



# USER MANUAL

## HY3 Series Hybrid Inverter

EN



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# 1. About This Manual

## 1.1 Products Range





Hoymiles HY3 Series Hybrid Inverters: HY3-5000, HY3-6000, HY3-8000, HY3-10000.

## 1.2 Target Group

This document is intended for qualified electricians. The actions described here must be performed by qualified electricians in compliance with standards, wiring rules or requirements of local grid authorities or bodies.

## 1.3 Symbols Used

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

Symbol	Explanation
 <b>DANGER</b>	Indicates a hazard with a high level of risk that will result in death or serious injury.
 <b>WARNING</b>	Indicates a hazard with a medium level of risk that can result in death or serious injury.
 <b>CAUTION</b>	Indicates a hazard with a low level of risk that can result in minor or moderate injury.
 <b>NOTICE</b>	Indicates a situation which, if not avoided, can result in property damage.

## 2. Safety

### 2.1 Intended Use

The **HY3 Series** are three phase solar hybrid inverters. The hybrid inverter works with lithium batteries, PV panels and smart meter as a solar-storage system, for increased self-consumption, backup power supply, peak shaving, and etc.

To prevent personal injury and property damage and to ensure long-term operation of the product, please read and follow all the instructions and cautions on the inverter and this user manual during installation, operation or maintenance at all times.

### 2.2 Important Safety Instructions



#### **DANGER**

***Danger to life from electric shock.***

- Before performing any work on the inverter, disconnect all DC and AC power from inverter and wait for at least 5 minutes.
- Do not touch DC conductors or any non-isolated cable ends.
- If an error occurs, contact your local distributor or qualified electricians.
- Make sure the inverter is not touchable from children.



#### **WARNING**

***Risk of burns from hot surfaces.***

- The surface of the inverter might exceed 60°C, 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 inverter before attempting any maintenance or cleaning or working on any circuits connected to inverter.



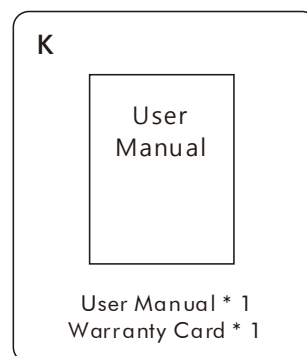
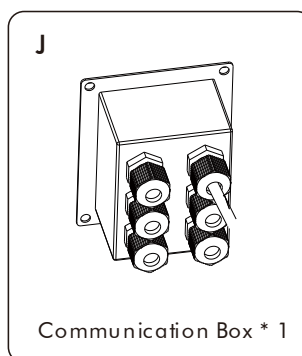
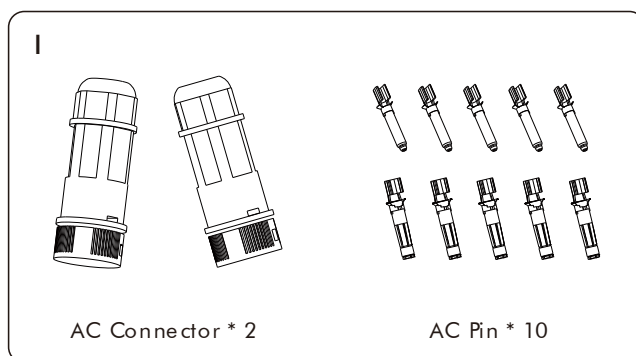
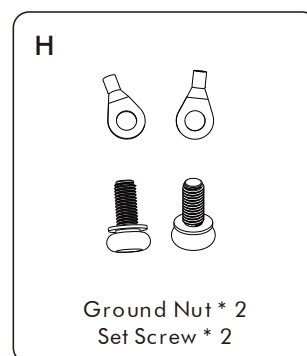
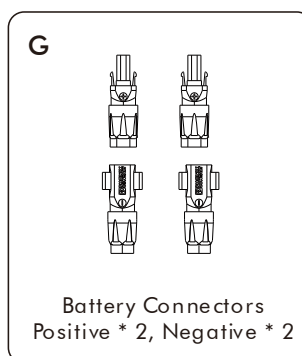
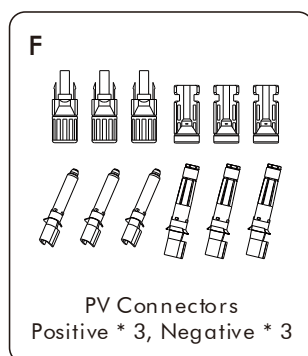
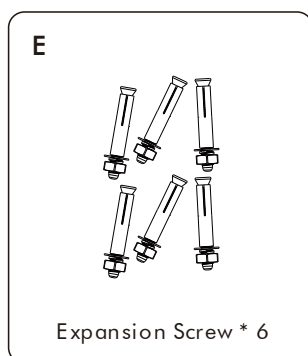
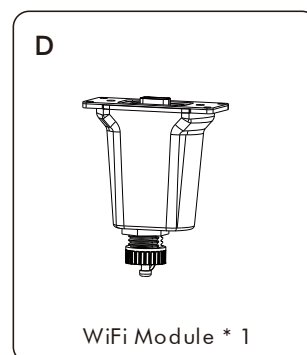
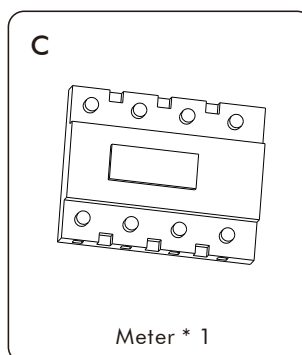
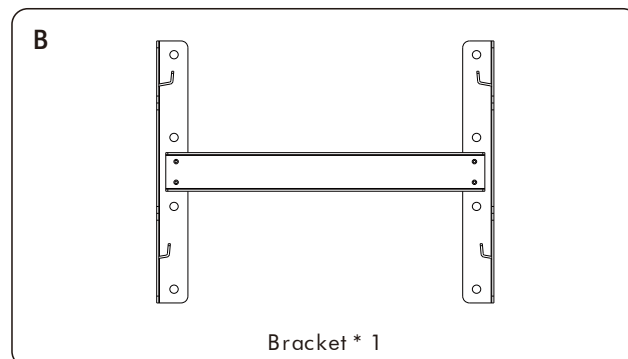
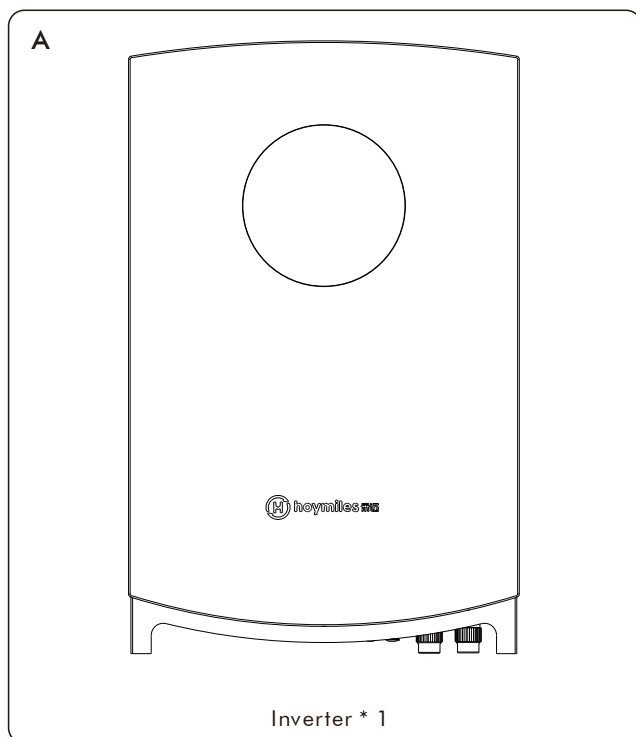
### CAUTION

- The Inverter has a transformerless design on PV side. Either positive or negative terminals of PV panels should not be grounded.
- The frames of PV panels should be grounded for safety reasons.

### NOTICE

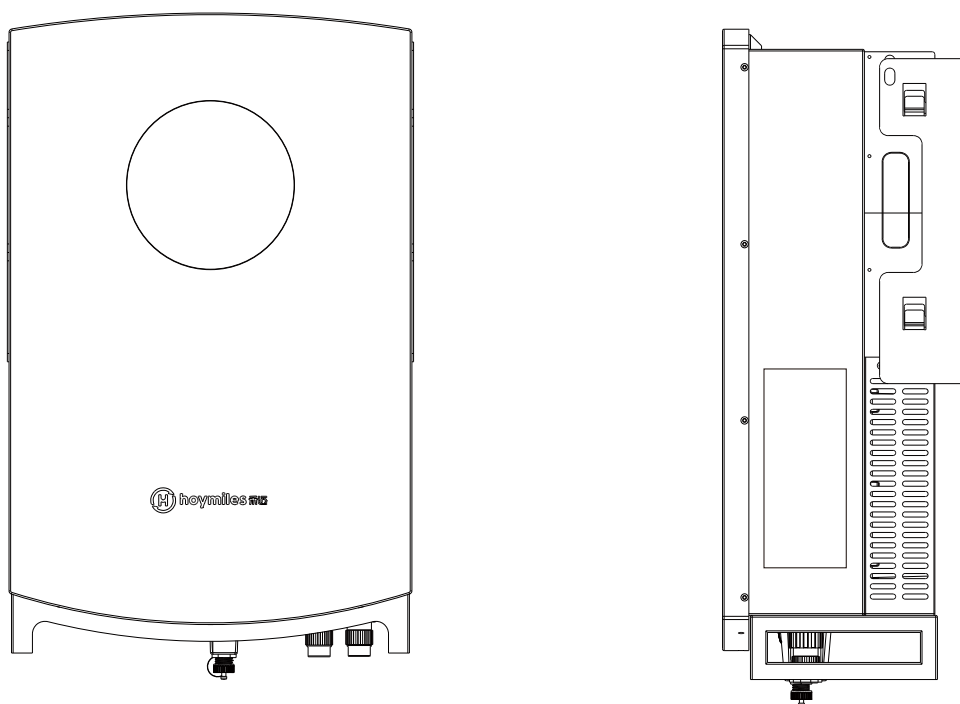
- Do not open the inverter cover or change any components without authorization, otherwise the warranty commitment for the inverter will be invalid.
- Appropriate methods must be adopted to protect inverter from electrostatic discharge; any damage caused by ESD is not warranted by the manufacturer.

# 3.Scope of Delivery








## 4. Product Description

### 4.1 View of the Product



*View of the HY3 Series Hybrid Inverter*

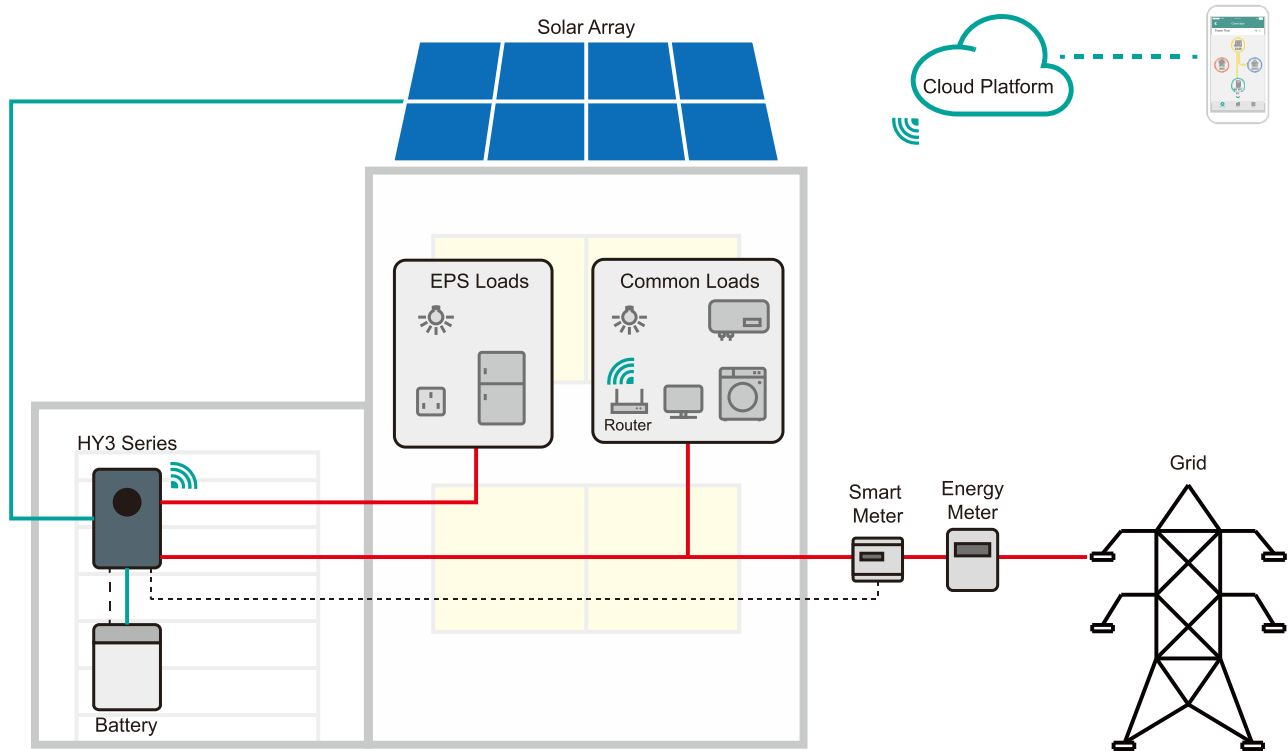
#### *Symbols on the Label*

Symbol	Explanation
	CE Mark
	Refer to User Manual
	Caution, Risk of Danger
	Caution, Risk of Electric Shock
	Caution, Hot Surface



## 4.2 System Diagram

The **HY3 Series** hybrid inverter can be used with battery and solar array to form a solar-storage system. It can improve the self-consumption of solar energy, and can also perform as a backup power supply.



*System Diagram of HY3 Series*

### NOTICE

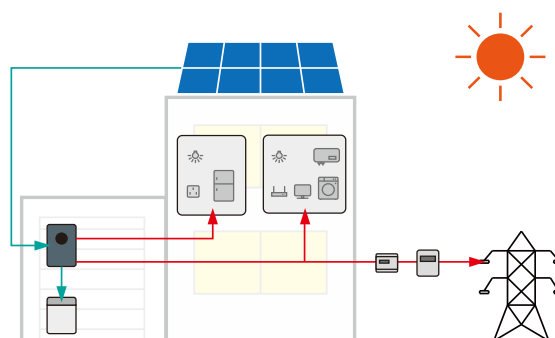
This diagram is a simplified system sketch, only for explanation of system modes, which is NOT for wiring or connection.

Normally, the EPS port needs an external switchover device to get power from grid when grid is available. Please refer to the Wiring Diagram in the Chapter 6.2.

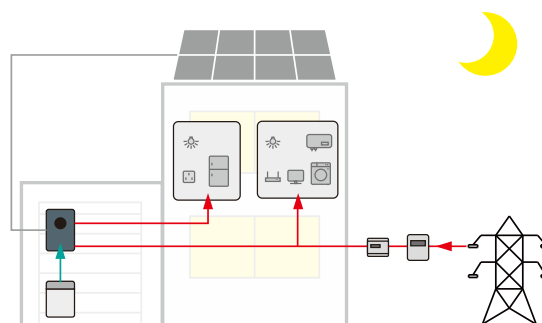
## 4.3 Operating Mode Introduction

### Several Common Operation Modes

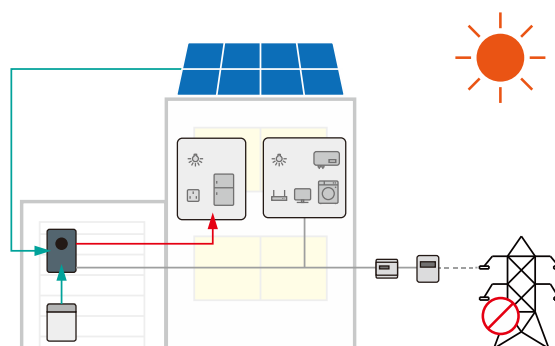
**Mode 1** In the daytime when there is sufficient sunlight, the solar energy supports the loads first; excess energy is stored in battery; rest energy is fed into grid (or limited if required).



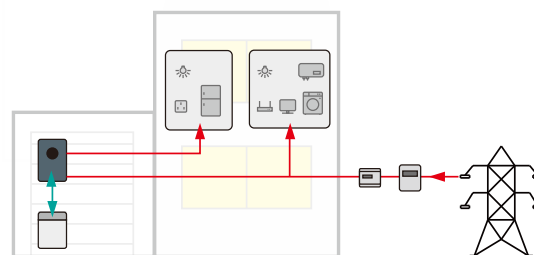
**Mode 2** In the night, or when there is not sufficient solar energy, the battery supplies the loads together with grid and solar if available.



**Mode 3** When the grid is not available, the inverter can supply the loads by energy from solar and battery.



**Mode 4** The inverter can also charge the battery with energy from grid. For instance, in areas with Time of Use tariff, users can choose to charge the battery in low tariff periods, and use stored energy in high tariff periods.



# 5. Mounting

## 5.1 Selecting the Mounting Location

### NOTICE

Check to make sure the installation location does not fall into any of the following conditions. If any do, then a risk assessment will be required.

#### Check List

- Unsafe due to assessment of occupational health safety risks.

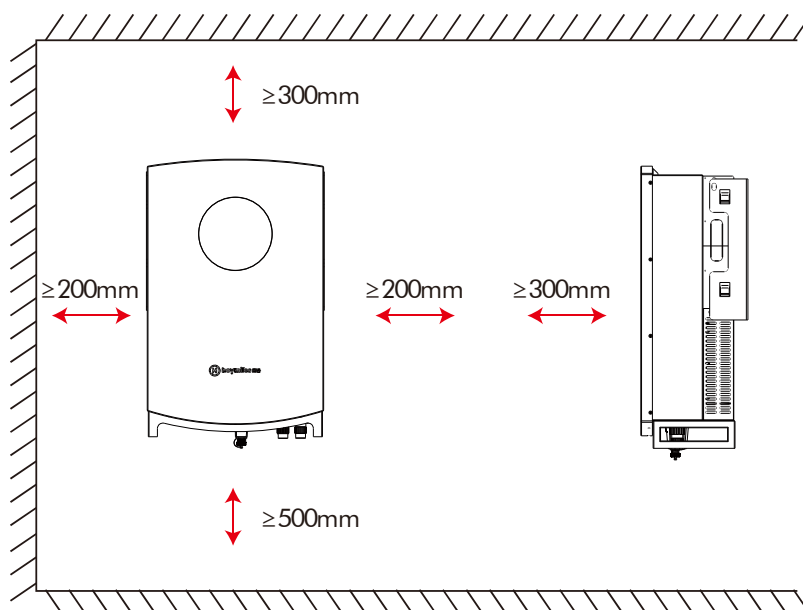
- Exposed to direct sunlight, rain, or snow.



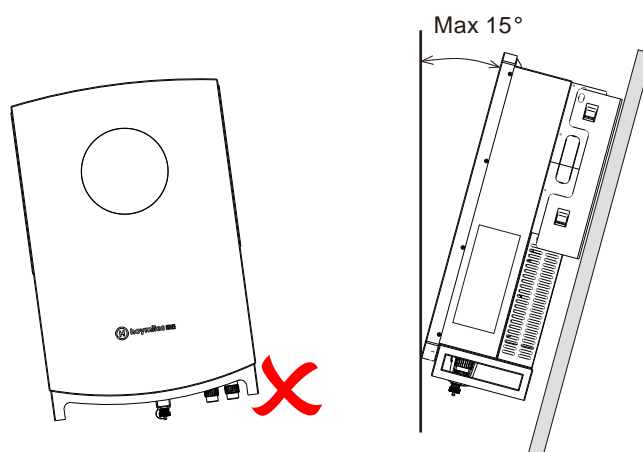
- The ambient temperature is outside the range of tolerable ambient temperature (-20°C to +60°C, -4°F to +140°F).
- Higher than the altitude of 2,000m above sea level. Above 2000m the inverter output will be de-rated.
- Close to flammable materials or areas where flammable materials are stored.
- Prone to be damaged by sea water.
- Close to corrosive gas or liquid (for example, locations where chemicals are processed or stored).
- Little or no air flow.
- Mounted on a surface without suitable fire/heat rating.
- Mounted on a wall without suitable load holding capacity.
- High humidity.
- Sites considered unsafe because of local regulations.
- Confined space without adequate airflow.
- Area subject to sand or dust storms.
- Exposed to steam, vapor, or water.
- Near antenna and/or data cables.

## Requirements of Mounting

- Enough space around the inverter is suggested, as left picture shows.



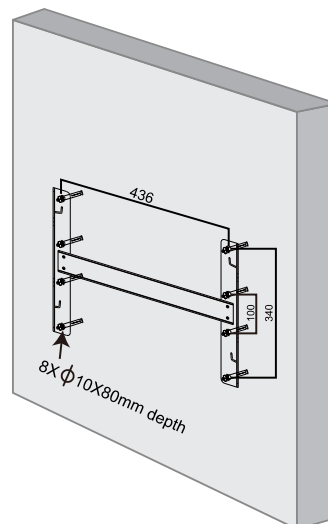
- The inverter must be mounted in upright position with a tilt angle no more than 15 degree.



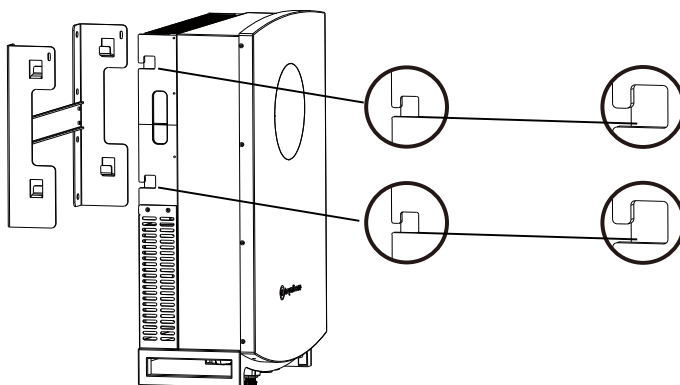
## 5.2 Mounting the Inverter

### Procedure

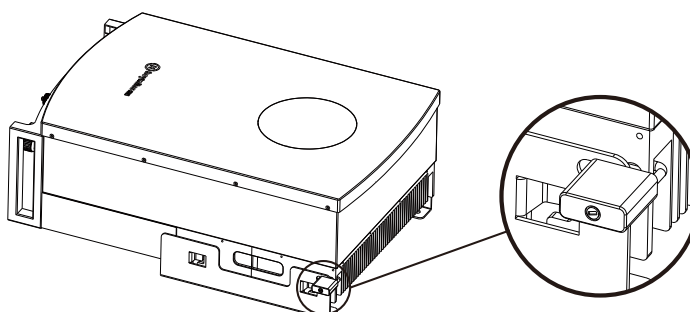
- Step 1**
- Please use the mounting bracket as a template to drill 6 holes on the wall (10mm in diameter, and 80mm in depth).
  - Use expansion bolts in accessory box, to fix the mounting bracket onto the wall tightly.



- Step 2**
- Lift the inverter with the handles on two sides and the bottom.
  - Hang the inverter onto the mounting bracket.

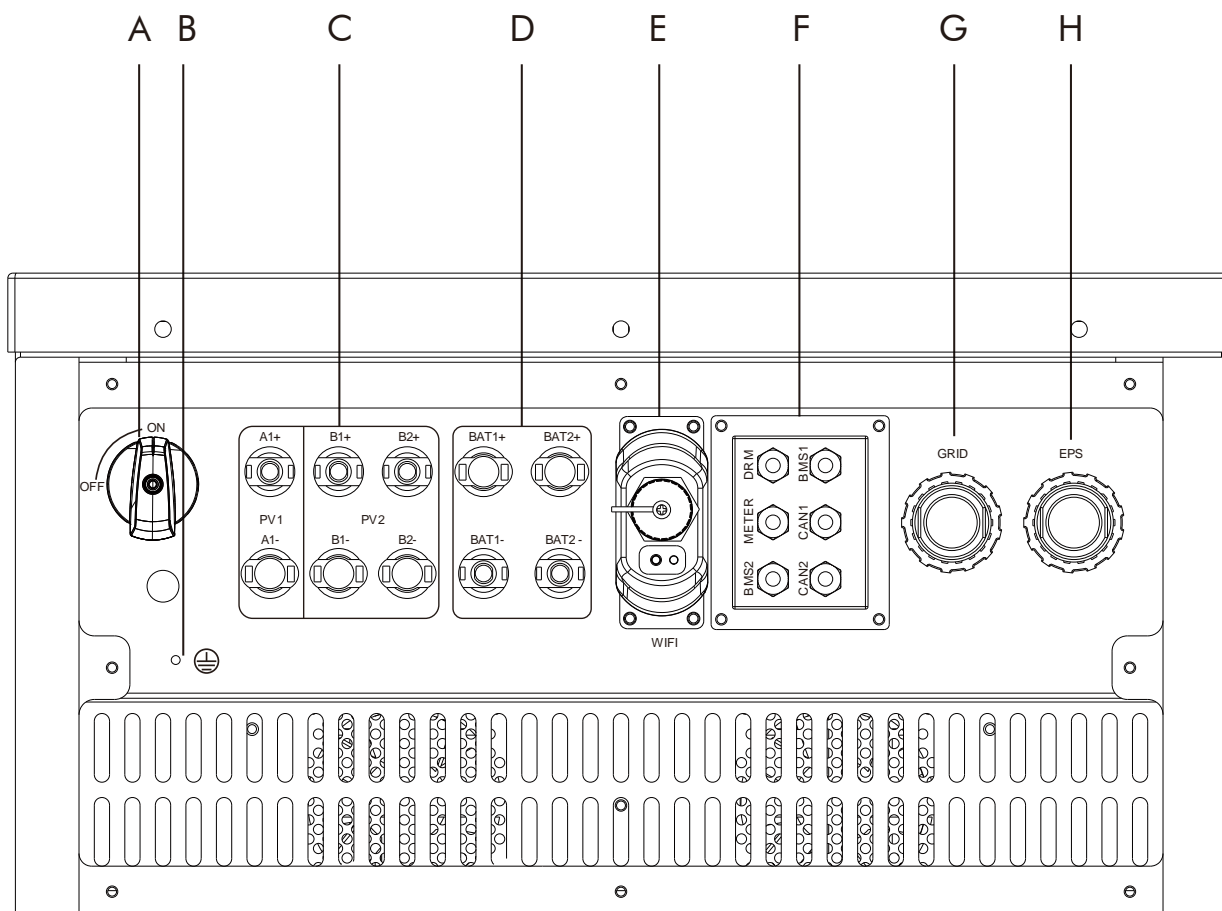


- Step 3**
- One can lock the inverter on its bracket, for anti-theft purpose.



## 6. Electrical Connection

### 6.1 Overview of Connection Area



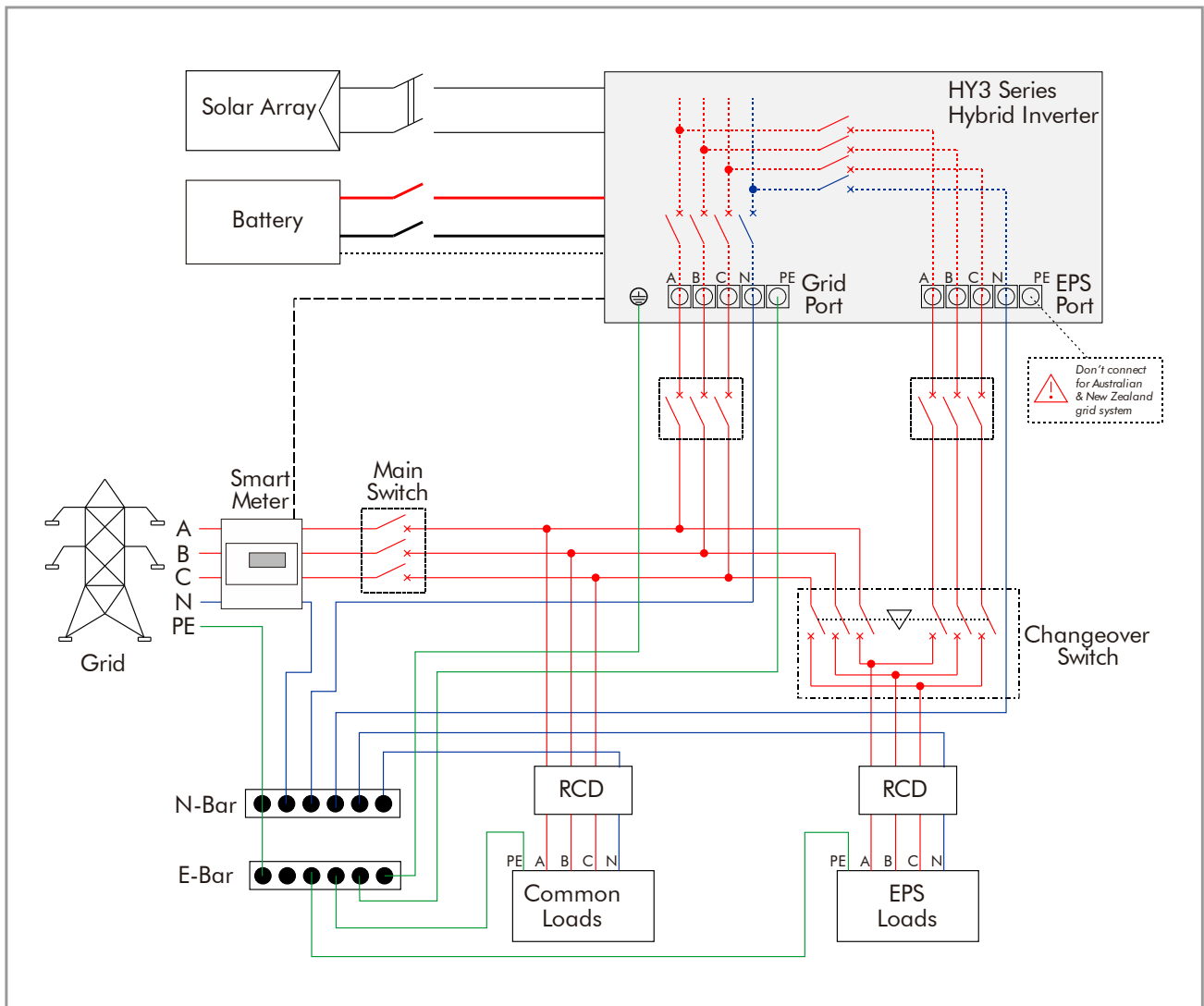
Position	Designation
A	Solar Switch
B	Additional Grounding Point
C	Solar Input Ports
D	Battery Input Ports
E	WiFi Module Port
F	Communication Port (Include DRM, smart meter port, 2 BMS ports, 2 CAN ports)
G	Grid Connector
H	EPS Connector

## 6.2 Wiring Diagram

### A. Diagram for Australia and New Zealand

#### NOTICE

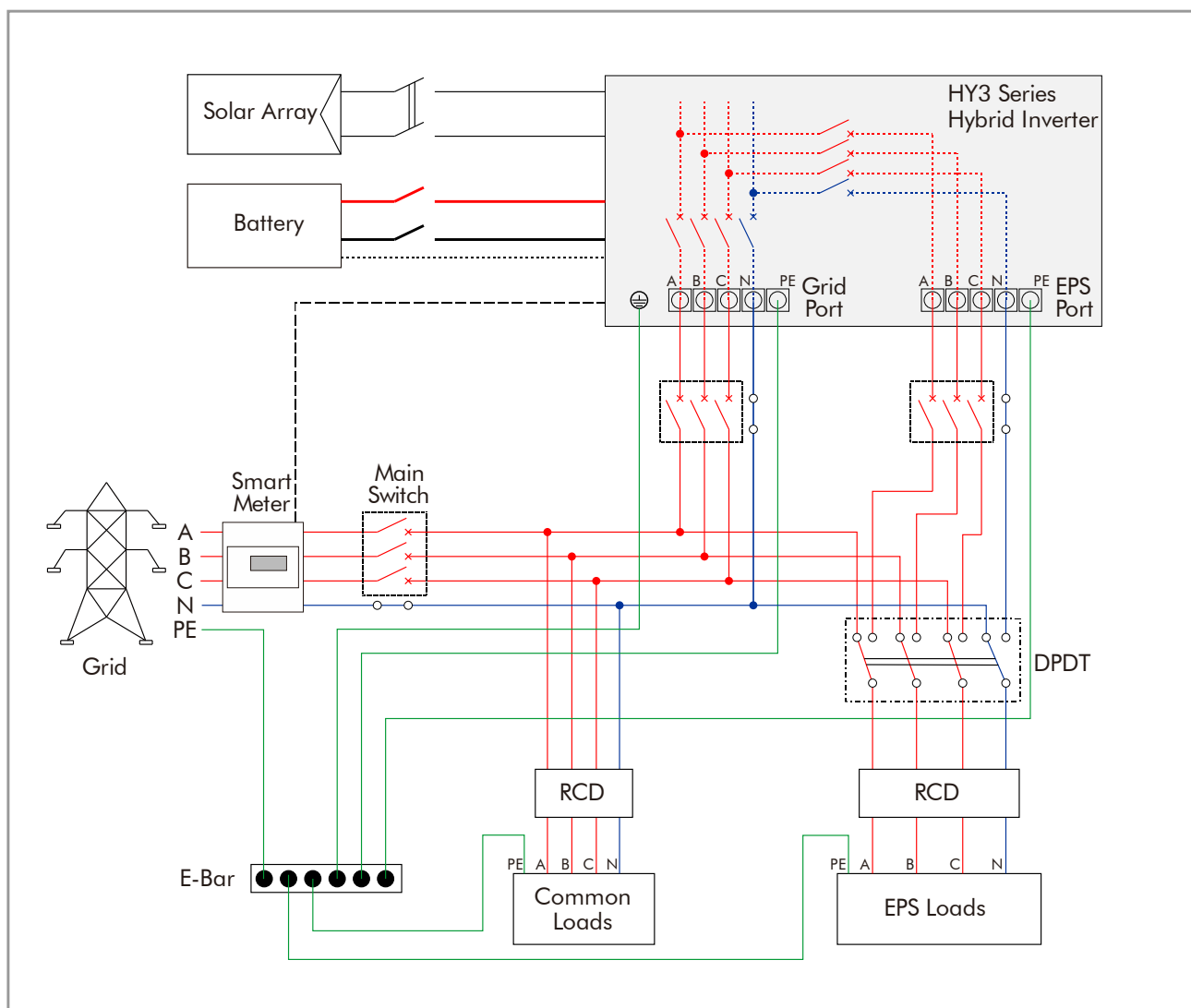
For Australian safety countries, the neutral line of EPS port must NOT be isolated or switched.



## B. Diagram for Other Countries

**NOTICE**

For other countries, the neutral line of EPS port can be isolated or switched.





## 6.3 PV Connection

Before connecting, please make sure:

- The voltage, current and power ratings of the panels to be connected are within the allowable range of the inverter, ensure polarity is correct, and please refer to the Technical Data in chapter 9 for voltage and current limits.
- Since the inverter is transformerless, please do not ground either output of the PV panels. Ground the panel frames.
- The HY3 Series inverters are designed with 2 MPPT trackers and the HY3-8000HV/10000HV have 3 PV inputs. Only one solar string is permitted for one input port. If the inputs of the PV panels are paralleled; please consult with your local distributor for technical support.
- If the inverter is equipped with a PV switch, please make sure it is in the "off" position. Otherwise please use an external PV switch to cut off the PV connection during wiring and when necessary.

### WARNING

When exposed to light, PV panels will generate DC voltage. One should turn off the PV switch before connecting the wire, and be careful with the conductors.

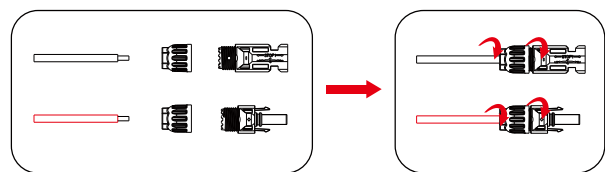
### NOTICE

Use the PV Connectors in the accessory box for PV connections.

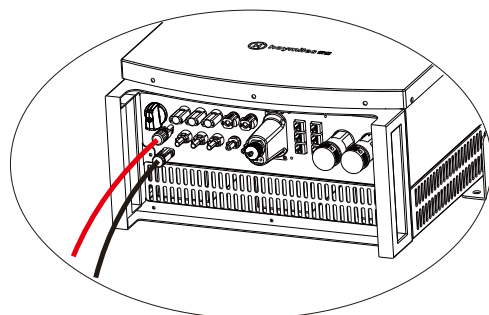
Please make sure the connectors are correct, not the battery connectors, as they look similar.

#### Procedure

- Step 1**
- Assemble the PV connectors from the accessory box.
  - Make sure the polarity is correct.
  - The conduct core section: 2.5-4mm<sup>2</sup>.



- Step 2**
- Connect the PV connectors to the inverter. There should be a "click" sound, if it is plugged in correctly.



## 6.4 Grid Connection

Before connecting, make sure:

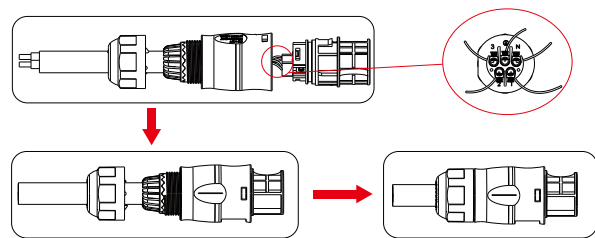
- Use the Grid Connector from the accessory box.
- The grid voltage and frequency is in the permissible range.
- External AC breaker must be used for cutting off the inverter from grid when necessary.

The breaker model selection:

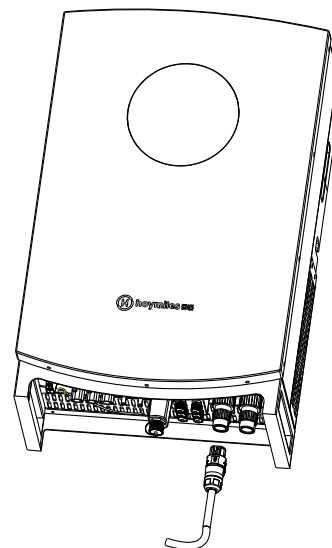
- 25A/400V AC Breaker for HY3-5000HV/6000HV
- 40A/400V AC Breaker for HY3-8000HV/10000HV

### Procedure

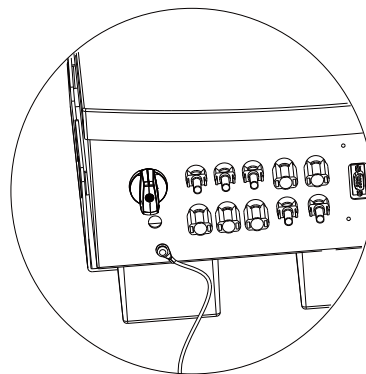
- Step 1**
- Assemble the grid connectors from the accessory box.
  - Make sure the 3L/N/PE are correctly assembled.
  - The conduct core section: 4-6mm<sup>2</sup>.



- Step 2**
- Connect the grid connectors to the inverter. There should be a "click" sound, if it is plugged in correctly.



- Step 3**
- Connect an additional grounding wire to the ground point.



## 6.5 EPS Connection

If you want to use the energy storage system to power the house (as a standalone system or during Grid failure), the EPS connector should be used and the EPS function should be enabled. Otherwise one can leave the EPS port un-connected.

Before connecting, make sure:

- Use the EPS Connector from the accessory box.
- The grid voltage and frequency is in the permissible range.
- External AC breaker must be used for cutting off the inverter from all the EPS loads when necessary.

The breaker model selection:

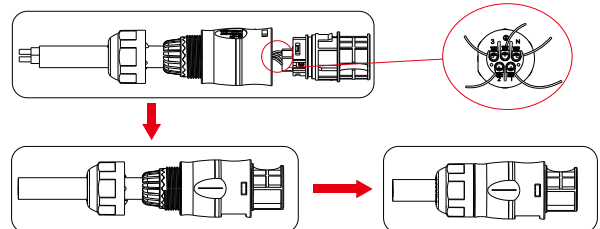
- 25A/400V AC Breaker for HY3-5000HV/6000HV
- 40A/400V AC Breaker for HY3-8000HV/10000HV

### NOTICE

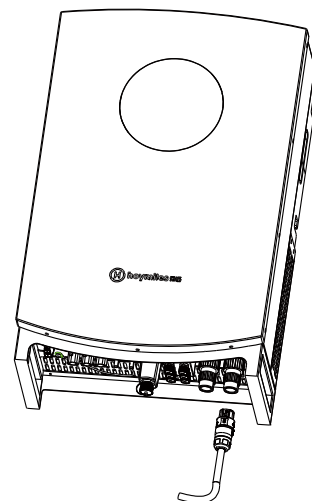
If there are discrepancies about wiring mode between local regulations/standards and this manual, please contact us before installation and/or operation.

#### Procedure

- Step 1**
- Assemble the EPS connectors from the accessory box.
  - Make sure the 3L/N/PE are correctly assembled.
  - The conduct core section: 4-6mm<sup>2</sup>.



- Step 2**
- Connect the grid connectors to the inverter. There should be a "click" sound, if it is plugged in correctly.



## 6.6 Battery Connection

Before connecting, make sure:

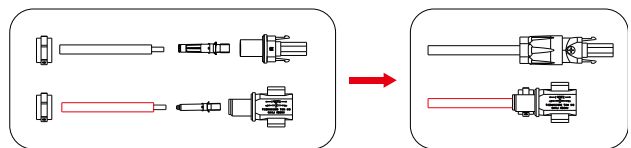
- Use the Battery Connectors from the accessory box.
- The battery is compatible with HY3 Series. Please contact local distributor or manufacturer for approved battery list.
- A DC breaker with OCP function is compulsory to be installed between inverter and battery. The battery may have this switch integrated. If not, an external DC switch of proper ratings should be used.
- Make sure the breaker mentioned above is in "off" position.

### NOTICE

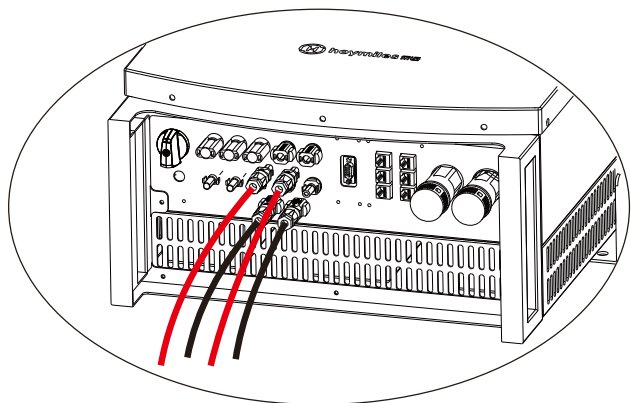
Use the Battery Connectors in the accessory box for battery connections.  
Please make sure the connectors are correct, not the PV connectors, as they look similar.

#### Procedure

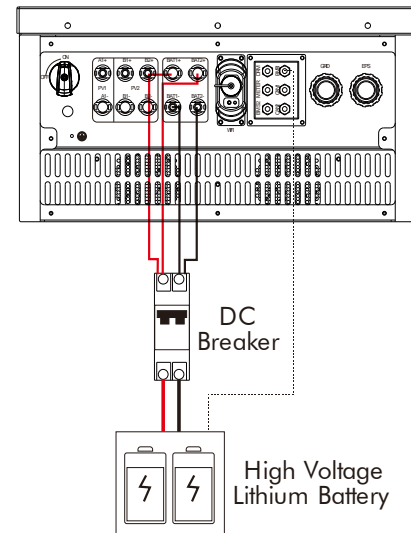
- Step 1**
- Assemble battery connectors from the accessory box.
  - Make sure the polarity is correct.
  - The conduct core section: 6mm<sup>2</sup>.



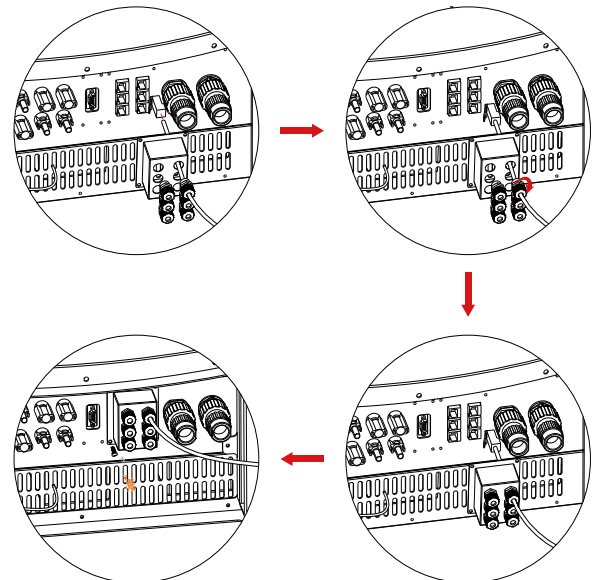
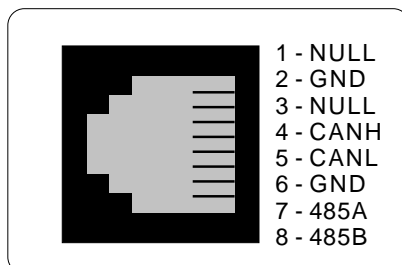
- Step 2**
- Connect the battery connectors to the inverter. There should be a "click" sound, if it is plugged in correctly.
  - As the battery current is up to 50A, two pairs of battery connectors with cables are needed.



- Step 3**
- Connect the wires from inverter to a DC breaker firstly, and then connect the battery and DC breaker with a cable of 10-16mm<sup>2</sup> core section.
  - Besides, if the battery is integrated with a DC breaker, and its port can accommodate two inputting wires or connectors, one can connect the wires to the battery directly.



- Step 4**
- Assemble and connect the BMS connector (RJ45) to inverter.
  - The BMS port's PIN definition is shown in the below.
  - Connect the other end of BMS cable to battery, following battery's instructions and manual.



## 6.7 Smart Meter Connection

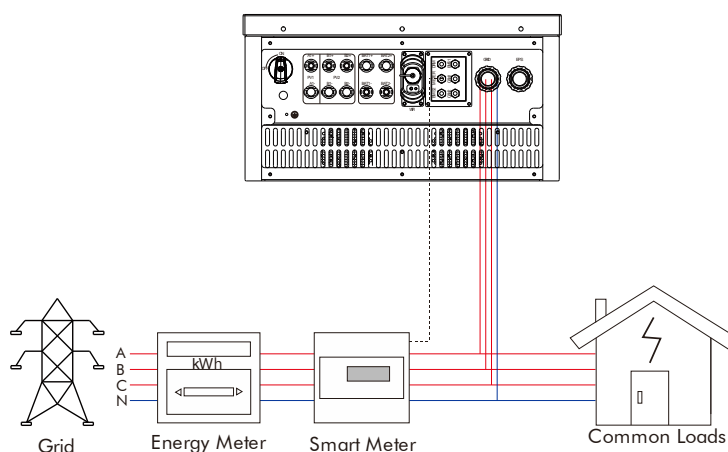
### NOTICE

The inverter needs the data from the smart meter, to monitor the power usage in the house, and control the generation/charge/discharge process according to smart meter's data.

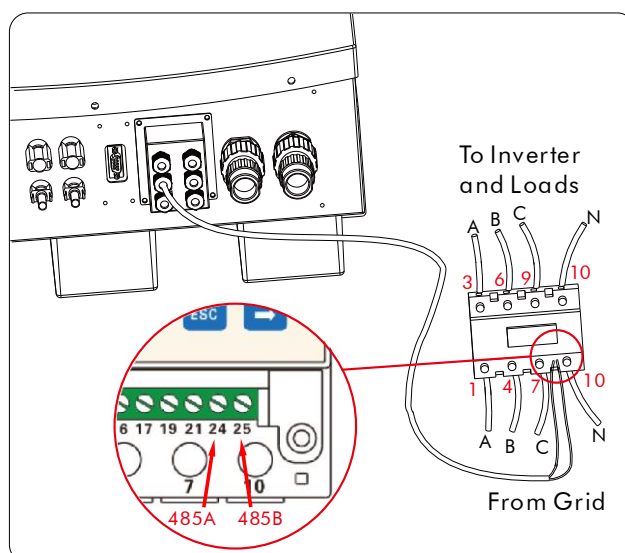
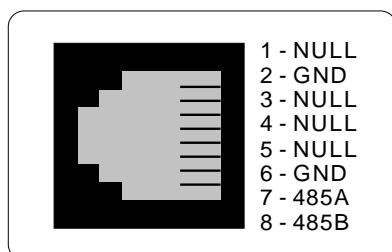
The smart meter communication only works when it is compatible with the inverter. Please use the provided meter from the accessory box.

### Procedure

- Step 1**
- Install the smart meter.
  - Normally, the smart meter should be placed in or near the grid distribution box right after the billing meter, in order to account all the loads.



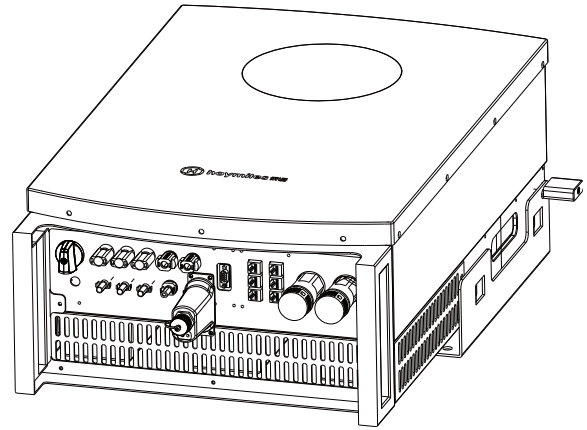
- Step 2**
- Connect the communication cable between inverter and smart meter.
  - The smart meter port's PIN definition is shown in the below.



## 6.8 WiFi Module Connection

### Procedure

- Step 1**
- Insert the WiFi module to the WiFi port.
  - Fasten the screws tight.
  - One can also use a network cable, to connect the WiFi module and router, if there is no or weak wireless network signal at the site.
- 
- Step 2**
- Configure network for the WiFi module by Hoymiles APP, which will be introduced in Chapter 7.4.



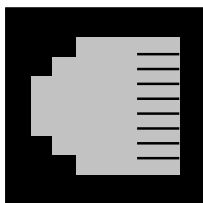
## 6.9 DRM Connection

DRM is provided to support several demand response modes by certain control signals.

If it is not required, one can leave it un-connected.

The connection steps are similar to BMS and smart meter communication connection.

### DRM Port's PIN Definition

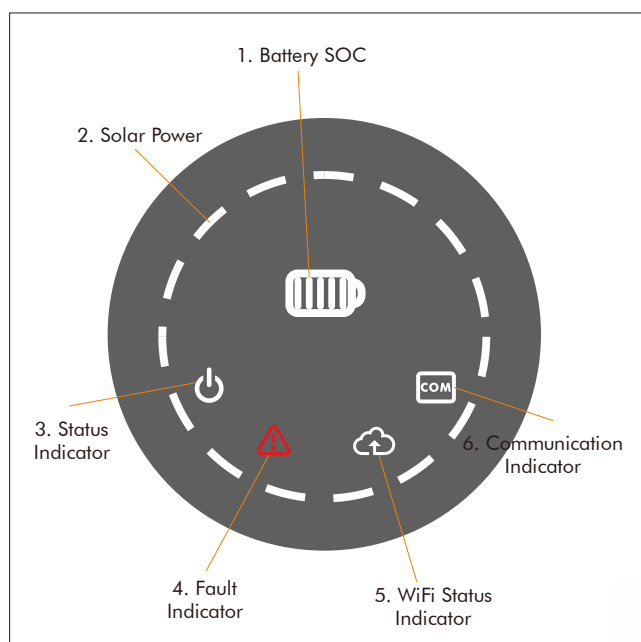


- 1 - NULL
- 2 - GND
- 3 - NULL
- 4 - NULL
- 5 - NULL
- 6 - GND
- 7 - 485A
- 8 - 485B

## 7. Operating the Inverter

### 7.1 Explanation of LED Indicators

The LEDs on the screen indicate the operating state.



#### Explanation of LED Indicators

1. Battery SOC	There are five LED bars, indicating the SOC is in the range of 0-20%, 20-40%, 40-60%, 60-80%, and 80-100%.
2. Solar Power	The outer LED cycle indicate the ratio of solar generation power. All LEDs light on means generating at rated (maximum) power.
3. Status	If the inverter is on, the LED lights on. If the inverter is shut down, the LED is off.
4. Fault	When the inverter is normal, the LED is off. When there is fault, the LED is on.
5. WiFi Status	If the WiFi module is not plugged in, the LED is off. When the WiFi module is plugged and is connected to internet, the LED is on. When the WiFi module is plugged and is not connected to internet, the LED flashes.
6. Communication	The LED shows communication status with battery, smart meter, and etc.: <ul style="list-style-type: none"> <li>When the communication is normal, the LED is on.</li> <li>When there is communication problem, the LED flashes.</li> <li>When no communication is available, the LED is off.</li> </ul>



## 7.2 Commission

### WARNING

Before commissioning the inverter, make sure:

- The country mark on the box is in accordance with the installation site;
- The inverter is correctly and firmly mounted;
- The circuit breaker and RCD are correctly connected and are all in “off” position;
- All cables are connected according to chapter 6;
- Unused inputs must be sealed using the corresponding connectors or sealing plugs.

Procedure		
<b>Step 1</b>	Power on the grid	<ul style="list-style-type: none"> <li>• Wait for a while, the status led should be on.</li> <li>• If not, power off the grid and check for the connections of grid power line and smart meter.</li> </ul>
<b>Step 2</b>	Power on the battery	<ul style="list-style-type: none"> <li>• The battery SOC indicator should be on, and show the current SOC.</li> <li>• If not, power off the battery and check for the power connection and BMS communication.</li> <li>• Also check the battery's SOC. If the SOC is too low, the battery may be in the sleep mode, and even cannot be power on.</li> </ul>
<b>Step 3</b>	Power on the PV	<ul style="list-style-type: none"> <li>• If there's sunlight, the outer cycle indicator will be on according to PV power.</li> <li>• Wait for a moment and the inverter will start a self-test procedure. When it is done successfully, the inverter will start using PV power to charge the battery or feed in power to the house and grid.</li> </ul>
<b>Step 4</b>	Switch on the loads	<ul style="list-style-type: none"> <li>• Make sure all the loads are ready to be powered on.</li> </ul>
<b>Step 5</b>	Configure network for WiFi module	<ul style="list-style-type: none"> <li>• Configure WiFi module via Hoymiles APP for remote monitoring.</li> </ul>

## 7.3 Decommission

Procedure	
<b>Step 1</b>	Turn off the loads.
<b>Step 2</b>	Turn off the PV.
<b>Step 3</b>	Turn off the battery.
<b>Step 4</b>	Turn off the grid.
<b>Step 5</b>	Wait for at least 5 minutes after the LED indicators black out for the internal circuits to discharge energy.
<b>Step 6</b>	Disconnect all the power cables. Disconnect all the communication cables. Remove the WiFi module.
<b>Step 7</b>	Remove the inverter from the wall, remove the bracket if necessary. Pack the inverter.

## 7.4 WiFi Configuration

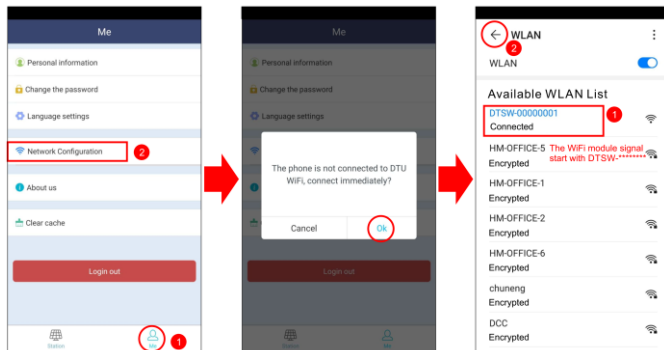
### Procedure

#### Step 1 Get WiFi Module Ready

- Press the button on the WiFi module three (3) times, and wait for about 30 seconds.

#### Step 2 Connect to WiFi Module

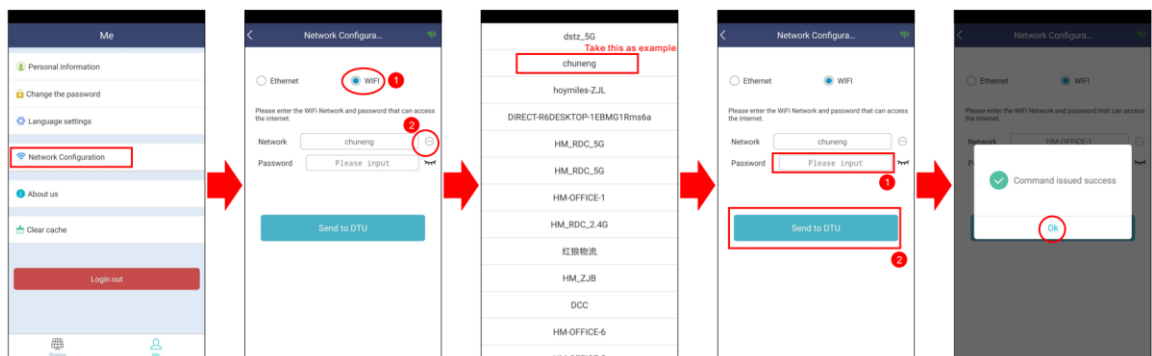
- Login Hoymiles APP.
- Connect to WiFi module's network as following.



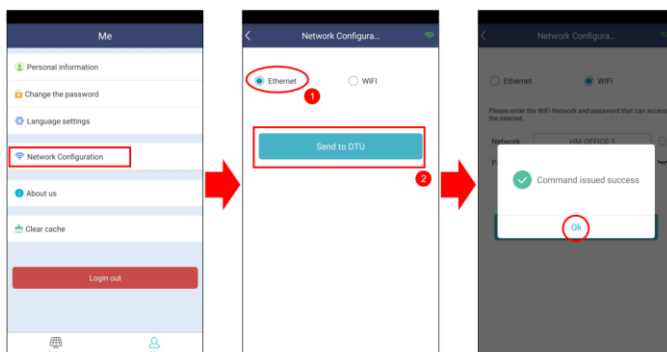
#### Step 3 Configure Network

- Configure network for WiFi module with wireless network or wired network.

For Wireless Network



For Wired Network



#### Step 4 Reset Network

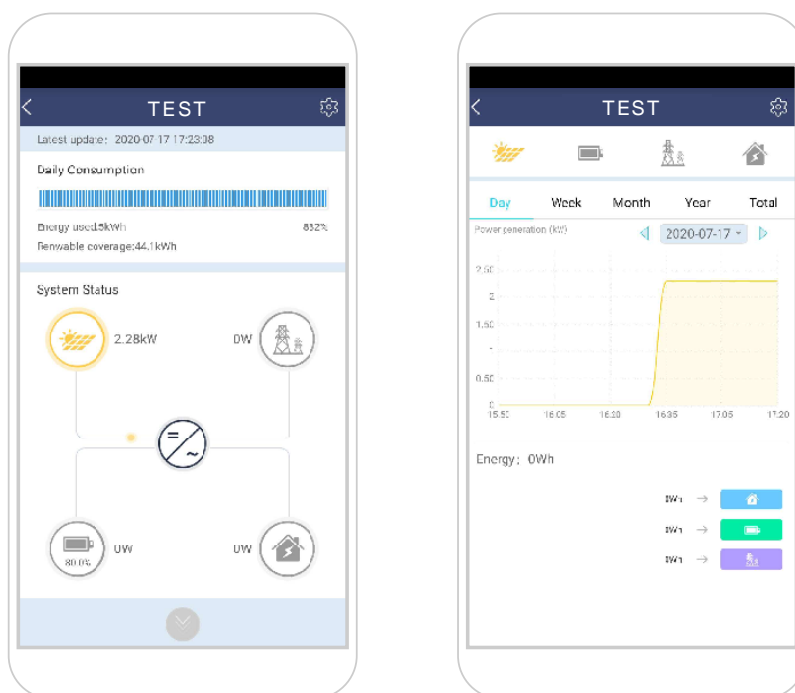
- Repeat step 1-3, to reset network for WiFi module.

## 7.5 APP Monitoring

Hoymiles APP is an external monitoring and configuration application for Hoymiles inverters.

One can monitor, operate, set, and update the inverter through the APP.

Search “Hoymiles” in the iOS Store and Google Play, to download the APP and get started.



## 8. Troubleshooting

*To be released.*

# 9. Technical Datasheet

Models	HY3-5000HV	HY3-6000HV	HY3-8000HV	HY3-10000HV
INPUT (DC)				
Max. recommended DC power [W]	6000	8000	10000	13000
Max. DC voltage [V]	1000	1000	1000	1000
Nominal DC operating voltage [V]	720	720	720	720
Max. input current [A]	11/11	11/11	11/11	11/20
Max. short circuit current [A]	14/14	14/14	14/14	14/23
MPPT voltage range [V]	230~800	280~800	370~800	330~800
Number of MPPT trackers	2	2	2	2
String per MPPT tracker	1	1	1	1/2
OUTPUT (AC)				
Nominal AC power [VA]	5000	6000	8000	10000
Max. AC power [VA]	5000	6000	8000	10000
Rated grid voltage/AC voltage range [V]	400(360~440)	400(360~440)	400(360~440)	400(360~440)
Rated frequency of grid [Hz]	50/60	50/60	50/60	50/60
Nominal AC current [A]	7.6	9	12.2	15
Max. AC current [A]	8.5	10	13.5	16
Displacement power factor	0.8 leading ... 0.8 lagging			
Total harmonic distortion [%]	<2 @ rated power			
Parallel operation	Yes			
Load control	Yes (optional)			
OUTPUT DC (BATTERY)				
Battery voltage range [V]	170~500			
Recommended battery voltage [V]	200	240	320	400
Max. charging/discharging power [W]	6000	8000	10000	10000
Max. charging/discharging current [A]	50			
Communication interfaces	CAN/RS485			
Reverse connect protection	Yes			
EPS OUTPUT (WITH BATTERY)				
EPS rated power [VA]	5000	6000	8000	10000
EPS rated voltage [V]; Frequency [Hz]	400/380, 50/60	400/380, 50/60	400/380, 50/60	400/380, 50/60
EPS rated current [A]	7.2	8.7	11.6	14.5
EPS peak power [W]; Duration [s]	7500, 60	9000, 60	12000, 60	14000, 60
Switch time [s]	<0.5			
Total harmonic distortion [%]	<0.2 with linear load			

EFFICIENCY				
MPPT efficiency [%]	99.9			
Euro efficiency [%]	97			
Max. efficiency [%]	97.8			
Battery charge/discharge efficiency [%]	97.8 (PV-BAT) 96.0 (BAT-AC)			
POWER CONSUMPTION				
Standby consumption(night) [W]	<7			
Idle mode	YES			
STANDARD				
Safety	IEC62109-1-2 / IEC62040/ AS3100			
EMC	EN61000-6-1/EN61000-6-2/EN61000-6-3			
Certifications	VDE0126-1-1, A1:2012/VDE-AR-N4105/G59-3/AS4777/EN50438/CEI 0-21/IEC62040/IEC62619/ISO13849-2/SN29500/IEC615086			
ENVIRONMENT LIMIT				
Protection class	IP65			
Operating temperature [°C]	-25 to +60 (derating at+45)			
Altitude [m]	<2000 (>2000, derating)			
Storage temperature [°C]	-20 to +60			
Noise emission(typical) [dB]	<30			
Over voltage category	III (electric supply side), II (PV side)			
GENERAL				
Dimensions(WxHxD) [mm]	456*655*228			
Weight [kg]	40	40	45	50
Cooling concept	Natural			
Topology	Transformerless			
Communication	Ethernet, Meter, WIFI (optional), RF(optional), DRM, USB, ISO alarm, Parallel operation			
LCD display	Backlight 20*4 character			
Standard warranty [years]	5~10			

# Warranty Card

ITEM	DESCRIPTION	REMARK
Customer Name		
Address		
Product Model		
Product Serial Number		
Date of Installation		
Installer		
Description of Problem		











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