User Manual

EQ Series

EQ4800/EQ5500

To prevent damage to the product caused by improper use, please carefully read this manual before operation.

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Version V1.0.8

Date 2025-12

Content

1 Notes on This Manual

The document describes the installation, commissioning, maintenance and troubleshooting of the following high voltage battery listed below.

EQ4800/EQ5500

Note: EQ4800/EQ5500= Main-module+ Support-module

The battery chemistry of these products is Lithium Iron Phosphate. This manual is designed for qualified personnel only. The tasks described in this document should be performed by authorized and qualified technicians only.

After Installation the Installer must explain the user manual to the end user.

1.1 Scope of Validity

This manual describes the assembly, installation, commissioning, maintenance and troubleshooting of the following model(s) of products:

EQ4800-M/EQ4800-S

EQ5500-M/EQ5500-S

Please keep this manual where it will be accessible at all times.

1.2 Target Group

This manual is intended for use by qualified electricians only. All procedures described herein shall be performed by trained and experienced electrical personnel in compliance with basic electrical safety requirements.

1.3 Symbols Used

The following symbols are used in the manual to highlight information in order to ensure the safety of the user's person and property when using the product, and to use the product more efficiently and optimally. The following symbols may appear in this manual, and the meanings they represent are listed below:

⚠ Danger!

"Danger" indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ Warning!

"Warning" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Note!

"Note" provides important tips and guidance.

Symbols	Explanation
	CE mark. The inverter complies with the relevant EU directives.
	RCM mark.
	The inverter meets the requirements of the UK product safety certification.
	Danger of high voltages. Danger to life due to high voltages in the inverter!
	Do not place nor install near flammable or explosive materials.
	Install the product out of reach of children.
	Prohibit the use of water to extinguish fires.
	Prohibition of private maintenance.
	Prohibit Connector Reversal.

	Read the manual before performing any operations on the inverter.
	Do not dispose of the product with household wastes.
	Disconnect the equipment before carrying out maintenance or repair.
	Observe precautions for handling electrostatic discharge sensitive devices.
	PE conductor terminal.
	Caution, risk of electric shock, energy storage timed discharge.

2 Safety Precautions

2.1 Personnel Safety

Any work on the batteries should be handled by purchaser approved installer and hence it is understood that the purchaser approved installer should familiarize themselves with the contents of this manual before any maintenance or installation is carried out on the system.

⚠ Danger!

Operating Requirements

- High voltage exists inside the equipment. Unauthorized removal of necessary protective measures, improper use, and improper installation and operation may cause serious safety hazards, shock hazards, or equipment damage, and the resulting damage to the equipment is not covered by the warranty.
- Do not energize the equipment without completing the installation or without professional confirmation, and strictly prohibit operation with electricity.

⚠ Warning!

Operating Requirements

- Always use special insulated tools for wiring operations. Direct contact or contact with other conductors or indirect contact with the power supply equipment through wet objects is prohibited.
- During operation of the equipment, the enclosure temperature is high and there is a risk of burns. Before touching any part of the inverter, make sure that the equipment and its surfaces are at a contact-safe temperature and voltage before proceeding.

Note!

Personnel requirements

- All operations, including transportation, installation, start-up and maintenance, must be performed by qualified and trained personnel.

2.2 Handling

- Do not expose battery to open flame.
- Store in a cool and dry place with ample ventilation.
- Do not store the product near water sources.
- Store the product on a flat surface.
- Recommend to store the product out of reach of children and animals.
- Do not damage the unit by dropping, deforming, impacting, cutting or penetrating with a sharp object. It may cause leakage of electrolyte or fire.
- Do not touch any liquid spilled from the product. There is a risk of electric shock or damage to skin.
- Always handle the battery wearing the insulated gloves.
- Do not step on the product or place any foreign objects on it. This can result in damage.

- Do not charge or discharge damaged battery.

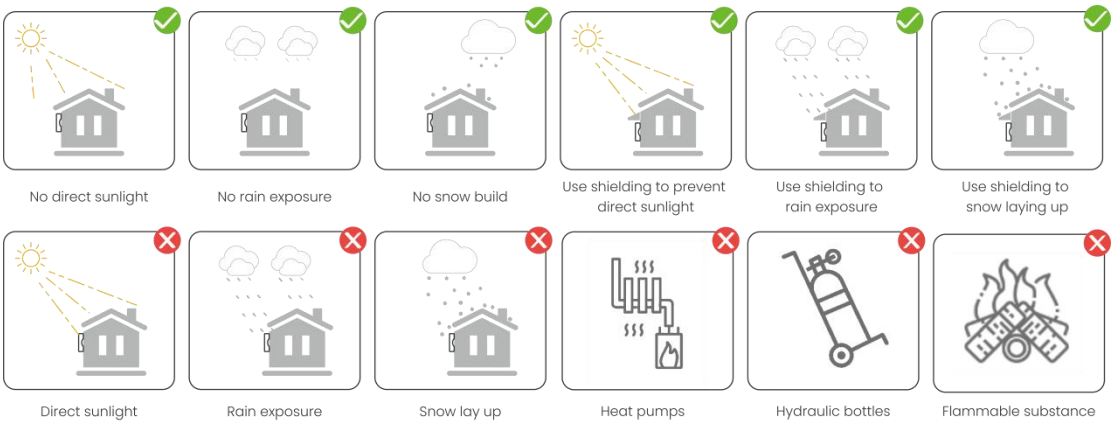
2.3 Installation

- Do not connect the battery directly to inverter conductors or PV conductors. This will damage the battery and may result in explosion.
- After unpacking, please check the product for damages and missing parts.
- Make sure that the inverter and battery is completely turned off before commencing installation.
- Do not interchange the positive and negative terminals of the battery.
- Ensure that there is no short circuit of the terminals or with any external device.
- Do not exceed the battery voltage rating of the inverter.
- Do not connect the battery to any incompatible inverter.
- Do not connect different battery types together.
- Please ensure that all the batteries are grounded properly.
- Do not open the battery to repair or disassemble. Only Fox ESS is allowed to carry out any such repairs.
- In case of fire, use only dry powder fire extinguisher. Liquid extinguishers should not be used.
- Please refrain from installing the battery near any water source to prevent accidental submersion.
- Recommend to install the battery away from children or pets.
- Do not use battery in high static environment where the protection device might be damaged.
- Do not install with other batteries or cells.
- Please ensure on installation site that the deviation of voltages between new batteries and every single present battery is less than 0.5V.
- Recommend to check the new batteries mounted on-site comply to the warranty scope or have ever been re-charged within 5 months; on top of that, please make sure the SOC of present battery system onsite is 50%±5%.

2.4 Mounting

Make sure the installation site meets the following conditions.

- Ensure the installation area is protected from direct sunlight, rain, and snow accumulation, a shelter(e.g., rain canopy)is recommended.
- Keep the installation area away from high-temperature sources, flammable or explosive materials and other potential explosion hazards such as gas valves, LPG cylinders, heat pumps, firewood stacks, etc.
- The installation area must be completely waterproof, with a hard, level floor, and the wall should not have noticeable inclined angle.
- Maintain low and stable humidity with good ventilation; dust and dirt within the installation area must be minimized.
- Position the installation area away from television antennas or antenna cables to avoid lightning strikes and electromagnetic interference.
- Avoid the presence of flammable debris around the battery, such as cotton, fabric, haystacks, etc. which may be ignited by sparks and then lead the fire source to the battery, thus causing the battery to burn.
- Avoid the presence of hot or flammable objects around the battery, such as hydraulic bottles natural gas, oxygen, etc.), heat pumps and so on.



3 Response to Emergency Situations

The batteries comprise of multiple batteries connected in series. It is designed to prevent hazards or failures. However, Fox ESS cannot guarantee their absolute safety.

Under exposure to the internal materials of the battery the following recommendations should be carried out by the user.

- If there has been inhalation, please leave the contaminated area immediately and seek medical attention.
- If there has been contact with eyes, rinse the eyes with running water for 15 minutes and seek medical attention immediately.
- If there has been contact with the skin, wash the contacted area with soap thoroughly and seek medical attention immediately.
- If there has been ingestion, induce vomiting and seek medical attention.

Fire Situation

In situations where the battery is on fire, if it is safe to do so, disconnect the battery module by turn off the circuit breaker to shut off the power to the system. Use FM-200 or CO_2 fire extinguisher for the battery and an ABC fire extinguisher for the other parts of the system.

Under any fire situation, please evacuate the people from the building immediately before trying to extinguish it.

Water Situation

The battery modules are not water resistant. Hence care should be taken not to get it wet. If you find the battery completely or partially submerged in water do not try to open. Contact an authorized personnel or Fox ESS for further instructions.

4 Fire Protection Function

Despite the extremely stable chemical properties of lithium iron phosphate batteries and the multiple protections, each battery unit is equipped with a fire protection module to further ensure the safety and reliability of Fox ESS batteries. This innovative module utilizes a new type of aerosol fire extinguishing device with features such as pressure-free storage, no maintenance required, high extinguishing efficiency, non-toxic and harmless characteristics.

4.1 Fire Extinguishing Mechanism

The fire extinguishing mechanisms of common agents mainly include isolation, smothering, cooling, and chemical suppression, with different agents exhibiting varying mechanisms. The fire extinguishing mechanism of thermal aerosols involves two main mechanisms: the cooling effect from endothermic decomposition and the chemical suppression effects in both gas and solid phases, which work synergistically. Additionally, the gaseous components in the products of the aerosol extinguishing agent also play a supportive role.

Cooling Fire Extinguishing Effect from Endothermic Decomposition

The cooling effect of thermal aerosol extinguishing agents is primarily due to the endothermic decomposition of metal oxides and carbonates. When a fire occurs, the solid particles in the aerosol rapidly absorb heat from the fire source, resulting in a decrease in flame temperature. This reduction minimizes the heat radiating to the burning surface and lowers the energy required to dissociate vaporized combustible materials into free radicals. As a result, the combustion reaction is effectively suppressed.

Gas Phase Chemical Suppression Effect

Under thermal conditions, vaporized metal ions, such as strontium (Sr), potassium (K), and magnesium(Mg), exist as vapors and participate in multiple chain reactions with active combustion radicals including hydrogen (H·), hydroxyl (·OH), and oxygen (O·). For example:

$Sr+2{\bullet}OH \rightarrow Sr(OH)_2$

$Sr+O{\bullet} \rightarrow SrO$

$Sr(OH)_2+2H{\bullet} \rightarrow Sr+2H_2O$

Through continuous action, this process consumes active combustion groups, significantly reducing their concentration and effectively suppressing combustion.

Solid Phase Chemical Suppression Effect

The solid particles in thermal aerosol extinguishing agents can adsorb intermediates such as • OH, H • , and O • from chain reactions, catalyzing their recombination into stable molecules. This interrupts the essential branching chain reactions in the combustion process. For example:

K_2O (s)+2H (g)→2KOH (s) KOH (s)+OH (g)→KO (s)+H_2O (g)

K_2O (s)+O (g)→2KO(s) KO(s)+H(g)→KOH

4.2 Technical Specifications

Activation method: Thermal activation

Thermal activation temperature: ≥ 170℃

Discharge time: ≤ 5 seconds

Notes:

Please contact Fox ESS for immediate replacement if the fire protection module is activated.

Non-professionals should not disassemble the battery without authorization.

Do not touch the device until the casing has cooled after the internal fire extinguisher has been activated to prevent burns.

For further assistance, please contact an authorized personnel or Fox ESS for further instructions.

5 Product Introduction

- Support-module is the battery module, and Main-module includes system controller and battery module;
- Main-module contains the controller of the entire system, so each system must have one Main-module;
- Ensure that each system has only 1 Main-module and a maximum of 8 Support-module.

5.1 EQ4800 Specifications

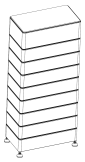
5.1.1 Support-module Specifications

Specifications for Support-module	
Model No.	EQ4800-S
Max. charge/discharge current (A)	50
Operating temperature (°C)	Charge: 0~55 Discharge: -10~55
Storage temperature (°C)	-10~35
Humidity (%)	5~95(No Condensing)
Normal voltage (V)	44.8
Normal capacity (Ah)	104
Normal energy (kWh)	4.66
Battery voltage range (V)	40.6~51.5
Max. Continuous discharge/charge current (A)	50/50
Short circuit current (kA)	2.5
(CC-CV) Standard charging current (A)	30
Constant current and voltage charging cut-off current (A)	5.3
Depth of discharge(%)	100
Peak discharge current (60s) (A)	65
Altitude (m)	≤2000
Dimensions (L*W*H) (mm)	570*380*172
Weight (kg)	39±5%
Communication interfaces	CAN

5.1.2 Main-module Specifications

Specifications for EQ7-M-50	
Model No.	EQ4800-M
Max. charge/discharge current (A)	50
Operating temperature (°C)	Charge: 0~55 Discharge: -10~55
Storage temperature (°C)	-10~35
Humidity (%)	5~95(No Condensing)
Normal voltage (V)	44.8
Normal capacity (Ah)	104
Normal energy (kWh)	4.66
Battery voltage range (V)	40.6~51.5
Max. Continuous discharge/charge current (A)	50/50
Short circuit current (kA)	2.5
(CC-CV) Standard charging current (A)	30
Constant current and voltage charging cut-off current (A)	5.3
Depth of discharge(%)	100
Peak discharge current (60s) (A)	65
Altitude (m)	≤2000
Dimensions (L*W*H) (mm)	570*380*188
Weight (kg)	43±5%
Communication interfaces	CAN

5.1.3 Battery System Specifications for EQ4800

Specifications for EQ4800								
Model No.	EQ4800-L2	EQ4800-L3	EQ4800-L4	EQ4800-L5	EQ4800-L6	EQ4800-L7	EQ4800-L8	EQ4800-L9
Technical Properties								
Battery designation	IFpP53/149/113[(14S)2S]E/-10+50/90	IFpP53/149/113[(14S)3S]E/-10+50/90	IFpP53/149/113[(14S)4S]E/-10+50/90	IFpP53/149/113[(14S)5S]E/-10+50/90	IFpP53/149/113[(14S)6S]E/-10+50/90	IFpP53/149/113[(14S)7S]E/-10+50/90	IFpP53/149/113[(14S)8S]E/-10+50/90	IFpP53/149/113[(14S)9S]E/-10+50/90
The number of batteries	1EQ4800-M+1EQ4800-S	1EQ4800-M+2EQ4800-S	1EQ4800-M+3EQ4800-S	1EQ4800-M+4EQ4800-S	1EQ4800-M+5EQ4800-S	1EQ4800-M+6EQ4800-S	1EQ4800-M+7EQ4800-S	1EQ4800-M+8EQ4800-S
Nominal voltage (V)	89.6	134.4	179.2	224.0	268.8	313.6	358.4	403.2
Nominal capacity (Ah)	104	104	104	104	104	104	104	104
Nominal energy (kWh)	9.32	13.98	18.64	23.30	27.96	32.61	37.27	41.93

Battery voltage range (V)	81.2 ~103.0	121.8 ~154.5	162.4 ~206.0	203.0 ~257.6	243.6 ~309.1	284.2 ~360.6	324.8 ~412.2	365.4 ~463.7
Max. charge/discharge current (A)	50/50							
(CC-CV) Standard charging current (A)	30							
Constant current and constant voltage charging cut-off current (A)	5.3							
Peak discharge Current (60s) (A)	65							
Depth of discharge(%)	100							
Storage temperature (℃)	-10~35							
Operating charge/discharge temperature (℃)	Charge: 0~55 Discharge: -10~55							
Discharge capacity (Ah)	90@-20±2℃ @1/3C ; 104@25±2℃ @1C; 104@55±2℃ @1C							
Ingress protection	IP65							
Protective class	Class Ⅰ							
Dimensions (L*W*H) (mm)	570*380* 386	570*380*52 4	570*380* 662	570*380* 800	570*380*9 38	570*380* 1076	570*380* 1214	570*380* 1352
Weight (kg)(±5%)	83.5	122.5	161.5	200.5	239.5	278.5	317.5	356.5
Communication interfaces	CAN							
Standard	IEC 62477-1;IEC 62619							

5.2 EQ5500 Specifications

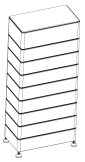
5.2.1 Support-module Specifications

Specifications for Support-module	
Model No.	EQ5500-S
Max. charge/discharge current (A)	50
Operating temperature (°C)	Charge: 0~55 Discharge: -10~55
Storage temperature (°C)	-10~35
Humidity (%)	5~95(No Condensing)
Normal voltage (V)	44.8
Normal capacity (Ah)	122
Normal energy (kWh)	5.46
Battery voltage range (V)	40.6~51.1
Max. Continuous discharge/charge current (A)	50/50
Short circuit current (kA)	2.6
(CC-CV) Standard charging current (A)	50
Constant current and voltage charging cut-off current (A)	2.0
Depth of discharge(%)	100
Peak discharge current (60s) (A)	65
Altitude (m)	≤3000
Dimensions (L*W*H) (mm)	570*380*172
Weight (kg)	41±5%
Communication interfaces	CAN

5.2.2 Main-module Specifications

Specifications for Main-module	
Model No.	EQ5500-M
Max. charge/discharge current (A)	50
Operating temperature (°C)	Charge: 0~55 Discharge: -10~55
Storage temperature (°C)	-10~35
Humidity (%)	5~95(No Condensing)
Normal voltage (V)	44.8
Normal capacity (Ah)	122
Normal energy (kWh)	5.46
Battery voltage range (V)	40.6~51.1
Max. Continuous discharge/charge current (A)	50/50
Short circuit current (kA)	2.6
(CC-CV) Standard charging current (A)	50
Constant current and voltage charging cut-off current (A)	2.0
Depth of discharge(%)	100
Peak discharge current (60s) (A)	65
Altitude (m)	≤3000
Dimensions (L*W*H) (mm)	570*380*188
Weight (kg)	44±5%
Communication interfaces	CAN

5.2.3 Battery System Specifications for EQ5500

Specifications for EQ5500								
Model No.	EQ5500-L2	EQ5500-L3	EQ5500-L4	EQ5500-L5	EQ5500-L6	EQ5500-L7	EQ5500-L8	EQ5500-L9
Technical Properties								
Battery designation	IFpP53/150/120[(14S)2S]E/-10+50/90	IFpP53/150/120[(14S)3S]E/-10+50/90	IFpP53/150/120[(14S)4S]E/-10+50/90	IFpP53/150/120[(14S)5S]E/-10+50/90	IFpP53/150/120[(14S)6S]E/-10+50/90	IFpP53/150/120[(14S)7S]E/-10+50/90	IFpP53/150/120[(14S)8S]E/-10+50/90	IFpP53/150/120[(14S)9S]E/-10+50/90
The number of batteries	1EQ5500-M+1EQ5500-S	1EQ5500-M+2EQ5500-S	1EQ5500-M+3EQ5500-S	1EQ5500-M+4EQ5500-S	1EQ5500-M+5EQ5500-S	1EQ5500-M+6EQ5500-S	1EQ5500-M+7EQ5500-S	1EQ5500-M+8EQ5500-S
Nominal voltage (V)	89.6	134.4	179.2	224.0	268.8	313.6	358.4	403.2
Nominal capacity (Ah)	122	122	122	122	122	122	122	122
Nominal energy (kWh)	10.92	16.38	21.84	27.30	32.76	38.22	43.68	49.14

Battery voltage range (V)	81.2 ~102.2	121.8 ~153.3	162.4 ~204.4	203.0 ~255.5	243.6 ~306.6	284.2 ~357.7	324.8 ~408.8	365.4 ~459.9
Max. charge/discharge current (A)	50/50							
(CC-CV) Standard charging current (A)	50							
Constant current and constant voltage charging cut-off current (A)	2.0							
Peak discharge Current (60s) (A)	65							
Depth of discharge(%)	100							
Storage temperature (℃)	-10~35							
Operating charge/discharge temperature (℃)	Charge: 0~55 Discharge: -10~55							
Discharge capacity (Ah)	97@-20±2℃ @1/3C ; 122@25±2℃ @1C; 122@55±2℃ @1C							
Ingress protection	IP65							
Protective class	Class Ⅰ							
Dimensions (L*W*H) (mm)	570*380* 386	570*380*524	570*380* 662	570*380* 800	570*380*938	570*380* 1076	570*380* 1214	570*380* 1352
Weight (kg)(±5%)	85	126	167	208	249	290	331	372
Communication interfaces	CAN							
Standard	IEC 62477-1;IEC 62619							

Note:The battery designation is a series of numbers that represent the battery's positive and negative electrode types, structure and size, charge and discharge rate, and operating temperature range.

6 Product Features

6.1 Battery System Features

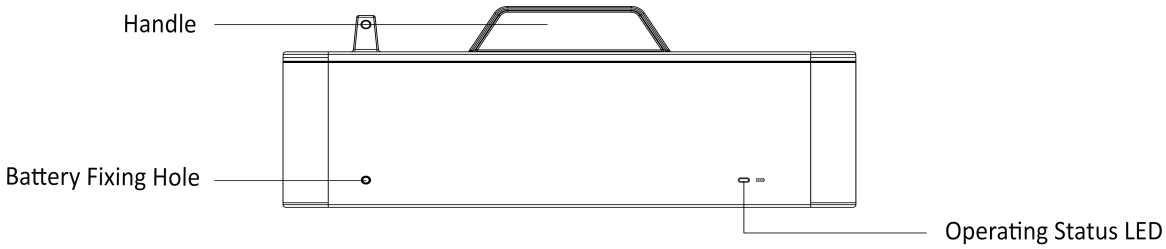
The batteries have been fitted with multiple protection systems to ensure the safe operation of the system. Some of the protection system includes:

- Inverter interface protection: Over Voltage, Over Current, External Short Circuit, Reverse Polarity, Ground Fault, Over Temp, In Rush Current.
- Battery protection: Internal Short Circuit, Over Voltage, Over Current, Over Temp, Under Voltage.

The battery system contains the following Interface to allow it to connect and operate efficiently.

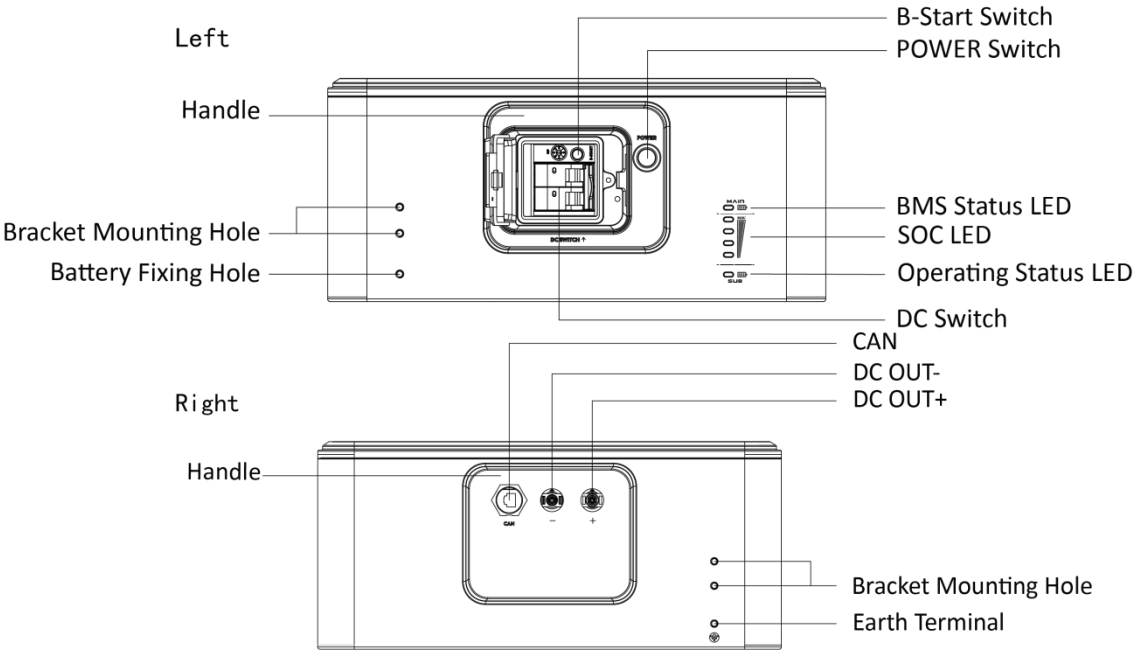
Support-module Features:

- interface:



Main-module Features:

- interface:



DC Switch

Power switch, battery charge and discharge circuit switch.

DC OUT +

Connect bat + of inverter.

DC OUT -

Connect bat - of inverter.

POWER Switch

System power on switch, press this switch, the system starts to work.

BMS Status LED and SOC LED

LED display specific alarm information and battery system power.

Operating status LED

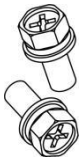
This LED is used to indicate if the battery is operating effectively. A green light on this LED means the battery is ON and operating normally. If the battery is operating failure, a red light on this LED means the battery is operating abnormally.

7 Installation

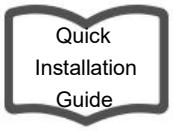
7.1 Items in the package

Please check if following items are including with the package:

For Support-module



A

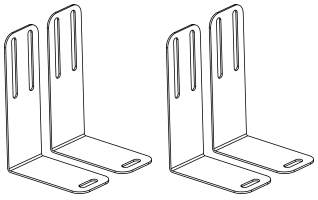


B

No.	Items
A	Mounting screw pack
B	Installation guide

For Main-module

C



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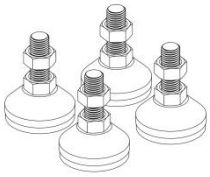

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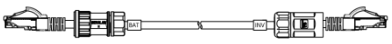
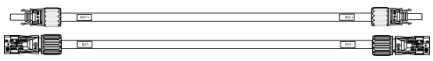


F

G

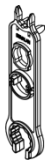


H

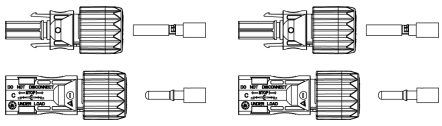
I

J

K



L

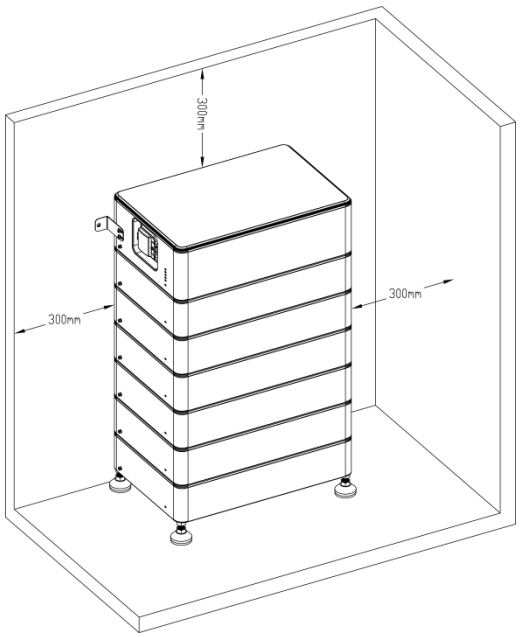


M

Note: For batteries with and without warm up function, K is different.

No.	Items	No.	Items
C	Mounting screw pack	I	Installation guide
D	Fixing bracket*2	J	Expansion tube*2 & Expansion screw*2
E	Footstand	K	Waterproof cover
F	Communication cable (BMS-Inverter)	L	Loosening tool
G	Grounding cable	M	Terminal PV*2
H	DC output cable		

7.2 Clearance



Note:

- Make sure to leave a space of at least 300mm. A clearance of at least 300mm must be left around the battery module for proper cooling.
- Installation clearance requirements shall comply with local regulations.
- Make sure that the battery module is always exposed to the ambient air. The battery module is cooled by natural convection. If the battery module is entirely or partially covered or shielded, it may cause the battery module to stop operating.
- The safety clearance for equipment installation must comply with local regulations.
- For indoor installation scenarios, the installation area must be no less than 10 m^2.
- The battery system must be kept at least 2 meters away from heat sources.

7.3 Tools

The following tools will be required to install Main-module and Support-module.

6mm Magnetic Phillips Screwdriver

Crimpers

Safety Shoes

Multimeter

Safety Gloves

Safety Glasses

Plier

Cable Ties

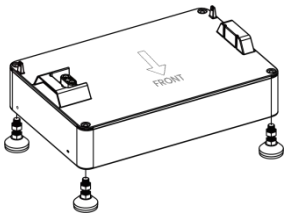
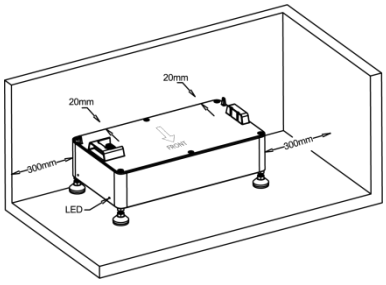
Hammer Drill @φ8mm

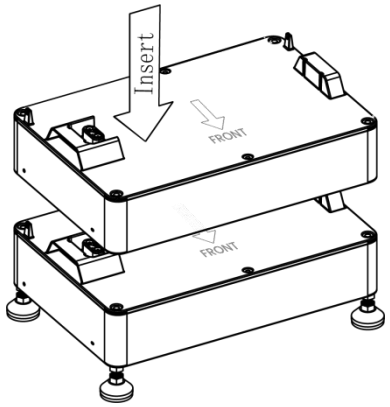
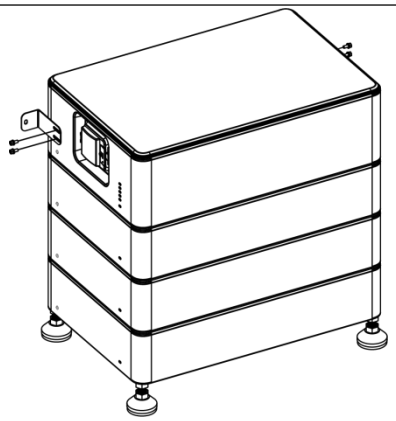
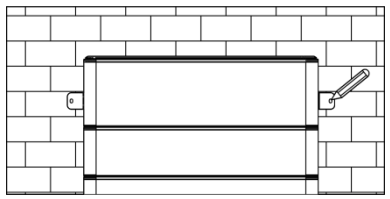
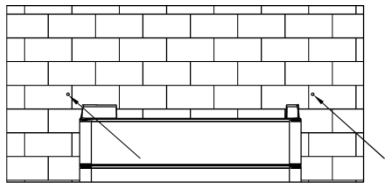
Spirit Level

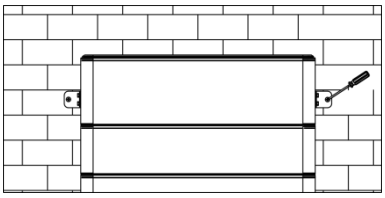
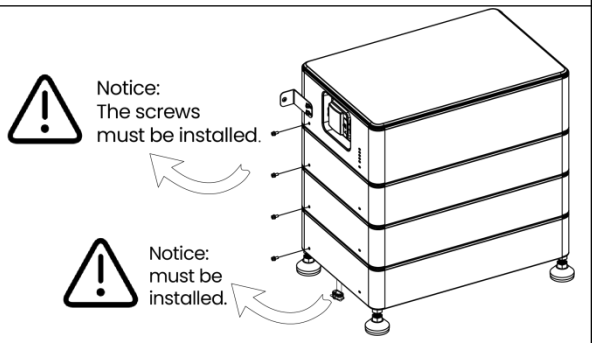
Tape

Marker

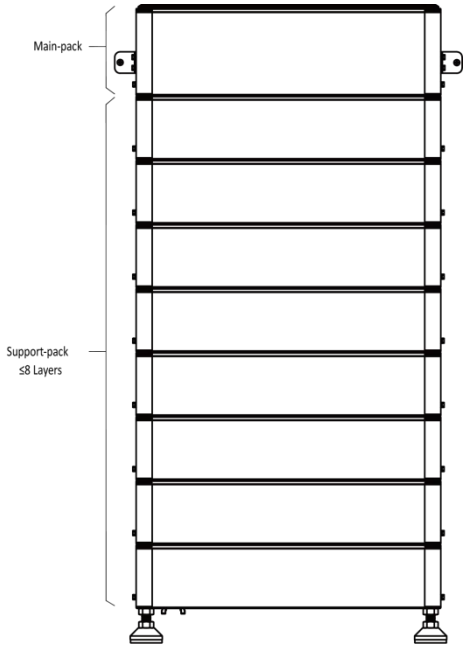
7.4 Installation Steps

Procedures		
Step 1	Install a Support-module with four footstand (Item E) and place it on the ground and adjust it to the level. After installing the footstand, use a track level bar to confirm the level.	
Step 2	Place the battery 20mm against the wall. Note: Please make sure the Operating Status LED is on your left handside when you facing the battery model.	

Step 3	Stack the batteries one by one.	
Step 4	Place the two fixing brackets (Item D) close to the wall and install them on both sides of the battery.	
Step 5	Mark the wall through the bracket hole.	
Step 6	Punch after removing the Main-module. Drill holes with electric drill, make sure the holes are at least 50mm deep, and then tighten the expansion tubes (Item J).	

Step 7	After stacking Main-module again, fix the battery on the wall.	
Step 8	Fix the mounting screw packs (Item C) on both sides of the battery. Insert the waterproof cover (Item K) into the bottom of the battery and lock it in place with the clip.	

Note:Please make sure each system including 1 Main-module and 1 Support-module. Support-module less than 8(1~8) pieces:



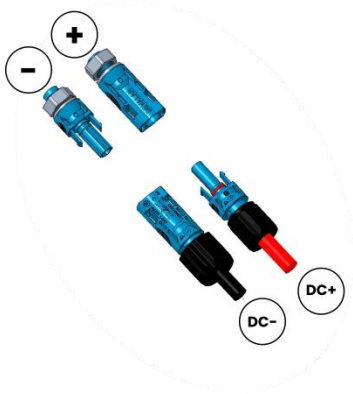
Note: Installation Location Instructions for fixing brackets (Item D):

- L : number of layers in the battery system.
- When L ≤ 6, a pair of Item D is installed on Main-module;
- When L > 6, a pair of Item D is installed on Main-module, and install an additional pair of Item D in the middle layer of the Support-module modules.

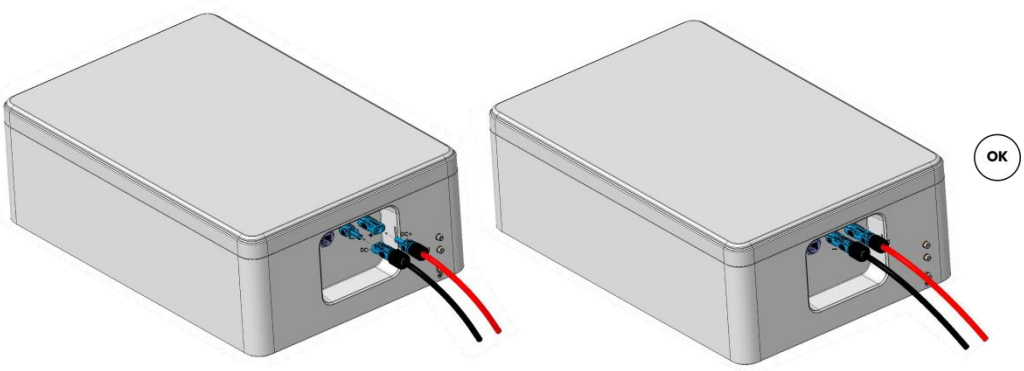
Note: When used with an inverter, the battery system voltage must meet the inverter battery port voltage range.

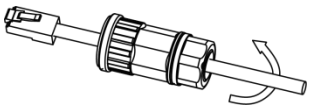
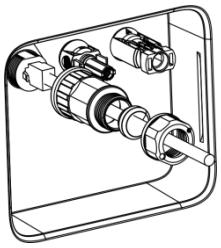
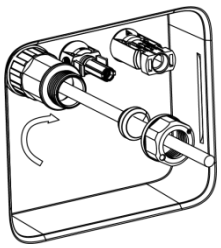
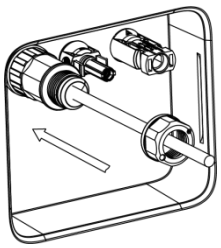
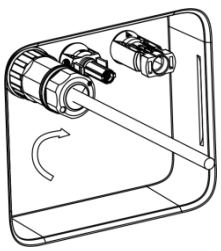
7.5 Wiring Steps

The connection steps of the battery Main-module power cable are presented below. Main-module+ and Main-module- are the connectors on the Main-module. DC+ and DC- are the connectors of the supplied power cable. Follow the steps below to securely connect the Main-module power cable.



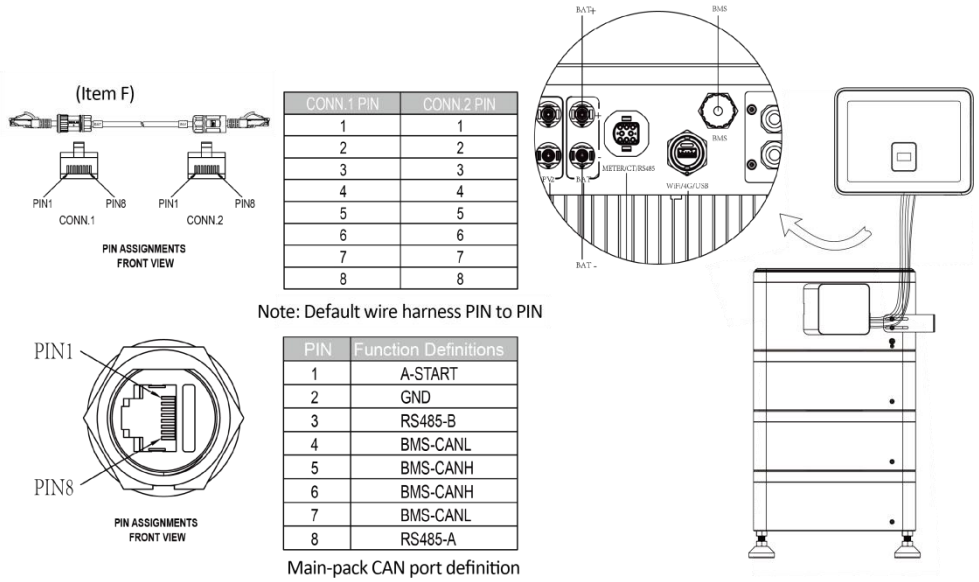
Step 1	Connect the supplied power cable to the DC connectors of the Main-module module. The DC+ is connected to the Main-module+ connector and the DC- is connected to the Main-module- connector.
Step 2	Push the connectors until they are locked with a 'click' sound. Note: The opposite side of the supplied power cable is connected to the inverter battery DC port. For the wiring on the inverter side, please refer to the inverter manual.



Communication cable installation procedure		
Step 1	Open the tail lock wire nut.	
Step 2	Plug communication cable RJ45 into the battery BMS port.	
Step 3	Use an open-end spanner to lock the body onto the RJ45 board end connector; torque: 1.2±0.2N·m.	
Step 4	Install the sealing plug into the main.	
Step 5	Use an open-end spanner to lock the thread locking nut onto the main body.	

Step 6

Insert the cable connector into BMS port at the bottom of inverter and screw it tightly.



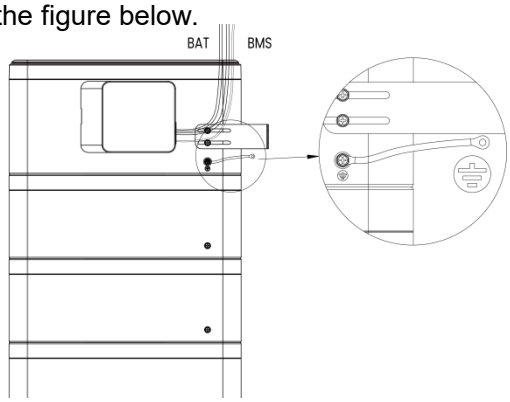
CONN.1 PIN	CONN.2 PIN
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Note: Default wire harness PIN to PIN

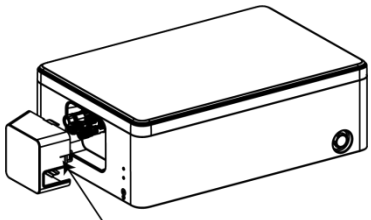
PIN	Function Definitions
1	A-START
2	GND
3	RS485-B
4	BMS-CANL
5	BMS-CANH
6	BMS-CANH
7	BMS-CANL
8	RS485-A

Main-pack CAN port definition

Connect the grounding cable to ensure that all batteries are grounded. The wiring method can be referred to as shown in the figure below.



The installation of the junction box.



First, fit the buckle on the other side into the groove of the box. Then, press this buckle to insert it into the groove of the box.

Note：

Make sure that the power cable connected to the battery is connected vertically and that the vertical length is greater than 30Main-module. If the cable is bent close to the terminals, it may cause poor line contact and result in burnt terminals.

7.6 System Operation

- When the grid connected system is started, the inverter should be turned on first to avoid the current pulse of the inverter increasing to the battery module.
- All installation and operation must comply with local electrical standards.
- Check all power cables and communication cables carefully.

System Start Up:

First turn on DC Switch and then press the POWER Switch, firstly main battery LED will light up once, and then the BMS Status LED will light up for 0.5s,Operating Status LED will light up for 1s at the same time,it means that the system works normally.

System Shut Down:

First turn off the POWER Switch, and then turn off the DC Switch,all LEDs are off when POWER Switch is turned off.

After shutting down the system, there is no current flow between the support units.

System Black Start:

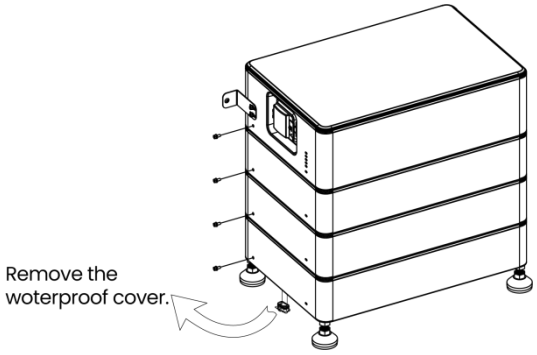
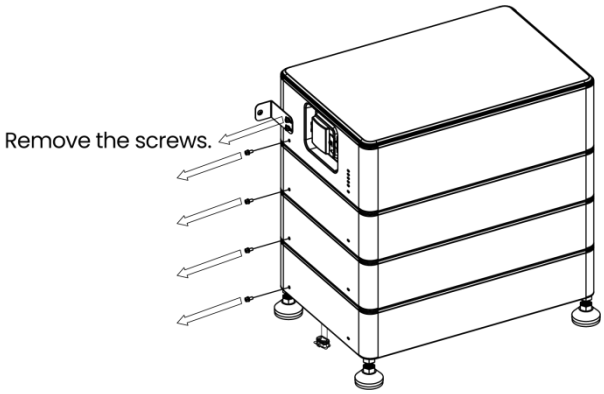
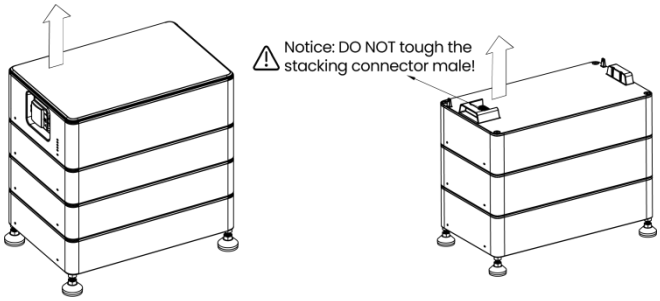
Under special circumstances when both PV and Grid power are out of order, the battery can be activated through the "Black Start" function. This means that our energy storage inverter and battery can continue to operate. The startup steps for Black Start are as follows:

- First turn on DC Switch and the then press the POWER Switch.
- Please press and hold the B-Start Switch for 5 seconds. (Complete within 30 seconds after the battery system starts up).
- The Status LED remains solid green, indicating successful activation of Black Start mode.

Note:

Ensure correct battery-inverter connection prior to Black Start. No wiring modifications during black start.

7.7 Disassembly Steps

Procedures		
Step 1	Shut down the battery system (refer to Section 7.6: System Shutdown), then disconnect the wiring harness connected to the inverter (refer to Section 7.5: Wiring Steps).	
Step 2	Remove the waterproof cover.	
Step 3	Remove the screws (refer to Step 7 and Step 8 in Section 7.4).	
Step 4	Remove the Main-module and Support-modules, and store them properly according to the manufacturer's storage requirements.	

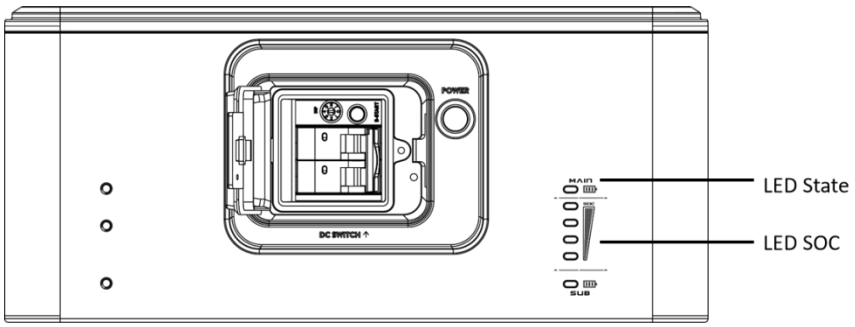
8 Commissioning

The operating status light on the left side of the battery module shows its working status.

For Support-module

Green LED	Red LED	Batteries Status
On for 0.5s, Off for 0.5s	On for 0.5s, Off for 0.5s	Running in boot
On for 0.1s, Off for 0.1s	On for 0.1s, Off for 0.1s	Upgrading
On for 1s, Off for 1s	Off	Normal Working
Off	On for 1s, Off for 1s	Alarm

For Main-module



SOC	System Status	LED State	LED SOC			
=100%	Standby	■	●	●	●	●
100% > SOC >= 75%		■	●	●	●	●
75% > SOC >= 50%		■	/	●	●	●
50% > SOC >= 25%		■	/	/	●	●
25% > SOC >= 0%		■	/	/	/	●
=100%	Discharge	●	●	●	●	●
100% > SOC >= 75%		●	●	●	●	●
75% > SOC >= 50%		●	/	●	●	●
50% > SOC >= 25%		●	/	/	●	●
25% > SOC >= 0%		●	/	/	/	●
=100%	Charge	●	■	■	■	■
100% > SOC >= 75%		●	■	■	■	■
75% > SOC >= 50%		●	/	■	■	■
50% > SOC >= 25%		●	/	/	■	■
25% > SOC >= 0%		●	/	/	/	■

Fault	LED State	LED SOC			
Under voltage fault	■	/	/	/	●
Over voltage fault	■	/	/	●	/
Over temperature fault	■	/	/	●	●
Under temperature fault	■	/	●	/	/
Discharge over current	■	/	●	/	●
Charge over current	■	/	●	●	/
Warm up film switch adhesion	■	/	●	●	●
Reserve	■	●	/	/	/
Pre-Charge failed	■	●	/	/	●
Short circuit Protection	■	●	/	●	/
AFE communication failed	■	●	/	●	●
Module Addressing failed	■	●	●	/	/
IVU Communication failed	■	●	●	/	●
BMU Communication failed	■	●	●	●	/
PCS Communication failed	■	●	●	●	●
HVB FUSE fault	●	/	/	/	●
Module FUSE fault	●	/	/	●	/
Power failed	●	/	/	●	●
Internal total voltage sampling failed	●	/	●	/	/
Temperature sampling failed	●	/	●	/	●
Relay adhesion	●	/	●	●	/
Relay Not Close	●	/	●	●	●
Relay drive failed	●	●	/	/	/
Single Cell "0V" fault	●	●	/	/	●
Temperature high permanent failed	●	●	/	●	/
The Single voltage high permanently failed	●	●	/	●	●
SOH low protection	●	●	●	/	/
AFE failed (UV/OV/UT/OT)	●	●	●	/	●
Shutdown failed	●	●	●	●	/
Other fault	●	●	●	●	●

Remark:

■: LED flash display (on: 0.5s, off: 0.5s)

●: LED on display

9 Exclusion

The warranty shall not cover the defects caused by normal wear and tear, inadequate maintenance, handling, storage faulty repair, modifications to the battery or module by a third party other than Fox ESS or Fox ESS agent, failure to observe the product specification provided herein or improper use or installation, including but not limited to the following.

- Damage during transport or storage.
- Incorrect Installation of battery into module or maintenance.
- Use of battery pr module in inappropriate environment.
- Improper, inadequate, or incorrect charge, discharge or production circuit other than stipulated herein.
- Incorrect use or inappropriate use.
- Insufficient ventilation.
- Ignoring applicable safety warnings and instructions.
- Altering or attempted repairs y unauthorized personnel.
- In case of force majeure (ex: lightning, storm, flood, fire, earthquake, etc.).
- There are no warranties-implied or express-other than those stipulated herein. Fox ESS or Fox ESS shall not be liable for any consequential or indirect damages arising or in connection with the product specification, battery or module.

10 Troubleshooting and Maintenance

10.1 Maintenance

- Regularly check whether the service environment of the battery meets the requirements, and the installation position should be far away from the heat source.
- The battery module should be stored in an environment with a temperature range between -20℃- +55℃, and charged regularly according to the table below with no more than 0.5 C(A C-rate is a measure of the rate at which a battery is discharged relative to its maximum capacity.) to the SOC of 50% after a long time of storage.

Storage environment temperature	Relative humidity of the storage environment	Storage time	SOC
Below -20℃	/	Not allowed	/
-20~0℃	10%~90%	≤ 1 months	20%≤SOC≤50%
0~35℃	10%~90%	≤ 6 months	20%≤SOC≤50%
35~55℃	10%~90%	≤ 1 months	20%≤SOC≤50%
Above 55℃	/	Not allowed	/

Note: If the battery is stored over one year,5%- 8% of the capacity may lose irreversibly.

- Regularly check whether the battery and its supporting terminals, connecting cables and indicator lights are normal.

Expanded capacity requirement

If a battery is replaced or added for capacity expansion, each battery's SOC should be consistent. The max. SOC difference should be between±5%.

If users want to increase their battery system capacity, please ensure that the SOC of the existing system capacity is about 50%. The manufacturer date of the new battery shall not exceed 12 months; in case of exceeding 12 months. please charge the new battery to around 50%.

10.2 Storage with Low SOC

After the product is powered off, static power consumption and self-discharge loss may occur in internal modules. Therefore, charge batteries in a timely manner and do not store the product in low SOC. Otherwise, the product may be damaged due to overdischarge, and battery modules need to be replaced.

Storage in low SOC may occur in the following scenarios:

- The DC SWITCH on the power control module is OFF.
- The power cables or signal cables are not connected.

- The batteries cannot be charged due to a system fault after discharge.
- The batteries cannot be charged due to incorrect configurations in the system.
- The batteries cannot be charged due to no PV input and long-term mains failure.

Regardless of scenarios, the batteries must be charged within the longest interval corresponding to the SOC when the batteries are powered off. If the batteries are not charged within the specified interval, they may be damaged due to overdischarge.

Storage environment temperature	Power-Off SOC Before Storage	Maximum Charge Interval
0~35℃	0% ≤ SOC < 5%	7 days

Note: When the battery SOC decreases to 0%, charge the batteries within seven days. Permanent battery faults caused by delayed charge due to customer reasons are beyond the warranty scope.

10.3 Troubleshooting

When the red / green LED on the panel is flashing or normally on, it does not mean that the EQ is abnormal, it may be just an alarm or protection. Please check the "LED status indicators" in chapter 8 for the detailed faulty definition before any troubleshooting steps. In general, the alarm indication is normal without manual intervention. When the alarm triggering state is removed, EQ will automatically return to normal use.

Problem determination based on the following points:

- Check if the red indicator light illuminates once the battery enters operation;
- Whether the buzzer in Main-module on;
- Whether the battery system can be communicated with inverter;
- Whether the battery can be output voltage or not.

Preliminary determination steps

Battery system cannot work, when DC switch on and POWER on, the LED doesn't light up or flash, please contact the local distributor.

- The LED display of Main-module and Support-module is normal, but it cannot charge and discharge. Observe the display screen of inverter and there is no SOC. Please check whether the CAN communication between Main-module to inverter is well connected. If the connection is good, please replace a CAN communication cable. If the SOC is still not visible on the inverter display screen, please contact the local distributor.
- After the battery system is powered on, if you can see the alarm information on the LED and inverter display screen at the same time, please contact the local distributor.

11 Appendix

11.1 Quality Guarantee

FOXESS Co., Ltd. (hereinafter referred to as "the Company") will, for products found to be faulty during the warranty period, repair the product free of charge or replace it with a new one.

Supporting Documentation Required

When requesting warranty service, the customer must present the original purchase invoice indicating the date of purchase. Furthermore, the product's trademark must be clearly visible. The Company reserves the right to decline warranty coverage if these conditions are not met.

Relevant Conditions

- Non-conforming products replaced under warranty shall be disposed of by the Company.
- The customer must allow the Company a reasonable period of time to complete repairs on faulty equipment.

Warranty Exclusions

The Company reserves the right to decline warranty coverage under the following circumstances:

- The entire machine or specific components have exceeded the free warranty period.
- Damage incurred during transportation.
- Faults resulting from incorrect installation, modification, or use.
- Operation in environments that exceed the limits specified as harsh in this manual.
- Malfunctions or damage caused by installation, repair, alteration, or disassembly performed by service organizations or personnel not authorized by the Company.
- Use or installation outside the scope defined in the relevant international standards.
- Damage caused by abnormal natural disasters.
- Damage resulting from storage conditions that do not meet the requirements stated in the product documentation.
- Any losses arising from failure to adhere to the safety precautions outlined in this manual.

If a product failure is caused by any of the above circumstances and the customer still requests repair services, the Company's authorized service organization may, upon assessment, provide repair services subject to a charge.

Other Provisions

The Company reserves the right to change product dimensions and parameters based on its latest documentation without prior notice.

11.2 Contact Us

If you have any questions about the product, please contact us:

- Fox ESS Headquarters: No.939, Jinhai Third Road, New Airport Industry Area, Longwan District, Wenzhou, Zhejiang, China.
- Wuxi R&D Center: No. 97 Huaqing Avenue, Wuxi Economic Development Zone (Intersection of Huaqing Avenue and Huayun Road)
- Wuhan R&D Center: No.5, Jiayuan Road, Hongshan District, Wuhan, Hubei, China
- Shanghai R&D Center: No.1255, Jinhai Road, Pudong New Area, Shanghai, China
- After-Sales Service Hotline: 400 1888 900
- Contact Telephone (Wenzhou): 0577-88159999
- Contact Telephone (Wuxi): 0510-68092998
- Contact Us: info@fox-esscom
- Contact Us (EV Charger): ev@fox-esscom
- After-Sales Service: service@fox-esscom

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