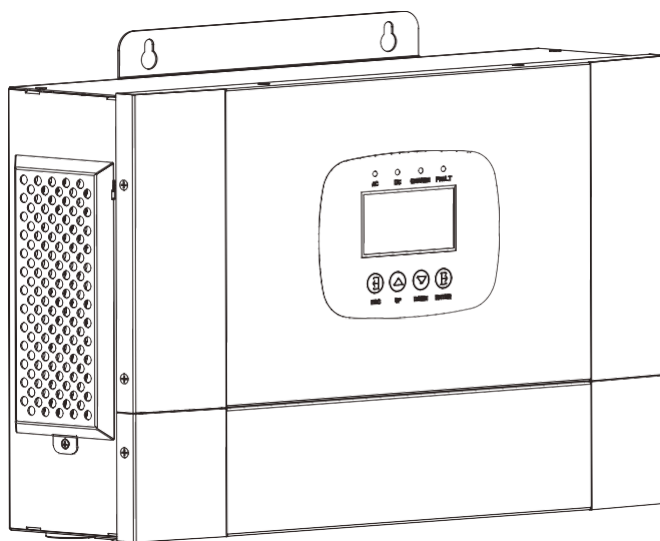


ON GRID HYBRID INVERTER



AMP AO 2KW 12V

Important Instructions

The instructions contain all the safety alerts, installation instructions, and operation instructions of the 2.5KVA Inverter. Please read the instructions carefully before installation and use, and properly keep it for future reference.

- ☐ There is an unsafe voltage in the device. Do not disassemble the device by yourself in case of electric shock. Please contact the local qualified service center for repair.
- ☐ The mains input and AC output are of high voltage. Please do not touch the wire connection.
- ☐ In order to reduce the risk of electric shock, please disconnect all wires before maintenance.
- ☐ Do not open the terminal cover when the device is under operation to prevent the electric shock.
- ☐ The device shall be installed by qualified professionals.
- ☐ Do not place or install the inverter in a place accessible to children.
- ☐ Do not install the inverter in a humid, greasy, flammable, explosive, dusty, or other harsh environment.
- ☐ Do not touch the hot shell when the device is under operation.
- ☐ It is recommended to install a proper fuse or circuit breaker outside the inverter.
- ☐ Disconnect the fuse or circuit breaker near the Photovoltaic (PV) array, mains, and battery terminals with insulating gloves, before installation and adjustment of the wiring of the inverter.
- ☐ After installation, please check whether all wires are tightly connected in case of fire hazards due to heat accumulation generated by loose connections.
- ☐ The inverter is an On grid device. Please ensure that the inverter is the only power source of the load. Do not use it in parallel with other AC power sources in case of damage to the inverter and electrical appliance.
- ☐ In order to reduce the risk of injury, only deep-cycle rechargeable batteries can be used if using lead-acid battery.
- ☐ During normal use, please clean the dust filter of the machine every two months. The operation needs to be carried out after power off.
- ☐ The dust filter shall be cleaned once every three months.

Table of Contents

Important Instructions	1
1. Basic Information	3
1.1 Product Overview and Features	3
1.2 Introduction to the Basic System	3
1.3 Product Appearance	4
1.4 Dimensional Drawing	5
2. Installation Instructions	5
2.1 Installation Precautions	5
2.2 Wiring Specifications and Circuit Breaker Selection	7
2.3 Installation and Wiring	8
3. Working Modes	15
3.1 Power Supply Modes	15
3.2 Charging Modes	16
3.3 Battery Charging Parameters	18
4. Operating Instructions for LCD Screen	20
4.1 Operation and Display Panel	20
4.2 Parameter Settings	24
5. Other Functions	30
5.1 RS485 Communication Function	30
5.2 Wi-Fi Wireless Communication Function	30
6. APP Instructions	31
7. Protection	31
7.1 Error Code	31
7.2 Troubleshooting (partial)	33
8. System Maintenance	35
9. Technical Parameters	35

1. Basic Information

1.1 Product Overview and Features

This device is a new solar energy storage inverter integrating solar energy storage, grid charging & storage, and AC sine wave output. Controlled by the digital signal processor (DSP), the inverter has high response speed, high reliability, high standards, and other features. Its charging and AC output modes are optional to meet the characteristics of different application scenarios.

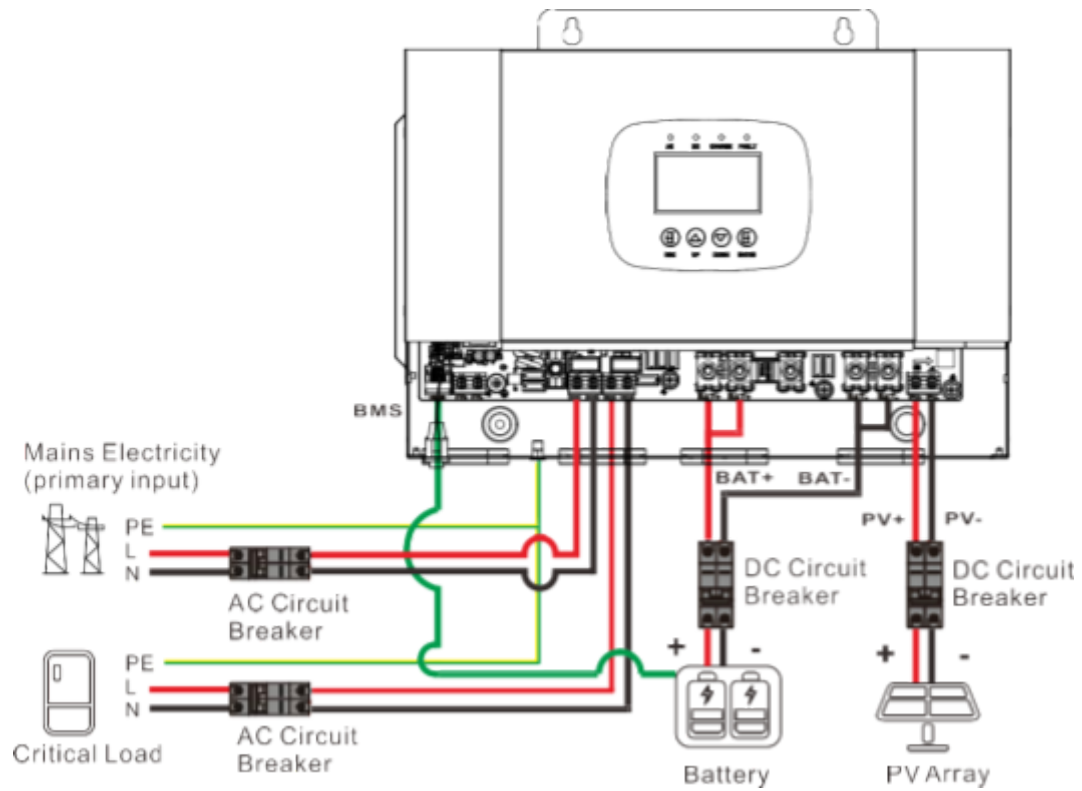
Features:

- Simplified charging modes: solar energy charging only/solar energy charging priority charging. Each mode maximizes the use of solar energy.
- An uninterruptible power supply (UPS) function with three types of AC outputs such as grid bypass, inverter output, and power supply.
- Up to 160A maximum current for long-time discharging.
- Supports both lead-acid batteries and lithium batteries.
- Up to 16A PV input current.

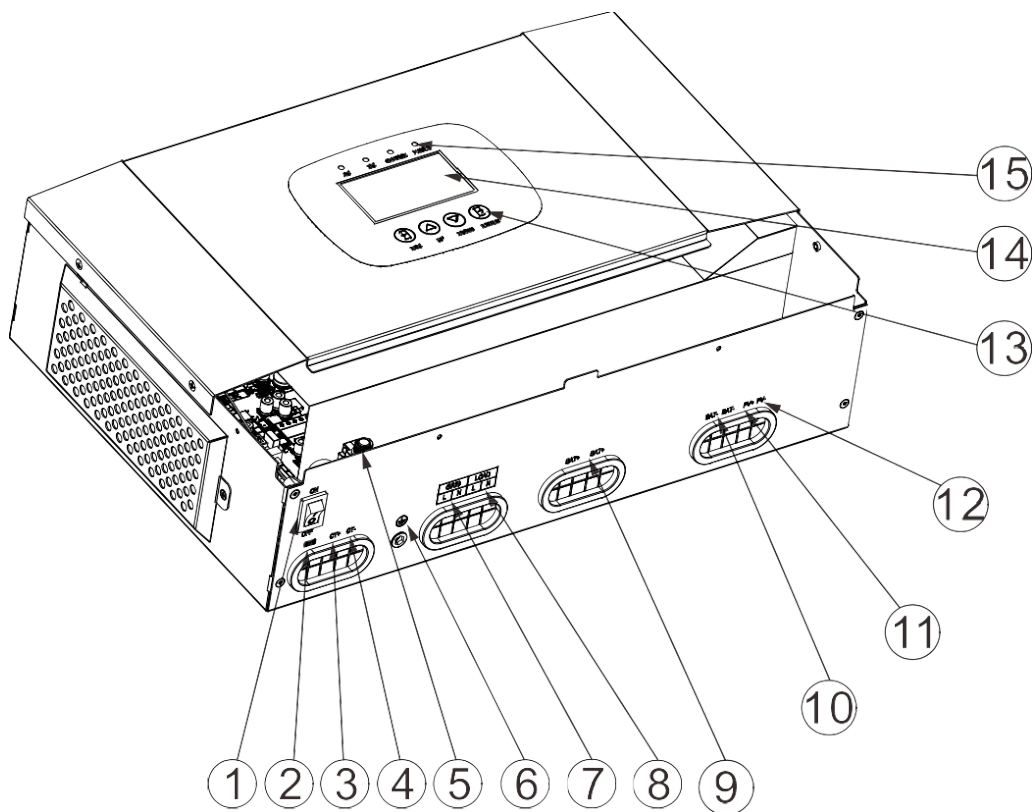
1.2 Introduction to the Basic System

The basic application of the inverter is shown in the following figure. The complete operating system includes:

- Grid
- PV module
- Battery
- Domestic load
- Energy storage inverter

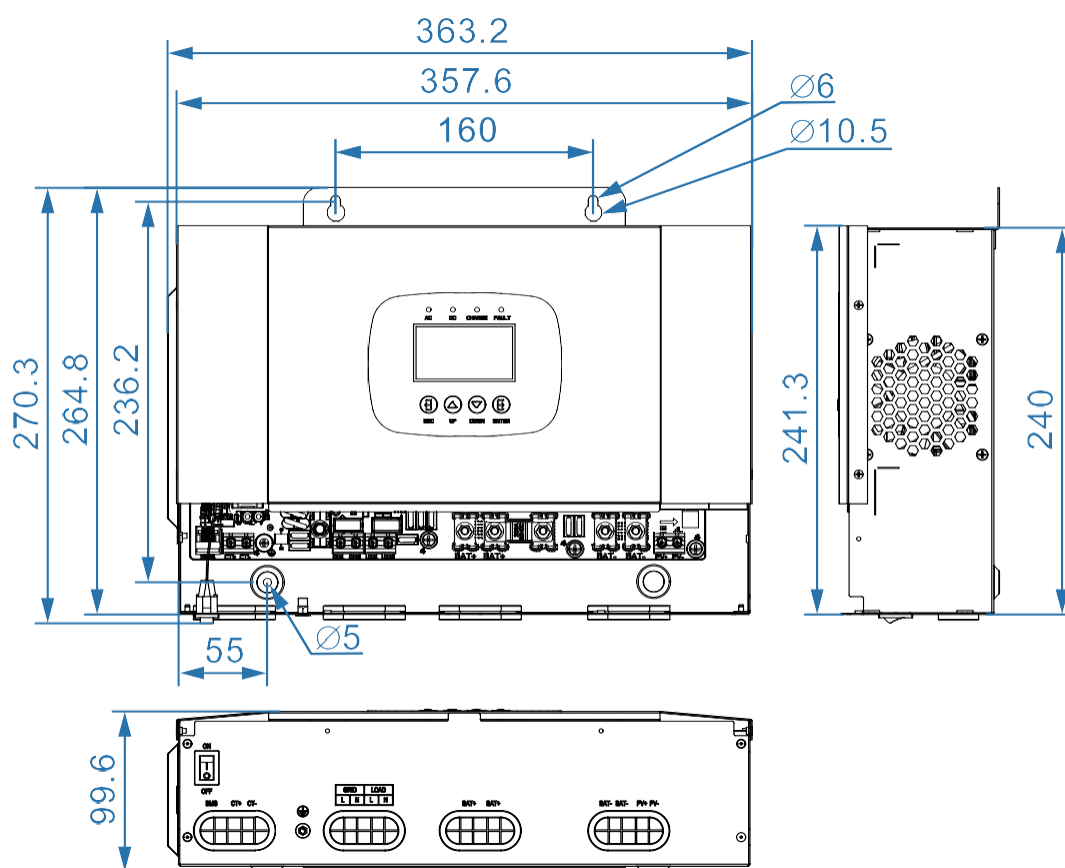


1.3 Product Appearance



①	ON/OFF rocker switch	⑨	Input port for battery anode
②	BMS communication port	⑩	Input port for battery cathode
③	CT+ contact port(Ratio 2000:1)	⑪	PV+ input port
④	CT- contact port(Ratio 2000:1)	⑫	PV- input port
⑤	Overload protector for AC input	⑬	Function keys
⑥	Ground screw hole	⑭	LCD display screen
⑦	AC input port	⑮	Status light
⑧	AC output port		

1.4 Dimensional Drawing



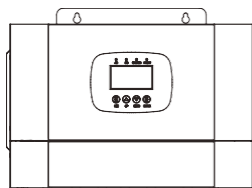
2. Installation Instructions

2.1 Installation Precautions

Before installation, please carefully read this manual to understand the procedures and get familiarized with the precautions.

- Be careful when installing the battery. Please wear protective goggles when installing the lead-acid liquid battery, and rinse with clean water promptly in case of any contact with battery acid.
- Keep the battery away from metal objects in case of short circuits.
- Make sure the environment is well-ventilated because acid gas may be generated when the battery is charged.
- Leave enough space around the inverter for heat dissipation. Do not install the inverter and the lead-acid liquid battery in the same cabinet in case that acid gas generated by the battery corrodes the inverter.
- Only charge the battery compatible with the inverter.
- Loose connectors and corroded wires may cause great heat and melt the wire insulation layer, burn the surrounding materials, and even cause a fire, so please make sure that the connectors are tightened and the wires are preferably fixed with cable ties in case of loose connectors caused by the wobbling wires during movement.
- Select connecting wires with a current density less than 5A/mm^2 for the system.
- Avoid direct sunlight and rainwater in outdoor installation.
- After the power switch is turned off, a high voltage is still inside the inverter. Do not open or touch the internal components until the capacitor completely discharges.
- Do not install the inverter in a humid, greasy, flammable, explosive, dusty, or other harsh environment.
- It is forbidden to reversely connect the input ends of the battery. Otherwise, it may lead to the damage of the device or unpredictable risks.
- The grid input and AC output are of high voltage. Please do not touch the wire connection.

- Do not touch the operating fan in case of injury.
- Make sure that the inverter is the only power source of the load. Do not use it in parallel with other AC power sources in case of damage.
- Please check the machine before installation to make sure there is no damage in the packaging. You should receive the following items in your package



Inverter
(*1)



User manual
(*1)



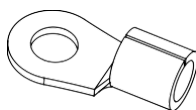
Passport
(*1)



Self-tapping screw
ST4.2 (*3)



Terminal
SC35-6 (*4)



OT terminal
RNB14-5(*1)



Network cable
(*1)

2.2 Wiring Specifications and Circuit Breaker Selection

The wiring and installation must comply with requirements of the national and local electrical codes. The wiring specifications and circuit breakers are recommended as follows:

- Specifications of the AC input and output wire diameter and circuit breaker are as follows:

Device Model	Recommended wire size of AC input/output	Maximum working current	Recommended model of the air switch or circuit breaker
INVERTER	3.3mm ² /12AWG	15A	2P-25A

- Specifications of the PV input wire diameter and circuit breaker are as follows:

Device Model	Recommended wire size of PV input	Single-path maximum operating current	Recommended model of the air switch or circuit breaker
INVERTER	3.3mm ² /12AWG	16A	2P-25A

- Specifications of the battery input wire diameter and circuit breaker are

as follows:

Device Model	Recommended wire size of BAT input	Recommended O-type terminal	Maximum working current	Recommended model of the air switch or circuit breaker
INVERTER	80mm ² /2AWG*2	SC35-6	160A	2P-200A

□ Specification of the shell earth wire is as follows:

Device Model	Recommended size of the earth wire
INVERTER	4-6mm ² /10-12AWG

Notes:

- The wire diameters are for reference only. If the distance between the PV array and the device or between the device and the battery is long, the thicker wire can reduce the voltage drop to improve the system efficiency.
- The above wire diameters and circuit breakers are theoretically recommended. Please select the appropriate wire diameters and circuit breakers based on actual conditions.

2.3 Installation and Wiring

Warnings:

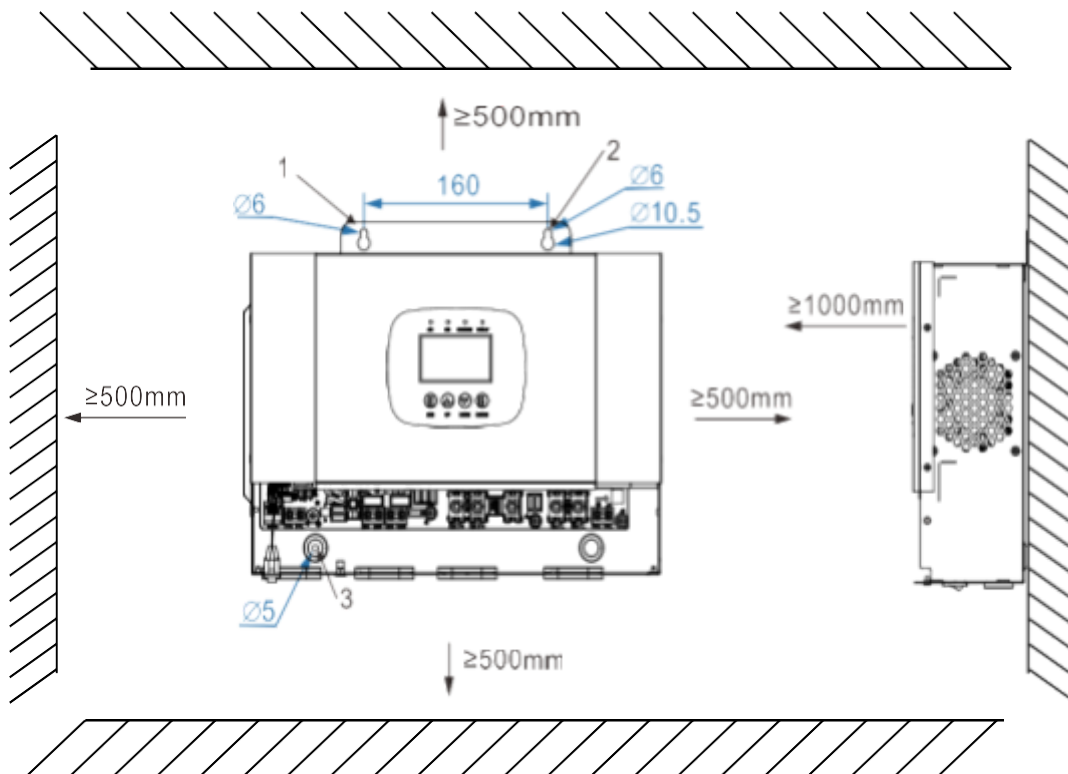
- There is unsafe voltage in the grid input and PV input. Please disconnect the circuit breaker or air switch before wiring.
- During the wiring process, please make sure the circuit breaker and air switch are disconnected in case of short circuit and the “+” and “-” polarities on each port are correctly connected. The circuit breaker must be installed on the battery port.

Installation and wiring steps are as follows:

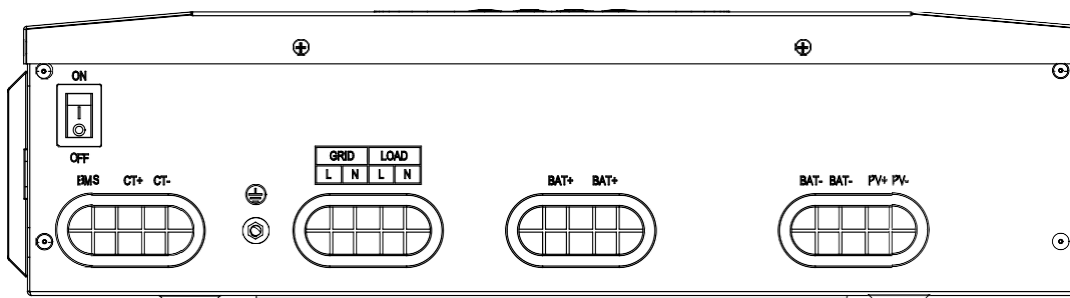
Step 1:

Reserve a gap of 500 mm above and below the inverter and a gap of 500 mm on the left and right on an appropriate wall to ensure ventilation and heat dissipation.

Unpack and take out the inverter, disassemble the terminal cover by removing the screws, and fix the inverter on the wall with five self-tapping screws. As shown in the figure below, the equipment is fixed using self-tapping screws ST4.2*60 through holes 1,2 and 3.



Step 2: Wiring



Bottom view

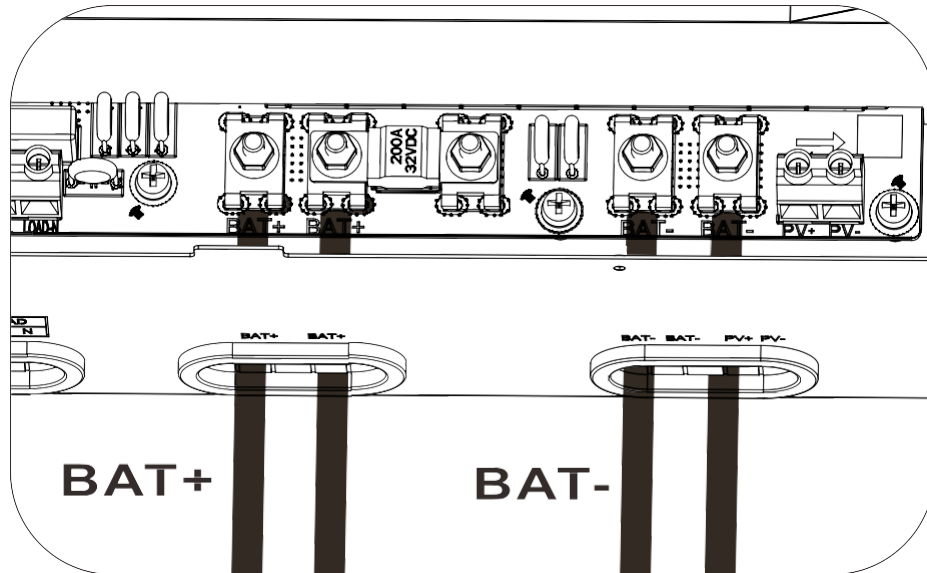
Please follow the steps below to perform the wiring. In order to ensure safe operation and comply with regulations, please install a circuit breaker and disconnect the circuit breaker before wiring.

(1) Connect the battery

Before wiring, disconnect the external circuit breaker and check whether the cables used are thick enough. Please refer to “2.2 Wiring Specifications and Circuit Breaker Selection.” The BAT cables must be connected to the device with an O-type terminal with a recommended internal diameter of 10mm. The O-type terminal must

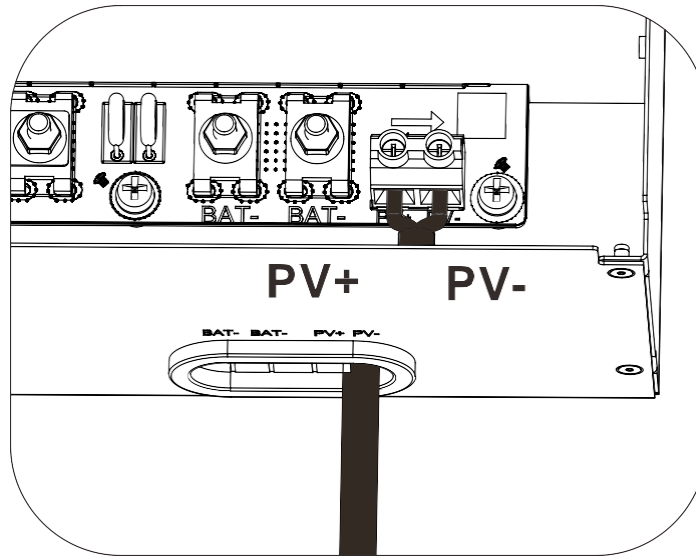
clamp the BAT cables tightly to prevent excessive heat caused by excessive contact impedance;

Insert BAT+/BAT- cables as indicated on the label, and fix them with the M5 nut. The torque is $1.2 \text{ N} \cdot \text{m}$. As shown in the figure below, “BAT+” represents the battery anode, and “BAT-” the battery cathode.



(2) Connect PV cables

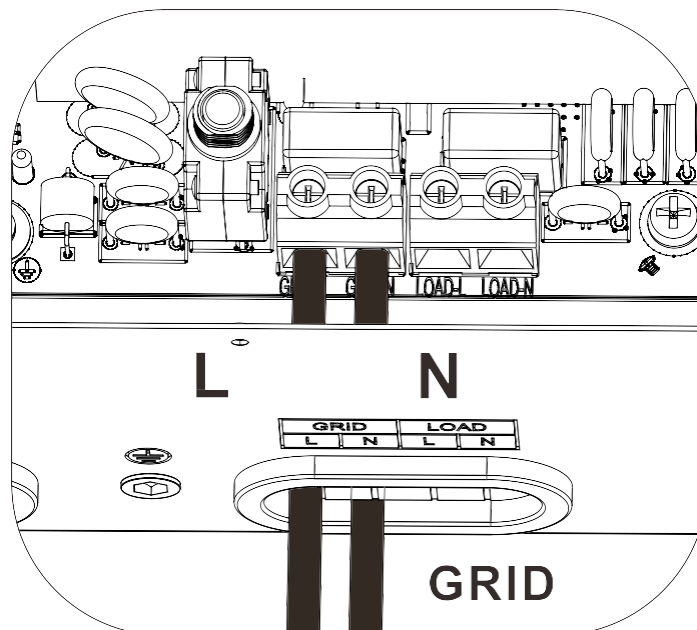
Before wiring, please disconnect the external circuit breaker and check whether the cables used are thick enough. Please refer to “2.2 Wiring Specifications and Circuit Breaker Selection.” Insert PV+/PV- cables as indicated on the label, and fix the terminals on the device with a slotted screwdriver. The torque is $0.65 \text{ N} \cdot \text{m}$. As shown in the figure below, “PV+” represents the positive PV input, and “PV-” the negative PV input.



(3) Connect AC input

Before AC input wiring, please disconnect the external circuit breaker and check whether the cables used are thick enough. Please refer to “2.2 Wiring Specifications and Circuit Breaker Selection.”

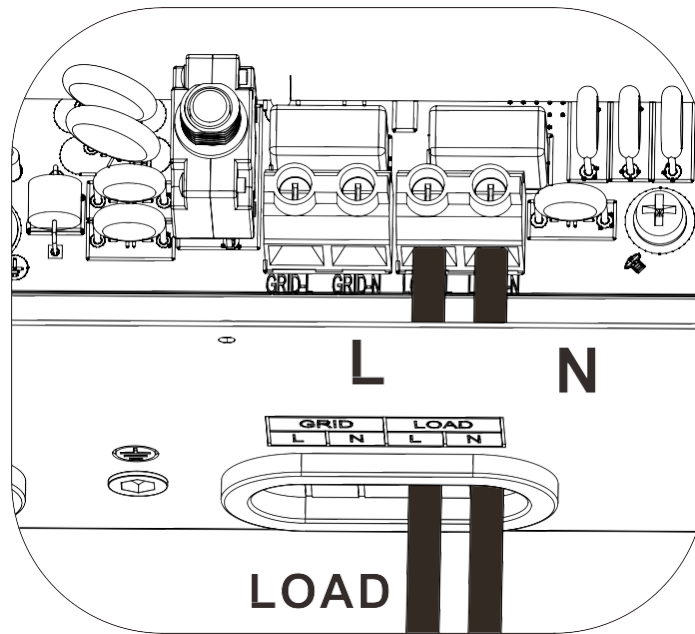
Insert AC output cables as indicated on the label, and fix the terminals on the device with a slotted screwdriver. The torque is $0.65 \text{ N} \cdot \text{m}$. As shown in the figure below, “L” represents the live wire, “N” the neutral wire.



(4) Connect AC output

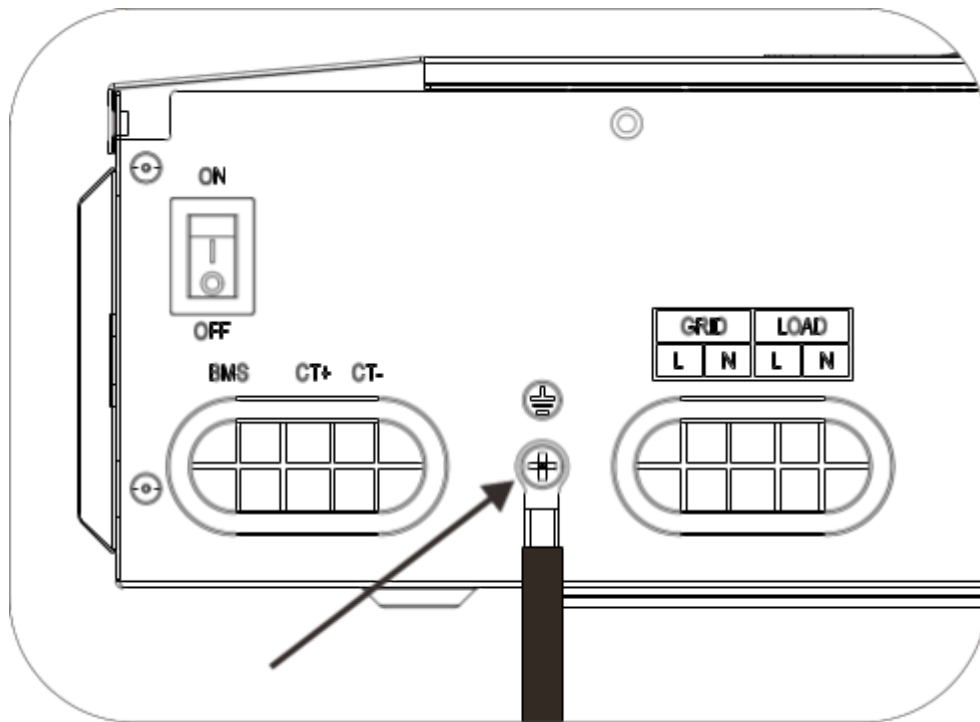
Before AC output wiring, please disconnect the external circuit breaker and check whether the cables used are thick enough. Please refer to “2.2 Wiring Specifications and Circuit Breaker Selection.”

Insert AC output cables as indicated on the label, and fix the terminals on the device with a slotted screwdriver. The torque is $0.65 \text{ N} \cdot \text{m}$. As shown in the figure below, “L” represents the live wire, “N” the neutral wire, and “PE” the protective earth wire. Please note that the two outputs share the same earth wire port.



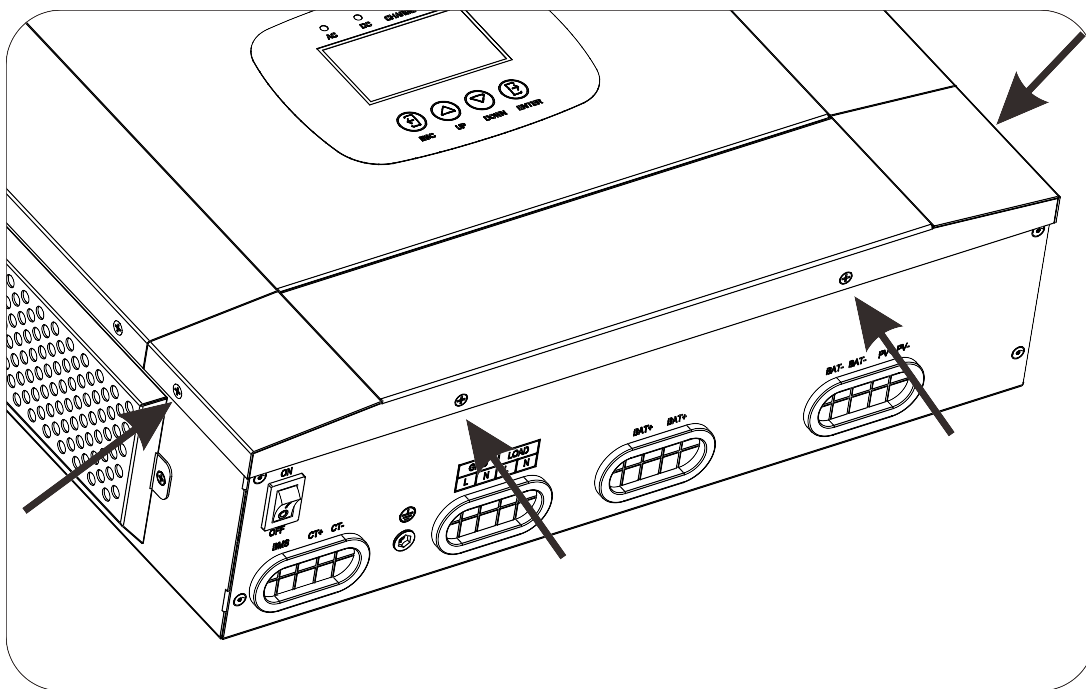
(5) Shell earthing

Please note an additional earthing point on the shell. Clamp the cable with the OT terminal and lock it in the position indicated in the figure below. For cable specifications, please refer to the “2.2 Wiring Specifications and Circuit Breaker Selection.” Please ensure that the equipment is properly grounded.



Step 3: Check whether the wiring is correct and firm, especially whether the battery input anode and cathode are correctly connected, whether positive and negative PV inputs are correctly connected, whether the AC input is incorrectly connected to the AC output, and whether the AC input is incorrectly connected to the input port of the diesel generator.

Step 4: Use a Phillips screwdriver to reinstall the terminal cover on the device. The torque is $0.7 \text{ N} \cdot \text{m}$.



Step 5: Start the inverter

First, close the circuit breaker of the battery, and switch the inverter's rocker switch to the "ON" state. The blinking "AC" indicator indicates the normal operation of the inverter. Then, close the circuit breaker between the PV array and the grid, and turn on the AC load after the AC output is normal. In this case, the inverter will work normally in accordance with the set mode.

Notes: If energy is supplied to different AC loads, it is recommended to turn on the load with a large impulse current first, and then turn on the load with a small impulse current after the load works stably, in order to avoid the protection action caused by a large transient impulse generated by turning on the load at the same time. If the inverter fails to work normally, and the LCD or indicator displays abnormality, please refer to Section 7 for troubleshooting.

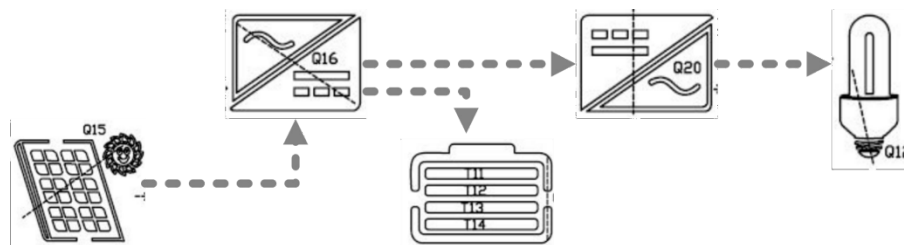
3. Working Modes

3.1 Power Supply Modes

□ PV power priority mode:

This mode prioritizes PV power for power supply to the load. When the PV power is unavailable, grid and battery will supply power to maximize the use of solar power generation and maintain the battery power. This working mode is suitable for areas with a relatively stable power grid. The priority of power supply realized at the load side is PV power -> Grid -> battery.

With PV energy input:



Without PV energy input:



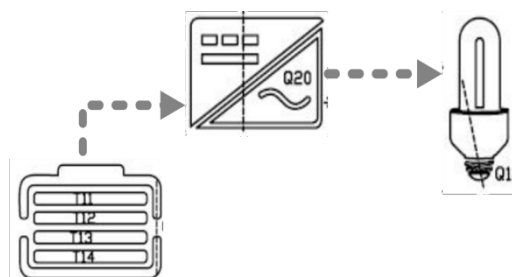
□ Grid priority mode

This mode prioritizes grid for power supply to the load. Battery inverter power supply will be applied only when the grid is unavailable, and grid charging and power supply will be applied when the grid is available. If there is PV power, PV power will charge the battery first, and the surplus energy and grid will be output to the load in a complementary way, maximizing the use of solar energy, reducing the use of grid, and keeping the battery power. This mode is suitable for areas with an unstable power grid. The priority of power supply realized at the load side is: Grid -> PV power -> battery.

With grid input:



Without grid input:



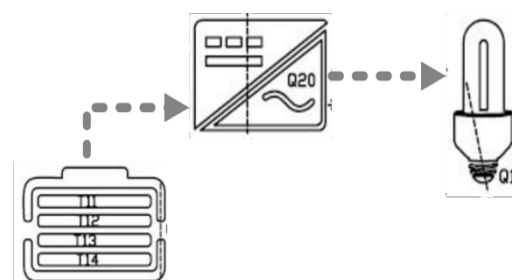
□ Inverter priority mode:

In this mode, the grid will be applied for power supply only when the battery voltage is lower than the setting point (setting item 04), and the battery discharging mode will be applied when the battery charging voltage is higher than the setting point (setting item 05), so as to repeat the battery charging and discharging cycle. If there is PV power, PV power will maximize the use of solar energy according to PV energy and battery charging and discharging states. This mode is used in areas with a stable power grid. The priority of power supply at the load side is: PV power -> battery -> grid.

When the battery voltage is lower than the set point (04 setting item), switch to grid supply



The battery voltage is higher than the grid-to-battery voltage, switch to battery inverter

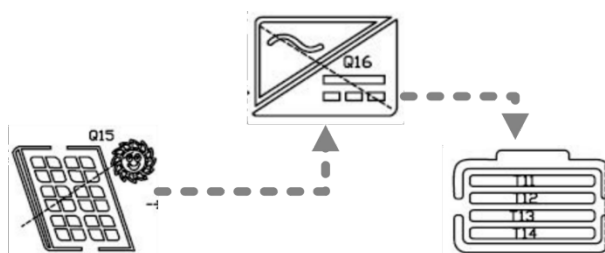


3.2 Charging Modes

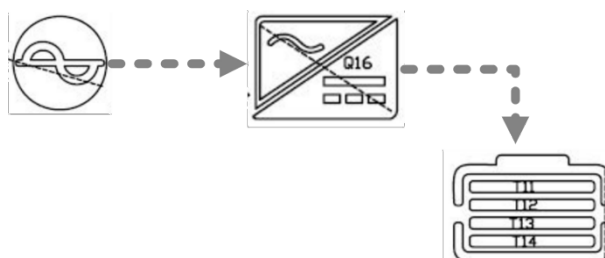
□ PV charging priority:

PV power gives priority to charging the battery, and the grid charging is only started when PV power does not meet the working conditions. This mode can make full use of solar energy to charge in the daytime and switches to grid at nighttime to keep the battery power, which is used in areas with a relatively stable power grid and relatively expensive electricity price.

With PV energy input:

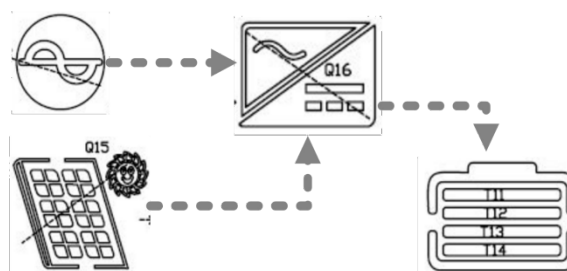


Without PV energy input:



□ Charging:

As for charging of PV energy and grid, PV energy charging is preferred with grid as a supplement when PV energy is insufficient. This mode mainly meets the requirement for maximum charging power with the fastest charging speed. It is suitable for areas with an unstable power grid, providing sufficient backup power supply.



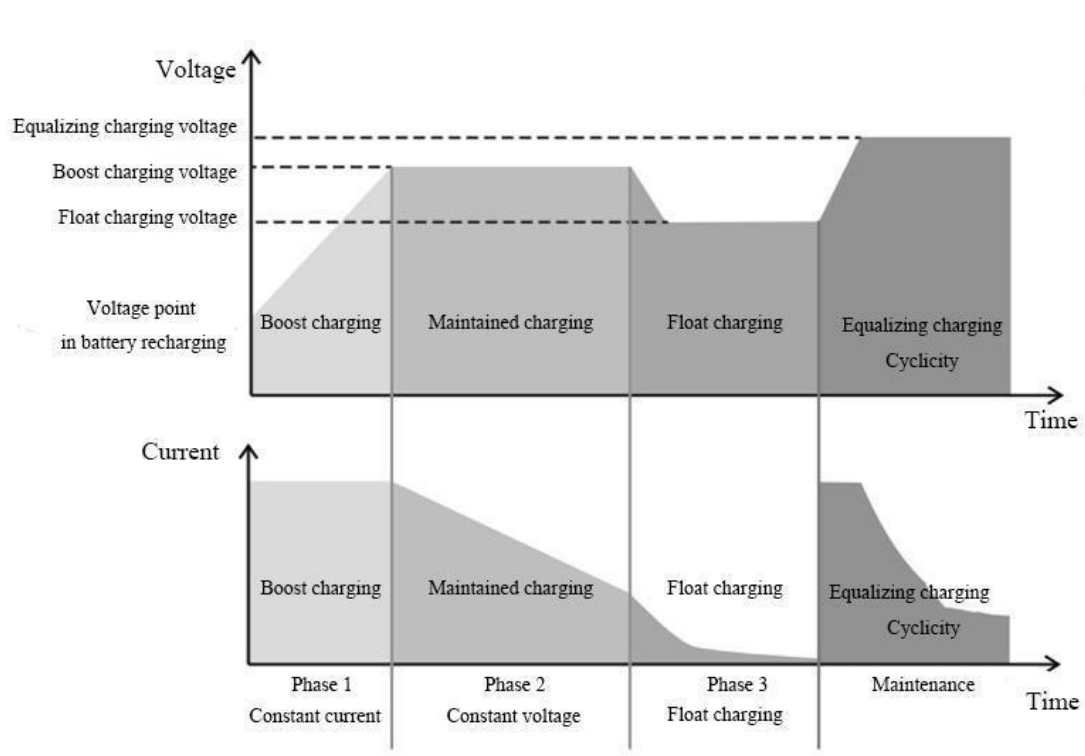
□ PV charging mode only

Only the PV energy is used to charge the battery without grid. This mode is the most energy-saving one because the battery power comes from PV solar energy, which is usually used in areas with good lighting conditions.



3.3 Battery Charging Parameters

□ The charging curve of the lead-acid battery is shown in the figure below:

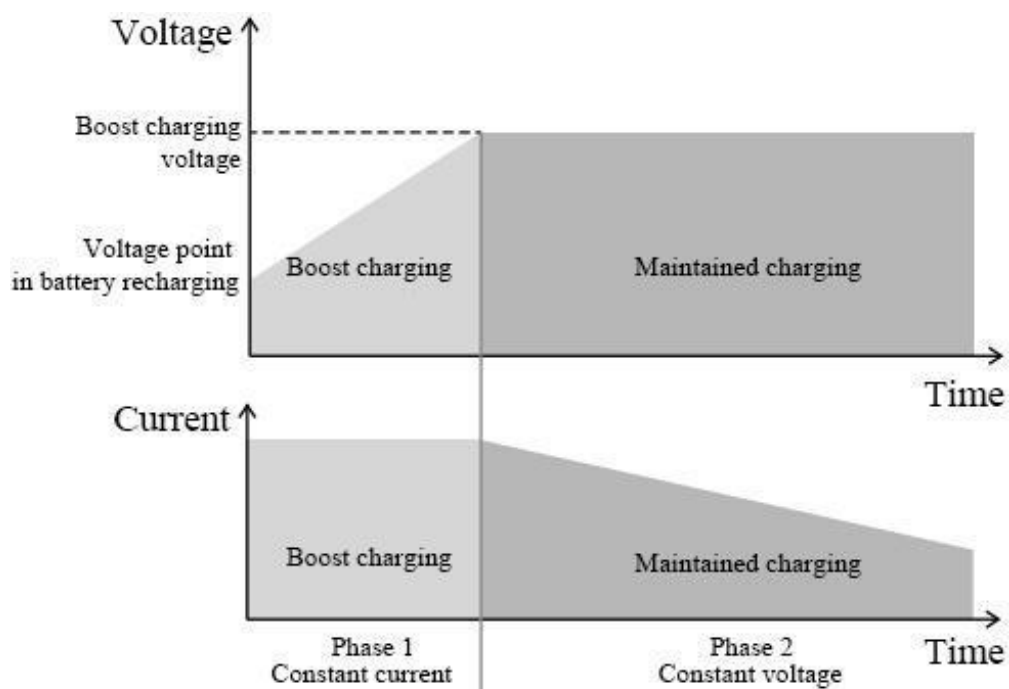


□ The charging parameters of the lead-acid battery are shown in the table below:

	Gel lead-acid (GEL)	Sealed lead-acid (SLD)	Flooded lead-acid (FLD)	Customized (USER)
Over-voltage disconnect threshold	15V	15V	15V	13~15V (Adjustable)
Recovery voltage in recharging after fully-charged	13V	13V	13V	13V (Adjustable)
Boost charging voltage	14.2V	14.2V	14.2V	13-15V (Adjustable)
Float charging voltage	13.8V	13.8V	13.8V	13-15V (Adjustable)

Equalizing charging voltage	14.2V	14.5V	14.8V	13~15V (Adjustable)
Under voltage alarm threshold	11V	11V	11	10.5~12.5V (Adjustable)
Under voltage recovery threshold	Under voltage alarm threshold + 2V			
Low-voltage disconnect threshold	10.5V	10.5V	10.5V	10~11.5V (Adjustable)
Low-voltage recovery	13V	13V	13V	12.5~13.5V (Adjustable)
Discharging limited voltage	10V	10V	10V	9.5~11.0V (Adjustable)
Over-discharge (detection) delay time	5s	5s	5s	1~30s (Adjustable)
Equalization duration	-	120 min	120 min	0~600 min (Adjustable)
Equalizing charging interval	-	30 days	30 days	0~250 days (Adjustable)
Boost duration charging	30 min	30 min	30 min	10~600 min (Adjustable) 180min (Default)

□ The charging curve of the lithium battery is shown in the figure below:



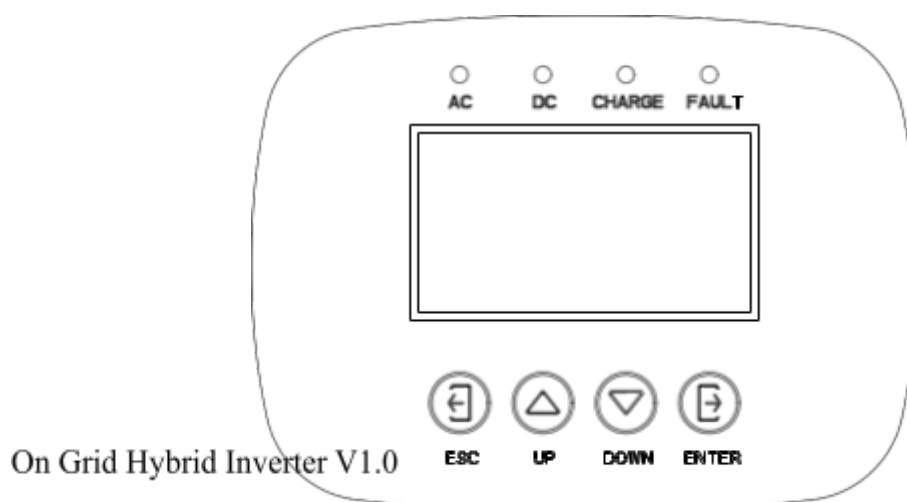
□ The charging parameters of the lithium battery without BMS communication are shown in the table below:

	LiFePO4 (L4)	Ternary lithium (N3)
Over-voltage disconnect threshold	15V	13.9V
Recovery voltage in recharging after fully-charged	13.4V	11.7V
Boost charging voltage	14.2V	12.3V
Float charging voltage	14.2V	12.3V
Under voltage alarm threshold	11.6V	10.0V
Under voltage recovery threshold	Under voltage alarm threshold +2V	
Low-voltage disconnect threshold	10.5V	9.0V
Low-voltage recovery	11.5V	10.6V
Discharging limited voltage	10.2V	8.4V
Over-discharge (detection) delay time	30s	30s
Equalization duration	120 min	120 min

4. Operating Instructions for LCD Screen

4.1 Operation and Display Panel

- The operation and display panel include one display screen, four indicators, and four keys, as shown in the figure below.



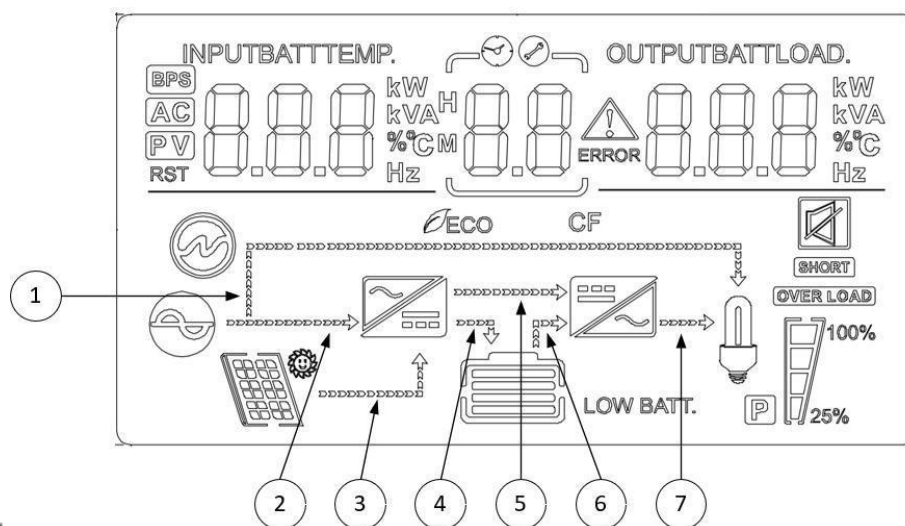
□ Description of the horse race lamp

Indicator	Color	Description
AC	The green light is on	Grid charging or grid bypass output
	The green light flashes	Inverter output
DC	The yellow light is on	Battery discharging
CHARGE	The yellow light flashes	Fast charging
	The yellow light is on	Float charging
FAULT	The red light is on	Fault state
	The red light flashes	Firmware upgrade

□ Description of the keys

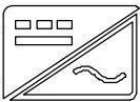
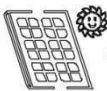
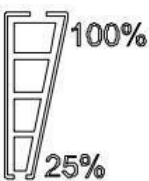
Function key	Description
	When out of the setting function, (on the Display menu or the Settings menu), the key is used for turning pages: click UP to turn the page up and click DOWN to turn the page down. When setting the parameters, the key is used to increase or decrease parameters;
	
	On the Display menu, click to back to the first page. On the Settings menu, click to exit.
	Press and hold it for 2s to enter the Settings menu and click to enter or confirm the options.

□ Introduction to Display Panel

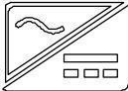
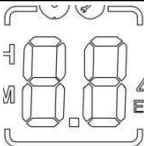
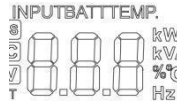


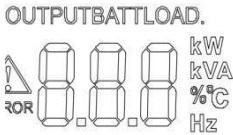
Arrow indication			
①	Power grid to load	②	Grid power supply to charging circuit
③	PV power supply to charging circuit	④	The charging circuit charges the battery
⑤	The PV supplies power to the inverter circuit	⑥	The battery supplies power to the inverter circuit
⑦	The inverter circuit supplies power to the load		

□ Introduction to the icons on the display panel

Icon	Description	Icon	Description
	The AC input port is connected to an AC input		The inverter circuit is working
	This icon represents Wide Voltage AC Input Mode (APL mode)		The device is in the grid bypass working mode
	PV is connected to the solar panel		The AC output overloads
	The device is connected to the battery:  represents a remaining battery capacity of 5%~24%,  represents a remaining battery capacity of 25%~49%,  represents a remaining battery capacity of 50%~74%,  represents a remaining battery capacity of ≥75%	 100% 25%	Load percentage of AC output:  represents a load percentage of 5%~24%,  represents a load percentage of 25%~49%,  represents a load percentage of 50%~74%,  represents a load percentage of ≥75%

	capacity of 75%~100%		
LOW BATT.	The battery voltage is too low (battery SOC is lower than 5%)		Buzzer is not enabled (mute)

	The AC/PV charging circuit is working		The device has an alarm event
	There is an AC voltage output from the AC output	ERROR	The device is faulty
	In parallel use, it indicates that this machine is the host, which is only valid in the parallel mode.		The device is in the Settings mode.
	Parameters displayed in the center of the screen, 1. Out of the Settings mode, it displays the page number of current real-time parameters; 2. In the Settings mode, it displays the page number currently set.	ECO	Energy-saving mode
Parameters displayed on the left of the screen: input parameters			
	AC input		PV input
RST	This icon is not displayed		It displays battery voltage, total battery charging current, grid charging power, AC input voltage, AC input frequency, PV input voltage, temperature of the internal radiator, and software version.
Parameters displayed on the right of the screen: output parameters			

	It indicates output voltage, output current, output active power, output apparent power, battery discharging current, software version, alarm code, and fault code; In the Settings mode, it displays the parameters under the currently set codes of parameter options;
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□ Real-time data check

Under normal conditions, there are 15 pages in the display screen. Display information such as input and output voltages, input and output frequencies, battery, PV voltage and current, load, software version, and fault alarms. If any faults information, the red light will stay on constantly and needs to go to page 15 to check faults code.

Click the UP/DOWN key to flip the display interface up/down. Without any key operation, it will automatically return to the first page after 60 seconds; click ESC to jump to the first page of real-time parameters; press and hold ENTER for more than two seconds to enter the Settings interface. Information on the real-time parameter interface is as follows:

Page	Parameter on the left of the screen	Parameter on the right of the screen
1	INPUT BATT V	OUTPUT V
2	BATT SOC	AC OUTPUT Hz
3	INPUT/OUTPUT BATT A	INPUT/OUTPUT BATT kW
4	PV1 INPUT V	
5	PV1 INPUT A	
6	PV1 INPUT kW	
7	AC INPUT V	AC INPUT Hz
8	AC OUTPUT A	OUTPUT KVA
9	Grid LOAD kW	OUTPUT kW
10	DSP software version	
11	Model and battery voltage level (12V)	Output power level (2kW)
12	Model and PV voltage level (400V)	Model and PV current level (16A)
13	RS485 address	
14	BMS Connection display	
15	Main alarm code	Sub alarm code
16	Main fault code	Sub fault code

4.2 Parameter Settings

In the default interface, press and hold ENTER for more than two seconds to enter the Settings interface, and click ESC to exit to the real-time parameter display interface.

Settings	Parameter	Option	Description
【2】	Power supply priority (WFM)	SOL	It indicates the PV power priority mode.
		UTI (Default)	It indicates the grid priority mode. It switches to the battery inverter power supply only when there is no grid input.
		SBU	It indicates the inverter power priority mode. It switches to the grid power supply only when the battery voltage is lower than the value set in parameter [32]; it switches to battery discharging and inverter power supply only when the battery is fully charged or higher than the value set in parameter [33].
【3】	Charging priority (CHM)	CSO	PV priority charging: The grid will be applied to charge the battery only when the PV power is unavailable.
		SNU (Default)	Charging of PV and grid power: PV power charging is preferred with grid power as a supplement when PV energy is insufficient. When the PV energy is sufficient, grid stops charging. Note: Only when the grid bypass output is loaded, PV and grid charging can be applied simultaneously. When the inverter is working, the PV power will be applied to charge the battery.
		OSO	PV charging only, without grid.
【7】	Off-grid output voltage (GOV)	230V (Default)	The default off-grid output voltage is 230V, with an optional setting of 200/208/220/230/240V.
【8】	Off-grid output frequency (OPF)	50Hz (Default)	Bypass adaptive function: when there is grid, it automatically adapts to the frequency of the first grid-on; When there is no grid, the output frequency can be set on the menu, and the default output of 230V AC inverter is 50 Hz.
		60Hz	
【9】	Input mode (GVR)	APL	A wide grid input voltage range for 230V device: 90~280VAC, applicable to household appliances. A narrow grid input voltage range for 230V device: 170~265VAC, applicable to computers, etc.
		UPS (Default)	
【10】	Anti reverse mains power setting(GPC)	0(Default)	Set the input power from the Grid under grid connected conditions, The larger the setting value, the better the anti reverse effect. Range 0-300w, step 5w.
【11】	Grid Feedinged enablement (GFE)	DIS (Default)	This function is prohibited.
		ENA	When the input power priority is in the mains priority mode, the inverter is enabled to feed power to the grid, and excess photovoltaic energy can be fed in to the grid after inversion.This item requires password (618)verification to allow setting.

【12】	Grid Feedinged Power setting (GFP)	4(Default)	The default Grid Feedinged Power is 4, with a setting range of 0~4 and a step of 1.
【15】	Battery subtype (BTP)	USE(Default)	Lead-acid battery mode. Charge and discharge follow preset parameters; please set parameters matching actual lead-acid battery specifications.
		LIT	The setting enables the inverter to be compatible

			with non-communicating lithium batteries, as the inverter has lithium battery activation function. Under this mode, lithium battery charging and discharging are based on defined parameters. Users need to input charging and discharging parameters corresponding with battery information, otherwise the battery will be damaged.
		CAN	Lithium battery type. The inverter communicates with lithium batteries via CAN bus. Connect inverter BMS port to battery CAN port.
		485	Lithium battery type. In this mode, the inverter communicates with lithium batteries via RS485 communication. Connect the inverter BMS communication port to the battery RS485 port.
		SLD	Sealed lead-acid battery: with a constant-voltage charging voltage of 14.4V and a float charging voltage of 13.8V.
		FLD	Flooded lead-acid battery: with a constant-voltage charging voltage of 14.6V and a float charging voltage of 13.8V.
		GEL	Gel lead-acid battery: with a constant-voltage charging voltage of 14.2V, and a float charging voltage of 13.8V.
		L4	LiFePO4 batteries L4 correspond to series 4 of LiFePO4 batteries. The default constant-voltage charging voltage is 14.2V respectively, which can be adjusted.
		N3	Adjustable ternary lithium batteries. The default constant-voltage charging voltage of series N3 is 12.3V.
【16】	Battery communication protocol (BDS)	PYL(Default)	PYL=PYLONTECH
		GRW	GRW=GROWCOL
		VOT	VOT=VOLTRONIC

【17】	Maximum charging current of the battery (MCC)	20A (Default)	The default maximum charging current of the battery is 20A, with a setting range of 0~150A and a step of 5A.
【18】	Limit current of AC charging (ACM)	60A (Default)	The default limited current is 60A for AC battery charging, with a setting range of 1~120A and a step of 5A.
【19】	Battery charging CV voltage (ICV)	14.2V (Default)	The default CV voltage is 14.2V, with a setting range of 12~15V and a step of 0.1V. It is valid when the battery type is customized battery and lithium battery.
【20】	Float charging voltage (FLV)	13.8V (Default)	The default float charging voltage is 13.8V, with a setting range of 12~14.6V and a step of 0.1V.
【21】	Charging cut-off SOC(CES)	100(Default)	The default cut-off SOC is 100, with a setting range of 10~100 and a step of 5. When the lithium battery reaches the set SOC value during charging, it stops charging and is only effective for BMS communication lithium battery.

【22】	Maximum boost charging duration (ICT)	30min (Default)	The default maximum boost charging duration is 30 min, with a setting range of 5~900 min, and a step of 5 min. It refers to the maximum charging duration when the voltage reaches the voltage set in parameter [19] during constant-voltage charging.
【23】	Battery under voltage alarm threshold (BUA)	11V (Default)	The default under voltage alarm threshold of the battery is 11V, with a setting range of 10~12.5V, and a step of 0.1V. When the load is less than 50% of the rated power, if the battery voltage falls below this threshold, an under-voltage alarm will be triggered. When the load exceeds 50% of the rated power, if the low-voltage alarm point is 2V lower than the set value, and the inverter output will not be shut down.
【24】	Battery recharging recovery threshold (BRC)	13V (Default)	The default battery recharging recovery threshold is 13V, with a setting range of 12.5~14V and a step of 0.1V. After the battery is fully charged, the inverter charging stops, and the battery charging can be recovered when the battery voltage is lower than this voltage value.
【27】	Battery low-voltage shutdown voltage (delayed shutdown) (BDL)	10V (Default)	The default battery low-voltage shutdown voltage is 10V, with a setting range of 10~12V and a step of 0.1V. It is valid when the battery type is customized batteries and lithium batteries.

【28】	LV Voltage (BLV)	10.5V (Default)	The default LV voltage is 10.5V, with a setting range of 10~13V and a step of 0.1V. When the load is less than 50% of the rated power, if the battery voltage falls below this threshold, the inverter output will shut down immediately. When the load is higher than the rated power, if the battery voltage is 1V lower than the set value, the inverter output will be shut down immediately. It is valid when the battery type is customized battery and lithium battery.
【29】	Low-voltage recovery threshold (LVR)	13V (Default)	The default recovery threshold for low-voltage disconnection battery voltage is 13V, with a setting range of 11~14.5V and a step of 0.1V. When the inverter output is disconnected due to the battery's low voltage, the battery inverter AC output can be recovered when the battery voltage is higher than this set value.
【30】	Off-grid discharge cutoff SOC (OSD)	20 (Default)	The default off-grid discharge cutoff SOC is 20, with a setting range of 5~ 90 and a step of 5. End-of-discharge SOC of lithium batteries under disconnected grid-tied relay and loaded battery.Only valid for BMS communication lithium

			batteries.
【31】	Off-grid end-of-discharge recovery SOC (ORD)	30 (Default)	The default off-grid end-of-discharge recovery SOC is 30, with a setting range of 10~ 100 and a step of 10. End-of-discharge SOC of lithium batteries under disconnected grid-tied relay and loaded battery.Only valid for BMS communication lithium batteries.
【32】	Battery-to-grid voltage (BTG)	11.5V (Default)	The default battery-to-grid supply voltage is 11.5V, with a setting range of 11V~14V and a step of 0.1V. When parameter [2] = SBU, the battery voltage is lower than the set value, and the output is switched from the inverter to the grid supply.This setting item is only applicable to lead-acid batteries. For BMS lithium battery settings, please refer to setting item [34].
【33】	Grid-to-battery voltage (GTB)	13.5V (Default)	The default grid-to-battery voltage is 13.5V, with a setting range of 12~14.5V and a step of 0.1V. When parameter [2] = SBU, the battery voltage is higher than the set value, and the output is switched from the grid to the inverter power supply.This setting item is only applicable to lead-acid batteries. For BMS lithium battery settings, please refer to setting

			item [35].
【34】	On-grid discharge cutoff SOC (GSD)	50 (Default)	The default On-grid discharge cutoff SOC is 50, with a setting range of 10~ 90 and a step of 10. Lithium batteries end discharge to recover SOC under loads of the grid and the battery.Only valid for BMS communication lithium batteries.
【35】	On-grid end-of-discharge recovery SOC (GRD)	90 (Default)	The default On-grid end-of-discharge recovery SOC is 90, with a setting range of 20~100 and a step of 10. Lithium batteries end discharge to recover SOC under loads of the grid and the battery.Only valid for BMS communication lithium batteries.
【36】	High-voltage disconnect threshold (HDV)	15V (Default)	The default battery input high-voltage disconnect threshold is 15V, with a setting range of 12~15.2V and a step of 0.1V. The inverter output will be shut down if the voltage is too high.
【37】	Li-ion Activation (Forced Wake-up) (LFW)	0 (Default)	After the lithium-ion battery enters the sleep state, the battery shall be activated and put into operation by the inverter once this parameter is set. The default setting is 0, indicating the function is disabled. When set to 1, this function is enabled.
【61】	Energy-saving	DIS (Default)	Energy-saving mode is prohibited

	mode enabled (ESM)	ENA	After the mode is enabled, if the inverter output load is empty or less than 50W, turn off the output after the inverter output is delayed for a period. When the load is greater than 50W, the inverter starts automatically.
【62】	Overload Auto Restart (OLR)	DIS	When overload auto restart is prohibited, if overload occurs, turn off the output, and the device will never restart.
		ENA (Default)	When overload auto restart is enabled, if overload occurs, turn off the output, and the first restoration takes 30 seconds, the second restoration takes 30 seconds, and the third restoration takes 1 hour.
【63】	Over-temperature restart enabled (OTR) Cannot be set up(Default)	DIS	When over-temperature auto restart is prohibited, if over-temperature occurs, turn off the output machine and the inverter output will not restart.
		ENA (Default)	When over-temperature auto restart is enabled, if over-temperature occurs, turn off the output, and the AC inverter output will be restarted after the temperature drops.
【64】	Buzzer switch (BAL)	DIS	The buzzer alarm is prohibited with a muse mode.
		ENA(Default)	The buzzer alarm is enabled.
【65】	Bluetooth	DIS	This function is prohibited.

	enabled (BTE)	ENA(Default)	Turn on Bluetooth.
【66】	Restore factory settings(FRS)	YES	After setting this option, you need to enter a password (618) for verification. Once verified, the system settings parameters will be restored to their factory default values. After the restoration is complete, the system will restart.
【67】	CT Enablement (CTM)	DIS(Default)	External CT is not enabled. The equipment operates according to the original three energy supply priority levels.
		ENA	External CT enabling, three power supply priorities are invalid. The power supply mode is as follows: without PV, the battery supplies power to the load; with PV, PV supplies power to the load first, and if PV is insufficient, the battery supplies power to the load; when PV is sufficient, PV supplies power to the load first, and the remaining energy is used to charge the battery. Power feed network is not allowed.

5. Other Functions

5.1 RS485 Communication Function

This port integrates RS485 and CAN:

- RS485 communicates with lithium battery BMS (customized);
- CAN communicates with lithium battery BMS

(customized). Network port pins are defined as follows:



1	RS485-B	5	CAN-L
2	RS485-A	6	NC
3	BAT_GND	7	RS485-A
4	CAN-H	8	RS485-B

5.2 Wi-Fi Wireless Communication Function

The internal Wi-Fi of the energy storage inverter can be connected to the local router. After the data is uploaded to the server, the user can view the operating parameters and device status anytime and anywhere via the mobile APP while completing some general settings of the inverter with the APP.

6. APP Instructions

1. Please scan the QR code with your mobile phone to download the APP and obtain the instructions.



Android

IOS



HaiPower manual

User manual

7. Protection

7.1 Error Code

Buzzer working logic:

□ Fault: The fault indicator code is on, and the buzzer stops after a 10-second beep.

Error type	Error code	Error description
Fault	103	Inverter DC offset is too high
	105	Bypass AC output is overloaded
	200	Off-grid output voltage is too low 0:Off-grid first-stage low voltage

		1:Off-grid second-stage low voltage
	201	Off-grid output voltage is too high

	202	Off-grid output has a short circuit
	203	Off-grid output is overloaded 1:First-stage Overpower 2:Second-stage Overpower 3:Third-stage Overpower 4:Fourth-stage Overpower 5:First-stage Overcurrent 6:Second-stage Overcurrent 7:Third-stage Overcurrent 8:Fourth-stage Overcurrent
	204	Abnormal off-grid output DC component offset
	301	Battery open circuit
	305	Battery overvoltage
	306	Battery overcurrent
	307	Battery communication fault
	308	BMS fault
	400	PV overvoltage
	403	PV short circuit
	404	PV reverse connection
	500	Abnormal BUS voltage 0: Bus Over Voltage 1: Bus Under Voltage 2: Off-grid First-stage Bus Under Voltage 3: Off-grid Second-stage Bus Under Voltage
	501	Abnormal BUS voltage sampling 1: Bus Voltage Too Low 2: Bus Voltage Too High
	502	Abnormal communication in the device
	505	Abnormal connection of the temperature sensor
	506	Device over-temperature 0: LLC Over Temperature 1: Boost Over Temperature 2: Inverter Over Temperature
	507	Abnormal relay 0: Relay Open Circuit 1: Relay Short Circuit
	508	Overcurrent Protection 0: Inverter Software Overcurrent 1: PV Software Overcurrent 3: Inverter Tz Overcurrent 4: PV Tz Overcurrent
	509	Anti-counter-current output timeout

	510	Mismatched software version
	511	Fan fault

- Alarm: The alarm indicator flashes, and the buzzer beeps once every 1s and lasts for 30s before it stops.

Alarm	102	CT Connection Abnormal 0: CT Reverse Connection 1: CT CT Disconnected
	103	Grid unavailable
	104	Over range voltage of grid 0: First-stage Over voltage 1: Second-stage Over voltage 2: Third-stage Over voltage 3: First-stage Under voltage 4: Second-stage Under voltage 5: Third-stage Under voltage
	105	Over range frequency of grid 0: First-stage Over frequency 1: Second-stage Over frequency 3: First-stage Under frequency 4: Second-stage Under frequency
	106	No output voltage from the generator
	107	Over range output voltage of the generator
	108	Over range output frequency of the generator
	302	Low battery
	304	Abnormal BMS information
	305	Low battery voltage alarm
	502	Abnormal memory reading and writing

7.2 Troubleshooting (partial)

Fault Code	Fault Description	Troubleshooting
202	Off-grid output short circuit	Check whether the load end wiring is short-circuited. Restart the inverter after clearing the short circuit.
203	Off-grid output overload	Restart the inverter after reducing the electric equipment.
301	Battery open circuit	Check whether the battery circuit breaker is switched on and battery cables are connected.

305	Battery over voltage	Check whether the battery voltage exceeds the protection value and discharge the battery until it is lower the over voltage recovery value.
306	Battery over current	Restart the inverter after reducing the electric equipment.

308	BMS fault	Check BMS fault information.
400	PV over voltage	Use a multimeter to check whether the solar energy input voltage exceeds the maximum PV input voltage of the device.
404	PV reverse connection	Check whether the solar energy input wiring is reversed.
506	Device over-temperature	Check whether the heat dissipation hole of the device is blocked by foreign bodies. The device will return to normal operation after cooling down.
511	Fan fault	Check whether the fan is blocked by foreign bodies.
	No display on the screen	Check whether the device switch is ON and whether the battery and PV circuit breaker are switched on; Press any key on the screen to wake up the screen.

8. System Maintenance

- In order to maintain the best performance of the inverter, it is recommended to check the following items three times a year:

- ① Make sure that the airflow around the inverter is not blocked and remove any dirt or debris from the air intake to ensure the intake air volume.
- ② Check the wires for electrical leakage caused by poor insulation due to weathering or damage by other objects.

9. Technical Parameters

Technical Data	AMP AO 2KW 12V
Solar Input Data	
Max. PV Input Power	2600W
Max. Input Voltage	400V
Start-up Voltage	50V
PV Voltage Range	30~400V
MPPT Voltage Range	165~320V
Max. Input Current per MPPT	16A
Max. Short Circuit Current per MPPT	22A
Number of MPPT	1
AC Input Data	
Nominal Input Voltage	230Vac, L/N/PE
Input Voltage Range	90~280Vac
Max. Input Current	15A
Nominal Input Power	3500W
AC Frequency Range	50/60Hz(Auto sensing)
Battery Data	
Battery Type	Li-Ion/Lead-acid
Nominal Battery Voltage	12V
Battery Voltage Range	10~15V
Max. Charge/Discharge Current	150A/160A
Max. Charge Power	1600W
Li-Ion Battery Activation	Yes
Li-Ion Battery Communication	CAN/RS485

Max. Solar Charge Current	150A
Max. AC Charge Current	120A
Max. Charge Current (PV+AC)	150A
Inverter Output Data	
Nominal Output Power	2000W

Peak Apparent AC Power	4000VA
Nominal AC Voltage	230V
Nominal Grid Frequency	50/60Hz
Voltage Waveform	Pure Sine wave
Transfer Time	4ms
Max. Output Current	8.69A
Overload Protection	60s@102%-110% load ; 30s@110%-130% load ;
THDv (@linear load)	<3%
Efficiency	
Peak Efficiency (η_{conv} [%])	94%(Battery EPS), (PV EPS)
MPPT Efficiency (η_{MPP} [%])	$\geq 99.9\%$
η_t [%]	
$\eta_{MPPTstat}$, EUR [%]	
η_t , EUR [%]	
$\eta_{MPPTstat}$, CEC [%]	
η_t , CEC [%]	
$\eta_{MPPTdyn,t}$ [%]	
Protection	
DC Surge Protection	Yes
AC Surge Protection	Yes
AC Short circuit Protection	Yes
System Parameters	
Dimension (W*H*D)	363*265*100mm
Weight	4.25kg
Relative Humidity	5%~95% (Non-condensing)
Operating Temperature Range	-10°C~60°C
Noise Emission	≤ 50 dB

Altitude	2000m
Cooling Method	Fan Cooling
Ingress Protection	IP21
Characteristic	
Number of AC Output	1
Display	LCD&APP
Communication Interface	CAN/ Wi-Fi

WARRANTY CARD

MODEL NO.		SERIAL NO.	
DATE OF PURCHASE		DEALER NAME	
CUSTOMER NAME CONTACT			
ADDRESS			
.....			

- AMP Fuel, Warrants to the original purchaser provided the product is still possession of and used by the original purchaser from the date of purchase.
- The warranty stands on all parts (except LED, Switches, External Body and Battery)
- The warranty will not apply to defects arising in company's opinion by reasons of accident, abuse, misuse, neglect, improper installation (if not undertaken by the company or its representative), fire, flood or other act of GOD any other natural calamities. Any other unauthorized repairs done or carried out will have to be borne by the purchaser. The problem of fuse & MOV will not be included in the warranty of the product. The services given for the same will be a paid service.
- The company in no way will be held liable for any loss or injury or damage caused to any form of life for any reason whatsoever.
- The warranty will not apply if any original seal are found broken or tampered.
- The warranty will not apply if point to point wiring not found.

LIMITED WARRANTY STATEMENT

- Amp Fuel, represents and warrants that the Inverter/HUPS("PRODUCT") is free from defects in material and workmanship.

- During the warranty period AMP Fuel or its authorized service network will repair or replace the PRODUCT or any relevant part (Except LCD/LED's, Switches and External Body) thereof in the event found to be defective. The repaired PRODUCT or the product / part provided as a replacement for a defective PRODUCT/ part shall be free from defects. The END USER/Consumer/Purchaser of the PRODUCT of his/her assignee ("CONSUMER") shall not be charged (whether for parts, labour or otherwise) for the repair or replacement of the defective product during the warranty period. All parts/boards or equipments shall become the property of AMP Fuel.
- The warranty will be void if installed solar panels are more than the maximum recommended capacity (Voc & Power).
- The warranty in respect of a repaired or replaced PRODUCT/part shall extend for the remaining warranty period of the repaired PRODUCT or replacement thereof to the CONSUMER.
- The CONSUMER shall have no coverage or benefits under this warranty in the event that any of the following conditions are applicable:
 - a) The PRODUCT has been subject to abnormal use or conditions, improper storage, exposure to excessive moisture or dampness, exposure to excessive temperature (beyond specification), unauthorized modification, unauthorized repair (including but not limited to the use of unauthorized spare parts), abuse accident, acts of God, spills of food or liquids, improper installation and breakage or damage.
 - b) The CONSUMER has not notified the defect of the PRODUCT to AM, during the applicable warranty period.
 - c) The PRODUCT serial number code or the accessory date code has been removed, defaced or altered.
 - d) The PRODUCT has not been with or connected to an accessory:
 - Not supplied by Amp Fuel or its affiliates.
 - Not fit for use with the PRODUCT
 - Used otherwise than in the manner intended.
 - e) All plastic surfaces and all other externally exposed parts that are scratched, or damages due to abnormal customer use.
- In order to derive benefit of this warranty in respect of any defects in the PRODUCT, the CONSUMER shall ship the PRODUCT or part thereof at its cost to the authorized service center of Amp Fuel. The Amp Fuel shall bear the cost of shipping the PRODUCT or part thereof back to the CONSUMER after the completion of the service under this limited warranty.
- NO OTHER EXPRESS WARRANTY IS APPLICABLE TO THE PRODUCT. THE DURATION OF ANY IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MARKETABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IS LIMITED TO THE DURATION OF THE

EXPRESS WARRANTY HEREIN GENUS INNOVATION LTD. SHALL NOT BE LIABLE FOR THE LOSS OF USE OF THE PRODUCT INCONVENIENCE LOSS OR ANY OTHER CONSEQUENTIAL DAMAGE ARISING OUT OF THE USE OF OR INABILITY OF USE OF THIS PRODUCT OR FOR THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY INCLUDING THE IMPLIED WARRANTY OF MARKETABILITY OR MERCHANTABILITY OR FITNESS APPLICABLE TO THIS PRODUCT.

- It's hereby expressly clarified that all warranties (express or implied) in respect of PRODUCT are provided by the Amp Fuel.