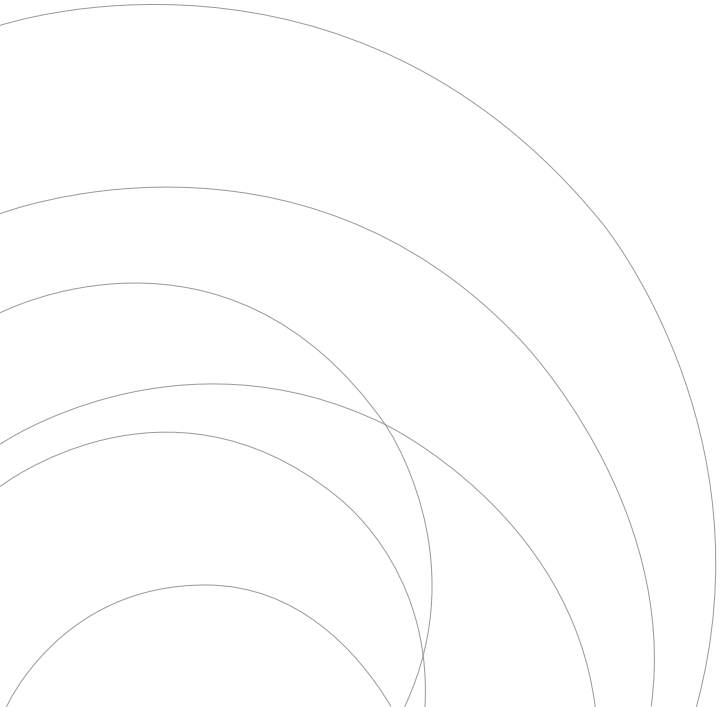
Installation / User Manual

Micro hybrid inverter
SUN-BK60/80/100SG01-EU-AM2



Ver:1.2.0

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1.Important Safety Instructions

This manual contains important instructions to follow during installation and maintenance of the micro hybrid inverter.To reduce the risk of electrical shock and ensure the safe installation and operation of the micro hybrid inverter, the following symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

Specifications subject to change without notice - please ensure you are using the latest manual found at the manufacturer website.

WARNING: This indicates a situation where failure to follow instructions may cause a serious hardware failure or personnel danger if not applied appropriately. Use extreme caution when performing this task.

NOTE: This indicates information that is important for optimized micro hybrid inverter operation. Follow these instructions strictly.

CAUTION: IMPORTANT TO READ CAREFULLY AND KEEP FOR EVENTUAL REQUESTS.

1.1 Safety Instructions

- ✔ **DO NOT** disconnect the PV module from the micro hybrid inverter without disconnecting the AC power.
- ✔ Only qualified professionals should install and/or replace the micro hybrid inverters.
- ✔ Perform all electrical installations in accordance with local electrical codes.
- ✔ Before installing or using the micro hybrid inverter, please read all instructions and cautionary markings in the technical documents and on the micro hybrid inverter system and the solar-array.
- ✔ Be aware that the body of the micro hybrid inverter is the heat sink and can reach a temperature of 80℃. To reduce risk of burns,do not touch the body of the micro hybrid inverter.
- ✔ When the micro hybrid inverter is working properly, please maintain a distance of at least 20 cm from it.
- ✔ **DO NOT** attempt to repair the micro hybrid inverter. If it fails, contact technical support to obtain an RMA number and start the replacement process. Damaging or opening the micro hybrid inverter will void the warranty.
- ✔ Caution!
  The external protective earthing conductor is connected to the inverter protective earthing terminal through AC connector.
  When connecting, connect the AC connector first to ensure the inverter earthing then do the DC connections.
  When disconnecting, disconnect the AC by opening the branch circuit breaker first

but maintain the protective earthing conductor in the branch circuit breaker connect to the inverter ,then disconnect the DC inputs.

- ✔ In any circumstance, do not connect DC input when AC connector is unplugged.
- ✔ Please install isolation switching devices on the AC side of the inverter.

1.2 Radio Interference Statement

The equipment could radiate radio frequency energy and this might cause harmful interference to radio communications if not following the instructions when installing and using the equipment. But there is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception,the following measures might resolve the issues:

A) Relocate the receiving antenna and keep it well away from the equipment.

B) Consult the dealer or an experienced radio / TV technical for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

WiFi information
Frequency range: 2.412~2.472GHz
WiFi maximum transmitting power: 16dBm ± 2dBm
Antenna: External Antenna
Antenna Gain: 2.00dBi

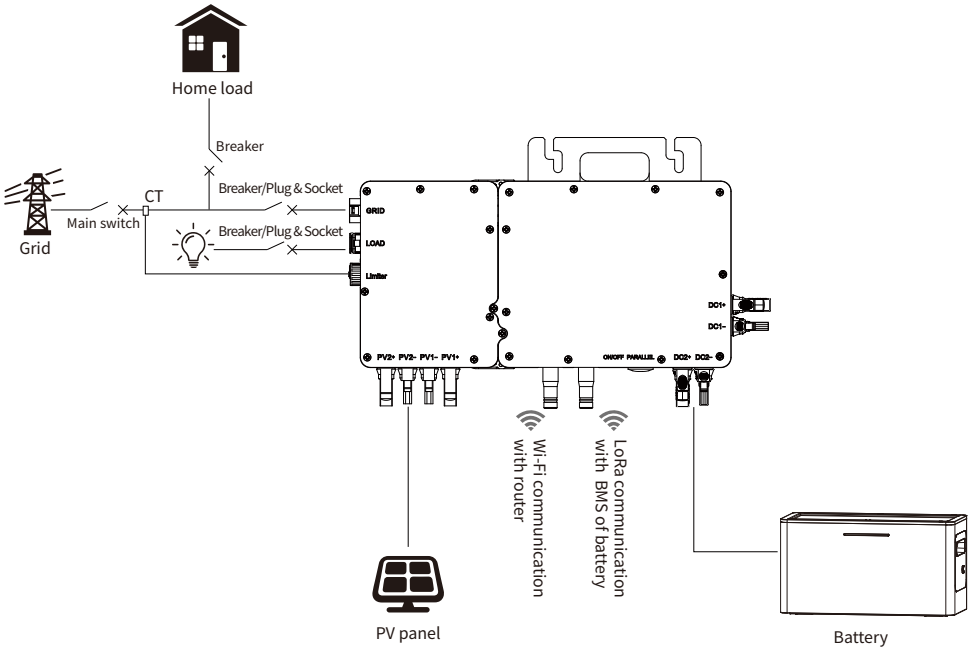
1.3 The Meaning of Symbols

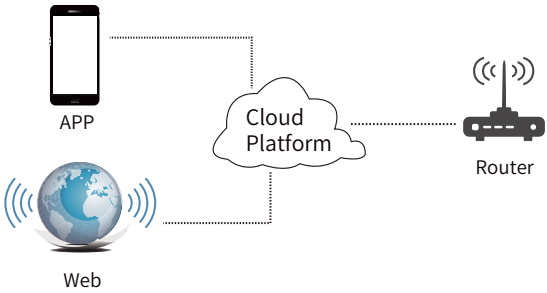
Labels	Description
	Caution, risk of electric shock.
	Caution, risk of burn - Do not touch.
	Caution, hot surface.
	Symbol for the marking of electrical and electronics devices according to Directive 2002/96/EC. Indicates that the device, accessories and the packaging must not be disposed as unsorted municipal waste and must be collected separately at the end of the usage. Please follow Local Ordinances or Regulations for disposal or contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.

CE	CE mark is attached to the solar inverter to verify that the unit follows the provisions of the European RED Directives.
	Refer to the operating instructions.
Qualified personnel	Person adequately advised or supervised by an electrically skilled person to enable him or her to perceive risks and to avoid hazards which electricity can create. For the purpose of the safety information of this manual, a "qualified person" is someone who is familiar with requirements for safety, refrigeration system and EMC and is authorized to energize,ground, and tag equipment, systems, and circuits in accordance with established safety procedures. The inverter and endues system may only be commissioned and operated by qualified personnel.

2.Micro hybrid inverter System Introduction

This type of Micro hybrid inverter is commonly used on balcony scenarios. The structure of the entire energy storage system constructed by energy storage Micro hybrid inverter is shown as following figure, comprised of the following several components:Micro hybrid inverter, Battery, Router, PV panel, Utility Grid, Home load, Backup load.





NOTE: 1. Not all these components mentioned are necessary.
2. If the wireless signal is too weak in the location where this Micro hybrid inverter installed,it is necessary to add a wifi booster at a suitable place between the router and the Micro hybrid inverter.

3.Micro hybrid inverter System Installation

A solar system using energy storage Micro hybrid inverter is simple to install. The Micro hybrid inverter can be easily mounted on the rack of PV module, directly beneath the PV module(s). With low DC voltage, the wires of PV modules can be directly connected to the Micro hybrid inverter, without the risk of high DC voltage. Installation MUST comply with local regulations and technical rules.

WARNING: Perform all electrical installations in accordance with local electrical codes.

WARNING: Be aware that only qualified professionals can install and/or replace Micro hybrid inverters.

WARNING: Before installing or using an Micro hybrid inverter,please read all instructions and warnings in the technical documents and on the lables of the Micro hybrid inverter itself as well as other componented included. itself as well as on the PV array.

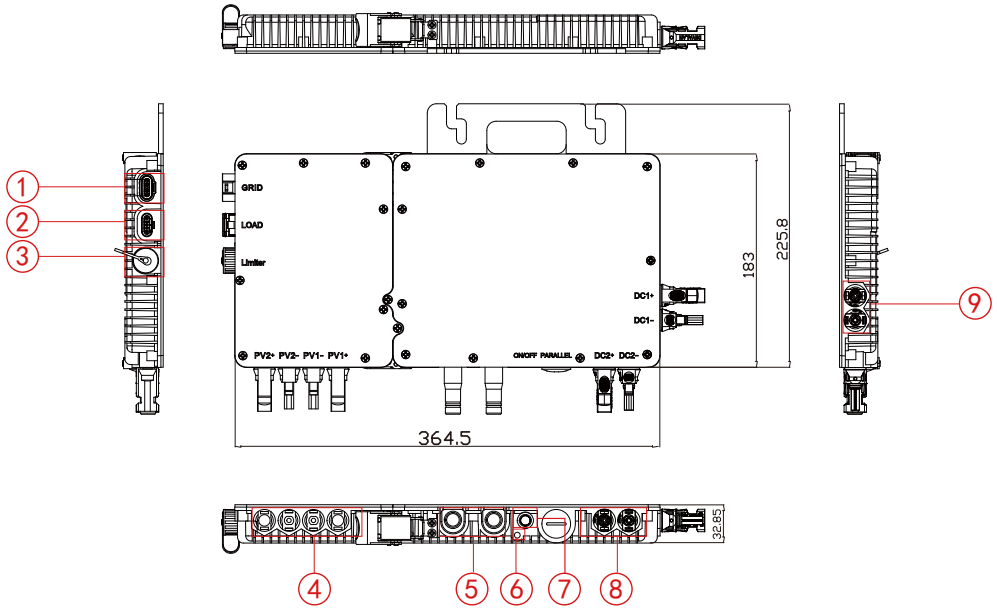
WARNING: Be aware that installation of this system includes the risk of electric shock.

3.1 Required Parts and Tools from you

In addition to your PV array, Battery, Micro hybrid inverter and its accessories, you may also need the following items:

· Mounting bracket suitable for mounting PV modules.
· Sockets and wrenches for mounting hardware.
· Continuous grounding conductor and grounding washers.
· A Phillips screwdriver.
· A torque wrench.

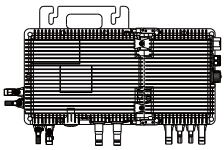
3.2 Introduction of micro hybrid inverter



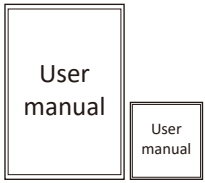
1: Grid port 2: Load port 3: Limiter port for CT 4: PV inputs(built-in MPPT)
5: The antenna of the Wi_Fi and LoRa modules 6: LED 7: Power button
8: DC input 9: DC input

3.3 Parts list

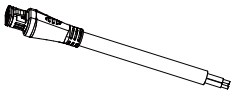
Please check the following table, to see whether all the parts are included in the package:



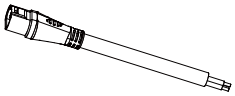
Micro hybrid inverter x1



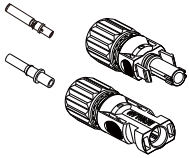
Document x2



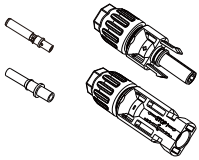
Grid line x1



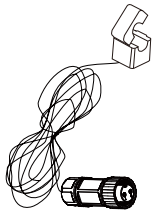
Load line x1



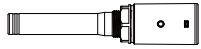
DC+/DC- Plug connectors including metal terminal (gray) x1



PV+/PV- Plug connectors including metal terminal (black) x2

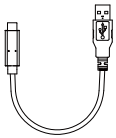


Current transformer x1

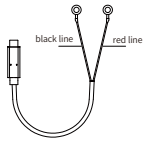


BMS-SMART-TX01 x1

Communication cable x1



USB Type-C Cable x1



Type-C OT terminal Cable x1

4. Electrical connection on DC side

4.1 PV Connection

It is very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Wire Size	Cable(mm^2)
SUN-BK60SG01 -EU-AM2	10AWG	4.0
SUN-BK80SG01 -EU-AM2	10AWG	4.0
SUN-BK100SG01 -EU-AM2	10AWG	4.0

The grounding wire of the PV module frame may have leakage current, so when installing PV modules, the grounding wire of the PV module frame should not be connected to the grounding bar of the inverter system, and ensure that PV+ and PV- are not grounded.

It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

4.2 PV Module Selection

When selecting proper PV modules, please be sure to consider below parameters:

1) The open-circuit voltage (Voc) of the PV modules must not exceed the inverter's maximum PV input voltage.

2) Open circuit Voltage (Voc) of PV modules should be higher than min. start voltage.

3) The PV modules used to connected to this inverter shall be Class A rating certified according to lEC 61730.

Inverter Model	SUN-BK60SG01 -EU-AM2	SUN-BK80SG01 -EU-AM2	SUN-BK100SG01 -EU-AM2
PV Input Voltage	42.5V (25V-60V)		
PV Array MPPT Voltage Range	20V-55V		
No. of MPP Trackers	2		
No. of Strings per MPP Tracker	1		

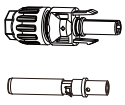
4.3 PV Module Wire Connection

1. Switch the Grid Supply Main Switch(AC)OFF.
2. Switch the DC lsolator OFF.
3. Assemble PV input connector to the inverter.

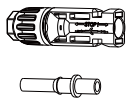
Safety Hint:
When using PV modules, please ensure the PV+ & PV- of solar panel is not connected to the system ground bar.

Safety Hint:
Before connection, please make sure the polarity of the output voltage of PV array matches the “DC+” and “DC-” symbols.

Safety Hint:
Ensure the open-circuit voltage (Voc) of the PV array is within the inverter's voltage limit.



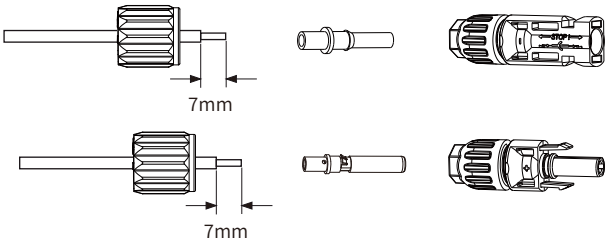
PV + male connector



PV - female connector

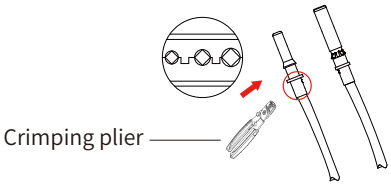
Safety Hint:
Please use approved DC cable for PV system.

The steps to assemble the PV connectors are listed as follows:
a)Strip off the DC wire about 7mm, disassemble the connector cap nut.



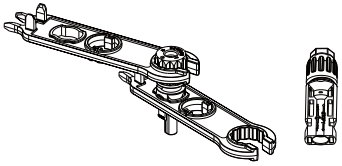
Disassemble the connector cap nut

b) Crimping metal terminals with crimping pliers



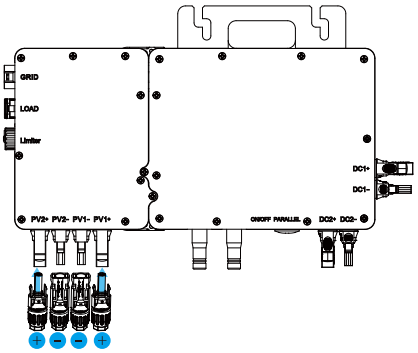
Crimp the contact pin to the wire

c) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector.



connector with cap nut screwed on

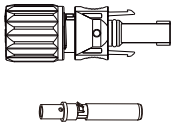
d) Finally insert the PV connector into the positive and negative input of the inverter.



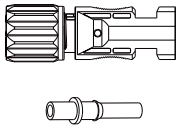
Warning:
Sunlight shines on the panel will generate voltage, high voltage in series may cause danger to life. Therefore, before connecting the DC input line, the solar panel needs to be blocked by the opaque material and the DC switch should be 'OFF', otherwise, the high voltage of the inverter may lead to life-threatening conditions.

4.4 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 certain applications, a disconnect switch may not be necessary, but it is always essential to have DC overcurrent protection in place. Refer to the typical amperage for the required fuse or circuit breaker size.



DC+ male connector

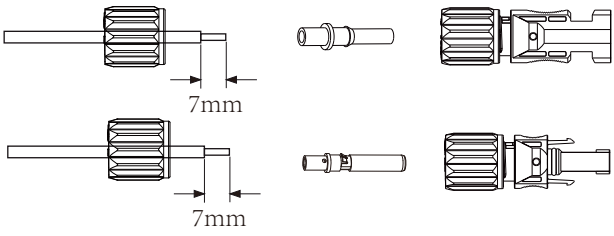


DC- female connector

Safety Hint:
Please use approved DC cable for battery system.

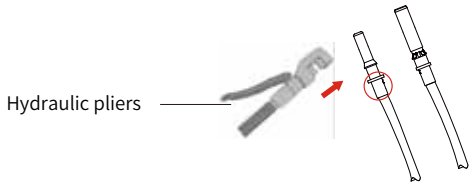
Model	Recommended value	
	Range	Cross section (mm²)
SUN-BK60/80/100SG01 -EU-AM2	12AWG	2.5mm²

The steps to assemble the battery connectors are listed as follows:
a) Strip the insulation of the battery wire by 7 mm, disassemble the cap nut of the connetctor, thread one battery wire through the cap nut of the connector . Repeat the process with the other wire, paying special attention to their polarity of the connector.



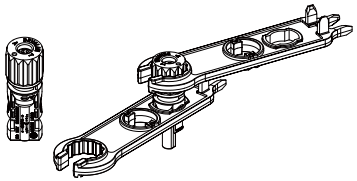
Disassemble the connector cap nut

b) Crimping metal terminals with crimping pliers .



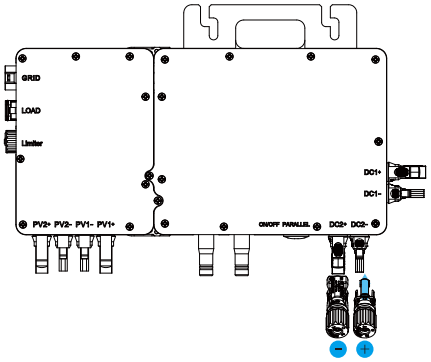
Crimp the contact pin to the wire

c) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector completely.



connector with cap nut screwed on

d) Finally insert the DC connector into the positive and negative battery inputs of the inverter,Either DC 1 or DC 2 can be used to connect with battery.



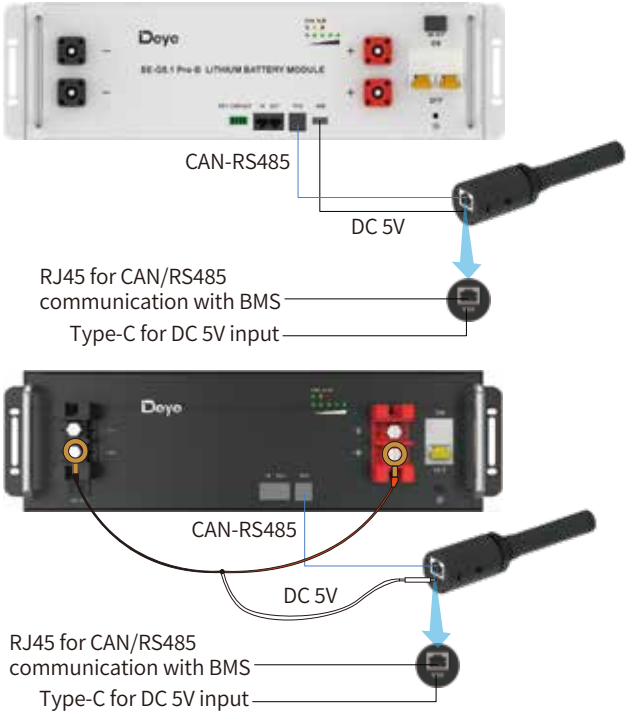
Communication between BMS and inverter:

Scenario 1:

When using Deye AE-F series batteries, please refer to chapter 9.3 of this user manual to bind the battery set to the inverter, and after power on the battery module/modules, the built-in LoRa module of the master battery module will conduct channel scanning automatically to build communication with the inverter.

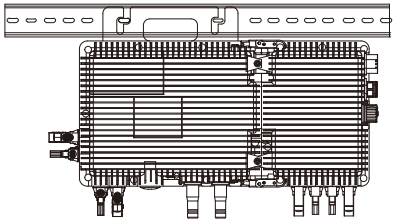
Scenario 2:

When using other matched battery via BMS-SMART-TX01, please refer to the chapter 9.3 of this user manual to bind the BMS-SMART-TX01 to the inverter, and then refer to the user manual of BMS-SMART-TX01 to install the BMS-SMART-TX01 with the battery set and conduct the channel scanning manually.



4.5 Mounting steps

a. Mark the location of the Micro hybrid inverter on the rack, with respect to the PV module and junction box or any other obstructions.
b. Mount one Micro hybrid inverter at each of these locations using hardware recommended by your module racking vendor.

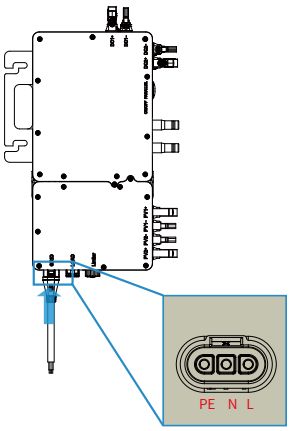


SUN-BK60/80/100SG01-EU-AM2 Mounting

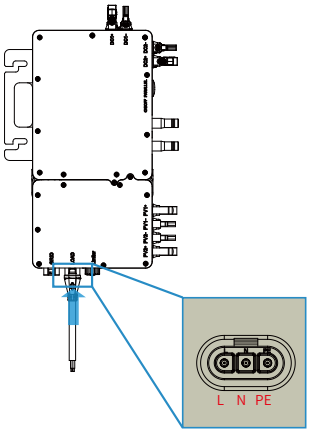
5. Grid connection and backup load connection

Please follow below steps to implement AC input/output connection:

Before making Grid, load connection, be sure to turn off AC breaker or disconnector first.



Grid connection for micro hybrid inverter



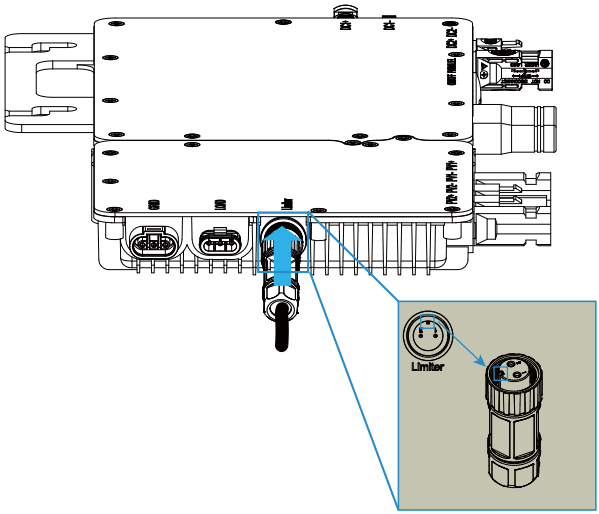
Backup load connection for micro hybrid inverter

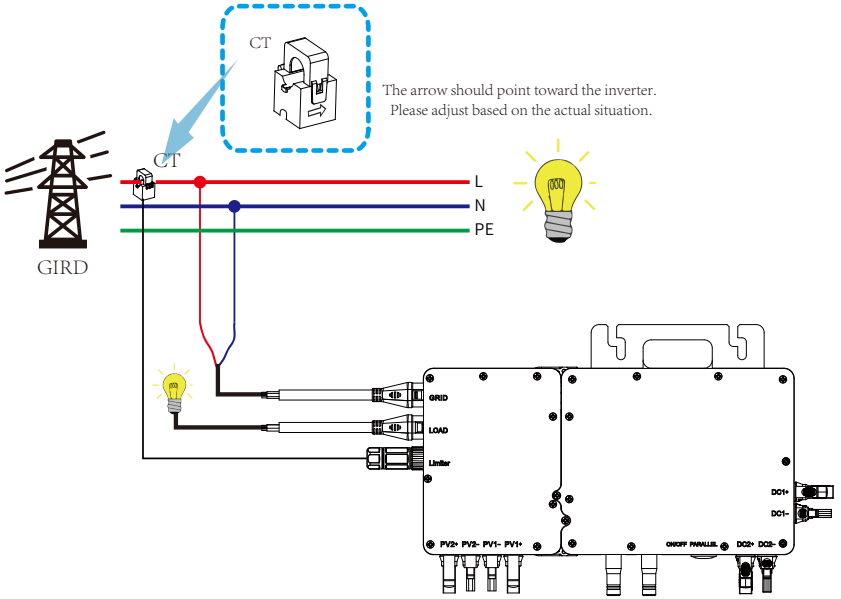
Warning:
All wiring must be performed by a qualified personnel.It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below.

Model	Recommended value	
	Range	Cross section（mm^2）
SUN-BK60/80/100SG01 -EU-AM2	16AWG	1.0mm^2

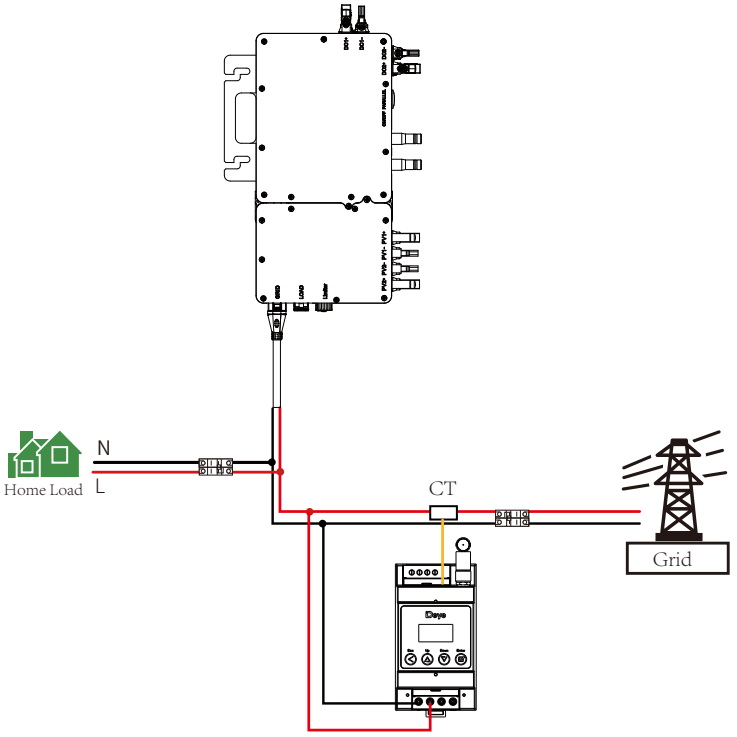
Recommended Size for AC wires and PE lines

6. CT Connection





7.Wireless communication CT connection (Optional)



8. Operating Instructions

8.1 Operation steps

1. Insert the plug (if any) of the inverter's grid port into the socket connected to the main power source (such as the grid) and turn on the AC breakers in the distribution box or turn on the AC breaker between the inverter's grid port and the main power source.
2. Press the power button of the battery to turn on the battery.
3. Press the power button of the Micro hybrid inverter to turn on it.
4. The Micro hybrid inverter will start up and begin to self-check procedure.
5. Configurate the wireless network of the Wi-Fi module and build the LoRa communication between the Micro hybrid inverter and the battery. Please refer to the section 9.3 for the detailed steps.
6. Check the status of the LED indicator lights of the Micro hybrid inverter to confirm if it is operating normally.

NOTE: When AC power is applied but the micro hybrid inverter is not started, the power meter on the grid side of each micro inverter can measure approximately 0.1A current and 25VA power. This type of power is reactive power and does not consume the active power of the power grid.

8.2 Explanation of LED indicators

No.	Action of LED indicator	Explanation
1	The red light flashes for 0.1 seconds one time at 1 second interval	Wait for startup
2	The red light flashes twice at intervals of 0.1 seconds and cycles at intervals of 1 second	DC input voltage is too high or too low
3	The red light flashes three times at intervals of 0.1 seconds and cycles at intervals of 1 second	Grid Fault: including over/under frequency, over/under voltage, surge voltage, and anti-island, the Micro hybrid inverter will only alarm this fault in on-grid mode.
4	The red light flashes four times at intervals of 0.1 seconds and cycles at intervals of 1 second	PV array insulation impedance fault
5	The red light flashes five times at intervals of 0.1 seconds and cycles at intervals of 1 second	AC current over the upper limit of software and hardware or overload
6	The red light flashes six times at intervals of 0.1 seconds and cycles at intervals of 1 second	DC current over the upper limit of software and hardware
7	The red and blue lights are bright at the same time	The software is initializing after the system is powered on or after a software update.
8	The red light flashes twice at intervals of 0.4 seconds and cycles at intervals of 0.8 seconds	The software of DSP is updating remotely
9	The red light flashes frequently at intervals of 0.05 seconds	The components, such as LoRa module and battery, are updating.

WARNING: Do not disconnect the DC connector of the micro hybrid inverter when there may be DC current flowing through it. Before disconnecting the PV module, an opaque cover can be used to cover the PV module or personnel can wear insulation protective equipment

9. Monitoring Platform

Using webpage monitoring, please visit: *https://www.deyecloud.com* .
Using mobile device monitoring, please scan the QR code below to download the APP.

Deye Cloud

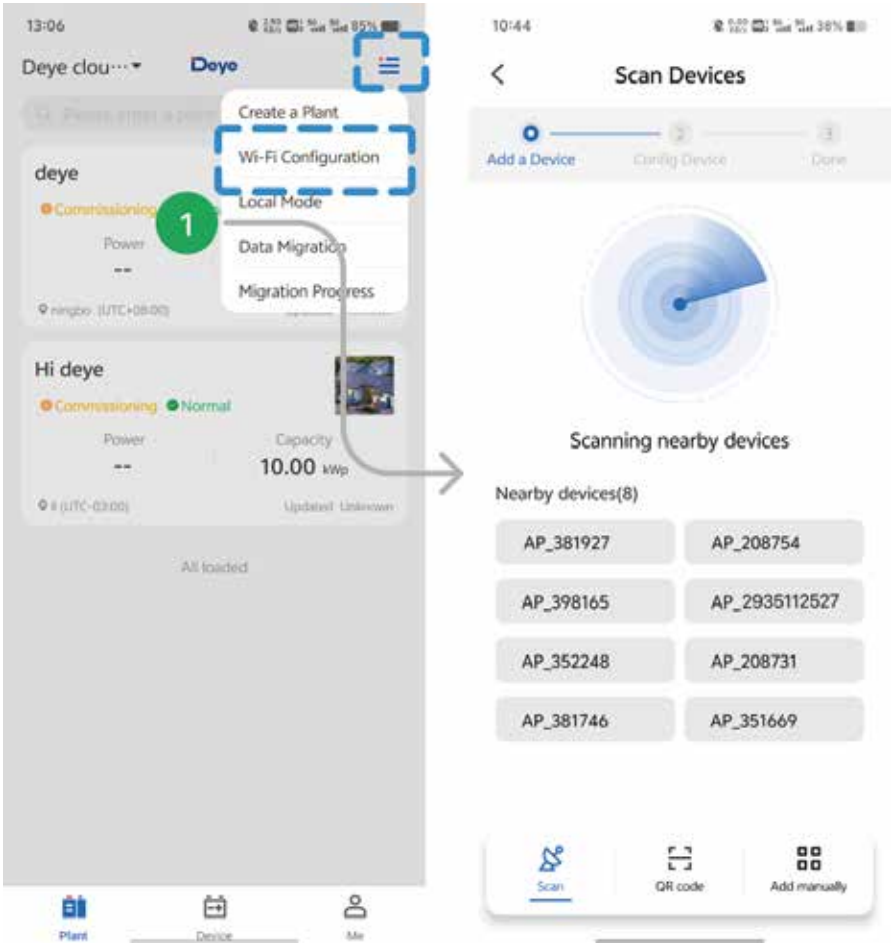
All in one, Efficiency

Scan QR code to download APP

9.1 WiFi configuration via APP

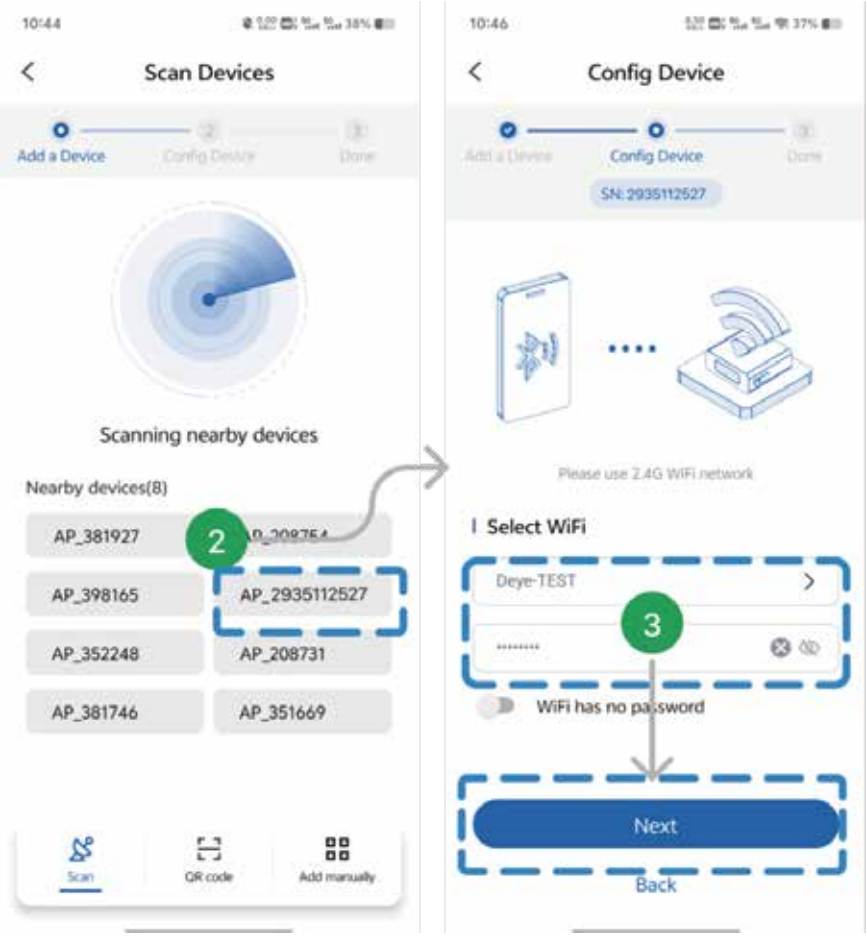
The built-in WiFi module of this device has Bluetooth function and supports quickly configure WiFi through APP. The steps are as follows:

Step 1: Tap on “ ” icon in the upper right corner of Deye cloud APP, select “Wi-Fi configuration” and automatically jump to the page for scanning nearby devices;



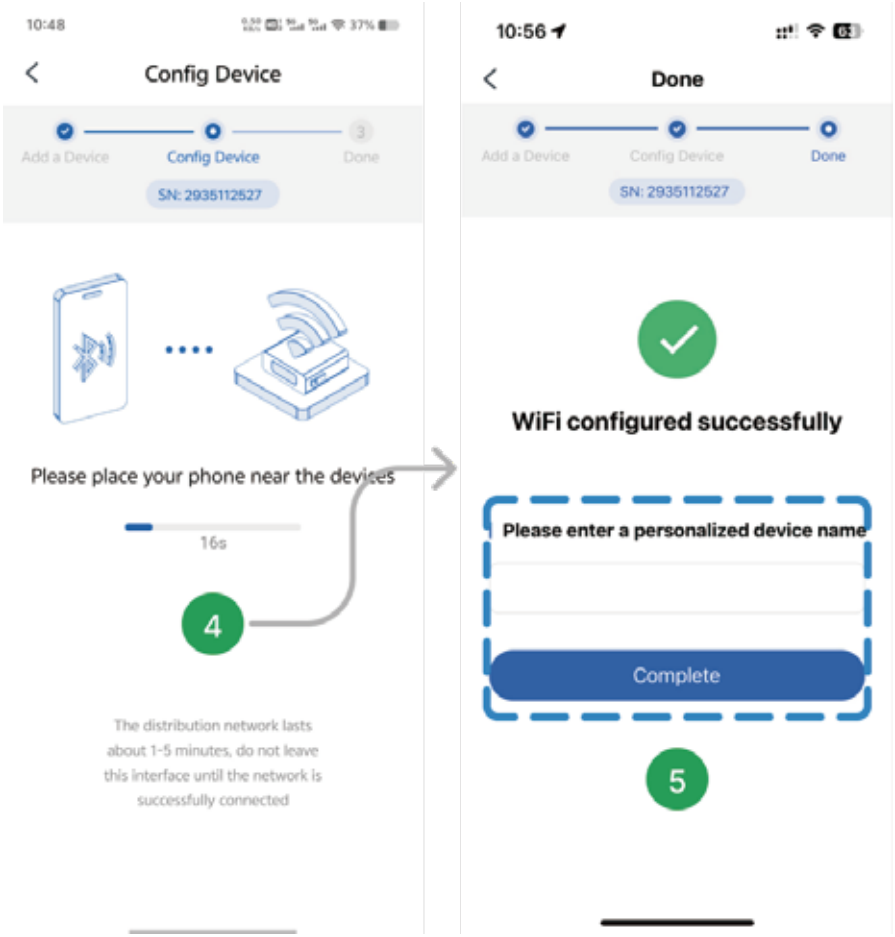
Step 2: Select the AP network of the Micro hybrid inverter that we need to configure for Wi-Fi;

Step 3: Select an available 2.4G network, enter it' s password and tap on "Next" ;



Step 4: Wi-Fi configuration is in process (Please don’ t leave this page and place your phone near the devices);

Step 5: After Wi-Fi configuration done, you could enter a personalized device name and tap on “Complete” to end the configuration.



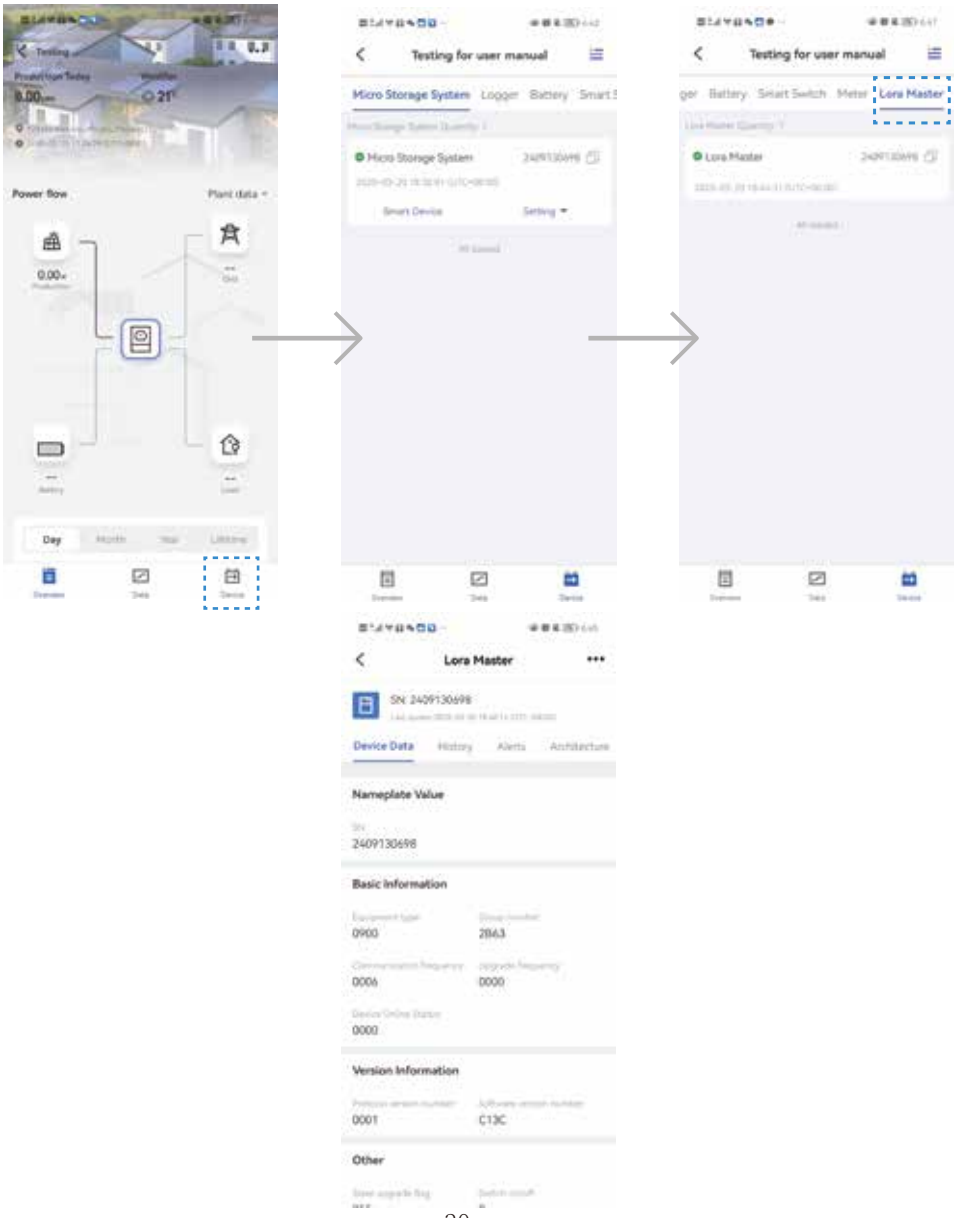
9.2 WiFi configuration via localhost

The buit-in WiFi module has a localhost webpage:10.10.100.254,which can also be used to conduct WiFi configuration. Please scan the QR code below to download the reference document.

9.3 Bind the battery and smart devices

Method 1:

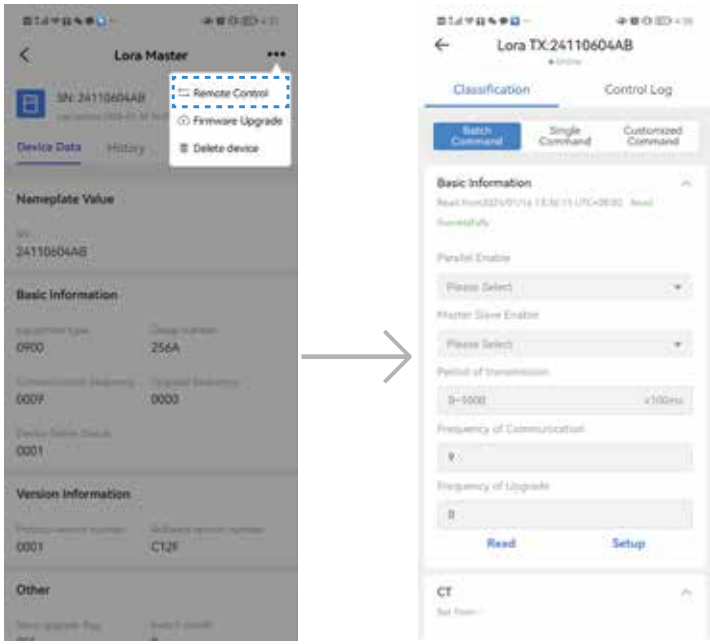
Step 1: After Network configuration is done, click the "Device" icon on the lower right corner of the plant page to enter the "Device" page, and then follow the following steps to enter the "Lora Master" page.



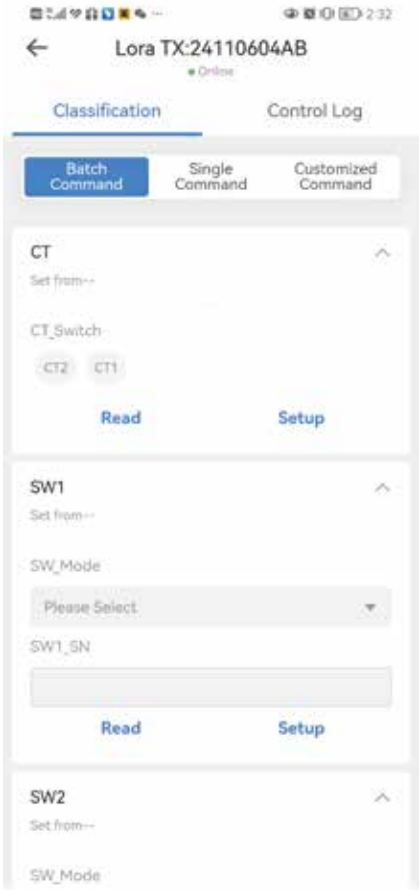
Step 2:On the Lora Master page, click the "..." icon in the upper right corner, and then select the "Remote control" option from the drop-down menu to enter the Lora Master's remote control page.

Step 3:On the Lora Master's remote control page,there are several sub items as follows that can be read and set:Basic Information,CT,SW1-SW10,BMS,EV.For micro hybrid inverter, EV item is invalid.

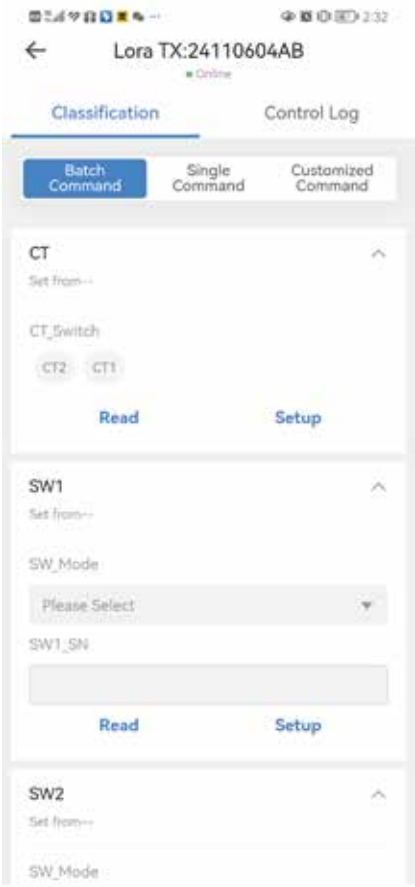
Under the "Basic Information" item,there are following programmable parameters:
Parallel Enable:Reserved function.
Master Slave Enable:Reserved function.
Frequency of Communication:Set the communication channel between Lora Master and subordinate devices.
Frequency of Upgrade:Select a channel for Lora master to upgrade subordinate devices.
After adjusting all parameters as expected, click the "setup" icon to complete the setup.

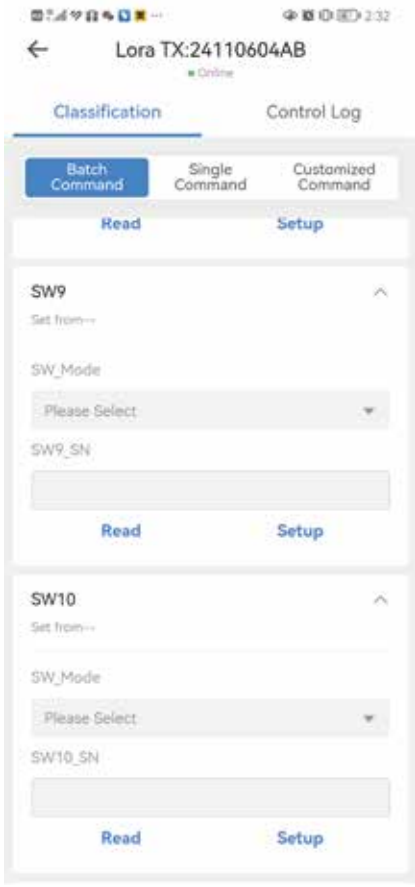


Step 4: Click on "CT1" or "CT2" or both, and then type their serial numbers in the pop-up text box. After typing the correct SN for these two CT meters, click the "setup" icon to complete the setup.
In addition,under normal operation of the micro hybrid inverter, refer to the user manual of smart CT to perform channel scanning, in order to establish communication with the built-in lora master node of the micro hybrid inverter.



Step 5:Based on the actual number of smart switches and smart plugs installed, select the same number of SW sub items to enter SN and enable them.After typing the correct SN for each SW sub item, click the "setup" icon to complete the setup.
In addition,under normal operation of the micro hybrid inverter, refer to the user manuals of smart switches and smart plugs to perform channel scanning, in order to establish communication with the built-in lora master node of the micro hybrid inverter.





Step 6:For the BMS sub items,there are two scenarios:

(1)If using Deye's AE-F series of battery, typing in the SN of the built-in Lora module of the master battery module,and the SN of the built-in Lora module of the master battery module should be consistent with the SN of battery itself, which can be found from the nameplate zone on its body, as shown in Figure 9.3-1.

(2)If the lithium battery used does not have a built-in Lora module but is on the Deye low-voltage approved battery list, it needs to be paired with an external BMS-SMART-TX01 communication node. Enter the serial number of the BMS-SMART-TX01 in the text box under BMS-SN, which can be found on its body, as shown in Figure 9.3-2.Please refer to the user manual of the BBMS-SMART-TX01 for instructions on how to install it.

Figure 9.3-1

Figure 9.3-2

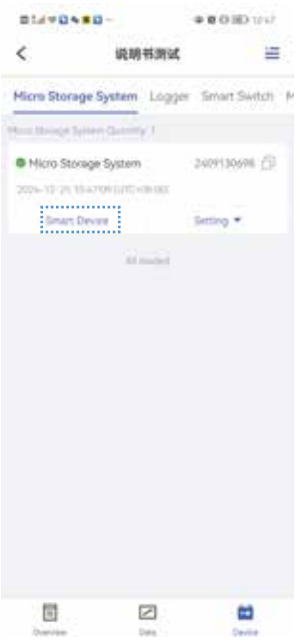
The EV sub item is invalid for this micro hybrid inverter.

Method 2:

Step 1: After Network configuration is done, click the "Device" icon on the lower right corner of plant page to enter the "Device" page.

Step 2: Click the blue "Smart Device"icon just below the Micro Storage System to bind the battery and other smart devices to it.

Step 3: Click the "+" icon on the lower right corner of this page.



Step 4: To scan the SN QR code of the smart device and the battery or type their SN manually.

Step 5: Choose which type of smart device it is, click "Batt" when binding the battery to the micro hybrid inverter.

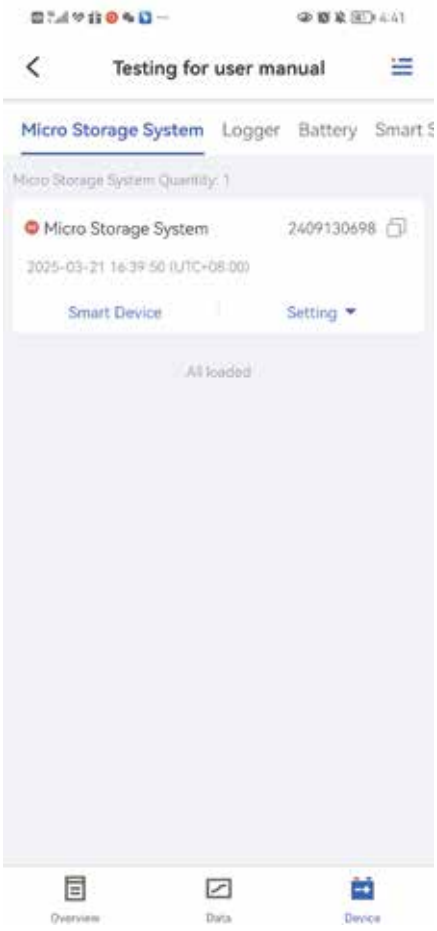
Step 6: After choosing the type of smart device, click the "Confirm" button on the bottom to surely bind this smart device to the Micro hybrid inverter.

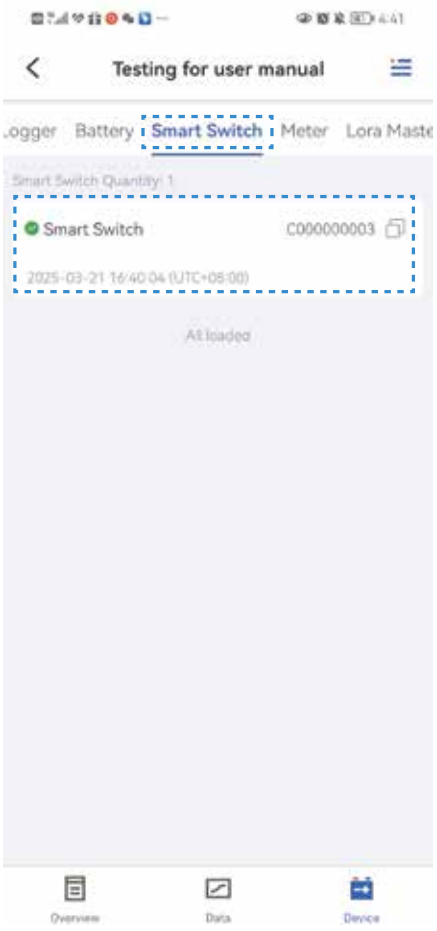
10. Setup the smart switches via APP

Click the menu item "Smart Switch" on the top of Device page,the switches added will be listed here.

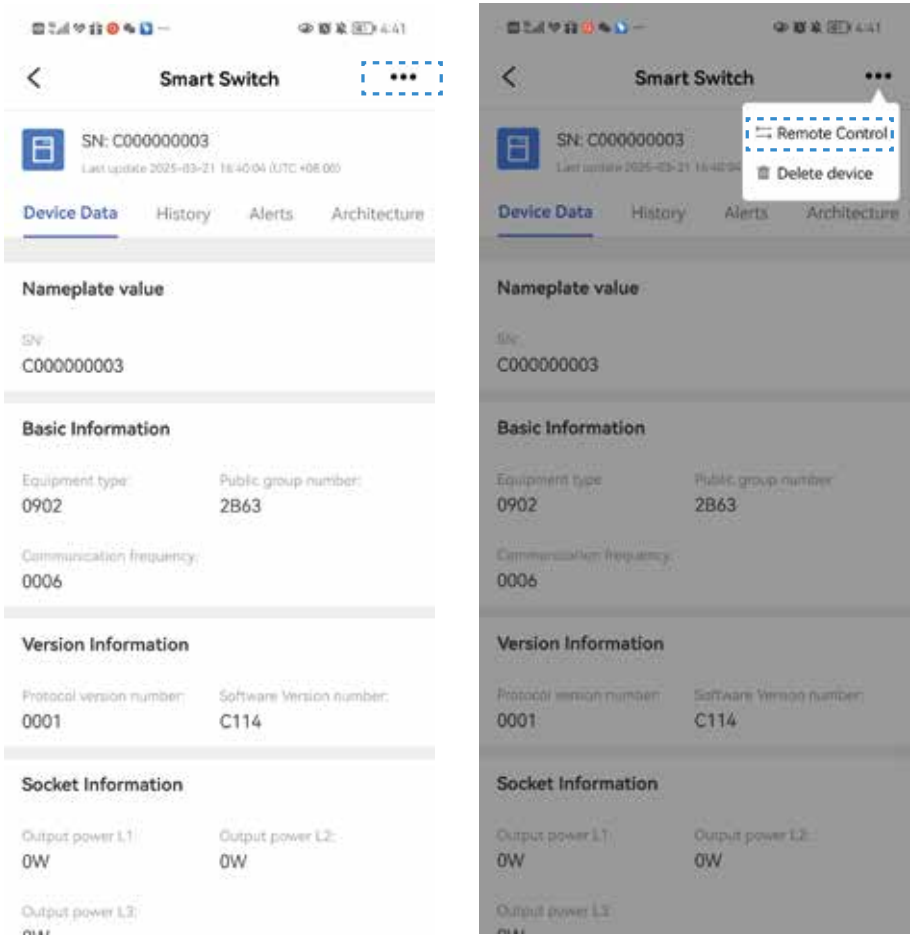
indicates this smart switch/plug communicates with lora master normally.

indicates this smart switch/plug can't communicate with lora master now.





Click the smart switch you want to control to enter its detail data page,then click the "..." icon on the upper right corner and choose the "Remote Control" itme on the pop up menu.



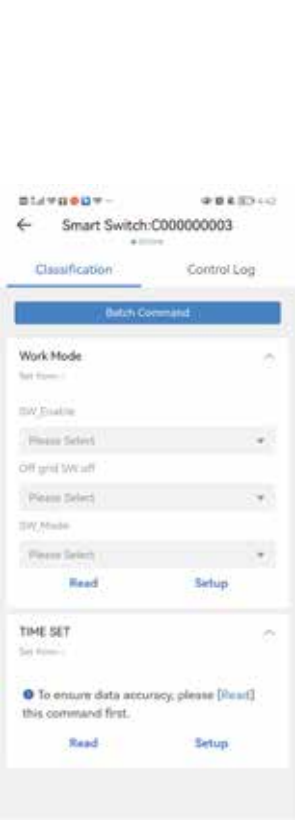
On the remote control page of smart switch/plug, there are two sub items: Work Mode, TIME SET.

Under Work Mode sub item, there are three parameters as follows:

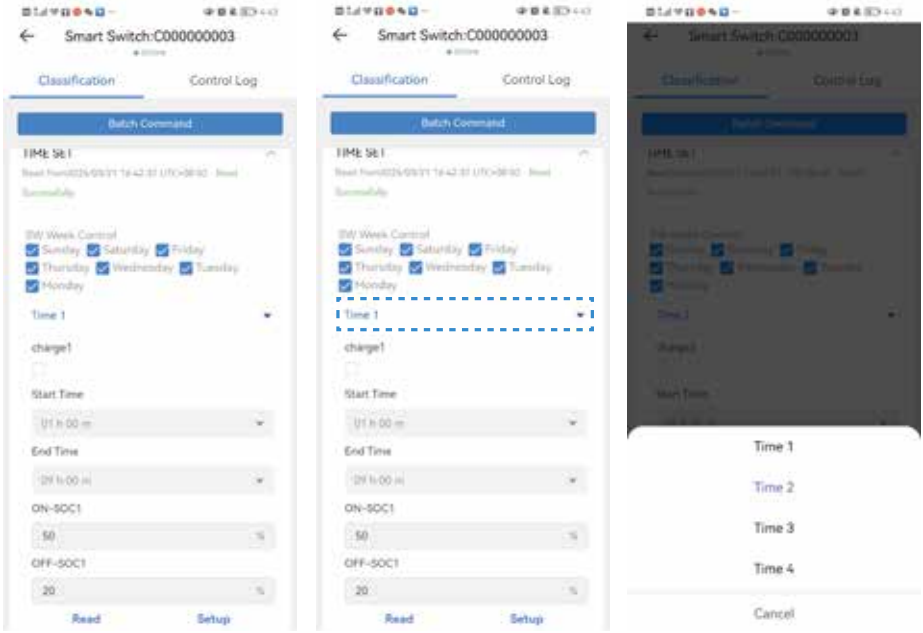
SW_Enable: Whether to use this smart switch/plug or not.

Off grid SW off: Switch off this smart switch/plug automatically when the ESS turn to off-grid status.

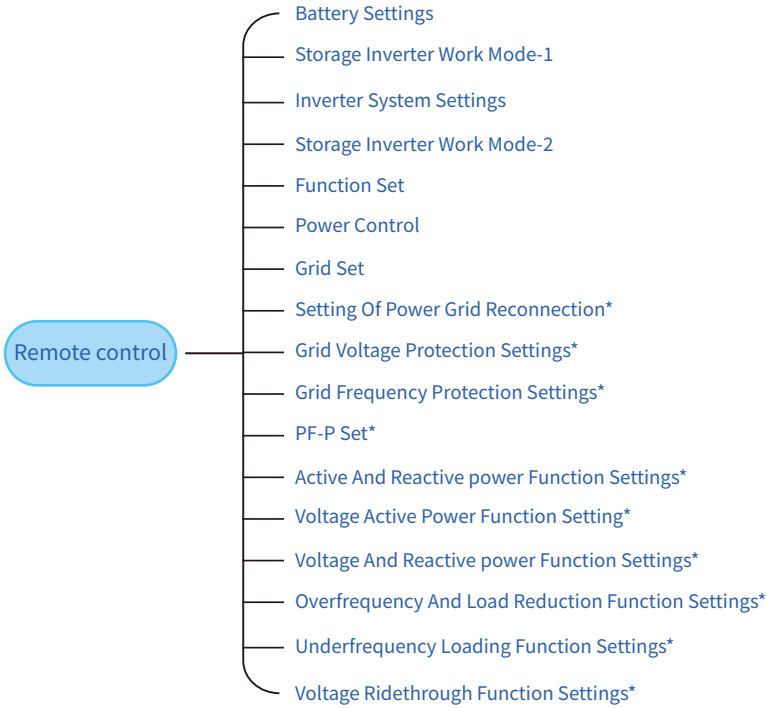
SW_Mode: To choose the control mode of this smart switch/plug.



After setting the "SW-Mode" as "Time mode", the following parameters will be valid.
SW Week Control:Select which days of the week to execute the setting of TIME SET.
Start Time: The starting time point of each time period of Time Mode.
End Time: The ending time point of each time period of Time Mode.
ON_SOC1/2/3/4: When the battery SOC rises to this set value, this smart switch/plug will be switched on automatically.
OFF_SOC1/2/3/4: When the battery SOC drops to this set value, this smart switch/plug will be switched off automatically.
24 hours of a whole day will be divided into 4 time periods. Click on the area indicated by the red dashed box, and in the pop-up window, you can switch to the time period you want to set.



11. Commissioning via APP



*Note：The parameters under these sub items are only for professionals, and non professionals can maintain their default values.

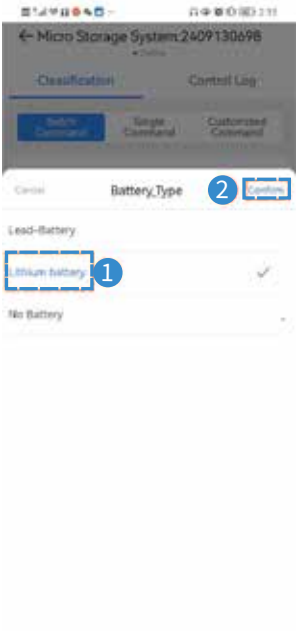
Optional parameter settings:

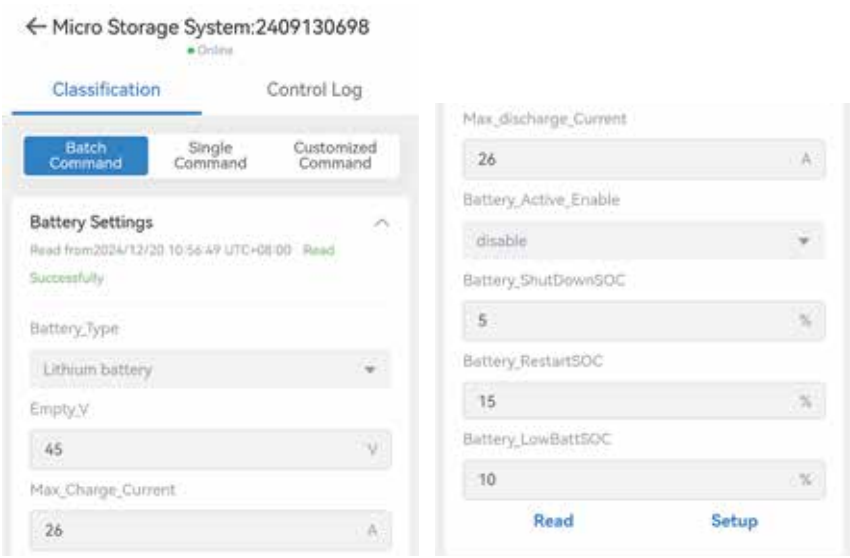
1.Click "Read" button of the current sub item before setting these parameters under this sub item.

2. Switch to option desired and click on "Confirm" in the upper right corner of the pop-up window.

3.After adjusting all the parameters that need to be set, click the "setup" button in the bottom right corner of the current sub item to complete the setup.

In addition, you can click "Read" button again to confirm if the parameters are set correctly.





Battery Setting

Battery_Type:
Range: Lead-Battery/Lithium Battery/No Battery.Note: Balcony energy storage(Choose the "Lithium Battery")

Empty _V:
Range:0.01-60.00.The voltage of battery when it is discharging to empty status.

Max_Charge_Current:
Range:0.01~26.00.The upper limit of charging current allowed.

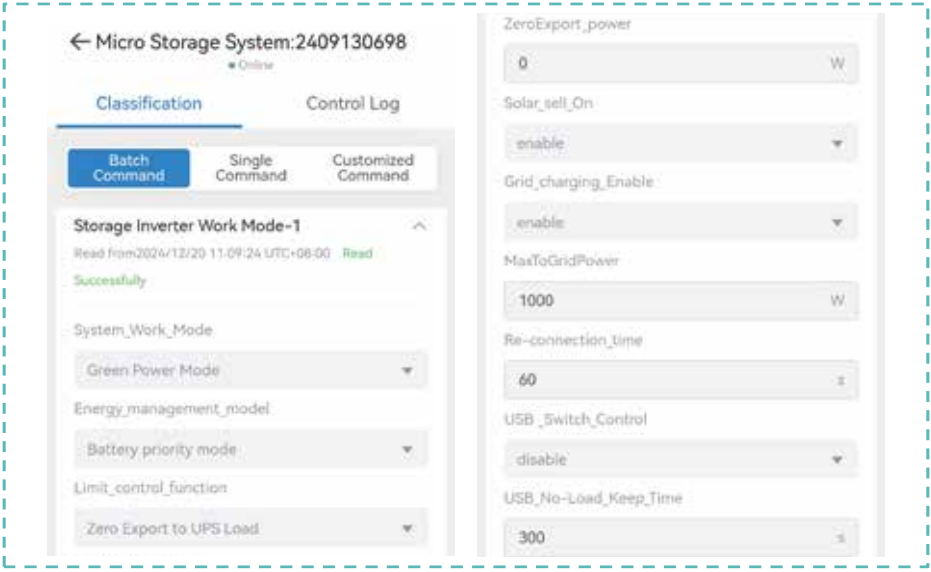
Max_Discharge_Current:
Range:0.01~26.00.The upper limit of discharging current allowed.

Battery_Active_Enable:
Disable/Enable.Activate the over discharged batteries with a small charging current.

Battery_ShutDownSOC:
Range:0~100.When the inverter operates in off-grid mode and the battery SOC drops to this set value, the low SOC protection is triggered, the inverter will shut down its DC/AC inverter module to stop outputting AC power.

Max_Discharge_Current:
Range:0~100.When the inverter operates in off-grid mode and the battery SOC restores to this set value, the inverter will restart its DC/AC inverter module to output AC power again.

Battery_LowBattSOC:
Range:0~100.When the inverter operates in on-grid mode and the battery SOC drops to this set value, this low SOC protection will be triggered, the inverter will stop discharging the battery to maintain the .battery SOC not lower than this set value.



Storage Inverter Work Mode-1

System_Work_Mode:
Green Power Mode: Solar and battery storage energy will mainly be consumed locally by user, but it is also allowed to sell electricity to the grid under specific circumstances.
Full Charge Mode: Before portable use, fully charge the battery with solar or grid power.
Customized Mode: Charging or discharging based on the porgrammable settings of TOU function.

Enery_management_model:
Battery priority mode: PV power will be prioritized for charging battery.
Load first mode:PV power will be prioritized for supplying power to loads.

Limit_control_function:
Sell First:It is allowed to feed power into the grid.
Zero Export to UPS Load:The AC ouput power of inverter module will only be used to supply the backup loads on the load port of this ESS system.
Zero Export to CT:Use an external CT to prevent current output from the inverter from flowing into the grid after passing through the external CT.
Zero Export to wireless CT:Use an external CT to prevent current output from the inverter from flowing into the grid after passing through the external wireless CT meter.

ZeroExport_power:
Range: 0-500W.To get this set power from the grid to prevent the feed-in power from inverter to grid due to the measuring error of build-in or external CT.

Solar_sell_On:
Range: Enable/Disable.Whether or not to sell the excess solar power to the grid.

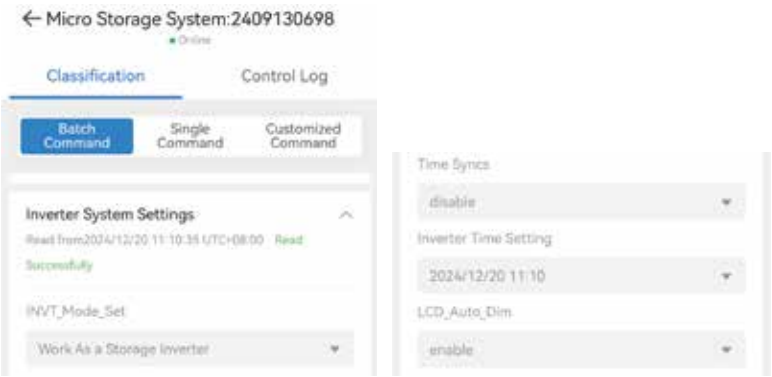
Grid_charging_Enable:
Range: Enable/Disable.To set whether it is allowed to use the grid power to charge the battery or not.

MaxToGridPower:
Range:0-1000.The upper limit of power allowed to be fed into the grid.

Re-connection_time:
Range:10-3000.Reconnection time after grid restoration.

USB_Switch_Control:
Range: Enable/Disable.To set whether the power button of USB terminals can control the ON/OFF status of USB terminals or not.

USB_No-Load_Keep_Time:
Range:300-1800.The USB terminal will be turned off when the idle time reaches this set value.



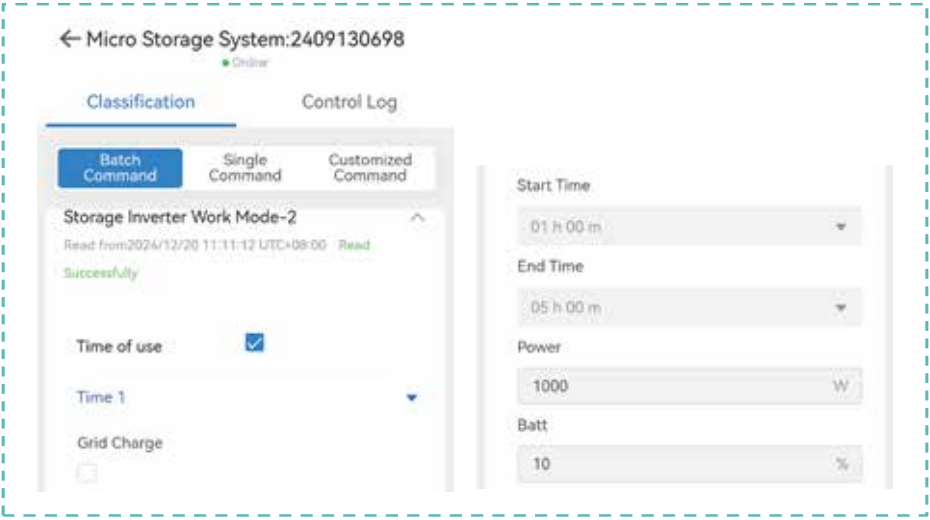
Inverter System Settings

INVT_Mode_Set:
Work As a Storage Inverter:To work as an micro hybrid inverter with energy storage function.

Time Syncs:
Range: Enable/Disable.After enabling, when the ESS is online, its time will be synchronized with the cloud platform's time.

Inverter Time Setting:
To set the local time for this ESS manually.

LCD_Auto_Dim:
Range: Enable/Disable.After enabling this function, the LCD display of this ESS will automatically dim after 2 minutes of inactivity.



Storage Inverter Work Mode-2

Time of use:
Manage battery charging and discharging ac cording to a programmable schedule.

Time 1/2/3/4/5/6:
Six programmable time period.

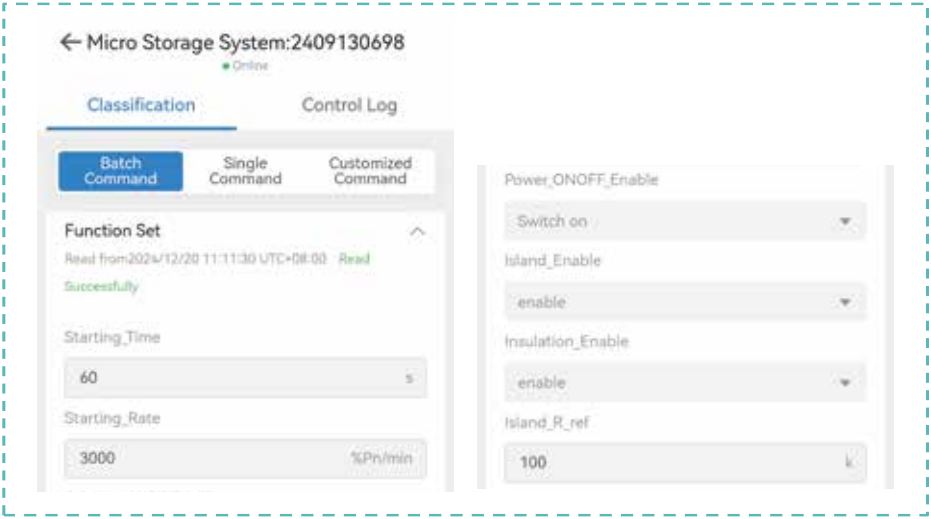
Grid Charge:
To set whether it is allowed to use the grid power to charge the battery or not.

Start Time:
The starting time point of each time period.

End Time:
The ending time point of each time period.

Power:
0-1000W.The upper limit of discharging power of each time period.

Batt:
0-100%.The target SOC of battery during each time period. When the actual SOC of the battery is higher than this set value, the battery can be discharged. When the actual SOC of the battery is lower than this set value, the battery needs to be charged.



Function Set

Starting_Time:
0-1000.The time required to start the inverter module of this ESS.

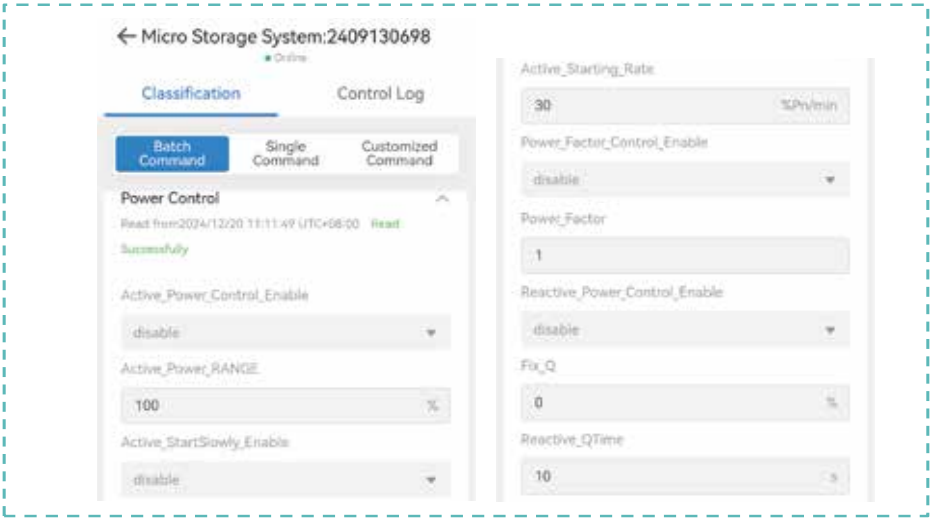
Starting_Rate:
0.0-3000.0.The ramp rate percentage based on rated output power.

Power_ONOFF_Enable:
Range:Switch on/Switch off.To power ON/OFF the inverter module of this ESS remotely via APP.

Island_Enable:
Range: Enable/Disable.Whether to enable the Anti-island protection feature of this ESS or not.

Insulation_Enable:
Range: Enable/Disable.Whether to enable the Insulation Impedance monitoring function or not.

Island_R_ref:
0-250.The lower limit of impedance for referring to judge whether the insulation impedance of this ESS is normal or not.



Note: To change the following settings, please contact the distributor first.

Power Control

Active_Power_Control_Enable:
Range: Enable/Disable.Whether to enable active power control function or not.

Active_Power_RANGE:
0-120.maximum output active power percentage compare to rated output power.

Active_StartSlowly_Enable:
Range: Enable/Disable.After starting, the ouput active power of this ESS will rise slowly in set rate.

Active_Starting_Rate:
0.00-100.00.After enalbling Active Starting Rate, the ouput active power of this ESS will rise slowly in this set rate.

Power_Factor:
-1.000-1.000.To set the power factor of output power of this ESS.

Power_Factor_Control_Enable:
Range: Enable/Disable.Whether to enable reactive power control function or not.

Fix_Q:
-100.00~100.00.The set maximum percentage of reactive power output or absorption.

Reactive_QTime:
0-100.The time taken to reach the set Fix_Q.

Grid Set

Grid_Standard:
Range: USER_DEFINED, GENERALITY,VDE_AR_N_4105, etc.To choose the desired grid code according to your local standard.

Grid_Voltage_Type:
Range：208/220/230/240.In on-grid mode, set this value according to the AC voltage between the live line and neutral line of your grid. While in off-grid mode,set this value according to the rated voltage of your loads.

Grid_Frequency_Type:
Range：50/60Hz.In on-grid mode, set this value according to the frequency of your grid. While in off-grid mode,set this value according to the rated frequency of your loads.

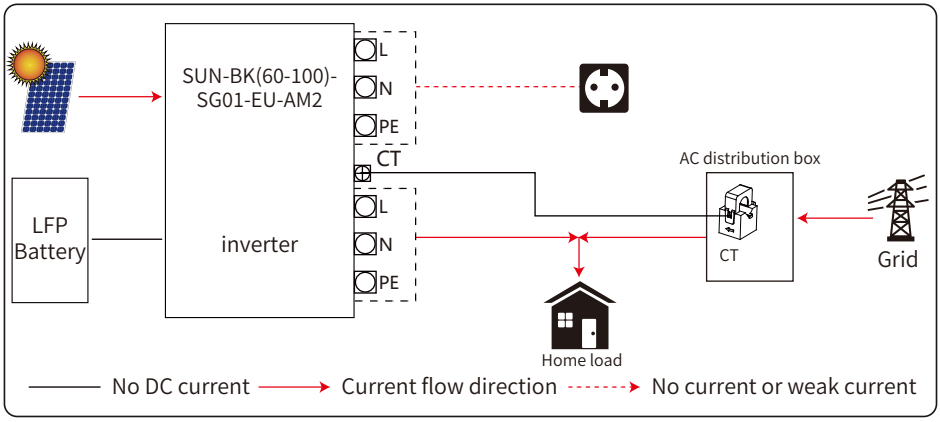
12. Application modes

ESS can be used as a household energy storage system and a portable outdoor power source. Based on whether ESS is connected to photovoltaics, connected or disconnected from the grid, with or without CT/meter, and the differences in working mode settings, ESS can be used in various application scenarios and can be flexibly converted.

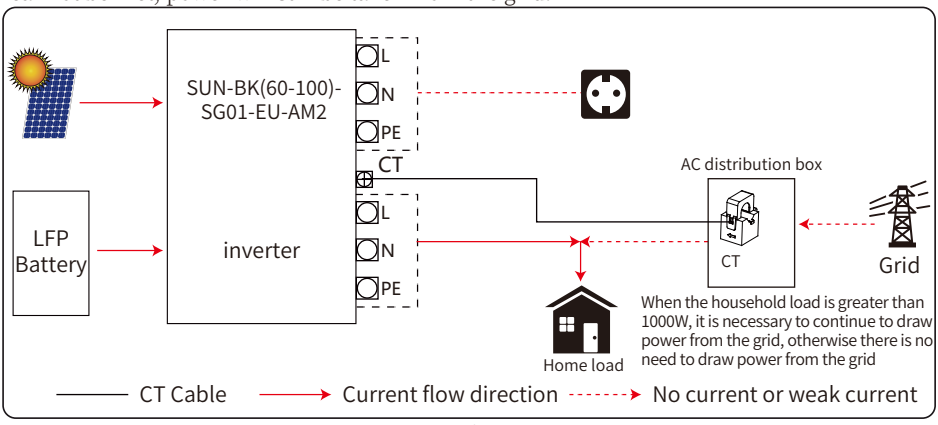
Mode	Time of use	Batt(Target SOC) of Each time period	Grid_charging_Enable under "Storage Inverter Work mode-1"	Grid Charge under "Storage Inverter Work mode-2"
Green Power Mode (Default)	Enable	Follow the set value of "Battery_LowBattSOC" under Battery Settings	Enable	Disable
Full Charge Mode	Disable	Disable	Enable	Disable
Customized Mode	Customized	Customized	Customized	Customized

Green Power Mode with CT

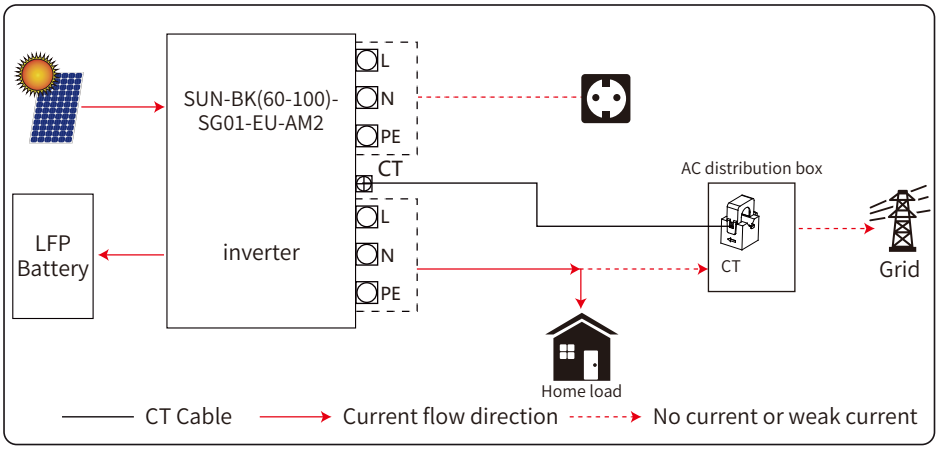
Scenario 1: During the day time, Solar power< Load power and Battery SOC is lower than Battery_LowBattSOC,Load will be supplied by solar power and grid power together.



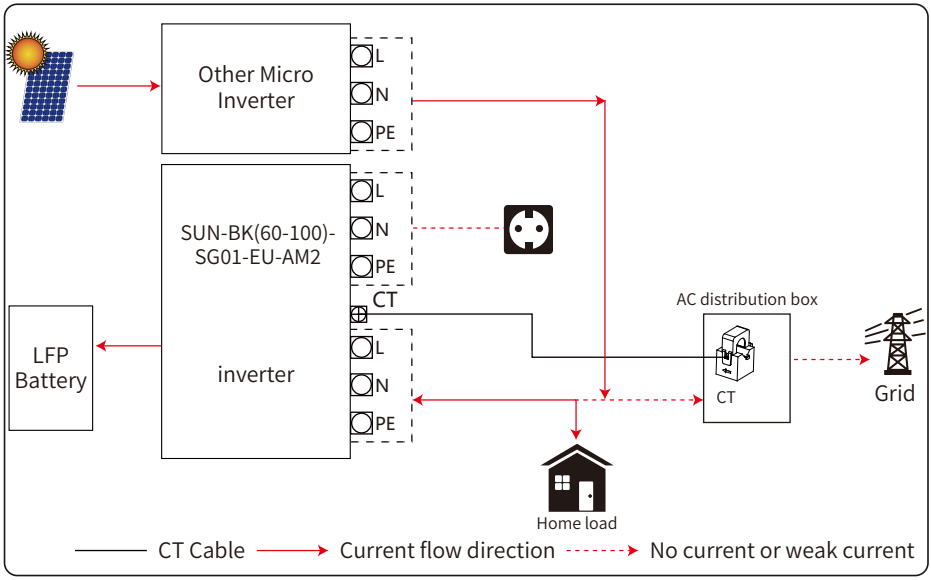
Scenario 2: During the day time, Solar power< Load power and Battery is able to discharge, battery will discharge to supply the loads with solar power together, if the load power demand cannot be met, power will still be taken from the grid.



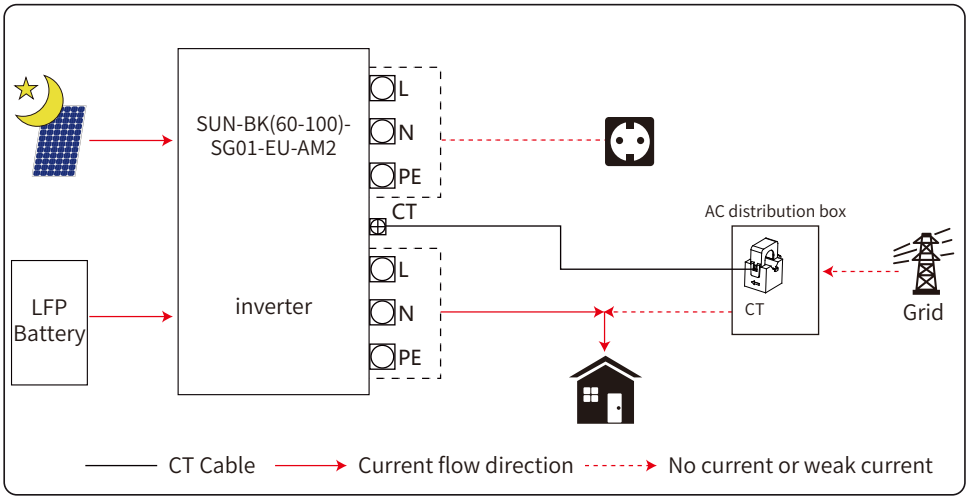
Scenario 3: During the day time, Solar power> Load power,the excess power will firstly be charged into the battery,If there is still excess power, you can choose whether to sell it to the grid.



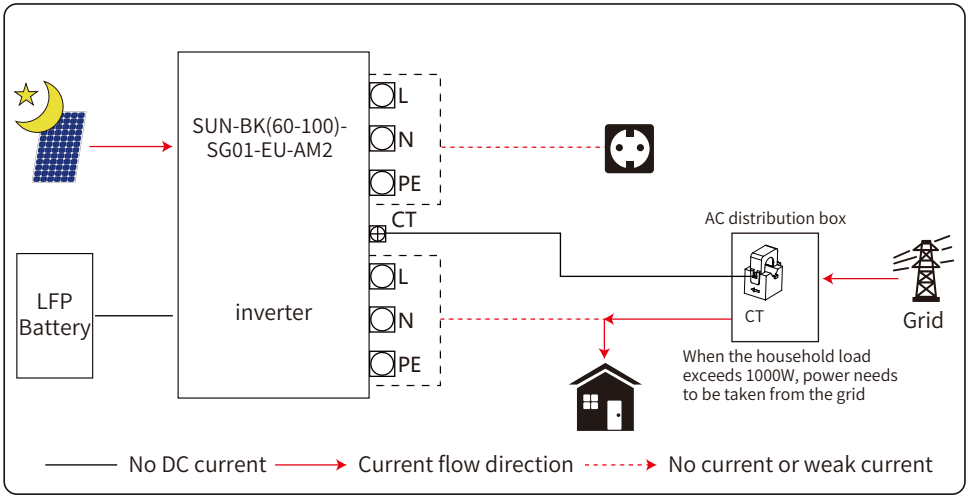
Scenario 4: During the day time, Solar power< charging power,and there is another PV system with sufficient power generation selling power to the grid,this ESS will turn to charging mode automatically.



Scenario 5: During the night time,the battery SOC is higher enough to be able to discharge.If the discharging power of battery is insufficient, the power grid will supplement it.

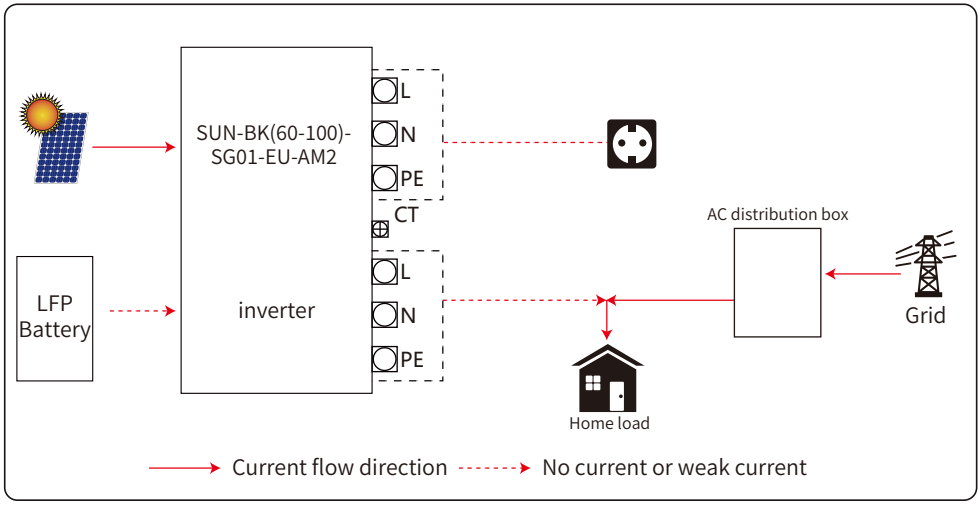


Scenario 6: During the night time,the battery SOC is too low to discharge,so the loads will totally supplied by grid.

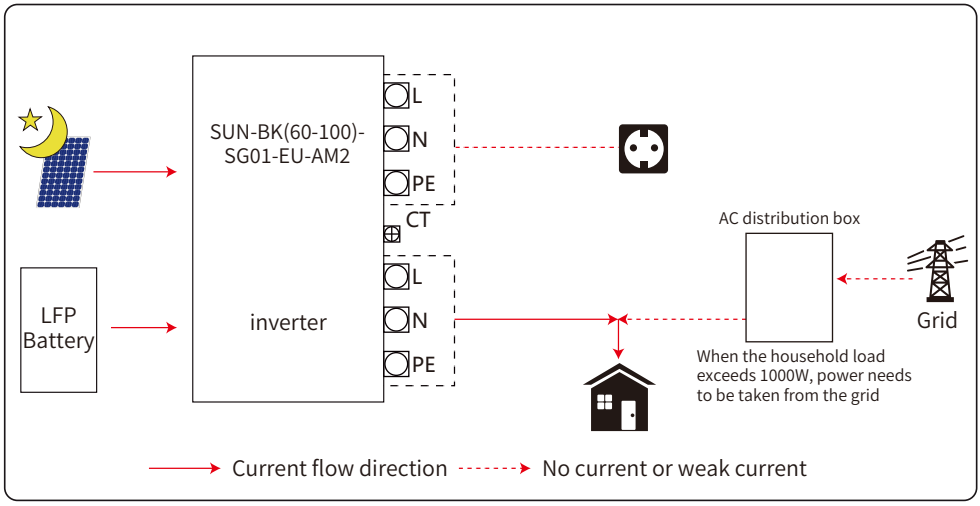


Green Power Mode without CT(Zero Export to UPS load)

Scenario 7: During the day time,the PV power will firstly used to supply the backup load, the excess power will be used to charge the battery, if it still has excess power, you can choose to sell it to grid or not.

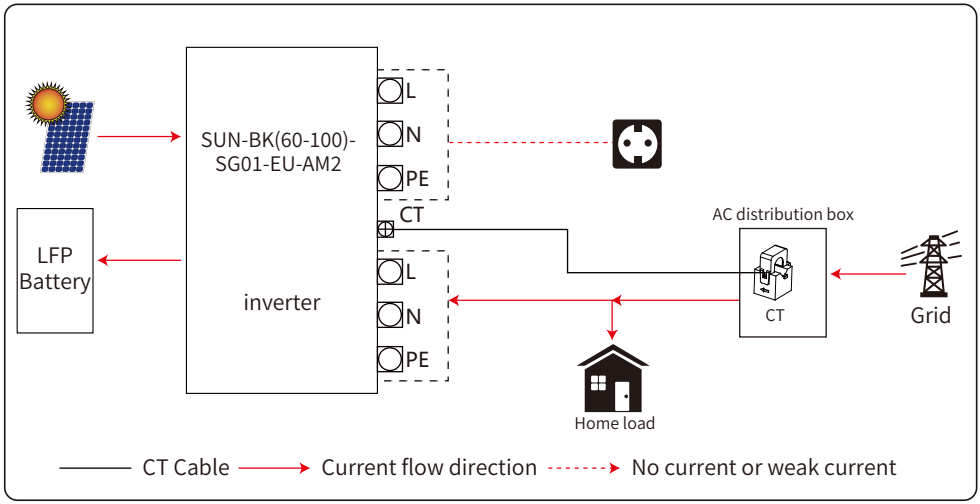


Scenario 8: During the night time, the battery SOC is higher enough to discharge. The discharging power will firstly be used to supply loads on load port, and whether to export power to grid port will depends on the setting of Limit_control_function.



Full Charge Mode (On-grid)

Charge the battery in max_charge_current with solar and grid power.
PV power is sufficient: PV power will firstly charge the battery,the excess power can be used to supply the loads or even sell to grid as desired
PV power is insufficient: PV power will be used to charge the battery, the insufficient part will be supple mented by the power grid,and the power needed by the load is also provided by the power grid.
After the battery is fully charged, it will automatically stop charging. During day time, the excess PV power will be used to supply loads or sell to grid as desired.



Purpose of this Mode:
(1) To prepare for portable applications or planned power outages, fully charge the battery in advance.
(2) Forcefully recharge and calibrate SOC when the battery has not been fully charged for a long time or SOC is too lower due to has not been charged for a long time.

Off-Grid Application scenrio：Portable/UPS power source

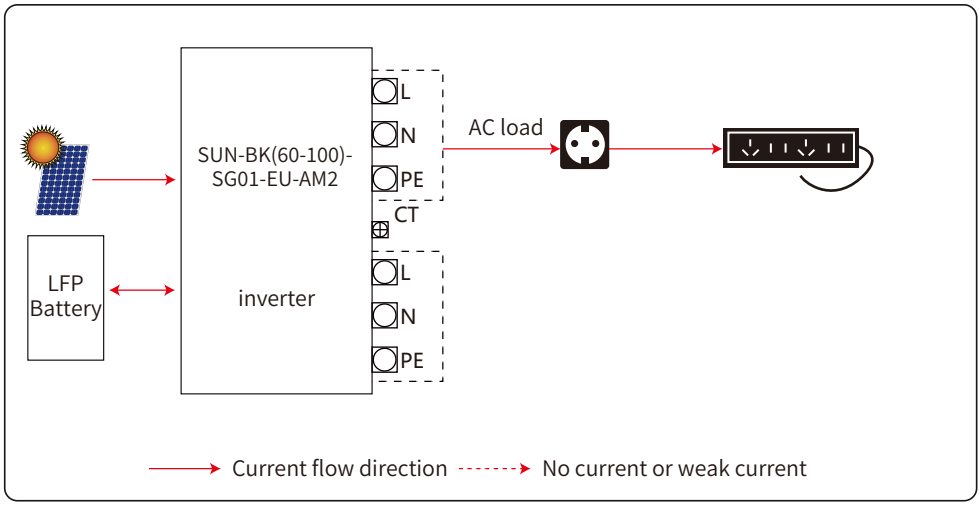
Insert the plug of power strip into the Schuko socket on load port of ESS to expand the numbers of usable sockets.

During day time, PV power will firstly be used to supply the load, and excess power can be used to charge the battery. Else If PV power is insufficient, battery will discharge to supply loads together with PV power (until reaching Low Batt)

During the night time, the battery will discharge to supply power to load until reaching Low Batt.

During outage, this ESS can be used as a little-scale UPS power source, maximum output power is only 1000W, and the backup hours depends on the UPS load power and the remaining SOC of battery.

For example：Laptop 60W, SOC 100% can supply power to it for nearly 30 hours.



13.Datasheet

Model	SUN-BK60SG01 -EU-AM2	SUN-BK80SG01 -EU-AM2	SUN-BK100SG01 -EU-AM2
Battery Input Data			
Battery Type	Lithium-ion		
Battery Voltage Range(V)	40-60		
Max.Charging Current(A)	25		
Max.Discharging Current(A)	25		
Charging Strategy for Li-ion Battery	Self-adaption to BMS		
Number of battery input	1		
PV String Input Data			
Max. PV Access Power(W)	1320	1760	2200
Max. PV Input Power(W)	960	1280	1600
Max. PV Input Voltage(V)	60		
Start-up Voltage(V)	25		
MPPT voltage range(V)	20-55		
Full Load MPPT Voltage Range(V)	28-55	30-55	35-55
Rated PV Input voltage(V)	42.5		
Max. Input Short-Circuit Current (A)	27+27		
Max. Operating PV Input Current(A)	18+18		
No. of MPP Trackers/ No. of Strings per MPP Tracker	2/1+1		
Max. Inverter Backfeed Current To the Array	0		
AC Input/Output Data			
Rated AC Input/Output Active Power(W)	600	800	1000
Max. AC Input/Output Active Power(W)	660	880	1100
Max. AC Input/Output Apparent Power (VA)	660	880	1100
Peak Power (off-grid) (W)	2 times of rated power,10s		
Rated AC Input/Output Current (A)	2.8/2.7A	3.7/3.5A	4.6/4.4A
Max. AC Input/Output Current (A)	3.0/2.9A	4.0/3.9A	5.0/4.8A
Max. Continuous AC Passthrough (grid to load) (A)	10A		
Max. Output Fault Current(A)	6	8	10
Max. Output Overcurrent Protection (A)	16		
Rated Input/Output Voltage/Range(V)	220V/230V 0.85Un-1.1Un		
Grid Connection Form	L+N+PE		
Rated Input/Output Grid Frequency/Range	50Hz/45Hz-55Hz 60Hz/55Hz-65Hz		
Power Factor Adjustment Range	0.8 leading-0.8lagging		
Total Current Harmonic Distortion THDi	<3%		
DC Injection Current	<0.5%In		
Efficiency			
Max. Efficiency	96.5%		
Euro Efficiency	96%		
MPPT Efficiency	>99%		

Model	SUN-BK60SG01 -EU-AM2	SUN-BK80SG01 -EU-AM2	SUN-BK100SG01 -EU-AM2
Equipment Protection			
DC reverse polarity protection	yes		
AC Output Overcurrent Protection	yes		
AC Output Overvoltage Protection	yes		
AC Output Short Circuit Protection	yes		
Thermal Protection	yes		
Insulation Impedance detection	yes		
Anti-islanding protection	yes		
Surge Protection Level	TYPE II(DC),TYPE II(AC)		
Interface			
Communication Interface	WiFi， Lora， Bluetooth		
General Data			
Max. Operating Frequency(Hz)	2.412GHz-2.472GHz		
Operating Temperature Range (℃)	-40 ℃ to +65 ℃ , >45 ℃ derating		
Permissible Ambient Humidity	0-100%		
Permissible Altitude (m)	2000m		
Noise (dB)	⩽ 25 dB		
Ingress Protection(IP) Rating	IP 67		
Inverter Topology	Isolated		
Over Voltage Category	OVC II(DC),OVC III(AC)		
Cabinet Size（W*H*D）[mm]	364.5×183×32.9 (Excluding connectors and brackets)		
Weight [kg]	4.55		
Warranty [year]	Standard 10 years, extended warranty		
Type Of Cooling	Natural cooling		
Grid Regulation	IEC 61727, IEC 62116, CEI 0-21, EN 50549, NRS 097, RD 140, UNE 217002, OVE-Richtlinie R25, G98, VDE-AR-N 4105		
Safety EMC/Standard	IEC/EN 61000-6-1/2/3/4, IEC/EN 62109-1, IEC/EN 62109-2		

* Note : 15 years warranty (only installed in Germany and Austria)

14.Common Faults and Troubleshooting

Definitions and solutions of faults of the inverter module		
Fault Code	**Definitions**	**Solutions**
F01	DC_Inversed Failure	Reserved.
F02	DC_Insulation_Failure	Reserved.
F03	GFDI_Failure	Reserved.
F04	GFDI_Ground_Failure	Reserved.
F05	EEPROM_Read_Failure	Reserved.
F06	EEPROM_Write_Failure	Reserved.
F07	DC/DC_Softstart_Fault	Reserved.
F08	GFDI_Relay_Failure	Reserved.
F09	IGBT_Failure	Reserved.
F10	AuxPowerBoard_Failure	Reserved.
F11	AC_MainContactor_Failure	Reserved.
F12	AC_SlaveContactor_Failure	Reserved.
F13	Grid_Mode_changed	Grid Mode changed When setting the inverter in grid mode, parallel mode, battery mode, and other related settings, this fault will be triggered. If settings no problem inverter can back to work mode.
F14	DC_OverCurr_Fault	DC over current fault Battery current exceeds the allowable value. If it occurs multiple times or cannot be restored after restarting, there may be the following reasons: Check the maximum discharge current setting;When in lithium battery mode, the maximum discharge current value of the lithium battery should be checked;Check the battery current sensor or circuits related to the sensor.
F15	SW_AC_OverCurr_Fault	AC over current Software Protection: When the inverter is running, if there is overload or severe grid distortion, it may cause the fault. If it cannot be restarted, there may be the following reasons: 1. IGBT or driver damage on the inverter side; 2.Current sensor or related circuit malfunction;
F16	GFCI_Failure	Reserved.
F17	Active_Battery_Hold	Reserved.

Fault Code	Definitions	Solutions
F18	Tz_Ac_OverCurr_Fault	AC over current Hardware protection: When the inverter is running, if there is overload or severe grid distortion, it may cause the fault. If it cannot be restarted, there may be the following reasons: 1. IGBT or driver damage on the inverter side; 2.Current sensor or related circuit malfunction;
F19	Tz_Integ_Fault	Reserved.
F20	Tz_Dc_OverCurr_Fault	DC hardware over current fault: The input hardware over current fault of the PV panel may be caused by the following reasons if it cannot be restored: 1. PV current sensor failure, or hard ware over current protection detection circuit failure; 2. BOOST inductor damage;
F21	Tz_GFDI_OC_Fault	Reserved.
F22	Tz_EmergStop_Fault	Emergency stop fault: The inverter remains stopped. Contact the distributor
F23	Tz_GFCI_OC_Fault	Reserved.
F24	DC_Insulation_Fault	DC Insulation Fault 1. Check if the PV cable on site is break; 2. Check if the inverter assembled properly.
F25	Reserved	Reserved.
F26	BusUnbalance_Fault	Reserved.
F27	PV_or_Grid_WAKE_UP_Failed	Battery wake up failure: The possible reasons for battery wake-up failure are: 1. boost failure during PV wake up. 2. The MOS or their drivers on both sides of the transformer are damaged.
F28	DCIOver_M1_Fault	Reserved.
F29	Parallel_Comm_Fault	Parallel communication error: 1. Setting error, set the desired function according to the corresponding instructions, determine the master/slave and its address and other Settings; 2. The communication line is not connected properly; The communication module is faulty. Check the devices related to the parallel port.
F30	AC_MainContactor_Fault	AC main contactor fault： Please check the Relays and their drivers.

Fault Code	Definitions	Solutions
F31	Soft_Start_Failed	Reserved.
F32	DCIOver_M2_Fault	Over charging current fault: This is a software protection to prevent excessive charging current from affecting the battery, which rarely occurs for the following reasons: 1. Full power charging, PV and grid fluctuation; 2. The battery current sensor is faulty.
F33	AC_OverCurr_Fault	AC Over Current Fault 1. The bypass load is heavy. Bypass CT (built-in Limiter sensor) or its detection of circuit faults.
F34	AC_Overload_Fault	AC Overload Fault 1. The AC load is too heavy 2. The power grid mode is selected incorrectly, for example, the European model is selected as a split phase 120V output 3. Not all IGBTs in AC inverter bridge working well.
F35	AC_NoUtility_Fault	AC No Utility Fault When there is no battery mode or a battery has problem, this fault is reported during the Grid-connected mode.
F36	AC_GridPhaseSeque_Fault	Reserved.
F37	Wake_up_Over_Current	Overcurrent fault during activating battery : Check the connection of power cable of battery terminals; Some of MOSFET components are broken.
F38	Parallel_system_Stop	Reserved.
F39	Tz_Resonance_OverCurr_Fault	DC LLC Over Current: 1. The heavy load suddenly accesses 2. Mosfet damaged 3. Resonant capacitor or transformer damage (uncommon) 4. Resonant current detection circuit fault (uncommon)
F40	Gen_OverCurr_Fault	Reserved.
F41	AC_WU_OverVolt_Fault	Grid over voltage fault This error will be reported only when the inverter work in no battery mode and works in grid-connected mode. 1. Check the Grid voltage 2. Check the internal voltage sampling circuit.

Fault Code	Definitions	Solutions
F42	AC_WU_UnderVolt_Fault	Grid Under voltage fault This error will be reported only when the inverter work in no battery mode and works in grid-connected mode. 1. Check the Grid voltage 2. Check the internal voltage sampling.
F43	AC_VW_OverVolt_Fault	Reserved.
F44	AC_VW_UnderVolt_Fault	Reserved.
F45	AC_UV_OverVolt_Fault	Reserved.
F46	AC_UV_UnderVolt_Fault	Reserved.
F47	AC_OverFreq_Fault	Grid Over Frequency fault This error will be reported only when the inverter work in no battery mode and works in grid-connected mode. 1. Verify whether the grid frequency had exceeded the normal range before the alarm and is shifting significantly now. 2. Check the internal frequency sampling circuit.
F48	AC_UnderFreq_Fault	Grid Under Frequency fault This error will be reported only when the inverter work in no battery mode and works in grid-connected mode. 1. Check the Grid frequency 2. Check the internal frequency sampling circuit.
F49	Backup_Battery_Fault	Reserved.
F50	AC_softstart_Fault	Wait for the machine to attempt a restart, or press the inverter switch to restart the inverter. If it cannot be restored, contact the distributor
F51	Battery_TempHigh	Battery Temperature High fault When this fault occurs, power off the battery immediately to check the battery temperature.
F52	AC_A_InductCurr_DcHigh_Fault	Reserved.
F53	AC_B_InductCurr_DcHigh_Fault	Reserved.
F54	AC_C_InductCurr_DcHigh_Fault	Reserved.
F55	DC_VoltHigh_Fault	DC Voltage High Fault 1. Check the battery voltage 2. Check the input voltage of the PV 3. Check whether the capacitor is abnormally damaged;

Fault Code	Definitions	Solutions
F56	DC_VoltLow_Fault	DC Voltage Low Fault 1.Check the battery voltage 2.Check whether the bus capacitor is 3.abnormally damaged;
F57	AC_BackFeed_Fault	Reserved.
F58	BMS_Communication_Fault	BMS Communication Fault 1. Check the connection between the battery BMS cable and the inverter 2. Check the lithium battery Settings and inverter Settings 3. If change a battery still not working, check the BMS communication circuit of the inverter.
F59	AC_V_GridCurr_High_Fault	The AC voltage and current are too high The fault occurs only when inverter work in no battery mode, and almost all of this situation work can be restored. If the inverter reports this failure very frequently may have the following reasons: 1. Weak power grid with serious distortion 2. Voltage detection failure.
F60	Gen_Volt_or_Fre_Fault	Reserved.
F61	Button_Manual_OFF	Reserved.
F62	DRMs_Stop	Reserved.
F63	Arc_Fault	Reserved.
F64	AC_V_GridCurr_High_Fault	Heat-sink High Temperature Fault 1. The ambient temperature is too high or the surrounding ventilation is bad; 2. The temperature sensor is faulty.

WARNING: Do not attempt to repair the Micro hybrid inverter.If troubleshooting methods fail, please call for Technical Support

If you have any question you can't handle during using Deye products,please contact with our after services by email:service@deye.com.cn,details can refer to products' warranty.

15. Maintenance

Deye micro hybrid inverters do not require any specific regular maintenance.

16.EU Declaration of Conformity

within the scope of the EU directives
· Radio Equipment Directive 2014/53/EU (RED)
· Restriction of the use of certain hazardous substances 2011/65/EU)(RoHS)

NINGBO DEYE INVERTER TECHNOLOGY CO., LTD. confirms herewith that the products described in this document are in compliance with the fundamental requirements and other relevant provisions of the above mentioned directives. The entire EU Declaration of Conformity and certificate can be found at https://www.deyeinverter.com/download/#balcony-energy-storage.

250324001
www.deyeinverter.com

EU Declaration of Conformity

Product: **Micro hybrid inverter**
Models:SUN-BK60SG01-EU-AM2;SUN-BK80SG01-EU-AM2; SUN-BK100SG01-EU-AM2;
Name and address of the manufacturer: Ningbo Deye Inverter Technology Co., Ltd.
No. 26 South YongJiang Road, Daqi, Beilun, NingBo, China

This declaration of conformity is issued under the sole responsibility of the manufacturer. Also this product is under manufacturer's warranty.
This declaration of conformity is not valid any longer: if the product is modified, supplemented or changed in any other way, as well as in case the product is used or installed improperly.

The object of the declaration described above is in conformity with the relevant Union harmonization legislation: The restriction of the use of certain hazardous substances (RoHS) Directive 2011/65/EU and the Radio Equipment Directive (RED) 2014/53/EU.

References to the relevant harmonized standards used or references to the other technical specifications in relation to which conformity is declared:

EN 62109-1:2010	●
EN 62109-2:2011	●
EN IEC 61000-6-1:2019	●
EN IEC 61000-6-2:2019	●
EN IEC 61000-6-3:2021	●
EN IEC 61000-6-4:2019	●
EN 62920:2017/A1:2021	●
EN IEC 61000-3-2:2019/A1:2021	●
EN 61000-3-3:2013/A2:2021/AC:2022-01	●
EN IEC 61000-3-11:2019	●
EN 61000-3-12:2011	●
EN 55011:2016/A2:2021	●
EN 50665:2017	●
EN 62479:2010	●
EN 50663:2017	●
EN IEC 62311:2020	●
ETSI EN 300328 V 2.2.2:2019	●
ETSI EN 301489-1 V 2.2.3:2019	●
ETSI EN 301489-17 V 3.2.4:2020	●
ETSI EN 301489-3 V 2.3.2:2023	●
ETSI EN 300220-1 V 3.1.1:2017	●
ETSI EN 300220-2 V 3.2.1:2018	●

EU DoC – *v1*

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www.deyeinverter.com

Nom et Titre / Name and Title:

Bard Dai
Senior Standard and Certification Engineer

Au nom de / On behalf of:
Ningbo Deye Inverter Technology Co., Ltd.

Date / Date (yyyy-mm-dd):
2025-03-24

A / Place:

Ningbo Deye Inverter Technology Co., Ltd.
No. 26 South YongJiang Road, Daqi, Beilun, NingBo, China

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