Open Energy for All

Hybrid/AC-coupled Inverter

USER MANUAL

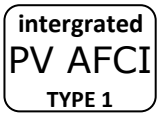
HYS/HAS-3.8LV-USG1
HYS/HAS-4.8LV-USG1
HYS/HAS-6.0LV-USG1
HYS/HAS-7.6LV-USG1
HYS/HAS-9.6LV-USG1
HYS/HAS-11.5LV-USG1

CONTENTS

1 Safety Introduction

1.1 Explanation of Symbols

The following types of safety precautions and general information symbols used in this manual must be followed during the installation, operation, and maintenance of the inverter.

Symbol	Usage
	Indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
	Indicates a hazard with a medium level of risk that, if not avoided, can result in death or serious injury.
	Indicates a hazard with a low level of risk that, if not avoided, can result in minor or moderate injury.
	Indicates a situation that, if not avoided, can result in property damage. NOTICE is used to address practices not related to personal injury.
	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.
	Burn danger due to hot surface that may exceed 60℃.
	Refer to the operating instructions.
	After the inverter is turned off, wait for at least 5 minutes before opening the inverter or touching live parts.
	Products shall not be disposed as household waste.
	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.
	A maximum of six (6) identical packages can be stacked.

1.2 Safety Information

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.

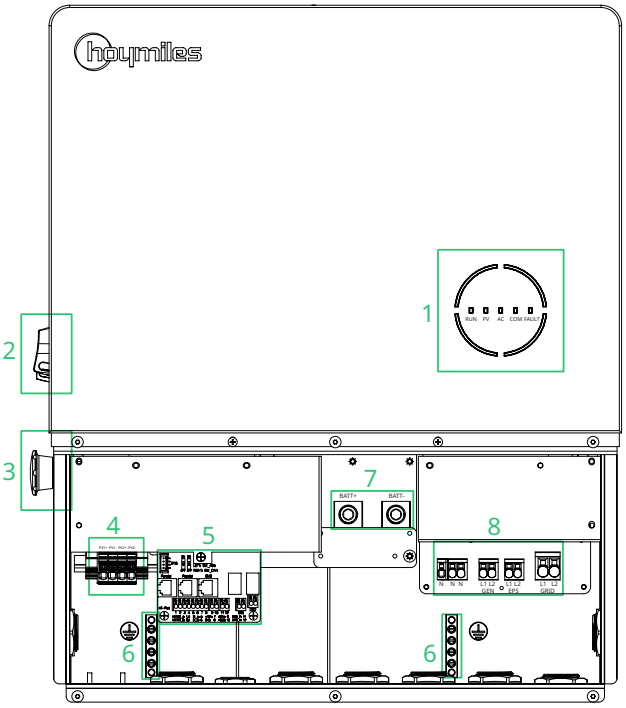
Symbol	Usage
	**Danger to life from electric shock** • Before performing any work on the inverter, disconnect all DC and AC power from the inverter and wait for at least 5 minutes. The hazardous voltage will exist for up to 5 minutes after disconnection from the power supply. • Never insert or remove 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.
	**Risk of burns from hot surfaces** • The surface of the inverter might exceed 60℃ (140℉), and touching the surface may result in burns. • Do not touch hot surfaces before it cools down.

 WARNING	• 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℃ (194℉). • 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.

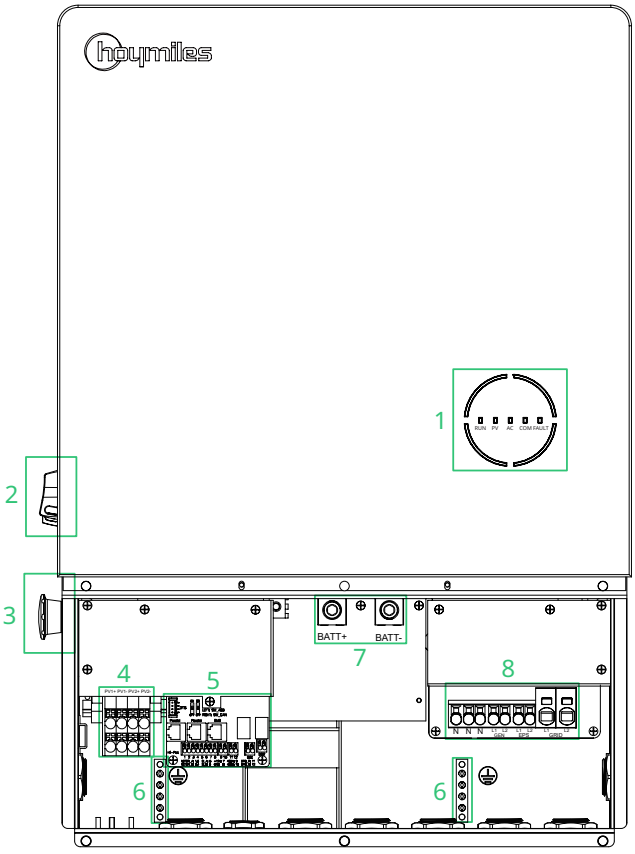
2 Product Introduction

2.1 Product Overview

The HYS/HAS-(3.8-11.5)LV-USG1 series inverter is a high-performance single-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

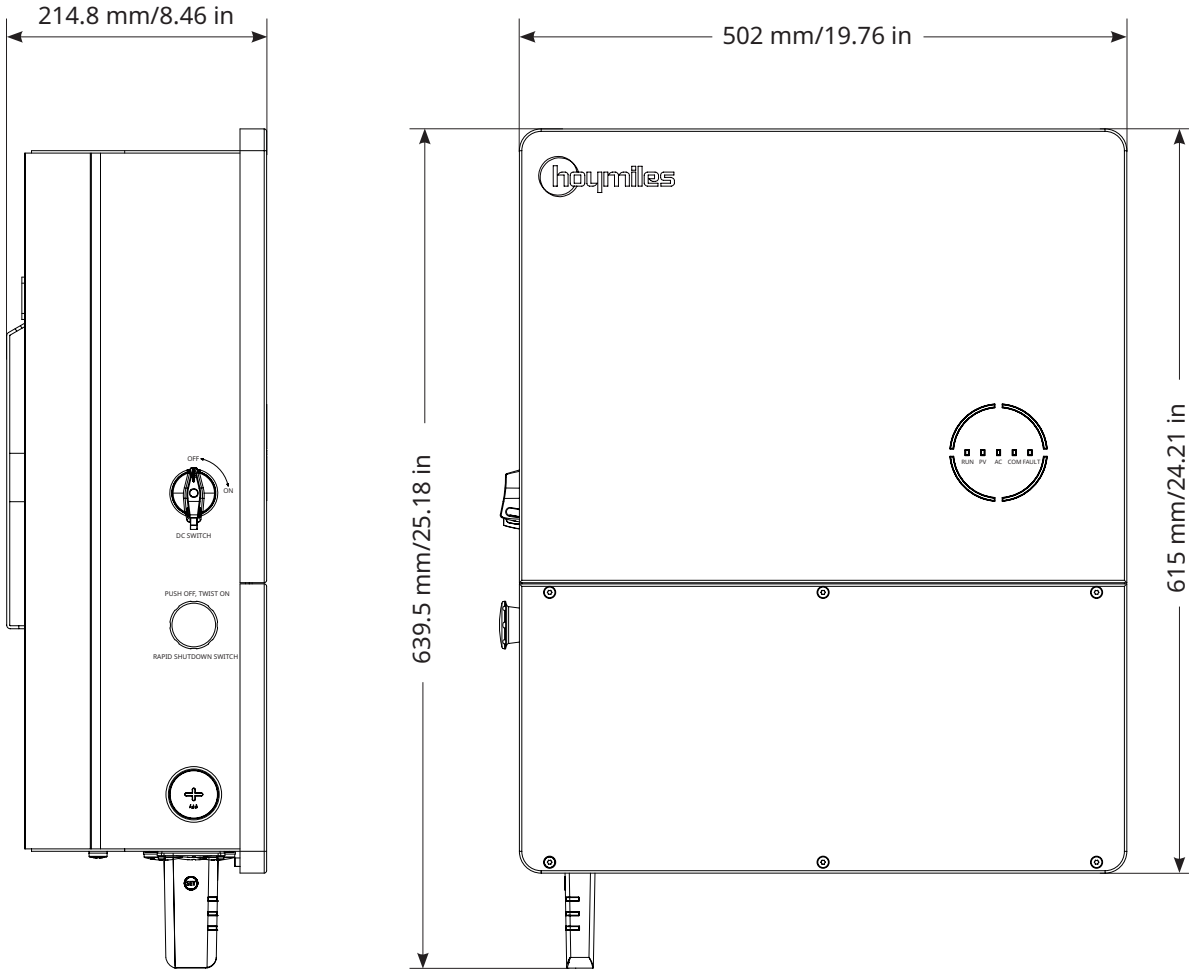
Note:

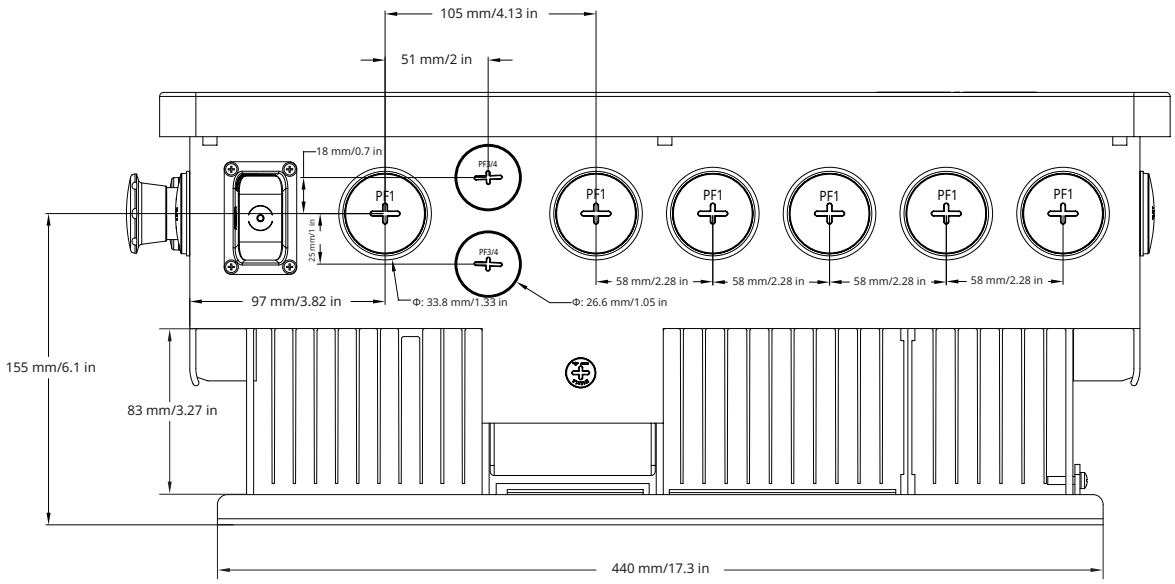
(1) Only for HYS-(3.8-11.5)LV-USG1 series inverter

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

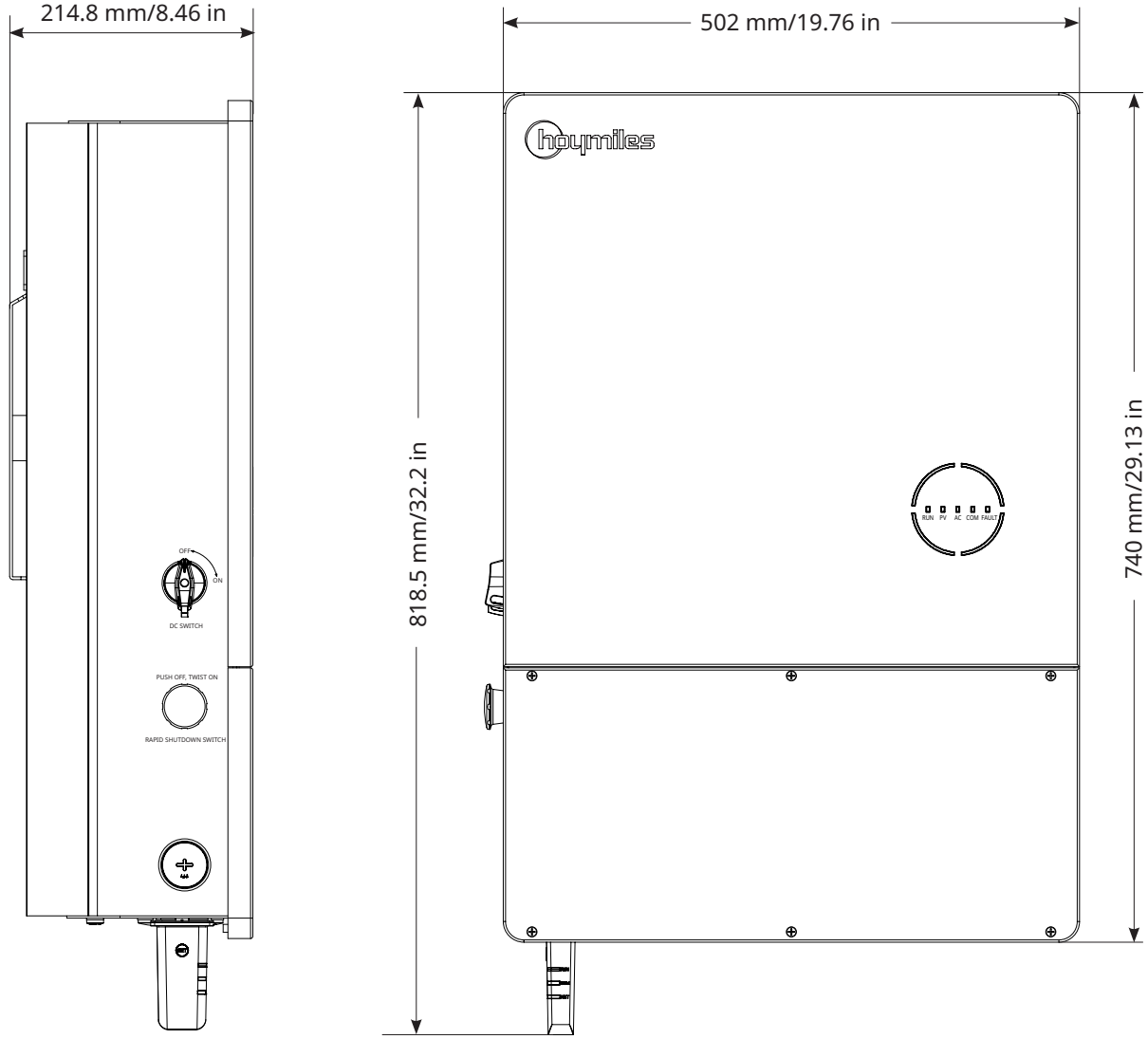
2.2 Product Dimensions

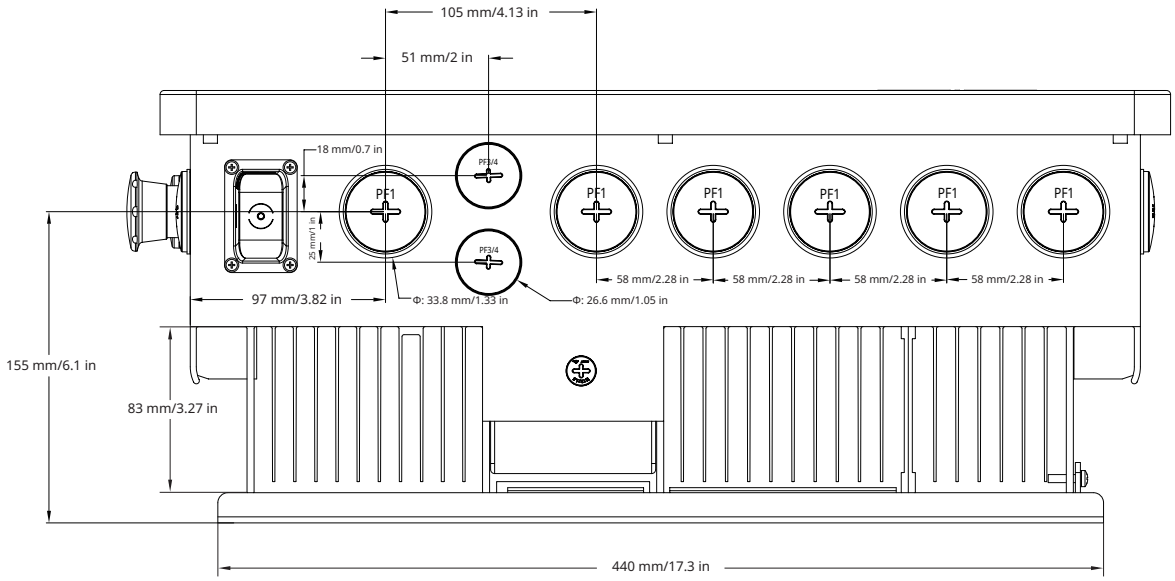
HYS-(3.8-6.0)LV-USG1



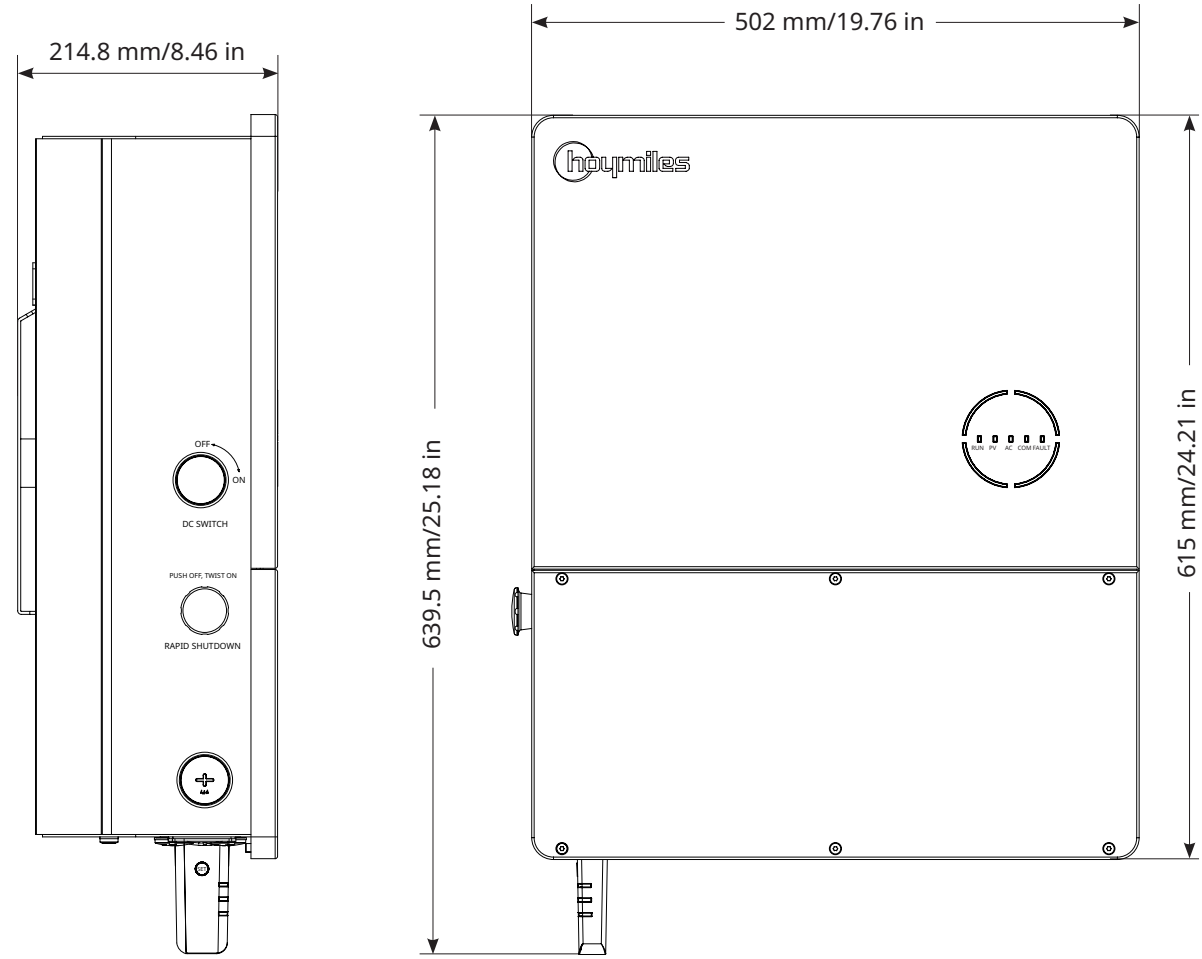


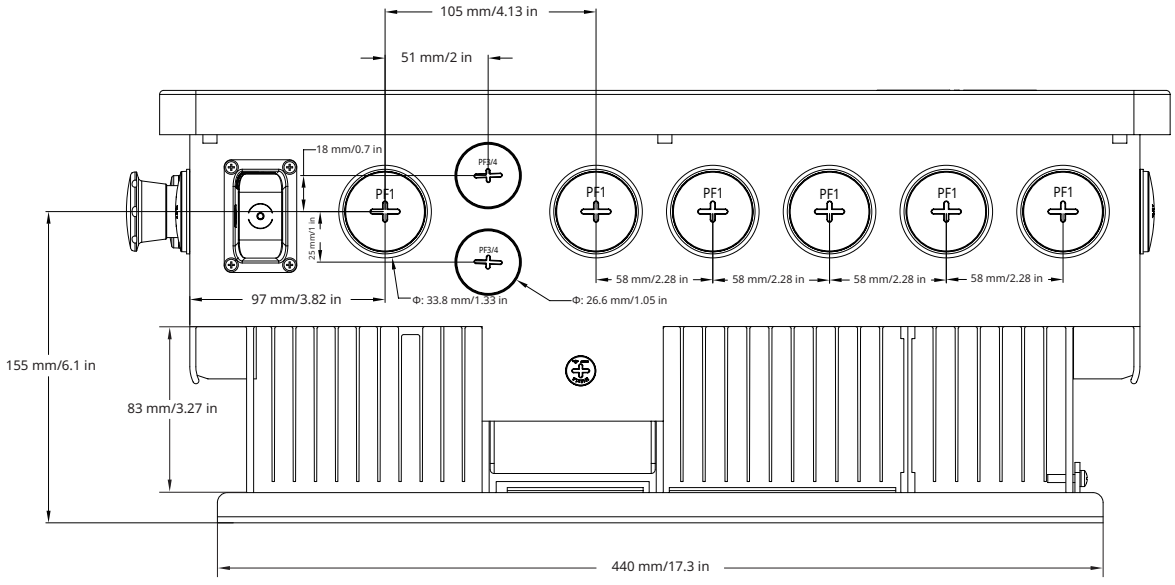
HYS-(7.6-11.5)LV-USG1



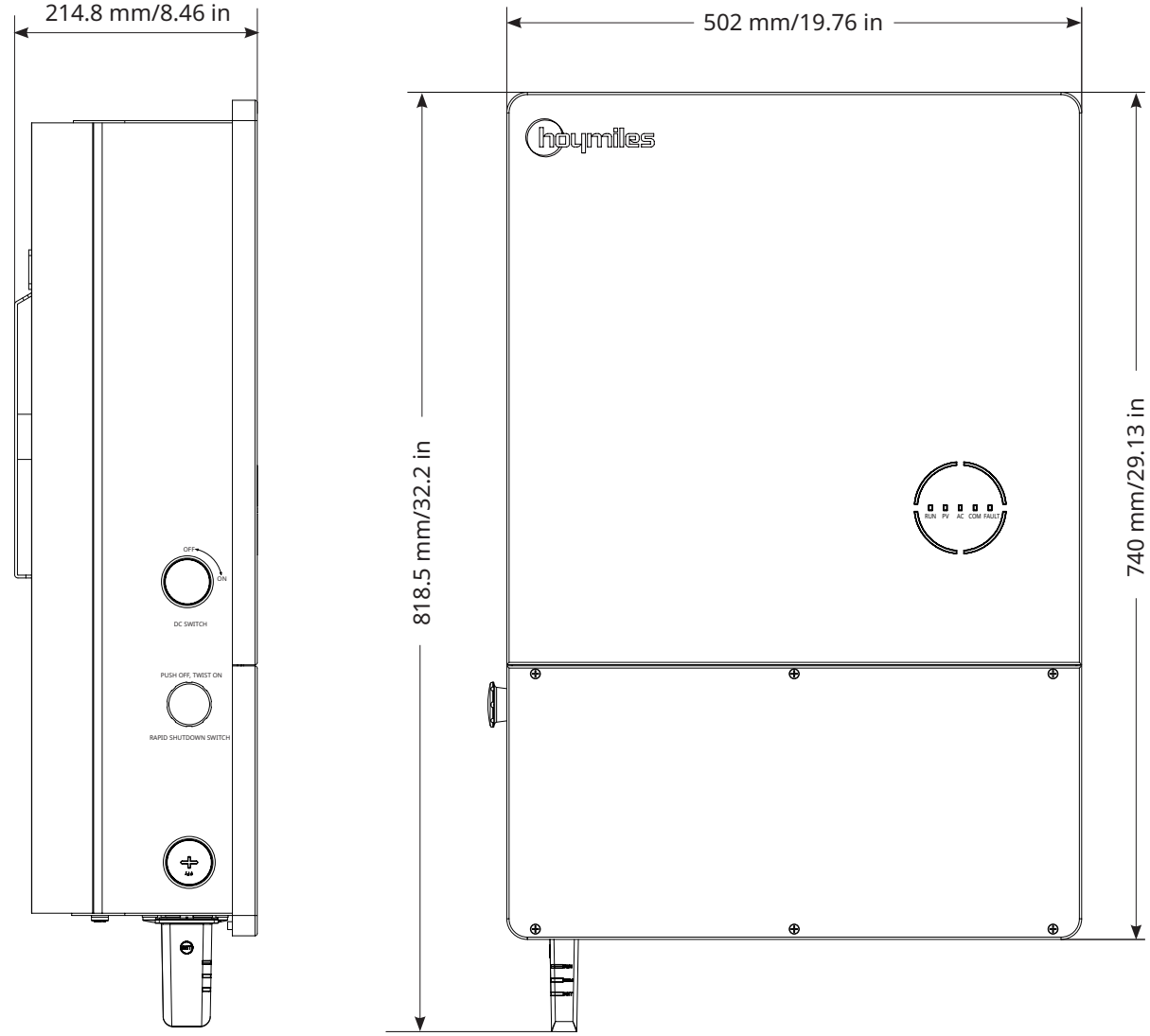


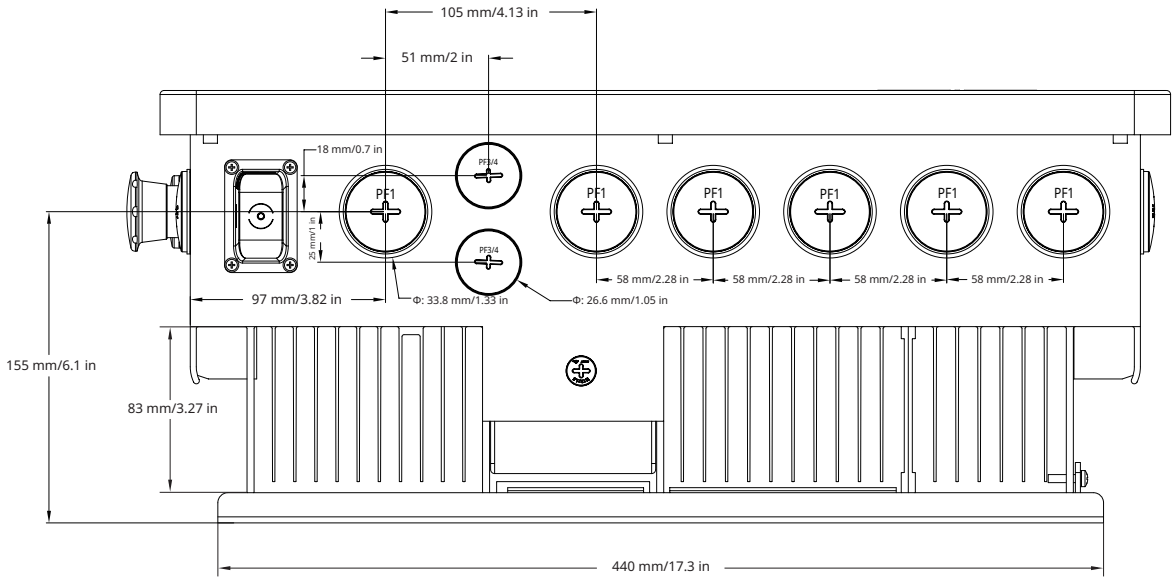
HAS-(3.8-6.0)LV-USG1



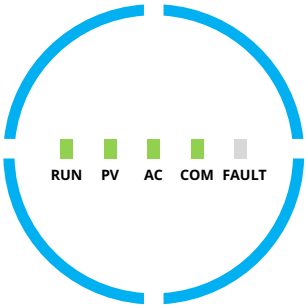


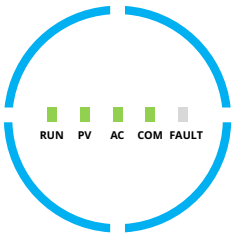
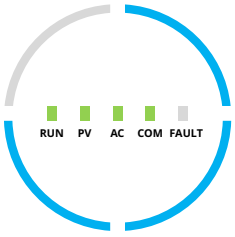
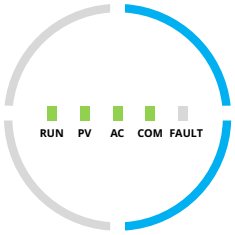
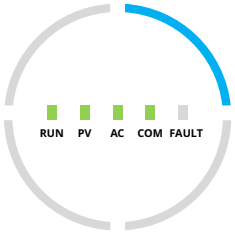
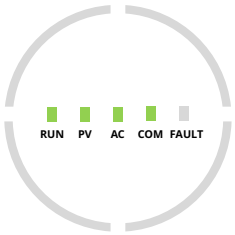
HAS-(7.6-11.5)LV-USG1

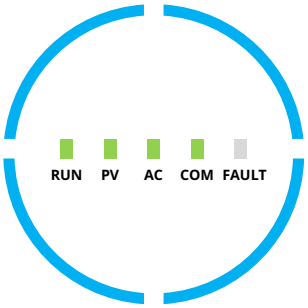




2.3 LED Indicators



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 (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

2.4 Protection Circuitry and Controls

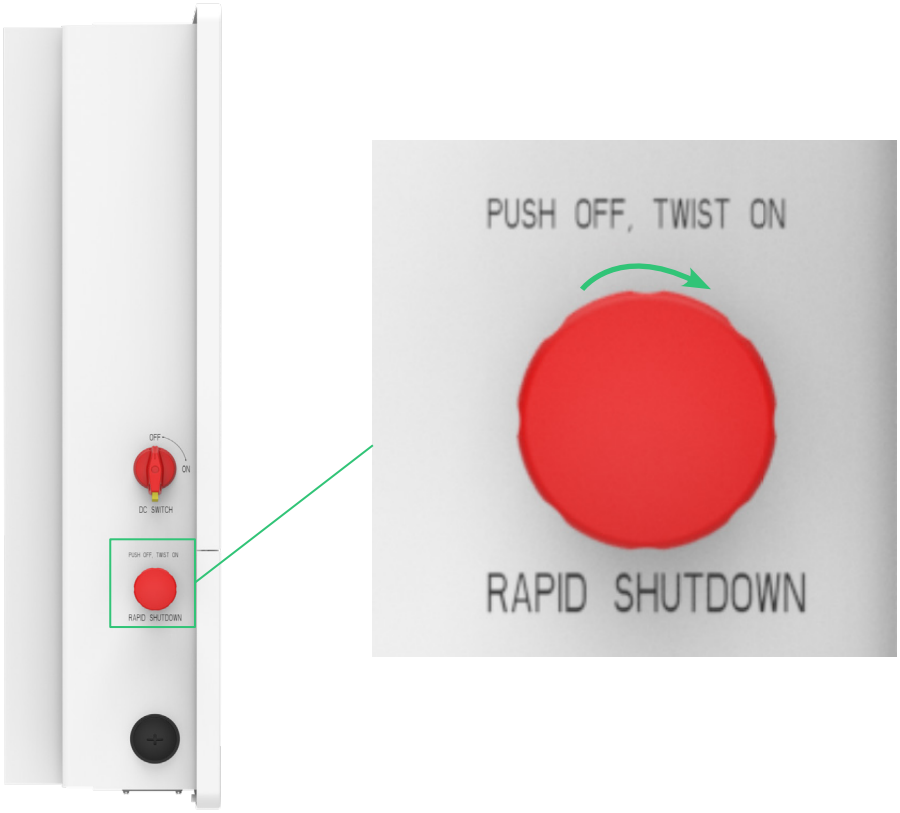
The Hoymiles HYS-(3.8-11.5)LV-USG1 series inverter is equipped with arc fault circuit breakers (AFCI) and rapid shutdown (RSD) for the protection circuit and control to meet the relevant codes and standards.

2.4.1 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.

2.4.2 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.

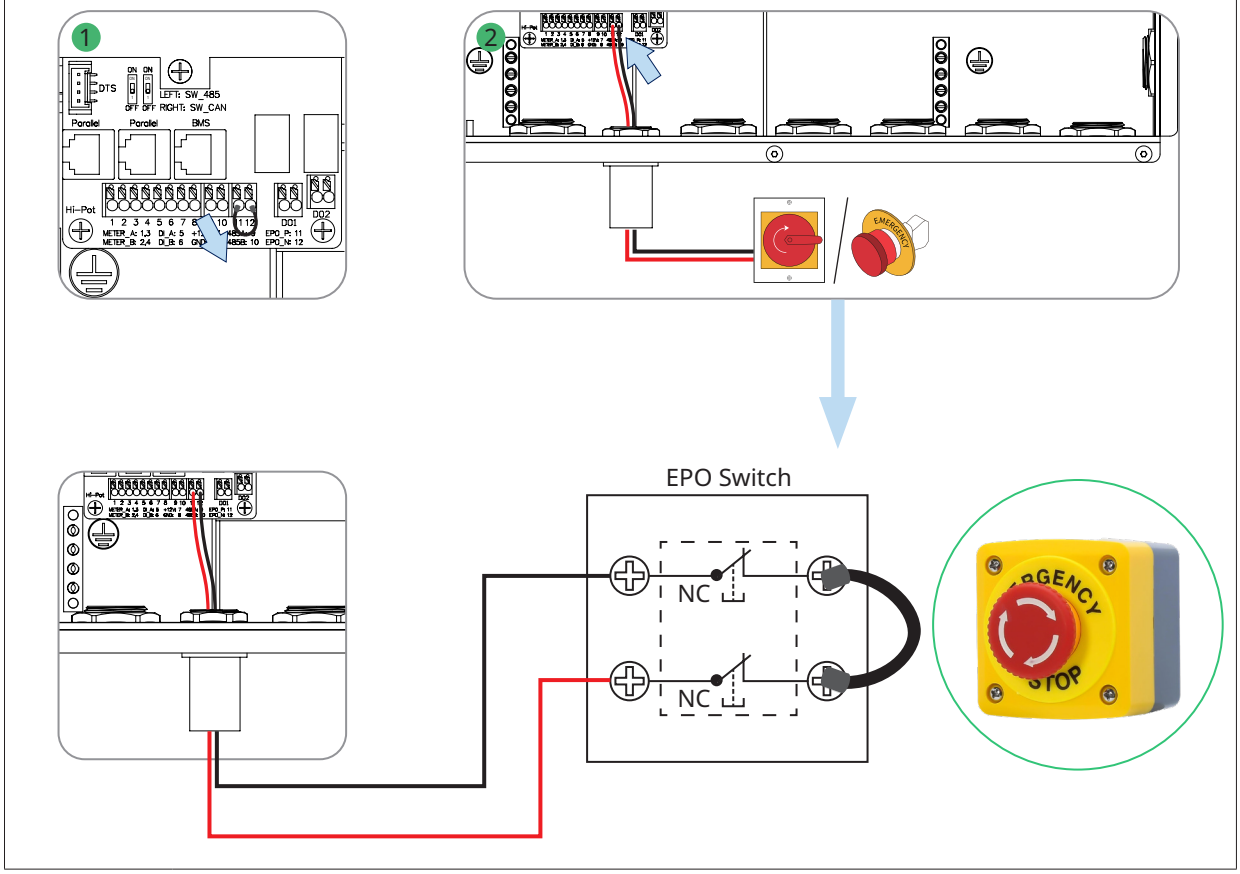
2.4.3 External Emergency Power Off Switch (Optional)

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.

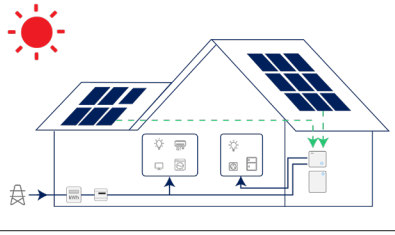
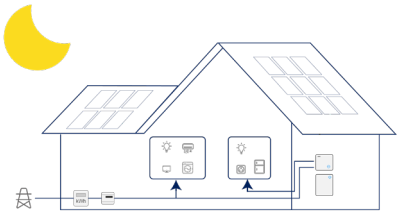
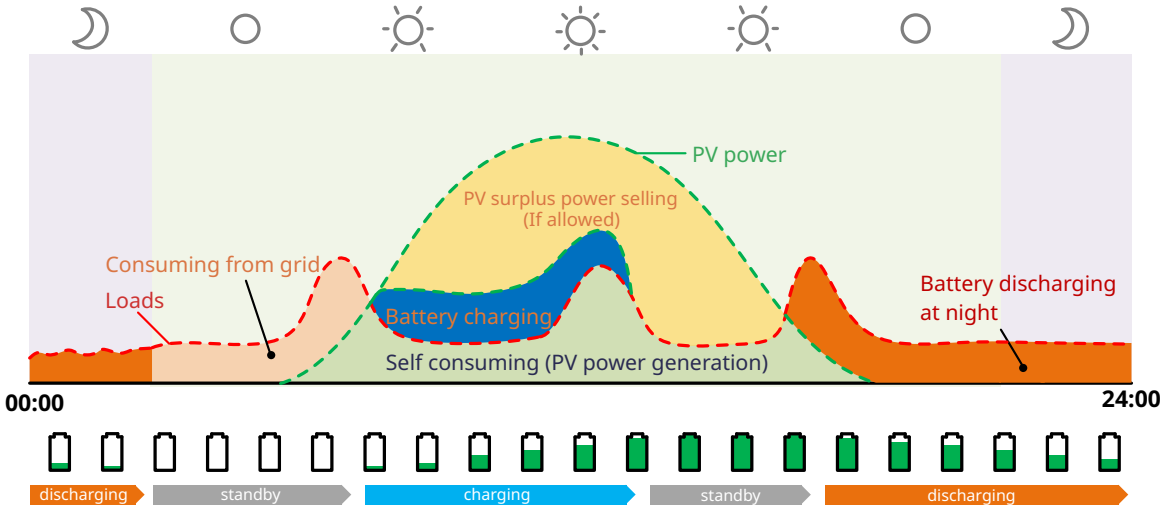
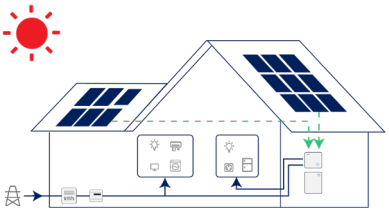


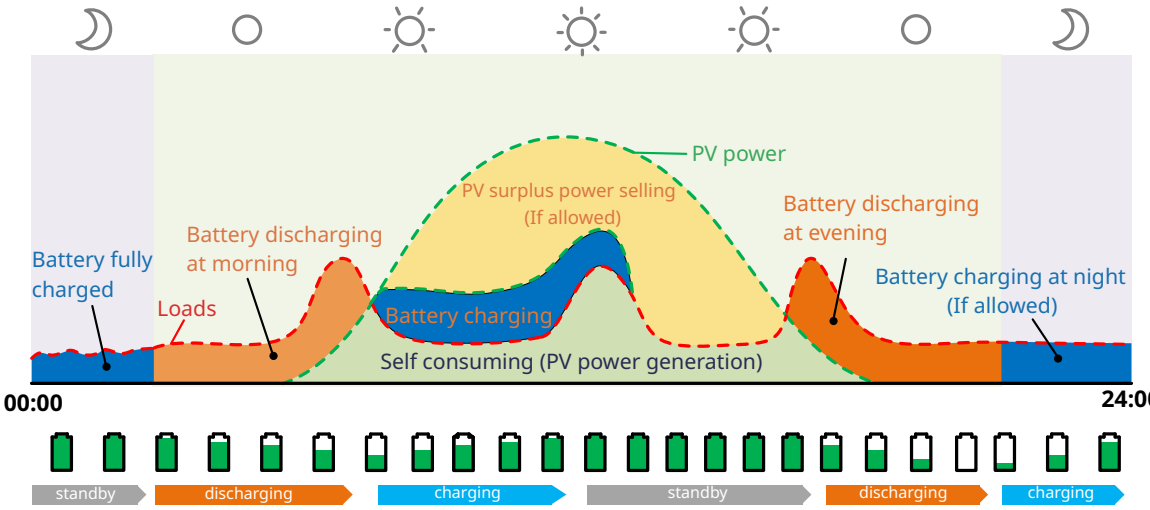
Note:

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

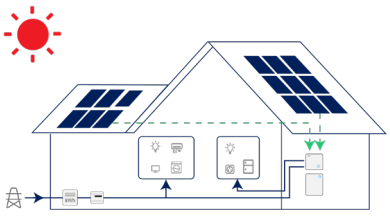
2.5 Operating Modes

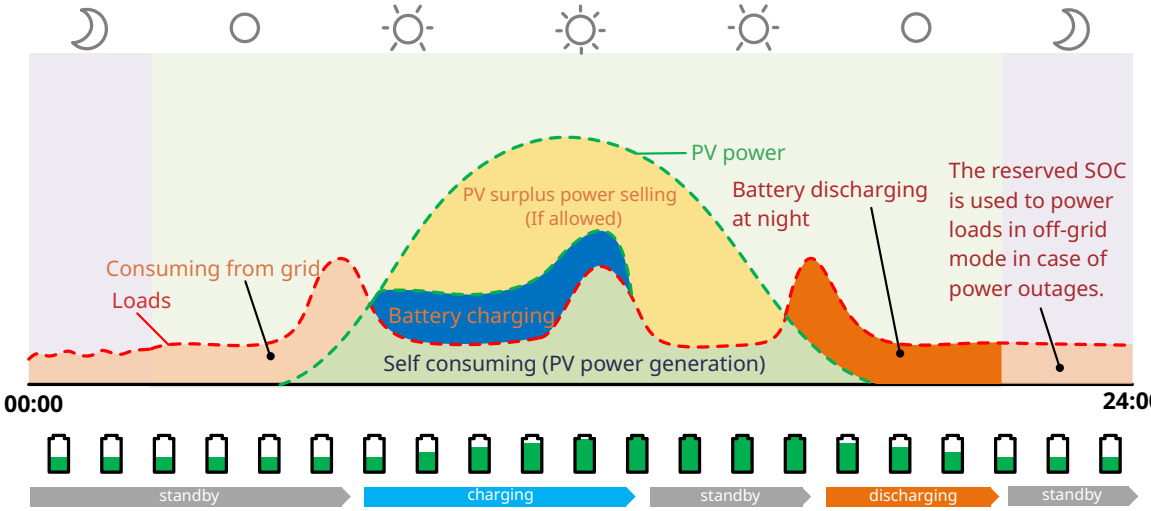
<table>
<tr><th colspan="3">Main Operation Modes</th></tr>
<tr><td colspan="3">The following operation modes are applicable for the HYS series inverter, and are also applicable for the HAS series inverter which is connected to the PV inverter through the GEN port.</td></tr>
<tr><td>Self-consumption Mode</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

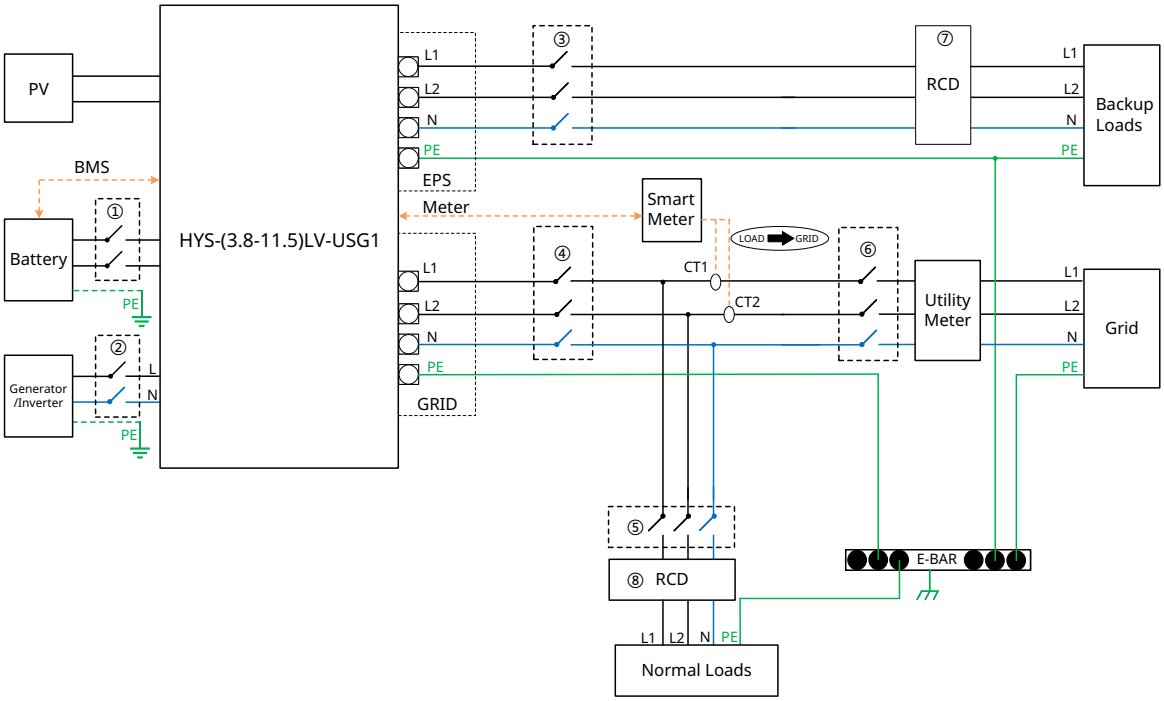
2.6 System Diagram

NOTICE	• The following diagrams are only intended to explain system architecture. Please comply with local laws and regualtion. • 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.

2.6.1 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 DC-coupled system for a new installation or an AC-coupled system to retrofit existing installations.

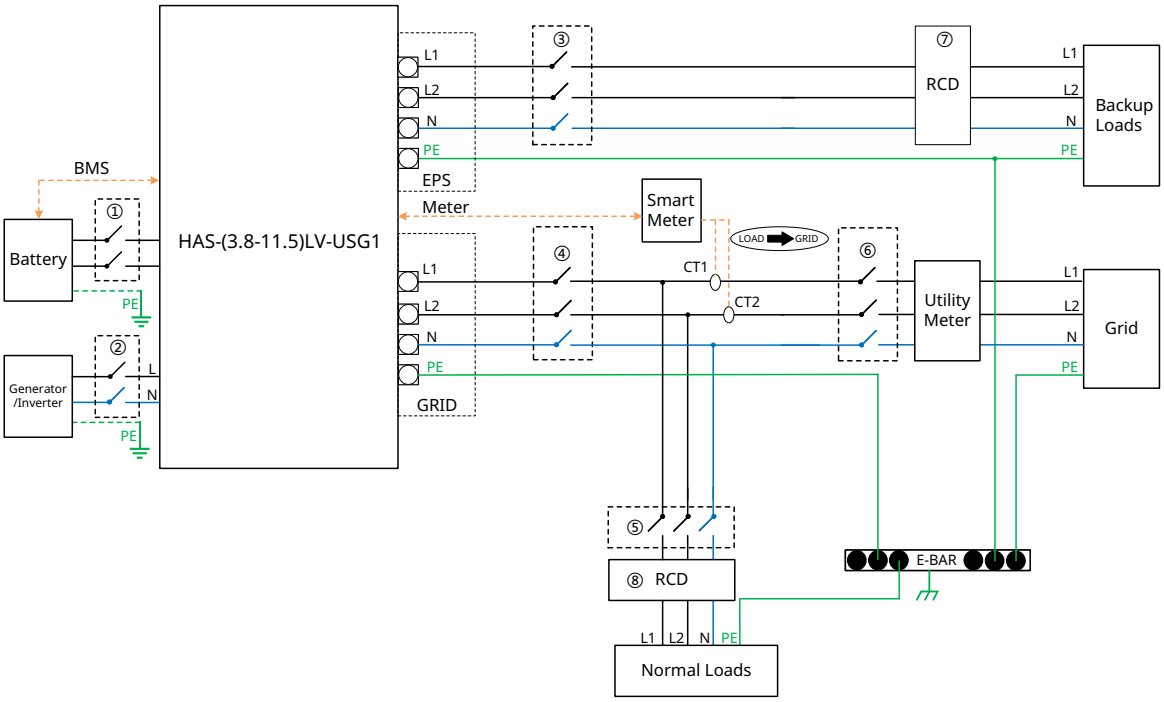


Note:

- 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, then 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.

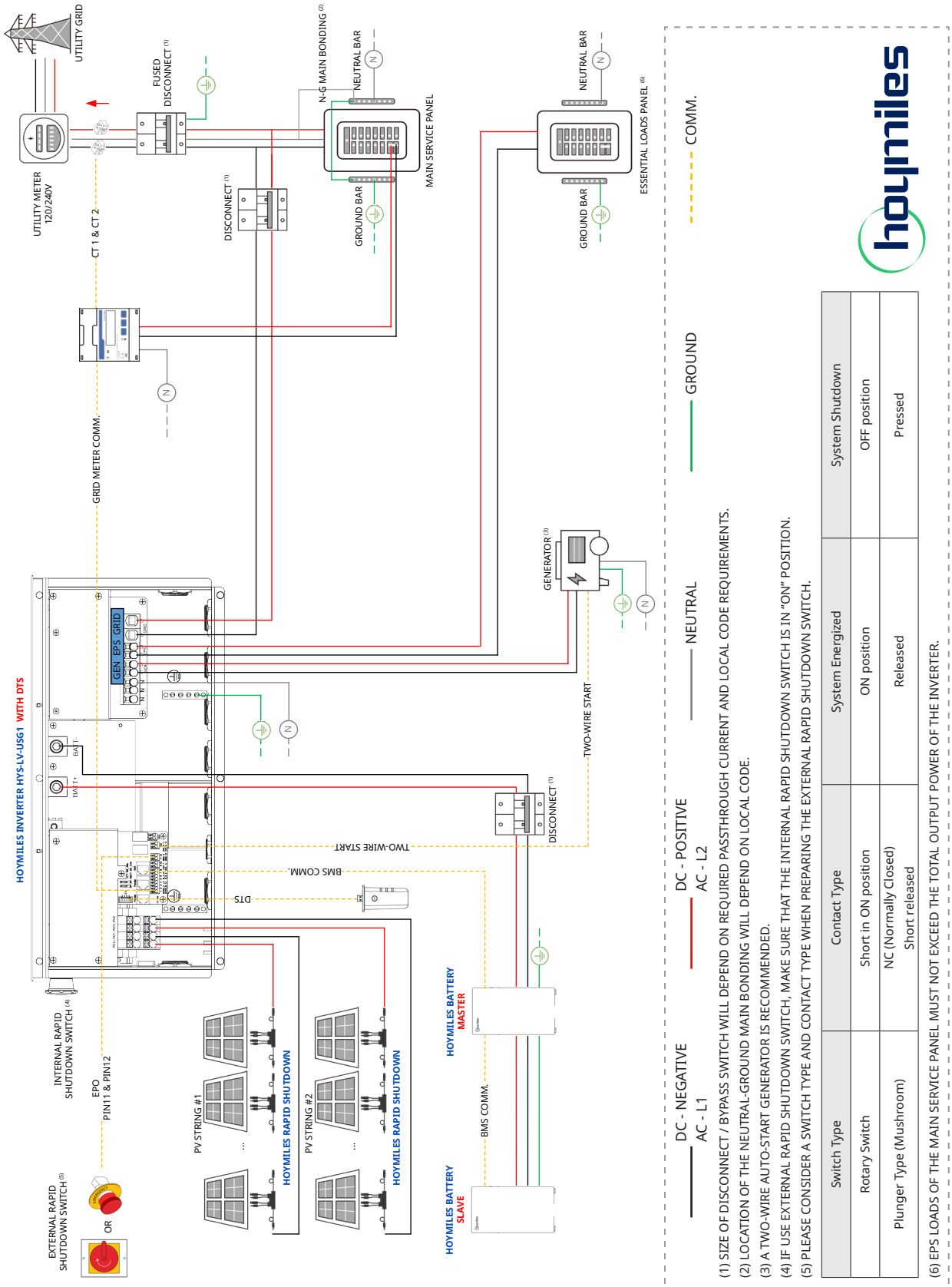


Note:

- 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.

2.6.2 Rerofit Diagram

Scenario 1 DC COUPLING SYSTEM AND PARTIAL HOME BACKUP WITH GENERATOR

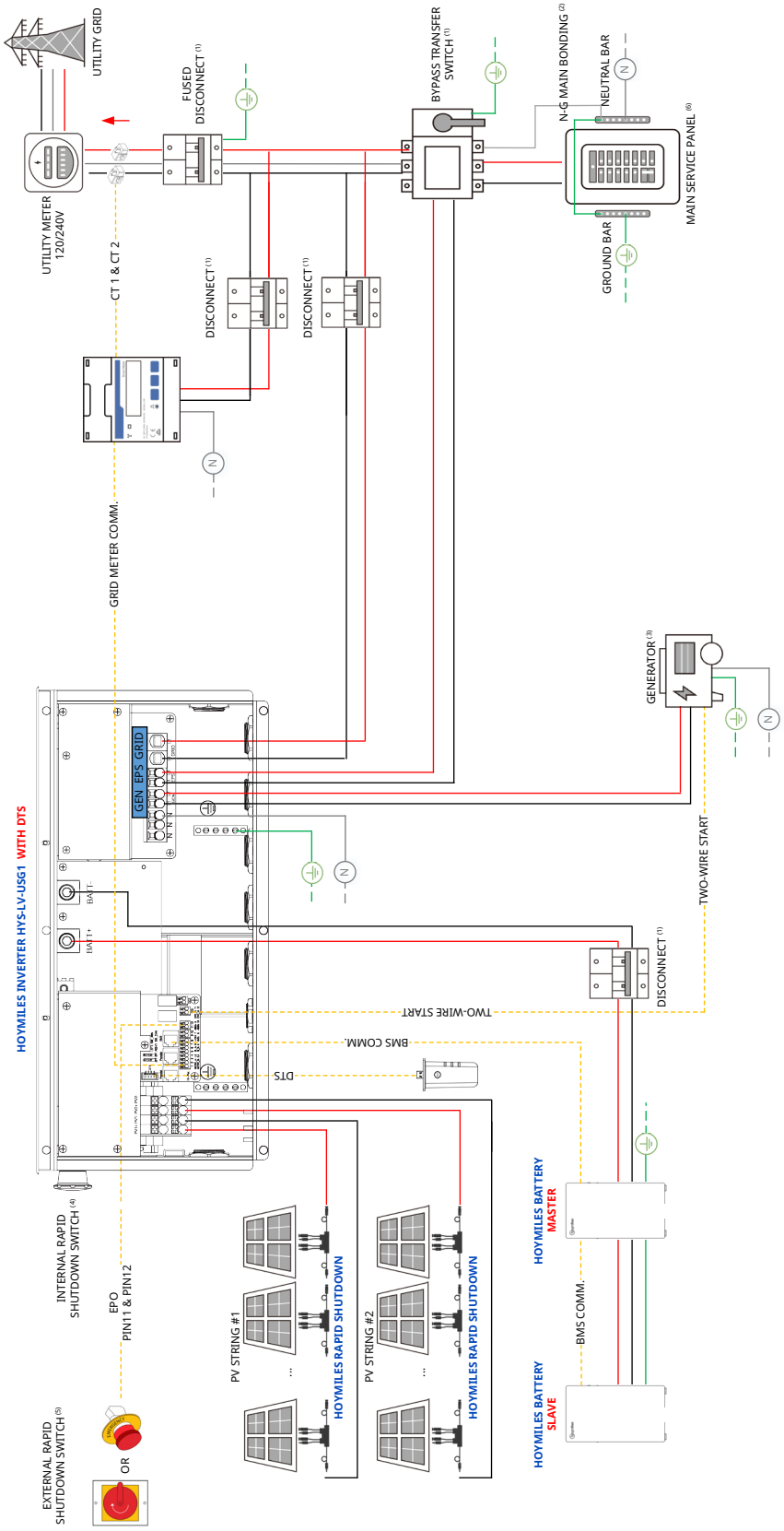


(1) SIZE OF DISCONNECT / BYPASS SWITCH WILL DEPEND ON REQUIRED PASSTHROUGH CURRENT AND LOCAL CODE REQUIREMENTS.
(2) LOCATION OF THE NEUTRAL-GROUND MAIN BONDING WILL DEPEND ON LOCAL CODE.
(3) A TWO-WIRE AUTO-START GENERATOR IS RECOMMENDED.
(4) IF USE EXTERNAL RAPID SHUTDOWN SWITCH, MAKE SURE THAT THE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



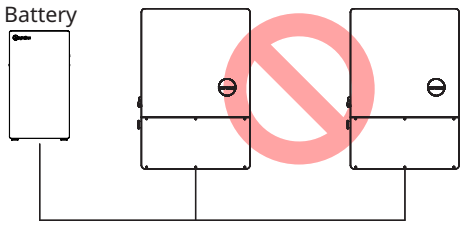
(1) SIZE OF DISCONNECT / BYPASS SWITCH WILL DEPEND ON REQUIRED PASSTHROUGH CURRENT AND LOCAL CODE REQUIREMENTS.
(2) LOCATION OF THE NEUTRAL-GROUND MAIN BONDING WILL DEPEND ON LOCAL CODE.
(3) A TWO-WIRE AUTO-START GENERATOR IS RECOMMENDED.
(4) IF USE EXTERNAL RAPID SHUTDOWN SWITCH, MAKE SURE THAT THE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

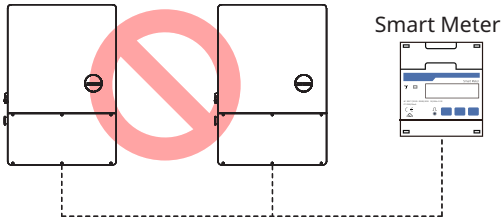
(6) EPS LOADS OF THE MAIN SERVICE PANEL MUST NOT EXCEED THE TOTAL OUTPUT POWER OF THE INVERTER.

2.6.3 Unacceptable Diagram

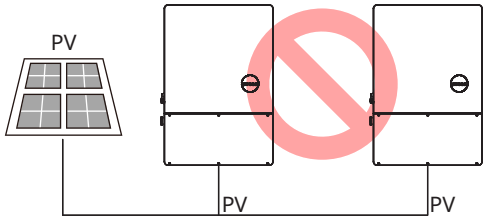
Avoid the following installation types to prevent damage to the system or the inverter.



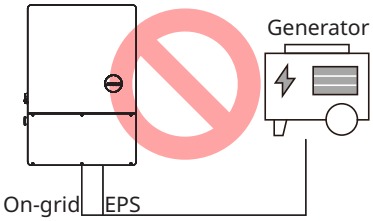
One battery cannot be connected to multiple inverters.



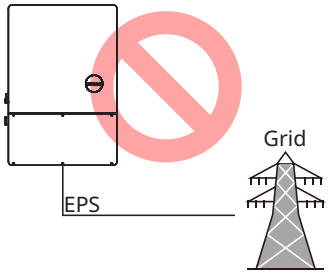
One meter cannot be connected to multiple inverters and different CTs cannot be connected to the same line cable.



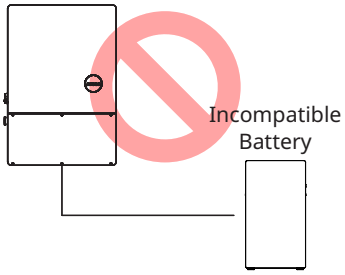
Single PV cannot be connected to multiple inverters.



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



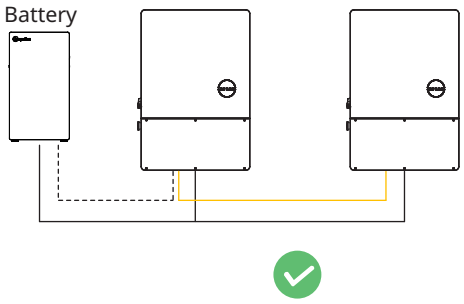
EPS port cannot be connected to grid directly.

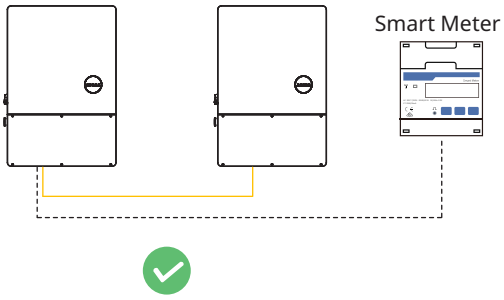


Incompatible battery cannot be connected to battery port.

Note:

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



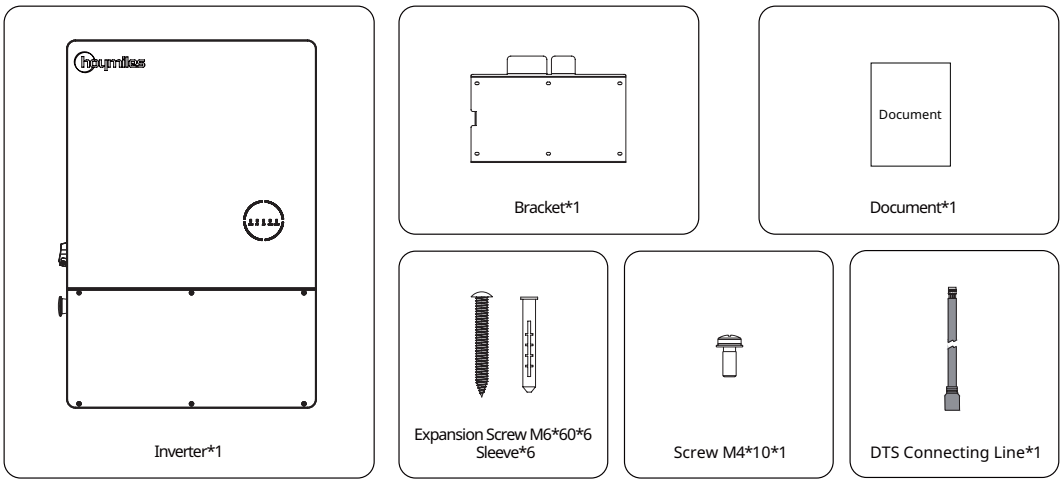


3 Installation Instruction

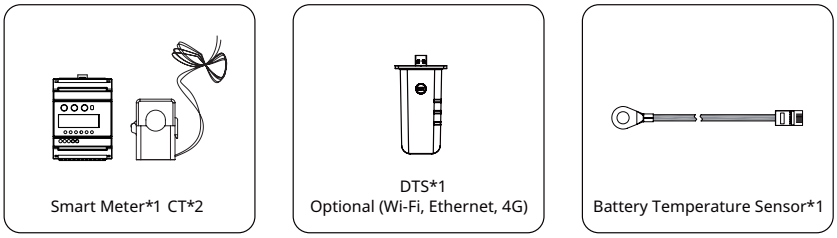
3.1 Packing List

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

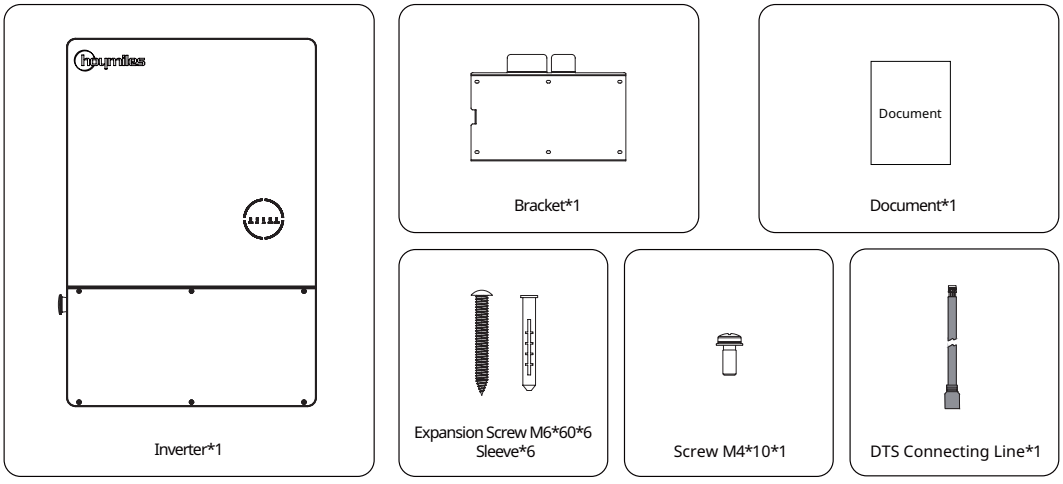
HYS-(3.8-11.5)LV-USG1



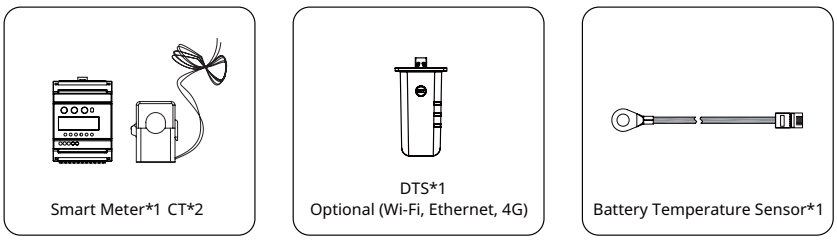
Accessories Packing List (Optional)



HAS-(3.8-11.5)LV-USG1



Accessories Packing List (Optional)



3.2 Installation Tools

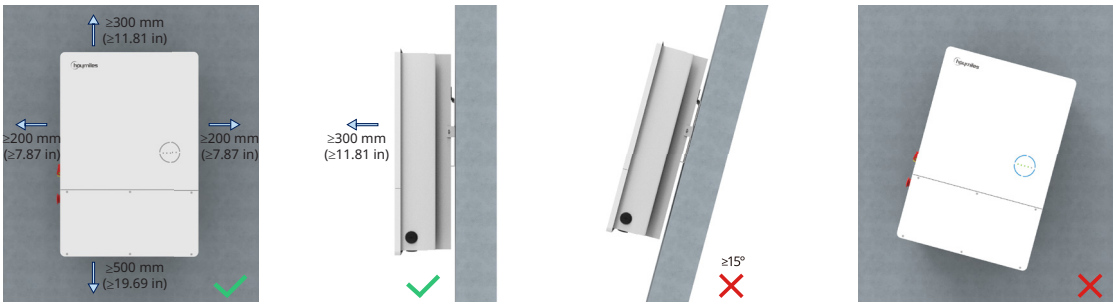
The following tools are recommended in the installation process, and other auxiliary tools can also be used on site if necessary.

3.3 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.

Check List

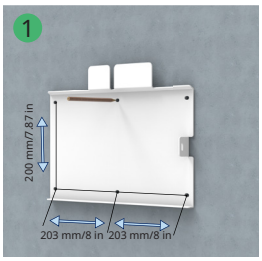
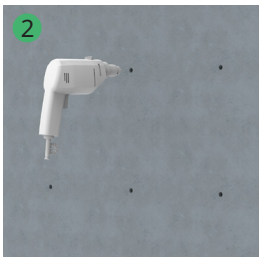
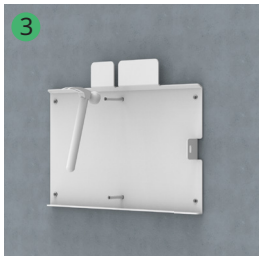
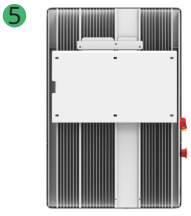
1. The inverter installation should be protected by shelter from direct sunlight or bad weather such as snow, rain, or lightning.
2. The inverter should be installed on a solid surface that is suitable for the inverter's dimensions and weight.
3. The inverter should be installed vertically or at a maximum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



4. The inverter should be installed in an environment with good ventilation and heat dissipation conditions.
5. 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.
6. The relative humidity should be less than 95%, without condensing.
7. The inverter should be installed at eye level for convenient maintenance.
8. The product label on the inverter should be visible after installation.
9. The inverter should be installed far from flammable materials.

3.4 Wall Mounting Steps

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

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

4 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.

4.1 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℃/194℉, 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℃/194℉, 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.

4.2 Recommended Cable List

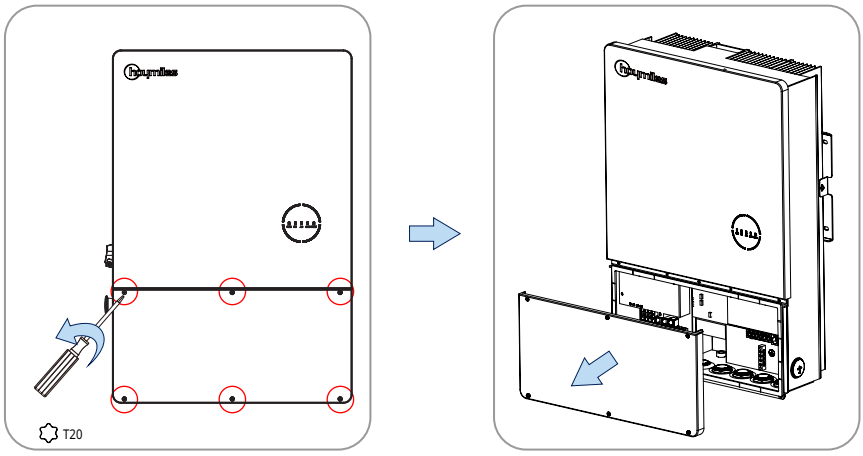
This data is the cable specification recommended by Hoymiles. For proper cable specifications, please refer to local laws and regulations and actual installation.

Cable (90℃/194℉, 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℃/194℉, 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

4.3 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.



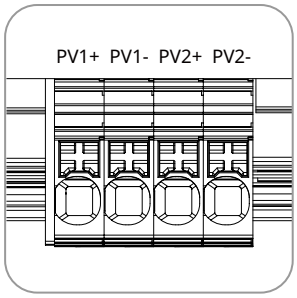
4.4 PV Cable Connection (Only for HYS series inverters)

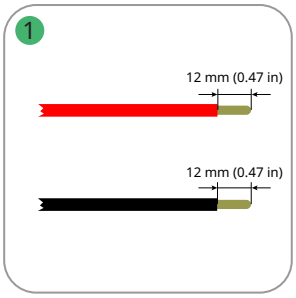
WARNING	Before connecting PV cables, please make sure all requirements listed below are followed. • The voltage, current and power ratings of the panels to be connected are within the allowable range of the inverter. Ensure the polarity is correct, and please refer to the technical parameters in Chapter 5 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.

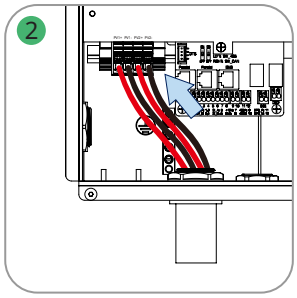
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS-3.8LV-USG1	HYS-4.8LV-USG1	HYS-6.0LV-USG1	HYS-3.8LV-USG1	HYS-4.8LV-USG1	HYS-6.0LV-USG1
PV	20 A	20 A	20 A	14-6 AWG	14-6 AWG	14-6 AWG

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.



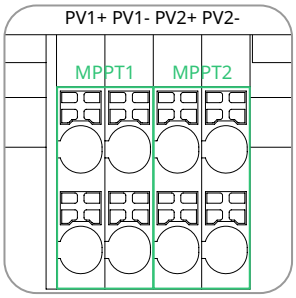


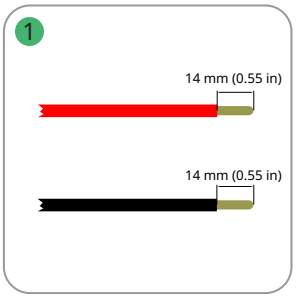


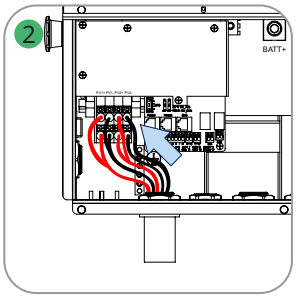
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90℃/194℉, Copper)		
	HYS-7.6LV-USG1	HYS-9.6LV-USG1	HYS-11.5LV-USG1	HYS-7.6LV-USG1	HYS-9.6LV-USG1	HYS-11.5LV-USG1
PV	20 A	20 A	20 A	14-6 AWG	14-6 AWG	14-6 AWG

Cable (90℃/194℉, 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.







4.5 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.

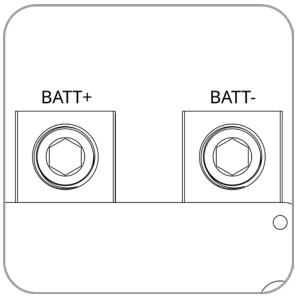
If you need to use this hybrid inverter or AC-coupled inverter as a grid-tied inverter, please contact Hoymiles for help.

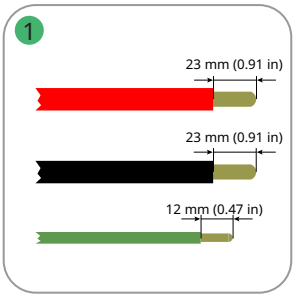
WARNING	• A two-pole DC breaker with an overcurrent protection (OCP) function is compulsory to be installed between the inverter and battery. The battery may have this switch integrated. If not, an external DC switch of proper ratings should be used. • Make sure the breaker mentioned above is in the “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, please refer to “5.2 System Commissioning of Wireless Access Point (AP) Connection”.

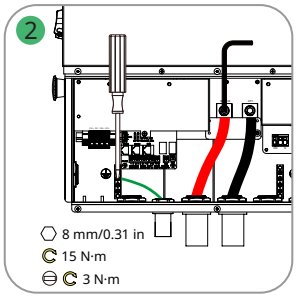
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1
Battery	100 A	125 A	125 A	3-1/0 AWG	2-2/0 AWG	2-2/0 AWG

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	• Strip the battery cable insulation by 23 mm (0.91 in). • 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.



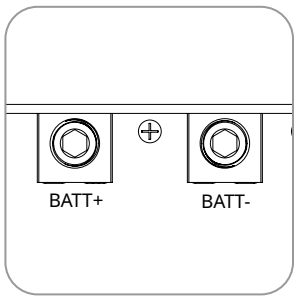


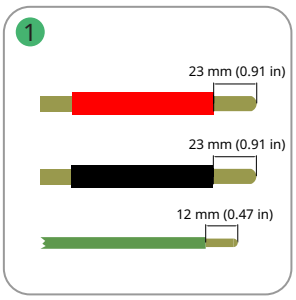


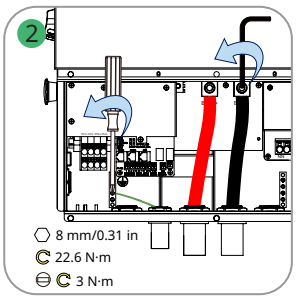
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
Battery	200 A	250 A	250 A	3/0-4/0 AWG	4/0 AWG	4/0 AWG

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	• Strip the battery cable insulation by 23 mm (0.91 in). • 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.







4.6 AC Cable Connection

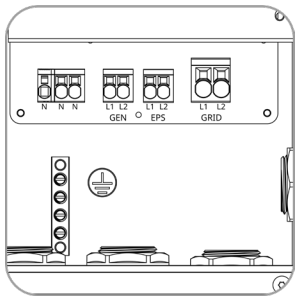
The following diagrams are examples of connecting grid cables, and the GEN and EPS connection methods are the same as grid connection. For recommended cable specifications of EPS and GEN, please refer to the following recommended cable list.

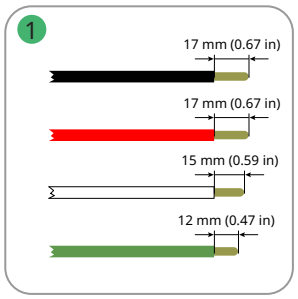
WARNING	Before connecting the AC cables, please make sure all requirements listed below are followed. • An independent two or three circuit breaker must be installed on the output side of the inverter to ensure safe disconnection from the grid. • Multiple inverters cannot share one circuit breaker. • Never connect a load between the inverter and the circuit breaker. • Make sure that the overcurrent protection devices (OCPDs) (breakers) are turned off. • Before proceeding to the next step, make sure that the AC voltages are 0 Vac through a multimeter.

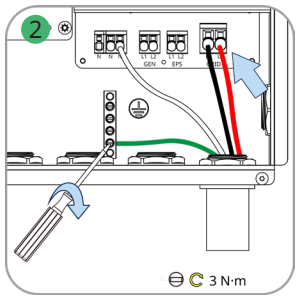
Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1
Grid L1/L2	40 A	50 A	50 A	10-4 AWG	8-4 AWG	8-4 AWG
EPS/GEN L1/L2	20 A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





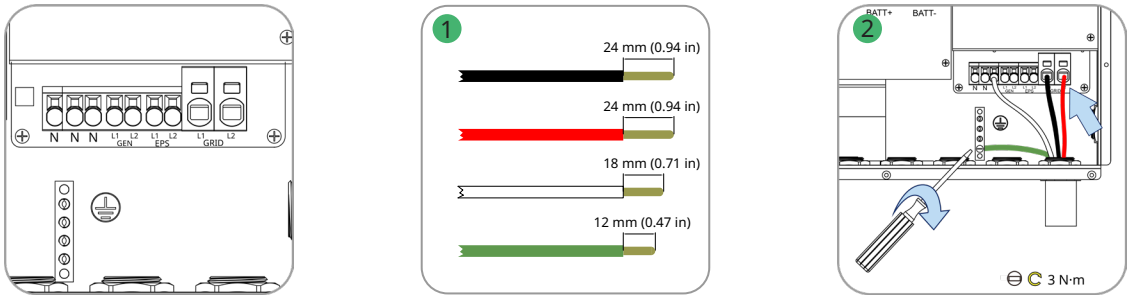


Overcurrent Protection (Circuit Breaker)	Recommended Specification			Recommended Cable Range (90°C/194°F, Copper)		
	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
Grid L1/L2	80 A	100 A	100 A	4-1 AWG	3-1 AWG	3-1 AWG
EPS/GEN L1/L2	40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



4.6.1 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

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

4.6.2 Generator Control

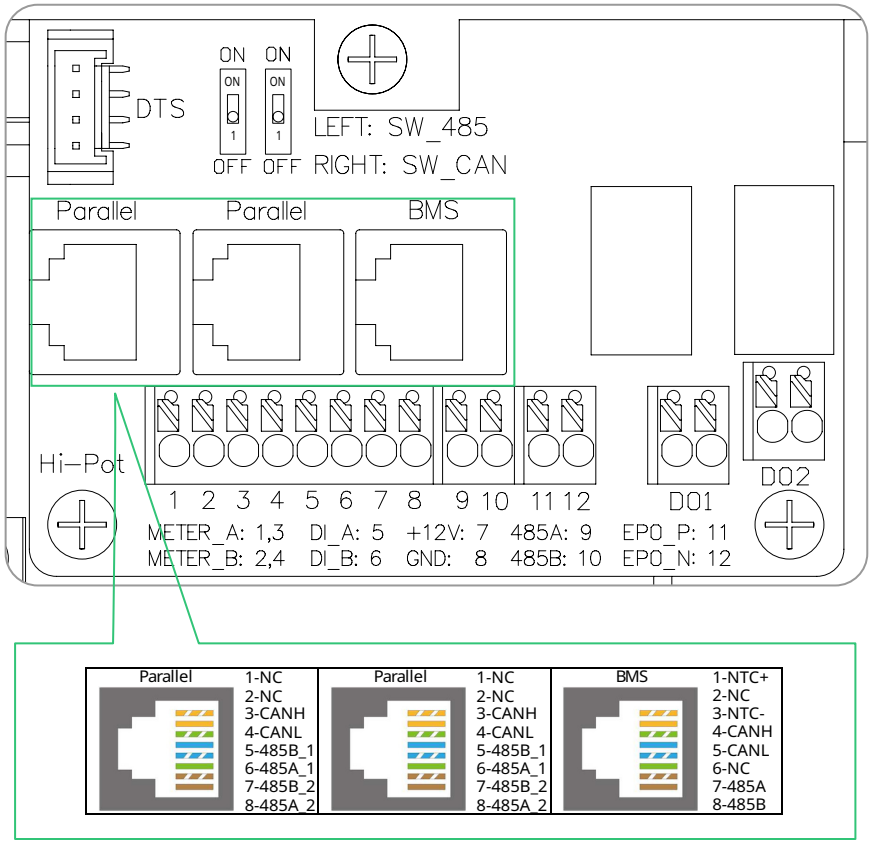
A generator can be connected to the GRID port or GEN port, and multiple generators only can be connected to the GRID port. It is recommended to use generators controlled by dry contact. Connect the generator to the DO1 port of the inverter as described in "4.7.3 DO connection", and start and stop it using the S-Miles App. For detailed online operations, please refer to "5.2 System Commissioning of Wirless Access Point (AP) Connection".

4.6.3 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 "4.7.3 DO connection", and start and stop it using the S-Miles App. For detailed online operations, please refer to "5.2 System Commissioning of Wireless Access Point (AP) Connection".

4.7 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.

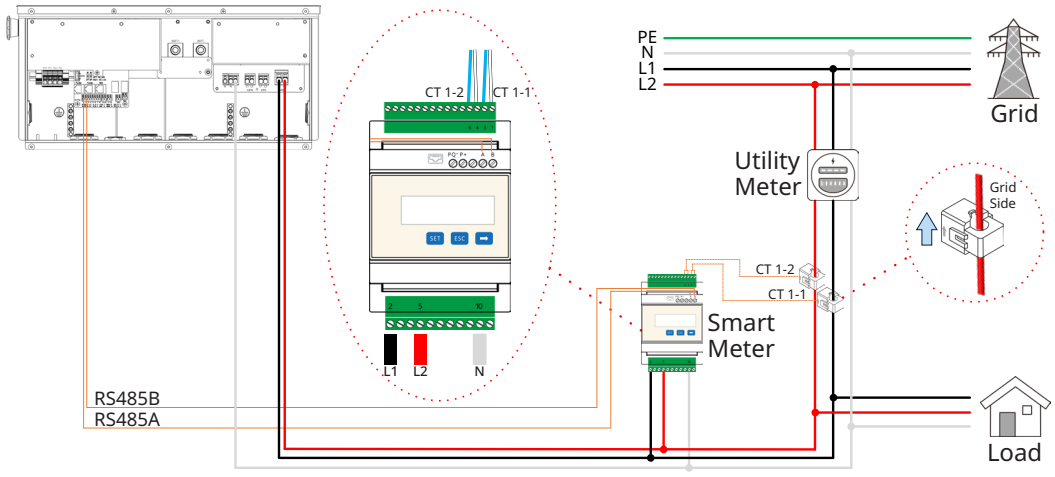
4.7.1 Smart Meter and CT Connection

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.

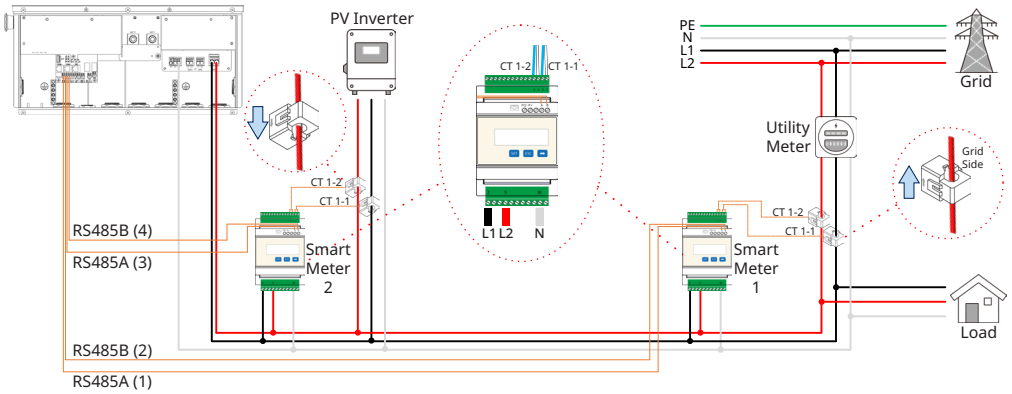
WARNING	• Before connecting the smart meter and CT, ensure that the AC cable is totally isolated from the AC power source.
NOTICE	• One smart meter can be used with only one inverter. • One CT must be used for one smart meter and must be connected to the same phase with the smart meter power cable. • 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℃/194℉, 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 wire of CT 1-1 to terminals 1/3, and respectively connect the white and blue wire 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).

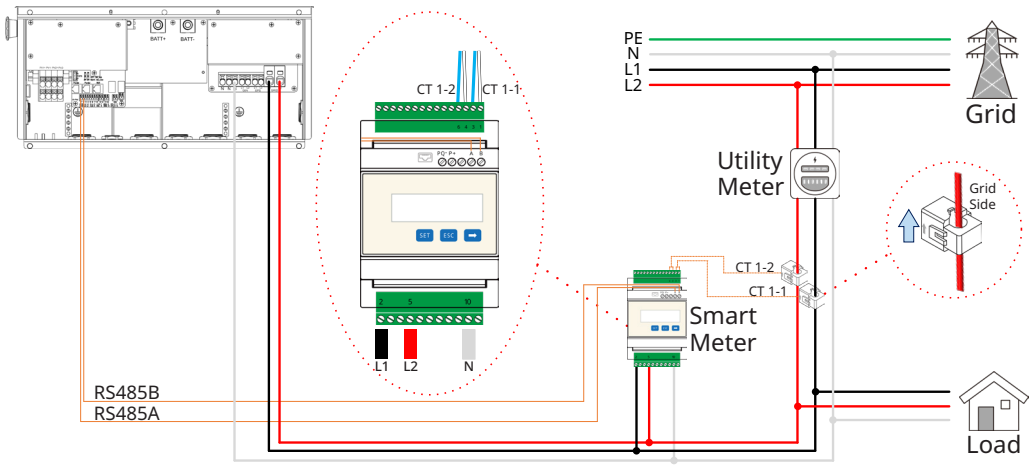


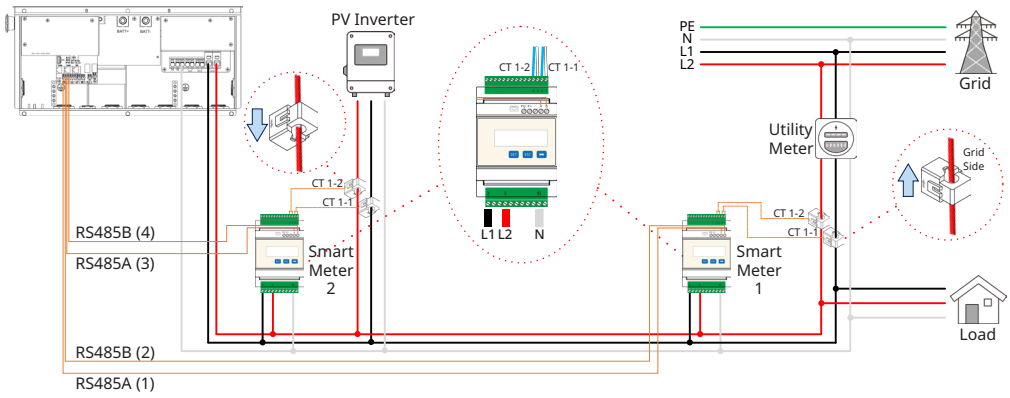
Procedure (HAS-3.8/4.8/6.0LV-USG1)	
Step 1	• The connection method of smart meter 1 is the same as that described above. The arrow on the surface of CT should point to the grid.
Step 2	• If the PV inverter is connected to the grid port, connect terminals 2/5/10 of smart meter 2 to PV inverter L1 (Black)/L2 (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℃/194℉, 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 wire of CT 1-1 to terminals 1/3, and respectively connect the white and blue wire 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).



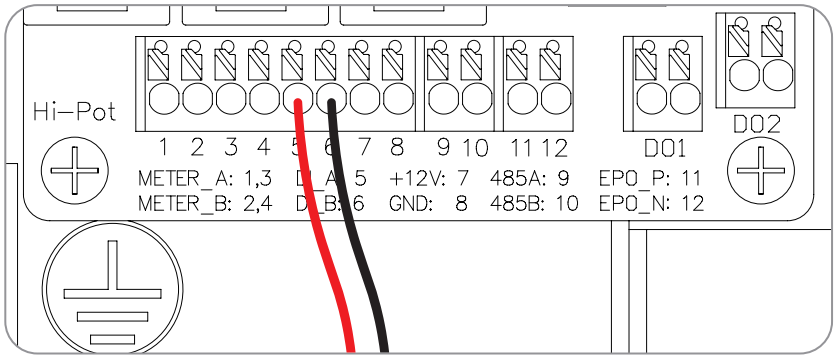
Procedure (HAS-7.6/9.6/11.5LV-USG1)	
Step 1	• The connection method of smart meter 1 is the same as that described above. The arrow on the surface of CT should point to the grid.
Step 2	• If the PV inverter is connected to the grid port, connect terminals 2/5/10 of smart meter 2 to PV inverter L1 (Black)/L2 (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 should be purchased from Hoymiles.
- Manually enter the meter SN or scan the barcode to identify the SN. After that, the meter address is automatically set. 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.

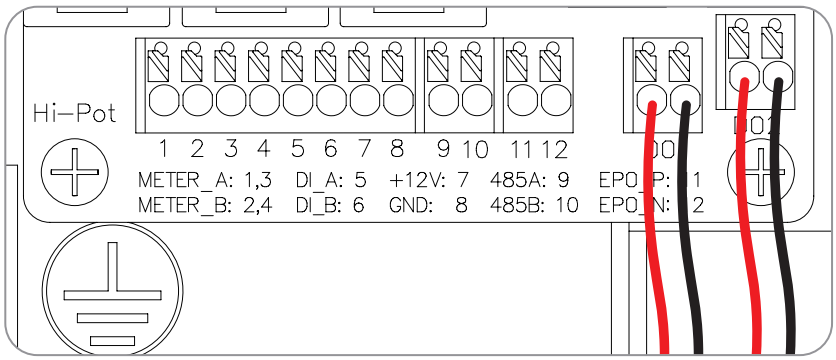
4.7.2 DI Connection

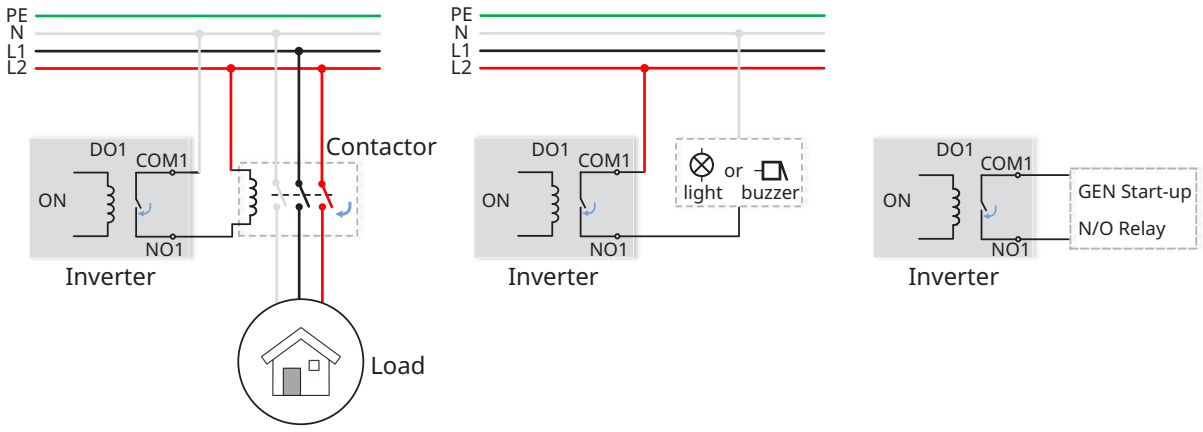
There is an integrated DI (DI_A, DI_B) as the dry contact input to the bypass contactor of the inverter.



4.7.3 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.



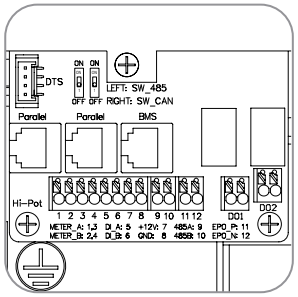
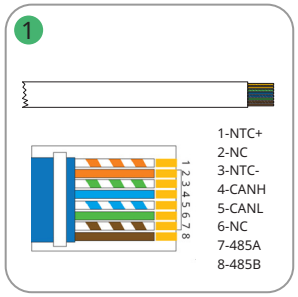
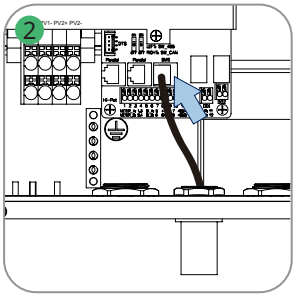


DO1-Load Control | DO1-Earth Fault Alarm | DO1-Generator Control

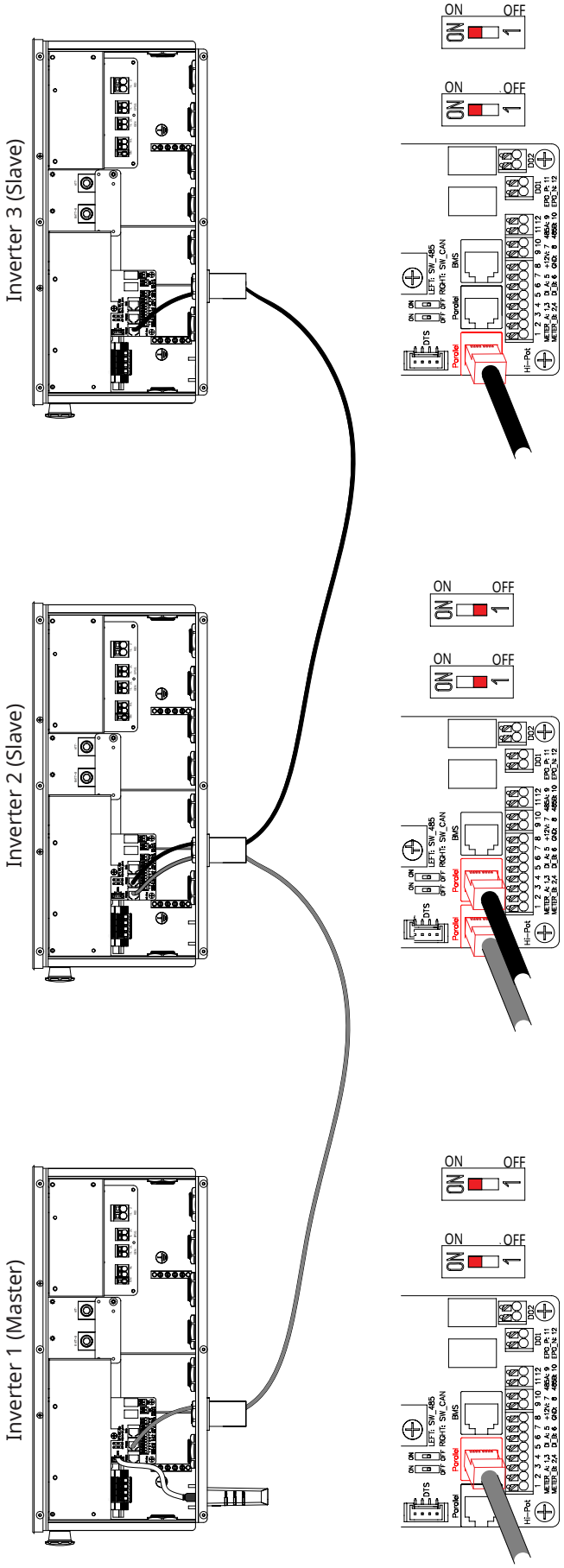
4.7.4 BMS Connection

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.

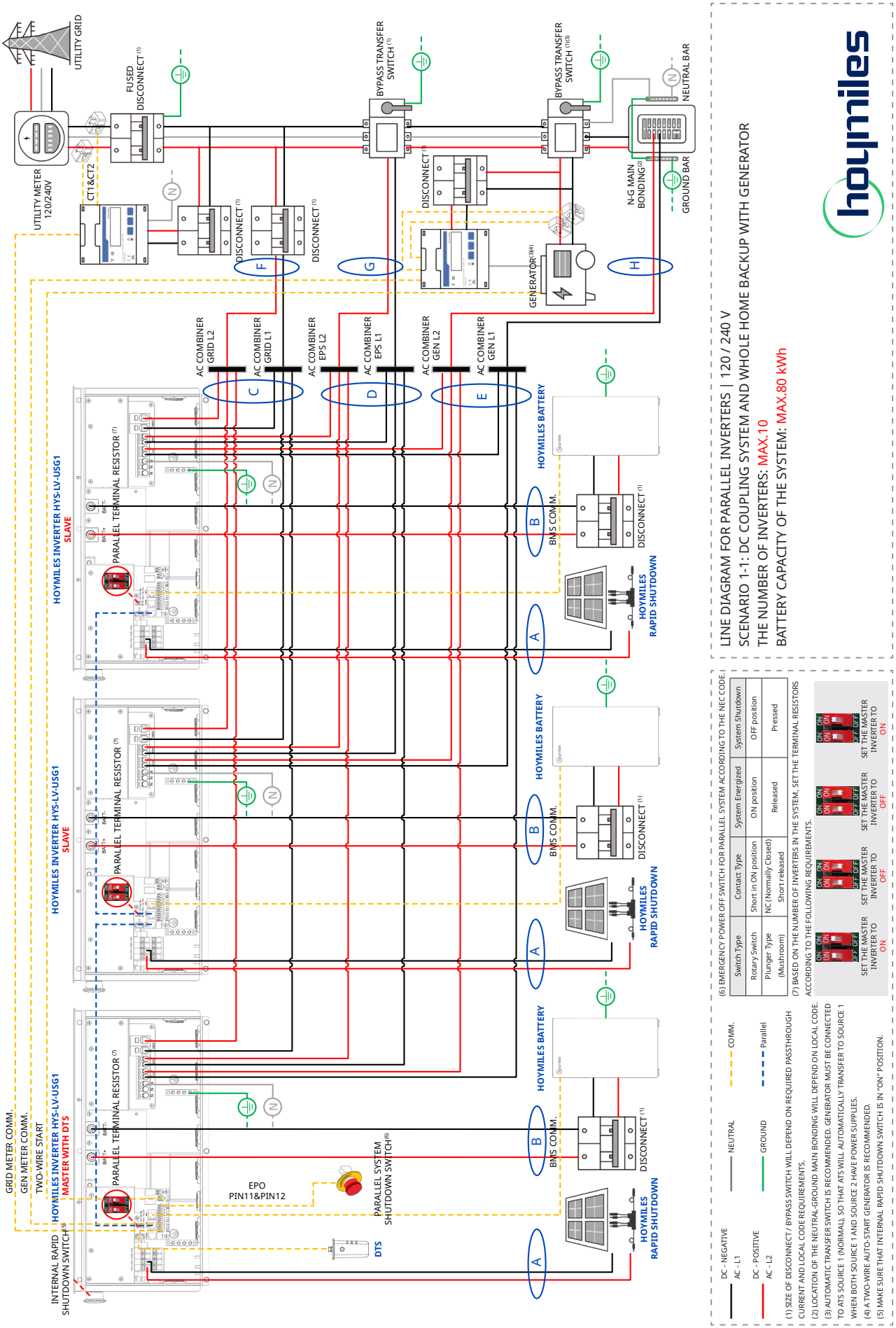
Procedure	
Step 1	• Strip the communication cable insulation with an ethernet wire stripper, and lead the corresponding signal cables out. Insert the signal cables into the RJ45 plug in the correct order, and crimp it with a network cable crimper.
Step 2	• Insert the RJ45 plug into the BMS port, and 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.
  	

4.8 Parallel Connection



* *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".*

4.8.1 Parallel System 1



LINE DIAGRAM FOR PARALLEL INVERTERS | 120 / 240 V
SCENARIO 1-1: DC COUPLING SYSTEM AND WHOLE HOME BACKUP WITH GENERATOR
THE NUMBER OF INVERTERS: MAX.10
BATTERY CAPACITY OF THE SYSTEM: MAX.80 kWh

DC - NEGATIVE
AC - L1
DC - POSITIVE
AC - L2
NEUTRAL
GROUND
COMM.
Parallel

(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) AUTOMATIC TRANSFER SWITCH IS RECOMMENDED. GENERATOR MUST BE CONNECTED TO ATS SOURCE 1 (NORMAL), SO THAT ATS WILL AUTOMATICALLY TRANSFER TO SOURCE 1 WHEN BOTH SOURCE 1 AND SOURCE 2 HAVE POWER SUPPLIES.
(4) A TWO-WIRE AUTO-START GENERATOR IS RECOMMENDED.
(5) MAKE SURE THAT INTERNAL RAPID SHUTDOWN SWITCH IS IN "ON" POSITION.

(6) EMERGENCY POWER OFF SWITCH FOR PARALLEL SYSTEM ACCORDING TO THE NEC CODE:

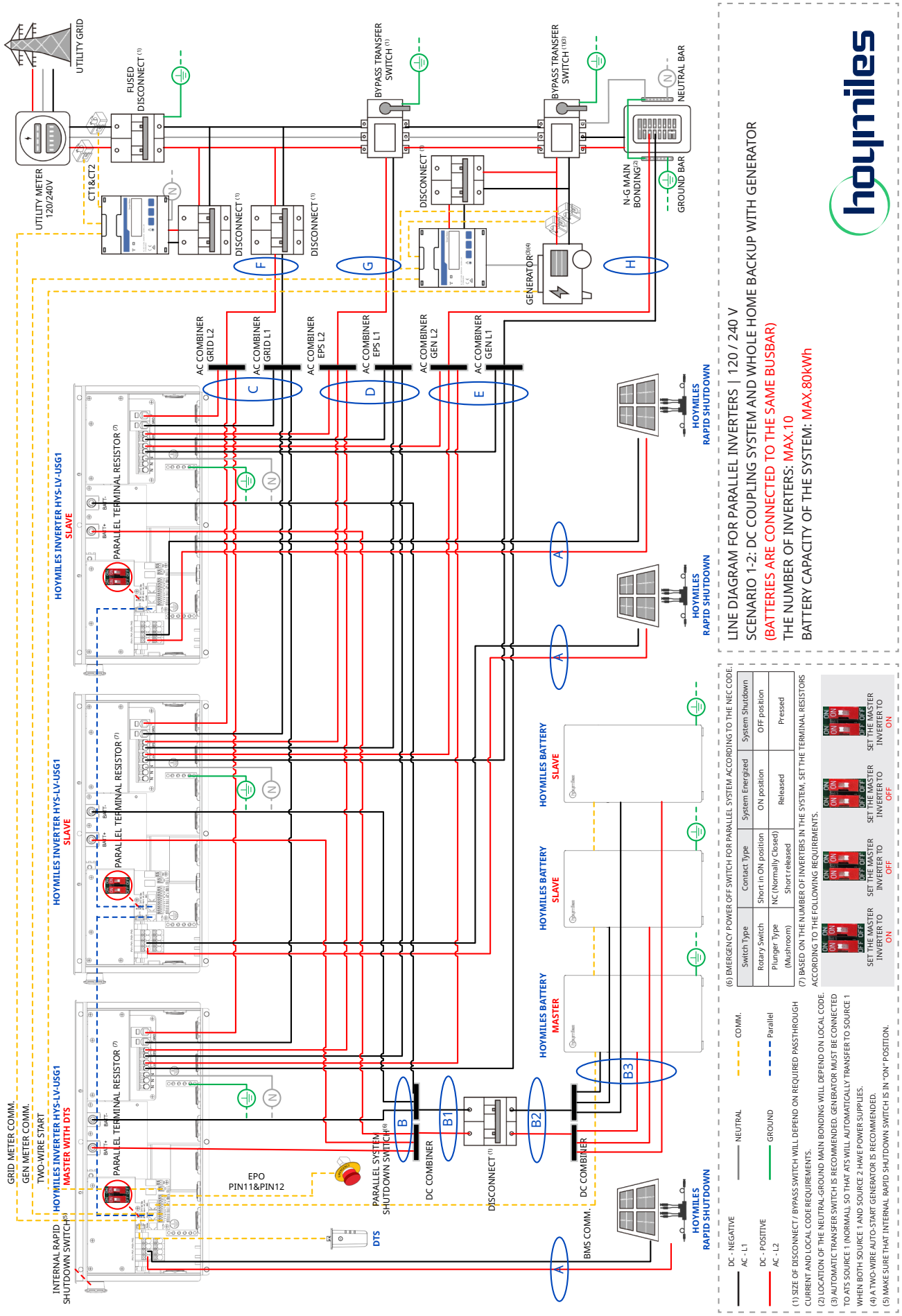
Switch Type	Contact Type	System Energized	System Shutdown
Rotary Switch	Short in ON position	ON position	OFF position
Plunger Type (Mushroom)	NC (Normally Closed) Short released	Released	Pressed

(7) BASED ON THE NUMBER OF INVERTERS IN THE SYSTEM, SET THE TERMINAL RESISTORS ACCORDING TO THE FOLLOWING REQUIREMENTS.

Cable (90℃/194℉, 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

4.8.2 Parallel System 2

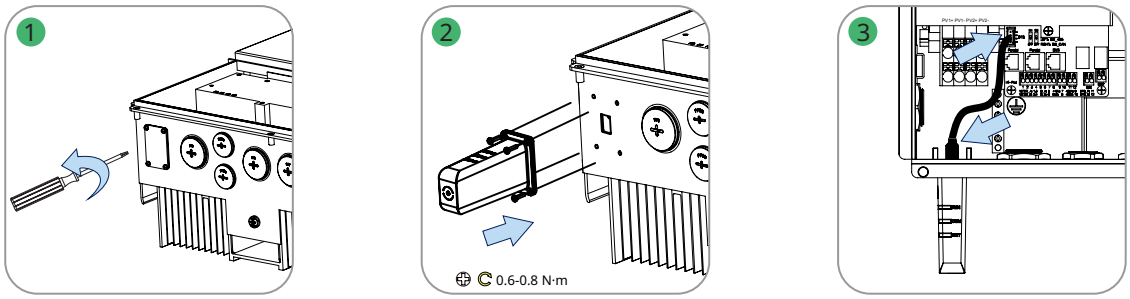


Cable (90℃/194℉, Copper)	Recommended Cable Specification					
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
A (PV) (for HYS)	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG	14 AWG-6 AWG
B (Inverter Side)	3 AWG–1/0 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

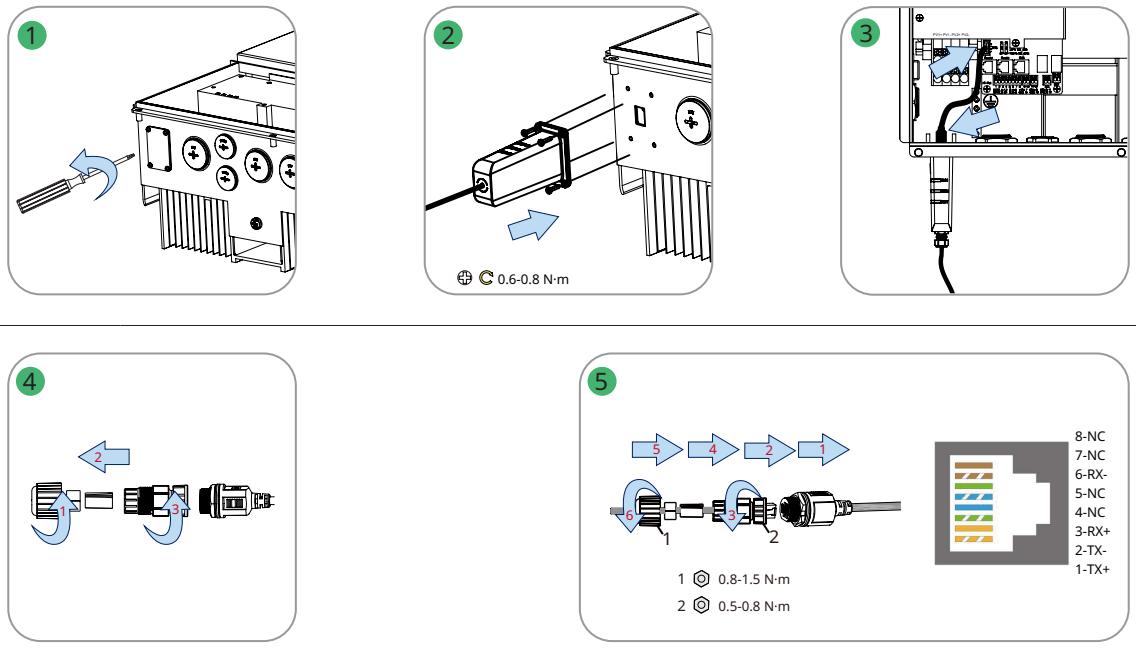
Cable (90°C/194°F, Copper)	Overcurrent Protection Parameter					
	HYS/HAS-3.8LV-USG1	HYS/HAS-4.8LV-USG1	HYS/HAS-6.0LV-USG1	HYS/HAS-7.6LV-USG1	HYS/HAS-9.6LV-USG1	HYS/HAS-11.5LV-USG1
A (PV) (for HYS)	20 A	20 A	20 A	20 A	20 A	20 A
B (Battery)	100 A	125A	125A	200 A	250 A	250 A
C (Grid)	40 A	50 A	50 A	80 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

4.9 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.



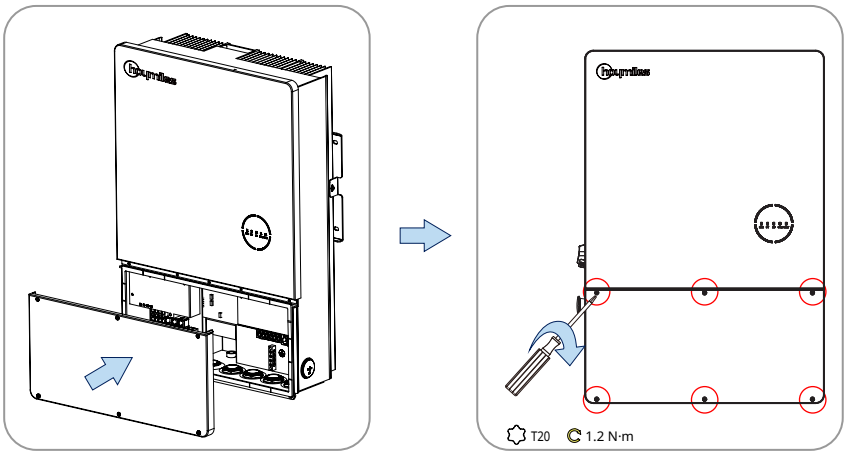
DTS-Ethernet-G1 Procedure*	
Step 1&2	• Remove the DTS port cover plate. • Insert the DTS-Ethernet into the USB port, and tighten the screws.
Step 3&4	• Respectively connect the ends of the DTS connecting line to the corresponding ports. • Unscrew the swivel nut from the connector.
Step 5	• Insert the 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.) • Thread the cable of an appropriate length through the connector. • Tighten the cable gland.



** 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.

4.10 Installing the Wiring Box Cover

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


5 Operation

5.1 Commissioning

	Before the commissioning of the inverter, make sure: • The inverter DC switch and external circuit breaker are disconnected; • Check wiring according to "4 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.

System Power-on Procedure	
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) 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.

5.2 Decommissioning

	After powering off the inverter, follow the steps below if needed: • Wait at least 5 minutes after the LED indicators turn off to release the internal energy; • Disconnect all cables; • Remove DTS and power meter; • Remove the inverter from the wall, remove the bracket if necessary, and finally pack the inverter and accessories; Please strictly follow the procedure below. Otherwise, it will cause lethal voltages or unrecoverable damage to the inverter.

System Power-off Procedure	
Step 1	Stop the inverter from working via the Hoymiles App.
Step 2	Disconnect the AC breaker between the inverter and the grid.
Step 3	(Only for HYS) Rotate the DC switch to "OFF".
Step 4	Turn off the DC breaker between the inverter and the battery.
Step 5	Check whether the inverter indicators are off.

6 S-Miles Cloud

The S-Miles Cloud App has been developed for Hoymiles inverter and offers the following features:

a. Network configuration;

b. Local installation assistant;

c. System monitoring.

Please download the S-Miles Cloud App from the Google Play Store or the Apple App Store. The QR code below can also be scanned to download the App. Please refer to the S-Miles Cloud User Manual from www.hoymiles.com/resources/download/ for details.

S-Miles Installer

S-Miles End-user

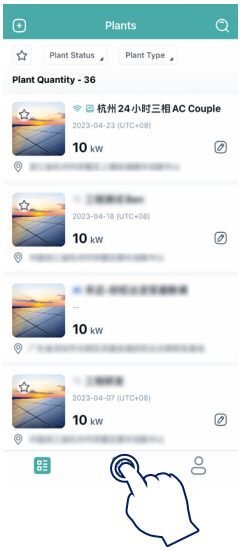
6.1 DTS Online Setting

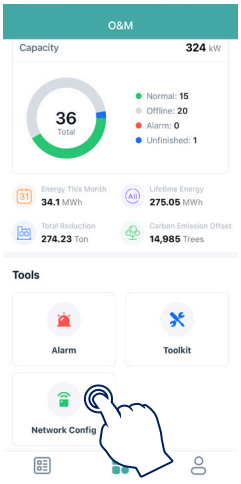
1. Search “Hoymiles” in the App Store (iOS) or the Play Store (Android), or scan the QR code to download the Hoymiles Installer App.

2. Open the app and log in with your installer account and password. For new Hoymiles installers, please apply for an installer account from your distributor in advance.

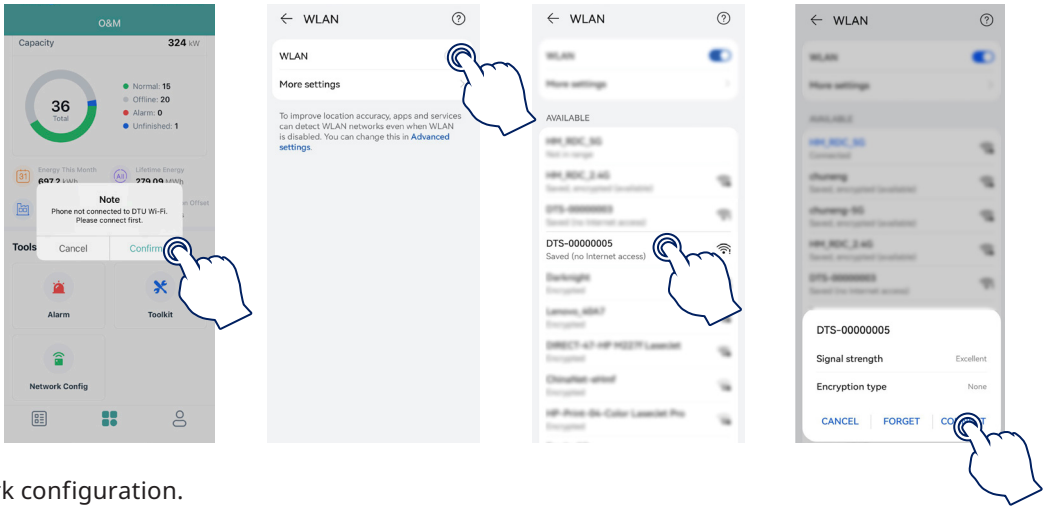
3. Use the App to connect to the DTS.

(a) Open the Installer App on smartphone/tablet and log in. Tap on “O&M” at the bottom of the page, and then tap on “Network Config”.





(b) Select the DTS's wireless network and tap "Connect". (The network name consists of DTS and the last 8 digits of the product serial number, and the default password is ESS12345.)

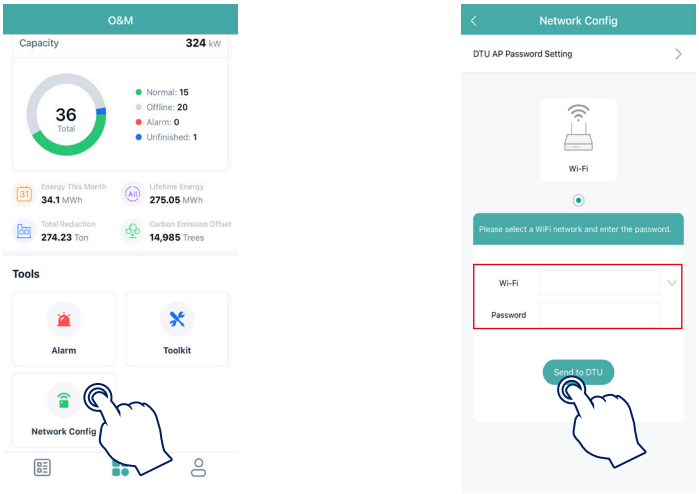


4. Network configuration.

(a) Upon successful connection, tap on "Network Config" again and access the Network Configuration page.

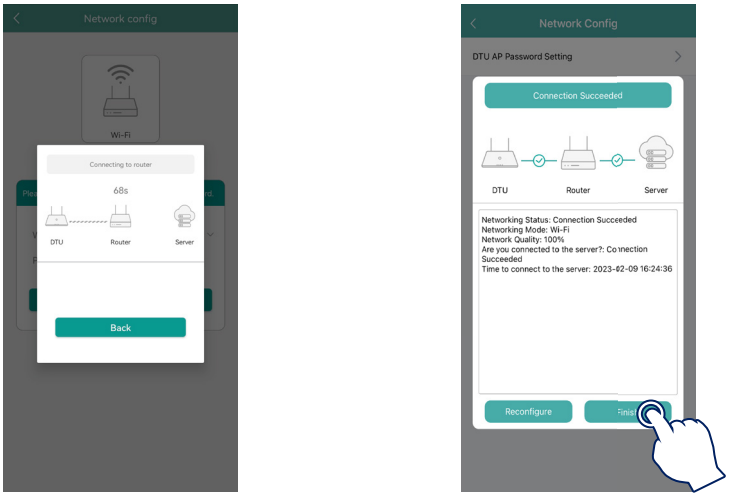
(b) Select the router Wi-Fi and enter the password.

(c) Tap on "Send to DTU".



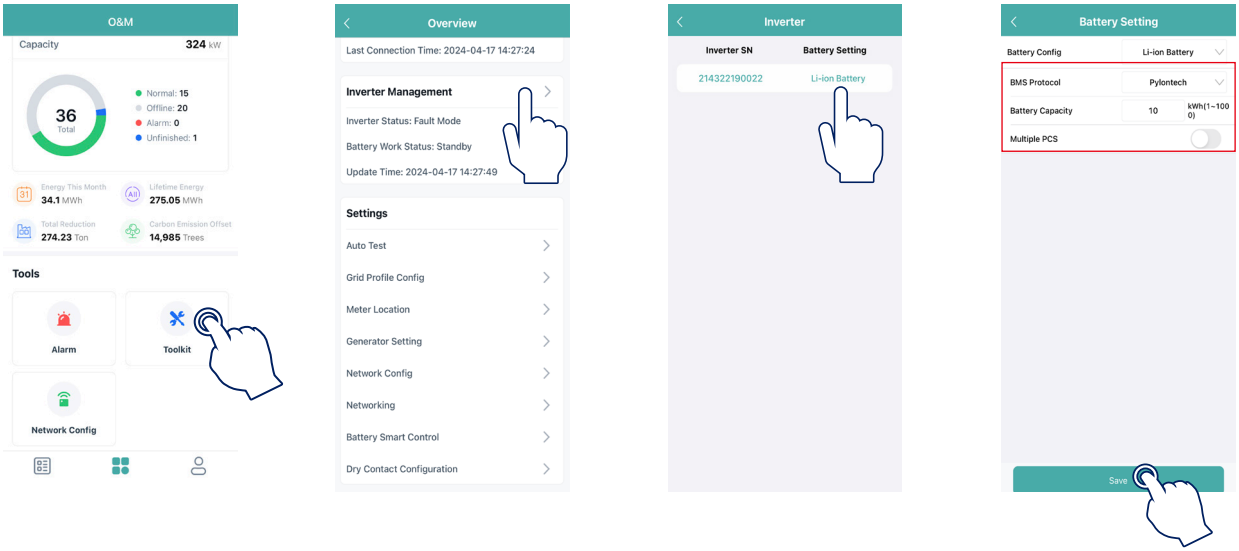
5. Check the DTS indicator for a solid blue light, which signifies a successful connection.

The network configuration takes about 1 minute, please be patient. If the network is not connected, please check the internet as instructed.

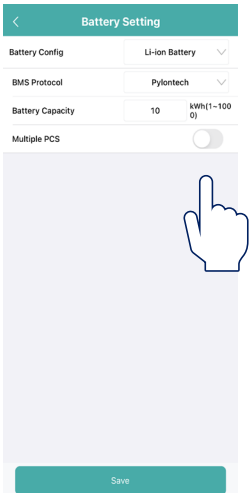


6.2 System Commissioning of Wireless Access Point (AP) Connection

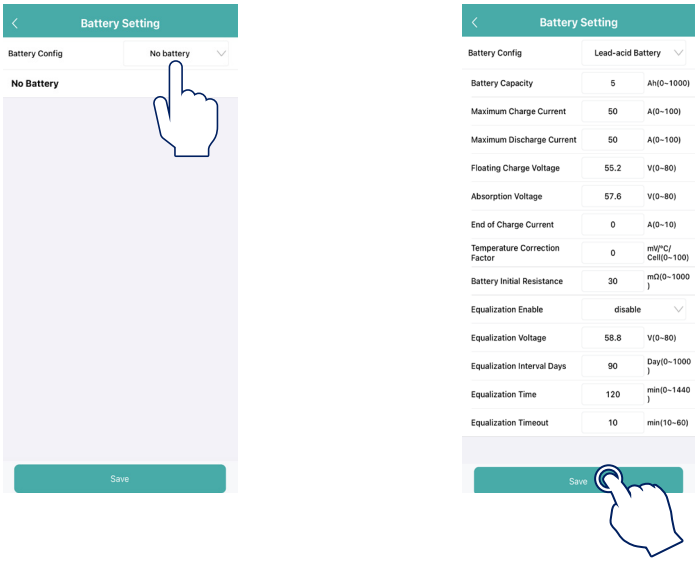
1. Connect the wireless network of DTU. Open the App, tap “Toolkit → Inverter Management → Battery Setting” to set battery type, BMS protocol, and battery capacity, and tap “Save”. (The default setting is “No battery”.)



(a) If Li-ion batteries are connected as shown in in “4.8.2 Parallel System 2”, enable “Multiple PCS”.

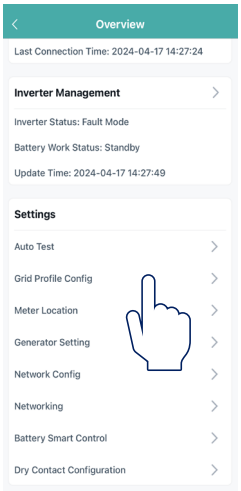


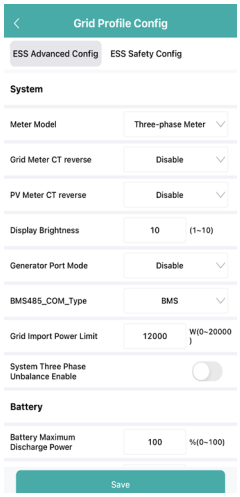
(b) If lead-acid batteries are connected, tap “Battery Config → Lead-acid Battery” to configure relevant parameters. Detailed parameters are shown as follows.



Parameter	Description	Default Value
Battery Capacity	Enter the battery capacity.	5 Ah
Maximum Charge Current	Set the maximum charge current.	50 A
Maximum Discharge Current	Set the maximum discharge current.	50 A
Floating Charge Voltage	The battery will be charged at this voltage to supplement the self-discharge of the battery.	55.2 V
Absorption Voltage	Set the voltage of absorption charging stage.	57.6 V
End of Charge Current	Set the end of charge current.	0 A
Temperature Correction Factor	Set the temperature correction factor.	0 mV/°C/Cell
Battery Initial Resistance	Set the battery initial resistance.	30 mΩ
Equalization Enable	Regularly enable the equalization to improve battery life.	disable
Equalization Voltage	Set the equalization voltage.	58.8 V
Equalization Interval Days	The equalization will be regularly enabled according to this set value.	90 d
Equalization Time	The time the battery takes for equalization each time.	120 min
Equalization Timeout	Set the equalization timeout.	10 min

2. Tap “Grid Profile Config → ESS Advanced Config” to configure relevant parameters of the system, battery, emergency power supply (EPS), and generator, and tap “Save”.





★ System

Parameter	Description	Default Value
Meter Model	For single-phase inverter, please choose “Single-phase Meter” or “Three-phase Meter”; For three-phase inverter, please choose “Three-phase Meter”; For inverter used in North America, please choose “Two-phase Meter”.	No Meter
Display Brightness	The brightness of the machine display lamp.	10
Generator Port Mode	After the generator port is connected to the PV inverter or generator, choose the corresponding option.	Disable
BMS485_COM_Type	Communication type includes BMS485 and DTU Com. If the RS485 port is connected to the battery, please choose BMS485; if the RS485 port is connected to the microinverter DTU, please choose DTU.COM.	BMS
Grid Import Power Limit	Limit the charging power of the grid to the battery. The power input limit must not exceed the inverter power.	The default value is set according to the inverter type.
System Three-phase Unbalance Enable	When the loads of the three-phase inverter are not balanced, enable the system three-phase unbalance function. It can compensate for each load.	Disable

★ Battery

Parameter	Description	Default Value
Battery Maximum Discharge Power	Set the maximum discharge power.	100%
Battery Maximum Charge Power	Set the maximum charge power.	100%
Battery Maximum SOC	Set the maximum battery capacity as recommended by the battery manufacturer.	90%
Battery Minimum SOC	Set the minimum battery capacity as recommended by the battery manufacturer.	10%
Battery Supplementary Power	When the battery emergency charging is enabled, or the battery capacity falls below the minimum battery SOC, the battery charge will be triggered.	200 W
Reserved SOC Supplementary Power	Set the percentage of reserved SOC supplementary power. (When the battery SOC falls below the reserved SOC, the battery will be charged at this percentage.)	10%

Battery Grid Feed Power in Peak Time	Set the percentage of battery feed-in power in peak time.	100%
Bat Discharge Power in Partial Peak Time	Set the percentage of battery discharge power in partial peak time.	100%
MPPT Global Scan Enable	If the PV modules are shaded, enable this function.	Disable

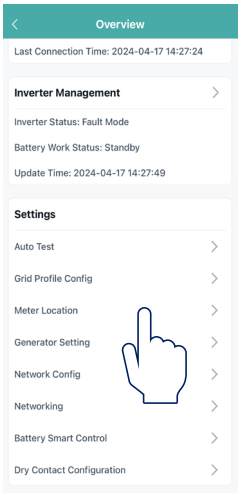
★ Emergency Power Supply (EPS)

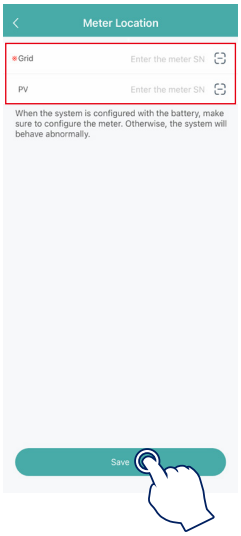
Parameter	Description	Default Value
EPS Mode	When the EPS port is connected, you can choose “EPS” or “UPS”. You can choose “UPS” when the load keeps power on, and the on-grid mode and off-grid mode will automatically switch to each other under UPS mode.	EPS
	EPS is characterized by the continuous power 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 a 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 a power outage, but also can output high quality power supply to ensure normal operation of electric equipment when such abnormal situations of power supply as overvoltage, undervoltage, and surge occur.	
	When the inverter is used as a PV inverter, choose “Disable”.	
External Bypass Switch	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 Off-grid Mode Enable	In off-grid mode, PV can also operate without the battery. (Under this mode, the system is unstable, so this function is not recommended.)	Disable

★ Generator Setting

Parameter	Range	Default Value
Generator Position	None/GenSide	None
Generator Signal Type	Manual/DI/DO	Manual
Generator Minimum Run Time	5-60 min	10 min
Generator Maximum Run Time	6-10 hr	8 hr
Generator Protection Interval	5-60 min	10 min
Generator Synchronized Time	1-20 min	5 min
Generator Shutdown Delay	1-20 min	5 min
Generator Exercise Mode Interval	1-65 d	30 d
Generator Rated Max Power	0-20000 W	/
Generator High Voltage Limit	0-280 V	/
Generator Low Voltage Limit	0-180 V	/
Generator High Frequency Limit	0-70 Hz	/
Generator Low Frequency Limit	0-59 Hz	/

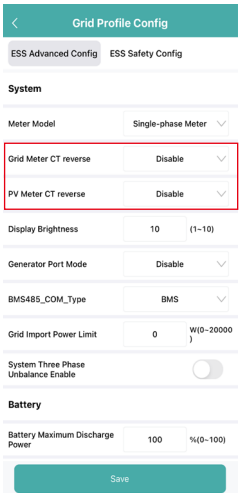
3. Tap “Meter Location” to configure the grid side meter. The serial number (SN) can be entered manually or identified through scanning the barcode. If the GEN port is connected to the PV inverter, the PV side meter also needs to be configured.

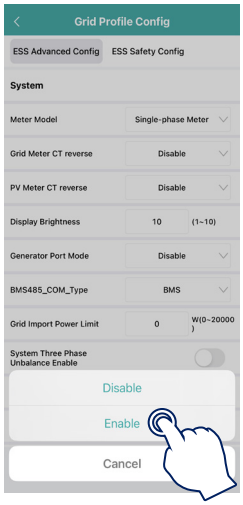




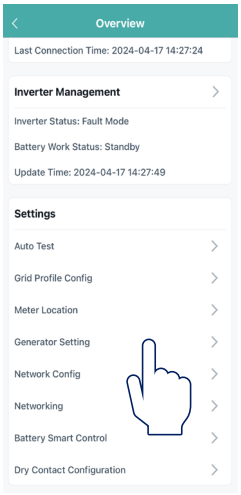
Note:

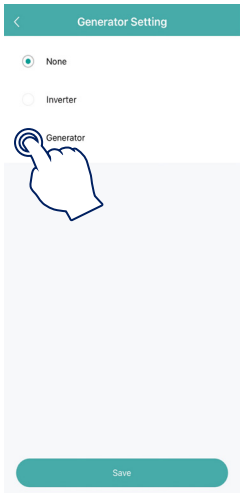
Check whether the direction of CT is correct. If the CT is reversely connected, tap “Grid Profile Config → Grid Meter CT reverse → Enable” or “PV Meter CT reverse → Enable” to get the correct sampling current, and tap “Save”.



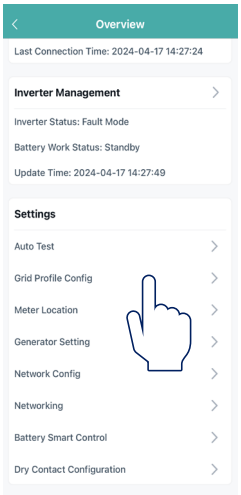


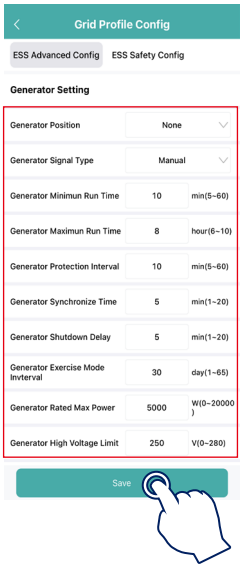
4. Tap “Generator Setting”, choose the corresponding option according to whether the device connected to the GEN port is “Inverter” or “Generator”, and tap “Save”. (The default option is “None”.)



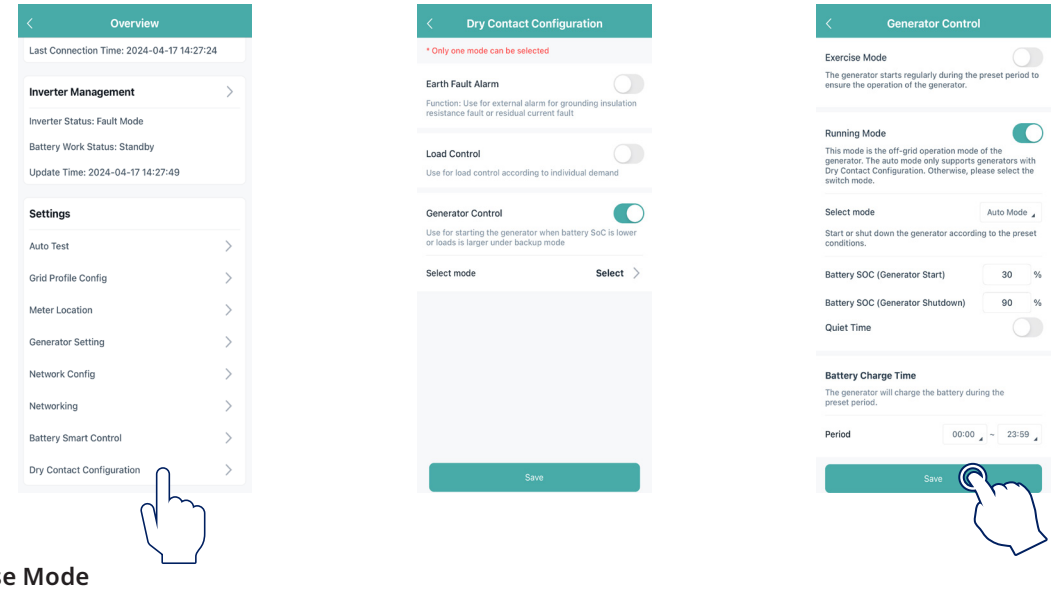


If the GEN port is connected to the generator, tap “Grid Profile Config → ESS Advanced Config”, slide your finger up to set generator parameters, and tap “Save”. For detailed parameters, please refer to “NO.2 Generator Setting”.





After setting the generator parameters, tap “Dry Contact Configuration → Generator Control” to set its mode and corresponding parameters, and tap “Save”.



Exercise Mode

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

Running Mode

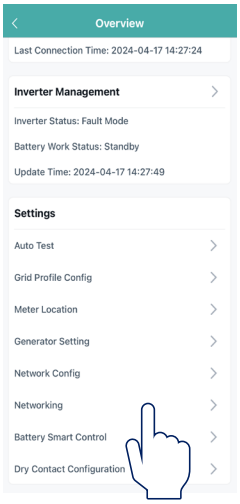
This mode is the off-grid operation mode of the generator, including switch mode and auto mode. The switch mode is used to turn on or turn off the generator manually; the auto mode is used to turn on or turn off the generator according to the battery capacity. The auto mode only supports generators controlled by Dry Contact. Otherwise, please select the switch mode.

Mode / Parameter	Auto Mode
Battery SOC (Generator Start)	When the battery capacity drops to the set value, the generator will turn on automatically.
Battery SOC (Generator Shutdown)	When the battery capacity reaches the set value, the generator will turn off automatically.
Quiet Time	During the quiet time, the generator is disabled.

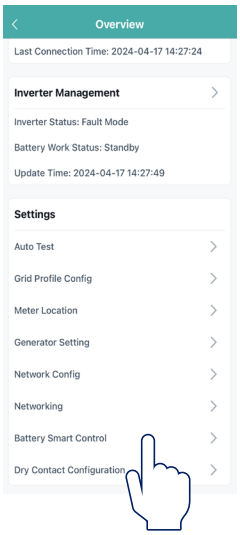
Battery Charge Time

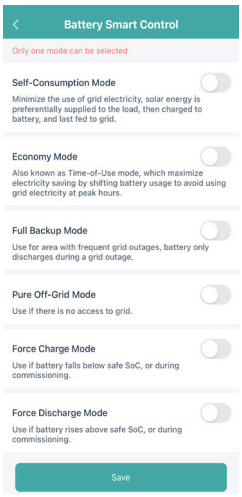
Description: The generator will charge the battery during the preset period.

5. Tap “Networking” to access to the networking page, and tap “Networking” at the bottom left corner to perform parallel operation. The inverter connected to the DTS is the master, and the others are slaves. After the slaves are connected to the master through a communication cable, they can communicate with the DTS. Note that a single DTS can only communicate with up to 10 inverters. If you want to change the master, tap “unbind” to change the master or stop parallel operation.



6. Tap “Battery Smart Control” to set the EMS mode, including Self-Consumption Mode, Economy Mode, Full Backup Mode, Pure Off-Grid Mode, Force Charge Mode, and Force Discharge Mode.





★ 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 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 grid at night.

The self-consumption mode can reduce the use of grid power. Solar energy is preferentially supplied to the load, charged to the battery, and fed into the grid last. Users can set the reserve capacity within a certain range (a small amount of power can be reserved due to infrequent power outages), and then tap “Save”.

★ 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 reserve capacity 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. Tap “Edit” to set the time period for peak, low and partial peak grid prices in different seasons or dates, but you can just add up to four time periods, and then tap “Save”.

★ Full Backup Mode

Full 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 reserve capacity within the certain range and tap “Save”.

★ Pure Off-grid Mode

When the system is not connected to the grid, You can choose the pure off-grid mode and tap “Save”.

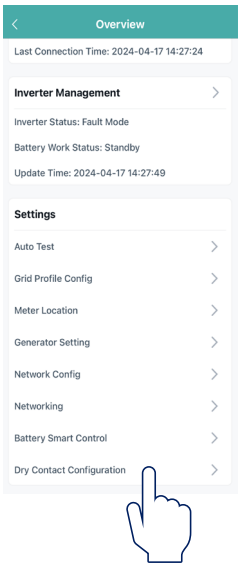
★ Force Charge Mode

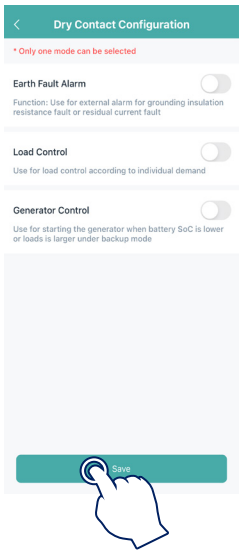
The force charge mode can be used during the commissioning of inverter or when the battery capacity falls below the value of safety SOC. You can set the reserve capacity within the certain range. If the battery capacity is lower than the setting, the battery will be forcibly charged. And You can set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

7. Tap “Dry Contact Configuration” to edit dry contact configuration. Note that only one mode can be selected at a time.





★ 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) Time 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) Backup Load 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 size minus the EV Charger size, the EV Charger is allowed to work; when the input current is larger than the entrance breaker size, shut down the EV Charger to protect the entrance breaker.

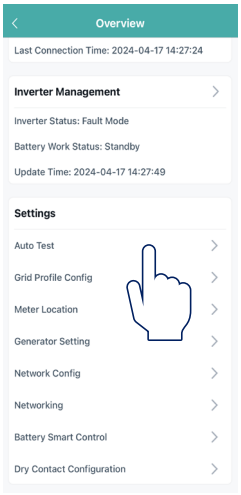
(6) **Heat Pump Control:** The heat pump control function allows users to add up to four runtimes. According to the set power and battery SOC, it can control the start and stop as well as the power of the SG Ready heat pump, maximizing the PV energy utilization.

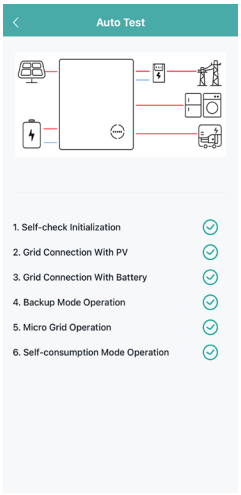
Parameter	Description
Start Power	When the average feed-in power is greater than or equal to the start power, the heat pump will be started.
Shutdown Power	When the running time is greater than or equal to the minimum single runtime and the average grid input power is greater than or equal to the shutdown power, the heat pump will be shut down.
Battery Start 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.

★ Generator Control

For detailed settings, please refer to "NO.4".

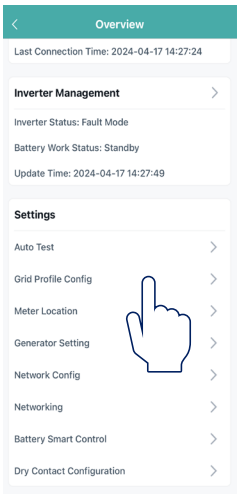
8. Make sure that all cables including DC cables, AC cables, and communication cables are properly connected, and all AC and DC switches are turned on, and then tap “Auto Test”. If there is any problem, solve the problem, and tap “Auto Test” again to confirm that the problem is completely solved. If there is no problem, this interface will display green checkmarks on the right of these items.

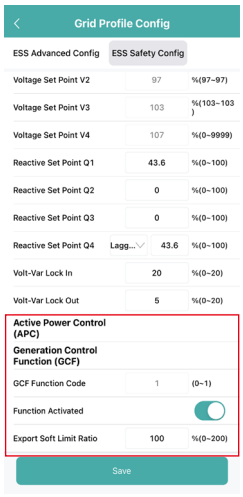




6.3 Export Management Setting

Tap “Grid Profile Config → ESS Safety Config”, slide your fingers up, and set the parameters of export management. The Generation Control Function (GCF) is enabled by default, the default value of the export soft limit ratio is 100%.





(a) 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.

(b) 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.

(c) If you need to limit the feed-in power, set the export soft limit ratio as required.

Scenario 1: Export Soft Limit Ratio 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: Export Soft Limit Ratio 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 export soft limit ratio.

Scenario 3: Export Soft Limit Ratio 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 export soft limit ratio.

Scenario 4: Export Soft Limit Ratio is 150%

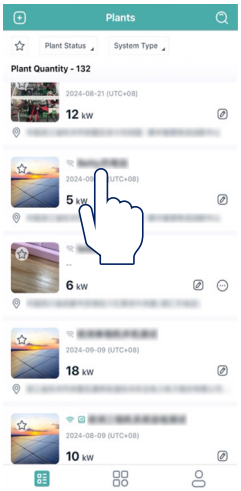
The maximum allowable feed-in power is 150% of the rated power of ESS. If an input device, such as a microinverter, is connected to the grid side, it can operate with its full power, and the energy storage inverter will adjust the output of ESS in real time according to the set export soft limit ratio.

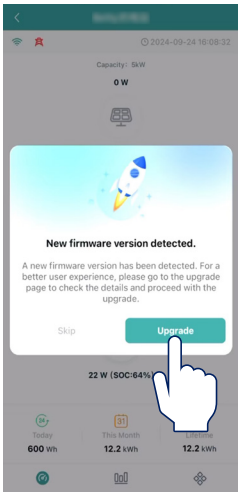
Note:

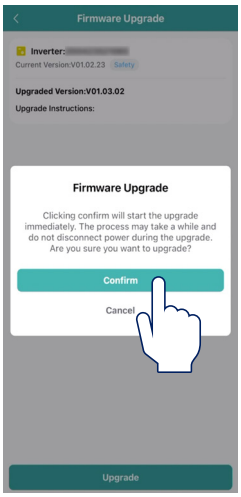
- ESS refers to a single energy storage inverter or parallel system
- The energy storage inverter cannot control the output power of other input devices connected to the grid side. It means that the feed-in power cannot be limited to 0 if other input devices are connected to the grid side.
- If no input device is connected to the grid side, the Export Soft Limit Ratio can be set to 0-100%.

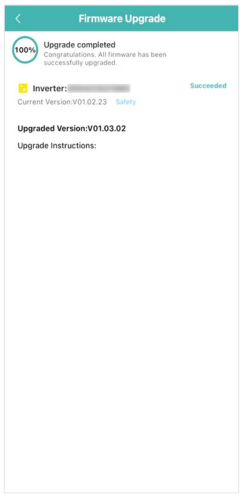
6.4 Firmware Upgrade

Open the app and tap the plant. There will be a pop-up window if there is a new firmware version. If you want to upgrade the firmware, tap “Upgrade”; if you do not want to upgrade immediately, tap “Skip”. Note that during the firmware upgrade, do not power off the inverter.









6.5 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/.

6.5.1 Export Only Mode

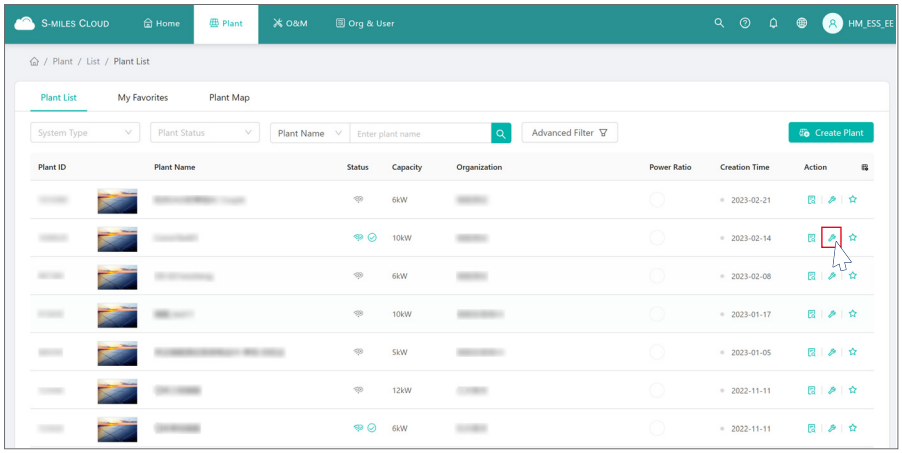
If the Export Only Mode is chosen, the ESS may export active power to the Area EPS during discharging but shall not import active power from the Area EPS for ESS charging purposes. Under this mode, the Generation Control Function (GCF) is disabled, the grid input power is limited to 0 W.

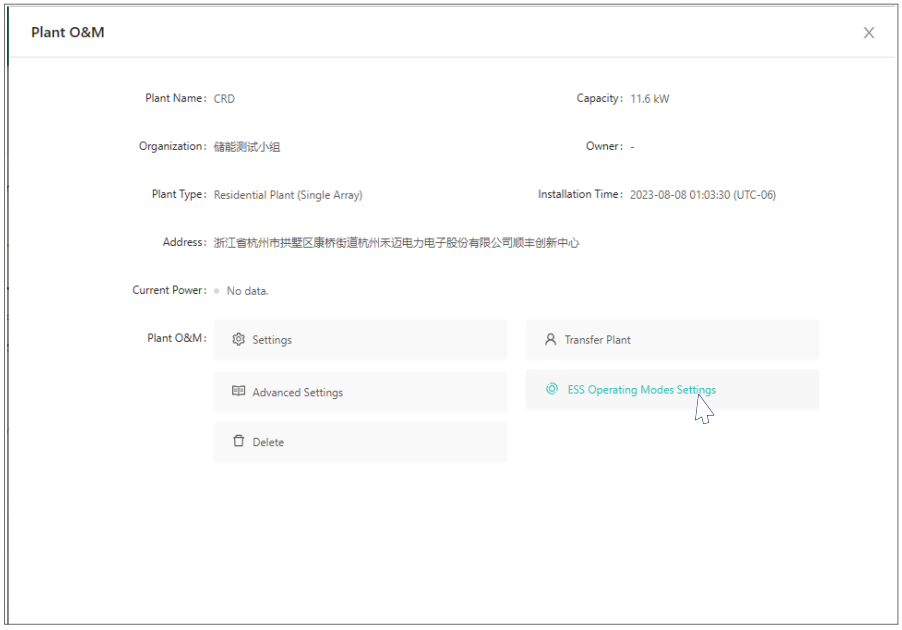
6.5.2 Import Only Mode

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.

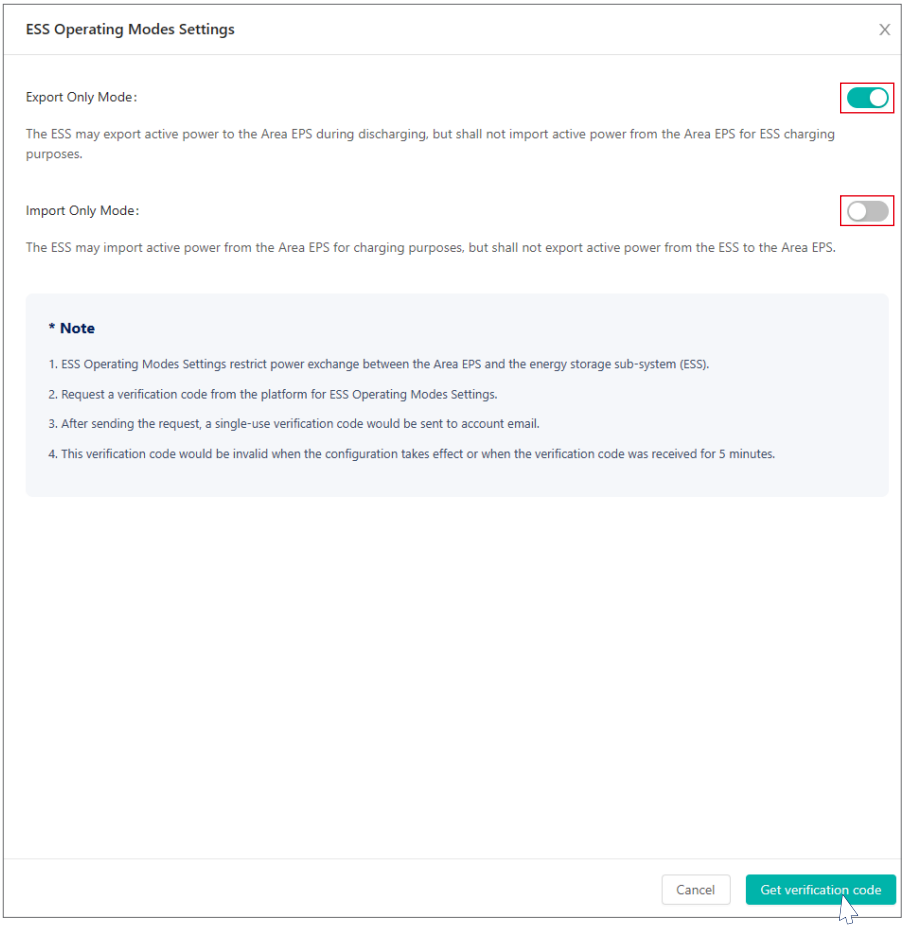
6.5.3 Online Setting

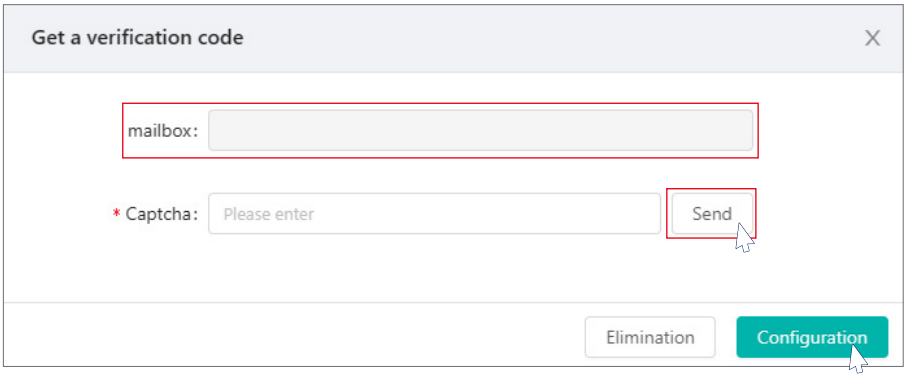
1. Choose the plant you want to edit and click the “O&M → ESS Operating Modes Setting” button to perform ESS Operating Modes setting.

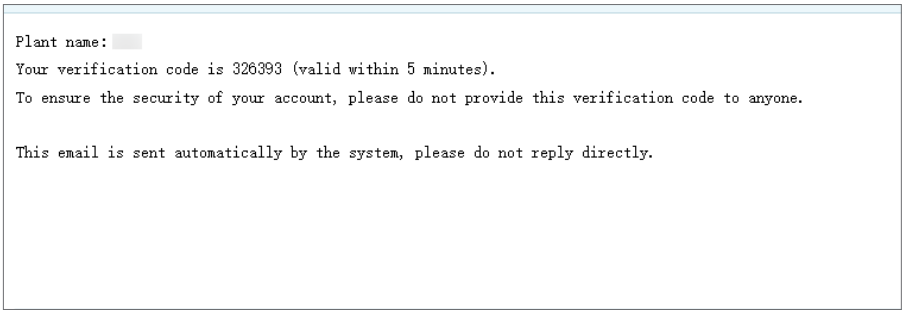




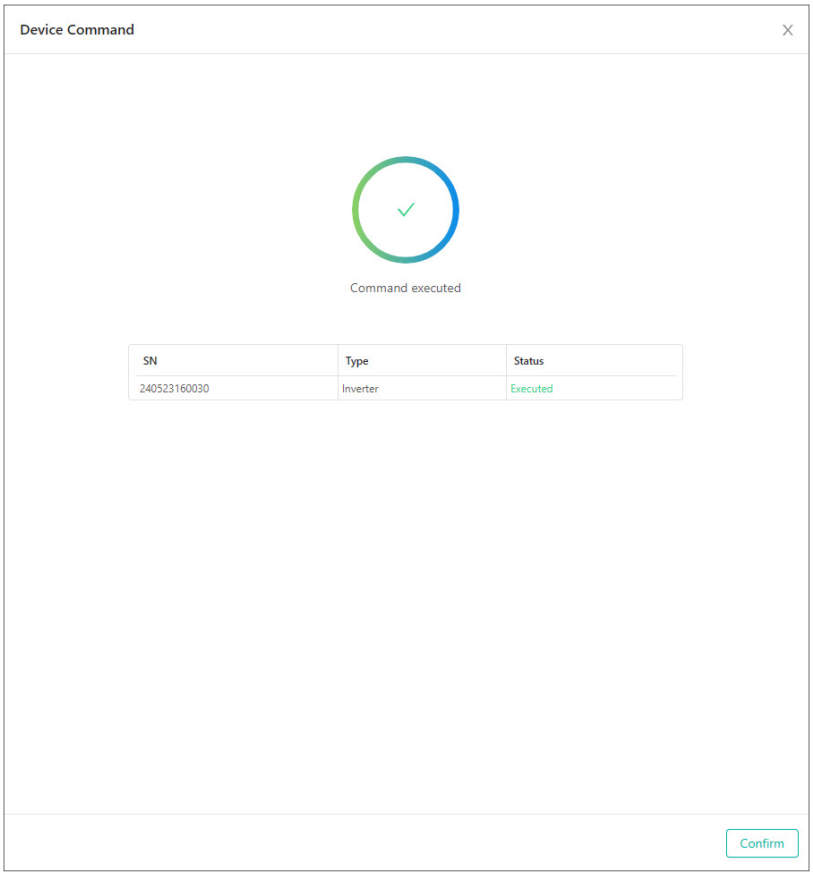
2. Click the “Export Only Mode” or “Import Only Mode”, click “Get verification code”, enter your E-mail, and click the “Send” button to get a verification code. After you send the request, a single-use verification code will be sent to your E-mail. Enter the verification code and click “Configuration” to complete the setting.

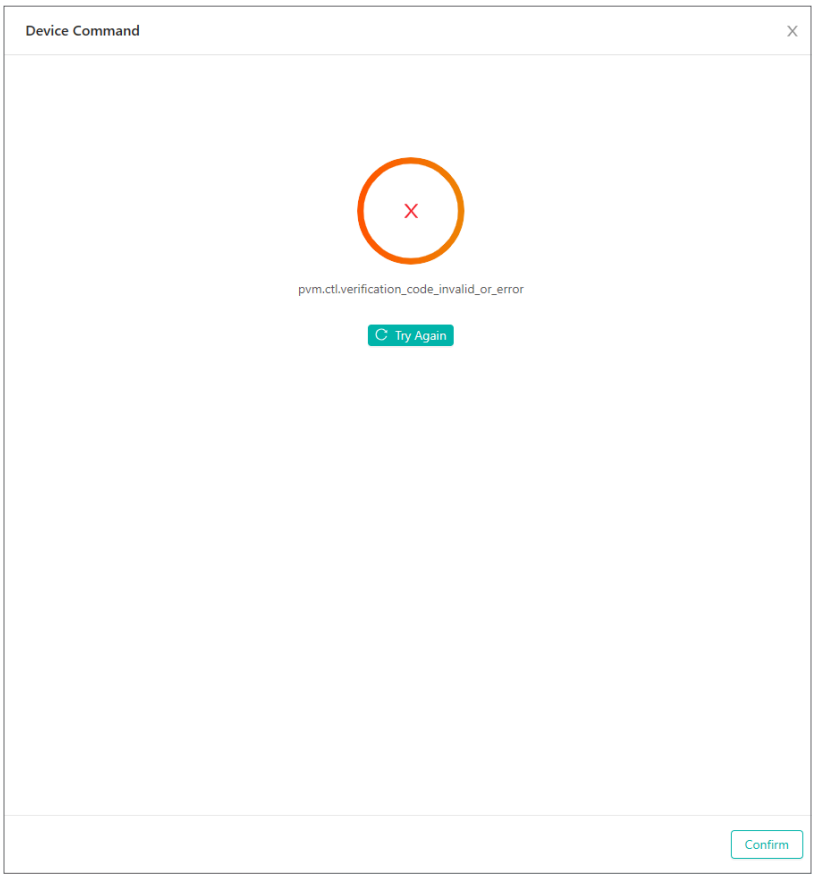






3. The verification would be invalid when the configuration takes effect or when the verification code is received for 5 minutes. If you correctly enter the verification code within the valid time, this page will display “Command executed”; if you enter the wrong verification code or enter the code beyond 5 minutes, this page will display “pvm.ctl.verification_code_invalid_or_error”. Note that once the Export Only Mode or Import Only Mode is set, it will be locked and cannot be modified.





7 Troubleshooting

When the system is in alarm, please log into the S-Miles Cloud App to review. The possible causes and their troubleshooting are detailed in the following table:

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.

Display	Possible Cause	Handling Suggestions
Over Temperature	The temperature inside the inverter is higher than the permissible range.	1. Make sure that the installation complies with the instructions from 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 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.

Display	Possible Cause	Handling Suggestions
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.

8 Technical Datasheet

8.1 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℉ to +149℉ (>113℉, derating)/-25℃ to +65℃ (>45℃, 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(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					
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.
(2) The DTS-Ethernet and DTS-4G solutions will be coming soon.

8.2 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℉ to +149℉ (>113℉, derating)/-25℃ to +65℃ (>45℃, 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.

Appendix A: 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.

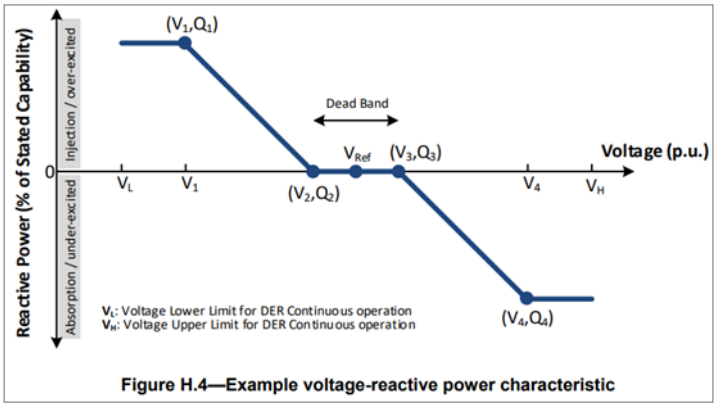


Figure H.4—Example voltage-reactive power characteristic

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.

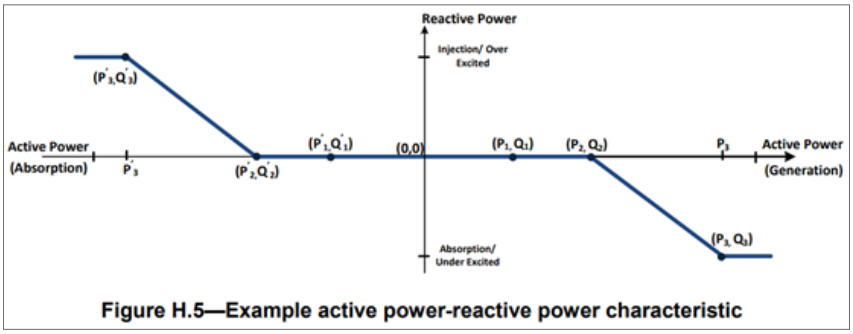


Figure H.5—Example active power-reactive power characteristic

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.

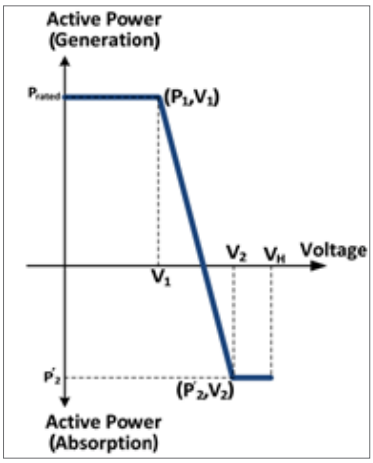
P'min is the minimum, in amplitude, active power that the DER can absorb.

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.

Appendix B: HECO

1. 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	0.017-1.0
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

S-Miles Installer

S-Miles End-user

Floor 6-10, Building 5, 99 Housheng Road, Gongshu District,
Hangzhou 310015
P. R. China
+86 571 2805 6101

General inquiry: info@hoymiles.com
Technical support: service@hoymiles.com

Visit https://www.hoymiles.com/ for more information.