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V02

INSTALLATION, OPERATION & MAINTENANCE MANUAL
ENERGY STORAGE SYSTEM (ESS)
STORION-SMILE5 (AU)

CONTENTS

01 INTRODUCTION

1.1 System Introduction

AlphaESS Storion-SMILE5 (incl. SMILE5-BAT and SMILE-INV) can be applied in DC-coupled systems (mostly new installation), AC-coupled systems (mostly retrofit) and Hybrid-coupled systems (mostly retrofit, and PV capacity-increase), as the following schemes show:

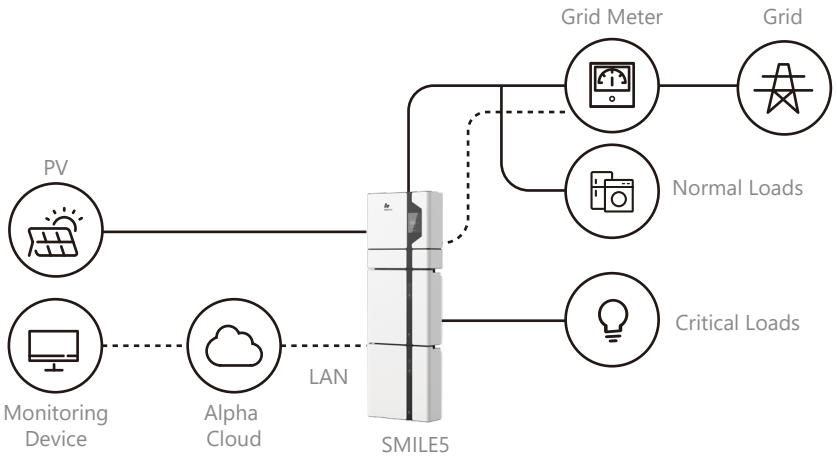


Figure 1 DC-coupled Storage System – Scheme

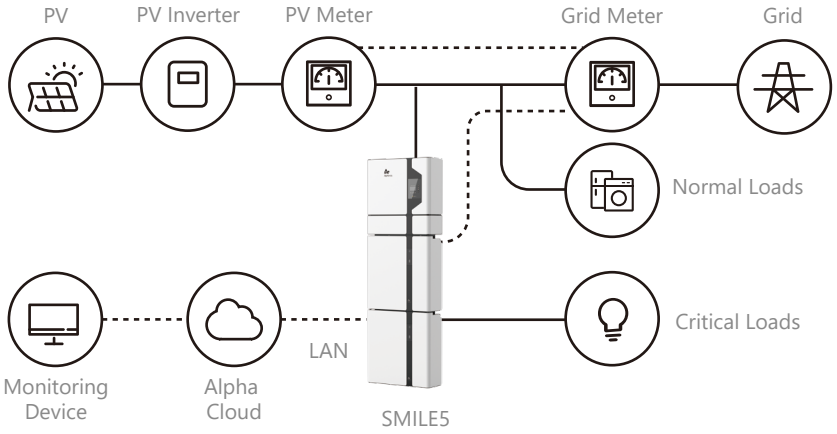


Figure 2 AC-coupled Storage System – Scheme

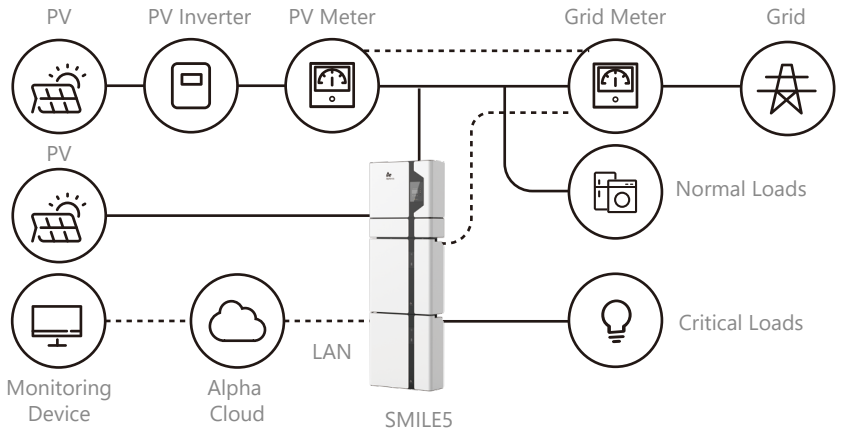


Figure 3 Hybrid-coupled Storage System – Scheme

CAUTION:

For the AC-/ Hybrid-coupled system, unlike DC, two power meters are to be mounted. SMILE5 cannot be used in pure off-grid systems!

1.2 Safety Introduction

1.2.1 Manual Keeping

This manual contains important information about operating the system. Before operating, please read it very carefully.
The system should be operated in strict accordance with the instructions in the manual, otherwise it can cause damages or loss to equipment, personnel and property.
This manual should be kept carefully for maintenance and reparation.

1.2.2 Operator Requirements

The operators should get a professional qualification, or be trained.
The operators should be familiar with the whole storage system, including compositions and working principles of the system.
The operators should be familiar with the Product Instruction.
While maintaining, the maintainer is not allowed to operate any equipment until all the equipment has been turned off and fully discharged.

1.2.3 Protection of Warning Sign

The warning signs contain important information for the system to operate safely, and it is strictly prohibited to torn or damage them. Ensure that the warning signs are always well-functioned and correct placed. The signs must be replaced immediately when damaged.

	This sign indicates a hazardous situation which, if not avoided, could result in death or serious injury!
	This sign shows danger of high voltage and electric shock!
	The Storion SMILE5 must not be touched or put into service until 5 minutes after it has been switched off or disconnected to prevent an electric shock or injury.
	This sign shows danger of hot surface!
	Refer to the operating instructions.

1.2.4 Setting of Warning Sign for Safety

During instruction, maintenance and repair, follow the instructions below to prevent non-specialist personnel from causing misuse or accident:

- Obvious signs should be placed at front switch and rear-level switch to prevent accidents caused by false switching.
- Warning signs or tapes should be set near operating areas.
- The system must be reinstalled after maintenance or operation.

1.2.5 Measuring Equipment

To ensure the electrical parameters to match requirements, related measuring equipment are required when the system is being connected or tested.
Ensure that the connection and use matched specification to prevent electric arcs or shocks.

1.2.6 Moisture Protection

It is very likely that moisture may cause damages to the system. Repair or maintaining activities in wet weather should be avoided or limited.

1.2.7 Operation After Power Failure

The battery system is part of the energy storage system system which stores life-threatening high voltage even when the DC side is switched off. Touching the battery outlets is strictly prohibited. The inverter can keep a life-threatening voltage even after disconnecting it from the DC and / or AC side. Therefore, for safety reasons, it must be tested with a properly calibrated voltage tester before an installer works on the equipment..

1.3 Battery Safety Datasheet

1.3.1 Hazard Information

Classification of the hazardous chemical

Exempt from classification according to Australian WHS regulations.

Other hazards

This product is a Lithium Iron Phosphate Battery with certified compliance under the UN Recommendations on Transport of Dangerous Goods, Manual of Tests and Criteria, Part III, subsection 38.3. For the battery cell, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage. However, if the product is exposed to a fire, added mechanical shocks, decomposed, added electric stress by misuse, the gas release vent will be operated. The battery cell case will be breached at the extreme. Hazardous materials may be released. Moreover, if heated strongly by the surrounding fire, acrid or harmful fume may be emitted.

1.3.2 Safety Datasheet

For detailed information please refer to the provided battery safety datasheet.

1.4 General Precautions

DANGER

Danger to life due to high voltages of the PV array, battery and electric shock. When exposed to sunlight, the PV array generates dangerous DC voltage which will be present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the system under load, an electric arc may occur leading to electric shock and burns.

- ★ Do not touch uninsulated cable ends.
- ★ Do not touch the DC conductors.
- ★ Do not open the inverter and battery.
- ★ Do not wipe the system with damp cloth.
- ★ Have the system installed and commissioned by qualified people with the appropriate skills only.
- ★ Prior to performing any work on the inverter or the battery pack, disconnect the inverter from all voltage sources as described in this document.

WARNING

Risk of chemical burns from electrolyte or toxic gases. During standard operation, no electrolyte shall leak from the battery pack and no toxic gases shall form. Despite careful construction, if the Battery Pack is damaged or a fault occurs, it is possible that electrolyte may be leaked or toxic gases formed.

- ★ Do not install the system in any environment of temperature below -10°C or over 50°C and in which humidity is over 85%.
- ★ Do not touch the system with wet hands.
- ★ Do not put any heavy objects on top of the system.
- ★ Do not damage the system with sharp objects.
- ★ Do not install or operate the system in potentially explosive atmospheres or areas of high humidity.
- ★ Do not mount the inverter and the battery pack in areas containing highly flammable materials or gases.
- ★ If moisture has penetrated the system (e.g. due to a damaged enclosure), do not install or operate the system.
- ★ Do not move the system when it is already connected with battery modules.
- ★ Secure the system to prevent tipping with restraining straps in your vehicle.
- ★ The transportation of AlphaESS Storion-SMILE5 must be made by the manufacturer or an instructed personal. These instructions shall be recorded and repeated.
- ★ A certified ABC fire extinguisher with minimum capacity of 2kg must be carried along when transporting.
- ★ It is totally prohibited to smoke in the vehicle as well as close to the vehicle when loading and unloading.
- ★ For the exchange of a battery module, please request for new hazardous goods packaging if needed, pack it and let it be picked up by the suppliers.
- ★ In case of contact with electrolyte, rinse the affected areas immediately with water and consult a doctor without delay.

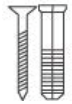
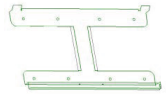
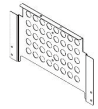
CAUTION:

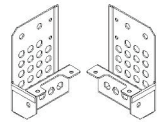
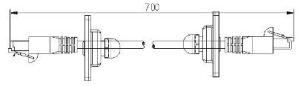
Risk of injury through lifting or dropping the system. The inverter and battery are heavy. There is risk of injury if the inverter or battery is lifted incorrectly or dropped during transport or when attaching to or removing from the wall.

- ★ Lifting and transporting the inverter and battery must be carried out by more than 2 people.

1.5 Parts List

Check the following parts list to ensure it is complete.
AlphaESS delivers a total system separately on site to client, this consists of:

SMILE5-INV					
					
8x φ8*60	2x M4 Nuts	4x M6 Nuts	1x Mounting Panel	1x Mounting Bracket	10x M6 Gasket
					
2x MC4	Two AC Connectors for grid and backup	1x Meter (1x SM60A or 1x ADL3000 or 1x ACR10R)		1x Installation Manual	1x User Manual

SMILE5-BAT			
			
6xφ8*60	6x M5*10	6x M4*10	2x Mounting Panel
			
6x M6 Gasket	2x Power Cable (1 black, 1 red)	1x User Manual	Battery Communication Cable

1.6 System Appearance

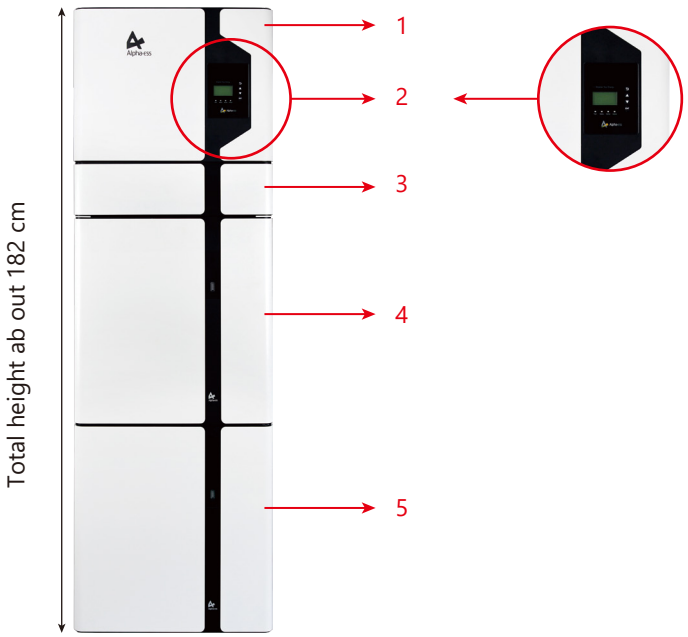


Figure 4 Storion-SMILE5 Delivery Scope

Object	Description
1	Hybrid Inverter
2	EMS Display Screen
3	Cable Box (connected to Inverter)
4	SMILE5-BAT (Battery 1)
5	SMILE5-BAT (Battery 2)

1.6.1 Cable Box Part

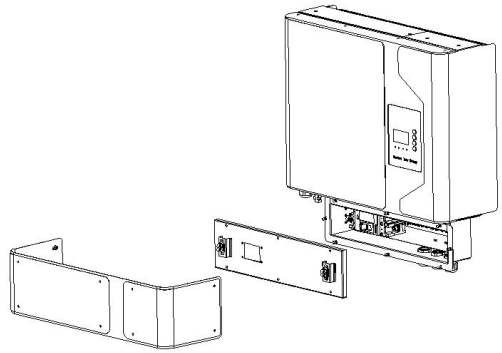


Figure 5 Inverter without Cable Box Covers– Front View

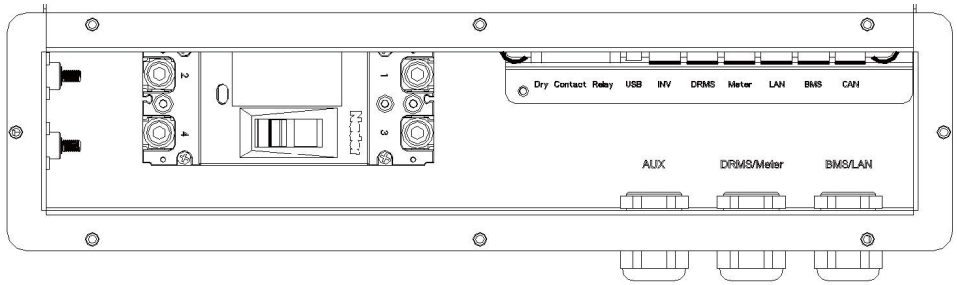


Figure 6 Cable Box Part without Covers – Front View

Item	Description	Item	Description
Dry Contact Relay	External Device Control Interface	USB	USB Debug Communication Port
INV	Inverter Debug Communication	DRMS	Power Dispatching Port
Meter	Meter Communication Port	LAN	Net Wire Connection Port
BMS	Battery Communication Port	CAN	External Expansion Port Or External Dispatching Port

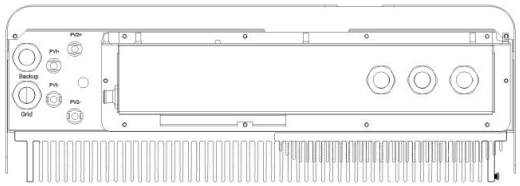


Figure 7 Cable Box Part without Covers - Bottom View

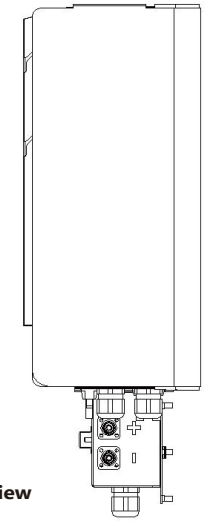


Figure 8 Cable Box Part without Covers - left View

Object	Description	Item	Description
PV1, PV2	PV Connector	GRID	Terminal Board Grid
BAT +, BAT -	Battery Connector	BACKUP	Terminal Board Backup Load

1.7 Liability Limitation

Any product damage or property loss caused by the following conditions, AlphaESS does not assume any direct or indirect liability.

- Product modified, design changed or parts replaced without AlphaESS authorization;
- Changes, repair attempts and erasing of series number or seals by non AlphaESS technician;
- System design and installation are not in compliance with standards and regulations;
- Fail to comply with the local safety regulations (VDE for DE, SAA for AU);
- Transport damage (including painting scratch caused by rubbing inside packaging during shipping). A claim should be made directly to shipping or insurance company in this case as soon as the container/packaging is unloaded and such damage is identified;
- Fail to follow any/all of the user manual, the installation guide and the maintenance regulations;
- Improper use or misuse of the device;
- Insufficient ventilation of the device;
- The maintenance procedures relating to the product have not been followed to an acceptable standard;
- Force majeure (violent or stormy weather, lightning, overvoltage, fire etc.);
- Damages caused by any external factors.

02 INSTALLATION

This Manual introduces the basic steps to install and set up AlphaESS Storion-SMILE5. SMILE5-BAT is a sealed component with no access to battery terminals or cell components within the module.
SMILE5-BAT contains a Bi-pole DC isolator, which conforms to IEC 60947. It has been operated in all live conductors

⚠ NOTE:

Please be cautious unpacking the battery, otherwise components could be damaged.

2.1 Installation Site and Environment

2.1.1 General

This SMILE5 energy storage system is outdoor version and can be installed in an outdoor or an indoor location.
When SMILE5 systems are installed in a room, SMILE5 must not be hampered by the structure of the building, the furnishings and equipment of the room.
The Storion SMILE5 is naturally ventilated. The location should therefore be clean, dry and adequately ventilated. The mounting location must allow free access to the unit for installation and maintenance purposes, and the system panels must not be blocked.
The following location are not allowed for installation:

- habitable rooms;
- ceiling cavities or wall cavities;
- on roofs that are not specifically considered suitable;
- access / exit areas or under stairs / access walkways;
- where the freezing point can be reached, such as garages, carports or other places as well as wet rooms (environmental category 2);
- locations with humidity and condensation over 85%;
- places where salty and humid air can penetrate;
- seismic areas - additional security measures are required;
- sites higher than 3000 meters above sea level;
- places with an explosive atmosphere;
- locations with direct sunlight or a large change in the ambient temperature;
- places with flammable materials or gases or an explosive atmosphere.

2.1.2 Restricted Locations

The SMILE5 shall not be installed —
(a) in restricted locations as defined for panels in AS / NZS 3000;
(b) within 600 mm of any heat source, such as hot water unit, gas heater, air conditioning unit or any other appliance.
(c) within 600 mm of any exit;
(d) within 600 mm of any window or ventilation opening;
(e) within 900 mm of access to 240 Vac connections; and
(f) within 600 mm of side of other device.

A SMILE5 installed in any corridor, hallway, lobby or the like and leading to an emergency exit shall ensure sufficient clearance for safe egress of at least 1 meter.
The SMILE5 must also not be installed in potentially explosive atmospheres for gas cylinders that are heavier than air gases and have a vent clamp in accordance with AS / NZS 3000.

2.1.3 Barrier to Habitable Rooms

To protect against the spread of fire in living spaces where the SMILE5 is mounted or on surfaces of a wall or structure in living spaces with a SMILE5 on the other side, the wall or structure shall have a suitable non-combustible barrier. If the mounting surface itself is not made of a suitable non-combustible material, a non-combustible barrier can be placed between the SMILE5 and the surface of a wall or structure.
If the SMILE5 is mounted at a wall or at a distance of 300 mm from the wall or the structure separating it from the habitable space, the distances to other structures or objects must be increased. The following distances must remain free :

(i) 600 mm beside the SMILE5;
(ii) 1200 mm above the SMILE5; and
(iii) 600 mm before the SMILE5.

If the distance between the Storion SMILE5 and the ceiling or any object above the system is less than 1200 mm, the ceiling or structural surface above the system must be made of noncombustible material within a radius of 600 mm around the system.
The SMILE5 must be mounted to ensure the highest point is not more than 2.2 m above the ground or the platform.

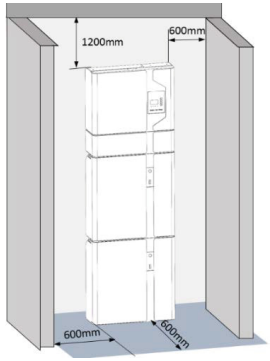


Figure 9 Limit Distance of Installation to Neighboring Objects

2.2 Installation

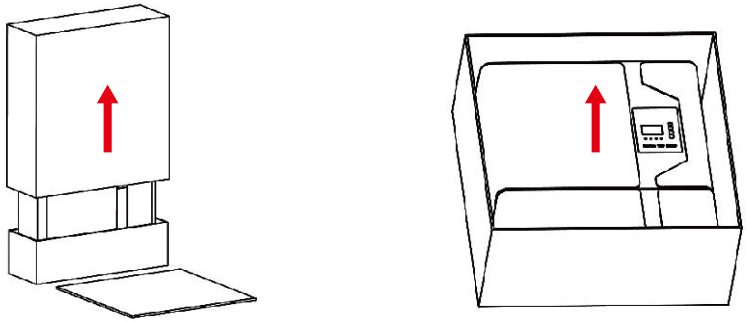


Figure 10 Unpacking the inverter and battery

Step 1 Remove the battery and inverter from the packaging box.

2.2.1 Battery Installation

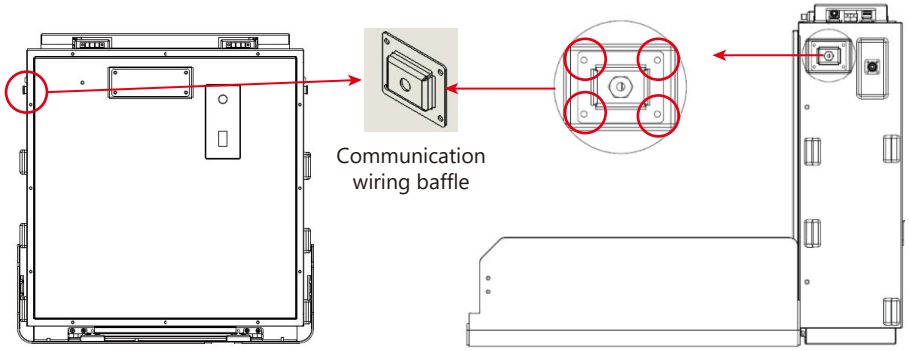


Figure 11 Battery with Lid off - Front View

Figure 12 Battery with Lid off – Side View

Step 2 Open the front cover of the battery and remove the communication wiring cover (each battery has such a cover on the left and right sides of the case.). Set the covers aside and close the case.

> NOTE:
> The front cover of the battery should not be opened more than 90°

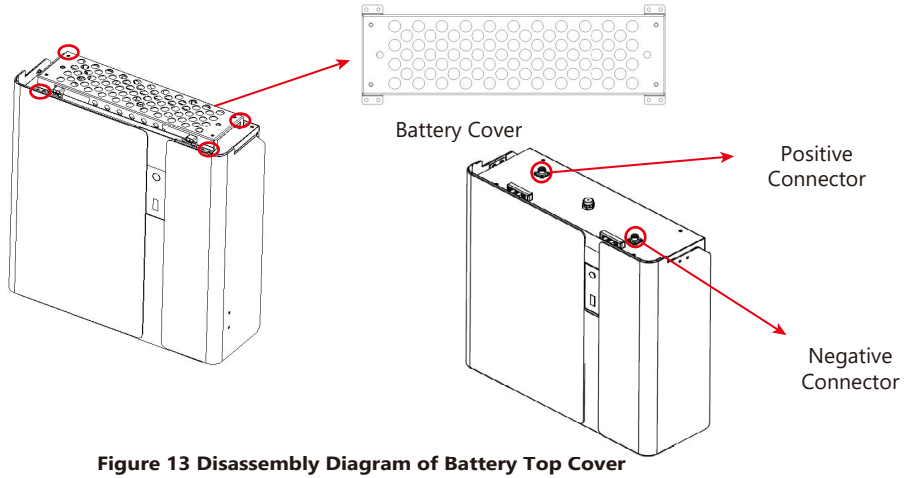


Figure 13 Disassembly Diagram of Battery Top Cover

Step 3 If you use more than 1 battery module, they must be interconnected. For all other battery modules (battery modules 2-6) you will have to remove the top cover (with 2 batteries you must remove the cover of one battery, with 3 batteries the covers of 2 batteries, with 4 batteries the covers of 3 batteries etc.) For the new version battery please connect the power cables directly.

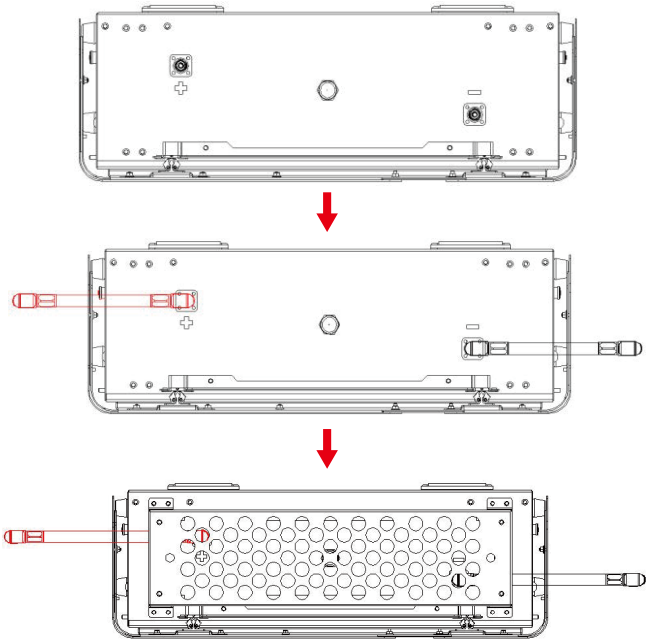


Figure 14 Battery power cable installation diagram

Step 4 Close the battery front cover and connect the power cable at the top, which are included in the parts list of SMILE5-BAT

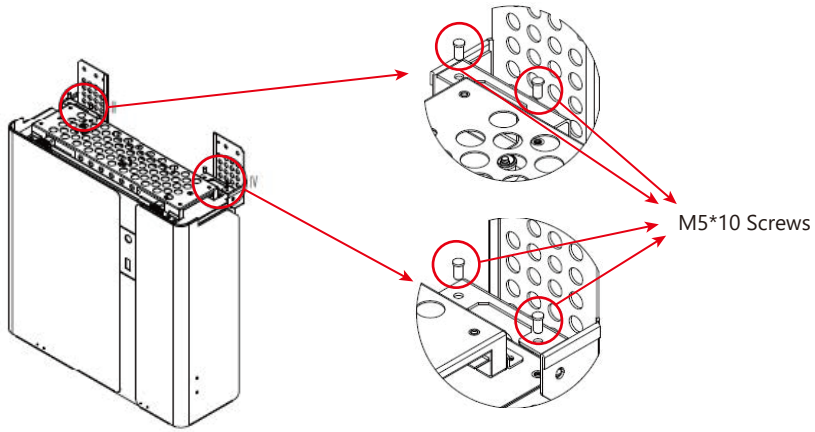


Figure 15 Assemble Battery Mounting Panel

Step 5 Assemble the battery mounting panel on the battery.

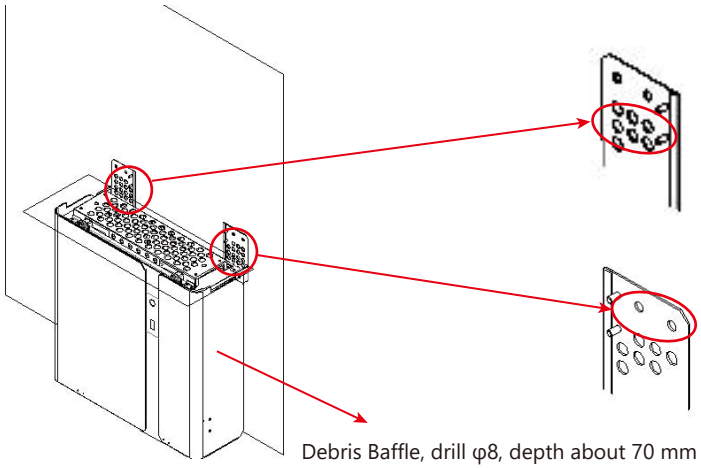


Figure 16 Battery Installation - Drill Holes

Step 6 Position the battery parallel to the wall and use a Φ8mm drill to drill holes at a depth of about 70mm in the wall for subsequent fixation of the mounting plates.

> ⚠ NOTE:
>
> The typeAC RCD must be installed on the backup port of the system. In additon, the installation of inverter must fulfill AS/NZS 3000,AS/NZS 4777.1 and AS/NZS 5033.

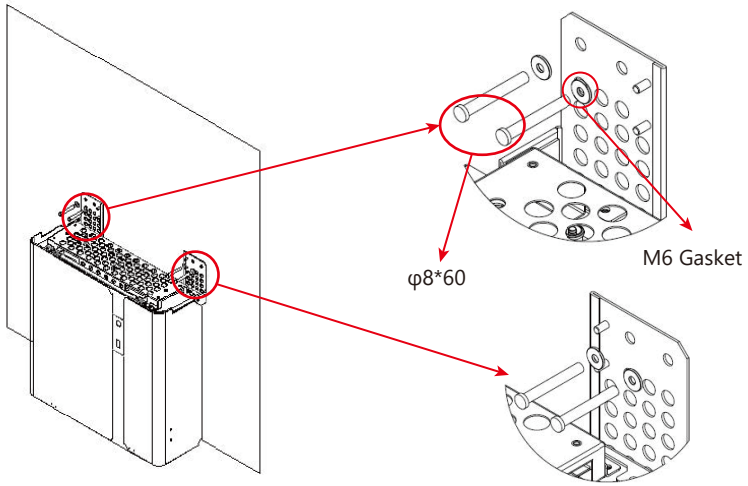


Figure 17 Battery Installation – Mounting on the Wall

Step 7 Remove the debris baffle and secure the battery to the wall with screws and gaskets.

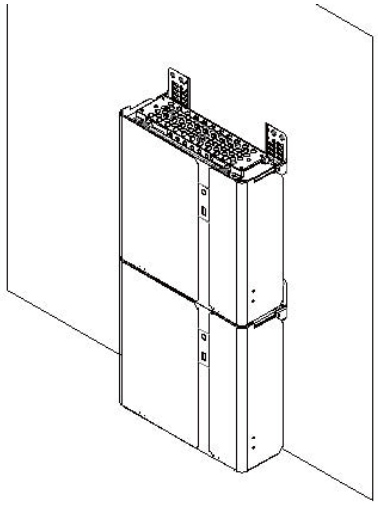


Figure 18 Battery Installation – Second Battery Installation

Step 8 To assemble the second (and all other) battery, repeat steps 6 and 7, respectively.

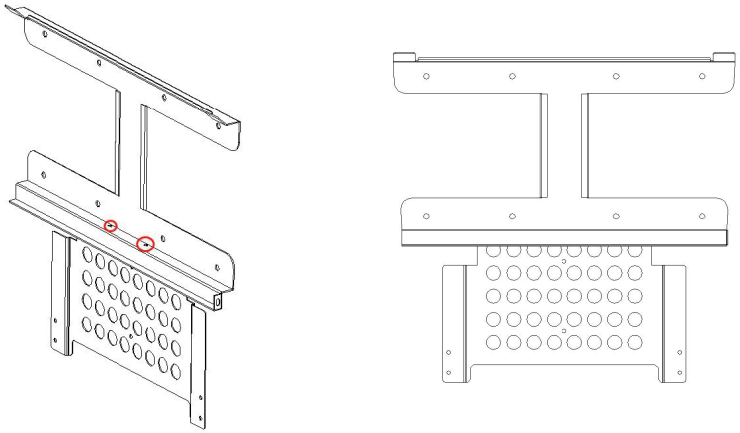


Figure 19 Inverter Mounting Panel Installation

Step 9 Remove the inverter mounting plate and bracket. And connect them using the M4 nuts as shown above. Check carefully if everything is tight.

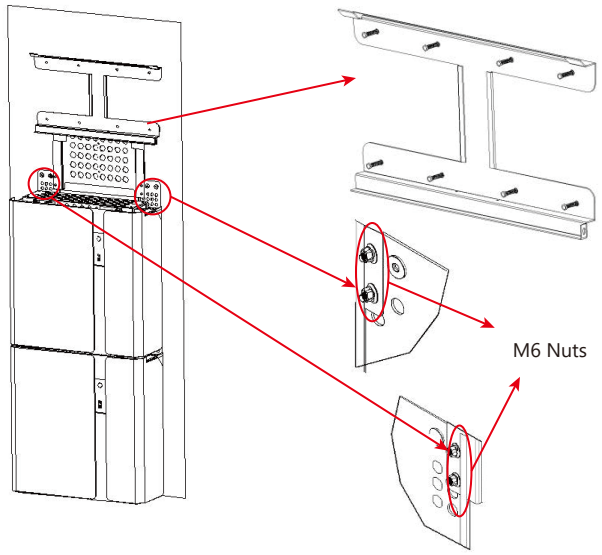


Figure 20 Inverter Installation - Inverter Mounting Panel

Step10 Drill the corresponding holes into the wall with a drill and fix the inverter mounting plate with screws on the wall and with the M6 nuts to the mounting plate of the battery. The battery assembly is now complete.

2.2.2 Inverter Installation

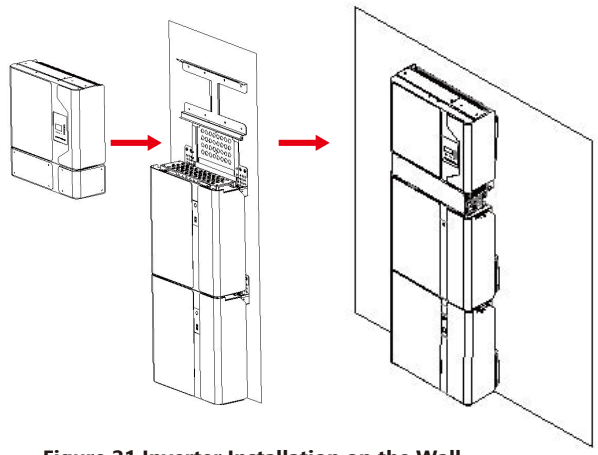


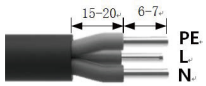
Figure 21 Inverter Installation on the Wall

Step11 Hang the inverter onto the mounting panels, adjust the entire system and ensure that the battery and the inverter have been securely hung onto the panels and brackets.

Step12 Please make AC cables on site.

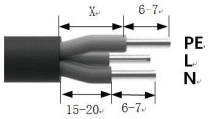
Step12-1 Please follow the AC cable requirements below.

For backup AC cables the stripping method is as following:



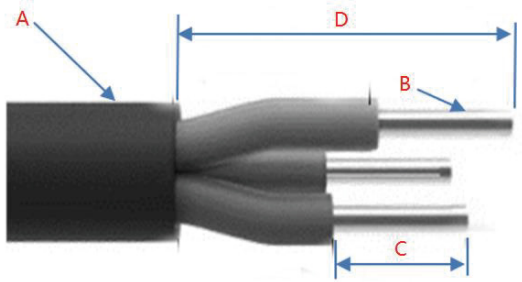
Strip the insulation sheath of the three-core AC cable for about. 30mm. Strip L, N and PE cables for 6-7mm respectively.

For grid AC cables the stripping method is as following:



Strip the insulation sheath of the three-core AC cable for about 35mm. Cut L and N cable for 5mm. Strip L, N and PE cables 6-7mm for respectively to make sure X-length is 5mm longer than Y-length of L/ N cable.

Object	Description	Description
A	External diameter	8 mm to 14 mm
B	Conductor cross-section	2.5 mm^2 to 4 mm^2
C	Stripping length of the insulated conductors	approx.6.5mm
D	Stripping length of the outer sheath of the AC cable	approx. 30 mm (Backup) approx.30mm (Grid L and N) approx.35mm (Grid PE)

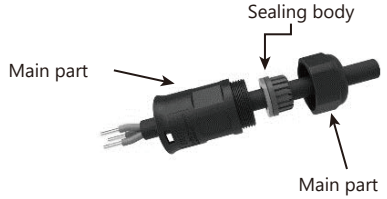


Step12-2 Assemble the AC connector and connect the conductor to the AC connector

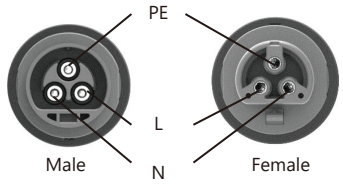
Step12-3 Ensure that all conductors are securely connected to the AC connector.

Step12-4 Plug the AC connector into the jack for the AC connection.

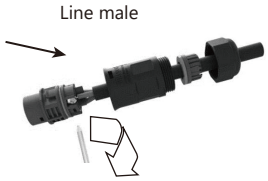
a. Parts are equipped with cables



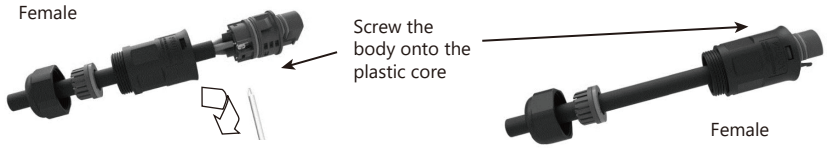
b. Crimp the wire according to the position shown, tighten the screw torque0.8±0.1N·m.



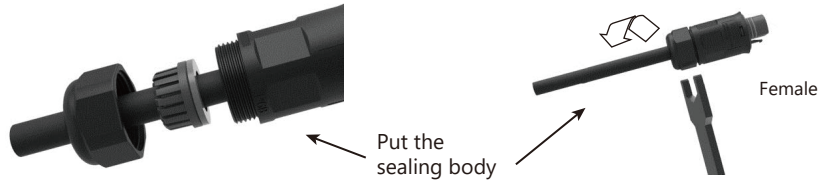
Insert the cables into the corresponding Pin holes and tighten the screws with the screwdrivers.



c. The plastic core is screwed into the body



d. Put the sealing body into the main body groove, and then tighten the lock nut to the main body with a wrench. Torque 2.0±0.3 N·m



Put the sealing body into the main body and lock the lock nut with a wrench

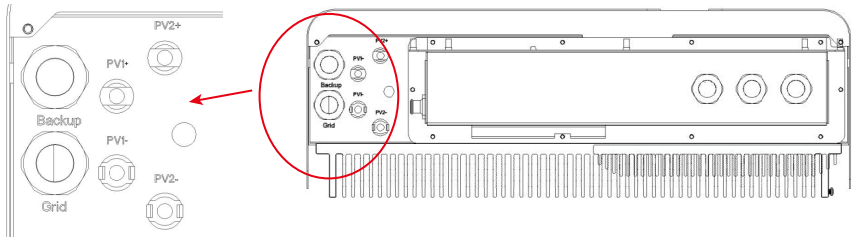


Figure 22 Cable Box Bottom View, Wiring Connectors

Step12-5 Connect the Backup and Grid cables in advance according to the connector mode, and connect them to the Backup and Grid board connectors in turn.

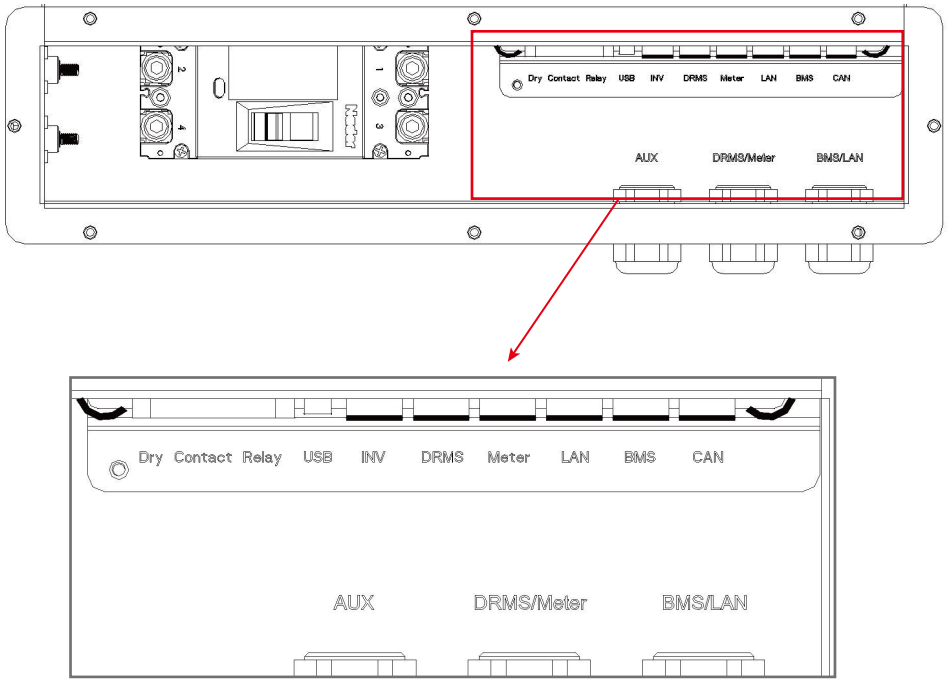


Figure 23 Communication interface of the inverter

Step13 Take out the communication cable set provided in the accessory parts of one SMILE5-BAT, cut off one end and crimp a new RJ45 connector. If there are two batteries, you only need to remake one of battery communication cable on site.

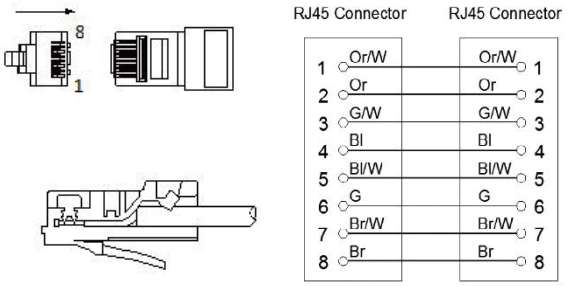


Figure 24 Network Cable Type B

> **NOTE:**
>
> The communication cable is in type B, see Figure 23. Leave the power cables and communication cables hanging on outside. Leave the device aside.

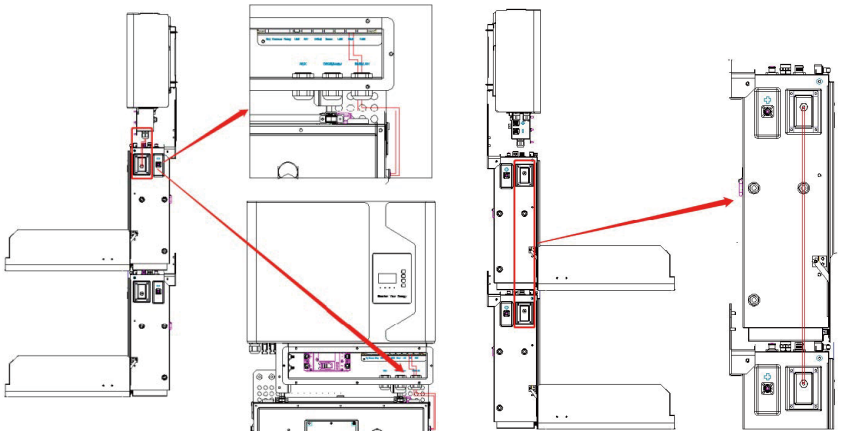


Figure 25 Wiring the Communication Cable

Step14 Connect the BAT communication cable of the cable box from Step 13 to the topmost battery at the right side. Then use the communication cable supplied with the batteries to connect the batteries to each other via the respective connectors on the left side. After you have connected all the modules together, close all covers (if you want to connect further battery modules, you must mount them before closing).

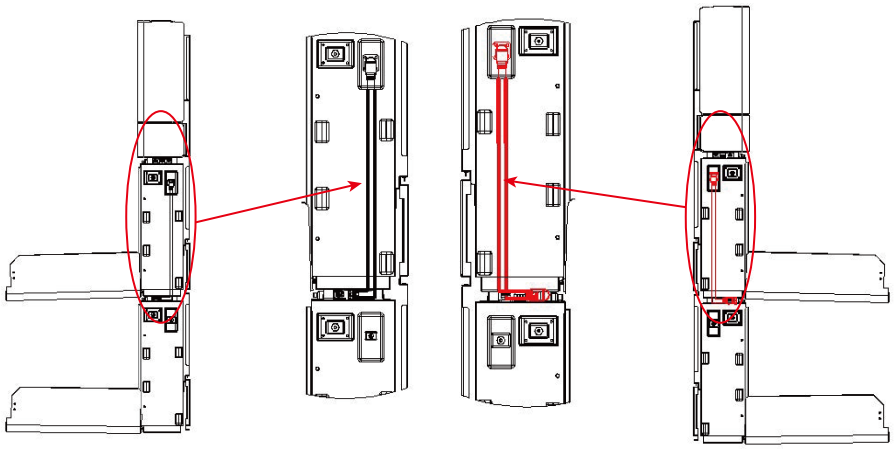


Figure 26 Wiring the Battry Power Cable

Step15 Connect the power cables of the bottom battery from Step 4 to the side terminals of the top battery. Make sure that red connects to red and black connects to black.

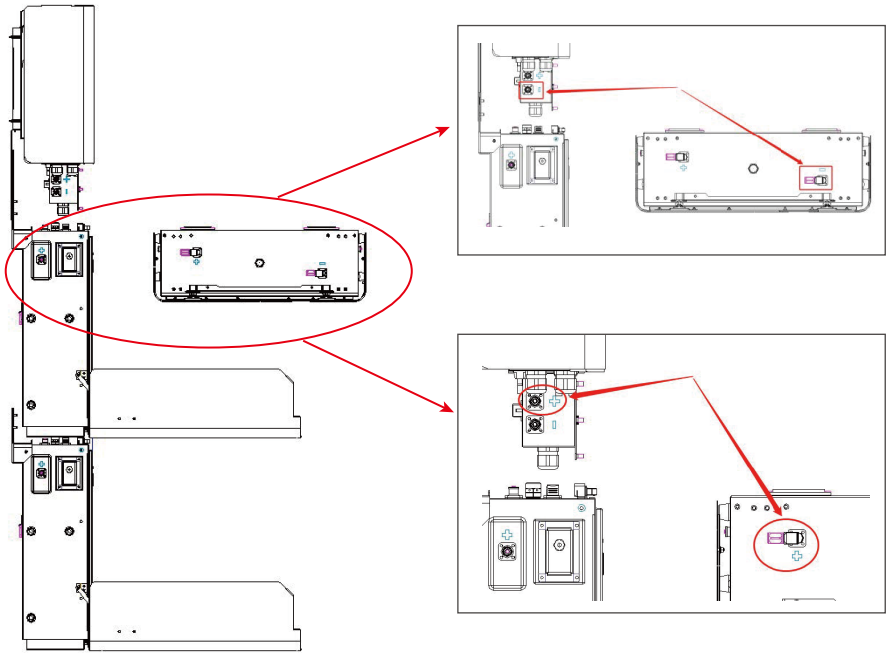
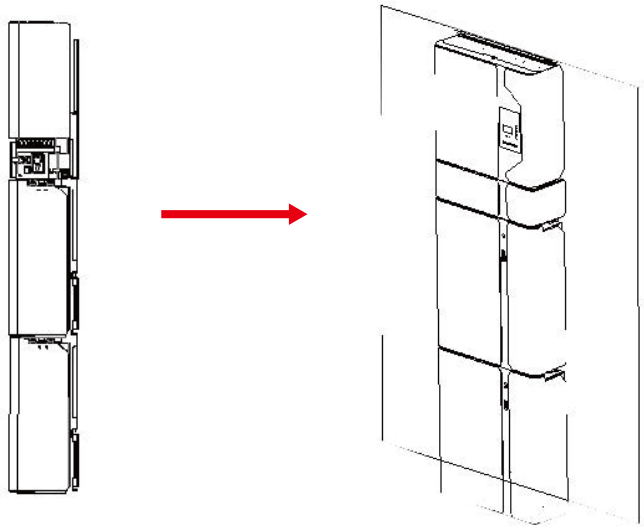


Figure 27 Wiring the Power Cable of the Cable Box

Step16 Connect the power cable of the top battery from Step 4 to the terminals of the cable box. Make sure that red connects to red and black connects to black.



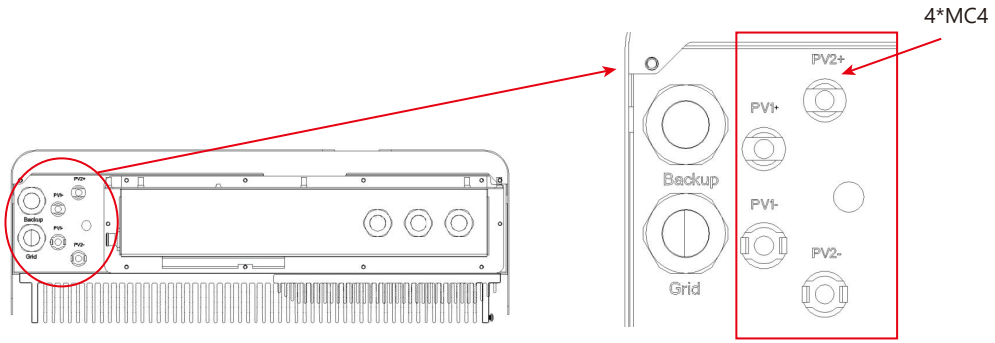


Figure 28 PV Wiring

Step17 Close the battery covers and connect the PV-MC4 connectors to the system (connection on both sides). Also, connect all AC cables, the meter communications cable METER, and the Ethernet cable LAN. Then close the cable box cover.

The installation is now complete.

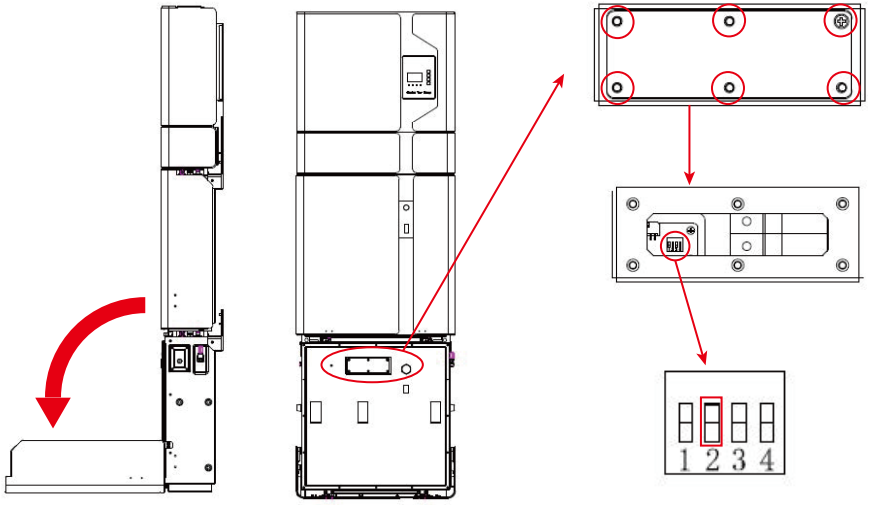


Figure 29 DIP Operation

Step18 Open the front cover of the last battery and remove the DIP cover. Now set the DIP switch 2 to "on" mode and close the cover again.

1. If there is only one BAT, the DIP switch of this BAT must be set following:

Battery Position	DIP 1	DIP 2	DIP 3	DIP 4	DIP Switch
Battery	OFF	ON	OFF	OFF	

2. If there are two or more than two BATs, the DIP switch of the BATs must be set following:

Battery Position	DIP 1	DIP 2	DIP 3	DIP 4	DIP Switch
Non-bottom battery	OFF	OFF	OFF	OFF	
Bottom battery	OFF	ON	OFF	OFF	

NOTE:

The DIP setting is only changed on the last battery.

If you connect more than 2 battery modules to the system, please only install the additional batteries 3-6 on the side of the system. You can connect up to 6 batteries, 2 each mounted on top of each other, to the SMILE 5.

To do this, carry out the individual installation steps as for the first two batteries, including the DIP setting on the last module.

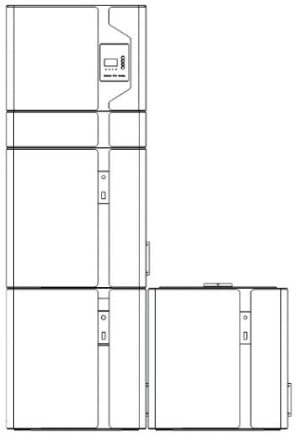


Figure 30 Increase the Battery Modules

NOTE:

Recommended AC circuit breaker rating is 32A.

NOTE:

Installer in Australia or New Zealand must install external cuicult breaker or switch for PV, backup and grid side.

NOTE:

In Australia and New Zealand, the neutral of backup and grid circuit should be externally connected on the neutral bar.

2.2.3 Single Line Diagram

The single line diagrams of DC-, AC- and Hybrid-coupled sysyem are as below:

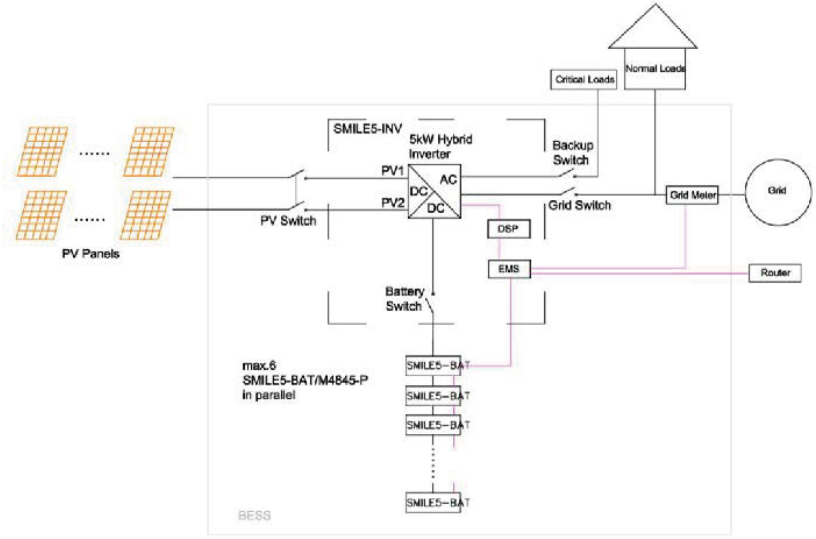


Figure 31 DC-coupled system

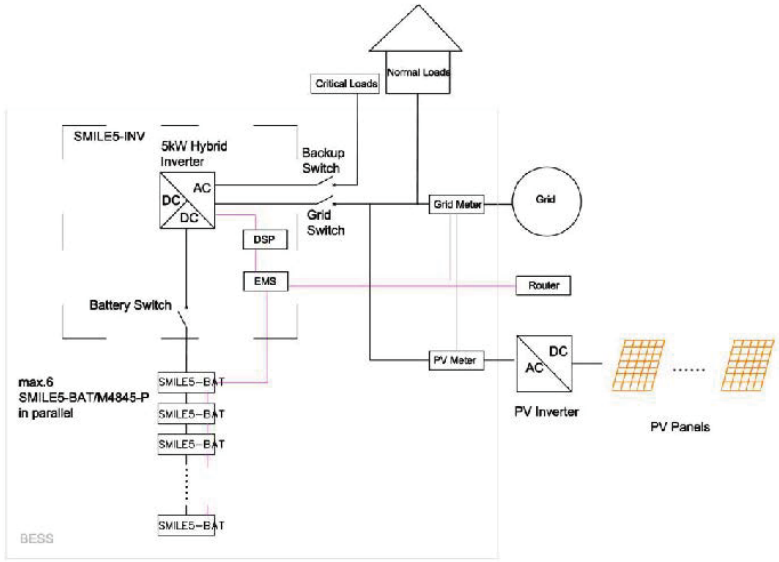


Figure 32 AC-coupled system

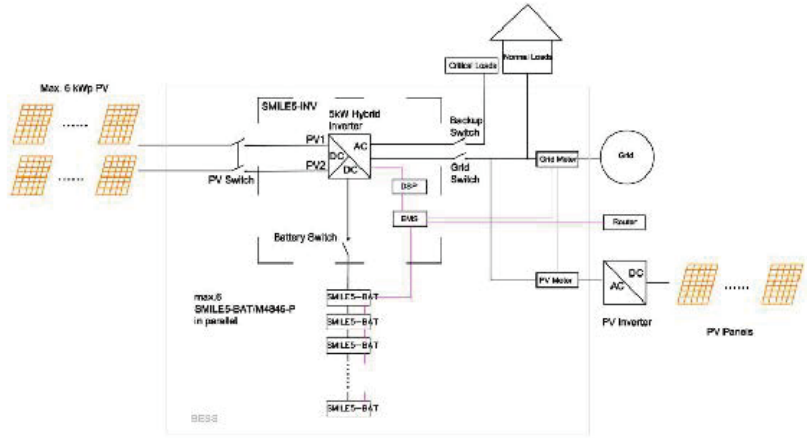


Figure 33 Hybrid-coupled system

2.3 Power Meter Wiring

The electricity meter should be mounted and connected at the grid transition point (feed-in point) so that it can measure the grid reference and feed-in power. Alpha ESS currently provides 4 different power meter solutions:

- ★ADL-3000: three-/ single-phase meter (with or without CT)
- ★SM60A: single-phase meter
- ★Backup Box: three-/ single-phase meter (Contain off-grid switching and load management)
- ★ACR10R: Three-phase CT electric meter

Table 1 CT meter ratio and accuracy table

Model	CT ratio	Accuracy
ADL3000-N/CT & 300A/5A CT	60	0.6 kWh
ADL3000-N/CT & 400A/5A CT	80	0.8 kWh
ADL3000-N/CT & 400A/1A CT	400	4.0 kWh
ACR10R-100A CT	100	1.0 kWh
ACR10R-200A CT	200	2.0 kWh

2.3.1 Meter ADL-3000 (If Applicable)

2.3.1.1 Single-phase in House

ADL-3000 single-phase connection (without CT, without meter plug), if applicable:

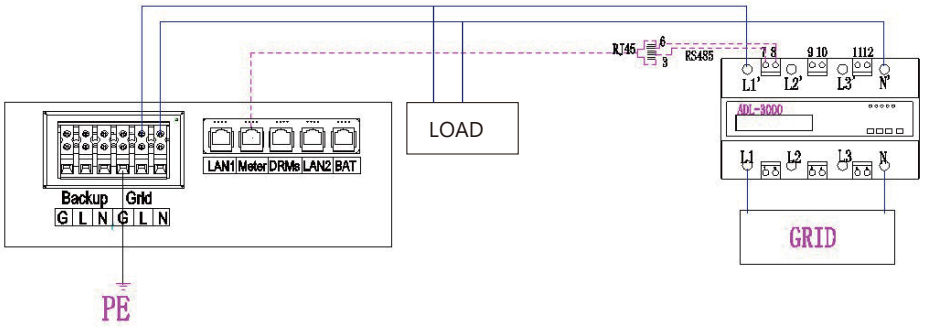


Figure 34 ADL-3000 single-phase Connect (with CT, without Meter Plug)

NOTE:

Connect the power meter (PIN 7, 8) to the meter port of the cable box (PIN 3, 6) using the RJ45 cable.

ADL-3000 single-phase connection (without CT, with meter plug), if applicable:

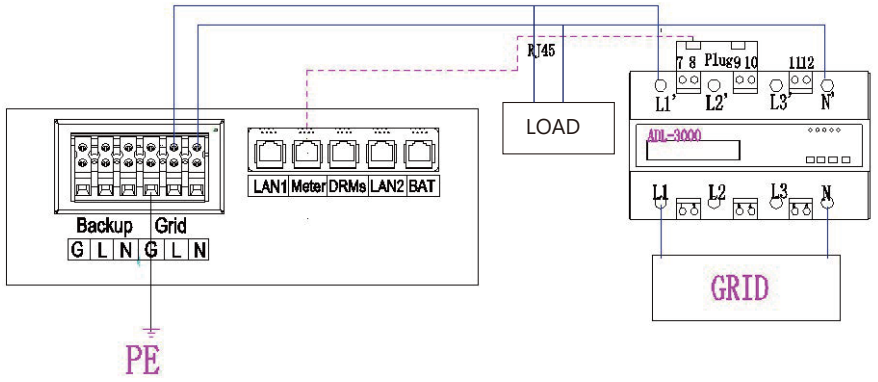


Figure 35 ADL-3000 single-phase Connect (without CT, with Meter plug)

ADL-3000 single-phase connection (with CT, without meter plug), if applicable:

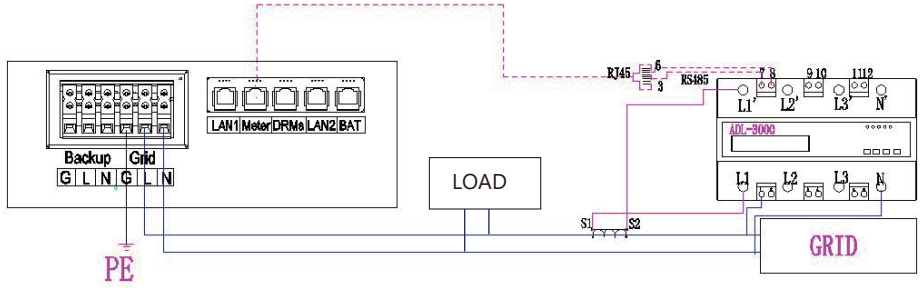


Figure 36 ADL-3000 single-phase Connect (with CT, without Meter plug)

NOTE:

Connect the power meter (PIN 7, 8) to the meter port of the cable box (PIN 3, 6) using the RJ45 cable.

ADL-3000 single-phase connection (with CT, meter plug), if applicable:

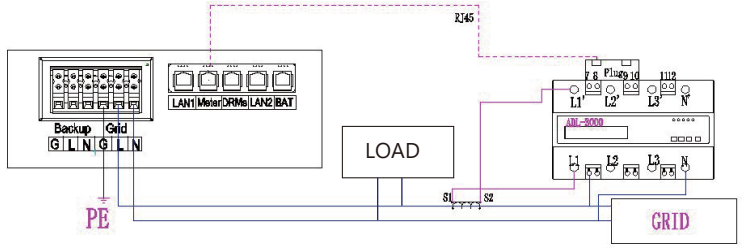


Figure 37 ADL-3000 single-phase Connect (with CT, with Meter plug

2.3.1.2 Three-phase in House

ADL-3000 three-phase connection (without CT, without meter plug), if applicable:

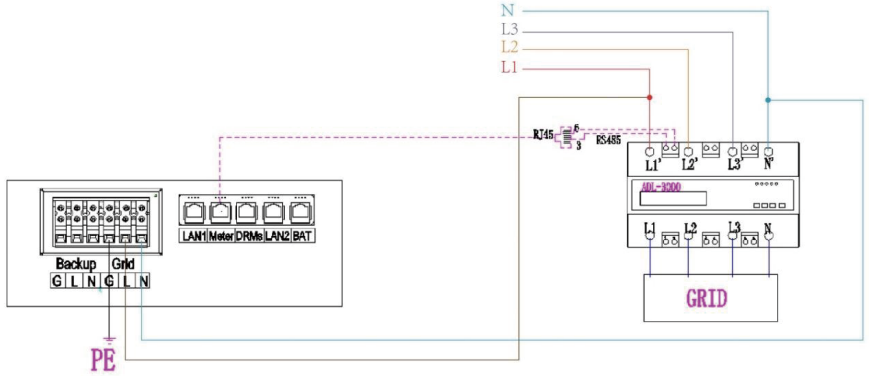


Figure 38 ADL-3000 three-phase Connect (without CT, without Meter plug)

NOTE:

Connect the power meter (PIN 7, 8) to the meter port of the cable box (PIN 3, 6) using the RJ45 cable.

ADL-3000 three-phase connection (without CT, with meter plug), if applicable:

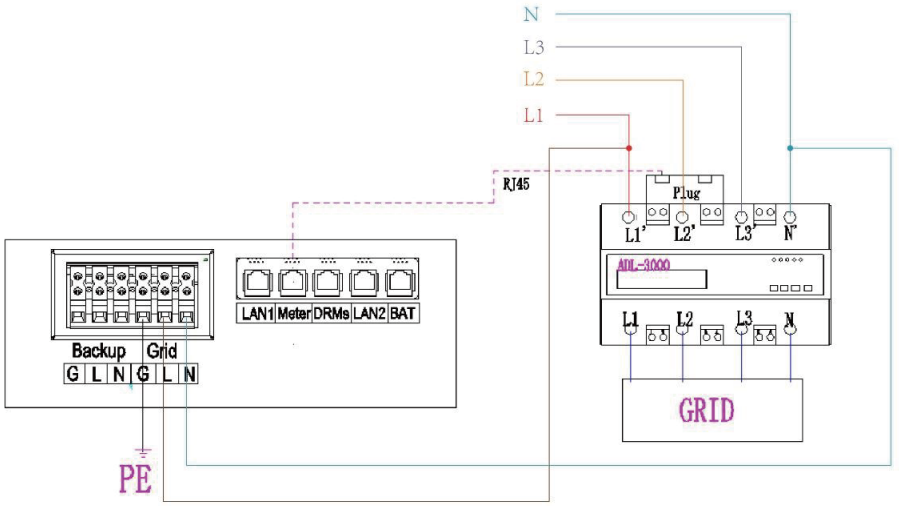


Figure 39 ADL-3000 three-phase Connect (without CT, without Meter plug)

ADL-3000 three-phase connection (with CT, without meter plug), if applicable:

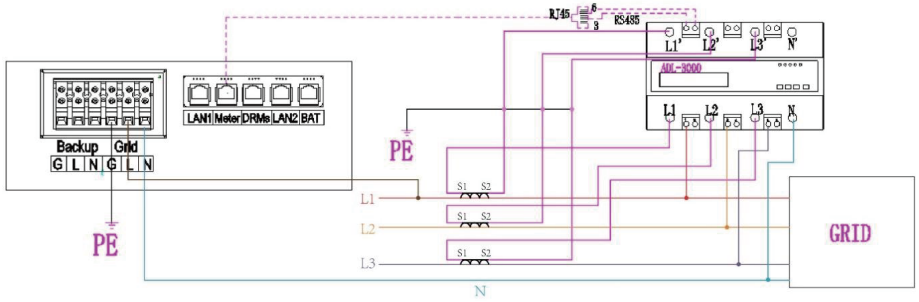


Figure 40 ADL-3000 three-phase Connect (with CT, without Meter plug)

NOTE:

Connect the power meter (PIN 7, 8) to the meter port of the cable box (PIN 3, 6) using the RJ45 cable.

ADL-3000 three-phase connection (with CT, without meter plug), if applicable:

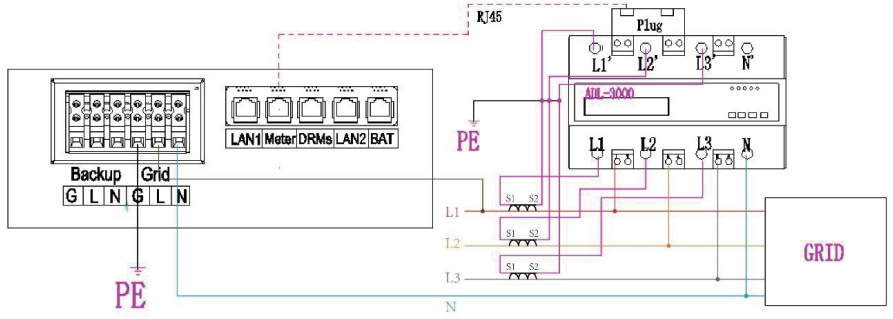


Figure 41 ADL-3000 three-phase Connect (with CT, with Meter plug)

NOTE:

To connect the current transformer, connect S1 to L1 and S2 to L1'.

For AC/Hybrid system, there are two meter needed:

Option 1: with Meter Plug

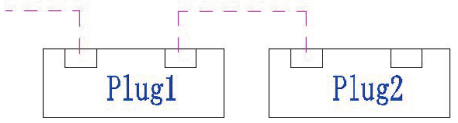


Figure 42 Two Meter Connect, with Meter Plug

Option 2: without Meter Plug

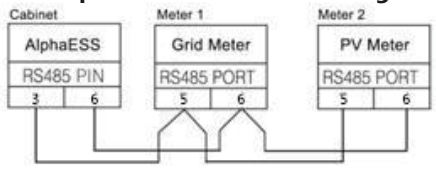


Figure 43 Two Meter Connect, without Meter Plug

NOTE:

If the ADL3000 meter with CT is used as a grid meter, the direction of arrow in CT should point away from the grid to the energy storage system.
If the ADL3000 meter with CT is used as a PV meter in AC- or hybrid-coupled system, the direction of arrow in CT should point away from the PV inverter to the energy storage system.

2.3.2 Meter SM60A (If Applicable)

2.3.2.1 SM60A Connect (with Meter Plug), If Applicable:

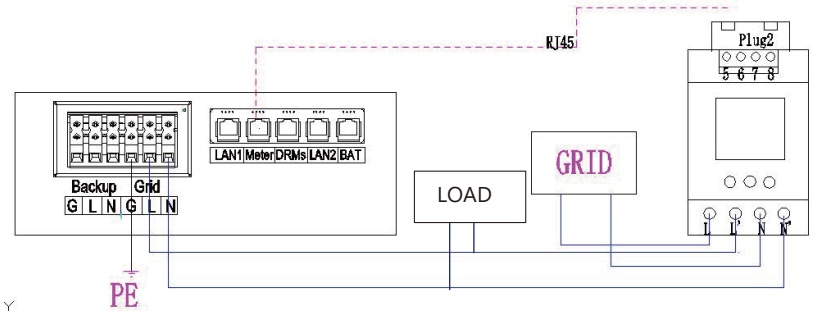


Figure 44 SM60A connect (with meter plug)

2.3.2.2 SM60A Connect(without Meter Plug), If Applicable:

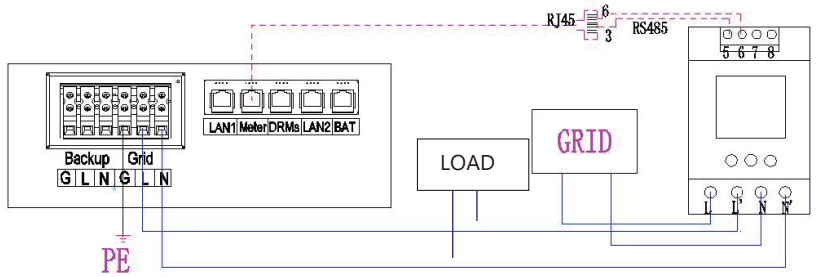


Figure 45 SM60A connect (without meter plug)

NOTE:

Connect the power meter (PIN 5, 6) to the meter port of the cable box (PIN 3, 6) using the RJ45 cable.

For AC/Hybrid system, there are two meter needed:

Option 1: with Meter Plug

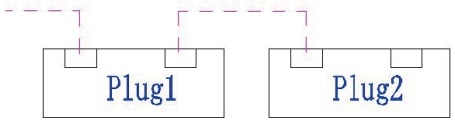


Figure 46 Two Meter Connect, with Meter Plug

Option 2: without Meter Plug

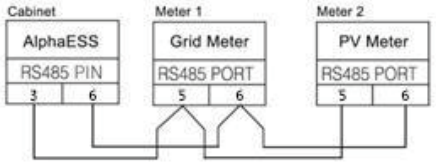


Figure 47 Two Meter Connect, without Meter Plug

2.3.3 ACR10R Meter (If Applicable)

2.3.3.1 ACR10R Single-phase Connection

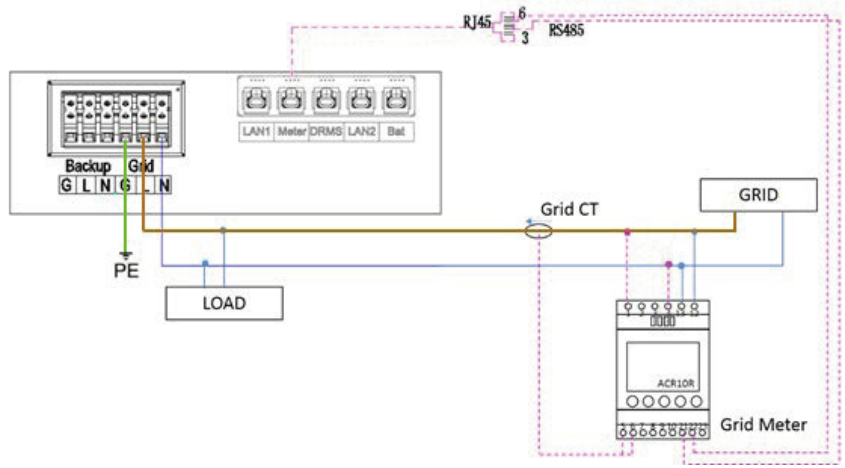


Figure48 ACR10R single-phase connection (if applicable)

2.3.3.2 ACR10R Three-phase Connection

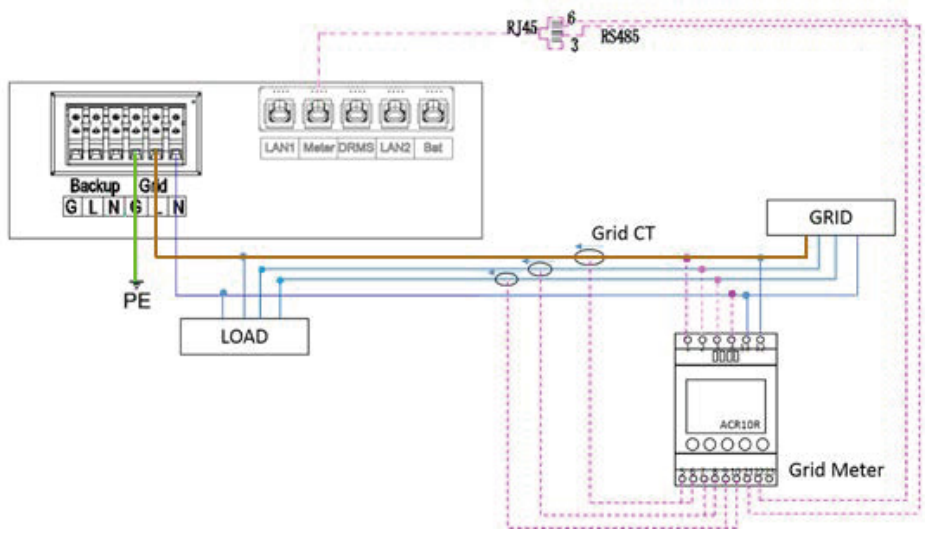


Figure 49 CR meter three-phase connection (if applicable)

NOTE:

Connect the power meter (PIN 21, 22) to the meter port of the cable box (PIN 3, 6) using the RJ45 cable.

For AC/Hybrid system, there are two meter needed:

without Meter Plug

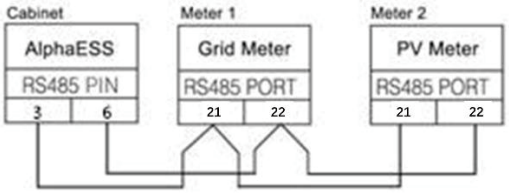


Figure 50 Two Meter Connect, without Meter Plug

If the ACR10 meter is used as a grid meter, the direction of arrow in CT should point away from the grid to the energy storage system.
If the ACR10R meter is used as a PV meter in hybrid system, the direction of arrow in CT should point away from the PV inverter to the energy storage system.

2.3.4 Backup Box (If Applicable)

Backup Box Connect to SMILE5 (single-phase grid in house):

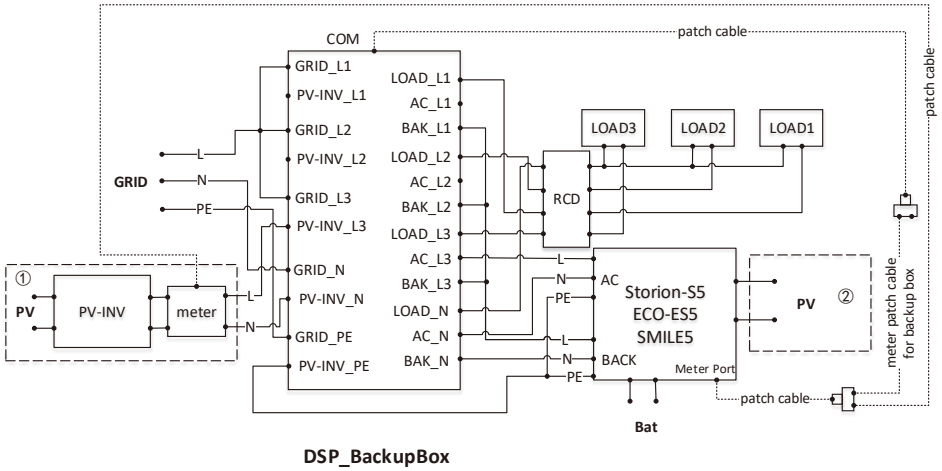
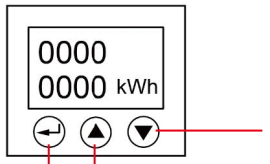


Figure 51 Backup Box Connect to SMILE5 (single phase grid in house)

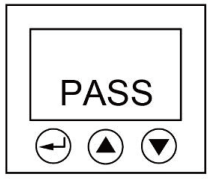
2.3.5 Meter Setting

2.3.5.1 SM60A

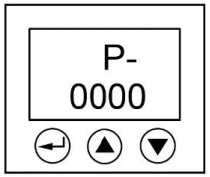
There are 3 buttons on the front of the electricity meter:



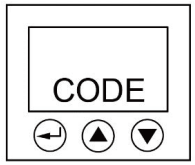
1. Down arrow: shift button
2. Up arrow: value adjustion
3. Enter button / Menu button

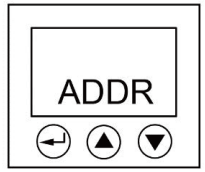


Step 1: Click the "Enter" button to enter the menu interface.

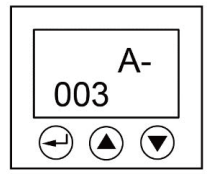


Step 2: Click the "Enter" button to input the password. The initial password is 0000. Then click the "Enter" button.

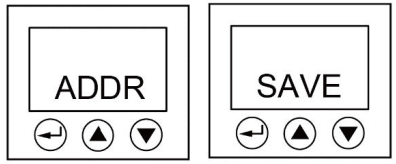




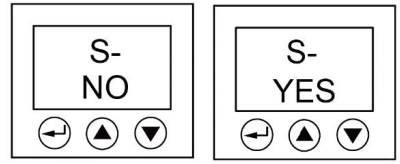
Step 3: You will get into the code interface. Then click the "Shift" button to enter the adress interface.



Step 4: Please set the meter address by using the "Value adjustion" button, the Grid meter (DC, AC and Hybrid system) address is set to 003, and the PV meter (AC and Hybrid system) address is set to 004.

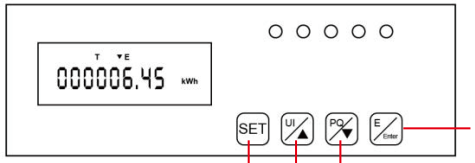


Step 5: Click the "Enter" button to get back to the menu interface. Then click the "Shift" button 5 times to enter the save interface.



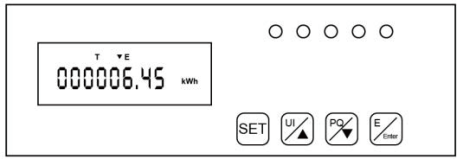
Step 6: Click the "Shift" button to save the setting.

2.3.5.2 ADL3000

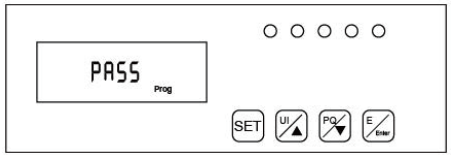


There are 4 buttons on the front of the electricity meter:

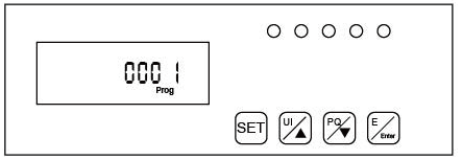
1. Enter button / Energy button
2. Down arrow / Power button
3. Up arrow / Voltage & current button
4. SET button



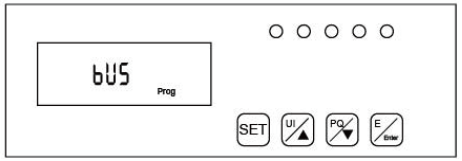
Step 1: The initial interface of the meter (normal working mode) is shown above.



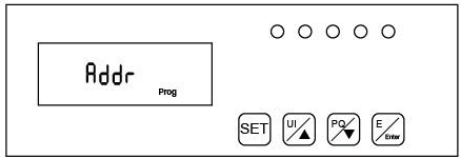
Step 2: Click the “SET” button to enter the password interface



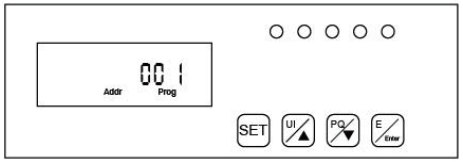
Step 3: Click the "Enter" button to enter the above interface, and press the up and down arrow keys to enter the password 0001.



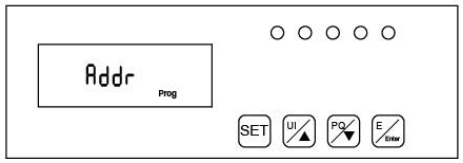
Step 4: Click the "Enter" button and the password input is completed.



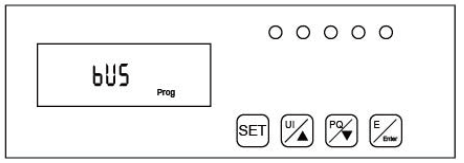
Step 5: Click the “Enter” button again to enter the address interface



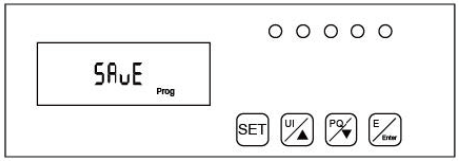
Step 6: Click the “Enter” button and press the up and down arrow keys to set the meter address. The Grid meter (DC, AC and Hybrid system) address is set to 001, the PV meter (AC and Hybrid system) address is set to 002.



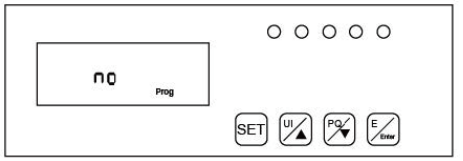
Step 7: Click the "Enter" button and the address setting is completed.

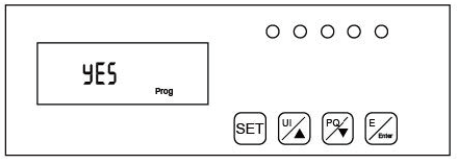


Step 8: Click the “SET” button to enter the following interface



Step 9: Click the “SET” button again to enter the save interface

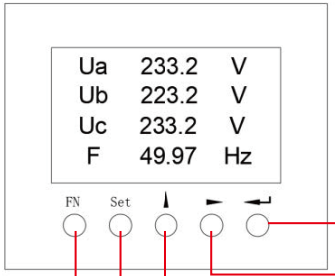




Step 10: Click the “Enter” button to enter the following interface, press the up and down arrow keys, and set “no” to “YES” to save the configuration.

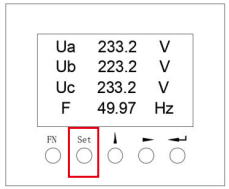
Step 11: Click the "Enter" button and the setting ends.

2.3.5.3 ACR10R

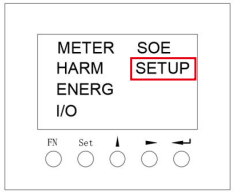


There are 5 buttons on the meter's front:

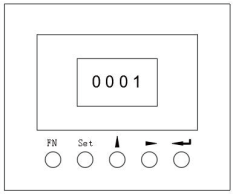
1. Enter key
2. Arrow to the right
3. Up arrow
4. SET button
5. FN key (no function)



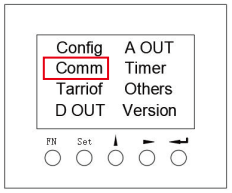
Step 1: Activate the meter display by pressing any key. Then click the "Set" button.



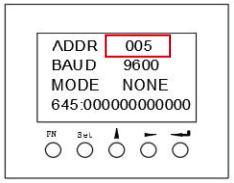
Step 2: Use the arrow keys to select the "SETUP" menu item and confirm your selection with the Enter key.



Step 3: Enter the password "0001" and confirm the entry by pressing the Enter key.



Step 4: Select the menu item "Comm" in the settings menu to change to the communication settings.



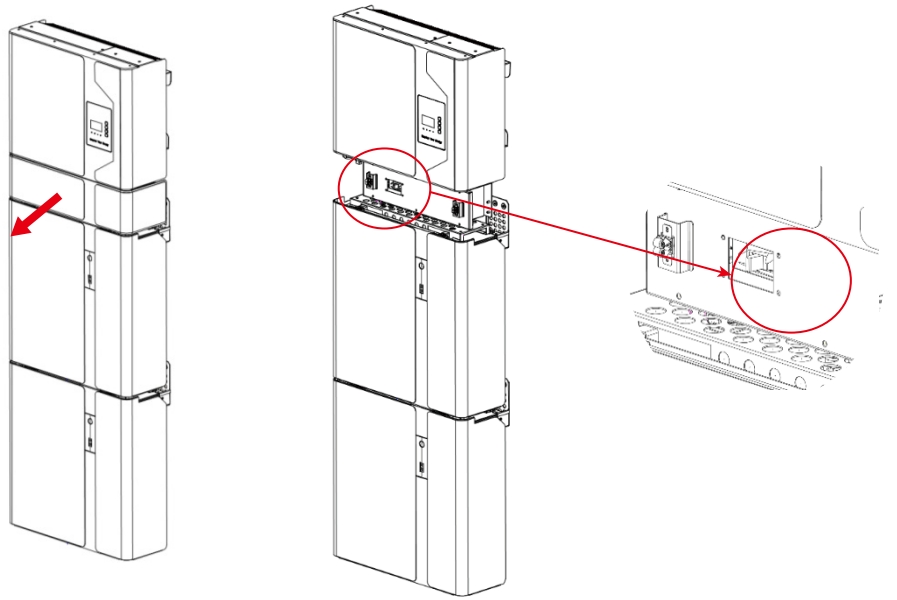
Step 5: Set the communication address and communication baud rate in the communication setting interface. When the meter is used as Grid meter (DC, AC/Hybrid system), the address is set to “005” . When it is used as the PV meter (AC/Hybrid system), the address is set to “006” . The baud rate is set to 9600.

03 SYSTEM OPERATION

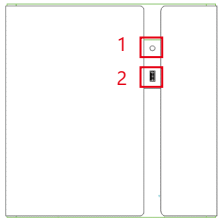
3.1 Switch On

When turning on the system, it is very important to follow the steps below to prevent damage to the system.

WARNING: Please check the installation again before turning on the system.



Step 1: Turn on the external PV switch
Step 2: Turn on the external grid switch.
Step 3: If backup load is applied, turn on the external Backup switch.



NOTE:
the Backup switch is only used when a backup load is applied.

Step 4: Open the outer shell of the cable box. Open the battery switch cover and turn on the battery switch on the cable box.
Step 5: Press power button on all the batteries until the indicator lights turn on.
Step 6: Close the battery switch cover and the outer shell of the cable box.

3.2 Switch Off

Step 1: Press the power button on all the batteries, till the lights turn off.
Step 2: Open cable box outer shell, open the battery switch cover and turn off the battery switch.
Step 3: Turn off the external grid switch.
Step 4: If backup load is applied, turn off the external backup switch.
Step 5: Turn off the external PV switch on the cable box.
Step 6: Close the battery switch cover and the outer shell of cable box.
More information can be found in SMILE5-BAT user manual.

3.3 Emergency Procedure

When the SMILE5 energy storage system appears to be running abnormally, you can turn off the grid-connected main switch that directly feeding the BESS, and turn off all load switches within the BESS, turn off the battery switch at the same time. To prevent a potentially fatal personal injury, if you want to repair or open the machine after the power is switched off, please measure the voltage at the input terminals with a suitably calibrated voltage tester.
Before working on this equipment, please confirm that there is no grid electric supply to the BESS!
The upper cover plate cannot be opened until the DC-link capacitance inside the battery modules discharges completely about 15 minutes later.

3.3.1 Emergency Handling Plan

1. Disconnect the AC breaker.
2. Check the control power supply. If it is OK, return the power supply to find out the reason.
3. Please record every detail related to the fault, so AlphaESS can analyse and solve the fault. Any operation of equipment during a fault is strictly forbidden, please contact Alpha as soon as possible.
4. As battery cells contains a little Oxygen inside and all cells have got explosion-proof valves, explosion hardly happens.
5. When the indicator light on the battery shows a red fault, check the fault type through the communication protocol, and contact our after-sales service personnel for advice.

3.3.2 Hazards

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If one is exposed to the leaked substance, immediately perform the actions described below:
Inhalation: Evacuate the contaminated area, and seek medical attention.
Eye contact: Rinse eyes with running water for 5 minutes, and seek medical attention.
Contact with skin: Wash the affected area thoroughly with soap and water, and seek medical attention.
Ingestion: Induce vomiting and seek medical attention.

3.3.3 Fire

If a fire breaks out in the place where the battery pack is installed, perform the following countermeasures:

Fire extinguishing media
During normal operation, no respirator is required. Burning batteries can not be extinguished with a regular fire extinguisher, this requires special fire extinguishers such as the Novec 1230, the FM-200 or a dioxin extinguisher. If the fire is not from a battery, normal ABC fire extinguishers can be used for extinguishing.

Fire -fighting instructions
1. If fire occurs when charging batteries, if it is safe to do so, disconnect the battery pack circuit breaker to shut off the power to charge.
2. If the battery pack is not on fire yet, extinguish the fire before the battery pack catches fire.
3. If the battery pack is on fire, do not try to extinguish but evacuate people immediately.

⚠ There may be a possible explosion when batteries are heated above 150°C.
When the battery pack is burning, it leaks poisonous gases. Do not approach.

Effective ways to deal with accidents
Battery in dry environment: Place damaged battery into a segregated place and call local fire department or service engineer.
Battery in wet environment: Stay out of the water and don’ t touch anything if any part of the battery, inverter, or wiring is submerged.
Do not use a submerged battery again and contact the service engineer.

04 EMS INTRODUCTION AND SET UP

4.1 Function Description

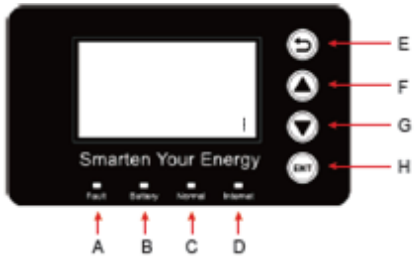


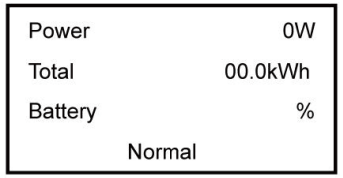
Figure 52 SMILE5 EMS Interface

Object	Name	Description
A	Indicator LED	Red: The inverter is in fault.
B		Green: The battery is in charging or discharging.
C		Green: The inverter is in normal state.
D		Green: The inverter is in communication.
E	Button Function	Return Button: Escape from current interface or function.
F		Up button: Move cursor to upside or increase value.
G		Down Button: Move cursor to downside or decrease value.
H		ENT Button: Confirm the selection.
I	LCD Screen	Display the information of the inverter in this LCD screen.

4.2 Introduction

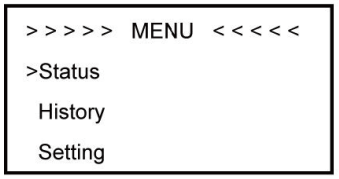
This part is suitable for EMS firmware-version 1.01.67 and above.

4.2.1 Main



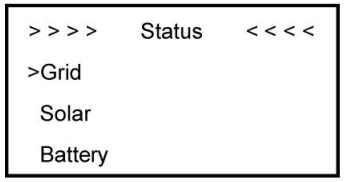
Main displays the inverter working status and information, including:

- Power: Current PV power
- Total: Total power generation.
- Battery: Current remaining battery power (SOC).
- Normal: Current working state of the equipment, including Standby.

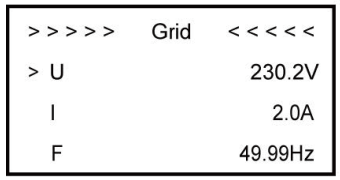


In the Main interface, press ENT key to enter the menu’ s main interface.
Use the up and down key to select a sub-menu, press the ENT key to enter the selected sub-menu, press Return key to return to the previous layer.

4.2.2 Status

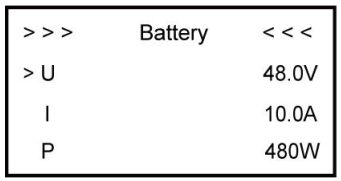


Status menu contains five sub-menus: Solar, Battery, Grid, UPS and Comm .These display the relevant information about the current physical or communication interface respectively.

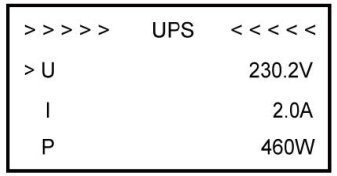


Grid interface displays the real-time information on the ultility grid side:
voltage U, current I, frequency F, P_{Inv}, $P_{MeterAC}$, $P_{MeterDC}$.

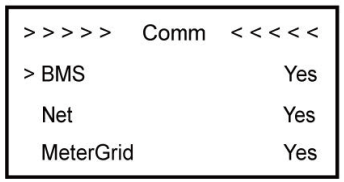
Solar interface displays the real-time information of PV side: voltage U1, current I1, power P1, voltage U2, current I2 and power P2.



Battery interface displays the real-time information of battery side: voltage U, current I, power P, residual capacity of Battery (SOC), the internal environmental temperature Temp

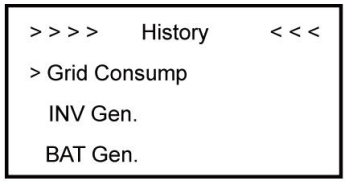


UPS interface displays the real-time information in this mode: voltage U, current I, power P, frequency F

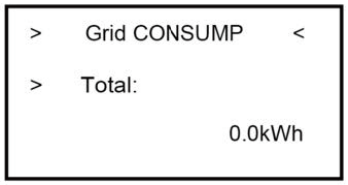


Communication interface displays the real-time communication situation of BMS, Net, MeterGrid and MeterDC.

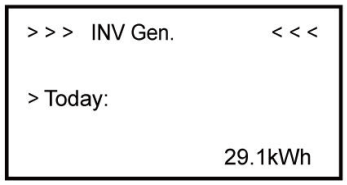
4.2.3 History



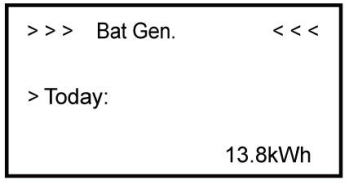
History menu contains seven sub-menus: Grid Consumption, INV Gen., BAT Gen., PV Gen., Grid Charge, PV Charge, Error Logs



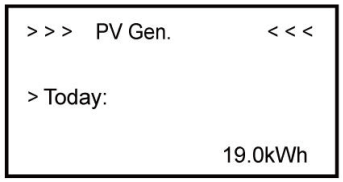
Grid Consumption interface displays today's or total load consumption from grid



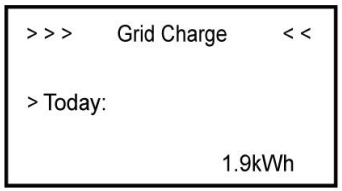
INV Gen. interface displays today's or total electricity quantity generated from SMILE5-INV.



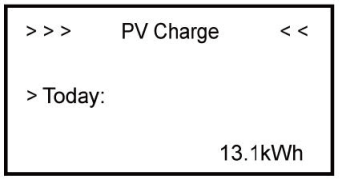
Bat Gen. interface displays today's or total electricity quantity discharged from the battery.



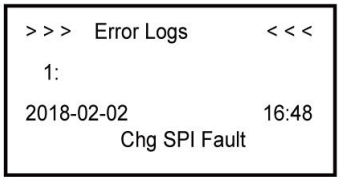
PV Gen. interface displays today's or total electricity quantity generated from the PV-panels.



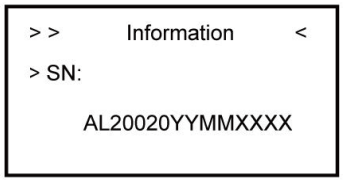
Grid Charge interface displays today's or total electricity quantity battery charged from the grid.



PV Charge interface displays today's or total electricity quantity battery charged from the PV-panels.



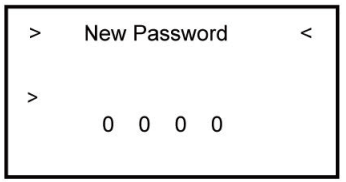
Error Logs interface displays the 10 latest fault records of this device, including the name of the fault and time of error.



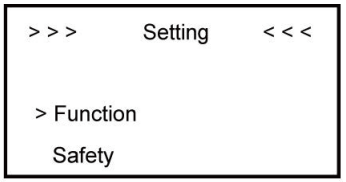
Make sure all numbers in the information menu are correct.

4.2.4 Setting

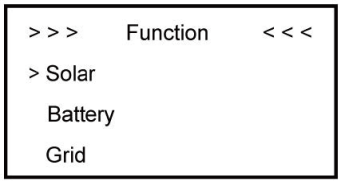
4.2.4.1 General Setting



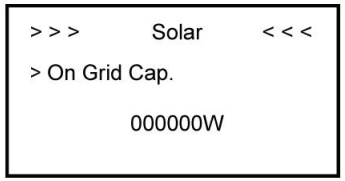
Step 1: Click setting and enter the password. The installation's password is a four-digits password: 1111, after four-digits password was correctly input, you can enter into the main Setting interface (administrator permissions).



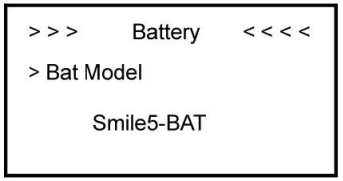
Step 2: Click Function to enter function setting.



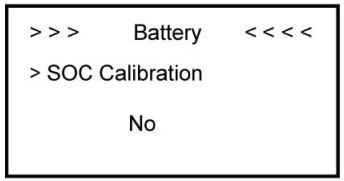
Step 3: Click Solar to set the Solar relevant information.



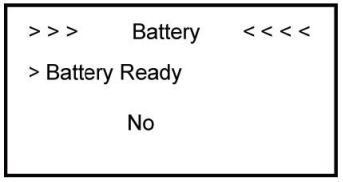
Step 4: Set on-grid capacity, storage capacity and number of PV strings (MPPT number).



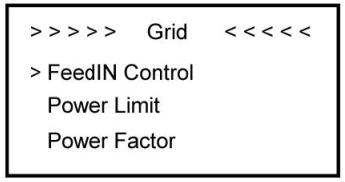
Step 5: Click the Battery Function and check battery type SMILE5-BAT.



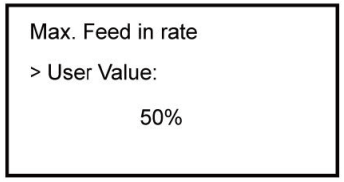
Step 6: Check SOC Calibration function set No.



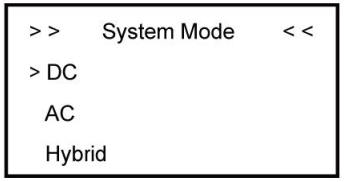
Step 7: Check the Battery Ready function set No. If you only use the inverter without battery, please set it Yes.



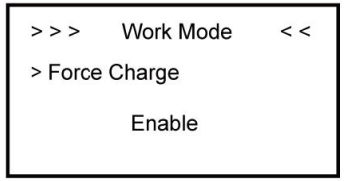
Step 8: Click the Grid Function to set up relevant parameters about the grid



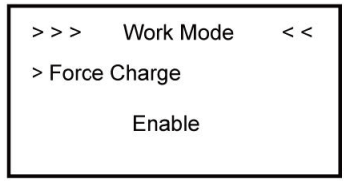
Step 9: Set the Max. Feed in rate value.



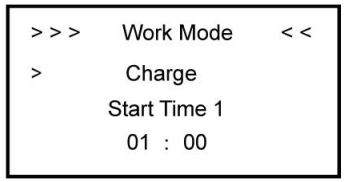
Step 10: Click Function-System Mode to set system mode: DC, AC, Hybrid.



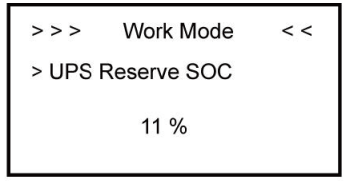
Step 11: Click the mode then set up work mode.(self-use or force time charge)



Step 12: If you want to use force charge, set Enable here.

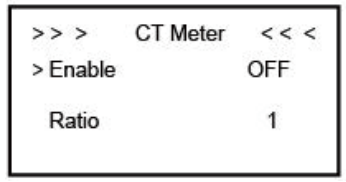


Step 13: Set the charge and discharge time.

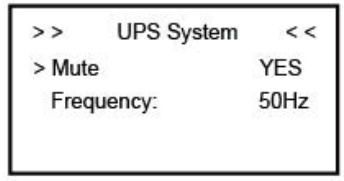


Step 14: Set the UPS Reserve SOC, it means how much battery energy left for UPS function.

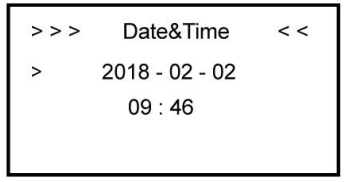
Step 15: Click Safety in the setting menu. Set safety standard.
AS4777 for Australia, ARN4105 for Germany, CEI0_21 for Italy, G83_2 for Great Britain, NRS097_2_1 for South Africa, RD1699 for Spain, VDE0216 for 60Hz countries.



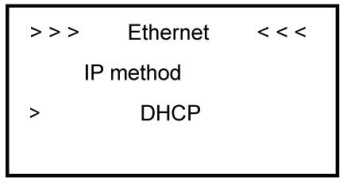
Step 16: If you use CT meter, please set CT meter enable and the relevant ratio



Step 17: If you use UPS function, please set the mute as YES in UPS System interface and the relevant Frequency.



Step 18: Click System in the setting menu. Click Date &Time and set up the date and time.



Step 19: Click Ethernet to set the IP address. DHCP mode means that setup IP address is set up automatically.
If you want to set up the IP address manually, please choose manual mode

NOTE:

It is needed to set the following 3 parameters for manual mode:
IP Address: IP address;
Subnet Mask: Subnet mask;
Default Gateway: Default gateway;
Automatic display one parameter:
MAC Address: display MAC Address.

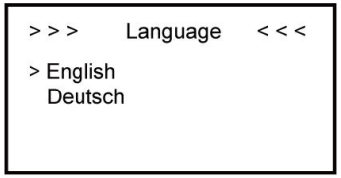


Figure 53 Date&Time Setting Interface

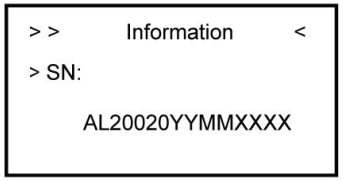


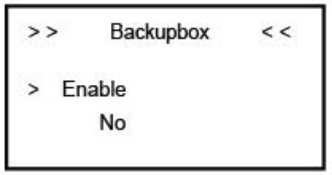
Figure 54 Date&Time Setting Interface

Step 20: Click Language to set language

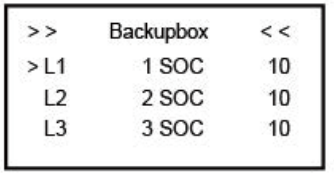
Step 21: Make sure all the following number is correct.

4.2.4.2 Additional Function Setting

A. If you use Backup box, please set as below:

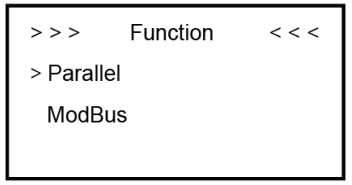


Step 1: Click Enable to set yes.

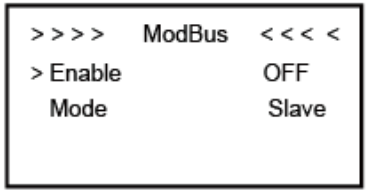


Step 2: Set the priority of the load, L1＞L2＞L3

B. If external device will dispatch the system, please set as following steps:

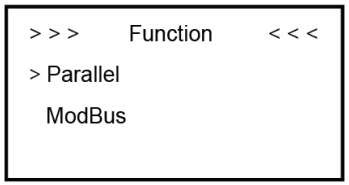


Step 1: Please go to the function menu, choose “ModBus” and press enter.

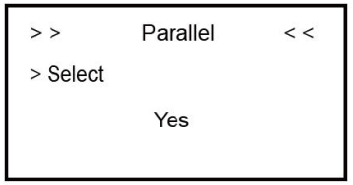


Step 2: Please set Modbus enable as yes.

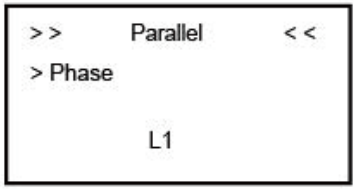
C. If you use cascading function please set as following steps:



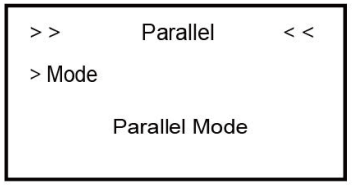
Step 1: Please go to the function menu, choose “Parallel” and press enter.



Step 2: Please choose “Select” as “Yes” and press enter.



Step 3: Please choose “Phase” as L1 (master) and press enter.

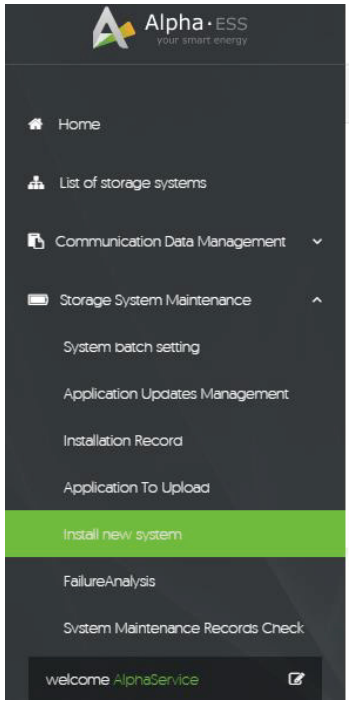


Step 4: Please choose “Mode” as “Parallel mode” and press enter.

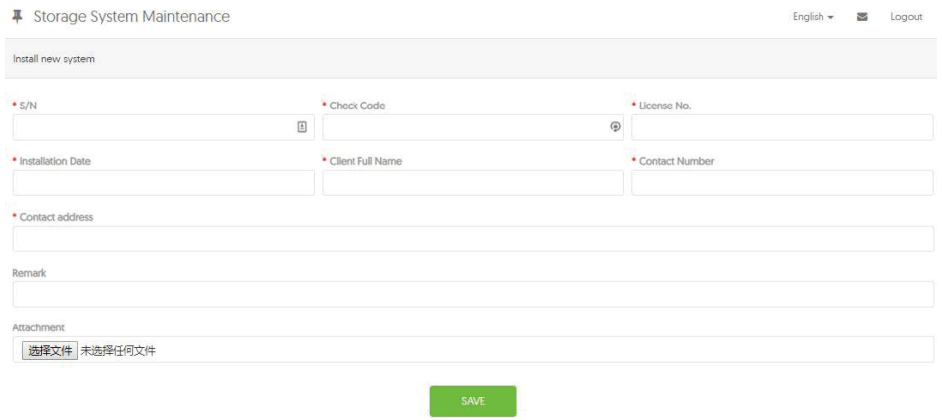
Step 5: please repeat Step 1 to 4 to set the other device as L2 (slave) L3 (slave).

05 ONLINE MONITORING

Installers who haven't registered yet need to click “Register” to visit the registration page. Please refer to “AlphaCloud Online Monitoring Webserver Installers User Manual” , which you can get from AlphaESS sales and get your personal license number from relevant AlphaESS sales.



Log in to your installer account and choose Storage System Maintenance> "Install new system" to register a new system at Alpha ESS.



Enter the system S/N, check code, license, installation date, client name, contact number, contact address, and click "SAVE". The red marks indicate the relevant information is needed. Click the Browse button to select an attachment you want to add.

5.1 System Setup in Monitoring

Some of the system settings must be carried in the installer monitoring. To do this, follow the steps below:

Step 1: Please login in the installer account, click the list of storage systems and enter the SN code.

5.1.1 Basic Information

Step 2: After selecting the correct system, enter System Setup interface. Enter in the "Basic Information" and input below information:

- Address,
- Zip code,
- Contact name,
- E-Mail address,
- Currencies and
- Telephone number.

NOTE:

Do not forget to click “Save” button!

5.1.2 Other Information

Step 3: select the "Other Information" submenu and set the following parameter:

- Time zone
- Data upload frequency: SMILE5 has second level data, you can choose it as 10s data if you wish.

06 ROUTINE MAINTENANCE

6.1 Maintenance Plan

★ Check if wire connections are loose.
★ Check if cables are aged/damaged.
★ Check if cable insulating ribbon drops.
★ Check if cable terminal screw loose, any overheat sign.
★ Check if ground connection is well.

6.1.1 Operating Environment

(Every six months)
Carefully observe whether the battery system equipment is ineffective or damaged;
When the system is running, listen to any part of the system for abnormal noise;
Check whether the voltage, temperature and other parameters of the battery and other equipment parameters are normal during system operation;

6.1.2 Equipment Cleaning

(Every six months to one year, depending on the site environment and dust content, etc.)
Ensure that the ground is clean and tidy, keep the maintenance access route unblocked, and ensure that the warning and guiding signs are clear and intact.
Monitor the temperature of the battery module and clean the battery module if necessary.

6.1.3 Cable, Terminal and Equipment Inspection

(Every six months to one year)
★ Check if the cable connections are loose.
★ Check whether the cables are aged / damaged.
★ Check whether the cable tie of the cable has fallen off.
★ Check if the cable terminal screws are loose and the terminal position has any signs of overheating.
★ Check whether the management system of the system equipment, monitoring system and other related equipment are invalid or damaged.
★ Check that the grounding of the equipment is good and the grounding resistance is less than 10 ohms.

6.2 Notes

After the equipment are out of operation, please pay attention to following notes while maintaining :
★Related safety standards and specifications should be followed in operation and maintenance.
★Disconnect all the electrical connections so that the equipment would not be powered on.
★Wait at least 5 minutes after disconnection, so that the residual voltage of the capacitors drops to a safe voltage. Use a multimeter to make sure that the equipment is completely discharged.
★The equipment should be repaired by professional staff only and it is strictly forbidden for maintenance staff to open equipment modules on their own.

★Appropriate protective measures should be taken while maintaining, such as insulated gloves, shoes, and anti-noise ear plugs.
★Life is priceless. Make sure no one would get hurt first.
★In case of a deep discharge, the battery must be charged to a SOC rate of 30% to 50% if the entire system is static (ie the battery has not been charged for two weeks or more).

Please contact us in time if there are any conditions that could not be explained in the manual.