User Manual



CQ Series

CQ16/ High-Voltage Control Box

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

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FOXESS Co., Ltd

Add:

No.939, Jinhai Third Road, New Airport Industry Area, Longwan District, Wenzhou, Zhejiang, China

Tel: 0510- 68092998

Postcode: 325024

WWW.FOX-ESS.COM

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1 Notes on This Manual

CQ16 series products are designed and tested in accordance with international safety requirements. Certain safety precautions must be taken when installing and operating this product. The installer must read and follow all instructions, cautions and warnings in this installation manual.

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:

CQ16/ High-Voltage Control Box

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!

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"Note" provides important tips and guidance.

Symbols	Explanation
	CE mark. The product complies with the relevant EU directives.
	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.

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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

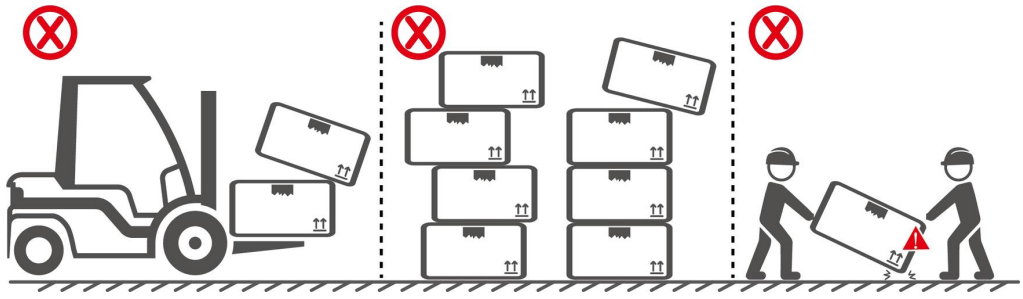
- Do not expose battery to open flame.
- Store in a cool and dry place with ample ventilation.
- Do not store the product near water sources.
- Store the product on a flat surface.
- Recommend to store the product out of reach of children and animals.
- Do not damage the unit by dropping, deforming, 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.

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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.
- Do not install the equipment outdoors in salt-affected areas because it may be corroded. A salt-affected area refers to the region within 1000 m of the coast or prone to sea breeze.
- 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 6 months; on top of that, please make sure the SOC of present battery system onsite is 50%±5%.

Warning: Do not use the battery if it has been dropped or appears compromised.

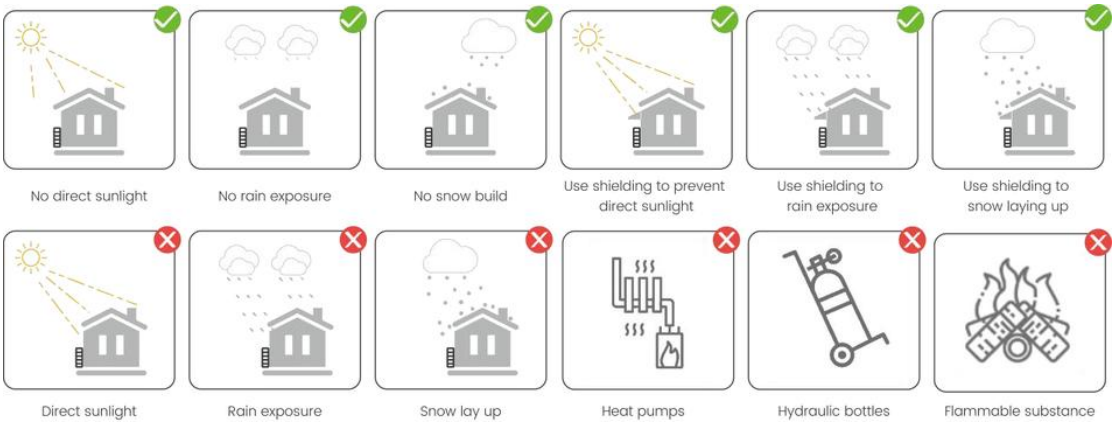


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2.4 Mounting

Make sure the installation site meets the following conditions:

- Ensure the installation area is protected from direct sunlight, rain, and snow accumul ation, a shelter (e.g., rain canopy) is recommended.
- Keep the installation area away from high-temperature sources, flammable or explos ive materials, and other potential explosion hazards such as gas valves, LPG cylind ers, 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 install ation area must be minimized.
- Position the installation area away from television antennas or antenna cables to avo id lightning strikes and electromagnetic interference.
- Avoid the presence of flammable debris around the battery, such as cotton, fabric, ha ystacks, 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.



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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 pack 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.

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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.

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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°C

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.

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5 Product Introduction

- CQ16 is the battery module, **it needs to be used with High-Voltage Control Box controller;**
- High-Voltage Control Box is the controller of the whole system, so each system must have one High-Voltage Control Box;
- Our system consists of at least 4 CQ16+ 1 High-Voltage Control Box and up to 15 CQ16+ 1 High-Voltage Control Box.

5.1 CQ16 Specifications

Specifications for CQ16	
Model No.	CQ16
Operating temperature range (°C)	Charge: 0~55 Discharge: -10~55
Storage temperature (°C)	-10~55
Humidity (%)	5~95
Nominal voltage* (V)	51.2
Nominal capacity (Ah)	314
Nominal energy (kWh)	16.07
Battery voltage range (V)	46.4~58.4
Max. Continuous discharge/charge current (A)	240/240
(CC-CV) Standard charging current (A)	157
Constant current and voltage charging cut-off current (A)	≤16
Peak discharge current (A)	470@60S
Altitude (m)	≤3000
Dimensions (W*H*D) (mm)	390*235*810
Weight (kg)	115±5%
Communication interfaces	CAN
*Voltage here is single unit data.	

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5.2 High-Voltage Control Box Specifications

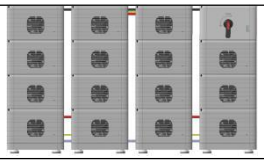
Specifications for High-Voltage Control Box	
Operating voltage range (Vdc)	101~1000
Max. Charge/Discharge current (A)	240/240
Total voltage measurement accuracy (%FSR)	±0.5
Current measurement range (A)	-240~+240
Communication interfaces	CAN
Charge/Discharge efficiency (%)	>92
Operating temperature (°C)	Charge: 0~55 Discharge: -10~55
Storage temperature (°C)	-10~55
Humidity (%)	5~95
Weight (kg)	29±5%
Dimensions (W*H*D) (mm)	390*235*810

5.3 Description of CQ

Model	Nominal voltage (V)	Rated energy (kWh)	Composition
CQ 64.28	204.8	64.28	High-Voltage Control Box*1+CQ16*4
CQ 80.35	256	80.35	High-Voltage Control Box*1+CQ16*5
CQ 96.42	307.2	96.42	High-Voltage Control Box*1+CQ16*6
CQ 112.49	358.4	112.49	High-Voltage Control Box*1+CQ16*7
CQ 128.56	409.6	128.56	High-Voltage Control Box*1+CQ16*8
CQ 144.63	460.8	144.63	High-Voltage Control Box*1+CQ16*9
CQ 160.7	512	160.7	High-Voltage Control Box*1+CQ16*10
CQ 176.77	563.2	176.77	High-Voltage Control Box*1+CQ16*11
CQ 192.84	614.4	192.84	High-Voltage Control Box*1+CQ16*12
CQ 208.91	665.6	208.91	High-Voltage Control Box*1+CQ16*13

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5.4 Battery System Specifications for CQ 241.05

Specifications for CQ 241.05	
Model No.	CQ 241.05
Technical properties	
Battery designation	IFpP73/175/208[(16S)15S]E/-10+50/90
The number of batteries	High-Voltage Control Box*1+CQ16*15
Nominal voltage (V)	768
Nominal capacity (Ah)	314
Nominal energy (kWh)	241.05
Battery voltage range (V)	696~876
Max. charge/discharge current (A)	240/240
(CC-CV) Standard charging current (A)	157
Constant current and constant voltage charging cut-off current (A)	16
Peak discharge current (A)	470@60S
Storage temperature (°C)	-10~55
Operating charge/discharge temperature (°C)	0~55/-10~55
Cycle life	6000 cycle (70%SOH), @25°C@90% DOD @0.5C
Ingress protection	IP20
Protective class	Class I
Dimensions (W*H*D) (mm)	1710*1010*810
Weight (kg)	1763
Communication interfaces	CAN

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6 Product Features

6.1 Battery System Features

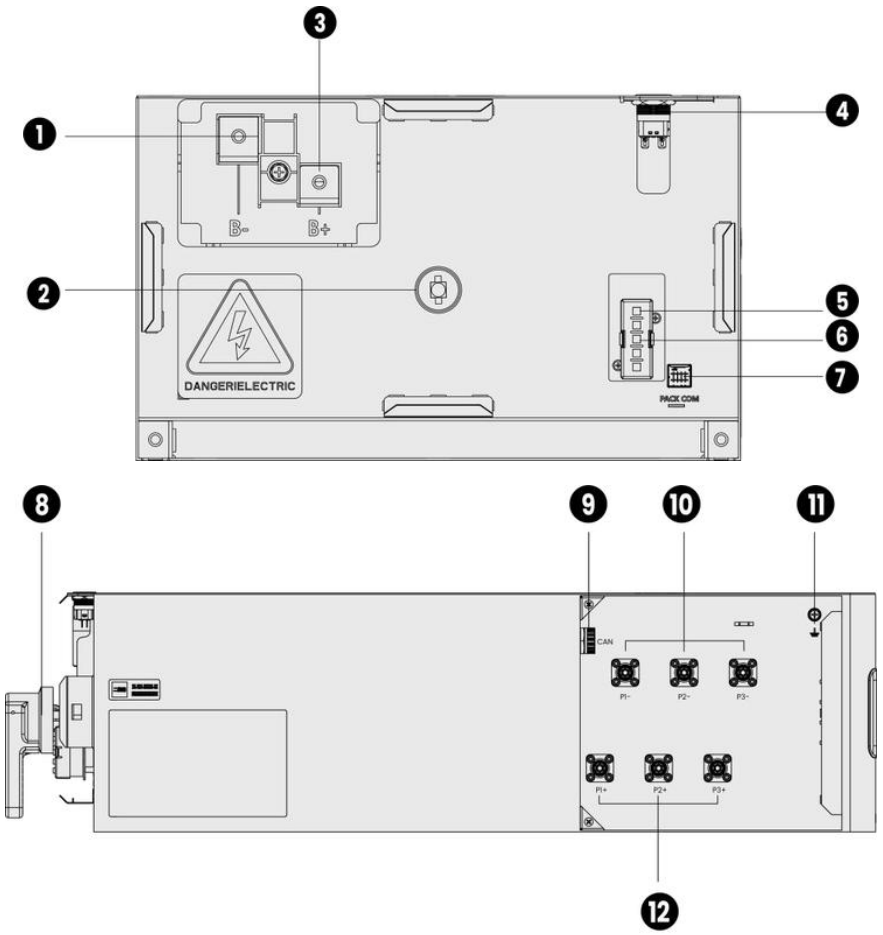
The batteries have been fitted with multiple protection systems to ensure the safe operation of the system. Some of the protection system includes:

- 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.

High-Voltage Control Box Features:

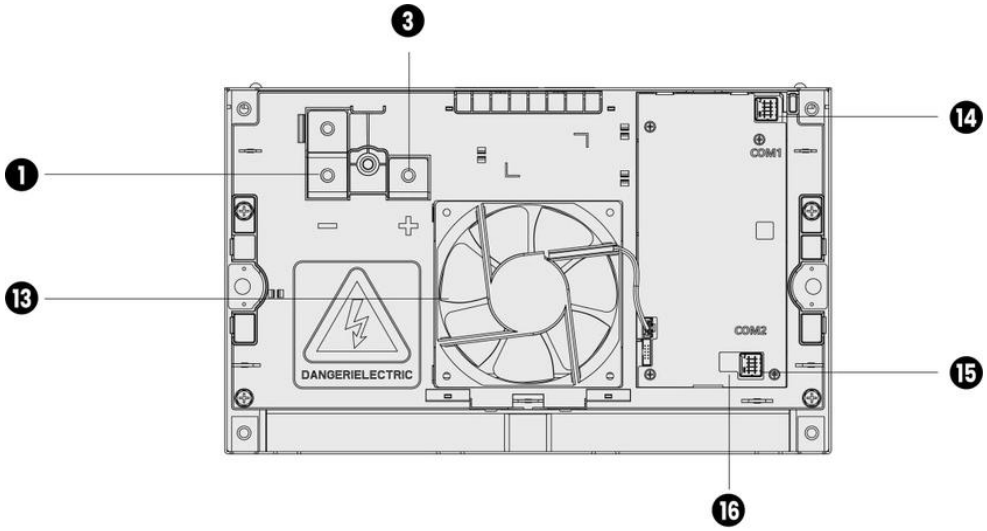
- Interface:



No.	Interface	Description
1	BAT-	BAT negative terminal
2	DC Switch	Power switch, battery charge and discharge circuit switch
3	BAT+	BAT positive terminal
4	Power Switch	Battery charge and discharge circuit switch
5	Status LED	LED display specific alarm information and battery system power
6	SOC LED	
7	COM	Communication interface with the battery pack
8	Handle	DC Switch Handle
9	CAN	Battery and inverter communication port
10	P-	High-Voltage Control Box negative terminal, connected to hybrid inverter's negative terminal
11	PE	Ground terminal, connected to the hybrid inverter
12	P+	High-Voltage Control Box positive terminal, connected to hybrid inverter's positive terminal

CQ16 Features:

- Interface:



No.	Interface	Description
1	BAT-	BAT negative terminal
3	BAT+	BAT positive terminal
13	Fan	Ventilation and heat dissipation
14	COM1	Connection position of battery module communication and power supply input
15	COM2	Connection position of battery module communication and power supply output
16	LED	Battery pack status display

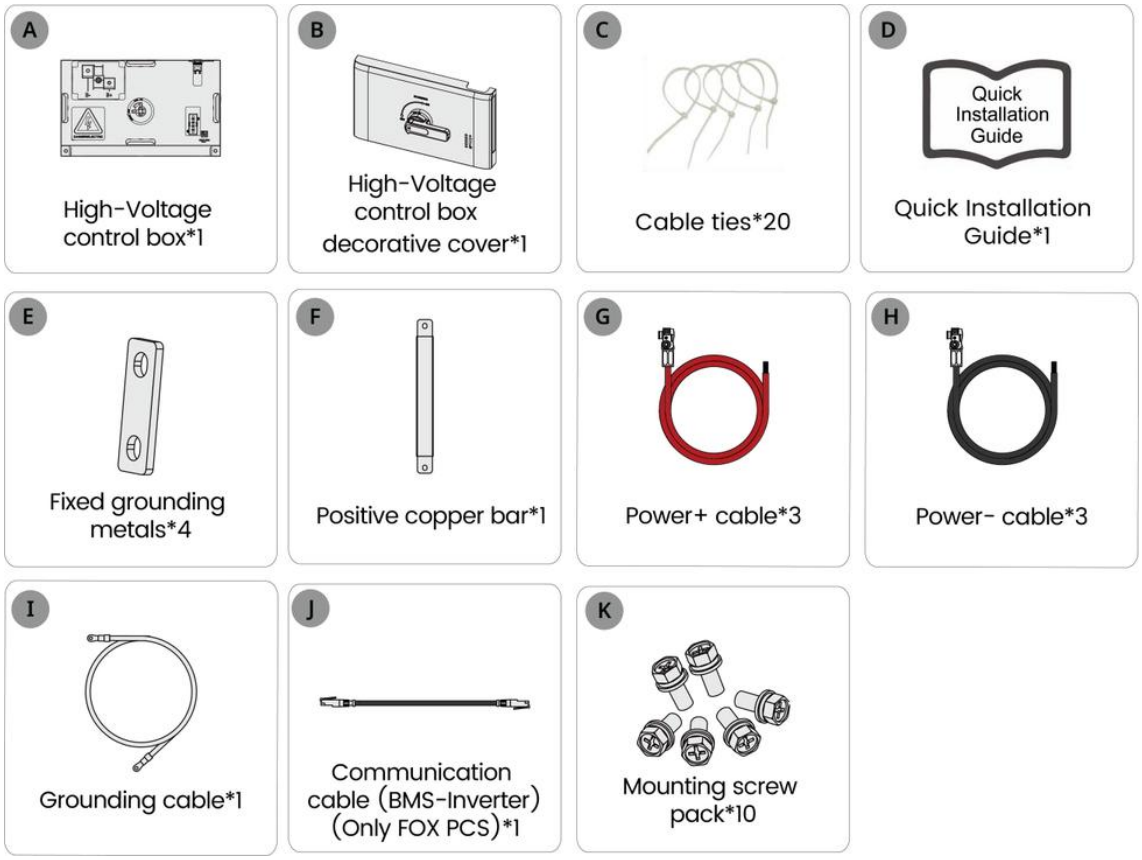
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7 Installation

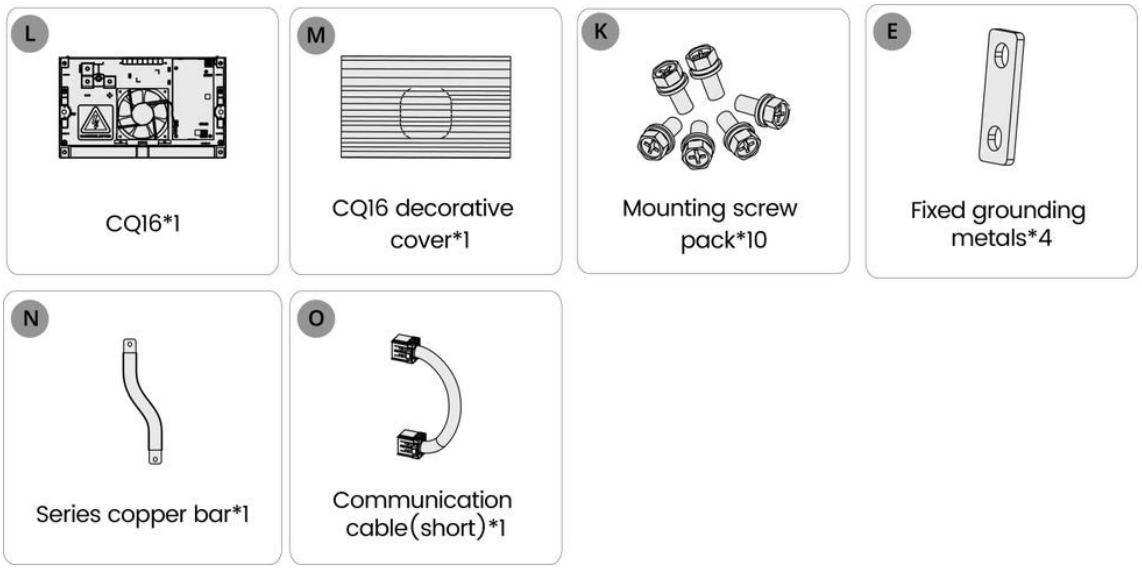
7.1 Items in the package

Please check if following items are including with the package.

For High-Voltage Control Box



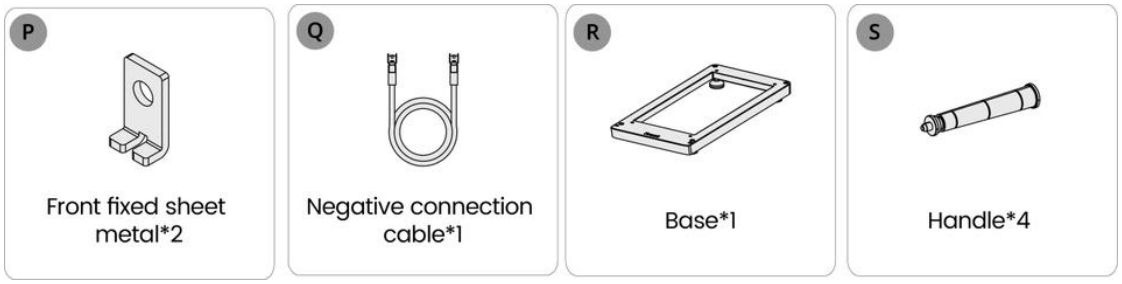
For CQ16



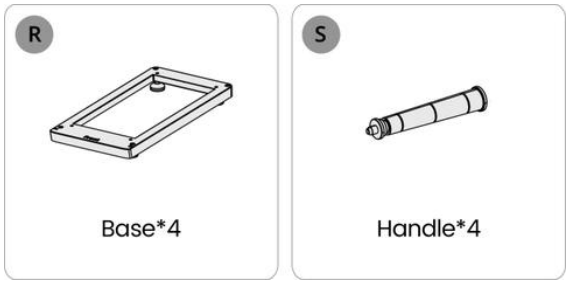
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Accessory package 1

For 1+4 System

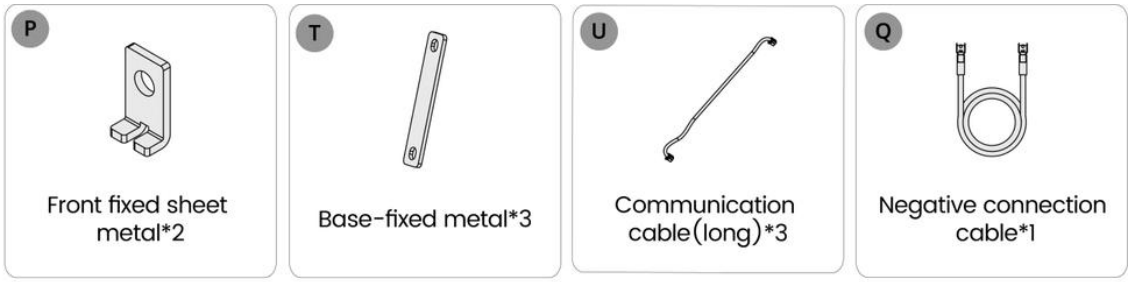


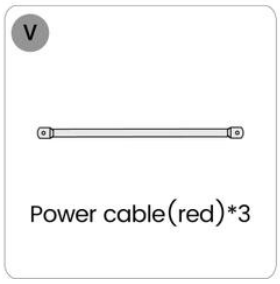
Accessory package 2



Accessory package 3

For 1+15 System



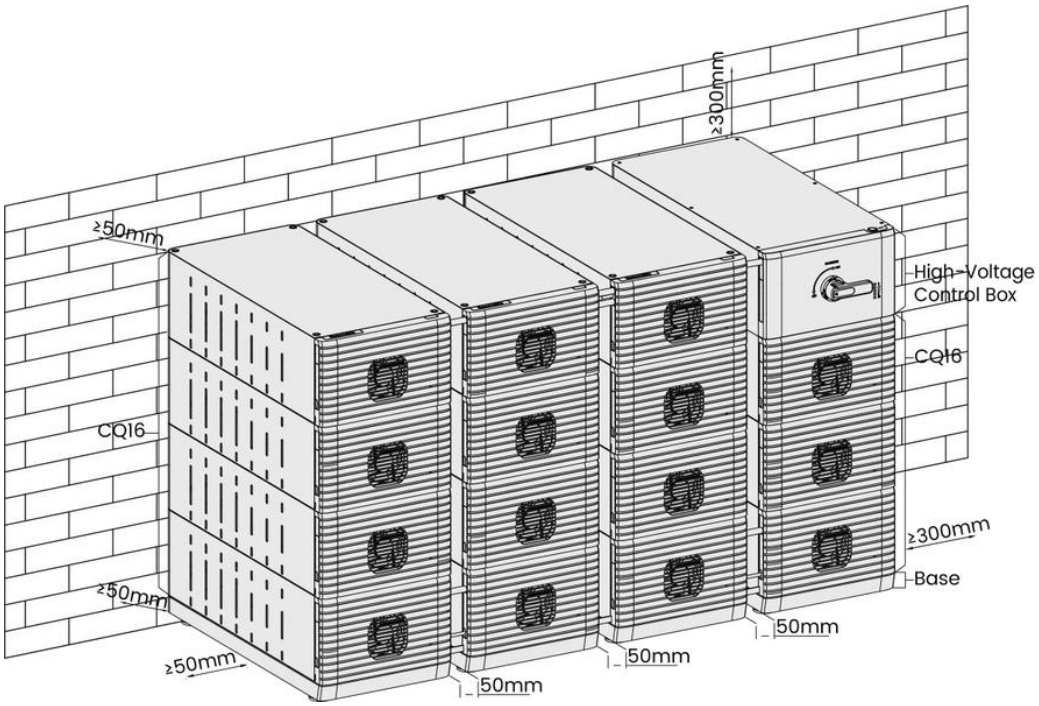


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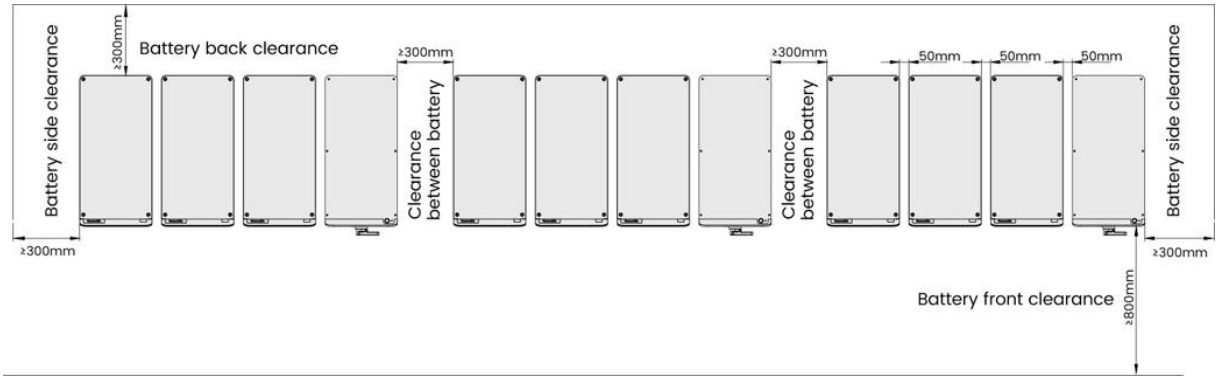
7.2 Clearance

When multiple rows of batteries are stacked, please keep the distance between the bases at 50mm.

Installation spacing of single battery cluster



Installation spacing of three battery clusters



Note:

- The bases are fixed by base-fixed metals (**Item T**).
- To ensure proper operation and long battery life, please make sure to leave at least **300mm** of cooling space around the battery. Shading or insufficient space for heat dissipation will result in high battery temperatures, which may cause unplanned shutdowns and significantly shorten the service life of the battery.

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7.3 Tools

The following tools will be required to install CQ16 and High-Voltage Control Box.



6mm Magnetic Phillips Screwdriver



Crimpers



Safety Shoes



Multimeter



Safety Gloves



Safety Glasses



Plier



Cable Ties



Hammer Drill @φ8mm



Spirit Level

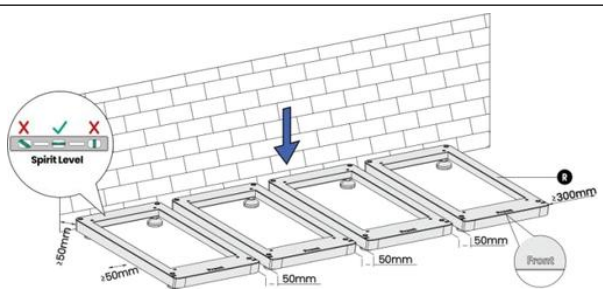


Tape



Marker

7.4 Installation Steps

Procedures	
Step 1	**Battery Base Installation** Position the base **(Item R)** on the floor at the distance shown in the figure below, and verify levelness using a spirit level. **Note:** When placing the base, it is necessary to ensure that the distance between the bases is 50mm; Otherwise, the base-fixed metals **(Item T)** in Step 2 will not be able to be installed.
	

Step 2

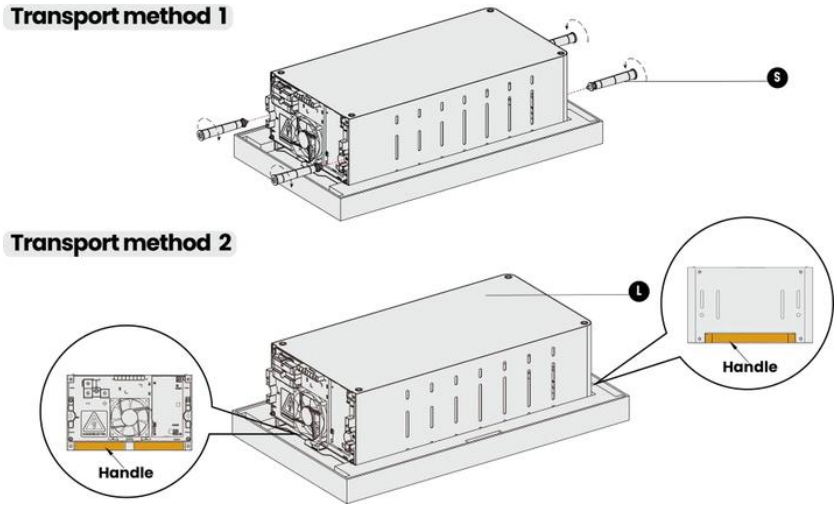
Battery Pack-to-Base Installation

① Handling the Battery Pack

Two methods are available for handling the battery pack:

Method 1: Screw the solid handles **(Item S)** from the Accessory Package into the pre- tapped mounting holes on the battery pack.

Method 2: Use the integral handle slots molded into the battery pack housing.



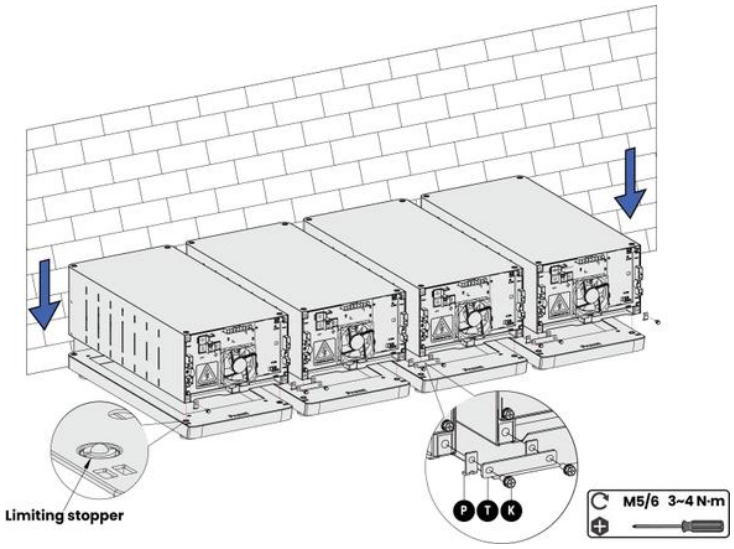
② Place the battery on the base.

By moving the position of the battery pack, the raised sphere on the base will bounce up and restrict the movement of the battery pack.

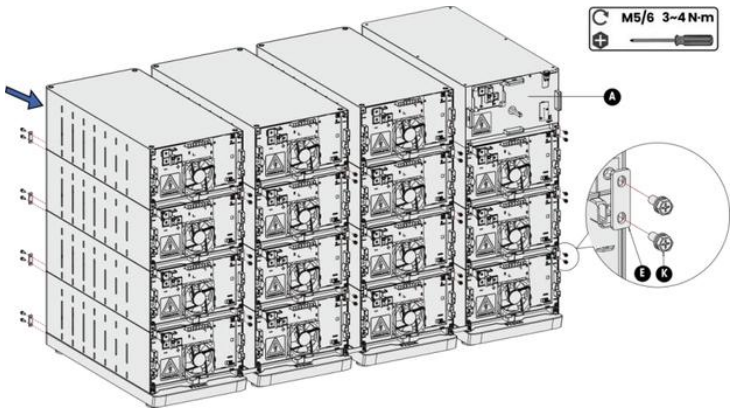
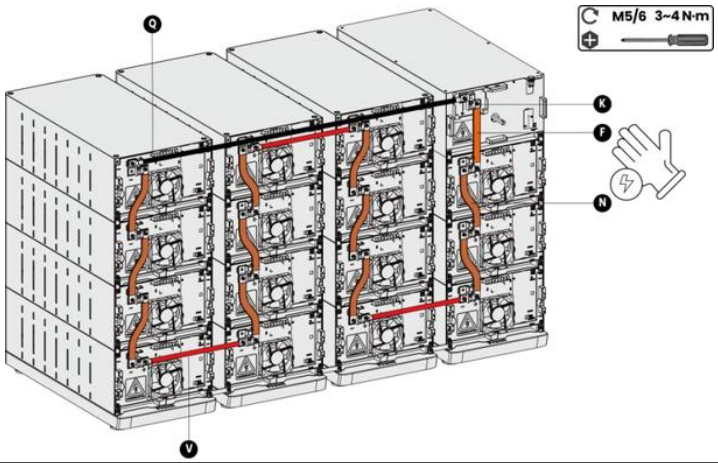
③ Securing Battery PACK to Base

Use front fixed sheet metals **(Item P)** to secure the battery pack and the base.

Fix the battery packs at the bottom of the two columns using base-fixed metals **(Item T)**.



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Step 3	**Battery Pack-to-Pack Installation** ① Select the appropriate stacking configuration based on the quantity of battery packs, then handle and stack the High-Voltage Control Box and all CQ16 in accordance with the selected arrangement. ② The upper and lower two battery packs are fixed with fixed grounding metals **(Item E)**. ③ Connect the fixed grounding metals **(Item E)** between all the batteries. **Note:** ● Position the High-Voltage Control Box on the top of the battery packs in the rightmost column. ● The back of the battery also needs to be fixed.A total of four fixed grounding metals **(Item E)** are required between every two battery packs for fixation. ● The fixed grounding metals have the function of grounding connection. Please connect all the fixed grounding metals.
	
Step 4	**Battery cable and copper bar installation.** Secure cables and copper bars **(Items F, N, V, Q)** to battery pack using mounting screw **(Item K)**. Ensure High-Voltage Control Box and CQ16 are sequentially connected in series circuit. **Note:** When connecting copper bar with high voltage, the work must be implemented by professional electrical operators with insulation gloves.
	

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Step 5

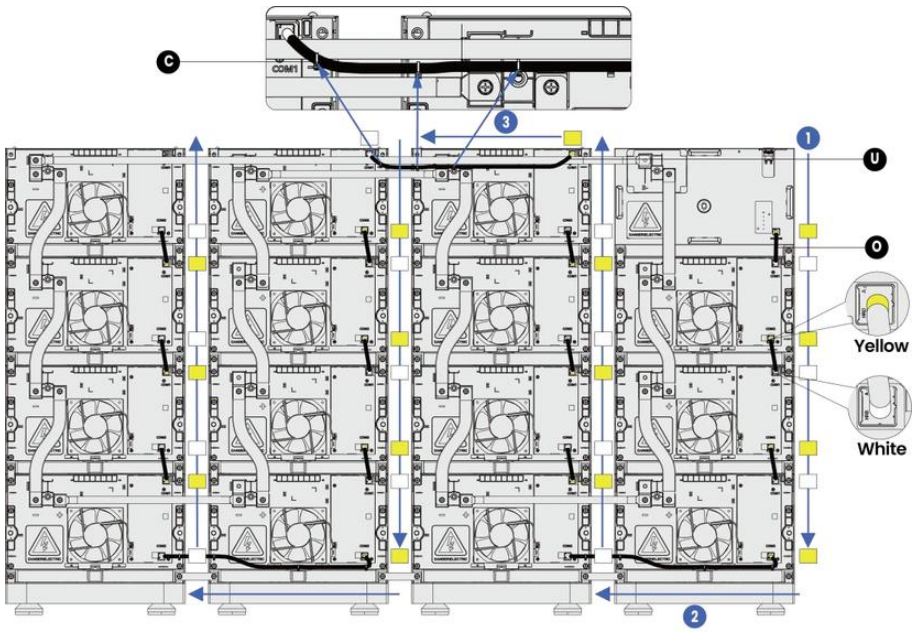
Battery Communication Cable Installation

① Use communication cable **(Item O)** to connect the first battery "INCOM (white)" from the high-voltage box "OUTCOM (yellow)". The communication cable **(Item O, U)** between other battery packs are connected in sequence from "OUTCOM" to "INCOM". (Refer to the illustration below: Following the direction indicated by the arrows, insert the communication cables harness in the color sequence “yellow, white, yellow, white...”.)

② Use cable ties **(Item C)** to fix the cable.

Note:

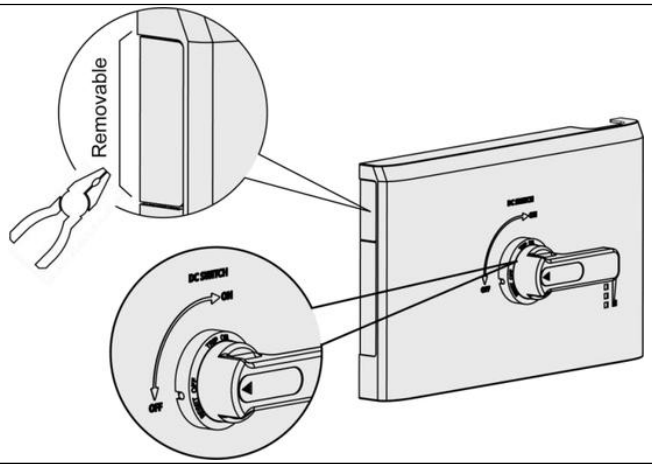
- When connecting cables, observe the installation diagram and pay attention to the direction of the communication cables. Otherwise, the products may not work properly.
- All wiring harnesses and brads supplied by FOX.



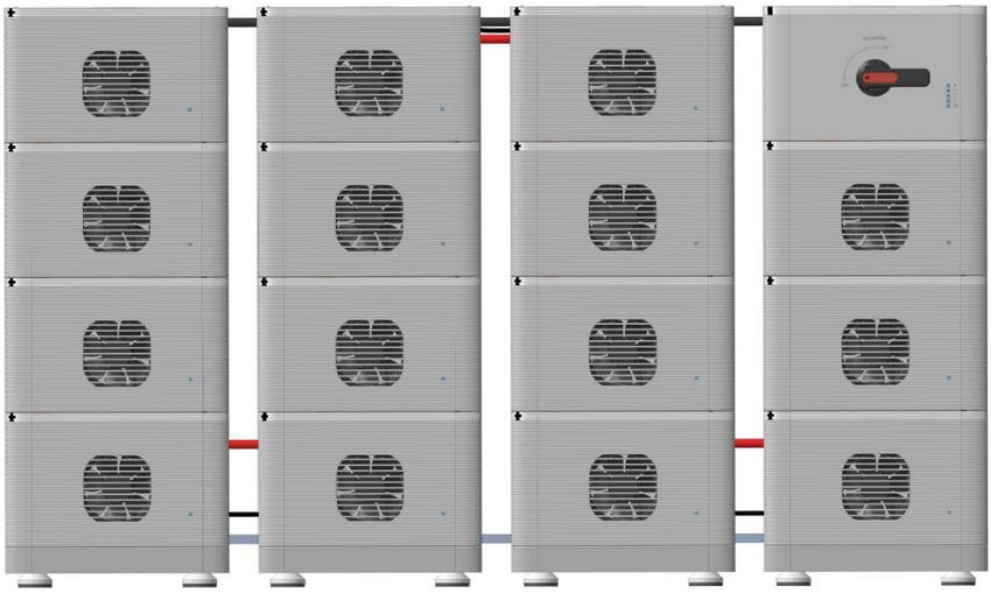
Step 6

Installation of decorative covers

① Depending on the actual installation requirements, you can selectively remove the "Removable".



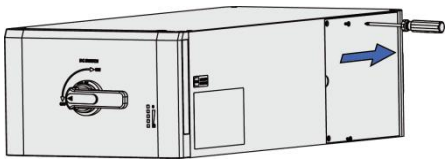
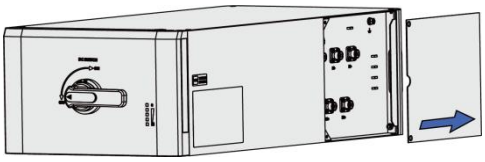
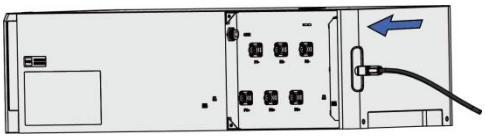
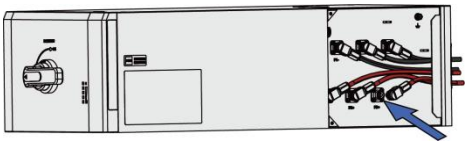
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	② Install the decorative covers of CQ16 and High-Voltage Control Box.
	

7.5 Power, communication and grounding cable connection

A. Power Cable (Item G&H) Installation Procedure

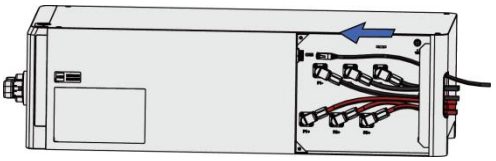
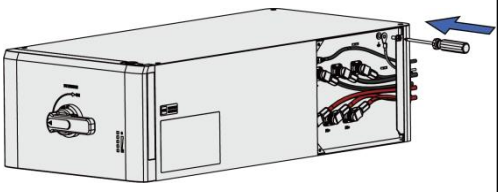
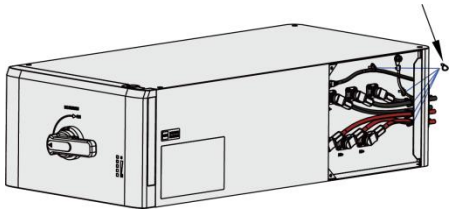
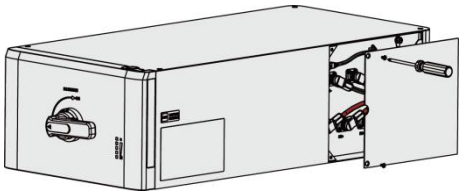


Procedures		
Step 1	Remove screw securing decorative cover with screwdriver.	
Step 2	Remove decorative cover.	
Step 3	Route power cables **(Item G&H)** through right-side cable duct.	
Step 4	Connect all six power cables **(Item G&H)** individually. Ensure firm and reliable connections.	

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B. Communication Cable (Item J) and Grounding Cable (Item I) Installation Procedure

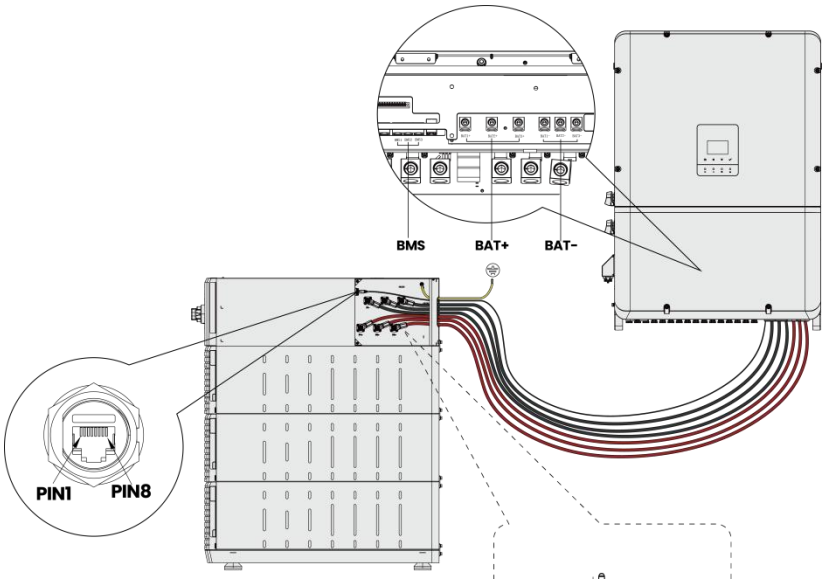


Procedures		
Step 1	Route communication cable **(Item J)** through right-side cable duct.	
Step 2	Route grounding cable **(Item I)** through right-side cable duct and secure with screw. Ensure firm and reliable connection.	
Step 3	Secure wiring cable with cable ties **(Item C)**.	
Step 4	Reinstall decorative cover.	

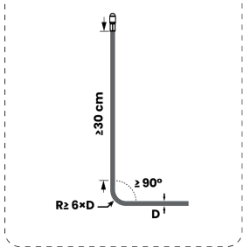
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C. The cable method can be referred to as shown in the figure below.

See the user manual of the inverter for details on the cable steps.



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



Note:

- Make sure that the power cable connected to the battery is connected vertically and t hat the vertical length is greater than 30cm. If the cable is bent close to the terminals, it may cause poor line contact and result in burnt terminals.
- Power cables must be routed linearly at an appropriate length and must not be subjected to any tensile (pulling) or torsional (twisting) stress.
- Excess cable length shall not be coiled, looped, or tightly bundled, as this creates an inductive loop effect and severe thermal accumulation. Failure to comply can melt the insulation, leading to short circuits, equipment damage, or catastrophic fire. The installer and end-user are responsible for ensuring the cables are deployed in accordance with this warning.



⚠WARNING: DO NOT COIL.
EXTEND FULLY BEFORE USE.

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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 pack.
- All installation and operation must comply with local electrical standards.
- Check all power cables and communication cables carefully.

System Start Up:

When the inverter is connected to the PV and the grid and both are operating normally, turn on the battery DC Switch. Press the Power switch and hold it for 3 seconds, then release. The Status LED is blinking green and indicates that the system is working normally.

System Shut Down:

Press and hold the Power Switch for at least 5 seconds until all of the LEDs (BMS Status LED and SOC LED) begin blinking. Once they start blinking, release the switch. The lights will automatically turn off after 5 seconds. Then, turn off the DC Switch.

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:

- Turn on the DC Switch, press and hold the Power Switch for 3 seconds, then release.
- Press the Power Switch three times in succession within 4 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:

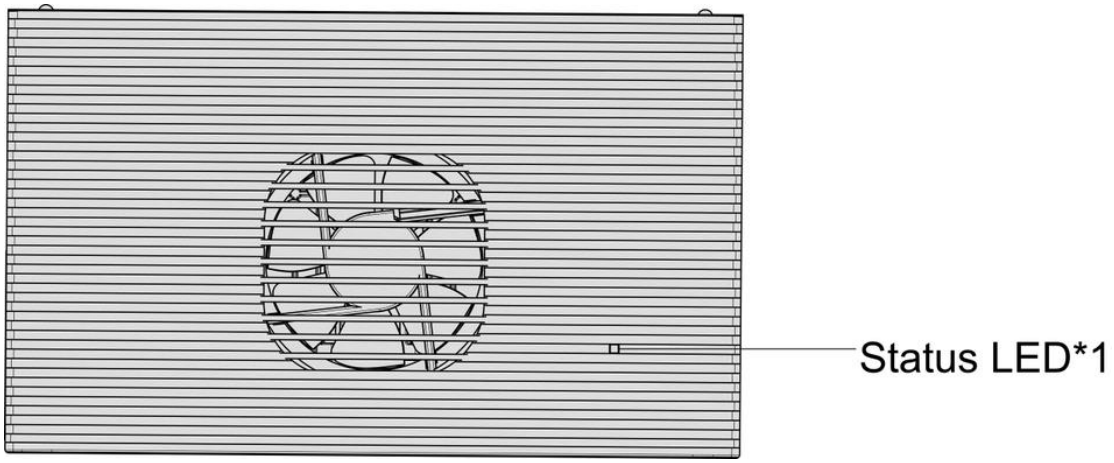
Ensure correct battery-inverter connection prior to Black Start. No cable modifications during Black Start.

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8 Commissioning

The operating status light on the right side of the battery pack shows its working status.

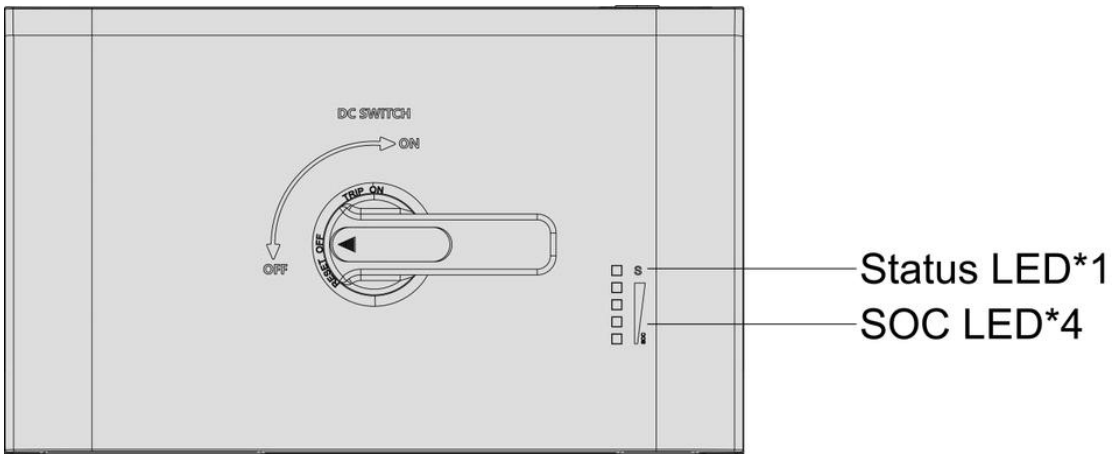
For CQ 16



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

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For High-Voltage Control Box



SOC	LED indication	Red	Green	LED SOC			
				LED-4	LED-3	LED-2	LED-1
Activate		Running water lamp					
Shut down		■	/	■	■	■	■

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%		●	/	/	/	■

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Fault	Red	Green	LED SOC			
			LED-4	LED-3	LED-2	LED-1
Under voltage fault	■		/	/	/	/
Over voltage fault	■		/	/	/	●
Over temperature fault	■		/	/	/	●
Under temperature fault	■		/	/	●	/
Discharge over current	■		/	/	●	/
Charge over current	■		/	/	●	●
Pre-Charge failed	■		/	●	/	/
AFE communication failed	■		/	●	/	●
Module addressing 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 failure	★		/	★	★	★
Other fault	●		/	●	●	●

Remark:

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

●: LED on display

/: LED off display

★: LED flash display (on: 0.3S, off: 0.6S)

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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 pack 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 pack or maintenance.
- Use of battery or pack 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 by 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 agent shall not be liable for any consequential or indirect damages arising or in connection with the product specification, battery or pack.

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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°C- +55°C, 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°C	/	Not allowed	/
-20~0°C	10%~90%	≤ 1 months	20%≤SOC≤50%
0~35°C	10%~90%	≤ 6 months	20%≤SOC≤50%
35~55°C	10%~90%	≤ 1 months	20%≤SOC≤50%
Above 55°C	/	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 energy, each battery's SOC should be consistent. The max. SOC difference should be between ±5%.

If users want to increase their battery system energy, please ensure that the SOC of the existing battery system 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%.

Note: After installing a new battery, the SOC of battery system may fluctuate or jump unexpectedly. This can be automatically corrected within 1 to 2 weeks via passive balancing.

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:

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- 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°C	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 Low-Temperature Battery Reserve

The battery system includes an automatic low-temperature protection feature. it proactively manages.

The battery to maintain adequate charge, extending standby time when temperatures drop.

10.4 Troubleshooting

When the red / green LED on the panel is flashing or normally on, it does not mean that the CQ16 is abnormal, it may be just an alarm or protection. Please check the “LED status indicators” in chapter 9 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, CQ16 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 High-Voltage Control Box 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 High-Voltage Control Box and CQ16 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 High-Voltage Control Box 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,

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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.

System Lock Function

The CQ battery system has a non-reset table function to stop operation when one or more cells in the battery system deviate from the operating region during operation. This feature shall not be a user reset table or allow for automatic reset. Please ask after sales for help.

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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.

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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. 37 Huaqing Avenue, Wuxi Economic Development Zone (Intersection of Huaqing Avenue and Huayun Road)
- Wuhan R&D Center: 6th Floor, Block A, Tower T4, CHINA PROCUREMENT CENTER, No. 789 Gaoxin Avenue, East Lake New Technology Development Zone, 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-ess.com
- Contact Us (EV Charger): ev@fox-ess.com
- After-Sales Service: service@fox-ess.com

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