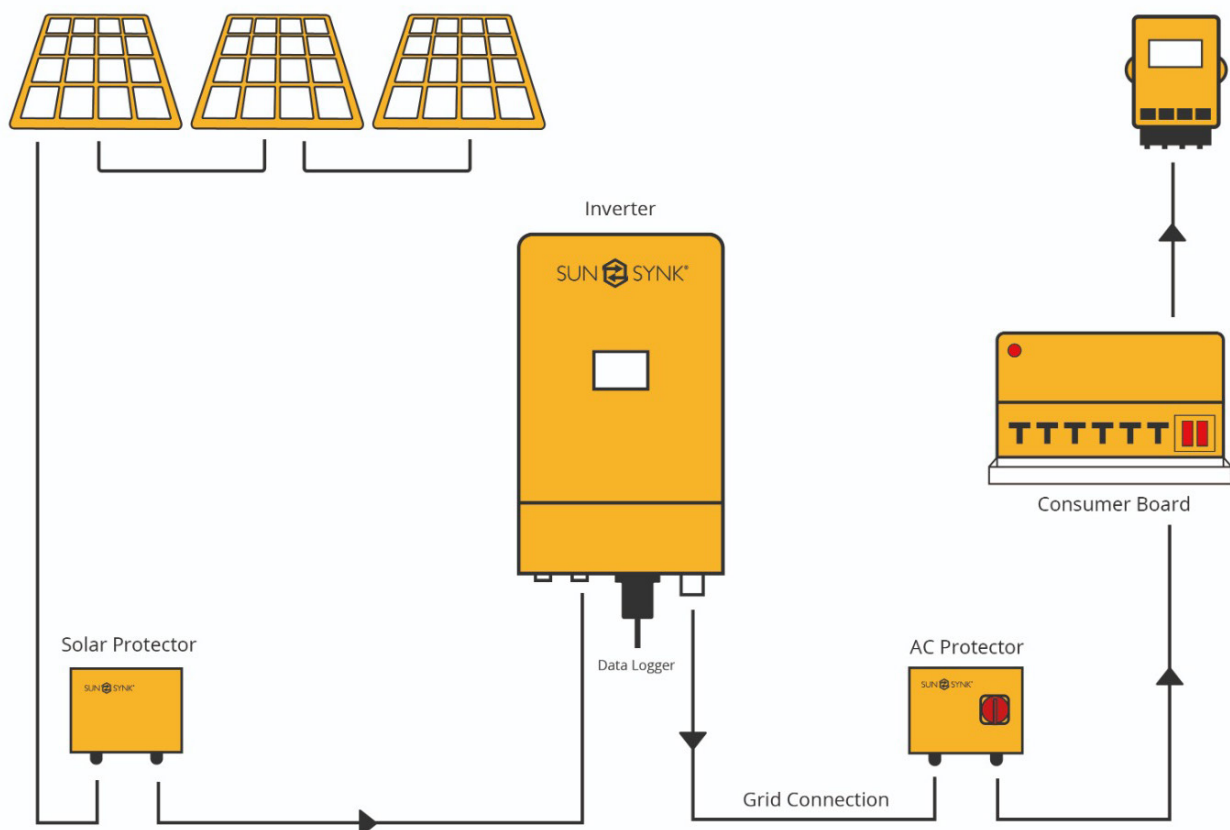


6.3. Sunsink Storage Inverter Without Batteries

The figure below shows a system utilising a Sunsink Storage Inverter without batteries, where the inverter will work as a conventional grid-tied / on-grid inverter. In this system, no energy storage system is used so that the power generated by the PV panels are delivered to the home appliances or exported to the grid; you can choose to export or not power to the grid. Depending on the size of your array, you can split it into smaller arrays and connect them to separated MPPTs in order to optimise solar production. Please refer to the inverter's datasheet to select an appropriate solar array installed on an MPPT input.

This system consists of the following components:

1. Solar array connected to the MPPT input;
2. Solar isolator and protection circuit;
3. Sunsink inverter;
4. AC protection circuit and isolator;
5. Consumer unit connected with or without a CT coil.

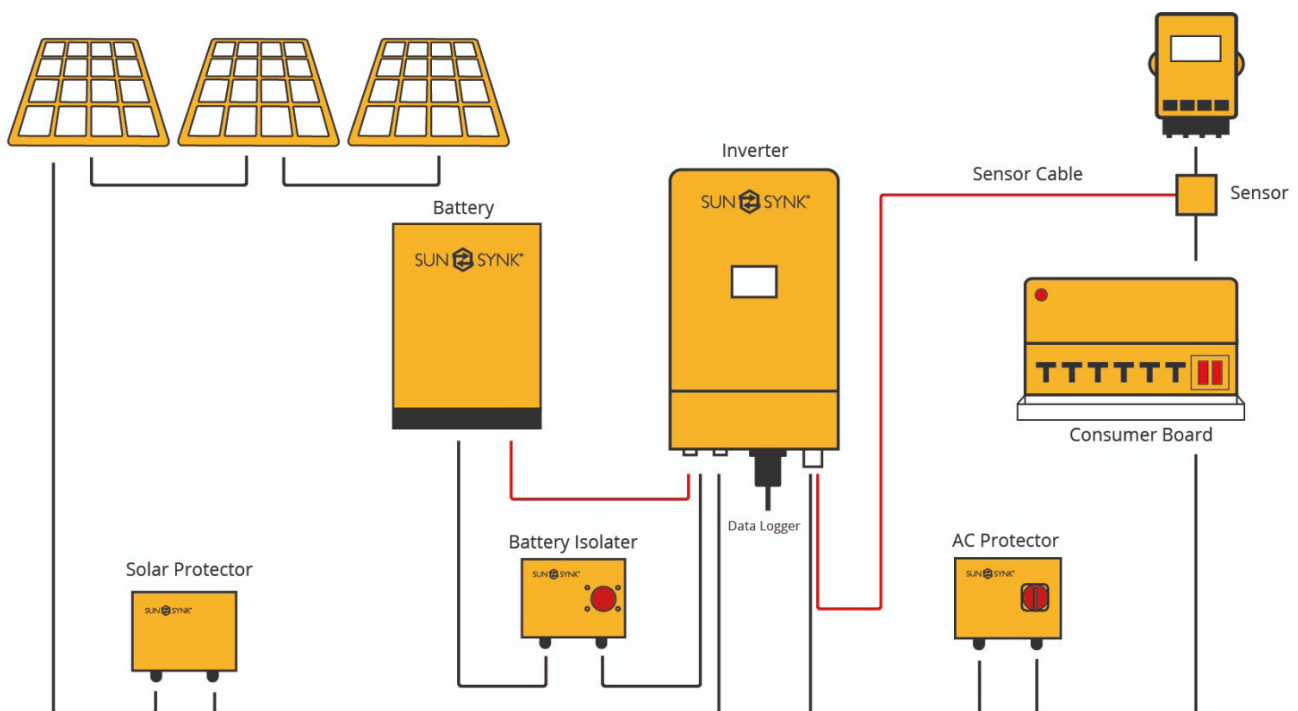


6.4. Sunsynk Storage Inverter with Batteries

The figure below shows a hybrid system utilising a Sunsynk Storage Inverter with batteries. In this system, the batteries may be charged with either solar panels or the electricity grid (depending on which is more economical or preferred); and you can schedule in real-time the charging or discharging time of the batteries. Also, you may limit the power exported to the grid.

This system is composed of the following components:

1. Solar array connected to the MPPT input;
2. Solar isolator and protection circuit;
3. Sunsynk inverter;
4. Battery;
5. Battery isolator and protection circuit;
6. AC protection circuit and isolator;
7. Consumer unit connected with a CT coil.



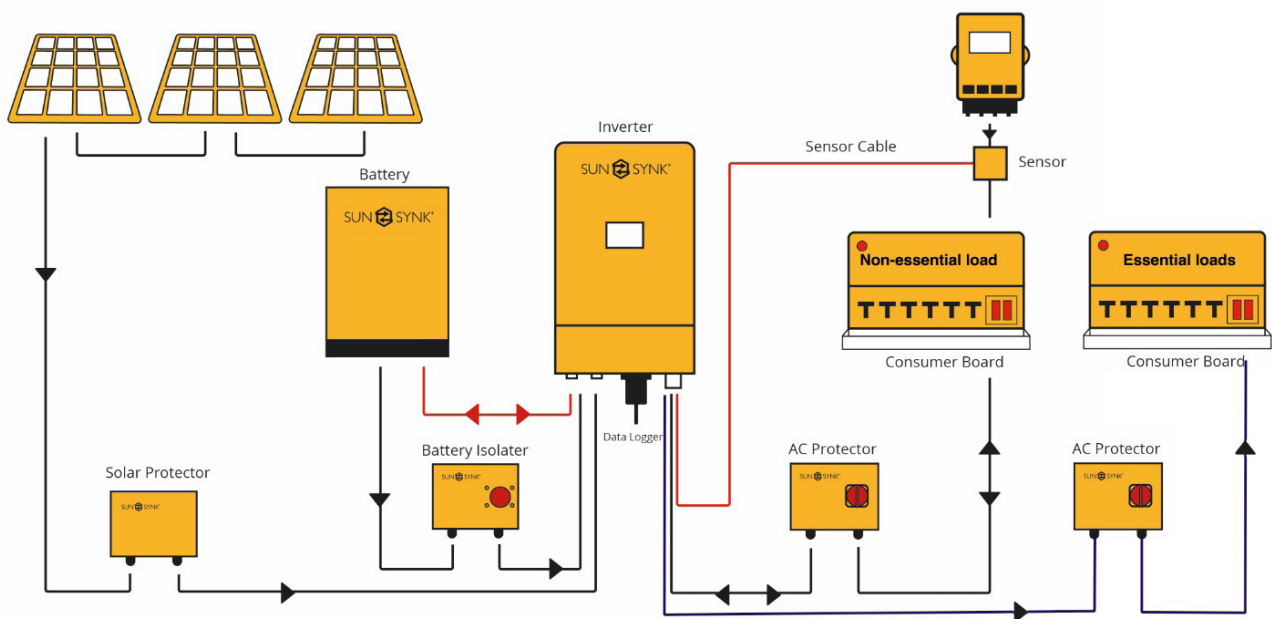
6.5. Sunsynk Storage Inverter with Essential & Non-essential Loads

The figure below shows a hybrid system utilising a Sunsynk Storage Inverter with batteries, very similar to the diagram shown in the section **Sunsynk Storage Inverter with Batteries**. However, in this case, the load is separated into two groups: non-essential and essential. You will have a consumer board for loads that need to operate even during a power failure, such as lights, security devices, routers, and computers. The loads that are not essential, such as most sockets, air conditioning, heaters, etc., will be connected to the non-essential load's consumer board.

The essential loads are connected to the 'LOAD' input of the Sunsynk inverter, while the non-essential loads are connected to the 'GRID' input.

This system is composed of the following components:

1. Solar array connected to the MPPT input;
2. Solar isolator and protection circuit;
3. Sunsynk inverter;
4. Battery;
5. Battery isolator and protection circuit;
6. AC protection circuit and isolator for non-essential loads;
7. AC protection circuit and isolator for essential loads;
8. Consumer unit connected with a CT coil.

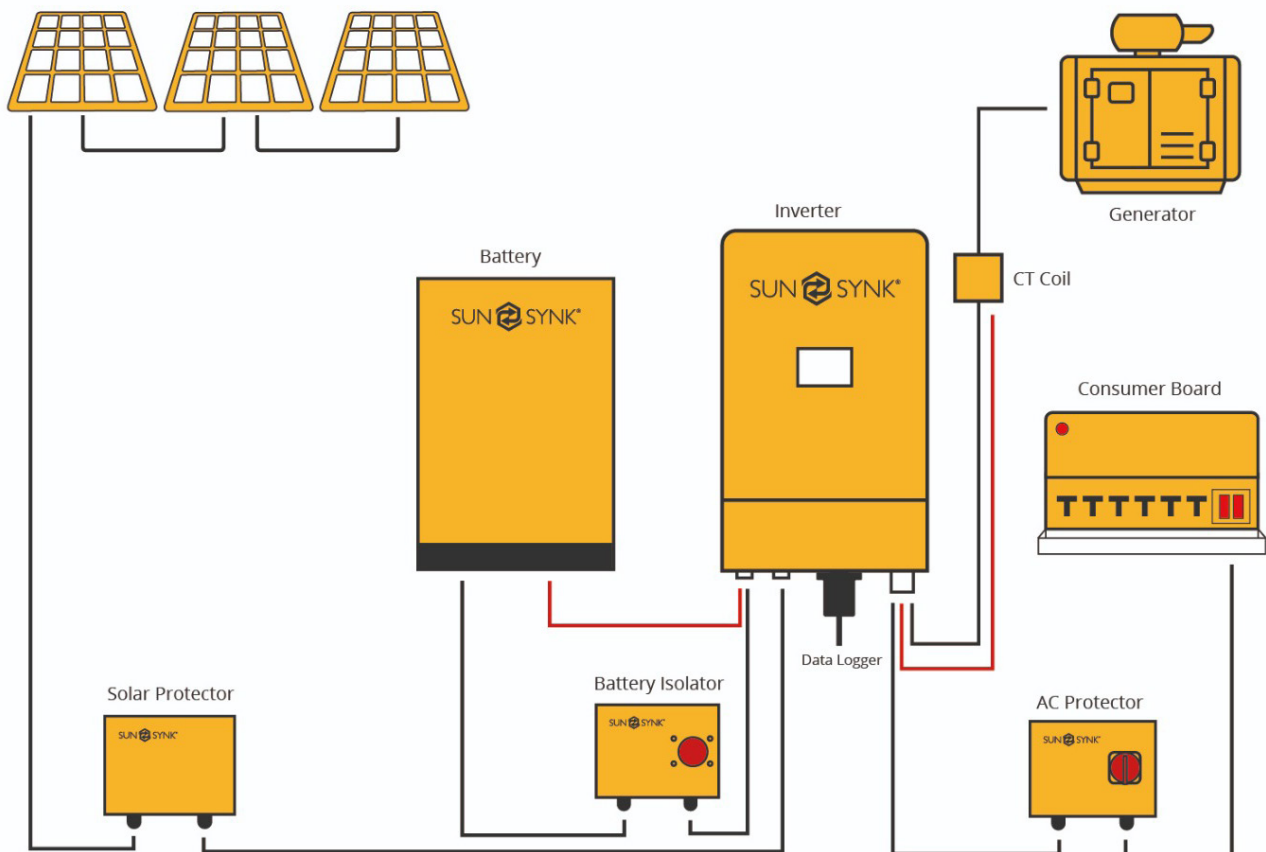


6.6. Sunsynk Storage Inverter with a Diesel Generator

The Sunsynk Storage Inverter can be integrated to and also control a diesel generator, becoming very useful in applications such as construction sites and remote areas. The inverter can optimize the usage of the generator, providing money saving, less pollution and noise. In the diagram of Figure 6, the batteries can be charged with the solar panels, the grid, or the generator (you can choose that in the inverter settings).

This system is composed of the following components:

1. Solar array connected to the MPPT input;
2. Solar isolator and protection circuit;
3. Sunsynk inverter;
4. Battery;
5. Battery isolator and protection circuit;
6. AC protection circuit and isolator for the loads;
7. Generator connected with a CT coil.



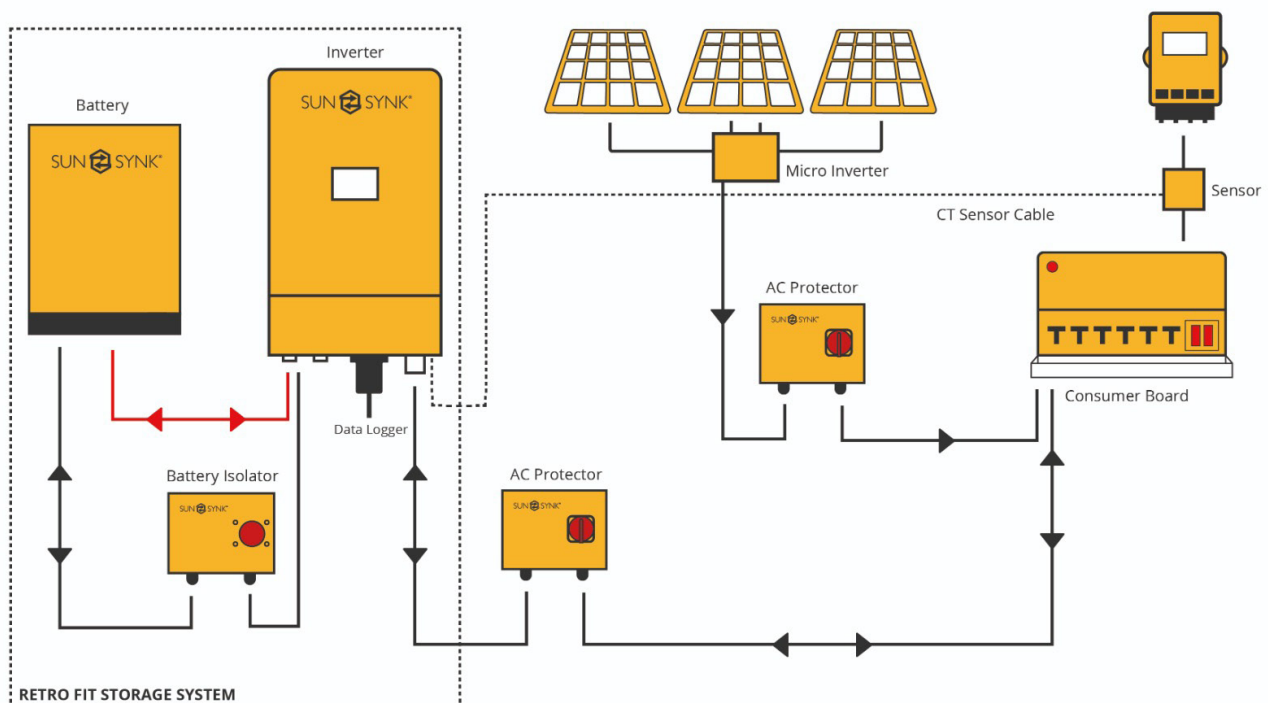
6.7. Microinverter System with Energy Storage

The figure below presents a system that uses a microinverter to transfer the power generated by the solar panels into the grid. However, an energy storage system is also connected to the grid through the Sunsynk Hybrid Inverter, which uses power from the electrical grid to charge the batteries.

During the day, the microinverter supplies power to the home appliances or export it to the grid. At night, the batteries provide power to the home appliances or sell power to the grid.

This system is composed of the following components:

1. Solar array connected to the MPPT inputs;
2. Multi-channel Sunsynk Micro Inverter;
3. AC protection system and isolator for the microinverter;
4. Sunsynk inverter;
5. Battery;
6. Battery isolator and protection circuit;
7. AC protection circuit and isolator for the loads;
8. Generator connected with a CT coil.

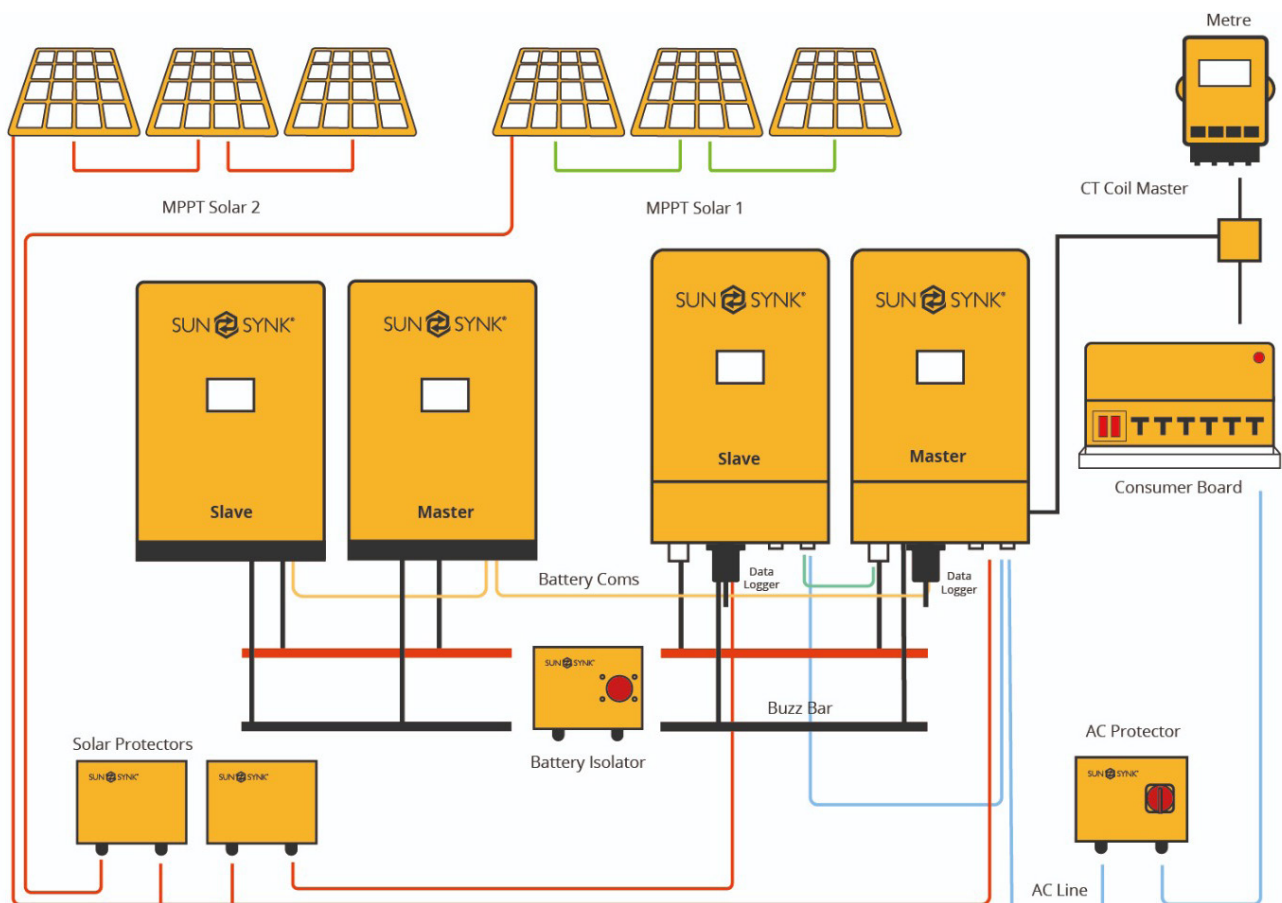


6.8. Paralleling Sunsynk Hybrid Inverters in Single-Phase

When need more power, paralleling the Sunsynk Hybrid Inverter is a great alternative that can be used in order to scale up your power production. The figure below shows the diagram of a hybrid system that uses paralleling. In this case, the inverters are paralleled using the single-phase configuration, where only one CT coil and AC protection circuit are used (for the master). Theoretically, you can parallel up to 16 inverters using the single-phase configuration. But be careful with the inrush current when switching on.

This system is composed of the following components:

1. Solar arrays connected to the MPPT inputs;
2. Solar protection circuit and isolators;
3. Sunsynk inverters set as master and slave;
4. Communication cables;
5. Batteries;
6. Battery isolator and protection circuit;
7. AC protection circuit and isolator for the loads;
8. Consumer unit connected with a CT coil.

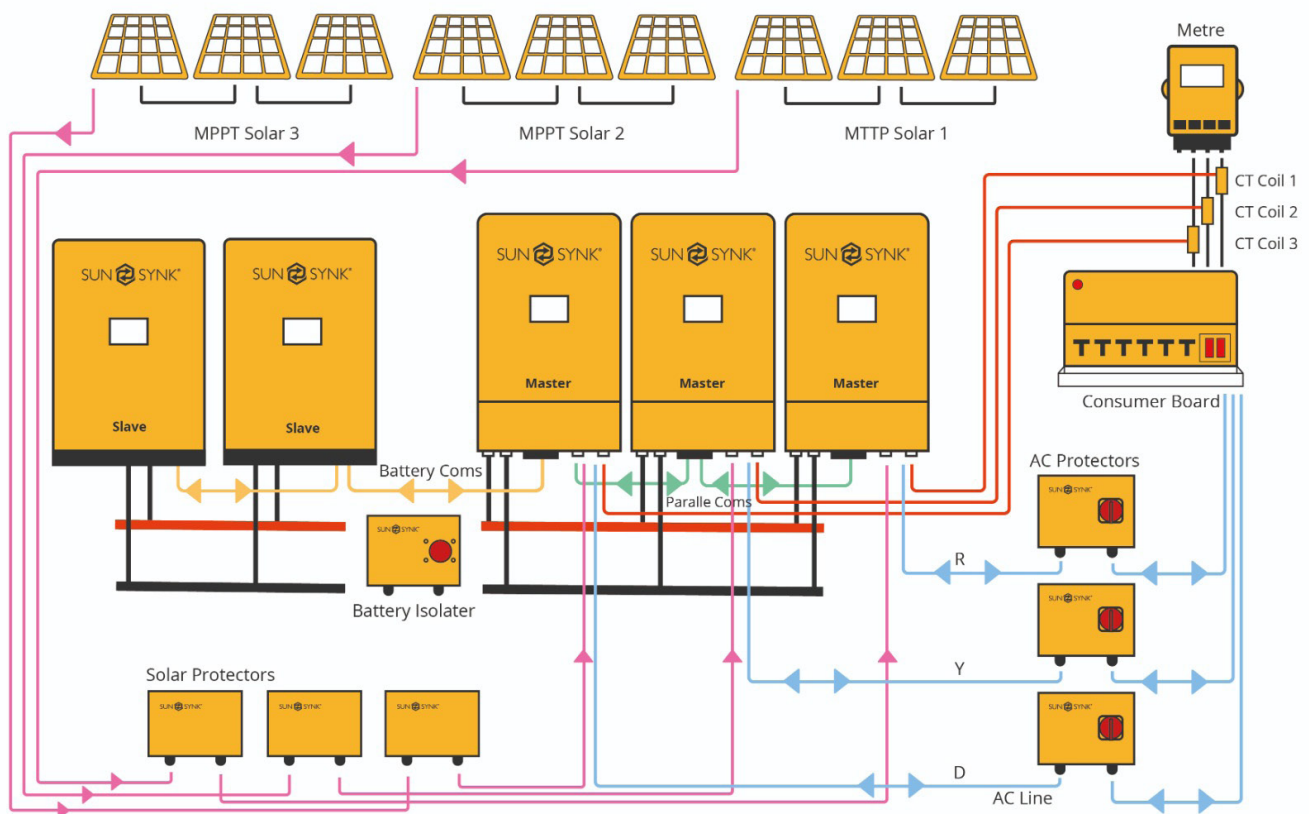


6.9. Paralleling Sunsnyk Hybrid Inverters in Three-Phase

The Sunsnyk hybrid inverter can also be paralleled in three-phase with perfect phase rotation. In this case, you need to have three masters, and all the others are slaves. You will have one CT coil for each master, as well as one AC protector box for each phase.

This system is composed of the following components:

1. Solar arrays connected to the MPPT inputs;
2. Solar protection circuit and isolators;
3. Sunsnyk inverters set as master and slave;
4. Communication cables;
5. Batteries;
6. Battery isolator and protection circuit;
7. AC protection circuit and isolator for the loads;
8. Consumer unit connected with a CT coil.



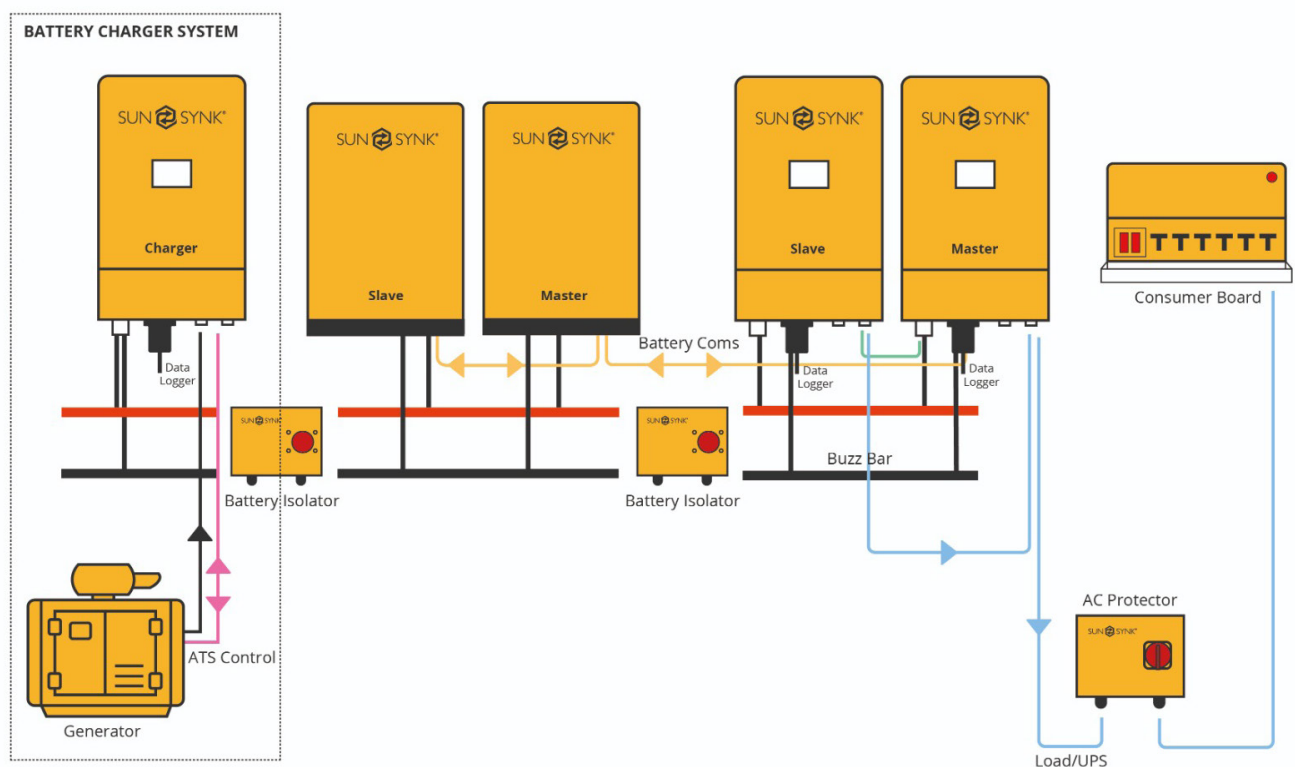
6.10. Sunsink Hybrid Inverters in Parallel & Generator for Battery Charging

The figure below shows Sunsink Hybrid Inverters connected in parallel using the single-phase configuration. This is a great configuration for construction sites and remote applications that demand more power, and where you will be using a diesel generator to power up equipment and site offices. In these applications, even though only 10% of the generator's power is used, it will be running continuously, thereby wasting money, producing noise and carbon emissions.

In this case, a generator is used to charge the batteries, and a Sunsink inverter is used exclusively as a charger inverter to control the generator. Therefore, the charger inverter will turn the generator off when the batteries are full and the other inverters will get this power and send it to the grid or to the electrical equipment.

This system is composed of the following components:

1. Sunsink inverters set as master and slave;
2. Communication cables;
3. Batteries;
4. Battery isolators and protection circuits;
5. AC protection circuit and isolator for the loads;
6. Generator;
7. Charger inverter.



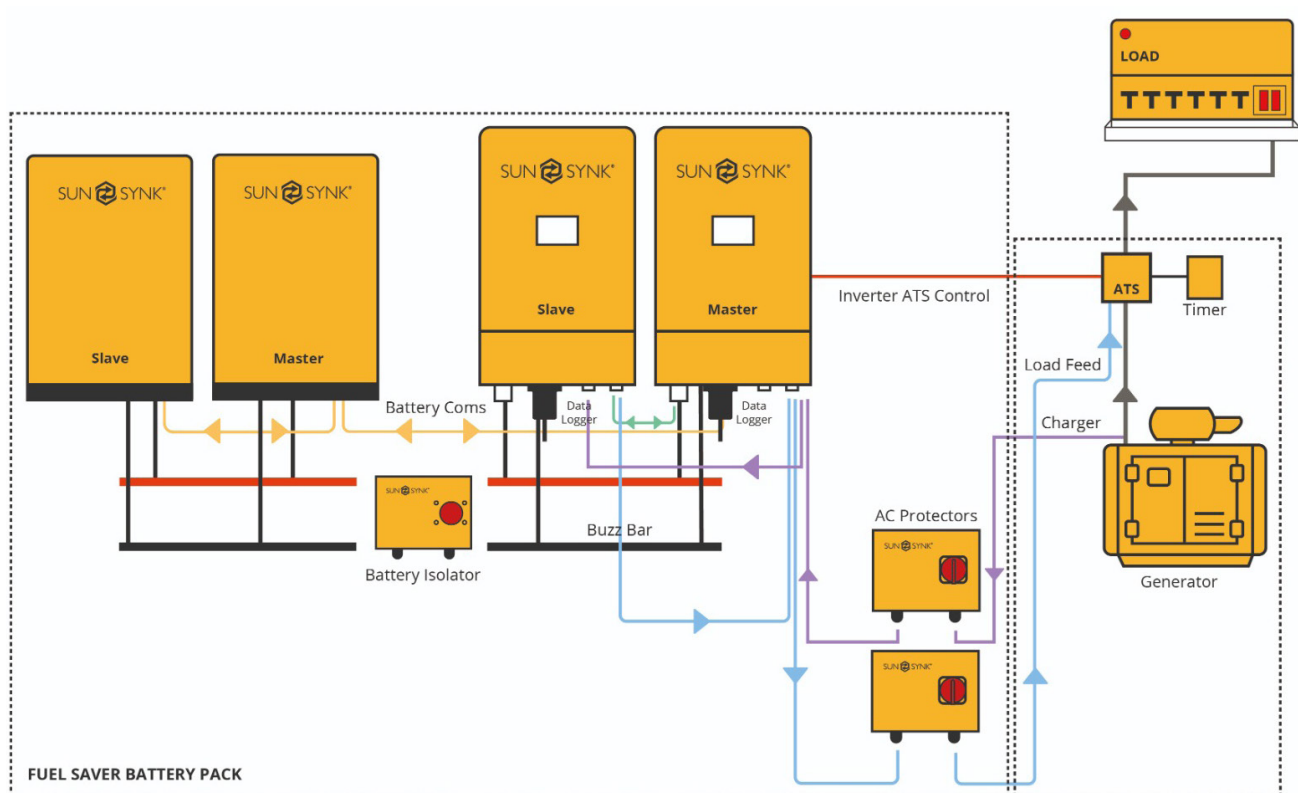
6.11. Sunsynk Hybrid Inverters in Parallel for Fuel Saving

Sunsynk Hybrid Inverters can also be paralleled in order to save fuel from higher power generators. The Sunsynk inverters are then used to charge the batteries with the generator.

So, when the batteries get fully charged, the Sunsynk inverter will turn the generator off in order to save fuel and also reduce noise and carbon emissions. Then, when power is required from the appliances, the inverters reverse and discharge the batteries, feeding the load.

This system is composed of the following components:

1. Sunsynk inverters set as master and slave;
2. Communication cables;
3. Batteries;
4. Battery isolator and protection circuit;
5. AC protection circuit and isolator for the loads;
6. AC protection circuit and isolator for the generator;
7. Generator;
8. Automatic transfer switch (ATS) and timer.

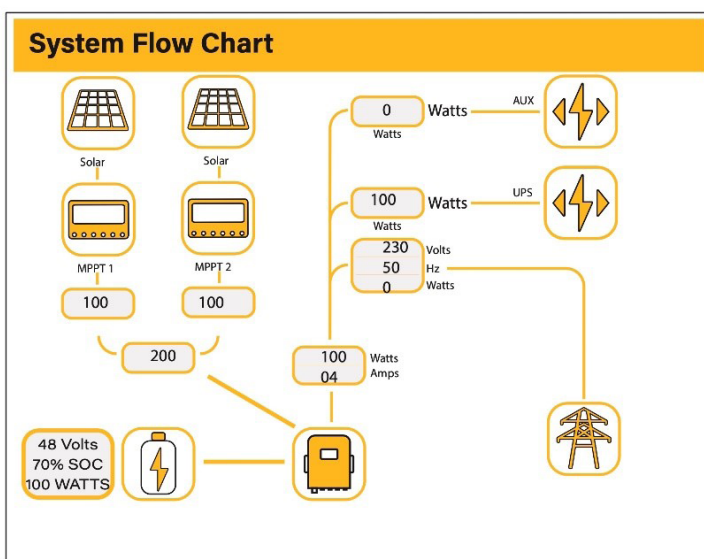


7. FLOW CHART

Access the Flow Chart by clicking on the bar chart on the Home Page of the inverter display.

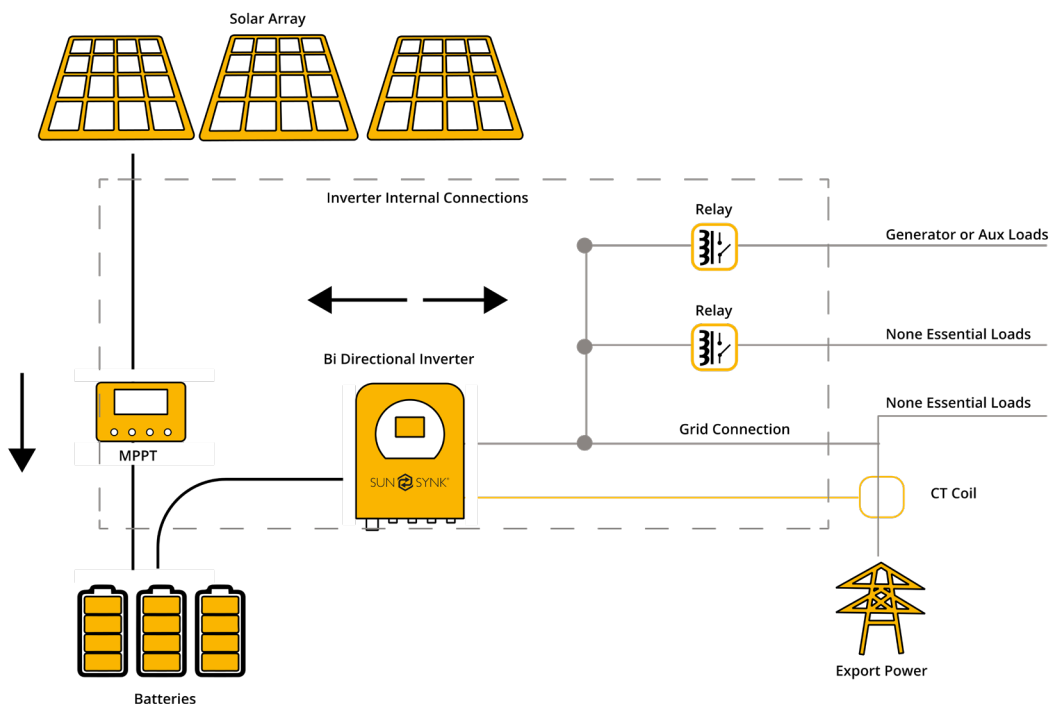
To better understand the functioning of your system, take a look at the figure bellow:

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



What this page displays:

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



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Audio Training manuals on Apple Pod Cast and Spotify.

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