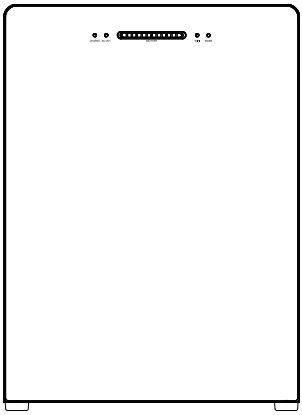
iGarden

USER MANUAL

Micro Energy Storage System



SKU: PLUG 5120

Fairland iGarden Co.,Ltd.

EN

Legal Statement

Disclaimer

The Manual contains instructions for the use of the product. All the pictures and charts in this manual are for description and explanation only. FAIRLAND reserves the right to change the information in the manual which is subject to change without further notice.

Please read this manual carefully before using the product and keep this manual for further reference. Failure to use the product in accordance with the manual may result in serious injuries, property damages and may void the warranty, for which FAIRLAND shall not be liable.

FAIRLAND makes no representations or warranties express or implied, with respect to all the information in this manual.In the event of any conflicts between this manual and the applicable law, the latter prevails.

The final interpretation of this manual belongs to FAIRLAND.

Safety Precautions

⚠ Warning

1. Please read this document and other relevant product documents before operation.
2. The installation of this product must comply with all applicable local regulations, codes, or standards.
3. An overcurrent circuit breaker must be installed between this product and the power grid.
4. When the photovoltaic (PV) array is exposed to light, it provides DC voltage to the power conversion equipment (PCE).
5. Use insulated tools and wear personal protective equipment during installation and maintenance.
6. Please install this product in a clean, dry, and well-ventilated environment.
7. Keep this product out of reach of children and pets. If the product is used near children, they should be under close supervision.
8. The connection length of each PV cable for this product should be less than 3 meters.
9. Before making any electrical connections, ensure that any loads (e.g., equipment powered by this product) are disconnected from power.
10. When disconnecting the product, pull the plug rather than the power cord to reduce the risk of damaging the plug and cord.
11. Do not insert fingers or hands into this product.
12. Do not expose this product directly to sunlight, rain, or snow.
13. Do not expose this product to strong electromagnetic fields to avoid radio interference.
14. Do not install or operate this product near flammable, explosive, corrosive, or caustic sources.
15. Do not install or operate this product under extreme weather conditions such as lightning, heavy rain, or strong winds.
16. Do not subject this product to severe impact, vibration, or dropping to avoid physical damage.
17. Do not drag, squeeze, step on this product, or throw it into fire, as there is a risk of explosion.

18. Do not use damaged wires or cables with this product.
19. Do not damage, deface, or remove any labels on this product.
20. Do not disassemble, repair, or modify this product by yourself. For any maintenance or service, please contact FAIRLAND Customer Service.
21. Do not place the device near an open flame, heat source, or flammable materials.
22. Do not shake the device.
23. If the device's exterior is severely damaged, do not use it.
24. Do not disassemble the device.
25. Placing batteries in high-temperature environments may cause explosion or leakage of flammable liquids/gases. Batteries under extremely low air pressure may also lead to explosion or leakage of flammable substances.
26. Do not open under load. Do not open or damage the battery. Released electrolyte is harmful to skin and eyes and may be toxic.
27. Do not use any unofficial or unrecommended components and accessories. For replacements, contact FAIRLAND for further assistance.
28. Do not clean this product with flammable or toxic solvents; use a dry soft cloth instead.
29. Do not place heavy objects (0 ~ 40kg) on this product.
30. Equipment Dismantling: To safely dismantle this product, please follow the steps below in sequence:
a. Power off the connected load.
b. Remove the cables from the photovoltaic terminals.
c. Disconnect the cable from the AC socket.
d. Disconnect the cable from the Grid terminal.
e. Turn off the product power.
31. Grounding Instructions: This product must be grounded.
In the event of a fault or breakdown, grounding provides the path of least resistance for current to reduce the risk of electric shock. For your safety, FAIRLAND provides a flexible cable with an equipment grounding conductor/grounding plug. The plug must be installed in a properly grounded socket in accordance with all local codes and regulations.

Safety Precautions

Warning—Improper connection of the equipment grounding conductor may pose a risk of electric shock.

Consult a qualified electrician in the following cases, and do not replace the plug provided with the product arbitrarily:

- Uncertain whether the product is properly grounded;
- The plug attached to the product is found to be incompatible with the socket.

32. Personnel Requirements: Certain installation or maintenance tasks must be performed exclusively by qualified technicians.

Refer to the personnel requirements emphasized in the product documentation to ensure these tasks are completed correctly and safely.

33. Note: The grounding terminal shall not be connected to the AC neutral line. When the equipment (and its cascading system, if applicable) is disconnected from the power grid, the internal electrical system remains isolated from the earth.

34. External Grounding Instructions: Supplementary grounding may be required at installation sites with insufficient grounding or special grounding requirements stipulated by local codes. In such cases, use the grounding terminal of this product to establish a good ground connection.

Notice

Use

Symbol	Description	
	User Manual	Before installation, operation, and maintenance, please carefully read the user manual and all safety instructions.
	Warning!	Before maintenance, disconnect the equipment from all voltage sources.
	Warning! Electric Shock Risk during Maintenance	There are no user-serviceable parts inside. Please refer maintenance to qualified personnel.

Safety Precautions

Symbol	Description	
	Warning! Risk of Scalding	Do not touch the casing during equipment operation.
	Warning! Risk of Electric Shock	Wait at least 15 minutes before maintenance after all power sources are disconnected.
	CE Mark	This equipment complies with the essential requirements of EU regulations.
	Directive on Waste Electrical and Electronic Equipment	Do not dispose of this equipment as domestic waste. Please comply with local requirements for the disposal of electronic waste.

- It is not recommended to use this equipment for powering safety-related medical devices associated with individuals.
- When using the equipment, ensure good ventilation.
- Do not move or invert the equipment during use. Place the equipment correctly.
- Do not stack heavy objects on the equipment.
- For safety, use only accessories (cables, chargers, etc.) provided or recommended by FAIRLAND. FAIRLAND shall not be liable for damages caused by third-party devices.

For safety, use only the included accessories (cables, chargers, etc.).

- Battery maintenance should be performed or supervised by personnel familiar with batteries, and red preventive measures are required.
- The casing has an IP65 protection rating.

Transport

- Do not take the equipment onto the aircraft.

Maintenance

- Charge the equipment once every 3 months. For long-term storage, maintain the charge between 40% and 70% before storage. If the equipment is fully discharged, charge it within 12 hours. Prolonged power loss may cause irreversible damage to the equipment.
- If the equipment fails to operate normally, contact the supplier or the nearest service center.
- Do not disassemble the equipment for maintenance or repair by yourself.

Safety Precautions

• To maintain optimal long-term performance, it is recommended to perform at least the following inspections once per quarter:

1. Ensure the airflow around the inverter is unobstructed, and remove any dirt or debris from the cooling vents.
2. Check all exposed wires for insulation damage caused by sunlight, friction with surrounding objects, dry rot, insect or rodent damage, etc. Repair or replace wires if necessary.
3. Verify that indicators and displays are consistent with equipment operations. Note any fault or error messages and take corrective actions if necessary.
4. Inspect all wiring terminals for signs of corrosion, insulation damage, high temperature, or burning/discoloration. Tighten the terminals.
5. Check for dirt, nesting insects, and corrosion. Clean as required and regularly wash the insect-proof nets.
6. If the lightning arrester has failed, replace the failed lightning arrester in a timely manner to prevent lightning strike damage to the inverter and even other equipment of users.

Note: Before performing any inspection or operation, ensure that the inverter is disconnected from all power sources and that the capacitors are fully discharged to avoid the risk of electric shock.

The company shall not be liable for damages caused by the following reasons:

a) Damage caused by improper use or use in the wrong location.
b) The open-circuit voltage of the photovoltaic module exceeds the maximum allowable voltage.
c) Damage caused by the operating temperature exceeding the limited operating temperature range.
d) Disassembly and maintenance of the inverter by unauthorized personnel.
e) Damage caused by force majeure: damage during transportation or handling of the inverter.

Cleaning

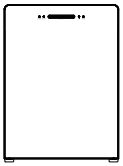
• Please clean the external surface of the equipment with a soft dry cloth.

Waste Disposal

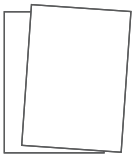
• Please dispose of used batteries in accordance with the laws or regulations of the country or region.

Contents

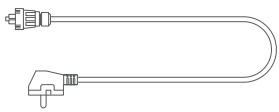
1 Packing List



PLUG 5120

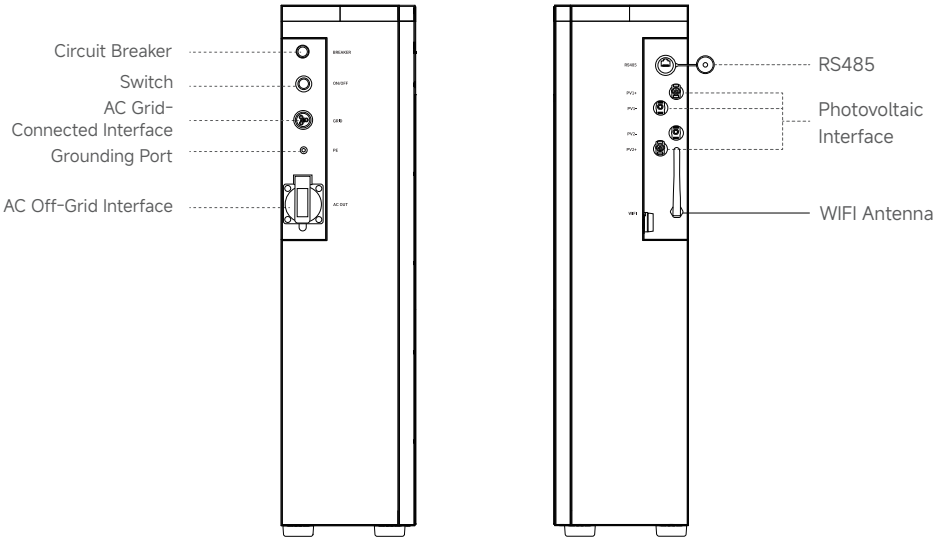


User Manual

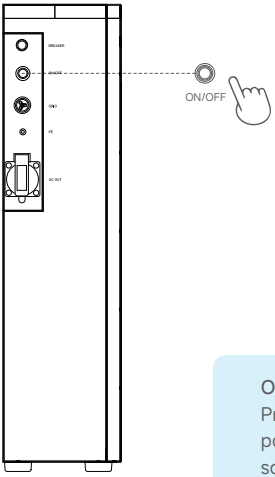


Grid-Connected Power Line

2 Interface Description

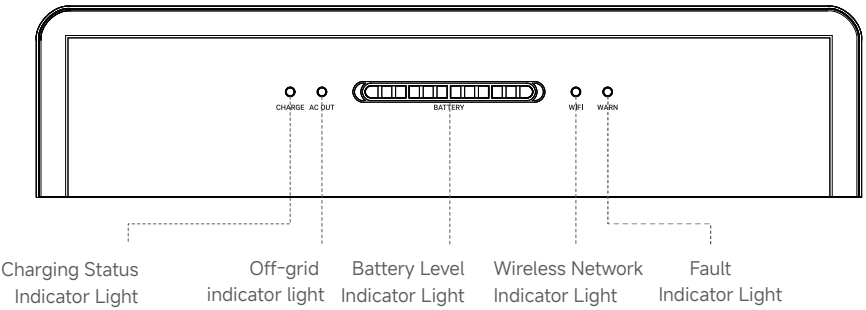


3 Operating Instructions



ON/OFF Switch:
Press the self-locking switch button. After a "click" sound, the device powers on. Press the self-locking switch button again. After a "click" sound, the device powers off.

4 Indicator Light Instructions



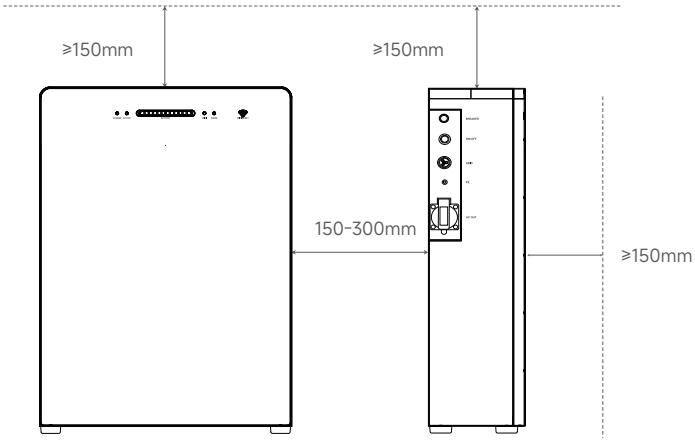
Pilot lamp	Pigment	Description
CHARGE	Ice blue	Flash: Fast charging
		Constantly on: float charge
AC OUT	Ice blue	Constantly on: mains power bypass output
		Flash: Off-grid output of inverter
BATTERY	Ice blue	0%: total extinction
		0%<SOC≤25%: 25% energy bar
		25<SOC≤50%: 50% energy bar
		50% <SOC<=75%: 75% energy bar
		75% <SOC<=100%: 100% energy bar
WIFI	Ice blue	Constantly on: Communication with the device is successful
		Flash: Flash or reset the machine on for 2 seconds
WARN	Red lantern	Hitch

5 Tools Used

Screwdriver		Multimeter	
Wrench		Tape measure	
Diagonal pliers		Cable ties	
Insulated gloves		Insulated shoes	
Utility knife		Goggles	
Wire stripper		Marker pen	

6 Installation environment requirements

At least 150 mm of space should be reserved between the top and the rear of the machine to ensure that there are no other devices or obstacles around, so as to meet the requirements of heat dissipation and safety isolation.



7 Fault code and corresponding measures

7.1 Fault code

Fault code	Name of the fault	Whether it affects output	Explain
【1】	Battery voltage under-voltage alarm	deny	The battery voltage is lower than the battery voltage warning value, indicating that the battery is in a state of low voltage.
【2】	Low battery voltage protection	yes	The battery voltage is low, and the output is turned off to stop the battery discharge protection.
【3】	The average discharge current of the battery is too high protect	yes	If the average discharge current of the battery is greater than the maximum input battery current for one minute, the output is turned off and the battery discharge protection stops.
【4】	Overcurrent protection for battery discharge instantaneous value protect	yes	If the average discharge current of the battery is greater than the maximum input battery current for 1 minute, the output is turned off to stop the battery discharge protection.
【5】	Battery not connected	yes	Battery not connected alarm.
【6】	Battery overvoltage	yes	If the selected battery type or set battery voltage is exceeded, the output stops the battery charging protection.
【7】	BMS battery capacity rate low alarm	deny	Low battery capacity rate alert for lithium battery. (Enable BMS to be effective)
【8】	BMS battery capacity rate protection	yes	Lithium battery BMS The battery capacity rate is low, and the output is turned off to stop the battery discharge protection. (Set BMS enablement to be effective)
【9】	Overload protection for the bypass	yes	The mains power is overloaded with a load, and the AC output is turned off and the mains power charging is stopped.
【10】	Battery inverter overload protection	yes	The mains power is overloaded with a load, and the AC output is turned off and the mains power charging is stopped.
【11】	The battery inverter AC output is short circuit	yes	The battery discharge inverter AC output is short circuit, the AC output is turned off and the battery discharge protection is stopped.
【12】	The battery inverter output is too high	yes	Overcurrent in the battery discharge inverter AC output, turn off the AC output and stop the battery discharge protection.
【13】	Battery inverter voltage DC component unusual	yes	The DC component of the battery inverter voltage is abnormal, and the AC output is turned off and the battery discharge protection is stopped.
【14】	Bus overvoltage software sampling protection	yes	The internal battery is boosted, the voltage of the busbar is overvoltage software protection, and the AC output and charging are turned off.
【15】	Bus overvoltage hardware sampling protection	yes	The internal battery is boosted, the overvoltage hardware protection of the bus voltage is turned off, and the AC output and charging are turned off.
【16】	Busbar undervoltage protection	yes	Internal battery boost, boost bus voltage undervoltage protection, close AC output and charging.
【17】	Busbar short circuit protection	yes	Internal battery boost, boost bus voltage short circuit protection, close AC output and charging.

7 Fault code and corresponding measures

【18】	PV input overvoltage protection	yes	Solar input voltage exceeds maximum allowable input voltage protection.
【20】	PV current overcurrent protection	deny	Solar charging overcurrent hardware protection, turn off solar charging.
【22】	The PV radiator is overheated	deny	The temperature of the solar charging radiator is too high, so turn off the solar charging.
【23】	The transfer radiator is overheated	yes	If the temperature of the AC charging or battery inverter discharge radiator is too high, turn off the AC charging or battery inverter discharge.
【24】	The main transformer is overheated	yes	If the temperature of the internal main transformer is too high during AC charging or battery inverter discharge, turn off AC charging or battery inverter discharge.
【25】	The AC input relay is short-circuited	yes	Short circuit protection of AC input relay to prevent reverse injection of inverter AC output to bypass AC input.
【26】	The AC output relay is short circuit	yes	The AC output relay is short-circuited to protect the inverter output and all charging functions.
【27】	Fan failure	yes	If the fan is blocked or fails, turn off the inverter output and all charging functions.
【30】	A model detection error occurred	yes	The model is not set in the factory, and the model identification is wrong.
【33】	The CAN communication of the parallel control is faulty	yes	In parallel mode, the CAN communication is lost and the AC output and charging are turned off.
【35】	Standby mode fault	yes	In parallel mode, there is a inconsistency in the system's machine parallel mode [31].
【36】	The parallel current is faulty	yes	In parallel mode, the battery inverter AC output is different from each machine, and the current output difference is large. The AC output and charging are turned off.
【37】	The ID of the standby machine is set incorrectly	yes	In parallel mode, the RS485 address is duplicated and conflicting. The faulty machine will turn off the AC output and charging. After the master machine automatically reassigns the address, the fault will be cleared and the machine will enter parallel mode again.
【38】	The batteries are not consistent	yes	In parallel mode, the battery voltage input of each machine is different.
【39】	Standby mode, mains input The source is inconsistent	yes	In parallel mode, the mains input source is inconsistent.
【40】	Synchronous fault in parallel mode	yes	In parallel mode, the hardware synchronization signal reception fault occurs, and the parallel operation and AC output are stopped.
【41】	The versions of the standby program are inconsistent	yes	In the parallel system, there are machines with inconsistent program versions. Stop the parallel and AC output.
【42】	The communication line between the two machines is faulty	yes	There is a fault in the wiring of the parallel communication line, and the parallel operation and AC output are stopped.

7 Fault code and corresponding measures

【43】	Serial number error	yes	No serial number is set at the factory, or there are repeated serial numbers in the system.
【49】	BMS communication error	yes	No serial number is set at the factory, or there are repeated serial numbers in the system.
【50】	Other BMS fault alarms	yes	After checking the lithium battery BMS fault type, clear the lithium battery fault
【51】	BMS battery overtemperature alarm	yes	Lithium battery BMS over temperature alarm
【52】	BMS battery overcurrent alarm	yes	Lithium battery BMS battery overcurrent alarm
【53】	BMS battery overvoltage alarm	deny	Lithium battery BMS battery overvoltage alarm
【54】	BMS battery under voltage alarm	deny	Lithium battery BMS battery under voltage alarm
【55】	BMS battery low temperature alarm	yes	Lithium battery BMS low temperature alarm

7 Fault code and corresponding measures

7.2 Troubleshooting

Fault code	Hitch	countermeasure
/	The indicator light does not illuminate	Check if the battery switch is on
【1】【2】	Battery under-voltage	Wait for the battery to be charged or restored above the low voltage disconnection recovery voltage.
【5】	Battery not connected	Check that the battery is properly connected
【6】	Battery overvoltage	Check whether the battery voltage exceeds the protection value. If it does, the battery needs to be discharged or the voltage is below the battery overvoltage recovery point
【9】【10】	Overload protection for bypass and inverter	①Reduce the use of electrical equipment ②Restart the all-in-one machine and restore the output load
【11】	Inverter short circuit protection	①Carefully check the load connection and remove short circuit fault points; ②Power is reconnected and the load resumes output.
【18】	PV overvoltage	Use a multimeter to check whether the PV input voltage exceeds the maximum allowable input voltage.
【22】【23】	The radiator is overheated	When the temperature of the device is cooled below the over-temperature recovery temperature, the normal charge and discharge control is restored.
【27】	Fan failure	Check to see if the fan is not turning or if it is blocked by something else.
【40】【42】	Fault of parallel wiring	Check whether the parallel line is not connected properly, such as loose or wrong connection
【49】	BMS communication error	Check whether the BMS communication line and inverter communication port are correctly connected

Note: If the product failure cannot be solved by the methods in the above table, please contact our after-sales service department for technical support. Do not disassemble the equipment by yourself.

8 Specification Sheet

Specification Type	PLUG 5120
Battery Info	
Rated Voltage	51.2V
Battery Energy	5120Wh
Life Cycle (Times)	>6000(25°C)
Cell Type	LiFePO4
Depth of Discharge	90%
Capacity	100Ah
PV input	
Operating Voltage Range(Vdc)	10-100
Maximum Input Voltage(Vdc)	100
Maximum Continuous Input Current(A)	16*2
Maximum Input Power(W)	1000*2
AC Input	
Rated Power	2.4kW
Grid Connection Type	L/N/PE
Rated Grid Voltage	230V
Grid Voltage Range	184V-253V
Rated Grid Frequency	50Hz
Rated Grid Current	10.44A
Power Factor	>0.9
THDi	<3%
AC Output (On Grid)	
Rated Voltage	0.8kW(Default)/2.4kW(*Premium)
Grid Connection Type	L/N/PE
Rated Grid Voltage	230V
Grid Voltage Range	184V-253V
Rated Grid Frequency	50Hz
Rated Grid Current	3.48A(Default)/10.44A(*Premium)
Power Factor	>0.9
THDi	<3%

8 Specification Sheet

Specification Type	PLUG 5120
AC Output（Off Grid）	
Rated Off-grid Output Power	2.4kW
Max.Output Power	3.6kW,10s
Rated Output Current	10.44A
Rated Output Voltage	230V
Rated Output Voltage Freg,	50Hz
THDv(Linear Load)	<2%
Efficiency	
Battery-AC Side Max. Efficiency	>93.5%
Protection	
Protection leve	I
General Parameter	
Typology	Isolation
Operating Temperature Range	-20°C ~+ 60°C
Relative humidity	0-95%
Ingress Protection	IP65
Cooling Strategy	Natural cooling
Max. Operating Altitude	2000m
On-grid Connection Standard	VDE-4105,EN50549-1
Regulatory	IEC62109、IEC62477
EMC	IEC/EN 61000
Dimension(L*W*H)	520*181*715mm
Weight	59±2kg
Grid Connection	Single-phase plug
Display	LED
Communication Mode	WIFI&Bluetooth&RS-485(Waterproof Aviation Plug)

Note 1: Rated voltage/frequency range can be changed according to the requirements of local power department.

Note 2: Please refer to local electrical regulations to determine the number of the Power Supply that can be connected to each branch.

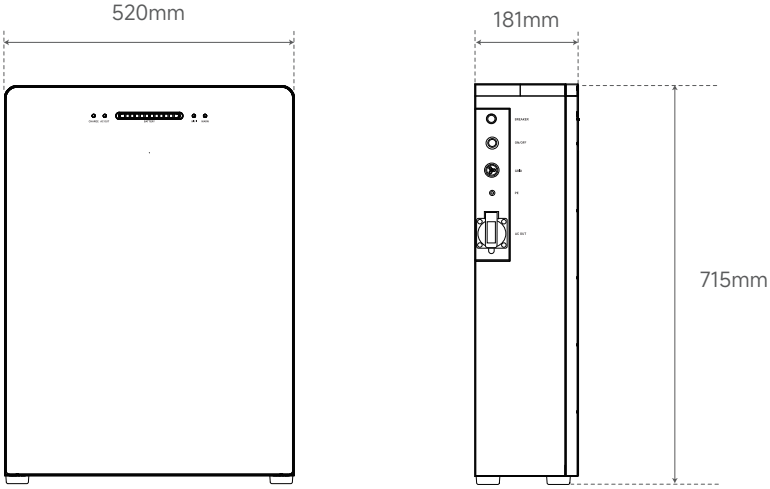
Note 3：The use of secondary lithium batteries and battery systems, especially abuse, may lead to dangerous situations and cause injuries.

Note 4：The maximum charging current of the product is 60A, and the maximum discharging current is also 60A. The charging temperature range is 0°C - 57°C, and the discharging temperature range is -20°C - 60°C. The voltage range is 44.8V - 58.4V. Please use within the current, temperature and voltage limits; otherwise, it may cause injuries.

*Enabling this function must comply with local regulations and must be performed by professional technicians!

8 Specification Sheet

Dimension



9 Protection Function

Serial Number	Protection Functions	Instructions
【1】	PV Current Limiting /Power Limiting Protection	When the charging current of the configured photovoltaic array exceeds the rated current of the PV, charging will be performed at the rated current.
【2】	PV Anti-Backflow Protection at Night	At night, since the voltage of the battery is higher than that of the PV module, it is necessary to prevent the battery from discharging through the PV module.
【3】	Mains Input Over-voltage Protection	When the mains voltage exceeds 280V, mains charging will be stopped and switched to inverter output.
【4】	Mains Input Under-voltage Protection	When the mains voltage is lower than 170V, mains charging will be stopped and switched to inverter output.
【5】	Battery Overvoltage Protection	When the battery voltage reaches the overvoltage disconnection point, charging of the battery from both the PV and mains power will automatically stop to prevent damage to the battery caused by overcharging.
【6】	Battery Undervoltage Protection	When the battery voltage reaches the low-voltage disconnection point, discharging of the battery will automatically stop to prevent damage to the battery caused by over-discharging.
【7】	Load Output Short Circuit Protection	When a short - circuit fault occurs at the load output terminal and exceeds 200 milliseconds, the output AC voltage will be immediately turned off.
【8】	Radiator Overheating Protection	When the internal temperature of the all-in-one unit is too high, the unit will stop charging and discharging. When the temperature returns to normal, the all-in-one unit will resume charging and discharging.
【9】	PV Reverse Polarity Protection	When the PV polarity is reversed, the machine will not be damaged.
【10】	AC Anti-Backflow Protection	Prevent the battery-inverted alternating current from backflowing to the bypass AC input.
【11】	Bypass Overcurrent Protection	It is equipped with a built-in overcurrent protection circuit breaker for AC input.
【12】	Battery Input Protection	When the battery is connected in reverse or a short circuit occurs inside the inverter, the battery input fuse inside the inverter will blow to prevent battery damage or fire.
【13】	Charging Short Circuit Protection	When the external battery port is short-circuited during PV or AC charging, the inverter will protect and stop outputting current.

10 Frequently Asked Questions and Answers

1. What should be paid attention to when storing equipment?

Before storing the equipment, please turn off the device first and place it in a dry and ventilated area. The temperature should be within the range of -5°C to 35°C, and the humidity should be between 0% and 60%. Keep it away from fire sources, heat sources, water sources, and corrosive substances. For long-term storage, ensure that the device battery level is between 40% and 70%. After storing the equipment, it is recommended to inspect and charge the device every 3 months.

2. If the voltage and current of the electrical equipment are within the rated range, but the equipment still cannot be used?

Please confirm whether the power of a single electrical device is less than the rated power of the corresponding interface, and whether the sum of the powers of all electrical devices is less than the rated power of the equipment.

3.How to upgrade the equipment?

The equipment can be upgraded through the App. Please ensure that the equipment has sufficient power before upgrading, and do not use the equipment during the upgrade process.

4. Can the equipment be charged with third-party photovoltaic panels?

Yes. If you choose a third-party photovoltaic panel, please confirm that the panel interface is an MC4 interface and the voltage is between 10V and 100V.

5. In a low-temperature environment, the battery still cannot be charged after enabling the heating film?

When the cell temperature is lower than the rated value, the equipment cannot be charged. After the heating film is turned on, the battery will automatically heat up. When the cell is heated to an appropriate temperature, the battery can resume the charging function. Please be patient and wait for the charging function to resume after enabling the heating film.

FAIRLAND Warranty Card

User Information

Name: _____

Phone: _____

Email: _____

Postal Code: _____

Address: _____

Product Information

Model: _____

Serial Number: _____

Seller Information

Seller Name: _____

Contact Phone: _____

Purchase Date: _____

Thank you for purchasing FAIRLAND product!

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