KTECH
ENERGY SOLUTIONS FOR ALL MATTERS

OFF-GRID INVERTER

KE Series Single Phase

User Manual

KAD0004

Model : KE-8KL1EF KE-10KL1EF KE-12KL1EF

CATALOUGE

1. Safety Precautions

1.1 How to Use This Manual

- This manual contains important information, guidelines, operation instructions, and maintenance details for the following models: KE-8KL1EF, KE-10KL1EF, and KE-12KL1EF.
- Users must follow the content of this manual during installation, operation, and maintenance.

1.2 Meanings of Symbols in the Manual

Symbol	Description
	**DANGER:** Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	**WARNING:** Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
	**NOTICE:** Provides some tips regarding the operation of the product.

1.3 Safety statement

DANGER

This chapter contains important safety instructions. Please read and keep this manual for future reference.

Be sure to install this inverter in compliance with local requirements and regulations.

Caution: High voltage. Before and during installation, turn off the switches of each power source to avoid electric shock.

To ensure the optimal operation of this inverter, select the appropriate cable size and necessary protective devices as specified.

Do not connect or disconnect any connections while the inverter is operating.

Do not open the terminal cover while the inverter is operating.

Ensure that the inverter is properly grounded.

Do not short - circuit the AC output and DC input.

Do not disassemble this device. For all repairs and maintenance, send it to a professional maintenance center.

Never charge a frozen battery.

2. Product Introduction

2.1 Product Description

The KE series of energy storage hybrid inverters connect, coordinate, and control photovoltaic systems, energy storage batteries, the power grid, and loads. They provide stable, safe, and clean electrical energy for residential, commercial, and industrial users, meeting energy demands in various scenarios

2.2 Product Features

Supports various types of energy storage batteries, such as lead - acid batteries and lithium - ion batteries.

Supports single - phase parallel operation and three - phase pure sine - wave output in parallel units.

The voltage level of 200 - 240Vac can be selected for single - unit or parallel systems.

Supports two - way photovoltaic input and has the function of simultaneously tracking the maximum power charging/carrying capacity of two MPPTs. The MPPT efficiency is as high as 99.9%, and the maximum current of a single circuit is 22A.

Features two output modes: mains bypass and inverter output, and has an uninterruptible power supply function.

Offers four charging modes: photovoltaic only, mains - priority, photovoltaic - priority, and mains/photovoltaic hybrid charging.

Supports timed battery charging and timed battery discharging.

The single - unit energy - saving mode function reduces no - load energy loss.

Equipped with multiple protection functions to comprehensively protect the safety of photovoltaic panels, batteries, loads, and the controller itself.

Features a capacitive intelligent touch - screen, menu - based operation, and intuitive and convenient parameter setting.

Supports 256 event records and 1024 - day historical data storage.

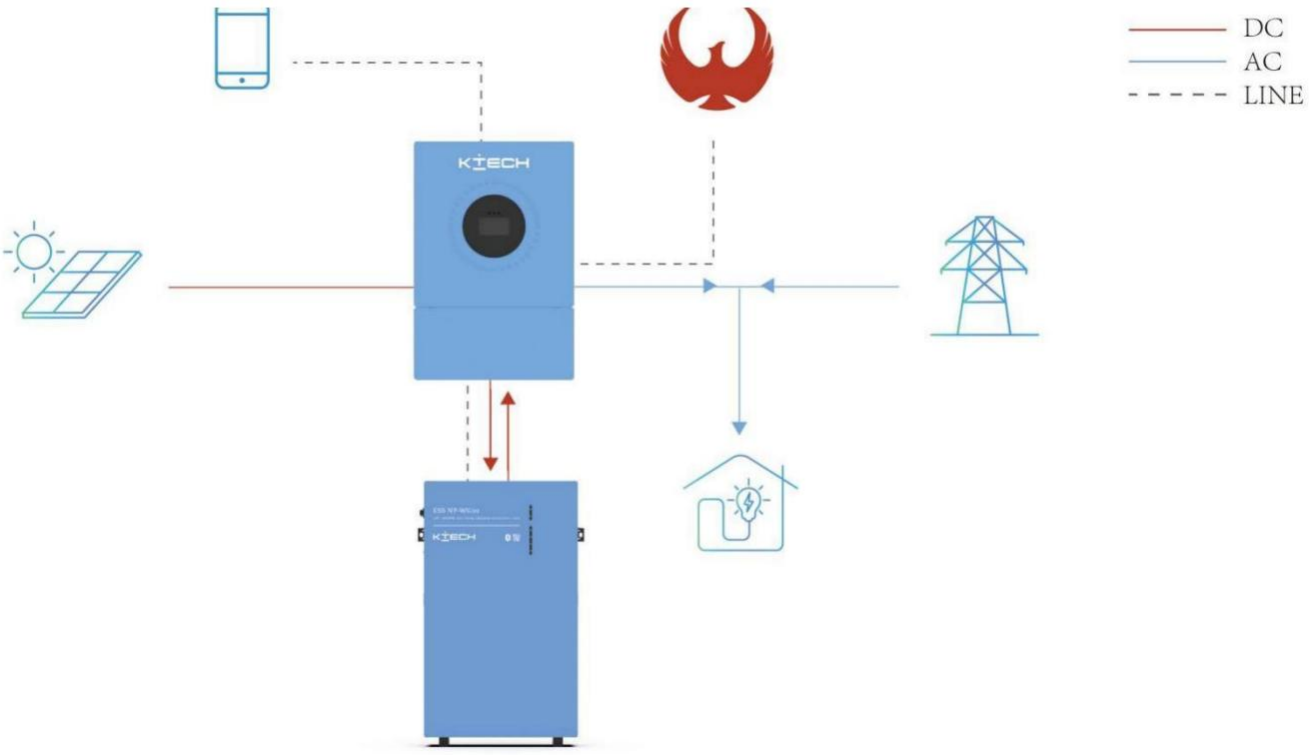
Built - in Bluetooth and WiFi interfaces, providing native cloud - platform access capabilities. It can automatically synchronize time after connection.

2.3 System Connection Diagram

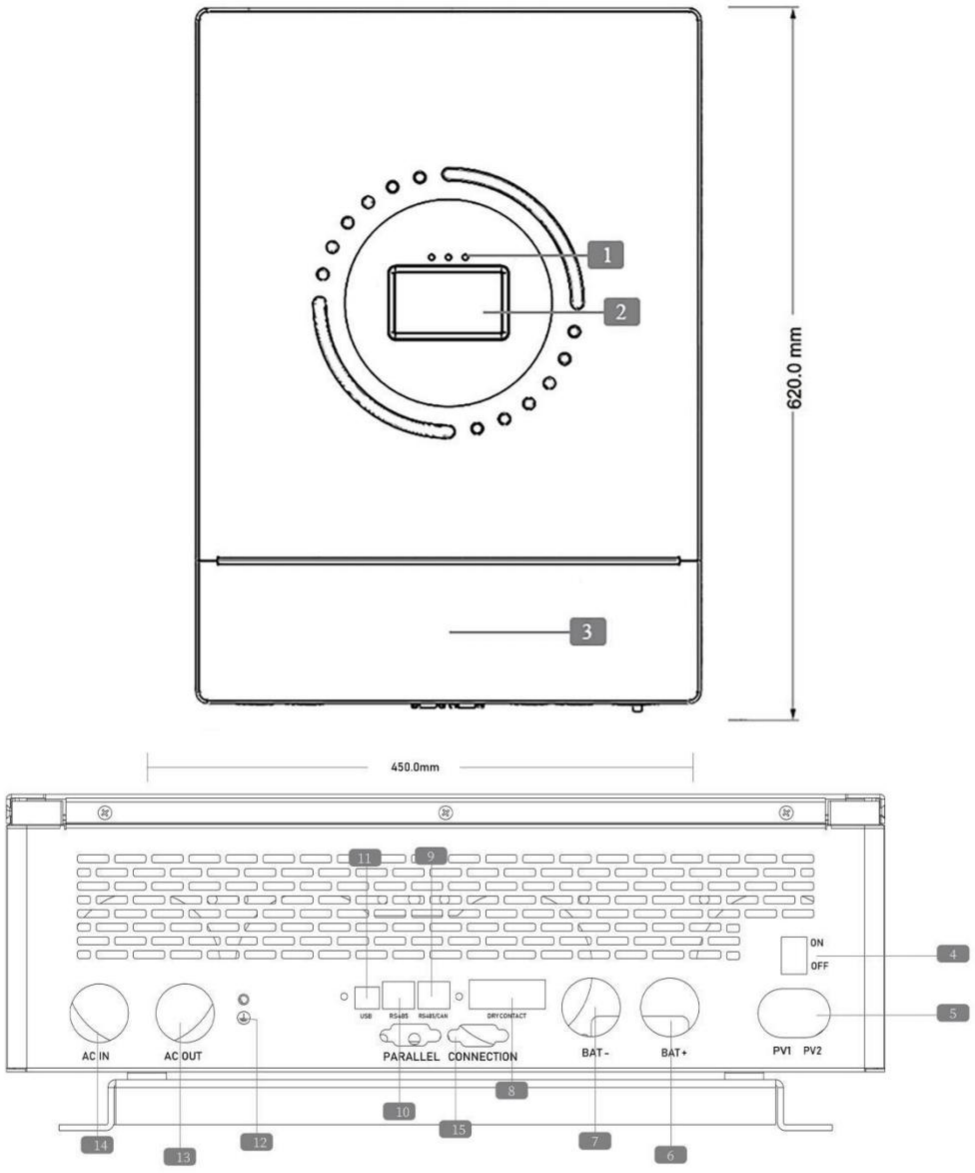
The following figure shows the system application scenarios of this product. A complete system consists of the following parts:

1. Photovoltaic Modules: These convert light energy into DC electrical energy. They can charge the battery through the inverter or be directly inverted into AC power to supply power to the load.
2. Mains Power or Generator: Connected to the AC input, it can supply power to the load and charge the battery simultaneously. When the battery and photovoltaic modules supply power to the load, the system can generally operate without mains power or a generator.
3. Battery: The function of the battery is to ensure the normal power supply to the system load when the photovoltaic power is insufficient or there is no mains power.
4. Loads: Various household and office loads can be connected, including refrigerators, lights, televisions, fans, air conditioners, and other AC loads.
5. Inverter: It is the energy conversion device of the entire system.
6.

Actual Application Scenario Diagram:



2.4 Product Overview



1	LED indicator	2	Capacitive touch screen	3	Terminal protection cover
4	ON/OFF rocker switch	5	Photovoltaic input (1/1)	6	Battery (Positive Pole)
7	Battery (Negative Pole)	8	Dry contact	9	CAN/RS485-2 port
10	RS485-1 port	11	USB-B port	12	Grounding screw
13	AC output (L + N)	14	AC input (L + N)	15	Parallel communication port

2.5 Product Parameter Table

Model	KE-8KL1EF	KE-10KL1EF	KE-12KL1EF
Inverter Output			
Rated Output Power	8,000W	10,000W	12,000W
Maximum Peak Power	16,000W	20,000W	24,000W
Rated Output Voltage	230Vac（Single-phase）		
Motor Loading Capacity	5HP	6HP	
Rated Frequency	50/60Hz		
Output Waveform	pure sine wave		
Switching Time	10ms（typical value）		
Battery			
Battery Type	Lithium - ion battery / Lead - acid battery / User - defined		
Rated Battery Voltage	48Vdc		
Voltage Range	40～60Vdc		
Maximum Photovoltaic Charging Current	180A	200A	
Maximum Mains/Generator Charging Current	100A	120A	
Maximum Hybrid Charging Current	180A	200A	
Photovoltaic Input			
Number of MPPT Routes	2		
Maximum Input Power	5,500W+5,500W		6,600W+6,600W
Maximum Input Current	22A+22A		

Maximum Open - circuit Voltage	500Vdc+500Vdc		
MPPT Operating Voltage Range	125~425Vdc		
Mains/Generator Input			
Input Voltage Range	90~275Vac		
Input Frequency Range	50/60Hz		
Bypass Overload Current	63A		
Efficiency			
MPPT Tracking Efficiency	99.9%		
Maximum Battery - to - Inverter Efficiency	92%		
General			
Dimensions	620*450*172mm		
Weight	23kg		
Protection Level	IP20，For indoor use only		
Ambient Temperature	-10~55℃,>45℃ frequency reduction		
Noise	<60dB		
Cooling Method	Smart cooling		
Warranty Period	3 Years		
Communication			
Built - in Interfaces	RS485 /CAN /USB / Dry contact		
Communication module	WIFI/Bluetooth		
Certification			
Safety Regulations	IEC62109-1，IEC62109-2		
EMC	EN61326-1：2013		
RoHS	Yes		

3. Installation

3.1 Selecting the Installation Location

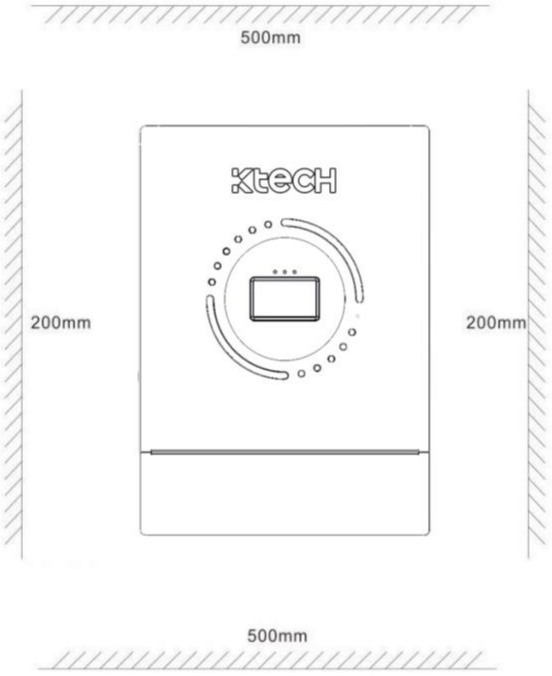
This product is for indoor use only (protection level IP20). Before choosing an installation location, users should consider the following factors:

Select a sturdy wall to install the inverter.

Install the inverter at a height level with the line of sight.

Provide sufficient heat - dissipation space for the inverter.

The ambient temperature should be between - 10℃ and 55℃ (14˚F and 131˚F) to ensure optimal operation.



DANGER

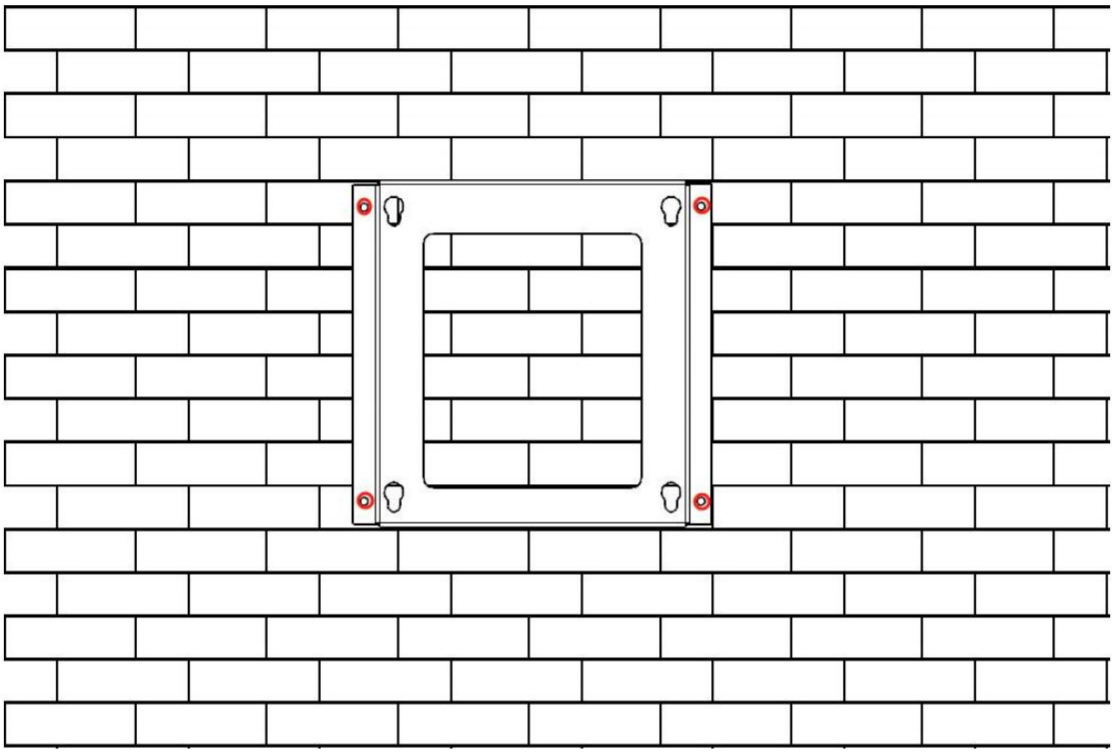
- Do not install the inverter near highly flammable materials.
- Do not install the inverter in potentially explosive areas.
- Do not install the inverter and lead - acid batteries in an enclosed space.

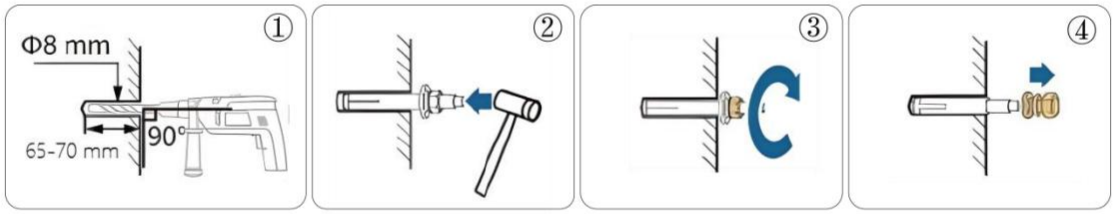
WARING

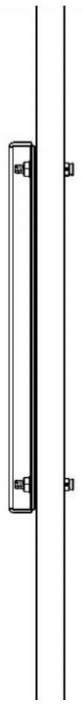
- Do not install the inverter in direct sunlight.
- Do not install or use the inverter in a humid environment.

3.2 Installing the Wall-Mount Bracket

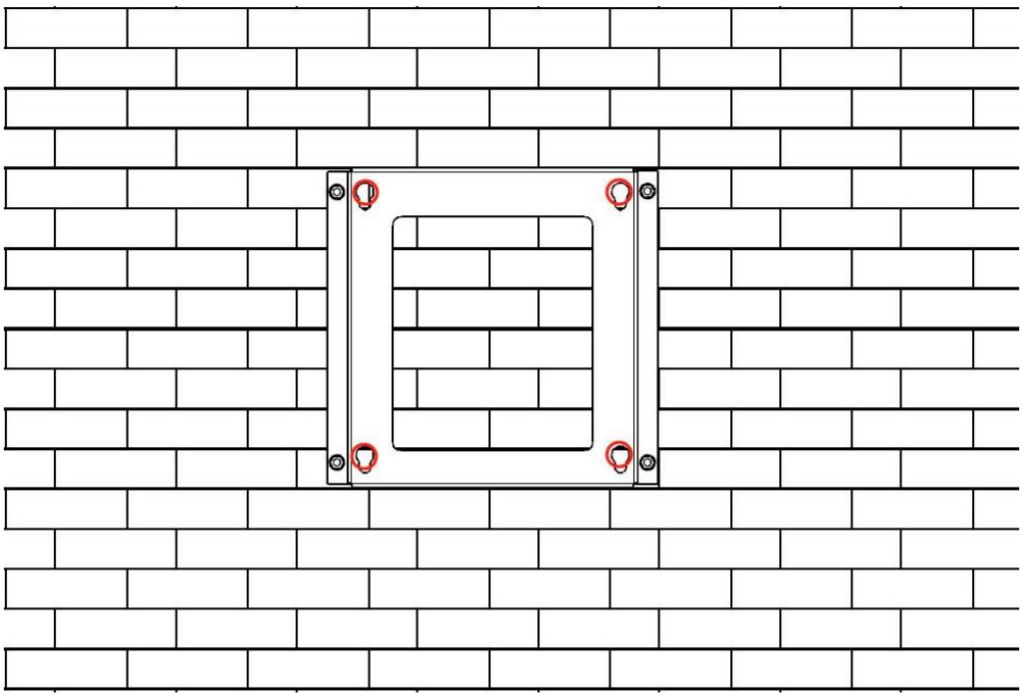
According to the specified dimensions, align with the hole positions of the wall - mount bracket. Use an electric drill to drill four installation holes in the wall, and then insert four expansion screws.

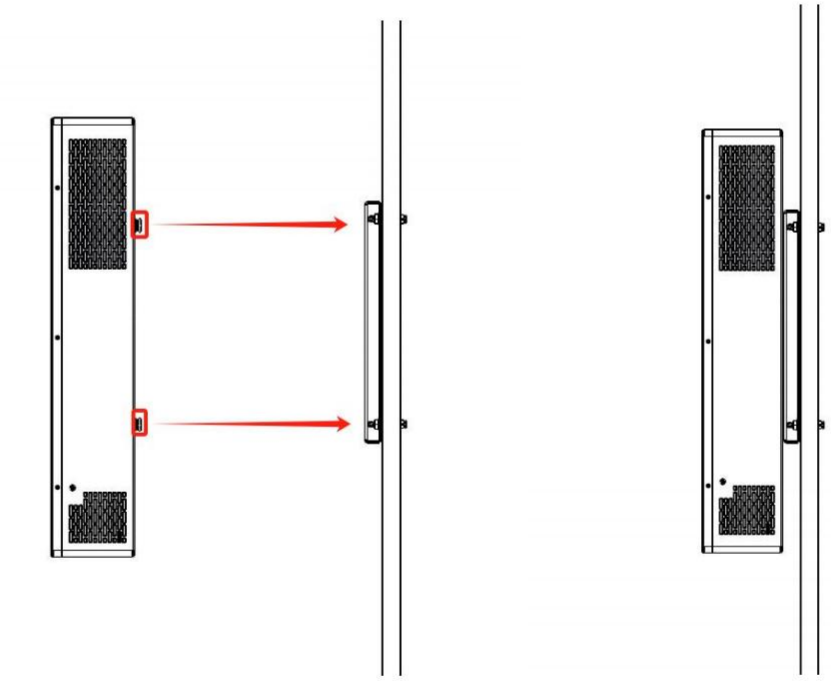






3.3 Installing the Inverter





NOTICE

· When using the equipment in areas with poor air quality, the dust - proof net is prone to being blocked by airborne particles. Regularly disassemble and clean the dust - proof net to avoid affecting the internal air flow velocity of the inverter. Otherwise, it may trigger the over - temperature protection fault of components, affecting power supply and the service life of the inverter.

3.4. Parallel Wiring Connection

3.4.1 Introduction

· The inverter can be paralleled with a maximum of six units.

· When using the parallel operation function, it is necessary to connect the parallel communication wires correctly, firmly and reliably. The following is the diagram of the connection wires (packaging accessories):

3.4.2 Precautions for Connecting Parallel Connection Wires

1)PV Wiring :

· When making parallel connections, different inverters should be connected to different PV arrays or PV sources. Do not connect the same PV to different inverters. Also, PV1 and PV2 of an inverter should not be connected to the same PV source.

2)Battery Wiring :

For single - phase or three - phase parallel connections, all inverters must be connected to the same battery. Connect BAT+ to BAT+ and BAT - to BAT -, and ensure that the connections are correct before power-on, and that the wiring lengths and wire gauges are the same. Incorrect connections may cause abnormal operation of the parallel system output.

3)AC OUT Wiring :

a) Single - phase Parallel Wires

When making single - phase parallel connections, for all inverters, connect L to L, N to N, and PE to PE. Ensure that the connections are correct before power-on, and that the wiring lengths and wire gauges are the same. Incorrect connections may lead to abnormal operation of the parallel system output.

b) Three - phase Parallel Wires

When making three - phase parallel connections, all inverters must have their N wires connected to each other and their PE wires connected to each other. The L wires of all inverters in the same phase should be connected together, but the L wires of AC outputs in different phases should not be connected.

4)AC IN Wiring :

Single - phase Parallel Connection: For single - phase parallel connections, all inverters must have their L wires connected to each other, N wires connected to each other, and PE wires connected to each other. Ensure that the connections are correct before power-on, and that the wiring lengths and wire diameters are the same. Incorrect connections may cause abnormal operation of the parallel system output. Meanwhile, to avoid damage to the inverter or external electrical equipment,do not have multiple different AC power sources for input. It is necessary to ensure the consistency and uniqueness of the AC power source input.

Three - phase Parallel Connection: When making three - phase parallel connections, all inverters must have their N wires connected to each other and their PE wires connected to each other. The L wires of all inverters in the same phase should be connected together, while the L wires of AC inputs in different phases should not be connected.

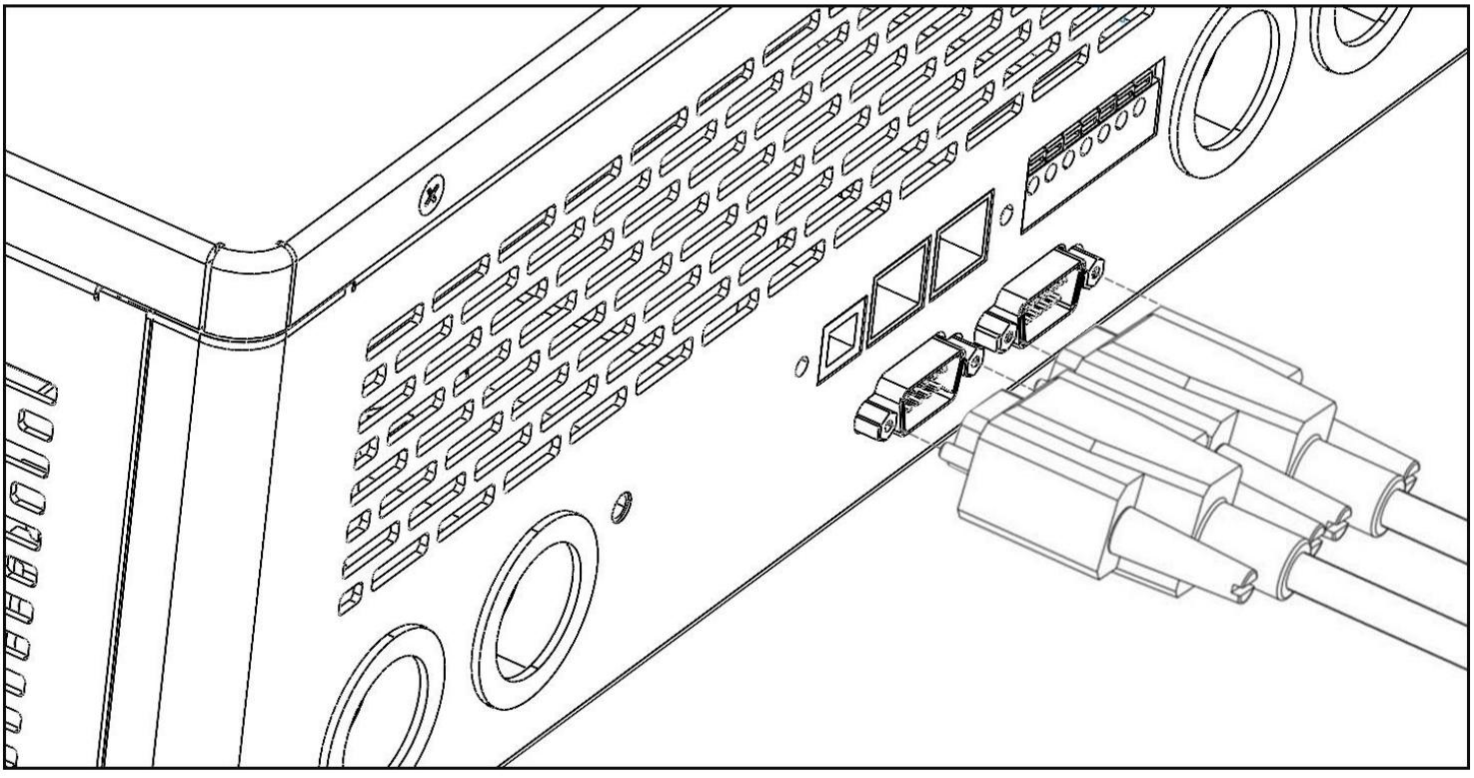
5)Parallel Communication Cable Wiring :

The communication cable is used for single - phase or three - phase parallel connections. When connecting each unit, it should follow a one-out-one-in principle. That is, the male connector (out) of the local unit should be connected to the female connector (in) of the unit to be paralleled. Do not connect the male connector of the local unit to its own female connector.

Meanwhile, for each unit, make sure the parallel communication cable is tightened with screws to prevent the cable from falling off or having poor contact, which could cause abnormal operation or damage to the system output.

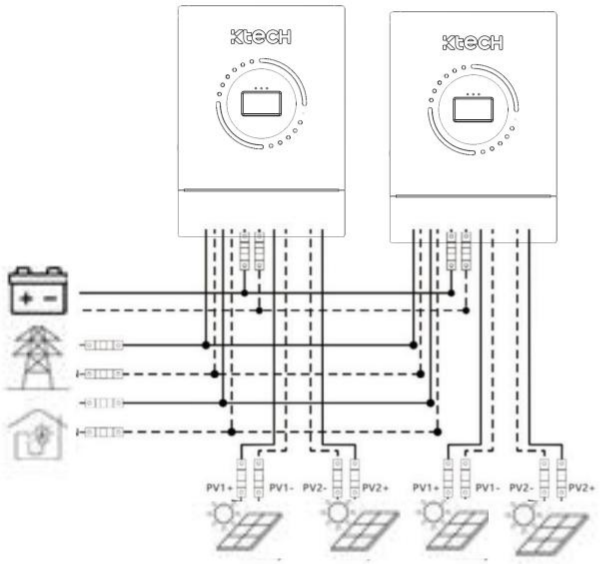
3.4.3 Schematic Diagram for Single - phase Parallel Connection Guidance

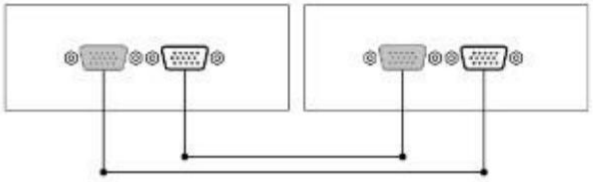
1) Both the parallel communication cable and the current-sharing detection cable of the inverters need to be connected and then tightened with screws. The schematic diagram is as follows:



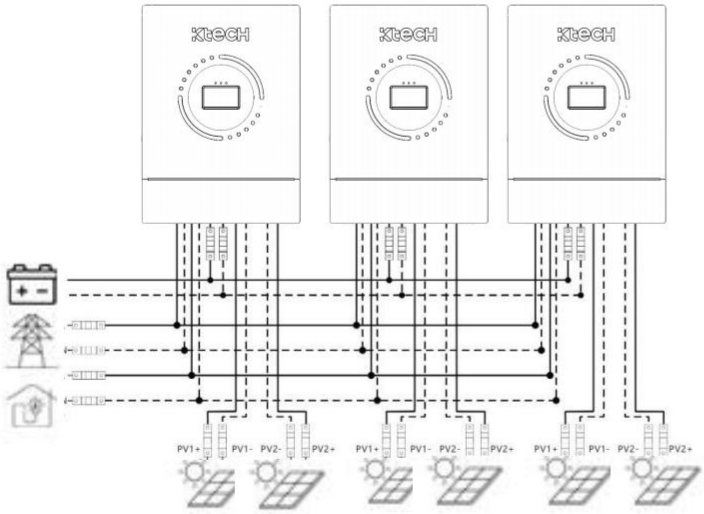
2) When multiple units are connected in parallel, the schematic diagram for parallel connection guidance is as follows:

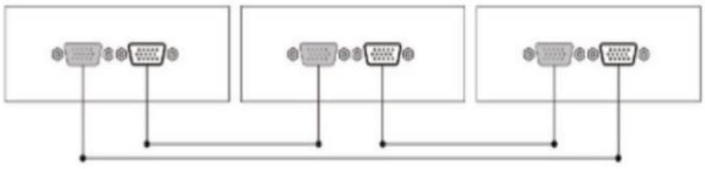
a）Two inverters are paralleled in the system:



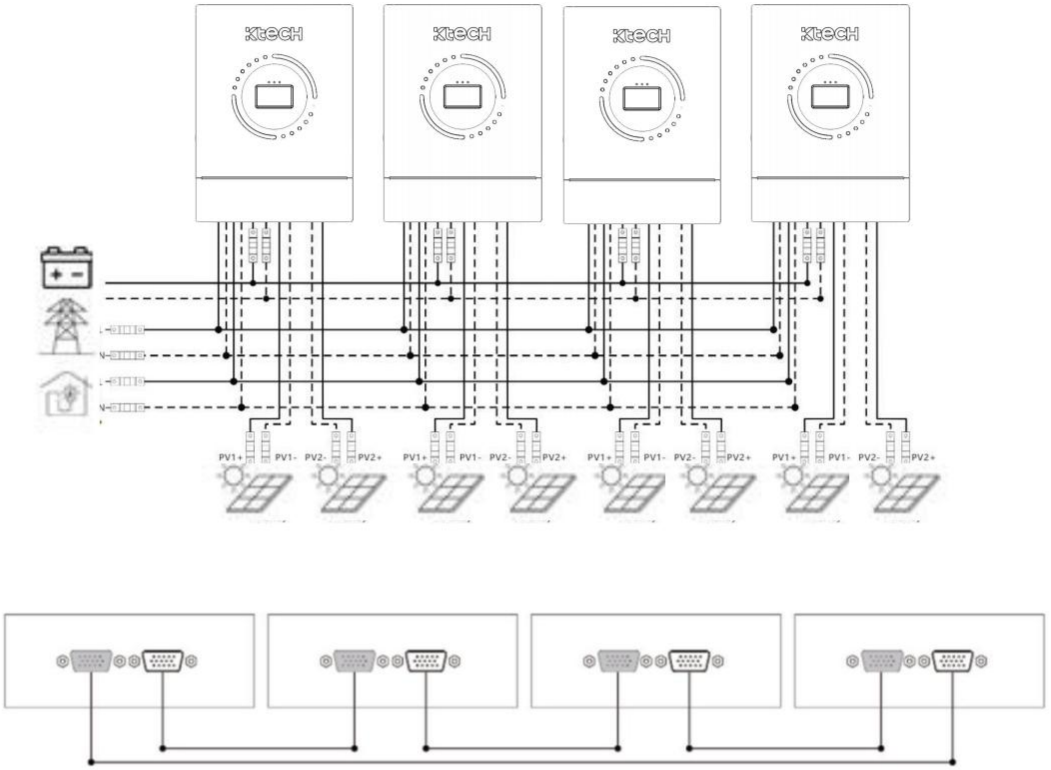


b）For a system with three inverters in parallel:

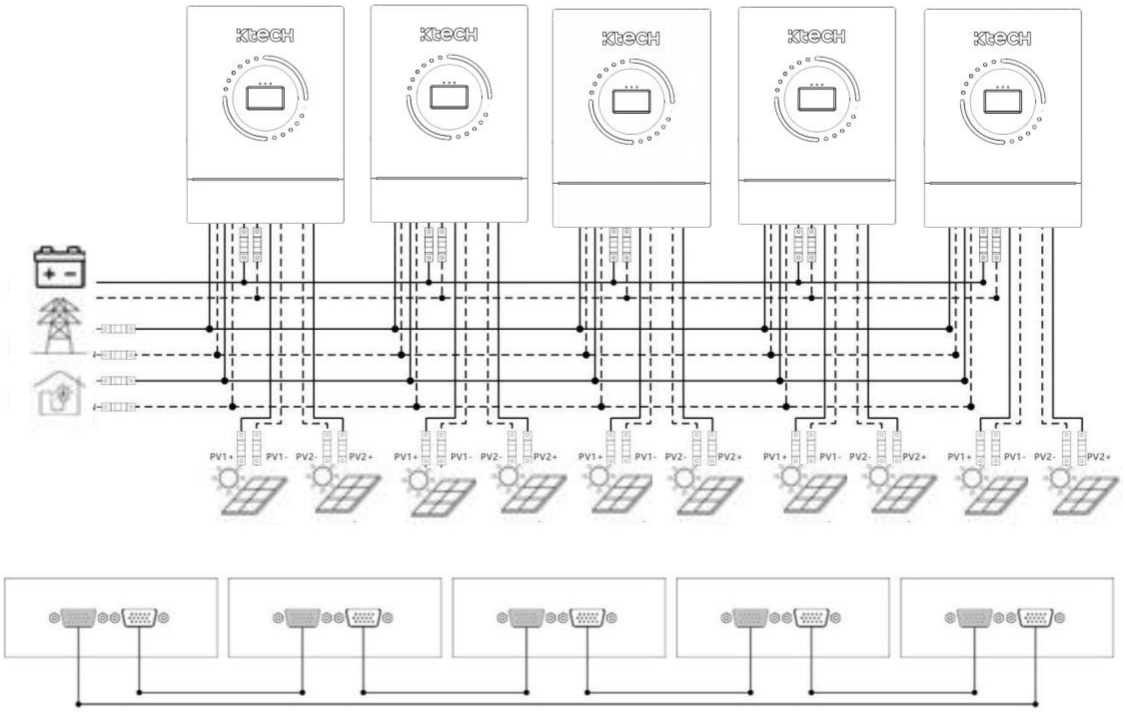




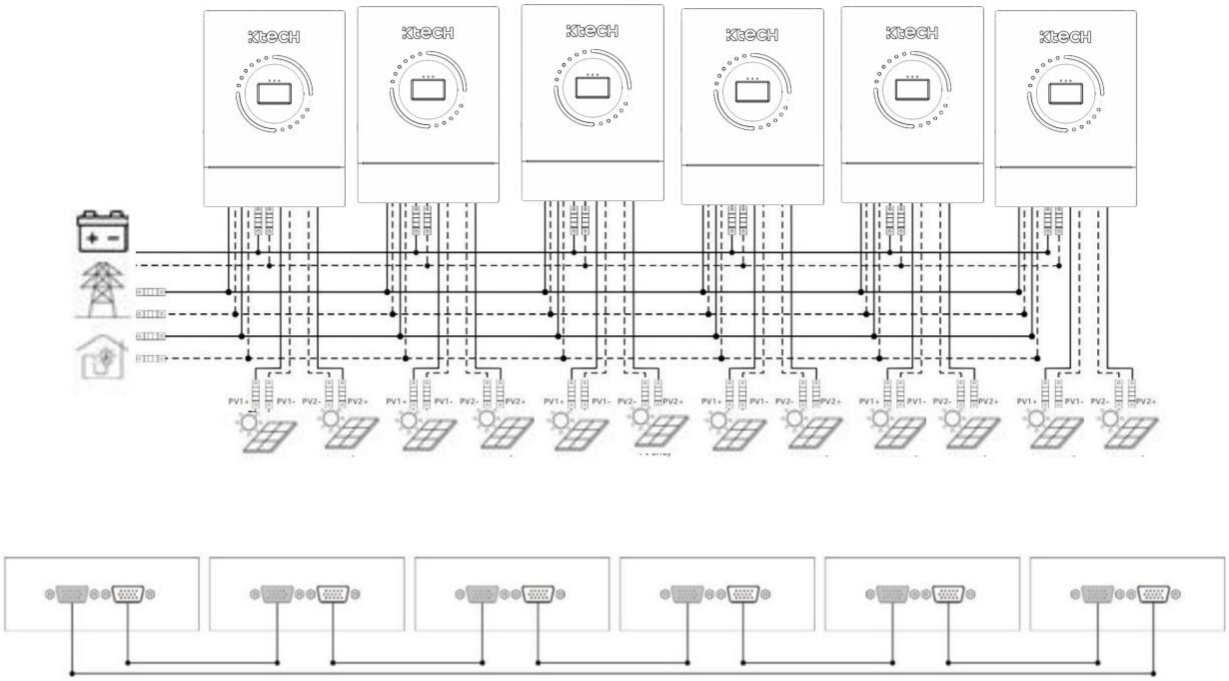
c）Four inverters are in parallel in the system:



d）Five inverters are in parallel in the system:

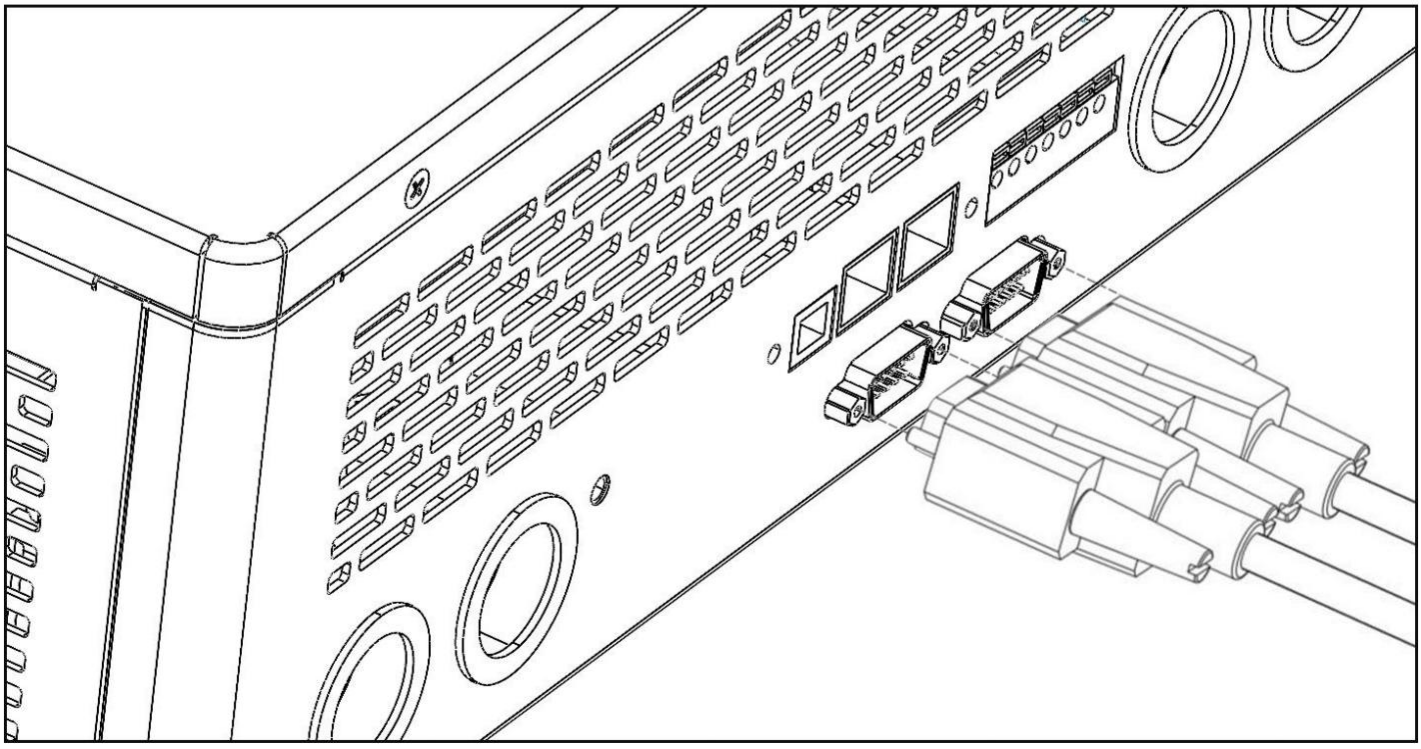


e）Six inverters are in parallel in the system:



3.4.4 Schematic Diagram for Three - phase Parallel Connection Guidance

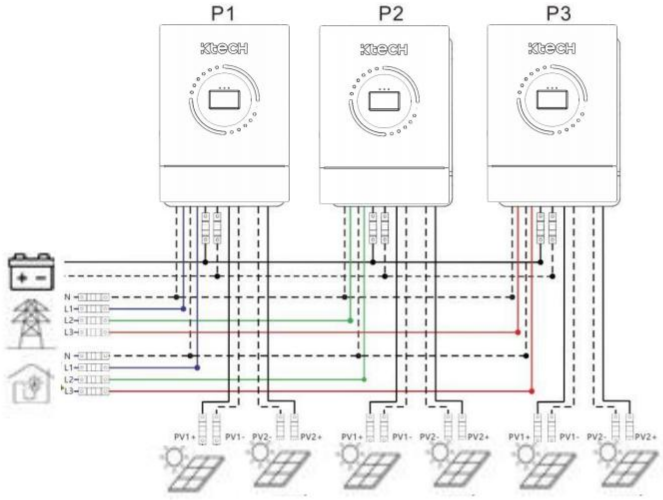
1、The parallel communication cables of the inverters need to be connected and then tightened with screws. The schematic diagram is as follows:



Three - phase parallel connection

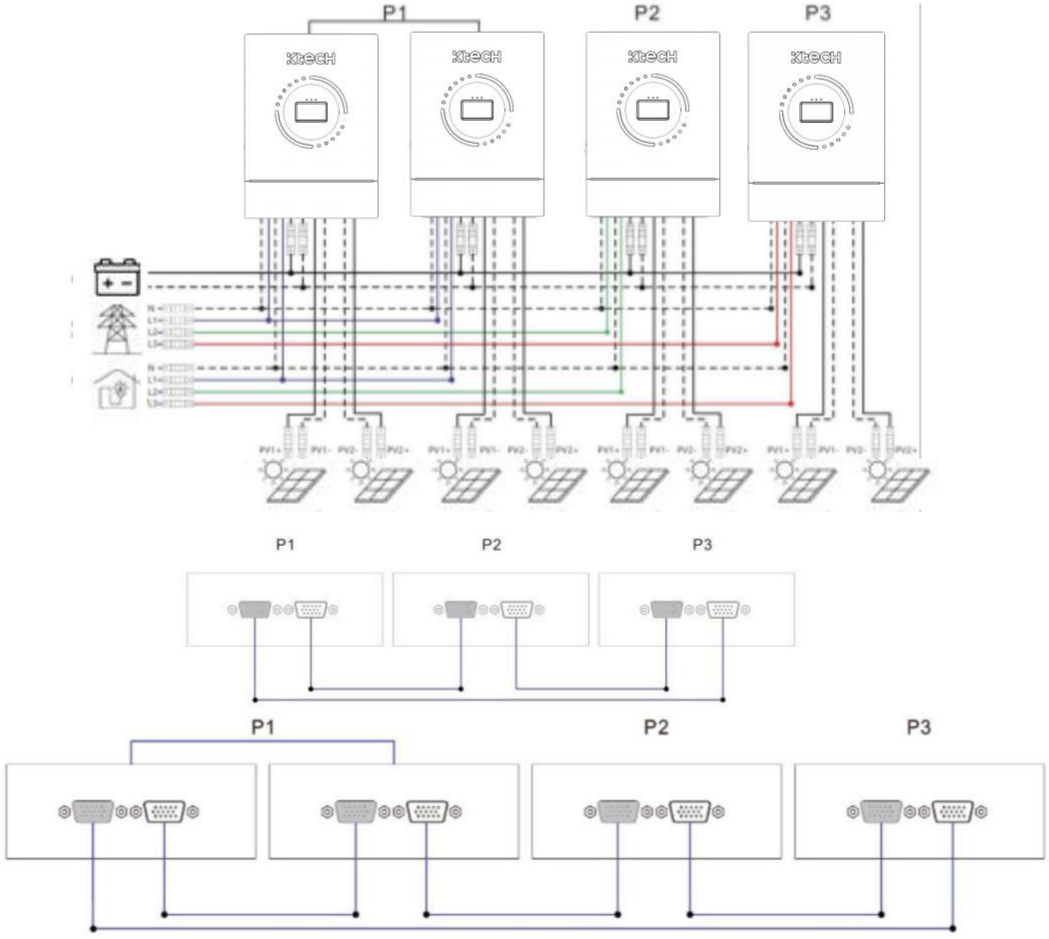
Three devices constitute a three-phase separation system

1+1+1 system



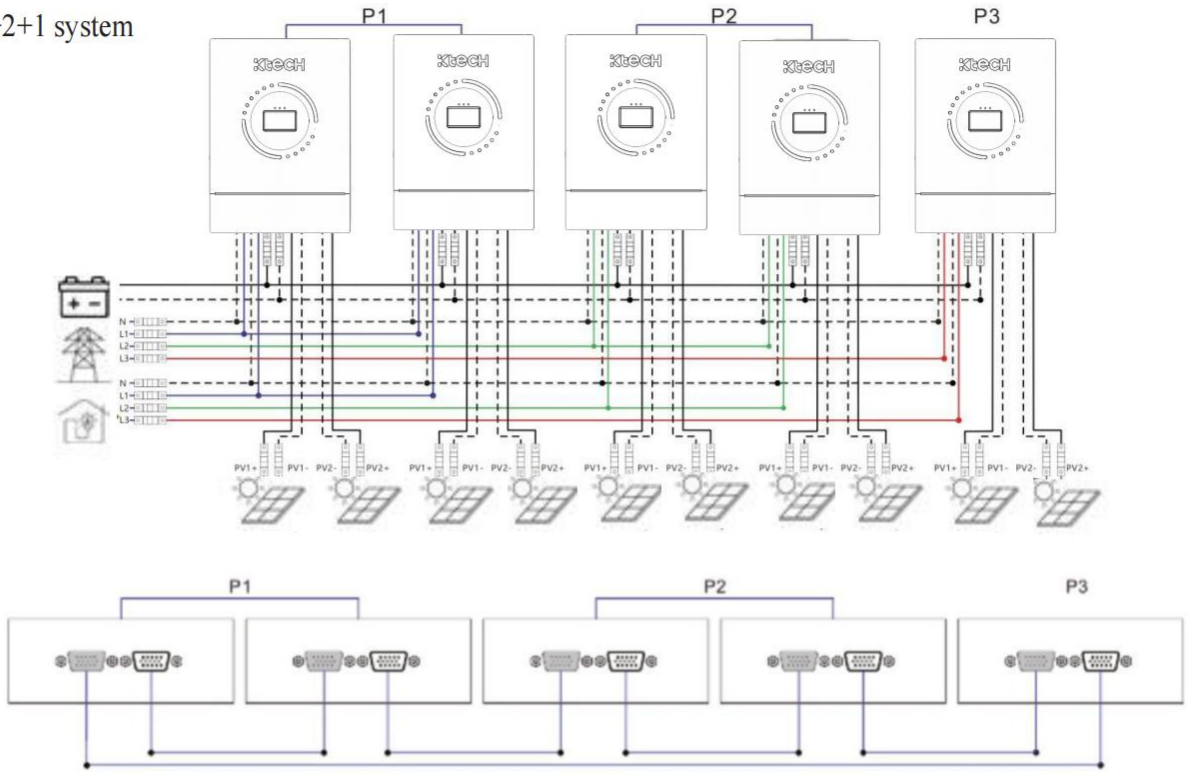
Four devices form a three-phase split system

2+1+1 system

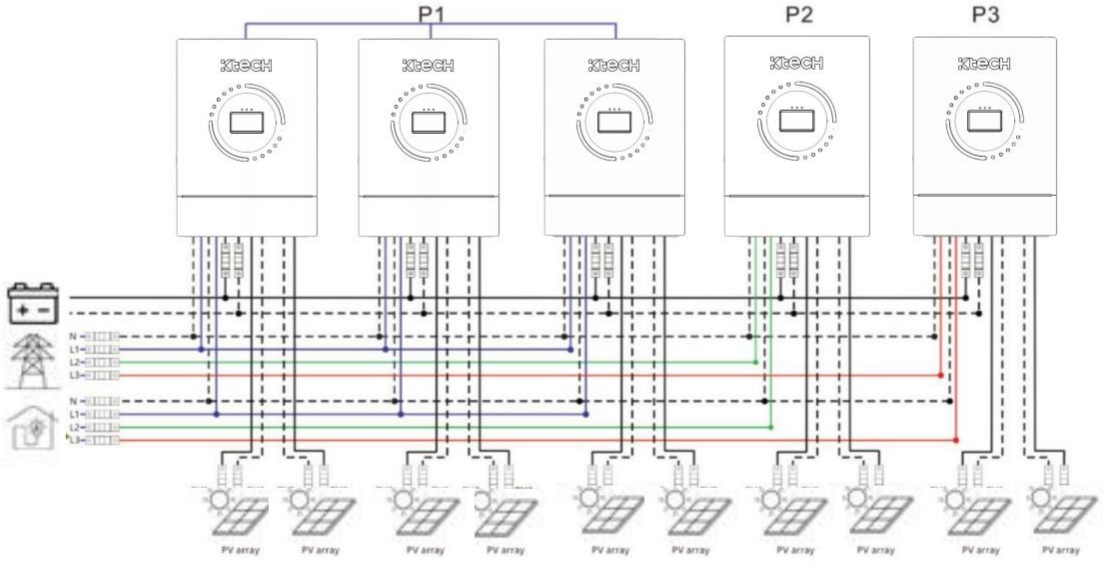


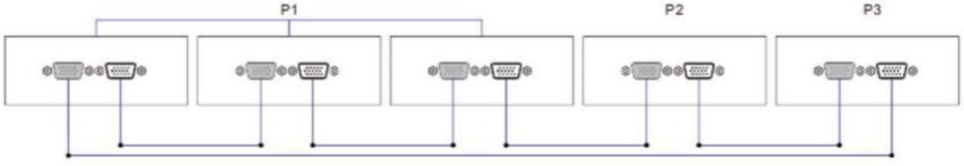
Five devices constitute a three-phase separation system

2+2+1 system



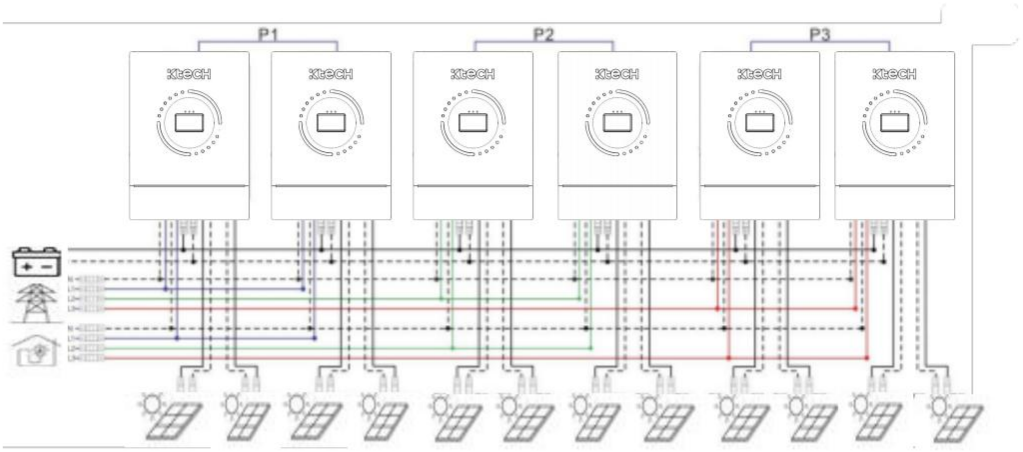
3+1+1 system

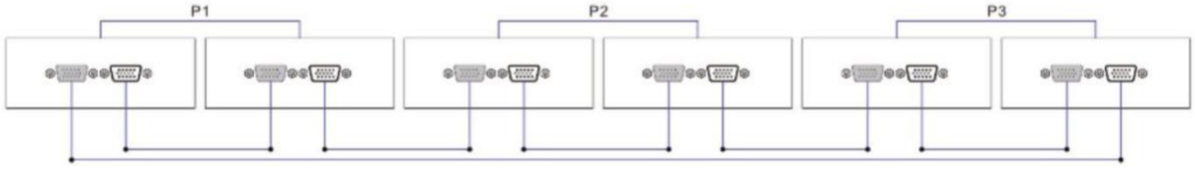




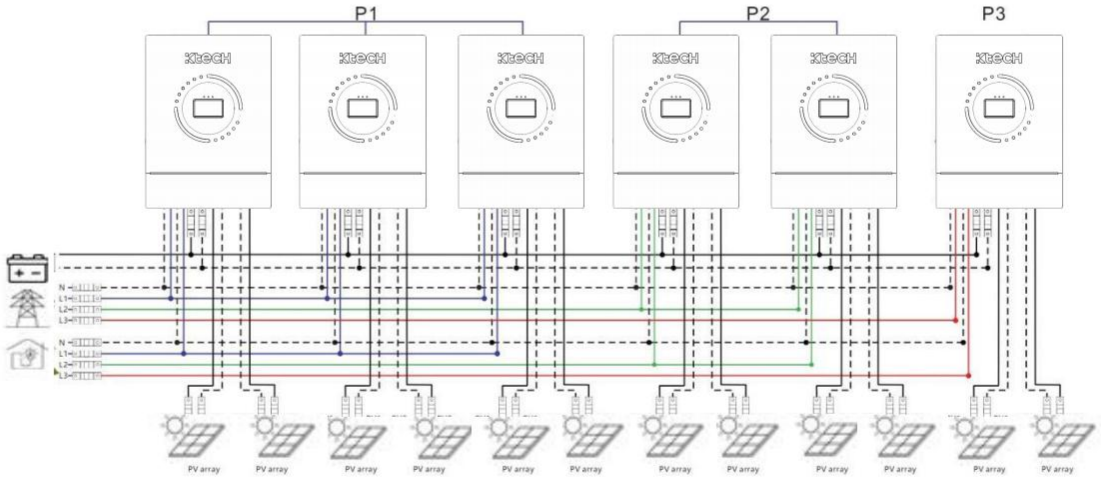
Six devices form the three-phase split phase system

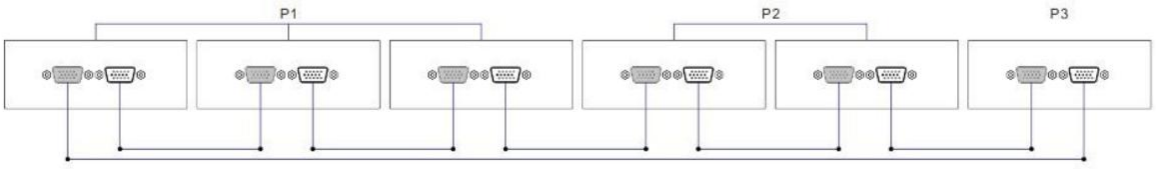
2+2+2 system



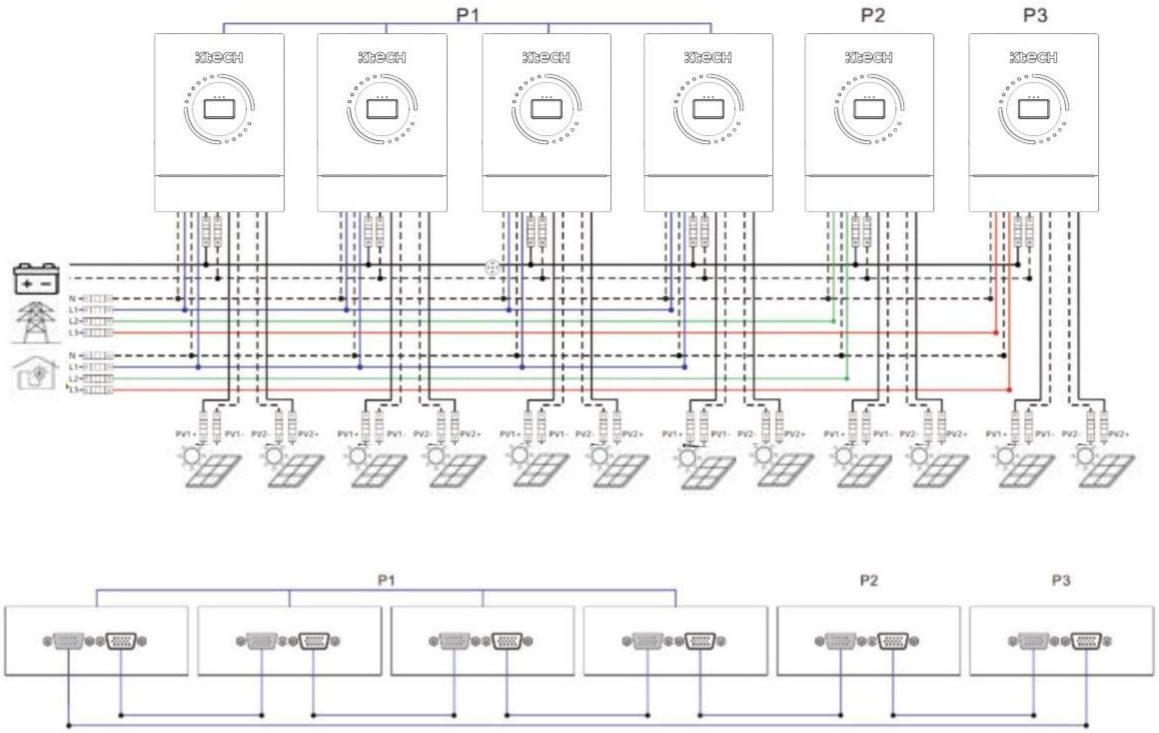


3+2+1 system





4+1+1 system



Note:

1) Before powering on the screen, check whether the cable connections are correct according to the preceding cable connection diagram to avoid system problems.

2) All connections should be fixed firmly to avoid abnormal system operation caused by line falling off.

3) When the AC output is connected to the load, it is necessary to correctly connect the cables according to the requirements of the electrical load equipment to avoid damage to the load equipment.

4) The AC output voltage needs to be set consistently, or set only for the host. When the system runs in parallel, the voltage set on the host takes precedence. The master forcibly overwrites the voltage of other slaves to be consistent. This option can be set in standby mode only.

5) The machine defaults to single-machine mode. If parallel or three-phase functions are used, AC output mode needs to be set through the screen. The setting method is:

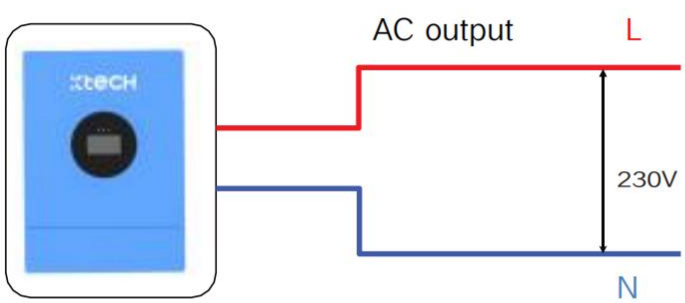
Power on one machine at a time, and shut down the other machines. Then set the AC output mode according to the on-site system running mode. After setting the machine successfully, turn off it, and wait for it to power off, and then set other machines in turn, until all machines are set up, all machines are powered on at the same time, and are on their the working state.

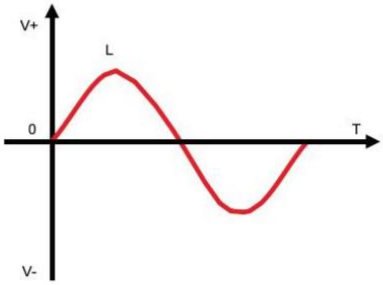
When the output voltage set by the AC output voltage is 230Vac, the voltage between P1 phase L1 and P2 phase L2 is 230*1.732=398Vac, similarly, the line voltage between L1-L3 and L2-L3 is 398Vac:

After the system runs, measure the output voltage correctly, and then connect to the load setting..

4.Wiring

4.1 Single - phase Mode



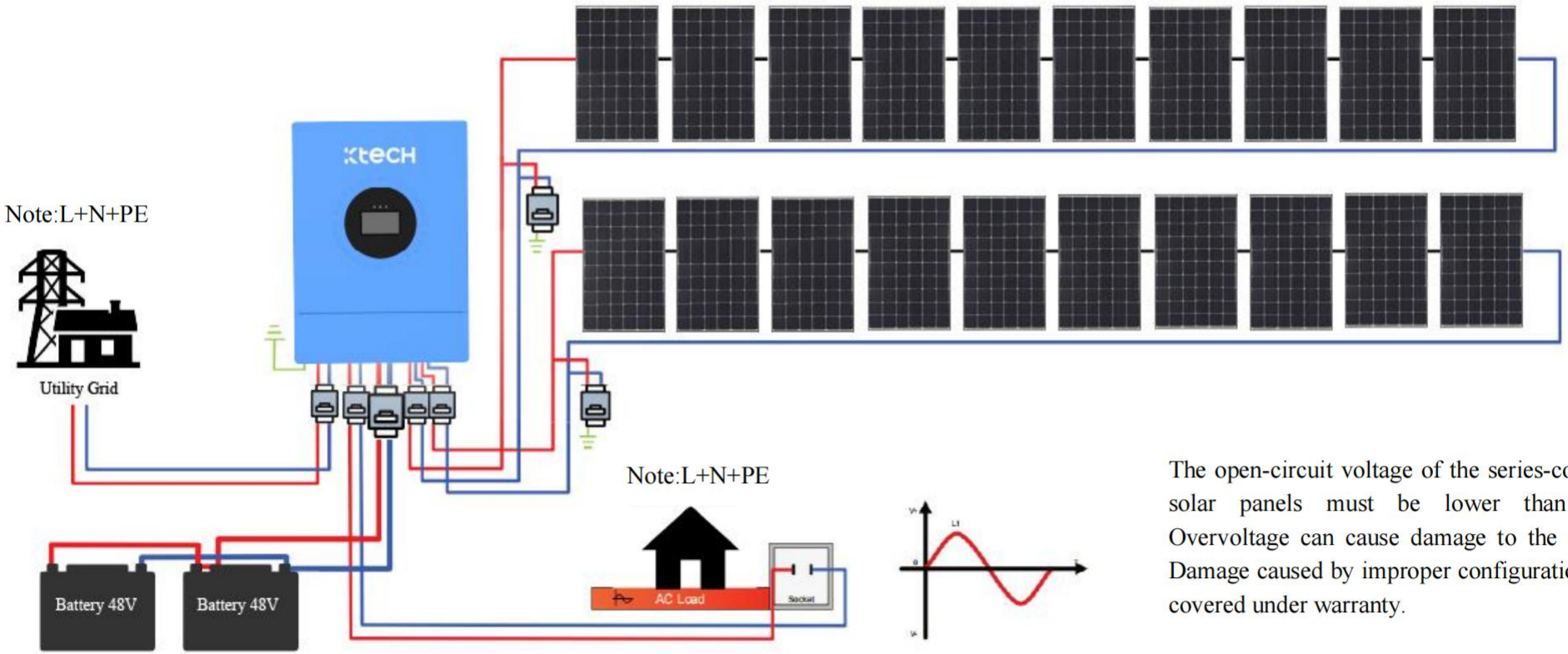


Item	Description
Applicable Models	KE-12KL1EF/KE-10KL1EF/KE-8KL1EF
AC Output Phase Voltage (L - N)	200~240Vac, 230Vac default

NOTICE

- Users can change the output voltage through the setting menu.
- The output voltage can be set within the range of 200V to 240V

Single-phase mode



The open-circuit voltage of the series-connected solar panels must be lower than 500V. Overvoltage can cause damage to the inverter. Damage caused by improper configuration is not covered under warranty.

4.2 Cable and Circuit Breaker Selection

•Photovoltaic input

Model	Wire Diameter	Maximum Input Current	Circuit Breaker Specification
KE-8KL1EF	5mm²/10AWG	22A	2P-25A
KE-10KL1EF	5mm²/10AWG	22A	2P-25A
KE-12KL1EF	5mm²/ 10 AWG	22A	2P-25A

• AC Input

Model	Output Mode	Maximum Current	Wire Diameter	Circuit Breaker Specification
KE-8KL1EF	Single-phase	63A	13mm²/6AWG（L/N）	2P-63A
KE-10KL1EF	Single-phase	63A	13mm²/6AWG（L/N）	2P-63A
KE-12KL1EF	Single-phase	63A	13mm²/6AWG（L/N）	2P-63A

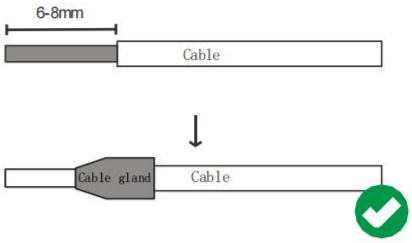
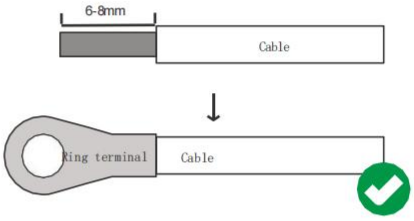
•Battery

Model	Wire Diameter	Maximum Current	Circuit Breaker Specification
KE-8KL1EF	34mm²/2 AWG	180A	2P-200A
KE-10KL1EF	42mm²/1 AWG	220A	2P-250A
KE-12KL1EF	42mm²/1 AWG	220A	2P-250A

•AC Output

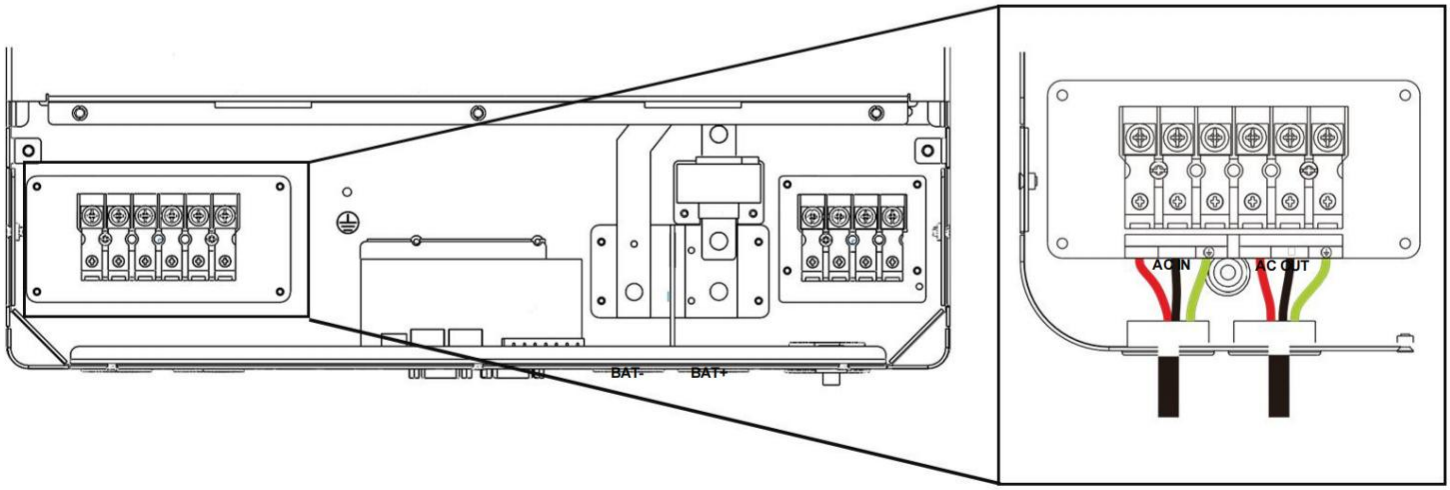
Model	Output Mode	Maximum Current	Wire Diameter	Circuit Breaker Specification
KE-8KL1EF	Single-phase	63A (L/N）	13mm²/6AWG (L/N）	2P-63A
KE-10KL1EF	Single-phase	63A (L/N）	13mm²/6AWG (L/N）	2P-63A
KE-12KL1EF	Single-phase	63A (L/N）	13mm²/6AWG (L/N）	2P-63A

NOTICE

• For the photovoltaic input, AC input, and AC output terminals. 1. Use a wire stripper to remove 6 - 8mm of the insulation layer of the cable. 2. Fix a cable gland at the end of the cable (the cable gland needs to be prepared by the user).	
• Battery Terminal 1. Use a wire stripper to remove 6 - 8mm of the insulation layer of the cable. 2. Fix the ring terminal (provided with the box) at the end of the cable.	

4.3 AC Input and Output Wiring

Connect the live wire, neutral wire, and ground wire according to the cable position and sequence shown in the figure below.



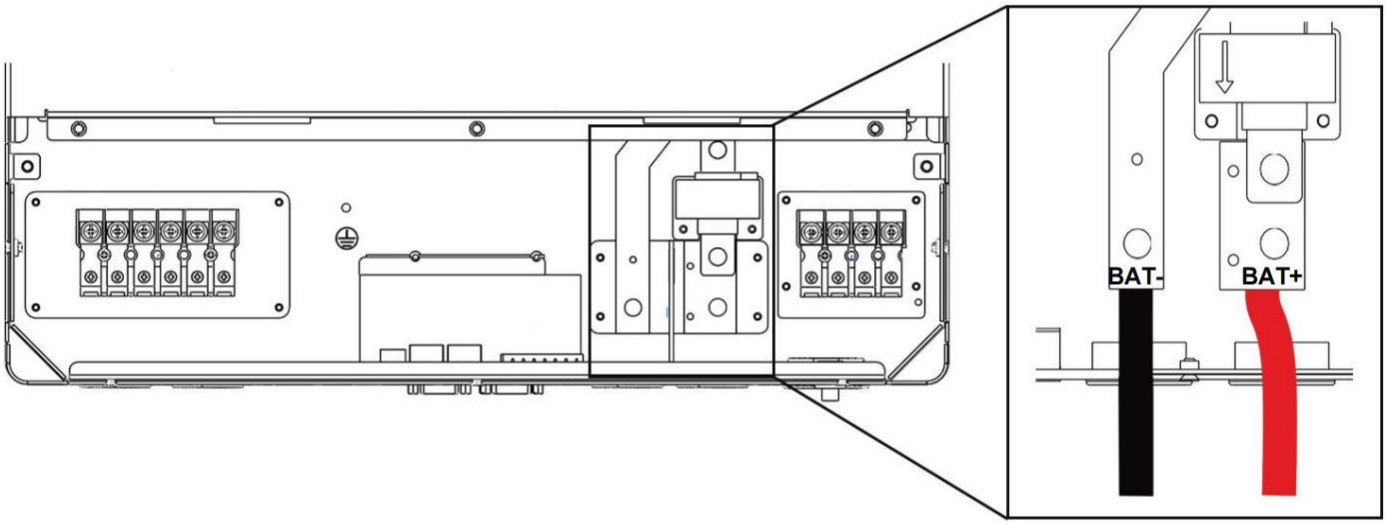
AC Input AC Output

DANGER

- Before connecting the AC input and output, the circuit breaker must be disconnected to avoid the danger of electric shock. Do not operate with electricity.
- Please check whether the cable used is sufficient to meet the requirements. Cables that are too thin or of poor quality may pose serious safety hazards.

4.4 Battery Wiring

Connect the positive and negative cables of the battery according to the cable position and sequence shown in the figure below.

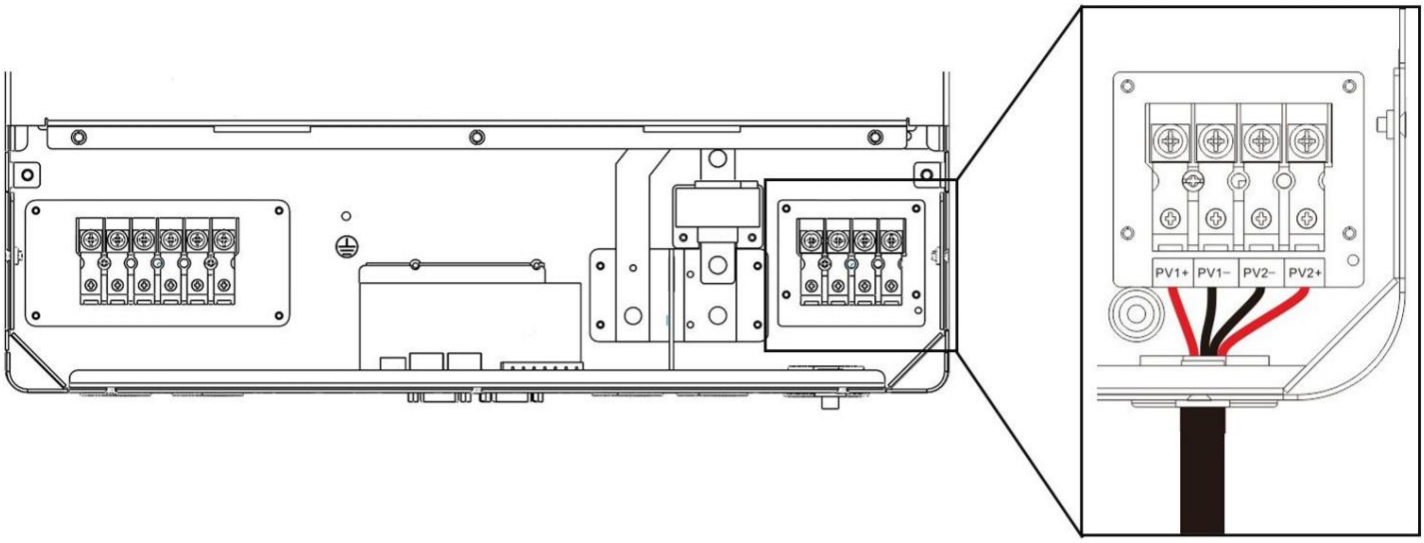


DANGER

- Before connecting the battery, the circuit breaker must be disconnected to avoid the danger of electric shock. Do not operate with electricity.
- Please ensure that the positive and negative poles of the battery are connected correctly. Do not reverse the connection, otherwise, it may damage the inverter.
- Please check whether the cable used is sufficient to meet the requirements. Cables that are too thin or of poor quality may pose serious safety hazards.

4.5 Photovoltaic Wiring

Connect the positive and negative wires of the two photovoltaic circuits according to the cable position and sequence shown in the figure below.

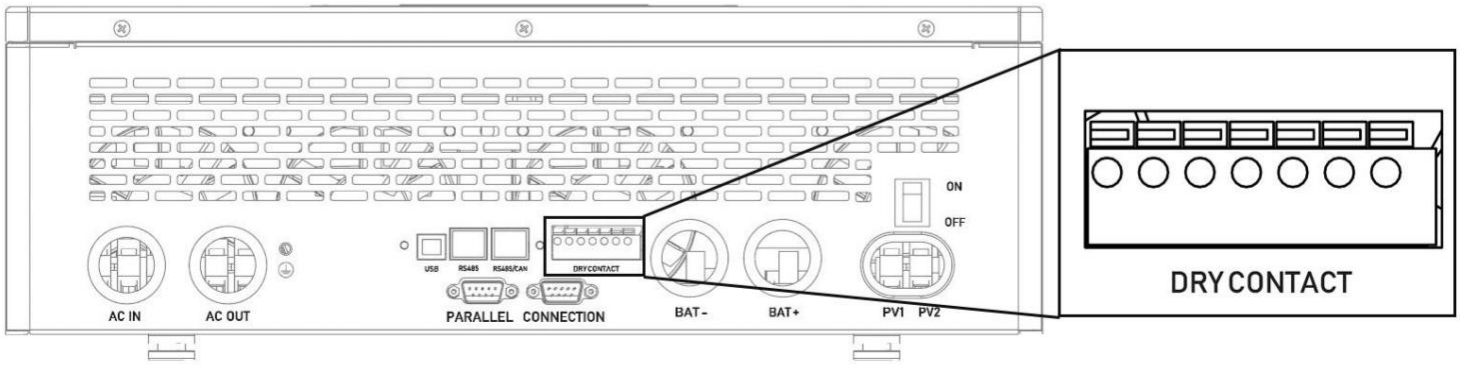


DANGER

- Before connecting the photovoltaic, the circuit breaker must be disconnected to avoid the risk of electric shock. Do not operate with electricity.
- Please ensure that the open-circuit voltage of the photovoltaic modules in series does not exceed the maximum open-circuit voltage of the inverter (in the KE series, this value is 500V), otherwise the inverter may be damaged.

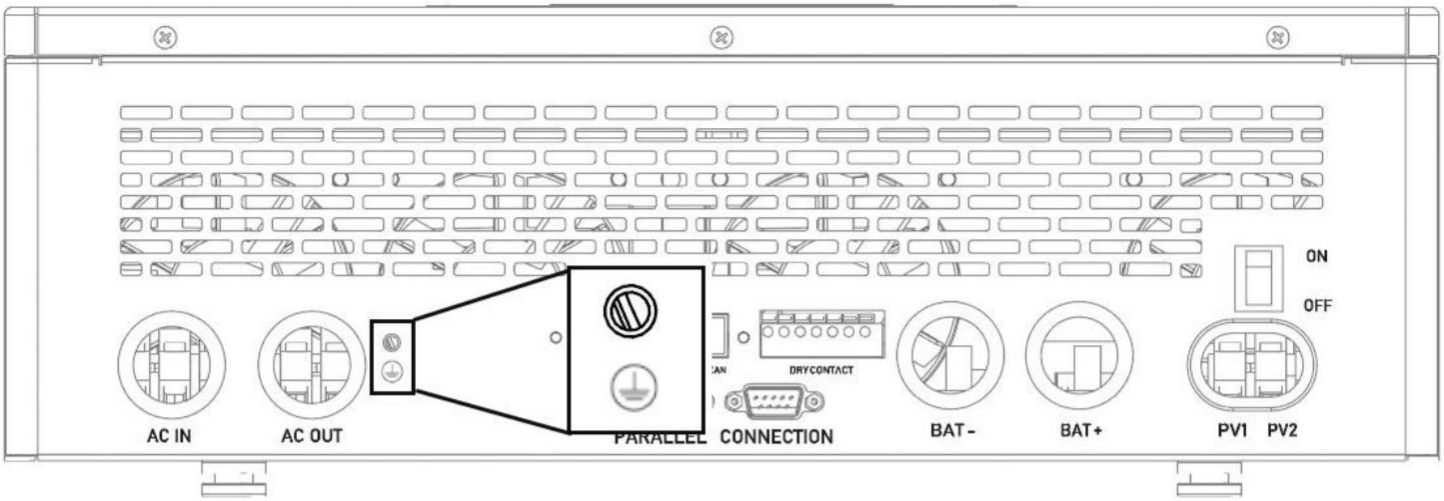
4.6 Dry Contact Wiring

Use a small-sized screwdriver to push in the direction indicated by the arrow, and then insert the communication cable into the dry contact port. (The cross-sectional area of the communication cable is 0.2~1.5mm²)



4.7 Grounding

Please ensure that the grounding terminal is reliably connected to the grounding bus bar.



NOTICE

- The diameter of the grounding wire should not be less than 4mm² and should be as close to the grounding point as possible.

4.8 Final Installation

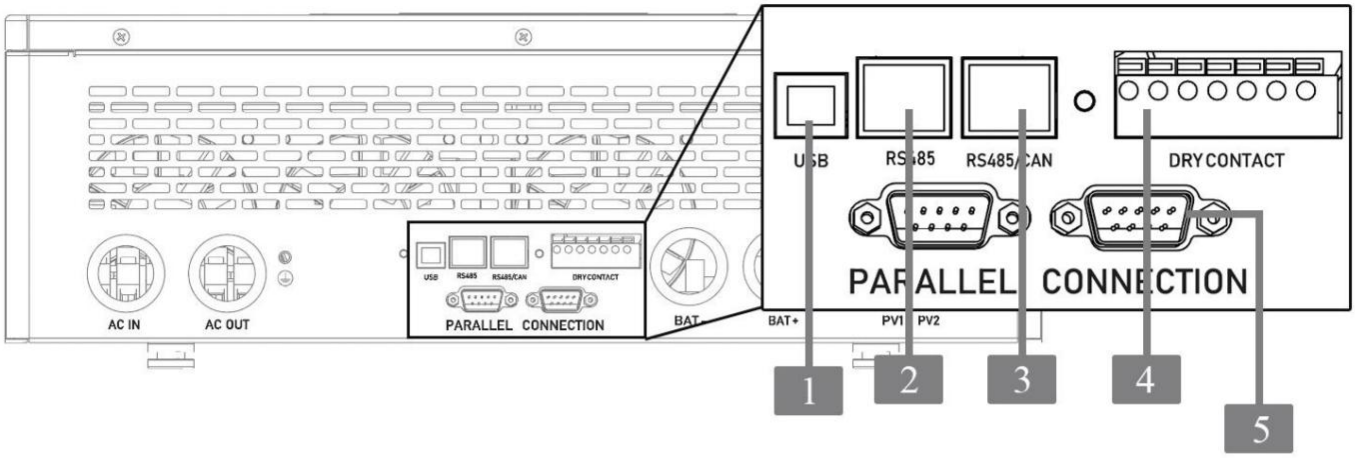
After ensuring that the wiring is reliable and the wire sequence is correct, restore the terminal protection cover to its original position.

4.9 Inverter Start-up

- Step 1: Close the battery circuit breaker.
- Step 2: Press the boat switch at the bottom of the inverter, and the screen and indicator light up, indicating that the inverter has been activated.
- Step 3: Close the circuit breakers of photovoltaic, AC input and AC output in turn.
- Step 4: Start the load one by one in order of power from small to large.

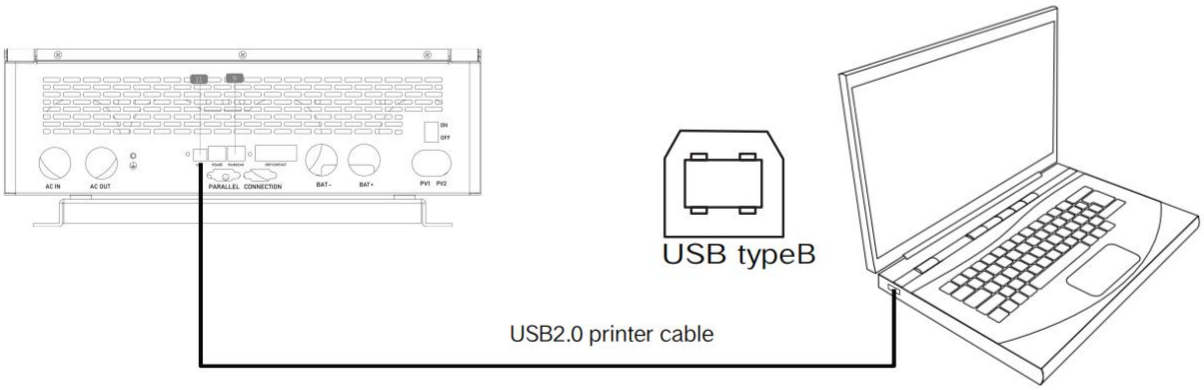
5.Communication

5.1 Overview



1	USB-B Port	2	RS485-1 Port	3	CAN/RS485-2 Port
4	Dry Contact Port Parallel Port	5	Parallel Port		

5.2 USB-B Port

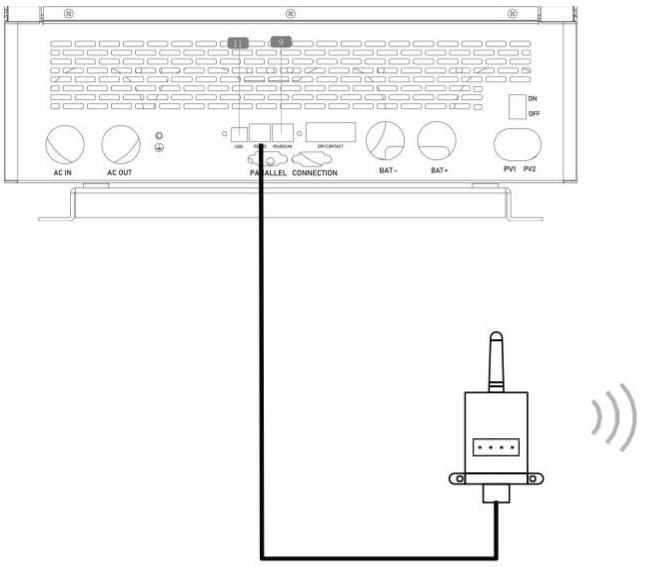


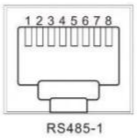
Users can use the upper computer software to read and modify device parameters through this port. If you need the installation package of the upper computer software, you can download it from the official website or contact us to obtain the installation package.

NOTICE

USB-B and RS485 communication ports cannot be ued simultaneously.

5.3 RS485-1 Port

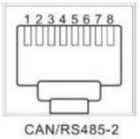




RJ45	Definition
Pin 1	5V
Pin 2	GND
Pin 3	/
Pin 4	/
Pin 5	/
Pin 6	/
Pin 7	RS485-A
Pin 8	RS485-B

5.4 CAN/RS485-2 Port

The RS485-2 port is used to connect to the Battery Management System (BMS) of the lithium-ion battery.



RJ45	Definition
Pin 1	5V
Pin 2	GND
Pin 3	/
Pin 4	CANH
Pin 5	CANL
Pin 6	/
Pin 7	RS485-A
Pin 8	RS485-B

NOTICE

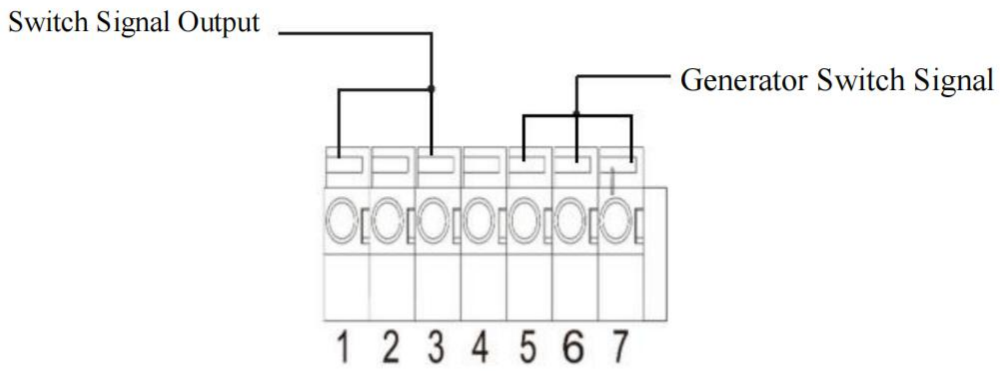
If you need the inverter to communicate with the lithium battery BMS, please contact us to learn about the communication protocol or upgrade the inverter to the corresponding software program.

If you are using an ordinary RJ45 network cable, please check the pin definitions. Pin 1 and pin 2 usually need to be cut off for normal use.

5.5 Dry Contact Port

The dry contact port has two functions:

1. Switch signal output 2. Generator remote start/stop



Function	Description
Switch Signal Output	When the battery voltage reaches the discharge limiting voltage, the voltage from pin 3 to pin 1 is 0V. When the battery is charging and discharging normally, the voltage from pin 3 to pin 1 is 5V.
Generator Remote Start/Stop	When the battery voltage reaches the undervoltage alarm voltage (Parameter 14) or the voltage point when the mains power switches to the battery (Parameter 04), the connection between pin 6 and pin 5 is normally open, and the connection between pin 7 and pin 5 is normally closed. When the battery voltage reaches the voltage point when the battery switches to the mains power (Parameter 05) or the battery is fully charged, the connection between pin 6 and pin 5 is normally closed, and the connection between pin 7 and pin 5 is normally open. (Pins 5/6/7 output 125Vac/1A, 230Vac/1A, 30Vdc/1A)

NOTICE

If you need to use the remote start/stop function of the generator through the dry contact, please ensure that the generator has an ATS (Automatic Transfer Switch) and supports remote start/stop.

5.6 Bluetooth

The inverter has a built-in Bluetooth module and can be connected and used through the EnerWise APP. (The EnerWise APP can be downloaded from the official website or by contacting us to obtain the installation package.)

5.7 WIFI

After setting up the internet access AP, it can be connected to the EnerWise cloud platform.

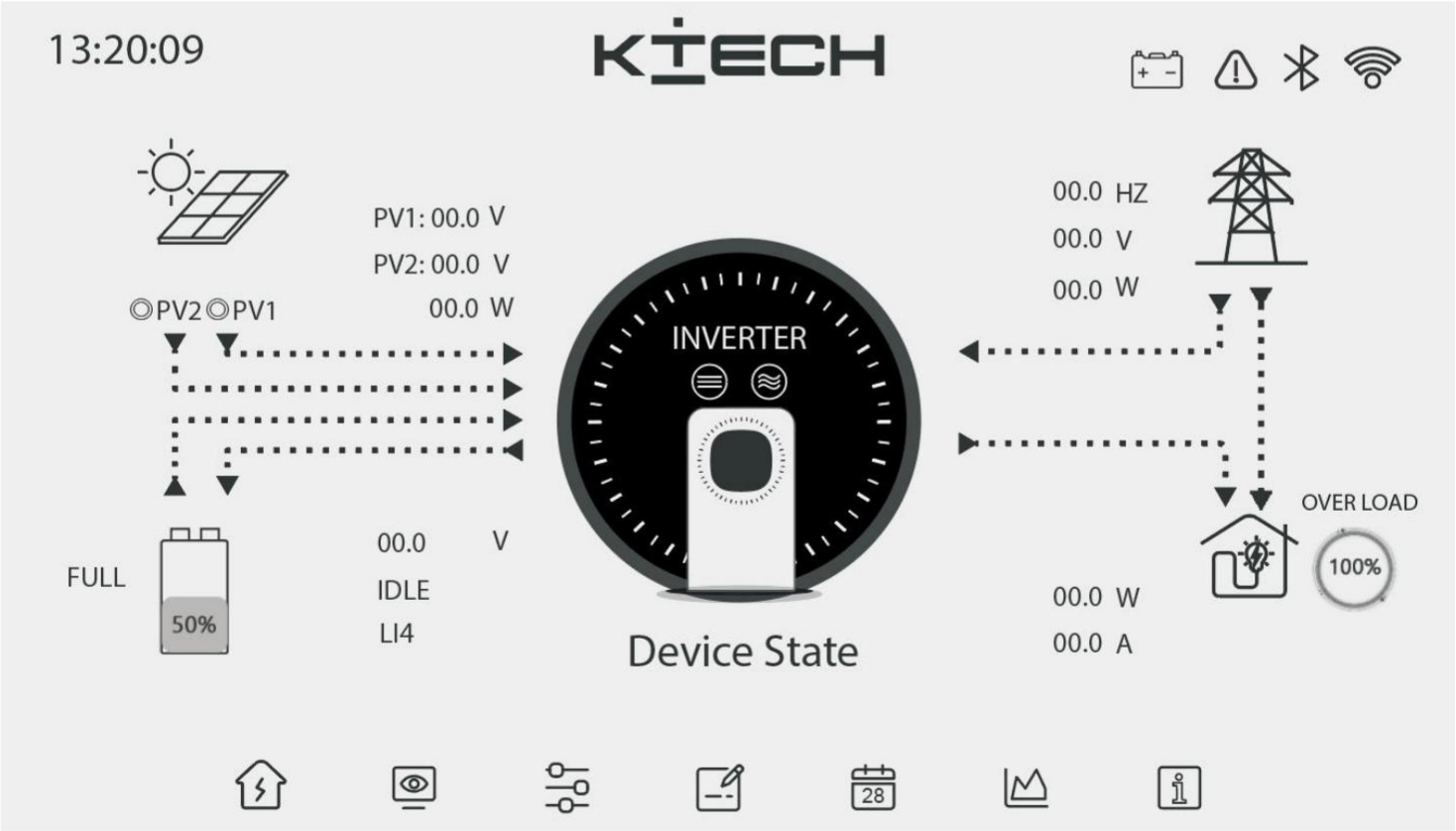
6.Interface Operation

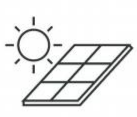
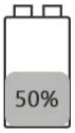
6.1 LED Indication

Indicator	Color	Description
AC/INV	Green	Steady on: Mains bypass output
		Flashing: Inverter output
CHARGE	Green	Steady on: Charging completed
		Flashing: Charging in progress
FAULT	Red	Flashing: A fault has occurred

6.2 Liquid Crystal Display and Operation

6.2.1 Main Page



Icon Data	Description	Icon Data	Description
	Represents the battery.		Main Interface
	Represents the PV photovoltaic panel.		Parameter Setting Interface
	Represents the load.		Real-time Data Interface
	Represents the grid.		Statistical Data Interface
	Represents the direction of electric energy flow.		Event Record Interface
	Battery SOC capacity.		Historical Data Interface
	Load rate.		Device Information Interface

The status information display of each interface is as follows:

Icon Data	Description
	Gray: Bluetooth not connected Green: Bluetooth connected
	Gray: Device has no fault Yellow: Device has a fault
	Gray: WIFI not connected Green: WIFI connected
	Gray: BMS not communicating Green: BMS communicating

Explanation of the device running status displayed on the main interface.

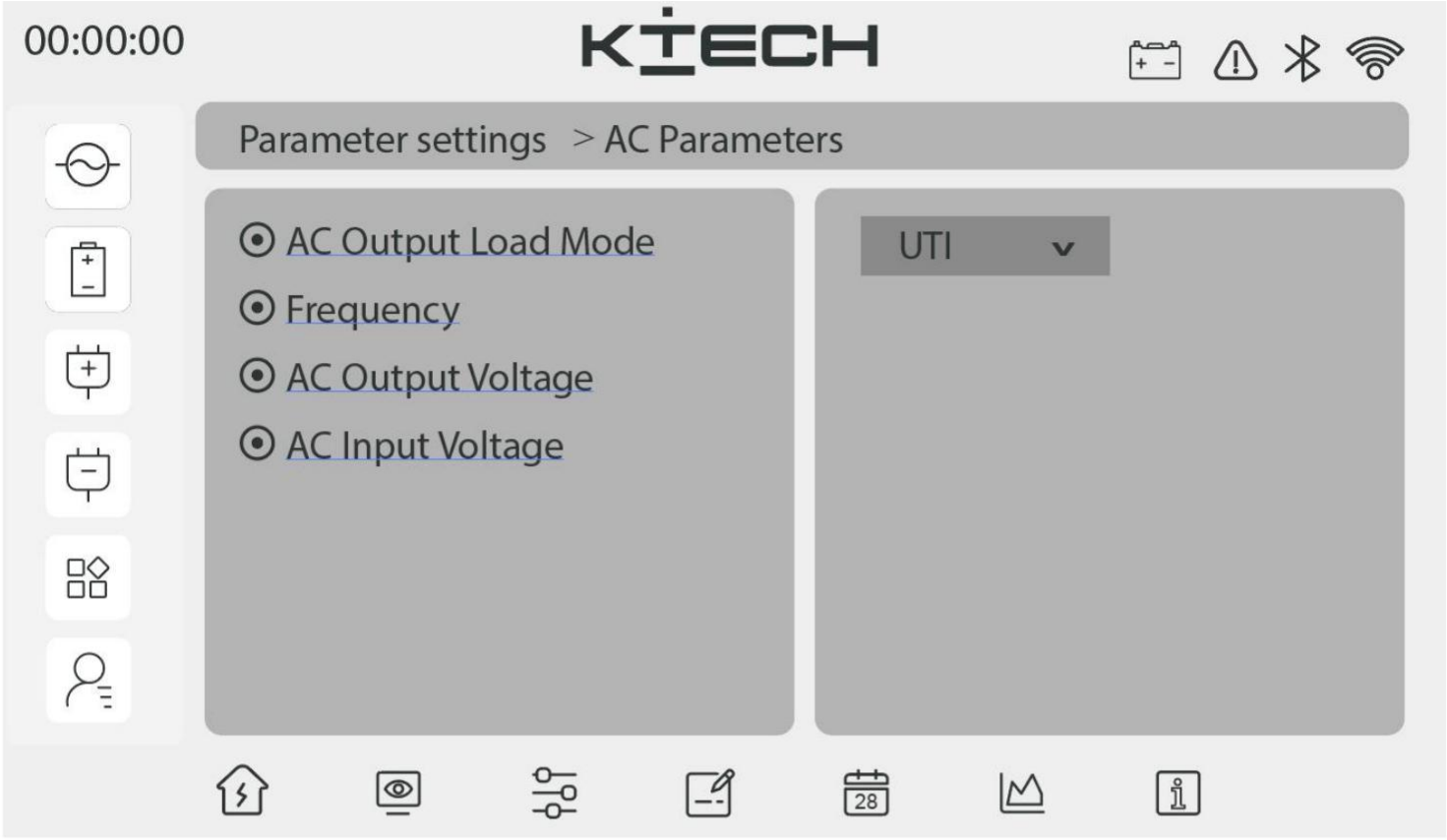
Device Status	Description
INIT	Initialization
READY	Standby State
MAINS	Mains Operation
INVERTER	Inverter Operation
INV2MAINS	Inverter to Mains Conversion
MAINS2INV	Mains to Inverter Conversion
BATACTIVE	Battery Activation
MANUALOFF	Manual Shutdown
FAULT	Fault

The menu options of each interface are as follows:

The above figure is the bottom view of any interface. You can touch and press the interface icon on any interface to jump to the corresponding interface.

Menu Level	Items	LCD Display Items
Main Menu	1.Main Page	Main interface
	2.Parameter Settings	Parameter settings
	3.Real-time Monitoring	Real time monitoring
	4.Statistical Data	Statistical data
	5.Event Records	Event recording
	6.Historical Data	Historical data of the day
	7.Device Information	Device information

6.2.2 Parameter Settings



In the parameter design interface, valid values can be entered through the virtual keyboard or options can be selected through the drop-down list. When entering through the virtual keyboard, you must press the "√" on the virtual keyboard after modification to complete the valid modification. After expanding the drop-down list, click on the item you want to select to complete the parameter setting modification. If you do not want to modify after expanding, click anywhere outside the drop-down list on the interface to cancel the drop-down options.

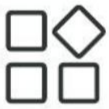
(Note: When the device fails, parameters cannot be modified.)

Item	Item Icon	Item Name	LCD Display Item	Item Parameters and Their Range	Step Size
1.AC Parameter Settings		AC Output Mode	AC Output load mode	0: UTI Mains Priority 1: SBU Inverter Priority 2: SOL PV Priority	
		Output Frequency	Frequency	×1Hz（45~ 65Hz）	1
		Output Voltage	AC Output voltage	×1V（100~264V）	1
		AC Input Range	AC Input range	×1（0:APL 1:UPS)	

2.Battery Parameter Settings		Battery Type	Battery type	"USE" User-defined "SLD" Sealed Lead Acid Battery "FLD" Flooded Lead Acid Battery "GEL" Gel Battery "L14" Lithium-ion Battery *14 "L15" Lithium-ion Battery *15 "L16" Lithium-ion Battery *16 "N13" Ternary Lithium-ion Battery *13 "N14" Ternary Lithium-ion Battery *14	
		Inverter Switching Voltage	Inverter switching voltage	×0.1V（9.0~17.0V）* n	0.1
		Battery System Voltage	Battery system voltage	“12V” “24V” “36V” “48V”	
		Battery Nominal Capacity	Nominal battery capacity	×1（1~9999AH）	1
		Lithium Battery Activation Current	Activation current of lithium battery	×0.1A（0~20A）	0.1
		Discharge Cut-off SOC	Discharge cut-off SOC	×1%（0~100%）	1
		Stop Charging SOC	Stop charging SOC	×1%（0~100%）	1
		Temperature Compensation Coefficient	Temperature compensation	×-0.1mV（0，no compensation； -(3~5)mV/℃/2V）	0.1
		SOC Low Alarm	SOC low alarm	×1%（0~100%， SOC Low Capacity Alarm）	1
		Mains Switching SOC Capacity	Switching the SOC capacity of the mains	×1% (0~100%, in SBU mode, when the SOC capacity is less than or equal	1

			power supply	to this value, switch to mains power.)	
		Battery Switching SOC Capacity	Switching battery SOC capacity	×1% (1~100%, in SBU mode, when the SOC capacity is greater than or equal to this value, switch to inverter.)	1
		Mains Switching Voltage	Switch voltage of mains power	×0.1V（9.0~17.0V）* n，	0.1
3.Battery Charging Settings		Battery Charging Mode	Battery charging mode	SNU Hybrid Mode CUB Mains Priority CSO PV Priority OSO PV Only	
		Mains Charging Current	Utility charging current	×1A（0~100A）	1
		Maximum Charging Current	Maximum allowed charging current	×1 (0~200A: 0: System charging and discharging prohibited)	1
		Overvoltage Voltage	Over-voltage threshold	×0.1V（9.0~17.0V）* n	0.1
		Boost Charging Voltage	Boost charging voltage	×0.1V（9.0~17.0V）* n	0.1
		Boost Charging Time	Boost charging time	×1MIN（0~300 MIN）	1
		Boost Charging Return Voltage	Boost charging recovery voltage	×0.1V（9.0~17.0V）* n	0.1
		Equalizing Charging Voltage	Equalization charging voltage	×0.1V（9.0~17.0V）* n	0.1
		Equalizing Charging Time	Equalization charging time	×1MIN（0~300 MIN）	1
		Equalizing Charging Timeout Time	Equalize the charge	×1MIN（5~900 MIN）	1

			timeout		
		Equalizing Charging Interval	Equalization charging interval	0, Off; 1~300D (days)	1
		Charging Activation Method	Charging activation method	×1 (0, OFF: Activation Prohibited (Lead-acid Batteries Only); 1, PULSE: (Default) Intermittent Control (Except for Lead-acid Batteries))	
		Float Charging Voltage	Float charge voltage	×0.1V（9.0~17.0V）* n	0.1
		Stop Charging Current	Stop charging current	×1A（0~10A）	1
4.Battery Discharge Settings		Undervoltage Warning Voltage	Battery under-voltage alarm voltage	×0.1V（9.0~17.0V）* n	0.1
		Over-discharge Return Voltage	Battery under-voltage recovery voltage	×0.1V（9.0~17.0V）* n	0.1
		Over-discharge Voltage	Battery over-discharge voltage	×0.1V（9.0~17.0V）* n	0.1
		Discharge Limiting Voltage	Battery discharge limiting voltage	×0.1V（9.0~17.0V）* n	0.1
		Over-discharge Delay	Battery over-discharge delay	×1s（0~60s）	1
5.System Parameter Settings		Parallel Machine Mode	Parallel mode	0: Stand-alone 1: Single-phase Parallel Connection 2: Two-phase Parallel Connection 3: Two-phase Parallel Connection 120 4: Two-phase Parallel Connection	

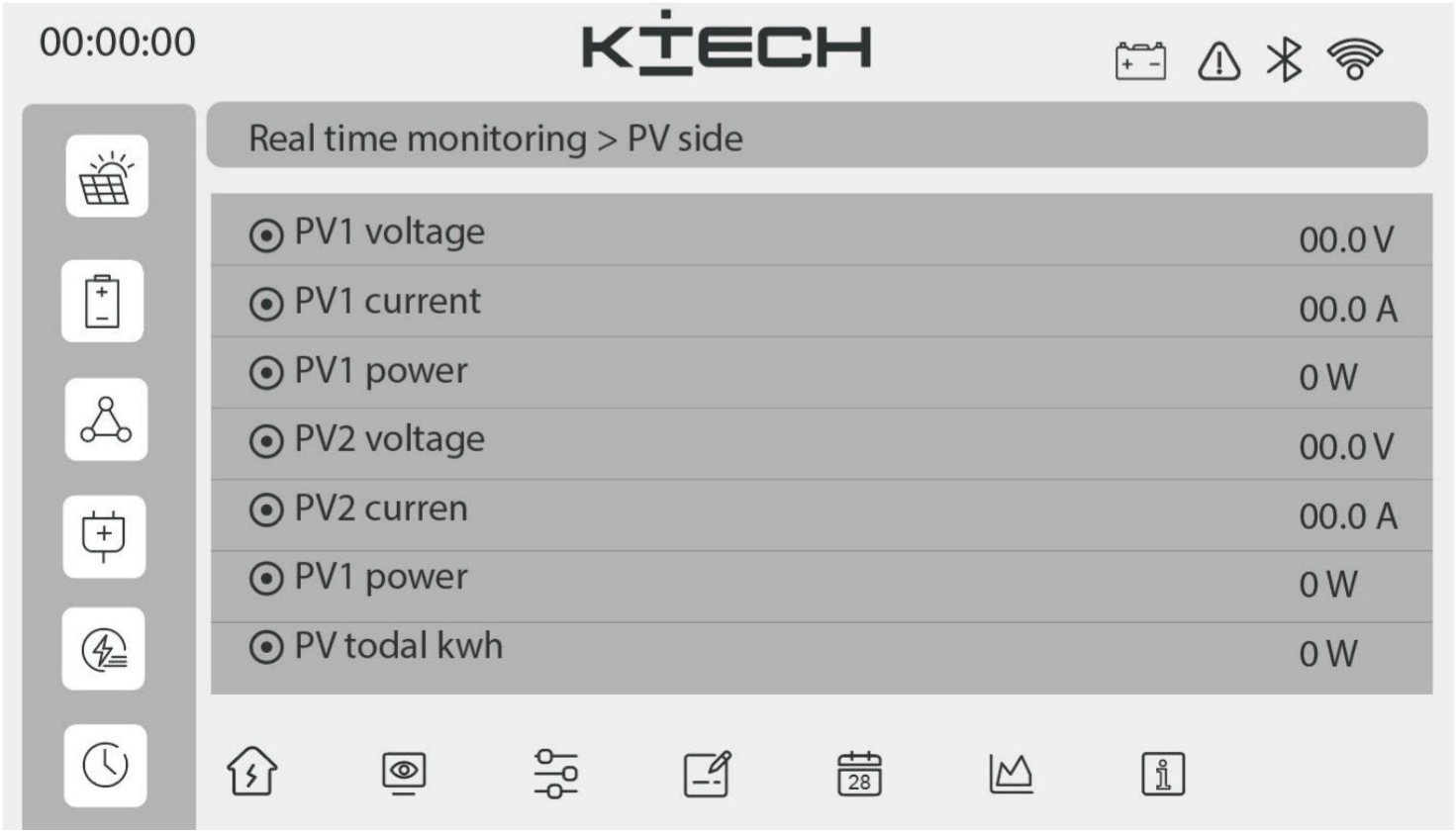
				180 5: Three-phase A 6: Three-phase B 7: Three-phase C	
		Machine Derated Power	Machine derating power	×1W (0: No derating, 1000~30000W)	1
		NPE Ground Short-circuit Function	NPE ground shorting function	0: Prohibited 1: Enabled	
		Energy-saving Mode	Energy saving mode	0: Prohibited 1: Enabled	
		Over-temperature Automatic Restart	Automatic restart after over-temperature	0: Prohibited 1: Enabled	
		Overload Automatic Restart	Automatic restart after overload	0: Prohibited 1: Enabled	
		Buzzer Alarm	Buzzer alarm	0: Prohibited 1: Enabled	
		Mode Conversion Reminder	Mode shift alerted	0: Prohibited 1: Enabled	
		Overload Bypass Function	Overload bypass function	0: Prohibited 1: Enabled	
		Single Machine Phase-to-Phase Phase Difference	The phase difference between the phases of the single machine	Only applicable to single-phase split-phase machines 0: Phase difference 180 degrees 1: Phase difference 120 degrees 2: Phase difference 0 degrees	
		Grid Connection and Hybrid Load Carrying Function	Grid connection and mixed-load function	0: Prohibited (Default) 1: on grid 2：mix load	
		Leakage Current	Leakage current	0: Prohibited	

		Detection	detection	1: Enabled	
		PV Output Priority	PV output priority	0: Charging Priority 1: Load Carrying Priority	
		Charging Current Limitation (When Starting BMS)	Charge current limit	0：SET； 1：BMS（Default） 2：INV	
		BMS Protocol	BMS	×1（0~30）	1
6.Communication Parameter Settings		Device Communication Address	Device communication address	×1（1~247）	1
		RS4851 Working Mode	RS485-1 working mode	0, Modbus Slave 1, BMS Master	
		RS4851 Communication Baud Rate	RS485-1 communication baud rate	0，9600； 1，19200； 2，38400； 3，57600； 4，115200	
		RS4851 Communication Data Bits	RS485-1 communication data bits	0，5； 1，6； 2，7； 3，8	
		RS4851 Communication Stop Bits	RS485-1 communication stop bit	1，1； 2，1.5； 3，2	
		RS4851 Communication Checksum	RS485-1 communication verification	0, None; 2, Even; 3, Odd	
		RS4852 Working Mode	RS485-2 working mode	0, Modbus Slave; 1, BMS Master	

		RS4852 Communication Baud Rate	RS485-2 communication baud rate	0，9600； 1，19200； 2，38400； 3，57600； 4，115200	
		RS4852 Communication Data Bits	RS485-2 communication data bits	0，5； 1，6； 2，7； 3，8	
		RS4852 Communication Stop Bits	RS485-2 communication stop bit	1，1； 2，1.5； 3，2	
		RS4852 Communication Checksum	RS485-2 communication verification	0, None; 2, Even; 3, Odd	
		LCD Backlight Time Setting	LCD backlight time	×1 (0, Always On; 1~600s)	1
		Bluetooth Enabling	BLE enabled	0, Disabled; 1, Enabled	
		WiFi Enabling	WIFI enabled	0, Disabled; 1, Enabled	
7.Segmented Charging Time Settings		Segmented Charging Enabling	Time-based utility charge /load function switch	0: Prohibit 1: Enable	
		Segment 1 Start and End Charging Time	1 stage start and end charge time	Hour: 0-23 Minute: 0-59	
		Segment 2 Start and End Charging Time	2 stage start and end charge time	Hour: 0-23 Minute: 0-59	
		Segment 3 Start and End Charging Time	Segment 3 Start and End Charging	Segment 3 Start and End Charging Time	Segment 3 Start and End Chargin

			Time		-g Time
8.Segmented Discharge Time Settings		Segmented Discharge Enabling	Scheduled utility discharge function switch	0: Prohibit 1: Enable	
		Segment 1 Start and End Charging Time	1 stage start and end discharge time	Hour: 0-23 Minute: 0-59	
		Segment 2 Start and End Discharge Time	2 stage start and end discharge time	Hour: 0-23 Minute: 0-59	
		Segment 3 Start and End Discharge Time	3 stage start and end discharge time	Hour: 0-23 Minute: 0-59	

6.2.3Real - time Monitoring



In any interface, click on the "Real - time Monitoring" icon, and you can jump to this interface.

Item	Item Icon	Item Name	LCD Display Item	Description
1.PV (Photovoltaic Panel) Data		Voltage of Solar Panel 1	PV1 voltage	
		Current of Solar Panel 1	PV1 current	
		Power of Solar Panel 1	PV1 power	
		Voltage of Solar Panel 2	PV2 voltage	
		Current of Solar Panel 2	PV2 current	
		Power of Solar Panel 2	PV2 power	
		Total Power of Solar Panels	PV total kWh	
2.Battery Data		Voltage of the storage battery	BAT voltage	
		Current of the storage battery	BAT current	
		State of Charge (SOC) of the battery	BAT SOC	
		Battery charging status	BAT charging state	"IDLE": Not charging; "MPPT": MPPT charging; "BST": Boost charging; "FLT": Float charging; "EQU": Equalizing charging; "LIMIT": Current-limiting charging
		Battery fully charged status	BAT charging full state	"NOT FULL": Not fully charged "FULL": Fully

				charged
		Load-carrying status	Load selection	0: No load 1: Inverter carrying load, INV 2: Bypass carrying load, Bypass 3: Carrying load simultaneously, Bypass and INV
3.Utility power and other data		Apparent power of phase A of the power grid	Phase A grid apparent power	
		Voltage of phase A of the power grid	Grid A voltage	
		Current of phase A of the power grid	Grid A current	
		Voltage of phase A of the inverter	Inverter phase A voltage	
		Current of phase A of the inverter	Inverter phase A current	
		Current of phase A of the load	Load phase A current	
		Active power of phase A of the load	Load phase A active power	
		Apparent power of phase A of the load	Apparent power of phase A of the load	
		Load rate of phase A	Phase A load rate	
		Power grid frequency	Grid frequency	
		Inverter frequency	Inverter frequency	
		Voltage of phase B of the power grid	Phase B voltage of the power grid	
		Voltage of phase C of the	Phase C voltage of the power grid	

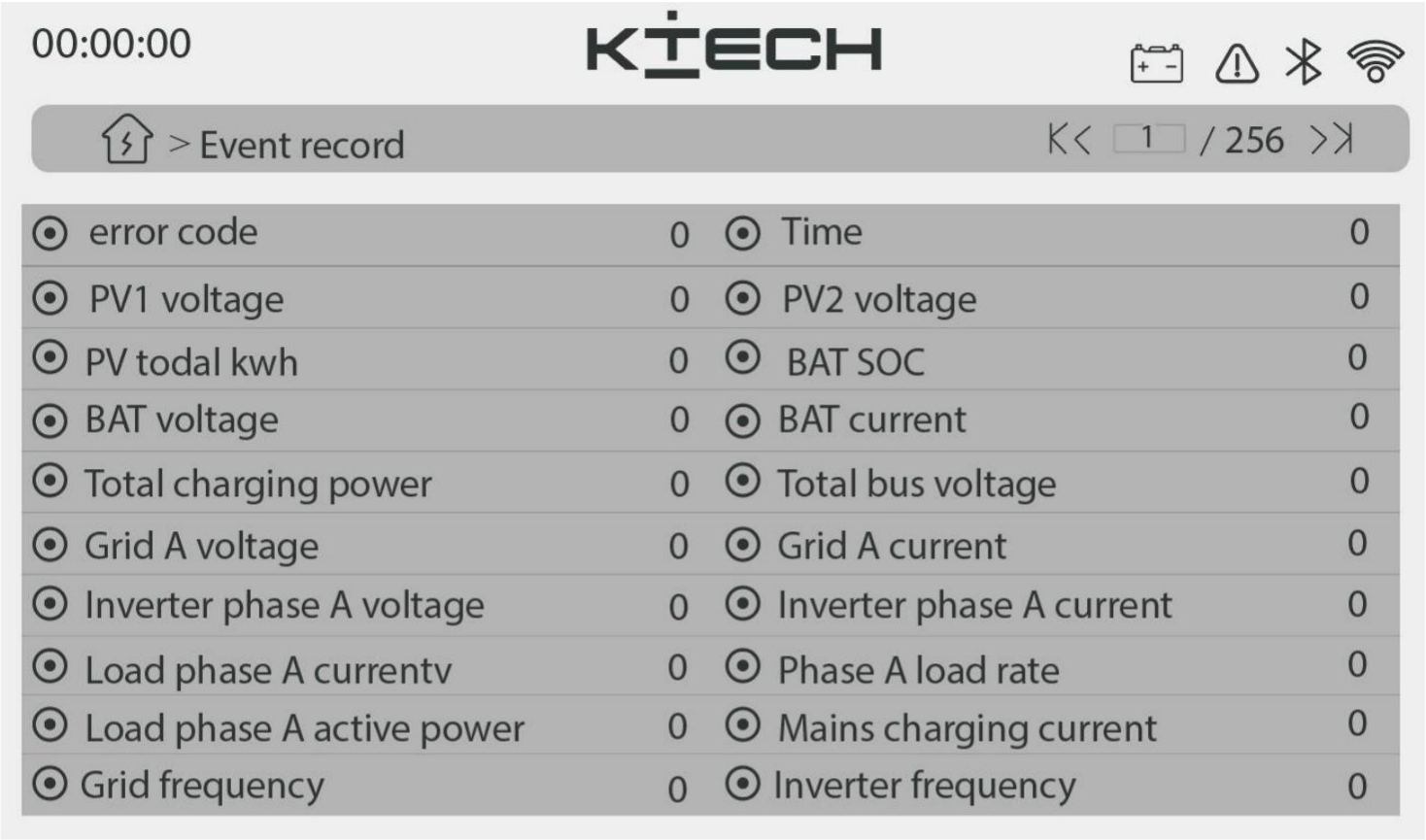
		power grid		
		Voltage of phase B of the inverter	Inverter B phase voltage	
		Current of phase B of the inverter	Inverter B phase current	
		Voltage of phase C of the inverter	Inverter C phase voltage	
		Current of phase C of the inverter	Inverter C phase current	
		Current of phase B of the load	Load B phase current	
		Current of phase C of the load	Load C phase current	
		Apparent power of phase C of the power grid	Phase C grid apparent power	
		Apparent power of phase B of the power grid	Phase B grid apparent power	
		Active power of phase B of the load	Active power load on phase B	
		Active power of phase C of the load	Active power load on phase C	
		Apparent power of phase B of the load	Apparent power of phase B of the load	
		Apparent power of phase C of the load	Apparent power of phase C of the load	
		Load rate of phase B	B-phase loading rate	
		Load rate of phase C	C-phase loading rate	
		Current of phase B of the power grid	Phase B current of the grid	

		Current of phase C of the power grid	Phase C current of the grid	
		Active power of phase A of the power grid	Phase A grid active power	
		Active power of phase B of the power grid	Phase B grid active power	
		Active power of phase C of the power grid	Phase C grid active power	
4.Charging Data		Total charging power	Total charging power	
		Mains charging current	Mains charging current	
		PV charging current	PV charge current	
5.Discharging Data		Total bus voltage	Total bus voltage	
		Positive bus voltage	Positive bus voltage	
		Negative bus voltage	Negative bus voltage	
		Average current of parallel - connected load	Average current of parallel load	
6.Equipment and Temperature Data		PV radiator temperature	PV radiator temperature	
		Inverter radiator temperature	Inverter radiator temperature	
		Battery radiator temperature	Battery radiator temperature	
		Equipment Status	Device status	0: Initialization INIT 1: Standby state READT 2: Mains operation MAINS 3: Inverter operation INVERTER 4: Inverter to mains transition INV2MAINS

				5: Mains to inverter transition MAINS2INV 6: Battery activation BATACTIVE 7: Manual shutdown MANUALOFF 10: Fault FAULT
		Fault Information	Error information	For details, refer to the Fault Code Information Table.
7.Communication status		Bluetooth Status	Ble status	0: Turned off 1: Connected 2: Waiting for connection
		WIFI Status	WIFI status	0: Closed 1: Connected 2: Waiting to connect
		Cloud platform connectivity status	Cloud platform connectivity status	0: Closed 1: Connected
		RS485-1 communication status	RS485-1 communication status	0: Not communicating 1: Communicating
		RS485-2 communication status	RS485-2 communication status	0: Not communicating 1: Communicating
		BMS communication status	BMS communication status	0: Communication abnormal 1: Communication normal

6.2.4 Event Records

In any interface, clicking on the "Event Records" icon ,and it will redirect you to this interface. A maximum of 256 events can be recorded.



Serial Number	Description	Serial Number	Description
1	Equipment Status	14	Inverter Phase A Current
2	Battery Charging Status	15	Load Phase A Current
3	Solar Panel 1 Voltage	16	Load Phase A Active Power
4	Solar Panel 2 Voltage	17	Load Phase A Apparent Power
5	Total Power of Solar Panels	18	Mains Charging Current
6	State of Charge (SOC) of Battery	19	Phase A Load Rate
7	Battery Voltage	20	Grid Frequency
8	Battery Current	21	Inverter Frequency
9	Total Charging Power	22	PV Heat Sink Temperature

10	Total Bus Voltage	23	Inverter Heat Sink Temperature
11	Grid Phase A Voltage	24	Battery Transformer Heat Sink Temperature
12	Grid Phase A Current	25	PV Charging Current
13	Inverter Phase A Voltage	26	Parallel Load Average Current

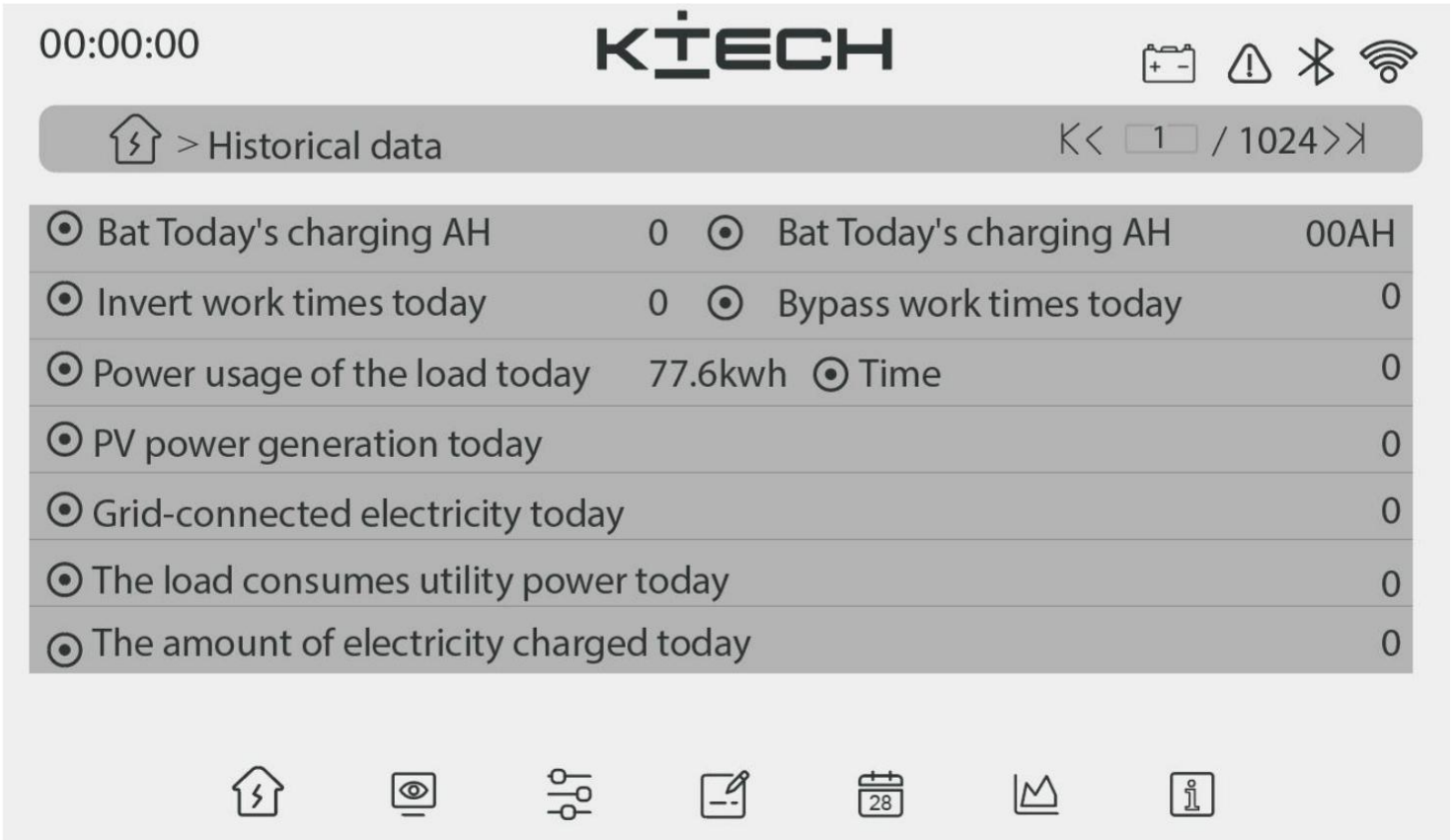
The fault information table is as follows:

Fault Code	Description	Fault Code	Description
1	Battery Under - voltage Alarm	27	Mains Input Phase Error
2	Battery Discharge Average Current Over - current Software Protection	28	Bus Voltage Low Protection
3	Battery Not Connected Alarm	29	Battery Capacity Rate Below 10% Alarm (Effective after successful BMS communication)
4	Battery Under - voltage Stop Discharge Alarm	30	Battery Capacity Rate Below 5% Alarm (Effective after successful BMS communication)
5	Battery Over - current Hardware Protection	31	Battery Low Capacity Shutdown (Effective after successful BMS communication)
6	Charging Over - voltage Protection	32	Parallel Control CAN Communication Failure
7	Bus Over - voltage Hardware Protection	33	Parallel CAN Communication Failure
8	Bus Over - voltage Software Protection	34	Parallel ID (Communication Address) Setting Error
9	PV Over - voltage Protection	35	Parallel Current Sharing Failure
10	Boost Over - current Software Protection	36	Parallel Mode, Large Battery Voltage Difference
11	Boost Over - current Hardware Protection	37	Parallel Mode, Inconsistent Mains Input Sources
12	Master - Slave Chip Communication Failure	38	Parallel Mode, Hardware Synchronization Signal Failure
13	Bypass Overload Protection	39	Abnormal DC Component in Inverter Voltage
14	Inverter Overload Protection	40	Inconsistent Parallel Program Versions
15	Inverter Over - current Hardware Protection	41	Parallel Wiring Fault
16	Slave Chip Request Shutdown Failure	42	Factory - unset Serial Number
17	Inverter Short - circuit Protection	43	AC Output Mode - Setting Item Setting Error
18	Bus Soft - start Failure	44	Battery Voltage Below Discharge Limit Voltage Affects Output

19	PV Radiator Over - temperature Protection	45	Battery Transformer and Radiator Over - temperature Protection
20	Inverter Radiator Over - temperature Protection	58	BMS Communication Failure
21	Fan Failure	59	BMS Error Report
22	Memory Failure	60	BMS Low - temperature Alarm (Effective after successful BMS communication)
23	Model Setting Error	61	BMS Over - temperature Alarm (Effective after successful BMS communication)
24	Positive and Negative Bus Voltage Imbalance	62	BMS Over - current Alarm (Effective after successful BMS communication)
25	Bus Short - circuit	63	BMS Under - voltage Alarm (Effective after successful BMS communication)
26	Inverter AC Output Reverse - feeding to Bypass AC Output	64	BMS Over - voltage Alarm (Effective after successful BMS communication)

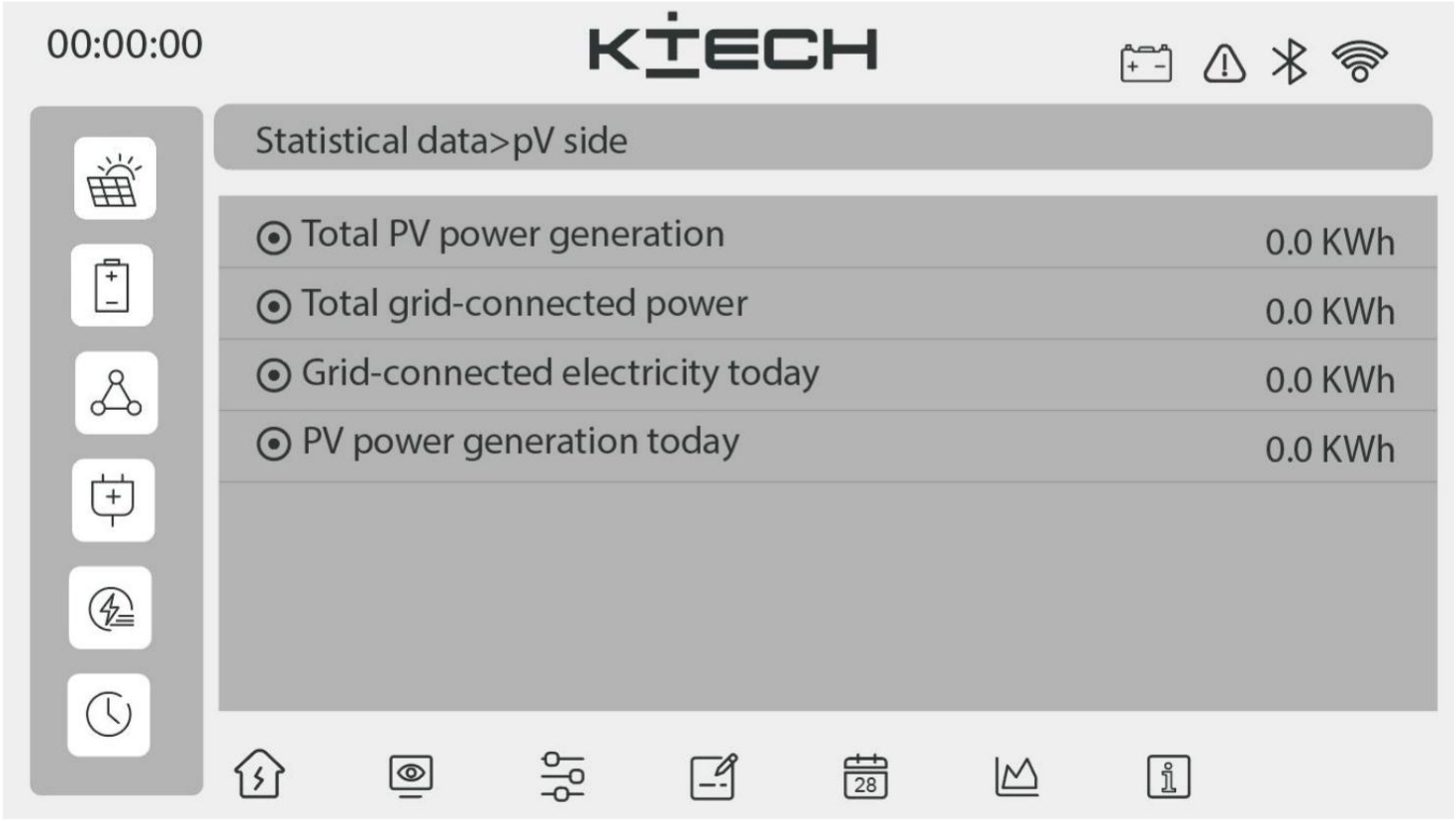
6.2.5 Historical data

In any interface, clicking on the "Historical Data" icon ,and it willredirect you to this interface. A maximum of 1,024 historical data records can be recorded.



Serial number	Project Name
1	Daily Grid - connected Electricity Quantity
2	Daily Battery Charging Ampere - hour Quantity
3	Daily Battery Discharging Ampere - hour Quantity
4	Daily PV Power Generation
5	Daily Load Electricity Consumption
6	Daily Mains Charging Electricity Quantity
7	Daily Load Electricity Consumption from Mains
8	Daily Inverter Operating Time
9	Daily Bypass Operating Time

6.2.6 Statistical Data

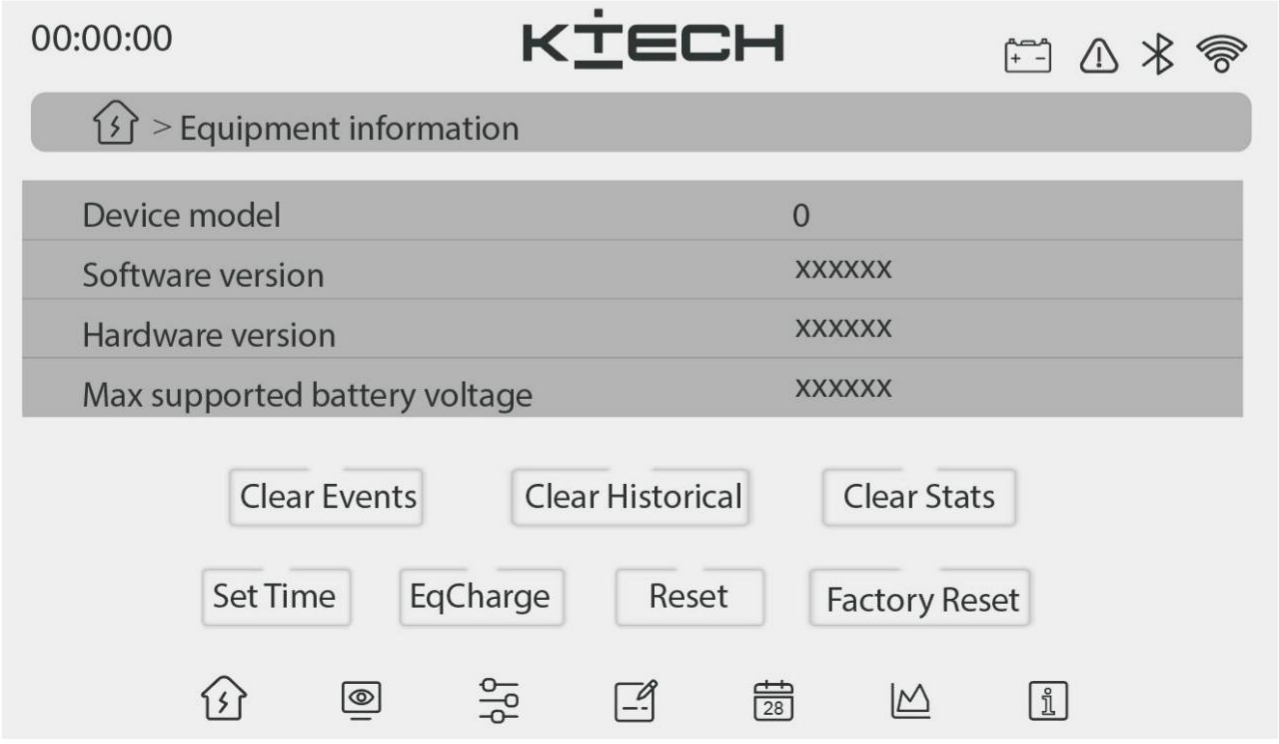


In any interface, clicking on the "Statistical Data" icon will redirect you to this interface.

Project	Project Icon	Project Name	Liquid Crystal Display Project
1.PV and Grid - connected Data		Cumulative PV Power Generation	Total PV power generation
		Cumulative Grid - connected Power	Total grid-connected power
		Daily Grid - connected Power	Grid-connected electricity today
		Daily PV Power Generation	PV power generation today
2.Battery Data		Daily Battery Charging Ampere - hour	Today's charging AH
		Daily Battery Discharging Ampere - hour	Today's discharge AH
		Cumulative Battery Charging Ampere - hour	Cumulative discharge AH
		Cumulative Battery Discharging Ampere - hour	Cumulative charge AH
3.Load Data		Cumulative Load Power Consumption from Mains	Total electricity consumption from mains
		Cumulative Load Power Consumption	Total load power consumption
		Daily Load Power Consumption from Mains	The load consumes utility power today
		Daily Load Power Consumption	Electricity consumption on the day of load
4.Charging Data		Cumulative Mains Charging Power	Total charging of mains
		Daily Mains Charging Power	The amount of electricity charged today

5.Time Data		Startup Time	Boot time
		Total Operating Days	Total running days
		Daily Inverter Operating Time	Invert working hours today
		Daily Bypass Operating Time	Bypass is working for today's hours
		Last Equalization Charging Completion Time	Time of last equalization charge completion
		Cumulative Inverter Operating Time	Cumulative working hours of the inverter
		Cumulative Bypass Operating Time	Cumulative working hours for bypasses
		Number of Fault Records	Event records
		Number of Historical Data Records	Historical data records

6.2.7 Equipment Information



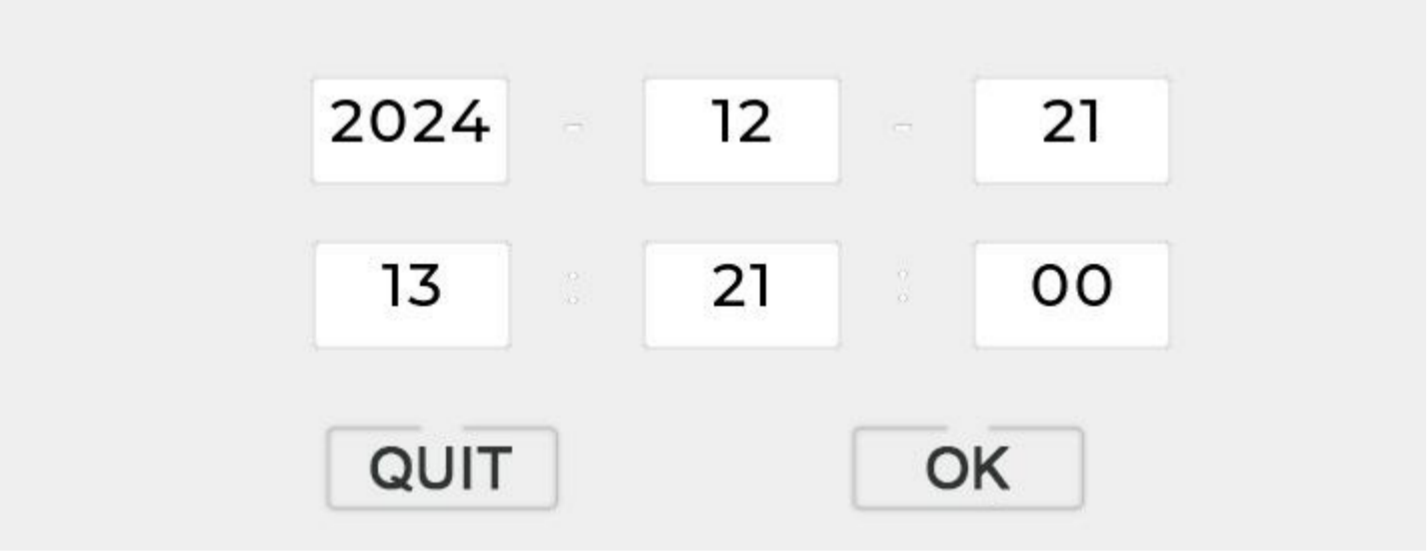
Liquid Crystal Display	Item Project Name
Model	Device Model
Hardware version	Hardware Version
Software version	Software Version
Max supported battery voltage	Maximum Supported Battery Voltage

Immediately Conduct Equalizing Charge

Click "EqCharge" on the equipment information interface, and the device will enter the equalizing charge state.

Modify Equipment Time

Click "Set time" on the equipment information interface to enter the time-setting interface.



Modify the device time by touching the virtual keyboard. After modification, you must click "OK", otherwise the changes will not take effect.

Clear Event Records

Click "Clear Events" on the equipment information interface, and confirm in the pop-up message box to clear the event records.

Clear Historical Data Records

Click "Clear Historical" on the equipment information interface, and confirm in the pop-up message box to clear the historical data records.

Clear Statistical Data

Click "Clear stats" on the equipment information interface, and confirm in the pop - up message box to clear the

statistical data.

Restore Factory Settings

Click "Factory Reset" on the equipment information interface, and confirm in the pop-up message box to restore the factory settings.

Reset

When the device malfunctions, click "Reset" on the equipment information interface, and confirm in the pop-up message box to perform a reset.

7.Protection Functions

7.1 Protection Functions

No	Protection Functions	Instructions
1	Photovoltaic Current Limiting Protection	When the charging current or power of the configured photovoltaic array exceeds the rated current or power of the inverter, charging will be carried out at the rated current and power.
2	Photovoltaic Overvoltage Protection	If the photovoltaic voltage exceeds the maximum value allowed by the hardware, the machine will report a fault and stop the photovoltaic boost to output a sinusoidal AC wave.
3	Nighttime Anti - reverse Charge Protection	At night, as the battery voltage is higher than that of the photovoltaic modules, the battery is prevented from discharging to the photovoltaic modules.
4	Mains Input Overvoltage Protection	When the voltage of each phase of the mains voltage exceeds 280Vac, mains charging will be stopped, and the output will switch to inverter output.
5	Mains Input Undervoltage Protection	When the voltage of each phase of the mains voltage is lower than 170Vac, mains charging will be stopped, and the output will switch to inverter output.
6	Battery Overvoltage Protection	When the battery voltage reaches the over-voltage disconnection voltage point, PV and mains charging of the battery will be automatically stopped to prevent damage to the battery due to over - charging.
7	Battery Undervoltage Protection	When the battery voltage reaches the low-voltage disconnection voltage point, discharging of the battery will be automatically stopped to prevent damage to the battery due to over - discharging.

8	Battery Overcurrent Protection	When the battery current exceeds the range allowed by the hardware, the machine will turn off the output and stop discharging the battery.
9	AC Output Short Circuit Protection	When a short-circuit fault occurs at the load output terminal, the output AC voltage will be immediately turned off and output again after 1 minute. If the load terminal is still in a short - circuit state after 3 attempts at output, the short - circuit fault of the load must be eliminated first, and then the machine must be manually powered on again to resume normal output.
10	Radiator Over - temperature Protection	When the internal temperature of the inverter is too high, the inverter will stop charging and discharging. When the temperature returns to normal, the inverter will resume charging and discharging.
11	Overload Protection	After the overload protection is triggered, the inverter will resume output after 3 minutes. If overload occurs continuously for 5 times, the output will be turned off until the inverter is restarted. (102% < load < 110%) ±10%: Error, and the output will be turned off after 5 minutes. (110% < load < 125%) ±10%: An error will be reported and the output will be turned off after 10 seconds. Load > 125% ±10%: Report an error and turn off the output after 5 seconds.
12	AC Reverse Influx Protection	Prevent the AC power inverted from the battery from flowing back to the bypass AC input.
13	Bypass Overcurrent Protection	An over-current protection circuit breaker for AC input is built - in.
14	Bypass Wiring Error Protection	When the phases of the two-way bypass input are different from those of the inverter - divided ones, the machine will prohibit bypass switching to prevent load power-off orShort-circuit when switching to bypass.

8.Product Maintenance

8.1Troubleshooting

Fault Code	Meaning	Cause	Solution
/	Screen Displays Nothing	There is no power input, or the device switch is not turned on.	Check whether the battery circuit breaker or PV circuit breaker is closed; ensure the switch is in the "ON" state.
01	Battery Under-voltage	The battery voltage is lower than the value set as the "Battery Under-voltage Warning Voltage" in the parameter items.	Charge the battery until its voltage is higher than the value set in the parameters.
03	Battery Not Connected	The battery is not connected, or the lithium battery BMS is in the discharge protection state.	Check if the battery is securely connected; verify whether the battery circuit breaker is off; make sure the BMS of the lithium - ion battery can communicate normally.
04	Battery Over-discharged	The battery voltage is lower than the value set as the "Over-discharge Voltage" in the parameters.	Perform a manual reset. Turn off the power and restart. Automatic reset: Charge the battery until its voltage is higher than the value set in the parameter item "Over - discharge Recovery Voltage".
06	Over-voltage Protection of Rechargeable Battery	The battery is in an over-voltage state.	Manually turn off the power and restart. Check if the battery voltage has exceeded the limit. If so, discharge the battery until the voltage is lower than the battery's over - voltage value.
13	Bypass Overload (Detected by Software)	The bypass output power or output current is overloaded within a certain period.	Reduce the load power and restart the device.
14	Inverter Overload (Detected by Software)	The inverter output power or output current is overloaded within a certain period.	
19	Excessive Temperature of Photovoltaic Radiator	The temperature of the photovoltaic radiator exceeds 90°C and lasts for 3 seconds.	When the temperature of the radiator cools down to below the over - temperature recovery temperature, normal charging and discharging will resume.
20	Excessive Temperature of Inverter Radiator	The temperature of the inverter radiator exceeds 90°C and lasts for 3 seconds.	
21	Fan Failure	The hardware detects that the fan has a malfunction.	After powering off, manually turn the fan to check if there is any foreign object blocking it.
26	Short Circuit of AC Input Relay	The AC output relay is stuck.	Manually restart. If the fault reappears after restarting, you need to contact the after - sales service for machine repair.
27	Mains Input Phase Fault	The AC input phase is inconsistent with the AC output phase.	Ensure that the phase of the AC input is the same as that of the AC output. For example, if the output is in split - phase mode, the input must also be in split - phase mode.

8.2 Maintenance

To maintain the best long-term working performance, it is recommended to carry out the inspection of the following items twice a year.

1. Confirm that the air flow around the inverter is not blocked, and remove any dirt or debris on the radiator.
2. Check all exposed wires to see if their insulation is damaged due to sun exposure, friction with surrounding objects, dry rot, damage by insects or rodents, etc. Repair or replace the wires if necessary.
3. Verify that the indicators and displays are consistent with the equipment operation. Pay attention to any fault or error displays and take corrective measures if necessary.
4. Examine all the wiring terminals for signs of corrosion, insulation damage, high temperature, burning/discoloration, and tighten the terminal screws.
5. Check for dirt, nesting insects, and corrosion, and clean the insect - proof net regularly as required.
6. If the lightning arrester has failed, replace the failed one in a timely manner to prevent lightning-strike damage to the inverter and even other equipment of the users.

DANGER

•Before conducting any inspections or operations, ensure that the inverter is disconnected from all power sources and that the capacitors are fully discharged to avoid the risk of electric shock.

Machine issues caused by the following situations are not covered by the KTECH standard warranty:

1. The product has exceeded the warranty period (except when an extended warranty service has been separately signed by both parties).
2. Operations not in accordance with the product manual or relevant installation and maintenance requirements, and malfunctions or damages caused by working environments, storage, or usage not specified by the product. For example, incorrect installation distance, ventilation problems, improper use of waterproof caps, etc.
3. Unauthorized disassembly, repair, or modification of the machine without KTECH's authorization.
4. Products obtained through non-KTECH-authorized channels.
5. Malfunctions and damages caused by unforeseeable, Human-induced factors, or force majeure, such as stormy weather, floods, lightning, overvoltage, pest damage, and fires.
6. Unauthorized modifications, design changes, or replacement of parts.
7. Deliberate damage, defacement, making indelible marks, theft, etc.
8. Normal wear and tear.
9. Use not in line with correct safety regulations (such as VDE standards).
10. Malfunctions or damages caused by reasons other than the quality of the KTECH product itself.

11. Damages caused during transportation (including scratches on the machine casing caused by moving the packaged product during transportation).

12. Rust and corrosion on the machine casing due to harsh environments.