



Installation & Operation Manual

Energy Storage System (ESS)

Storion-SMILE-B3



V02

Copyright Declaration

The copyright of this manual is owned by Alpha ESS Co., Ltd. (hereinafter referred to as "AlphaESS") and all rights are reserved. Please keep the manual properly and operate strictly according to all safety and operation instructions in this manual. Do not operate the system without reading the manual.

Version Information

Version	Date	Contents
V01	Nov. 30 th , 2018	Newly compiled manual
V02	Dec. 5 th , 2018	Modify the connection diagram of meters. Add the notice of external connection of backup and grid neutral line in Austria.

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1. Introduction

1.1 Introduction of System

SMILE-B3 is an AC coupled all-in-one battery energy storage system (BESS). It can help to achieve the optimal usage of renewable energy. SMILE-B3 can control the bi-directional flow of electric power, work under auto/manual & time-of-use (TOU) modes, charge/discharge the battery as per customer's setting. Under the auto mode, SMILE-B3 will store surplus renewable energy onto the battery and discharge battery to supply power to local loads when renewable energy is not enough. SMILE-B3 is equipped with 3 buttons, friendly human machine interaction system. More importantly SMILE-B3 is stable, safe, and reliable. The schematic is as shown in Figure 1.1:

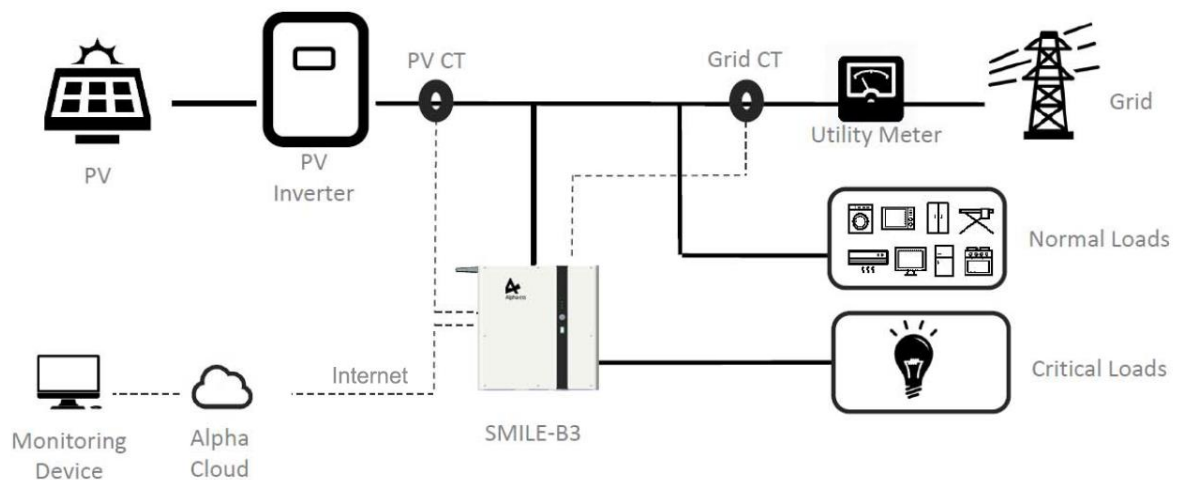


Figure 1.1 Storion-SMILE-B3 System Figure

NOTE: For the AC coupled system, if only installing Grid CT, the system cannot display PV Inverter generated power, electric energy production etc.

1.2 General Precautions



Danger:

Danger to life due to high voltages of battery and electric shock.

- Do not touch uninsulated cable termination.
- Do not touch the DC wires.
- Do not open the inverter and battery.
- Do not use wet cloth to wipe the system.
- Do not dispose of batteries in fire. The batteries may explode!
- Only qualified personnel who are equipped with the corresponding skills can install and debug the system. Before performing any work on the inverter or battery pack, please disconnect the inverter from all voltage sources as described in this document.

**Warning****Risks of chemical burn electrolyte or toxic gases.**

During standard operation, electrolyte won't leak from the battery pack as well as form of toxic gases. Even if the battery was handled with care, but if the battery pack is damaged or breaks down, electrolyte may leak or form toxic gases.

- Do not install the system in temperature or humidity exceeding the permitted range.
- Please do not use wet hands to touch the system.
- Do not place heavy objects on the top of the system.
- Do not damage the system using sharp objects.
- Do not install or operate the system in the inflammable and explosive environment or high humidity environment.
- Do not install explosive gas and the battery pack in the area that containing highly flammable substance or gas.
- If the moisture penetrates the system (e.g. due to casing damage), please do not install or operate the system.
- When the system has connected the extended battery module, please do not move the system.
- Use strapping if necessary during transportation to prevent tipping.
- Storion - SMILE - B3 transport must be conducted by the manufacturer or professionals, these operations should be recorded and used.
- Certified ABC extinguishers with minimum capacity 2 kg must be carried during transportation.
- No smoking during unloading of vehicles and close to them.
- If you want to replace the battery module, please pack new dangerous packaging according to needs, pack them and let the supplier receive them.
- If contacting with the electrolyte, please wash affected area with water immediately, and consult a doctor immediately.

**Risk of injury by hoisting or falling system**

Inverters and batteries are heavy and can cause personal injury if the inverter or battery is improperly lifted or dropped during transport or when attached or removed from walls.

Lifting and transporting Storion- SMILE-B3 is conducted by more than 1 person.

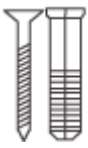

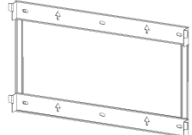

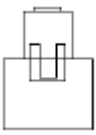

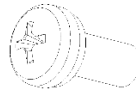

2. Installation

2.1 Parts List

Check the following parts list for completeness.

AlphaESS provides a complete set of system for on-site customers, including:

Table 1 Parts List

Storion-SMILE-B3			
			
8 x M8*60	8 x M6 gasket	1 x installing support	8 x white plug
			
2 x CT (100A, 3000:1)	1x installation manual	4 x M4*12 screws	1 x WiFi module (optional)

2.2 System Appearance

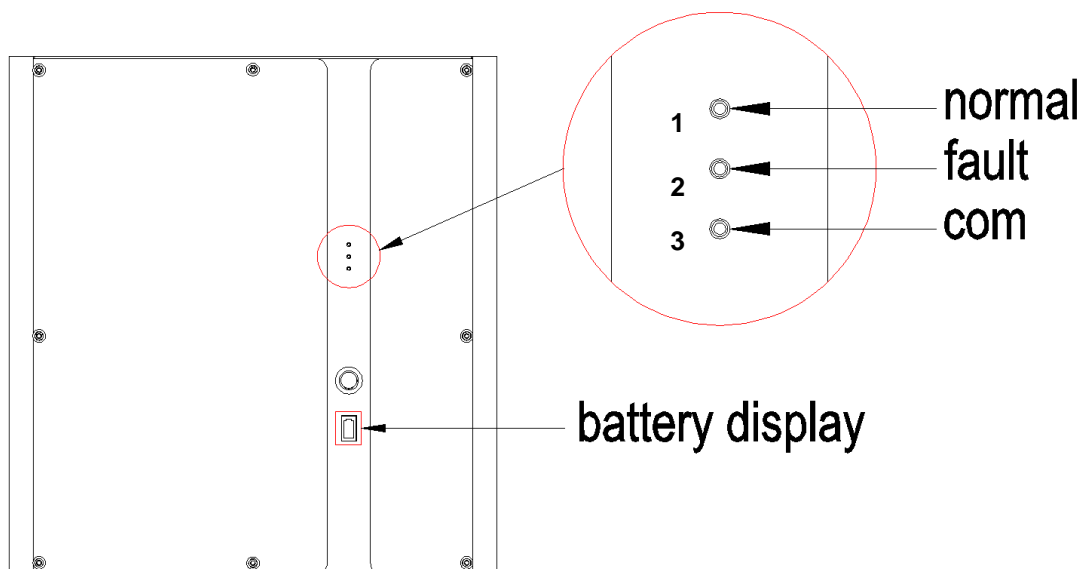


Figure 2.1 Storion-SMILE-B3 External View

Table 2 SMILE-B3 System LED Display










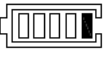




LED	Status	Description
normal		Normally on: Normal system operation
		Single flicker: system standby or self-inspection
		Extinguishing: out-of-order
fault		Extinguishing: fault-free
		Normally on: out-of-order
com		Normally on: Normal network connection
		Flicker: connecting to the server
		Extinguishing: un-connected network

Table 3 SMILE-B3 Battery LED Display

LED Outer Ring Light Flicker Status	SOC Status	Description
Standby: green light flicker 1s work: green light flicker 10s		SOC<5%
		5%=<SOC<25%
		25%=<SOC<50%
		50%=<SOC<75%
		75%=<SOC<95%
		SOC>95%

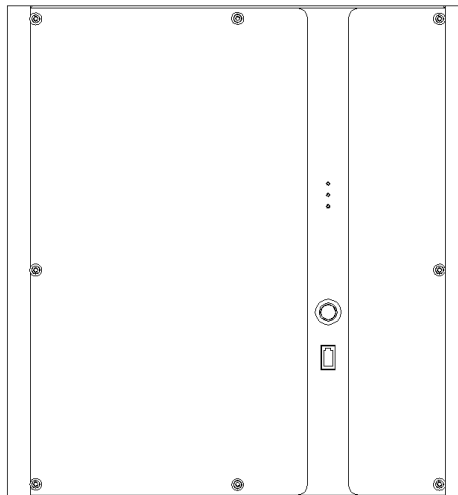


Figure 2.2 Storion-SMILE-B3 Front View

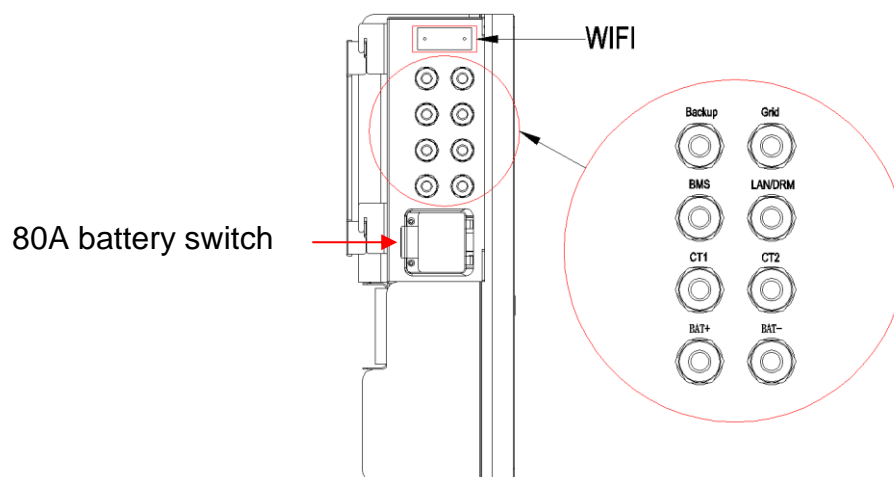


Figure 2.3 Storion-SMILE-B3 Left View

Table 4 Ports Definition

Name	Description
BMS	Additional battery BMS communicate cable connect
DRMs	DRED connect port (only for AU)
CT1	PV CT communicate cable
CT2	Grid CT communication cable
BAT+	Additional battery power positive cable connect
BAT-	Additional battery power negative cable connect
BACKUP	Critical load connect

GRID	Grid connect
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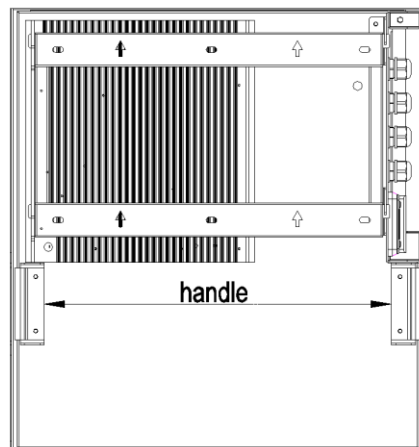


Figure 2.4 Storion-SMILE-B3 Rear View

2.3 Limitation of Liability

AlphaESS shall not be liable directly or indirectly for any product damage or property loss caused by any of the following conditions.

The product has been modified, the design modification or the change of parts without the authorization of AlphaESS;

Non-AlphaESS technicians change, repair and serial number removing;

System design and installation fail to meet the standards and other relevant requirements;

Fail to observe local safety regulations;

Transportation damage (including paint scratches caused by friction in packaging during transportation). Once the container/package is unloaded and the damage is confirmed, claims shall be put forward directly to the transport or insurance company;

Fail to comply with any/all user manuals, installation guide and maintenance rules;

Improperness or misuse of equipment;

Insufficient equipment ventilation;

Product maintenance procedures do not follow acceptable standards;

Force majeure (violent or stormy weather, thunder and lightning, overvoltage, fire, etc.);

Any damage caused by external factors

2.4 System Installation

This manual introduces the basic steps how to install and set up Storion-SMILE-B3.

Observe the specified minimum distance of adjacent objects;

Minimum distance guarantee;

Sufficient heat dissipation;

The upper cover of the energy storage system has enough space to open;

Sufficient room for maintenance.

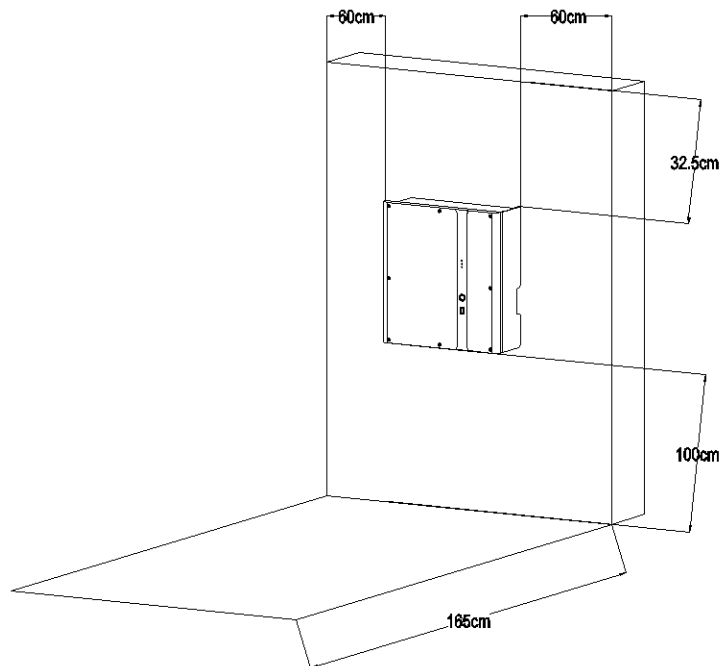


Figure 2.5 Limit the Distance to an Adjacent Object

2.4.1 Installation Site and Environment

The following sites are not allowed installation:

- wall cavities;
- on roofs not specifically deemed suitable;
- areas of access/egress;
- under stairways;
- under access walkways;
- sites where the freezing point is reached, like garages, carports or other places;
- sites with humidity and condensation is above 85%.
- Places with plenty of salt.
- Flooded areas.
- Earthquake areas-additional security measures are needed here.
- Places with altitude higher than 2,000 meters.
- Place with explosive gases.
- Place with direct sunlight.
- Place with the ambient temperature extremely variable.
- Places with highly flammable materials or gases.
- Wet rooms

- Places with potentially explosive gases.
- Wall loading installation must exceed 180 kg.

2.4.2 Installation Tools

The following tools are required to install the equipment.



Wire Cutter



Cable clamp



Screw Driver Set



Percussion Drilling

NOTE: Use properly insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

Safety Gear

It is recommended to wear the following safety gear when dealing with the battery pack



Insulated gloves



Safety goggles



Safety shoes

2.4.3 Installation Steps

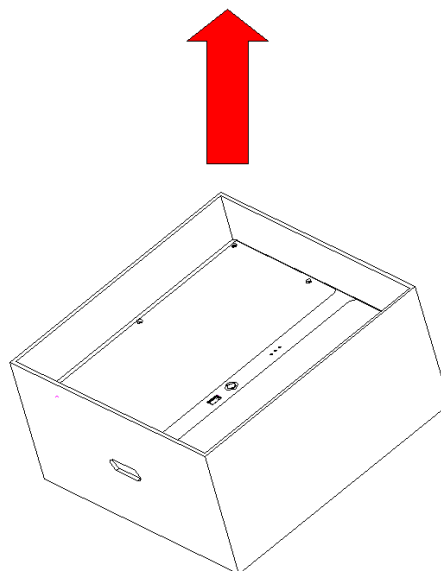


Figure 2.6 Open Storion-SMILE-B3 Packaging

Step 1: Take out Storion- SMILE-B3 from the packaging box, as shown in Figure 2.6.

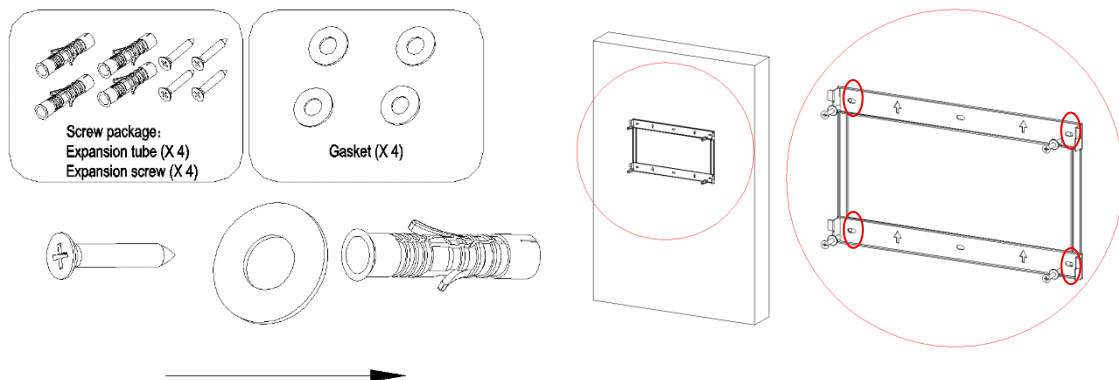


Figure 2.7 Stand Positioning

Step 2: first use the percussion drill (M10 drill) to drill holes in the wall with depth 65mm, then install and place the stand. (1. Insert the expansion pipe into the drilled hole. Then pass the tapping screw through the spacer and tighten it with the cross screwdriver), as shown in Figure 2.7.

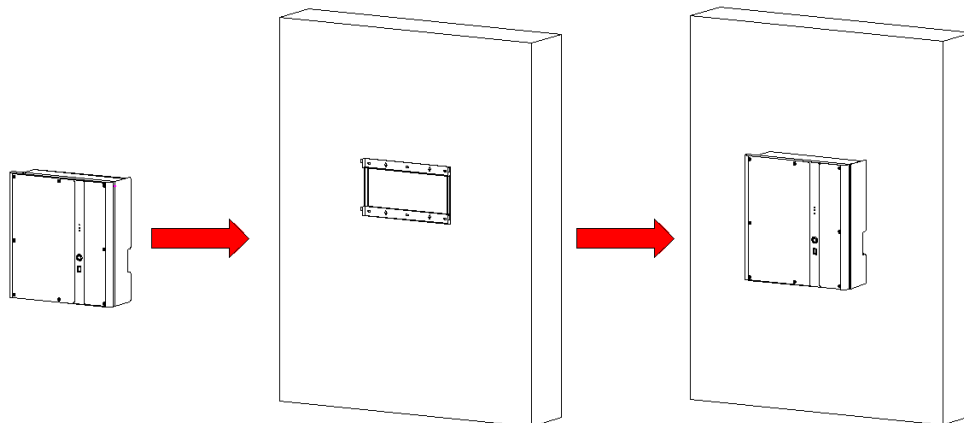


Figure 2.8 Box Fixation

Step 3: install the box of Storion-SMILE-B3 (hold the two handles on the back of B3 and install the B3 box to the stand), as shown in Figure 2.8.

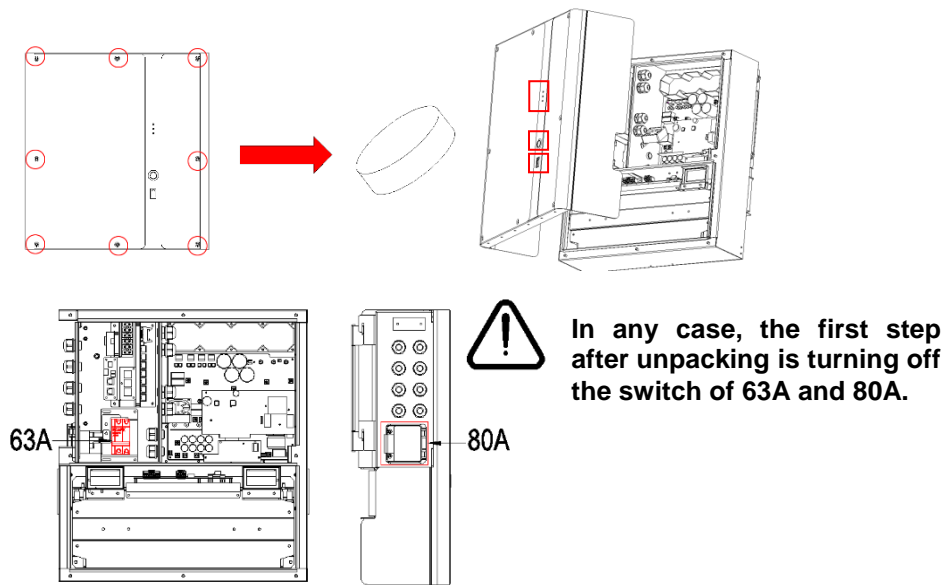


Figure 2.9 Take Down Storion-SMILE-B3 Upper Cover Plate

Step 4: Use the M5 internal hexagon wrench to unscrew the screws. After pulling out the connecting wire harness on the back of the upper cover plate, remove the B3 upper cover plate to prepare wiring, as shown in Figure 2.9.



Note: the internal 63A and the external 80A switch must be switched off to prevent short circuit.

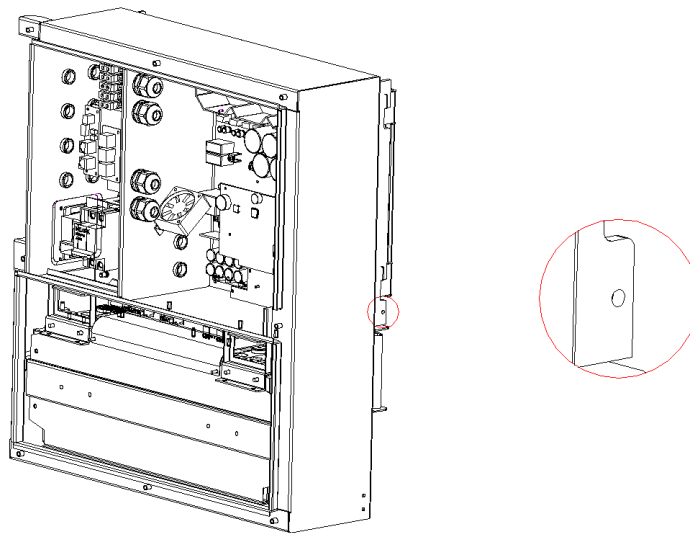


Figure 2.10 Earthing Bonding Position

Step 5: the earthing bonding position for Storion-SMILE-B3 is as shown in Figure 2.10, please use the M4*12 screw.

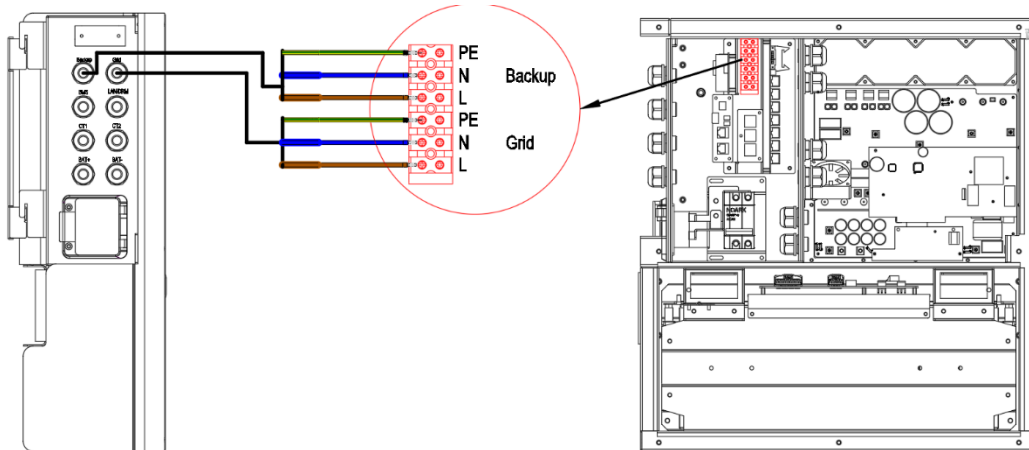


Figure 2.11 Backup and Grid Wire Harness Wiring

Step 6: Connect Backup and Grid wire harness (to 6 pin terminal strip), as shown in Figure 2.11.

i Note: in Australia, the neutral of backup and grid circuit should be externally connected on the neutral bar.

The suggested torque for the waterproof contact is $3.75 \text{ N.m} \pm 10\%$.

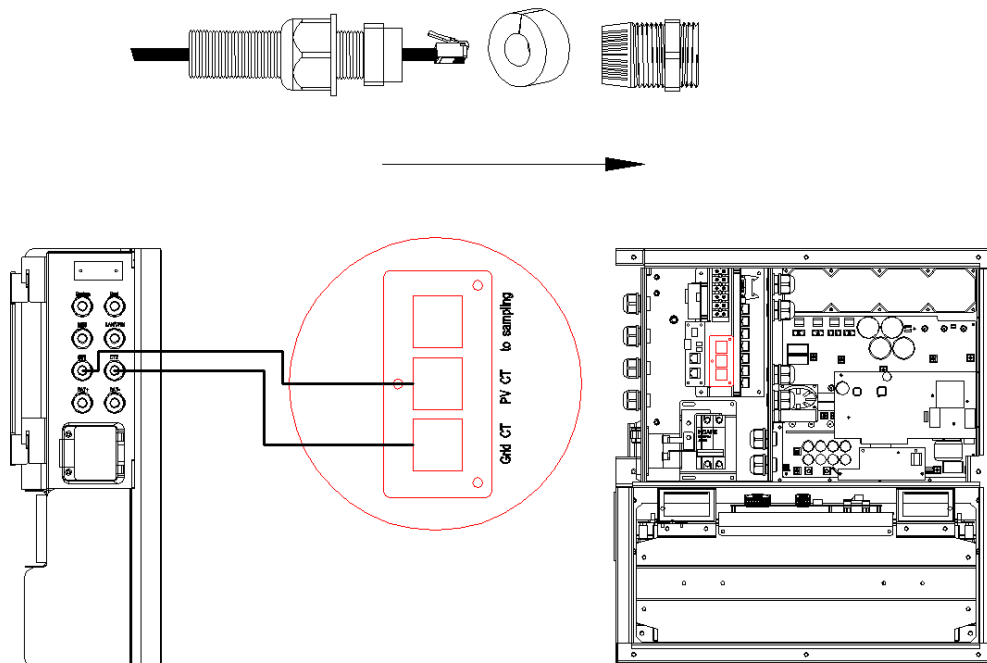


Figure 2.12 CT Wire Harness Wiring

Step 7: Complete for installing CT, as shown in Figure 2.12.

i Note: CT communication wires can be connected directly through the silica gel ring of the M20 waterproof contact, no need to make the on-site network line.

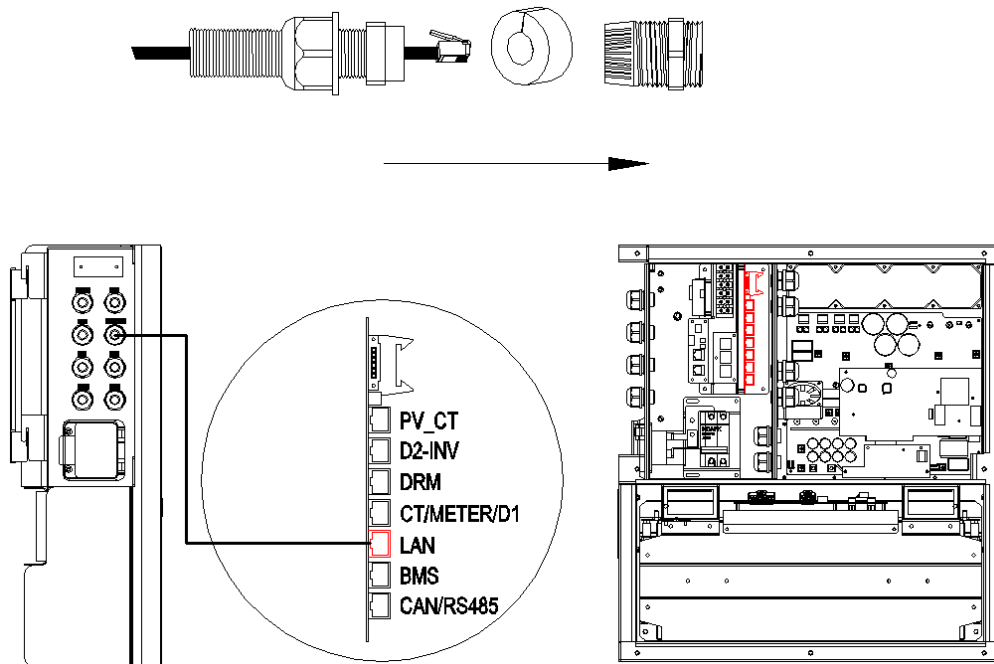


Figure 2.13 Ethernet Communication Cable Wiring

Step 8: Install ethernet communication cable, as shown in Figure 2.13. It won't be needed if using WiFi module.



Note: The ethernet communication cable can be connected wiring directly through the silica gel ring of the M20 waterproof contact, no need to make the on-site network cable.

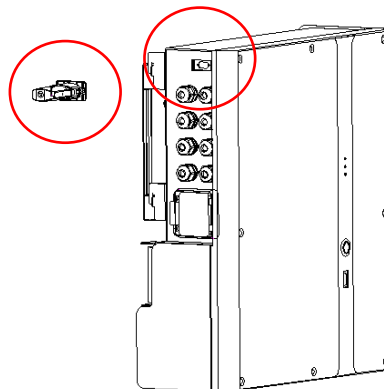


Figure 2.14 Install WiFi Module



Note: If using WiFi module, open the cover plate of the side WiFi module, insert the WiFi module into the terminal port and then fix it with screws, as shown in Figure 2.14.

Step 9: before re-covering the upper cover plate, please turn on the internal 63A switch.

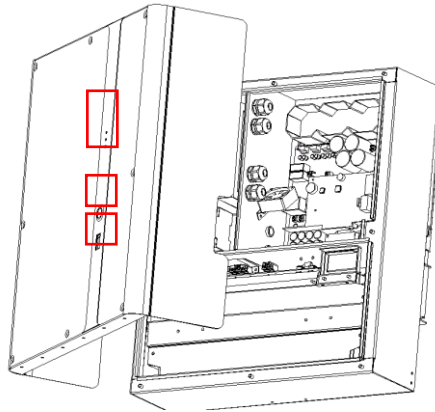


Figure 2.15 Re-cover the Upper Cover Plate

Step 10: the wiring is completed, please connect the wiring harness on the back of the upper cover plate. Then re-cover the B3 upper cover plate, use the M5 internal hexagonal wrench to tightly lock the upper cover screw, and then install the white plug, as shown in Figure 2.15.

i Note: the upper wiring harness from EMS shall be connected to the back upper part , the below wiring harness from BMS shall be connected to the back below part. Please pay attention to the positive and negative pole of the button switch wires.

The suggested torque is $2.6 \text{ N.m} \pm 10\%$. For capacity expansion, please refer to the accessory package attached for details.

2.4.4 Electricity Meter Wiring

The power meter should be installed and connected in the distribution box. There are four types of power meters, available for CT, ADL-3000, SM 60A or ACR10R.

CT: 100A, 1:3000

ADL-3000: Three-phase electricity meter (with or without CT)

SM60A: Single-phase electricity meter

ACR10R: Three-phase CT electricity meter (with CT)

2.4.4.1 CT

The CTs connection is as shown in Figure 2.16:

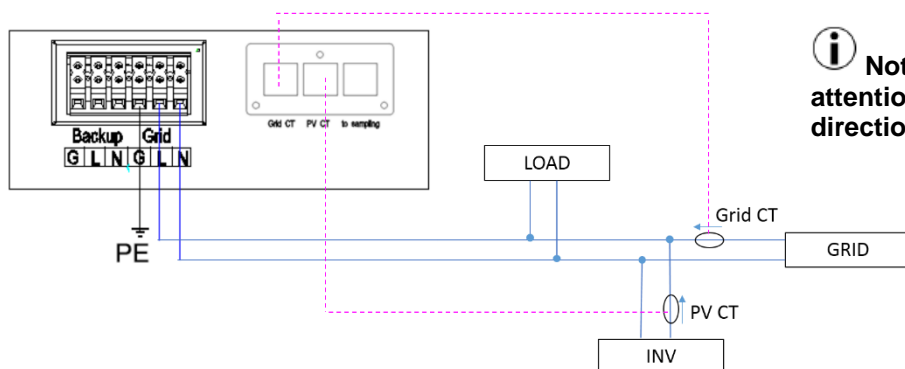


Figure 2.16 CT Connection

2.4.4.2 Electricity meter SM60A (if optional)

SM60A connection (with meterplug):

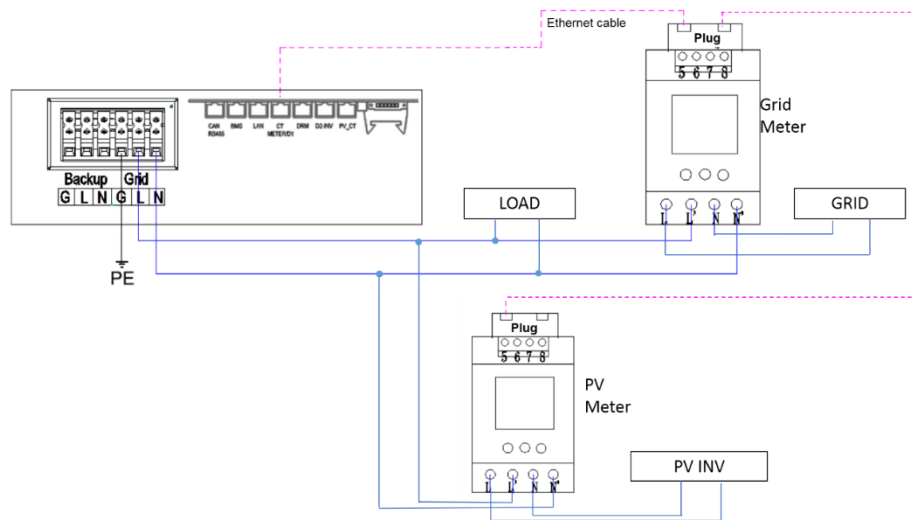


Figure 2.17 SM60A Connection (with meterplug)

SM60A connection (without meterplug):

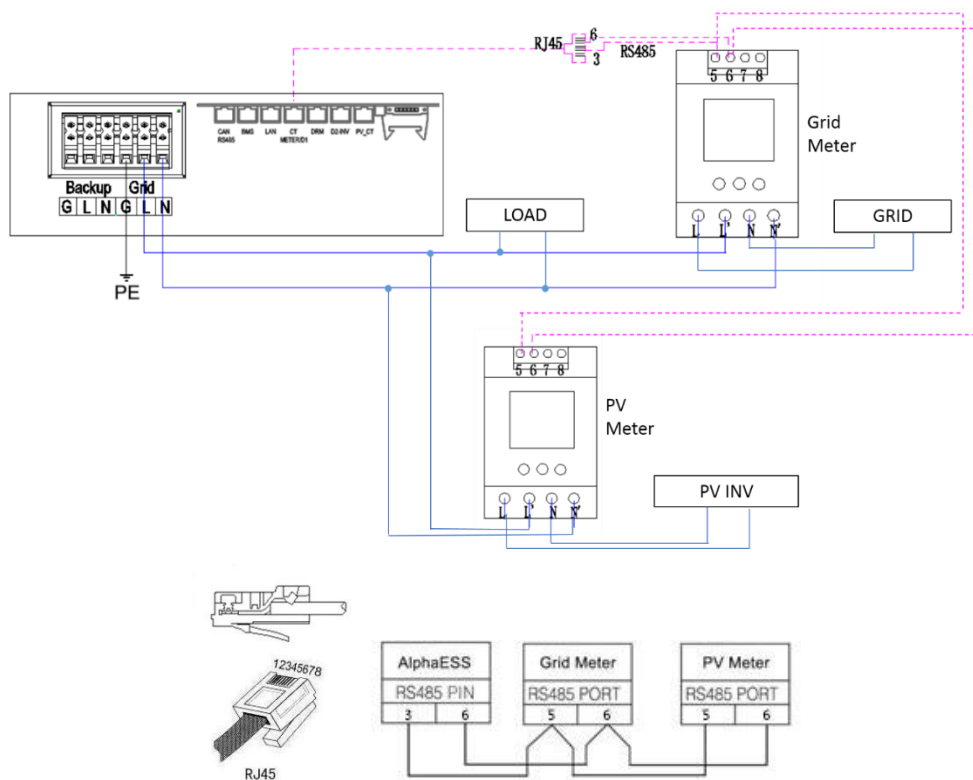


Figure 2.18 SM60A Connection (without meterplug)

Note: terminal 5, 6 connecting RJ45 PIN 3, 6

2.4.4.3 Electricity Meter ADL-3000 (if optional)

ADL-3000 connection (without CT, without Meterplug):

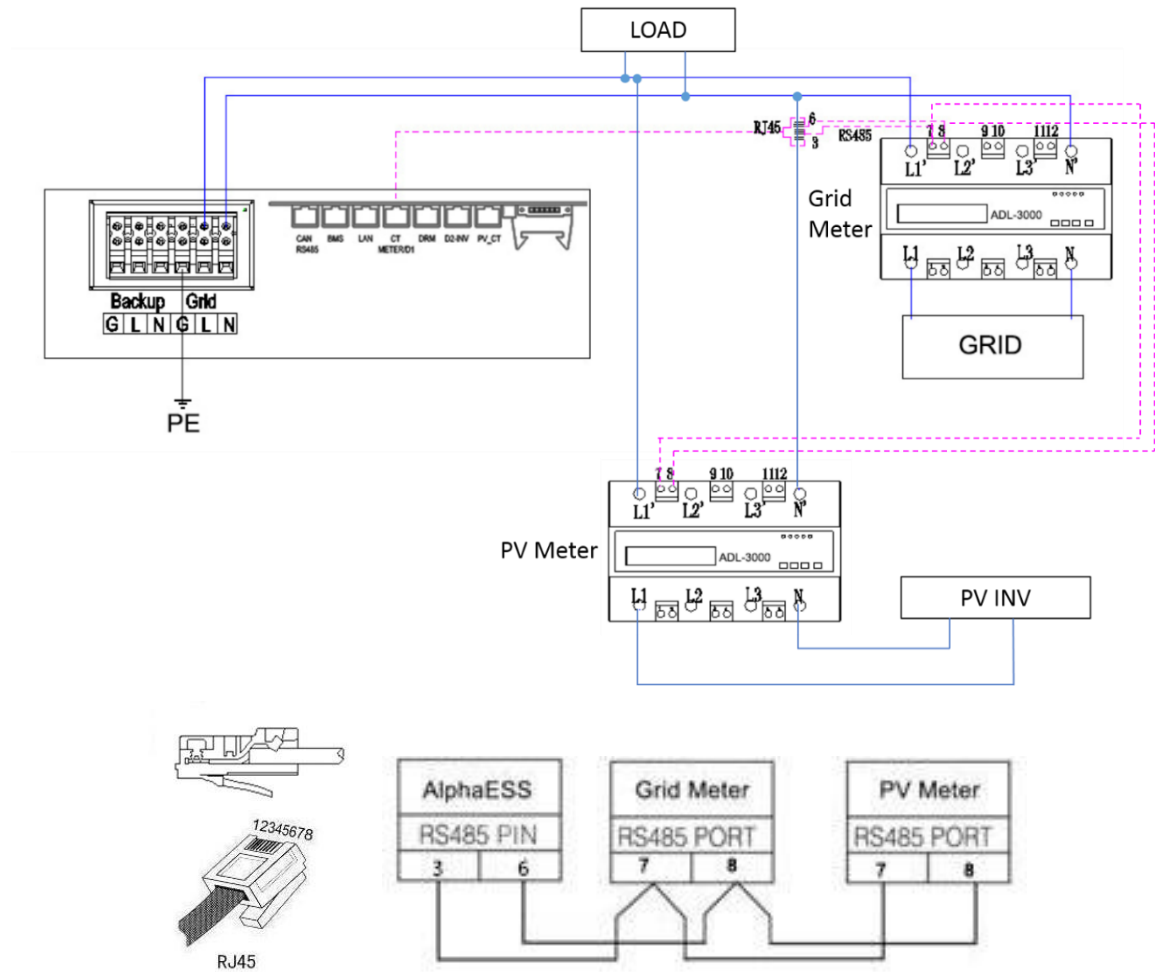


Figure 2.19 ADL-3000 connection (without CT, without meterplug)

Note: terminal 7, 8 connecting RJ-45 PIN 3, 6.

ADL-3000 connection (without CT, with Meterplug)

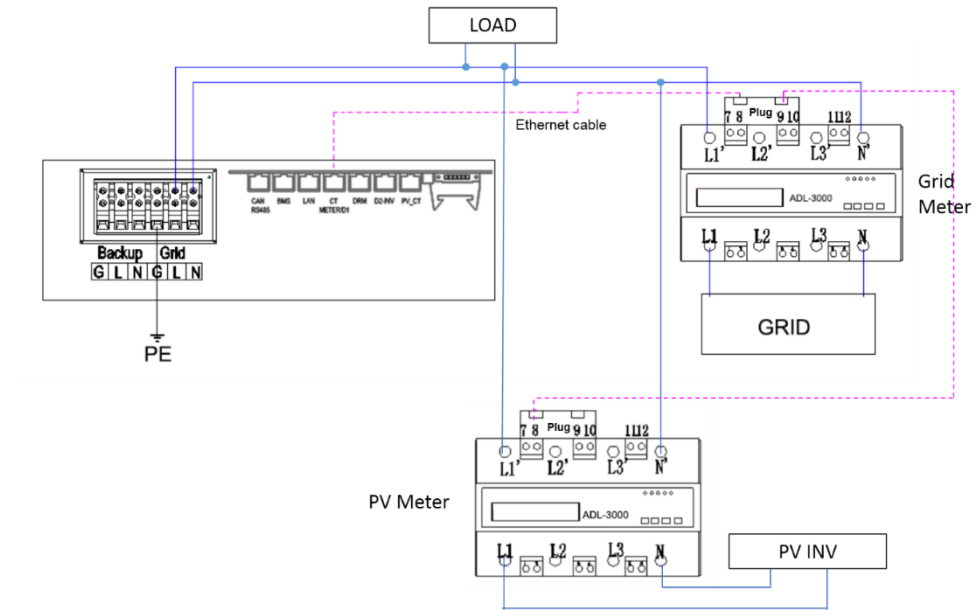


Figure 2.20 ADL-3000 connection (without CT, with meterplug)

ADL-3000 connection (with CT, without Meterplug)

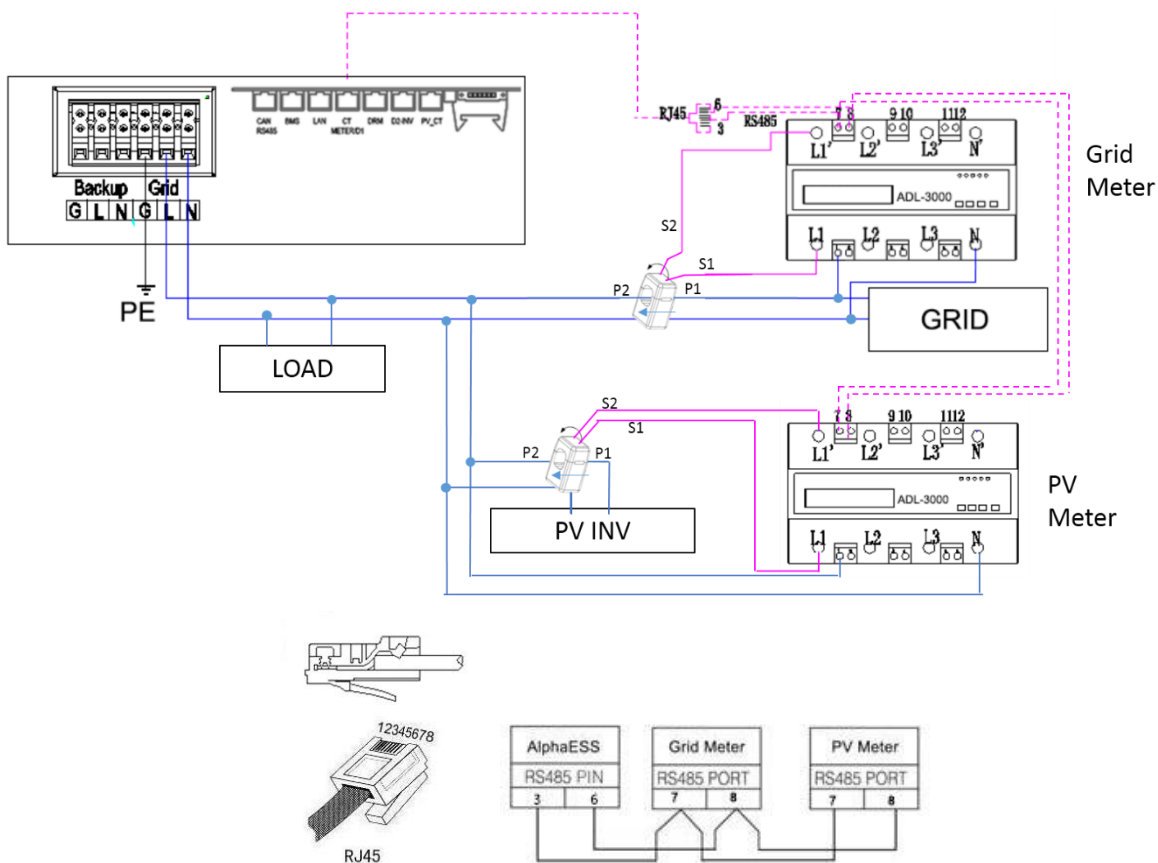


Figure 2.21 ADL-3000 Connection (with CT, without meterplug)

ADL-3000 Connection (with CT and Meterplug):

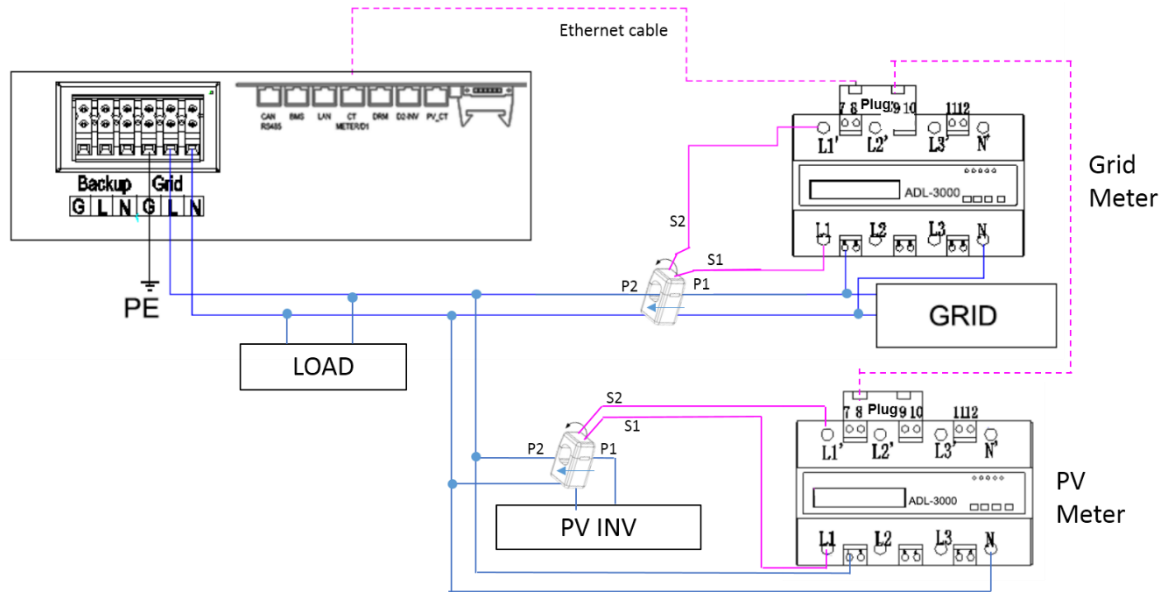


Figure 2.22 ADL-3000 Connection (with CT and meterplug)

2.4.4.4 Electricity meter ACR10R (if optional)

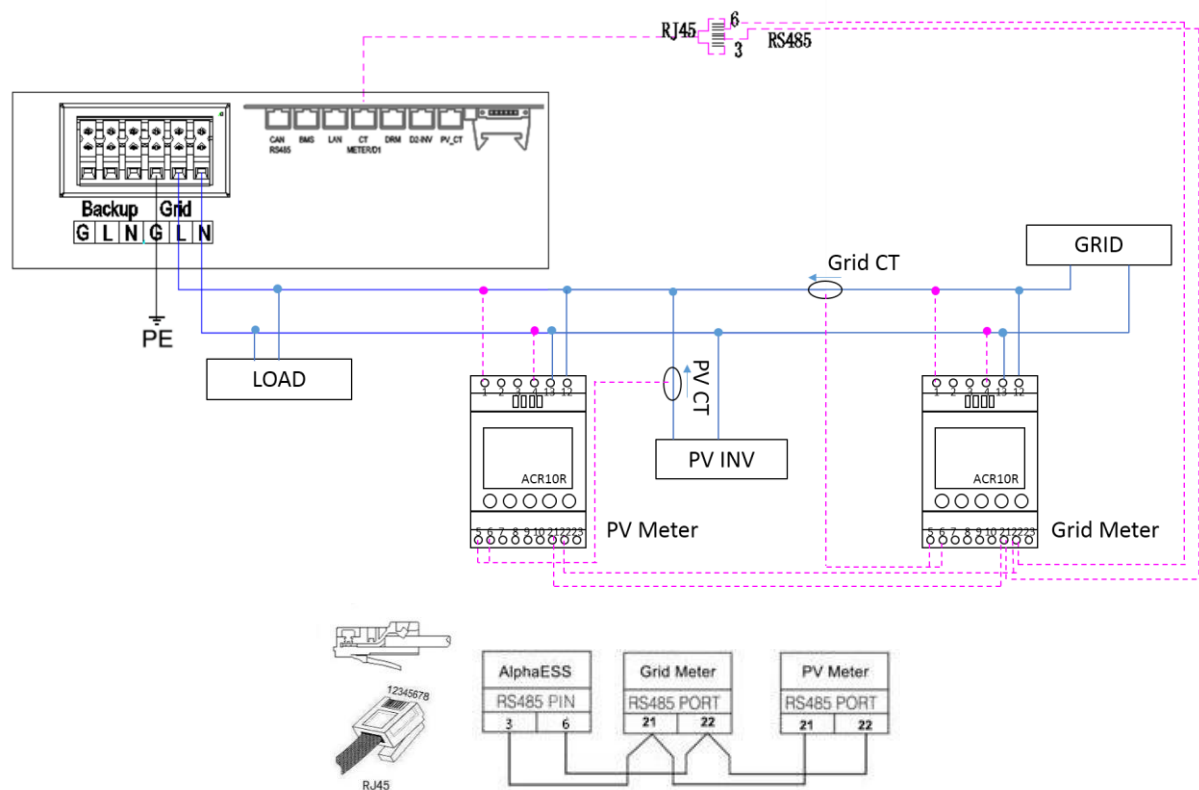


Figure 2.23 ACR10R Connection

Note: please pay attention to the CTs direction.

3. Operation

Please double check the following before operation.

1. SMILE-B3 is firmly fastened to the mounting bracket on the wall;
2. The polarity of battery wires is correct, battery wires are firmly connected;
3. 80A battery switch: OFF;
4. If PV is applied, the PV-INV switch: OFF
5. GRID / LOAD cables are firmly / correctly connected;
6. External grid AC switch is correctly connected between SMILE-B3 GRID port & GRID, AC circuit breaker: OFF;
7. If backup load is applied, external backup AC switch is correctly connected to SMILE-B3 Load port, AC circuit breaker: OFF;
8. AC contactor is correctly connected;
9. Please ensure that the communication cable has been correctly connected;

3.1 Switch on

System shall be turned on in the correct sequence to avoid any damage.

Step 1: Turn on the external grid AC breaker;

Step 2: If PV is applied, turn on the PV-INV switch;

Step 3: Press the button on the battery until the battery LED lights;

Step 4: Turn on the 80A battery switch of B3 system;

Step 5: If backup load is applied, turn on the external backup AC breaker; if not, then keep it off.

3.2 Switch off

Step 1: If backup load is applied, turn off the external backup AC breaker;

Step 2: Turn off the 80A battery switch of B3 system;

Step 3: Press the button on the battery until the battery LED off;

Step 4: Turn off the external grid AC breaker.

3.3 Emergency Procedure

When the SMILE-B3 Battery 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, closing 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 cell contains little Oxygen inside and all cells have got explosion-proof valve, 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


Respirator is not required during normal operations.

Use Novec 1230, FM-200 or dioxide extinguisher for battery fire.

Use an ABC fire extinguisher, if the fire is not from battery and not spread to it yet.

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

On land: Place damaged battery into a segregated place and call local fire department or service engineer.

In water: Stay out of the water and don't touch anything if any part of the battery, inverter, or wiring is submerged.

Do not use submerged battery again and contact the service engineer

4. On-line Monitoring

4.1 Configuration Network

Install power plug and the system will start automatically. Download and install the APP by scanning the QR code (Figure 4.1), and directly connect to Storion-SMILE-B3 by WiFi module.



Figure 4.1 AlphaESS-APP

Step 1: fill in the "user name" and "password" and log in the mobile Alpha APP, as shown in Figure 4.2.

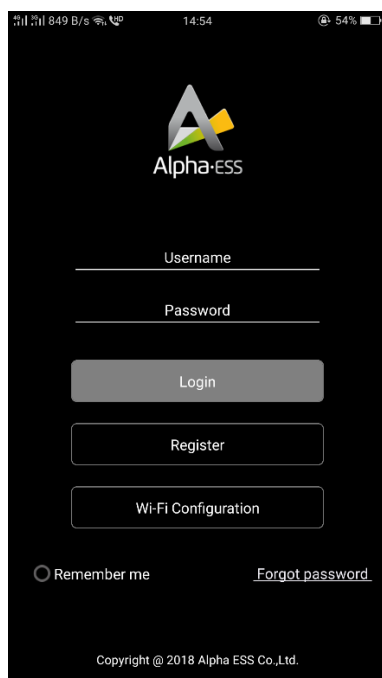


Figure 4.2 Network Setting

Step 2: after logging into the APP, automatically identify the WiFi module, check whether it is connected, and search WiFi, as shown in Figure 4.3.

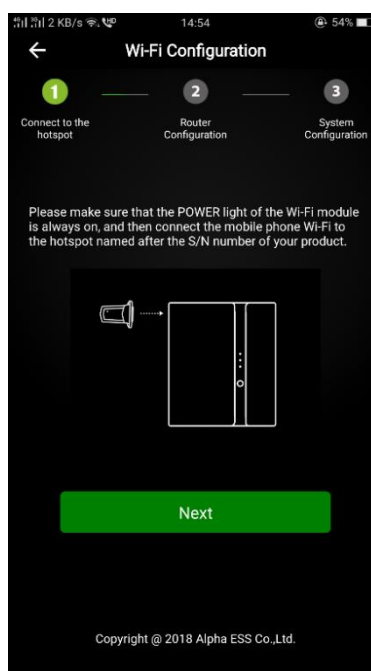


Figure 4.3 Hardware Connection

Step 3: enter the WiFi account and password and then save it, the configuration is successful, click "next", as shown in Figure 4.4 and Figure 4.5.

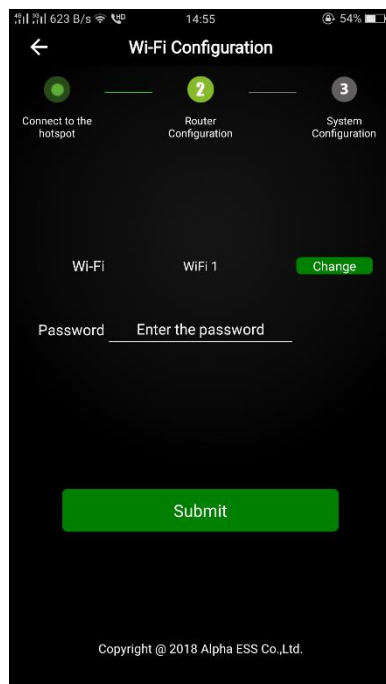


Figure 4.4 WiFi Setting

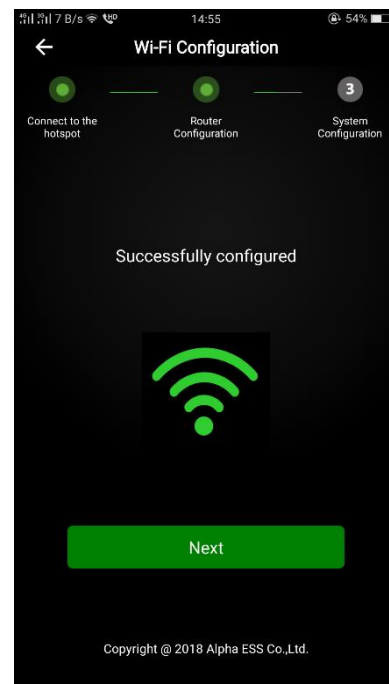


Figure 4.5 Configuration Success

Step 4: set the basic parameters, and you can see the details of equipment, complete, as shown in Figure 4.6 and Figure 4.7.

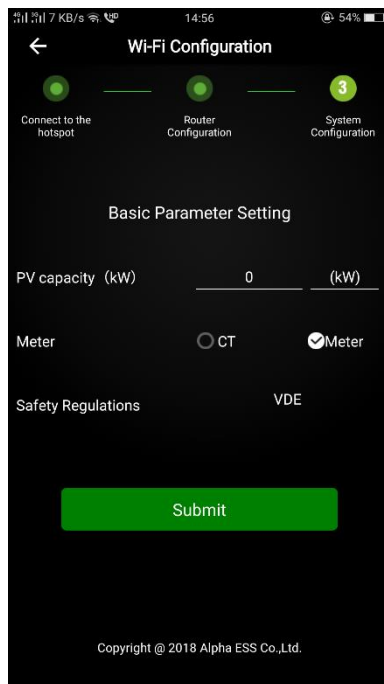


Figure 4.6 Basic Parameter Setting

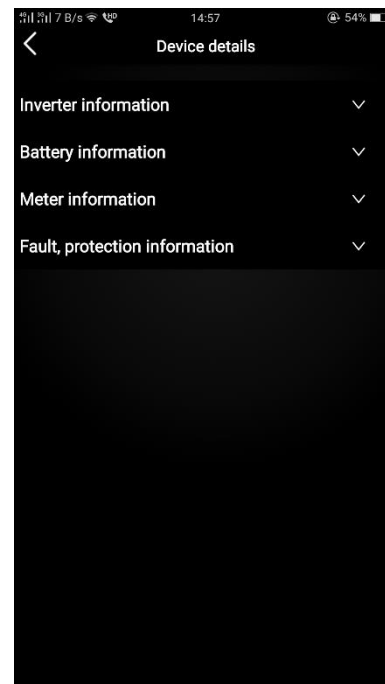



Figure 4.7 Equipment Details

 **Note:** If without registration, please register account according to the hint after downloading and installing App.

4.2 Registration

You can create a new account on our webserver for the normal monitoring. In addition, a part of our warranty is based on this connection to our webserver.

The data produced prior to registration can be synchronized to the webserver.

Please use the following steps:

Step 1: Open the portal: www.alphaess.com.

Step 2: Please fill in "Username", "Password" and click "Login" if you have already registered.

If not, please register by filling in the following webform.

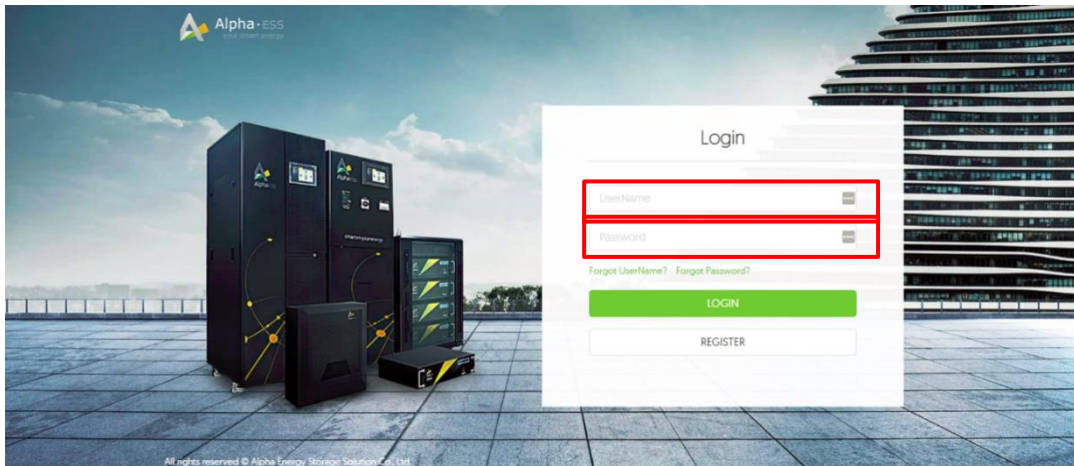


Figure 4.8 Monitoring Login Interface

Register

User Type
End user ▼

S/N

* Username

* Password * Confirm Password

* Country Province/State City

Address * Zip Code

* Language * Contacts * Contact Number

English ▼

* E-mail

Time zone
(UTC-12:00) International Date Line West ▼

☒ Commitment to upgrade?

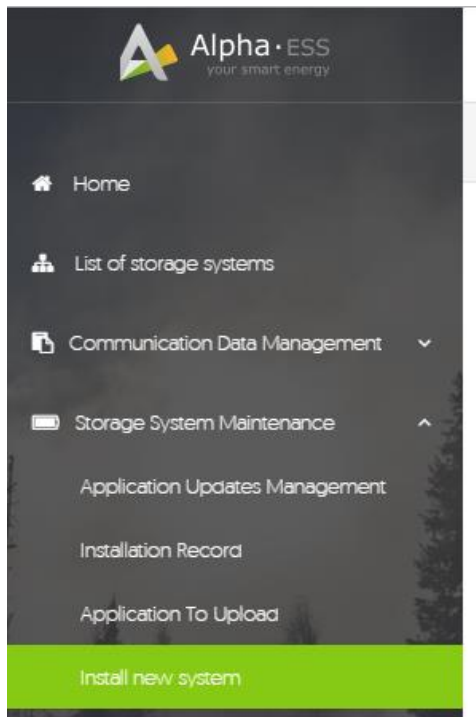
☐ Read and accept <<Terms and Conditions>>

[SIGN UP NOW](#) [Back](#)

Under this form, all spaces marked with an asterisk must be filled in, and you can select the finally users or installation procedures.

More detailed information is available in the online monitoring Web server installation manual.

Figure 4.9 Account Registration Interface



Click install new system to register the license.

Figure 4.10 Menu for installer

Install new system

<div>S/N</div> <input type="text"/>	<div>Check Code</div> <input type="text"/>	<div>License No.</div> <input type="text"/>
<div>Installation Date</div> <input type="text"/>	<div>Client Full Name</div> <input type="text"/>	<div>Contact Number</div> <input type="text"/>
<div>Contact address</div> <input type="text"/>		
<div>Remark</div> <input type="text"/>		
<div>Attachment</div> <div> <input type="button" value="选择文件"/> 未选择任何文件 </div>		

SAVE

Figure 4.11 System Registration Interface

Input S/N (serial number), Check Code, License No., Date, Name, and Contact No. to complete the registering process.

5. Annex

5.1 Data Sheet

System		
Model	Storion-SMILE-B3	
Rated Output Power	3000 W	
Maximum AC Input Power	3000 W	
IP Protection	IP65	
Dimensions (W X D X H)	610 x 236 x 650mm	
Weight	49kg	
Operating Temperature Range	-10 ~ 50 °C*	
Storage Temperature	Short-term (within one month)	-20°C ~ 45°C
	Long-term (within one month)	0°C ~35°C
Relative humidity	15~85%	
Max. Operating Altitude	3000m	
Warranty	5 Year Product Warranty,10 Year Performance Warranty	
Inverter		
Max. Grid / Backup Current	13.1 Aa.c	
Max. Grid / Backup Voltage	230 Va.c	
Battery Voltage Range	40~58 V	
Grid Voltage Range	180 Va.c ~ 270 Va.c	
Rated Grid / Backup Frequency	50/60 Hz	
Phase	Single phase	
Power Factor Range	0.8 cap ~ 0.8 ind	
Battery Voltage Range	40 ~ 58 Vd.c	
Maximum Charge-Discharge Current	60 Ad.c	
Maximum Charge-Discharge Power	3000 W	
Backup	UPS	
Grid Regulation	AS 4777.2, VDE-AR-N 4105, G83/2	
Safety	IEC 62040-1, IEC 62477-2	

Battery	
Module Capacity	2.9 kWh (90% DoD)
Battery Type	Lithium iron phosphate
Battery Rated Voltage	51.2 Vd.c
Number of cells	16 (1P16S)
Cycle Life	≥ 6000
Standard Charge/Discharge Current	56A (1C)
Max. Charge/Discharge Current	60 A
External Battery Expansion	1~5 M4856-P in parallel

*When the temperature is below 0 °C or above 40 °C, the performance will be limited.