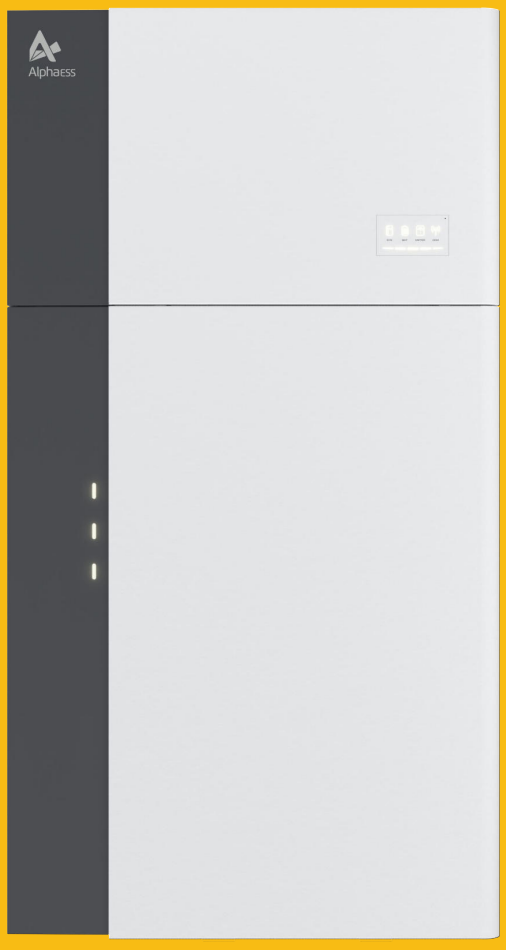
AlphaESS
your smart energy

V10

# INSTALLATION, OPERATION & MAINTENANCE MANUAL OF SMILE-G3-S3.6/S5/B5/S6



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# 1. Introduction

## 1.1. Content and Structure of this Document

This document is valid for SMILE-G3 single phase energy storage system, which includes inverter SMILE-G3- S3.6/S5/B5/S6-INV and battery SMILE-G3-BAT-10.1P and SMILE-G3-BAT-3.8S/4.5S/9.3S.

This document describes the mounting, installation, commissioning, configuration, operation, troubleshooting and decommissioning of the energy storage system as well as the operation of the user interface.

Please read all documentation that accompanies the product. Keep them in a convenient place and available at all times.

Illustrations in this document are reduced to the essential information and may deviate from the real product.

## 1.2. Target Group

This document is intended for qualified persons. Only qualified persons are allowed to perform the operations marked with a warning symbol in this document.

Qualified personnel must have:

1. Knowledge of working principle of inverters.
2. Knowledge of how to deal with the dangers and risks associated with installing and using electrical devices, batteries and energy storage system.
3. Knowledge of the installation and commissioning of electrical devices and energy storage system.
4. Knowledge of the applicable standards and directives relevant to the product and its installation.
5. Understood and complied with this document, including all safety precautions.
6. Understood and complied with the documents of the battery manufacturer and inverter manufacturer, including all safety precautions.

## 1.3. Levels of Warning Messages

The following levels of warning messages may occur when handling the product.

| |
|---|
| DANGER<br>DANGER indicates a hazardous situation that will result in death or serious injury if not avoided. |
| WARNING<br>WARNING indicates a hazardous situation that could result in serious injury or even death if not avoided. |

| |
|---|
| CAUTION<br>CAUTION indicates a hazardous situation that could result in minor or moderate injury if not avoided. |
| NOTICE<br>NOTICE indicates a situation that could result in property damage if not avoided. |
| INFORMATION provides tips which are valuable for the optimal installation and operation of the product. |

## 1.4. Definition of Abbreviations and Nouns

**A**

| | |
|---|---|
| AC | Alternating Current |
| App | Application |
| AUX | Auxiliary |

**B**

| | |
|---|---|
| BAT | Battery |
| BMS | Battery Management System |

**D**

| | |
|---|---|
| DC | Direct Current |

**E**

| | |
|---|---|
| EMS | Energy Management System |
| ESS | Energy Storage System |

**I**

| | |
|---|---|
| INV | Inverter |

**P**

| | |
|---|---|
| PV | Photovoltaic |

**S**

| | |
|---|---|
| SOC | The State Of Charge |

# 2. Safety

## 2.1. Intended Use

The inverter, batteries and electricity meters together form a system designed to optimise the self-consumption of electrical energy in a household. The inverter transfers energy between AC current and DC current while the battery is used for the storage of energy (typically storing surplus energy produced by solar arrays).

Inverter SMILE-G3-S3.6/S5/B5/S6-INV, and battery SMILE-G3-BAT-10.1P, SMILE-G3-BAT-4.5S/9.3S are suitable for indoor and outdoor installation (SMILE-G3-S6-INV is not compatible with battery SMILE-G3-BAT-4.5S).

Battery SMILE-G3-BAT-3.8S is only suitable for indoor installation.

Inverter SMILE-G3-S3.6/S5/B5/S6-INV must only be operated with PV arrays of protection class II in accordance with IEC 61730, application class A. The PV modules must be compatible with this product.

The product is not equipped with an integrated transformer and therefore has no galvanic isolation.

The product must not be operated with PV modules whose outputs are grounded. This can cause the product to be destroyed. The product may be operated with PV modules whose frame is grounded.

PV modules with a high capacity to ground must only be used if their coupling capacity does not exceed 1.0 µF.

All components must be used in a manner and environment in compliance with the requirements of this manual and in compliance with all relevant local Standards and directives. Any other operation may cause personal injury or property damage.

Alterations to the product, e. g. changes or modifications, are only permitted with the express written permission of AlphaESS. Unauthorized alterations will void the product warranty(s). AlphaESS shall not be held liable for any damage caused by such changes.

Any use of the product other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and comply with all instructions contained therein.

The type label must remain permanently attached to the product.

## 2.2. Battery Safety Instructions

### 2.2.1. General Safety Precautions

1. Before installing any part of the SMILE G3 energy storage system, please read the Installation Manual completely. If additional hardware is being installed at the same time as the SMILE G3 unit (e. g. a Backup device or a separate AC-coupled PV system),

please read the Installation Manual for each component/system before commencing installation of any hardware. The installation of one piece of hardware may create hazards for the installation of another piece of hardware – be sure to read all Manuals to understand the interaction and safety implications of the combined systems.

2. Overvoltage or incorrect wiring can damage the battery and cause deflagration, which can be extremely dangerous.
3. All types of battery breakdown may lead to electrolyte or flammable gas leakage.
4. The battery is not user-serviceable because there is high voltage in the device.
5. Read the label with Warning Symbols and Precautions on the right side of the battery.
6. Do not connect any AC conductors or PV conductors directly to the battery which should be connected only to the inverter.
7. Do not charge or discharge a damaged battery.
8. Do not damage the battery by dropping, deforming, impacting, cutting or penetrating it with a sharp object. Battery damage may cause a leakage of electrolyte or fire.
9. Do not expose the battery to an open flame.

### 2.2.2. Response to Emergency Situations

The battery is designed to prevent the danger caused by malfunction.

In the case of user exposure to the electrolyte or other internal materials of the battery cells, the list below details recommended actions dependent on the type of exposure:

1. Inhalation: Leave the contaminated area immediately and seek medical attention.
2. Eye injuries: Rinse eyes with running water for 15 minutes and seek medical attention.
3. Skin injuries: Wash the affected area thoroughly with soap and seek medical attention.
4. Ingestion: Induce vomiting and seek medical attention.

If a fire breaks out in the place where the battery is installed, please follow these methods:

1. Fire extinguishing methods:

(1) A Respirator is not required during normal operations.
(2) Use an FM-200 or CO2 extinguisher for battery fire.
(3) In the case of a fire in the property but where the fire has not yet reached the battery, if it is safe to do so, use an ABC fire extinguisher and prevent the fire from reaching the battery.

2. Firefighting instructions

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

**WARNING**

There may be a possible explosion when batteries are heated above 150 °C.

When the battery is burning, it leaks poisonous gases. Do not approach.

3. Effective ways to deal with accidents

(1) On land: Place damaged battery in a segregated place and call local fire department or technical service engineer.
(2) In water: Stay out of the water and don't touch anything if any part of the battery, inverter, or wiring is submerged.
(3) Do not use submerged battery again and contact an Alpha-Accredited or Battery-Accredited technical service engineer.

## 2.3. Important Safety Instructions

DANGER

**Danger to life due to electric shock when live components or DC cables are touched**

The DC cables connected to a battery or a PV module may be live. Touching live DC cables can result in serious injury or even death due to electric shock. To avoid this danger:

- Disconnect the inverter and battery from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Do not disconnect the DC connectors under load.
- Wear suitable personal protective equipment for all work on the product.
- Observe all safety information of this document.

DANGER

**Danger to life due to electric shock if live system components in backup mode are touched**

Even if the grid circuit breaker and the PV switch of the inverter are disconnected, parts of the system may still be live when the battery is switched on due to backup mode. To avoid this danger:

- Before performing any work on the inverter, disconnect it from all voltage sources as described in this document.

DANGER

**Danger to life due to electric shock if touching live components or DC cables when working on the battery**

The DC cables connected to the battery may be live. Touching live DC cables can result in serious injury or even death due to electric shock. To avoid this danger:

- Before performing any work on the battery, disconnect the inverter from all voltage sources as described in this document.

DANGER

**Danger to life due to electric shock if touching live components when the inverter or battery cover is open**

High voltages are present in the live parts and cables inside the system during operation. Touching live parts and cables can result in significant injuries or even death due to electric shock. To avoid this danger:

- Do not open the system.

DANGER

**Danger to life due to electric shock if live components are touched during a ground fault**

When a ground fault occurs, parts of the energy storage system may still be live. Touching live parts and cables can result in significant injuries or even death due to electric shock. To avoid this danger:

- Disconnect the product from voltage sources and make sure it cannot be reconnected before working on the device.
- Touch the cables of the PV array on the insulation only.
- Do not touch any parts of the substructure or frame of the PV array.
- Do not connect PV strings with ground faults to the inverter.

DANGER

**Danger to life due to electric shock if an ungrounded PV module or array frame is touched**

Touching ungrounded PV modules or array frames can result in significant injuries or even death due to electric shock. To avoid this danger:

- Connect and ground the frame of the PV modules, the array mounting frame and the electrically conductive surfaces to ensure continuous conduction.
- Observe the applicable local regulations.

DANGER

**Danger to life due to dangerous voltages on the battery**

There is dangerous voltage at the terminal of the battery power cable. Reaching into the terminal of the battery power cable can result in a lethal electric shock. To avoid this danger:

- Do not open the battery cover.
- Leave the protective caps on the connectors for the battery's power connection until the inverter cables are connected to the battery.
- Disconnect the system from voltage sources and make sure it cannot be reconnected before working on the inverter or the battery.

WARNING

**Risk of chemical burns from electrolyte or toxic gases**

During normal operation, no electrolyte would leak from the battery and no toxic gases would form. Despite careful construction, if the battery is damaged or a fault occurs, it is possible that electrolyte may leak or toxic gases may form. To avoid this danger:

- Store the battery in a cool and dry place.
- Do not drop the battery or expose it to sharp objects.
- Protect the battery from mechanical damage from vehicles, tools and other objects.
- Only set the battery down on its back or its base.
- Do not open the battery.
- Do not install or operate the battery in a potentially explosive atmosphere or areas of high humidity.
- If moisture has penetrated the battery (e. g. due to a damaged housing), do not install or operate the battery.
- In case of contact with electrolyte, rinse the affected areas immediately with water and seek medical attention without delay.

WARNING

**Danger to life due to burns caused by electric arcs through short-circuit currents**

Short-circuit currents in the battery can cause heat build-up and electric arcs. Heat build-up and electric arcs may result in lethal injuries due to burns. To avoid this danger:

- Disconnect the battery from all voltage sources before performing any work on it.
- Observe all safety information of this document.

CAUTION

**Risk of burns from the inverter's hot surface**

The surface of the inverter can get extremely hot during operation, and touching it can

result in burns. To avoid this danger:

- Correctly mount the inverter so that it cannot be inadvertently touched.
- Do not touch hot surfaces.
- Wait for 30 minutes for surfaces to cool down after switching the system off.
- Observe the safety messages on the inverter.
- During operation, don't touch any parts other than the display panel of the inverter.

CAUTION

**Risk of injury due to weight of the inverter and battery**

Injuries may be caused if the product is lifted incorrectly or dropped while being transported or mounted. To avoid this danger:

- Transport and lift the product carefully. Take the weight of the product into account. Use lifting and conveyance aids such as lifting trolleys wherever possible.
- Wear suitable personal protective equipment for all work on the product.

NOTICE

**Damage to the inverter and battery due to electrostatic discharge**

Touching electronic components can result in electrostatic discharge, which can damage or destroy the inverter and battery. To avoid this:

- Ground yourself before touching any component.

NOTICE

**Damage due to cleaning agents or inappropriate cleaning methods**

The use of cleaning agents may cause damage to the product and its components. To avoid this:

- Clean the product and all its components only with a cloth moistened with clear water.
- Never clean the unit with a hose or with the use of a water jet.

## 2.4. Symbols Explanation

Symbols on the type label of the energy storage inverter

| Symbol | Explanation |
|---|---|
|  | **Beware of a danger zone**<br>This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site. |
|  | **Beware of electrical voltage**<br>The product operates at high voltages. |

| | |
|---|---|
|  | **Beware of hot surface**<br>The inverter can get hot during operation. |
|  | **Danger to life due to high voltages in the inverter; observe a waiting time of 5 minutes**<br>High voltages that can cause lethal electric shocks are present in the live components of the inverter.<br>Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document. |
|  | **WEEE designation**<br>Do not dispose of the product together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site. |
|  | **Observe the documentations**<br>Observe all documentations supplied with the product. |
|  | **CE marking**<br>The product complies with the requirements of the applicable EU directives. |
|  | **RCM (Regulatory Compliance Mark)**<br>The product complies with the requirements of the applicable Australian standards. |
|  | **UKCA marking**<br>The product complies with the regulations of the applicable laws of England, Wales and Scotland. |

Symbols on the type label and warning label of the battery

| Symbol | Explanation |
|---|---|
|  | **Beware of a danger zone**<br>This symbol indicates that the battery must be additionally grounded if additional grounding or equipotential bonding is required at the installation site. |
|  | **Beware of electrical voltage**<br>The product operates at high voltages. |

| | |
|---|---|
|  | **Corrosive substances warning**<br>The product contains corrosive substances that can cause severe injury if they come into direct contact with the skin. |
|  | **Potentially explosive substances warning**<br>Improper handling or fire can cause the product to ignite or explode. |
|  | **Warning of hazards from batteries**<br>This symbol indicates the danger of handling batteries. |
|  | **Observe the documentations**<br>Observe all documentations supplied with the product. |
|  | **Refer to the instruction for operation**<br>Observe all documentations supplied with the product. |
|  | **Use eye protection**<br>Wear eye protection for all work on the device. |
|  | **No open flame**<br>Handling an open flame and sources of ignition is forbidden in the immediate vicinity of the product. |
|  | **Access is prohibited for all children**<br>Children must be kept at a safe distance from the product. |
|  | **Do not short circuit**<br>Touching the short-circuit connection of the battery can result in serious injuries or even death due to electric shock and massive energy release. |
|  | **WEEE designation**<br>Do not dispose of the battery together with the household waste but in accordance with the locally applicable disposal regulations for batteries. |
|  | **CE marking**<br>The product complies with the requirements of the applicable EU directives. |
|  | **RCM (Regulatory Compliance Mark)**<br>The product complies with the requirements of the applicable Australian |

| | |
|---|---|
| | standards. |
| UKCA | **UKCA marking**<br>The product complies with the regulations of the applicable laws of England, Wales and Scotland. |
| UN38.3 | **Marking for transport of dangerous goods**<br>The product passes the certifications of the UN38.3. |

# 3. Product Introduction and Application Scenarios

## 3.1. Naming Convention

**SMILE-G3-S5**



1 2 3

| Position | Name | Explanation |
|---|---|---|
| 1 | SMILE | Residential energy storage system |
| 2 | G3 | Generation 3 for SMILE series |
| 3 | | Prefix S = Solar Connections (i.e. Hybrid)<br>Prefix B = Battery Only (i.e. AC-coupled) |
| | S3.6 | 3.6kW Inverter with Solar Connections –single phase Hybrid energy storage system |
| | S5 | 5kW Inverter with Solar Connections – single phase Hybrid energy storage system |
| | B5 | 5kW Battery-Only inverter – single-phase AC-coupled energy storage system |
| | S6 | 6kW Inverter with Solar Connections – single phase Hybrid energy storage system |

| Complete designation | Designation in this document |
|---|---|
| SMILE-G3-S3.6-INV,<br>SMILE-G3-S5-INV,<br>SMILE-G3-B5-INV,<br>SMILE-G3-S6-INV | Energy storage inverter |
| SMILE-G3-BAT-10.1P | Parallel battery |

| | |
|---|---|
| SMILE-G3-BAT-3.8S,<br>SMILE-G3-BAT-4.5S,<br>SMILE-G3-BAT-9.3S | Series batteries |
| SMILE-G3-S3.6,<br>SMILE-G3-S5,<br>SMILE-G3-B5,<br>SMILE-G3-S6 | System/Energy storage system/BESS |

## 3.2. System Introduction

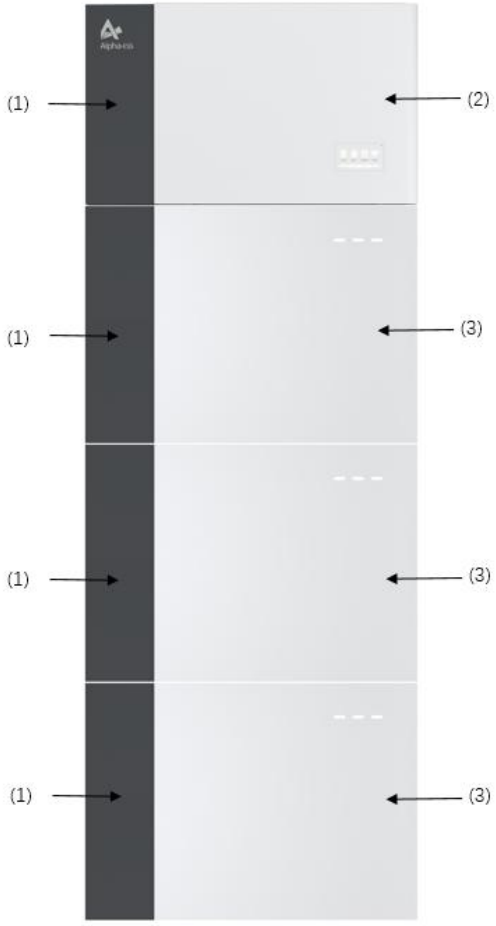



Figure 3-1 System product diagram

| Position | Name | Explanation |
|---|---|---|
| 1 | Cable Cover | Covers for the left wiring area (There are two types of covers, one for the Battery Module(s) wiring and a second for the Inverter connections.) |
| 2 | SMILE-G3-S3.6-INV,<br>SMILE-G3-S5-INV,<br>SMILE-G3-B5-INV,<br>SMILE-G3-S6-INV | Energy storage inverter |
| 3 | SMILE-G3-BAT-10.1P,<br>SMILE-G3-BAT-3.8S, | Battery |

| | | |
|---|---|---|
| | SMILE-G3-BAT-4.5S,<br>SMILE-G3-BAT-9.3S | |

## 3.3. Product Description

### 3.3.1. Inverter Electrical Interface & Connections Introduction

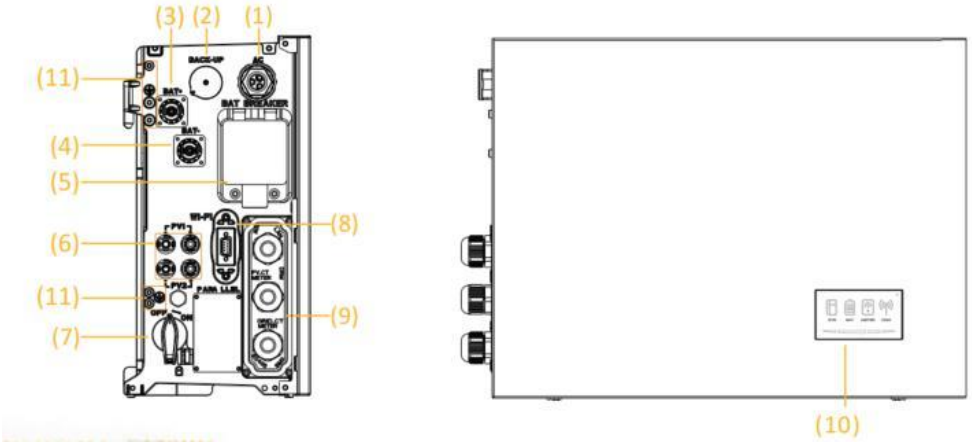



Figure 3-2 Inverter electrical interface diagram

| Position | Designation |
|---|---|
| 1 | Grid Connector (AC Supply) |
| 2 | Backup Connector |
| 3 | Battery Positive Connector |
| 4 | Battery Negative Connector |
| 5 | Battery Circuit Breaker * |
| 6 | Positive and Negative PV Connectors, PV1/ PV2 |
| 7 | PV Switch* |
| 8 | Wi-Fi Dongle Port |
| 9 | Communication Ports (BMS, RS485, PV-CT, Meter&Grid-CT, DRM**&RRCR***, LAN, AUX), Refer to Chapter 6.6 |
| 10 | LED Display |
| 11 | Grounding Points |

* Battery circuit breaker and PV switch of the inverter are switched off when shipped.G3-B5 has no PV switch.

** The DRM is only for regions with AS/NZW 4777.2 safety regulations.

***The RRCR performs the corresponding maximum feed net percentage according to different signals.

### 3.3.2. Inverter Display Interface Introduction

LED Display

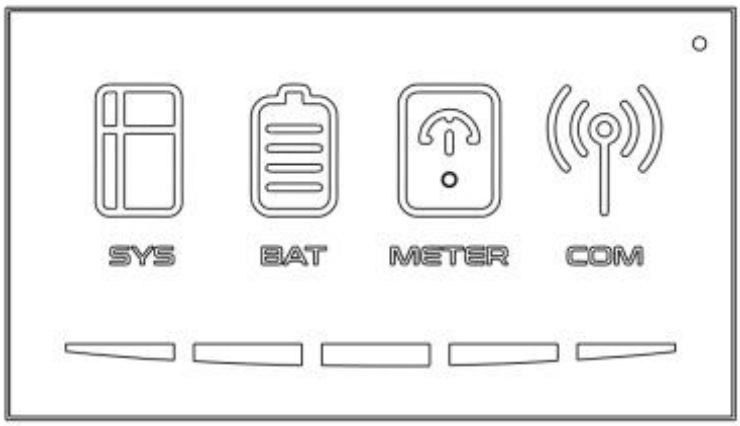



Figure 3-3 LED display

The upper four LED indicators and one reset button are provided on the display panel. These LED indicators provide information about the operation status of the system.

| Status | Explanation | Status | Explanation |
|---|---|---|---|
| SYS | **White light**<br>The system works normally | BAT | **White light**<br>The battery works normally |
| SYS | **Red light**<br>The system is in fault | BAT | **No light**<br>The battery is in fault |
| METER | **White light**<br>Meter communication works normally | COM | **White light**<br>Connected to the server |
| METER | **Flashing when SYS is white**<br>The system is in UPS mode<br>**Flashing or No light when SYS is red**<br>Meter lost | COM | **No light**<br>Disconnected to the server |

The lower five LED indicators provide information about the State of Charge (SOC) of the

batteries connected to this energy storage system.

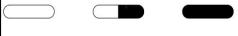
| Status | Explanation |
|---|---|
|  | White LED is off |
|  | White LED is flashing |
|  | White LED is glowing |

| LED Indicator | SOC | Description |
|---|---|---|
| LEDs show the SOC of batteries |  | SOC≤5% |
| |  | 5%＜SOC≤20% |
| |  | 20%＜SOC≤40% |
| |  | 40%＜SOC≤60% |
| |  | 60%＜SOC≤80% |
| |  | 80%＜SOC≤100% |

Note that the LED lights provide an approximation of the State of Charge and should be read as an indication and not as a set value.

### 3.3.3. Battery Display Interface Introduction

During normal operation of battery, three LED indicators on the front cover provide information about the SOC of the battery with white lights on and off or flashing (0.5S on, 1.5S off).

| LED Indicator | No. | SOC | Description |
|---|---|---|---|
| LEDs show the SOC status | 1 |  | SOC≤10% |
| | 2 |  | 10%＜SOC≤30% |
| | 3 |  | 30%＜SOC≤50% |
| | 4 |  | 50%＜SOC≤60% |
| | 5 |  | 60%＜SOC≤90% |
| | 6 |  | 90%＜SOC≤100% |

State Display: the LEDs indicate the operating state of the product.

Standby: all white LEDs are flashing (0.5s on and 0.5s off).

Normal: white LEDs are glowing or flashing (0.5s on and 1.5s off).

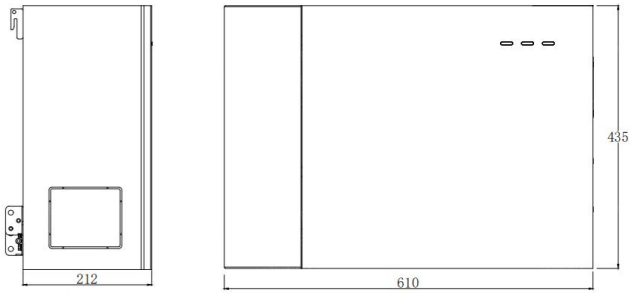
Protection: yellow LEDs are glowing or flashing (0.5s on and 0.5s off).

Error: yellow LEDs are glowing or flashing (0.5s on and 0.5s off).

Shutdown: all LEDs are off.

### 3.3.4. Battery Introduction of SMILE-G3-BAT-3.8S

Battery appearance and dimensions




Unit: mm

Figure 3-4 Battery appearance and size diagram

Connection area overview

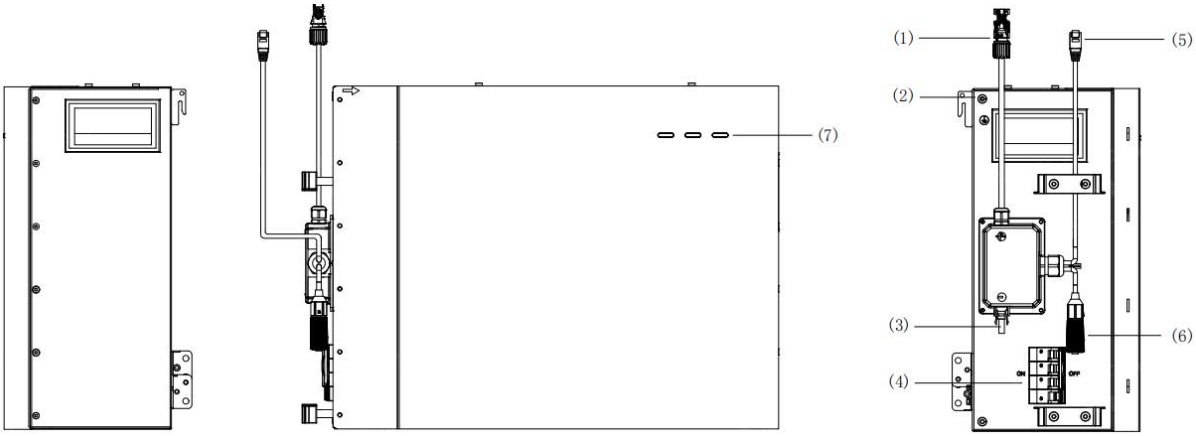



Figure 3-5 Battery connection area diagram

| Position | Designation |
|---|---|
| 1 | Battery Positive Connector |
| 2 | Grounding Point |
| 3 | Battery Negative Connector |

| | |
|---|---|
| 4 | Battery Circuit Breaker |
| 5 | BMS COM1 |
| 6 | BMS COM2 (with Termination Resistor) |
| 7 | LED Display |

### 3.3.5. Battery Introduction of SMILE-G3-BAT-4.5S

Battery appearance and dimensions

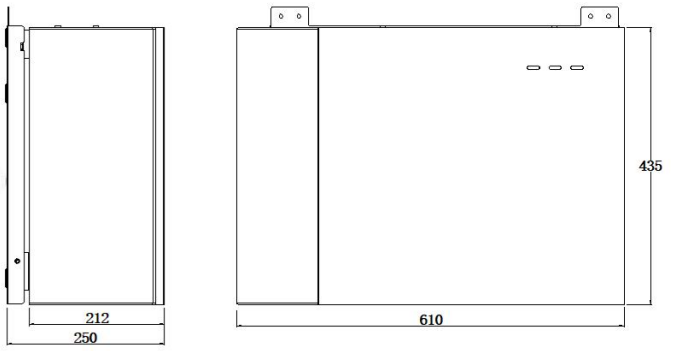



Figure 3-6 Battery appearance and dimensions

Connection area overview

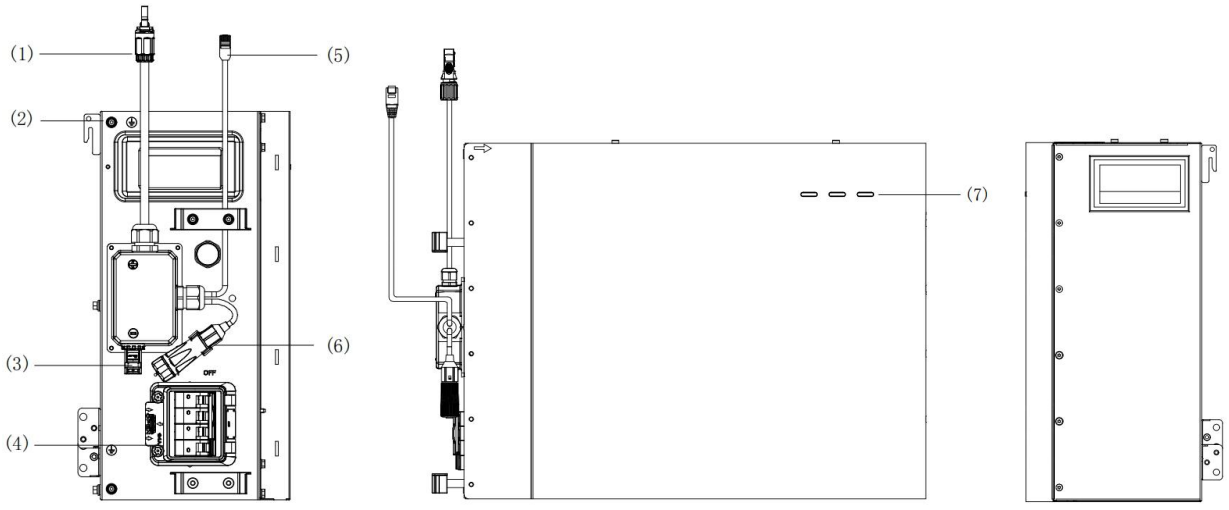



Figure 3-7 Connection area overview

| Position | Designation |
|---|---|
| 1 | Battery Positive Connector |
| 2 | Grounding Point |

| | |
|---|---|
| 3 | Battery Negative Connector |
| 4 | Battery Circuit Breaker |
| 5 | BMS COM1 |
| 6 | BMS COM2 (with Termination Resistor) |
| 7 | LED Display |

### 3.3.6. Battery Introduction of SMILE-G3-BAT-9.3S

Battery appearance and dimensions

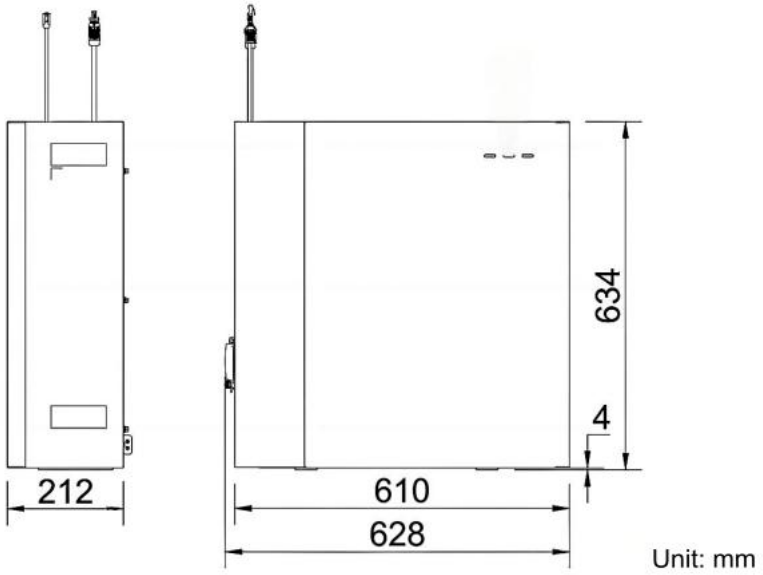



Figure 3-8 Battery appearance and dimensions

Connection area overview

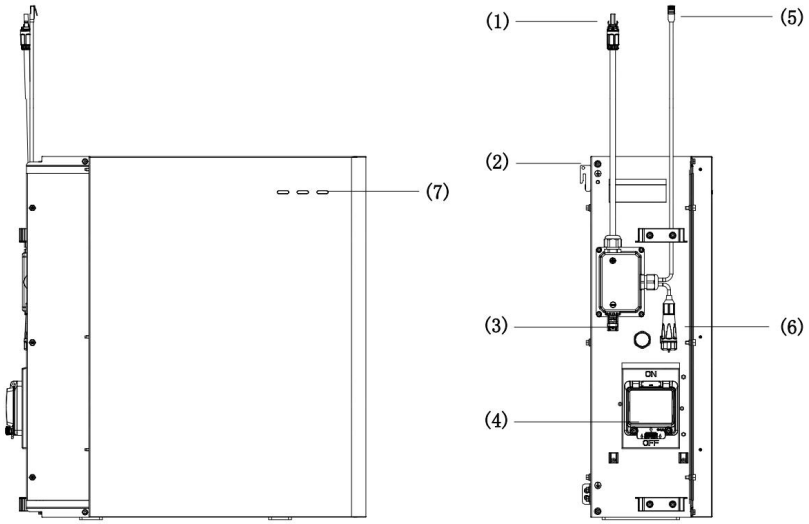



Figure 3-9 Connection area overview

| Position | Designation |
|---|---|
| 1 | Battery Positive Connector |
| 2 | Grounding Point |
| 3 | Battery Negative Connector |
| 4 | Battery Circuit Breaker |
| 5 | BMS COM1 |
| 6 | BMS COM2 (with Termination Resistor) |
| 7 | LED Display |

### 3.3.7. Battery Introduction of SMILE-G3-BAT-10.1P

Battery appearance and dimensions

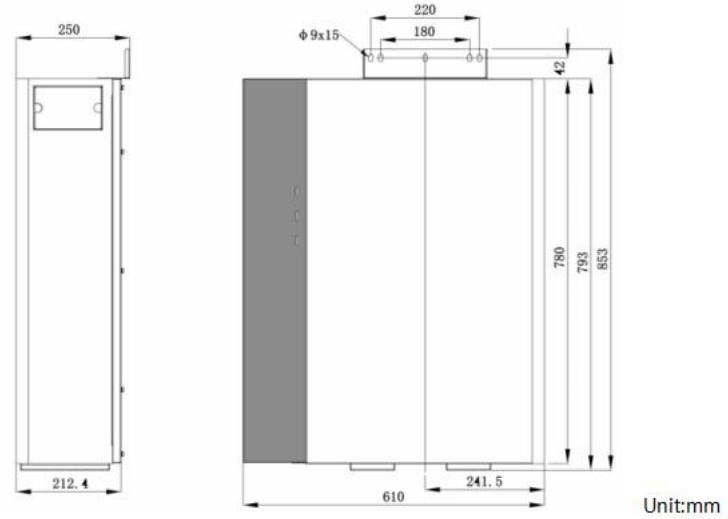



Figure 3-10 Battery appearance and dimensions

Connection area overview

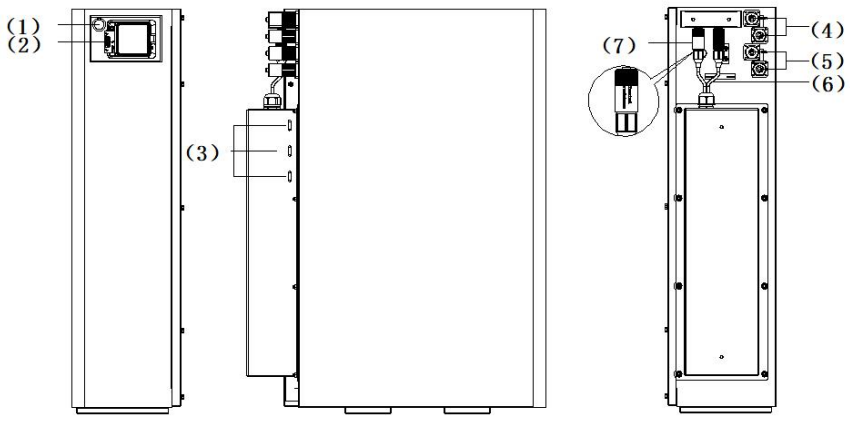



Figure 3-11 Connection area overview

| Position | Designation |
|---|---|
| 1 | Battery Power Button |
| 2 | Battery Breaker |
| 3 | Battery LED Display |
| 4 | Battery Positive Connector |
| 5 | Battery Negative Connector |
| 6 | Grounding Point |
| 7 | BMS COM Ports: BMS COM1, BMS COM2 (with Termination Resistor) |

## 3.4. Application Scenarios

SMILE-G3 single phase system (comprise of the inverter SMILE-G3-S3.6/S5/B5/S6-INV and battery SMILE-G3-BAT-10.1P, SMILE-G3-BAT-3.8S/4.5S/9.3S) can be connected as a DC-Coupled systems (mostly new installation), AC-Coupled systems (mostly retrofit), Hybrid-Coupled systems (mostly retrofit, and increase the PV capacity), and Off-Grid systems (with Generator) as shown in the following diagrams:

### 3.4.1. DC-Coupled Storage System

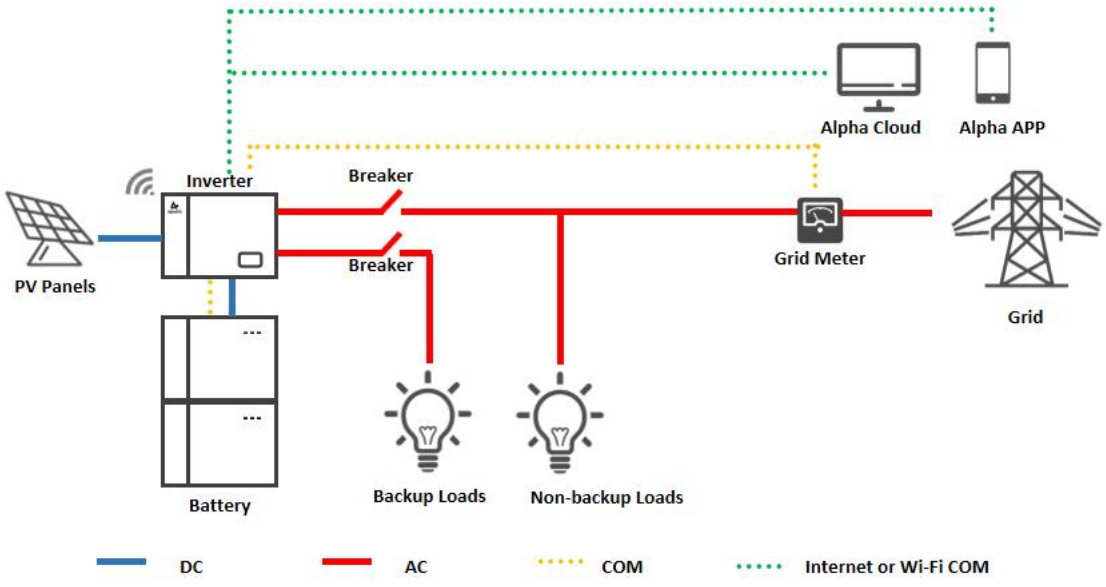



Figure 3-12 DC-Coupled Storage System – Scheme

### 3.4.2. AC-Coupled Storage System

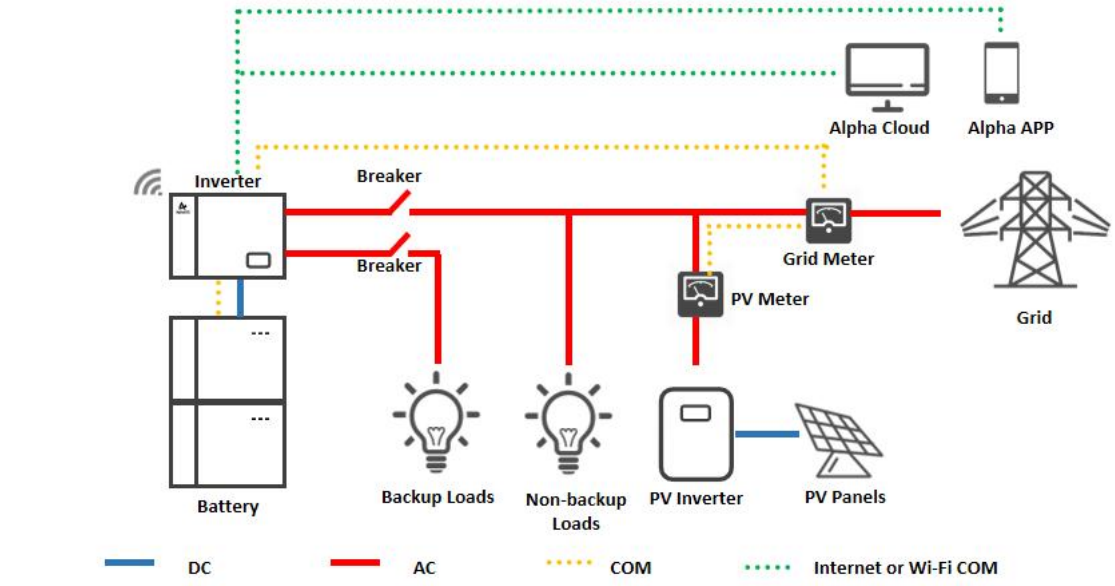



Figure 3-13 AC-Coupled Storage System – Scheme

### 3.4.3. Hybrid-Coupled Storage System

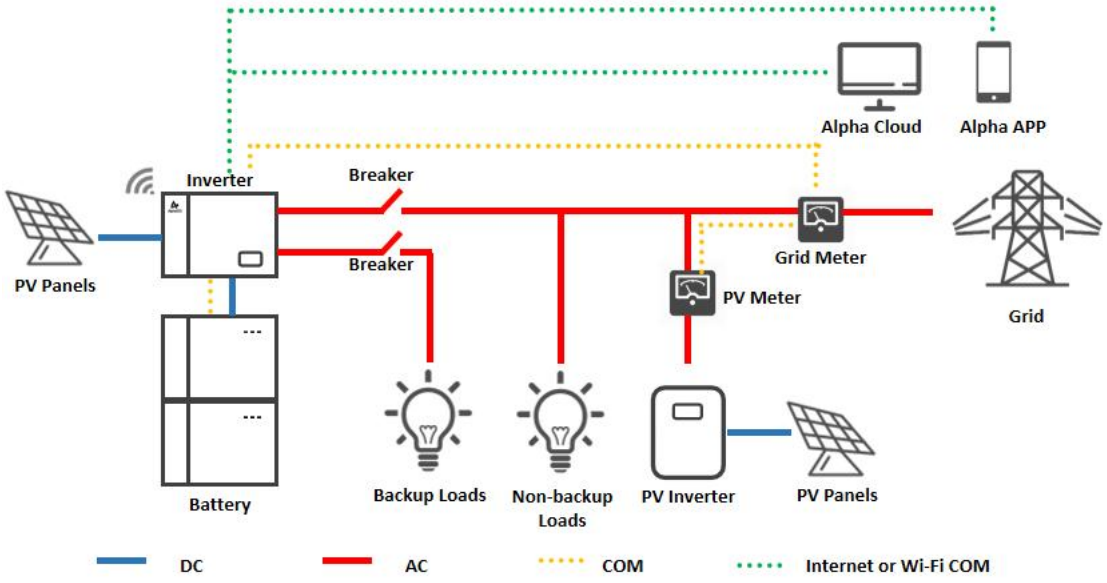



Figure 3-14 Hybrid-Coupled Storage System – Scheme

### 3.4.4. Off-Grid Storage System

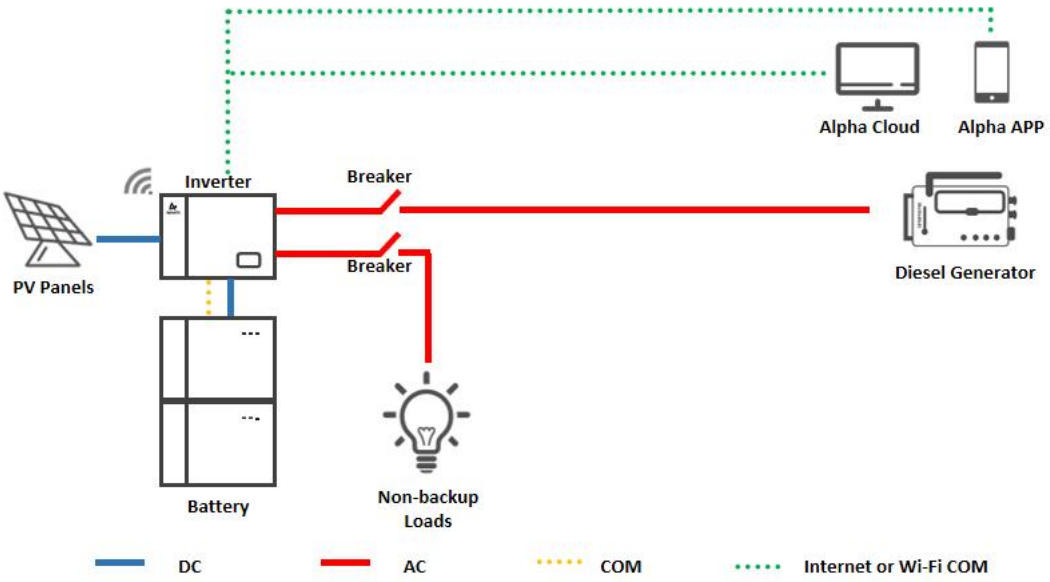



Figure 3-15 Off-Grid (with Generator) Storage System – Scheme

**Note:** In all scenarios, Non-backup Loads and Backup Loads must be appropriately protected by earth fault protection devices (e. g. Type A or Type B RCDs, RCBOs) in accordance with appropriate standards.

Non-backup/Backup Loads should not exceed the rated capacity of the inverter, even during on-grid operation.

# 4. Storage and Transport

## 4.1. Storage

### 4.1.1. Inverter Storage

The following requirements should be met if the inverter is not put into immediate use:

1. Do not unpack the inverter.
2. Keep the storage temperature at -40~60°C and the humidity at 5%~95% RH.
3. The inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
4. A maximum of six inverters can be stacked. To avoid personal injury or device damage, stack inverters with caution to prevent them from falling over.
5. During the storage period, check the inverter periodically. Replace any damaged packaging promptly.
6. The inverters stored for more than 2 years should be inspected and tested before being put into service.

### 4.1.2. Battery Storage

The following requirements should be met if the battery is not put into immediate use:

1. Place batteries according to the signs on the carton during storage. Do not put the batteries upside down or store them horizontally.
2. Stack battery cartons in accordance with the stacking requirements printed on the external carton.
3. Store the battery out of reach of children and animals.
4. Store the battery in an area where there is minimal dust and dirt.
5. Handle batteries with care to avoid damage.
6. The requirements for the storage environment are as follows:

(1) Ambient temperature: -10~55°C, recommended storage temperature: 15~30°C.
(2) Relative humidity: 15%~85%.
(3) Place batteries in a dry, clean, ventilated location free from dust.
(4) Store batteries in a place that is away from corrosive organic solvents and gases.
(5) Keep batteries away from direct sunlight.
(6) Keep batteries at least 2 meters away from heat sources.

7. The batteries in storage must be disconnected from external devices and the indicators (if any) on the batteries should be off.
8. Warehoused batteries should be delivered based on the "first in, first out" stock control.
9. The warehouse keeper should collect battery storage information every month and report to the planning department. Batteries stored for more than 6 months should be

assessed and charged periodically.

10. Capacity loss may occur if a lithium battery is stored for a long time. After a lithium battery is stored for 12 months in the recommended storage temperature, the irreversible capacity loss rate is 3%~10%. It is recommended that batteries not be stored for a long period. If the batteries need to be stored for more than 6 months, it is recommended to recharge the batteries to 65~75% of the SOC.

## 4.2. Transport

During transportation, please follow these guidelines:

1. Use the original packaging for transportation. If the original packaging is not available, place the product inside a suitable cardboard box with adequate protection and seal the carton.
2. Handle with care, choose the corresponding handling method according to the weight, and pay attention to safety. Mechanical aids should always be used in preference to lifting by hand.

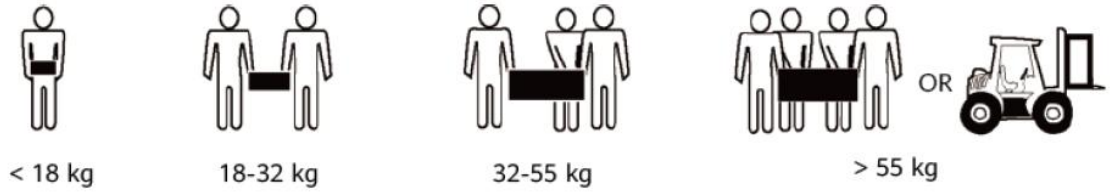



Figure 4-1 Handling methods for batteries of different weights

3. Keep the packaging dry and away from potential sources of damage during transportation.
4. Secure the product during transportation to prevent falling or mechanical impact.

# 5. Mounting

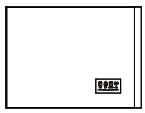
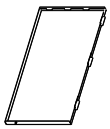
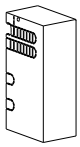
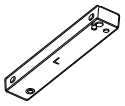
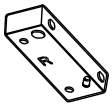
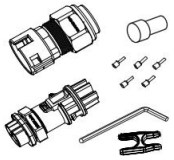
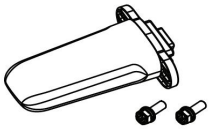
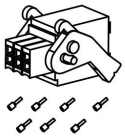
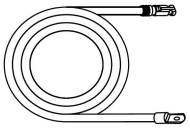
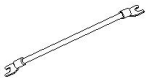
## 5.1. Check the Outer Packaging

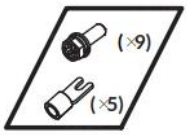
Before unpacking the product, check the outer packaging for damage, such as holes, signs of mechanical damage or water damage. If any damage is found, do not unpack the product and contact your dealer as soon as possible.

## 5.2. Scope of Delivery

Check the scope of delivery and inspect components to ensure they are present and undamaged.

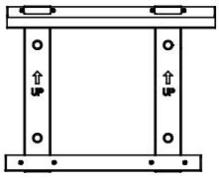
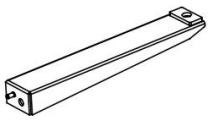
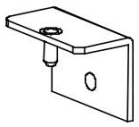
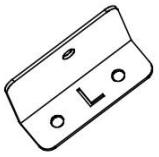
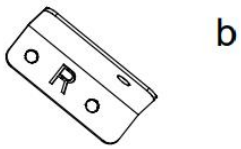
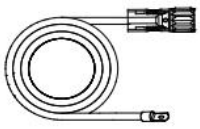
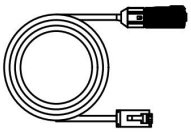
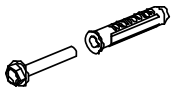
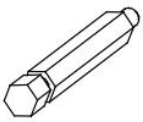
Contact your distributor if the packed components are incomplete or damaged.

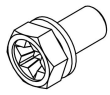
| SMILE-G3 Single Phase Inverter | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| Inverter (×1) | TOP Cover (×1) | Right Cover (×1) | Cable Cover (×1) | Left Support Foot (×1) |
|  |  |  |  |  |
| Right Support Foot (×1) | PV+ Connectors [a](×2) | PV- Connectors [a](×2) | Grid Plug Connector (×1) | Backup Plug Connector [b](×1) |
|  |  |  |  |  |
| Wi-Fi Dongle (×1) | 6 Pin AUX Terminal Block (×1) | Series Batteries Main Positive Power Cable (×1) | Series Batteries Main Negative Power Cable (×1) | Grounding Cable (×1) |

| | | | | |
|---|---|---|---|---|
|  |  |  | | |
| PV connector removal wrench (×1) | Hexagon Head Screws M5*12 and Terminals<br>OT16-5 Set (×1) | Documentation (×3) | | |

a: PV+ &PV- Connectors not included in SMILE-G3-B5-INV.

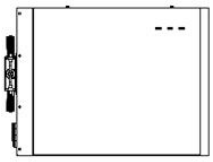
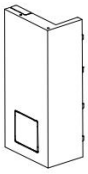
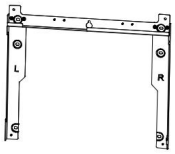
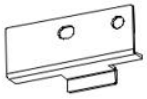
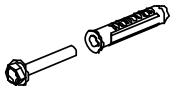
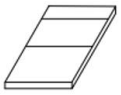
b: Backup plug connector for SMILE-G3-S6-INV.

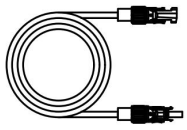
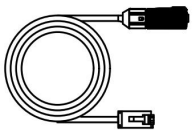
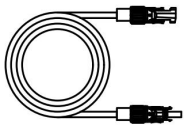
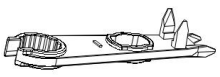
| **(Optional) Wall Bracket of SMILE-G3 Single Phase Inverter** | | | |
|---|---|---|---|
|  |  |  |  |
| Wall Bracket (×1) | Support Plate for Cable Cover (×1) | Locating Stud for Cable Cover (×1) | Left Connector for BAT Wall Bracket (×1) |
|  |  |  |  |
| Right Connector for BAT Wall Bracket (×1) | Series Battery Main Negative Power Cable (×1) | Series Battery Main Positive Power Cable (×1) | Communication Cable between Inverter and 1st Series Batteries (×1) |
|  |  |  |  |
| Wall Anchor ST6*55 (×6) | Locating Screw for Side Cover (×1) | Screw M3*10 (×2) | Flange Nut M5 (×5) |

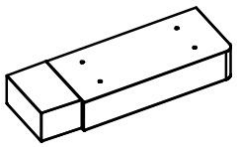
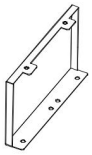
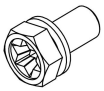
| | | | |
|---|---|---|---|
|  |  b | | |
| Screw M5*12 (×10) | Screw M5*10 (×3) | | |

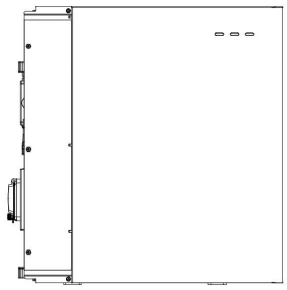
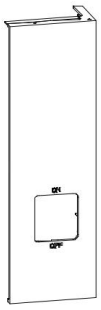
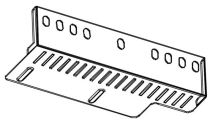
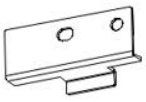
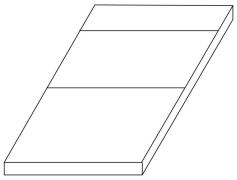
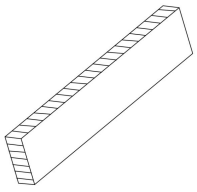
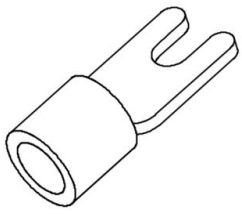
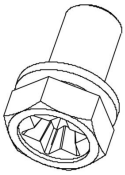
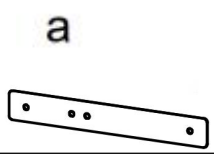
a: Only suitable for inverter wall mounting.

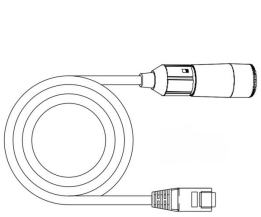
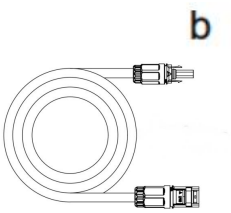
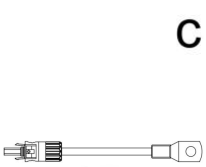
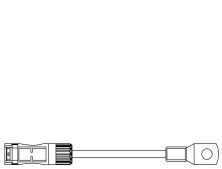
b: Used to connect between the wall bracket of inverter and the wall bracket of the first battery.

| SMILE-G3-BAT-3.8S/4.5S | | | |
|---|---|---|---|
|  |  |  |  |
| Battery (×1) | Battery Cable Cover (×1) | Wall Bracket (×1) | Grounding Bar (×1) |
|  |  |  |  |
| Wall Anchor ST6*55 (×6) | Hexagon Head Large Washer Screw M5*12 (×3) | Flange Nut M5 (×7) | Quick Installation Guide (×1) |

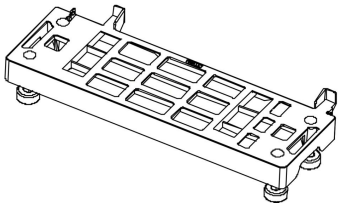
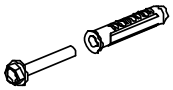
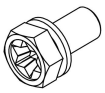
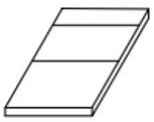
| (Optional) Cables for Distanced Horizontal Battery Expansion of SMILE-G3-BAT-3.8S | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| Main Negative Power Extension Cable (×1) | Communication Cable between two Column Series Batteries (×1) | Power Cable between two Column Series Batteries (×1) | M5 Y Type Terminal (×3) | PV connector removal wrench (×1) |

| (Optional) Top Cover Unit of SMILE-G3-BAT-3.8S/4.5S /9.3S | | | |
|---|---|---|---|
|  |  |  |  |
| Top Cover (×1) | Top Cover Bracket (×2) | Hexagon Head Screw M5*12(×5) | Countersunk Head Screw M4*8 (×5) |

| SMILE-G3-BAT-9.3S | | | |
|---|---|---|---|
|  |  |  |  |
| Battery (×1) | Battery Cable Cover (×1) | Top Bracket (×1) | Grounding Bar (×1) |
|  |  |  |  |
| Quick Installation Guide (×1) | Wall Anchor ST6*55 (×4) | M5 Y Type Terminal (×2) | BAT Connector Disassembling Tool (×1) |
|  |  |   |  |
| BAT Connector Disassembling Tool (×1) | Hexagon Head Screw M5*12 (×4) | Connecting Plate (×2) | Countersunk Head Screw M5 * 8 (×2) |

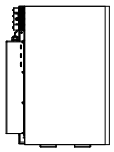
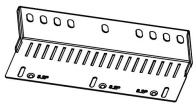
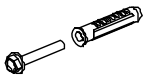
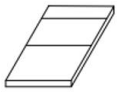
| | | | |
|---|---|---|---|
|  |  |  |  |
| Communication Cable (×1) Code: A | Power Cable (×1)Code: B | Power Cable (×1) Code: C | Power Cable (×1) Code: D |

a: For batteries top connection during batteries forward expansion mounting.
b: Only applicable to Australia and New Zealand.
c: Connect to SMILE-G3 single phase inverter with M6 OT battery connection terminals. Only provide for Australia and New Zealand markets.

| (Optional)Battery Base Unit of SMILE-G3-BAT-3.8S/4.5S/9.3S | | | |
|---|---|---|---|
|  |  |  |  |
| Base Unit (×1) | Fixing Brackets (×2) | Right Connection Block (×1) | Wall Anchor ST6*55 (×4) |
|  |  | a  | b  |
| Hexagon Head Screw M5*12 (×10) | Quick Installation Guide (×1) | Right Connection Plate (indoor) (×4) | Hexagon Head Limit Screw M5*10 (×9) |
| c  | d  | e  | f  |
| Top Wall Bracket | Limit block | Pan Head Screw M5*10* (×9) | Right Connection Plate (outdoor) (×4) |

| | | | |
|---|---|---|---|
| (×1) | (×8) | | |

a: For SMILE-G3-BAT-3.8S and SMILE-G3-BAT-4.5S.
b: For SMILE-G3-BAT-3.8S.
c: For SMILE-G3-BAT-3.8S and SMILE-G3-BAT-4.5S.
d: For SMILE-G3-BAT-4.5S.
e: For SMILE-G3-BAT-4.5S.
f: For SMILE-G3-BAT-9.3S.

| **SMILE-G3-BAT-10.1P** | | | |
|---|---|---|---|
|  |  |  |  |
| Battery(×1) | Top Wall Bracket(×1) | M5 Y Type Terminal (×2) | Spanner(×1) |
|  |  |  |  |
| Battery Cable Cover (×1) | Breaker Cover(×1) | Wall Anchor ST6*55 (×4) | Gap Gasket for Battery Stacking (×2) |
|  |  |  |  |
| Countersunk Head Screw M5*10 (×10) | BAT Positive Power Cable(×1) | BAT Negative Power Cable(×1) | Battery Communication Cable (×1) |
|  |  | | |
| Wall Gap Shim (×1) | Quick Installation Guide (×1) | | |

## 5.3. Requirements for Mounting

DANGER

**Danger to life due to fire or explosion**

Despite careful construction, electrical devices can cause fires.

- Do not mount the ESS in areas containing highly flammable materials or gases.
- Do not mount the ESS in potentially explosive atmospheres.

### 5.3.1. Basic Requirements

1. SMILE-G3-S3.6/S5/B5/S6-INV, SMILE-G3-BAT-10.1P and SMILE-G3-BAT-4.5S/9.3S are suitable for indoor and outdoor installation. Battery SMILE-G3-BAT-3.8S is only suitable for indoor installation.
2. Do not install the ESS in a place where people can easily touch it because the inverter's surface will get extremely hot during operation.
3. Do not engage screws into tapped holes using a Hammer Driver, Impact Driver or "Rattle gun". Do not damage screws or threaded holes by tightening with too much torque.
4. To ensure safety, children should not operate or be near the ESS unless supervised by an adult.

### 5.3.2. Mounting Environment Requirements

DANGER

**Danger to life due to fire or explosion**

Despite careful construction, electrical devices can cause fires.

- Do not mount the energy storage system in areas containing highly flammable materials or gases.
- Do not mount the energy storage system in potentially explosive atmospheres.

1. Do not mount the ESS outdoors in areas of high salt mist likelihood where corrosion may cause damage. An area of high salt mist likelihood refers to a region within 500m from the coast or prone to the sea breeze.
2. Do not place the system near water sources such as downpipes or sprinklers.
3. The ESS must be mounted in a well-ventilated environment to ensure adequate heat dissipation.
4. Do not mount in a location that will be exposed to direct sunlight. Mount the ESS in a sheltered place or mount an awning over it. When mounted under direct sunlight, the power of the ESS may be derated due to additional temperature rise and the longevity of the product will be reduced.

5. Favour locations that are indoors, under cover, or generally protected from the elements and extreme temperatures (e. g. in a garage). If the ESS is mounted in the garage, ensure the product is adequately protected from potential mechanical impact.
6. In the UK , the energy storage battery shall be installed outdoors.
7. The optimal temperature range for the battery to operate is 15 to 30 ℃.
8. In the UK, If the energy storage batteries are installed within a dwelling area, an extra audible warning shall be used for battery persistent dangerous conditions.
9. In the UK , Batteries shall not be installed in any of the following locations:
   (1) Rooms in which persons are intended to sleep;
   (2) Routes used as a means of escape that are not defined as protected escape routes, including landings, staircases and corridors;
   (3) Corridors, shafts, stairs or lobbies of protected escape routes;
   (4) Firefighting lobbies, shafts or staircases;
   (5) Storage cupboards, enclosures or spaces opening into rooms in which persons are intended to sleep;
   (6) Outdoors (ground-mounted or wall-mounted in a suitable enclosure) within 1 m of:
      a. escape routes;
      b. doors;
      c. windows; or
      d. ventilation ports.
   (7) Voids, roof spaces or lofts;
   (8) Within 2 m of stored flammable materials and fuel storage tanks or cylinders;
   (9) Cellars or basements that have no access to the outside of the building.
10. In the UK, after the system is installed, the surrounding environment needs to be equipped with fire alarm or fire extinguishing devices in accordance with the BS EN54 standard.
11. In the UK, if the system is installed in areas prone to vehicle damage (such as garages, driveways, etc.), please install protective devices (such as protective barriers, protective enclosures, etc.) in these areas.
12. The flash arcs of the SMILE-G3-BAT-4.5S and SMILE-G3-BAT-9.3S batteries are both below 3 cal/cm^2 (using the calculation method described in AS/NZS 5139). Therefore, tools are required when contacting the battery cells in the UK.

### 5.3.3. Mounting Structure Requirements

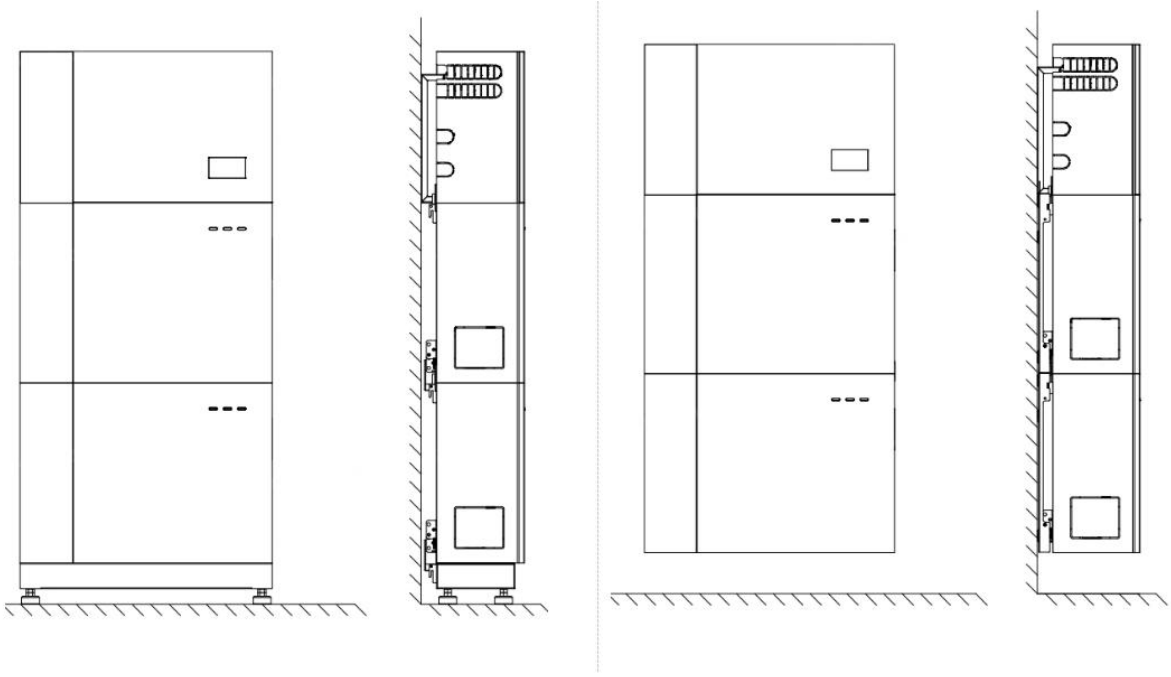
1. The surface to which the ESS is to be mounted shall be fire-rated where required by local regulations.
2. Out of an abundance of caution, it is recommended that the system be mounted on non-flammable building materials, even when not required by local regulations.
3. Ensure that the mounting surface is sufficiently sturdy to bear the weight of the Product, like a solid support surface (e.g., concrete or masonry).
4. In residential installation, do not mount the ESS on drywalls or walls made of gyprock

or similar materials with poor sound insulation. The noises generated by the inverter can be noticeable and may be exacerbated by locations with poor insulation or where echoing may occur.

5. The mounting location must be suitable for the weight and dimensions of the product (see Section 5.3.5).

### 5.3.4. Mounting Angle and Stack Requirements

1. The battery should be mounted on the base unit or hanged on the wall bracket and secured to the wall.
2. The inverter should be placed on the top of the battery and secured to the battery.
3. The installation angle requirement: do not mount the inverter at forward-tilted, side-tilted, horizontal, or inverted positions.Refer to Figure 5-1.

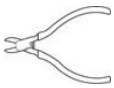
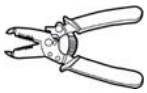
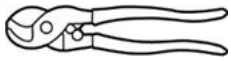
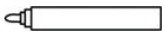


a. Base installation b. Wall mounting installation

Figure 5-1 Product installation diagram

## 5.4. Preparing Tools and Instruments

| Category | Tools and Instruments | | |
|---|---|---|---|
| Installation |  |  |  |
| | Hammer drill<br>(with a Φ10mm drill bit) | Torque socket wrench SW8&SW10 | Multimeter (DC voltage range ≥ 1000V) |

| | | | |
|---|---|---|---|
| |  |  |  |
| | Diagonal pliers | Wire strippers | T20/PH2 screwdriver (torque range: 0-5Nm), L=150mm |
| |  |  |  |
| | Rubber mallet | Utility knife | Cable cutters |
| |  |  |  |
| | Crimping tool (model: PV-CZM-22100) | Bootlace/Ferrule terminal crimper | Vacuum cleaner |
| |  |  |  |
| | Spirit level | Heat shrink tubing | Heat gun |
| |  |  | |
| | Marker | Measuring tape | |
| Personal Protective Equipment |  |  |  |
| | Safety gloves | Safety goggles | Anti-dust respirator |
| |  | | |
| | Safety shoes | | |

### 5.4.1. Mounting Space Requirements

1. Reserve sufficient space around the energy storage system to do installation, maintenance and heat dissipation. Refer to Figure 5-2.
2. Recommend a minimum of 200 mm off the ground was advisable to protect from submergence, so the batteries should be mounted by wall brackets or base unit.

3. The side clearance is a recommendation which can be adjusted according to the end-users requirements. Clearances may be up to 100mm less than noted if ventilation is adequate and no restrictions or objects will limit access to the labelling or switches of the Product or to the use of tools to remove covers or service/remove the Product.

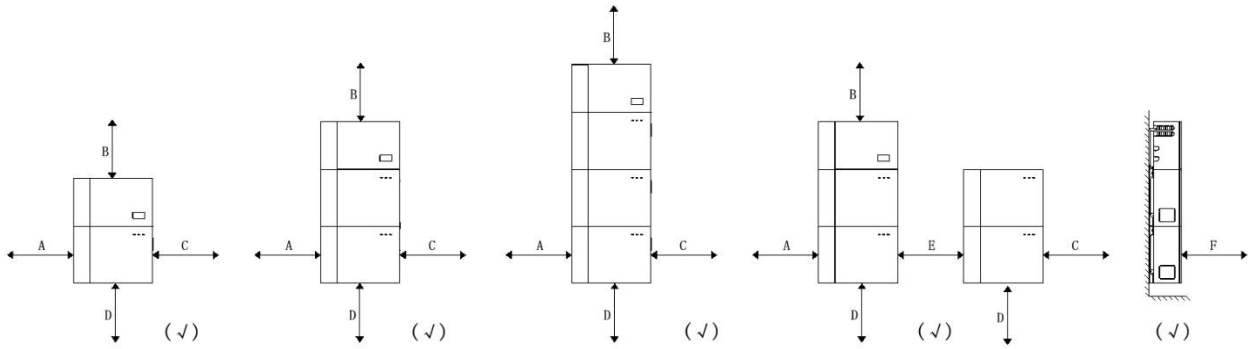



Figure 5-2 Installation space requirements

| Position | Distance (Unit: mm) |
|---|---|
| A | ≥300 |
| B | ≥300 |
| C | ≥300 |
| D | ≥200 |
| E | ≥300 |
| F | ≥100 |

**Note:** Local Standards may add additional clearance requirements, particularly regarding clearances between the ESS and other Electrical Appliances.

## 5.5. Mounting the System

### 5.5.1. Mounting the Batteries

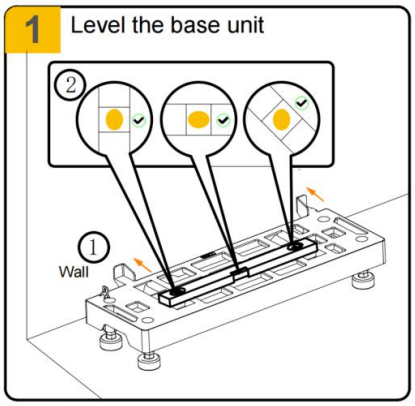
**Note:** The following battery installation instructions only list the general steps. There may be slight differences for each battery.Install the pictures using the 9.3S battery as an example.

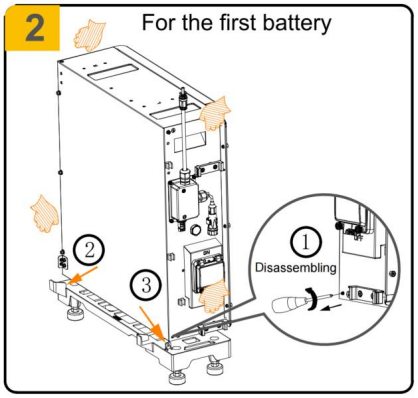
#### 5.5.1.1 Mounting the Battery with Base Unit

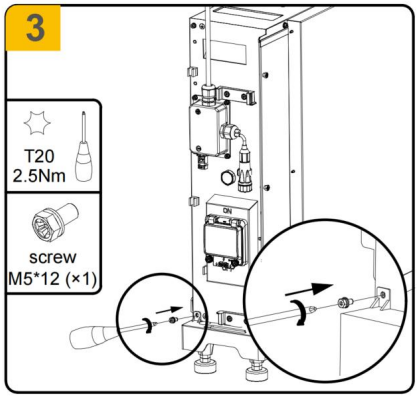
When mounting battery SMILE-G3-BAT-10.1P, SMILE-G3-BAT-3.8S/4.5S/9.3S with base unit, please follow the below steps.

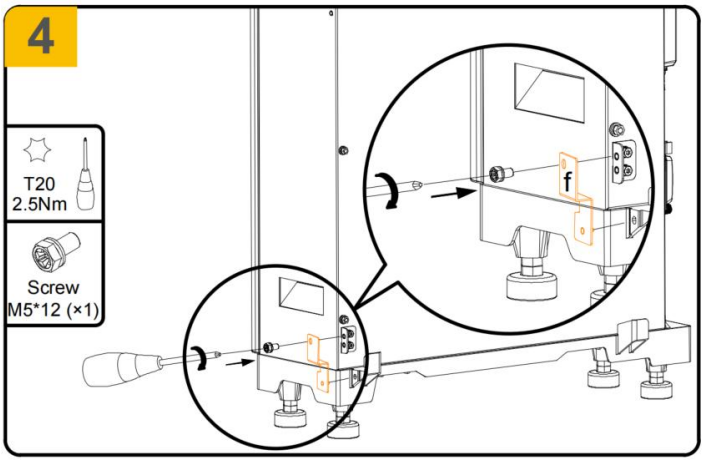
1. Take out the base unit, place it on the floor, and level it using a spirit level. Refer to 1 in Figure 5-3.

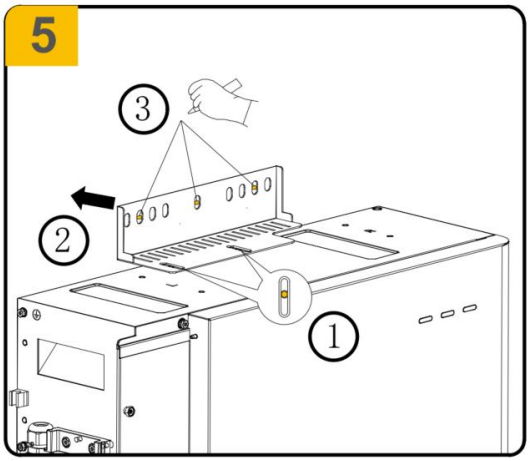
2. Release the base unit clip and place the first battery onto the base unit. Refer to 2 in Figure 5-3.
3. Tighten the M5 screw into the limit hole. (tool: T20 screwdriver, torque: 2.5 Nm). Refer to 3 in Figure 5-3..
4. Tighten the base unit to the battery using the connection plate. (tool: T20 screwdriver, torque: 2.5 Nm). Refer to 4 in Figure 5-3.
5. Position the wall bracket at the top of the battery, aligning it with the battery's mounting holes. Mark the contact points against the wall using a marker pen. Refer to 5 in Figure 5-3.
6. Cover the top of the battery with the packaging bag. Using a hammer drill, bore holes along the previously marked positions on the wall. Drive the expansion plugs into the holes using a hammer, then remove the packaging bag. Refer to 6 in Figure 5-3.
7. Secure the wall bracket and the top of the battery using M5 screws. (tool: T20 screwdriver, torque: 2.5 Nm). Refer to 7 in Figure 5-3.
8. Screw the ST6 into the expansion nut. (tool: SW8, torque: 6 Nm). Refer to 8 in Figure 5-3.
9. Place the second battery on top of the first battery, ensuring the battery switch is closed. Refer to 9 in Figure 5-3.
10. Secure the grounding bar between the two batteries. (tool: T20 screwdriver, torque: 2.5 Nm). Refer to 10 in Figure 5-3.
11. Repeat steps 5 to 8 to complete the installation of two batteries.

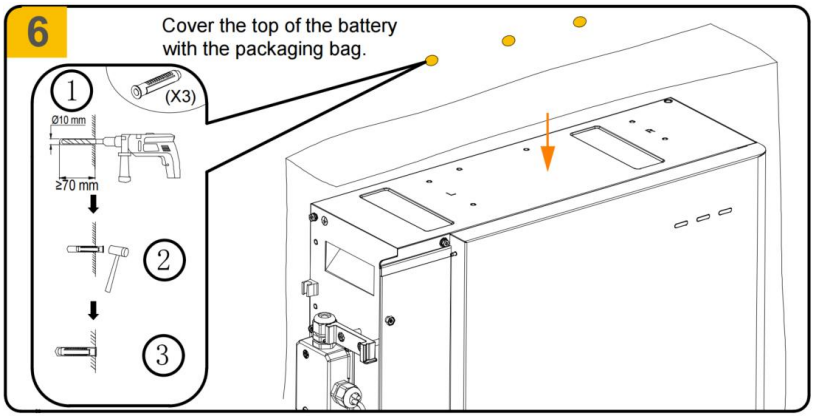

1
Level the base unit
2
1
Wall

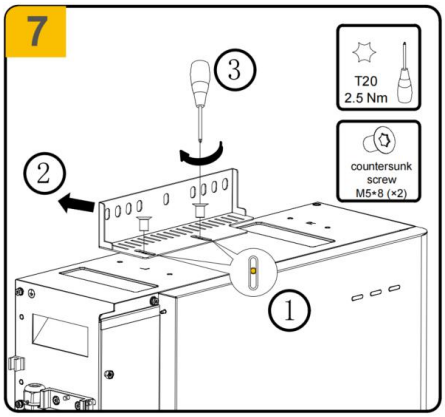

2
For the first battery
2
3
1
Disassembling


3
T20
2.5Nm
screw
M5*12 (×1)


4
T20
2.5Nm
Screw
M5*12 (×1)


5
3
2
1


6
Cover the top of the battery
with the packaging bag.
1
(X3)
Ø10 mm
≥70 mm
2
3


7
3
T20
2.5 Nm
countersunk
screw
M5*8 (×2)
2
1

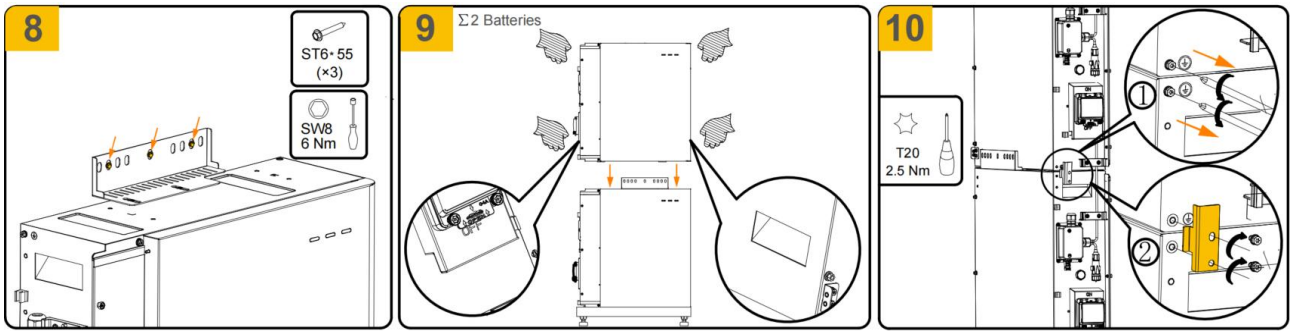



Figure 5-3 Battery Base Installation Steps Diagram

### 5.5.1.2 Mounting the Battery without Base Unit

When mounting battery SMILE-G3-BAT-10.1P, SMILE-G3-BAT-3.8S/4.5S/9.3S without base unit, please follow the below steps.

1. Take out the limit cardboard, place horizontally against the wall. Refer to 1 in Figure 5-4.
2. Attach the battery tightly to the limit cardboard. Refer to 2 in Figure 5-4.
3. Position the wall bracket at the top of the battery, aligning it with the battery's mounting holes. Mark the contact points against the wall using a marker pen. Refer to 3 in Figure 5-4.
4. Cover the top of the battery with the packaging bag. Using a hammer drill, bore holes along the previously marked positions on the wall. Drive the expansion plugs into the holes using a hammer, then remove the packaging bag. Refer to 4 in Figure 5-4.
5. Secure the wall bracket and the top of the battery using M5 screws. (tool: T20 screwdriver, torque: 2.5 Nm). Refer to 5 in Figure 5-4.
6. Screw the ST6 into the expansion nut. (tool: SW8, torque: 6 Nm). Refer to 6 in Figure 5-4.
7. Place the second battery on top of the first battery, ensuring the battery switch is closed. Refer to 7 in Figure 5-4.
8. Secure the grounding bar between the two batteries. (tool: T20 screwdriver, torque: 2.5 Nm). Refer to 8 in Figure 5-4.
9. Repeat steps 3 to 8 to complete the installation of two batteries.

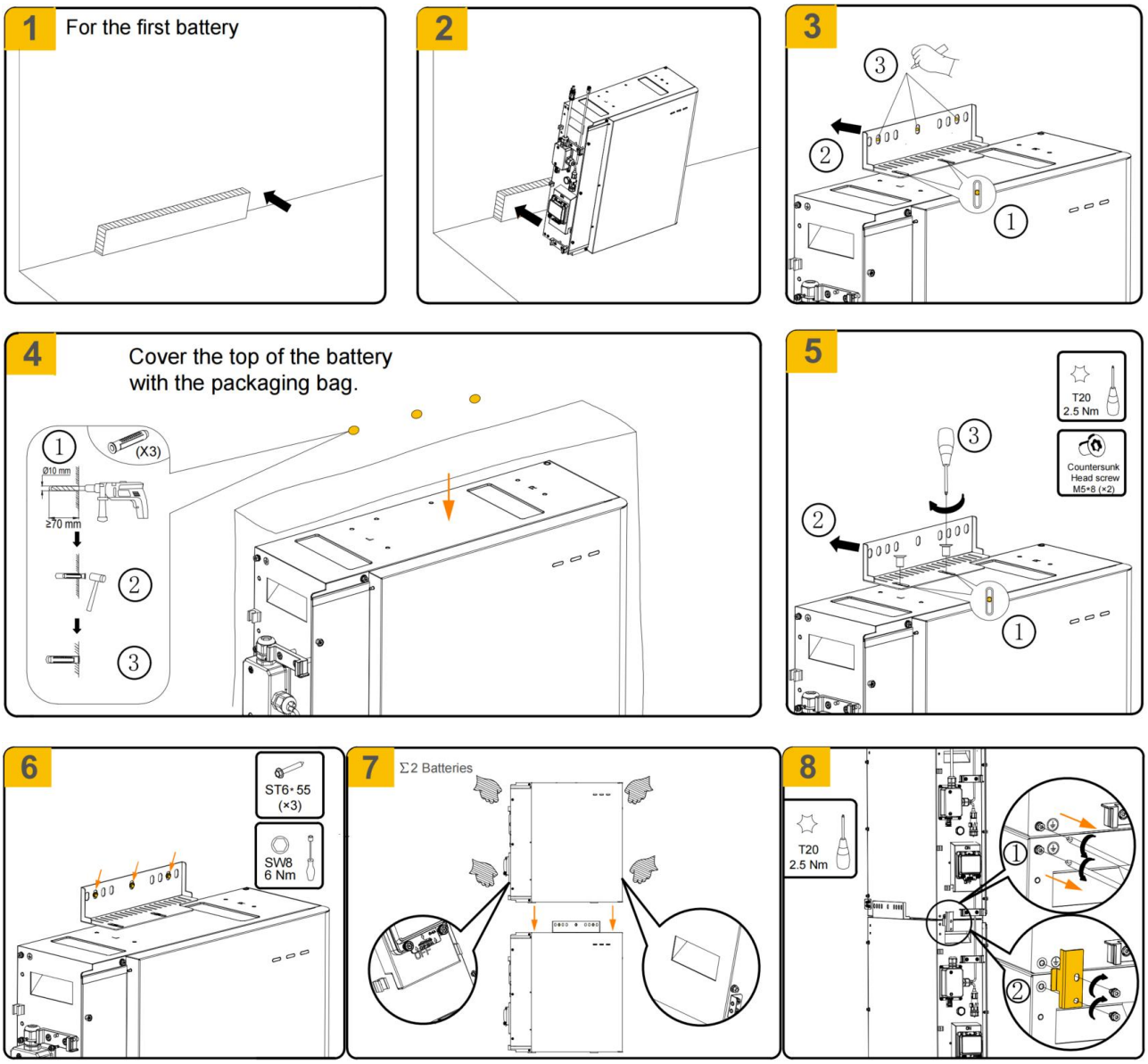



Figure 5-4 Battery Base Installation Steps Diagram

### 5.5.1.3 Mounting the Battery with Wall Bracket

Wall bracket installation for one battery installation, please follow the below steps(for SMILE-G3-BAT-3.8S/4.5S).

1. Select a suitable height for the wall bracket location. Please reserve enough height if you want to add more batteries later.
2. Mark one drilling position which is used to secure the upper middle location of the wall bracket later and drill the marked hole with a Φ10 drill. Insert the screw anchor into the drill hole, and pre-tighten the wall bracket horizontally with the provided screw (tool: Socket wrench SW8, torque: 4 Nm). Retain 5~10 mm from the screw head to the wall. Refer to Figure 5-5.
3. Take out the wall bracket from the packaging and hang the wall bracket on the screw head, adjust its horizontal position, then mark the other drilling positions, drill the

marked holes with a Φ10 drill and insert the screw anchors into the drill holes. Refer to 2 in Figure 5-6.

4. Secure the wall bracket to the wall (tool: Socket wrench SW8, torque: 6 Nm).Refer to 3 in Figure 5-6.
5. Horizontally lift the battery using the handles at two sides and let the top hooks on the back of the battery slide from right to left in the upper beam of the wall bracket. Refer to 4 in Figure 5-6.
6. Secure the battery to the wall bracket and tighten them with two M5*12 screws (tool: T20 screwdriver, torque: 2.5 Nm). Refer to 5 in Figure 5-6.

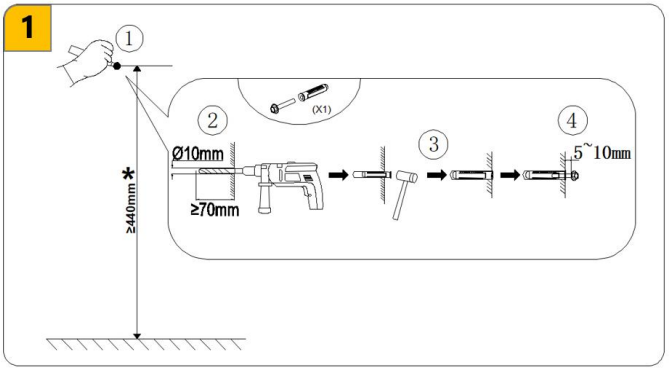



Figure 5-5 Selection of wall-mounted bracket position

* This recommended value “440 mm” is for wall bracket location of the bottom battery. Depending on the number of expansion batteries mounted later, meanwhile it is advisable to have a minimum of 100 mm off the ground to protect the system from submergence.

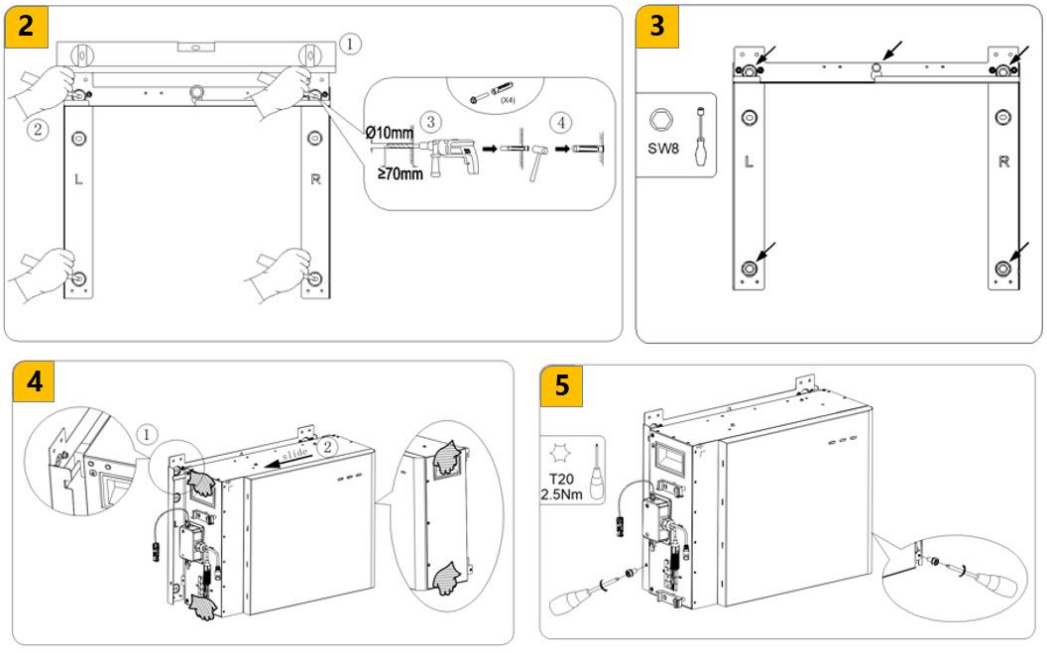



Figure 5-6 Installation diagram of a single battery wall-mounted bracket

### 5.5.1.4 Mounting the top Cover of the Battery(Optional)

Mount the top cover on the battery top, detailed steps as follows:

1. Take out the top cover support from the package.

Mount two top cover supports onto the top of the second column battery with four hexagon head screws M5*12 (tool: T20 screwdriver, torque: 2.5 Nm). Refer to 1 in Figure 5-7.

2. Take out the top cover from the package.

Mount the top cover onto the top of two top cover supports with four countersunk head screws M4*8 (tool: T20 screwdriver, torque: 1.6 Nm). Refer to 2 in Figure 5-7.

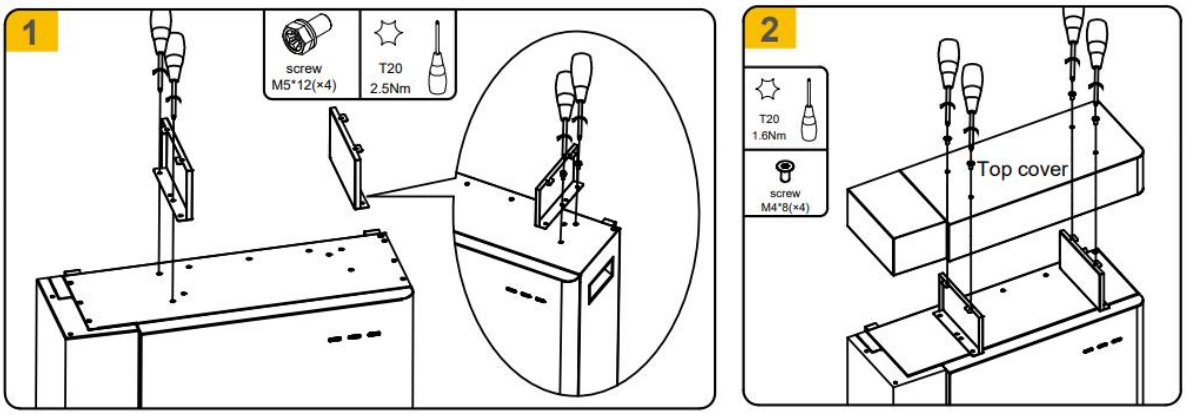



Figure 5-7 Battery top cover installation

### 5.5.2. Mounting the Inverter

Mount the inverter standing on the battery, detailed steps as follows:

1. Take out the left support foot and right support foot from the inverter package.
2. Mount the left support foot and right support foot onto the top of the upper battery. Refer to 1 in Figure 5-8.
3. Place the inverter onto the two support feet.Ensure the lower right and left holes on the bottom of the inverter align to and insert into the respective guides in the support feet. Refer to 2 in Figure 5-8.
4. Attach the inverter to the side support feet. The inverter mounting holes should align to the horizontal holes of the side support feet. Note that the inverter sits inside (between) the two feet and is secured with two screws on the left and right sides. Refer to 3 in Figure 5-8.

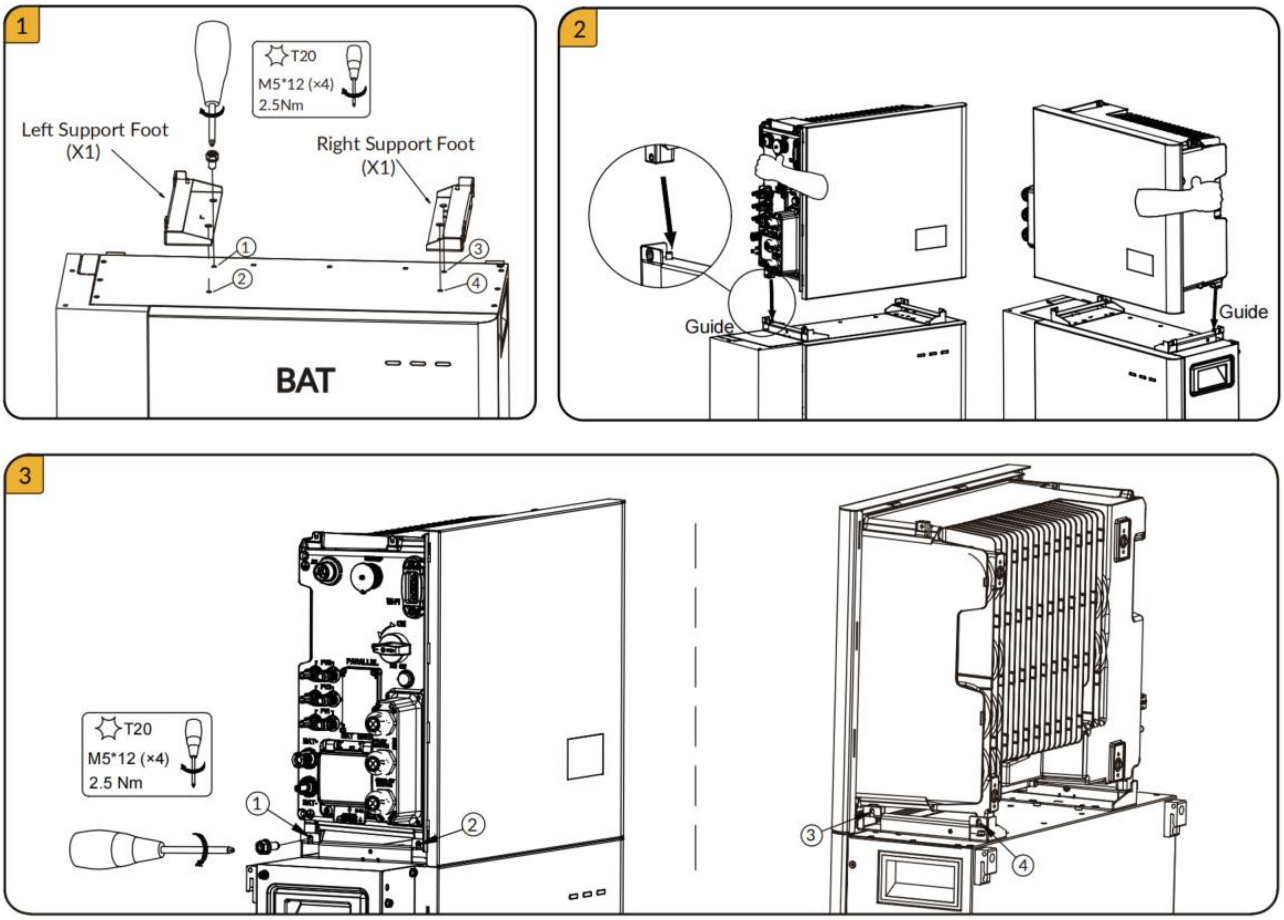



Figure 5-8 Inverter installation diagram

### 5.5.3. Battery Installation for Battery-Ready Application（optional）

Battery Ready scenario is that end users initially only installed ESS inverter as PV inverter but did not install batteries, later the users decide to install the batteries.

If you want to mount batteries below the existing inverter, please follow the mounting steps of charter 4 of Quick Installation Guide of Wall Mounting of SMILE G3-S Series Inverter.

At this section we will introduce how to mount the first series battery, please follow these steps.

1. Take out the wall bracket from battery packaging and two connectors for wall brackets from inverter wall bracket packaging, assemble them with M5 nuts (tool: Socket wrench SW8, torque: 2.5 Nm).Refer to 1 in Figure 5-9.
2. Align the upper holes of the two connectors for battery wall bracket to the lower rivets of the wall bracket of the hybrid inverter, mark the drilling position of the newly wall bracket of the series battery. Refer to 2-3 in Figure 5-9.
3. Remove the newly assembled battery wall bracket, drill the marked hole with drill Φ10. Insert screw anchors into the drilling holes, tighten the screws with the SW8 socket wrench to secure the wall bracket to the wall. Refer to 3-4 in Figure 5-9.

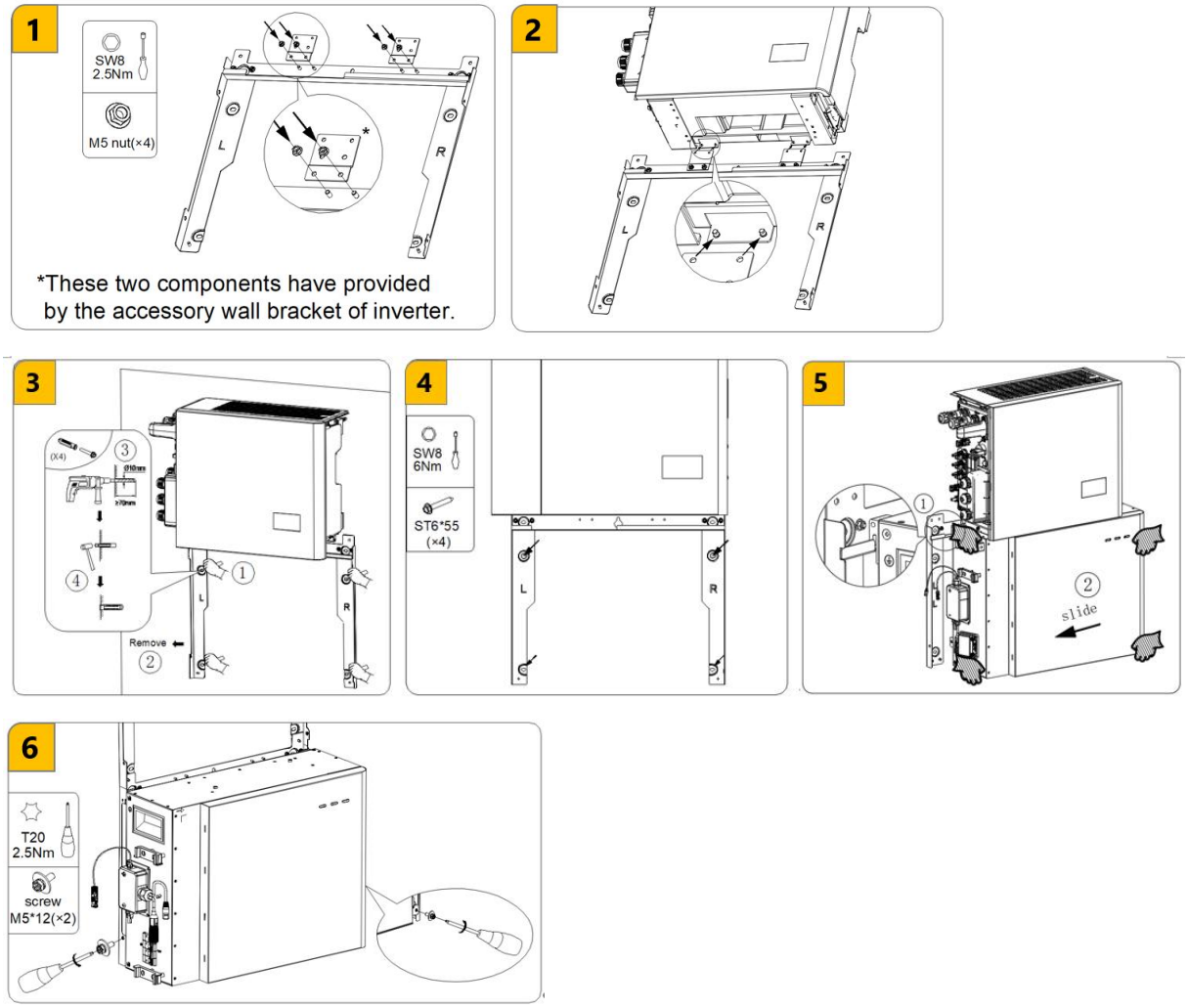



Figure 5-9 the first series battery installation

### 5.5.4. Mounting the Wi-Fi Dongle

Mount the Wi-Fi dongle at the left of the inverter, detailed steps as follows:

1. Remove the protective cover of Wi-Fi port at the left of the inverter.
2. Tighten the Wi-Fi Dongle onto the inverter with two M4*12 screws provided (Tool: T20 screwdriver, torque: 1.6 Nm). DO NOT OVERTIGHTEN – do not damage the plastic housing of the Wi-Fi Dongle.Refer to Figure 5-10.

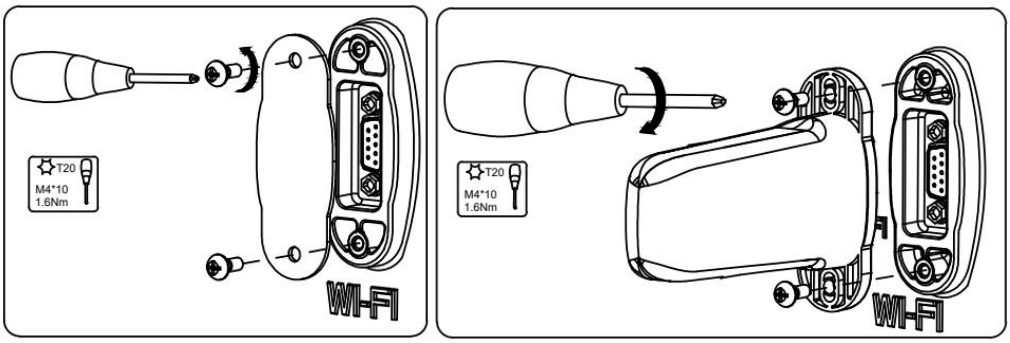



Figure 5-10 Installation diagram of Wi-Fi Dongle

# 6. Electrical Connection

**Precautions**

DANGER

Electric Shock Hazard - Before connecting cables, switch OFF all breakers and switches connected to the inverter and batteries.

CAUTION

- Damage to the energy storage system caused by incorrect cable connections is not covered under warranty.
- Only certified electricians accredited by AlphaESS are allowed to connect cables.
- Appropriate PPE must be worn when installing or connecting the Product.

NOTICE

The cable colors shown in the electrical connection diagrams provided in this chapter are for reference only.

Select cables in accordance with local cable specifications (green-and-yellow cables are only used for PE).

## 6.1. Cable Requirements for Connection

| No. | Cable | Type | Conductor Cross Section Area Range | Outer Diameter | Source |
|---|---|---|---|---|---|
| 1 | PV power cable | Standard PV cable (recommended type: H1Z2Z2-K) | 4~6 $mm^2$ | 5.5~9 mm | Prepared by the installer |
| 2* | Signal cable | Standard network cable (recommended type: Cat5e, SFTP, UV-resistant for outdoor use) | 0.12~0.2 $mm^2$ (AWG26~AWG24) | 4~6 mm | Prepared by the installer |
| 3** | Signal cable | Two-core outdoor shielded twisted pair copper cable | 0.5~1.5 $mm^2$ | 4~6mm | Prepared by the installer |
| 4*** | Signal cable | Outdoor shielded twisted pair copper | 0.5~1.3 $mm^2$ | 4~6 mm | Prepared by the installer |

| | | | | | |
|---|---|---|---|---|---|
| | | cable | | | |
| 5 | AC power cable for backup | Three-core (L, N and PE) outdoor copper cable | 4~6 $mm^2$<br>6~10 $mm^2$ **** | 10~14 mm<br>12~18 mm**** | Prepared by the installer |
| 6 | AC power cable for grid | Three-core (L, N and PE)<br>outdoor copper cable | 4~10 $mm^2$ | 12~18mm | Prepared by the installer |
| 7 | PE cable | Single-core outdoor copper cable | 2.5~10 $mm^2$ | N/A | Prepared by the installer |

*Signal cable for CAN/RS485, LAN, Meter (with CT), DRM.

**Signal cable for three-phase meter (without CT).

***Signal cable for AUX.

**** Only suitable for SMILE-G3-S6-INV.

## 6.2. Grounding Connection

**CAUTION**

**Electric Shock Hazard**

Before doing electrical connection, please ensure the PV switch & all AC and BAT circuit breakers in the energy storage system are switched OFF and cannot be accidentally or unintentionally reactivated.

A grounding point is provided near the grid connector on the energy storage inverter.

Prepare M5 Eye/Ring terminals, strip the grounding cable insulation, insert the stripped conductor into the ring terminal lug and crimp with a crimping tool.

Connect the grounding terminal to the inverter using the T20 screwdriver with a torque of 2.5 Nm.

Grounding connection for the energy storage inverter.

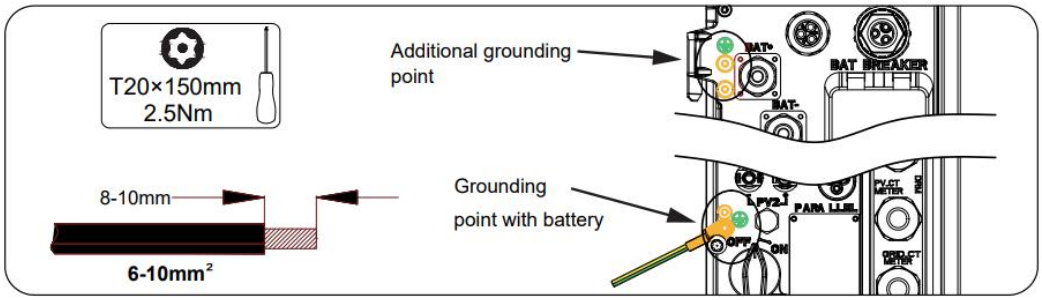


Figure 6-1 Grounding connection of the energy storage inverter

Grounding connection for the battery.

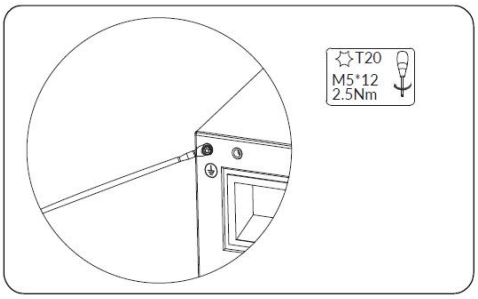



Figure 6-2 Grounding connection for the battery

## 6.3. AC Connection

### 6.3.1. Requirements for the AC Connection

AC cable requirements as follows:

1. Conductor type: copper conductor (tinned copper preferred).
2. Current carrying capacity depends on the Model selected and should be such that.

The AC cable can carry the full current of the AC supply and the Backup output:

Example for 5 kW inverter model (SMILE-G3-S5/B5-INV).

.AC Supply Max. current =43.5 A.

Backup Output Max. current:35A.

**Note**: Account for temperature derating and voltage drop/rise when selecting wire diameters. 110 °C or higher rated cable derates slower as temperatures increase.

| Description | External diameter | Conductor cross-section | Insulation stripping length | Sheath stripping length |
|---|---|---|---|---|
| Grid connector | 12~18 mm | 6~10 $mm^2$ | 16 mm | 45 mm |
| Backup connector | 10~14 mm | 4~6 $mm^2$ | 10 mm | 33 mm |

**DANGER**

You must protect each inverter with an individual grid/backup circuit breaker in order to ensure that the inverter can be disconnected safely.

CAUTION

**Residual-current monitoring unit**

The inverter is equipped with an all-pole sensitive residual-current monitoring unit in accordance with IEC/EN 62109-2 and VDE 0126-1-1. The all-pole sensitive residual-current monitoring unit monitors AC and DC residual currents.

It disconnects the inverter redundantly from the utility grid in the event of residual current jumps of > 30 mA. If the residual current monitoring unit malfunctions, the inverter is immediately disconnected from the utility grid at all poles. If the protection by automatic disconnection of supply according to DIN VDE 0100-410 is fulfilled by an appropriate overcurrent protective device, the inverter does not require an external residual-current device for safe operation. If local regulations require the use of a residual-current device, the following must be observed:

- The inverter is compatible with type A and B residual-current devices. The rated residual current of the residual-current device must be 30 mA or higher. Each inverter in the system must be connected to the utility grid via a separate residual-current device.
- When using residual-current device with a lower rated residual current, there is a risk of false tripping of the residual-current device, depending on the system design.

### 6.3.2. Select Suitable AC Circuit Breaker

The general requirements for the selection of circuit breakers are determined by standards and country-specific provisions. The following factors should be considered when selecting a suitable circuit breaker:

1. Factors influencing the current-carrying capacity of the cable: type of cable used, ambient temperature around the cable, type of cable routing, bundling of cables.
2. Other influencing factors: loop impedance, mutual heating of circuit breakers, ambient temperature at the circuit breaker, selectivity, type of connected device.
3. If these factors are ignored, it will increase the risk of the circuit breaker tripping under normal operating conditions.
4. Selecting Circuit Breakers for the AC supply and Backup output is dependent on the maximum current of the backup circuit and the inverter (if it is force-charged), the model of MCBs used and their derated current rating considering their maximum temperatures. Supplier Datasheets detail temperature derating for their MCBs. Ensure the MCBs used are appropriate for the current and the operating temperature. Otherwise, the risk of the circuit breaker tripping will increase under normal operating conditions.

AC connection recommendation for SMILE-G3-S3.6-INV

| Description | Max. Current | Breaker Type | Recommend cable cross section |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Grid Side | 32 A | 40 A | 6~10 mm² |
| Backup Side | 23.5 A | 40 A | 4~6 mm² |

AC connection recommendation for SMILE-G3-S5/B5-INV.

| Description | Max. Current | Breaker Type | Recommend cable cross section |
|---|---|---|---|
| Grid Side | 43.5 A | 50 A | 10 mm² |
| Backup Side | 35 A | 50 A | 6 mm² |

AC connection recommendation for SMILE-G3-S6-INV

| Description | Max. Current | Breaker Type | Recommend cable cross section |
|---|---|---|---|
| Grid Side | 50 A | 63 A | 10 mm² |
| Backup Side | 50 A | 63 A | 10 mm² |

### 6.3.3. Grid and Backup Connection

**WARNING**

**Use AlphaESS App or AlphaCloud to select the current rating of the circuit breaker used to protect the AC cable connecting to the inverter**

The BESS is programmed to limit the battery charge rate (from the grid) depending on the backup circuit current and the size of the MCB used. This avoids the risk of the backup circuit combining with a force-charge or VPP charge and pulling too much current through the grid-supply AC cable/MCB.

Note that an Automatic Transfer Switch can be used to bypass the battery AC cable and backup connection if preferred. In this case, the current on the Backup Output plug will be 0A until there is a power outage. This means that the MCB on the AC supply to the battery only needs to be sized for the maximum current rating of the inverter (i. e. 21.7 A for a 5kW inverter).

The combined current of the Battery Grid-charge and the backup circuit will be limited to the current rating of the MCB less 2 A (to account for the temperature derating of a typical MCB). Installers must advise AlphaESS if the MCB used has a steeper derating factor where the 2A buffer would not be sufficient.

Example: If a 32A MCB is used and the backup circuit is drawing 15 A, any force charging of the battery will be limited to (32 A-2 A) – 15 A = 15 A. If the load on the backup circuits drops to 11 A, the maximum grid-charge current would increase to 19 A.

Where the wire diameter used for the AC connection to or from the battery inverter exceeds the maximum wire diameter for the grid connector plug below (e. g. if a long cable

run is required and Voltage Rise Calculations require a wire of greater than 10 $mm^2$), use an intermediary connection point close to the battery to downsize the wire. Ensure that the short-run wire type is appropriate for the current and temperature (e. g. 180 °C Silicone flex will carry much greater current than vs 90 °C PVC) and use an intermediate MCB at the intermediary connection point if required.

The steps for connecting the grid connector as follows:

1. Dismantle the AC cable by 45 mm. Refer to 1 in Figure 6-3.
2. Shorten L and N by 5mm each, so that the grounding conductor is 5 mm longer. This ensures that the grounding conductor is the last to be pulled from the screw terminal in the event of tensile strain.Refer to 1 in Figure 6-3.
3. Strip the insulation of L, N and the grounding conductor 16 mm.Refer to 1 in Figure 6-3.
4. If using fine stranded wire, fit L, N and PE with bootlace ferrules.
5. Unscrew the swivel nut from the threaded sleeve and pass the swivel nut and threaded sleeve over the AC cable.Refer to 2 in Figure 6-3.
6. Insert the three conductors into the screw terminals on the bush insert and tighten the screws using the torque 2.0 Nm with provided tool. Ensure that all conductors are securely in place in the screw terminals on the bush insert.Refer to 3 in Figure 6-3.
7. Insert the threaded sleeve into the bush insert and hear the "click" sound. Screw the swivel nut onto the threaded sleeve.Refer to 3 in Figure 6-3.
8. Insert the grid connector plug into the socket for the grid connection, making sure to align the key on the grid connection socket to the keyway on the bush insert of the grid plug connector.Refer to 4 in Figure 6-3.

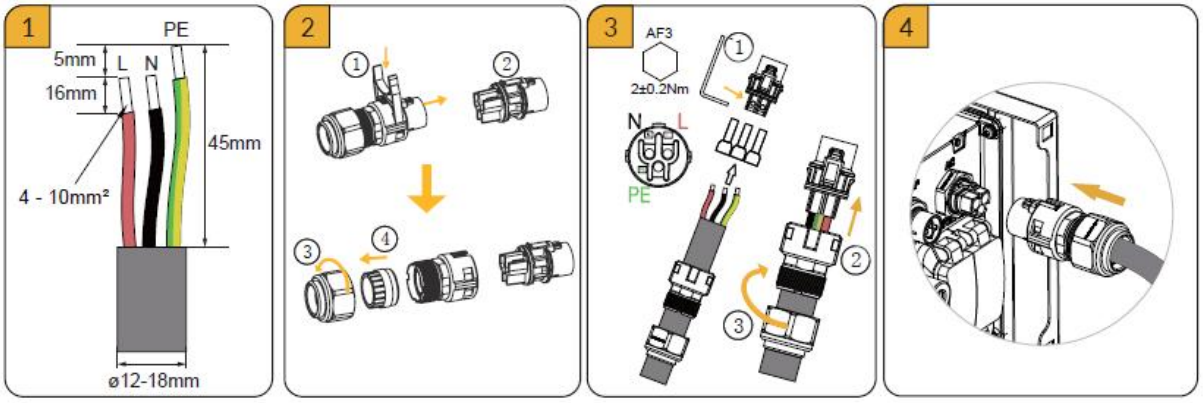



Figure 6-3 Grid connection steps diagram

The above wiring steps are also suitable for backup connection of SMILE-G3-S6-INV.
There is color difference between the grid connector and backup connector.
Bush insert of backup connector of the SMILE-G3-S6-INV is blue.
Bush insert of AC connector of the SMILE-G3-S6-INV is black.

The steps for connecting the backup connector as follows:

1. Dismantle the AC cable by 33 mm. Refer to 1 in Figure 6-4.
2. Shorten L and N by 3 mm each, so that the grounding conductor is 3mm longer. This ensures that the grounding conductor is the last to be pulled from the screw terminal in the event of tensile strain. Refer to 1 in Figure 6-4.
3. Strip the insulation of L, N and the grounding conductor 10 mm. Refer to 1 in Figure 6-4.
4. If using fine stranded wire, fit L, N and PE with bootlace ferrules.
5. Unscrew the swivel nut from the threaded sleeve and pass the swivel nut and threaded sleeve over the AC cable.Refer to 2 in Figure 6-4.
6. Insert the three conductors into the screw terminals on the bush insert and tighten the screws using the torque 1.2 Nm with provided tool. Ensure that all conductors are securely in place in the screw terminals on the bush insert.Refer to 2 in Figure 6-4.
7. Insert the threaded sleeve into the bush insert and hear the "click" sound. Screw the swivel nut onto the threaded sleeve.Refer to 3 in Figure 6-4.
8. Unplug the backup connector cover. Refer to 4 in Figure 6-4.

Use a flat-blade screwdriver (blade width: 2.5 mm) to push the orange latch forwards to unlock the connector coupling structure, rotate the backup connector cover anticlockwise, then pull the backup connector cover apart from the backup connection socket.

9. Insert the backup connector plug into the socket for the backup connection and screw tight. When doing so, making sure to align the key on the backup socket with the keyway on the backup connector bush insert. Refer to 4 in Figure 6-4.

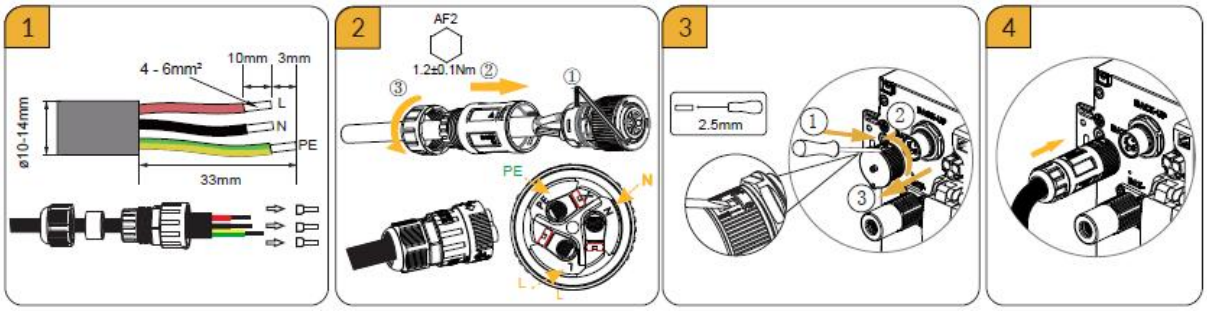



Figure 6-4 Backup connector installation

**Note:** the above wiring steps are only suitable for backup connection of SMILE-G3-S5/S3.6/B5-INV.

### 6.3.4. Disassembling Grid and Backup Connectors

Disassemble the grid connector (e. g. due to faulty assembly), proceed as follows:

1. Unplug the grid plug connector. To do this, insert a flat-blade screwdriver (blade width: 2.5 mm) into the coupling mechanism of the grid connector and carefully pull the grid plug connector apart from the grid connection socket. Do not pull on the cable.
2. Unlock the grid plug connector. To do this, unscrew the swivel nut from the threaded sleeve, then insert the H-shaped tool into the side catch mechanism and pry the catch

mechanism open. Carefully pull the bush insert apart.

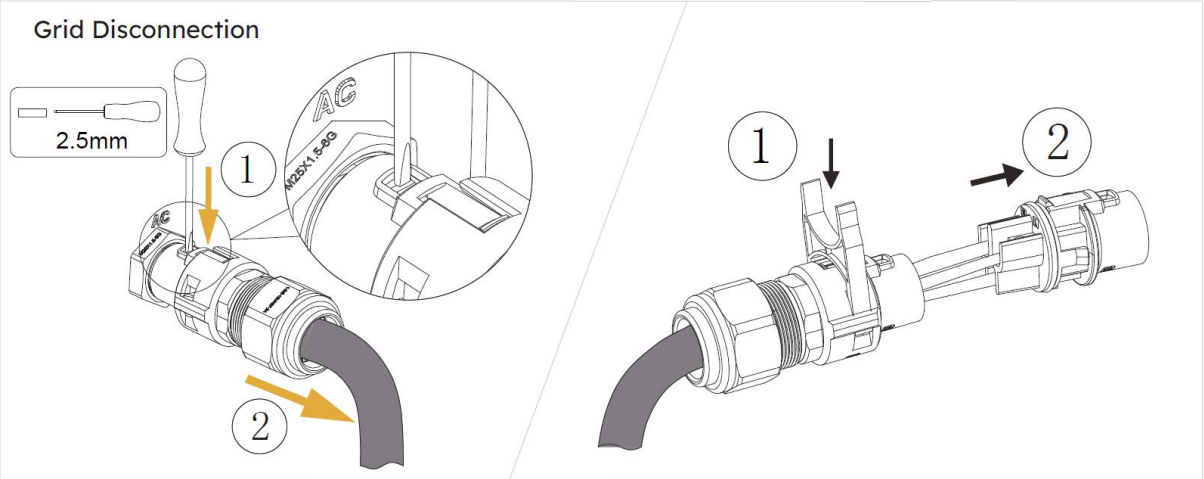



Figure 6-5 Disassembly of network connectors

Disassemble the backup connector (e. g. due to faulty assembly), proceed as follows.

1. Unplug the backup plug connector. Detailed steps: use a flat-blade screwdriver (blade width: 2.5 mm) to push the orange latch forwards to unlock the connector coupling structure, rotate the bush insert of the backup plug connector anticlockwise, then pull the backup plug connector apart from the backup connection socket. Do not pull on the cable. Refer to the left side of Figure 3-1.
2. Unlock the backup plug connector. To do this, unscrew the swivel nut from the threaded sleeve, then insert a flat-blade screwdriver (blade width: 2.5 mm) into the side catch mechanism and pry the catch mechanism open. Carefully pull the bush insert apart. Refer to the right side of Figure 3-1.

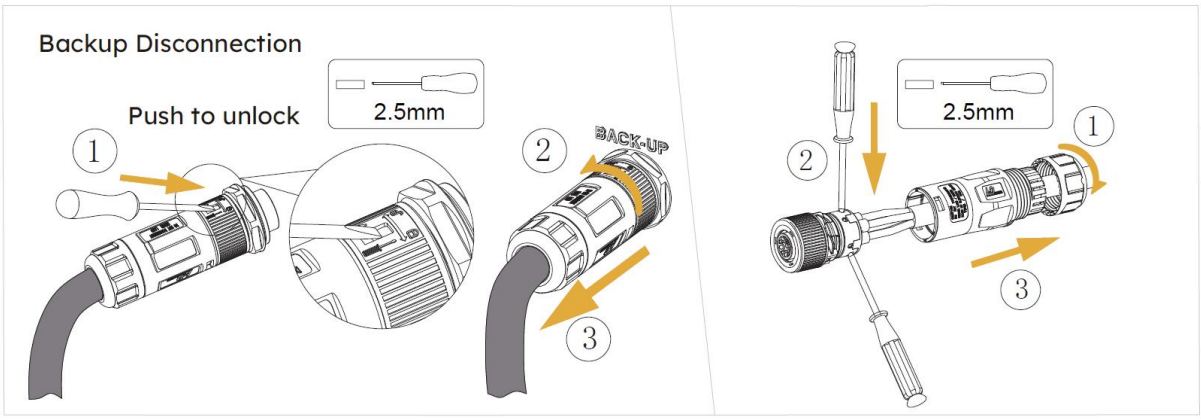



Figure 6-6 Disassembly of the Backup connector

### 6.3.5. CT Connection & Meter Connection & P1 Meter Reader Connection

| Item | Scenarios |
|---|---|
| CT | CT (cable length 10m) |
| DTSU666-3*230V 5(80)A | Three phase meter (without CT) |

| | |
|---|---|
| DTSU666-3*230V 100A/40mA | Three phase meter (with CT) |
| DTSU666-3*230V 250A/50mA | Three phase meter (with CT) |
| SMILE-SLMeter-CH1C60/100/250 (Single-Circuit) | Single phase wireless meter(1CT) |
| SMILE-SLMeter-CH2C60/100/250 (Dual-Circuit) | Single phase wireless meter(2CT) |

On the left-hand side of the inverter, loosen the strain relief of the cable glands on the COM connection cover, and unscrew the 4 screws on the corners to reveal the Grid CT/METER, PV CT/METER ports.

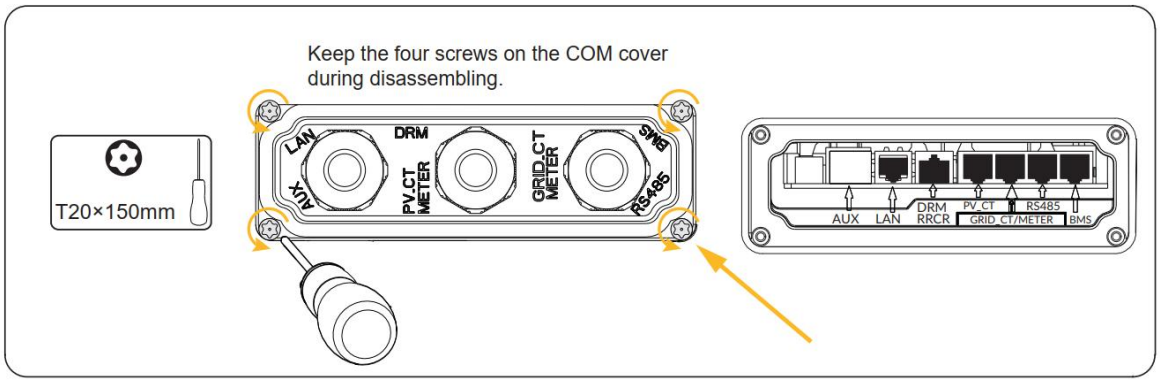



Figure 6-7 Electric meter connection

### 6.3.5.1 CT Connection

A Grid CT & relative cable is provided as an accessory purchased separately for the SMILE-G3 single phase inverter.

For hybrid or AC-coupled storage system installations, an additional PV CT & relative cable must be purchased separately in order to measure the AC-coupled PV output.

Please take out CT(s) from the package before installing. The CTs must be connected to the relative cables provided. The CT and the relative cables connect together via the connectors on each cable.

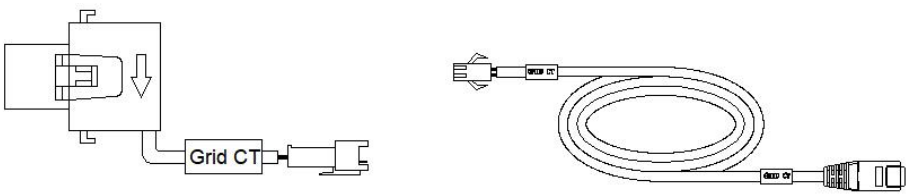



Figure 6-8 CT & relative cable

Step 1:

- Close the magnetic clamp of the Grid CT on the grid-supply cable. The ideal place for the Grid CT is between the Retail Meter and the Main Switch. If placed on either side of a Service Fuse, be very careful not to accidentally capture any Controlled Loads.

- The arrow on the casing of the Grid CT should point to the grid port of the energy storage inverter.
- In general, Controlled Loads should NOT be captured in the CT clamp.

Step 2:

- For hybrid or AC-coupled storage system application, close and latch the magnetic clamp of the PV CT on the AC output cable(s) of the installed PV inverter(s). The arrow on the magnetic buckle of the PV CT should point away from the PV inverter, again "toward the mains grid".
- If multiple PV inverters are installed, ensure the PV CT captures the combined output either by combining the PV inverter outputs into a single wire to clamp or by clamping multiple wires. If clamping multiple wires, ensure that the multiple wires are aligned such that the arrow on the CT does not point to any of the PV inverters. Failure to follow this instruction would result in one PV output being subtracted from the other in the CT clamp measurement calculations.

Step 3:

- Pass the CT cables through the cable gland of the COM connection cover but don't tighten the strain relief of the cable glands yet.
- Please follow the corresponding marking to insert the RJ45 plugs into the relevant RJ45 sockets.
- Only secure the cover in place after the CTs/Meter communication cable, the BMS cable, and the LAN cable (if used) have been clipped into their respective ports.
- When securing the cover over the communication ports, tighten the cover in place and then lightly push the communication cable into the cover as you tighten the strain relief gland onto the cables. This will ensure the communication cables are well-seated in the RJ45 ports.
- Connect the CT(s) and the relative cables together via the connectors on each cable, please follow the cable marking.

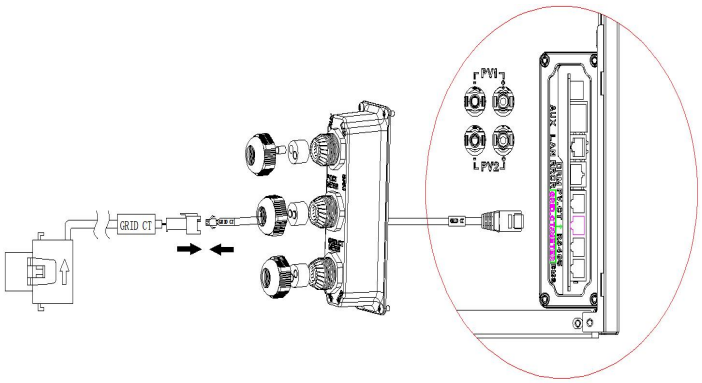
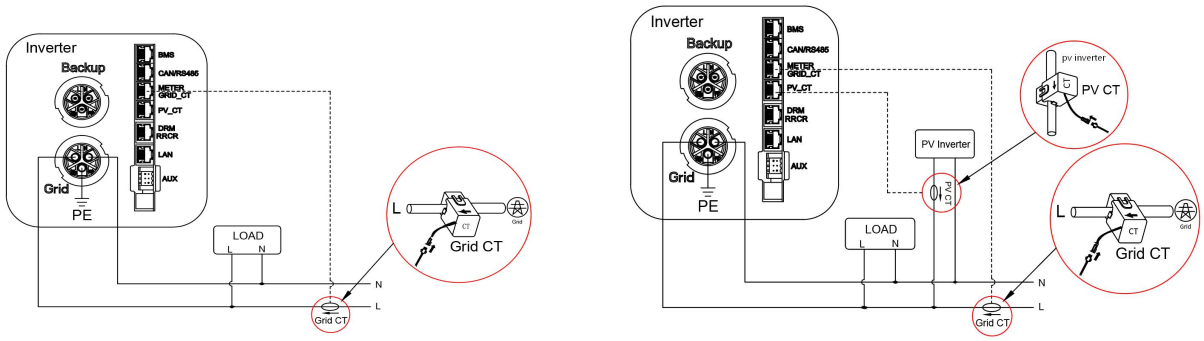



Figure 6-9 Grid CT installation

**CAUTION**

The CT cable marked Grid CT should be connected to the Grid CT, and the CT cable

marked PV CT should be connected to the PV CT.




DC-Coupled Storage System AC-coupled or Hybrid-coupled Storage System

Figure 6-10 Installation positions of CT in AC, DC and Hybrid systems

### 6.3.5.2 Meter Wiring

Pass the meter communication cable through the cable gland of the COM connection cover but don't tighten the strain relief nut of the cable gland.

Insert the RJ45 plug of the meter communication cable into the METER communication port labelled "METER" of the inverter.

The other steps for meter connection as follow:

1. DSTU666-3*230V 5(80)A: three-phase meter (without CT) connection.

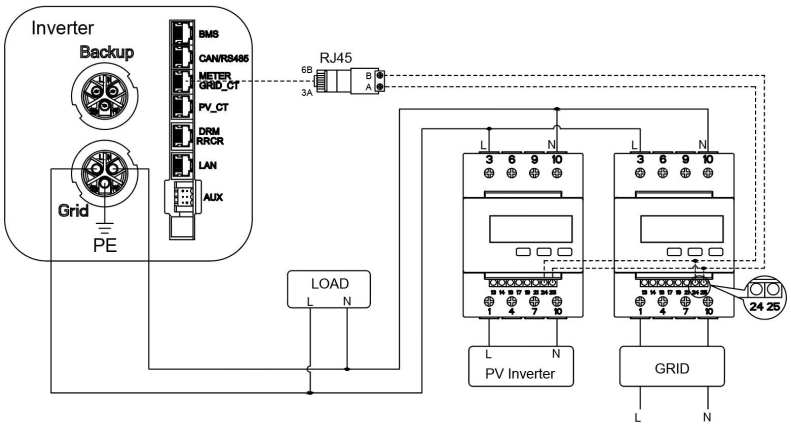



Figure 6-11 Single-phase household wiring diagram

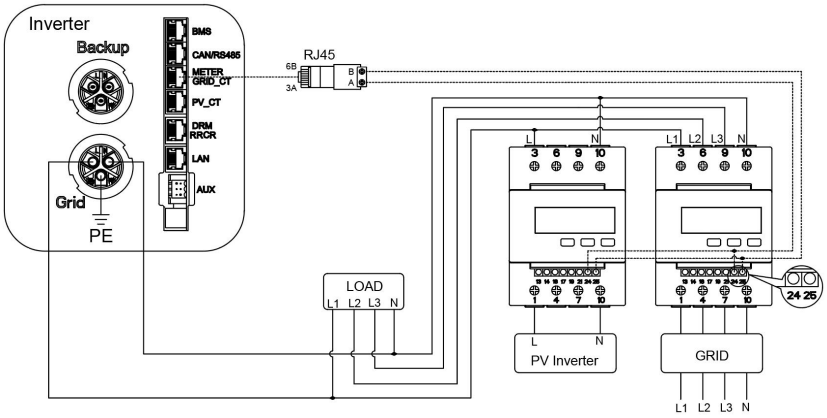



Figure 6-12 Three-phase household wiring diagram

Meter communication cable requirements: two-core outdoor shielded twisted pair copper cable (flexible), conductor cross-section 0.5~1.5mm$^2$, wires terminal should be fitted with bootlace ferrules.

2. DSTU666-3*230V 100A/40mA: three-phase meter (with CT) connection.

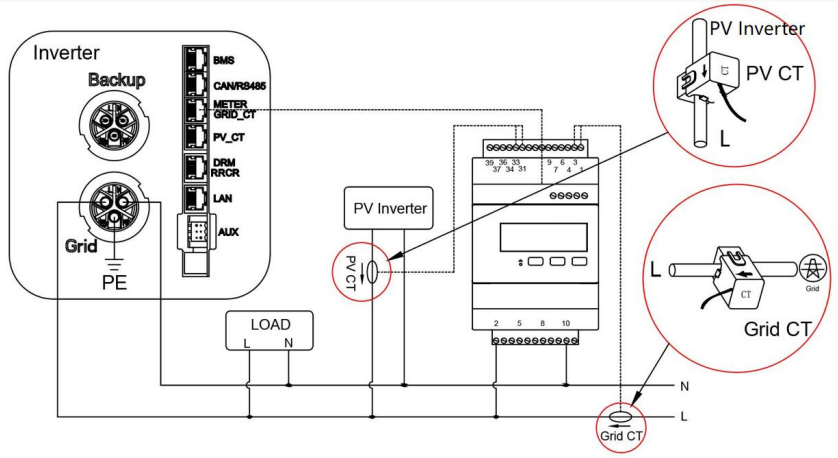



Figure 6-13 Single-phase household wiring diagram

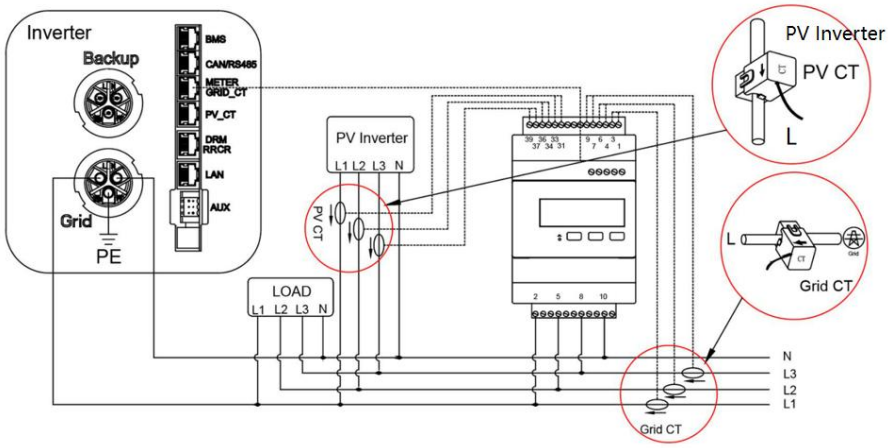



Figure 6-14 Three-phase household wiring diagram

Meter communication cable requirements: standard network cable (recommended type: Cat5e, SFTP, UV-resistant for outdoor use).

The connections are marked clearly on the meter.

Wiring location description of three-phase meter (with CT).

| Grid CT | PV CT | GRID |
|---|---|---|
| 1--------IA* (White) | 31--------IA* (White) | 2----------L1 |
| 3--------IA (Blue) | 33--------I*A (Blue) | 5----------L2 |
| 4--------IB* (White) | 34--------IB* (White) | 8----------L3 |
| 6--------IB (Blue) | 36--------IB (Blue) | 10-------- N |
| 7--------IC* (White) | 37--------IC* (White) | |
| 9--------IC (Blue) | 39--------IC (Blue) | |

| CT Group | Grid-> Load | | | | | | | | PV->Load | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CT Phase | IA* | IA | IB* | IB | IC* | IC | | | IA* | IA | IB* | IB | IC* | IC |
| Terminal | 1 | 3 | 4 | 6 | 7 | 9 | X | X | 31 | 33 | 34 | 36 | 37 | 39 |
| Colour | White | Blue | White | Blue | White | Blue | | | White | Blue | White | Blue | White | Blue |

3. SMILE-SLMeter-CH1C60/100/250 (Single-Circuit): Single phase wireless meter(1CT) connection.

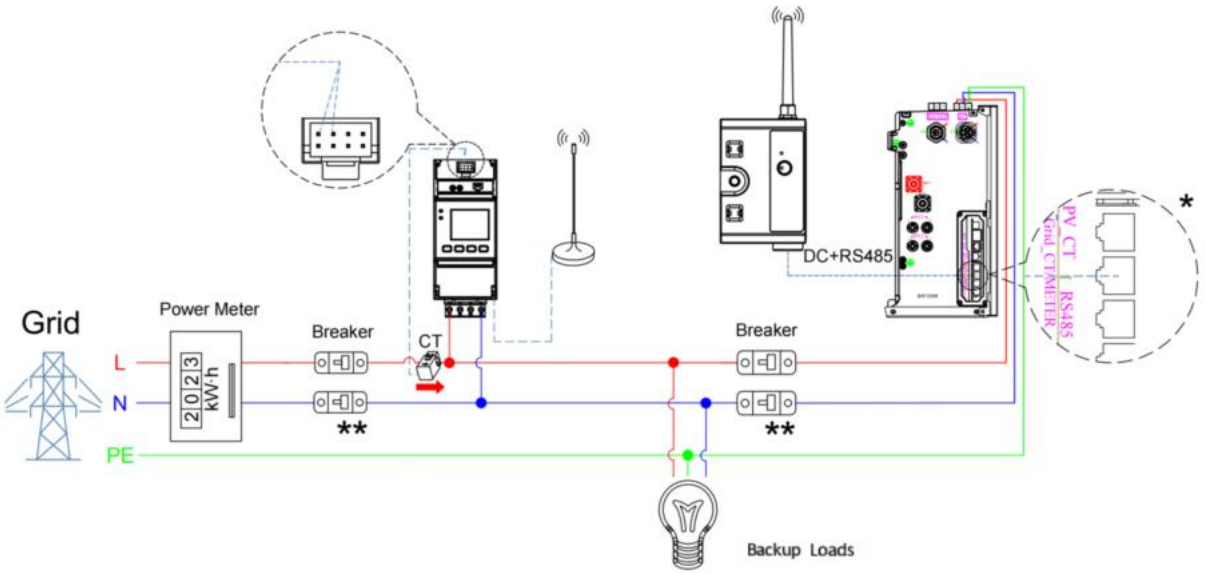



Figure 6-15 Single phase wireless meter(1CT) connection

* When used with the G3-S3.6/S5/B5/S6 series, the AP module is connected to the 'Grid_CT/METER' port.

** In Australia and New Zealand, the N wire does not need to be connected to a circuit breaker.

4. SMILE-SLMeter-CH1C60/100/250 (Daul-Circuit):Single phase wireless meter(1CT) connection.

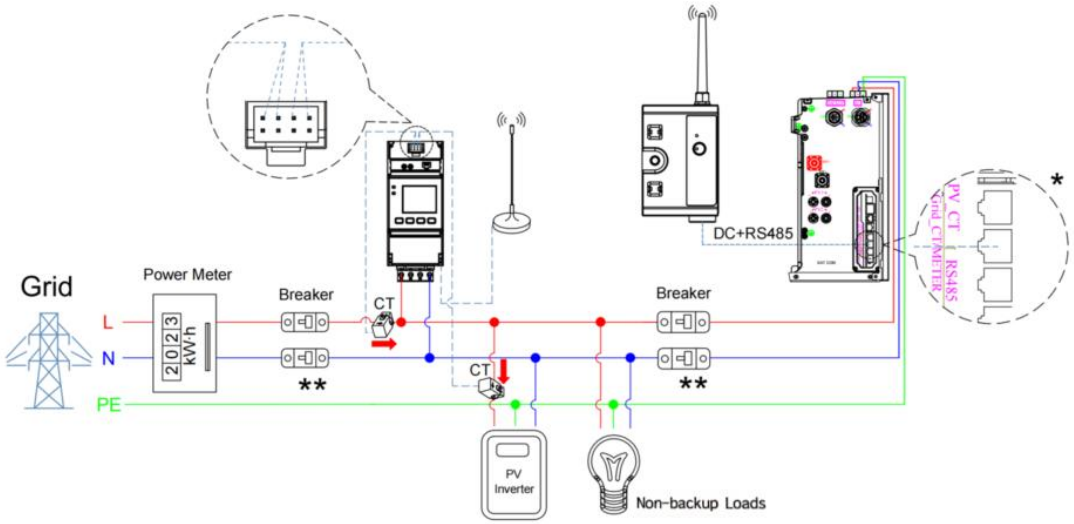



Figure 6-16 Single phase wireless meter(1CT) connection

* When used with the G3-S3.6/S5/B5/S6 series, the AP module is connected to the 'Grid_CT/METER' port.

** In Australia and New Zealand, the N wire does not need to be connected to a circuit breaker.

NOTICE

Be VERY careful when wiring or checking these connections because the connections appear reversed when the meter is secured in place on the Din Rail. Always physically check the label on the meter when wiring any CTs or grid reference wires.

#### 6.3.5.3 Meter Configuration

If connecting DTSU666 meter without CTs, two meters are required if there is any AC-coupled PV. One for the Grid Import/Export and one for the AC-coupled PV measurements.

| Model | Grid Meter Address | PV Meter Address |
|---|---|---|
| DTSU666-3*230V 5(80)A (without CT) | 1 | 2 |
| DTSU666-3*230V100A/40mA (with CT) | 1 | N/A |
| SMILE-SLMeter-CH1C60/100/250 (Single-Circuit) | 1 | 2 |
| SMILE-SLMeter-CH2C60/100/250 (Daul-Circuit) | 1 | N/A |

1. Meter setting for type DTSU666-3*230V 5(80)A, which is three-phase meter (without CT). When the meter is used as grid meter, the default address is 1. The installer doesn't need to make any other settings.

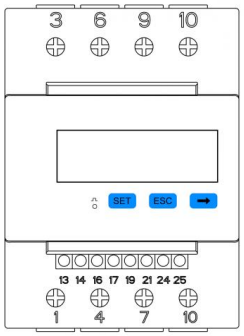



Figure 6-17 DTSU666-3*230V 5 (80) A type three-phase electricity meter (without CT) setting

If installer wants to have a check, please follow the steps bellow:

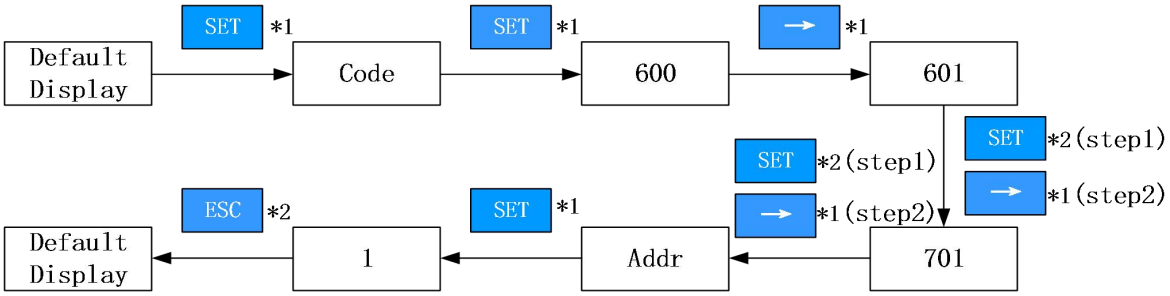



Figure 6-18 Installation program check

When the meter is used as PV meter, please follow the steps below to complete the address setting:

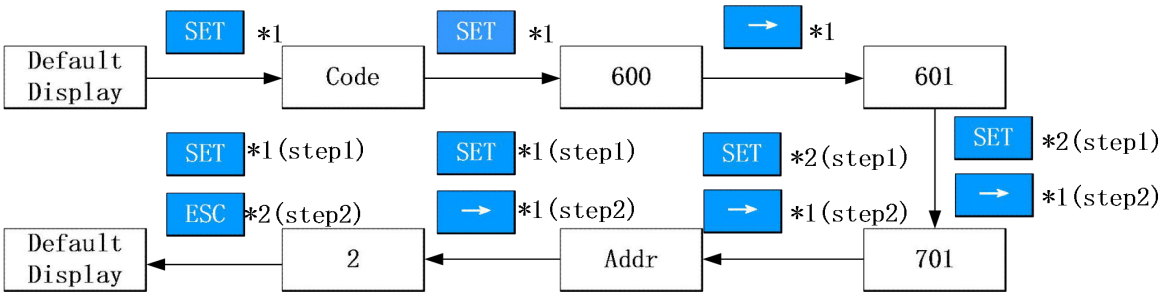



Figure 6-19 Address setting for photovoltaic electricity meters

2. Meter setting for type DTSU666-3*230V 100A/40mA, three-phase meter (with CT).

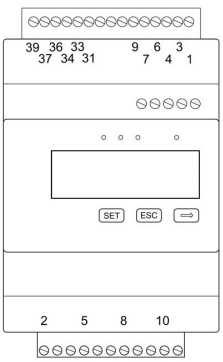



Figure 6-20 Range setting of DTSU666-3*230V 100A/40mA three-phase electricity meter (with CT)

The default address is 1. The installer doesn't need to make any other settings.

If installer wants to have a check, please follow the steps below:

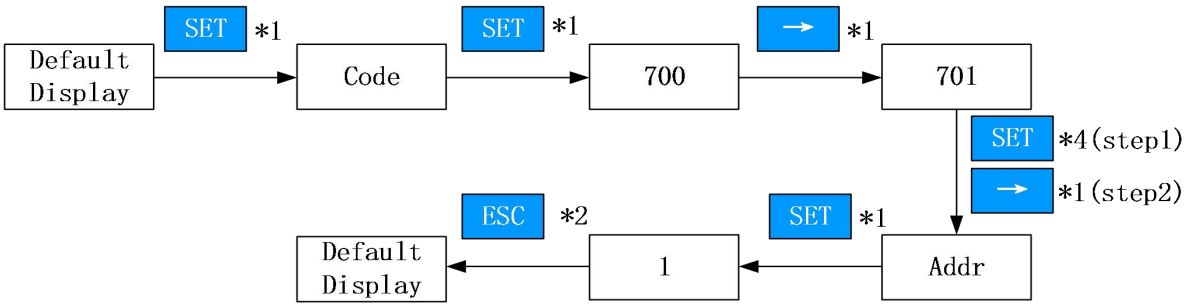



Figure 6-21 Installation program check

The display order of parameters:

The following images show the information read and displayed by the meter in real time.

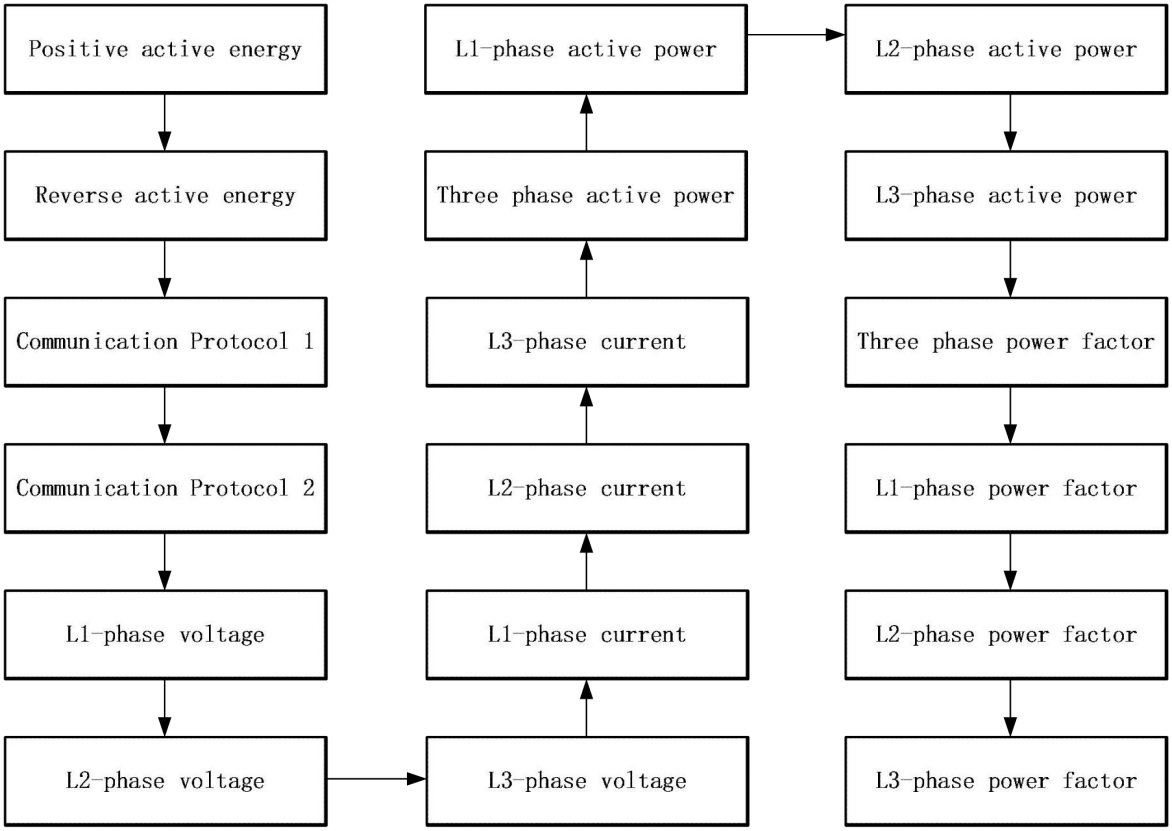



Figure 6-22 Parameter display sequence

3. 3.Meter setting for type SMILE-TLMeter-CH3C60/100/250 (Single-Circuit) is the same as DTSU666-3*230V 5(80)A.
4. 4.Meter setting for type SMILE-TLMeter-CH6C60/100/250 (Dual-Circuit) is the same as DTSU666-3*230V 100A/40mA.

#### 6.3.5.4 P1 Meter Reader Connection

The installation connection steps for the P1 reader are as follows. For other detailed information, please refer to the P1 Meter Reader Installation Manual.

1. Install the P1 Reader

Insert the electricity meter reader: As shown in the figure below, first confirm the direction of the interface of the electricity meter reader RJ12. Insert the electricity meter along the arrow direction.

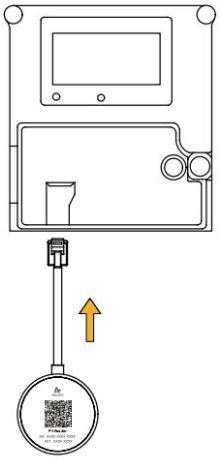


Figure 6-23 Insert the electricity meter reader

The installation effect is as follows:

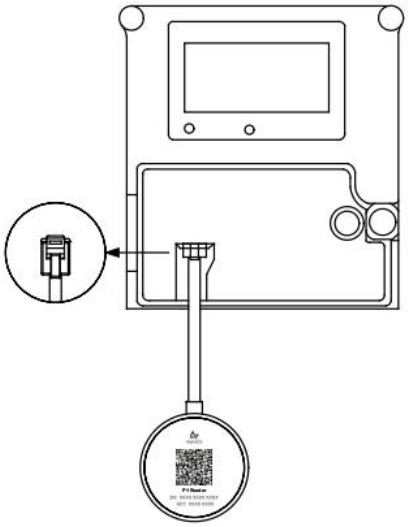


Figure 6-24 Installation completion diagram

2. Disassemble the P1 Reader

Gently press the tab on the back of the P1 Reader, then pull it out along the arrow direction. As shown in the figure below:

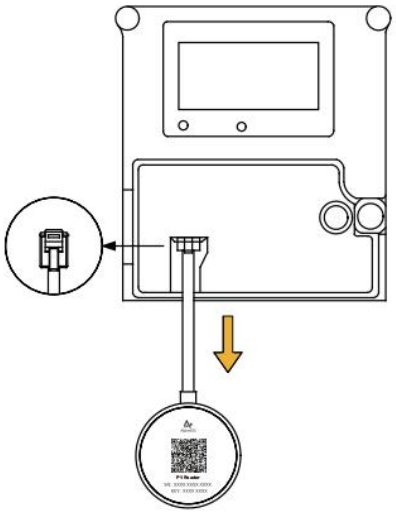


Figure 6-25 Disassemble the electricity meter reader

## 6.4. PV Connection(Not include SMILE-G3-B5-INV)

### 6.4.1. Connecting the PV Array

DANGER

**Danger to life due to electric shock if live components or DC cables are touched**

The DC cables connected to a PV module may be live. Touching live DC cables can result in serious injury or even death due to electric shock. To avoid this danger:

- Disconnect the inverter and battery from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Do not disconnect the DC connectors under load.
- Wear suitable personal protective equipment for all work on the product.
- Observe all safety information in this document.

NOTICE

**Risk of the inverter due to overvoltage**

If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, the inverter can be destroyed due to overvoltage.

- If the open-circuit voltage of the PV modules exceeds the maximum input voltage of the inverter, do not connect any strings to the inverter and check the design of the PV system.

NOTICE

**Risk of product damage due to ground fault on DC side during operation**

Due to the transformerless topology of the inverter, the occurrence of ground faults on DC side during operation can lead to irreparable damage. Damages to the inverter due to a faulty or damaged DC installation are not covered by warranty. The inverter is equipped with a protective device that checks whether a ground fault is present during the starting sequence. The inverter is not protected during operation.

- Ensure that the DC installation is carried out correctly and no ground fault occurs during operation.

NOTICE

**Risk of the inverter damage due to sand, dust and moisture ingress if the PV inputs are not closed**

The inverter is only properly sealed when all unused PV inputs are closed with sealing plugs. Sand, dust and moisture penetration can damage the inverter and impair its functionality.

- Seal all unused PV inputs using sealing plugs.

Please ensure the following before connecting PV strings to the inverter:

1. Make sure the open voltage of the PV strings will not exceed the max. DC input voltage (580Vdc). Violating this condition will void the warranty.
2. Make sure the polarity of the PV connectors is correct.
3. Make sure the PV-switch, breakers of battery, AC-BACKUP and AC-Grid are all isolated/in their "off" states.
4. Make sure the PV resistor to ground is higher than 200K Ohms.

The inverter uses the Vaconn D4 PV connectors. Please follow the picture below to assemble the PV connectors.

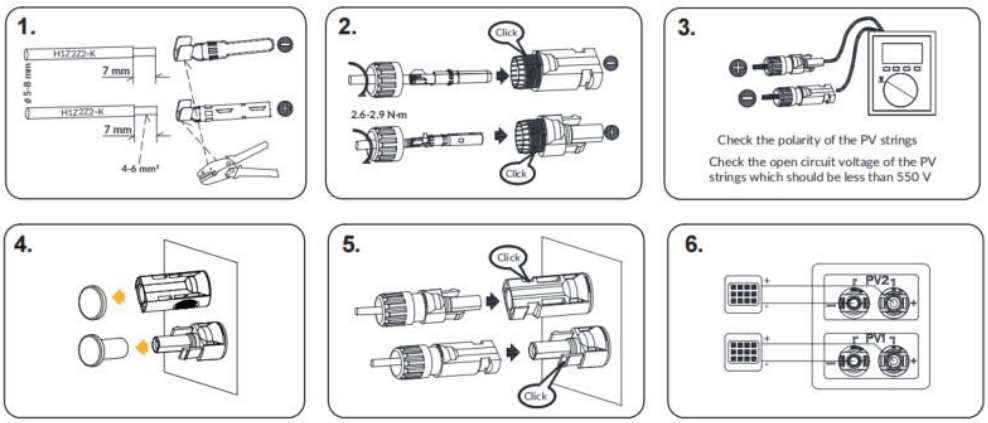



Figure 6-26 Assembly of photovoltaic connectors

### 6.4.2. Disassembling the PV Connector

DANGER

**Danger to life due to electric shock if live components or DC cables are touched**

The DC cables connected to a PV module may be live. Touching live DC cables can result in serious injury or even death due to electric shock. To avoid this danger:

- Disconnect the inverter and battery from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Do not disconnect the DC connectors under load.
- Wear suitable personal protective equipment for all work on the product.
- Observe all safety information in this document.

Ensure that the PV connector can only be removed via using the Connector removal wrench.

Removing the PV connector without the PV Connector Disassembling Toolisn't allowed and dangerous.

1. Release and remove the PV connectors. To do so, insert the removal wrench into the bayonet, press the wrench with an appropriate strength to release the locking mechanism, then pull the PV connectors out. Please do not pull on the cable.

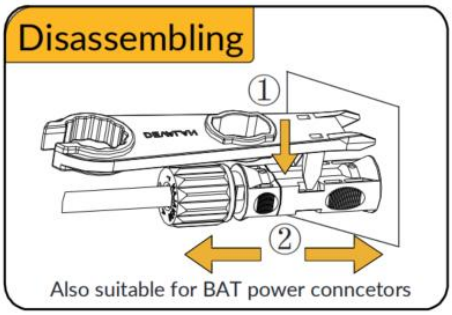



Figure 6-27 Disassembly of PV connectors

2. If there are PV connectors unused, please use the PV covers to seal the PV connectors.

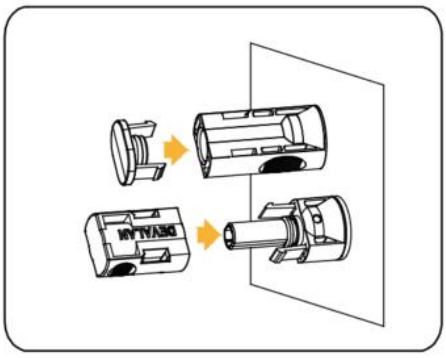


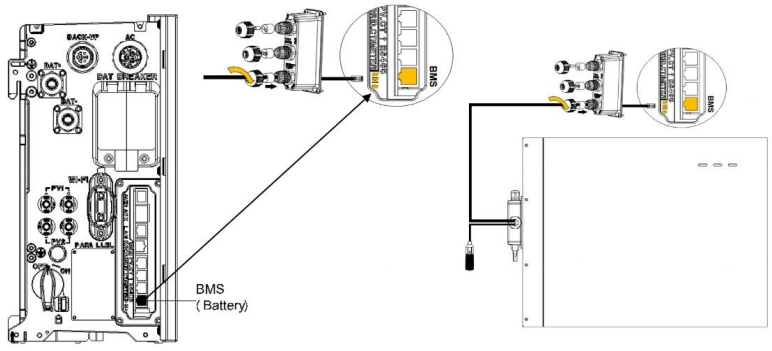
Figure 6-28 Seal the PV connectors

## 6.5. Electrical Connection between the ESS Inverter and Battery

### 6.5.1. Communication Connection between the INV and BAT

Communication cable connection between the inverter and battery proceed as follows.

1. Pass the battery communication cable of the upper battery through the cable gland of the COM connection cover of inverter. Do not tighten the strain relief nuts of the cable glands yet.
2. Insert the RJ45 plug to the BMS communication port on the inverter communication board labelled “BMS”.
3. Only secure the COM connection cover in place after the meter communication cable, the BMS cable and the LAN cable (if used) have been clipped into their respective ports.
4. When securing the COM connection cover over the communication ports, tighten the cover in place and then lightly push the communication cables into the cover as you tighten the strain relief nuts onto the cables. This will ensure the communication cables are well-seated in the RJ45 ports.




Inverter BMS port Battery Communication Connection

Figure 6-29 The electrical connection between the inverter and the battery

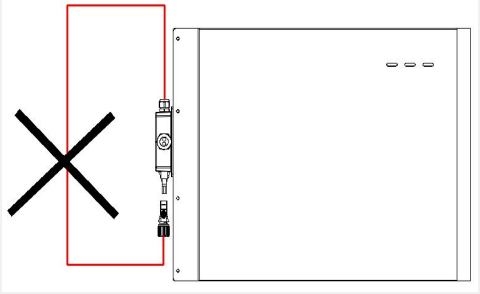
### 6.5.2. System Connection between INV and BAT

**DANGER**

**Danger to life due to burns caused by electric arcs through short-circuit currents**

Short-circuit currents in the battery can cause heat build-up and electric arcs. Heat build-up and electric arcs may result in lethal injuries due to burns.

- Disconnect the battery from all voltages sources prior to performing any work on the battery.
- The upper power connector of the lower battery must connect to the lower power connector of the upper battery, otherwise the short-circuiting of the battery will occur.



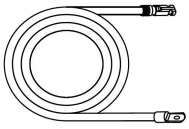
- Please connect both ends of one battery power cable completely before starting to connect the next power cable.
- Observe battery safety information provided in the manual.

You can install up to 4 series batteries (10.1P battery can install up to 6 units) in the SMILE-G3-S3.6/S5/B5/S6 energy storage system (SMILE-G3-S6-INV is not compatible with battery SMILE-G3-BAT-4.5S).

For the SMILE-G3-BAT-3.8S and SMILE-G3-BAT-4.5S batteries, a single row is recommended to install a maximum of 4 units. For the SMILE-G3-BAT-9.3S and SMILE-G3-BAT-10.1P batteries, a single row is recommended to install a maximum of 3 units.

Cables connection between the inverter and series batteries of single column as follows:

Please pay attention to the cable type, there are three kinds of cables.

| No. | Picture | Description |
|---|---|---|
| 1 |  | The main negative power cable, length 1.85 m, 10 $mm^2$, black<br>connect BAT main negative connector of series battery (the last series battery) and the BAT negative terminal of inverter. |
| 2 |  | The main positive power cable between inverter and the first series battery, length 0.18m, 10$mm^2$, red<br>connect BAT main positive connector of series battery (directly below the inverter) and the BAT positive terminal of inverter. |
| 3 |  | The grounding cable between inverter and the first series battery, 6$mm^2$, yellow-green<br>Connect the grounding point of series battery (directly below the inverter) and the grounding point of the inverter. |

Detailed electrical connection between the ESS inverter and single column of series batteries as follows:

1. Take out all cables from the inverter packaging.
2. Use the provided grounding cable to connect the grounding point of the first series battery (directly below the inverter) and the grounding point of the inverter.

3. Remove the protective caps from the battery power connectors of the inverter.
4. Complete the grounding, power and communication connection between the upper and lower series batteries.

(1) Connect the upper power connector of the lower series battery to the lower power connector of the upper series battery.

(2) Connect the upper communication cable of the lower series battery to the lower communication connector of the upper series battery. Disassemble the battery communication connector components, remove the termination resistor, unscrew the swivel nut and push the cable support sleeve out of the threaded sleeve.

(3) Thread the swivel nut and threaded sleeve over the battery communication cable. At the same time, thread the cable through the opening in the cable support sleeve. Insert the RJ45 plug of the lower battery into the BMS communication port of the upper battery and screw the threaded sleeve. Press the cable support sleeve into the threaded sleeve. Screw the swivel nut onto the threaded sleeve.

(4) Retain the termination resistor of last battery.

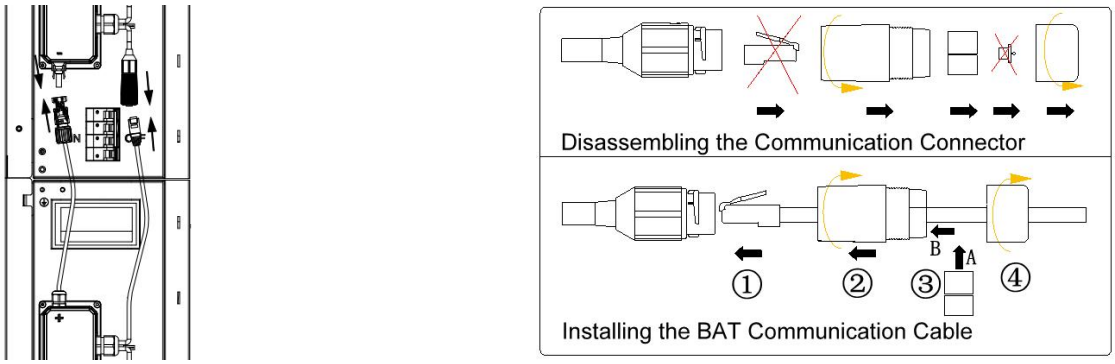



Figure 6-30 Installation of battery connection cables

5. Pick up the red power cable from the inverter packaging, connect BAT main positive connector of series batteries (directly below the inverter) to the BAT positive terminal of inverter. Please follow the installing steps for BAT positive connection of inverter. Press the buckle with a flat-head screwdriver (blade width: 2.5 mm) when unscrewing the threaded sleeve of the battery power connector of the inverter.

(1) Take out the sealing ring from the terminal.

(2) Unscrew the screw on the terminal used to connect the battery power cable.

(3) Pass the BAT main positive cable through the threaded sleeve and the sealing

(4) ring, enter the terminal.

(5) Tighten the screw to secure the battery power cable on the terminal (tool: T20

(6) screwdriver, torque: 4 Nm).

(7) Push the sealing ring to the terminal.

(8) Tighten the threaded sleeve to the terminal by hand.

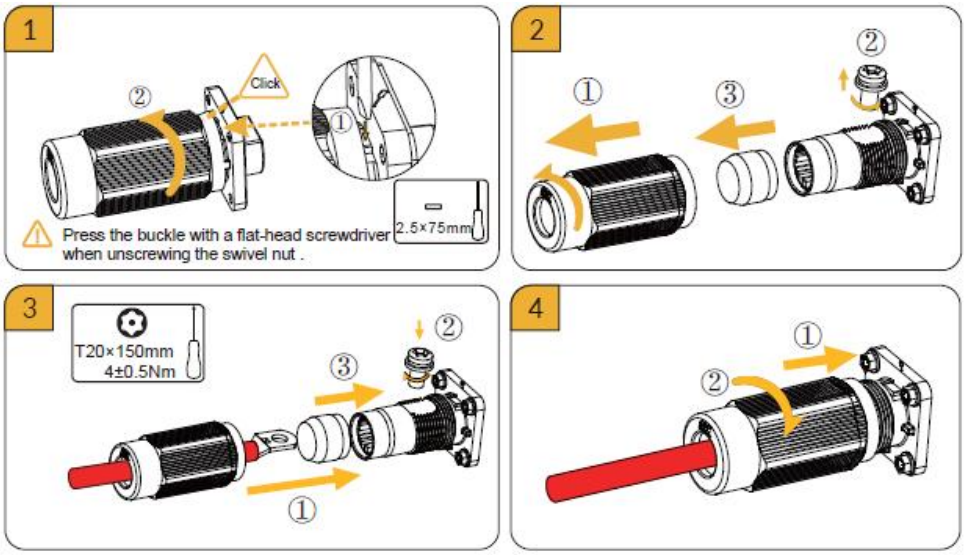



Figure 6-31 Installation of terminal blocks

6. Connect the connector of the BAT main positive cable to the upper power connector of the upper series battery (directly below the inverter).
7. Take out the black power cable from the inverter packaging, connect BAT main negative connector of series batteries (the last series battery) to the BAT negative terminal of inverter.

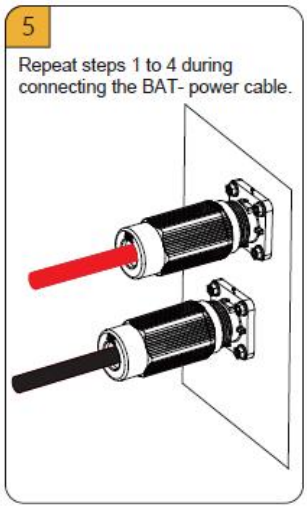



Figure 6-32 Installation of terminal blocks

8. Battery side wiring diagram as follows （The battery side connection in the following figure is illustrated with a 3.8S battery example.）：

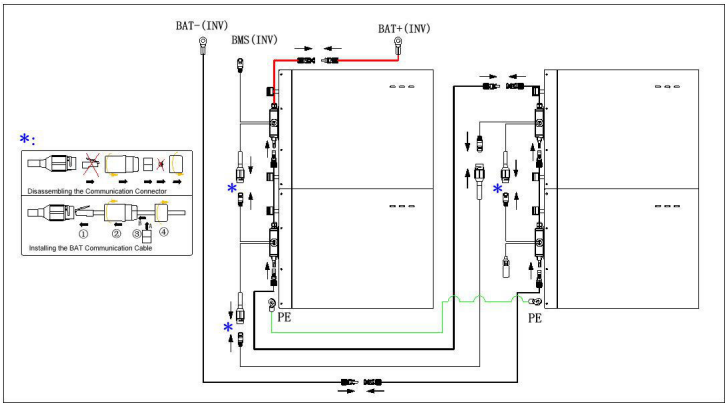



Figure 6-33 Separate series batteries side wiring diagrams

### 6.5.3. Disassembling BAT Connectors

DANGER

**Danger to life due to electric shock when touching exposed DC conductors or BAT plug contacts if the BAT connectors are damaged or loose**

The BAT connectors can break or become damaged, become free of the DC cables, or no longer be connected correctly if the BAT connectors are released and disconnected incorrectly. This can result in the DC conductors or BAT plug contacts being exposed. Touching live DC conductors or BAT plug connectors will result in serious injury or even death due to electric shock.

- Do not disconnect the BAT connectors under load.
- Before removing the BAT connectors, ensure that the BAT circuit breakers of the batteries and inverter are OFF.
- Wear insulated gloves and use insulated tools when working on the BAT connectors.
- Ensure that the BAT connectors are in perfect condition and that none of the DC conductors or BAT plug contacts are exposed.
- Carefully release and remove the BAT connectors as described in the following.

Ensure that the BAT connector can only be removed via using the removal wrench.

Removing the BAT connector without the PV Connector Disassembling Toolisn't allowed and dangerous.

To disassemble the BAT connectors (e. g. due to faulty installation), proceed as follows.

Release and remove the BAT connectors. To do so, insert the PV Connector Disassembling Toolinto the bayonet, press the wrench with an appropriate strength to release the locking mechanism, then pull the BAT connectors out. Please do not pull on the cable.

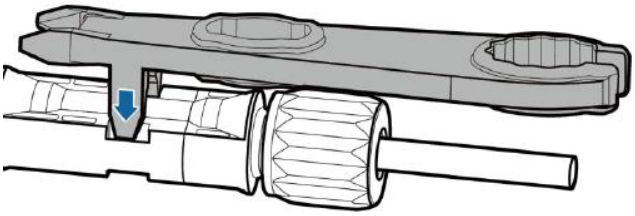


Figure 6-34 Disassemble the BAT connectors

## 6.6. Communication Connection with Inverter

For other communication (AUX, LAN, RRCR, DRM, Meter, RS485) connection, please follow the steps below.

1. Unscrew the 4 screws on the COM connection cover of the inverter, then loosen the strain relief nuts of the cable glands on the COM connection cover.

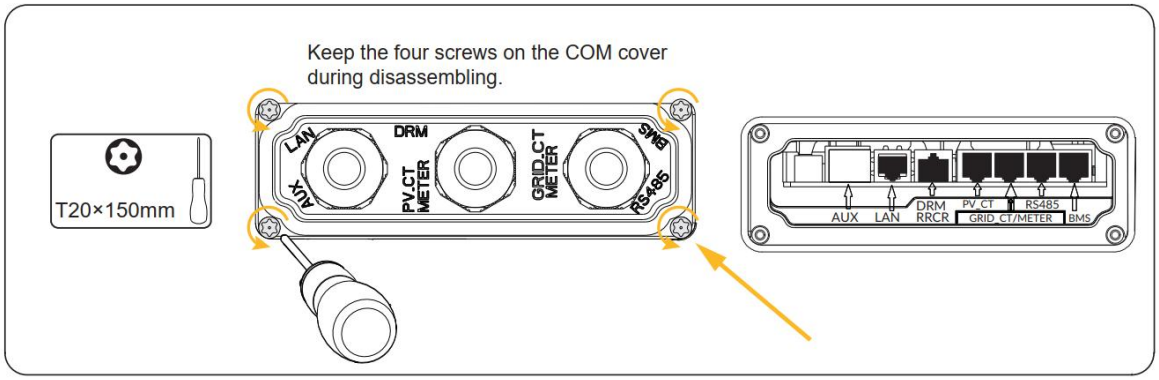



Figure 6-35 COM connection cover

2. Pass the communication cables through the cable glands of the COM connection cover. Do not tighten the strain relief nuts of the cable glands yet.

Insert the RJ45 plugs to the relative RJ45 sockets.

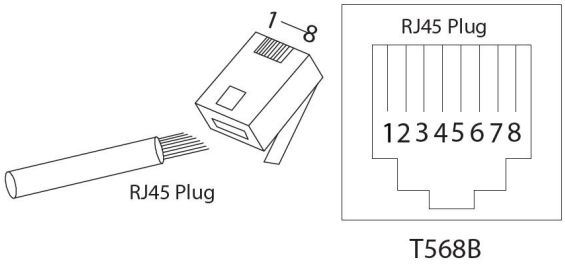



Figure 6-36 RJ45 plug connection

(1) For meter wiring, refer to Section 6.3.4 Meter Connection.

(2) 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 SMILE-G3 inverter.

(3) Take out 1 piece of 6 pin terminal block for AUX connection.

For AUX position definition, please refer to the AUX wiring documentation.

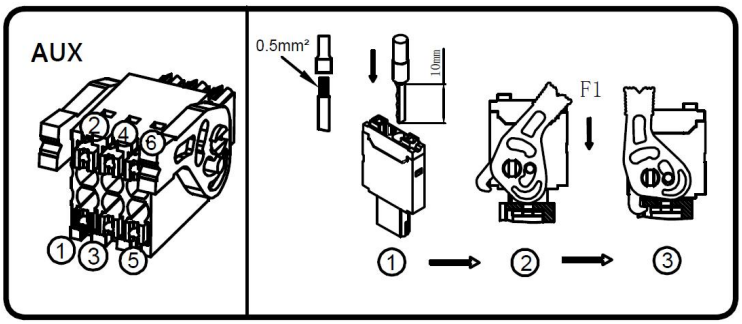



Figure 6-37 A 6-pin terminal block with AUX connection

In emergency situations, such as fire, the end user can manually press the EPO (Emergency Power Off) button to shut down the inverter and switch off the battery (except for the PV array). End users or installer should prepare the external EPO.

UX cable requirements: outdoor shielded copper cable (flexible), recommended conductor cross-section 0.5mm$^2$. Conductor ends should be fitted with bootlace ferrules.

To disconnect the AUX connection, rotate the handles on both sides clockwise, unplug the AUX connector, insert a screwdriver (blade width: 1.2 mm) into the relative connection position side and unplug the conductor.

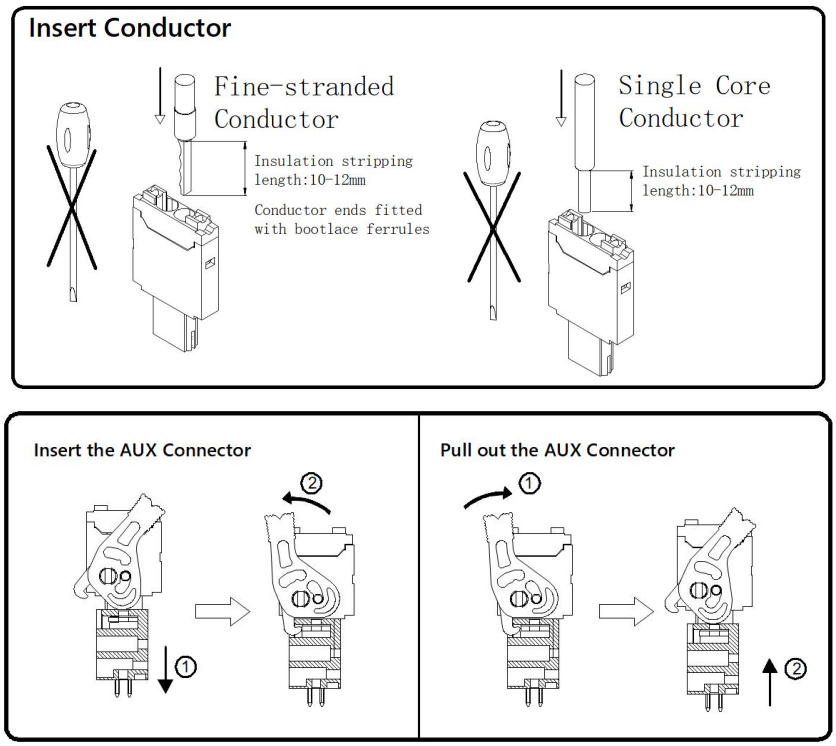



Figure 6-38 Disconnect the AUX connection

3. Place the COM connection cover against the inverter enclosure and tighten the 4 screws. When securing the cover over the communication ports, tighten the cover in place and then lightly push the communication cables into the cover as you tighten the strain relief nuts onto the cables. This will ensure the communication cables are well-seated in the RJ45 ports.

The pin definition of the communication ports:

| Item \ No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| BMS | NC | RS485_A4 | NC | CAN1_H | CAN1_L | NC | RS485_B4 | NC |
| RS485 | 12 V | NC | GND | RS485_B5 | RS485_A5 | NC | NC | NC |
| GRID_CT/METER | GRID_CT- | GRID_CT+ | RS485_A7 | 12V | GND | RS485_B7 | NC | NC |
| PV_CT | PV_CT- | PV_CT+ | RS485_A7 | NC | NC | RS485_B7 | NC | NC |
| RRCR | K1 | K2 | K3 | K4 | 5 V | NC | | |
| DRM | DRED1/5 | DRED2/6 | DRED3/7 | DRED4/8 | REFGEN/0 | COMLOAD/0 | GND | |
| AUX | DO1_NO | DO1_COM | DO1_NC | DI_NEGATIVE | DI_POSITIVE | GND | | |

The electrical parameters of the AUX port:

| AUX | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| | DO1_NO | DO1_COM | DO1_NC | DI_negative | DI_positive | GND |
| Electrical Parameters | 2A 24VDC | 2A 24VDC | 2A 24VDC | 1A 24VDC | 1A 24VDC | 1A |
| | 2A 230VAC | 2A 230VAC | 2A 230VAC | | | |

## 6.7. Mount Covers of the Battery and Inverter

After finishing electrical connection of energy storage system, please follow the steps below to mount the covers.

1. Mount the cable cover of the batter y, Refer to 1-2 in Figure 6-39.

(1) Cut a cable hole based on the cabling routing and route the cables through the cable hole.
(2) Align the top surface of the cable cover to the top surface of the battery housing.
(3) Align the protrusions on the right side of the cable cover to the slots on the left side of the battery's front cover, then push the cable cover right to the battery housing till hearing the "click" sound.

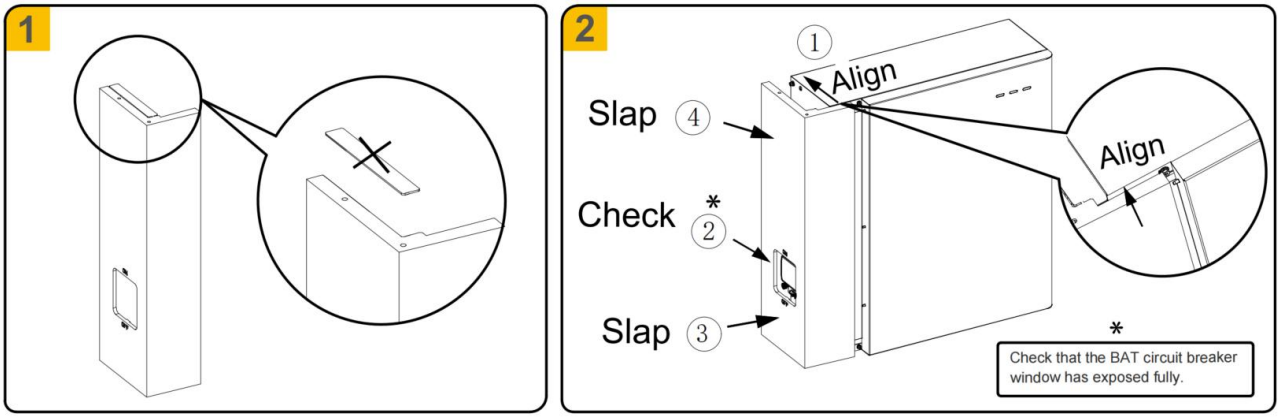



Figure 6-39 Install the cable cover for the battery

2. Disassemble the cable cover of the battery, Refer to 1 in Figure 6-40.

(1) Grasp the cable cover, then pull it to the left.

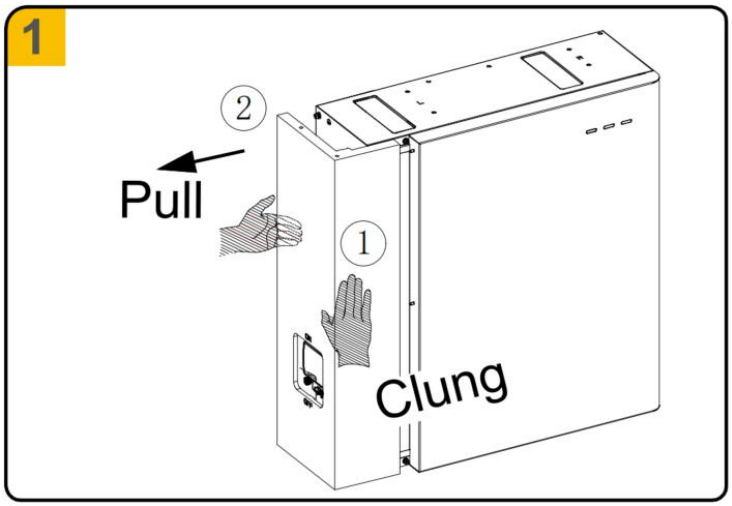



Figure 6-40 Disassemble Cable Cover

3. Mount the covers of the inverter

(1) Attach the top cover to the inverter.

Place the top cover on top of the inverter and slide it forward. The three side screws of the top cover should align to the inverter mounting threaded holes. Secure the top cover to the inverter (tool: T20 screwdriver, torque: 1.6 Nm).

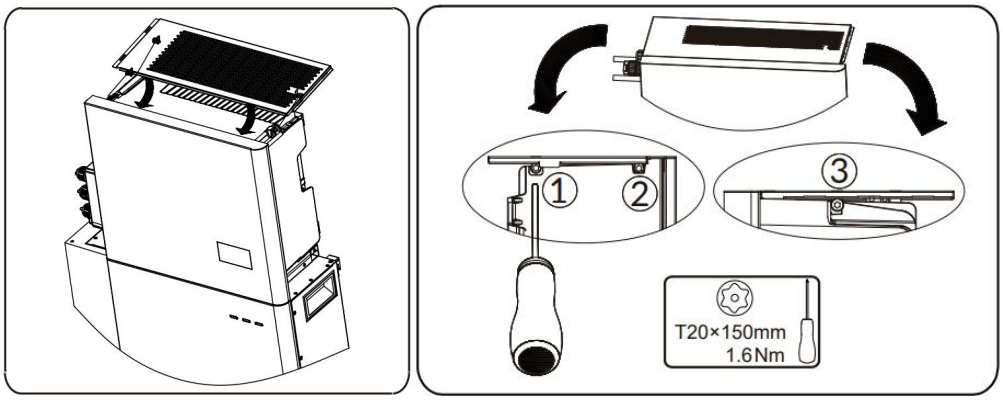



Figure 6-41 Attach the top cover to the inverter

(2) Mount left cable cover and right cover of the inverter when inverter standing on the battery, please follow the steps below.

- Take out the right cover and cable cover from the inverter packaging.
- Align the hooks on the front side of the right cover to the slots on the right side of the front cover, downwards insert the right cover along the right edge of the inverter front cover till the protruding pin in the lower right corner falls into the hole located at the right rear of the battery housing.

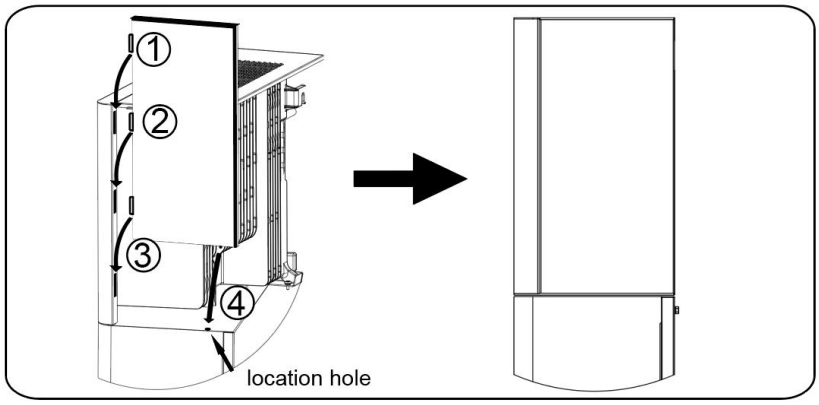



Figure 6-42 Mount the right cover

- Cut a cable hole based on the AC cabling routing and route the cables through the cable hole.

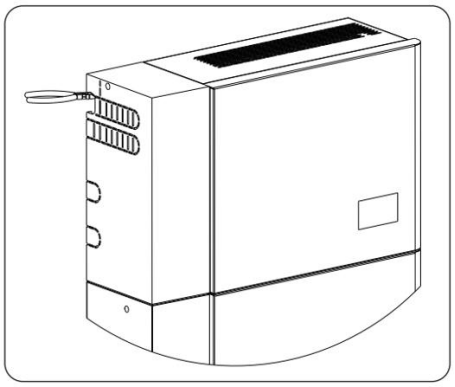


Figure 6-43 Cut a cable hole

- Align the hooks on the right side of the cable cover to the slots on the left side of the front cover, downwards insert the cable cover along the left edge of the inverter front cover till the top surfaces of the top cover and cable cover are flush.

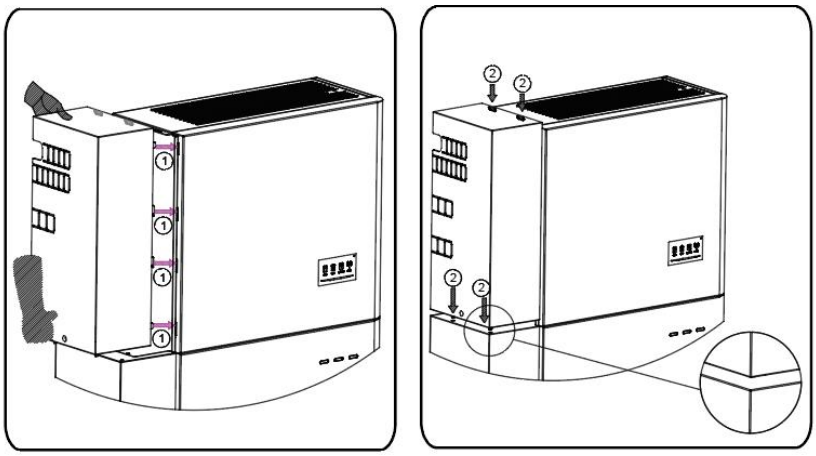


Figure 6-44 Mount the cable cover

(3) Disassemble the cable cover of the inverter

- Insert a screwdriver (blade width: 1.2 mm) into the gap between the cable covers of the inverter and the first battery, then pry the cable cover up lightly.
- Grasp the cable cover and lift it up by about 20mm, then move it to the left.

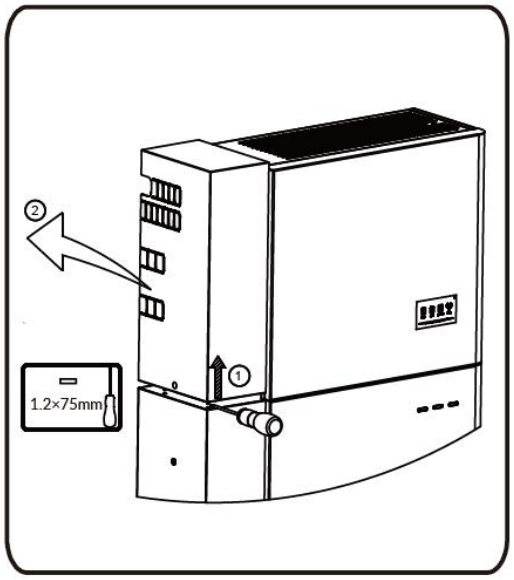



Figure 6-45 Disassemble the cable cover of the inverter

# 7. Power on and off the System

## 7.1. Power on the System

WARNING

- Before power on the ESS, please ensure the PV switch & all AC and BAT circuit breakers in the system are switched OFF and cannot be reactivated.
- Never power on the ESS without the correct and reliable installation and electrical connection.

1. Switch on the battery circuit breaker which is at the upper left of the inverter.
2. Switch on the battery circuit breakers of all batteries.
3. Switch on the AC circuit breaker between the grid port of the ESS inverter and the mains grid (this AC circuit breaker should be labelled Main Switch Battery ESS Supply or similar).
4. Switch on the AC circuit breaker between the backup port of the ESS inverter and the loads (this AC circuit breaker should be labelled Main Switch Battery ESS Backup or similar).
5. Switch on the PV switch at the lower left of the inverter (if there are PV strings directly connected to the ESS inverter).
6. Switch on the AC circuit breaker (if there is any) between any separate PV inverter and the mains grid. These separate PV inverters are also referred to as "AC-coupled PV inverters".

## 7.2. Power off the System

WARNING

After the energy storage system is powered off, the remaining electricity and heat may still cause electric shocks and body burns. Please put on protective gloves and operate the product 5 minutes after the system is powered off.

1. Switch off the AC circuit breaker between the ESS inverter and the backed-up loads.
2. Switch off the AC circuit breaker between the ESS inverter and the mains grid.
3. Switch off the PV DC Isolator(s) between the PV strings and the ESS inverter if there are any.
4. Switch off the PV switch on the lower left of the ESS inverter (if there are PV strings directly connected the ESS inverter).
5. Switch off the battery circuit breakers of all batteries.
6. Switch off the battery circuit breaker which is at the upper left of the inverter.

# 8. Commissioning

## 8.1. Checks Before Power-On

| No. | Check Item | Acceptance Criteria |
|---|---|---|
| 1 | Installation/Mounting environment | The installation environment is safe and the unit has adequate clearance as per the instruction in this manual as well as in compliance with local standards. The area around the installation should be free from clutter and should not be flood-prone. |
| 2 | Battery and inverter mounting | The battery and inverter should be mounted correctly, securely, and reliably. |
| 3 | Wi-Fi mounting | The Wi-Fi Dongle should be mounted correctly, securely, and reliably. |
| 4 | Cable layout | Cables should be routed neatly and protected adequately where exposed, in accordance with standards. |
| 5 | Cable tie | Cable ties should be secured and trimmed evenly and no burr exists. |
| 6 | Grounding | The grounding cables should be connected correctly, securely, and reliably. Impedance/resistance checks should be conducted to confirm reliable Earth connections. |
| 7 | Switches and circuit breakers status | The PV switch (if there is any) and battery circuit breakers and any AC circuit breakers connecting to the energy storage system should be OFF. |
| 8 | Cable connections | The AC cables, PV cables (if there are any), battery power cables, and communication cables should be connected correctly, securely, and reliably. |
| 9 | Unused ports | Unused power ports and communication ports should be sealed from water or dust ingress by watertight caps. |

## 8.2. Power on the Product before Commissioning

**WARNING**

- Before commissioning, please ensure the PV switch & all AC and BAT circuit breakers in the system are switched OFF and cannot be reactivated.
- Never power on the energy storage system without the correct and reliable installation

and electrical connection.
- Don't switch on the PV switch on the energy storage inverter.
- Don't switch on the AC circuit breaker on the PV inverter (if there is any).

Please strictly follow the steps described in section 7.1 to power on the system.

## 8.3. Installing New System and Setting up the App

### 8.3.1. Download and Install the App

1. Android device users can download the App through major Android App stores such as Google Play. You can also scan the following two-dimensional code to install.
2. IOS device users can search for "AlphaESS" in the App Store and download the App. You can also scan the following QR code to install.

Figure 8-1 AlphaESS App

### 8.3.2. Register as an Installer

If you don't have an installer account, please register first.

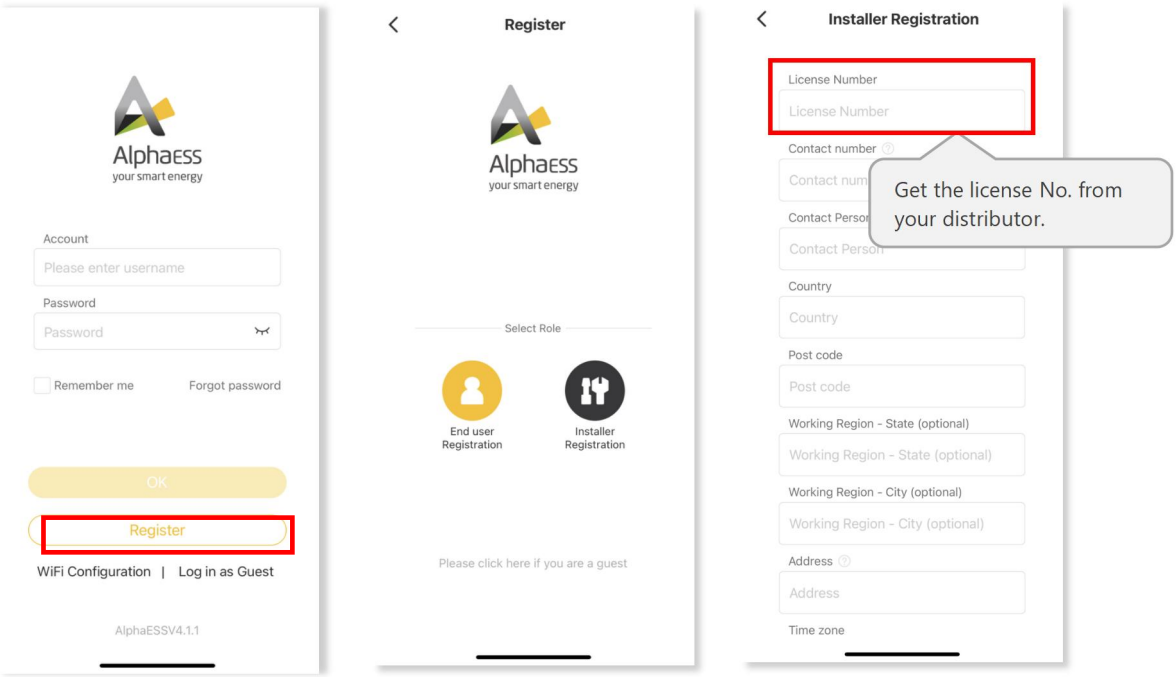



Figure 8-2 APP register and login

If you already have an installer account, please log in directly.

### 8.3.3. Overview of Functions for Installer Account

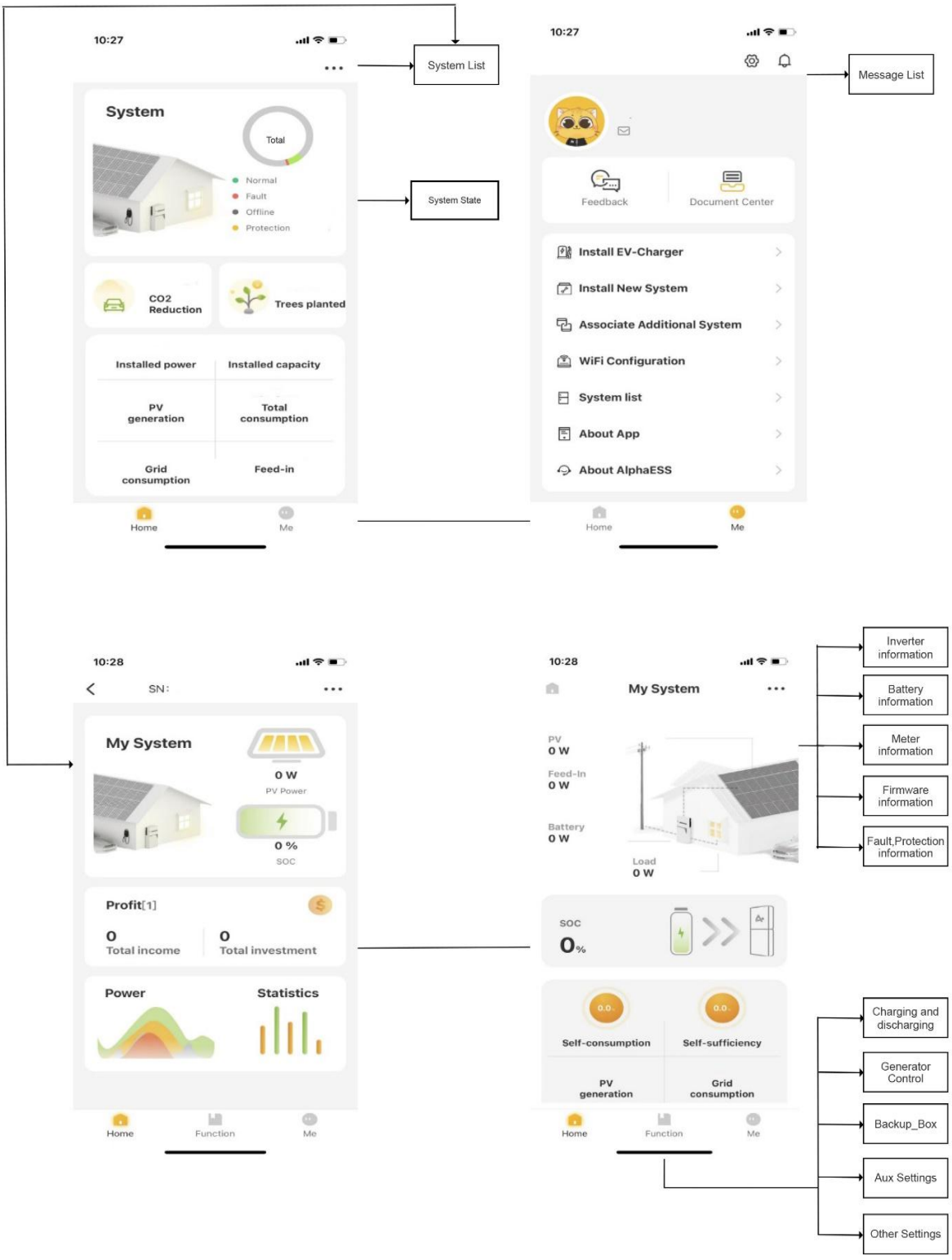



Figure 8-3 Account Functions

### 8.3.4. Install New System on the App

You can carry out “Install New System” as follows:

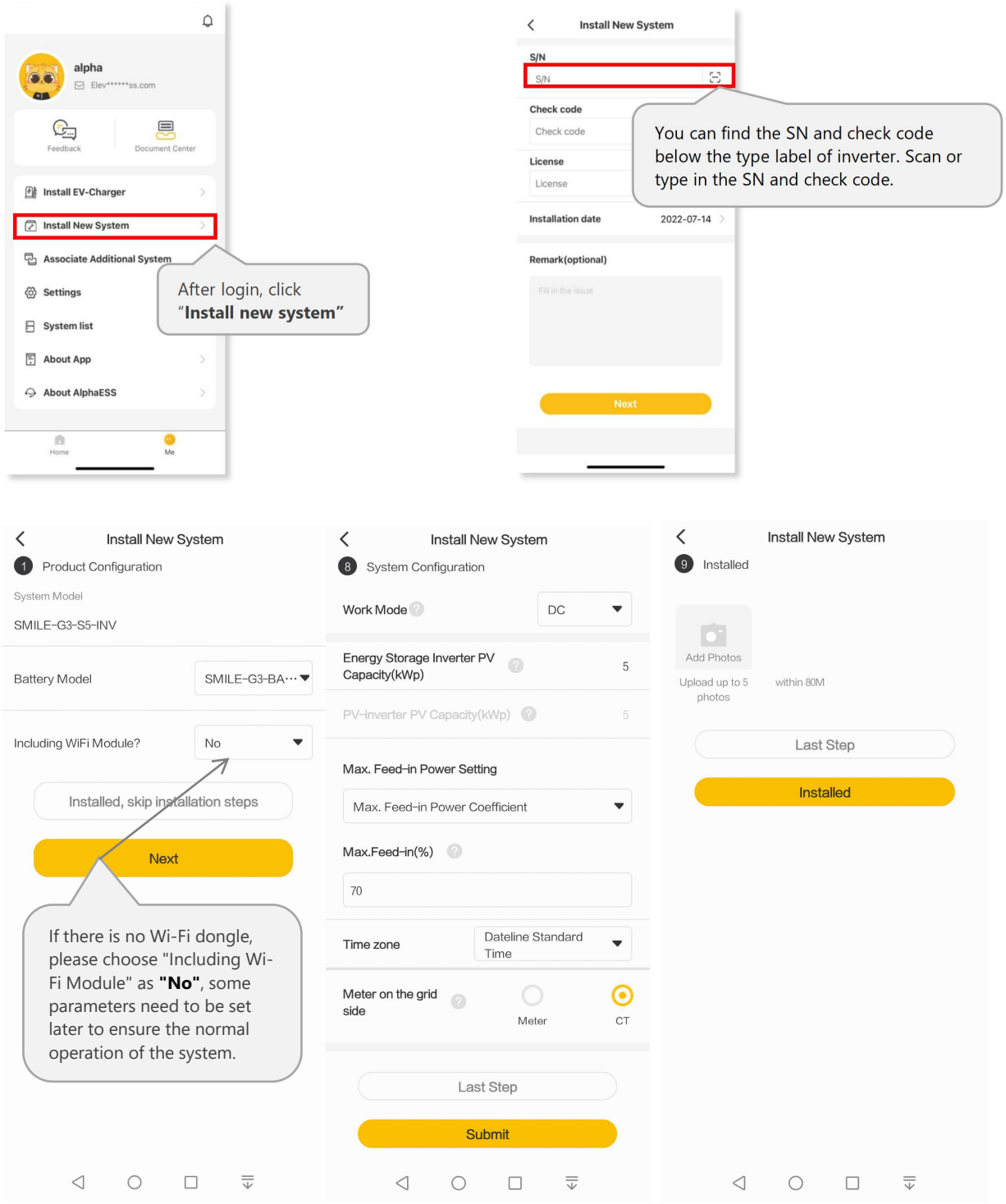



Figure 8-4 Install the new system in APP

For regular installers, please click “Install New System”, enter your installer account ID in the “license” field to bind the system to your account and “activate” the system. Enter S/N, check code, license, installation time and click the “save” button.

**NOTICE**

More settings are needed for installers in Australia. If you are an installer in Australia, you will need to fill in the Street (NMI), Suburb (NMI), Postcode (NMI) fields for the Region section, which has six fixed options (NSW, QLD, VIC, SA, TAS, WA). If SA is selected as the region, two more fields are required, which are Agent and NMI. These fields are necessary in response to the requirements of the Network Operator for Dynamic Export and PV output control by a Relevant Agent.

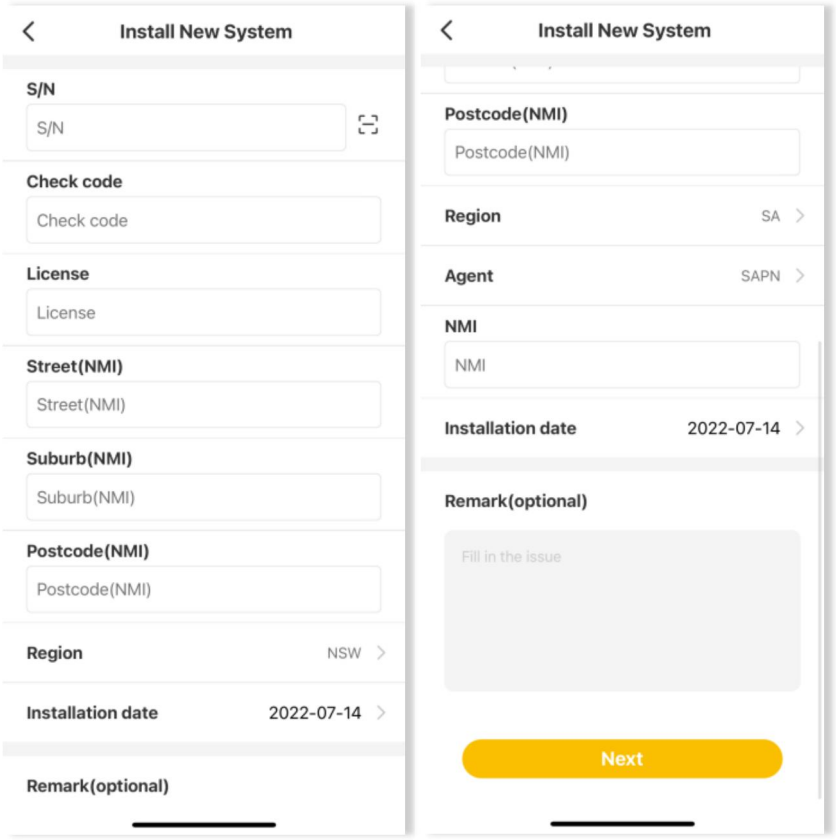



Figure 8-5 Australian Installer

Fields that are not marked "optional" need to be filled in.

Click "Next".

### 8.3.5. Instruct the End User to Install the App

Please make sure that end user has downloaded the App, registered the account correctly, and bound the system SN.

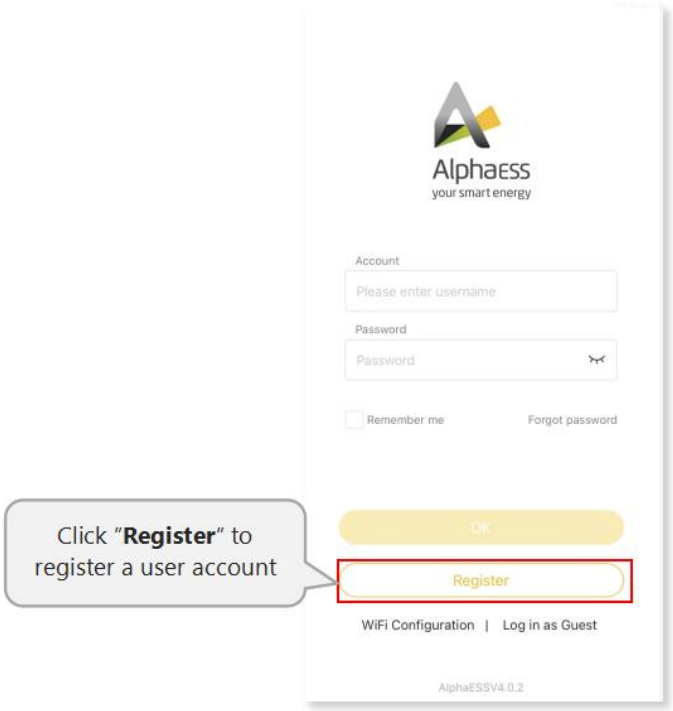
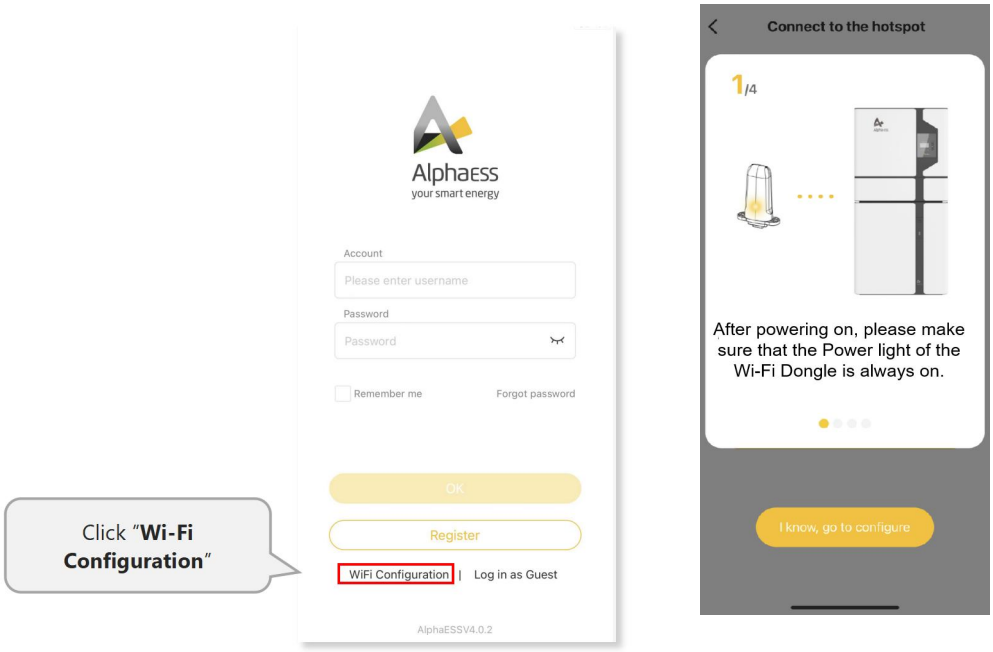


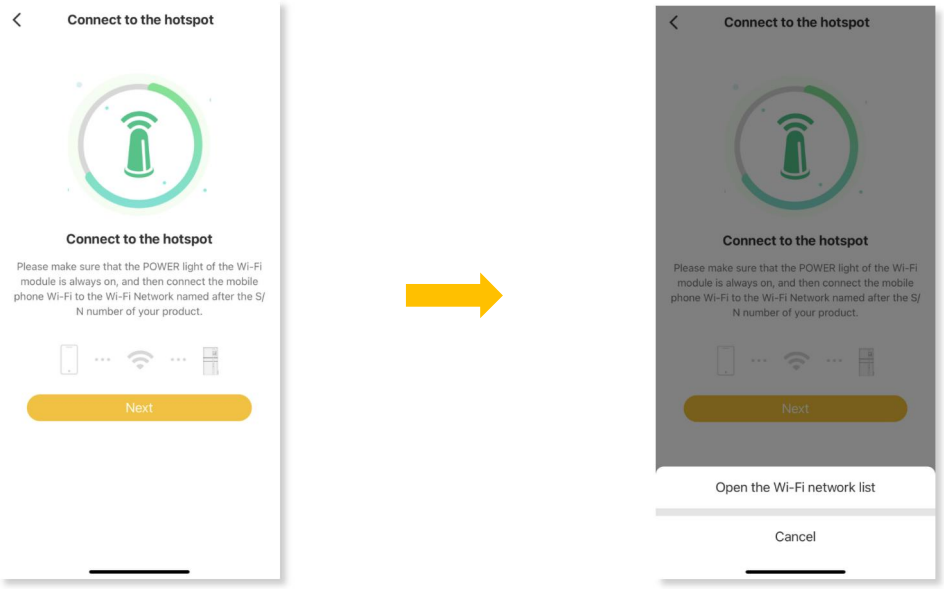

Figure 8-6 User account registration

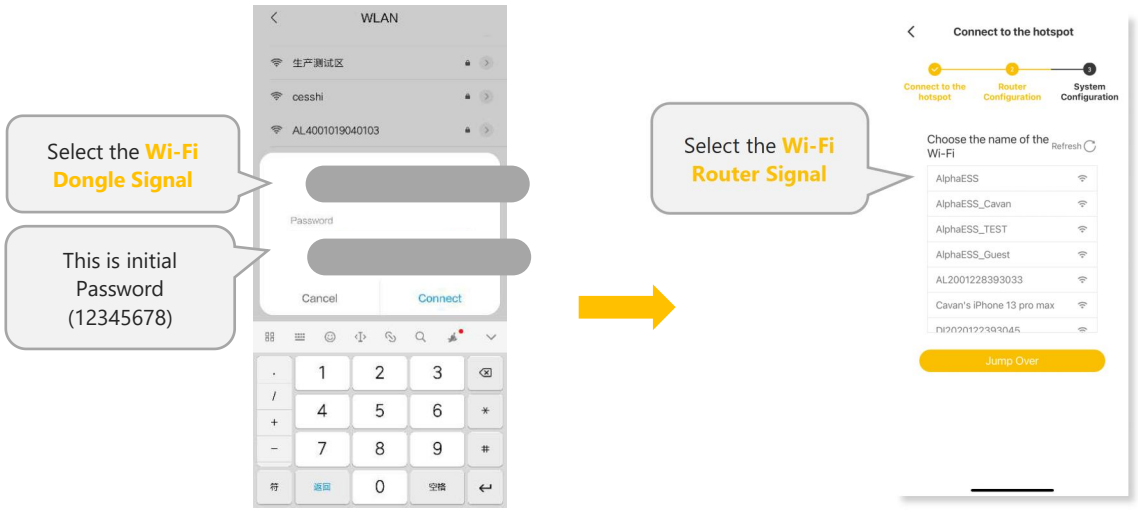
## 8.4. Wi-Fi Configuration and Basic Parameters

This section is for user who has an energy storage system with a Wi-Fi dongle.
The AlphaESS App is used to configure the network, set system basic parameters, monitor system operating status and check configurations.

### 8.4.1. Wi-Fi Dongle Configuration


Alphaess
your smart energy
Account
Please enter username
Password
Password
Remember me
Forgot password
OK
Register
WiFi Configuration | Log in as Guest
AlphaESSV4.0.2
Click "Wi-Fi Configuration"
Connect to the hotspot
1/4
After powering on, please make sure that the Power light of the Wi-Fi Dongle is always on.
I know, go to configure


Connect to the hotspot
Connect to the hotspot
Please make sure that the POWER light of the Wi-Fi module is always on, and then connect the mobile phone Wi-Fi to the Wi-Fi Network named after the S/N number of your product.
Next
Open the Wi-Fi network list
Cancel


WLAN
生产测试区
cesshi
AL4001019040103
Password
Cancel
Connect
Select the Wi-Fi Dongle Signal
This is initial Password (12345678)
Connect to the hotspot
Connect to the hotspot
Router Configuration
System Configuration
Choose the name of the Wi-Fi
Refresh
AlphaESS
AlphaESS_Cavan
AlphaESS_TEST
AlphaESS_Guest
AL2001228393033
Cavan's iPhone 13 pro max
Jump Over
Select the Wi-Fi Router Signal

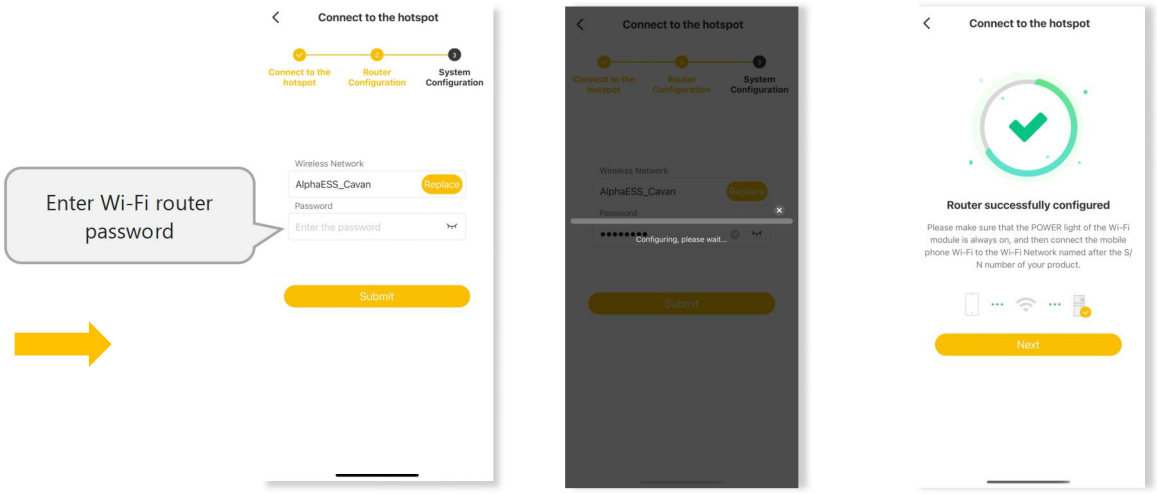



Figure 8-7 APP Wi-Fi connection and configuration

**NOTICE**

- The system will not be able to connect to the internet without either a physical LAN cable connection or configured Wi-Fi if the Wi-Fi module is used.
- To ensure account security, change the Wi-Fi password periodically and keep the new password in mind. Not changing the initial password may cause password disclosure. A password left unchanged for a long period of time may be stolen or cracked. If a password is lost, devices cannot be accessed.

### 8.4.2. Basic Parameters Settings

**DC Mode**

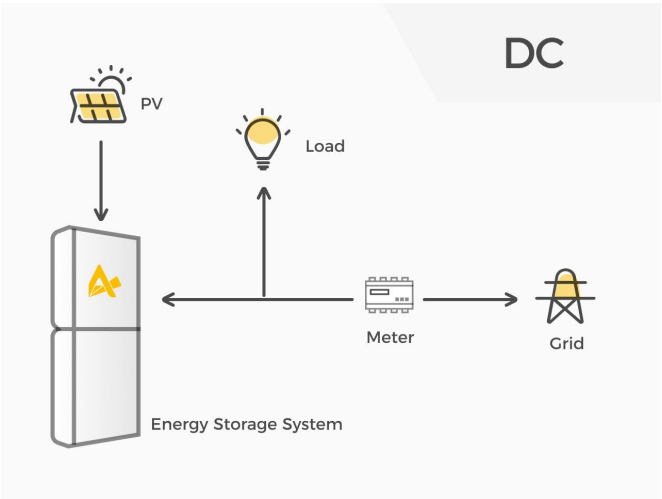



Figure 8-8 DC Mode

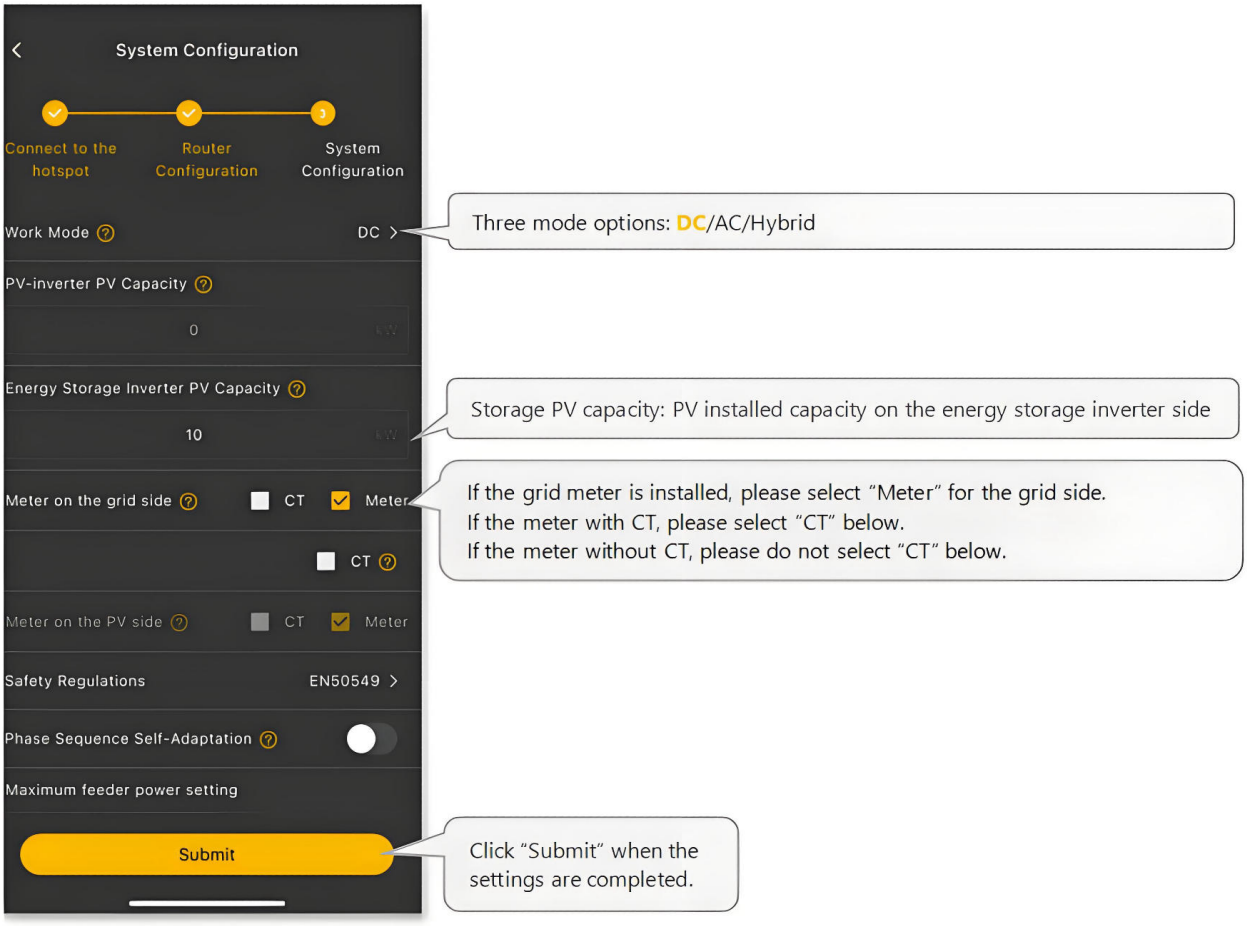



Figure 8-9 APP DC mode Settings

## AC Mode

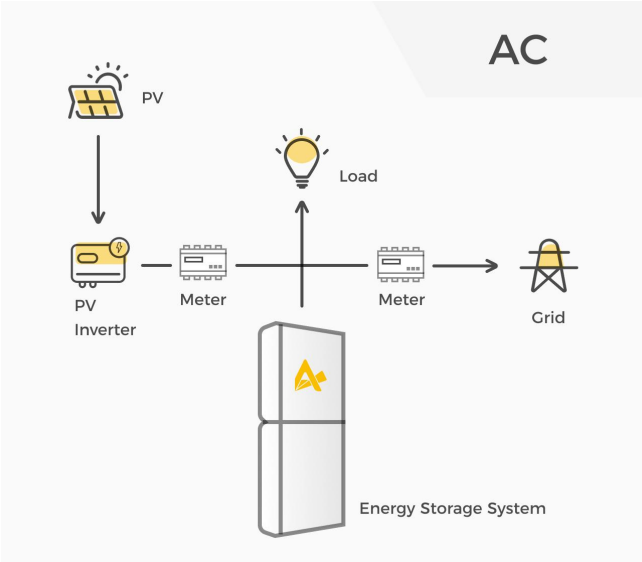



Figure 8-10 AC Mode

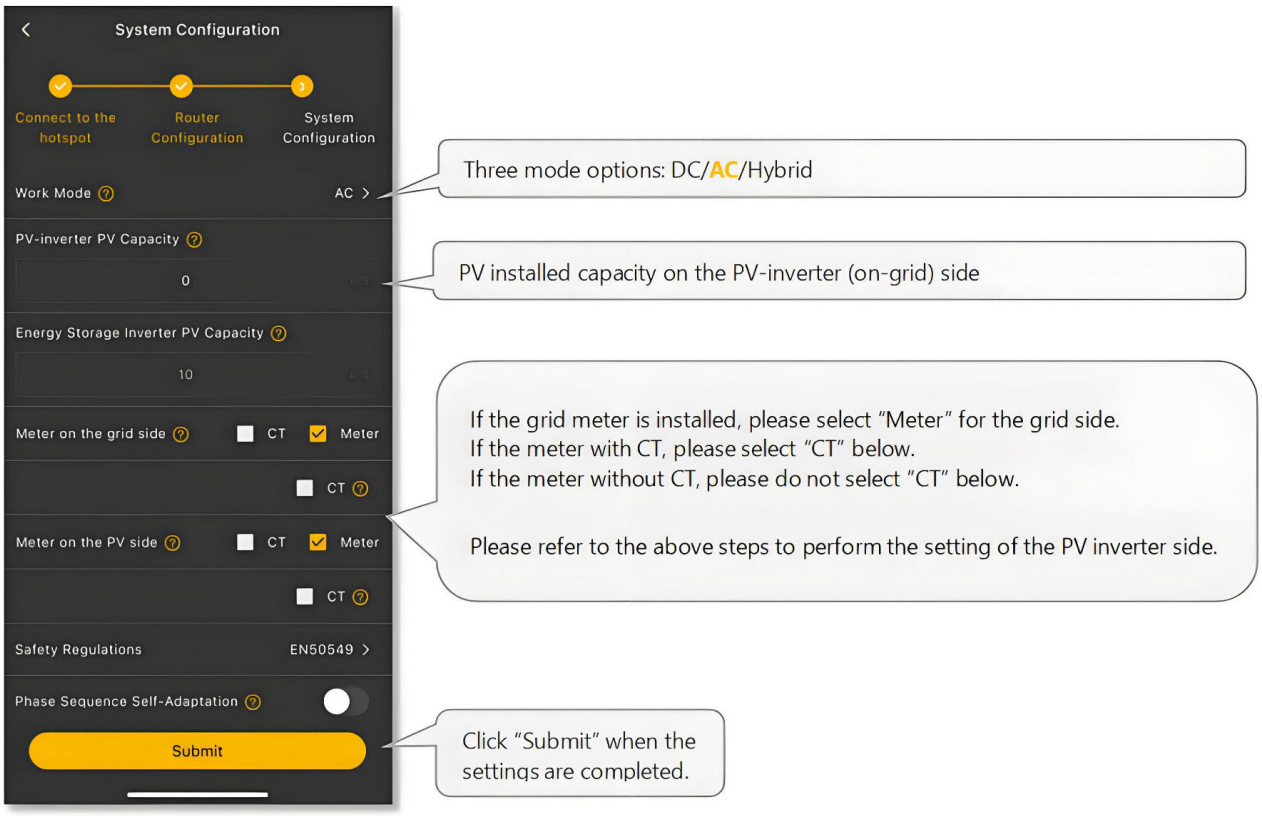



Figure 8-11 APP AC mode Settings

## Hybrid Mode

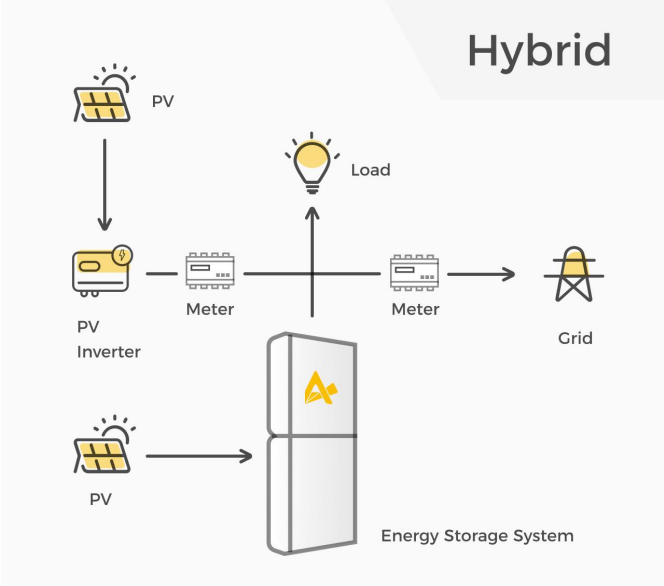



Figure 8-12 Hybrid Mode

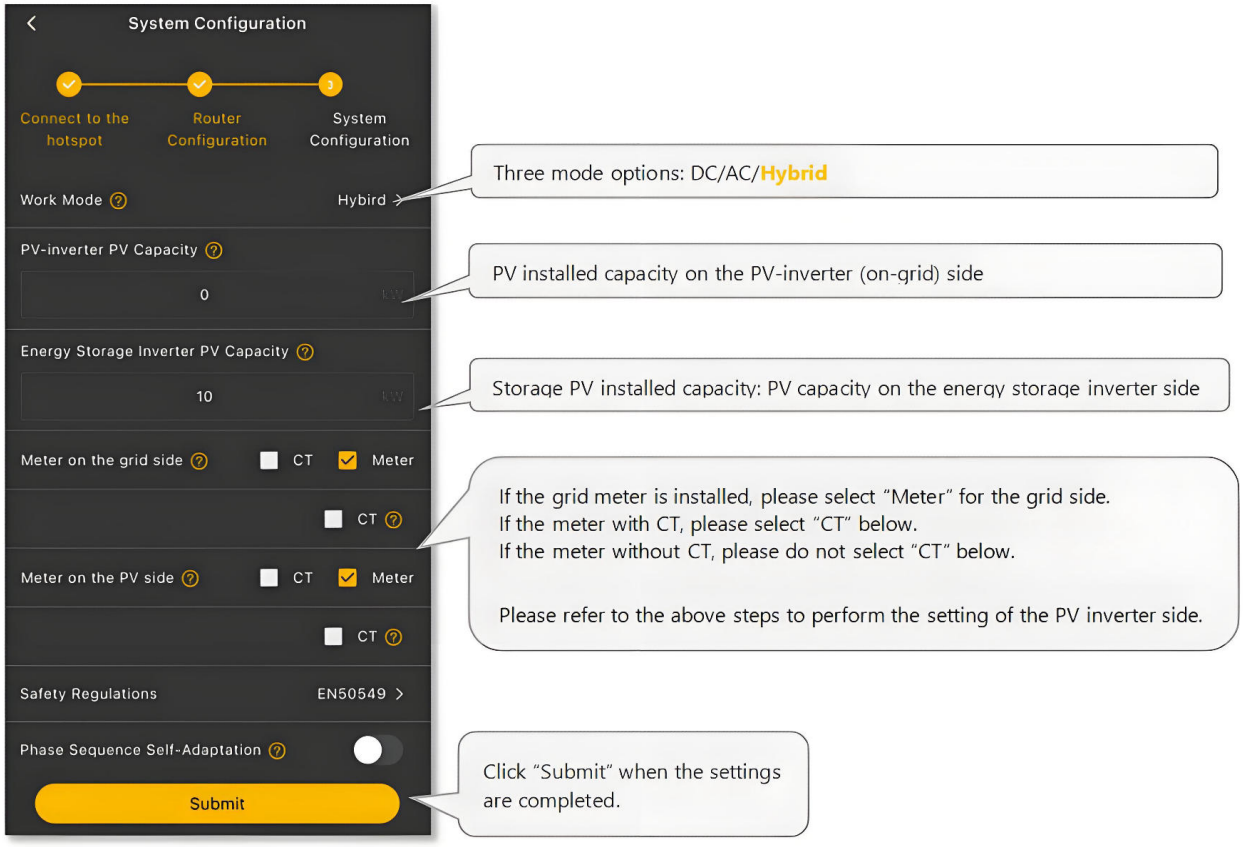



Figure 8-13 APP Hybrid mode Settings

### 8.4.3. Information on the main page

After finishing the basic parameters setting, all the stauts can be found via the main page. On the main page, tap "your device" to view the information for the system. The firmware version can be checked in the "Firmware information", and the safety regulations, the power quality modes and setpoints can be viewed through the "inverter information". Once the safety regulation is chosen during the basic parameters setting, only the Alpha service engineer can change the safety regulation and the setpoints for the power quality response modes. Please contact AlphaESS to change settings when necessary.

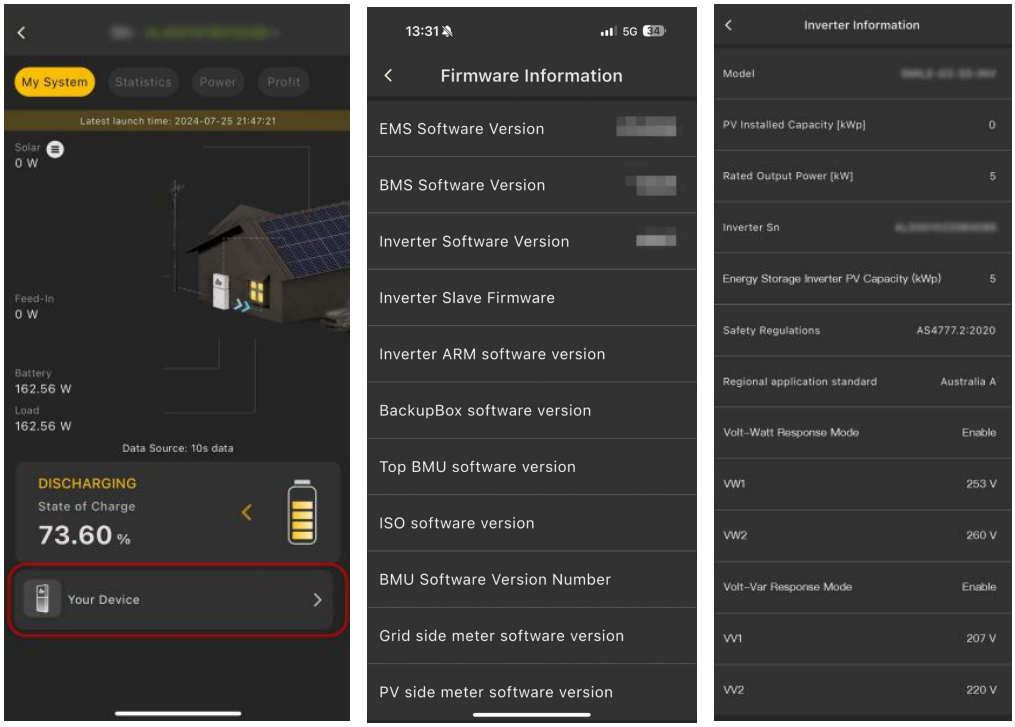



Figure 8-14 Check device information

### 8.4.4. Function settings

#### 8.4.4.1 Generation and export limitation

Specifically, if you are an installer who wants to set the soft export limit, you can set the allowable max feed-in factoe from 0-100%, the output to the grid will be reduced based on the inverter maximum output power multiplied by the factor. Or you can set the allowable max feed-in power from 0 W to the rated power of inverter. To switch to the hard export limit and keep the same value, please contact Alpha ESS. To set up the generation limit (for both hard and soft limit), go to your device after the configuration and choose "Inverter Information", where you can set the number of the apparent power for generation limit.

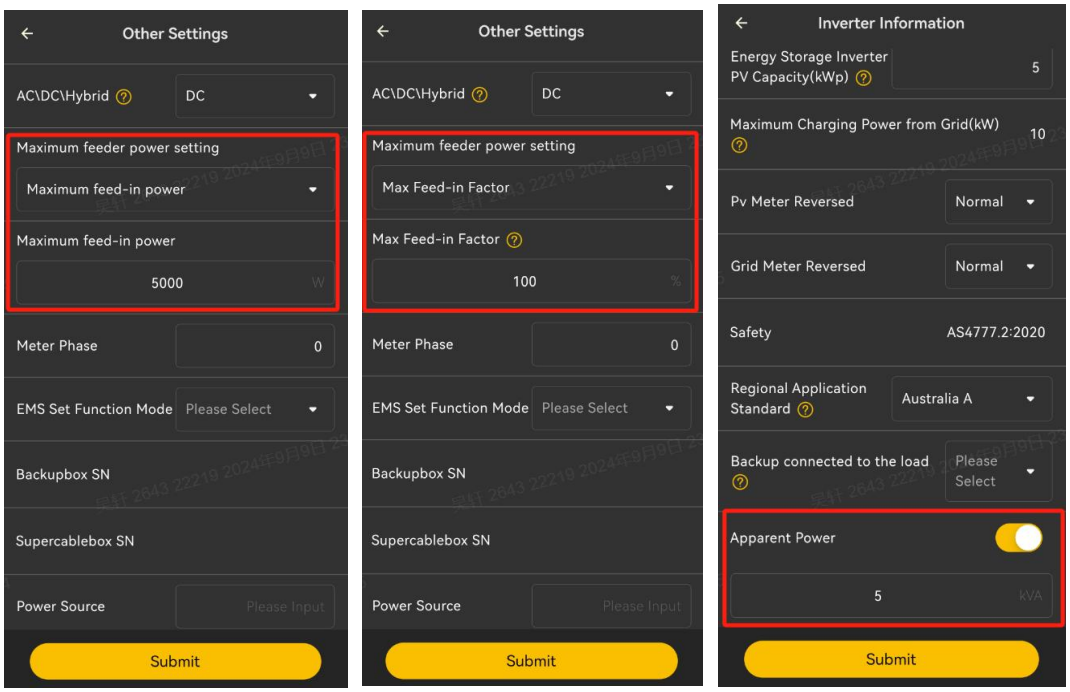



Figure 8-15 Other Settings

CAUTION

**The safety standard field must be set correctly**

If you select a safety standard that is not valid for your country, region and purpose, it can cause a disturbance in the energy storage system and lead to problems with the Network Operator. When selecting the safety standard, you must always observe the locally applicable standards and directives as well as the properties of the PV system (e.g. PV system size, grid-connection point).

- If you are not sure which safety standard is valid for your country, region or purpose, contact your Network Operator for information on which safety standard should be used.

NOTICE

**A Note on setting Feed-In limits with multiple PV systems**

If the product is installed with DC-connected Solar Panels as well as with an existing AC-coupled PV system, Installers may need to set a Feed-In limit to comply with Local Regulations.

The Feed-in limit should be set to the total Phase feed-in limit set by the Network Operator, regardless of the size of the existing AC-coupled PV system. Only set the feed-in limit to *zero* if the Network Operator has dictated *zero feed-in* from the house.

## 8.5. Register on AlphaCloud

### 8.5.1. Register an Installer Account on AlphaCloud

If you do not already have an Installer account, you can create a new account on our web server for system monitoring purposes. In addition, Alpha Warranty is predicated on this connection to our web server.

The data produced prior to registration can be synchronized to the web server.

**Step 1:** Please open the portal: www.alphaess.com.

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

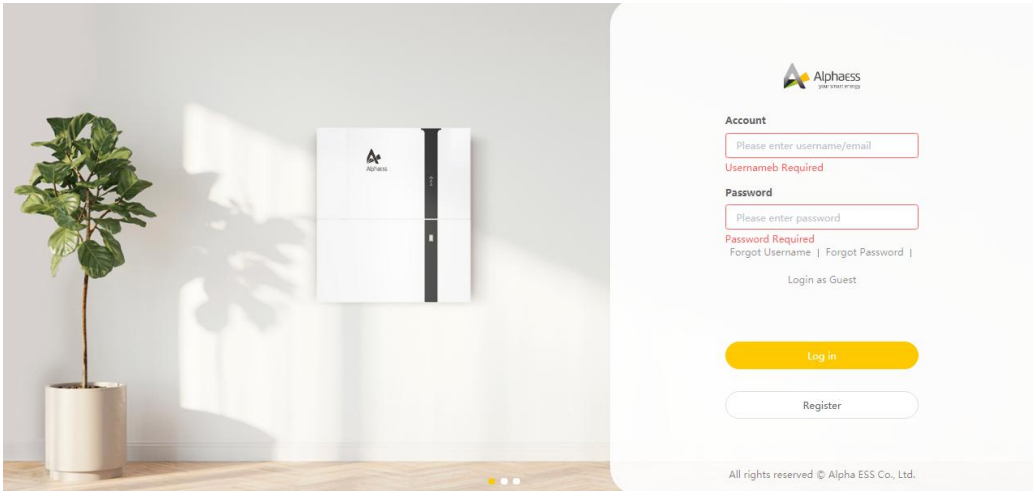



Figure 8-16 Alpha Cloud platform login page

If not, please register by filling in the following web form.

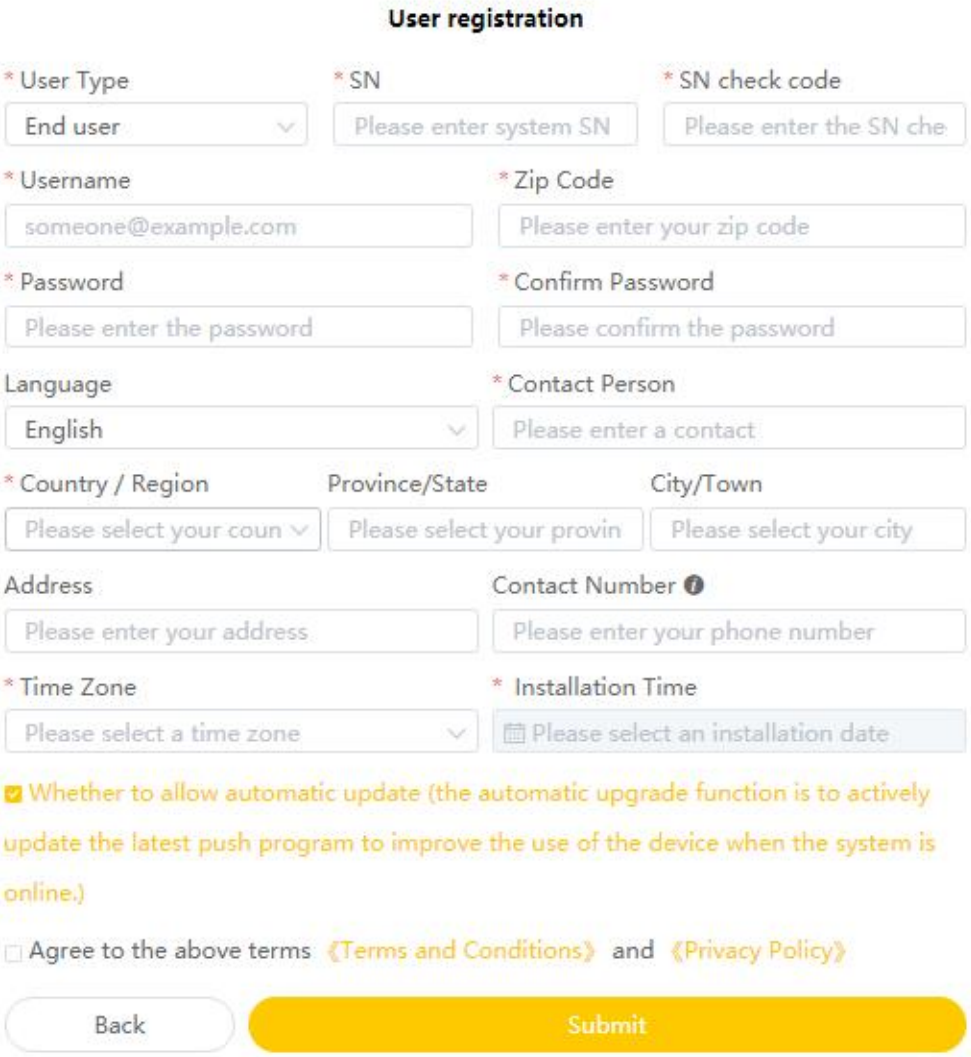



Figure 8-17 User registration

In this form, all fields with a red star are required.
***Serial Number:** SN (please see the type label of the inverter)
***Username:** 5-15 letters / numbers
***Password:** 5-15 letters / numbers / characters
More details are available in the Online Monitoring Web Server Installers User Manual, which can be downloaded from the AlphaESS homepage.

### 8.5.2. Install New System on AlphaCloud

Installers who haven't yet registered need to click “Register” to visit the registration page. Please refer to the “AlphaCloud Online Monitoring Web Server Installers User Manual”, which you can get from the Alpha sales team and get a Alpha Installer license number.

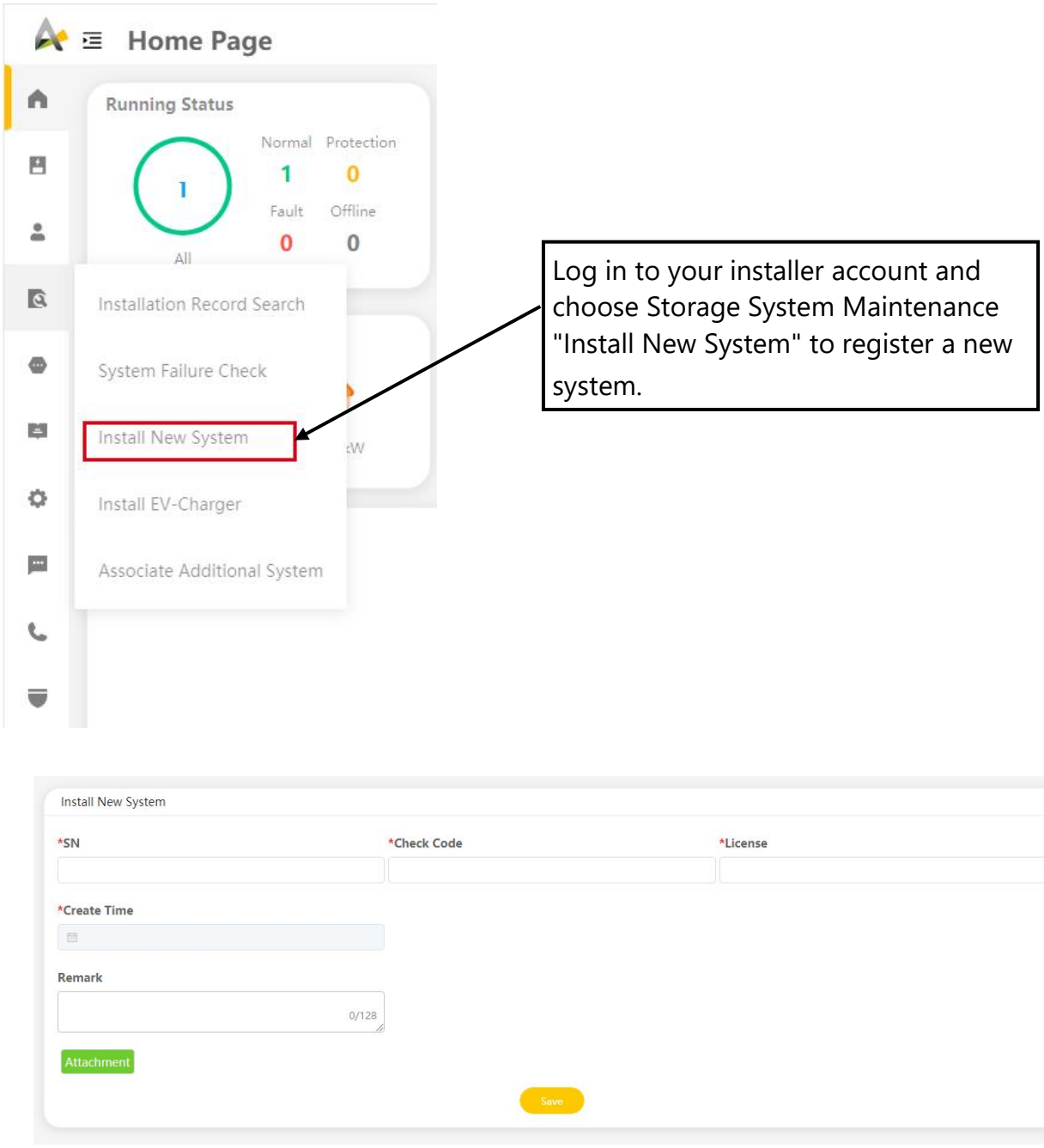



Figure 8-18 Install the new system on the Alpha Cloud platform

Enter the system S/N, check the code, license, and installation date, then click the “Save” button. The red * indicated a required field. Click the “Browse” button to select any attachment you want to add.

## 8.6. Check System Wiring and Meter Installation

Check the grid's voltage range and frequency range and the installation (including location, direction and phase sequence) of all CT(s) and/or meter(s).

You can commission the system after the system configuration process.

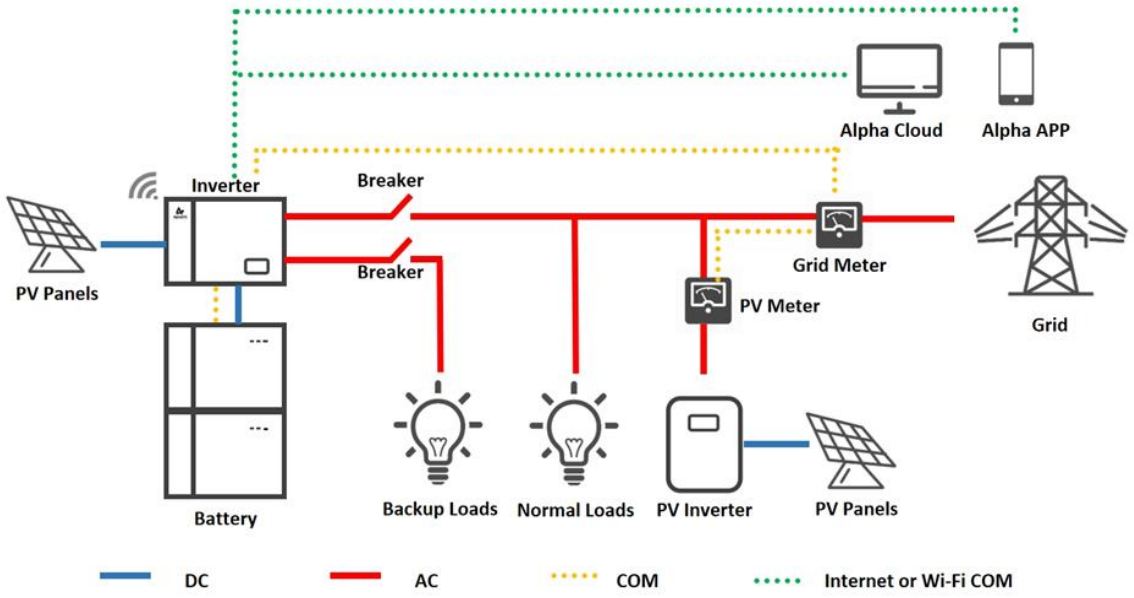



Figure 8-19 Brief wiring diagram of hybrid system

1. Detailed operating steps to check system wiring and meter installation as follows:

Please perform the steps below for the circuit breakers and PV switch in the system.

(1) Switch on the battery circuit breaker of the energy storage inverter.

(2) Switch on the battery circuit breakers of all batteries.

(3) Switch on the AC circuit breaker between the grid port of the energy storage inverter and the grid.

(4) Switch on the AC circuit breaker between the backup port of the energy storage inverter and the loads.

(5) Switch off the PV switch of the energy storage inverter (if there is any).

(6) Switch off the AC circuit breaker (if there is any) between the PV inverter and the grid.

(7) At this moment, the energy storage inverter will enter NORMAL state.

(8) Please turn off all loads. If you can’t, please ensure that there aren't loads of large power fluctuations connected in the system.

(9) Log on to the App and click to page “My System” and note the current "Load".




Figure 8-20 My system page on the APP

2. Operate the App and follow the instructions below to enable "Charge Batteries from the Grid".

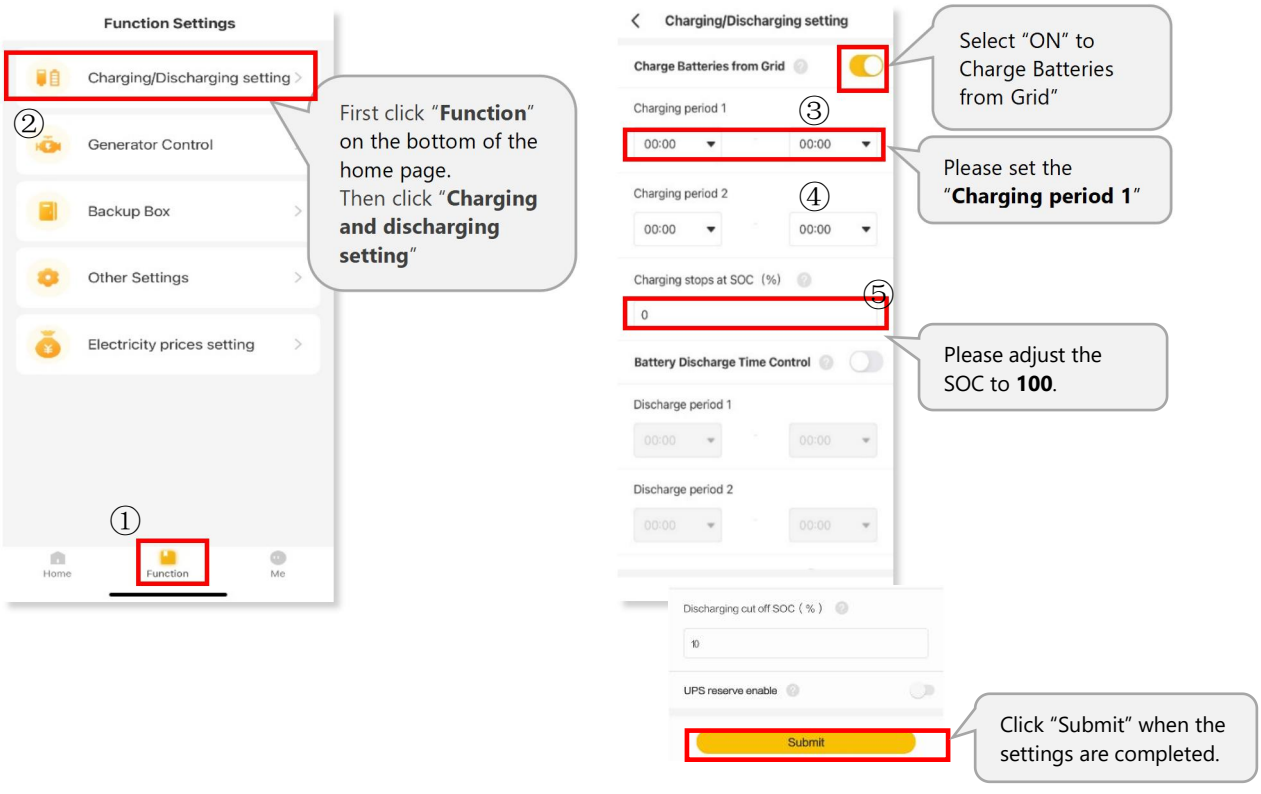



Figure 8-21 Settings for charging the battery from the power grid

If the formula "Grid Power≈ **Load** + Battery Charging Power" fits well, the grid meter installation of the energy storage inverter is correct. Please remember to deactivate the "Charge Batteries from Grid" by clicking "OFF" and save the changes.




Figure 8-22 Confirmation of installation of power grid electricity meters

If the fomula above does not apply, please perform the troubleshooting below.

| Meter Type | Solution |
|---|---|
| BB, BB Plus | Please refer to the relative system wiring diagram to check the wiring.<br>If the error persists, contact AlphaESS customer service for further check. |
| Meter (without CT) | Check the wiring and location of the grid meter. |
| Meter (with CT) | Check the location, direction, phase sequence and cable connection of the grid CT. |
| CT Only | Check the location, direction and cable connection of the grid CT. |
| P1 meter reader | Check the connection and installation configuration of the P1 meter reader. |

1. If there is no PV inverter in the system, please skip this step.

If a PV inverter exists in the system, switch on the AC breaker between the PV inverter and the grid.
In the AlphaESS App, turn to “Running Information” and check the power value of “PV Inverter Power”. If the power value is positive, the meter installation of the PV inverter is correct.

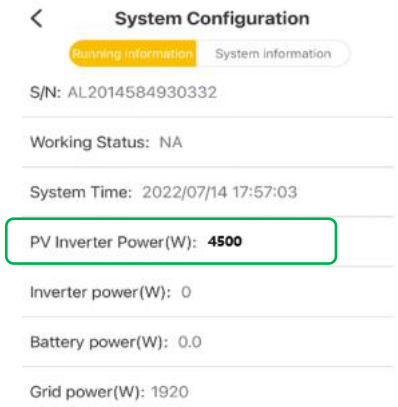



Figure 8-23 Check the power of the photovoltaic inverter

If the power value of "PV Inverter Power" is negative, please perform the troubleshooting below.

| Meter Type | Solution |
|---|---|
| BB, BB Plus | Please refer to the relative system wiring diagram to check the wiring.<br>If the error persists, contact AlphaESS customer service for further check. |
| Meter (without CT) | Check the wiring and location of the grid meter. |
| Meter (with CT) | Check the location, direction, phase sequence and cable connection of the grid CT. |
| CT Only | Check the location, direction and cable connection of the grid CT. |
| P1 meter reader | Check the connection and installation configuration of the P1 meter reader. |

2. If there are PV modules connected directly to the energy storage inverter, switch on the PV switch of the energy storage inverter.
3. Switch off the AC breaker between the grid port of the energy storage inverter and the grid. At this moment, please check whether the electrical appliance connected to backup side of the energy storage inverter runs normally. Otherwise, please contact Alpha service for further check.

**NOTICE**

During commissioning, if the LEDs on the display panel of the inverter or the battery show red or yellow, please refer to the troubleshooting chapter of the Installation, Operation &

Maintenance Manual.

4. Congratulations! All required checks of system wiring and meter installation have been completed.

## 8.7. Meter Setting

### 8.7.1. Meter Setting on Alpha Cloud

**Step 1:**

When the system work mode is selected as “DC”, click the slider under the item “Grid Meter” to turn the “Meter” icon orange.

When the system work mode is selected as “AC” or “Hybrid”, click the sliders under the items “Grid Meter” and “PV side meter” to turn the “Meter” icons orange.

**Step 2:**

Click "Save" and wait a few minutes to refresh the page.

When the “Meter Model” displays DTSU666 model, the setting is successful.

**CAUTION**

Do not modify the “Meter CT Ratio”.

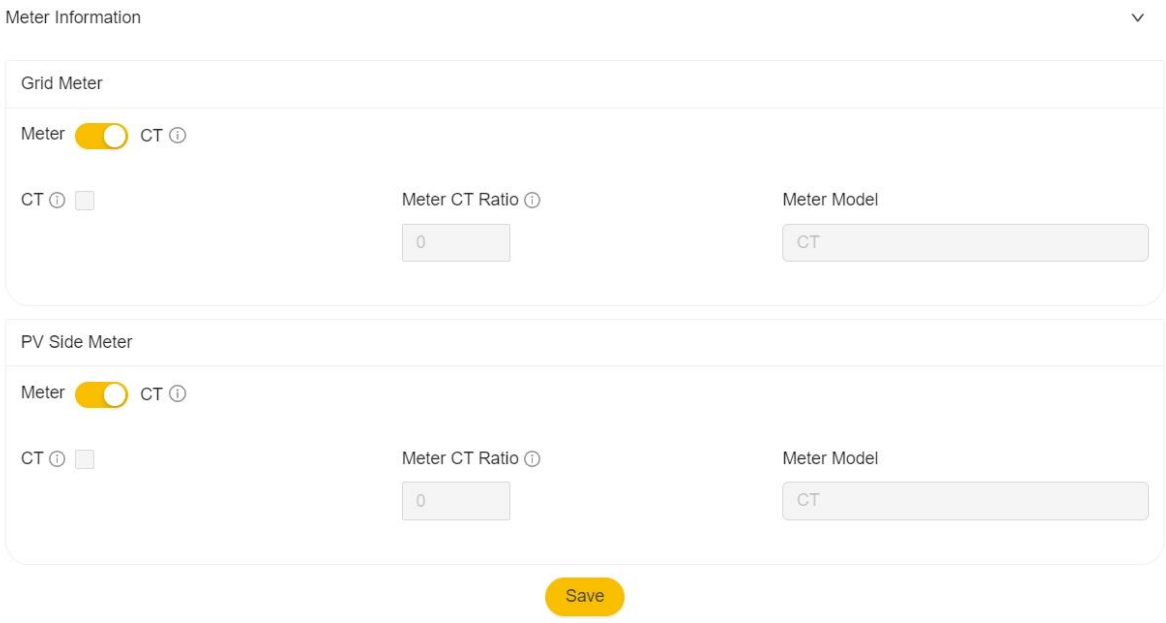



Figure 8-24 Electricity meter Settings in AlphaCloud

### 8.7.2. Meter Setting on the AlphaESS App

**Step 1:**

When the system work mode is selected as “DC”, only tick the "Meter" icon on the right of the “Grid Meter”.

When the system work mode is selected as “AC” or “Hybrid”, tick the two "Meter" icons on the right of the “Grid Meter” and the “PV Meter”.

**Step 2:**

Click "Submit" and enter the “System information” page to check the meter model. When the “Meter Model” displays DTSU666 model, the setting is successful.

**CAUTION**

Do not modify the “CT” ratio.

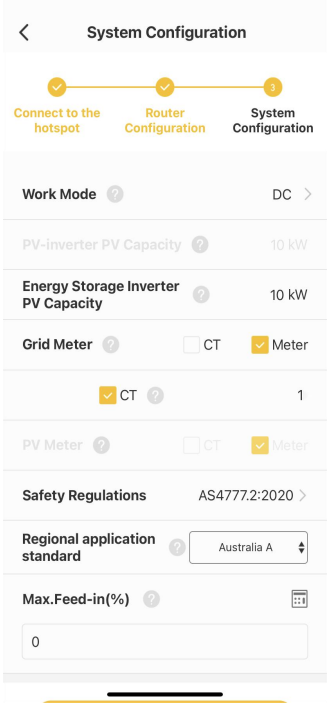



Figure 8-25 Electricity meter Settings in Alpha ESS App

## 8.8. P1 Meter Setting

**Note:** Versions 6.4.3 and above of the AlphaESS APP support P1 Meter.

**Step 1:**

Open the AlphaESS App → Enter the installation system → Check the installation configuration.

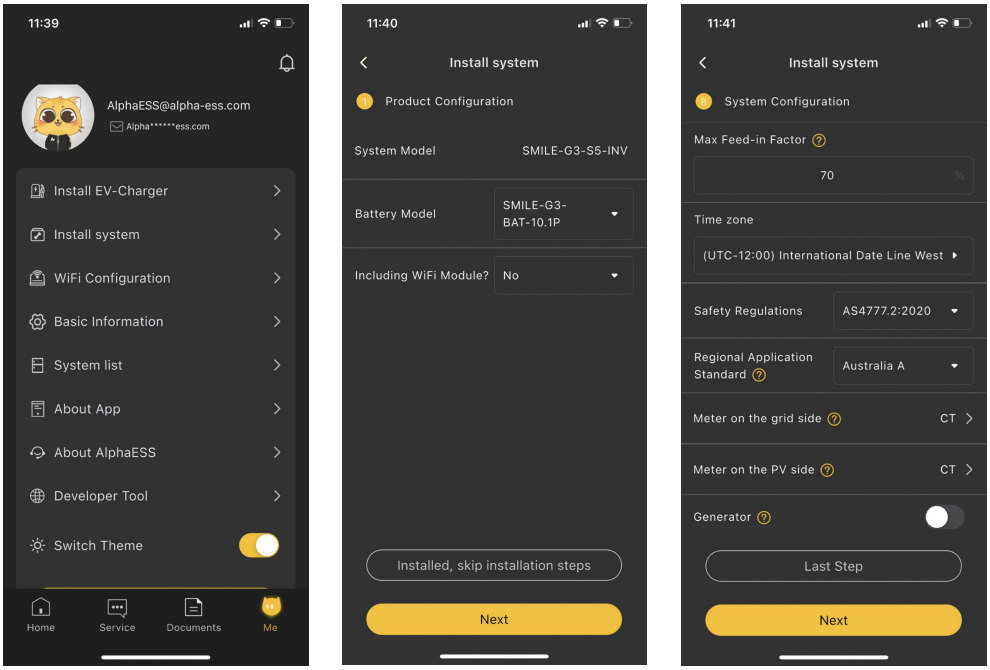



Figure 8-26 Check the installation configuration

**Step 2:**

Select the "P1 Meter" type in the grid-side electricity meter.

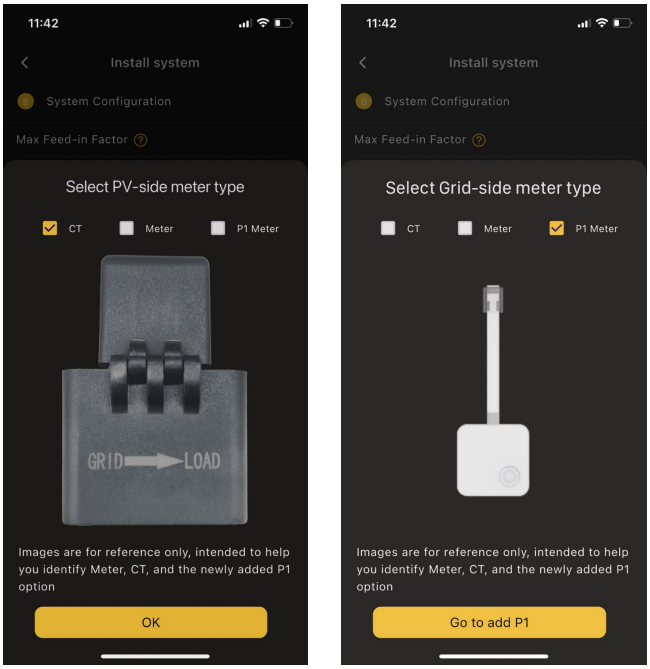



Figure 8-27 Select "P1 Meter"

**Step 3:**

Proceed to add, and select the addition method:

Method 1: Scan the QR code on the P1 Reader.

Method 2: Search for nearby P1 Reader via Bluetooth.

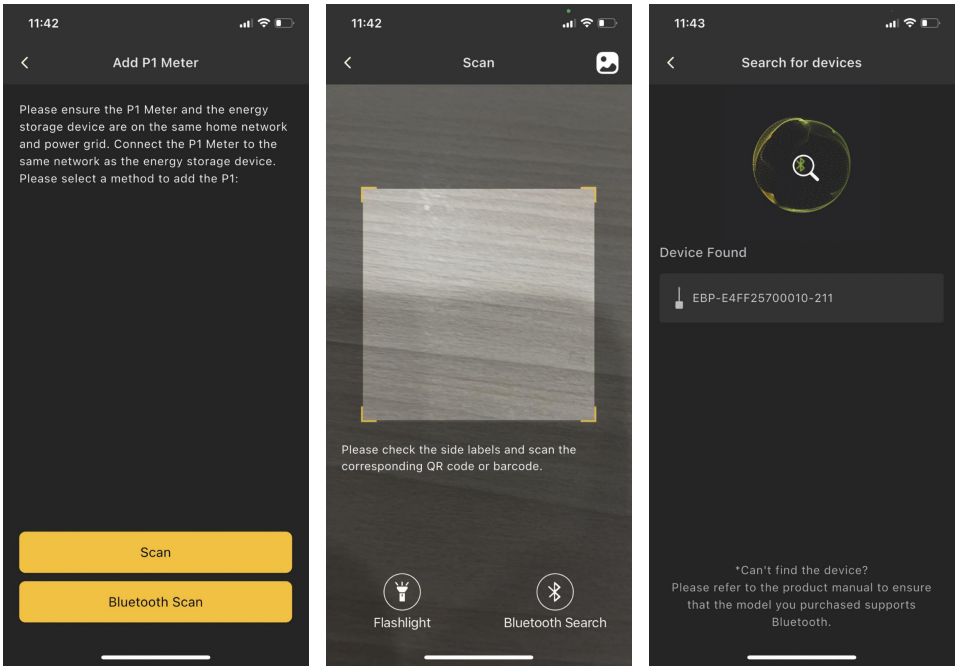



Figure 8-28 Add "P1 Meter"

**Step 4:**

Input pairing code.

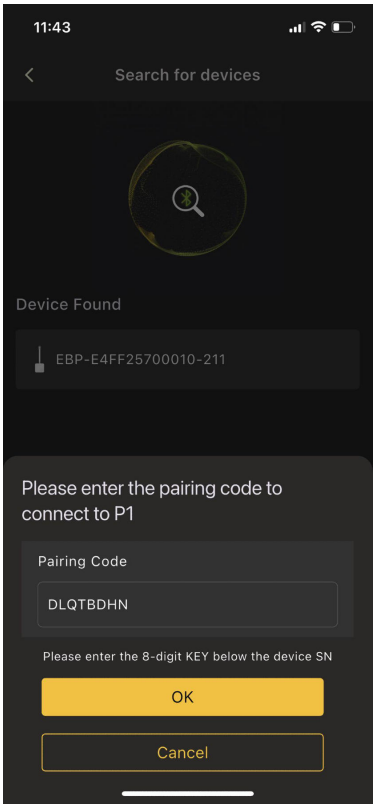



Figure 8-29 Input pairing code

**Step 5:**

Connect to Wi-Fi, then manually select the Wi-Fi name and enter the password.

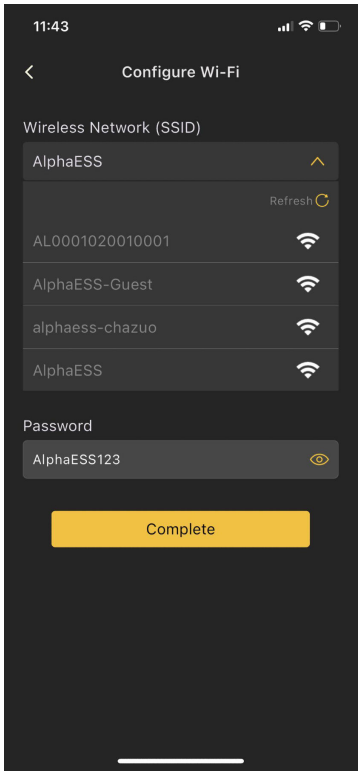



Figure 8-30 Connect to Wi-Fi

**Step 6:**

Click "Finish" and wait for the App to prompt "P1 has been successfully launched".

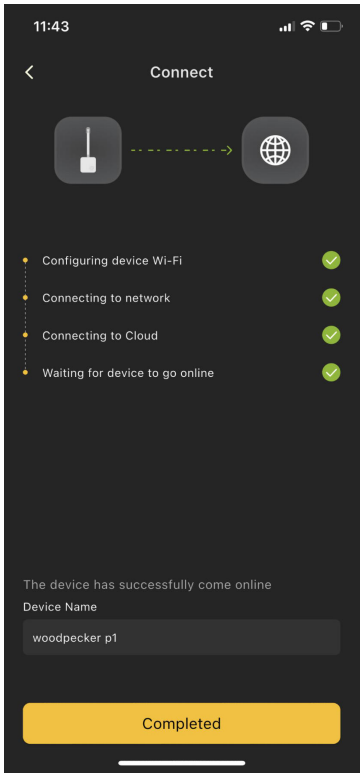



Figure 8-31 Connection Completion Diagram

**Step 7:**

Return to the configuration page, confirm that the P1 information is displayed (electric

meter name, serial number, grid data), and complete the P1 configuration.

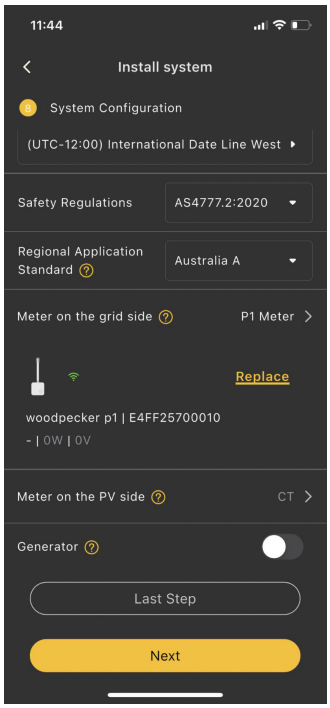



Figure 8-32 Confirm that the P1 information has been displayed

# 9. Maintenance and Troubleshooting

## 9.1. Routine Maintenance

Normally, the energy storage system needs no maintenance or calibration.

However, in order to maintain the accuracy of the SOC, it is recommended to perform a full charge calibration for SOC (charge the battery until the charge power is 0W) on the battery at regular intervals (such as two weeks).

Before cleaning, ensure that the system is disconnected from all power sources. Clean the housing, cover and display panel with a soft cloth.

To ensure that the energy storage system can operate properly in the long term, it is advised to perform routine maintenance as described in this chapter.

**Maintenance Checklist**

| Check Item | Acceptance Criteria | Maintenance Interval |
|---|---|---|
| Product cleanliness | The enclosure of the inverter should be free from obstacles or dust. | Once every 6 to 12 months |
| Product visible damage | The product should be not damaged or deformed. | Once every 6 months |
| Product running status | 1. The product should operate without any abnormal sound.<br>2. All parameters of the product should be set correctly. Perform this check when the product is running. | Once every 6 months |
| Electrical connections | 1. Cables should be securely connected.<br>2. Cables should be intact, and in particular, the cable jackets touching the metallic surface should not be scratched.<br>3. Unused cable glands should be blocked by rubber sealing which are secured by pressure caps. | Perform the first maintenance 6 months after the initial commissioning.<br>Thereafter, perform the maintenance once every 6 to 12 months. |

CAUTION

**Risk of burns due to hot enclosure of the inverter**

The enclosure of the inverter can get hot during operation.

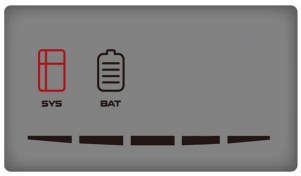
- Do not touch any parts other than the display panel during operation.
- Wait approximately 30 minutes for the inverter to cool down before cleaning.

## 9.2. Troubleshooting

### 9.2.1. Common Errors

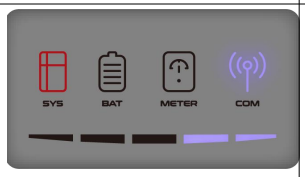
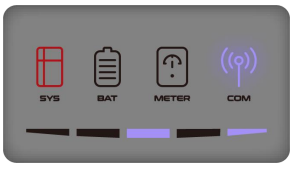
Communication Troubleshooting

| LED Indictor | Error Code | LED Display | Description | Troubleshooting |
|---|---|---|---|---|
| SYS red light is flashing fast | 4 |  | Inverter lost | Inverter communication lost<br>1. Restart the system.<br>2. Contact customer service to remotely update the inverter program.<br>3. If the error persists, contact customer service for further check. |
| SYS red light is glowing.<br>METER light is flashing fast if | 5 |  | Grid meter lost | Grid side meter lost<br>1. Check whether the system configuration parameters of AlphaESS APP or Alphacloud are correct and whether the meter is used on the grid side<br>2. Check whether the communication cable of the grid meter is connected correctly (RS485：3A6B).<br>3. Check whether the communication configuration parameters of the grid meter are correct (communication address and baud rate).<br>4. If the error persists, contact customer service for further check. |

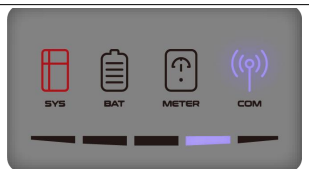
| | | | | |
|---|---|---|---|---|
| Grid meter lost.<br><br>METER light is flashing slow if PV meter lost .<br>METER light is off if all meters lost. | 6 |  | PV meter lost | PV inverter side meter lost<br>1. Check whether the system configuration parameters of<br>AlphaESS APP or Alphacloud are correct and whether the meter is used on the PV inverter side<br>2. Check whether the communication cable of the meter of PV inverter side is connected correctly (RS485：3A6B).<br>3. Check whether the communication configuration parameters of the meter on the PV inverter side are correct (communication address and baud rate).<br>4. If the error persists, contact customer service for further check |
| SYS red light is glowing, BAT light is off | 7 |  | BMS lost | BMS lost<br>1. Check whether the BMS communication connection between the battery and the inverter is correct.<br>2. Check if the battery is switched on.<br>3. If the error persists, contact service for further check. |
| SYS red light is flashing fast<br>SOC is not illuminated | 34 |  | parallel_host_lost | 1. Check the parallel machine communication lines;<br>2. Contact the after-sales service to determine if the communication error of the parallel machine is caused by the EMS software not supporting it. If so, upgrade the software;<br>3. Replace the EMS board. |
| | 35 |  | parallel_form_lost | 1. Check the parallel machine communication lines;<br>2. Contact the after-sales service to determine if the communication error of the parallel machine is caused by the EMS software not supporting it. If so, upgrade the software;<br>3. Replace the EMS board. |

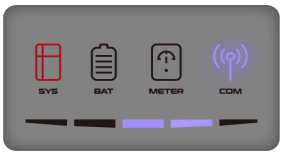
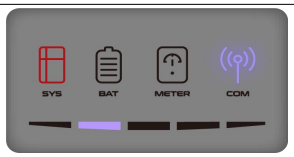
| | | | | |
|---|---|---|---|---|
| | 36 |  | pvcharger_host_lost | 1. Check the parallel machine communication lines (PVCharger uses 485 communication);<br>2. Replace the EMS board. |

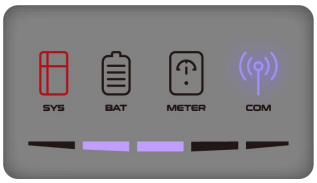
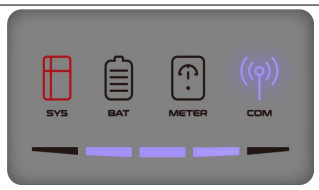
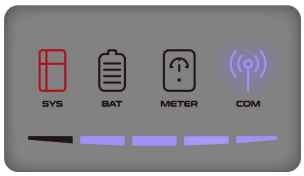
Battery Error Troubleshooting

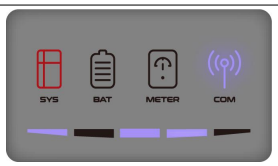
| LED Indictor | Error Code | LED Display | Description | Troubleshooting |
|---|---|---|---|---|
| SYS red light is glowing, BAT light is flashing during battery is in faulty. | 60002 |  | Circuit_Breaker_Open | Try to switch on the circuit breakers of all batteries.<br>If the error persists, contact customer service for further check. |
| | 60004 |  | Follower_Battery_ Communication_Lost | Check the communication cables between batteries.<br>If the error persists, contact customer service for further check. |
| | 60006 |  | Host_Battery_Communication_Lost | |
| | 60008 |  | Multi_Master_error | |

Inverter Error Troubleshooting

| LED Indictor | Error Code | LED Display | Description | Troubleshooting |
|---|---|---|---|---|
| SYS red light is | 100000 |  | Grid_OVP | 1. Check whether grid is abnormal.<br>2. Confirm whether the grid cable connection is normal.<br>3. Restart inverter.<br>If the error persists, contact customer service for further check. |
| | 100001 |  | Grid_UVP | 1. Check whether the PV input voltage of PV1 and PV2 exceeds 580V. If there is no PV input overvoltage, restart the inverter. |

| | | | | |
|---|---|---|---|---|
| flashing fast. | 100002 |  | Grid_OFP | If the error persists, contact customer service for further check. |
| | 100003 |  | Grid_UFP | 1. Check whether the PV input voltage of PV1 and PV2 exceeds 580V. If there is no PV input overvoltage, restart the inverter.<br>If the error persists, contact customer service for further check. |
| | 100005 |  | BUS_OVP1 | |
| | 100007 |  | Insulation_ fault | 1. Check whether PV cable connection is reliable.<br>2. Check whether PV cable is damaged.<br>If the error persists, contact customer service for further check. |
| | 100008 |  | GFCI_fault | 1. Restart inverter and check whether the error persists.<br>If it so, please call customer service. |
| | 100010 |  | Grid_relay_ fault | |
| | 100011 |  | Over_ Temperature | 1. Check whether the environment around inverter has poor heat dissipation.<br>2. Confirm whether inverter installation meets the installation requirements. |
| SYS red light is flashing fast | 100012 |  | PV_Reverse | 1.Check whether the PV terminal of the inverter is reversed.<br>If the connection of PV terminals is right and the error persists, please call customer service. |
| | 100013 |  | BAT_Reverse | 1.Check whether the BAT terminal of the inverter is reversed. If the connection of BAT terminals is right and the error persists, please call customer service. |

| | | | | |
|---|---|---|---|---|
| SYS red | 100017 |  | MPPT1_OVP | Check the PV1 voltage.<br>If it exceeds 585VDC, reduce the number of PV modules. |
| | 100021 |  | MPPT2_OVP | Check the PV2 voltage.<br>If it exceeds 585V, reduce the number of PV modules. |
| | 100025 |  | BAT_OVP | Check whether the actual battery voltage exceeds the battery charge cut-off voltage by more than 20V. |
| | 100026 |  | BAT_UVP | 1. Check whether the actual battery voltage is lower than the battery discharge cut-off voltage.<br>If the error persists, contact customer service for further check. |
| | 100027 |  | Battery_lose | 1. Confirm whether the battery communication cable connection is normal.<br>2. Check whether the battery voltage sampling value is less than 75V.<br>If the error persists, contact customer service for further check. |
| | 100042 |  | Output_short_circuit | 1. Use a multimeter to test the impedance of the off-grid output. If it is low, check whether the wiring is correct.<br>2. Restart the inverter.<br>If the error persists, contact customer service for further check. |
| | 100043 |  | Output_ overload | Check whether the load exceeds the rated power.<br>2. Restart the inverter.<br>If the error persists, contact customer service for further check. |

| | | | | |
|---|---|---|---|---|
| light is flashing fast. | 100052 |  | Backup_ovp | 1. Restart the inverter.<br>If the error persists, contact customer service for further check. |
| | 100211 |  | Para_CAN | Check the communication cables connection between inverters.<br>If the error persists, contact customer service for further check. |
| | 100213 |  | Para_SW_Diff | Check the inverter software versions. If they are inconsistent, upgrade the inverters to the same software version. |
| | 100214 |  | Para_Module_Fault | Check parallel inverter mode settings. Only one host is allowed. |
| | 100216 |  | Para_Multi_ Master | |

### 9.2.2. Battery Protection Description for Series Battery

The three LED indicators on the front cover provide information about the protection status of the battery.

 : Yellow LEDs flashing

 : Yellow LEDs on

 : Yellow LEDs off

| LED Display State | Description | Troubleshooting |
|---|---|---|
|  | Temperature difference | Wait for automatic recovery.<br>If this protection state persists, please call customer service. |
|  | High temperature | Stop discharging and charging until this protection state disappears. Wait for the temperature to drop. |
|  | Low temperature discharge | Stop discharging until this protection state disappears. Wait for the temperature to rise. |

| | | |
|---|---|---|
| | Overcurrent charge | Wait for automatic recovery.<br>If this protection state persists, please call customer service. |
| | Overcurrent discharge | |
| | Cell overvoltage | Wait for automatic recovery.<br>If this protection state persists for a long time, please call customer service. |
| | Cell under voltage | Stop discharging and call customer service immediately. |
| | Low temperature charge | Stop charging until this protection state disappears. Wait for the temperature to rise. |

**NOTICE**

During work mode, if the protection status "Cell under voltage" appears, please take the following action:

First switch off the circuit breaker which is located at the lower left of the battery, switch on the circuit breaker and wait for 3~5 seconds, switch off the circuit breaker, then switch on the circuit breaker and wait for 3~5 seconds, switch off the circuit breaker, at last switch on the circuit breaker of the battery. The BMS will be forced to turn on the MOSFET of discharge so that the inverter can detect the battery's open voltage and begin charging the battery.

### 9.2.3. Battery Error Description

The three LED indicators on the front cover provide information about the error status of the battery.

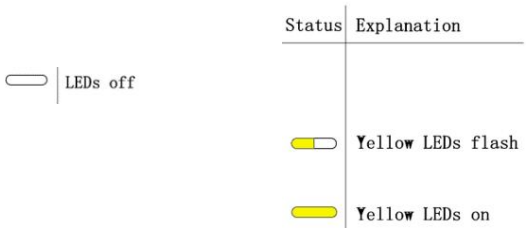
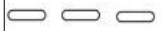



Figure 9-1 LED display

| LED Display State | Description | Troubleshooting |
|---|---|---|
| | Hardware error | Wait for automatic recovery. |

| | | |
|---|---|---|
|  | | If this error persists, please call customer service. |
|  | Hardware error | |
|  | Circuit breaker open | Switch on circuit breaker after powering off the battery. |
|  | LMU disconnect (follower) | Reconnect the BMS communication cable. |
|  | SN missing | Please call customer service. |
|  | LMU disconnect (host) | Reconnect the BMS communication cable. |
|  | Software version inconsistent | Please call customer service. |
|  | Multi-host | Restart all batteries. |
|  | MOS over temperature | Power off the battery and power on the battery after 30 minutes. |
|  | Insulation fault | Restart battery.<br>In case this error persists, please call customer service. |
|  | Total voltage fault | Restart battery.<br>In case this error persists, please call customer service. |
|  | Precharge failure | Restart battery.<br>In case this error persists, please call customer service. |

# 10. Product Removal & Return

## 10.1. Removing the Product

Procedure

Step 1: Power off the energy storage system as described in Chapter 8.2 Powering off the System.
Step 2: Disconnect all cables from the system, including communication cables, PV power cables, battery power cables, AC cables, and PE cables.
Step 3: Remove the Wi-Fi module.
Step 4: Remove the cable covers of the inverter and the battery.Remove the right cover of the inverter.
Step 5: Remove the inverter from the top of the battery.
Step 6: Remove the batteries.
Step 7: Remove the battery wall brackets.

## 10.2. Packing the Product

If the original packaging is available, put the product inside it and then seal it using adhesive tape.

If the original packaging is not available, put the product inside a suitable cardboard box and seal it properly.

## 10.3. Disposing of the Product

If the product's service life expires, dispose of it according to the local disposal rules for electrical equipment and electronic waste.

Dispose of the packaging and replaced parts according to the rules at the installation site where the device is installed.

Do not dispose the product with regular household waste.



# 11. Technical Data

## 11.1. Datasheet of SMILE-G3 Single Phase Inverter

| Ite | SMILE-G3-S5 -INV | SMILE-G3-S3.6 -INV | SMILE-G3-B5 -INV |
|---|---|---|---|
| **Input DC (PV side)** | | | |
| **Recommended max. PV power** | 10000 W | 7360 W | N/A |
| **Max. PV input voltage** | 580 V | | N/A |
| **Rated voltage** | 360 V | | N/A |
| **Start-up voltage** | 90 V | | N/A |
| **MPPT voltage range** | 100 ~ 550 V | | N/A |
| **Max. input current per MPPT** | 16 A / 16 A | | N/A |
| **Max. short circuit current per MPPT** | 24 A / 24 A | | N/A |
| **MPPT number** | 2 | | N/A |
| **Max. input strings number per MPPT** | 1 | | N/A |
| **Surge category in accordance with IEC 62109-1** | II | | N/A |
| **Battery** | | | |
| **Battery type** | LFP ($LiFePO_4$) | | |
| **Battery voltage range** | 80 ~ 450 V | | |
| **Max. charge power** | 5 kW | 3.68 kW | 5 kW |
| **Max. discharge power** | 5 kW | 3.68 kW | 5 kW |
| **Max. charge/ discharge current** | 60 A / 60 A | | |
| **Communication** | CAN | | |

| Output AC (Back-up, on Grid) | | | |
|---|---|---|---|
| **Rated output power** | 5 kW | 3.68 kW | 5 kW |
| **Rated apparent output power** | 5 kVA | 3.68 kVA | 5 kVA |
| **Rated output current** | 21.7 A | 16 A | 21.7 A |
| **Rated output voltage** | L/N/PE, 230 V | | |
| **Rated frequency** | 50/60 Hz | | |
| **Output AC (Back-up, off Grid)** | | | |
| **Rated output power** | 5 kW | 3.68 kW | 5 kW |
| **Rated apparent output power** | 5 kVA | 3.68 kVA | 5 kVA |
| **Rated output current** | 21.7 A | 16 A | 21.7 A |
| **Max. continuous output power** | 5.5 kW | 4.0 kW | 5.5 kW |
| **Max. continuous output apparent power** | 5.5 kVA | 4.0 kVA | 5.5 kVA |
| **Max. output power ≤ 30s** | 7.5 kW | 5.5 kW | 7.5 kW |
| **Max. output apparent power ≤ 30s** | 7.5 kVA | 5.5 kVA | 7.5 kVA |
| **Max. output power ≤ 1s** | 10 kW | 7.36 kW | 10 kW |
| **Max. output apparent power ≤ 1s** | 10 kVA | 7.36 kVA | 10 kVA |
| **Back-up switch time** | <20ms | | |
| **Rated output voltage** | L/N/PE, 230 V | | |
| **Rated frequency** | 50/60 Hz | | |
| **Input AC (Grid side)** | | | |
| **Rated input power** | 10 kW | 7.36 kW | 10 kW |
| **Max. input current** | 43.5 A | 32 A | 43.5 A |
| **Rated output voltage** | L/N/PE, 230 V | | |

| | | | |
|---|---|---|---|
| **Rated frequency** | 50/60 Hz | | |
| **Output AC (Grid side)** | | | |
| **Rated output power** | 5 kW | 3.68 kW | 5 kW |
| **Rated apparent output power** | 5 kVA | 3.68 kVA | 5 kVA |
| **Rating grid output current** | 21.7 A | 16 A | 21.7 A |
| **Operation phase** | Single phase | | |
| **Rated grid voltage** | L/N/PE, 230 V | | |
| **Grid voltage range** | 180 ~ 270 V | | |
| **Rated grid frequency** | 50 / 60 Hz | | |
| **Power factor** | >0.99 (0.8 leading to 0.8 lagging) | | |
| **THDi** | < 3% | | |
| **Protection class** | I | | |
| **Overvoltage category** | III | | |
| **Surge category in accordance with IEC 60664-1** | II | | |
| **Efficiency** | | | |
| **Max. efficiency** | >97% | | |
| **EU efficiency** | >96.2% | | |
| **Protection** | | | |
| **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 |
| **PV reverse polarity protection** | Integrated |
| **PV overvoltage protection** | Integrated |
| **PV switch** | Integrated |
| **Battery circuit breaker** | Integrated |
| **General data** | |
| **Dimensions (W*H*D)** | 610*366*212 mm |
| **Weight** | 19.5 kg |
| **Topology** | Transformerless |
| **Operation temperature range** | -25 ~ +60 °C |
| **Max. permissible value for relative humidity (condensing)** | 100% |
| **Ingress protection** | IP65 |
| **Display** | LED |
| **Noise emission** | <30 dB(A) @1 m |
| **Cooling concept** | Natural convection |
| **Max. operation altitude** | 3000 m |
| **Features** | |
| **PV connection** | Vaconn D4 connector |
| **Grid connection** | Vaconn plug in connector |
| **Backup connection** | Handa plug in connector |
| **BAT connection** | Screw terminal |
| **Communication** | LAN, Wi-Fi |

| Item | SMILE-G3-S6-INV |
|---|---|
| **Input DC (PV side)** | |
| **Recommended max. PV power** | 10000 W |
| **Max. PV input voltage** | 580 V |
| **Rated voltage** | 360 V |
| **Start-up voltage** | 120 V |
| **MPPT voltage range** | 100 ~ 550 V |
| **Max. input current per MPPT** | 16 A / 16 A |
| **Max. short circuit current per MPPT** | 22.5 A / 22.5A |
| **MPPT number** | 2 |
| **Max. input strings number per MPPT** | 1 |
| **Surge category in accordance with IEC 62109-1** | II |
| **Battery** | |
| **Battery type** | LFP ($LiFePO_4$) |
| **Battery voltage range** | 80 ~ 467.2 V |
| **Max. charge power** | 6 kW |
| **Max. discharge power** | 6 kW |
| **Max. charge/ discharge current** | 60 A / 60 A |
| **Communication** | CAN |
| **Output AC (Back-up, on Grid)** | |
| **Rated output power** | 6 kW |

| | |
|---|---|
| **Rated apparent output power** | 6 kVA |
| **Rated output current** | 26 A |
| **Rated output voltage** | L/N/PE, 230 V |
| **Rated frequency** | 50/60 Hz |
| **Output AC (Back-up, off Grid)** | |
| **Rated output power** | 6 kW |
| **Rated apparent output power** | 6 kVA |
| **Rated output current** | 26 A |
| **Max. continuous output power** | 6.6 kW |
| **Max. continuous output apparent power** | 6.6 kVA |
| **Max. output power ≤ 30 s** | 9 kW |
| **Max. output apparent power ≤ 30 s** | 9 kVA |
| **Max. output power ≤ 1 s** | 12 kW |
| **Max. output apparent power ≤ 1 s** | 12 kW |
| **Back-up switch time** | <20ms |
| **Rated output voltage** | L/N/PE, 230 V |
| **Rated frequency** | 50/60 Hz |
| **Input AC (Grid side)** | |
| **Rated input power** | 11.5 kW |
| **Max. input current** | 50 A |
| **Rated output voltage** | L/N/PE, 230 V |
| **Rated frequency** | 50/60 Hz |
| **Output AC (Grid side)** | |

| | |
|---|---|
| **Rated output power** | 6 kW |
| **Rated apparent output power** | 6 kVA |
| **Rating grid output current** | 26 A |
| **Operation phase** | Single phase |
| **Rated grid voltage** | L/N/PE, 230 V |
| **Grid voltage range** | 150 ~ 287V |
| **Rated grid frequency** | 50 / 60 Hz |
| **Power factor** | >0.99 (0.8 leading to 0.8 lagging) |
| **THDi** | < 3% |
| **Protection class** | I |
| **Overvoltage category** | III |
| **Surge category in accordance with IEC 60664-1** | II |
| **Efficiency** | |
| **Max. efficiency** | >97% |
| **EU efficiency** | >96.2% |
| **Protection** | |
| **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 |

| | |
|---|---|
| **PV reverse polarity protection** | Integrated |
| **PV overvoltage protection** | Integrated |
| **PV switch** | Integrated |
| **Battery circuit breaker** | Integrated |
| **General data** | |
| **Dimensions (W*H*D)** | 610*366*212 mm |
| **Weight** | 20.5 kg |
| **Topology** | Transformerless |
| **Operation temperature range** | -25 ~ +60 °C |
| **Max. permissible value for relative humidity (condensing)** | 100% |
| **Ingress protection** | IP65 |
| **Display** | LED |
| **Noise emission** | <40 dB(A) @1m |
| **Cooling concept** | Fan cooling |
| **Max. operation altitude** | 3000 m |
| **Features** | |
| **PV connection** | Vaconn D4 connector |
| **Grid connection** | Vaconn plug in connector |
| **Backup connection** | Vaconn plug in connector |
| **BAT connection** | Screw terminal |
| **Communication** | LAN, Wi-Fi |

## 11.2. Datasheet of Battery

### 11.2.1. Datasheet of Battery SMILE-G3-BAT-10.1P

| Model | SMILE-G3-BAT-10.1P |
|---|---|
| **Battery type** | LFP ($LiFePO_4$) |
| **Rated capacity** | 99.7 Ah |
| **Weight** | 90 kg |
| **Dimension (W*H*D)** | 610*790*210 mm |
| **Ingress protection** | IP65 |
| **Installed energy** | 10.1 kWh |
| **Usable energy** | 9.6 kWh |
| **DoD** | 95% |
| **Nominal voltage** | 96 V |
| **Operating voltage range** | 90 to 108 V |
| **Max. continuous charge current*** | 52.5 A |
| **Max. continuous discharge current*** | 52.5 A |
| **Operating temperature range** | Charge: 0＜T≤50℃<br>Discharge: -10＜T≤50℃ |
| **Monitoring parameters** | System voltage, current, cell voltage,<br>cell temperature, PCBA temperature |
| **BMS communication** | CAN |
| **System** | |
| **Safety** | IEC62619 / IEC63056 / IEC62040 |
| **Transportation** | UN38.3 |

* Max. charge/discharge current derating may occur with changes in temperature and SOC.

### 11.2.2. Datasheet of Battery SMILE-G3-BAT-3.8S

| Model | SMILE-G3-BAT-3.8S |
|---|---|
| **Battery type** | LFP (LiFePO4) |
| **Rated capacity** | 38 Ah |
| **Weight** | 38.5 kg |
| **Dimension (W*H*D)** | 610*435*212 mm |
| **Ingress protection** | IP21 |
| **Installed energy** | 3.84 kWh |
| **Usable energy** | 3.65 kWh |
| **DoD** | 95% |
| **Nominal voltage** | 96 V |
| **Operating voltage range** | 90 ~ 105.6 V |
| **Max. continuous charge current*** | 40 A |
| **Max. continuous discharge current*** | 40 A |
| **Operating temperature range** | Charge：0＜T≤50 ℃<br>Discharge：-10＜T≤50 ℃ |
| **Monitoring parameters** | System voltage, current, cell voltage,<br>cell temperature, PCBA temperature |
| **BMS communication** | CAN |
| **System** | |
| **Safety** | IEC62619 / IEC63056 / IEC62040 |
| **Transportation** | UN38.3 |

* Max. charge/discharge current derating may occur with changes in temperature and SOC.

### 11.2.3. Datasheet of Battery SMILE-G3-BAT-4.5S

| Model | SMILE-G3-BAT-4.5S |
|---|---|

| | |
|---|---|
| **Battery type** | LFP (LiFePO4) |
| **Rated capacity** | 47.5 Ah |
| **Weight** | 53 kg |
| **Dimensions (W*H*D)** | 610*435*212 mm |
| **Ingress protection** | IP65 |
| **Installed energy** | 4.8 kWh |
| **Usable energy** | 4.56 kWh |
| **DoD** | 95% |
| **Nominal voltage** | 96 V |
| **Operating voltage range** | 90 ~ 105.6 V |
| **Max. charge current*** | 50 A |
| **Max. discharge current*** | 50 A |
| **Operating temperature range** | Charge: -20 ≤ T ≤ 50 °C<br>Discharge: -20 ≤ T ≤ 50 °C |
| **Monitoring parameters** | System voltage, current, cell voltage,<br>cell temperature, PCBA temperature |
| **BMS communication** | CAN |
| **System** | |
| **Safety** | IEC62619 / IEC63056 / IEC62040 |
| **Transportation** | UN38.3 |

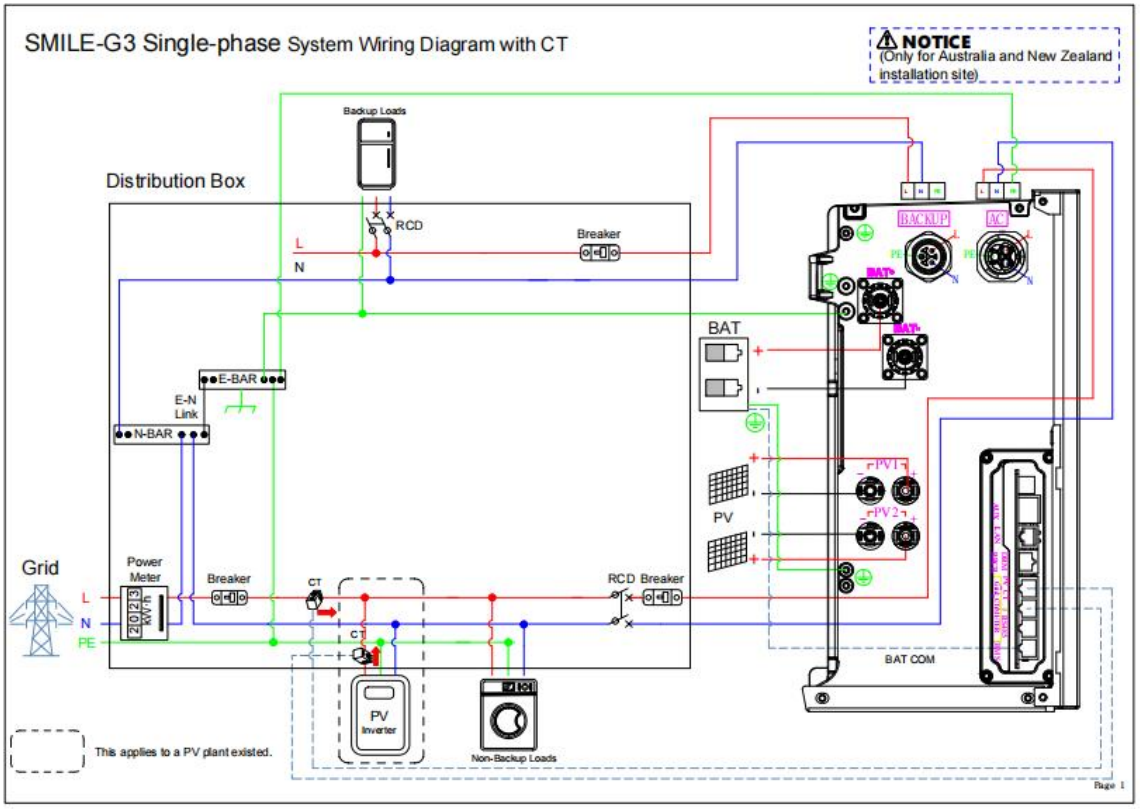
* Max. charge/discharge current derating may occur with changes in temperature and SOC.

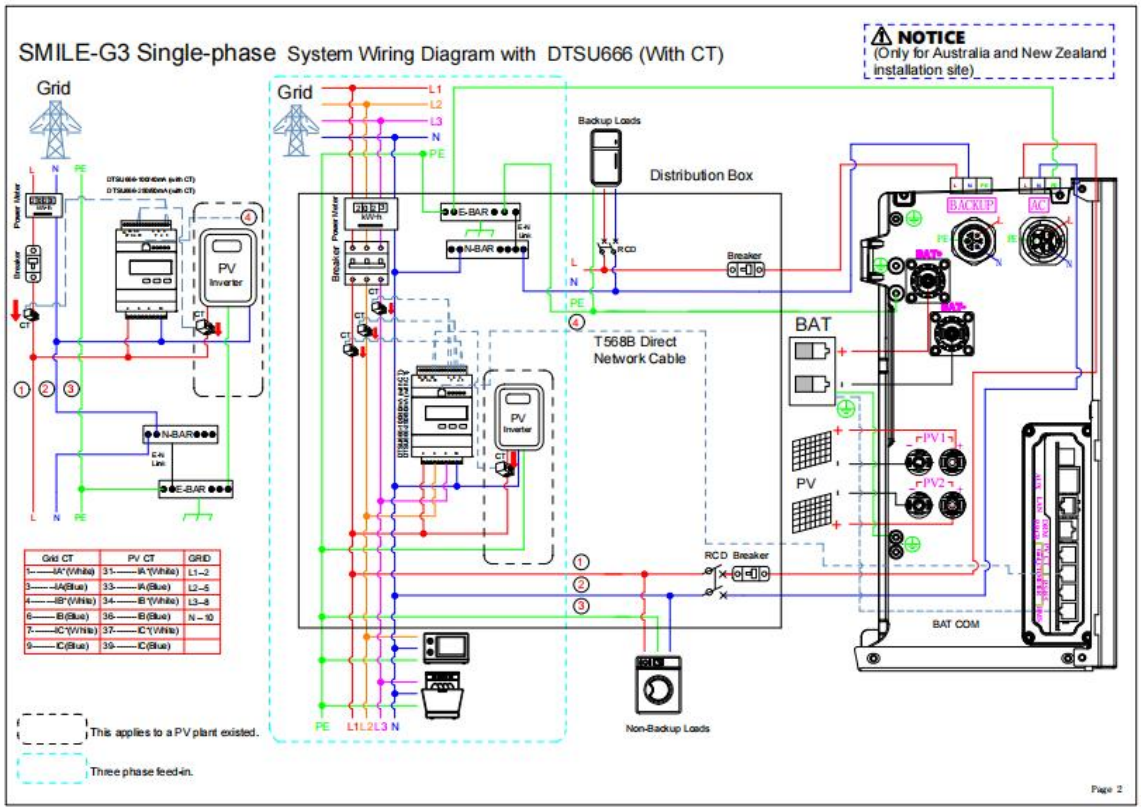
### 11.2.4. Datasheet of Battery SMILE-G3-BAT-9.3S

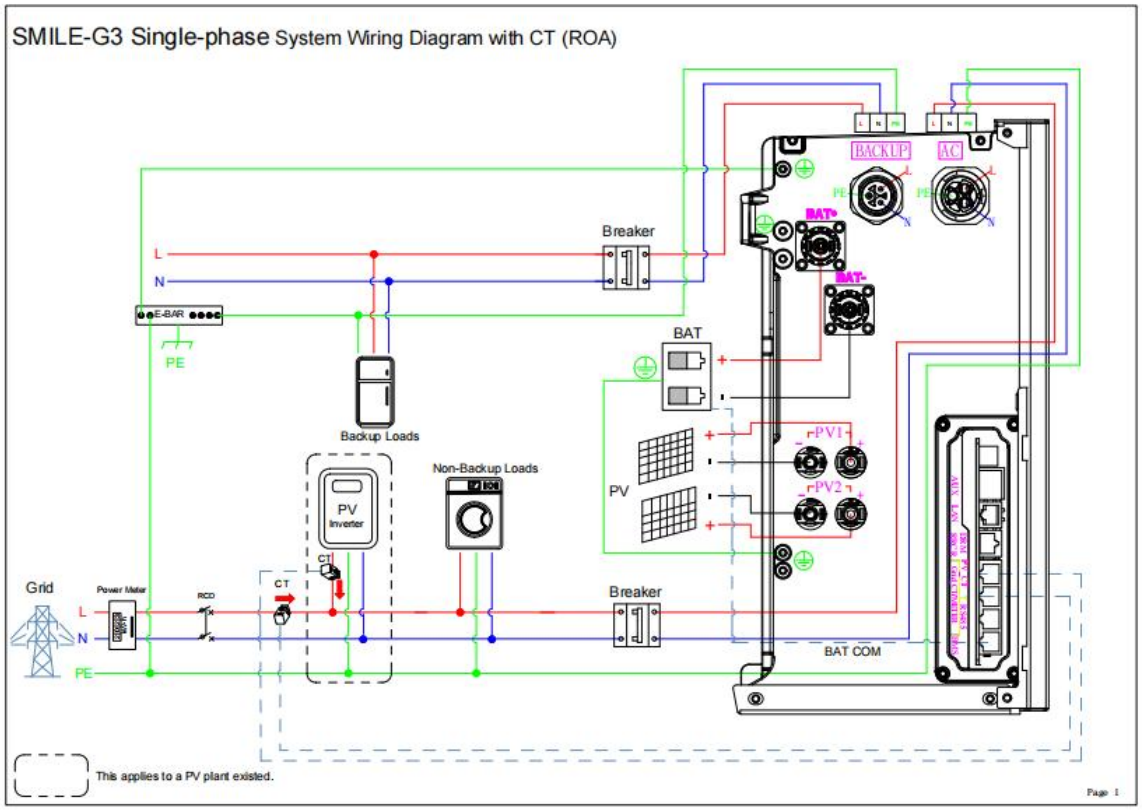
| Model | SMILE-G3-BAT-9.3S |
|---|---|
| **Battery type** | LFP (LiFePO4) |
| **Weight** | 81 kg |
| **Dimensions (W*H*D)** | 610*634*212 mm |
| **Ingress protection** | IP65 |
| **Nominal energy** | 9.3 kWh |
| **Usable energy** | 9.3 kWh |
| **DoD** | 100% |
| **Nominal voltage** | 96 V |
| **Operating voltage range** | 90 ~ 105.6 V |
| **Max. charge current*** | 52.5 A |
| **Max. discharge current*** | 52.5 A |
| **Operating temperature range** | Charge: -20 ≤ T ≤ 50 °C<br>Discharge: -20 ≤ T ≤ 50 °C |
| **Monitoring parameters** | System voltage, current, cell voltage,<br>cell temperature, PCBA temperature |
| **BMS communication** | CAN |
| **System** | |
| **Safety** | IEC62619 / IEC63056 / IEC62040 |
| **Transportation** | UN38.3 |

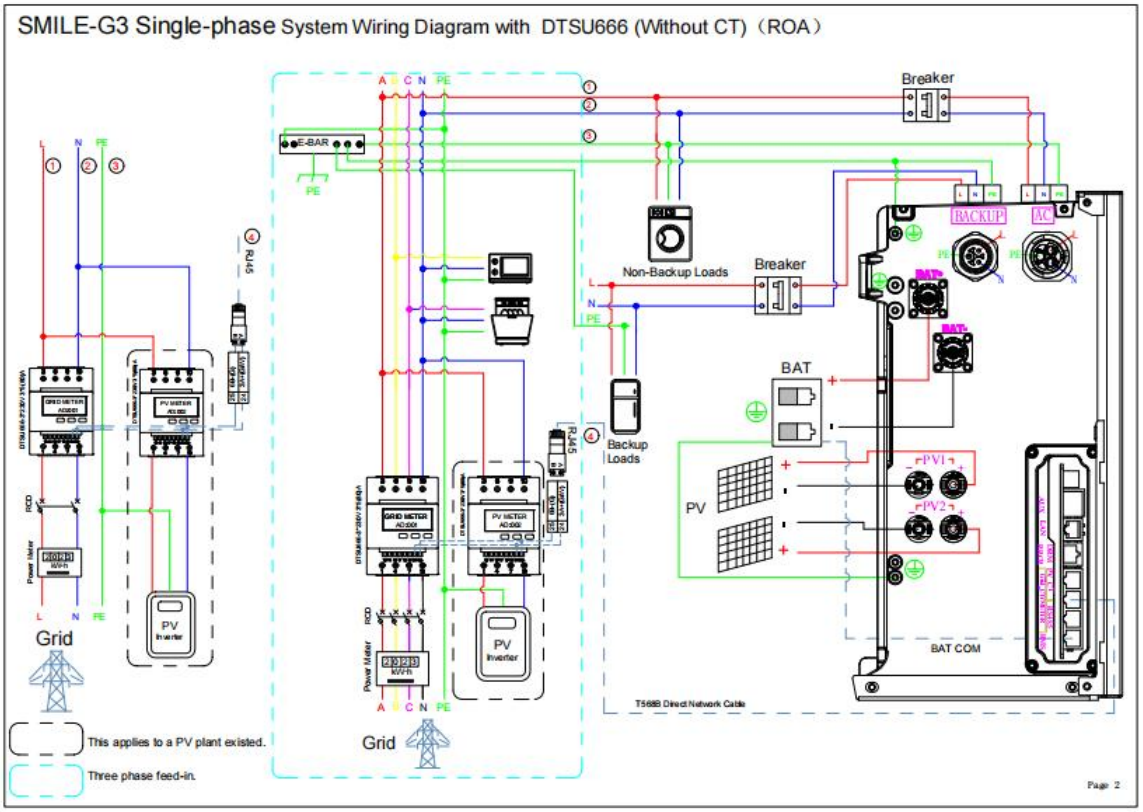
* Max. charge/discharge current derating may occur with changes in temperature and SOC.

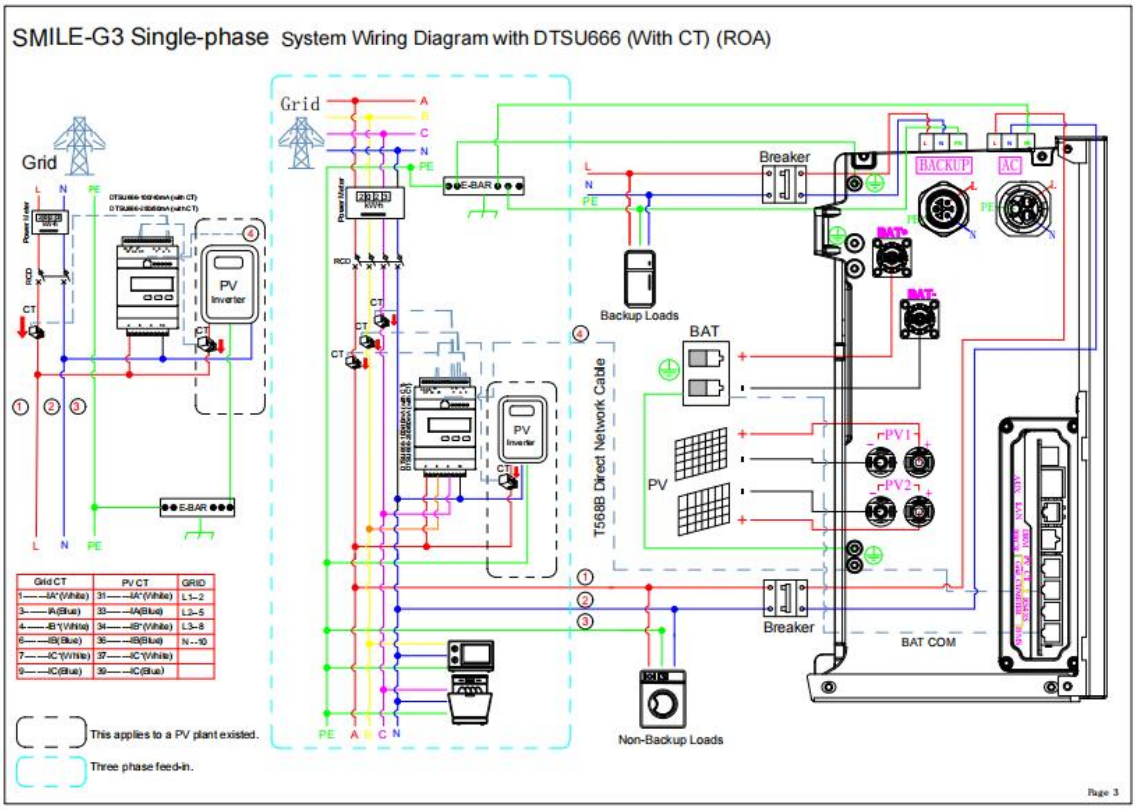
# Appendix 1: System Wiring Diagram

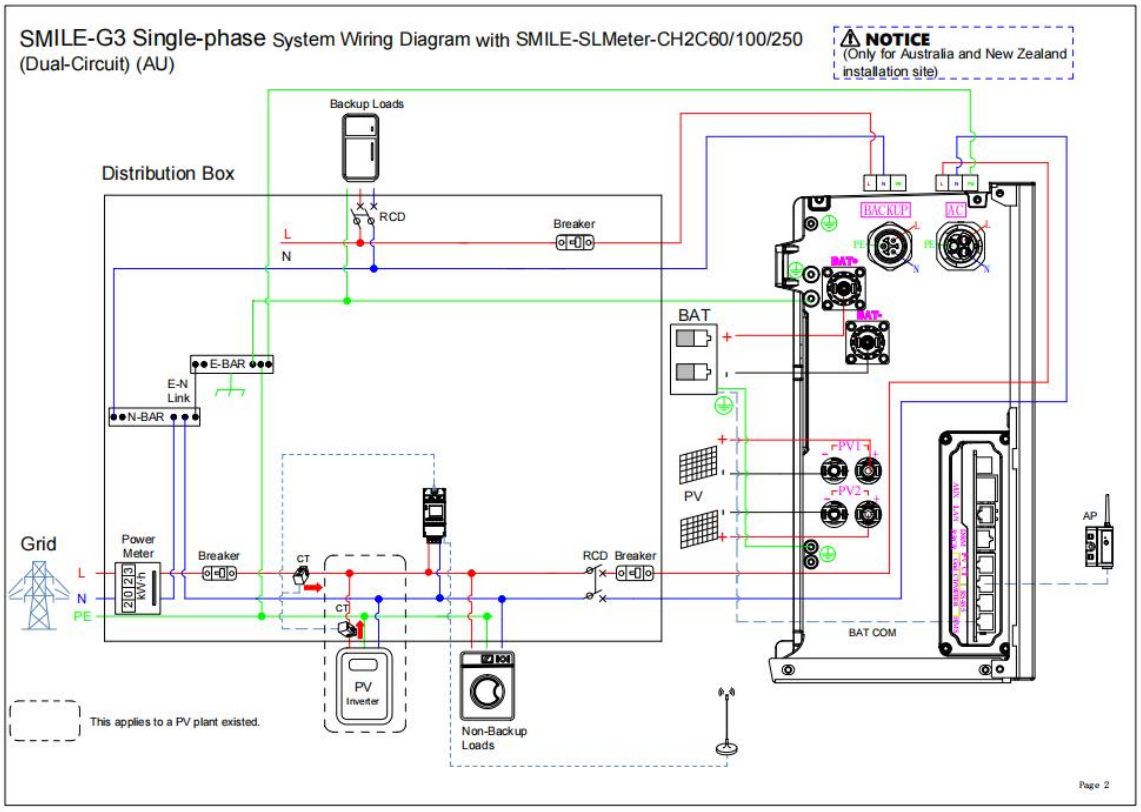


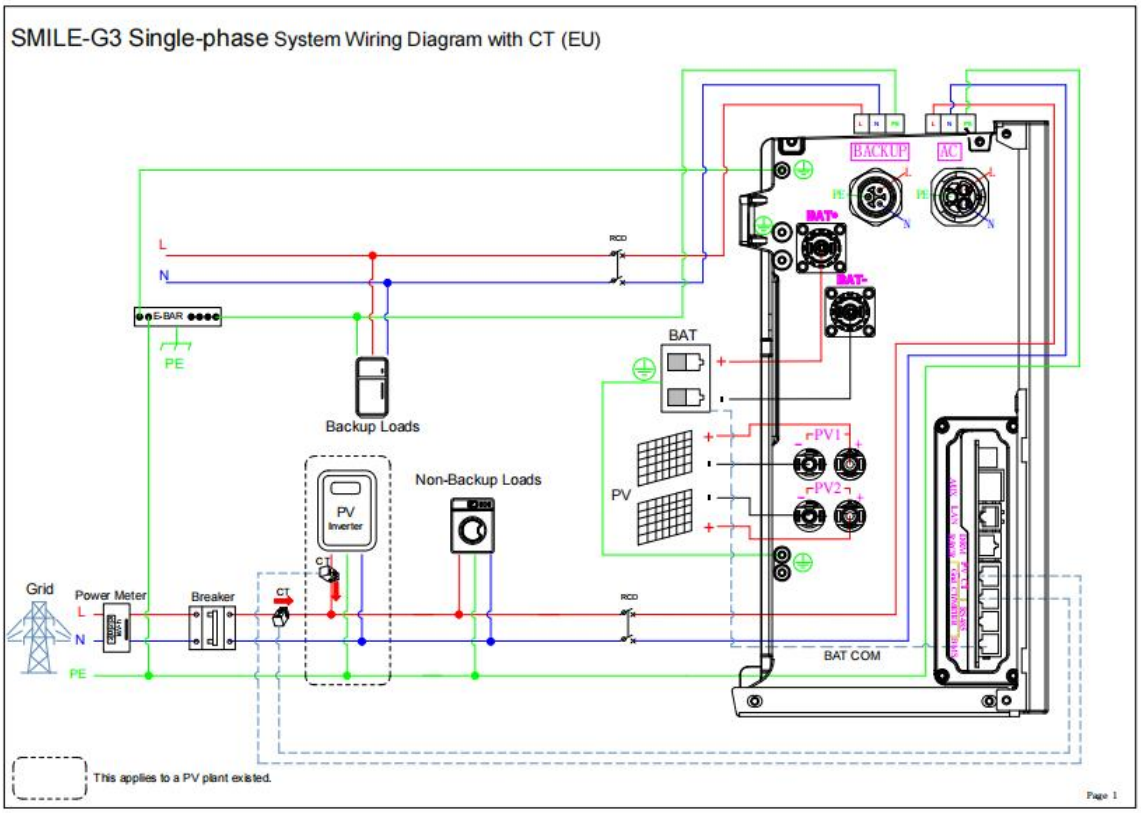



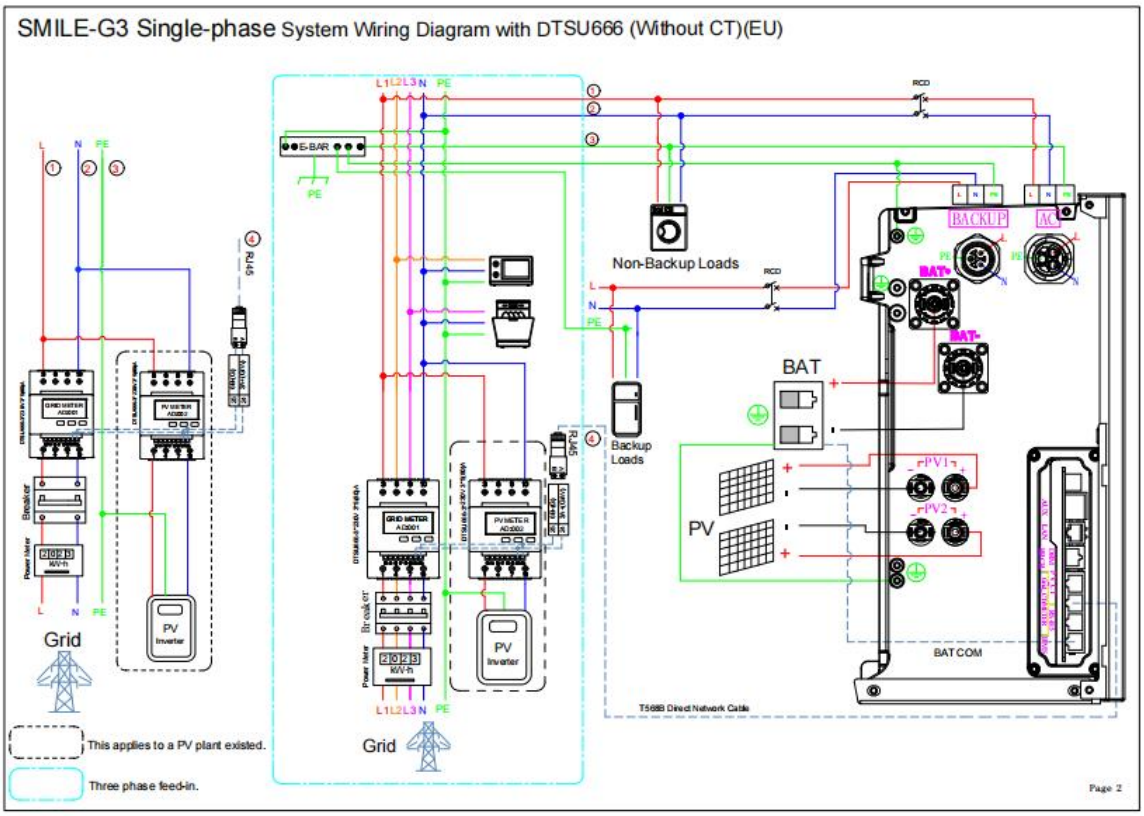

SMILE-G3 Single-phase System Wiring Diagram with CT (ROA)
L
N
PE
E-BAR
Breaker
BAT
Backup Loads
Non-Backup Loads
PV Inverter
CT
PV
PV1
PV2
BACKUP
AC
BAT+
BAT-
Grid
Power Meter
RCD
BAT COM
This applies to a PV plant existed.
Page 1

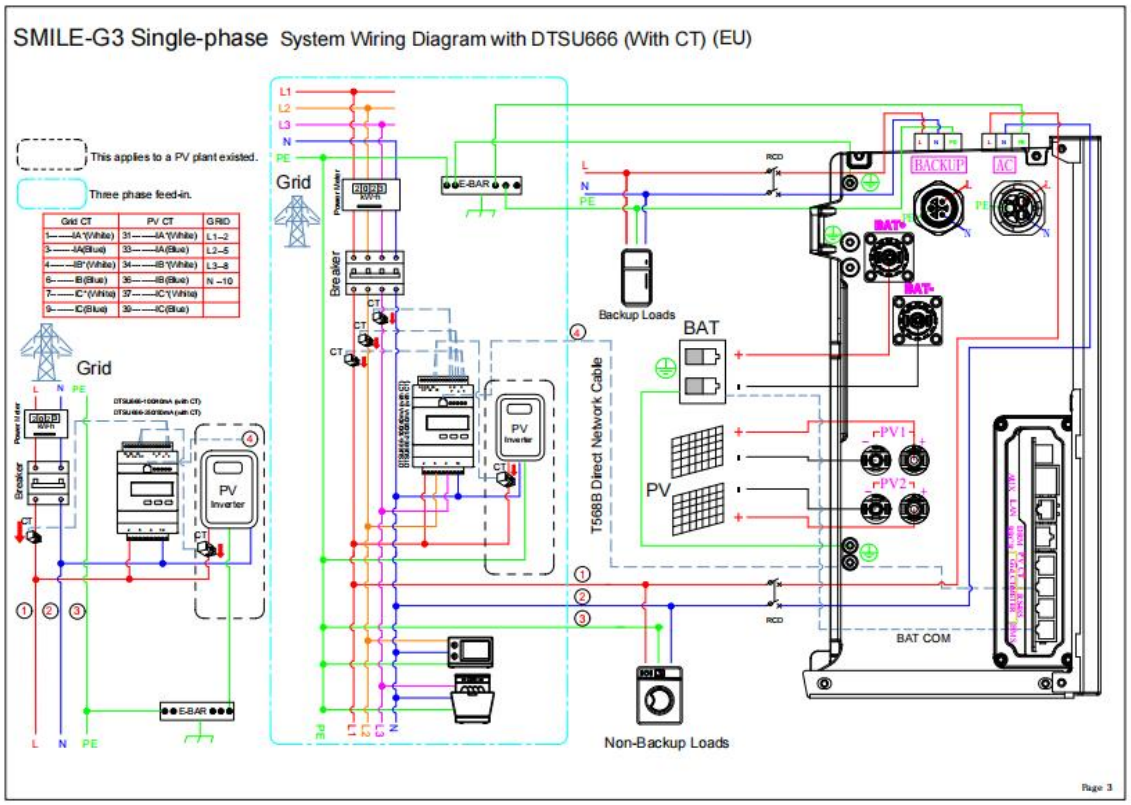

SMILE-G3 Single-phase System Wiring Diagram with DTSU666 (Without CT)（ROA）
A B C N PE
E-BAR
Breaker
Non-Backup Loads
Backup Loads
BAT
PV
PV1
PV2
BACKUP
AC
BAT+
BAT-
BAT COM
RJ45
RS485
RCD
Power Meter
Grid
PV Inverter
T568B Direct Network Cable
This applies to a PV plant existed.
Three phase feed-in.
Page 2

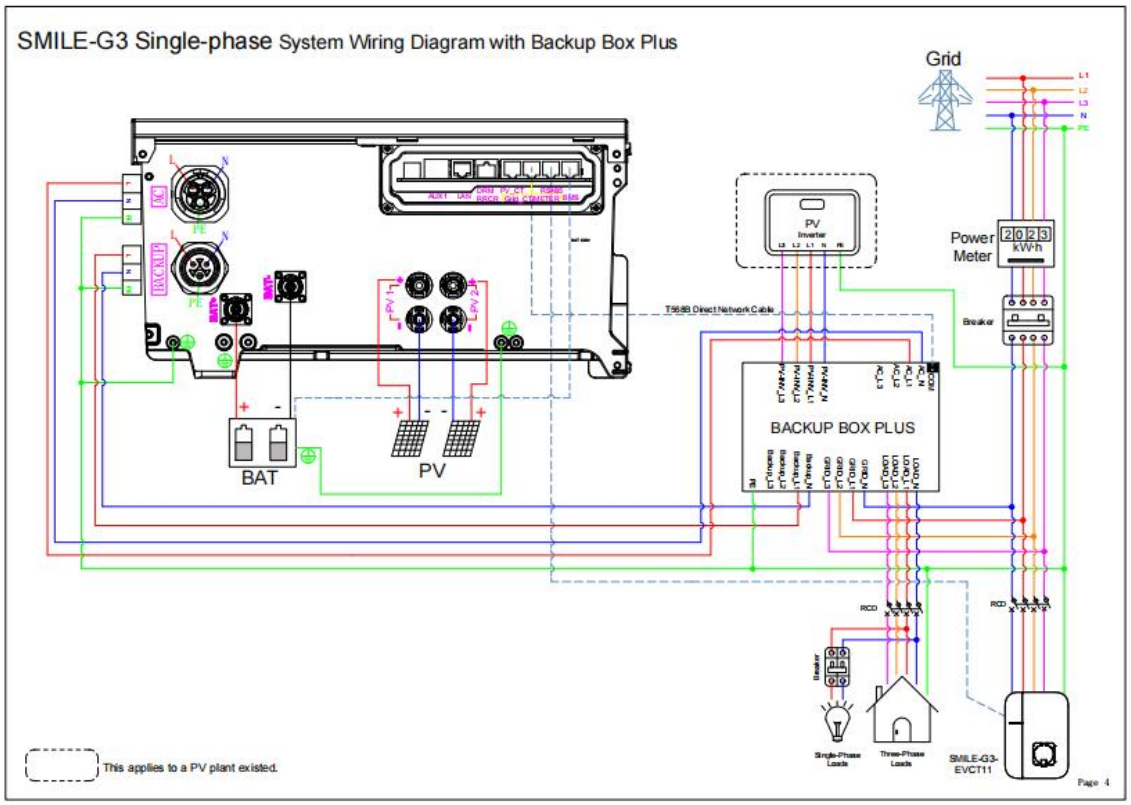

SMILE-G3 Single-phase System Wiring Diagram with DTSU666 (With CT) (ROA)
Grid
PV Inverter
E-BAR
Breaker
BACKUP
AC
Backup Loads
BAT
PV
T568B Direct Network Cable
BAT COM
Non-Backup Loads
This applies to a PV plant existed.
Three phase feed-in.

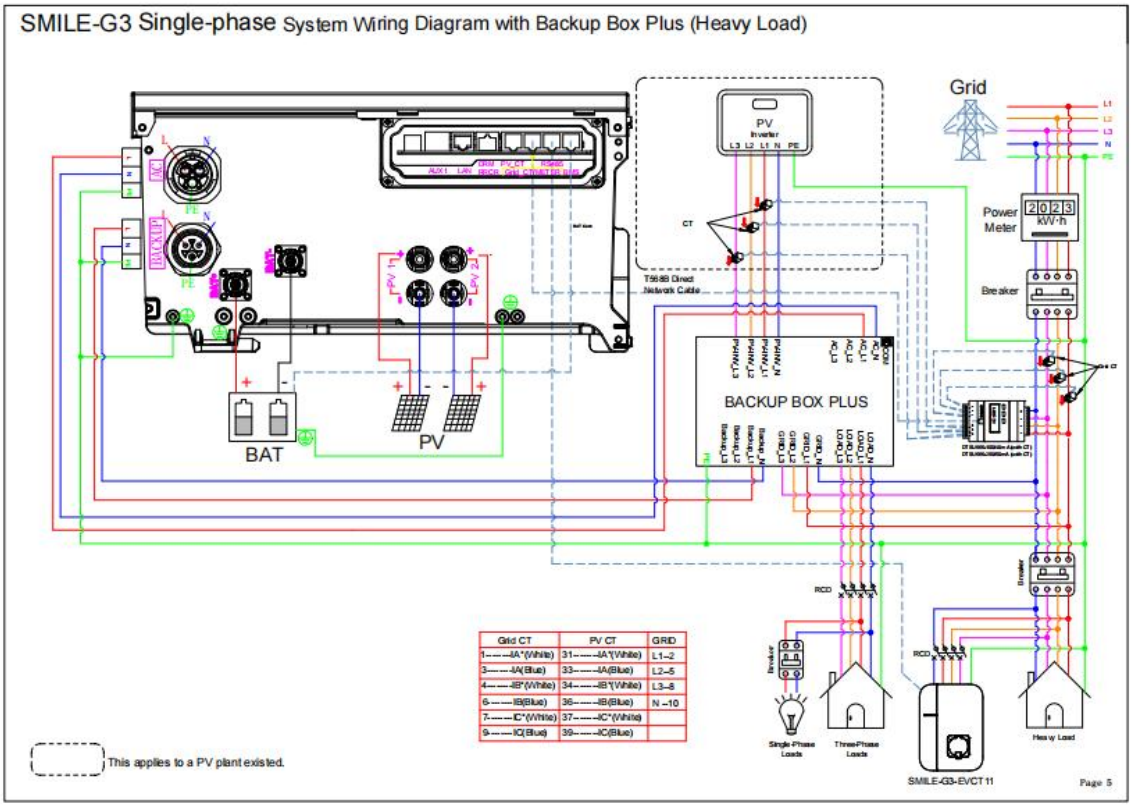

SMILE-G3 Single-phase System Wiring Diagram with SMILE-SLMeter-CH2C60/100/250 (Dual-Circuit) (AU)
NOTICE
(Only for Australia and New Zealand installation site)
Backup Loads
Distribution Box
RCD
Breaker
E-BAR
E-N Link
N-BAR
BAT
PV
Grid
Power Meter
RCD Breaker
PV Inverter
Non-Backup Loads
BAT COM
AP
This applies to a PV plant existed.

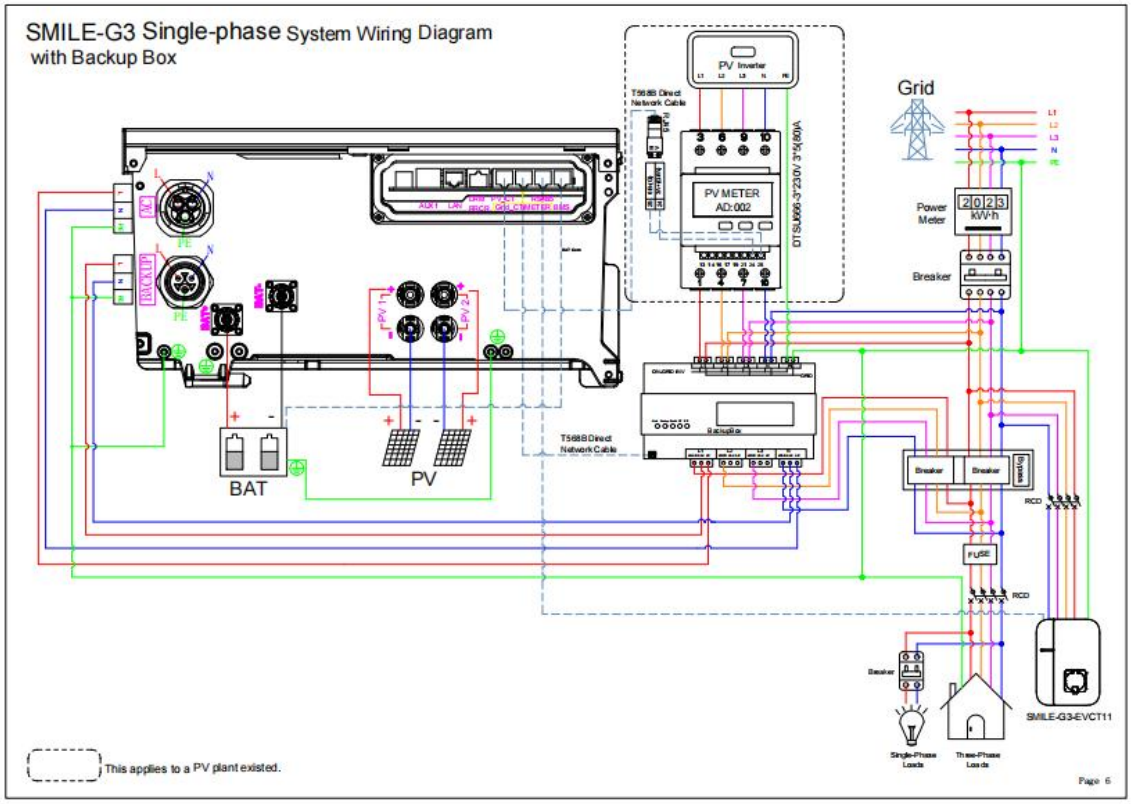

SMILE-G3 Single-phase System Wiring Diagram with CT (EU)
L
N
E-BAR
PE
Backup Loads
Non-Backup Loads
PV Inverter
CT
Grid
Power Meter
Breaker
BAT
PV
PV1
PV2
BACKUP
AC
BAT+
BAT-
BAT COM
RCD
This applies to a PV plant existed.
Page 1

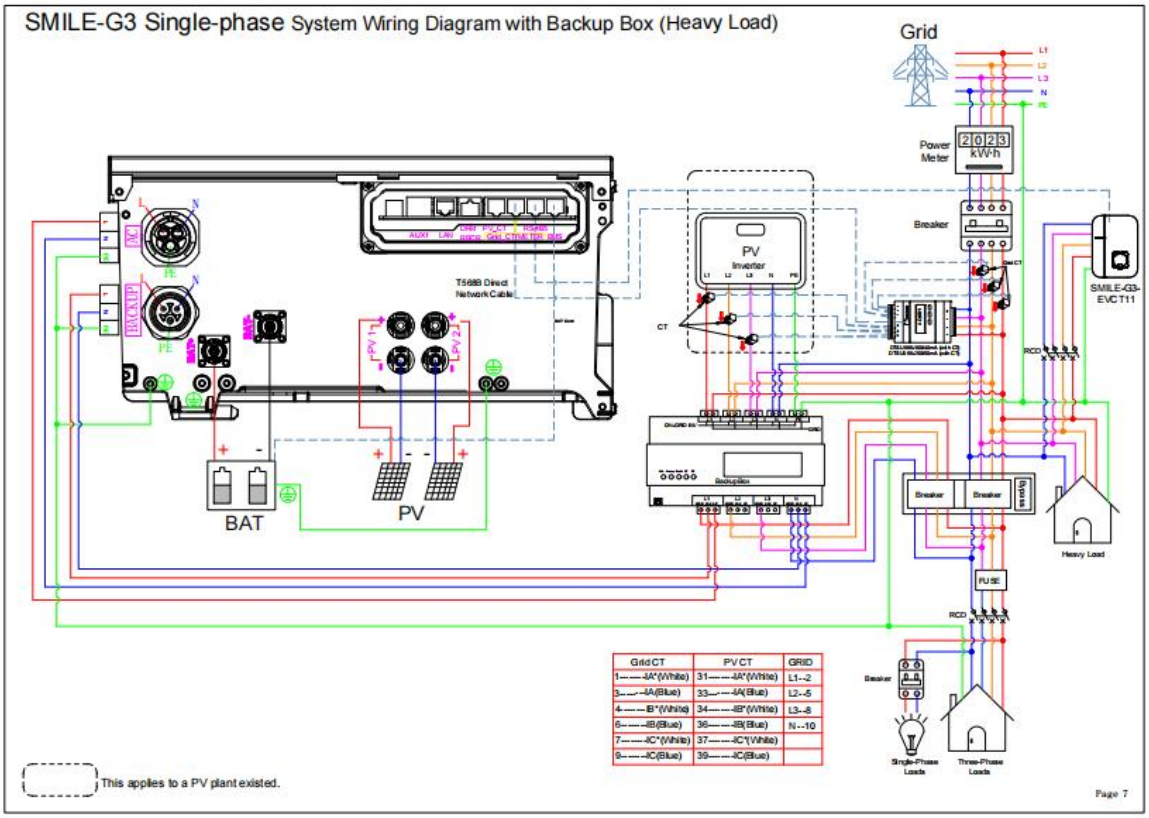

SMILE-G3 Single-phase System Wiring Diagram with DTSU666 (Without CT)(EU)
L1 L2 L3 N PE
E-BAR
PE
Non-Backup Loads
Backup Loads
BAT
PV
PV1
PV2
BACKUP
AC
BAT+
BAT-
BAT COM
RCD
RJ45
Grid
PV Inverter
Breaker
Power Meter
T568B Direct Network Cable
This applies to a PV plant existed.
Three phase feed-in.
Page 2

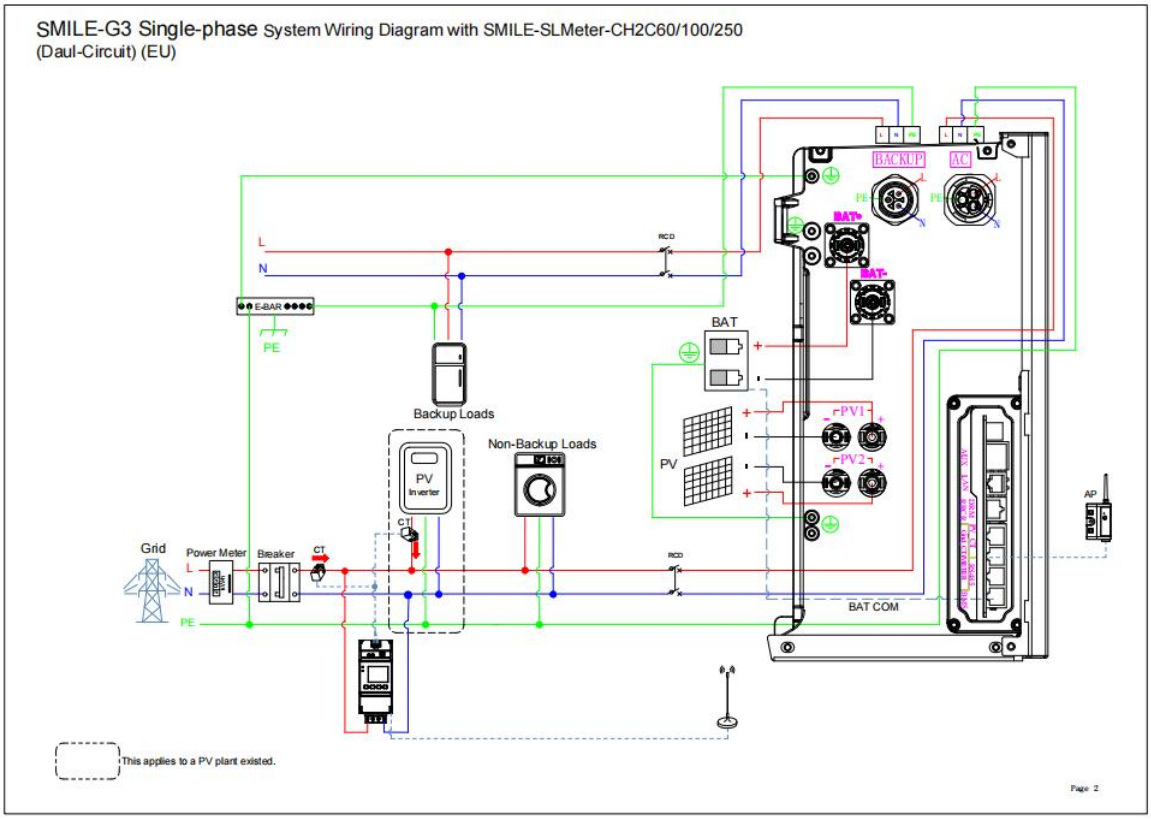

SMILE-G3 Single-phase System Wiring Diagram with DTSU666 (With CT) (EU)
This applies to a PV plant existed.
Three phase feed-in.
Grid
Grid
Breaker
E-BAR
PV Inverter
Backup Loads
Non-Backup Loads
BAT
PV
T568B Direct Network Cable
BACKUP
AC
BAT COM
PV1
PV2
Page 3


SMILE-G3 Single-phase System Wiring Diagram with Backup Box Plus
Grid
Power Meter
PV Inverter
T568B Direct Network Cable
BACKUP BOX PLUS
BAT
PV
Breaker
RCD
Single-Phase Loads
Three-Phase Loads
SMILE-G3-EVCT11
This applies to a PV plant existed.
Page 4


SMILE-G3 Single-phase System Wiring Diagram with Backup Box Plus (Heavy Load)
Grid
PV
Inverter
L3 L2 L1 N PE
CT
T568B Direct Network Cable
Power Meter
2023
kW·h
Breaker
BACKUP BOX PLUS
BAT
PV
RCD
Single-Phase Loads
Three-Phase Loads
Heavy Load
SMILE-G3-EVCT11
Grid CT
PV CT
GRID
L1–2
L2–5
L3–8
N –10
This applies to a PV plant existed.
Page 5


SMILE-G3 Single-phase System Wiring Diagram
with Backup Box
PV Inverter
T568B Direct Network Cable
PV METER
AD:002
DTSU666-3*230V 3*5(80)A
Grid
Power Meter
2023
kW·h
Breaker
BAT
PV
T568B Direct Network Cable
FUSE
RCD
SMILE-G3-EVCT11
Single-Phase Loads
Three-Phase Loads
This applies to a PV plant existed.
Page 6


SMILE-G3 Single-phase System Wiring Diagram with Backup Box (Heavy Load)
Grid
Power Meter
Breaker
PV Inverter
SMILE-G3-EVCT11
T568B Direct Network Cable
CT
BAT
PV
Heavy Load
FUSE
RCD
Grid CT
PV CT
GRID
This applies to a PV plant existed.
Page 7


SMILE-G3 Single-phase System Wiring Diagram with SMILE-SLMeter-CH2C60/100/250
(Daul-Circuit) (EU)
BACKUP
AC
BAT+
BAT-
E-BAR
PE
RCD
BAT
PV1
PV2
PV
Backup Loads
Non-Backup Loads
PV Inverter
CT1
Grid
Power Meter
Breaker
CT
BAT COM
AP
This applies to a PV plant existed.
Page 2

# Appendix 2: Regional Application Standard

Please check with your local grid company and choose the corresponding regional application standard, the power quality modes Volt-VAR and Volt-Watt will be running automatically. (Only for regions with AS/NZW 4777.2 safety standard).

| Regional application Standard | Electric Company |
|---|---|
| Australia A | N/A |
| Australia B | N/A |
| Australia C | N/A |
| New Zealand | N/A |
| Vector | New Zealand Vector |

# Appendix 3: Earth Fault Alarm Notification

If the system occurs an earth fault, the user will receive a mail like this to remind them check the grounding status:

Dear user,

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

| SN | Status | Error Code | Update Time |
|---|---|---|---|
| ALD081024090001 | Earth Fault | EMS:100008 | 25/9/2024 4:27:30 PM |

SN Status Error Code Update Time ALD081024090001 Earth Fault EMS:100008 25/9/2024 4:27:30 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.

**Alpha ESS Co., Ltd.**

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