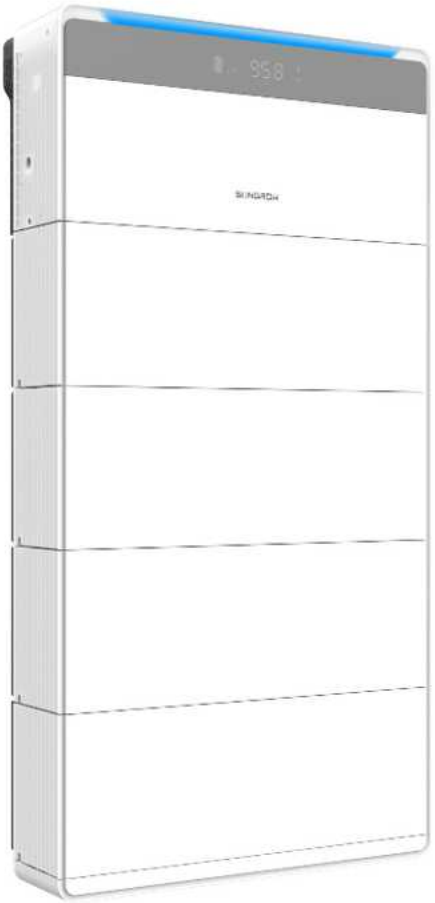
SUNGROW
Clean power for all

User Manual

Residential Three-Phase All-in-One Unit

SH10/12/15TA&SBD060–600-EU



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About This Manual

This manual primarily introduces the inverter's product information, installation, operation, and maintenance instructions, and does not include all information about the photovoltaic system. For more details, please visit **www.sungrowpower.com** or the equipment manufacturer's website.

Scope of Application

This manual is primarily intended for the following products:

- SH10TA
- SH12TA
- SH15TA

In the following text, unless otherwise specified, it shall be referred to as "inverter".

Target Group

This manual is intended for technical professionals who need to perform installation, operation, and maintenance of the inverter, as well as users who need to view and operate the inverter parameters.

Installation can only be done by qualified personnel. Qualified technical personnel must:

- Have certain electrical wiring, electronic, and mechanical expertise, and be familiar with electrical and mechanical schematics.
- Have received professional training in the installation and commissioning of electrical equipment.
- Be able to respond quickly to hazards or emergencies that may occur during the process of installation and commissioning.
- Be familiar with applicable local standards and relevant safety regulations on electrical systems.
- Read through this manual carefully and have a good understanding of the relevant safety instructions.

How to Use This Manual

Read through this manual carefully before using the product and keep it in a safe and accessible place.

The manual may be updated and revised from time to time; however, there still might be slight deviations from the real product or errors. Users shall refer to the actual purchased product and may obtain the latest version of the manual via **support.sungrowpower.com** or through sale channels.

Security Disclaimer

To learn more about the product cybersecurity vulnerability disclosure and handling process, visit https://en.sungrowpower.com/security-vulnerability-management.

For more cybersecurity details, please refer to the user manual of the corresponding communication module/data logger provided with the product.

Symbols in This Manual

To ensure the safety of life and property for users when using the product and to improve the efficiency of product use, the manual provides relevant information, which are highlighted by the following symbols.

Symbols used in this manual are listed below. Please review carefully for better use of this manual.

⚠ DANGER

Indicates high-risk potential hazards that, if not avoided, may lead to death or serious injury.

⚠ WARNING

Indicates moderate-risk potential hazards that, if not avoided, may lead to death or serious injury.

⚠ CAUTION

Indicates low-risk potential hazards that, if not avoided, may lead to minor or moderate injury.

NOTICE

Indicates potential risks that, if not avoided, can lead to device malfunctions or financial losses.

"NOTE" provides supplementary information, highlights, or further explains specific content, and may include tips for optimized product use to help you solve problems or save time.

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1 Safety Instructions

Follow strictly the relevant safety instructions during the process of product installation, commissioning, operation, and maintenance. Improper use or incorrect operation may result in:

- Injury to or death of the operator or other people.
- Damage to the product, or to the property that belongs to the operator or a third party.

Strictly follow the safety instructions stated in the manual to avoid the hazards mentioned above.

⚠ WARNING

Do not perform any operation on the product (including but not limited to, handling, installing, powering on, and maintaining the product, performing electrical connection, and working at heights) in harsh weather conditions, such as thunder and lightning, rain, snow, and Level 6 or stronger winds. SUNGROW shall not be held liable for any damage to the product due to force majeure, such as earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weathers.
In case of fire, evacuate the building or product area and call the fire department. Do not go back to the fire area.
Tighten the screws at the specified torques using proper tools when fastening the product and terminals. Otherwise, the product may be damaged. The damage caused therefrom will not be covered by the warranty.
Understand how to use the tools properly first before starting using them, to avoid causing personal injury or product damage.
Before leaving the site during installation, implement necessary safety measures (e.g., lock the equipment doors).

NOTICE

Perform operations on the product only if you have a good understanding of this manual and appropriate tools in hand.

- Safety instructions in this manual should only serve as a supplement and are not all-encompassing regarding all the norms that need to be followed. All work should be carried out considering the actual situation on the site.
- SUNGROW shall not be held liable for any damage caused by violation of general safe operation requirements, safety standards, and the safety instructions specified in this manual.
- Product installation, operation, and maintenance should be conducted in compliance with applicable local laws, regulations, and specifications. Safety instructions in this manual should only be a supplement to the local laws, regulations, and specifications.
- During the product transport, installation, wiring, and maintenance, etc., the materials and tools prepared by users must meet the requirements of applicable local laws and regulations, safety standards, and other relevant specifications. SUNGROW shall not be held liable for any damage to the product caused by the adoption of materials and tools that fail to meet the above-mentioned requirements.
- Operations on the product, including but not limited to, handling, installing, wiring, powering-on, maintenance, and use of the product, must not be performed by unqualified personnel. SUNGROW shall not be held liable for any damage to the product resulting from operations done by unqualified personnel.
- Where the transport of the product is arranged by users, SUNGROW shall not be held liable for any damage to the product that is caused by users themselves or the third-party transport service providers designated by the users.
- SUNGROW shall not be held liable for any damage to the product caused by the negligence, intent, fault, improper operation, and other behaviors of users or third-party organizations.
- SUNGROW shall not be held liable for any damage to the product arising from reasons unrelated to SUNGROW.

1.1 Unpacking and Inspection

⚠ WARNING

- **Check all safety signs, warning labels, and nameplates on products.**
- **Ensure that the safety signs, warning labels and nameplates must be clearly visible and cannot be removed or covered before the product is decommissioned.**

NOTICE

After receiving the product, check whether the appearance and structural parts of the device are damaged, and check whether the packing list is consistent with the actual ordered product. If there are problems with the above inspection items, do not install the device and contact SUNGROW in time.

1.2 Installation Safety

⚠ DANGER

Make sure there is no electrical connection before installation.
Where hole drilling is required during installation, avoid the internal water pipes and electrical wires when drilling.

⚠ CAUTION

Improper installation may cause personal injury!

- **If the product supports hoisting transport and is hoisted by hoisting tools, ensure no personnel pass or stay beneath the product during the process.**
- **When handling the product, get prepared for carrying its weight and keep the balance to prevent it from tilting or falling.**

NOTICE

Before operating the product, check and ensure that the tools to be used have undergone regular maintenance.

1.3 Electrical Connection Safety

⚠ DANGER

Before making electrical connections, ensure that the product is not damaged; otherwise, it may lead to danger!
Before making the electrical connection, be sure to turn off both the inverter and all switches connected to it. Otherwise, there is a risk of electric shock!

⚠ DANGER

Hazardous voltages are generated on the PV string when it is exposed to sunlight!

- **Operators must wear proper personal protective equipment during electrical connections.**
- **Check and confirm that the DC cables are voltage-free using a measuring instrument before touching them.**
- **Observe all the safety instructions listed in the documents for the PV string and other relevant documents.**
- **The inverter must not be connected to a PV string that requires positive or negative grounding.**

⚠ DANGER

A short circuit in the battery can cause the instantaneous current to become excessively high and release a large amount of heat, which may even lead to fires and personal injury.
Before performing any electrical operations on the battery, disconnect the battery from all power sources.
The battery terminals and the cables connecting to the inverter have lethal voltage. Keep away from the cables or terminals inside the inverter, as doing so could result in serious injury or death.
Please strictly follow all safety instructions provided by the battery manufacturer.

⚠ DANGER

Danger to life due to high voltages inside the product!

- **Be sure to use specialized insulated tools during wiring.**
- **Observe the warning labels on the product, and perform operations by strictly following the corresponding safety instructions.**
- **Observe all the safety precautions listed in this manual and other relevant documents for the product.**

⚠ WARNING

Improper wiring may damage the product, and such damage will not be covered by the warranty.

- **Electrical connections must only be performed by qualified technical persons.**
- **The specification of cables used in the PV power system should meet the relevant requirements. The cables should be properly insulated and firmly connected.**

⚠ WARNING

- **Before connecting the DC connector to the inverter, please check the polarity of the PV string. After confirming that it is correct, insert the DC connector into the corresponding DC terminal.**
- **During the installation and operation of the inverter, please ensure that the positive or negative polarities of PV strings do not short-circuit to the ground. Otherwise, an AC or DC short-circuit may occur, hence damaging the product. The damage caused therefrom will not be covered by warranty.**
- **The load cannot be connected between the inverter and its directly connected AC circuit breaker to avoid causing the switch to trip erroneously.**
- **Determine the specifications of AC circuit breakers to be used strictly in compliance with the applicable local laws and regulations and safety standards or the recommendation by SUNGROW. Otherwise, the circuit breaker may not open in time in the event of something abnormal, which may then lead to safety incidents.**

⚠ WARNING

The battery interface must be compatible with the inverter. The entire voltage range of the battery must be fully within the inverter's allowable range, and the battery voltage must not exceed the inverter's maximum allowable DC input voltage.

NOTICE

Wiring must be done in compliance with the applicable local grid regulations and relevant safety instructions specified for the PV string.

NOTICE

When making electrical connections, the external protective earth cable should be installed first; when removing the inverter, the external protective earth cable should be disconnected last.

1.4 Operational Safety

⚠ DANGER

When laying cables, keep the cables at least 30 mm away from the outer edge of the heat-generating components or areas, so as to protect the insulation layer of cables from aging or getting damaged due to high temperature.
During operation, observe the following precautions:

- **Do not touch the product enclosure.**
- **Do not plug or unplug any connectors on the inverter.**
- **Do not touch any wiring terminals of the inverter; otherwise, there is a risk of electric shock.**
- **Do not disassemble any components of the inverter; otherwise, there is a risk of electric shock.**
- **Do not touch hot parts of the inverter (such as heat sinks); otherwise, there is a risk of burns.**
- **Do not connect or disconnect a string or a module within a string; otherwise, there is a risk of electric shock.**
- **If the product is equipped with a DC switch, do not operate it; otherwise, equipment damage or personal injury may occur.**

During firmware upgrade, do not perform other operations (such as parameter setting or power-off) to prevent upgrade failure.

⚠ DANGER

Do not connect or disconnect a battery; otherwise, there is a risk of burns.

1.5 Maintenance Safety

⚠ DANGER

Improper maintenance may result in personal injury or product damage!

- **Before maintenance, first open the grid-side AC circuit breaker, then turn off the DC switch, If a fault that could cause personal injury or equipment damage is detected before maintenance, open the AC circuit breaker and wait until nighttime before operating the DC switch. Otherwise, the inverter may catch fire or explode, causing personal injury.**
- **After powering off theinverter, wait 10 minutes. Use appropriate test equipment to verify the absence of voltage and current. Wear appropriate personal protective equipment before performing operation and maintenance work on the inverter.**
- **Even if the equipment has stopped operating, it may still be hot and cause burns. Perform operations on the equipment wearing protective gloves after it cools down.**

⚠ DANGER

Touching the grid or any contacts or terminals connected to it inside the product may cause electric shock!

- **Voltage may be present on the grid side. Before touching any component, use a standard voltmeter to verify that no voltage is present.**

⚠ CAUTION

Place prominent warning signs or safety barriers around the product to prevent unauthorized personnel from approaching the product, operating it inadvertently, or causing an accident.

NOTICE

- **If paint peels off the inverter enclosure or rust appears, repair the affected area promptly. Otherwise, inverter operation may be affected.**
- **Do not use cleaning agents to clean the inverter. Cleaning agents may damage the inverter, and any resulting damage is not covered by the warranty.**
- **The inverter contains no user-serviceable parts. Do not open the inverter enclosure (excluding the wiring compartment) or replace internal components without authorization. Any resulting damage is not covered by the warranty.**
- **To minimize the risk of electric shocks, do not perform maintenance operations that are not specified in this manual. If necessary, contact SUNGROW for maintenance. Losses arising from failure to observe this instruction will not be covered by warranty.**
- **Do not open the maintenance compartment door in rain or snow. If this cannot be avoided, take protective measures to prevent rain or snow from entering the maintenance compartment and affecting product operation.**
- **Before closing the maintenance compartment door, check that no objects, such as screws or tools, have been left inside the compartment.**
- **Use of a cable sheath to protect the AC cable is recommended. If a cable sheath is used, ensure that it is located inside the maintenance compartment.**

1.6 Disposal Safety

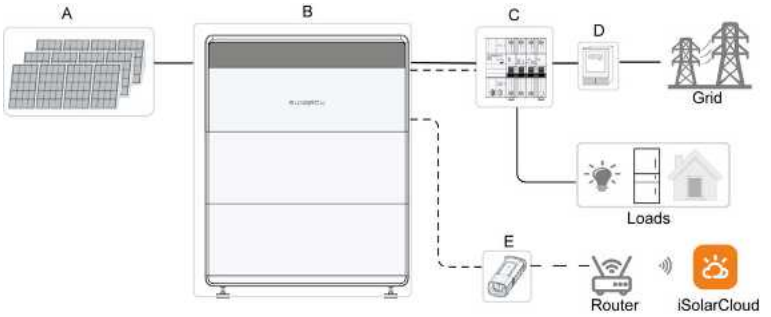
⚠ WARNING

Please scrap the product in accordance with relevant local regulations and standards to avoid property damages or personal injuries.

2 System Introduction

2.1 System Introduction

The residential three-phase all-in-one system is a home energy management system for residential applications. It consists of a residential three-phase all-in-one unit, PV modules, an EnergyBridge, an iHomeManager Mini, loads, the grid, and a monitoring platform, as shown in the following figure.



No.	Name	Description
A	PV module	Monocrystalline silicon PV modules, polycrystalline silicon PV modules, or thin-film PV modules that do not require grounding.
B	Residential three-phase all-in-one unit	SH10/12/15TA&SBD060–600-EU A system with two Packs is used as an example.
C	EB	On-grid/off-grid transfer switch
D	Electricity meter	Used as a standard metering device for the energy output of the all-in-one unit

No.	Name	Description
E	iHomeManager Mini	Smart home energy management device

The system can operate off-grid and supply emergency power to loads when the power supply is interrupted for any of the following reasons:

- Islanding effect
- Undervoltage
- Underfrequency or overfrequency

2.2 Product Description

2.2.1 Residential Three-Phase All-in-One Unit Overview

Product Overview

The model designation of the residential three-phase all-in-one unit is explained below using the SH10TA as an example.

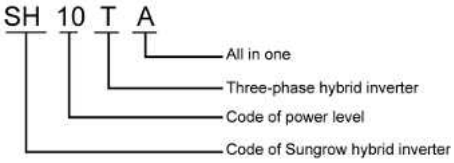


Figure 2-1 Model Designation

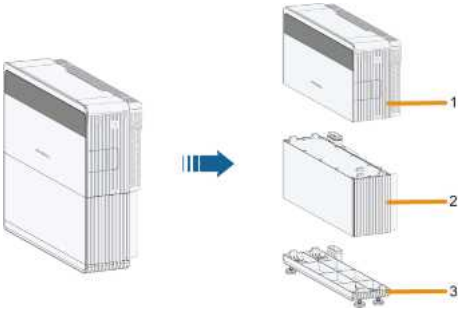


Figure 2-2 All-in-One Unit Components

The figure is for reference only. Refer to the actual product.

No.	Item
1	Inverter
2	Pack

No.	Item
3	Base

Inverter

The inverter can supply the energy generated by the PV system to loads, store it in the battery, or feed it into the grid. By integrating an EMS, the inverter can control and optimize energy flow, thereby increasing system self-consumption.

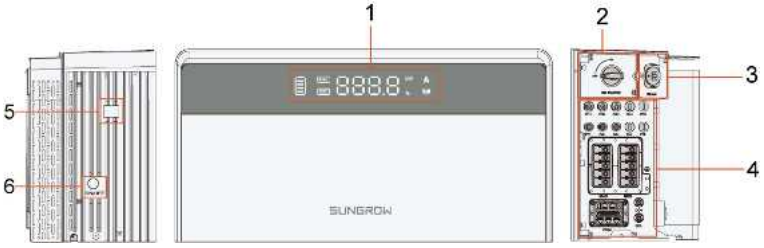


Figure 2-3 Front and Side Views

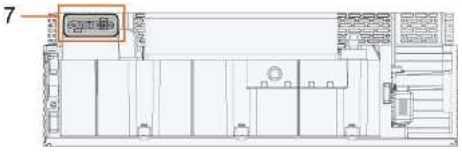


Figure 2-4 Bottom View

No.	Name	Description
1	LED indicators	Indicates the current operating status of the system
2	DC switch	Connect or disconnect the DC input
3	WLAN	For connecting iHomeManager Mini
4	Electrical connection area	Contains the DC terminals, AC terminals, multi-function port, grounding terminal, communication terminals, and other interfaces
5	Nameplate area	The nameplate is located behind this area of the decorative cover.
6	Manual start/stop button	Used to start and stop the Pack.

No.	Name	Description
7	Connector	Used for power and communication connections between the inverter and the Packs.

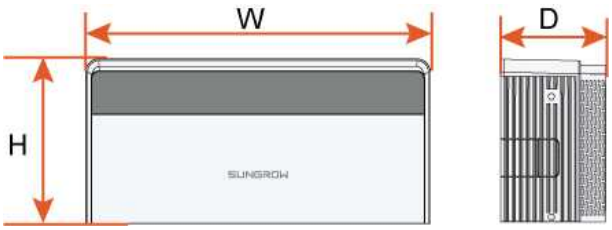


Figure 2-5 Specification

Model	W (mm)	H (mm)	D (mm)	Weight (kg)
SH10/12/15TA	788	375	255	≤ 41

Pack

The residential three-phase all-in-one unit supports a stack of up to six Packs.

The Pack is used for energy storage and release. Each Pack consists of battery cells connected in series.

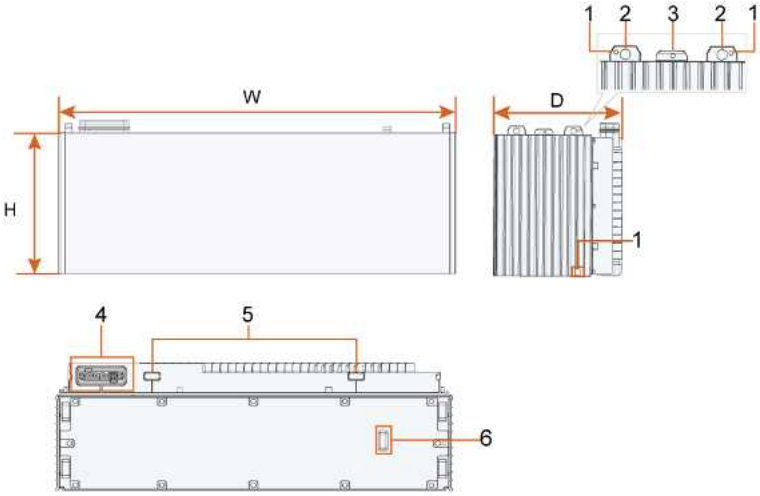


Figure 2-6 Pack Appearance

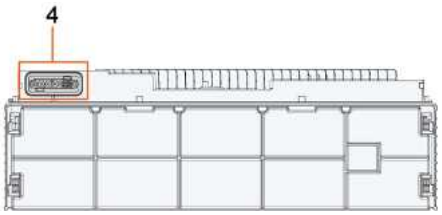


Figure 2-7 Bottom View of the Pack

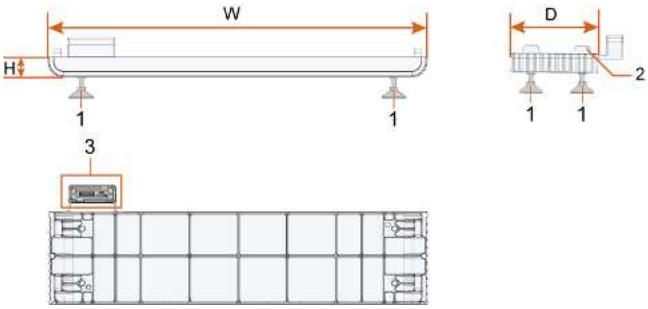
No.	Name	Description
1	Pack or inverter mounting hole	Used to secure Packs together or to secure the inverter to the Pack.
2	Carrying-handle mounting hole	Used to install a carrying handle for moving the Pack.
3	Pack-to-inverter locking hole	Used to secure the inverter and the Pack together.
4	Connector	Used for power and communication connections between the inverter and the Pack, or between Packs.
5	Anti-tip bracket mounting hole	Used to secure the Pack to the wall.
6	Pack-to-inverter mounting hole	Used to secure the Pack to the inverter.

Table 2-1 Specification

Model/ Parameter	SMD060	SMD090	SMD100
Dimensions (W × H × D)	788 mm × 280 mm × 255 mm (excluding handles and connectors)		
Weight	58 ± 1 kg	76 ± 1 kg	79 ± 1 kg
Rated capacity	314 Ah		

Base

The base is mainly used to secure the Packs.



No.	Name	Description
1	Adjustable foot	Used for leveling.
2	Pack mounting hole	Used to securely fasten the Pack in place.
3	Positioning boss	Used to position and secure the Pack, and provide electrical protection for the connector.

Table 2-2 Specification

Parameter	Value
Dimensions (W × H × D)	788 mm * 43 mm * 194 mm (excluding adjustable feet)
Weight	2.5±1 kg

2.2.2 EnergyBridge Overview

EnergyBridge is a smart switch that measures grid voltage, current, power, and other electrical parameters. It also enables on-grid/off-grid switching and supports whole-home backup and retrofit applications.

> EnergyBridge is hereinafter referred to as “EB.”

EB is shown below.

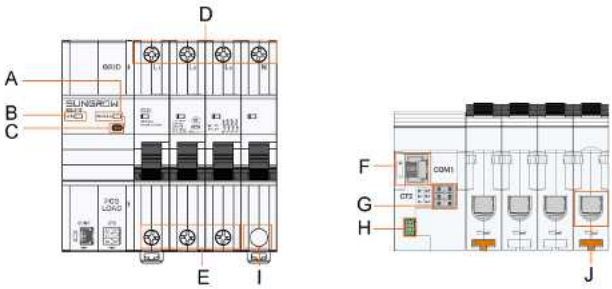
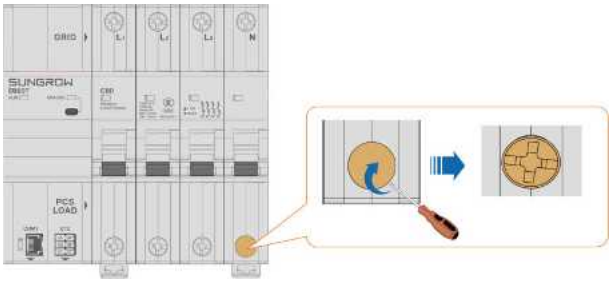


Figure 2-8 EB Terminals

No.	Description
A	Manual mode indicator[1]
B	Operating status indicator[2]
C	Manual mode button[1]
D	Grid side L1, L2, L3, N*
E	Inverter side L1, L2, L3 Load side L1, L2, L3
F	RS485
G	CT**
H/I***/J***	Reserved

*Connect the grid-side N conductor to the N-bar. In Australia and New Zealand, the N conductor on the output side may be left unconnected.
**Compatible with 100 A / 333 mV voltage-output CTs and intended only for third-party inverters in retrofit applications.
***Pry open I and J with a slotted screwdriver.



EB supports two operating modes:

- Manual mode: EB can be closed only manually using its handle and cannot be closed through the communication I/O port. Manual intervention is required. Manual mode applies in the following situations:
  - If EB opens locally because of an overcurrent, a short circuit, or manual operation, the manual mode indicator blinks rapidly. EB can no longer be controlled through the communication I/O port, and manual intervention is required.
  - If inverter control fails, the inverter stops operating but continues to command EB to open. As a result, the household loads remain without power even when grid power is available, and manual intervention is required.

Manual intervention: Press and hold the manual mode button for 2 seconds. When the manual mode indicator lights steadily, EB enters manual mode and can then be closed manually. After closing EB manually, press and hold the manual mode button again for 2 seconds. When the manual mode indicator blinks slowly, EB returns to automatic mode.

- Automatic mode: Opening and closing of EB are fully controlled through the communication I/O port. The manual mode indicator blinks slowly, indicating that EB is under normal control. No manual intervention is required.

[1] Manual Mode Indicator and Button

Indicator	Status	Description	Button and EB Operation
Blue	Slow blinking (0.5 s)	EB operates under inverter control.	• If the inverter is operating normally or EB is closed, do not press the manual mode button. • If the inverter is faulty and EB is open, press and hold the manual mode button for 2 seconds until the manual mode indicator is steadily lit, and then close EB manually.
	Steady on	EB operates in manual mode.	When EB is closed, press and hold the manual mode button for 2 seconds to restore inverter control. The indicator then blinks slowly.
	Fast blinking (0.05 s)	EB opens because of an overcurrent, a short circuit, or manual operation.	• Check the household loads for a short circuit. • Press and hold the manual mode button for 2 seconds until the manual mode indicator is steadily lit, and then close EB manually.
	Off	EB opens because grid power is unavailable.	The system operates in off-grid mode. Do not press the manual mode button or close EB.

[2] Operating Status Indicator

Indicator	Status	Description
Blue	Steady on	No communication with the inverter
	Blinking	Normal communication with the inverter
Red	Steady on	EB is faulty
	Blinking	EB is in an alarm state

[3] RS485

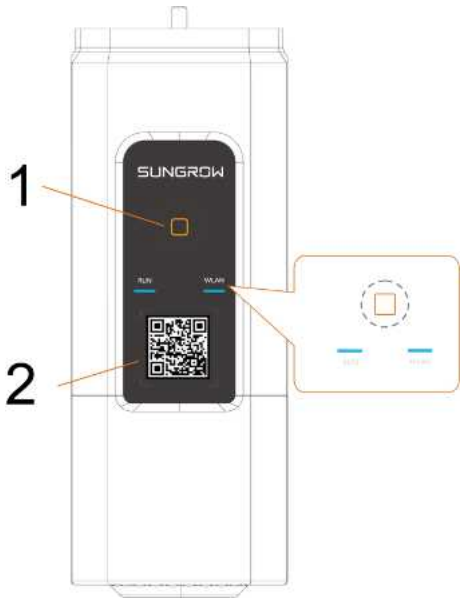
No.	Label	568A	568B	Description
1	DI+	White-green	White-orange	Connect to the inverter's COM port
2	DI-	Green	Orange	Connect to the inverter's DO port*
3	A	White-orange	White-green	Connect to A2 on the inverter's Meter port
4	NC	Blue	Blue	Reserved
5	NC	White-blue	White-blue	Reserved
6	B	Orange	Green	Connect to B2 on the inverter's Meter port
7	DO+	White-brown	White-brown	Connect to the inverter's RSD-1 terminal**
8	DO-	Brown	Brown	Connect to the inverter's RSD-2 terminal**

2.2.3 iHomeManager Mini Overview

iHomeManager Mini is a smart home energy management device that enhances coordination between the home and the grid, advancing PV-ESS-Charging applications from basic self-consumption to smart energy use that maximizes returns.

To facilitate management of connected devices, iHomeManager Mini provides cloud connectivity and uploads collected data to iSolarCloud for real-time viewing and monitoring. iHomeManager Mini also supports parameter settings, log export, power adjustment, and other functions for connected devices.

Appearance



No.	
1	Multi-function port
2	S/N

*The figure is for reference only. Refer to the actual product. The 4G indicator is available only on the 4G version.

> The WLAN port on the all-in-one unit currently supports only iHomeManager Mini.

Indicator Descriptions

Indicator	Color	Status	Description
RUN	Red and blue	Off	Not connected to power
		Breathing blue	Normal operation
		Steady red	Internal fault
WLAN	Blue	Off	Not connected to the router
		Steady blue	Connected to the router
		Blinking fast (blue)	Exchanging data

Description of the Multi-Function Button

Operation	Description
Press briefly three times	Enable the AP hotspot or Bluetooth.
Press and hold for 3–10 seconds	Restart the device.
Press and hold for more than 30 seconds	Factory reset (prior permission from the customer is required).
Press five times in succession	Reset the local login password (prior permission from the customer is required).

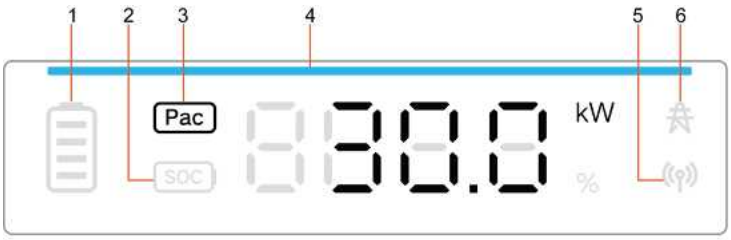
2.3 Symbols on the Product

Mark	Meaning
	CE compliance mark.
	Do not dispose of the inverter as household waste.
	Transformerless inverter.
	Disconnect the inverter from all external power sources before inverter maintenance.
	Burn hazard due to the hot surface! May exceed 60°C!
	Danger! Lethal high voltage! Installation and operation must only be performed by qualified personnel.
10min	Danger! Lethal high voltage! After disconnecting the inverter from the external power source, you must wait 10 minutes before touching internal conductive parts. Installation and operation must only be performed by qualified personnel.

Mark	Meaning
	Read the manual before performing any operation on the inverter.
	RCM compliance mark
	PE terminal.

2.4 LED Indicators

As a human-machine interface, the LED indicators on the inverter's front panel display the current operating status of the inverter.



(a)

(b)

(a) Normal status (b) Fault status

No.	Name	Description
1	Battery charging/ discharging	• During battery charging, the illuminated bars increase from none to all. Interval: 2 s. • During battery discharging, the illuminated bars decrease from all to none. Interval: 2 s.

No.	Name	Description
		• When the battery is neither charging nor discharging: - SOC < 10%: no bars are displayed; indicator is yellow The threshold value "< 10%" is configurable within a range of 0–15%. - 10% ≤ SOC < 25%: one white bar displayed - 25% ≤ SOC < 50%: two white bars displayed - 50% ≤ SOC < 75%: three white bars displayed - 75% ≤ SOC: four white bars displayed
2	SOC	Displays the current battery SOC Displayed in white when radar sensing is triggered and alternates with the Pac display at 5-second intervals.
3	Pac	Displays the current output power Displayed in white when radar sensing is triggered and alternates with the SOC display at 5-second intervals.
4	Top light bar	Displays breathing and dynamic lighting effects • Blue: normal status • Yellow: alarm • Red: fault During a system upgrade, the top LED light bar displays a chasing-light effect, and the number below it indicates the upgrade progress as a percentage.
5	Communication	Displays the communication status • Steady white: communication is normal • Blinking yellow (period: 0.5 s): not connected to the server

No.	Name	Description
		• Steady red: communication is lost
6	On-grid/off-grid	Displays the on-grid/off-grid status • Steady white: on-grid • Steady yellow: off-grid • Steady red: grid fault, such as overvoltage/undervoltage, overfrequency/underfrequency, or islanding
7	Fault	Displays a fault code or alarm code

The figure is for reference only. Refer to the actual product.

2.5 Energy Management Mode

Self-Consumption

The **Self-consumption** mode maximizes the utilization of PV output and battery energy to power the loads, thus minimizing grid energy consumption. Users can configure time windows for Feed-in peak power and Peak shaving limit based on electricity rates, allowing for flexible adjustment of battery charging/discharging and energy purchase strategies to optimize energy costs.

- **Demand control**
  Demand control allows you to set the **Feed-in peak power** and **Peak shaving limit**. In **Self-consumption** mode, configuring the demand control parameters allows the battery charging/discharging strategy to be adjusted flexibly based on the system's grid import and feed-in power, improving returns from clean energy.
  - **Feed-in peak power**
    After you configure this threshold, when there is sufficient sunlight, the system will meet the load demand with PV energy first and feed the excess into the grid. The battery will only be charged when the feed-in power exceeds this threshold. When the battery is fully charged, the system will limit PV generation or grid feed-in based on the configured Feed-in power limit.
  - **Peak shaving limit**
    After you configure this threshold, when there is insufficient sunlight: If the battery has sufficient charge, the system will prioritize supplying power to the load from the battery. If the battery charge is insufficient, the system will draw power from the grid to supply the load. When grid import power exceeds this threshold, the system continues to supply the load from the battery, helping reduce the user's electricity costs.
- **Set time period**

In the **Self-consumption** mode, you can set battery charging/discharging plans to optimize the energy usage and management. With properly set time windows for Feed-in peak power and Peak shaving limit, the system maximizes the use of PV output during on-peak hours and reduces the energy purchased from the grid during off-peak hours, thus lowering the electricity costs.

Time Plan

The **Time plan** mode is mainly used in electricity trading scenarios. By leveraging the differences between peak and off-peak electricity prices, you can manually set the time periods and corresponding power for battery charging and discharging to maximize economic benefits. It is recommended to set discharge periods during price peaks and charge periods during price valleys.

Forced Mode

The **Forced mode** is mainly used in battery O&M to force the battery to operate according to the preset charging/discharging mode and power. After O&M is completed, restore the system to its previous operating mode.

AI Mode

In **AI mode**, the system analyzes meteorological data and the user's electricity consumption patterns using big-data techniques to forecast future PV generation and household electricity consumption. It then optimally controls battery charging/discharging and household electricity use to maximize either clean energy utilization or returns.

A certain amount of data accumulation is required for AI mode to predict future production and consumption more accurately.

2.6 Application Scenarios

The all-in-one unit currently supports EB retrofit applications.

2.6.1 EB Retrofit Application

The all-in-one unit is compatible with PV inverters. By adding a PV inverter, an existing PV system can be retrofitted into an integrated PV-ESS system.

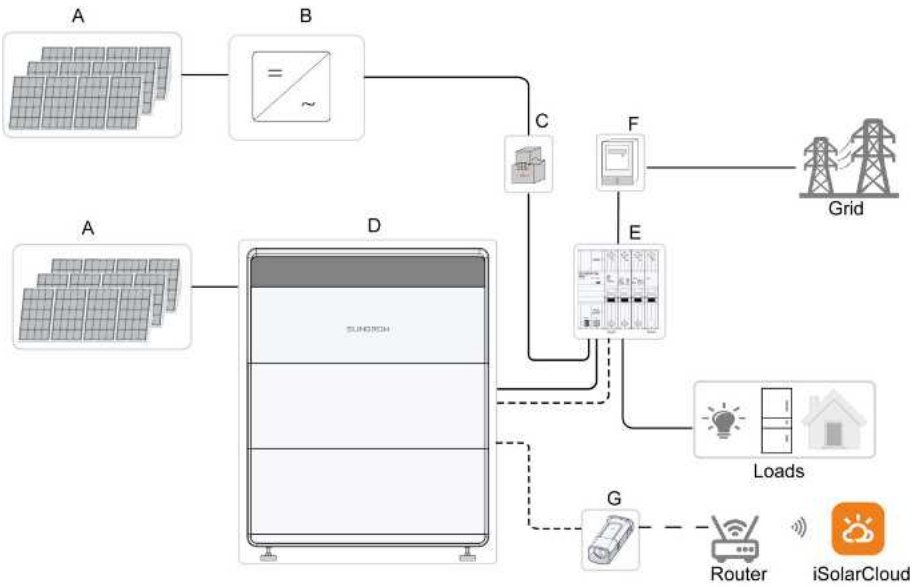


Figure 2-9 EB Retrofit Application

No.	Name	Description
A	PV module	Monocrystalline silicon PV modules, polycrystalline silicon PV modules, or thin-film PV modules that do not require grounding.
B	PV inverter	SGRT series PV inverter or third-party PV inverter
C	CT	Mainly used for energy metering (Only applicable to the scenario of connecting to third-party PV inverters.)
D	Residential three-phase all-in-one unit	SH10/12/15TA&SBD060–600-EU A system with two Packs is used as an example.
E	EB	On-grid/off-grid transfer switch

No.	Name	Description
F	PoC meter	Used as a standard metering device for the energy output of the all-in-one unit
G	iHomeManager Mini	Smart home energy management device

- The PV inverter power should not exceed the maximum battery charging power.
- When a third-party PV inverter is configured, three external CTs must be installed. Connect the external CTs to the CT2 port on EB. The recommended external CT specifications are as follows:

CT model	ZTY6.176.532 (for 100 A)
CT type	Split-core
Max. input current	100 A
Output voltage	333 mV
Cable length	6 m

- The PV inverter must support overfrequency derating, and the all-in-one unit supports frequency shift power control.
- Use an adapter for multi-wire connections.

3 Function Description

3.1 Safety Function

3.1.1 Protection

The inverter integrates various protection functions, including short-circuit protection, ground insulation resistance monitoring, residual current protection, anti-islanding protection, and DC overvoltage/overcurrent protection.

3.1.2 Grounding Fault Alarm

The inverter integrates a multifunctional dry contact (DO relay) that can be used for external grounding fault alarms. External alarms require power supply from the grid. The required devices are indicator lights or buzzers. In the event of a grounding fault:

- The DO dry contact will automatically activate and send a grounding fault alarm signal.
- The internal buzzer of the inverter will emit a beeping sound.
- The grounding fault alarm signal will be uploaded.

3.2 Energy Conversion and Management

The inverter converts DC power from PV arrays or batteries to AC power per grid requirements, and transfers DC power from PV panels to batteries.

With its integrated bidirectional converter, the inverter can charge/discharge batteries.

Multiple MPPT trackers maximize power output from PV strings with different orientations, tilt angles or module configurations.

3.2.1 Power Derating

Power derating is a method to protect the inverter from overload or potential faults. Power derating is activated as required by the grid.

The inverter may derate its power under the following conditions:

- Overtemperature (including ambient temperature and power module temperature)
- Input overvoltage
- Grid undervoltage
- Grid overvoltage
- Grid overfrequency
- Power factor (when outside the rated range)

- High altitude
- Duty cycle

3.2.2 Normal Operating Voltage Range

The inverter shall be capable of operating within the specified voltage range for at least the designated observation period. The settings depend on the grid-connection condition: normal startup or automatic reconnection after grid disconnection.

When the voltage exceeds the operating and protection thresholds, the inverter disconnects from the grid within the specified time. If the disturbance lasts longer than the protective trip time limit, the inverter automatically reconnects to the grid after the voltage returns to the normal range.

3.2.3 Normal Operating Frequency Range

The inverter shall operate continuously within its frequency range for at least the specified observation time. The settings depend on the grid-connection condition: normal startup or automatic reconnection after grid disconnection.

If the frequency exceeds the operating and protection thresholds, the inverter disconnects from the grid. If the disturbance lasts longer than the protective trip time limit, the inverter automatically reconnects to the grid after the disturbance ends and the frequency returns to the normal range.

3.2.4 Reactive Power Regulation

The inverter is capable of operating in reactive power regulation mode to support the grid. The reactive power regulation mode can be configured via the iSolarCloud App.

3.2.5 Load Control

The inverter integrates a multifunctional dry contact (DO relay) for load control via contactors. Control modes are user-configurable:

3.3 Communication and Configuration

The residential three-phase all-in-one unit has various ports for device and system monitoring, including RS485, Ethernet, WLAN, and CAN ports. Configure the parameters to achieve optimal performance. Information about the residential three-phase all-in-one unit can be accessed through the iSolarCloud App.

4 Unpacking and Storage

4.1 Unpacking and Inspection

The product has undergone strict tests and inspections before delivery. However, as it may still get damaged during transportation, please carry out a thorough inspection before signing the delivery receipt.

- Inspect the packaging for any damages.
- Check the delivered items for quantity and see if the delivery matches the order placed according to the packing list.
- Unpack and inspect the items inside for any damages.

Contact the transport company or SUNGROW in case of any damages or missing items, and provide relevant photos or the name/quantity of the missing items for better services.

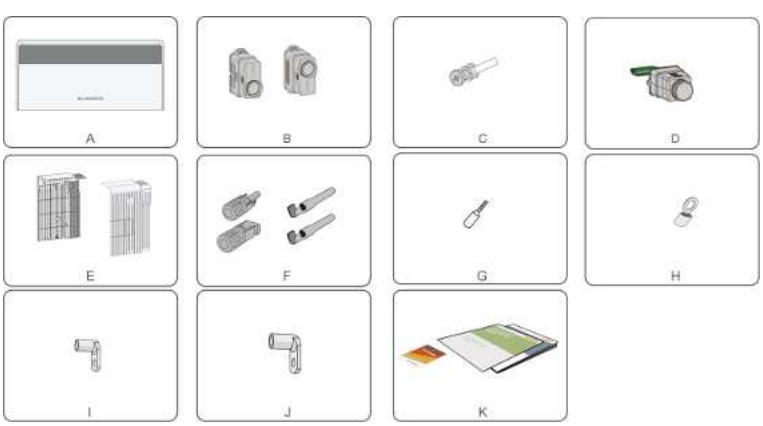
Do not throw away the original packaging box. It is recommended to store the device in its original packaging after it is decommissioned.

NOTICE

- **Inspect the product for any external damages or damages to the structural parts, and check if the packing list matches the order placed. In case of any problem with the above-mentioned inspection items, do not install the device and contact SUNGROW in time.**
- **If any tool is used for unpacking, be careful not to damage the product.**

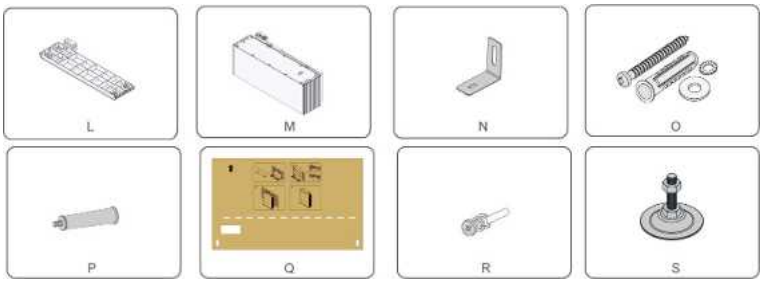
4.2 Scope of Delivery

Inverter



No.	Name	Quantity
A	Inverter	1
B	AC connector set	1
C	M5x12 screw set	2
D	Communication connector	1
E	Decorative cover set	1
F	PV connector	3
G	Wire ferrule (DIN end)	10
H	180° OT terminal	2
I	90° OT terminal(10mm^2-16mm^2)	12
J	90° OT terminal (6mm^2)	6
K	Documents	1

Battery

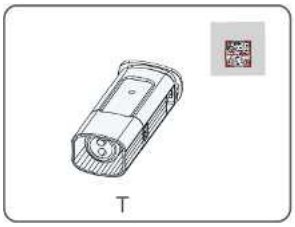


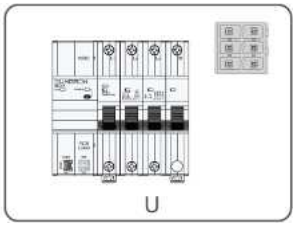
No.	Name	Quantity
M	Base	1
N	Pack**	1
O	Battery fixing bracket	4
P	Expansion bolt set	6
Q	Handle	4
R	Mounting template	1
S	M5x12 screw set	16

No.	Name	Quantity
T	Adjustable foot	5

*This pack is not included with the all-in-one system and must be purchased separately.

Other accessories





No.	Name	Quantity
U	iHomeManager Mini**	1
V	EnergyBridge***	1

**iHomeManager Mini contains a QR code. By scanning it, you can obtain the SN number and the corresponding product information, which is mainly used for setting up the power station and connecting nearby devices.
***The EnergyBridge contains CT connection terminals.

The images shown here are for reference. The actual product and quantity are based on delivery.

4.3 All-in-One Unit Storage

If the inverter is not put into operation immediately, it must be stored under specific environmental conditions.

- Repack the inverter in the original packing crate and retain the desiccant.
- The number of stacked inverter packages must not exceed the stacking limit marked on the outer packaging. Do not stack more than six Packs. Never store unpacked batteries in stacks.
- The packing crate must not be tilted or turned upside down.
- If the product needs to be transported again, pack it securely before loading it for transport.
- Keep the product away from direct sunlight, rain, or strong electric fields.
- Do not place the product in places with items that may affect or damage it.
- Store the product in a clean, dry place protected from dust and moisture.

- Do not store the product where corrosive chemicals are present or where it may be damaged by insects or rodents.
- Carry out routine inspections. Inspection should be conducted at least once every six months. Replace the packaging materials promptly if damage caused by insects or rodents is found.
- If the inverter has been stored for one year or more, or has been installed but not operated for over three months, it must be inspected and tested by professionals before being put into operation.
- The maximum storage period under the specified conditions is 12 months. Charge the battery every six months until its SOC reaches 40%.
- Store the inverter at -30°C to +70°C and 0%–95% relative humidity, non-condensing.
- Store the battery at -10°C to +35°C and 5%–95% relative humidity, non-condensing.

Store the product according to the storage requirements. Damage resulting from failure to meet the requirements will not be covered by the warranty.

5 Mechanical Mounting

⚠ WARNING

Respect all local standards and requirements during mechanical installation.

5.1 Installation Precautions

⚠ DANGER

Ensure that there are no electrical connections to the product before installation.

⚠ WARNING

A poor installation environment will affect the performance of the inverter system. For specific requirements of the installation environment, please refer to 5.2.1 Installation Environment Requirements. SUNGROW shall not be held liable for any loss caused by a non-compliant installation environment.

⚠ CAUTION

Improper installation may cause personal injury!

- **When moving the inverter, be aware of its weight and keep the balance to prevent it from tilting or falling.**
- **Wear proper protective equipment before performing operations on the inverter.**
- **The bottom terminals and interfaces of the inverter cannot directly contact the ground or other supports. The inverter cannot be directly placed on the ground.**

NOTICE

During installation, ensure that no device in the system prevents the DC switch from being turned off or the AC circuit breaker from being opened.
If drilling is necessary during installation:

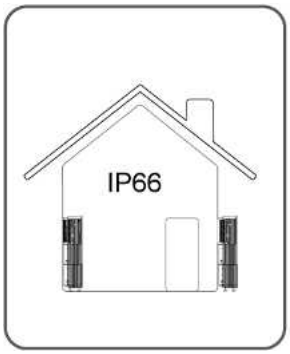
- **Wear goggles and safety gloves.**
- **Before drilling, ensure that the drilling location is clear of concealed water pipes and electrical wiring.**
- **Cover the product to protect it from the ingress of debris and dust.**

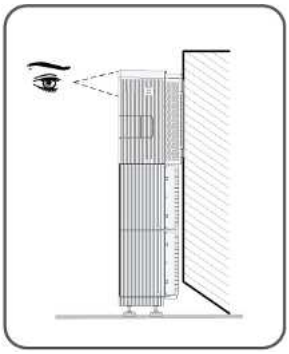
5.2 Select Installation Location

Selecting an optimal installation location is essential to safe operation, service life, and performance of the all-in-one unit.

The all-in-one unit has an IP66 rating and can be installed indoors or outdoors.

Install the all-in-one unit at a height that allows the LED indicator panel to be easily viewed and facilitates electrical connection, operation, and maintenance.



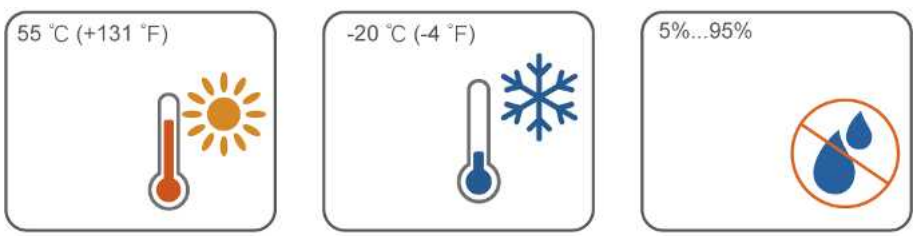


5.2.1 Installation Environment Requirements

- Do not install the device in a place prone to water leakage, e.g., under the air-conditioner vent, the air vent, or the cable outlet window of the machine room, so as to prevent device damage or short circuit caused by liquid ingress.
- Do not install the all-in-one unit in an environment with flammable or explosive materials or smoke.
- Never install the all-in-one unit in an area containing corrosive substances, such as corrosive gases or organic solvents.
- The surface of the all-in-one unit may become hot during operation. Do not touch it, as doing so may cause burns.
- Do not install the all-in-one unit where children can easily reach it.
- Good ventilation and heat dissipation are essential. Install the all-in-one unit in a well-ventilated location.
- If the all-in-one unit is installed in an enclosed or semi-enclosed space, add a cooling or ventilation system to ensure that the indoor ambient temperature during operation does not exceed the outdoor ambient temperature. A semi-enclosed environment refers to a special space where not all six sides are fully enclosed, but natural ventilation is hindered, making it prone to gas accumulation or heat buildup.
- The installation site must have firm ground, free from yielding soil, soft soil, or other unfavorable geological conditions prone to subsidence. Do not select low-lying areas prone to water or snow accumulation. The site level should be higher than the historical maximum water level in the area.
- Never install the all-in-one unit where it could be submerged.
- To prevent ground vegetation or standing water from affecting normal inverter operation, the bottom clearance may be increased as appropriate provided that the top clearance requirement is met.
- It is recommended to install the all-in-one unit in a sheltered location to protect it from direct sunlight and severe weather such as snow, rain, and lightning. If the all-in-one unit

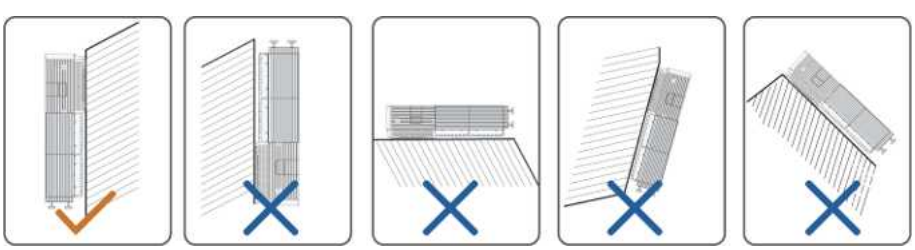
is installed in direct sunlight, the inverter may reduce its power output as the ambient temperature rises as part of its high-temperature self-protection function.

- Consult SUNGROW before installing the all-in-one unit outdoors in a salt-affected area. Such areas mainly refer to coastal areas within 500 m of the coast. Salt spray deposition varies considerably depending on the characteristics of the nearby seawater, sea winds, precipitation, air humidity, topography, and forest cover.
- Never install the all-in-one unit in a chemically contaminated environment containing substances such as halogens or sulfides.
- Never install the all-in-one unit in an environment subject to vibration or strong electromagnetic fields. A strong magnetic field environment refers to an environment where the magnetic field strength exceeds 30 A/m.
- In dusty environments such as areas with high levels of dust, smoke, or fibrous debris, particles may cling to the device's air outlet or heat sink, impairing heat dissipation and, in severe cases, damaging the device. Never install the all-in-one unit in a dusty environment. If this cannot be avoided, clean the fans and heat sinks regularly to maintain effective heat dissipation.
- The operating ambient temperature is the average temperature measured within 1 m of the inverter. The temperature and humidity must meet the following requirements:



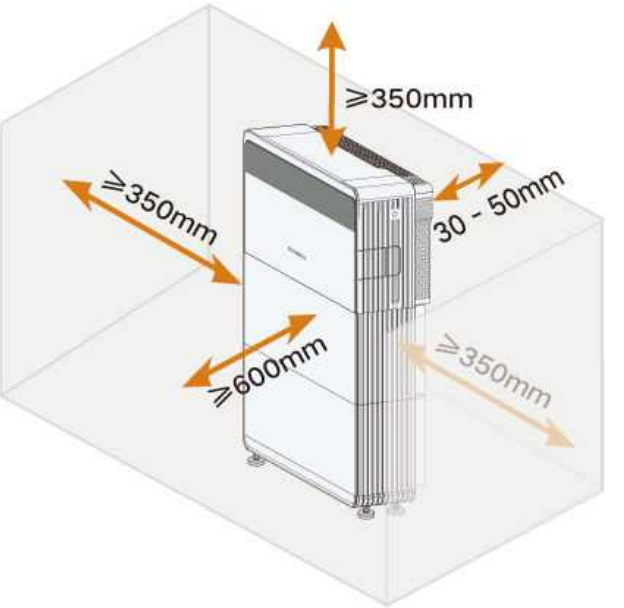
5.2.2 Installation Angle Requirement

Vertical installation is recommended. Do not install the all-in-one unit tilted forward, tilted backward, upside down, horizontally, or on its side.

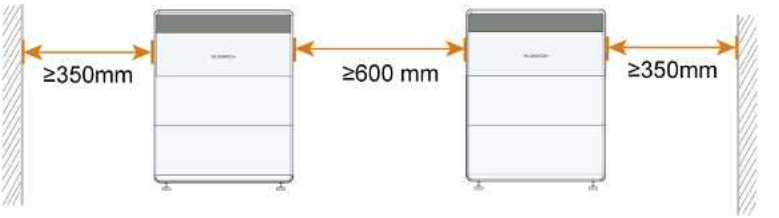


5.2.3 Installation Clearance Requirements

Make sure there is sufficient space around the inverter for good ventilation. The space requirements for installing one inverter are shown in the figure below.



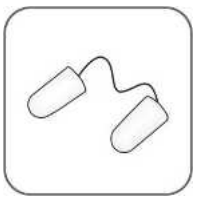
The all-in-one units can be installed in a row. The required installation clearances are shown in the following figure.



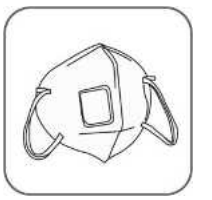
5.3 Installation Tools

Installation tools include but are not limited to the recommended tools below. If necessary, use other auxiliary tools on site.

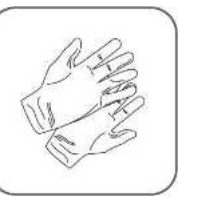
Goggles



Earplugs



Dust mask



Safety gloves

Safety shoes

Utility knife

Electric screwdriver* (M3, M4, M5)

Phillips screwdriver* (M3, M4, M5)

Hammer drill (φ10)

Marker

Vacuum cleaner

Rubber mallet

Anti-static wrist strap

Wire cutter

Wire stripper

Hydraulic crimping tool

Heat gun

MC4 terminal crimping tool

Assembly wrench

Multimeter ≥ 1000 V DC

Open-end wrench (17 mm, 41 mm, 44 mm)	RJ45 crimping tool	Spirit level	Tape measure
Socket wrench set	Slotted screwdriver		

*A shaft length of at least 110 mm is recommended.
Use tools with magnetic properties where possible.

5.4 Device Handling

Before installation, remove the inverter and Packs from their respective packages and move them to the selected installation location. Observe the following instructions when moving the inverter and Packs.

- Always take the weight of the inverter and Packs into account.
- Lift the inverter using the handles on both sides.
- Lift each Pack using the handles on both sides.
- Have two installers move the inverter or Pack together, or use suitable handling equipment.
- Do not release the device until it is securely fixed.

⚠ CAUTION

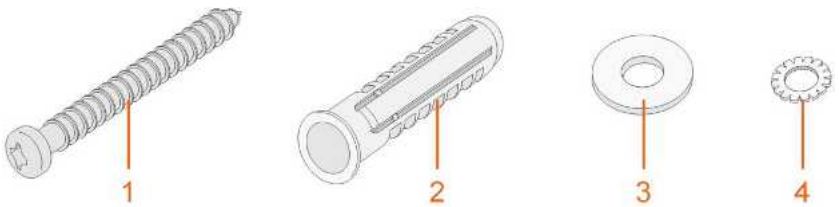
Improper handling may lead to personal injury!

- **Arrange a sufficient number of installers according to the inverter weight. Installers must wear protective equipment such as safety shoes and gloves.**
- **During inverter handling, always pay attention to the inverter's center of gravity to prevent tilting.**
- **Placing the inverter directly on a hard surface may damage its metal enclosure. Place protective material such as foam or a sponge mat underneath the inverter.**
- **Use the handles supplied with the product to move the inverter. Do not use the product terminals or other components as handholds.**

5.5 Device Installation

- Ensure that the floor is level.
- Ensure that the floor has sufficient load-bearing capacity for the actual product weight. For the specific weight, see Technical Data.
- The following example shows the installation of two Packs.

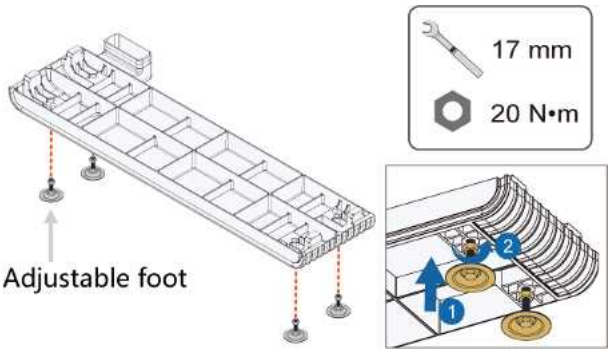
The expansion bolt assembly shown below is recommended for installation.



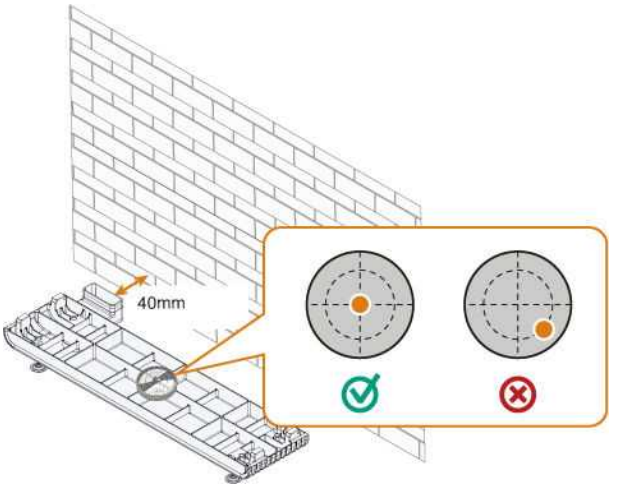
(1) Self-tapping screw	(2) Expansion tube	(3) Flat washer	(4) Spring washer

Before installation, first open the inverter package and remove the inverter and battery base.

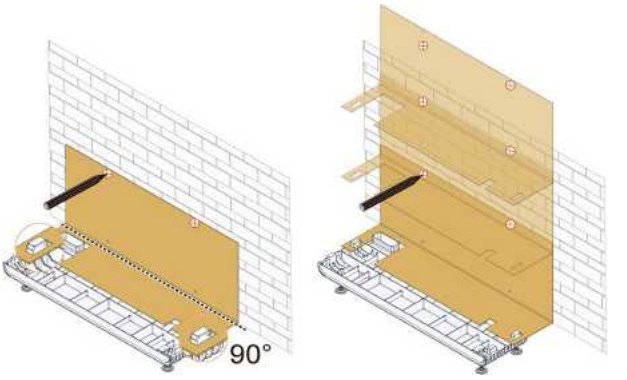
Step 1 Install the adjustable feet on the base.



Step 2 Level the base with a spirit level.

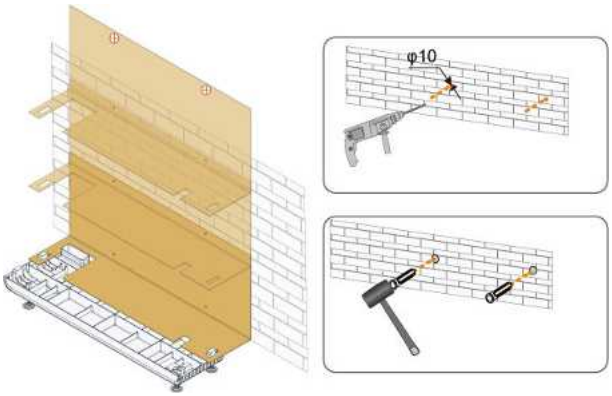


Step 3 Use the positioning template to mark the drilling positions.



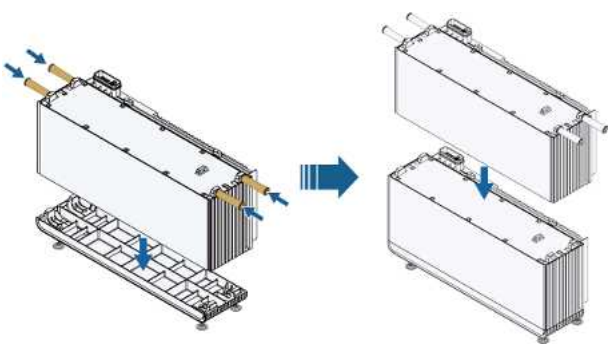
- If two or fewer Packs are installed, install the mounting bracket on the top module.
- If more than two Packs are installed, an additional mounting bracket on the second or third module is recommended to reduce the risk of tipping caused by an unstable foundation.

Step 4 Install expansion bolts in the drilled holes.



- The recommended drilling depth is 70 mm.
- Cover the connector openings while drilling to prevent drilling dust from entering the connectors.

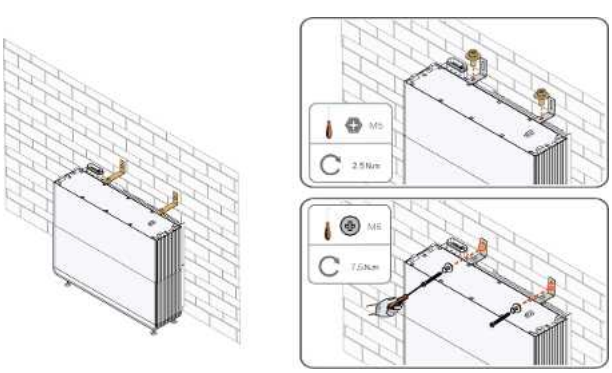
Step 5 Use the handles to stack the Packs on the base one by one.



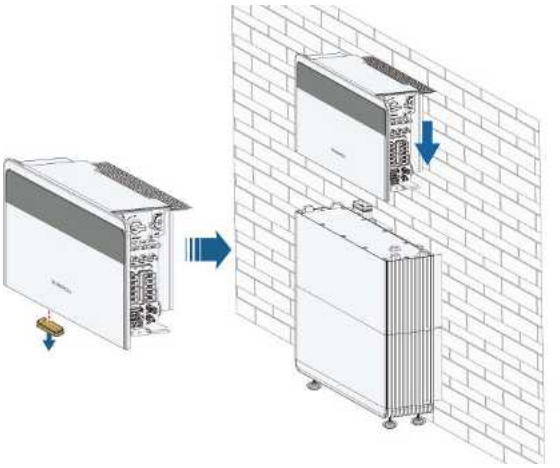
Lower each Pack vertically onto the base during installation.

Ensure that the handles are fully rotated into position before lifting the Pack. After installing the Packs, store the handles properly.

Step 6 Install the battery mounting bracket.



Step 7 Remove the dust cover from the bottom of the inverter, and then install the inverter.



Step 8 Secure the Packs and inverter.

--End

6 Electrical Connection

6.1 Safety Precautions

⚠ DANGER

Exposing the PV string to sunlight will generate dangerous voltage!

- **When performing electrical connection operations, operators must wear personal protective equipment (PPE).**
- **Before touching DC cables, always use a measuring device to verify that the cables are de-energized.**
- **Comply with the safety precautions for the PV strings and those listed in the relevant documents.**

⚠ DANGER

- **Before electrical connection, ensure that the inverter and all switches connected to it are in the "OFF" position; otherwise, electric shock may occur!**
- **Before performing electrical work, ensure that the inverter is undamaged and that all cables are de-energized.**
- **Do not close the AC circuit breaker until electrical connections are completed.**

⚠ WARNING

The grounding conductor must not be damaged, and the product must not be operated before installing the grounding conductor; otherwise, personal injury or product damage may occur.
Select a measuring device with a suitable range. Overvoltage may damage the measuring device and cause personal injury.

⚠ WARNING

Incorrect wiring may damage the product, and such damage is not covered under warranty.

- **Electrical connection operations must be performed by qualified persons only.**
- **When performing electrical connection operations, operators must wear PPE.**
- **Cables used in the PV system must be of the correct specification, securely connected, and well insulated.**
- **Factors affecting cable selection include rated current, cable type, routing method, ambient temperature, and maximum expected line loss.**

NOTICE

All electrical connections must comply with local and national/regional electrical standards.

- **Cables selected by the user must meet local legal and regulatory requirements.**
- **The inverter must only be connected to the grid with permission from the local electric utility.**

NOTICE

During electrical connection, connect the grounding cable first; when removing the inverter, disconnect the grounding cable last.
Wiring must follow local grid regulations and the safety instructions for the PV strings.

NOTICE

- **After crimping, the conductor crimp must completely enclose all conductor strands, and the conductor must be securely held in the crimp terminal with no looseness.**
- **When using a heat gun, take precautions to prevent heat damage to the equipment.**
- **Before connecting power cables (such as AC cables and DC cables), always confirm that the cable labels are correct before proceeding.**
- **When routing communication cables, keep them separate from power cables and away from strong interference sources to prevent signal interference and communication issues.**
- **All unused terminals must be covered with waterproof caps to avoid compromising the product's IP rating.**
- **Ensure that the AC output cables are securely connected; otherwise, the inverter may not operate properly, or the AC connectors may become damaged during operation.**
- **After wiring, seal the gaps around the cable entry/exit holes with firestop putty or other fireproof/waterproof materials to prevent ingress of foreign matter or moisture, which could affect long-term operation.**

The cable colors shown in the illustrations in this manual are for reference only. Select cables according to local cable standards.

6.2 Introduction to Wiring Terminals

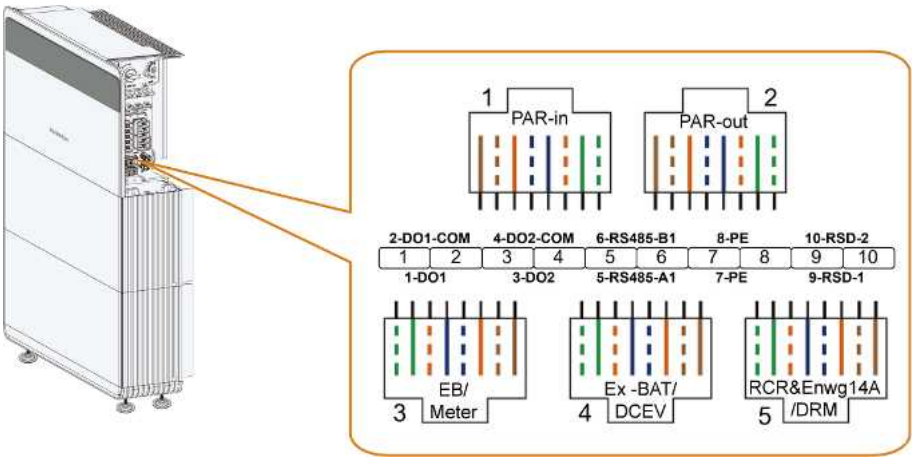
The electrical connection area is located on the side of the all-in-one unit, as shown in the following figure.

The figure is for reference only. Refer to the actual product.

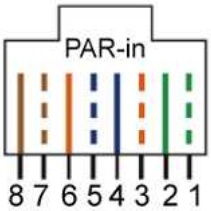
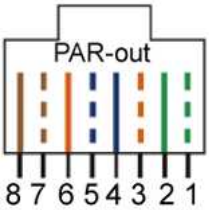
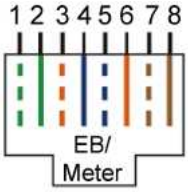
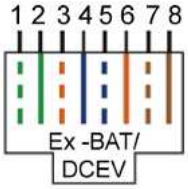
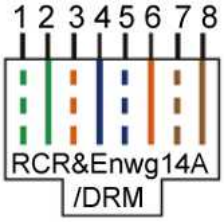
No.	Item	Silkscreen Marking	Description
1	DC switch	DC SWITCH	Used to control the connection and disconnection of DC inputs
2	WLAN	WLAN	Used for connecting a communication module Currently compatible only with iHomeManager Mini
3	DC input terminals	PV1+/-, PV2+/-, PV3+/-	Three pairs of PV connectors
4	AC wiring terminal	LOAD, GRID	For AC output wiring
5	Communication side	COM	For communication connections such as EnergyBridge, EnWG 14a, and RS485
6	External grounding terminal	⏚	Used for reliable grounding
7	Multi-function port	DC+/-	Reserved
8	Manual start/stop button	ON/OFF	When no PV array is connected: • Press and hold the button for 3 seconds to start. • Press and hold the button for 10 seconds to shut down. Release the button when

No.	Item	Silkscreen Marking	Description
			the LED starts to change gradually.

COM is the communication port. Details are provided below.



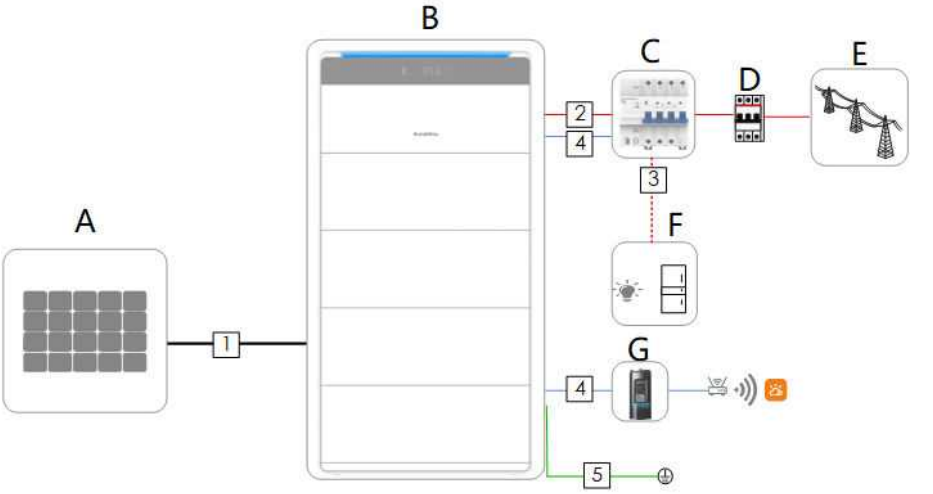
Label	Description
PAR-in	For master-slave parallel communication
PAR-out	For master-slave parallel communication
EB/Meter	For connecting an EnergyBridge or smart meter
Ex-BAT/DCEV	For CAN communication with an expansion battery, CAN communication with the DC/DC converter used for battery expansion, and RS485 communication with a DC charger
RCR & EnWG 14a / DRM	DE: ripple control receiver (RCR)
1-DO1, 2-DO1-COM, 3-DO2, 4-DO2-COM	For starting and stopping an SG heat pump
5-RS485-A1, 6-RS485-B1	For an external RS485 connection
7-PE, 8-PE	PE conductor, used as the grounding point for the RS485 cable shield.
9-RSD-1,	Emergency stop button

Label	Description							
10-RSD-2								
	PAR-in							
	8	7	6	5	4	3	2	1
	NC	NC	ETH-RD-N	CANL-DSP	CANH-DSP	ETH-RD-P	ETH-TD-N	ETH-TD-P
	PAR-out							
	8	7	6	5	4	3	2	1
	NC	NC	ETH-RD-N	CANL-DSP	CANH-DSP	ETH-RD-P	ETH-TD-N	ETH-TD-P
	EB/Meter							
	1	2	3	4	5	6	7	8
	NO1	NO1-COM	RS485-A2	CANH-DSP	CANL-DSP	RS485-B2	DI	GND
	Ex-BAT/DCEV							
	1	2	3	4	5	6	7	8
	CANH-BAT	CANL-BAT	NC	RS485-A3	RS485-B3	NC	CANH-DCDC	CANL-DCDC
	RCR & EnWG 14a / DRM							
	1	2	3	4	5	6	7	8
	DRM3/7	C	DRM1/5	DRM4/8	R	DRM2/6	NC	NC

6.3 Electrical Wiring Overview

System Wiring Diagram

The system wiring diagram is as shown below:



(A) PV string	(B) All-in-one unit	(C) EB	(D) AC circuit breaker
(E) Grid	(F) Load	(G) iHomeManager Mini	

NOTICE

- **Do not change the phase sequence (L1–L3). Otherwise, a fault may occur.**
- **The PV-side circuit and the battery-side circuit of the inverter are not directly coupled, so backfeeding will not occur in the event of a short circuit. To prevent safety risks caused by a short circuit, strictly observe the circuit rated current limits when configuring external overcurrent protection devices: maximum battery discharge current, 50 A; PV-side short-circuit current, 25 A. Select overcurrent protection devices with appropriate ratings accordingly to ensure safe and stable system operation.**

Table 6-1 Cable Specifications

No.	Cable	Type	Specification	
			Outer Diameter (mm)	Cross-Sectional Area (mm^2)
1	DC cable	Multi-core copper PV cable with a maximum	4.7–6.4	4–6

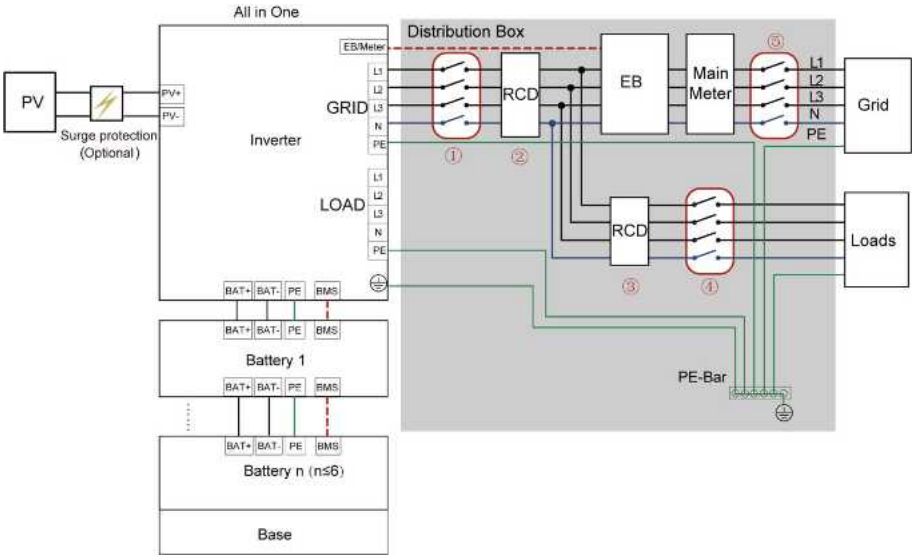
No.	Cable	Type	Specification	
			Outer Diameter (mm)	Cross-Sectional Area (mm^2)
		withstand voltage of 1000 V and a maximum withstand current of 20 A		(12 AWG–10 AWG)
2, 3	AC cable	Outdoor multi-core copper cable	22 - 27.5	10 - 16
			4.65 - 4.9	6
4	Communication cable*	Shielded twisted pair cable	6.4–8	2 × (0.5–0.75) (20 AWG–18 AWG)
		CAT 5e outdoor shielded Ethernet cable		8 × 0.2 (24 AWG)
5	External grounding cable	Outdoor single-core copper cable	Same specifications as the PE conductor in the AC cable	

*To meet shielding and anti-interference requirements:

- A shielded Ethernet cable must be used. A CAT 5e or CAT 6 shielded Ethernet cable is recommended.
- Install a ferrite core at each end of the Ethernet cable. Under certain operating conditions, an additional ferrite core is required midway along the cable.

Whole-Home Backup System Wiring Diagram (TN System)

This wiring diagram is for reference only. Follow local regulations and wiring requirements.



No.	SH10/12/15TA
①	32 A / 400 V Type B / Type C AC circuit breaker*
②	300 mA residual current device (RCD) (must comply with local regulations)
③	30 mA RCD (must comply with local regulations)
④	Depends on load
⑤	Depends on the load and all-in-one unit capacity

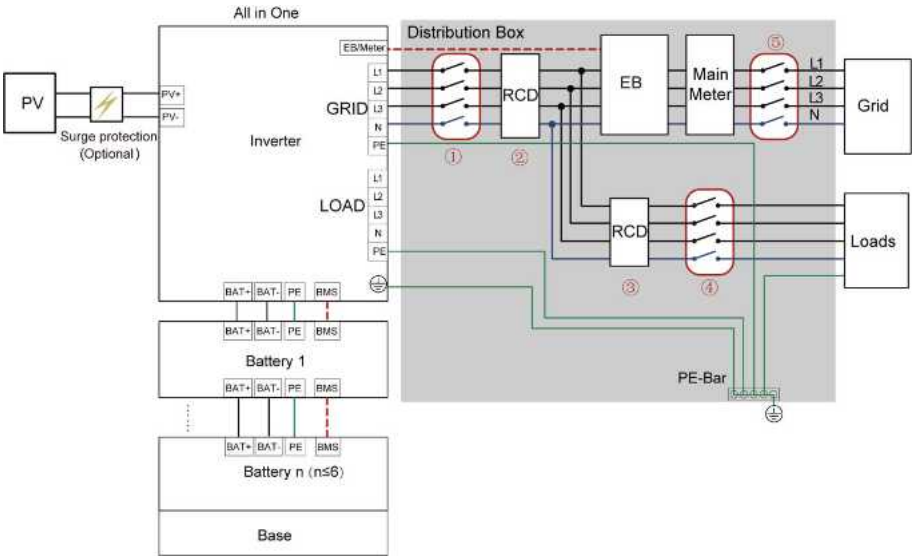
- *Select a miniature circuit breaker (MCB) with a rated current appropriate for the actual requirements, taking into account the overall wiring scheme, number of loads, and inverter load capacity.
- The values in the table are recommended values and may be adjusted as appropriate for the actual application.
- To improve system safety, configure the inverter's **Feed-in power limitation** immediately after completing the wiring. Use the following formula: **Feed-in power limit** ≤ 3 × 230 × 0.8 × Rated current of the household main switch.

When connecting EB, select the appropriate accessory based on the number of wires.

Number of Wires	Recommended Accessory	Specification
2	Power distribution block	One input and two outputs, with the current rating selected based on the load
3	Power distribution block	One input and three outputs, with the current rating selected based on the load

Whole-Home Backup System Wiring Diagram (TT System)

This wiring diagram is for reference only. Follow local regulations and wiring requirements.



No.	SH10/12/15TA
①	32 A / 400 V Type B / Type C AC circuit breaker*
②	300 mA RCD (must comply with local regulations)
③	30 mA RCD (must comply with local regulations)
④	Depends on load
⑤	Depends on the load and all-in-one unit capacity

- *Select a miniature circuit breaker (MCB) with a rated current appropriate for the actual requirements, taking into account the overall wiring scheme, number of loads, and inverter load capacity.
- The values in the table are recommended values and may be adjusted as appropriate for the actual application.
- To improve system safety, configure the inverter's **Feed-in power limitation** immediately after completing the wiring. Use the following formula: **Feed-in power limit** ≤ 3 × 230 × 0.8 × Rated current of the household main switch.

When connecting EB, select the appropriate accessory based on the number of wires.

Number of Wires	Recommended Accessory	Specification
2	Power distribution block	One input and two outputs, with the current rating selected based on the load
3	Power distribution block	One input and three outputs, with the current rating selected based on the load

6.4 External Protective Grounding Connection

⚠ DANGER

- **When the inverter is powered on and running, high current is present. Powering the unit without proper grounding poses a risk of electric shock and may disable essential protection features such as lightning protection. Therefore, before powering on the inverter, ensure that the inverter is reliably grounded. Damages caused by failure to comply are not covered under warranty.**
- **During electrical connections, grounding must be the first and highest-priority step.**

⚠ WARNING

- **Since the inverter is transformerless, neither the positive nor the negative terminals of the PV strings can be grounded. Otherwise, the inverter will not operate normally.**
- **The external protective grounding connection must be completed before making any AC, PV string, or communication connections.**
- **The external protective grounding point provides a reliable ground connection. Do not use an improper grounding conductor for grounding, Otherwise, it may cause product damage or personal injury.**

⚠ WARNING

The external protective grounding terminal must meet at least one of the following requirements:

- **If the grounding cable cross-sectional area ≥ 10 mm² (copper) or 16 mm² (aluminum), it is recommended to ground both the external protective grounding terminal and the AC side grounding terminal.**
- **If the grounding cable cross-sectional area < 10 mm² (copper) or 16 mm² (aluminum), ensure both the external protective ground terminal and AC side ground terminal are grounded.**

Other grounding schemes, which meet the local standards and safety regulations, may also be adopted. However, SUNGROW shall not be held liable for any consequence caused thereby.

6.4.1 Requirements for External Protective Grounding

In PV power generation systems, all non-current-carrying metal parts and equipment enclosures must be grounded (e.g., PV mounting structures, inverter enclosures, etc.).

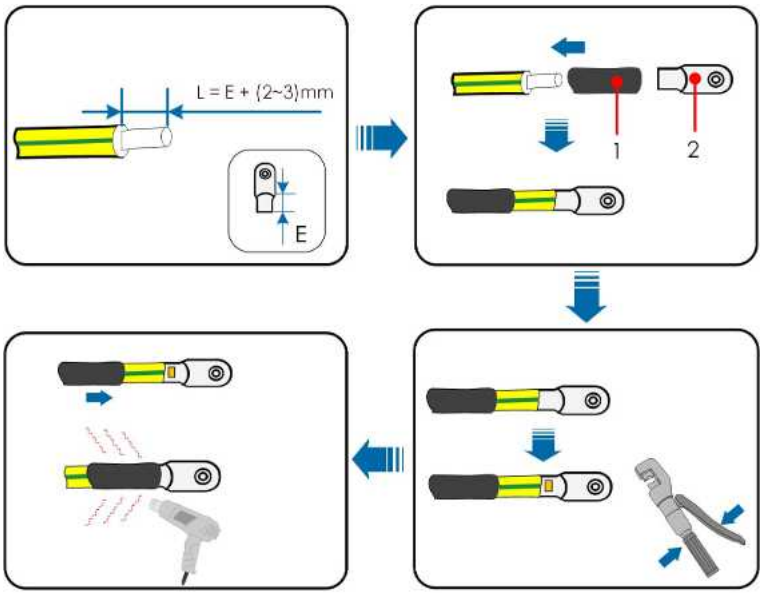
For a single inverter, the external protective grounding terminal must be grounded locally.

For systems with multiple inverters, connect all external protective grounding terminals and PV mounting structure grounding points to an equipotential bonding conductor (specific operations depend on site conditions) to ensure equipotential bonding.

6.4.2 Grounding Procedures

The cross-sectional area of the external grounding cable must be the same as that of the PE conductor in the AC cable.

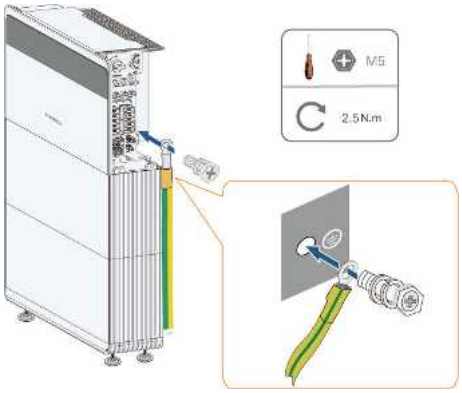
Step 1 Crimp the OT terminal onto the cable.



1: Heat shrink tubing 2: OT/DT terminal

- After crimping, the OT terminal must fully enclose the conductor, and the conductor must be in firm contact with the OT terminal.
- When using a heat gun, ensure that the device is not scorched.

Step 2 Remove the screw from the grounding terminal and secure the cable using a screwdriver.



Step 3 Apply silicone sealant or paint to the grounding terminal to improve its corrosion resistance.

--End

6.5 AC Cable Connection

6.5.1 AC Side Requirements

Before connecting the inverter to the grid, ensure that the inverter is compatible with the grid voltage and frequency. For detailed parameters, see 11.1 Technical Data or contact the power company.

> The inverter can only be connected to the grid with the permission of the local power company.

⚠ CAUTION

Install an AC circuit breaker between the inverter and the grid to ensure that the inverter can be safely disconnected from the grid.

- **Determine whether an AC circuit breaker with higher overcurrent capacity is required based on actual conditions.**
- **Multiple inverters cannot share a single AC circuit breaker.**

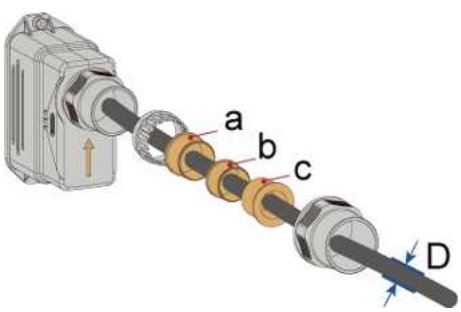
Residual Current Monitoring Unit

The inverter has an integrated residual current monitoring unit and quickly disconnects from the grid if the detected residual current exceeds the permissible value.

6.5.2 Install AC Connector

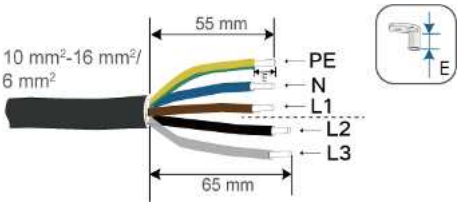
The AC-side GRID connection procedure is shown in the following figure.

Step 1 Select the appropriate sealing ring for the cable diameter, and route the cable through the connector.



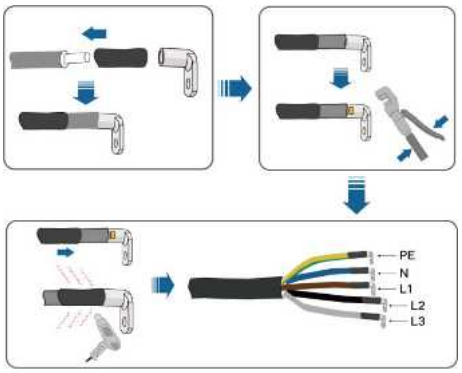
Outer Diameter D (mm)	Sealing Ring
22–26	a
19–22	a+b
14–19	a+b+c

Step 2 Strip the cable insulation.



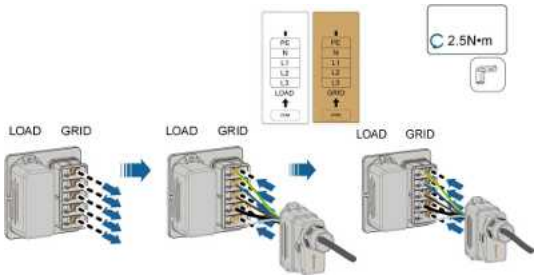
The wire colors shown in the figure are for reference only. The selected cable and conductors must comply with local standards.

Step 3 Crimp the OT terminal onto the cable.

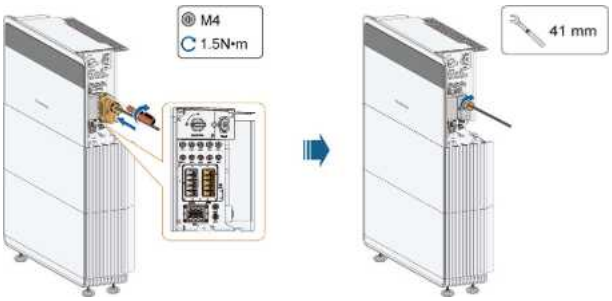


Step 4 Remove the blanking plug from the **GRID** port.

Step 5 Remove the nut on the AC side, and secure the cable with crimped OT terminals to the **GRID** port.



Step 6 Secure the connector and tighten the nut.



Before tightening the connector, press the matching screw on the connector housing fully inward, and then tighten it with a screwdriver.

--End

6.6 DC Cable Connection

DANGER

Hazardous voltages on the PV string when it is exposed to sunlight!

- **Observe all the safety instructions listed in the documents for the PV string and other relevant documents.**

⚠ WARNING

- **Make sure the PV array is well insulated to the ground before connecting it to the inverter.**
- **Make sure the maximum DC voltage and the maximum short circuit current of any string never exceed inverter permitted values specified in “ Technical Data. ”**
- **Check the positive and negative polarity of the PV strings, and connect the PV connectors to corresponding terminals only after ensuring polarity correctness.**
- **During the installation and operation of the inverter, please ensure that the positive or negative electrodes of PV strings do not short-circuit to the ground. Otherwise, an AC or DC short-circuit may occur, resulting in equipment damage. The damage caused by this is not covered by the warranty.**
- **Electric arc or contactor over-temperature may occur if the DC connectors are not firmly in place, and the loss caused is not covered by the warranty.**
- **If the DC input polarity is reversed or both the positive and negative terminals of different MPPTs are shorted to ground while the DC switches are set to the ON position, do not operate the inverter immediately, as this may cause damage. Wait until string current drops below 0.5 A, turn DC switches OFF, and disconnect the DC connectors to adjust string polarity.**
- **The inverter does not support the full parallel connection of PV strings (Full parallel connection refers to a connection method in that strings are connected in parallel and then connected to the inverter separately).**
- **Do not connect one PV string to multiple inverters. Otherwise, the inverters may be damaged.**

⚠ WARNING

- **Use the DC connectors supplied with the product for DC cable connection. Using any other type of DC connector may result in serious consequences. Any resulting damage to the product is not covered under warranty.**

NOTICE

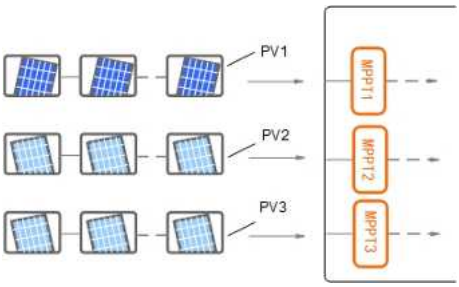
The following requirements about PV string connection must be met. Otherwise, it may cause irreversible damage to the inverter, which is not covered by the warranty.

- **Mixed use of different brand or model of PV modules in one MPPT circuit, or PV modules of different orientation or angles in a string will not necessarily damage the inverter but may degrade system performance.**

6.6.1 PV Input Configuration

The output voltage of each string must exceed the lower limit of the full-load MPPT voltage range.

Each PV input operates independently and has its own MPPT. The string configuration of each PV input may vary, including the type of PV module, the number of PV modules per string, tilt angle, and mounting direction.



Before connecting the PV input to the inverter, ensure that the following electrical parameter requirements are met.

Model	Open-Circuit Voltage (OCV) Limit	Max. Current of the Input Connector
SH10/12/15TA	1000 V	30 A

6.6.2 Install PV Connector

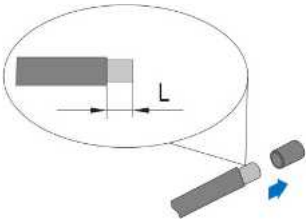
⚠ DANGER

High voltage may be present in the inverter!

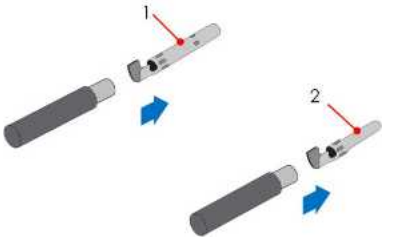
- **Before performing electrical work, ensure that all cables are de-energized.**
- **Do not turn on the DC switch or close the AC circuit breaker before completing all electrical connections.**

To ensure an IP66 rating, use the connector included in the supplied accessories.

Step 1 Strip the cable insulation.

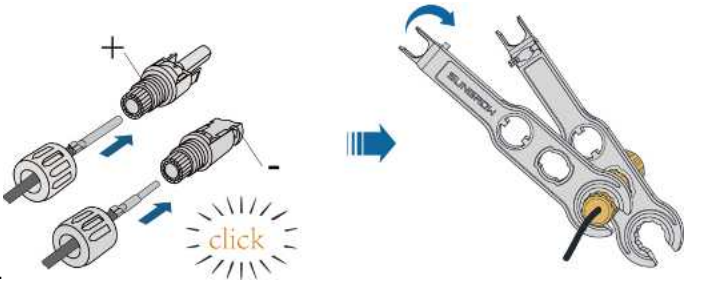


Step 2 Crimp the contact on the cable wires using a crimping tool.



1: Positive crimp contact 2: Negative crimp contact

Step 3 Route the cable through the cable gland and insert it into the insulating sleeve until it clicks into place. Gently pull the cable to make sure the connection is secure. Tighten the sealing sleeve and insulating sleeve to a torque of 2.5–3 N·m.



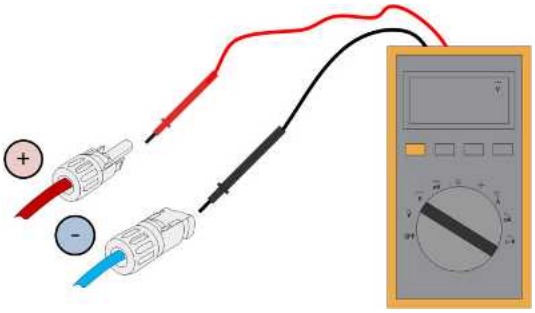
Step 4 Check if the polarity is correct.

NOTICE

If the polarity is reversed, the inverter will be in a fault or alarm state and cannot operate normally.

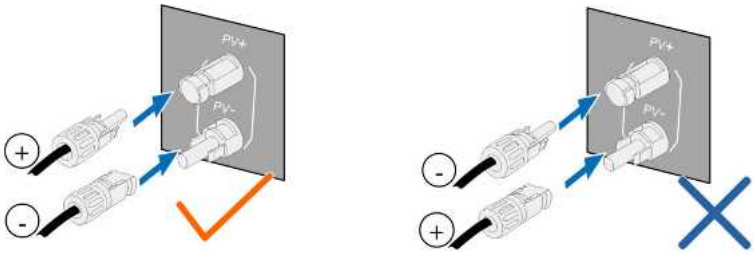
Step 5 Rotate the DC switch to "OFF".

Step 6 Check that the polarity of the PV string connection cables is correct, and ensure that the OCV never exceeds the inverter's maximum input voltage of 1000 V.



The DC voltage range of the multimeter must be at least 1000 V. If the voltage reads negative, the DC input cables are not connected in the correct polarity. Correct the wiring and make sure the polarity is correct. If the voltage exceeds 1000 V, too many PV modules have been configured. Reconfigure the PV array.

Step 7 Insert each DC connector into the corresponding DC terminal until you hear it click into place.



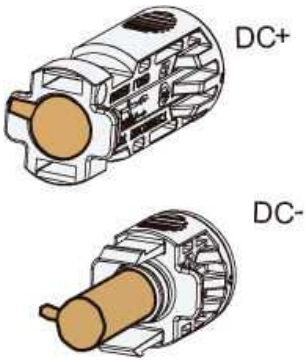
Step 8 Connect other PV strings following the above steps.

Step 9 Keep the waterproof plugs installed in unused PV ports.

--End

6.7 Multi-function Port Connection

The multi-function port is currently reserved. Keep the waterproof plug installed to maintain the IP66 rating.



6.8 Communication Connection

WLAN Connection

After installing iHomeManager Mini module, you can view the relevant information in the iSolarCloud App or on iSolarCloud Web.

RS485 Functions

The RS485 communication interface is used to establish a communication connection with monitoring devices.

6.8.1 iHomeManager Mini Connection

iHomeManager Mini module supports Ethernet and WLAN communication. Using both communication methods at the same time is not recommended.

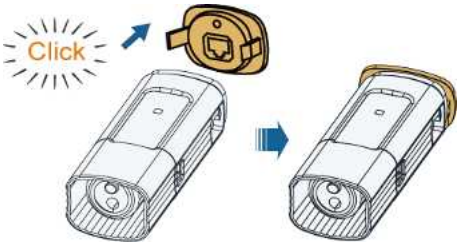
For more information, scan the QR code on iHomeManager Mini or the QR code in the accompanying materials.

The WLAN port currently supports only iHomeManager Mini.

6.8.1.1 WLAN Connection

Step 1 Remove the waterproof cap from the **WLAN** port.

Step 2 Install iHomeManager Mini module. After installation, gently wiggle the module by hand to ensure that it is secure.



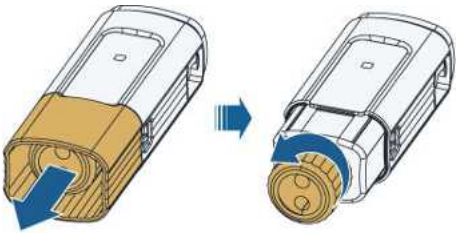
Step 3 For iHomeManager Mini parameter settings, refer to the accompanying setup guide.

--End

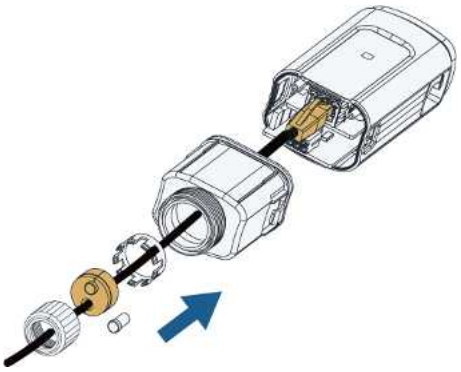
6.8.1.2 LAN Connection

Step 1 Connect the cables to the RJ45 plug.

Step 2 Remove the protective cover, nut, and sealing sleeve from iHomeManager Mini.

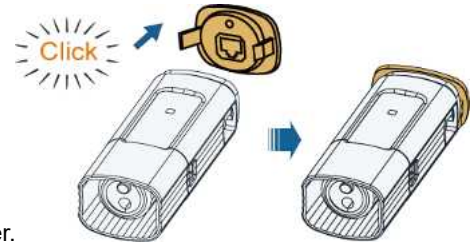


Step 3 Route the cable through the protective cover, nut, and sealing sleeve, insert it into the RJ45 Ethernet port, and reinstall the removed parts in reverse order to complete the cable connection.



Step 4 Remove the blanking plug from the **WLAN** port on the inverter.

Step 5 Plug the wired iHomeManager Mini into the **WLAN** port on the

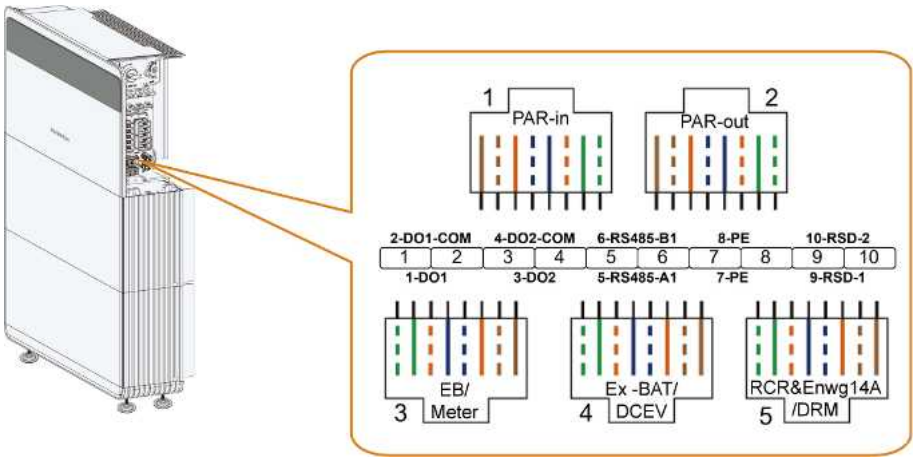


inverter.

--End

6.8.2 COM Connection

COM is used to establish RS485 communication with devices such as EB, the meter, and the emergency stop button.



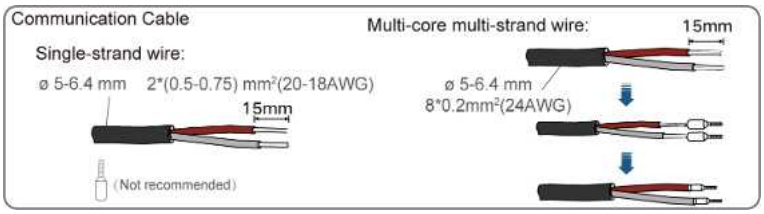
6.8.2.1 Emergency Stop Button Connection

Connect the emergency stop button as follows:

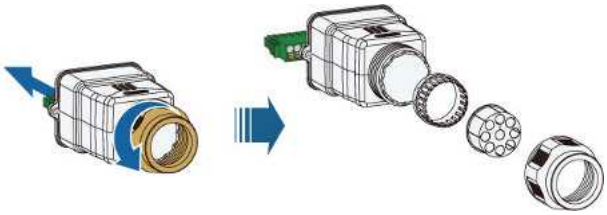
Step 1 Remove the blanking plug from the **COM** side.

Step 2 Strip the cable insulation.

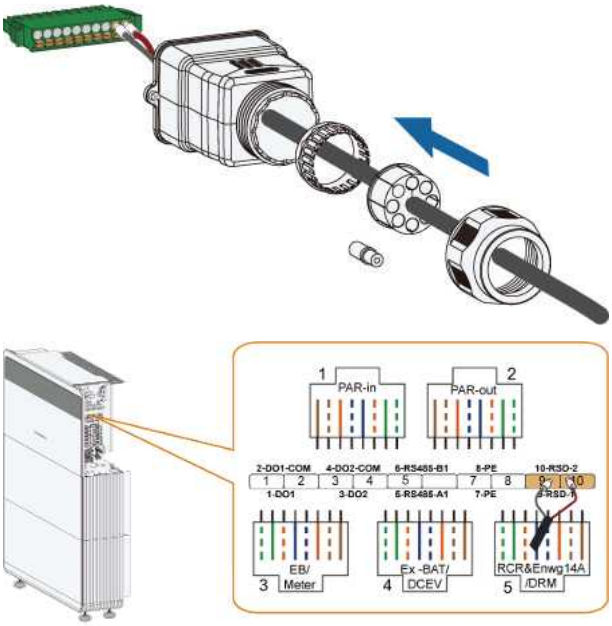
Crimp wire-end ferrules onto the stranded conductors of multi-core cables.



Step 3 Rotate the nut on the communication connector and remove the terminal block.



Step 4 Route the communication cable through the communication connector and insert the wires into the corresponding terminals.

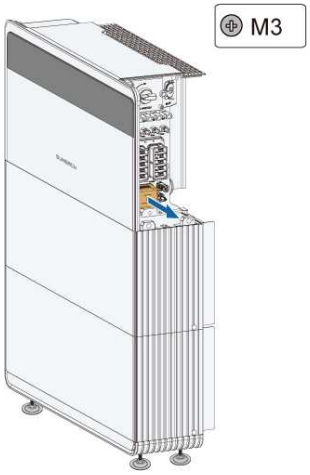


--End

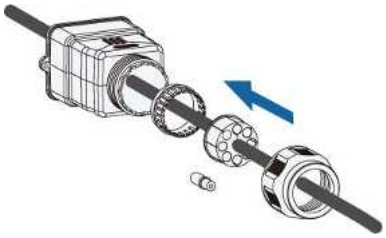
6.8.2.2 EnergyBridge Connection

EnergyBridge is mainly used for whole-home backup and retrofit applications to switch between on-grid and off-grid operation. Connect EB communication cable as follows:

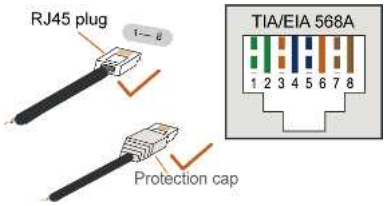
1. Remove the blanking plug from the communication side of the all-in-one unit.



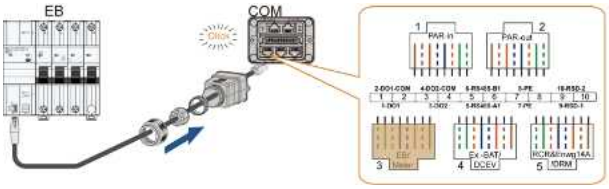
2. Route the communication cable through the communication connector.



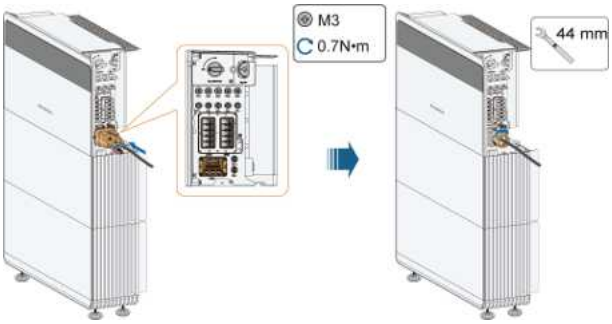
3. Crimp the RJ45 plug.



4. Insert the communication cable with the crimped RJ45 plug into **EB/Meter** port.



5. Secure and tighten the communication connector fitted with the cable.



6.8.2.3 EnWG 14a Connection

In Germany and certain other parts of Europe, grid operators use an RCR to convert grid dispatch signals into dry-contact signals. The plant must therefore receive grid dispatch signals through dry-contact communication.

Connect the dry-contact cable of the RCR as shown in the following figure:

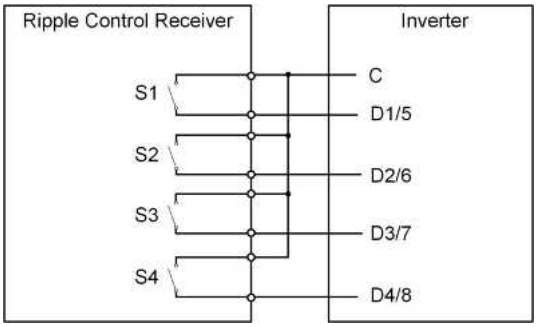
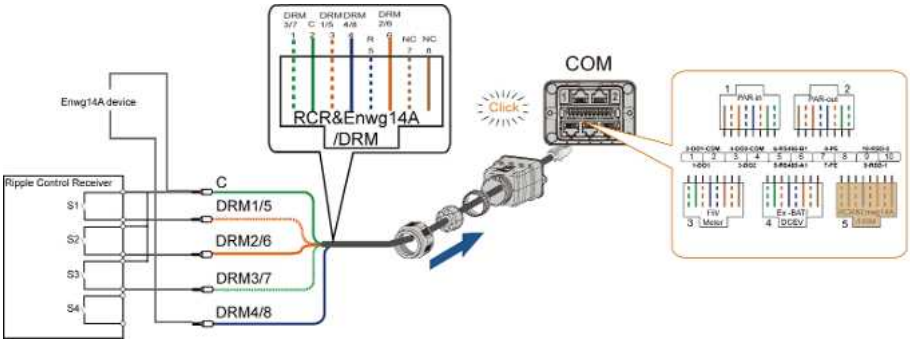


Table 6-2 DI Mode Activation Method

S 1	S 2	S 3	S 4	External RCR Switch Operation	Output Power (Percentage of Rated AC Output Power)
0	0	0	0	None	100% (configurable as needed)
1	0	0	0	Close S1	100%
0	1	0	0	Close S2	60%
0	0	1	0	Close S3	30%
1	1	0	0	Close S1 and S2	0% (disconnect from the grid)

Wiring Steps

Connect the communication cable to the corresponding terminal according to the communication port label.



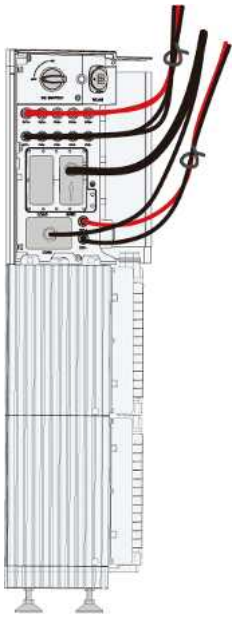
6.9 Install Decorative Covers

The decorative covers consist of a left cover and a right cover. Install the left decorative cover after all wiring is complete, and install the right decorative cover after the system has been powered on.

Step 1 Install the left decorative cover. Ensure that the clips are secure, and then tighten the screws with a screwdriver.

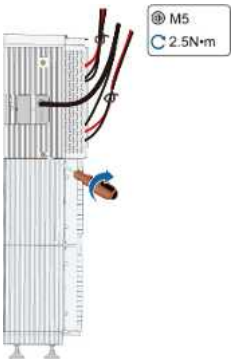
A screwdriver with a shaft length of at least 110 mm is recommended.

Step 2 After terminating the cables, arrange and bundle them to form downward-facing drip loops that prevent water from running along the cables into the device.



Step 3 Refer to Commissioning to power on the system.

Step 4 Cut along the dashed line on the right decorative cover, and then install the cover.



A screwdriver with a shaft length of at least 110 mm is recommended.

--End

7 Commissioning

7.1 Inspection Before Commissioning

Perform inspections as follows before starting the inverter for the first time, and make sure the requirements below are all met.

- All devices are properly installed.
- The DC switch and AC circuit breaker are all set to "OFF".
- The grounding cable is properly and reliably connected.
- The AC cable is properly and reliably connected.
- The DC cable is properly and reliably connected.
- The communication cable is properly and reliably connected.
- The unused terminals have been sealed off properly.
- No construction tools or other objects are left on top of the inverter or inside the junction box (if equipped).
- The AC circuit breaker is selected in compliance with the relevant requirements specified in this manual and applicable local standards.
- All safety and warning labels are firmly attached, intact, and legible.

7.2 Commissioning Steps

If all the above checks are passed, perform the following steps for initial commissioning.

Step 1 Press the manual start/stop button.

Press the manual start/stop button for no more than 3 seconds.

Step 2 Rotate the DC switch to the "ON" position.

Step 3 Close the AC circuit breaker between the all-in-one unit and EB.

Step 4 Close the AC circuit breaker between the all-in-one unit and the grid.

Step 5 Observe the inverter LED indicators to ensure that the all-in-one unit is operating normally. For details, see 2.4 LED Indicators.

- If the solar irradiance and grid conditions meet the requirements, the all-in-one unit operates normally. The all-in-one unit may take several minutes or longer to connect to the grid, depending on the country/region code selected during initial setup and the actual grid conditions on site.
- Strictly follow the sequence above. Otherwise, any resulting damage is not covered by the warranty.
- Before closing the AC circuit breaker between the all-in-one unit and the grid, measure the AC voltage with a multimeter and ensure that it is within the specified range. Otherwise, the all-in-one unit may be damaged.

--End

7.3 App Preparation

Step 1 Install the latest version of the App. For details, see 8.2 Install iSolarCloud.

App version requirements:
- Android: V2.1.6.20260730 or later.
- iOS: V2.1.6.20260807 or later.

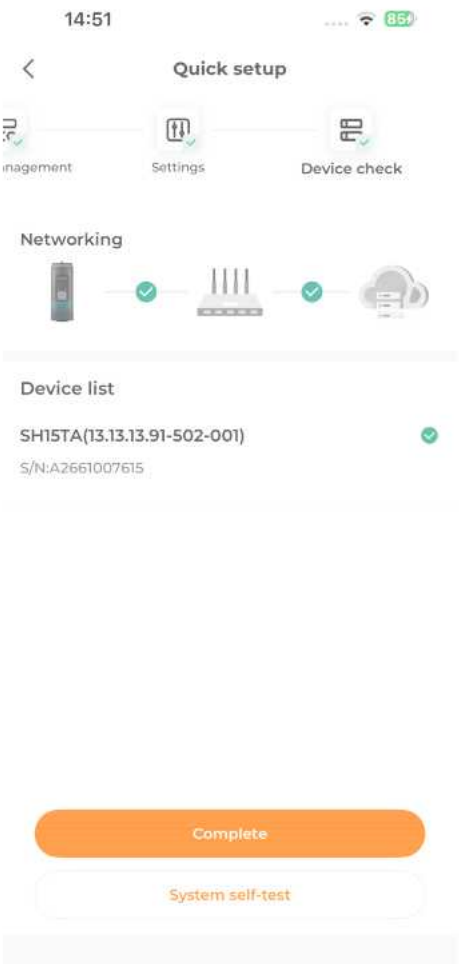
Step 2 Register an account. For details, see 8.3 User Roles. If you have obtained an account and password from a distributor, installer, or SUNGROW, skip this step.

Step 3 Download the firmware installation package to the mobile device in advance. For details, see 8.4 Device Commissioning. This prevents download failures caused by poor network reception on site.

--End

7.4 System Self-Test

A connection check will be performed by the system automatically once you go to **System self-test**. You can then check whether the communication between devices is normal.



Step 1 If a device communication problem is displayed, follow the on-screen instructions to troubleshoot it. troubleshoot it.

Step 2 Tap **System Self-test** at the bottom of the screen.

Step 3 If the system check is finished without detecting anything abnormal in the devices, tap **Complete**. **Complete**

Step 4 Choose whether to create a plant now.

- Tap **Continue** to go to 7.5 Create Plant.
- Tap **Not now** to go to the **Home** screen.

--End

7.5 Create Plant

To open the **Create plant** screen, switch to mobile data or connect the mobile device to a home network, and then return to the App.

1. Fill in the **Basic plant information**:

Parameter Name	Description
Plant name*	Name the plant.
Installed PV power (kWp)*	Enter the installed power.
Plant type*	Select the plant type: • Residential PV plant • Residential energy storage plant
City*	The city where the plant is located.
Postal code	The postal code of the plant location.
Country/region*	The country/region where the plant is located.
Time zone*	Automatically displays the time zone for the selected **Country/region**.
Grid connection type*	Select the type of grid connection for the plant: • 100% feed-in • Self-consumption • Zero-export • Off-grid
Grid connection date	Shows the current date by default. You can tap to set the grid-connection date as needed.

Fields marked with * are mandatory.

2. Fill in the **Retailer/installer information**:
   Enter the **Retailer/installer email address**. Select the **Notify the installer via email** checkbox if needed. The retailer/installer can log in to the App using the email address and check the plant in the plant list.
3. Fill in the **Owner Information**:
   Enter the **Owner's email address**. Select the **Notify the property owner via email** checkbox if needed. The owner can log in to the App using the email address and check the plant in the plant list.
4. Set tariff
   a. Set your preferred currency in **Unit**.
   b. Set the **Feed-in tariff** and the **Consumption tariff**. Select the **Tariff type**:
      - **Fixed tariff**: The same tariff applies to all time periods.
      - **Time-of-use tariff**: Different electricity rates can be set for multiple time periods. The time periods must not overlap.

5. Tap **Save and continue**.

8 iSolarCloud App

8.1 About iSolarCloud

The iSolarCloud App is a mobile application used for power plant management. The App provides plant operation analysis service and enables intelligent mobile O&M. It is designed with functions such as plant operation data display, rapid plant access, remote parameter setting, quick fault location and notification, and power yield and revenue analysis. With iSolarCloud, convenient and efficient end-to-end plant O&M is allowed.

Connection Methods

Users can log in to the App via remote connection or local access for plant monitoring.

Login by Establishing a Direct Connection (Local)

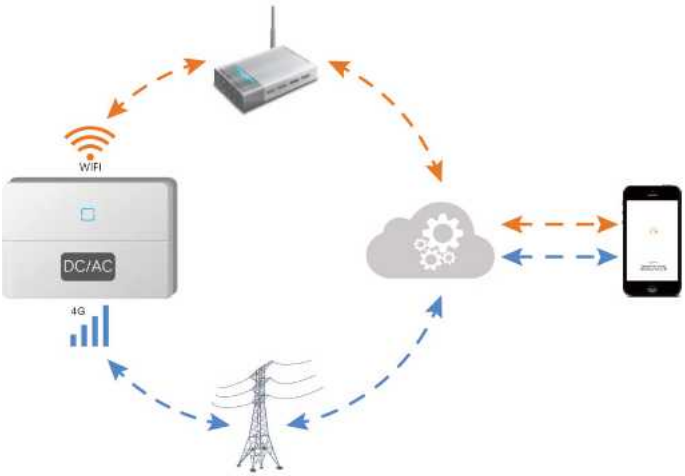
Establish communication between the mobile phone and the WiFi wireless communication module or the inverter's built-in Bluetooth module to enable local-end maintenance of the inverter. Users can check the inverter information and set the parameters for the inverter.

Direct Login (Local)

> Login via Bluetooth connection is applicable only for SUNGROW inverters with built-in Bluetooth modules. Please consult your retailer/installer about whether the inverter is equipped with a Bluetooth module.

Login with an Account (Remote)

Establish communication between the communication module and the home router or base station to enable data exchange between the inverter and the cloud server. Users can check the inverter data or send commands to control the inverter on the App.



Login Via Account and Password (Remote)

8.2 Install iSolarCloud

Prerequisite

This section introduces how to download and install the iSolarCloud App.

Steps

Step 1 Search for **iSolarCloud** in App Store, Google Play, or other application stores, or scan the QR code below with a mobile phone and download the App by following the onscreen instructions.

Step 2 Tap the downloaded installation package and follow the onscreen instructions to complete the installation. The icon of iSolarCloud will then appear on the screen of your phone.

--End

8.3 User Roles

After logging into the iSolarCloud App with different roles, users will have varying levels of access to device operations. For the default account and password corresponding to each user role, refer to **iSolarCloud App User Manual Device Commissioning (V2.1.6.20250218 and later) > Connect to Device > Connect to Device via WLAN > Identity Verification**section.

For account security purposes, please refer to the **Identity Verification** section to change your password promptly after logging into the iSolarCloud app.

8.4 Device Commissioning

For inverter commissioning operations, refer to the **Device Commissioning** section in the iSolarCloud App User Manual. Alternatively, scan the QR code below to access **Device Commissioning** section in the manual.

9 Decommissioning

9.1 Deactivate Inverter

9.1.1 Shut Down the Inverter

Prerequisite

⚠ CAUTION

Burn hazard!
A burn hazard remains even after the inverter is shut down. Wait for the inverter to cool down. Then, perform operations on the inverter wearing safety gloves.

Normally, the inverter does not need to be shut down. However, for maintenance or repair, shutdown is required. Follow the steps below to disconnect the inverter from both AC and DC power. Failure to do so may result in personal injury or device damage.

Step 1 Shut down the inverter through the App.

Step 2 Open the circuit breaker between the inverter and EB.

Step 3 Close EB manually.

Step 4 Turn off the inverter DC switch.

Step 5 Press and hold the manual start/stop button for 10 seconds until the battery powers off.

Step 6 Wait 10 minutes for the internal capacitors to discharge completely.

Step 7 Test the DC cables using a current clamp and ensure they are current-free.

--End
Enter the task that the user needs to perform after completing the current task.

9.1.2 Dismantle Inverter

Prerequisite

⚠ CAUTION

Danger of burns and electric shocks!
Wait 10 minutes after the inverter is powered off. Then use test equipment to verify that no voltage or current is present. Wear protective equipment when operating or maintaining the inverter.

- Before dismantling the inverter, both the AC and DC sides must be de-energized.
- If there are more than two layers of inverter DC terminals, dismantle the outer DC connectors before dismantling the inner ones.
- If the original packing materials are available, put the inverter inside them and then seal them using adhesive tape. If the original packing materials are not available, put the inverter inside a sturdy cardboard box suitable for the weight and size of this inverter and seal it properly.

Step 1 Refer to 6 Electrical Connection and disconnect all electrical connections of the inverter by following the steps in reverse order. To remove a DC connector, use the assembly wrench to release the locking mechanism, and then install the waterproof plug.

Step 2 Refer to 5 Mechanical Mounting and dismantle the inverter by following the steps in reverse order.

Step 3 If the inverter is to be used at a later time, please refer to 4.3 All-in-One Unit Storage for proper storage of the inverter.

Step 4 Open the AC circuit breaker.

Step 5 Remove EB.

After removing EB, ensure that the load wiring remains correct.

--End

9.1.3 Dispose of Inverter

The user is responsible for disposing of the inverter.

WARNING

Please scrap the product in accordance with relevant local regulations and standards to avoid property damages or personal injuries.

NOTICE

Some parts of the inverter may cause environmental pollution. Please dispose of them in accordance with the disposal regulations for electronic waste applicable at the installation site.

9.2 Replace Pack

Replace a Pack if the all-in-one unit reports a battery fault or an inspection reveals visible damage to the Pack.

1. Shut down the inverter through the App.
2. Open the circuit breaker between the inverter and EB, and close EB manually.

3. Turn off the inverter DC switch.
4. Press and hold the manual start/stop button for 10 seconds until the battery powers off.
5. Wait 10 minutes for the internal capacitors to discharge completely.
6. Test the DC cables using a current clamp and ensure they are current-free.
7. Install the handles on the Pack to be removed. Rotate the handles fully into position, and then remove the Pack from the all-in-one unit.
8. Install the handles on the new Pack. Rotate the handles fully into position, and then install the Pack in the all-in-one unit.
9. See 7.2 Commissioning Steps for normal power-on operation.

After replacing the Pack, make sure the Packs are consistent in the App.

10 Troubleshooting and Maintenance

10.1 Troubleshooting

When an inverter fault occurs, the fault information can be viewed in the mobile App. If the inverter has an LCD, the information can also be viewed on the screen.

All inverter fault codes and corresponding troubleshooting methods are listed in the table below. The model you purchased may include only some of these faults. If the inverter reports a fault, you can look up the corresponding information by fault code in the mobile App.

Fault Code	Fault Name	Troubleshooting Methods
2, 3, 14, 15	Grid overvoltage	Generally, the inverter will reconnect to the grid once the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage. Contact your local power company for solutions if the grid voltage is higher than the set value. 2. Check protection parameters via the App or LCD. Obtain consent from the local grid operator before modifying the overvoltage protection threshold. 3. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
4, 5	Grid undervoltage	Generally, the inverter will reconnect to the grid once the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage. Contact your local power company for solutions if the grid voltage is lower than the set value. 2. Check whether the protection parameters are appropriately set via the App or the LCD. 3. Check whether the AC wiring connections are secure. 4. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
8	Grid overfrequency	Generally, the inverter will reconnect to the grid once the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid frequency, and contact the local power company for solutions if the grid frequency is beyond the set range.

Fault Code	Fault Name	Troubleshooting Methods
9	Grid underfrequency	2. Check whether the protection parameters are appropriately set via the App or the LCD. 3. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
10	Grid outage	Generally, the inverter will reconnect to the grid once the grid returns to normal. If the fault occurs repeatedly: 1. Check whether the grid supplies power reliably. 2. Check whether the AC wiring connections are secure. 3. Check whether the AC cables are connected to the correct terminals (whether the live wire and the N wire are reversed). 4. Check whether the AC circuit breaker is closed. 5. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
12	Excess residual current	1. Humid conditions around the PV modules or insufficient irradiance may cause this fault. In general, the inverter will reconnect to the grid after the environmental conditions improve. 2. If the environment is normal, check whether the AC and DC cables are well insulated. 3. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
13	Grid anomaly	Generally, the inverter will reconnect to the grid once the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid frequency and grid voltage. Contact your local power company for help if the grid parameter exceeds the set range. 2. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
17	Grid voltage unbalance	Generally, the inverter will reconnect to the grid once the grid returns to normal. If the fault occurs repeatedly: 1. Measure the actual grid voltage. If grid phase voltages differ greatly, contact the local power company for solutions. 2. If the voltage difference between phases is within the permissible range of the local power company, modify the grid voltage unbalance parameter through the App or the LCD.

Fault Code	Fault Name	Troubleshooting Methods
		3. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
28, 29	PV reverse polarity fault	1. Check whether the corresponding string is of reverse polarity. If so, turn off the DC switch and adjust the polarity when the string current drops below 0.5 A. 2. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service. 28 corresponds to DC PV1, and 29 corresponds to DC PV2.
37	Excessively high ambient temperature	Generally, the device will resume operation after the internal temperature or module temperature returns to normal. If the fault occurs repeatedly: 1. Check whether the ambient temperature of the device is too high. 2. Check whether the device is in a well-ventilated place. 3. Check whether the device is exposed to direct sunlight. Shield it if it is under direct sunlight. 4. Check whether the fan is running properly. Replace the fan if it is not working normally. 5. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
39	Low system insulation resistance	Wait for the inverter to return to normal. If the fault occurs repeatedly: 1. Check whether the ISO resistance protection value is excessively high via the App or the LCD, and ensure that it complies with the local regulations. 2. Check the resistance to ground of the string and DC cable. Take corrective measures in case of a short circuit or damaged insulation layer. 3. If the cable is normal and the fault occurs on rainy days, check it again when the weather turns fine. 4. If batteries are installed in the system, check if the battery cables are damaged or if wiring terminals are loosened or in poor contact. If so, replace the damaged cable and tighten the terminals to ensure a reliable connection. 5. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.

Fault Code	Fault Name	Troubleshooting Methods
106	Grounding cable fault	1. Check whether the AC cable is wired in the correct phase sequence. 2. Check whether the insulation between the ground cable and the live wire is normal. 3. If the fault is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
51	Backup load overload	1. Reduce the power of the loads connected to the backup port or disconnect some loads. 2. If the fault persists, contact Sungrow Customer Service.
714	BMS communica tion alarm	1. Check the communication cable and terminals for anomalies. Correct any problem found to ensure a reliable connection. 2. Reconnect the communication cable to the measuring instrument. 3. If the fault persists, contact Sungrow Customer Service.
932–935, 937, 939	Battery alarm	Generally, the battery can recover automatically. If the alarm persists for a long time: 1. If the alarm is caused by ambient temperature, such as an overtemperature or low-temperature alarm, adjust the ambient temperature, for example, by improving heat dissipation conditions. 2. If the fault persists, contact the battery manufacturer.
703, 711, 712, 715, 732–736, 739, 832–833, 835–837	Battery anomaly alarm	1. If the battery voltage is abnormal, check whether the battery power cable is connected incorrectly. If so, reconnect the battery power cable correctly. 2. If the battery power cable is connected correctly, check whether the real-time battery voltage is abnormal. If it is abnormal, contact the battery manufacturer. If no anomaly is found, contact Sungrow Customer Service. 3. If the battery temperature is abnormal, adjust the ambient temperature, for example, by improving heat dissipation conditions, etc. 4. If the fault persists, contact the battery manufacturer.
502–504, 507, 508, 510, 513,	System alarm	1. The inverter can continue running. 2. Check the wiring and terminals associated with the alarm for anomalies, check for foreign objects or other

Fault Code	Fault Name	Troubleshooting Methods
516–518, 994, 996		abnormal conditions in the surrounding environment, and rectify any issues found. 3. If the alarm occurs repeatedly, please contact Sungrow Customer Service.
514	Meter communication anomaly alarm	1. Check whether the communication cable and the terminals are abnormal. If so, correct them to ensure a reliable connection. 2. Reconnect the communication cable of the meter. 3. If the alarm is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
6, 7, 11, 19, 21, 25, 38, 40–42, 48–50, 52–54, 56, 64–67, 100–102, 105, 107, 113, 117, 200–205, 300, 303–305, 308–316, 320, 600, 601, 605, 608, 612, 616, 620, 624, 995	System fault	1. Wait for the system to return to normal. 2. Open the AC and DC switches. If a battery is installed, open the battery side switch. Wait 15 minutes, then close the AC and DC switches in sequence and restart the system. If the fault persists, please contact SUNGROW Customer Service. 3. If the alarm occurs repeatedly, please contact Sungrow Customer Service.
75	Parallel communication alarm	1. Wait for the fault to clear automatically. 2. Check whether the parallel parameters are correctly set. 3. Check the communication cable between the master and slave devices for disconnection, looseness, or damage. 4. If the alarm is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.

Fault Code	Fault Name	Troubleshooting Methods
90	Inverter parallel synchronization signal anomaly	1. Check the master and slave settings. Ensure that one inverter is set as the master inverter and the remaining inverters are set as slave inverters. The number of master and slave devices must match the actual configuration, and slave device IDs must be set sequentially. 2. Check if the parallel communication wiring is correct, including the CAN2H/CAN2L wiring of COM1 ports between different devices. 3. Check whether a termination resistor is connected to the last inverter. A 120 Ω termination resistor (included in the supplied accessories) must be connected correctly between CAN2H and CAN2L.
213	Parallel inverter grid-side wiring fault	Check whether the phase sequence of the grid-side wiring is consistent between the system's master and slave inverters.
214	Parallel inverter load-side wiring fault	Check whether the phase sequence of the load-side wiring is consistent between the master and slave inverters in the system.
329	AC port wiring or terminal anomaly	1. Check the AC port wiring. 2. Turn off the power and restart the inverter. 3. If the alarm is not caused by the foregoing reasons and persists, please contact Sungrow Customer Service.
994	Generator phase sequence mismatch	1. Turn off the inverter and the generator. 2. Check the generator AC cable and ensure that its phase sequence is consistent with that of the grid. 3. The warning is automatically cleared after the inverter detects that the phase sequences are consistent.
995	Backup port short circuit	1. Turn off the inverter. 2. Use a multimeter to measure the resistance between each pair of phase conductors and check whether the measured values are consistent with the actual household loads. 3. Check the AC cable connection to the load port.

Fault Code	Fault Name	Troubleshooting Methods
996	Generator set anomaly	1. Check whether the generator has been started; 2. Check the DO connection between the generator and inverter; 3. Use a multimeter to check whether voltage is present at the generator port.
100	Communication module communication anomaly	1. For a wireless connection, check the signal strength between the communication module and the home router. 2. For a wired Ethernet connection, check the Ethernet cable between the communication module and the router.
102	Inverter communication anomaly	1. Check whether the inverter is in a fault state. 2. If the devices are networked through a communication module, check the connection between the communication module and iHomeManager Mini. 3. If a wired RS485 connection is used, check the connection between the inverter and iHomeManager Mini.
103	Battery communication anomaly	1. Check whether the battery is in a fault state. 2. Check the Ethernet cable connection between the battery and the inverter.
133	EnergyBridge fault	1. Check the communication cable between EnergyBridge and the inverter. 2. Restart the inverter. 3. If the fault persists, contact Sungrow Customer Service.
134	EnergyBridge local control	1. If EnergyBridge opens locally and the manual mode indicator blinks rapidly, press and hold the manual mode button for 2 seconds. When the indicator is steadily lit, either close EnergyBridge manually to restore operation or press the manual mode button again to restore inverter control. 2. If the fault persists, contact Sungrow Customer Service.
136	EnergyBridge alarm	1. Check the communication cable between EnergyBridge and the inverter. 2. Restart the inverter.

Fault Code	Fault Name	Troubleshooting Methods
		3. Open the main circuit breaker, wait 10 seconds, and then close it again. Wait for EnergyBridge to restart and resume normal operation. 4. If the alarm persists, contact Sungrow Customer Service.
139	EnergyBridge wiring fault	1. Check the miniature circuit breaker wiring between EnergyBridge and the inverter. 2. If the fault persists, contact Sungrow Customer Service.
201	Multiple meters fault	1. Check whether multiple meters are installed in the energy system. 2. Check whether a previously installed meter was left in place during the retrofit. 3. Check whether the meter and inverter are wired incorrectly.
301	No meter alarm	1. Check whether a meter is installed in the system. 2. Check whether communication between the meter and inverter is normal. 3. Check whether the meter type is supported by the system.
715	Battery hardware overvoltage	1. Check whether the actual battery voltage exceeds the specification limit. 2. If the settings are correct but the fault persists, contact Sungrow Customer Service.
716	Battery connection abnormal	Check and ensure the DC side wiring is correct.
833	Battery internal hardware failure	Contact the installer or manufacturer for assistance.
840	Heating alarm	1. Check whether temperature sampling is normal and whether a temperature sampling fault is present. 2. Check the heating film’s cable for disconnection, damage, or other anomalies.

Fault Code	Fault Name	Troubleshooting Methods
		3. Check the heating condition of each cell in the affected Pack and determine whether inconsistent cell behavior is causing an abnormal temperature rise. 4. If the alarm is not caused by the foregoing reasons and persists, contact Sungrow Customer Service.
884	Bus overvoltage fault	1. If the fault occurs during charging or discharging, restart the battery and check whether the fault recurs. 2. If the fault persists, contact the battery manufacturer for root cause analysis.
887	DC/DC output overcurrent fault	1. If the fault occurs during charging or discharging, restart the battery and check whether the fault recurs. 2. If the fault persists, contact the battery manufacturer for root cause analysis.
890	Bus hardware overvoltage fault	1. If the fault occurs during charging or discharging, restart the battery and check whether the fault recurs. 2. If the fault persists, contact the battery manufacturer for root cause analysis.
891	DC/DC overtemperature fault	1. Check whether the ambient temperature or heat sink temperature exceeds the protection threshold. 2. Restart the system after the temperature returns to normal.
892	Low temperature fault	1. Check whether the ambient temperature is below the protection threshold. 2. Wait until the temperature returns to normal, then restart the device.
899	Output overload fault	1. Check whether the battery output power exceeds the rated value. 2. Restart the system and operate it within the rated power range.
904	DC/DC fault	Contact the installer or manufacturer for assistance.
905	Communication fault	1. Check whether the battery output power exceeds the rated value. 2. Restart the system and operate it within the rated power range.

If the recommended actions in the “Troubleshooting methods” column do not resolve the problem, contact the dealer directly. If the dealer cannot resolve the problem, contact SUNGROW.

10.2 Maintenance

10.2.1 Maintenance Precautions

⚠ DANGER

When servicing the product, do not open it if there is an unusual odor, smoke, or any obvious anomaly in its appearance. If none of these conditions are present, troubleshoot or restart the inverter according to the recommended actions for the alarm. Avoid standing directly in front of the inverter during maintenance.
Risk of personal injury or equipment damage due to improper maintenance!

- **Be sure to use specialized insulated tools when performing high-voltage operations.**
- **Before maintenance, open the grid-side AC circuit breaker and then turn off the DC switch. If a fault that may cause personal injury or equipment damage is detected before maintenance, open the AC circuit breaker and wait until nighttime before operating the DC switch. Otherwise, the inverter may catch fire or explode, causing personal injury!**
- **Wait 10 minutes after the inverter is powered off, then use testing equipment to verify that no voltage or current is present. Wear protective equipment when operating or maintaining the inverter.**
- **Even if the equipment has stopped operating, it may still be hot and cause burns. Perform operations on the equipment wearing protective gloves after it cools down.**

⚠ CAUTION

Prevent unauthorized personnel from approaching the product to avoid misoperation or accidents. Place prominent warning signs around the product or set up a safety warning barrier to prevent accidents caused by misoperation.

NOTICE

Restart the inverter only after removing the fault that impairs safety performance.
The inverter contains no components that require maintenance. Do not open the inverter enclosure or replace internal components.
To minimize the risk of electric shocks, do not perform maintenance operations that are not specified in this manual. If necessary, contact SUNGROW for maintenance. Losses arising from failure to observe this instruction will not be covered by warranty.

NOTICE

Touching the PCB or other electrostatic-sensitive components may cause damage to the device.

- **Do not touch the circuit board unless it is necessary.**
- **Observe the provisions for protection against electrostatic discharge and wear anti-static wrist straps.**

10.2.2 Routine Maintenance

See the following table for routine maintenance items and intervals for the all-in-one unit.

Item	Inspection Method	Maintenance Period
Device cleaning	Check the temperature of the all-in-one unit and the amount of dust accumulated on it. If necessary, clean the inverter enclosure.	Once every 6 months to once a year.
Electrical connections	Check whether any cable connections are loose or disconnected. Check the cables for damage, especially cuts where they contact the metal enclosure.	Check once six months after commissioning, and then once or twice a year.
Basic system status	• Visually inspect the all-in-one unit for damage or deformation. • Check for abnormal noise during operation. • Check all operating parameters. • Ensure that the heat sink of the all-in-one unit is not obstructed.	Once every six months

11 Appendix

11.1 Technical Data

Parameter	SH10TA	SH12TA	SH15TA
Input (DC)			
Max. PV input power	20000 Wp	24000 Wp	30000 Wp
Max. usable PV input power	16000 W	19200 W	24000 W
Max. PV input voltage *		1000 V	
Min. PV input voltage / Startup input voltage		100 V / 100 V	
Rated PV input voltage		600 V	
MPPT operating voltage range		100 V – 950 V	
MPP voltage range for rated power	300 V – 800 V	355 V – 800 V	450 V – 800 V
No. of independent MPP trackers		3	
No. of PV strings per MPP tracker		1 / 1 / 1	
Max. PV input current		20 A / 20 A / 20 A	
Max. DC short-circuit current		25 A / 25 A / 25 A	

Parameter	SH10TA	SH12TA	SH15TA
Max. current for input connector		30 A	
On Grid Output			
Max. AC input power	10000W	12000W	15000W
Rated output power	10000 W	12000 W	15000 W
Max. output apparent power	11000 VA	13200 VA	16500 VA
Max. output current (@ 220 V / 230 V / 240 V)	15.2 A / 14.5 A / 13.9 A	18.2A / 17.4 A / 16.7 A	22.8 A / 21.8 A / 20.9 A
Rated voltage	220 V / 380 V; 230 V / 400 V; 240 V / 415 V		
Voltage range	155 V – 277 V / 268 V –480 V		
Rated grid frequency	50 Hz / 60 Hz		
Grid frequency range	45 Hz – 55 Hz / 55 Hz – 65 Hz		
THD (at rated power)	≤ 3%		
Power factor at rated power / Adjustable power factor	>0.99 / 0.8 leading to 0.8 lagging		
Feed-in phases / Connection phases	3 / 3-N-PE		
Efficiency			
Max. efficiency	0.981		
European efficiency	0.972		
Output (AC backup) during on-grid mode			

Parameter	SH10TA	SH12TA	SH15TA
Max. connectable power for backup load		43000 W	
Max. output current for backup load		63 A	
Output (AC backup) during off-grid mode			
Rated voltage	3 / N / PE, 220 V / 380 V; 230 V / 400 V; 240 V / 415 V		
Rated frequency		50 Hz / 60 Hz	
THDv (linear load)		< 3%	
Backup switch time		0 ms	
Rated output power	10000 W	12000 W	15000 W
Peak output power □10S□	15000 VA	18000 VA	22500 VA
Protection & Function			
Grid monitoring		Yes	
PV / Battery input reverse polarity protection		Yes	
AC short-circuit protection		Yes	
Leakage current protection		Yes	
Arc fault circuit interrupter (AFCI)		Yes	
DC switch (solar)		Yes	
Surge Protection		DC Type II / AC Type II	
PID Zero		Yes	

Parameter	SH10TA	SH12TA	SH15TA
Active anti-islanding method		Yes	
Parallel operation on grid port		Master-slave mode	
General Data			
Topology (Inverter)		Non-isolated	
Degree of protection		IP66	
Protective class		class I	
Overvoltage category		III[AC]□II[PV]□II[BATTERY]	
Dimensions (W × H × D)		788 mm × 375 mm × 255 mm	
Weight		≤41 kg	
Mounting method		Floor stand	
Operating ambient temperature range**		-25℃ to 60℃	
Allowable relative humidity range (Non-condensing)		0% – 95%	
Cooling method		Natural convection	
Max. operating altitude		2000 m	
Noise (Typical)		35 dB(A)	
Display		LED	
Communication		RS485, WLAN, Ethernet, CAN, FE	
DI / DO		DI × 2 / DO × 3 / DRM0 × 1	

Parameter	SH10TA	SH12TA	SH15TA
DC connection type	Plug and play connector (PV, Max. 6 mm²)		
Battery connection type	Stackable		
AC connection type	OT terminal (Max. 16 mm²)		
Compliance	IEC/EN 62109-1, IEC/EN 62109-2, IEC 60730-1, IEC/EN 62477-1, IEC 60068, IEC/EN 62920, EN 61000-6-1/-3, EN 61000-6-2/-4, CISPR 11, EN 55011, IEC 62116 IEC 61727, IEC 61683, EN 50530, EN50549-1/2		
Scalability	Energy Bridge		
Country of manufacture	China		

Parameter	SMD060	SMD090	SMD100
Battery type	LiFePO4 Prismatic Cell		
Cell capacity	314 Ah		
Cycle life ***	10000		
Energy (usable)****	5.7 kWh	8.7 kWh	9.7 kWh
Nominal energy	6.0 kWh	9.0 kWh	10.0 kWh
Operating voltage	300 V – 950V		
Max. charging/ discharging current	7.8 A / 9.4 A	11.7 A / 14.1 A	13.0 A / 15.7 A
Max. charging/ discharging power	3100 W / 3800 W	4660 W / 5690 W	5180 W / 6300 W
Rated. charging/ discharging power	3100W / 3000 W	4660 W / 4500 W	5180 W / 5000 W
Peak charging/ discharging power(10S)	3410W / 4150 W	5120 W / 6270 W	5700 W / 6720 W

Parameter	SMD060	SMD090	SMD100
Depth of discharge*****	Max. 100%DOD (settable)		
Display	SOC indicator, Status indicator		
Communication interface	CAN		
Protection			
Over/under voltage protection	Yes		
Over current protection	Yes		
Over/under temperature protection	Yes		
Disconnector	Yes		
General Data			
Dimensions (W*H*D)	788 mm × 280 mm × 255 mm		
Weight(±1)	58 kg	76 kg	79 kg
Installation location	Indoor / Outdoor		
Mounting method	Floor stand		
Operating ambient temperature range	Charge□-20 to 50℃ ; Discharge□-20 to 50℃		
Degree of protection	IP66		
Allowable relative humidity range (Non-condensing)	5% – 95%		
Max. operating altitude	Max. 2000 m		

Parameter	SMD060	SMD090	SMD100
Cooling method	Natural convection		
Certificates	CE, CB, IEC 62619, IEC 62040, UN38.3, VDE 2510-50□ IEC62477□IEC63056		
Scalability	2 in parallel		
Number of modules per controller	1 ~ 6		
Country of manufacture	China		

- *Input voltage exceeding the MPPT operating voltage range triggers inverter protection.
- **□ 45℃Derating"
- *** Life cycle test conditions: 90% DOD, 0.5C charge & discharge at 25°C.
- **** Refers to the usable energy capacity. Battery must be recharged within 7 days after being fully discharged to keep battery healthy.
- *****Test conditions: 100% depth of discharge, 0.2C rate charge & discharge averagely at 25°C, at the beginning of life.

11.2 Quality Assurance

If product faults occur during the warranty period, SUNGROW will provide free service or replace the product with a new one.

The software security update period for this product aligns with the warranty period. During the warranty, security patches or updates will be provided if any vulnerabilities or compatibility issues are identified.

Evidence

During the warranty period, the customer shall provide the product purchase invoice with a date. In addition, the trademark on the product shall be undamaged and legible. Otherwise, SUNGROW has the right to refuse to honor the quality guarantee.

Conditions

- After replacement, unqualified products shall be processed by SUNGROW.
- The customer shall give SUNGROW a reasonable period to repair the faulty device.

Exclusion of Liability

In the following circumstances, SUNGROW has the right to refuse to honor the quality guarantee:

- The free warranty period for the whole machine or components has expired.
- The device is damaged during transport.
- The device is incorrectly installed, refitted, or used.
- The device operates in harsh conditions beyond those described in this manual.
- The fault or damage is caused by installation, repairs, modification, or disassembly performed by a service provider or personnel not from SUNGROW.
- The fault or damage is caused by the use of non-standard or non-SUNGROW components or software.
- The installation and use range are beyond the stipulations of relevant international standards.
- The damage is caused by unexpected natural factors.

For faulty products in any of the above cases, if the customer requests maintenance, paid maintenance service may be provided based on the judgment of SUNGROW.

> Product dimensions and parameters are subject to change without prior notice. The latest documentation from SUNGROW shall prevail in case of any deviation.

11.3 Contact Information

In case of questions about this product, please contact us. We need the following information to provide you with the best assistance:

- Model of the device
- Serial number (S/N) of the device
- Fault code/name
- Brief description of the fault

For detailed contact information, please visit: **https://www.sungrowpower.com/en/about-us/contact-us**

Sungrow Power Supply Co., Ltd.

www.sungrowpower.com