

L260

Technical Proposal

261kWh

Pylontech Solution
Pylon Technologies Co., Ltd

Version	Date	Prepared By	Approved By
V1.0	22/07/2025		



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Purpose

The purpose of this document is to define the scope of supply of Pylontech for BESS project and clarify the technical features of all equipment within the scope of the supply.

Disclaimer

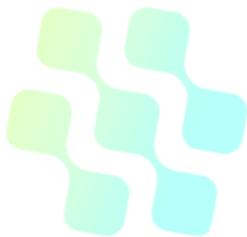
The scope of supply and the technical features are based on the technical discussions between Pylontech and the customer.

To avoid any misunderstanding and unexpected non-conformities, the customer shall inform Pylontech in writing regarding all technical requirements prior to order placement.

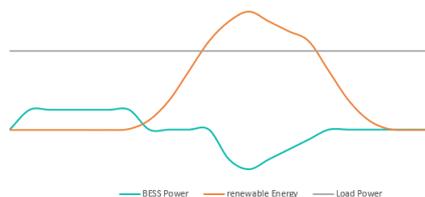
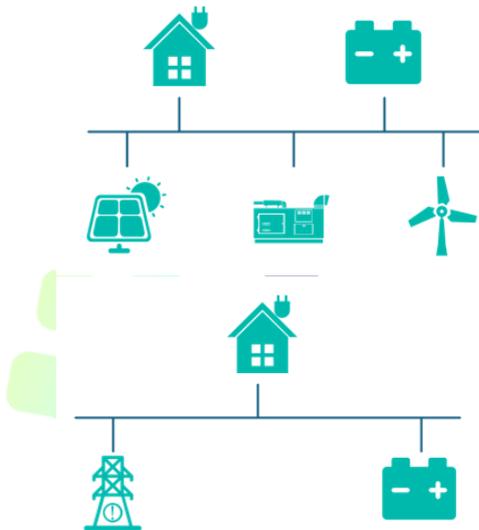
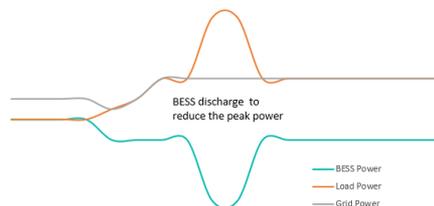
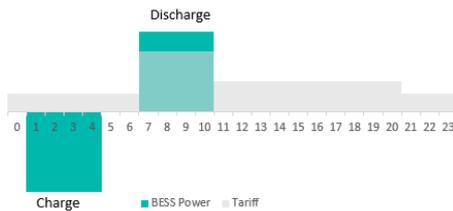


1. Abbreviations

Abbreviations	
AC	Alternating Current
BOL	Beginning of Life
BMU	Battery Management Unit
BMS	Battery Management System
LEMS	Local Energy Management System
ESS	Energy Storage System
DC	Direct Current
DOD	Depth of Discharge
FSS	Fire Suppression System
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning
MBMS	Master Battery Management System
LFP	LiFePO ₄ (Lithium iron phosphate Battery)
PCS	Power Conversion System
SCADA	Supervisory Control and Data Acquisition
SOC	State of Charge
SOH	State of Health
STS	Static Transfer Switch



2. Application



Grid Service

BESS can stabilize the power grid by maintaining consistent frequency and voltage levels.

Arbitrage

The BESS charges during low tariff periods and discharges when tariffs are high to maximize profit.

Demand Charge

The demand charge is determined by the highest peak in your energy usage, measured in kilowatts (kW), during the month. BESS can reduce this peak, leading to savings on your bill.

Micro-grid

BESS plays a crucial role in micro grids, enhancing the integration of renewable energy and ensuring system stability.

Back-up

In regions with weak power grids, BESS can act as a reliable backup power source during grid failures.

Self-consumption

Renewable energy can generate enough power to meet your home's needs. By maximizing self-consumption, you retain the energy you produce, reducing both grid dependency and energy waste.

3. Certification

The main equipment meets the following certifications:

Category	Standard	statement	Certification No	comments
Cell	IEC 62619: 2022	Complete	TÜV SÜD: SG PSB-BT-04148	Certificate holder: CALB
		Complete	TÜV SÜD: SG PSB-BT-05253	Co-license holder: Pylontech
	UL 1973: 2022	Complete	UL: MH65785	Certificate holder: CALB
		Complete	UL: MH64541	Co-license holder: Pylontech
	UL 1642: 2020	Complete	UL: MH65293	Certificate holder: CALB
	UL 9540A: 2019	Complete	CSA: (Report No.) 80184345	Certificate holder: CALB
		Complete	CSA: (Report No.) 80232266	Co-license holder: Pylontech
	RoHS Directive 2011/65/EU Annex II amending Annex (EU) 2015/863 of CE Directive	Complete	HP-LAB: (Report No.) C230619090001-1	Certificate holder: CALB
	REACH	Complete	HP-LAB: (Report No.) C230619090002-1	Certificate holder: CALB
	Directive 2006/66/EC and its amendment Directive 2013/56/EU	Complete	HP-LAB: (Report No.) C230619090003-1	Certificate holder: CALB
	UN 38.3	Complete	MCM: (Report No.) ZCXH20230613U01	Certificate holder: CALB
	MSDS	Complete	MCM: (Report No.) ZCXH20230613MSDS 01	Certificate holder: CALB

Battery Pack	UL 9540A: 2019	Completed	TÜV Rheinland : (Report No.) CN244Y4S 001	
	RoHS Directive 2011/65/EU Annex II amending Annex (EU) 2015/863 of CE Directive	Completed	TÜV SÜD : (Report No.) 64.168.24.60586.01A	
	REACH Regulation (EC) No.1907/2006	Completed	TÜV SÜD : (Report No.) 64.168.24.60586.01B; 64.168.24.60586.01C	
	WEEE Directive 2012/19/EU	Completed	TÜV SÜD: (Report No.) 64.168.24.60586.01D	
	UN 38.3 Rev.8	Completed	Zhejiang Academy of Science and Technology for Inspection and Quarantine: (Report No.) STL/R2406935-2	
	MSDS	Completed	Technology Center of Hangzhou Customs District: (Report No.) TCH24023878	
	Certification for Safe Transport of Chemical Goods (By Sea)	Completed	Technology Center of Hangzhou Customs District: (Report No.) TCH24023877-1	
	UN 3480	Completed	Technology Center of Hangzhou Customs District: (Report No.) TCH24023849-2	
1000V	RoHS Directive	Completed	TÜV SÜD : (Report	

Control Box	2011/65/EU Annex II amending Annex (EU) 2015/863 of CE Directive	d	No.) 64.168.24.60586.01E	
	REACH Regulation (EC) No.1907/2006	Completed	TÜV SÜD : (Report No.) 64.168.24.60586.01F 64.168.24.60586.01G	
	WEEE Directive 2012/19/EU	Completed	TÜV SÜD : (Report No.) 64.168.24.60586.01K	
	Hazard Classification and Identification Report for Transport of Goods (By Sea)	Completed	Shanghai Institute of Chemical Industry Testing Co.,Ltd.: NO.212500204032174	
	Hazard Classification and Identification Report for Transport of Goods (By Air)	Completed	Shanghai Institute of Chemical Industry Testing Co.,Ltd.: NO.212500804332973	
1000V Battery Cabinet (IN-POWER)	IEC 62619: 2022 IEC 63056: 2020	Completed	TÜV Rheinland: AK 50661959 0001	
	VDE-AR-E_2510-50 VDE-AR-E_2510-2	Completed	TÜV Rheinland: R 50674313 0001	
	ISO 13849-1: 2023 (only rack)	Completed	TÜV Rheinland : (Report No.) CN245G7D 001	
	CE LVD/EN 62477-1	Completed	TÜV Rheinland: AN 50672586 0001	
	CE EMC/EN IEC 61000-6-2& EN IEC 61000-6-4	Completed	TÜV Rheinland: AE 50662513 0001	
	UN 38.3 Rev.8	Completed	Zhejiang Academy of Science and Technology for	Version A of L260

			Inspection and Quarantine: STL/R2407525-1 STL/R2407525-2	
	MSDS	Completed	Nanjing Customs: (Report No.) DG2444151C	Version A of L260
	UN3480	Completed	Nanjing Customs: (Report No.) DG2444153	Version A of L260
	Certification for Safe Transport of Chemical Goods (By Sea)	Completed	Nanjing Customs: (Report No.) DG2540001	Version A of L260

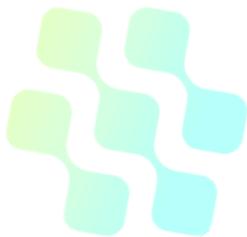


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4. Supply Scope

NO	System	Product	Description	Quantity	Unit
1	Cabinet Control System	Cabinet	Matal (Q345) liquid cooling cabinet.	1	pcs
		LEMS	Centre control for whole system	1	pcs
2	Electric components	UPS	UPS for control system and firefighting components power supply	1	pcs
		MCCB	Control main power connection	1	pcs
		AC SPD	Surge protection device		pcs
		Circuit breaker	For auxiliary power supply control	1	set
		Power supplier	For 24Vd.c. power supply	1	pcs
3	Fire fighting components	Aerosol	Firefighting in case of system fire	1	pcs
		Gas detector	Detect hydrogen concentration inside the cabinet	1	pcs
		Temperature detector	Detect temperature inside the cabinet	1	pcs
		Smoke detector	Detect smoke concentration inside the cabinet	1	pcs
		Sound-light alarm	Sound and light alarms are triggered in case of fire.	1	pcs
4	Thermal management system	Liquid chiller	Thermal management for battery system	1	pcs
		Liquid cooling pipe	Whole set pipe for liquid cooling system	1	set
		Dehumidifier	Manage humidity inside the cabinet	1	pcs
5	Battery System	Battery module	HM7A200L	5	pcs

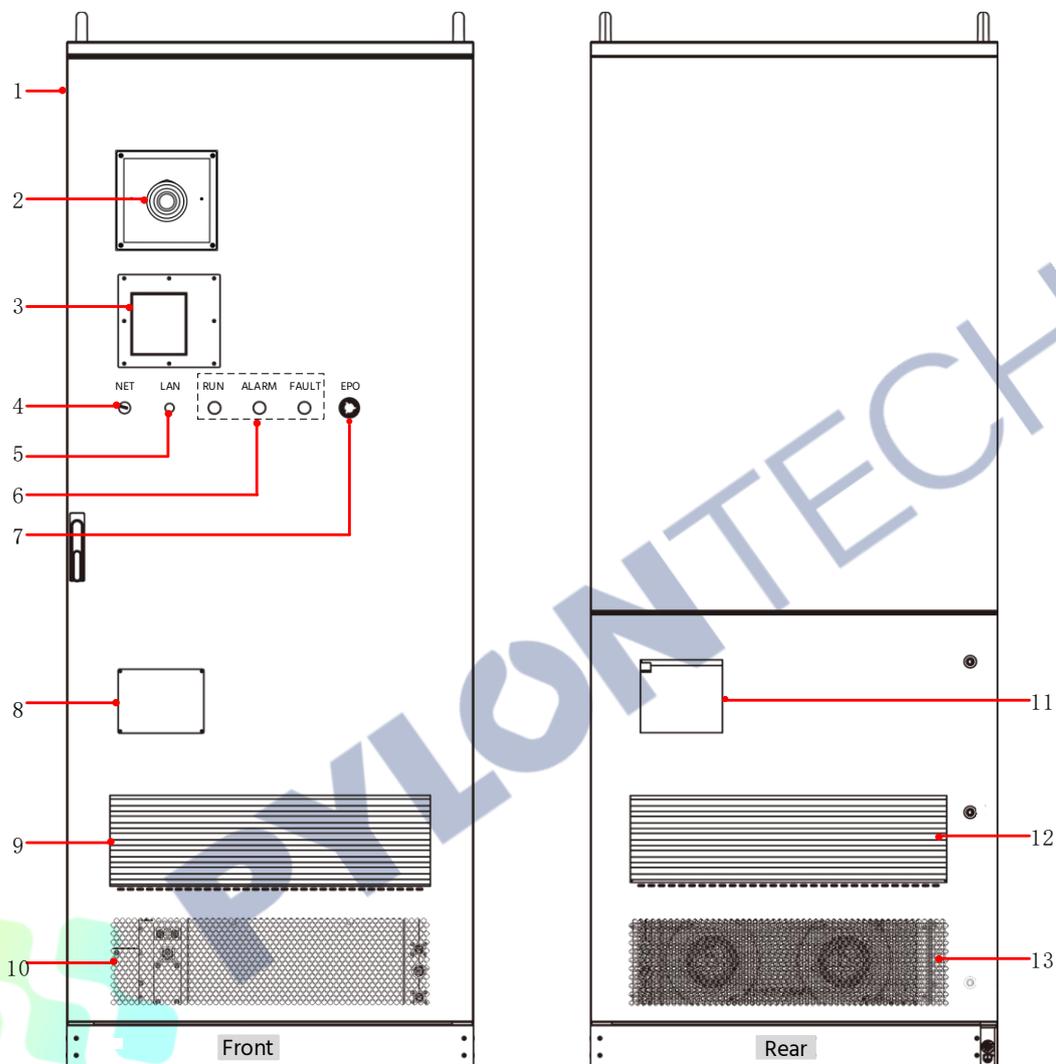
		BMS	OPS10M7A200E	1	pcs
6	Power conversion system	Inverter	Volatage: 400Va.c. Power: 125kW	1	pcs
7	Cables	Power cable	Power cable between BMS&battery module , battery module& battery module	1	set
		Commu nication cable	Power cable between LEMS&BMS , BMS&battery module , battery module& battery module	1	set



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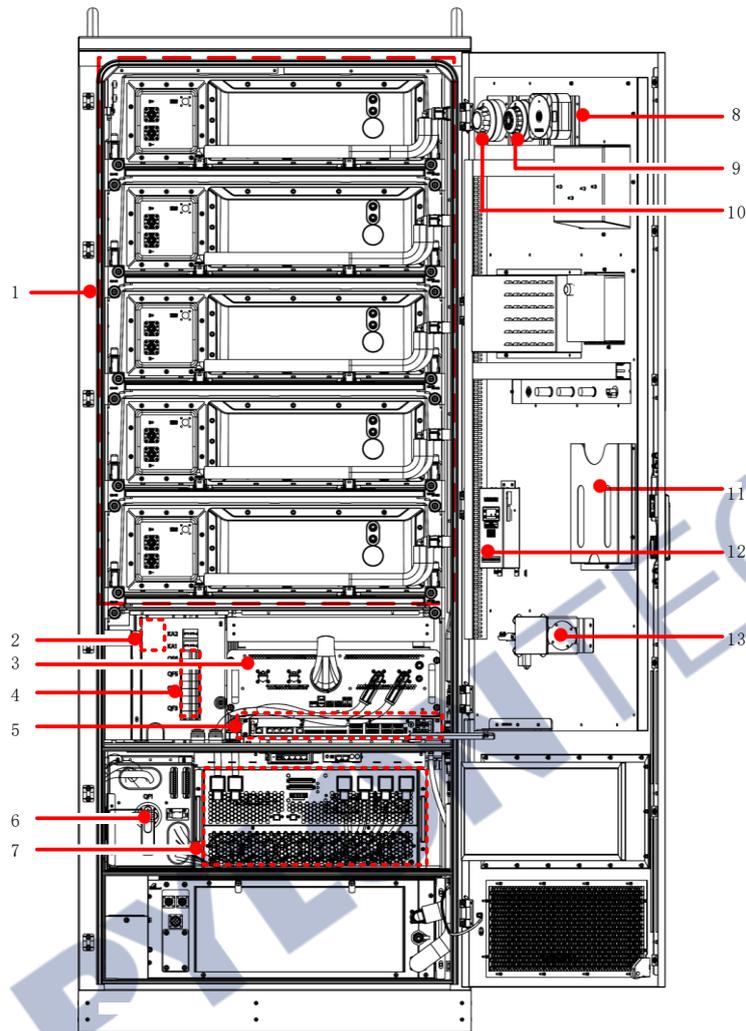
5. General Layout

5.1. External Design



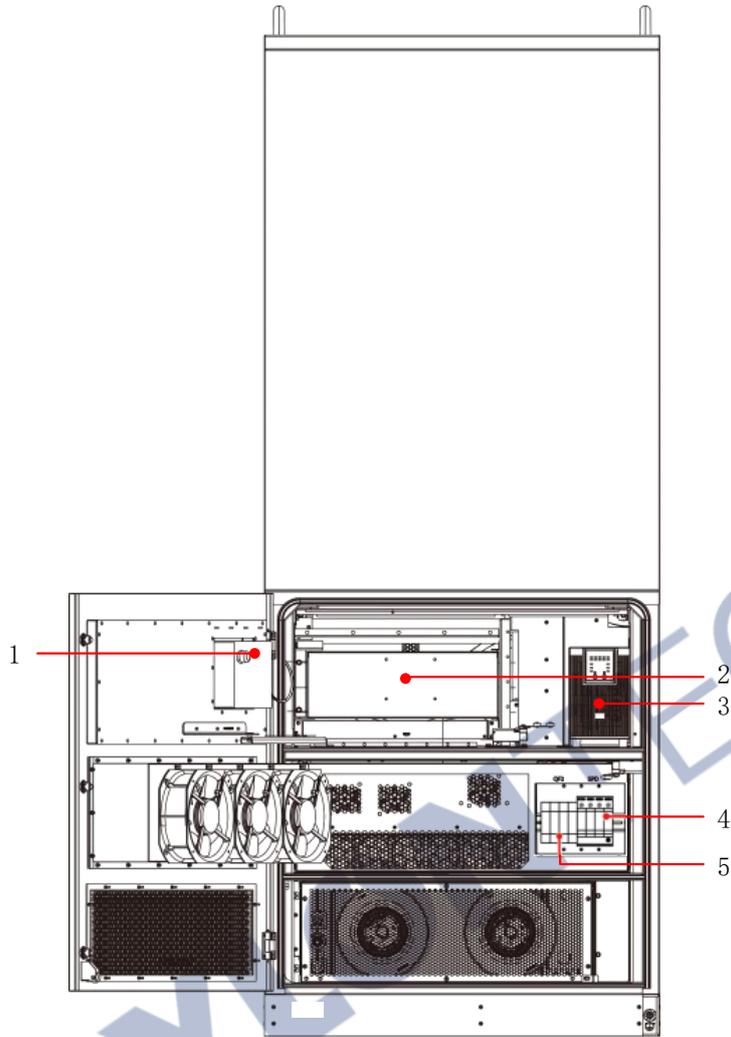
No.	Description	No.	Description
1	Cabinet Body	8	Product Nameplate
2	Sound-Light Alarm	9	Ventilation Louver (air inlet)
3	Exhaust Fan (air outlet)	10	Ventilation Window (air inlet)
4	NET(optional, internet access module for data migration to the cloud)	11	Electric Ventilation Louver(air inlet)
5	LAN Port(for debugging)	12	Ventilation Louver (air outlet)
6	Status Indicator	13	Ventilation Window(air outlet)
7	EPO (Emergency Power OFF Switch)		

5.2. Internal Design



Front View

No.	Description	No.	Description
1	Battery Modules (5 pcs)	8	Gas Detector
2	Power Meter (under the cover plate)	9	Temperature Detector
3	BMS (Battery Control Module)	10	Smoke Detector
4	Circuit Breakers (QF3~QF6)	11	File Folder
5	LEMS	12	Dehumidifier
6	MCCB (Molded Case Circuit Breaker, QF1)	13	Fixed Aerosol Fire-extinguishing Device
7	PCS		



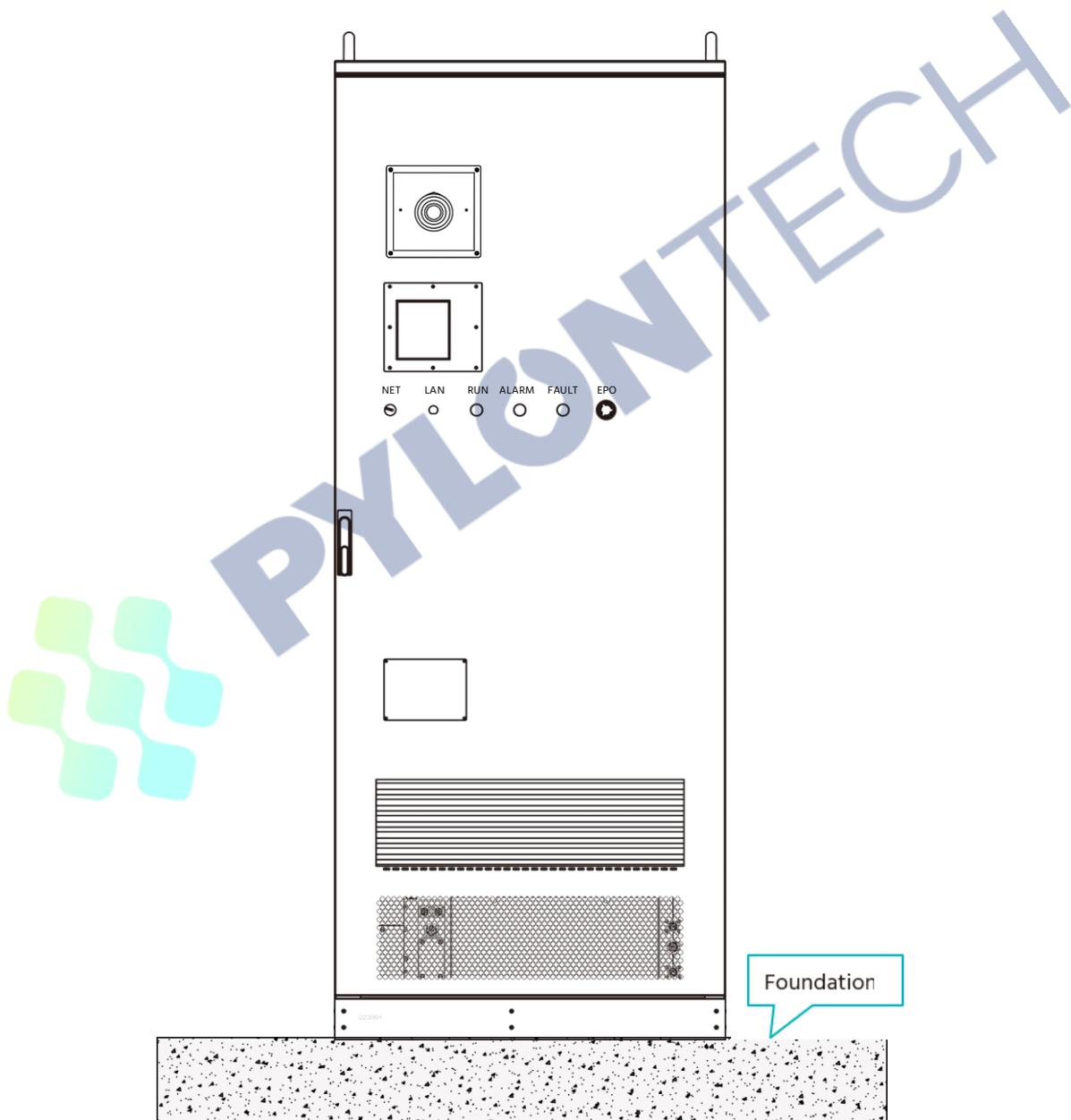
Rear View

No.	Description	No.	Description
1	Electric Ventilation Louver(air inlet)	4	SPD (Surge Protection Device)
2	BMS (Battery Control Module)	5	Circuit Breaker (QF2)
3	UPS (Uninterrupted Power Supply)		

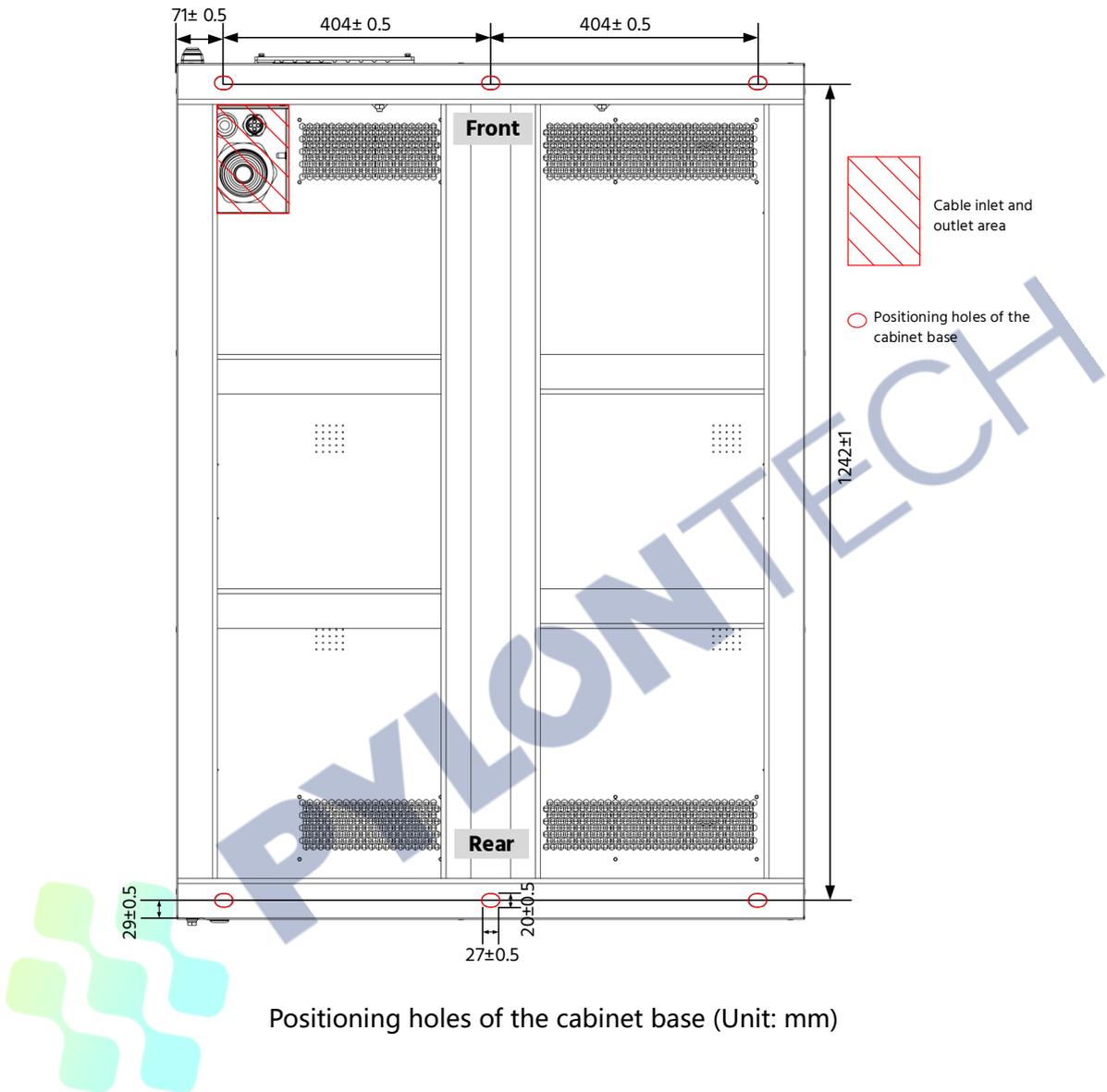
5.3. Installation Foundation Requirements

The installation site needs to meet the following requirements:

1. The installation foundation should be able to bear the total weight of the whole outdoor cabinet system (about 2900kg).
2. The installation foundation should be concrete or channel steel support structure, which should be flat, firm, safe and reliable. The installation foundation must meet the following height requirements, whichever is higher: above the highest water level in the history of the area; or at least 300mm above the level ground.
3. The angle of inclination of the installation ground should not exceed 15°.



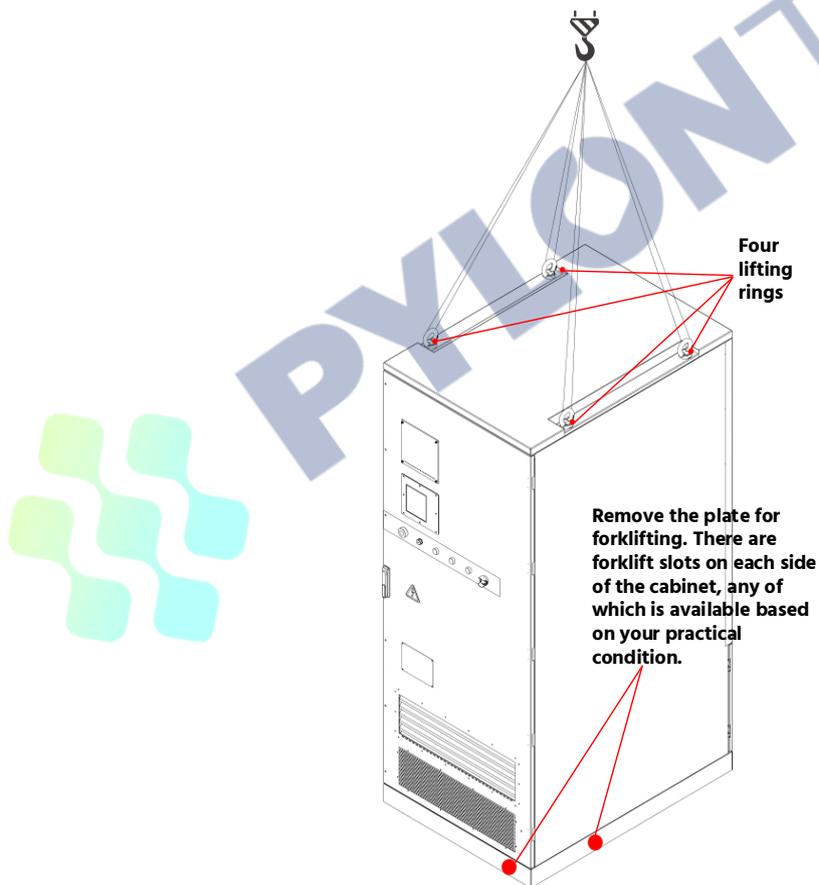
The cabinet is fixed at the bottom, and holes should be pre-opened on the installation site in accordance with the fixed holes (marked in red) in the base of the cabinet. See the drawing below.



5.4. Handling of the Cabinet

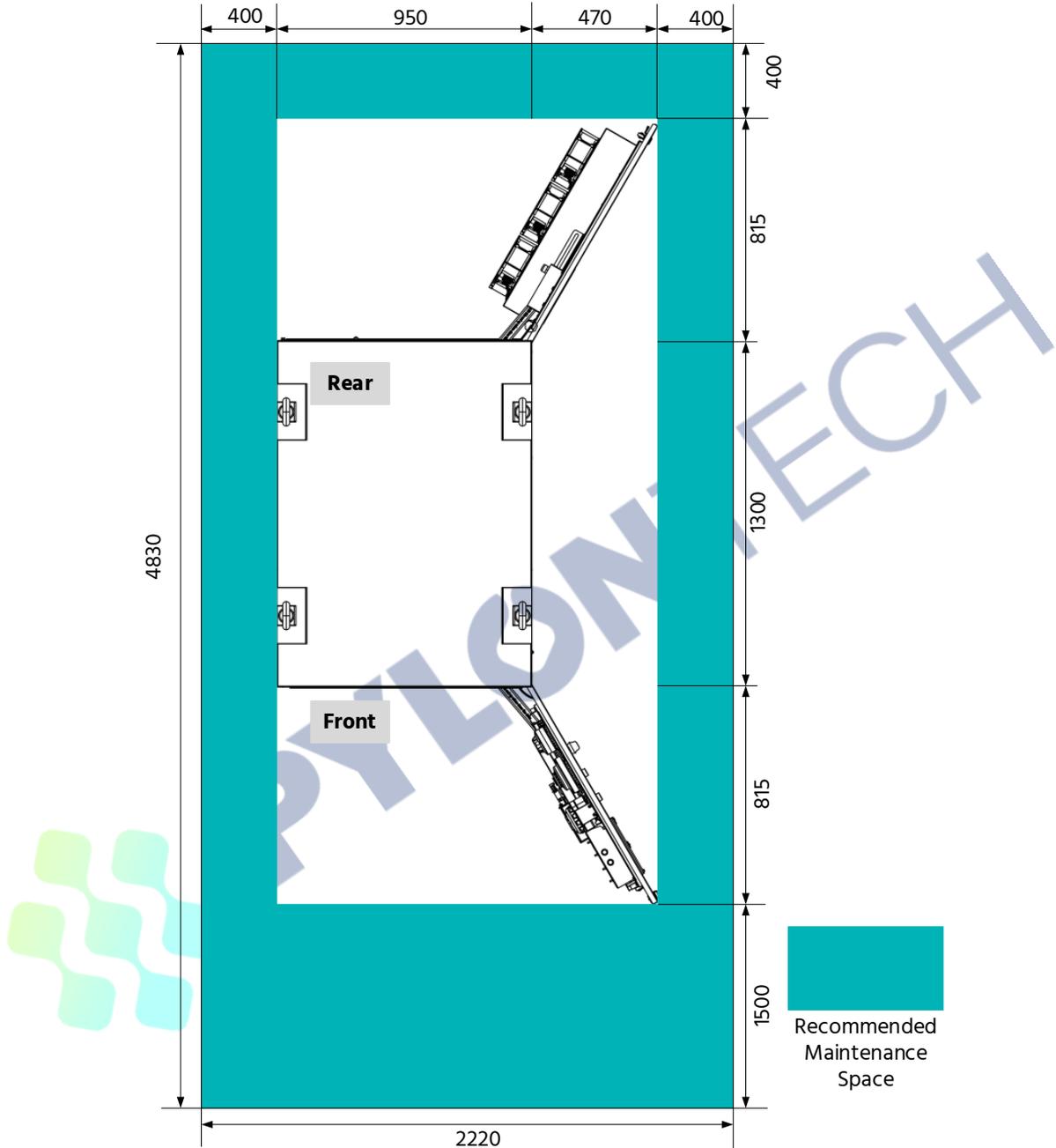
The outdoor cabinet can be transported by crane or forklift. Positions of the lifting rings and forklift slots See the drawing below. The lifting needs to meet the following requirements:

1. Please choose a suitable crane and wire rope based on the actual weight of the cabinet: 950 mm (W) x 1300 mm (D) x 2480 mm (H), about 2900kg.
2. During the moving process, the equipment should not be tilted at an angle of more than 5° and should not be suddenly lowered or lifted (increase speed $\leq 5\text{m/min}$).
3. During the transportation by forklift, the radial acceleration of the forklift cannot exceed 2.35m/s^2 .
4. Pay attention to the center of gravity when lifting or forking the cabinet and keep the moving process slow, smooth and balanced.
5. When lifting, please ensure that there are no obstacles around and lift slowly and steadily to ensure safe lifting.
6. When installing the lifting wire rope, do not scratch the paint of the cabinet.

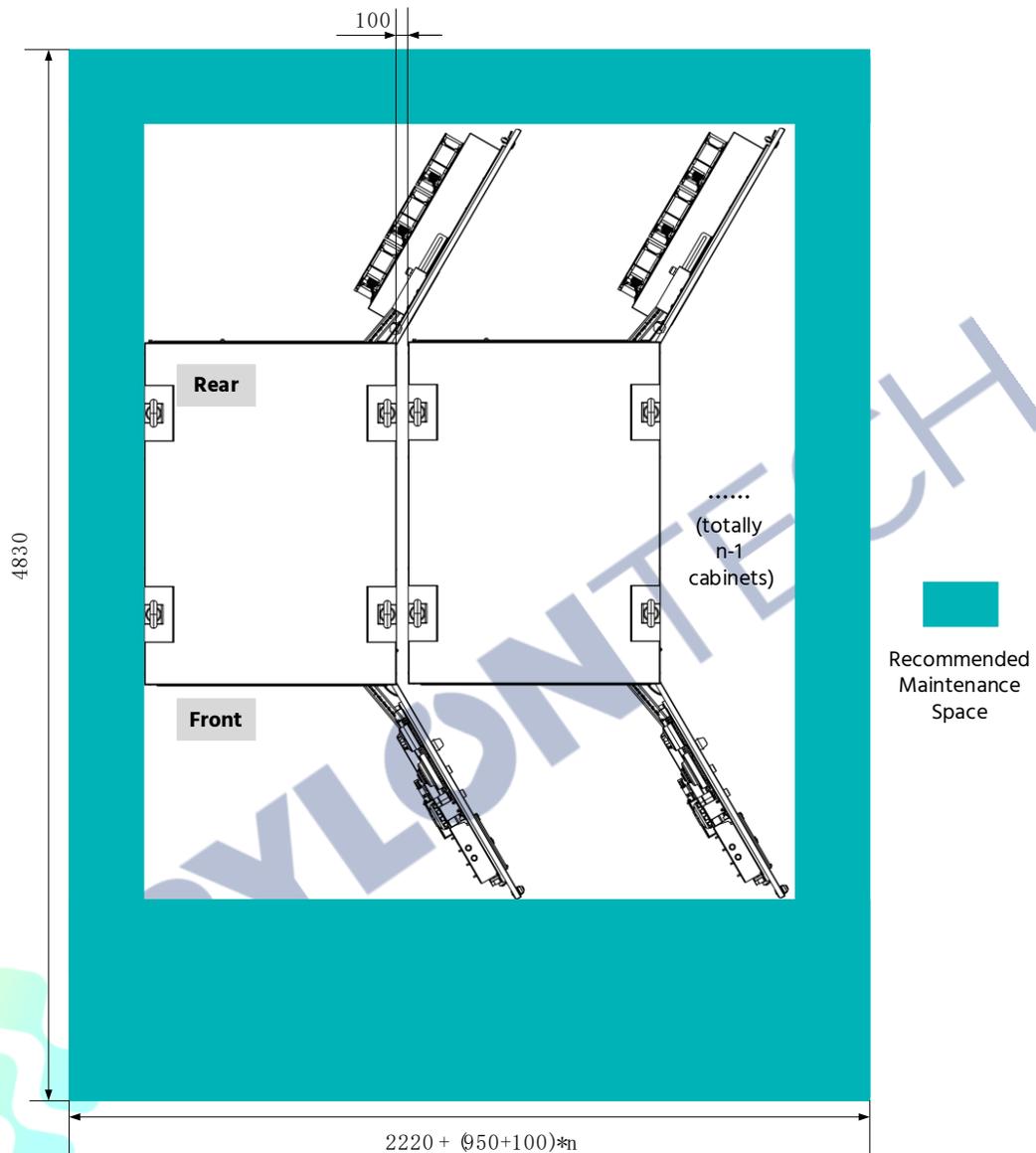


5.5. Station layout

The installation space for a single cabinet system is shown below (recommended spacing).



When multiple cabinets are installed, the spacing between each cabinet is 100mm. In the grid-connected application scenario, a maximum of 20 cabinets can be connected. In the off-grid application scenario, a maximum of 5 cabinets can be connected.



Note:

1. Refer to the PCS installation manual for the distance between PCS and external obstacles;
2. The distance between BESS cabinets and between cabinets and surrounding structures in the above figure only considers the operation and maintenance walkway. If there are fire safety requirements, please refer to local fire safety standards to reserve appropriate space.

6. Specification for BESS Equipment

The following document include the design detail of the Pylontech L260 liquid cooling system. the chapter introduce the structure, electricity, cable connection, BMS software, LEMS software, FSS and the HVAC. Please note that Pylontech reserves the right to modify product specifications without prior notice.

6.1. Specification for Battery Cabinet

6.1.1. Cabinet description

The appearance and datasheet of the cabinet are shown in the following figures.



Specifications	Model Name	Optim US-A1-M7-B-125/261-EU-xx
AC side Parameters	Rated Power (kW)	125
	Rated Voltage (VAC)	400
	Max current (A)	198
	Frequency (Hz)	50
	Wiring Method	3W+N+PE
	Auxiliary Power Input Voltage / Max. Current /Frequency	230VAC/18A/50Hz
	Overvoltage Category	III
DC side Parameters	Rated Energy (kWh)	261.248
	Rated Capacity (Ah)	314
	Nominal Voltage (V)	832
	Upper Limit Charging Voltage (V)	936
	End-of-discharge Voltage (V)	702
	Standard Current (A)	157
	Maximum Current (A)	200
	Overvoltage Category	II
System Parameters	External Dimensions of the cabinet (mm)	950 (W) x 1300 (D) x 2480 (H)
	Weight (kg)	2900
	Handling Type	Applicable for hoist and forklift handling
	Working Temperature range (°C) *	-25~55
	Ingress Protection (IP) / Protective Class	IP55/ Class I
	Relative Humidity	0-95% RH, non-condensing
	Noise (dB)	70 @ 1 meter
	Maximum Altitude (m)	≤ 4000 m, derating > 2000m
	Pollution Degree	PD3 (Outside), PD2 (Inside)
	Cooling Type	Liquid Cooling
	Coolant	50% water, 50% ethylene glycol
	Nominal Operating pressure (bar)	2.0~2.2
	Maximum Operating pressure (bar)	3
Usable Extinguishing Agent	A/B/C/F	

Specifications	Model Name	Optim US-A1-M7-B-125/261-EU-xx
	Fire and Explosion Safety Configurations	01: Explosion relief panel 02: Explosion relief panel + Sprinkler system 03: Ventilation fan 04: Ventilation fan + Sprinkler system 05: Explosion relief panel +Ventilation fan + Sprinkler system
	External Communication Protocol	Modbus-TCP、 Modbus-RTU
	Wire feeding in and out method	Bottom in and bottom out
	Connectable Power Supply System Types	TN, TT

The Pylon cabinet adopts a highly integrated design, integrating Pylon battery cells, modules, liquid coolers, fire protection systems, and power distribution systems. The capacity of a single cabinet is 261 KWH. The full configuration scheme adopts Pylon independently designed control logic to ensure system safety, energy efficiency improvement, personnel protection, and other advantages. Please refer to the following description for details:

1. Third level short circuit protection: PACK level fuse short circuit protection, cluster level short circuit protection, system level short circuit protection.
2. Software Level 4 Protection: The software has Level 4 protection, with fault alarms divided into Levels 1-3. The addition of Level 0 lock function increases system security.
3. Arc flash protection design: The arc flash energy is less than 0.08 cal/cm^2 , and the PPE level equipped by the operator should be level I.
4. Electrical connection reliability testing: The connection points of power connectors and cell modules have temperature detection function to ensure the safety and reliability of electrical connections.
5. Electrical active cut-off protection: Each main control is equipped with a circuit breaker, which can actively cut off the external power connection in emergency situations.
6. Cell temperature rise rate detection: Real time detection of abnormal temperature rise status of the cell, and warning of thermal runaway.
7. Fire safety: The European standard is equipped with aerosol fire protection system, combustible gas detection, explosion-proof venting system. Vehicle grade smoke

detection, no need for correction for 15 years.

In terms of application, Pylon also has own unique design:

1. Easy to maintain: Pylon is equipped with dedicated battery pack disassembly tools and battery balancing tools for easy after-sales service. It has Pylon own designed balancing equipment, ensuring easy maintenance of the declared cycle.

2. Remote monitoring: supports data migration to the cloud and can remotely monitor the system's operational status.

3. SOC&SOE High Precision: Independently developed SOC and SOE algorithms, with a detection accuracy of 1% under ideal working conditions and extreme energy management.

4. Flexible configuration: In grid-connected mode, up to 20 cabinets can be connected in parallel, and in off-grid mode, up to 5 cabinets can be connected in parallel.

5. PCS matching: Supports both centralized and string based PCS, meeting the design needs of different PCS on the market.

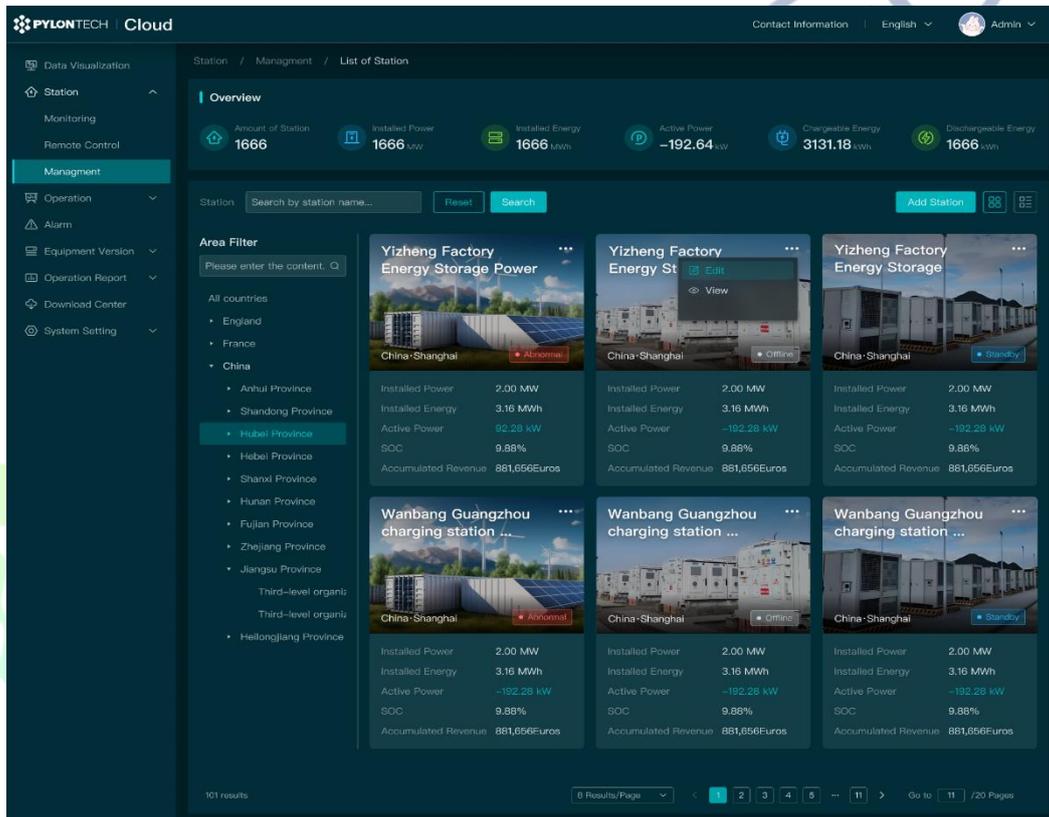


Figure Pylon cloud

6.1.2. Wire harness design

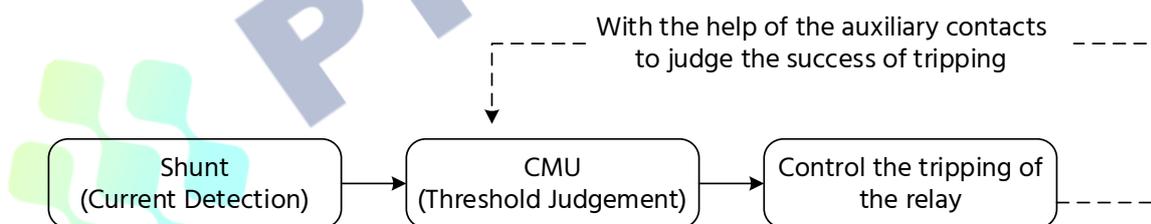
The wiring harness design ensures the efficient and safe operation of the energy storage system

1. Safety: The wiring harness should have good insulation performance and durability, appropriate conductor cross-sectional area, and prevent problems such as short circuit, overcurrent, and overheating.
2. Reliability: Choose high-quality connectors to ensure stable and reliable current and communication transmission. At the same time, the wiring harness has dedicated cable trays for wiring and is properly tied and fixed to avoid shaking and loose connections caused by vibration, impact, etc.
3. Electromagnetic interference suppression: Reasonable zoning of wiring harnesses and shielding design of communication lines ensure the accuracy and stability of signal transmission.
4. Certification: The wiring harness meets the requirements of UL and CE dual certification.

6.1.3. System electrical design

6.1.3.1. Overload protection

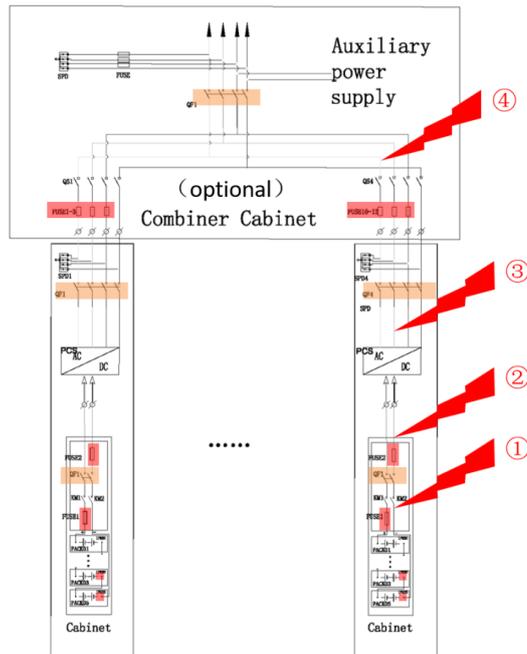
The components involved include relays and current detection boards. The protection function is shown below, where the overload protection current threshold needs to be confirmed based on the cell capacity.



6.1.3.2. Short circuit protection

The design adopts a fast type fuse to achieve ms level short-circuit fault protection.

1. The battery pack design adopts one fuse, located near the total negative.
2. The main control box is designed with two fuses, located near B+, D- .
3. The cabinet is equipped with an AC molded-case circuit breaker.
4. The combiner cabinet is optional, which is designed with fuses.



short circuit protection action - multi-level short circuit protection

1. When a short circuit fault occurs on the battery side: battery pack fuse
- 2 . When a short circuit occurs inside the main control box: fuse inside the main control box
- 3 . When a short circuit fault occurs on the AC line inside the cabinet : MCCB on the AC line
- 4 . When a short circuit fault occurs on the AC busbar side: fuse on the AC busbar side in combiner cabinet (optional)

6.1.3.3. Overvoltage protection - lightning protection

1. Direct lightning protection: shell lightning protection

The outdoor installation form of the product cabinet poses a risk of direct lightning strikes to the outer shell. Lightning protection grounding can be adopted, and the overall shell ensures grounding continuity.

2. Inductive lightning protection: interface lightning protection

There is a risk of induced lightning strikes and overvoltage damage from the power grid. According to the classification of the minefield, the surge protector equipped on the outgoing side belongs to Class II and needs to meet the protection waveform of 8/20us.

3. Overvoltage level design

Through the overvoltage protection function of the surge protector mentioned above, it can be achieved.

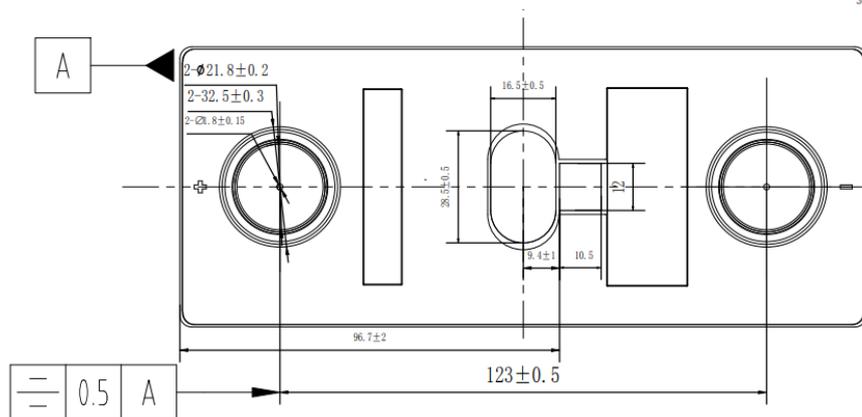
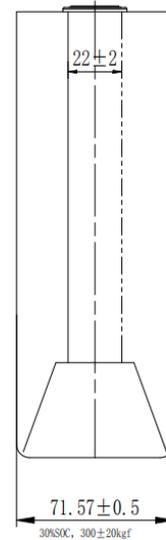
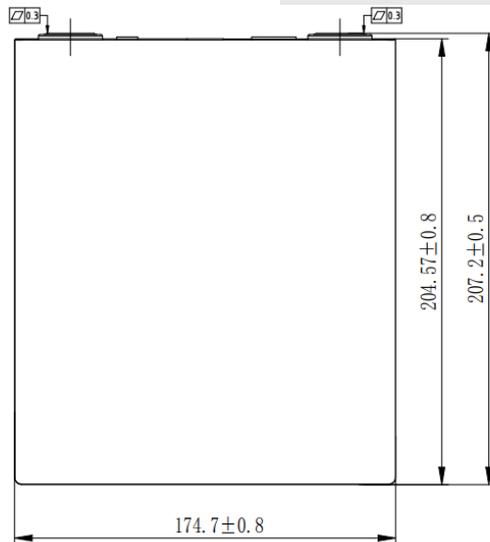
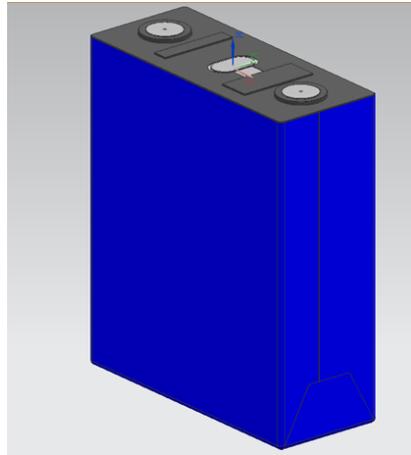
6.1.3.4. Safety Design

The electrical circuits in the system that are independently separated and have external interfaces include:

1. D+\ D -, B+\ B - (DC1000) main circuit~ Dangerous voltage circuit
2. AC (AC220 \ AC400) external distribution circuit~ Dangerous voltage circuit
3. Communication circuit~ Ultra low voltage circuit

6.2. Specification for Battery Cell

6.2.1. Exterior dimensions of battery cells



outlook of battery cell

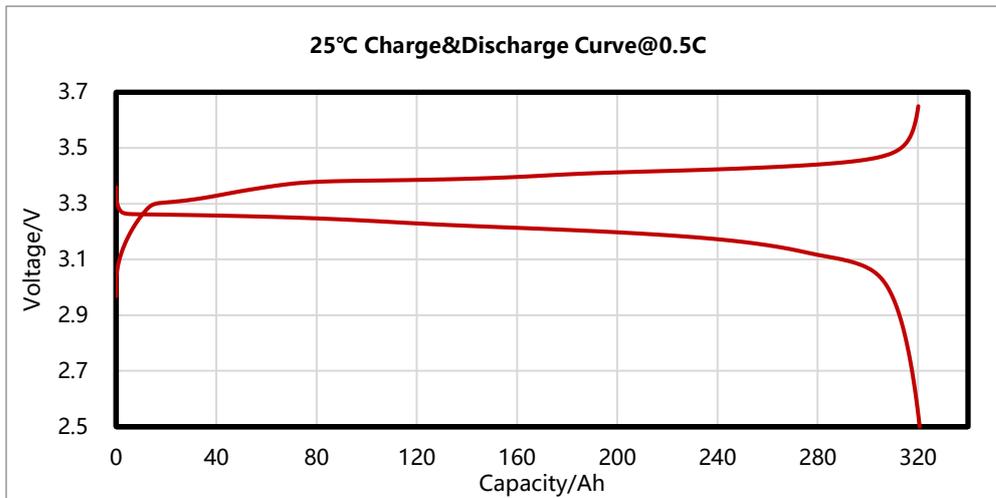
6.2.2. Cell performance parameters

Parameter of the Pylontech Battery Cell:

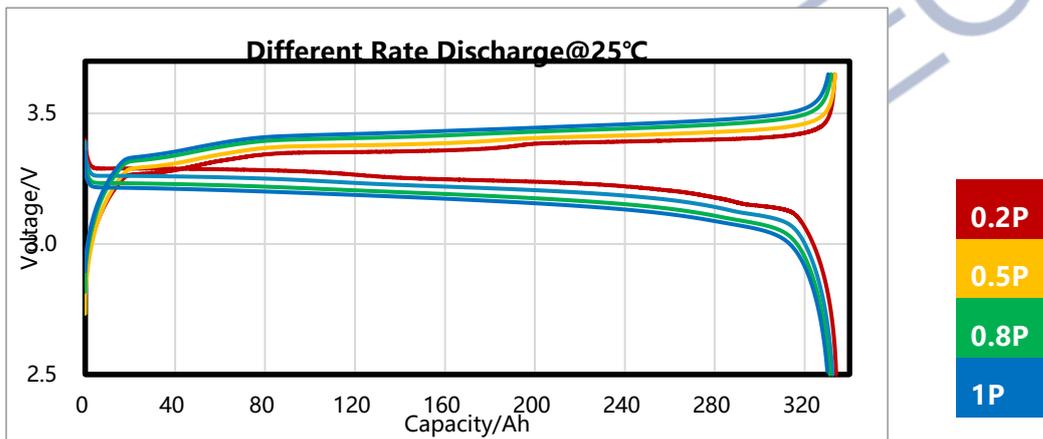
Item		Value	Remark
Nominal capacity		314Ah	25±2°C, 0.5P
Nominal Energy		1004.8Wh	25±2°C, 0.5P
Nominal voltage		3.2 V	N.A.
Working voltage		2.5 V to 3.65 V	0 ~ 60°C
ACIR		≤0.23mΩ	AC 1 KHZ, 25±2°C, 20%SOC
charging (CC-CV)	Standard charge power	502.4W	≥20°C
	Cut off condition	3.65V	
discharge (Constant current DC)	Standard discharge power	502.4W	
	Cut off condition	2.5 V	>0°C
Working temperature	charge	0 ~ 55 °C	N.A.
	discharge	- 30 ~ 55 °C	N.A.
Storage temperature		-20 ~ 60 °C	Storage humidity ≤85%
Recommended operation SOC		5%~95%SOC	N.A.
Shipment status		~20%SOC	Adjustable according to requirements
Weight		5.56±0.15kg	(ref.)
volume		2.55L	Excl. Pole
Energy Density		≥394Wh/L	25±2°C, 0.5P
Battery Cell Size	Height	(207.20±0.5)mm	Incl. Pole
	Height	(204.57±0.8)mm	Excl. Pole
	Width	(174.7±0.8)mm	/
	Thickness	(71.57±0.5)mm	20%SOC, 300±20kgf
	Pole Diameter	(21.8±0.2)mm	/

6.2.3. Performance parameters

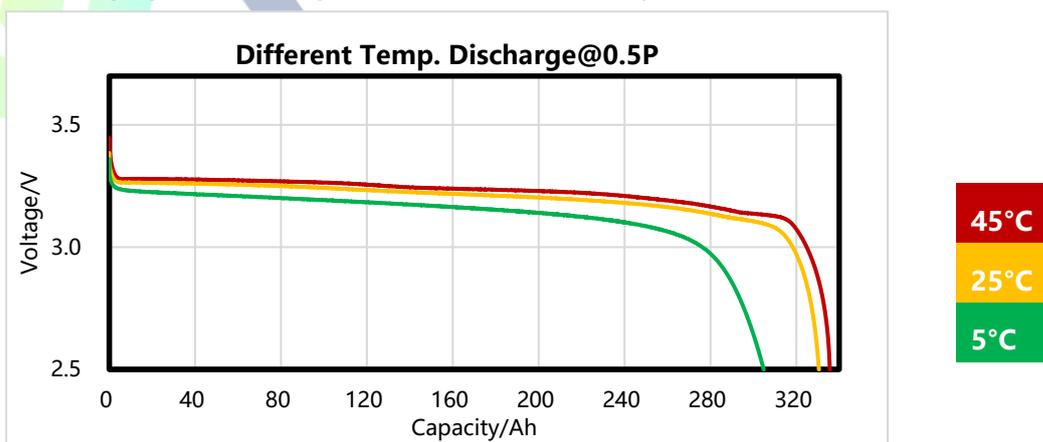
1. 0.5C Charging and discharging curve

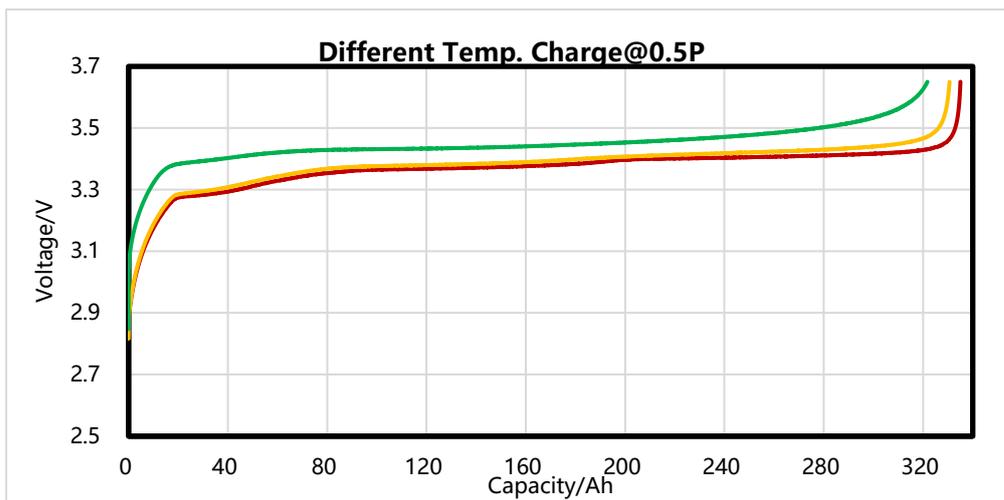


2. Charging and discharge curves at different rates

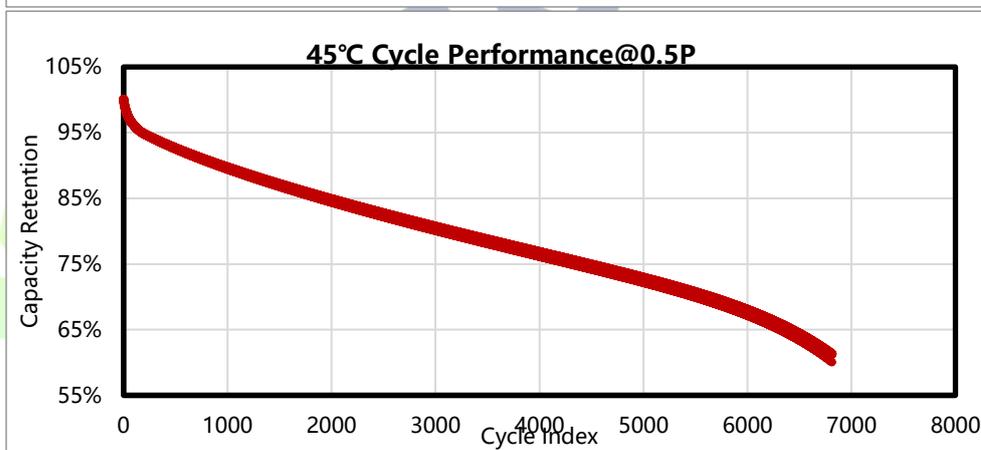
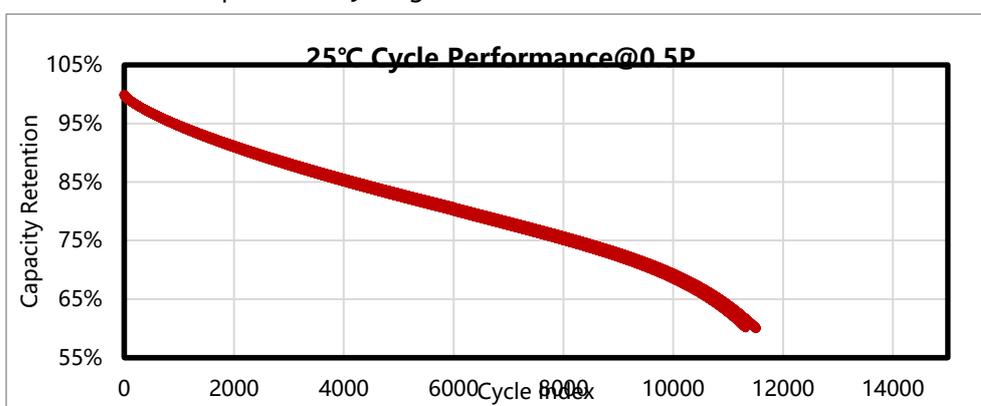


3. Charging and discharge curves at different temperatures





4. Different temperature cycling attenuation curves



6.3. Specification for Battery Module

6.3.1. Basic Parameters



Specifications	HM7A200L
Cell Technology	Li-ion (LFP)
Battery Module Capacity (kWh)	52.249
Battery Module Voltage (VDC)	166.4
Charge Upper Limit Voltage	189.8
Discharge Lower Limit Voltage	130
Battery Module Capacity (AH)	314
Dimension (W*D*H, mm)	1145×790×245
Protection Class	IP67
Weight (kg)	336
Operation Cycle Life*	8,000
Operation Temperature(°C)	10~45
Operation Temperature for Charge (°C)	0~55
Operation Temperature for Discharge (°C)	-30~55
Storage Temperature within One Year (°C)	5~35
Storage Temperature within One Month (°C)	-30~60
Transportation Certificate	UN38.3

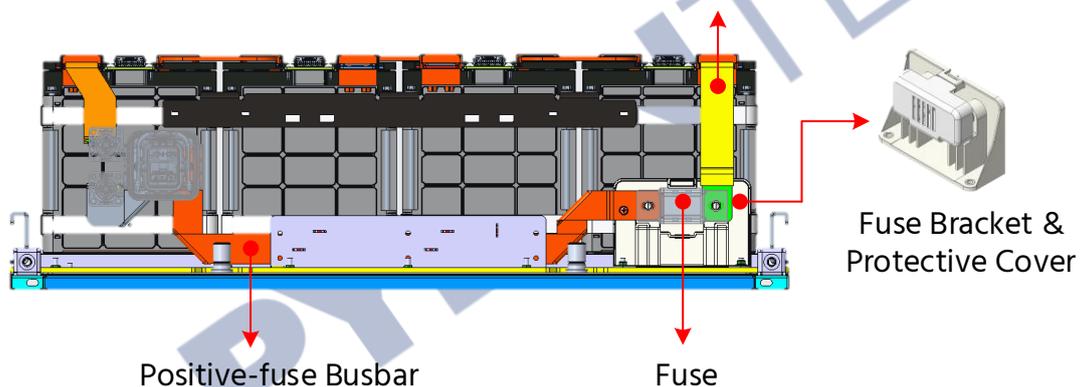
* Cycle life is defined based on specific operation conditions, for more details please check with Pylontech service team.



The four lifting devices for each Pack are shown in Figure , applying to transportation and installation in different processes.The battery pack is secured to the frame through fixing holes.

6.3.2. Electrical Design

When a short circuit occurs,the fuse can effectively cut off the short-circuit loop,preventing the spread of the fault.It provides global protection for the pack and also considers co-ordinated protection with the cluster-level short-circuit protection.



6.3.3. Thermal Design

6.3.3.1. Heat Insulation Board

By installing nanoscale heat insulation boards between cells,the insulation boards ensure the heat conduction path under normal operating conditions, While under extreme conditions,they efficiently block high temperatures and flames,preventing thermal runaway from becoming uncontrollable and ensuring the safe operation of the energy storage system.The nanoscale thermal insulation boards we use have the following characteristics:

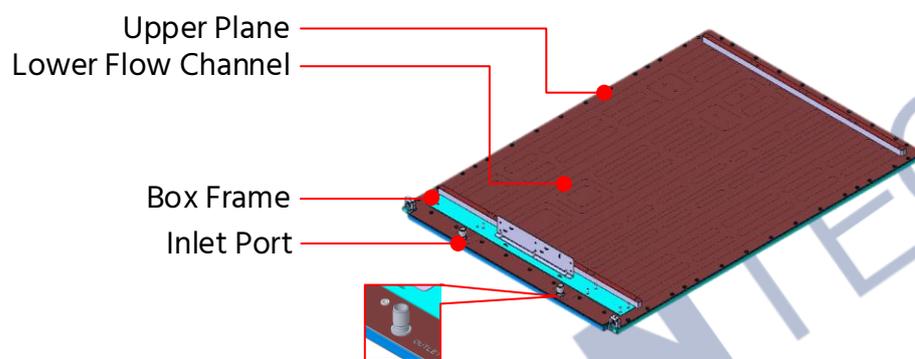
1. Excellent thermal insulation performance:Made by CVD deposition of nanoscale powders combined with light-blocking components,they can effectively block heat transfer.The thermal conductivity of the nanoscale insulation boards remains below 0.035 W/m·K even under high-temperature conditions of 500°C,which is superior to aerogel felt

in terms of thermal insulation performance.

2. Stable chemical properties: Energy storage devices need to adapt to various complex environments, such as high temperatures, extreme cold, and high-salt and high-humidity conditions. The insulation pads have excellent temperature resistance and hydrophobic properties, with a service life that far exceeds the design life of energy storage products, providing long-term and stable protection for the energy storage system.

3. Extremely low base density: Compared with traditional insulation materials, the nanoscale insulation boards have a lower density and are lighter in weight.

6.3.3.2. Liquid cooling Plate



1. A stamped and brazed water cooling plate is used, with the inlet and outlet ports located outside the Pack (compatible with both standard quick-connect and self-sealing fitting solutions), ensuring there are no internal piping connections within the Pack to reduce the risk of coolant leakage. A stamped and brazed water cooling plate is used, with the inlet and outlet ports located outside the Pack (compatible with both standard quick-connect and self-sealing fitting solutions), ensuring there are no internal piping connections within the Pack to reduce the risk of coolant leakage.

2. The design employs cooling plate support blocks, the housing frame, and the housing base plate for the load-bearing design of the module; an air gap is maintained between the flow plate and the housing base plate, which is used for the thermal insulation design of the cooling plate.

3. The stamped and brazed water cooling plate is fixed to the housing frame using a pull riveting process.

4. Nano-fiber thermal insulation plates are used for the end plate's heat leakage prevention design to ensure the temperature difference requirements of the cells.

6.4. Specification for Control Module

Control module is the connection between the Battery and the communication cabinet, covering the electrical connection and the communication part. This chapter main introduce the interface and the electrical diagram.

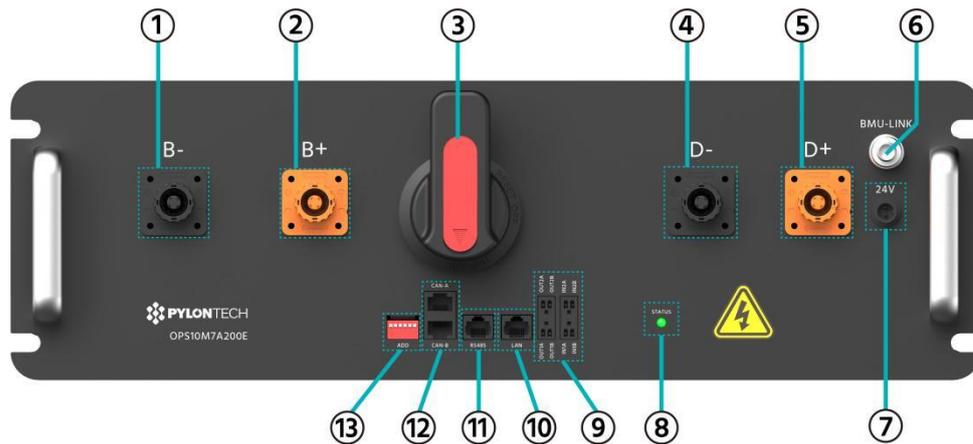
6.4.1. The appearance and the specification of the control module



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

Specifications	OPS10M7A200E
AC Supply for BMS	230VAC/50Hz/1.3A
System Operation Voltage (VDC)	0~1000
Dimension (mm)	460 (W) × 758 (D) × 160 (H)
Communication	RS485\CAN\LAN
Protection Class	IP20
Weight(kg)	21.25
Operation Life (Years)	15+

6.4.2. Interface of the battery control module



Control Module Front Interface

Item	Description	Item	Description
①	Power Terminal B-	⑧	Status LED
②	Power Terminal B+	⑨	Dry Contact
③	Circuit Breaker	⑩	LAN Port
④	External Power Terminal D-	⑪	RS485 Port
⑤	External Power Terminal D+	⑫	CAN-A, CAN-B Ports
⑥	BMU-LINK	⑬	ADD Switch
⑦	24VDC IN		

① Power Terminal B-

The battery 's DC connection for the negative pole.

② Power Terminal B+

The battery 's DC connection for the positive pole.

③ Circuit Breaker

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

④ Power Terminal D-

DC connection for the battery string to the negative pole of PCS.

⑤ Power Terminal D+

DC connection for the battery string to the positive pole of PCS.

⑥ BMU-LINK

Communication port to connect the battery module.

⑦ 24VDC IN

Connects to 24VDC external power for supplying power to the control module.

⑧ STATUS (LED)

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

⑨ 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	N/A (Not Applicable).
In2	Reserved	N/A (Not Applicable).
Out1	Reserved	N/A (Not Applicable).
Out2	Reserved	N/A (Not Applicable).

⑩ LAN Port

RJ45 port, follows Modbus protocol, used for communication between the battery system and LEMS, switch or upper controller.

⑪ RS485 Port

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

⑫ CAN A, CAN B Ports

CAN Communication Terminal: follows CAN protocol, for communication between the battery system and the PCS.

CAN A connects to another BMS (Battery control module).

CAN B connects to PCS.

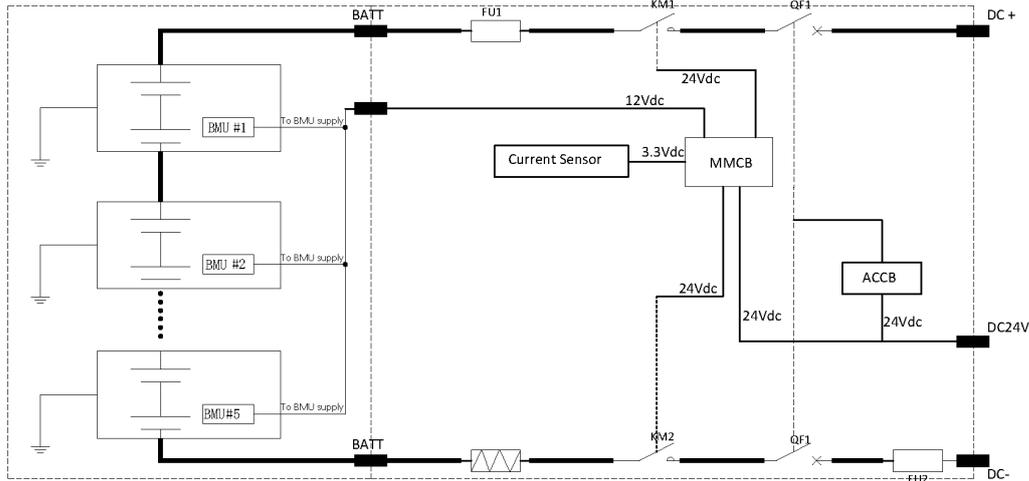
⑬ ADD Switch

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.

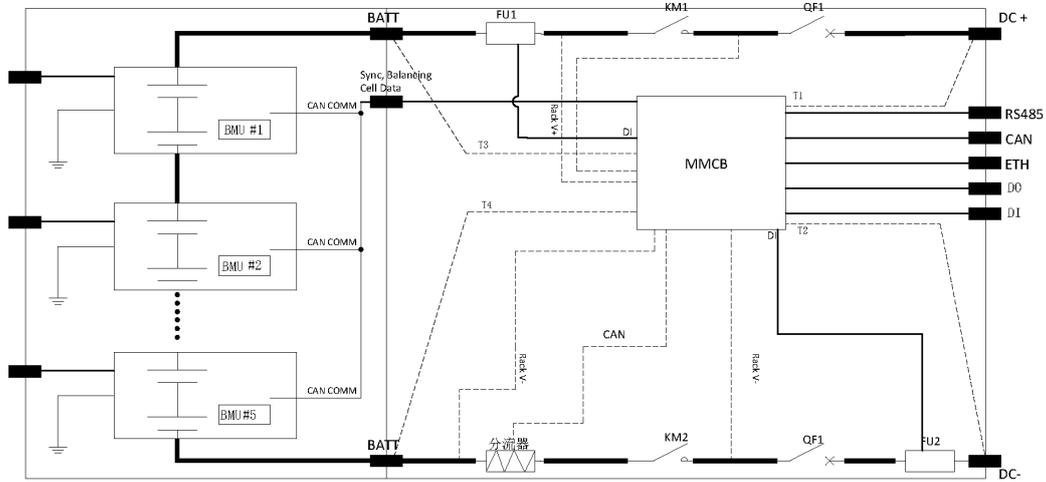
6.4.3. Electrical design

List of Key Components	Description
Breaker	Provide clear disconnection points and overcurrent protection function for the system
DC Contactor	Connect battery with system, protect the system
FUSE	Short circuit protection, quick cut-off system
Shut	Monitor the circuit and protect the system

Through professional electrical current carrying, protection, and overvoltage design, PylonTechnology has designed dedicated control modules to ensure the safe operation of the system. Combined with software testing, it ensures the safe operation of the entire product lifecycle.



Power supply diagram



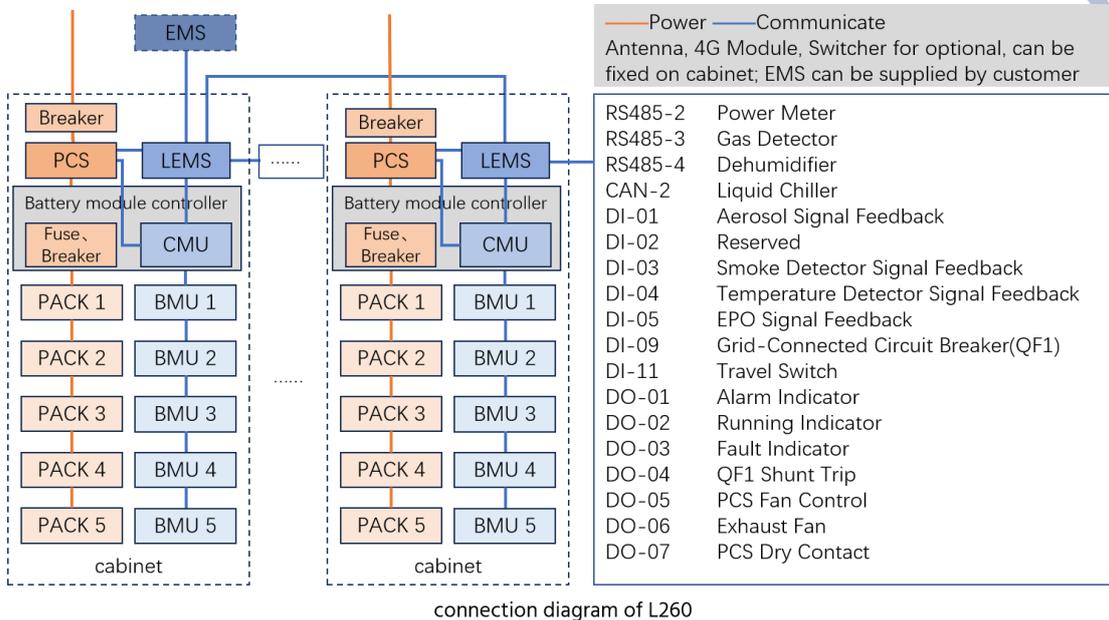
Communication Diagram



6.5. Specification for BMS

BMS plays a key role in battery systems, it will monitor the data of battery system, and make calculation of SOC and SOH, arrange the battery SOC balance, record and analyze these data and give alarm or fault information. The BMS also has protection functions, such as avoiding overcharging and discharging, short-circuit protection, etc., as well as controlling the battery temperature to ensure that the battery works within the appropriate temperature range, thereby improving battery performance and life. Pylontech has self-developed BMS, which can well realize the above functions.

For the Battery system, three level BMS structure will be adapt, they are BMU,BMS,LEMS. The three levels of BMS is as the following figure:



6.5.1. BMU

BMU is at the first level in the BMS of the energy storage system and is the most fundamental and critical level in the BMS system. It is mainly used to detect cell voltage, cell temperature, terminal temperature, fuse temperature, high voltage interlock switch status, smoke sensor data, and humidity sensor data in battery packs.

During the data detection process, BMU also conducts relevant fault diagnosis, such as sampling line fault diagnosis, AFE chip fault diagnosis, temperature sensor fault diagnosis, smoke sensor fault diagnosis, thermal runaway fault diagnosis, etc.

BMU will transmit the collected data, diagnosed fault causes, and fault diagnosis results to the CMU main control unit through communication.

BMU receives control instructions from CMU main control unit to execute actions. When there is inconsistency in the battery cells of the battery pack, BMU will activate the on-board balancing circuit based on the balancing instruction sent by CMU to balance the

batteries, ensure the consistency of the cells, improve the efficiency, lifespan, and safety of the entire battery pack.

The main functions of BMU are as follows:

1. Voltage detection of 52 strings of battery cells in the battery pack
2. Temperature detection of 16 channels in the battery pack
3. Temperature detection of two terminals of the battery pack
4. Temperature detection of battery pack fuse
5. Temperature detection of high-voltage interlock switch for battery pack
6. Data acquisition of temperature and humidity sensors for battery packs
7. Fault diagnosis of rapid temperature rise and thermal runaway in battery packs
8. Battery pack sleep wake-up function
9. Battery pack fault information recording function

6.5.2. CMU

CMU is the management device of the battery cluster system, responsible for collecting cell data of the entire battery cluster, data of each battery pack, and system data of the battery cluster, and controlling the operation of the entire battery cluster based on the collected data.

The data of individual cells and battery packs have been described in the BMU section, and will not be repeated here. The battery system data that CMU needs to collect includes system voltage, system current, relay status, circuit breaker/isolating switch status, fuse status, high-voltage box terminal temperature, etc.

CMU performs fault diagnosis based on the collected data to protect the safety of the battery system.

CMU controls the input and disconnection of the battery system based on the control instructions issued by LEMS.

The main functions of CMU are as follows:

10. Cascade startup

The main control unit CMU and the lower level BMU are connected to each other through a cascade line, and when turned on, the BMU is started by holding hands. CMU first starts the power supply of the first BMU, and after the first BMU completes the startup and obtains the address. Start the second BMU and perform address allocation until the last BMU completes startup and address allocation.

11. CAN communication function

The main control unit CMU communicates data with the BMU through the CAN interface, and the BMU actively uploads the collected cell data and battery pack data to the CMU periodically through the CAN interface. At the same time, CMU sends balancing

instructions, sleep instructions, and shutdown instructions to BMU through the CAN interface.

12. LAN communication function

The main control unit CMU communicates with the third level device LEMS through the LAN interface. CMU sends system data of battery clusters, battery pack data, individual cell data, and battery pack system status to LEMS through the LAN interface. LEMS sends control instructions to BMS through the LAN port, and BMS switches on and off the battery cluster based on the issued power on and power off instructions. The LAN communication interface supports the establishment of two connections simultaneously on the same port.

13. Temperature detection

In addition to real-time processing of information such as cell temperature, terminal temperature, fuse temperature, etc. sent by BMU. CMU also collects real-time terminal temperatures on the main control box, and executes fault diagnosis strategies for different temperature data to detect system anomalies.

14. Current sampling

Complete the sampling of system current through a current sampling template.

15. Voltage sampling

Complete voltage sampling of the battery terminal and output terminal through a voltage sampling template, and execute corresponding fault diagnosis and protection strategies based on the collected terminal voltage.

16. Feedback contact detection

The main control CMU board is equipped with feedback contact detection, which detects the status of relays, fuses, circuit breakers/isolating switches through feedback contacts to determine whether the relevant equipment is normal.

17. Relay/Circuit Breaker Control

In the event of a malfunction, the main control CMU will actively disconnect the relay. In the event of a short circuit, the main circuit breaker should be disconnected to protect the battery system.

18. DIDO output

The main control CMU has DIDO function reserved.

19. Device address configuration

The main control CMU has the function of setting device addresses. There is a dip switch on the CMU hardware board, which can set the device address of the main control to 1-31 according to the actual situation, and generally not set to 0.

20. SOC calculation

The main control CMU calculates the SOC of the battery system based on parameters such as charge and discharge status, cell voltage, cell temperature, and system operating

current.

21. SOH calculation

The main control CMU calculates the State of Health (SOH) of the battery system based on the charging and discharging status, cell voltage, cell temperature, system operating current, cycle charging and discharging times, cumulative charging and discharging energy, and the decay rate of cell capacity.

22. SOP management

The main control CMU outputs the SOP parameters of the battery system based on the charging and discharging status, cell voltage, cell temperature, system SOH, and other parameters.

23. Fault diagnosis

The main control CMU executes fault diagnosis strategies based on the system's charging and discharging status, cell voltage, temperature, current, battery pack voltage, terminal temperature, and other data. The faults are divided into four levels, namely level 3, level 2, level 1, and level 0. Among them, the level 3 fault alarm has no impact on the operation of the system. Level 2 fault alarm, 50% current limit will be applied. Level 1 fault, the system will prohibit charging and discharging. Level 0 fault, the system will prohibit charging and discharging, and a diagnostic tool is required to clear it.

24. Insulation resistance inspection

During the startup process, the main control CMU will perform an insulation resistance check on the battery cluster. After the insulation resistance check is completed, the system enters standby mode. When the battery system is not in operation, the main control CMU will periodically check the insulation resistance of the battery cluster.

6.5.3. LEMS

LEMS is usually installed in the control cabinet of a battery system, used to manage one or more battery units (all battery clusters connected to the DC side of PCS) in a battery cabinet, including the collection, calculation, and reception of battery system data from superiors, issuing instructions to various battery clusters, thermal management system, power conversion system, and other equipment according to control and protection strategies. At the same time, it can record all control instructions and historical data. LEMS can achieve comprehensive control and protection of prefabricated energy storage battery compartments, and communicate with PCS and energy storage monitoring layers. Battery management function:

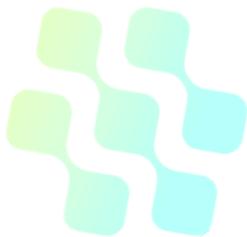
1. Discharge management: During the discharge process, control the battery voltage above the minimum allowable discharge voltage and send the maximum allowable discharge current to EMS and PCS.
2. Charging management: During the charging process, control the battery voltage

below the maximum allowable charging voltage and send the maximum allowable charging current to EMS and PCS.

3. Balance management: It can control the opening and closing of the balance function of each BCMU.

4. Thermal management: Sending battery temperature information and other control signals to the thermal management system to achieve thermal management system control, which can control the on/off of the liquid chiller, issue target temperatures, and control the operating mode.

5. High voltage management: By communicating with BCMU, the contactor of the battery cluster can be controlled to close and open, the opening and closing of the battery cluster can be controlled. The pin is connected to the PCS emergency stop at the contact point and can actively send an emergency stop signal.



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6.6. Specifacation for structure and applycation

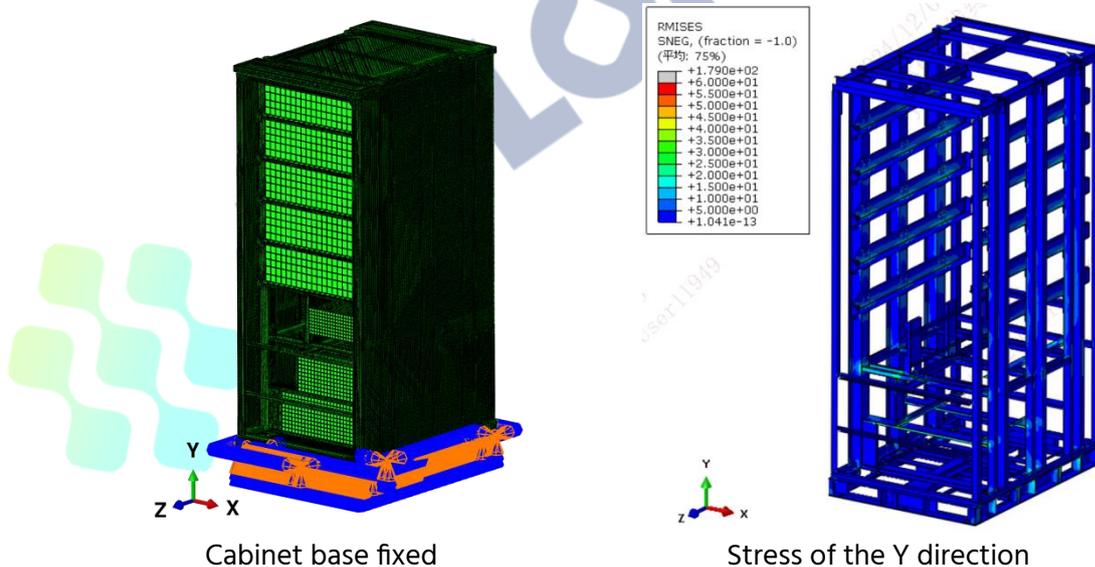
The simulation results of the product structure are as follows.

Simulation working condition	Simulation conclusion
ISTA-3E transport vibration condition	Pass
Vertical lifting condition	Pass
Snow load condition	Pass
Wind load condition	Pass
IEEE 693 Recommended Practice for Seismic Design of Substations	Pass

6.6.1. Transport Vibration Simulation

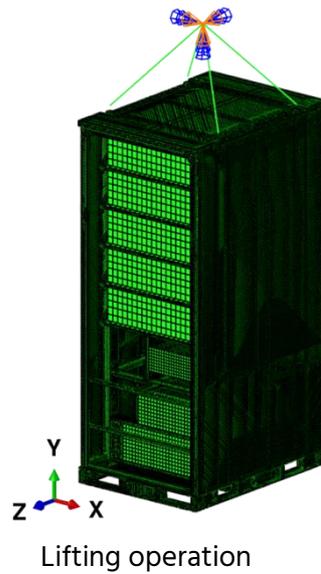
Working condition: ISTA-3E Transport Vibration Condition. The bottom of the cabinet is fixed as shown in the figure.

Results: The overall stress of the cabinet is below 60 MPa, which is considered safe. The results in the Y direction are shown in the following figure.



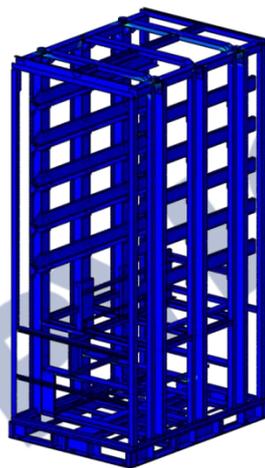
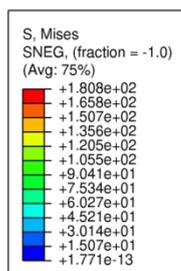
6.6.2. Lifting Simulation

Working condition: 45° inclined lifting, 2g acceleration. The illustration of the lifting operation is as follows.

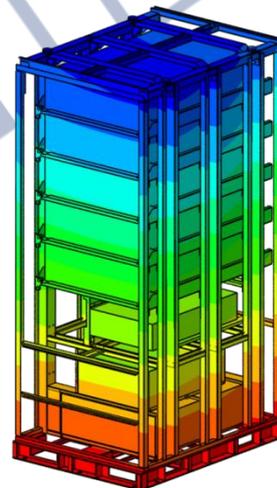
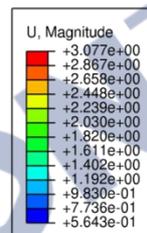


Results:

1. Maximum stress of 180 MPa occurs at the end of the PCS crossbeam.
2. Maximum deformation: 0.6 mm.



Stress of lifting simulation



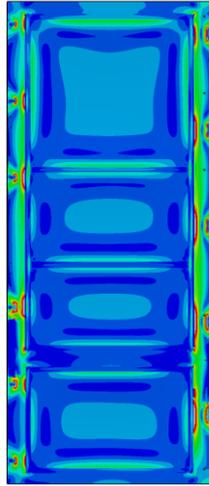
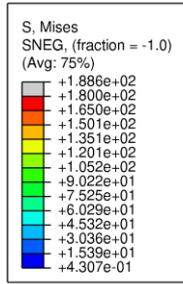
Deformation of lifting simulation

6.6.3. Wind & Snow load

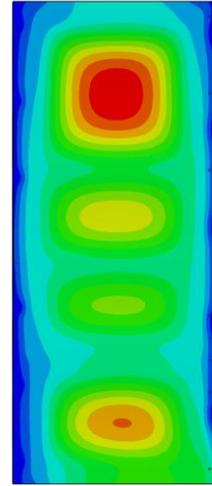
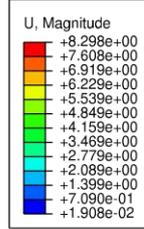
Working condition: Category 5 hurricane, wind speed 70 m/s; 150 pounds per square foot snow load. The bottom of the cabinet is fixed.

Results:

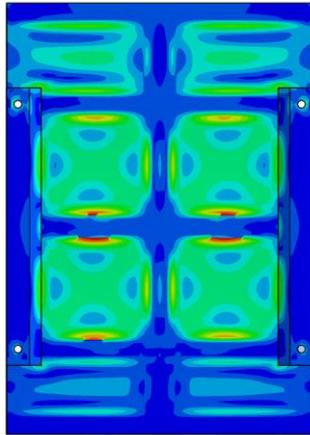
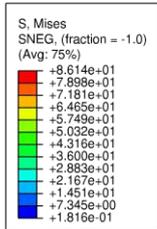
1. Overall stress of the door panel is below 180 MPa.
2. Maximum deformation: 8.3 mm, located at the upper part of the door panel.
3. Maximum stress is 86 MPa, which is less than the criterion of 180 MPa.
4. Maximum deformation: 1.7mm.



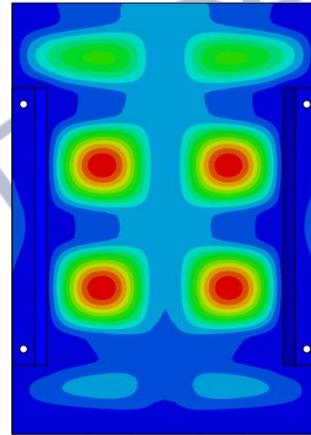
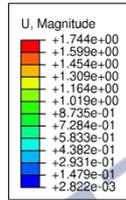
Stress of wind load



Deformation of wind load



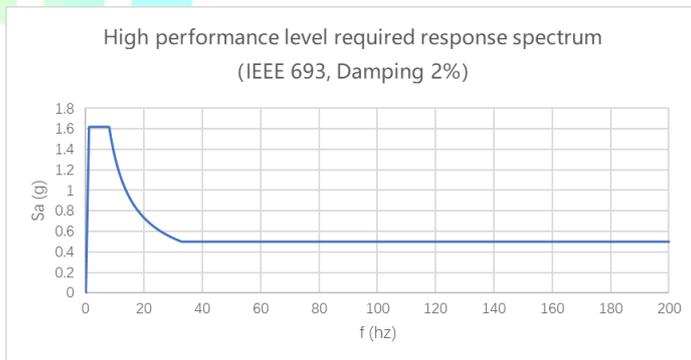
Stress of snow load



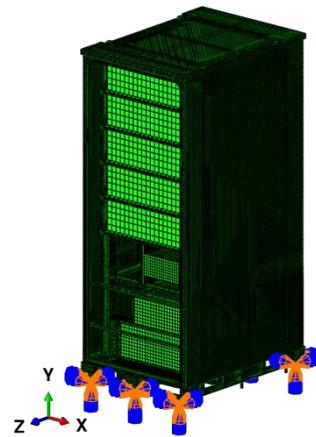
Deformation of snow load

6.6.4. Seismic Simulation

Working condition: IEEE693 Seismic Response Spectrum Curve is as below. The lower parts of the 6 anchor bolts at the front and rear are fixed.



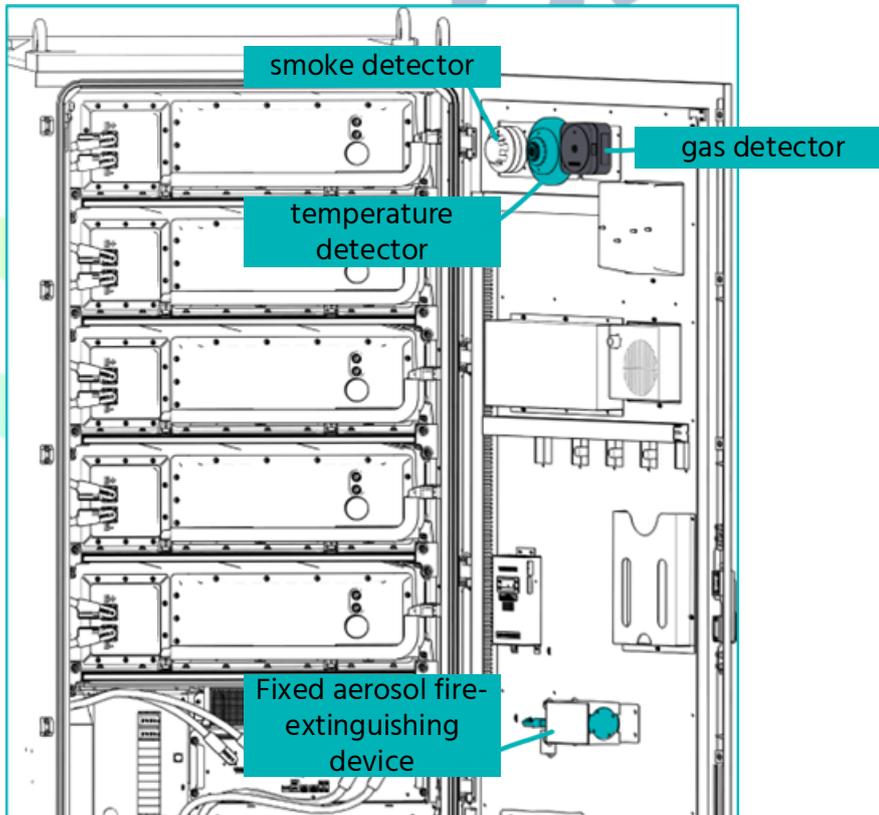
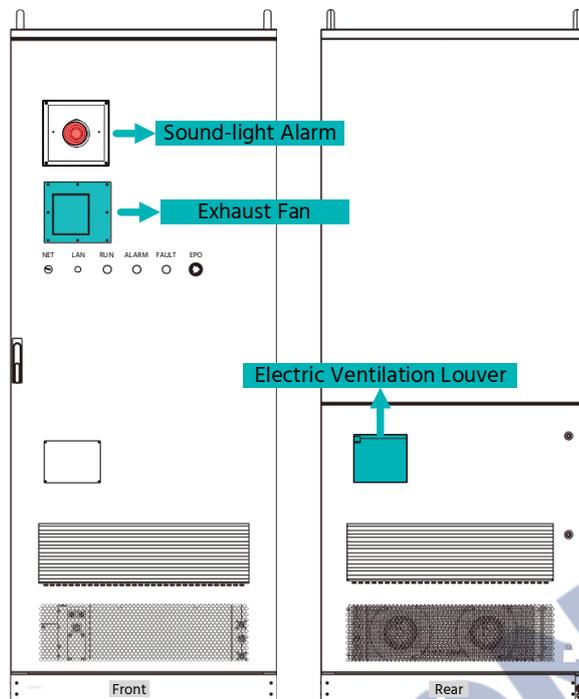
IEEE693 Seismic Response Spectrum Curve



Cabinet base fixed

6.7. Specification for FSS

6.7.1. The FSS layout of the cabinet



6.7.2. System Description

This fire protection system mainly consists of four subsystems.

1. Fire Detection and Alarm System

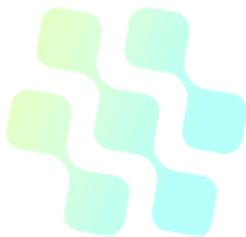
The fire detection and alarm system is composed of smoke detectors, temperature detectors, gas detectors, and sound and light alarms. When any detector detects an alarm signal, the sound and light alarm will act, alerting relevant personnel through auditory and visual means, and transmitting the signal to the control device in the outdoor cabinet to implement relevant safety strategies, such as cutting off power.

2. Fire Extinguishing System

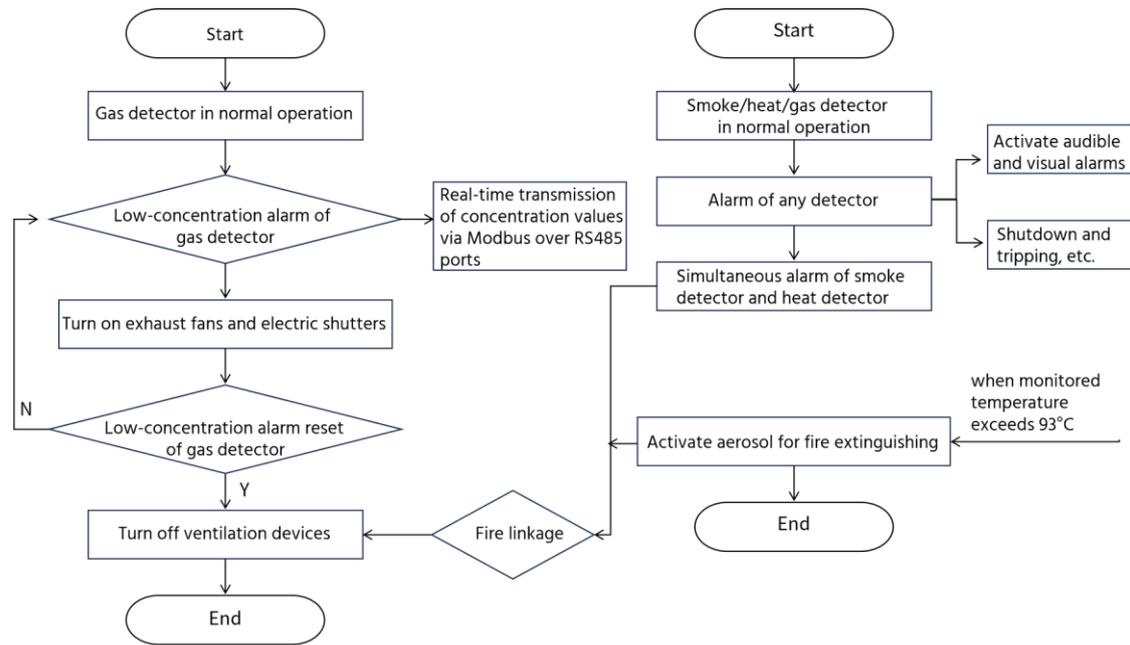
The fire extinguishing device is composed of aerosol, temperature-activated self-starting device, and discharge signal feedback device. When the temperature reaches above 93°C, the aerosol will automatically start and send the discharge feedback to the control device in the outdoor cabinet to implement relevant safety strategies, such as cutting off power.

3. Explosion-proof Ventilation System

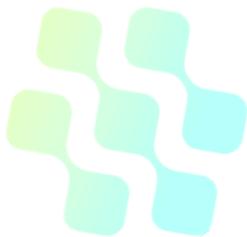
The explosion-proof ventilation system is composed of gas detectors, air intake devices, and explosion-proof exhaust devices. When the gas detector detects a concentration reaching the first threshold of 10% LEL, it will automatically activate the air intake and exhaust devices to remove flammable gases from the cabinet and prevent the accumulation of flammable gases inside the cabinet from causing an explosion. The gas detector will transmit the real-time concentration to the control device in the outdoor cabinet to implement relevant safety strategies, such as cutting off power.



6.7.3. FSS action logic diagram



Gas detection & fire protection system logic diagram



6.8. Specification for HVAC

6.8.1. Solution of thermal management system

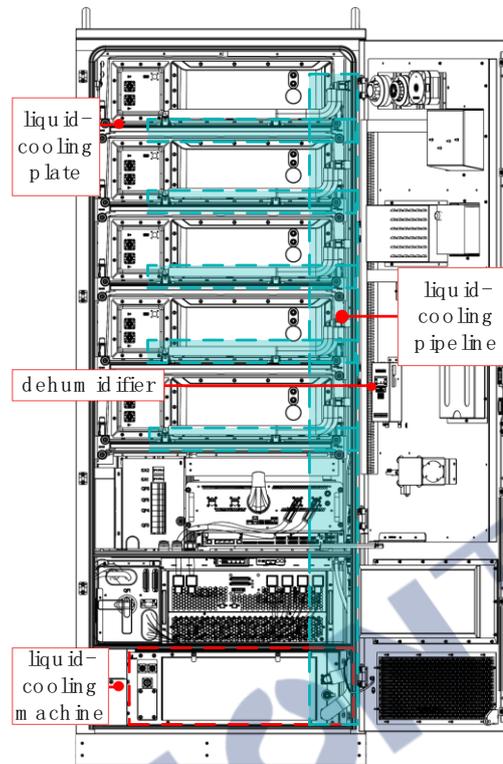


Figure Schematic diagram of thermal management system

1. Liquid-cooling battery pack

It adopts IP67 design. The water cooling plate connectors are located outside the pack, ensuring that the leakage of antifreeze will not affect the electrical safety inside the Pack.

2. Liquid-cooling pipeline

A bidirectional cutoff piping scheme is designed for the battery pack to facilitate the disassembly and maintenance work of the battery pack.

Due to the extensive use of bidirectional cutoff valves, the system does not need to refill or drain liquid during maintenance and repair, avoiding long-term downtime and enabling quick repair and replacement.

3. Liquid chiller

It is linked with LEMS to adjust the outlet water temperature reasonably based on the temperature conditions inside the battery pack and the cabinet. This ensures that the cell temperature is controlled within the long-life environmental range.

4. Intelligent dehumidifier

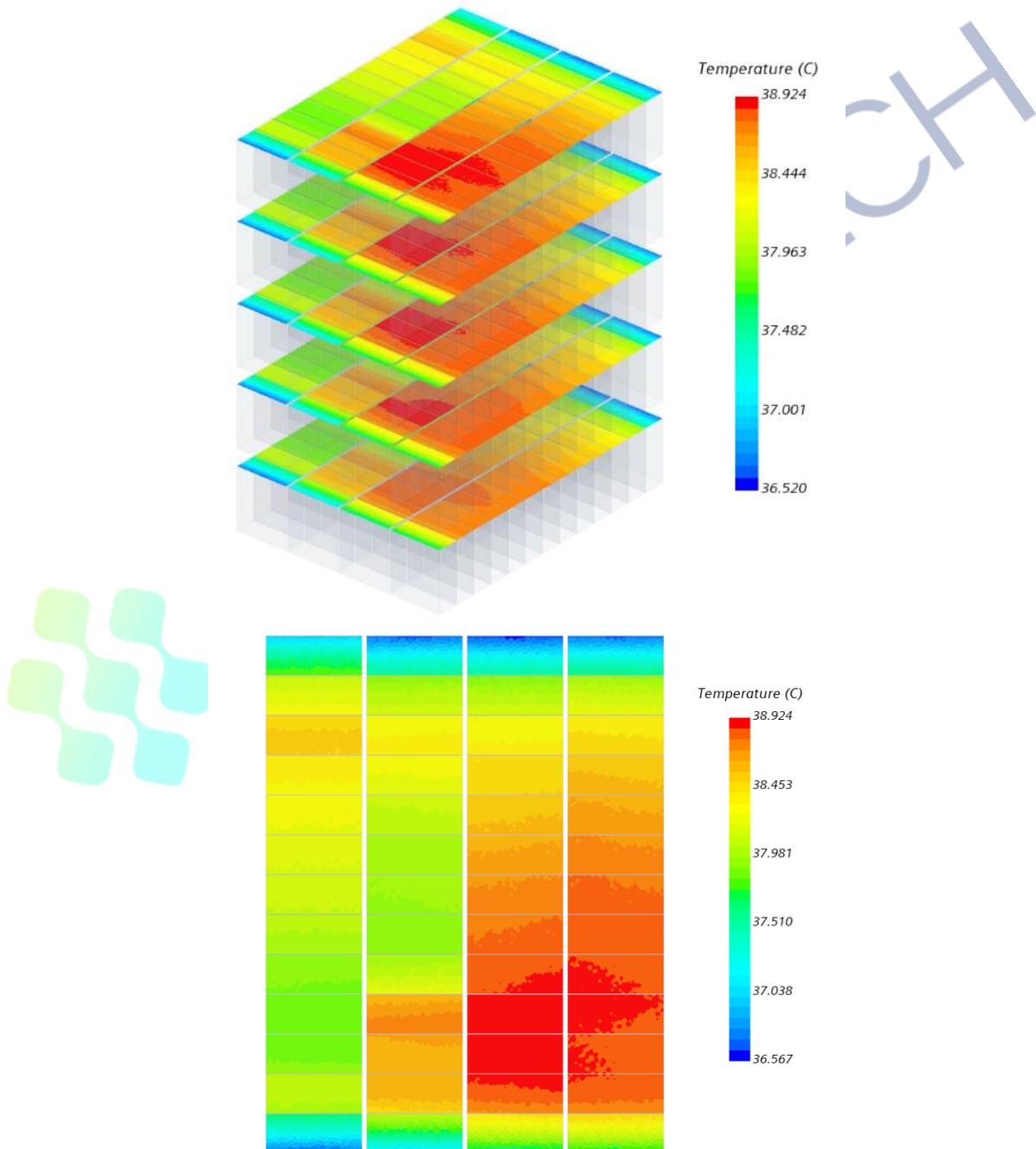
It is linked with EMS to turn on and off in a timely manner based on the cabinet's temperature and humidity. This reduces the risk of condensation in the cabinet while also

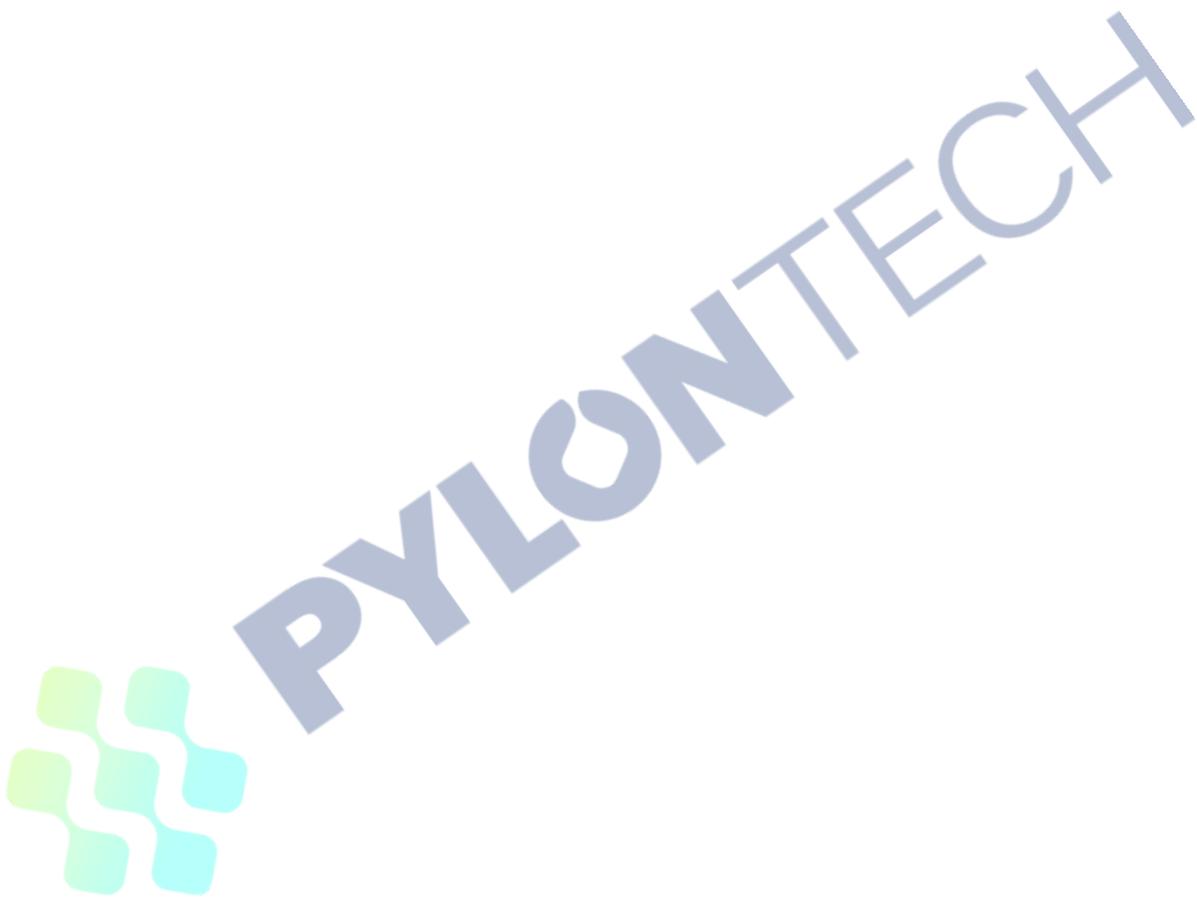
considering the overall energy consumption of the machine.

6.8.2. Simulation data of thermal management system

The following figure shows the temperature cloud map of the battery cells in the system under a 0.5P continuous cycling condition in a 25°C environment:

1. The highest temperature at the "center of the upper surface" of the battery cells in the system is: 38.9°C
2. The maximum temperature difference at the "center of the upper surface" of the battery cells in the system is: 2.5°C





6.9. PCS

The directional PCS realizes the charge and discharge control of the energy storage battery. It is an important part of the smart grid, which can regulate power resources and ensure the normal operation of the grid. On one hand, the PCS can invert the direct current of the energy storage battery into alternating current to supply power to the load or input into the grid; on the other, the PCS can rectify the alternating current of the grid into direct current to charge the energy storage battery.



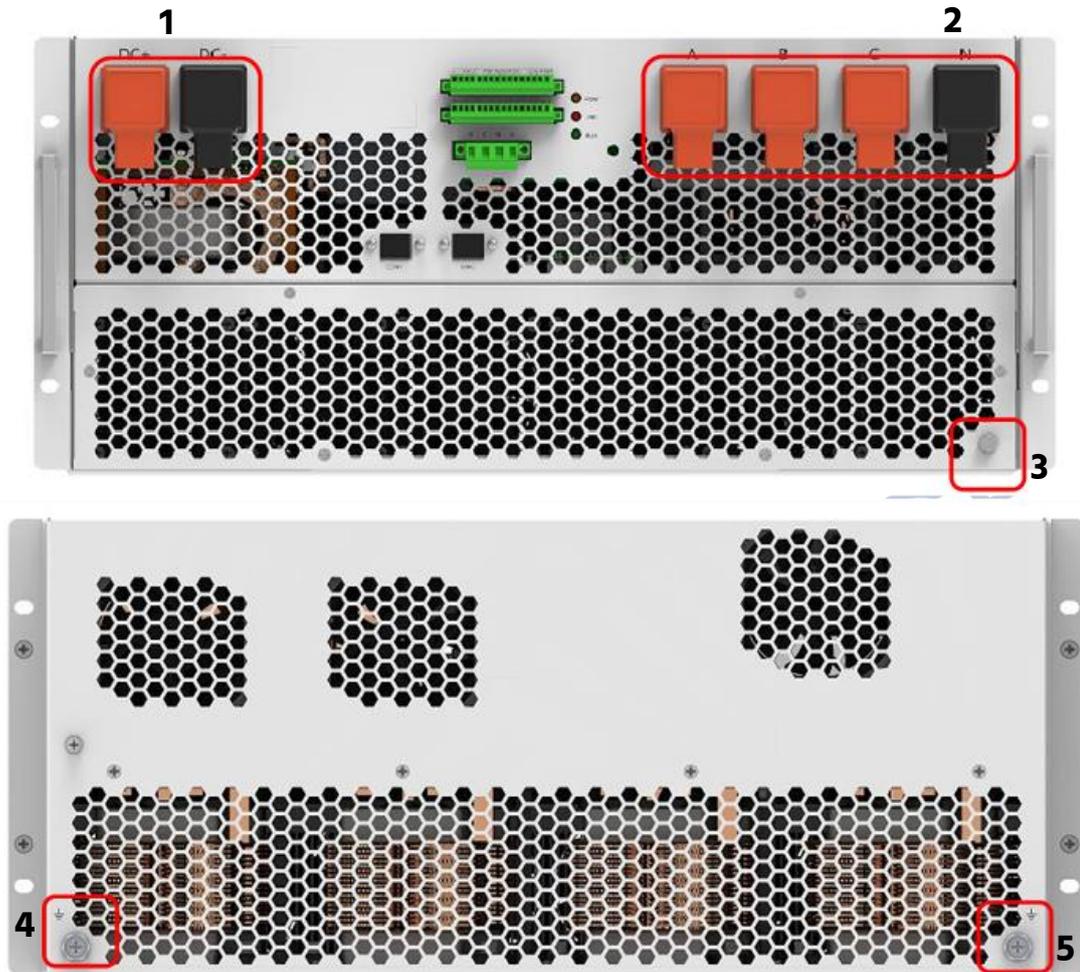
6.9.1. Specifications of the PCS

Model		INPPCS-125/0.4-W-14-A2-OS
Battery port	Max. DC Voltage (V)	1000
	Min. DC Voltage (V)	600
	DC Voltage Range (V)	630-950
	Max. DC Current (A)	217
	Rated DC power (kW)	125
	Max. DC Power (kW)	137.5
	Overvoltage Category (OVC)	II
AC on-grid port	AC Rated Input/Output Active Power (kW)	125
	AC Rated Input/Output Apparent Power (kVA)	125
	Max. AC Input/Output Current (A)	198
	Nominal AC Voltage U_r (V)	3L/N/PE, 400/230
	AC Voltage Tolerance	-15%- +15%
	Nominal Frequency/Frequency (Hz)	50/60
	Harmonic (THDi)	≤3% (at nominal Power) , Linear load

	Power Factor	-0.99- +0.99, At nominal power
	Adjustable Reactive Power Range	-100%-100%
	Overvoltage Category (OVC)	III
	Rated Conditional Short-circuit Current (A)	10k
AC off-grid output	Nominal AC Voltage Ur (V)	3L/N/PE, 400/230
	AC Voltage Tolerance	AC 400V ± 3%
	AC Rated Input/Output Apparent Power (kVA)	125
	Max. AC Input/Output Current (A)	198
	Harmonic THDu	≤3%, Linear load
	DC Voltage Component	<0.5%, Linear load
	Unbalance Load Capacity	100%
	Nominal Frequency/Frequency (Hz)	50/60
System	Type of Inverter	Non-isolated
	Ingress Protection (IP)	IP20
	Operating Temperature Range (°C)	-30-55°C (>50 derating)
	Max. Operating Altitude (m)	4000 (>2000 derating)
	Enclosure Dimensions (W × H × D, mm)	520 × 240 × 680
	Weight (kg)	≤70

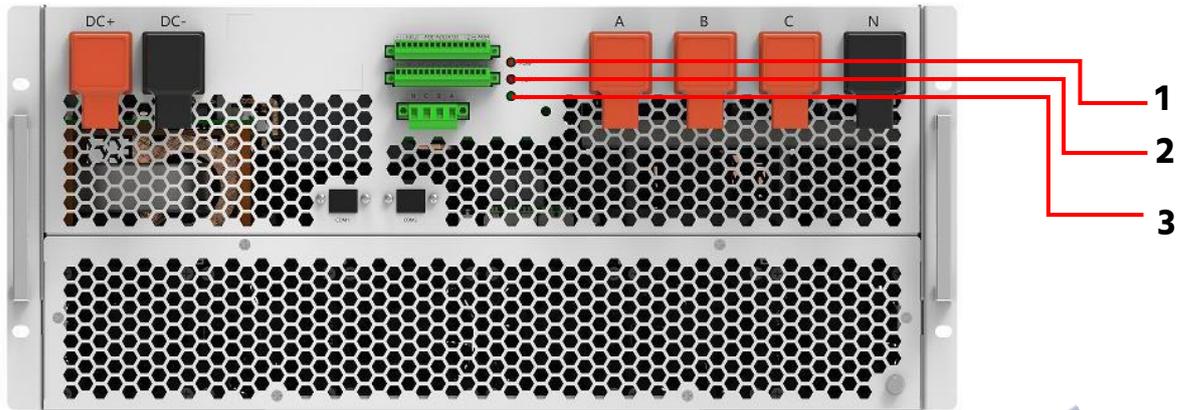


6.9.2. Front and Rear Interface Panel of the PCS



No.	Item	Description
1	DC wiring port	Connect the DC cables from Battery String [D+] to PCS [D+], Battery String [D-] to PCS [D-].
2	AC wiring port	Connect the cables from AC side to the A, B, C, N phases of the PCS, ensuring correct phase sequence.
3/4/5	Grounding points	Choose one of the points for grounding connection.

6.9.3. LED Indicators



Description of LED indicators

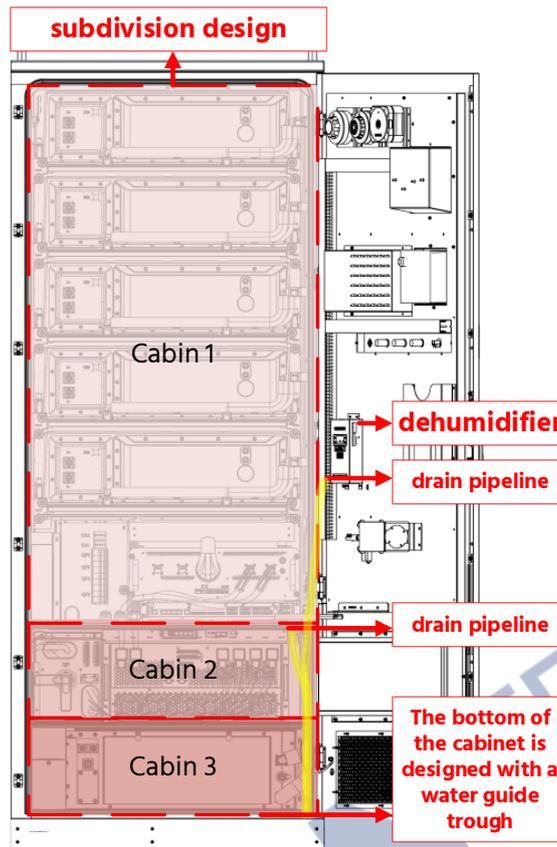
No.	Display Color	Description
1	 Yellow LED Indicator	Power indication: it will stay on when DC input is above 60V.
2	 Red LED Indicator	Alarm indication: it will stay on when there is a fault in the module.
3	 Green LED Indicator	Operation indication: it will flash during standby/shutdown, and stay on when the module is running.



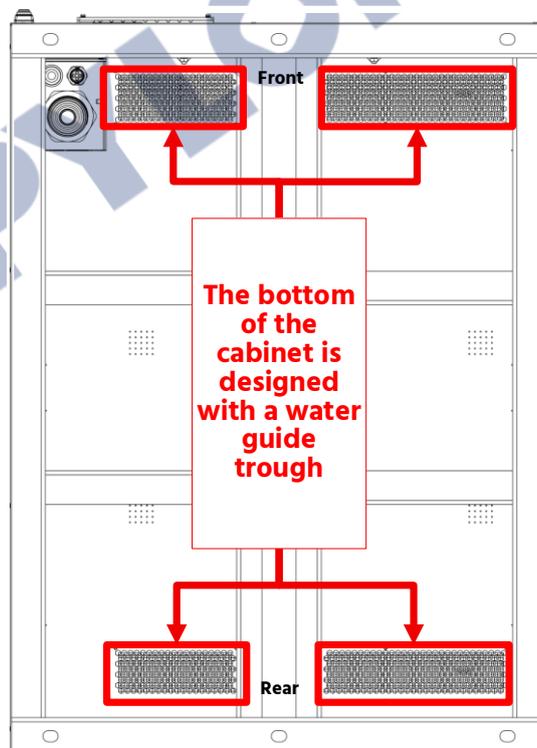
Appendix

Leak-proof Design

1. Leakage risk assessment that may result from material compatibility: In order to avoid the leakage risk caused by the reaction caused by the long-term contact between the coolant and the non-metallic materials inside the liquid cooling system, the compatibility test was carried out on the pipes, joints, sealing rings and non-metallic materials inside the unit, and the test results showed that the selected coolant and related materials had good compatibility.
2. Leakage risk assessment inside the battery pack: The connection interface between the liquid cold plate and the pipeline is designed outside the battery pack to ensure that there is no connection point inside the battery pack and avoid the possible leakage risk inside the battery pack.
3. Leak-proof design of each connection point of the pipeline: (1) The plug-in connection position adopts a double sealing ring design; (2) The crimping position adopts the design of expansion joint and reinforcing ring to ensure the reliability of the connection.
4. Verification of the reliability of each connection of the pipeline and the reliability of the liquid cold plate itself during the transportation vibration process: In order to investigate the performance of the product in the transportation process, Pylontech launched the road test project of the liquid-cooled cabinet energy storage system in July 2024. After a about 4,000km/126h road test, the entire cabinet system can still maintain a stable operating state, which further verifies that the product still maintains stability and reliability even in the harsh transportation vibration process.
5. System leakage detection: the water circulation side of the liquid-cooled unit is equipped with a water pressure sensor, when there is leakage during the operation of the system and the pressure is less than 20kPa, the unit will report a low-pressure fault, and the fault information will be fed back to the after-sales end through the cloud platform, so as to go to the site for troubleshooting in time.
6. Drainage design of the cabinet system: If there is a large amount of coolant leakage in the liquid cooling system, the coolant can be quickly discharged out of the cabinet through the drainage hole at the bottom of the cabinet, so as to avoid the accumulation of coolant in the box and cause electrical safety problems.

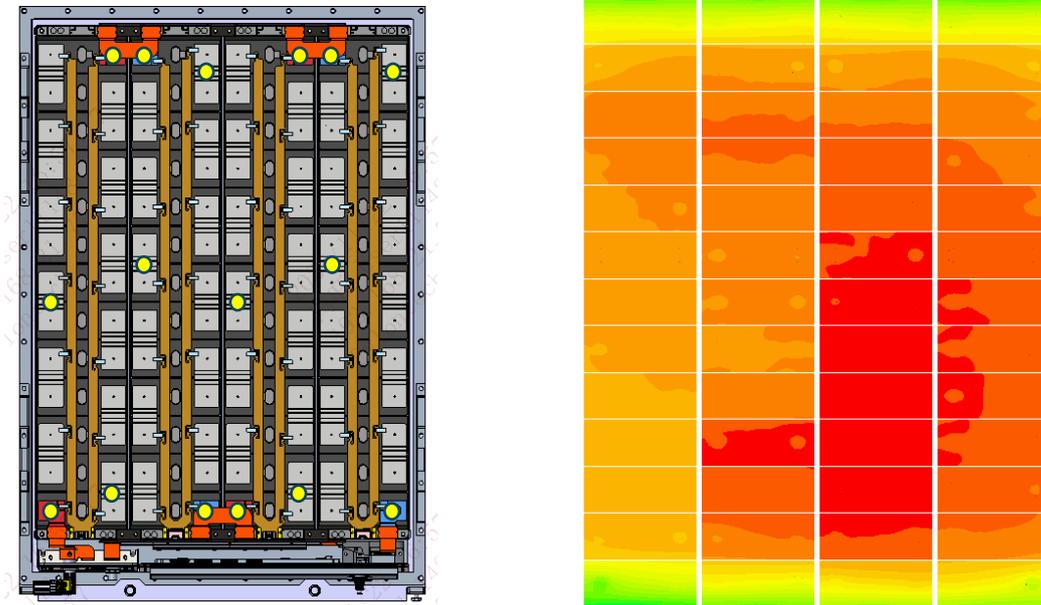


drainage design of the cabinet system



design of floor drain at the bottom of the cabinet

Pack Thermal Management Scheme -NTC- Layout Scheme Description



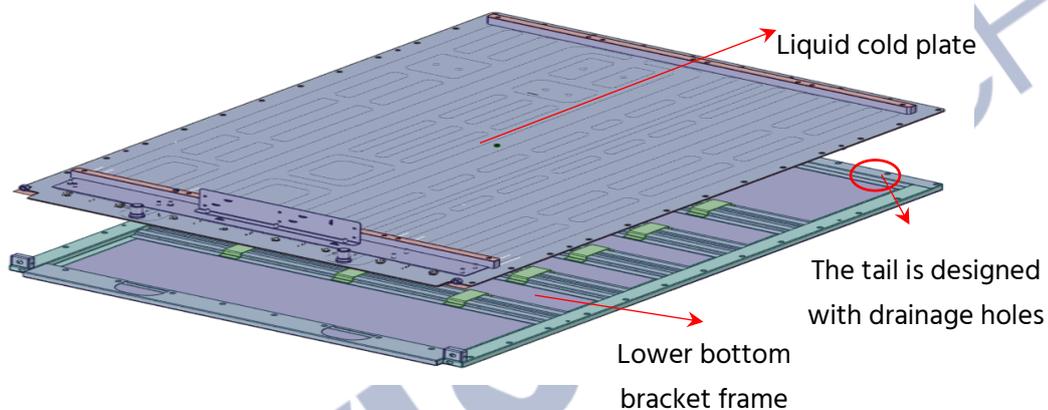
schematic diagram of NTC layout scheme of battery pack

NTC Layout Scheme Description:

1. Each module is equipped with 4 NTCs, and there are 16 packs in total;
2. The NTC layout position can monitor the maximum temperature and minimum temperature of the Pack cell;
3. The bolt connection points of each module are arranged with NTC, and if the connection is loose, it can be identified by temperature change in time;
4. The NTC distribution position of the module is kept uniform, so that it can be collected in time when the temperature of the battery cell is abnormal, and the early warning of thermal runaway can be made according to the feedback temperature signal, and timely intervention in the thermal runaway of the battery cell can be carried out to ensure the safety of system operation.

Anti-condensation Design

1. Anti-condensation design inside the battery pack: The battery pack adopts IP67 design, which can prevent external water molecules from entering the inside of the pack, and there is a humidity collection point inside the pack to control the initial humidity value inside the pack to be in a low state;
2. Anti-condensation design on the outside of the Pack: The bottom of the liquid cold plate is designed with a bottom bracket frame to avoid condensate on the surface of the liquid cold plate from dripping directly to the lower Pack, and the tail of the lower bottom bracket is designed with a drainage hole, which can realize the directional discharge of condensate and avoid dripping onto the high-pressure connector;

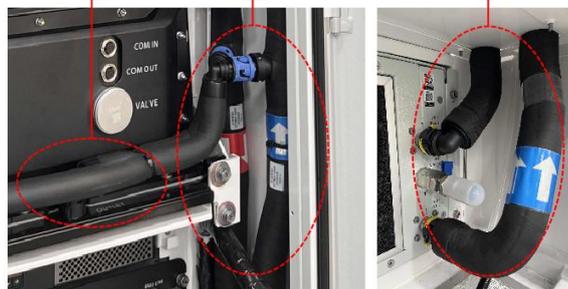


schematic diagram of the bottom bracket structure under the battery pack

3. Anti-condensation design of the pipeline: the exterior of the primary pipeline, the secondary pipeline and the tertiary pipeline are covered with 5mm foam to avoid the condensation dripping onto the electrical parts;



The tertiary tubing is covered with 5mm foam The secondary tubing is covered with 5mm foam The primary tubing is covered with 5mm foam



anti-condensation design of liquid-cooled pipelines

4. Dehumidifier installed inside the cabinet: There is 60W dehumidifiers arranged inside the system, and when the humidity inside the cabinet exceeds 60%, it will be turned on to reduce the humidity in the cabinet.

Thermal Management Strategies

In terms of thermal management strategy, the temperature threshold of the liquid cooling unit is adjusted according to different charging and discharging currents, so as to ensure that the temperature of the battery cells is controlled within an appropriate range while taking into account the energy consumption of the system.

Operation strategy of liquid-cooled unit

	Working mode	Trigger conditions	Close the condition	Remark
Control policy	Refrigeration mode	The following conditions are triggered when they occur at the same time: 1. It is not in the alarm state; 2. The charge and discharge current $\geq 0.4C$, and the current duration $\geq 2\text{min}$; 3. The maximum temperature of the battery cell $\geq 30^\circ \text{C}$.	When any of the following conditions occurs, it is closed: 1. Trigger each warning state; 2. The maximum temperature of the battery cell $\leq 27^\circ \text{C}$, and the refrigeration holding time $\geq 10\text{min}$.	Target water temperature: 21°C
		The following conditions are triggered when they occur at the same time: 1. It is not in the alarm state; 2. The charge and discharge current $\geq 0.25C$, and the duration of $<0.4C \geq 2\text{min}$; 3. The maximum temperature of the battery cell $\geq 34^\circ \text{C}$.	When any of the following conditions occurs, it is closed: 1. Trigger each warning state; 2. The maximum temperature of the battery cell $\leq 31^\circ \text{C}$, and the refrigeration holding time $\geq 10\text{min}$.	
		The following conditions are triggered when they occur at the same time: 1. It is not in the alarm state; 2. Charge and discharge current $< 0.25C$; 3. The maximum	When any of the following conditions occurs, it is closed: 1. Trigger each warning state; 2. The maximum temperature of the battery cell $\leq 35^\circ \text{C}$, and the refrigeration holding time $\geq 10\text{min}$.	

		temperature of the battery cell $\geq 38^{\circ} \text{C}$.		
	Heating mode	The following conditions are triggered when they occur at the same time: 1. It is not in the alarm state; 2. The minimum temperature of the battery cell $\leq 15^{\circ} \text{C}$.	When any of the following conditions occurs, it is closed: 1. Trigger each warning state; 2. The minimum temperature of the battery cell $\geq 21^{\circ} \text{C}$.	Target water temperature: 30°C
	Self-circulating mode	The following conditions are triggered when they occur at the same time: 1. It is not in the alarm state; 2. The water cooler is not in the refrigeration working mode; 3. The water cooler is not in the heating mode; 4. The maximum temperature difference of the battery cell $\geq 8^{\circ} \text{C}$.	When any of the following conditions occurs, it is closed: 1. Trigger each warning state; 2. The water cooler triggers the refrigeration working mode; 3. The water cooler triggers the heating working mode; 4. The maximum temperature difference of the battery cell $\leq 5^{\circ} \text{C}$; 5. The self-circulation time is $\geq 4\text{h}$.	/
	Standby mode	Any of the following conditions are triggered: 1. It is not in the alarm state; 2. The water cooler is not in the refrigeration working mode; 3. The water cooler is not in the heating mode; 4. The water cooler is not in self-circulating working mode.	The following conditions occur at the same time, which is closed: 1. Do not trigger each warning state; 2. The water cooler triggers the refrigeration working mode, or the heating working mode, or the self-circulating working mode.	/