HYPONTECH
ENERGIZING FUTURE

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HYPONTECH

ENERGIZING FUTURE



HES-3000/3680/4000/5000/6000T Series

Single-Phase Hybrid Inverters

USER MANUAL

V1.00

CATALOGUE

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1. INTRODUCTION

1.1 OPERATION MODES INTRODUCTION

HES normally has the following operation modes based on your configuration and layout conditions.

1.1.1 Self-consumption mode

In this mode, the Hypontech hybrid inverter maximizes the use of self-generated power to meet local load demand. The system will intelligently allocate power to ensure that the home fully utilizes self-generated power, thus reducing electricity costs.

1.1.2 Full Backup Mode

In areas where grid failures or power outages are common, the Hypontech hybrid inverter's full backup mode, plays a key role. Utilizing the energy storage system, it provides continuous and reliable power to guarantee the seamless operation of important equipment, ensuring that users have full power backup.

1.1.3 Full off-grid mode

Fully off-grid mode allows users to operate independently, completely off the grid. This self-sufficient energy solution enhances the user's independence and reduces reliance on external power sources.

1.1.4 Feed in Priority Mode

In this mode, the inverter prioritizes feeding excess generation back to the grid. With smart technologies such as BMS scheduling, grid limits, charge/discharge times and power settings, the inverter seamlessly manages the flow of power, giving the user the flexibility to sell excess power to the grid or rely on the grid to meet additional power needs.

Prioritized scheduling with full consideration for the user:

Hypontech hybrid inverters not only provide four flexible power generation modes, but also maximize the user's power needs through priority scheduling, BMS management and other intelligent algorithm. Users can customize and effectively manage energy usage according to actual scenarios.

1.2 SYSMBOLS ON THE LABEL

	DANGER, WARNING AND CAUTION		RECYCLABLE AND REUSABLE
	HIGH VOLTAGE AVOID CONTACT		AVOID DAMP AND MOISTURE
	HIGH TEMPERATURE AVOID CONTACT		SHIPMENT STACK LIMIT: 7
	CE MARKS		DO NOT DISPOSE WITH HOUSEHOLD WASTE
	PROCEED OPERATIONS AFTER 5 MINUTES DISCHARGE		BREAKABLE ITEM
	PLACE UPWARDS		USER MANUAL IN PACK

2. SAFETY AND WARNINGS

1. All persons who are responsible for mounting, installation, commissioning, maintenance, tests, and service of HYPONTECH inverter products must be suitably trained and qualified for corresponding operations. They MUST be experienced and have knowledge of operation safety and professional methods. All installation personnel must have knowledge of all applicable safety information, standards, directives, and regulations.
2. The product must ONLY be connected and operated with PV arrays of protection class II, in accordance with IEC 61730, application class A. The PV modules must also be compatible with this product. Power resources other than compatible PV arrays MUST not be connected and operate with the product.
3. When designing or constructing a PV system, all components MUST remain in their permitted operating ranges, and their installation requirements MUST always be fulfilled.
4. Under exposure to sunlight, the PV array may generate dangerous output in DC voltage. Contacts with the DC wires, conductors and live components in the inverter may result in lethal shocks.
5. High voltages in inverter could cause lethal electrical shocks. Before proceeding any work, including maintenance and/or service, on the inverter, fully disconnect it from all DC input, AC grid and other voltage sources. There MUST be a 5-minute waiting time after the full disconnection.
6. The DC input voltage of the PV array MUST never exceed the maximum input voltage of the inverter.
7. DO NOT touch parts of the inverter during operation as heat will be induced and these parts will exceed 60℃.
8. There are installations where multiple inverter energy systems are used and electrical installation connects at a single point of supply to the grid, please refer to the requirements of Appendix B.
9. Safe Transport / Handling:

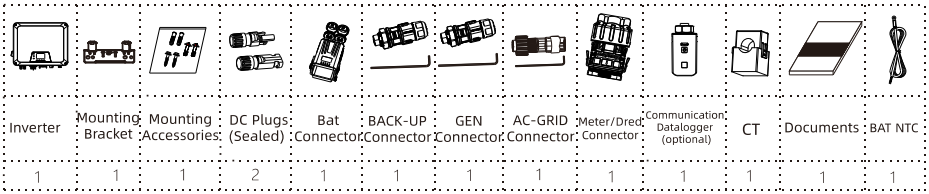
- Find the mark of PLACE UPWARDS on the inverter container and keep it upward.
- The inverter container should be tied or fixed during transportation.
- The transport of the inverter requires two people for lifting, there is one handle on the left and one on the right.
- The inverter should be protected from heavy vibrations and shocks during transportation.

10. Compatible Battery Models
    please refer to the corresponding Hypontech Compatible Battery List, which is available in printed form inside Documents pack, or an online manual on HYPONTECH website at https://www.hypon.com/xiazai.

3. UNPACKING

3.1 Scope of Delivery

Please inspect and check for completeness in the scope of delivery. Confirm with purchase order.

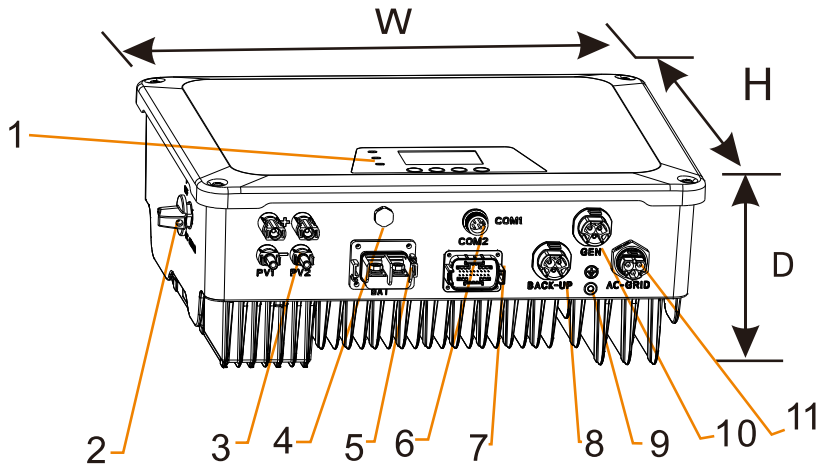


Inverter	Mounting Bracket	Mounting Accessories	DC Plugs (Sealed)	Bat Connector	BACK-UP Connector	GEN Connector	AC-GRID Connector	Meter/Dred Connector	Communication Datalogger (optional)	CT	Documents	BAT NTC
1	1	1	2	1	1	1	1	1	1	1	1	1

3.2 Product Overview

The total size of HES-3000/3680/4000/5000/6000T is 455(width) ×365(height) ×182(depth) mm. It has 2 pairs of PV input terminals,1 Battery input terminals and 2 communication ports. It also has a LCD&LED for getting information and setting parameters at field.

The detail description is shown below:



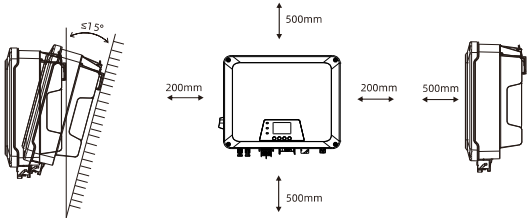
Mark Num.	Component	Description
1	LCD&LED	Display and setting device at field
2	DC Switch	For switch on/off the inverter
3	PV Terminal (s)	Connected with PV Panel

4	Breathing valve	Waterproof and breathable passage
5	Battery Terminal (s)	Connected with Battery Panel
6	COM1: Wi-Fi/LAN	Alternative distant communication method
7	COM2: DRED/CT/BMS	DRED ,CT and BMS
8	BACK-UP Terminal	Connected with BACK-UP
9	Secondary PE Terminal	For Grounding Protection
10	GEN Terminal	Connected with GEN
11	AC Terminal	Connected with AC Grid

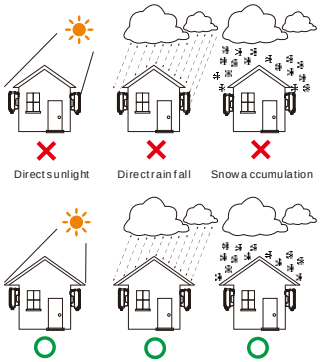
4. INSTALLING

4.1 Installation Requirement

1. Please install the inverter(s) in places that can avoid inadvertent contact.
2. Installation method, location and surface must be fitting for the inverter's weight and dimensions.
3. Please install the inverter in an accessible location for operation, future maintenance and service.
4. The inverter performance peaks at ambient temperature lower than 45℃.
5. When installing in residential or domestic environment, it is recommended to install and mount the inverter on a solid, concrete wall surface. Mounting the inverter on composite or plaster boards or walls with similar materials would induce noise during its operation and is therefore not recommended.
6. DO NOT cover the inverter NOR place any objects on top of the inverter.
7. To ensure sufficient room for heat dissipation and maintenance, the clearing space between inverter(s) and other surroundings is indicated below for reference:

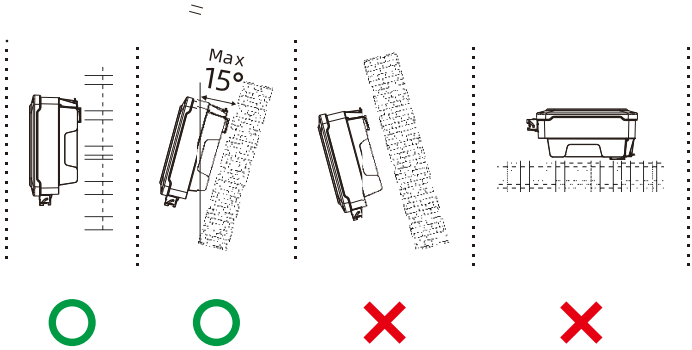


8. Avoid direct exposure to sunlight and rain and snow layup.



4.2 Mounting Location

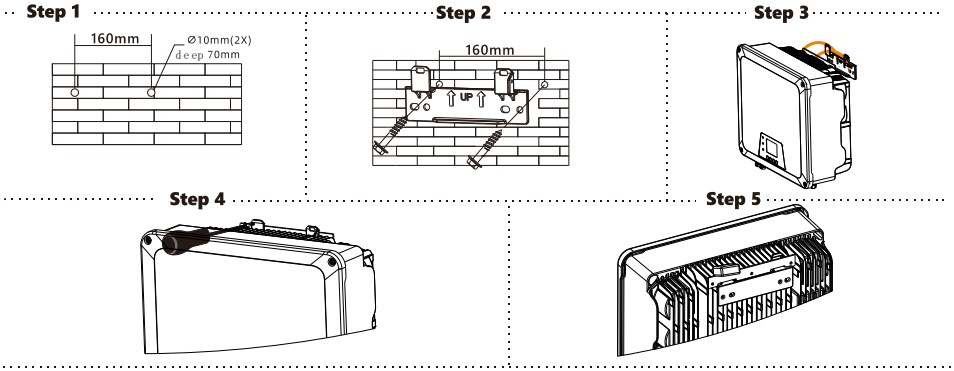
1. DO NOT mount the inverter near any inflammable materials.
2. DO NOT mount the inverter near any explosive materials.



3. DO NOT mount the inverter on tilting surface over 15° backwards. Please mount the inverter on a vertical wall surface.
4. DO NOT mount the inverter on any surfaces tilting forward or to either sides.
5. DO NOT mount the inverter on a horizontal surface.
6. For easy installation and operation, please mount the inverter on a height that the display could match eye level.
7. The bottom side where all commissioning terminals are equipped MUST always point downwards.

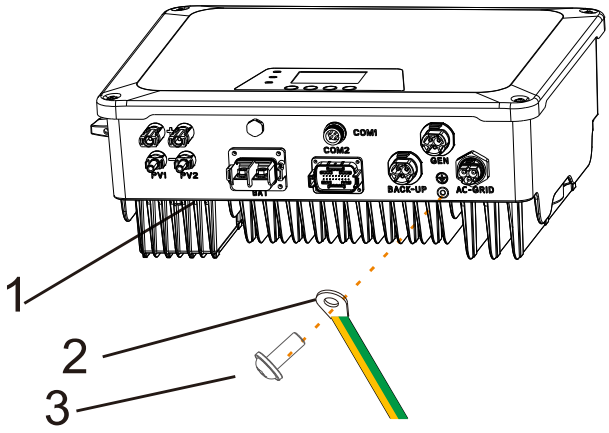
4.3 Mounting

1. Use the mounting bracket as a template and mark the drill holes. Drill 2 holes using a 10mm bit to 70mm depth.
2. Fix the mounting bracket with the screws and expansion bolts packed in mounting accessories.
3. Attach the inverter to the mounting bracket.
4. Use M5 screws (T25 screwdriver, torque 2.5 Nm) to attach the heat sink fins to the mounting bracket.
5. It is recommended to attach the anti-theft lock to the inverter. Lock diameter φ4-5.5mm recommended.



4.4 Installing the PE cable

1. Insert the grounding conductor into the suitable terminal lug and crimp the contact.
2. Thread the M5 * 13 screw through the terminal lug.
3. Tighten it firmly into the housing (screwdriver type: T25, torque: 2.5Nm).



Information on grounding components:

Object	Description
1	Housing
2	M5 terminal lug with protective conductor
3	M5×13 pan head screw

PE Conductor cross-section: 10mm²

4.5 Cable Specification

No	Item	Type	Specifications
1	PE cable	Outdoor copper cable	Conductor cross-section: 10mm²
2	AC Output cable	Outdoor copper cable	Conductor cross-section: 10 mm²
3	DC Input cable	Standard outdoor PV cable, PV1-F Model recommended	Conductor cross-section: 4~6 mm²
4	AC Backup cable	Outdoor copper cable	Conductor cross-section: 6 mm²
5	Battery cable	Outdoor copper cable	Conductor cross-section: 20mm²~35mm²
6	Meter/RS485/DRED	Outdoor shielded twisted pair cable	Conductor cross-section:0.14~1.0mm²

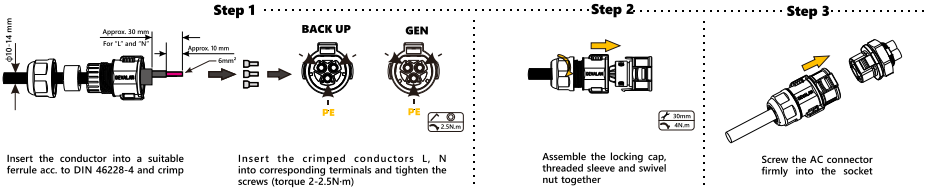
5. COMMISSIONING

5.1 Safety Instructions

1. Measure the frequency and voltage of grid connection and make sure they follow the inverter's grid connection specifications.
2. An external circuit-breaker on the AC side (or a fuse) at 1.25*AC rated current is strongly recommended.
3. Reliability of all earth connections must be tested and valid.
4. Before commissioning, disconnect the inverter and the circuit-breaker or fuse, and prevent accidental reconnection.

5.2 BACK-UP&GEN Wire Assembly and Connection

5.2.1 BACK-UP Commissioning



Note: Please ensure that the connector has been correctly installed! In scenarios where the Backup and/or AC port is not used, you shall install the connectors to the port(s) to prevent safety risks.

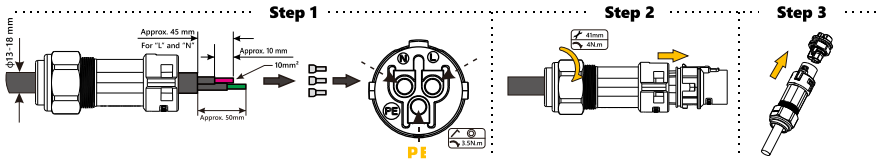
5.2.2 BACK-UP Breaker Types

Please install an individual 2-stage miniature circuit breaker according to the following specifications.

Model	Maximum output current (A)	AC Breaker Rated current (A)
HES-3000	14.3	50
HES-3680	17.6	50
HES-4000	19.1	63
HES-5000	23.9	63
HES-6000	28.7	63

5.3 AC Wire Assembly and Connection

5.3.1 AC Commissioning



Note: Please ensure that the connector has been correctly installed!
In scenarios where the Backup and/or AC port is not used, you shall install the connectors to the port(s) to prevent safety risks.

5.3.2 AC Breaker Types

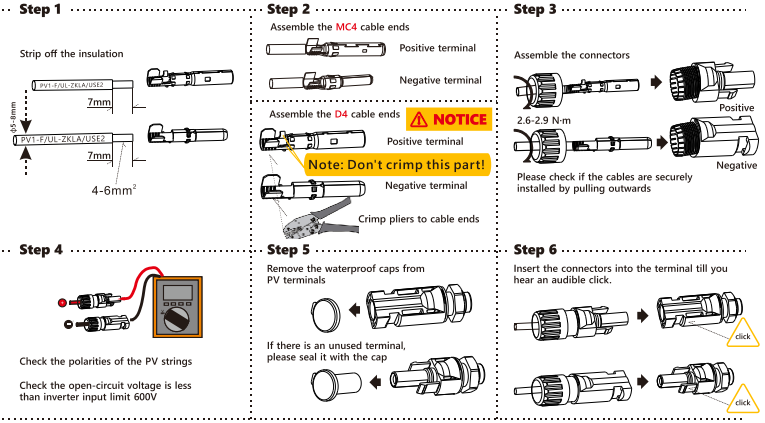
Please install an individual 2-stage miniature circuit breaker according to the following specifications.

Model	Maximum output current（A）	AC Breaker Rated current（A）
HES-3000	14.3	50
HES-3680	17.6	50
HES-4000	19.1	63
HES-5000	23.9	63
HES-6000	28.7	63

5.4 PV Wire Assembly and Connection

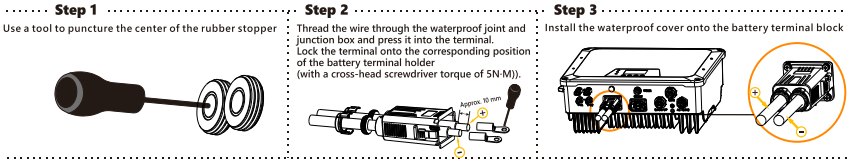
1. PV modules of the connected strings must be of: the same time, identical alignment and tilting angle.
2. Before commissioning and connecting the PV arrays, the DC switch MUST be open.
3. Parallel strings must have the same number of modules.
4. It is mandatory to use the DC connectors within package for the connection of PV arrays.
5. The polarity of the PV arrays MUST be compatible to the DC connectors of the inverter.

6. The DC input voltage AND DC input current of the PV array MUST never exceed the maximum input allowance of the inverter.



5.5 Battery Wire Assembly and Connection

1. Make sure there is an external DC breaker (≥150A) connected for battery without build-in DC breaker.
2. Make sure the battery model is enlisted in the suggested list. Prevent reverse polarity connection!
3. Make sure battery breaker is off and battery nominal voltage is less than 480V before connecting battery to inverter and make sure inverter is totally isolated from PV and AC power.
4. If the Battery connectors are not assembled properly and locked into place, arc or overheat may be induced.



5.6 Residual Current Protection

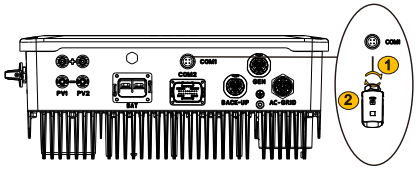
This product is equipped with residual current protection device internally, in accordance with IEC 60364-7-712. An external residual current protection device is not needed.

If the local regulation demands otherwise, it is recommended to install a 300mA Type A residual current protection device.

6. COMMUNICATION

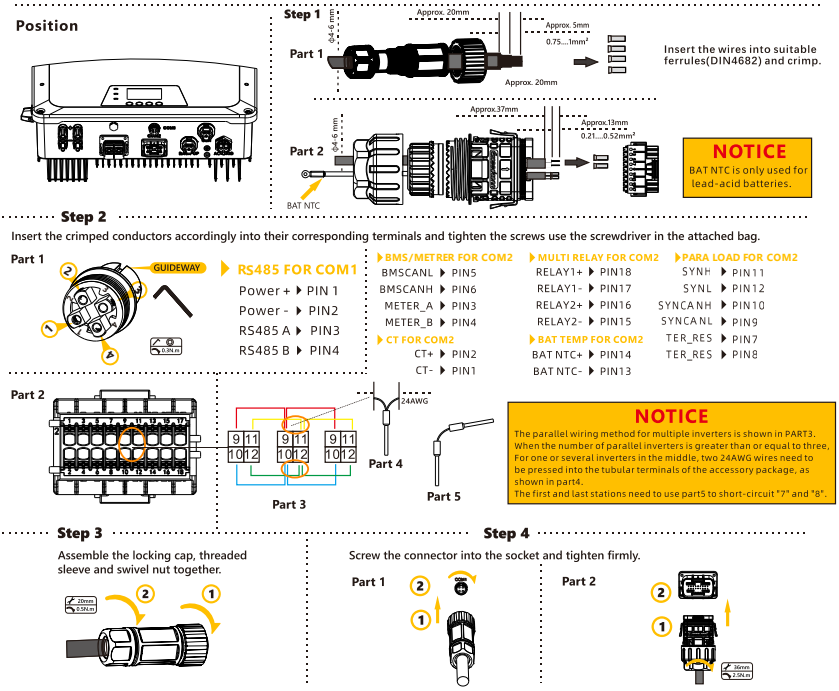
6.1 System monitoring via Datalogger - RS485/Wi-Fi/LAN (Optional)

6.1.1 Wi-Fi / LAN Datalogger Installation



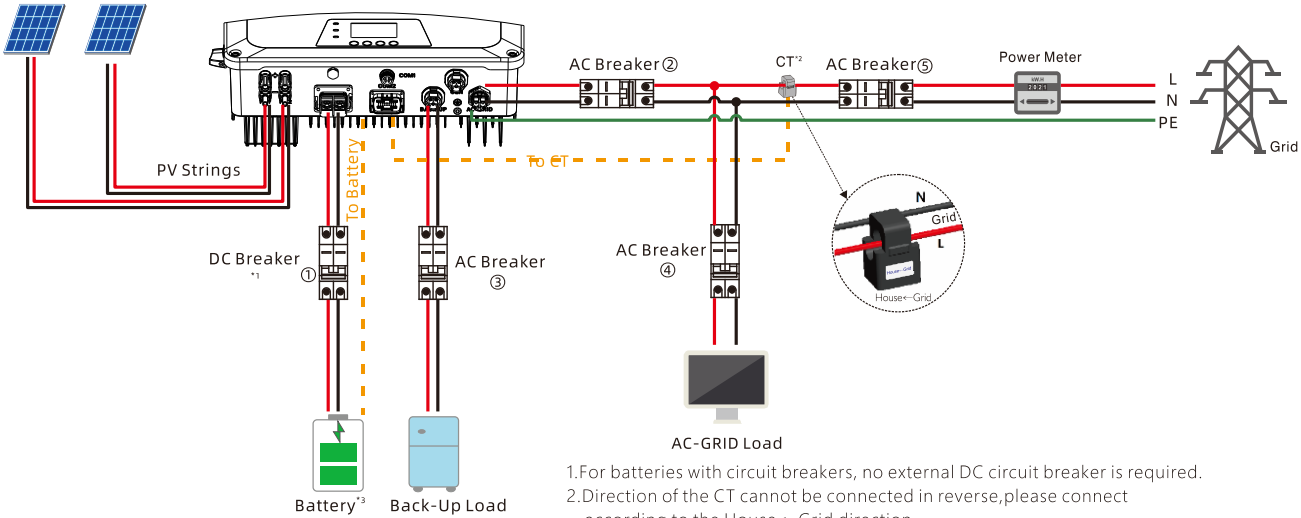
1. Unpack the Datalogger from package.
2. Unscrew the cap in COM1 port.
3. Plug the Datalogger in and tighten securely.
4. Otherwise the communication cannot be built.
5. For user guidance and configuration of Datalogger, please refer to the corresponding HYPON HED-WF stick User manual, which is available in printed form inside Documents pack, or an online manual on HYPONTECH website at https://www.hypontech.com/xiazai.

6.1.2 RS485 / CT /BMS Connection



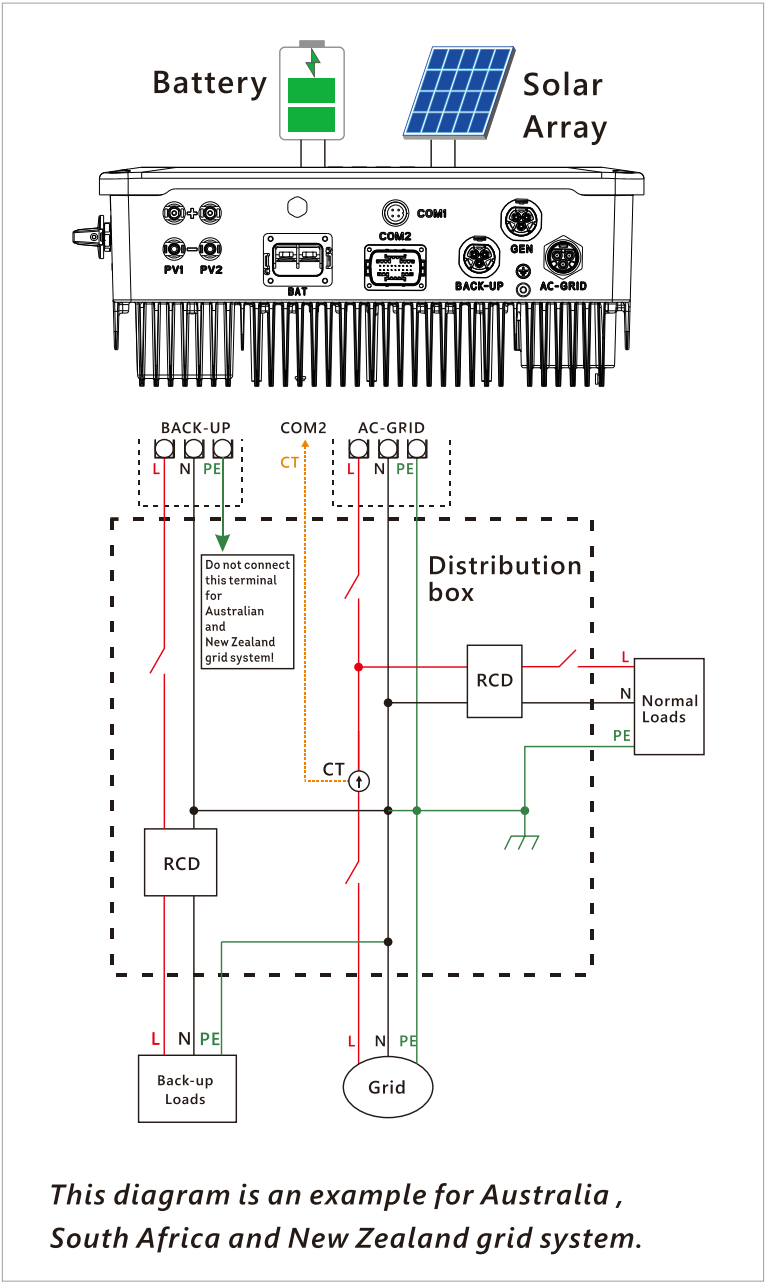
Wiring system for HHS series Hybrid inverter

model \ breaker	①	②	③	④	⑤
HES-3000	150A/60VDC breaker	50A/230V AC breaker	50A/230V AC breaker	Depends on household loads	
HES-3680		50A/230V AC breaker	50A/230V AC breaker		
HES-4000		63A/230V AC breaker	63A/230V AC breaker		
HES-5000		63A/230V AC breaker	63A/230V AC breaker		
HES-6000		63A/230V AC breaker	63A/230V AC breaker		

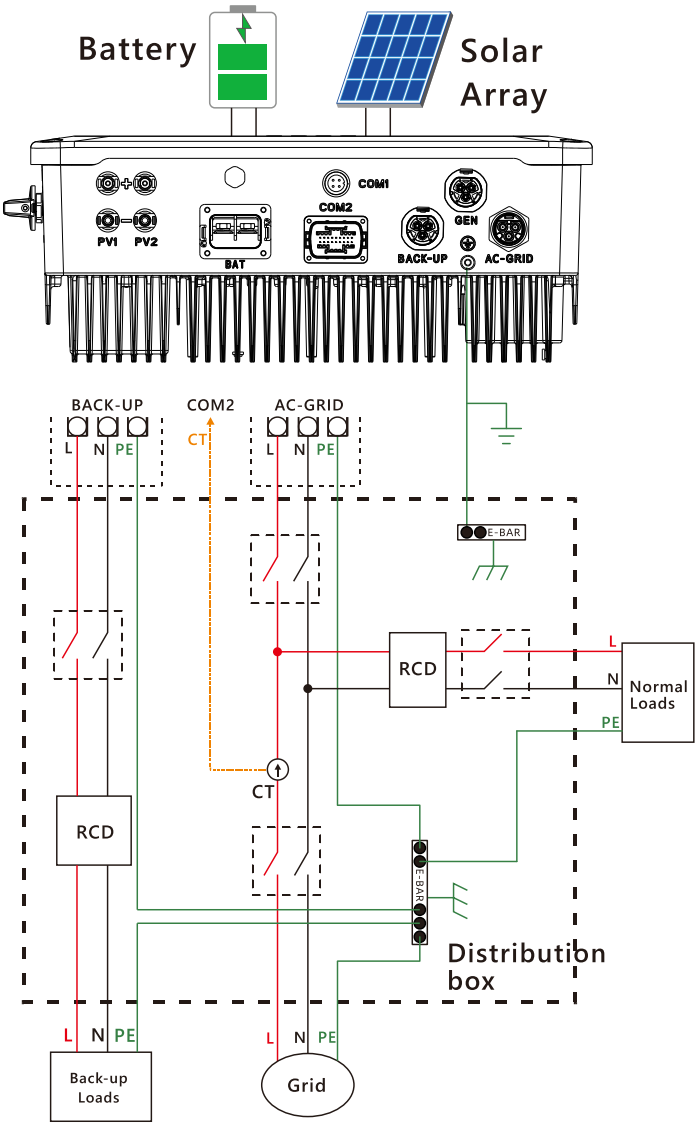


1.For batteries with circuit breakers, no external DC circuit breaker is required.
2.Direction of the CT cannot be connected in reverse,please connect according to the House ←Grid direction.
3.Battery inverters do not need to route between batteries and inverters before activating battery functions.

6.1.3 System Connection Diagrams



This diagram is an example for Australia , South Africa and New Zealand grid system.



This diagram is an example for grid system without requirement on electrical wiring connection.

7. START UP AND OPERATION

7.1 Safety Check Before Start Up

Please check before switching on any voltage resources connected to the inverter and closing inverter's DC switch:

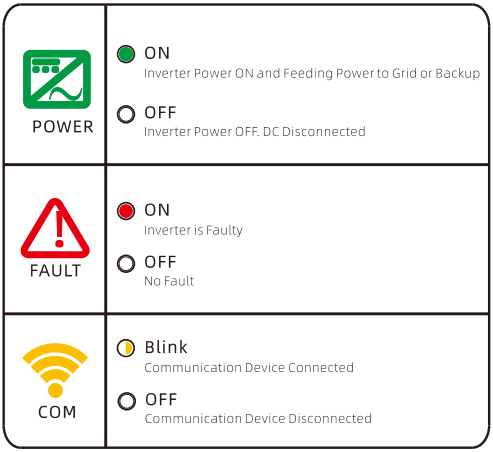
1. Grid Voltage: Check the grid voltage at point of connection at the inverter complies with permitted range of the inverter.
2. Mounting Bracket: Check if the mounting bracket is properly and securely installed.
3. Mounting of the inverter: Check if the inverter is properly mounted and attached to the mounting bracket.
4. PV Connectors: Check if the DC connectors are installed correctly on terminals.
5. Battery Connectors: Check if the Battery connectors are installed correctly on terminals.
6. Back-up Connector and Wire Assembly: Check if wires are assembled correctly on the Load side and if the Back-up connector is properly and securely installed. Check if the Back-up connector is firmly plugged into Back-up terminal.
7. AC-Grid Connector and Wire Assembly: Check if wires are assembled correctly on the AC side and if the AC connector is properly and securely installed. Check if the AC connector is firmly plugged into AC terminal.
8. Cables: Check if all cables are reliably connected. Check if the connections are effective, while the insulations are undamaged.
9. Groundings: Check all groundings using multimeter and if all exposed metal parts of the inverter are properly grounded.
10. PV and Battery Voltage: Check if the largest open-circuit voltage of DC arrays complies with the permitted range.
11. PV and Battery Polarity: Check if the wires from DC voltage resource are connected to terminals with correct polarity.

12. Grounding Resistance: Check if the grounding resistance of PV and Battery strings >1MOhm using a multimeter.

After all installation and checks, close the AC circuit-breaker, then the DC switch and DC Breaker of battery. The inverter will start to operate when DC input voltage and grid conditions meet the requirements of inverter startup.

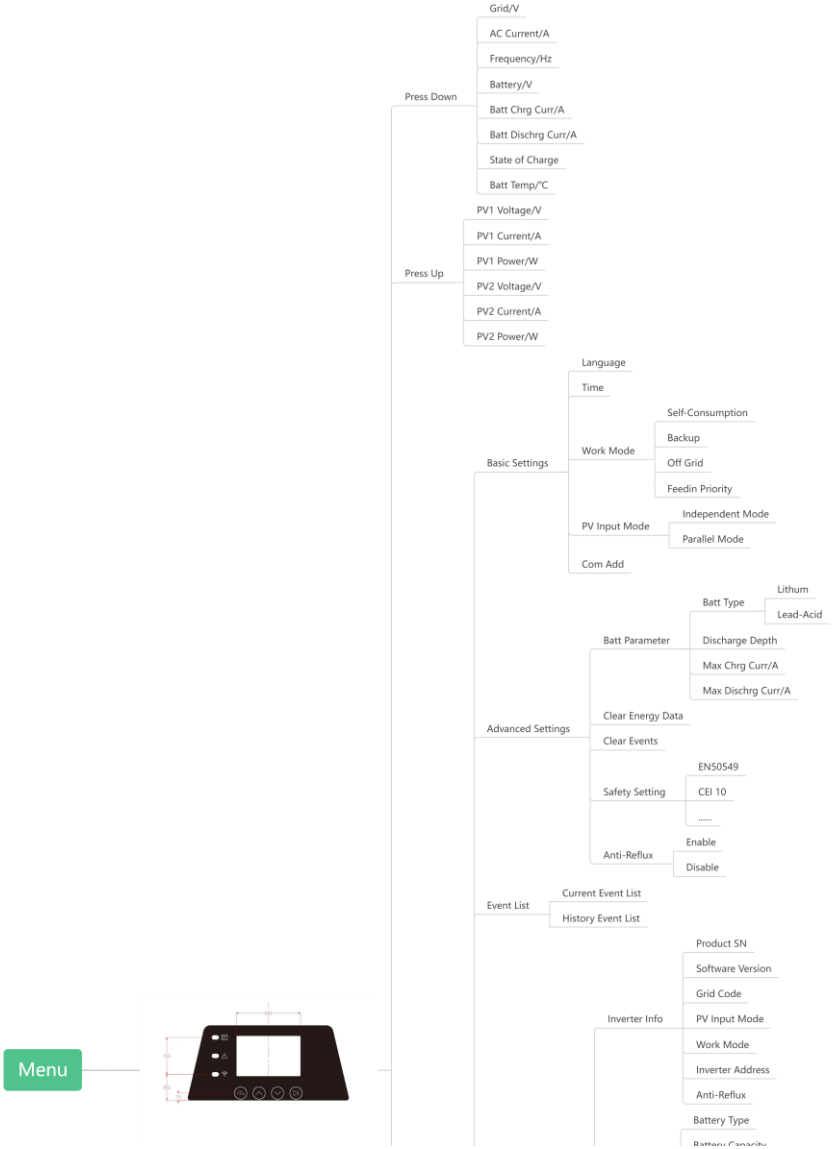
7.2 Inverter LED Indicators

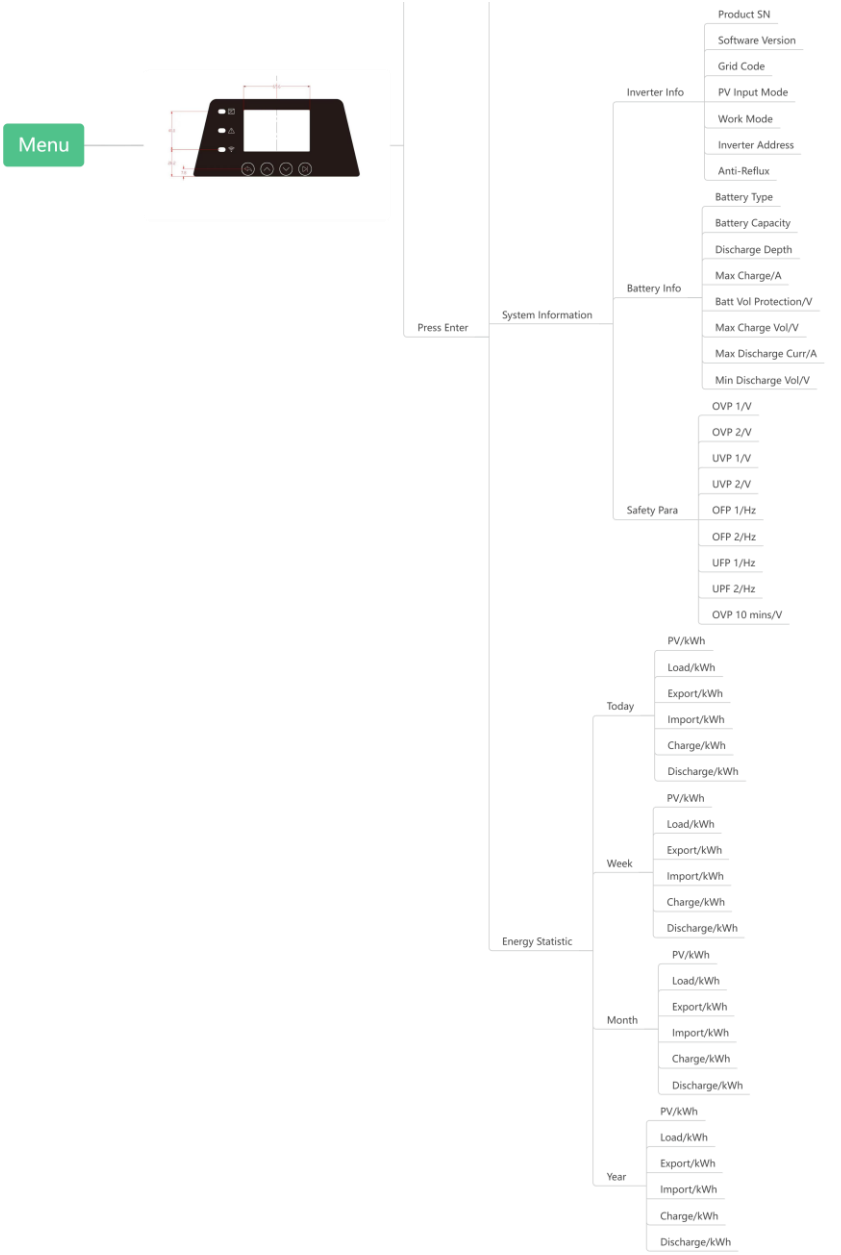
When the inverter operates, LED symbols on display have the following meanings:



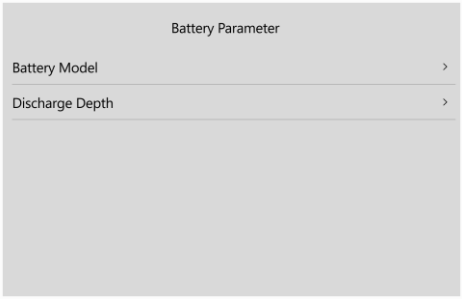
7.3 Display and Control Logics

When inverter starts up and operates, there is a control button beside LCD Display of the inverter. Please follow the logics listed below.



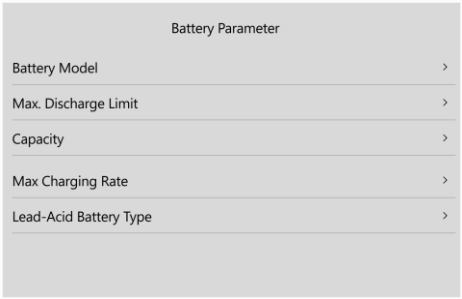

Menu
Press Enter
System Information
Inverter Info
Product SN
Software Version
Grid Code
PV Input Mode
Work Mode
Inverter Address
Anti-Reflux
Battery Info
Battery Type
Battery Capacity
Discharge Depth
Max Charge/A
Batt Vol Protection/V
Max Charge Vol/V
Max Discharge Curr/A
Min Discharge Vol/V
Safety Para
OVP 1/V
OVP 2/V
UVP 1/V
UVP 2/V
OFP 1/Hz
OFP 2/Hz
UFP 1/Hz
UPF 2/Hz
OVP 10 mins/V
Energy Statistic
Today
PV/kWh
Load/kWh
Export/kWh
Import/kWh
Charge/kWh
Discharge/kWh
Week
PV/kWh
Load/kWh
Export/kWh
Import/kWh
Charge/kWh
Discharge/kWh
Month
PV/kWh
Load/kWh
Export/kWh
Import/kWh
Charge/kWh
Discharge/kWh
Year
PV/kWh
Load/kWh
Export/kWh
Import/kWh
Charge/kWh
Discharge/kWh

7.4 Battery Setup Menu



Battery Model： Choose different type or brand's battery.

Discharge Depth: Setup minimum discharge allow SOC.



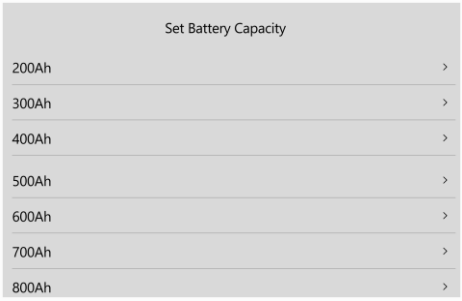
*When you select "Lead-Acid Battery", the left page will show up.

Max. Discharge Limit: Setup maximum discharge rate limit.

Capacity: Setup battery's capacity

Max. Charge Rate: Setup maximum charge rate.

Lead-Acid Battery Type: Setup lead-acid battery. Type



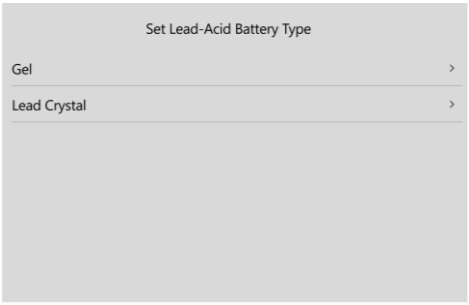
*When you select "**Capacity**", the left page will show up.

You can choose the suitable capacity for your battery. The range is from 200Ah to 1200Ah



*When you select “**Max. Charge Rate**”, the left page will show up.

You can choose the suitable charge rate for your battery. The range is from 0.1C to 0.2C.



*When you select “**Lead-Acid Battery Type**”, the left page will show up.

You can choose the suitable charge rate for your battery. The option now is Gel and Lead Crystal.

8. DISCONNECTING FROM VOLTAGE SOURCES

Before proceeding any operations on inverter, please disconnect the inverter from all voltage resources as described in this manual.

Following these steps in described sequence are mandatory.

1. Disconnect all miniature circuit-breaker and switch off to prevent from unintentional reconnections.
2. Disconnect all loads, unscrew and remove the Back-up connector
3. Disconnect connections, unscrew and remove the connector.
4. Use clamps to ensure there is no electrical current in PV and Battery wires.
5. Disconnect all PV, Battery connections and resources. Unplug the DC connectors, and DO NOT pull the cables directly.



6. Use multimeter to ensure the voltage on DC terminals of inverter is 0.

Danger to life due to high voltages.

Inverter capacitors need 5 minutes to be completely de-energized.

When an error occurs, DO NOT remove the cover of the inverter onsite. Improper operations and attempts may induce electric shock.

9. SET UP MONITORING SYSTEM

9.1 Scan the QR code to download the HYPON.Cloud APP.

Google Play APP Store Android Apk

9.2 Connect the Inverter to HYPON.Cloud.

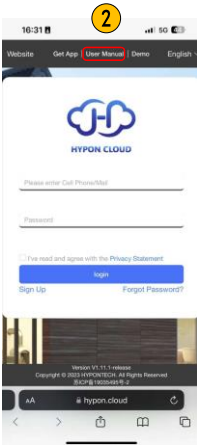
Connect the Inverter to the network using HYPON.Cloud APP.

Please refer to the HYPON.Cloud ***User Manual*** to set up monitoring system.

Product information is subject to change without notice. (Please download reference guides at ***https://www.hypon.cloud***).



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10. TECHNICAL PARAMETERS

Model (Hybrid Inverter)	HES-3000	HES-3680	HES-4000	HES-5000	HES-6000
Battery Input data					
Battery Type	Lithum/lead-Acid				
Battery Voltage Range(V)	40-60				
Nominal voltage (V)	48				
Max. Charging/discharging Curent(A)	70		80	120	
Charging strategy for lead-acid battery	3 Stages Curve				
Input(DC)					
Max. PV power（Wp)	6000	6000	6400	8000	12000
Max. input voltage(V)	600				
MPP voltage range(V)	80-550				
Min. input voltage(V)	70				
Nominal DC-Input voltage(V)	360				
Max. input current(A)	16/16				
Max. short DC current(A)	20/20				
No. of independent MPPT inputs	2				
No. of PV strings per MPPT	1				
Output AC for On-grid					
Nominal Power to grid(W)	3000	3680	4000	5000	6000
Max. apparent AC power to grid(VA)	3300	4048	4400	5500	6600
Max. apparent AC power from grid(VA)	6000	7360	8000	10000	10000
Nominal grid voltage(Vac)	220/230/240				
Nominal power frequency(HZ)	50/60				
Max. output current to grid(A)	14.3	17.6	19.1	23.9	28.7
Max. AC current from grid(A)	28.7	35.2	38.3	40	40
Adjustable displacement power factor	0.8ind to 0.8cap				
THDi at nominal power	<3%				

Output AC for Back-up					
Max. apparent output power (VA)	3000	3680	4000	5000	6000
Peak apparent output power (VA) @60sec.	6000	7360	8000	7500	9000
Rated power frequency(HZ)	50/60				
Max. output current(A)	14.3	17.6	19.1	23.9	28.7
Automatic Switch Time (ms)	<10				
Nominal Output Voltage (V)	230 (±2%)				
Nominal Ouput Frequency (Hz)	50/60(+/-0.2%)				
THDV at linear load	<3%				
Efficiency					
Max. Efficiency	98%				
Euro. Efficiency	97.6%				
Max. MPPT Efficiency	99.9%				
Battery Charged By PV Max. Efficiency	98.0%				
Battery Charge/discharge From/To AC Max. Efficiency	97.0%				
Protection					
Anti-Islanding	Integrated				
Insulation Resistor detect	Integrated				
Residual current monitor	Integrated				
Output over current	Integrated				
Over voltage protection	Integrated				
Grid output short	Integrated				
Surge Protection	Optional				
General Data					
Dimensions(W*H*D) mm	455*365*182				
Weight(kg)	18.4				
Noise emission(typical) dB	<25				
User Interface	LED&LCD				
DC connection type	MC4（SUNCLIX, D4 optional)				

Battery connection type	SUNCLIX
AC connection type	Plug-in Connector
Communication with Cloud	WiFi/LAN/4G(optional)
Communication with BMS	CAN,RS485
Communication with Power meter	RS485
Cooling method	Natural cooling
Operating ambient temperature range	-30℃….+60℃
Allowable relative humidity range	0% to 100%
Max. operating altitude(m)	3000(>3000 derating)
Degree of protection(IEC 60529)	IP65
Climatic category（IEC 60721-3-4)	4K4H
Isolation method	Transformerless
Power loss in night mode	<5W

Inverter power quality response modes	
Power quality response modes	Default operation per AS/NZS 4777.2:2020
Volt-watt response mode	Default: Enabled
Volt-var response mode	Default: Enabled
Fixed power factor mode	Default: Disabled
Reactive power mode	Default: Disabled
Characteristic power factor curve for cos φ (P)	Default: Disabled

Note

- The power quality modes can be enabled or disabled via our monitoring APP or Web. Please refer to the "Safety Parameter Setting User Manual" on our website at https://www.hypontech.com/xiazai, or contact our servicer for more information.
- Only an authorized person can modify the power quality response mode.
- After commissioning, please view the power quality response modes via monitoring APP or Web.

Please access the monitoring platform on www.hyponportal.com/signin

11. TROUBLE SHOOTING

Earth Fault Alarm

This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring.
If an **Earth Fault Alarm** occurs, the **error code 6** will be displayed on the LCD. Red LED indicator will also light up.
If an external indication of earth fault alarm is required, please connect PV System to inverter monitoring app/portal. The monitoring platform will send email notification in the event of an Earth Fault. Please refer to Sector 6.1 and HYPONTECH WI-FI STICK GUIDE on how to setup your inverter communication function.

Full Error Code and Corrective Measures

When the PV system does not operate normally, we recommend the following solutions for quick troubleshooting. If an error occurs, the Error code will be displayed on the inverter's screen or on the Hypontech's monitoring App/Web, the red LED will light up. The corresponding corrective measures are as follows:

Error Code	Fault Name	Description	Corrective Measures
1	Functional fault in Micro-Controller Unit (MCU)	MCU abnormal self-check in start process	Disconnect the inverter from the utility grid and the PV array, and reconnect it after LED turns off. If this fault is still being displayed, please contact service.
2	A faulty current sensor detected	AC current sensor detect current abnormal in the start process	Disconnect the inverter from the utility grid and the PV array, and reconnect it after LED turns off. If this fault is still being displayed, please contact service.
3	Ground fault circuit interrupter (GFCI) sensor error	GFCI sensor self-check abnormal	Disconnect the inverter from the utility grid and the PV array, and reconnect it after LED turns off. If this fault is still being displayed, please contact service.

4	A faulty grid relay detected	The difference between INV voltage and output voltage exceeds limit.	Disconnect the inverter from the utility grid and the PV array, and reconnect it after LED turns off. If the fault persists, measure the phase to phase voltage and phase to zero and zero to ground voltage with a multimeter to ensure that the voltage is normal and the zero to ground voltage value should not be greater than 10V. Disconnect the inverter from the utility grid and the PV array, and reconnect it after LED turns off. If this fault is still being displayed, please contact service.
5	PV voltage too high	When the PV voltage of any circuit is greater than 600V, it is determined as the PV voltage is too high.	Check the open-circuit voltages of the strings and make sure it is below the maximum DC input voltage of the inverter. If the input voltage lies within the permissible range while the fault occurs, please contact the service.
6	Surface insulation resistance error	In the process of power on and start-up, the insulation impedance of PV + , PV -, Battery+, Battery- to ground is detected. When the detection insulation impedance is less than 200kohm, it is judged as insulation fault.	1. If it happens occasionally, it may be caused by rainy or humid environment. After the fault is eliminated, the inverter can resume normal operation without other actions. 2.If there is continuous alarm, please check the PV array's, battery insulation to ground and make sure that the insulation resistance to ground is greater than 200Kohm. Otherwise, visual inspection of all PV and battery cables and modules. Make sure the grounding connection of the inverter is reliable. If all above are normal, please contact the service.
7	Ground fault circuit interrupter (GFCI) exceeds the permissible range	residual current over the permission range	1.Make sure the grounding connection of the inverter is reliable. 2.Make a visual inspection of all PV cables and modules. If this fault is still shown, contact the service.
8	Inverter temperature too high	Heat sink and internal environment temperature higher than 85 degree	Please confirm: 1.Whether the airflow to the heat sink is obstructed. 2. Whether the installation site is in direct sunlight and ambient temperature around the inverter is too high. If all above is normal, contact the service.

9	Utility grid disconnected	inverter detected grid voltage failed	1.If it happens occasionally, it belongs to the short-time abnormality of the power grid, the inverter will return to normal operation after detecting that the power grid is normal, and there is no need to deal with it. 2.If it cannot be recovered for a long time, please confirm: ①whether the AC circuit breaker is disconnected ②whether the AC terminal or fuse is in good contact ③whether the power supply line is normal If this fault is still being shown, contact the service.
10	Grid voltage exceeds the permissible range	grid voltage exceeds the Safety regulations	1.If it happens occasionally, it belongs to the short-time abnormality of the power grid, the inverter will return to normal operation after detecting the normal power grid, and there is no need to deal with it. 2. In case of frequent occurrence but automatic recovery, please confirm if the grid voltage is outside the permissible range due to local grid conditions, try to modify the values of the monitored operational limits after informing the electric utility company first. 3.If it cannot be recovered for a long time, please confirm: ①whether the AC circuit breaker is disconnected ②whether the AC terminal is in good connection ③whether the power supply line is normal ④whether the AC cable wiring (such as wire length and wire diameter) complies with the user manual guidance ⑤whether the safety regulation settings are normal
11	Grid frequency exceeds the permissible range	grid frequency exceeds the Safety regulations	1.If it happens occasionally, it belongs to the short-time abnormality of the power grid, the inverter will return to normal operation after detecting the normal power grid, and there is no need to deal with it. 2. In case of frequent occurrence but automatic recovery, please confirm if the grid voltage is outside the permissible range due to local grid conditions, try to modify the values of the monitored operational limits after informing the electric utility company first.

			3.If it cannot be recovered for a long time, please confirm: ①whether the AC circuit breaker is disconnected ②whether the AC terminal is in good connection ③whether the power supply line is normal ④ whether the safety regulation settings are normal
12	DC component of the electricity exceeds the permissible range	the current exceeds 1A in stastic state and 4A in dynamic state	Disconnect the inverter from the utility grid and the PV array, and reconnect it after LED turns off. If this fault is still being displayed, please contact the service.
13	EEPROM Error, e.g. transition disturbance	Micro CPU read EEPROM failed	Disconnect the inverter from the utility grid and the PV array, and reconnect it after LED turns off. If this fault is still being displayed, please contact the service.
14	Internal communication fault	Master CPU communicate with slave CPU abnormal	Disconnect the inverter from the utility grid and the PV array, and reconnect it after LED turns off. If this fault is still being displayed, please contact the service.
15	Bus-voltage too high	Bus-voltage is greater than 600V	Check the open-circuit voltages of the strings and make sure it is below the maximum DC input voltage of the inverter. If the input voltage lies within the permissible range while the fault occurs, please contact the service.
16	Bus-voltage too low	Bus-voltage is 20V lower than standard Bus-voltage	Check the open-circuit voltages of the strings and make sure it is below the maximum DC input voltage of the inverter. If the input voltage lies within the permissible range while the fault occurs, please contact the service.
17	DRM S9 Error	DRM switch S9 fault	Check the connection of DRM device. If the DRM device is connected normally while this fault occurs, please contact the service.

18	DRM S0 Error	DRM switch S0 fault	Check the connection of DRM device. If the DRM device is connected normally while this fault occurs, please contact the service.
21	BMS Communication Error	Battery BMS communication interrupted	Check the connection of BMS cable with storage inverter. If the BMS cable is connected normally while this fault occurs, please contact the service.
22	CT Null Error	Current transducer not connected	Check the connection of CT device. If the CT device is connected normally while this fault occurs, please contact the service.
23	CT Reverse Error	Current transducer reverse connection	Try to change the direction of CT device. If the CT device is connected correctly while this fault occurs, please contact the service.
24	Battery Null Error	Battery disconnection	Check the connection of battery. If the battery is connected normally while this fault occurs, please contact the service.

12. SYSTEM MAINTENANCE

For the inverter's long-term performance, it is suggested to maintain your inverter regularly:

NOTICE：

HEAT SINK MIGHT INDUCE INJURY

When the inverter is operating, the heat sink might exceed 60℃

- Please disconnect all electrical cables and connections. Wait for the inverter to cool down completely.
- Use compressed air cleaning or a soft brush to clean the inverter heat sink.

Content	Maintenance Measures	Cycle
System Cleaning	• Check if the heat sink is covered and dusted • Maintenance of DC Switch can be performed at night. Turn the switch to ON and OFF positions for 4~5 times. • Use a wet cloth to clean the display	Annually OR Half a year
System Status	• Inspect the enclosure for damage/deformation • Listen for abnormal noises during operation • Check if the parameters are normal during operation	Half a year
Commissioning	•Check if the cables are loose •Check if the cable insulations are damaged, especially the parts in contact with metal surfaces	Half a year after first commissioning Annually OR Half a year
Grounding	• Check if the cables are securely grounded	Half a year after first commissioning Annually OR Half a year

13. RESTARTS

When reconnecting the inverter for electrical power supply, please follow the commissioning procedures and safety instructions as described in **Section 6** when applicable (e.g. DC Wires need to be reassembled).

Please run safety checks as described in **Section 7** before closing the DC Switch and starting up again.