

Magic-Kepler Series

Hybrid solar inverter with charger



MK1200-12
MKH3600-22

User Manual

User Manual_Magic-Kepler series_V1.0_QE
CE, RoHS, ISO9001:2015
Subject to change without notice!

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Dear Clients,

Thank you very much for choosing the Magic-Kepler series hybrid solar inverter with charger. This product manual provides important recommendations related to the Magic-Kepler integrated inverter-controller, including installation, operation, precautions, and more. Please read this manual carefully before using the product.

1.Safety instructions and waiver of liability

1.1 Safety instructions

Please keep this manual for future reference.

The following symbols are used in this manual to indicate potentially hazardous situations or to mark important safety instructions. Please exercise caution when you encounter these symbols.



WARNING: Indicates a potentially hazardous situation. Exercise extreme caution when performing this operation.



CAUTION: Indicates a critical step for the safe and correct operation of the inverter/charger.



WARNING:

- (1) There are no user-serviceable parts inside the all-in-one unit. Do not disassemble or attempt to repair the inverter.
- (2) Install the inverter/charger all-in-one unit in a well-ventilated area. The heat sink can become very hot during operation.
- (3) Keep children away from batteries and the inverter.

1.2 Liability exclusion

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

1.3 Safety precautions

After receiving the inverter, please check the product condition first, if there is any damage occurred during shipping, please contact the transportation company or us in time.



CAUTION: The installation of the entire system must be carried out by qualified technical personnel!



CAUTION: The casing of the all-in-one unit generates significant heat and becomes very hot during operation. Do not touch and keep away from materials or equipment that could be affected by high temperatures.



CAUTION: When installing the all-in-one unit, the work area must be assessed for potential arc flash hazards.



CAUTION: The all-in-one unit must be connected to a battery for operation. It is recommended that the minimum battery capacity (Ah) be at least five times the unit's rated output power divided by the battery voltage.



CAUTION: It is recommended to install a suitable fuse or circuit breaker externally for the all-in-one unit.



CAUTION: Before installing or adjusting the wiring of the all-in-one unit, always disconnect the fuse or circuit breaker near the PV array, AC mains, and battery terminals.



CAUTION: After installation, check all wiring connections to ensure they are tight and secure to avoid the risk of heat buildup due to loose connections.



WARNING: When the all-in-one unit is operating, the AC output carries high voltage. Do not touch the wiring terminals to prevent electric shock.



WARNING: Do not open the casing for operation while the all-in-one unit is running.



WARNING: The following operations may cause hazardous situations inside the all-in-one unit, such as arcing, fire, or explosion. In the event of an accident, it must be handled by qualified technical personnel; improper handling could lead to more serious incidents.

- Touching uninsulated ends of cables that may be live;
- Touching terminals or internal components that may be live;
- Loose power cable connections;
- Accidentally dropping screws or other parts into the interior of the all-in-one unit;
- Incorrect operation by untrained, non-professional personnel.

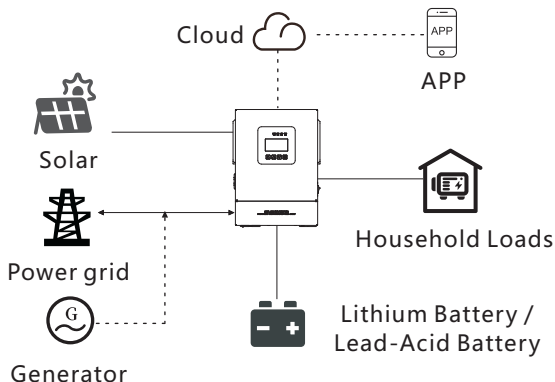


WARNING: Do not touch or open the casing for maintenance to prevent danger!

- Only restart the inverter after clearing faults that affect the safety performance of the all-in-one unit;
- The all-in-one unit contains no internal serviceable parts. For any repair services needed, please contact after-sales product support.

2. Overview

This is a multifunctional solar inverter that integrates an MPPT solar charge controller, a high-frequency pure sine wave inverter, and a UPS function module into one unit. It can also operate without a battery configured.



Hybrid Solar Storage System

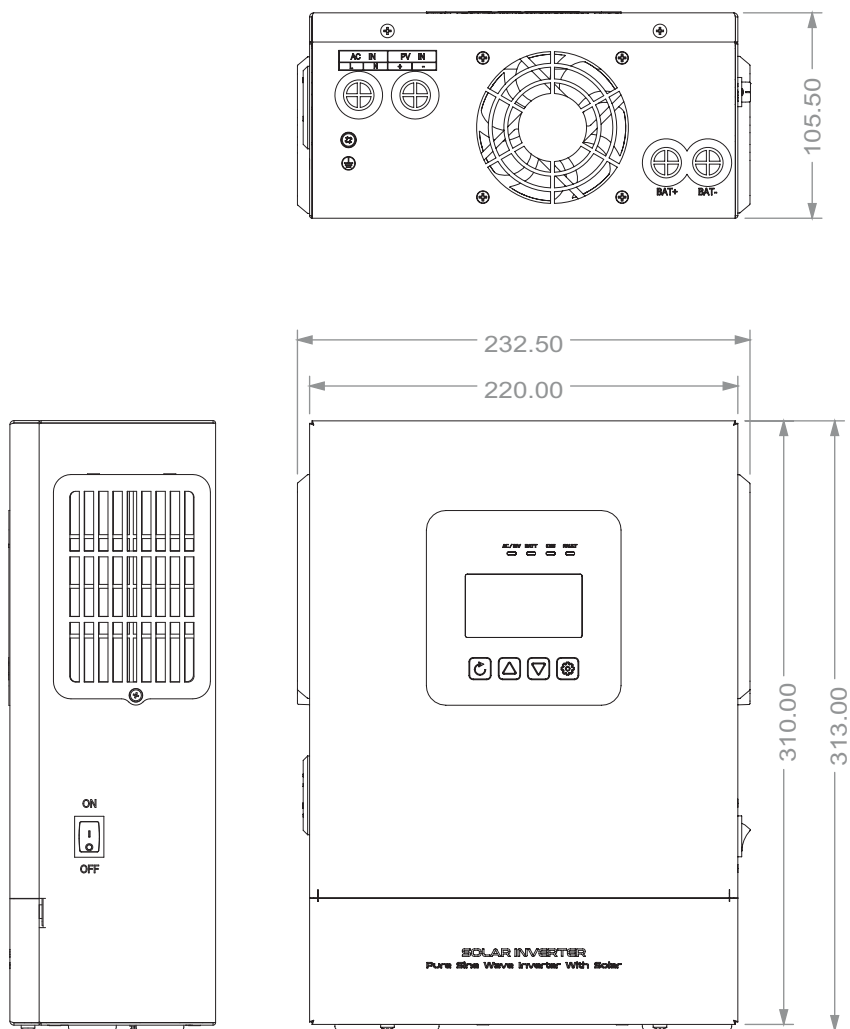
This equipment, along with other power supply equipment such as photovoltaic modules, generators, utility mains, and storage batteries, constitutes an electrical system. Please consult your system integrator regarding other possible system architectures based on your requirements. The WiFi/GPRS module is a plug-and-play monitoring device that can be installed on the inverter. Using this device, users can monitor the status of the photovoltaic system anytime, anywhere via a mobile website.

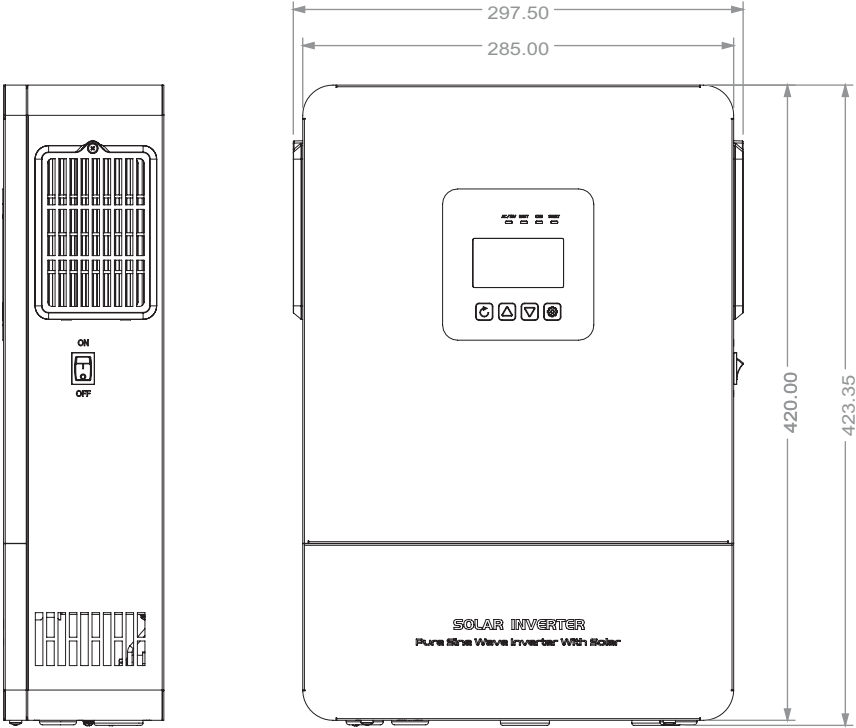
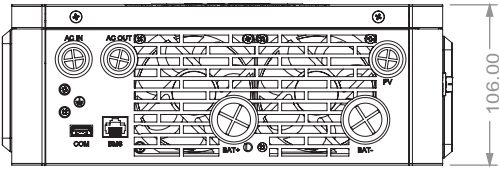
2.1 Characteristic

- PV, utility grid, and battery can simultaneously power the load.
- MK1200-12: MPPT range 17–115 VDC; MKH3600-22: MPPT range 40–450 VDC.
- When equipped with a WiFi module, the MKH3600-22 inverter allows remote monitoring of operating parameters.
- Features CAN/RS485 for BMS communication, facilitating management of the energy storage battery (applicable to MKH3600-22 only).
- High-frequency inverter: compact size and light weight.
- Pure sine wave AC output.
- The MKH3600-22 can operate without a battery, whereas the MK1200-12 requires a battery to function.

3.Dimensions(Unit:mm)

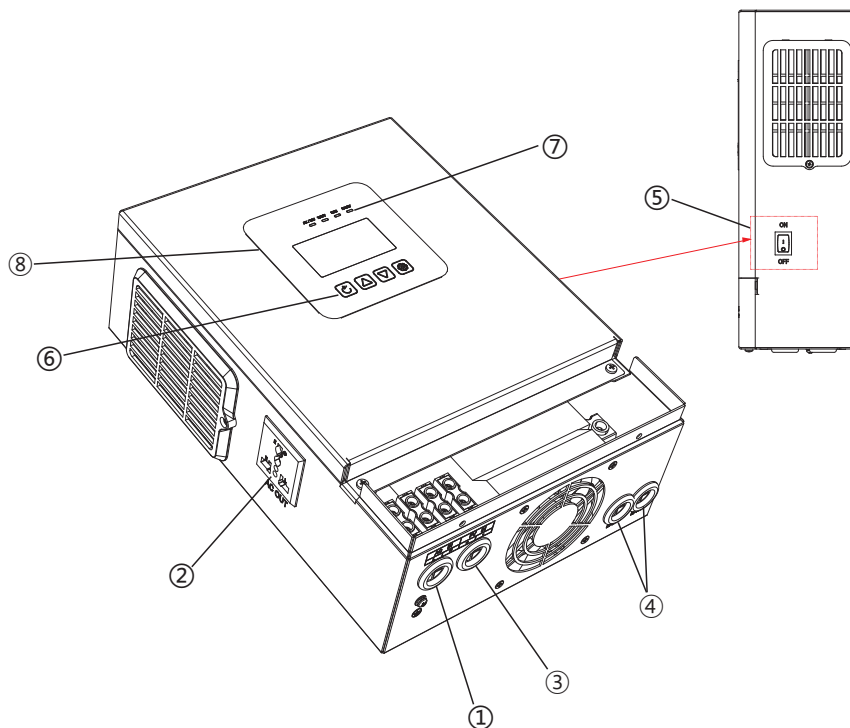
■ MK1200-12



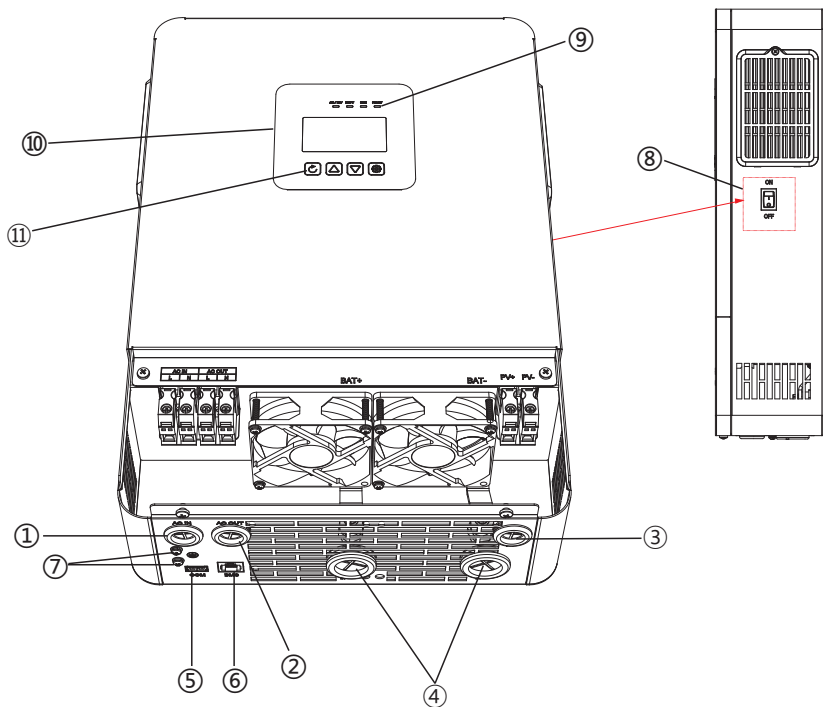


4.Appearance introduction

■ MK1200-12



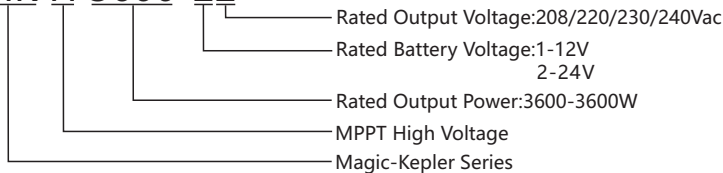
①	AC Input	⑤	Power switch
②	AC Output	⑥	Key
③	PV Port	⑦	Indicator light
④	Battery Terminal (Positive/Negative)	⑧	LCD Display



①	AC Input	⑦	Enclosure grounding
②	AC Output	⑧	Power switch
③	PV Port	⑨	Indicator light
④	Battery Terminal (Positive/Negative)	⑩	LCD Display
⑤	COM communication port (WiFi interface)	⑪	Key
⑥	BMS communication port	/	/

5.Desinations of models

MK H 3600-22



MPPT:Maximum Power Point Tracking;
UPS:Uninterruptible Power Supply;
WiFi/GPRS:Wireless Fidelity/General Packet Radio Service;
BMS:Battery Management System;
AGM:Lead-Acid Battery;
FLD:Fluoride Ion Battery;
LIB:Ternary Lithium Battery;
FEL:Lithium Iron Phosphate Battery;
CUS:Customer Setting Types;
APP:Client Application Software;
GEN:Generator;PV:Photovoltaic;
SOC:State of Charge;
EEPROM:Electrically Erasable Programmable Read-Only Memory.

6.Installation

6.1 Unpacking and Inspection

6.1.1 Unpacking and Inspection

All products undergo rigorous testing before leaving the factory. Please inspect the goods before signing for receipt. If the product is damaged, please contact your local dealer.

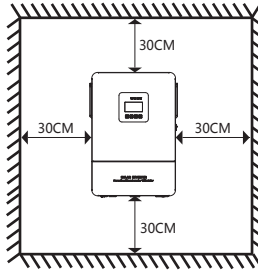
6.1.2 Installation tools

Tools	Multimeter 	Protective Gloves 	Insulated Safety Toe Shoes 
	Safety Glasses 	Anti-Static Wrist Strap 	Hammer Drill 
	Electric Screwdriver 	Phillips Screwdriver 	Rubber Mallet 
	Spirit Level 	Wire Cutter / Wire Stripper 	Terminal Crimping Tool 

6.1.3 Packing List

Num	Item	Quantity	Description	Remarks
1	Inverter	1		
2	Accessory Mounting Kit	1		
3	User Manual	1		

6.2 Installation



Before choosing an installation location, please consider the following points:

- Do not install the inverter on flammable building materials.
- Please install the inverter on a solid surface.
- To ensure optimal operation, the ambient temperature should be between -10°C and 60°C .
- The recommended installation position is vertically mounted on the wall.
- Always maintain clearances from other objects and surfaces as shown in the diagram above to ensure adequate heat dissipation and sufficient space for wiring access.
- Ensure the installation location prevents water ingress.



WARNING!

The inverter is only suitable for installation on concrete or other non-combustible surfaces.

Inverter Installation Steps:

1) Back-mounting (Wall-mounting with hook)

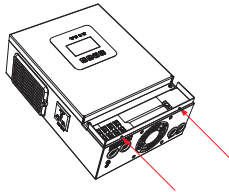
1. Take the relevant accessories from the accessory box. Use M5 screws to secure the spring hook and plastic sleeve to the rear side of the enclosure.
2. Use expansion screws and expansion anchors to fix the mounting bracket to the installation wall. Then hang the inverter onto the bracket. Finally, use a screwdriver to tighten the top screw of the spring hook from the upper side.

2) Suspended mounting (Hanging mount)

1. Use M5 screws to secure the round-hole end of the hanging bracket to the upper part of the rear side of the enclosure, and tighten the screws.
2. After the hanging bracket is installed, secure the inverter at the installation location.

6.3 Inverter connection:

Before connecting all wiring, first remove the two screws on the bottom cover and open the top cover. As shown in the figure below:



NOTE!

Before connecting to the AC input power source, install a separate AC circuit breaker between the inverter and the AC input power source. This will ensure that the inverter can be safely disconnected during maintenance and will provide protection against AC input overcurrent. The recommended AC circuit breaker specification for the MK1200-12 inverter is 16A; for the MKH3600-22 inverter, the AC circuit breaker specification is 25A.



NOTE!

Ensure that the AC input live and neutral wires are connected correctly. If the live (L) and neutral (N) wires are reversed, it may cause a short circuit in the power supply when the inverters are operating in parallel.



NOTE!

Before connecting the photovoltaic (PV) array, install a separate DC circuit breaker between the inverter and the PV array.



NOTE!

For safe operation and regulatory compliance, a separate DC overcurrent protector or disconnect device is required between the battery and the inverter. In some applications, a disconnect device may not be necessary, but overcurrent protection is still required. The recommended size for the protector or disconnect device is 150A for the MK1200-12, and 175A for the MKH3600-22.



WARNING!

Do not ground the positive or negative terminal of the PV array. Failure to comply may result in severe damage to the inverter.



WARNING!

Sunlight generates lethal high voltage within PV strings. Therefore, strictly adhere to the safety precautions listed for PV strings and in related documents.



WARNING!

Ensure that the PV input wiring is connected to the correct terminals on the inverter; reversing the polarity may damage the inverter.



WARNING! Risk of electric shock!

Due to the high voltage of batteries connected in series, installation must be carried out with extreme caution.



WARNING!

All wiring must be performed by qualified personnel.



DANGER!

Ensure the grounding wire is reliably connected to prevent the risk of electric shock.



WARNING!

The external grounding point provides reliable grounding. Do not use unsuitable grounding conductors, as this may result in product damage or personal injury. If you are uncertain about the grounding connection, consult a qualified professional for appropriate guidance.



WARNING!

Use appropriate cables to connect the inverter. To reduce system safety risks, please use the recommended cable sizes below.

Recommended cable sizes for connections:

Cable Type	Cable Type	MK1200-12	MKH3600-22
AC Input Cable	American Wire	16AWG	14AWG
	Metric (mm ²)	2mm ²	4mm ²
AC Output Cable	American Wire	16AWG	14AWG
	Metric (mm ²)	2mm ²	4mm ²
PV Input Cable	American Wire	14AWG	14AWG
	Metric (mm ²)	4mm ²	4mm ²
Battery Input Cable	American Wire	2AWG	2AWG
	Metric (mm ²)	25mm ²	25mm ²



NOTE!

Before making the final DC connection or closing the DC circuit breaker/disconnect switch, ensure the positive terminal (+) is connected to the positive (+) and the negative terminal (-) is connected to the negative (-).



WARNING!

Do not close any AC/DC circuit breakers before completing all electrical connections. All operations during electrical connections, as well as the specifications of the cables and components used, must comply with local laws and regulations.

6.4 PV array configuration

When configuring PV modules, be sure to comply with the following inverter parameters:

1. The MK1200-12 inverter allows a PV input voltage range of 17–115 Vdc; the MKH3600-22 inverter allows a PV input voltage range of 40–500 Vdc.
2. The maximum allowable PV input power for the MK1200-12 inverter shall not exceed 800W; for the MKH3600-22 inverter, the maximum allowable PV input power shall not exceed 5000W.
3. The maximum allowable PV input current for the MK1200-12 inverter shall not exceed 16A; for the MKH3600-22 inverter, the maximum allowable PV input current shall not exceed 18A.

When configuring PV modules, follow the steps below:

① Check the technical specifications of the PV modules to be used, such as open-circuit voltage and short-circuit current.

② When configuring PV modules, series connection is recommended to increase the PV input voltage. The total voltage after series connection should fall within the MPPT voltage range, and some margin should be reserved to prevent overvoltage due to voltage fluctuations. It is recommended that the maximum calculated value be lower than the maximum PV voltage. Example: For the MK1200-12, if the PV module open-circuit voltage is 40V, a maximum of 2 PV modules can be connected in series.

4. Check that the short-circuit current of the PV modules does not exceed the inverter's allowable input current.

The MK1200-12 inverter shall not exceed 16A; the MKH3600-22 inverter shall not exceed 18A.

Example: Configuring PV modules for the MK1200-12 inverter.

Maximum power: 450W;

Maximum voltage: 41.76 Vdc;

Maximum current: 10.78A;

Open-circuit voltage: 50.12 Vdc;

Short-circuit current: 11.67A.

It is recommended to connect a maximum of 2 PV panels in series! Do not connect in parallel!

6.5 Battery connection

6.5.1 Lead-acid battery connection

MK1200-12 Inverter: Users can select a lead-acid battery with an appropriate capacity and a rated voltage of 12V.

MKH3600-22 Series Inverter: Users can select a lead-acid battery with an appropriate capacity and a rated voltage of 24V.

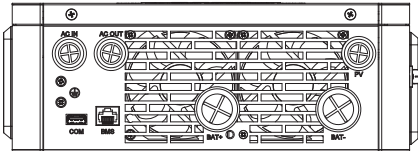
Additionally, you need to select the battery type as "AGM (Lead-Acid Battery) or FLD (Fluoride Ion Battery)."

Note: For lead-acid batteries, the recommended charging current is 0.3C (C ≤ battery capacity). Connect all battery banks according to the equipment requirements. It is recommended to connect a battery with a capacity of at least 200Ah.

6.5.2 Lithium battery connection

If a lithium battery is selected for the inverter, please first check the compatibility of the communication protocol. Follow the steps below for lithium battery connection:

- 1.First, connect the power cables.
- 2.Connect the BMS/RS485 port of the battery bank to the BMS port of the inverter. The communication protocol is either RS485 or CAN. (The MK1200-12 does not support the BMS function.)

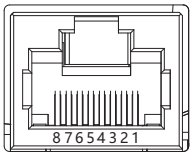


Note: If you choose a lithium battery, when setting up the inverter, you need to select the battery type as "L1b (Ternary Lithium Battery)" or "FEL (Lithium Iron Phosphate Battery)".

Lithium battery communication and settings:

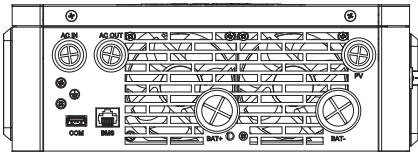
Ensure that the connection between the lithium battery BMS port and the inverter is Pin to Pin. The pin assignment of the inverter BMS port is shown in the figure below:

NO	BMS port
1	RS485B
2	RS485A
3	/
4	CANH
5	CANL
6	/
7	/
8	/



6.6 WiFi communication module connection(optional component)

The WiFi communication module is used to connect to the cloud platform, enabling remote monitoring of inverter parameters. Insert the WiFi communication module into the COM port. Use your mobile phone to scan the QR code on the WiFi module packaging to download the APP. Open the APP, register an account, scan the QR code on the WiFi communication module using the APP, add the device, and proceed with Bluetooth network configuration. (The MK1200-12 does not support the WiFi communication module.)



7.Label description

Label on the inverter

	Warning: Do not disconnect under load!
	Danger: High voltage! Danger: Risk of electric shock!
	Disconnect the inverter from all external power sources for at least 5 minutes before starting maintenance on the inverter.
	Before performing any operation on the inverter, please read the operation manual carefully.
	Grounding. For the safety of operators, the inverter must be strictly grounded.

Label in the document

 Warning!	Highly potential danger, which may result in death or serious injury if not avoided.
 Caution!	Potential hazard of moderate or low level, which may cause moderate or minor injury to personnel if not avoided, and may lead to death or serious injury in severe cases.



Warning!

This document contains important safety and operating instructions. Read and keep this manual for reference.

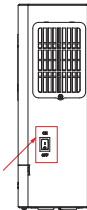
1. Please clearly specify which battery system you want: a lithium battery system or a lead-acid battery system. If you choose the wrong system, the energy storage system will not function properly.
2. Before using the unit, please read all instructions and warning labels on this device, the battery, and all applicable sections of this manual. Failure to install in accordance with the instructions in this manual will void the company's warranty and may cause equipment damage.
3. All operations and connections should be carried out by a qualified electrical or mechanical engineer.
4. All electrical installations must comply with local electrical safety standards.
5. When installing PV modules during the day, installers should cover the PV modules with an opaque material; otherwise, the high terminal voltage of the modules under sunlight may cause danger.
6. Caution: To reduce the risk of injury, charge only deep-cycle lead-acid rechargeable batteries and lithium batteries. Other types of batteries may burst, causing personal injury and damage.
7. Do not disassemble the unit. If service or repair is required, take it to a qualified service center. Incorrect reassembly may occur.
8. To reduce the risk of electric shock, disconnect all wiring before attempting any maintenance or cleaning. Turning off the unit does not reduce this risk.
9. Never charge a frozen battery.
10. For optimal operation of the inverter, select the appropriate cable size according to the required specifications. This is very important for proper operation of the inverter.
11. Be very careful when using metal tools on or around the battery. Dropping a tool may cause sparks, short-circuit the battery or other electrical components, and may lead to an explosion.
12. When you wish to disconnect AC or DC terminals, strictly follow the installation procedures. For details, refer to the installation section of this manual.

13. Grounding instructions — This inverter should be connected to a permanent grounded wiring system. Local requirements and regulations must be followed when installing this inverter.
14. Never short-circuit the AC output or DC input. Do not connect to the mains when the DC input is short-circuited.
15. Before operation, ensure that the inverter is fully assembled.

8.Operation and Display

8.1 Power switch

After the device is correctly installed, press the ON/OFF switch (located on the housing button) to power on and run the device.



8.1 Button operation



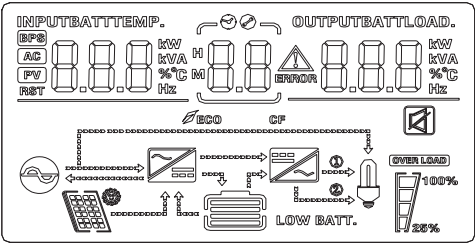
Icon	Description
	Exit or return to setting mode
	Go to the previous selection.
	Go to the next selection.
	Confirm the selection in setting mode or enter setting mode.

8.2 Indicator light introduction



	LED indicator light	Indication information
① AC	Status indicator light (Green)	On Mains power is normal, entering mains operation.
		Flash Mains power is normal, but not entering mains
		Off Mains power abnormal.
② Inverting	Inverter indicator light (Yellow)	On In battery mode, the output is powered by the battery or photovoltaic.
		Off Other status.
③ Charging	Charging indicator light (Yellow)	On The battery is in float charge state.
		Flash The battery is in constant voltage charging state.
		Off Other status.
④ Fault	Fault indicator light (Red)	On An inverter fault has occurred.
		Flash An inverter warning condition has occurred.
		Off The inverter is operating normally.

8.3 Operation interface



Display area	Icon	Description
①AC input		AC input icon
		Displays the AC input power, AC input voltage, AC input frequency, and AC input current.
②PV input information		PV input icon
		Displays PV power, PV voltage, PV current, and other related information.
③Output information		Inverter icon
		Displays output voltage, output current, output frequency, and inverter temperature
④Load information		Load icon
		Displays the load power and the load power percentage.
		Indicates that an overload has occurred.
⑤Battery information		In battery mode, indicates battery level in four ranges: 0–24%, 25–49%, 50–74%, and 75–100%. In line mode, indicates charging status.
		Displays battery voltage, battery percentage, and battery current.
⑥Other information		Indicates alarm codes and fault codes.
		Indicates that a fault is occurring.
		Indicates that the alarm is disabled.
		Indicates power-saving mode.

8.4 LCD setting

Press and hold the Enter button for 2 seconds; the unit will enter setting mode. Press the "Up" or "Down" button to select a setting program. Then press the "Enter" button to confirm the selection, or press the "ESC" button to exit. It is recommended to remove the screen protective film before operation.

8.4.1 MK1200-12 and MKH3600-22 LCD Settings

Item	Description	Setting	
01	Output voltage	OPU 01 230	
		230V(Default)adjustable/set values:208V,220V,230V,240V	
02	Output frequency	OPF 02 50	
		50Hz(Default)adjustable/settable frequency:50Hz,60Hz	
03	Output priority	PV priority	OPP 03 PGB
		MK1200-12: The working principle is the same as the utility-first mode. MKH3600-22: Solar power takes priority in supplying the load. If solar power is sufficient, the battery will be charged using solar energy. If solar power is insufficient to supply all connected loads, the grid will supply the load simultaneously. Any excess power will charge the battery. If both solar power and utility power are insufficient, the battery will supply the load at the same time. If solar power, utility power, and battery power are all insufficient to supply the load, the inverter will enter standby mode and charge the battery.	
		Grid priority (MKH3600-22 Default)	OPP 03 GPG
		MK1200-12: Utility power takes priority in supplying the load. If utility power is not connected, the battery will supply the load. Solar energy will charge the battery under any circumstances. If both utility power and battery power are insufficient to supply the load, the inverter will enter standby mode and charge the battery. MKH3600-22: Utility power takes priority in supplying the load, and solar energy will charge the battery. If solar energy is insufficient to charge the battery, utility power will charge the battery simultaneously. If utility power is insufficient to supply the connected load, solar energy will supply the load simultaneously. If both solar energy and utility power are insufficient, the battery will supply the load simultaneously. If solar energy, utility power, and battery power are all insufficient to supply the load, the inverter will enter standby mode and charge the battery.	
		PBG priority (MK1200-12 Default)	OPP 03 PPG
		MK1200-12: Battery power takes priority in supplying the load. If battery energy is insufficient, utility power will supply the load. Solar energy will charge the battery under any circumstances. If both utility power and battery power are insufficient to supply the load, the inverter will enter standby mode and charge the battery. MKH3600-22: Solar power takes priority in supplying the load. If solar power is sufficient, it will charge the battery. If solar power is insufficient to supply the connected load, the battery will supply the load simultaneously. If both solar power and battery power are insufficient, utility power will supply the load simultaneously. If solar power, utility power, and battery power are all insufficient to supply the load, the inverter will enter standby mode and charge the battery.	

		MKS	0PP 03 nLP
		MK1200-12: All priorities. When PV is present, battery takes priority; when PV is not present, utility power takes priority. MKH3600-22:None.	
04	Input mode	APP: Device (Default)	n0d 04 APP
		Applied to household appliances.	
		UPS	n0d 04 UPS
		Applied to computers and other equipment. Typical transfer time is 10ms.	
		GEN	n0d 04 GEN
		Used to connect a generator to the utility input port. Typical transfer time is 60ms.	
05	Charging priority	PNG: PV and Utility (Default)	CHP 05 PNG
		PV and utility charge simultaneously.	
		OPV: PV Only	CHP 05 OPV
		PV charging only.	
		GRD: Utility Priority	CHP 05 GtD
		Utility charging priority (only applicable to MKH3600-22 model)	
		PV: PV Priority	CHP 05 PVF
		When both PV and utility are present, only PV charges. When only PV is present, PV charges. When only utility is present, utility charges.	
06	Utility charging current	tCC 06 30	
		MK1200-12 Inverter: 30A (default) Available options: 2/10/20/30/40/50A MKH3600-22 Series Inverter: 40A (default) Setting range: [2,100A]	
07	Max. charging current	nCC 07 40	
		Sets the total charging current of the solar and utility chargers. MK1200-12 Inverter: Default value is 40A. Available options: 2/10/20/30/40/50/60/70/80/90/100A MKH3600-22 Series Inverter: Default value is 60A. Available options: 2/10/20/30/40/50/60/70/80/90/100A	
08	Menu Defaults	ndF 08 00	
		When setting: Set to ON: If the current page is not the first page and there is no operation for 1 minute, the system will return to display the first page. Set to OFF: If the current page is not the first page and there is no operation for 1 minute, the system will remain on the current page.	
09	Overload Restart	Default: ON	LtS 09 00
10	Over-temp Restart	Default: ON	EtS i0 00

11	Main Input Power Loss Warning	nIP i1 ON	
		Enable/Disable the utility or PV loss alarm. Default setting: ON. If loss of utility or PV input is detected, the buzzer will sound for 3 seconds. When set to OFF, the buzzer will not sound after utility input loss.	
12	Energy Saving Mode	PUS i2 OFF	
		Default setting: OFF. When set to ON, in battery mode, if the load is below 25W, the system will stop outputting for a period of time and then resume. If the load remains below 25W, the system will cycle between stopping and resuming. If the load exceeds 35W, the system will resume continuous normal output.	
13	Overload to Bypass	OLG i3 OFF	
		Default setting: OFF. When set to ON, in PBG (PV priority) mode, if an overload occurs, the system will immediately switch to bypass mode (utility output, also known as bypass mode).	
14	Mute Setting	nUE i4 OFF	
		Enable/Disable the buzzer sound. Default setting: OFF. When set to ON, the buzzer will not sound under any circumstances (e.g., alarms and faults).	
15	Battery to Utility Voltage Point	bEG i5 11.5V	
		When the battery is set to CUS (Customer-defined type) mode: MK1200-12: Default is 11.7V, adjustable within the range of [10, 12.5V]. MKH3600-22: Adjustable within the range of [22, 26V].	
		When the battery is set to AGM (Lead-acid battery type) or FLD (Fluoride ion battery type) mode: MK1200-12: Default is 11.5V, adjustable within the range of [11, 13V]. MKH3600-22: Default is 23V, adjustable within the range of [22, 26V].	
		When the battery is set to LIB (Ternary Lithium Battery) or FEL (Lithium Iron Phosphate Battery): MK1200-12: Default is 11.9V, adjustable within the range of [10, 12.5V]. MKH3600-22: Default is 23.8V, adjustable within the range of [20, 25V].	
16	Battery Mode Return Voltage Point	bEb i6 13.0V	
		When the battery is set to CUS (Customer-defined type) mode: MK1200-12: Default is 13.6V, voltage range is [11.5, 14.5V]. MKH3600-22: Default is 26V, voltage range is [24, 29V].	
		When the battery is set to AGM (Lead-acid battery type) or FLD (Fluoride ion battery type) mode: MK1200-12: Default is 13V, adjustable within the range of [12, 14.5V]. MKH3600-22: Default is 26V, adjustable within the range of [24, 29V].	
		When the battery is set to LIB (Ternary Lithium Battery) or FEL (Lithium Iron Phosphate Battery): MK1200-12: Default is 13.6V, adjustable within the range of [11.5, 14.5V]. MKH3600-22: Default is 27V, adjustable within the range of [23, 28.5V].	
17	Battery Type	AGM (Default)	bAE i7 AGM
		FLD (Fluoride Ion Battery)	bAE i7 FLD

		LIB (Ternary Lithium Battery)	bAt 17 LIB
		FEL (Lithium Iron Phosphate Battery) (MKH3600-22: N/A)	bAt 17 FEL
		CUS Customer-defined type	bAt 17 CUS
18	Battery Low Voltage Point	bAL 18 10V	
		Low Battery Voltage Alarm Setting. When the battery type is set to LIB: MK1200-12 Inverter: Default is 11V. Adjustable voltage range is [10.3, 12.5V]. MKH3600-22 Inverter: Default is 23.8V. Adjustable voltage range is [20.6, 25.0V]. When the battery type is set to FEL: MK1200-12 Inverter: Default is 11V. Adjustable voltage range is [10.3, 12.5V]. MKH3600-22 Inverter: None. When the battery type is set to CUS: MK1200-12 Inverter: Default is 11V. Adjustable voltage range is [10.5, 13.5V]. MKH3600-22 Inverter: Default is 21.6V. Adjustable voltage range is [21, 27V].	
		When the battery type is set to AGM or FLD, this cannot be set. MK1200-12 Inverter: Initial default setting is 11V. MKH3600-22 Inverter: Initial default setting is 21.6V.	
19	Battery Shutdown Point	bAU 19 10.5V	
		The low battery voltage shutdown point setting function is not adjustable when the battery is defined as AGM or FLD mode. MK1200-12 Inverter: Default is 10.5V. MKH3600-22 Inverter: Default is 21V.	
		When the battery type is set to LIB, the battery shutdown point can be modified. MK1200-12 Inverter: Default is 10.5V, adjustable range is [10, 12V]. MKH3600-22 Inverter: Default is 23V, adjustable range is [20, 24V]. When the battery type is set to CUS, the battery shutdown point can be modified. MK1200-12 Inverter: Default is 10.5V, adjustable range is [10, 12V]. MKH3600-22 Inverter: Default is 21V, adjustable range is [20, 24V]. When the battery type is set to FEL, the battery shutdown point can be modified. MK1200-12 Inverter: Default is 10.5V, adjustable range is [10, 12V]. MKH3600-22 Inverter: None.	
20	Constant Voltage Mode Voltage Point Setting	bCV 20 14.1V	
		When the battery is defined as AGM or FLD mode, the voltage setpoint cannot be configured. MK1200-12 Inverter: Default is 14.1V for AGM mode and 14.5V for FLD mode. MKH3600-22 Inverter: Default is 28.2V for AGM mode and 29V for FLD mode.	

		When the battery type is CUS: MK1200-12 Inverter: The constant voltage charging setpoint can be set within the range of [12, 15V]. Default is 14.1V. MKH3600-22 Inverter: The constant voltage charging setpoint can be set within the range of [24, 29V]. Note that the constant voltage setpoint must be higher than the float charging setpoint. When the battery type is set to LIB: MK1200-12 Inverter: The constant voltage charging setpoint can be set within the range of [12, 15V]. Default is 14.1V. MKH3600-22 Inverter: The constant voltage charging setpoint is adjustable within the range of [25, 29V]. Default is 28.2V. When the battery type is set to FEL: MK1200-12 Inverter: The constant voltage charging setpoint can be set within the range of [12, 15V]. Default is 14.1V. MKH3600-22 Inverter: None Note: The constant voltage setpoint must be higher than the float charging setpoint.
21	Float Voltage Point Setting	bFL 21 135° When the battery is defined as AGM or FLD mode, the voltage setpoint cannot be configured. MK1200-12 Inverter: The default setting for AGM/FLD mode is 13.5V. When the battery type is CUS, the float charging voltage setpoint can be set within the range of [12, 15V]. The default value is 13.8V. MKH3600-22 Inverter: The default setting for AGM/FLD mode is 27V. When the battery type is CUS, the float charging voltage setpoint can be set within the range of [26.6, 27.8V]. When the battery type is LIB: MK1200-12 Inverter: The default setting for the float charging voltage setpoint is 13.8V. The setting range is [12.5, 14.5V]. MKH3600-22 Inverter: The default setting for the float charging voltage setpoint is 27.6V. The setting range is [24, 28V]. When the battery type is FEL: MK1200-12 Inverter: The default setting for the float charging voltage setpoint is 13.8V. The setting range is [12.5, 14.5V]. MKH3600-22 Inverter: None. Note: The constant voltage setpoint should always be set higher than the float charging setpoint.
22	Low Utility Voltage Point Setting	LLV 22 154° If the input mode is APL/GEN, the utility low voltage point can be set within the range of 90V to 154V. The default setting is 154V. If the input mode is UPS, the utility low voltage point can be set within the range of 170V to 200V. The default setting is 185V.
23	High Utility Voltage Point Setting	LHV 23 264° If the input mode is APL/GEN, the utility high voltage point can be set within the range of 264V to 280V. The default setting is 264V. If the input mode is UPS, the utility high voltage point is set to 264V.

24	Automatic Screen Off Setting (MK1200-12)	Atb 24 OFF
		When this function is turned on, the backlight will turn off after 10 minutes of no button operation.
	Low Battery Discharge Time Setting (MKH3600-22)	Lud 24 8 In battery mode, prolonged unlimited discharging during low-load operation will drain the battery and affect its lifespan. When the inverter reaches the set low-power discharge time, the low battery voltage shutdown point will be raised to 22V. The default low-power discharge time is 8 (8 hours), with an adjustable range of [1, 8]. In inverter mode, the low-power discharge time setting defaults to 8 (8 hours), with a setting range of [1, 8]. In battery mode, if the continuous discharge time exceeds 8 hours and the battery shutdown point has not yet been reached, the battery voltage shutdown point will be modified to 22V. The battery will continue to discharge until it reaches 22V, at which point the system will sound an alarm for 1 minute and then shut down again. When the battery voltage exceeds 26.4V for more than 30 seconds, the battery discharge time will be reset.
25	Soft Start Setting for Inverter	StE 25 OFF Default setting is OFF. If set to ON, the inverter output will gradually rise from 0 to the target voltage. If set to OFF, the inverter output will rise directly from 0 to the target voltage. Setting condition: Can be set in single-unit operation mode.
26	Restore Factory Settings	Std 26 OFF Restore all settings to factory default values. Before setting, this screen displays OFF. When set to ON, the system will restore to the default settings. After the restoration is complete, this screen will display OFF again. This setting can be applied immediately in utility and standby modes, but cannot be set in battery mode.

8.4.2 MK1200-12 LCD Settings

29	No Battery Connected Warning	SbA 29 OFF Enable/Disable the battery not connected alarm. Default setting: OFF. When set to OFF, if the battery is not connected, no alarms for battery disconnection, low battery voltage, or insufficient battery voltage will occur.
31	Equalization Voltage Setpoint Setting	EqV 31 14.6 The default setting is 14.6V, with a configurable range of [12, 15V].
32	Equalization Time Setting	EqE 32 OFF During the equalization stage, the inverter will charge the battery as much as possible until the battery voltage rises to the battery equalization voltage. Constant voltage regulation is then applied to maintain the battery voltage. The battery will remain in the equalization stage until the set battery equalization time is reached. The default setting is OFF (disabled), with a time setting range of [OFF, 5~900], and each adjustment increment is 5 minutes.

33	Equalization Delay Setting	E90 33 120
		During the equalization stage, if the battery equalization time expires and the battery voltage has not risen to the battery equalization voltage point, the inverter will extend the battery equalization time until the battery voltage reaches the battery equalization voltage. When the battery equalization delay time is completed and the battery voltage is still below the battery equalization voltage, the inverter will stop equalization and return to the float stage. The default setting is 120 minutes, with a configurable range of [5, 900]. Each adjustment increment is 5 minutes.
34	Equalization Interval Setting	E91 34 30
		When the equalization mode is enabled and battery connection is detected during the float charging stage, the inverter will enter the equalization stage once the set equalization interval time (battery equalization cycle) is reached. The default is 30 days, with a settable range of [1, 90]. Each adjustment increment is 1 day.
35	Start Equalization Immediately Setting	E90 35 OFF
		The default setting is OFF (disabled), so this function is not activated. When set to ON, during the float charging stage, the equalization mode is enabled. Upon detecting a battery connection, equalization charging starts immediately, and the inverter enters the equalization stage.
44	BMS Communication Feature	b05 44 OFF
		Default is OFF (disabled), so this function is not activated. When set to a specific BMS protocol, the inverter communicates with the lithium battery BMS through the centralized control board to obtain battery information. When this function is enabled, if communication is abnormal, alarm 56 will be triggered, and the inverter will not determine its operation logic based on BMS information. Supported protocols: CVT: CVTE protocol (485) PYL: PYLON protocol (485) GRO: GROWATT protocol (485) VOL: VOLTRONIC protocol (485) PAR: PACE RTU protocol (485) IRF: Tower protocol (485)
45	BMS ID Configuration	b01 45 ATO
		Set the BMS ID number to communicate with. The setting value is Auto (ATO), with a setting range of [0, 15]. When set to Auto (ATO), the system will automatically poll BMS IDs from low to high. When the system polls and receives the first correct response from an ID, it will lock that ID and subsequently only query that BMS ID. If the BMS is lost, the BMS ID will be unlocked and the system will re-poll for the BMS ID.

46	Low SOC Shutdown Function	650 46 20*
		Set the inverter to shut down when the battery SOC (battery charge level) is low. The default is 20%, with a configurable range of [5, 50]. In battery mode, when the lithium battery SOC reaches the set value, the inverter shuts down and generates alarm 68. When the SOC returns to the set value +5%, alarm 68 is cleared. In standby mode, the system switches to battery mode only when the SOC reaches the set value +10%. If this threshold is not met, alarm 69 is generated. When this function is enabled, when the lithium battery SOC reaches the set value +5%, alarm 69 is triggered, and it is cleared when the SOC returns to the set value +10%. It can be set to OFF (disabled); the inverter will no longer perform shutdown, startup, alarm, or other operations based on SOC information. When this function is enabled, if communication is abnormal, the inverter will no longer operate based on SOC information and will clear related alarms.
47	High SOC Switch to Battery Function	566 47 90*
		The default is 90%, with a configurable range of [10, 100]. In PBG mode, when the lithium battery SOC reaches the set value while in utility mode, the system switches to battery mode. When enabled, the inverter will switch to battery mode only when the SOC is above the set value and the battery voltage is above the transfer back to battery mode voltage point. It can be set to OFF (disabled); the inverter will no longer switch from utility mode to battery mode based on SOC conditions. When this function is enabled, if communication is abnormal, the inverter will no longer operate based on SOC information and will clear related alarms.
48	Low SOC Switch to Utility Function	566 48 50*
		Set the SOC value at which the inverter switches to utility mode. The default is 50%, with a configurable range of [10, 90]. In PBG mode, when the lithium battery SOC reaches the set value while in battery mode, the inverter switches to utility mode. When enabled, the inverter switches to utility mode when the SOC is below the set value or the battery voltage is below the voltage point. It can be set to OFF (disabled); the inverter will no longer switch from battery mode to utility mode based on SOC conditions. When this function is enabled, if communication is abnormal, the inverter will no longer operate based on SOC information and will clear related alarms. When this setting is higher than the STB point, STB and STG will no longer take effect after the next activation.
61	Max Discharge Current Function	ndC 61 OFF
		Default setting is OFF. Available options: Off, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110. When the battery current exceeds the set value in battery mode, overload alarm 60 is triggered. After 5 seconds, overload fault 14 is reported. If the overload transfer to bypass function is enabled in PBG mode, battery overcurrent will also trigger the overload transfer to bypass logic. It can be set to OFF; the inverter will no longer trigger overload faults or alarms based on battery current.

8.4.3 MKH3600-22 LCD设置

28	No Battery Connected Warning	5bA 28 OFF
		Enable/Disable the battery not connected alarm. Default setting: OFF. When set to OFF, if the battery is not connected, no alarms for battery disconnection, low battery voltage, or insufficient battery voltage will occur.
29	Equalization Mode	E9n 29 OFF
		Enable/Disable battery equalization. Default is OFF. When set to ON, when the set equalization interval (battery equalization time) is reached during the float charging stage, the controller will enter the equalization stage; otherwise, equalization will start immediately.
30	Equalization Voltage Point Setting	E9v 30 29.2V
		The default setting is 29.2V, with a configurable range of [25, 31.5V].
31	Equalization Charging Time Setting	E9t 31 60
		During the equalization stage, the inverter will charge the battery as much as possible until the battery voltage rises to the battery equalization voltage. Constant voltage regulation is then applied to maintain the battery voltage. The battery will remain in the equalization stage until the set battery equalization time is reached. The default is 60 minutes, with a configurable range of [5, 900]. Each adjustment increment is 5 minutes.
32	Equalization Delay Time Setting	E9D 32 120
		During the equalization stage, if the battery equalization time expires and the battery voltage has not yet risen to the battery equalization voltage point, the inverter will extend the battery equalization time until the battery voltage reaches the battery equalization voltage. When the battery equalization delay time is completed and the battery voltage is still below the battery equalization voltage, the inverter will stop equalization and return to the float stage. The default setting is 120 minutes, with a configurable range of [5, 900]. Each adjustment increment is 5 minutes.
33	Equalization Interval Time Setting	E9I 33 30d
		When equalization mode is enabled and battery connection is detected during the float charging stage, the inverter will enter the equalization stage once the set equalization interval time (battery equalization cycle) is reached. The default is 30 days, with a settable range of [1, 90]. Each adjustment increment is 1 day.
34	Immediate Equalization Start Setting	E9n 34 OFF
		The default setting is OFF (disabled), so this function is not activated. When set to ON, during the float charging stage, the equalization mode is enabled. Upon detecting a battery connection, equalization charging starts immediately, and the inverter enters the equalization stage.

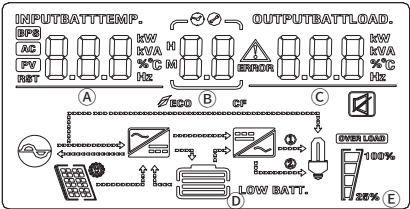
35	Grid-Tie Inverter Function	6H 35 OFF
		Set whether the inverter supplies power to the utility in PV mode or PBG mode. The default setting is OFF (disabled), so this function is not activated. When set to ON, the inverter tracks the maximum power point, and excess energy is fed back to the utility. When this function is enabled, if communication is abnormal, alarm 56 will be triggered, and the inverter will not determine its operation logic based on BMS information.
38	BMS Communication Function	6n5 38 OFF
		Enable/Disable communication between the lithium battery and the inverter. Default is OFF. If a communication abnormality occurs, alarm 56 will be generated, and the inverter will no longer operate based on BMS information. Supported Protocols: PYL: PYLON protocol (485 and CAN) GRO: GROWATT protocol (485 and CAN) VOL: VOLTRONIC protocol (485) IRF: Tower protocol (485)
39	Low SOC Shutdown Function	65U 39 OFF
		Set the inverter to shut down when the battery SOC (battery charge level) is low. The default is 20%, with a configurable range of [5, 50]. In battery mode, when the lithium battery SOC reaches the set value, the inverter shuts down and generates alarm 68. When the SOC returns to the set value +5%, alarm 68 is cleared. In standby mode, the system switches to battery mode only when the SOC reaches the set value +10%. If this threshold is not met, alarm 69 is generated. When this function is enabled, when the lithium battery SOC reaches the set value +5%, alarm 69 is triggered, and it is cleared when the SOC returns to the set value +10%. It can be set to OFF (disabled); the inverter will no longer perform shutdown, startup, alarm, or other operations based on SOC information. When this function is enabled, if communication is abnormal, the inverter will no longer operate based on SOC information and will clear related alarms.
40	High SOC Transfer to Battery Function	5t6 40 OFF
		Set the SOC value at which the inverter switches to battery mode. The default is 95%, with a configurable range of [10, 100]. In PBG mode, when the lithium battery SOC reaches the set value while in utility mode, the system switches to battery mode. When enabled, the inverter will switch to battery mode only when the SOC is above the set value and the battery voltage is above the transfer back to battery mode voltage point. It can be set to OFF (disabled); the inverter will no longer switch from utility mode to battery mode based on SOC conditions. When this function is enabled, if communication is abnormal, the inverter will no longer operate based on SOC information and will clear related alarms.

41	Low SOC Transfer to Utility Function	56 41 OFF
		Set the SOC value at which the inverter switches to utility mode. The default is 50%, with a configurable range of [10, 90]. In PBG mode, when the lithium battery SOC reaches the set value while in battery mode, the inverter switches to utility mode. When enabled, the inverter switches to utility mode when the SOC is below the set value or the battery voltage is below the voltage point. It can be set to OFF (disabled); the inverter will no longer switch from battery mode to utility mode based on SOC conditions. When this function is enabled, if communication is abnormal, the inverter will no longer operate based on SOC information and will clear related alarms. When this setting is higher than the STB point, STB and STG will no longer take effect after the next activation.

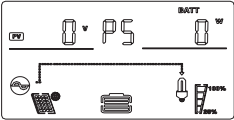
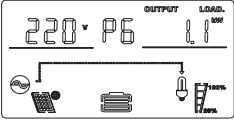
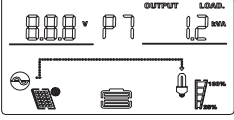
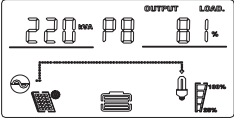
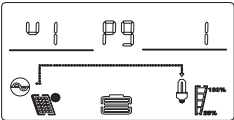
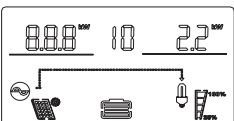
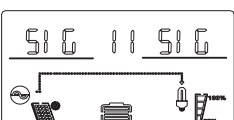
8.5 Display panel information

8.5.1 MK1200-12 Display Information

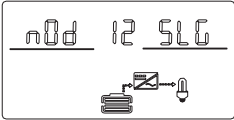
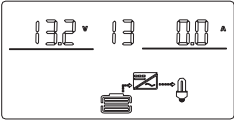
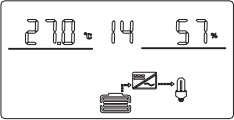
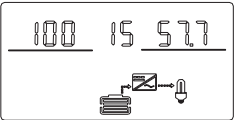
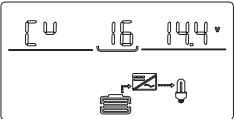
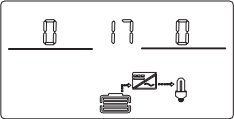
Press the "UP" or "DOWN" button to cycle through the LCD display information. The selectable information sequence is: voltage, frequency, current, power, firmware version.



Information	LCD display
A AC input voltage B Page number C Output voltage D Battery capacity E Load percentage	
A AC input frequency B Page number C Output frequency D Battery capacity E Load percentage	
A Battery voltage B Page number C Charging current D Battery capacity E Load percentage	
A PV voltage B Page number C PV charging current D Battery capacity E Load percentage	

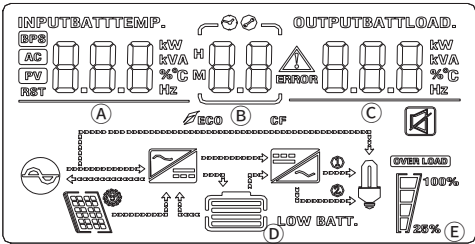
Ⓐ PV voltage Ⓑ Page number Ⓒ PV power Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Output voltage Ⓑ Page number Ⓒ Active power output Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Output voltage Ⓑ Page number Ⓒ Apparent power output Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Output voltage Ⓑ Page number Ⓒ Load percentage Ⓓ Battery capacity Ⓔ Load percentage	
Display the software version	
Ⓐ Total power generation Ⓑ Page number Ⓒ Daily power generation Ⓓ Battery capacity Ⓔ Load percentage	
Parallel operation status	

※After BMS is enabled, the following pages are available:

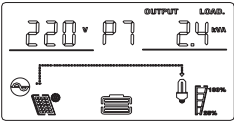
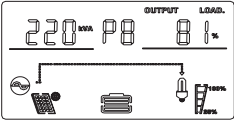
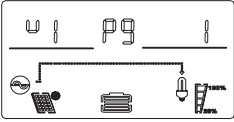
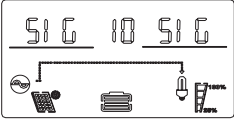
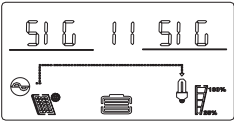
Lithium Battery Network Status: When SIG is steadily lit in the upper right corner of the display, it indicates that the battery bank is operating in single-group mode. When PAR is steadily lit, it indicates that multiple battery banks are operating in series-parallel connection. When PAR is flashing, it indicates that the battery banks are establishing a multi-group series-parallel connection.	
Lithium Battery Voltage and Current Information: The upper left of the display shows BMS battery voltage information. The upper right of the display shows BMS battery current information. When BMS communication fails, both the upper left and upper right displays will flash ERR.	
Lithium Battery Temperature and SOC: The upper left of the display shows BMS temperature information. The upper right of the display shows BMS SOC information. When BMS communication fails, both the upper left and upper right displays will flash ERR.	
Lithium Battery Capacity: The upper left of the display shows the rated capacity. The upper right of the display shows the current capacity. When BMS communication fails, both the upper left and upper right displays will flash ERR.	
Lithium Battery Constant Voltage Point: The upper left of the display shows the fixed letters "CV". The upper right of the display shows the BMS constant voltage charging point. When BMS communication fails, the upper right display will flash ERR.	
Lithium Battery Fault and Alarm Information: The upper left of the display shows BMS alarm information. The upper right of the display shows BMS fault information. When BMS communication fails, both the upper left and upper right displays will flash ERR.	

8.5.2 MKH3600-22 Display Information

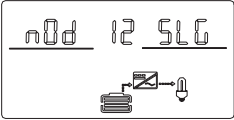
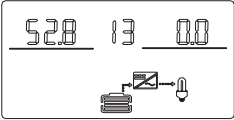
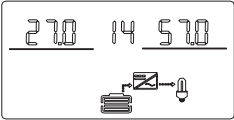
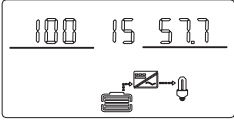
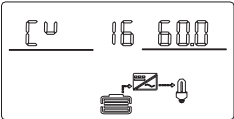
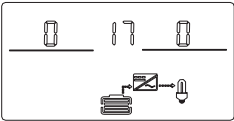
Press the "UP" or "DOWN" button to cycle through the LCD display information. The selectable information sequence is: voltage, frequency, current, power, firmware version.



Information	LCD display
Ⓐ AC input voltage Ⓑ Alarm or fault code (default display) Ⓒ Output voltage Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ AC input frequency Ⓑ Alarm or fault code Ⓒ Output frequency Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Battery voltage Ⓑ Alarm or fault code Ⓒ Output current Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ PV voltage Ⓑ Alarm or fault code Ⓒ PV charging current Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ PV voltage Ⓑ Alarm or fault code Ⓒ PV power Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Output voltage Ⓑ Alarm or fault code Ⓒ Active power output Ⓓ Battery capacity Ⓔ Load percentage	

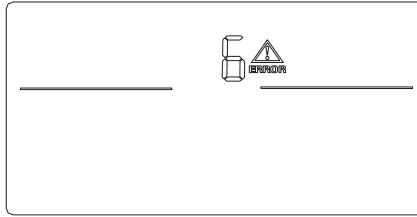
Ⓐ Output voltage Ⓑ Alarm or fault code Ⓒ Apparent power output Ⓓ Battery capacity Ⓔ Load percentage	
Ⓐ Output voltage Ⓑ Alarm or fault code Ⓒ Load percentage Ⓓ Battery capacity Ⓔ Load percentage	
Display the software version	
Display PV power generation	
Display PV power generation during parallel operation	

※After BMS is enabled, the following pages are available:

Lithium Battery Network Status: When SIG is steadily lit in the upper right corner of the display, it indicates that the battery bank is operating in single-group mode. When PAR is steadily lit, it indicates that multiple battery banks are operating in series-parallel connection. When PAR is flashing, it indicates that the battery banks are establishing a multi-group series-parallel connection.	
Lithium Battery Voltage and Current Information: The upper left of the display shows BMS battery voltage information. The upper right of the display shows BMS battery current information. When BMS communication fails, both the upper left and upper right displays will flash ERR.	
Lithium Battery Temperature and SOC: The upper left of the display shows BMS temperature information. The upper right of the display shows BMS SOC information. When BMS communication fails, both the upper left and upper right displays will flash ERR.	
Lithium Battery Capacity: The upper left of the display shows the rated capacity. The upper right of the display shows the current capacity. When BMS communication fails, both the upper left and upper right displays will flash ERR.	
Lithium Battery Constant Voltage Point: The upper left of the display shows the fixed letters "CV". The upper right of the display shows the BMS constant voltage charging point. When BMS communication fails, the upper right display will flash ERR.	
Lithium Battery Fault and Alarm Information: The upper left of the display shows BMS alarm information. The upper right of the display shows BMS fault information. When BMS communication fails, both the upper left and upper right displays will flash ERR.	

9. Fault Code Display Instructions

9.1 MK1200-12 Fault Display:



Function Description: If an alarm occurs, the fault indicator flashes, and the buzzer sounds once every 1 second for 1 minute, then stops. If a fault occurs, the fault indicator remains steadily lit, the buzzer sounds for 10 seconds, then stops. The system will attempt to restart. If the machine does not operate after six restart attempts, the machine and the LCD display will remain in a fault state. A complete power-off (screen off) or a 30-minute wait is required to restart the machine. The fault LCD display is shown in the figure above. In fault mode, the fault icon is steadily lit; in alarm state, the alarm icon flashes. Contact the manufacturer based on the fault information for troubleshooting.

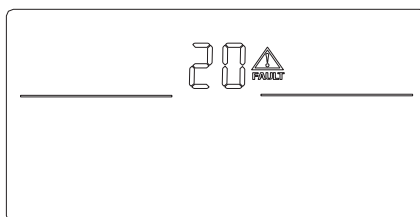
Fault: The inverter enters fault mode, the red LED remains steadily lit, and the LCD displays a fault code. The following recoverable faults can be restarted up to 6 times within 15 minutes. If the 6-attempt limit is exceeded, a fault lock is triggered, which is released after 15 minutes.

9.1.1 Fault code and Meaning

Fault code	Meaning	Action	Trigger Condition	Recovery Condition	Fault Alarm
1	Bus soft start failure	Fault mode	Bus voltage did not reach the setpoint.	Recoverable	Fault
2	Bus overvoltage	Fault mode	Bus voltage exceeds the overvoltage protection setpoint.	Recoverable	Fault
3	Bus under-voltage	Fault mode	Bus voltage is lower than the undervoltage protection setpoint.	Recoverable	Fault
4	Battery overcurrent	Fault mode	The TZ interrupt is triggered more than two times in 2ms.	Unrecoverable	Fault
5	Over-temperature	Fault mode	The temperature exceeds the protection threshold or the fan is stuck.	Recoverable	Fault
6	Battery overvoltage	Fault mode	Battery voltage exceeds the setpoint.	Recoverable	Fault
7	Bus soft-start failure	Fault mode	The soft start process has timed out, but the bus voltage has not reached the setpoint.	Recoverable	Fault
8	Bus short circuit	Fault mode	The bus voltage is below the critical value when the inverter is on or the PFC is on.	Recoverable	Fault
9	Inverter soft-start failure	Fault mode	After the inverter soft start has been running for a period of time, the rated output voltage still cannot be reached.	Recoverable	Fault
10	Inverter overvoltage	Fault mode	Inverter voltage exceeds the setpoint.	Recoverable	Fault

11	Inverter under-voltage	Fault mode	The inverter voltage is lower than the set value in battery mode.	Recoverable	Fault
12	Inverter short circuit	Fault mode	In battery or standby mode, when the inverter voltage is low, the current is greater than the setpoint.	Recoverable	Fault
13	Negative power protection	Fault mode	In battery mode, the load power falls below the setpoint (negative power, such as -1200W).	Recoverable	Fault
14	Overload fault	Fault mode	Overload exceeds the limit (listed in the specifications).	Recoverable	Fault
26	BMS fault	Fault mode	Fault code in the BMS message.	Turn off the BMS communication function or restore from the BMS fault	Fault
27	MCU fault	Fault mode	MCU error.	Unrecoverable	Fault
29	Inverter timing fault	Fault mode	Four half-cycles in a row, with each half-cycle triggering over 10 fast overcurrent events.	Recoverable	Fault

9.2 MKH3600-22Fault Display:



Function Description: If an alarm occurs, the fault indicator flashes, and the buzzer sounds once every second for 1 minute, then stops. If a fault occurs, the fault indicator remains steadily lit, and the buzzer sounds for 10 seconds, then stops. The system will attempt to restart. If the machine does not operate after six restart attempts, the machine and the LCD display will remain in a fault state. A complete power-off (screen off) or a 30-minute wait is required to restart the machine. The fault LCD display is shown in the figure above. In fault mode, the fault icon is steadily lit; in alarm state, the alarm icon flashes. Contact the manufacturer based on the fault information for troubleshooting.

Fault: The inverter enters fault mode, the red LED remains steadily lit, and the LCD displays a fault code.

9.2.1 Fault code and Meaning

Fault code	Meaning	Action	Trigger Condition	Recovery Condition	Fault Alarm
1	Bus soft start failure	Fault mode	The bus voltage fails to reach the setpoint for over 30 seconds.	Unrecoverable	Fault
2	Bus overvoltage	Fault mode	Bus voltage exceeds the overvoltage protection setpoint.	Unrecoverable	Fault
3	Bus under-voltage	Fault mode	Bus voltage is lower than the undervoltage protection setpoint.	Unrecoverable	Fault
4	Battery overcurrent	Fault mode	The TZ interrupt is triggered more than two times in 2ms.	Unrecoverable	Fault

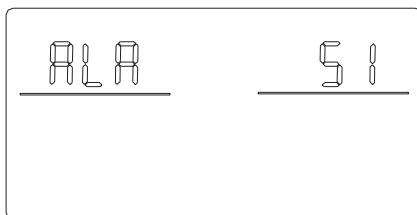
5	Over-temperature	Fault mode	PFC temperature is above the protection threshold. The fan is jammed for over 5 minutes.	Six restart attempts are made; if all fail, the fault cannot be recovered.	Fault
6	Battery overvoltage	Fault mode	Battery voltage exceeds the setpoint.	Unrecoverable	Fault
7	Bus soft-start failure	Fault mode	Switch to fault mode. The soft start process has timed out, but the bus voltage has not reached the setpoint.	Unrecoverable	Fault
8	Bus short circuit	Fault mode	The bus voltage is below the critical value when the inverter is on or the PFC is on.	Unrecoverable	Fault
9	Inverter soft-start failure	Fault mode	Bus voltage exceeds the setpoint, or DC component exceeds 20V, or inversion fails to complete within 5 minutes.	Unrecoverable	Fault
10	Inverter overvoltage	Fault mode	The inverter voltage exceeds the set value of 276V.	Unrecoverable	Fault
11	Inverter under-voltage	Fault mode	In battery mode and without an inverter short circuit, the inverter voltage falls below 160V.	Unrecoverable	Fault
12	Inverter short circuit	Fault mode	In battery or standby mode, when the inverter voltage is low, the current is greater than the setpoint.	Attempt to restart six times; if failed, the fault is non-recoverable.	Fault
13	Negative power protection	Fault mode	In battery mode, the load power falls below the setpoint (negative power, such as -1200W).	Unrecoverable	Fault
14	Overload fault	Fault mode	Overload exceeds the limit (listed in the specifications).	Attempt to restart six times; if failed, the fault is non-recoverable.	Fault
15	Model fault	Fault mode	No matching model is found during model detection.	Not recoverable. Check if the control board has an assembly error or if the program has been flashed incorrectly.	Fault
16	No bootloader	Fault mode	No bootloader.	Not recoverable. Try sending command TIDA191100000 0000000.	Fault
17	Programming progress	Fault mode	The inverter has received an update task.	Restore after update.	Fault

19	Same serial number	Fault mode	Parallel operation with the same serial number.	Unrecoverable	Fault
20	CAN communication fault	Fault mode	Slave number error.	Unrecoverable	Fault
21	Excessive voltage difference among batteries connected in parallel.	Fault mode	Excessive voltage difference among batteries connected in parallel.	Unrecoverable	Fault
22	Parallel inverter voltage difference too large	Fault mode	Main voltage difference between parallel inverters exceeds limit.	Unrecoverable	Fault
23	Parallel inverter frequency difference too large	Fault mode	The power frequency difference between parallel inverters exceeds the set value.	Unrecoverable	Fault
24	Parallel configuration mismatch	Fault mode	The local inverter is in single-unit mode, but there is a parallel unit on the bus.	Switch to single-unit mode and disconnect parallel comms, or restore parallel mode.	Fault
25	Association lost	Fault mode	Synchronization signal lost.	Unrecoverable	Fault
26	BMS fault	Fault mode	Fault code in the BMS message.	Turn off the BMS communication function or restore from the BMS fault.	Fault
28	NTC fault	Fault mode	NTC open circuit fault.	Unrecoverable	Fault
29	Inverter overcurrent	Fault mode	Inverter instantaneous current exceeds the setpoint.	Attempt to restart six times; if failed, the fault is non-recoverable.	Fault

10. Alarm Code Display Instructions

10.1 MK1200-12 Alarm Codes

The inverter has not entered fault mode, the red LED flashes, and the LCD displays an alarm code.

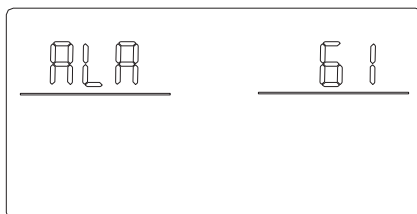


Alarm code	Meaning	Action	Trigger Condition	Recovery Condition	Alarm
50	Battery open circuit	Alarm, Battery not charging	The battery voltage is below 8V.	Recovers when the battery voltage is > 10V.	Alarm
51	Battery under voltage shutdown	Alarm: Battery undervoltage shutdown or unable to start up	The battery voltage is below the set value.	Recovers after the battery voltage is restored.	Alarm
52	Low battery voltage	Alarm	Battery voltage below setpoint.	Recovers when battery voltage returns.	Alarm
53	Charger short circuit	Alarm, Battery not charging	Battery voltage < 5V and charging current > 4A.	Unrecoverable	Alarm
55	Battery overcharge	Alarm, Battery not charging	Battery voltage above setpoint.	Recovers when voltage < setpoint - 0.5V.	Alarm
56	BMS lost	Alarm, Locked in standby mode.	Communication fails after the BMS communication function is enabled.	Restores after turning off the communication function or when communication succeeds.	Alarm
58	Fan fault	An alarm occurs when one fan fails while the other fan operates at full speed.	Fan speed is lower than the setpoint.	Recovers after the fan returns to normal.	Alarm
60	Overload	Alarm, Battery not charging	When not in utility mode, or when PV is normal and the output priority is not utility priority, the load exceeds 102%.	Returns to normal after the load is reduced.	Alarm

68	Low SOC shutdown	Alarm, Switch to standby mode	The battery SOC is below the set value.	Recovers after disabling the low SOC shutdown function or disabling the BMS communication function, or when the SOC returns to the set value + 5%.	Alarm
69	Low SOC warning	Alarm: If in standby mode, remain in standby mode and do not power on.	The lithium battery SOC is below (set value + 5%) in power mode or battery mode, and below (set value + 10%) in standby mode.	Recovers after disabling the low SOC shutdown function or disabling the BMS communication function, or when the SOC returns to the set value + 10%.	Alarm
71	Battery short circuit	Alarm	Battery short circuit detected.	Unrecoverable	Alarm
72	Battery voltage below startup voltage	Alarm	After power-on, the battery voltage is below the allowable start-up voltage.	The battery voltage is above the allowable start-up voltage.	Alarm

10.2 MKH3600-22 Alarm Codes

The inverter has not entered fault mode, the red LED flashes, and the LCD displays an alarm code.



Alarm code	Meaning	Action	Trigger Condition	Recovery Condition	Alarm
50	Battery not connected	Alarm, Battery not charging	Battery voltage below setpoint.	Recovers when battery voltage returns.	Alarm
51	Battery under voltage shutdown	Alarm: Battery undervoltage shutdown or unable to start up	Battery voltage below setpoint.	Recovers when battery voltage returns.	Alarm
52	Low battery voltage	Alarm	Battery voltage below setpoint.	Recovers when battery voltage returns.	Alarm

53	Charger short circuit	Alarm, Battery not charging	Battery voltage < 5V and charging current > 4A.	Unrecoverable	Alarm
54	Low power discharge	Alarm	Battery voltage > 26.4V and discharge time exceeds the low power discharge time setting.	Recovers when battery voltage returns.	Alarm
55	Battery overcharge	Alarm, Battery not charging	Battery voltage above setpoint.	Recoverable	Alarm
56	BMS lost	Alarm, Locked in standby mode.	No valid BMS communication response is received within 10 seconds.	Restores once communication is restored.	Alarm
57	Over-temperature	Alarm, Battery not charging	PFC or INV temperature exceeds the setpoint.	Restores when the temperature drops below the setpoint.	Alarm
58	Fan fault	An alarm occurs when one fan fails while the other fan operates at full speed.	Fan speed is lower than the setpoint.	Recovers after the fan returns to normal.	Alarm
59	EEPROM fault	Alarm	Value calibration error.	Restores once calibration is successful.	Alarm
60	Overload	Alarm, Battery not charging	The load exceeds 102% for 200-220ms under the condition that the system is not in utility mode, or PV is normal and output priority is set to something other than utility priority.	Returns to normal after the load is reduced.	Alarm
61	Generator waveform abnormal	Alarm, Continue running in battery mode.	The generator waveform detection result is abnormal.	Recoverable	Alarm
62	Weak PV energy	Alarm, PV output and charging are turned off.	With no battery connected, the bus voltage falls below the setpoint.	Restores in 10 minutes.	Alarm
63	Sync lost	Alarm, Switch to fault mode.	The master, or a slave unit with an active master, does not recover the synchronization signal within the set time.	Restores once the signal returns.	Alarm
64	Parallel configuration incompatible	Alarm, Switch to standby mode	In three-phase parallel operation, one phase is absent.	Restores once the three-phase configuration is correct.	Alarm

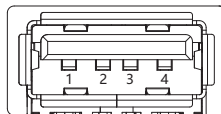
65	Incompatible parallel version	Alarm, Switch to standby mode	There are incompatible version numbers in the parallel system.	Restores once all firmware versions in the parallel system are mutually compatible.	Alarm
66	Parallel communication failure	Alarm, Switch to standby	The slave unit is not detected in the parallel system.	Restores when a slave is found, or if the system is switched to single-unit mode.	Alarm
67	Utility input difference among parallel units	Alarm	The master determines that the voltage difference between the local utility voltage and the utility voltage of any slave exceeds the set value.	Unrecoverable	Alarm
68	Low SOC shutdown	Alarm, Switch to standby mode	The battery SOC is below the set value.	Recovers after disabling the low SOC shutdown function or disabling the BMS communication function, or when the SOC returns to the set value +5%.	Alarm
69	Low SOC warning	Alarm: If in standby mode, remain in standby mode and do not power on.	The lithium battery SOC is below (set value + 5%) in power mode or battery mode, and below (set value + 10%) in standby mode.	Recovers after disabling the low SOC shutdown function or disabling the BMS communication function, or when the SOC returns to the set value +10%.	Alarm
70	Low energy at battery terminals	Alarm, Switch to standby mode.	No battery connected, and the terminal voltage is lower than the setpoint.	Restores after a battery is detected, or when the battery terminal voltage remains above the setpoint for one full minute.	Alarm

11.Communication interface and Description

11.1 USB interface

Supports Wi-Fi/GPRS function. An external data collector (application required) is needed for connection. The inverter/controller unit can be controlled via a mobile APP.

Num	Meaning	Description
1	+5V	5V serial port power supply
2	RS.232.RX	Serial Debug Interface
3	RS.232.TX	Serial Debug Clock Interface
4	GND	Ground

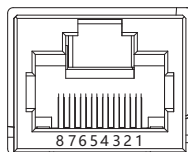


※ The MK1200-12 inverter does not support this function.

11.2 RJ45 interface

This port can be used for RS485 communication with the lithium battery BMS. Port definition:

Num	Meaning	Description
1	RS485B	RS485 Communication Interface
2	RS485A	RS485 Communication Interface
3	NC	/
4	CAN-BUS+	CAN Communication Interface
5	CAN-BUS-	CAN Communication Interface
6	NC	/
7	NC	/
8	NC	/



※ The MK1200-12 inverter does not support this function.

12.Battery balancing description

An equalization function is incorporated into the charge controller. It reverses the accumulation of negative chemical effects, such as stratification, which occurs when the acid concentration at the bottom of the battery is greater than that at the top. Equalization also helps remove sulfate crystals that may build up on the plates. If left unchecked, this condition, known as sulfation, will reduce the overall capacity of the battery. Therefore, it is recommended to equalize the battery periodically.

Note: Do not activate this mode when using lithium batteries.

① How to apply the equalization function on the MK1200-12:

The battery equalization function must first be enabled by changing the charging time from "OFF" to another setting. Then, you can apply this function on the device using any of the following methods:

- 1.Set the equalization voltage point on program 31.
- 2.Set the equalization delay time on program 33.
- 3.Set the equalization interval time on program 34.
- 4.Set the immediate equalization activation on program 35.

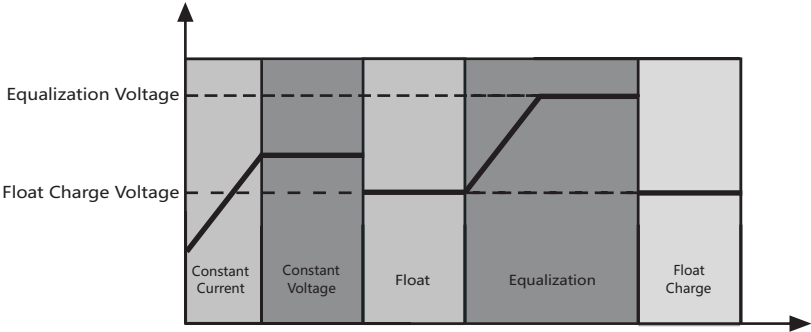
② How to apply the equalization function on the MKH3600-22:

The battery equalization function must first be enabled in LCD setting program 29. Then, you can apply this function on the device using any of the following methods:

- 1.Set the equalization mode on program 29.
- 2.Set the equalization voltage point on program 30.
- 3.Set the equalization charging time on program 31. Set the equalization delay time on program 32.
- 4.Set the equalization interval time on program 33.
- 5.Set the immediate equalization activation on program 34.

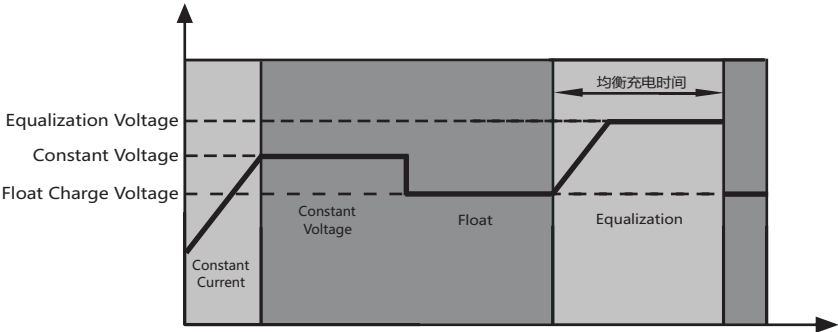
12.1 Equalization time

At a certain stage, when the set equalization interval (battery equalization cycle) is reached or when equalization is immediately activated, the controller will begin to enter the equalization stage.

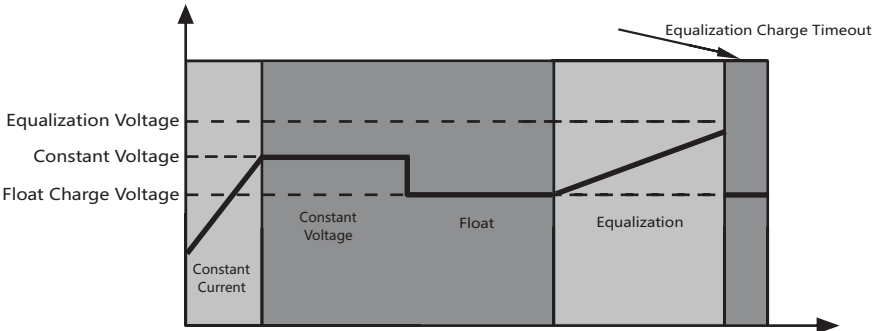


12.2 Equalization charging time and timeout

During the equalization stage, the controller will supply as much power as possible to charge the battery until the battery voltage rises to the equalization voltage. Constant voltage regulation is then applied to maintain the battery voltage at the equalization voltage. The battery remains in the equalization stage until the set battery equalization time is reached.



However, during the equalization stage, if the battery equalization time expires and the battery voltage has not risen to the equalization voltage point, the charge controller will extend the battery equalization time until the battery voltage reaches the equalization voltage. When the battery equalization timeout period ends and the battery voltage is still below the battery equalization voltage, the charge controller will stop equalization and return to the float stage.



13. System maintenance

To maintain optimal long-term performance, it is recommended to perform the following inspections twice a year.

- Ensure that the airflow around the all-in-one unit is not blocked, and remove any dirt or debris from the heatsink.
- Inspect all exposed wires for insulation damage caused by sunlight, friction with surrounding objects, dry rot, or damage from insects or rodents. Repair or replace wires as necessary.
- Verify that the indications and displays are consistent with the equipment's operation. Pay attention to any fault or error displays and take corrective action as needed.
- Check all wiring terminals for signs of corrosion, insulation damage, high temperature, or burning/discoloration. Tighten the terminal screws.
- Inspect for dirt, nesting insects, and corrosion, and clean as required.



WARNING!

Risk of electric shock! When performing the above operations, be sure to disconnect all power sources to the all-in-one unit and fully discharge any remaining charge in the capacitors before conducting any inspection or operation.

The company assumes no responsibility for damage caused under the following circumstances:

- ① Damage caused by improper use or use in an unsuitable location.
- ② The open-circuit voltage of the PV module exceeds the maximum allowable voltage.
- ③ Damage caused by the operating environment temperature exceeding the limited operating temperature range.
- ④ Unauthorized disassembly or repair of the all-in-one unit.
- ⑤ Damage caused by force majeure: Damage occurring during transportation or handling of the all-in-one unit.

14. Troubleshooting

14.1 Troubleshooting for MK1200-12 Inverter

Trouble	Description	Trigger Condition	Solution
LED screen displays fault code 5	Over-heating	The fan is locked for more than 10 seconds.	Please check whether the fan is not connected or has loose wiring. If the fan remains disconnected for more than 10 seconds, the machine will report fault code 5.
LED screen displays fault code 12	Inverter short circuit	In battery mode or standby mode, if the inverter voltage is below 80V and the inverter current exceeds 5A, a response should occur within 80-100ms.	1. Check whether the output terminals are short-circuited (e.g., a screw piercing through and tightening the terminal, causing an L-N short circuit). 2. Check whether the inverter voltage and inverter current meet the triggering conditions.
LED screen displays fault code 15	Model fault	Model detection does not match any model.	Check whether the control board is incorrectly assembled or the program is incorrectly burned.
LED screen displays fault code 16	Unable to start the program	The third digit in the communication data is not 1.	Send command TIDA19110000000000

LED screen displays fault code 58	Fan fault	Any fan rotates less than 10 times within 5 seconds.	1.Check whether the fan is correctly connected or if the connection is loose. 2. If the fan is correctly connected: a)Check the fan detection circuit for issues, usually caused by excessive soldering under the control socket. b)Check whether the fan itself is damaged.
Unable to start	Battery	Since starting the machine in battery mode requires a voltage of $\geq 11.5V/N$, common causes of startup failure include improper calibration or insufficient battery voltage.	1. Check whether the battery voltage sampling is normal and whether the battery voltage has been calibrated. 2.Use a multimeter to measure the voltage at the battery terminals (using a DC power supply or an actual battery) to see if the minimum voltage of 11.5V per battery required for startup is reached. Note: It is essential to configure the battery voltage according to the machine model. Connecting the wrong battery voltage may cause the capacitor to explode.
/	Utility power	/	1.Check whether the power terminals are short-circuited (e.g., a screw piercing through and causing a short circuit between the live and neutral terminals). 2.Check for wiring errors, such as incorrectly connecting the power input to the output terminals.
/	PV	/	1.Check whether the PV input voltage is too close to the critical threshold. 2.For low-voltage version machines, check whether the software version number of the main controller is compatible. If the software versions differ significantly, the machine may not start.
PV not charging	/	/	Connecting the wrong battery voltage may cause damage to the auxiliary power supply on the PV side, resulting in power loss and loss of communication with the main controller.

14.2 Troubleshooting for MKH3600-22 Inverter

Trouble	Description	Trigger Condition	Solution
LED screen displays fault code 5	Over-heating	1.The PFC temperature exceeds the protection threshold (85°C when not stalled, 65°C when stalled) for more than 20 seconds. 2.The fan is locked for more than 30 seconds.	Please check whether the fan is not connected or has loose wiring. If the fan remains disconnected for more than 30 seconds, the machine will report fault code 5.
LED screen displays fault code 12	Inverter short circuit	In battery mode or standby mode, if the inverter voltage is below 100V and the inverter current exceeds 40A, a response should occur within 80-100ms.	1. Check whether the output terminals are short-circuited (e.g., a screw piercing through and tightening the terminal, causing an L-N short circuit). 2. Check whether the inverter voltage and inverter current meet the triggering conditions.
LED screen displays fault code 15	Model fault	Model detection does not match any model.	Check whether the control board is incorrectly assembled or the program is incorrectly burned.
LED screen displays fault code 16	Unable to start the program	The third digit in the communication data is not 1.	Send command TIDA19110000000000
LED screen displays fault code 20	CAN communication error	In battery mode, if the battery mode is set to utility mode and the parallel mode is set to utility mode, the number of responding slave devices does not match the previously defined number of slave devices. Communication is continuously received from two or more devices with a slave count of zero.	1. Check whether the parallel mode is set, but the machine is started in single-unit mode. 2.Check whether the parallel connection cable and parallel board follow the parallel SOP (Standard Operating Procedure).
LED screen displays fault code 58	Fan fault	Any fan completes fewer than 8 rotations in 2 seconds.	1.Check whether the fan is correctly connected or if the connection is loose. 2. If the fan is correctly connected: a)Check the fan detection circuit for issues, usually caused by excessive soldering under the control socket. b)Check whether the fan itself is damaged.

Unable to start	Battery	Since starting the machine in battery mode requires a voltage of $\geq 11.5V/N$, common causes of startup failure include improper calibration or insufficient battery voltage.	1. Check whether the battery voltage sampling is normal and whether the battery voltage has been calibrated. 2. Use a multimeter to measure the voltage at the battery terminals (using a DC power supply or an actual battery) to see if the minimum voltage of 11.5V per battery required for startup is reached. Note: It is essential to configure the battery voltage according to the machine model. Connecting the wrong battery voltage may cause the capacitor to explode.
/	Utility power	/	1. Check whether the power terminals are short-circuited (e.g., a screw piercing through and causing a short circuit between the live and neutral terminals). 2. Check for wiring errors, such as incorrectly connecting the power input to the output terminals.
/	PV	/	1. Check whether the PV input voltage is too close to the critical threshold. 2. For low-voltage version machines, check whether the software version number of the main controller is compatible. If the software versions differ significantly, the machine may not start.
PV not charging	/	/	Connecting the wrong battery voltage may cause damage to the auxiliary power supply on the PV side, resulting in power loss and loss of communication with the main controller.

15. Technical data

15.1 Utility power parameters

Item	Mode	MK1200-12	MKH3600-22	Note
Input Voltage	Main Input	L+N+PE		
	Input Voltage	230Vac		Adjustable 208/220/230/240Vac
	Input Voltage Range	90~280Vac		Adjustable
	Input Low Loss	154Vac(Default)Adjustable:90~154Vac		APP/GEN mode
		185Vac(Default)Adjustable:170~200Vac		UPS mode
	Input Low Recovery	Low Loss Voltage+9V		
	Input High Loss	264Vac (默认) 可设置: 264~280Vac		APP/GEN mode
		264Vac		UPS mode
	Input High Recovery	High Loss Voltage-9V		
Input Frequency	Rated Frequency	50/60Hz		
	Frequency Low Loss/Recovery	40/43.5Hz@50Hz(UPS mode) 50/53.5Hz@60Hz(UPS mode) 40/40.5Hz@50Hz(APP/GEN mode) 50/50.5Hz@60Hz(APP/GEN mode)		
	Frequency High Loss/Recovery	60/56.5Hz@50Hz(UPS mode) 70/66.5Hz@60Hz(UPS mode) 70/69.5Hz@50Hz(APP/GEN mode) 70/69.5Hz@60Hz(APP/GEN mode)		
Input Current	Max. Current(RMS)	10A	20A	MK1200-12: >10A, 60s; >12A, 10s; >14A, 3s; >16A, 200ms; MKH3600-22: >20A, 60s; >22A, 10s; >24A, 3s; >26A, 200ms;

Note: MK1200-12 Inverter: When the external circuit breaker rating is greater than 16A, the maximum input current is 16A. When the external circuit breaker rating is less than 16A, the maximum input current depends on the rating of the external circuit breaker.

MKH3600-22 Inverter: When the external circuit breaker rating is greater than 20A, the maximum input current is 20A. When the external circuit breaker rating is less than 20A, the maximum input current depends on the rating of the external circuit breaker.

15.2 Battery parameters

Item	Mode	MK1200-12	MKH3600-22	Note
Battery Information	Number of Batteries	1Pcs	2Pcs	12V/Pcs
	Auto-start function	Yes		
	Battery Test Function	No		
	Battery Type	AGM/FLD/LIB/FEL/CUS	AGM/FLD/LIB/CUS	
	Rated Battery Voltage	N*12V		@25°C
	Battery Management	Yes		

Battery Protection	Battery Overvoltage	15V	30.5V	
	Battery Undervoltage	10.5V*N		Adjustable: 10*N~11*N
	Low Battery Alarm	10.8V*N		Adjustable: 10.3*N~11.3*N
	Overcurrent Protection	Fuse		Fast Acting

Note: N=Number of batteries.

15.3 Charging parameters

Item	Mode	MK1200-12	MKH3600-22	Note
Charging (Utility Mode)	Charging Voltage	FV mode:13.5V Adjustable:12~14.9V CV mode:28.2V Adjustable:12~15V	FV mode:27V Adjustable: 26.6~27.8V CV mode:28.2V Adjustable:8~29V	
	Temperature Compensation	No		
	Charging Current	2~50A	2~100A	Adjustable
	Default Charging Current	30A	40A	
	Charging Method	Two/Auto Adjustable	Two/Three/Auto Adjustable	Three states: CC/CV/Float Two states: CC/Float
	Charging Voltage Accuracy	±5%		Calibrated via RS232
Charging (PV Mode)	PV Charging Method	MPPT		
	Max. PV Input Power	800W	5000W	
	Max. PV Input Current	/	18A	
	Efficiency	99.5%(Max.)		
	PV voltage accuracy	/	±2%	
	MPPT	17~115Vdc	40~450Vdc	
	Min. PV Voltage	17Vdc	40Vdc	
	Max. PV Voltage	115V	500V	
	Default charging current	40A	60A	
	PV start-up voltage	/	60Vdc	MKH3600-22 Inverter: If the PV voltage is below 60V, the inverter must be connected to a battery for operation; when the PV voltage is above 60V, the inverter can operate without a battery.
	Max. charging current	100A(Max. allowable value)		Adjustable

15.4 Output parameters

Item	Mode	MK1200-12	MKH3600-22	Note
Output power rating	Output	L+N+PE		
	Max. Output Power	1200W	3600W	When the output voltage is set to 208V, the output rated power will be reduced to 90%.
Output voltage	Rated Voltage	230Vac		Settable: 208/220/230/240 Vac, manually set via RS232 or LCD.
	Waveform	Sine Wave		
	Voltage Regulation	±5%		
	DC Offset	±200mV(Battery mode)		No-load and linear load mode
Output frequency	Rated Frequency	50/60Hz		Automatic 50/60Hz selection (default: ON)
	Battery Mode	50/60Hz		
	Frequency Regulation	±0.1Hz		
	Utility Mode	50Hz: (43.5~26.5)Hz(UPS mode) (40~70)Hz(APP/GEN mode) 60Hz: (53.5~66.5)Hz(UPS mode) (40~70)Hz(APP/GEN mode)		
Over load rating (battery mode) /		10 minutes @ 102%~120% load; 1 minute @ 120%~150% load; 10 seconds @ 150%~200% load; 5 seconds @ >200% load.	1 minute @ 102%~110% load; 10 seconds @ 110%~130% load; 3 seconds @ 130%~150% load; 200 milliseconds @ >150% load.	
Output short circuit protection	Battery mode	Current limit	Current limit	
	Utility mode	Circuit breaker(16A)	Circuit breaker(20A)	

15.5 Transfer time parameters

Item	Mode	Parameters	Note
Transfer time	Utility mode to battery mode transfer	10ms(Typical Value)	UPS mode
		10ms(Typical Value)	Appliance (APP) Mode
		MK1200-12:10ms(Typical Value) MKH3600-22:60ms(Typical Value)	Generator (GEN) Mode

15.6 Efficiency parameters

Item	Mode	MK1200-12	MKH3600-22	注释
Efficiency	Utility Mode	> 99%@1.2KVA	> 99.5%@3KVA > 99.5%@5KVA	Full resistive load: No battery connected.
	Battery Mode	> 90%@1.2KVA	> 92%@1KVA > 92%@2KVA > 90%@3KVA	Full resistive load
	Standby Power	< 30W	< 65W	No-load mode, battery disconnected.