User Manual

HI-5K-DL,HI-6K-DL,HI-8K-DL,HI-10K-DL,HI-12K-DL

V1.1

INHENERGY

INHENERGY CO., LTD.

CONTENTS

1 Notes on this manual

1.1 Validity

This manual describes the assembly, installation, commissioning and maintenance of the following Inhenergy hybrid inverters model:

HI-5K-DL
HI-6K-DL
HI-8K-DL
HI-10K-DL
HI-12K-DL

Target Group

This manual is for qualified personnel. Qualified personnel have received training and have demonstrated skills and knowledge in the construction and operation of this device. Qualified personnel are trained to deal with the dangers and hazards involved in installing electric devices.

Additional information

Find further information on special topics in the download area at www.inhenergy.com. The manual and other documents must be stored in a convenient place and be available at all times. We assume no liability for any damage caused by failure to observe these instructions. For possible changes in this manual, Inhenergy Co., Ltd. accepts no responsibilities to inform the users.

1.2 Symbols in this document

Please pay close attention to all the symbols for the purpose of avoiding possible personal injury or equipment break down.

Symbol	description
⚠ DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠ NOTICE	NOTICE is used to address practices not related to personal injury.
🛈 Information	Information that you must read and know to ensure optimal operation of the system.

Markings on this product

Symbol	Explanation
⚡	Caution, risk of electric shock.
〰	Caution, hot surface.
⚡ 5min	Operation after 5 minutes.
📖	Read the manual.
⏚	Point of connection for grounding protection.
CE	CE mark. The inverter complies with the requirements of the applicable CE guidelines.
🗑	The inverter must not be disposed of with the household waste.
Warning: High Temperature!高温危险! Never touch the enclosure of an operating inverter. 逆变器工作时严禁触摸外壳。	Warning, high temperature hazard.

1.3 Storage

The following requirements should be met if the inverter is not put into use directly.

◆ Do not unpack the inverter.

◆ Keep the storage temperature at -25°C to +60°C and the humidity at 5%-95% RH (non-condensing).

◆ The inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion.

◆ The number of stacking layers of multiple inverters shall not exceed the limit of stacking layers marked on the outer box.

◆ Periodic inspections are required during the storage. Replace the packing materials if necessary.

◆ If the inverter has been stored for half a year or more, inspections and tests should be conducted by qualified personnel before it is put into use.

2 Overview

2.1 Product Introduction

Function

HI-5~12K-DL series, also called split phase low-voltage hybrid solar inverters, apply to solar system with participation of PV, battery, loads and grid system for energy management. The energy produced by PV system shall be used to optimize self-consumption, excess power charge battery and the rest power could be exported to the grid. Battery shall discharge to support loads when PV power is insufficient to meet self-consumption. If battery power is not sufficient, the system will take power from grid to support loads.

Models

This document involves the following product models:
HI-5K-DL,HI-6K-DL,HI-8K-DL,HI-10K-DL,HI-12K-DL.
Model description (HI-12K-DL is used as an example)

HI-12K-DL
 1   2   3

Model description

Icon	Meaning	Description
1	Product	Hybrid inverter.
2	Power level	12K:The rated power is 12 kW.
3	Topology	DL:Split phase low voltage battery. DH:Split phase high voltage battery.

2.2 Appearance
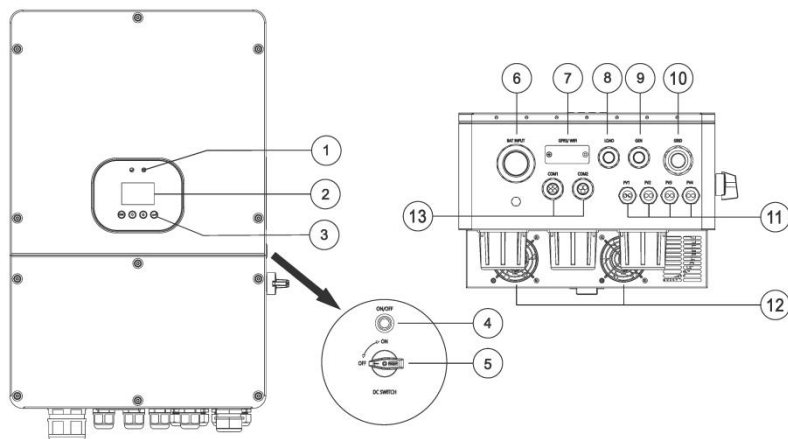
① LED indicator   ② LCD display   ③ Function button   ④ Main switch

⑤ DC switch   ⑥ Battery port   ⑦ GPRS/WIFI communication port   ⑧ Load port

⑨ GEN port   ⑩ On-Grid port   ⑪ DC input PV terminals   ⑫ Cooling fan

⑬ Communication port

LED indicator description

Category	Status	Meaning
⊘ —LED 1	Green light on	Normal status
	Green light blinking	Alarm status
⊗ —LED 2	Red light on	Fault status
	Blinking red at short intervals	Software updating

Function button description

Category	Description
ESC	ESC button: Return from current interface or function.
⇩	Down button: Move cursor to downside or decrease value.
⇧	Up button: Move cursor to upside or increase value.
↵	OK button: Confirm the selection.

3 Installation

3.1 Check for Physical Damage

Make sure the inverter is intact during transportation. If there is any visible damage, such as cracks, please contact your dealer immediately.

3.2 Packing List

Open the package and take out the product, please check the accessories first.

The packing list shown as below.
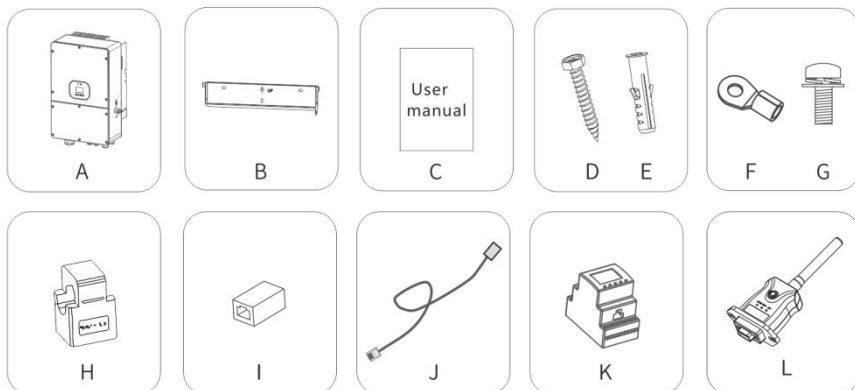
Object	Description	Quantity
A	Inverter	1
B	Bracket	1
C	User manual	1
D	Expansion screws	3
E	Expansion tubes	3
F	Ring terminal	1
G	Set screw(for mounting, external enclosure grounding)	3
H	CT	2
* I	RJ45 connector	1
J	Lead-acid battery temperature sensor	1
K	Meter (optional)	1
L	Wi-Fi module (optional)	1

* I:When the length of CT wire cannot meet the use requirements, the CT communication wire can be extended through RJ45 connector.

3.3 Mounting

Installation Precaution

HI-5~12K-DL series inverter is designed for outdoor installation (IP 65).

Make sure the installation site meets the following conditions:

◆ Not in direct sunlight.

◆ Not in areas where highly flammable materials are stored.

◆ Not in potential explosive areas.

◆ Not in the cool air directly.

◆ Not in environment of precipitation or humidity (> 95%).

◆ Under good ventilation condition.

◆ The ambient temperature should be kept below 45℃ to ensure optimal operation.

◆ The wall hanging the inverter should meet conditions below:

  1.Solid brick/concrete, or strength equivalent mounting surface.

  2.Inverter must be supported or strengthened if the wall's strength isn't enough(such as wooden wall, the wall covered by thick layer of decoration).

Please avoid direct sunlight, rain exposure, snow laying up during.

◆ The slope of the wall should be within 15°.
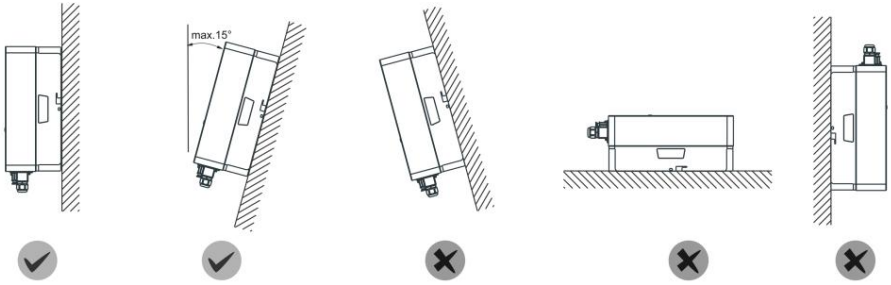
3.4 Space Requirement
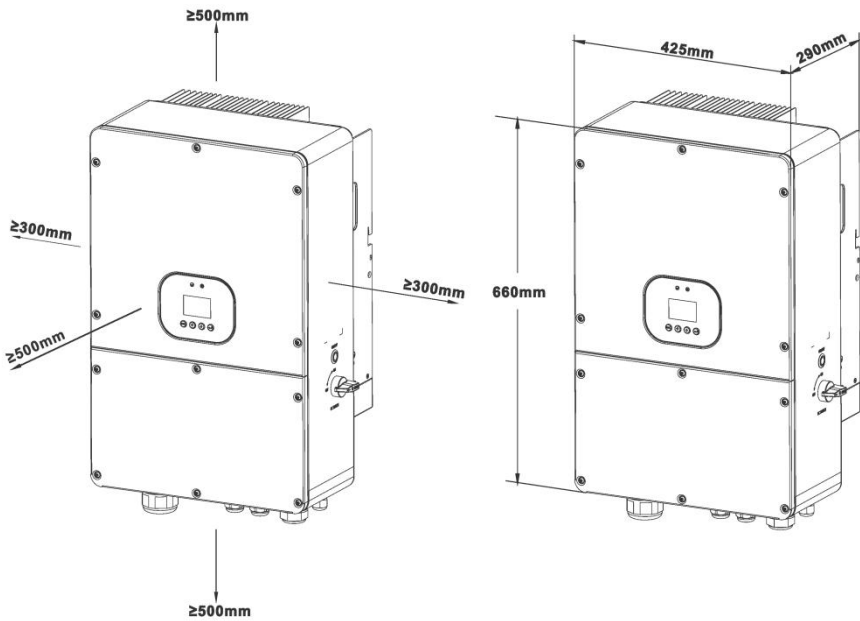
3.5 Mounting Steps

1.Use the wall bracket as a template to mark the position of the 3 holes on the wall (unit:mm).

2.Drill holes with driller, make sure the holes are deep enough (at least 60mm) for installation, and then tighten the expansion tubes.

3.Install the expansion tubes in the holes, and tighten them. Then install the wall bracket by using the expansion screws. (Φ10 driller, torque: 2.5±0.2Nm).

4.Hang the inverter over the bracket, move the inverter close to it, slightly lay down the inverter, and make sure the 2 mounting bars on the back are fixed well with the 2 grooves on the bracket.

5.After confirming the inverter is fixed reliably, fasten two M5 safety-lock sockets head cap screws on the right or left side firmly to prevent the inverter from being lifted off the bracket (torque: 2.0±0.2Nm).

6.According to personal needs, you can install a lock for anti-theft.
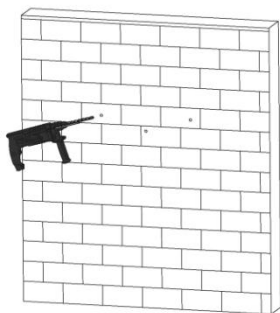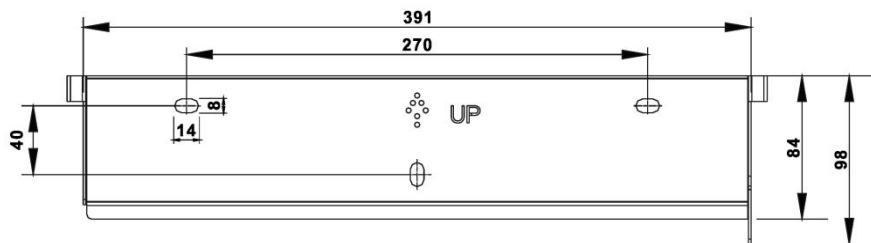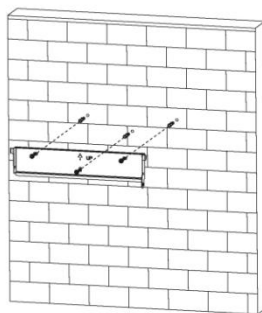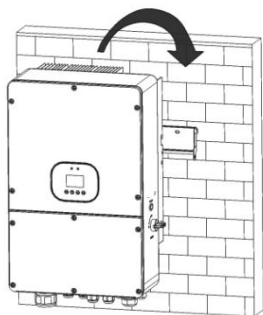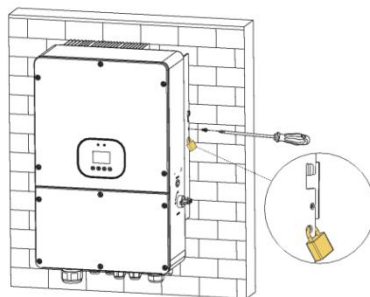
4 Electrical Connection

⚠️ **CAUTION**	◆ For Australian safety country, the neutral cable of On-Grid side and Back-Up side must be connected together, otherwise Back-Up function will not work.

System connection diagrams:

This diagram is an example for grid systems without special requirement on electrical wiring connection.
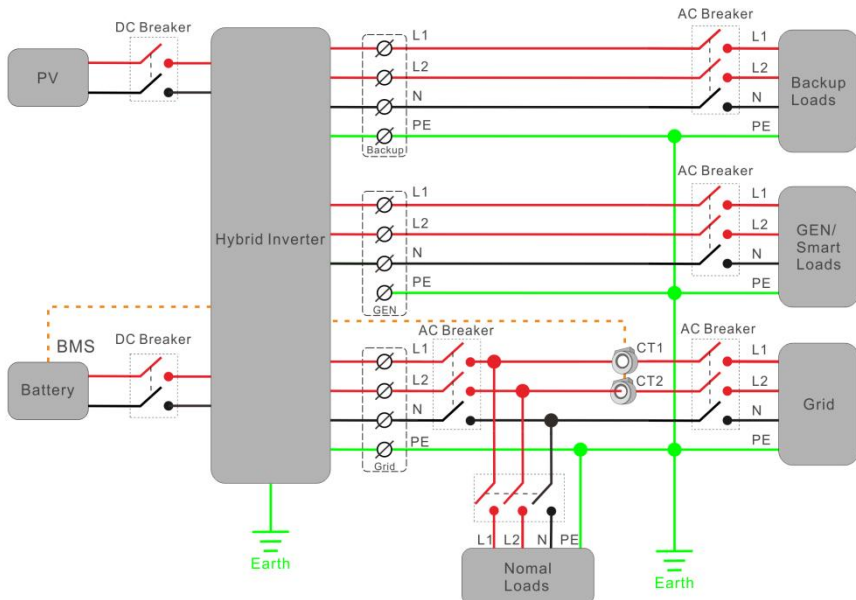
Before connecting all wires, please take off the metal cover by removing screws as shown below:
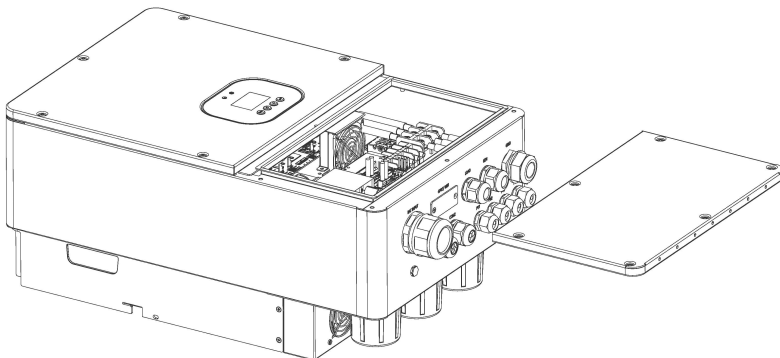
4.1 PV Connection

◆ Conditions for DC Connection

The inverter has 4 independent input: PV1 & PV2 & PV3 & PV4.

DANGER	The solar modules connected to the inverter must conform to the Class A requirements of the IEC 61730 standard.
CAUTION	If the inverter is not equipped with a DC switch but this is mandatory in the country of installation, install an external DC switch. The DC input current of the inverter must not be exceeded 20A.

◆ Connecting the PV Array

DANGER	Danger to life due to lethal voltages! ◆ PV array supplies DC voltage to inverter when exposed to light, before connecting the PV array, cover some light screens above PV arrays, ensure that the DC switch and AC breaker are disconnect from the inverter. NEVER connect or disconnect the DC connectors under load. ◆ Make sure the maximum open circuit voltage(Voc) of each PV string is less than the maximum input voltage of the inverter. ◆ Check the design of the PV plant. The Max. open circuit voltage, which can occur at solar panels temperature of -10℃, must not exceed the Max. input voltage of the inverter.
CAUTION	◆ Improper operation during the wiring process can cause fatal injury to operator or unrecoverable damage to the inverter. Only qualified personnel can perform the wiring work. ◆ Please don't connect PV array positive or negative pole to the ground, it could cause serious damages to the inverter. ◆ Check the connection cables of the PV modules for correct polarity and make sure that the maximum input voltage of the inverter is not exceeded.

Connection Steps:

1.Choose the 12 AWG copper wire to connect with the tubular terminal.

2.Remove 12mm of insulation from the end of wire.

3.Insert the insulation into pin contact and use crimping plier to clamp it.

4.Insert pin contact through the cable gland, connect the cable to the DC terminal block and lock the cable (torque: 1.2N.m).

5.Tighten the nut of the cable gland and apply fireproof mud to seal the contact of the cable gland.
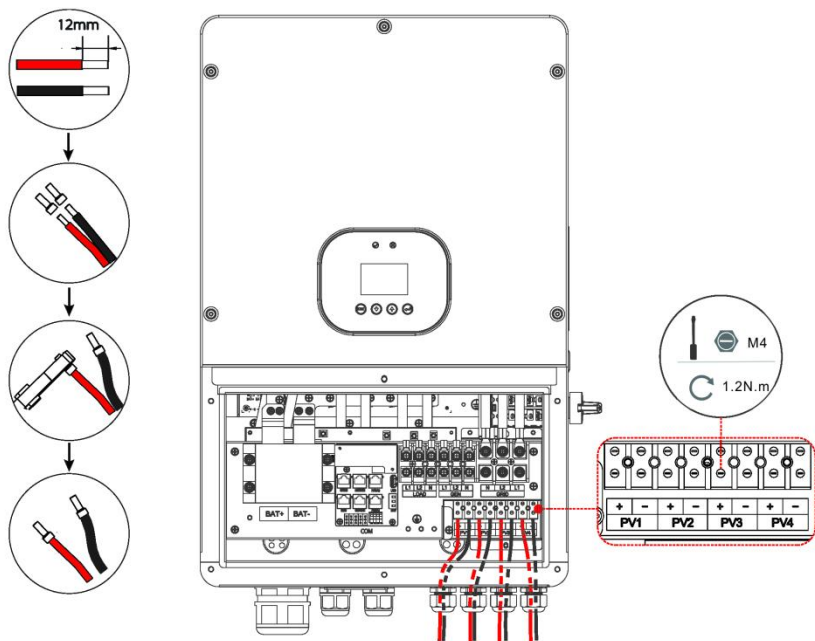
4.2 Battery Connection

◆ Lead-Acid and other similar older-technology battery types require experienced and precise design, installation and maintenance to work effectively. For lead-acid battery bank, the inconformity between battery cells might lead to battery cell over-charge or discharge, and further might damage battery cells and shorten battery bank life.

◆ For lithium battery (pack) the capacity should be 50Ah or larger. Battery cable requirement as below.

Table 1 Cable recommended

It is recommended that all cables are made of copper core. If aluminum cables are used, use copper-aluminum conversion terminals. Direct contact between copper terminal and aluminum wire will cause electrochemical corrosion and affect the reliability of electrical connection.

A	O.D	16-20mm
B	Isolation section	NA
C	Area	70mm²or 1/0AWG

◆ Please be careful against any electric shock or chemical hazard.

◆ Make sure there is an external DC switch connected for battery without build-in DC switch.

Battery wiring connection steps as below:

⚠️ CAUTION	◆ Make sure battery switch is off and battery nominal voltage meet specification before connecting battery to inverter and make sure inverter is totally isolated from PV and AC power. ◆ Please make sure polarity (+/-) of battery are not reversed.

1.Choose the appropriate copper wire. (Cable size: refer to Table1)

2.Remove appropriate length of insulation from the end of wire.

3.Insert the insulation into pin contact and use crimping plier to clamp it.

4.Insert pin contact through the cable gland, connect the cable to the battery terminal block and lock the cable (torque: 5.0N.m).

5.Tighten the nut of the cable gland and apply fireproof mud to seal the contact of the cable gland.
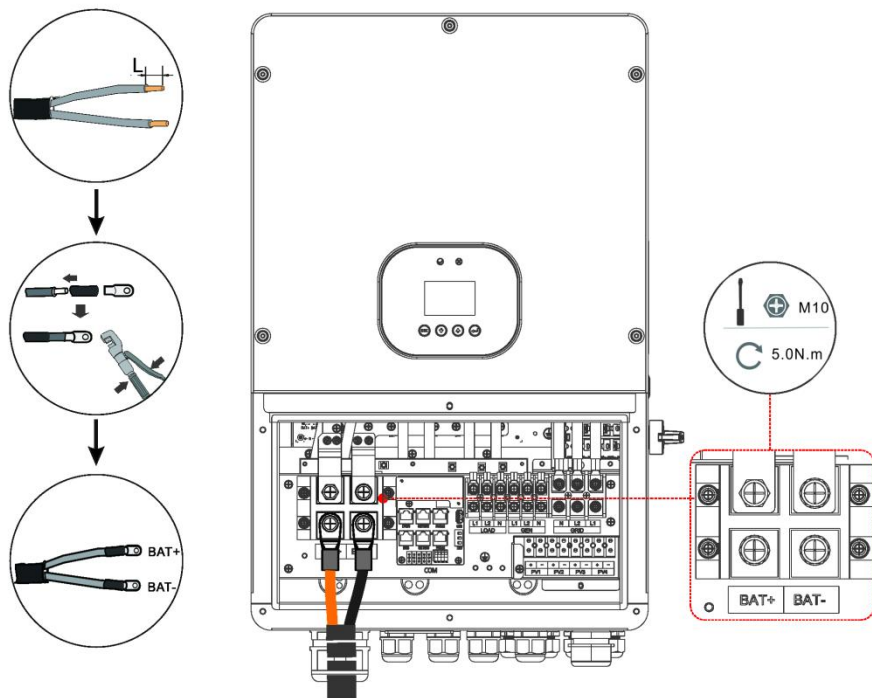
4.3 On-Grid & Load & GEN Connection
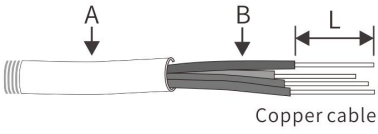
An external AC switch is needed for on-grid connection to isolate from grid when necessary.

⚠️ CAUTION	◆ Make sure inverter is totally isolated from any DC or AC power before connecting AC cable. ◆ Please connect in strict accordance with the phase sequence, otherwise the machine cannot work normally.

Connection Steps
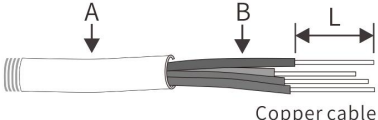
1.Choose the appropriate copper wire. (Cable size: refer to corresponding table)

2.Remove appropriate length "L" of insulation from the end of wire.

3.Insert the insulation into pin contact and use crimping plier to clamp it.

4.Insert pin contact through the cable gland, connect the cable to terminal block and lock the cable (On-Grid torque: 3.0N.m, Load and GEN torque: 2.0N.m).

5.Tighten the nut of the cable gland and apply fireproof mud to seal the contact of the cable gland.

On-Grid Connection:

Copper cable	A	Diameter	19-25mm
	B	Area	25mm²or 2AWG
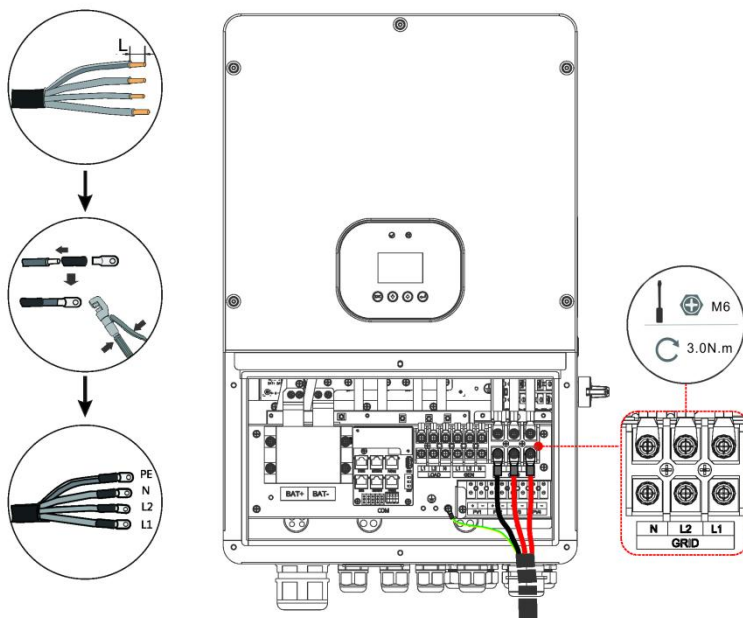
Load & GEN Connection：

A	Diameter	13-18mm	
B	Area	10mm²or 6AWG	
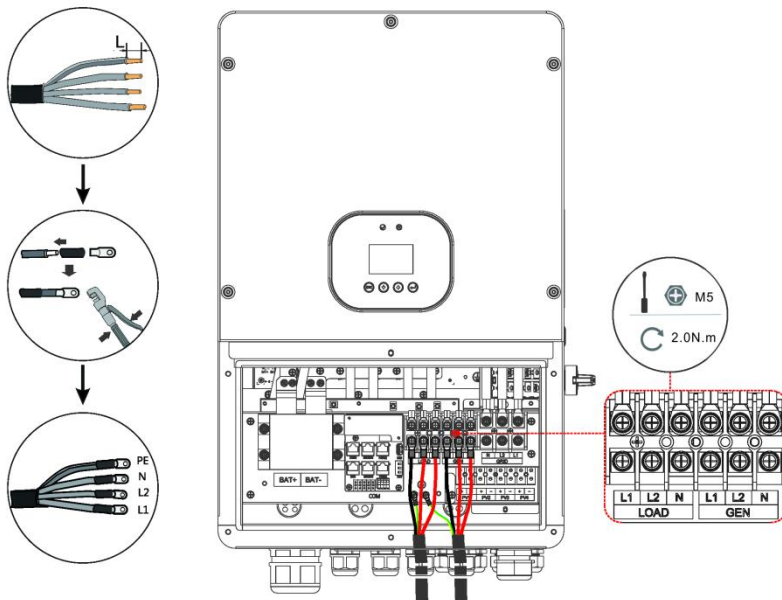
4.4 Earth Connection

Users must additionally earth the inverter to the enclosure of a second earthing or equipotential bonding. This prevents electric shock if the original protective conductor fails.

Earth Connection Steps:

1.Strip the earthing cable insulation and insert the stripped cable into the ring terminal, then clamp it.

2.Place the ring terminal into the earthing rod and screw the earthing screw tightly.

Terminal:OT-M5
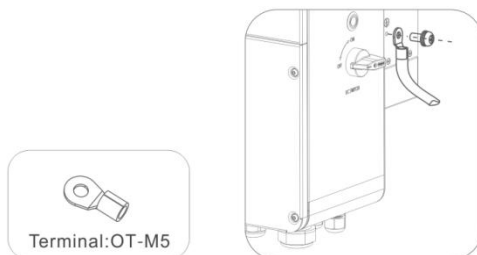
4.5 Communication Connection

1.Function port definition
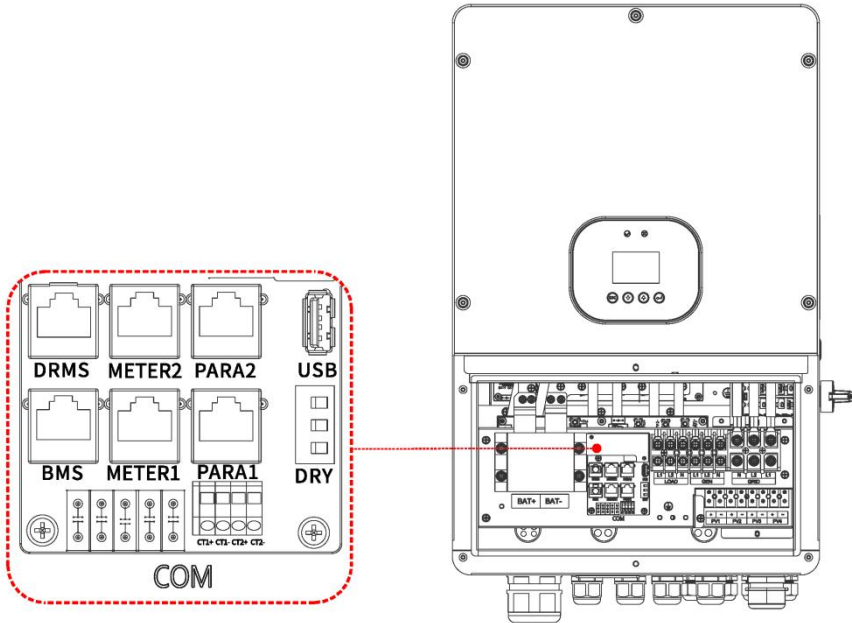
Object	Category	Description
1	BMS	RS485/CAN/NTC port for battery communication
2	DRMS	For Australia market only
3	METER1	Meter communication port 1
4	METER2	Meter communication port 2
5	PARA1	Parallel port 1
6	PARA2	Parallel port 2
7	USB	Upgrade firmware program port
8	DRY	External devices communication port
9	CT1+/CT1+	Current transformer port 1
10	CT2+/CT2+	Current transformer port 2

◆ Make sure use standard RJ45 cable and plug, as below

Pin	BMS	METER1	DRMS	METER2
1	RS485B	METER1.485L	DRM1/5	METER2.485L
2	RS485A	EXT-CT1_N	DRM2/6	EXT-CT2_N
3	GND-S	EXT-CT1_N	DRM3/7	EXT-CT2_N
4	CANH	**GND-S**	DRM4/8	GND-S
5	CANL	METER1.485H	DRM_REF	METER2.485H
6	NTC.BAT	EXT-CT1_P	DRM_COM	EXT-CT2_P
7	Wake-	EXT-CT1_P	RS485A	EXT-CT2_P
8	Wake+	CT1_ON+	RS485B	CT2_ON+

2.CT Connection

◆ The CT in product box is compulsory for inverter system installation, used to detect grid voltage and current direction and magnitude, further to instruct the operation condition of inverter via RS485 communication.

⚠️ CAUTION	◆ Make sure inverter is totally isolated from any DC or AC power before connecting AC cable. ◆Direction of the CT cannot be connected in reverse, please follow "K→L" direction to do the connection. Make sure CT are connected between loads and grid.

CT Connection Diagram:
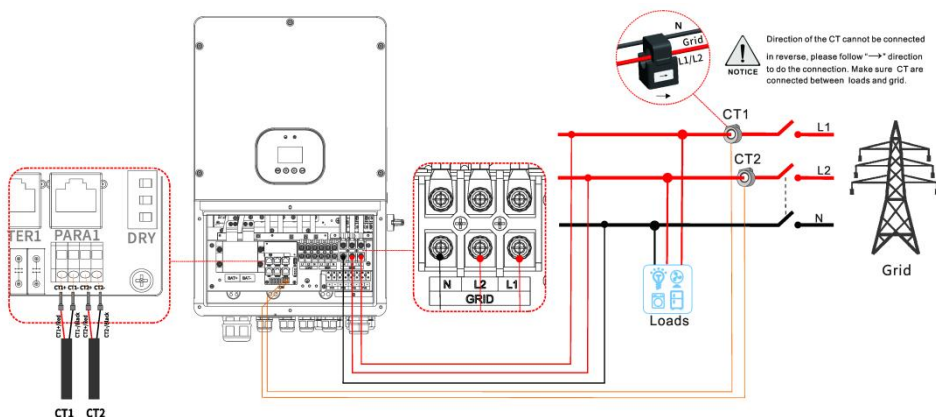
Connection Steps:

1.Uninstall the "CT" cable from the accessory bag.

2.Thread the "CT" cable through the cable gland.

3.Insert the tubular terminal into the "CT1/CT2" pin and lock the cable.

The completed appearance is like the below figure.
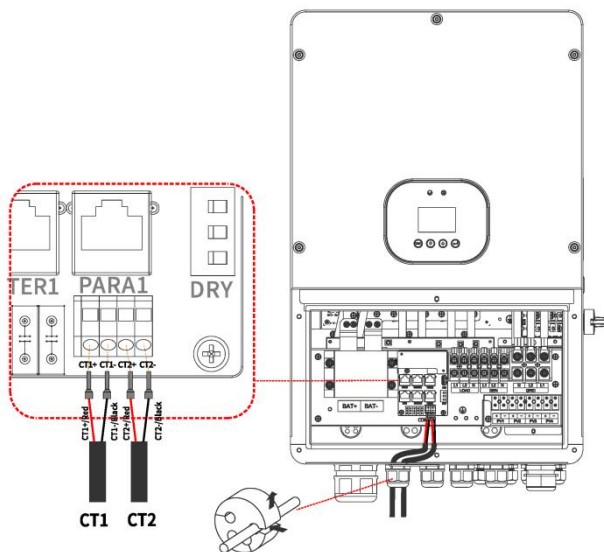
3.Meter Connection

◆ The meter is optional, used to detect grid voltage and current direction and magnitude, further to instruct the operation condition of inverter via RS485 communication.

Meter Connection Diagram:
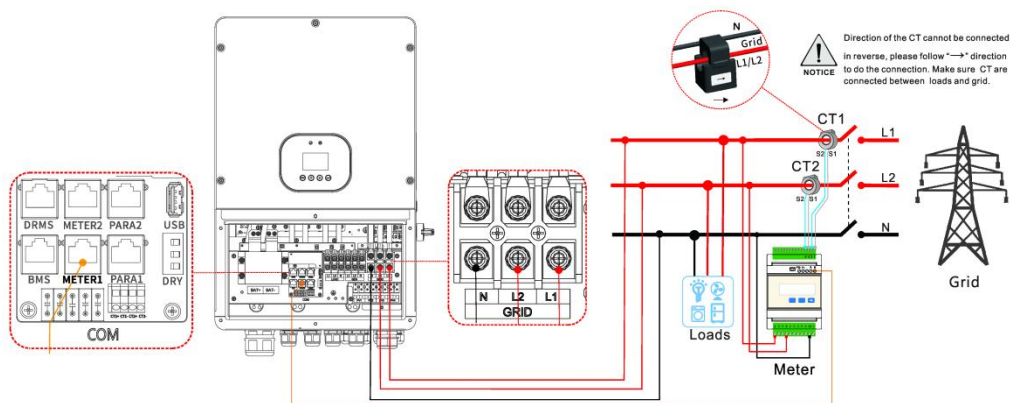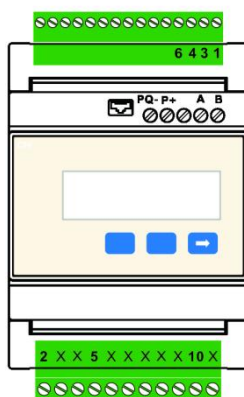
Voltage signal (only for connection via current transformer):

2:L1 Voltage input terminal

5:L2 Voltage input terminal

10:N voltage input terminal

First current signal:

1:First L1 current input terminal

3:First L1 current output terminal

4:First L2 current input terminal

6:First L2 current output terminal

RS485 Communication wire:

A:(RS485 Terminal A)

B:(RS485 Terminal B)

⚠ NOTICE Before powering, you must check whether the wiring mode of the instrument is correct, and the wiring diagram is shown as below:

A	B
RS485 A	RS485 B
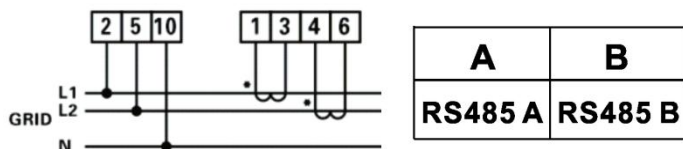
CT	1-1 S1	1-1 S2	1-2 S1	1-2 S2
Meter	1	3	4	6

Connection Steps:

1.Uninstall the "CT" and Meter from the accessory bag.

2.Connect the wires according to the wiring diagram and clamp the CT onto the cable.

3.Crimp the RJ45 plug according to the corresponding pin position and insert it into the "METER1" interface until it clicks into place.

The completed appearance is like the below figure.
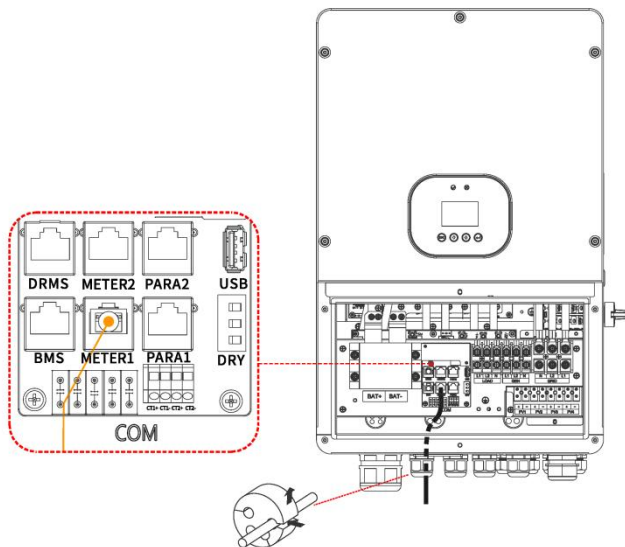
Description	METER1-Pin	**Meter-Pin**
RS485B	1	**B**
RS485A	5	**A**

4.BMS Connection

◆ Using CAN or RS485 communication with lithium batteries.

◆ Using lead-acid batteries, a temperature sensor must be connected.

⚠️ CAUTION	◆If you are using a lead-acid battery, you do not need to install CAN or RS485 communication. ◆The CAN battery communication and RS485 battery communication can't be installed at same time.

Connection Steps:

1.Prepare communication cable.

2.Thread the "BMS" cable through the cable gland.

3.Insert the RJ45 plug of the network cable into the "BMS" pin until it snaps into place. The other end is connected to the lithium battery.

The completed appearance is like the below figure.
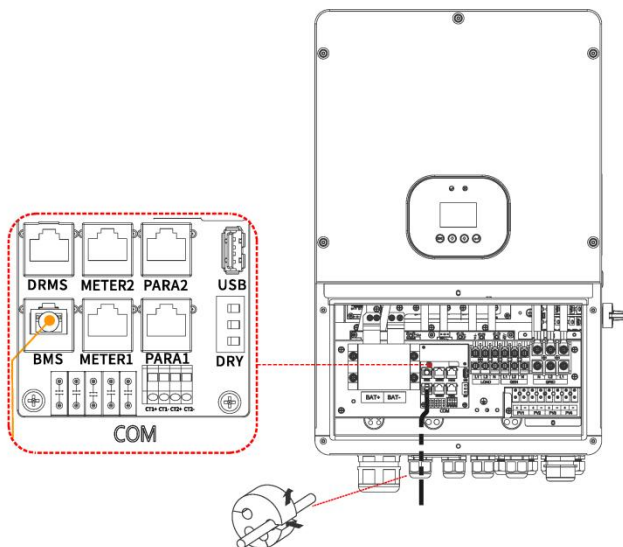
Using lead-acid batteries, the temperature sensor must be in contact with the surface of the lead-acid battery. The completed appearance is like the below figure.
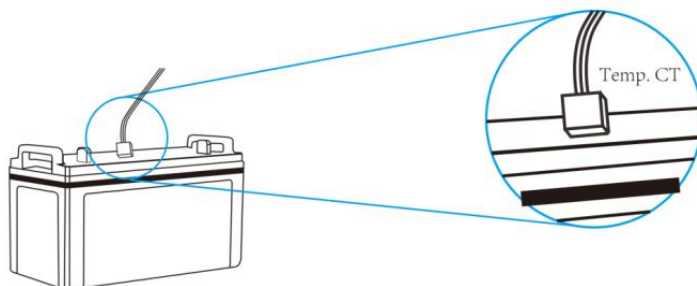
5.DRMS Connection

◆ DRMS is only for Australian and New Zealand installations, in compliance with Australian and New Zealand safety requirements. Detailed connection of DRMS device is shown below:

Connection Steps:

1. Prepare communication cable.

2. Thread the "DRMS" cable through the cable gland.

3. Insert the RJ45 plug of the network cable into the "DRMS" pin until it snaps into place.

The completed appearance is like the below figure.

5 Powering On the System

⚠ CAUTION	Before turning on the AC switch between the inverter and the power grid, use a multimeter set to the AC position to check that the AC voltage is within the specified range.

Suggested Turn-off the inverter step:

1. Turn on the DC switch between the battery and the inverter.

2. Turn on the DC switch between the PV string and the inverter.

3. Turn on the DC switch on the side of the inverter.

4. Turn on the AC switch between the inverter and the power grid.

5. If the battery is lithium, turn on the switch on the battery.

6. Turn on the main switch on the side of the inverter.

7. Observe the LEDs to check the operating status of the inverter.

6 Powering Off the System

<table>
<tr>
<td></td>
<td>Do not disconnect the DC connectors under load.</td>
</tr>
</table>

Suggested Turn-off the inverter step:

1.Turn off the main switch on the side of the inverter.

2.Turn off the AC switch between the inverter and the power grid.

3.Turn off the DC switch between the PV string and the inverter.

4.Turn off the DC switch on the side of the inverter.

5.Turn off the DC switch between the battery and the inverter.

6.Check the inverter operating status.

7.Waiting until LED, OLED have gone out, the inverter is shut down.

7 LCD Operation

When the system started up successfully, the startup animation of the inverter displays all

patterns, models, and brand, the following figure shows the interface.
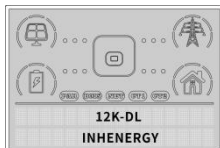
In normal, it will turn on page automatically, when pushing the button "Down", the order of the

paging information as follow:

```
          System Status
        "BAT:  . V/  %"
              Or
        "BAT:     .  V"
              │
          System Status
         "Pbat:      W"
              │
          System Status
        "PV1:  V/   W"
              │
          System Status
        "PV2:  V/   W"
              │
```
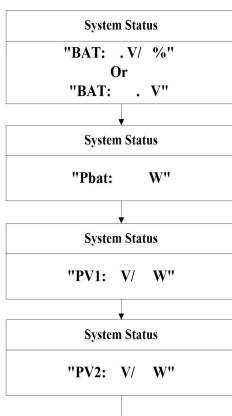
The fourth position of the Model number Is 4(12kW),3(10kW),
2(8kW), or when the Conditions on the right side are not met

System Status
"PV3:   V/   W"

The fourth position
of the Model number
is 0 (5kW) and1(6kW)

System Status
"PV4: V/ W"

System Status
"GridR: V/ Hz"

System Status
"GridR: V/ Hz"

System Status
"GridS: V/ Hz"

System Status
"InvR: V/   W"

System Status
"InvS: V/   W"

System Status
"UpsR: V/   W"

System Status
"UpsS: V/   W"

System Status
"GenR: V/   W"

System Status
"PL: W "

System Status
"PL_R: W "

System Status
"PL_S: W "

System Status
"PctR: W"

System Status
"PctS: W"

System Status
"Statistical Data"

System Status
FW Version

System Status
Model

System Status
Serial Number

System Status
Time

Notes:

Display	Meaning	Display	Meaning
BAT	BAT represent battery voltage.	GenR	Voltage and power of the R-phase of the GEN.
Pbat	Battery charging and discharging power.	PL	Power of Load.
PV1	Voltage and power of PV1.	PL_R	Power of Load R-phase.
PV2	Voltage and power of PV2.	PL_S	Power of Load S-phase.
PV3	Voltage and power of PV3.	PctR	Power of meter R-phase.
PV4	Voltage and power of PV4.	PctS	Power of meter S-phase.
GridR	Voltage and frequency of the R-phase of the On-grid.	Statistical Data	Electricity consumption display menu entry.
GridS	Voltage and frequency of the S-phase of the On-grid.	FW Version	Press Enter to view DSP and ARM software versions.
InvR	Power of inverter R-phase.	Model	Mode number.
InvS	Power of inverter S-phase.	Serial Number	SN code.
UpsR	Voltage and power of the R-phase of the Back-UP.	Time	Before using the system, set the display time based on the local time in the Setting menu.
UpsS	Voltage and power of the S-phase of the Back-UP.		

Press ENTER in the main page to enter the statistics menu, which is the value of electricity consumption statistics.

System Status	
"Statistical Data"	→ to "El_A: kWh"

System Status
"Ec_D: kWh"

System Status
"Ec_A: kWh"

System Status
"Ed_D: kWh"

System Status
"Ed_A: kWh"

System Status
"Epv_D: kWh"

System Status
"Epv_A: kWh"

System Status
"El_D: kWh"

System Status
"El_A: kWh"

System Status
"Gen_D: kWh"

System Status
"Gen_A: kWh"

System Status
"EbuyD: kWh"

System Status
"EbuyA: kWh"

System Status
"EselD: kWh"

System Status
"EselA: kWh"
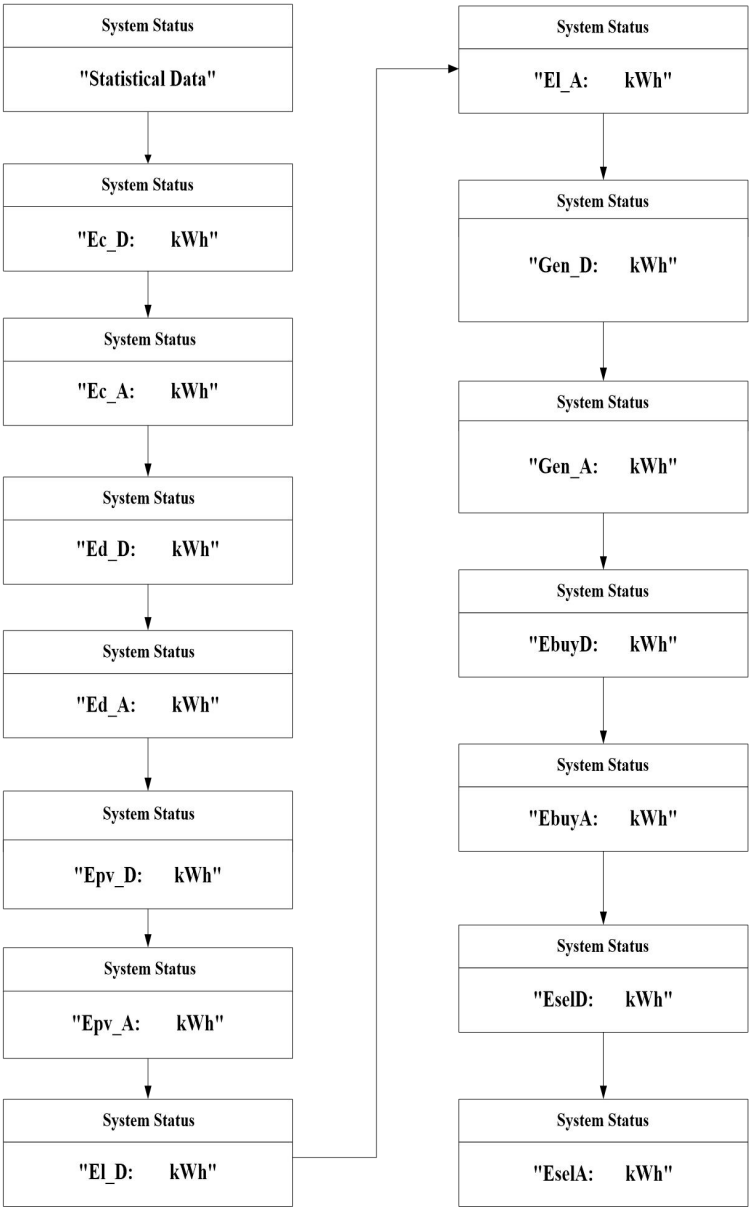
Notes：

Display	Meaning
Ec_D	The amount of battery charge that day.
Ec_A	Total battery charging capacity.
Ed_D	The amount of battery discharge that day.
Ed_A	Total battery discharging capacity.
Epv_D	PV power of the day.
Epv_A	Total PV capacity.
El_D	Electricity consumption of the day's load.
El_A	Total load electricity consumption.
Gen_D	GEN port electricity consumption is collected that day.
Gen_A	GEN port total electricity consumption is collected.
EbuyD	Daily electricity purchase.
EbuyA	Total purchased electricity.
EselD	Daily electricity sales.
EselA	Total electricity sales.

Setup menu

System Status
System : ON/OFF

System Status		System Status
SelfConsumption	→	DisCharge Limit

System Status		System Status
PeakLoadShifting	→	Charge Set
	→	System Status
		DisCharge Set

System Status		System Status
Back-up	→	Backup: UPS
		Disable
	→	System Status
		AC Volt: 230 V
		240 V
		208 V
	→	System Status
		AC Freq: 50 Hz
		60 Hz
	→	System Status
		Stop SOC

System Status
Generator Port

System Status		System Status
System Config	→	Language
	→	System Status
		System time
	→	System Status
		Prevent BackFlow
	→	System Status
		CT1:Cable CT
		Meter
	→	System Status
		CT2:Cable CT
		Meter
	→	System Status
		BAT : Lead-acid
		Li-ion #1
		...
	⤍	System Status
		Auto Test
	⤍	System Status
		Lead-acid CV
	⤍	System Status
		Lead-acid CC
	⤍	System Status
		Lead-acid LV
	→	System Status
		Development
		Long press (3s)

7.1 Enter Setting Interface

| "Enter" 3s then release | → | System Status
System: ON/OFF | ◄► | System Status
SelfConsumption | ◄► | System Status
PeakLoadShifting | ◄► | System Status
Back-up | ◄► | System Status
Generator Port | ◄► | System Status
System Config |
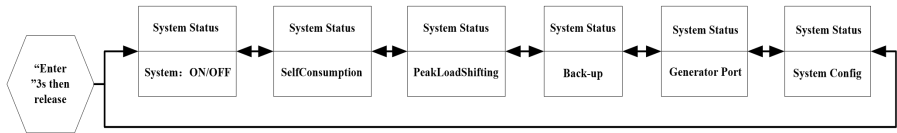
First Press any key to light up the LCD. Then press and hold the "Enter" button for 3 seconds and release, user can enter to above setting interface, of which includes 6 types of setting contents.

Use the "↑" or "↓" and "Enter" buttons to enter "System: ON/OFF" setting. The hybrid inverter will run automatically when it is powered on. And user can set the inverter to standby mode through this interface, "OFF" for standby mode and "ON" for operation mode.

7.2 Check and Set System Time

| System Status
System Config | → | System Status
System Time | → | System Status
xxxx/xx/xx XX:XX |
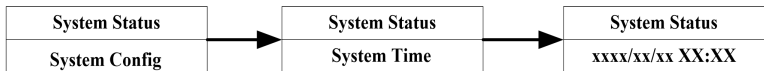
Use the "↑" or "↓" and "Enter" buttons to enter "System Config" to check or reset the system time.

If there is a data logger module connected, the server will automatically synchronize the inverter time. If the system time is not set correctly, time settings for charging and discharging will be influenced.

7.3 Check and Set the Standard for Grid Connection

| System Status
System Config | → | System Status
Development | → | System Status
Password:1111 | → | System Status
Grid Standard |
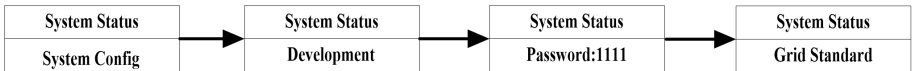
Use the "↑" or "↓" and "Enter" buttons to enter the grid standard screen in "System Config" to check or select the required grid standard. User need to long press "Enter" button for 5 seconds and then release it to enter the password verification screen to access "Development" interface.

| System Status
System Config | → | System Status
AutoTest | → | System Status
Yes? |
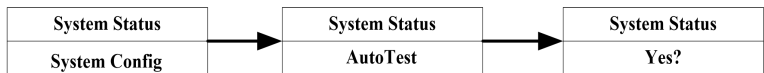
For example, if the grid connection standard is set to "CEI021", inverter will provide automatic self-test function. When the system is running, enter the "AutoTest" interface in "System Config". After setting to "YES" to confirm the selected grid connection standard, the system will

automatically run tests as per standards. LCD screen will display test status. After the automatic self-test is completed, the system continues to operate normally.

System Status
Development

→

System Status
PV Model

→

System Status
Mod:Parallel/Standalone
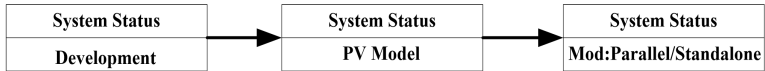
Users can choose parallel or independent input modes through the PV Model settings in advanced settings.

7.4 Check and Set the Battery Type

System Status
System Config

→

System Status
BATx: XXX
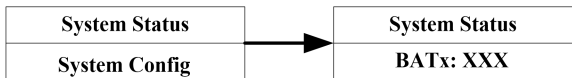
Use the "↑" or "↓" and "Enter" buttons to enter the "System Config " in the battery type screen. User can check and set the corresponding battery type through this page.

System Status
System Config

System Status
BAT0: LeadAcid

System Status
LeadAcid CV
→
System Status
55.0-59.2V

System Status
LeadAcid CC
→
System Status
0-240A

System Status
LeadAcid LV
→
System Status
44-50V
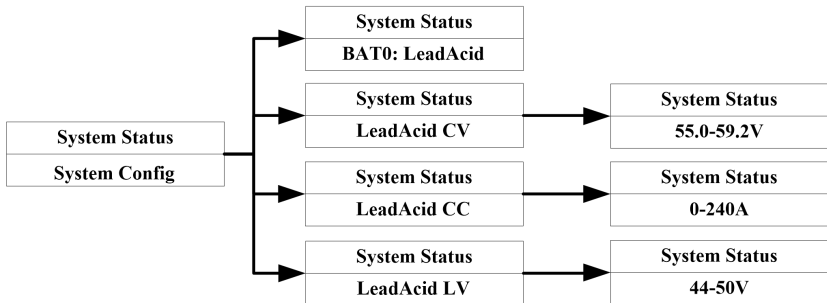
When using lead-acid battery, user need to connect NTC to the BMS communication port and stick the other end to the correct position of the lead-acid battery. And set the battery type to "BAT0: LeadAcid". Then set the parameters of CV constant voltage, CC constant current and LV under voltage point for the lead-acid battery.

Default parameters for CC, CV, LV, and adjustable parameter range.

   CC: Default 240A, Range 0-240A, Maximum charge current of lead-acid battery.

   CV: Default 58.0V, Range 55.0-59.2V, Constant voltage of lead-acid battery.

   LV: Default 47V, Range 44-50V, Lead Acid Battery Stop Discharge Voltage.

Before wiring, please pay attention that neither battery power line positive or negative cannot be reversed in the inverter battery port!

7.5 Check and Set the CT1/CT2 Type

System Status		System Status		System Status
System Config	→	CT1	→	CableCT / Meter

System Status		System Status		System Status
System Config	→	CT2	→	CableCT / Meter

When the inverter is under self-consumption mode, user need to connect CT/meter to the CT1/CT2 port and also make sure that the other end of the CT/meter is connected to the grid in the correct direction. If CT/meter is not connected, inverter will report error.

Press "↑" or "↓" and "Enter" buttons to enter the CT selection screen and check or set the CT option to CT or meter.

7.6 Check and Set the Prevent BackFlow Function

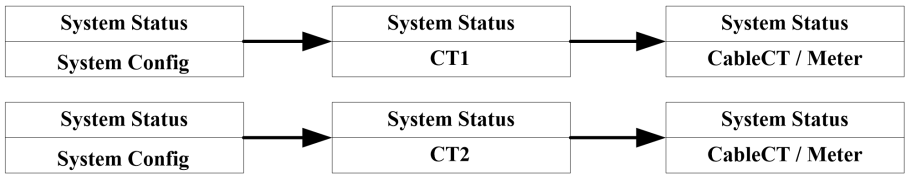| System Status		System Status		System Status
System Config	→	Prevent BackFlow	→	Anti BackFlow:ON/OFF
			→	System Status
				Power Rate:0%
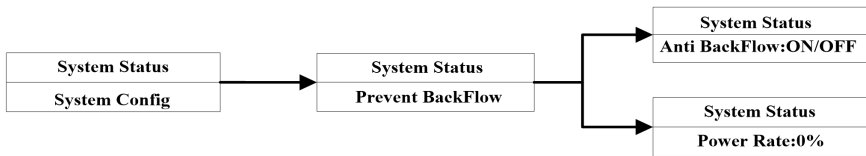
The hybrid inverter has an anti-backflow/0-export function. Users can use the "↑" or "↓" and "Enter" buttons to enter the "Prevent BackFlow" screen in "System Config" to set and enable the anti-backflow function. When the system has excess power to feed into the grid, the hybrid inverter limits the power output to the utility to the anti-backflow setting power (rated inverter power * backflow power percentage "Power Rate") via CT/Meter. When "Anti BackFlow" is set to ON and the power rate set to 0%, the anti-backflow function is on and inverter cannot feedback to grid; if set to OFF then the inverter can feedback to grid. The Power Rate option is only available when prevent backflow is set to ON. When set to 0%, 0 power is allowed to feed back to the grid; when set to 30%, 30% of the inverter's rated power is allowed to feed to the grid. For example, if the 12kW inverter is set to 30%, it can feed up to 3.6kW to the grid.

Note: When the inverter is running in forced discharge mode, prevent backflow function is not available.

7.7 GEN Port Function Settings

GEN Port is for Smart Load, Generator and Micro INV.

System Status
Type:Smart Load

System Status
Start Ppv:500W

System Status
Stop Ppv: 0 W

System Status
GEN Port

System Status
Output:OnGrid-On/By PV/SOC

System Status
Start SOC:90%

System Status
Stop SOC:70%
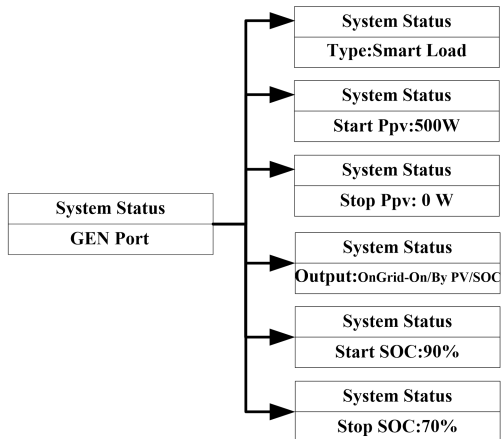
Type: Please select "**Smart Load**" if user wants to use smart load function, "Disable" is default.

Output: When output option is "OnGrid-On", smart load is always on when Grid is online, otherwise smart load runs according to PV power and battery SOC all the time.

For example: Start Ppv = 1000W, Stop Ppv = 500W, Start SOC = 90%, Stop SOC = 70%.

When PV power≥1000W and battery SOC≥90%, GEN port starts to power smart load.

When PV power≤500W or battery SOC≤70%, GEN port stops to power smart load.

Please make sure that the total load on GEN port and Back-Up port together should not exceed the PV and battery input power or Inverter Rated output power when running off Grid.

System Status
Type:Generator

System Status
GEN Pmax:6000W

System Status
GEN Port

System Status
Start SOC:40%

System Status
Stop SOC:100%
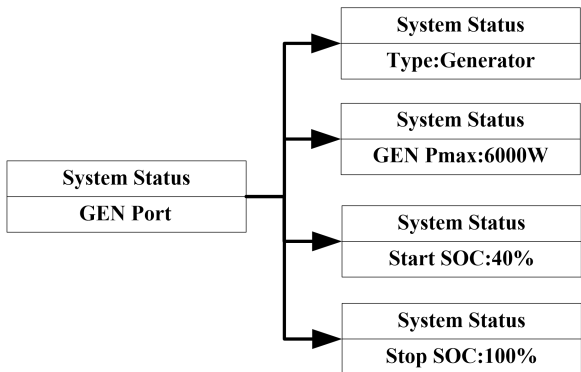
Type: Please select "**Generator**" if user wants to use Generator function, "Disable" is default.

Output: GEN Pmax indicates the maximum output power of the generator, generator runs according to battery SOC all the time.

For example：Gen Pmax = 6000W, Start SOC = 40%, Stop SOC = 100%.

When battery SOC ≤ 40%, generator starts to power inverter by GEN port and the maximum input power of the generator is 6000W.

When battery SOC ≥ 100%, generator stops to power inverter by GEN port.

System Status
Type:Micro INV

System Status
GEN Port

System Status
Start SOC:40%

System Status
Stop SOC:100%

Type: Please select "**Micro INV**" if user wants to use Micro INV function, "Disable" is default.

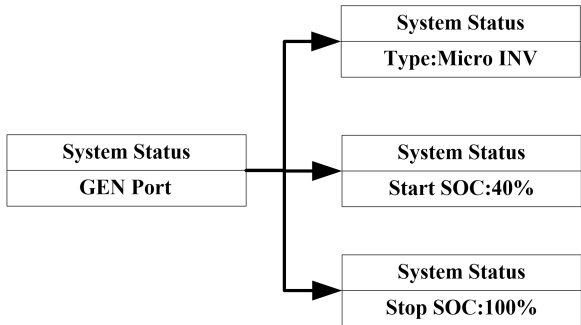**Output**: Micro INV is always on when Grid is online, otherwise Micro INV runs according to battery SOC all the time.

For example：Start SOC = 40%, Stop SOC = 100%.

When battery SOC ≤ 40%, Micro INV starts to power inverter by GEN port.

When battery SOC ≥ 100%, Micro INV stops to power inverter by GEN port.
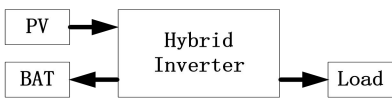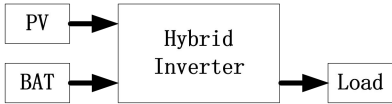
7.8 Check and Set Off-grid Parameters

System Status
Disable/UPS

System Status
Back-up

System Status
AC Volt:230/240/208V

System Status
AC Freq:50Hz/60Hz

System Status
Stop SOC
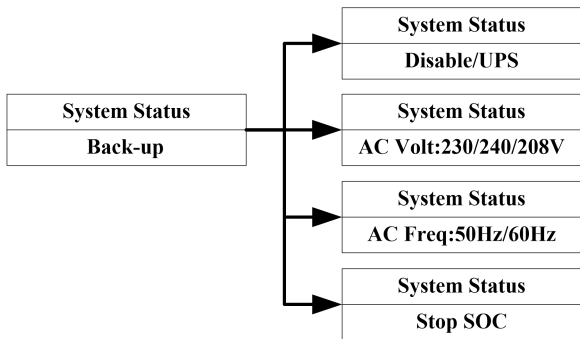
If the user needs to use the off-grid function when there is no utility power, the off-grid function should be turned on. Check and set the corresponding off-grid output voltage and frequency.

BackUp: Disable, off-grid function is not enabled. No output from the backup port when grid outage.

BackUp: UPS, when utility power is available, the backup port is used as a utility bypass, outputting the same voltage and frequency as per the utility voltage and frequency. After a utility power failure, the backup port switches to UPS power mode within 10ms and outputs the "pre-set off-grid voltage and frequency".

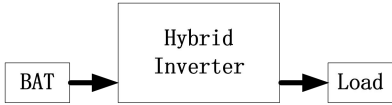| When PV or Battery is available (without Grid)	
PV → Hybrid Inverter → Load ; BAT ←	Solar provides energy to loads as first priority, if Ppv>Pload, extra solar energy will charge battery.
PV → Hybrid Inverter → Load ; BAT →	Solar provides energy to loads as first priority, if Ppv<Pload, battery energy and solar energy will supply to the loads at the same time.
Hybrid Inverter → Load ; BAT →	When PV is Off, battery energy will supply to the loads.
PV → Hybrid Inverter → Load	When there is only PV, user can enable backup to UPS then PV will supply to the loads without battery and Grid for emergent use.

7.9 Inverter Used Under Peakloadshifting Mode
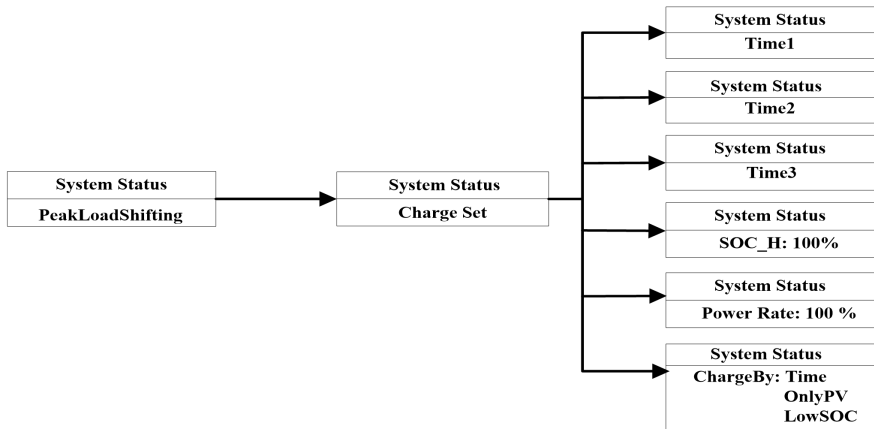
When the utility charging cost is low or the battery SOC is too low, user need to force the battery to be charged. Press "↑" or "↓" and "Enter" buttons to enter the "Charge Set" interface in "PeakLoadShifting" to set and enable the charge start time and stop time. Then inverter will

charge the battery according to the set charging power (Rated Battery Power*Power Rate) and stop charging when the battery SOC reaches "SOC_H". If the Grid is connected and "ChargeBy" is set to Time, the hybrid inverter can use the grid power to charge the battery during the charging period; otherwise, the grid power will not be used for charging.

System Status		System Status		System Status
PeakLoadShifting	→	**Discharge Set**	→	**Time1**
				System Status
				Time2
				System Status
				Time3
				System Status
				SOC_L: 5%
				System Status
				Power Rate: 100 %
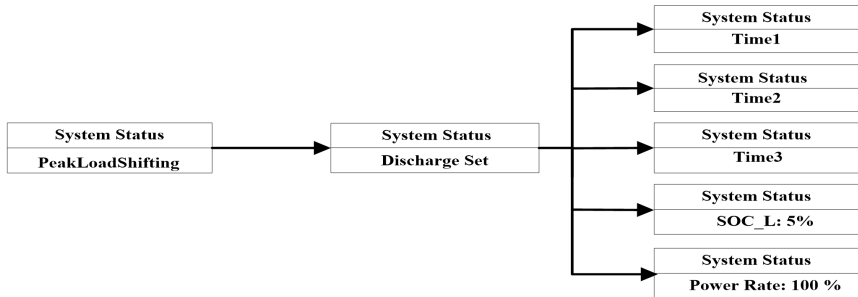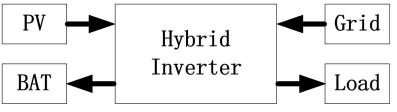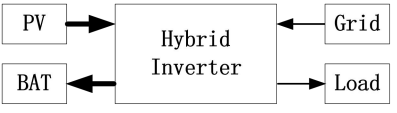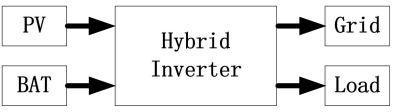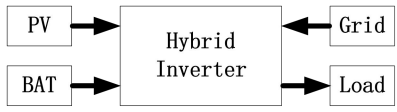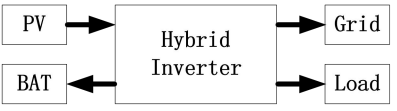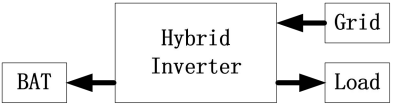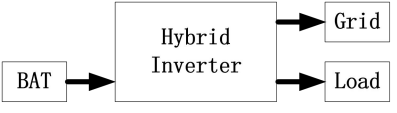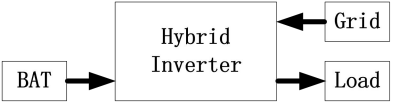
When the selling price of electricity is high or the battery needs to be discharged, user can press "↑" or "↓" and "Enter" buttons to enter the "Disc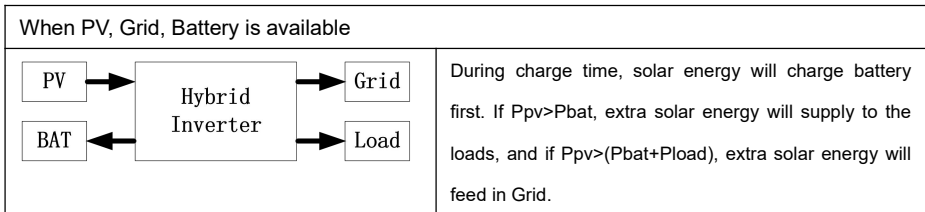harge Set" interface in "PeakLoadShifting" to set and enable the discharge start time and stop time. Then the inverter will discharge the battery according to the set discharge power (rated battery power*Power Rate) and stop discharging when the battery SOC reaches "SOC_L".

"Forced Charge or Forced Discharge Set" is provided with three separate time periods for setting. Users can force charge and force discharge the battery multiple times in one day, just make sure the force charge and force discharge times do not conflict. During the forced charging time period, the battery does not respond to the discharge demand of the load. However, during the forced discharge time period, if the PV power is greater than the rated inverter power, the excess energy of the PV automatically charges the battery.

Note: When the inverter is running in forced discharge mode, prevent backflow function is not available.

When PV, Grid, Battery is available	
PV → Hybrid Inverter → Grid / BAT ← Hybrid Inverter → Load	During charge time, solar energy will charge battery first. If Ppv>Pbat, extra solar energy will supply to the loads, and if Ppv>(Pbat+Pload), extra solar energy will feed in Grid.

Diagram	Description
PV → Hybrid Inverter ← Grid; BAT ← ; → Load	During charge time, solar energy will charge battery first. If Ppv>Pbat, extra solar energy will supply to the loads, and if Ppv<(Pbat+Pload), Grid will supply energy with solar together.
PV → Hybrid Inverter ← Grid; BAT ← ; → Load	During charge time, solar energy will charge battery first. If Ppv<Pbat, Grid will supply energy with solar together. But if Ppv<Pbat and ChargeBy is OnlyPV, the battery charging energy is only use solar energy, Grid energy will only supply for loads.
PV → Hybrid Inverter → Grid; BAT → ; → Load	During discharge time, solar energy and battery discharge energy provide power to the loads. If (Ppv+Pbat)>Pload, the extra energy will feed in Grid.
PV → Hybrid Inverter ← Grid; BAT → ; → Load	During discharge time, solar energy and battery discharge energy provide power to the loads. If (Ppv+Pbat)<Pload, Grid energy will supply for loads with solar and battery.
PV → Hybrid Inverter → Grid; BAT ← ; → Load	During discharge time, if Ppv>ACRatePower, solar energy will supply ACRatePower for loads and Grid, and the extra solar energy will charge the battery instead of battery discharge.

When Grid, Battery is available (without PV)

Diagram	Description
Hybrid Inverter ← Grid; BAT ← ; → Load	During charge time, Grid will charge battery and supply power to the loads at the same time.
Hybrid Inverter → Grid; BAT → ; → Load	During discharge time, if Pbat>Pload, battery discharge energy will supply for loads and extra battery discharge energy will feed in Grid.
Hybrid Inverter ← Grid; BAT → ; → Load	During discharge time, if Pbat<Pload, Grid will supply energy with battery together for loads.
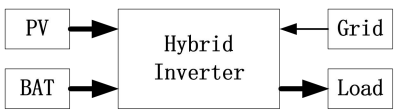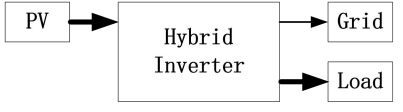
7.10 Inverter Used Under Self-consumption Mode

When the system time of the inverter is not within the forced charging and discharging time set by "PeakLoadShifting", or the forced charge/discharge time of "PeakLoadShifting" is not enabled, the hybrid inverter automatically operates in "SelfConsumption" mode. The hybrid inverter detects the power of CT/Meter, when the PV is connected and the PV power is greater than the load power, the excess PV power will be output to the grid through CT/Meter. At this time, the hybrid inverter automatically uses this excess PV power to charge the battery and reduce the backflow power to the grid. If there is no PV or the PV power is lower than the load power, the load will take power from the grid through CT/Meter. At this time, the hybrid inverter automatically controls the battery discharge to provide energy to the load and reduce the power taken from the grid.
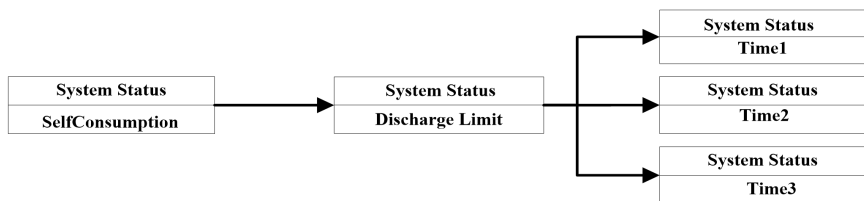
When the hybrid inverter is in "SelfConsumption" mode, if the user does not want to discharge the battery for a certain period of time, for example, If the price of utility power is relatively low during a certain period of time, it is more economic to use utility power than battery power. Users can access the "Discharge Limit" screen in "SelfConsumption" by pressing the "↑" or "↓" and "Enter" buttons, set and enable the limit battery discharge time. During this set time period, the battery is not discharged and the load is powered directly from the utility. The "SelfConsumption" mode also support three settable time periods to limit battery discharge.

When PV, Grid, Battery is available	
	When Ppv>Pload, extra solar energy is going to feed in Grid, battery will charge to reduce feed in Grid power. If Ppv>(Pbat+Pload), extra solar energy still feed in Grid, if Anti BackFlow is On, feed in Grid power will be limited at setting power rate.

PV → Hybrid Inverter ← Grid BAT → → Load	When Pload>Ppv, the loads is going to use Grid power, battery will discharge to reduce Grid consume power. If Pload>(Pbat+Ppv), Grid will supply for loads with solar and battery. But during Discharge Limit time, the battery can only charge and no discharge.
When Grid is available, without PV or Battery	
Hybrid Inverter ← Grid BAT → → Load	When Pload>0, the loads is going to use Grid power, battery will discharge to reduce Grid consume power. If Pload>Pbat, Grid will supply for loads with battery. During Discharge Limit time, the battery can only charge, loads use energy all from Grid.
PV → Hybrid Inverter → Grid → Load	When Ppv<Pload, Grid will supply for loads with solar. When Ppv>Pload, extra solar energy will feed in Grid, if Anti BackFlow is On, feed in Grid power will be limited at setting power rate.

7.11 Restore Default Factory Settings

System Status		System Status		System Status		System Status
System Config	→	Development	→	Password:1111	→	Default Set

When user need to restore the system to factory settings, user can use the "↑" or "↓" and "Enter" buttons to enter the "System Config" interface and select the "Development" option. When enter to "Development" screen, user need to long press "Enter" for 5 seconds to enter the password verification screen.

8 Maintenance and Cleaning

8.1 Maintain Periodically

1.Checking Heat Dissipation

If the inverter regularly reduces its output power due to high temperature, please improve the heat dissipation condition. Maybe you need to clean the heat sink.

2.Cleaning the Inverter

If the inverter is dirty, turn-off the inverter according to title 6, waiting the inverter shut down, then clean the enclosure lid, the display, and the LEDs using only a wet cloth. Do not use any cleaning agents (e.g. solvents or abrasives).

3.Checking the DC switch

Check for externally visible damage and discoloration of the DC switch and the cables at regular intervals. If there is any visible damage to the DC switch, or visible discoloration or damage to the cables, contact the installer.

8.2 Trouble shooting

Our quality control program assures that every inverter is manufactured to accurate specifications and is thoroughly tested before leaving our factory. If you have difficulty in the operation of your inverter, please read through the following information to correct the problem.

Alarm ID	Alarm Name	Suggestion
W5	Meter COM Err	1.Check whether the meter matches the inverter protocol. 2.Check the wire connection between meter and inverter is good or not.
W6	PV Short Err!	Check whether the PV line is short-circuited.
W8	BMS COM Err	1.Check the lithium Battery is open or not. 2.Check the connection of lithium Battery and inverter is good or not.
W11	BAT NTC Open	1.Check the temperature of lead-acid battery is installed or not. 2.Check the temperature of lead-acid battery is connected well or not.
W14	Bat Temp Out	Check the environment temperature of battery is in the range of specification or not.
W15	Over Load!	Please reduce the load of UPS output.
W18	BMS Warn	Check the warning information from lithium battery user manual.
W19	FanStuck	Check whether the fan is faulty.

W26	AC Volt Out	1.Check the AC voltage is in the range of standard voltage in specification. 2.Check the grid connection is good or not.
W27	DCI High	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
W28	No AC Input	1.Please confirm grid is lost or not. 2.Check the grid connection is good or not. 3.Check the switches on the cable are on or not.
W29	AC Freq Out	Check the frequency is in the range of specification or not. Restart inverter. Please contact the manufacturer if restart can't solve the problem.
W30	Bat Reversed	Check the positive and negative of battery is reversed or not.
W31	Battery Open	Check the battery connection is good or not. Check the switches between the battery and inverter are all on or not.
W32	BatVolt High	Check the voltage of battery is in the range of specification or not. Check the battery connection is right or not If battery is really higher than 750V. (The default voltage is 750V, and the actual setting parameters shall prevail) Please disconnect the connection of battery and check inverter.
W33	Bat Volt Low	Check the real voltage of battery. Check the wire of battery and inverter is good or not.
W35	BMS Err	Check the lithium battery error information according to the error code.

Alarm ID	Alarm Name	Suggestion
E0	N-PE Fault!	Check the L line and N line is reversed or not. Check the PE is connected well or not.
E1	PV Iso Low!	Check the connection of PV panels and inverter is good or not. Check the PE of inverter is good or not.
E2	Relay Fault!	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E3	BusVolt High!	Check the PV input voltage. Do not exceed the range of specification. Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E4	IGBT Fault!	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E5	Firmware Err!	Read DSP and COM firmware version from LCD. Check if the firmware is correct.
E6	ARM RX Fault!	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E7	DSP RX Fault!	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E8	BackUp Short!	Check the load of BackUp. Check the output of UPS. Especial not connect to grid.
E9	AutoTest Err!	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E10	Model Fault!	Checking Model Settings. Please contact the manufacturer if restart can't solve the problem.
E11	NTC Open!	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E12	Sequence Err	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E13	BDC OTP!	Please check the temperature is in the range of specification or not.
E16	PV Volt High	Please check the voltage of PV input is in the range of specification or not.

E17	Bus UnBLE!	Restart inverter. Please contact the manufacturer if restart can't solve the problem.
E18	BST OTP!	Please check the temperature is in the range of specification or not. Please contact the manufacturer if restart can't solve the problem.
E19	INV OTP!	Please check the temperature is in the range of specification or not. Please contact the manufacturer if restart can't solve the problem.
E22	GFCI High!	Check the cable of inverter. Restart inverter. Please contact the manufacturer if restart can't solve the problem.

9 Decommissioning

9.1 Remove the Inverter

◆ Turn off the main switch on the side of the inverter.

◆ Disconnect the inverter from DC Input and AC output.

◆ Wait for 5 minutes for de-energizing.

◆ Disconnect communication and optional connection wirings.

◆ Remove the inverter from the bracket.

◆ Remove the bracket if necessary.

9.2 Packaging

◆ Please pack the inverter with the original packaging.

◆ If the original package is no longer available, you can also use an equivalent carton that meets the following requirements.

9.3 Storage and Transportation

◆ Store the inverter in a dry environment where ambient temperature keep always between -25 °C - +60 °C.

◆ When the inverter or other related components need to be disposed. Have it carried out according to local waste handling regulations. Please be sure to deliver wasted inverters and packing materials to certain site, where can assist relevant department to dispose and recycle.

10 Technical Data

Model	HI-5K-DL	HI-6K-DL	HI-8K-DL	HI-10K-DL	HI-12K-DL
PV String Input Data:					
Max. DC input power	7.5kW	9kW	12kW	15kW	18kW
Max. DC input voltage	550V				
Nominal input voltage	360V				
MPPT operation voltage range	90~550V DC	90~550V DC	90~550V DC	90~550V DC	90~550V DC
Min start-up voltage	100VDC				
Number of independent MPPT / strings per MPPT	2/1	2/1	4/1	4/1	4/1
MPPT max. current	20A*2	20A*2	20A*4	20A*4	20A*4
AC Output/Input Data (On-grid):					
Nominal output active power	5kW	6kW	8kW	10kW	12kW
Max. output apparent power	5.5kVA	6.6kVA	8.8kVA	11kVA	13.2kVA
Max. apparent power from utility grid	11kVA	12kVA	16kVA	20kVA	24kVA
Nominal output voltage	120V/240V(Split phase),208V(2/3 phase)				
Nominal output frequency	50Hz,60Hz/±5Hz				
Max. output current	26A	32A	42A	53A	60A

Max. AC current from utility grid	26A*2	32A*2	42A*2	53A*2	60A*2
Power factor	±0.8				
THDi	<3%				
Grid system pattern	Split phase; 2/3 phase				
Back-up Output Data (UPS):					
Peak output apparent power	5.5kVA	6.6kVA	8.8kVA	11kVA	13.2kVA
Nominal output apparent power	5kVA	6kVA	8kVA	10kVA	12kVA
Nominal output voltage	120V/240V(Split phase),208V(2/3 phase)				
Nominal output frequency	50Hz,60Hz/±5Hz				
Output THDV	<3%				
Automatic switch time	<10ms				
GEN Input Data：					
Max. input current	26A	32A	42A	53A	60A
Nominal input apparent power	5kVA	6kVA	8kVA	10kVA	12kVA
Battery Input Data:					
Battery type	Lithium /Lead-acid				
Battery voltage range	40V-60V				
Max. charging current	100A	120A	160A	200A	240A
Max. discharging current	100A	120A	160A	200A	240A
Charging strategy for Li-Ion battery	Self-adaption to BMS				

Efficiency:	
Max. efficiency	98%
Europe efficiency	97.5%
Max. battery to load efficiency	94.5%
General Data:	
Dimensions(L/W/H) in mm	425mm*290mm*660mm
Weight	40kg
Operation temperature range	−25 °C ... +60 °C
Heat dissipation mode	Smart cooling
IP Class	IP65
Maximum altitude	3000m
Self-Consumption night	<3W
Topology	Transformerless
Display	LCD and App
Communication interface	WiFi/4G/USB/CAN/RS485

11 Appendix

Approved battery brand from Inhenergy.

Icon	Brand	RS485 or CAN
0	Lead_Acid	/
1	JOHNRAY	CAN
2	PYLON	CAN
3	DYNESS	CAN
4	ATL	CAN
5	GenixGreen	CAN
6	VTC	CAN
7	ZETARA	CAN
8	EVE	CAN
9	KPD	RS485
10	INHENERGY	CAN / RS485
11	SUNKET	CAN
12	SLF-PACE	RS485
13	Genbyte	CAN
14	PACE	CAN / RS485
15	SUG	CAN
16	RITA	RS485
17	Pytes	CAN
18	VESTWOOD	CAN

12 Manufacturer's Warranty

Please refer to the warranty card.

13 Contact

If you have technical problems concerning our products, contact your installer or

manufacturer. During inquiring, please provide below information:

1.Inverter type

2.Modules information

3.Communication method

4.Serial number of Inverters

5.Error code of Inverters

6.Display of inverter LCD

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