Open Energy for All

Hybrid/AC-coupled Inverter

USER MANUAL

HYS/HAS-3.8LV-USG1
HYS/HAS-4.8LV-USG1
HYS/HAS-6.0LV-USG1
HYS/HAS-7.6LV-USG1
HYS/HAS-9.6LV-USG1
HYS/HAS-11.5LV-USG1

Legal Notice

Hoymiles has made every effort to ensure the accuracy and completeness of this manual. However, this manual may be changed and revised due to product enhancements or user feedback.

Hoymiles reserves the right to modify this manual without prior notice at any given time. The latest version of this manual can be found by visiting the Hoymiles official website ***www.hoymiles.com*** or scanning the QR Code below.

Warranty

Follow the installation instructions in this manual to ensure warranty compliance and reliability. The current warranty conditions can be accessed at ***www.hoymiles.com***.

Contact Information

If you have technical queries or any questions concerning our products, please contact our support through the Hoymiles service portal:

USA
service.us@hoymiles.com

Canada
service.ca@hoymiles.com

Brazil
service.br@hoymiles.com

Spanish-speaking LA countries
service.mx@hoymiles.com

USA & Canada
+1 (205) 395-5515

Brazil
+55 1148585231

hoymiles.com

Contents

1 About This Manual

1.1 Purpose

This manual provides information on the installation, electrical connections, operation, and maintenance of the HYS/HAS series inverter.

Please consider the following before installation:

- Carefully read this manual before operation.
- Keep this manual for reference.

1.2 Audience

This manual is intended for use by qualified persons only. Qualified persons must have the following skills:

- Knowledge of how a battery works.
- Knowledge of how an inverter works.
- Training in how to deal with the dangers and risks associated with the installation, maintenance, and use of electrical devices.
- Training in the installation, commissioning, and maintenance of electrical devices.
- Knowledge of and compliance with all applicable laws, standards, and directives.

1.3 Validity

This manual is valid for:

- HYS/HAS-3.8LV-USG1
- HYS/HAS-4.8LV-USG1
- HYS/HAS-6.0LV-USG1
- HYS/HAS-7.6LV-USG1
- HYS/HAS-9.6LV-USG1
- HYS/HAS-11.5LV-USG1

2 Safety Information

Before installing, operating, commissioning, and maintaining the inverter, please carefully read the safety rules and usage instructions in this document as failure to do so may result in safety hazards or device damage. Safety instructions in this manual cannot cover all precautions that should be taken. Please consider the actual conditions on site when performing operations. Any damage caused by a violation of the safety instructions in this manual shall not be the responsibility of Hoymiles.

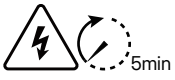
2.1 Safety Symbols

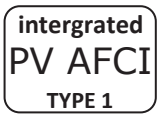
Safety symbols are used in this manual as follows:

Symbol	Description
DANGER	This symbol indicates potential risks that, if not avoided, may lead to death or serious physical injury.
WARNING	This symbol indicates potential risks that, if not avoided, may lead to personal injury or device damage.
CAUTION	This symbol indicates potential risks that, if not avoided, may lead to device malfunctions or financial losses.
NOTICE	This symbol indicates potential risks that, if not avoided, may lead to minor injury or damage to the equipment.
NOTE	This symbol indicates an important step or tip that leads to the best results but is not safety or damage-related.

2.2 Additional Symbols

The product label contains the following symbols with their meanings described below:

Symbol	Usage
	**Caution** Failure to observe any warnings contained in this manual may result in injury.
	**Danger to life due to high voltages** Only qualified personnel can open and maintain the inverter.
	**Hot surface** Burn danger due to hot surface that may exceed 60°C.
	After the inverter is turned off, wait for at least 5 minutes before opening the inverter or touching live parts.
	The product shall not be disposed of as household waste.

	**Observe the documentation** Read and understand all documentation supplied with the product.
	Supports Type 1 DC Arc Detection on PV side.
	CSA Marking for the United States of America and Canada.
	This side up! This package must always be transported, handled, and stored in such a way that the arrows always point upwards.
	Fragile - The package/product should be handled carefully and should never be tipped over or slung.
	Keep dry! The package/product must be protected from excessive humidity and must be stored under cover.
	No more than six (6) identical packages are to be stacked on each other.

2.3 Safety Instructions

SAVE THESE INSTRUCTIONS-This manual contains important instructions for models HYS/HAS-3.8LV-USG1, HYS/HAS-4.8LV-USG1, HYS/HAS-6.0LV-USG1, HYS/HAS-7.6LV-USG1, HYS/HAS-9.6LV-USG1, and HYS/HAS-11.5LV-USG1, which should be followed during the installation and maintenance of the inverter.

For the purpose of preventing personal injury and property damage, as well as ensuring the long-term operation of the product, please read and follow all the instructions and cautions on the inverter and in this user manual during installation, operation, and maintenance.

Safety instructions in this manual cannot cover all precautions that should be taken. Please consider the actual conditions on site when performing operations. Any damage caused by a violation of the safety instructions in this manual shall not be the responsibility of Hoymiles.

⚠ DANGER

Danger to life from electric shock

- Before performing any work on the inverter, disconnect all DC and AC power from the inverter and wait for at least 5 minutes. The hazardous voltage will exist for up to 5 minutes after disconnection from the power supply.
- Never insert or remove the AC or DC connections when the inverter is running.
- Any live parts connected to battery ports cannot be touched before removing all the power from the inverter for 5 minutes, because there is still danger to life even battery voltage is lower than 60 V.
- Do not touch DC conductors or any non-isolated cable ends.
- The mounting location must be inaccessible to children.
- Never touch either the positive or negative pole of the PV connecting device. Strictly prohibit touching both at the same time.

⚠ WARNING

Risk of burns from hot surfaces

- The surface of the inverter might exceed 60°C (140°F), and touching the surface may result in burns.
- Do not touch hot surfaces before it cools down.
- Only authorized service personnel are allowed to install the inverter or perform servicing and maintenance.
- All powers, both AC and DC, should be disconnected from the inverter before attempting any maintenance, cleaning, or working on any circuits connected to the inverter.
- Attempting to service the inverter yourself may result in a risk of electric shock or fire and will void your warranty.
- Keep away from flammable and explosive materials to avoid fire disasters.
- The installation place should be away from humid or corrosive substances.
- The unit contains capacitors that remain charged to a potentially lethal voltage after the mains, battery, and PV supply have been disconnected.
- When accessing the internal circuit of the inverter, wait for at least 10 minutes after disconnecting the power.

⚠ CAUTION

- The inverter has a transformerless design on the PV side. Neither positive nor negative terminals of PV panels should be grounded.
- The frames of PV panels should be grounded for safety reasons.
- Ensure that existing wiring is in good condition and no wire is undersized.
- Do not disassemble any parts of the inverter which are not mentioned in the installation.
- Authorized service personnel must use insulated tools when installing or working with this equipment.
- PV modules shall have an IEC 61730 class A rating and should be certified to UL 61730-1 and UL 61730-2 standards.

NOTICE

- The minimum rated temperature of the wire used is 90°C (194°F).
- All electrical connections must be in accordance with local and national standards.
- Only with permission of the local utility grid company, the inverter can be connected to the utility grid.
- Do not open the inverter cover or change any components without authorization, otherwise, the warranty commitment for the inverter will be invalid.
- Appropriate methods must be adopted to protect the inverter from electrostatic discharge; any damage caused by ESD is not warranted by the manufacturer.
- Prior to the application, please read this section carefully to ensure correct and safe application. Please keep the user manual properly.
- The manual contains no instructions for user-serviceable parts. See Warranty for instructions on obtaining service.
- If an error occurs, contact your local distributor or qualified electricians.

3 Transportation and Storage

3.1 Transportation Requirements

- Place the inverters into the original packaging or specially designed transport packaging. The packaging materials should have sufficient strength and cushioning performance to prevent damage caused by collisions and squeezes during transportation.
- Secure the inverter firmly inside the packaging to avoid displacement during transportation. For large or heavy inverters, additional fixing devices may be required.
- Maintain stability and avoid sudden starts, stops, or significant oscillations during transportation.
- Observe the safety symbols on the package of the inverter before transportation.
- Pay attention to the weight of inverter. Be cautious to avoid injury when moving. Handle the inverter according to the personnel quantity required by local regulations.
- Wear protective gloves when moving the equipment by hand to prevent injuries.
- Hold the handle position and the bottom position of the inverter when lifting up the inverter. Keep the inverter horizontal in case of falling down.
- Use professional handling equipment, and it is essential to ensure that the operators possess the requisite operational skills and experience.

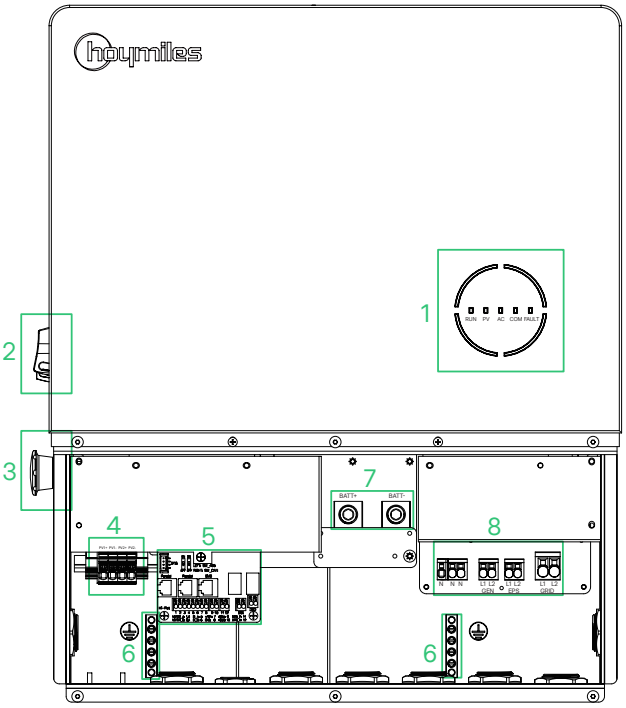
3.2 Storage Requirements

- Do not unpack the inverter if it is not used immediately.
- The storage temperature should be between –40°C (–40°F) and 70°C (158°F), and the relative humidity should be between 5% and 95%, without condensing.
- Store inverters in a clean and dry place to protect them from dust and moisture.
- The storage place should be well ventilated to ensure air circulation and avoid overheating of the equipment.
- Do not store the products in places exposed to direct sunlight, wet by rain, or with strong electric fields.
- Do not store inverters in places with chemically corrosive substances or where there are pests and rodents.
- Inverters should be repackaged in their original packages with desiccants retained.
- To avoid personal injury or device damage, stack inverters with caution to prevent them from falling down.
- The packages should not be tilted or inverted.
- Do not place heavy objects on the inverters to prevent damage to the equipment housing or internal components.
- During the storage period, inverters should be checked regularly, and it is recommended to check the inverter once every three months. Replace the packing materials damaged by insects or rodents in a timely manner.
- If inverters have been stored for two years or longer, they must be inspected and tested by professionals before being put into use.

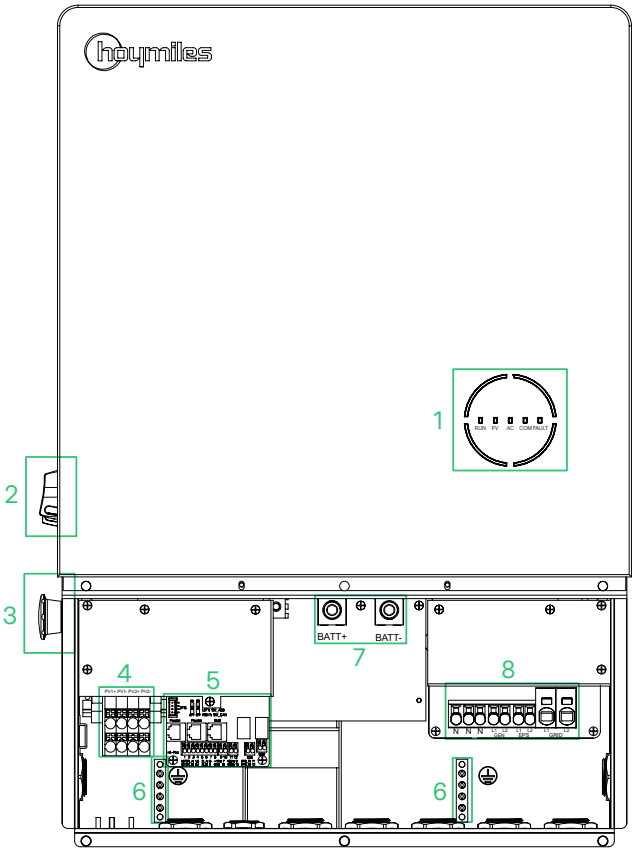
4 Product Introduction

4.1 Product Overview

The HYS/HAS-(3.8-11.5)LV-USG1 series inverter is a high-performance split-phase energy storage inverter with excellent reliability. The intelligent EMS function supports self-consumption, economic, and backup modes for multi-scenario applications. Monitoring management through S-Miles Cloud allows users to remotely diagnose and track the system performance over time, offering superior energy production.



HYS-(3.8-6.0)LV-USG1



HYS-(7.6-11.5)LV-USG1

* The image shown here is for reference only. The actual product received may differ.

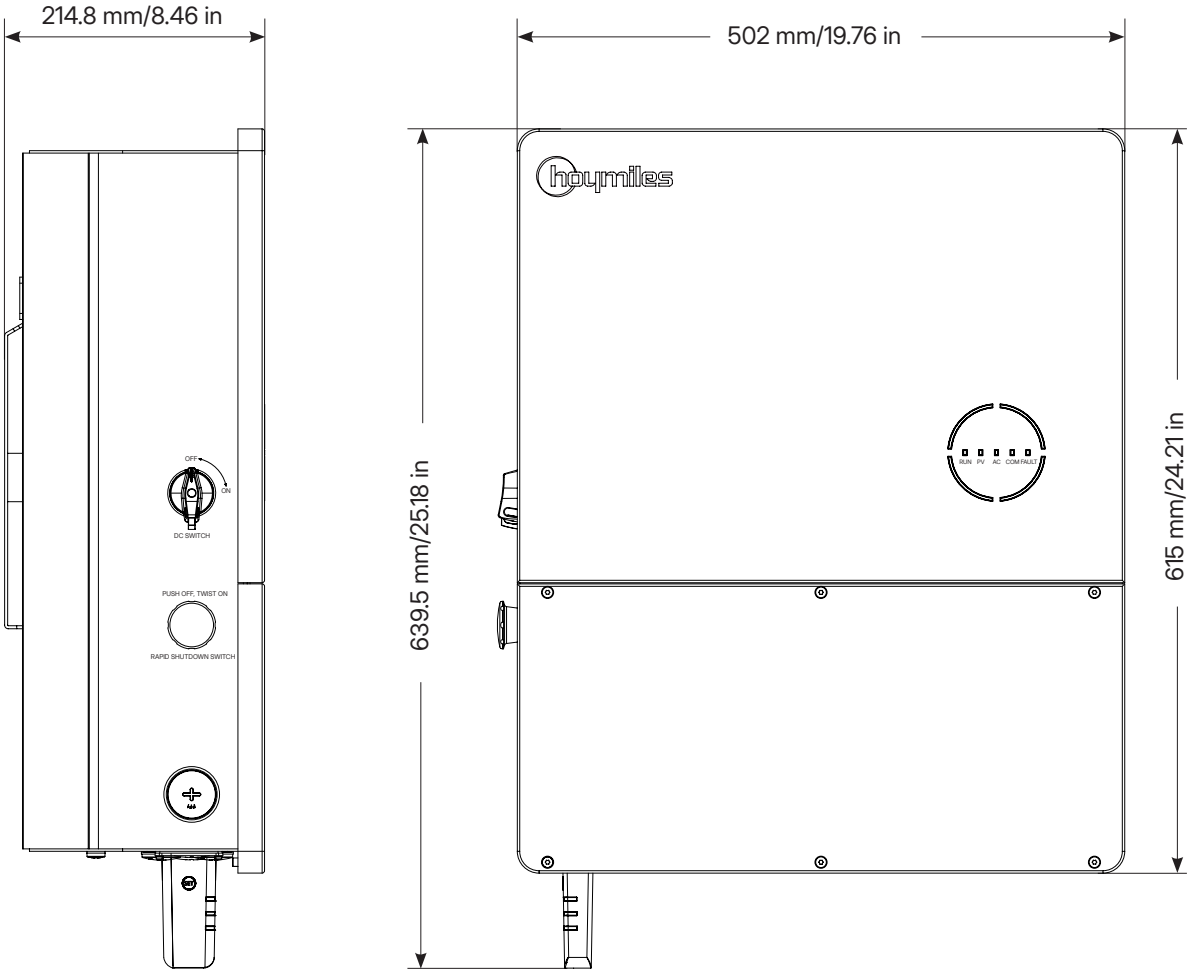
Object	Description
1	LED Indicators
2	DC Switch(1)
3	Rapid Shutdown Switch
4	PV Terminals(2)
5	Communication Port
6	Grounding Bar
7	Battery Terminals
8	AC Terminals

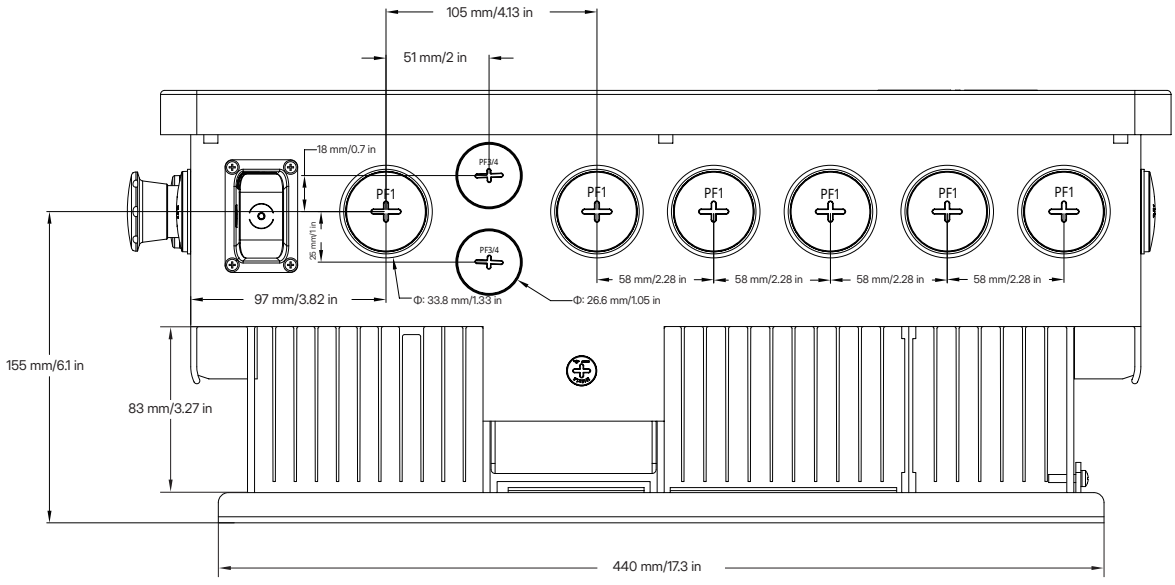
(1) Only for HYS-(3.8-11.5)LV-USG1 series inverter

(2) Only for HYS-(3.8-11.5)LV-USG1 series inverter

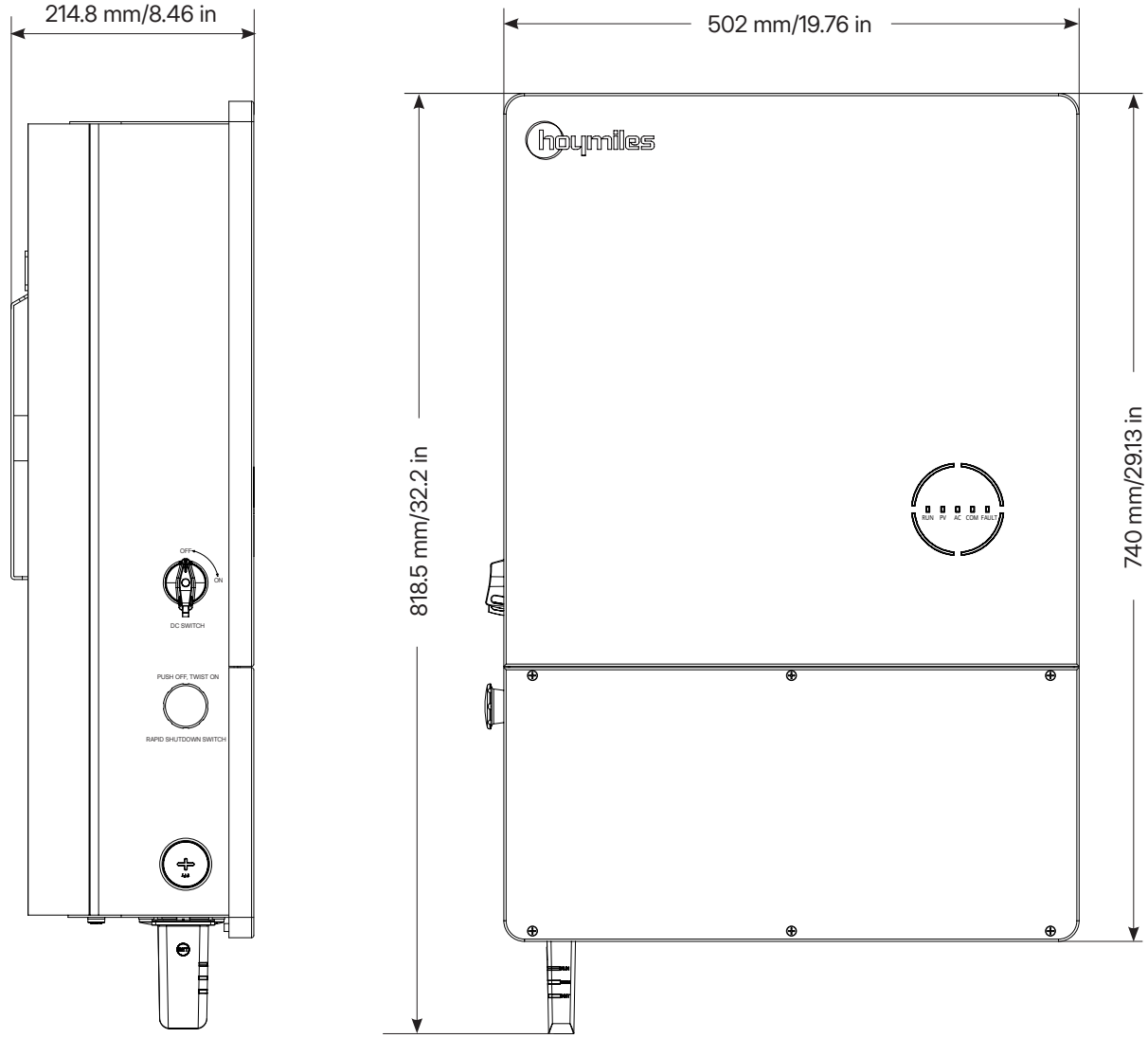
4.2 Product Dimensions

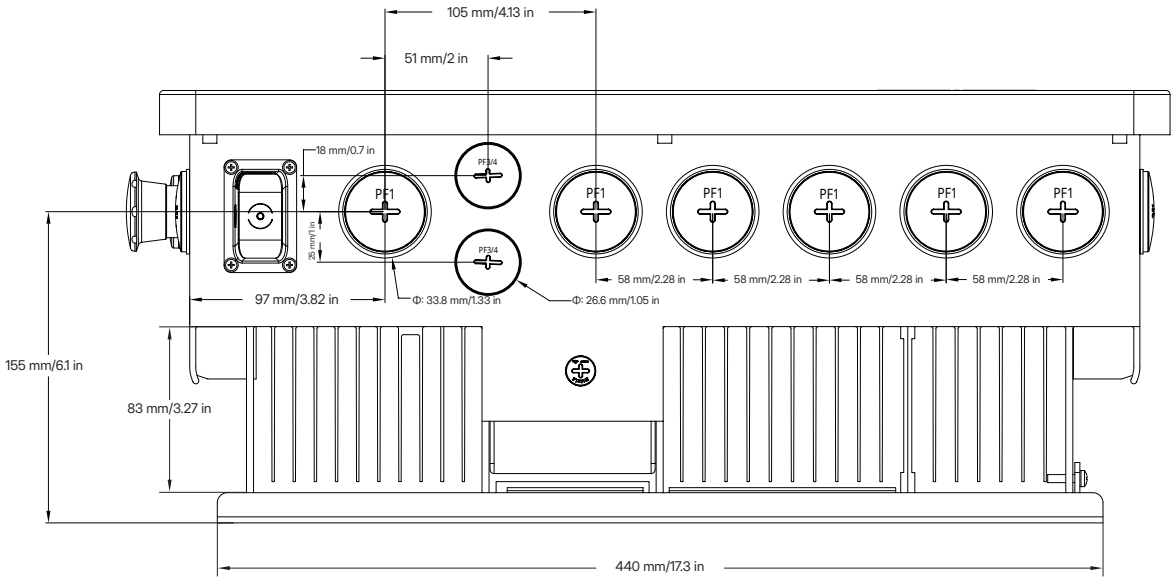
HYS-(3.8-6.0)LV-USG1



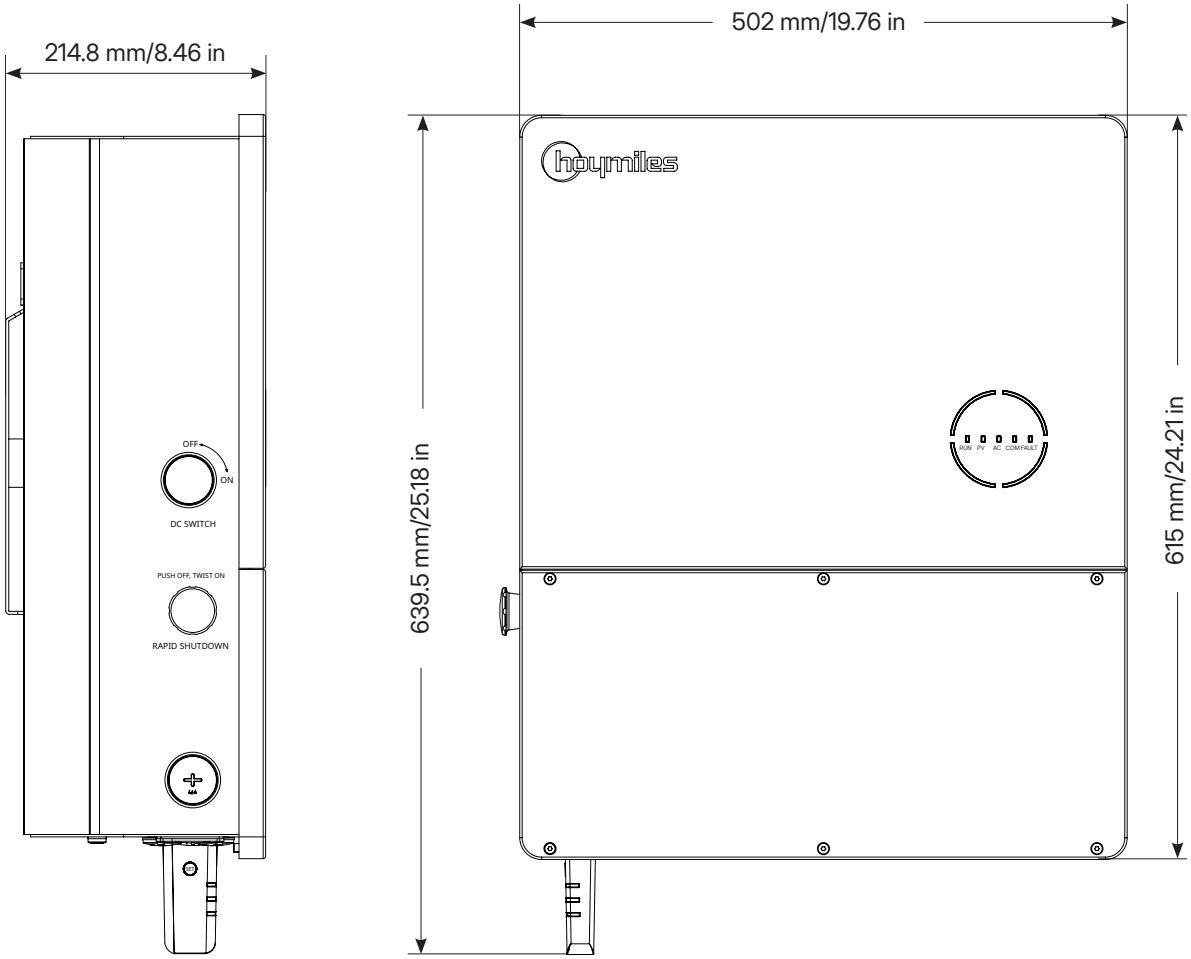


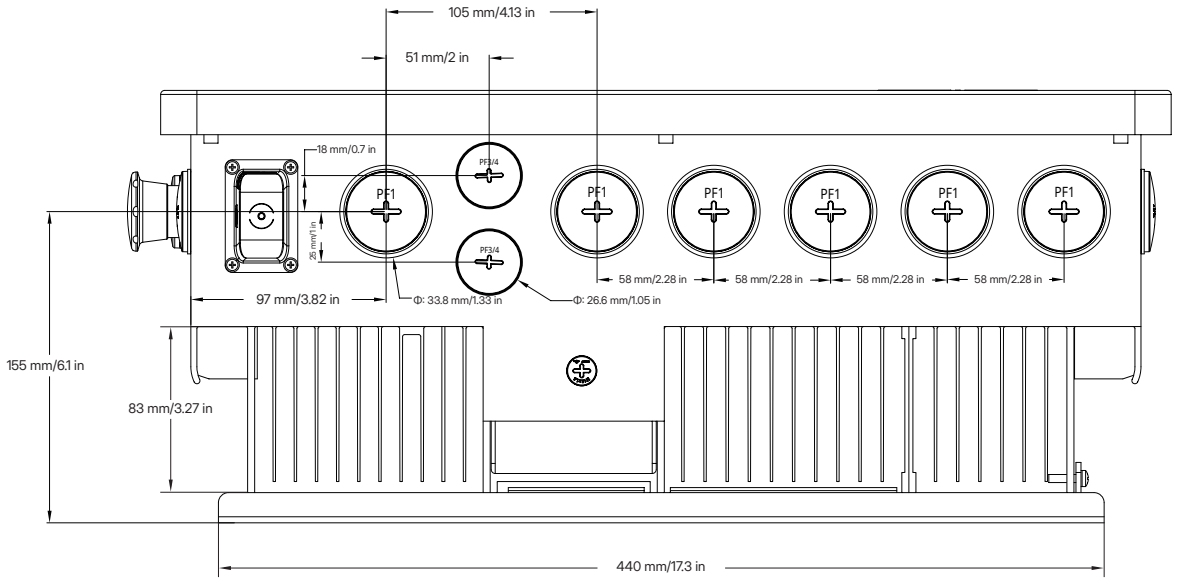
HYS-(7.6-11.5)LV-USG1



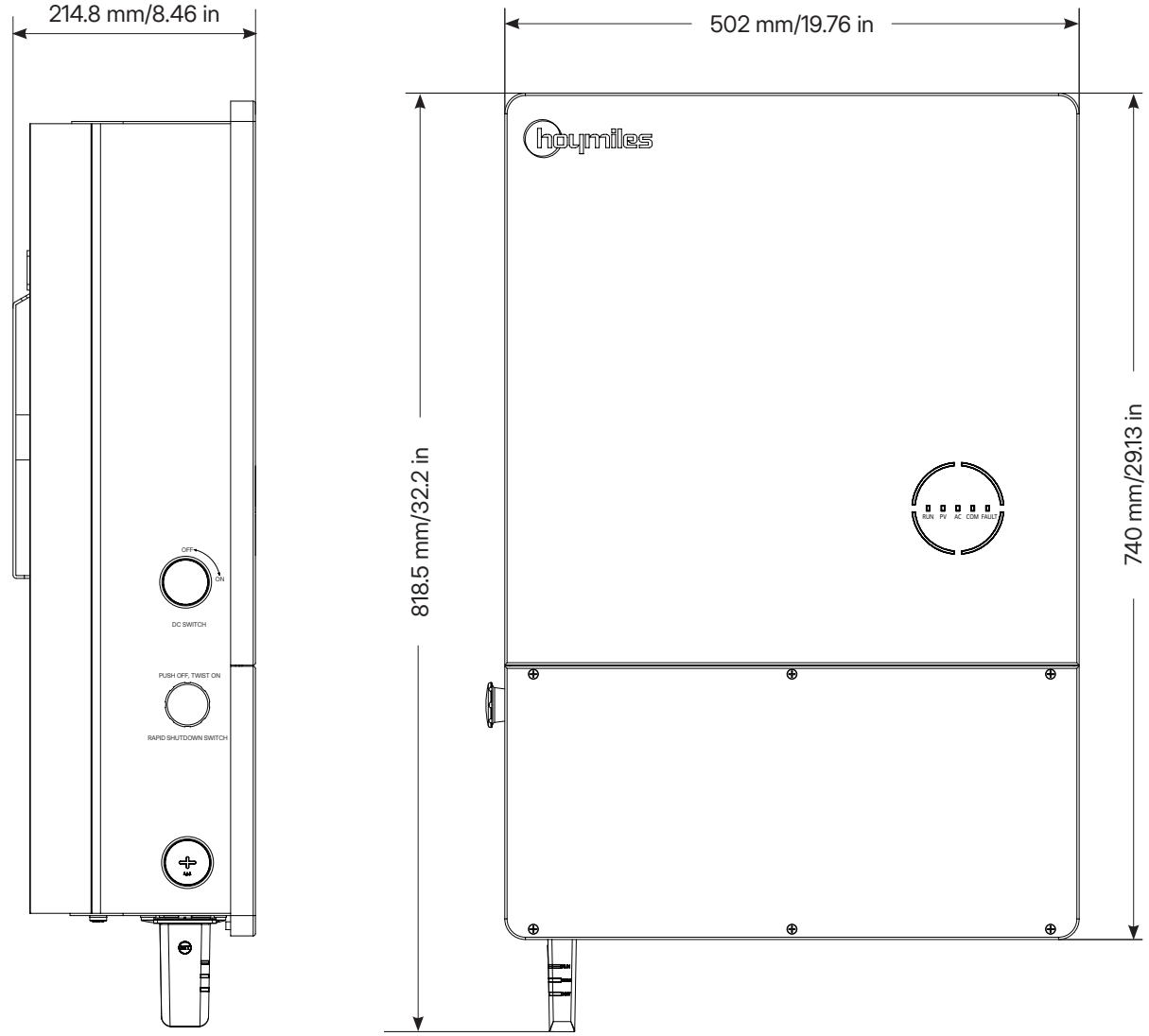


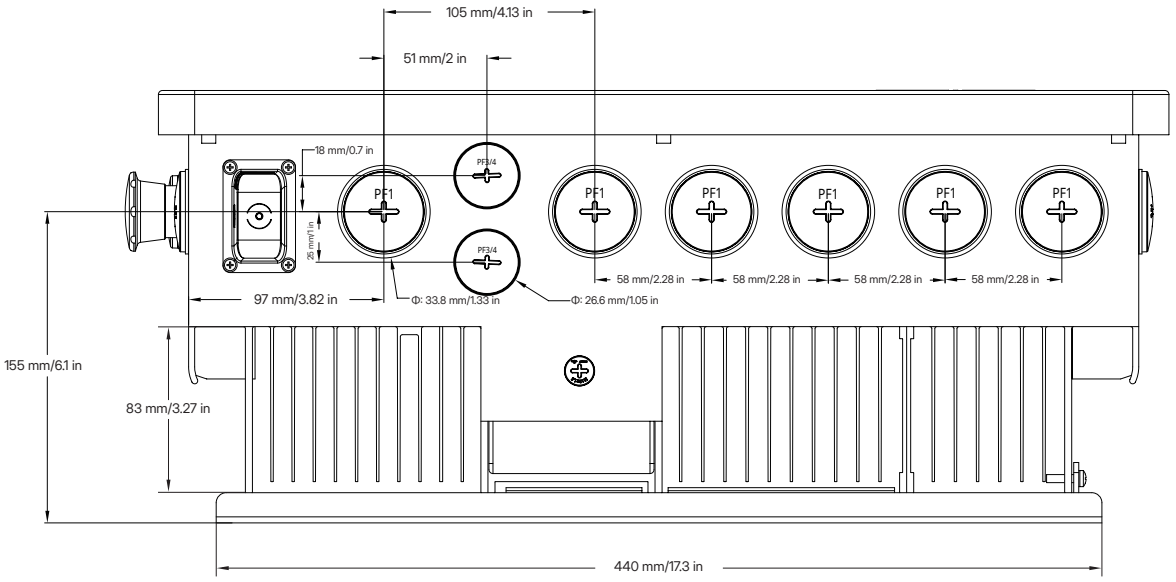
HAS-(3.8-6.0)LV-USG1



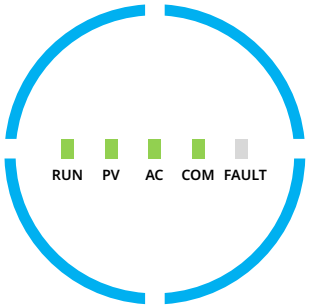


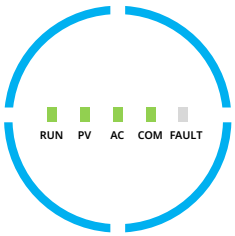
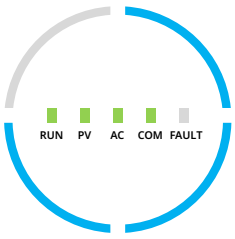
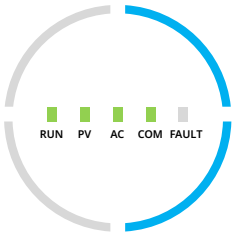
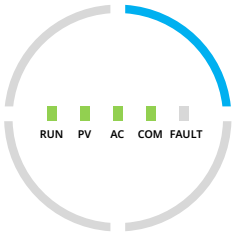
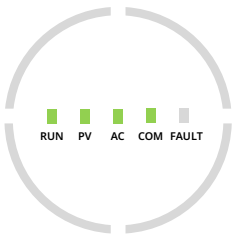
HAS-(7.6-11.5)LV-USG1

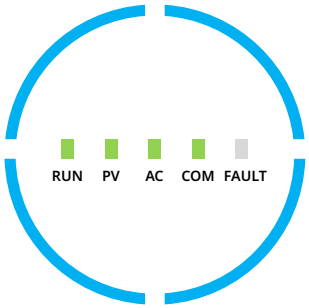


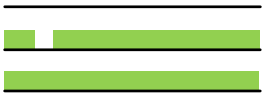
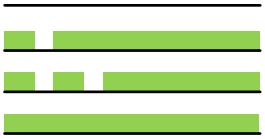
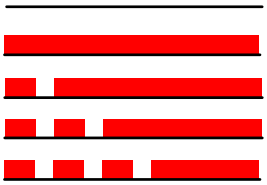


4.3 LED Indicators



Indicator	Status	Explanation
SOC		Full circle LEDs on – SOC is 75-100%; battery is discharging or in standby Full circle LEDs blink – SOC is 75-100%; battery is charging
		3/4 circle LEDs on – SOC is 50-75%; battery is discharging or in standby 3/4 circle LEDs blink – SOC is 50-75%; battery is charging
		2/4 circle LEDs on – SOC is 25-50%; battery is discharging or in standby 2/4 circle LEDs blink – SOC is 25-50%; battery is charging
		1/4 circle LED on – SOC is 0-25%; battery is discharging or in standby 1/4 circle LED blinks – SOC is 0-25%; battery is charging
		Full circle LEDs off – No BMS communication



Indicator	Status	Explanation
RUN		Off – Inverter is shut down Blink 1 – Inverter is booting Blink 2 – Inverter is in bypass mode On – Inverter is turned on
PV (Only for HYS)		Off – PV voltage is low Blink 1 – PV power is low On – PV is generating power
AC		Off – Grid is disconnected and EPS is off, or a grid fault occurs Blink 1 – Grid is disconnected but EPS is on On – Grid is connected
COM		Off – Communication error of both meter and BMS Blink 1 – Communication failed to meter Blink 2 – Communication failed to BMS On – Both meter and BMS communications are normal
FAULT		Off – No fault On - A fault occurs Blink 1 – EPS port overload Blink 2 – ISO/RCD fault Blink 3 – Arc fault

4.4 Protection Circuitry and Controls

The Hoymiles HYS-(3.8-11.5)LV-USG1 series inverter is equipped with arc fault circuit breakers (AFCI) and rapid shutdown (RSD) for the protection circuit and control to meet the relevant codes and standards.

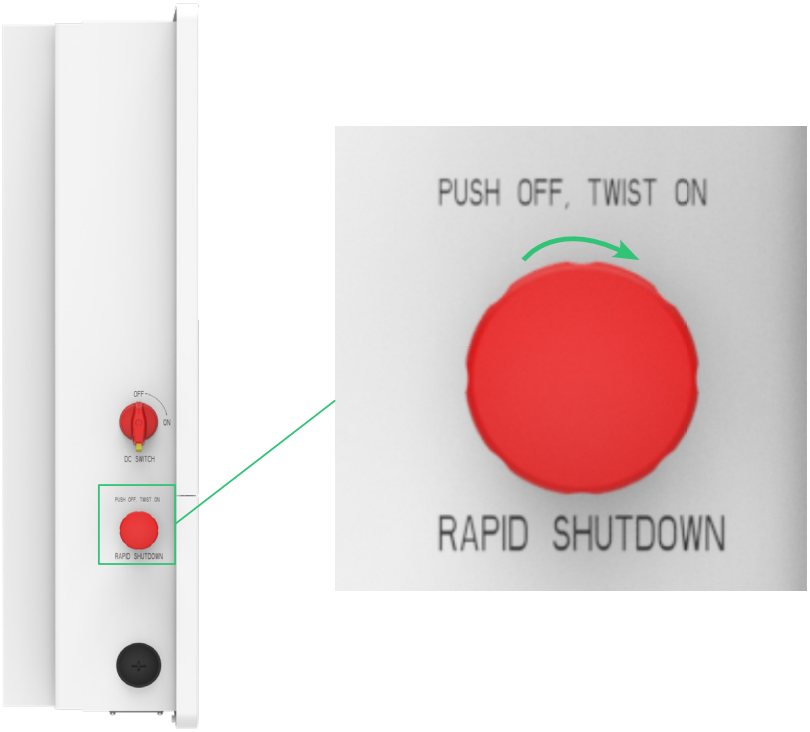
4.4.1 AFCI

According to 2011 NEC Section 690.11, photovoltaic systems operating at 80 volts DC or greater between any two conductors shall be protected by a listed PV arc-fault circuit interrupter or other system components listed to provide equivalent protection. The AFCI function is integrated into the

HYS-(3.8-11.5)LV-USG1 series inverter. Once an arc fault is detected, the corresponding error and time will be reported in the App. Within 24 hours, when the first four faults occur, the inverter will automatically clear the alarms and restart; when the fifth fault occurs, the inverter will shut down, and cannot automatically clear the alarm and restart. The inverter will resume operation after inspecting and repairing the arc fault position on-site, and manually clearing the alarm.

4.4.2 RSD

The HYS-(3.8-11.5)LV-USG1 series inverter integrates the transmitter HT10. When paired with Hoymiles rapid shutdown HRSD and powered on, HT10 sends a “permission to operate” signal to HRSD that is connected to the PV modules. Once HRSD receives this signal, it will start to work and enable PV modules to be connected in series to the hybrid inverter, thus producing power. When HRSD gets this signal, it will start to work and allow the string voltage to ramp up. When the HRSD loses this signal, it will be in the standby state, and the HRSD only outputs around 1 Vdc.



Rapid Shutdown Initiation Process:

1. Press the switch button to turn off the internal transmitter. This will initiate rapid shutdown of the PV (ramps the PV voltage down).

2. Twist the switch clockwise to turn on the transmitter. This will bring the PV voltage back up to normal.

NOTE

The rapid shutdown will only be initiated if HRSD has been installed on the PV modules. Without the HRSD, rapid shutdown is not possible.

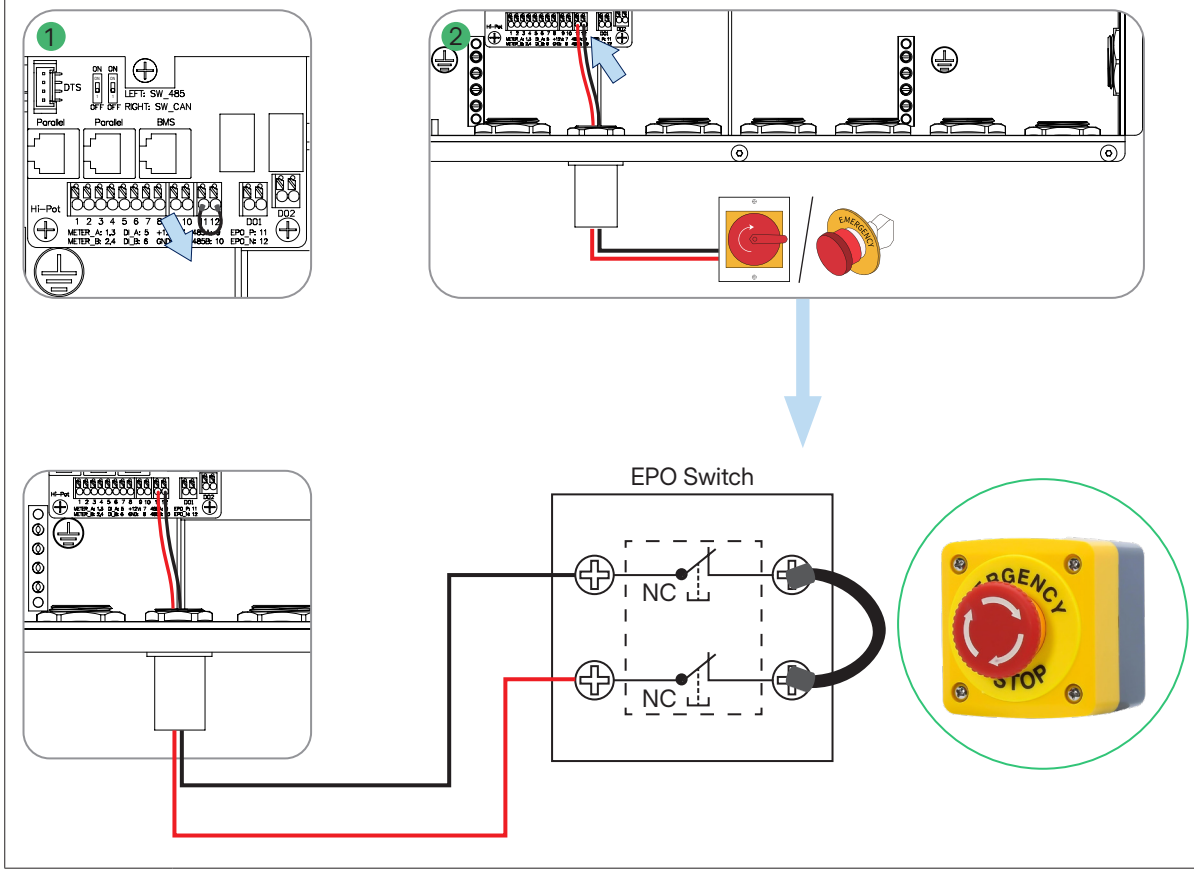
4.4.3 External Emergency Power Off Switch (Optional)

If the inverter is installed in a place where it is inaccessible to first responders, an external Emergency Power Off (EPO) switch must be installed to manually shut down the system in case of emergency.

The external EPO switch is not provided by Hoymiles and should be purchased separately. It must meet the requirements as follows.

- An ON/OFF position and an ON/OFF position indicator.
- A protection degree of NEMA 3R or above.
- It should be a normally closed (NC) switch.
- The installation location should be readily accessible.

Procedure	
Step 1	Remove the jumper wires between EPO_P and EPO_N.
Step 2	Connect one end of the positive and negative wires to the EPO_P and EPO_N terminals, and connect the other end to the external EPO switch.

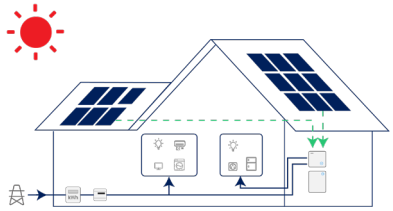
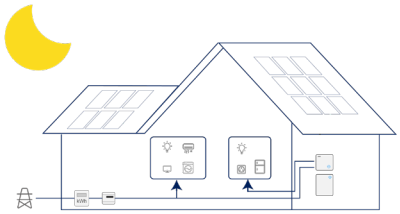
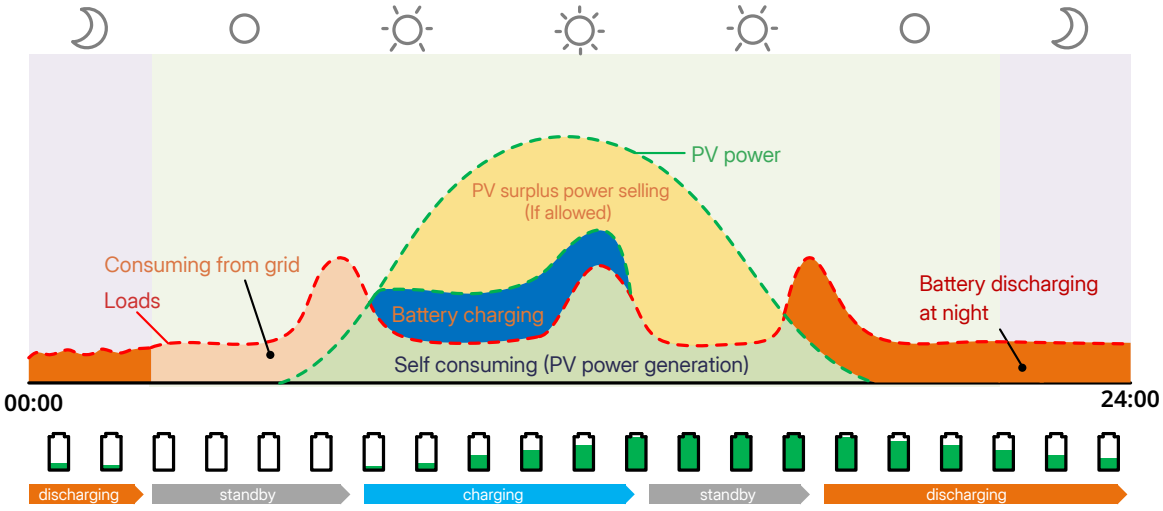
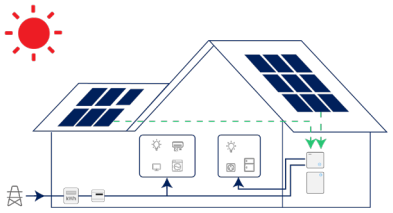


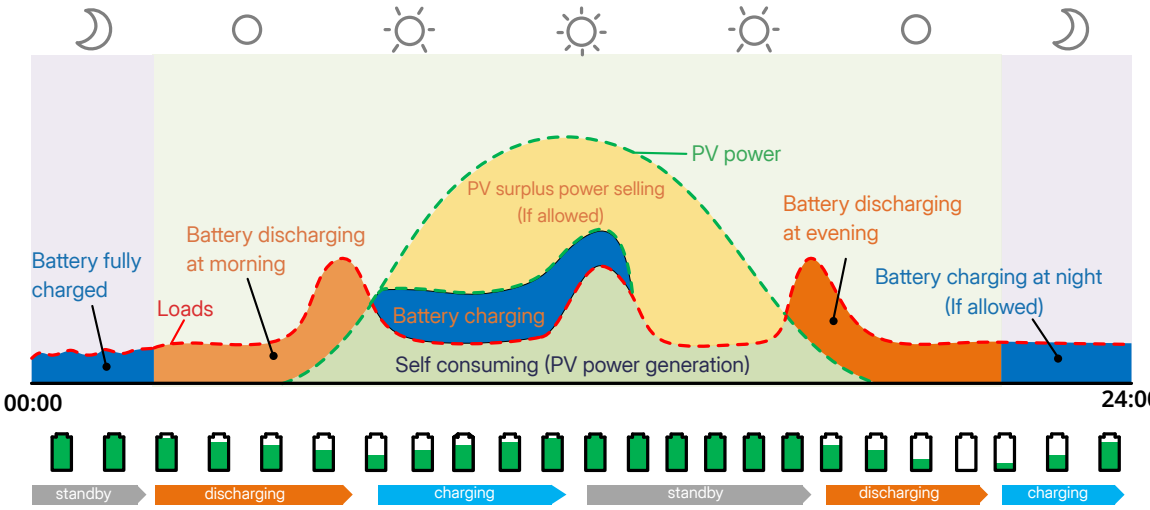
NOTE

If an external Emergency Power Off switch is not needed, please do not remove the jumper wires.

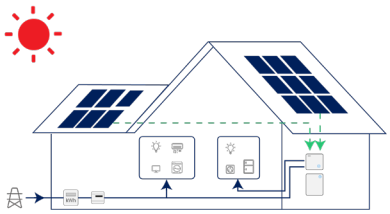
4.5 Working Modes

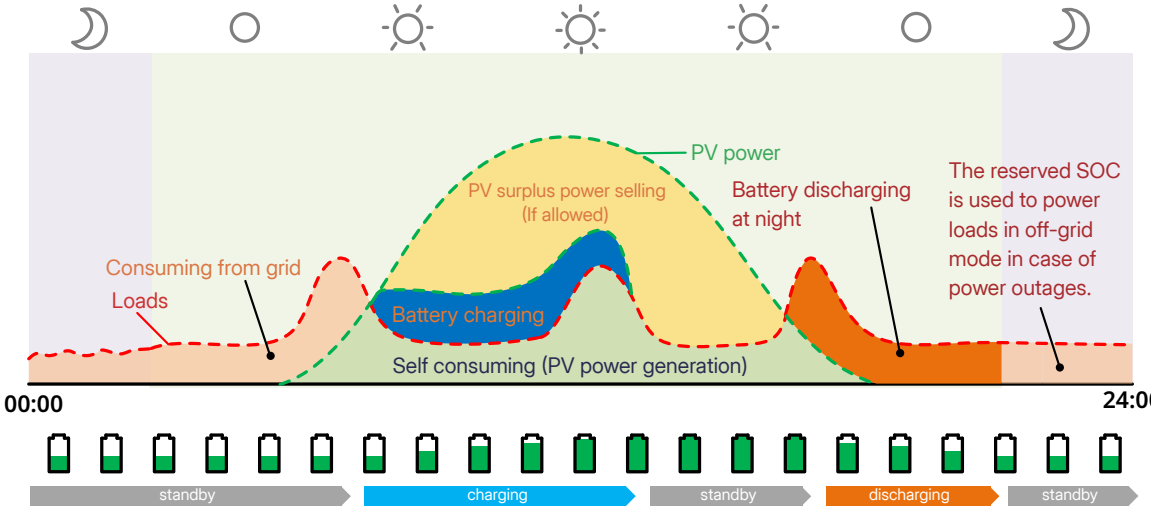
<table>
<tr><th colspan="3">Main Working Modes</th></tr>
<tr><td colspan="3">The following operation modes are applicable for the HYS series inverter, and are also applicable for the HAS series inverter which is connected to the PV inverter through the GEN port.</td></tr>
<tr><td>Self-consumption Mode</td><td>In the daytime, solar energy supports the loads first and surplus energy is stored in the battery. When the battery is fully charged or reaches the maximum charge power, the rest energy is fed into the grid (if allowed).

At night, the battery discharges for the loads first, and the grid will supply the loads once the battery power is not enough. In this mode, the battery cannot be charged from the grid at night.</td><td> 
  </td></tr>
<tr><td colspan="3"> 
</td></tr>
<tr><td colspan="3">Power flow of self-consumption mode</td></tr>
<tr><td>Economy Mode</td><td>In this mode, the time of battery charge and discharge needs to be set. The battery can be forced to discharge during the preset discharge time. For instance, the battery could be discharged according to peak electricity price, and the battery can be charged by surplus PV power in the daytime or from the grid during the period of valley electricity price (if allowed).</td><td>  </td></tr>
</table>



Power flow of economy mode

Backup Mode	In case of frequent power outages, a backup power SOC can be configured, which ensures that the battery always has enough energy to handle critical loads.	



Power flow of backup mode

5 System Overview

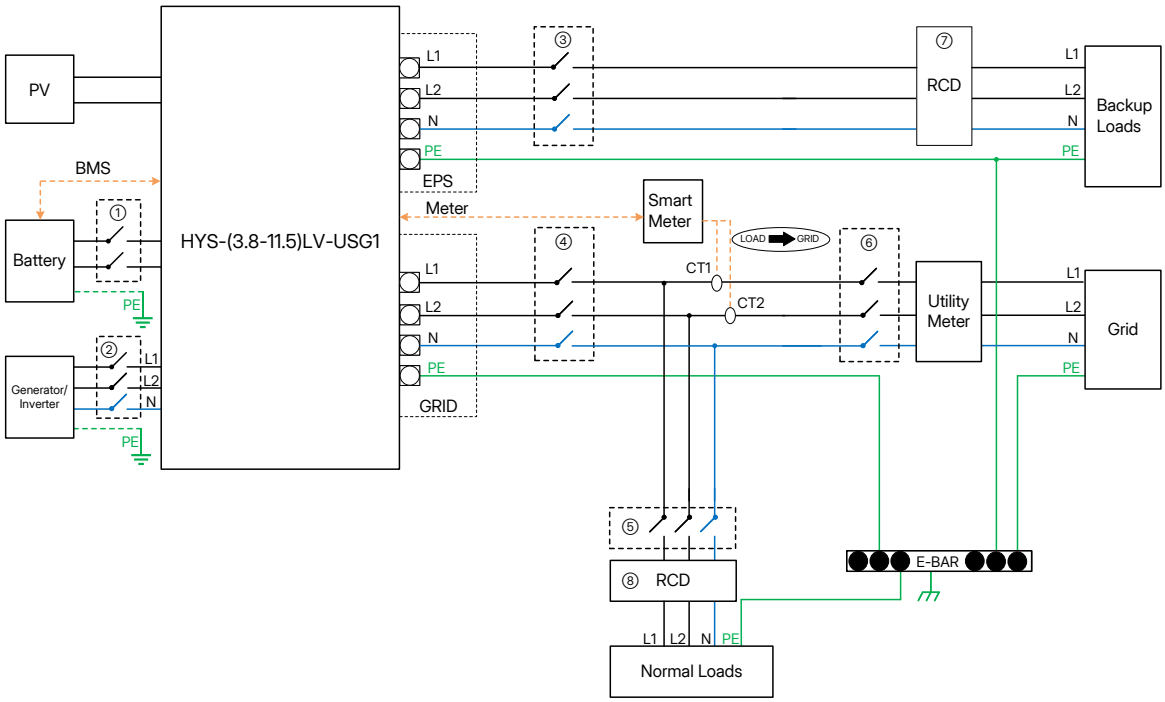
NOTICE

- The following diagrams are only intended to explain system architecture. Please comply with local laws and regulations.
- HYS-(3.8-11.5)LV-USG1 series and HAS-(3.8-11.5)LV-USG1 series support both li-ion and lead-acid batteries. Only qualified personnel can install, operate, and maintain the inverter and the battery. If there are any problems, please contact Hoymiles for technical support.
- Please refer to ***https://www.hoymiles.com*** for the compatible Li-ion battery list. The user should first contact Hoymiles for technical consultation and obtain official confirmation before installing any battery not included in the official published list.

5.1 Basic Diagram

HYS-(3.8-11.5)LV-USG1

The HYS-(3.8-11.5)LV-USG1 series inverter can be connected to a battery and PV panels to form a PV Energy Storage System (ESS). In the event of a grid outage, it can be used as an emergency power supply (EPS) through the self-consumption of solar energy. It can form a hybrid system for a new installation or an AC-coupled system to retrofit existing installations.

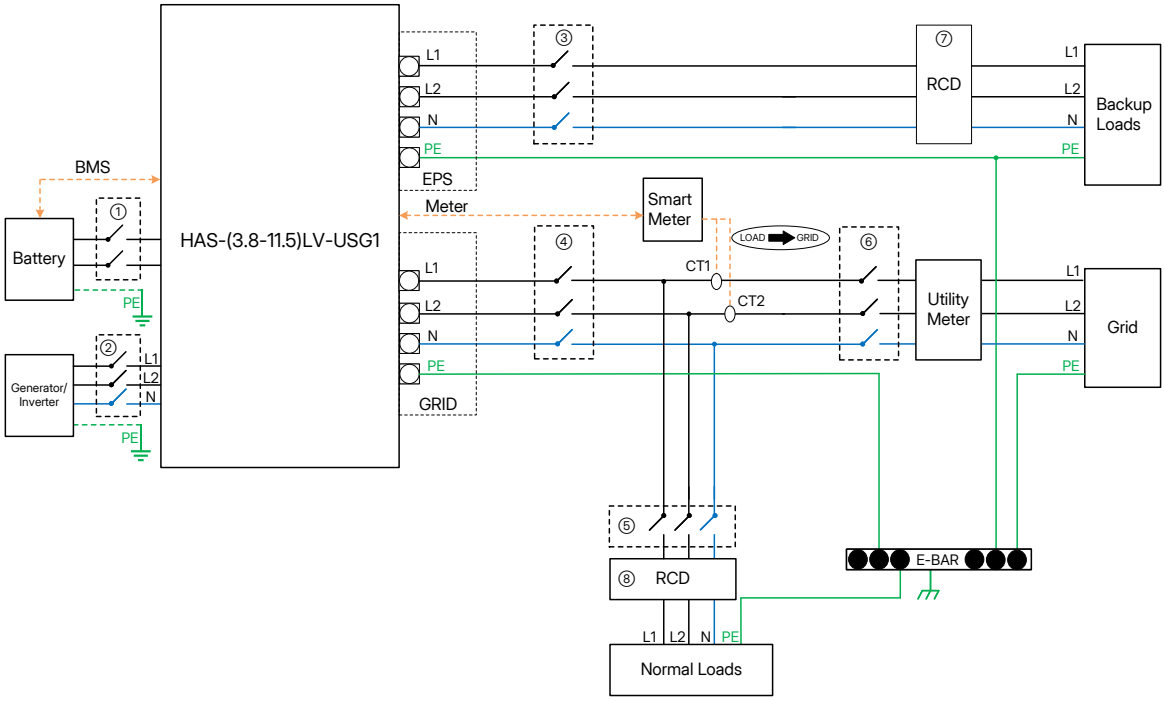


NOTE

- If the battery integrates a readily accessible internal DC breaker or fuse, no additional ① DC breaker or fuse is required.
- If the generator has integrated a readily accessible internal AC breaker, no additional ② AC breaker is required.
- ⑦⑧ 30 mA RCD is recommended but not mandatory; please comply with local regulations.

HAS-(3.8-11.5)LV-USG1

The HAS-(3.8-11.5)LV-USG1 series inverter can be connected to a battery and any grid-connected PV inverter to form a PV Energy Storage System (ESS). In the event of a grid outage, it can be used as an emergency power supply (EPS) through the self-consumption of solar energy, as the grid-connected PV inverter can also work when it is connected to the GEN port or EPS port even if there is a grid outage.

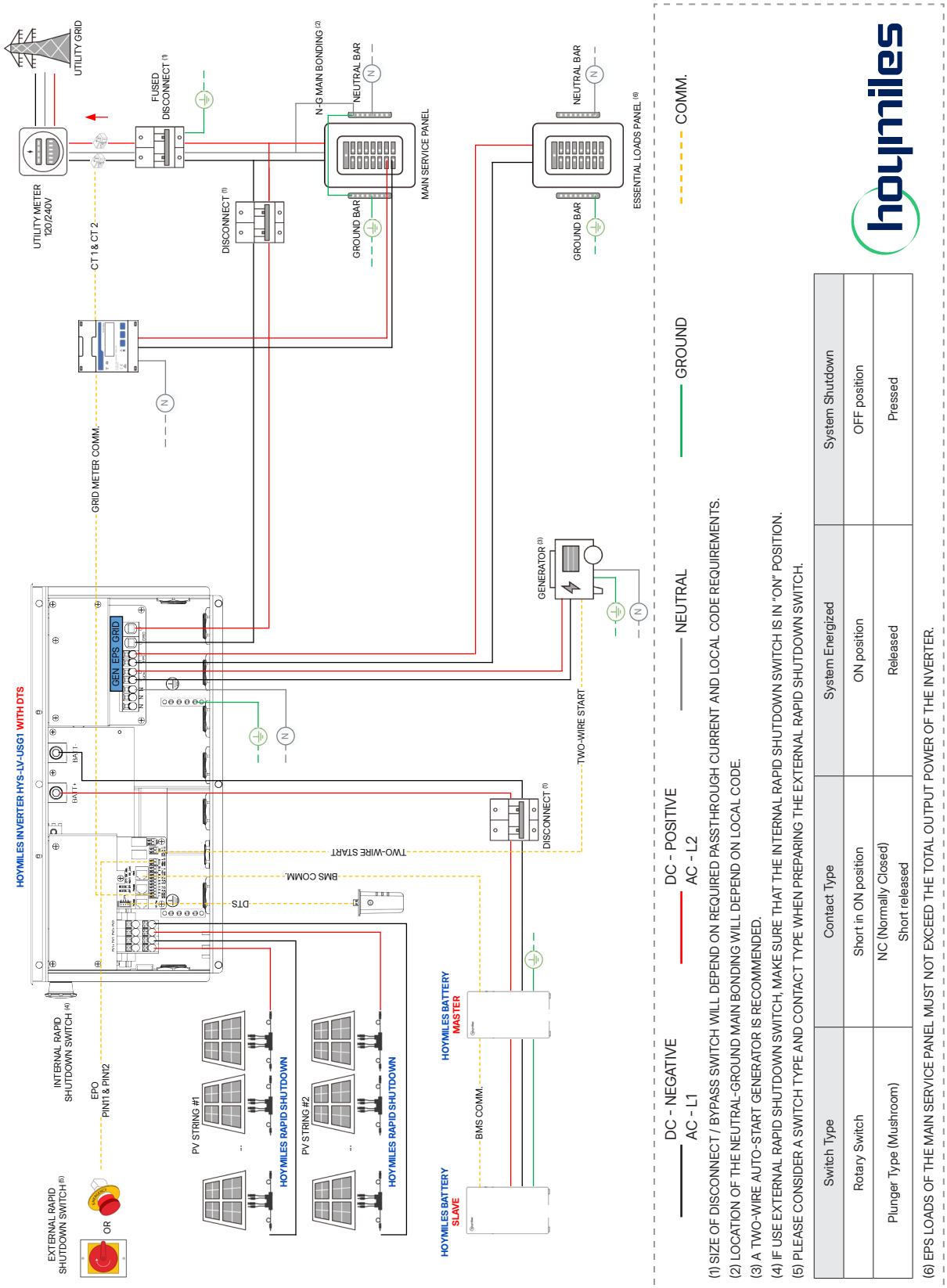


NOTE

- If the battery integrates a readily accessible internal DC breaker or fuse, no additional ① DC breaker or fuse is required.
- If the generator has integrated a readily accessible internal AC breaker, then no additional ② AC breaker is required.
- ⑦⑧ 30 mA RCD is recommended but not mandatory; please comply with local regulations.

5.2 Retrofit Diagram

Scenario 1 DC COUPLING SYSTEM AND PARTIAL HOME BACKUP WITH GENERATOR

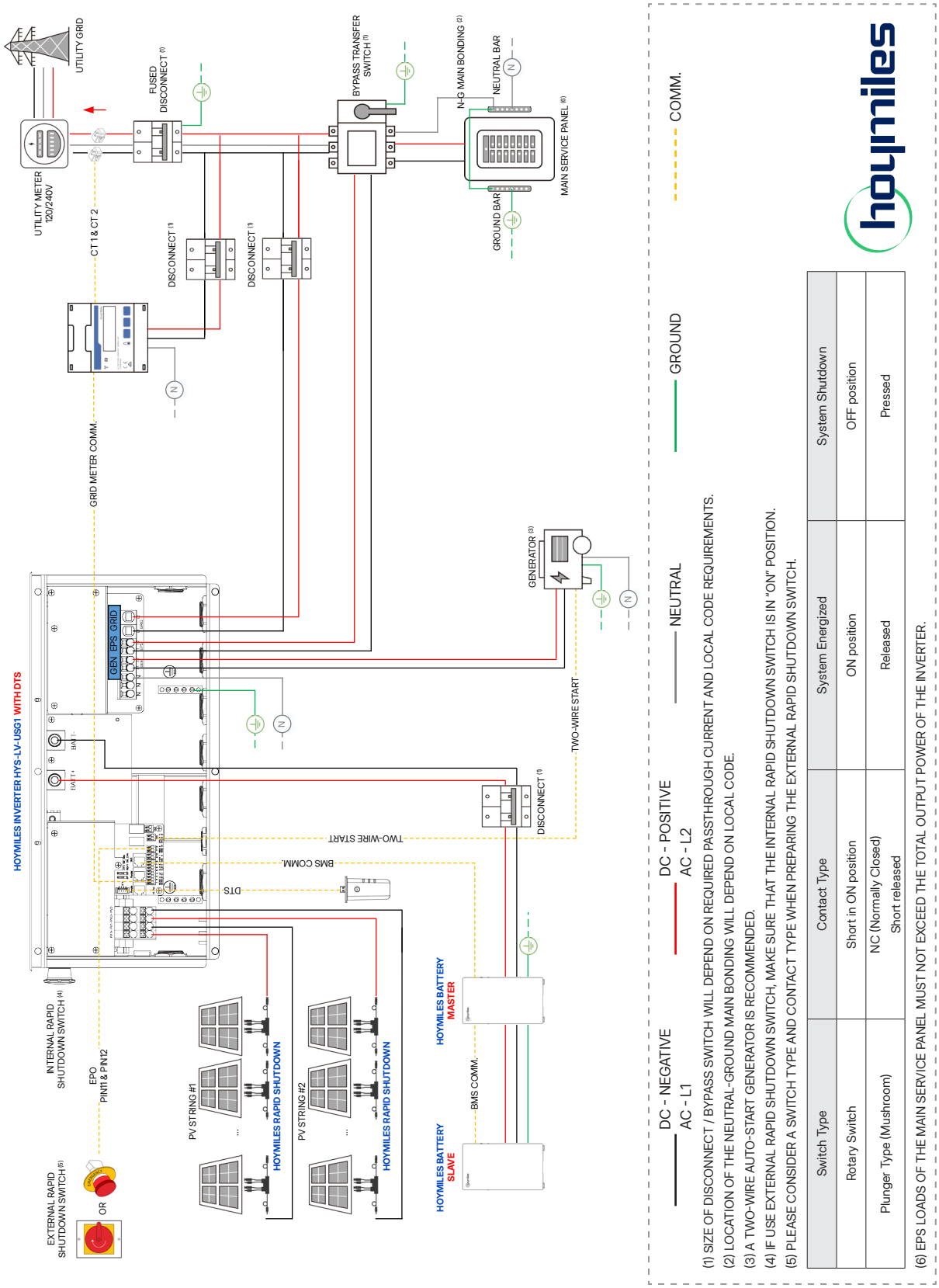


(1) SIZE OF DISCONNECT / BYPASS SWITCH WILL DEPEND ON REQUIRED PASSTHROUGH CURRENT AND LOCAL CODE REQUIREMENTS.
(2) LOCATION OF THE NEUTRAL-GROUND MAIN BONDING WILL DEPEND ON LOCAL CODE.
(3) A TWO-WIRE AUTO-START GENERATOR IS RECOMMENDED.
(4) IF USE EXTERNAL RAPID SHUTDOWN SWITCH, MAKE SURE THAT THE INTERNAL RAPID SHUTDOWN SWITCH IS IN "ON" POSITION.
(5) PLEASE CONSIDER A SWITCH TYPE AND CONTACT TYPE WHEN PREPARING THE EXTERNAL RAPID SHUTDOWN SWITCH.

Switch Type	Contact Type	System Energized	System Shutdown
Rotary Switch	Short in ON position	ON position	OFF position
Plunger Type (Mushroom)	NC (Normally Closed) Short released	Released	Pressed

(6) EPS LOADS OF THE MAIN SERVICE PANEL MUST NOT EXCEED THE TOTAL OUTPUT POWER OF THE INVERTER.

Scenario 2 DC COUPLING SYSTEM AND WHOLE HOME BACKUP WITH GENERATOR



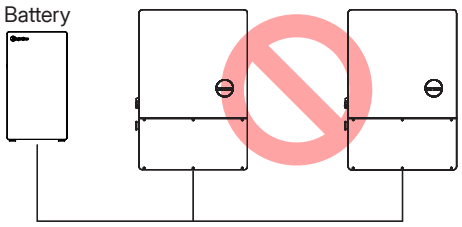
(1) SIZE OF DISCONNECT / BYPASS SWITCH WILL DEPEND ON REQUIRED PASSTHROUGH CURRENT AND LOCAL CODE REQUIREMENTS.
(2) LOCATION OF THE NEUTRAL-GROUND MAIN BONDING WILL DEPEND ON LOCAL CODE.
(3) A TWO-WIRE AUTO-START GENERATOR IS RECOMMENDED.
(4) IF USE EXTERNAL RAPID SHUTDOWN SWITCH, MAKE SURE THAT THE INTERNAL RAPID SHUTDOWN SWITCH IS IN "ON" POSITION.
(5) PLEASE CONSIDER A SWITCH TYPE AND CONTACT TYPE WHEN PREPARING THE EXTERNAL RAPID SHUTDOWN SWITCH.

Switch Type	Contact Type	System Energized	System Shutdown
Rotary Switch	Short in ON position	ON position	OFF position
Plunger Type (Mushroom)	NC (Normally Closed) Short released	Released	Pressed

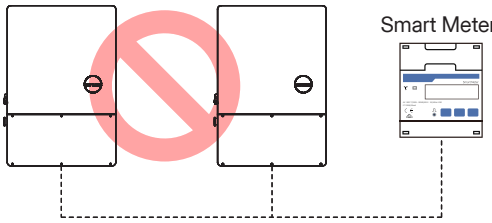
(6) EPS LOADS OF THE MAIN SERVICE PANEL MUST NOT EXCEED THE TOTAL OUTPUT POWER OF THE INVERTER.

5.3 Unacceptable Diagram

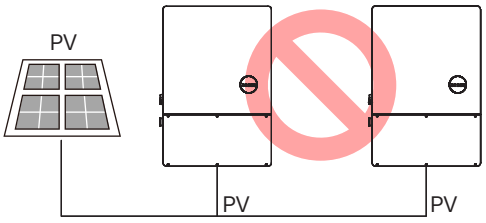
Avoid the following installation types to prevent damage to the system or the inverter.



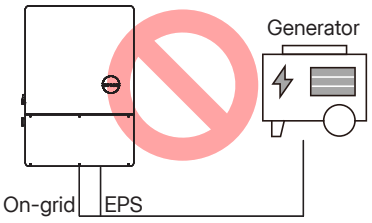
One battery cannot be connected to multiple inverters.



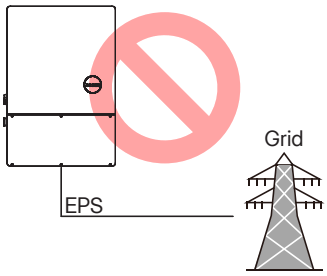
One meter cannot be connected to multiple inverters and different CTs cannot be connected to the same line cable.



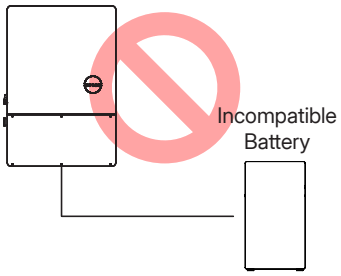
Single PV cannot be connected to multiple inverters.



Neither EPS or on-grid port can be connected to generator directly.



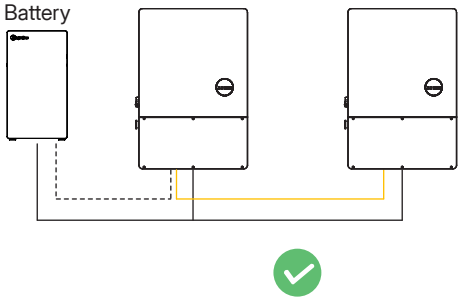
EPS port cannot be connected to grid directly.

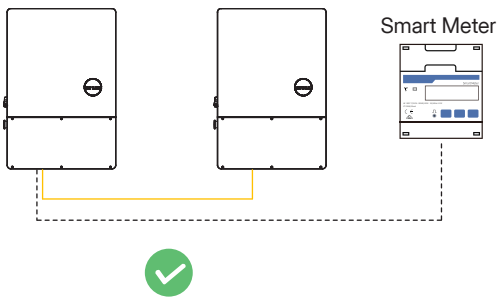


Incompatible battery cannot be connected to battery port.

NOTE

The following two diagrams are acceptable if the inverters are connected in parallel.



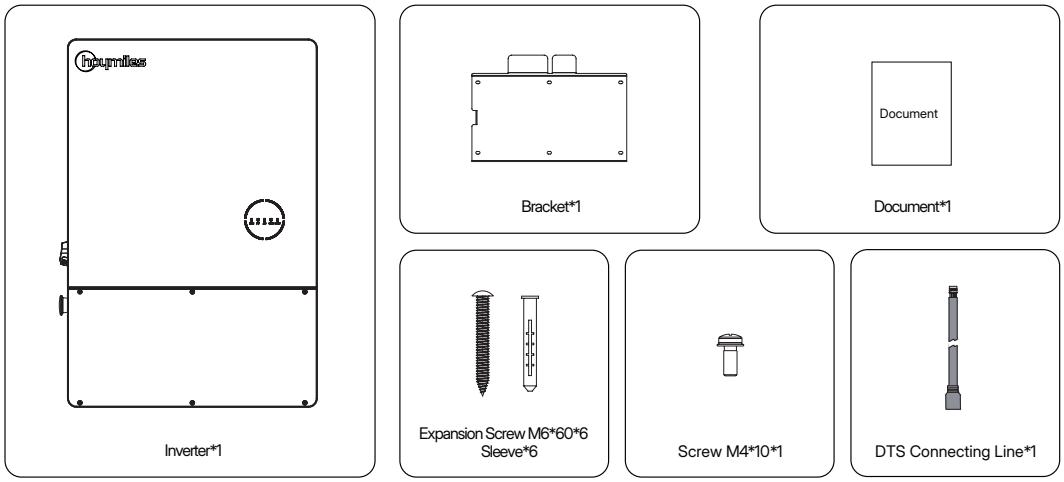


6 Installation Instruction

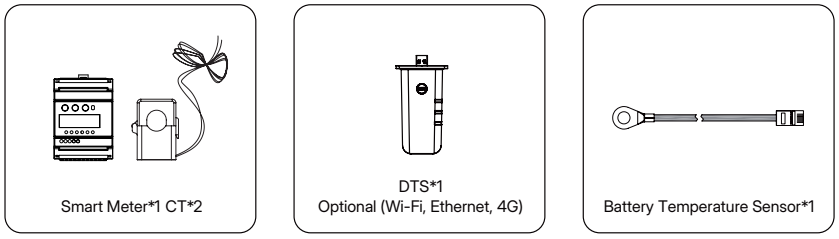
6.1 Unpacking

Please ensure that none of the components listed below are missing or damaged upon receipt of the hybrid or AC-coupled inverter.

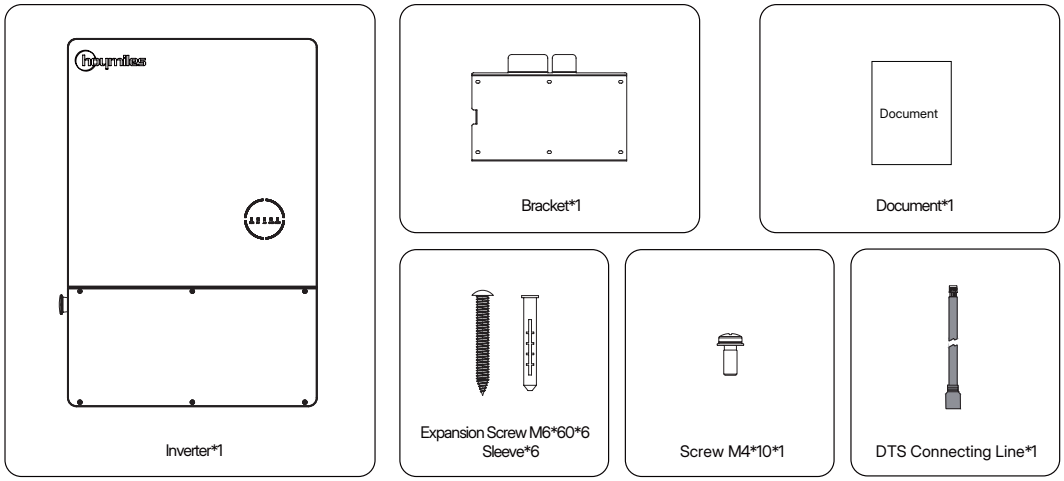
HYS-(3.8-11.5)LV-USG1



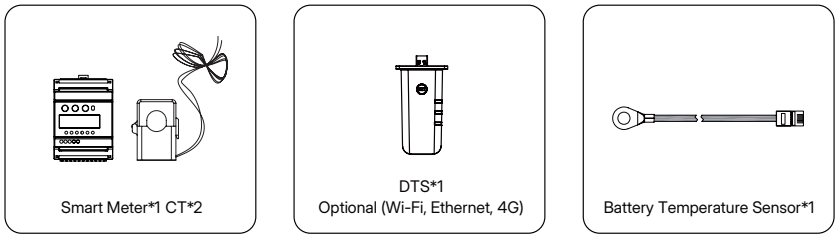
Accessories Packing List (Optional)



HAS-(3.8-11.5)LV-USG1

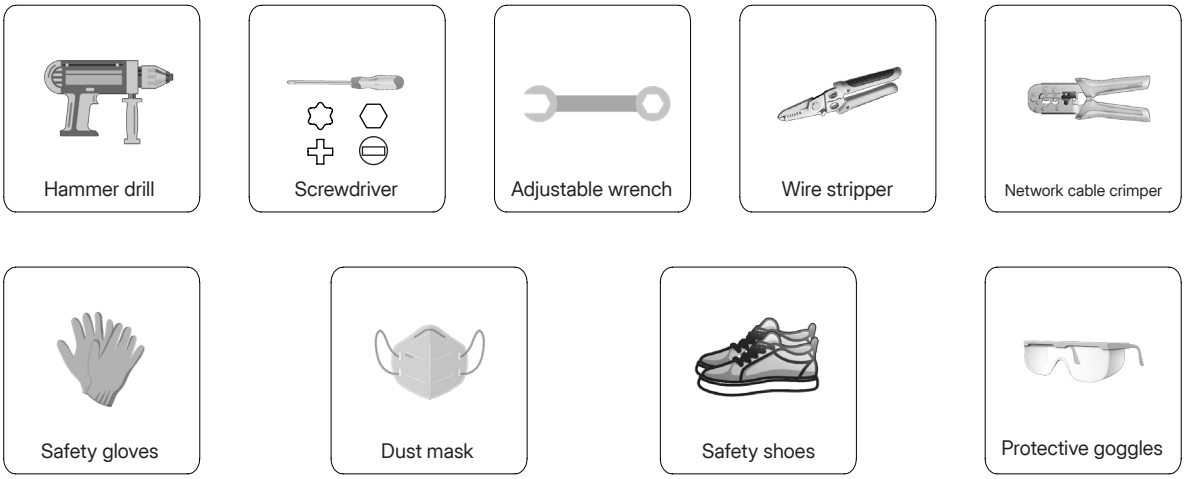


Accessories Packing List (Optional)



6.2 Installation Tools

The following tools are recommended in the installation process, and other auxiliary tools can also be used on site if necessary.



6.3 Installation Requirements

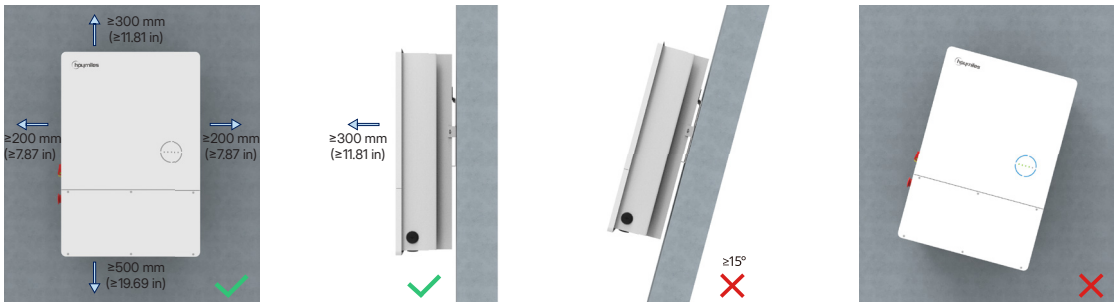
⚠ WARNING

- Make sure there is no electrical connection before installation.
- To avoid electric shock or other injuries, make sure that holes are not drilled over any electrical parts or plumbing installations.

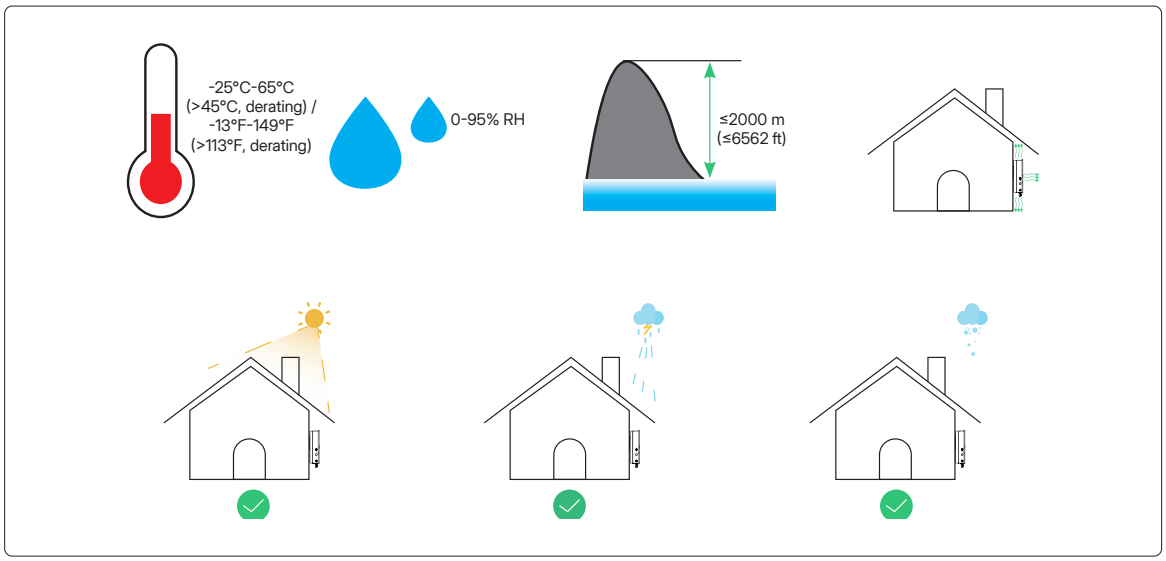
NOTICE

Make sure the inverter is correctly installed according to the following list. Any incorrect installation would require a risk assessment.

- The inverter installation should be protected by shelter from direct sunlight or bad weather such as snow, rain, or lightning.
- The inverter should be installed on a solid surface that is suitable for the inverter's dimensions and weight.
- The inverter should be installed vertically or at a maximum back tilt of 15°. Leave enough space around the inverter according to the figure below.

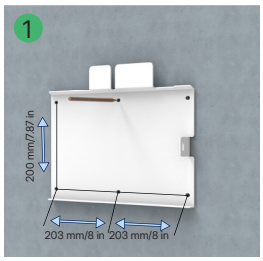
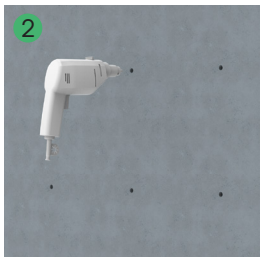
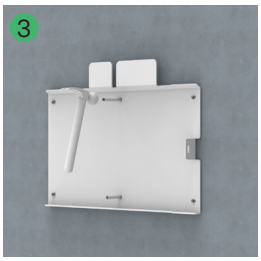
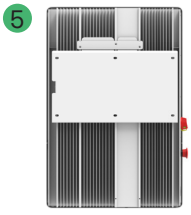


- The inverter should be installed in an environment with good ventilation and heat dissipation conditions.
- The ambient temperature should be between -25°C (-13°F) and 45°C (113°F). High ambient temperatures will cause power derating of the inverter.
- The relative humidity should be less than 95%, without condensing.
- The inverter should be installed at eye level for convenient maintenance.
- The product label on the inverter should be visible after installation.
- The inverter should be installed far from flammable materials.



6.4 Installation Steps

Install the inverter on the wall using the provided wall-mounting bracket and expansion plug sets.

Procedure	
Step 1&2	a. Position the bracket against the wall and mark the 6 drilling hole locations. b. Drill holes with a driller, and make sure the holes are deep enough (at least 60 mm).
	 
Step 3&4	a. Place sleeves in the holes, and then tighten them. b. Fix the wall bracket with expansion screws. Please confirm that the bracket is firmly attached to the mounting surface.
	 
Step 5&6	a. Mount the inverter on the bracket. b. Tighten the screw with a torque of 1.4 N·m to secure the bracket and the inverter.
	 

7 Electrical Connection

⚠ WARNING

Before any electrical connections, keep in mind that the inverter has dual power supplies. It is mandatory for the qualified personnel to wear personal protective equipment (PPE) during electrical work.

NOTICE

Before connecting the cables, use the adjustable wrench to unscrew the waterproof plugs with a torque of at least 7 N·m. The size of the adjustable wrench can be adjusted to 41 mm (1.61 in) and 32 mm (1.26 in) according to the size of the waterproof plugs.

7.1 Overcurrent Protection Requirement

To ensure safe connection and operation, it is recommended to install an overcurrent protection device (circuit breaker) while installing PV cables, battery cables, grid cables, EPS cables, and GEN cables. The following data is the recommended specification for the overcurrent protection device.

Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1
PV (only for HYS)	20 A	20 A	20 A	14-6 AWG	14-6 AWG	14-6 AWG
Battery	100 A	125 A	125 A	3-1/0 AWG	2-2/0 AWG	2-2/0 AWG
Grid L1/L2	40 A	50 A	50 A	10-4 AWG	8-4 AWG	8-4 AWG
EPS/GEN L1/L2	20 A	25 A	25 A	14-6 AWG	14-6 AWG	14-6 AWG

Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
PV (only for HYS)	20 A	20 A	20 A	14-6 AWG	14-6 AWG	14-6 AWG
Battery	200 A	250 A	250 A	3/0-4/0 AWG	4/0 AWG	4/0 AWG
Grid L1/L2	80 A	100 A	100 A	4-1 AWG	3-1 AWG	3-1 AWG
EPS/GEN L1/L2	40 A	50 A	50 A	10-6 AWG	8-6 AWG	8-6 AWG

ⓘ NOTE

- Select the appropriate circuit breaker according to the actual installation.
- The overcurrent protection device (circuit breaker) is not provided by Hoymiles and should be prepared separately.

7.2 Recommended Cable List

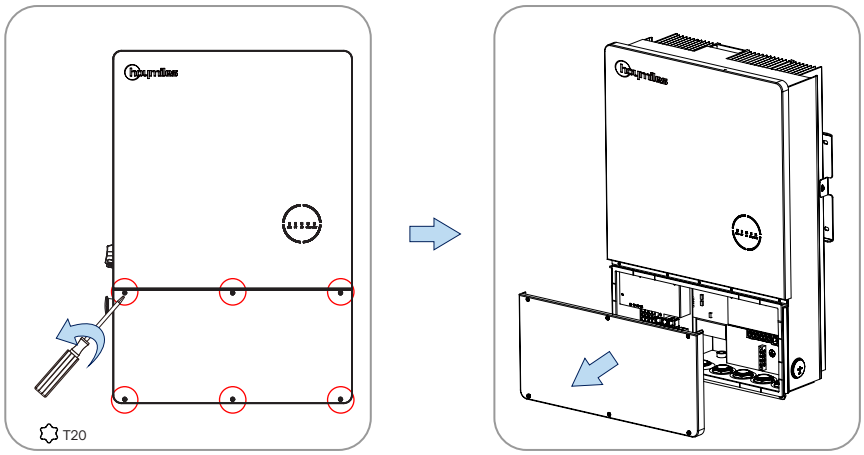
This data is the cable specification recommended by Hoymiles. For proper cable specifications, please refer to local laws and regulations and actual installation.

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8/4.8/6.0LV-USG1
PV Cable (only for HYS)	12 AWG	12 AWG	12 AWG	12 mm/0.47 in
Battery Cable	2 AWG	2 AWG	2 AWG	23 mm/0.91 in
Battery Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in
Grid L1/L2 Cable	8 AWG	8 AWG	8 AWG	17 mm/0.67 in
Grid N Cable	10 AWG	10 AWG	10 AWG	15 mm/0.59 in
Grid Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in
EPS/GEN L1/L2/N Cable	10 AWG	10 AWG	10 AWG	15 mm/0.59 in
EPS/GEN Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in
Communication Cable	24 AWG	24 AWG	24 AWG	8 mm/0.31 in

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6/9.6/11.5LV-USG1
PV Cable (only for HYS)	12 AWG	12 AWG	12 AWG	14 mm/0.55 in
Battery Cable	3/0 AWG	4/0 AWG	4/0 AWG	23 mm/0.91 in
Battery Ground Cable	6 AWG	6 AWG	6 AWG	12 mm/0.47 in
Grid L1/L2 Cable	4 AWG	3 AWG	3 AWG	24 mm/0.94 in
Grid N Cable	10 AWG	8 AWG	8 AWG	18 mm/0.71 in
Grid Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in
EPS/GEN L1/L2/N Cable	10 AWG	8 AWG	8 AWG	18 mm/0.71 in
EPS/GEN Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in
Communication Cable	24 AWG	24 AWG	24 AWG	8 mm/0.31 in

7.3 Opening the Wiring Box Cover

Procedure	
Step 1	Loosen but do not remove the 6 screws of the wiring box cover with T20 screwdriver.
Step 2	Remove the cover.



7.4 PV Cable Connection (Only for HYS series inverters)

⚠ WARNING

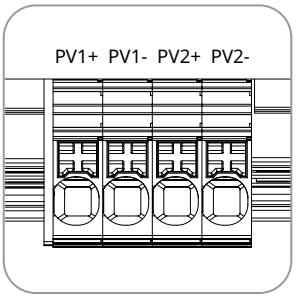
Before connecting PV cables, please make sure all requirements listed below are followed.

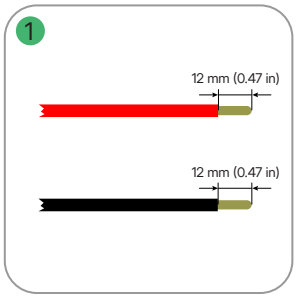
- The voltage, current and power ratings of the panels to be connected are within the allowable range of the inverter. Ensure the polarity is correct, and please refer to the technical parameters in ***12 Technical Datasheet*** for voltage and current limits.
- If the PV cables are reversely connected or if the inverter is not working properly, do not turn off the DC switch. Otherwise, it may cause a DC arc, fire, or damage to the inverter. After the PV input current drops below 0.5 A, disconnect the DC switch and adjust the polarity of the PV strings.
- Since the inverter is a transformerless structure, please do not ground the outputs of PV panels.

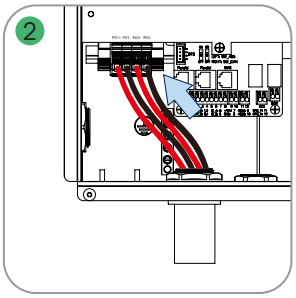
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS-3.8LV-USG1	HYS-4.8LV-USG1	HYS-6.0LV-USG1	HYS-3.8LV-USG1	HYS-4.8LV-USG1	HYS-6.0LV-USG1
PV	20 A	20 A	20 A	14-6 AWG	14-6 AWG	14-6 AWG

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS-3.8LV-USG1	HYS-4.8LV-USG1	HYS-6.0LV-USG1	HYS-3.8/4.8/6.0LV-USG1
PV Cable	12 AWG	12 AWG	12 AWG	12 mm/0.47 in

Procedure	
Step 1	Strip the cable insulation by 12 mm (0.47 in).
Step 2	Insert the PV cables into the terminal, and gently pull the cables backward to ensure that they are firmly connected.



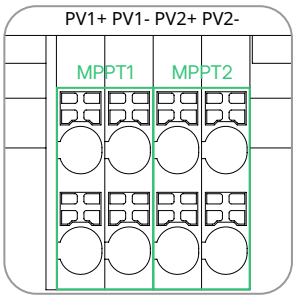


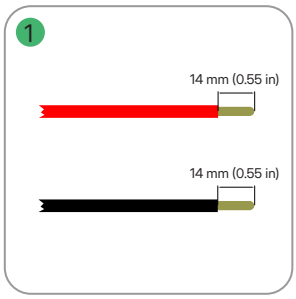


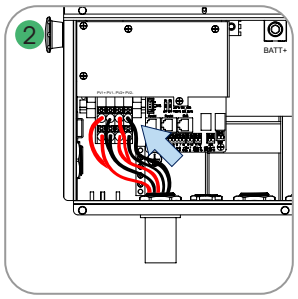
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS-7.6LV-USG1	HYS-9.6LV-USG1	HYS-11.5LV-USG1	HYS-7.6LV-USG1	HYS-9.6LV-USG1	HYS-11.5LV-USG1
PV	20 A	20 A	20 A	14-6 AWG	14-6 AWG	14-6 AWG

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS-7.6LV-USG1	HYS-9.6LV-USG1	HYS-11.5LV-USG1	HYS-7.6/9.6/11.5LV-USG1
PV Cable	12 AWG	12 AWG	12 AWG	14 mm/0.55 in

Procedure	
Step 1	Strip the cable insulation by 14 mm (0.55 in).
Step 2	Insert the PV cables into the terminal, and gently pull the cables backward to ensure that they are firmly connected.







7.5 Battery Cable Connection

This section mainly describes the cable connections on the inverter side. Refer to the instructions supplied by the battery manufacturer for the connections on the battery side.

For batteries without a built-in DC breaker, make sure that an external DC breaker is connected.

If you need to use this hybrid inverter or AC-coupled inverter as a grid-tied inverter, please contact Hoymiles.

⚠ WARNING

- A two-pole DC breaker with an overcurrent protection (OCP) function is compulsory to be installed between the inverter and battery. The battery may have this switch integrated. If not, an external DC switch of proper ratings should be used.
- Make sure the breaker mentioned above is in the "OFF" position.
- Before proceeding to the next step, make sure that the battery voltage is 0 Vdc through a multimeter.

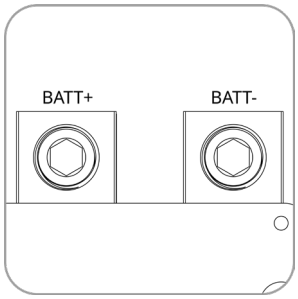
NOTICE

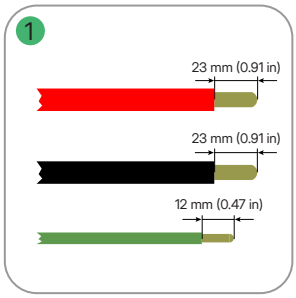
- Do not turn on the battery switch until all cables are properly connected.
- The inverter supports both Li-ion and lead-acid batteries. Only qualified personnel can install, operate, and maintain the inverter and the battery.
- Please refer to ***https://www.hoymiles.com*** for the compatible Li-ion battery list.
- For detailed battery settings, refer to ***9 S-Miles Cloud***.

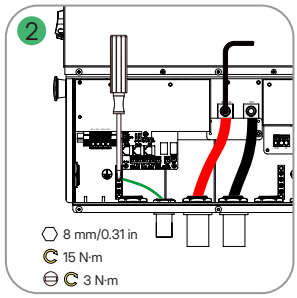
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1
Battery	100 A	125 A	125 A	3-1/0 AWG	2-2/0 AWG	2-2/0 AWG

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8/4.8/6.0LV-USG1
Battery Cable	2 AWG	2 AWG	2 AWG	23 mm/0.91 in
Battery Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in

Procedure	
Step 1	a. Strip the battery cable insulation by 23 mm (0.91 in). b. Strip the battery ground cable insulation by 12 mm (0.47 in).
Step 2	Firstly, use the slotted screwdriver to unscrew the screw on the grounding bar, insert the battery ground cable, and tighten the screw. Secondly, use the hex wrench to unscrew the bolts, insert the battery cables into the terminals, and then tighten the bolts. Gently pull the battery cables and battery ground cable backward to ensure that they are firmly connected.



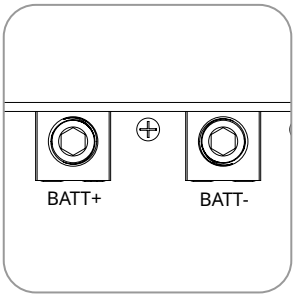


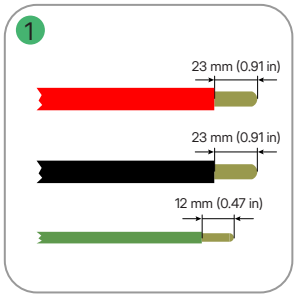


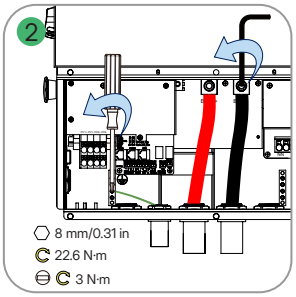
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
Battery	200 A	250 A	250 A	3/0-4/0 AWG	4/0 AWG	4/0 AWG

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6/9.6/11.5LV-USG1
Battery Cable	3/0 AWG	4/0 AWG	4/0 AWG	23 mm/0.91 in
Battery Ground Cable	6 AWG	6 AWG	6 AWG	12 mm/0.47 in

Procedure	
Step 1	a. Strip the battery cable insulation by 23 mm (0.91 in). b. Strip the battery ground cable insulation by 12 mm (0.47 in).
Step 2	Firstly, use the slotted screwdriver to unscrew the screw on the grounding bar, insert the battery ground cable, and tighten the screw. Secondly, use the hex wrench to unscrew the bolts, insert the battery cables into the terminals, and then tighten the bolts. Gently pull the battery cables and battery ground cable backward to ensure that they are firmly connected.







7.6 AC Cable Connection

The following diagrams are examples of connecting grid cables, and the GEN and EPS connection methods are the same as grid connection. For recommended cable specifications, please refer to the following recommended cable list.

⚠ WARNING

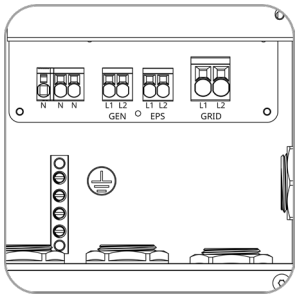
Before connecting the AC cables, please make sure all requirements listed below are followed.

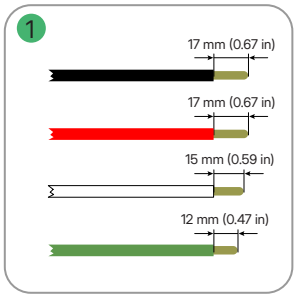
- An independent two or three circuit breaker must be installed on the output side of the inverter to ensure safe disconnection from the grid.
- Multiple inverters cannot share one circuit breaker.
- Never connect a load between the inverter and the circuit breaker.
- Ensure that the overcurrent protection devices (OCPDs) (breakers) are turned off.
- Ensure the rated power of the EPS load does not exceed the rated output power of the inverter.
- Ensure that the starting power of inductive loads, such as air conditioners, refrigerators, and pumps, does not exceed the EPS peak power of the inverter. (The starting power of the air conditioner is at least 2 times the rated power. For details, refer to the appliance manual.) Otherwise, the inverter will stop output or even shut down with a fault alarm.
- Before proceeding to the next step, make sure that the AC voltages are 0 Vac through a multimeter.

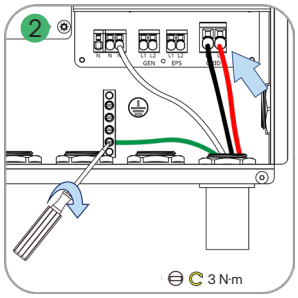
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1
Grid L1/L2	40 A	50 A	50 A	10-4 AWG	8-4 AWG	8-4 AWG
EPS/GEN L1/L2	20 A	25 A	25 A	14-6 AWG	14-6 AWG	14-6 AWG

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8/4.8/6.0LV-USG1
Grid L1/L2 Cable	8 AWG	8 AWG	8 AWG	17 mm/0.67 in
Grid N Cable	10 AWG	10 AWG	10 AWG	15 mm/0.59 in
Grid Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in
EPS/GEN L1/L2/N Cable	10 AWG	10 AWG	10 AWG	15 mm/0.59 in
EPS/GEN Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in

Procedure	
Step 1	a. Strip the grid L1/L2 cable insulation by 17 mm (0.67 in), and strip the grid N cable insulation by 15 mm (0.59 in). b. Strip the grid ground cable insulation by 12 mm (0.47 in).
Step 2	Firstly, use the slotted screwdriver to unscrew the screw on the grounding bar, insert the grid ground cable, and tighten the screw. Secondly, insert the L1/L2/N cable into the grid terminals. Gently pull the grid cable and grid ground cable backward to ensure that they are firmly connected.





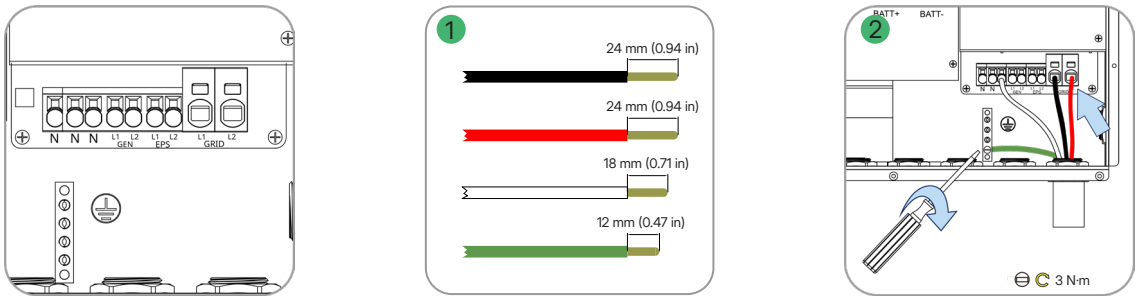


Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
Grid L1/L2	80 A	100 A	100 A	4-1 AWG	3-1 AWG	3-1 AWG
EPS/GEN L1/L2	40 A	50 A	50 A	10-6 AWG	8-6 AWG	8-6 AWG

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6/9.6/11.5LV-USG1
Grid L1/L2 Cable	4 AWG	3 AWG	3 AWG	24 mm/0.94 in

Grid N Cable	10 AWG	8 AWG	8 AWG	18 mm/0.71 in
Grid Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in
EPS/GEN L1/L2/N Cable	10 AWG	8 AWG	8 AWG	18 mm/0.71 in
EPS/GEN Ground Cable	8 AWG	8 AWG	8 AWG	12 mm/0.47 in

Procedure	
Step 1	a. Strip the grid L1/L2 cable insulation by 24 mm (0.94 in), and strip the grid N cable insulation by 18 mm (0.71 in). b. Strip the grid ground cable insulation by 12 mm (0.47 in).
Step 2	Firstly, use the slotted screwdriver to unscrew the screw on the grounding bar, insert the grid ground cable, and tighten the screw. Secondly, insert the L1/L2/N into the grid terminals. Gently pull the grid cable and grid ground cable backward to ensure that they are firmly connected.



7.6.1 GEN Port Limit

If the GEN port is connected to the PV inverter or generator, the GEN port limits are described as follows:

Inverter Model	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
Rated input voltage of GEN port	240 V	240 V	240 V	240 V	240 V	240 V
Max. input current of GEN port	16 A	20 A	20 A	32 A	40 A	40 A
Recommended AC breaker	20 A/240 V	25 A/240 V	25 A/240 V	40 A/240 V	50 A/240 V	50 A/240 V
Recommended cable	14-6 AWG	14-6 AWG	14-6 AWG	10-6 AWG	8-6 AWG	8-6 AWG

- *Select the appropriate AC breaker in accordance with local laws and regulations.*
- *The grid-connected PV inverter connected to the GEN port must have an overfrequency protection function.*

7.6.2 Generator Control

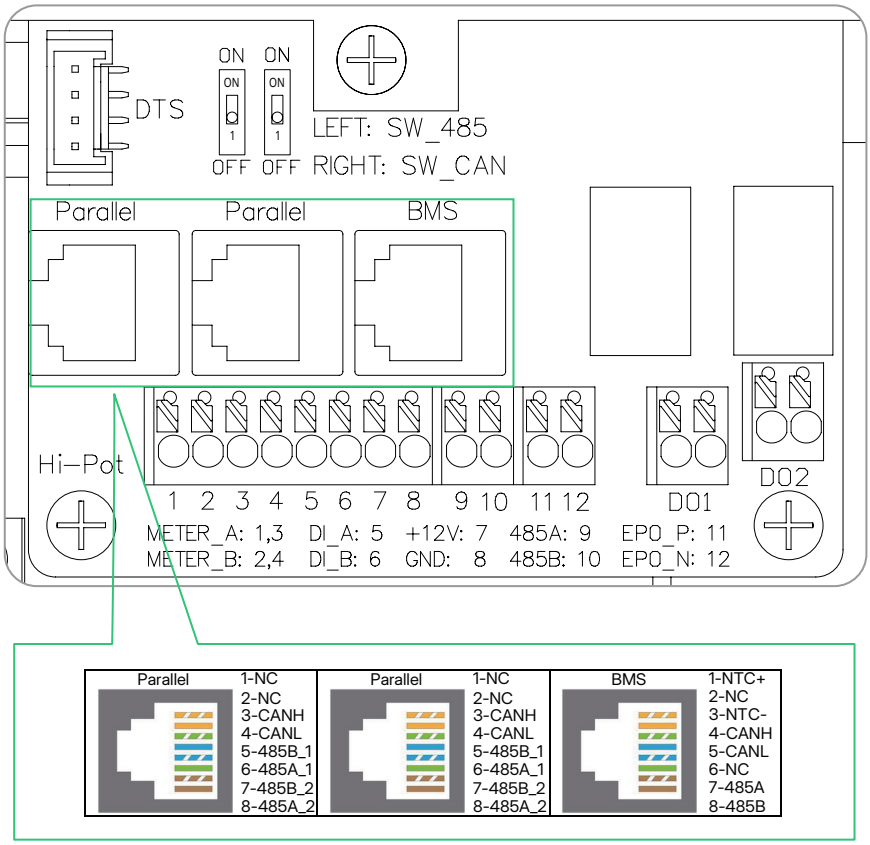
A generator can be connected to the GRID port or GEN port, and multiple generators only can be connected to the GRID port. It is recommended to use generators controlled by dry contact. Connect the generator to the DO1 port of the inverter as described in ***7.7.3 DO Connection***, and start and stop it using the S-Miles App. For detailed online operations, please refer to ***9.3.4 Set Dry Contact Function***.

7.6.3 Heat Pump Control

A heat pump can be connected to the GRID port. Meanwhile, connect it to the DO1 port of the inverter as described in ***7.7.3 DO Connection***, and start and stop it using the S-Miles App. For detailed online operations, please refer to ***9.3.4 Set Dry Contact Function***.

7.7 Communication Cable Connection

Detailed pin functions of each port on the communication interface are as follows.



Label	Description
Parallel (CANH, CANL, 485B_1, 485A_1, 485B_2, 485A_2)	For parallel operation.
BMS (NTC+, NTC-, CANH, CANL, 485A, 485B)	For Li-ion batteries, communication is via CAN. For lead-acid batteries, the temperature is monitored via a sensor through NTC+ and NTC-.
SW_485 (ON, OFF)	120 Ohm termination resistor for parallel operation.
SW_CAN (ON, OFF)	120 Ohm termination resistor for parallel operation.
Meter (485A1, 485B1, 485A2, 485B2)	For the smart meter. One is connected to the grid side, and the other is connected to the third-party inverter.
DI (DI_A, DI_B)	Dry contact input of external bypass contactor.
+12V/GND	Reserved.
EPO_P/EPO_N	For external Emergency Power Off switch.
DO1 (NO1, COM1)	Dry contact output. The DO1 can be set to one of the functions as follows: Earth Fault Alarm, Load Control, and Generator Control.
DO2 (NO2, COM2)	Dry contact output. The DO2 will control the bypass contactor under certain logic.

7.7.1 Smart Meter and CT Connection

The smart meter and CT in the accessory box are necessary for system installation and are used to provide the operating condition of the inverter via RS485 communication.

⚠ WARNING

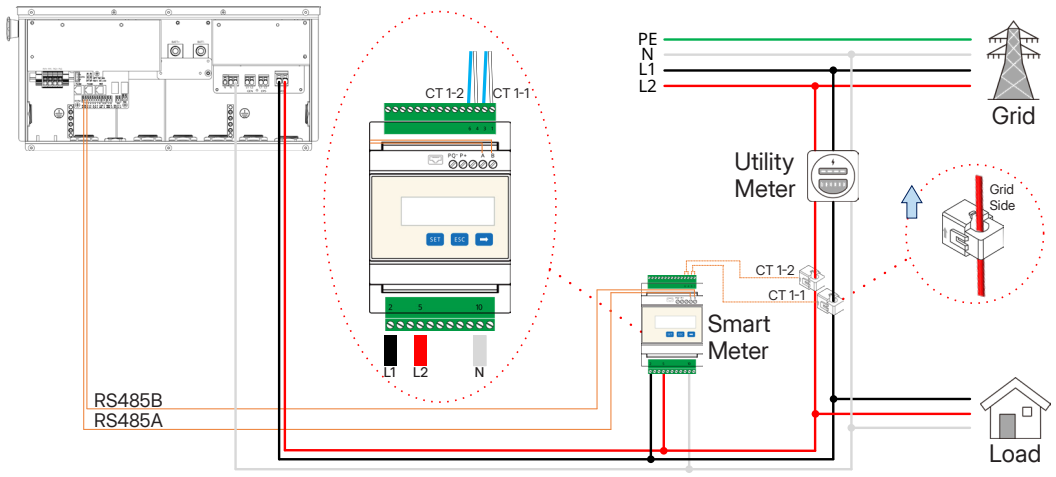
Before connecting the smart meter and CT, ensure that the AC cable is totally isolated from the AC power source.

NOTICE

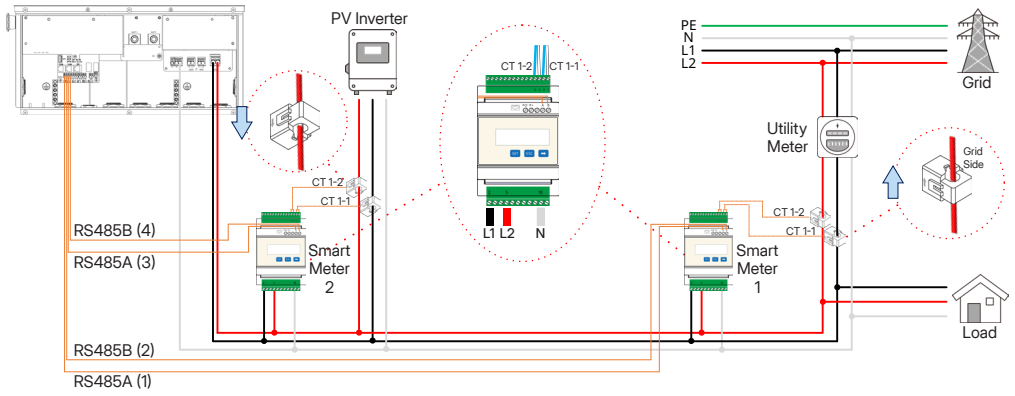
- One smart meter can be used with only one inverter.
- One CT must be used for one smart meter and must be connected to the same phase with the smart meter power cable.
- There is a symbol (arrow) or label on the surface of CT that indicates the correct mechanical orientation of the CT on the conductor under measurement. Please identify the arrow or label before installing the CT.
- The communication cable should be a standard CAT 5 Ethernet cable.

Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8/4.8/6.0LV-USG1
L1/L2/N Cable	14 AWG	14 AWG	14 AWG	6 mm/0.24 in
RS485 Cable (shield twisted pair)	24 AWG	24 AWG	24 AWG	8 mm/0.31 in

Procedure (HYS-3.8/4.8/6.0LV-USG1)	
Step 1	Clamp CT 1-1 and CT1-2 to L1/L2 wire, respectively connect the white and blue wires of CT 1-1 to terminals 1/3, and respectively connect the white and blue wires of CT 1-2 to terminals 4/6. The arrow on the surface of CT should point to the grid.
Step 2	Connect meter's terminals 2/5/10 to grid L1 (Black)/L2 (Red)/N (White).
Step 3	Respectively connect meter's terminals A and B to inverter METER_A (1) and METER_B (2).

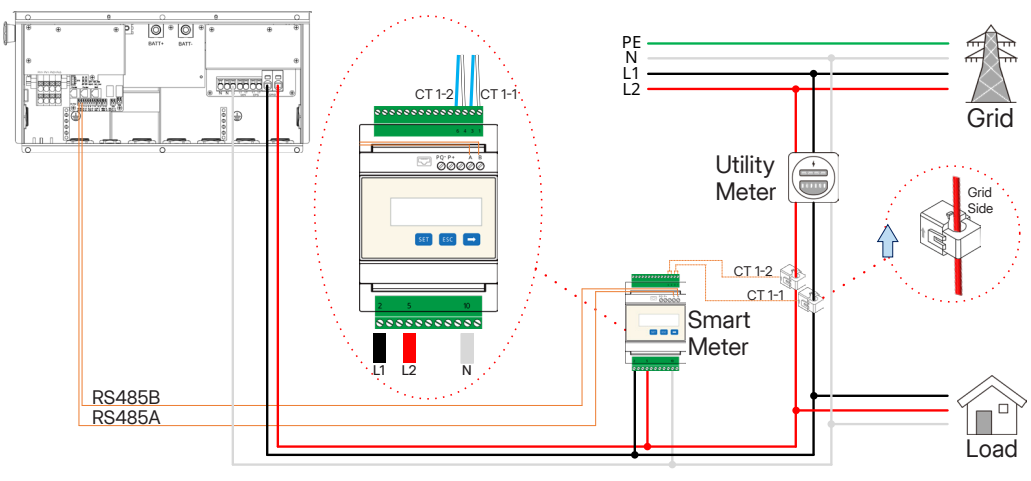


Procedure (HAS-3.8/4.8/6.0LV-USG1)	
Step 1	The connection method of smart meter 1 is the same as that described above. The arrow on the surface of CT should point to the grid.
Step 2	If the PV inverter is connected to the grid port, connect terminals 2/5/10 of smart meter 2 to PV inverter L1 (Black)/L2 (Red)/N (White), and respectively connect meter's terminals A and B to inverter METER_A (3) and METER_B (4). Note that the arrow on the surface of CT should point to the opposite direction of the PV inverter.

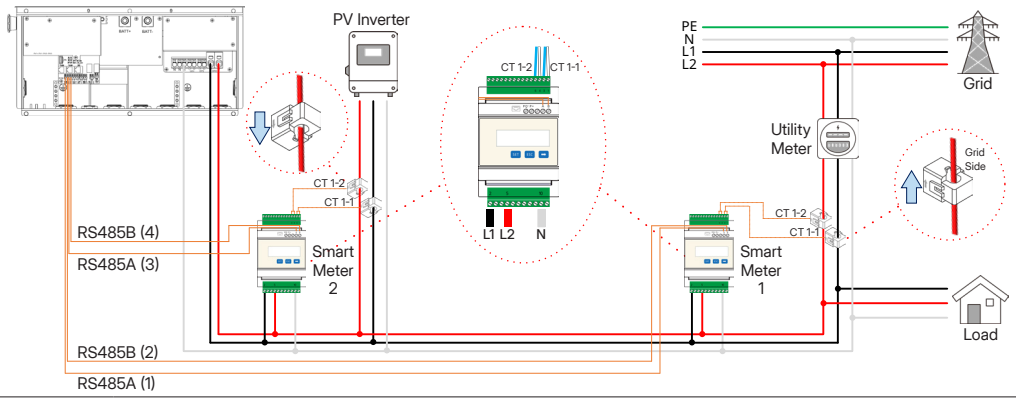


Cable (90°C/194°F, Copper)	Recommended Specification			Stripping Length
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6/9.6/11.5LV-USG1
L1/L2/N Cable	14 AWG	14 AWG	14 AWG	6 mm/0.24 in
RS485 Cable (shield twisted pair)	24 AWG	24 AWG	24 AWG	8 mm/0.31 in

Procedure (HYS-7.6/9.6/11.5LV-USG1)	
Step 1	Clamp CT 1-1 and CT1-2 to L1/L2 cable, respectively connect the white and blue wires of CT 1-1 to terminals 1/3, and respectively connect the white and blue wires of CT 1-2 to terminals 4/6. The arrow on the surface of CT should point to the grid.
Step 2	Connect grid L1 (Black)/L2 (Red)/N (White) to meter's terminals 2/5/10.
Step 3	Respectively connect meter's terminals A and B to inverter METER_A (1) and METER_B (2).



Procedure (HAS-7.6/9.6/11.5LV-USG1)	
Step 1	The connection method of smart meter 1 is the same as that described above. The arrow on the surface of CT should point to the grid.
Step 2	If the PV inverter is connected to the grid port, connect terminals 2/5/10 of smart meter 2 to PV inverter L1 (Black)/L2 (Red)/N (White), and respectively connect meter's terminals A and B to inverter METER_A (3) and METER_B (4). Note that the arrow on the surface of CT should point to the opposite direction of the PV inverter.

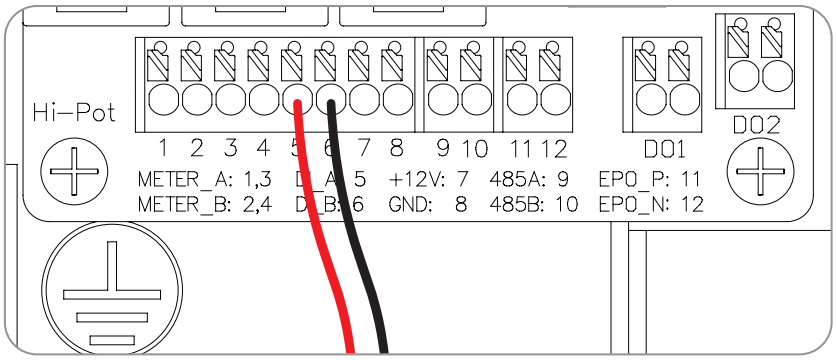


NOTE

- If needed, the smart meter must be purchased from Hoymiles.
- If there are meter communication problems, please check if the address of the PV side meter is set to 001, and the address of the grid side meter is set to 002.

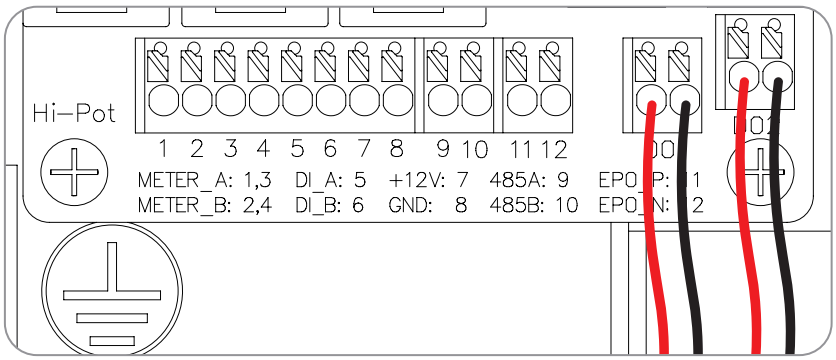
7.7.2 DI Connection

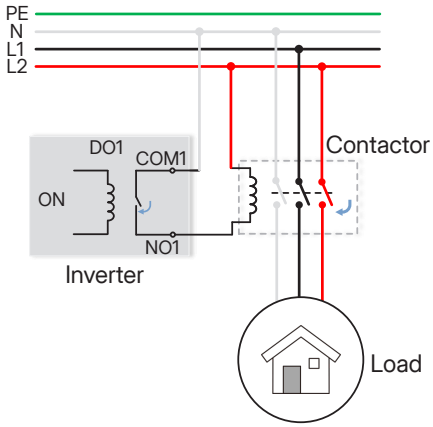
There is an integrated DI (DI_A, DI_B) as the dry contact input to the bypass contactor of the inverter.



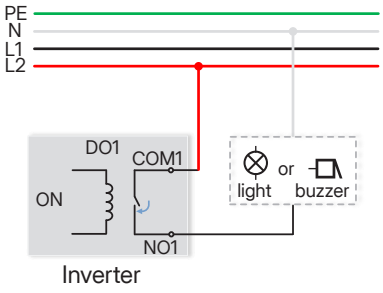
7.7.3 DO Connection

The inverter has integrated a multiple-function dry contact (DO1 and DO2). The DO1 can be set to one of the functions as follows, Earth Fault Alarm, Load Control, and Generator Control. The DO2 can control the external bypass contactor if installed.

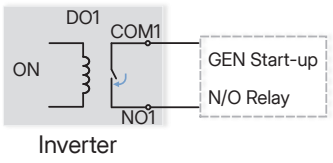




DO1-Load Control



DO1-Earth Fault Alarm



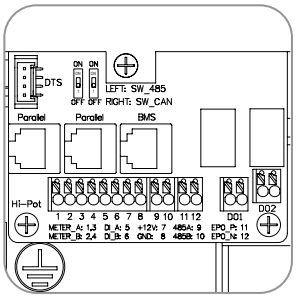
DO1-Generator Control

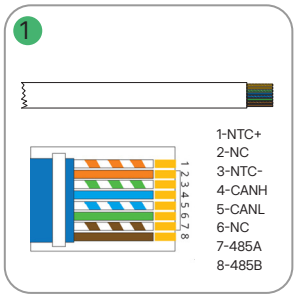
7.7.4 BMS Connection

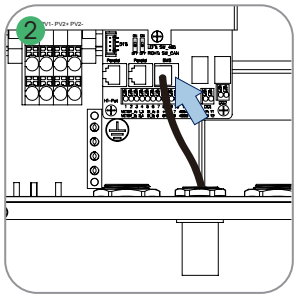
BMS is used to communicate with compatible Li-ion batteries. Note that the communication cable should be a standard CAT 5 Ethernet cable.

If a lead-acid battery is used to work with this inverter, the battery temperature sensor in the packing list shall be used to monitor the battery temperature.

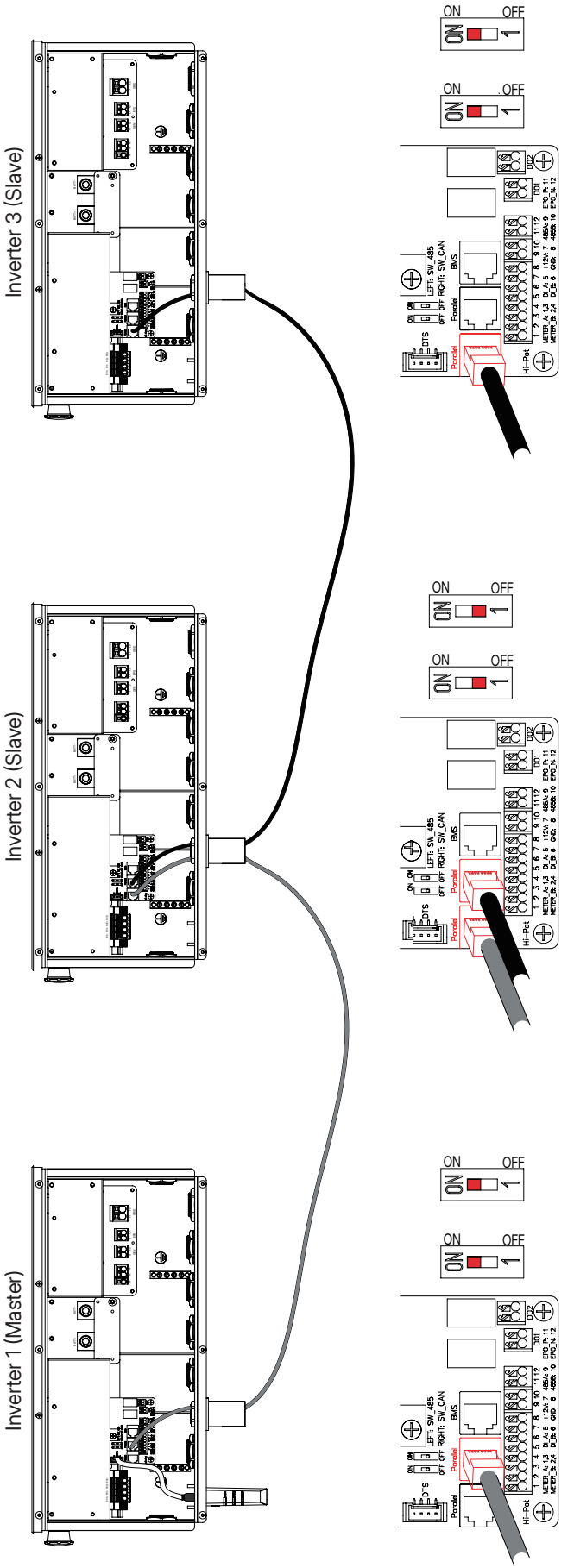
Procedure	
Step 1	Strip the communication cable insulation with an ethernet wire stripper, and lead the corresponding signal cables out. Insert the signal cables into the RJ45 plug in the correct order, and crimp it with a network cable crimper.
Step 2	Insert the RJ45 plug into the BMS port, and gently pull the cable backward to make sure that the plug is completely connected to the BMS port. The pin definition of BMS or battery temperature sensor is shown as follows.







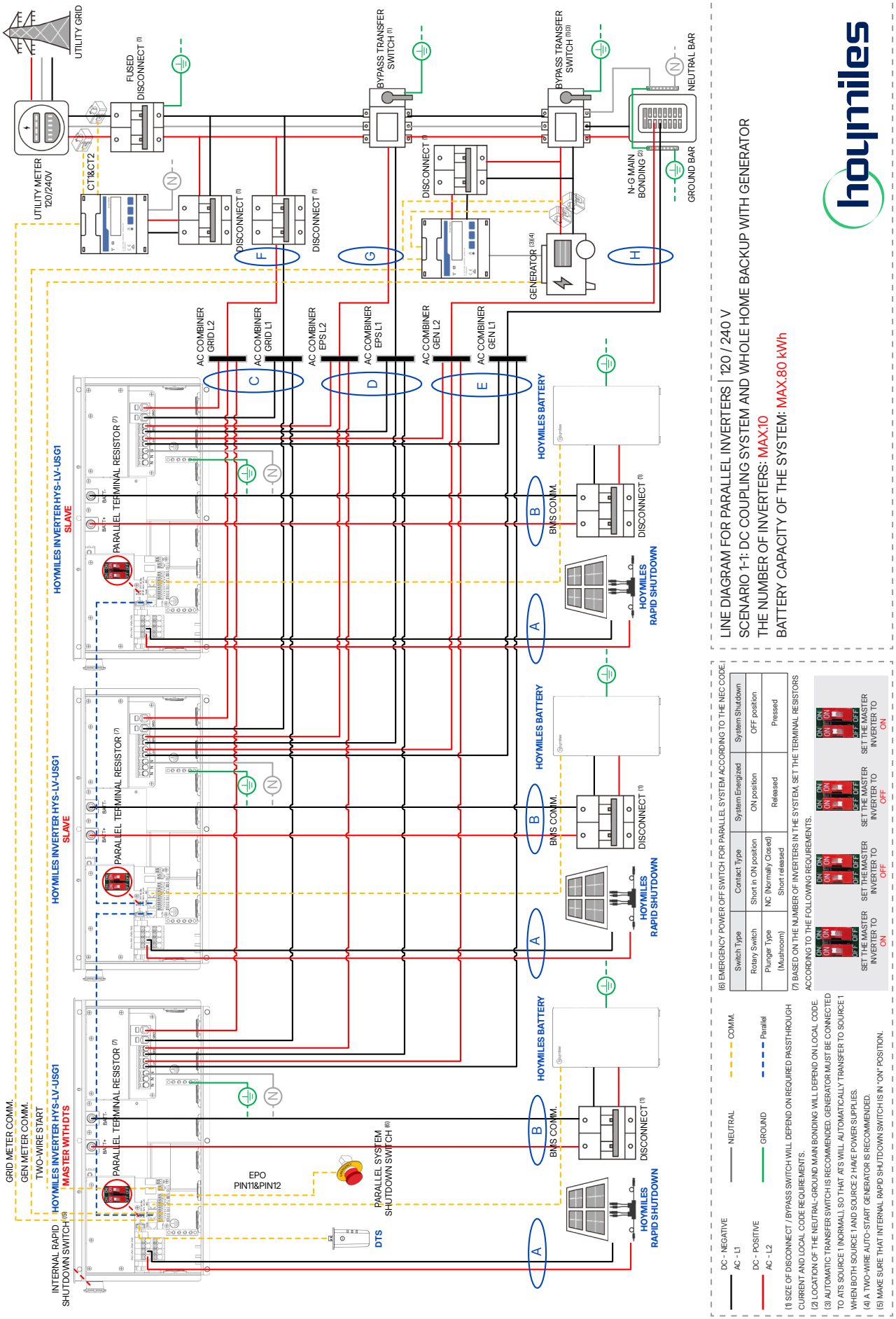
7.8 Parallel Connection



NOTE

- As shown in the figure, parallel operation is performed through the parallel interface. When inverters are used in parallel, the first and the last inverters are "ON", and the others are "OFF".
- The cable used for parallel communication between two inverters cannot exceed 10 m (33 ft).

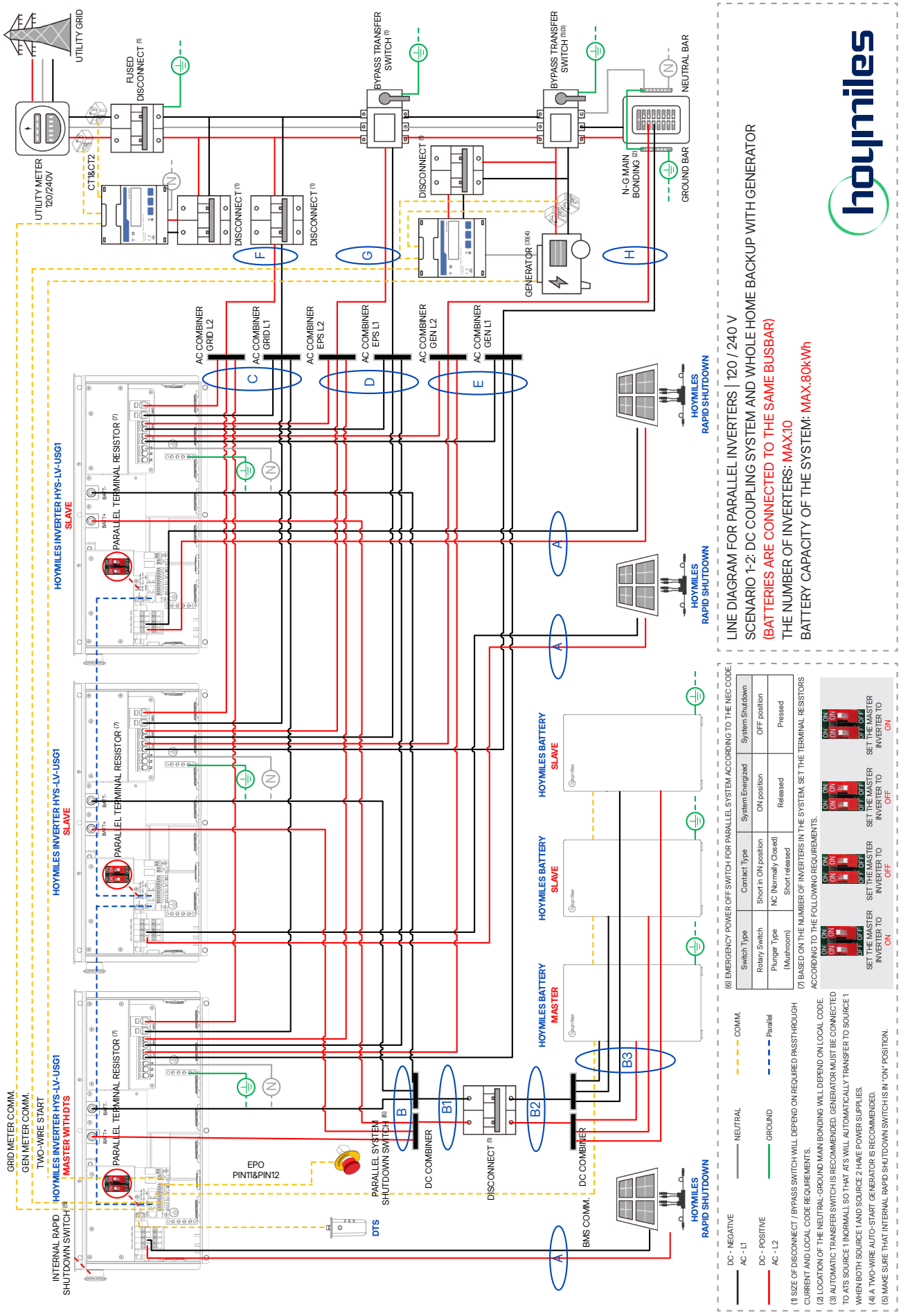
7.8.1 Parallel System 1



Cable (90°C/194°F, Copper)	Recommended Cable Specification					
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
A (PV) (for HYS)	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG
B (Battery)	3 AWG–1/0 AWG	2 AWG-2/0 AWG	2 AWG-2/0 AWG	3/0 AWG-4/0 AWG	4/0 AWG	4/0 AWG
C (Grid)	10 AWG-4 AWG	8 AWG-4 AWG	8 AWG-4 AWG	4 AWG-1 AWG	3 AWG-1 AWG	4 AWG-1 AWG
D/E (EPS/GEN)	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	10 AWG-6 AWG	8 AWG-6 AWG	8 AWG-6 AWG
F (Coupling on Grid Side)	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
	#10 AWG	#8 AWG	#8 AWG	#4 AWG	#3 AWG	#3 AWG
	HYS/HAS-3.8LV-USG1*2	HYS/HAS-4.8LV-USG1*2	HYS/HAS-6.0LV-USG1*2	HYS/HAS-7.6LV-USG1*2	HYS/HAS-9.6LV-USG1*2	HYS/HAS-11.5LV-USG1*2
	#4 AWG	#3 AWG	#3 AWG	1/0 AWG	3/0 AWG	3/0 AWG
	HYS/HAS-3.8LV-USG1*3	HYS/HAS-4.8LV-USG1*3	HYS/HAS-6.0LV-USG1*3	HYS/HAS-7.6LV-USG1*3	HYS/HAS-9.6LV-USG1*3	HYS/HAS-11.5LV-USG1*3
	#2 AWG	1/0 AWG	1/0 AWG	4/0 AWG	300 AWG	300 AWG
	HYS/HAS-3.8LV-USG1*4	HYS/HAS-4.8LV-USG1*4	HYS/HAS-6.0LV-USG1*4	HYS/HAS-7.6LV-USG1*4	HYS/HAS-9.6LV-USG1*4	HYS/HAS-11.5LV-USG1*4
	1/0 AWG	3/0 AWG	3/0 AWG	300 AWG	500 AWG	500 AWG
	HYS/HAS-3.8LV-USG1*5	HYS/HAS-4.8LV-USG1*5	HYS/HAS-6.0LV-USG1*5	HYS/HAS-7.6LV-USG1*5	HYS/HAS-9.6LV-USG1*5	HYS/HAS-11.5LV-USG1*5
	3/0 AWG	4/0 AWG	4/0 AWG	500 AWG	700 AWG	700 AWG
	HYS/HAS-3.8LV-USG1*6	HYS/HAS-4.8LV-USG1*6	HYS/HAS-6.0LV-USG1*6	HYS/HAS-7.6LV-USG1*6	HYS/HAS-9.6LV-USG1*6	HYS/HAS-11.5LV-USG1*6
	4/0 AWG	300 AWG	300 AWG	700 AWG	1000 AWG	1000 AWG
	HYS/HAS-3.8LV-USG1*7	HYS/HAS-4.8LV-USG1*7	HYS/HAS-6.0LV-USG1*7	HYS/HAS-7.6LV-USG1*7	HYS/HAS-9.6LV-USG1*7	HYS/HAS-11.5LV-USG1*7
	250 AWG	350 AWG	350 AWG	900 AWG	1500 AWG	1500 AWG
	HYS/HAS-3.8LV-USG1*8	HYS/HAS-4.8LV-USG1*8	HYS/HAS-6.0LV-USG1*8	HYS/HAS-7.6LV-USG1*8	HYS/HAS-9.6LV-USG1*8	HYS/HAS-11.5LV-USG1*8
	300 AWG	500 AWG	500 AWG	1250 AWG	2*500 AWG	2*500 AWG
	HYS/HAS-3.8LV-USG1*9	HYS/HAS-4.8LV-USG1*9	HYS/HAS-6.0LV-USG1*9	HYS/HAS-7.6LV-USG1*9	HYS/HAS-9.6LV-USG1*9	HYS/HAS-11.5LV-USG1*9
	400 AWG	600 AWG	600 AWG	1750 AWG	2*600 AWG	2*600 AWG
	HYS/HAS-3.8LV-USG1*10	HYS/HAS-4.8LV-USG1*10	HYS/HAS-6.0LV-USG1*10	HYS/HAS-7.6LV-USG1*10	HYS/HAS-9.6LV-USG1*10	HYS/HAS-11.5LV-USG1*10
	500 AWG	700 AWG	700 AWG	2*500 AWG	2*700 AWG	2*700 AWG
G/H (Coupling on EPS/ GEN Side)	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
	#14 AWG	#14 AWG	#14 AWG	#10 AWG	#8 AWG	#8 AWG
	HYS/HAS-3.8LV-USG1*2	HYS/HAS-4.8LV-USG1*2	HYS/HAS-6.0LV-USG1*2	HYS/HAS-7.6LV-USG1*2	HYS/HAS-9.6LV-USG1*2	HYS/HAS-11.5LV-USG1*2
	#10 AWG	#8 AWG	#8 AWG	#4 AWG	#3 AWG	#3 AWG
	HYS/HAS-3.8LV-USG1*3	HYS/HAS-4.8LV-USG1*3	HYS/HAS-6.0LV-USG1*3	HYS/HAS-7.6LV-USG1*3	HYS/HAS-9.6LV-USG1*3	HYS/HAS-11.5LV-USG1*3
	#6 AWG	#6 AWG	#6 AWG	#2 AWG	1/0 AWG	1/0 AWG
	HYS/HAS-3.8LV-USG1*4	HYS/HAS-4.8LV-USG1*4	HYS/HAS-6.0LV-USG1*4	HYS/HAS-7.6LV-USG1*4	HYS/HAS-9.6LV-USG1*4	HYS/HAS-11.5LV-USG1*4
	#4 AWG	#3 AWG	#3 AWG	1/0 AWG	3/0 AWG	3/0 AWG
	HYS/HAS-3.8LV-USG1*5	HYS/HAS-4.8LV-USG1*5	HYS/HAS-6.0LV-USG1*5	HYS/HAS-7.6LV-USG1*5	HYS/HAS-9.6LV-USG1*5	HYS/HAS-11.5LV-USG1*5
	#3 AWG	#2 AWG	#2 AWG	3/0 AWG	4/0 AWG	4/0 AWG
	HYS/HAS-3.8LV-USG1*6	HYS/HAS-4.8LV-USG1*6	HYS/HAS-6.0LV-USG1*6	HYS/HAS-7.6LV-USG1*6	HYS/HAS-9.6LV-USG1*6	HYS/HAS-11.5LV-USG1*6
	#2 AWG	1/0 AWG	1/0 AWG	4/0 AWG	300 AWG	300 AWG
	HYS/HAS-3.8LV-USG1*7	HYS/HAS-4.8LV-USG1*7	HYS/HAS-6.0LV-USG1*7	HYS/HAS-7.6LV-USG1*7	HYS/HAS-9.6LV-USG1*7	HYS/HAS-11.5LV-USG1*7
	#1 AWG	2/0 AWG	2/0 AWG	250 AWG	350 AWG	350 AWG
	HYS/HAS-3.8LV-USG1*8	HYS/HAS-4.8LV-USG1*8	HYS/HAS-6.0LV-USG1*8	HYS/HAS-7.6LV-USG1*8	HYS/HAS-9.6LV-USG1*8	HYS/HAS-11.5LV-USG1*8
	1/0 AWG	3/0 AWG	3/0 AWG	300 AWG	500 AWG	500 AWG
	HYS/HAS-3.8LV-USG1*9	HYS/HAS-4.8LV-USG1*9	HYS/HAS-6.0LV-USG1*9	HYS/HAS-7.6LV-USG1*9	HYS/HAS-9.6LV-USG1*9	HYS/HAS-11.5LV-USG1*9
	2/0 AWG	3/0 AWG	3/0 AWG	400 AWG	600 AWG	600 AWG
	HYS/HAS-3.8LV-USG1*10	HYS/HAS-4.8LV-USG1*10	HYS/HAS-6.0LV-USG1*10	HYS/HAS-7.6LV-USG1*10	HYS/HAS-9.6LV-USG1*10	HYS/HAS-11.5LV-USG1*10
	3/0 AWG	4/0 AWG	4/0 AWG	500 AWG	700 AWG	700 AWG

Cable (90°C/194°F, Copper)	Overcurrent Protection Parameter					
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
A (PV) (for HYS)	20 A	20 A	20 A	20 A	20 A	20 A
B (Battery)	100 A	125A	125A	200 A	250 A	250 A
C (Grid)	40 A	50 A	50 A	80 A	100 A	100 A
D/E (EPS/GEN)	20 A	25 A	25 A	40 A	50 A	50 A
F (Coupling on Grid Side)	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
	40 A	50 A	50 A	80 A	100 A	100 A
	HYS/HAS-3.8LV-USG1*2	HYS/HAS-4.8LV-USG1*2	HYS/HAS-6.0LV-USG1*2	HYS/HAS-7.6LV-USG1*2	HYS/HAS-9.6LV-USG1*2	HYS/HAS-11.5LV-USG1*2
	80 A	100 A	100 A	160 A	200 A	200 A
	HYS/HAS-3.8LV-USG1*3	HYS/HAS-4.8LV-USG1*3	HYS/HAS-6.0LV-USG1*3	HYS/HAS-7.6LV-USG1*3	HYS/HAS-9.6LV-USG1*3	HYS/HAS-11.5LV-USG1*3
	120 A	150 A	150 A	240 A	300 A	300 A
	HYS/HAS-3.8LV-USG1*4	HYS/HAS-4.8LV-USG1*4	HYS/HAS-6.0LV-USG1*4	HYS/HAS-7.6LV-USG1*4	HYS/HAS-9.6LV-USG1*4	HYS/HAS-11.5LV-USG1*4
	160 A	200 A	200 A	320 A	400 A	400 A
	HYS/HAS-3.8LV-USG1*5	HYS/HAS-4.8LV-USG1*5	HYS/HAS-6.0LV-USG1*5	HYS/HAS-7.6LV-USG1*5	HYS/HAS-9.6LV-USG1*5	HYS/HAS-11.5LV-USG1*5
	200 A	250 A	250 A	400 A	500 A	500 A
	HYS/HAS-3.8LV-USG1*6	HYS/HAS-4.8LV-USG1*6	HYS/HAS-6.0LV-USG1*6	HYS/HAS-7.6LV-USG1*6	HYS/HAS-9.6LV-USG1*6	HYS/HAS-11.5LV-USG1*6
	240 A	300 A	300 A	480 A	600 A	600 A
	HYS/HAS-3.8LV-USG1*7	HYS/HAS-4.8LV-USG1*7	HYS/HAS-6.0LV-USG1*7	HYS/HAS-7.6LV-USG1*7	HYS/HAS-9.6LV-USG1*7	HYS/HAS-11.5LV-USG1*7
	280 A	350 A	350 A	560 A	700 A	700 A
	HYS/HAS-3.8LV-USG1*8	HYS/HAS-4.8LV-USG1*8	HYS/HAS-6.0LV-USG1*8	HYS/HAS-7.6LV-USG1*8	HYS/HAS-9.6LV-USG1*8	HYS/HAS-11.5LV-USG1*8
	320 A	400 A	400 A	640 A	800 A	800 A
	HYS/HAS-3.8LV-USG1*9	HYS/HAS-4.8LV-USG1*9	HYS/HAS-6.0LV-USG1*9	HYS/HAS-7.6LV-USG1*9	HYS/HAS-9.6LV-USG1*9	HYS/HAS-11.5LV-USG1*9
	360 A	450 A	450 A	720 A	900 A	900 A
	HYS/HAS-3.8LV-USG1*10	HYS/HAS-4.8LV-USG1*10	HYS/HAS-6.0LV-USG1*10	HYS/HAS-7.6LV-USG1*10	HYS/HAS-9.6LV-USG1*10	HYS/HAS-11.5LV-USG1*10
	400 A	500 A	500 A	800 A	1000 A	1000 A
G/H (Coupling on EPS/ GEN Side)	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
	20 A	25 A	25 A	40 A	50 A	50 A
	HYS/HAS-3.8LV-USG1*2	HYS/HAS-4.8LV-USG1*2	HYS/HAS-6.0LV-USG1*2	HYS/HAS-7.6LV-USG1*2	HYS/HAS-9.6LV-USG1*2	HYS/HAS-11.5LV-USG1*2
	40 A	50 A	50 A	80 A	100 A	100 A
	HYS/HAS-3.8LV-USG1*3	HYS/HAS-4.8LV-USG1*3	HYS/HAS-6.0LV-USG1*3	HYS/HAS-7.6LV-USG1*3	HYS/HAS-9.6LV-USG1*3	HYS/HAS-11.5LV-USG1*3
	60 A	75 A	75 A	120 A	150 A	150 A
	HYS/HAS-3.8LV-USG1*4	HYS/HAS-4.8LV-USG1*4	HYS/HAS-6.0LV-USG1*4	HYS/HAS-7.6LV-USG1*4	HYS/HAS-9.6LV-USG1*4	HYS/HAS-11.5LV-USG1*4
	80 A	100 A	100 A	160 A	200 A	200 A
	HYS/HAS-3.8LV-USG1*5	HYS/HAS-4.8LV-USG1*5	HYS/HAS-6.0LV-USG1*5	HYS/HAS-7.6LV-USG1*5	HYS/HAS-9.6LV-USG1*5	HYS/HAS-11.5LV-USG1*5
	100 A	125 A	125 A	200 A	250 A	250 A
	HYS/HAS-3.8LV-USG1*6	HYS/HAS-4.8LV-USG1*6	HYS/HAS-6.0LV-USG1*6	HYS/HAS-7.6LV-USG1*6	HYS/HAS-9.6LV-USG1*6	HYS/HAS-11.5LV-USG1*6
	120 A	150 A	150 A	240 A	300 A	300 A
	HYS/HAS-3.8LV-USG1*7	HYS/HAS-4.8LV-USG1*7	HYS/HAS-6.0LV-USG1*7	HYS/HAS-7.6LV-USG1*7	HYS/HAS-9.6LV-USG1*7	HYS/HAS-11.5LV-USG1*7
	140 A	175 A	175 A	280 A	350 A	350 A
	HYS/HAS-3.8LV-USG1*8	HYS/HAS-4.8LV-USG1*8	HYS/HAS-6.0LV-USG1*8	HYS/HAS-7.6LV-USG1*8	HYS/HAS-9.6LV-USG1*8	HYS/HAS-11.5LV-USG1*8
	160 A	200 A	200 A	320 A	400 A	400 A
	HYS/HAS-3.8LV-USG1*9	HYS/HAS-4.8LV-USG1*9	HYS/HAS-6.0LV-USG1*9	HYS/HAS-7.6LV-USG1*9	HYS/HAS-9.6LV-USG1*9	HYS/HAS-11.5LV-USG1*9
	180 A	225 A	225 A	360 A	450 A	450 A
	HYS/HAS-3.8LV-USG1*10	HYS/HAS-4.8LV-USG1*10	HYS/HAS-6.0LV-USG1*10	HYS/HAS-7.6LV-USG1*10	HYS/HAS-9.6LV-USG1*10	HYS/HAS-11.5LV-USG1*10
	200 A	250 A	250 A	400 A	500 A	500 A

7.8.2 Parallel System 2

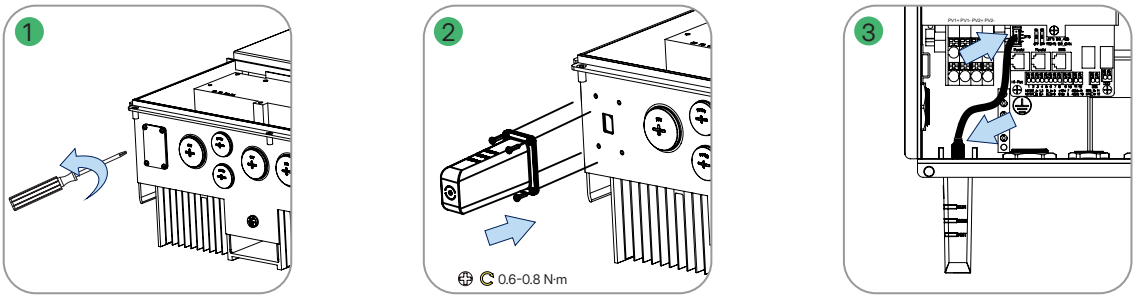


Cable (90°C/194°F, Copper)	Recommended Cable Specification					
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
A (PV) (for HYS)	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG
B (Inverter Side)	3 AWG–1/0 AWG	2 AWG-2/0 AWG	2 AWG-2/0 AWG	3/0 AWG-4/0 AWG	4/0 AWG	4/0 AWG
B1 (BAT Coupling)	Inverter Side. Depending on the model and quantity of parallel inverters.					
B2 (BAT Coupling)	Battery Side. Depending on the model and quantity of parallel batteries. The cable ampacity on the B1 side should be nearly identical to that on the B2 side.					
B3 (Battery Side)	Depending on the model of the battery.					
C (Grid)	10 AWG-4 AWG	8 AWG-4 AWG	8 AWG-4 AWG	4 AWG-1 AWG	3 AWG-1 AWG	4 AWG-1 AWG
D/E (EPS/GEN)	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	10 AWG-6 AWG	8 AWG-6 AWG	8 AWG-6 AWG
F (Coupling on Grid Side)	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
	#10 AWG	#8 AWG	#8 AWG	#4 AWG	#3 AWG	#3 AWG
	HYS/HAS-3.8LV-USG1*2	HYS/HAS-4.8LV-USG1*2	HYS/HAS-6.0LV-USG1*2	HYS/HAS-7.6LV-USG1*2	HYS/HAS-9.6LV-USG1*2	HYS/HAS-11.5LV-USG1*2
	#4 AWG	#3 AWG	#3 AWG	1/0 AWG	3/0 AWG	3/0 AWG
	HYS/HAS-3.8LV-USG1*3	HYS/HAS-4.8LV-USG1*3	HYS/HAS-6.0LV-USG1*3	HYS/HAS-7.6LV-USG1*3	HYS/HAS-9.6LV-USG1*3	HYS/HAS-11.5LV-USG1*3
	#2 AWG	1/0 AWG	1/0 AWG	4/0 AWG	300 AWG	300 AWG
	HYS/HAS-3.8LV-USG1*4	HYS/HAS-4.8LV-USG1*4	HYS/HAS-6.0LV-USG1*4	HYS/HAS-7.6LV-USG1*4	HYS/HAS-9.6LV-USG1*4	HYS/HAS-11.5LV-USG1*4
	1/0 AWG	3/0 AWG	3/0 AWG	300 AWG	500 AWG	500 AWG
	HYS/HAS-3.8LV-USG1*5	HYS/HAS-4.8LV-USG1*5	HYS/HAS-6.0LV-USG1*5	HYS/HAS-7.6LV-USG1*5	HYS/HAS-9.6LV-USG1*5	HYS/HAS-11.5LV-USG1*5
	3/0 AWG	4/0 AWG	4/0 AWG	500 AWG	700 AWG	700 AWG
	HYS/HAS-3.8LV-USG1*6	HYS/HAS-4.8LV-USG1*6	HYS/HAS-6.0LV-USG1*6	HYS/HAS-7.6LV-USG1*6	HYS/HAS-9.6LV-USG1*6	HYS/HAS-11.5LV-USG1*6
	4/0 AWG	300 AWG	300 AWG	700 AWG	1000 AWG	1000 AWG
	HYS/HAS-3.8LV-USG1*7	HYS/HAS-4.8LV-USG1*7	HYS/HAS-6.0LV-USG1*7	HYS/HAS-7.6LV-USG1*7	HYS/HAS-9.6LV-USG1*7	HYS/HAS-11.5LV-USG1*7
	250 AWG	350 AWG	350 AWG	900 AWG	1500 AWG	1500 AWG
	HYS/HAS-3.8LV-USG1*8	HYS/HAS-4.8LV-USG1*8	HYS/HAS-6.0LV-USG1*8	HYS/HAS-7.6LV-USG1*8	HYS/HAS-9.6LV-USG1*8	HYS/HAS-11.5LV-USG1*8
	300 AWG	500 AWG	500 AWG	1250 AWG	2*500 AWG	2*500 AWG
	HYS/HAS-3.8LV-USG1*9	HYS/HAS-4.8LV-USG1*9	HYS/HAS-6.0LV-USG1*9	HYS/HAS-7.6LV-USG1*9	HYS/HAS-9.6LV-USG1*9	HYS/HAS-11.5LV-USG1*9
	400 AWG	600 AWG	600 AWG	1750 AWG	2*600 AWG	2*600 AWG
	HYS/HAS-3.8LV-USG1*10	HYS/HAS-4.8LV-USG1*10	HYS/HAS-6.0LV-USG1*10	HYS/HAS-7.6LV-USG1*10	HYS/HAS-9.6LV-USG1*10	HYS/HAS-11.5LV-USG1*10
	500 AWG	700 AWG	700 AWG	2*500 AWG	2*700 AWG	2*700 AWG
G/H (Coupling on EPS/GEN Side)	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
	#14 AWG	#14 AWG	#14 AWG	#10 AWG	#8 AWG	#8 AWG
	HYS/HAS-3.8LV-USG1*2	HYS/HAS-4.8LV-USG1*2	HYS/HAS-6.0LV-USG1*2	HYS/HAS-7.6LV-USG1*2	HYS/HAS-9.6LV-USG1*2	HYS/HAS-11.5LV-USG1*2
	#10 AWG	#8 AWG	#8 AWG	#4 AWG	#3 AWG	#3 AWG
	HYS/HAS-3.8LV-USG1*3	HYS/HAS-4.8LV-USG1*3	HYS/HAS-6.0LV-USG1*3	HYS/HAS-7.6LV-USG1*3	HYS/HAS-9.6LV-USG1*3	HYS/HAS-11.5LV-USG1*3
	#6 AWG	#6 AWG	#6 AWG	#2 AWG	1/0 AWG	1/0 AWG
	HYS/HAS-3.8LV-USG1*4	HYS/HAS-4.8LV-USG1*4	HYS/HAS-6.0LV-USG1*4	HYS/HAS-7.6LV-USG1*4	HYS/HAS-9.6LV-USG1*4	HYS/HAS-11.5LV-USG1*4
	#4 AWG	#3 AWG	#3 AWG	1/0 AWG	3/0 AWG	3/0 AWG
	HYS/HAS-3.8LV-USG1*5	HYS/HAS-4.8LV-USG1*5	HYS/HAS-6.0LV-USG1*5	HYS/HAS-7.6LV-USG1*5	HYS/HAS-9.6LV-USG1*5	HYS/HAS-11.5LV-USG1*5
	#3 AWG	#2 AWG	#2 AWG	3/0 AWG	4/0 AWG	4/0 AWG
	HYS/HAS-3.8LV-USG1*6	HYS/HAS-4.8LV-USG1*6	HYS/HAS-6.0LV-USG1*6	HYS/HAS-7.6LV-USG1*6	HYS/HAS-9.6LV-USG1*6	HYS/HAS-11.5LV-USG1*6
	#2 AWG	1/0 AWG	1/0 AWG	4/0 AWG	300 AWG	300 AWG
	HYS/HAS-3.8LV-USG1*7	HYS/HAS-4.8LV-USG1*7	HYS/HAS-6.0LV-USG1*7	HYS/HAS-7.6LV-USG1*7	HYS/HAS-9.6LV-USG1*7	HYS/HAS-11.5LV-USG1*7
	#1 AWG	2/0 AWG	2/0 AWG	250 AWG	350 AWG	350 AWG
	HYS/HAS-3.8LV-USG1*8	HYS/HAS-4.8LV-USG1*8	HYS/HAS-6.0LV-USG1*8	HYS/HAS-7.6LV-USG1*8	HYS/HAS-9.6LV-USG1*8	HYS/HAS-11.5LV-USG1*8
	1/0 AWG	3/0 AWG	3/0 AWG	300 AWG	500 AWG	500 AWG
	HYS/HAS-3.8LV-USG1*9	HYS/HAS-4.8LV-USG1*9	HYS/HAS-6.0LV-USG1*9	HYS/HAS-7.6LV-USG1*9	HYS/HAS-9.6LV-USG1*9	HYS/HAS-11.5LV-USG1*9
	2/0 AWG	3/0 AWG	3/0 AWG	400 AWG	600 AWG	600 AWG
	HYS/HAS-3.8LV-USG1*10	HYS/HAS-4.8LV-USG1*10	HYS/HAS-6.0LV-USG1*10	HYS/HAS-7.6LV-USG1*10	HYS/HAS-9.6LV-USG1*10	HYS/HAS-11.5LV-USG1*10
	3/0 AWG	4/0 AWG	4/0 AWG	500 AWG	700 AWG	700 AWG

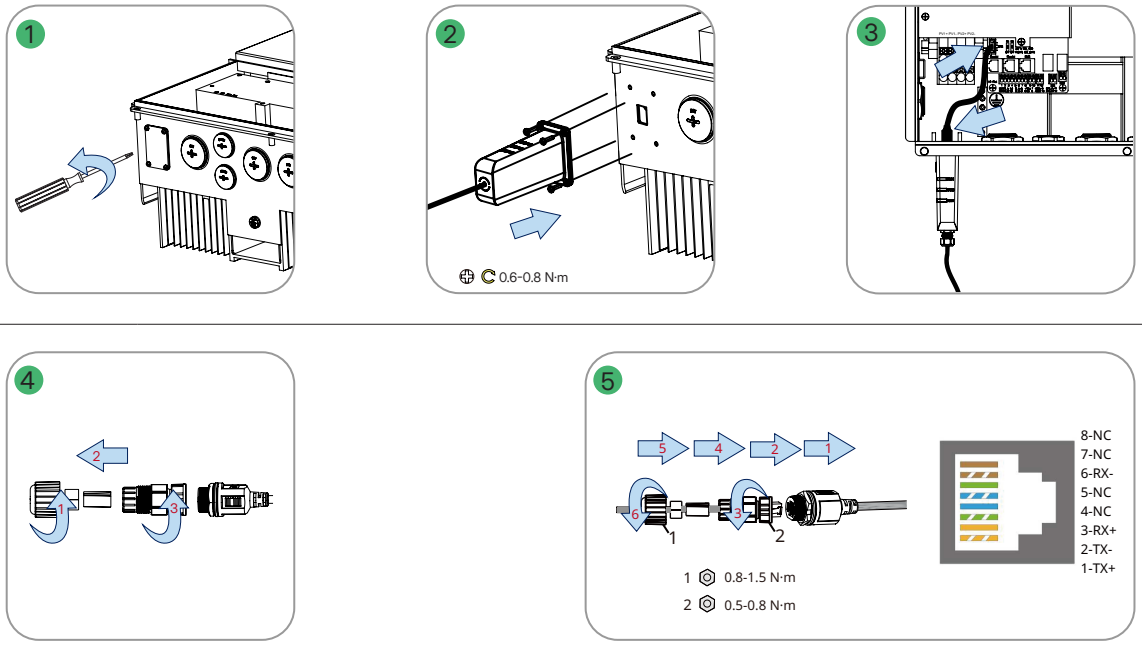
Cable (90°C/194°F, Copper)	Overcurrent Protection Parameter					
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
A (PV) (for HYS)	20 A	20 A	20 A	20 A	20 A	20 A
B (Battery)	100 A	125A	125A	200 A	250 A	250 A
C (Grid)	40 A	50 A	50 A	80 A	100 A	100 A
D/E (EPS/GEN)	20 A	25 A	25 A	40 A	50 A	50 A
F (Coupling on Grid Side)	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
	40 A	50 A	50 A	80 A	100 A	100 A
	HYS/HAS-3.8LV-USG1*2	HYS/HAS-4.8LV-USG1*2	HYS/HAS-6.0LV-USG1*2	HYS/HAS-7.6LV-USG1*2	HYS/HAS-9.6LV-USG1*2	HYS/HAS-11.5LV-USG1*2
	80 A	100 A	100 A	160 A	200 A	200 A
	HYS/HAS-3.8LV-USG1*3	HYS/HAS-4.8LV-USG1*3	HYS/HAS-6.0LV-USG1*3	HYS/HAS-7.6LV-USG1*3	HYS/HAS-9.6LV-USG1*3	HYS/HAS-11.5LV-USG1*3
	120 A	150 A	150 A	240 A	300 A	300 A
	HYS/HAS-3.8LV-USG1*4	HYS/HAS-4.8LV-USG1*4	HYS/HAS-6.0LV-USG1*4	HYS/HAS-7.6LV-USG1*4	HYS/HAS-9.6LV-USG1*4	HYS/HAS-11.5LV-USG1*4
	160 A	200 A	200 A	320 A	400 A	400 A
	HYS/HAS-3.8LV-USG1*5	HYS/HAS-4.8LV-USG1*5	HYS/HAS-6.0LV-USG1*5	HYS/HAS-7.6LV-USG1*5	HYS/HAS-9.6LV-USG1*5	HYS/HAS-11.5LV-USG1*5
	200 A	250 A	250 A	400 A	500 A	500 A
	HYS/HAS-3.8LV-USG1*6	HYS/HAS-4.8LV-USG1*6	HYS/HAS-6.0LV-USG1*6	HYS/HAS-7.6LV-USG1*6	HYS/HAS-9.6LV-USG1*6	HYS/HAS-11.5LV-USG1*6
	240 A	300 A	300 A	480 A	600 A	600 A
	HYS/HAS-3.8LV-USG1*7	HYS/HAS-4.8LV-USG1*7	HYS/HAS-6.0LV-USG1*7	HYS/HAS-7.6LV-USG1*7	HYS/HAS-9.6LV-USG1*7	HYS/HAS-11.5LV-USG1*7
	280 A	350 A	350 A	560 A	700 A	700 A
	HYS/HAS-3.8LV-USG1*8	HYS/HAS-4.8LV-USG1*8	HYS/HAS-6.0LV-USG1*8	HYS/HAS-7.6LV-USG1*8	HYS/HAS-9.6LV-USG1*8	HYS/HAS-11.5LV-USG1*8
	320 A	400 A	400 A	640 A	800 A	800 A
	HYS/HAS-3.8LV-USG1*9	HYS/HAS-4.8LV-USG1*9	HYS/HAS-6.0LV-USG1*9	HYS/HAS-7.6LV-USG1*9	HYS/HAS-9.6LV-USG1*9	HYS/HAS-11.5LV-USG1*9
	360 A	450 A	450 A	720 A	900 A	900 A
	HYS/HAS-3.8LV-USG1*10	HYS/HAS-4.8LV-USG1*10	HYS/HAS-6.0LV-USG1*10	HYS/HAS-7.6LV-USG1*10	HYS/HAS-9.6LV-USG1*10	HYS/HAS-11.5LV-USG1*10
	400 A	500 A	500 A	800 A	1000 A	1000 A
G/H (Coupling on EPS/ GEN Side)	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
	20 A	25 A	25 A	40 A	50 A	50 A
	HYS/HAS-3.8LV-USG1*2	HYS/HAS-4.8LV-USG1*2	HYS/HAS-6.0LV-USG1*2	HYS/HAS-7.6LV-USG1*2	HYS/HAS-9.6LV-USG1*2	HYS/HAS-11.5LV-USG1*2
	40 A	50 A	50 A	80 A	100 A	100 A
	HYS/HAS-3.8LV-USG1*3	HYS/HAS-4.8LV-USG1*3	HYS/HAS-6.0LV-USG1*3	HYS/HAS-7.6LV-USG1*3	HYS/HAS-9.6LV-USG1*3	HYS/HAS-11.5LV-USG1*3
	60 A	75 A	75 A	120 A	150 A	150 A
	HYS/HAS-3.8LV-USG1*4	HYS/HAS-4.8LV-USG1*4	HYS/HAS-6.0LV-USG1*4	HYS/HAS-7.6LV-USG1*4	HYS/HAS-9.6LV-USG1*4	HYS/HAS-11.5LV-USG1*4
	80 A	100 A	100 A	160 A	200 A	200 A
	HYS/HAS-3.8LV-USG1*5	HYS/HAS-4.8LV-USG1*5	HYS/HAS-6.0LV-USG1*5	HYS/HAS-7.6LV-USG1*5	HYS/HAS-9.6LV-USG1*5	HYS/HAS-11.5LV-USG1*5
	100 A	125 A	125 A	200 A	250 A	250 A
	HYS/HAS-3.8LV-USG1*6	HYS/HAS-4.8LV-USG1*6	HYS/HAS-6.0LV-USG1*6	HYS/HAS-7.6LV-USG1*6	HYS/HAS-9.6LV-USG1*6	HYS/HAS-11.5LV-USG1*6
	120 A	150 A	150 A	240 A	300 A	300 A
	HYS/HAS-3.8LV-USG1*7	HYS/HAS-4.8LV-USG1*7	HYS/HAS-6.0LV-USG1*7	HYS/HAS-7.6LV-USG1*7	HYS/HAS-9.6LV-USG1*7	HYS/HAS-11.5LV-USG1*7
	140 A	175 A	175 A	280 A	350 A	350 A
	HYS/HAS-3.8LV-USG1*8	HYS/HAS-4.8LV-USG1*8	HYS/HAS-6.0LV-USG1*8	HYS/HAS-7.6LV-USG1*8	HYS/HAS-9.6LV-USG1*8	HYS/HAS-11.5LV-USG1*8
	160 A	200 A	200 A	320 A	400 A	400 A
	HYS/HAS-3.8LV-USG1*9	HYS/HAS-4.8LV-USG1*9	HYS/HAS-6.0LV-USG1*9	HYS/HAS-7.6LV-USG1*9	HYS/HAS-9.6LV-USG1*9	HYS/HAS-11.5LV-USG1*9
	180 A	225 A	225 A	360 A	450 A	450 A
	HYS/HAS-3.8LV-USG1*10	HYS/HAS-4.8LV-USG1*10	HYS/HAS-6.0LV-USG1*10	HYS/HAS-7.6LV-USG1*10	HYS/HAS-9.6LV-USG1*10	HYS/HAS-11.5LV-USG1*10
	200 A	250 A	250 A	400 A	500 A	500 A

7.9 DTS Connection

DTS-4G-G1 and DTS-Wi-Fi-G1 Procedure	
Step 1	Remove the DTS port cover plate.
Step 2	Insert the DTS into the USB port, and tighten the screws.
Step 3	Respectively connect the ends of the DTS connecting line to the corresponding ports.



DTS-Ethernet-G1 Procedure	
Step 1&2	a. Remove the DTS port cover plate. b. Insert the DTS-Ethernet into the USB port, and tighten the screws.
Step 3&4	a. Respectively connect the ends of the DTS connecting line to the corresponding ports. b. Unscrew the swivel nut from the connector.
Step 5	a. Insert the RJ45 plug (pin definition is shown in the right figure) into the connector until there is an audible click sound. (Note that the RJ45 plug with cable sheath cannot be inserted.) b. Thread the cable of an appropriate length through the connector. c. Tighten the cable gland.

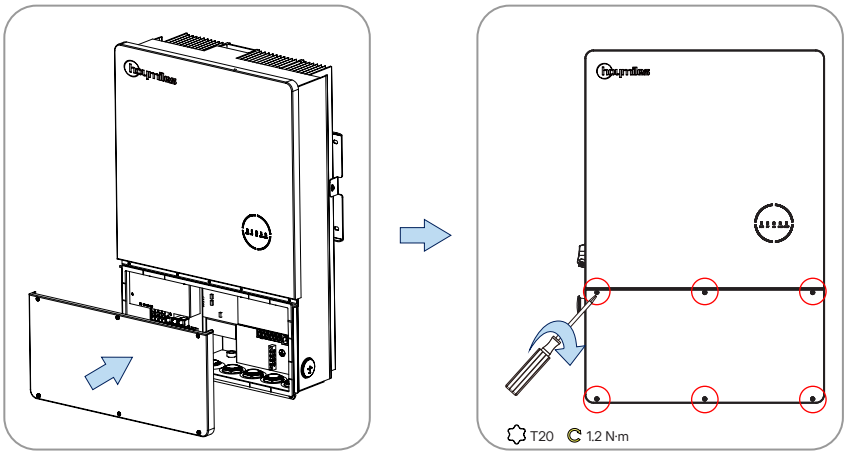


NOTE

The DTS-4G-G1 and DTS-Ethernet-G1 solutions will be coming soon.

Indicator	Status	Description
RUN	ON	DTS is powered on.
	OFF	DTS is not powered on.
COM	ON	Proper communication with the inverter.
	OFF	Improper communication with the inverter.
NET	ON	Proper communication with S-Miles Cloud.
	OFF	Improper communication with S-Miles Cloud.
	BLINK	Improper communication with S-Miles Cloud, but the network is connected.

7.10 Installing the Wiring Box Cover

Procedure
After the wires are firmly and correctly connected, install the wiring box cover with a T20 screwdriver.


NOTE

To ensure the normal operation of the inverter with an IP65 rating, seal the cable inlet holes at the bottom of the inverter after it is successfully installed.

8 System Commissioning

8.1 Preparation

Before the commissioning of the inverter, make sure:

- The inverter DC switch and external circuit breaker are disconnected.
- Check wiring according to ***7 Electrical Connection***.
- Check whether the rapid shutdown switch is in the “ON” position.
- Check whether the grid voltage is within the permissible range through the multimeter before turning on the AC switch.
- Unused terminals must be sealed using corresponding sealing plugs.
- Nothing is left on the top of the inverter and battery.
- Cables are routed in a safe place or protected against mechanical damage.
- Warning signs and labels are intact.

8.2 System Power-on

Step 1 If the inverter is connected to the battery, turn on the battery power switch and DC breaker.

Step 2 Turn on the AC breaker between the inverter and the grid.

Step 3 (Only for HYS series inverters) Rotate the DC switch to “ON” if the inverter is connected to the PV strings.

Step 4 Check whether the inverter is operating properly through the inverter indicators status.

9 S-Miles Cloud

The S-Miles App has been developed for Hoymiles and offers the following features.

a. Network configuration;

b. Local installation assistant;

c. System monitoring.

S-Miles Installer

S-Miles End-user

Please download the S-Miles App from the Google Play Store or the Apple App Store. The QR code above can also be scanned to download the App.

NOTE

- In a residential energy storage system, the DTU displayed in the S-Miles Cloud refers to the DTS (Data Transfer Stick).
- The screenshots (Version 3.2.0) shown in this manual are for reference only. Since the App version will be updated periodically, the interface displayed on your screen may differ.

9.1 Connect to the DTU

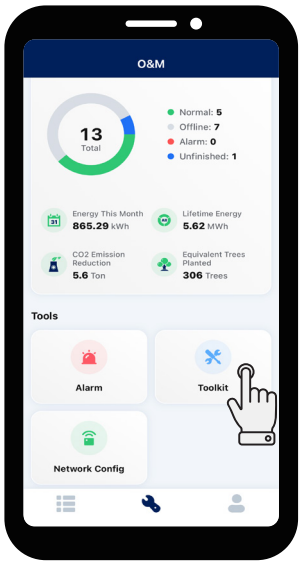
NOTE

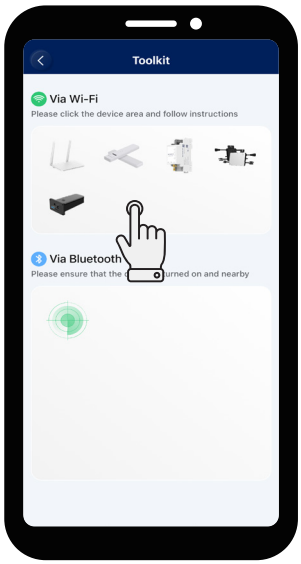
The steps about the password are only required for the first connection.

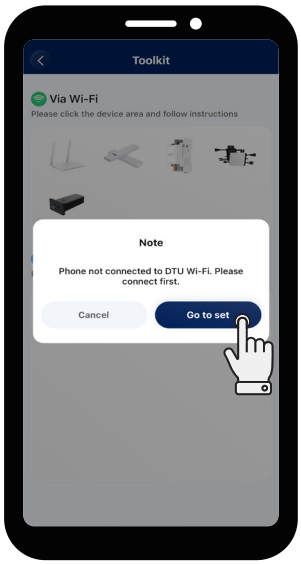
Step 1 Tap **O&M** > **Toolkit**.

Step 2 Tap **Via Wi-Fi** area.

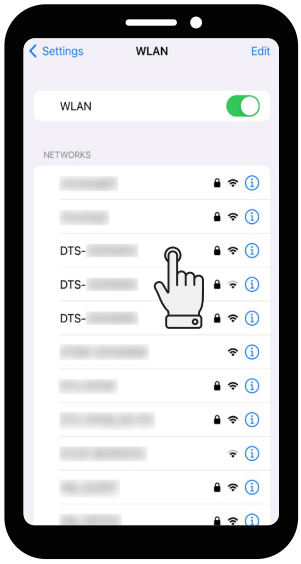
Step 3 Tap **Go to set**.

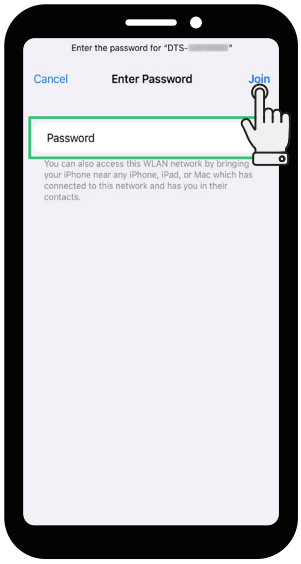






Step 4 Select the wireless network of DTS and enter the default password **ESS12345**. The DTS network name consists of “DTS” and the last eight digits of the product serial number.

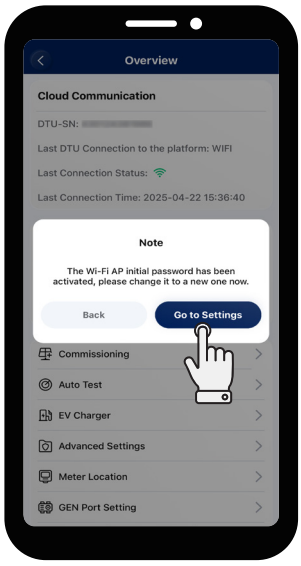


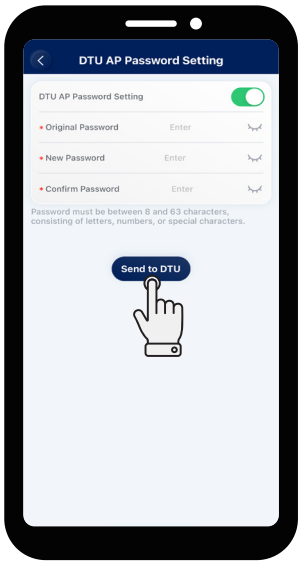


Step 5 Return to the App (will automatically enter the overview interface).

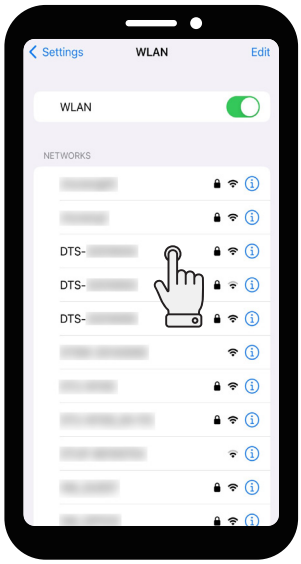
Step 6 Tap **Go to Settings** to change the default password to a new one.

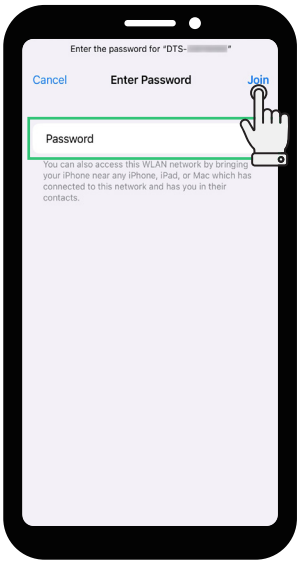
Step 7 Enter the original password and new password, confirm the new one, and tap **Send to DTU**.



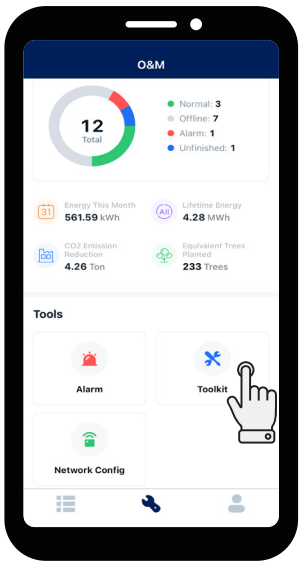


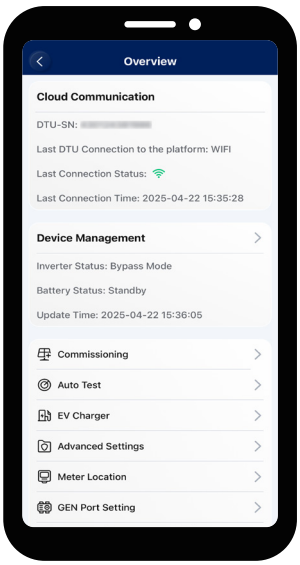
Step 8 Select the wireless network of DTS and enter the new password.





Step 9 Return to the App, and tap **O&M** > **Toolkit**.



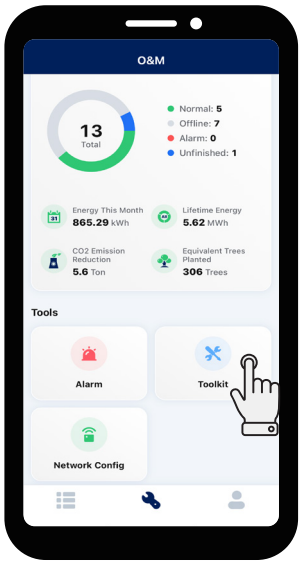


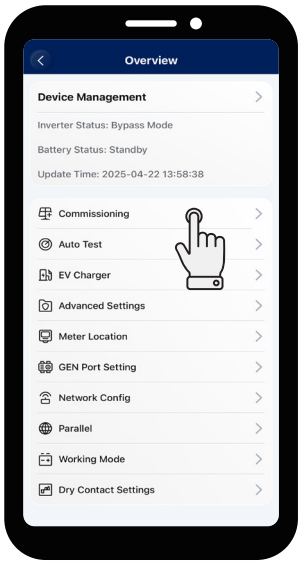
9.2 Start Commissioning

Commissioning is used to set and test a new residential energy storage system. It is a critical step to ensure that a new device and system can function properly according to the design specifications.

Step 1 Tap **O&M** > **Toolkit**.

Step 2 Tap **Commissioning**.

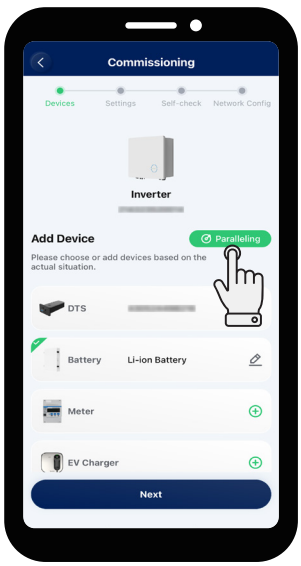




Step 3 Add devices

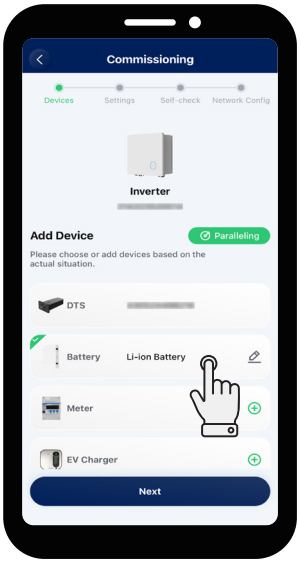
- If a parallel system is installed, tap **Paralleling**. All slave devices will be automatically added.

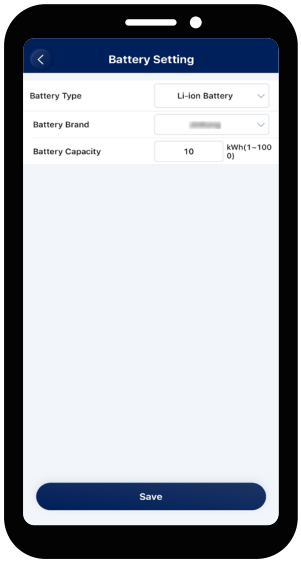
> **NOTE**
>
> - The DTS must be connected to the Master.
> - After the slaves are connected to the Master through a communication cable, they can communicate with the DTS.
> - A DTS can only communicate with up to 10 inverters.



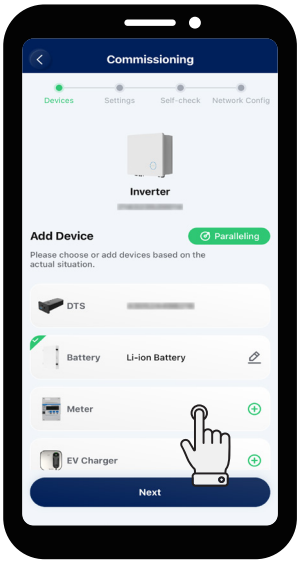
- If batteries are connected to the inverter, tap **Battery** to set battery parameters. Hoymiles batteries can be automatically identified. (The default setting is **No battery**.)

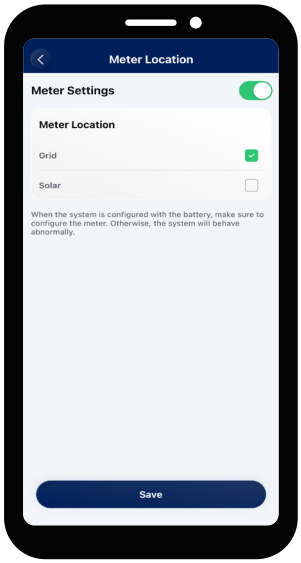
> **NOTE**
>
> If Li-ion batteries are connected in parallel via the busbar, and the master battery communicates with the master inverter, enable **Multiple PCS**.



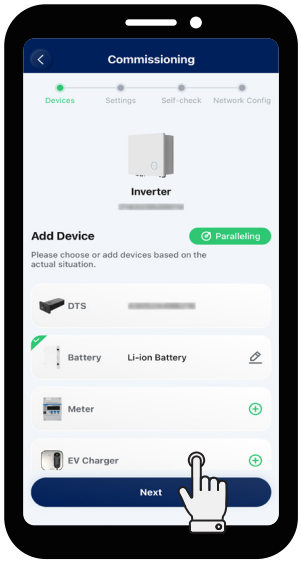


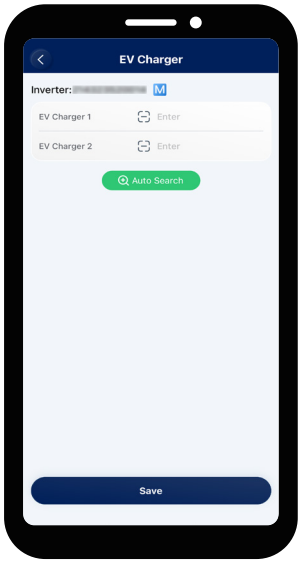
- Tap **Meter**, toggle on **Meter Settings,** and select the corresponding checkbox.



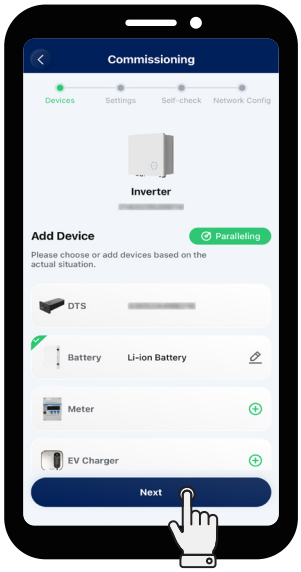


- If an EV charger is connected, tap **EV Charger**. You can tap **Auto Search** or scan the QR code on the label to identify the serial number (SN).





- Tap **Next**.



Step 4 Complete other settings

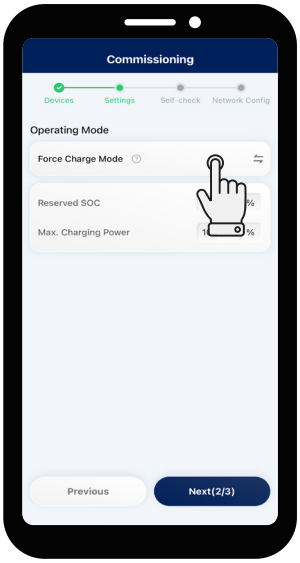
a. Select the grid profile in your region, and tap **Next**.

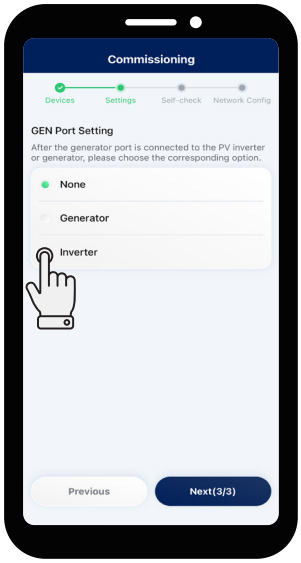
b. Select the working mode according to your actual needs, and tap **Next**. For details about working modes, refer to *9.3.3 Set Working Mode*.

c. Select the corresponding option according to whether the device connected to the GEN port is **Generator** or **Inverter**, and tap **Next**. (The default option is **None**.)

NOTE

- If a generator is connected to the GEN port, detailed parameters are shown in *9.3.1 Set Advanced Parameters*. After setting the parameters, tap *Dry Contact Settings > Generator Control* to set its mode and corresponding parameters.





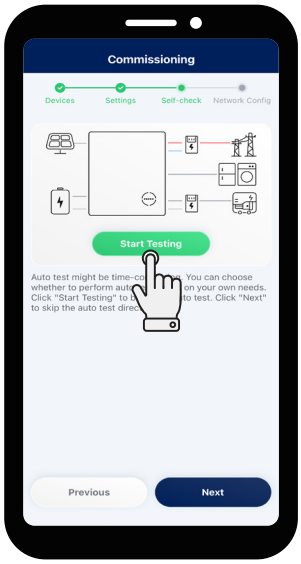
Step 5 Complete the self-check

You can complete the self-check or skip the self-check as required.

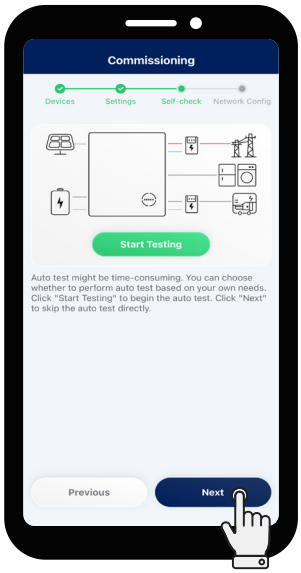
- If you want to complete the self-check, tap **Start Testing**.

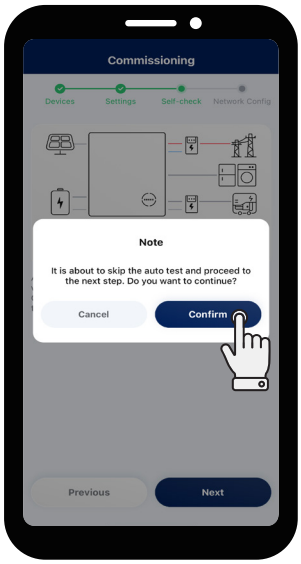
NOTE

- Before this operation, make sure that all cables including DC cables, AC cables, and communication cables are properly connected, and all AC and DC switches are turned on.
- If the result shows the CT is reversely connected, tap **Advanced Settings** > **Grid CT reverse** > **Enable** or **PV CT reverse** > **Enable**, and tap **Save**. For details, refer to *9.3.1 Set Advanced Parameters*.



- If you want to skip this step, tap **Next** > **Confirm**.





Step 6 Configure the network

You can follow the instructions to configure the network or directly skip this step.

NOTE

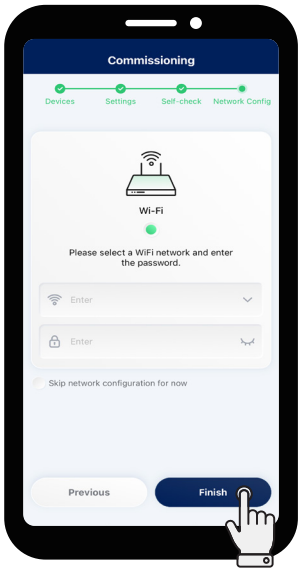
- **Go to Settings** will navigate to the new plant creation interface (haven't created a plant before the commissioning) or the homepage of the plant (have created a plant before the commissioning).
- After completing the commissioning, if you want to tap **Go to Settings**, first disconnect from the DTU Wi-Fi.

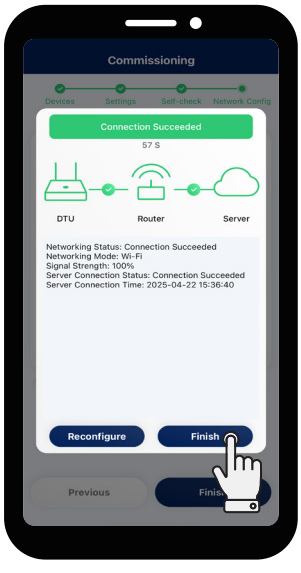
- If you want to configure the network:

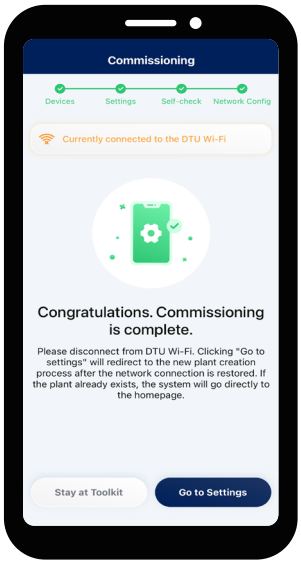
  a. Enter the Wi-Fi name and password, and tap **Finish**.

  b. Tap **Finish** after the network is successfully connected.

  c. Tap **Stay at Toolkit** or **Go to Settings**.



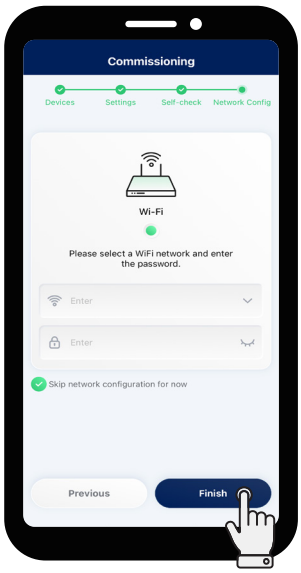


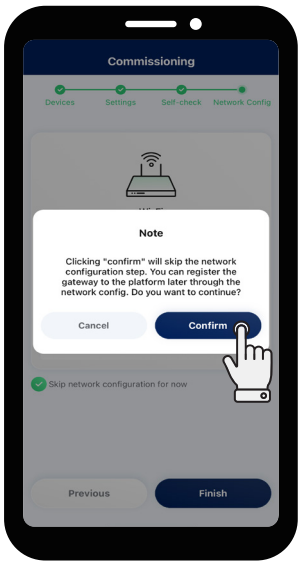


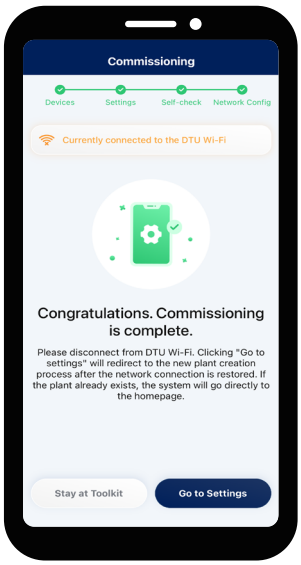
- If you want to skip this step:

  a. Tap **Skip network configuration for now** > **Finish** > **Confirm**.

  b. Tap **Stay at Toolkit** or **Go to Settings**.



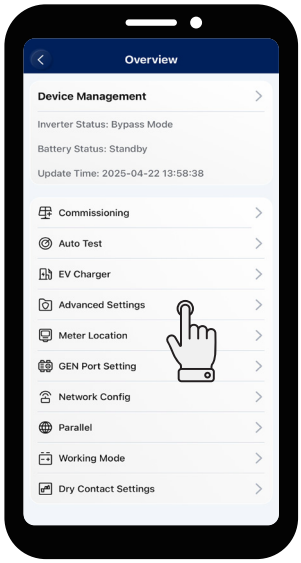


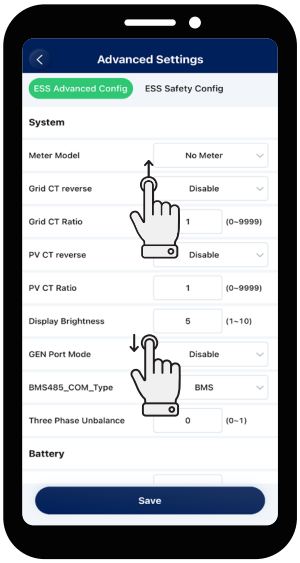


9.3 Set System Parameters

9.3.1 Set Advanced Parameters

Tap **Advanced Settings** to set parameters of System, Battery, PV, Emergency Power Supply (EMS), and Generator.





★ System

Parameter	Description	Default Value
Meter Model	• For a single-phase inverter, please select “Single-phase Meter” or “Three-phase Meter”. • For a three-phase inverter, please select “Three-phase Meter”. • For an inverter used in North America, please select “Two-phase Meter”.	No Meter
Grid CT Reverse	Enable it to get correct sampling current when the grid side CT is reversely connected.	Disable

Grid CT Ratio	Set the grid side CT ratio.	1
PV CT Reverse	Enable it to get correct sampling current when the PV inverter side CT is reversely connected.	Disable
PV CT Ratio	Set the PV inverter side CT ratio.	1
Display Brightness	Set the brightness of LED indicators.	10
GEN Port Mode	After the generator port is connected to the inverter or generator, select the corresponding option.	Disable
BMS485_COM_Type	• If the RS485 port is connected to the battery, please select "BMS485". • If the RS485 port is connected to the microinverter DTU, please select "DTU.COM".	BMS

★ Battery

Parameter	Description	Default Value
Max. Discharging Power	Set the maximum discharging power.	100%
Max. Charging Power	Set the maximum charging power.	100%
Max. SOC	Set the maximum battery capacity as recommended by the battery manufacturer.	100%
Min. SOC	Set the minimum battery capacity as recommended by the battery manufacturer.	10%
Min. SOC Force Charging Power	Set the power to forcibly charge the battery when the battery SOC falls below the set minimum SOC.	200 W
Reserved SOC Force Charging Power	Set the power to charge the battery when the battery SOC falls below reserved SOC.	2%
Max. BAT Feed-in Power in Peak Time	Set the maximum value of battery feed-in power in peak time.	100%
Max. Grid Charging Power in Off-peak Time	Set the maximum power to charge the battery from the grid in off-peak time.	0 W
Max. BAT Discharging Power in Partial Peak Time	Set the maximum value of battery discharging power in partial peak time.	100%

★ PV

Parameter	Description	Default Value
MPPT Global Scan	If the PV modules are shaded, enable this function.	Disable

★ Emergency Power Supply (EPS)

Parameter	Description	Default Value
EPS Mode	• When the EPS port is connected, you can select “EPS” or “UPS”. You can select “UPS” when the load keeps power on, and the system will automatically switch between the on-grid mode and the off-grid mode under UPS mode. • EPS is characterized by continuous power supply, which means that the loads are powered by bypass under normal power supply, and the DC power will be inverted to supply the loads during power outage, maximizing energy utilization. • UPS is a kind of uninterrupted power supply which has stable voltage and frequency, and has an extremely high requirement for switching time. UPS not only operates during power outage, but also can output high quality power supply to ensure normal operation of electric equipment in case of abnormal situations such as overvoltage, undervoltage, and surge. • When the inverter is used as a PV inverter, select “Disable”.	EPS
External Bypass	For inverters with an external ATS (EPS) Box, when the external bypass switch is enabled, the inverter EPS port works in the off-grid mode and will not work in the on-grid mode.	Disable
PV Only	In off-grid mode, PV can also operate without the battery. (This function is not recommended since the system is unstable under this mode)	Disable

★ Generator

Parameter	Range
GEN Location	None/GenSide. To ensure the normal operation of the generator, please select “GenSide”.
GEN Signal Setting	Manual or DI/DO. If the generator cannot be controlled by dry contact, please select “Manual”. If the generator can be controlled by dry contact, please select “DI/DO”.
Min. Run Time	5-60 min
Max. Run Time	6-10 hour
Protection Interval	5-60 min
Synchronize Time	1-20 min
Shutdown Delay	1-20 min
GEN Rated Power	0-20000 W
High Voltage Limit	0-280 V
Low Voltage Limit	0-180 V
High Frequency Limit	0-70 Hz
Low Frequency Limit	0-59 Hz
Max. GEN Charging Power	0-20000 W

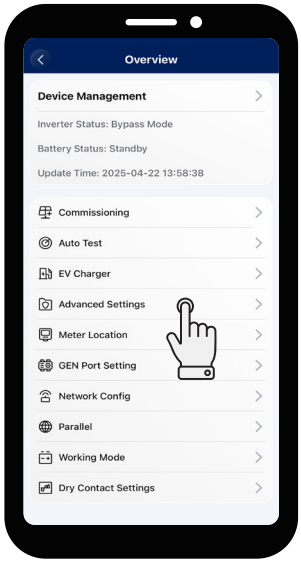
9.3.2 Set Export Management Parameters

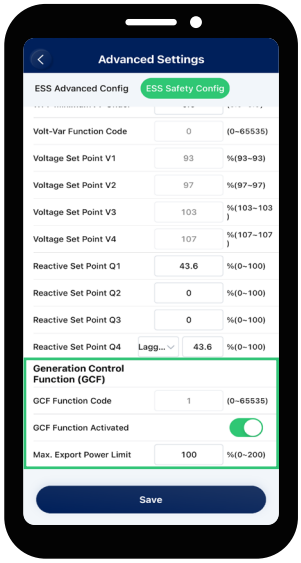
NOTE

- This function is enabled by default, and the default value of Max. Export Power Limit is 100%.
- ESS refers to a single energy storage inverter or a parallel system.

Step 1 Tap **Advanced Settings** > **ESS Safety Config**.

Step 2 Slide your finger down to the bottom, ensure **Generation Control Function (GCF)** is enabled, and set the value of Max. Export Power Limit.





- If no input device is connected to the grid side, and you do not need to limit the feed-in power, disable this function or skip this setting.
- If an input device, such as a microinverter, is connected to the grid side, and you do not need to limit the feed-in power, disable this function.
- If you need to limit the feed-in power, set Max. Export Power Limit as required.

  Scenario 1: Max. Export Power Limit is 0

  The feed-in power of an Energy Storage System (ESS) is 0. If an input device, such as a microinverter, is connected to the grid side, its output power cannot be controlled; it will output power according to its logic.

  Scenario 2: Max. Export Power Limit is 50%

  The maximum allowable feed-in power is 50% of the rated power of ESS. If an input device, such as a microinverter, is connected to the grid side, it can operate at full power, and the energy storage inverter will adjust the output of ESS in real time according to the set Max. Export Power Limit.

  Scenario 3: Max. Export Power Limit is 100%

  The maximum allowable feed-in power is 100% of the rated power of ESS. If an input device, such as a microinverter, is connected to the grid side, it can operate with its full power, and the energy storage inverter will adjust the output of ESS in real time according to the set Max. Export Power Limit.

  Scenario 4: Max. Export Power Limit is 150%

  The maximum allowable feed-in power is 150% of the rated power of ESS. If an input device, such as a microinverter, is connected to the grid side, it can operate with its full power, and the energy storage inverter will adjust the output of ESS in real time according to the set Max. Export Power Limit.

NOTE

- The energy storage inverter cannot control the output power of other input devices connected to the grid side. It means that the feed-in power cannot be limited to 0 if other input devices are connected to the grid side.
- If no input device is connected to the grid side, Max. Export Power Limit can be set to 0-100%.

9.3.3 Set Working Mode

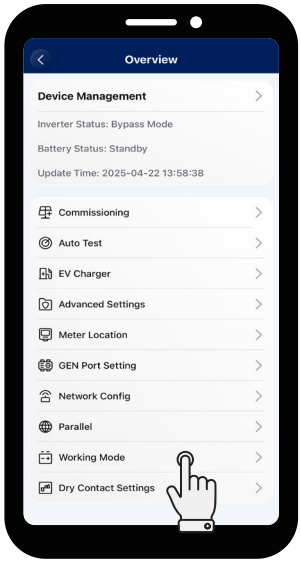
NOTE

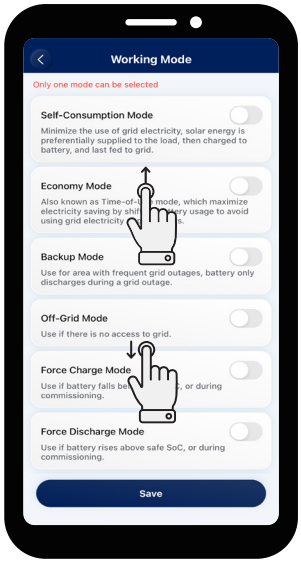
- Only one mode can be selected at a time.
- Peak Shaving Mode and Time of Use Mode are not supported in North America.

Step 1 Tap **Working Mode**.

Step 2 Select one mode and set relevant parameters.

Step 3 Tap **Save**.





★ Self-consumption Mode

In the daytime, solar energy supports the loads firstly, and surplus energy is stored in the battery. When the battery is fully charged or reaches the maximum charge power, the surplus energy is fed into the grid (or limited if required). At night, the battery discharges for the loads firstly, and the grid will supply the loads once the battery power is not enough. In this mode, battery cannot be charged from the grid at night.

The self-consumption mode can reduce the use of grid power. Solar energy is preferentially supplied to the loads, charged to the battery, and finally fed into the grid. Users can set the reserved SOC within a certain range. (A small amount of power can be reserved due to infrequent power outages.)

★ Economy Mode

In this mode, battery charging and discharging periods need to be defined. Meanwhile, the battery can be forced to charge from the grid during the preset charging time. For instance, the battery could be charged or discharged according to valley or peak electricity prices. You can set reserved SOC within a certain range (a small amount of power can be reserved due to infrequent power outages), select the type of currency you need, and set different time periods to be more flexible to save costs of electricity. Set the time period for peak, low and partial peak grid prices in different seasons or dates, and you can just add up to four time periods.

★ Backup Mode

Backup mode can be selected when the grid frequently breaks down. The battery will be forced to charge to a set capacity so that it has enough power to support the electricity consumption in daily life when the inverter is in off-grid mode. You can also set the reserved SOC within a certain range.

★ Off-grid Mode

When the system is not connected to the grid, you can choose the off-grid mode.

★ Force Charge Mode

The force charge mode can be used during the commissioning of inverter or when the battery capacity falls below the value of safety SOC. You can set the reserved SOC within a certain range. If the battery capacity is lower than the setting, the battery will be forcibly charged. And You can set the max. charging power of battery if needed. Finally, save the values you have changed.

★ Force Discharge Mode

The force discharge mode can be used during the commissioning of inverter or when the battery capacity rises above the value of safety SOC. You can set the reserved SOC within a certain range. If the battery capacity is higher than the setting, the battery will be forcibly discharged. And you can set the max. discharging power of battery if needed. Finally, save the values you have changed.

★ Peak Shaving Mode

In this mode, the Peak Meter Power (the maximum power that the inverter obtains from the grid) can be set; only when PV and battery can fully supply the loads, can the Peak Meter Power be limited. Set the Baseline SOC to ensure the normal operation of this mode. When the battery SOC is less than the Baseline SOC, the grid can supply the loads or charge the battery with an output power not higher than the Peak Meter Power; when the battery SOC is less than the reserved SOC, the battery will not be discharged.

★ Time of Use Mode

The time of use mode allows users to customize the charge and discharge time of the battery within eight periods. During the pre-set charge time, the battery will be charged from the grid at the pre-set charging power until it reaches the pre-set stop charge SOC; during the pre-set discharge time, the battery will supply power to the load and the grid at the pre-set power until the battery discharges to the pre-set stop discharge SOC. The energy storage system allows users to freely set the charge and discharge time according to the local peak and valley electricity price to maximize the benefits. For the rest of the time, the system will run in self-consumption mode by default.

9.3.4 Set Dry Contact Function

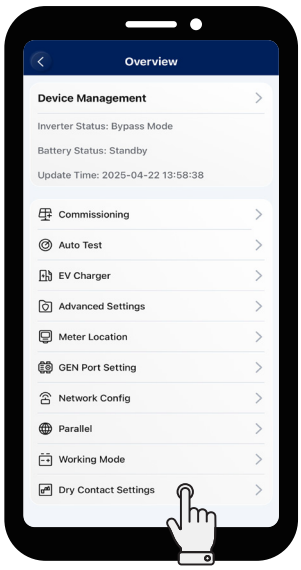
NOTE

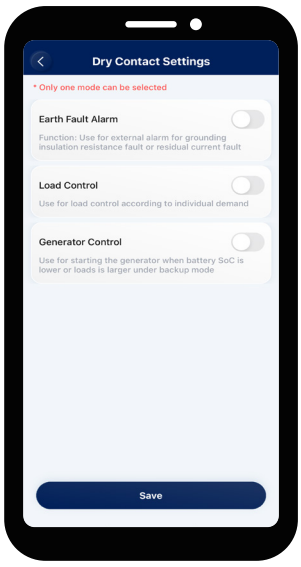
Only one mode can be selected at a time.

Step 1 Tap **Dry Contact Settings**.

Step 2 Select one mode and set relevant parameters.

Step 3 Tap **Save**.





★ Earth Fault Alarm

This function is used for external alarm caused by grounding insulation resistance fault or residual current fault. Disable the external alarm when the load is connected. This function is to produce alarm, not to cause tripping.

★ Load Control

Load control can be used according to individual demand. This setting is to control whether the load is working or not. There are six modes available as follows.

(1) Switch Mode

Manually turn on or turn off the dry contact.

(2) Scheduled Mode

Set the time period for the dry contact to work. The dry contact is closed during this set time and disconnected at other times.

(3) Intelligent Mode

Because the energy generated by PV fluctuates a lot, this mode is to make the dry contact avoid being turned on and off frequently. The dry contact will only be turned on when the residual energy generated by the PV exceeds the power set by the load within the set time period. You can set the minimum run time and the nominal power of the dry contact.

(4) EPS Port Smart Control

The unnecessary dry contact will be turned off in off-grid situation when the battery capacity is lower than the set SOC value. You can set the value of protection SOC if needed.

(5) EV Charger Smart Control

In this mode, whether to start the EV charger can be determined based on the total input current. When the input current is less than the value of the entrance breaker rated current minus the EV Charger rated current, the EV Charger is allowed to work; when the input current is larger than the entrance breaker rated current, shut down the EV Charger to protect the entrance breaker.

(6) Heat Pump Control

The heat pump control function allows users to add up to four runtimes. According to the set power and battery SOC, it can control the start and stop as well as the power of the SG Ready heat pump, maximizing the PV energy utilization.

Parameter	Description
Start Power	When the average feed-in power is greater than or equal to the start power, the heat pump will be started.
Shutdown Power	When the running time is greater than or equal to the minimum single runtime and the average grid input power is greater than or equal to the shutdown power, the heat pump will be shut down.
Battery Starting SOC	There is an ON/OFF option. The default option is OFF. ON: When the average feed-in power is greater than or equal to the start power or the battery SOC is greater than or equal to the battery start SOC, the heat pump will be started.
Battery Shutdown SOC	When the running time is greater than or equal to the minimum single runtime and the battery SOC is less than the battery shutdown SOC, the heat pump will be shut down.
Min. Single Runtime	The minimum single runtime of the heat pump.

Max. Single-day Runtime	There is an ON/OFF option. The default option is OFF. ON: The heat pump will be shut down when the running time of the day reaches the maximum single-day runtime; it will be started again when the starting condition is reached the next day.
Time Range	Up to 4 operating periods can be set.

★ Generator Control

(1) Exercise Mode

The generator starts regularly during the preset period to ensure the operation of the generator.

Parameter	Description
Frequency	It allows the generator to start regularly at this frequency.
Start Time	It allows the generator to start regularly at this time.
Duration	The generator will stop running after this duration.

(2) Running Mode

This mode is the off-grid operation mode of the generator, including manual mode and auto mode.

A. Manual Mode

The manual mode is used to turn on or turn off the generator manually.

B. Auto Mode

The auto mode is used to turn on or turn off the generator according to the battery capacity. The auto mode only supports generators controlled by Dry Contact. Otherwise, please select the manual mode.

Parameter	Description
GEN Start SOC	In off-grid mode, start the generator when the battery capacity is lower than the safety SOC.
GEN Shutdown SOC	In generator mode, shut down the generator when the battery capacity is higher than the safety SOC.
Quiet Time	During the quiet time, the generator is disabled. If you set this time, it will affect the normal use of electricity.

(3) Battery Charge Time

Parameter	Description
Battery Charge Time	The generator will charge the battery during the preset period. Please choose the time period when the PV power is low to avoid wasting PV power.

9.4 Upgrade the Firmware

NOTE

During the firmware upgrade, do not power off the device.

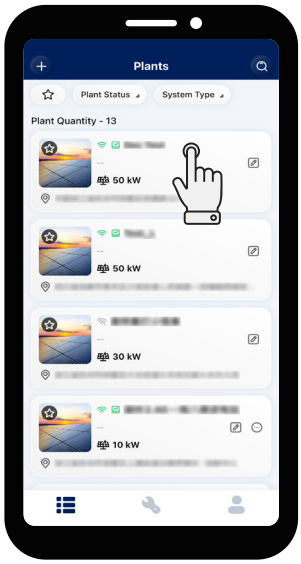
When you enter the plant overview interface, there will be a pop-up window if there is a new firmware version.

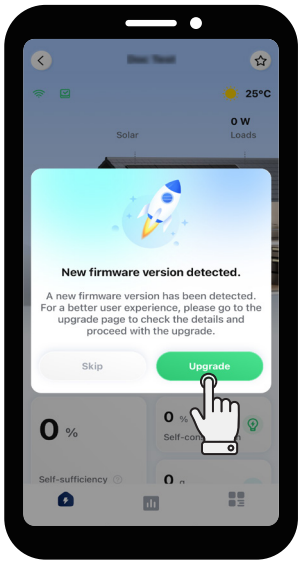
Method One

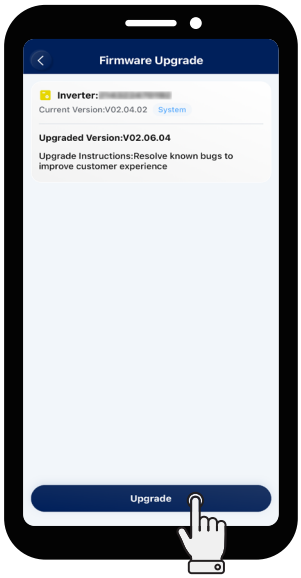
Step 1 Tap the target plant.

Step 2 Tap **Upgrade**.

Step 3 Tap **Upgrade**.



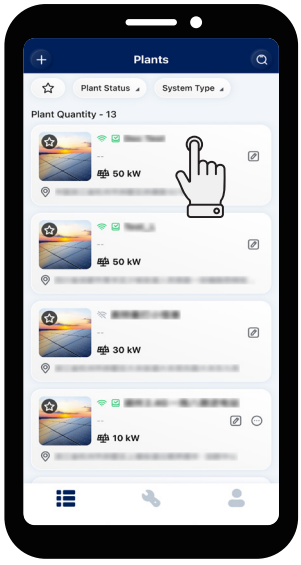


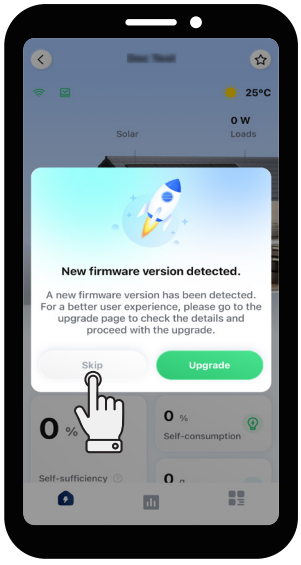


Method Two

Step 1 Tap the target plant.

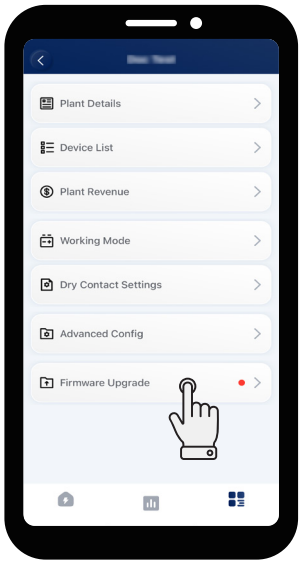
Step 2 Tap **Skip**.

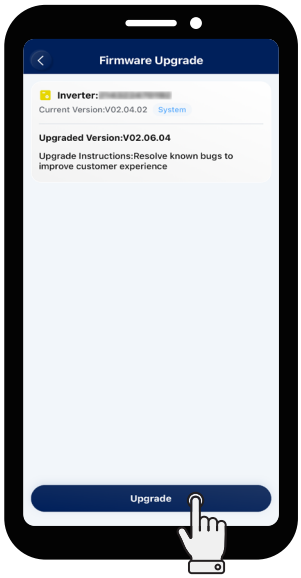




Step 3 Tap in the lower right corner.

Step 4 Tap **Firmware Upgrade** > **Upgrade**.





9.5 ESS Operating Modes Setting

ESS Operating Mode is only for the United States, Canada, and Mexico. It is to restrict the energy exchange between the Area EPS and the energy storage sub-system (ESS). Hoymiles energy storage system has two ESS operating modes, Export Only Mode and Import Only Mode. The ESS Operating Modes can only be set through S-Miles Cloud Monitoring Platform *https://global.hoymiles.com/*.

9.5.1 Export Only Mode

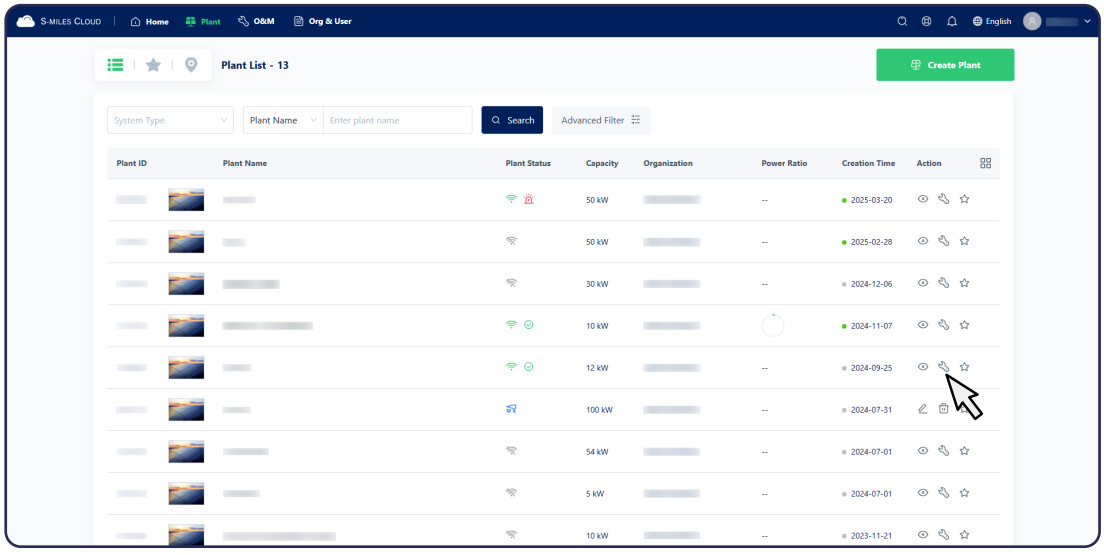
If the Export Only Mode is chosen, the ESS may export active power to the Area EPS during discharging but shall not import active power from the Area EPS for ESS charging purposes. Under this mode, the Generation Control Function (GCF) is disabled, the grid input power is limited to 0 W.

9.5.2 Import Only Mode

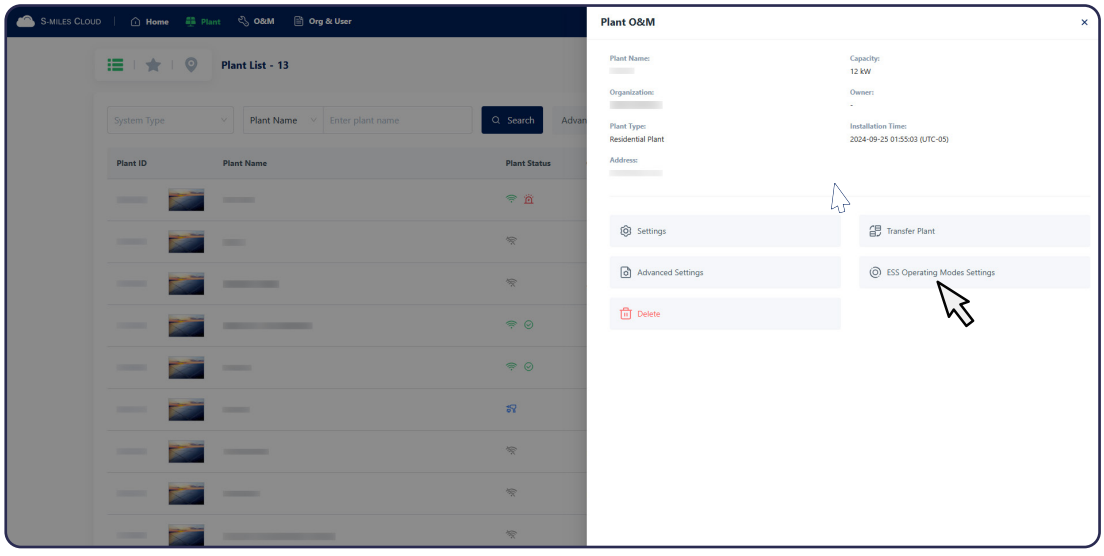
If the Import Only Mode is chosen, the ESS may import active power from the Area EPS for charging purposes but shall not export active power from the ESS to the Area EPS. Under this mode, the GCF function is enabled, and the feed-in power is limited to 0 W.

9.5.3 Online Setting

Step 1 Click **Plant**, find the target plant, and click **O&M** in the Action Column.



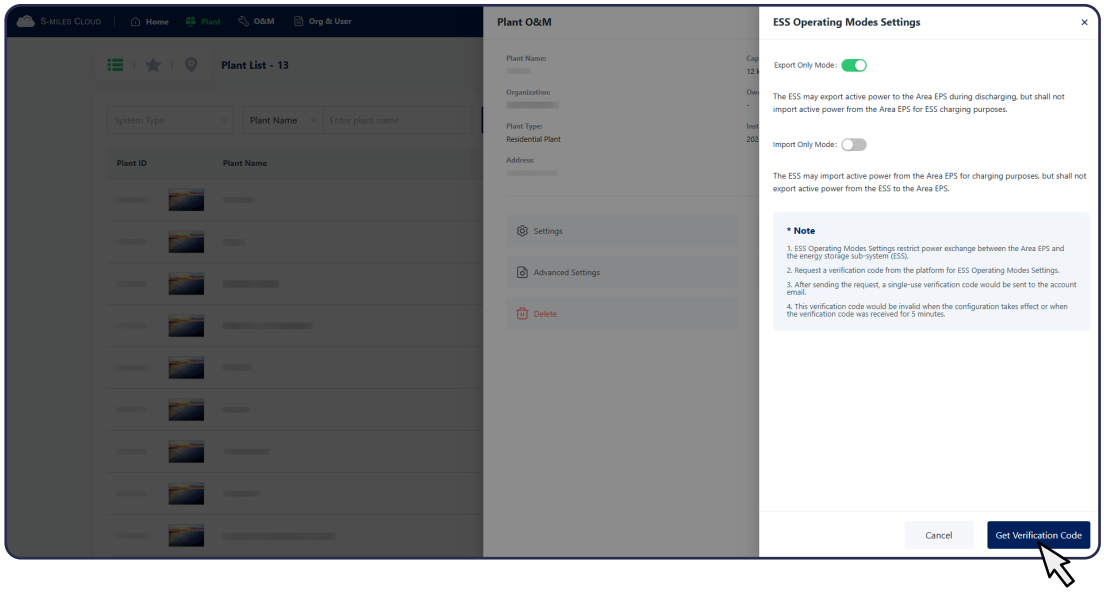
Step 2 Click **ESS Operating Modes Settings**.



Step 3 Enable **Export Only Mode** or **Import Only Mode**, click **Get Verification Code**, and click **Send**.

NOTE

Once the Export Only Mode or Import Only Mode is set, it will be locked and cannot be modified.



Step 4 Enter the verification code you received and click **Configure**.

NOTE

- The verification code you received is a one-time password (OTP).
- The verification code would be invalid when the configuration takes effect or when the verification code is received for 5 minutes.

10 System Maintenance

10.1 System Power-off

NOTICE

Wait at least 5 minutes after the LED indicators turn off to release the internal energy.

Step 1 Stop the inverter from working via the S-Miles App.

Step 2 If the inverter is connected to the battery, disconnect the DC breaker between the inverter and the battery.

Step 3 Disconnect the AC breaker between the inverter and the grid.

Step 4 (Only for HYS series inverters) Rotate the DC switch to "OFF" if the inverter is connected to the PV strings.

Step 5 Check whether the inverter indicators are off.

10.2 Routine Maintenance

To ensure that the inverter can operate for a long time, it is recommended to perform the following maintenance items. Make sure that all maintenance items are performed after the inverter is powered off.

Check Item	Check Method	Maintenance Interval
System Cleanliness	Periodically check the heat sinks to ensure that there are no obstacles and dust.	Once every 6 months
System Operation Status	1. Check whether the inverter is damaged or deformed. 2. Check whether there is an abnormal sound when the inverter is working. 3. Check whether the inverter parameters are set correctly.	Once every 6 months
Electrical Connection	1. Check whether the cables are firmly connected and intact; in particular, ensure that the parts being contacted with the metal surface are not scratched. 2. Check whether the waterproof plugs or covers of unused ports are firmly in place.	The first inspection is 3 months after the first installation, and the subsequent inspections can be carried out once every 6 to 12 months.
Grounding Reliability	Check whether the ground cables are firmly connected.	The first inspection is 3 months after the first installation, and the subsequent inspections can be carried out once every 6 to 12 months.

10.3 Troubleshooting

When the system is in alarm, please log in to the S-Miles App to review. The possible causes and their troubleshooting are shown as follows.

Display	Possible Cause	Handling Suggestions
Grid Overvoltage	The grid voltage is higher than the permissible range.	Generally, the inverter will reconnect to the grid after the grid recovers. If the alarm occurs frequently: 1. Make sure the ESS safety configuration of the inverter is set correctly. 2. Make sure that the grid voltage in your area is stable and within the normal range. 3. Check whether the cross-sectional area of the AC cable meets the requirement. 4. If the alarm persists, contact Hoymiles technical support team.
Grid Undervoltage	The grid voltage is lower than the permissible range.	Generally, the inverter will reconnect to the grid after the grid recovers. If the alarm occurs frequently: 1. Make sure the ESS safety configuration of the inverter is set correctly. 2. Make sure that the grid voltage in your area is stable and within the normal range. 3. Check whether the AC cable is firmly in place. 4. If the alarm persists, contact Hoymiles technical support team.
Grid Overfrequency	The grid frequency is higher than the permissible range.	Generally, the inverter will reconnect to the grid after the grid recovers. If the alarm occurs frequently: 1. Make sure the ESS safety configuration of the inverter is set correctly. 2. Make sure that the grid frequency in your area is stable and within the normal range. 3. If the alarm persists, contact Hoymiles technical support team.
Grid Underfrequency	The grid frequency is lower than the permissible range.	
No Grid	The inverter detects that there is no grid connected.	Generally, the inverter will reconnect to the grid after the grid recovers. If the alarm occurs frequently: 1. Check whether the grid supply is reliable. 2. Check whether the AC cable is firmly in place. 3. Check whether the AC cable is correctly connected. 4. Check whether the AC circuit breaker is disconnected. 5. If the alarm persists, contact Hoymiles technical support team.
RCD Fault	The residual leakage current is too high.	1. The alarm can be caused by high ambient humidity, and the inverter will reconnect to the grid after the environment is improved. 2. If the environment is normal, check whether the AC and DC cables are well insulated. 3. If the alarm persists, contact Hoymiles technical support team.
PV Reverse Connection	The inverter detects that the PV strings are reversely connected.	1. Check whether the corresponding string is of reverse polarity. If so, disconnect the DC switch and adjust the polarity when the string current drops below 0.5 A. 2. If the alarm persists, contact Hoymiles technical support team.

PV Undervoltage	The PV voltage is lower than the permissible range.	1. Check whether the DC cable is firmly in place. 2. Check whether there is a PV module shaded. If so, remove the shade and ensure the PV module is clean. 3. Check whether the PV module is in abnormal aging. 4. If the alarm persists, contact Hoymiles technical support team.
PV Overvoltage	The PV voltage is higher than the permissible range.	1. Check the specification and numbers of corresponding string PV modules. 2. If the alarm persists, contact Hoymiles technical support team.
Over Temperature	The temperature inside the inverter is higher than the permissible range.	1. Make sure that the installation complies with the instructions from the User Manual. 2. Check whether the alarm “Fan Fault” occurs. If so, replace the faulty fan. 3. If the alarm persists, contact Hoymiles technical support team.
ISO Fault	The insulation impedance of the PV string to the ground is too low.	1. Use a multimeter to determine if the resistance between the earth and the inverter frame is close to zero. If not, please ensure that the connection is good. 2. If the humidity is too high, an isolation fault may occur. Attempt to restart the inverter. If the fault persists, check it again when the weather turns fine. 3. Check the resistance to ground from the PV module/cable. Take corrective measures in case of leading to a short circuit or damaged insulation layer. 4. If the alarm persists, contact Hoymiles technical support team.
Arc Fault	The inverter detects that there is an arc fault.	1. Disconnect the DC switch and check whether DC cables are damaged and whether the wiring terminals are loose or in poor contact. If so, take corresponding corrective measures. 2. After taking corresponding measures, reconnect the DC switch. 3. If the alarm persists, contact Hoymiles technical support team.
EPS Load Overpower	The EPS load power is higher than the permissible range.	1. Reduce the power of EPS loads, or remove some EPS loads. The inverter will restart automatically. 2. If the alarm persists, contact Hoymiles technical support team.
Meter Reverse Connection	The inverter detects that the Meter or CT is reversely connected.	1. Make sure that the installation complies with the instructions from the User Manual. 2. If the alarm persists, contact Hoymiles technical support team.
Meter Communication Fault	The inverter detects that there is a meter communication fault.	1. Check whether the Meter communication cable and terminal are abnormal. 2. Reconnect the Meter communication cable. 3. If the alarm persists, contact Hoymiles technical support team.
Battery Reverse Connection	The inverter detects that the battery wirings are reversely connected.	1. Check the battery for polarity correctness, and correct it if necessary. 2. If the alarm persists, contact Hoymiles technical support team.
Battery Voltage Fault	The battery voltage is higher than the permissible range.	1. Check if the battery input voltage is within the normal range. 2. If the alarm persists, contact Hoymiles technical support team.

BMS Communication Fault	The inverter detects that there is a BMS communication fault.	1. Check whether the BMS communication cable and terminal are abnormal. 2. Reconnect the BMS communication cable. 3. If the alarm persists, contact Hoymiles technical support team.
BMS Battery Alarm	The inverter detects that there is a battery fault from BMS.	Try to restart the battery. If the fault persists, contact the battery manufacturer.
BMS Battery Fault	The inverter detects that there is a battery fault from BMS.	Try to restart the battery. If the fault persists, contact the battery manufacturer.
Relay Self-check Fault	The inverter detects that there is a relay self-check fault.	Try to restart the inverter. If the fault persists, contact Hoymiles technical support team.

11 Decommissioning

11.1 Removing the Product

Step 1 Power off the product as described in *10.1 System Power-off*.

Step 2 Disconnect all cables.

Step 3 Remove the DTS and the smart meter.

Step 4 Remove the inverter from the wall, remove the bracket if necessary.

11.2 Packing the Product

If the original package is available, put the product and its accessories into the package and keep it in a dry and proper place.

If the original package is not available, put the product and its accessories into a suitable package. The package should be easy to remove, can bear the weight of the inverter, and can be sealed properly.

11.3 Disposing of the Product

If the inverter can not be used and needs to be disposed of, dispose of the inverter and its accessories in accordance with relevant regulations.

12 Technical Datasheet

12.1 HYS-(3.8-11.5)LV-USG1

Model	HYS-3.8LV-USG1	HYS-4.8LV-USG1	HYS-6.0LV-USG1	HYS-7.6LV-USG1	HYS-9.6LV-USG1	HYS-11.5LV-USG1
Battery						
Battery type	Li-ion/Lead-acid					
Battery voltage range (V)	40-60					
Max. charge/discharge current (A)	80/80	100/100	100/100	160/160	200/200	200/200
Max. charge/discharge power (W)	3840/3840	4800/4800	4800/4800	7600/7600	9600/9600	9600/9600
Charging strategy for Li-ion battery	Self-adaption to BMS					
Charging curve	3 Stages/Equalization					
External temperature sensor	Optional					
Communication	CAN					
PV Input						
Recommended max. PV power (W)	5760	7200	9000	11520	14400	14400
Max. input voltage (V)	550					
Rated voltage (V)	380					
Start-up voltage (V)	150					
MPPT voltage range (V)	125-500					
Max. input current (A)	16/16	16/16	16/16	32/32	32/32	32/32
Max. short circuit current (A)	20/20	20/20	20/20	40/40	40/40	40/40
MPPT number/Max. input strings number	2/2	2/2	2/2	2/4	2/4	2/4
AC Input and Output (On-grid)						
Rated output power (W)	3840	4800	6000	7680	9600	11520
Max. output apparent power (VA)	3840	4800	6000	7680	9600	11520
Max. input power (W)	7680	9600	9600	15360	19200	19200
Rated AC output voltage/Range (V)	240, 211-264/208, 183-229[1]					
Rated grid frequency (Hz)	60					
Max. output current (A)	16	20	25	32	40	48
Max. input current (A)	32	40	40	64	80	80
Power factor	>0.99 (0.8 leading ... 0.8 lagging)					
THDi (@rated output)	<3%					
AC Output (Off-grid)						
Rated output power (W)	3840	4800	4800	7680	9600	9600
Max. output apparent power (VA)[2]	7680, 10s	9600, 10s	9600, 10s	15360, 10s	19200, 10s	19200, 10s
Back-up switch time (ms)	<40					
Rated output voltage (V)	120/240 (split phase), 120/208[1]					
Rated output frequency (Hz)	60					
Max. continuous output current (A)	16	20	20	32	40	40
THDv (@linear load)	<3%					

Efficiency						
MPPT efficiency	99.9%	99.9%	99.9%	99.9%	99.9%	99.9%
Max. efficiency	97.6%	97.6%	97.6%	97.6%	97.6%	97.6%
CEC efficiency	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%
Max. battery discharge to AC efficiency	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Protection						
Anti-islanding protection	Integrated					
PV arc fault detection	Integrated					
PV string input reverse polarity protection	Integrated					
Compliant MLRSD products	Integrated					
Insulation resistor detection	Integrated					
Residual current monitoring unit	Integrated					
AC over current protection	Integrated					
AC short current protection	Integrated					
AC overvoltage and undervoltage protection	Integrated					
Surge protection	DC Type II/AC Type III					
General						
Dimensions (W × H × D)	19.8 × 24.2 × 7.95 inch (502 × 615 × 202 mm)			19.8 × 29.1 × 7.95 inch (502 × 740 × 202 mm)		
Weight	68.3 lbs (31 kg)			90.4 lbs (41 kg)		
Mounting	Wall mounting					
Operating temperature	-13°F to +149°F (>113°F, derating)/-25°C to +65°C (>45°C, derating)					
Relative humidity	0-95%, no condensing					
Cooling	Natural convection					
Topology (Solar/Battery)	Transformerless/High-frequency isolation					
Altitude	≤6562 ft (2000 m)					
Protection degree	Type 4X					
Noise (dB)	<40					
User interface	LED, App					
Digital input/output	1 × DI, 2 × DO					
Max. parallel	10					
Communication	RS485, optional: Wi-Fi/Ethernet/4G[3]					
Warranty	10 Years					
Certifications and Standards						
Grid connection standard	IEEE 1547-2018, IEEE 1547.1-2020, SRD2.0					
Safety/EMC standard	UL 1741, CSA C22.2 No.107.1, UL 1741 CRD, UL 1741 SB, FCC Part 15 Class B					
AFCI	UL 1699B					
Software approval	UL 1998					

(1) For 240 V, the grid profile is US_IEEE1547; for 208 V, the grid profile is IEEE1547_208V.
(2) Can be achieved only if PV and battery power are sufficient.
(3) The DTS-Ethernet and DTS-4G solutions will be coming soon.

12.2 HAS-(3.8-11.5)LV-USG1

Model	HAS-3.8LV-USG1	HAS-4.8LV-USG1	HAS-6.0LV-USG1	HAS-7.6LV-USG1	HAS-9.6LV-USG1	HAS-11.5LV-USG1
Battery						
Battery type	Li-ion/Lead-acid					
Battery voltage range (V)	40-60					
Max. charge/discharge current (A)	80/80	100/100	100/100	160/160	200/200	200/200
Max. charge/discharge power (W)	3840/3840	4800/4800	4800/4800	7600/7600	9600/9600	9600/9600
Charging strategy for Li-ion battery	Self-adaption to BMS					
Charging curve	3 Stages/Equalization					
External temperature sensor	Optional					
Communication	CAN					
AC Input and Output (On-grid)						
Rated output power (W)	3840	4800	6000	7680	9600	11520
Max. output apparent power (VA)	3840	4800	6000	7680	9600	11520
Max. input power (W)	7680	9600	9600	15360	19200	19200
Rated AC output voltage/Range (V)	240, 211-264/208, 183-229[1]					
Rated grid frequency (Hz)	60					
Max. output current (A)	16	20	25	32	40	48
Max. input current (A)	32	40	40	64	80	80
Power factor	>0.99 (0.8 leading ... 0.8 lagging)					
THDi (@rated output)	<3%					
AC Output (Off-grid)						
Rated output power (W)	3840	4800	4800	7680	9600	9600
Max. output apparent power (VA)	7680, 10s	9600, 10s	9600, 10s	15360, 10s	19200, 10s	19200, 10s
Back-up switch time (ms)	<40					
Rated output voltage (V)	120/240 (split phase), 120/208[1]					
Rated output frequency (Hz)	60					
Max. continuous output current (A)	16	20	20	32	40	40
THDv (@linear load)	<3%					
Efficiency						
Max. battery discharge to AC efficiency	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Protection						
Anti-islanding protection	Integrated					
AC over current protection	Integrated					
AC short current protection	Integrated					
AC overvoltage and undervoltage protection	Integrated					
Surge protection	DC Type II/AC Type III					
General						
Dimensions (W × H × D)	19.8 × 24.2 × 7.95 inch (502 × 615 × 202 mm)			19.8 × 29.1 × 7.95 inch (502 × 740 × 202 mm)		
Weight	61.7 lbs (28 kg)			81.6 lbs (37 kg)		
Mounting	Wall mounting					
Operating temperature	-13°F to +149°F (>113°F, derating)/-25°C to +65°C (>45°C, derating)					
Relative humidity	0-95%, no condensing					
Cooling	Natural convection					
Topology (Battery)	High-frequency isolation					
Altitude	≤6562 ft (2000 m)					
Protection degree	Type 4X					
Noise (dB)	<40					
User interface	LED, App					
Digital input/output	1 × DI, 2 × DO					
Max. parallel	10					
Communication	RS485, optional: Wi-Fi/Ethernet/4G[2]					
Warranty	10 Years					
Certifications and Standards						
Grid connection standard	IEEE 1547-2018, IEEE 1547.1-2020, SRD2.0					
Safety/EMC standard	UL 1741, CSA C22.2 No.107.1, UL 1741 CRD, UL 1741 SB, FCC Part 15 Class B					
Software approval	UL 1998					

(1) For 240 V, the grid profile is US_IEEE1547; for 208 V, the grid profile is IEEE1547_208V.
(2) The DTS-Ethernet and DTS-4G solutions will be coming soon.

13 Appendix 1: Power Quality Response Modes

1. Voltage Trip

When the power grid voltage is abnormal, the inverter can be turned off for a certain period of time.

Shall trip function	Default setting		Ranges of allowable settings	
	Voltage (V)	Clearing time (s)	Voltage (V)	Clearing time (s)
OV2	1.20	0.16	Fix at 1.2	Fix at 0.16
OV1	1.10	13.0	1.10-1.20	1.0-13.0
UV1	0.88	21.0	0.0-0.88	2.0-50.0
UV2	0.5	2.0	0.0-0.50	0.16-21.0

2. Consecutive HVRT_240 V&120 V

The ability of a generating unit or generating plant to stay connected during voltage dips or swells.

Voltage range (p.u.)	Operating mode/ response	Minimum ride through time (s)	Maximum response time (s) (design criteria)
V>1.20	Cease to Energize(2)	N/A	0.16
1.10<V≤1.20	Momentary Cessation(3)	12	0.083
0.88≤V≤1.10	Continuous Operation	Infinite	N/A
0.70≤V<0.88	Mandatory Operation	20	N/A
0.50(1)≤V<0.70	Mandatory Operation	10	N/A
V<0.50(1)	Momentary Cessation	1	0.083

(1): Cessation of current exchange of DER with Area EPS in not more than the maximum specified time and with no intentional delay. This does not necessarily imply disconnection, isolation, or a trip of the DER. This may include momentary cessation or trip.

(2): Temporarily cease to energize an EPS, while connected to the Area EPS, in response to a disturbance of the applicable voltages or the system frequency, with the capability of immediately restoring output of operation when the applicable voltages and the system frequency return to within defined ranges.

(3): The voltage threshold between mandatory operation and momentary operation may be changed by mutual agreement between the Area EPS operator and DER operator.

3. Frequency Trip_240 V

When the power grid frequency is abnormal, the inverter can be shut down for a certain period of time.

Shall trip function	Default setting		Ranges of allowable settings	
	Frequency (Hz)	Clearing time (s)	Frequency (Hz)	Clearing time (s)
OF2	62.0	0.16	61.8-66.0	0.16-1000
OF1	61.2	300.0	61.0-66.0	180.0-1000
UF1	58.5	300.0	50.0-59.0	180.0-1000
UF2	56.5	0.16	50.0-57.0	0.16-1000

4. H/LFRT

The ability of a generating unit or generating plant to stay connected during frequency dips or swells.

Frequency range (Hz)	Operating mode	Minimum time (s)
f>62.0	N/A	N/A
61.2<f≤61.8	Mandatory Operation	299
58.8≤f≤61.2	Continuous Operation	Infinite
57.0≤f<58.8	Mandatory Operation	299
f<57.0	N/A	N/A

5. Volt-Var (Default)

The inverter will change reactive output power based on voltage change.

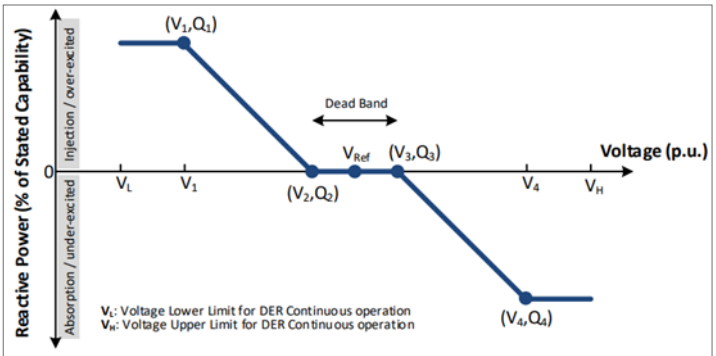


Figure H.4—Example voltage-reactive power characteristic

Setting point	Voltage range	Voltage default	Q range/default
Vref	0.95Vn-1.05Vn	Un	/
(V1, Q1)	(Vref-0.18Vn)-(V2-0.02Vn)	Vref-0.08Vn	(0-60%) Sn/+40%Sn
(V2, Q2)	(Vref-0.02Vn)-Vref	Vref-0.02Vn	(-60%-60%) Sn/0
(V3, Q3)	Vref-(Vref+0.03Vn)	Vref+0.02Vn	(-60%-60%) Sn/0
(V4, Q4)	(V3+0.02Vn)-(Vref+0.18Vn)	Vref+0.08Vn	(-60%-0) Sn/-44%Sn

Tr: Open loop response time, default 5s, range 1-90s.

6. Vol-Watt (Default)

The inverter will change reactive output power based on active power change.

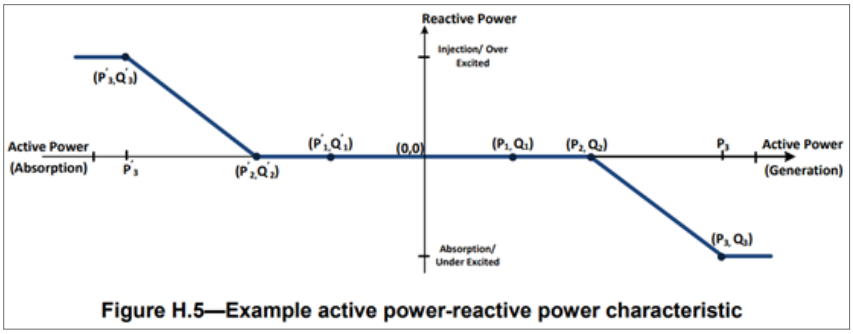


Figure H.5—Example active power-reactive power characteristic

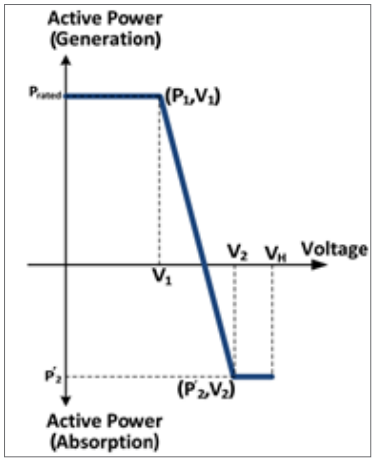
Active power-reactive power parameters	Ranges of allowable settings	Default settings
P3	(P2+0.1 Prated)-Prated	Prated
P2	0.4 Prated-0.8 Prated	50%Prated
P1	Pmin-(P2-0.1 Prated)	20%Prated
P'1	(P'2-0.1 P'rated)-P'min	-20%Prated
P'2	0.8 P'rated-0.4 P'rated	-50%Prated
P'3	P'rated-(P'2+0.1 P'rated)	-Prated
Q3	-60%Sn-60%Sn	-44%Prated
Q2	-60%Sn-60%Sn	0
Q1	-60%Sn-60%Sn	0
Q'1	-60%Sn-60%Sn	0
Q'2	-60%Sn-60%Sn	0
Q'3	-60%Sn-60%Sn	44%Prated

NOTE

- Prated is the nameplate active power rating of the DER.
- P'rated is the maximum active power that the DER can absorb.
- Pmin is the minimum active power output of the DER.
- P'min is the minimum, in amplitude, active power that the DER can absorb.
- P' parameters are negative in value.
- The maximum DER response time to maintain constant reactive power shall be 10s or less.

7. Vol-Watt (Default)

The inverter will change active power output power based on voltage change.



Voltage-active power parameters	Ranges of allowable settings	Default values for DER
V1	1.05Vn-1.09Vn	1.06Vn
P1	N/A	Prated
V2	(V1+0.01Vn)-1.10Vn	1.1Vn
P'2	0-P'rated	0
Open loop response time	0.5s-60s	10s

8. Fre-Watt (Default)

The inverter will change active power output power based on frequency change.

Parameter	Default settings	Ranges of allowable settings
dbOF, dbUF (Hz)	0.036	0.017(1)-1.0
kOF, kUF	0.05	0.03-0.05
Response time (small-signal) (s)	5	1-10

(1): A deadband of less than 0.017 Hz shall be permitted.

14 Appendix 2: HECO

1. Fre-Watt (Default)

The inverter will change active power output based on frequency change.

Parameter	Default settings	Ranges of allowable settings
dbOF, dbUF (Hz)	0.036	0.017-1.0
kOF, kUF	0.07	0.02-0.07
Response time (small-signal) (s)	5	0.2-10

2. H/LFRT (Default)

The ability of a generating unit or generating plant to stay connected during frequency dips or swells.

Frequency range (Hz)	Operating mode	Minimum time (s)
f>65.0	N/A	N/A
63.0<f≤65.0	Mandatory Operation	299
57.0≤f≤63.0	Continuous Operation	Infinite
50.0≤f<57.0	Mandatory Operation	299
f<50.0	N/A	N/A

Hoymiles Power Electronics Inc.

Floor 6, Building 5, Housheng 99 Road,
Gongshu District, Hangzhou 310015 P. R. China

+86 571 2805 6101

hoymiles.com

service@hoymiles.com
support@hoymiles.com