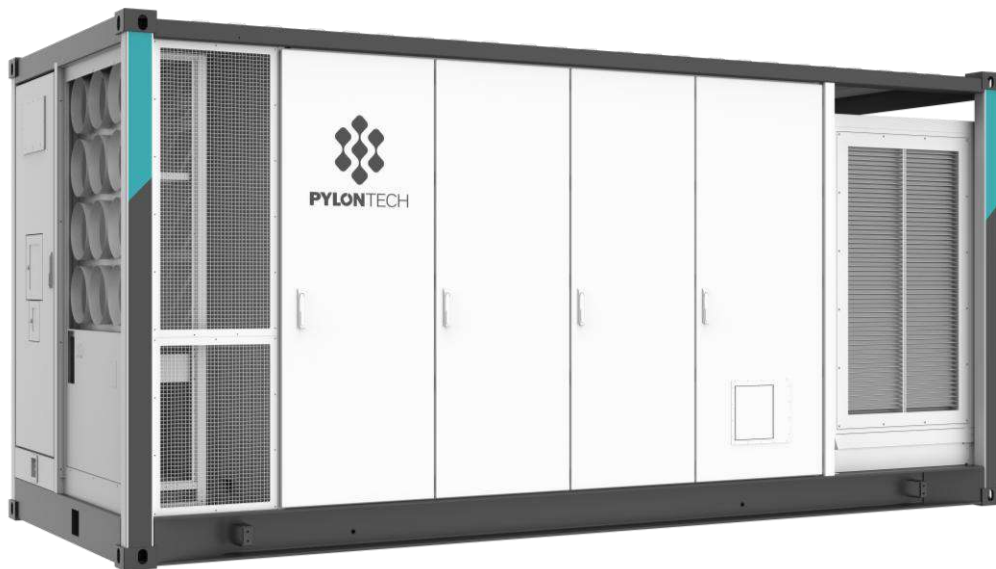




Container-L3300-OMNI Lithium Iron Phosphate Battery Energy Storage System Operation Manual

Information Version: 1.0

5PMPA08-00XXX

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About this Manual

Purpose

This manual describes the Lithium Iron Phosphate Battery Energy Storage System (hereinafter referred to as "the system" unless otherwise noted) from Pylontech in terms of its overview, installation, commissioning, maintenance, etc.

Please read this manual before installing the system and follow the instructions carefully during installation. In case of any confusion, please contact Pylontech immediately for advice and clarification (Contact information can be found on the back cover of the manual).

Validity

This manual is applicable to the container battery energy storage system: Container-L5000-BAT. It is mainly used in industrial and commercial application scenarios such as power grid peak cutting and valley filling, power capacity increase, etc. Container-L5000-BAT is a high-voltage energy storage system that can only be operated by authorized personnel and professionals.

Product Name Description

Container-L3300-OMNI

1 2 3 4

No.	Designation	Description
1	System type	Container BESS System
2	Cooling type of the system	Liquid Cooling
3	The rated energy (in kWh) of the system*	The rated energy of this system is 3300 kWh.
4	Type of the container	"Omni" represents all in one container (including the PCS).

* The energy of the standard container is 5000 kWh. And the energy may differ based on your practical system.

Product Model Description

PowerCube-20H-M7A200Cx.xxx-EU-yy



No.	Designation	Description
1	Product Series	PowerCube Series
2	Volume of the container	20ft container
3	Battery model used in the product	The product uses M7A200 battery module.
4	PCS type that can be used for this system	Centralized type PCS
5	The rated energy (in MWh) of the system (Where x.xxx=2.089~5.015, in step of 0.418)	The rated energy is x.xxx MWh.
6	Sales territory	The product is Intended for European market.
7	The firefighting configurations (Where yy=01, 02, 03, 04 or 05, in step of 01)	01: Explosion vent panel 02: Explosion vent panel + Sprinkler system 03: Explosion proof system 04: Explosion proof system + Sprinkler system 05: Explosion vent panel + Explosion proof system + Sprinkler system

Symbols Explanation

Symbol	Description
	Danger: Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Warning: Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Caution: Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	Note: Indicates additional information, emphasized contents, or important points helping you use the product better.

Abbreviations

Abbreviation	Designation
Pylontech	Pylon Technologies Co., Ltd.
AC	Alternating Current
DC	Direct Current
QC	Quality Control
BMS	Battery Management System
BMU	Battery Management Unit
PCS	Power Conversion System
SOC	State of Charge
SOH	Battery State of Health, in percent
UPS	Uninterruptible Power Supply
BESS	Battery Energy Storage System
EMS	Energy Management System
PMU	Power Management Unit
CMU	Control Management Unit
SPD	Surge Protecting Device
EU	European Union
DOD	Depth of Discharge
LEMS	Local Energy Management System
MCU	Microcontroller Unit

Contents

Legal Information.....	I
About this Manual.....	II
Purpose.....	II
Validity	II
Product Name Description.....	II
Product Model Description.....	III
Symbols Explanation	III
Abbreviations	IV
Contents.....	V
1 Safety.....	1
1.1 Personal Requirements	1
1.2 Setting of Safety Warning Signs.....	1
1.3 Requirements for Escape Routes.....	1
1.4 Electrical Working.....	2
1.5 Moisture Protection.....	2
2 System Introduction.....	3
2.1 System Description	3
2.1.1 System Overview	4
2.1.2 System Specifications	5
2.2 Label Description	6
2.3 Reference Standards.....	7
2.3.1 System Related Standards.....	7
2.3.2 Battery Related Standards.....	7
3 System Components	8
3.1 External Design	8
3.1.1 Outdoor Cabinet	8
3.2 Internal Design	10
3.2.1 Battery String	11
3.2.2 Integrated Communication Cabinet.....	18
3.2.3 Liquid Chiller.....	7

3.2.4	PCS (PWS1-1725KTL-H-NA/EX-O Power).....	9
3.3	Safety Features.....	12
3.3.1	Fire Protection System.....	12
3.3.2	Explosion proof and vent systems.....	13
4	Installation.....	15
4.1	Checking Before the Installation.....	15
4.2	Preparing tools and instruments.....	15
4.3	Overall Dimensions.....	16
4.4	Installation Environment Requirements.....	17
4.4.1	Installation Site Selection.....	17
4.4.2	Foundation Requirements.....	17
4.4.3	Installation Clearances.....	20
4.5	Hoisting.....	21
5	Electrical and Communication Wiring.....	23
5.1	System Diagram.....	24
5.2	Cable Requirements and Bolt Torque.....	26
5.3	Grounding.....	27
5.4	DC Side Wiring.....	28
5.4.1	Wiring of Single Battery String System.....	29
5.4.2	DC Cables from the PCS (provided by the customer) to the busbars.....	30
5.5	AC Side Wiring.....	30
5.6	Communication Wiring.....	31
6	Commissioning.....	32
6.1	Fire Protection System Prerequisites.....	32
6.2	System Status.....	33
6.2.1	Battery String Status.....	33
6.3	System Turning On.....	34
7	Maintenance.....	36
7.1	System Turning Off.....	36
7.2	Routine Maintenance.....	38
7.3	Battery Maintenance.....	40
7.3.1	Battery Control Module Maintenance.....	41

7.3.2	Battery Module Maintenance.....	41
7.4	Liquid Chiller Maintenance	41
7.5	PCS Maintenance	41
8	Trouble Shooting.....	42
8.1	System Troubleshooting	42
8.2	Battery String Failure	42
8.3	Fire Fighting Failure.....	42
8.4	Liquid Cooler Failure.....	43
8.5	Emergency Disposal.....	44
8.5.1	EPO	44
8.5.2	Fire protection emergency stop and manual release	44
9	Transportation and Storage	45
9.1	Transportation.....	45
9.2	Storage	46
	Annex: Cause and Effect Matrix for ESS Container Products.....	47

1 Safety

1.1 Personal Requirements

This system is only operated by authorized personnel. Read all safety instructions carefully prior to any work and follow these instructions at all times when working with the system.

Incorrect operation or work may cause:

- Injury or death to the operator or a third party.
- Damage to the system hardware and other properties belonging to the operator or a third party.

Qualified personnel must have the following skills:

- Training in the installation and commissioning of the electrical system, as well as dealing with hazards.
- Knowledge of the manual and other related documents.
- Knowledge of local regulations and directives.

1.2 Setting of Safety Warning Signs

During the installation, routine maintenance, overhaul and other operations of the system, to prevent irrelevant personnel from approaching and misoperation or accidents. Please observe the following:

- Obvious signs shall be set up at the front and rear switches of the maintenance equipment to prevent accidents caused by false closing
- Set up warning signs or safety warning tapes near the operation area.

1.3 Requirements for Escape Routes

To ensure that the staff can leave the site quickly in case of accident, please observe the following items:

In the process of equipment maintenance, overhaul and other operations, it is necessary to ensure that the escape routes are completely unblocked.

It is strictly prohibited to stack sundries in the escape way or occupy the escape way in any form.

1.4 Electrical Working

There is high voltage in the system, and accidental contact may lead to fatal electric shock danger, so when working with electricity, you should:

- Tag and lock the live area.
- Do a good job of protection, wear insulating gloves and shoes, and wear the corresponding level of anti-arc flashover clothing when necessary.
- There must be an escort to ensure personal safety.

1.5 Moisture Protection

The entry of moisture is very likely to damage electrical equipment! To ensure the normal use of various functions of the system, please observe the following items:

- Do not open the door of the system or equipment when the air humidity is above 95 %.
- Avoid maintenance or overhaul of the system in rainy or humid weather conditions.

In addition, the following protective or emergency measures should be taken according to the needs of the site:

- During the maintenance and overhaul of the system, relevant personnel shall take appropriate protective measures according to the needs of the site, such as wearing anti-noise earplugs, insulating shoes, insulating gloves and scalding gloves.

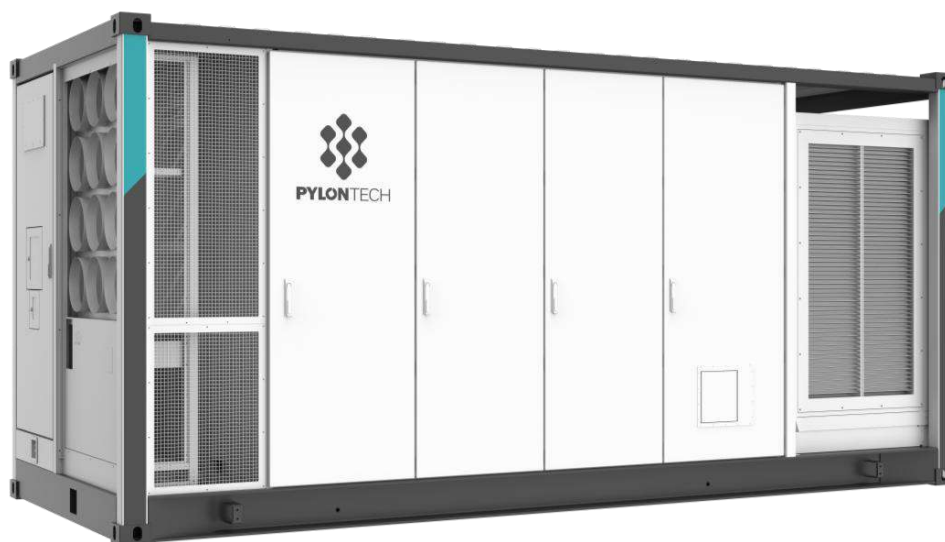
Take all necessary auxiliary measures to ensure the safety of personnel and equipment. Matters needing attention in the use of this manual:

- This manual cannot cover all possibilities during operation, maintenance and overhaul. Please contact our company in time if you encounter any situation that cannot be explained in the manual.
- In order to facilitate users to read and use this manual better, a large number of pictures are configured in the manual. All pictures are for illustration purposes only. Users should refer to the actual products received.

2 System Introduction

2.1 System Description

This system is a high voltage battery storage system based on lithium iron phosphate battery. The system adopts module series design, which voltage level is 1500V.



Front View



Rear View

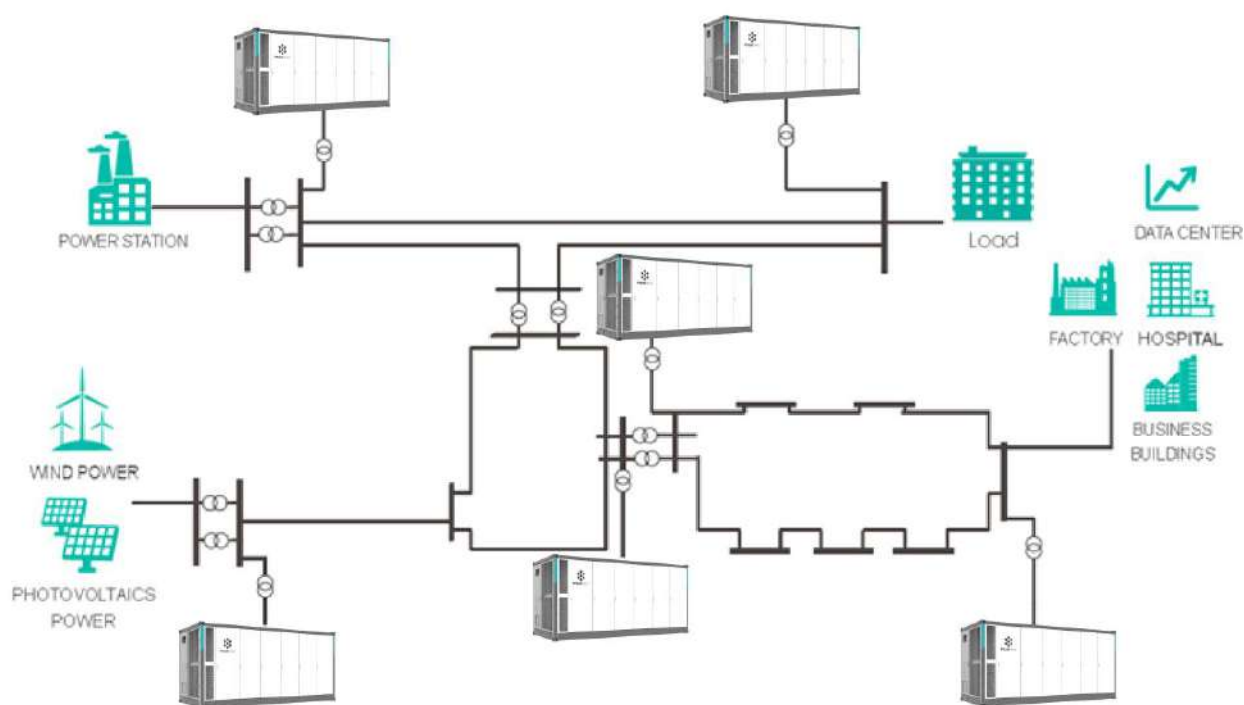
NOTE

The above pictures are for reference only. The appearance of the product is subject to the actual delivery.

2.1.1 System Overview

Through reliable BMS system and high-performance balancing technology, the whole system is characterized by flexible configuration and high reliability. It can be widely used in grid energy storage, photovoltaic energy storage, container energy storage, microgrid energy storage, data room and other application scenarios that need high-voltage batteries. The system application is shown in the following figure.

Product Application Scenario



2.1.2 System Specifications

Specifications	Parameters	PowerCube-20H-M7A200Cx.xxx-EU-yy (*)
System Parameters	Maximum Weight (ton)	Approx. 42
	Dimensions (mm)	6058(-6,0) (W) x 2896(-5,0) (H) x 2438(-5,0) (D)
	IP Rating	IP55
	Protective Class	Class I
	Pollution Degree	PD3 (Outside), PD2 (Inside)
	Cooling Type	Liquid cooling
	Liquid Coolant Type	50% water, 50% ethylene glycol
	Fire Fighting Mode	“yy” represents the firefighting configurations of the system (yy=01, 02,03,04 or 05) 01: Explosion vent panel 02: Explosion vent panel + Sprinkler system 03: Explosion proof system 04: Explosion proof system + Sprinkler system 05: Explosion vent panel + Explosion proof system + Sprinkler system
	Charge Temperature Range(°C)	-30~55
	Discharge Temperature Range(°C)	-30~55
	Relative Humidity	0-95%RH, non-condensing
	Altitude (m)	< 4000
Auxiliary Power Parameters	Power Input Voltage (VAC)	380
	Maximum Current (A)	100
	Rated Frequency (Hz)	50/60
	Wiring Method	3P4W
DC side Parameters	Rated Capacity (Ah)	314
	Rated Energy (kWh)	417.998 x n (n=5~12)
	Rated Power (kW)	208.99 x n (n=5~12)
	Nominal voltage (VDC)	1331.2
	Upper Limit Charging Voltage (V)	1497.6
	End-of -discharge Voltage (V)	1164.8

* “x.xxx” represents the rated energy (in MWh) of the system (Where x.xxx=2.089~5.015, in step of 0.418)

“yy” represents the firefighting configurations of the system (Where yy=01, 02, 03, 04 or 05, in step of 01, see details in the table above)

2.2 Label Description

	Read the manual before installing and operating the battery system.		Keep away from flame or ignition sources.
	Must wear an ear protector.		Warning: electric shock.
	Must wear a safety helmet.		Warning: flammable materials.
	Grounding label.		Recycle label.
	Do not connect the positive and negative reversely.		The certificate label for CE.
	No access without permission.		Label for Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU).

2.3 Reference Standards

2.3.1 System Related Standards

No.	Description	Code
1	CE LVD Directive 2014/35/EU	EN 62477-1
2	UN38.3 Safe Transport Standard	UN38.3
3	CE EMC Standard	EN IEC 61000-6-2:2019 EN IEC 61000-6-4:2019

2.3.2 Battery Related Standards

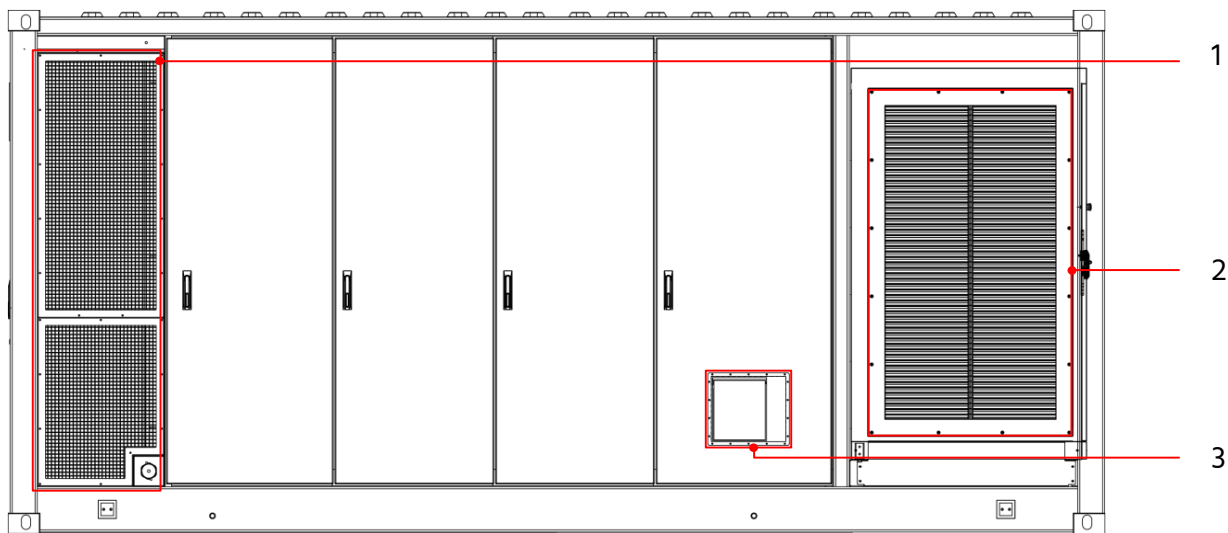
No.	Description	Code
1	Safety Standard for Secondary Lithium Batteries	IEC62619-2022 IEC63056 IEC62477-1 IEC62040-1 ISO 13849-1
2	UN38.3 Safe Transport Standard	UN38.3
3	CE EMC Standard CE EMC Directive 2014/30/EU	EN IEC 61000-6-2:2019 EN IEC 61000-6-4:2019
4	Battery Cell Safety Standard	UL1642
5	Battery Cell Safety Standard	UL1973
6	Battery Cell Safety Standard	IEC60730-1 SIL B/II
7	Safety Standard for Electrical Devices CE LVD Directive 2014/35/EU	EN 62477-1
8	Safety Standard for Lithium Battery (Germany)	VDE2510-50

3 System Components

3.1 External Design

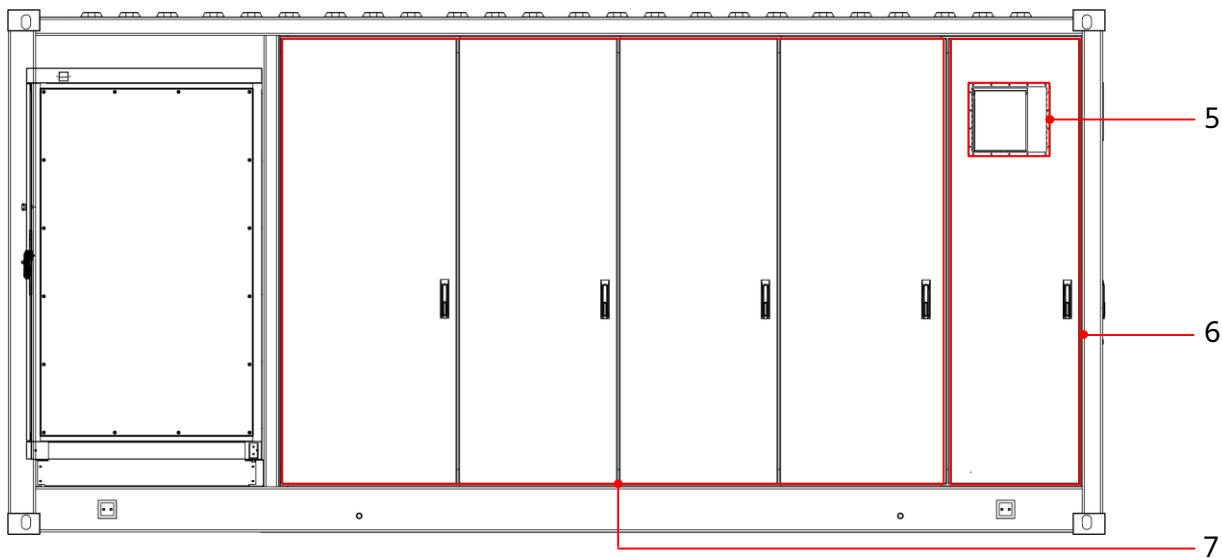
3.1.1 Outdoor Cabinet

The external and internal layouts of the container are shown in the following figures.



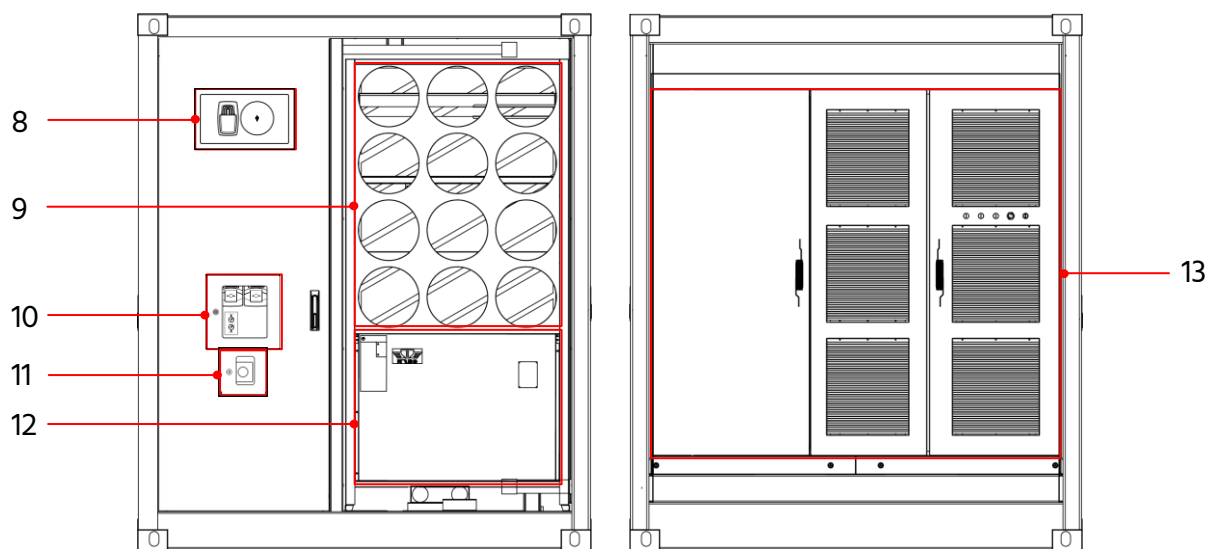
Front View

NO.	Description	NO.	Description
1	Liquid chiller air inlet	3	Ventilation window (explosion proof system)
2	Exhaust fan of PCS		



Rear View

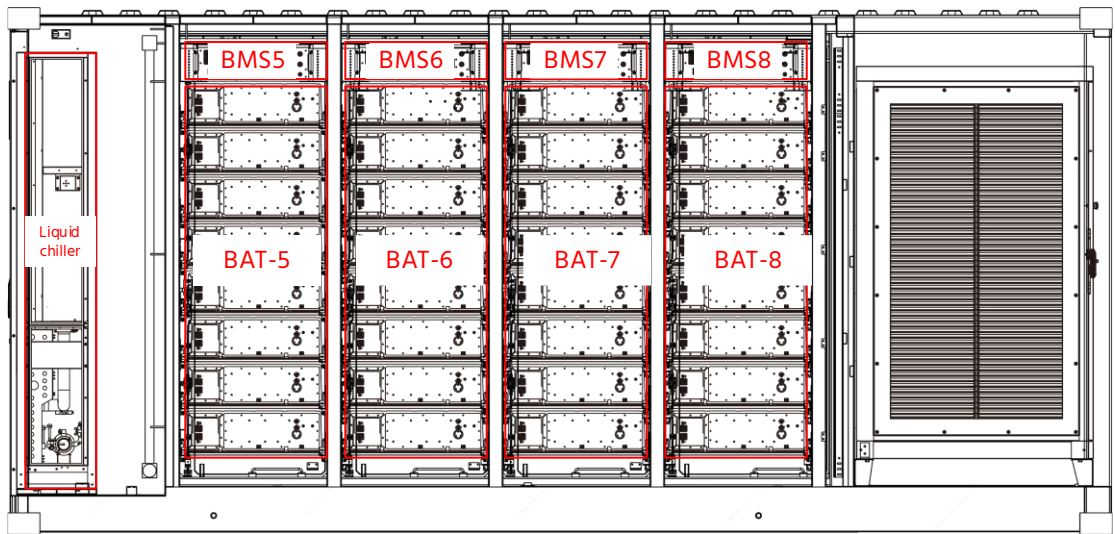
NO.	Description	NO.	Description
5	Electric ventilation louver (explosion proof system)	7	Battery cabinet door
6	Electric cabinet door		



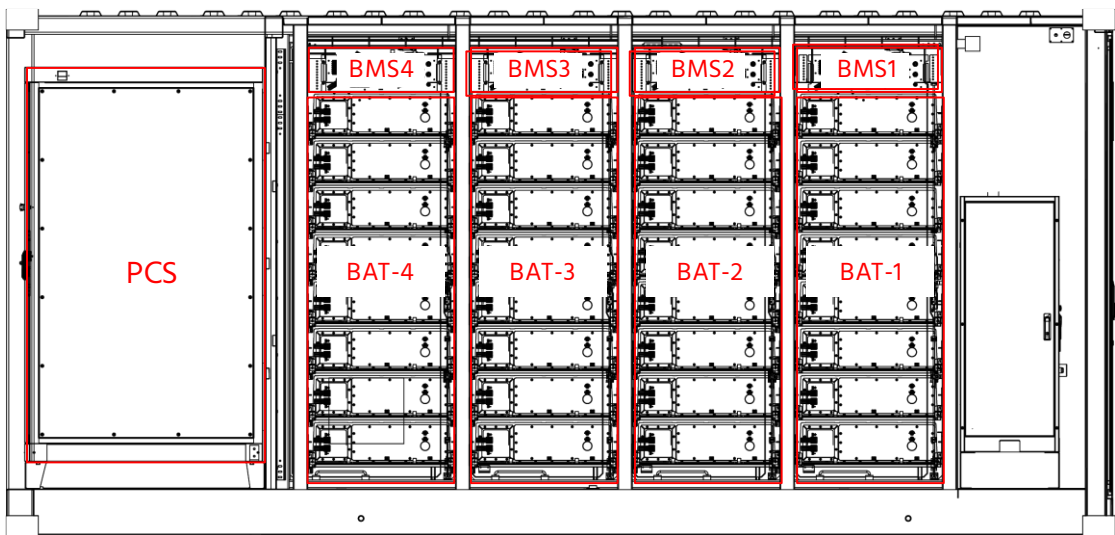
Side View

NO.	Description	NO.	Description
8	Fire audible and visual alarm	12	EPO(Emergency Power OFF Switch)
9	Liquid chiller air outlet	13	PCS door
11	Fire EPO		

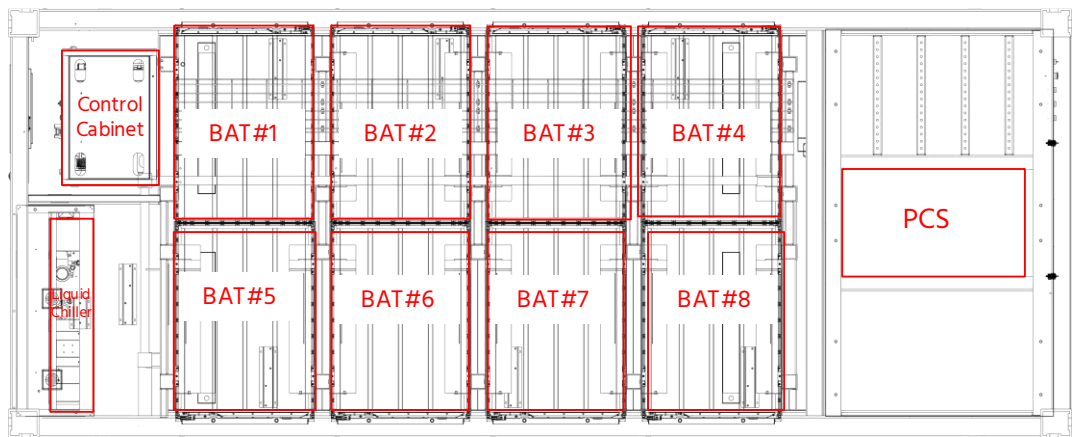
3.2 Internal Design



Front View



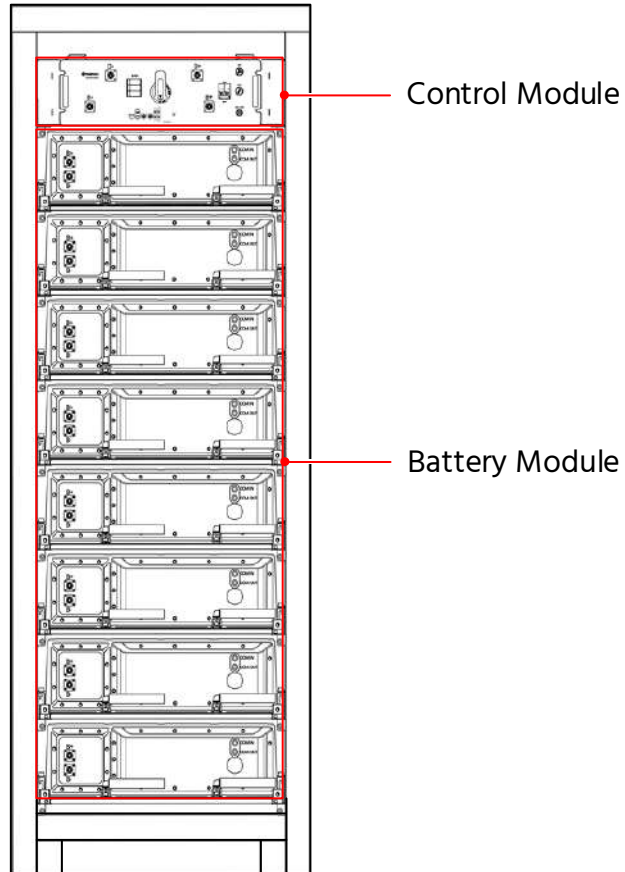
Rear View



Top View

3.2.1 Battery String

The standard battery system consists of 8 sets of 417.9 kWh battery string. And each battery string contains eight battery modules and one control module. The appearance of the single battery string is shown as follows.

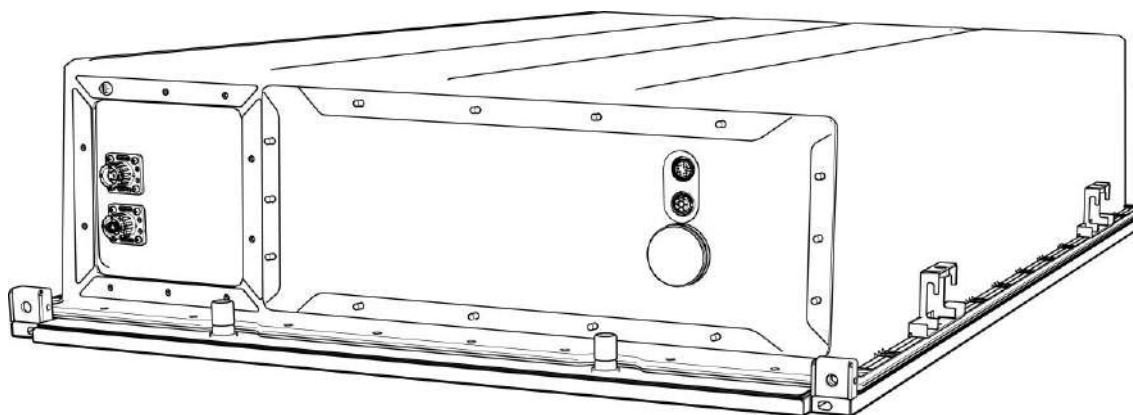


3.2.1.1 Single Battery System String Specifications

Specifications	PowerCube-M7A
System Voltage (VDC)	< 1500
Battery Module Type	HM7A200L
Control Module Type	S1500M7A200E
Rated Capacity (Ah)	314
Total Storage Energy (kWh)	417.9
Nominal Voltage (VDC)	1331.2
Charge Upper Limit Voltage	1497
Discharge Cutoff Voltage	1165
Nominal Current (Amps)	157
Maximum Continuous Current (Amps)	188
Peak Current (Amps)	250@15 seconds
Communication type	CANBUS & Modbus RTU & Modbus TCP/IP
Charge Temperature Range (°C) *	2~55
Discharge Temperature Range (°C) *	-28~58
Humidity (%)	5 – 95 (without condensing)
Round-trip efficiency (%)	95
Depth of Discharge (%)	95
Operation Life (year)	10+
Cooling type	Liquid cooling
Altitude [m]	< 4,000

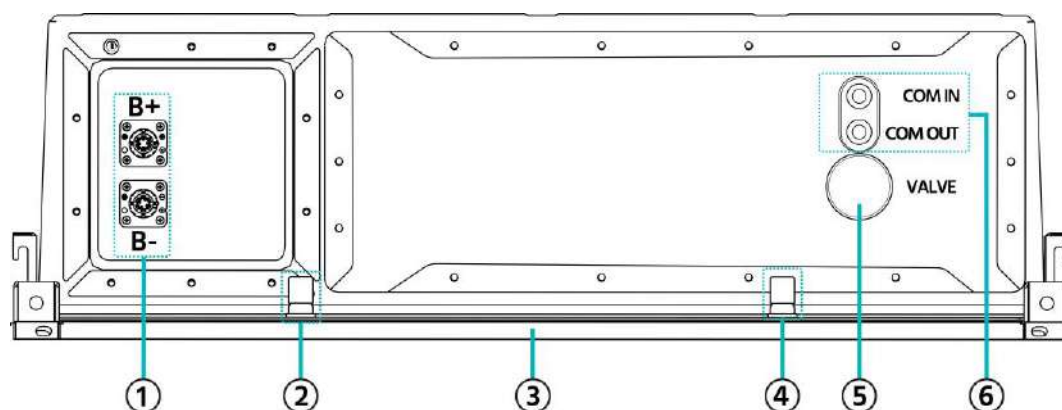
3.2.1.2 Battery Module

The appearance and the specifications of the battery module are shown as follows.



Specifications	HM7A200L
Cell Technology	Li-ion (LFP)
Battery Module Capacity (kWh)	52.25
Battery Module Voltage (VDC)	166.4
Battery Module Capacity (AH)	314
Dimension (W*D*H, mm)	790 ±5 (W) x 1145±5 (D) × 245±5 (H)
Protection Class	IP67
Weight (kg)	336±5
Charge Temperature Range (°C)	2~55
Discharge Temperature Range (°C)	-28~58
Storage Temperature (°C)	-30~60
Transportation Certificate	UN38.3

Front Interface of the battery module



Item	Description	Item	Description
①	Power Terminal B+/B-	④	Liquid Outlet Connector
②	Liquid Inlet Connector	⑤	Pressure Relief Valve
③	Liquid Cooling Plate	⑥	Communication Port (COM IN/ COM/ OUT)

① Power Terminal B+/B-

Positive (B+) and negative (B-) battery DC input terminals for connecting the batteries in serial.

② Liquid Inlet Connector

Connects the liquid cooling pipe for coolant in.

③ Liquid Cooling Plate

Regulates battery temperatures by the coolant flowing through the internal channels to ensure optimal battery performance, longevity and safety.

④ Liquid Outlet Connector

Connects the liquid cooling pipe for coolant out.

⑤ Pressure Relief Valve

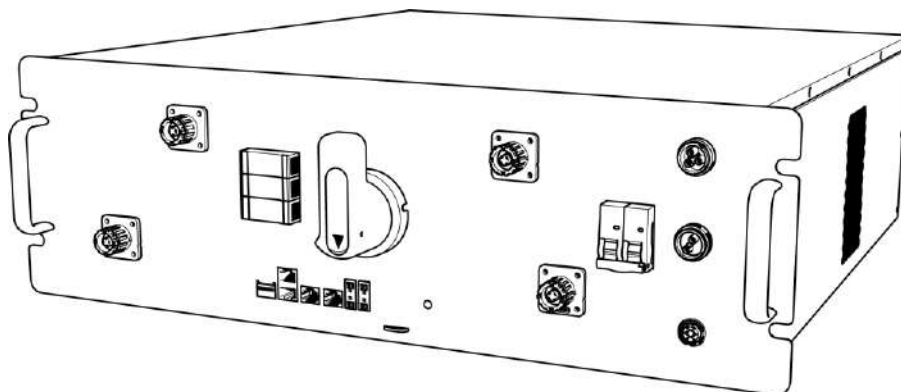
Prevents explosions caused by thermal runaway and automatically vents the internal pressure of the battery module in the event of a fire.

⑥ Communication Port (COM IN/ COM/ OUT)

Communication ports (CAN communication), between multiple serial battery modules and control module.

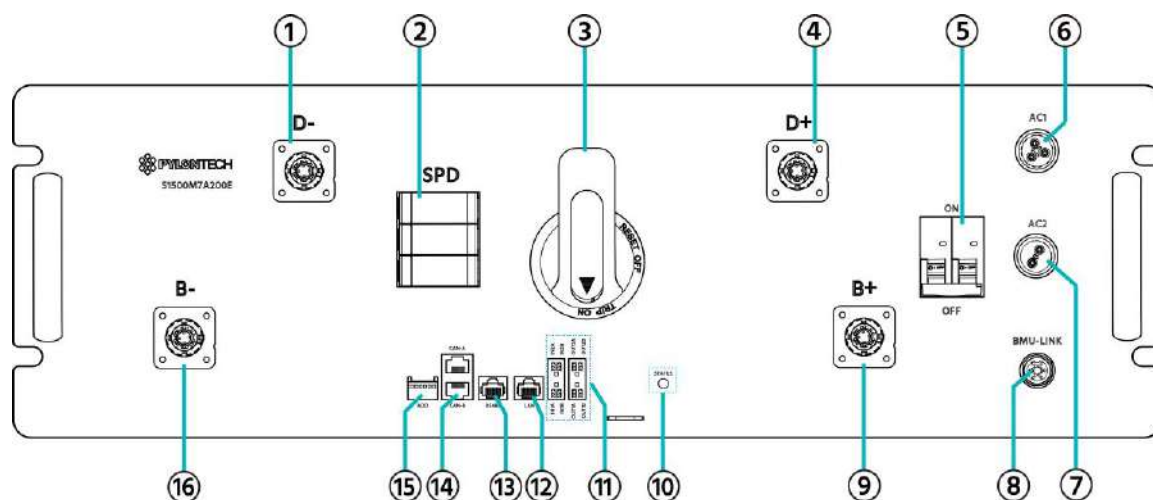
3.2.1.3 Battery Control module

Each battery string contains a battery control module. The appearance and the specification of the control module are shown as follows.



Specifications	S1500M7A200E
Related Product	PowerCube-M7A
AC Supply for BMS	230VAC/50Hz/1.3A
System Operation Voltage (VDC)	1000~1500
Dimension (mm)	600 ±5 (W) × 620±5 (D) × 200±5 (H)
Communication	RS485\CAN\LAN
Protection Class	IP20
Weight(kg)	29
Operation Life (Years)	15+

Front Interface of the battery control module



Item	Description	Item	Description
①	External Power Terminal D-	⑨	Power Terminal B+
②	SPD (Surge protection Device)	⑩	Status Indicator
③	Circuit Breaker	⑪	Dry Contact
④	External Power Terminal D+	⑫	LAN Port
⑤	Mirco Circuit Breaker	⑬	RS485 Port
⑥	AC Socket (AC1)	⑭	CAN-A, CAN-B Ports
⑦	AC Socket (AC2)	⑮	ADD Switch
⑧	BMU-LINK (Internal communication Port)	⑯	Power Terminal B-

① & ④ External Power Terminal (D-/D+)

External DC connection for the battery system to the DC copper bars in the communication and confluence cabinet.

② Surge protection Device (SPD)

Protection against indirect and direct lightning effects or other transient overvoltage surges.

③ Circuit Breaker

On/Off switch for the control module, and carries out shunt tripping function when system is overcurrent or short circuit.

⑤ Mirco Circuit Breaker

Circuit breaker for AC power supply of AC1 and AC2.

⑥ AC Socket (AC1)

Connects to external AC power supply for BMS (battery control module).

⑦ AC Socket (AC2)

Connects to external AC power supply for shunt trip.

⑧ BMU-LINK

Communication port to connect the battery module.

⑨& ⑩ Power Terminal B+/B-

Power terminal to connect the battery module.

⑩ Status Indicator

Indicates the status of the battery string (Normal , Abnormal .

⑪ Dry Contact

(Dry Contact Terminals): provide 2 input and 2 output dry contact signals.

Dry Contact Definitions

In/Out	Function	Open and close state
In1	Reserved	Normal close.
In2	Emergency stop	Normal close, power relay opened when signal received.
Out1	Stop charging	Normal close, when suggested charge current is "0", it shall open.
Out2	Stop discharging	Normal close, when suggested discharge current is "0", it shall open.

⑫ LAN Port

RJ45 port, follows Modbus TCP/IP protocol, used for communication between battery string and LEMS, switch or upper controller.

⑬ RS485 Port

Console Communication Terminal: (RJ45 port), for manufacturer or professional engineer to debug or service.

⑭ CAN A, CAN B Ports

RJ45 Port, follows CAN protocol, for communication between the battery system and the PCS (provided by the customer).

CAN A connects to another BMS.

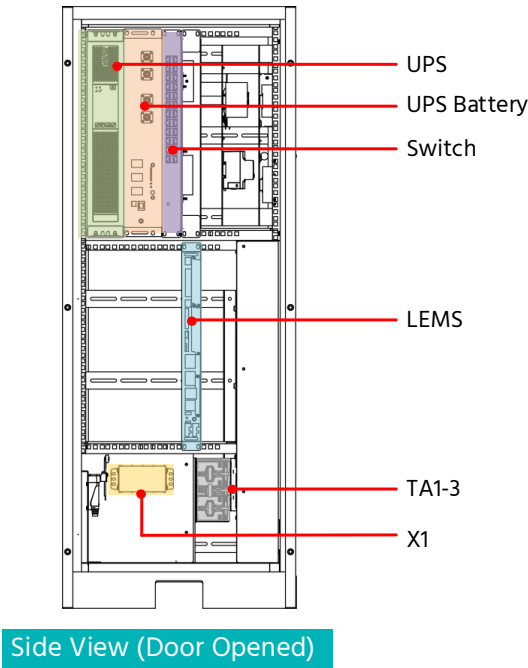
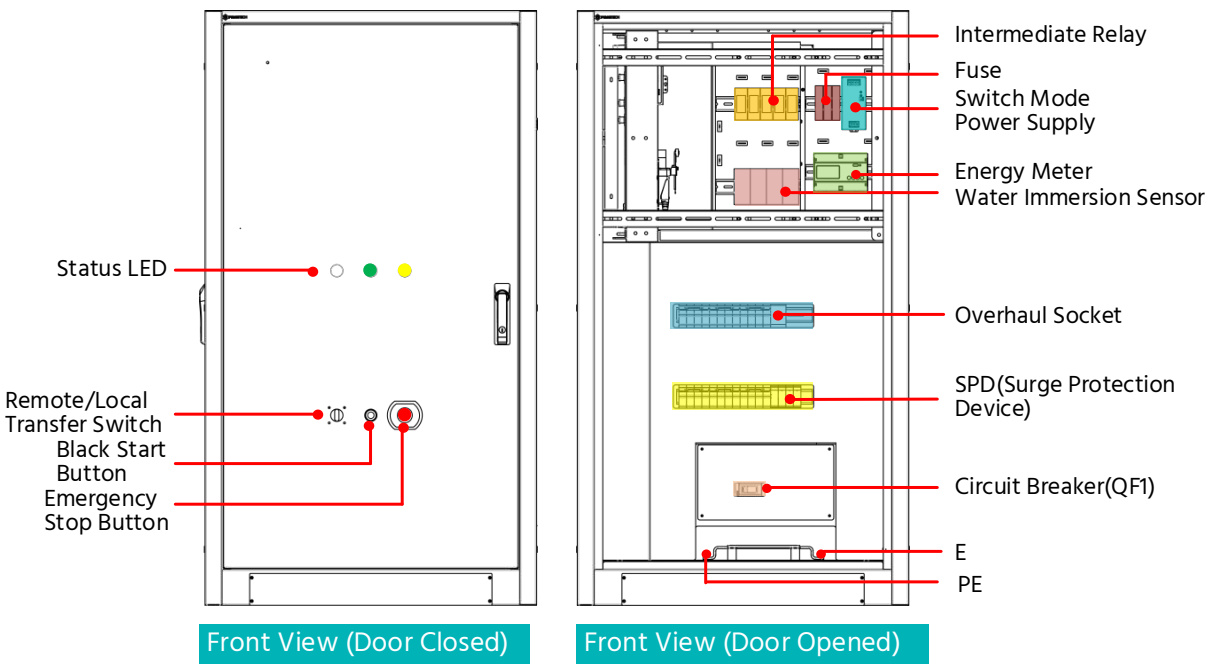
CAN B connects to PCS.

⑮ ADD Switch

6-bit dial switches to manually distribute the communication addresses of the battery system. The lower position is OFF, means "0". The upper position is ON, means "1". 1st bit to 5th bit are for address, and the 6th bit dial switch supports a 120Ω resistance.

3.2.2 Integrated Communication Cabinet

The internal layout of the integrated communication cabinet is shown in the following figure.



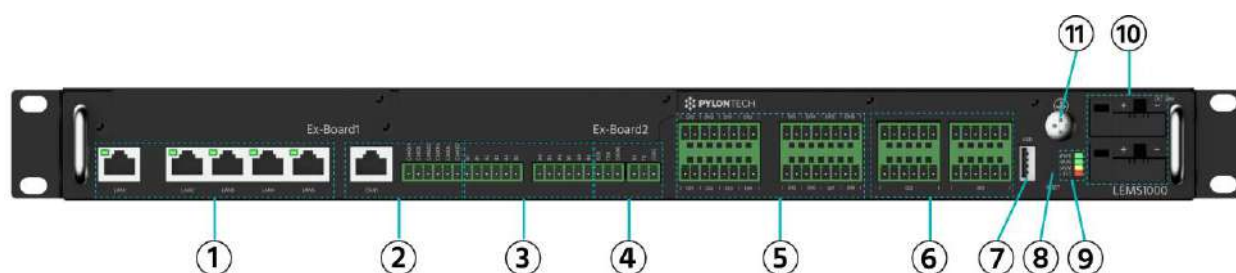
3.2.2.1 LEMS

The energy storage battery container adopts a local energy management system device LEMS 1000 for communication. It can communicate upwards with devices such as EMS, upper controller, touch screen, etc. It can also communicate downwards with devices such as battery control module, PCS, fire suppression control panel, power meter, UPS, thermal management device, sensors, etc.



Item	Specification
Operating voltage range (VDC)	9~36
Communication interface	LAN/CAN/RS485/RS232/USB
System Consumption (W)	12
Dimensions (mm)	482.6 (W) x 246.5 (D) x 44 (H)
Protection degree	IP20
Pollution degree	PD2
Protection Class	Class III
Weight (kg)	4.0
Working temperature (°C)	-40~85
Storage temperature (°C)	-40~85
LAN (maximum 10 Sockets)	Speed:100/1000Mbps
CAN (maximum 3 groups)	Baud rate: 500K; terminal resistance: 0/120Ω
RS485 (maximum 6 groups)	Baud rate:9600/115200
RS232(maximum 2 groups)	Baud rate:115200
DI (maximum 16 connects)	Dry Digital Input
DO (maximum 8 connects)	Passive Digital Output
USB	USB 2.0
Operation Life (year)	15

Interface Panel of the LEMS



No.	Port	Silk-screen	Description and Function	
1	LAN	LAN1	An Ethernet Port (100Mbps) with default IP:192.168.10.100	Used for SCADA, EMS, Cloud Platform etc. They are backup for each other, and support IEC61850, IEC60870-5-104, and Modbus/TCP protocols.
		LAN2	An Ethernet Port (1Gbps) with default IP:192.168.11.100	
		LAN3	LAN3 and all batteries' main control boards (CMUs) are connected to the ethernet switch so they can communicate with each other by Pylon IBC Protocol.	LAN3/4/5 are switched from the chip's original 1Gbps LAN port with default IP:162.172.1.100, 192.168.3.100, and 192.168.0.100.
		LAN4	Used to connect to PCS through Modbus/TCP protocol, and the slave LEMS1000s.	
		LAN5	Used to connect to the touch screen or PCs with BatteryView Pro installed.	
2	CAN	CAN1	a RJ45 Port, pin2 is CAN1G, pin4 is CAN1H, pin5 is CAN1L.	All these three CAN ports can be connected through CAN ports to devices e.g. PCSs.
		CAN2H/ CAN2L/ CAN2G (CAN2)	CAN Port	
		CAN3H/ CAN3L/ CAN3G (CAN3)	CAN Port	

No.	Port	Silk-screen	Description and Function
3	RS485	A1B2~A6B6	All these six RS485 ports can be connected through RS485 ports to devices, e.g. air-conditions, energy meters, humidity-temperature sensors, air-cooled chiller, H2/CO concentration sensors, PCSs, dehumidifiers, etc.
4	RS232	RX6/TX6/GND6 RX/TX/232G	Two debug ports.
5	DI	DI1~16	Dry Contact, 16 Digital Inputs. Passive signal or active signal not higher than 5V. They can be used to monitor the signals such as fire-alarm, door open, UPS fault, PCS fault and etc. And every signal can be configured to any DI arbitrarily from DI1 to DI16. The default state can be configured also. Use the signals according to the specific system, referring to <i>section 2.2</i> for details of the DI signals.
6	DO	DO1~8	Dry Contact, 8 Isolated passive Digital Outputs, specification is DC 30V/2A, AC 240V/0.25A. They can be used to control the signals such as main shunt trip, LEDs, load relay, on-off grid relay and etc. And every signal can be configured to any DO arbitrarily from DO1 to DO8. Each DO port has three pins for NC, COM, NO, and can be used flexibly. Use the signals according to the specific system, referring to <i>section 2.3</i> for details of the DO signals.
7	USB	USB	USB2.0 port for device upgrade or data download using a U-disk.
8	Reset Switch Button	RESET	Press this button restart the system.
9	LED Indicators	PWR/RUN/ALM /FLT	See <i>Section 3.5.1.2</i> for detailed instructions.
10	9~36VDC input	DC 24V + -	Power supply for the device, external power supply of 9~36VDC. There are two power ports for backup.
11	Grounding Bolt		Grounding Protection

LED Indicators Instructions

LED Indicator	Silk-screen	Indication	Details
	PWR	Power LED	The green LED indicator on indicates the device itself is Powered on. ● When the device is powered on, it will flash once per two seconds (0.5Hz). ● When the device is being upgraded or data-downloading, it will flash twice per second (2Hz).
	RUN	Run LED	The green LED indicator on indicates the system is Running. ● When the device is running normally, it will be constant on. NOTE: DO NOT perform maintenance work when the system is running.
	ALM	Alarm LED	The yellow LED indicator on indicates the system is in Alarm status. ● When the LED flashes once per two seconds (0.5Hz), it indicates a minor alarm. ● When the LED is constant on, it indicates a major alarm.
	FLT	Fault LED	The red LED indicator on indicates the device is in Fault status. ● When the system has a critical issue, it will be constant on. And most power supply will be shutdown. NOTE: If this happens, the device needs check or repair prior to further work.

3.2.2.2 UPS

The electrical cabinet is equipped with an UPS to supply power for BMS, LEMS, ethernet switch, and other loads, so as to ensure that the system can still operate for a period of time in case of mains power failure.

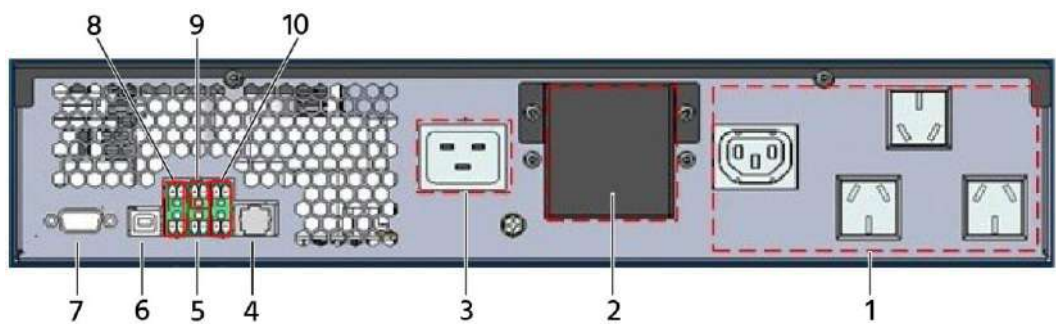
Front Panel of the UPS

As shown in the following figure, the UPS front panel provides ventilation holes, operation and display panel, LED indicators and functional keys.



NO.	Description
1	Ventilation holes
2	Functional keys
3	Operation and display panel
4	LED indicators

Rear Panel of the UPS



NO.	Description	NO.	Description
1	Output outlet	6	USB port
2	Battery module port	7	Intellislot port (DB9)
3	Input outlet	8	Output dry contact port
4	Ethernet port	9	REPO (Remote Emergency Power Off) Port
5	Battery module number detection port	10	Input dry contact port

3.2.2.3 UPS Battery (US2000C)

Before normal operation, power cables of the UPS battery (US2000C) need to be connected in the following picture, connecting the orange cable to the orange terminal, and black cable to the black terminal.



Turn on the Power switch of US2000C. Press the “SW” button of US2000C for about 3 seconds, and observe the indicator light of the UPS host. If there is mains power, the indicator light is green, indicating normal startup.

When you need to shut down the UPS, turn off the Power switch of US2000C and observe the UPS LED light. If it is off, the UPS is shut down.

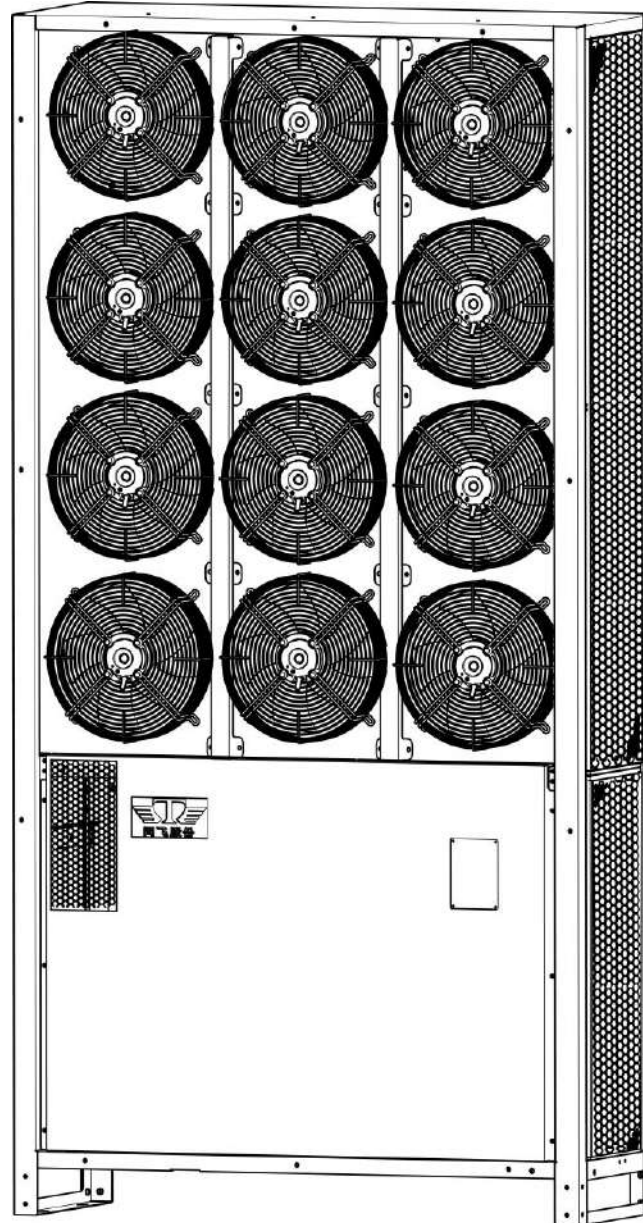


NOTE: For more detailed information of the UPS, please refer to the separate UPS manual.

3.2.3 Liquid Chiller

The system is equipped with a liquid chiller to control the temperature of the battery compartment.

The appearance of the liquid chiller is shown as below:



Specifications of the Liquid Chiller

Item	Specification
Power supply	3/N/PE AC 400V $\pm$ 10% 50/60Hz
Maximum current (kW/A)	56.4
Standby power (W)	100
Self-circulation power (kW)	4.2
Communication protocol	RS485
Cooling capacity (kW)	57 (L45°C/W20°C); 52 (L45°C/W18°C)
Cooling power/current (kW/A)	32.2/50.4 (L45°C/W20°C); 32.5/50.8 (L45°C/W18°C)
Heating capacity (kW)	24
Heating power/current (kW/A)	28.2/41.4
Working mode	Automatic control mode, cooling mode, heating mode, standby mode, self-circulation mode
Liquid setting range (°C)	15~35
Refrigerant	R410A
Condensing air volume (m³/h)	19800
Noise (dB(A))	< 85
Rated flow (L/min)	500
Rated differential pressure (kPa)	130
Max. Inlet/outlet differential pressure (kPa)	350
Liquid circuit system design pressure (Bar)	6
Inlet/outlet size	Φ 63.5 chuck
Drainage/refilling size	DN15 internal thread
Tank capacity (L)	12
Ambient temperature range (°C)	-30~55
Anticorrosion grade	C3
Applicable altitude (m)	≤ 3000
Protection degree	IP55
Painting	RAL7035 Textured finish
Dimensions (mm)	1200 (W) × 440 (D) × 2400 (H)
Weight (kg)	≤ 450
Coolant	Concentration ≤ 60% glycol solution

3.2.4 PCS (PWS1-1725KTL-H-NA/EX-O Power)

PWS1-1725KTL-H series bi-directional energy storage converter (PCS) is a conversion device between the grid and the battery, which can charge and discharge the battery. It can invert the DC power from the battery into AC power that can be connected to the grid and rectify the AC power from the grid into DC power that can be charged into the battery. Bidirectional energy storage converters can be used in on-grid mode or off-grid mode.

3.2.4.1 Appearance



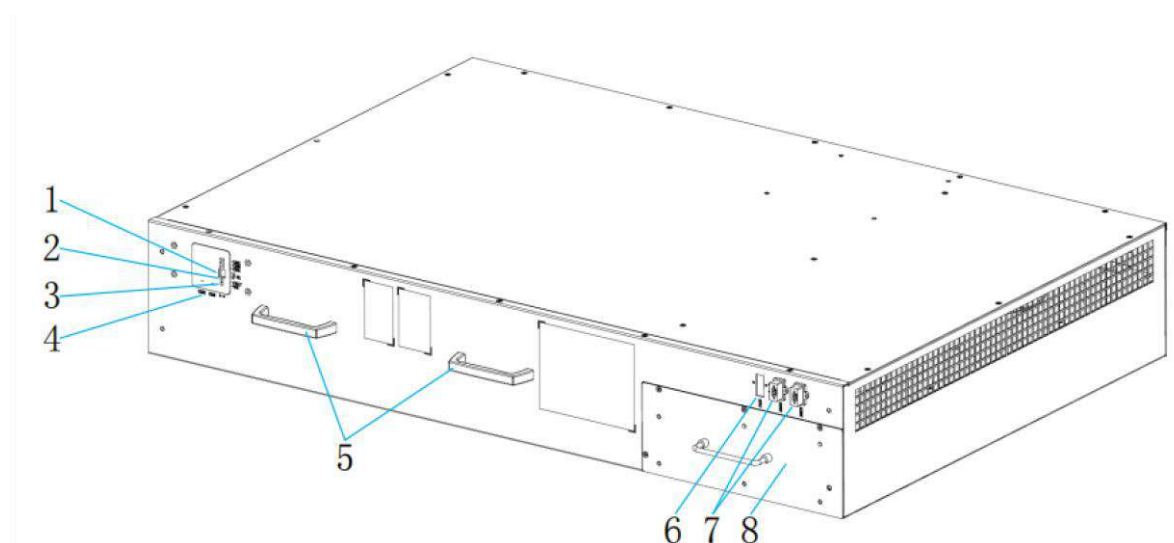
Position	Description	Instruction
A	Power indicator	Control circuit power indicator
B	RUN indicator	Always on when the converter is running normally
C	FAULT indicator	Always on when there is a fault, blinking when there is an alarm
D	Emergency stop knob	Press in case of emergency to disconnect AC and DC power immediately
E	AUX knob	Control the inverter aux power*

*The knob is used to control the auxiliary power supply to the rack.

When the AUX knob is rotated to ON, the auxiliary power supply supplies power to the control box and the control box supplies power to the power module minimum system to ensure communication of the power module. The AC/DC breakers can be controlled to close only when power is supplied to the control box.

When the DC side frame circuit breaker is closed, the control box can be powered by the power module (the control box can be powered by the frame auxiliary power supply individually or by

the module individually or both together. It is recommended that both be jointly powered.). The AUX knob should be kept in the ON position during normal operation.



LED designation	Description	Instruction
1	DIP switch	Address
2	Fault indicator light	Red
3	Normal indicator light	Green
4	Communication cable socket	
5	Handle	For pushing and pulling only, not for carrying.
6	24VDC Power supply socket	
7	220VAC Power supply socket	
8	The drawer of Fan	

3.2.4.2 Specification

Product Model	PWS1-1725KTL-H-EX/NA-O
DC Parameters	
DC voltage range	1070~1500V
Maximum DC current	1612A
Numbers of DC branches	1/8
Utility-interactive Mode	
Nominal AC power	1725kVA
AC voltage	690V(-15%~10%)
AC frequency	50Hz/60Hz(±5Hz)
Nominal AC current	1443A
Output THDi	≤3%
AC PF	-1~+1
Stand-alone Mode	

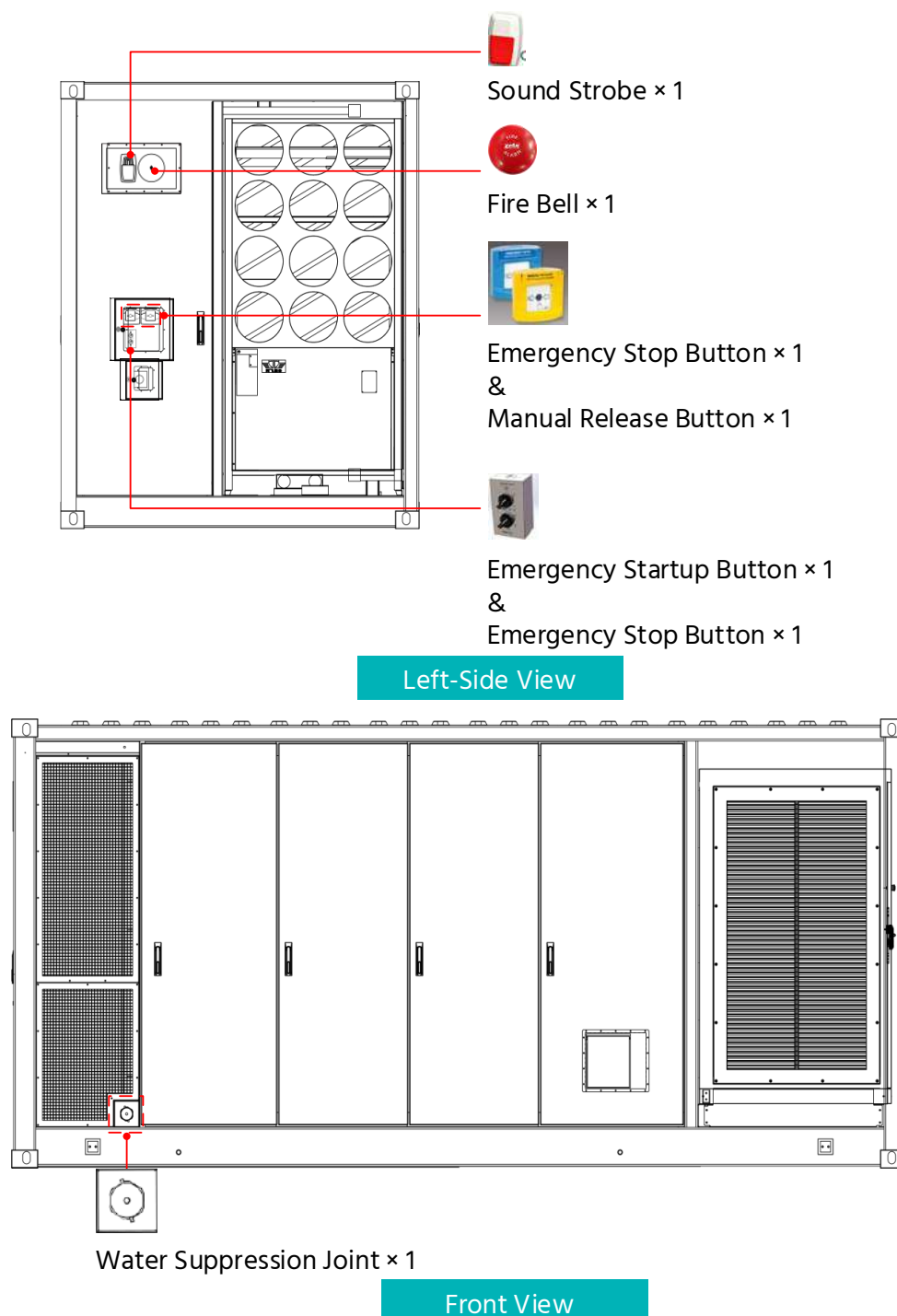
AC voltage	690V(-15%~10%)
AC frequency	50Hz/60Hz(±5Hz)
Output THDu	≤2% (Linear load)
System parameters	
Peak efficiency	98.5%
AC connection	3-Phase 3-Wire
Isolation	Non-isolation
Cooling	Forced air cooling
Noise	75dB
Operating temperature	-20°C~60°C(De-rating over45°C)
Enclosure	IP54/NEMA3R
Max elevation	3000m/10000feet (> 3000m/10000feet derating)
Humidity	0~95%
Size (W×D×H)	2200*1300*2160 mm
Weight	2200kg(93kg for per power module)
Connection parameters	
Protocol	ModbusTCP/RTU、 IEC104、 IEC61850
Interface	LAN、 RS485、 CAN
BMS	Support

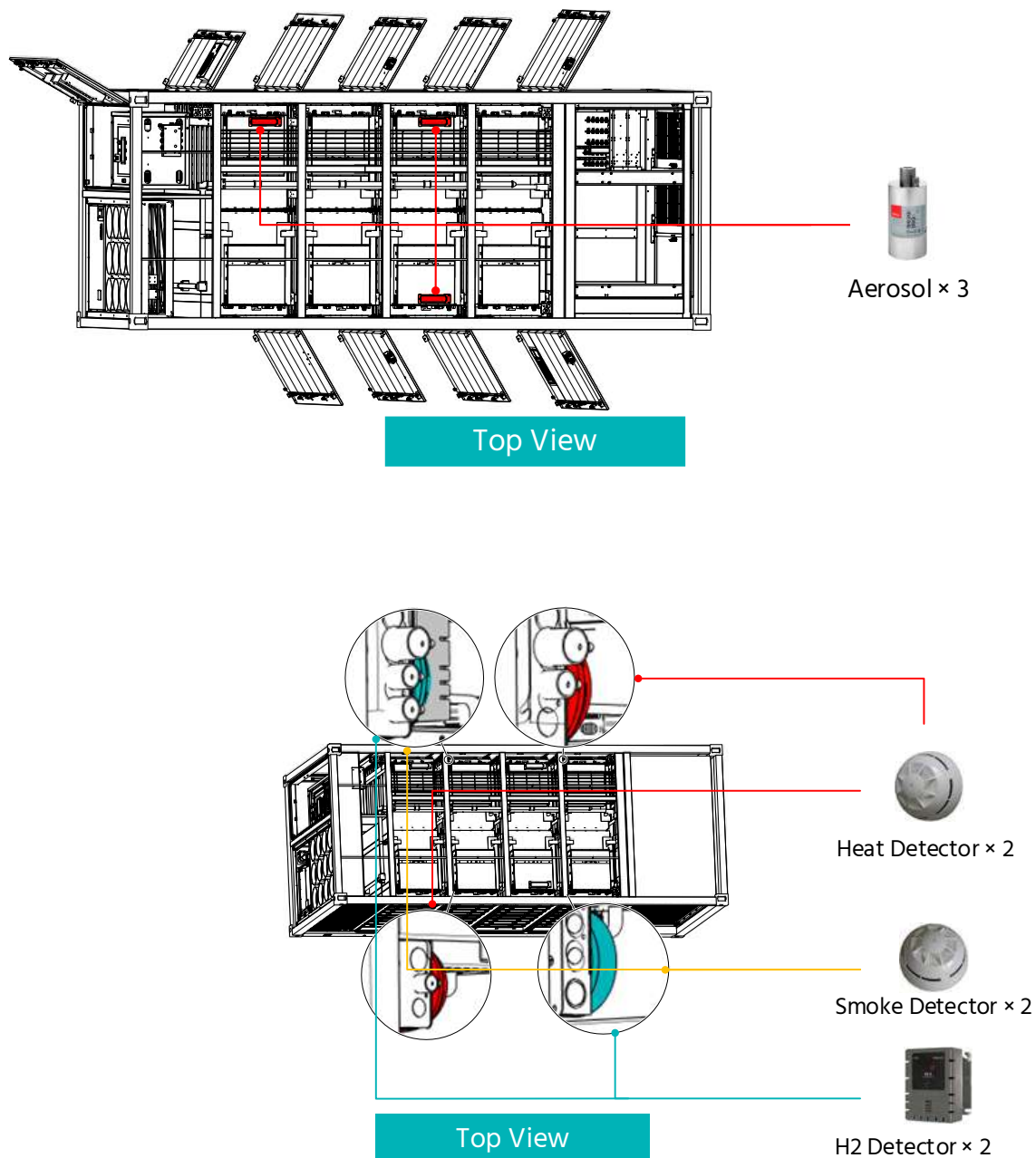
3.3 Safety Features

This system is equipped with safety features that include a fire protection system as well as explosion proof and vent systems.

3.3.1 Fire Protection System

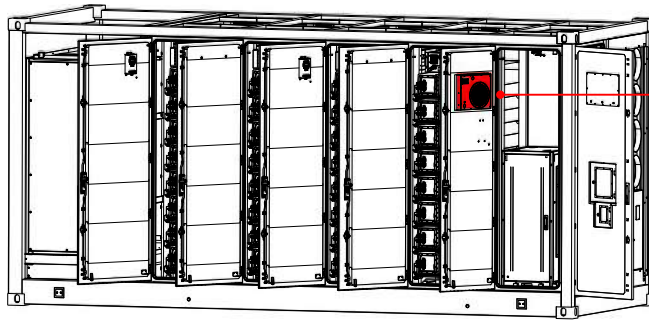
The fire protection system is mainly composed of fire alarm system and fire suppression system. The former consists of detectors, strobe sounder, fire bell, automatic extinguishing panel, etc. The latter consists of aerosol, water spray system, etc. Please see the following for details.



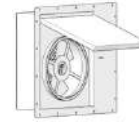


3.3.2 Explosion proof and vent systems

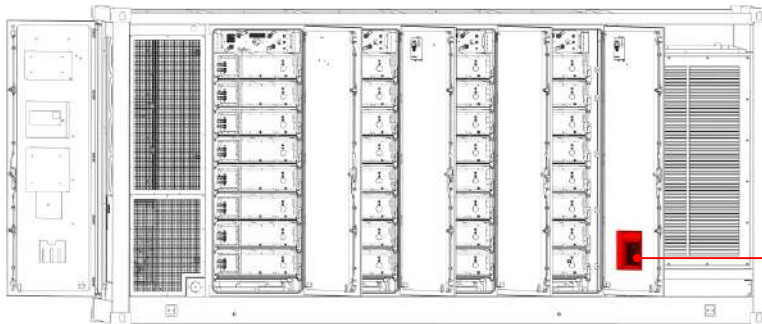
The system is equipped with explosion proof and vent systems to ensure safety. Please see the following for details.



Rear View



Exhaust Fan × 1



Front View



Electric Ventilation Louver × 1

4 Installation

4.1 Checking Before the Installation

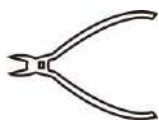
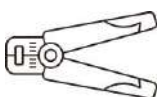
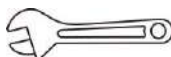
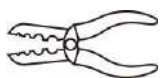
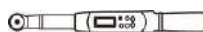
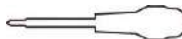
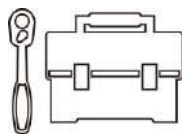
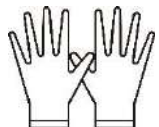
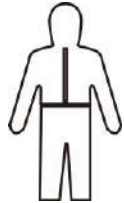
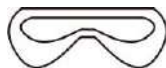
Checking the Outer Packing

After receiving the product, check the outer packing for damage, such as holes, cracks, deformation and so on. If any damage is found, contact us as soon as possible.

Checking Deliverables

After unpacking the product, check that the deliverables are complete. If any item is missing or damaged, contact us as soon as possible.

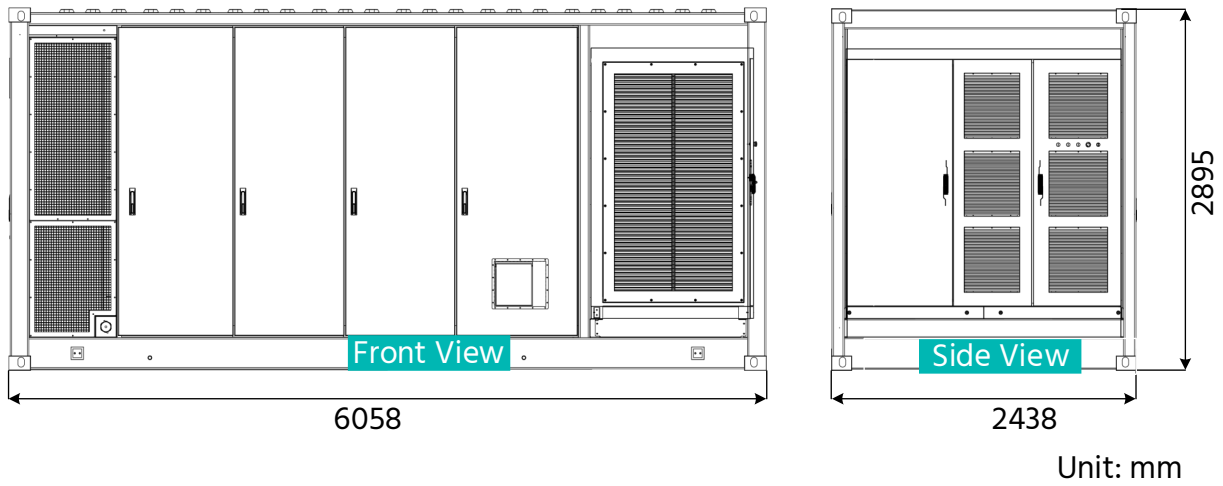
4.2 Preparing tools and instruments

Tools					
					
Wire Cutter	Crimping Modular Plier	Adjustable Wrench	Wire Stripper	Torque Wrench	Screwdriver
					
Cable Tie	Socket Wrench set	Electric Drill	1000VDC Multimeter	Electric Screwdriver	
PPE (Personal protective equipment)					
					
Insulating Gloves	Anti-arc Flash Suit	Safety Shoes	Ear Protector	Safety Goggles	Anti-static Bracelets

 **NOTE:** Use properly insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, cover the entire exposed metal surfaces with available insulated alternatives, except their tips, with electrical tape.

4.3 Overall Dimensions

The external dimensions (W × H × D) of the storage system are 6058 (-6, 0) mm × 2895 (-5,0) mm × 2438 (-5, 0) mm.



4.4 Installation Environment Requirements

4.4.1 Installation Site Selection

- Ensure that the BESS is installed away from residential areas to avoid noise.
- Ensure that the installation site is away from high salt and high corrosion environment.
- Keep away from heat, flammable, explosive and corrosive materials. Keep away from harmful gas concentration areas.
- Ensure that the environment around the installation site is dry and well-ventilated.
- Ensure that there are no trees around the installation location to prevent high winds from knocking down branches or leaves and blocking the doors or air intakes of the BESS.

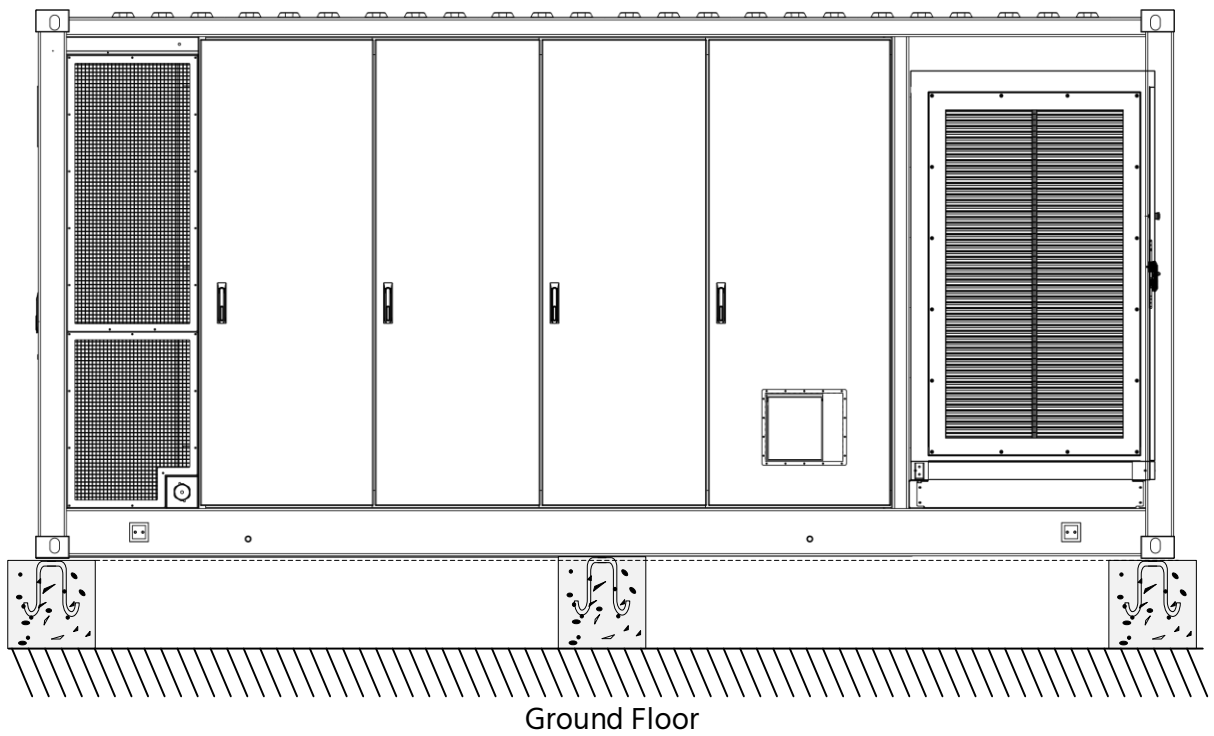
4.4.2 Foundation Requirements



BESS is heavy, and all conditions of the installation site (mainly geological conditions and environmental climate conditions) should be examined before building the foundation.

The installation foundation needs to meet the following requirements:

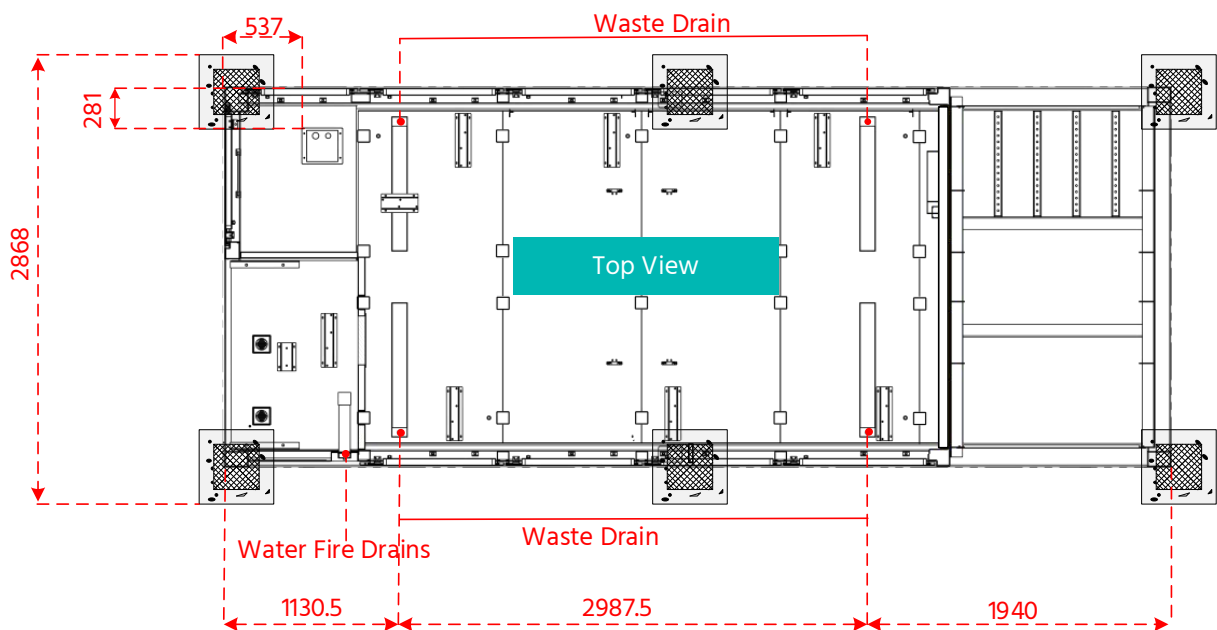
- It is recommended that the relative density of the soil in the installation site be at least 98%. If the soil is loose, take measures to ensure that the foundation is stable.
- The installation foundation should be able to bear the total weight of the whole container system (approx. 42 tons). And the foundation should be flat, firm, safe and reliable.
- The foundation shall be made according to the drawings provided by Pylontech. The surface tolerance of the foundation shall be $\pm 5\text{mm}$.
- Cable routing should be considered when building the foundation.
- Drainage measures should be built according to local geological conditions.

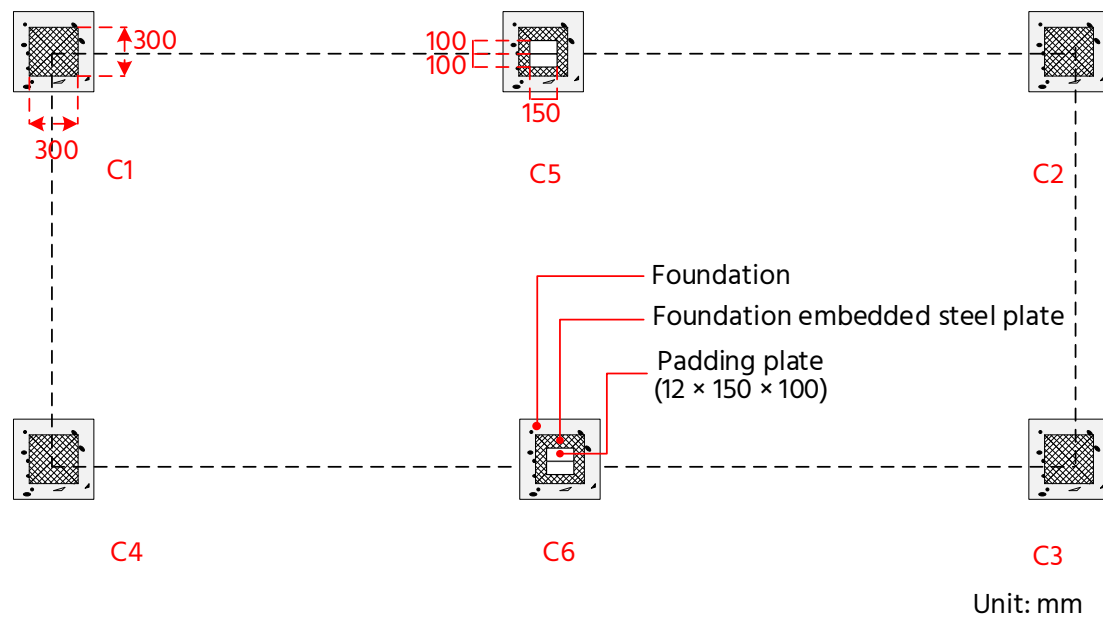


 Foundation

NOTE

The foundation height is determined by the customer, and the center foundation must be 12mm higher than the foundations in both sides.





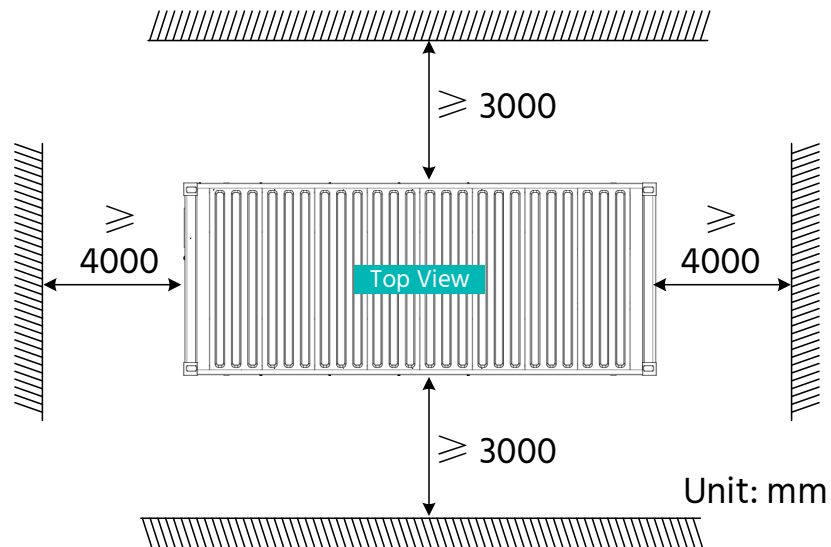
NOTE

- The surface of the padding plates is sprayed with a zinc-rich primer of 30um thickness.
- For more detailed foundation requirements, see the drawings provided by Pylontech or contact Pylontech.

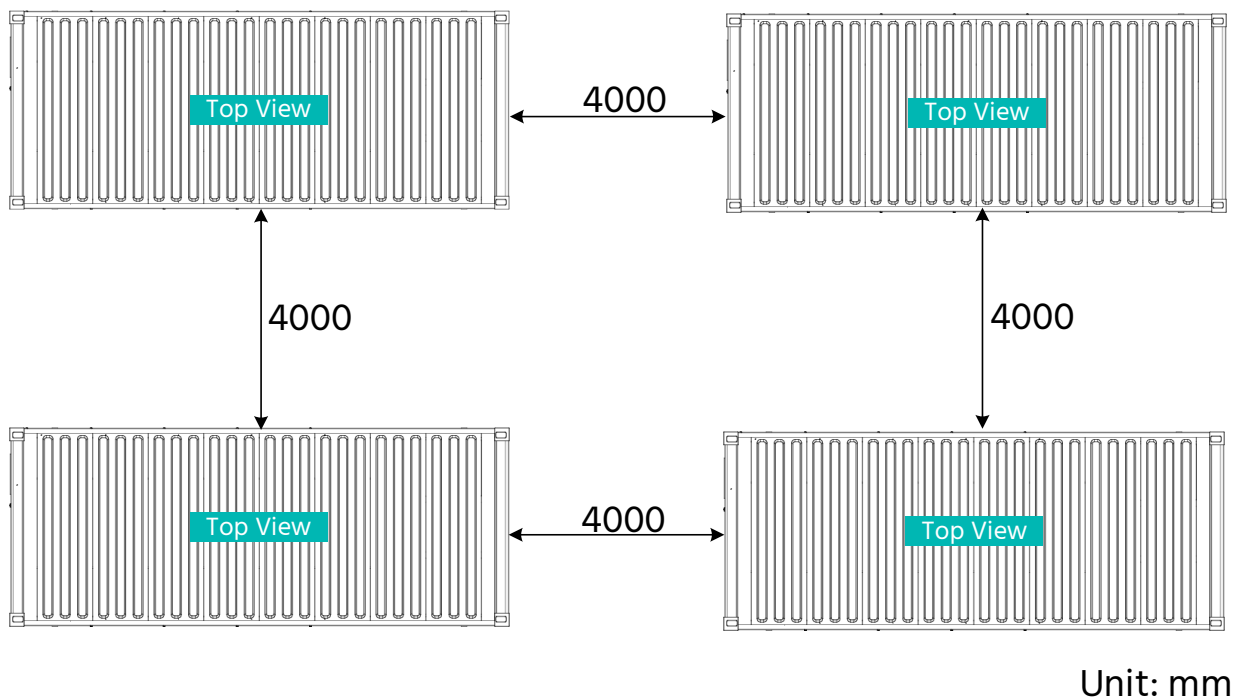
4.4.3 Installation Clearances

It is recommended to reserve sufficient space around the container to meet heat dissipation and maintenance requirement.

- The installation space for a single BESS is shown below (recommended spacing).

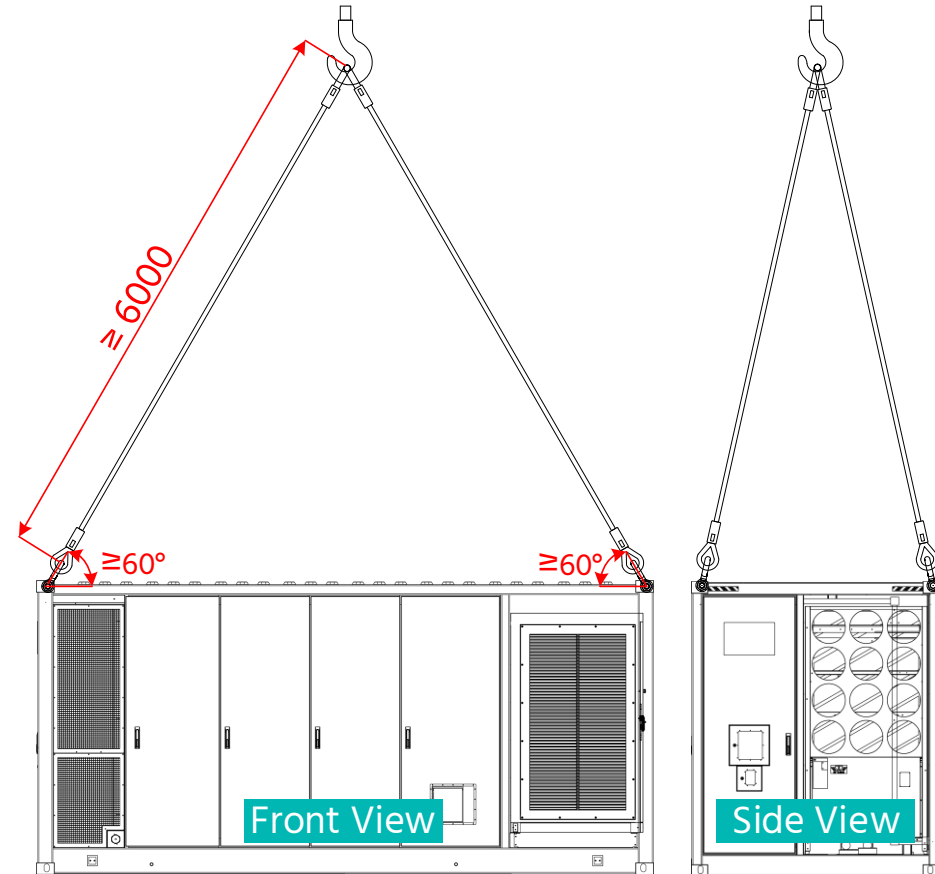


- The installation space for multiple BESS is shown below (recommended spacing).



4.5 Hoisting

There are four lifting points on the top four corners of the container. Please use cranes bearing weight more than 30.5 tons for lifting the container.



Unit: mm

DANGER

There is danger during hoisting, please follow the requirements below.

- During the whole process of lifting the equipment, all safety operation standards and specifications of the country where the project is located shall be strictly observed.
- DO NOT stand within 10 meters of the operation area, especially under the lifting arm during lifting or moving, to avoid casualties.
- In case of bad weather conditions, such as heavy rain, fog, strong wind, etc., the lifting work should be stopped.
- Please refer to the lifting points and the center of gravity for hoisting.

NOTE:

- The lifting acceleration should be less than 1.4G and the duration should be less than 1.2G.
- During the hoisting operation, there should be professionals on site to command the whole

process.

- The strength of the sling used should at least meet the lifting requirements of the equipment weight.
- Ensure that all sling connections are safe and reliable.
- The length of the sling can be adjusted according to the actual requirements on site.
- Make sure that the equipment is stable and free from deflection during the whole lifting process.
- Please use the supporting spreader to lift the equipment.
- Take all necessary auxiliary measures to ensure the safe and smooth lifting of the equipment.
- The lifting weight of crane and wire rope under load shall meet the weight of this product.
- When lifting, protect the surface of the box to avoid paint scratches.

5 Electrical and Communication Wiring

DANGER

This system is a high voltage DC system, operated by qualified and authorized person only.

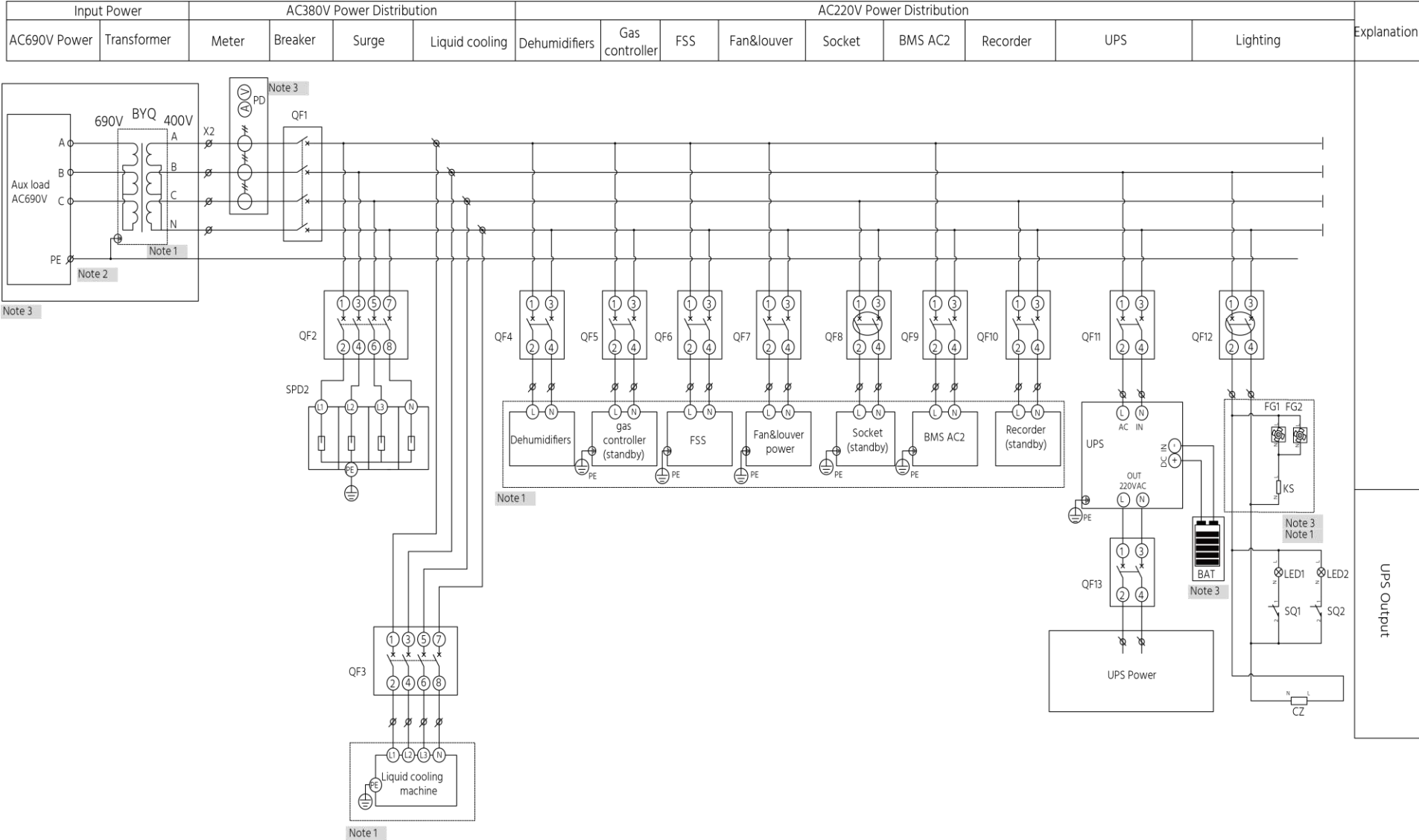
DANGER

When wiring the cables, ensure that the energy storage system DC side and AC side are all disconnected.

DANGER

Whenever operating the system, wear suitable personal protective equipment (PPE) such as rubber gloves, rubber boots and goggles.

5.1 System Diagram



 Note:

- The equipment is in the container.
- All PE cables are elicited from the PE bar in the cabinet.
- Select the product based on the engineering BOM.

5.2 Cable Requirements and Bolt Torque

- **Cable Requirements**

The wire diameter of the cables used in the outdoor cabinet must be selected in accordance with the maximum current of the AC side and DC side, and there must be a residual reservation.

Please follow the cable specifications below.

Cable	Wire Diameter Requirements	Terminal Model
Auxiliary Power cables	4x 25 mm ²	SC16-8
Ground PE-Cable	16 mm ²	SC16-8
Ground PE - galvanized flat iron	4x 50 mm	/
External Ethernet communication cable	Ultra Category 6 shielded cable	RJ45
External RS485 cable	Twisted shielded cable $\geq 1,5$ mm ²	E1510

- **Bolt Torque**

When fixing electrical cables, make sure that the cable terminals are completely tightened with the copper bars or terminal blocks to avoid heating or even fire of the cables caused by poor contact, and the following torque requirements should be met when the cables are connected:

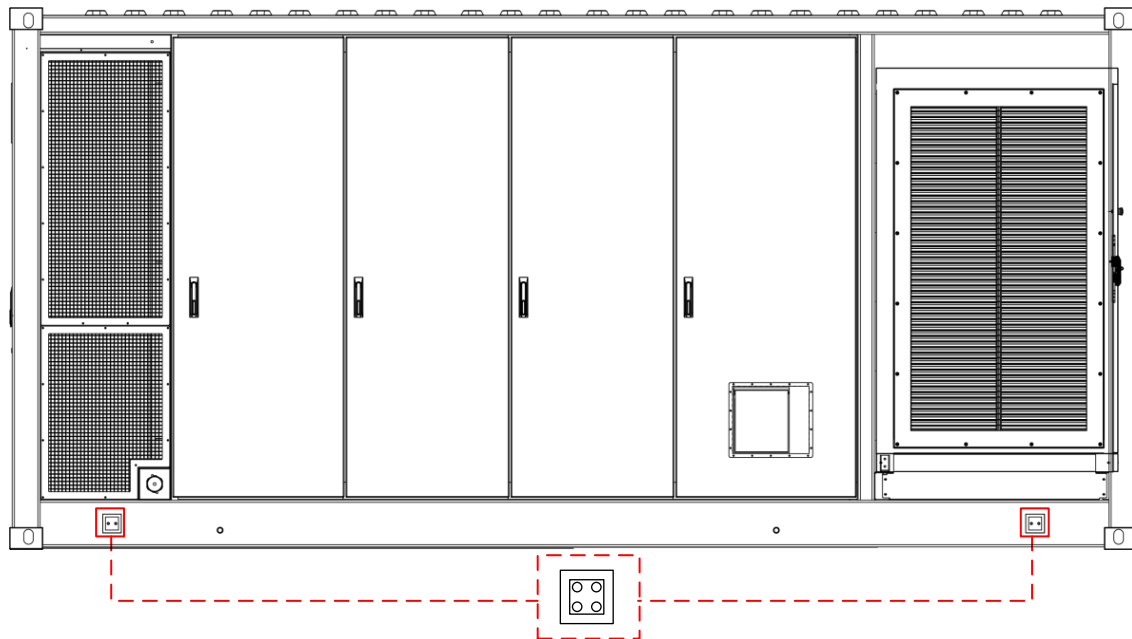
Screw Size	M3	M4	M5	M6	M8	M10	M12	M16
Torque (N•m)	0.9	2	4	7	17	35	55	119.5

5.3 Grounding

DANGER

Life-threatening electric shock may occur if the grounding is insufficient or absent. Before battery installation, make sure that the grounding points of the container are stable and reliable.

The system has four grounding points, as shown in the figure below.



- Before hoisting, the grounding grid should be laid. Connect the furthest two points for grounding connection.
- The grounding resistance is determined to be less than 4Ω and the grounding cable should be crimped.
- The grounding bar shall be solid polished copper or metal bar, with tinned or nickel plating, the grounding depth shall be ≥ 2 meters inside the earth.

5.4 DC Side Wiring

During transportation, each battery module in each string is disconnected. The cables need to be connected when they arrive at the site. Please refer to *section 5.4.1* for wiring diagram of the battery strings.

The cables from the battery control modules to the DC confluence copper bars in the communication and confluence cabinet have been installed at the factory. Please check the installation status of the cables when they arrive at the site, and use a multimeter to check the cable connection.

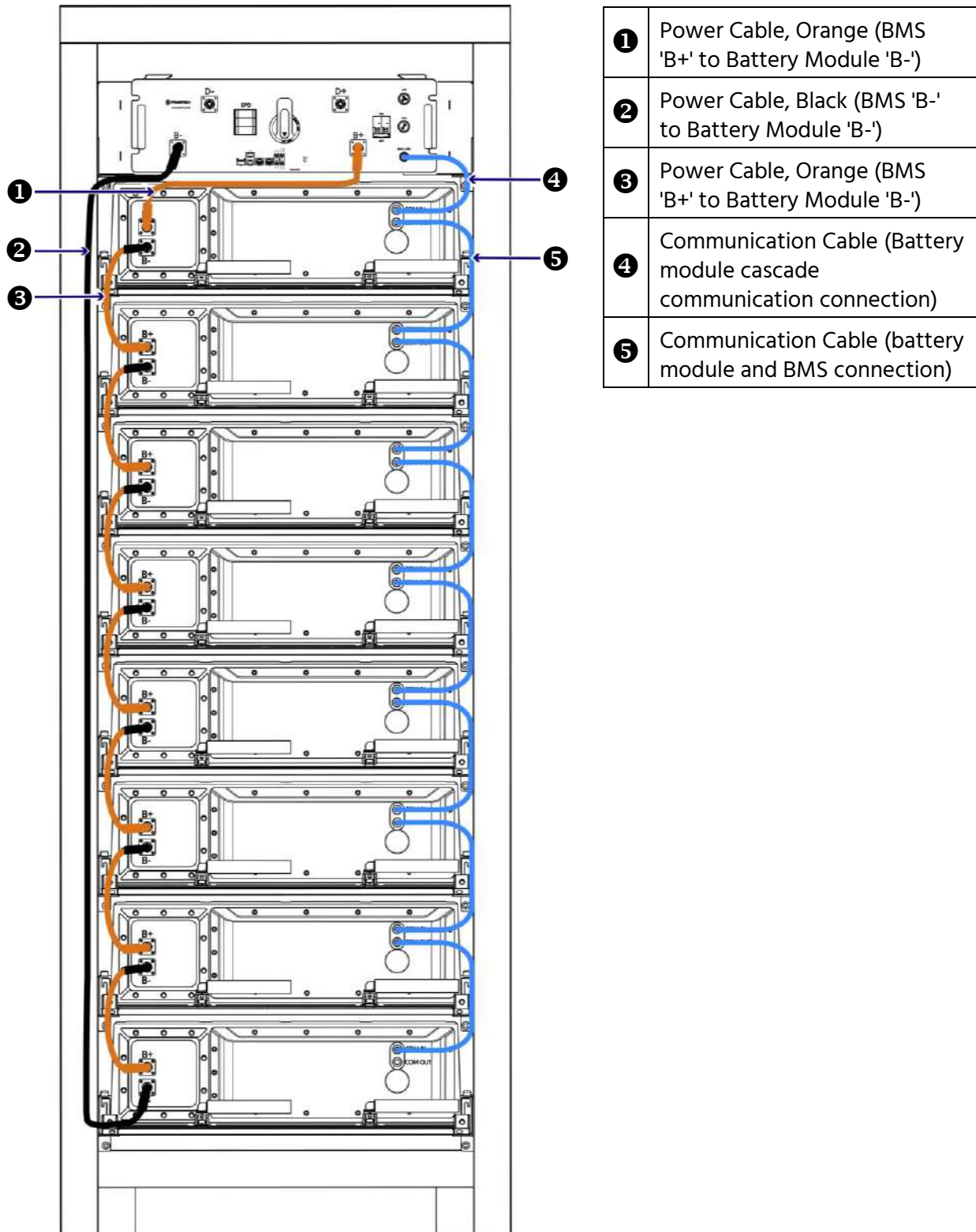


Do not connect the positive and negative reversely.

- (1) Connect the positive and negative electrodes of the battery modules in series.
- (2) Connect the internal and external communication cables of the battery string

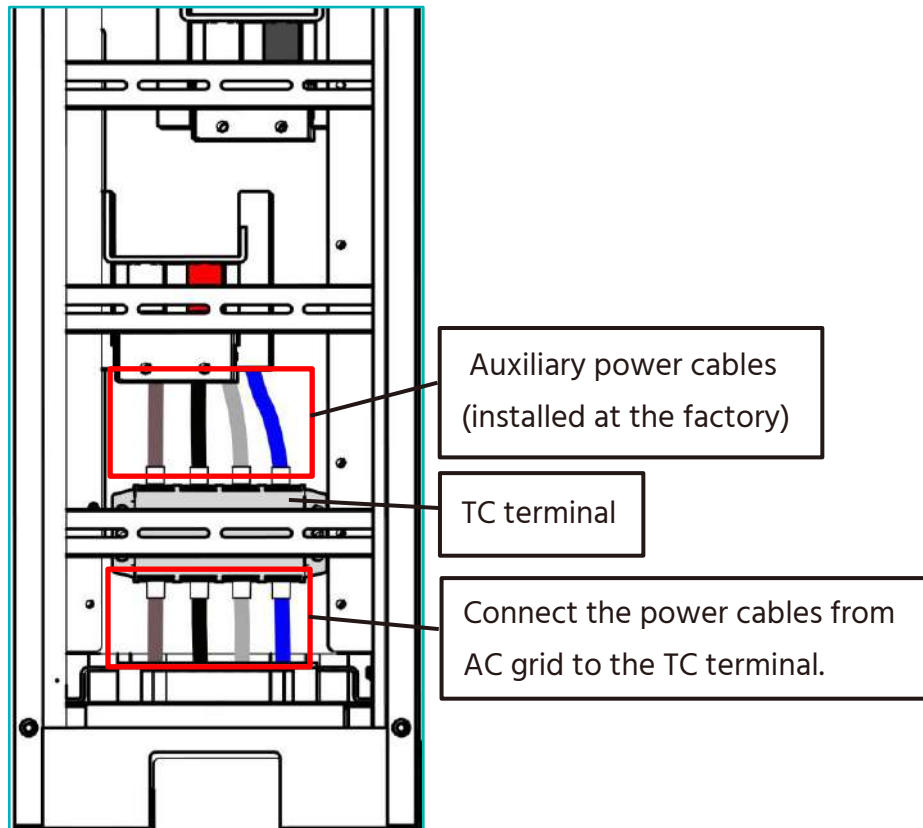
5.4.1 Wiring of Single Battery String System

There are 12 battery strings in the container. For single battery strings' system, the cable connection should be done according to the drawing below.



5.5 AC Side Wiring

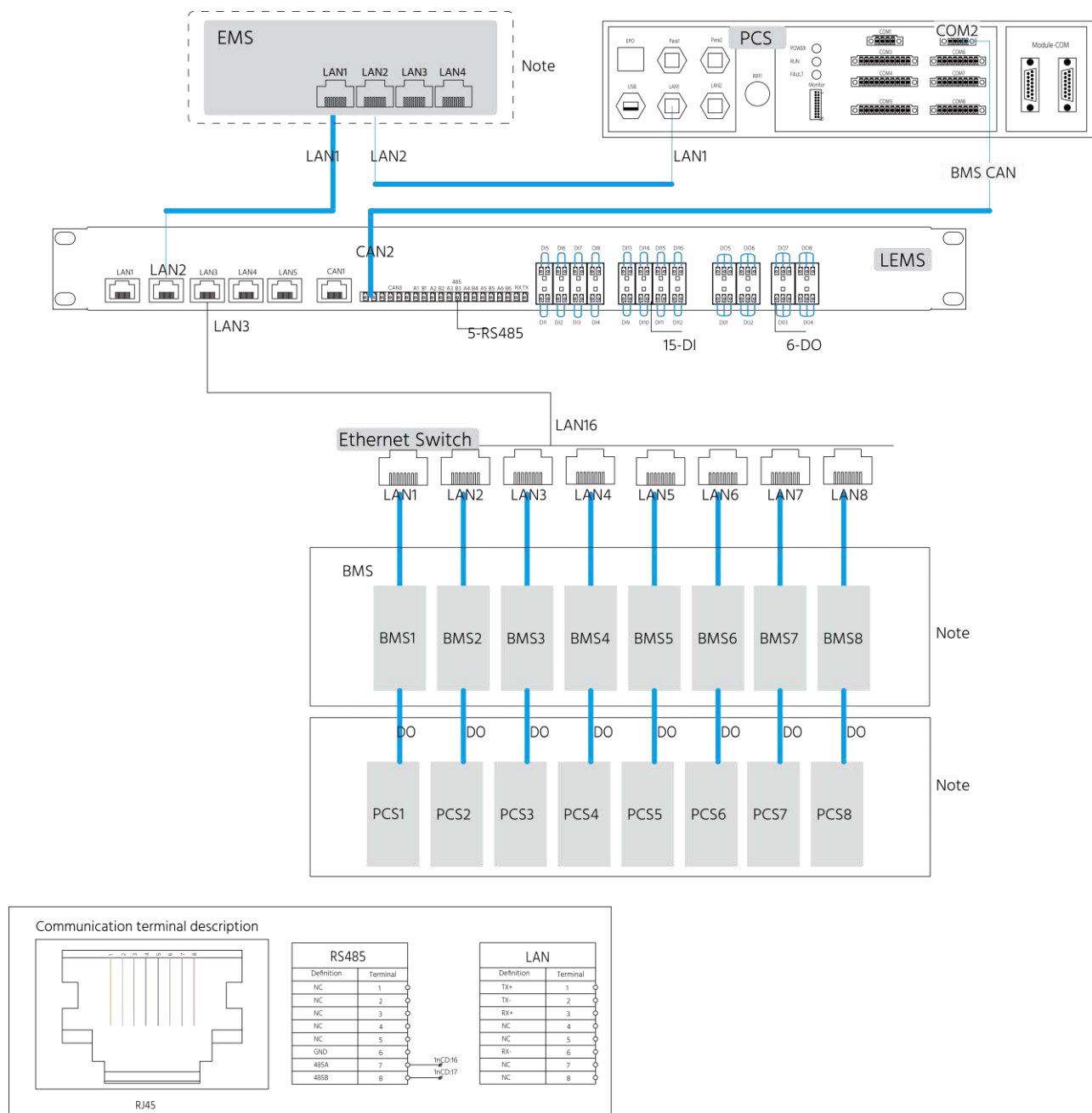
Connect the cables from the AC grid to the TC terminal in the integrated communication cabinet. According to the labeling, connect the cables of each phase sequence in turn and three opposite sequences are not allowed.



NOTE: Ensure that all connections are correct, and there is no overlap and no stress between the wires and sheet metal.

5.6 Communication Wiring

- Check the wiring according to the diagram below, and connect with CAN, 485 and dry contact of PCS during system installation.
- Check the wiring with reference to the diagram below, and connect with LAN0 and 485 with EMS during system installation.



NOTE: BMS, EMS and PCS are not included in the system.

6 Commissioning

6.1 Fire Protection System Prerequisites

WARNING

Before system commissioning, ensure to set the Automatic extinguishing panel (on the inner side of the door) to Manual mode for safety.

The operation position is shown in the following figure.



Press the extinguishant release button under the yellow cover for manually suppressing fire.

Turn this key for setting to Manual mode.

WARNING

If a fire occurs during the installation or commissioning of the system, please manually open the yellow device shown above to press the Extinguishant Release button or press the manual release button. If there is no fire, DO NOT touch the Extinguishant Release button to prevent equipment damage.

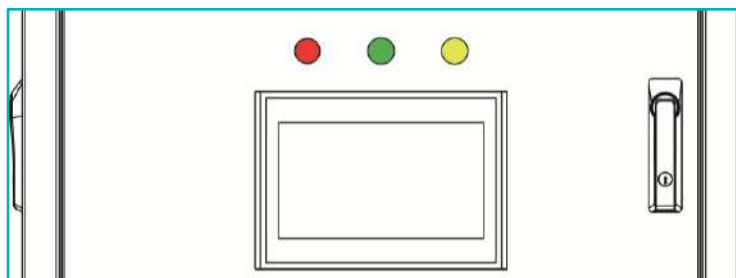


Press the extinguishant release button for manually suppressing fire.

1. Open all the doors and check all the detectors without plastic packaging.
2. Check whether all detectors are in good condition.

6.2 System Status

The container system status (Run ● , Alarm ● , Fault ●) can be viewed through the Status LED on the door of the communication and confluence cabinet.



6.2.1 Battery String Status

The battery string status can be viewed through the “STATUS” LED on the BMS of the battery string. Following are the details:

“STATUS” LED: shows the status of battery module (Normal ● , Fault ●).

Table of LED Indicators Instructions

Battery Status	Normal/ Fault	STATUS (green)	STATUS (red)	Descriptions
		●	●	
Shut Down	/	Off	Blink 1* (slow flashing)	Indicates the battery modules in the battery system are shutdown. And the BMS is still power on.
Initialization	Normal	Blink 2* (slow flashing)	Off	Indicates the battery system is initializing.
Sleep	Normal	Blink 2* (slow flashing)	Off	Indicates Sleep Mode, to save battery power.
Idle	Normal	Light	Off	Indicates Idle Mode, to save battery power.
Standby	Normal	Light	Off	Indicates Standby Mode.
Charge	Normal	Light	Off	Indicates the battery system is charging.
Discharge	Normal	Blink 2* (slow flashing)	Off	Indicates the battery system is discharging.
Fault	Fault	Off	Blink 3* (fast flashing)	Indicates the battery system has a fault.

* The LED Blink instructions:

Blink 1 - 0.3 seconds light / 3.7 seconds off.

Blink 2 - 0.5 seconds light / 0.5 seconds off.

Blink 3- 0.1 seconds light / 0.1 seconds off.

6.3 System Turning On

WARNING

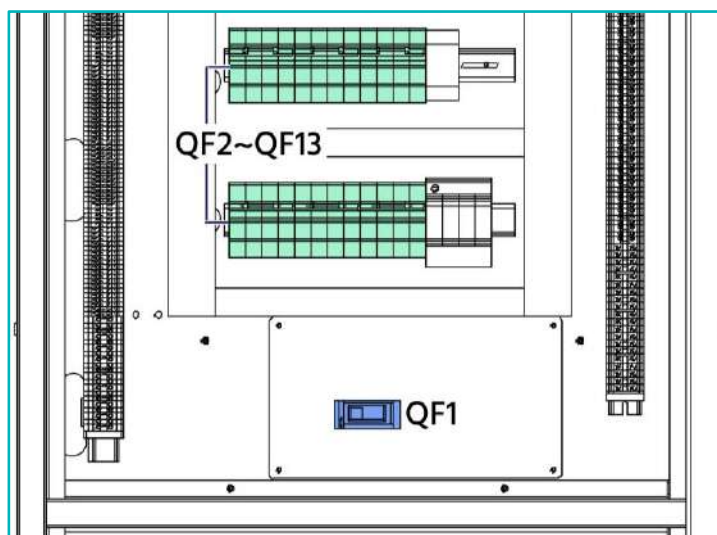
Ensure that the voltage of the inverter/PCS matches the voltage of the battery system. Check that all the power switches are OFF.

WARNING

The external switch or breaker between PCS and battery string must be off before the battery system power on.

Procedure

1. Turn on the main circuit breaker "QF1" in the cabinet.
2. Turn on circuit breaker "QF2" of SPD.
3. Turn on circuit breaker "QF3" of the liquid chiller and the liquid chiller starts up.
4. Turn on circuit breaker "QF4" of the dehumidifier and the dehumidifier starts up.
5. Turn on circuit breaker "QF5" of the gas controller.
6. Turn on circuit breaker "QF6" of the fire protection device.
7. Turn on circuit breaker "QF7" of the explosion proof system.
8. Turn on circuit breaker "QF8" of the overhaul socket.
9. Turn on circuit breaker "QF9" of the battery strings' shunt trip.
10. Turn on circuit breaker "QF10" of the recorder overhaul socket.



11. Turn on circuit breaker "QF11" of the UPS power input. Use  or  move the cursor, press the "Enter"  key to select "Yes", then the running indicator (green) flashes, and then the running indicator is solid on.

- [illegible]

-  **NOTE:** The second BMS must be operated after the first battery string's self-check succeeds, which should be done within 30 seconds.

If there is any failure during the self-check, be sure to debug the failure prior to next step.

- When the EMS (outside the container) monitors the bus voltage of the DC side of the PCS and the DC side of the battery, the PCS can be powered down. The power increases step by step, and the main circuit side starts charging and discharging.

The whole Battery Energy Storage System (BESS) should be charged to full at first before commercial operation, or after it is left unused for a long time.

- 35

7 Maintenance

DANGER

This system is a high voltage DC system, operated by qualified and authorized person only.

WARNING

Do not turn off the circuit breakers of the BMSs (battery control modules) during normal running status (unless in an emergency situation). Otherwise it will cause current surge to the rest of the battery strings. Be sure to turn off the PCS first prior to turning off the BMSs in normal running condition.

CAUTION

The UPS can be powered on if there is any equipment that needs working without power outage. Otherwise the UPS should be turned off to save its power.

CAUTION

Before changing the battery module for service, be sure to charge/discharge the new battery at the same open circuit voltage as the other ones in the battery module system. Otherwise the system needs a long time to do balance for this new battery module.

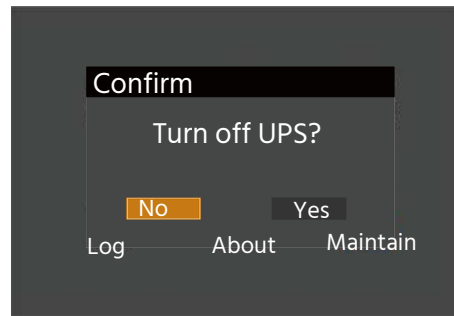
 **NOTE:** Before maintenance or long-term storage, ensure to turn the system off.

7.1 System Turning Off

Procedure

1. Disconnect the AC switch and DC switch of the PCS to ensure no current flows through the battery string. Check that PCS power decreases to 0.
2. Turn off circuit breakers QF12 and QF11 in the cabinet.
3. Turn off the UPS as following:
 - (1) Long press the power button  on the front panel of the UPS.

- (2) Click "Yes" to confirm "Turn off UPS" on the display panel. After a while, the UPS shuts down.



4. Turn off the circuit breaker QF13 of the UPS power output.
5. Turn off the circuit breaker and micro circuit breaker one after another from BMS1 to BMS12.
6. Turn off the circuit breakers QF10, QF9, QF8, QF7, QF6, QF5, QF4, QF3 QF2 and QF1 one after another in the cabinet.
7. Now the whole system is turned off.

7.2 Routine Maintenance

Due to the influence of ambient temperature, humidity, dust, vibration, etc., the internal components of the system or equipment will be aged or worn, which will lead to the potential failure of the system or equipment. Therefore, it is necessary to carry out routine and regular maintenance on the system to ensure its normal operation and service life.

WARNING

Only qualified and authorized personnel can maintain the system. During maintenance, do not leave screws, washers, tools and other metal parts inside the equipment, otherwise the equipment may be damaged.

WARNING

After the system is out of operation, you must wait at least 10 minutes before carrying out maintenance or overhaul operations on the system. After the system is shut down, pay attention to:

- Ensure that the system is not accidentally re powered on.
- Use a multi-meter or a stylus to check to ensure that the system is completely dead.
- The possible live parts adjacent to the operating part shall be covered with insulating cloth.
- During the whole process of maintenance and overhaul, it is necessary to ensure that the escape routes are completely unblocked.

 **NOTE:** Before maintenance, be sure to Set the fire protection to **Manual Only**. See *section 6.1* for details.

Routine maintenance table

The regular maintenance plan is formulated according to different equipment. Please refer to the following table and the recommended cycle for maintenance:

Project	Standard	Frequency
Battery string hardware	Whether the LED light on the main control box displays normally.	half a year
	Whether the relay inside the main control box can be disconnected normally.	half a year
	Whether the LED on the battery pack displays normally.	half a year
	Check that if there is abnormal sound or abnormal operation of the battery string fan.	half a year
Container	Check that if there are signs of aging and burning at the wiring bolts of the battery and the electric cabinet, and shake them by hand to make sure that they are in a tight state.	one year
	Check the power cable and control cable for signs of broken skin. If there are any signs, it is necessary to add corresponding insulation measures or replace cables.	one year
	Check the connector for looseness, serious rust or oxidation on the terminal surface, and good contact.	one year
	Check that if the grounding point is loose.	one year

Firefighting maintenance items and frequency

Project	Standard	Method	Frequency
Firefighting system	Fire protection system linkage testing.	Conduct fire system linkage testing.	one year
	Bleed indicator light.	Pull up pressure switch reset button.	one year
	Smoke and temperature detectors, alarm bells.	Use a fire test smoke temperature gun. If the smoke does not exceed the preset alarm value, the indicator light flashes once every 6 seconds; If the smoke exceeds the preset alarm value, stable indicator light on, fire extinguishing controller generates an alarm and triggers an alarm bell.	one year
	Audible and visual alarm.	Press the manual release button on the control panel.	one year
	UPS on the control board.	Disconnect the power input from the control panel and allow the rear battery to power the control panel.	one year

7.3 Battery Maintenance



The power must be turned off prior to any maintenance of the battery.

Voltage Inspection

Check the voltage of battery system through the monitor system. Check if the system is abnormal voltage. For example: Single cell's voltage is abnormally high or low.

SOC Inspection

Check the SOC of battery system through the monitor system. Check if the battery string is abnormal SOC.

Cable Inspection

Visual inspect all the cables of battery system. Check if the cables are broken, aging, or getting loose.

Balancing

The battery strings will become unbalanced if not fully charged for a long time. The balancing maintenance (full charged) should be done every 3 months and is usually done automatically by communication between the system and external device.

Output Relay Inspection

Under low load condition (low current), switch the output relay to OFF and ON to hear the clicking sound, which means this relay can be turned off and on normally.

History Inspection

Analyze the historical records to check if there is an accident (alarm and protection) and analyze the reasons.

Environment Inspection

Check the installation environment such as dust, water, insect etc.

7.3.1 Battery Control Module Maintenance

The replaceable internal overcurrent protective of the control modules are as follows:

Part	Manufacturer	Model	Specification
Fuse	Guangdong Eugard Co., Ltd	ESH5582	Rated Voltage: 1500VDC Rated Current (In): 4000A Rated Breaking Capacity: 250kA
Fuse (Alternative)	ADLER Elektrotechnik Leipzig GmbH	ASE3400DB3	Rated Voltage: 1500VDC Rated Current (In): 400A Rated Breaking Capacity: 250kA
SPD	CITEL	DS50PV-1500/51	DC 1500V/15KA/40KA/T2/4P
SPD Fuse	Guangdong Chnbel Co., Ltd	HV-200A (S)	DC 1500V/200A/30KA

7.3.2 Battery Module Maintenance

The replaceable internal overcurrent protective of the battery module are as follows:

Part	Manufacturer	Model	Specification
Fuse	Advanced Surgetech Materials Ltd.	A372102-400 DY	Rated Voltage: 250VDC Rated Current: 400A Rated Breaking Capacity: 50kA
Fuse (Alternative)	EUGARD CO., LTD	HEV2-400C	Rated Voltage: 250VDC Rated Current: 400A Rated Breaking Capacity: 50kA

7.4 Liquid Chiller Maintenance

Please refer to the separate *Liquid Chiller product manual* for maintenance information.

7.5 PCS Maintenance

Please refer to the separate *PCS Manual* for maintenance information.

8 Trouble Shooting

The common faults and solutions during the commissioning of the energy storage system are shown in the following sections. If the problems cannot be solved according to this manual, please contact us. We need the following to help you better.

- Machine serial number, production date and software version
- Manufacturer, model and configuration information of the equipment
- Simple fault description
- Failure site photos

8.1 System Troubleshooting

Local monitoring checks the fault trigger location, which is divided into battery string fault, fire fault and air conditioning fault.

8.2 Battery String Failure

- Use a 232 to USB device to connect to the on-site PC, and at the same time, contact the after-sales engineer of Pylontech to obtain the CRT software and install the software.
- Connect RJ45 port to the 232 debugging port of the corresponding fault master, and connect USB port to the PC end of the computer. Open the control panel to read the port number, and select the port number of the software as the corresponding serial port.
- Connect the computer to WIFI or network and install sunflower remote software, opening the Battery view debug APP.
- Contact the dispatched after-sales engineer for troubleshooting.

8.3 Fire Fighting Failure

No.	Fault	Checking method
1	Power Failure	There is no 230V AC power supply, and the system operates using backup batteries. If there is no power outage, or check the electrical fuse inside the panel.
2	Battery failure	Check if the two batteries are connected and connected together, Test the battery. Disconnect the battery and ensure that 28 volts can be measured on the battery charger lead.

No.	Fault	Checking method
3	Auxiliary 24V fault	The LED light indicates that the fuse protecting the R0V output has been activated and exceeds the rated value of the output.
4	Communication fault	Communication interruption between relay panels or accessory boards. Check all communication faults between repeaters and auxiliary boards to determine the root cause of the problem.
5	Manual release fault	Manual release switch input short circuit or open circuit. Remove the wiring and reinstall the end of the line. Check the wiring of the manual release circuit.
6	Release fault	Release switch input short circuit or open circuit. Remove the line and reinstall the end of the line. Check the wiring of the release pressure switch circuit.

If other faults occur, please contact the supplier.

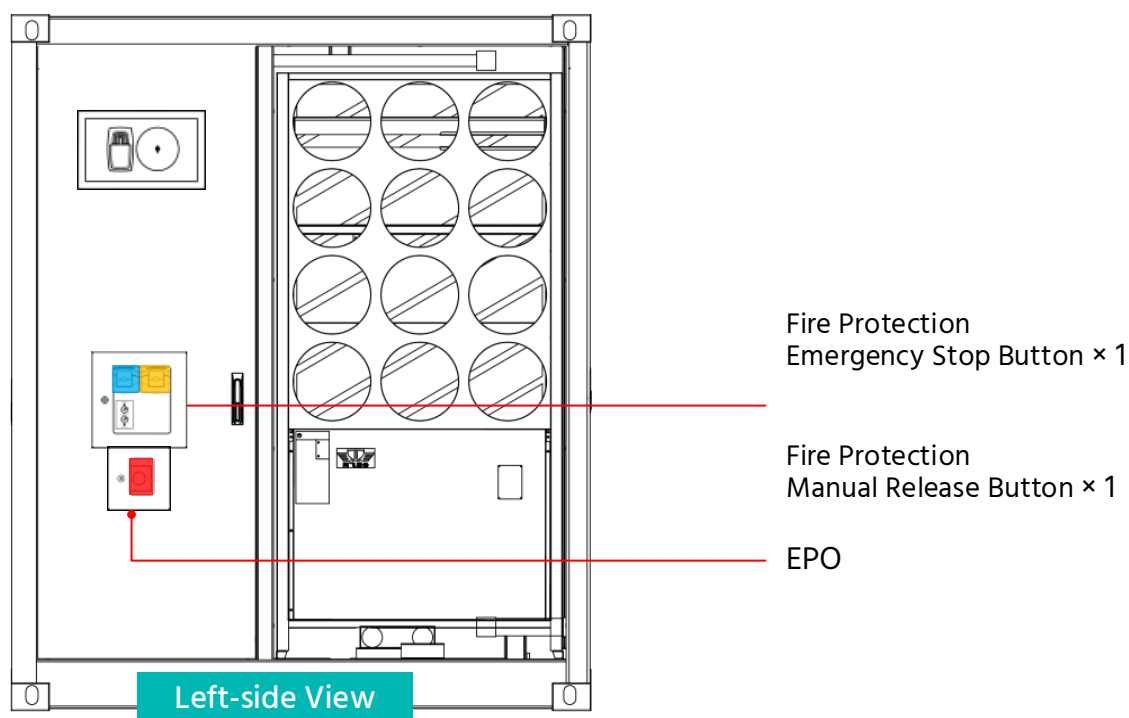
8.4 Liquid Cooler Failure

Please refer to the *Liquid Cooler Product Manual* for the liquid cooler troubleshooting.

8.5 Emergency Disposal

8.5.1 EPO

In case of fire or any situation beyond the control of anyone, please immediately tap the EPO (emergency stop button) to stop the system. DO NOT touch the EPO during normal operation. To restore the system, firstly rotate the EPO button in the operating direction on the panel to make the button pop up, and then power on the system according to the power on steps.



8.5.2 Fire protection emergency stop and manual release

WARNING

DO NOT operate the fire-fighting equipment when the system is free of fire, which may cause the system to fail to operate normally later.

In the event of fire, the fire protection system will spray automatically. If the fire protection system does not act, please operate the fire protection manual release button for active fire protection.

If any misoperation triggers the fire protection system to start, press the fire protection Emergency Stop button, seeing the figure above.

9 Transportation and Storage

9.1 Transportation

Attention should be paid to the following matters during transportation:

- (1) The BESS system is transported with batteries installed. During transportation, it should not be subjected to severe impact.
- (2) During transportation, it should be securely fixed and not displaced inside the carriage.
- (3) During transportation, it should be placed and transported strictly in the vertical direction, with a tilt angle less than 5 °, and should not be transported horizontally or sideways to avoid damaging the components due to vibration.
- (4) During transportation, it is not allowed to ship together with flammable, explosive, or corrosive goods.
- (5) The equipment is not allowed to withstand washing and mechanical damage from rain, snow, or liquid substances.

NOTE:

- 1) The SOC of a single battery is around 20-30% before shipment. The remaining capacity of batteries after shipment and before charging varies depending on storage time and storage conditions.
- 2) The battery module complies with the UN38.3 certification standard.

9.2 Storage

CAUTION

Be sure to follow the instructions below for long-term storage. Otherwise, the battery's cycle life will decrease.

- (1) Relative humidity is less than 65%, the environment is clean, ventilated and free of corrosive gases. The temperature requirements are as follows:

Storage Temperature (T)	SOC	Storage Duration
$T < -40\text{ }^{\circ}\text{C}$	/	Not allowed
$-40\text{ }^{\circ}\text{C} \leq T < -30\text{ }^{\circ}\text{C}$	20%~ 40%	≤ 7 days
$-30\text{ }^{\circ}\text{C} \leq T < -20\text{ }^{\circ}\text{C}$	20%~ 40%	≤ 30 days
$-20\text{ }^{\circ}\text{C} \leq T < 35\text{ }^{\circ}\text{C}$	20%~ 40%	≤ 180 days (After 180 days of storage, a full charge and discharge is required.)
$35\text{ }^{\circ}\text{C} \leq T < 50\text{ }^{\circ}\text{C}$	20%~ 40%	≤ 30 days
$50\text{ }^{\circ}\text{C} \leq T < 60\text{ }^{\circ}\text{C}$	20%~ 40%	≤ 7 days
$T \geq 60\text{ }^{\circ}\text{C}$	/	Not allowed

- (2) Keep away from all kinds of harmful gases, flammable, explosive items and corrosive chemicals. And there should be no strong mechanical vibration, impact or strong magnetic field of the storage site.

Annex: Cause and Effect Matrix for ESS Container Products

Information Version: V1.0

System Output System Input	Notification			Action					Output signal			
	Bell Alarm	Horn Strobe Alarm	Gas Release Indicator LED Action	Agent Release Count-down Starts	Agent Release Count-down Pauses	Agent Release Count-Down ends	Ventilation Operation	Ventilation Shutdown	Fire Alarm	Agent Release Signal	General Fault	Gas Detect or Signal
Description	A	B	C	D	E	F	G	H	I	J	k	L
Smoke detector alarm x 1	√								√			
Heat detector alarm x 1	√								√			
Smoke detector alarm x 2	√								√			
Heat detector alarm x 2	√								√			
Smoke and heat detector alarm	√	√	√	√		√		√	√	√		
Manual pull station action	√	√	√	√		√		√	√	√		
Pressing and holding abort station button					√							
Any fault of fire control panel											√	
H2 detector action							√					√

 **NOTE:** See the table as follows for detailed instructions.

Instructions of the System Output Items (A~L)

Item	Instructions
A	Bell releasing alarm indicates a potential fire hazard.
B	Horn strobe releasing alarm indicates that fire extinguishing agents are to be released.
C	Gas release indicator LED lighting indicates not entering the space where fire extinguishing agents are to be released.
D	The countdown of agent releasing starts, and countdown period can be adjusted from 0 to 30 seconds.
E	The countdown of agent releasing is paused at 30 seconds by pressing and holding the abort station button.
F	The countdown of releasing agent has ended, and the agent has been released into the container.
G	The explosion-proof ventilation device operates to reduce the amount of combustible gas in the container to a safe range.
H	Before agent releasing, turn off the ventilation device to prevent the agent from leaking.
I ~L	Output dry contact signals of external device and host.



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