



Alpha·ESS
your smart energy

Installation, Operation & Maintenance Manual

Energy Storage System (ESS)

Storion-SMILE5 (AU)



V03

IMPRINT

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Step. 25th 2019

Copyright Statement

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Version Information

Version	Date	Content
V1.6	02022018	Notes are added for better overview purposes. RJ45 connecting diagram was updated.
V1.7	06032018	Figures changed after firmware version update. Figures and installation steps changed after new pre-wired cable configuration in CB.
V1.72	14052018	Package parts list modified. Power definition modified. ADL3000 3-phase connection added.
V1.74	22092018	Daily maintenance content added, installation environment requirements and parameters in DS. EMS display indication modified.
V1.76	05112018	Differentiation of outdoor and indoor versions.
V02	25092019	Off-grid application removed; two wirings in the inverter reduced; ACR meter connection added; color of the inverter display light modified; new version of the cover drawing added; Australian standard split machine wiring modified
V03	05062020	Added WiFi Instruction Meter connection diagram modified Added earthing requirements for battery in Australia Added datasheet and safety- region table
V04	22112021	Updated

Content

IMPRINT	1
Copyright Statement	2
Version Information	2
Content	3
1. Introduction	5
1.1 System Introduction	5
1.2 Safety Introduction	6
1.3 Battery Safety Datasheet	8
1.4 General Precautions	8
1.5 Parts List	9
1.6 System Appearance	11
1.7 Liability Limitation	13
2. Installation	14
2.1 Installation Site and Environment	14
2.2 Installation	16
2.3 Power Meter Wiring	35
3. System Operation	47
3.1 Switch on	47
3.2 Switch off	47
3.3 Emergency Procedure	48
4. EMS Introduction and Set up	49
4.1 Function Description	49
4.2 Introduction	50
5. Commissioning	57
5.1 Download and Install APP (Optional)	57
5.2 Overview of Functions for Installer Account	57
5.3 WiFi Module Setting (Optional)	58
5.4 Create a New Plant	59
5.5 Choose the Battery Model	60
5.6 Basic configuration	61
5.7 Safety Parameters Settings	61
5.8 Meter Settings (Optional)	61
5.9 Check after commissioning	62
6. Routine Maintenance	62
6.1 Maintenance Plan & checklist	62
6.2 Notes	63

7. Trouble Shooting 64

8. Specification 69

Appendix 1: Safety Country Code 71

Appendix 2: Regional application Standard 72

Appendix 3: System Connection Diagrams 73

1. 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:

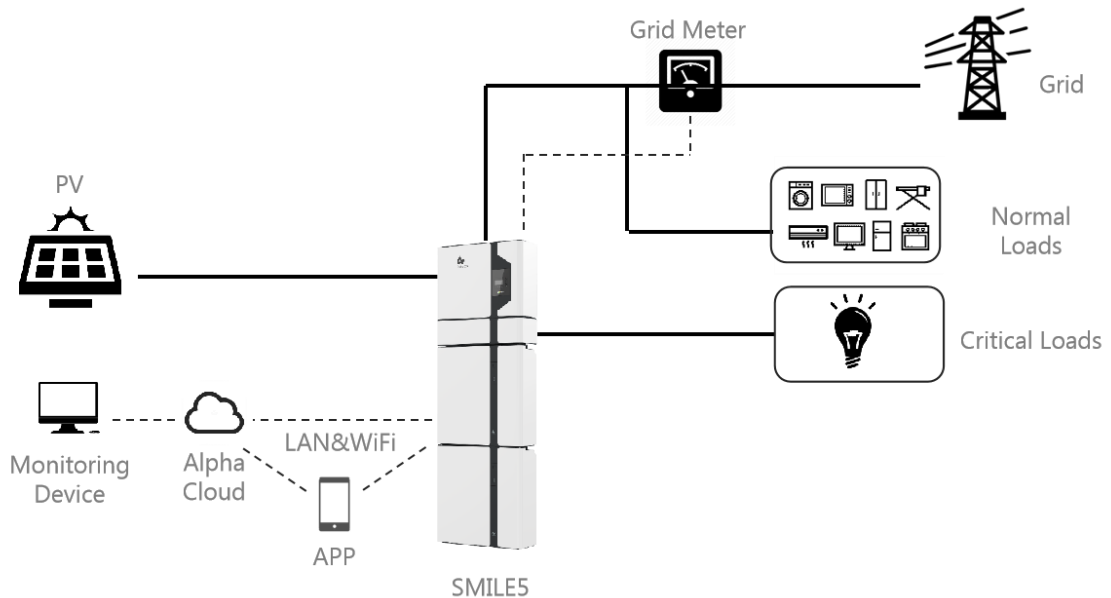


Figure 1 DC - Coupled Storage System – Scheme

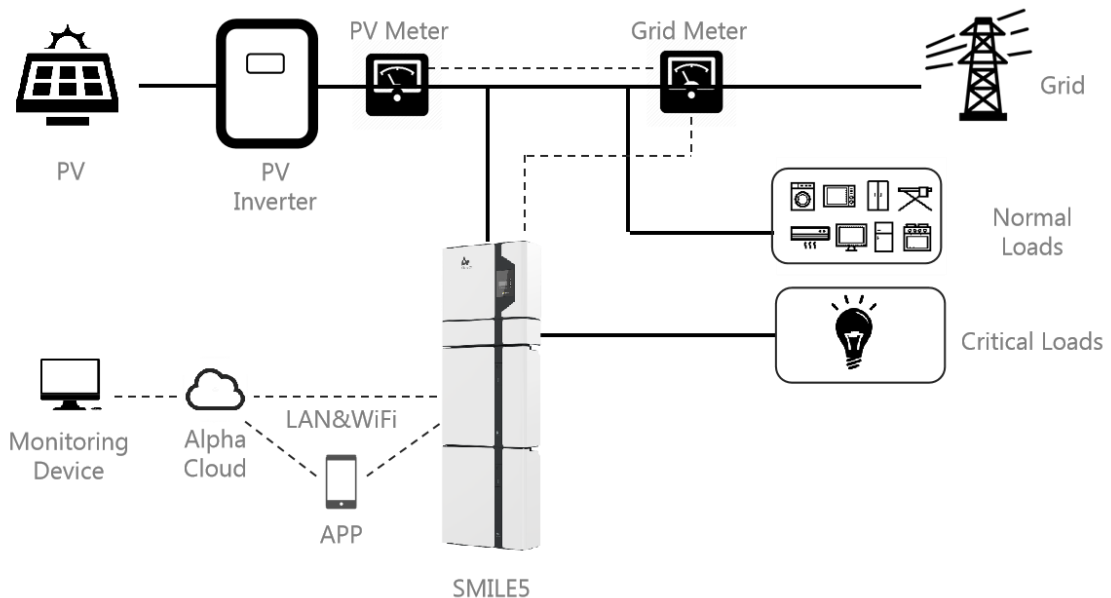


Figure 2 AC - Coupled Storage System – Scheme

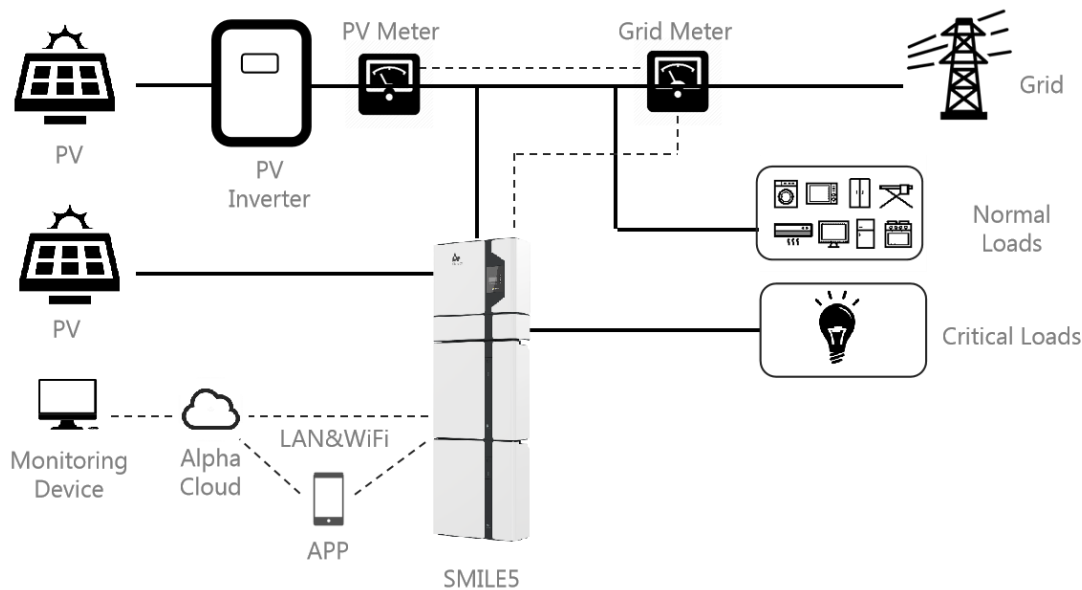


Figure 3 Hybrid - Coupled Storage System – Scheme



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!

SMILE5 is only compatible lithium ion battery which model is SMILE5-BAT.

SMILE5 cannot be used to build up a three phase system.

SMILE5 cannot be used to form the master-slave arrangement.

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 description 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 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 read-able 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

For ensuring 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 and 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, sub-section 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 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.

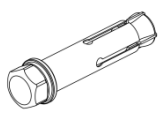


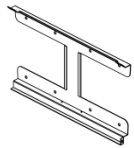
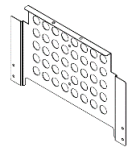
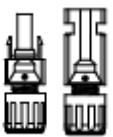
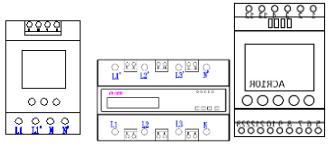
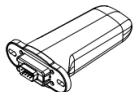
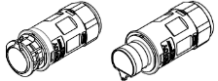


The inverter and battery are heavy. There is risk of injury if the inverter or battery is lifted incorrectly or dropped during transport or when attaching to or removing from the wall.

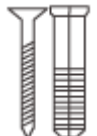
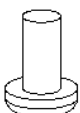
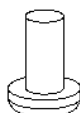
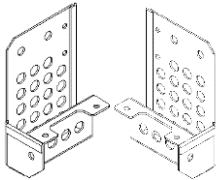



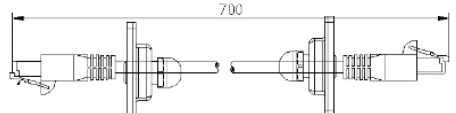
- Lifting and transporting the inverter and battery must be carried out by more than 2 people.

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					
					
4x M8*60 SUS304	2x M4 Nuts	4x M6 Nuts	1x Wall Bracket	1x Position Plate	2x PV connector
					
1x Meter (1x SM60A or 1x ADL3000 or 1x ACR10R)	1 x WiFi module (optional)	2x AC connectors for grid and backup	1x Installation Manual	1x User Manual	

SMILE5-BAT			
			
6x φ 8*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

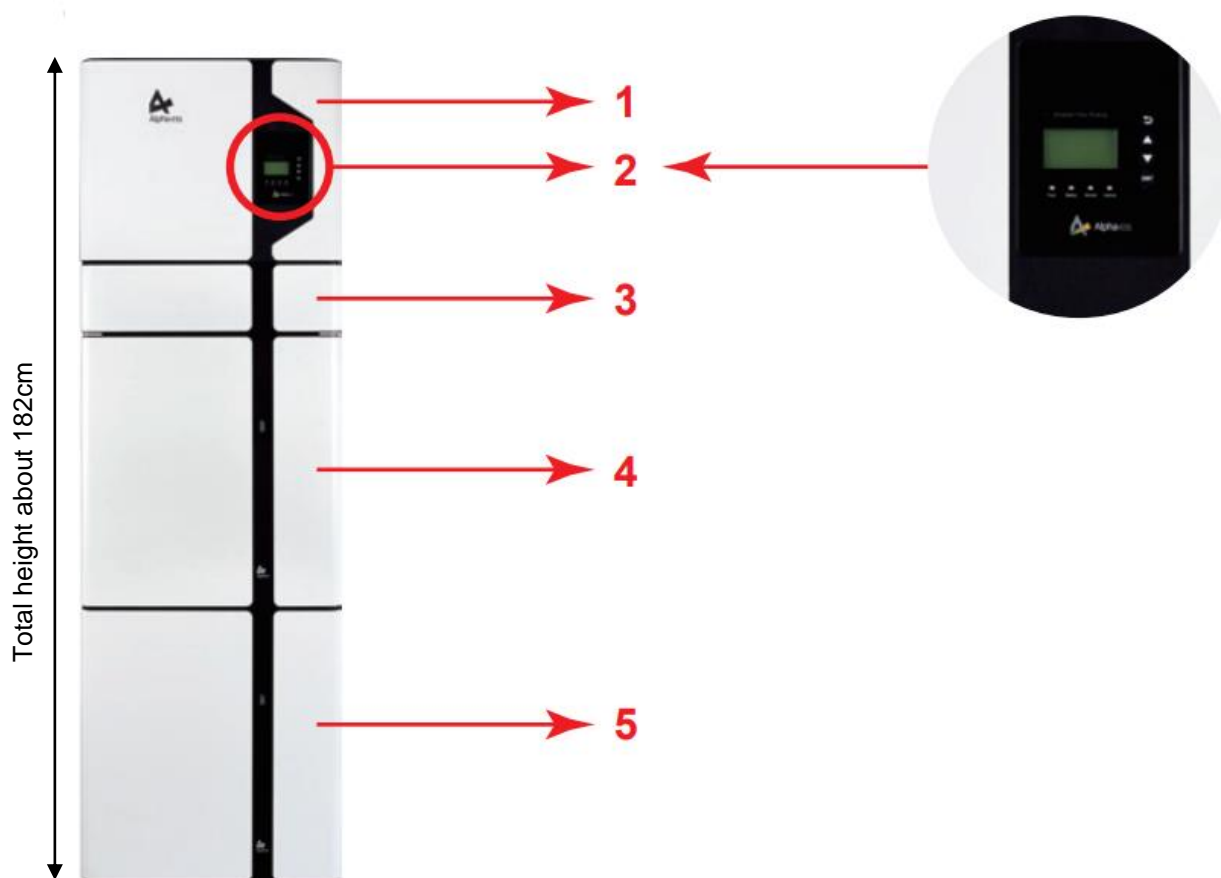


Figure 4 Storion-SMILE5 Delivery Scope

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

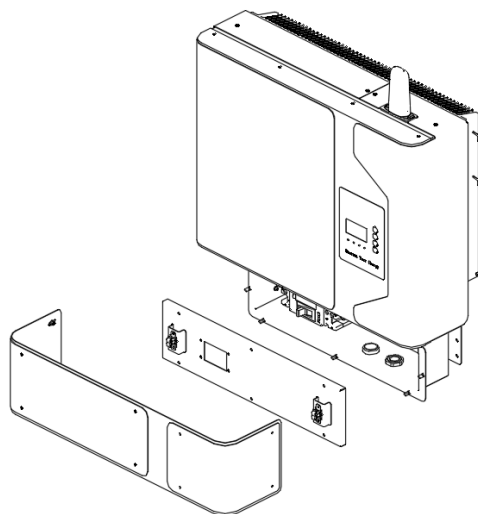


Figure 5 Inverter without Cable Box Covers– Front View

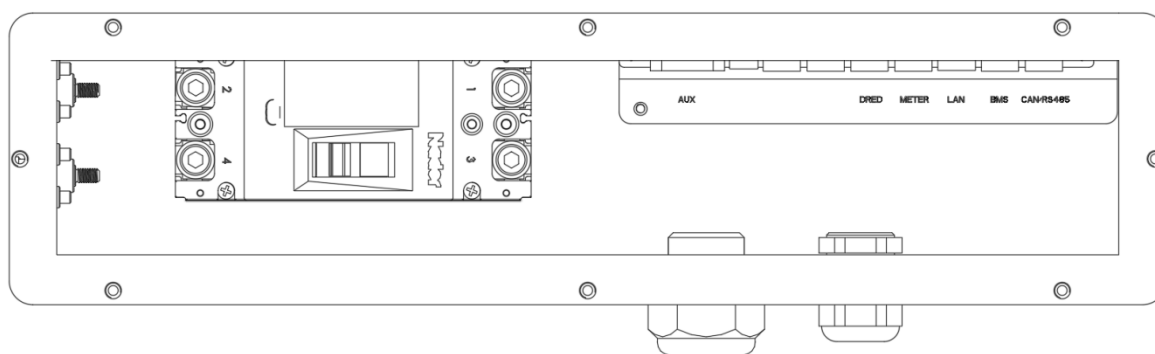


Figure 6 Cable Box Part without Covers – Front View

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/RS485	External Expansion Port Or External Dispatching Port

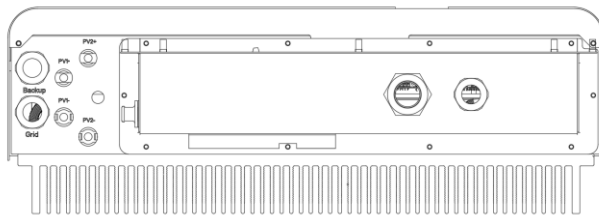


Figure 7 Cable Box Part without Covers - Bottom View

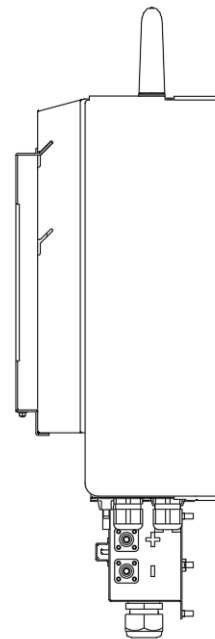


Figure 8 Cable Box Part without Covers - left View

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, or attempted repairs and erasing of series number or seals by non AlphaESS technician;
- System design and installation are not in compliance with standards and regulations;
- Failure 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/package is unloaded and such damage is identified;
- Failure 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.

2. Installation

This Manual introduces the basic steps how 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 pay attention for 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 structure separating it from the habitable space, the distances to other structures or objects must be increased. The following distances must then remain free:

- (i) 600 mm beside the SMILE5;
- (ii) 900 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 900 mm, the ceiling or structural surface above the system must be made of non-combustible material within a radius of 600 mm around the system.

The SMILE5 must be mounted so that the highest point is not more than 2.2 m above the ground or the platform.

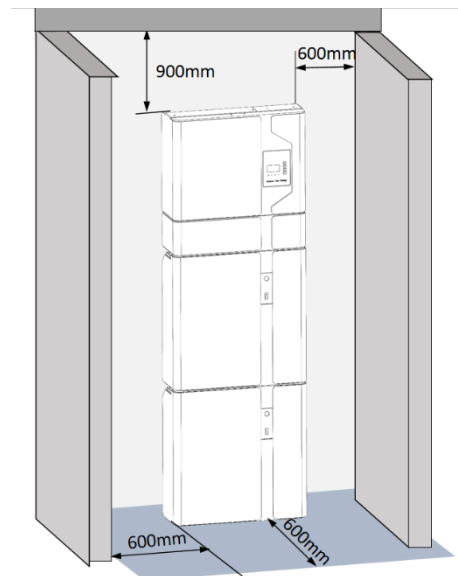


Figure 9 Limit Distance of Installation to Neighboring Objects

2.2 Installation

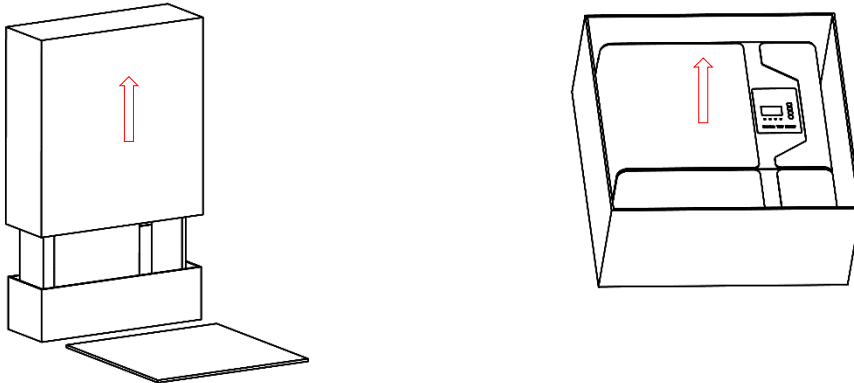


Figure 10 Unpacking the inverter and battery

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

2.2.1 Battery Installation

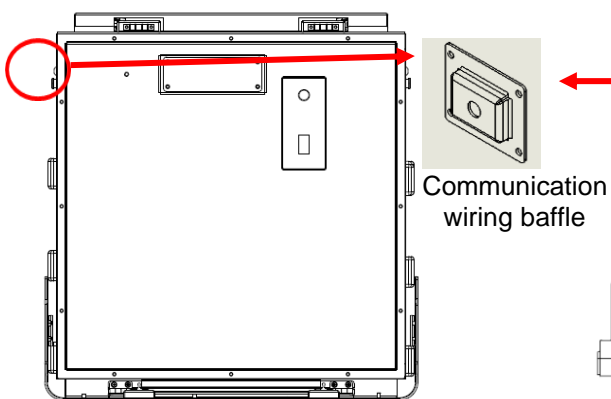


Figure 11 Battery with Lid off - Front View

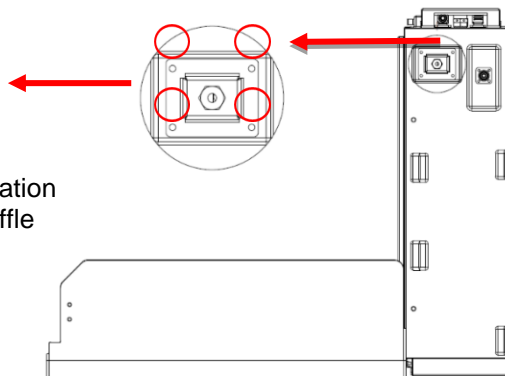


Figure 12 Battery with Lid off – Side View

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°

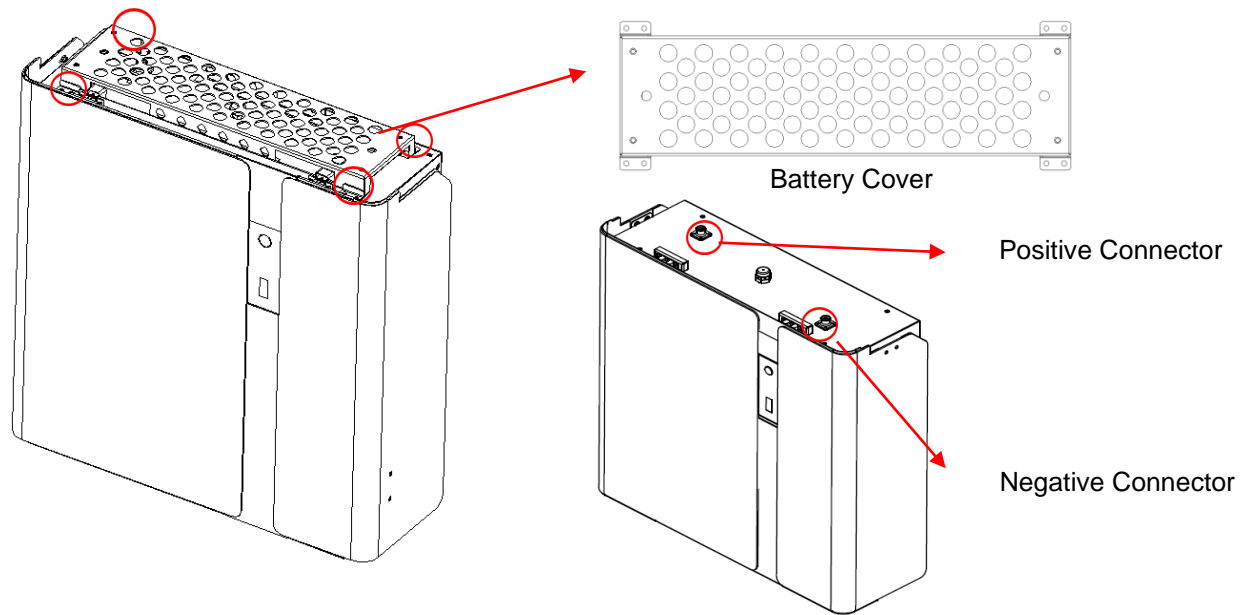


Figure 13 Disassembly Diagram of Battery Top Cover

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.

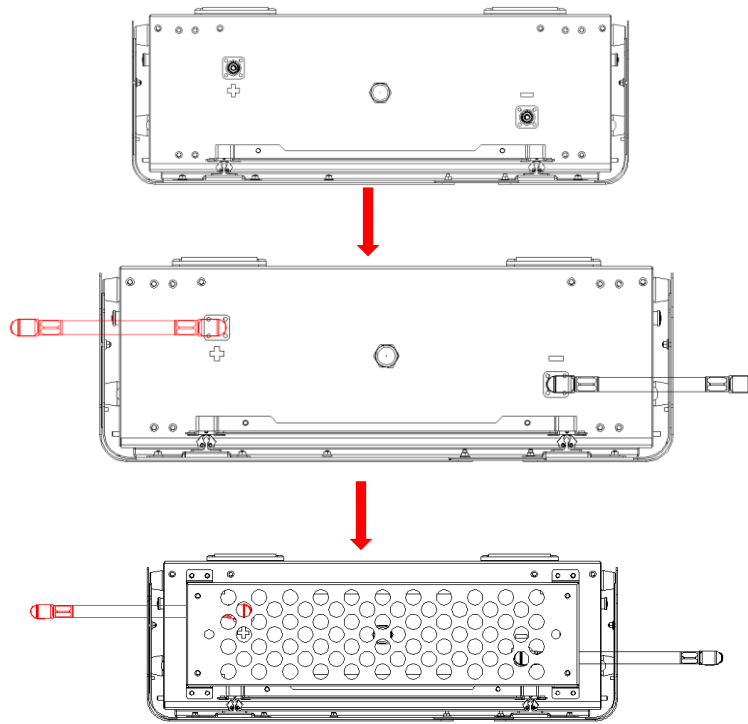


Figure 14 Battery power cable installation diagram

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

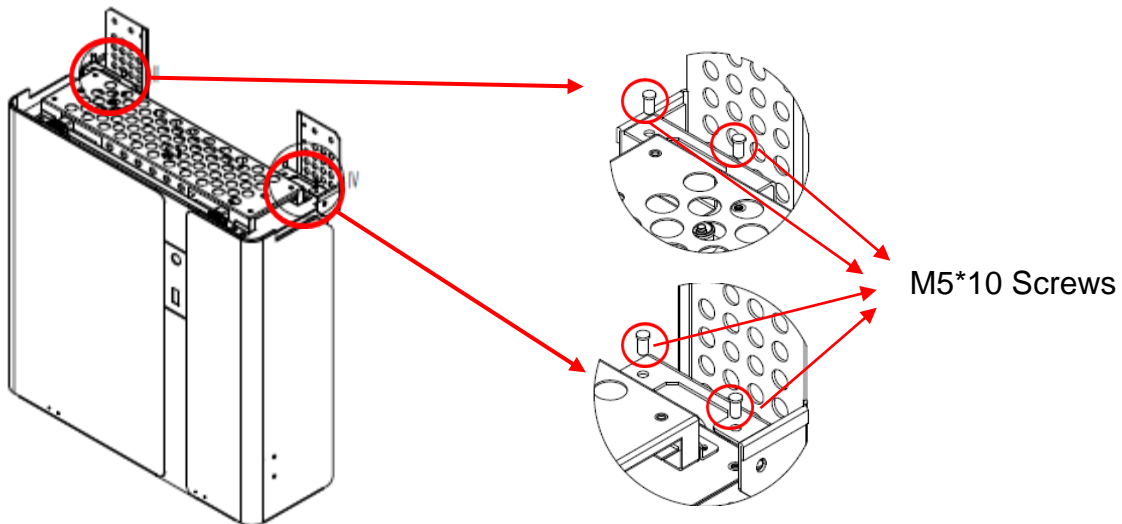


Figure 15 Assemble Battery Mounting Panel

Step 5: Assemble the battery mounting panel on the battery.

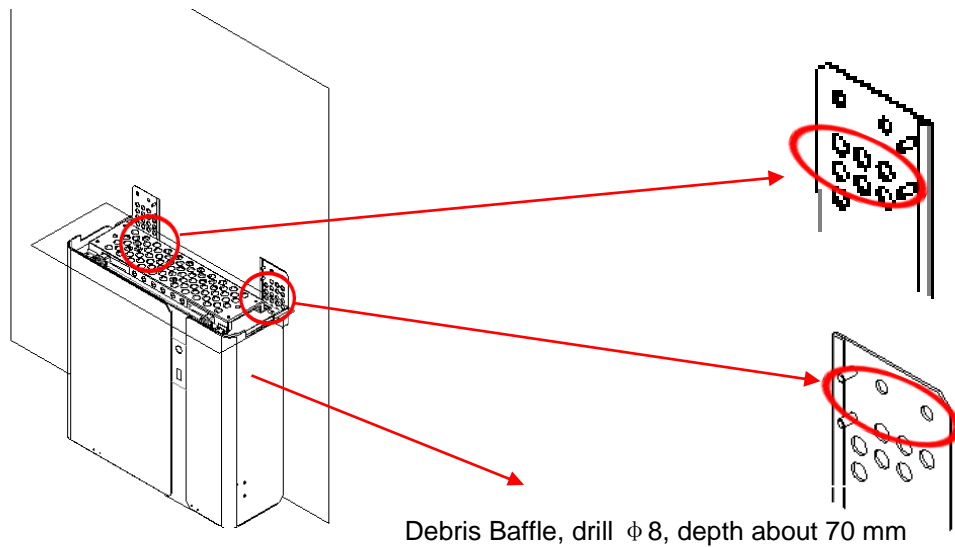


Figure 16 Battery Installation - Drill Holes

Step 6: Position the battery parallel to the wall and use a $\Phi 8\text{mm}$ drill to drill holes at a depth of about 70mm in the wall for subsequent fixation of the mounting plates.

i NOTE: Place a cover (paper, foil, etc.) over the battery while drilling into the wall to protect it from dust. In addition, at the place of installation, the slope of the ground on a horizontal plane may not exceed 3° .

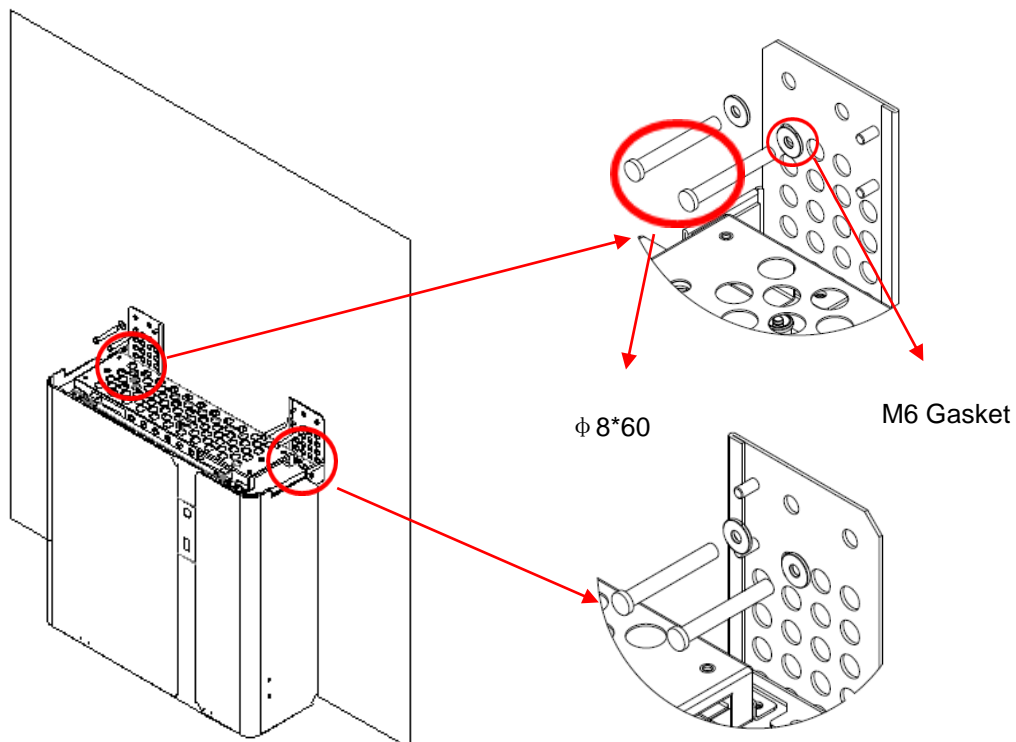


Figure 17 Battery Installation – Mounting on the Wall

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

gaskets.

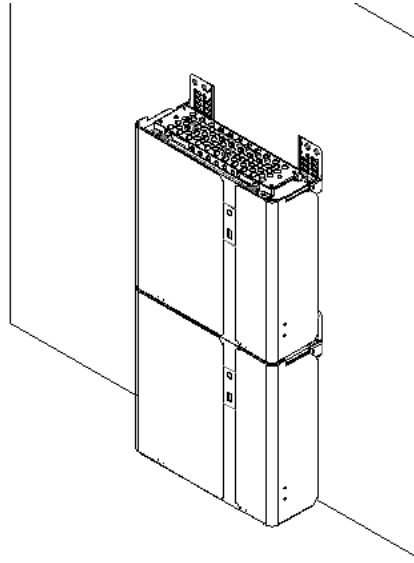


Figure 18 Battery Installation – Second Battery Installation

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

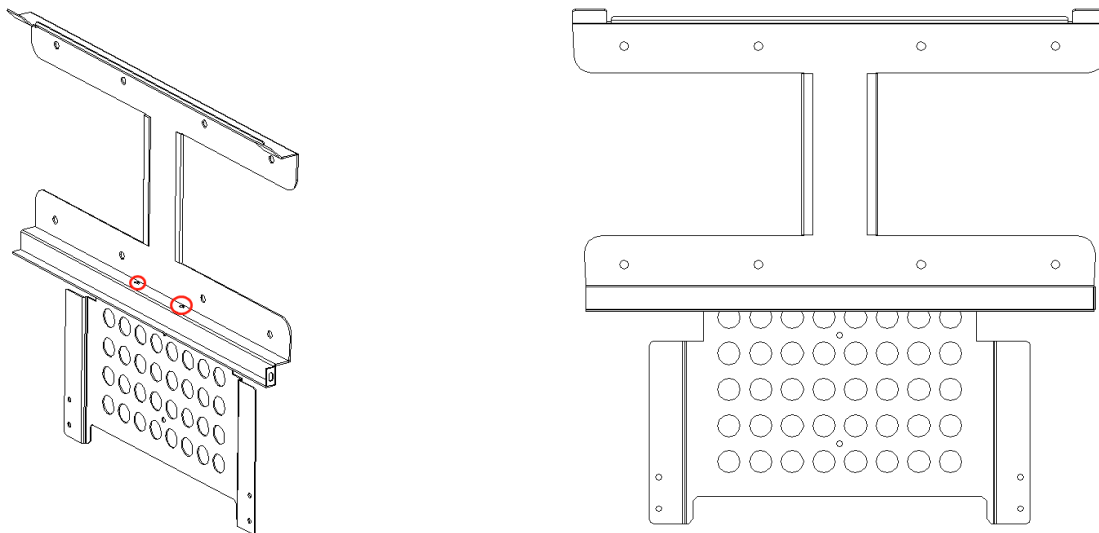


Figure 19 Wall Bracket Installation

Step 9: Take out the inverter position plate and the wall bracket and connect them using the M4 nuts as shown above. Check carefully if everything is tight.

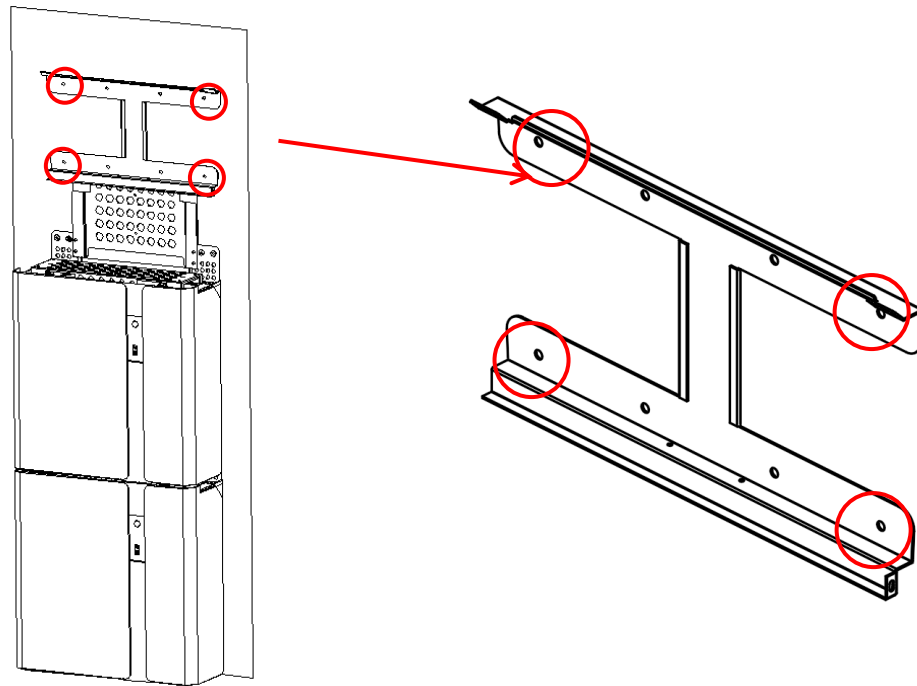


Figure 20 Wall Bracket Installation - Drill Holes

Step 10: Position the wall bracket, the mounting plate of the battery and mark points as shown above. Remove the wall bracket and drill holes at the marked position on the wall. (Drill ϕ 12mm)

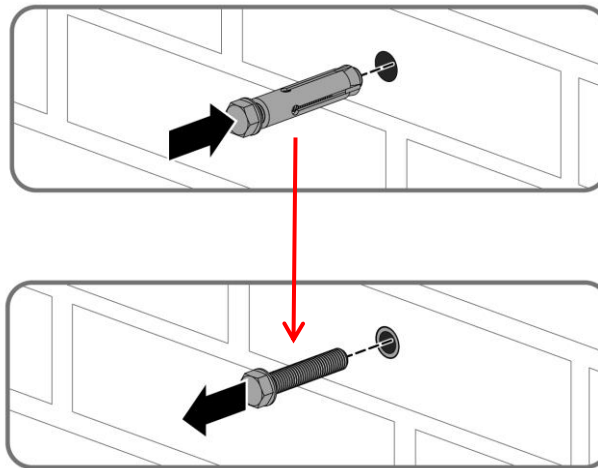


Figure 21 Wall Bracket Installation - Install the metal expansion bolts

Step 11: Knock the metal expansion tube bolts into the wall holes and unscrew the hexagonal bolts.

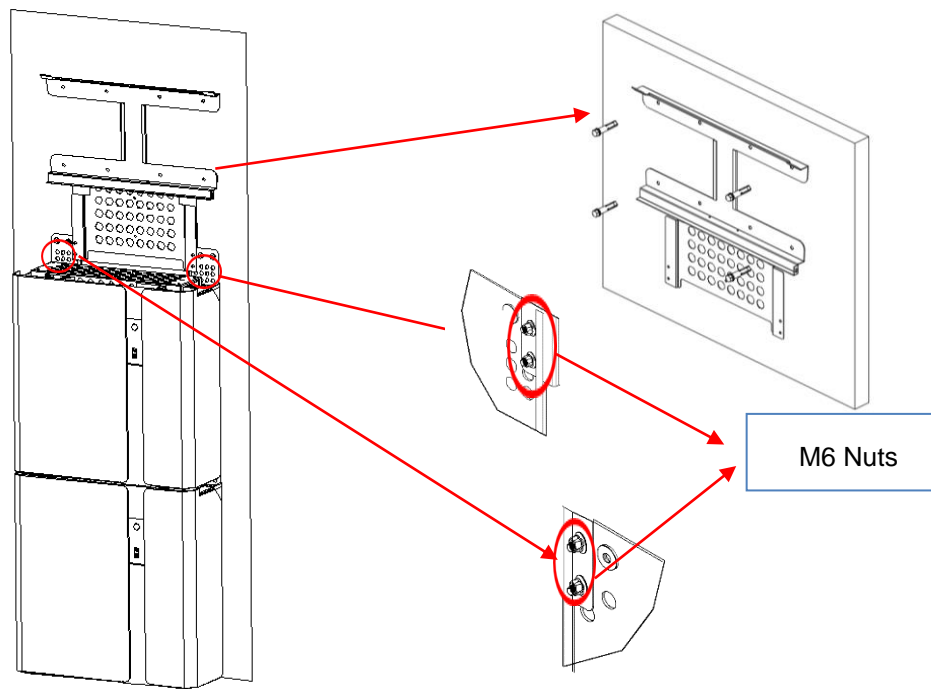


Figure 22 Inverter Installation - Wall Bracket

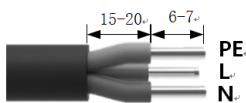
Step 12: Fix the wall bracket with the hexagonal bolts (tool: SW13 screwdriver, torque: 30 N.m) to the wall and fix the battery mounting plate with M6 nuts. The battery assembly is now complete.

2.2.2 Inverter Installation

Step 13: Please make AC cables on site.

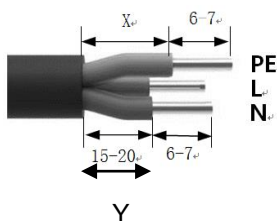
Step 13-1: Please follow the AC cable requirements below.

For backup AC cables the stripping method is as following:



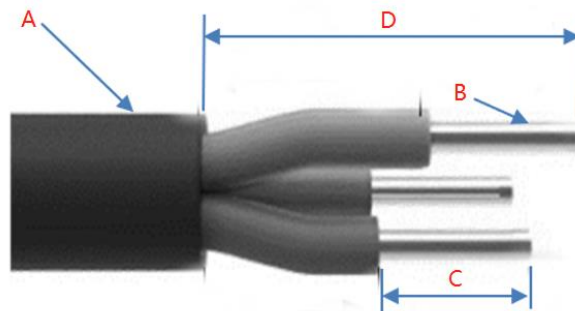
Strip the insulation sheath of the three-core AC cable for about 30mm. Strip L, N and PE cables for 6-7mm respectively.

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	Value
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)

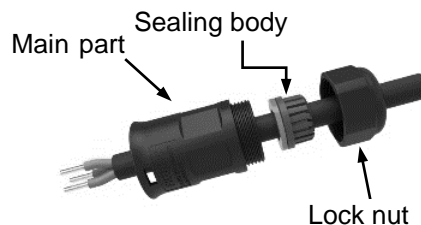


Step 13-2: Assemble the AC connector and connect the conductor to the AC connector

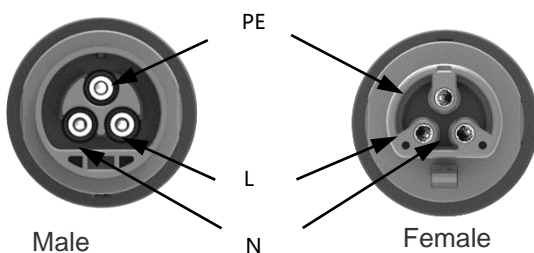
Step 13-3: Ensure that all conductors are securely connected to the AC connector.

Step 13-4: Plug the AC connector into the jack for the AC connection.

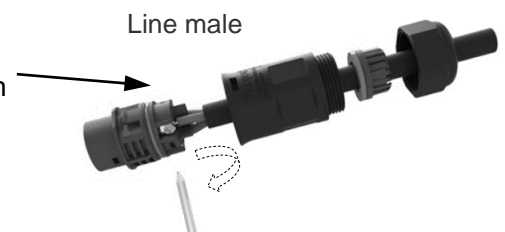
a. Parts are equipped with cables



b. Crimp the wire according to the position shown, tighten the screw torque $0.8 \pm 0.1 \text{ N} \cdot \text{m}$.



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



c. The plastic core is screwed into the body

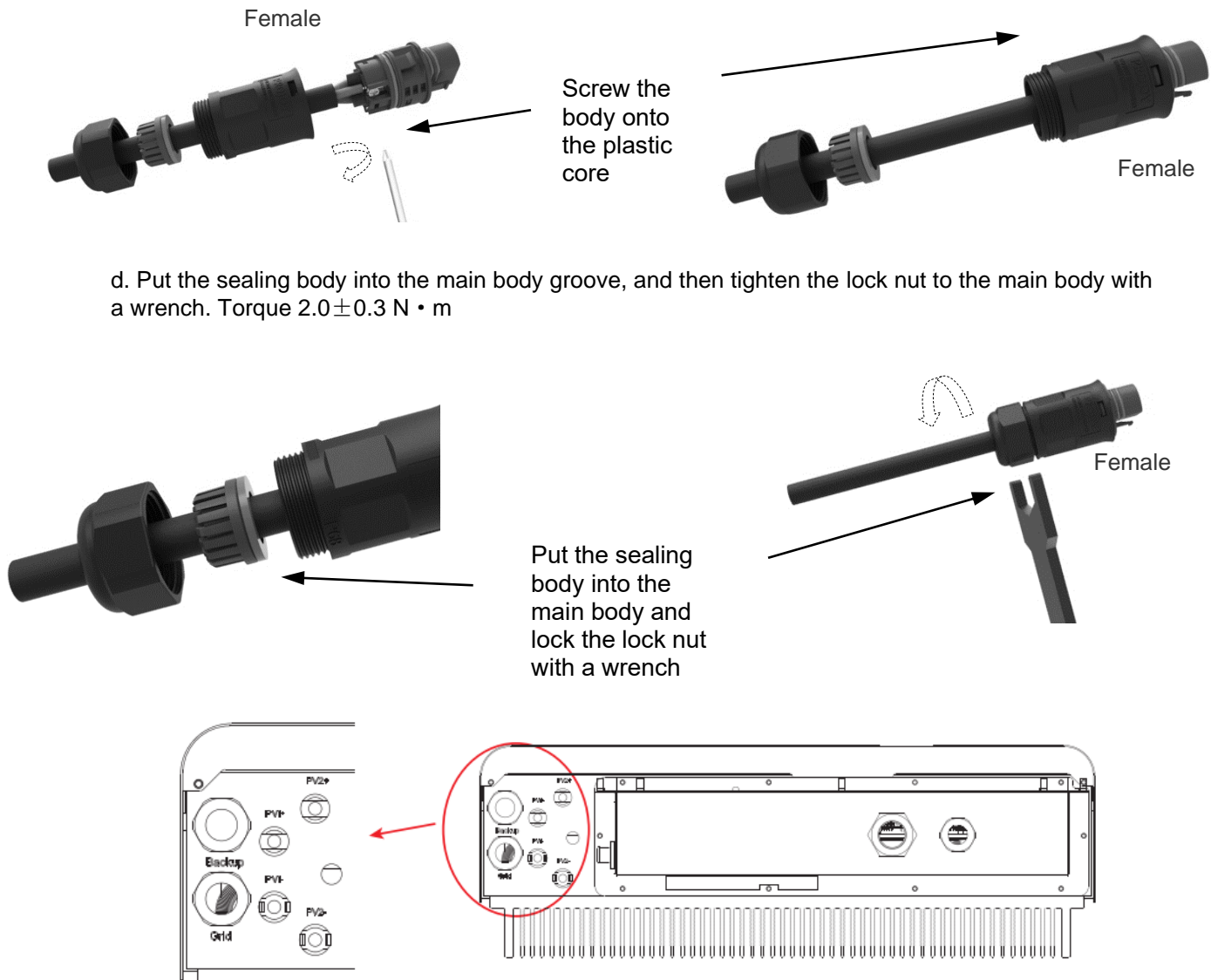


Figure 23 Cable Box Bottom View, Wiring Connectors

Step 13-5: 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.



NOTE: Recommended AC circuit breaker rating is 32A.



NOTE: Installer in Australia or New Zealand must install external circuit 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.



NOTE: No external earthing required. After the PE line of AC cables has been grounded, the whole inverter including the case will be grounded.

NOTE: According to Australian safety country, the neutral cable of on-grid side and back-up side must be connected together, otherwise back-up function will not work (Appendix 3).

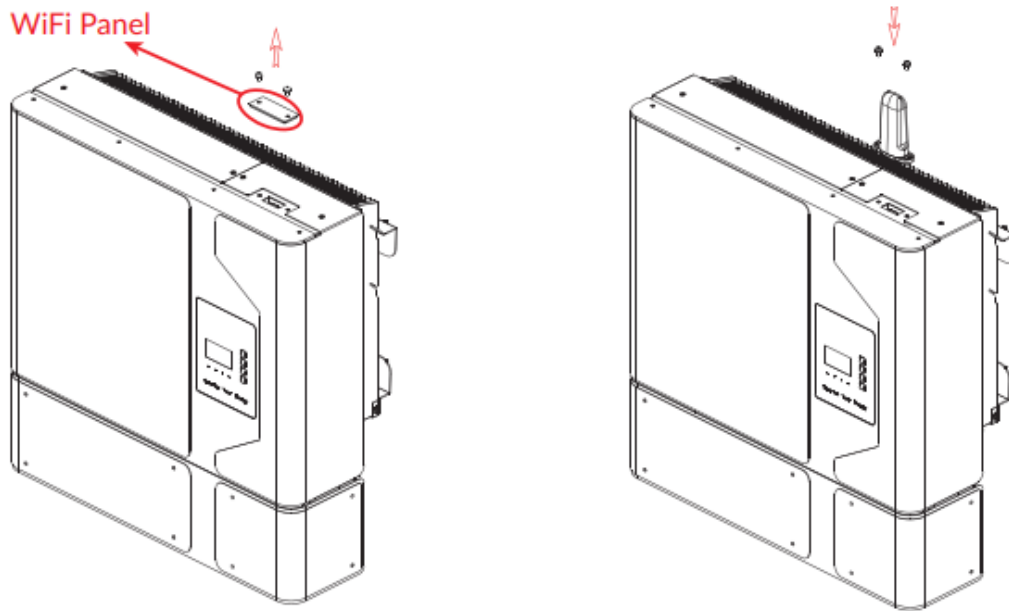


Figure 24 WiFi Module installation

Step 14: Remove the WiFi panel on the top and install the WiFi module (tool: T20 screwdriver, torque: 1.6Nm). Please refer to section 错误!未找到引用源。 configuration network instructions.

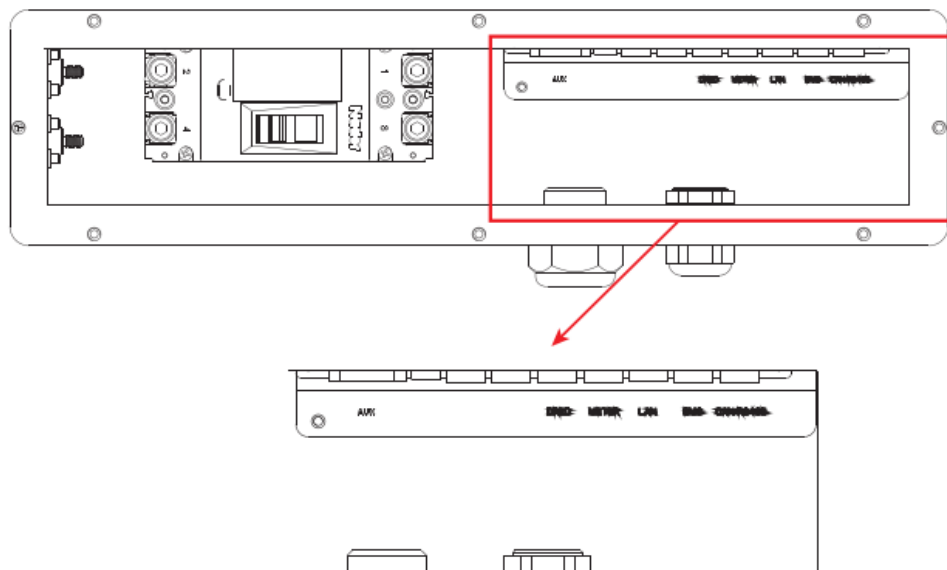


Figure 25 Communication interface of the inverter

Step 15: 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.

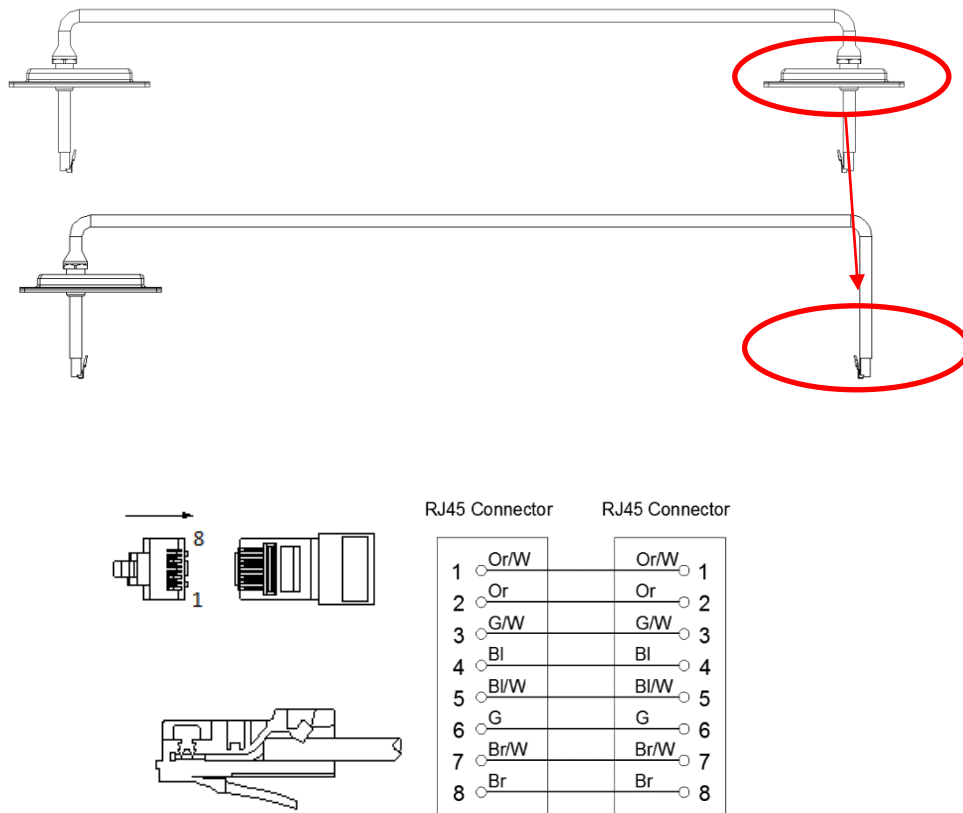


Figure 26 Network Cable Type B

NOTE: The communication cable is in type B, see Figure 26. Leave the power cables and communication cables hang on the outside. Leave the device aside.

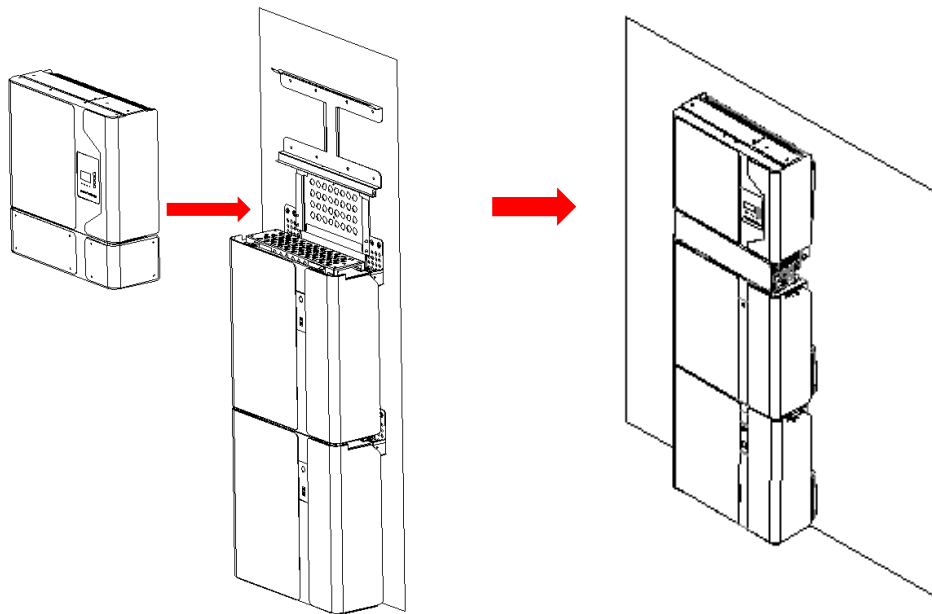
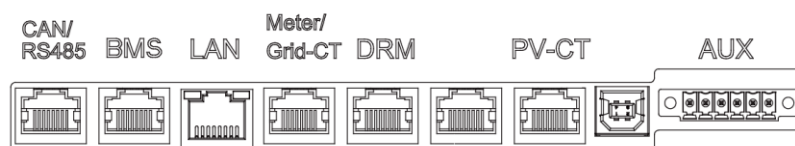


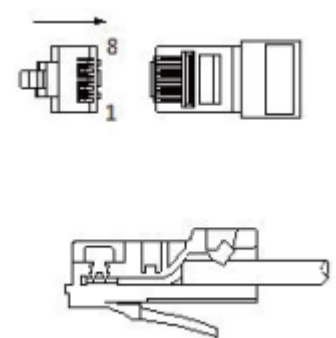
Figure 27 Inverter Installation on the Wall

Step 10: Hang the inverter onto the wall bracket, adjust the entire system and ensure that the battery and the inverter have been securely hung onto the panels and brackets.

2.2.3 DRMs

If DRM support is specified, the system may only be used in conjunction with a Demand Response Enabling Device (DRED). This ensures that the system implements the commands from the grid operator for active power limitation at all times. The system and the Demand Response Enabling Device (DRED) must be connected in the same network. Only DRM0 is available for SMILE5 system.



RJ45 Pin	MODE	View
1	DRM4	
2	DRM5	
3	DRM1	
4	DRM2	
5	DRM3	
6	DRM0	
7	N/A	
8	Ref Gen	

Mode	Requirement
DRM 0	Operate the disconnection device
DRM 1	Do not consume power
DRM 2	Do not consume at more than 50% of rated power
DRM 3	Do not consume at more than 75% of rated power AND Source reactive power if capable
DRM 4	Increase power consumption (subject to constraints from other active DRMs)
DRM 5	Do not generate power
DRM 6	Do not generate at more than 50% of rated power
DRM 7	Do not generate at more than 75% of rated power AND Sink reactive power if capable
DRM 8	Increase power generation (subject to constraints from other active DRMs)

2.2.4 Grounding

According to AS/NZS 5033, the system must be grounding, including the inverter and battery part. Otherwise, the installer will receive a mail like this (This function will be activated automatically once the system is commission.):

Dear User,↓

⊕ Your system has an earth fault, the details are as follows: ↵

SN↵	Status↵	Error Code↵	UpdateTime↵
AL0000327090007↵	GFCI Err↵	EMS:15↵	7/10/2021 4:51:27 PM↵

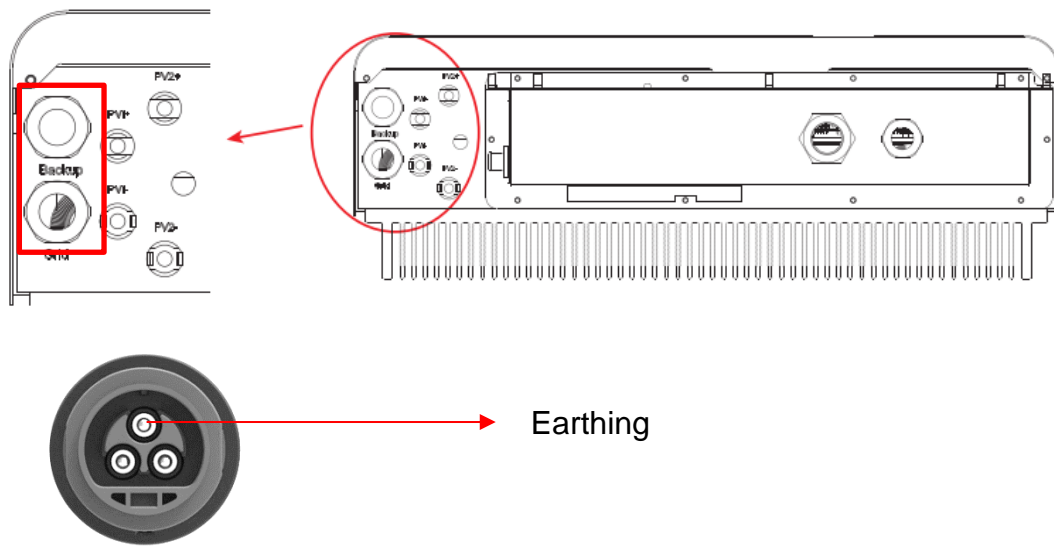
Please contact your installer company to correct these faults.↓

This email is automatically sent by the system, please do not reply directly.↵

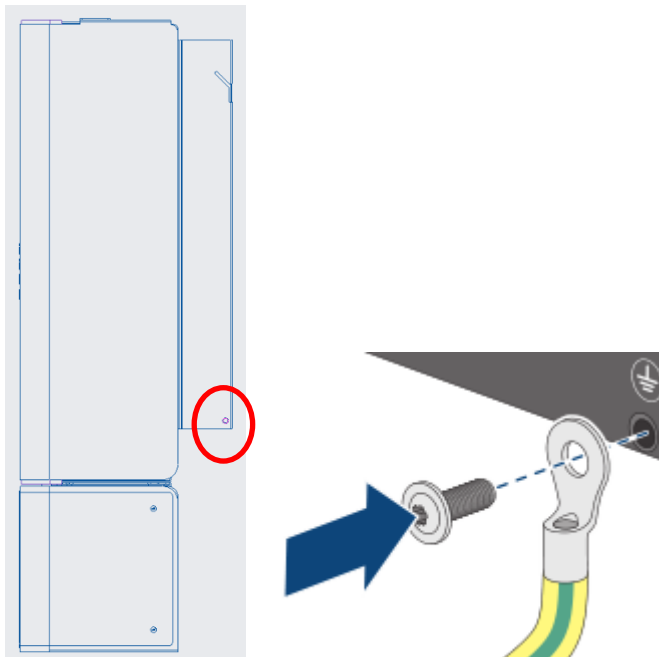
Sincerely,↓

Alpha ESS Co., Ltd↵

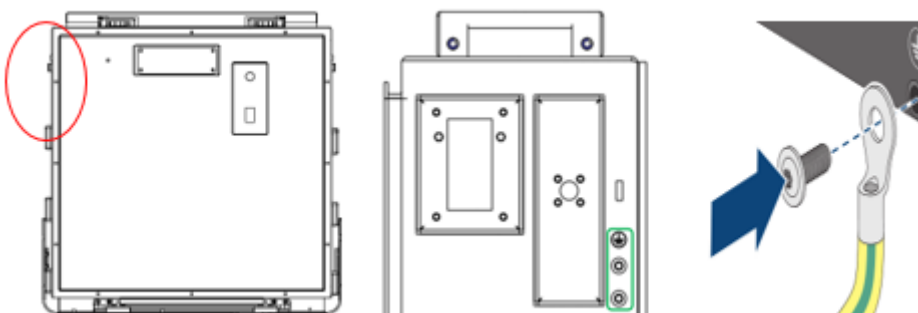
1. Grounding of Grid & Backup:



2. Grounding of inverter shell:



3. Grounding of battery shell:



2.2.5 Wiring

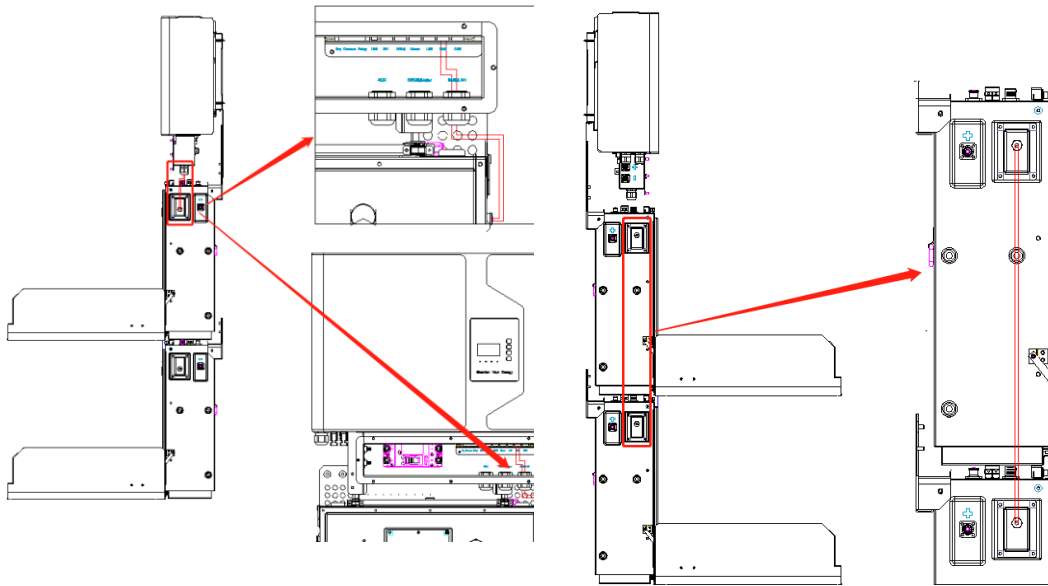


Figure 28 Wiring the Communication Cable

Step 11: Connect the BAT communication cable of the cable box from Step 14 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).

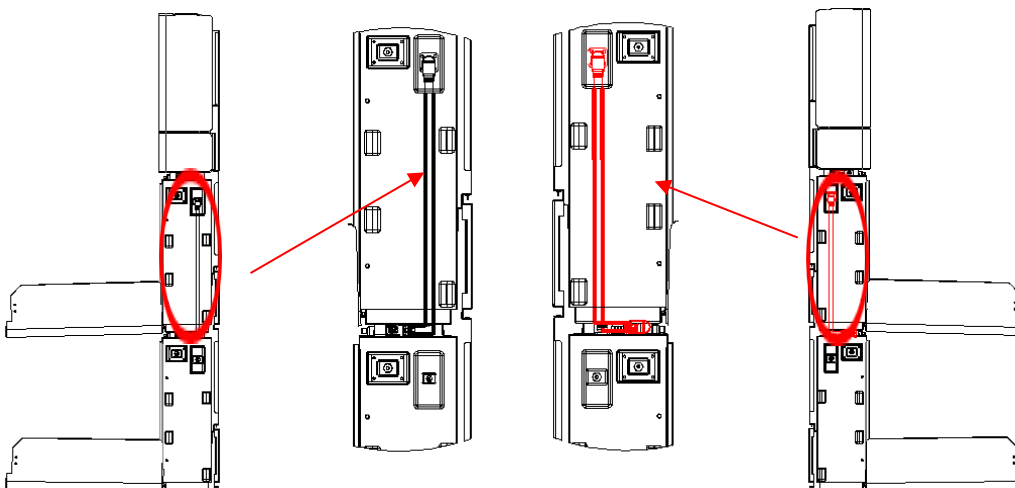


Figure 29 Wiring the Battery Power Cable

Step 12: 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.

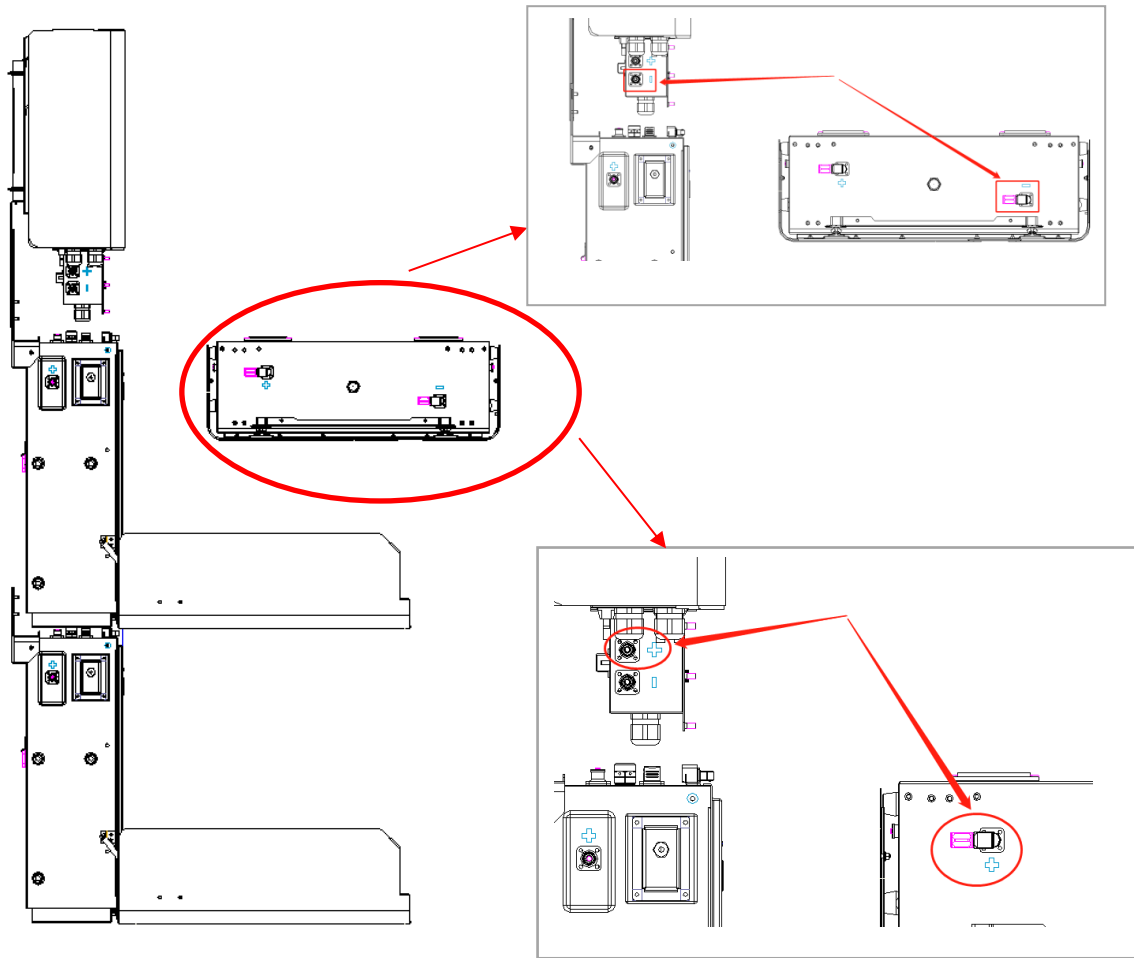


Figure 30 Wiring the Power Cable of the Cable Box

Step 13: 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.

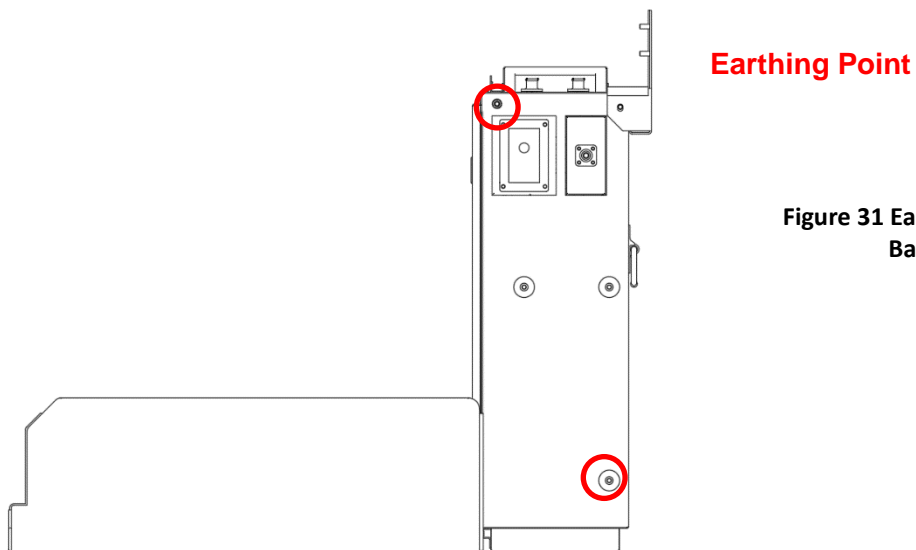


Figure 31 Earthing Point of Battery

NOTE: In Australia and New Zealand, please find the earthing point on the right side of the battery and connect the earthing point of all of the batteries to the ground refer to AS 3000.

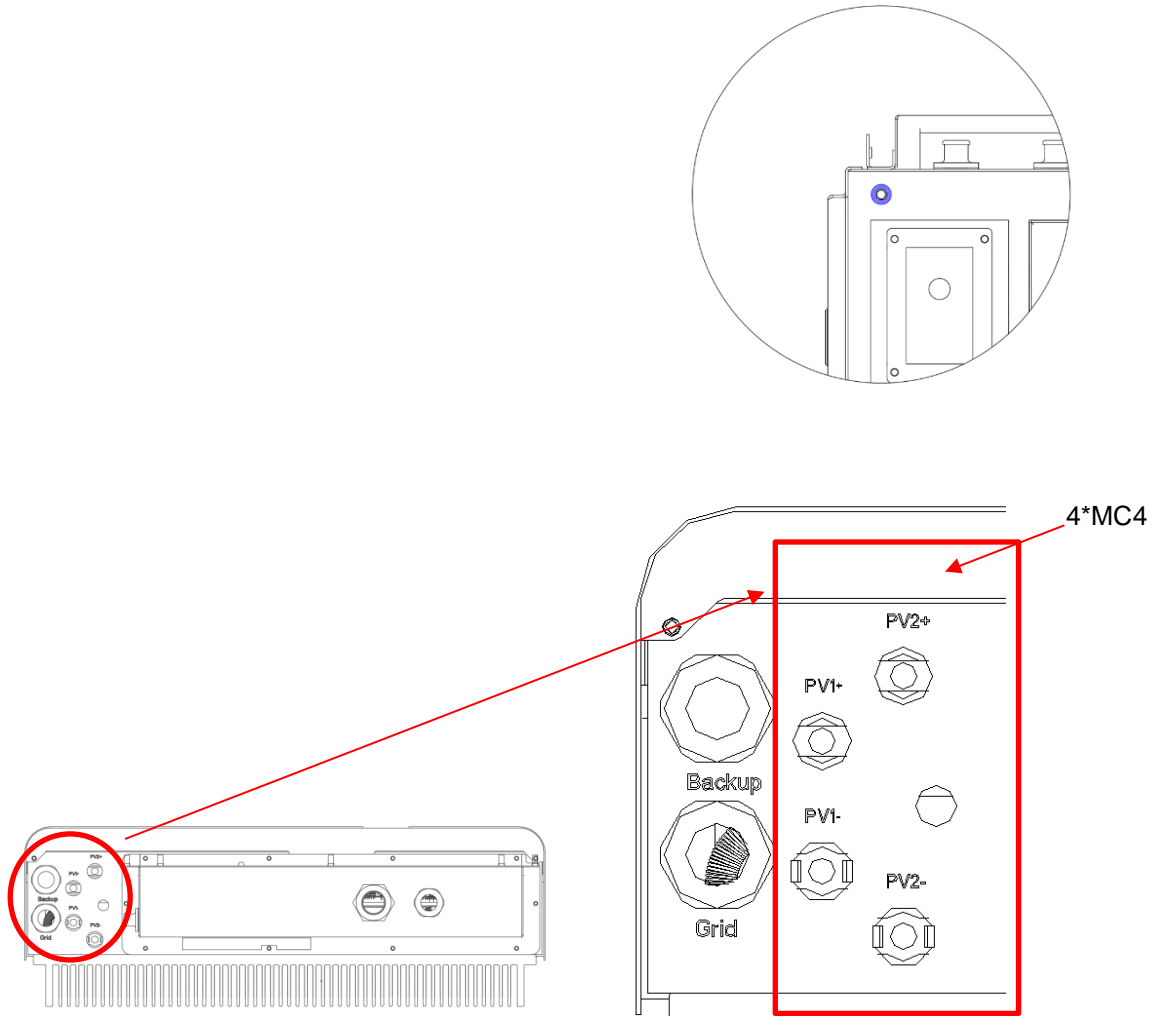


Figure 32 PV Wiring

Step 20: 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.

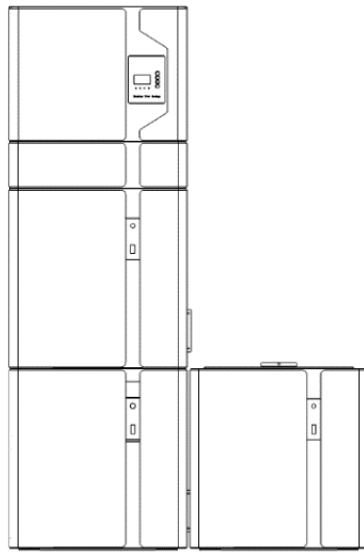


Figure 33 Increase the Battery Modules

2.2.6 Residual Current Protection

The inverter is not equipped with an all-pole sensitive residual current monitoring unit (RCMU) which fulfills the requirement of DIN VDE0100-712(IEC60364-7-712:2002). The inverter includes an integrated residual current device (RCD) which trips at a residual current of 30 mA (Type A).

2.2.7 Single Line Diagram

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

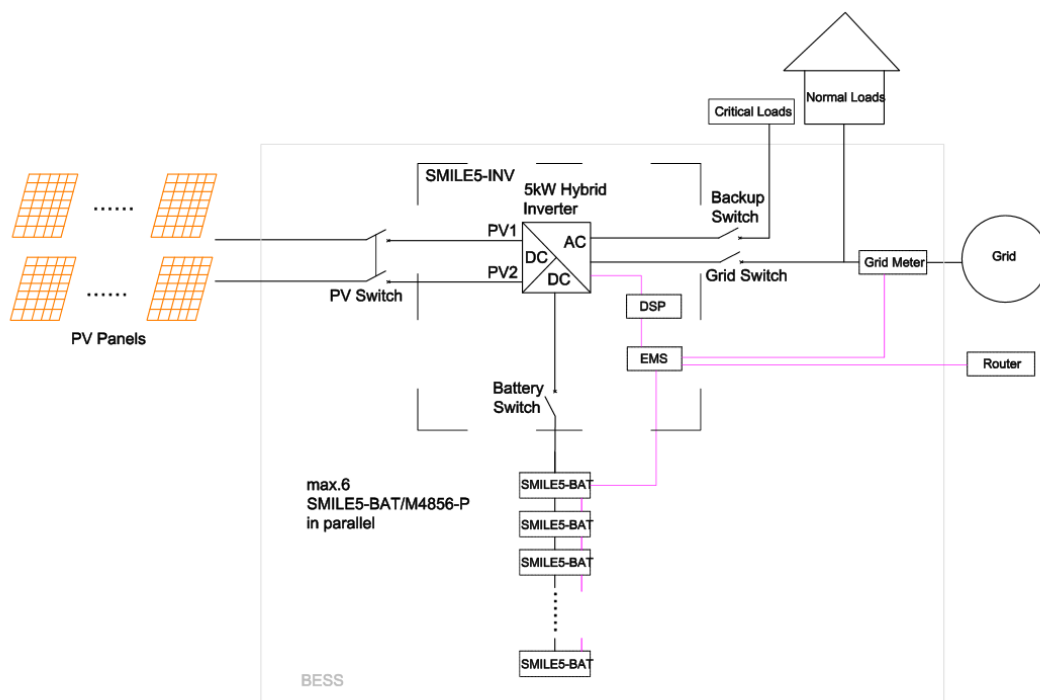


Figure 34 DC-coupled system

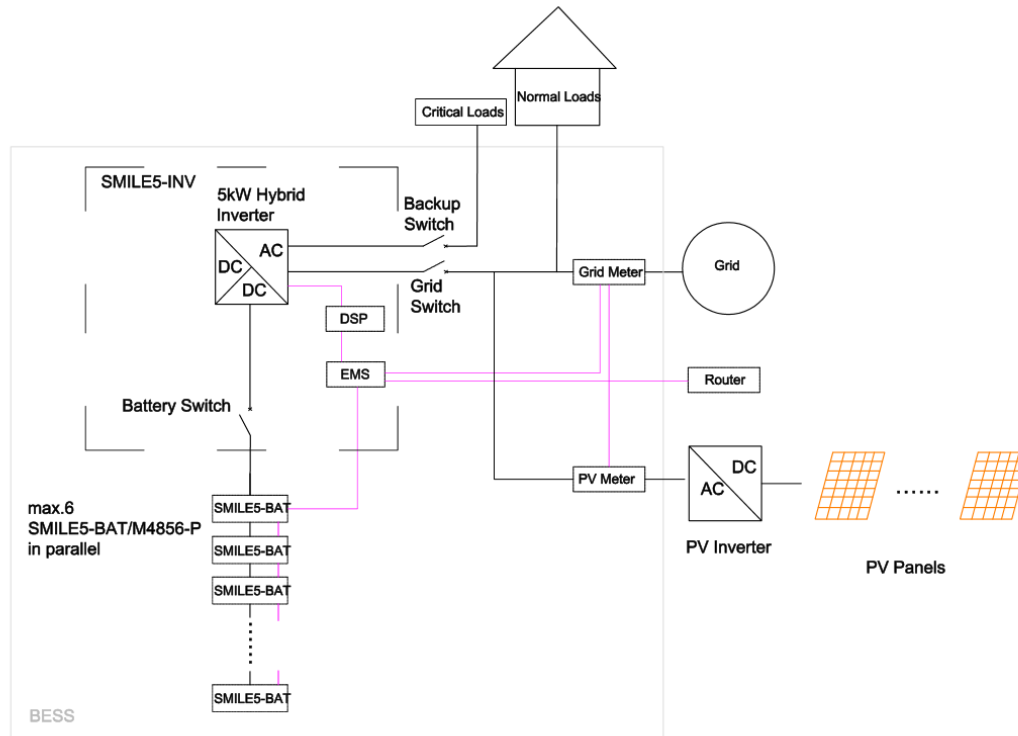


Figure 35 AC-coupled system

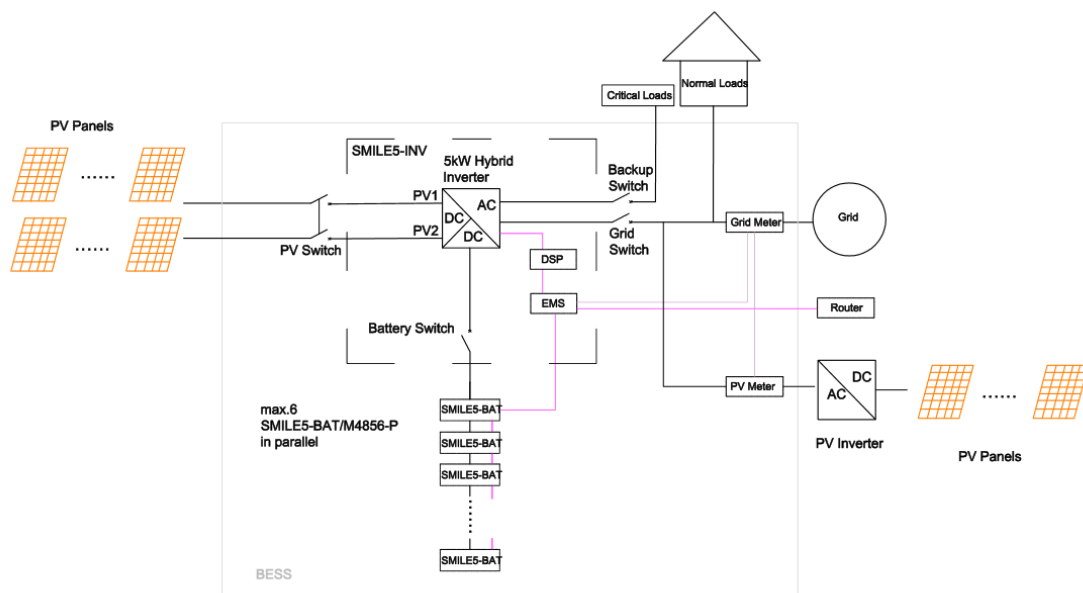


Figure 36 Hybrid-coupled system

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-200A CT	200	2.0 kWh
ACR10R-120A CT	120	1.2 kWh

2.3.1 Meter SM60A (If Applicable)

2.3.1.1 SM60A connect (with meter plug), if applicable:

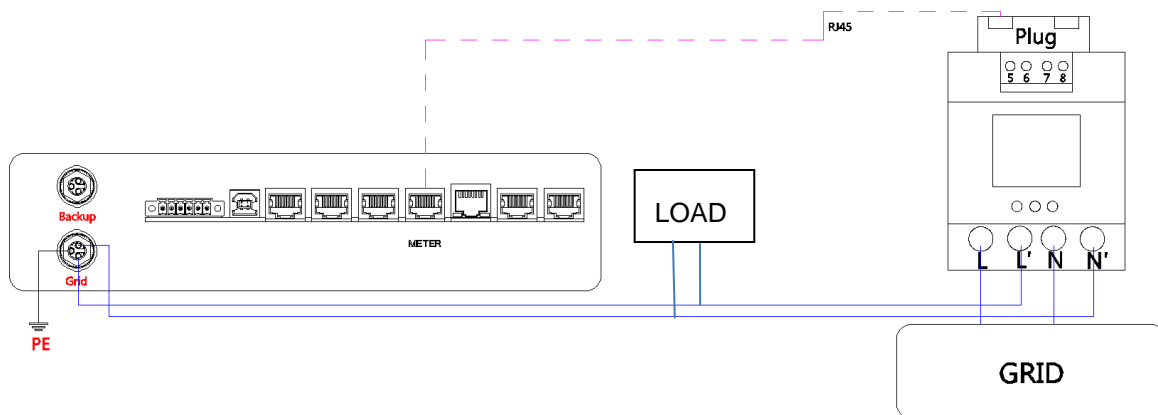


Figure 37 SM60A connect (with meter plug)

2.3.1.2 SM60A connect (without meter plug), if applicable:

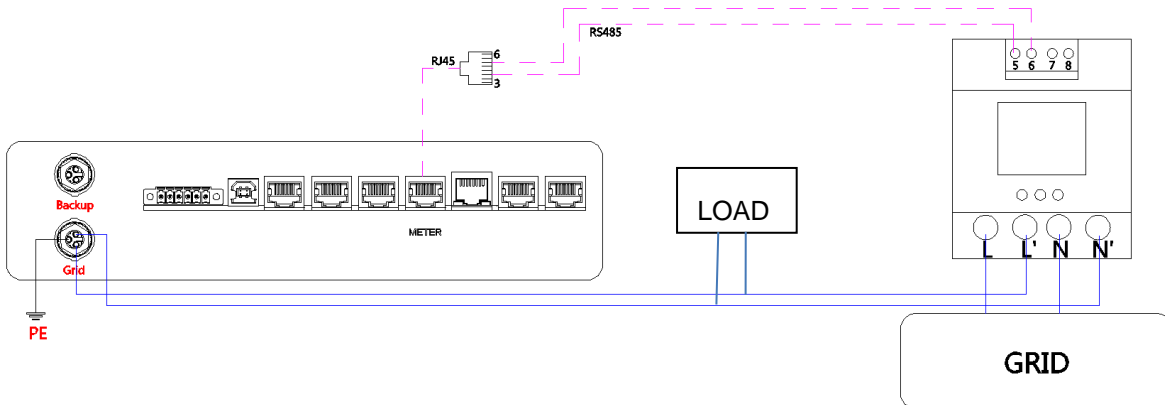


Figure 38 SM60A connect (without meter plug)

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

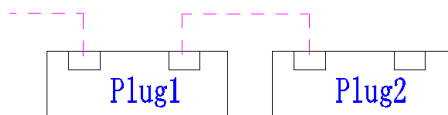


Figure 39 Two Meter Connect, with Meter Plug

Option 2: without Meter Plug

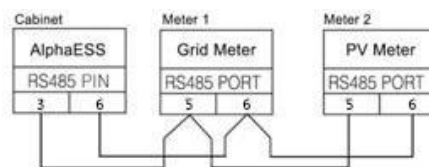


Figure 40 Two Meter Connect, without Meter Plug

2.3.2 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:

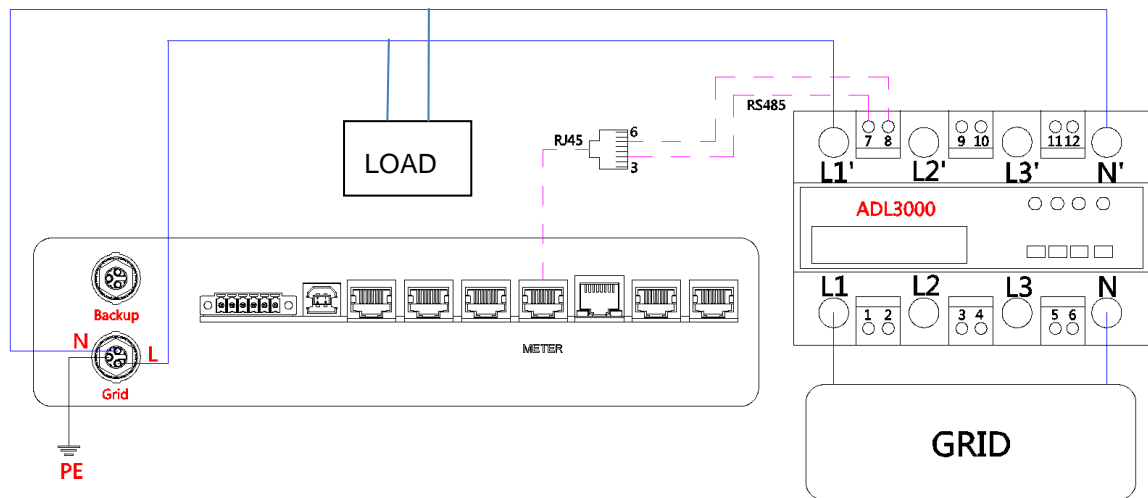


Figure 41 ADL-3000 single-phase Connect (with CT, without Meter Plug)

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:

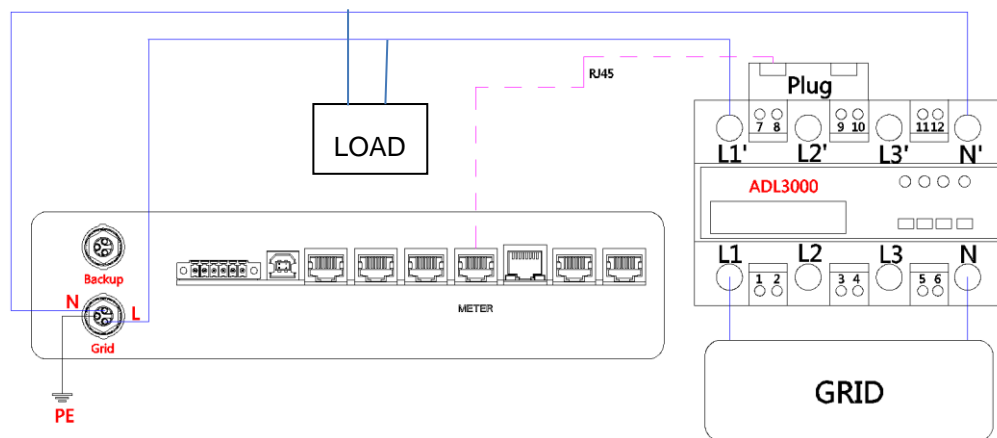
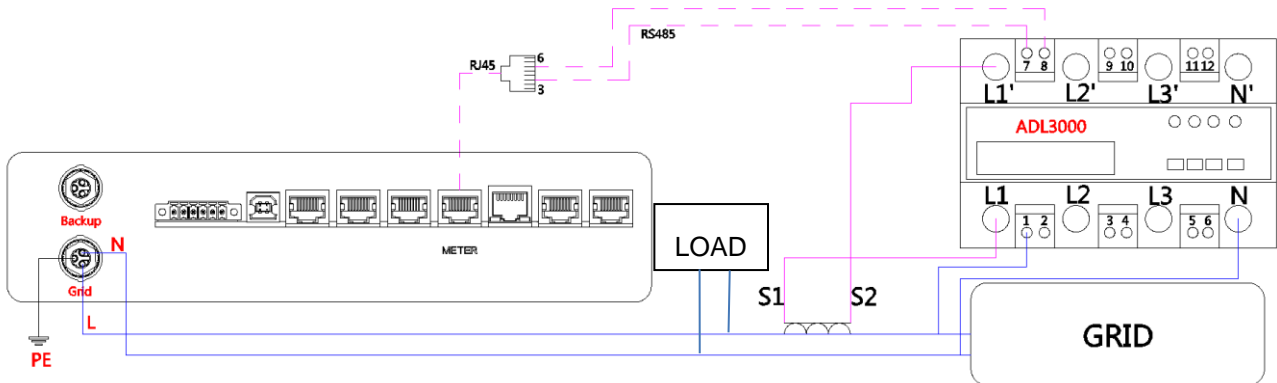
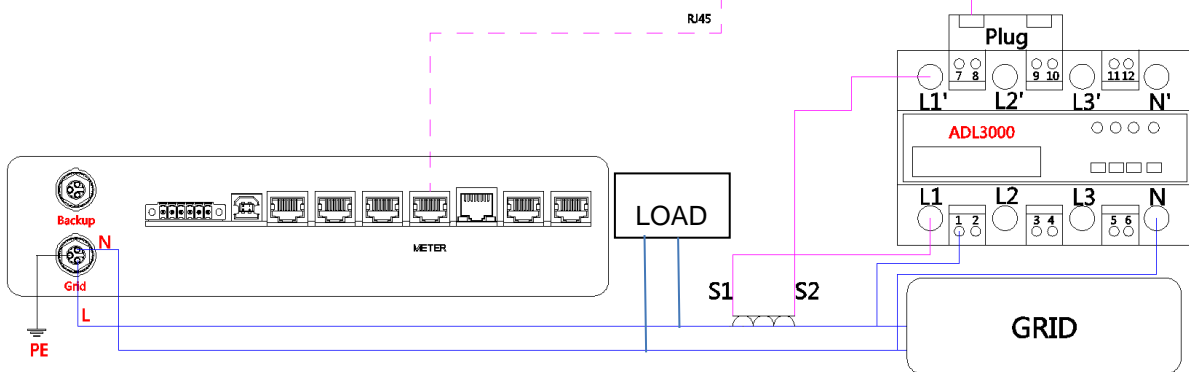


Figure 42 ADL-3000 single-phase Connect (without CT, with Meter plug)

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

Figure 43 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 44 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:

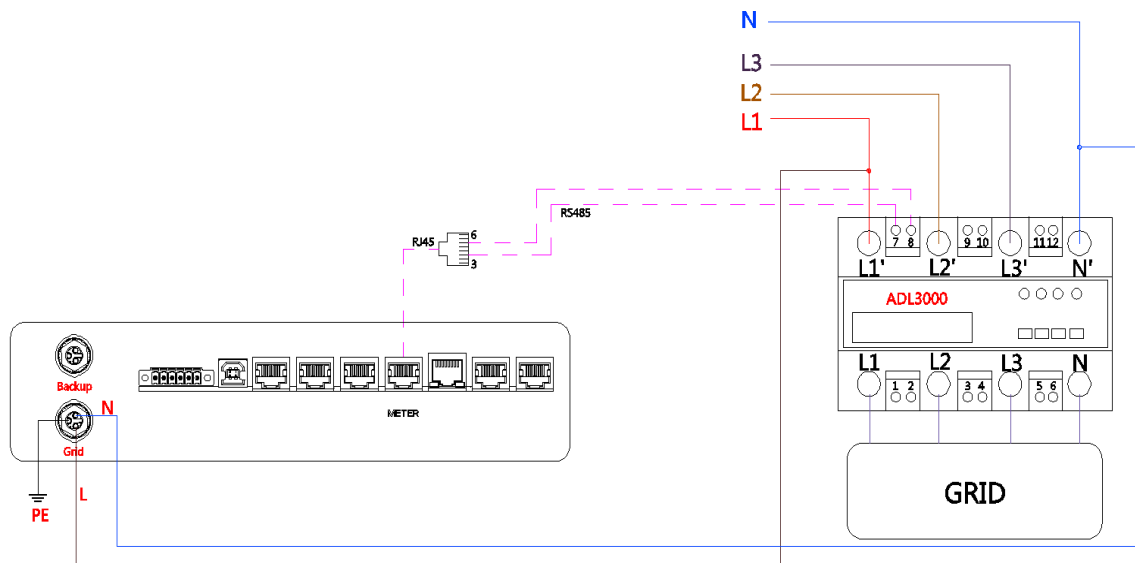


Figure 45 ADL-3000 three-phase Connect (without CT, without Meter plug)

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:

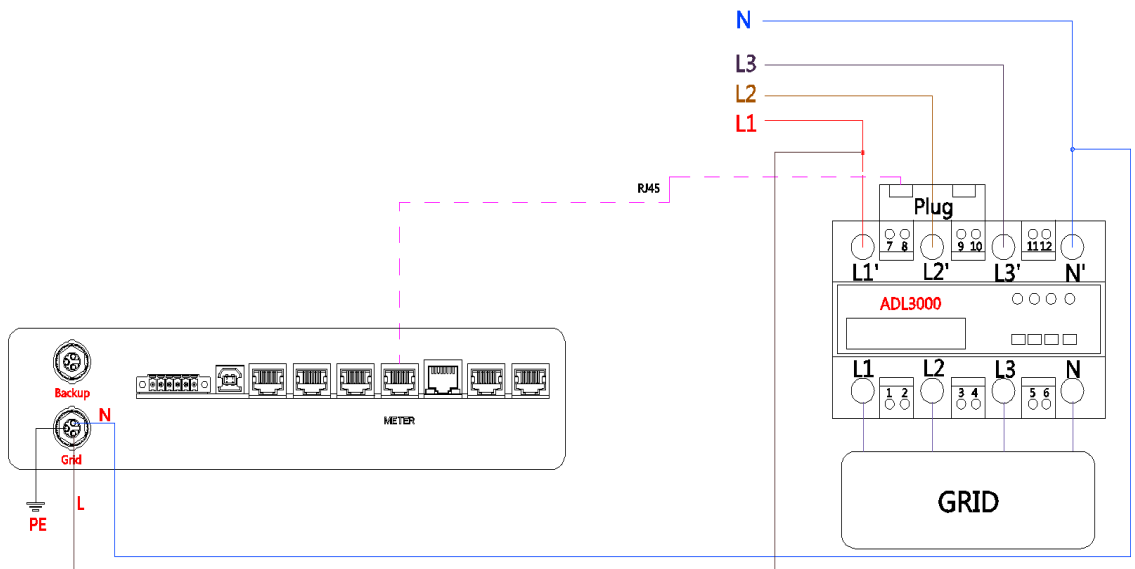


Figure 46 ADL-3000 three-phase Connect (without CT, with Meter plug)

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

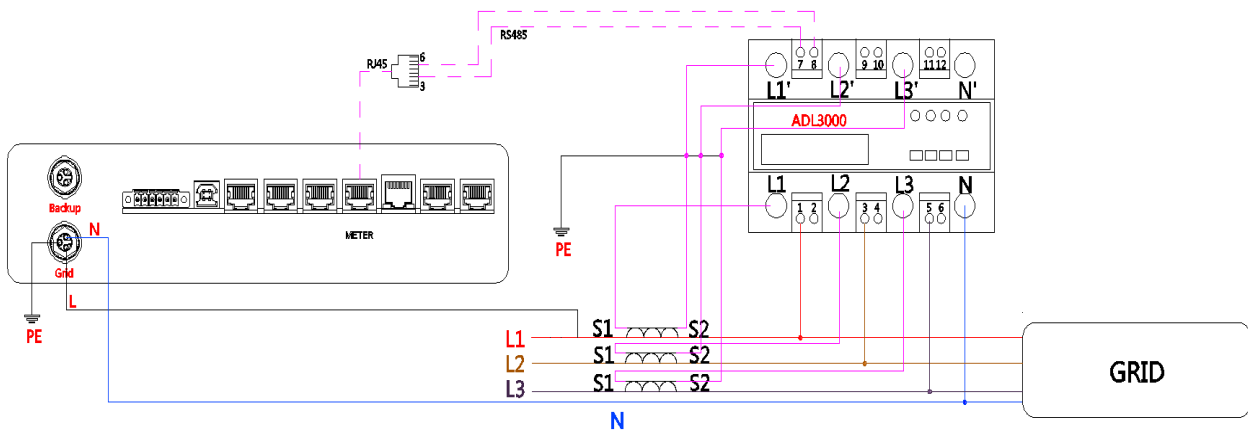


Figure 47 ADL-3000 three-phase Connect (with CT, without Meter plug)

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, with meter plug), if applicable:

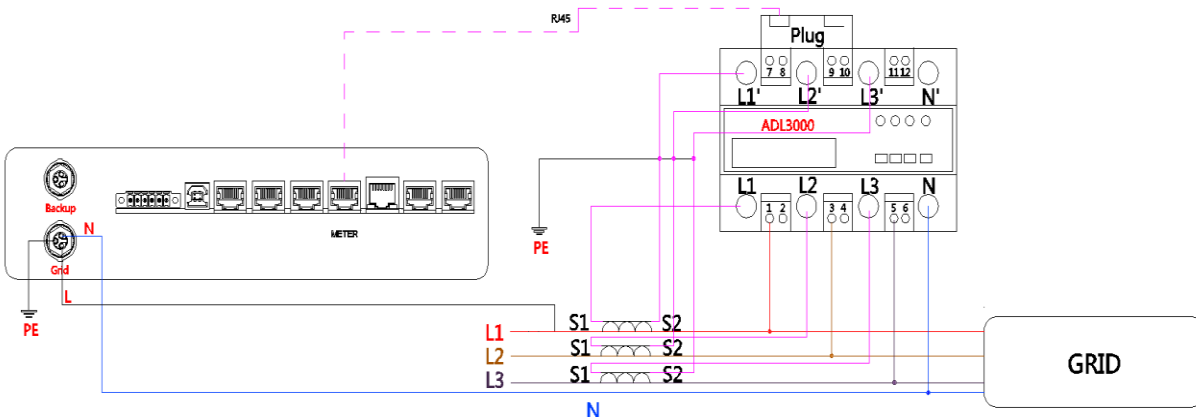


Figure 48 ADL-3000 three-phase Connect (with CT, with Meter plug)

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

Option 2: without Meter Plug

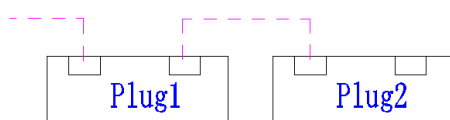
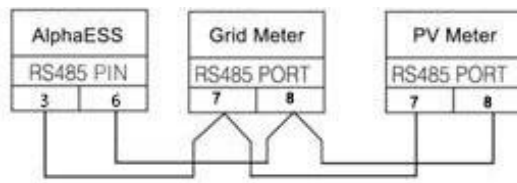


Figure 49 Two Meter Connect, with Meter Plug


NOTE: If the

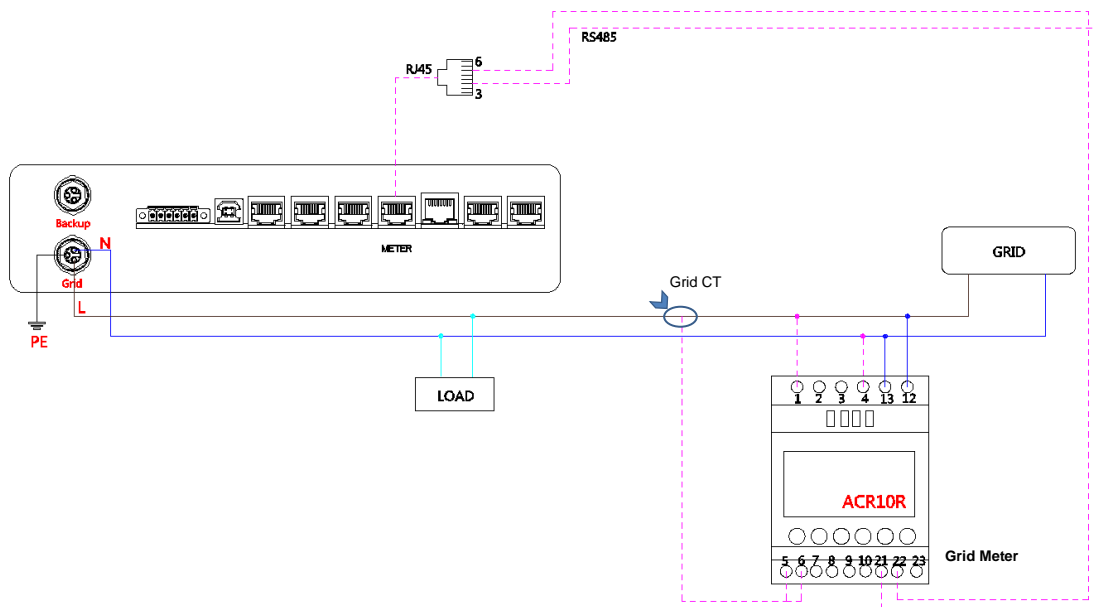
Figure 50 Two Meter Connect, without Meter Plug

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.

2.3.3 ACR10R Meter (if applicable)

2.3.3.1 ACR10R single-phase connection


Figure 51 ACR10R single-phase connection (if applicable)

2.3.3.2 ACR10R three-phase connection

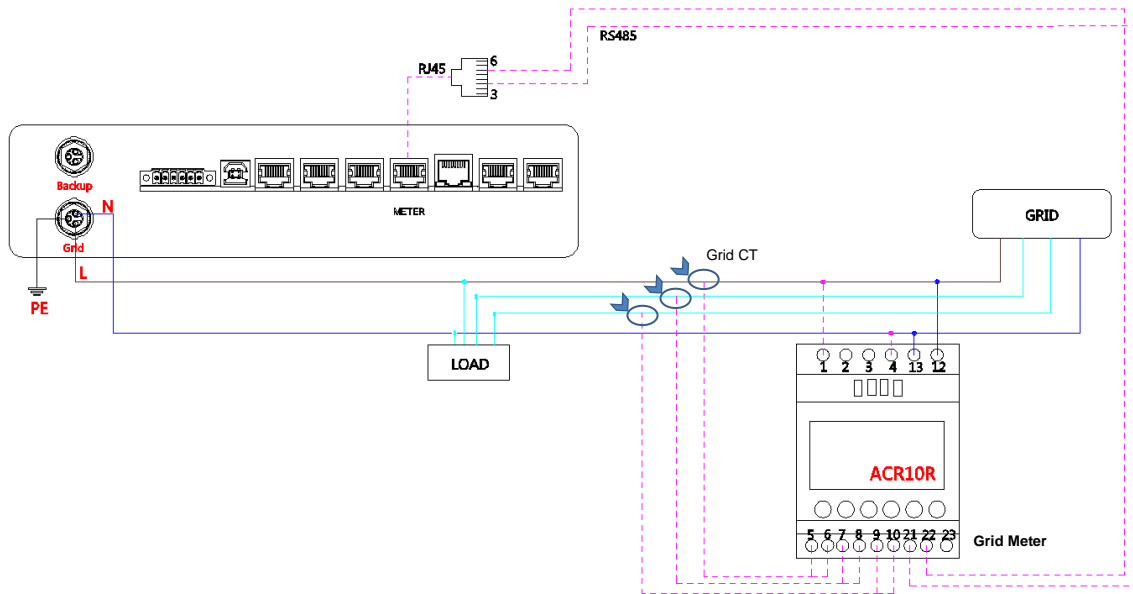


Figure 52 ACR10R three-phase connection (if applicable)

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

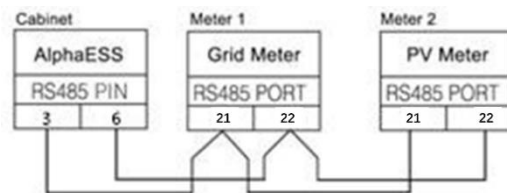


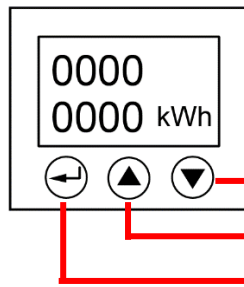
Figure 53 Two Meter Connect, without Meter Plug

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.

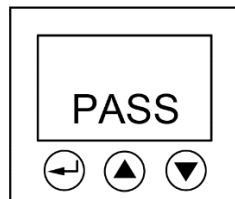
2.3.4 Meter setting

2.3.5.1 SM60A

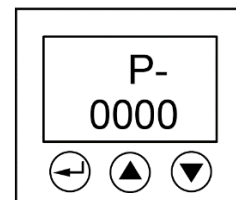


There are 3 buttons on the front of the electricity meter:

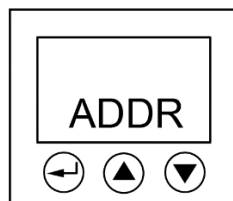
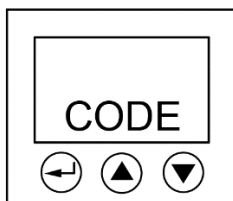
1. Down arrow: shift button
2. Up arrow: value adjustment
3. Enter button / Menu button



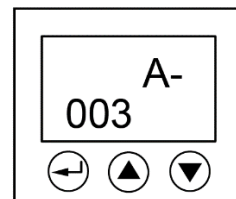
Step 1: Click the "Enter" button to enter the menu interface.



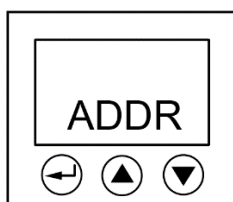
Step 2: Click the "Enter" button to input the password. The initial password is 0000. Then click the "Enter" button.



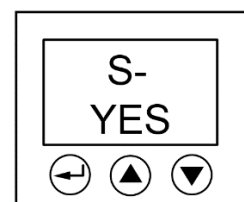
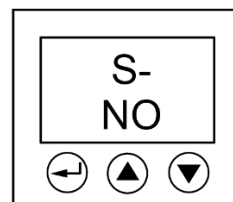
Step 3: You will get into the code interface. Then click the "Shift" button to enter the address interface.



Step 4: Please set the meter address by using the "Value adjustment" 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.

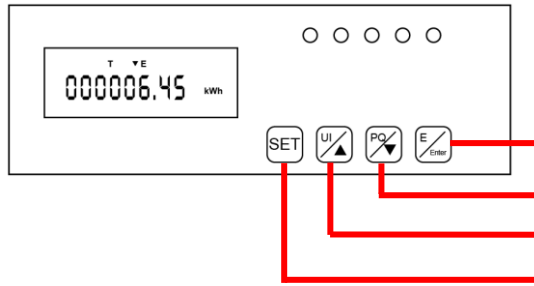


Step 5: Click the "Enter" button to get back to the menu interface. Then click the "Shift" button 5 times to enter the save interface.



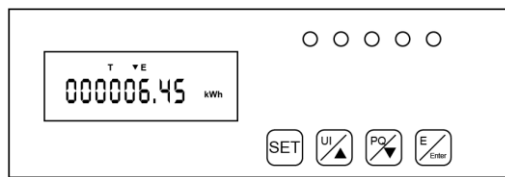
Step 6: Click the "Shift" button to save the setting.

2.3.5.2 ADL3000

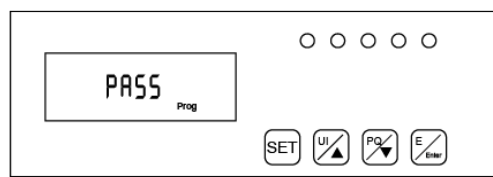


There are 4 buttons on the front of the electricity meter:

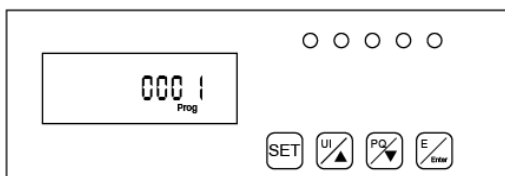
1. Enter button / Energy button
2. Down arrow / Power button
3. Up arrow / Voltage & current button
4. SET button



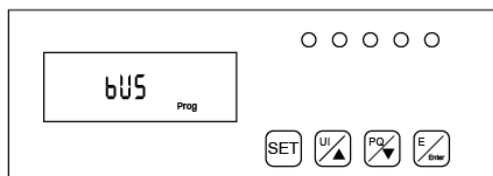
Step 1: The initial interface of the meter (normal working mode) is shown above.



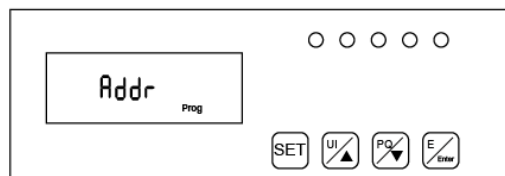
Step 2: Click the "SET" button to enter the password interface



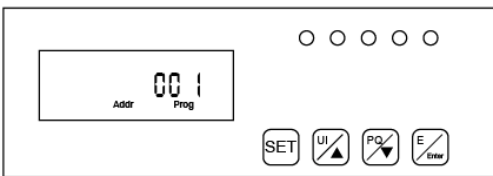
Step 3: Click the "Enter" button to enter the above interface, and press the up and down arrow keys to enter the password 0001.



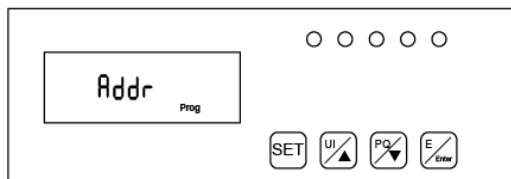
Step 4: Click the "Enter" button and the password input is completed.



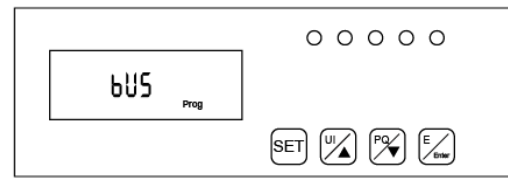
Step 5: Click the "Enter" button again to enter the address interface



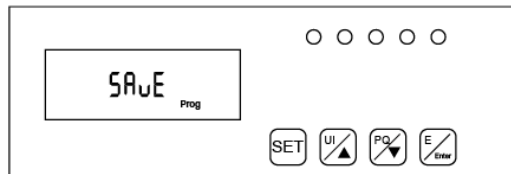
Step 6: Click the "Enter" button and press the up and down arrow keys to set the meter address. The Grid meter (DC, AC and Hybrid system) address is set to 001, the PV meter (AC and Hybrid system) address is set to 002.



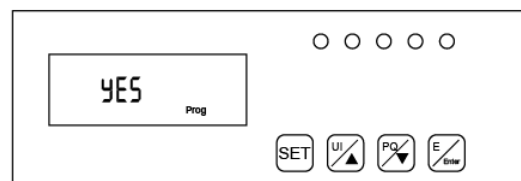
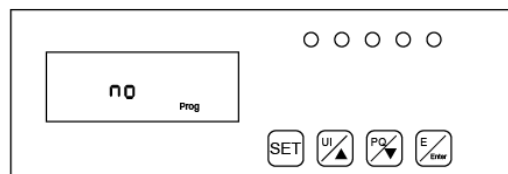
Step 7: Click the "Enter" button and the address setting is completed.



Step 8: Click the "SET" button to enter the following interface



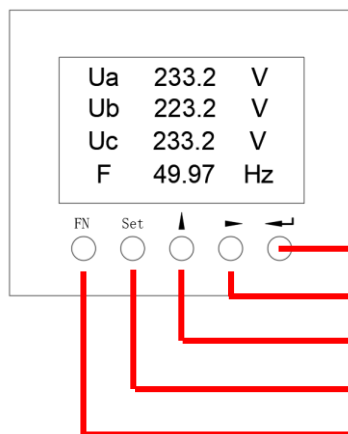
Step 9: Click the "SET" button again to enter the save interface



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.

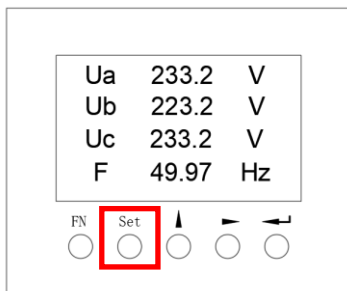
Step 11: Click the "Enter" button and the setting ends.

2.3.5.3 ACR10R

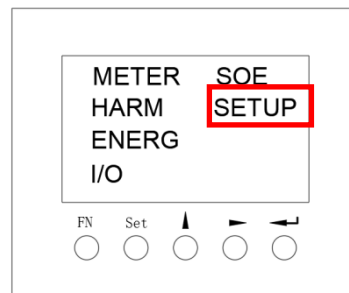


There are 5 buttons on the meter's front:

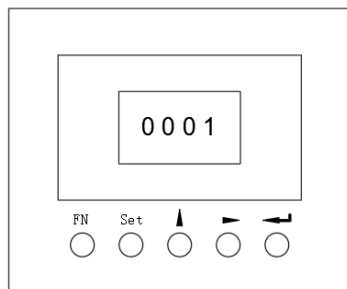
1. Enter key
2. Arrow to the right
3. Up arrow
4. SET button
5. FN key (no function)



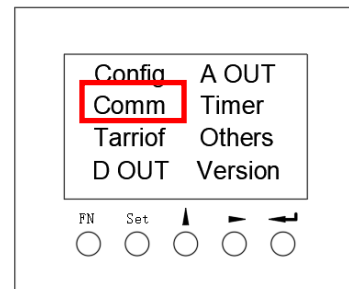
Step 1: Activate the meter display by pressing any key. Then click the "Set" button.



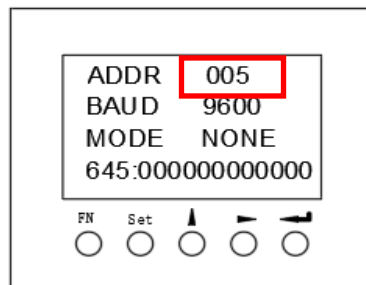
Step 2: Use the arrow keys to select the "SETUP" menu item and confirm your selection with the Enter key.



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.



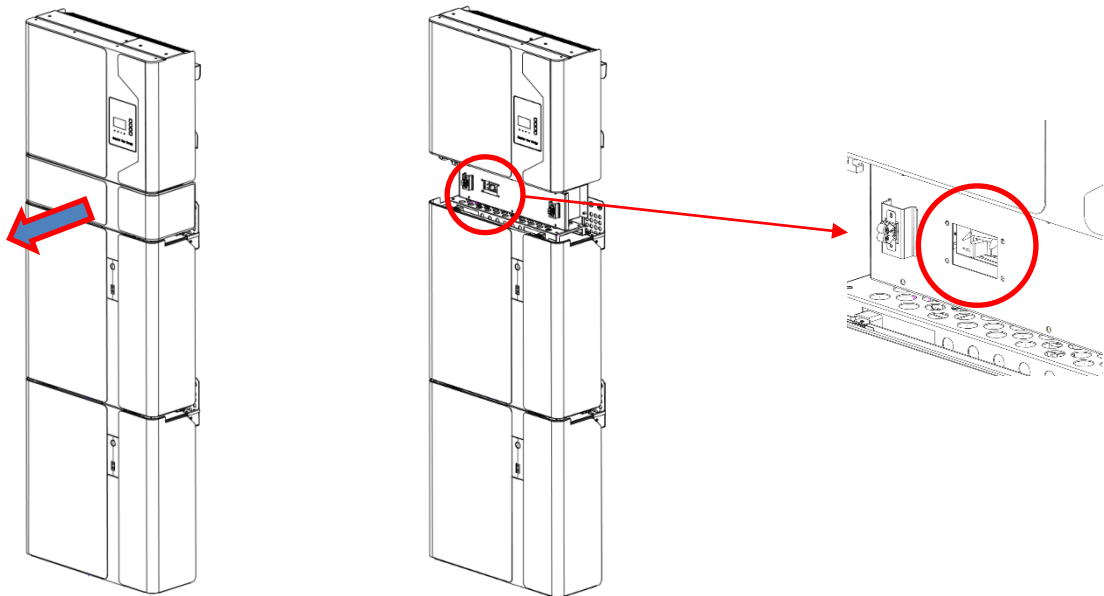
Step 5: Set the communication address and communication baud rate in the communication setting interface. When the meter is used as Grid meter (DC, AC/Hybrid system), the address is set to "005". When it is used as the PV meter (AC/Hybrid system), the address is set to "006". The baud rate is set to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

3. System Operation

3.1 Switch on

When turning on the system, it is very important to follow the order of the following steps 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.

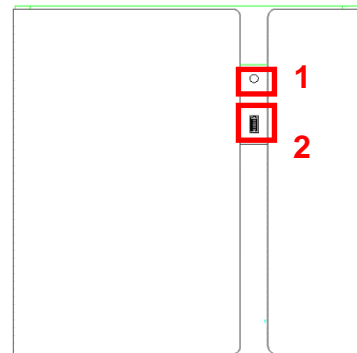


NOTE: the Backup switch is only used when a backup load is applied.

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 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 analyze 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 cannot 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.

4. EMS Introduction and Set up

4.1 Function Description

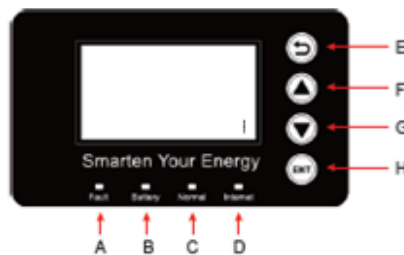


Figure 54 SMILE5 EMS Interface

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

Power	0W
Total	00.0kWh
Battery	%
Normal	

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.

>>>> MENU <<<<
>Status
History
Setting

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 <<<<
>Grid
Solar
Battery

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	<<<<<
> U		230.2V
I		2.0A
F		49.99Hz

Grid interface displays the real-time information on the utility grid side:

voltage U, current I, frequency F, P_{Inv} , $P_{MeterAC}$, $P_{MeterDC}$.

>>>>>	Solar	<<<<<
> U1	360.0V	
I1	1.0A	
P1	360W	

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

>>>	Battery	<<<
> U	48.0V	
I	10.0A	
P	480W	

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	<<<<<
> U	230.2V	
I	2.0A	
P	460W	

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

>>>>>	Comm	<<<<<
> BMS	Yes	
Net	Yes	
MeterGrid	Yes	

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

4.2.3 History

>>>>	History	<<<
> Grid Consump		
INV Gen.		
BAT Gen.		

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

>	Grid CONSUMP	<
>	Total:	
		0.0kWh

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

```
>>> INV Gen. <<<

> Today:

29.1kWh
```

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

```
>>> Bat Gen. <<<

> Today:

13.8kWh
```

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

```
>>> PV Gen. <<<

> Today:

19.0kWh
```

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

```
>>> Grid Charge <<

> Today:

1.9kWh
```

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

```
>>> PV Charge <<

> Today:

13.1kWh
```

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

```
>>> Error Logs <<<

1:
2018-02-02 16:48
Chg SPI Fault
```

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

```

> >      Information      <
> SN:
      AL20020YYMMXXXX
  
```

Make sure all numbers in the information menu are correct.

4.2.4 Setting

4.2.4.1 General Setting

```

>      New Password      <
>
      0  0  0  0
  
```

Step 1: Click setting and enter the password.

The installation's password is a four-digit password and the installer can get the password from Alpha ESS in different pathway. After enter the password, you can enter into the main Setting interface (administrator permissions).

```

> > >      Setting      < < <
> Function
      Safety
  
```

Step 2: Click Function to enter function setting.

```

> > >      Function      < < <
> Solar
      Battery
      Grid
  
```

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

```

> > >      Solar      < < <
> On Grid Cap.
      000000W
  
```

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

On-grid capacity: Existing PV capacity

Storage capacity: PV capacity on SMILE5

```

> > >      Battery      < < < <
> Bat Model
      Smile5-BAT
  
```

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

```

>>>   Battery   <<<<
> SOC Calibration

      No
  
```

Step 6: Check SOC Calibration function set No.

```

>>>   Battery   <<<<
> Battery Ready

      No
  
```

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

```

>>>>   Grid   <<<<<
> FeedIN Control
  Power Limit
  Power Factor
  
```

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

```

Max. Feed in rate
> User Value:

      50%
  
```

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

```

>>   System Mode   <<
> DC
  AC
  Hybrid
  
```

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

```

>>>   Work Mode   <<
> Force Charge

      Enable
  
```

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

```

>>>   Work Mode   <<
> Force Charge

      Enable
  
```

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

```

>>>   Work Mode   <<
>      Charge
  Start Time 1
  01 : 00
  
```

Step 13: Set the charge and discharge time.

```

>>>   Work Mode   <<
> UPS Reserve SOC

      11 %
  
```

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


```

>>> CT Meter <<<
> Enable      OFF
Ratio         1
  
```

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

```

>> UPS System <<
> Mute      YES
Frequency:  50Hz
  
```

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

```

>>> Date&Time <<
> 2018 - 02 - 02
    09 : 46
  
```

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

```

>>> Ethernet <<<
    IP method
>      DHCP
  
```

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.

```

>>> Language <<<
> English
  Deutsch
  
```

Step 20: Click Language to set language

```

>> Information <
> SN:
    AL20020YYMMXXXX
  
```

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:

```

>> Backupbox <<
> Enable
    No
  
```

Step 1: Click Enable to set yes.

```

>> Backupbox <<
> L1      1 SOC    10
  L2      2 SOC    10
  L3      3 SOC    10
  
```

Step 2: Set the priority of the load,

L1 > L2 > L3

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

```

>>> Function <<<
> Parallel
    ModBus
  
```

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

```

>>>> ModBus <<<<
> Enable      OFF
    Mode      Slave
  
```

Step 2: Please set Modbus enable as yes.

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

```

>>> Function <<<
> Parallel
    ModBus
  
```

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

```

>> Parallel <<
> Select
    Yes
  
```

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

```

>> Parallel <<
> Phase
    L1
  
```

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

```

>> Parallel <<
> Mode
    Parallel Mode
  
```

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).

5. Commissioning

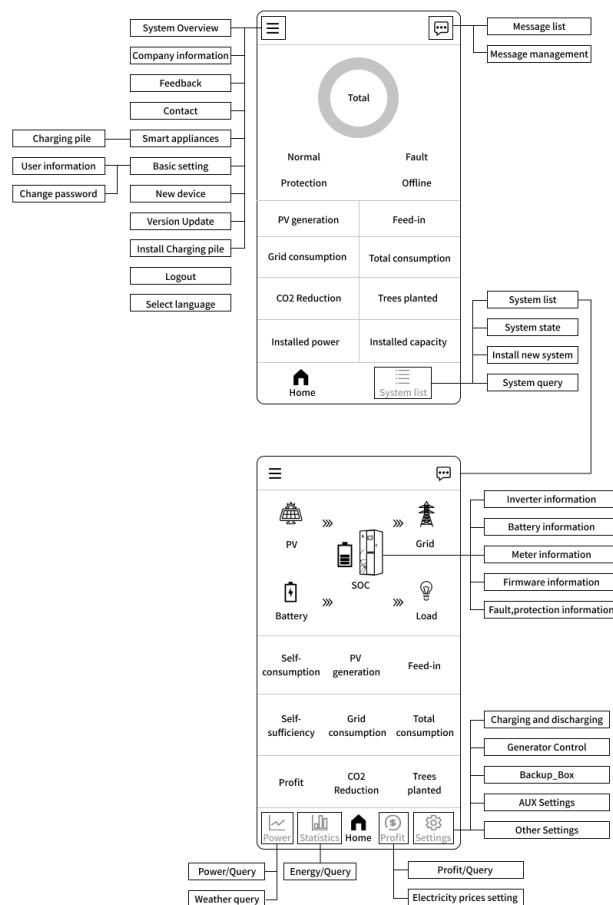
5.1 Download and Install APP (Optional)

1. Android device users can download the APP through major Android application markets such as Google Play.
2. IOS device users can search for “AlphaESS” in AppStore and download the APP.



AlphaESS-APP

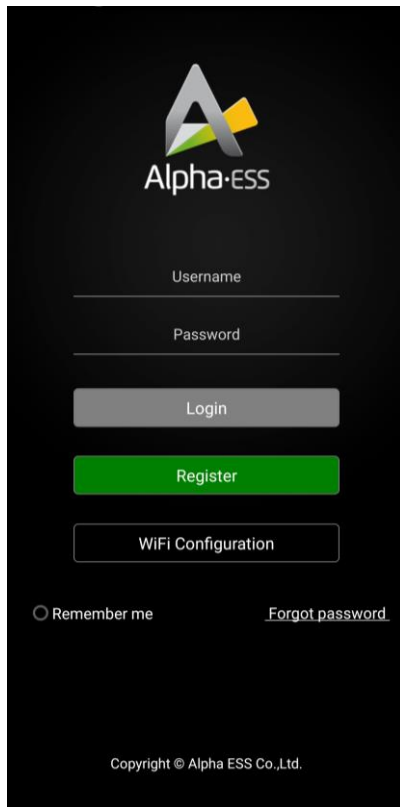
5.2 Overview of Functions for Installer Account



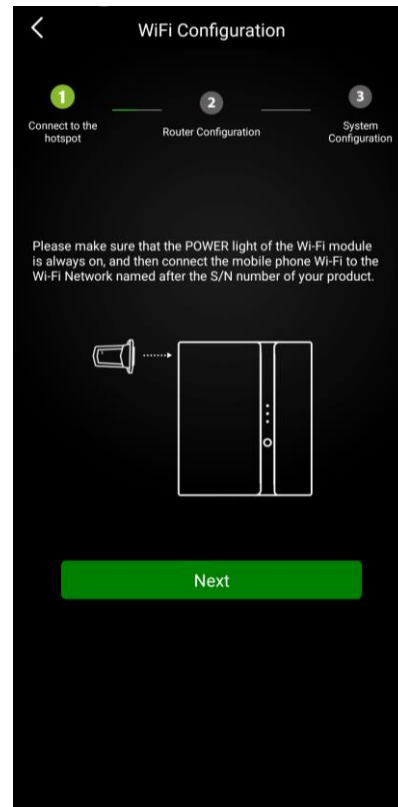
5.3 WiFi Module Setting (Optional)

This section is for users who have a system with a WiFi module.

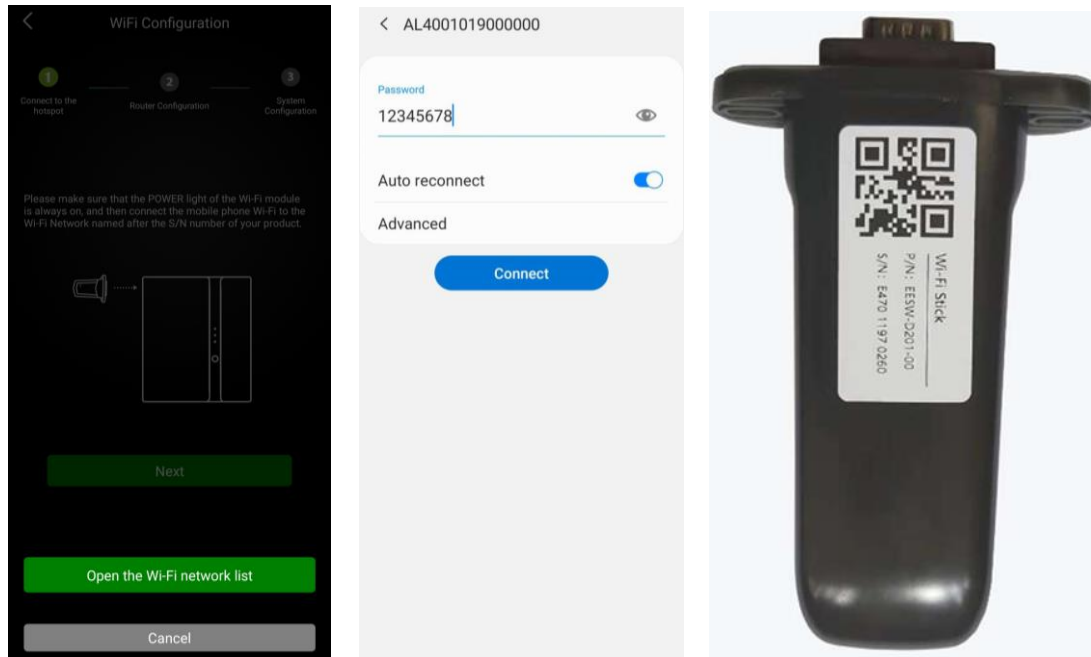
AlphaESS App supports network configuration, setting of the system basic parameter, and the viewing of system operation and configuration information.



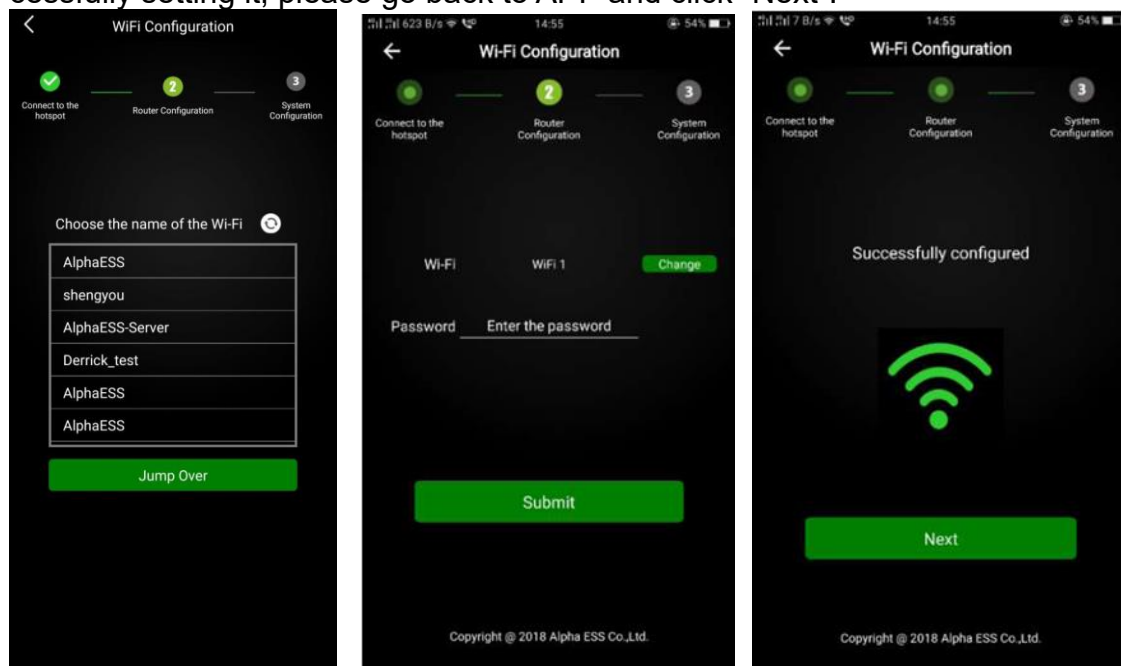
Step 1: Open AlphaESS APP, click the “Wi-Fi Configuration” button and enter the WiFi configuration interface.



Step 2: After that please check whether your mobile phone has connected to the system’s hotspot.

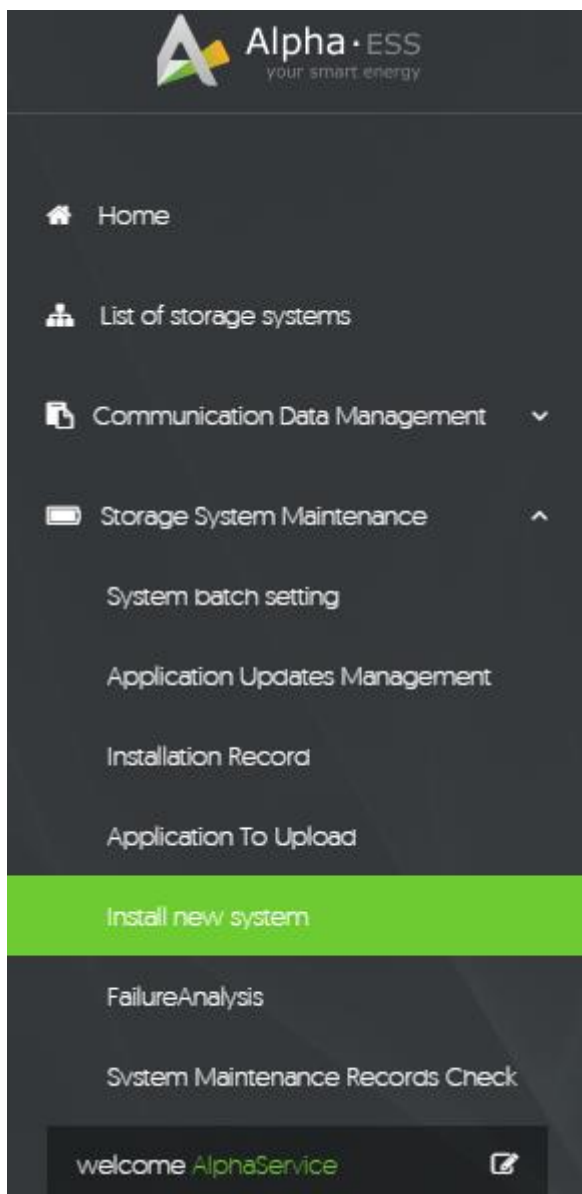


Step 3: If your mobile phone hasn't connected to the system's hotspot, please open the Wi-Fi network list. Please find the hotspot named by the product SN in WLAN list then enter the password "12345678" and connect to it. After successfully setting it, please go back to APP and click "Next".



Step 4: Select the WiFi of your home you are using, enter the password, complete the WiFi configuration and submit. If there is no network currently, you can click Jump over to skip the WiFi configuration step and directly set the system parameters. Note: the system will not be able to connect to the Internet without WiFi configuration.

5.4 Create a New Plant



Login the installer account and choose Storage System Maintenance> "Install new system" to register a new system at Alpha ESS.

The installer will be asked to input corresponding information as the picture shown below when he starts commissioning a new site, including the SN, Check Code, Liscense No. And so on.

*S/N	*Check Code	*License
AL700103284858	DCE981	ALPHA0001123456
*Create Time	*Customer Full Name	*Contact Number
2021-11-05	aaa	aaa
*Address		
ddd		
Remark		
Attachment		
Save		

5.5 Choose the Battery Model

The sever will recognize the the model according to the SN and the battery model will be required to input.

Inverter Model

SMILE-B3

Installed Battery Model

M4856-P

5.6 Basic configuration

The installer will choose the work mode and time zone.

Work Mode	Time Zone Setting
DC	(UTC+08:00) Beijing, Chongqing, Hong Kong, Urumqi
PV Installed Capacity on the Side of the Energy Storage System[kWp]	
0	
PV Installed Capacity on the Side of PV Inverter[kWp]	
0	

5.7 Safety Parameters Settings

Then the grid regulaition must be chosen and if the safety country is AS4777.2, regional application standard have to be set for different Volt-Watt & Volt-Var settings. All the country code and regional application standard are shown in Appendix 2 & 3.

On-grid Settings		
Grid Regulation	Regional Application Standard	Max. Feed-in Rate[%]
AS4777.2	Australia A	70

If the enduser want to disable the generation export, set the 'Max. Feed-in Rated' as 0. Or set a feed-in rate depends.

NOTE: Only the installer and administrator will have the authority to select the safety country and regional option. The safety country and regional option will be locked after commissioning unless sending mail to the staff of Alpha ESS.

NOTE: AS4777.2 means the latest standard AS/NZS 4777.2:2020.

5.8 Meter Settings (Optional)

Choose meter or CT and setting the ratio.

Meter Settings

Grid Meter

Meter ☒ CT

☐ CT

CT-ratio

1

5.9 Check after commissioning

The enduser can login their account and check the settings & firmware version after commissioning at following interface .

Inverter Information

Model

Smile5-INV

PV Installed Capacity

5

Rated Output Power [kW]

5

Inverter SN

AL2002017070138

PV Installed capacity on the side of PV inverter [kWp]

5

PV Installed Capacity On the Side of the Energy Storage System [kWp]

0

PV Meter Reversed

Normal

Grid Meter Reversed

Normal

Safety

AS4777.2

Regional application standard

Australia A

Power Factor

100

5-minute Average Voltage

0

10-minute average voltage

2550

Over-temperature Protection Threshold

0

Output Overcurrent Protection Threshold

0

DC Current Input

900

RCD

0

PVISO

0

Charge Boost Cur

0

Battery Enable Switch

Switch OFF

Maximum Grid Charging Power [kW]

0

Software Information

BMS Firmware Version

V1.86

Inverter Firmware Version

V1.43

EMS Firmware Version

V1.02.42

BackupBox Firmware Version

0.0.0

BMU Software Version Number

Top BMU Version

ISO Version

Inverter Slave Firmware

6. Routine Maintenance

6.1 Maintenance Plan & checklist

- 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.

Check Item	Acceptance Criteria	Maintenance Interval
Product cleanliness	The heatsink at the back of SMILE-B3-PLUS are free from obstacles or dust.	Once every 6 to 12 months
Product visible damage	The SMILE-B3-PLUS are not damaged or deformed.	Once every 6 months
Product running status	1. SMILE-B3-PLUS operate with no abnormal sound. 2. All parameters of SMILE-B3-PLUS are correctly set. Perform this check when SMILE-B3-PLUS is running.	Once every 6 months
Electrical connections	1. Cables are securely connected. 2. Cables are intact, and in particular, the cable jackets touching the metallic surface are not scratched. 3. Unused cable glands are blocked by rubber sealing which are secured by pressure caps.	Perform the first maintenance 6 months after the initial commissioning. From then on, perform the maintenance once every 6 to 12 months.

6.1.1 Operating Environment

(Every half year)

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, the following notes should be paid attention to 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 for-bidden 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 (e.g. 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.

7. Trouble Shooting

Error Category	Server Error Code	Error Analysis	Trouble Shooting
EMS	1	Network Card_Fault	Please contact AlphaESS service center.
	2	Rtc_Fault	Please contact AlphaESS service center.
	4	E2prom_Fault	Please contact AlphaESS service center.
	8	INV_Comms_Error	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	16	Grid_Meter_Lost	Please check the communication order and connectivity between the grid meter and EMS.
	32	PV_Meter_Lost	Please check the communication order and connectivity between PV meter and EMS.
	64	BMS_Lost	Please check the communication order and connectivity between BMS and EMS.
	128	UPS_Battery_Volt_Low	Please charge the battery.
	256	Backup_Overload	Please check whether the critical load of the inverter exceeds the loading capacity of the inverter.

	512	INV_Slave_Lost	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	1024	INV_Master_Lost	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	2048	Parallel_Comm_Error	Please turn off the parallel connection mode and check if the configuration is correct and the communication cables are normal.
	4096	Parallel_Mode_Differ	Please turn off the parallel connection mode and check if the configuration is correct
BMS	1	Over Temperature	Please wait for the battery temperature to decrease.
	16	Charge Over-current	Please wait for battery to recover from over-current.
	64	Discharge Over-current	Please wait for battery to recover from over-current.
	128	Multi Master error	Please turn on all batteries in 30 seconds after power-off.
	256	Cell Over-voltage	It is forbidden to charge the battery and wait for the battery to recover from over-voltage.
	512	Mos High Temperature	Please shut down the system and wait for 2 hours before restart.
	1024	Discharge Low Temperature	It is forbidden to charge or discharge the battery and wait for the battery temperature to rise.
	2048	Mos DriverFeedback Error	Please contact AlphaESS service center.
	4096	Cell Under-voltage	It is forbidden to discharge the battery and wait for the battery to recover from under-voltage.

	8192	Firmware Versions Inconsistence	Upgrade batteries with inconsistent firmware versions to the same.
	16384	Current error	Check whether the wiring and check whether inverter load exceed the maximum discharge power of the battery.
	32768	Mos error	Please restart the battery system. If there is still a problem, please contact the service center.
	1048576	The Slave Battery Communication Lost	Please check if the communication cable between the slave battery and BMS is not connected or restart the battery.
	2097152	Charge Low Temperature	Please confirm that the ambient temperature is higher than 0°C.
	4194304	Dial switching mode in Parallel modules Inconsistence	Please check whether the dial switching mode of parallel battery modules are consistent.
	8388608	Master Battery Communication Lost	Please check if the communication cable between the master battery and BMS is not connected or restart the battery.
	134217728	No SOC calibration For 4 weeks	Please calibrate the SOC of battery.
	268435456	Circuit Breaker Turned off	Please power off the battery system and check the circuit breaker sampling line.
	536870912	SN Missing	Please contact AlphaESS service center.
	1073741824	Two Temperature Sensor Error	Please restart the battery system. If there is still a problem, please contact the service center.
INV	1	TzProtectFault	Please check the inverter wiring and restart the inverter.
	2	MainsLostFault	Please contact AlphaESS service center.
	4	GridVoltFault	Please confirm whether the grid parameters conform to the system grid regulations.
	8	GridFreqFault	Please confirm whether the grid parameters conform to the system grid regulations.

	16	PLLLostFault	Please confirm whether the grid parameters conform to the system grid regulations.
	32	BusVoltFault	Please confirm whether the PV wiring voltage exceeds the maximum range of the system.
	64	Ac5Mins_Voltage_Fault	Please confirm whether the grid parameters conform to the system grid regulations.
	128	Inv_OCP_Fault	Please restart the inverter.
	256	Dci_OCP_Fault	Please restart the inverter.
	512	ResidualCurrentFault	Please confirm that the case is grounded and the neutral wire is not reversed.
	1024	PvVoltFault	Please confirm that PV has voltage access and reduce PV voltage.
	2048	Ac10Mins_Voltage_Fault	Please confirm whether the grid parameters conform to the system grid regulations.
	4096	IsolationFault	Please restart the inverter. If the problem has not been solved, please contact AlphaESS service center.
	8192	TemperatureOverFault	Please confirm the inverter temperature and let the inverter standby to cool down.
	65536	SpiCommsFault	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	131072	SciCommsFault	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	262144	CanCmmsFault	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	524288	InputConfigFault	Confirm whether the number of PV access consistent with MPPT number settings.
	1048576	EepromFault	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	2097152	RelayFault	Please update the inverter firmware.

			If the problem has not been solved, please contact AlphaESS service center.
	4194304	SampleConsistenceFault	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	8388608	ResidualCurrent_DeviceFault	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	33554432	Wiring_Fault	Check if the wirings between inverter and grid and backup are correct.
	67108864	HCT_AC_DeviceFault	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.
	134217728	OverLoadFault	Please check whether the critical loads of the inverter exceeds the load capacity of it.
	268435456	UPS_OCP_Fault	Check whether the emergency load exceeds the maximum current of the inverter.
	536870912	DCI_DeviceFault	Please restart the inverter. If the problem has not been solved, please contact AlphaESS service center.
	1073741824	Other_DeviceFault	Please restart the inverter. If the problem has not been solved, please contact AlphaESS service center.
	2147483648	UpsRelayFault	Please update the inverter firmware. If the problem has not been solved, please contact AlphaESS service center.

8. Specification

PV input	
Maximum Input PV Power	2 x 3330 W
Maximum DC Voltage	580 V
Nominal DC Voltage	360 V
Start-up DC Voltage	125 V
MPPT Voltage Range	125 ~ 550 V
MPPT Number	2
Maximum Input Current	2 x 12 A
Maximum Short-circuit Current	2 x 15 A
Battery input	
Battery Type	Li-ion
Battery Voltage Range	40 ~ 60 V
Maximum Charge/ Discharge Power	5 kW
Maximum Charge/ Discharge Current	100A / 100 A
Output AC (Back-up side)	
Rated Output Power	5 kW / 5 kVA
Back-up Switch Time	<20 ms
Rated Output Voltage	L/N/PE, 230 V
Rated Frequency	50/60 Hz
Rated Output Current	21.7 A
THDv(@linear load)	3%
Input AC (Grid side)	
Rated Input Voltage	L/N/PE, 230 V
Rated Frequency	50/60 Hz
Rated Input Power	5 kW
Max. Input Current	21.7 A
Output AC (Grid side)	
Rated Output Power	5 kW / 5 kVA
Phase	Single phase
Rated Grid Voltage	L/N/PE, 230 V
Grid Voltage Range	180 ~ 270 V
Rated Grid Frequency	50 / 60 Hz
Rating Grid Output Current	21.7 A

Power Factor	>0.99 (0.8 leading - 0.8 lagging)
THDi	< 3%
Protection class	I
Overvoltage category	III
Protection (Inverter side)	
Anti-Islanding Protection	Integrated
Insulation Resistor Detection	Integrated
Residual Current Monitoring Unit	Integrated
Output Over Current Protection	Integrated
Output Short Protection	Integrated
Output Overvoltage Protection	Integrated
Battery Reverse Protection	Integrated
Battery Breaker	Integrated
General Data	
Display	LED
Dimensions (W*H*D)	600 x 600 x 250 mm
Weight	60 kg
Topology	Transformerless
Operation Temperature Range	-10 ~ +50 °C
Ingress Protection	IP65
Relative Humidity	0 ~ 100%
Noise Emission	<30 dB(A) @1m
Cooling Concept	Natural convection
Max. Operation Altitude	2000 m

Battery pack (SMILE5-BAT)	
Battery Type	LFP (LiFePO4)
Weight	65 kg
Energy Capacity	5.7 kWh
Usable Capacity	5.5 kWh
Nominal Voltage	51.2 V
Operating Voltage Range	48 ~ 57.6 V

Appendix 1: Safety Country Code

	Safety Code	Country	Remarks
1	VDE0126	France	
2	VDE4105	Germany	
3	AS4777.2	Australia	Regional standards
4	C10/C11	Belgium	
5	TOR Erzeuger	Austria	
6	CEI 0-21	Italy	
7	NRS 097-2-1	South Africa	
8	G98/G99	Britain	
9	50Hz default	50Hz grid	For 50Hz grid region
10	G98/G99-IE	Ireland	
11	EN50549	EU	
12	NC Rfg	Poland	

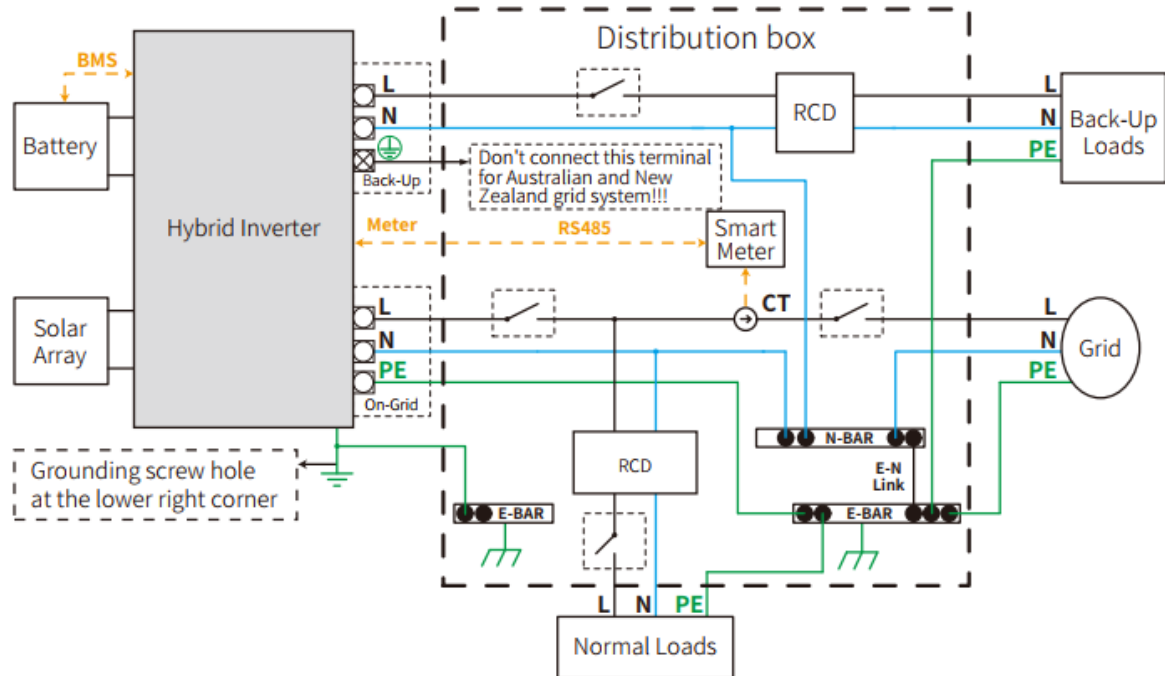
Appendix 2: Regional application Standard

Regional application Standard	Electric Company
Australia A	N/A
Australia B	N/A
Australia C	N/A
New Zealand	N/A
Victoria	Ausnet Services
	Jemena
	Citipower
	Powercor
	United Energy
Queensland	Energex
	Ergon Energy
South Australia	SA Power Networks
New South Wales	Ausgrid
	Endeavour Energy
	Essential Energy
Western Australia	Horizon Power
	Western Power
Australian Capital Territory	Evoenergy
Northern Territory	NT Power and Water
Tasmania	Tas Networks
Vector	Vector

- Choose the correspond Regional application Standard, the power quality modes Volt-var and Volt-Watt will running automatically. (Only for Australia)
- All the value of setting point is according to AS NZ 4777.2-2020 and local electricity company.

Appendix 3: System Connection Diagrams

Example for application that Neutral connects together with PE in distribution box, such as Australia, New Zealand, South Africa, etc. (Please follow local wiring regulations!)



Example for grid systems without special requirements on electrical wiring connection. (The back-up PE line and earthing bar must be grounded properly and effectively. Otherwise the back-up function may be abnormal when the grid fails.)

