USER MANUAL

QI Series Inverter/charger

QI1012-0610C, QI1021-0415C

EN

Table of Contents

Important Safety Instructions

Please keep this manual for future reference.

This manual contains all the safety, installation, and operation instructions for the QI series inverter/charger (hereinafter referred to as "inverter/charger").

1. Explanation of symbols

To ensure the user's personal and property safety while using this product, relevant information is provided in the manual and highlighted with the following symbols. Please read the relevant texts carefully when you encounter the following symbols in the manual.

⚠ DANGER

Indicates a high-level hazard that, if not avoided, will result in serious injury or death.

⚠ WARNING

Indicates a medium-level hazard that, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a low-level hazard that, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates an important reminder during the operation which, if ignored, may result in an equipment error alarm.

Tip	Indicates recommendation for reference.
	Read through the user manual before any operations.

2. Requirements for professional and technical personnel

- Professionally trained.
- Familiar with related safety regulations of the electrical system.

- Read this manual carefully and master the related safety precautions.

3. Operations for professional and technical personnel

- Install the Inverter/charger to a specified position.
- Conduct test operations for the inverter/charger.
- Operate and maintain the inverter/charger.

4. Safety precautions before installation

DANGER

- When installing the inverter/charger, please evaluate whether there is a risk of electric arc in the operation area.
- Keep the inverter/charger out of reach of children.

NOTICE

- After receiving the inverter/charger, please check if there is any damage during transportation. If you find any problem, please contact the transportation company, our local distributor or our company in time.
- When installing or moving the inverter/charger, follow the instructions in the manual.

5. Safety precautions for mechanical installation

DANGER

Before installation, confirm the inverter/charger has no electrical connection.

NOTICE

Ensure enough heat dissipation space for the inverter/charger before installation. Do not install the inverter/charger in humid, salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments.

6. Safety precautions for electrical connection

DANGER

- Do not put the inverter/charger close to the flooded lead-acid battery because the spark in the terminals may ignite the hydrogen released by the battery.
- Both the utility input and AC output are of high voltage, do not touch the wiring to avoid electric shock.
- When the AC output terminal connects to the load, the inverter/charger needs to stop working.

WARNING

- Ensure all wirings are secure to prevent overheating due to loose connections.
- The inverter/charger shell should be connected to the ground, and the cross-sectional area of the wire connecting the ground terminal to the earth should not be less than $4mm^2$.
- A fast-acting fuse or breaker should be used between the battery and inverter/charger; whose rated current should be twice of the inverter/charger rated input current.

NOTICE

- Do not connect the AC output terminal to other power sources or utility. Otherwise, the inverter/charger will be damaged.
- It is strictly forbidden to connect a transformer or a load with a surge power (VA) exceeding the overload power at the AC output port. Otherwise, the damage will be caused to the inverter/charger.

7. Safety precautions for the inverter/charger operation

WARNING

- The inverter/charger generates much heat during operation with a high cabinet temperature. Do not touch the unit and keep it far away from the materials and devices that are sensitive to high temperature.
- When the inverter/charger is working, do not open the inverter/charger shell for any operation.
- When eliminating the fault that affects the safety performance of the inverter/charger, disconnect the DC input circuit breaker, disconnect the AC output circuit breaker, turn off the inverter/charger switch and operate it after the LCD is completely OFF.

8. Dangerous operations causing an electric arc, fire, or explosion

- Touch the uninsulated ends of potentially live cables.
- Touch the wiring copper busbars, terminals or internal components of the inverter/charger that might be electriferous.
- Loose connection of power cables.
- Accidental dropping of screws or other components into the inverter/charger.
- Improper operations by untrained non-professional or technical personnel.

⚠ DANGER

Once an accident occurs, it must be handled by professionals. Improper operation would cause a more serious accident.

9. Precautions for stopping the inverter/charger

- Turn off the AC output and disconnect the utility input breakers. Then, turn off the DC switch.
- After the input and output wires are disconnected for ten minutes, the internal conductive modules could be touched.
- The inverter/charger does not contain repair parts internally. If any maintenance service is required, please get in touch with our after-sales service personnel.

⚠ DANGER

Do not touch or open the shell after the inverter/charger is powered off within ten minutes.

10. Precautions for inverter/charger maintenance

- It is recommended to test the inverter/charger with testing equipment to ensure there is no voltage at the input terminals or no current on the input and output cables.
- When conducting the electrical connection and maintenance, post a temporary warning sign or put up barriers to prevent unrelated personnel from entering the electrical connection or maintenance area.
- Improper maintenance of the inverter/charger may cause injury to personnel or damage to the equipment.
- It is recommended to wear an antistatic wrist strap or avoid unnecessary contact with the circuit board.

⚠ CAUTION

The safety mark, warning label and rating plate on the inverter/charger should be clearly visible, not removed or covered.

11. Working environment

- Ambient temperature: -20℃ to +50℃
- Storage temperature: -25℃ to +60℃ (No sharp temperature changing)
- Relative humidity: < 95% (Non-condensing)
- Altitude: < 4,000 meters (If the altitude exceeds 2,000 meters, the actual output power is reduced appropriately.)

NOTICE

The inverter/charger is strictly prohibited from being used in the following places. The company shall not assume any liability for damages caused by its use in inappropriate locations:

- Do not install the inverter/charger in harsh environments, including those with high humidity, salt spray, corrosion, grease, flammable or explosive materials, or excessive dust accumulation. When installing it outdoors, avoid direct sunlight and rainwater infiltration.
- Do not install the inverter/charger and lead-acid liquid batteries in a sealed space. The batteries produce combustible gases, and a spark at the connection terminals may cause a fire.

Disclaimers

The warranty does not apply to the following conditions:

- Damage caused by improper use or inappropriate environments. (It is strictly forbidden to install the inverter/charger in the humid, salt spray, corrosive, greasy, flammable, explosive,dust accumulative or other severe environments.).
- The actual current/voltage/power exceeds the limit value of the inverter/charger.
- Damage caused by working temperature exceeding the rated range.
- Electric arc, fire, explosion, and other accidents caused by failure to follow the inverter/charger labels or manual instructions.
- Unauthorized disassembly and maintenance of the inverter/charger.
- Damage caused by force majeure such as lightning strikes, rainstorms, mountain torrents and utility failures.
- Damage occurred during transportation or loading/unloading the inverter/charger.

1 General Information

1.1 Overview

QI series is an upgrade hybrid inverter/charger that integrates charging and inverting functions. It supports charging from utility power, generators, and solar panels, as well as offers utility bypass, independent inverter output, and energy management capabilities.

The DSP chip in the product with an advanced control algorithm brings high response speed and conversion efficiency. In addition, this product adopts an industrial design to ensure high reliability and features multiple charging and output modes.

The product adopts the Three-stage charging method (Bulk Charging, Constant Charging, and Float Charging) to ensure battery safety. The large lattice LCD color screen shows the operational status and full parameters. The communication interface with the standard Modbus protocol allows end-users to expand their applications and is suitable for different monitoring requirements.

The new optimized MPPT tracking technology can fast-track the PV array's maximum power point in any sunlight conditions and obtain the maximum energy in real time.

The AC to DC charging process adopts the advanced control algorithm brings the full digital PFC and dual closed-loop voltage-current control. It enables the input power factor close to 1 and improves the control accuracy. The fully smart digital DC to AC inverting process adopts the advanced SPWM technology, outputs a pure sine wave, and converts the DC power to AC power. It is suitable for household appliances, power tools, industrial equipment, audio systems, and other electronics.

End-users can choose energy sources according to actual needs to maximize solar energy utilization and flexibly take the Utility as a supplement in the hybrid system. QI series enhances the power supply reliability of the system. It is applicable to residences, schools, medical facilities, government buildings, mosques, religious sites, cabins as well as areas with unstable power supply.

Features

- Full intelligent digital energy storage equipment
- Support battery mode or non-battery mode
- PFC technology with high power factor to reduce the grid usage, low harmonic content of AC current
- Advanced MPPT technology, with maximum tracking efficiency higher than 99.5%
- Supports charging from multiple types of generators(1)
- Battery voltage controls the dry contact state to control the external equipment
- Battery charging or discharging current limit to compatible with different types of batteries

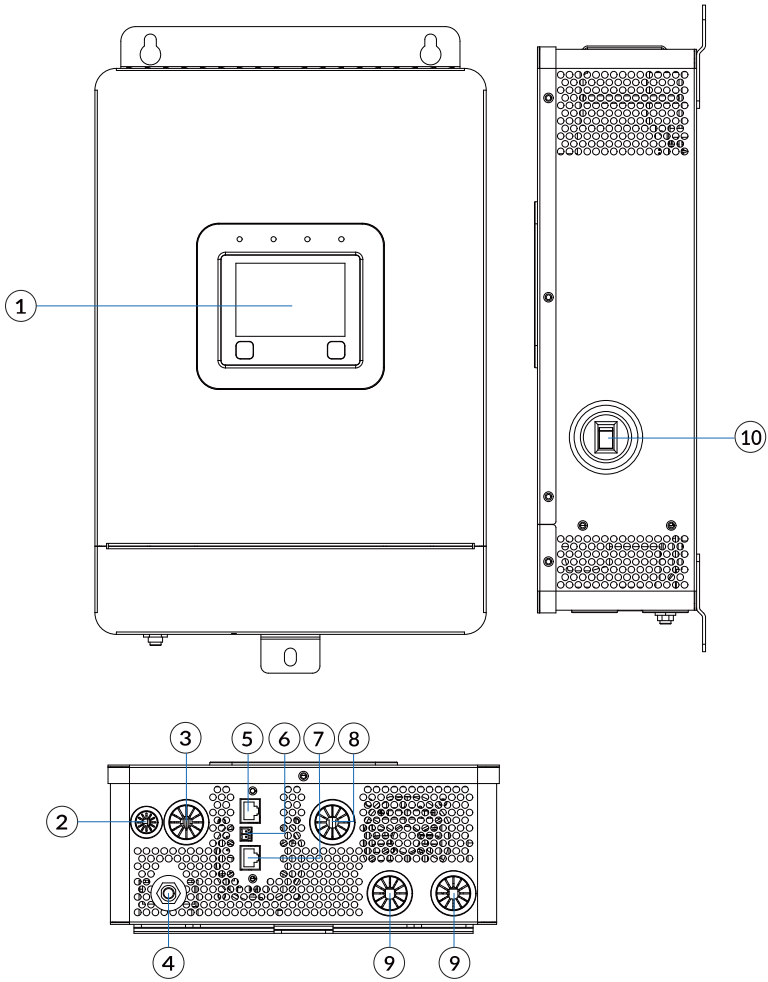
- Maximum utility charging current settings to flexibly configure utility charging power
- ECO Mode and low-voltage power-off functions to prolong the service life of the battery
- Function of historical data recording(2) with up to 25,000 records available. Records at 15-minute intervals can cover half a year, and the interval time ranges from 1 to 3,600 seconds is configurable
- One-button control of AC output
- Large lattice LCD color screen to monitor system status in real time
- RS485 communication port with optional WiFi, or TCP modules for remote monitoring
- Three-stage charging method to ensure battery safety
- Lithium battery communication port to perform the safe charging and discharging
- -20℃ to +50℃ operating temperature range to meet more environment requirements

(1) When connecting a non-inverter generator, the charging current maybe cannot reach the rated power. It is recommended to connect an inverter generator. And when using the generator, you need to set the AC input to the generator mode, please refer to the Subsection 2.5.1 Parameters list for the specific setting method.

(2) The contents of each historical record include: Year, Month, Day, Hour, Minutes, Seconds, Maximum PV Voltage (V), PV Power (W), Utility Voltage (V), Utility Current (A), Utility Frequency (Hz), Utility Power (W), Load Voltage (V), Load Current (A), Load Power (W), Inverter Frequency (Hz), Battery Voltage (V), Battery Current (A), Battery SOC (%), Battery Temperature (℃), PV Module Temperature (℃), Transformer Temperature (℃), Maximum BAT Volt (V), Minimum BAT Volt (V).

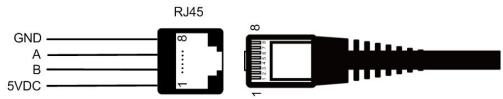
1.2 Appearance

QI1012-0610C/QI1021-0415C



No.	Instruction	No.	Instruction
1	Color LCD (see Chapter 2 Interface)	6	Dry contact port(2)
2	AC input terminal	7	RS485 port (RJ45, with isolation design)(3) 5VDC/1.2A
3	AC output terminal/Grounding terminal	8	PV connection port
4	Utility overcurrent protector	9	Battery connection port
5	BMS com. port (RJ45, with isolation design)(1)	10	Power switch

(1) Through a built-in BMS-Link module, direct connection of lithium batteries to the BMS communication port is enabled, and different BMS protocols can be converted into our company's standard BMS protocol. In addition, it realizes the communication between the inverter/charger and different BMS companies' standards. The pins of the BMS communication port (RJ45) are defined as follows:



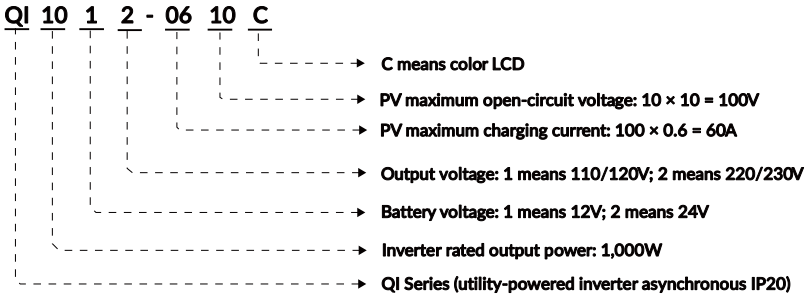
Pin	Definition	Pin	Definition
1	+5VDC	5	RS485-A
2	+5VDC	6	RS485-A
3	RS485-B	7	GND
4	RS485-B	8	GND

Tip	Please go to EPEVER official website to check or download the currently supported BMS manufacturers and the BMS parameters.

(2) The dry contact port is connected with the oil generator switch in parallel and can turn on/off the oil generator. Dry contact specification: 1A@250VAC.

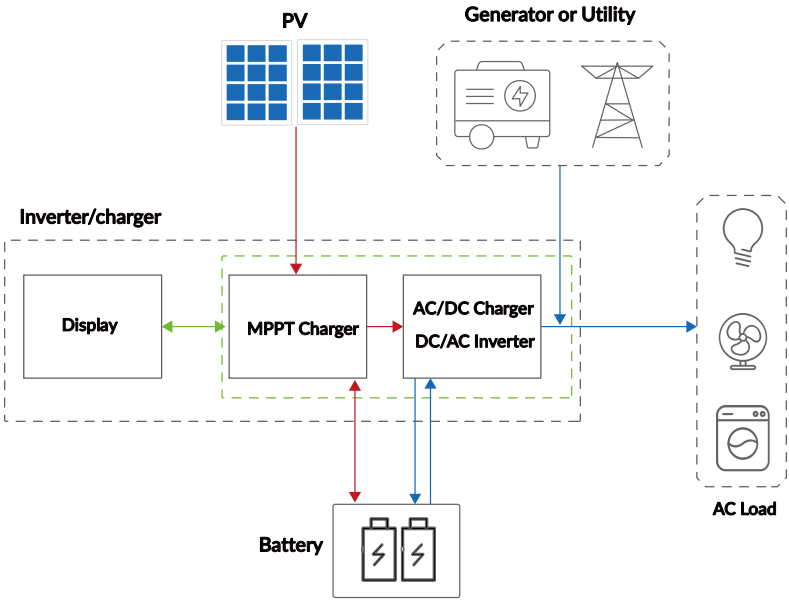
(3) Remote monitoring is achieved by connecting the WiFi or TCP modules via RS485 communication port. Pin definition for the RS485 port is the same as the BMS port, see description in above item (1).

1.3 Naming rules

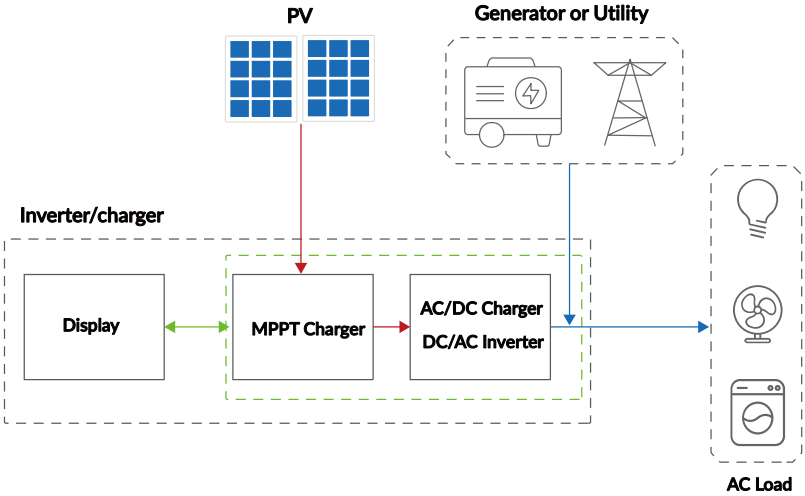


1.4 Connection diagram

• Battery mode



• No-battery mode



NOTICE

- AC loads shall be determined according to the output power of the inverter/charger. The load exceeding the maximum output power may damage the inverter/charger.
- For different battery types, confirm the relevant parameters before power on.
- There are various types of oil generators with complex output situations. It is recommended to use the variable frequency oil generator. If a non-variable frequency oil generator is used, actual testing is required before use.
- In the no-battery mode, the inverter/charger will only start up when the open-circuit voltage of the PV system exceeds 25V.

2 Interface

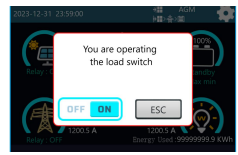
Tip	The display screen can be viewed clearly when the angle between the end-user's horizontal sight and the display screen is within 90°. If the angle exceeds 90°, the information on the display screen cannot be viewed clearly.

2.1 Indicator

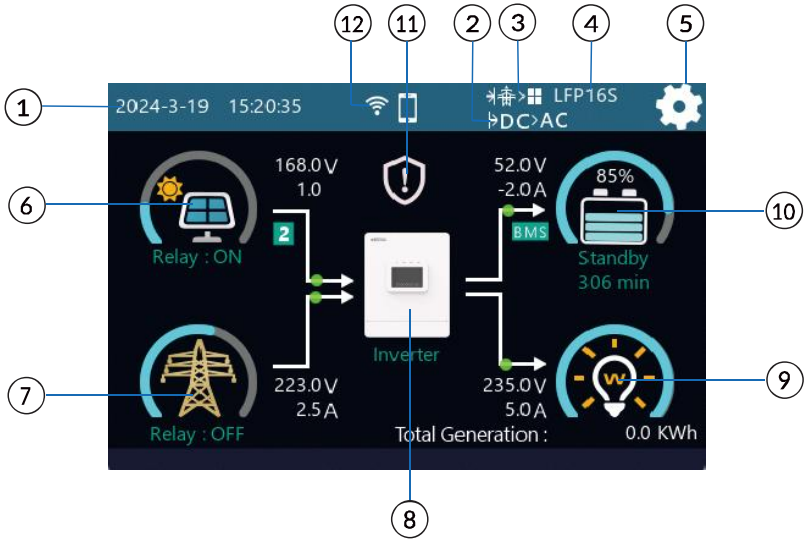
Indicator	Status	Instruction
PV	OFF	No PV input
	Solid green	PV normal
	Solid red	PV charging fault (PV1/PV2 overvoltage)
	Flashing green (1Hz)	No-battery mode
LOAD	OFF	No inverter output
	Solid green	Inverter, charging, and bypass are normal
	Solid red	Inverter fault (inverter overcurrent/overvoltage/ undervoltage, output short-circuit/over load)

UTILITY	OFF	No utility input
	Solid green	Normal utility
	Flashing green (1Hz)	Oil generator charging
	Solid red	Utility charging fault (Utility overvoltage/overcurrent/under voltage/frequency abnormal)
RUN	Flashing green (1Hz)	Normal communication
	Flashing red (1Hz)	Communication fault alarm

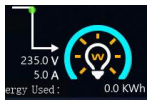
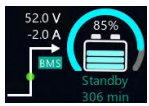
2.2 Button

Button	Operation	Instruction
	Press	Exit the current interface
	Press	Load ON/OFF button Press this button and the following prompt messages will pop up. Click “ON/OFF” to turn the load switch on or off. 

2.3 Home page



No.	Instruction	
1	2024-3-19 15:20:35	Display the system time. Before using the inverter/charger, please set the system time correctly. For specific operations, please refer to Subsection 2.5.1 Parameters list > 5) System > 5.4 System Time Setting.
2		Display the battery discharging mode. For specific operations, please refer to Subsection 2.5.1 Parameters list. Bypass indicates Bypass mode DC>AC indicates Inverter mode
3		Display the battery charging mode For specific operations, please refer to Subsection 2.5.1 Parameters list. means **Solar** mode; means **Solar > Utility (Solar prior)** mode; means **Solar plus Utility** mode;

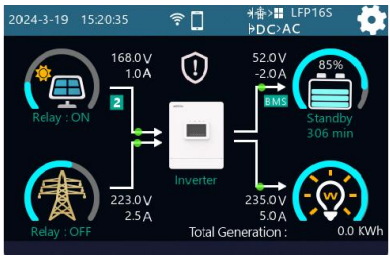
4		Display the battery type. For specific operations, please refer to Subsection 2.5.1 Parameters list.
5		Parameters setting icon. Click it to enter the password input interface, and customize and set various parameters of the system after entering the correct password. For specific operations, please refer to Section 2.5 Parameters setting.
6		Display the PV input voltage, PV input current, the flow direction of PV input energy (the numbers 1/2 beside the line indicate the PV modules corresponding to the current data), the percentage of PV generation (shown in an arc), the PV status indication, and the PV relay status. Click the PV icon to enter the PV real-time parameter interface. For specific operations, please refer to 2.4.1 PV.
7		Display the Utility input voltage, input current, the flow direction of Utility energy, the percentage of Utility charging (shown in an arc), the Utility status indication, and the Utility relay status. Click the Utility icon to enter the Utility real-time parameter interface. For specific operations, please refer to Subsection 2.4.2 Utility.
8		Display the working modes. Click the inverter/charger icon to enter the device real-time parameter interface. For specific operations, please refer to Subsection 2.4.3 Device.
9		Display the load input voltage, input current, energy used, energy status, and the percentage of load power (shown in an arc), as well as the load ON/OFF status. Click the load icon to enter the load real-time parameter interface. For specific operations, please refer to Subsection 2.4.4 Load.
10		Display the charging and discharging voltages and currents of the battery, the flow direction of the battery energy, the battery status indication, the percentage value of the battery SOC (shown in an arc), the charging status, and the remaining available time. Click the battery icon to enter the battery real-time parameter interface. For specific operations, please refer to Subsection 2.4.5 Battery.

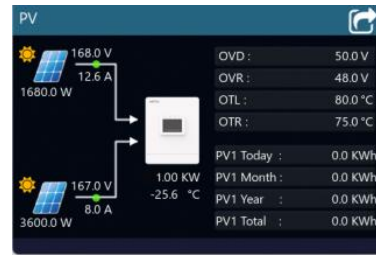
11		The current system shows no fault.
		The current system has a fault. Click on the icon to view the detailed real-time errors. For specific operations, please refer to Subsection 2.4.6 Real-time faults.
12		 indicates that turning on the 5V power supply of the COM port of the inverter/charger allows an external connection of a Bluetooth or WiFi module.

Note: When the PV or Utility is charging the battery, the equalization charging is performed on the 28th of each month by default (the date can be modified).

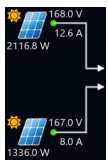
2.4 Real-time parameters

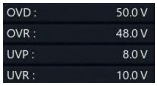
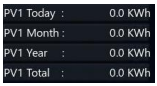
2.4.1 PV



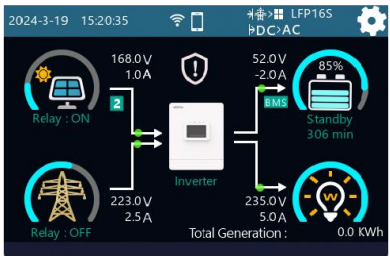


Touch the PV icon on the home page to enter the PV real-time parameter interface. The instructions of the interface are as follows:

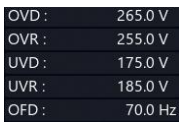
Icon	Instruction
	1. PV input voltage and current 2. The flow direction of the PV energy 3. PV real-time power **Note:** Only one PV icon will be displayed here when there is only one PV input.

	1. Total power output of PV generation (It will not be displayed if there is only one PV input.) 2. PV temperature
	Swipe up and down in this area to view all set parameters of the PV module. Refer to Subsection 2.5.1 Parameter list for default values and setting ranges.
	Swipe up and down in this area to view daily, monthly, yearly and total generation statistics of the PV module.

2.4.2 Utility

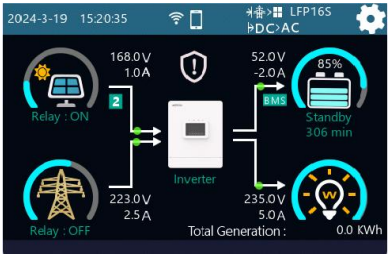


Touch the Utility icon on the home page to enter the Utility real-time parameter interface. The instructions of the interface are as follows:

Icon	Instruction
	1. Input voltage, current and frequency of the Utility 2. The flow direction of the Utility energy 3. Power input of Utility generation
	Swipe up and down in this area to view all set parameters of the Utility. Refer to Subsection 2.5.1 Parameter list for default values and setting ranges.

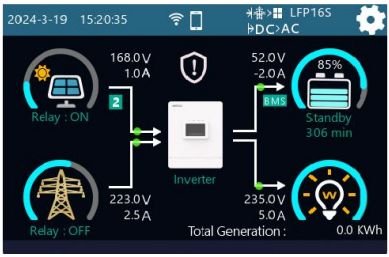
	Display the daily, monthly, yearly and total generation statistics

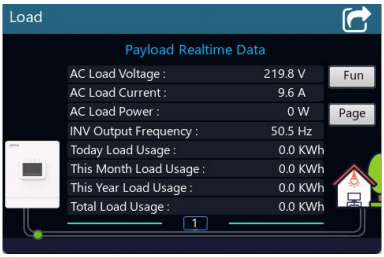
2.4.3 Device



Touch the inverter/charger icon on the home page to enter the device real-time parameter interface. It displays the current product series, product model, SN, LCD PCB version, and LCD firmware version and others. Click  to view other parameters.

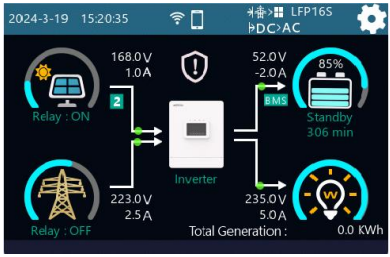
2.4.4 Load

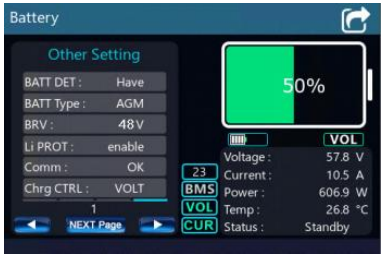




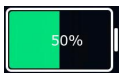
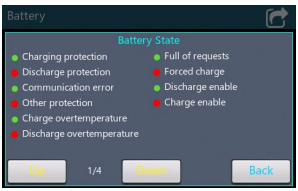
- Touch the load icon on the home page to enter the load real-time parameter interface.
- Click “Fun” to turn to next page and display the Payload Real-time Data and Setting Parameters To Display interfaces.
- Click “Page” to view all details of the current page.

2.4.5 Battery



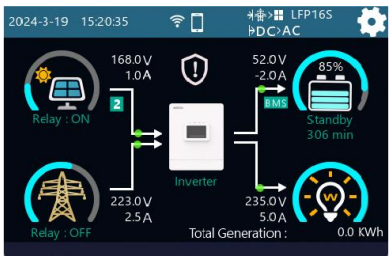


Touch the battery icon on the home page to enter the battery real-time parameter interface. The instructions of the interface are as follows:

Icon	Instruction
	1. Click ◄ / ► to turn to the next interface and display the Other Setting, BMS Data, Voltage Setting, and SOC Setting one by one. 2. Click NEXT Page to view all details of the current page.
	Display the SOC of the battery. Click this icon to view the BMS status as below.  Click “Up/Down” to view more state data, and click “Back” to return to the battery real-time parameter interface.
	1. Indicate whether the set battery protocol supports parallel connection. ▭ indicates that the set battery protocol does not support the parallel connection. ▭▭ indicates that the set battery protocol supports the parallel connection. 2. Indicate the value set for the BCCMode. VOL indicates the BCCMode is set to VOL, and SOC indicates the BCCMode is set to SOC.

	Display real-time voltage, current, power, temperature and charging status of the battery.
	1. The number “23” indicates the current BMS protocol. 2. “BMS” indicates the status of the BMS. Gray means disabled; green means enabled. 3. “VOL” indicates the status of the BMS Voltage Control mode. Gray indicates disabled; green indicates enabled. 4. “CUR” indicates the status of the BMS Current Control mode. Gray means parameter is set to “Invalid”; green means set to “BMS”, and SIM means set to Simulate BMS.

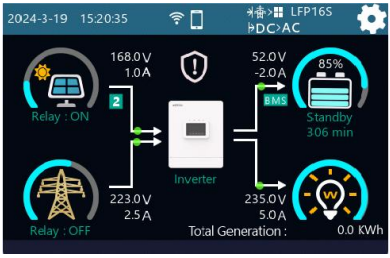
2.4.6 Real-time faults



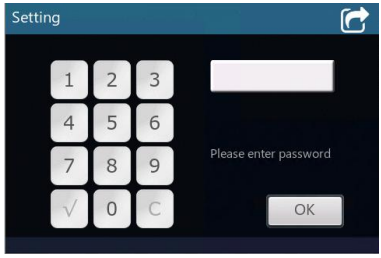
-  will be displayed on the home page when no fault occurs in the current system.
-  will be displayed on the home page when a fault occurs in the current system. Users can enter the real-time error list by touching this icon.
- Click the “Fun” button to view the next page of the fault list, and click “Clear” to clear the current faults. The fault information will be cleared only if the system errors are successfully removed. If not, the fault list will remain unchanged.

2.5 Parameter settings

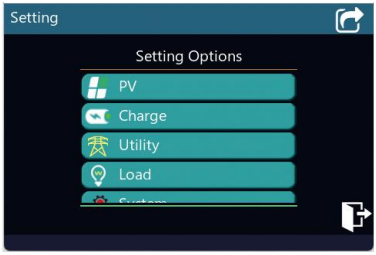
2.5.1 Parameter list

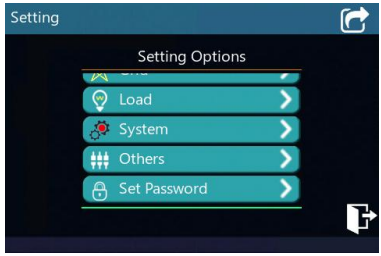


1. Click  in the upper right corner of the home page to enter the password input interface.



2. Enter the correct password (default is 000000) on the input interface, and click OK to enter the "Setting Options" interface.

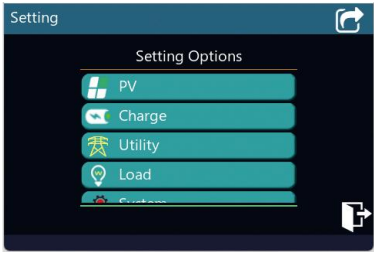


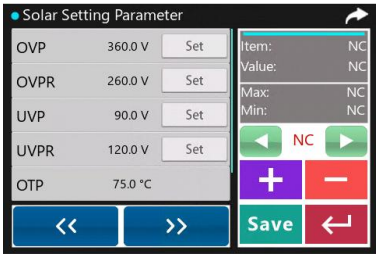


- The options include: PV (PV general parameter setting), Charge (parameter setting of battery charging control mode), Utility (utility general parameter setting), Load (load general parameter setting), System (system parameter setting), Others (other system control parameter setting), and Set Password (password interface). On the "Setting Options" interface, swipe up and down to select the parameter item to be set, and click the parameter to enter the setting interface.

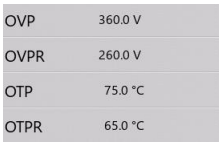
- Click  to exit the current interface and return to the home page. If you access the parameter setting interface again within 5 minutes after this way of exiting, there is no need to re-enter the password. However, if you click  to fully exit the current interface and return to the home page, you will need to re-enter the password when accessing the parameter setting screen again.

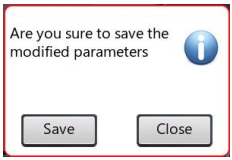
1) PV





Click "PV" on the setting interface to enter the PV parameter configuration. The instructions of the interface are as follows:

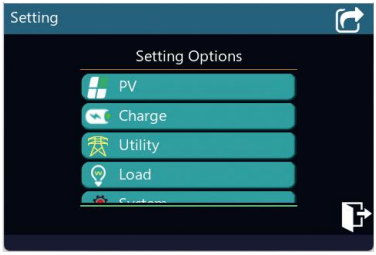
Icon	Instruction
	Default values and setting instructions of PV general parameters. Swipe up and down to view all configured parameters on the current interface. If there is a Set button, it indicates that the parameter value can be customized; if there is no Set button, it indicates that the parameter is read-only and modifications are not supported.
	Click to view other configurable parameters. **Note:** The clicking action on this button is invalid when setting the PV parameters.
	Click the Set button to display the parameter name, default value, maximum configurable value, and minimum configurable value.
	x10.0 represents the step change ratio, with options of 0.1 times, 10 times, 1 time, and 0.5 times. After setting the step change ratio, click + − button to increase or decrease the current parameter.
	After finishing all settings, click the ↵ button to confirm the set value. After setting all parameters on the current interface, click Save to save new parameter values. Then the following prompt

	interface will pop up:  Click “Save” to complete the parameter setting.

Default values and setting instructions of PV general parameters are shown in the following table:

Parameter list	Default	Instructions
OVP	95.0V	Read-only. QI1012-0610C **Note:** A voltage higher than 150V may cause damage to the equipment.
	145.0V	Read-only. QI1021-0415C **Note:** A voltage higher than 150V may cause damage to the equipment.
OVPR	85.0V	Read-only. QI1012-0610C
	135.0V	Read-only. QI1021-0415C
OTP	80.0℃	Read-only.
OTPR	75.0℃	Read-only.

2) Charge



Click "Charge" on the setting interface to enter the battery charging control modes interface. The instructions of the interface are as follows:

Icon	Instruction
	Default values and setting instructions of the battery voltage/SOC parameters. Swipe up and down to view all configured parameters on the current interface. If there is a Set button, it indicates that the parameter value can be customized; if there is no Set button, it indicates that the parameter is read-only and modifications are not supported.
	Click to view the Voltage Control Strategy and SOC Control Strategy interface.

Note: Refer to the instructions of 2.5.1 Parameter list > 1) PV for the content and operations of the parameter setting area on the right screen.

Default values and setting instructions of the battery charging control are shown in the following table:

Parameter list	Default	Instructions
2.1 Voltage Control Strategy		
OVD	16.0V (12V system)	User define: Overvoltage Recovery Voltage plus 0.1*N ≤ Overvoltage Disconnect Voltage ≤ 16*N), step size: 0.1V **Note:** N = Rated battery voltage/12.
	32.0V (24V system)	

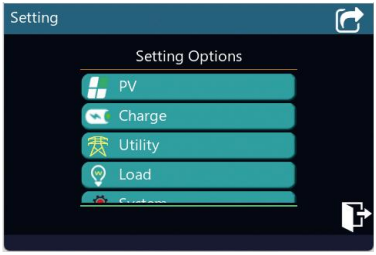
CLV	15.0V (12V system) 30.0V (24V system)	User define: Equalization Charging Voltage < Charging Limit Voltage < Overvoltage Disconnect Voltage, step size: 0.1V
OVR	15.0V (12V system) 30.0V (24V system)	User define: (Discharging Limit Voltage plus 0.1*N ≤ Overvoltage Recovery Voltage ≤ (Overvoltage Disconnect Voltage minus 0.1*N), step size: 0.1V **Note:** N = Rated battery voltage/12.
ECV	14.6V (12V system) 29.2V (24V system)	User define: Bulk Charging Voltage ≤ Equalization Charging Voltage < Charging Limit Voltage, step size: 0.1V
BCV	14.4V (12V system) 28.8V (24V system)	User define: Float Charging Voltage ≤ Bulk Charging Voltage ≤ Equalization Charging Voltage, step size: 0.1V
FCV	13.8V (12V system) 27.6V (24V system)	User define: Bulk Recovery Voltage < Float Charging Voltage ≤ Bulk Charging Voltage, step size: 0.1V
BVR	13.2V (12V system) 26.4V (24V system)	User define: Low Voltage Recovery Voltage < Bulk Recovery Voltage < Float Charging Voltage, step size: 0.1V
LVR	12.6V (12V system) 25.2V (24V system)	User define: Low Voltage Disconnect Voltage < Low Voltage Recovery Voltage < Bulk Recovery Voltage, step size: 0.1V

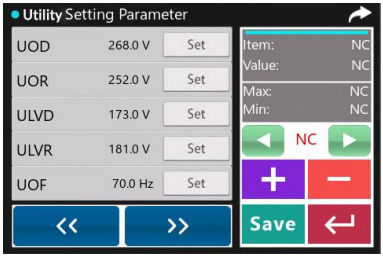
UVWR	12.2V (12V system)	User define: (Undervoltage Alarm Voltage plus 0.1*N) ≤ Undervoltage Alarm Recovery Voltage ≤ (Overvoltage Recovery Voltage minus 0.1*N), step size: 0.1V **Note:** N = Rated battery voltage/12.
	24.4V (24V system)	
UVW	12.0V (12V system)	User define: (Discharging Limit Voltage plus 0.1*N) ≤ Undervoltage Alarm Voltage ≤ (Undervoltage Alarm Recovery Voltage minus 0.1*N), step size: 0.1V **Note:** N = Rated battery voltage/12.
	24.0V (24V system)	This voltage is the disconnect voltage for the primary power-down of AC output. When the battery voltage drops to the mentioned value, the relay for AC output primary power-down is disengaged.
LVD	11.1V (12V system)	User define: Discharging Limit Voltage < Low Voltage Disconnect Voltage < Low Voltage Recovery Voltage, step size: 0.1V
	22.2V (24V system)	
AUX OFF	14.0V (12V system)	Under the “Solar prior” charging mode, the Utility will stop charging the battery if the battery voltage exceeds this value. User define: (Auxiliary Charging ON Voltage plus 0.2*N) ≤ Auxiliary Charging OFF Voltage ≤ Charging Limit Voltage (N = Rated battery voltage/12), step size: 0.1V (subject to battery type)
	28.0V (24V system)	
AUX ON	12.0V (12V system)	Under the “Solar prior” charging mode, the Utility will start charging the battery if the battery voltage exceeds this value. User define: Low Voltage Disconnect Voltage ≤ Auxiliary Charging ON Voltage ≤ (Auxiliary Charging OFF Voltage minus 0.2*N), step size: 0.1V (subject to battery type) **Note:** N = Rated battery voltage/12.
	24V (24V system)	

2.2 SOC Control Strategy		
FCP	100%	Valid only when "BCCMode" is set to "SOC". When the battery SOC is greater than or equals to this value, the inverter/charger will automatically stop charging the battery. User define: (Full Charge Protection Recovery SOC plus 5%) to 100%, or 80% to 100%, step size: 1% **Note:** Take the maximum value between (Full Charge Protection Recovery SOC plus 5%) and 80%.
FCPR	95%	Valid only when "BCCMode" is set to "SOC". When the battery SOC is less than this value, the inverter/charger will automatically charge the battery. User define: 60% to (Full Charge Protection SOC minus 5%), step size: 1%
LPAR	40%	Valid only when "BCCMode" is set to "SOC". It cannot be set separately (equals to the DPR (Discharging Protection Recovery SOC)).
LPA	25%	Valid only when "BCCMode" is set to "SOC". User define: 10% to 35%, or 10% to (Discharging Protection Recovery SOC minus 5%), step size: 1% **Note:** Take the minimum value between 35% and (Discharging Protection Recovery SOC minus 5%).
DPR	40%	Valid only when "BCCMode" is set to "SOC". User define: (Discharging Protection SOC plus 5%) to 60%, or 20% to 60%, step size: 1% **Note:** Take the maximum value between (Discharging Protection SOC plus 5%) and 20%.
DP	20%	Valid only when "BCCMode" is set to "SOC". When the battery SOC is less than this value, the battery will automatically stop discharging. User define: 0 to 30%, or 0 to (Discharging

		Protection Recovery SOC minus 5%), step size: 1% **Note:** Take the minimum value between 30% and (Discharging Protection Recovery SOC minus 5%).
UAC ON	30%	Valid only when "BCCMode" is set to "SOC". User define: 20% to 50%, or 20% to (Utility Auxiliary Charging OFF SOC minus 10%), step size: 1% **Note:** Take the minimum value between 50% and (Utility Auxiliary Charging OFF SOC minus 10%).
UAC OFF	60%	Valid only when "BCCMode" is set to "SOC". User define: (Utility Auxiliary Charging ON SOC plus 10%) to 100%, or 40% to 100%, step size: 1% **Note:** Take the maximum value between (Utility Auxiliary Charging ON SOC plus 10%) and 40%.
Set SOC	45%	Read-only. When the BMS is valid and the communication is normal, the real-time SOC value of the BMS needs to be uploaded to the inverter/charger.

3) Utility





Click "Utility" on the setting interface to enter the Utility parameter configuration. The instructions of the interface are as follows:

Icon	Instruction
	Default values and setting instructions of general parameters of Utility. Swipe up and down to view all configured parameters on the current interface. If there is a Set button, it indicates that the parameter value can be customized; if there is no Set button, it indicates that the parameter is read-only and modifications are not supported.
	Click to view other configurable parameters. **Note:** The clicking action on this button is invalid when setting the Utility parameters.

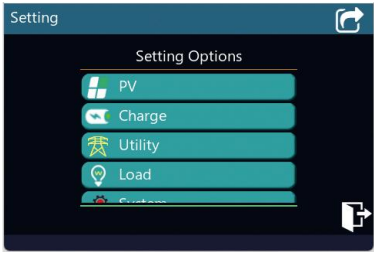
Note: Refer to the instructions of 2.5.1 Parameter list > 1) PV for the content and operations of the parameter setting area on the right screen.

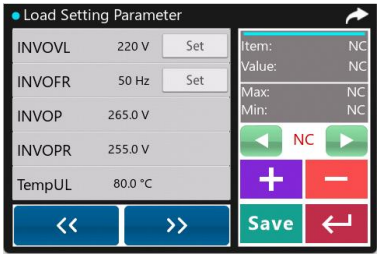
Default values and setting instructions of Utility general parameters are shown in the following table:

Parameter list	Default	Instructions
UOD	265.0V	User define: (Utility Overvoltage Reconnect Voltage plus 10V) to 285.0V, step size: 0.1V QI1012-0610C
	140.0V	User define: (Utility Overvoltage Reconnect Voltage plus 10V) to 140.0V, step size: 0.1V QI1021-0415C

UOR	255.0V	User define: 220.0V to (Utility Overvoltage Disconnect Voltage minus 10V), step size: 0.1V QI1012-0610C
	130.0V	User define: 110.0V to (Utility Overvoltage Disconnect Voltage minus 10V), step size: 0.1V QI1021-0415C
ULVD	170.0V	User define: 170.0V to (Utility Undervoltage Recovery Voltage minus 10V), step size: 0.1V QI1012-0610C
	80.0 V	User define: 80.0V to (Utility Undervoltage Recovery Voltage minus 10V), step size: 0.1V QI1021-0415C
ULVR	180.0V	User define: (Utility Undervoltage Disconnect Voltage plus 10V) to 220.0V, step size: 0.1V QI1012-0610C
	90.0 V	User define: (Utility Undervoltage Disconnect Voltage plus 10V) to 110.0V, step size: 0.1V QI1021-0415C
UOF	65.0Hz	In the bypass state, when the actual utility input frequency is less than this value, the inverter/charger will be switched to the inverter output state. User define: 52.0 to 65.0Hz, or (Utility Underfrequency Disconnect Frequency plus 0.5Hz) to 65.0Hz, step size: 0.1Hz **Note:** Take the maximum value between 52.0Hz and (Utility Underfrequency Disconnect Frequency plus 0.5Hz).
UFD	45.0Hz	In the bypass status, when the actual utility input frequency is less than this value, the inverter/charger will be switched to the inverter output status. User define: 45.0 to 58.0Hz, or 40.0Hz to (Utility Overfrequency Disconnect Frequency minus 0.5Hz), step size: 0.1Hz **Note:** Take the minimum value between 58.0Hz and (Utility Overfrequency Disconnect Frequency minus 0.5Hz).

4) Load





Click "Load" on the setting interface to enter the load parameter configuration. The instructions of the interface are as follows:

Icon	Instruction
	Default values and setting instructions of Load general parameters. Swipe up and down to view all configured parameters on the current interface. If there is a Set button, it indicates that the parameter value can be customized; if there is no Set button, it indicates that the parameter is read-only and modifications are not supported.
	Click to view other configurable parameters. **Note:** The clicking action on this button is invalid when setting the Load parameters.

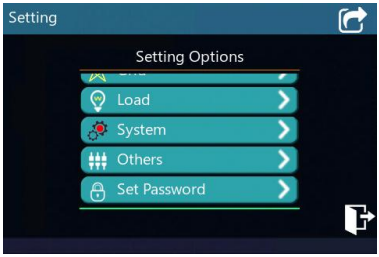
Note: Refer to the instructions of 2.5.1 Parameter list > 1) PV for the content and operations of the parameter setting area on the right screen.

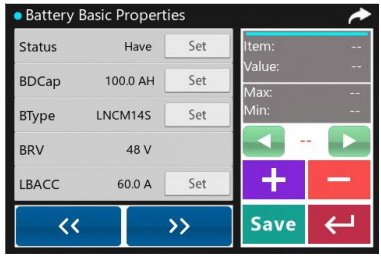
Default values and setting instructions of Load general parameters are shown in the following table:

Parameter list	Default	Instructions
INVOVL	230V	User define: 220V/230V QI1012-0610C
	120V	User define: 110V/120V QI1021-0415C

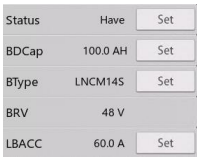
INVOFR	50Hz	User define: 50Hz/60Hz QI1012-0610C
	60Hz	User define: 50Hz/60Hz QI1021-0415C **Note:** When connecting to the utility and detecting the frequency of the utility, the output of the utility bypass status will be in accordance with the utility frequency. For a single inverter/charger, it takes effect immediately after the output frequency is changed. For parallel connections, the inverter/charger must be shut down for 10 seconds and then restarted for the modification to take effect (Enter into the "Load Setting Parameter" interface again to check if the modification is completed).
INVOP	265.0V	Read-only. QI1012-0610C
	140.0V	Read-only. QI1021-0415C
INVOPR	255.0V	Read-only. QI1012-0610C
	130.0V	Read-only. QI1021-0415C
TempUL	85.0℃	Read-only.
TempULR	80.0℃	Read-only.

5) System





Click "System" on the setting interface to enter the system parameter configuration. The instructions of the interface are as follows:

Icon	Instruction
	Default values and setting instructions of system general parameters. Swipe up and down to view all configured parameters on the current interface. If there is a Set button, it indicates that the parameter value can be customized; if there is no Set button, it indicates that the parameter is read-only and modifications are not supported.
	Click to view the battery basic and advanced properties, charging and discharging management parameters, system time and the local parameters setting interfaces.
	Setting of the parameters with options: Click + − to switch options. A green blinking dot in front of the parameter indicates that the current parameter is selected. Click ↵ to confirm the set value and then click Save to complete the setting. Refer to the instructions of 2.5.1 Parameter list > 1) PV for the content and operations of the parameter setting area on the right screen.

Default values and setting instructions of system parameters are shown in the following table:

Parameter list	Default	Instructions
5.1 Battery Basic Properties		
Status	Have	User define: Have; No
BDCap	100.0AH	User define: 10.0 to 2400.0AH, step size: 0.1AH
BType	AGM	**12V battery type:** AGM, GEL, FLD, LFP4S and LNCM3S
	AGM	**24V battery type**: AGM, GEL, FLD, LFP8S, LNCM6S, LNCM7S
BRV	12V	Read-only. QI1012-0610C
	24V	Read-only. QI1021-0415C
LBACC	90.0A	User define: 5.0 to 90.0A, step size: 0.1A QI1012-0610C
	45.0A	User define: 5.0 to 70.0A, step size: 0.1A QI1021-0415C
LBADC	225.0A	User define: 5.0 to 225.0A, step size: 0.1A QI1012-0610C
	110.0A	User define: 5.0 to 110.0A, step size: 0.1A QI1021-0415C
BECT	120 Min	User define: 10 to 180 minutes, step size: 1 minute
BECD	28 D	User define: 1–28, step size: 1
BBCT	120 Min	User define: 10 to 180 minutes, step size: 1 minute
BTCC	3	User define: 0–9, step size: 1 **Note:** This option is reserved, which is invalid currently.

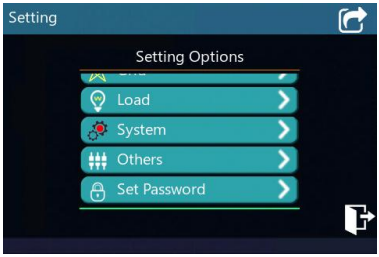
5.2 Advanced Battery Properties		
Li PROT	Disable	User define: Disable; Enable Set the parameter as “Enable”, and the Low Temperature Charging Limit will be valid.
LTSChrg	0℃	User define: -20.0℃ to 0℃, step size: 0.1℃ When the ambient or battery temperature is less than this value, the inverter/charger will stop charging the battery.
LTSDischrg	0℃	User define: -20.0℃ to 0℃, step size: 0.1℃ When the ambient or battery temperature is less than this value, the inverter/charger will stop charging the battery.
BATT OTP	50.0℃	User define: (Battery Over Temperature Protection Recovery plus 5℃) to 60.0℃, step size: 0.1℃
BATT OTPR	45.0℃	User define: 30℃ to (Battery Over Temperature Protection minus 5℃), step size: 0.1℃
Chrg	Enable	User define: Enable; Disable Set the parameter as “Disable”, and the inverter/charger can not charge the battery.
Dischrg	Enable	User define: Enable; Disable Set the parameter as “Disable”, the inverter/charger can not discharge to the battery.
PWRSDT	10 Min	User define: 1 to 10 minutes, step size: 1 minute
5.3 Charge and Discharge Management		
BACC	60.0 A	Read-only. QI1012-0610C
	45.0A	Read-only. QI1021-0415C
BADC	225.0A	Read-only. QI1012-0610C

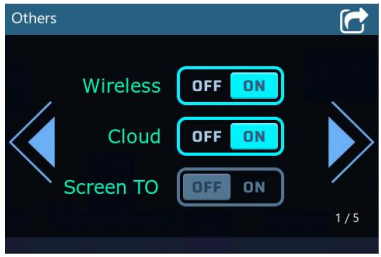
	110.0A	Read-only. QI1021-0415C
UACC	60.0 A	User define: 5.0 to 60.0A, step size: 0.1A QI1012-0610C
	30.0A	User define: 5.0 to 30.0A, step size: 0.1A QI1021-0415C
CMode	Solar plus Utility	User define: Solar, Solar prior, Solar plus Utility **Note:** For detailed working modes, refer to Chapter 4 Working Mode.
DMode	Inverter	User define: Inverter; Bypass **Note:** For detailed working modes, refer to Chapter 4 Working Mode.
ACmode	Utility	User define: Utility; Oil When a generator works as the AC input source, set this mode to "Oil" to enhance the charging of the inverter/charger. Note: If the configured AC input mode is not compatible with the actual AC source, the normal operation of the inverter/charger will be affected. After setting, restart the inverter/charger for the setting to take effect.
PVMode	Single	User define: Single; Parallel When two or more PV arrays are input independently, the "Single" mode must be set. When two or more PV arrays are connected in parallel to the inverter/charger (the PV terminals of the inverter/charger to be externally paralleled), the "Parallel" mode must be set. **Note:** PV Mode is invalid when the product only has one PV input.
BCCMode	VOL	User define: VOL; SOC **VOL:** Set the parameter as "VOL", the relevant battery voltage control parameters will be valid. **SOC:** Set the parameter as "SOC", the relevant battery SOC parameters will be valid. **Note:** When "SOC" is selected and there is no

		connection to the BMS, it is recommended to correctly set the battery capacity and perform multiple complete charge-discharge cycles. Only in this way can the SOC be accurately displayed.
BMSProt	10	User define: 0–27, step size: 1 **Note:** Refer to the Lithium Battery Protocol file.
BMS	Disable	User define: Disable; Enable Set the parameter as "Enable", the inverter/charger can communicate normally with the battery pack.
BMSVolt	Disable	User define: Disable; Enable Set the parameter as "Enable", the internal voltage control parameters of the BMS will be automatically synchronized into the inverter/charger, and the inverter/charger will control the battery charging and discharging based on these data.
BMSCurr	Invalid	User define: Invalid; BMS Set the parameter as "Invalid", the inverter/charger controls the charging and discharging according to the value set on the LCD. Set the parameter as "BMS" the inverter/charger controls the charging and discharging according to the read BMS value.
BMSFail	DSP	User define: DSP; Disable **DSP:** The inverter/charger works according to the default mode and parameters. **Disable:** No charging and discharging, equivalent to standby mode.
5.4 System Time Setting		
5.5 Local Parameters		
LCD BRT	100%	User define: 50%–100% The LCD brightness when operating the LCD.
TODelay	15S	User define: 6 to 60S, step size: 1S When the set "TODelay" time is reached after no operation on the LCD, the LCD brightness will be

		reduced to the set “LCDSBRT” value.
LCDSBRT	50%	User define: 35%–100% The LCD brightness after no operation on the LCD exceeds the “TODelay” time.
SOT	30S	User define: 15 to 60S, step size: 1S If “Screen To” is set to “ON”, and after no operation on the LCD exceeds both the “TODelay” time and the “SOT” time, the LCD will turn off.
Com ID	1	User define: 1–240, step size: 1
Com Bps	115200bps	User define: 9600, 19200, 38400, 57600, 115200, 256000
DCT ON	11.0V (12V system)	User define: 0 to (Dry Contact OFF Voltage minus 0.2*N) (N = Rated battery voltage/12), step size: 0.1V When the battery voltage is less than this set value, the dry contact switch closes.
	22.0V (24V system)	
DCT OFF	12.5V (12V system)	User define: (Dry Contact ON Voltage plus 0.2*N) to Overvoltage Disconnect Voltage (N = Rated battery voltage/12), step size: 0.1V When the battery voltage is greater than this set value, the dry contact switch opens.
	25.0V (24V system)	
Switch BMS	Enable	User define: Enable; Disable In the case of normal BMS communication, if it is set to “Enable”, charging is allowed. If set to “Disable”, charging is not allowed. When the BMS communication is abnormal, this setting will be invalid.
Buzz	ON	User define: OFF; ON Control the activation of the buzzer.
LED	ON	User define: OFF; ON Control the display of the LED light on the screen.
HRI	60S	User define: 1 to 3600 seconds Interval for historical records.

6) Others





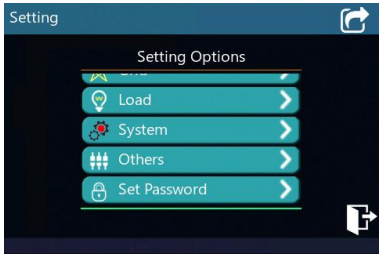
Click “Others” on the setting interface to enter the other system parameter configuration. Click  to switch interfaces. Set relevant parameters directly through touching screen.

Default values and setting instructions of other system control parameters are shown in the following table:

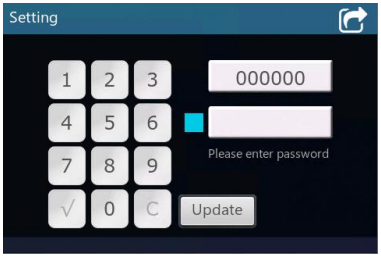
Parameter list	Default	Instructions
Wireless	ON	User define: OFF; ON Switch on/off the internal WiFi module. **Note:** No internal communication module inside the product, and this parameter is invalid.
Cloud	OFF	User define: OFF; ON Switch on/off the 5V power supply for inverter/charger’s COM port. Set it to “ON” to enable the external Bluetooth/WIFI module.
Screen TO	ON	User define: ON; OFF LCD backlight switch. When set it to “ON”, the LCD backlight turns off after “TODelay” plus “SOT” time. When set it to “OFF”, the LCD backlight is always on.
Parameter Rest	Normal Mode	User define: Normal Mode; Standby Mode After selecting “Standby Mode” and clicking the “Factory Reset” button, all setting parameters can be restored to factory default values (including password settings).

SOC Reset	--	After clicking “SOC Reset”, the inverter/charger will re-evaluate a new SOC value based on the current battery voltage status.
Saving Energy Mode	ECO Mode	User define: ECO Mode; Normal Mode When set it to “ECO Mode”, the inverter/charger will enter the low-power consumption mode when certain conditions are met, such as no PV and utility, and the battery voltage drops to the “Low Voltage Disconnect Voltage”. When set it to “Normal Mode”, the inverter/charger will not enter the low-power consumption mode.
Manual Equalizer	--	On the “Saving Energy Mode” interface, after pressing the “Manual Equalizer” button, the inverter/charger enters the equalization charging status. **Note:** This function is independent of whether the ECO Mode or Normal Mode is selected.
DC Source Characteristic	PV Source	User define: PV Source; DC Source When using a DC power to replace the PV array for power supply testing, it is necessary to select as “DC Source” for this parameter. Otherwise, the inverter/charger can not work properly.
Initializing Records	--	On the “DC Source Characteristic” interface, after pressing the “Initializing Records” button, the historical fault records are cleared after about 10 seconds. **Note:** This function is independent of whether the DC Source or PV Source is selected.
Clear Statistical Power	Day/Month/Year	User define: Day/Month/Year; Total Generation After selecting “Day/Month/Year” or “Total Generation”, pressing the “Clear” button can clear the corresponding accumulated power.

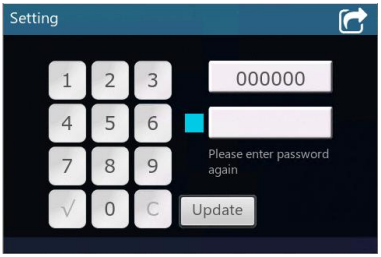
7) Password



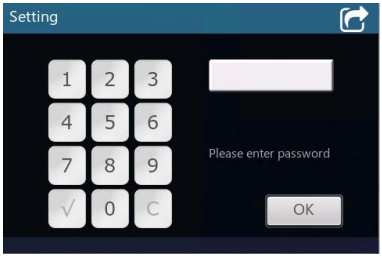
1. Click "Set Password" on the setting interface to enter the password modification interface.



2. Enter the previous password in the upper field and the new password in the lower field. Then click Update to enter the password input interface.



3. Re-enter the new password and click Update to complete the modification.



4. Enter the new password and click OK to re-enter the parameters setting interface.

Note: The password can be modified to be empty or any number with no more than 6 digits. An empty password means that no digits are entered when modifying the password.

2.5.2 Battery mode

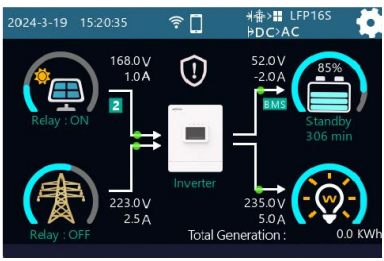
The following table lists the setting process for different application scenarios. According to your current battery status (such as whether it is a lithium-ion battery pack, whether it has BMS function, whether it has current control function at the end of charge and discharge, etc.), you can reasonably set the parameters to ensure that the battery works in the optimal performance, so as to ensure the safe operation of the system for a long time.

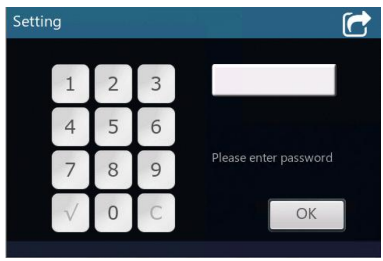
No.	Scenario	Setting Process
1	Battery without BMS	See Figure 1 Setting Process for Battery without BMS
2	Lithium battery with BMS	See Figure 2 Setting Process for Lithium Battery with BMS

- **Figure 1 Setting Process for Battery Without BMS**

When the system adopts the battery without BMS, follow the table below to set parameters correctly. The inverter/charger controls charging and discharging based on the LCD settings.

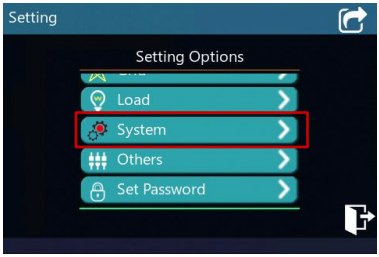
Interface	Parameters	Define
Battery Basic Properties	BDCap	Set according to the actual battery type.
	BType	
Charge and Discharge Management	BCCMode	Set it to "VOL" or "SOC", the inverter/charger controls charging and discharging based on the set battery voltage control parameters or SOC control parameters.

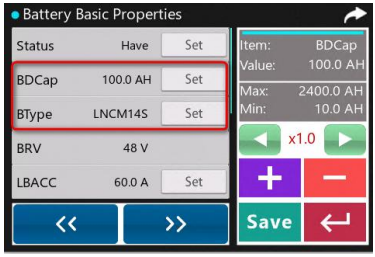




1. Click  in the upper right corner on the home page to enter the password input interface.

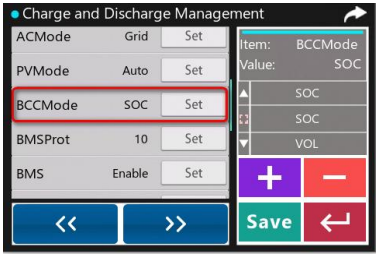
2. Enter the correct password (by default 000000) on the input interface, and click OK to enter the "Setting Options" interface.





3. On the "Setting Options", swipe up and down to select "System", and click  to enter the parameter setting interface.

4. Set the value of "BDCap" and "BType" according to the actual battery. After setting all parameters, click Save to save new parameter values.



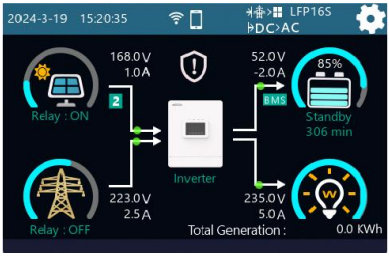
5. Click  to switch to "Charge and Discharge Management" interface, and set "BCCMode" as "VOL" or "SOC". After setting all parameters, click Save to save new parameter values.

- **Figure 2 Setting Process for Lithium Battery with BMS**

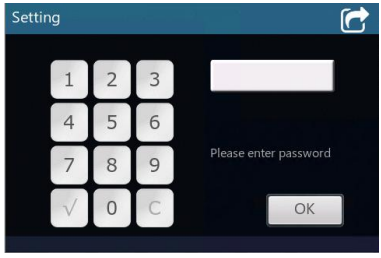
When the system adopts the lithium battery with BMS, follow the table below to set parameters correctly.

Interface	Parameters	Define
Battery Basic Properties	BType	Set according to the actual battery type.
Charge and Discharge Management	BCCMode	Set it to "VOL" or "SOC", the inverter/charger controls charging and discharging based on the set battery voltage control parameters or SOC control parameters.

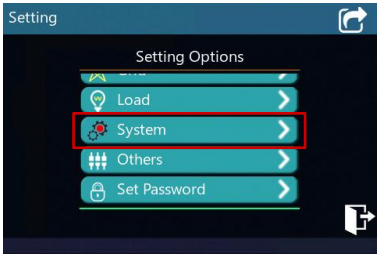
	BMSProt	Set according to the actual battery protocol.
	BMS	Enable
	BMSVolt	Enable
	BMSCurr	BMS



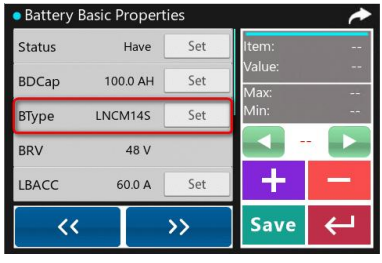
1. Click  in the upper right corner on the home page to enter the password input interface.



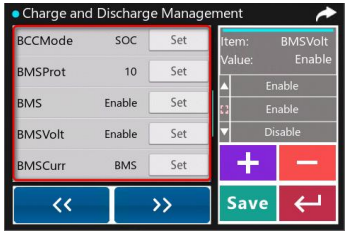
2. Enter the correct password (by default 000000) on the input interface, and click OK to enter the "Setting Options" interface.



3. On the "Setting Options" interface, swipe up and down to select "System", and click  to enter the parameter setting interface.



4. Set the "BType" according to the actual battery. After setting all parameters, click Save to save new parameter values.



5. Click >> to switch to "Charge and Discharge Management" interface, and set "BCCMode", "BMSProt", "BMS", "BMSVolt" and "BMSCurr". After setting all parameters, click Save to save new parameter values.

Tip Please go to EPEVER official website to download the currently supported BMS manufacturers and the BMS parameters.

NOTICE

The inverter/charger will control charging and discharging based on the LCD settings after setting the "BMSCurr" as "Invalid" or the communication between battery and inverter/charger fails.

2.5.3 Battery voltage control parameters (Expert)

1) Lead-acid battery voltage control parameters

The parameters are measured in the condition of 24V/25°C.

Battery Type / Voltage Control Parameters	AGM	GEL	FLD	User Define
Overvoltage Disconnect Voltage	32.0V	32.0V	32.0V	18~32V
Charging Limit Voltage	30.0V	30.0V	30.0V	18~32V
Overvoltage Recovery Voltage	30.0V	30.0V	30.0V	18~32V
Equalization Charging Voltage	29.2V	28.4V	29.6V	18~32V
Bulk Charging Voltage	28.8V	28.4V	29.2V	18~32V
Float Charging Voltage	27.6V	27.6V	27.6V	18~32V
Bulk Recovery Voltage	26.4V	26.4V	26.4V	18~32V
Low Voltage Recovery Voltage	25.2V	25.2V	25.2V	18~32V
Undervoltage Alarm Recovery Voltage	24.4V	24.4V	24.4V	18~32V

Undervoltage Alarm Voltage	24.0V	24.0V	24.0V	18–32V
Low Voltage Disconnect Voltage	22.2V	22.2V	22.2V	18–32V
Discharging Limit Voltage	21.2V	21.2V	21.2V	Read-only

The parameters are measured in the condition of 12V/25°C.

Battery Type / Voltage Control Parameters	AGM	GEL	FLD	User Define
Overvoltage Disconnect Voltage	16.0V	16.0V	16.0V	9–16V
Charging Limit Voltage	15.0V	15.0V	15.0V	9–16V
Overvoltage Recovery Voltage	15.0V	15.0V	15.0V	9–16V
Equalization Charging Voltage	14.6V	14.2V	14.8V	9–16V
Bulk Charging Voltage	14.4V	14.2V	14.6V	9–16V
Float Charging Voltage	13.8V	13.8V	13.8V	9–16V
Bulk Recovery Voltage	13.2V	13.2V	13.2V	9–16V
Low Voltage Recovery Voltage	12.6V	12.6V	12.6V	9–16V
Undevoltage Alarm Recovery Voltage	12.2V	12.2V	12.2V	9–16V
Undervoltage Alarm Voltage	12.0V	12.0V	12.0V	9–16V
Low Voltage Disconnect Voltage	11.1V	11.1V	11.1V	9–16V
Discharging Limit Voltage	10.6V	10.6V	10.6V	Read-only

When setting the Lead-acid battery voltage control parameters, the following rules must be obeyed:

A. Overvoltage Disconnect Voltage > Charging Limit Voltage ≥ Equalization Charging Voltage ≥ Bulk Charging Voltage ≥ Float Charging Voltage > Bulk Recovery Voltage

B. Overvoltage Disconnect Voltage > Overvoltage Recovery Voltage

C. Low Voltage Recovery Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage

D. Undervoltage Alarm Recovery Voltage > Undervoltage Alarm Voltage ≥ Discharging Limit Voltage

E. Bulk Recovery Voltage > Low Voltage Recovery Voltage

2) Lithium battery voltage control parameters

Battery Type / Voltage Control Parameters	LFP			
	24V system		12V system	
	LFP8S	User Define	LFP4S	User Define
Overvoltage Disconnect Voltage	29.0V	21.2–32V	14.5V	10.6 – 16V
Charging Limit Voltage	28.6V	21.2–32V	14.3V	10.6 – 16V
Overvoltage Recovery Voltage	28.6V	21.2–32V	14.3V	10.6 – 16V
Equalization Charging Voltage	28.4V	21.2–32V	14.2V	10.6 – 16V
Bulk Charging Voltage	28.4V	21.2–32V	14.2V	10.6 – 16V
Float Charging Voltage	26.6V	21.2–32V	13.3V	10.6 – 16V
Bulk Recovery Voltage	26.0V	21.2–32V	13.0V	10.6 – 16V
Low Voltage Recovery Voltage	25.6V	21.2–32V	12.8V	10.6 – 16V
Undervoltage Alarm Recovery Voltage	24.4V	21.2–32V	12.2V	10.6 – 16V
Undervoltage Alarm Voltage	24.0V	21.2–32V	12.0V	10.6 – 16V
Low Voltage Disconnect Voltage	22.6V	21.2–32V	11.3V	10.6 – 16V
Discharging Limit Voltage	21.2V	Read-only	10.6V	Read-only

Battery Type / Voltage Control Parameters	LNCM				
	24V system			12V system	
	LNCM6S	LNCM7S	User Define	LNCM3S	User Define
Overvoltage Disconnect Voltage	25.8V	30.1V	21.2–32V	12.9V	10.6–16V
Charging Limit Voltage	25.5V	29.7V	21.2–32V	12.7V	10.6 – 16V
Overvoltage Recovery Voltage	25.5V	29.7V	21.2–32V	12.7V	10.6 – 16V
Equalization Charging Voltage	25.0V	29.1V	21.2–32V	12.5V	10.6 – 16V

Bulk Charging Voltage	25.0V	29.1V	21.2–32V	12.5V	10.6 – 16V
Float Charging Voltage	24.0V	28.0V	21.2–32V	12.0V	10.6 – 16V
Bulk Recovery Voltage	23.4V	27.3V	21.2–32V	11.7V	10.6 – 16V
Low Voltage Recovery Voltage	22.2V	25.9V	21.2–32V	11.1V	10.6 – 16V
Undervoltage Alarm Recovery Voltage	21.6V	25.2V	21.2–32V	10.8V	10.6 – 16V
Undervoltage Alarm Voltage	21.2V	24.5V	21.2–32V	10.6V	10.6 – 16V
Low Voltage Disconnect Voltage	21.2V	22.4V	21.2–32V	10.6V	10.6 – 16V
Discharging Limit Voltage	21.2V	21.2V	Read-only	10.6V	Read-only

When setting the lithium battery voltage control parameters, the following rules must be obeyed:

A. Overvoltage Disconnect Voltage < Over Charging Protection Voltage (BMS Circuit Protection Modules) minus 0.2V

B. Overvoltage Disconnect Voltage > Charging Limit Voltage ≥ Equalization Charging Voltage ≥ Bulk Charging Voltage ≥ Float Charging Voltage > Bulk Recovery Voltage

C. Overvoltage Disconnect Voltage > Overvoltage Recovery Voltage

D. Bulk Recovery Voltage > Low Voltage Recovery Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage

E. Undervoltage Alarm Recovery Voltage > Undervoltage Alarm Voltage ≥ Discharging Limit Voltage

F. Low Voltage Disconnect Voltage ≥ Over Discharging Protection Voltage (BMS Circuit Protection Modules) plus 0.2V

NOTICE

The voltage control accuracy of BMS circuit protection module must be at least ± 0.2V. The [Overvoltage Disconnect Voltage] shall be lower than the protection voltage of the BMS circuit protection module. In contrast, the [Low Voltage Disconnect Voltage] shall be higher. The increased voltage of the [Overvoltage Disconnect Voltage] and the [Low Voltage Disconnect Voltage] is determined by the control accuracy of the BMS circuit protection module.

3 Single Installation

3.1 Precautions

- Please read the manual carefully to get familiar with the installation steps before installation.
- Be very careful when installing the batteries, especially flooded lead-acid batteries. Please wear eye protection, and have fresh water available to rinse if any contact with battery acid.
- Keep the battery away from any metal objects, which may cause a short circuit of the battery.
- Combustible and harmful gases may come out from the battery during charging. Ensure the ventilation condition is good.
- Ensure that the bearing capacity of the wall meets the wall-mounted requirements.
- Ventilation is highly recommended if mounted in an enclosure. Never install the inverter/charger in a sealed enclosure with flooded batteries! Battery fumes from vented batteries will corrode and destroy the inverter/charger circuits.
- The inverter/charger can work with a lead-acid battery and lithium battery within its control scope.
- Ensure all switches and breakers are disconnected before wiring. Please operate the inverter/charger after checking that all wiring is correct.
- Loose connections and corroded wires can lead to overheating, which may cause the insulation of the wires to melt and ignite surrounding materials, thereby creating a fire hazard. Ensure that all connections are secure and utilize cable clamps to prevent movement of the cables.
- Select the system connection cables according to the current density no greater than 5A/mm^2.
- The inverter/charger is for indoor installation only. Do not install the inverter/charger in the humid, salt spray, corrosive, greasy, flammable, explosive,dust accumulative or other severe environments.
- High voltage still exists inside the inverter/charger after turning off the switch. Do not open or touch the internal devices within ten minutes before conducting related operations.
- The inverter/charger has anti-reverse protection circuit at the battery input terminal, but it is only valid when no PV or Utility connected. Please do not operate it in error frequently as it may cause damage.
- Both utility input and AC output are high voltage. Please do not touch the wiring connection.
- When the fan is working, please do not touch it to avoid injury.

3.2 Wire and circuit breaker size

The wiring and installation methods must conform to all national and local electrical code requirements.

3.2.1 Recommended PV array wire and circuit breaker size

The output current of a PV module varies based on its size, connection method, and sunlight angle. The minimum wire size can be calculated using the PV Isc (maximum short-circuit current). Refer to the Isc value in the specifications of the PV module. When PV modules are connected in series, the total Isc is equal to the Isc of any individual module. In contrast, when connected in parallel, the total Isc is the sum of all modules' Isc values. The Isc of the PV array must not exceed the maximum input current of the PV system. For details on the maximum PV input current and the corresponding maximum wire size, please refer to the table below:

Model	PV Wire Size	Circuit Breaker
QI1012-0610C	10mm^2/7AWG	2P–50A
QI1021-041510C	6mm^2/10AWG	2P–32A

3.2.2 Recommended utility wire size

Model	Utility Wire Size	Circuit Breaker
QI1012-0610C	1.5mm^2/15AWG	2P—10A
QI1021-041510C	4mm^2/12AWG	2P—16A

3.2.3 Recommended battery wire and breaker size

Model	Battery Wire Size	Circuit Breaker
QI1012-0610C	35mm^2/2AWG	2P–200A
QI1021-041510C	20mm^2/4AWG	2P–125A

3.2.4 Recommended AC output wire size

Model	Load Wire Size	Circuit Breaker
QI1012-0610C	1.5mm^2/15AWG	2P—10A
QI1021-041510C	2.5mm^2/13AWG	2P—16A

NOTICE

- The wire size is only for reference. Suppose a long-distance exists among the PV array, the inverter/charger, and the battery. In that case, larger wires shall be used to reduce the voltage drop and improve the system performance.
- The above sizes for wire and circuit breaker are for reference only; please choose a suitable wire and circuit breaker according to the actual situation.

3.3 Mounting the inverter/charger

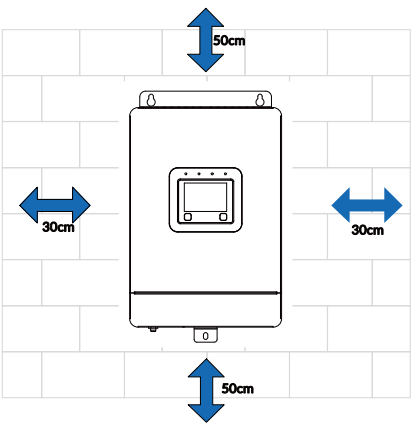
⚠ DANGER

- Risk of explosion! Do not install the inverter/charger in a sealed enclose with flooded batteries!
- Do not install the inverter/charger in a confined area where the battery gas can accumulate.

NOTICE

- The inverter/charger can be fixed to the concrete and solid brick walls, while it cannot be fixed to the hollow brick wall.
- The inverter/charger requires at least 30cm of clearance right and left, and 50cm of clearance above and below.

Step 1: Determine the installation location and heat-dissipation space. The inverter/charger requires at least 30cm of clearance right and left, and 50cm of clearance above and below.



Step 2: Drill two M10 holes with an electric drill according to the installation position marked with the mounting plate 1.

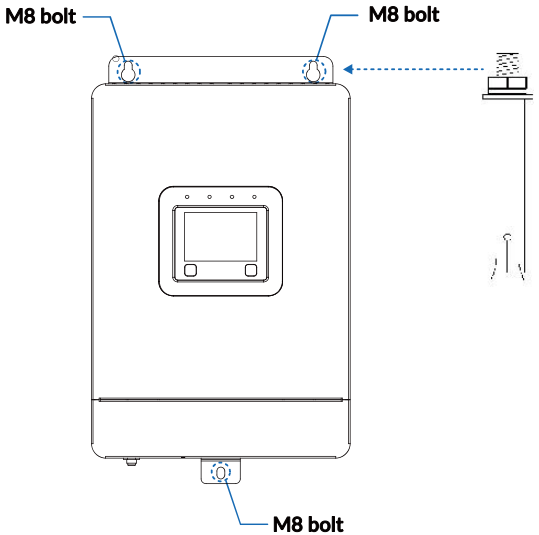
Step 3: Insert the screws of the M8 bolts and the steel pipes into the two M10 holes.

Step 4: Install the inverter/charger and determine the installation position of the M10 hole (located at the bottom of the inverter/charge).

Step 5: Remove the inverter/charger and drill an M10 hole according to the position determined in step4.

Step 6: Insert the screw of the M8 bolt and the steel pipe into the M10 hole.

Step 7: Install the inverter/charger and secure the nuts with a sleeve.

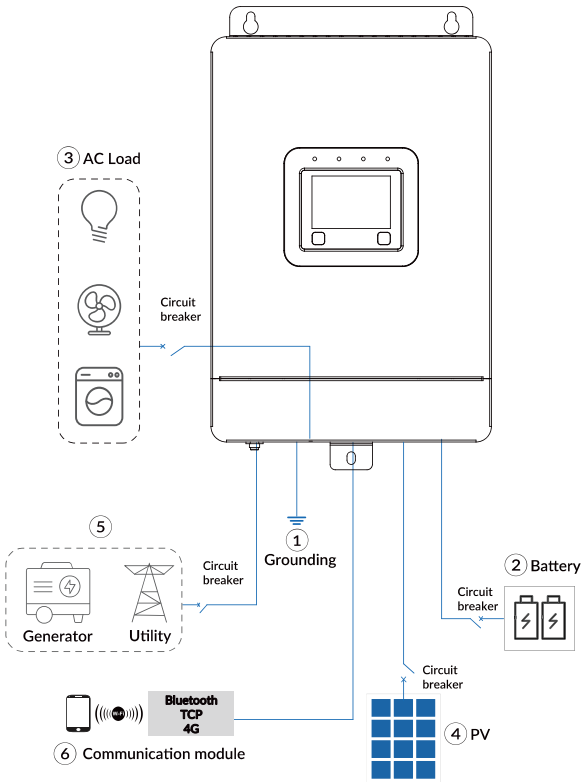


3.4 Wiring the inverter/charger

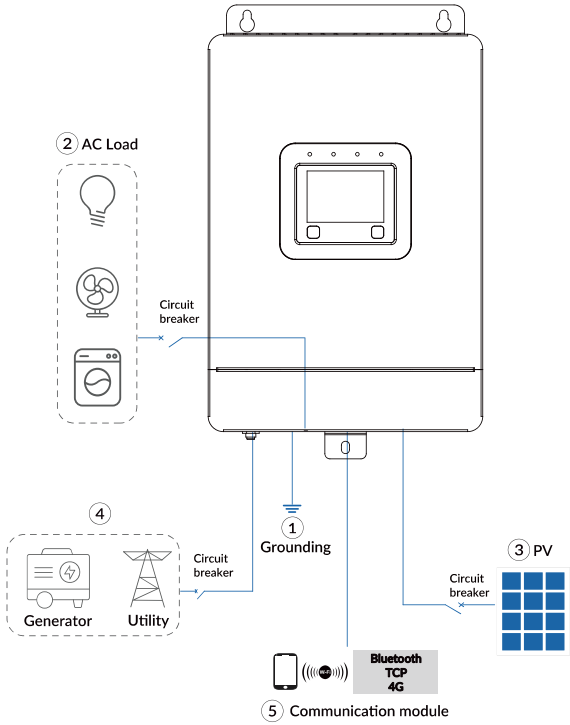
Connect the inverter/charger in the order of Grounding > Battery > Load > PV array > Utility or generator > Optional accessories, and disconnect the inverter/charger in the reverse order.

The following wiring sequence is illustrated in the appearance of "QI1012-0610C". For wiring positions of other models, please refer to the actual product appearance.

- **Battery mode**



- **No-battery mode**



NOTICE

- The cable length of the battery should not exceed 3 meters.
- The recommended cable length of the PV array should not exceed 3 meters (**Note:** If the cable length of the PV array is less than 3 meters, the system meets EN/IEC61000-6-3 requirements. If more than 3 meters, the system may not meet EN/IEC61000-6-3 requirements).

3.4.1 Grounding

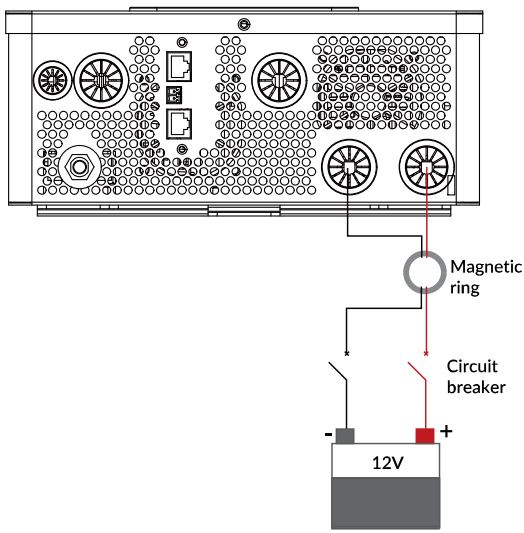
The inverter/charger has a dedicated grounding terminal, which must be grounded reliably. The grounding wire size must be consistent with the recommended load wire size. The grounding connection point shall be as close as possible to the inverter/charger, and the total grounding wire shall be as short as possible.

☒ NO GROUNDING	☒ Do not connect the and the battery terminals to ground. ☒ Do not connect the PV terminals to ground. ☒ Do not ground the AC input L or N terminals between the inverter/charger and the household power distribution cabinet. ☒ Do not connect the AC output L or N terminals to ground.
☑ GROUNDING	☑ The cabinet case and the PE terminal of AC input and output must be firmly grounded through the earth rail.

3.4.2 Connect the battery

NOTICE

- Please disconnect the circuit breaker before wiring and ensure that the leads of "+" and "-" poles are polarity correctly. The positive ("+") and negative ("-") terminals of the battery have no reverse protection circuit. No reverse connection allowed.
- A circuit breaker must be installed on the battery side. Please refer to Subsection 3.2 Wire and circuit breaker size for selection.
- For optimal electromagnetic compatibility, please use the included magnetic ring provided with the inverter/charger. At a position close to the wiring hole of the cabinet, wind both the positive and negative battery terminals around the magnetic ring once simultaneously before connecting them to the internal wiring terminals.



3.4.3 Connect the AC load

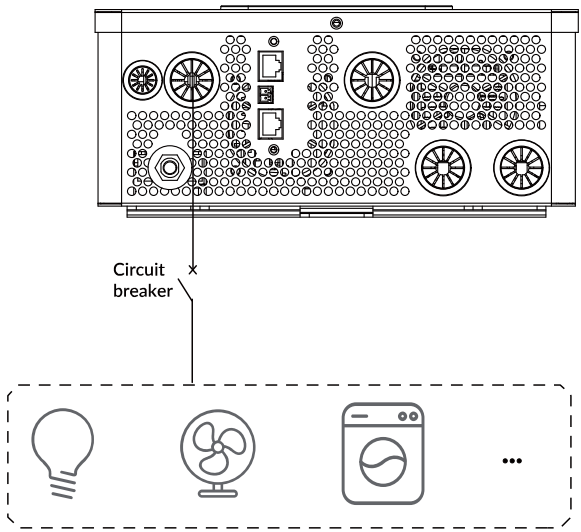
DANGER

High voltage! Electric shock hazard! When wiring the AC load, please disconnect the circuit breaker and ensure that the poles' leads are connected correctly.

NOTICE

If inductive loads such as motors, or a bidirectional transfer switch is connected to the AC output terminal, a separate overvoltage and overcurrent protector (VA-Protector) needs to be installed at the AC output terminal.

- **Load wiring diagram**



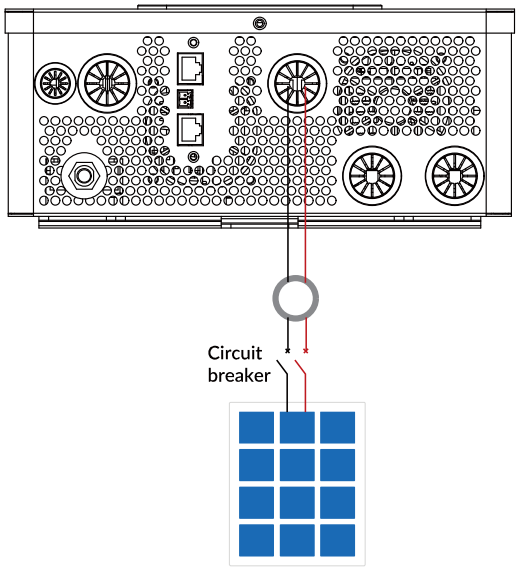
3.4.4 Connect the PV modules

DANGER

High voltage! Electric shock hazard! The PV array can generate dangerous high voltage. Disconnect the circuit breaker before wiring, and ensure that the leads of "+" and "-" terminals are connected correctly.

NOTICE

- Suppose the inverter/charger is used in an area with frequent lightning strikes. In that case, install an external surge arrester at the PV input and utility input terminals is a must.
- For optimal electromagnetic compatibility, please use the included magnetic ring provided with the inverter/charger. At a position close to the wiring hole of the cabinet, wind both the positive and negative PV terminals around the magnetic ring once simultaneously before connecting them to the internal wiring terminals.



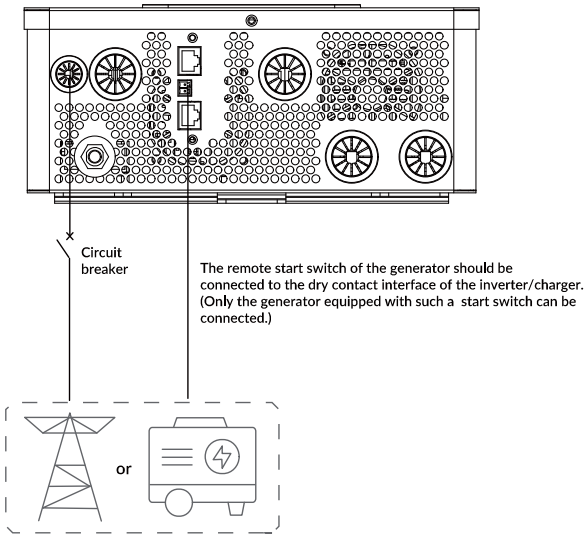
3.4.5 Connect the utility or generator

DANGER

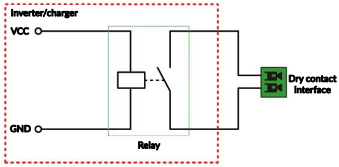
- High voltage! Electric shock hazard! The utility input can generate very high voltage. Disconnect the circuit breaker or fast-acting fuse before wiring and ensure that the poles' leads are connected correctly.
- After the utility is connected, the PV and battery cannot be grounded. In contrast, the inverter/charger cover must be grounded reliably to shield the outside electromagnetic interference effectively and prevent the cover from causing electric shock to the human body.

NOTICE

There are various types of oil generators with complex output conditions. It is recommended to use the inverter oil generator. If non-inverter oil generators are used, they must be tested in practice before use.



Dry contact interface: The dry contact interface can turn on/off the oil generator and is connected parallel with the oil generator's switch.

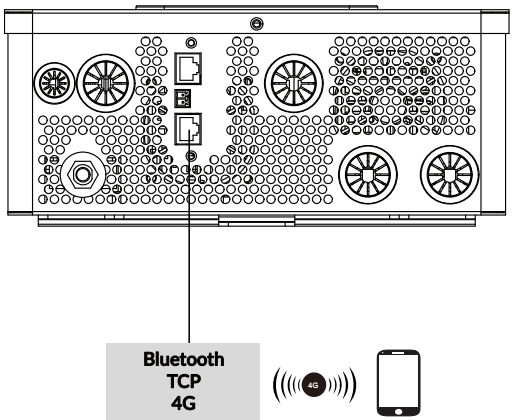


Working principle:

When the battery voltage reaches the "Dry Contact ON Voltage", the dry contact is connected. Its coil is energized. The dry contact can drive loads of no more than 125VAC/1A, 30VDC/1A. According to different battery types of the inverter/charger, the default values of the Dry Contact ON/OFF Voltage are different. Please refer to Subsection 2.5.1 Parameters list > 5. System for the details.

3.4.6 Connect the communication module

End-users can remote monitor the inverter/charger or modify parameters on the phone APP after connecting the WiFi, 4G or other communication module to the RS485 interface on the inverter/charger. For detailed setting methods, please refer to the instructions on cloud APP, WiFi or 4G communication modules in user manual.



Communication module

Note: For the specific communication modules supported, please refer to the accessories list file.

3.5 Operate the inverter/charger

Step 1: Double check whether the wire connection is correct.

Step 2: Connect the battery circuit breaker.

Step 3: Turn on the power switch. The LCD will be lit, which means the system running is normal.

Step 4: Set parameters by the buttons.

NOTICE

For detailed parameters setting, please refer to Section 2.5 Parameters setting. Please consult relevant technical personnel if you have any question before setting.

Step 5: Use the inverter/charger. Connect the load circuit breaker and the PV array circuit breaker in sequence; and then connect the utility input. After the AC output is normal, turn on the AC loads one by one. Do not turn on all the loads simultaneously to avoid protection action due to a large transient impulse from the current. The inverter/charger will perform normal work according to the set working mode. See Section 2.3 Home page for the details.

NOTICE

- When supplying power for different AC loads, it is recommended to turn on the load with larger impulse current first. After the load output is stable, turn on the load with smaller impulse current later.
- If the inverter/charger cannot work properly or the LCD/indicator shows an abnormality, please refer to Chapter 6 Troubleshooting or contact our after-sales personnel.

4 Working modes

4.1 Abbreviation

Abbreviation	Instruction
P_{PV}	PV power
P_{LOAD}	Load power
V_{BAT}	Battery voltage
LVD	Low Voltage Disconnect Voltage
LVR	Low Voltage Recovery Voltage
DP	Discharging Protection SOC
DPR	Discharging Protection Recovery SOC
AOF	Auxiliary Charging OFF Voltage (namely, Utility Charging OFF Voltage)
AON	Auxiliary Charging ON Voltage (namely, Utility Charging ON Voltage)
UCF	Utility Auxiliary Charging OFF SOC
UCO	Utility Auxiliary Charging ON SOC
MCC	Battery Maximum Charging Current
SOC	The battery charging state, which indicates the ratio of the current storage capacity dividing the maximum storage capacity.

4.2 Battery mode

4.2.1 Scenario A: Both PV and utility are not available.

Regardless of the input and output sources, the working mode is as follows.

(A)

PV ☒

Utility ☒

$V_{BAT} \geq LVR$ /SOC ≥ DPR

$V_{BAT} \leq LVD$ /SOC ≤ DP

① When any of the following conditions is met, the battery supplies the load.

- The battery voltage is greater than or equal to the LVR value.
- The battery SOC is greater than or equal to the DPR value.

② When any of the following conditions is met, the battery stops supplying the load.

- The battery voltage is less than or equal to the LVD value.
- The battery SOC is less than or equal to the DP value.

NOTICE

- Set the "BCCMode" as "VOL", the working mode is determined by the battery voltage value.
- Set the "BCCMode" as "SOC", the working mode is determined by the battery SOC. Before starting the SOC mode, set the "BCCMode" as "SOC" first, the SOC control mode will be more accurate after a full charge-discharge cycle.
- For the setting of the "BCCMode", please refer to the Subsection 2.5.1 Parameters list.

4.2.2 Scenario B: PV is available, but the utility is not available.

Regardless of the input and output sources, the working mode is as follows.

(B)

PV ☑

Utility ☒

① When the PV power is greater than the load power, PV charges the battery and supplies extra power to the load.

$P_{PV} > P_{LOAD}$ ⇅ $P_{PV} \leq P_{LOAD}$

② When the PV power is less than or equal to the load power, the PV will not charge the battery, the battery will cut in to supply power to the load together with the PV.

$V_{BAT} \geq LVR$ /SOC ≥ DPR ⇅ $V_{BAT} \leq LVD$ /SOC ≤ DP

③ When any of the following conditions is met, the PV and the battery stop supplying power to the load, PV charges the battery only.

- The battery voltage is less than or equal to the LVD value.
- The battery SOC is less than or equal to the DP value.

Note: When the battery voltage is greater than or equal to the LVR value, or the battery SOC is greater than or equal to the DPR value, the system returns to working mode ②.

4.2.3 Scenario C: Both PV and Utility are available.

Charging Mode: Solar | **Discharging Mode: Inverter**

① When the PV power is greater than load power, the PV charges the battery and supplies extra power to the load.

$P_{PV} > P_{LOAD}$ ⇅ $P_{PV} \leq P_{LOAD}$

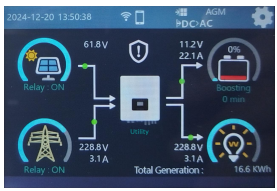
(C-1)

PV ☑

Utility ☑

② When the PV power is less than or equal to the load power, the PV will not charge the battery, the battery will cut in to supply power to the load together with the PV.

$V_{BAT} \geq LVR$ /SOC ≥ DPR ⇅ $V_{BAT} \leq LVD$ /SOC ≤ DP



③ Any of the following is satisfied, the Utility supplies power to the load and the PV charges the battery in priority.

- The battery voltage is less than or equal to the LVD value.
- The battery SOC is less than or equal to the DP value.

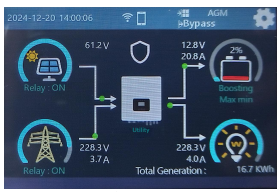
Note: When the battery voltage is greater than or equal to the LVR value, or the battery SOC is greater than or equal to the DPR value, the system returns to working mode ②.

Charging Mode: Solar | **Discharging Mode: Bypass**

(C-2)

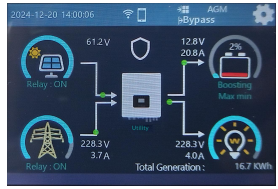
PV ☑

Utility ☑



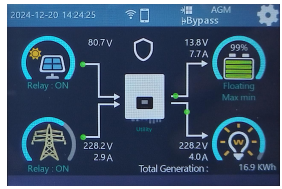
① When the battery is under the bulk or equalization charging, the Utility supplies the load, and PV charges the battery.

Bulk or Equalization ⇅ Float



$P_{PV} \leq P_{CHG}$ ⇅ $P_{PV} > P_{CHG}$

② When the battery is under float charging, if $P_{PV} \leq P_{CHG}$, the Utility supplies the load, and PV charges the battery.



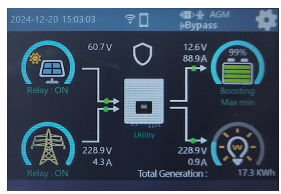
③ When the battery is under float charging, if $P_{PV} > P_{CHG}$, the Utility and PV supplies the load simultaneously, and PV charges the battery.

(C-3)

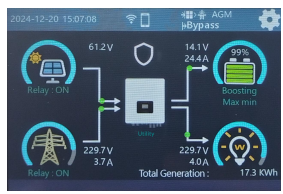
PV ☑

Utility ☑

Charging Mode: Solar prior



$V_{BAT} \leq$ AUX ON /$S_{BMS} \leq$ UAC OFF ⇅ $V_{BAT} \geq$ AUX OFF /$S_{BMS} \geq$ UAC OFF



Bulk or Equalization ⇅ Float

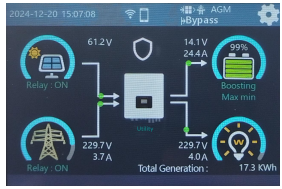
Discharging Mode: Not relevant

① When the battery is under the bulk or equalization charging, and any of the following conditions is met, the Utility supplies power to the load and charges the battery together with the PV.

- The battery voltage is less than or equal to the AUX ON value.
- The battery SOC is less than or equal to the UAC OFF value.

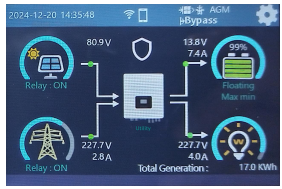
② When the battery is under the bulk or equalization charging, and any of the following conditions is met, the Utility supplies power to the load and PV charges the battery.

- The battery voltage is greater than or equal to the AUX OFF value.
- The battery SOC is greater than or equal to the UAC OFF value.



$P_{PV} > P_{CHG}$ ⇅ $P_{PV} \leq P_{CHG}$

③ When the battery is under float charging, if $P_{PV} > P_{CHG}$, the Utility and PV supplies the load simultaneously, and PV charges the battery.



④ When the battery is under float charging, if $P_{PV} \leq P_{CHG}$, the Utility supplies the load, and PV charges the battery.

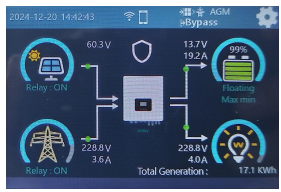
Charging Mode: Solar plus Utility

Discharging Mode: Not relevant

(C-4)

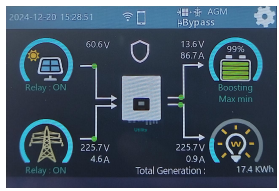
PV ☑

Utility ☑



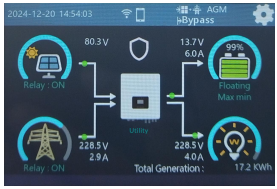
Bulk or Equalization ⇅ Float

① When the battery is the bulk or equalization charging, the Utility supplies power to the load and charges the battery together with the PV.



$P_{PV} > P_{CHG}$ ⇅ $P_{PV} \leq P_{CHG}$

② When the battery under float charging, if $P_{PV} > P_{CHG}$, the Utility and PV supply the load simultaneously, and PV charges the battery.



③ When the battery under float charging, if $P_{PV} < P_{CHG}$, the Utility supplies power to the load and charges the battery together with the PV.

4.2.4 Scenario D: The PV is not available, but the Utility is available.

(D-1)

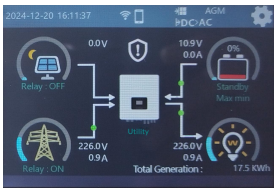
PV ☒

Utility ☑

Charging Mode: Solar

$V_{BAT} \geq LVR$ /SOC ≥ DPR

$V_{BAT} \leq LVD$ /SOC ≤ DP



Discharging Mode: Inverter

① When any of the following conditions is met, the battery supplies the load.

- The battery voltage is greater than or equal to the LVR value.
- The battery SOC is greater than or equal to the DPR value.

② When any of the following conditions is met, the Utility supplies power to the load.

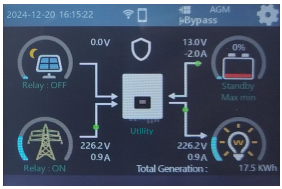
- The battery voltage is less than or equal to the LVD value.
- The battery SOC is less than or equal to the DP value.

(D-2)

PV ☒

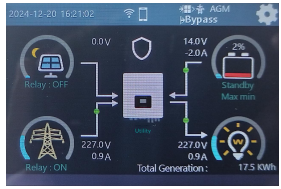
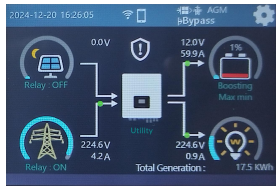
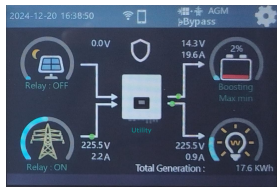
Utility ☑

Charging Mode: Solar



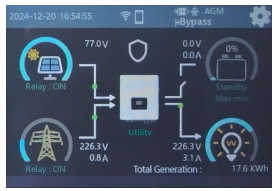
Discharging Mode: Bypass

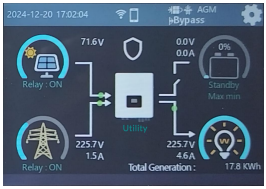
The Utility supplies power to the load.

(D-3) **PV ☒** **Utility ☑**	**Charging Mode: Solar prior**  $V_{BAT} \geq$ AUX OFF /SOC ≥ UAC OFF ⇅ $V_{BAT} \leq$ AUX ON /SOC ≤ UAC OFF  	**Discharging Mode: Not relevant** ① When any of the following conditions is met, the Utility supplies power to the load. • The battery voltage is greater than or equal to the AUX OFF value. • The battery SOC is greater than or equal to the UAC OFF value. ② When any of the following conditions is met, the Utility supplies power to the load and charges the battery simultaneously. • The battery voltage is less than or equal to the AUX ON value. • The battery SOC is less than or equal to the UAC OFF value.
(D-4) **PV ☒** **Utility ☑**	**Charging Mode: Solar plus Utility**  	**Discharging Mode: Not relevant** The Utility supplies power to the load and charges the battery simultaneously.

4.3 No-battery mode

Note: Under the no-battery mode, the "Charging Mode" and "Discharging Mode" settings will not take effect.

PV ☑ **Utility ☑**	 $P_{PV} > P_{LOAD}$ ⇅ $P_{PV} \leq P_{LOAD}$	① When the PV power is greater than the load power, the PV supplies power to the load. **Note:** The Utility maintains a minimum power input. When the load power is greater than the PV power, the Utility can replenish the power supply at any time to avoid device shutdown.



② When the PV power is less than or equals to the load power, the PV and the Utility supply power to the load together.

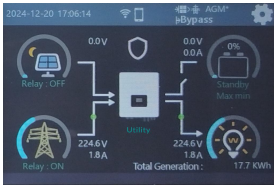
PV ☑

Utility ☒

The PV supplies power to the load alone.

PV ☒

Utility ☑



The Utility supplies the load alone.

5 Protections

No.	Protections	Instruction
1	PV limit current	When the actual charging current/power of the PV array exceeds its rated current/power, it will charge the battery as per the rated current/power.
2	PV short-circuit	When the PV is not charging and a short circuit occurs, the inverter/charger will not be damaged. However, if a short circuit occurs in the PV array during the PV charging process, it may damage the inverter/charger.
3	PV reverse polarity	When the PV array polarity is reversed, the battery backup will not be damaged and will resume to normal operation after correction.
4	Utility input overvoltage	When the utility voltage exceeds the set value of "Utility Overvoltage Disconnect Voltage", the utility will stop charging and supplying the load.
5	Utility input undervoltage	When the utility voltage is less than the set value of "Utility Low Voltage Disconnect Voltage", the utility will stop charging and supplying the load.
6	Battery overvoltage	When the battery voltage exceeds the "Overvoltage Disconnect Voltage," the PV/Utility will stop charging the battery to protect the battery from overcharging.
7	Battery over discharge	When the battery voltage goes lower than the "Low Voltage Disconnect Voltage", the battery will stop discharging to protect the battery from being over-discharged.
8	Load output short-circuit	The load output is turned off immediately when a short circuit occurs. And then, the output is recovered automatically after a delay time of 5s, 10s, and 15s separately (if the recovery is less than 3 times within 5 minutes, it will be recounted). The inverter/charger stops working after the 4th protection and can resume working after resetting or restarting. Clear the fault in time because it may damage the inverter/charger permanently. **Note:** "Reset" here refers to the operation in the Subsection 2.4.6 Real-time faults, clicking on "Clear" to clear the current fault list and restore the normal working state.

<table>
<tr><td>9</td><td>Device overheating</td><td colspan="4">When the internal temperature overheats, the inverter/charger will stop charging/discharging.
The inverter/charger will resume charging/discharging when the internal temperature is normal and the protection time lasts more than 20 minutes.</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Inverter overload</td><td>1.05–1.3* Rated power</td><td>1.3–1.5* Rated power</td><td>1.5–2* Rated power</td><td>P ≥ 2* Rated power</td></tr>
<tr><td>Protect after 60 seconds</td><td>Protect after 10 seconds</td><td>Protect after 5 seconds</td><td>Protect immediately</td></tr>
<tr><td colspan="4">Note: The output is recovered automatically after a delay time of 5s, 10s, and 15s separately. The inverter/charger stops working after the 4th protection and can resume working after resetting or restarting.</td></tr>
<tr><td rowspan="3">11</td><td rowspan="3">Utility bypass overload</td><td>1.5–2*Rated power</td><td>2–2.5*Rated power</td><td colspan="2">P ≥ 2.5*Rated power</td></tr>
<tr><td>Protect after 30 seconds</td><td>Protect after 5 seconds</td><td colspan="2">Protect immediately</td></tr>
<tr><td colspan="4">Note: The output is recovered automatically after a delay time of 5s, 10s, and 15s separately. The inverter/charger stops working after the 4th protection and can resume working after resetting or restarting.</td></tr>
</table>

6 Troubleshooting

NOTICE

After the inverter/charger is powered on, the meter displays the boot screen all the time (unable to enter the home screen) and the red "RUN" indicator flashes. It means the communication with the inverter/charger is abnormal. When the above fault occurs, check whether the communication cable is disconnected. If not, please contact our after-sales engineer.

6.1 Battery faults

Error code(1)	Fault/Status	Indicator	Buzzer	Solution
ER04	Battery Overvoltage	--	--	Disconnect the utility and PV connection, and check whether the battery voltage is too high. Verify if the actual battery voltage matches the rated battery voltage; or check if the "Overvoltage Disconnect Voltage" is inconsistent with the battery specifications. After the battery voltage drops below the set value of "Overvoltage Recovery Voltage", the alarm will automatically be cleared.
ER05	Battery Undervoltage			Disconnect the loads connection, and check whether the battery voltage is too low. After the battery is charged and its voltage is restored to above the "Low Voltage Recovery Voltage", it will automatically return to normal, or use other methods to charge the battery.
ER11	Battery Over Temperature			Ensure the battery is installed in a cool and well-ventilated place, check that the battery actual charging and discharging current does not exceed the set values of "Battery Maximum Charging Current" and "Battery Maximum Discharging Current". It resumes normal work when the battery cools down to below the "Battery Over Temperature Protection Recovery".

ER37	Battery Charging Overcurrent			Check if the battery actual charging/discharging current exceeds the set values of "Battery Max. charging current " and "Battery limit discharging current."
ER58	Battery Discharging Abnormal			
ER39	Battery Cable Disconnected			Check whether the battery connection is normal, and whether the BMS protection occurs.
ER50	Battery Undervoltage Alarm			Check if the battery voltage is less than the "Undervoltage Alarm Voltage".
ER56	Battery Connection Failed			Check if the battery connection is normal and the BMS communication of the lithium battery is normal.

(1) The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

6.2 PV faults

Error code(1)	Fault/Status	Indicator	Buzzer(2)	Solution
ER15	PV1 Overvoltage	PV indicator solid red	Intermittent beeps	Check if the PV open-circuit voltage is greater than PV Overvoltage Protection.
ER17	PV1 Charging Overcurrent	PV indicator solid green	--	Turn off the inverter/charger first, wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER18	PV2 Overvoltage	PV indicator solid red	Intermittent beeps	Check if the PV open-circuit voltage is too high (greater than 500 V). The alarm is released when the PV open-circuit voltage is below 490 V.

ER20	PV2 Charging Overcurrent	PV indicator solid green	--	Turn off the inverter/charger first, wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER43	PV1 Temp Sensor Disconnected			
ER34	PV Current OFFSET Error	--	--	

(1) The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

(2) Set the "BuzzerAlert" as "ON", the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF", even if a fault occurs, the buzzer will not sound.

6.3 Inverter faults

Error code[1]	Fault/Status	Indicator	Buzzer[2]	Solution
ER02	Inverter Output Overcurrent	LOAD indicator solid red	Intermittent beeps	Check if the load actual power exceeds the rated power (namely, the inverter/charger's continuous output power), disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER07	Inverter Output Overvoltage	LOAD indicator solid red	Intermittent beeps	Disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.

ER10	Inverter Over Temperature	--	--	Ensure the inverter/charger is installed in a cool and well-ventilated place.
ER22	Inverter Hardware Overvoltage			Disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER23	Inverter Hardware Overcurrent			
ER32	Inverter Voltage OFFSET Error			
ER35	Inverter Current OFFSET Error			
ER45	Inverter Temp Sensor Disconnected	LOAD indicator solid green	--	Turn off the inverter/charger first, wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER49	Inverter Output Undervoltage	LOAD indicator solid red	Intermittent beeps	Check if the load actual power exceeds the rated power (namely, the inverter/charger's continuous output power), disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER60	Boost Module Over Temperature	--	--	Ensure the inverter/charger is installed in a cool and well-ventilated place.

(1) The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

(2) Set the "BuzzerAlert" as "ON", the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF", even if a fault occurs, the buzzer will not sound.

6.4 Utility faults

<table>
<tr><th>Error code(1)</th><th>Fault/Status</th><th>Indicator</th><th>Buzzer(2)</th><th>Solution</th></tr>
<tr><td>ER08</td><td>Utility Overvoltage</td><td rowspan="2">Utility indicator solid red</td><td rowspan="2">Intermittent beeps</td><td>Check if the utility voltage is normal (i.e. within the "Utility work voltage range"), disconnect the AC input completely and turn off the inverter/charger. Wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal operation. If it is still abnormal, please contact our technical support.</td></tr>
<tr><td>ER09</td><td>Utility Overcurrent</td><td rowspan="3">Check if the load actual power exceeds the rated power (namely, the inverter/charger's continuous output power), disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.</td></tr>
<tr><td>ER25</td><td>Utility Undervoltage</td><td>Utility indicator solid red</td><td>--</td></tr>
<tr><td>ER28</td><td>Utility Pre-charge Timeout</td><td rowspan="2">Utility indicator solid green</td><td rowspan="2">--</td></tr>
<tr><td>ER29</td><td>Utility Relay Adhesion</td><td rowspan="2">Disconnect the Utility input and turn off the inverter/charger first. Wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.</td></tr>
<tr><td>ER31</td><td>Utility Frequency Error</td><td>Utility indicator solid red</td><td>Intermittent beeps</td></tr>
</table>

(1) The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

(2) Set the "BuzzerAlert" as "ON", the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF", even if a fault occurs, the buzzer will not sound.

6.5 Load faults

Error code(1)	Fault/Status	Indicator	Buzzer(2)	Solution
ER33	Load Current OFFSET Error	--	--	Disconnect the load completely and turn off the inverter/charger. Wait 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER48	Load Over Load	LOAD indicator solid red	Intermittent beeps	
ER55	Overload Lockdown			

(1) The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

(2) Set the "BuzzerAlert" as "ON", the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF", even if a fault occurs, the buzzer will not sound.

6.6 BMS faults

Error code(1)	Fault/Status	Indicator	Buzzer(2)	Solution
ER66	BMS Overvoltage	--	Intermittent beeps	Check the BMS communication status or BMS setting parameters.
ER68	BMS Charging Temp Abnormal			
ER69	BMS Undervoltage			
ER71	BMS Discharging Temp Abnormal			
ER74	BMS Communication Failure			

(1) The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

(2) Set the “BuzzerAlert” as “ON”, the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the “BuzzerAlert” is set as “OFF”, even if a fault occurs, the buzzer will not sound.

6.7 Other faults for single inverter/charger

Error code[1]	Fault/Status	Indicator	Buzzer	Solution
ER00	DC Bus Overvoltage	--	--	Turn off the inverter/charger first, wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER06	DC Bus Undervoltage			
ER12	Ambient Over Temperature			Ensure the inverter/charger is installed in a cool and well-ventilated place.
ER21	Battery or Bus Hardware Overvoltage			Turn off the inverter/charger first, wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER24	High Volt Bus Hardware Overcurrent			
ER36	High Volt Bus Current Abnormal			
ER38	Boost Drive Error			
ER40	Auxiliary Power Supply Abnormal			
ER42	Environment Temp Sensor Disconnected			Turn off the inverter/charger first, wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.

ER46	Low Temperature Charging Limit			Check whether the ambient temperature is less than the set “Low Temperature Charging Limit” and "Low Temperature Discharging Limit”.
ER47	Low Temperature Discharging Limit			
ER54	EEprom Abnormal			Turn off the inverter/charger first, wait for 5 minutes and then turn on the inverter/charger to check if it resumes normal. If it is still abnormal, please contact our technical support.
ER57	Model Abnormal	--	--	--

(1) The fault/status code is displayed in the “Status” column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

7 Maintenance

The following inspections and maintenance tasks are recommended at least twice yearly for best performance.

- Make sure the well ventilation and heat dissipation of the inverter/charger and clear up dirt and fragments on the fan.
- Check for damage to exposed wires caused by sun exposure, friction with surrounding objects, dry rot, or insect and rodent activity. Repair or replace damaged wires as necessary.
- Check and confirm that LED or LCD is consistent with the required. Pay attention to any troubleshooting or error indication. Take necessary corrective action.
- Check for signs of corrosion, insulation damage, high temperature or burning/discoloration on the terminal screws. Tighten terminal screws to the suggested torque.
- Check for dirt, nesting insects, and corrosion, and clean up in time as required.
- Check and confirm that the lightning arrester is in good condition. Replace a new one in time to avoid damaging the inverter/charger and other equipment.

⚠ DANGER

Electric shock hazard! Make sure that the power supply of the inverter/charger is disconnected when performing the above operations, and wait for 10 minutes for the power in the capacitor to be discharged before performing the corresponding checks or operations.

8 Technical Specifications

Model	QI1012-0610C	QI1021-0415C
Battery (DC)		
Voltage Range	10.6V–16V	21.2V–32V
Rated Voltage	12V	24V
Maximum Charging Current	90A	45A
Maximum PV Charging Current	60A	40A
Maximum Utility Charging Current	60A	30A
PV Input (DC)		
Maximum Input Power	1,000W	1,280W
Maximum Input Voltage	95V	145V
Maximum Input Current per MPPT	50A	35A
MPPT Voltage Range	12V–76V	23V–116V
Number of MPPTs	1	
Utility Input		
Rated Input Power (Charging + Bypass)	1,500W	
Rated Input Voltage	220/230VAC	110/120VAC
Input Voltage Range	170V–280V	80V–140V
Input Frequency Range	45Hz–65Hz	
Inverter Output		
Rated Power	1,000W	
Transient Surge Output Power	2*Rated output power (5S)	

Output Voltage Level	230VAC ± 3%	120VAC ± 3%
Output Voltage Waveform	Pure Sine Wave	
Output Frequency Level	50Hz	60Hz
THDu	< 3%	
Switch Time	< 10ms	
Environmental Parameters		
Operating Temperature	-20℃ to +50℃ (> 40℃ derating)(1)	-20℃ to +50℃
Storage Temperature	-25℃ to +60℃	
Relative Humidity	< 95% (N.C.)	
Altitude	< 4,000m (> 2,000m derating)(2)	
Ingress Protection	IP20	
Mechanical Parameters		
Dimensions (L × W × H)	265mm × 380mm × 110mm	
Weight	8kg	
Others		
Display	Color LCD, English interface	
Certifications	EN IEC 61000-6-2; EN IEC 61000-6-4; EN IEC 61000-3-2; EN 61000-3-3; IEC 62109-1; IEC 62109-2	

(1) Load derating for QI1012-0610C: In the temperature range from 40℃ to 50℃, the load-carrying capacity linearly reduces to 90% of the rated power.

(2) Altitude derating: For every 1,000-meter increase in altitude above 2,000 meters, the load-carrying capacity decreases by 10%.

9 Abbreviation Index

Interface	Abbreviations	Full Name
Solar Setting Parameter	OVP	Overvoltage Protection
	OVPR	Overvoltage Protection Recovery
	OTP	Over Temperature Protection
	OTPR	Over Temperature Protection Recovery
Voltage Control Strategy	OVD	Overvoltage Disconnect Voltage
	CLV	Charging Limit Voltage
	OVR	Overvoltage Recovery Voltage
	ECV	Equalization Charging Voltage
	BCV	Bulk Charging Voltage
	FCV	Float Charging Voltage
	BVR	Bulk Voltage Recovery Voltage
	LVR	Low Voltage Recovery Voltage
	UVWR	Undervoltage Alarm Recovery Voltage
	UVW	Undervoltage Alarm Voltage
	LVD	Low Voltage Disconnect Voltage
	DLV	Discharging Limit Voltage
	AUX OFF	Auxiliary Charging OFF Voltage
	AUX ON	Auxiliary Charging ON Voltage
SOC Control Strategy	FCP	Full Charge Protection SOC
	FCPR	Full Charge Protection Recovery SOC
	LPAR	Low Power Alarm Recovery SOC
	LPA	Low Power Alarm SOC
	DPR	Discharging Protection Recovery SOC

	DP	Discharging Protection SOC
	UAC ON	Utility Auxiliary Charging ON SOC
	UAC OFF	Utility Auxiliary Charging OFF SOC
	Set SOC	Set SOC
Utility Setting Parameter	UOD	Utility Overvoltage Disconnect Voltage
	UOR	Utility Overvoltage Reconnect Voltage
	ULVD	Utility Low Voltage Disconnect Voltage
	ULVR	Utility Low Voltage Reconnect Voltage
	UOF	Utility Overfrequency Disconnect Frequency
	UFD	Utility Underfrequency Disconnect Frequency
Load Setting Parameter	INVOVL	Inverter Output Voltage Level
	INVOFR	Inverter Output Frequency Range
	INVOP	Inverter Overvoltage Protection Voltage
	INVOPR	Inverter Overvoltage Protection Recovery Voltage
	TempUL	Temperature Upper Limit
	TempULR	Temperature Upper Limit Recovery
Battery Basic Properties	Status	Battery Status
	BDCap	Battery Design Capacity
	BType	Battery Type
	BRV	Battery Voltage
	LBACC	Local Battery Available Charging Current
	LBADC	Local Battery Available Discharging Current
	BECT	Battery Equalization Charging Time
	BECD	Battery Equalization Charging Date
	BBCT	Battery Bulk Charging Time

	BTCC	Battery Temperature Compensation Coefficient
Advanced Battery Properties	Li PROT	Lithium Battery Protection
	LTSChrg	Low Temperature Stop Charging Temperature
	LTSDischrg	Low Temperature Stop Discharging Temperature
	BATT OTP	Battery Over Temperature Protection
	BATT OTPR	Battery Over Temperature Protection Recovery
	Chrg	Charging
	Dischrg	Discharging
Charge and Discharge Management	BACC	Battery Available Charging Current
	BADC	Battery Available Discharging Current
	UACC	Utility Available Charging Current
	CMode	Charging Mode
	DMode	Discharge Mode
	ACmode	AC Input Mode
	PVMode	PV Mode
	BCCMode	Battery Charging Control Mode
	BMSProt	BMS Protocol
	BMS	BMS Enable
	BMSVolt	BMS Voltage Control
	BMSCurr	BMS Current Control
	BMSFail	BMS Fail Action
Local Parameters	LCD BRT	LCD Brightness
	TODelay	Idle Timeout Delay
	LCDSBRT	Standby LCD Brightness
	SOT	Screen Off Time

	Com ID	Communication ID
	Com Bps	Communication Baud Rate
	DCT ON	Dry Contract ON Voltage
	DCT OFF	Dry Contract OFF Voltage
	Switch BMS	Switch BMS
	Buzz	Buzz
	LED	LED
	HRI	History Record Interval
Others	Wireless	Wireless
	RTU POWER	RTU POWER
	Screen TO	Screen Timeout
	Parameter Rest	Parameter Rest
	Low Power Mode	Low Power Mode
	Manual Equalizer	Manual Equalizer
	DC Source Characteristic	DC Source Characteristic
	Initializing Records	Initializing Records
	Clear Statistical Power	Clear Statistical Power

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